SECTION EC
ENGINE CONTROL SYSTEM

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QG18DE (EXC CALIF CA)

QG18DE (CALIF CA)

QR25DE

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HO2S1 (B1)	P0134	EC-226
HO2S1 (B1)	P1143	EC-450
HO2S1 (B1)	P1144	EC-456
HO2S1 (B2)	P0152	EC-208
HO2S1 (B2)	P0153	EC-216
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*1: 1st trip DTC No. is the same as DTC No.
*2: These numbers are prescribed by SAE J2012.
*3: When the fail-safe operation occurs, the MIL illuminates.
*4: These DTCs are displayed with CONSULT-II only.
*5: The MIL illuminates when both the “Revolution sensor signal” and the “Vehicle speed sensor signal” meet the fail-safe condition at the same time.

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UBS001C2

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DTC*1*2 CONSULT-II GST	Items (CONSULT-II screen terms)	Reference page
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P0303	CYL3 MISFIRE	EC-290
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P0335	CKP SEN/CIRCUIT	EC-300
P0340	CMP SEN/CIRCUIT	EC-306
P0350	IGN SIGNAL-PRIMARY	EC-312
P0400	EGR SYSTEM	EC-321
P0403	EGR VOL CON/V CIR	EC-328
P0405	EGR TEMP SEN/CIRC	EC-335
P0406	EGR TEMP SEN/CIRC	EC-335
P0420	TW CATALYST SYS-B1	EC-341
P0430	TW CATALYST SYS-B2	EC-341
P0441	EVAP PURG FLOW/MON	EC-345
P0442	EVAP SMALL LEAK	EC-353
P0444	PURG VOLUME CONT/V	EC-364
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P0605	ECM	EC-438
P0705	PNP SW/CIRC	AT-114
P0710	ATF TEMP SEN/CIRC	AT-119
P0720*5	VEH SPD SEN/CIR AT	AT-124
P0725	ENGINE SPEED SIG	AT-128
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DTC*1*2 CONSULT-II GST	Items (CONSULT-II screen terms)	Reference page
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P0740	TCC SOLENOID/CIRC	AT-155
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P0755*3	SFT SOL B/CIRC	AT-180
P1102	MAF SENSOR	EC-172
P1111	INT/V TIM V/CIR-B1	EC-440
P1140	INTK TIM S/CIRC-B1	EC-445
P1143	HO2S1 (B1)	EC-450
P1144	HO2S1 (B1)	EC-456
P1146	HO2S2 (B1)	EC-462
P1147	HO2S2 (B1)	EC-470
P1148	CLOSED LOOP-B1	EC-479
P1163	HO2S1 (B2)	EC-450
P1164	HO2S1 (B2)	EC-456
P1166	HO2S2 (B2)	EC-462
P1167	HO2S2 (B2)	EC-470
P1168	CLOSED LOOP-B2	EC-479
P1217	ENG OVER TEMP	EC-481
P1402	EGR SYSTEM	EC-494
P1442	EVAP SMALL LEAK	EC-501
P1444	PURG VOLUME CONT/V	EC-503
P1446	VENT CONTROL VALVE	EC-510
P1448	VENT CONTROL VALVE	EC-515
P1456	EVAP VERY SML LEAK	EC-393
P1464	FUEL LEVL SEN/CIRC	EC-522
P1490	VC/V BYPASS/V	EC-525
P1491	VC CUT/V BYPASS/V	EC-531
P1605	A/T DIAG COMM LINE	EC-538
P1705*3	TP SEN/CIRC A/T	AT-184
P1706	P-N POS SW/CIRCUIT	EC-541
P1760	O/R CLTCH SOL/CIRC	AT-192

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

PFP:00001

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

UBS001C3

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. Information necessary to service the system safely is included in the SRS and SB section of this Service Manual.

WARNING:

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

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

UBS001C4

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

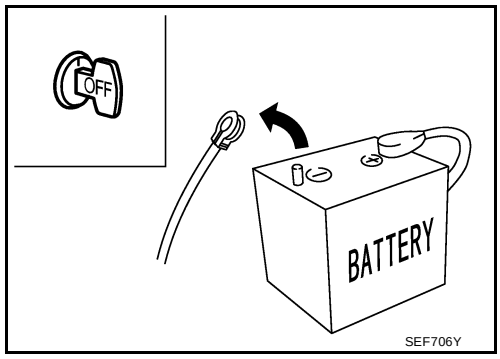
CAUTION:

- **Be sure to turn the ignition switch “OFF” and disconnect the negative battery terminal before any repair or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will cause the MIL to light up.**
- **Be sure to connect and lock the connectors securely after work. A loose (unlocked) connector will cause the MIL to light up due to the open circuit. (Be sure the connector is free from water, grease, dirt, bent terminals, etc.)**
- **Certain systems and components, especially those related to OBD, may use a new style slide-locking type harness connector.**
  For description and how to disconnect, refer to EL section, “Description”, “HARNESS CONNECTOR”.
- **Be sure to route and secure the harnesses properly after work. The interference of the harness with a bracket, etc. may cause the MIL to light up due to the short circuit.**
- **Be sure to connect rubber tubes properly after work. A misconnected or disconnected rubber tube may cause the MIL to light up due to the malfunction of the EGR system or fuel injection system, etc.**
- **Be sure to erase the unnecessary malfunction information (repairs completed) from the ECM and TCM (Transmission control module) before returning the vehicle to the customer.**

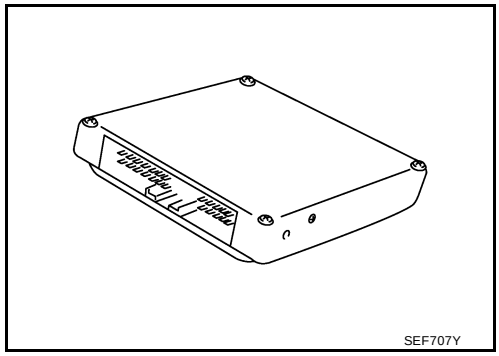
Precautions

UBS001C5

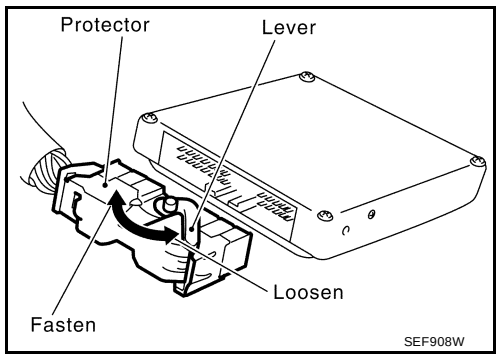
- **Always use a 12 volt battery as power source.**
- **Do not attempt to disconnect battery cables while engine is running.**
- **Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect negative battery terminal. Failure to do so may damage the ECM because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



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

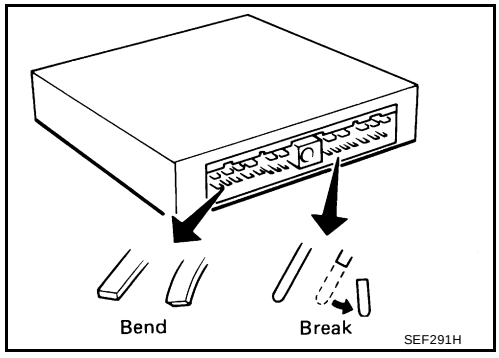

SEF707Y

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



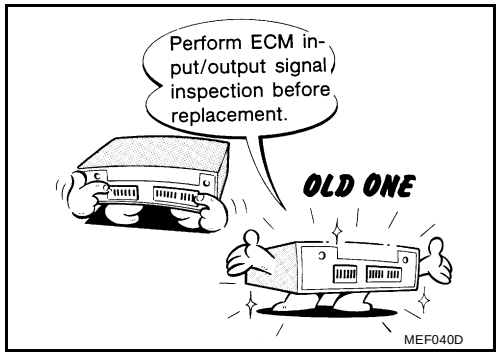
SEF908W

- **When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).**
  Make sure that there are not any bends or breaks on ECM pin terminals when connecting pin connectors.
- **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 a engine control system malfunctions due to receiving external noise, degraded operation of ICs, etc.**
- **Keep engine control system parts and harness dry.**



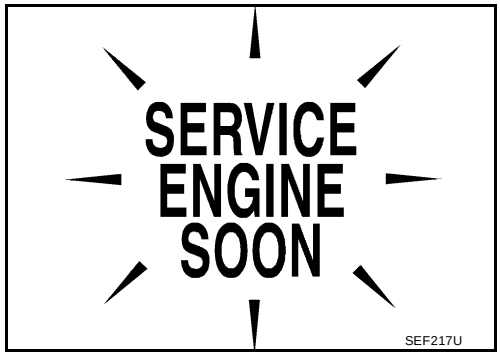
SEF291H

- **Before replacing ECM, perform Terminals and Reference Value inspection and make sure ECM functions properly. Refer to EC-113, "ECM Terminals and Reference Value" .**

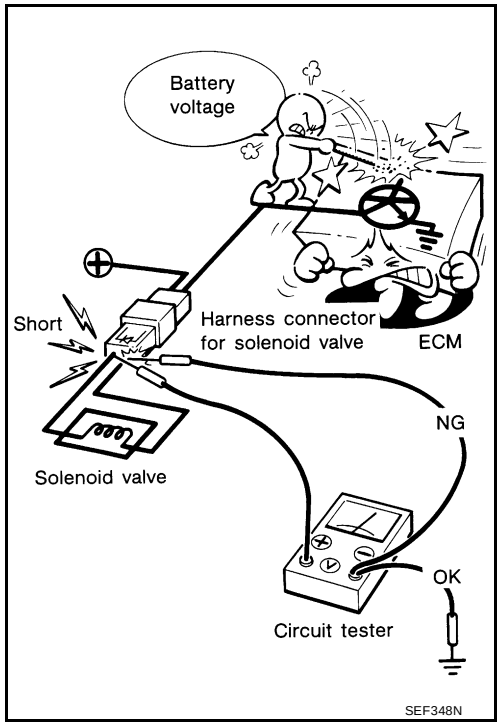


MEF040D

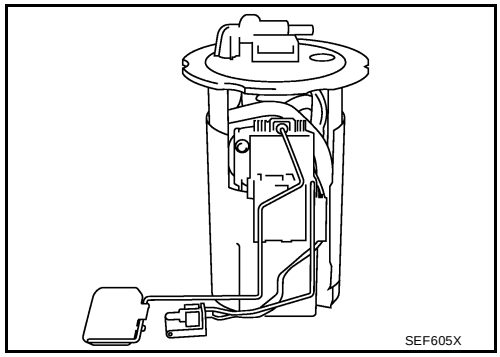
- **After performing each TROUBLE DIAGNOSIS, perform "Overall Function Check" or "DTC Confirmation Procedure".**
  The DTC should not be displayed in the "DTC Confirmation Procedure" if the repair is completed. The "Overall Function Check" should be a good result if the repair is completed.



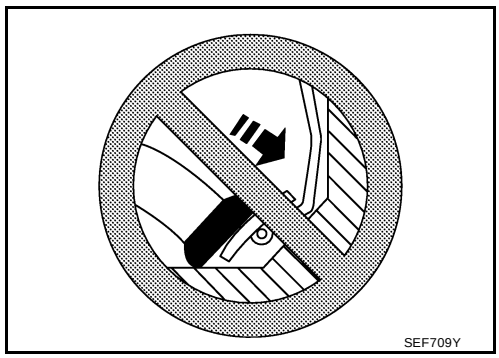
- **When measuring ECM signals with a circuit tester, never allow the two tester probes to contact.**
  Accidental contact of probes will cause a short circuit and damage the ECM power transistor.
- **Handle mass air flow sensor carefully to avoid damage.**
- **Do not disassemble mass air flow sensor.**
- **Do not clean mass air flow sensor with any type of detergent.**
- **Do not disassemble IACV-AAC valve.**
- **Even a slight leak in the air intake system can cause serious problems.**
- **Do not shock or jar the camshaft position sensor (PHASE), crankshaft position sensor (POS).**



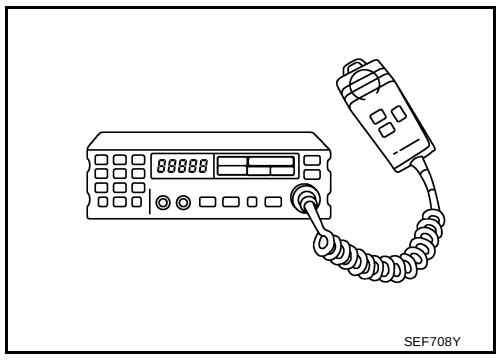
- **Do not operate fuel pump when there is no fuel in lines.**
- **Tighten fuel hose clamps to the specified torque.**



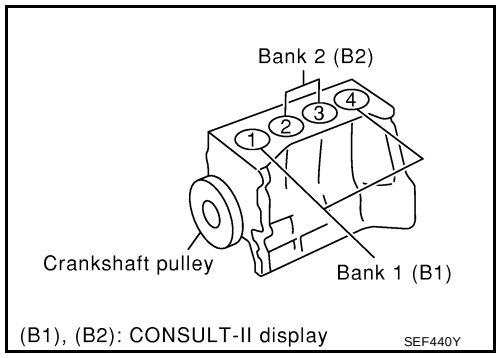
- **Do not depress accelerator pedal when starting.**
- **Immediately after starting, do not rev up engine unnecessarily.**
- **Do not rev up engine just prior to shutdown.**


SEF709Y

- **When installing C.B., ham radio or a mobile phone, be sure to observe the following as it may adversely affect electronic control systems depending on installation location.**
  - **Keep the antenna as far as possible from the electronic control units.**
  - **Keep the antenna feeder line more than 20 cm (8 in) away from the harness of electronic controls.**
    Do not let them run parallel for a long distance.
  - **Adjust the antenna and feeder line so that the standing-wave ratio can be kept smaller.**
  - **Be sure to ground the radio to vehicle body.**
- **Regarding model B15, “-B1” indicates cylinders number 1 and 4 and “-B2” indicates cylinders number 2 and 3.**



SEF708Y



SEF440Y

Wiring Diagrams and Trouble Diagnosis

UBS001C6

When you read Wiring diagrams, refer to the following:

- GI-13, "How to Read Wiring Diagrams"
- PG-2, "POWER SUPPLY ROUTING" for power distribution circuit

When you perform trouble diagnosis, refer to the following:

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

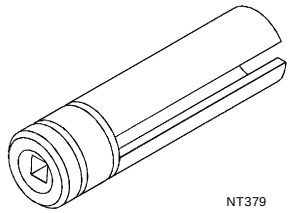
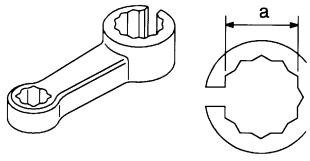
PREPARATION

PFP:00002

Special Service Tools

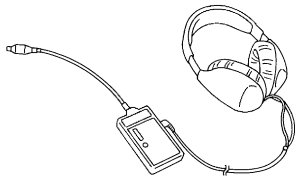
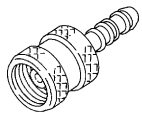
UBS001C7

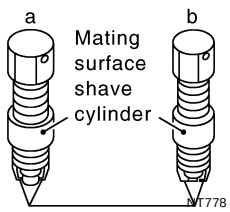
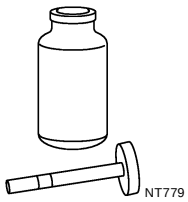
The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description	
KV10117100 (J36471-A) Heated oxygen sensor wrench	 NT379	Loosening or tightening heated oxygen sensor 1 with 22 mm (0.87 in) hexagon nut
KV10114400 (J-38365) Heated oxygen sensor wrench	 NT636	Loosening or tightening heated oxygen sensor 2 **a: 22 mm (0.87 in)**
Fuel filler cap adapter (J-45356)	 NT815	Checking fuel tank vacuum relief valve opening pressure

Commercial Service Tools

UBS001C8

Tool name	Description	
Leak detector (J41416)	 NT703	Locating the EVAP leak
EVAP service port adapter (J41413-OBD)	 NT704	Applying positive pressure through EVAP service port

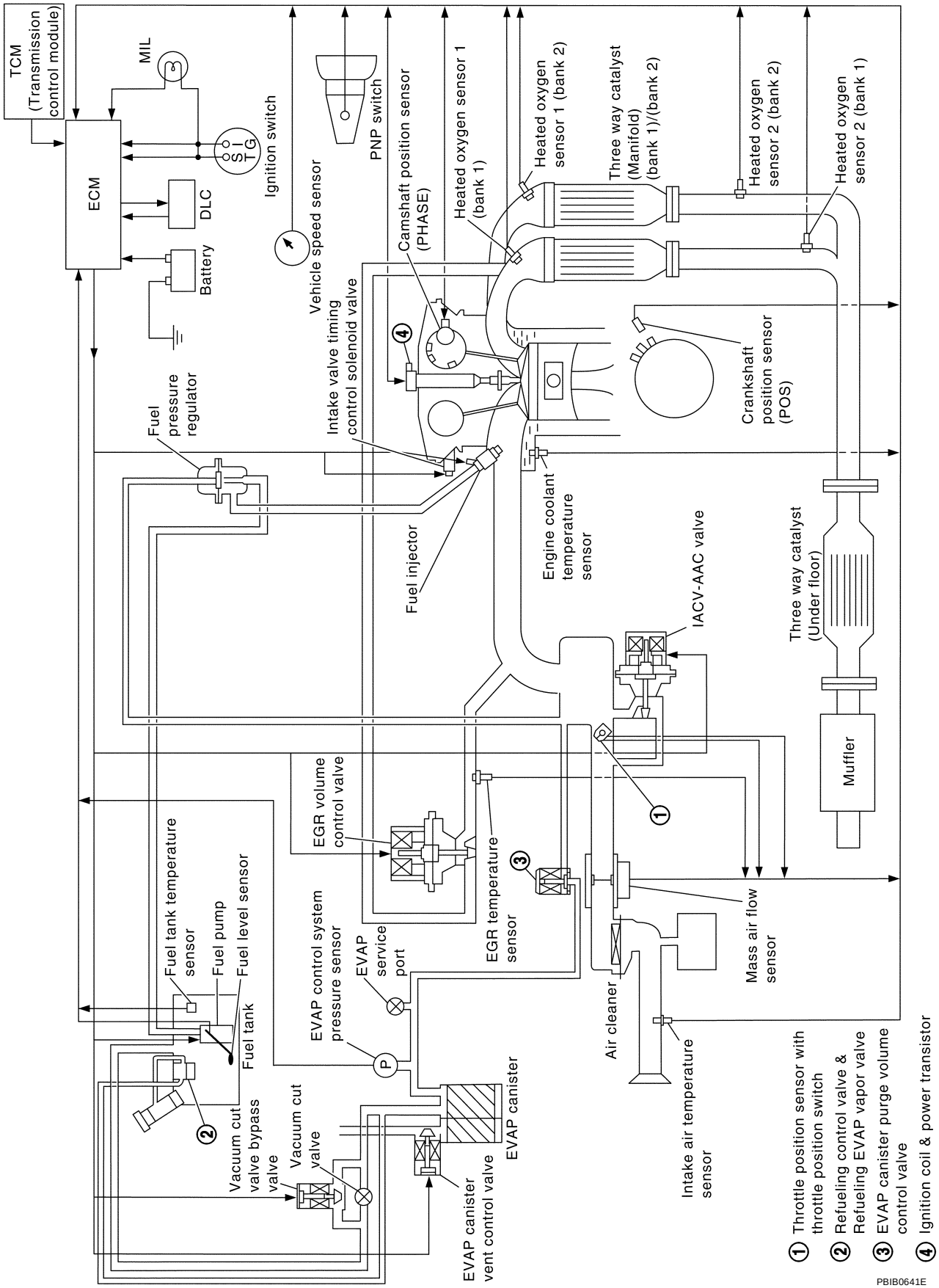
Tool name	Description	
Oxygen sensor thread cleaner (J-43897-18) (J-43897-12)		Reconditioning the exhaust system threads before installing a new oxygen sensor. Use with anti-seize lubricant shown below. **a: J-43897-18 18 mm with 1.5 mm pitch dia., for Zirconia Oxygen Sensor** **b: J-43897-12 12 mm with 1.25 mm pitch dia., for Titania Oxygen Sensor**
Anti-seize lubricant (Permatex^{TM} 133AR or equivalent meeting MIL specification MIL-A-907)		Lubricating oxygen sensor thread cleaning tool when reconditioning exhaust system threads.

ENGINE CONTROL SYSTEM

PFP:23710

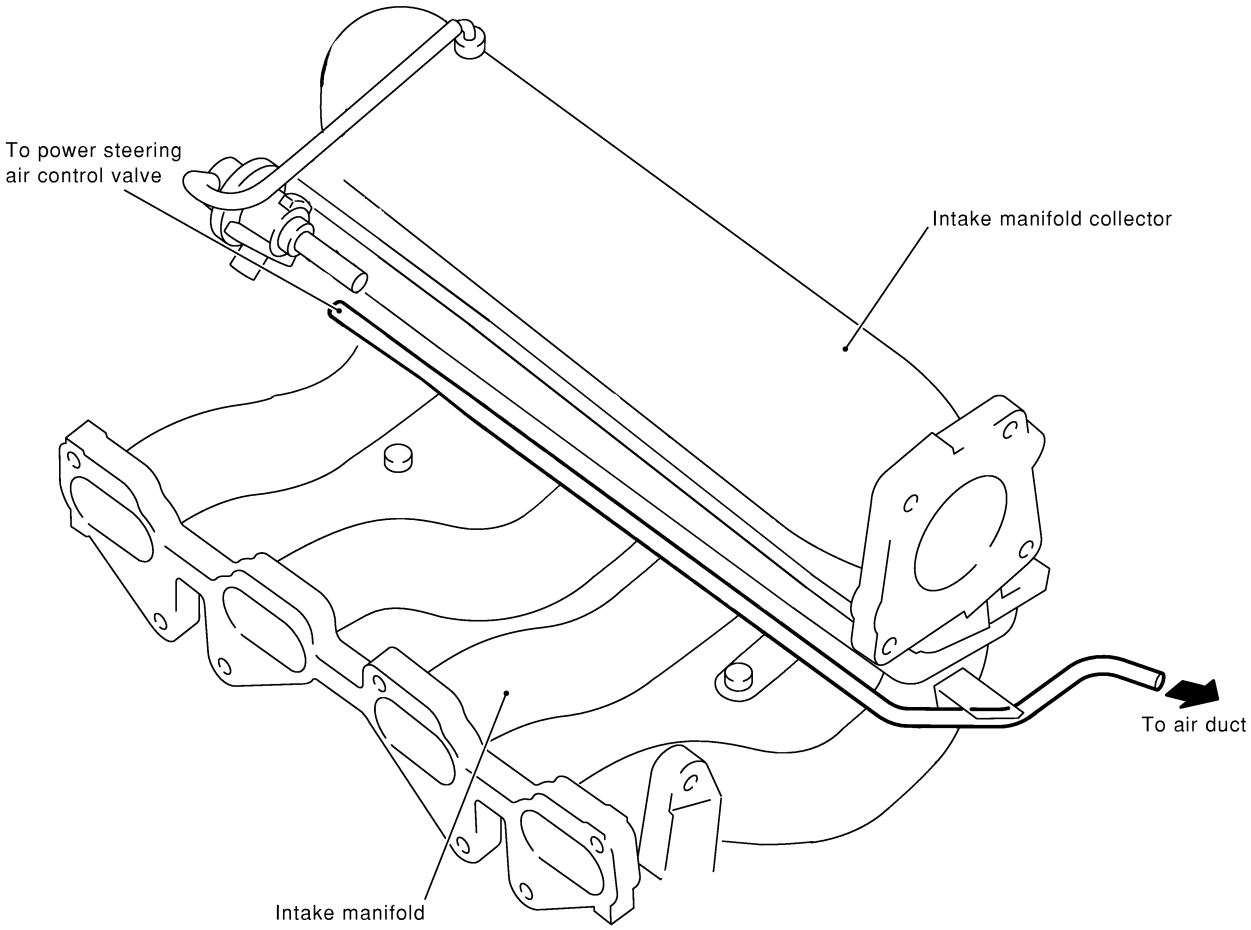
System Diagram

UBS001C9



Vacuum Hose Drawing

UBS001CA



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

BBIA0073E

System Chart

UBS001CB

Input (Sensor)	ECM Function	Output (Actuator)
● Camshaft position sensor (PHASE) ● Crankshaft position sensor (POS) ● Mass air flow sensor ● Engine coolant temperature sensor ● Heated oxygen sensor 1 ● Ignition switch ● Throttle position sensor ● PNP switch ● Air conditioner switch ● Knock sensor ● EGR temperature sensor*1 ● EVAP control system pressure sensor*1 ● Fuel tank temperature sensor*1 ● Battery voltage ● Power steering oil pressure switch ● Vehicle speed sensor ● Intake air temperature sensor ● Heated oxygen sensor 2*3 ● TCM (Transmission control module)*2 ● Closed throttle position switch*4 ● Electrical load ● Intake valve timing control position sensor*1 ● Fuel level sensor*1 ● Refrigerant pressure sensor	Fuel injection & mixture ratio control	Injectors
	Electronic ignition system	Power transistor
	Idle air control system	IACV-AAC valve
	Intake valve timing control	Intake valve timing control solenoid valve
	Fuel pump control	Fuel pump relay
	On board diagnostic system	Malfunction indicator lamp (On the instrument panel)
	EGR control	EGR volume control valve
	Heated oxygen sensor 1 and 2 heater control	Heated oxygen sensor heater
	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
	Cooling fan control	Cooling fan relays
	Air conditioning cut control	Air conditioner relay
	ON BOARD DIAGNOSIS for EVAP system	● EVAP canister vent control valve ● Vacuum cut valve bypass valve

*1: These sensors are not used to control the engine system. They are used only for the on board diagnosis.
*2: The DTC related to A/T will be sent to ECM.
*3: Under normal conditions, this sensor is not for engine control operation.
*4: This switch will operate in place of the throttle position sensor to control EVAP parts if the sensor malfunctions.

Multiport Fuel Injection (MFI) System

UBS001CC

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE)	Engine speed and piston number	Fuel injection & mixture ratio control	Injector
Crankshaft position sensor (POS)	Engine speed		
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Heated oxygen sensor 1	Density of oxygen in exhaust gas		
Throttle position sensor	Throttle position Throttle valve idle position		
PNP switch	Gear position		
Vehicle speed sensor	Vehicle speed		
Ignition switch	Start signal		
Air conditioner switch	Air conditioner operation		
Knock sensor	Engine knocking condition		
Electrical load	Electrical load signal		
Battery	Battery voltage		
Power steering oil pressure switch	Power steering operation		
Heated oxygen sensor 2*	Density of oxygen in exhaust gas		

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

SYSTEM DESCRIPTION

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

VARIOUS FUEL INJECTION INCREASE/DECREASE COMPENSATION

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

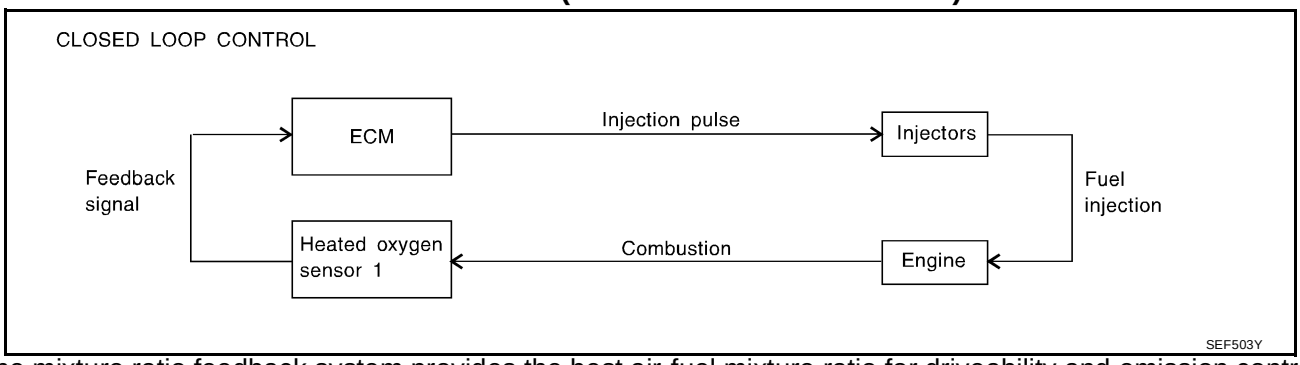
<Fuel increase>

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

<Fuel decrease>

- During deceleration
- During high engine speed operation
- During high vehicle speed operation
- Extremely high engine coolant temperature

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 can then better reduce CO, HC and NOx emissions. This system uses a heated oxygen sensor 1 in the exhaust manifold to monitor if the engine operation is rich or lean. The ECM adjusts the injection pulse width according to the sensor voltage signal. For more information about the heated oxygen sensor 1, refer to EC-226 . 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. Even if the switching characteristics of the heated oxygen sensor 1 shift, the air-fuel ratio is controlled to stoichiometric by the signal from the heated oxygen sensor 2.

Open Loop Control

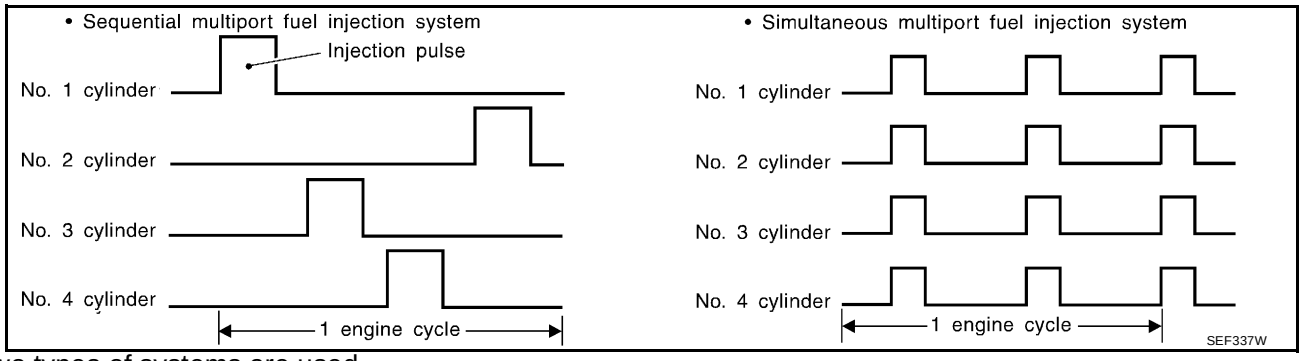
The open loop system condition refers to when the ECM detects any of the following conditions. Feedback control stops in order to maintain stabilized fuel combustion.

- Deceleration and acceleration
- High-load, high-speed operation
- Malfunction of heated oxygen sensor 1 or its circuit
- Insufficient activation of heated oxygen sensor 1 at low engine coolant temperature
- High engine coolant temperature
- During warm-up
- When starting the engine

MIXTURE RATIO SELF-LEARNING CONTROL

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

FUEL INJECTION TIMING



Two types of systems are used.

Sequential Multiport Fuel Injection System

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

Simultaneous Multiport Fuel Injection System

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

FUEL SHUT-OFF

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

Electronic Ignition (EI) System

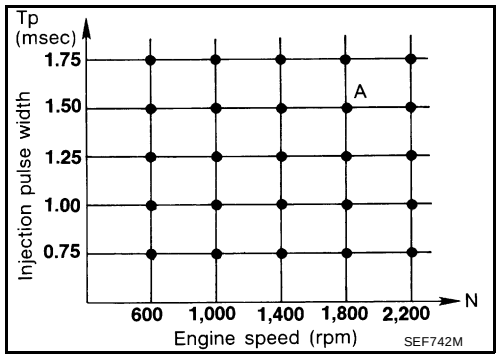
UBS001CD

INPUT/OUTPUT SIGNAL CHART

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

SYSTEM DESCRIPTION

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



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

- At starting

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

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

Air Conditioning Cut Control

UBS001CE

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Air conditioner switch	Air conditioner “ON” signal	Air conditioner cut control	Air conditioner relay
PNP switch	Neutral position		
Throttle position sensor	Throttle valve opening angle		
Camshaft position sensor (PHASE)	Engine speed		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Refrigerant pressure sensor	Refrigerant pressure		

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 the refrigerant pressure is excessively high or low.

Fuel Cut Control (at no load & high engine speed)

UBS001CF

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Vehicle speed sensor	Vehicle speed	Fuel cut control	Injectors
PNP switch	Neutral position		
Throttle position sensor	Throttle position		
Engine coolant temperature sensor	Engine coolant temperature		
Crankshaft position sensor (POS)	Engine speed		
Camshaft position sensor (PHASE)	Engine speed and piston number		

If the engine speed is above 2,500 rpm with no load, (for example, in Neutral and engine speed over 2,500 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed. Fuel cut will operate until the engine speed reaches 2,000 rpm, then fuel cut is cancelled.

NOTE:
This function is different from deceleration control listed under EC-36, "Multiport Fuel Injection (MFI) System" .

BASIC SERVICE PROCEDURE

PFP:00018

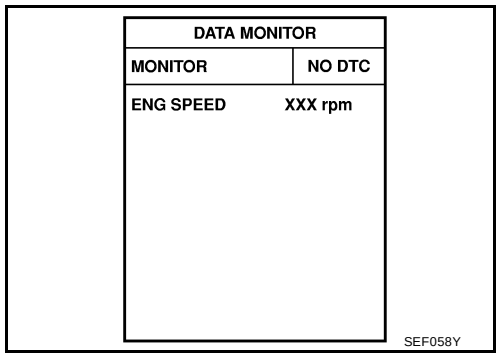
Idle Speed and Ignition Timing Check

UBS001CG

IDLE SPEED

With CONSULT-II

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



With GST

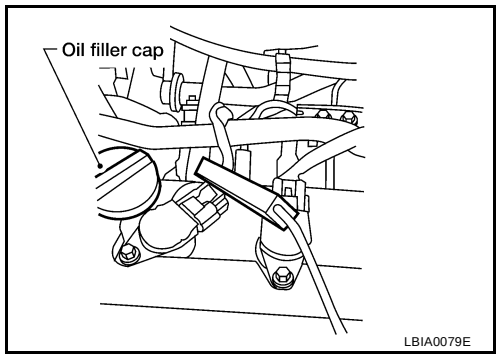
Check idle speed in “MODE 1” with GST.

IGNITION TIMING

Any of following two methods may be used.

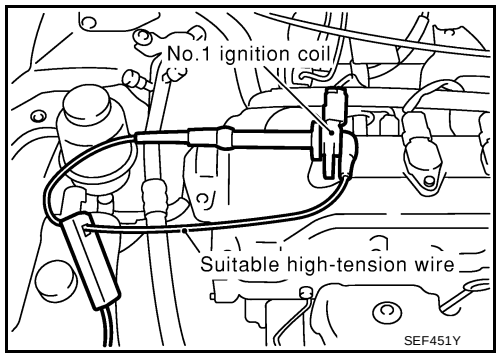
Method A

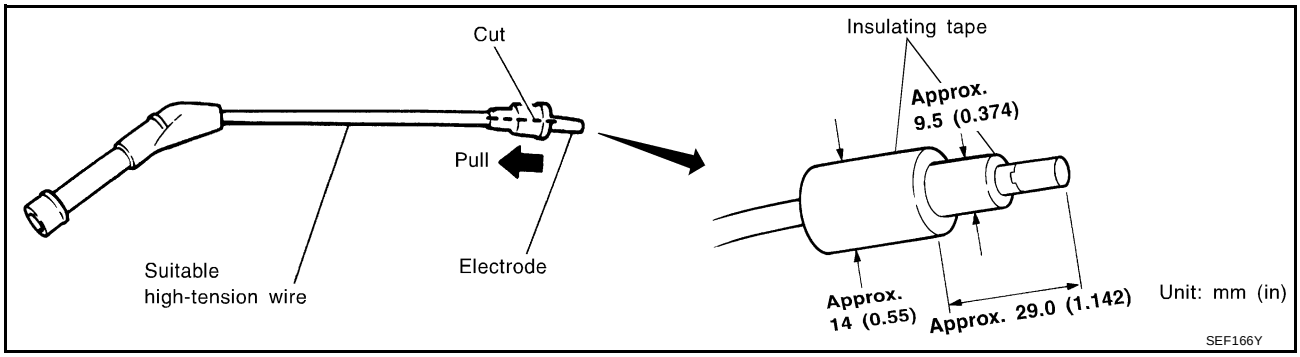
1. Slide the harness protector of ignition coil No.1 to clear the wires.
2. Attach timing light to the wires as shown in the figure.
3. Check ignition timing.



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.




Cut
Pull
Suitable
high-tension wire
Electrode
Insulating tape
Approx.
9.5 (0.374)
Approx.
14 (0.55)
Approx. 29.0 (1.142)
Unit: mm (in)
SEF166Y

Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment

UBS001CH

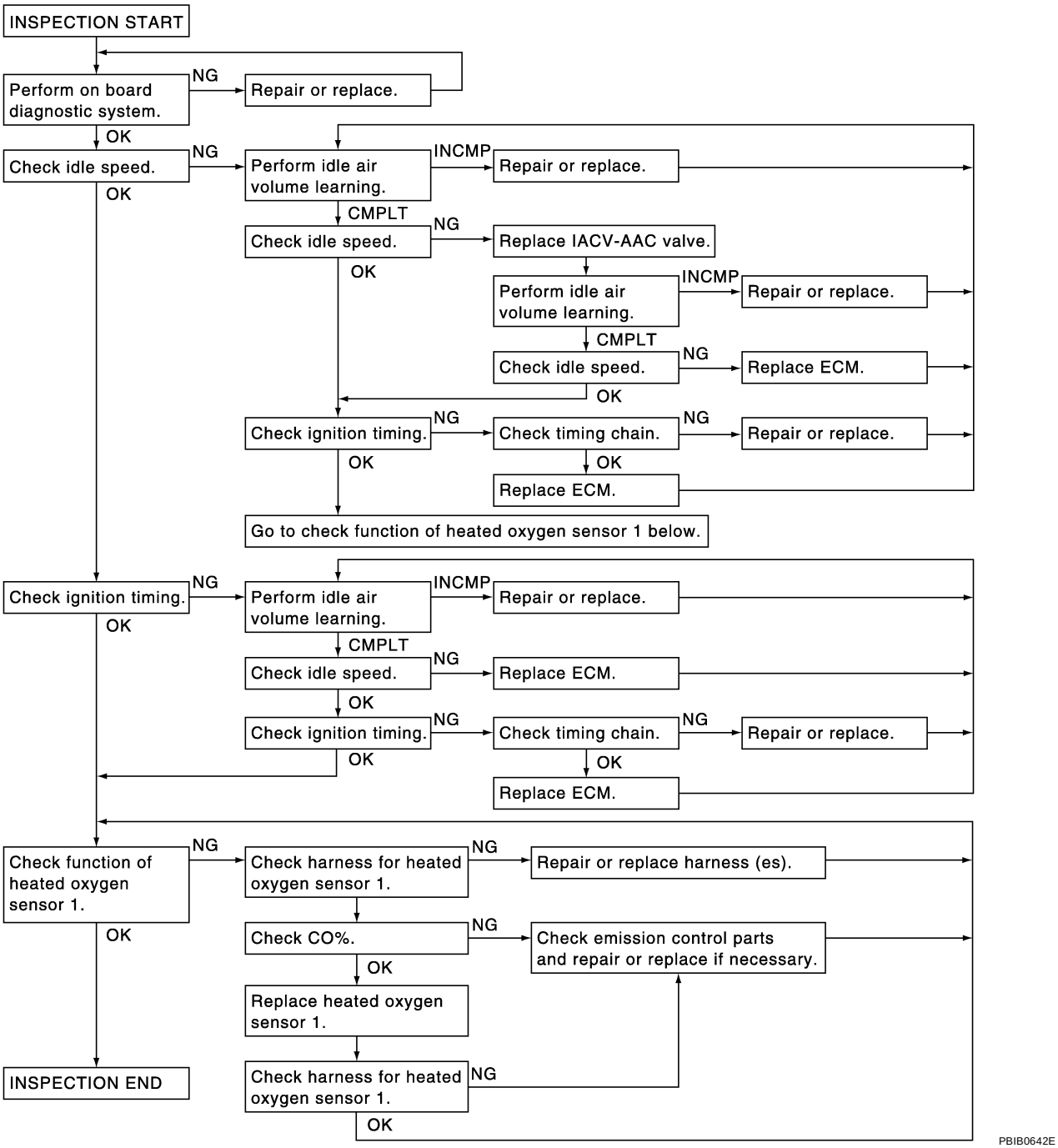
PREPARATION

1. Make sure that the following parts are in good order.

- Battery
- Ignition system
- Engine oil and coolant levels
- Fuses
- ECM harness connector
- Vacuum hoses
- Air intake system
  (Oil filler cap, oil level gauge, etc.)
- Fuel pressure
- Engine compression
- EGR valve operation
- Throttle valve
- EVAP system

2. On models equipped with air conditioner, checks should be carried out while the air conditioner is “OFF”.
3. On models equipped with automatic transaxle, when checking idle speed, 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 headlamps, heater blower, rear window defogger.
6. Keep front wheels pointed straight ahead.
7. Make the check after the cooling fan has stopped.

OVERALL INSPECTION SEQUENCE



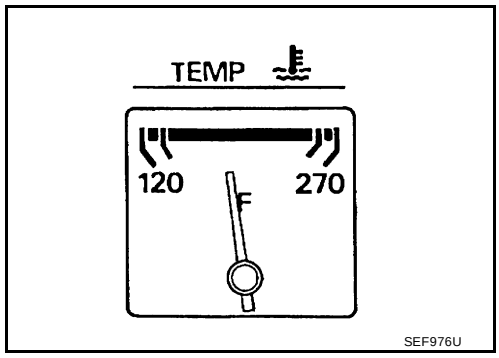
NOTE:
If a vehicle contains a part which is operating outside of design specifications with no MIL illumination, the part shall not be replaced prior to emission testing unless it is determined that the part has been tampered with or abused in such a way that the diagnostic system cannot reasonably be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

INSPECTION PROCEDURE

1. INSPECTION START

1. Visually check the following:
- Air cleaner clogging
- Hoses and ducts for leaks
- EGR valve operation
- Electrical connectors
- Gasket
- Throttle valve and throttle position sensor operation

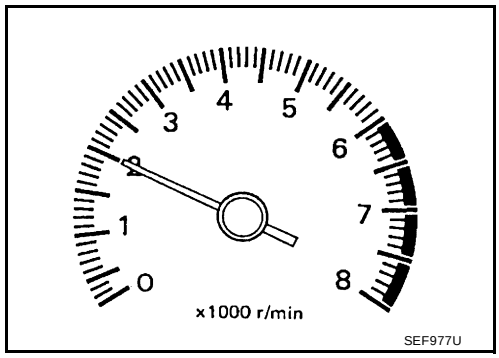
2. Start engine and warm it up until engine coolant temperature indicator points to the middle of gauge.
   Ensure engine stays below 1,000 rpm.



3. Open engine hood and run engine at about 2,000 rpm for about 2 minutes under no-load.
4. Make sure that no DTC is displayed with CONSULT-II or GST.

OK or NG

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



2. REPAIR OR REPLACE

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

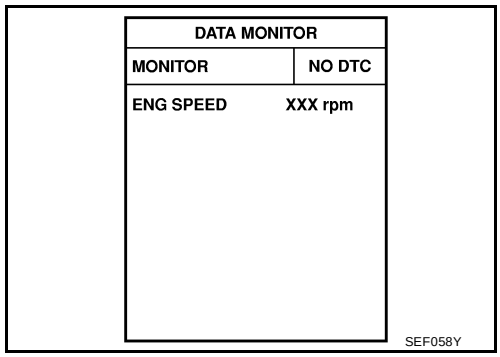
>> GO TO 3.

3. CHECK TARGET IDLE SPEED

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “ENG SPEED” in “DATA MONITOR” mode with CONSULT-II.
3. Check idle speed.

M/T : 650±50 rpm
A/T : 800±50 rpm (in “P” or “N” position)



Without CONSULT-II

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

M/T : 650±50 rpm
A/T : 800±50 rpm (in “P” or “N” position)

OK or NG

OK >> GO TO 12.
NG >> GO TO 4.

4. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-56, "Idle Air Volume Learning" .
Which is the result CMPLT or INCMP?

CMPLT or INCMP

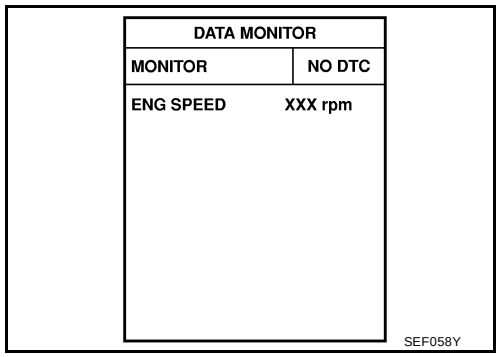
CMPLT >> GO TO 5.
INCMP >> 1. Follow the construction of “Idle Air Volume Leaning”.
2. GO TO 4.

5. CHECK TARGET IDLE SPEED AGAIN

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “ENG SPEED” in “DATA MONITOR” mode with CONSULT-II.
3. Check idle speed.

M/T : 650±50 rpm
A/T : 800±50 rpm (in “P” or “N” position)



Without CONSULT-II

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

M/T : 650±50 rpm
A/T : 800±50 rpm (in “P” or “N” position)

OK or NG

OK >> GO TO 10.
NG >> GO TO 6.

6. REPLACE IACV-AAC VALVE

Replace IACV-AAC valve.

>> GO TO 7.

7. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-56, "Idle Air Volume Learning" .
Which is the result CMPLT or INCMP?

CMPLT or INCMP

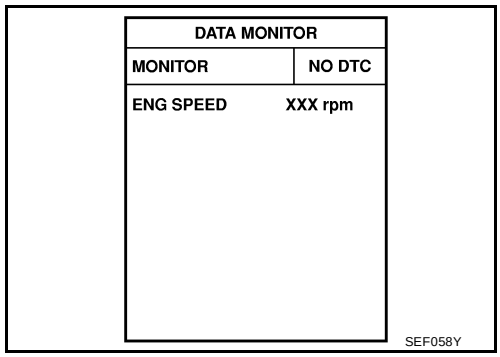
CMPLT >> GO TO 8.
INCMP >> 1. Follow the construction of “Idle Air Volume Learning”.
2. GO TO 4.

8. CHECK TARGET IDLE SPEED AGAIN

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “ENG SPEED” in “DATA MONITOR” mode with CONSULT-II.
3. Check idle speed.

M/T : 650±50 rpm
A/T : 800±50 rpm (in “P” or “N” position)



Without CONSULT-II

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

M/T : 650±50 rpm
A/T : 800±50 rpm (in “P” or “N” position)

OK or NG

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

9. CHECK ECM FUNCTION

Substitute another known-good ECM to check ECM function. (ECM may be the cause of a problem, but this is rarely the case.)

>> GO TO 4.

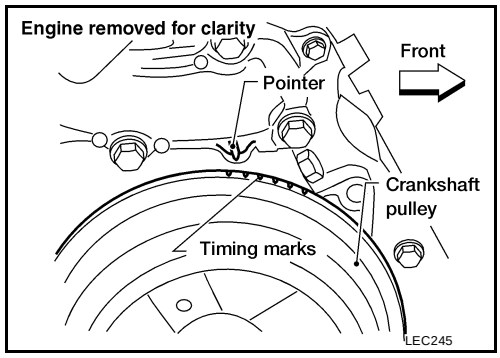
10. CHECK IGNITION TIMING

1. Start engine and warm it up to normal operating temperature.
2. Check ignition timing at idle using a timing light.

M/T : 9°± 5° BTDC
A/T : 9°± 5° BTDC (in “P” or “N” position)

OK or NG

OK >> GO TO 18.
NG >> GO TO 11.



11. CHECK TIMING CHAIN INSTALLATION

Check timing chain installation. Refer to EM-28, "Installation" .

OK or NG

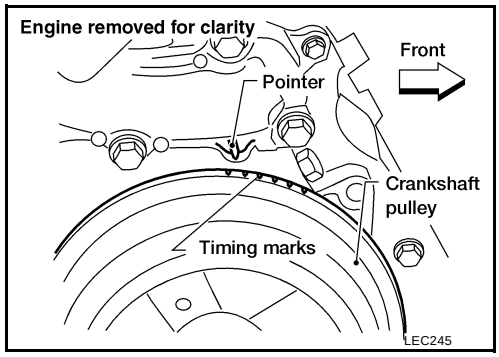
OK >> GO TO 9.
NG >> 1. Repair the timing chain installation.
2. GO TO 4.

12. CHECK IGNITION TIMING

1. Start engine and let it idle.
2. Check ignition timing at idle using a timing light.

M/T : 9°± 5° BTDC

A/T : 9°± 5° BTDC (in “P” or “N” position)



OK or NG

OK >> GO TO 18.
NG >> GO TO 13.

13. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-56, "Idle Air Volume Learning" .

Which is the result CMPLT or INCMP?

CMPLT or INCMP

CMPLT >> GO TO 14.
INCMP >> 1. Follow the construction of “Idle Air volume Learning”.
2. GO TO 13.

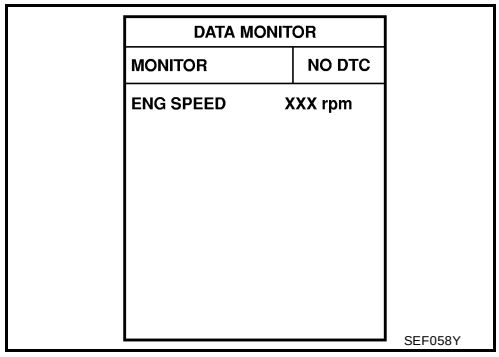
14. CHECK TARGET IDLE SPEED AGAIN

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “ENG SPEED” in “DATA MONITOR” mode with CONSULT-II.
3. Check idle speed.

M/T : 650±50 rpm

A/T : 800±50 rpm (in “P” or “N” position)



Without CONSULT-II

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

M/T : 650±50 rpm

A/T : 800±50 rpm (in “P” or “N” position)

OK or NG

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

15. CHECK ECM FUNCTION

Substitute another known-good ECM to check ECM function. (ECM may be the cause of a problem, but this is rarely the case.)

>> GO TO 13.

16. CHECK IGNITION TIMING AGAIN

Check ignition timing again. Refer to Test No. 12.

OK or NG

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

17. CHECK TIMING CHAIN INSTALLATION

Check timing chain installation. Refer to EM-28, "Installation" .

OK or NG

OK >> GO TO 15.
NG >> 1. Repair the timing chain installation.
2. GO TO 13.

18. ERASE UNNECESSARY DTC

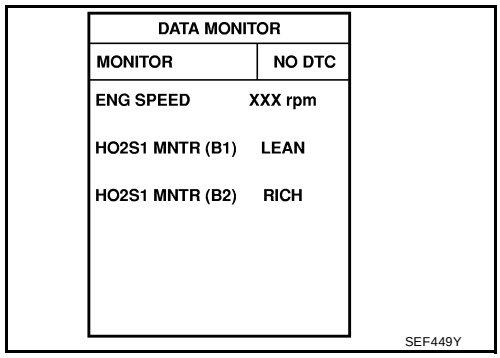
After this inspection, unnecessary DTC No. might be displayed.
Erase the stored memory in ECM and TCM (Transmission control module).
Refer to EC-73, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" and AT-39, "HOW TO ERASE DTC" .

With CONSULT-II>>GO TO 19.
Without CONSULT-II>>GO TO 20.

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

With CONSULT-II

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



OK or NG

OK >> GO TO 23.
NG (Monitor does not fluctuate.)>>GO TO 28.
NG (Monitor fluctuates less than 5 times.)>>GO TO 21.

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

Without CONSULT-II

1. Run engine at about 2,000 rpm for about 2 minutes under no-load.
2. Set voltmeter probe between ECM terminal 62 and ground.
3. Make sure that the voltage fluctuates between 0 - 0.3V and 0.6 - 1.0V more than 5 times during 10 seconds at 2,000 rpm.
   1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
   2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

OK or NG

OK >> GO TO 23.
NG (Voltage does not fluctuate.)>>GO TO 28.
NG (Voltage fluctuates less than 5 times.)>>GO TO 21.

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

With CONSULT-II

1. Stop engine.
2. Replace heated oxygen sensor 1 (bank 2).
3. Start engine and warm it up to normal operating temperature.
4. Run engine at approx. 2,000 rpm for approx. 2 minutes under no-load.
5. See “HO2S1 MNTR (B2)” in “DATA MONITOR” mode.
6. Running engine at 2,000 rpm under no-load (engine is warmed up to normal operating temperature.), check that the monitor fluctuates between “LEAN” and “RICH” more than 5 times during 10 seconds.
   1 time: RICH → LEAN → RICH
   2 times: RICH → LEAN → RICH → LEAN → RICH

Without CONSULT-II

1. Stop engine.
2. Replace heated oxygen sensor 1 (bank 2).
3. Start engine and warm it up to normal operating temperature.
4. Run engine at approx. 2,000 rpm for approx. 2 minutes under no-load.
5. Set voltmeter probe between ECM terminal 62 and ground.
6. Make sure that the voltage fluctuates between 0 - 0.3V and 0.6 - 1.0V more than 5 times during 10 seconds at 2,000 rpm.
   1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
   2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

OK or NG

OK (With CONSULT-II)>>GO TO 23.
OK (Without CONSULT-II)>>GO TO 24.
NG >> GO TO 22.

22. DETECT MALFUNCTIONING PART

Check the following.

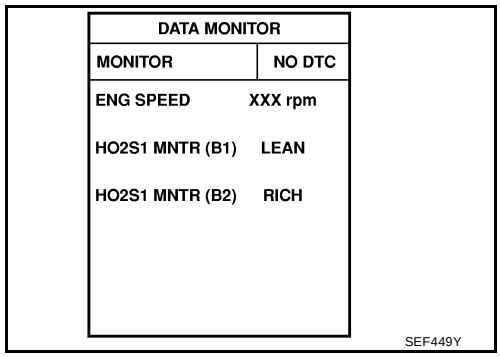
1. Check fuel pressure regulator. Refer to EC-59 .
2. Check mass air flow sensor and its circuit. Refer to EC-172 .
3. Check injector and its circuit. Refer to EC-546 .
   Clean or replace if necessary.
4. Check engine coolant temperature sensor and its circuit. Refer to EC-186 .
5. Check ECM function by substituting another known-good ECM.
   (ECM may be the cause of a problem, but this is rarely the case.)

>> GO TO 3.

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

With CONSULT-II

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



OK or NG

OK >> **INSPECTION END**
NG (Monitor does not fluctuate.)>>GO TO 27.
NG (Monitor fluctuates less than 5 times.)>>GO TO 25.

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

Without CONSULT-II

1. Set voltmeter probe between ECM terminal 94 and ground.
2. Make sure that the voltage fluctuates between 0 - 0.3V and 0.6 - 1.0V more than 5 times during 10 seconds at 2,000 rpm.
   1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
   2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

OK or NG

OK >> **INSPECTION END**
NG (Voltage does not fluctuate.)>>GO TO 27.
NG (Voltage fluctuates less than 5 times.)>>GO TO 25.

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

With CONSULT-II

1. Stop engine.
2. Replace heated oxygen sensor 1 (bank 1).
3. Start engine and warm it up to normal operating temperature.
4. Run engine at approx. 2,000 rpm for approx. 2 minutes under no-load.
5. See “HO2S1 MNTR (B1)” in “DATA MONITOR” mode.
6. Maintaining engine at 2,000 rpm under no-load (engine is warmed up to normal operating temperature.), check that the monitor fluctuates between “LEAN” and “RICH” more than 5 times during 10 seconds.
   1 time: RICH → LEAN → RICH
   2 times: RICH → LEAN → RICH → LEAN → RICH

Without CONSULT-II

1. Stop engine.
2. Replace heated oxygen sensor 1 (bank 1).
3. Start engine and warm it up to normal operating temperature.
4. Run engine at approx. 2,000 rpm for approx. 2 minutes under no-load.
5. Set voltmeter probe between ECM terminal 94 and ground.
6. Make sure that the voltage fluctuates between 0 - 0.3V and 0.6 - 1.0V more than 5 times during 10 seconds at 2,000 rpm.
   1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
   2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 26.

26. DETECT MALFUNCTIONING PART

Check the following.

- Check fuel pressure regulator. Refer to EC-59 .
- Check mass air flow sensor and its circuit. Refer to EC-172 .
- Check injector and its circuit. Refer to EC-546 .
  Clean or replace if necessary.
- Check engine coolant temperature sensor and its circuit. Refer to EC-186 .
- Check ECM function by substituting another known-good ECM.
  (ECM may be the cause of a problem, but this is rarely the case.)

>> GO TO 3.

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

1. Turn off engine and disconnect battery ground cable.
2. Disconnect ECM harness connector.
3. Disconnect heated oxygen sensor 1 (bank 1) harness connector.
4. Check harness continuity between ECM terminal 94 and heated oxygen sensor 1 (bank 1) harness connector terminal 1.
   Refer to EC-210, "BANK 1" .

Continuity should exist.

OK or NG

OK >> GO TO 30.
NG >> GO TO 29.

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

1. Turn off engine and disconnect battery ground cable.
2. Disconnect ECM harness connector.
3. Disconnect heated oxygen sensor 1 (bank 2) harness connector.
4. Check harness continuity between ECM terminal 62 and heated oxygen sensor 1 (bank 2) harness connector terminal 1.
   Refer to EC-211, "BANK 2" .

Continuity should exist.

OK or NG

OK >> GO TO 30.
NG >> GO TO 29.

29. REPAIR OR REPLACE

Repair or replace harness between ECM and heated oxygen sensor 1.

>> GO TO 3.

30. PREPARATION FOR “CO” % CHECK

With CONSULT-II

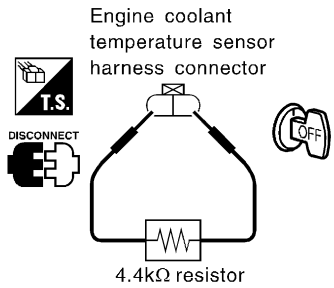
1. Reconnect ECM harness connector.
2. Turn ignition switch “ON”.
3. Select “ENG COOLANT TEMP” in “ACTIVE TEST” mode.
4. Set “ENG COOLANT TEMP” to 5°C (41°F) by touching “DWN” and “Qd”.

ACTIVE TEST	
ENG COOLANT TEMP	XXX °C
MONITOR	
ENG SPEED	XXX rpm
INJ PULSE-B1	XXX msec
IGN TIMING	XXX BTDC

SEF172Y

Without CONSULT-II

1. Disconnect ECM harness connector.
2. Disconnect engine coolant temperature sensor harness connector.
3. Connect a resistor (4.4 kΩ) between terminals of engine coolant temperature sensor harness connector.

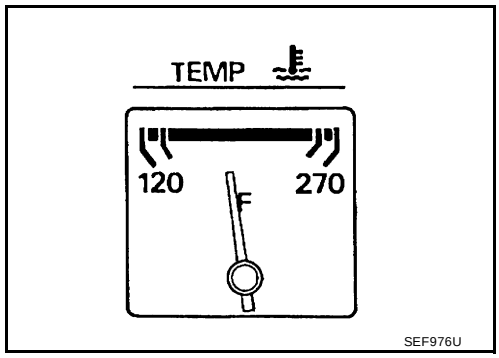


SEF982UA

>> GO TO 31.

31. CHECK “CO” %

1. Start engine and warm it up until engine coolant temperature indicator points to the middle of gauge.

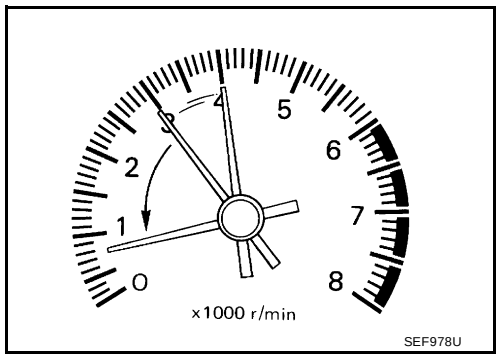


2. Rev engine (2,000 to 3,000 rpm) two or three times under no-load, then run engine at idle speed.
3. Check “CO” %.

   Idle CO : 0 - 8%

4. **Without CONSULT-II**
   After checking CO%,

- Disconnect the resistor from terminals of engine coolant temperature sensor.
- Connect engine coolant temperature sensor harness connector to engine coolant temperature sensor.



OK or NG

OK >> GO TO 32.
NG >> GO TO 33.

32. CHECK HEATED OXYGEN SENSOR 1 SIGNAL

With CONSULT-II

1. Stop engine.
2. Replace heated oxygen sensor 1.
3. Start engine and warm it up to normal operating temperature.
4. Run engine at approx. 2,000 rpm for approx. 2 minutes under no-load.
5. See “HO2S1 MNTR (B1)/(B2)” in “DATA MONITOR” mode.
6. Maintaining engine at 2,000 rpm under no-load (engine is warmed up to normal operating temperature.), check that the monitor fluctuates between “LEAN” and “RICH” more than 5 times during 10 seconds.
   1 time: RICH → LEAN → RICH
   2 times: RICH → LEAN → RICH → LEAN → RICH

Without CONSULT-II

1. Stop engine.
2. Replace heated oxygen sensor 1.
3. Start engine and warm it up to normal operating temperature.
4. Run engine at approx. 2,000 rpm for approx. 2 minutes under no-load.
5. Set voltmeter probe between ECM terminal 62 or 94 and ground.
6. Make sure that voltage fluctuates between 0 - 0.3V and 0.6 - 1.0V more than 5 times during 10 seconds at 2,000 rpm.
   1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
   2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

OK or NG

OK >> GO TO 3.
NG >> GO TO 33.

33. DETECT MALFUNCTIONING PART

Check the following.

- Connect heated oxygen sensor 1 harness connectors to heated oxygen sensors 1.
- Check fuel pressure regulator. Refer to EC-59 .
- Check mass air flow sensor and its circuit. Refer to EC-172 .
- Check injector and its circuit. Refer to EC-546 .
  Clean or replace if necessary.
- Check engine coolant temperature sensor and its circuit. Refer to EC-186 .
- Check ECM function by substituting another known-good ECM.
  (ECM may be the cause of a problem, but this is rarely the case.)

>> GO TO 3.

Idle Air Volume Learning

UBS001CI

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 IACV-AAC valve, throttle body or ECM is replaced.
- Idle speed or ignition timing is out of specification.

PRE-CONDITIONING

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

- Battery voltage: More than 12.9V (At idle)
- Engine coolant temperature: 70 - 95°C (158 - 203°F)
- PNP switch: ON
- Electric load switch: OFF
  (Air conditioner, headlamp, rear window defogger)

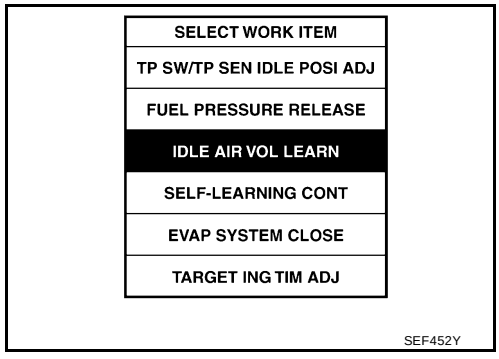
On vehicles equipped with daytime light systems, if the parking brake is applied before the engine is started the headlamp will not be illuminated.

- Cooling fan motor: Not operating
- Steering wheel: Neutral (Straight-ahead position)
- Vehicle speed: Stopped
- Transmission: Warmed-up
  For A/T models with CONSULT-II, drive vehicle until "FLUID TEMP SE" in "DATA MONITOR" mode of "A/T" system indicates less than 0.9V.
  For A/T models without CONSULT-II and M/T models, drive vehicle for 10 minutes.

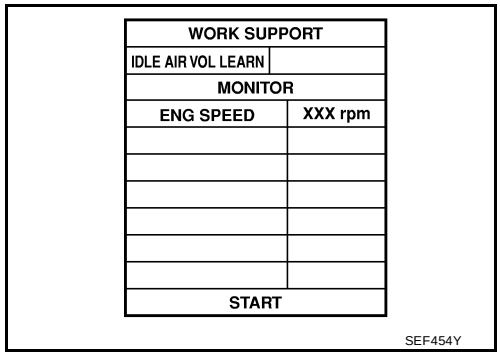
OPERATION PROCEDURE

With CONSULT-II

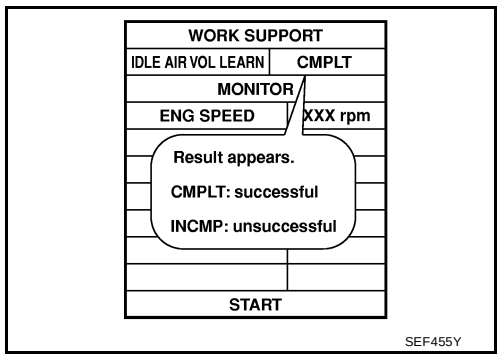
1. Turn ignition switch "ON" and wait at least 1 second.
2. Turn ignition switch "OFF" and wait at least 10 seconds.
3. Start engine and warm it up to normal operating temperature.
4. Check that all items listed under the topic EC-56, "PRE-CONDITIONING" are in good order.
5. Turn ignition switch "OFF" and wait at least 10 seconds.
6. Start the engine and let it idle for at least 30 seconds.
7. Select "IDLE AIR VOL LEARN" in "WORK SUPPORT" mode.



8. Touch “START” and wait 20 seconds.



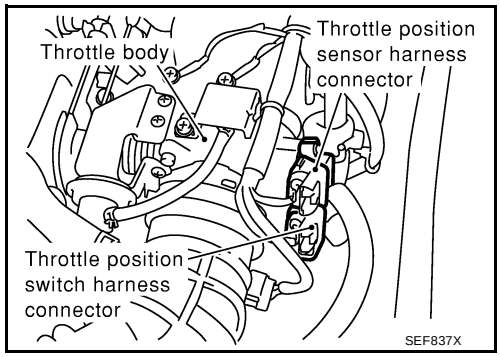
9. Make sure that “CMPLT” is displayed on CONSULT-II screen. If “INCMP” is displayed, “Idle Air Volume Learning” will not be carried out successfully. In this case, find the cause of the problem by referring to the NOTE on next page.
10. Rev up the engine two or three times. Make sure that idle speed and ignition timing are within specifications.



ITEM	SPECIFICATION
Idle speed	M/T: 650±50 rpm A/T: 800±50 rpm (in “P” or “N” position)
Ignition timing	M/T: 9°±5° BTDC A/T: 9°±5° BTDC (in “P” or “N” position)

Without CONSULT-II

1. Turn ignition switch “ON” and wait at least 1 second.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Start engine and warm it up to normal operating temperature.
4. Check that all items listed under the topic EC-56, "PRE-CONDITIONING" , are in good order.
5. Turn ignition switch “OFF” and wait at least 10 seconds.
6. Start the engine and let it idle for at least 30 seconds.
7. Disconnect throttle position sensor harness connector (brown), then reconnect it within 5 seconds.
8. Wait 20 seconds.
9. Make sure that idle speed is within specifications. If not, the result will be incomplete. In this case, find the cause of the problem by referring to the NOTE below.
10. Rev up the engine two or three times. Make sure that idle speed and ignition timing are within specifications.



ITEM	SPECIFICATION
Idle speed	M/T: 650±50 rpm A/T: 800±50 rpm (in “P” or “N” position)
Ignition timing	M/T: 9°±5° BTDC A/T: 9°±5° BTDC (in “P” or “N” position)

NOTE:
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. **Adjust closed throttle position switch and reset memory. (Refer to EC-87, "Basic Inspection" .)**
5. **When the above four items check out OK, engine component parts and their installation condition are questionable. Check and eliminate the cause of the problem.**
   It is useful to perform EC-143, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" .

6. **If any of the following conditions occur after the engine has started, eliminate the cause of the problem and perform "Idle air volume learning" all over again:**
   - **Engine stalls.**
   - **Erroneous idle.**
   - **Blown fuses related to the IACV-AAC valve system.**

Fuel Pressure Check

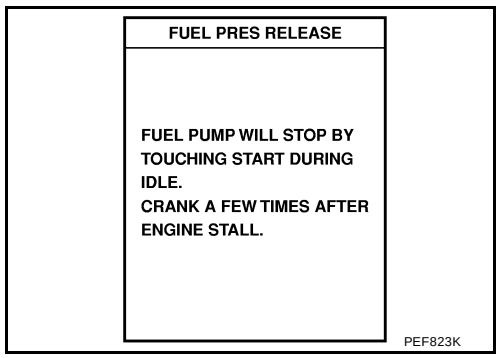
UBS001CJ

FUEL PRESSURE RELEASE

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

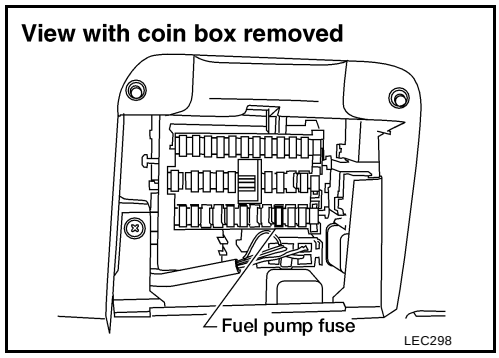
With CONSULT-II

1. Start engine.
2. Perform "FUEL PRES RELEASE" in "WORK SUPPORT" mode with CONSULT-II.
3. Remove fuse for fuel pump.
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 fuse for fuel pump.
2. Start engine.
3. After engine stalls, crank it two or three times to release all fuel pressure.
4. Turn ignition switch OFF and reconnect fuel pump fuse.

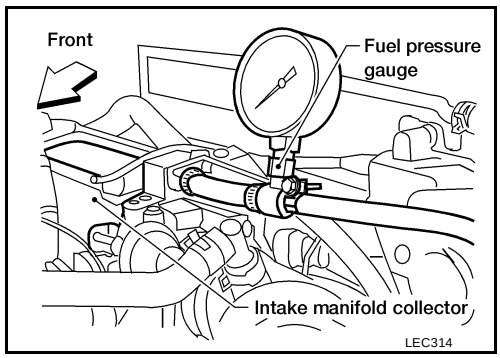


FUEL PRESSURE CHECK

- **When reconnecting fuel line, always use new clamps.**
- **Make sure that clamp screw does not contact adjacent parts.**
- **Use a torque driver to tighten clamps.**
- **Use Pressure Gauge to check fuel pressure.**
- **Do not perform fuel pressure check with electrical systems operating (i.e. lights, rear defogger, A/C, etc.) Fuel pressure gauge may indicate false readings due to varying engine loads and changes in manifold vacuum.**

1. Release fuel pressure to zero.
2. Disconnect fuel hose at fuel tube (engine side).

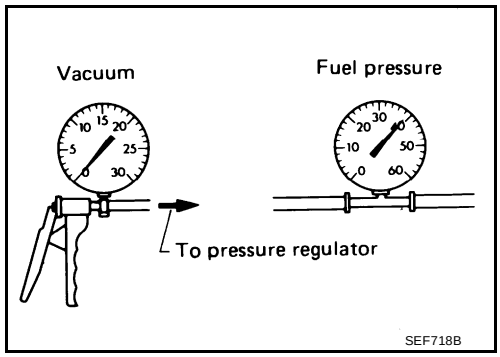
3. Install pressure gauge between fuel filter and fuel tube.
4. Start engine and check for fuel leakage.
5. Read the indication of fuel pressure gauge.
   If results are unsatisfactory, perform EC-59, "FUEL PRESSURE REGULATOR CHECK" .



FUEL PRESSURE REGULATOR CHECK

1. Stop engine and disconnect fuel pressure regulator vacuum hose from intake manifold.
2. Plug intake manifold with a rubber cap.
3. Connect variable vacuum source to fuel pressure regulator.
4. Start engine and read indication of fuel pressure gauge as vacuum is changed.

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



ON BOARD DIAGNOSTIC (OBD) SYSTEM

PFP:00028

Introduction

UBS001CK

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

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

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

X: Applicable —: Not applicable

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

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

The malfunction indicator lamp (MIL) on the instrument panel lights up when the same malfunction is detected in two consecutive trips (Two trip detection logic), or when the ECM enters fail-safe mode. (Refer to EC-86 .)

Two Trip Detection Logic

UBS001CL

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

X: Applicable —: Not applicable

Items	MIL				DTC		1st trip DTC	
	1st trip		2nd trip		1st trip display-ing	2nd trip display-ing	1st trip display-ing	2nd trip display-ing
	Blinking	Lighting up	Blinking	Lighting up				
Coolant overtemperature enrichment protection — DTC: P0217	—	X	—	—	X	—	X	—
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0304 is being detected	X	—	—	—	X	—	X	—
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0304 has been detected	—	—	X	—	—	X	—	—
Closed loop control — DTC: P1148	—	X	—	—	X	—	X	—
Fail-safe items (Refer to EC-86 .)	—	X	—	—	X*1	—	X*1	—
Except above	—	—	—	X	—	X	X	—

*1: Except “ECM”

Emission-related Diagnostic Information

UBS001CM

EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS

X: Applicable —: Not applicable

Items (CONSULT-II screen terms)	DTC*1	SRT code	Test value/ Test limit (GST only)	1st trip DTC*1	Reference page
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	**P0000**	—	—	—	—
INT/V TIM CONT-B1	P0011	—	—	X	EC-154
HO2S1 HTR (B1)	P0031	X	X	X*2	EC-160
HO2S1 HTR (B1)	P0032	X	X	X*2	EC-160
HO2S2 HTR (B1)	P0037	X	X	X*2	EC-166
HO2S2 HTR (B1)	P0038	X	X	X*2	EC-166
HO2S1 HTR (B2)	P0051	X	X	X*2	EC-160
HO2S1 HTR (B2)	P0052	X	X	X*2	EC-160
HO2S2 HTR (B2)	P0057	X	X	X*2	EC-166
HO2S2 HTR (B2)	P0058	X	X	X*2	EC-166
MAF SEN/CIRCUIT	P0101	—	—	X	EC-172
MAF SEN/CIRCUIT	P0102*3	—	—	—	EC-172
MAF SEN/CIRCUIT	P0103*3	—	—	—	EC-172
IAT SEN/CIRCUIT	P0112	—	—	—	EC-180
IAT SEN/CIRCUIT	P0113	—	—	—	EC-180
ECT SEN/CIRCUIT	P0117*3	—	—	—	EC-186
ECT SEN/CIRCUIT	P0118*3	—	—	—	EC-186
TP SEN/CIRCUIT	P0121	—	—	X	EC-191
TP SEN/CIRCUIT	P0122*3	—	—	—	EC-191
TP SEN/CIRCUIT	P0123*3	—	—	—	EC-191
ECT SENSOR	P0125	—	—	X	EC-201
IAT SENSOR	P0127	—	—	X	EC-180
THERMSTAT FNCTN	P0128	—	—	X	EC-206
HO2S1 (B1)	P0132	X	X	X*2	EC-208
HO2S1 (B1)	P0133	X	X	X*2	EC-216
HO2S1 (B1)	P0134	X	X	X*2	EC-226
HO2S2 (B1)	P0138	X	X	X*2	EC-235
HO2S2 (B1)	P0139	X	X	X*2	EC-243
HO2S1 (B2)	P0152	X	X	X*2	EC-208
HO2S1 (B2)	P0153	X	X	X*2	EC-216
HO2S1 (B2)	P0154	X	X	X*2	EC-226
HO2S2 (B2)	P0158	X	X	X*2	EC-235
HO2S2 (B2)	P0159	X	X	X*2	EC-243
FUEL SYS-LEAN-B1	P0171	—	—	X	EC-252
FUEL SYS-RICH-B1	P0172	—	—	X	EC-261
FUEL SYS-LEAN-B2	P0174	—	—	X	EC-252
FUEL SYS-RICH-B2	P0175	—	—	X	EC-261
FTT SENSOR	P0181	—	—	X	EC-270
FTT SEN/CIRCUIT	P0182	—	—	X	EC-270

Items (CONSULT-II screen terms)	DTC*1	SRT code	Test value/ Test limit (GST only)	1st trip DTC*1	Reference page
FTT SEN/CIRCUIT	P0183	—	—	X	EC-270
ENG OVER TEMP	P0217	—	—	X	EC-275
MULTI CYL MISFIRE	P0300	—	—	X	EC-290
CYL1 MISFIRE	P0301	—	—	X	EC-290
CYL2 MISFIRE	P0302	—	—	X	EC-290
CYL3 MISFIRE	P0303	—	—	X	EC-290
CYL4 MISFIRE	P0304	—	—	X	EC-290
KNOCK SEN/CIRC-B1	P0327	—	—	—	EC-296
KNOCK SEN/CIRC-B1	P0328	—	—	—	EC-296
CKP SEN/CIRCUIT	P0335	—	—	X	EC-300
CMP SEN/CIRCUIT	P0340	—	—	X	EC-306
IGN SIGNAL-PRIMARY	P0350	—	—	X	EC-312
EGR SYSTEM	P0400	X	X	X*2	EC-321
EGR VOL CON/V CIR	P0403	—	—	X	EC-328
EGR TEMP SEN/CIRC	P0405	—	—	X	EC-335
EGR TEMP SEN/CIRC	P0406	—	—	X	EC-335
TW CATALYST SYS-B1	P0420	X	X	X*2	EC-341
TW CATALYST SYS-B2	P0430	X	X	X*2	EC-341
EVAP PURG FLOW/MON	P0441	X	X	X*2	EC-345
EVAP SMALL LEAK	P0442	X	X	X*2	EC-353
PURG VOLUME CONT/V	P0444	—	—	X	EC-364
PURG VOLUME CONT/V	P0445	—	—	X	EC-364
VENT CONTROL VALVE	P0447	—	—	X	EC-369
EVAP SYS PRES SEN	P0452	—	—	X	EC-375
EVAP SYS PRES SEN	P0453	—	—	X	EC-375
EVAP GROSS LEAK	P0455	—	X	X*2	EC-383
EVAP VERY SML LEAK	P0456	X*4	X	X*2	EC-393
FUEL LEV SEN SLOSH	P0460	—	—	X	EC-405
FUEL LEVEL SENSOR	P0461	—	—	X	EC-409
FUEL LEVL SEN/CIRC	P0462	—	—	X	EC-412
FUEL LEVL SEN/CIRC	P0463	—	—	X	EC-412
VEH SPEED SEN/CIRC	P0500*5	—	—	X	EC-416
ISC SYSTEM/CIRC	P0505	—	—	X	EC-420
ISC SYSTEM	P0506	—	—	X	EC-420
ISC SYSTEM	P0507	—	—	X	EC-420
CLOSED TP SW/CIRC	P0510	—	—	X	EC-428
A/T COMM LINE	P0600	—	—	—	EC-435
ECM	P0605	—	—	X	EC-438
PNP SW/CIRC	P0705	—	—	X	AT-114
ATF TEMP SEN/CIRC	P0710	—	—	X	AT-119
VEH SPD SEN/CIR AT	P0720*5	—	—	X	AT-124
ENGINE SPEED SIG	P0725	—	—	X	AT-128
A/T 1ST GR FNCTN	P0731	—	—	X	AT-132

Items (CONSULT-II screen terms)	DTC*1	SRT code	Test value/ Test limit (GST only)	1st trip DTC*1	Reference page
A/T 2ND GR FNCTN	P0732	—	—	X	AT-137
A/T 3RD GR FNCTN	P0733	—	—	X	AT-142
A/T 4TH GR FNCTN	P0734	—	—	X	AT-147
TCC SOLENOID/CIRC	P0740	—	—	X	AT-155
A/T TCC S/V FNCTN	P0744	—	—	X	AT-160
L/PRESS SOL/CIRC	P0745	—	—	X	AT-170
SFT SOL A/CIRC	P0750*3	—	—	X	AT-176
SFT SOL B/CIRC	P0755*3	—	—	X	AT-180
MAF SENSOR	P1102	—	—	X	EC-172
INT/V TIM V/CIR-B1	P1111	—	—	X	EC-440
INTK TIM S/CIRC-B1	P1140	—	—	X	EC-445
HO2S1 (B1)	P1143	X	X	X*2	EC-450
HO2S1 (B1)	P1144	X	X	X*2	EC-456
HO2S2 (B1)	P1146	X	X	X*2	EC-462
HO2S2 (B1)	P1147	X	X	X*2	EC-470
CLOSED LOOP-B1	P1148	—	—	X	EC-479
HO2S1 (B2)	P1163	X	X	X*2	EC-450
HO2S1 (B2)	P1164	X	X	X*2	EC-456
HO2S2 (B2)	P1166	X	X	X*2	EC-462
HO2S2 (B2)	P1167	X	X	X*2	EC-470
CLOSED LOOP-B2	P1168	—	—	X	EC-479
ENG OVER TEMP	P1217	—	—	X	EC-481
EGR SYSTEM	P1402	X	X	X*2	EC-494
EVAP SMALL LEAK	P1442	X	X	X	EC-501
PURG VOLUME CONT/V	P1444	—	—	X	EC-503
VENT CONTROL VALVE	P1446	—	—	X	EC-510
VENT CONTROL VALVE	P1448	—	—	X	EC-515
EVAP VERY SML LEAK	P1456	X*4	X	X*2	EC-393
FUEL LEVL SEN/CIRC	P1464	—	—	X	EC-522
VC/V BYPASS/V	P1490	—	—	X	EC-525
VC CUT/V BYPASS/V	P1491	—	—	X	EC-531
A/T DIAG COMM LINE	P1605	—	—	X	EC-538
TP SEN/CIRC A/T	P1705*3	—	—	X	AT-184
P-N POS SW/CIRCUIT	P1706	—	—	X	EC-541
O/R CLTCH SOL/CIRC	P1760	—	—	X	AT-192

*1: 1st trip DTC No. is the same as DTC No.
*2: These are not displayed with GST.
*3: When the fail-safe operation occurs, the MIL illuminates.
*4: SRT code will not be set if the self-diagnostic result is NG.

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-73, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
For malfunctions in which 1st trip DTCs are displayed, refer to EC-61 . These items are required by legal regulations to continuously monitor the system/component. In addition, the items monitored non-continuously are also displayed on CONSULT-II.
1st trip DTC is specified in Mode 7 of SAE J1979. 1st trip DTC detection occurs without lighting up the MIL and therefore does not warn the driver of a problem. However, 1st trip DTC detection will not prevent the vehicle from being tested, for example during Inspection/Maintenance (I/M) tests.
When a 1st trip DTC is detected, check, print out or write down and erase (1st trip) DTC and Freeze Frame data as specified in “Work Flow” procedure Step II, refer to EC-82 . Then perform “DTC Confirmation Procedure” or “Overall Function Check” to try to duplicate the problem. If the malfunction is duplicated, the item requires repair.

How to Read DTC and 1st Trip DTC

DTC and 1st trip DTC can be read by the following methods.

With CONSULT-II

With GST

CONSULT-II or GST (Generic Scan Tool) Examples: P0340, P1148, P1706, etc.
These DTCs are prescribed by SAE J2012.
(CONSULT-II also displays the malfunctioning component or system.)

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

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

DTC display

SELF DIAG RESULTS	
DTC RESULTS	TIME
MAF SEN/CIRCUIT [P0101]	0

1st trip DTC display

SELF DIAG RESULTS	
DTC RESULTS	TIME
MAF SEN/CIRCUIT [P0101]	1t

SEC745C

FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA

The ECM records the driving conditions such as fuel system status, calculated load value, engine coolant temperature, short term fuel trim, long term fuel trim, engine speed, vehicle speed, throttle valve operating angle, 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-128 .
Only one set of freeze frame data (either 1st trip freeze frame data or freeze frame data) can be stored in the ECM. 1st trip freeze frame data is stored in the ECM memory along with the 1st trip DTC. There is no priority for 1st trip freeze frame data and it is updated each time a different 1st trip DTC is detected. However, once freeze frame data (2nd trip detection/MIL on) is stored in the ECM memory, 1st trip freeze frame data is no

longer stored. Remember, only one set of freeze frame data can be stored in the ECM. The ECM has the following priorities to update the data.

Priority	Items	
1	Freeze frame data	Misfire — DTC: P0300 - P0304 Fuel Injection System Function — DTC: P0171, P0172, 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-73, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .

SYSTEM READINESS TEST (SRT) CODE

System Readiness Test (SRT) code is specified in Mode 1 of SAE J1979.
As part of 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	3	Three way catalyst function	P0420, P0430
EVAPORATIVE SYSTEM	2	EVAP control system	P0442
	3	EVAP control system	P0456, P1456
		EVAP control system purge flow monitoring	P0441
HO2S	3	Heated oxygen sensor 1 (bank 1)/(bank 2)	P0132, P0152
		Heated oxygen sensor 1 (bank 1)/(bank 2)	P0133, P0153
		Heated oxygen sensor 1 (bank 1)/(bank 2)	P0134, P0154
		Heated oxygen sensor 1 (bank 1)/(bank 2)	P1143, P1163
		Heated oxygen sensor 1 (bank 1)/(bank 2)	P1144, P1164
		Heated oxygen sensor 2 (bank 1)/(bank 2)	P0138, P0158
		Heated oxygen sensor 2 (bank 1)/(bank 2)	P0139, P0159
		Heated oxygen sensor 2 (bank 1)/(bank 2)	P1146, P1166
		Heated oxygen sensor 2 (bank 1)/(bank 2)	P1147, P1167
HO2S HTR	3	Heated oxygen sensor 1 heater (bank 1)/(bank 2)	P0031, P0032,P0051, P0052
		Heated oxygen sensor 2 heater (bank 1)/(bank 2)	P0037, P0038, P0057, P0068
EGR SYSTEM	3	EGR function	P0400
	1	EGR function	P1402

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

SRT Set Timing

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

Self-diagnosis result		Example				
		Diagnosis	Ignition 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.

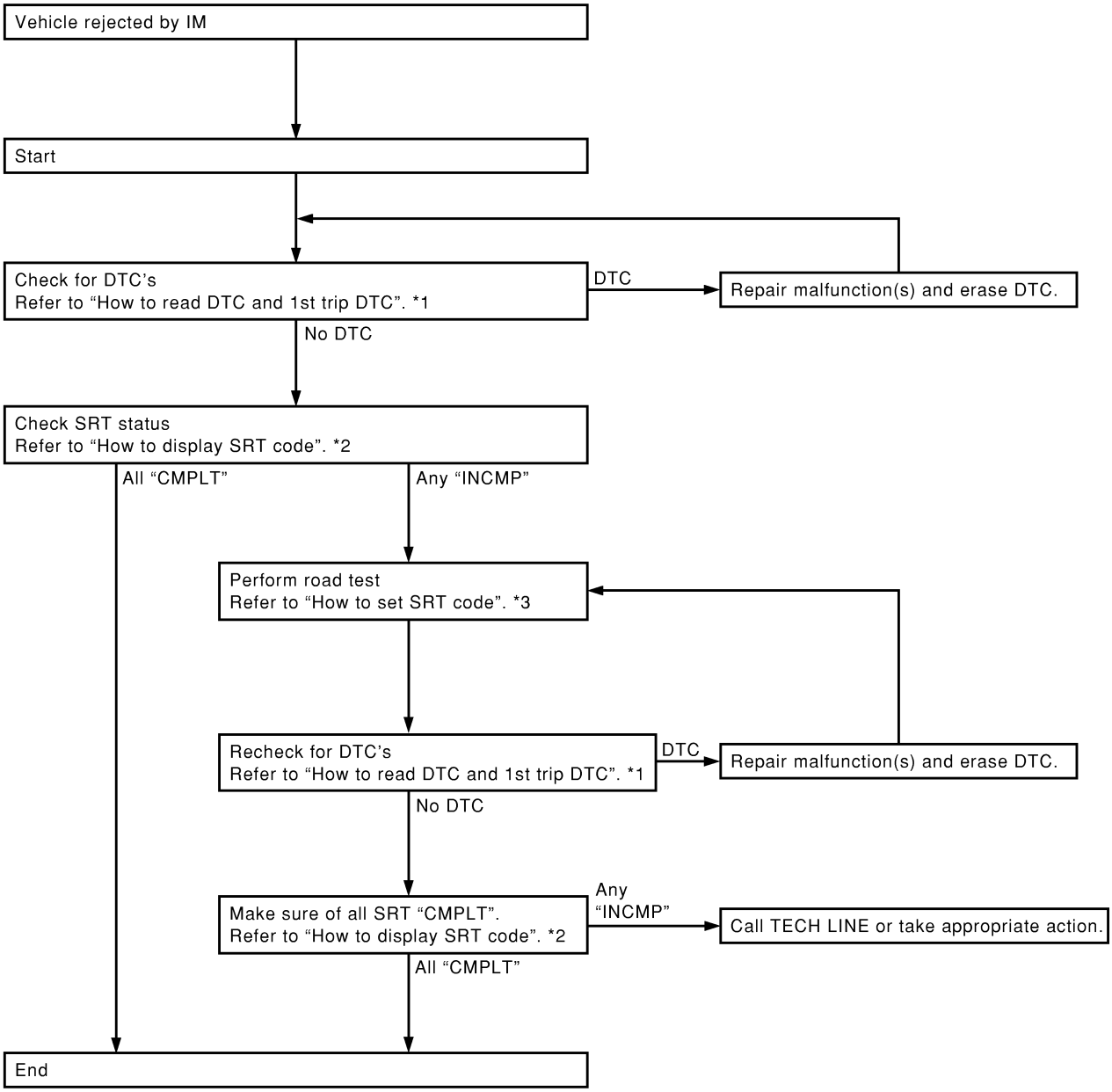
When all SRT related self-diagnoses showed OK results in a single cycle (Ignition OFF-ON-OFF), the SRT will indicate “CMPLT”. → Case 1 above
When all SRT related self-diagnoses showed OK results through several different cycles, the SRT will indicate “CMPLT” at the time the respective self-diagnoses 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 of each self-diagnosis to be executed twice (Case 3) for the following reasons:

- The SRT will indicate “CMPLT” at the time the respective self-diagnoses have one (1) OK result.
- The emissions inspection requires “CMPLT” of the SRT only with OK self-diagnosis 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.



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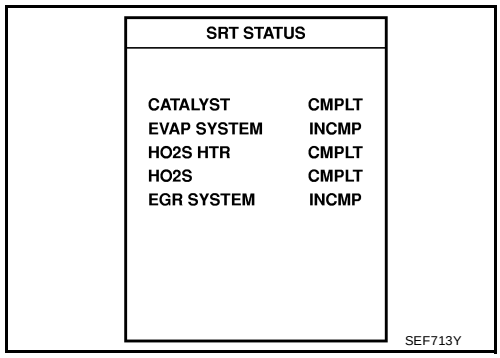
*1 EC-64 *2 EC-69 *3 EC-69

How to Display SRT Code

With CONSULT-II

Selecting “SRT STATUS” in “DTC CONFIRMATION” mode with CONSULT-II.
For items whose SRT codes are set, a “CMPLT” is displayed on the CONSULT-II screen; for items whose SRT codes are not set, “INCMP” is displayed.



With GST

Selecting Mode 1 with GST (Generic Scan Tool)
A sample of CONSULT-II display for SRT code is shown below.
“INCMP” means the self-diagnosis is incomplete and SRT is not set. “CMPLT” means the self-diagnosis is complete and SRT is set.

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.

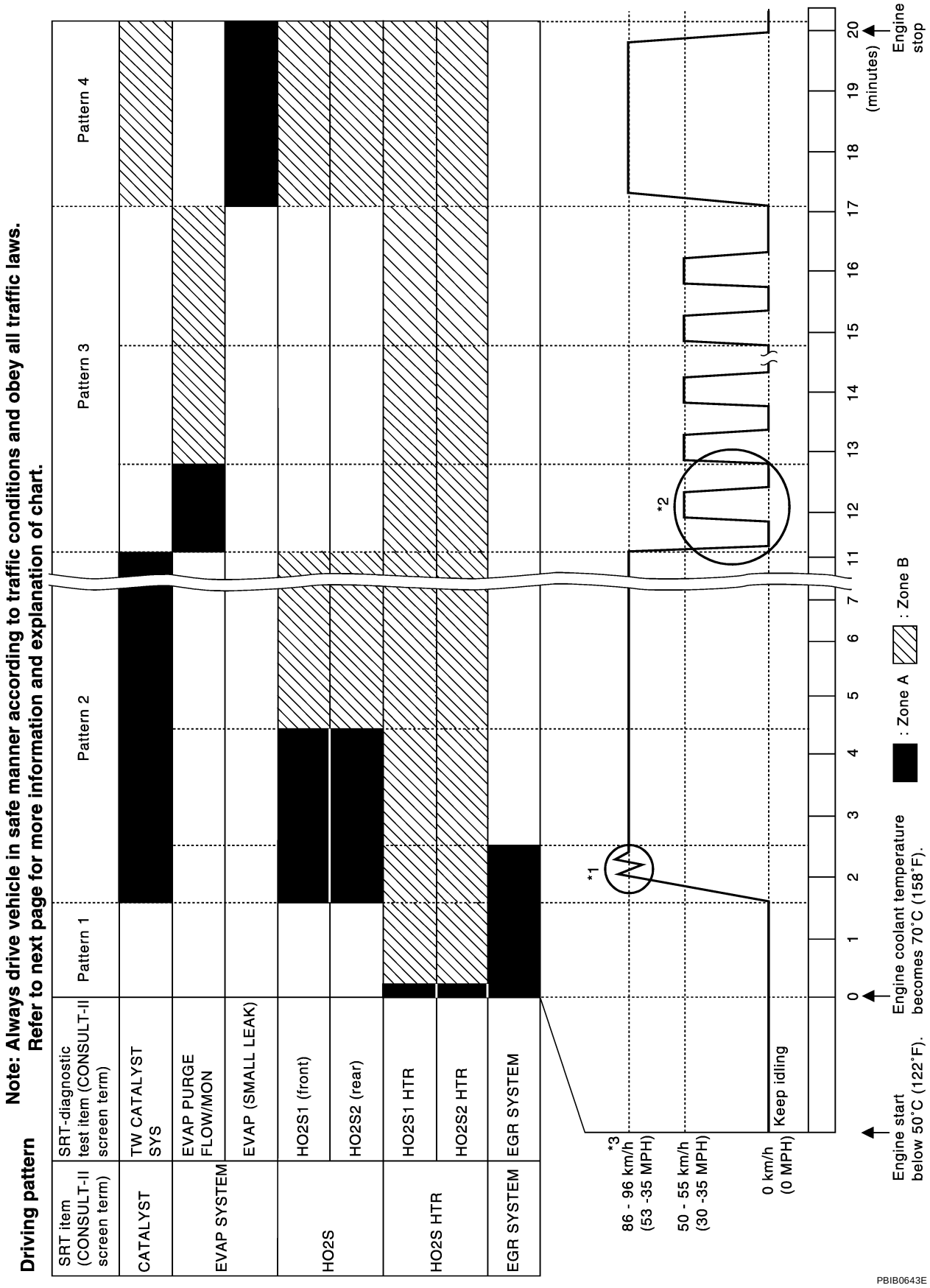
With CONSULT-II

Perform corresponding DTC Confirmation Procedure one by one based on “Performance Priority” in the table on EC-66 .

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 terminals 70 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 terminals 70 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 82 and ground is less than 4.1V).**

Pattern 2:

- When steady-state driving is performed again even after it is interrupted, each diagnosis can be conducted. In this case, the time required for diagnosis may be extended.

Pattern 3:

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

Pattern 4:

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

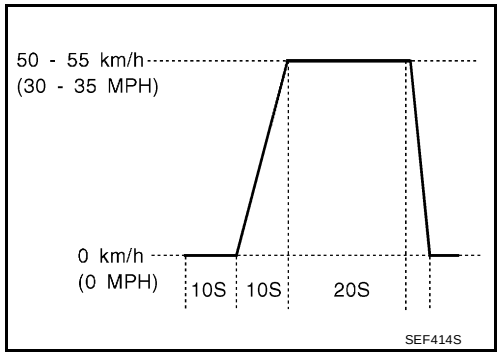
*1: Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH), then release the accelerator pedal and keep it released for more than 10 seconds. Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH) again.

*2: Operate the vehicle in the following driving pattern.

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

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

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



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

Suggested Transmission Gear Position for A/T Models

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

Suggested upshift speeds for M/T models

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

	For normal acceleration in low altitude areas [less than 1,219 m (4,000 ft)]:	For quick acceleration in low altitude areas and high altitude areas [over 1,219 m (4,000 ft)]:
Gear change	ACCEL shift point km/h (MPH)	km/h (MPH)
1st to 2nd	24 (15)	25 (15)
2nd to 3rd	40 (25)	40 (25)

	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)]:
3rd to 4th	65 (40)	65 (40)
4th to 5th	75 (45)	75 (45)

Suggested Maximum Speed in Each Gear

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

Gear	km/h (MPH)
1st	48 (30)
2nd	84 (52)
3rd	128 (80)
4th	—
5th	—

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

The following is the information specified in Mode 6 of SAE J1979.
The test value is a parameter used to determine whether a system/circuit diagnostic test is “OK” or “NG” while being monitored by the ECM during self-diagnosis. The test limit is a reference value which is specified as the maximum or minimum value and is compared with the test value being monitored.
Items for which these data (test value and test limit) are displayed are the same as SRT code items (13 test items).
These data (test value and test limit) are specified by Test ID (TID) and Component ID (CID) and can be displayed on the GST screen.

X: Applicable —: Not applicable

SRT item	Self-diagnostic test item	Test value (GST display)		Test limit	Application
		TID	CID		
CATALYST	Three way catalyst function (bank 1)	02H	81H	Min.	X
	Three way catalyst function (bank 2)	02H	81H	Min.	X
EVAP SYSTEM	EVAP control system (Small leak)	05H	03H	Max.	X
	EVAP control system purge flow monitoring	06H	83H	Min.	X

SRT item	Self-diagnostic test item	Test value (GST display)		Test limit	Application
		TID	CID		
HO2S	Heated oxygen sensor 1 (bank 1)	09H	04H	Max.	X
		0AH	84H	Min.	X
		0BH	04H	Max.	X
		0CH	04H	Max.	X
		0DH	04H	Max.	X
	Heated oxygen sensor 1 (bank 2)	11H	05H	Max.	X
		12H	85H	Min.	X
		13H	05H	Max.	X
		14H	05H	Max.	X
		15H	05H	Max.	X
	Heated oxygen sensor 2 (bank 1)	19H	86H	Min.	X
		1AH	86H	Min.	X
		1BH	06H	Max.	X
		1CH	06H	Max.	X
	Heated oxygen sensor 2 (bank 2)	21H	87H	Min.	X
		22H	87H	Min.	X
		23H	07H	Max.	X
		24H	07H	Max.	X
HO2S HTR	Heated oxygen sensor 1 heater (bank 1)	29H	08H	Max.	X
		2AH	88H	Min.	X
	Heated oxygen sensor 1 heater (bank 2)	2BH	09H	Max.	X
		2CH	89H	Min.	X
	Heated oxygen sensor 2 heater (bank 1)	2DH	0AH	Max.	X
		2EH	8AH	Min.	X
	Heated oxygen sensor 2 heater (bank 2)	2FH	0BH	Max.	X
		30H	8BH	Min.	X
EGR SYSTEM	EGR function	31H	8CH	Min.	X
		32H	8CH	Min.	X
		33H	8CH	Min.	X
		34H	8CH	Min.	X
		35H	0CH	Max.	X

HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION

How to Erase DTC (With CONSULT-II)

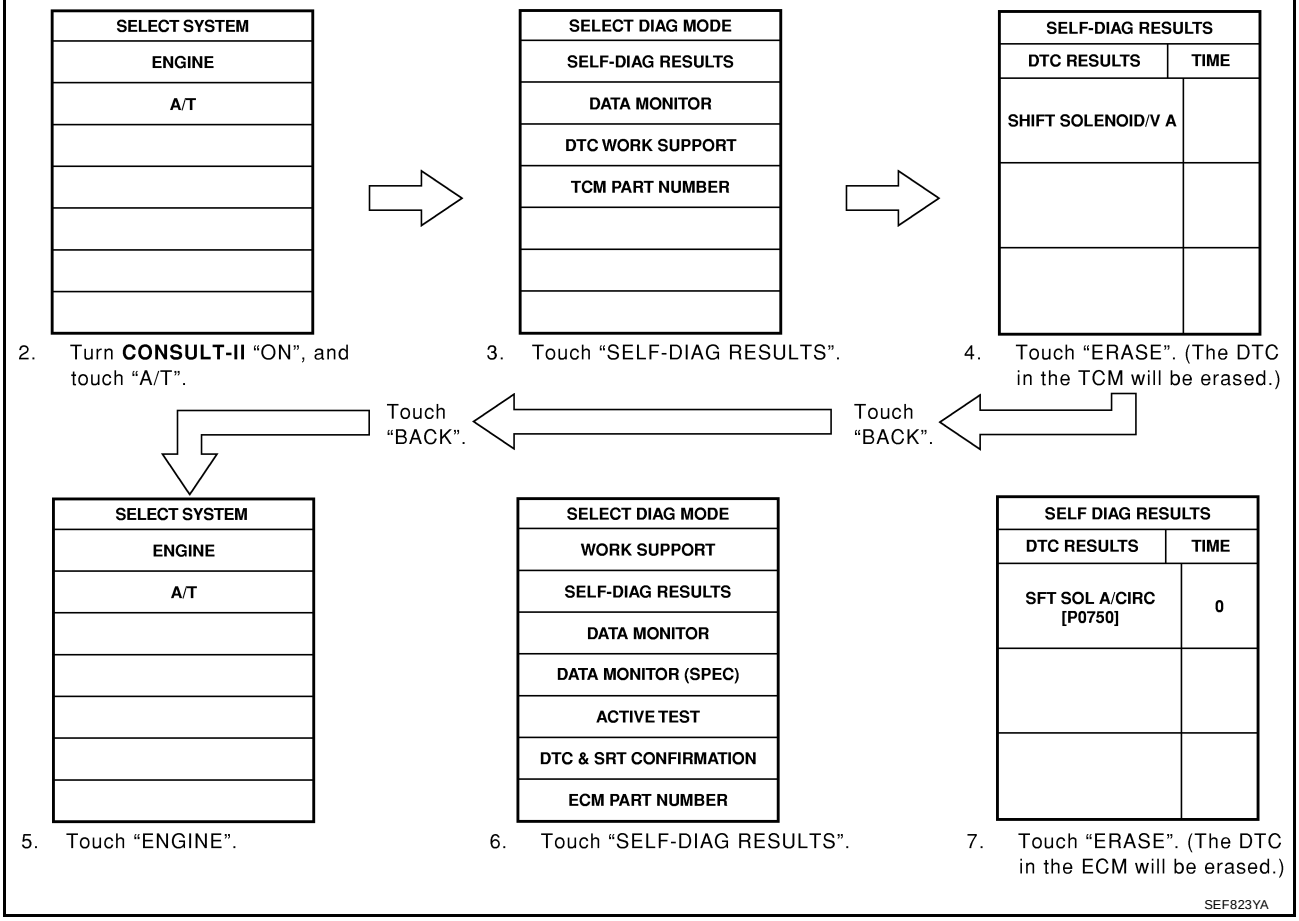
NOTE:
If the DTC is not for A/T related items (see EC-21), skip steps 2 through 4.

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.)

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

How to erase DTC (With CONSULT-II)

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



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

How to Erase DTC (With GST)

NOTE:
If the DTC is not for A/T related items (see EC-21), skip step 2.

1. If the ignition switch stays “ON” after repair work, be sure to turn ignition switch “OFF” once. Wait at least 10 seconds and then turn it “ON” (engine stopped) again.
2. Perform “SELF-DIAGNOSTIC PROCEDURE (Without CONSULT-II)” in AT section titled “TROUBLE DIAGNOSIS”, “Self-diagnosis”. (The engine warm-up step can be skipped when performing the diagnosis only to erase the DTC.)
3. Select Mode 4 with GST (Generic Scan Tool).

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

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

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

7. Others

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

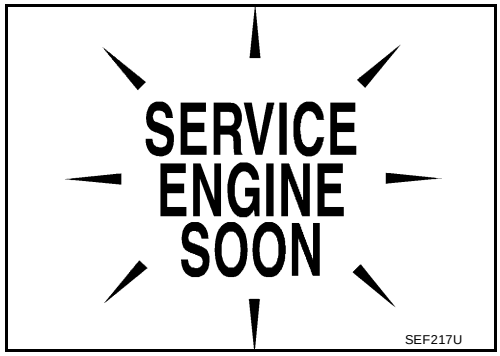
Malfunction Indicator Lamp (MIL)

UBS001CN

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-24, "WARNING LAMPS" or see EC-577 .
2. When the engine is started, the MIL should go off.
   If the MIL remains on, the on board diagnostic system has detected an engine system malfunction.



ON BOARD DIAGNOSTIC SYSTEM FUNCTION

The on board diagnostic system has the following two functions.

Diagnostic Test Mode	KEY and ENG. Status	Function	Explanation of Function
Mode I	Ignition switch in “ON” position  Engine stopped 	BULB CHECK	This function checks the MIL bulb for damage (blown, open circuit, etc.). If the MIL does not come on, check MIL circuit.
	Engine running 	MALFUNCTION WARNING	This is a usual driving condition. When a malfunction is detected twice in two consecutive driving cycles (two trip detection logic), the MIL will light up to inform the driver that a malfunction has been detected. The following malfunctions will light up or blink the MIL in the 1st trip. ● Coolant overtemperature enrichment protection ● “Misfire (Possible three way catalyst damage)” ● “Closed loop control” ● Fail-safe mode

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-24, "WARNING LAMPS" or see EC-577 .

Diagnostic Test Mode I — Malfunction Warning

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

OBD System Operation Chart

UBS001CO

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

- When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data are stored in the ECM memory.
- When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data are stored in the ECM memory, and the MIL will come on. For details, refer to EC-60, "Two Trip Detection Logic" .
- The MIL will go off after the vehicle is driven 3 times with no malfunction. The drive is counted only when the recorded driving pattern is met (as stored in the ECM). If another malfunction occurs while counting, the counter will reset.
- The DTC and the freeze frame data will be stored until the vehicle is driven 40 times (driving pattern A) without the same malfunction recurring (except for Misfire and Fuel Injection System). For Misfire and Fuel Injection System, the DTC and freeze frame data will be stored until the vehicle is driven 80 times (driving pattern C) without the same malfunction recurring. The “TIME” in “SELF-DIAGNOSTIC RESULTS” mode of CONSULT-II will count the number of times the vehicle is driven.
- The 1st trip DTC is not displayed when the self-diagnosis results in “OK” for the 2nd trip.

SUMMARY CHART

Items	Fuel Injection System	Misfire	Other
MIL (goes off)	3 (pattern B)	3 (pattern B)	3 (pattern B)
DTC, Freeze Frame Data (no display)	80 (pattern C)	80 (pattern C)	40 (pattern A)
1st Trip DTC (clear)	1 (pattern C), *1	1 (pattern C), *1	1 (pattern B)
1st Trip Freeze Frame Data (clear)	*1, *2	*1, *2	1 (pattern B)

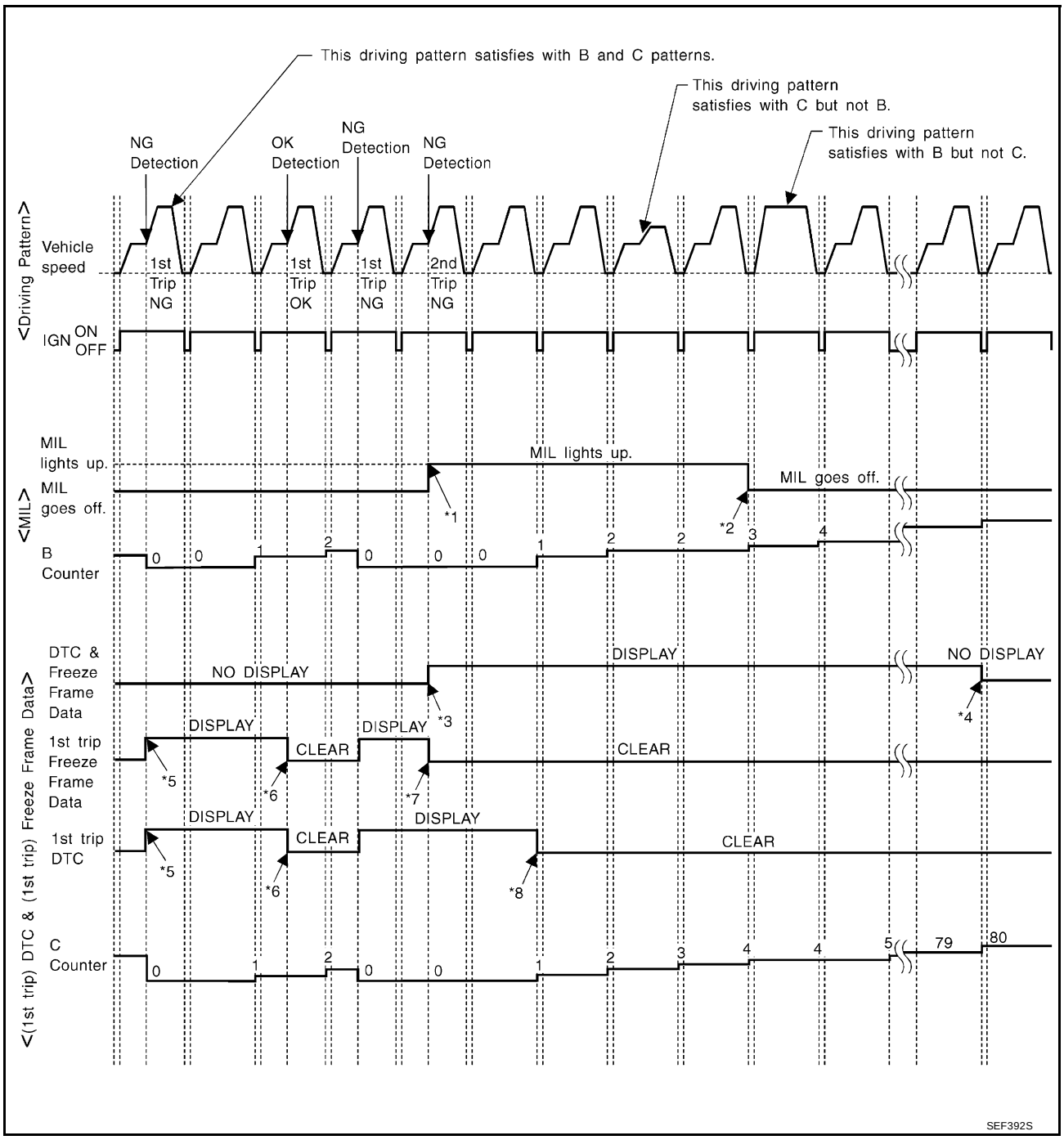
For details about patterns “B” and “C” under “Fuel Injection System” and “Misfire”, see EC-78 .

For details about patterns “A” and “B” under “Other”, see EC-80 .

*1: Clear timing is at the moment OK is detected.

*2: Clear timing is when the same malfunction is detected in the 2nd trip.

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



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

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

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

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

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

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

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

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

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

Driving Pattern B

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

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

Driving Pattern C

Driving pattern C means the vehicle operation as follows:

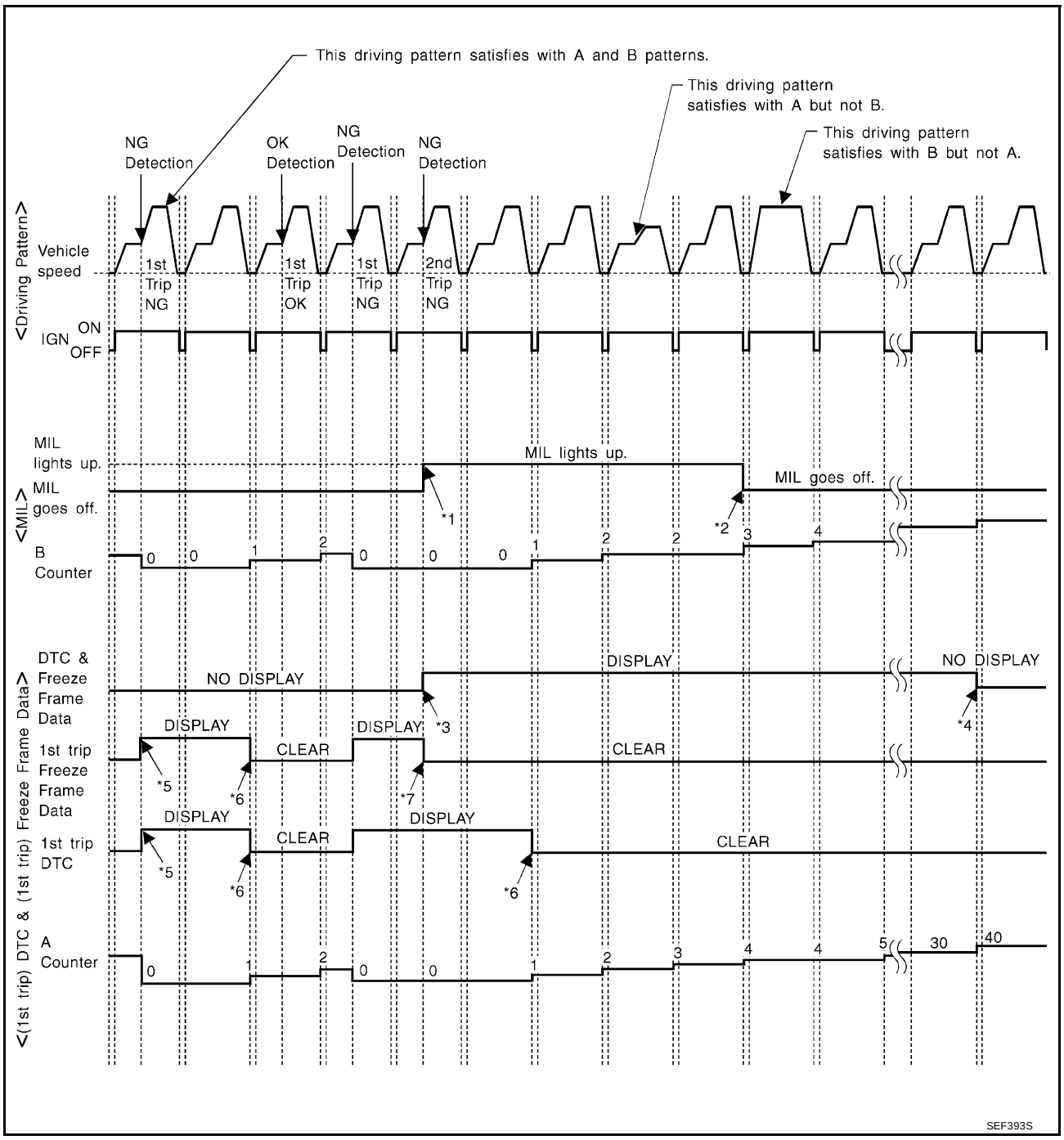
1. The following conditions should be satisfied at the same time:
   Engine speed: (Engine speed in the freeze frame data) ±375 rpm
   Calculated load value: (Calculated load value in the freeze frame data) × (1±0.1) [%]
   Engine coolant temperature (T) condition:

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

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

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

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



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

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

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

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

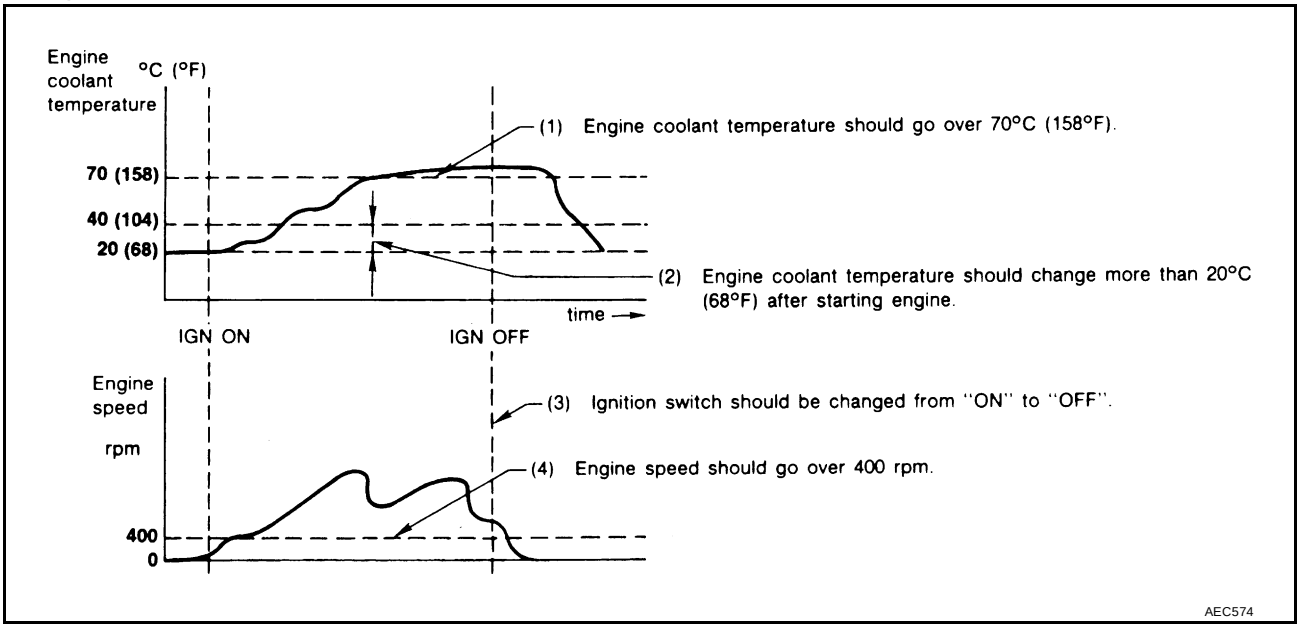
*5: When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM.

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

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

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

Driving Pattern A



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

Driving Pattern B

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

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

TROUBLE DIAGNOSIS

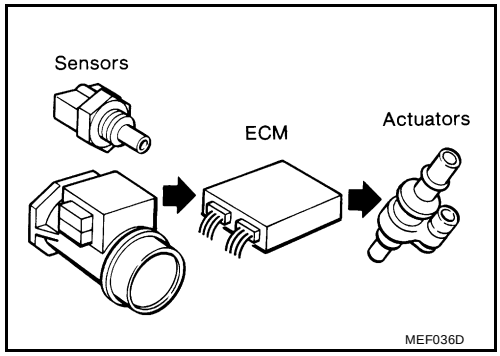
PFP:00004

Trouble Diagnosis Introduction

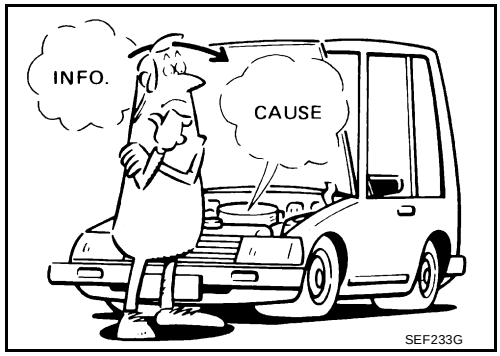
UBS001CP

INTRODUCTION

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



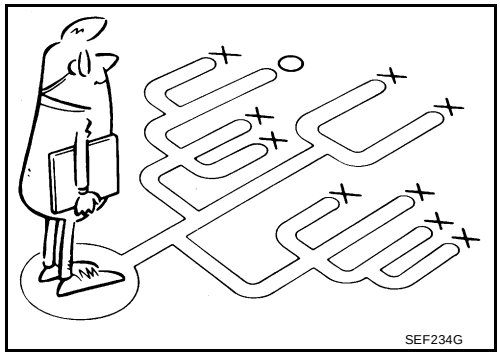
It is much more difficult to diagnose a problem that occurs intermittently rather than continuously. Most intermittent problems are caused by poor electric connections or improper wiring. In this case, careful checking of suspected circuits may help prevent the replacement of good parts.



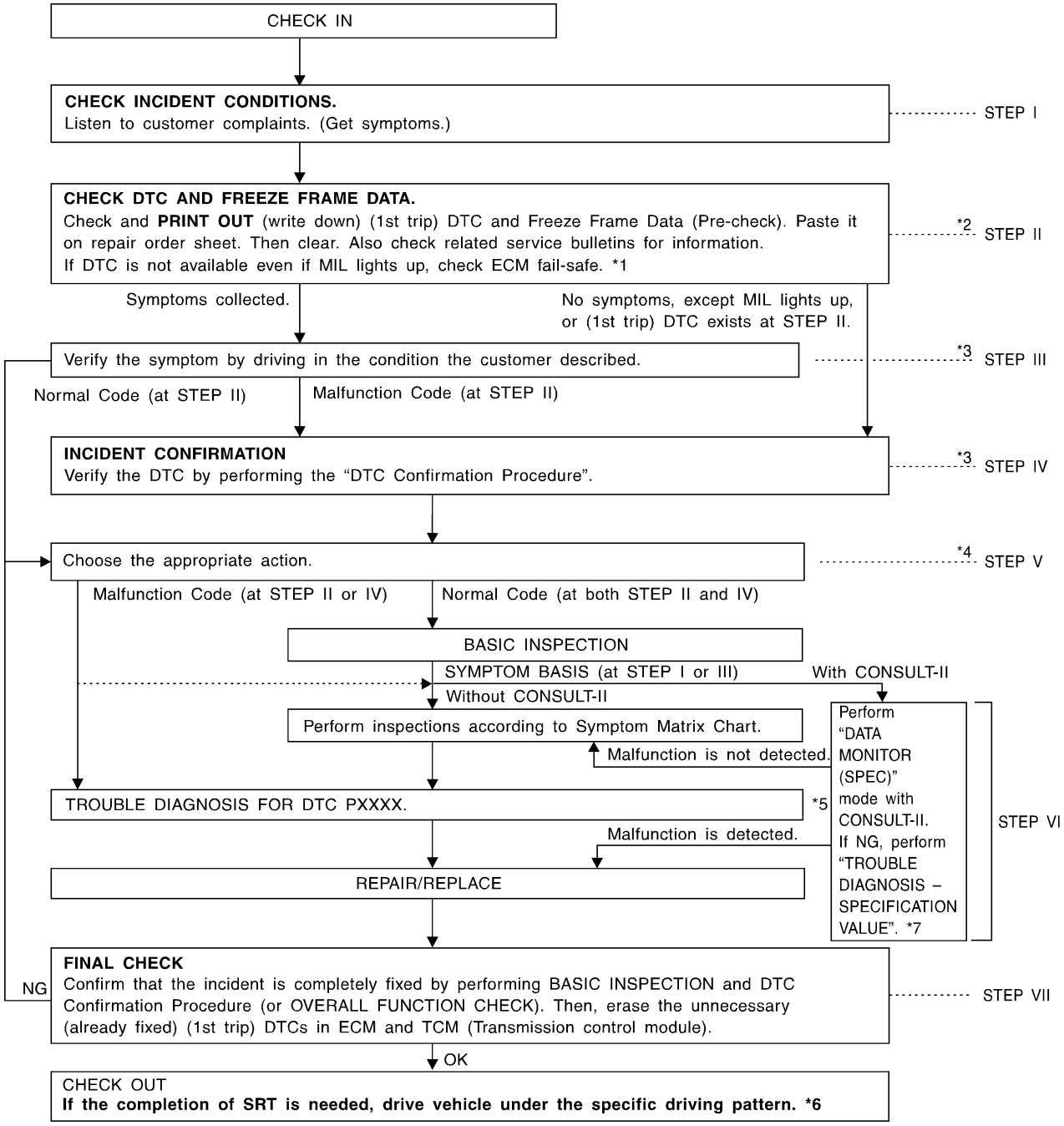
A visual check only may not find the cause of the problems. A road test with CONSULT-II (or GST) or a circuit tester connected should be performed. Follow the “Work Flow” on EC-82 .

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

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



WORK FLOW



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*1: EC-86

*2: If time data of "SELF-DIAG RESULTS" is other than "0" or "1t", refer to EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

*3: If the incident cannot be duplicated, refer to EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

*4: If the on board diagnostic system cannot be performed, check main power supply and ground circuit. Refer to EC-148, "POWER SUPPLY CIRCUIT FOR ECM" .

*5: If the malfunctioning part cannot be found, refer to EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

*6: EC-70

*7: EC-143

Description for Work Flow

STEP	DESCRIPTION
STEP I	Get detailed information about the conditions and the environment when the incident/symptom occurred using the EC-84, "DIAGNOSTIC WORKSHEET" .
STEP II	Before confirming the concern, check and write down (print out using CONSULT-II or Generic Scan Tool) the (1st trip) Diagnostic Trouble Code (DTC) and the (1st trip) freeze frame data, then erase the code and the data. (Refer to EC-73 .) The (1st trip) DTC and the (1st trip) freeze frame data can be used when duplicating the incident at STEP III & IV. If the incident cannot verified, perform EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" . Study the relationship between the cause, specified by (1st trip) DTC, and the symptom described by the customer. (The “Symptom Matrix Chart” will be useful. See EC-101 .) Also check related service bulletins for information.
STEP III	Try to confirm the symptom and under what conditions the incident occurs. The “DIAGNOSTIC WORK SHEET” and the freeze frame data are useful to verify the incident. Connect CONSULT-II to the vehicle in DATA MONITOR (AUTO TRIG) mode and check real time diagnosis results. If the incident cannot verified, perform EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" . If the malfunction code is detected, skip STEP IV and perform STEP V.
STEP IV	Try to detect the (1st trip) Diagnostic Trouble Code by driving in (or performing) the “DTC Confirmation Procedure”. Check and read the (1st trip) DTC and (1st trip) freeze frame data by using CONSULT-II or GST. During the (1st trip) DTC verification, be sure to connect CONSULT-II to the vehicle in DATA MONITOR (AUTO TRIG) mode and check real time diagnosis results. If the incident cannot verified, perform EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" . In case the “DTC Confirmation Procedure” is not available, perform the “Overall Function Check” instead. The (1st trip) DTC cannot be displayed by this check, however, this simplified “check” is an effective alternative. The “NG” result of the “Overall function check” is the same as the (1st trip) DTC detection.
STEP V	Take the appropriate action based on the results of STEP I through IV. If the malfunction code is indicated, proceed to trouble diagnosis for DTC PXXXX. If the normal code is indicated, proceed to the BASIC INSPECTION. (Refer to EC-87 .) If CONSULT-II is available, perform “DATA MONITOR (SPEC)” mode with CONSULT-II and proceed to the “TROUBLE DIAGNOSIS — SPECIFICATION VALUE” . (If malfunction is detected, proceed to “REPAIR/REPLACE”.) Then perform inspections according to the Symptom Matrix Chart. (Refer to EC-101 .)
STEP VI	Identify where to begin diagnosis based on the relationship study between symptom and possible causes. Inspect the system for mechanical binding, loose connectors or wiring damage using (tracing) “Harness Layouts”. Gently shake the related connectors, components or wiring harness with CONSULT-II set in “DATA MONITOR (AUTO TRIG)” mode. Check the voltage of the related ECM terminals or monitor the output data from the related sensors with CONSULT-II. Refer to EC-113 , EC-138 . The “Diagnostic Procedure” in EC section contains a description based on open circuit inspection. A short circuit inspection is also required for the circuit check in the Diagnostic Procedure. For details, refer to GI-26, "How to Perform Efficient Diagnosis for an Electrical Incident" . Repair or replace the malfunction parts. If malfunctioning part cannot be detected, perform EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .
STEP VII	Once you have repaired the circuit or replaced a component, you need to run the engine in the same conditions and circumstances which resulted in the customer's initial complaint. Perform the “DTC Confirmation Procedure” and confirm the normal code [DTC No. P0000] is detected. If the incident is still detected in the final check, perform STEP VI by using a different method from the previous one. Before returning the vehicle to the customer, be sure to erase the unnecessary (already fixed) (1st trip) DTC in ECM and TCM (Transmission control module). (Refer toEC-73, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" and AT-39, "HOW TO ERASE DTC" .)

DIAGNOSTIC WORKSHEET

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

- Vehicle ran out of fuel, which caused the engine to misfire.
- Fuel filler cap was left off or incorrectly screwed on, allowing fuel to evaporate into the atmosphere [for the models with EVAP (SMALL LEAK) diagnosis].

KEY POINTS

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

SEF907L

Worksheet Sample

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

MTBL0017

DTC Inspection Priority Chart

UBS001CQ

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

Priority	Detected items (DTC)
1	● P0100, P0102, P0103, P1102 MAF sensor ● P0112, P0113, P0127 IAT sensor ● P0117, P0118, P0125 ECT sensor ● P0121, P0122, P0123 TP sensor ● P0128 Thermostat function ● P0181, P0182, P0183 FTT sensor ● P0327, P0328 KS ● P0335 CKP sensor ● P0340 CMP sensor ● P0350 Ignition signal ● P0403 EGR volume control valve ● P0460, P0461, P0462, P0463, P1464 Fuel level sensor ● P0500 VSS ● P0605 ECM ● P1605 A/T diagnosis communication line ● P1706 PNP switch
2	● P0031, P0032, P0051, P0052 HO2S1 heater ● P0037, P0038, P0057, P0058 HO2S2 heater ● P0132, P0133, P0134, P0152, P0153, P0154, P1143, P1144, P1163, P1164 HO2S1 ● P0138, P0139, P0158, P0159, P1146, P1147, P1166, P1167 HO2S2 ● P0217 Coolant overtemperature enrichment protection ● P0405, P0406 EGRT sensor ● P0441 EVAP control system ● P0444, P0445, P1444 EVAP canister purge volume control solenoid valve ● P0447, P1446, P1448 EVAP canister vent control valve ● P0452, P0453 EVAP system pressure sensor ● P0510 CTP switch ● P1111 IVT control solenoid valve ● P1140 IVT control position sensor ● P1490, P1491 Vacuum cut bypass valve
3	● P0011 IVT control ● P0171, P0172, P0174, P0175 Fuel injection system function ● P0300-P0304 Misfire ● P0400, P1402 EGR function ● P0420, P0430 Three way catalyst function ● P0442, P0455, P0456, P1442, P1456 EVAP control system ● P0505, P0506, P0507 ISC system ● P0600 A/T control ● P1148, P1168 Closed loop control ● P1217 Engine over temperature

Fail-safe Chart

UBS001CR

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

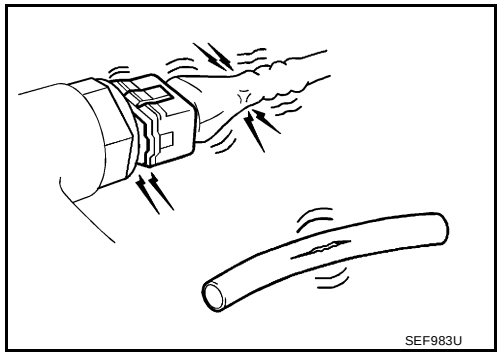
<table>
<tr><th>DTC No.</th><th>Detected items</th><th colspan="2">Engine operating condition in fail-safe mode</th></tr>
<tr><td>P0102
P0103</td><td>Mass air flow sensor circuit</td><td colspan="2">Engine speed will not rise more than 2,400 rpm due to the fuel cut.</td></tr>
<tr><td rowspan="5">P0117
P0118</td><td rowspan="5">Engine coolant temperature sensor circuit</td><td colspan="2">Engine coolant temperature will be determined by ECM based on the time after turning ignition switch “ON” or “START”.
CONSULT-II displays the engine coolant temperature decided by ECM.</td></tr>
<tr><td>Condition</td><td>Engine coolant temperature decided (CONSULT-II display)</td></tr>
<tr><td>Just as ignition switch is turned ON or Start</td><td>40°C (104°F)</td></tr>
<tr><td>More than approx. 4 minutes after ignition ON or Start</td><td>80°C (176°F)</td></tr>
<tr><td>Except as shown above</td><td>40 - 80°C (104 - 176°F)
(Depends on the time)</td></tr>
<tr><td rowspan="4">P0122
P0123</td><td rowspan="4">Throttle position sensor circuit</td><td colspan="2">Throttle position will be determined based on the injected fuel amount and the engine speed. Therefore, acceleration will be poor.</td></tr>
<tr><td>Condition</td><td>Driving condition</td></tr>
<tr><td>When engine is idling</td><td>Normal</td></tr>
<tr><td>When accelerating</td><td>Poor acceleration</td></tr>
<tr><td rowspan="10">Unable to access ECM</td><td rowspan="10">ECM</td><td colspan="2">ECM fail-safe activating condition
The computing function of the ECM was judged to be malfunctioning.
When the fail-safe system activates (i.e., if the ECM detects a malfunction condition in the CPU of ECM), the MIL on the instrument panel lights to warn the driver.
However it is not possible to access ECM and DTC cannot be confirmed.
Engine control with fail-safe
When ECM fail-safe is operating, fuel injection, ignition timing, fuel pump operation and IACV-AAC valve operation are controlled under certain limitations.</td></tr>
<tr><td></td><td>ECM fail-safe operation</td></tr>
<tr><td>Engine speed</td><td>Engine speed will not rise more than 3,000 rpm</td></tr>
<tr><td>Fuel injection</td><td>Simultaneous multiport fuel injection system</td></tr>
<tr><td>Ignition timing</td><td>Ignition timing is fixed at the preset valve</td></tr>
<tr><td>Fuel pump</td><td>Fuel pump relay is “ON” when engine is running and “OFF” when engine stalls</td></tr>
<tr><td>IACV-AAC valve</td><td>Full open</td></tr>
<tr><td colspan="2">Replace ECM, if ECM fail-safe condition is confirmed.</td></tr>
</table>

Basic Inspection

UBS001CS

1. INSPECTION START

1. Check service records for any recent repairs that may indicate a related problem, or a current need for scheduled maintenance.
2. Open engine hood and check the following:
- Harness connectors for improper connections
- Vacuum hoses for splits, kinks and improper connections
- Wiring for improper connections, pinches and cuts
- Air cleaner clogging
- Hoses and ducts for leaks
3. Confirm that electrical or mechanical roads are not applied.
- Head lamp switch is OFF.
- Air conditioner switch is OFF.
- Rear window defogger switch is OFF.
- Steering wheel is in the straight-ahead position, etc.


SEF983U

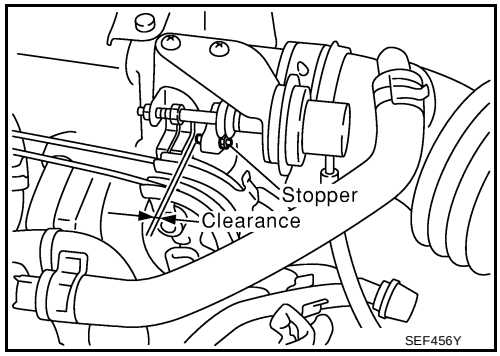
>> GO TO 2.

2. CHECK THROTTLE OPENER OPERATION-I

Confirm that there is a clearance between throttle drum and stopper.

OK or NG

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



SEF456Y

3. CHECK THROTTLE OPENER FIXING BOLTS

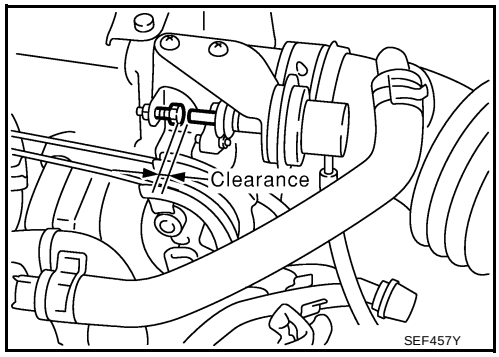
Check throttle opener fixing bolts for loosening.

OK or NG

OK >> 1. Repair or replace throttle body assembly.
2. GO TO 2.
NG >> 1. Retighten the fixing bolts.
2. GO TO 2.

4. CHECK THROTTLE OPENER OPERATION-II

1. Start engine and let it idle.
2. Confirm that throttle opener rod moves backward and there is a clearance between throttle drum and throttle opener rod.

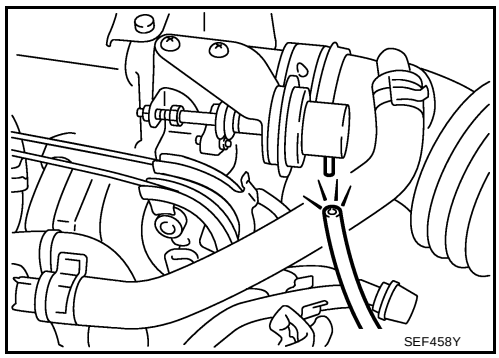


OK or NG

OK >> GO TO 7.
NG >> GO TO 5.

5. CHECK VACUUM SOURCE FOR THROTTLE OPENER

1. Disconnect vacuum hose connected to throttle opener.
2. Check vacuum existence with engine running.

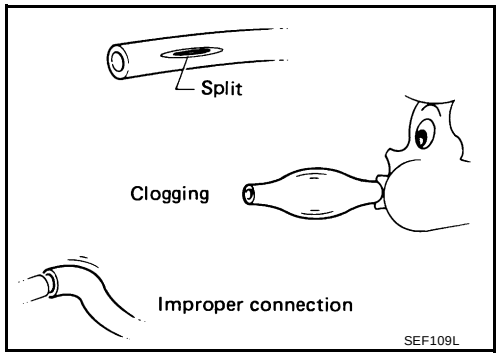


OK or NG

OK >> 1. Repair or replace throttle body assembly.
2. GO TO 4.
NG >> GO TO 6.

6. CHECK VACUUM HOSE

1. Stop engine.
2. Remove the vacuum hose.
3. Check the vacuum hose for splits, kinks and clogging.

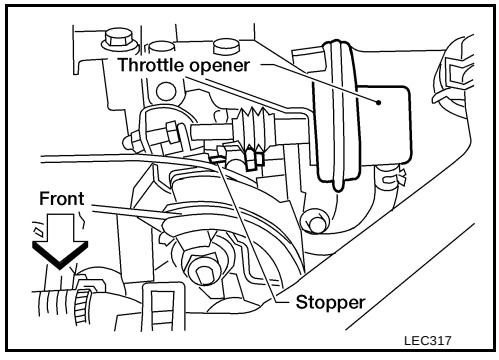


OK or NG

OK >> 1. Clean vacuum port by blowing air.
2. GO TO 4.
NG >> 1. Replace vacuum hose.
2. GO TO 4.

7. CHECK THROTTLE DRUM OPERATION

Confirm that throttle drum moves to contact the stopper.



OK or NG

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

8. CHECK ACCELERATOR WIRE INSTALLATION

1. Stop engine.
2. Check accelerator wire for slack.

OK or NG

OK >> GO TO 9.
NG >> 1. Adjust accelerator wire. Refer to ACC-2, "Adjusting Accelerator Wire" .
2. GO TO 7.

9. CHECK THROTTLE VALVE OPERATION

1. Remove intake air ducts.
2. Check throttle valve operation when moving throttle drum by hand.

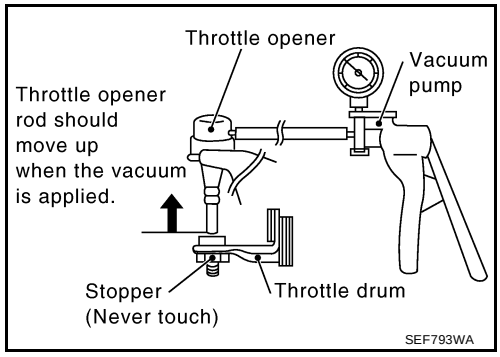
OK or NG

OK >> 1. Retighten the throttle drum fixing nuts.
2. GO TO 7.
NG >> 1. Clean the throttle body and throttle valve.
2. GO TO 7.

10. CHECK THROTTLE POSITION SWITCH CLOSED POSITION-I

NOTE:
Always check ignition timing before performing the following.

1. Warm up engine to normal operating temperature.
2. Stop engine.
3. Remove the vacuum hose connected to the throttle opener.
4. Connect suitable vacuum hose to vacuum pump as shown below.
5. Apply vacuum [more than –40.0 kPa (–300 mmHg, –11.81 inHg)] until the throttle drum is free from the throttle opener rod.



With CONSULT-II>>GO TO 11.
Without CONSULT-II>>GO TO 17.

11. CHECK THROTTLE POSITION SWITCH CLOSED POSITION-II

With CONSULT-II

1. Turn ignition switch “ON”.
2. Select “TP SW/TP SEN IDLE POSI ADJ” in “WORK SUPPORT” mode or “CLSD THL/P SW” in “DATA MONITOR” mode with CONSULT-II.
3. Read “CLSD THL/P SW” signal under the following conditions.

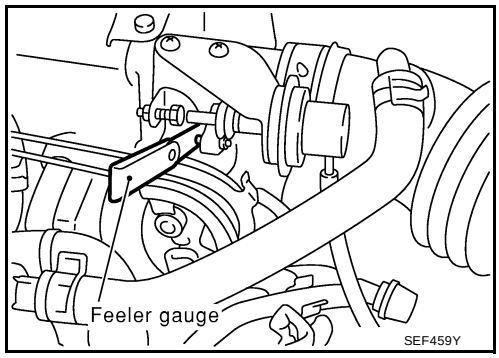
TP SW/TP SEN IDLE POSI ADJ	
MONITOR	
COOLAN TEMP/S	91°C
CLSD THL POS	ON
CLSD THL/P SW	ON

SEF715Y

- Insert a 0.05 mm (0.0020 in) and 0.15 mm (0.0059 in) feeler gauge alternately between stopper and throttle drum as shown in the figure and check the signal.

  “CLSD THL/P SW” signal should remain “ON” while inserting 0.05 mm (0.0020 in) feeler gauge.

  “CLSD THL/P SW” signal should remain “OFF” while inserting 0.15 mm (0.0059 in) feeler gauge.



SEF459Y

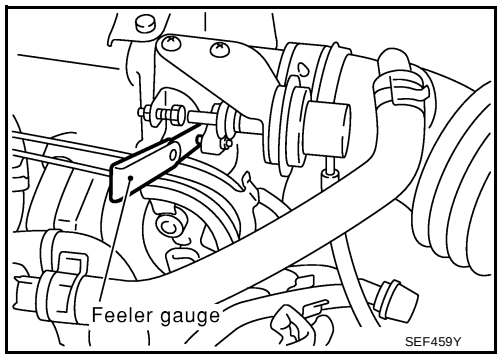
OK or NG

OK >> GO TO 14.
NG >> GO TO 12.

12. ADJUSTMENT THROTTLE POSITION SWITCH CLOSED POSITION-I

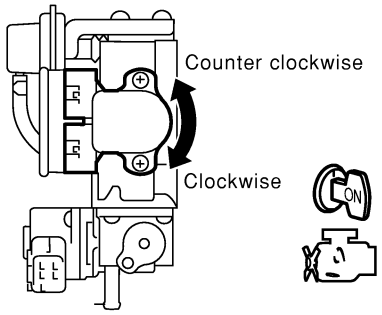
With CONSULT-II

1. Loosen throttle position sensor fixing bolts.
2. Confirm that proper vacuum is applied. Refer to test No. 10. During adjustment, vacuum should be applied.
3. Insert 0.05 mm (0.0020 in) feeler gauge between stopper and throttle drum as shown in the figure.



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

TP SW/TP SEN IDLE POSI ADJ	
MONITOR	
COOLAN TEMP/S	91°C
CLSD THL POS	ON
CLSD THL/P SW	OFF



>> GO TO 13.

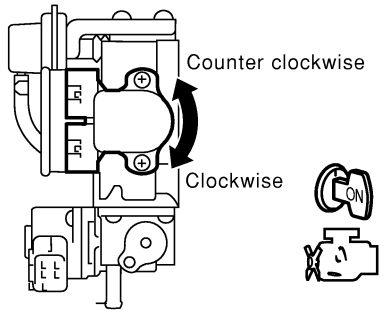
13. ADJUSTMENT THROTTLE POSITION SWITCH CLOSED POSITION-II

With CONSULT-II

1. Temporarily tighten sensor body fixing bolts as follows.

- **Gradually move the sensor body clockwise and stop it when "CLSD THL/P SW" signal switches from "OFF" to "ON", then temporarily tighten sensor body fixing bolts.**

TP SW/TP SEN IDLE POSI ADJ	
MONITOR	
COOLAN TEMP/S	91°C
CLSD THL POS	ON
CLSD THL/P SW	ON



SEF718Y

2. Make sure two or three times that the signal is "ON" when the throttle valve is closed and "OFF" when it is opened.
3. Remove 0.05 mm (0.0020 in) feeler gauge then insert 0.15 mm (0.0059 in) feeler gauge.
4. Make sure two or three times that the signal remains "OFF" when the throttle valve is closed.
5. Tighten throttle position sensor.
6. Check the "CLSD THL/P SW" signal again.
   The signal remains "OFF" while closing throttle valve.

OK or NG

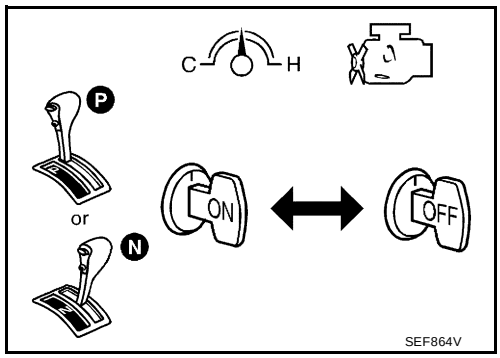
OK >> GO TO 14.
NG >> GO TO 12.

14. RESET THROTTLE POSITION SENSOR IDLE POSITION MEMORY

With CONSULT-II

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

1. Confirm that proper vacuum is applied. Refer to Test No. 10.
2. Attach blind cap to vacuum port from which vacuum hose to throttle opener was disconnected.
3. Start engine.
4. Warm up engine to normal operating temperature.
5. Select “TP SW/TP SEN IDLE POSI ADJ” in “WORK SUPPORT” mode.
6. Stop engine. (Turn ignition switch “OFF”.)
7. Turn ignition switch “ON” and wait at least 5 seconds.
8. Turn ignition switch “OFF” and wait at least 10 seconds.



9. Repeat steps 7 and 8 until “CLSD THL POS” signal changes to “ON”.

>> GO TO 19.

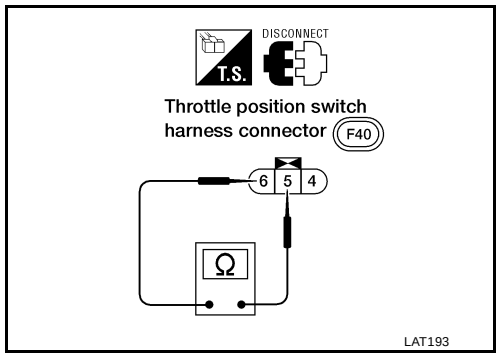
TP SW/TP SEN IDLE POSI ADJ	
MONITOR	
COOLAN TEMP/S	91°C
CLSD THL POS	ON
CLSD THL/P SW	ON

SEF715Y

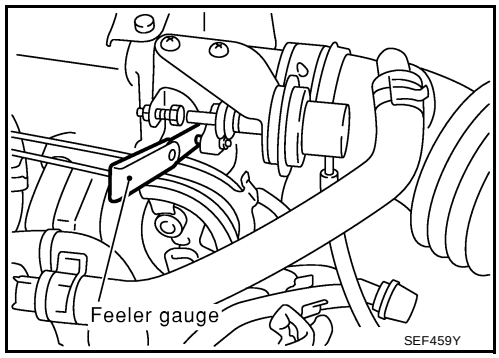
15. CHECK THROTTLE POSITION SWITCH CLOSED POSITION-II

Without CONSULT-II

1. Disconnect closed throttle position switch harness connector.
2. Check continuity between closed throttle position switch terminals **5** and **6** under the following conditions.



- Insert the 0.05 mm (0.0020 in) and 0.15 mm (0.0059 in) feeler gauge alternately between the stopper and throttle drum as shown in the figure.
  "Continuity should exist" while inserting 0.05 mm (0.0020 in) feeler gauge.
  "Continuity should not exist" while inserting 0.15 mm (0.0059 in) feeler gauge.



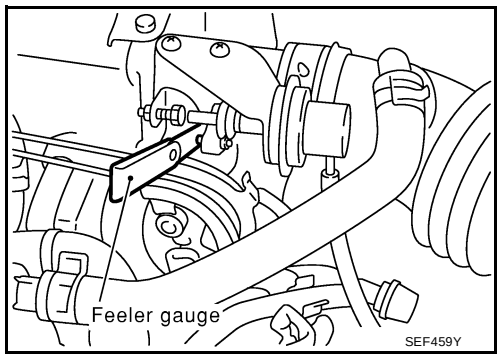
OK or NG

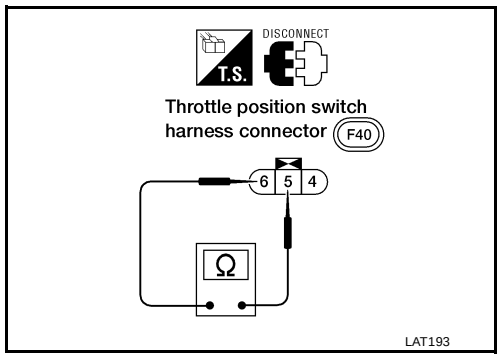
OK >> GO TO 18.
NG >> GO TO 16.

16. ADJUSTMENT THROTTLE POSITION SWITCH CLOSED POSITION-I

Without CONSULT-II

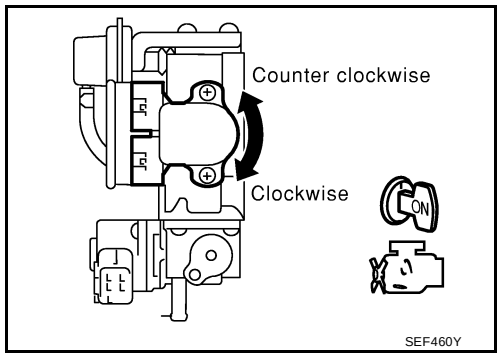
1. Loosen throttle position sensor fixing bolts.
2. Confirm that proper vacuum is applied. Refer to Test No. 10. During adjustment, vacuum should be applied.
3. Insert 0.05 mm (0.0020 in) feeler gauge between stopper and throttle drum as shown in the figure.





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

>> GO TO 17.



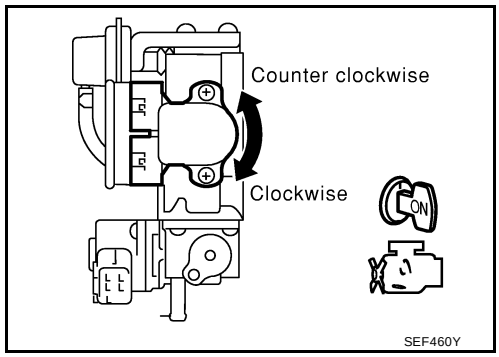
17. ADJUSTMENT THROTTLE POSITION SWITCH CLOSED POSITION-II

Without CONSULT-II

1. Temporarily tighten sensor body fixing bolts as follows.

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

2. Make sure two or three times that the continuity exists when the throttle valve is closed and continuity does not exist when it is opened.
3. Remove 0.05 mm (0.0020 in) feeler gauge then insert 0.15 mm (0.0059 in) feeler gauge.
4. Make sure two or three times that the continuity does not exist when the throttle valve is closed.
5. Tighten throttle position sensor.
6. Check the continuity again.



Continuity does not exist while closing the throttle valve.

OK or NG

OK >> GO TO 18.
NG >> GO TO 16.

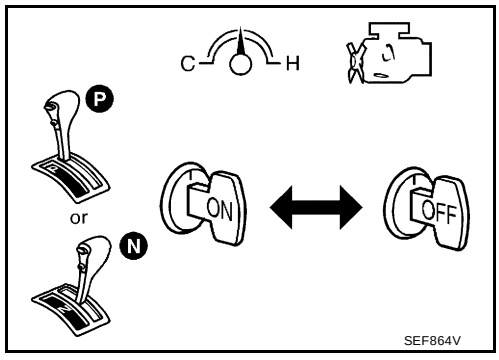
18. RESET THROTTLE POSITION SENSOR IDLE POSITION MEMORY

Without CONSULT-II

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

1. Confirm that proper vacuum is applied. Refer to Test No. 10.
2. Attach blind cap to vacuum port from which vacuum hose to throttle opener was disconnected.
3. Start engine.
4. Warm up engine to normal operating temperature.
5. Stop engine. (Turn ignition switch “OFF”.)
6. Turn ignition switch “ON” and wait at least 5 seconds.
7. Turn ignition switch “OFF” and wait at least 10 seconds.
8. Repeat steps 6 and 7, 20 times.

>> GO TO 19.



19. CHECK (1ST TRIP) DTC

1. Turn ignition switch “OFF”.
2. Release vacuum from throttle opener.
3. Remove vacuum pump and vacuum hose from throttle opener.
4. Reinstall original vacuum hose to throttle opener securely.
5. Start engine and warm it up to normal operating temperature.
6. Rev engine (2,000 to 3,000 rpm) two or three times.
7. Make sure no (1st trip) DTC is displayed with CONSULT-II or GST.

OK or NG

OK (With CONSULT-II)>>GO TO 21
OK (Without CONSULT-II)>>GO TO 22
NG >> GO TO 20

20. REPAIR OR REPLACE

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

With CONSULT-II>>GO TO 21.
Without CONSULT-II>>GO TO 22.

21. CHECK TARGET IDLE SPEED

With CONSULT-II

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

M/T : 650±50 rpm
A/T : 800±50 rpm (in “P” or “N” position)

OK or NG

OK >> GO TO 30.
NG >> GO TO 23.

22. CHECK TARGET IDLE SPEED

Without CONSULT-II

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

M/T : 650±50 rpm
A/T : 800±50 rpm (in “P” or “N” position)

OK or NG

OK >> GO TO 30.
NG >> GO TO 23.

23. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-56, "Idle Air Volume Learning" .
Which is the result CMPLT or INCMP?

CMPLT or INCMP

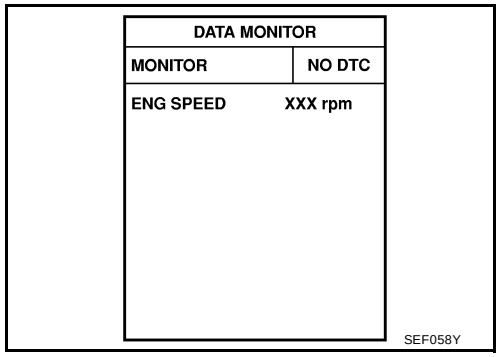
CMPLT >> GO TO 24.
INCMP >> 1. Follow the instruction of “Idle Air Volume Learning”, EC-56 .
2. GO TO 23.

24. CHECK TARGET IDLE SPEED AGAIN

With CONSULT-II

1. Read “ENG SPEED” in “DATA MONITOR” mode with CONSULT-II.
2. Check idle speed.

M/T : 650±50 rpm
A/T : 800±50 rpm (in “P” or “N” position)



Without CONSULT-II

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

M/T : 650±50 rpm
A/T : 800±50 rpm (in “P” or “N” position)

OK or NG

OK >> GO TO 28.
NG >> 1. Replace IACV-AAC valve.
2. GO TO 25.

25. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-56, "Idle Air Volume Learning" .
Which is the result CMPLT or INCMP?

CMPLT or INCMP

CMPLT >> GO TO 26.
INCMP >> 1. Follow instruction for “Idle Air Volume Learning”, EC-56 .
2. GO TO 23.

26. CHECK TARGET IDLE SPEED AGAIN

With CONSULT-II

1. Select “ENG SPEED” in “DATA MONITOR” mode.
2. Check idle speed.

M/T : 650±50 rpm
A/T : 800±50 rpm (in “P” or “N” position)

Without CONSULT-II

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

M/T : 650±50 rpm
A/T : 800±50 rpm (in “P” or “N” position)

OK or NG

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

27. CHECK ECM FUNCTION

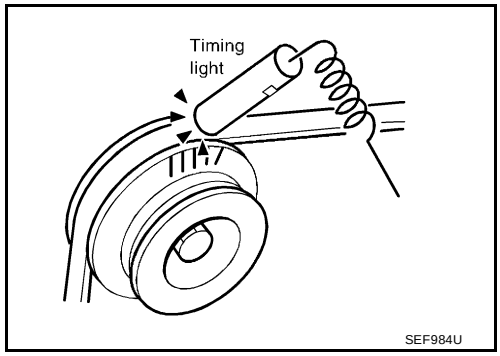
Substitute another known-good ECM to check ECM function. (ECM may be the cause of a problem, but this is rarely the case.)

>> GO TO 23.

28. CHECK IGNITION TIMING

Check ignition timing at idle using a timing light.

Ignition timing: 9°±5° BTDC (in “P” or “N” position)



OK or NG

OK >> GO TO 38.
NG >> GO TO 29.

29. CHECK TIMING CHAIN INSTALLATION

Check timing chain installation. Refer to EM-28, "Installation" .

OK or NG

OK >> GO TO 25.
NG >> 1. Repair.
2. GO TO 23.

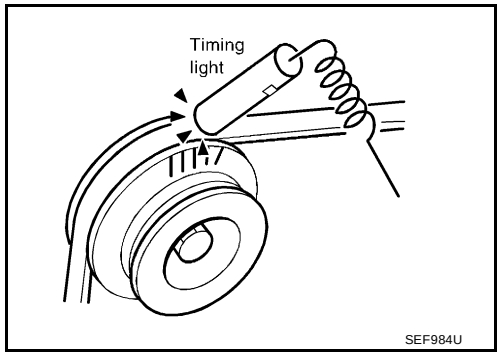
30. CHECK IGNITION TIMING

Check ignition timing at idle using a timing light.

Ignition timing:

M/T = 9°± 5° BTDC

A/T = 9°± 5° BTDC (in “P” or “N” position)



OK or NG

OK >> GO TO 38.
NG >> GO TO 31.

31. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-56, "Idle Air Volume Learning" .
Which is the result CMPLT or INCMP?

CMPLT or INCMP

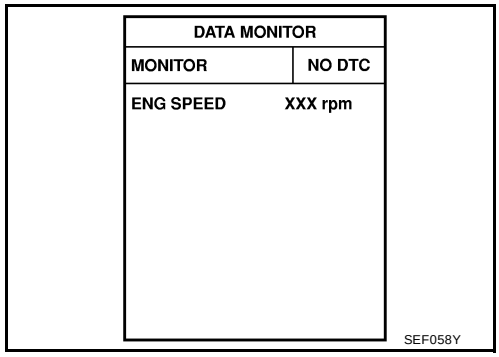
CMPLT >> GO TO 32.
INCMP >> 1. Follow the instruction of “Idle Air Volume Learning”, EC-56 .
2. GO TO 31.

32. CHECK TARGET IDLE SPEED AGAIN

With CONSULT-II

1. Read “ENG SPEED” in “DATA MONITOR” mode with CONSULT-II.
2. Check idle speed.

M/T : 650±50 rpm
A/T : 800±50 rpm (in “P” or “N” position)



Without CONSULT-II

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

M/T : 650±50 rpm
A/T : 800±50 rpm (in “P” or “N” position)

OK or NG

OK >> GO TO 36.
NG >> 1. Replace IACV-AAC valve.
2. GO TO 33.

33. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-56, "Idle Air Volume Learning" .
Which is the result CMPLT or INCMP?

CMPLT or INCMP

CMPLT >> GO TO 34.
INCMP >> 1. Follow instruction for “Idle Air Volume Learning”, EC-56 .
2. GO TO 31.

34. CHECK TARGET IDLE SPEED AGAIN

Without CONSULT-II

1. Select “ENG SPEED” in “DATA MONITOR” mode.
2. Check idle speed.

M/T : 650±50 rpm
A/T : 800±50 rpm (in “P” or “N” position)

Without CONSULT-II

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

M/T : 650±50 rpm
A/T : 800±50 rpm (in “P” or “N” position)

OK or NG

OK >> GO TO 36.
NG >> GO TO 35.

35. CHECK ECM FUNCTION

Substitute another known-good ECM to check ECM function. (ECM may be the cause of a problem, but this is rarely the case.)

>> GO TO 31.

36. CHECK IGNITION TIMING AGAIN

Check ignition timing again. Refer to Test No. 30.

OK or NG

OK >> GO TO 38.
NG >> GO TO 37.

37. CHECK TIMING CHAIN INSTALLATION

Check timing chain installation. Refer to EM-28, "Installation" .

OK or NG

OK >> GO TO 35.
NG >> 1. Repair.
2. GO TO 31.

38. ERASE UNNECESSARY DTC

After this inspection, unnecessary DTC No. might be displayed.
Erase the stored memory in ECM and TCM (Transmission control module).
Refer to EC-73, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" and AT-39, "HOW TO ERASE DTC" .

>> **INSPECTION END**

Symptom Matrix Chart

UBS001CT

SYSTEM — ENGINE CONTROL SYSTEM

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel pump circuit	1	1	2	3	2		2	2			3		2	EC-554
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			EC-59
	Injector circuit	1	1	2	3	2		2	2			2			EC-546
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			EC-578

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Air	Positive crankcase ventilation system	3	3	4	4	4	4	4	4	4		4	1		EC-591
	Incorrect idle speed adjustment	3	3				1	1	1	1		1			EC-87
	IACV-AAC valve circuit	1	1	2	3	3	2	2	2	2		2		2	EC-420
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC-87
	Ignition circuit	1	1	2	2	2		2	2			2			EC-312
EGR	EGR volume control valve circuit		2	2	3	3						3			EC-328
	EGR system	2	1	2	3	3	3	2	2	3		3			EC-321, EC-494
Main power supply and ground circuit		2	2	3	3	3		3	3		2	3		2	EC-148
Air conditioner circuit		2	2	3	3	3	3	3	3	3		3		2	MTC section

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

	SYMPTOM													Reference page
	HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Camshaft position sensor (PHASE) circuit	2	2	3	3	3		3	3			3			EC-306
Mass air flow sensor circuit	1	1	2	2	2		2	2			2			EC-172
Heated oxygen sensor 1 circuit		1	2	3	2		2	2			2			EC-226

	SYMPTOM													Reference page
	HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Engine coolant temperature sensor circuit	1	1	2	3	2	3	2	2	3		2			EC-186, EC-201
Throttle position sensor circuit		1	2		2	2	2	2	2		2			EC-191
Incorrect throttle position sensor adjustment		3	1		1	1	1	1	1		1			EC-87
Intake valve timing control system		3	3		3		3				3			EC-154
Vehicle speed sensor circuit		2	3		3						3			EC-416
Knock sensor circuit			2								3			EC-296
ECM	2	2	3	3	3	3	3	3	3	3	3			EC-438
Start signal circuit	2													EC-551
PNP switch circuit			3		3		3	3			3			EC-541
Power steering oil pressure switch circuit		2					3	3						EC-560
Electrical load signal circuit							3	3						EC-569

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 section
	Fuel piping			5	5	5		5	5			5			—
	Vapor lock														
	Valve deposit	5		5	5	5		5	5			5			
	Poor fuel (Heavy weight gasoline, Low octane)														
Air	Air duct	5	5	5	5	5	5	5	5	5		5			
	Air cleaner														
	Air leakage from air duct (Mass air flow sensor — throttle body)														
	Throttle body, Throttle wire														FL section
	Air leakage from intake manifold/ Collector/Gasket														—
Cranking	Battery	1	1	1		1		1	1					1	SC section
	Generator circuit														
	Starter circuit	3										1			
	Flywheel/Drive plate/Signal plate	6													EM section
	PNP switch	4													AT section

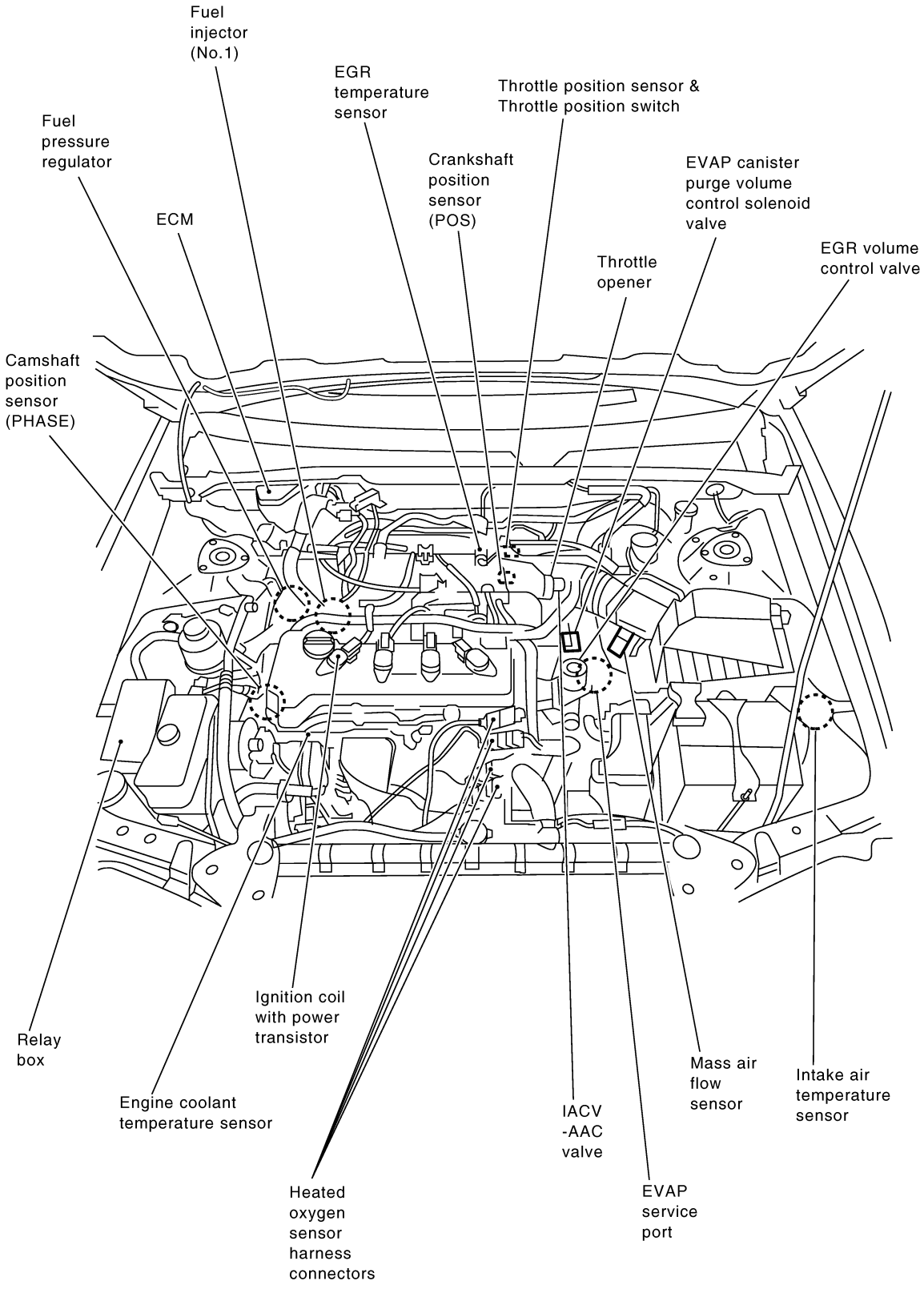
1 - 6: The numbers refer to the order of inspection.
(continued on next page)

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Engine	Cylinder head	5	5	5	5	5		5	5			5			EM section
	Cylinder head gasket										4		3		
	Cylinder block	6	6	6	6	6		6	6			6	4		
	Piston														
	Piston ring														
	Connecting rod														
	Bearing														
	Crankshaft														
Valve mechanism	Timing chain	5	5	5	5	5		5	5			5			EM section
	Camshaft														
	Intake valve												3		
	Exhaust valve														
Exhaust	Exhaust manifold/Tube/Muffler/Gasket	5	5	5	5	5		5	5			5			EX section
	Three way catalyst														
Lubrication	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery	5	5	5	5	5		5	5			5			MA, EM and LU sections
	Oil level (Low)/Filthy oil														
Cooling	Radiator/Hose/Radiator filler cap	5	5	5	5	5		5	5		4	5			
	Thermostat									5					CO section
	Water pump														
	Water gallery														
	Cooling fan									5					EC-481
	Coolant level (low)/Contaminated coolant														MA section

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

Engine Control Component Parts Location

UBS001CU



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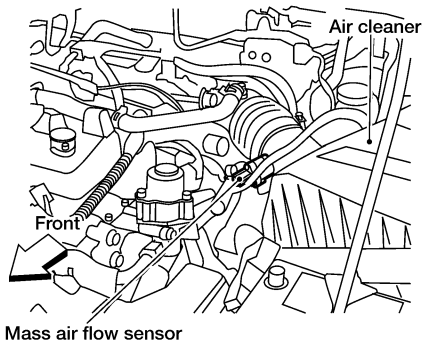
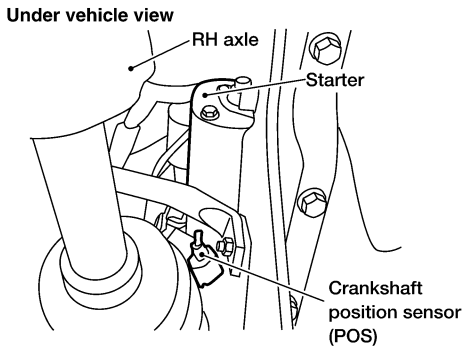
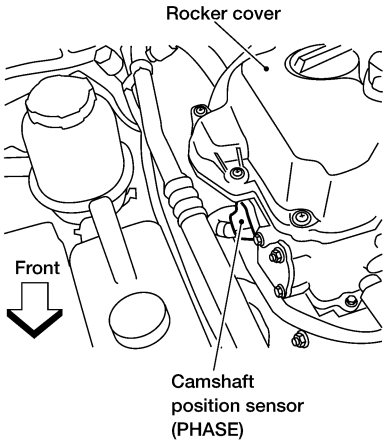
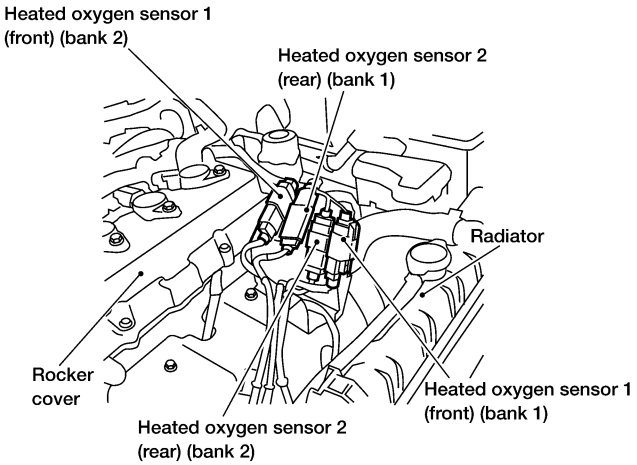
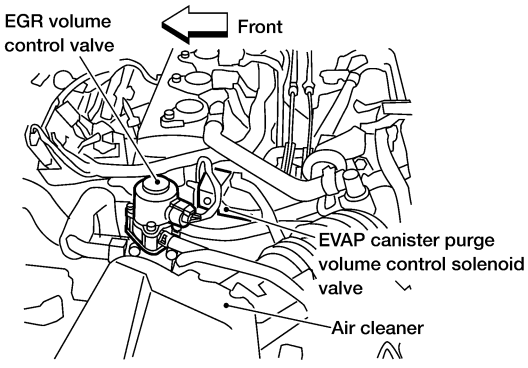
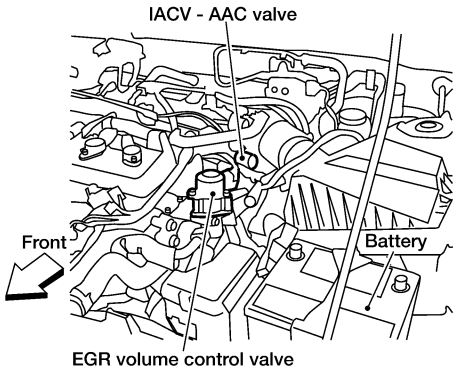

Air cleaner
Front
Mass air flow sensor


Under vehicle view
RH axle
Starter
Crankshaft
position sensor
(POS)


Rocker cover
Front
Camshaft
position sensor
(PHASE)

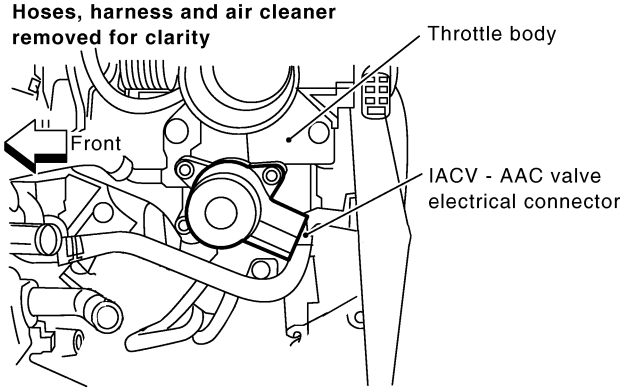

Heated oxygen sensor 1
(front) (bank 2)
Heated oxygen sensor 2
(rear) (bank 1)
Radiator
Rocker
cover
Heated oxygen sensor 1
(front) (bank 1)
Heated oxygen sensor 2
(rear) (bank 2)

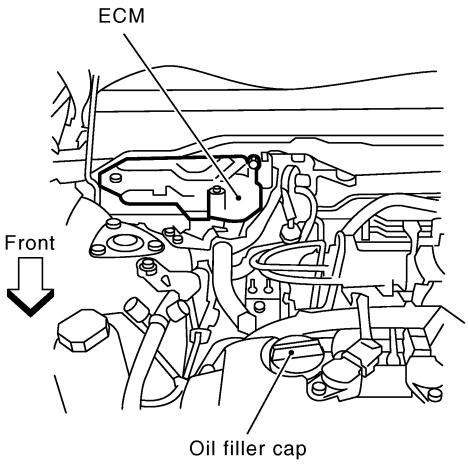

EGR volume
control valve
Front
EVAP canister purge
volume control solenoid
valve
Air cleaner


IACV - AAC valve
Front
Battery
EGR volume control valve

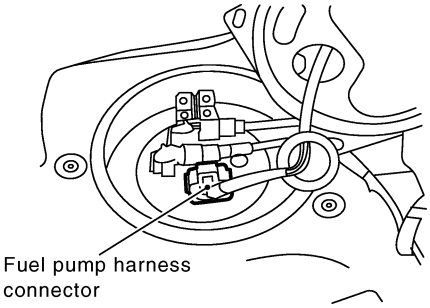
WEC828

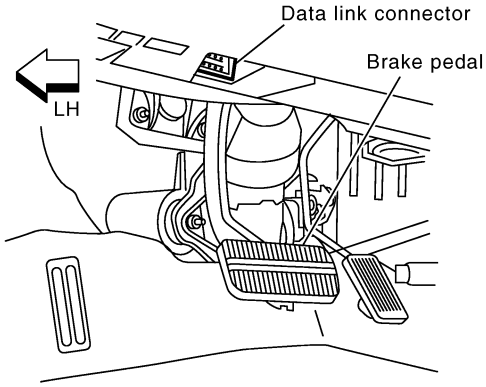
Hoses, harness and air cleaner removed for clarity

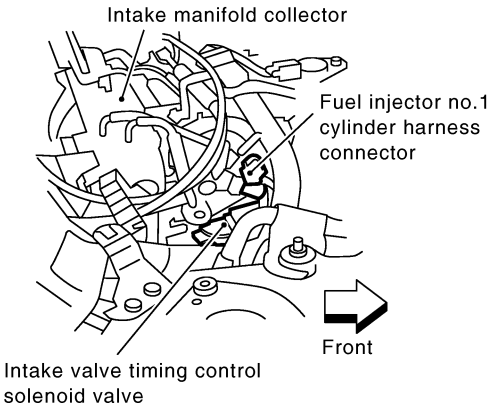




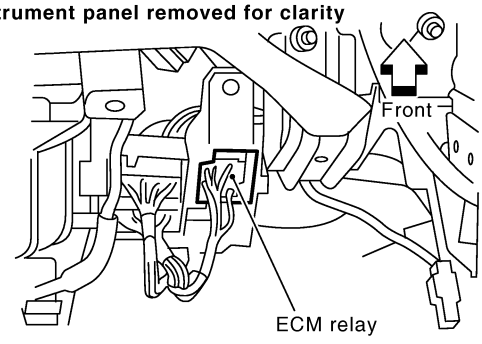
Rear seat bottom removed for clarity







Instrument panel removed for clarity



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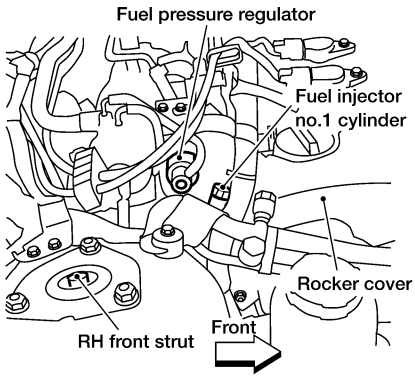
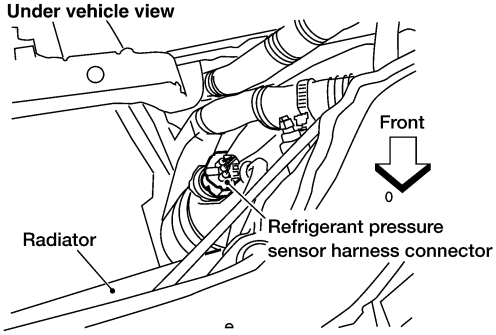
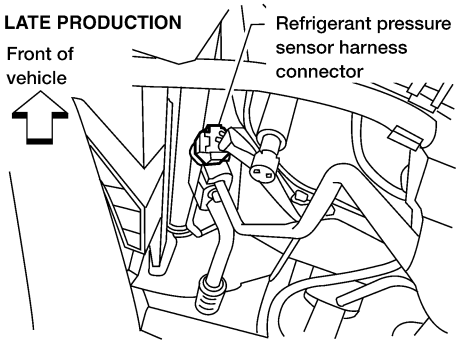
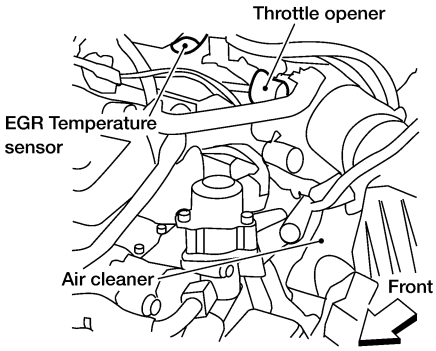
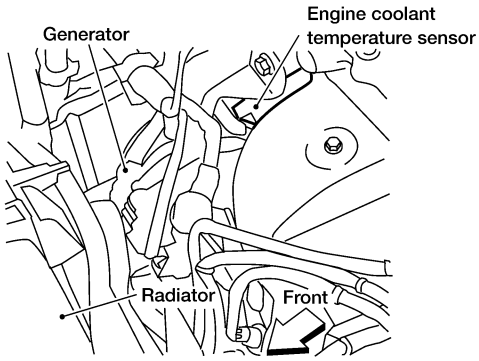


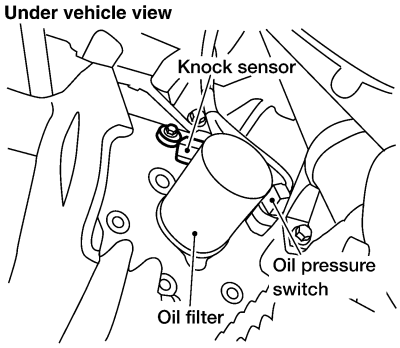
EARLY PRODUCTION

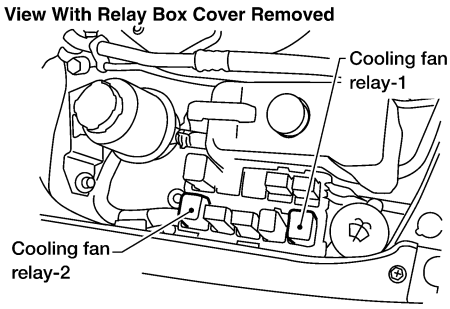












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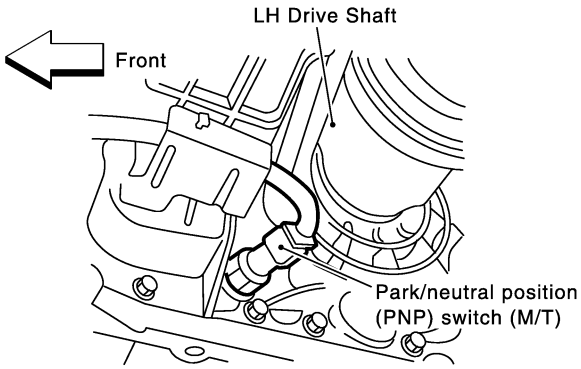
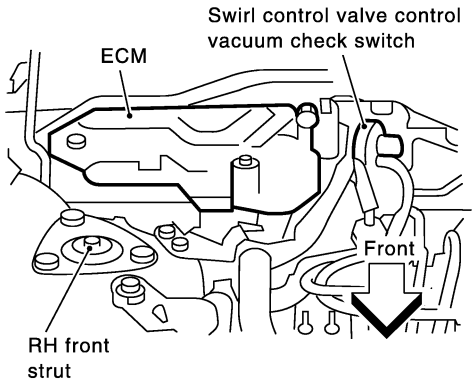
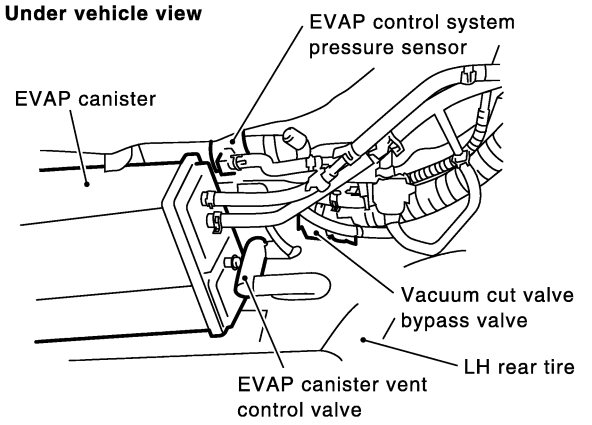
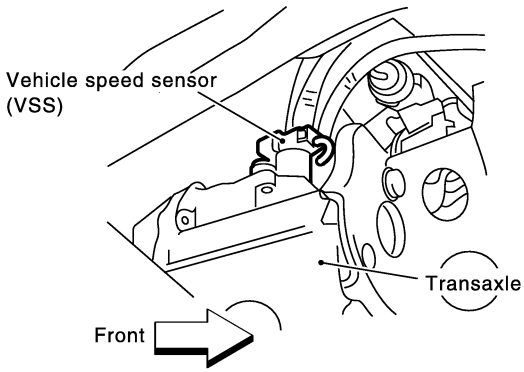
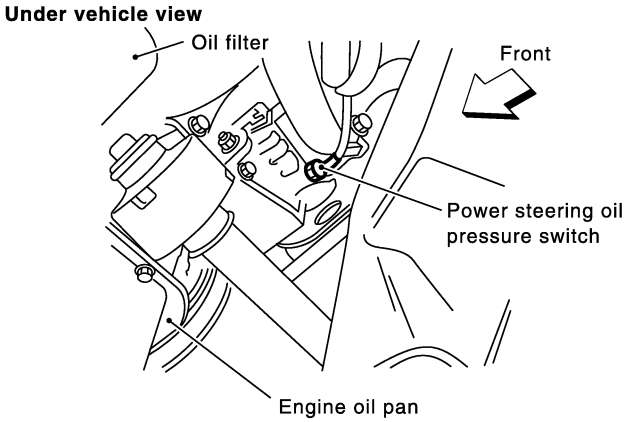

LH Drive Shaft
Front
Park/neutral position
(PNP) switch (M/T)


Swirl control valve control
vacuum check switch
ECM
Front
RH front
strut


Under vehicle view
EVAP control system
pressure sensor
EVAP canister
Vacuum cut valve
bypass valve
LH rear tire
EVAP canister vent
control valve

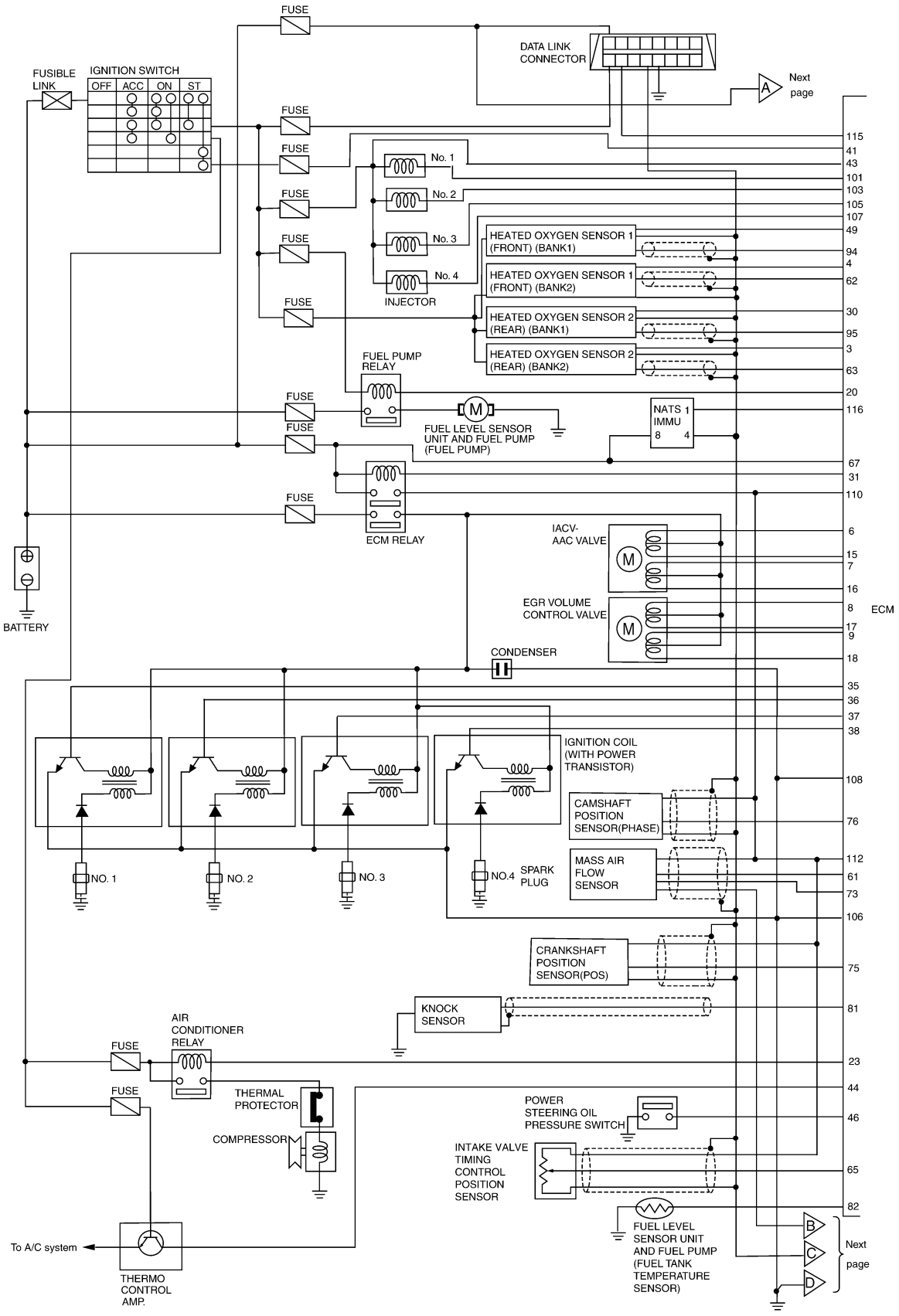

Vehicle speed sensor
(VSS)
Transaxle
Front


Under vehicle view
Oil filter
Front
Power steering oil
pressure switch
Engine oil pan

SEF879Z

Circuit Diagram

UBS001CV



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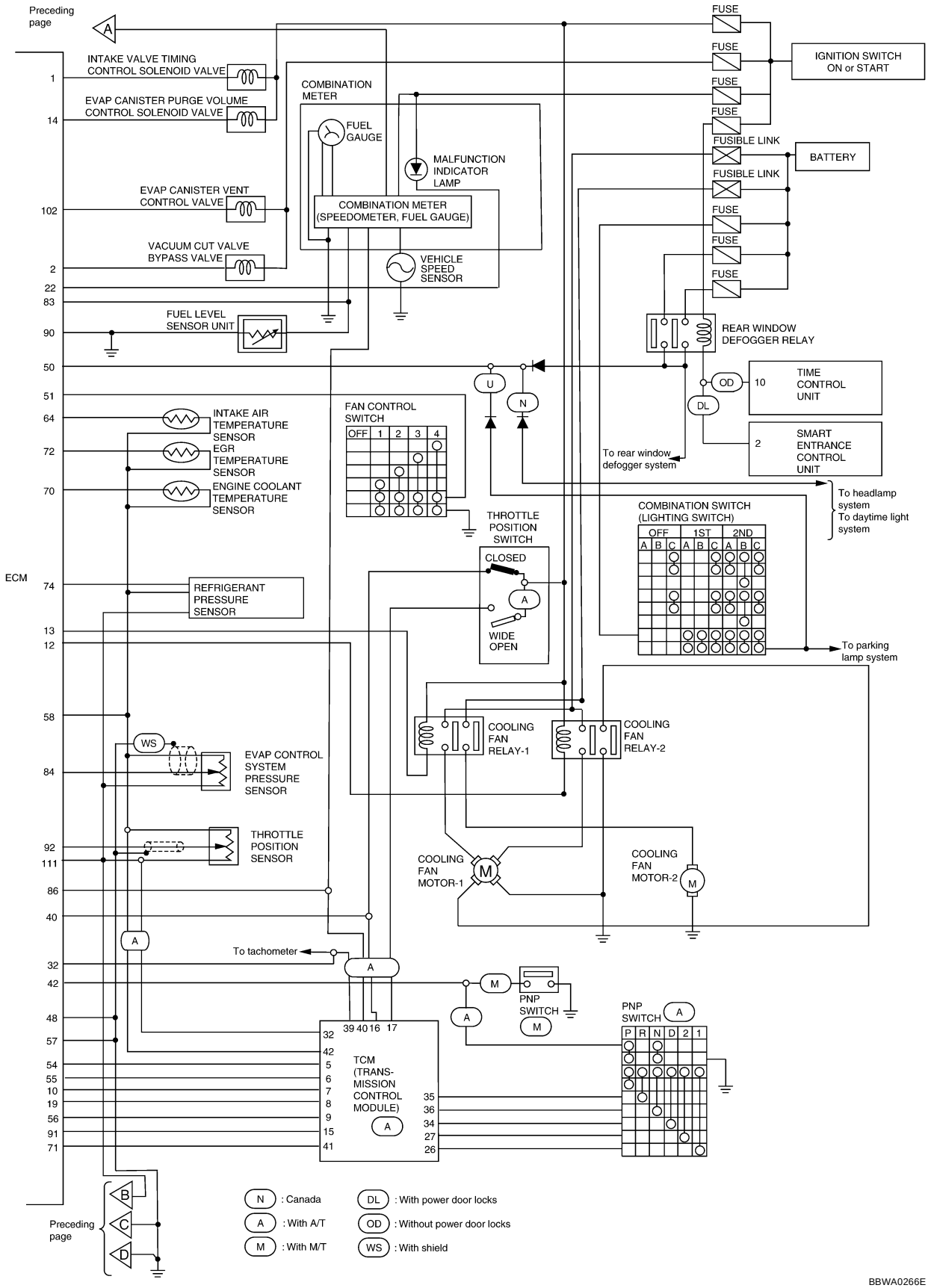
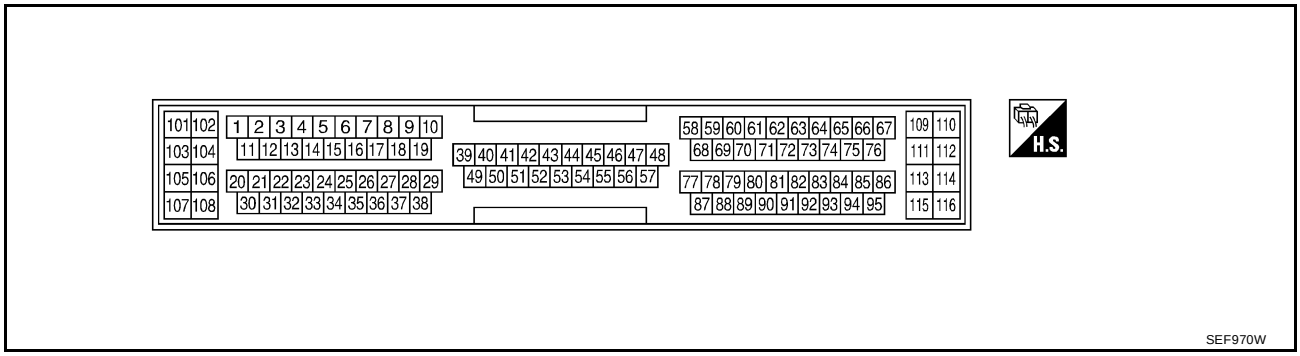

Preceding page
A
INTAKE VALVE TIMING CONTROL SOLENOID VALVE
1
EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE
14
EVAP CANISTER VENT CONTROL VALVE
102
VACUUM CUT VALVE BYPASS VALVE
2
22
83
FUEL LEVEL SENSOR UNIT
90
50
51
64
72
70
INTAKE AIR TEMPERATURE SENSOR
EGR TEMPERATURE SENSOR
ENGINE COOLANT TEMPERATURE SENSOR
ECM
74
REFRIGERANT PRESSURE SENSOR
13
12
58
84
92
111
86
40
32
42
48
57
54
55
10
19
56
91
71
WS
EVAP CONTROL SYSTEM PRESSURE SENSOR
THROTTLE POSITION SENSOR
A
To tachometer
COMBINATION METER
FUEL GAUGE
MALFUNCTION INDICATOR LAMP
COMBINATION METER (SPEEDOMETER, FUEL GAUGE)
VEHICLE SPEED SENSOR
FAN CONTROL SWITCH
OFF 1 2 3 4
THROTTLE POSITION SWITCH
CLOSED
WIDE OPEN
COMBINATION SWITCH (LIGHTING SWITCH)
OFF 1ST 2ND
A B C A B C A B C
To headlamp system
To daytime light system
To parking lamp system
To rear window defogger system
U
N
OD
DL
10
TIME CONTROL UNIT
2
SMART ENTRANCE CONTROL UNIT
REAR WINDOW DEFOGGER RELAY
FUSE
FUSIBLE LINK
BATTERY
IGNITION SWITCH ON or START
COOLING FAN RELAY-1
COOLING FAN RELAY-2
COOLING FAN MOTOR-1
COOLING FAN MOTOR-2
M
PNP SWITCH
P R N D 2 1
TCM (TRANS-MISSION CONTROL MODULE)
39 40 16 17
32 42 5 6 7 8 9 15 41
35 36 34 27 26
Preceding page
B
C
D
N : Canada
A : With A/T
M : With M/T
DL : With power door locks
OD : Without power door locks
WS : With shield

BBWA0266E

ECM Harness Connector Terminal Layout

UBS001CW

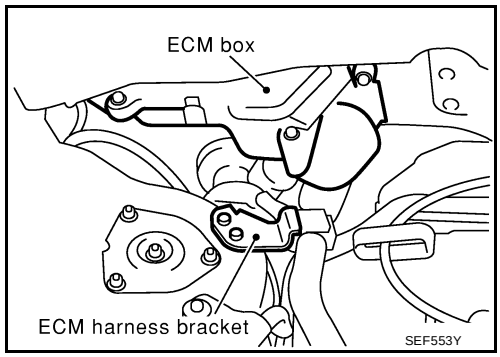


ECM Terminals and Reference Value

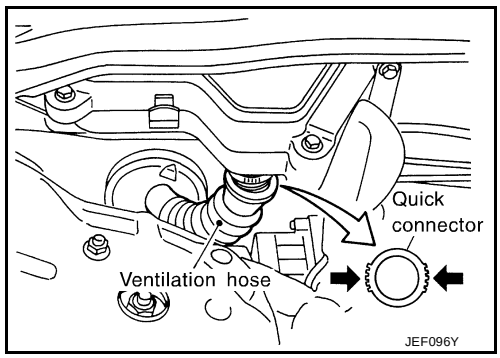
UBS001CX

PREPARATION

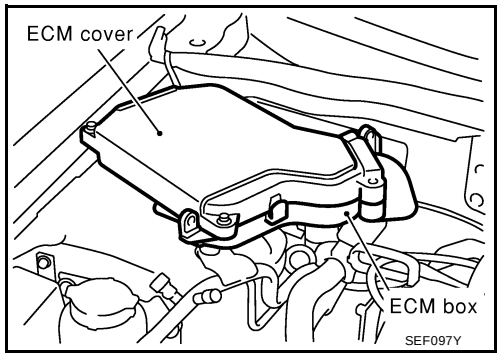
1. ECM is located in the right side of the cowl top (behind the strut tower).
   For this inspection:
   - Remove engine control harness bracket on the strut tower.



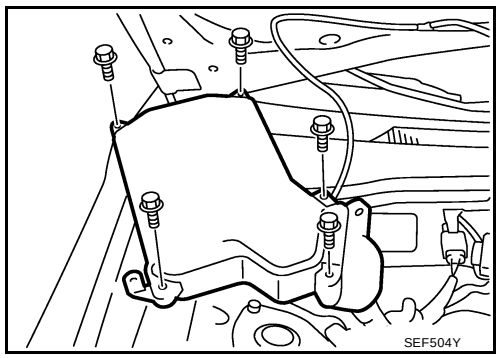
   - Remove quick connector on the ventilation hose.



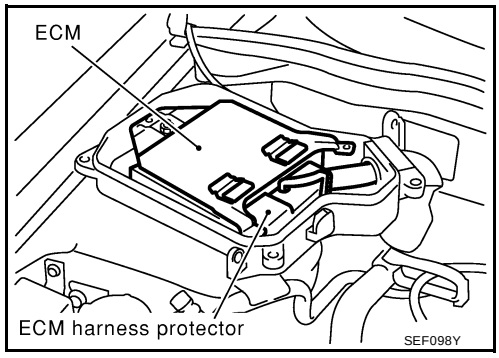
   - Remove ECM fixing bolts and pull ECM out all the way.



- Remove ECM cover fixing bolts.

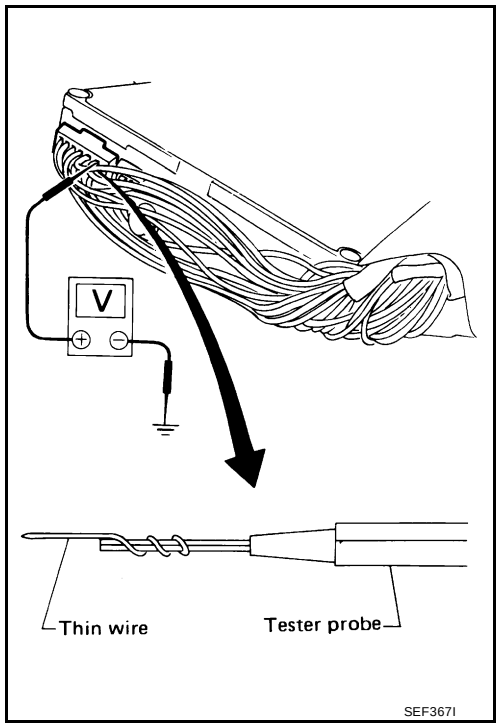


- Remove ECM fixing bolts.
- Remove ECM with the harness from the cover.



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

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

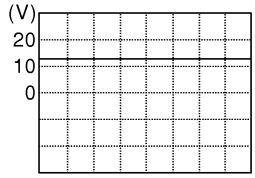
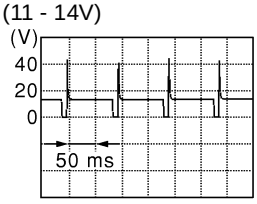


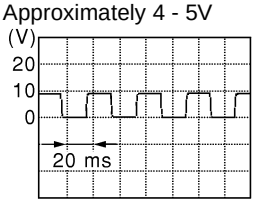
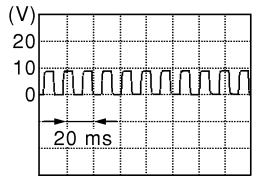
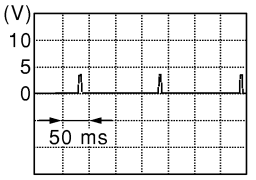
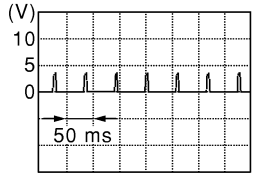
ECM INSPECTION TABLE

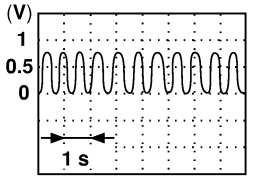
Specification data are reference values and are measured between each terminal and ground.

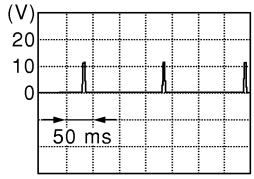
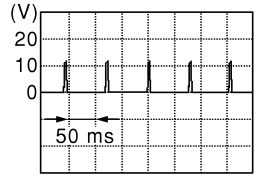
CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

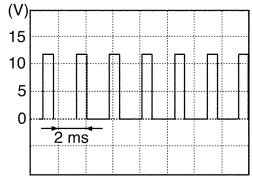
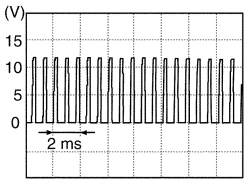
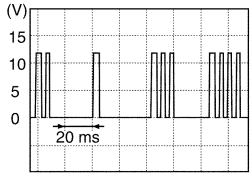
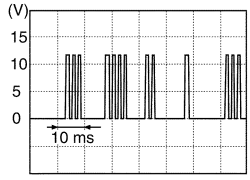
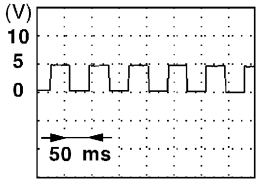
TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	Y/R	Intake valve timing control solenoid valve	**[Engine is running]** ● Intake valve timing control is operating	Approximately 0V
			[Engine is not running] ● Intake valve timing control is not operating	BATTERY VOLTAGE (11 - 14V)
2	L/B	Vacuum cut valve bypass valve	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)
3	W/R	Heated oxygen sensor 2 heater (bank 2) Heated oxygen sensor 2 heater (bank 1)	**[Engine is running]** ● Engine speed is below 3,600 rpm. ● After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more.	0 - 1.0V
30	G/Y		**[Ignition switch "ON"]** ● Engine stopped **[Engine is running]** ● Engine speed is above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)
4	R/B	Heated oxygen sensor 1 heater (bank 2) Heated oxygen sensor 1 heater (bank 1)	**[Engine is running]** ● Engine speed is below 3,600 rpm.	0 - 1.0V
49	GY/L		**[Engine is running]** ● Engine speed is above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)
6 7 15 16	R LG P OR	IACV-AAC valve	**[Engine is running]** ● Idle speed	0.1 - 14V
8 9 17 18	SB W/B R/Y Y	EGR volume control valve	**[Engine is running]** ● Idle speed	0.1 - 14V
10	Y/B	A/T signal No. 3	**[Engine is running]** ● Idle speed	0 - 1.0V
12	LG/B	Cooling fan relay (High)	**[Engine is running]** ● Cooling fan is not operating	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Cooling fan (High) is operating	0 - 0.6V
13	LG/R	Cooling fan relay (Low)	**[Engine is running]** ● Cooling fan is not operating	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Cooling fan is operating	0 - 0.6V

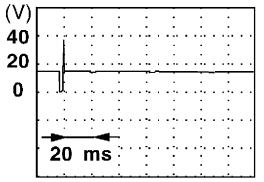
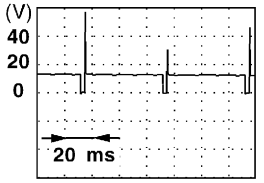
TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
14	GY/L	EVAP canister purge volume control solenoid valve	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)  SEF462Y
			[Engine is running] ● Engine speed is about 2,000 rpm (More than 100 seconds after starting engine).	BATTERY VOLTAGE (11 - 14V)  SEF461Y
19	BR/W	A/T signal No. 5	**[Engine is running]** ● Idle speed	Approximately 8V
20	B/P	Fuel pump relay	**[Ignition switch “ON”]** ● For 5 seconds after turning ignition switch “ON” **[Engine is running]**	0 - 1V
			[Ignition switch “ON”] ● More than 5 seconds after turning ignition switch “ON”	BATTERY VOLTAGE (11 - 14V)
22	OR/L	Malfunction indicator lamp	**[Ignition switch “ON”]**	0 - 1.0V
			[Engine is running] ● Idle speed	BATTERY VOLTAGE (11 - 14V)
23	L/W	Air conditioner relay	**[Engine is running]** ● Both A/C switch and blower switch are “ON” (Compressor operates)	0 - 0.6V
			[Engine is running] ● A/C switch is “OFF”	BATTERY VOLTAGE (11 - 14V)
31	W/G	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch “OFF”]** ● For 7 seconds after turning ignition switch “OFF”	0 - 1.0V
			[Ignition switch “OFF”] ● 7 seconds passed after turning ignition switch “OFF”	BATTERY VOLTAGE (11 - 14V)

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
32	L/OR	Tachometer	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 4 - 5V  SEF463Y
			[Engine is running] ● Engine speed is 2,000 rpm	Approximately 4 - 5V  SEF464Y
35 36 37 38	BR PU L/R GY/R	Ignition signal	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V  SEF465Y
			[Engine is running] ● Engine speed is 2,000 rpm	Approximately 0.5V  SEF466Y
40	Y/PU	Throttle position switch (Closed position)	**[Engine is running]** ● **Warm-up condition** ● Accelerator pedal fully released	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Accelerator pedal depressed	Approximately 0V
41	B/Y	Start signal	**[Ignition switch “ON”]**	Approximately 0V
			[Ignition switch “START”]	9 - 12V
42	G/OR	PNP switch	**[Ignition switch “ON”]** ● Gear position is “Neutral position” (M/T models) ● Gear position is “P” or “N” (A/T models)	Approximately 0V
			[Ignition switch “ON”] ● Except the above gear position	BATTERY VOLTAGE (11 - 14V)
43	B/R	Ignition switch	**[Ignition switch “OFF”]**	0V
			[Ignition switch “ON”]	BATTERY VOLTAGE (11 - 14V)
44	L/R	Air conditioner switch	**[Engine is running]** ● Both A/C switch and blower switch are “ON”	Approximately 0V
			[Engine is running] ● A/C switch is “OFF”	BATTERY VOLTAGE (11 - 14V)

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
46	PU	Power steering oil pressure switch	**[Engine is running]** ● Steering wheel is being turned.	Approximately 0V
			[Engine is running] ● Steering wheel is not being turned.	Approximately 5V
48	B	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
50	R/W	Electrical load signal	**[Ignition switch "ON"]** ● Lighting switch and/or rear window defogger switch "ON"	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch "ON"] ● Lighting switch and rear window defogger switch "OFF"	0V
51	LG/B	Heater fan switch	**[Engine is running]** ● Heater fan switch "ON"	Approximately 0V
			[Engine is running] ● Heater fan switch "OFF"	Approximately 5V
54	Y/R	A/T signal No. 1	**[Engine is running]** ● Idle speed	Approximately 0 - 1.0V
55	Y/G	A/T signal No. 2	**[Engine is running]** ● Idle speed	Approximately 0 - 1.0V
56	G/Y	A/T signal No. 4	**[Engine is running]** ● Idle speed	Approximately 0 - 1.0V
57	B	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
58	B	Sensor's ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
61	G	Mass air flow sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	1.3 - 1.7V
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,500 rpm	1.8 - 2.4V
62	W	Heated oxygen sensor 1 (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - Approximately 1.0V (Periodically change)  SEF059V
94	W	Heated oxygen sensor 1 (bank 1)		
63	W	Heated oxygen sensor 2 (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - Approximately 1.0V
95	R/L	Heated oxygen sensor 2 (bank 1)		
64	R/Y	Intake air temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with intake air temperature.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
65	R	Intake valve timing control position sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.5 - 0.6V  SEF191Z
			[Engine is running] ● Engine speed is 2,000 rpm	Approximately 0.5 - 0.6V  SEF192Z
67	W/L	Power supply for ECM (Back-up)	**[Ignition switch “OFF”]**	BATTERY VOLTAGE (11 - 14V)
70	BR/W	Engine coolant temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with engine coolant temperature.
71	GY	Throttle position sensor signal output	**[Engine is running]** ● **Warm-up condition** ● Accelerator pedal fully released	Approximately 0.4V
			[Ignition switch “ON”] ● Accelerator pedal fully depressed	Approximately 4V
72	PU	EGR temperature sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Less than 4.5V
			[Engine is running] ● **Warm-up condition** ● EGR system is operating	0 - 1.5V
73	B	Mass air flow sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
74	R/L	Refrigerant pressure sensor	**[Engine is running]** ● **Warm-up condition** ● Both A/C switch and blower switch are “ON” (Compressor operates)	1.0 - 4.0V

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
75	R	Crankshaft position sensor (POS)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 3.0 - 4.0V  SEF979W
			[Engine is running] ● Engine speed is 2,000 rpm	Approximately 3.0 - 4.0V  SEF980W
76	R	Camshaft position sensor (PHASE)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 2.0 - 3.0V  SEF977W
			[Engine is running] ● Engine speed is 2,000 rpm	Approximately 2.0 - 3.0V  SEF978W
81	W	Knock sensor	**[Engine is running]** ● Idle speed	Approximately 2.5V
82	G/OR	Fuel tank temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with fuel tank temperature.
83	G	Fuel level sensor	**[Ignition switch “ON”]**	Approximately 0 - 4.8V Output voltage varies with fuel level.
84	P	EVAP control system pressure sensor	**[Ignition switch “ON”]**	Approximately 1.8 - 4.8V
86	PU/R	Vehicle speed sensor	**[Engine is running]** ● Lift up the vehicle ● In 2nd gear position ● Vehicle speed is 40 km/h (25 MPH)	0 - Approximately 4.2V  SEF003W
90	B/W	Fuel level sensor ground	**[Engine is running]** ● Idle speed	Approximately 0V
91	PU	A/T check signal	**[Ignition switch “ON”]**	0 - Approximately 5V

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
92	Y	Throttle position sensor	**[Engine is running]** ● **Warm-up condition** ● Accelerator pedal fully released ● Vacuum is created using vacuum pump	0.15 - 0.85V
			[Ignition switch “ON”] ● Accelerator pedal fully depressed ● Vacuum is created using vacuum pump	3.5 - 4.7V
101 103 105 107	R/B Y/B G/B L/B	Injector No. 1 Injector No. 2 Injector No. 3 Injector No. 4	**[Engine is running]** ● **Warm-up condition** ● Idle speed	BATTERY VOLTAGE (11 - 14V)  SEF011W
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14V)  SEF012W
102	L/Y	EVAP canister vent control valve	**[Ignition switch “ON”]**	BATTERY VOLTAGE (11 - 14V)
106 108	B B	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
110 112	W W	Power supply for ECM	**[Ignition switch “ON”]**	BATTERY VOLTAGE (11 - 14V)
111	R	Sensor's power supply	**[Ignition switch “ON”]**	Approximately 5V
115	L/G	Data link connector	**[Ignition switch “ON”]** ● CONSULT-II or GST is disconnected.	Approximately 8V

CONSULT-II Function

UBS001CY

FUNCTION

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

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

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

ENGINE CONTROL COMPONENT PARTS/CONTROL SYSTEMS APPLICATION

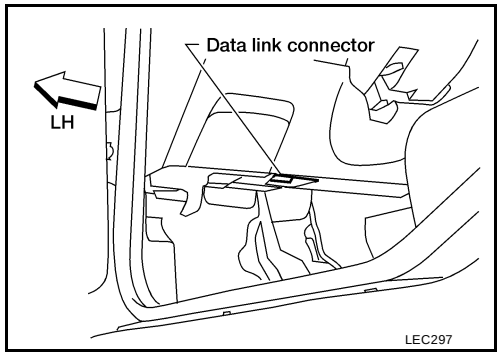
		Item	DIAGNOSTIC TEST MODE							
			WORK SUPPORT	SELF-DIAGNOSTIC RESULTS		DATA MONITOR	DATA MONITOR (SPEC)	ACTIVE TEST	DTC & SRT CONFIRMATION	
				DTC*1	FREEZE FRAME DATA*2				SRT STATUS	DTC WORK SUPPORT
ENGINE CONTROL COMPONENT PARTS	INPUT	Camshaft position sensor (PHASE)		X	X					
		Crankshaft position sensor (POS)		X			X			
		Mass air flow sensor		X		X	X			
		Engine coolant temperature sensor		X	X	X	X	X		
		Heated oxygen sensor 1		X		X	X		X	X
		Heated oxygen sensor 2		X		X	X		X	X
		Vehicle speed sensor		X	X	X	X			
		Throttle position sensor		X		X	X			
		Fuel tank temperature sensor		X		X	X	X		
		EVAP control system pressure sensor		X		X	X			
		EGR temperature sensor		X		X	X			
		Intake air temperature sensor		X	X	X	X			
		Knock sensor		X						
		Ignition switch (start signal)				X	X			
		Closed throttle position switch		X		X	X			
		Closed throttle position switch (throttle position sensor signal)				X	X			
		Air conditioner switch				X	X			
		Park/neutral position (PNP) switch		X		X	X			
		Power steering oil pressure switch				X	X			
		Battery voltage				X	X			
		Load signal				X	X			
		Fuel level sensor		X		X	X			

Item			DIAGNOSTIC TEST MODE							
			WORK SUPPORT	SELF-DIAGNOSTIC RESULTS		DATA MONITOR	DATA MONITOR (SPEC)	ACTIVE TEST	DTC & SRT CONFIRMATION	
				DTC*1	FREEZE FRAME DATA*2				SRT STATUS	DTC WORK SUPPORT
ENGINE CONTROL COMPONENT PARTS	OUTPUT	Injectors				X	X	X		
		Power transistor (Ignition timing)	X	X (Ignition signal)		X	X	X		
		IACV-AAC valve		X		X	X	X		
		EVAP canister purge volume control solenoid valve		X		X	X	X		X
		Air conditioner relay				X	X			
		Fuel pump relay	X			X	X	X		
		Cooling fan		X		X	X	X		
		EGR volume control valve		X		X	X	X		
		Heated oxygen sensor 1 heater		X		X	X		X	
		Heated oxygen sensor 2 heater		X		X	X		X	
		EVAP canister vent control valve		X		X	X	X		
		Vacuum cut valve bypass valve		X		X	X	X		X
		Intake valve timing control solenoid valve		X		X	X	X		
		Calculated load value			X	X	X			

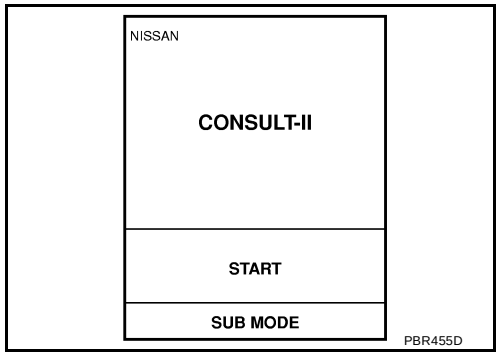
X: Applicable
*1: This item includes 1st trip DTCs.
*2: This mode includes 1st trip freeze frame data or freeze frame data. The items appear on CONSULT-II screen in freeze frame data mode only if a 1st trip DTC or DTC is detected. For details, refer to EC-64, "FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA" .

CONSULT-II INSPECTION PROCEDURE

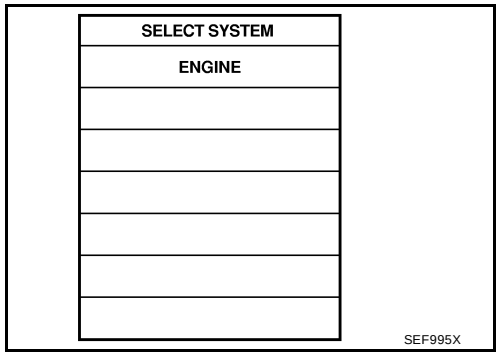
1. Turn ignition switch OFF.
2. Connect “CONSULT-II” to data link connector, which is located under LH dash panel near the fuse box cover.
3. Turn ignition switch ON.



4. Touch “START”.

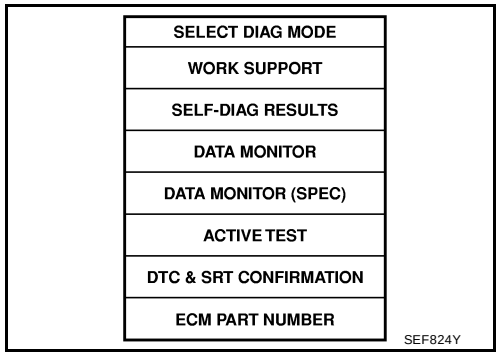


5. Touch “ENGINE”.



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

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



WORK SUPPORT MODE

WORK ITEM	CONDITION	USAGE
TP SW/TP SEN IDLE POSI ADJ	● FOLLOW THE BASIC INSPECTION INSTRUCTION IN THE SERVICE MANUAL.	When adjusting the idle throttle position
FUEL PRESSURE RELEASE	● FUEL PUMP WILL STOP BY TOUCHING “START” DURING IDLING. CRANK A FEW TIMES AFTER ENGINE STALLS.	When releasing fuel pressure from fuel line
IDLE AIR VOL LEARN	● THE IDLE AIR VOLUME THAT KEEPS THE ENGINE WITHIN THE SPECIFIED RANGE IS MEMORIZED IN ECM.	When learning the idle air volume
SELF-LEARNING CONT	● THE COEFFICIENT OF SELF-LEARNING CONTROL MIXTURE RATIO RETURNS TO THE ORIGINAL COEFFICIENT.	When clear the coefficient of self-learning control value
EVAP SYSTEM CLOSE	OPEN THE VACUUM CUT VALVE BYPASS VALVE AND CLOSE THE EVAP CANISTER VENT CONTROL VALVE IN ORDER TO MAKE EVAP SYSTEM CLOSE UNDER THE FOLLOWING CONDITIONS. ● IGN SW “ON” ● ENGINE NOT RUNNING ● AMBIENT TEMPERATURE IS ABOVE 0°C (32°F). ● NO VACUUM AND NO HIGH PRESSURE IN EVAP SYSTEM ● TANK FUEL TEMP. IS MORE THAN 0°C (32°F). ● WITHIN 10 MINUTES AFTER STARTING “EVAP SYSTEM CLOSE” ● WHEN TRYING TO EXECUTE “EVAP SYSTEM CLOSE” UNDER THE CONDITION EXCEPT ABOVE, CONSULT-II WILL DISCONTINUE IT AND DISPLAY APPROPRIATE INSTRUCTION. **NOTE:** **WHEN STARTING ENGINE, CONSULT-II MAY DISPLAY “BATTERY VOLTAGE IS LOW. CHARGE BATTERY”, EVEN IN USING CHARGED BATTERY.**	When detecting EVAP vapor leak point of EVAP system
TARGET IDLE RPM ADJ*	● IDLE CONDITION	When setting target idle speed
TARGET IGNITION TIMING ADJ*	● IDLE CONDITION	● When adjusting target ignition timing After adjustment, confirm target ignition timing with a timing light. ● If once the “TARGET IDLE RPM ADJ” has been done, the Idle Air Volume Learning procedure will not be completed.

*: 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 “TROUBLE DIAGNOSIS — INDEX” (See EC-21 .)

Freeze Frame Data and 1st Trip Freeze Frame Data

Freeze frame data item*1	Description
DIAG TROUBLE CODE [PXXXX]	● The engine control component part/control system has a trouble code, it is displayed as “PXXXX”. (Refer to “TROUBLE DIAGNOSIS — INDEX”, EC-21 .)
FUEL SYS-B1*2	● “Fuel injection system status” at the moment a malfunction is detected is displayed.
FUEL SYS-B2*2	● One mode in the following is displayed. “MODE 2”: Open loop due to detected system malfunction “MODE 3”: Open loop due to driving conditions (power enrichment, deceleration enrichment) “MODE 4”: Closed loop - using oxygen sensor(s) as feedback for fuel control “MODE 5”: Open loop - has not yet satisfied condition to go to closed loop
CAL/LD VALUE [%]	● The calculated load value at the moment a malfunction is detected is displayed.
COOLANT TEMP [°C] or [°F]	● The engine coolant temperature at the moment a malfunction is detected is displayed.
S-FUEL TRIM-B1*2 [%]	● “Short-term fuel trim” at the moment a malfunction is detected is displayed. ● The short-term fuel trim indicates dynamic or instantaneous feedback compensation to the base fuel schedule.
S-FUEL TRIM-B2*2 [%]	
L-FUEL TRIM-B1*2 [%]	● “Long-term fuel trim” at the moment a malfunction is detected is displayed. ● The long-term fuel trim indicates much more gradual feedback compensation to the base fuel schedule than short-term fuel trim.
L-FUEL TRIM-B2*2 [%]	
ENGINE SPEED [rpm]	● The engine speed at the moment a malfunction is detected is displayed.
VEHICLE SPEED [km/h] or [mph]	● The vehicle speed at the moment a malfunction is detected is displayed.
ABSOL TH-P/S [%]	● The throttle valve opening angle at the moment a malfunction is detected is displayed.
B/FUEL SCHDL [msec]	● The base fuel schedule at the moment a malfunction is detected is displayed.
INT/A TEMP SE [°C] or [°F]	● The intake air temperature at the moment a malfunction is detected is displayed.

*1: The items are the same as those of 1st trip freeze frame data.
*2: Regarding B15 model, “-B1” indicates cylinders No. 1 and 4, “-B2” indicates cylinders No. 2 and 3.

DATA MONITOR MODE
Monitored Item

X: Applicable

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
ENG SPEED [rpm]	×	×	● Indicates the engine speed computed from the REF signal (180° signal) of the camshaft position sensor (PHASE).	
MAS A/F SE-B1 [V]	×	×	● The signal voltage of the mass air flow sensor is displayed.	● When the engine is stopped, a certain value is indicated.
B/FUEL SCHDL [msec]			● "Base fuel schedule" indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.	
A/F ALPHA-B1 [%]		×	● The mean value of the air-fuel ratio feedback correction factor per cycle is indicated.	● When the engine is stopped, a certain value is indicated. ● This data also includes the data for the air-fuel ratio learning control.
A/F ALPHA-B2 [%]				
COOLAN TEMP/S [°C] or [°F]	×	×	● The engine coolant temperature (determined by the signal voltage of the engine coolant temperature sensor) is displayed.	● When the engine coolant temperature sensor is open or short-circuited, ECM enters fail-safe mode. The engine coolant temperature determined by the ECM is displayed.
HO2S1 (B1) [V]	×	×	● The signal voltage of the heated oxygen sensor 1 is displayed.	
HO2S1 (B2) [V]	×	×		
HO2S2 (B1) [V]	×		● The signal voltage of the heated oxygen sensor 2 is displayed.	
HO2S2 (B2) [V]	×	×		
HO2S1 MNTR (B1) [RICH/LEAN]	×		● Display of heated oxygen sensor 1 signal during air-fuel ratio feedback control: RICH ... means the mixture became "rich", and control is being affected toward a leaner mixture. LEAN ... means the mixture became "lean", and control is being affected toward a rich mixture.	● After turning ON the ignition switch, "RICH" is displayed until air-fuel mixture ratio feedback control begins. ● When the air-fuel ratio feedback is clamped, the value just before the clamping is displayed continuously.
HO2S1 MNTR (B2) [RICH/LEAN]	×			
HO2S2 MNTR (B1) [RICH/LEAN]	×		● Display of heated oxygen sensor 2 signal: RICH ... means the amount of oxygen after three way catalyst is relatively small. LEAN ... means the amount of oxygen after three way catalyst is relatively large.	● When the engine is stopped, a certain value is indicated.
HO2S2 MNTR (B2) [RICH/LEAN]	×			
VHCL SPEED SE [km/h] or [mph]	×	×	● The vehicle speed computed from the vehicle speed sensor signal is displayed.	
BATTERY VOLT [V]	×		● The power supply voltage of ECM is displayed.	
THRTL POS SEN [V]	×	×	● The throttle position sensor signal voltage is displayed.	
FUEL T/TMP SE [°C] or [°F]			● The fuel temperature judged from the tank fuel temperature sensor signal voltage is displayed.	
INT/A TEMP SE [°C] or [°F]	×		● The intake air temperature determined by the signal voltage of the intake air temperature sensor is indicated.	
EGR TEMP SEN [V]	×	×	● The signal voltage of the EGR temperature sensor is displayed.	

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
EVAP SYS PRES [V]			● The signal voltage of EVAP control system pressure sensor is displayed.	
FUEL LEVEL SE [V]			● The signal voltage of the fuel level sensor is displayed.	
START SIGNAL [ON/OFF]	×	×	● Indicates [ON/OFF] condition from the starter signal.	● After starting the engine, [OFF] is displayed regardless of the starter signal.
CLSD THL POS [ON/OFF]	×	×	● Indicates idle position [ON/OFF] computed by ECM according to the throttle position sensor signal.	
CLSD THL/P SW [ON/OFF]			● Indicates mechanical contact [ON/OFF] condition of the closed throttle position switch.	
AIR COND SIG [ON/OFF]	×	×	● Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioner signal.	
P/N POSI SW [ON/OFF]	×	×	● Indicates [ON/OFF] condition from the park/neutral position (PNP) switch signal.	
PW/ST SIGNAL [ON/OFF]	×	×	● [ON/OFF] condition of the power steering oil pressure switch determined by the power steering oil pressure signal is indicated.	
LOAD SIGNAL [ON/OFF]	×	×	● Indicates [ON/OFF] condition from the electrical load signal and/or lighting switch. ON ... rear defogger is operating and/or lighting switch is on. OFF ... rear defogger is not operating and lighting switch is not on.	
IGNITION SW [ON/OFF]	×		● Indicates [ON/OFF] condition from ignition switch.	
INJ PULSE-B1 [msec]		×	● Indicates the actual fuel injection pulse width compensated by ECM according to the input signals.	● When the engine is stopped, a certain computed value is indicated.
INJ PULSE-B2 [msec]				
IGN TIMING [BTDC]		×	● Indicates the ignition timing computed by ECM according to the input signals.	● When the engine is stopped, a certain value is indicated.
CAL/LD VALUE [%]			● “Calculated load value” indicates the value of the current airflow divided by peak airflow.	
ABSOL TH·P/S [degree]			● “Absolute throttle position sensor” indicates the throttle valve opening angle computed by ECM according to the signal voltage of the throttle position sensor.	
MASS AIRFLOW [g·m/s]			● Indicates the mass airflow computed by ECM according to the signal voltage of the mass airflow sensor.	
IACV-AAC/V [step]		×	● Indicates the IACV-AAC valve control value computed by ECM according to the input signals.	
PURG VOL C/V [%]		×	● Indicates the EVAP canister purge volume control solenoid valve control value computed by the ECM according to the input signals. ● The opening becomes larger as the value increases.	

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
EGR VOL CON/V [step]		×	● Indicates the EGR volume control value computed by the ECM according to the input signals. ● The opening becomes larger as the value increases.	
AIR COND RLY [ON/OFF]		×	● The air conditioner relay control condition (determined by ECM according to the input signal) is indicated.	
FUEL PUMP RLY [ON/OFF]		×	● Indicates the fuel pump relay control condition determined by ECM according to the input signals.	
INT/V SOL-B1			● The control condition of the intake valve timing control solenoid valve is indicated. ● ON ... Intake valve timing control solenoid is operating. OFF ... Intake valve timing control solenoid is not operating.	
VC/V BYPASS/V [ON/OFF]			● The control condition of the vacuum cut valve bypass valve (determined by ECM according to the input signal) is indicated. ● ON ... Open OFF ... Closed	
VENT CONT/V [ON/OFF]			● The control condition of the EVAP canister vent control valve (determined by ECM according to the input signal) is indicated. ● ON ... Closed OFF ... Open	
COOLING FAN [ON/OFF]		×	● Indicates the control condition of the cooling fan (determined by ECM according to the input signal). HIGH ... High speed operation LOW ... Low speed operation OFF ... Stop	
HO2S1 HTR (B1) [ON/OFF]			● Indicates [ON/OFF] condition of heated oxygen sensor 1 heater determined by ECM according to the input signals.	
HO2S1 HTR (B2) [ON/OFF]				
HO2S2 HTR (B1) [ON/OFF]			● Indicates [ON/OFF] condition of heated oxygen sensor 2 heater determined by ECM according to the input signals.	
HO2S2 HTR (B2) [ON/OFF]				
IDL A/V LEAN			● Display the condition of idle air volume learning YET ... Idle air volume learning has not been performed yet. CMPLT ... Idle air volume learning has already been performed successfully. INCMP ... Idle air volume learning has not been performed successfully.	
TRVL AFTER MIL [km] or [Mile]			● Distance traveled while MIL is activated	

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
Voltage [V]			● Voltage measured by the voltage probe.	
Frequency [msec] or [Hz] or [%]			● Pulse width, frequency or duty cycle measured by the pulse probe.	● Only “#” is displayed if item is unable to be measured. ● Figures with “#”s are temporary ones. They are the same figures as an actual piece of data which was just previously measured.

NOTE:

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

DATA MONITOR (SPEC) MODE

Monitored Item

X: Applicable

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
ENG SPEED [rpm]	×	×	● Indicates the engine speed computed from the REF signal (180° signal) of the camshaft position sensor (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 [%]		×	● The mean value of the air-fuel ratio feedback correction factor per cycle is indicated.	● When engine is running, specification range is indicated. ● This data also includes the data for the air-fuel ratio learning control.
A/F ALPHA-B2 [%]				

ACTIVE TEST MODE

Test Item

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
FUEL INJECTION	● Engine: Return to the original trouble condition ● Change the amount of fuel injection using CONSULT-II.	If trouble symptom disappears, see CHECK ITEM.	● Harness and connector ● Fuel injectors ● Heated oxygen sensor 1
IGNITION TIMING	● Engine: Return to the original trouble condition ● Timing light: Set ● Retard the ignition timing using CONSULT-II.	If trouble symptom disappears, see CHECK ITEM.	● Adjust initial ignition timing
IACV-AAC/V OPENING	● Engine: After warming up, idle the engine. ● Change the IACV-AAC valve opening percent using CONSULT-II.	Engine speed changes according to the opening percent.	● Harness and connector ● IACV-AAC valve
POWER BALANCE	● Engine: After warming up, idle the engine. ● A/C switch “OFF” ● Shift lever “N” ● Cut off each injector signal one at a time using CONSULT-II.	Engine runs rough or dies.	● Harness and connector ● Compression ● Injectors ● Power transistor ● Spark plugs ● Ignition coils
COOLING FAN	● Ignition switch: ON ● Turn the cooling fan “ON” and “OFF” using CONSULT-II.	Cooling fan moves and stops.	● Harness and connector ● Cooling fan motor ● Cooling fan relay
ENG COOLANT TEMP	● Engine: Return to the original trouble condition ● Change the engine coolant temperature using CONSULT-II.	If trouble symptom disappears, see CHECK ITEM.	● Harness and connector ● Engine coolant temperature sensor ● Fuel injectors
FUEL PUMP RELAY	● Ignition switch: ON (Engine stopped) ● Turn the fuel pump relay “ON” and “OFF” using CONSULT-II and listen to operating sound.	Fuel pump relay makes the operating sound.	● Harness and connector ● Fuel pump relay

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
EGR VOL CONT/V	● Ignition switch: ON (Engine stopped) ● Change EGR volume control valve opening step using CONSULT-II.	EGR volume control valve makes an operating sound.	● Harness and connector ● EGR volume control valve
VALVE TIMING SOL	● Ignition switch: ON (Engine stopped) ● Turn solenoid valve “ON” and “OFF” with CONSULT-II and listen for operating sound	Solenoid valve makes an operating sound.	● Harness and connector ● Solenoid valve
PURG VOL CONT/V	● Engine: After warming up, run engine at 1,500 rpm. ● Change the EVAP canister purge volume control solenoid valve opening percent using CONSULT-II.	Engine speed changes according to the opening percent.	● Harness and connector ● Solenoid valve
FUEL/T TEMP SEN	● Change the fuel tank temperature using CONSULT-II.		
VENT CONTROL/V	● Ignition switch: ON (Engine stopped) ● Turn solenoid valve “ON” and “OFF” with the CONSULT-II and listen to operating sound.	Solenoid valve makes an operating sound.	● Harness and connector ● Solenoid valve
VC/V BYPASS/V	● Ignition switch: ON (Engine stopped) ● Turn solenoid valve “ON” and “OFF” with the CONSULT-II and listen to operating sound.	Solenoid valve makes an operating sound.	● Harness and connector ● Solenoid valve

DTC & SRT CONFIRMATION MODE

SRT Status Mode

For details, refer to EC-65, "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.

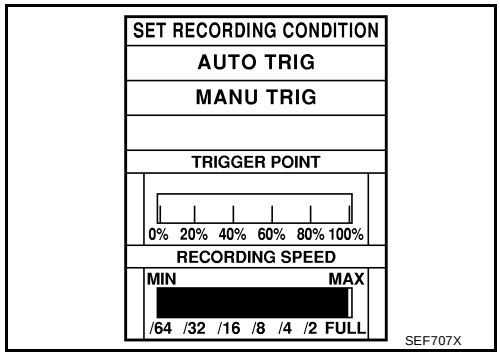
DTC Work Support Mode

Test mode	Test item	Condition	Reference page
EVAPORATIVE SYSTEM	PURG FLOW P0441	Refer to corresponding trouble diagnosis for DTC.	EC-345
	EVAP SML LEAK P0442/P1442		EC-353, EC-501
	EVAP V/S LEAK P0456/P1456		EC-393
	PURG VOL CN/V P1444		EC-503
	VC CUT/V BP/V P1491		EC-531
HO2S1	HO2S1 (B1) P0133		EC-216
	HO2S1 (B1) P0134		EC-226
	HO2S1 (B1) P1143		EC-450
	HO2S1 (B1) P1144		EC-456
	HO2S1 (B2) P0153		EC-216
	HO2S1 (B2) P0154		EC-226
	HO2S1 (B2) P1163		EC-450
	HO2S1 (B2) P1164		EC-456
HO2S2	HO2S2 (B1) P0139		EC-243
	HO2S2 (B1) P1146		EC-462
	HO2S2 (B1) P1147		EC-470
	HO2S2 (B2) P0159		EC-243
	HO2S2 (B2) P1166		EC-462
	HO2S2 (B2) P1167		EC-470
EGR SYSTEM	EGR SYSTEM P0400		EC-321
	EGR SYSTEM P1402		EC-494

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

Description

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



1. “AUTO TRIG” (Automatic trigger):

– The malfunction will be identified on the CONSULT-II screen in real time.
In other words, DTC/1st trip DTC and malfunction item will be displayed if the malfunction is detected by ECM.
At the moment a malfunction is detected by ECM, “MONITOR” in “DATA MONITOR” screen is changed to “Recording Data ... xx%” as shown at left, and the data after the malfunction detection is recorded. Then when the percentage reached 100%, “REAL-TIME DIAG” screen is displayed. If “STOP” is touched on the screen during “ Recording Data ... xx%”, “REAL-TIME DIAG” screen is also displayed.
The recording time after the malfunction detection and the recording speed can be changed by “TRIGGER POINT” and “Recording Speed”. Refer to CONSULT-II OPERATION MANUAL.

2. “MANU TRIG” (Manual trigger):

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

Operation

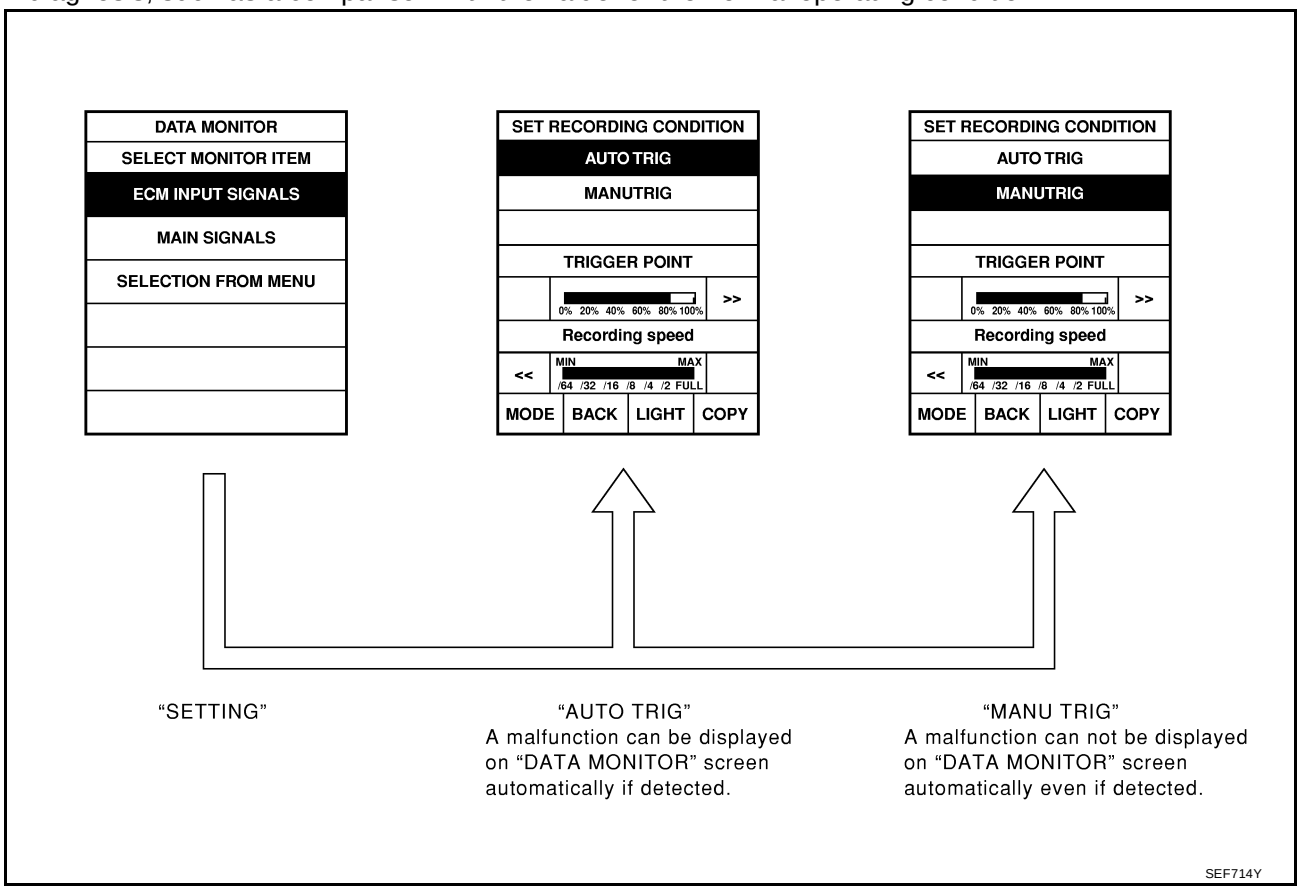
1. “AUTO TRIG”

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

- While narrowing down the possible causes, CONSULT-II should be set in “DATA MONITOR (AUTO TRIG)” mode, especially in case the incident is intermittent.
  When you are inspecting the circuit by gently shaking (or twisting) the suspicious connectors, components and harness in the “DTC Confirmation Procedure”, the moment a malfunction is found the DTC/1st trip DTC will be displayed. (Refer to GI-26, "How to Perform Efficient Diagnosis for an Electrical Incident" , “Incident Simulation Tests”.)

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.

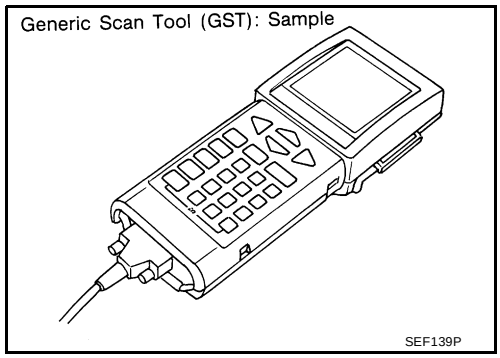


Generic Scan Tool (GST) Function

UBS001CZ

DESCRIPTION

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



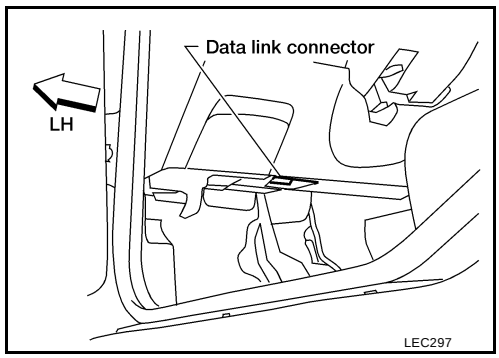
FUNCTION

Diagnostic test mode		Function
MODE 1	READINESS TESTS	This mode gains access to current emission-related data values, including analog inputs and outputs, digital inputs and outputs, and system status information.
MODE 2	(FREEZE DATA)	This mode gains access to emission-related data value which were stored by ECM during the freeze frame. For details, refer to EC-64, "FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA" .
MODE 3	DTCs	This mode gains access to emission-related power train trouble codes which were stored by ECM.
MODE 4	CLEAR DIAG INFO	This mode can clear all emission-related diagnostic information. This includes: ● Clear number of diagnostic trouble codes (MODE 1) ● Clear diagnostic trouble codes (MODE 3) ● Clear trouble code for freeze frame data (MODE 1) ● Clear freeze frame data (MODE 2) ● Reset status of system monitoring test (MODE 1) ● Clear on board monitoring test results (MODE 6 and 7)
MODE 6	(ON BOARD TESTS)	This mode accesses the results of on board diagnostic monitoring tests of specific components/systems that are not continuously monitored.
MODE 7	(ON BOARD TESTS)	This mode enables the off board test drive to obtain test results for emission-related powertrain components/systems that are continuously monitored during normal driving conditions.
MODE 8	—	This mode can close EVAP system in ignition switch “ON” position (Engine stopped). When this mode is performed, following parts can be opened or closed. ● EVAP canister vent control valve open ● Vacuum cut valve bypass valve closed In the following conditions, this mode cannot function. ● Low ambient temperature ● Low battery voltage ● Engine running ● Ignition switch “OFF” ● Low fuel temperature ● Too much pressure is applied to EVAP system
MODE 9	(CALIBRATION ID)	This mode enables the off-board test device to request specific vehicle information such as Vehicle Identification Number (VIN) and Calibration IDs.

GST INSPECTION PROCEDURE

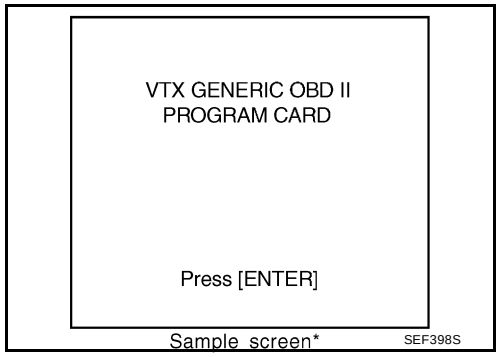
1. Turn ignition switch OFF.

2. Connect “GST” to data link connector. (Data link connector is located under LH dash panel near the fuse box cover.)



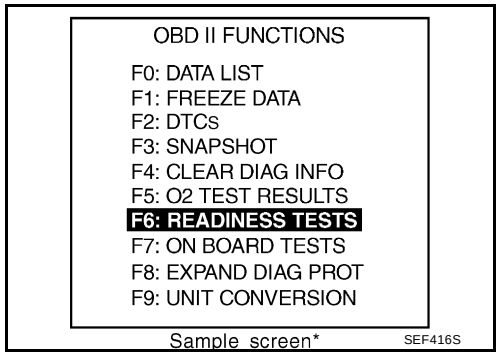
3. Turn ignition switch ON.
4. Enter the program according to instruction on the screen or in the operation manual.

(*: Regarding GST screens in this section, sample screens are shown.)



5. Perform each diagnostic mode according to each service procedure.

For further information, see the GST Operation Manual of the tool maker.



CONSULT-II Reference Value in Data Monitor Mode

UBS001D0

Remarks:
- Specification data are reference values.
- Specification data are output/input values which are detected or supplied by the ECM at the connector.
  * Specification data may not be directly related to their components signals/values/operations.
  (i.e., Adjust ignition timing with a timing light before monitoring IGN TIMING. Specification data might be displayed even when ignition timing is not adjusted to specification. This IGN TIMING monitors the data calculated by the ECM according to the input signals from the camshaft position sensor and other ignition timing related sensors.)
- If the real-time diagnosis results are NG, and the on board diagnostic system results are OK, when diagnosing the mass air flow sensor, first check to see if the fuel pump control circuit is normal.

MONITOR ITEM	CONDITION		SPECIFICATION
ENG SPEED	● Tachometer: Connect ● Run engine and compare tachometer indication with the CONSULT-II value.		Almost the same speed as the CONSULT-II value.
MAS A/F SE-B1	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: “N” ● No-load	Idle	1.0 - 1.7V
		2,500 rpm	1.5 - 2.4V
B/FUEL SCHDL	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: “N” ● No-load	Idle	1.0 - 1.6 msec
		2,000 rpm	0.7 - 1.3 msec

MONITOR ITEM	CONDITION		SPECIFICATION
A/F ALPHA-B1 A/F ALPHA-B2	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	53 - 155%
COOLAN TEMP/S	● Engine: After warming up		More than 70°C (158°F)
HO2S1 (B1) HO2S1 (B2)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ←→ 0.6 - 1.0V
HO2S2 (B1) HO2S2 (B2)	● Engine: After warming up	Revving engine from idle to 3,000 rpm quickly	0 - 0.3V ←→ 0.6 - 1.0V
HO2S1 MNTR (B1) HO2S1 MNTR (B2)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	LEAN ←→ RICH Changes more than 5 times during 10 seconds.
HO2S2 MNTR (B1) HO2S2 MNTR (B2)	● Engine: After warming up	Revving engine from idle to 3,000 rpm quickly	LEAN ←→ RICH
VHCL SPEED SE	● Turn drive wheels and compare speedometer indication with the CONSULT-II value		Almost the same speed as the CONSULT-II value
BATTERY VOLT	● Ignition switch: ON (Engine stopped)		11 - 14V
THRTL POS SEN	● Engine: After warming up, idle the engine	Throttle valve: fully closed	0.15 - 0.85V
	● Engine: After warming up ● Ignition switch: ON (Engine stopped) ● Vacuum is applied using a vacuum pump	Throttle valve: fully opened	3.5 - 4.7V
EGR TEMP SEN	● Engine: After warming up		Less than 4.5V
EVAP SYS PRES	● Ignition switch: ON		Approx. 4.4V
START SIGNAL	● Ignition switch: ON → START → ON		OFF → ON → OFF
CLSD THL POS CLSD THL/P SW	● Engine: After warming up ● Ignition switch: ON (Engine stopped) ● Vacuum is applied using a vacuum pump	Throttle valve: Idle position	ON
		Throttle valve: Slightly open	OFF
AIR COND SIG	● Engine: After warming up, idle the engine	A/C switch “OFF”	OFF
		A/C switch “ON” (Compressor operates)	ON
P/N POSI SW	● Ignition switch: ON	Shift lever “P” or “N”	ON
		Except above	OFF
PW/ST SIGNAL	● Engine: After warming up, idle the engine	Steering wheel in neutral position (forward direction)	OFF
		The steering wheel is turned	ON
IGNITION SW	● Ignition switch: ON → OFF		ON → OFF
INJ PULSE-B1 INJ PULSE-B2	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: “N” ● No-load	Idle	2.4 - 3.2 msec
		2,000 rpm	1.9 - 3.2 msec
IGN TIMING	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: “N” ● No-load	Idle	9°±5° BTDC
		2,000 rpm	More than 25° BTDC

MONITOR ITEM	CONDITION		SPECIFICATION
CAL/LD VALUE	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: “N” ● No-load	Idle	20.0 - 35.5%
		2,500 rpm	12.0 - 27.0%
ABSOL TH·P/S	● Engine: After warming up, idle the engine	Throttle valve: fully closed	0.0°
	● Engine: After warming up ● Ignition switch: ON (Engine stopped)	Throttle valve: fully opened	Approx. 80.0%
MASS AIRFLOW	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: N ● No-load	Idle	1.4 - 4.0 g·m/s
		2,500 rpm	5.0 - 10.0 g·m/s
IACV-AAC/V	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: “N” ● No-load	Idle	5 - 20 steps
		2,000 rpm	—
PURG VOL C/V	● Engine: After warming up ● Air conditioner switch: “OFF” ● Shift lever: “N” ● No-load	Idle	0 %
		2,000 rpm	—
EGR VOL CON/V	● Engine: After warming up ● Air conditioner switch: “OFF” ● Shift lever: “N” ● No-load	Idle	0 step
		Engine speed: Revving from idle up to 3,000 rpm quickly	10 - 55 steps
AIR COND RLY	● Air conditioner switch: OFF → ON		OFF → ON
FUEL PUMP RLY	● Ignition switch is turned to ON (Operates for 5 seconds) ● Engine running and cranking ● When engine is stopped (stops in 1.0 seconds)		ON
	● Except as shown above		OFF
INT/V SOL-B1	● Engine is running ● Engine speed is more than 2,000 rpm ● Quickly depressed accelerator pedal		OFF →ON
VC/V BYPASS/V	● Ignition switch: ON		OFF
VENT CONT/V	● Ignition switch: ON		OFF
COOLING FAN	● After warming up engine, idle the engine. ● Air conditioner switch: OFF	Engine coolant temperature is 94°C (201°F) or less	OFF
		Engine coolant temperature is between 95°C (203°F) and 104°C (219°F)	LOW
		Engine coolant temperature is 105°C (221°F) or more	HIGH
HO2S1 HTR (B1) HO2S1 HTR (B2)	● Engine speed: Below 3,600 rpm		ON
	● Engine speed: Above 3,600 rpm		OFF
HO2S2 HTR (B1) HO2S2 HTR (B2)	● Ignition switch: ON (Engine stopped) ● Engine speed: Above 3,600 rpm		OFF
	● Engine speed: Below 3,600 rpm [After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more]		ON

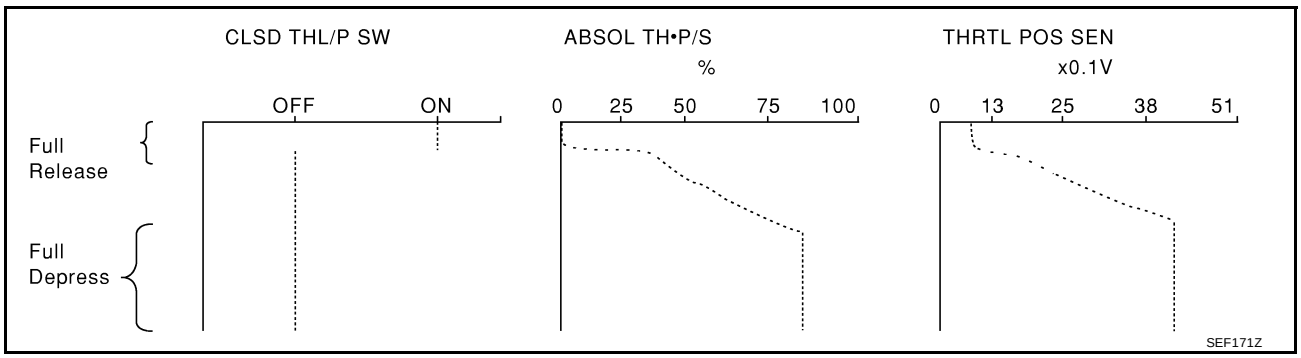
Major Sensor Reference Graph in Data Monitor Mode

UBS001D1

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

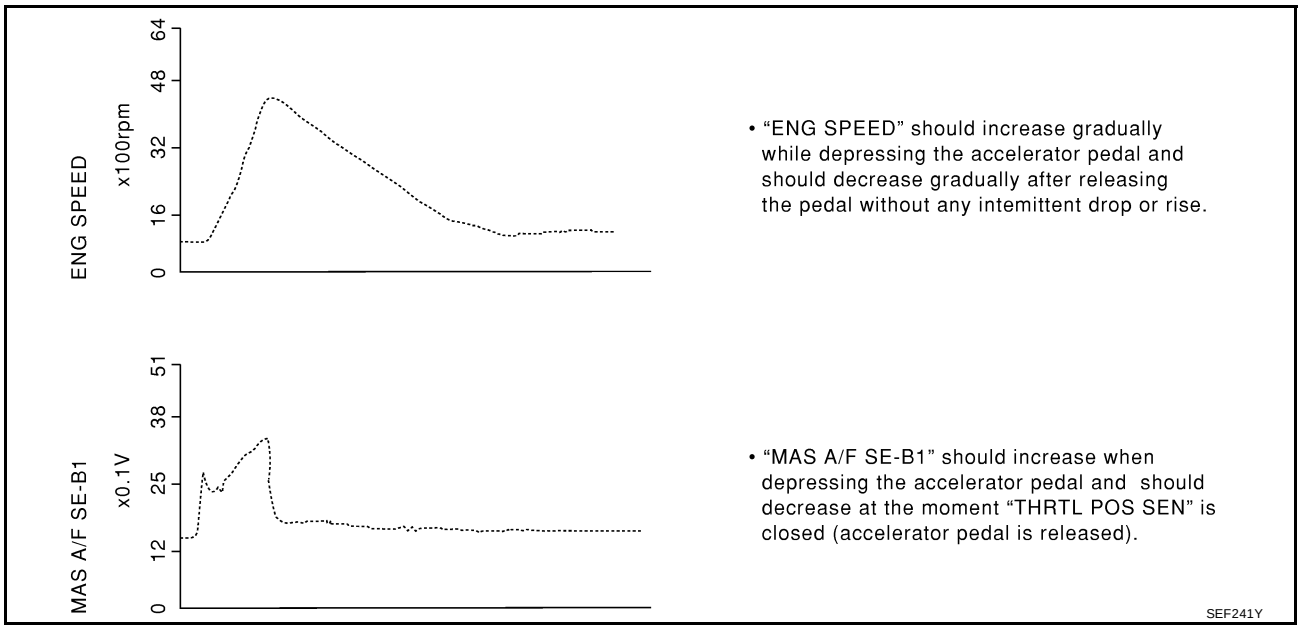
THRTL POS SEN, ABSOL TH·P/S, CLSD THL/P SW

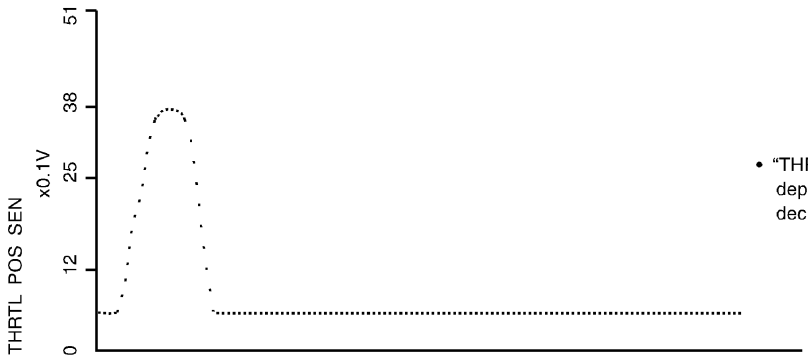
Below is the data for “THRTL POS SEN”, “ABSOL TH·P/S” and “CLSD THL/P SW” when depressing the accelerator pedal with the ignition switch “ON”.
The signal of “THRTL POS SEN” and “ABSOL TH·P/S” should rise gradually without any intermittent drop or rise after “CLSD THL/P SW” is changed from “ON” to “OFF”.



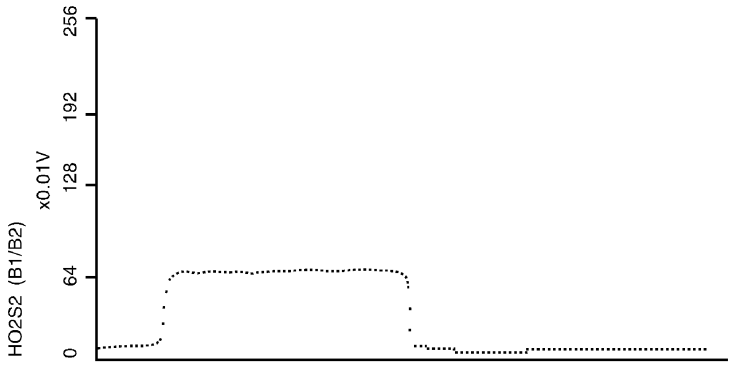
ENG SPEED, MAS A/F SE-B1, THRTL POS SEN, HO2S2 (B1/B2), HO2S1 (B1/B2), INJ PULSE-B1

Below is the data for “ENG SPEED”, “MAS A/F SE-B1”, “THRTL POS SEN”, “HO2S2 (B1/B2)”, “HO2S1 (B1/B2)” and “INJ PULSE” when revving engine quickly up to 4,800 rpm under no load after warming up engine to normal operating temperature.
Each value is for reference, the exact value may vary.

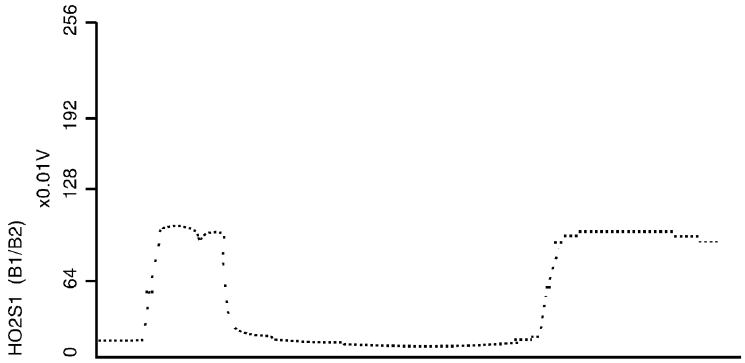




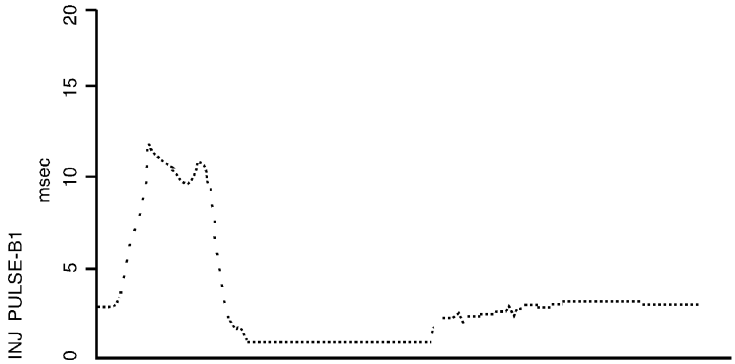
- "THRTL POS SEN" should increase while depressing the accelerator pedal and should decrease while releasing it.



- "HO2S2 (B1/B2)" may increase immediately after depressing the accelerator pedal and may decrease after releasing the pedal.



- "HO2S1 (B1/B2)" 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.

SEF242YB

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

PFP:00031

Description

UBS001D2

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 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

UBS001D3

- Vehicle driven distance: More than 5,000 km (3,107 miles)
- Barometric pressure: 98.3 - 104.3 kPa (1.003 - 1.064 kg/cm^2 , 14.25 - 15.12 psi)
- Atmosphere temperature: 20 - 30°C (68 - 86°F)
- Engine coolant temperature: 75 - 95°C (167 - 203°F)
- Transmission: Warmed-up *1
- Electrical load: Not applied *2
- Engine speed: Idle

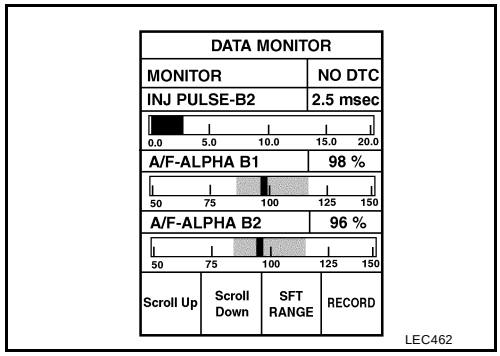
*1: For A/T models, after the engine is warmed-up to normal operating temperature, drive vehicle until “FLUID TEMP SE” (A/T fluid temperature sensor signal) indicates less than 0.9V. For M/T models, drive vehicle for 5 minutes after the engine is warmed-up to normal operating temperature.
*2: Rear window defogger switch, air conditioner switch, and lighting switch are “OFF”. Cooling fans are not operating. Steering wheel straight ahead.

Inspection Procedure

UBS001D4

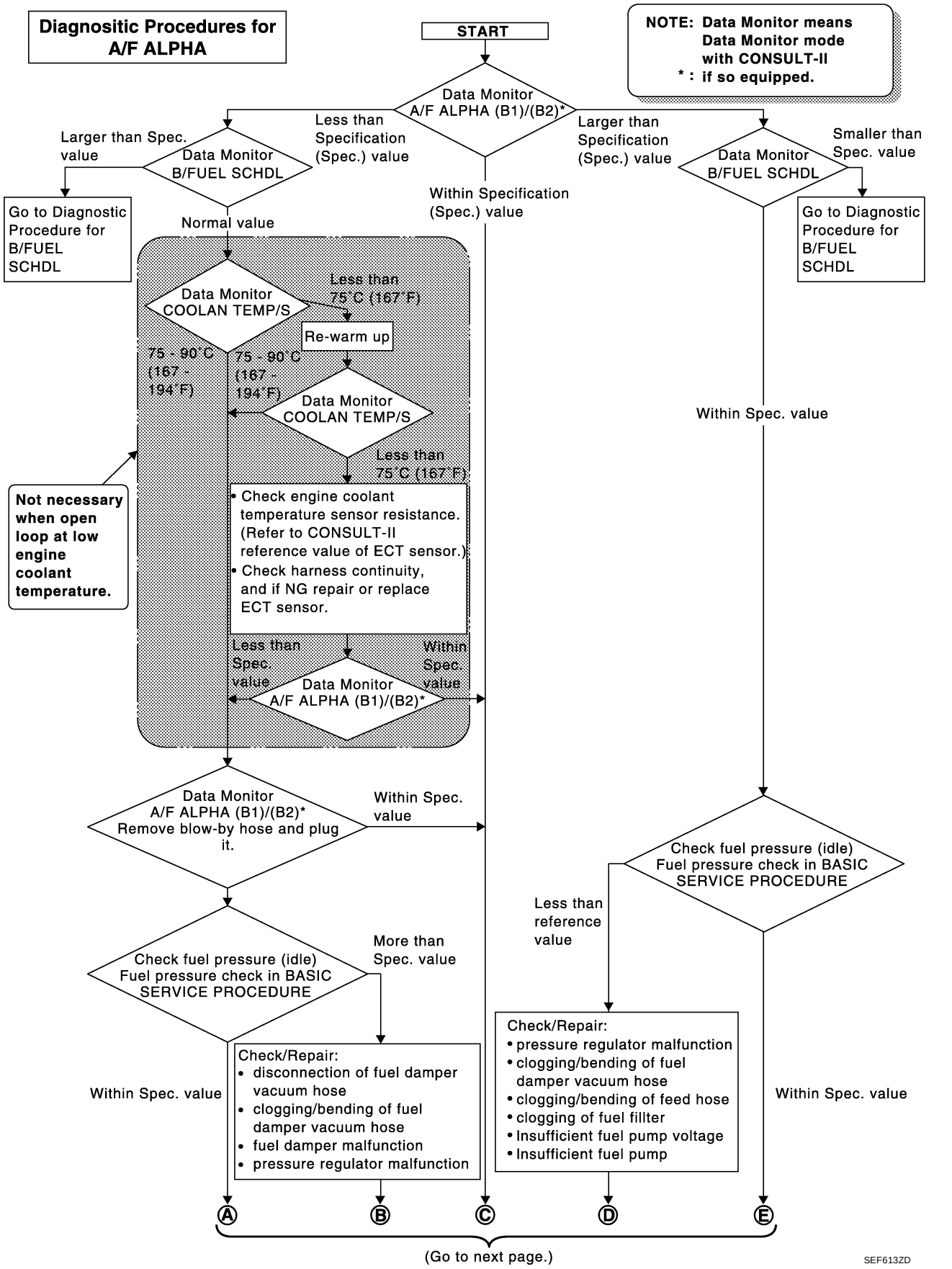
NOTE:
Perform “DATA MONITOR (SPEC)” mode in maximum scale display.

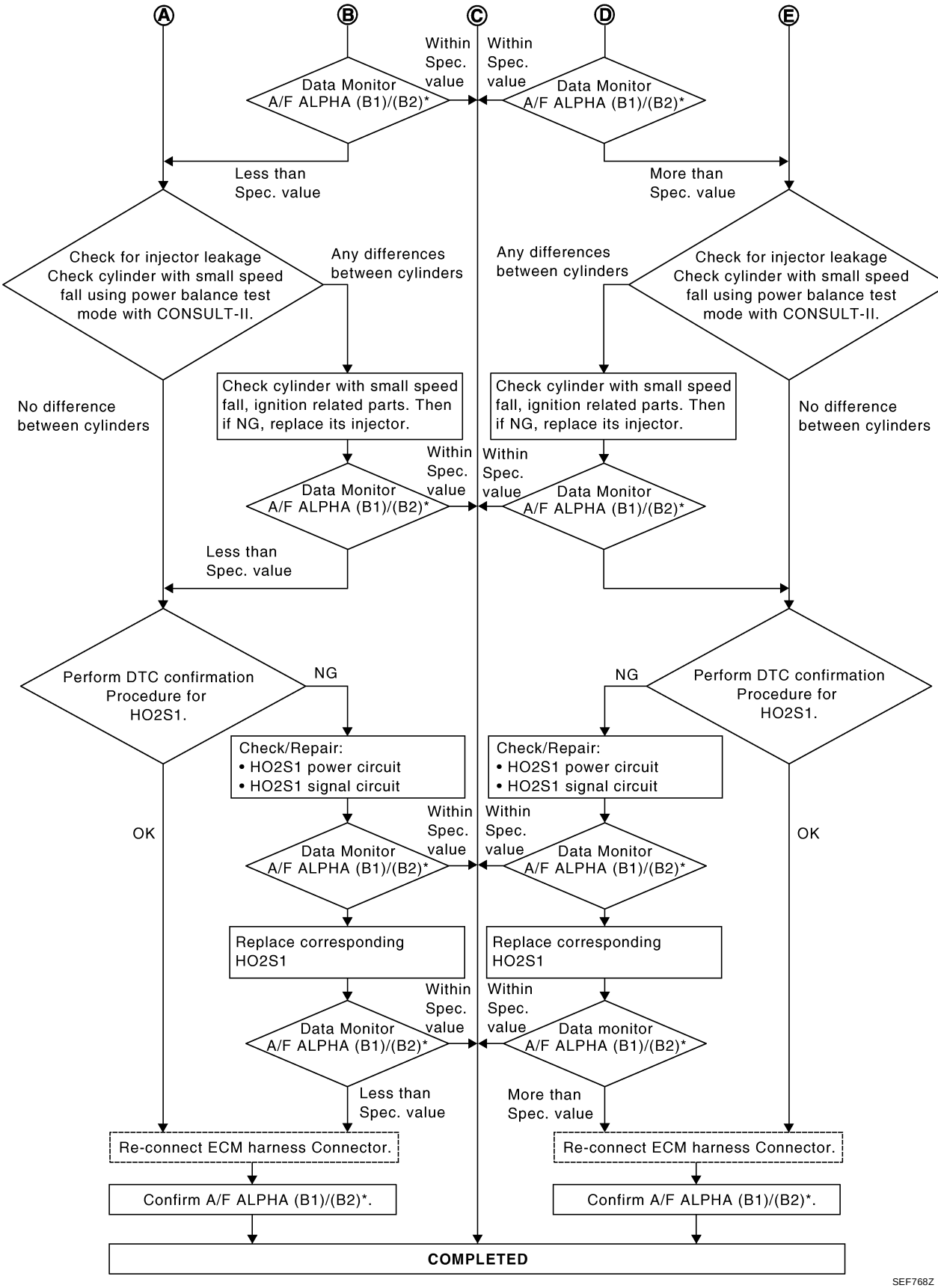
1. Perform “Basic Inspection”. Refer to EC-87, "Basic Inspection" .
2. Confirm that the testing conditions indicated above are met.
3. Select “B/FUEL SCHDL”, “A/F ALPHA-B1”, “A/F ALPHA-B2”, and “MAS A/F SE-B1” in “DATA MONITOR (SPEC)” mode with CONSULT-II.
4. Make sure that monitor items are within the SP value.
5. If NG, go to EC-144, "Diagnostic Procedure" .



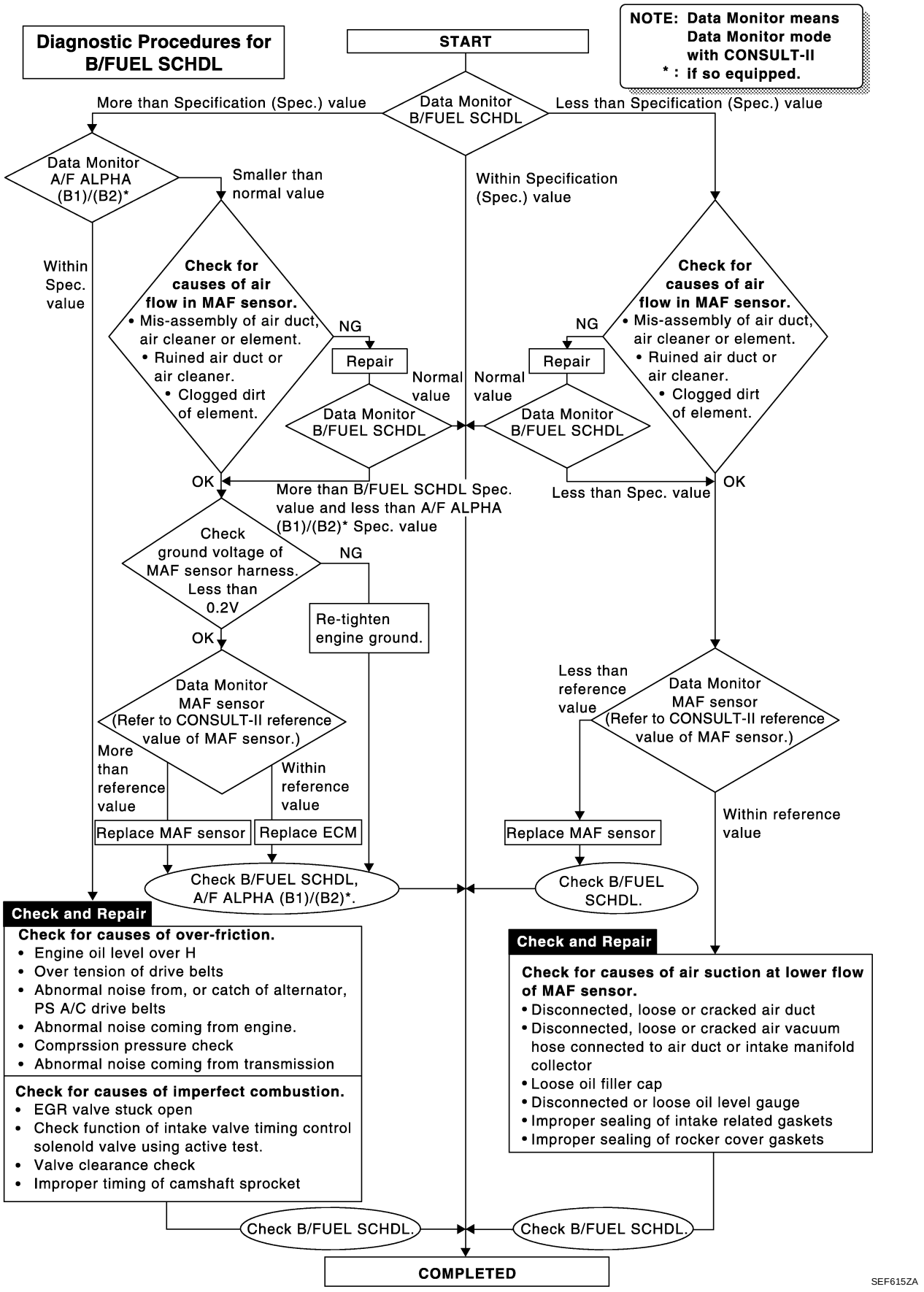
Diagnostic Procedure

UBS001D5




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

SEF768Z


Diagnostic Procedures for B/FUEL SCHDL
START
NOTE: Data Monitor means Data Monitor mode with CONSULT-II
* : if so equipped.
Data Monitor B/FUEL SCHDL
More than Specification (Spec.) value
Less than Specification (Spec.) value
Within Specification (Spec.) value
Data Monitor A/F ALPHA (B1)/(B2)*
Smaller than normal value
Within Spec. value
Check for causes of air flow in MAF sensor.
• Mis-assembly of air duct, air cleaner or element.
• Ruined air duct or air cleaner.
• Clogged dirt of element.
NG
Repair
Normal value
Data Monitor B/FUEL SCHDL
OK
More than B/FUEL SCHDL Spec. value and less than A/F ALPHA (B1)/(B2)* Spec. value
Less than Spec. value
Check ground voltage of MAF sensor harness. Less than 0.2V
Re-tighten engine ground.
Data Monitor MAF sensor (Refer to CONSULT-II reference value of MAF sensor.)
More than reference value
Within reference value
Less than reference value
Replace MAF sensor
Replace ECM
Check B/FUEL SCHDL, A/F ALPHA (B1)/(B2)*.
Check B/FUEL SCHDL.
Check and Repair
Check for causes of over-friction.
• Engine oil level over H
• Over tension of drive belts
• Abnormal noise from, or catch of alternator, PS A/C drive belts
• Abnormal noise coming from engine.
• Comprssion pressure check
• Abnormal noise coming from transmission
Check for causes of imperfect combustion.
• EGR valve stuck open
• Check function of intake valve timing control solenold valve using active test.
• Valve clearance check
• Improper timing of camshaft sprocket
Check for causes of air suction at lower flow of MAF sensor.
• Disconnected, loose or cracked air duct
• Disconnected, loose or cracked air vacuum hose connected to air duct or intake manifold collector
• Loose oil filler cap
• Disconnected or loose oil level gauge
• Improper sealing of intake related gaskets
• Improper sealing of rocker cover gaskets
Check B/FUEL SCHDL.
Check B/FUEL SCHDL.
COMPLETED
SEF615ZA

TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT

PFP:00006

Description

UBS001D6

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

COMMON I/I REPORT SITUATIONS

STEP in Work Flow	Situation
II	The CONSULT-II is used. The SELF-DIAG RESULTS screen shows time data other than “0” or “1t”.
III	The symptom described by the customer does not recur.
IV	(1st trip) DTC data does not appear during the DTC CONFIRMATION PROCEDURE.
VI	The TROUBLE DIAGNOSIS for PXXXX does not indicate the problem area.

Diagnostic Procedure

UBS001D7

1. INSPECTION START

Erase (1st trip) DTCs. Refer to EC-73, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .

>> GO TO 2.

2. CHECK GROUND TERMINALS

Check ground terminals for corroding or loose connection. Refer to GI-26, "How to Perform Efficient Diagnosis for an Electrical Incident" , “CIRCUIT INSPECTION”, “Ground Inspection”.

OK or NG

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

3. SEARCH FOR ELECTRICAL INCIDENT

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

OK or NG

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

4. CHECK CONNECTOR TERMINALS

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

OK or NG

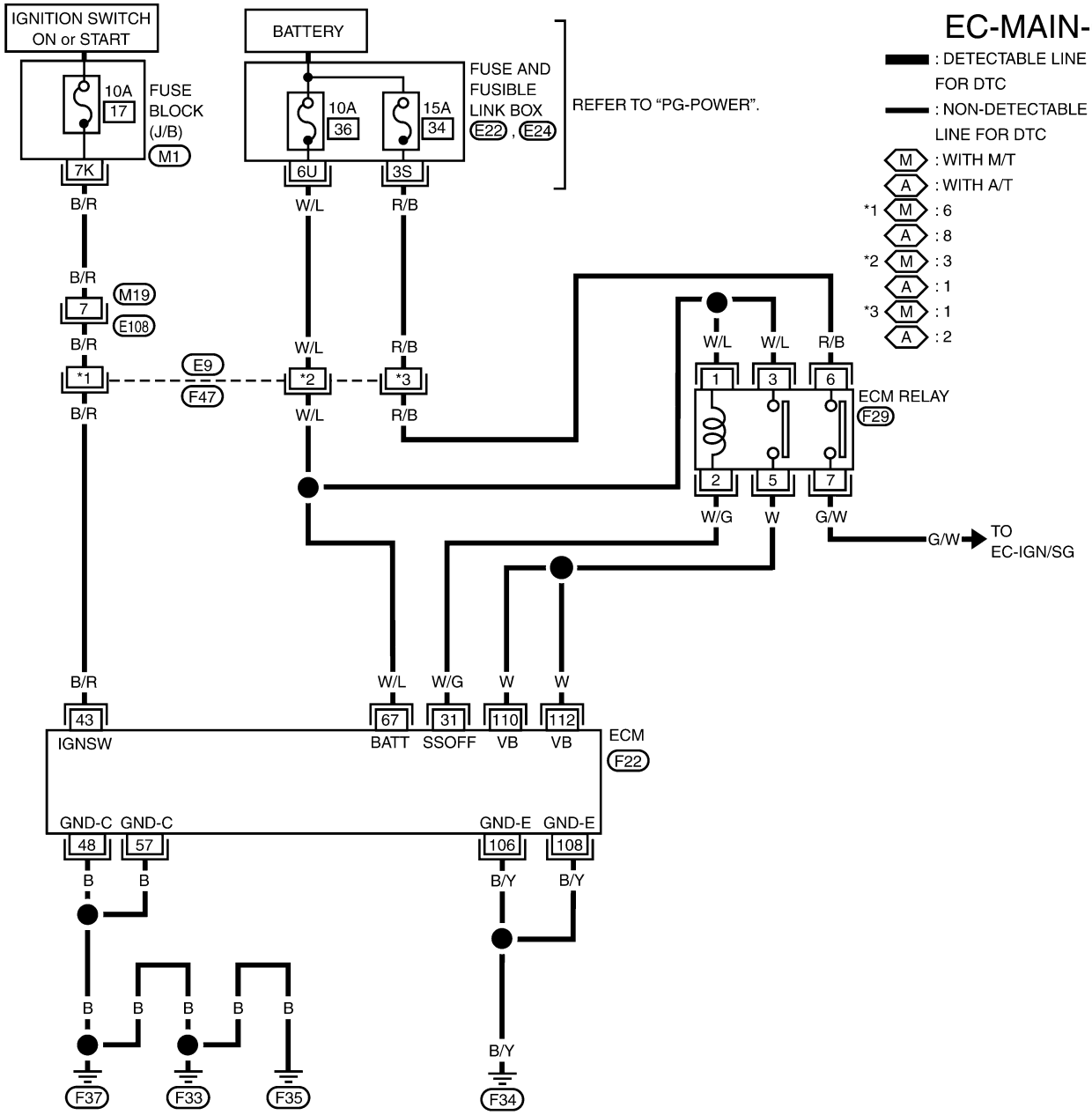
OK >> **INSPECTION END**
NG >> Repair or replace connector.

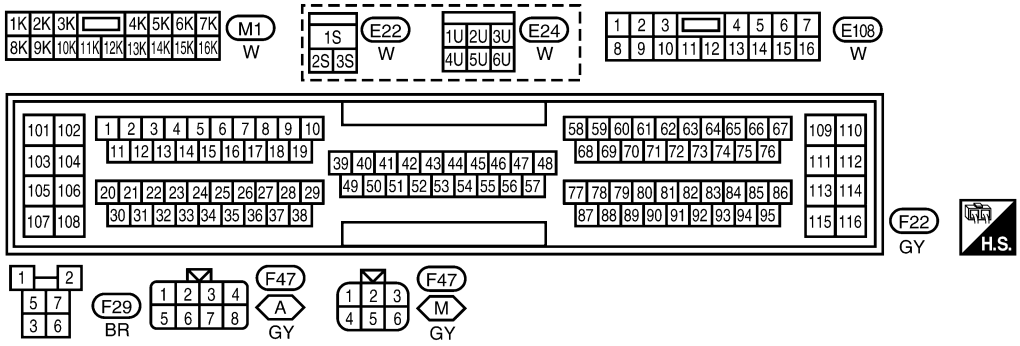
POWER SUPPLY CIRCUIT FOR ECM

PFP:24110

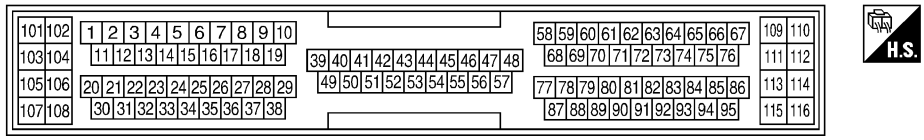
Wiring Diagram

UBS001D8





BBWA0105E



SEF970W

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
31	W/G	ECM RELAY (SELF-SHUTOFF)	ENGINE RUNNING FOR 5 SECONDS AFTER TURNING IGN OFF	0 - 1.0V
			5 SECONDS PASSED AFTER TURNING IGN OFF	BATTERY VOLTAGE
43	B/R	IGN	IGN OFF	0V
			IGN ON	BATTERY VOLTAGE
48	B	ECM GROUND	ENGINE RUNNING	ENGINE GROUND
57	B	ECM GROUND	ENGINE RUNNING AT IDLE SPEED	APPROX. 0 - 1.0V
67	W/L	POWER SUPPLY (BACK-UP)	IGN OFF	BATTERY VOLTAGE
106 108	B/Y B/Y	ECM GROUND	ENGINE RUNNING AT IDLE SPEED	ENGINE GROUND
110 112	W W	POWER SUPPLY FOR ECM	IGN ON	BATTERY VOLTAGE

SEF563Y

Diagnostic Procedure

UBS001D9

1. INSPECTION START

Start engine.
Is engine running?

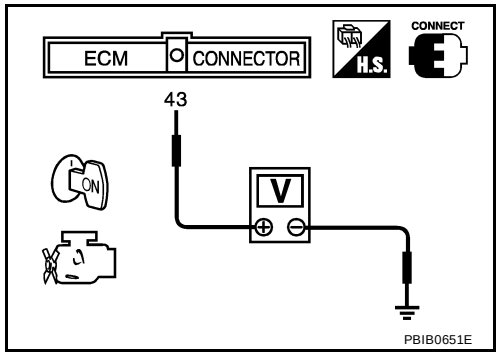
Yes or No

Yes >> GO TO 4.
No >> GO TO 2.

2. CHECK POWER SUPPLY-I

1. Turn ignition switch “OFF” and then “ON”.
2. Check voltage between ECM terminal 43 and ground with CONSULT-II or tester.

Voltage : Battery voltage



OK or NG

OK >> GO TO 13.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

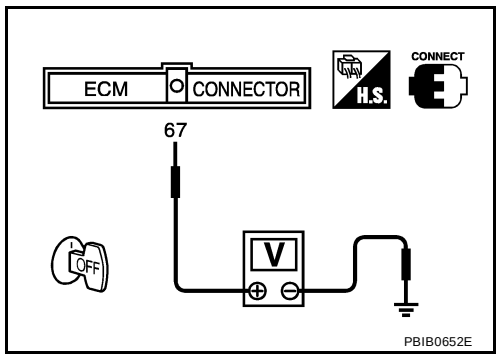
- 10A fuse
- Fuse block (J/B) connector M1
- Harness connectors E9, F47
- Harness connectors M19, E108
- Harness for open or short between ECM and 10A fuse

>> Repair harness or connectors.

4. CHECK POWER SUPPLY-II

1. Stop engine.
2. Check voltage between ECM terminal 67 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.

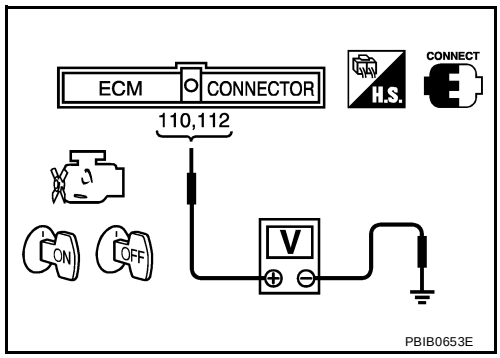
- 10A fuse
- Fuse and fusible link box connector E24
- Harness connectors E9, F47
- Harness for open or short between ECM and 10A fuse

>> Repair harness or connectors.

6. CHECK POWER SUPPLY-III

1. Turn ignition switch “ON” and then “OFF”.
2. Check voltage between ECM terminals 110, 112 and ground with CONSULT-II or tester.

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



OK or NG

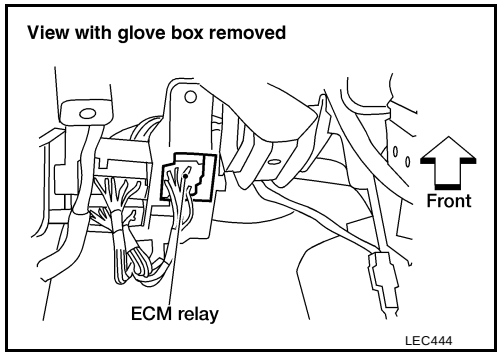
OK >> GO TO 13.
NG (Battery voltage does not exist.)>>GO TO 7.
NG (Battery voltage exists for more than a few seconds.)>>GO TO 12.

7. CHECK HARNESS CONTINUITY BETWEEN ECM RELAY AND ECM

1. Disconnect ECM harness connector.
2. Disconnect ECM relay.
3. Check harness continuity between ECM terminals 110, 112 and ECM relay terminal 5.
   Refer to Wiring Diagram.

Continuity should exist.

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



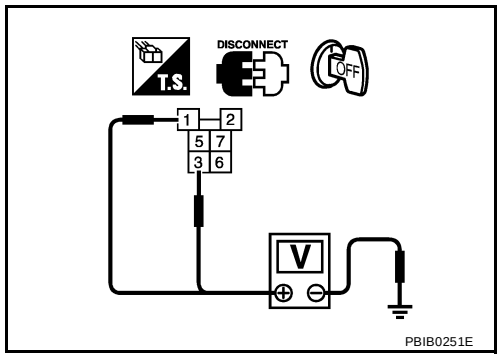
OK or NG

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

8. CHECK VOLTAGE BETWEEN ECM RELAY AND GROUND

Check voltage between ECM relay terminals 1, 3 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 harness for open or short between ECM relay and fuse.

>> Repair harness or connectors.

10. CHECK OUTPUT SIGNAL CIRCUIT

1. Check harness continuity between ECM terminal 31 and ECM relay 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 harness for open or short between ECM relay and ECM.

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

12. CHECK ECM RELAY

Refer to EC-153, "Component Inspection" .

OK or NG

OK >> GO TO 13.
NG >> Replace ECM relay.

13. CHECK GROUND CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminals 48, 57, 106, 108 and engine ground.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to power.

OK or NG

OK >> GO TO 14.
NG >> Repair open circuit or short to power in harness or connectors.

14. CHECK INTERMITTENT INCIDENT

Perform EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

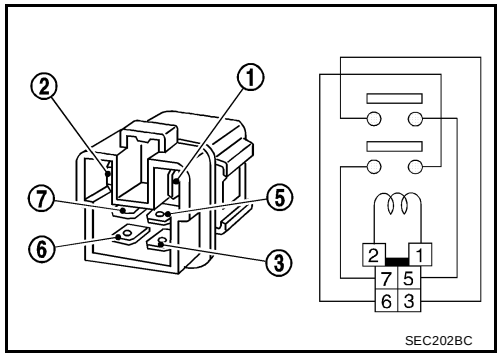
Component Inspection

UBS001DA

ECM RELAY

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

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



DTC P0011 IVT CONTROL

PFP:23796

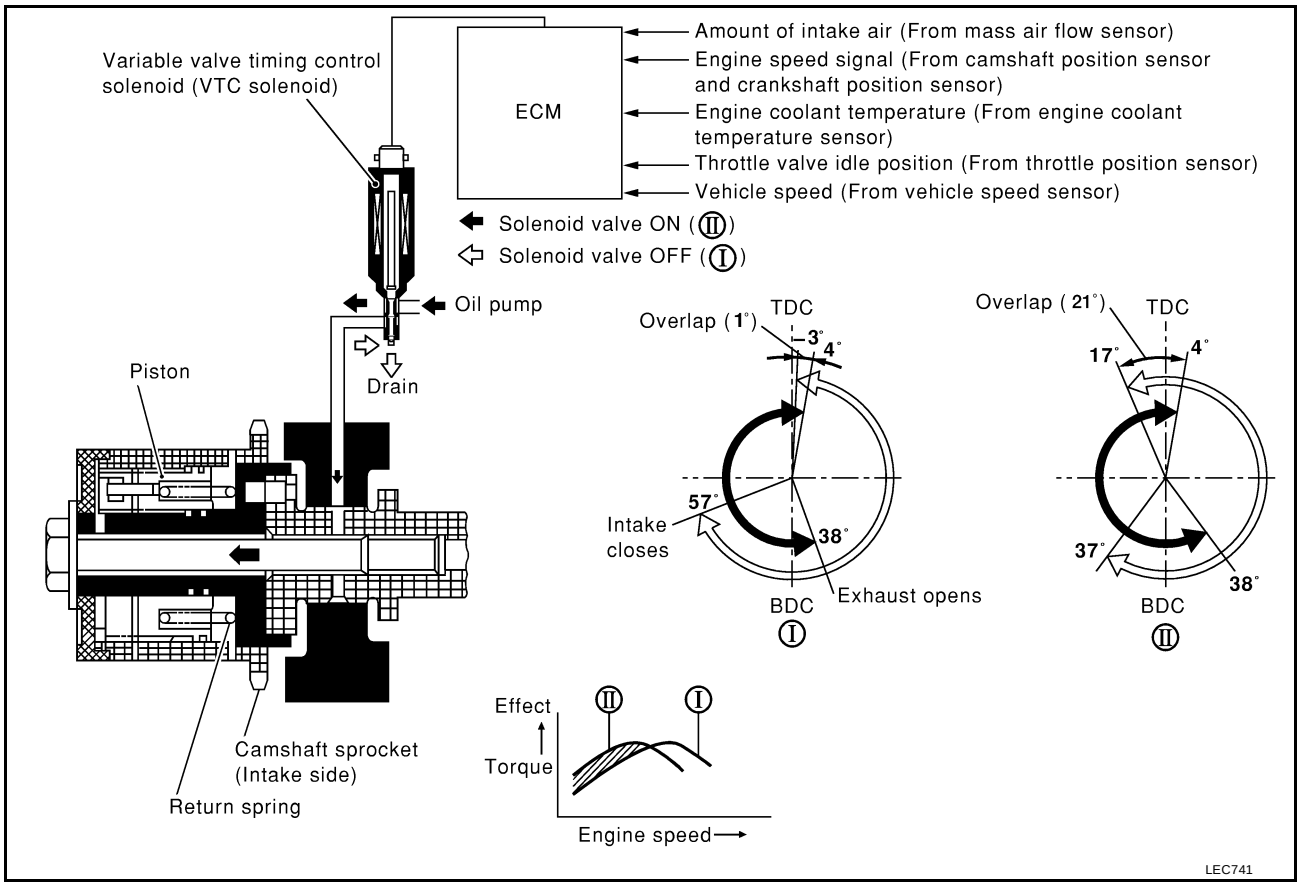
Description

UBS001DB

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE)	Engine speed and cylinder number	Intake valve timing control	Intake valve timing control solenoid valve
Crankshaft position sensor (POS)	Engine speed		
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Throttle position sensor	Throttle position		
Vehicle speed sensor	Vehicle speed		

The intake valve timing control system is utilized to control intake valve opening and closing timing. Engine coolant temperature signals, engine speed, amount of intake air, vehicle speed and throttle position are used to determine intake valve timing.
The intake camshaft sprocket position is regulated by oil pressure controlled by the intake valve timing control. When ECM sends ON signal to intake valve timing control solenoid valve, oil pressure is transmitted to camshaft sprocket. Then, intake side camshaft is advanced.



OPERATION

Engine operating condition	Intake valve timing control solenoid valve	Intake valve opening and closing time	Valve overlap	Engine valve timing
● Engine coolant temperature is between 15°C (59°F) to 110°C (230°F) and engine speed is between 1,100 rpm and 4,200 rpm. ● During high load condition	ON	Advance	Increased	II
Those other than above	OFF	Normal	Normal	I

CONSULT-II Reference Value in Data Monitor Mode

UBS001DC

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
INT/V SOL-B1	● Engine is in warm up condition. ● Engine speed is more than 2,000 rpm. ● Quickly depressed accelerator pedal	OFF → ON

On Board Diagnosis Logic

UBS001DD

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0011	● Comparing the intake valve timing position when the intake valve timing solenoid is ON with that when the solenoid is OFF, the difference does not exceed a certain limit.	● Harness or connectors (The intake valve timing control position sensor circuit is open.) ● Intake valve timing control position sensor ● Accumulation of debris to the signal pick-up portion of the camshaft

DTC Confirmation Procedure

UBS001DE

CAUTION:
Always drive at 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.

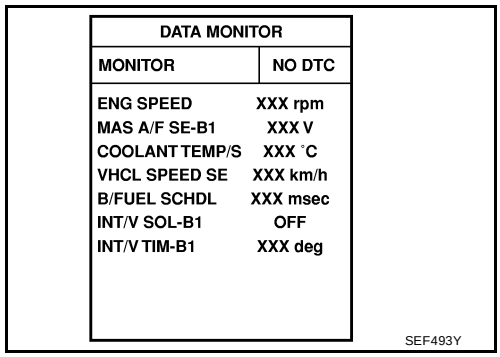
TESTING CONDITION:
Do not apply electrical load (e.g., cooling fan, rear window defogger, etc.)

WITH CONSULT-II

1. Warm up engine to normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II.
4. Restart engine and wait at least 30 seconds.
5. Let engine idle at least 50 seconds. (Test is completed when “INT/V SOL - B1 in “DATA MONITOR” with CONSULT-II remains “OFF”.) If indication is “ON”, repeat step.
6. Maintain the following conditions for at least 30 seconds. (Test is completed when “INT/V SOL - B1 in “DATA MONITOR” with CONSULT-II remains “ON”.) If indication is “OFF”, repeat step.

ENG SPEED	More than 2,000 rpm
B/FUEL SCHDL	More than 6 msec
Selector lever	5th (M/T) 3rd with OD “OFF” (A/T)

7. If 1st trip DTC is detected, go to EC-157, "Diagnostic Procedure" .



WITH GST

1. Warm up engine to normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Restart engine and wait at least 30 seconds.
4. Let engine idle at least 50 seconds.
5. Maintain the following conditions for at least 30 seconds.

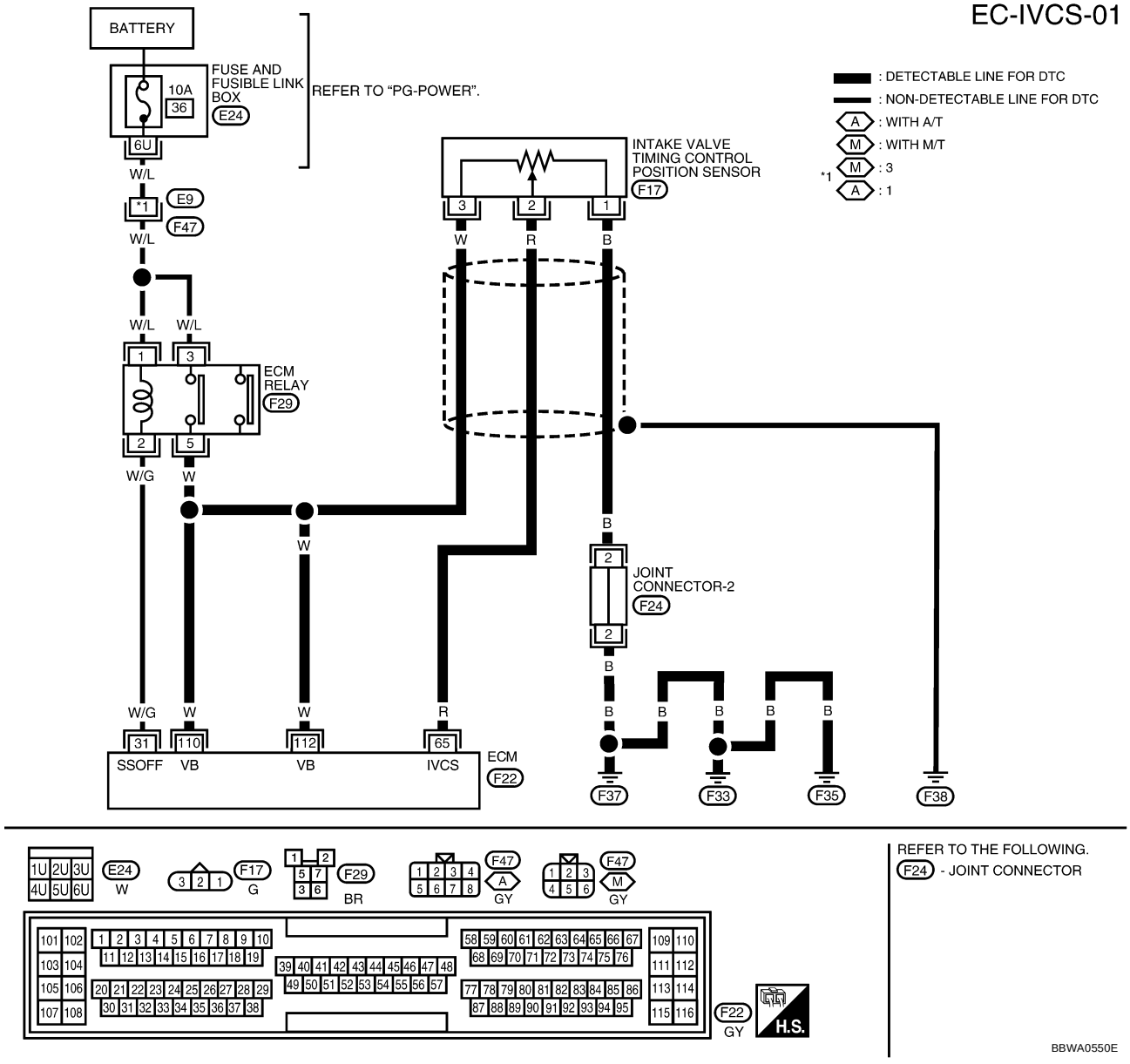
ENG SPEED	More than 2,000 rpm
B/FUEL SCHDL	More than 6 msec
Selector lever	5th (M/T) 3rd with OD “OFF” (A/T)

6. Select “MODE 7” with GST.
7. If 1st trip DTC is detected, go to EC-157, "Diagnostic Procedure" .

Wiring Diagram

UBS001DF

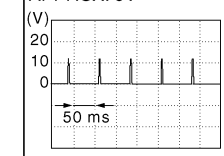
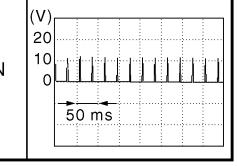
EC-IVCS-01



REFER TO THE FOLLOWING.
F24 - JOINT CONNECTOR

BBWA0550E

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
65	R	INTAKE VALVE TIMING CONTROL POSITION SENSOR	ENGINE RUNNING AT IDLE UNDER WARM-UP CONDITION	APPROX. 0V 
			ENGINE RUNNING AT 2,000 RPM UNDER WARM-UP CONDITION	APPROX. 0V 

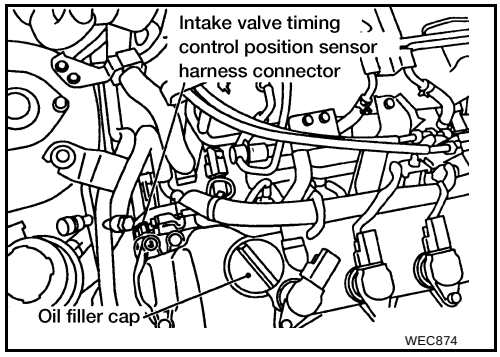
SEF744YB

Diagnostic Procedure

UBS001DG

1. CHECK POWER SUPPLY

1. Turn ignition switch "OFF".
2. Disconnect intake valve timing control position sensor harness connector.
3. Turn ignition switch "ON".

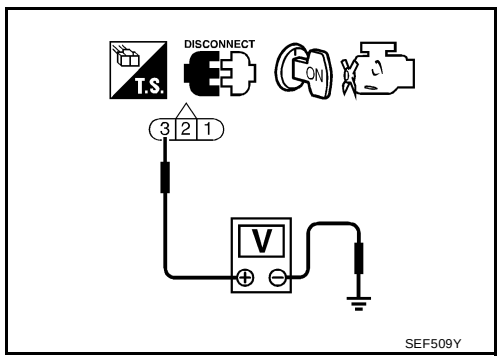


4. Check voltage between terminal 3 and engine ground.

Voltage: Battery voltage

OK or NG

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



2. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between the intake valve timing control position sensor and ECM relay
- Harness for open or short between the intake valve timing control position sensor and ECM

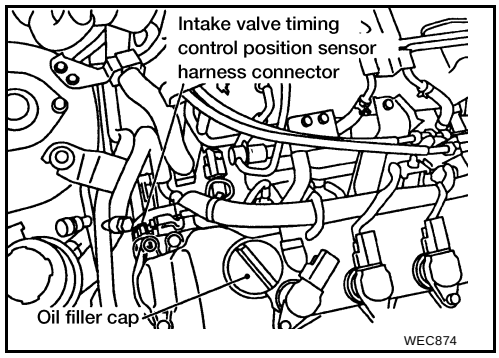
>> Repair harness or connectors.

3. CHECK INPUT SIGNAL CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Disconnect intake valve timing control position sensor harness connector.
4. Check harness continuity between ECM terminal 65 and terminal 2.
   Refer to Wiring Diagram.

   Continuity should exist.

   If OK, check harness for short to ground and short to power.



OK or NG

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

4. CHECK GROUND CIRCUIT

1. Loosen and retighten engine ground screws.
2. Check harness continuity between sensor terminal 1 and engine ground. Refer to wiring diagram.

   Continuity should exist.

   If OK, check harness for short to power.

OK or NG

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

5. DETECT MALFUNCTIONING PART

Check the following.

- Joint connector-2
- Harness for open or short between the intake valve timing control position sensor and ground

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

6. CHECK INTAKE VALVE TIMING POSITION SENSOR

Refer to EC-159, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace intake valve timing position sensor.

7. CHECK CAMSHAFT

Check accumulation of debris to the signal pick-up portion of the camshaft. Refer to EM-24, "TIMING CHAIN" .

OK or NG

OK >> 1. Replace intake valve timing control position sensor.
2. GO TO 8.
NG >> Remove debris and clean the signal pick-up cutout of camshaft.

8. CHECK INTERMITTENT INCIDENT

Perform EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

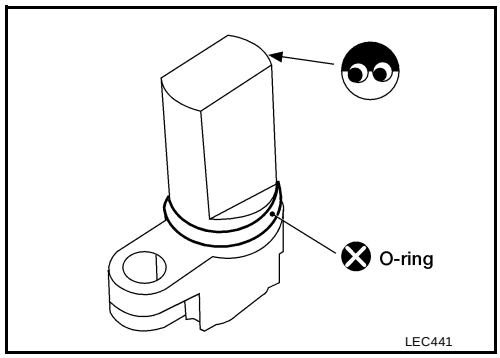
>> **INSPECTION END**

Component Inspection

UBS001DH

INTAKE VALVE TIMING CONTROL POSITION SENSOR

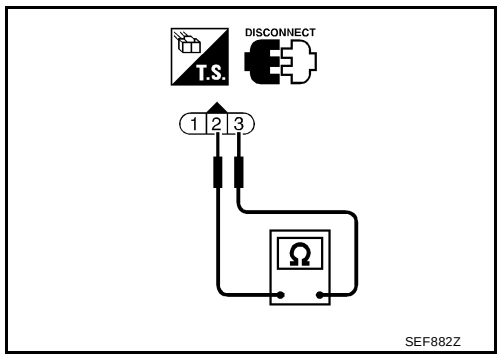
1. Disconnect intake valve timing control position sensor harness connector.
2. Loosen fixing bolt of the sensor.
3. Visually check the sensor for chipping.



4. Check resistance between terminals 2 and 3.

Resistance: 600 - 740Ω [at 20°C (68°F)]

If NG, replace intake valve timing control position sensor.



Removal and Installation

UBS001DI

INTAKE VALVE TIMING CONTROL POSITION SENSOR

Refer to EM-15, "Removal and Installation" .

DTC P0031, P0032, P0051, P0052 HO2S1 HEATER

PFP:22690

Description

UBS001DJ

SYSTEM DESCRIPTION

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

The ECM performs ON/OFF control of the heated oxygen sensor 1 heater corresponding to the engine operating condition.

OPERATION

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

CONSULT-II Reference Value in Data Monitor Mode

UBS001DK

Specification data are reference values.

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

On Board Diagnosis Logic

UBS001DL

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0031 (Bank 1) P0032 (Bank 1) P0051 (Bank 2) P0052 (Bank 2)	● The current amperage in the heated oxygen sensor 1 heater circuit is out of the normal range. [An excessively low (P0031, P0051) or high (P0032, P0052) voltage signal is sent to ECM through the heated oxygen sensor 1 heater.]	● Harness or connectors (The heated oxygen sensor 1 heater circuit is open or shorted.) ● Heated oxygen sensor 1 heater

DTC Confirmation Procedure

UBS001DM

NOTE:

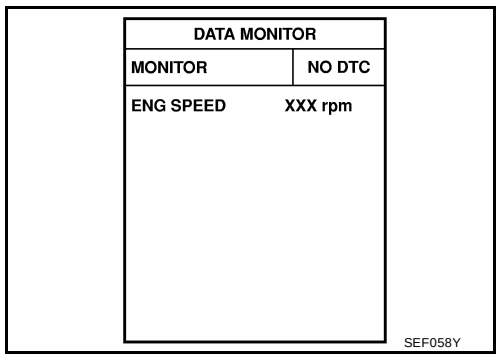
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

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

WITH CONSULT-II

1. Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and run it for at least 6 seconds at idle speed.
3. If 1st trip DTC is detected, go to EC-163, "Diagnostic Procedure".



WITH GST

1. Start engine and run it for at least 6 seconds at idle speed.
2. Turn ignition switch “OFF” and wait at least 10 seconds.

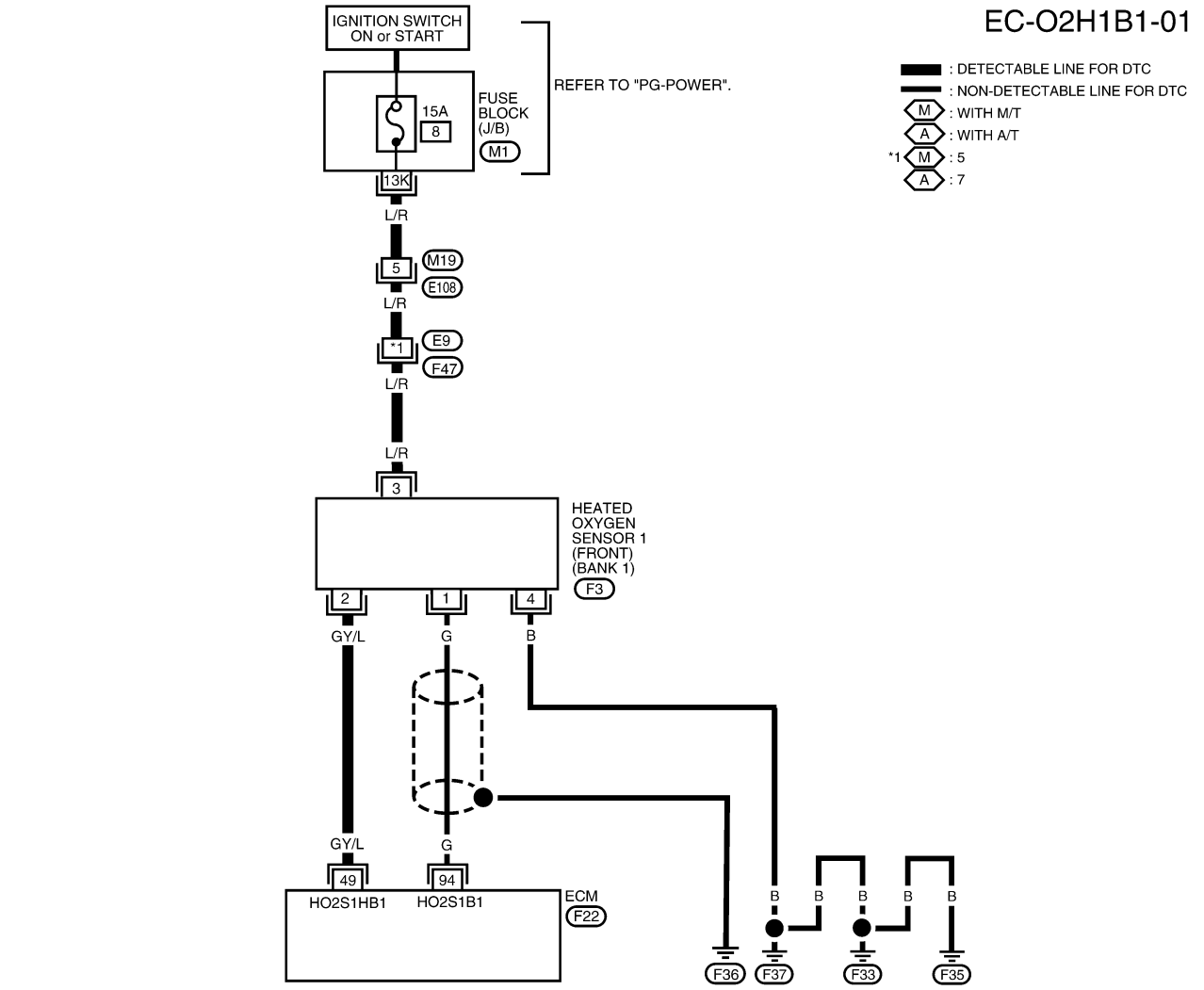
3. Start engine and run it for at least 6 seconds at idle speed.
4. Select “MODE 3” with GST.
5. If DTC is detected, go to EC-163, "Diagnostic Procedure" .

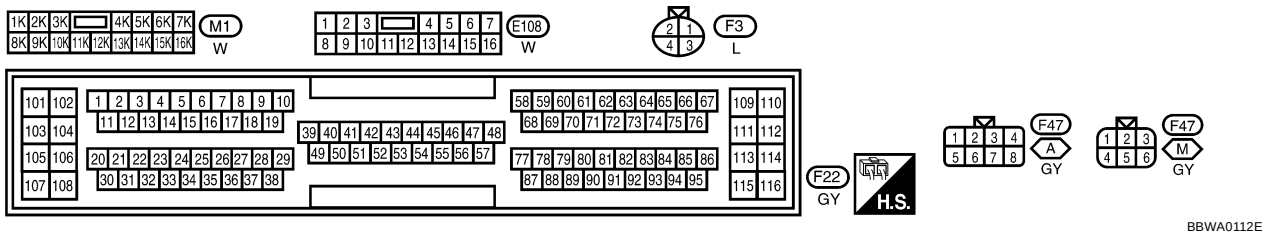
- **When using GST, “DTC Confirmation Procedure” should be performed twice as much as when using CONSULT-II because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II is recommended.**

Wiring Diagram

UBS001DN

BANK 1





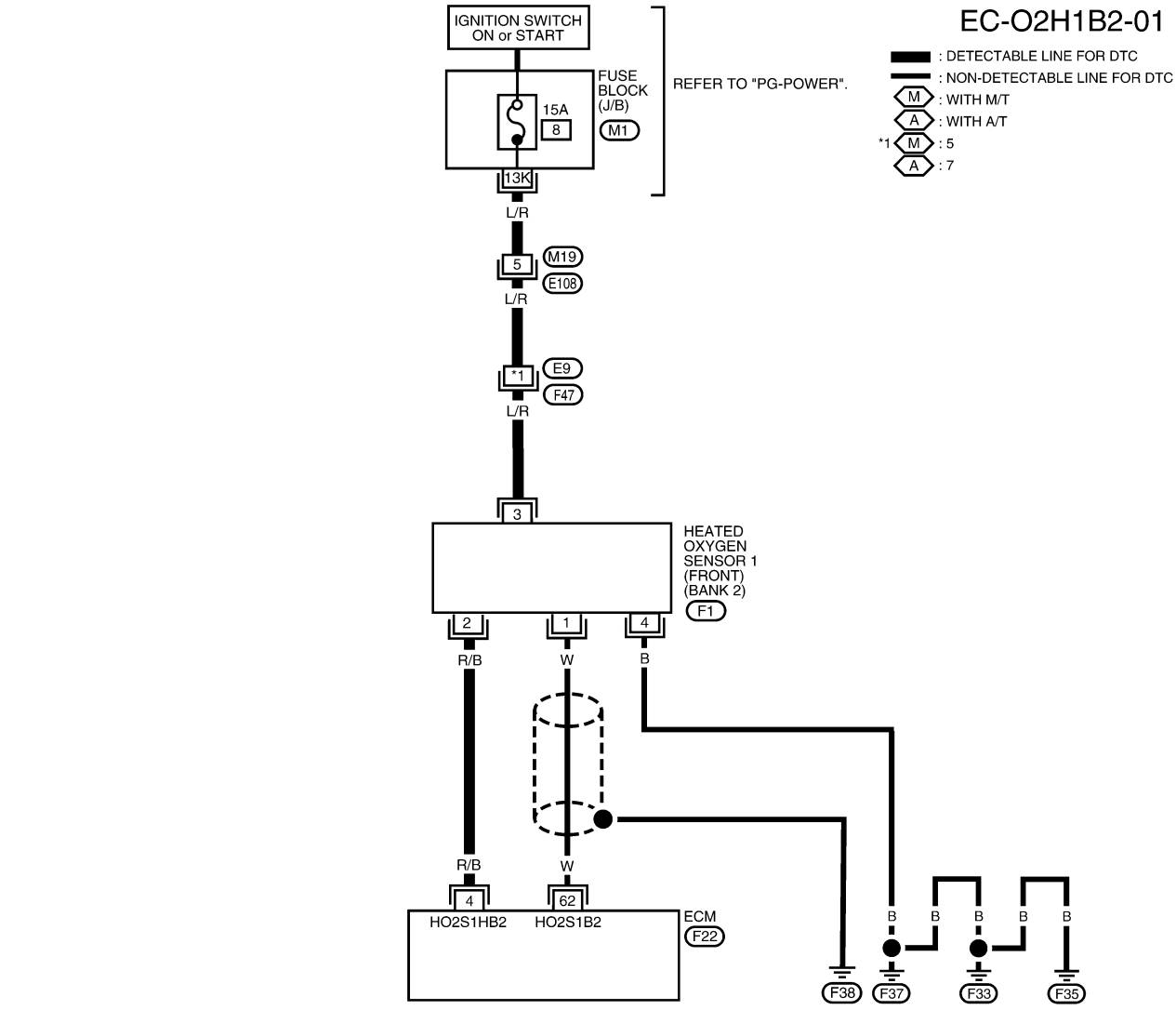
BBWA0112E

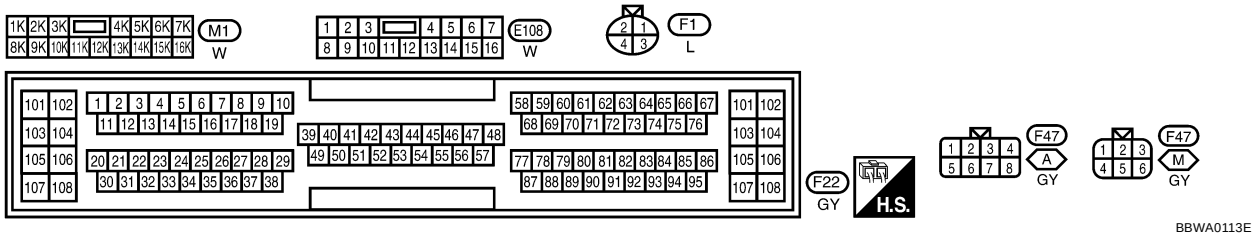
ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
49	GY/L	HEATED OXYGEN SENSOR 1 HEATER (FRONT) (BANK 1)	ENGINE RUNNING BELOW 3,600 RPM	0 - 1.0V
			ENGINE RUNNING ABOVE 3,600 RPM	BATTERY VOLTAGE

WEC897

BANK 2





BBWA0113E

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
4	R/B	HEATED OXYGEN SENSOR 1 HEATER (FRONT) (BANK 2)	ENGINE RUNNING BELOW 3,600 RPM	0 - 1.0V
			ENGINE RUNNING ABOVE 3,600 RPM	BATTERY VOLTAGE

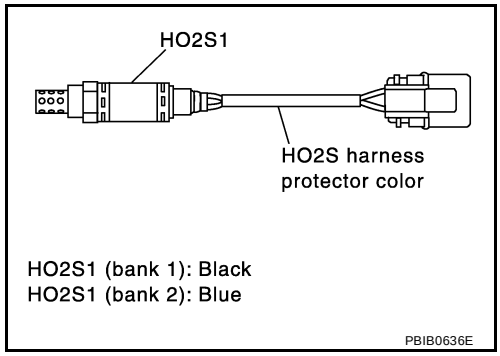
WEC896

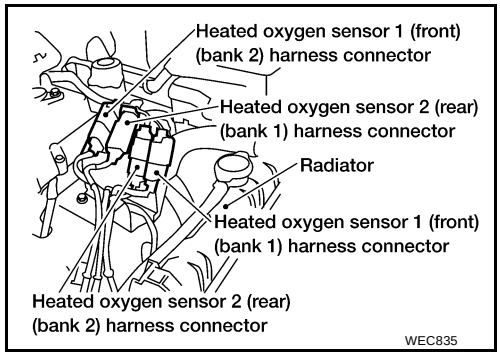
Diagnostic Procedure

UBS001DO

1. CHECK POWER SUPPLY

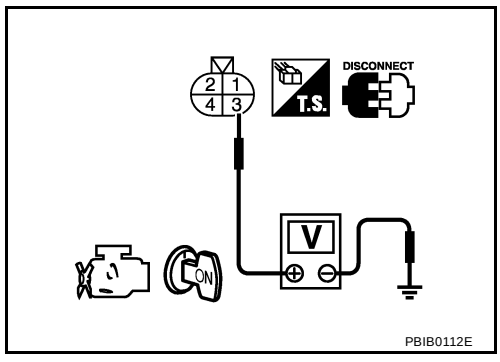
1. Turn ignition switch "OFF".
2. Check the HO2S1 harness protector color, and disconnect the corresponding heated oxygen sensor 1 harness connector.





3. Turn ignition switch "ON".
4. Check voltage between HO2S1 terminal 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

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

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E9, F47
- Harness connectors M19, E108
- Fuse block (J/B) connector M1
- 15A fuse
- Harness for open or short between heated oxygen sensor 1 and fuse

>> Repair harness or connectors.

3. CHECK OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal and HO2S1 as follows.
   Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0031, P0032	49	2	1
P0051, P0052	4	2	2

Continuity should exist.

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

OK or NG

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

4. CHECK HEATED OXYGEN SENSOR 1 HEATER

Refer to EC-165, "Component Inspection" .

OK or NG

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

5. CHECK INTERMITTENT INCIDENT

Perform EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

UBS001DP

HEATED OXYGEN SENSOR 1 HEATER

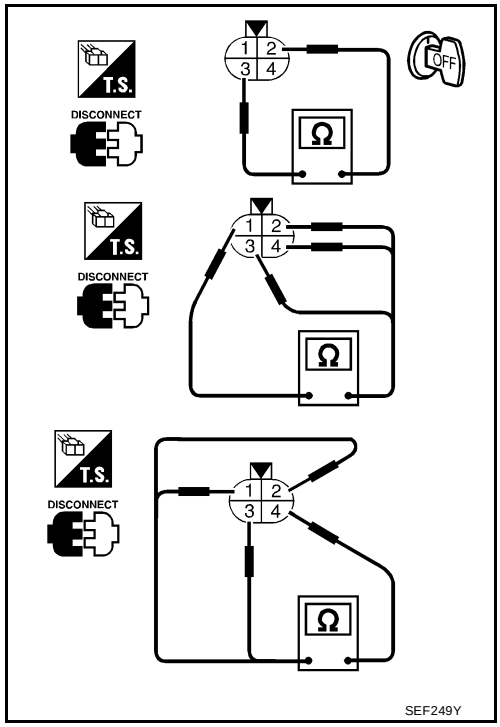
1. Check resistance between HO2S1 terminals as follows.

Terminal No.	Resistance
2 and 3	2.3 - 4.3 Ω at 25°C (77°F)
1 and 2, 3, 4	∞ Ω (Continuity should not exist)
4 and 1, 2, 3	

2. If NG, replace heated oxygen sensor 1.

CAUTION:

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



Removal and Installation

UBS001DQ

HEATED OXYGEN SENSOR 1

Refer to EM-15, "Removal and Installation" .

DTC P0037, P0038, P0057, P0058 HO2S2 HEATER

PFP:226A0

Description

UBS001DR

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)			

The ECM performs ON/OFF control of the heated oxygen sensor 2 heater corresponding to the engine speed.

OPERATION

Engine speed rpm	Heated oxygen sensor 2 heater
Above 3,600	OFF
Below 3,600	ON

CONSULT-II Reference Value in Data Monitor Mode

UBS001DS

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 HTR (B1)/ (B2)	● Ignition switch: ON (Engine stopped) ● Engine speed: Above 3,600 rpm	OFF
	● Engine speed: Below 3,600 rpm [After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more]	ON

On Board Diagnosis Logic

UBS001DT

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0037 (Bank 1) P0038 (Bank 1) P0057 (Bank 2) P0058 (Bank 2)	● The current amperage in the heated oxygen sensor 2 heater circuit is out of the normal range. [An excessively low (P0037, P0057) or high (P0038, P0058) voltage signal is sent to ECM through the heated oxygen sensor 2 heater.]	● Harness or connectors (The heated oxygen sensor 2 heater circuit is open or shorted.) ● Heated oxygen sensor 2 heater

DTC Confirmation Procedure

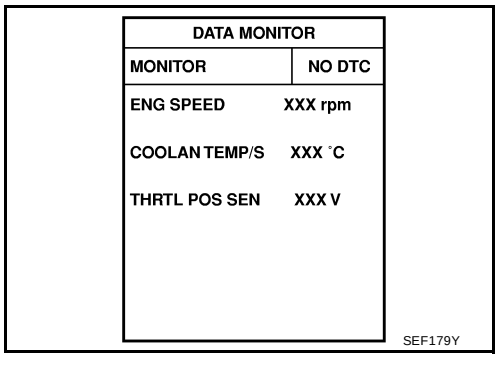
UBS001DU

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

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

WITH CONSULT-II

1. Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
3. Stop vehicle and let engine idle for at least 6 seconds.
4. If 1st trip DTC is detected, go to EC-169, "Diagnostic Procedure" .



WITH GST

1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.

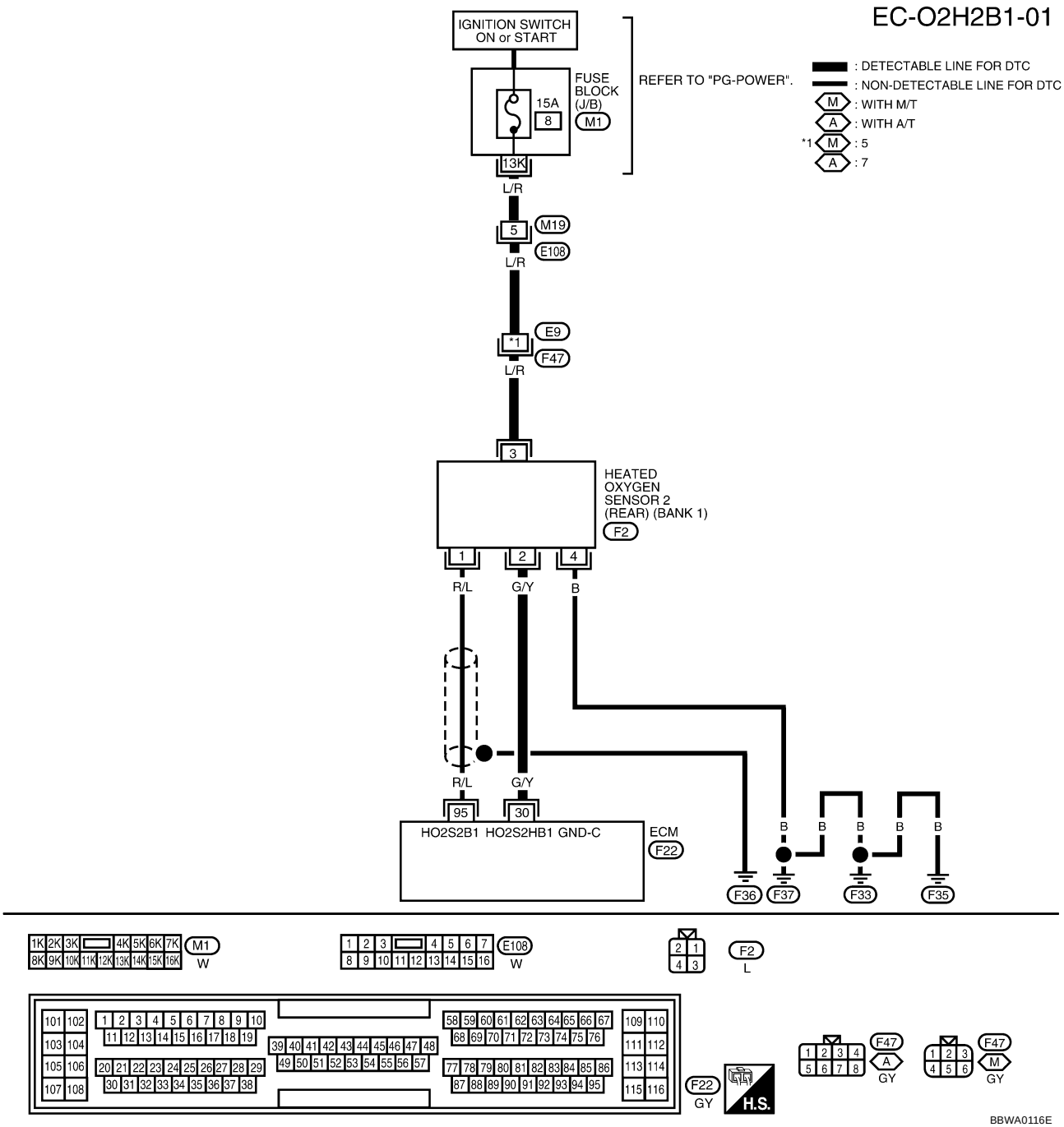
2. Stop vehicle and let engine idle for at least 6 seconds.
3. Turn ignition switch “OFF” and wait at least 10 seconds.
4. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
5. Stop vehicle and let engine idle for at least 6 seconds.
6. Select “MODE 3” with GST.
7. If DTC is detected, go to “Diagnostic Procedure”, EC-169, "Diagnostic Procedure" .

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

Wiring Diagram

UBS001DV

BANK 1

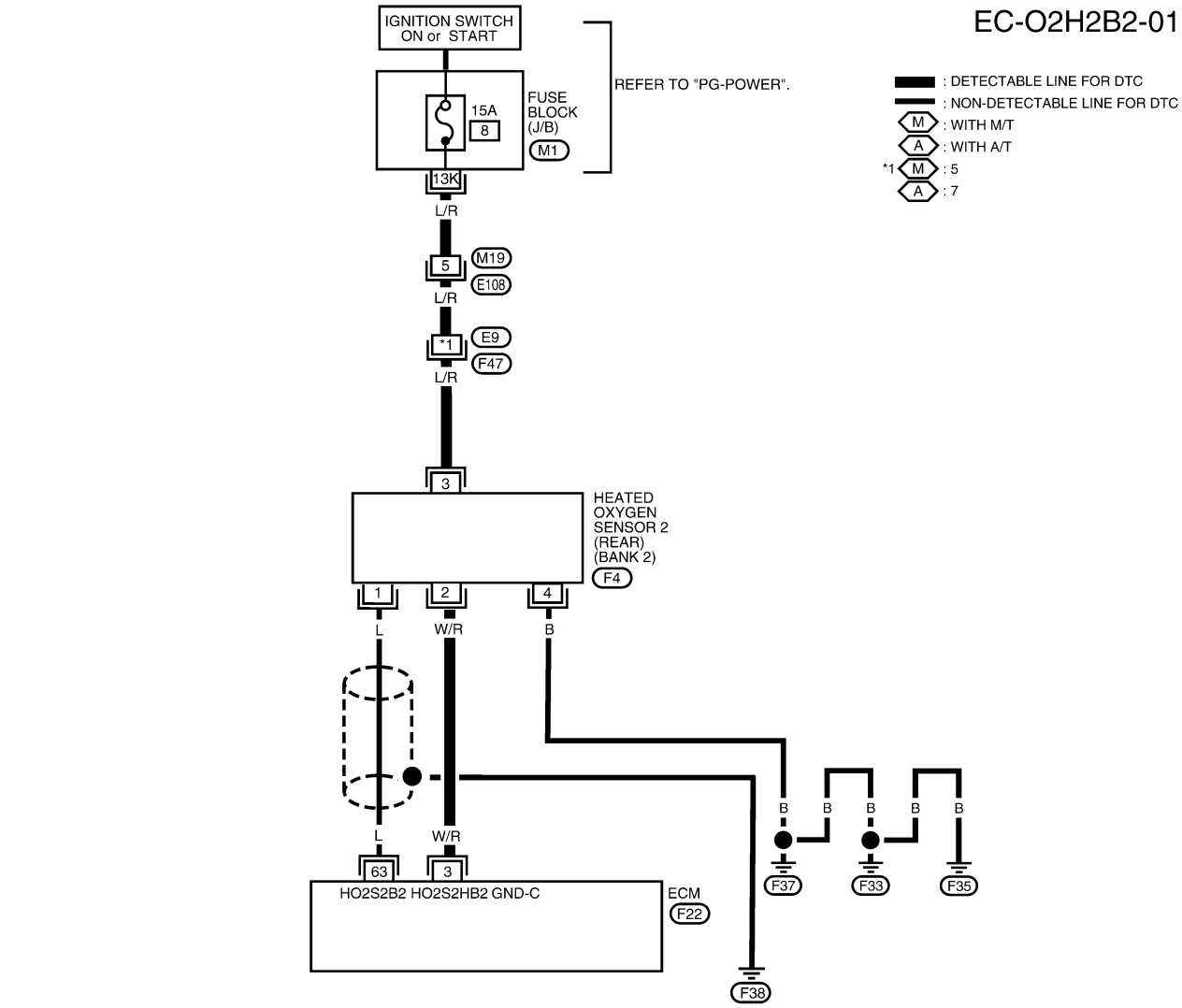


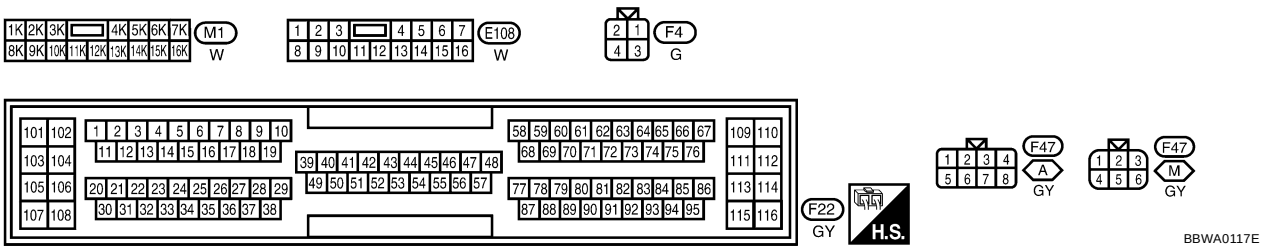
ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
30	G/Y	HEATED OXYGEN SENSOR 2 HEATER (REAR) (BANK 1)	IGN ON	BATTERY VOLTAGE
			ENGINE RUNNING ABOVE 3,600 RPM	
			ENGINE RUNNING BELOW 3,600 RPM AFTER DRIVING FOR 2 MINUTES AT A SPEED OF 70 KM/H (43 MPH) OR MORE	0 - 1.0V

WEC915

BANK 2





BBWA0117E

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
3	W/R	HEATED OXYGEN SENSOR 2 HEATER (REAR) (BANK 2)	IGN ON	BATTERY VOLTAGE
			ENGINE RUNNING ABOVE 3,600 RPM	
			ENGINE RUNNING BELOW 3,600 RPM AFTER DRIVING FOR 2 MINUTES AT A SPEED OF 70 KM/H (43 MPH) OR MORE	0 - 1.0V

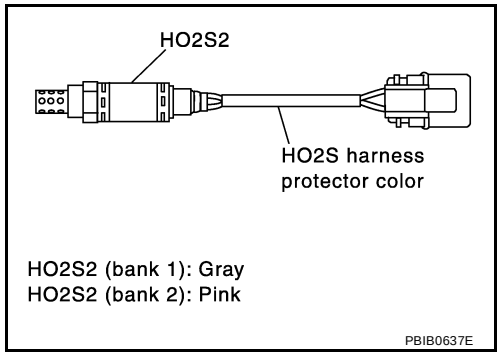
WEC909

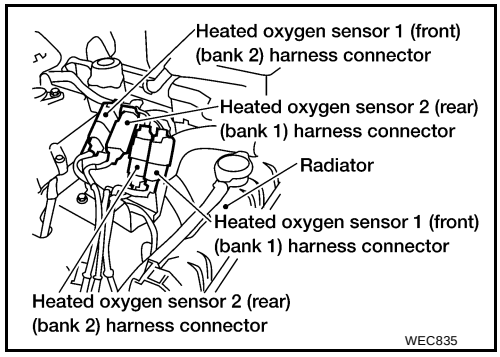
Diagnostic Procedure

UBS001DW

1. CHECK POWER SUPPLY

1. Turn ignition switch "OFF".
2. Check the HO2S2 harness protector color, and disconnect the corresponding heated oxygen sensor 2 harness connector.



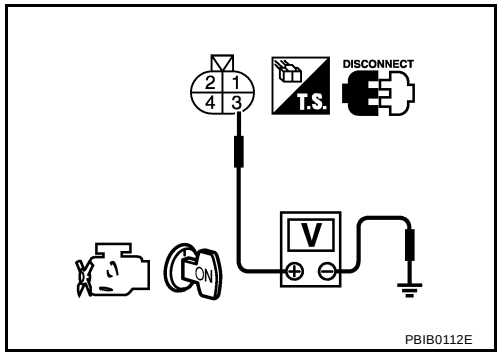


3. Turn ignition switch "ON".
4. Check voltage between HO2S2 terminal 3 and ground.

Voltage : Battery voltage

OK or NG

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



2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M19, E108
- Harness connectors E9, F47
- Fuse block (J/B) connector M1
- 15A fuse
- Harness for open or short between heated oxygen sensor 2 and fuse

>> Repair harness or connectors.

3. CHECK OUTPUT SIGNAL CIRCUIT

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

Continuity should exist.

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

OK or NG

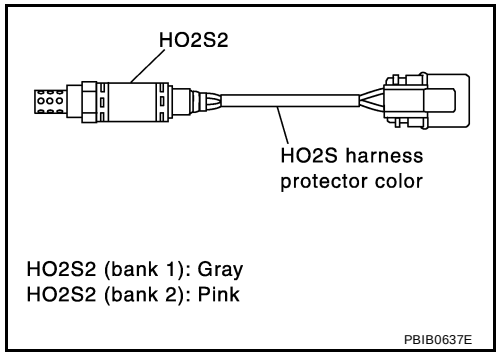
OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK HEATED OXYGEN SENSOR 2 HEATER

1. Turn ignition switch “OFF”.
2. Check the HO2S2 harness protector color, and disconnect the corresponding HO2S2 harness connector.
3. Check HO2S2 heater, refer to EC-170, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace corresponding heated oxygen sensor 2.



5. CHECK INTERMITTENT INCIDENT

Perform EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

UBS001DX

HEATED OXYGEN SENSOR 2 HEATER

Check the following.

1. Check resistance between terminals 2 and 3.

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

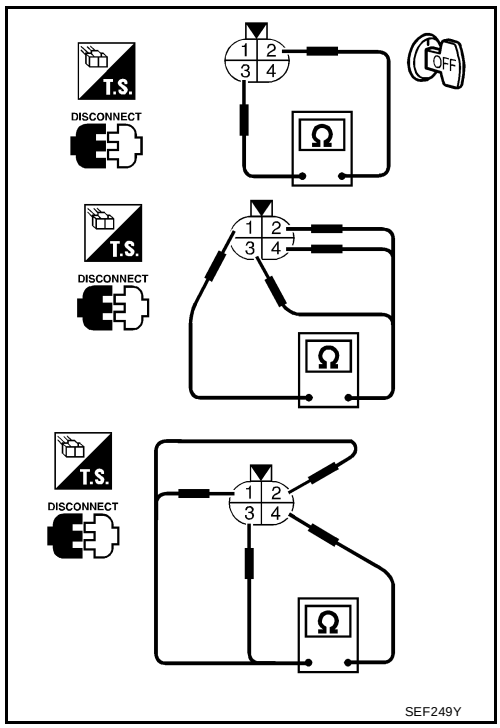
2. Check continuity.

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

If NG, replace the heated oxygen sensor 2.

CAUTION:

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



UBS001DY

Removal and Installation

HEATED OXYGEN SENSOR 2

Refer to EX-3, "Removal and Installation" .

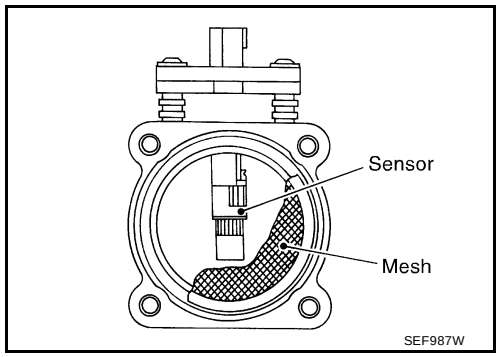
DTC P0101, P0102, P0103, P1102 MAF SENSOR

PFP:22680

Component Description

UBS001DZ

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

UBS001E0

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAS A/F SE-B1	● Engine: After warming up ● Air conditioner switch: “OFF” ● Shift lever: “N” ● No-load	Idle	1.0 - 1.7V
		2,500 rpm	1.5 - 2.4V
CAL/LD VALUE	● Engine: After warming up ● Air conditioner switch: “OFF” ● Shift lever: “N” ● No-load	Idle	20.0 - 35.5%
		2,500 rpm	12.0 - 27.0%
MASS AIRFLOW	● Engine: After warming up ● Air conditioner switch: “OFF” ● Shift lever: “N” ● No-load	Idle	1.4 - 4.0 g·m/s
		2,500 rpm	5.0 - 10.0 g·m/s

On Board Diagnosis Logic

UBS001E1

DTC No.		Malfunction is detected when ...	Check Items (Possible Cause)
P0103	A)	An excessively high voltage from the sensor is sent to ECM when engine is not running.	● Harness or connectors (The sensor circuit is open or shorted.) ● Mass air flow sensor
P0101	C)	A high voltage from the sensor is sent to ECM under light load driving condition.	
P1102	E)	A voltage from the sensor exists constantly approx. 1.0V when engine is running.	
P0102	B)	An excessively low voltage from the sensor is sent to ECM* when engine is running.	● Harness or connectors (The sensor circuit is open or shorted.) ● Intake air leaks ● Mass air flow sensor
P0101	D)	A low voltage from the sensor is sent to ECM under heavy load driving condition.	

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

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

DTC Confirmation Procedure

UBS001E2

If DTC P0101 is detected, perform “PROCEDURE FOR MALFUNCTION C” first. If there is no problem on “PROCEDURE FOR MALFUNCTION C”, perform “PROCEDURE FOR MALFUNCTION D”.

CAUTION:

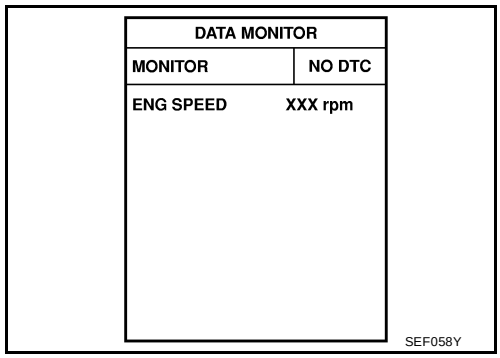
Always drive vehicle at a safe speed.

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 A

With CONSULT-II

1. Turn ignition switch “ON”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 6 seconds.
4. If 1st trip DTC is detected, go to EC-176, "Diagnostic Procedure"
   .
   If DTC is not detected, go to next step.
5. Start engine.
6. Wait at least 6 seconds.
7. If 1st trip DTC is detected, go to EC-176, "Diagnostic Procedure"
   .



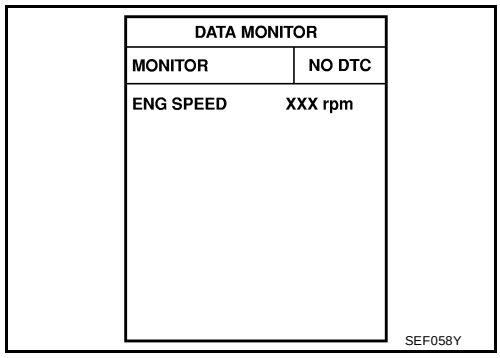
With GST

Follow the procedure “With CONSULT-II” above.

PROCEDURE FOR MALFUNCTION B AND E

With CONSULT-II

1. Turn ignition switch “ON”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and wait 5 seconds at most.
4. If 1st trip DTC is detected, go to EC-176, "Diagnostic Procedure"
   .



With GST

Follow the procedure “With CONSULT-II” above.

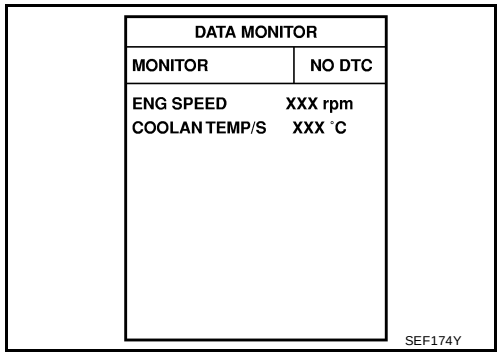
NOTE:
If 1st trip DTC is confirmed after more than 5 seconds, there may be Malfunction C.

PROCEDURE FOR MALFUNCTION C

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

With CONSULT-II

1. Turn ignition switch “ON”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and warm it up to normal operating temperature.
4. Run engine for at least 10 seconds at idle speed.
5. If 1st trip DTC is detected, go to EC-176, "Diagnostic Procedure"
   .



With GST

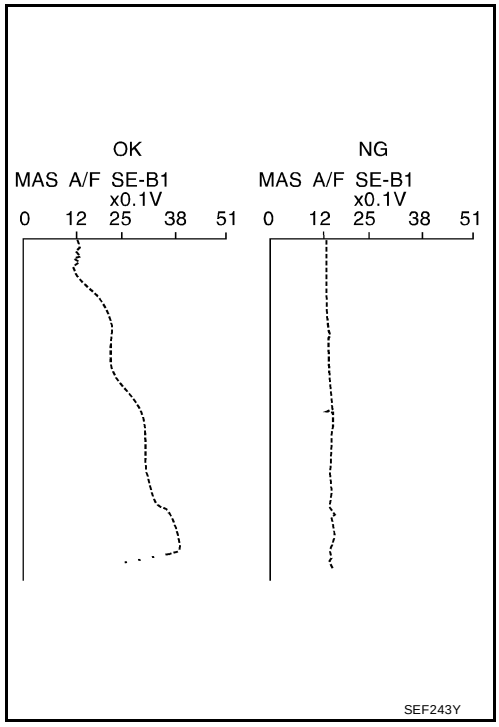
Follow the procedure “With CONSULT-II” above.

PROCEDURE FOR MALFUNCTION D

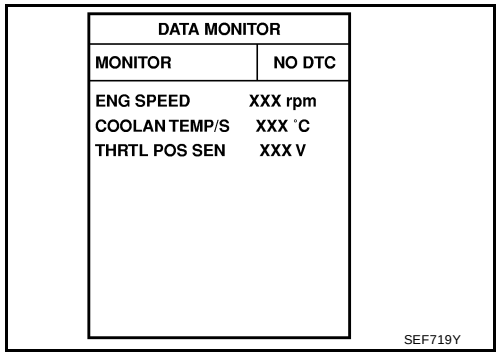
With CONSULT-II

1. Turn ignition switch “ON”.
2. Start engine and warm it up to normal operating temperature.
   If engine cannot be started, go to EC-176, "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-176, "Diagnostic Procedure" .
   If OK, go to following step.
7. Maintain the following conditions for at least 10 consecutive seconds.

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



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



Overall Function Check

UBS001E3

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

PROCEDURE FOR MALFUNCTION D

With GST

1. Turn ignition switch “ON”.
2. Start engine and warm it up to normal operating temperature.

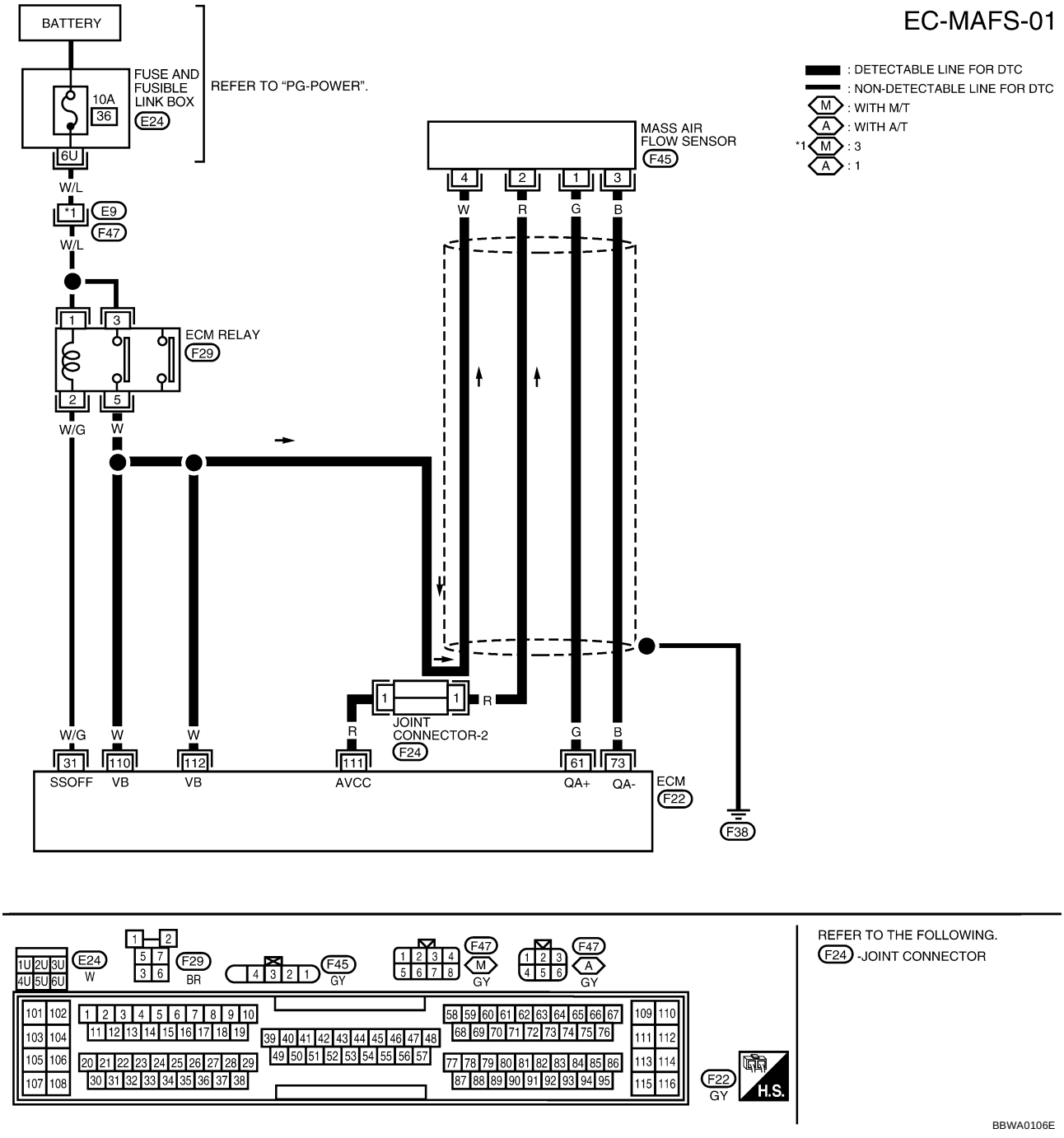
3. Select “MODE 1” with GST.
4. Check the mass air flow sensor signal with “MODE 1”.
5. Check for linear mass air flow rise in response to increases to about 4,000 rpm in engine speed.
6. If NG, go to EC-176, "Diagnostic Procedure" .

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

SEF534P

Wiring Diagram

UBS001E4



REFER TO THE FOLLOWING.
F24 -JOINT CONNECTOR

BBWA0106E

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
61	G	MASS AIR FLOW SENSOR	ENGINE RUNNING AT IDLE SPEED UNDER WARM-UP CONDITION	1.3 - 1.7V
			ENGINE RUNNING AT 2,500 RPM UNDER WARM-UP CONDITION	1.8 - 2.4V
73	B	MASS AIR FLOW SENSOR GROUND	ENGINE RUNNING AT IDLE SPEED UNDER WARM-UP CONDITION	APPROX. 0V
111	R	SENSOR'S POWER SUPPLY	IGN ON	APPROX. 5V

SEF564Y

Diagnostic Procedure

UBS001E5

1. INSPECTION START

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

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

Type I or Type II

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

2. CHECK INTAKE SYSTEM

Check the following connections.

- Air duct
- Vacuum hoses
- Intake air passage between air duct to collector

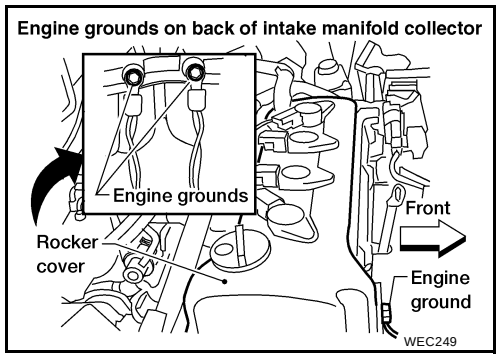
OK or NG

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

3. RETIGHTEN GROUND SCREWS

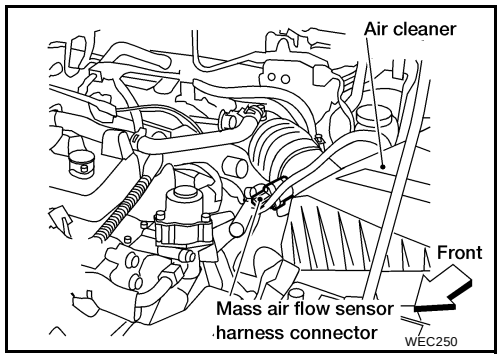
1. Turn ignition switch "OFF".
2. Loosen and retighten engine ground screws.

>> GO TO 4.



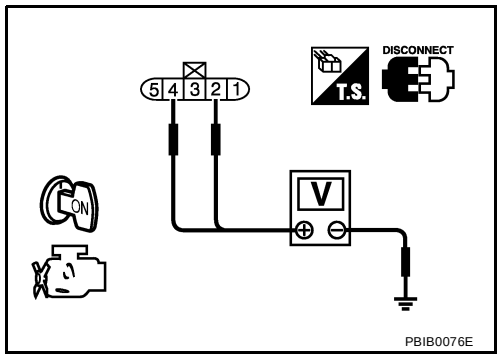
4. CHECK POWER SUPPLY

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



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

Terminal	Voltage
2	Approximately 5
4	Battery voltage



OK or NG

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

5. DETECT MALFUNCTIONING PART

Check the following.

- Joint connector-2
- Harness for open or short between ECM relay and mass air flow sensor
- Harness for open or short between mass air flow sensor and ECM

>> Repair harness or connectors.

6. CHECK GROUND CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between MAFS terminal 3 and ECM terminal 73.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to power.

OK or NG

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

7. CHECK INPUT SIGNAL CIRCUIT

1. Check harness continuity between MAFS terminal 1 and ECM terminal 61.
   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-179, "Component Inspection" .

OK or NG

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

9. CHECK INTERMITTENT INCIDENT

Perform EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

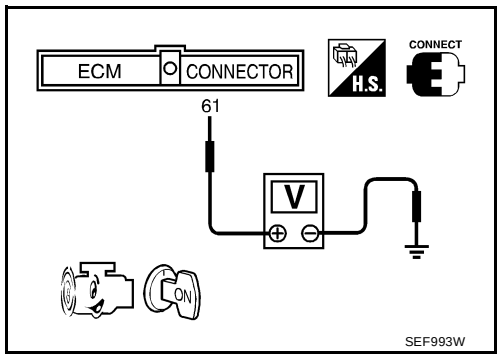
UBS001E6

MASS AIR FLOW SENSOR

1. Turn ignition switch “ON”.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 61 (Mass air flow sensor signal) and ground.

Conditions	Voltage V
Ignition switch “ON” (Engine stopped.)	Less than 1.0
Idle (Engine is warmed-up to normal operating temperature.)	1.0 - 1.7
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.5 - 2.4
Idle to about 4,000 rpm*	1.3 - 1.7 to Approx. 3.6

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



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

Removal and Installation

UBS001E7

MASS AIR FLOW SENSOR

Refer to EM-15, "Removal and Installation" .

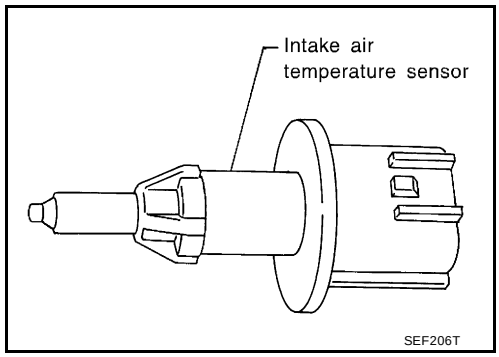
DTC P0112, P0113, P0127 IAT SENSOR

PFP:22630

Component Description

UBS001E8

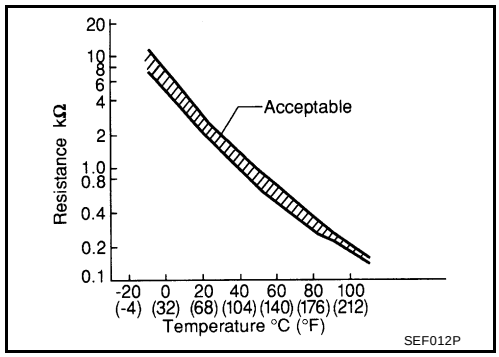
The intake air temperature sensor is mounted to the air duct housing. The sensor detects intake air temperature and transmits a signal to the ECM.
The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response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



<Reference data>

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

*: These data are reference values and are measured between ECM terminal 64 (Intake air temperature sensor) and ground.



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

On Board Diagnosis Logic

UBS001E9

DTC No.		Malfunction is detected when ...	Check Items (Possible Cause)
P0112 P0113	A)	An excessively low (P0112) or high (P0113) voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Intake air temperature sensor
P0127	B)	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signal from engine coolant temperature sensor.	

DTC Confirmation Procedure

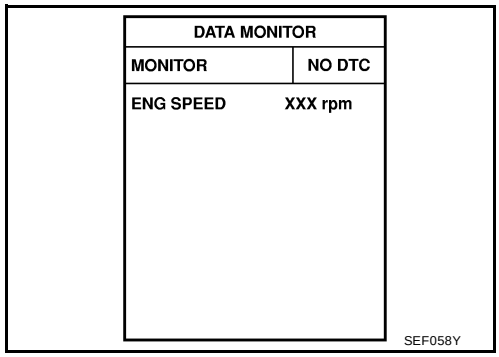
UBS001EA

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

PROCEDURE FOR MALFUNCTION A

With CONSULT-II

1. Turn ignition switch “ON”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-183, "Diagnostic Procedure"
.



With GST

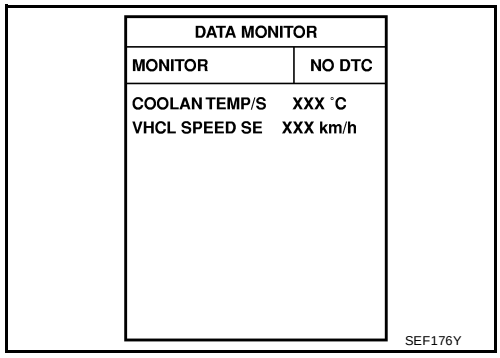
Follow the procedure “With CONSULT-II” above.

PROCEDURE FOR MALFUNCTION B

CAUTION:
Always drive vehicle at a safe speed.
TESTING CONDITION:
This test may be conducted in the shop with the drive wheels lifted or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

With CONSULT-II

1. Wait until engine coolant temperature is less than 90°C (194°F).
   - Turn ignition switch “ON”.
   - Select “DATA MONITOR” mode with CONSULT-II.
   - Check the engine coolant temperature.
   - If the engine coolant temperature is not less than 90°C (194°F), turn ignition switch “OFF” and cool down engine.
   - Perform the following steps before engine coolant temperature is above 90°C (194°F).
2. Turn ignition switch “ON”.
3. Select “DATA MONITOR” mode with CONSULT-II.
4. Start engine.
5. Hold vehicle speed more than 70 km/h (43 MPH) for 105 consecutive seconds.
6. If 1st trip DTC is detected, go to EC-183, "Diagnostic Procedure" .



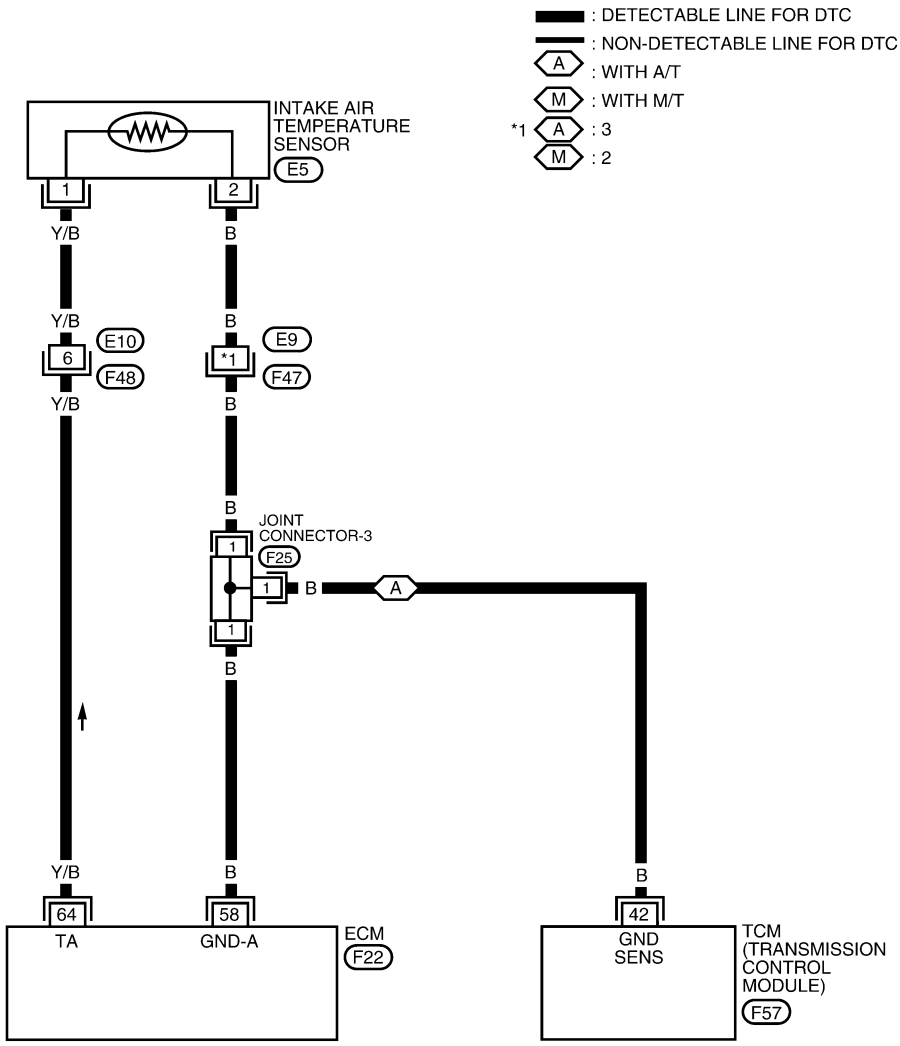
With GST

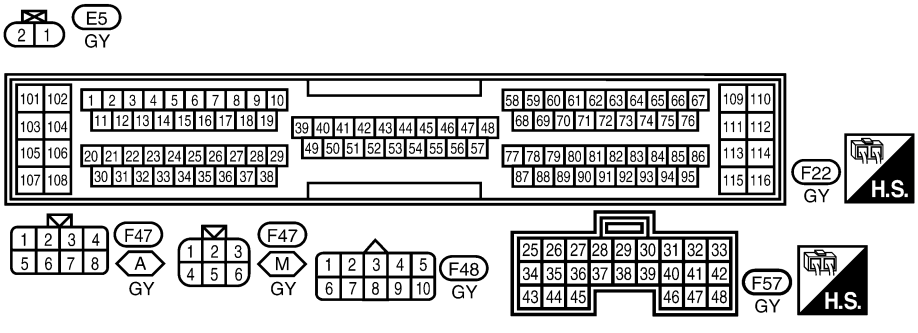
Follow the procedure “With CONSULT-II” above.

Wiring Diagram

UBS001EB

EC-IATS-01





REFER TO THE FOLLOWING.
F25 - JOINT CONNECTOR

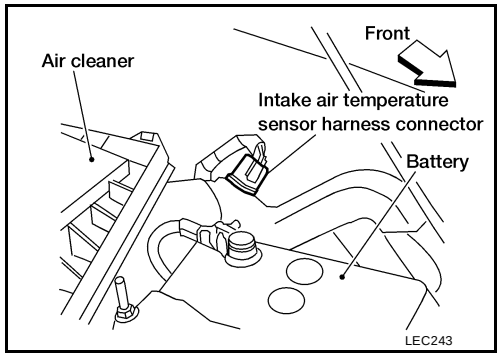
BBWA0107E

Diagnostic Procedure

UBS001EC

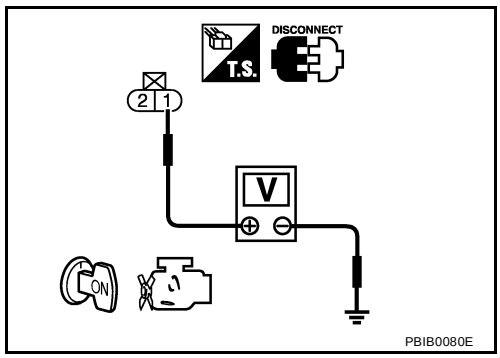
1. CHECK POWER SUPPLY

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



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

Voltage : Approximately 5V



OK or NG

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

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E10, F48
- Harness for open or short between ECM and intake air temperature sensor

>> Repair harness or connectors.

3. CHECK GROUND CIRCUIT

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

Continuity should exist.

3. Also check harness for short to power.

OK or NG

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

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E9, F47
- Joint connector-3
- Harness for open or short between ECM and intake air temperature sensor
- Harness for open or short between TCM (Transmission control module) and air intake temperature sensor

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

5. CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-185, "Component Inspection" .

OK or NG

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

6. CHECK INTERMITTENT INCIDENT

Perform EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

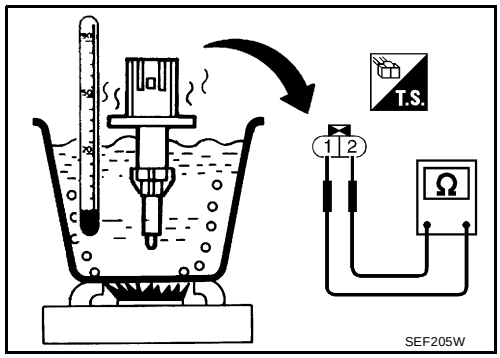
>> **INSPECTION END**

Component Inspection

UBS001ED

INTAKE AIR TEMPERATURE SENSOR

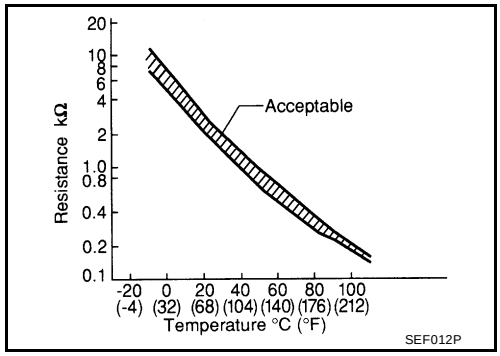
Check resistance as shown in the figure.



<Reference data>

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

If NG, replace intake air temperature sensor.



Removal and Installation

UBS001EE

INTAKE AIR TEMPERATURE SENSOR

Refer to EM-15, "Removal and Installation" .

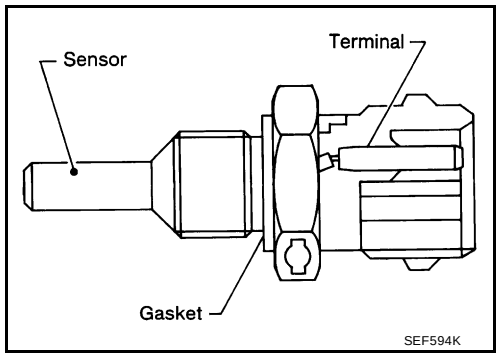
DTC P0117, P0118 ECT SENSOR

PFP:22630

Component Description

UBS001EF

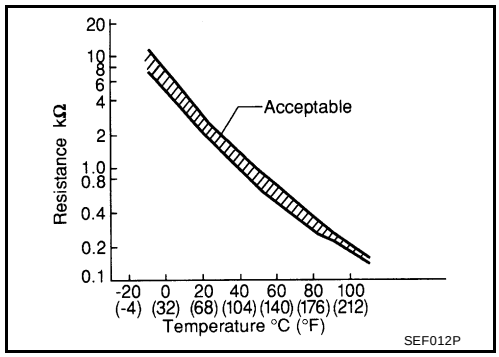
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The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



<Reference data>

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

*: These data are reference values and are measured between ECM terminal 70 (Engine coolant temperature sensor) and ground.



CAUTION:

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

CONSULT-II Reference Value in Data Monitor Mode

UBS001EG

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

On Board Diagnosis Logic

UBS001EH

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0117 P0118	● An excessively low (P0117) or high (P0118) voltage from the sensor is sent to ECM.*	● Harness or connectors (The sensor circuit is open or shorted.) ● Engine coolant temperature sensor

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

Detected items	Engine operating condition in fail-safe mode	
Engine coolant temperature sensor circuit	Engine coolant temperature will be determined by ECM based on the time after turning ignition switch “ON” or “START”. CONSULT-II displays the engine coolant temperature decided by ECM.	
	Condition	Engine coolant temperature decided (CONSULT-II display)
	Just as ignition switch is turned ON or Start	40°C (104°F)
	More than approx. 4 minutes after ignition ON or Start	80°C (176°F)
	Except as shown above	40 - 80°C (104 - 176°F) (Depends on the time)
	When the fail-safe system for engine coolant temperature sensor is activated, the cooling fan operates while the engine is running.	

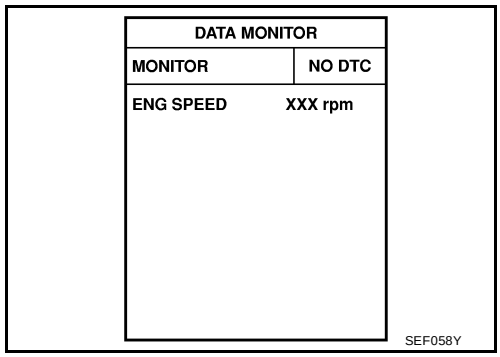
DTC Confirmation Procedure

UBS001EI

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-189, "Diagnostic Procedure"
.



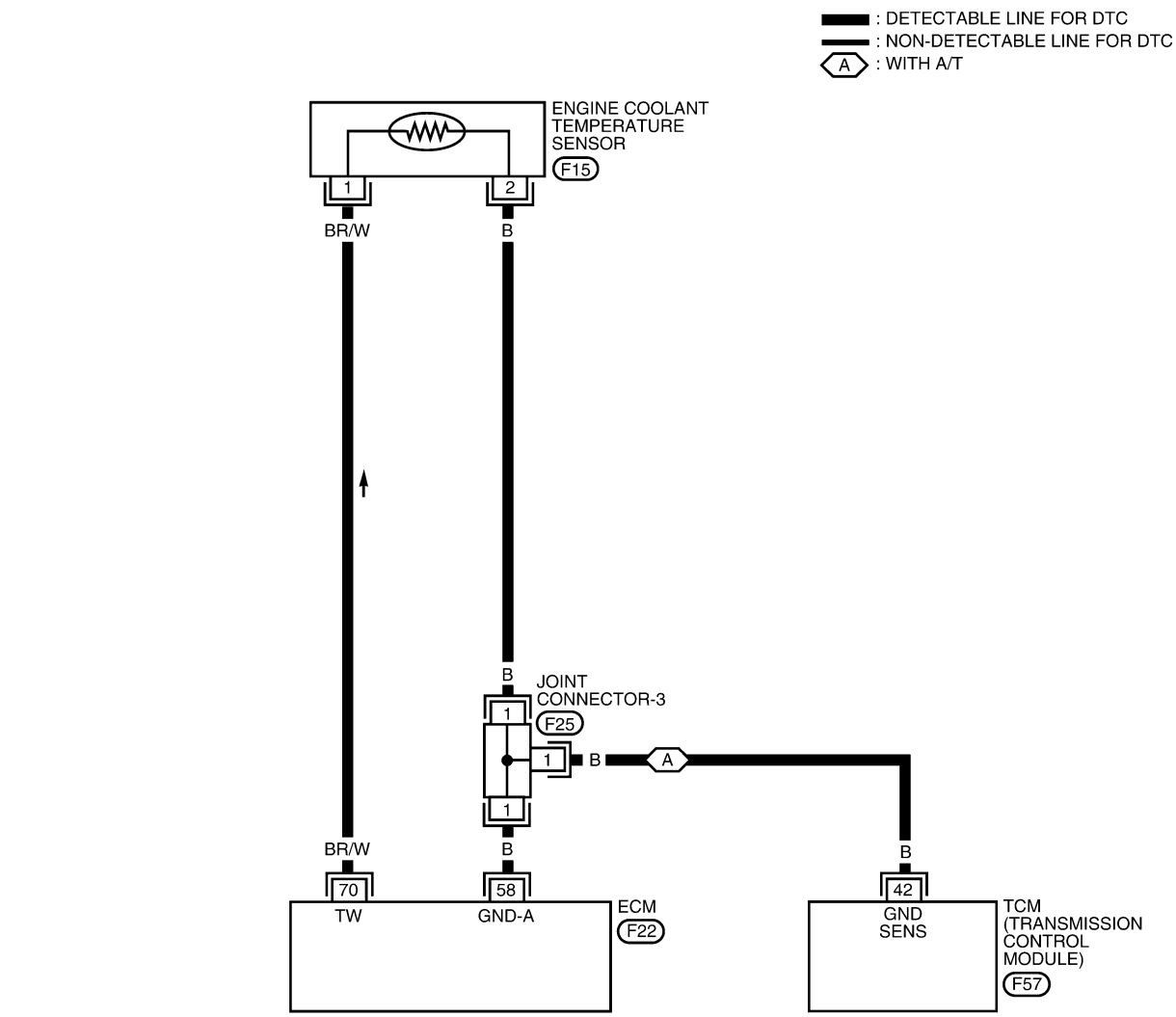
WITH GST

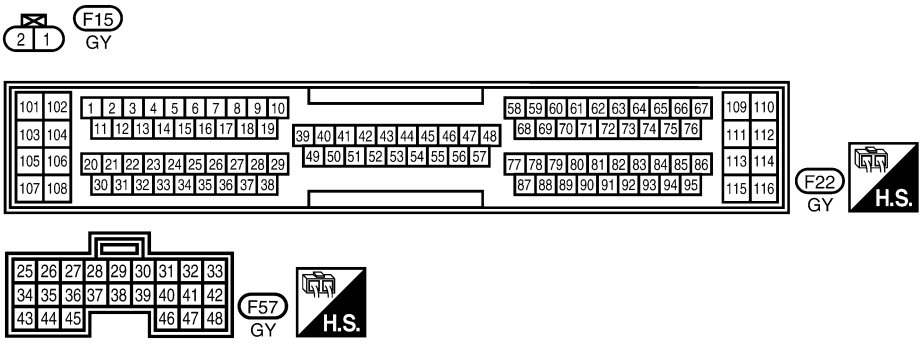
Follow the procedure “With CONSULT-II” above.

Wiring Diagram

UBS001EJ

EC-ECTS-01





REFER TO THE FOLLOWING.
F25 - JOINT CONNECTOR

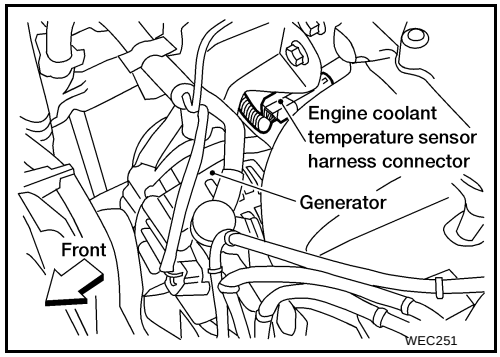
BBWA0108E

Diagnostic Procedure

UBS001EK

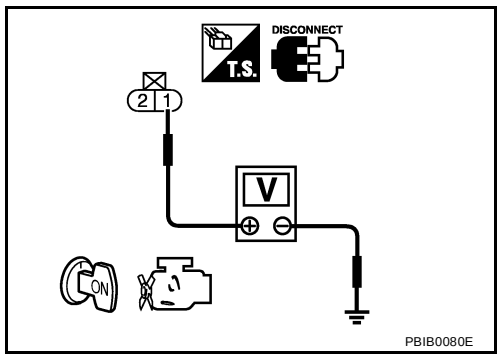
1. CHECK POWER SUPPLY

1. Turn ignition switch “OFF”.
2. Disconnect engine coolant temperature sensor (ECTS) harness connector.
3. Turn ignition switch “ON”.



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

Voltage: Approximately 5V



OK or NG

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

2. DETECT MALFUNCTIONING PART

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

>> Repair harness or connectors.

3. CHECK GROUND CIRCUIT

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

Continuity should exist.

3. Also check harness for short to power.

OK or NG

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

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between ECM and engine coolant temperature sensor
- Harness for open or short between TCM (Transmission control module) and engine coolant temperature sensor.
- Joint connector-3

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

5. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-190, "Component Inspection" .

OK or NG

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

6. CHECK INTERMITTENT INCIDENT

Perform EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

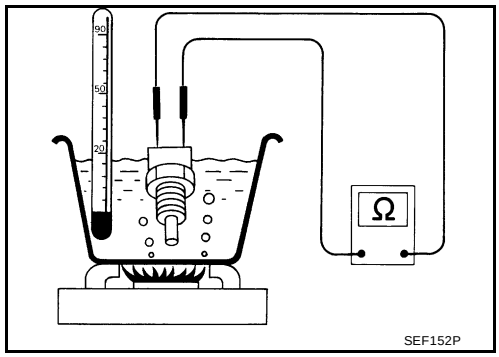
>> **INSPECTION END**

Component Inspection

UBS001EL

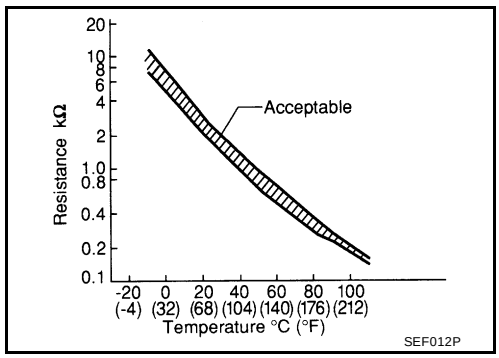
ENGINE COOLANT TEMPERATURE SENSOR

Check resistance as shown in the figure.



<Reference data>

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260



If NG, replace engine coolant temperature sensor.

Removal and Installation

UBS001EM

ENGINE COOLANT TEMPERATURE SENSOR

Refer to EM-15, "OUTER COMPONENT PARTS" .

DTC P0121, P0122, P0123 TP SENSOR

PFP:16119

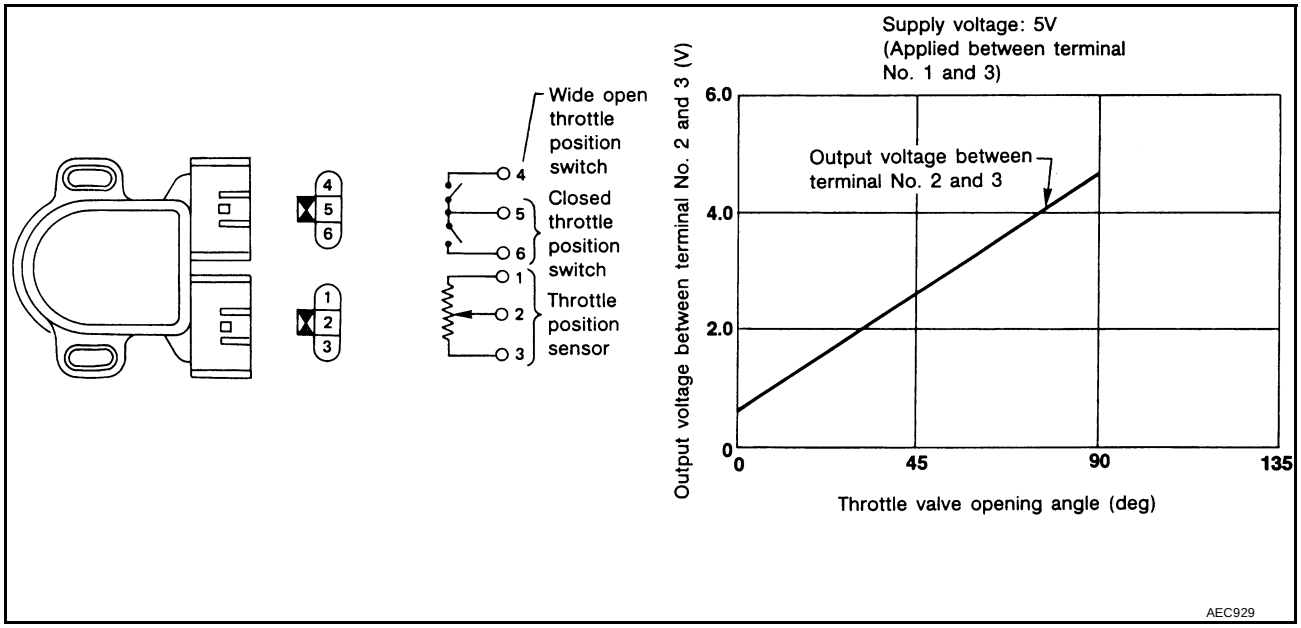
Component Description

UBS001EN

NOTE:
If DTC P0121, P0122 or P0123 is displayed with DTC P0510, first perform trouble diagnosis for DTC P0510, EC-428 .

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

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



CONSULT-II Reference Value in Data Monitor Mode

UBS001EO

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
THRTL POS SEN	● Engine: After warming up, idle the engine	Throttle valve: fully closed	0.15 - 0.85V
	● Engine: After warming up ● Ignition switch: ON (Engine stopped)	Throttle valve: fully opened	3.5 - 4.7V
ABSOL TH·P/S	● Engine: After warming up, idle the engine	Throttle valve: fully closed	0.0°
	● Engine: After warming up ● Ignition switch: ON (Engine stopped)	Throttle valve: fully opened	Approx. 88.0%

On Board Diagnosis Logic

UBS001EP

DTC No.		Malfunction is detected when ...	Check Items (Possible Cause)
P0122 P0123	A)	An excessively low (P0122) or high (P0123) voltage from the sensor is sent to ECM.*	● Harness or connectors (The throttle position sensor circuit is open or shorted.) ● Throttle position sensor
P0121	B)	A high voltage from the sensor is sent to ECM under light load driving condition.	● Harness or connectors (The throttle position sensor circuit is open or shorted.) ● Throttle position sensor ● Fuel injector ● Camshaft position sensor (PHASE) ● Mass air flow sensor
	C)	A low voltage from the sensor is sent to ECM under heavy load driving condition.	● Harness or connectors (The throttle position sensor circuit is open or shorted.) ● Intake air leaks ● Throttle position sensor

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

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

DTC Confirmation Procedure

UBS001EQ

If DTC P0121 is detected, perform “PROCEDURE FOR MALFUNCTION B” first. If there is no problem 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

CAUTION:
Always drive vehicle at a safe speed.
TESTING CONDITION:

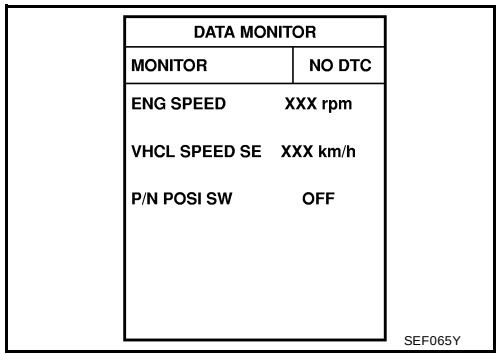
- **Before performing the following procedure, confirm that battery voltage is more than 10V at idle.**
- **This test may be conducted in the shop with the drive wheels lifted or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.**

With CONSULT-II

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

VHCL SPEED SE	More than 4 km/h (2 MPH)
Selector lever	Suitable position except “P” or “N” position

3. If 1st trip DTC is detected, go to EC-196, "Diagnostic Procedure".



With GST

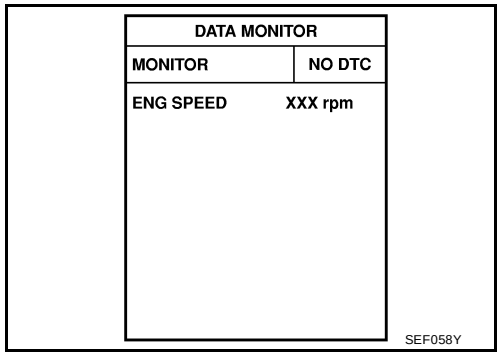
Follow the procedure “With CONSULT-II” above.

PROCEDURE FOR MALFUNCTION B

With CONSULT-II

1. Turn ignition switch “ON”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 10 seconds.
   If idle speed is over 1,000 rpm, maintain the following conditions for at least 10 seconds to keep engine speed below 1,000 rpm.

A/T model	Selector lever	Suitable position except “P” or “N” position
	Brake pedal	Depressed
	Vehicle speed	0 km/h (0 MPH)
M/T model	Selector lever	Suitable position except “N” (Higher gear position such as 3rd or 4th is better to keep low engine rpm.)
	Accelerator pedal	Released
	Vehicle speed	As slow as possible



4. If 1st trip DTC is detected, go to EC-196, "Diagnostic Procedure" .

With GST

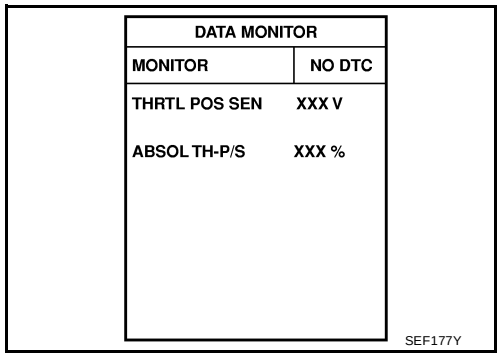
Follow the procedure “With CONSULT-II” above.

PROCEDURE FOR MALFUNCTION C

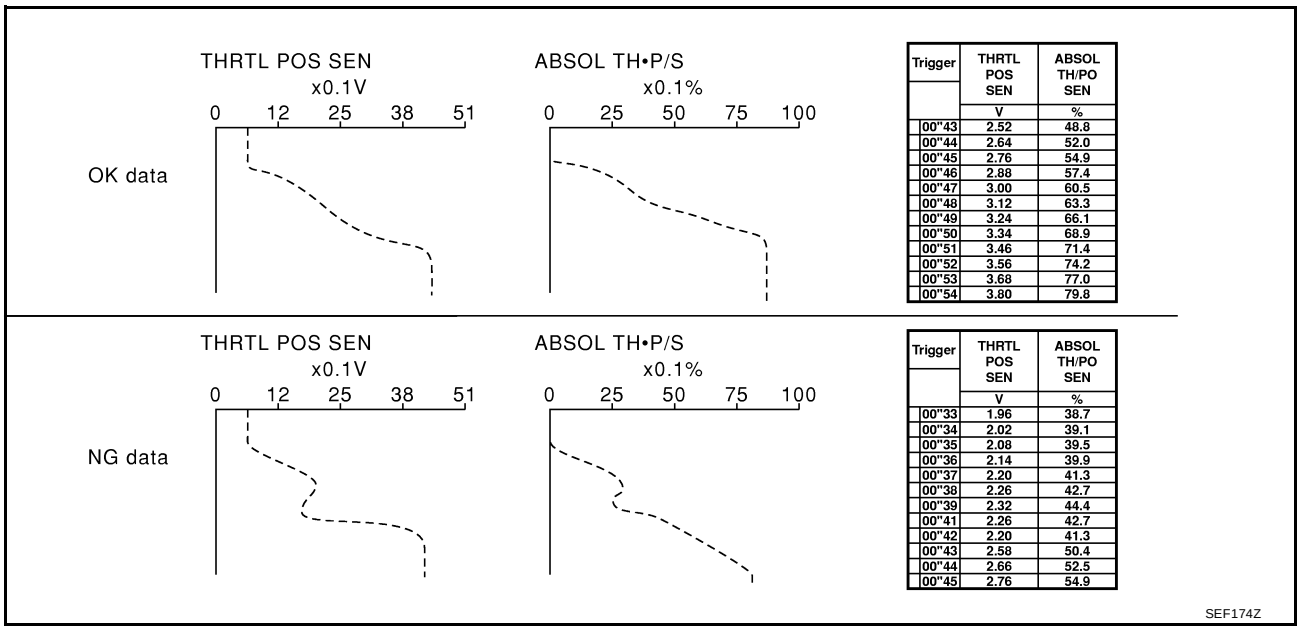
CAUTION:
Always drive vehicle at a safe speed.

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Turn ignition switch “ON”.
4. Select “MANU TRIG” in “DATA MONITOR” mode with CONSULT-II.
5. Select “THRTL POS SEN” and “ABSOL TH·P/S” in “DATA MONITOR” mode with CONSULT-II.
6. Press RECORD on CONSULT-II SCREEN at the same time accelerator pedal is depressed.



7. Print out the recorded graph and check the following:

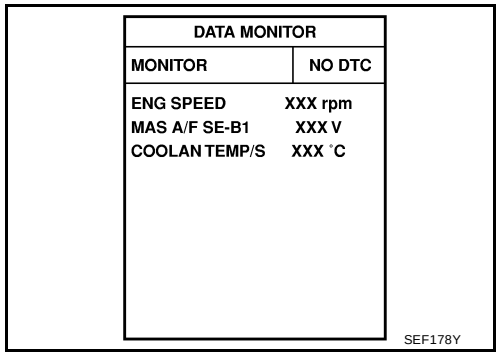


Trigger	THRTL POS SEN	ABSOL TH/PO SEN
	V	%
00"43	2.52	48.8
00"44	2.64	52.0
00"45	2.76	54.9
00"46	2.88	57.4
00"47	3.00	60.5
00"48	3.12	63.3
00"49	3.24	66.1
00"50	3.34	68.9
00"51	3.46	71.4
00"52	3.56	74.2
00"53	3.68	77.0
00"54	3.80	79.8

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

- The voltage rise is linear in response to accelerator pedal depression.
- The voltage when accelerator pedal is fully depressed is approximately 4V.
  If NG, go to EC-196, "Diagnostic Procedure" .
  If OK, go to following step.

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

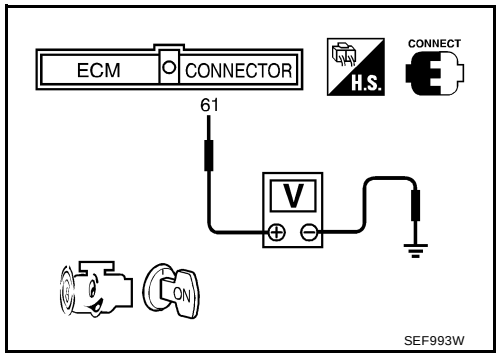


ENG SPEED	More than 2,000 rpm
MAS AIR/FL SE	More than 3V
COOLAN TEMP/S	More than 70°C (158°F)
Selector lever	Suitable position
Driving location	Driving vehicle uphill (Increased engine load) will help maintain the driving conditions required for this test.

10. If 1st trip DTC is detected, go to EC-196, "Diagnostic Procedure" .

With GST

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



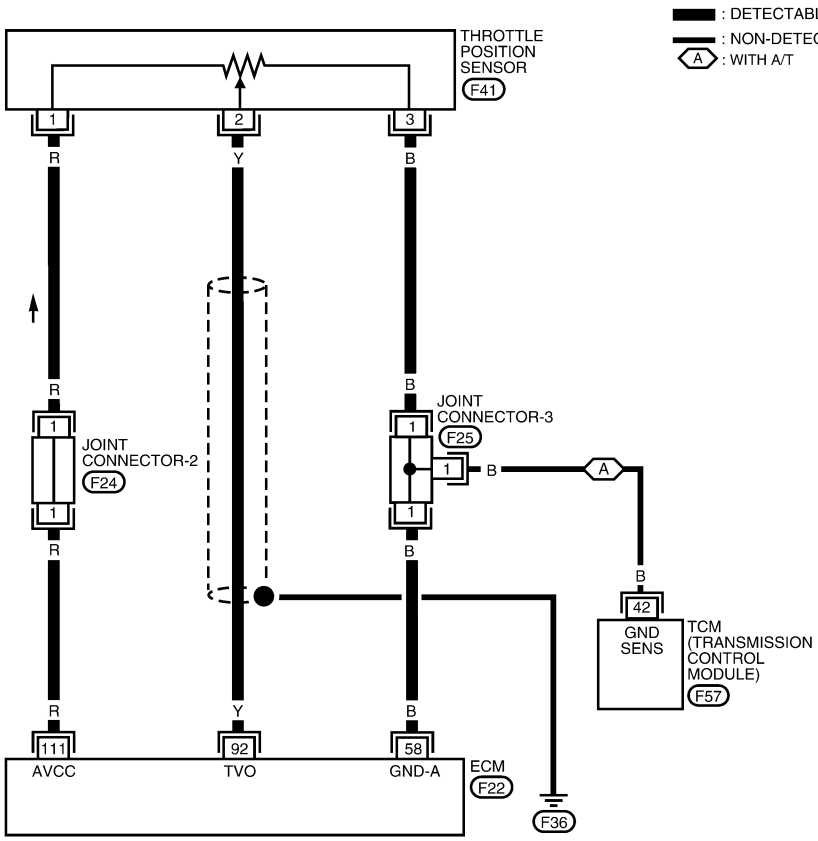
Gear position	Suitable position
Engine speed	More than 2,000 rpm
Engine coolant temperature	More than 70°C (158°F)
Voltage between ECM terminal 61 (Mass air flow sensor signal) and ground	More than 3V

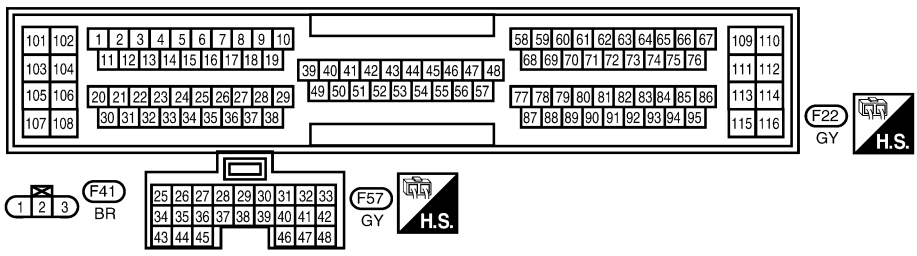
2. If 1st trip DTC is detected, go to EC-196, "Diagnostic Procedure" .

Wiring Diagram

UBS001ER

EC-TPS-01





REFER TO THE FOLLOWING.
F24 , F25 - JOINT CONNECTOR

BBWA0109E

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
58	B	SENSOR'S GROUND	IGN ON	APPROX. 0V
92	Y	THROTTLE POSITION SENSOR	ENGINE RUNNING UNDER WARM-UP CONDITION WITH ACCELERATOR PEDAL FULLY RELEASED	0.15 - 0.85V
			IGN ON WITH ACCELERATOR PEDAL FULLY DEPRESSED	3.5 - 4.7V
111	R	SENSOR'S POWER SUPPLY	IGN ON	APPROX. 5V

SEF175ZA

Diagnostic Procedure

UBS001ES

1. INSPECTION START

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

MALFUNCTION	Type
A	A
B	B
C	C

Type A, B or C

Type A or B>>GO TO 4.
Type C >> GO TO 2.

2. ADJUST THROTTLE POSITION SENSOR

Perform EC-87, "Basic Inspection" .

OK or NG

OK >> GO TO 3.

3. CHECK INTAKE SYSTEM

Check the following connections.

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

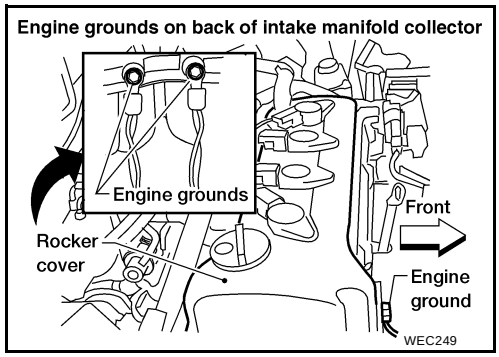
OK or NG

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

4. RETIGHTEN GROUND SCREWS

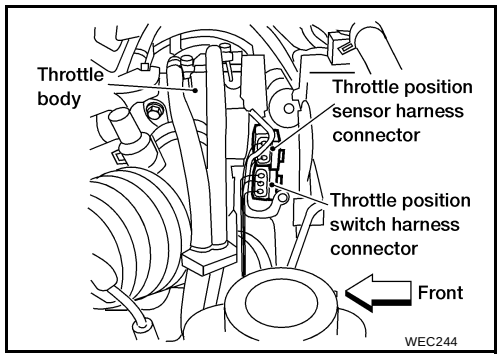
1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

>> GO TO 5.



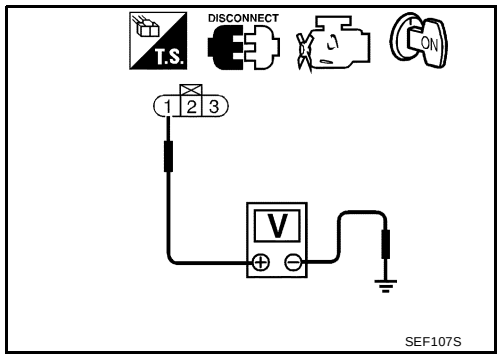
5. CHECK POWER SUPPLY

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



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

Voltage: Approximately 5V



OK or NG

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

6. DETECT MALFUNCTIONING PARTS

Check the following.

- Joint connector-2
- Harness for open or short between throttle position sensor and ECM

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

7. CHECK GROUND CIRCUIT

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

Continuity should exist.

3. Also check harness for short to power.

OK or NG

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

8. DETECT MALFUNCTIONING PART

Check the following.

- Joint connector-3
- Harness for open or short between ECM and throttle position sensor
- Harness for open or short between TCM (Transmission control module) and throttle position sensor

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

9. CHECK INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 92 and throttle position sensor terminal 2. Refer to the Wiring Diagram.

Continuity should exist.

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

OK or NG

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

10. CHECK THROTTLE POSITION SENSOR

Refer to EC-199, "Component Inspection" .

OK or NG

OK (Type B in step1)>>GO TO 11.
OK (Type A or C in step1)>>GO TO 14.
NG >> Replace throttle position sensor. To adjust it, perform EC-87, "Basic Inspection" .

11. CHECK MASS AIR FLOW SENSOR

Refer to EC-179, "Component Inspection" .

OK or NG

OK >> GO TO 12.
NG >> Replace mass air flow sensor.

12. CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-311, "Component Inspection" .

OK or NG

OK >> GO TO 13.
NG >> Replace camshaft position sensor (PHASE).

13. CHECK FUEL INJECTOR

Refer to EC-549, "Component Inspection" .

OK or NG

OK >> GO TO 14.
NG >> Replace fuel injector.

14. CHECK INTERMITTENT INCIDENT

Perform EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

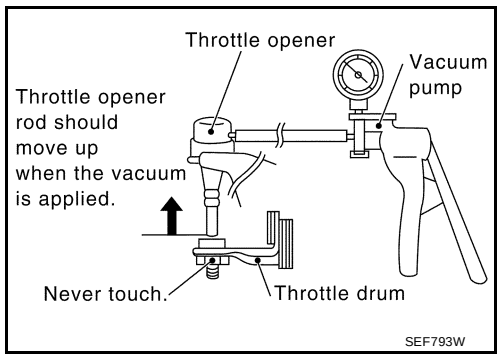
Component Inspection

UBS001ET

THROTTLE POSITION SENSOR

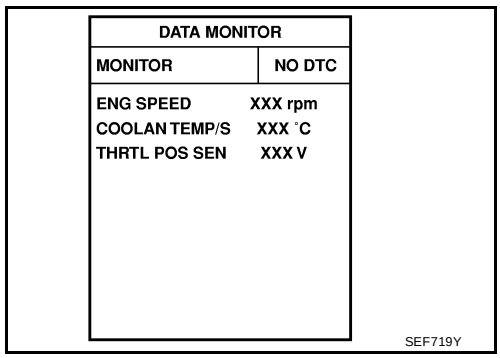
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine (ignition switch OFF).
3. Remove the vacuum hose connected to the throttle opener.
4. Connect suitable vacuum hose to the vacuum pump and the opener.
5. Apply vacuum [more than –40.0 kPa (–300 mmHg, –11.81 inHg)] until the throttle drum becomes free from the rod of the throttle opener.
6. Turn ignition switch ON.



7. Select “DATA MONITOR” mode with CONSULT-II.
8. Check voltage of “THRTL POS SEN” under the following conditions.

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



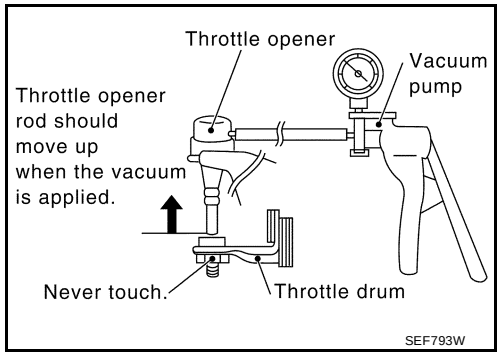
Throttle valve conditions	Voltage V
Completely closed	0.15 - 0.85 (a)
Partially open	Between (a) and (b)
Completely open	3.5 - 4.7 (b)

   If NG, adjust closed throttle position switch. Refer to EC-87, "Basic Inspection" .

9. If it is impossible to adjust closed throttle position switch in “Basic Inspection”, replace throttle position sensor.

Without CONSULT-II

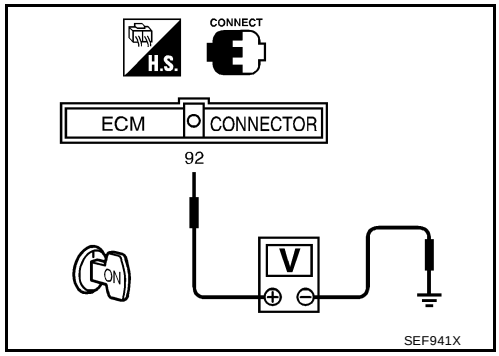
1. Start engine and warm it up to normal operating temperature.
2. Stop engine (ignition switch OFF).
3. Remove the vacuum hose connected to the throttle opener.
4. Connect suitable vacuum hose to the vacuum pump and the opener.
5. Apply vacuum [more than –40.0 kPa (–300 mmHg, –11.81 inHg)] until the throttle drum becomes free from the rod of the throttle opener.
6. Turn ignition switch ON.



7. Check voltage between ECM terminal 92 (Throttle position sensor signal) and ground under the following conditions.

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

Throttle valve conditions	Voltage V
Completely closed	0.15 - 0.85 (a)
Partially open	Between (a) and (b)
Completely open	3.5 - 4.7 (b)



   If NG, adjust closed throttle position switch. Refer to EC-87, "Basic Inspection" .

8. If it is impossible to adjust closed throttle position switch in “Basic Inspection”, replace throttle position sensor.

Removal and Installation

UBS001EU

THROTTLE POSITION SENSOR

Refer to EM-15, "OUTER COMPONENT PARTS" .

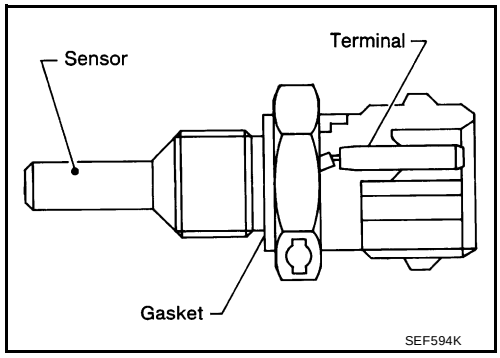
DTC P0125 ECT SENSOR

PFP:22630

Component Description

UBS001EV

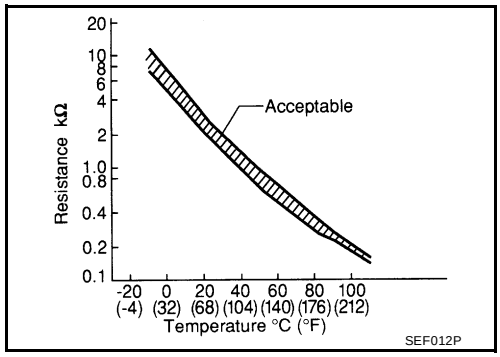
NOTE:
If DTC P0125 is displayed with P0117 or P0118, first perform trouble diagnosis for DTC P0117 or P0118, EC-186 .
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



<Reference data>

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

*: These data are reference values and are measured between ECM terminal 70 (Engine coolant temperature sensor) and ground.



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

CONSULT-II Reference Value in Data Monitor Mode

UBS001EW

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

On Board Diagnosis Logic

UBS001EX

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0125	● Voltage sent to ECM from the sensor is not practical, even when some time has passed after starting the engine. ● Engine coolant temperature is insufficient for closed loop fuel control.	● Harness or connectors (High resistance in the circuit) ● Engine coolant temperature sensor ● Thermostat

DTC Confirmation Procedure

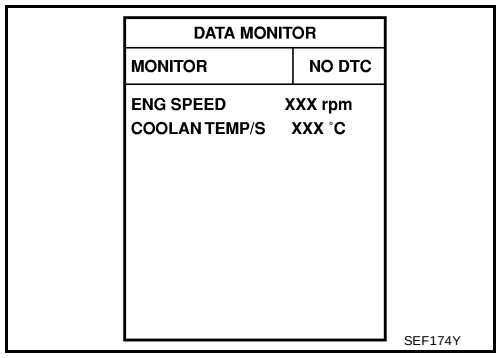
UBS001EY

CAUTION:
Be careful not to overheat engine.

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

WITH CONSULT-II

1. Turn ignition switch “ON”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Check that “COOLAN TEMP/S” is above 10°C (50°F).
   If it is above 10°C (50°F), the test result will be OK. If it is below 10°C (50°F), go to following step.
4. Start engine and run it for 65 minutes at idle speed.
   If “COOLAN TEMP/S” increases to more than 10°C (50°F) within 65 minutes, stop engine because the test result will be OK.
5. If 1st trip DTC is detected, go to EC-204, "Diagnostic Procedure"
   .



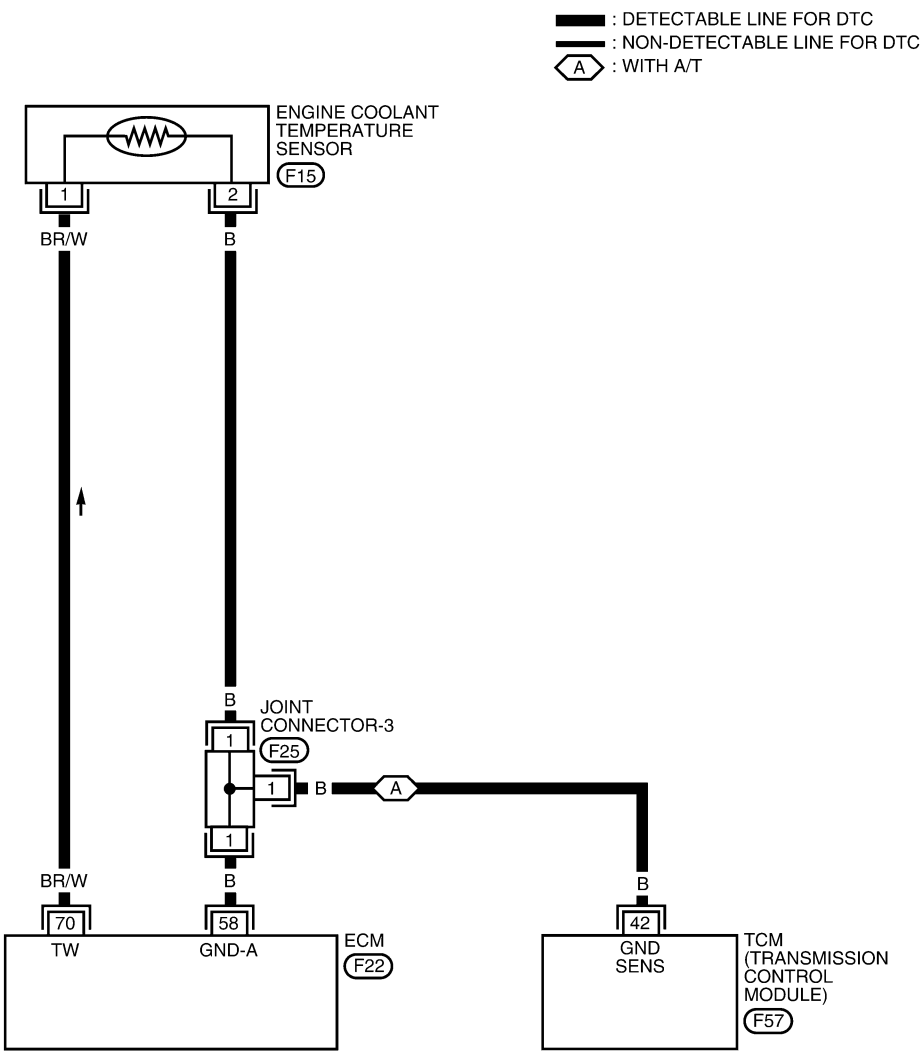
WITH GST

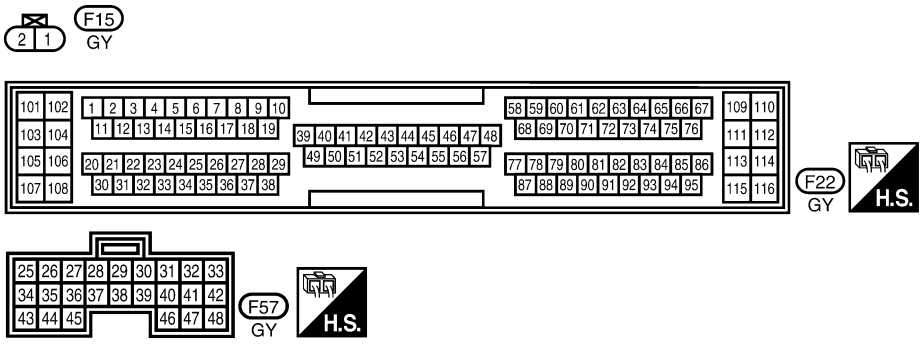
Follow the procedure “With CONSULT-II” above.

Wiring Diagram

UBS001EZ

EC-ECTS-01





REFER TO THE FOLLOWING.
F25 - JOINT CONNECTOR

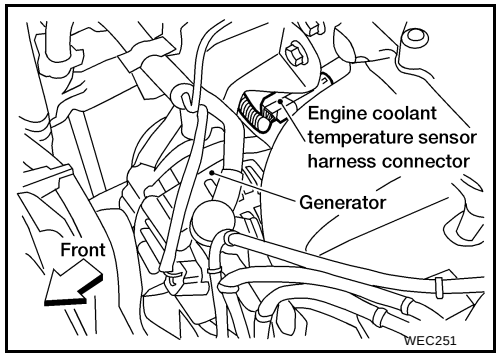
BBWA0108E

Diagnostic Procedure

UBS001F0

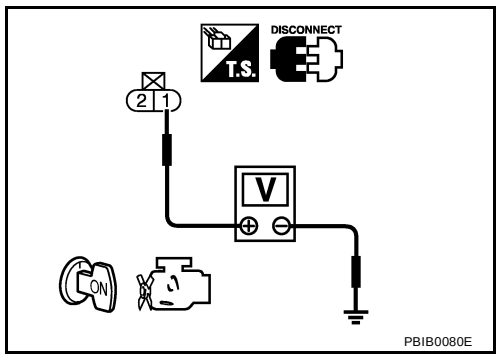
1. CHECK POWER SUPPLY

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



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

Voltage: Approximately 5V



OK or NG

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

2. DETECT MALFUNCTIONING PART

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

>> Repair harness or connectors.

3. CHECK GROUND CIRCUIT

1. Turn ignition switch “OFF”.
2. Check harness continuity between ECTS terminal 2 and engine ground. Refer to the Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

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

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between ECM and engine coolant temperature sensor
- Harness for open or short between TCM (Transmission control module) and engine coolant temperature sensor
- Joint connector-3

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

5. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-205, "Component Inspection" .

OK or NG

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

6. CHECK THERMOSTAT OPERATION

When the engine is cooled [lower than 82°C (180°F)], grasp lower radiator hose and confirm the engine coolant does not flow.

OK or NG

OK >> GO TO 7.
NG >> Repair or replace thermostat. Refer to CO-12, "THERMOSTAT AND THERMOSTAT HOUSING" .

7. CHECK INTERMITTENT INCIDENT

Perform EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

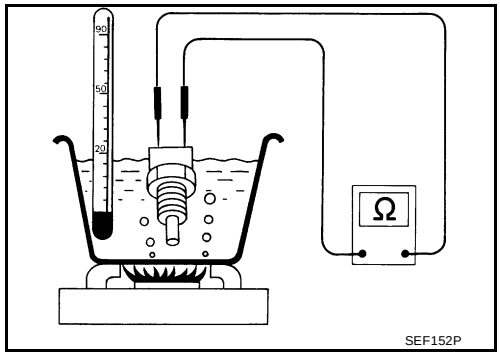
>> **INSPECTION END**

Component Inspection

UBS001F1

ENGINE COOLANT TEMPERATURE SENSOR

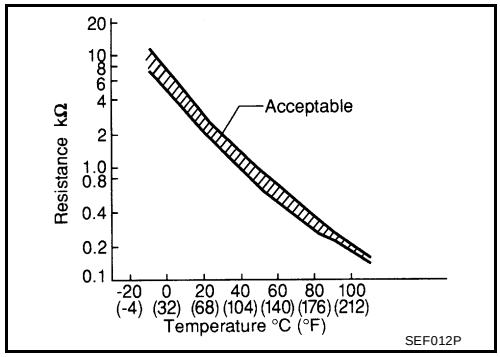
Check resistance as shown in the figure.



<Reference data>

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.0
90 (194)	0.236 - 0.260

If NG, replace engine coolant temperature sensor.



Removal and Installation

UBS001F2

ENGINE COOLANT TEMPERATURE SENSOR

Refer to EM-15, "OUTER COMPONENT PARTS" .

DTC P0128 THERMOSTAT FUNCTION

PFP:21200

On Board Diagnosis Logic

UBS001F3

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.
Malfunction is detected when the engine coolant temperature does not reach to specified temperature even though the engine has run long enough.

Possible Cause

UBS001F4

- Thermostat function
- Leakage from sealing portion of thermostat
- Engine coolant temperature sensor

DTC Confirmation Procedure

UBS001F5

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-12, "THERMOSTAT AND THERMOSTAT HOUSING" . Use only a genuine NISSAN thermostat as a replacement. If an incorrect thermostat is used, the MIL may come on.
2. Turn ignition switch “ON”.
3. Select “COOLAN TEMP/S” in “DATA MONITOR” mode with CONSULT-II.
4. Check that the “COOLAN TEMP/S” is above 60°C (140°F).
   If it is below 60°C (140°F), go to following step.
   If it is above 60°C (140°F), stop engine and cool down the engine to less than 60°C (140°F), then retry from step 1.
5. Drive vehicle for 10 consecutive minutes under the following conditions.

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

If 1st trip DTC is detected, go to EC-206, "Diagnostic Procedure" .

WITH GST

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

Diagnostic Procedure

UBS001F6

1. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-207, "Component Inspection" .

OK or NG

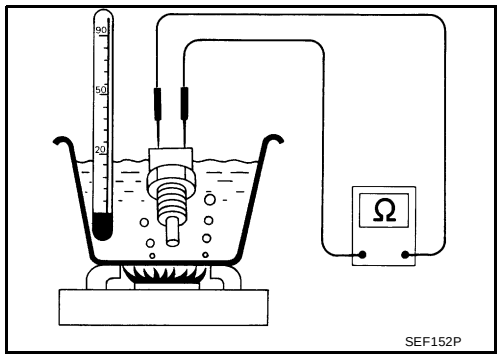
OK >> **INSPECTION END**
NG >> Replace engine coolant temperature sensor.

Component Inspection

UBS001F7

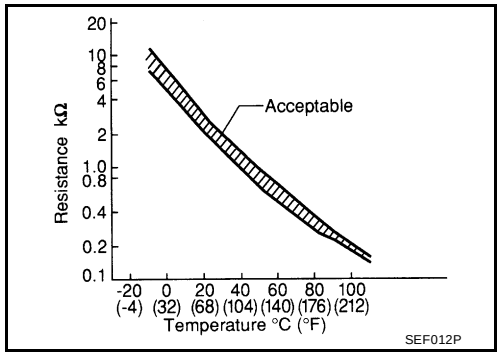
ENGINE COOLANT TEMPERATURE SENSOR

Check resistance as shown in the figure.



<Reference data>

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.0
90 (194)	0.236 - 0.260



If NG, replace engine coolant temperature sensor.

Removal and Installation

UBS001F8

ENGINE COOLANT TEMPERATURE SENSOR

Refer to EM-15, "OUTER COMPONENT PARTS" .

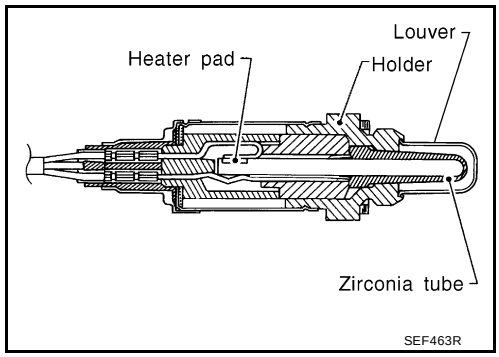
DTC P0132, P0152 HO2S1

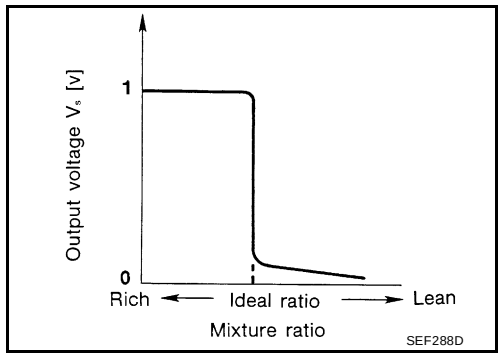
PFP:22690

Component Description

UBS001F9

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





CONSULT-II Reference Value in Data Monitor Mode

UBS001FA

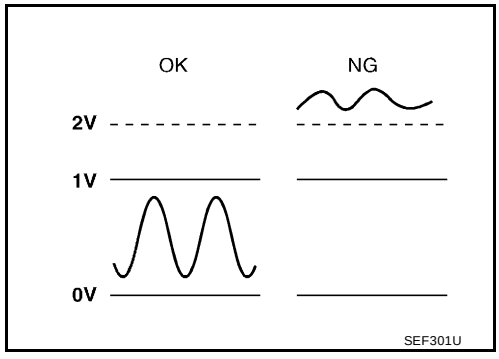
Specification data are reference values.

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

On Board Diagnosis Logic

UBS001FB

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



DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0132 (Bank 1) P0152 (Bank 2)	● An excessively high voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Heated oxygen sensor 1

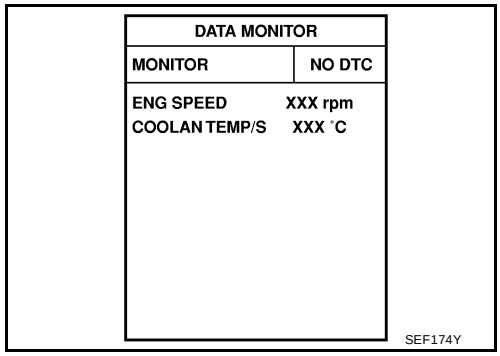
DTC Confirmation Procedure

UBS001FC

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

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Turn ignition switch “ON”.
4. Select “DATA MONITOR” mode with CONSULT-II.
5. Restart engine and let it idle for 2 minutes.
6. If 1st trip DTC is detected, go to EC-212, "Diagnostic Procedure" .



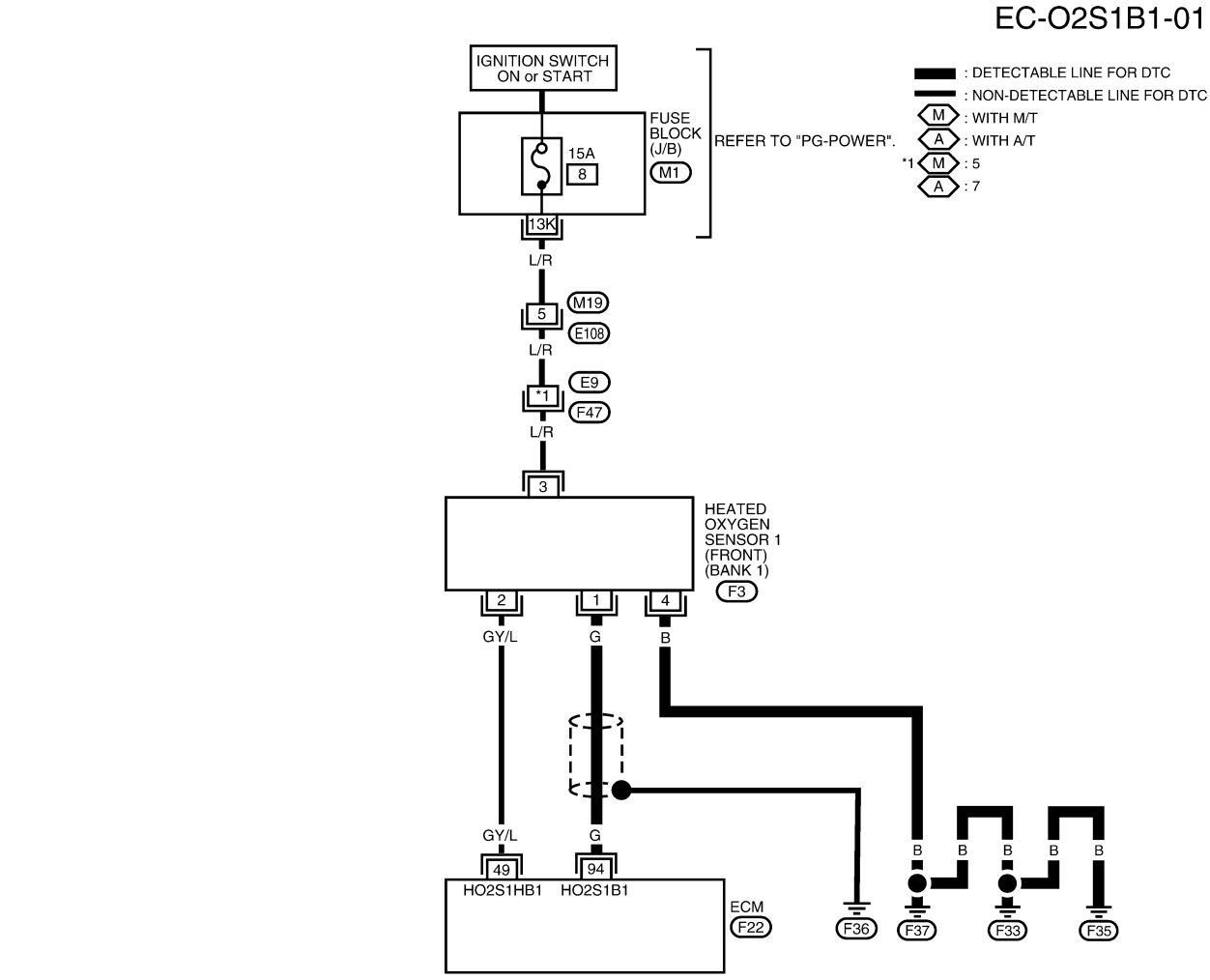
WITH GST

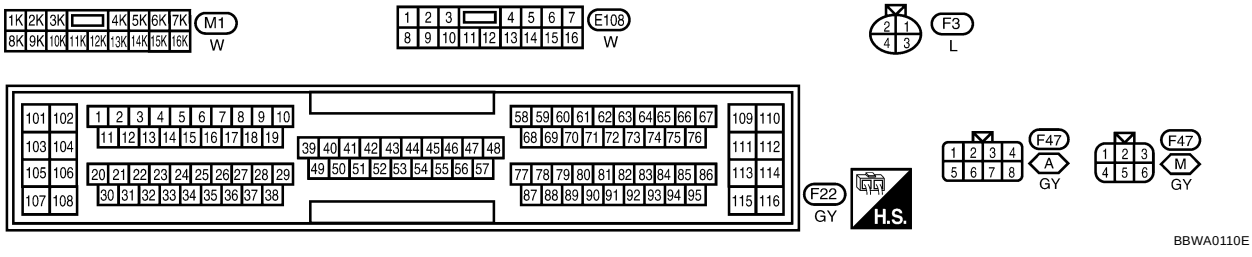
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Restart engine and let it idle for 2 minutes.
4. Turn ignition switch “OFF” and wait at least 10 seconds.
5. Restart engine and let it idle for 2 minutes.
6. Select “MODE 3” with GST.
7. If DTC is detected, go to EC-212, "Diagnostic Procedure" .

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

Wiring Diagram
BANK 1

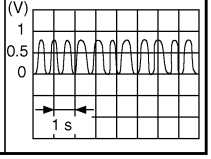
UBS001FD





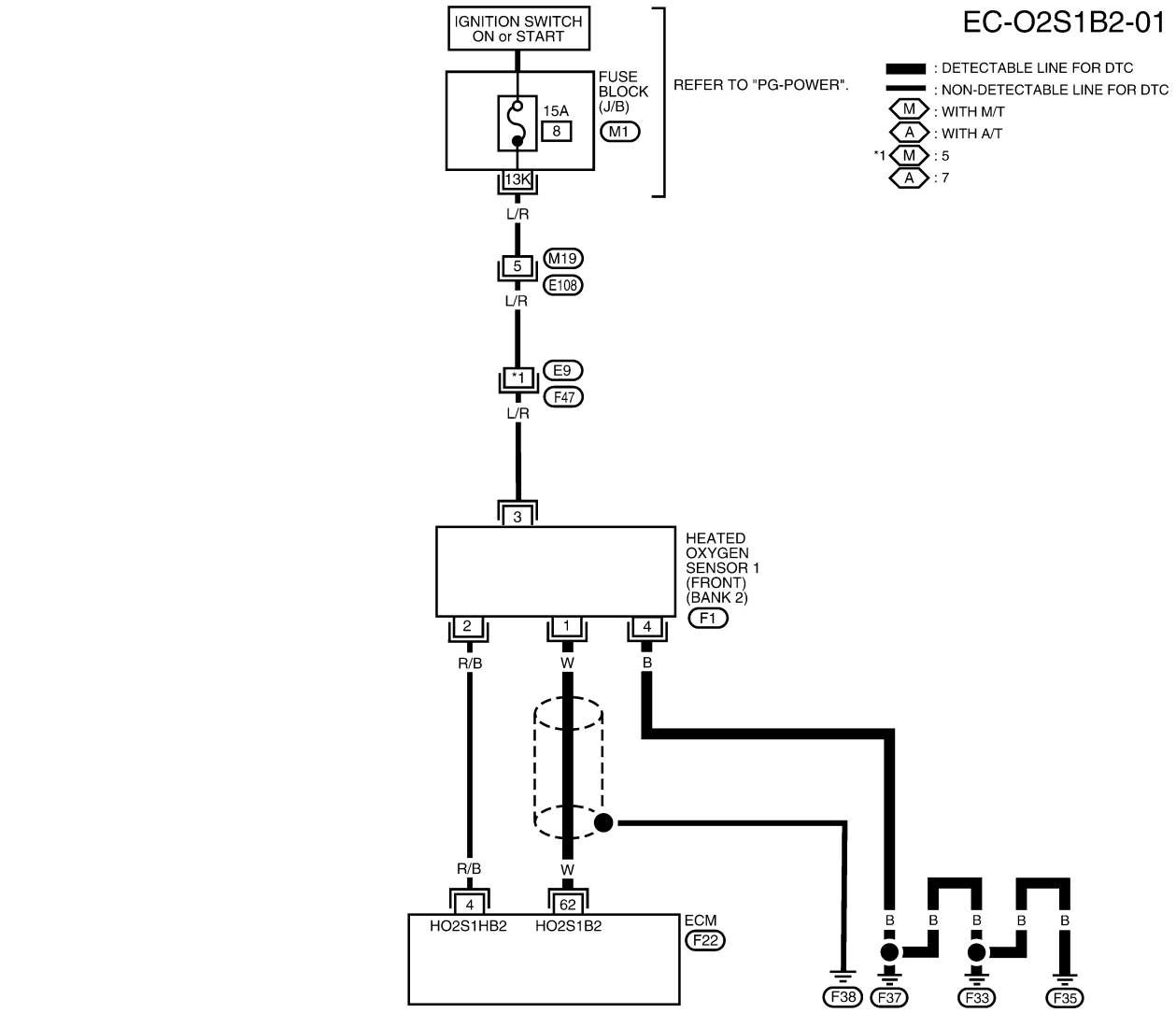
BBWA0110E

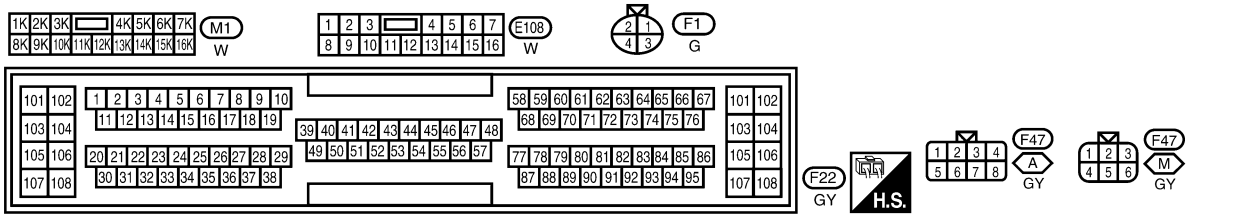
ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
94	G	HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)	ENGINE RUNNING AT 2,000 RPM AFTER WARMING UP TO NORMAL OPERATING TEMPERATURE	0 - APPROX. 1.0V 

WEC889

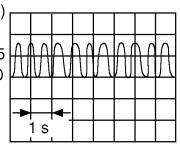
BANK 2





BBWA0111E

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
62	W	HEATED OXYGEN SENSOR 1 (FRONT) (BANK 2)	ENGINE RUNNING AT 2,000 RPM AFTER WARMING UP TO NORMAL OPERATING TEMPERATURE	0 - APPROX. 1.0V 

WEC888

Diagnostic Procedure

UBS001FE

1. RETIGHTEN HEATED OXYGEN SENSOR 1

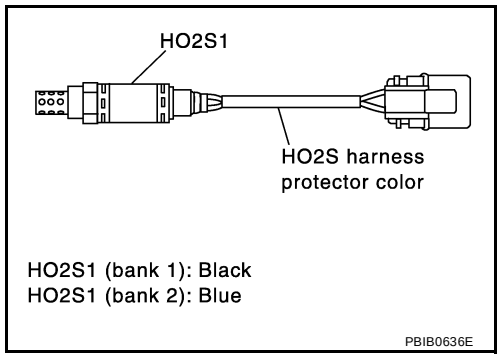
Loosen and retighten the corresponding heated oxygen sensor 1.

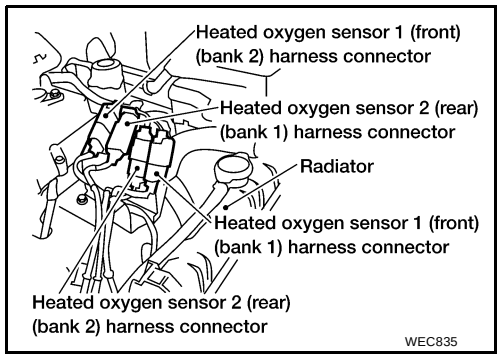
Tightening torque: 40 - 60 N·m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)

>> GO TO 2.

2. CHECK INPUT SIGNAL CIRCUIT

1. Check the HO2S1 harness protector color, and disconnect the corresponding heated oxygen sensor 1 harness connector and ECM harness connector.





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

DTC	Terminals		Bank
	ECM	Sensor	
P0132	94	1	1
P0152	62	1	2

Continuity should exist.

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

DTC	Terminals		Bank
	ECM or Sensor	Ground	
P0132	94 or 1	Ground	1
P0152	62 or 1	Ground	2

Continuity should not exist.

4. Also check harness for short to power.

OK or NG

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

3. CHECK GROUND CIRCUIT

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

Continuity should exist.

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

OK or NG

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

4. CHECK HARNESS CONNECTOR

Check heated oxygen sensor 1 harness connector for water.

Water should not exist.

OK or NG

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

5. CHECK HEATED OXYGEN SENSOR 1

Refer to EC-214, "Component Inspection" .

OK or NG

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

6. CHECK INTERMITTENT INCIDENT

Perform EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

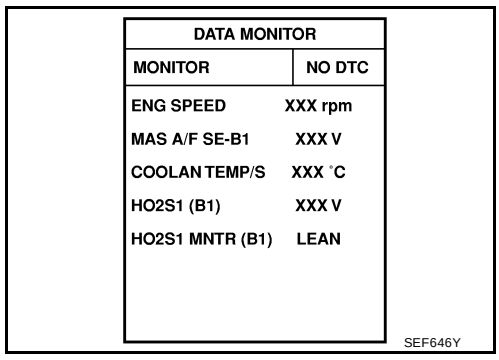
Component Inspection

UBS001FF

HEATED OXYGEN SENSOR 1

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “MANU TRIG” in “DATA MONITOR” mode, and select “HO2S1 (B1)/(B2)” and “HO2S1 MNTR (B1)/(B2)”.
3. Hold engine speed at 2,000 rpm under no load during the following steps.
4. Touch “RECORD” on CONSULT-II screen.



5. Check the following.

- "HO2S1 MNTR (B1)/(B2)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" five times in 10 seconds.
  5 times (cycles) are counted as shown below:
  R = "HO2S1 MNTR (B1)/(B2)", "RICH"
  L = "HO2S1 MNTR (B1)/(B2)", "LEAN"
- "HO2S1 (B1)/(B2)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)/(B2)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)/(B2)" voltage never exceeds 1.0V.

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

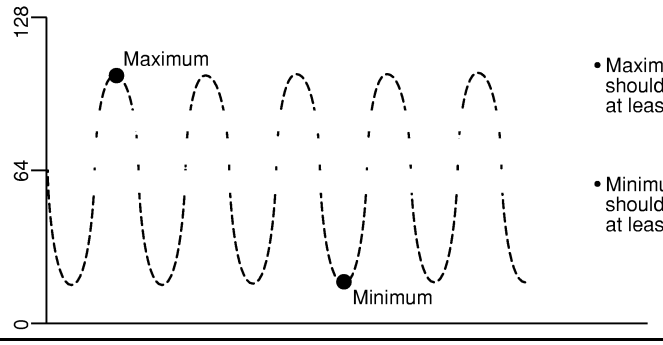
R means HO2S1 MNTR (B1)/(B2) indicates RICH
L means HO2S1 MNTR (B1)/(B2) indicates LEAN

SEF647Y

CAUTION:

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

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

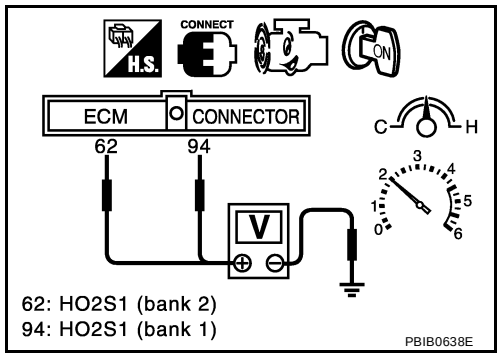


SEF648Y

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 62 (HO2S1 bank 2) or 94 (HO2S1 bank 1) and engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.

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



PBIB0638E

CAUTION:

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

Removal and Installation

UBS001FG

HEATED OXYGEN SENSOR 1

Refer to EM-15, "Removal and Installation" .

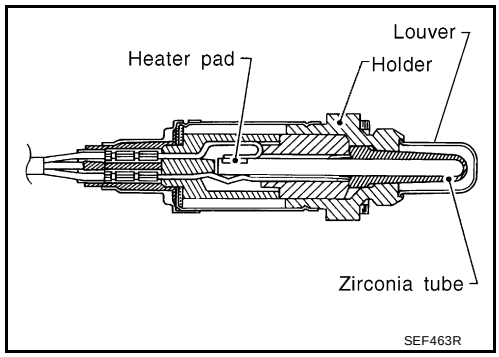
DTC P0133, P0153 HO2S1

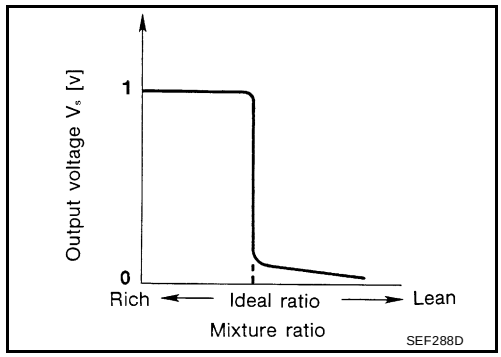
PFP:22690

Component Description

UBS001FH

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





CONSULT-II Reference Value in Data Monitor Mode

UBS001FI

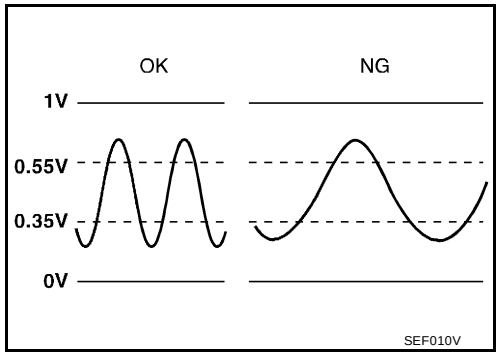
Specification data are reference values.

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

On Board Diagnosis Logic

UBS001FJ

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



DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0133 (Bank 1) P0153 (Bank 2)	● The response of the voltage signal from the sensor takes more than the specified time.	● Harness or connectors (The sensor circuit is open or shorted.) ● Heated oxygen sensor 1 ● Heated oxygen sensor 1 heater ● Fuel pressure ● Injectors ● Intake air leaks ● Exhaust gas leaks ● PCV ● Mass air flow sensor

DTC Confirmation Procedure

UBS001FK

CAUTION:
Always drive vehicle at a safe speed.

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

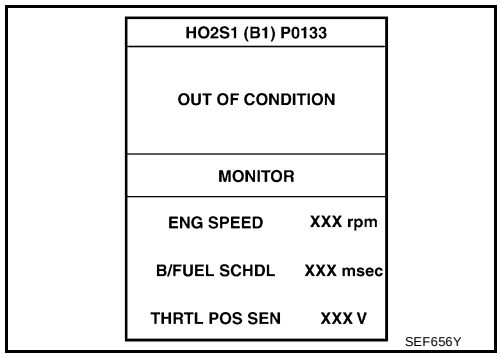
TESTING CONDITION:

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

WITH CONSULT-II

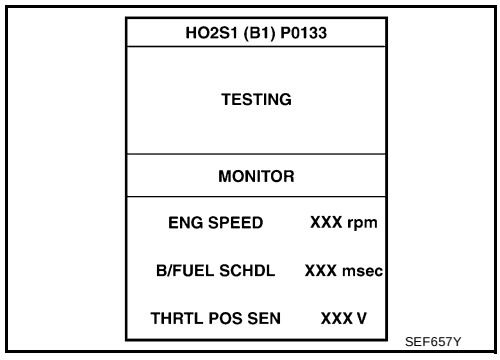
1. Start engine and warm it up to normal operating temperature.
2. Stop engine and wait at least 10 seconds.
3. Turn ignition switch "ON" and select "HO2S1 (B1)/(B2) P0133 (P0153)" of "HO2S1 (B1)/(B2)" in "DTC WORK SUPPORT" mode with CONSULT-II.
4. Touch "START".
5. Start engine and let it idle for at least 3.5 minutes.

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



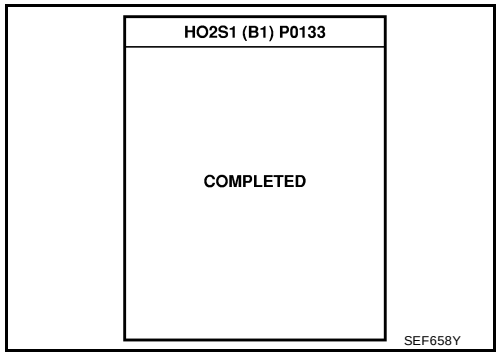
6. When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take approximately 20 seconds.)

ENG SPEED	1,950 - 3,200 rpm (A/T) 2,300 - 3,750 rpm (M/T)
Vehicle speed	More than 80 km/h (50 MPH)
B/FUEL SCHDL	3.5 - 12.5 msec (A/T) 3 - 10 msec (M/T)
Selector lever	Suitable position



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

7. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to EC-221, "Diagnostic Procedure" .



Overall Function Check

UBS001FL

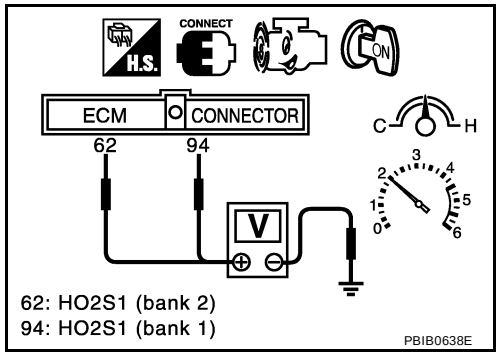
Use this procedure to check the overall function of the heated oxygen sensor 1 circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 62 (HO2S1 bank 2) or 94 (HO2S2 bank 1) and engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.

– The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than five times within 10 seconds.
1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

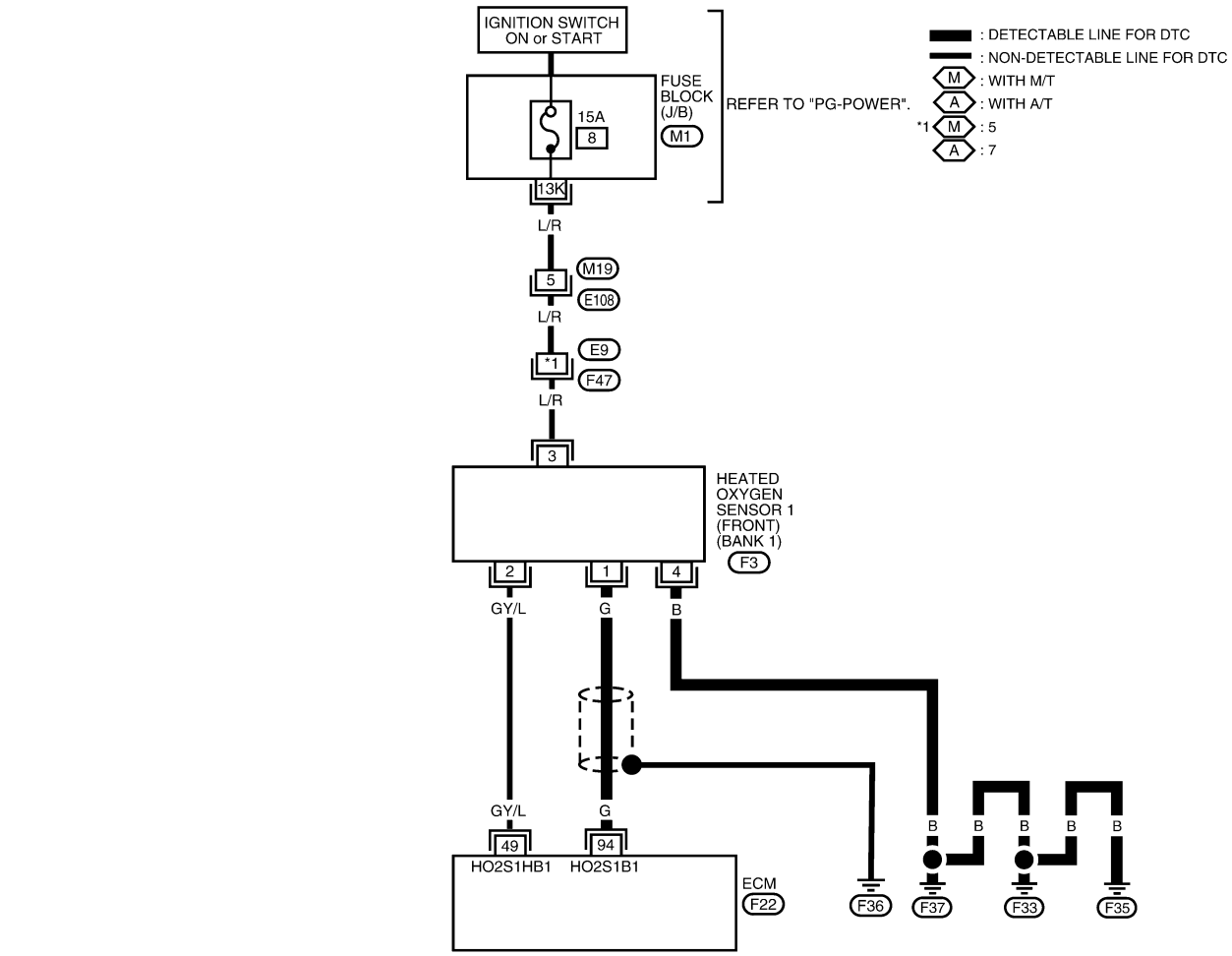
4. If NG, go to EC-221, "Diagnostic Procedure" .

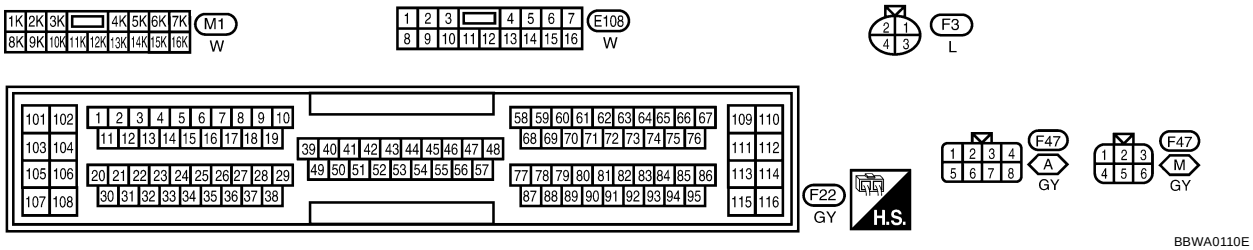


Wiring Diagram
BANK 1

UBS001FM

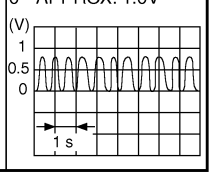
EC-O2S1B1-01





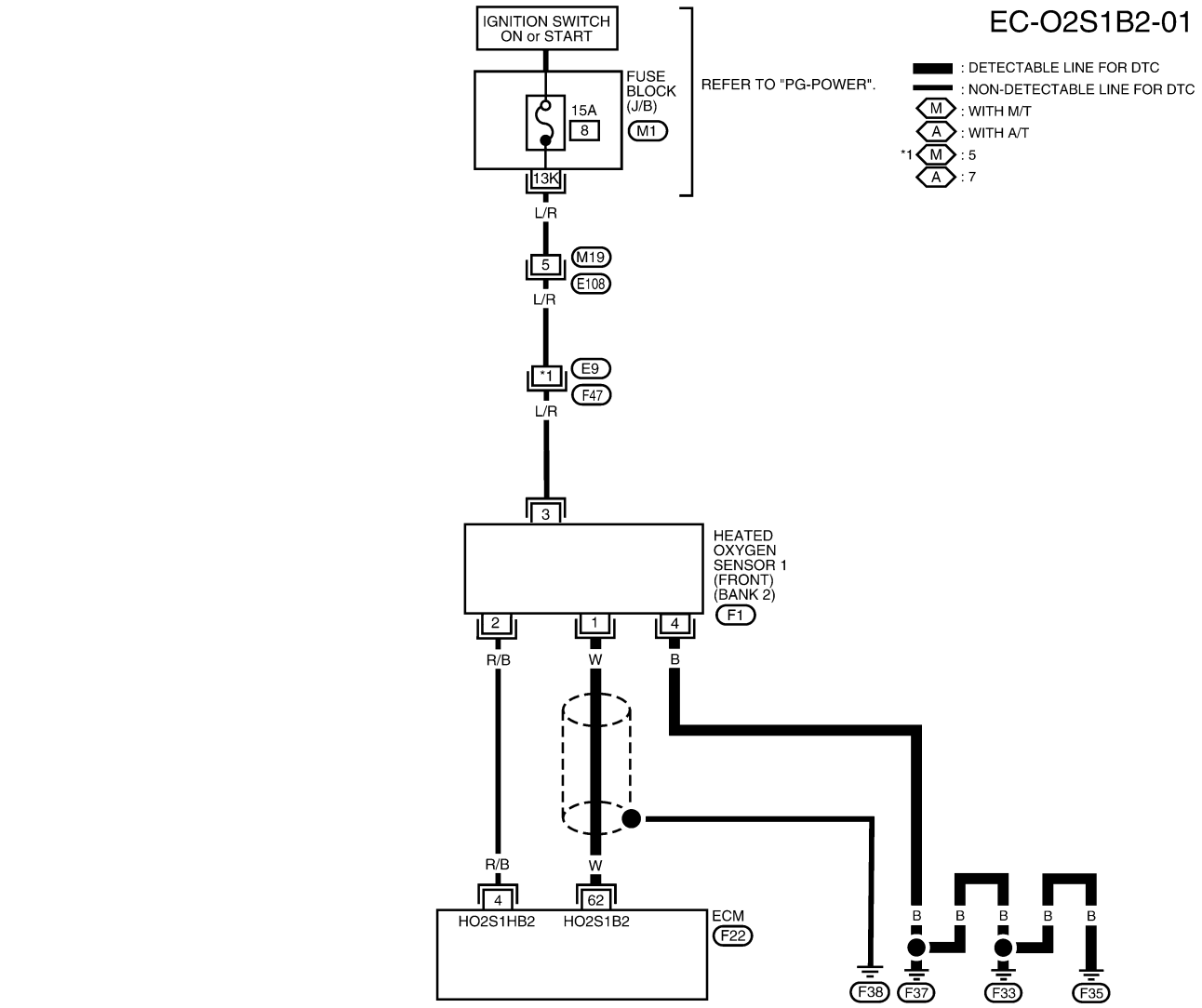
BBWA0110E

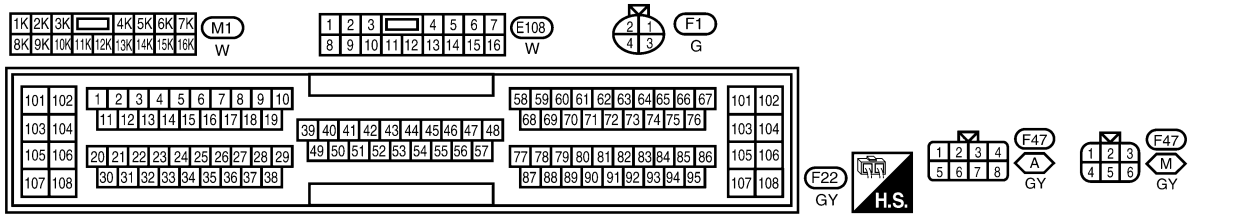
ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
94	G	HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)	ENGINE RUNNING AT 2,000 RPM AFTER WARMING UP TO NORMAL OPERATING TEMPERATURE	0 - APPROX. 1.0V 

WEC889

BANK 2

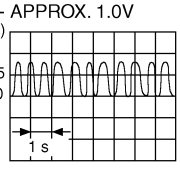




BBWA0111E

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
62	W	HEATED OXYGEN SENSOR 1 (FRONT) (BANK 2)	ENGINE RUNNING AT 2,000 RPM AFTER WARMING UP TO NORMAL OPERATING TEMPERATURE	0 - APPROX. 1.0V



WEC888

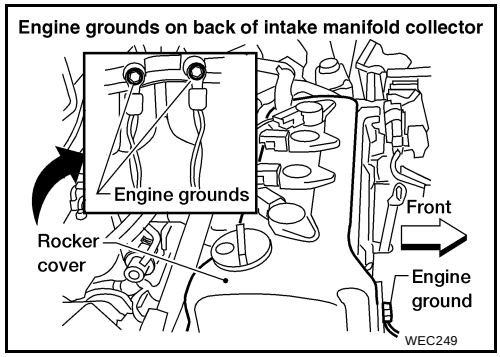
Diagnostic Procedure

UBS001FN

1. RETIGHTEN GROUND SCREWS

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

>> GO TO 2.



2. RETIGHTEN HEATED OXYGEN SENSOR 1

Loosen and retighten the corresponding heated oxygen sensor 1.

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

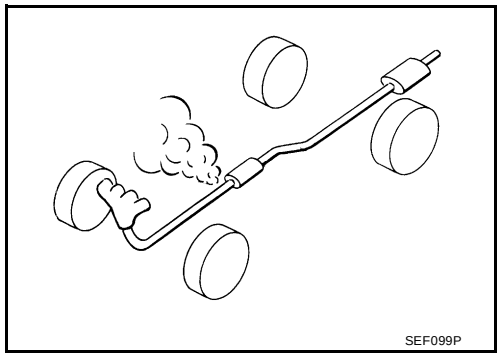
>> GO TO 3.

3. CHECK EXHAUST AIR LEAK

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

OK or NG

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



4. CHECK FOR INTAKE AIR LEAK

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

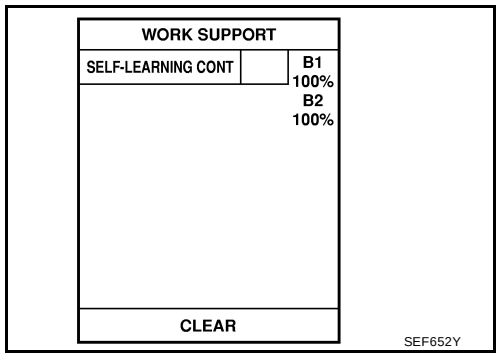
OK or NG

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

5. CLEAR THE SELF-LEARNING DATA

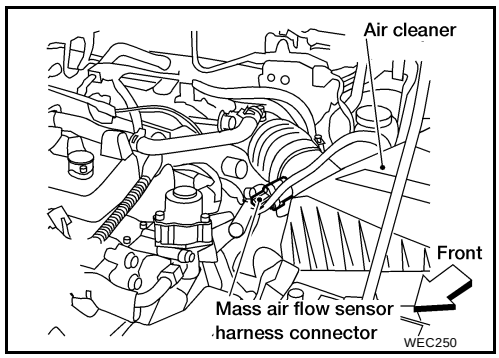
With CONSULT-II

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, P0174 or P0172, P0175 detected?
   Is it difficult to start engine?



Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF”.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 3 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC P0102 is displayed.
6. Erase the 1st trip DTC memory. Refer to EC-73, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171, P0174 or P0172, P0175 detected?
   Is it difficult to start engine?

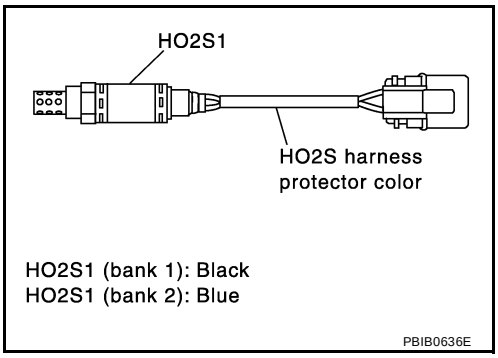


Yes or No

Yes >> Perform trouble diagnosis for DTC P0171, P0174, P0172, P0175. Refer to EC-252 , EC-261 .
No >> GO TO 6.

6. CHECK INPUT SIGNAL CIRCUIT

1. Check the HO2S1 harness protector color, and disconnect the corresponding heated oxygen sensor 1 harness connector and ECM harness connector.



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

DTC	Terminals		Bank
	ECM	Sensor	
P0133	94	1	1
P0153	62	1	2

Continuity should exist.

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

DTC	Terminals		Bank
	ECM or Sensor	Ground	
P0133	94 or 1	Ground	1
P0153	62 or 1	Ground	2

Continuity should not exist.

4. Also check harness for short to power.

OK or NG

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

7. CHECK GROUND CIRCUIT

1. Check continuity between HO2S1 terminal 4 and engine ground. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

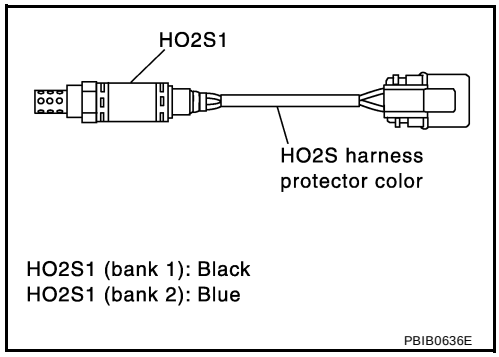
OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK HEATED OXYGEN SENSOR 1 HEATER

1. Turn ignition switch “OFF”.
2. Check the HO2S1 harness protector color, and disconnect the corresponding HO2S1 harness connector.
3. Check HO2S1 heater, refer to EC-165, "Component Inspection" .

OK or NG

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



9. CHECK HEATED OXYGEN SENSOR 1

Refer to EC-224, "Component Inspection" .

OK or NG

OK >> GO TO 10.
NG >> Replace corresponding heated oxygen sensor bank 1 (bank 2) sensor 1.

10. CHECK MASS AIR FLOW SENSOR

Refer to EC-179, "Component Inspection" .

OK or NG

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

11. CHECK PCV VALVE

Refer to EC-591, "Inspection" .

OK or NG

OK >> GO TO 12.
NG >> Repair or replace PCV valve.

12. CHECK INTERMITTENT INCIDENT

Perform EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

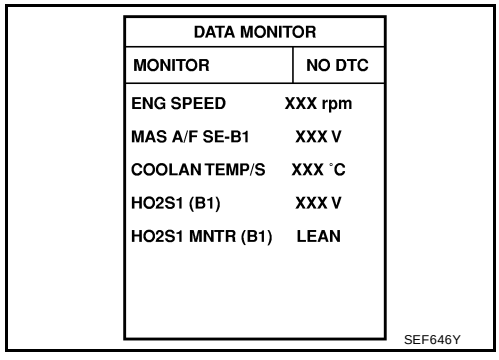
Component Inspection

UBS001FO

HEATED OXYGEN SENSOR 1

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “MANU TRIG” in “DATA MONITOR” mode, and select “HO2S1 (B1)/(B2)” and “HO2S1 MNTR (B1)/(B2)”.
3. Hold engine speed at 2,000 rpm under no load during the following steps.
4. Touch “RECORD” on CONSULT-II screen.



5. Check the following.

- "HO2S1 MNTR (B1)/(B2)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" five times in 10 seconds.
  5 times (cycles) are counted as shown below:
  R = "HO2S1 MNTR (B1)/(B2)", "RICH"
  L = "HO2S1 MNTR (B1)/(B2)", "LEAN"
- "HO2S1 (B1)/(B2)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)/(B2)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)/(B2)" voltage never exceeds 1.0V.

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

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

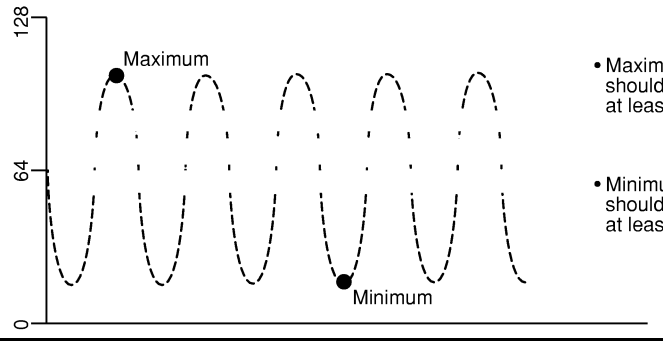
R means HO2S1 MNTR (B1)/(B2) indicates RICH
L means HO2S1 MNTR (B1)/(B2) indicates LEAN

SEF647Y

CAUTION:

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

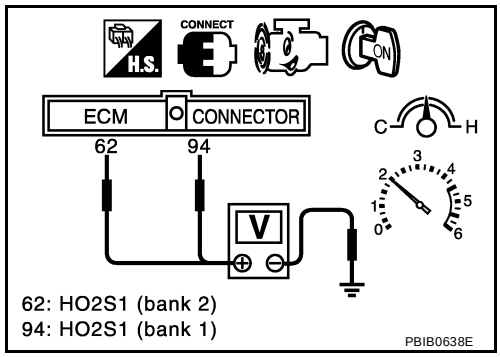
Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX



Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 62 (HO2S1 bank 2) or 94 (HO2S1 bank 1) and engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.

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



CAUTION:

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

Removal and Installation

UBS001FP

HEATED OXYGEN SENSOR 1

Refer to EM-15, "Removal and Installation" .

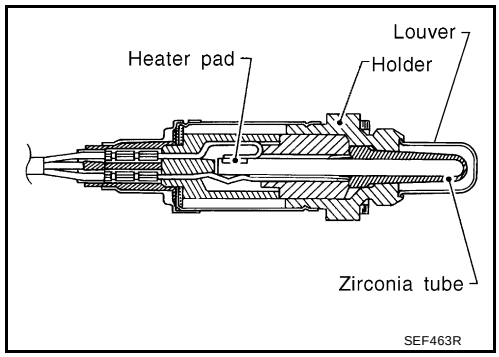
DTC P0134, P0154 HO2S1

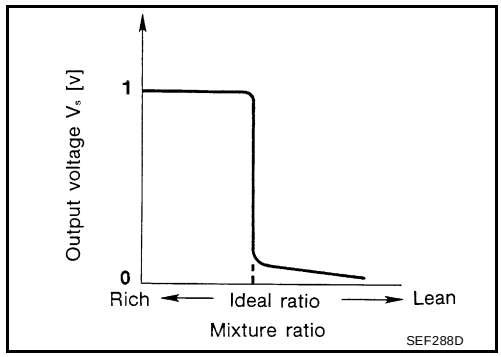
PFP:22690

Component Description

UBS001FQ

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





CONSULT-II Reference Value in Data Monitor Mode

UBS001FR

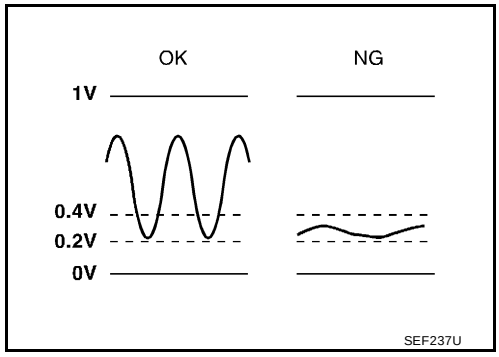
Specification data are reference values.

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

On Board Diagnosis Logic

UBS001FS

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



DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0134 (Bank 1) P0154 (Bank 2)	● The voltage from the sensor is constantly approx. 0.3V.	● Harness or connectors (The sensor circuit is open or shorted.) ● Heated oxygen sensor 1

DTC Confirmation Procedure

UBS001FT

CAUTION:

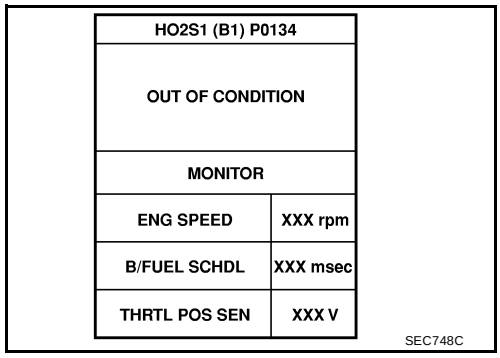
Always drive vehicle at a safe speed.

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

WITH CONSULT-II

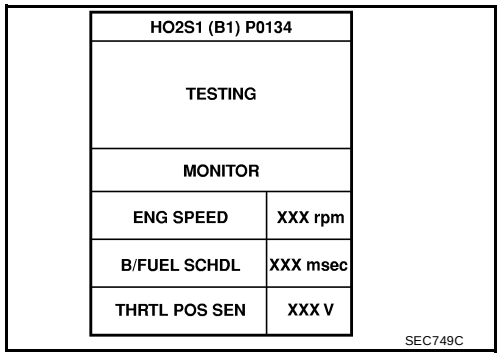
1. Start engine and warm it up to normal operating temperature.
2. Select “HO2S1 (B1)/(B2), P0134 (P0154)” of “HO2S1 (B1)/(B2)” in “DTC WORK SUPPORT” mode with CONSULT-II.
3. Touch “START”.
4. Let it idle for at least 3.5 minutes.

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



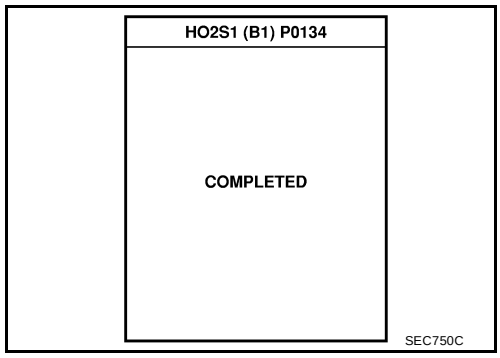
5. When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 10 to 60 seconds.)

ENG SPEED	1,600 - 3,400 rpm (A/T) 1,900 - 4,100 rpm (M/T)
Vehicle speed	More than 64 km/h (40 MPH)
B/FUEL SCHDL	2.4 - 12.5 msec (A/T) 2.8 - 10 msec (M/T)
Selector lever	Suitable position



   If “TESTING” is not displayed after 5 minutes, retry from step 2.
6. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to EC-231, "Diagnostic Procedure" .

During this test, P1148, P1168 may be displayed on CONSULT-II screen.



Overall Function Check

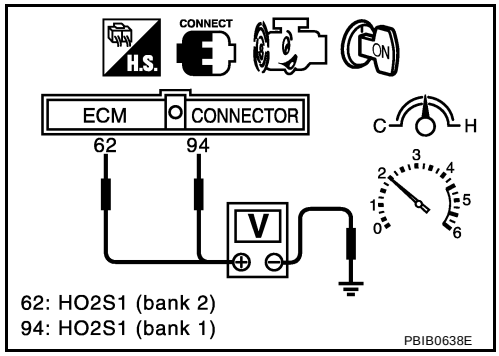
UBS001FU

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

WITH GST

1. Start engine and warm it up to normal operating temperature.

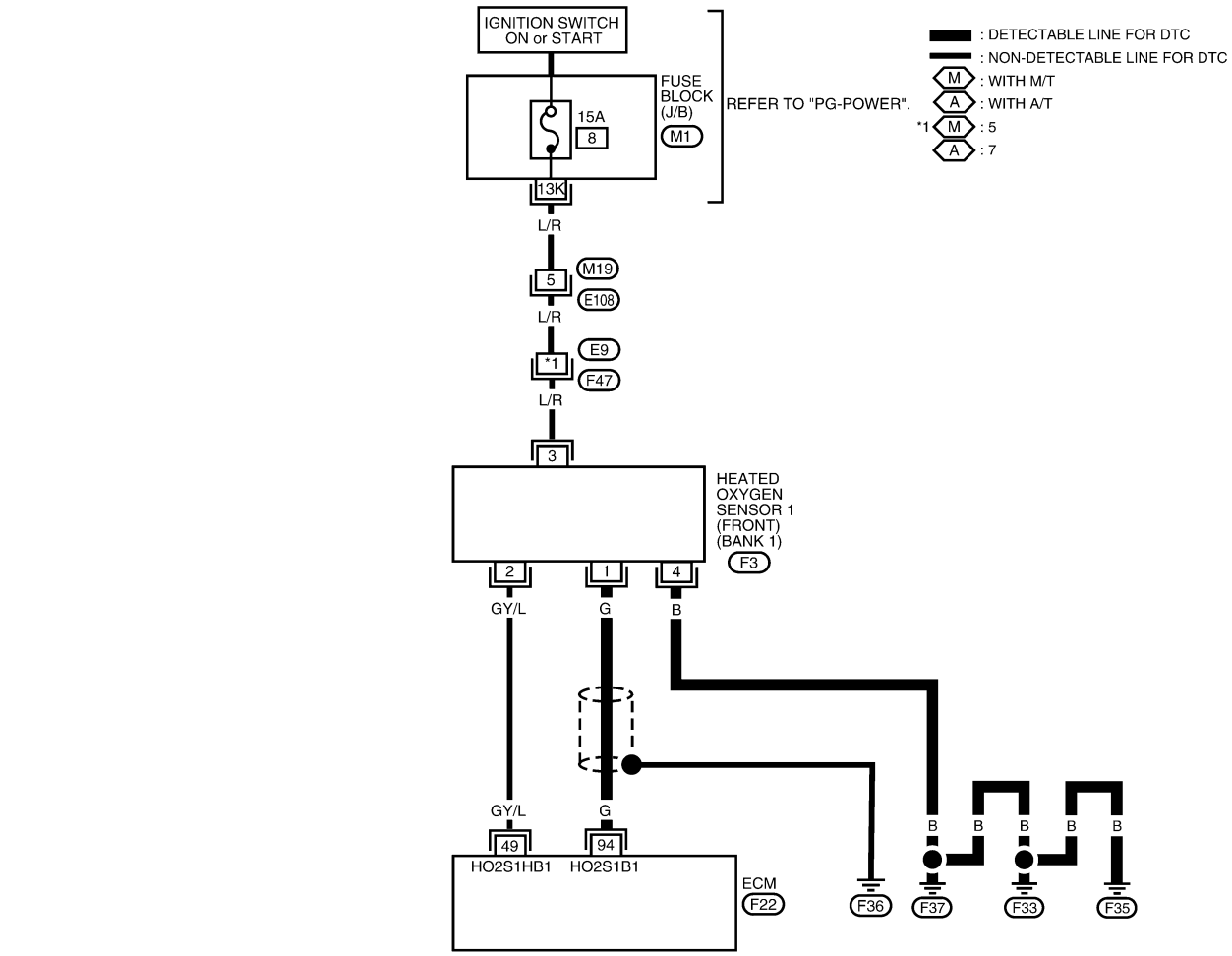
2. Set voltmeter probes between ECM terminal 62 (HO2S1 bank 2 signal) or 94 (HO2S1 bank 1) and engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.
   - The voltage does not remain in the range of 0.2 - 0.4V.
4. If NG, go to EC-231, "Diagnostic Procedure" .

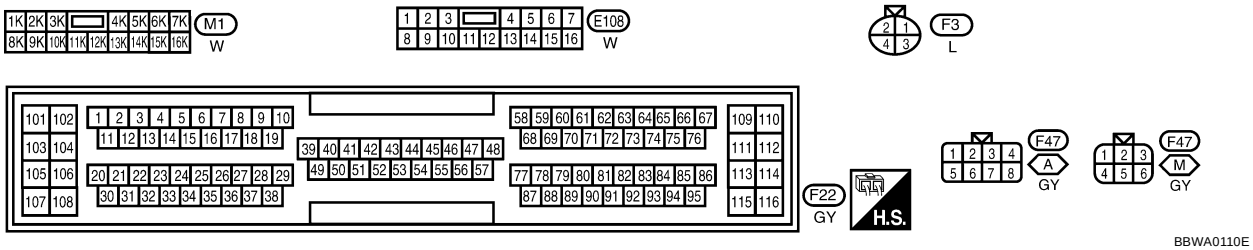


Wiring Diagram
BANK 1

UBS001FV

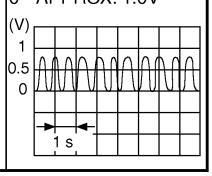
EC-O2S1B1-01





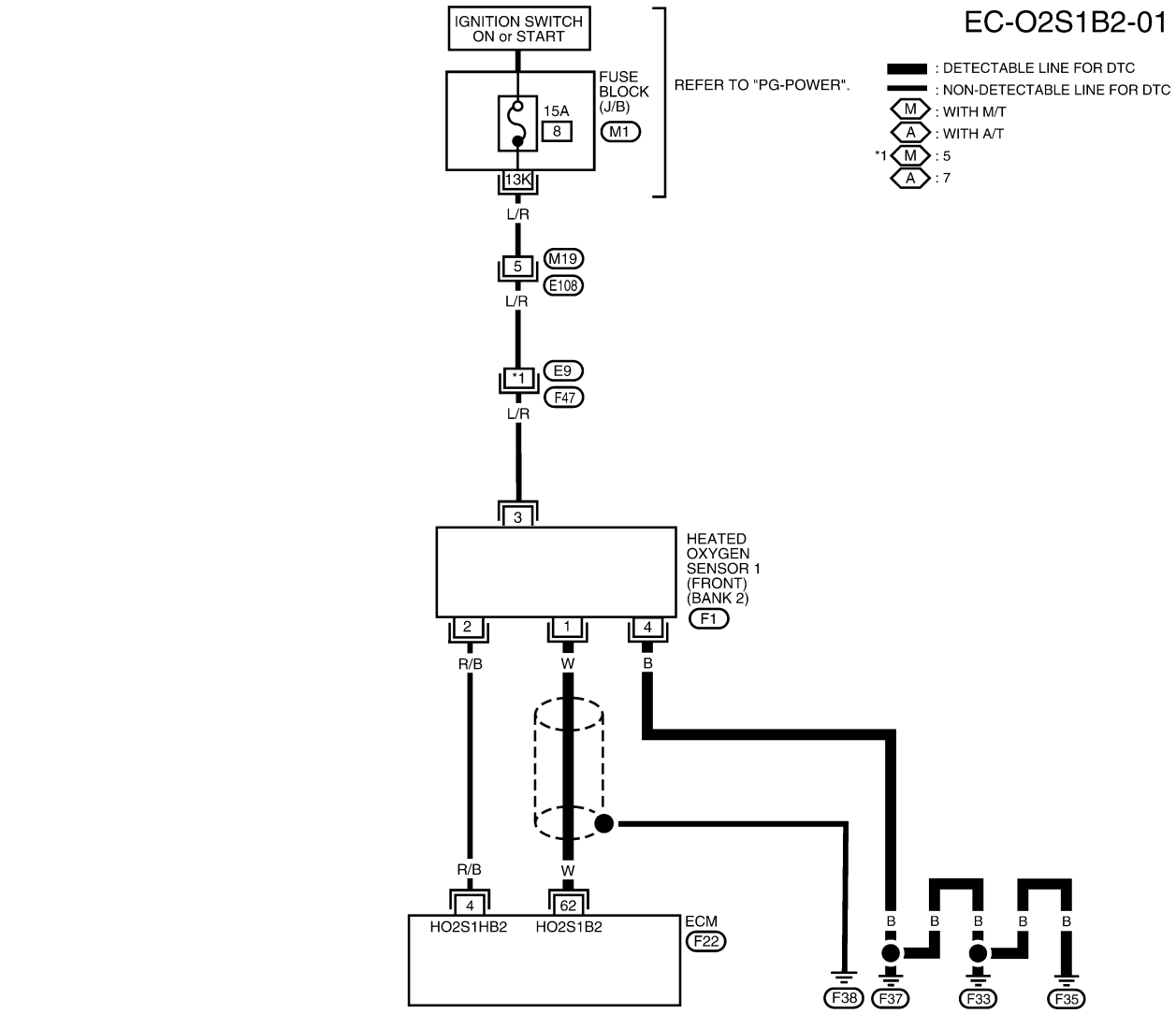
BBWA0110E

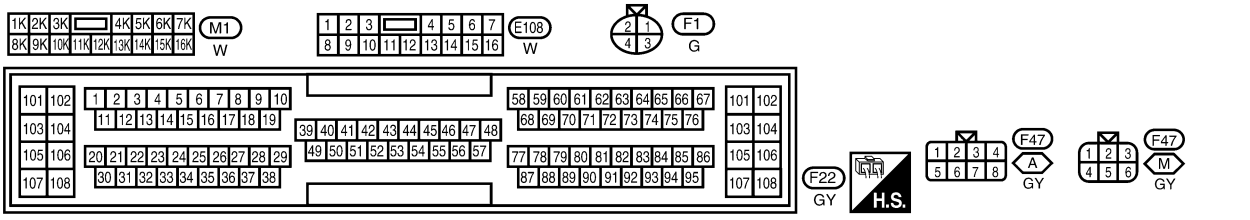
ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
94	G	HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)	ENGINE RUNNING AT 2,000 RPM AFTER WARMING UP TO NORMAL OPERATING TEMPERATURE	0 - APPROX. 1.0V 

WEC889

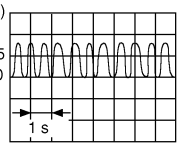
BANK 2





BBWA0111E

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
62	W	HEATED OXYGEN SENSOR 1 (FRONT) (BANK 2)	ENGINE RUNNING AT 2,000 RPM AFTER WARMING UP TO NORMAL OPERATING TEMPERATURE	0 - APPROX. 1.0V 

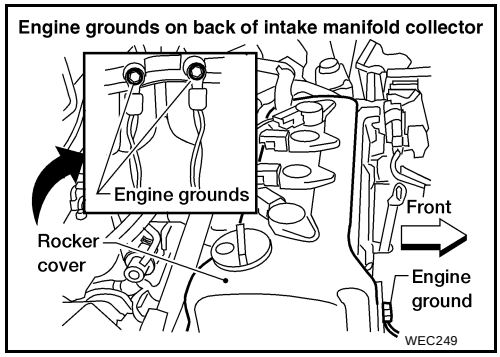
WEC888

Diagnostic Procedure

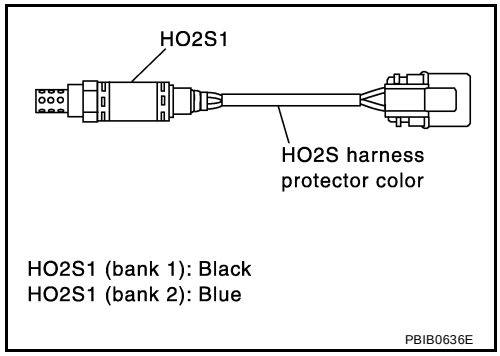
UBS001FW

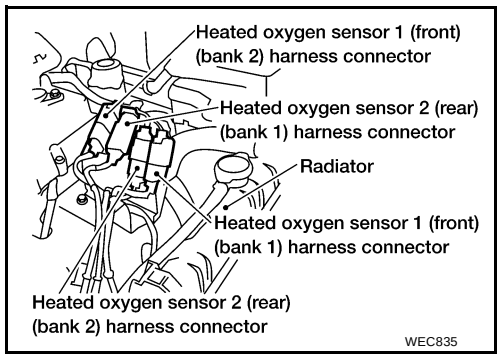
1. INSPECTION START

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



3. Check the HO2S1 harness protector color, and disconnect the corresponding heated oxygen sensor 1 harness connector.





>> GO TO 2.

2. CHECK INPUT SIGNAL CIRCUIT

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

DTC	Terminals		Bank
	ECM or Sensor	Sensor	
P0134	94	1	1
P0154	62	1	2

Continuity should exist.

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

DTC	Terminals		Bank
	ECM or Sensor	Ground	
P0134	94 or 1	Ground	1
P0154	62 or 1	Ground	2

Continuity should not exist.

4. Also check harness for short to power.

OK or NG

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

3. CHECK GROUND CIRCUIT

1. Check continuity between HO2S1 terminal 4 and engine ground. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

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

4. CHECK HEATED OXYGEN SENSOR 1

Refer to EC-233, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace corresponding heated oxygen sensor.

5. CHECK INTERMITTENT INCIDENT

Perform EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

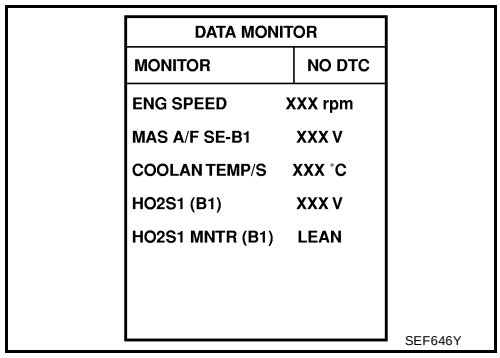
Component Inspection

UBS001FX

HEATED OXYGEN SENSOR 1

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “MANU TRIG” in “DATA MONITOR” mode, and select “HO2S1 (B1)/(B2)” and “HO2S1 MNTR (B1)/(B2)”.
3. Hold engine speed at 2,000 rpm under no load during the following steps.
4. Touch “RECORD” on CONSULT-II screen.



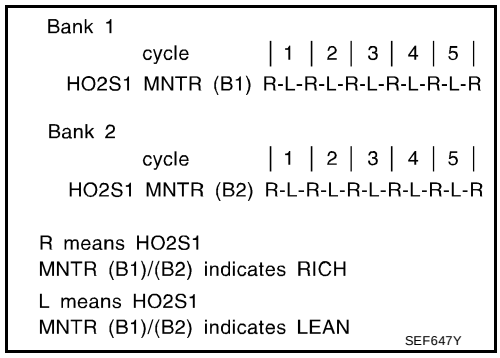
5. Check the following.

– “HO2S1 MNTR (B1)/(B2)” in “DATA MONITOR” mode changes from “RICH” to “LEAN” to “RICH” 5 times in 10 seconds.
5 times (cycles) are counted as shown below:
R = “HO2S1 MNTR (B1)/(B2)”, “RICH”
L = “HO2S1 MNTR (B1)/(B2)”, “LEAN”

– “HO2S1 (B1)/(B2)” voltage goes above 0.6V at least once.

– “HO2S1 (B1)/(B2)” voltage goes below 0.3V at least once.

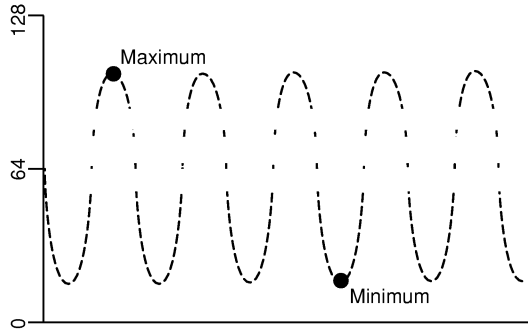
– “HO2S1 (B1)/(B2)” voltage never exceeds 1.0V.



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.**

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



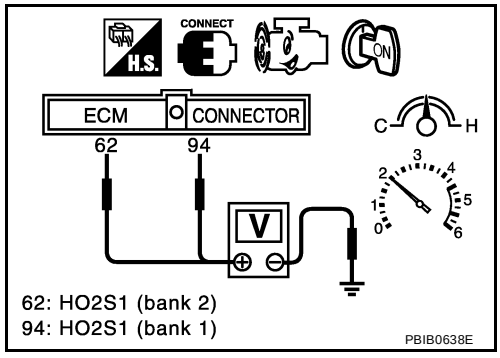
Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 62 (HO2S1 bank 2) or 94 (HO2S1 bank 1) and engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.

– The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than five times within 10 seconds.
1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

– The maximum voltage is over 0.6V at least one time.

– The minimum voltage is below 0.3V at least one time.



- The voltage never exceeds 1.0V.

CAUTION:

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

Removal and Installation

UBS001FY

HEATED OXYGEN SENSOR 1

Refer to EM-15, "Removal and Installation" .

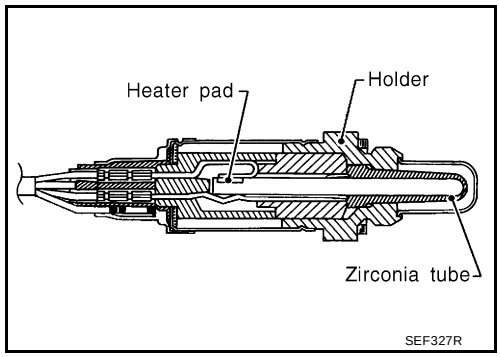
DTC P0138, P0158 HO2S2

PFP:226A0

Component Description

UBS001FZ

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



CONSULT-II Reference Value in Data Monitor Mode

UBS001G0

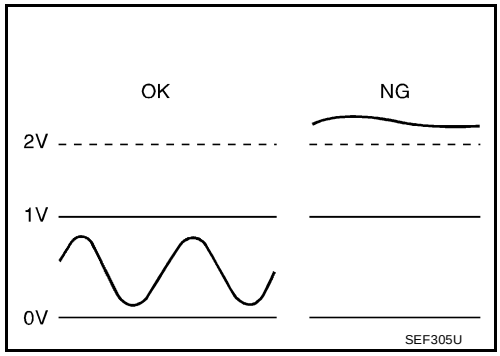
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1)/(B2)	● Engine: After warming up	Revving engine from idle to 3,000 rpm	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)/(B2)			LEAN ←→ RICH

On Board Diagnosis Logic

UBS001G1

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



DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0138 (Bank 1) P0158 (Bank 2)	● An excessively high voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Heated oxygen sensor 2

DTC Confirmation Procedure

UBS001G2

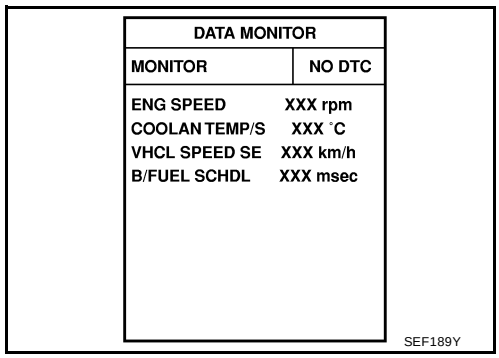
CAUTION:
Always drive vehicle at a safe speed.

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

WITH CONSULT-II

1. Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
3. Stop vehicle with engine running.
4. Let engine idle for 1 minute.
5. Maintain the following conditions for at least 5 consecutive seconds.

ENG SPEED	1,000 - 3,000 rpm (A/T) 1,000 - 3,600 rpm (M/T)
VHCL SPEED SE	68 - 130 km/h (42 - 81 MPH)
B/FUEL SCHDL	2.0 - 12.5 msec (A/T) 2.0 - 10.0 msec (M/T)
Selector lever	Suitable position



6. If 1st trip DTC is detected, go to EC-239, "Diagnostic Procedure" .

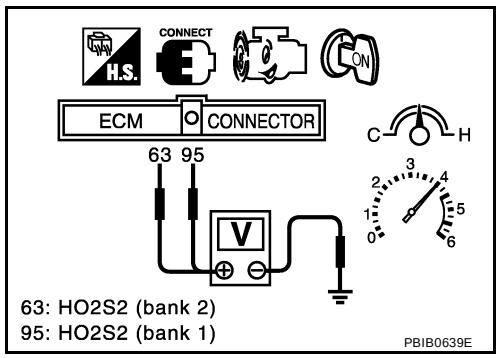
Overall Function Check

UBS001G3

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.

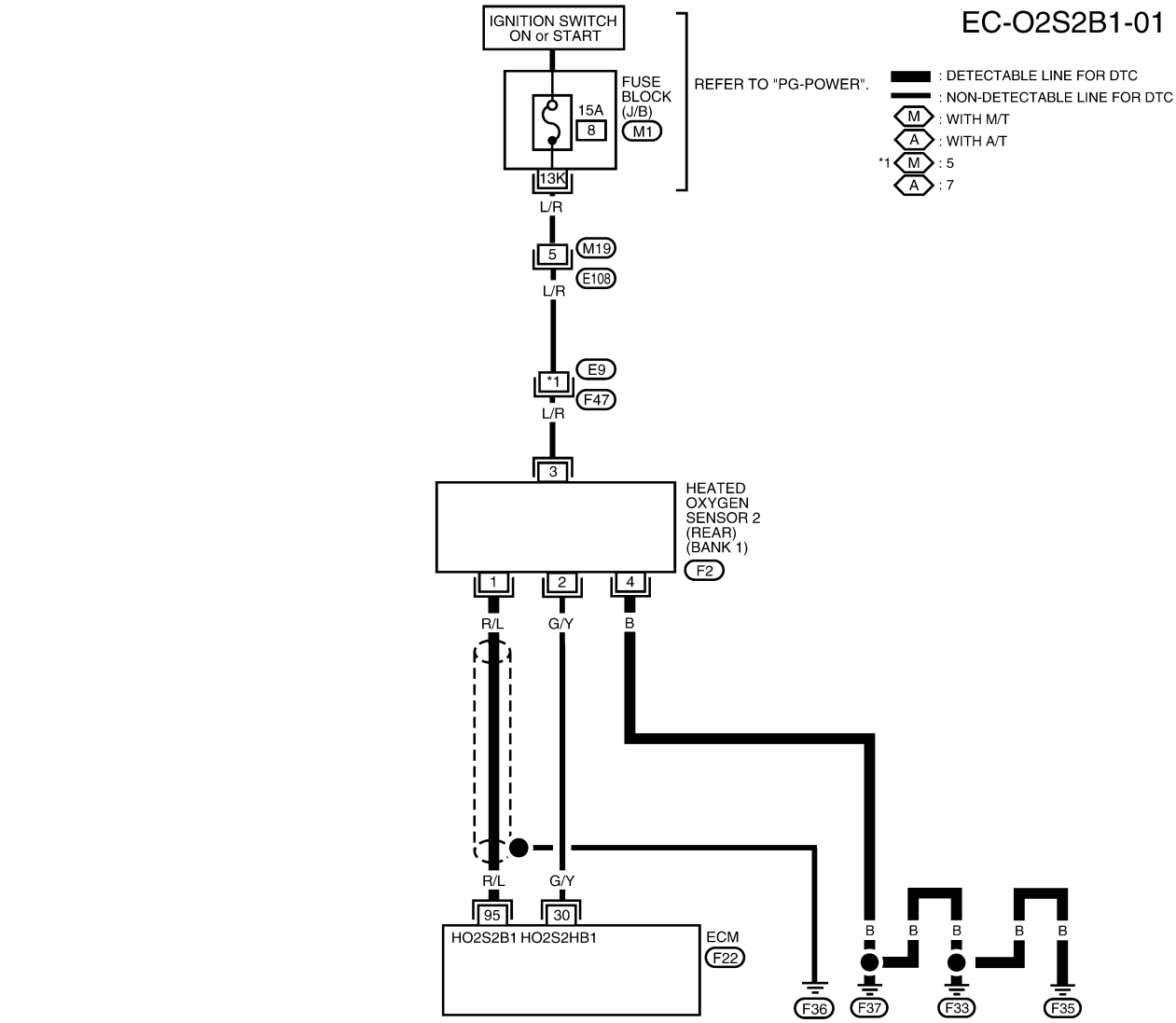
WITHOUT CONSULT-II

1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Set voltmeter probes between ECM terminals 63 (HO2S2 bank 2) or 95 (HO2S2 bank 1) and engine ground.
4. Check the voltage after 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 2V during this procedure.
5. If NG, go to EC-239, "Diagnostic Procedure" .



Wiring Diagram
BANK 1

UBS001G4



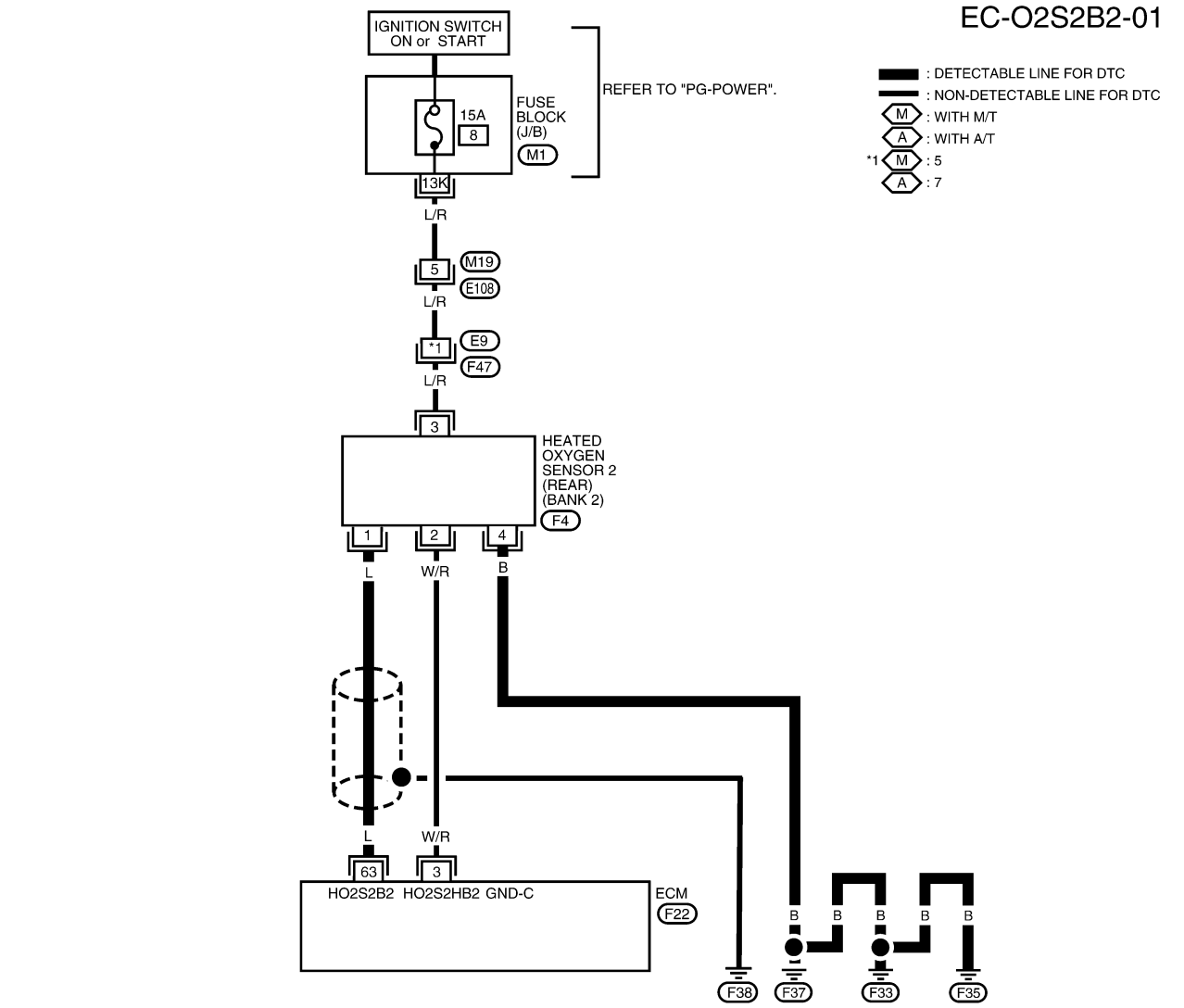
BBWA0114E

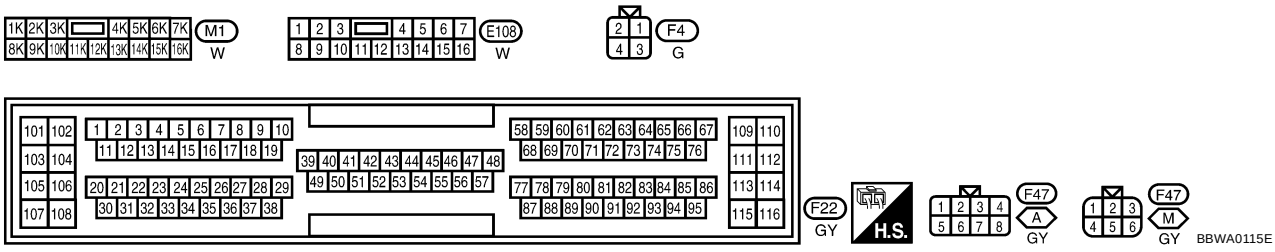
ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
95	R/L	HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)	ENGINE RUNNING FROM IDLE UP TO 2,000 RPM UNDER WARM-UP CONDITION	0 - APPROX. 1.0V

WEC914

BANK 2





ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
63	L	HEATED OXYGEN SENSOR 2 (REAR) (BANK 2)	ENGINE RUNNING FROM IDLE UP TO 2,000 RPM UNDER WARM-UP CONDITION	0 - APPROX. 1.0V

WEC900

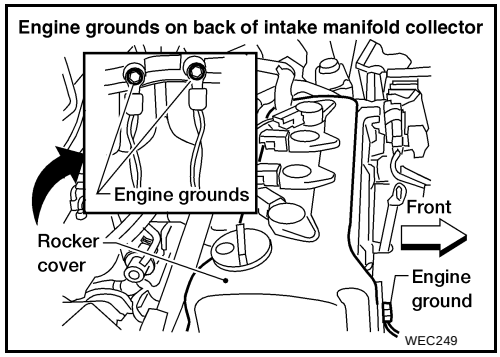
Diagnostic Procedure

UBS001G5

1. RETIGHTEN GROUND SCREWS

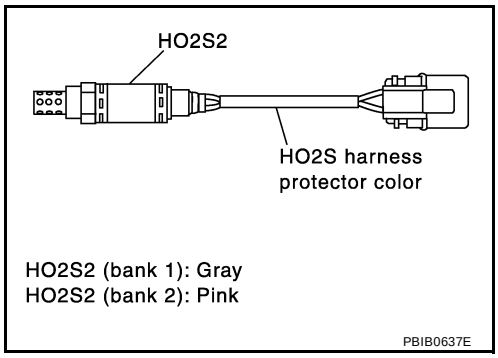
1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

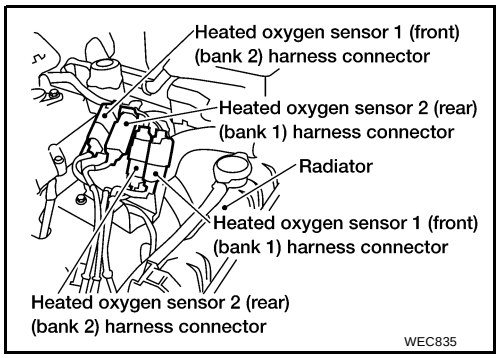
>> GO TO 2.



2. CHECK INPUT SIGNAL CIRCUIT

1. Check the HO2S2 harness protector color, and disconnect the corresponding heated oxygen sensor HO2S2 harness connector and ECM harness connector.





2. Check harness continuity between ECM terminal HO2S2 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0138	95	1	1
P0158	63	1	2

Continuity should exist.

3. Check harness continuity between ECM terminal HO2S2 and ground as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM or Sensor	Ground	
P0138	95 or 1	Ground	1
P0158	63 or 1	Ground	2

Continuity should not exist.

4. Also check harness for short to power.

OK or NG

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

3. CHECK GROUND CIRCUIT

1. Check harness continuity between HO2S2 terminal 4 and engine ground. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to 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 HARNESS CONNECTOR

Check heated oxygen sensor 2 harness connector for water.

Water should not exist.

OK or NG

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

5. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-241, "Component Inspection" .

OK or NG

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

6. CHECK INTERMITTENT INCIDENT

Perform EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

UBS001G6

HEATED OXYGEN SENSOR 2

With CONSULT-II

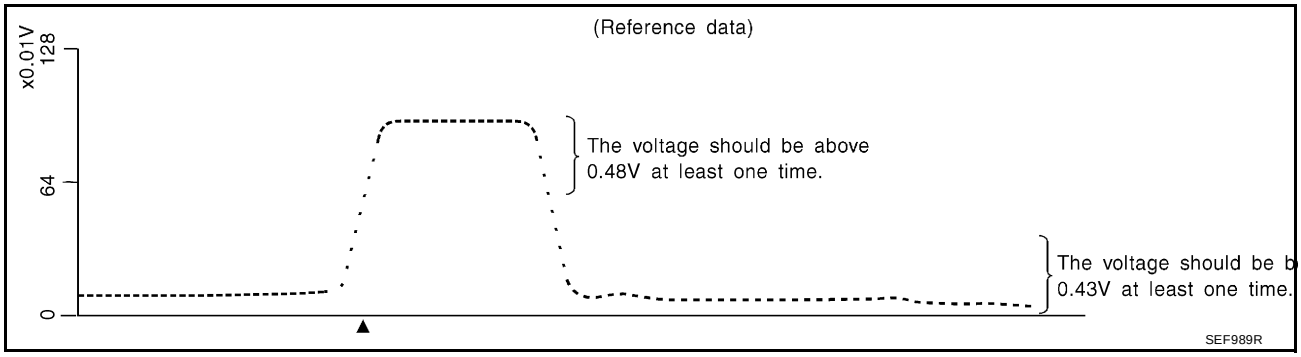
1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)/(B2)” as the monitor item with CONSULT-II.
4. Check “HO2S2 (B1)/(B2)” at idle speed when adjusting “FUEL INJECTION” to ±25%.
   “HO2S2 (B1)/(B2)” should be above 0.48V at least once when the “FUEL INJECTION” is +25%.
   “HO2S2 (B1)/(B2)” should be below 0.43V 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.**

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

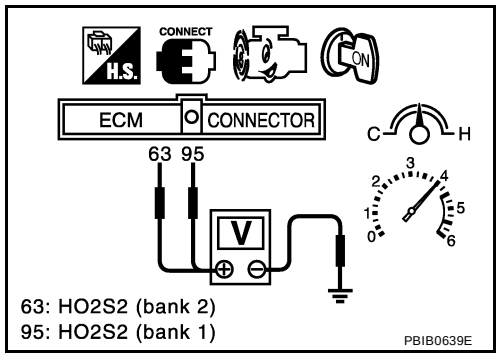
SEF662Y

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



Without CONSULT-II

1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Set voltmeter probes between ECM terminals 63 (HO2S2 bank 2) or 95 (HO2S2 bank 1) and engine ground.
4. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.48V at least once.
   If the voltage is above 0.48V at step 4, step 5 is not necessary.
5. Check the voltage when revving up to 6,000 rpm under no load. Or keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), D position with “OD” OFF (A/T).
   The voltage should be below 0.43V at least once.



CAUTION:

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

Removal and Installation

UBS001G7

HEATED OXYGEN SENSOR 2

Refer to EX-3, "Removal and Installation" .

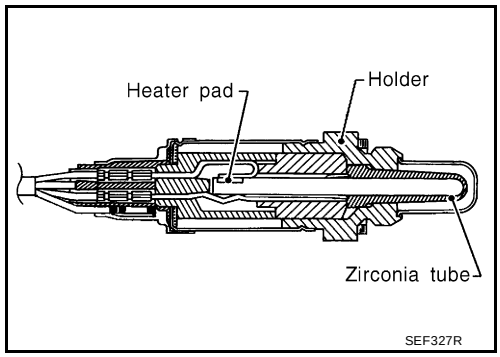
DTC P0139, P0159 HO2S2

PFP:226A0

Component Description

UBS001G8

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



CONSULT-II Reference Value in Data Monitor Mode

UBS001G9

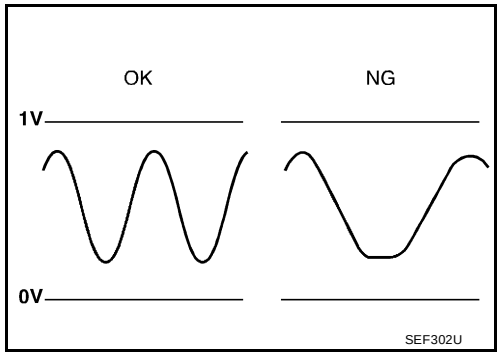
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1)/(B2)	● Engine: After warming up	Revving engine from idle to 3,000 rpm	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)/(B2)			LEAN ←→ RICH

On Board Diagnosis Logic

UBS001GA

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



DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0139 (Bank 1) P0159 (Bank 2)	● It takes more than the specified time for the sensor to respond between rich and lean.	● Harness or connectors (The sensor circuit is open or shorted.) ● Heated oxygen sensor 2 ● Fuel pressure ● Injectors ● Intake air leaks

DTC Confirmation Procedure

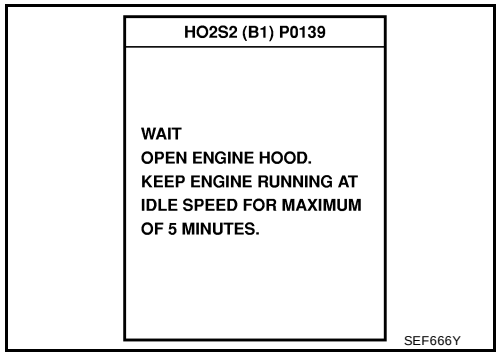
UBS001GB

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

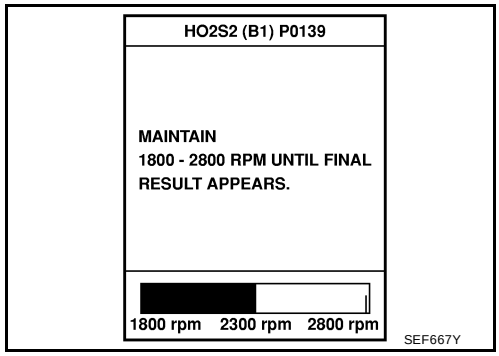
WITH CONSULT-II

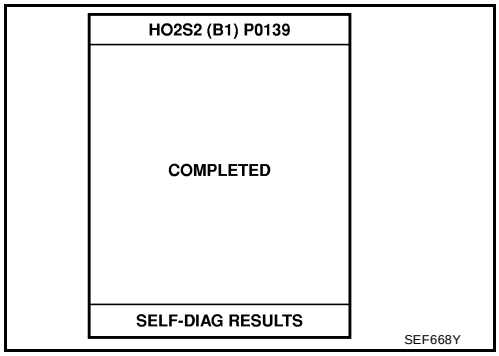
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Turn ignition switch “ON”.
4. Select “DATA MONITOR” mode with CONSULT-II.
5. Make sure that “COOLAN TEMP/S” indicates more than 70°C (158°F).

6. Select “HO2S2 (B1)/(B2) P0139 (P0159)” of “HO2S2 (B1)/(B2)” in “DTC WORK SUPPORT” mode with CONSULT-II.



7. Start engine and follow the instruction of CONSULT-II.





8. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”.
   If NG is displayed, refer to EC-248, "Diagnostic Procedure" .
   If “CANNOT BE DIAGNOSED” is displayed, perform the following.

- Stop engine and cool down until “COOLAN TEMP/S” indicates less than 70°C (158°F).
- Turn ignition switch “ON”.
- Select “DATA MONITOR” mode with CONSULT-II.
- Start engine.
- Return to step 6 again when the “COOLAN TEMP/S” reaches to 70°C (158°F).

Overall Function Check

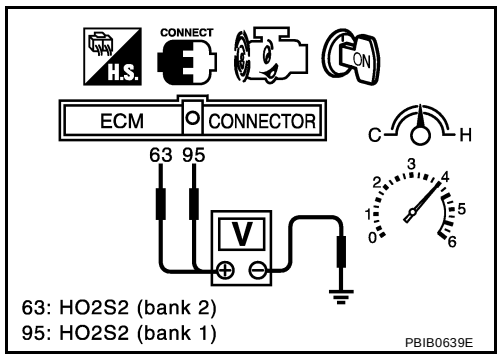
UBS001GC

Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

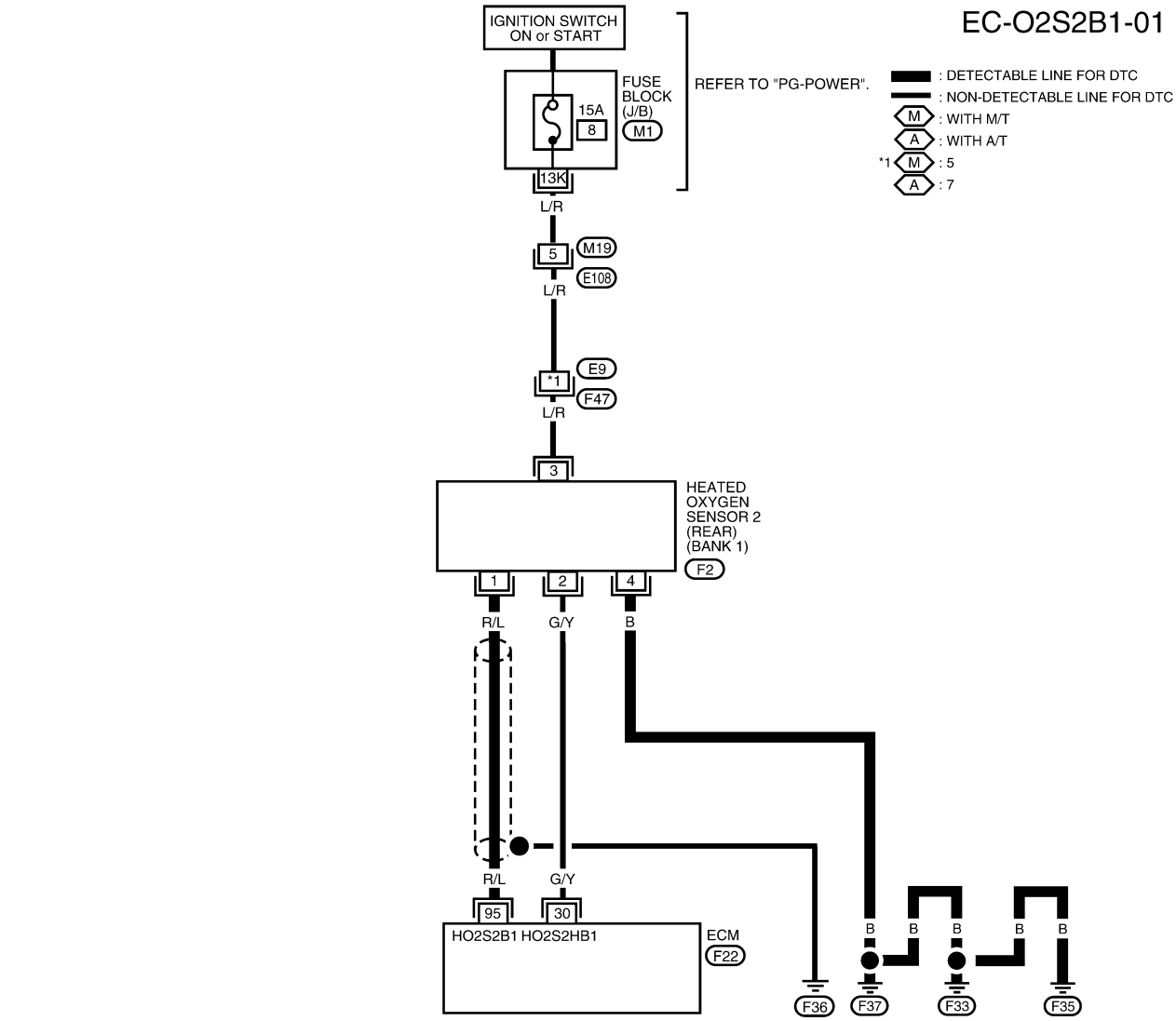
1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.

3. Set voltmeter probes between ECM terminals 63 (HO2S2 bank 2) or 95 (HO2S2 bank 1) and engine ground.
4. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should change at more than 0.06V for 1 second during this procedure.
   If the voltage can be confirmed in step 4, step 5 is not necessary.
5. Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), D position with “OD” OFF (A/T).
   The voltage should change at more than 0.06V for 1 second during this procedure.
6. If NG, go to EC-248, "Diagnostic Procedure" .



Wiring Diagram
BANK 1

UBS001GD



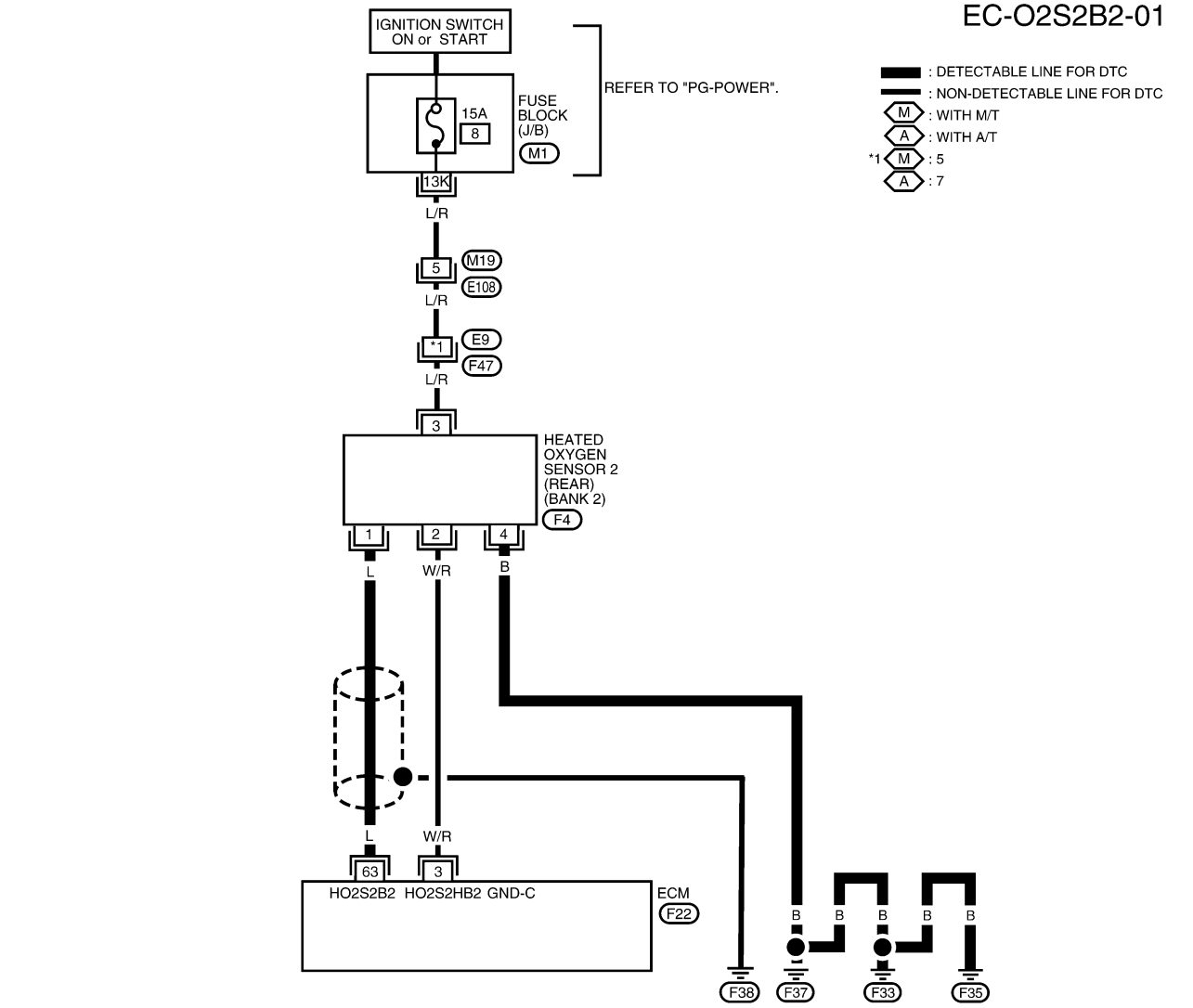
BBWA0114E

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
95	R/L	HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)	ENGINE RUNNING FROM IDLE UP TO 2,000 RPM UNDER WARM-UP CONDITION	0 - APPROX. 1.0V

WEC914

BANK 2



ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
63	L	HEATED OXYGEN SENSOR 2 (REAR) (BANK 2)	ENGINE RUNNING FROM IDLE UP TO 2,000 RPM UNDER WARM-UP CONDITION	0 - APPROX. 1.0V

WEC900

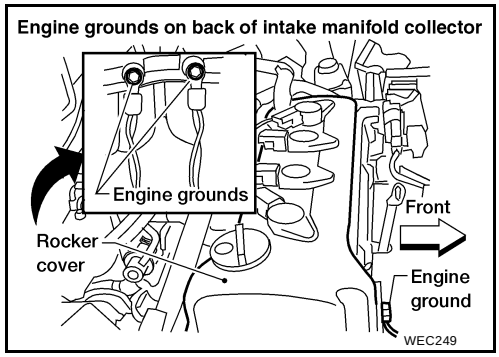
Diagnostic Procedure

UBS001GE

1. RETIGHTEN GROUND SCREWS

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

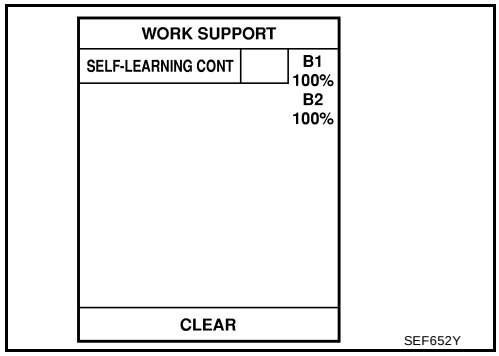
>> GO TO 2.



2. CLEAR THE SELF-LEARNING DATA

With CONSULT-II

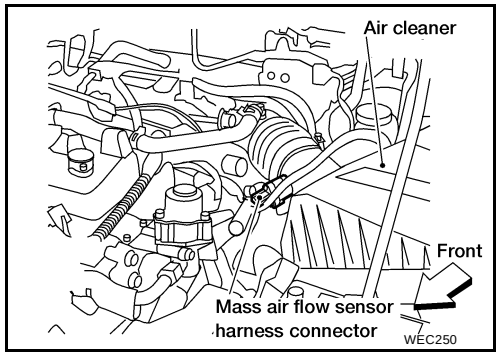
1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171, P0172, P0174, P0175 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 3 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC P0102 is displayed.
6. Erase the 1st trip DTC memory. Refer to EC-73, "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, P0175 detected? Is it difficult to start engine?

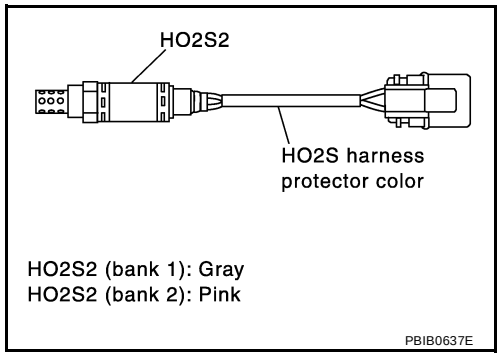


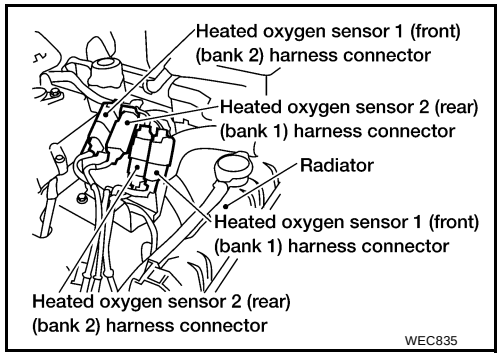
Yes or No

Yes >> Perform trouble diagnosis for DTC P0171, P0172, P0174, P0175. Refer to EC-252 , EC-261 .
No >> GO TO 3.

3. CHECK INPUT SIGNAL CIRCUIT

1. Turn ignition switch “OFF”.
2. Check the HO2S2 harness protector color, and disconnect the corresponding heated oxygen sensor 2 harness connector and ECM harness connector.





3. Check harness continuity between ECM terminal and HO2S2 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0139	95	1	1
P0159	63	1	2

Continuity should exist.

4. Check harness continuity between ECM terminal HO2S2 and ground as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM or Sensor	Ground	
P0139	95 or 1	Ground	1
P0159	63 or 1	Ground	2

Continuity should not exist.

5. Also check harness for short to power.

OK or NG

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

4. CHECK GROUND CIRCUIT

1. Check harness continuity between HO2S2 terminal 4 and engine ground.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Also check harness for short to 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

Refer to EC-250, "Component Inspection" .

OK or NG

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

6. CHECK INTERMITTENT INCIDENT

Perform EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

UBS001GF

HEATED OXYGEN SENSOR 2

With CONSULT-II

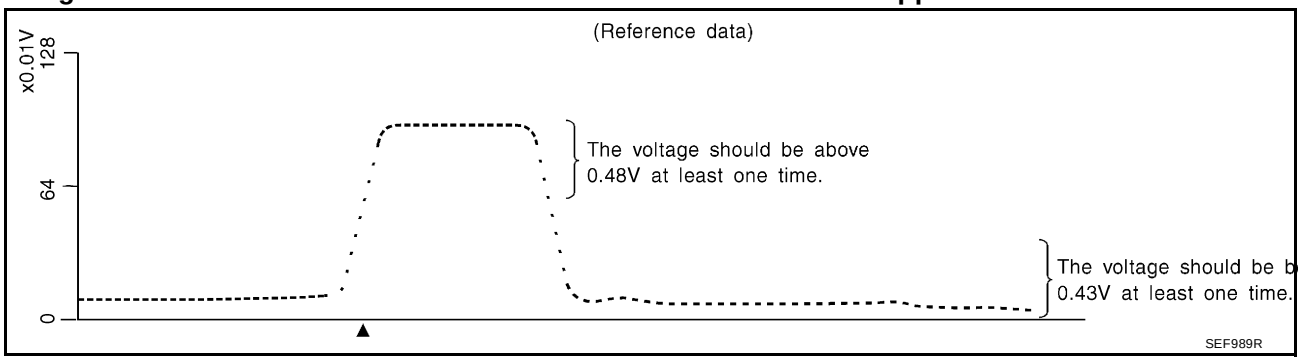
1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)/(B2)” as the monitor item with CONSULT-II.
4. Check “HO2S2 (B1)/(B2)” at idle speed when adjusting “FUEL INJECTION” to ±25%.
   “HO2S2 (B1)/(B2)” should be above 0.48V at least once when the “FUEL INJECTION” is +25%.
   “HO2S2 (B1)/(B2)” should be below 0.43V at least once when the “FUEL INJECTION” is −25%.

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

SEF662Y

CAUTION:

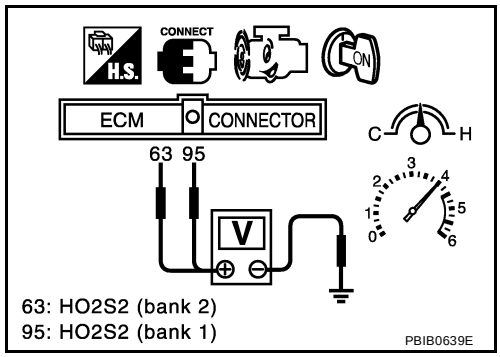
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18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



Without CONSULT-II

1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.

2. Stop vehicle with engine running.
3. Set voltmeter probes between ECM terminals 63 (HO2S2 bank 2) or 95 (HO2S2 bank 1) and engine ground.
4. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.48V at least once.
   If the voltage is above 0.48V at step 4, step 5 is not necessary.
5. Check the voltage when revving up to 6,000 rpm under no load. Or keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), D position with “OD” OFF (A/T).
   The voltage should be below 0.43V at least once.



CAUTION:

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

Removal and Installation

UBS001GG

HEATED OXYGEN SENSOR 2

Refer to EX-3, "Removal and Installation" .

DTC P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

PFP:16600

On Board Diagnosis Logic

UBS001GH

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the heated oxygen sensor 1 (bank 1)/(bank 2). 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 a fuel injection system malfunction and lights up the MIL (2 trip detection logic).

Sensor	Input Signal to ECM	ECM function	Actuator
Heated oxygen sensor 1 (bank 1)/(bank 2)	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection & mixture ratio control	Injectors

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0171 (Bank 1) P0174 (Bank 2)	● Fuel injection system does not operate properly. ● The amount of mixture ratio compensation is too large. (The mixture ratio is too lean.)	● Intake air leaks ● Heated oxygen sensor 1 (bank 1)/(bank 2) ● Injectors ● Exhaust gas leaks ● Incorrect fuel pressure ● Lack of fuel ● Mass air flow sensor ● Incorrect PCV hose correction

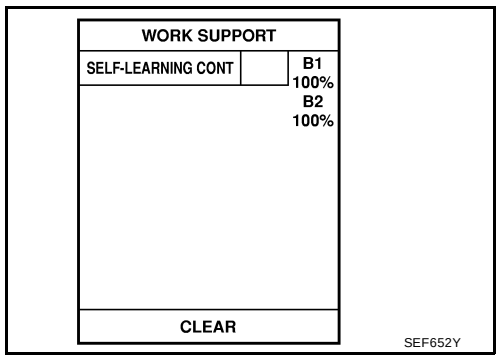
DTC Confirmation Procedure

UBS001GI

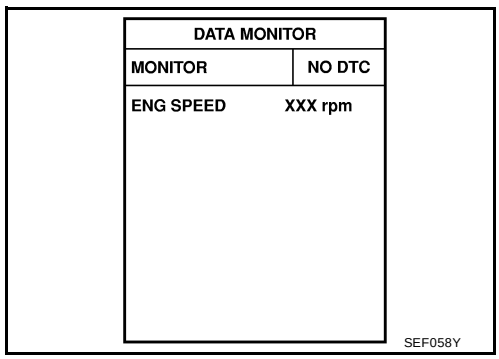
NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

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”.

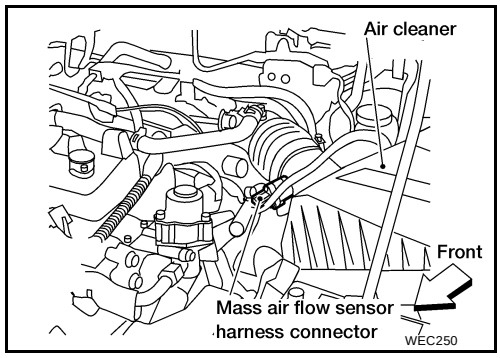


5. Select “DATA MONITOR” mode with CONSULT-II.
6. Start engine again and let it idle for at least 10 minutes.
   The 1st trip DTC P0171 (P0174) should be detected at this stage, if a malfunction exists. If so, go to EC-256, "Diagnostic Procedure" .
7. If it is difficult to start engine at step 6, the fuel injection system has a malfunction.
8. Crank engine while depressing accelerator pedal. If engine starts, go to EC-256, "Diagnostic Procedure" . If engine does not start, visually check for exhaust and intake air leak.



WITH GST

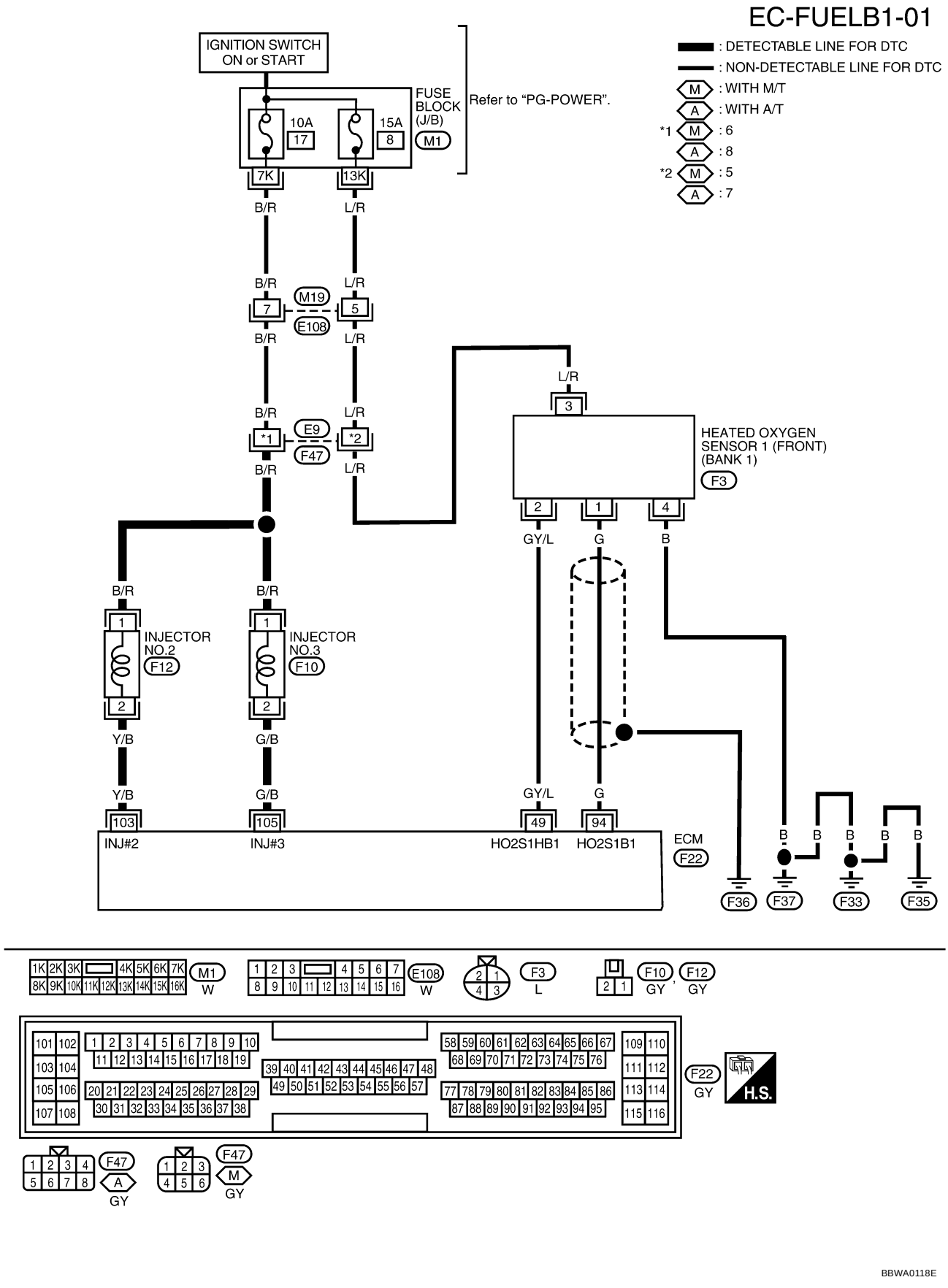
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Disconnect mass air flow sensor harness connector. Then restart and run engine for at least 3 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Select “MODE 7” with GST. Make sure 1st trip DTC P0102 is detected.
6. Select “MODE 4” with GST and erase the 1st trip DTC P0102.
7. Start engine again and run it for at least 10 minutes at idle speed.
8. Select “MODE 7” with GST. The 1st trip DTC P0171 (P0174) should be detected at this stage, if a malfunction exists. If so, go to EC-256, "Diagnostic Procedure" .



9. If it is difficult to start engine at step 8, the fuel injection system has a malfunction.
10. Crank engine while depressing accelerator pedal. If engine starts, go to EC-256, "Diagnostic Procedure" . If engine does not start, visually check for exhaust and intake air leak.

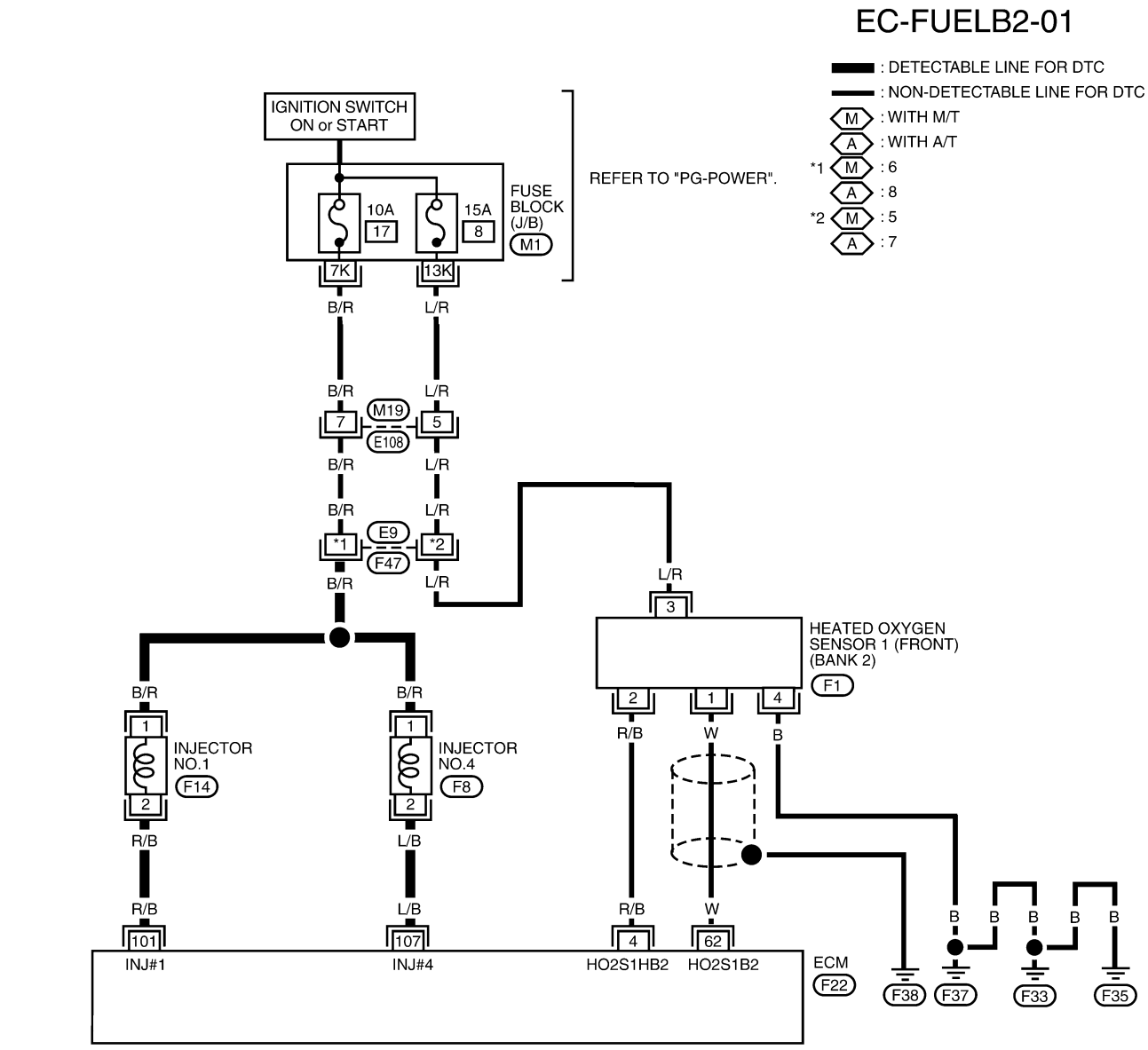
Wiring Diagram
BANK 1

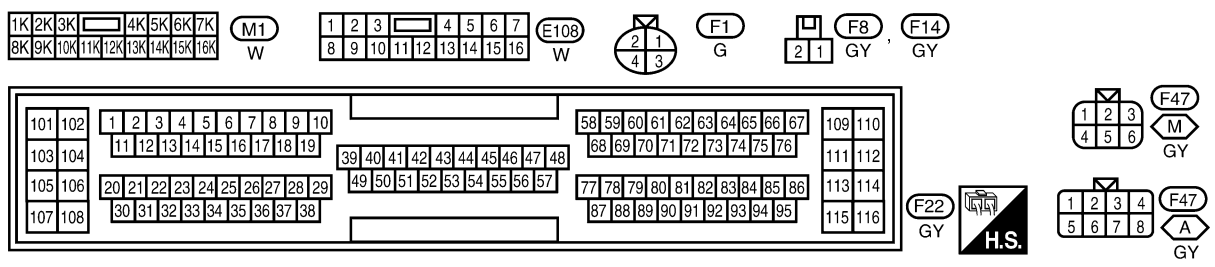
UBS001GJ



BBWA0118E

BANK 2





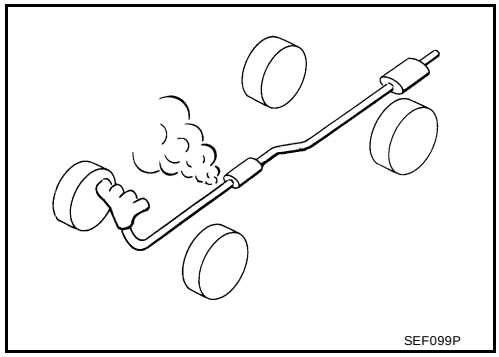
BBWA0119E

Diagnostic Procedure

UBS001GK

1. CHECK EXHAUST AIR LEAK

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



OK or NG

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

2. CHECK FOR INTAKE AIR LEAK AND PCV HOSE

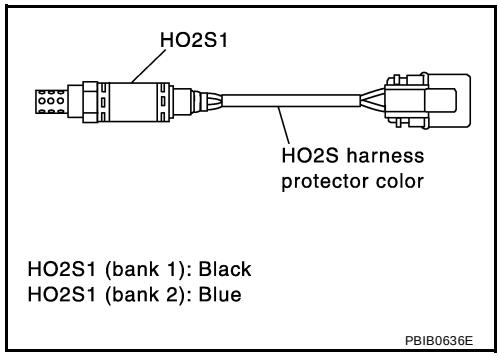
1. Listen for an intake air leak after the mass air flow sensor.
2. Check PCV hose connection.

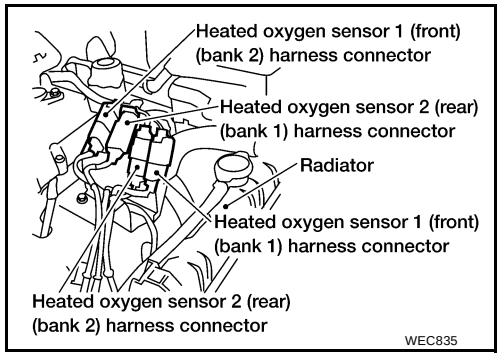
OK or NG

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

3. CHECK HEATED OXYGEN SENSOR 1 (BANK 1)/(BANK 2) CIRCUITS

1. Turn ignition switch “OFF”.
2. Check the HO2S1 (bank 1)/(bank 2) harness protector color, and disconnect the corresponding heated oxygen sensor 1 (bank 1)/(bank 2) harness connector and ECM harness connector.





3. Check harness continuity between ECM terminal and HO2S1 (bank 1)/(bank 2) terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0171	94	1	1
P0174	62	1	2

Continuity should exist.

4. Check harness continuity between ECM terminal or HO2S1 (bank 1)/(bank 2) and ground as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM or Sensor	Ground	
P0171	94 or 1	Ground	1
P0174	62 or 1	Ground	2

Continuity should not exist.

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

OK or NG

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

4. CHECK FUEL PRESSURE

1. Release fuel pressure to zero.
   Refer to EC-58 .
2. Install fuel pressure gauge and check fuel pressure.

At idling:

When fuel pressure regulator vacuum hose is connected.

235 kPa (2.4 kg/cm^2 , 34 psi)

When fuel pressure regulator vacuum hose is disconnected.

294 kPa (3.0 kg/cm^2 , 43 psi)

OK or NG

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

5. DETECT MALFUNCTIONING PART

Check the following.

- Fuel pump and circuit Refer to EC-554 .
- Fuel pressure regulator Refer to EC-59 .
- Fuel lines. Refer to MA-18, "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.

at idling: 1.4 - 4.0 g·m/sec
at 2,500 rpm: 5.0 - 10.0 g·m/sec

With GST

1. Install all removed parts.
2. Check mass air flow sensor signal in MODE 1 with GST.

at idling: 1.4 - 4.0 g·m/sec
at 2,500 rpm: 5.0 - 10.0 g·m/sec

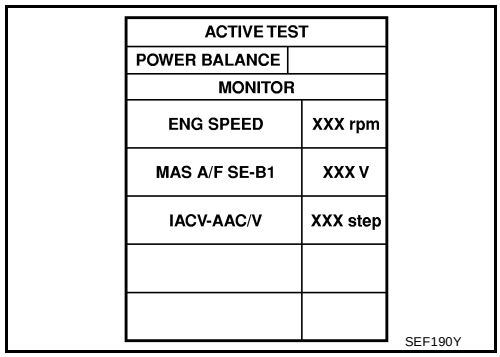
OK or NG

OK >> GO TO 7.
NG >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-172 .

7. CHECK FUNCTION OF INJECTORS

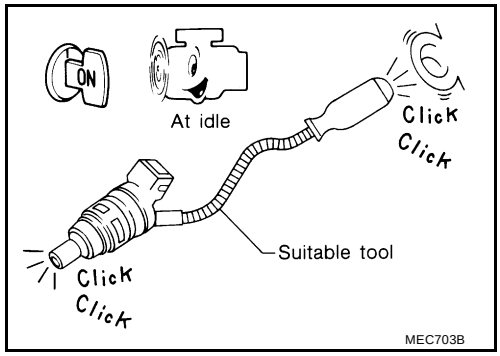
With CONSULT-II

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



Without CONSULT-II

1. Start engine.
2. Listen to each injector operating sound.
   Clicking noise should be heard.



OK or NG

OK >> GO TO 8.
NG >> Perform trouble diagnosis for EC-546, "INJECTOR" .

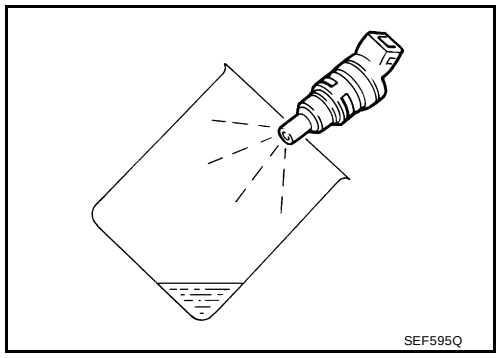
8. REMOVE INJECTOR

1. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
2. Turn ignition switch “OFF”.
3. Remove injector with fuel tube assembly. Refer to EM-15, "Removal and Installation" .
   Keep fuel hose and all injectors connected to injector gallery. The injector harness connectors should remain connected.

>> GO TO 9.

9. CHECK INJECTOR

1. Disconnect all ignition wires.
2. Place pans or saucers under each injector.
3. Crank engine for about 3 seconds. Make sure that fuel sprays out from injectors.
   Fuel should be sprayed evenly for each cylinder.



OK or NG

OK >> GO TO 10.
NG >> Replace injectors from which fuel does not spray out. Always replace O-ring with new one.

10. CHECK INTERMITTENT INCIDENT

Perform EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

DTC P0172, P0175 FUEL INJECTION SYSTEM FUNCTION

PFP:16600

On Board Diagnosis Logic

UBS001GL

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the heated oxygen sensor 1 (bank 1)/(bank 2). The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios.
In case the amount of the compensation value is extremely large (The actual mixture ratio is too rich.), the ECM judges the condition as the fuel injection system malfunction and lights up the MIL (2 trip detection logic).

Sensor	Input Signal to ECM	ECM function	Actuator
Heated oxygen sensor 1 (bank 1)/(bank 2)	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection & mixture ratio control	Injectors

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0172 (Bank 1) P0175 (Bank 2)	● Fuel injection system does not operate properly. ● The amount of mixture ratio compensation is too large. (The mixture ratio is too rich.)	● Heated oxygen sensor 1 (bank 1)/(bank 2) ● Injectors ● Exhaust gas leaks ● Incorrect fuel pressure ● Mass air flow sensor

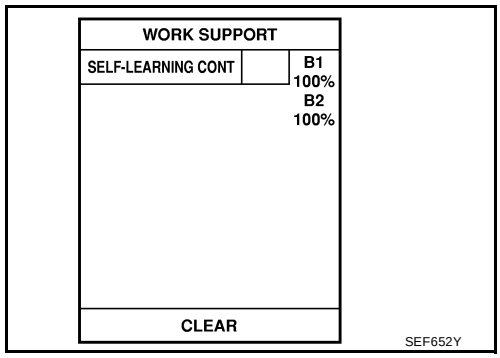
DTC Confirmation Procedure

UBS001GM

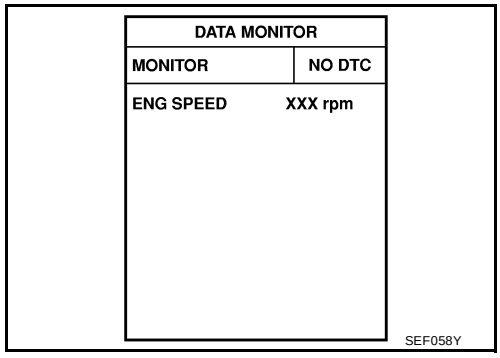
NOTE:
If “DTC Confirmation Procedure ” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

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” or “START”.



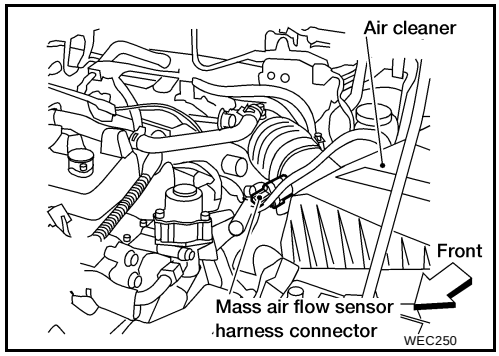
5. Select “DATA MONITOR” mode with CONSULT-II.
6. Start engine again and let it idle for at least 10 minutes.
   The 1st trip DTC P0172 (P0175) should be detected at this stage, if a malfunction exists. If so, go to EC-265, "Diagnostic Procedure" .
7. If it is difficult to start engine at step 6, the fuel injection system has a malfunction.
8. Crank engine while depressing accelerator pedal. If engine starts, go to EC-265, "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.

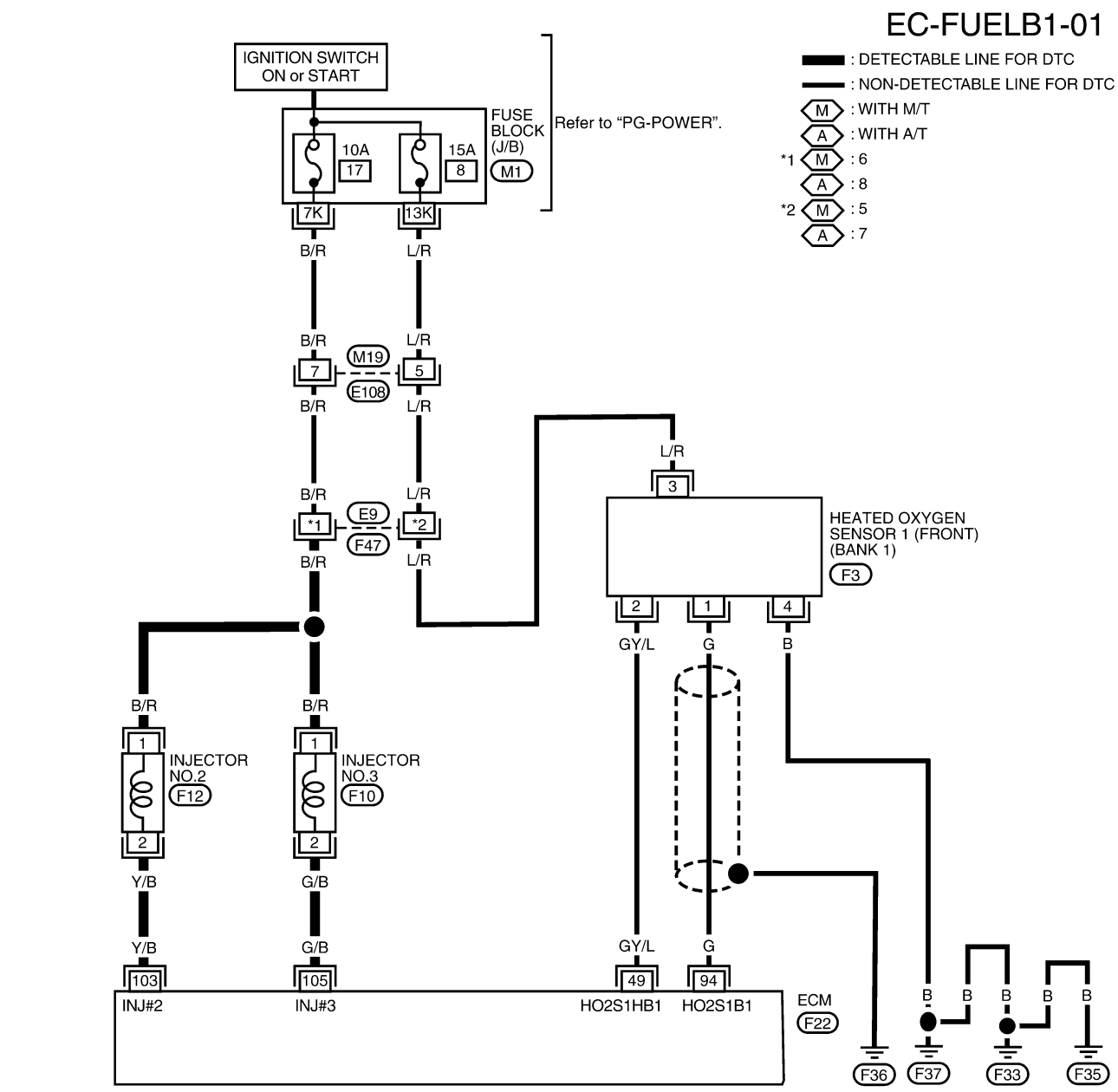
3. Disconnect mass air flow sensor harness connector. Then restart and run engine for at least 3 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Select “MODE 7” with GST. Make sure 1st trip DTC P0102 is detected.
6. Select “MODE 4” with GST and erase the 1st trip DTC P0102.
7. Start engine again and run it for at least 10 minutes at idle speed.
8. Select “MODE 7” with GST. The 1st trip DTC P0172 (P0175) should be detected at this stage, if a malfunction exists. If so, go to EC-265, "Diagnostic Procedure" .

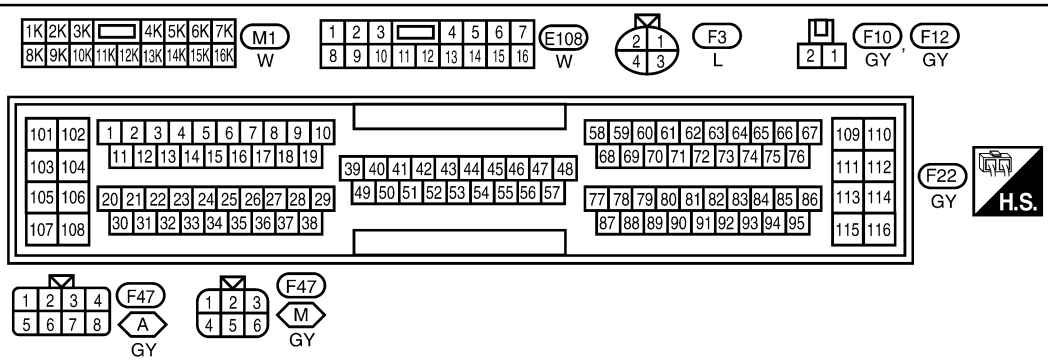


9. If it is difficult to start engine at step 8, the fuel injection system has a malfunction.
10. Crank engine while depressing accelerator pedal.
    If engine starts, go to EC-265, "Diagnostic Procedure" . If engine does not start, remove ignition plugs and check for fouling, etc.

Wiring Diagram
BANK 1

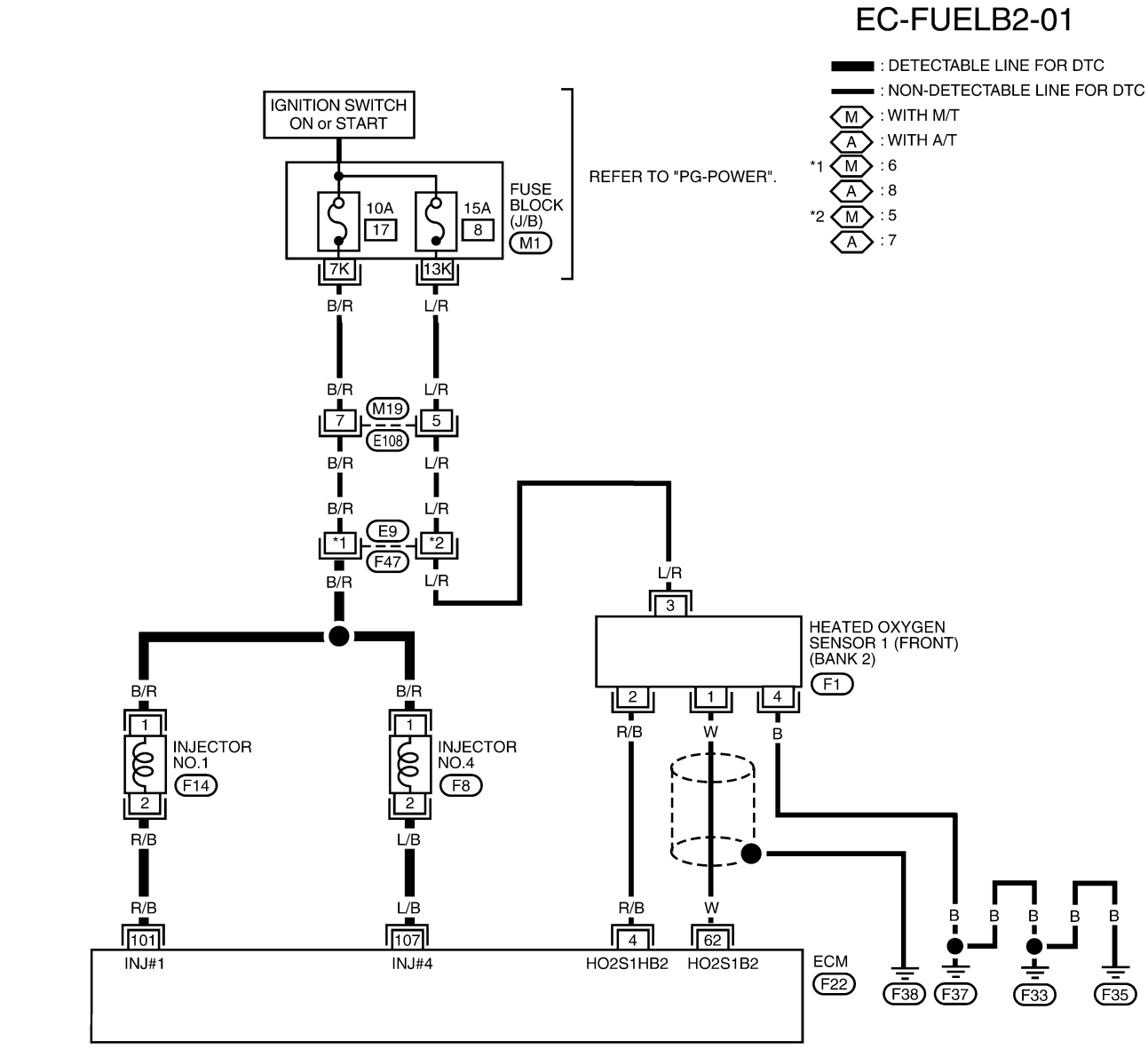
UBS001GN

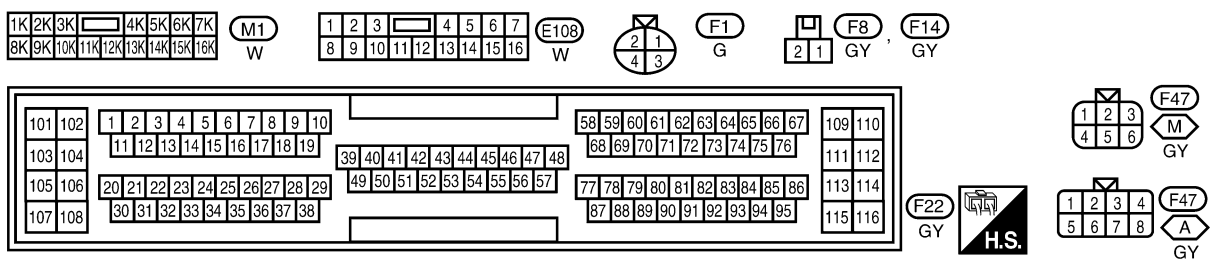




BBWA0118E

BANK 2





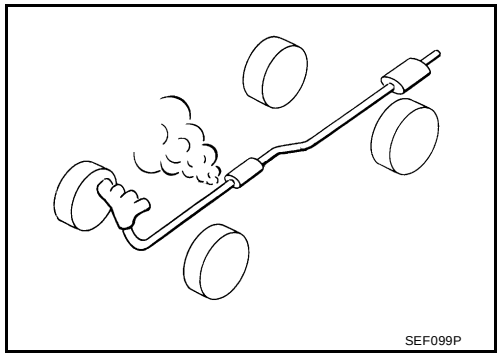
BBWA0119E

Diagnostic Procedure

UBS001GO

1. CHECK FOR EXHAUST AIR LEAK

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

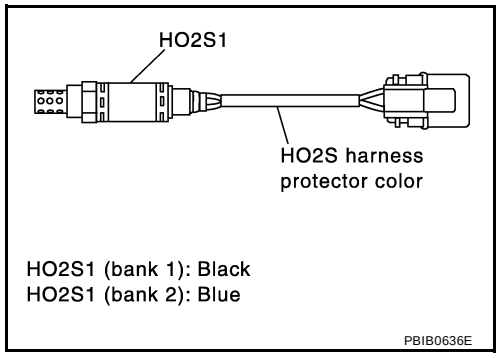


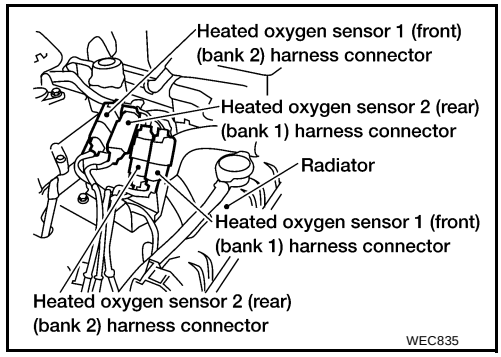
OK or NG

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

2. CHECK HEATED OXYGEN SENSOR 1 CIRCUIT

1. Turn ignition switch “OFF”.
2. Check the HO2S1 (bank 1)/(bank 2) harness protector color, and disconnect the corresponding heated oxygen sensor 1 (bank 1)/(bank 2) harness connector and ECM harness connector.





3. Check harness continuity between ECM terminal and HO2S1 (bank 1)/(bank 2) terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0172	94	1	1
P0175	62	1	2

Continuity should exist.

4. Check harness continuity between ECM terminal or HO2S1 (bank 1)/(bank 2) and ground as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM or Sensor	Ground	
P0172	94 or 1	Ground	1
P0175	62 or 1	Ground	2

Continuity should not exist.

5. Also check harness for short to power.

OK or NG

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

3. CHECK FUEL PRESSURE

1. Release fuel pressure to zero.
   Refer to EC-58, "FUEL PRESSURE RELEASE" .
2. Install fuel pressure gauge and check fuel pressure.

At idling:

When fuel pressure regulator vacuum hose is connected.

235 kPa (2.4 kg/cm^2 , 34 psi)

When fuel pressure regulator vacuum hose is disconnected.

294 kPa (3.0 kg/cm^2 , 43 psi)

OK or NG

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

4. DETECT MALFUNCTIONING PART

Check the following.

- Fuel pump and circuit (Refer to EC-554 .)
- Fuel pressure regulator (Refer to EC-59 .)

>> Repair or replace.

5. 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.

at idling: 1.4 - 4.0 g·m/sec
at 2,500 rpm: 5.0 - 10.0 g·m/sec

With GST

1. Install all removed parts.
2. Check mass air flow sensor signal in MODE 1 with GST.

at idling: 1.4 - 4.0 g·m/sec
at 2,500 rpm: 5.0 - 10.0 g·m/sec

OK or NG

OK >> GO TO 6.
NG >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-172 .

6. CHECK FUNCTION OF INJECTORS

With CONSULT-II

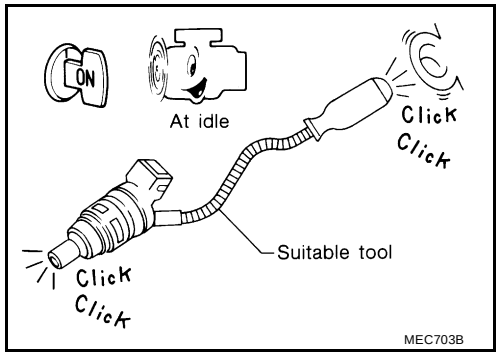
1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-II.
3. Make sure that each circuit produces a momentary engine speed drop.

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

SEF190Y

Without CONSULT-II

1. Start engine.
2. Listen to each injector operating sound.
   Clicking noise should be heard.



OK or NG

OK >> GO TO 7.
NG >> Perform trouble diagnosis for “INJECTORS”, EC-546 .

7. REMOVE INJECTOR

1. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
2. Turn ignition switch “OFF”.
3. Remove injector assembly. Refer to EM-15, "Removal and Installation" .
   Keep fuel hose and all injectors connected to injector gallery.

>> GO TO 8.

8. CHECK INJECTOR

1. Disconnect all injector harness connectors.
2. Disconnect all ignition coil harness connectors.
3. Prepare pans or saucers under each injectors.
4. Crank engine for about 3 seconds.
   Make sure fuel does not drip from injector.

OK or NG

OK (Does not drip)>>GO TO 9.
NG (Drips)>>Replace the injectors from which fuel is dripping. Always replace O-ring with new one.

9. CHECK INTERMITTENT INCIDENT

Perform EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

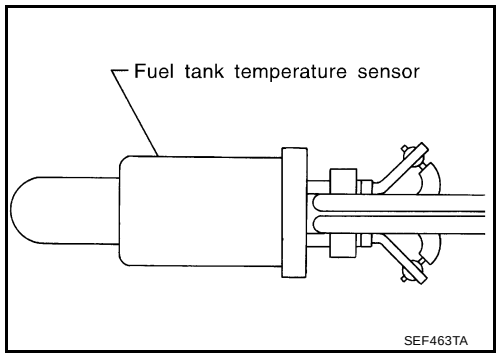
DTC P0181, P0182, P0183 FTT SENSOR

PFP:22630

Component Description

UBS001GP

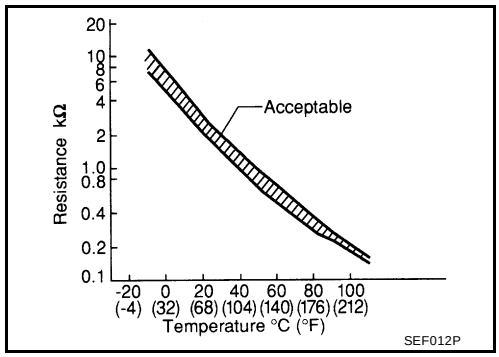
The fuel tank temperature sensor is used to detect the fuel temperature inside the fuel tank. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the fuel temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical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



<Reference data>

Fluid temperature °C (°F)	Voltage* V	Resistance kΩ
20 (68)	3.5	2.3 - 2.7
50 (122)	2.2	0.79 - 0.90

*: These data are reference values and are measured between ECM terminal 82 (Fuel tank temperature sensor) and ground.



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

On Board Diagnosis Logic

UBS001GQ

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0182 P0183	● An excessively low (P0182) or high (P0183) voltage is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Fuel tank temperature sensor
P0181	● Rationally incorrect voltage is sent to ECM, compared with the voltage signals from engine coolant temperature sensor and intake air temperature sensor.	

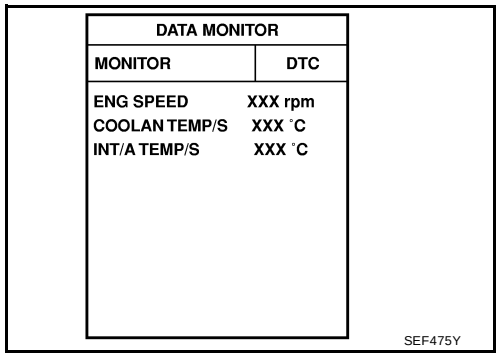
DTC Confirmation Procedure

UBS001GR

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

WITH CONSULT-II

1. Turn ignition switch “ON”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 10 seconds.
   If 1st trip DTC is detected, go to EC-273, "Diagnostic Procedure"
   .
   If the result is OK, go to following step.
4. Check “COOLAN TEMP/S” signal.
   If the signal is less than 50°C (122°F), the result will be OK.
   If the signal is above 50°C (122°F), go to the following step.
5. Cool engine down until “COOLAN TEMP/S” signal is less than 50°C (122°F).
6. Wait at least 10 seconds.
7. If 1st trip DTC is detected, go to EC-273, "Diagnostic Procedure" .



WITH GST

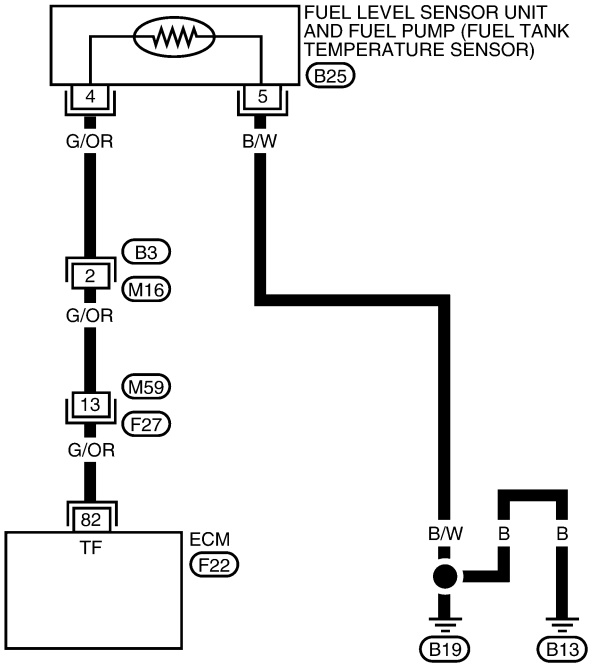
Follow the procedure “With CONSULT-II” above.

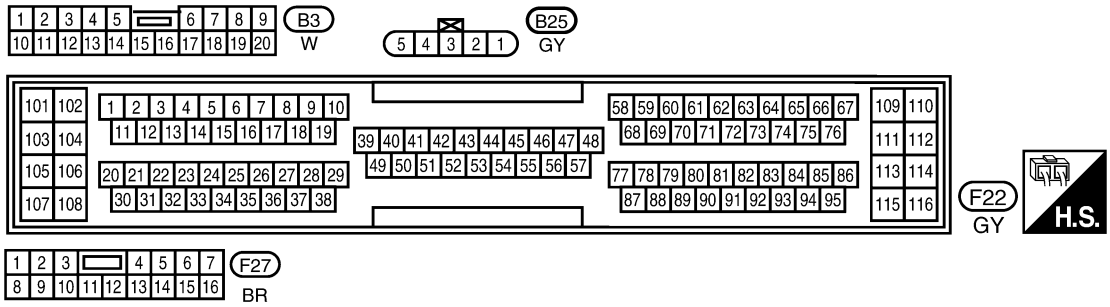
Wiring Diagram

UBS001GS

EC-FTTS-01

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





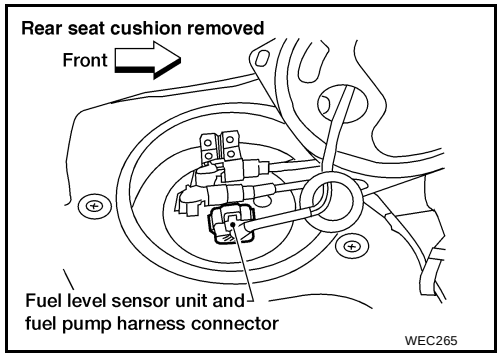
WEC573

Diagnostic Procedure

UBS001GT

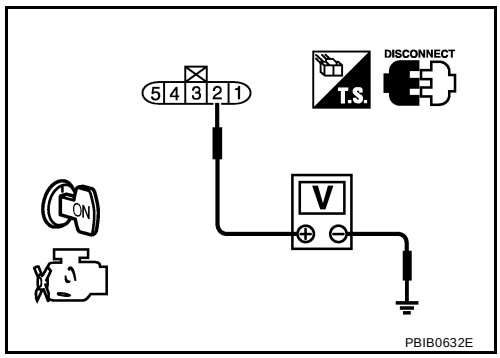
1. CHECK POWER SUPPLY

1. Turn ignition switch “OFF”.
2. Disconnect fuel level sensor unit and fuel pump harness connector.



3. Turn ignition switch “ON”.
4. Check voltage between fuel level sensor unit and fuel pump terminal 4 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

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

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M59, F27
- Harness connectors B3, M16
- Harness for open or short between ECM and fuel level sensor unit and fuel pump

>> Repair harness or connector.

3. CHECK GROUND CIRCUIT

1. Turn ignition switch “OFF”.
2. Check harness continuity between fuel level sensor unit and fuel pump terminal 5 and body ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

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

4. CHECK FUEL TANK TEMPERATURE SENSOR

Refer to EC-274, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace fuel tank temperature sensor.

5. CHECK INTERMITTENT INCIDENT

Perform EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

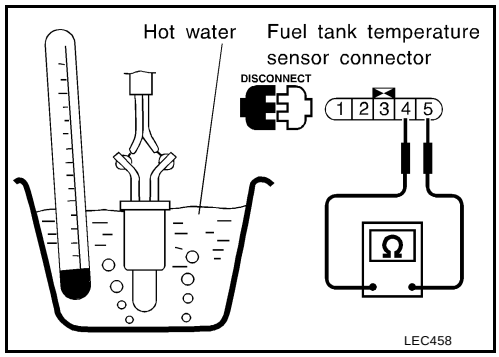
UBS001GU

FUEL TANK TEMPERATURE SENSOR

Check resistance by heating with hot water or heat gun as shown in the figure.

Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90

If NG, replace fuel tank temperature sensor.



Removal and Installation

UBS001GV

FUEL TANK TEMPERATURE SENSOR

Refer to FL-3, "QG18DE (EXCEPT CALIF. CA MODEL)" .

DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION

PFP:00019

System Description

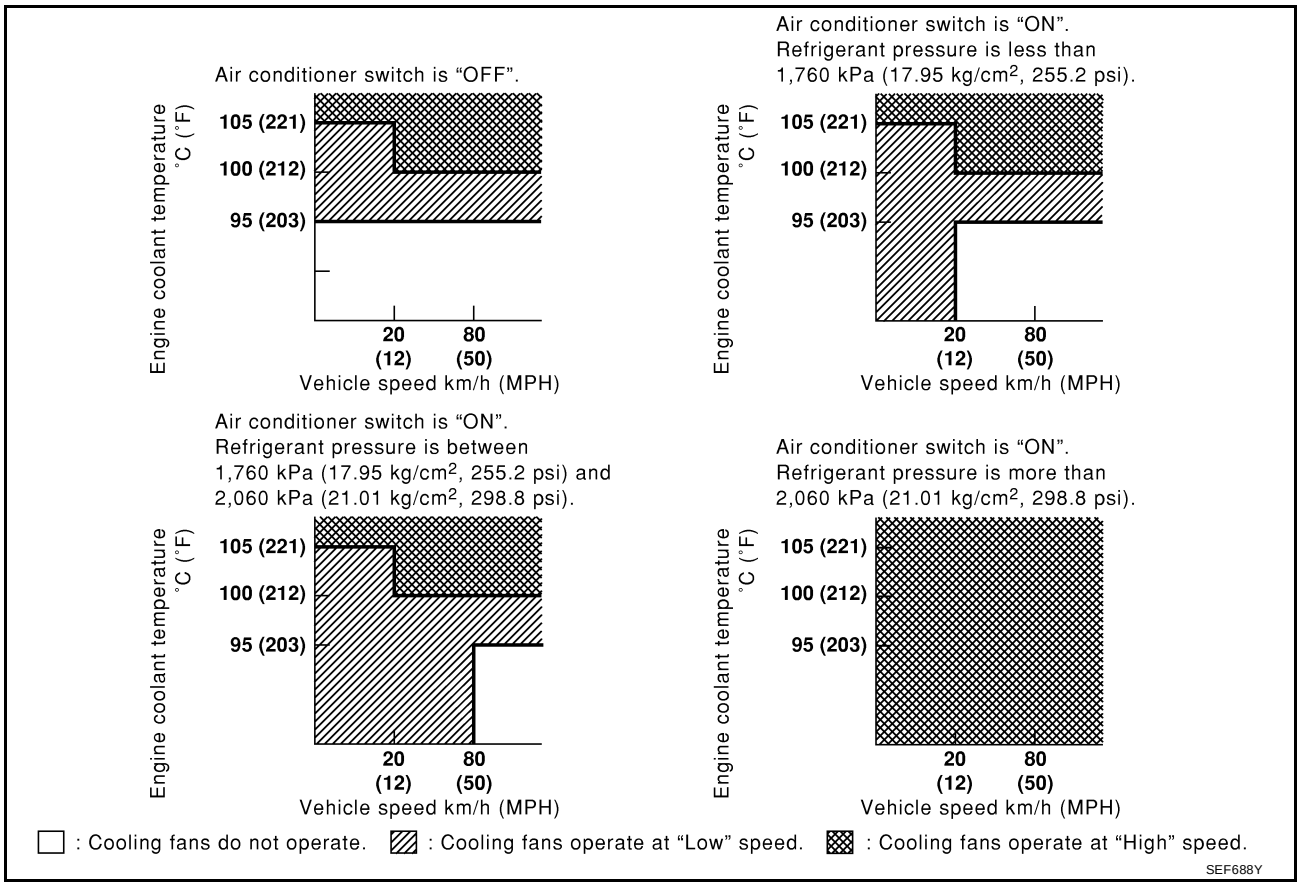
UBS001GW

COOLING FAN CONTROL

Sensor	Input Signal to ECM	ECM function	Actuator
Vehicle speed sensor	Vehicle speed	Cooling fan control	Cooling fan relay(s)
Engine coolant temperature sensor	Engine coolant temperature		
Air conditioner switch	Air conditioner “ON” signal		
Ignition switch	Start signal		
Refrigerant pressure sensor	Refrigerant pressure		

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].

OPERATION



CONSULT-II Reference Value in Data Monitor Mode

UBS001GX

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

MONITOR ITEM	CONDITION		SPECIFICATION
COOLING FAN	● After warming up engine, idle the engine. ● Air conditioner switch: OFF	Engine coolant temperature is 94°C (201°F) or less	OFF
		Engine coolant temperature is between 95°C (203°F) and 104°C (219°F)	LOW
		Engine coolant temperature is 105°C (221°F) or more	HIGH

On Board Diagnosis Logic

UBS001GY

This diagnosis checks whether the engine coolant temperature is extraordinary high, even when the load is not heavy.
When malfunction is detected, the malfunction indicator lamp (MIL) will light up even in the first trip.
Malfunction is detected when engine coolant temperature is excessively high under normal engine speed.

Possible Cause

UBS001GZ

- Harness or connectors
  (The cooling fan circuit is open or shorted)
- Cooling fan
- Thermostat
- Improper ignition timing
- Engine coolant temperature sensor
- Blocked radiator
- Blocked front end (Improper fitting of nose mask)
- Crushed vehicle frontal area (Vehicle damaged from a collision but not repaired)
- Blocked air passage by improper installation of front fog lamp or fog lamps.
- Improper mixture ratio of coolant
- Damaged bumper

For more information, refer to EC-287, "Main 12 Causes of Overheating" .

CAUTION:
When a malfunction is indicated, be sure to replace the coolant. Refer to MA-15, "Changing Engine Coolant" . Also, replace the engine oil. Refer to MA-19, "Changing Engine Oil" .

1. **Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute. Be sure to use coolant with the proper mixture ratio. Refer to MA-14, "Anti-freeze Coolant Mixture Ratio" .**
2. **After refilling coolant, run engine to ensure that no water-flow noise is emitted.**

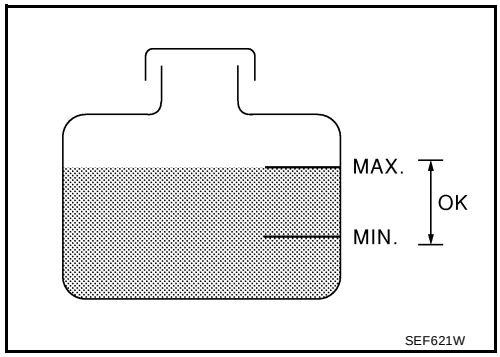
Overall Function Check

UBS001H0

Use this procedure to check the overall function of the coolant overtemperature enrichment protection check, a DTC might not be confirmed.

WARNING:
Never remove the radiator cap when the engine is hot. Serious burns could be caused by high-pressure fluid escaping from the radiator.
Wrap a thick cloth around the cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.

WITH CONSULT-II



1. Check the coolant level and mixture ratio (using coolant tester) in the reservoir tank and radiator.
   Allow engine to cool before checking coolant level and mixture ratio.
   - If the coolant level in the reservoir and/or radiator is below the proper range, go to EC-280, "Diagnostic Procedure" .
   - If the coolant mixture ratio is out of the range of 45 to 55%, replace the coolant in the following procedure MA-15, "Changing Engine Coolant" .
   - Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute like pouring coolant from a kettle. Be sure to use coolant with the proper mixture ratio. Refer to MA-14, "Anti-freeze Coolant Mixture Ratio" .
   - After refilling coolant, run engine to ensure that no water-flow noise is emitted.
   - After checking or replacing coolant, go to step 3 below.
2. Ask the customer if engine coolant has been added. If it has been added, go to EC-280, "Diagnostic Procedure" . After repair, go to the next step.
3. Start engine and let it idle.
4. Make sure that A/C switch is “OFF” and air conditioner is not operating. If NG, check air conditioner circuit. Refer to MTC-21, "TROUBLE DIAGNOSIS" . After repair, go to the next step.
5. Perform “ENG COOLANT TEMP” in “ACTIVE TEST” mode with CONSULT-II at idle.
   - Set “ENG COOLANT TEMP” to 95°C (203°F) and make sure that cooling fan operates at low speed.
     If NG, go to EC-280, "Diagnostic Procedure" .
   - Set “ENG COOLANT TEMP” to 105°C (221°F) and make sure that cooling fan operates at high speed. If NG, go to EC-280, "Diagnostic Procedure" . After repair, go to the next step.
6. Check for blocked coolant passage.
   - Warm up engine to normal operating temperature, then grasp radiator upper hose and lower hose and make sure that coolant flows.
     If NG, go to EC-280, "Diagnostic Procedure" . After repair, go to the next step.
     Be extremely careful not to touch any moving or adjacent parts.
7. Check for blocked radiator air passage.
   - When market fog lamps have been installed, check for damaged fans and clogging in the condenser and radiator.
   - Check the front end for clogging caused by insects or debris.
   - Check for improper fitting of front-end cover, damaged radiator grille or bumper, damaged vehicle front.
     If NG, take appropriate action and then go to the next step.
8. Check function of ECT sensor.
   Refer to step 7 of EC-280, "Diagnostic Procedure" .
   If NG, replace ECT sensor and go to the next step.
9. Check ignition timing. Refer to EC-87, "Basic Inspection" .
   Make sure that ignition timing is 9°±5° at idle.
   If NG, refer to EC-87, "Basic Inspection" , and then recheck.

WITH GST

1. Check the coolant level and mixture ratio (using coolant tester) in the reservoir tank and radiator.
   Allow engine to cool before checking coolant level and mixture ratio.
   - If the coolant level in the reservoir and/or radiator is below the proper range, and go to EC-280, "Diagnostic Procedure" .
   - If the coolant mixture ratio is out of the range of 45 to 55%, replace the coolant in the following procedure MA-15, "Changing Engine Coolant" .
   - Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute like pouring coolant from a kettle. Be sure to use coolant with the proper mixture ratio. Refer to MA-14, "Anti-freeze Coolant Mixture Ratio" .
   - After refilling coolant, run engine to ensure that no water-flow noise is emitted.

- After checking or replacing coolant, go to step 3 below.

2. Ask the customer if engine coolant has been added. If it has been added, go to EC-280, "Diagnostic Procedure" . After repair, go to the next step.
3. Start engine and let it idle.
4. Make sure that A/C switch is “OFF” and air conditioner is not operating. If NG, check air conditioner circuit. Refer to MTC-21, "TROUBLE DIAGNOSIS" . After repair, go to the next step.
5. Turn ignition switch “OFF”.
6. Disconnect engine coolant temperature sensor harness connector.
7. Connect 150Ω resistor to engine coolant temperature sensor.
8. Start engine and make sure that cooling fan operates.
   Be careful not to overheat engine.
   If NG, go to EC-280, "Diagnostic Procedure" . After repair, go to the next step.
9. Check for blocked coolant passage.

- Warm up engine to normal operating temperature, then grasp radiator upper hose and lower hose and make sure that coolant flows.
  If NG, go to EC-280, "Diagnostic Procedure" . After repair, go to the next step.
  Be extremely careful not to touch any moving or adjacent parts.

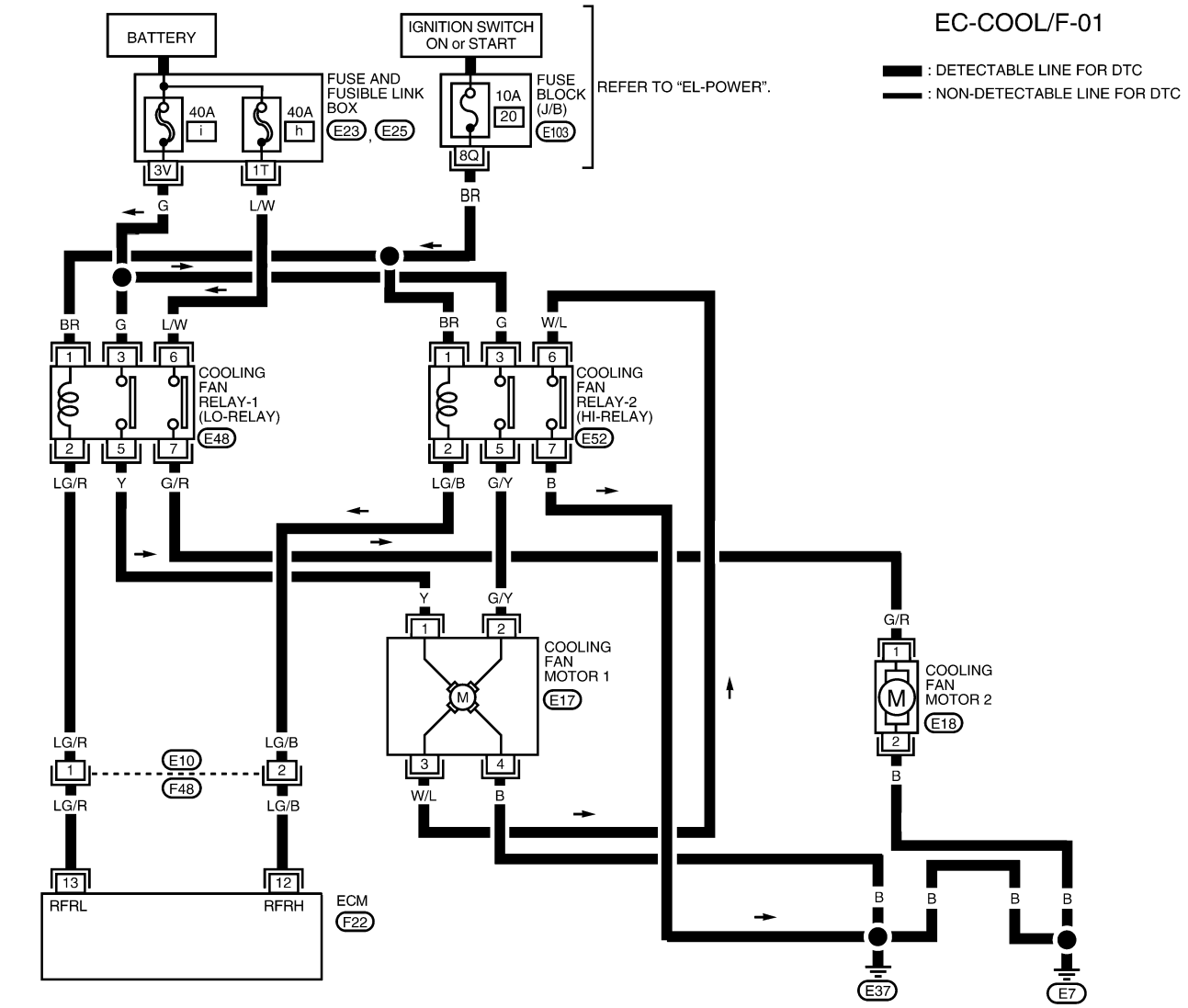
10. Check for blocked radiator air passage.

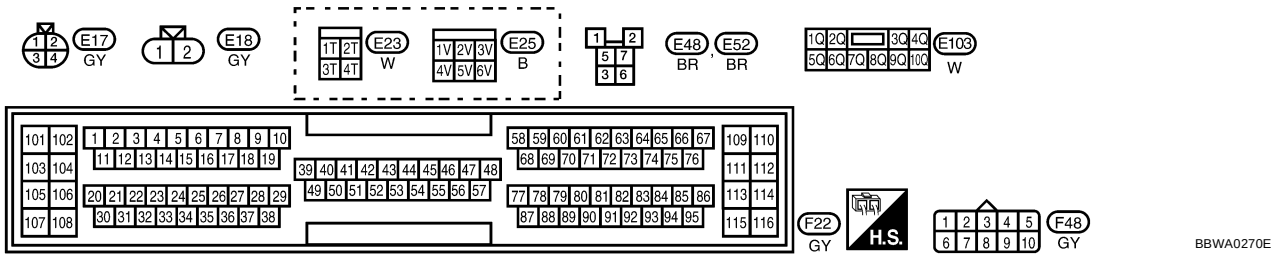
- When market fog lamps have been installed, check for damaged fans and clogging in the condenser and radiator.
- Check the front end for clogging caused by insects or debris.
- Check for improper fitting of front-end cover, damaged radiator grille or bumper, damaged vehicle front.
  If NG, take appropriate action and then go to the next step.

11. Check function of ECT sensor.
    Refer to step 6 of EC-280, "Diagnostic Procedure" .
    If NG, replace ECT sensor and go to the next step.
12. Check ignition timing. Refer to EC-87, "Basic Inspection" .
    Make sure that ignition timing is 9°±5° at idle.
    If NG, refer to EC-87, "Basic Inspection" , and then recheck.

Wiring Diagram

UBS001H1





BBWA0270E

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
12	LG/B	COOLING FAN RELAY (HIGH)	ENGINE RUNNING WITH COOLING FAN NOT OPERATING	BATTERY VOLTAGE
			ENGINE RUNNING WITH COOLING FAN OPERATING AT HIGH SPEED	0 - 0.6V
13	LG/R	COOLING FAN RELAY (LOW)	ENGINE RUNNING WITH COOLING FAN NOT OPERATING	BATTERY VOLTAGE
			ENGINE RUNNING WITH COOLING FAN OPERATING AT LOW SPEED	0 - 0.6V

SEF571Y

Diagnostic Procedure

UBS001H2

1. INSPECTION START

Do you have CONSULT-II?

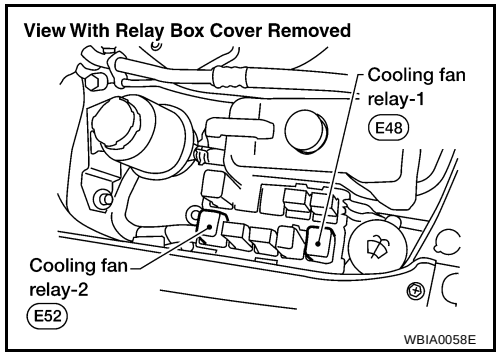
Yes or No

Yes >> GO TO 2.
No >> GO TO 4.

2. CHECK COOLING FAN LOW SPEED OPERATION

With CONSULT-II

1. Disconnect cooling fan relay-2.
2. Turn ignition switch “ON”.



3. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-II.
4. 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-284, "PROCEDURE A" .)

ACTIVE TEST	
COOLING FAN	OFF
MONITOR	
COOLAN TEMP/S	XXX °C

SEF646X

3. CHECK COOLING FAN HIGH SPEED OPERATION

With CONSULT-II

1. Turn ignition switch “OFF”.
2. Reconnect cooling fan relay-2.
3. Turn ignition switch “ON”.
4. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-II.
5. Make sure that cooling fan-1 operates at high speed.

OK or NG

OK >> GO TO 6.
NG >> Check cooling fan high speed control circuit. (Go to EC-286, "PROCEDURE B" .)

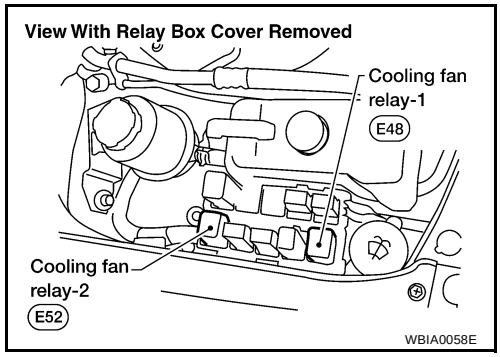
ACTIVE TEST	
COOLING FAN	OFF
MONITOR	
COOLAN TEMP/S	XXX °C

SEF646X

4. CHECK COOLING FAN LOW SPEED OPERATION

Without CONSULT-II

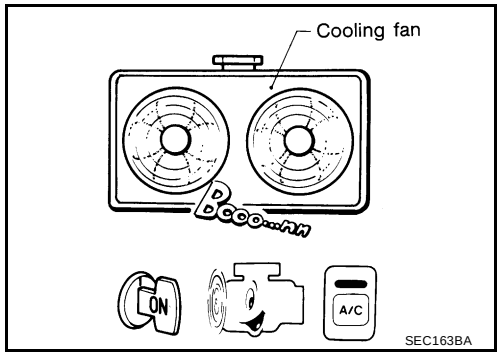
1. Disconnect cooling fan relay-2.
2. Start engine and let it idle.
3. Set temperature lever at full cold position.
4. Turn air conditioner switch “ON”.
5. Turn blower fan switch “ON”.



6. 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-284, "PROCEDURE A" .)



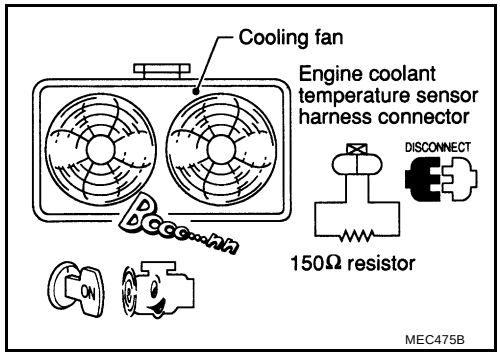
5. CHECK COOLING FAN HIGH SPEED OPERATION

Without CONSULT-II

1. Turn ignition switch “OFF”.
2. Reconnect cooling fan relay-2.
3. Turn air conditioner switch and blower fan switch “OFF”.
4. Disconnect engine coolant temperature sensor harness connector.
5. Connect 150Ω resistor to engine coolant temperature sensor harness connector.
6. Restart engine and make sure that cooling fan-1 operate at high speed.

OK or NG

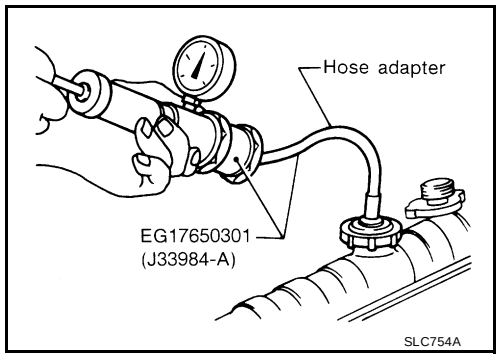
OK >> GO TO 6.
NG >> Check cooling fan high speed control circuit. (Go to EC-286, "PROCEDURE B" .)



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 , 23psi)



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

OK or NG

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

7. DETECT MALFUNCTIONING PART

Check the following for leaks.

- Hose
- Radiator
- Water pump (Refer to CO-10, "WATER PUMP" .)

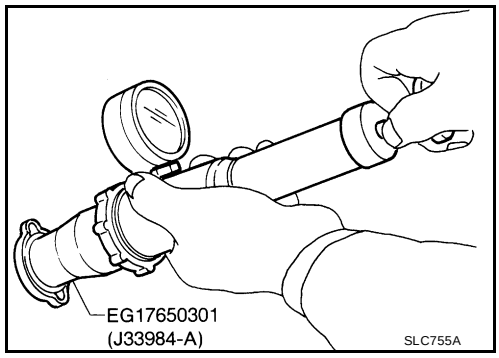
>> Repair or replace.

8. CHECK RADIATOR CAP

Apply pressure to cap with a tester and check radiator cap relief pressure.

Radiator cap relief pressure:

59 - 98 kPa (0.6 - 1.0 kg/cm^2 , 9 - 14 psi)



OK or NG

OK >> GO TO 9.
NG >> Replace radiator cap.

9. CHECK THERMOSTAT

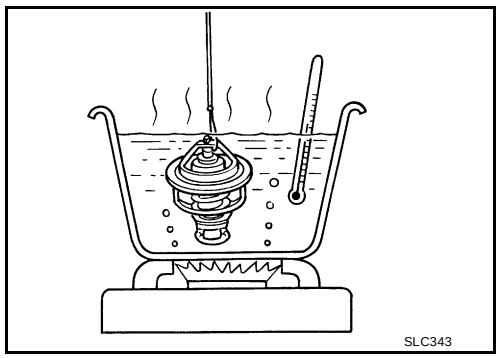
1. Remove thermostat.
2. Check valve seating condition at normal room temperatures.
   It should seat tightly.
3. Check valve opening temperature and valve lift.

   Valve opening temperature:

   76.5°C (170°F) [standard]

   Valve lift:

   More than 9 mm/90°C (0.35 in/194°F)



4. Check if valve is closed at 5°C (9°F) below valve opening temperature. For details, refer to CO-12, "THERMOSTAT AND THERMOSTAT HOUSING" .

OK or NG

OK >> GO TO 10.
NG >> Replace thermostat

10. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-190, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> Replace engine coolant temperature sensor.

11. CHECK MAIN 12 CAUSES

If the cause cannot be isolated, go to EC-287, "Main 12 Causes of Overheating" .

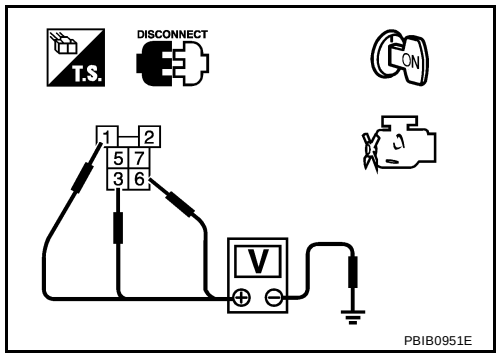
>> **INSPECTION END**

PROCEDURE A

1. CHECK COOLING FAN POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect cooling fan relay-1.
3. Turn ignition switch “ON”.
4. Check voltage between cooling fan relay-1 terminals 1, 3, 6 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

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

2. DETECT MALFUNCTIONING PART

Check the following.

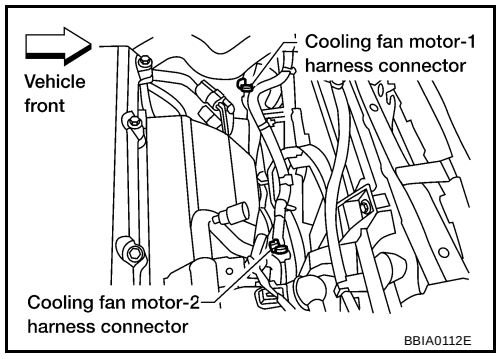
- Fuse and fusible link box connectors E23, E25
- Fuse block (J/B) connector E103
- 10A fuse
- 40A fusible links
- Harness for open or short between cooling fan relay-1 and fuse
- Harness for open or short between cooling fan relay-1 and battery

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

3. CHECK COOLING FAN GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect cooling fan motor-1 harness connector and cooling fan motor-2 harness connector.
3. Check harness continuity between cooling fan relay-1 terminal 5 and cooling fan motor-1 terminal 1, cooling fan motor-1 terminal 4 and body 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 cooling fan relay-1 terminal 7 and cooling fan motor-2 terminal 2, cooling fan motor-2 terminal 1 and body 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 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK COOLING FAN OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 13 and cooling fan relay-1 terminal 2. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

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

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E10, F48
- Harness for open or short between cooling fan relay-1 and ECM

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

6. CHECK COOLING FAN RELAY-1

Refer to EC-288, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace cooling fan relay.

7. CHECK COOLING FAN MOTORS-1 AND -2

Refer to EC-288, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace cooling fan motors.

8. CHECK INTERMITTENT INCIDENT

Perform EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

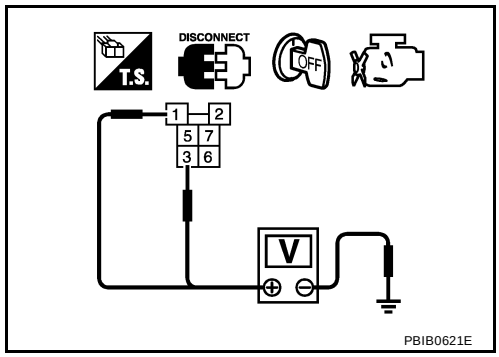
>> **INSPECTION END**

PROCEDURE B

1. CHECK COOLING FAN POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect cooling fan relay-2.
3. Turn ignition switch “ON”.
4. Check voltage between cooling fan relay-2 terminals 1, 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

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

2. DETECT MALFUNCTIONING PART

Check the following.

- Fuse and fusible link box connector E25
- Fuse block (J/B) connector E103
- 10A fuse
- 40A fusible link
- Harness for open or short between cooling fan relay-2 and fuse
- Harness for open or short between cooling fan relay-2 and fusible link

>> Repair harness or connectors.

3. CHECK COOLING FAN GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect cooling fan motor-2 harness connector.
3. Check harness continuity between cooling fan relay-2 terminal 5 and cooling fan motor-1 terminal 2, cooling fan relay-2 terminal 6 and cooling fan motor-1 terminal 3, cooling fan relay-2 terminal 7 and body ground.
   Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

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

4. CHECK COOLING FAN OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 12 and cooling fan relay-2 terminal 2. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

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

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E10, F48
- Harness for open or short between cooling fan relay-2 and ECM

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

6. CHECK COOLING FAN RELAY-2

Refer to EC-288, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace cooling fan relays.

7. CHECK COOLING FAN MOTORS-1 AND -2

Refer to EC-288, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace cooling fan motors.

8. CHECK INTERMITTENT INCIDENT

Perform EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Main 12 Causes of Overheating

UBS001H3

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	● Blocked radiator ● Blocked condenser ● Blocked radiator grille ● Blocked bumper	● Visual	No blocking	—
	2	● Coolant mixture	● Coolant tester	50 - 50% coolant mixture	See MA-13, "RECOMMENDED FLUIDS AND LUBRICANTS" .
	3	● Coolant level	● Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	See MA-15, "Changing Engine Coolant" .
	4	● Radiator cap	● Pressure tester	59 - 98 kPa (0.6 - 1.0 kg/cm^2 , 9 - 14 psi) (Limit)	See CO-8, "System Check" .

Engine	Step	Inspection item	Equipment	Standard	Reference page
ON*2	5	● Coolant leaks	● Visual	No leaks	See CO-8, "System Check" .
ON*2	6	● Thermostat	● Touch the upper and lower radiator hoses	Both hoses should be hot	See CO-12, "THERMOSTAT AND THERMOSTAT HOUSING" and CO-14, "RADIATOR" .
ON*1	7	● Cooling fan	● CONSULT-II	Operating	See trouble diagnosis for DTC P0217 (EC-275).
OFF	8	● Combustion gas leak	● Color checker chemical tester 4 Gas analyzer	Negative	—
ON*3	9	● Coolant temperature gauge	● Visual	Gauge less than 3/4 when driving	—
		● Coolant overflow to reservoir tank	● Visual	No overflow during driving and idling	See MA-15, "Changing Engine Coolant" .
OFF*4	10	● Coolant return from reservoir tank to radiator	● Visual	Should be initial level in reservoir tank	See CO-8, "System Check" .
OFF	11	● Cylinder head	● Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	See EM-40, "Inspection" .
	12	● Cylinder block and pistons	● Visual	No scuffing on cylinder walls or piston	See EM-60, "Inspection" .

*1: Turn the ignition switch ON.
*2: Engine running at 3,000 rpm for 10 minutes.
*3: Drive at 90 km/h (56 MPH) for 30 minutes and then let idle for 10 minutes.
*4: After 60 minutes of cool down time.
For more information, refer to CO-5, "OVERHEATING CAUSE ANALYSIS" .

Component Inspection

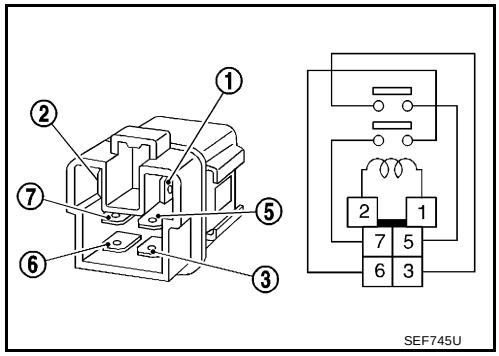
UBS001H4

COOLING FAN RELAYS-1 AND -2

Check continuity between terminals 3 and 5, 6 and 7.

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

If NG, replace relay.

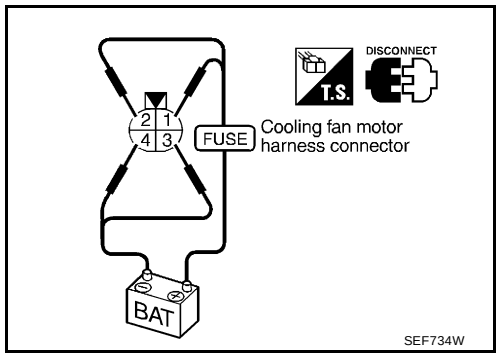


COOLING FAN MOTOR-1

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
	High	1, 2	3, 4

Cooling fan motor should operate.
If NG, replace cooling fan motor.

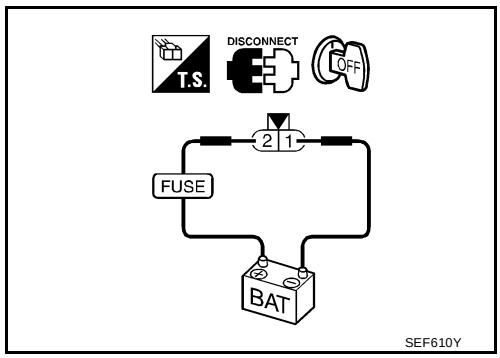


COOLING FAN MOTOR-2

1. Disconnect cooling fan motor harness connectors.

2. Supply cooling fan motor terminals with battery voltage and check operation.

	Terminals	
	(+)	(–)
Cooling fan motor	2	1



Cooling fan motor should operate.
If NG, replace cooling fan motor.

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

PFP:00000

On Board Diagnosis Logic

UBS001H5

When a misfire occurs, engine speed will fluctuate (vary). If the engine speed fluctuates enough to cause the crankshaft position sensor (POS) signal to vary, ECM can determine that a misfire is occurring.

Sensor	Input Signal to ECM	ECM function
Crankshaft position sensor (POS)	Engine speed	On board diagnosis of misfire

The misfire detection logic consists of the following two conditions.

1. One Trip Detection Logic (Three Way Catalyst Damage)
   On the first trip that a misfire condition occurs that can damage the three way catalyst (TWC) due to overheating, the MIL will blink.
   When a misfire condition occurs, the ECM monitors the crankshaft position sensor (POS) signal every 200 engine revolutions for a change.
   When the misfire condition decreases to a level that will not damage the TWC, the 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 cause damage to the TWC (but will affect vehicle emissions), the MIL will only light when the misfire is detected on a second trip. During this condition, the ECM monitors the crankshaft position sensor (POS) signal every 1,000 engine revolutions.
   A misfire malfunction can be detected on any one cylinder or on multiple cylinders.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0300	● Multiple cylinders misfire.	● Improper spark plug ● Insufficient compression ● Incorrect fuel pressure ● EGR volume control valve ● The injector circuit is open or shorted ● Injectors ● Intake air leak ● The ignition secondary circuit is open or shorted ● Lack of fuel ● Drive plate/Flywheel ● Heated oxygen sensor 1 ● Incorrect PCV hose connection
P0301	● No. 1 cylinder misfires.	
P0302	● No. 2 cylinder misfires.	
P0303	● No. 3 cylinder misfires.	
P0304	● No. 4 cylinder misfires.	

On Board Diagnosis Logic

UBS001H6

DTC Confirmation Procedure

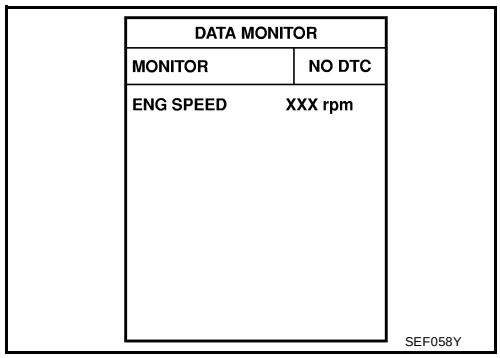
UBS001H7

CAUTION:
Always drive vehicle at a safe speed.

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

WITH CONSULT-II

1. Turn ignition switch “ON”, and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch “OFF” and wait at least 10 seconds.
4. Start engine again and drive at 1,500 to 3,000 rpm for at least 3 minutes.
   Hold the accelerator pedal as steady as possible.
   NOTE:
   Refer to the freeze frame data for the test driving conditions.
5. If 1st trip DTC is detected, go to EC-291, "Diagnostic Procedure"
   .



WITH GST

Follow the procedure “With CONSULT-II” above.

Diagnostic Procedure

UBS001H8

1. CHECK FOR INTAKE AIR LEAK

1. Start engine and run it at idle speed.
2. Listen for the sound of the intake air leak.
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 >> GO TO 3.
NG >> Repair or replace it.

3. CHECK EGR FUNCTION

Perform DTC Confirmation Procedure for DTC P1402 EGR FUNCTION.
Refer to EC-494, "DTC P1402 EGR FUNCTION" .

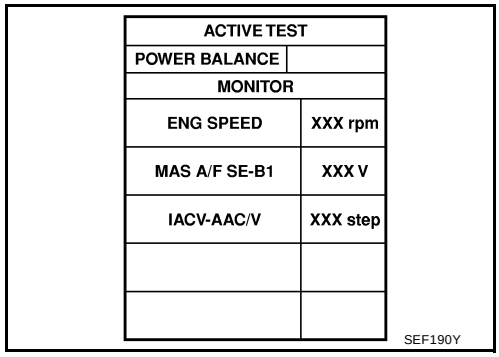
OK or NG

OK >> GO TO 4.
NG >> Repair EGR system.

4. PERFORM POWER BALANCE TEST

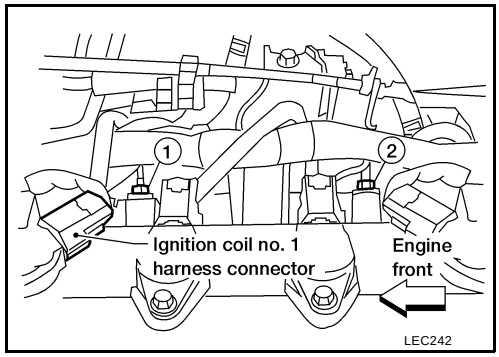
With CONSULT-II

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



Without CONSULT-II

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



Yes or No

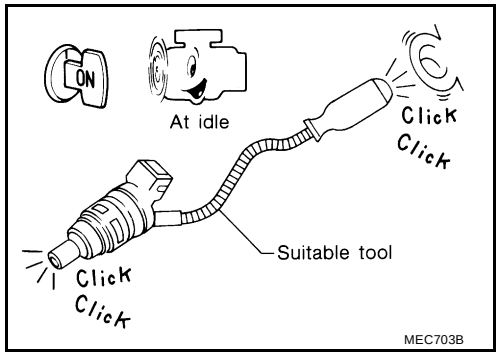
Yes >> GO TO 5.
No >> GO TO 8.

5. CHECK INJECTOR

Does each injector make an operating sound at idle?

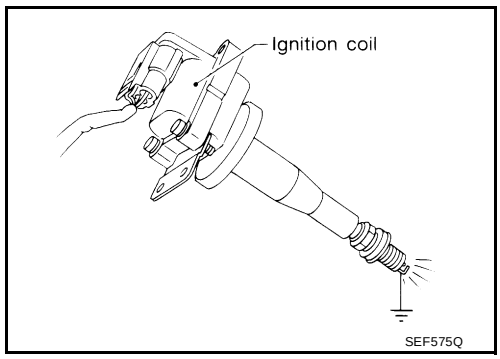
Yes or No

Yes >> GO TO 6.
No >> Check injector(s) and circuit(s). Refer to EC-546 .



6. CHECK IGNITION SPARK

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

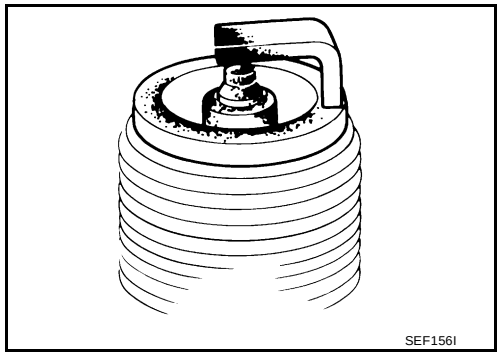


OK or NG

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

7. CHECK SPARK PLUGS

Remove the spark plugs and check for fouling, etc.



OK or NG

OK >> GO TO 8.
NG >> Repair or replace spark plug(s) with standard type one(s). For spark plug type, refer to MA-15, "ENGINE MAINTENANCE (QG18DE ENGINE)" .

8. CHECK COMPRESSION PRESSURE

Refer to EM-13, "Measurement of Compression Pressure" .
Check compression pressure.

Standard:	**1,324 kPa (13.5 kg/cm^2 , 192 psi)/300 rpm**
Minimum:	**1,157 kPa (11.8 kg/cm^2 , 168 psi)/300 rpm**
Difference between each cylinder:	**98 kPa (1.0 kg/cm^2 , 14 psi)/300 rpm**

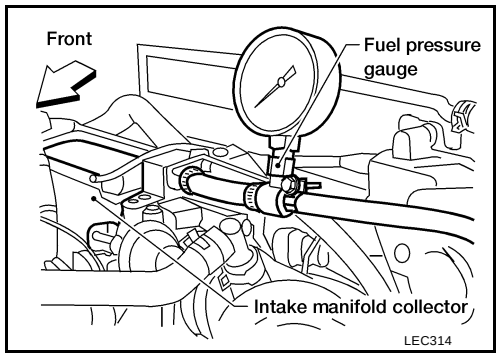
OK or NG

OK >> GO TO 9.
NG >> Check pistons, piston rings, valves, valve seats and cylinder head gaskets.

9. CHECK FUEL PRESSURE

1. Install any parts removed.
2. Release fuel pressure to zero. Refer to EC-58, "FUEL PRESSURE RELEASE" .
3. Install fuel pressure gauge and check fuel pressure.

At idle: Approx. 235 kPa (2.4 kg/cm^2 , 34 psi)



OK or NG

OK >> GO TO 11.
NG >> GO TO 10.

10. DETECT MALFUNCTIONING PART

Check the following.

- Fuel pump and circuit Refer to EC-554 .
- Fuel pressure regulator Refer to EC-59 .
- Fuel lines. Refer to MA-18, "Checking Fuel Lines" .
- Fuel filter for clogging

>> Repair or replace.

11. CHECK IGNITION TIMING

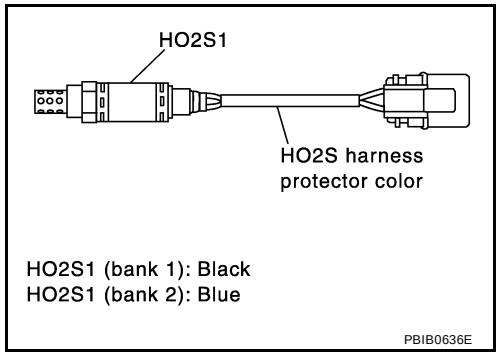
Perform EC-87, "Basic Inspection" .

OK or NG

OK >> GO TO 12.
NG >> Adjust ignition timing.

12. CHECK HEATED OXYGEN SENSOR 1

1. Turn ignition switch “OFF”.
2. Check the HO2S1 harness protector color, and disconnect the corresponding HO2S1 harness connector.
3. Check HO2S1 heater, refer to EC-160 .



OK or NG

OK >> GO TO 13.
NG >> Replace heated oxygen sensor 1.

13. CHECK MASS AIR FLOW SENSOR

With CONSULT-II

Check “MASS AIR FLOW” in “DATA MONITOR” mode with CONSULT-II.

at idling: 1.4 - 4.0 g·m/sec

at 2,500 rpm: 5.0 - 10.0 g·m/sec

With GST

Check mass air flow sensor signal in MODE 1 with GST.

at idling: 1.4 - 4.0 g·m/sec

at 2,500 rpm: 5.0 - 10.0 g·m/sec

OK or NG

OK >> GO TO 14.

NG >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-172 .

14. CHECK SYMPTOM MATRIX CHART

Check items on the rough idle symptom in EC-101, "Symptom Matrix Chart" .

OK or NG

OK >> GO TO 15.

NG >> Repair or replace.

15. 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-73, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .

>> GO TO 16.

16. CHECK INTERMITTENT INCIDENT

Perform EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

DTC P0327, P0328 KS

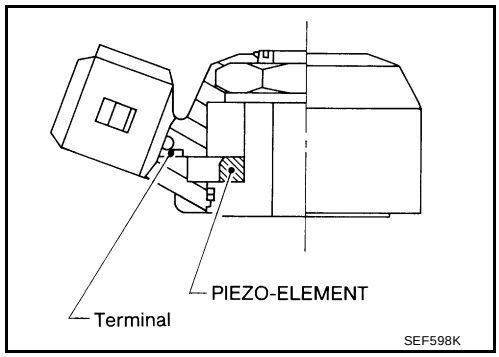
PFP:22060

Component Description

UBS001H9

The knock sensor is attached to the cylinder block. It senses engine knocking using a piezoelectric element. A knocking vibration from the cylinder block is sensed as vibrational pressure. This pressure is converted into a voltage signal and sent to the ECM.

Freeze frame data will not be stored in the ECM for the knock sensor. The MIL will not light for knock sensor malfunction. The knock sensor has one trip detection logic.



On Board Diagnosis Logic

UBS001HA

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0327	● An excessively low voltage from the knock sensor is sent to ECM.	● Harness or connectors (The knock sensor circuit is open or shorted.) ● Knock sensor
P0328	● An excessively high voltage from the knock sensor is sent to ECM	

DTC Confirmation Procedure

UBS001HB

NOTE:

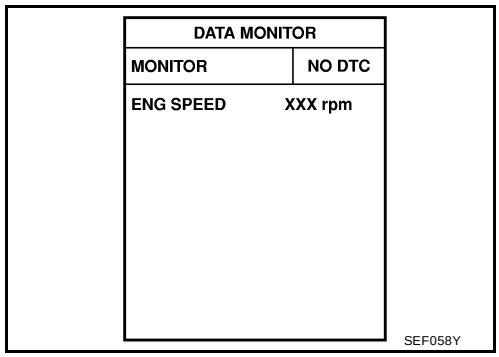
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

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

WITH CONSULT-II

1. Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and run it for at least 5 seconds at idle speed.
3. If DTC is detected, go to EC-298, "Diagnostic Procedure" .



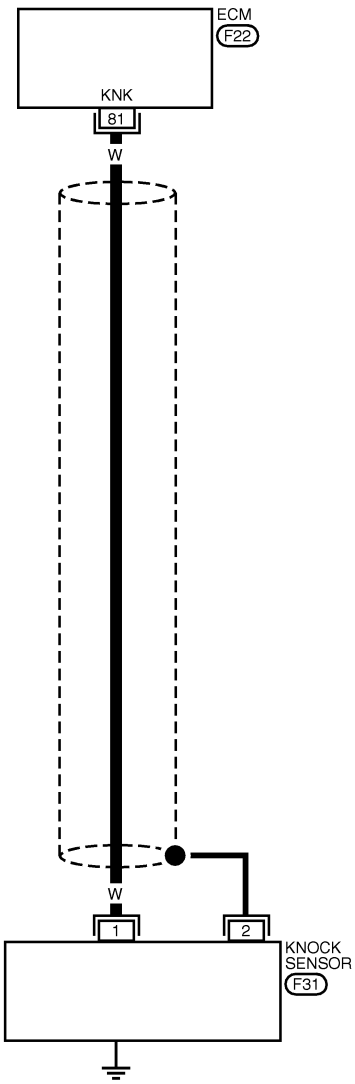
WITH GST

Follow the procedure “With CONSULT-II” above.

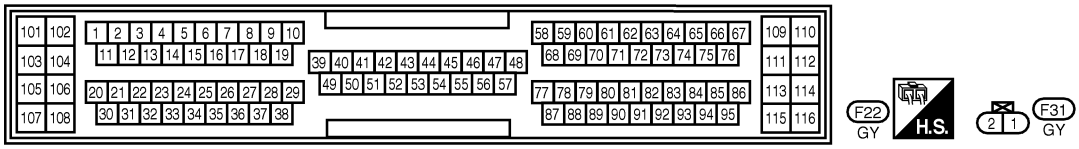
Wiring Diagram

UBS001HC

EC-KS-01



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



WEC386

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
81	W	KNOCK SENSOR	ENGINE RUNNING AT IDLE SPEED	APPROX. 2.5V

SEF572Y

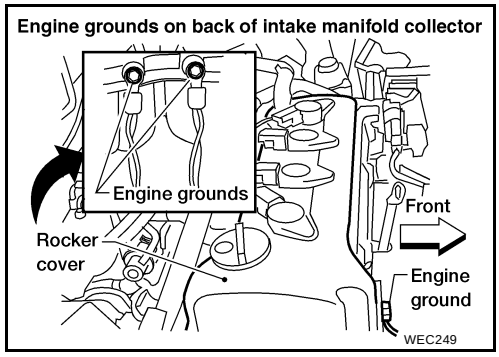
Diagnostic Procedure

UBS001HD

1. RETIGHTEN GROUND SCREWS

Loosen and retighten engine ground screws.

>> GO TO 2



2. CHECK INPUT SIGNAL CIRCUIT-1

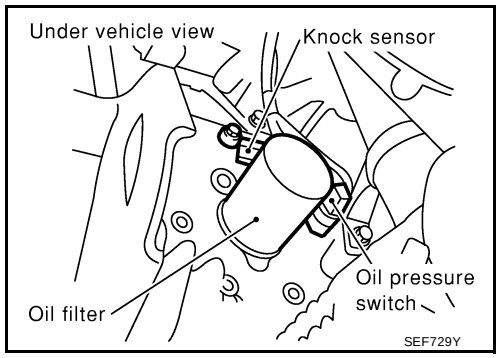
1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector and knock sensor harness connector.
3. Check harness continuity between knock sensor terminal 1 and ECM terminal 81.
   Refer to Wiring Diagram.

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 harness for open or short between knock sensor and ECM.

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

4. CHECK KNOCK SENSOR

Knock sensor
Refer to EC-298, "Component Inspection" .

OK or NG

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

5. CHECK INTERMITTENT INCIDENT

Perform EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

UBS001HE

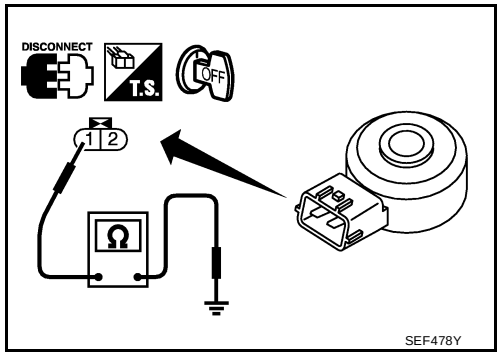
KNOCK SENSOR

1. Disconnect knock sensor harness connector.

2. Check resistance between terminal 1 and ground.

NOTE:
Use an ohmmeter which can measure more than 10 MΩ.

Resistance: 500 - 620 kΩ [at 20°C (68°F)]



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

Removal and Installation

UBS001HF

KNOCK SENSOR

Refer to EM-58, "CYLINDER BLOCK" .

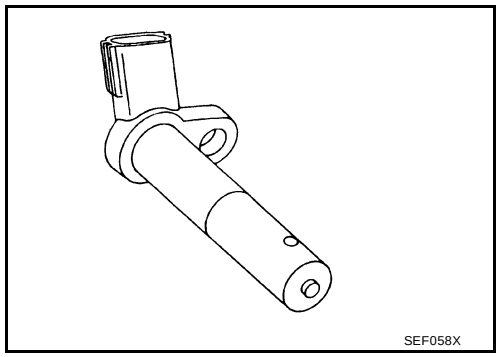
DTC P0335 CKP SENSOR (POS)

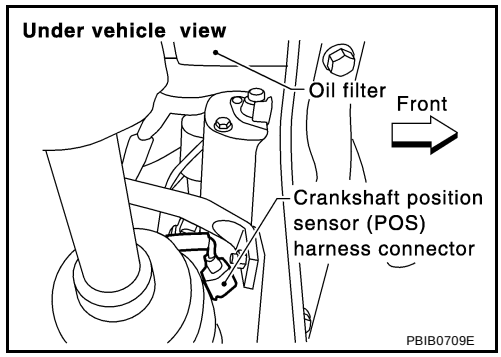
PFP:23731

Component Description

UBS001HG

The crankshaft position sensor (POS) is located on the cylinder block rear housing facing the gear teeth (cogs) of the signal plate at the end of the crankshaft. It detects the fluctuation of the engine revolution.
The sensor consists of a permanent magnet and hall IC.
When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.
The changing gap causes the magnetic field near the sensor to change.
Due to the changing magnetic field, the voltage from the sensor changes.
The ECM receives the voltage signal and detects the fluctuation of the engine revolution.


SEF058X



PBIB0709E

On Board Diagnosis Logic

UBS001HH

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0335	● The crankshaft position sensor signal is not detected by the ECM during the first few seconds of engine cranking. ● The proper pulse signal from the crankshaft position sensor (POS) is not sent to ECM while the engine is running. ● The crankshaft position sensor signal is not in the normal pattern during engine running.	● Harness or connectors (The crankshaft position sensor (POS) circuit is open.) ● Crankshaft position sensor (POS)

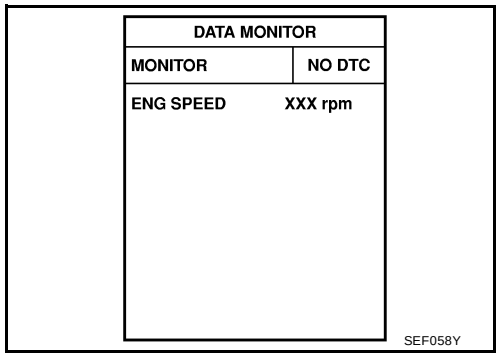
DTC Confirmation Procedure

UBS001HI

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 the battery voltage is more than 10.5V and the ignition switch is “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-302, "Diagnostic Procedure" .



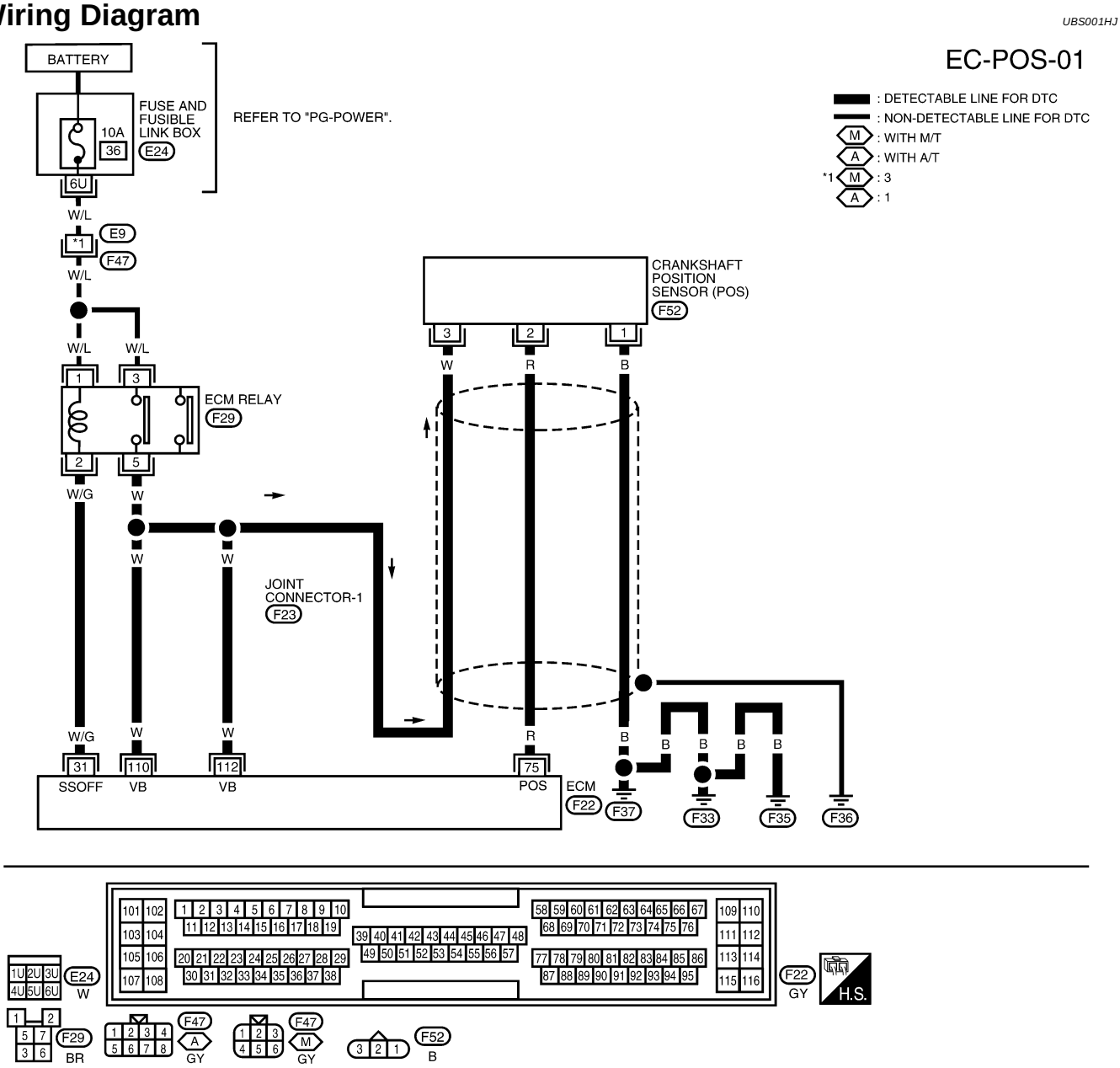
SEF058Y

WITH GST

Follow the procedure “With CONSULT-II” above.

Wiring Diagram

UBS001HJ

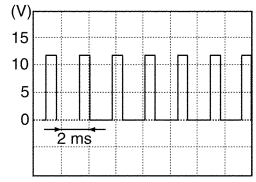
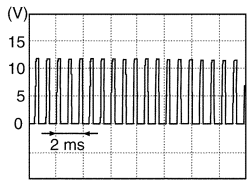


BBWA0121E

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

CAUTION:

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

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
75	R	Crankshaft position sensor (POS)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 3.0 - 4.0V  SEF979W
			[Engine is running] ● Engine speed is 2,000 rpm	Approximately 3.0 - 4.0V  SEF980W

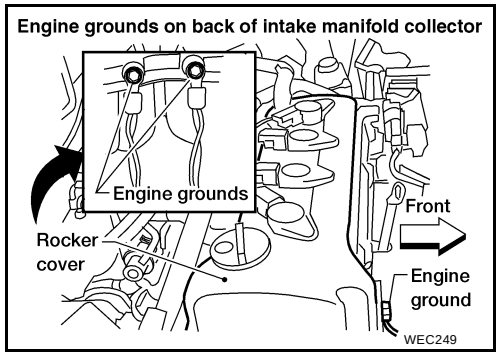
Diagnostic Procedure

UBS001HK

1. RETIGHTEN GROUND SCREWS

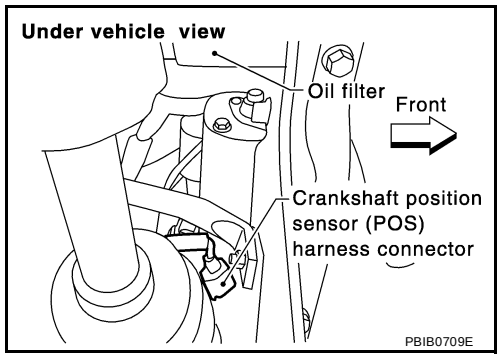
1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

>> GO TO 2.



2. CHECK POWER SUPPLY

1. Disconnect crankshaft position sensor (POS) harness connector.



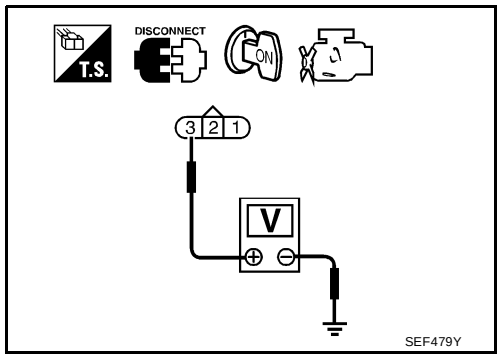
2. Check voltage between harness connector terminal 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage

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 harness for open or short between ECM relay and crankshaft position sensor (POS).

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

4. CHECK INPUT SIGNAL CIRCUIT

1. Check continuity between ECM terminal 75 and crankshaft position sensor (POS) terminal 2. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

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

5. DETECT MALFUNCTIONING PART

Check the harness for open or short between crankshaft position sensor (POS) and ECM.

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

6. CHECK GROUND CIRCUIT

1. Reconnect ECM harness connector.
2. Check harness continuity between crankshaft position sensor (POS) terminal 1 and engine ground. Refer to the Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

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

7. DETECT MALFUNCTIONING PART

Check the harness for open or short between crankshaft position sensor (POS) and ECM.

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

8. CHECK IMPROPER INSTALLATION

Loosen and retighten the fixing bolt of the crankshaft position sensor (POS). Then retest.

Trouble is not fixed.>>GO TO 9.

9. CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to EC-304, "Component Inspection" .

OK or NG

OK >> GO TO 10.
NG >> Replace crankshaft position sensor (POS).

10. CHECK SIGNAL PLATE TOOTH

Visually check for chipping signal plate tooth.

OK or NG

OK >> GO TO 11.
NG >> Replace the signal plate. Refer to EM-36, "Components" .

11. CHECK INTERMITTENT INCIDENT

Perform EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

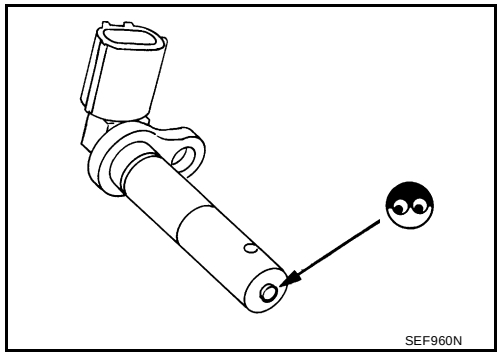
Component Inspection

UBS001HL

CRANKSHAFT POSITION SENSOR (POS)

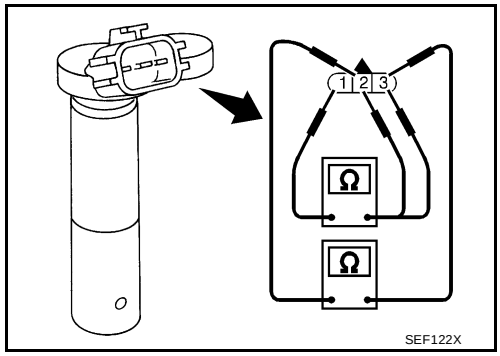
1. Disconnect crankshaft position sensor (POS) harness connector.
2. Loosen the fixing bolt of the sensor.
3. Remove the sensor.

4. Visually check the sensor for chipping.



5. Check resistance as shown in the figure.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
3 (+) - 1 (–)	Except 0 or ∞
2 (+) - 1 (–)	
3 (+) - 2 (–)	



If NG, replace crankshaft position sensor (POS).

UBS001HM

Removal and Installation

CRANKSHAFT POSITION SENSOR (POS)

Refer to EM-58, "CYLINDER BLOCK" .

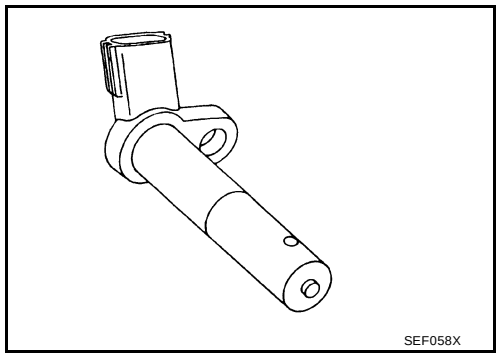
DTC P0340 CMP SENSOR (PHASE)

PFP:23731

Component Description

UBS001HN

The camshaft position sensor (PHASE) senses the protrusion provided with exhaust valve cam sprocket to identify a particular cylinder. The crankshaft position sensor (POS) senses the piston position.
When the crankshaft position sensor (POS) system becomes inoperative, the camshaft position sensor (PHASE) provides various controls of engine parts instead, utilizing timing of cylinder identification signals.
The sensor consists of a permanent magnet, core and coil.
When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.
The changing gap causes the magnetic field near the sensor to change.
Due to the changing magnetic field, the voltage from the sensor changes.


SEF058X

On Board Diagnosis Logic

UBS001HO

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0340	● The cylinder No. signal is not entered to ECM for the first few seconds during engine cranking. ● The cylinder No. signal is not enter to ECM during engine running. ● The cylinder No. signal is not in the normal pattern during engine running.	● Harness or connectors (The camshaft position sensor (PHASE) circuit is open or shorted.) ● Camshaft position sensor (PHASE) ● Starter motor (Refer to SC-9, "STARTING SYSTEM" .) ● Starting system circuit (Refer to SC-9, "STARTING SYSTEM" .)

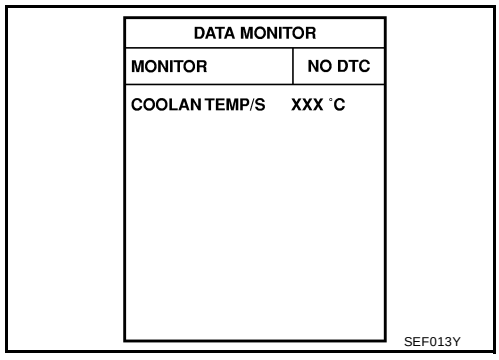
DTC Confirmation Procedure

UBS001HP

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10.5V.

WITH CONSULT-II

1. Turn ignition switch “ON”.
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-308, "Diagnostic Procedure" .



SEF013Y

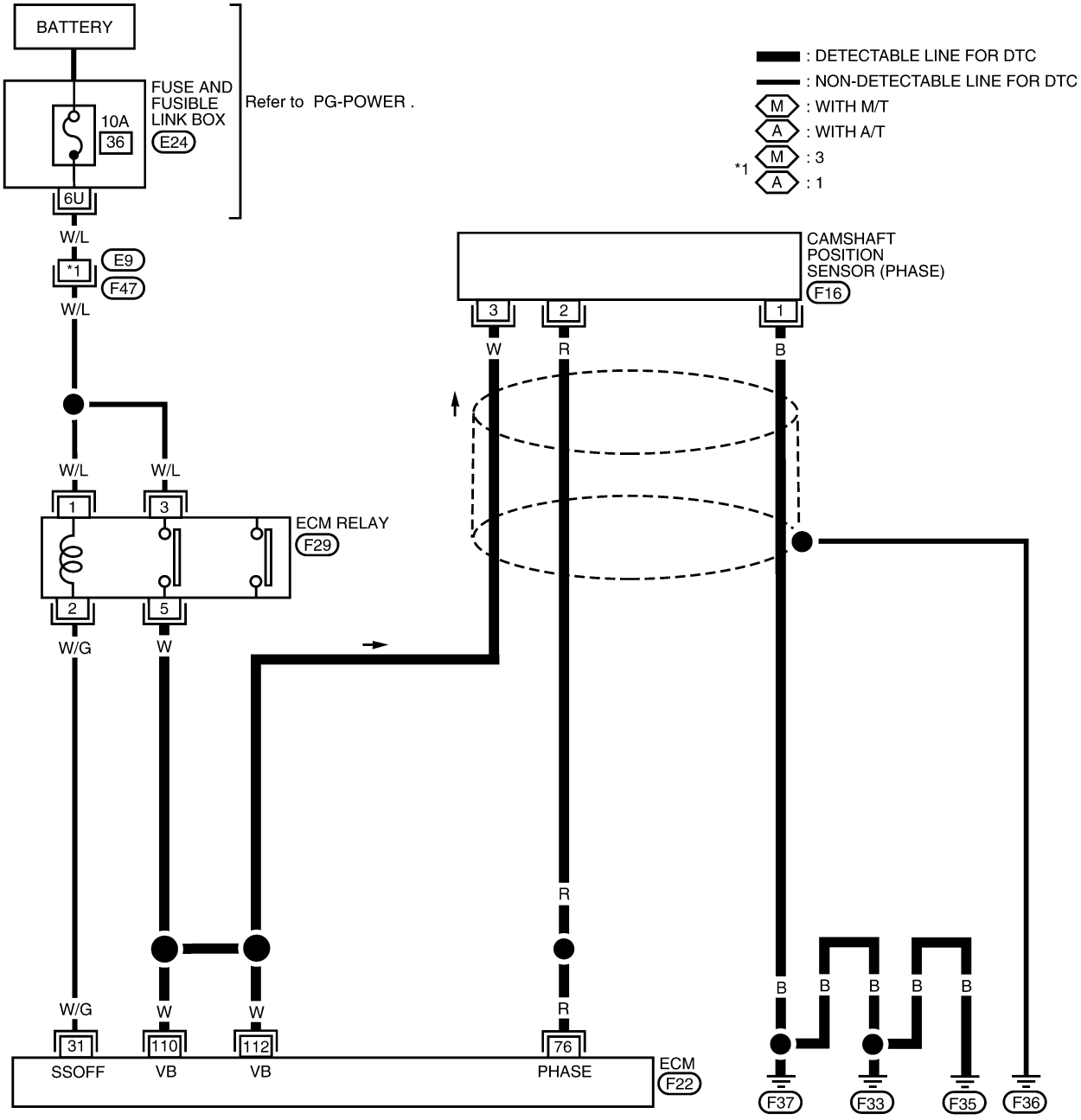
WITH GST

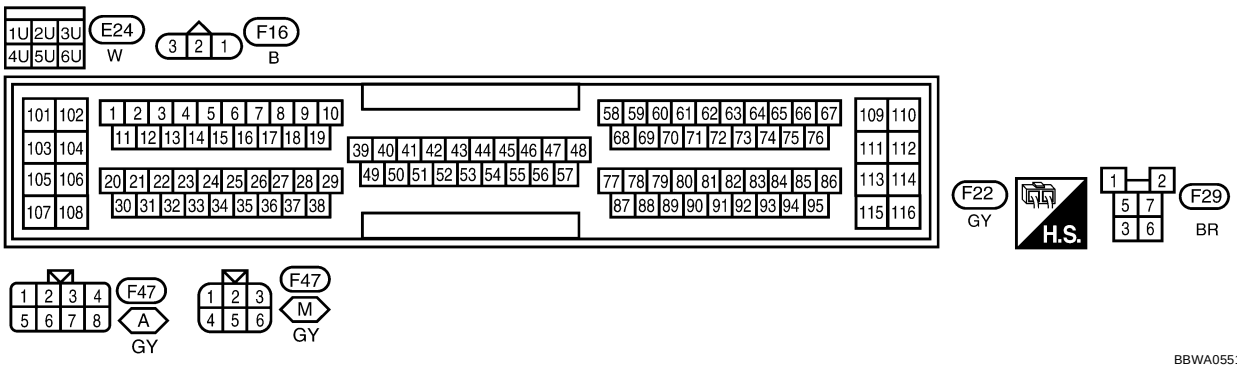
Follow the procedure “With CONSULT-II” above.

Wiring Diagram

UBS001HQ

EC-PHASE-01

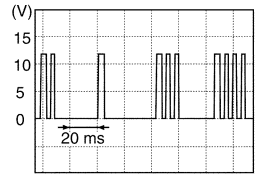
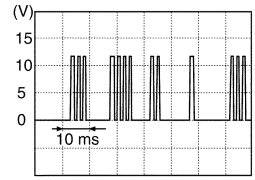




BBWA0551E

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

CAUTION:
Do not use ECM ground terminals when measuring input/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)
76	R	Camshaft position sensor (PHASE)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 2.0 - 3.0V  SEF977W
			[Engine is running] ● Engine speed is 2,000 rpm	Approximately 2.0 - 3.0V  SEF978W

Diagnostic Procedure

UBS001HR

1. CHECK STARTING SYSTEM

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

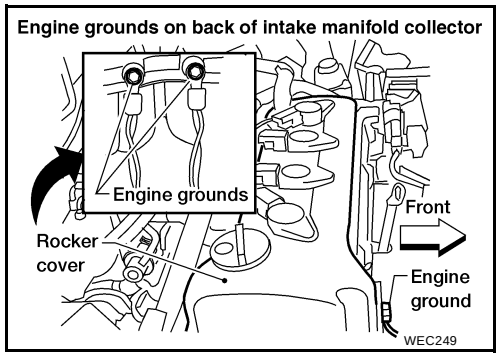
Yes or No

Yes >> GO TO 2.
No >> Check starting system. (Refer to EC-551, "START SIGNAL" .)

2. RETIGHTEN GROUND SCREWS

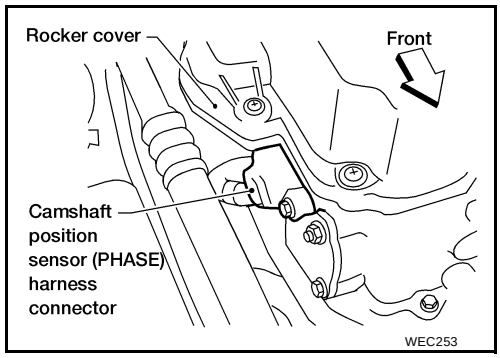
1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

>> GO TO 3.



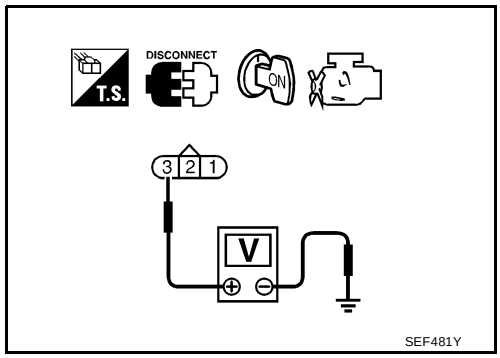
3. CHECK POWER SUPPLY

1. Disconnect camshaft position sensor (PHASE) harness connector.
2. Turn ignition switch “ON”.



3. Check voltage between camshaft position 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 for open or short between camshaft position sensor (PHASE) and ECM relay
- Harness for open or short between camshaft position sensor (PHASE) and ECM

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

5. CHECK INPUT SIGNAL CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between camshaft position sensor (PHASE) terminal 2 and ECM terminal 76. 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 harness for open or short between camshaft position sensor (PHASE) and ECM.

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

7. CHECK GROUND CIRCUIT

1. Turn ignition switch “OFF”.
2. Check harness continuity between camshaft position sensor (PHASE) terminal 1 and engine ground. Refer to the Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

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

8. CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-311, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace camshaft position sensor (PHASE).

9. CHECK INTERMITTENT INCIDENT

Perform EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

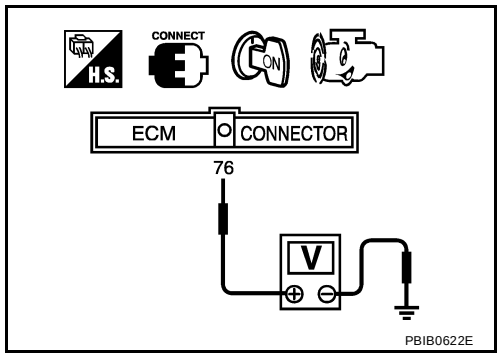
>> **INSPECTION END**

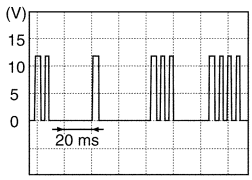
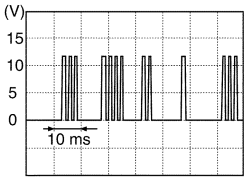
Component Inspection

UBS001HS

CAMSHAFT POSITION SENSOR (PHASE)

1. Start engine and warm it up to normal operating temperature.
2. Check voltage between ECM terminal 76 and engine ground.



Condition	Idle	2,000 rpm
Voltage	Approximately 2.0 - 3.0V	Approximately 2.0 - 3.0V
Pulse signal	 SEF977W	 SEF978W

If NG, replace camshaft position sensor (PHASE).

Removal and Installation

UBS001HT

CAMSHAFT POSITION SENSOR (PHASE)

Refer to EM-24, "TIMING CHAIN" .

DTC P0350 IGNITION SIGNAL

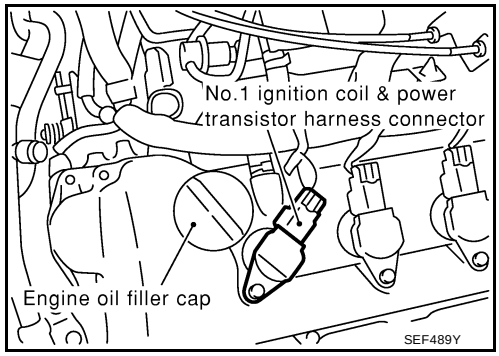
PFP:22448

Component Description

UBS001HU

IGNITION COIL & POWER TRANSISTOR

The ignition signal from the ECM is sent to and amplified by the power transistor. The power transistor turns on and off the ignition coil primary circuit. This on-off operation induces the proper high voltage in the coil secondary circuit.



On Board Diagnosis Logic

UBS001HV

Malfunction is detected when the ignition signal in the primary circuit is not sent to ECM during engine cranking or running.

Possible Cause

UBS001HW

- Harness or connectors (The ignition primary circuit is open or shorted.)
- Power transistor unit built into ignition coil
- Condenser
- Crankshaft position sensor (POS)
- Crankshaft position sensor (POS) circuit
- Camshaft position sensor (PHASE)
- Camshaft position sensor (PHASE) circuit

DTC Confirmation Procedure

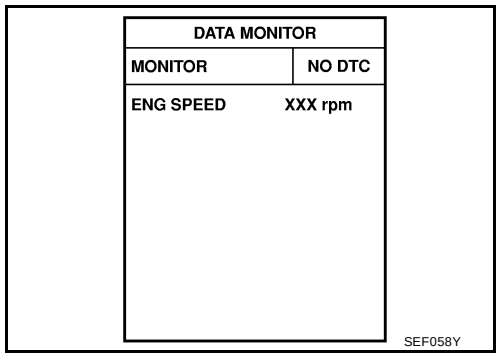
UBS001HX

NOTE:

- If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.
- **If DTC P0350 is displayed with DTC P0335 or P0340, perform trouble diagnosis for DTC P0335 or P0340 first. Refer to EC-300 or EC-306 .**

WITH CONSULT-II

1. Turn ignition switch “ON”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine. (If engine does not run, turn ignition switch to “START” for at least 5 seconds.)
4. If 1st trip DTC is detected, go to EC-316, "Diagnostic Procedure" .



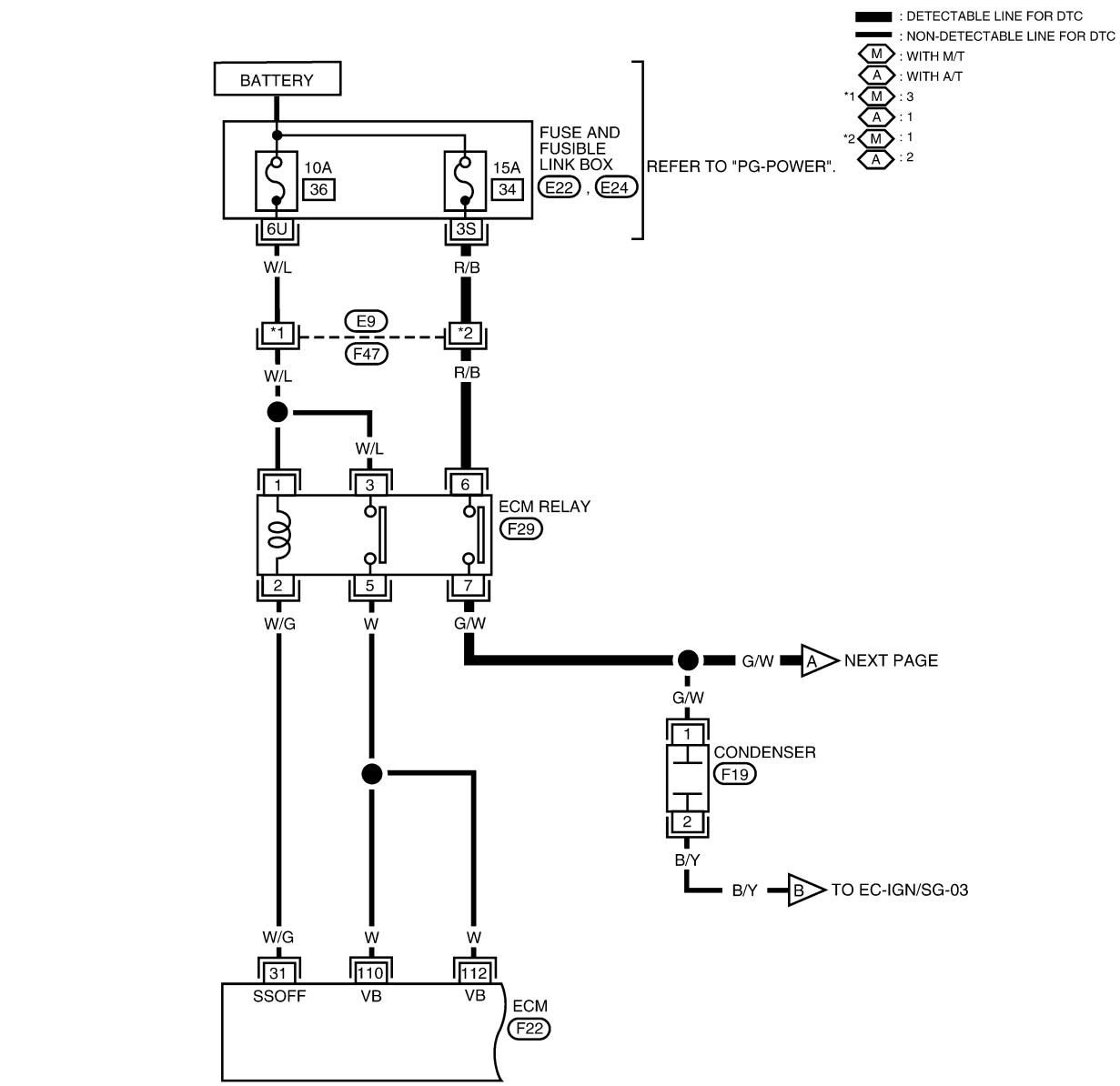
WITH GST

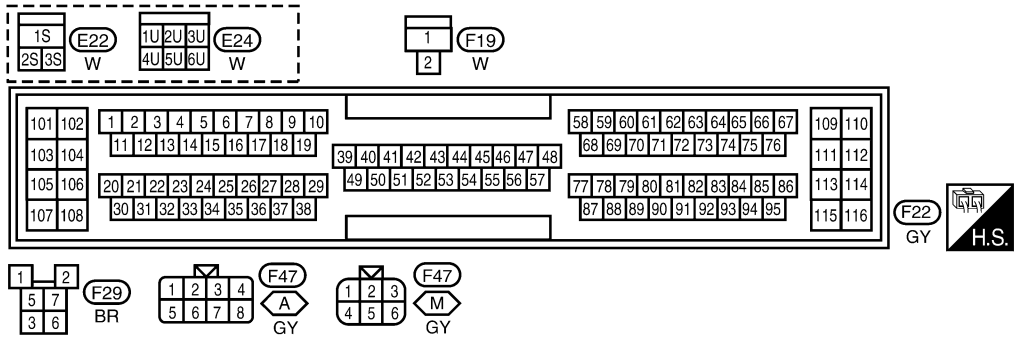
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS001HY

EC-IGN/SG-01

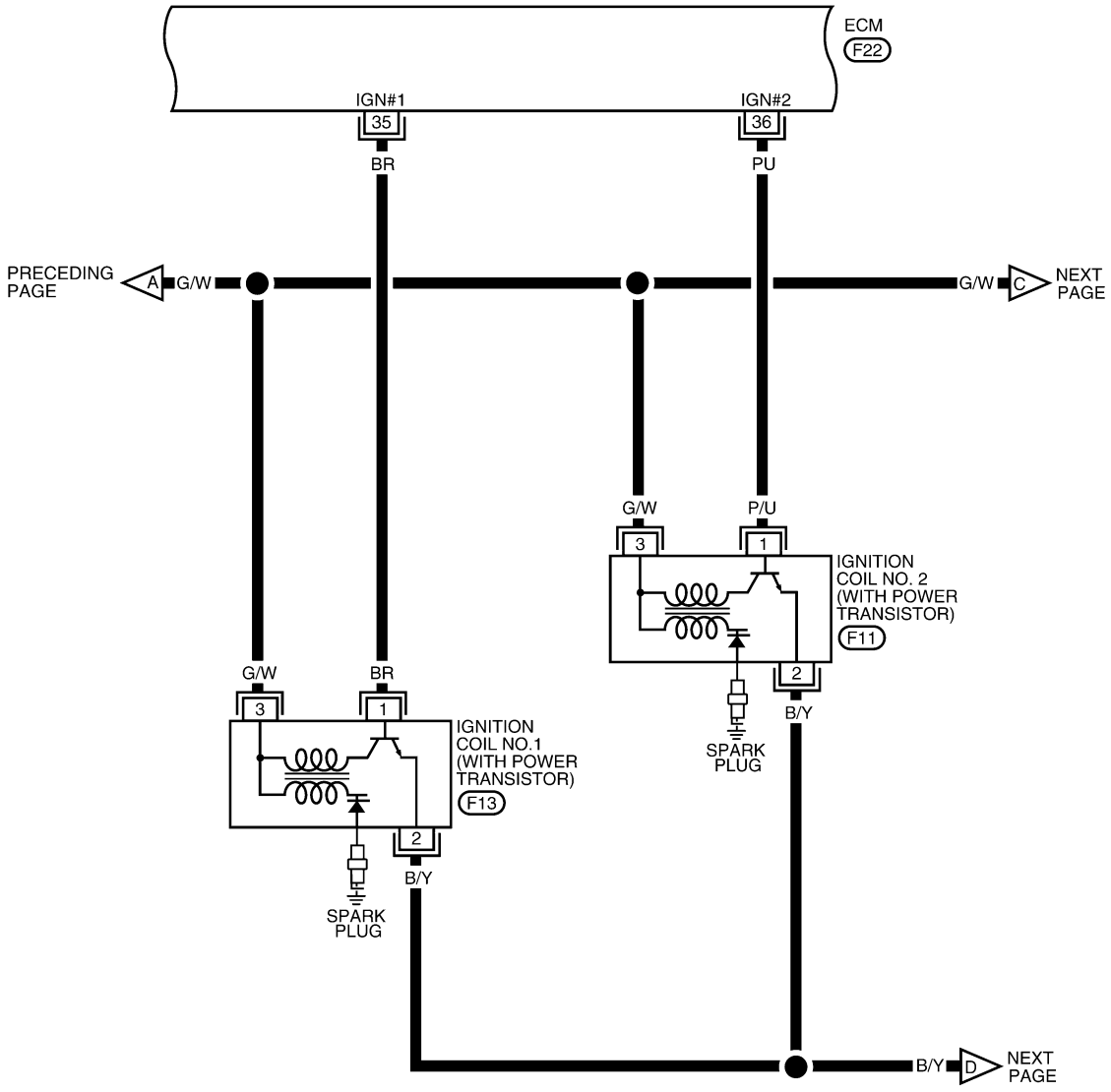


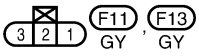


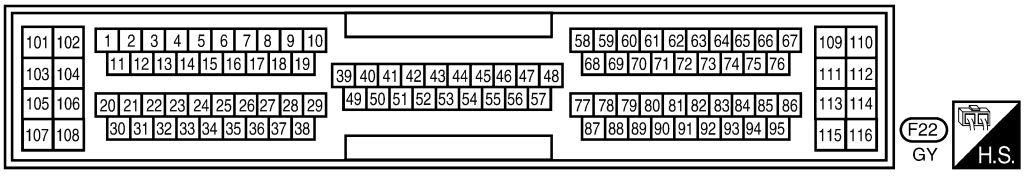
BBWA0135E

EC-IGN/SG-02

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

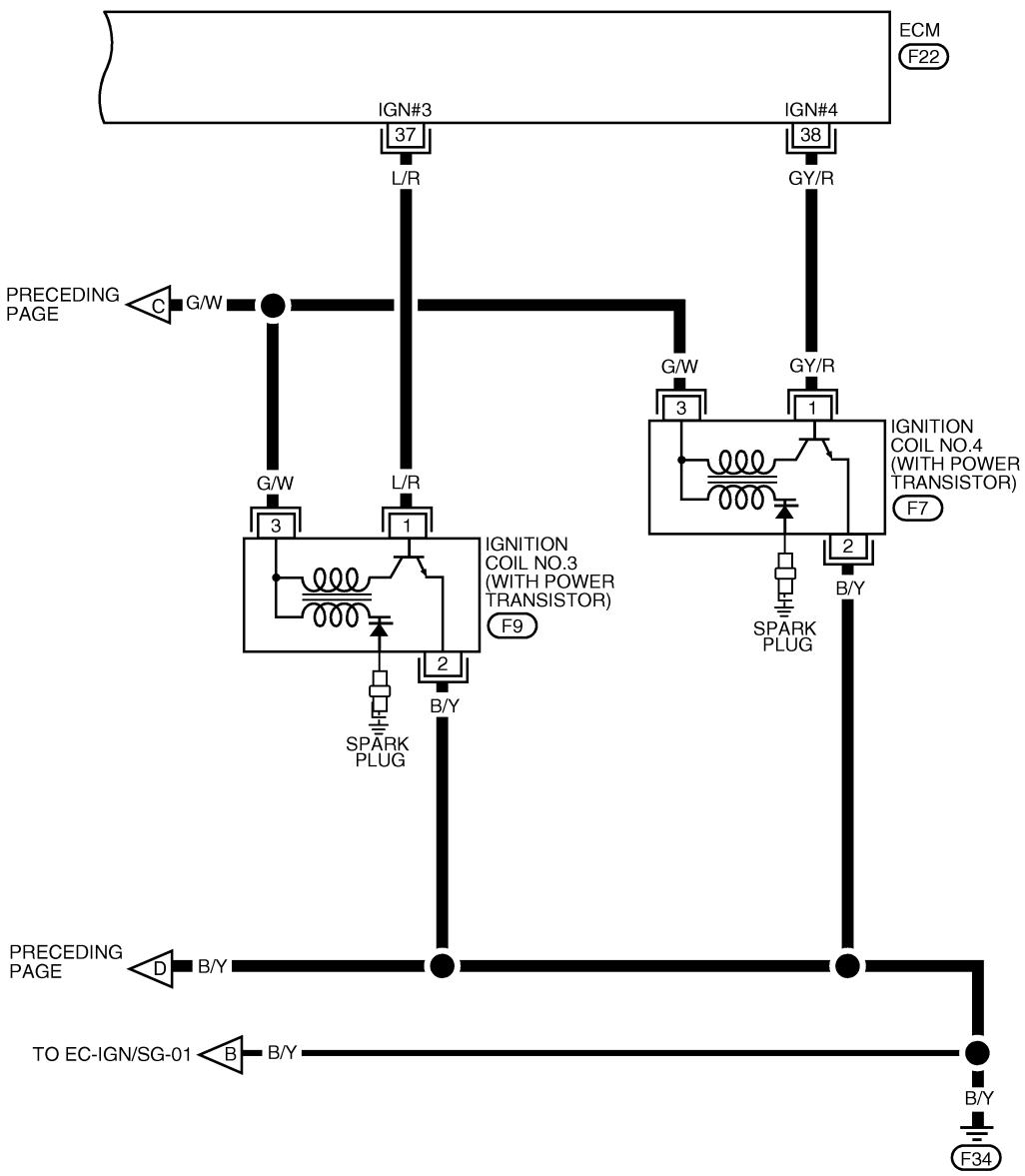


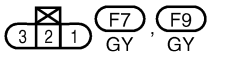


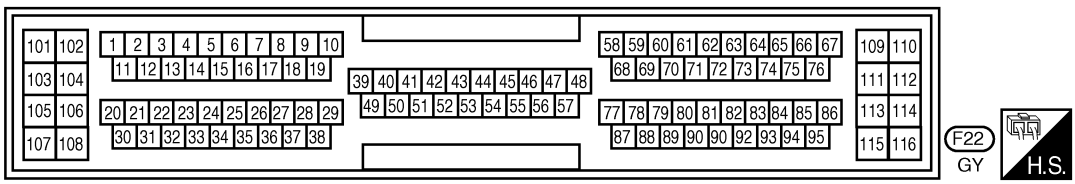


BBWA0136E

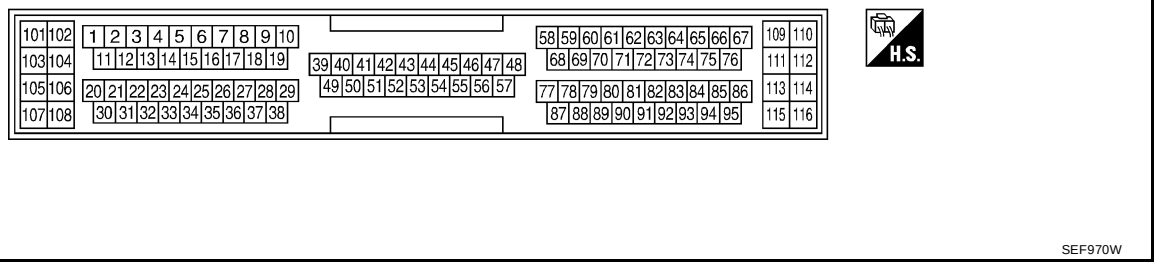
EC-IGN/SG-03





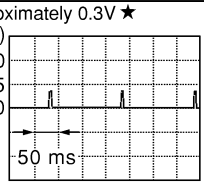
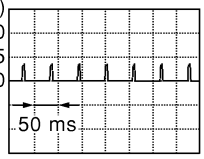


WEC407



SEF970W

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
35	B/R	IGNITION SIGNAL NO. 1	ENGINE RUNNING AT IDLE SPEED UNDER WARM-UP CONDITION	Approximately 0.3V ★ 
36	PU	IGNITION SIGNAL NO. 2		
37	L/R	IGNITION SIGNAL NO. 3	ENGINE RUNNING AT 2,000 RPM	Approximately 0.5V ★ 
38	GY/R	IGNITION SIGNAL NO. 4		

★ : AVERAGE VOLTAGE FOR PULSE SIGNAL (ACTUAL PULSE SIGNAL CAN BE CONFIRMED BY OSCILLOSCOPE.)

SEF746YA

Diagnostic Procedure

UBS001HZ

1. CHECK ENGINE START

Turn ignition switch "OFF", and restart engine.
Is engine running?

Yes or No

Yes (With CONSULT-II)>>GO TO 2.
Yes (Without CONSULT-II)>>GO TO 12.
No >> GO TO 3.

2. SEARCH FOR MALFUNCTIONING CIRCUIT

With CONSULT-II

1. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-II.
2. Search for circuit which does not produce a momentary engine speed drop.

>> GO TO 12.

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

SEF190Y

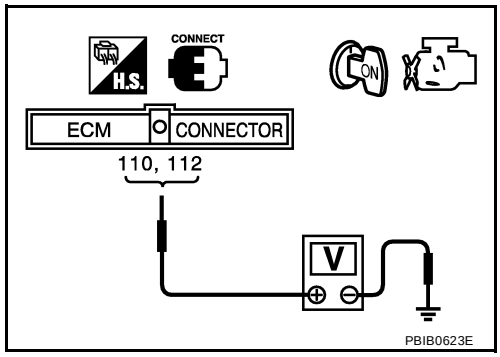
3. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-I

1. Turn ignition switch ON.
2. Check voltage between ECM terminals 110, 112 and ground with CONSULT-II or tester.

Voltage: Battery voltage

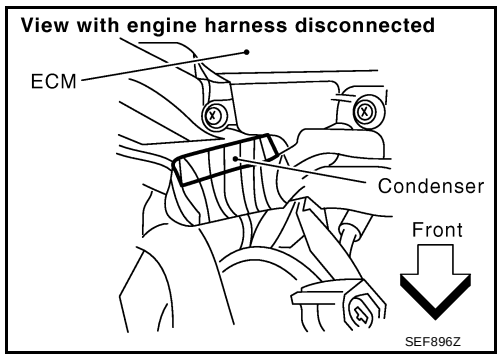
OK or NG

OK >> GO TO 4.
NG >> Go to EC-148, "POWER SUPPLY CIRCUIT FOR ECM".



4. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect condenser harness connector.
3. Turn ignition switch ON.

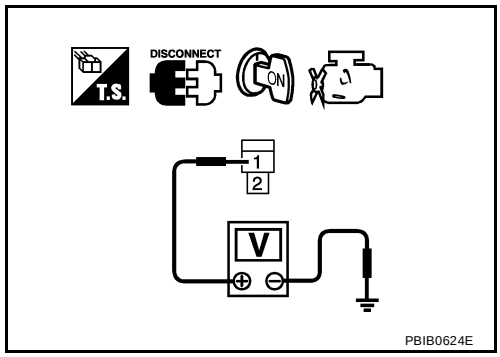


4. Check voltage between condenser terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 10.
NG >> GO TO 5.



5. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-III

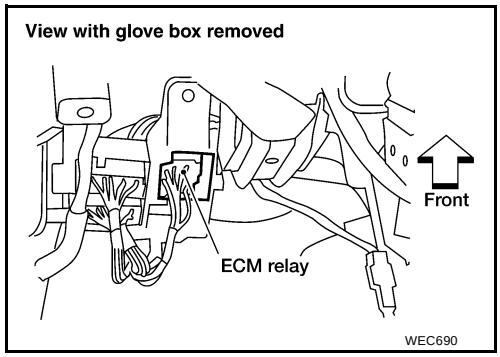
1. Turn ignition switch OFF.
2. Disconnect ECM relay.
3. Check harness continuity between ECM relay terminal 7 and condenser terminal 1.
   Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

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



6. DETECT MALFUNCTIONING PART

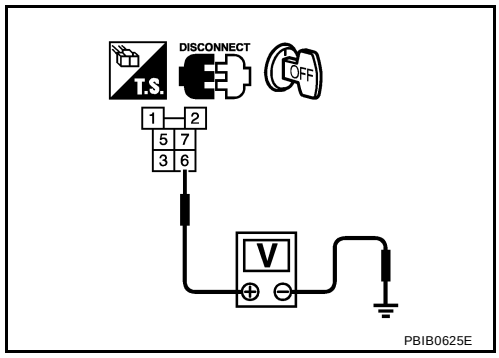
Check the harness for open or short between ECM relay and condenser.

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

7. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-IV

Check voltage between ECM relay terminal 6 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

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

8. DETECT MALFUNCTIONING PART

Check the following.

- Fuse and fusible link box connector E22
- 15A fuse
- Harness for open and short between ECM relay and fuse

>> Repair or replace harness or connectors.

9. CHECK ECM RELAY

Refer to EC-153, "Component Inspection" .

OK or NG

OK >> GO TO 17.
NG >> Replace ECM relay.

10. CHECK CONDENSER GROUND CIRCUIT FOR OPEN AND SHORT

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

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 11.
NG >> Repair open circuit or short to power in harness or connectors.

11. CHECK CONDENSER

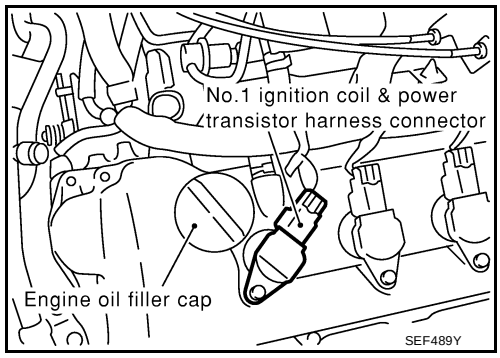
Refer to EC-320, "Component Inspection" .

OK or NG

OK >> GO TO 12.
NG >> Replace condenser.

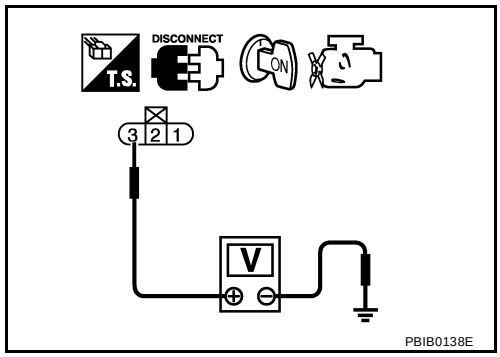
12. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-V

1. Turn ignition switch OFF.
2. Reconnect harness connectors disconnected.
3. Disconnect ignition coil harness connector.
4. Turn ignition switch ON.



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

Voltage: Battery voltage



OK or NG

OK >> GO TO 14.
NG >> GO TO 13.

13. DETECT MALFUNCTIONING PART

Check the harness for open or short between ignition coil and ECM relay.

>> Repair or replace harness or connectors.

14. CHECK IGNITION COIL GROUND CIRCUIT FOR OPEN AND SHORT

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

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 15.
NG >> Repair open circuit or short to power in harness or connectors.

15. CHECK IGNITION COIL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminals 35, 36, 37, 38 and ignition coil terminal 1. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

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

16. CHECK IGNITION COIL WITH POWER TRANSISTOR

Refer to EC-320, "Component Inspection" .

OK or NG

OK >> GO TO 17.
NG >> Replace ignition coil with power transistor.

17. CHECK INTERMITTENT INCIDENT

Refer to EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

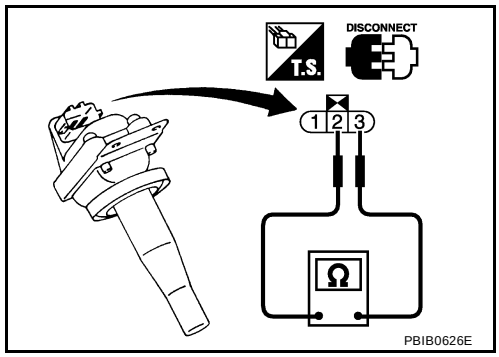
Component Inspection

UBS001I0

IGNITION COIL WITH POWER TRANSISTOR

1. Turn ignition switch “OFF”.
2. Disconnect ignition coil harness connector.
3. Check resistance between ignition coil terminals as follows.

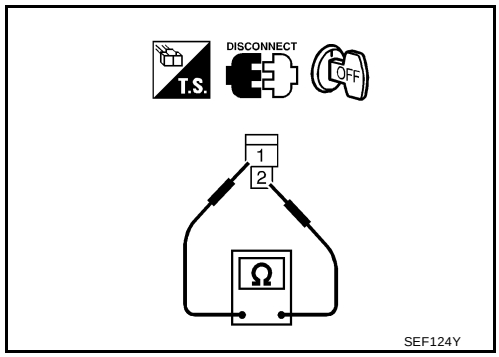
Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
3 (+) - 2 (-)	Except 0 or ∞
1 (+) - 3 (-)	Except 0
1 (+) - 2 (-)	



CONDENSER

1. Turn ignition switch “OFF”.
2. Disconnect condenser harness connector.
3. Check resistance between condenser terminals as 1 and 2.

Resistance: Above 1 MΩ at 25°C (77°F)



Removal and Installation

UBS001I1

IGNITION COIL WITH POWER TRANSISTOR

Refer to EM-15, "Removal and Installation" .

DTC P0400 EGR FUNCTION

PFP:14710

Description

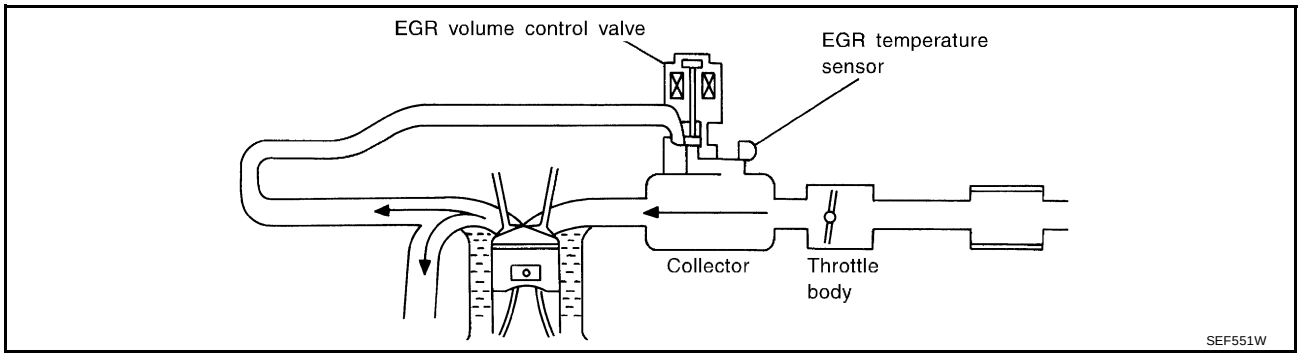
UBS001I2

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed	EGR volume control	EGR volume control valve
Camshaft position sensor (PHASE)	Engine speed and cylinder position		
Vehicle speed sensor	Vehicle speed		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		
Battery	Battery voltage		
Mass air flow sensor	Amount of intake air		
Air conditioner switch	Air conditioner operation		
Power steering oil pressure switch	Power steering load signal		
Electrical load	Electrical load signal		
PNP switch	Park/Neutral position signal		
TCM (Transmission control module)	Gear position, shifting signal		

This system controls flow rate of EGR led from exhaust manifold to intake manifold. The opening of the EGR bypass passage in the EGR volume control valve changes to control the flow rate. A built-in step motor moves the valve in steps corresponding to the ECM output pulses. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions. The EGR volume control valve remains closed under the following conditions.

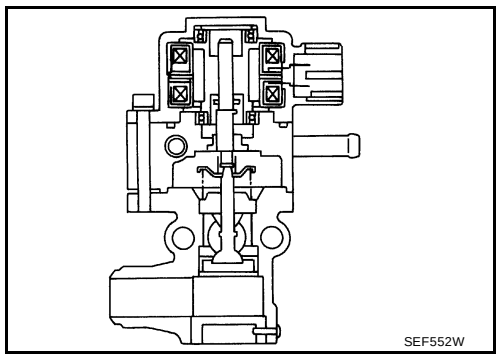
- Engine stopped
- Engine starting
- Engine idling
- Low engine coolant temperature
- Excessively high engine coolant temperature
- High engine speed
- Wide open throttle
- Low battery voltage



COMPONENT DESCRIPTION

EGR volume control valve

The EGR volume control valve uses a step motor to control the flow rate of EGR from exhaust manifold. This motor has four winding phases. It operates according to the output pulse signal of the ECM. Two windings are turned ON and OFF in sequence. Each time an ON pulse is issued, the valve opens or closes, changing the flow rate. When no change in the flow rate is needed, the ECM does not issue the pulse signal. A certain voltage signal is issued so that the valve remains at that particular opening.


SEF552W

CONSULT-II Reference Value in Data Monitor Mode

UBS001I3

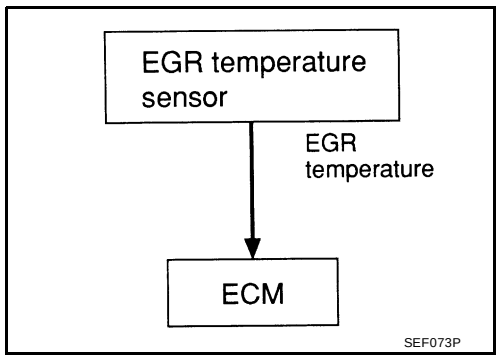
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
EGR TEMP SEN	● Engine: After warming up		Less than 4.5V
EGR VOL CON/V	● Engine: After warming up ● Air conditioner switch: “OFF” ● Shift lever: “N” ● No-load	Idle	0 step
		Revving engine up to 3,000 rpm quickly	10 - 55 steps

On Board Diagnosis Logic

UBS001I4

If the absence of EGR flow is detected by EGR temperature sensor under the condition that calls for EGR, a low-flow malfunction is diagnosed.
Malfunction is detected when no EGR flow is detected under condition that calls for EGR.



SEF073P

Possible Cause

UBS001I5

- Harness or connectors
  (EGR volume control valve circuit is open or shorted.)
- EGR volume control valve stuck closed
- Dead (Weak) battery
- EGR passage clogged
- EGR temperature sensor and circuit
- Exhaust gas leaks

DTC Confirmation Procedure

UBS001I6

CAUTION:
Always drive vehicle at a safe speed.

NOTE:

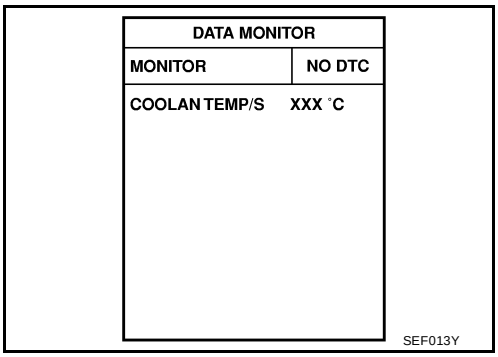
- If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 5 seconds before conducting the next test.
- P0400 will not be displayed at “SELF-DIAG RESULTS” mode with CONSULT-II even though DTC work support test result is NG.

TESTING CONDITION:

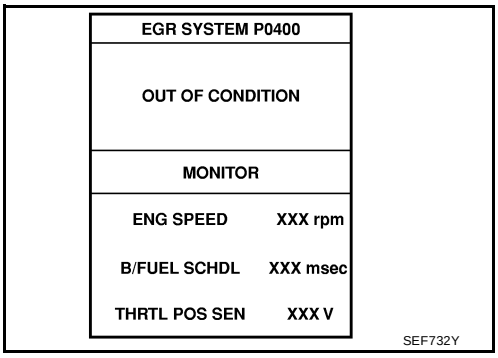
- **Before performing the following procedure, confirm battery voltage is more than 10V at idle, then stop engine immediately.**
- **For best results, perform the test at a temperature of 5°C (41°F) or higher.**

WITH CONSULT-II

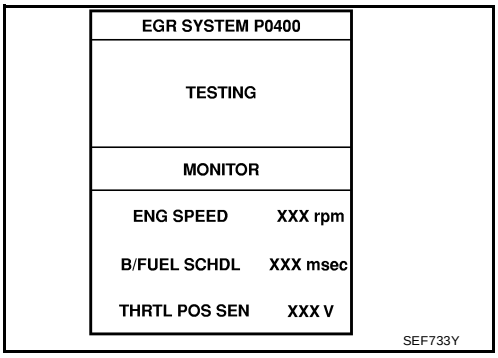
1. Turn ignition switch “OFF” and wait at least 10 seconds.
2. Turn ignition switch “ON”
3. Check “COOLAN TEMP/S” in “DATA MONITOR” mode with CONSULT-II.
   Confirm COOLAN TEMP/S value is within the range listed below.
   COOLAN TEMP/S: Less than 40°C (104°F)
   If the value is out of range, park the vehicle in a cool place and allow the engine temperature to stabilize. Do not attempt to lower the engine coolant temperature with a fan or means other than ambient air. Doing so may produce an inaccurate diagnostic result.



4. Start engine and let it idle monitoring “COOLAN TEMP/S” value. When the “COOLAN TEMP/S” value reaches 70°C (158°F), immediately go to the next step.
5. Select “EGR SYSTEM P0400” of “EGR SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II.

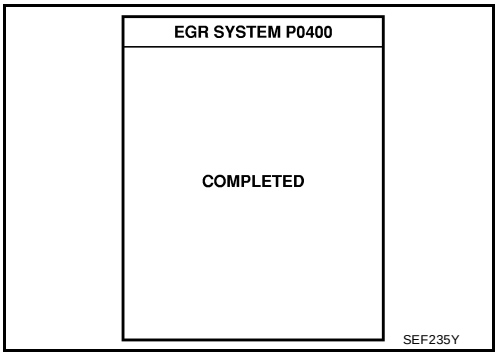


6. Touch “START”.



7. Accelerate vehicle to a speed of 40 km/h (25 MPH) once and then stop vehicle with engine running.
   If “COMPLETED” appears on CONSULT-II screen, go to step 9.
   If “COMPLETED” does not appear on CONSULT-II screen, go to the following step.
8. When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions until “TESTING” changes to “COMPLETED”. (It will take approximately 30 seconds or more.)

ENG SPEED	1,200 - 3,600 rpm
Vehicle speed	More than 10 km/h (6 MPH)



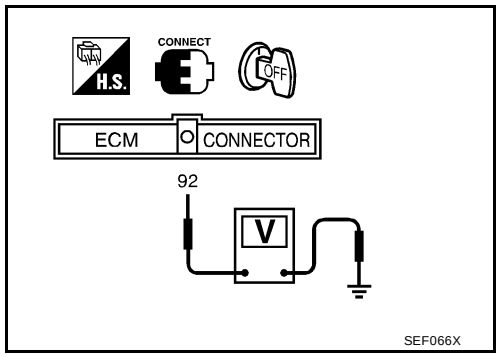
B/FUEL SCHDL	4.5 - 8.0 msec
Selector lever	Suitable position

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

9. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”.
   If “NG” is displayed, refer to EC-326, "Diagnostic Procedure" .

WITH GST

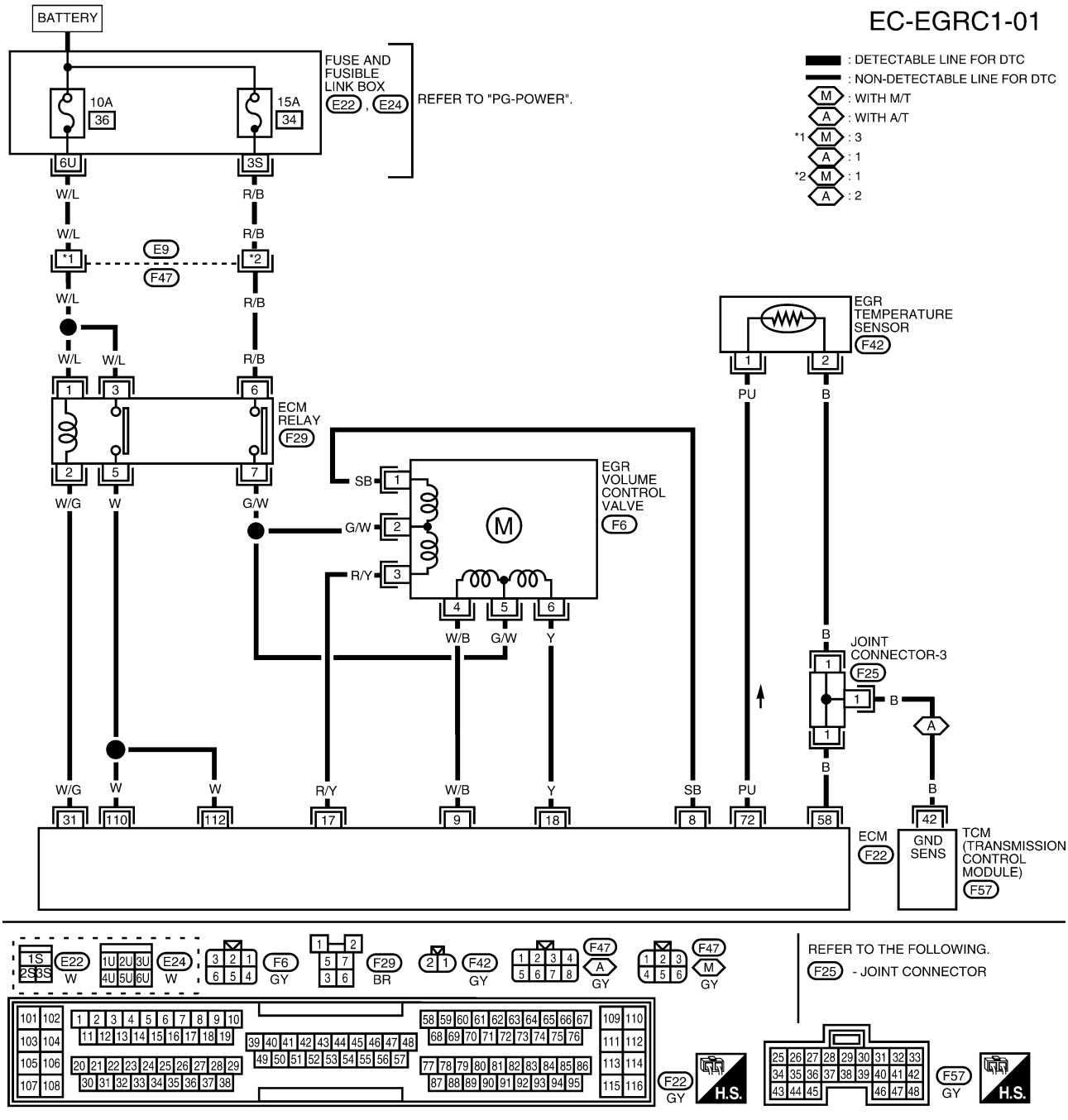
1. Turn ignition switch “OFF” and wait at least 10 seconds.
2. Turn ignition switch “ON”.
3. Check engine coolant temperature in MODE 1 with GST.
   Engine coolant temperature: Less than 40°C (104°F)
   If the value is out of range, park the vehicle in a cool place and allow the engine temperature to stabilize. Do not attempt to lower the coolant temperature with a fan or means other than ambient air. Doing so may produce an inaccurate diagnostic result.
4. Start engine and let it idle monitoring the value of “COOLAN TEMP/S”. When the engine coolant temperature reaches 70°C (158°F), immediately go to the next step.
5. Maintain the following conditions for at least 1 minute.
   Engine speed: 1,800 - 2,800 rpm
   Vehicle speed: More than 10 km/h (6 MPH)
   Selector lever: Suitable position
6. Stop vehicle.
7. Turn ignition switch “OFF” and wait at least 10 seconds, then turn “ON”.
8. Repeat steps 3 to 5.
9. Select “MODE 3” with GST.
10. If DTC is detected, go to EC-326, "Diagnostic Procedure" .



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

Wiring Diagram

UBS001I7



BBWA0123E

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
8	SB	EGR VOLUME CONTROL VALVE	ENGINE RUNNING AT IDLE SPEED	0.1 - 14V
9	W/B			
17	R/Y			
18	Y			

SEF180ZA

Diagnostic Procedure

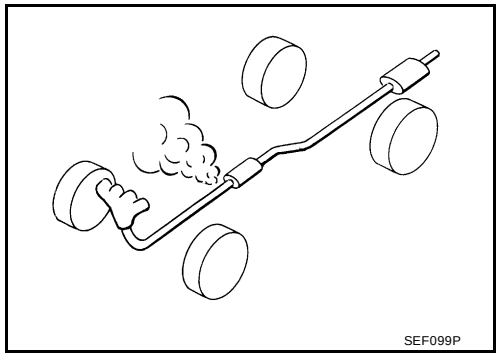
UBS001I8

1. CHECK EXHAUST SYSTEM

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

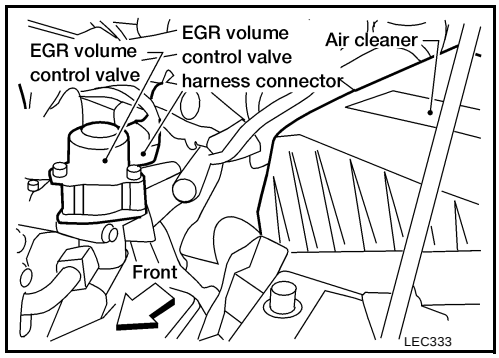
OK or NG

OK >> GO TO 2.
NG >> Repair or replace exhaust system.



2. CHECK EGR VOLUME CONTROL VALVE POWER SUPPLY CIRCUIT

1. Disconnect EGR volume control valve harness connector.
2. Turn ignition switch “ON”.

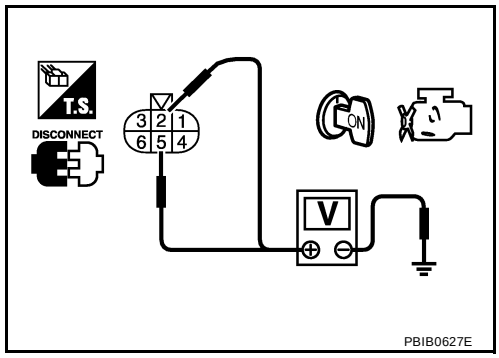


3. Check voltage between EGR volume control valve terminals 2, 5 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

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



3. DETECT MALFUNCTIONING PART

Check the following.

- Fuse and fusible link box connector E22
- 15A fuse
- Harness connectors E9, F47
- Harness for open or short between fuse and ECM relay
- ECM relay
- Harness for open or short between ECM relay and EGR volume control valve

>> Repair harness or connectors, or replace fuse or ECM relay.

4. CHECK EGR VOLUME 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 terminals and EGR volume control valve terminals as follows. Refer to Wiring Diagram.

ECM terminal	EGR volume control valve
8	1
9	4
17	3
18	6

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 EGR PASSAGE

Check EGR passage for clogging and cracks.

OK or NG

OK >> GO TO 6.
NG >> Repair or replace EGR passage.

6. CHECK EGR TEMPERATURE SENSOR AND CIRCUIT

Refer to EC-340, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace EGR temperature sensor.

7. CHECK EGR VOLUME CONTROL VALVE

Refer to EC-332, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace EGR volume control valve.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

DTC P0403 EGR VOLUME CONTROL VALVE

PFP:14710

Description

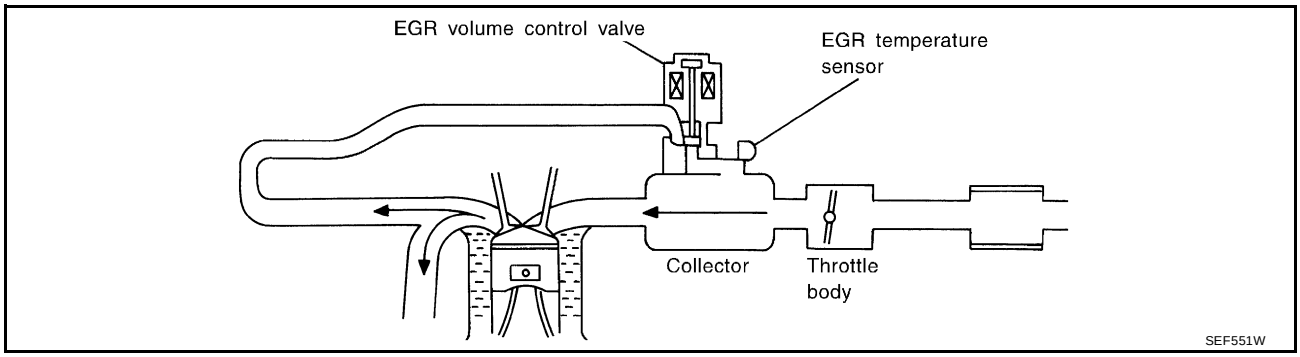
UBS001I9

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE)	Engine speed and cylinder position	EGR volume control	EGR volume control valve
Crankshaft position sensor (POS)	Engine speed		
Vehicle speed sensor	Vehicle speed		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		
Battery	Battery voltage		
Mass air flow sensor	Amount of intake air		
Air conditioner switch	Air conditioner operation		
Power steering oil pressure switch	Power steering load signal		
Electrical load	Electrical load signal		
PNP switch	Park/Neutral position signal		
TCM (Transmission control module)	Gear position, shifting signal		

This system controls flow rate of EGR led from exhaust manifold to intake manifold. The opening of the EGR bypass passage in the EGR volume control valve changes to control the flow rate. A built-in step motor moves the valve in steps corresponding to the ECM output pulses. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions. The EGR volume control valve remains closed under the following conditions.

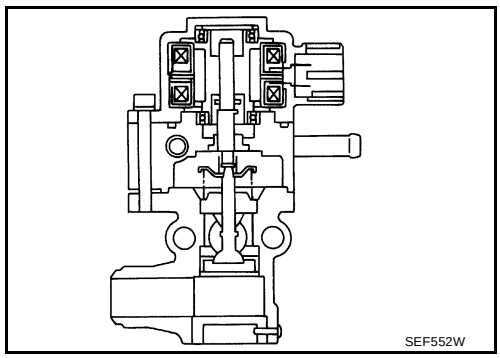
- Engine stopped
- Engine starting
- Engine idling
- Low engine coolant temperature
- Excessively high engine coolant temperature
- High engine speed
- Wide open throttle
- Low battery voltage



COMPONENT DESCRIPTION

EGR volume control valve

The EGR volume control valve uses a step motor to control the flow rate of EGR from exhaust manifold. This motor has four winding phases. It operates according to the output pulse signal of the ECM. Two windings are turned ON and OFF in sequence. Each time an ON pulse is issued, the valve opens or closes, changing the flow rate. When no change in the flow rate is needed, the ECM does not issue the pulse signal. A certain voltage signal is issued so that the valve remains at that particular opening.


SEF552W

CONSULT-II Reference Value in Data Monitor Mode

UBS001IA

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
EGR VOL CON/V	● Engine: After warming up ● Air conditioner switch: “OFF” ● Shift lever: “N” ● No-load	Idle	0 step
		Revving engine up to 3,000 rpm quickly	10 - 55 steps

On Board Diagnosis Logic

UBS001IB

Malfunction is detected when an improper voltage signal is sent to ECM through the valve.

FAIL-SAFE MODE

When the ECM enters the fail-safe mode, the MIL illuminates.

Detected items	Engine operating condition in fail-safe mode
EGR volume control valve circuit	Engine speed will not rise more than 2,800 rpm due to the fuel cut.

Possible Cause

UBS001IC

- Harness or connectors
  (EGR volume control valve circuit is open or shorted.)
- EGR volume control valve

DTC Confirmation Procedure

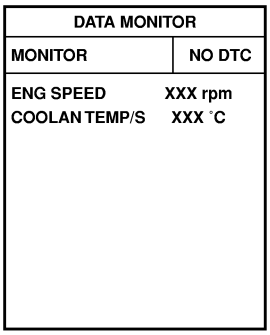
UBS001ID

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 warm it up to normal operating temperature.
3. Rev engine from idle to 2,000 rpm 10 times.
4. If 1st trip DTC is detected, go to EC-331, "Diagnostic Procedure"
   .



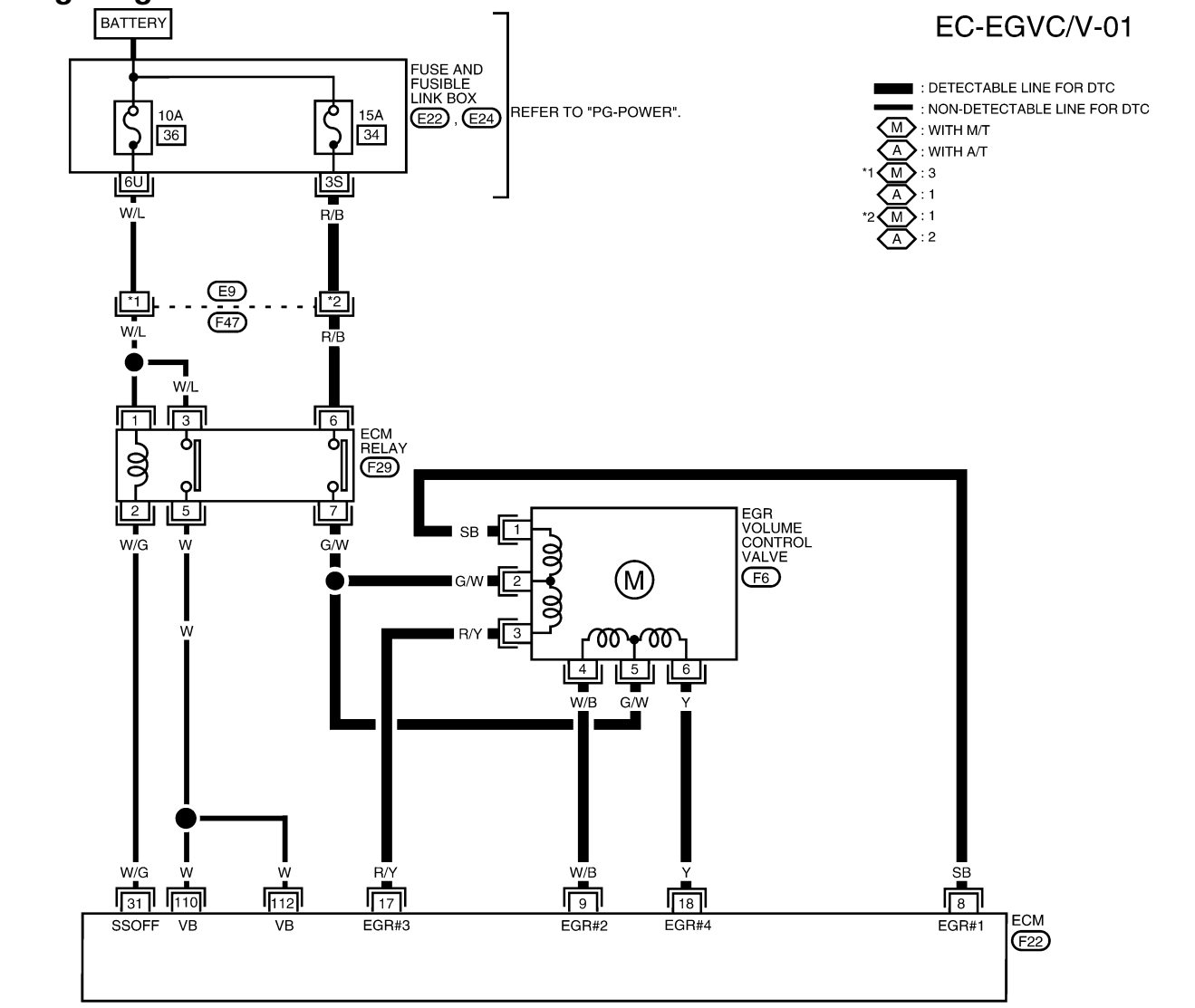
SEF174Y

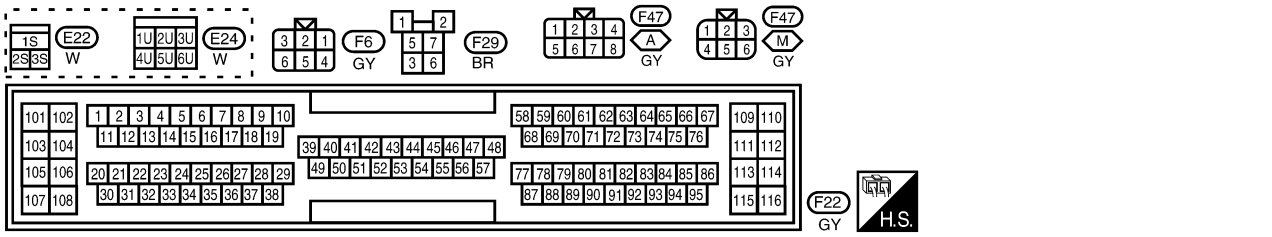
WITH GST

Follow the procedure “With CONSULT-II” above.

Wiring Diagram

UBS001IE





BBWA0124E

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
8	SB	EGR VOLUME CONTROL VALVE	ENGINE RUNNING AT IDLE SPEED	0.1 - 14V
9	W/B			
17	R/Y			
18	Y			

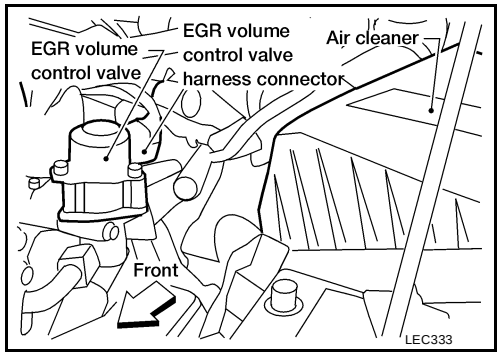
SEF181ZA

Diagnostic Procedure

UBS001IF

1. CHECK EGR VOLUME CONTROL VALVE POWER SUPPLY CIRCUIT

1. Disconnect EGR volume control valve harness connector.
2. Turn ignition switch “ON”.

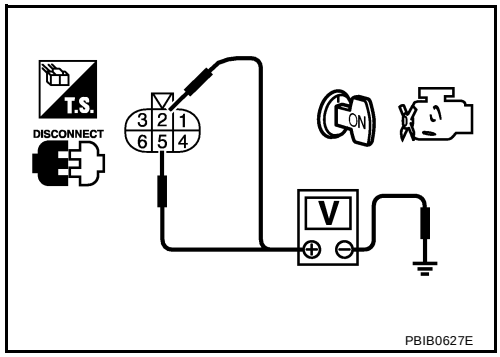


3. Check voltage between EGR volume control valve terminals 2, 5 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

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



2. DETECT MALFUNCTIONING PART

Check the following.

- Fuse and fusible link connector E22
- 15A fuse
- Harness connectors E9, F47
- Harness open or short between fuse and ECM relay
- ECM relay
- Harness for open or short between ECM relay and EGR volume control valve

>> Repair harness or connectors or replace fuse or ECM relay.

3. CHECK EGR VOLUME 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 terminals and EGR volume control valve terminals as follows. Refer to Wiring Diagram.

ECM terminal	EGR volume control valve
8	1
9	4
17	3
18	6

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 EGR VOLUME CONTROL VALVE

Refer to EC-332, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace EGR volume control valve.

5. CHECK INTERMITTENT INCIDENT

Refer to EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

UBS001IG

EGR VOLUME CONTROL VALVE

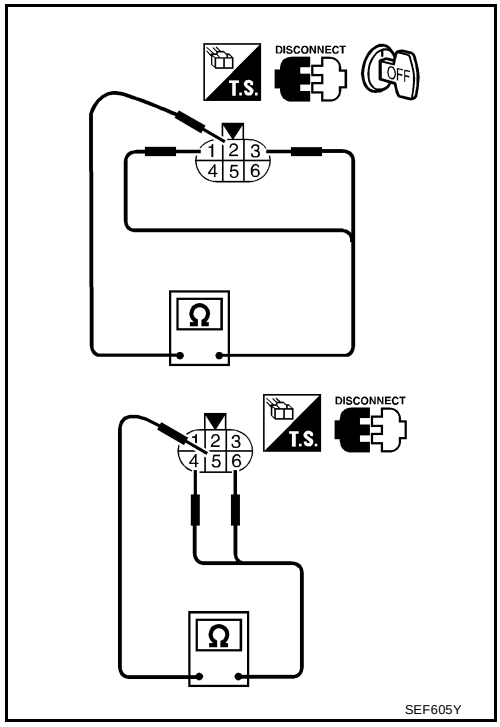
With CONSULT-II

1. Disconnect EGR volume control valve harness connector.

2. Check resistance between the following terminals.
terminal 2 and terminals 1, 3
terminal 5 and terminals 4, 6

Temperature °C (°F)	Resistance Ω
20 (68)	20.9 - 23.1

3. Reconnect EGR volume control valve harness connector.
4. Remove EGR volume control valve from cylinder head.
(The EGR volume control valve harness connector should remain connected.)
5. Turn ignition switch “ON”.



6. Perform “EGR VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-II. Check that EGR volume control valve shaft moves smoothly forward and backward according to the valve opening. If NG, replace the EGR volume control valve.

ACTIVE TEST	
EGR VOL CONT/V	20 step
MONITOR	
ENG SPEED	XXX rpm
EGR TEMP SEN	XXX V

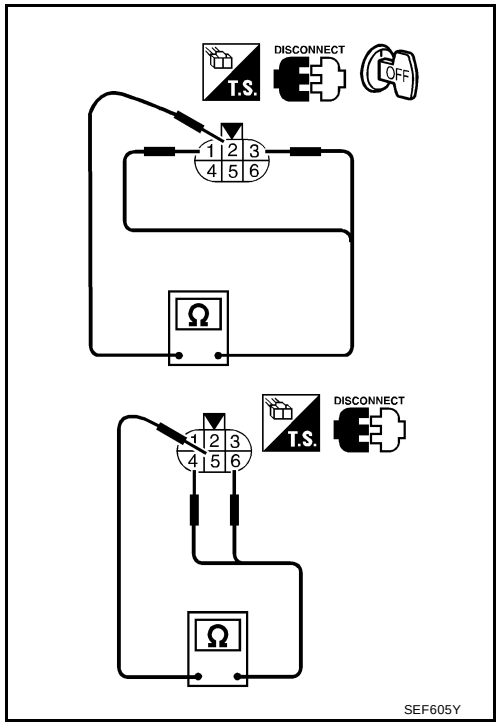
SEF015Y

Without CONSULT-II

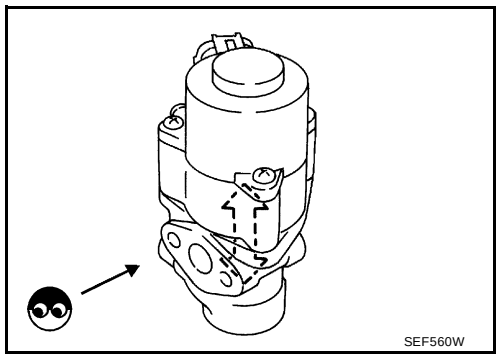
1. Disconnect EGR volume control valve harness connector.

2. Check resistance between the following terminals.
terminal 2 and terminals 1, 3
terminal 5 and terminals 4, 6

Temperature °C (°F)	Resistance Ω
20 (68)	20.9 - 23.1



3. Turn ignition switch “ON” and “OFF”. Check that EGR volume control valve shaft moves smoothly forward and backward according to the ignition switch position.
If NG, replace the EGR volume control valve.



Removal and Installation

UBS001IH

EGR VOLUME CONTROL VALVE

Refer to EM-15, "OUTER COMPONENT PARTS" .

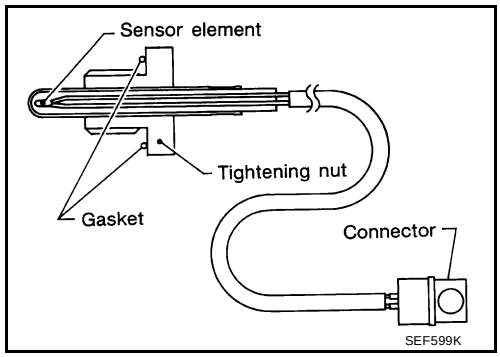
DTC P0405, P0406 EGRT SENSOR

PFP:14710

Component Description

UBS001II

The EGR temperature sensor detects temperature changes in the EGR passageway. When the EGR volume control valve opens, hot exhaust gases flow, and the temperature in the passageway changes. The EGR temperature sensor is a thermistor that modifies a voltage signal sent from the ECM. This modified signal then returns to the ECM as an input signal. As the temperature increases, EGR temperature sensor resistance decreases.
This sensor is not directly used to control the engine system. It is used only for the on board diagnosis.



<Reference data>

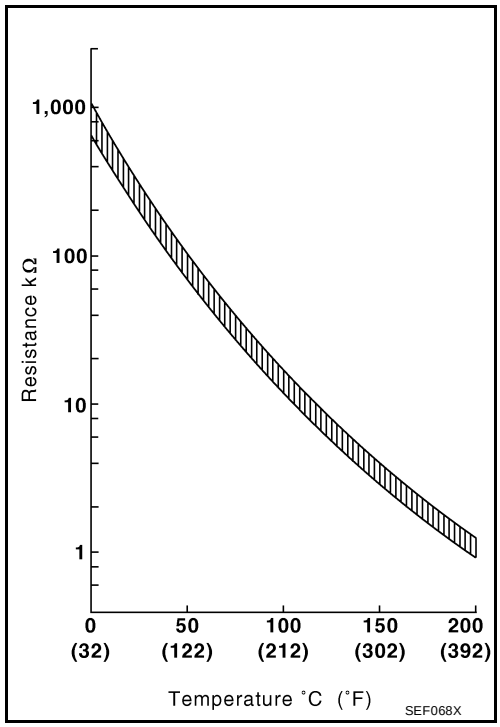
EGR temperature °C (°F)	Voltage* V	Resistance MΩ
0 (32)	4.56	0.62 - 1.05
50 (122)	2.25	0.065 - 0.094
100 (212)	0.59	0.011 - 0.015

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

CAUTION:

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

When EGR system is operating.
Voltage: 0 - 1.5V



On Board Diagnosis Logic

UBS001IJ

Malfunction is detected when
(Malfunction A: P0405) an excessively low voltage from the EGR temperature sensor is sent to ECM even when engine coolant temperature is low.
(Malfunction B: P0406) an excessively high voltage from the EGR temperature sensor is sent to ECM even when engine coolant temperature is high.

Possible Cause

UBS001IK

MALFUNCTION A

- Harness or connectors (The EGR temperature sensor circuit is shorted.)
- EGR temperature sensor
- Malfunction of EGR function

MALFUNCTION B

- Harness or connectors (The EGR temperature sensor circuit is open.)
- EGR temperature sensor
- Malfunction of EGR function

DTC Confirmation Procedure

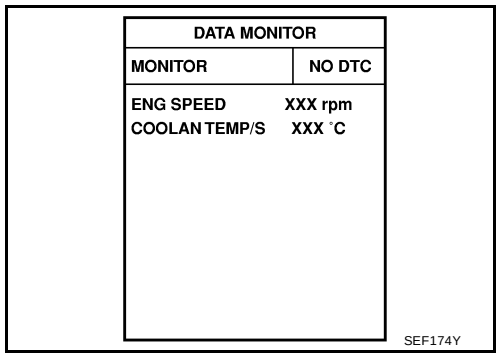
UBS001IL

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. Verify that “COOLAN TEMP/S” is less than 50°C (122°F).
   If the engine coolant temperature is above the range, cool the engine down.
4. Start engine and let it idle for at least 8 seconds.
5. If 1st trip DTC is detected, go to EC-339, "Diagnostic Procedure"
   .



With GST

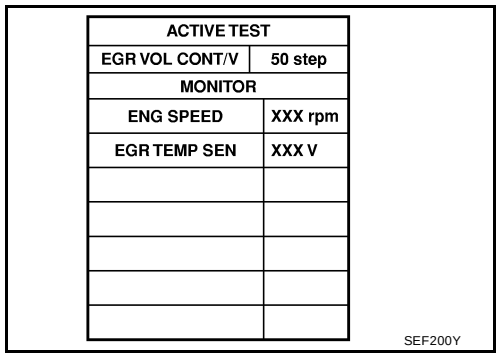
Follow the procedure “With CONSULT-II” above.

PROCEDURE FOR MALFUNCTION B

CAUTION:
Always drive vehicle at a safe speed.
TESTING CONDITION:
Always perform the test at a temperature above –10°C (14°F).

With CONSULT-II

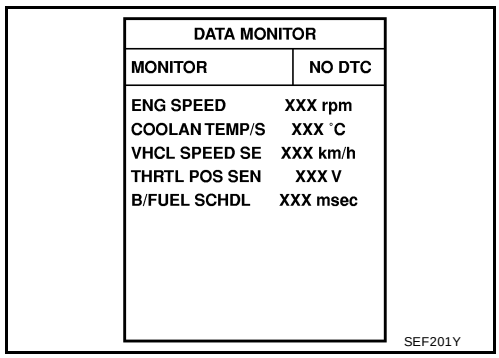
1. Start engine and warm it up to normal operating temperature.
2. Select “EGR VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-II.
3. Hold engine speed at 1,500 rpm.
4. Touch “Qu” and set the EGR volume control valve opening to 50 step and check EGR TEMP SEN.
   EGR TEMP SEN should decrease to less than 1.0V.
   If the check result is NG, go to EC-339, "Diagnostic Procedure" .
   If the check result is OK, go to the following step.
5. Turn ignition switch “OFF” and wait at least 5 seconds then turn “ON”.



6. Start engine and maintain the following conditions for at least 5 consecutive seconds.

ENG SPEED	1,200 - 3,600 rpm
VHCL SPEED SE	10 km/h (6 MPH) or more
B/FUEL SCHDL	4.5 - 8.0 msec
Selector lever	Suitable position

7. If 1st trip DTC is detected, go to EC-339, "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, then turn “ON”.

3. Select “MODE 1” with GST and maintain the following conditions for at least 5 consecutive seconds.

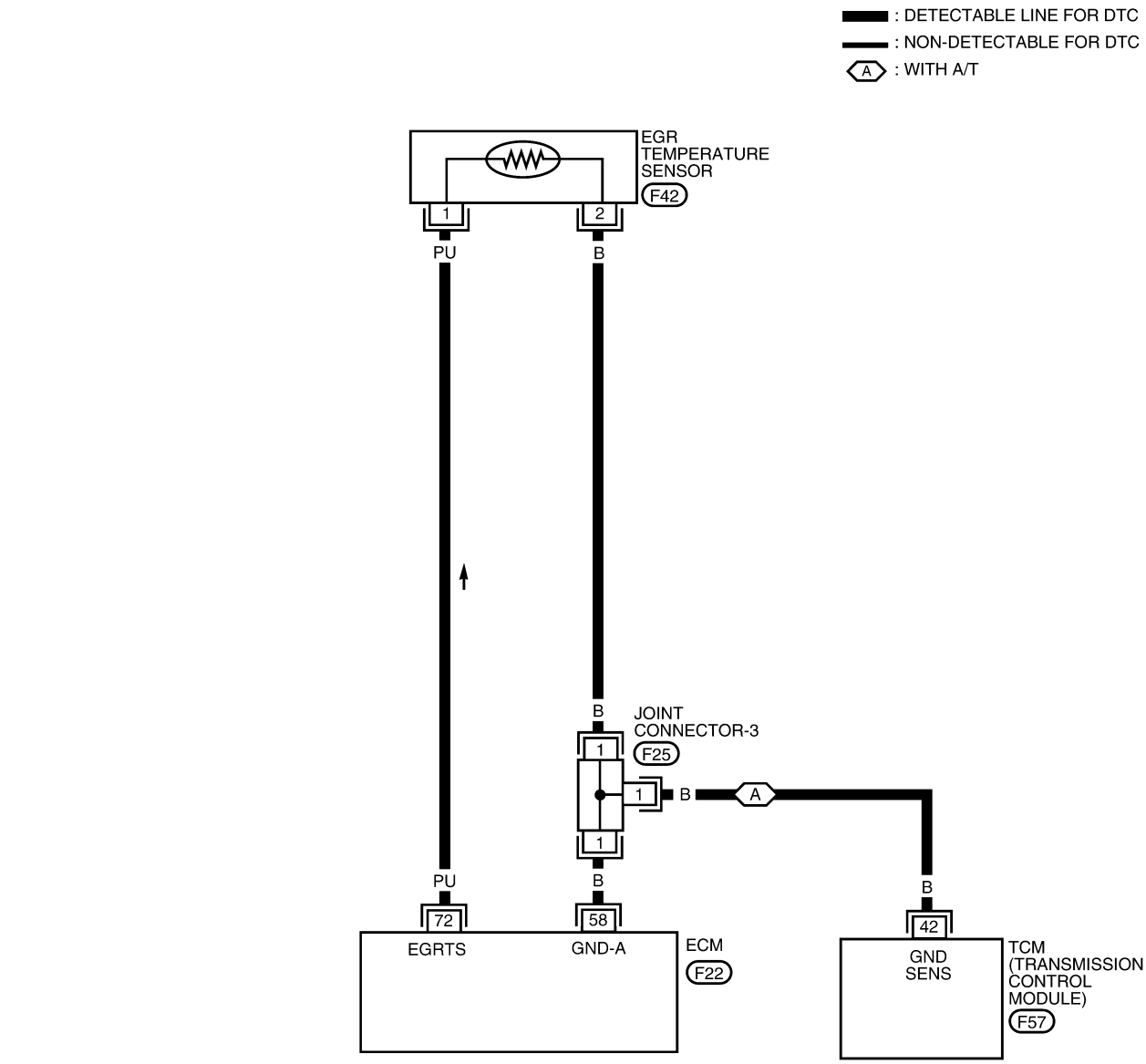
Engine speed	1,200 - 3,600 rpm
Vehicle speed	10 km/h (6 MPH) or more
Selector lever	Suitable position

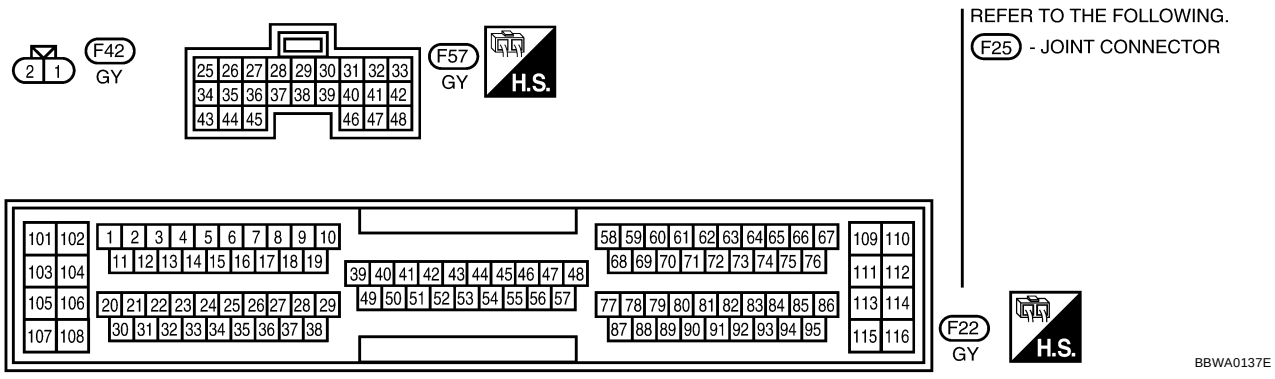
4. Select “MODE 7” with GST.
5. If 1st trip DTC is detected, go to EC-339, "Diagnostic Procedure" .

Wiring Diagram

UBS001IM

EC-EGR/TS-01



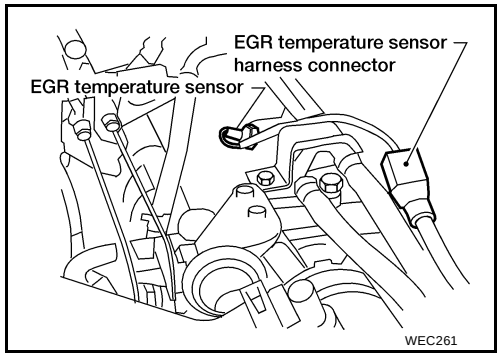


Diagnostic Procedure

UBS001IN

1. CHECK EGR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

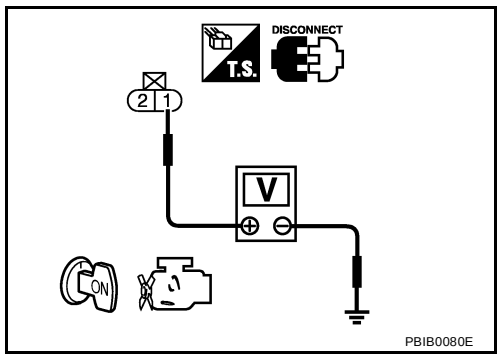
1. Turn ignition switch “OFF”.
2. Disconnect EGR temperature sensor harness connector.
3. Turn ignition switch “ON”.



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

OK or NG

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



2. CHECK EGR TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

Continuity should exist.

3. Also check harness for short to power.

OK or NG

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

3. DETECT MALFUNCTIONING PART

Check the following.

- Joint connector-3
- Harness for open or short between ECM and EGR temperature sensor
- Harness for open or short between TCM (Transmission control module) and EGR temperature sensor

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

4. CHECK EGR TEMPERATURE SENSOR

Refer to EC-340, "Component Inspection" .

OK or NG

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

5. CHECK EGR VOLUME CONTROL VALVE

Refer to EC-332, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace EGR volume control valve.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

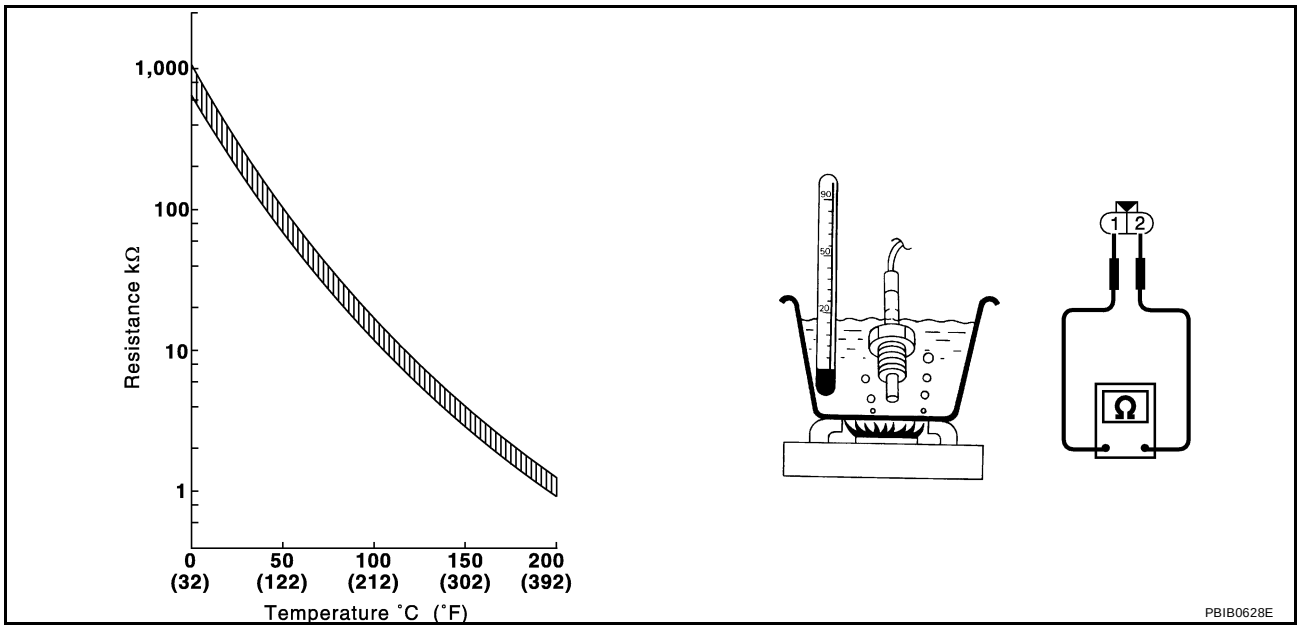
>> **INSPECTION END**

Component Inspection

UBS001IO

EGR TEMPERATURE SENSOR

1. Remove EGR temperature sensor.
2. Check resistance between EGR temperature sensor terminals 1 and 2 under the following conditions.



<Reference data>

EGR temperature °C (°F)	Resistance MΩ
0 (32)	0.62 - 1.05
50 (122)	0.065 - 0.094
100 (212)	0.011 - 0.015

If NG, replace EGR temperature sensor.

Removal and Installation

UBS001IP

EGR TEMPERATURE SENSOR

Refer to EM-15, "OUTER COMPONENT PARTS" .

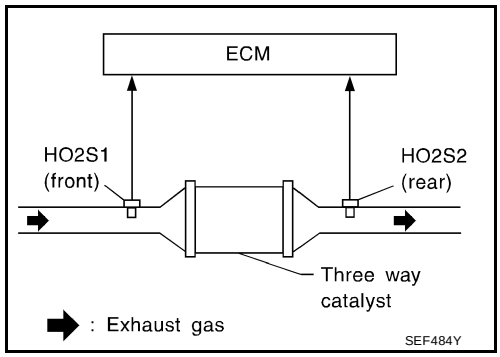
DTC P0420, P0430 THREE WAY CATALYST FUNCTION

PFP:20905

On Board Diagnosis Logic

UBS001IQ

The ECM monitors the switching frequency ratio of sensor 1 and sensor 2 of heated oxygen sensors.
A three way catalyst 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 sensor 1 and sensor 2 heated oxygen sensors approaches a specified limit value, the three way catalyst malfunction is diagnosed.



DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0420 (Bank 1) P0430 (Bank 2)	● Three way catalyst does not operate properly. ● Three way catalyst does not have enough oxygen storage capacity.	● Three way catalyst ● Exhaust tube ● Intake air leaks ● Injectors ● Injector leaks ● Spark plug ● Improper ignition timing

DTC Confirmation Procedure

UBS001IR

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

WITH CONSULT-II

TESTING CONDITION:

- **Open engine hood before conducting the following procedure.**
- **Do not hold engine speed for more than the specified minutes below.**

1. Turn ignition switch “ON”.
2. Select “DTC & SRT CONFIRMATION” then “SRT WORK SUPPORT” mode with CONSULT-II.
3. Start engine.
4. Rev engine up to 3,000 ± 500 rpm and hold it for 3 consecutive minutes then release the accelerator pedal completely.
   If “INCMP” of CATALYST changes to “CMPLT”, go to step 7).
5. Wait 5 seconds at idle.
6. Rev engine up to 2,500±500 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.

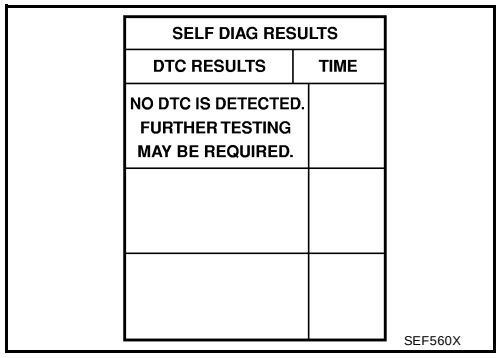
SRT WORK SUPPORT	
CATALYST	INCMP
EVAP SYSTEM	INCMP
O2 SEN HEATER	CMPLT
O2 SENSOR	INCMP
EGR SYSTEM	INCMP
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE B1	XXX V
B/FUEL SCHDL	XXX msec
A/F ALPHA-B1	XXX V
COOLAN TEMP/S	XX °C
HO2S1 (B1)	XXX V

SEF671Y

SRT WORK SUPPORT	
CATALYST	CMPLT
EVAP SYSTEM	INCMP
O2 SEN HEATER	CMPLT
O2 SENSOR	INCMP
EGR SYSTEM	INCMP
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE B1	XXX V
B/FUEL SCHDL	XXX msec
A/F ALPHA-B1	XXX V
COOLAN TEMP/S	XX °C
HO2S1 (B1)	XXX V

SEF672Y

7. Select “SELF-DIAG RESULTS” mode with CONSULT-II.
8. Confirm that the 1st trip DTC is not detected.
   If the 1st trip DTC is detected, go to EC-342, "Diagnostic Procedure" .



Overall Function Check

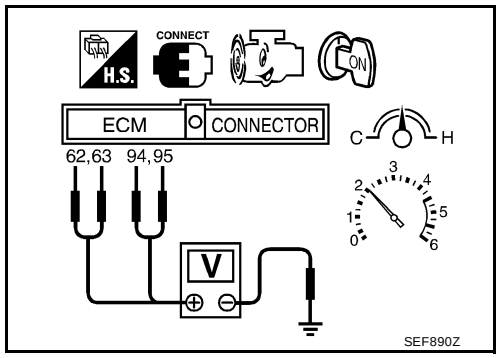
UBS001IS

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

WITH GST

1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Set voltmeters probes between ECM terminals and engine ground as follows.

ECM terminal	Ground
HO2S1 (B2) 62 HO2S2 (B2) 63	Ground
HO2S1 (B1) 94 HO2S2 (B1) 95	Ground



4. Keep engine speed at 2,000 rpm constant under no load.
5. Make sure that the voltage switching frequency (high & low) between ECM terminal 95 (63) and engine ground is much less than that of ECM terminal 94 (62) and engine ground.
   Switching frequency ratio = A/B
   A: Heated oxygen sensor 2 voltage switching frequency
   B: Heated oxygen sensor 1 voltage switching frequency
   This ratio should be less than 0.75.
   If the ratio is greater than above, it means three way catalyst does not operate properly.

   NOTE:
   If the voltage at terminal 94 (62) does not switch periodically more than 5 times within 10 seconds at step 4, perform trouble diagnosis for DTC P0133, P0153 first. (See EC-216 .)

Diagnostic Procedure

UBS001IT

1. CHECK EXHAUST SYSTEM

Visually check exhaust tubes and muffler for dent.

OK or NG

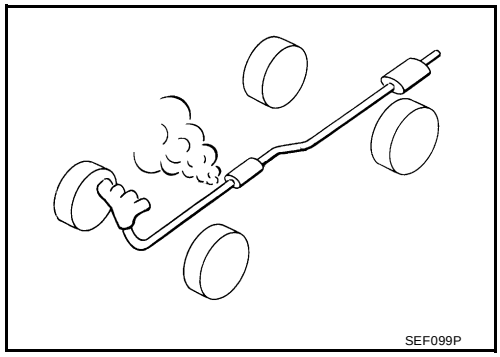
OK >> GO TO 2.
NG >> Repair or replace.

2. CHECK EXHAUST AIR LEAK

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

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 for ignition timing.
Refer to EC-87, "Basic Inspection" .

OK or NG

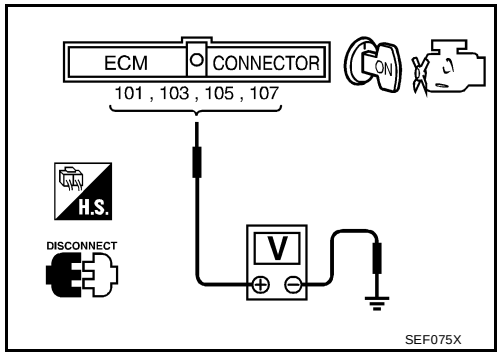
OK >> GO TO 5.
NG >> Adjust ignition timing.

5. CHECK INJECTORS

1. Refer to Wiring Diagram for Injectors, EC-547 .
2. Stop engine and then turn ignition switch “ON”.
3. Check voltage between ECM terminals 101, 103, 105, 107 and ground with CONSULT-II or tester.

Terminal	CYL No.	Bank
101	1	1
107	4	
103	2	2
105	3	

Voltage: Battery voltage

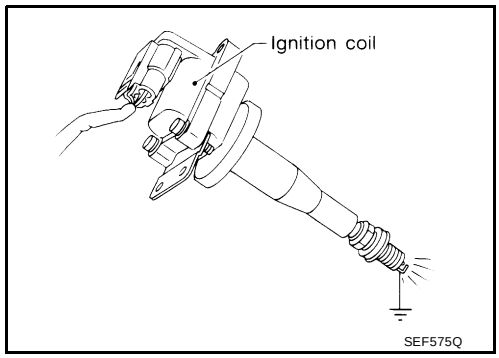


OK or NG

OK >> GO TO 6.
NG >> Perform “Diagnostic Procedure” INJECTOR, EC-548 .

6. CHECK IGNITION SPARK

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



OK or NG

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

7. CHECK INJECTOR

1. Turn ignition switch “OFF”.
2. Remove injector assembly. Refer to EM-15, "Removal and Installation" .
   Keep fuel hose and all injectors connected to injector gallery.
3. Disconnect ignition coil assembly harness connector.
4. Turn ignition switch “ON”.
   Make sure fuel does not drip from injector.

OK or NG

OK (Does not drip)>>GO TO 8.
NG (Drips)>>Replace the injector(s) from which fuel is dripping.

8. CHECK INTERMITTENT INCIDENT

Perform EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

Trouble is fixed>>**INSPECTION END**
Trouble is not fixed>>Replace three way catalyst.

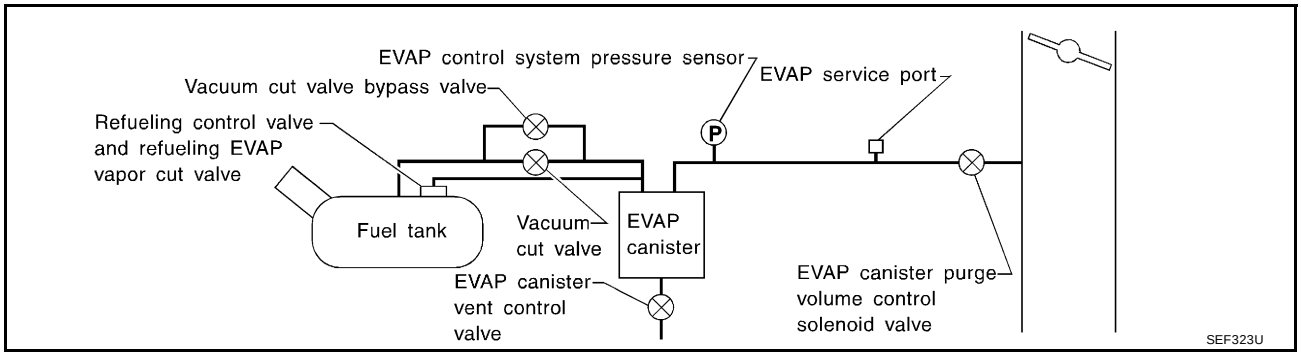
DTC P0441 EVAP CONTROL SYSTEM

PFP:14950

System Description

UBS001IU

NOTE:
If DTC P0441 is displayed with P0510, perform trouble diagnosis for DTC P0510 first. (See EC-428 .)



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

UBS001IV

Under normal conditions (non-closed throttle), sensor output voltage indicates if pressure drop and purge flow are adequate. If not, a fault is determined.
Malfunction is detected when EVAP control system does not operate properly, EVAP control system has a leak between intake manifold and EVAP control system pressure sensor.

Possible Cause

UBS001IW

- EVAP canister purge volume control solenoid valve stuck closed
- EVAP control system pressure sensor and the circuit
- Loose, disconnected or improper connection of rubber tube
- Blocked rubber tube
- Cracked EVAP canister
- EVAP canister purge volume control solenoid valve circuit
- Closed throttle position switch
- Blocked purge port
- EVAP canister vent control valve

DTC Confirmation Procedure

UBS001IX

CAUTION:
Always drive vehicle at a safe speed.

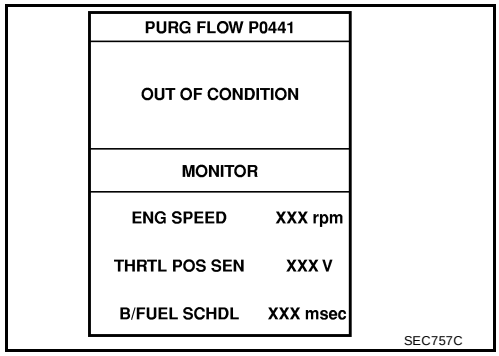
NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
For best results, perform test at a temperature of 0°C (32°F) or more.

WITH CONSULT-II

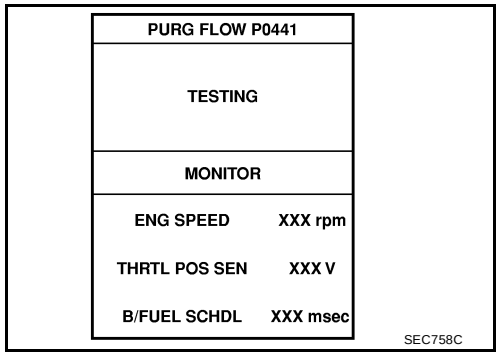
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Start engine and let it idle for at least 70 seconds.

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.



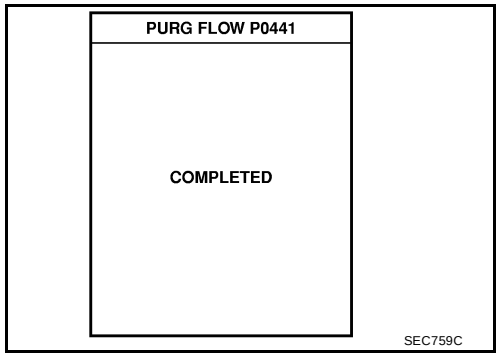
6. When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take at least 35 seconds.)

Selector lever	Suitable position
Vehicle speed	32 - 120 km/h (20 - 75 MPH)
ENG SPEED	500 - 3,800 rpm
B/FUEL SCHDL	1.0 - 6.2 msec
Engine coolant temperature	More than 70°C (158°F)



If “TESTING” is not changed for a long time, retry from step 2.

7. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to EC-348, "Diagnostic Procedure" .



Overall Function Check

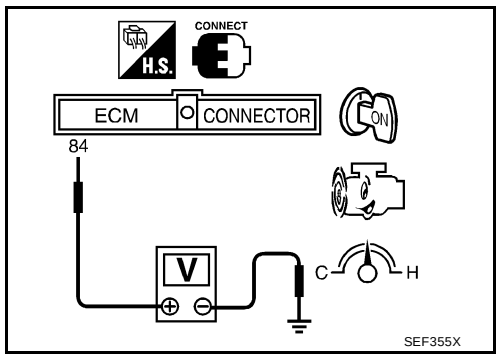
UBS001IY

Use this procedure to check the overall monitoring function of the EVAP control system purge flow monitoring. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Lift up drive wheels.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch “OFF”, wait at least 10 seconds.
4. Start engine and wait at least 70 seconds.
5. Set voltmeter probes to ECM terminals 84 (EVAP control system pressure sensor signal) and ground.
6. Check EVAP control system pressure sensor value at idle speed and note it.
7. Establish and maintain the following conditions for at least 1 minute.

Air conditioner switch	ON
Steering wheel	Fully turned
Headlamp switch	ON
Rear window defogger switch	ON



Engine speed	Approx. 3,000 rpm
Gear position	Any position other than “P”, “N” or “R”

8. Verify that EVAP control system pressure sensor value stays 0.1V less than the value at idle speed (measured at step 6) for at least 1 second.
9. If NG, go to EC-348, "Diagnostic Procedure" .

Diagnostic Procedure

UBS001IZ

1. CHECK EVAP CANISTER

1. Turn ignition switch “OFF”.
2. Check EVAP canister for cracks.

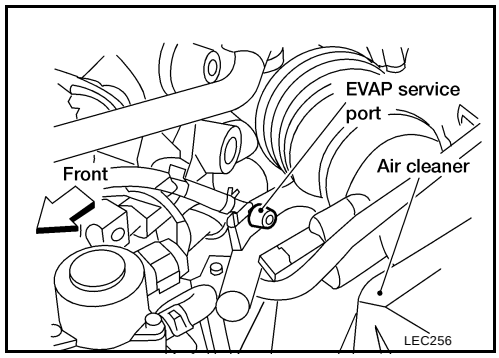
OK or NG

OK (With CONSULT-II)>>GO TO 2.
OK (Without CONSULT-II)>>GO TO 3.
NG >> Replace EVAP canister.

2. CHECK PURGE FLOW

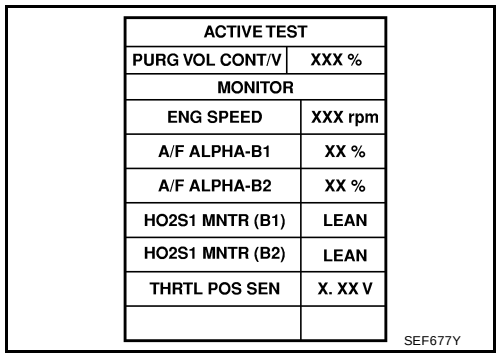
With CONSULT-II

1. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge.
2. Start engine and let it idle.



3. Select “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-II.
4. Rev engine up to 2,000 rpm.
5. Touch “Qd” and “Qu” on CONSULT-II screen to adjust “PURG VOL CONT/V” opening and check vacuum existence.

PURG VOL CONT/V	VACUUM
100.0%	Should exist
0.0%	Should not exist



OK or NG

OK >> GO TO 7.
NG >> GO TO 4.

3. CHECK PURGE FLOW

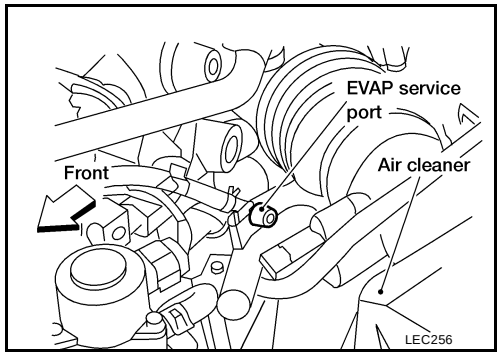
Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge.
4. Start engine and let it idle for at least 80 seconds.
5. Check vacuum gauge indication when revving engine up to 2,000 rpm.

   Vacuum should exist.

6. Release the accelerator pedal fully and let idle.

   Vacuum should not exist.



OK or NG

OK >> GO TO 7.
NG >> GO TO 4.

4. CHECK EVAP PURGE LINE

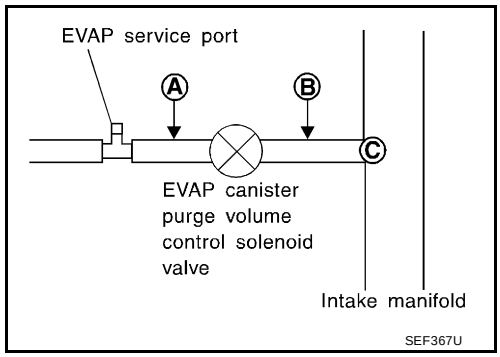
1. Turn ignition switch “OFF”.
2. Check EVAP purge line for improper connection or disconnection. Refer to EC-579, "EVAPORATIVE EMISSION LINE DRAWING" .

OK or NG

OK >> GO TO 5.
NG >> Repair it.

5. CHECK EVAP PURGE HOSE AND PURGE PORT

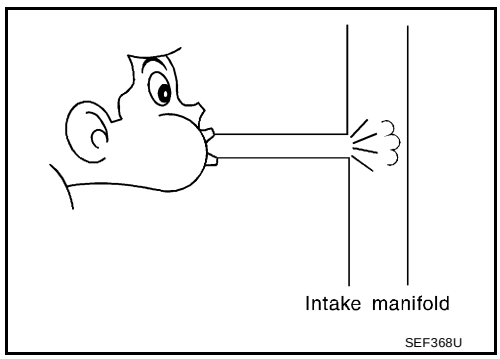
1. Disconnect purge hoses connected to EVAP service port **A** and EVAP canister purge volume control solenoid valve **B** .



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.

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XX %
A/F ALPHA-B2	XX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN
THRTL POS SEN	X. XX V

SEF677Y

OK or NG

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

7. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-367, "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 HOSE

1. Turn ignition switch “OFF”.
2. Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.

OK or NG

OK >> GO TO 9.
NG >> Repair it.

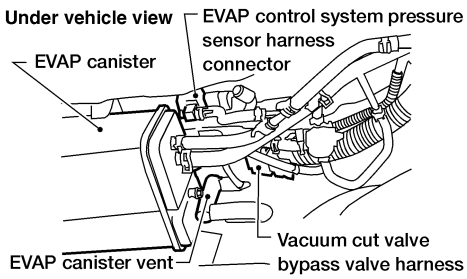
9. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check connectors for water.

Water should not exist.

OK or NG

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



10. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR FUNCTION

Refer to “DTC Confirmation Procedure” for DTC P0452 and P0453, EC-375 .

OK or NG

OK >> GO TO 11.
NG >> Replace EVAP control system pressure sensor.

11. CHECK RUBBER TUBE FOR CLOGGING

1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

OK or NG

OK >> GO TO 12.
NG >> Clean the rubber tube using an air blower.

12. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-373, "Component Inspection" .

OK or NG

OK >> GO TO 13.
NG >> Replace EVAP canister vent control valve.

13. CHECK THROTTLE POSITION SWITCH

1. Reconnect all removed parts.
2. Refer to EC-433, "Component Inspection" .

OK or NG

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

14. ADJUST THROTTLE POSITION SWITCH

Check the following items. Refer to EC-87, "Basic Inspection" .
Is it possible to adjust closed throttle position switch?

Items	Specifications
Ignition timing	9°±5° BTDC
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.05 mm (0.0020 in): ON 0.15 mm (0.0059 in): OFF
Target idle speed	M/T: 650±50 rpm A/T: 800±50rpm (in “P” or “N” position)

Yes or No

Yes >> GO TO 15.
No >> Replace throttle position switch.

15. CHECK EVAP PURGE LINE

Inspect EVAP purge line (pipe and rubber tube). Check for evidence of leaks.
Refer to EC-579, "EVAPORATIVE EMISSION LINE DRAWING" .

OK or NG

OK >> GO TO 16.
NG >> Replace it.

16. CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 17.

17. CHECK INTERMITTENT INCIDENT

Refer to EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

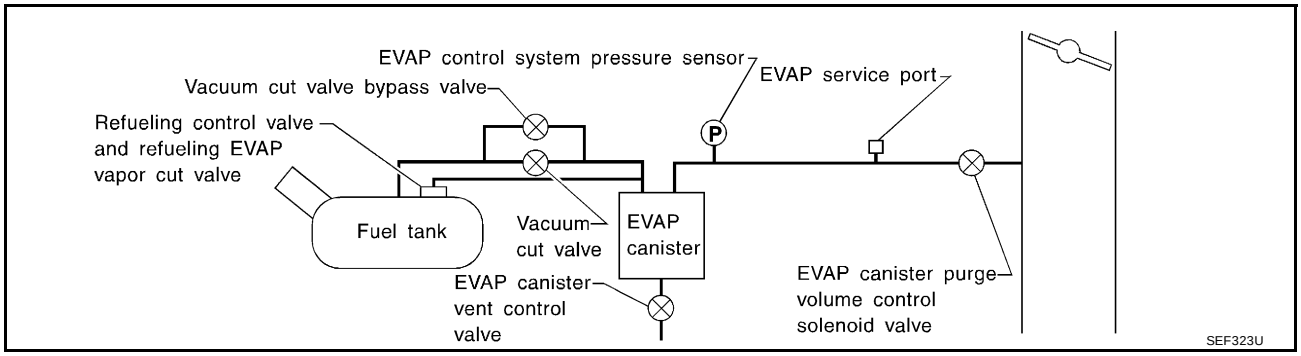
DTC P0442 EVAP CONTROL SYSTEM

PFP:14950

On Board Diagnosis Logic

UBS001J0

NOTE:
If DTC P0442 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-515 .)
This diagnosis detects leaks in the EVAP purge line using engine intake manifold vacuum.
If pressure does not increase, the ECM will check for leaks in the line between the fuel tank and EVAP canister purge volume control solenoid valve, under the following “Vacuum test” conditions.
The vacuum cut valve bypass valve is opened to clear the line between the fuel tank and the EVAP canister purge volume control solenoid valve. The EVAP canister vent control valve will then be closed to shut the EVAP purge line off. The EVAP canister purge volume control solenoid valve is opened to depressurize the EVAP purge line using intake manifold vacuum. After this occurs, the EVAP canister purge volume control solenoid valve will be closed.



Malfunction is detected when EVAP control system has a leak, EVAP control system does not operate properly.

CAUTION:

- **Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.**
- **If the fuel filler cap is not tightened properly, the MIL may come on.**
- **Use only a genuine NISSAN rubber tube as a replacement.**

Possible Cause

UBS001J1

- Incorrect fuel tank vacuum relief valve
- Incorrect fuel filler cap used
- Fuel filler cap remains open or fails to close.
- Foreign matter caught in fuel filler cap.
- Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.
- Foreign matter caught in EVAP canister vent control valve.
- EVAP canister or fuel tank leaks
- EVAP purge line (pipe and rubber tube) leaks
- EVAP purge line rubber tube bent
- Blocked or bent rubber tube to EVAP control system pressure sensor
- Loose or disconnected rubber tube
- EVAP canister vent control valve and the circuit
- EVAP canister purge volume control solenoid valve and the circuit
- Fuel tank temperature sensor
- O-ring of EVAP canister vent control valve is missing or damaged
- Water separator
- EVAP canister is saturated with water
- EVAP control system pressure sensor
- Fuel level sensor and the circuit
- Refueling control valve
- ORVR system leaks

DTC Confirmation Procedure

UBS001J2

CAUTION:

Never remove fuel filler cap during the DTC confirmation procedure.

NOTE:

- **If DTC P0442 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-515 .)**
- **Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.**
- If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

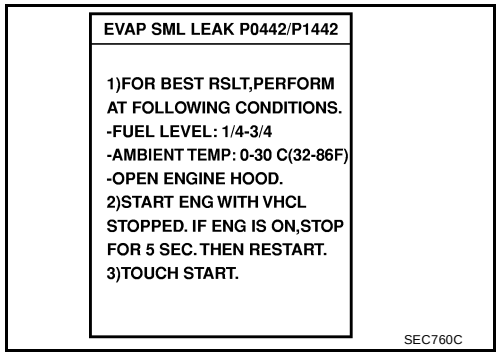
TESTING CONDITION:

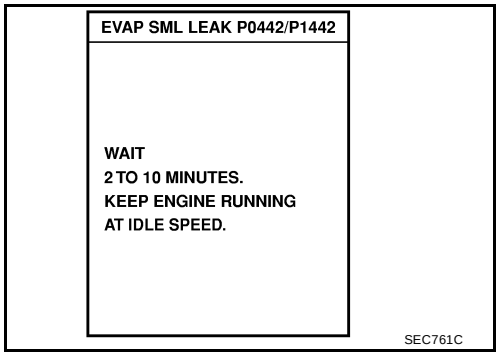
- **Perform “DTC WORK SUPPORT” when the fuel level is between 1/4 to 3/4 full and vehicle is placed on flat level surface.**
- **Open engine hood before conducting following procedure.**

WITH CONSULT-II

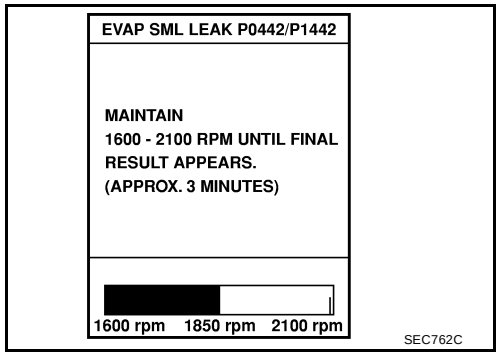
1. Turn ignition switch “ON”.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II.
4. Check the following conditions are met.
   COOLAN TEMP/S: 0 - 70°C (32 - 158°F)
   INT/A TEMP SE: More than −20°C (−4°F)
5. Select “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 “Basic Inspection”, EC-87, "Basic Inspection" .
   - Make sure that EVAP hoses are connected to the EVAP canister purge volume control solenoid valve properly.





6. Make sure that “OK” is displayed.
   If “NG” is displayed, refer to EC-355, "Diagnostic Procedure" .



WITH GST

NOTE:
Be sure to read the explanation of “Driving Pattern” on EC-70 before driving vehicle.

1. Start engine.
2. Drive vehicle according to “EC-70, "Driving Pattern" .
3. Stop vehicle.
4. Select “MODE 1” with GST.

– If SRT of EVAP system is not set yet, go to the following step.
– If SRT of EVAP system is set, the result will be OK.

5. Turn ignition switch “OFF” and wait at least 10 seconds.
6. Start engine.
   It is not necessary to cool engine down before driving.
7. Drive vehicle again according to the EC-70, "Driving Pattern" .
8. Stop vehicle.
9. Select “MODE 3” with GST.

– If P0442 or P1442 is displayed on the screen, go to EC-363, "Component Inspection" .
– If P0441 is displayed on the screen, go to “Diagnostic Procedure” for DTC P0441, EC-348 .
– If P0441, P0442 or P1442 are not displayed on the screen, go to the following step.

10. Select “MODE 1” with GST.

– If SRT of EVAP system is set, the result will be OK.
– If SRT of EVAP system is not set, go to step 6.

Diagnostic Procedure

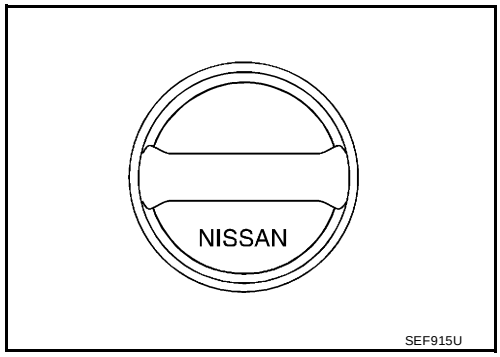
UBS001J3

1. CHECK FUEL FILLER CAP DESIGN

1. Turn ignition switch “OFF”.
2. Check for genuine NISSAN fuel filler cap design.

OK or NG

OK >> GO TO 2.
NG >> Replace with genuine NISSAN fuel filler cap.



2. CHECK FUEL FILLER CAP INSTALLATION

Check that the cap is tightened properly by rotating the cap clockwise.

OK or NG

OK >> GO TO 3.
NG >> ● Open fuel filler cap, then clean cap and fuel filler neck threads using air blower.
● Retighten until ratcheting sound is heard.

3. CHECK FUEL FILLER CAP FUNCTION

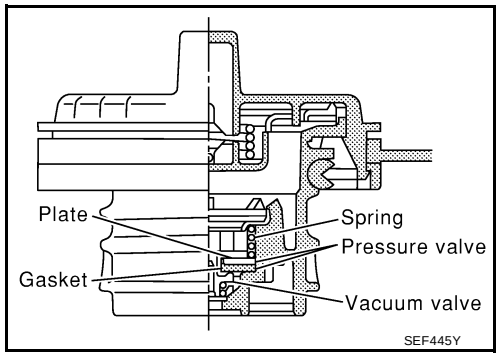
Check for air releasing sound while opening the fuel filler cap.

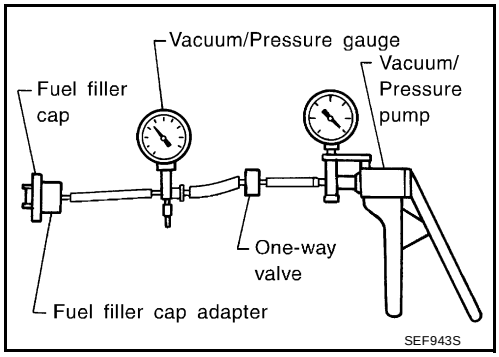
OK or NG

OK >> GO TO 6.
NG >> GO TO 4.

4. CHECK FUEL TANK VACUUM RELIEF VALVE

1. Wipe valve housing clean.
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 –3.4 kPa (–0.061 to –0.035 kg/cm^2 , –0.87 to –0.48 psi)**

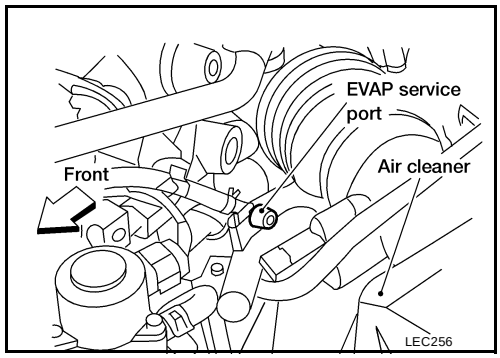
CAUTION:
Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.

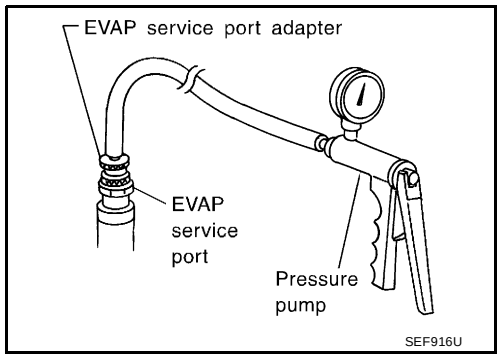
OK or NG

OK >> GO TO 5.
NG >> Replace fuel filler cap with a genuine one.

5. INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.





NOTE:
Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.

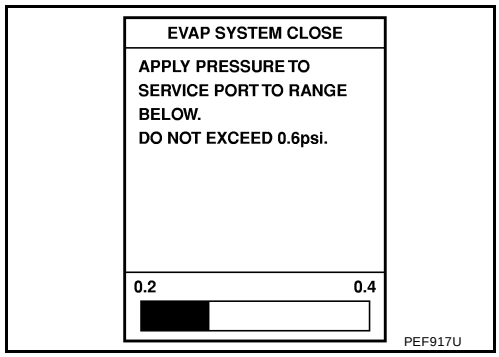
Models with CONSULT-II>>GO TO 6.
Models without CONSULT-II>>GO TO 7.

6. CHECK FOR EVAP LEAK

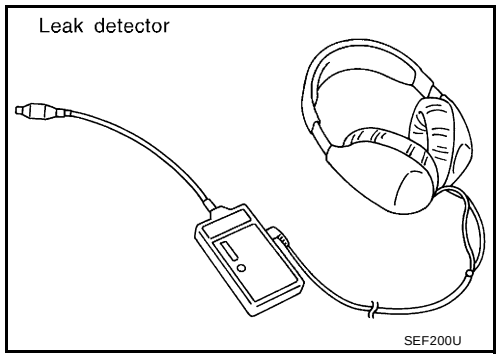
With CONSULT-II

1. Turn ignition switch “ON”.
2. Select “EVAP SYSTEM CLOSE” of “WORK SUPPORT” mode with CONSULT-II.
3. Touch “START” and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.

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



4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details.
   Refer to EC-579, "EVAPORATIVE EMISSION LINE DRAWING"
   .



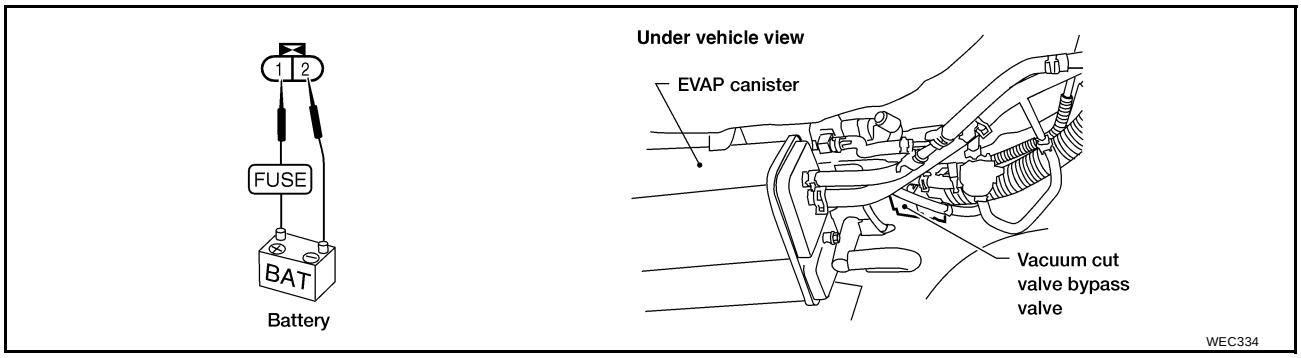
OK or NG

OK >> GO TO 8.
NG >> Repair or replace.

7. CHECK FOR EVAP LEAK

Without CONSULT-II

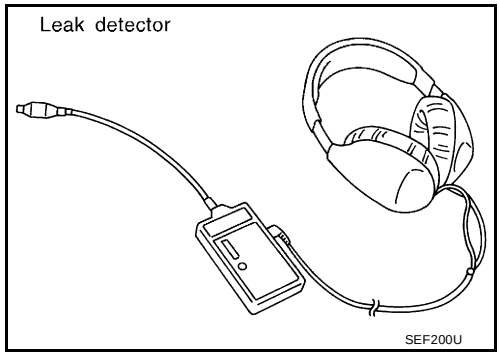
1. Turn ignition switch “OFF”.
2. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)
3. Apply 12 volts DC to vacuum cut valve bypass valve. The valve will open. (Continue to apply 12V until the end of test.)



4. Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg), then remove pump and EVAP service port adapter.

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

5. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to EC-579, "EVAPORATIVE EMISSION LINE DRAWING" .



OK or NG

OK >> GO TO 8.
NG >> Repair or replace.

8. RELEASE EVAP LINE PRESSURE

With CONSULT-II

1. Touch “BACK” on CONSULT-II screen.
2. Start engine warm it up to normal operating temperature.
3. Turn ignition switch “OFF” and wait at least 10 seconds.
4. Start engine and let it idle for 90 seconds.
5. Keep engine speed at about 2,000 rpm for 30 seconds.
6. Turn ignition switch “OFF”.

Without CONSULT-II

1. Stop applying 12 volts DC to EVAP canister vent control valve and vacuum cut valve bypass valve.
2. Reconnect harness connectors to EVAP canister vent control valve and vacuum cut valve bypass valve.
3. Start engine warm it up to normal operating temperature.
4. Turn ignition switch “OFF” and wait at least 10 seconds.
5. Start engine and let it idle for 90 seconds.
6. Keep engine speed at about 2,000 rpm for 30 seconds.
7. Turn ignition switch “OFF”.

>> GO TO 9.

9. CHECK WATER SEPARATOR

Refer to EC-363, "Component Inspection" .

OK or NG

OK >> GO TO 10.
NG >> Replace water separator.

10. CHECK EVAP CANISTER VENT CONTROL VALVE, O-RING AND CIRCUIT

Refer to EC-364, "DTC Confirmation Procedure" .

OK or NG

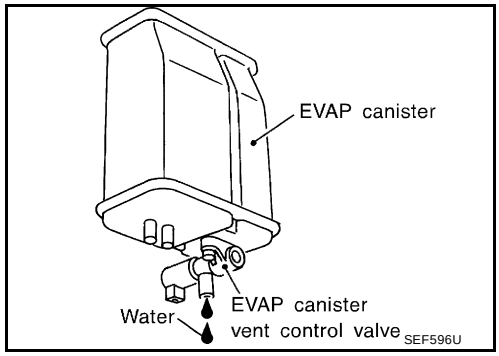
OK >> GO TO 11.
NG >> Repair or replace EVAP canister vent control valve and O-ring or harness/connector.

11. CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Does water drain from the EVAP canister?

Yes or No

Yes >> GO TO 12.
No (With CONSULT-II)>>GO TO 14.
No (Without CONSULT-II)>>GO TO 15.



12. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve attached.
The weight should be less than 1.8 kg (4.0 lb).

OK or NG

OK (With CONSULT-II)>>GO TO 14.
OK (Without CONSULT-II)>>GO TO 15.
NG >> GO TO 13.

13. DETECT MALFUNCTIONING PART

Check the following.

- EVAP canister for damage
- EVAP hose between EVAP canister and water separator for clogging or poor connection

>> Repair hose or replace EVAP canister.

14. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-II

1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
2. Start engine.
3. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode.
4. Touch “Qu” on CONSULT-II screen to increase “PURG VOL CONT/V” opening to 100.0%.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

Vacuum should exist.

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XX %
A/F ALPHA-B2	XX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN
THRTL POS SEN	X. XX V

SEF677Y

OK or NG

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

15. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
4. Start engine and let it idle for at least 80 seconds.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

Vacuum should exist.

OK or NG

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

16. CHECK VACUUM HOSE

Check vacuum hoses for clogging or disconnection. Refer to EC-34, "Vacuum Hose Drawing" .

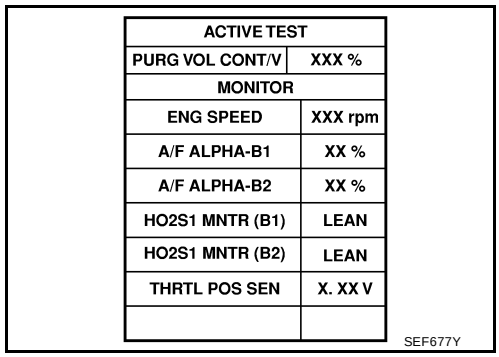
OK or NG

OK (With CONSULT-II)>>GO TO 17.
OK (Without CONSULT-II)>>GO TO 18.
NG >> Repair or reconnect the hose.

17. 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 19.
NG >> GO TO 18.

18. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-367, "Component Inspection" .

OK or NG

OK >> GO TO 19.
NG >> Replace EVAP canister purge volume control solenoid valve.

19. CHECK FUEL TANK TEMPERATURE SENSOR

1. Remove fuel level sensor unit.
2. Check fuel tank temperature sensor.
   Refer to EC-274, "Component Inspection" .

OK or NG

OK >> GO TO 20.
NG >> Replace fuel level sensor unit.

20. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-382, "Component Inspection" .

OK or NG

OK >> GO TO 21.
NG >> Replace EVAP control system pressure sensor.

21. CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection.
Refer to EC-578, "EVAPORATIVE EMISSION SYSTEM" .

OK or NG

OK >> GO TO 22.
NG >> Repair or reconnect the hose.

22. CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 23.

23. CHECK REFUELING EVAP VAPOR LINE

Check refueling EVAP vapor line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to EC-579, "EVAPORATIVE EMISSION LINE DRAWING" .

OK or NG

OK >> GO TO 24.
NG >> Repair or replace hoses and tubes.

24. CHECK SIGNAL LINE AND RECIRCULATION LINE

Check signal line and recirculation line between filler neck tube and fuel tank for clogging, kink, cracks, looseness and improper connection.

OK or NG

OK >> GO TO 25.
NG >> Repair or replace hoses, tubes or filler neck tube.

25. CHECK REFUELING CONTROL VALVE

Refer to EC-588, "Component Inspection" .

OK or NG

OK >> GO TO 26.
NG >> Replace refueling control valve with fuel tank.

26. CHECK FUEL LEVEL SENSOR

Refer to DI-23, "FUEL LEVEL SENSOR UNIT CHECK" .

OK or NG

OK >> GO TO 27.
NG >> Replace fuel level sensor unit.

27. CHECK INTERMITTENT INCIDENT

Refer to EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

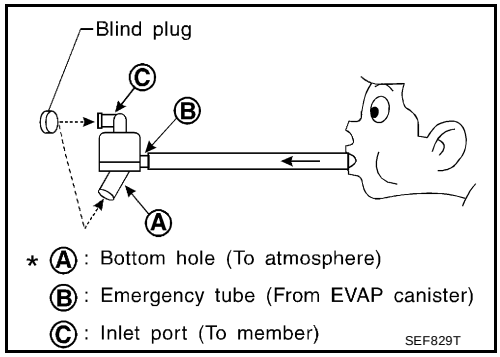
UBS001J4

WATER SEPARATOR

1. Check visually for insect rests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that A and C are not clogged by blowing air into B with A, and then C plugged.
5. In case of NG in items 2-4, replace the parts.

NOTE:

- Do not disassemble water separator.



DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

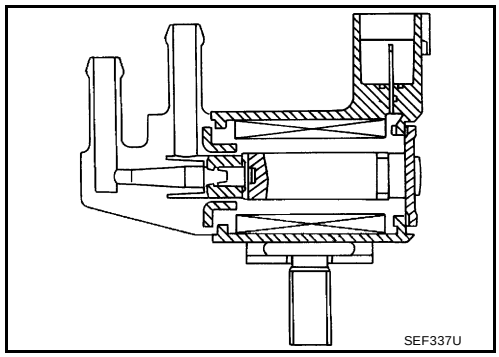
PFP:14920

Description

UBS001J5

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

UBS001J6

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PURG VOL C/V	● Engine: After warming up ● Air conditioner switch “OFF” ● Shift lever: “N” ● No-load	Idle (Vehicle stopped)	0%
		2,000 rpm	—

On Board Diagnosis Logic

UBS001J7

Malfunction is detected when an excessively low (P0444) or high (P0445) voltage signal is sent to ECM through the valve.

Possible Cause

UBS001J8

- Harness or connectors
  (The valve circuit is open or shorted.)
- EVAP canister purge volume control solenoid valve

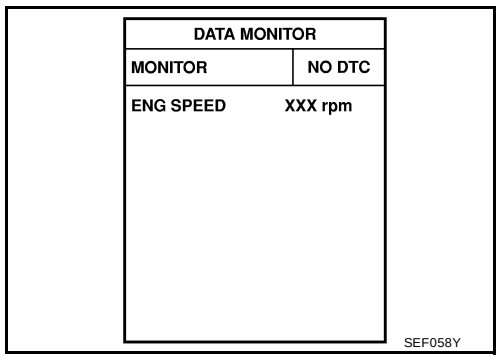
DTC Confirmation Procedure

UBS001J9

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-366, "Diagnostic Procedure"



WITH GST

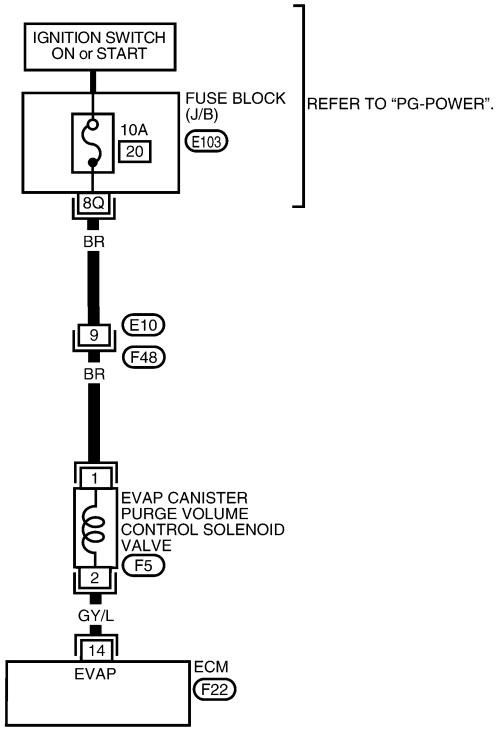
Follow the procedure “WITH CONSULT-II” above.

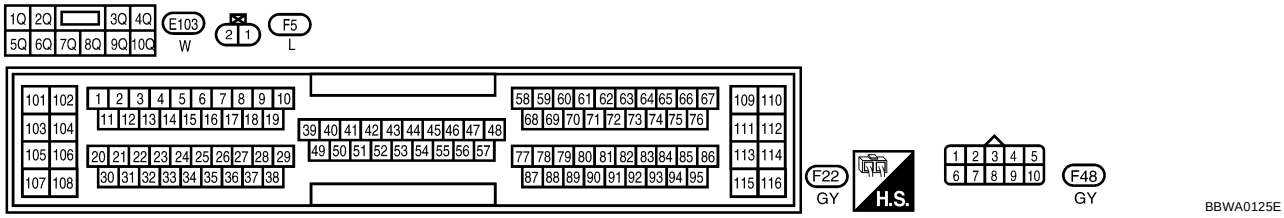
Wiring Diagram

UBS001JA

EC-PGC/V-01

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





BBWA0125E

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
14	GY/L	EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE	ENGINE RUNNING AT IDLE SPEED	BATTERY VOLTAGE (V) 40 20 0 50 ms
			ENGINE RUNNING AT 2,000 RPM (MORE THAN 100 SECONDS AFTER STARTING ENGINE)	BATTERY VOLTAGE (V) 40 20 0 50 ms

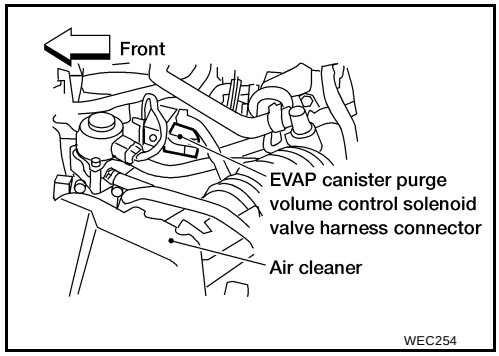
SEF576Y

Diagnostic Procedure

UBS001JB

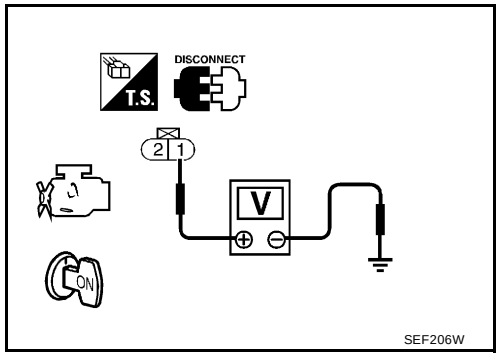
1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

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 E10, F48
- Fuse block (J/B) connector E103
- 10A fuse
- Harness for open or short between EVAP canister purge volume control solenoid valve and fuse

>> Repair harness or connectors.

3. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 14 and EVAP canister purge volume control solenoid valve terminal 2.
   Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

OK (With CONSULT-II)>>GO TO 5.
OK (Without CONSULT-II)>>GO TO 6.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the harness for open or short between EVAP canister purge volume control solenoid valve and ECM.

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

5. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-II

1. Start engine.
2. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-II. Check that engine speed varies according to the valve opening.

OK or NG

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

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XX %
A/F ALPHA-B2	XX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN
THRTL POS SEN	X. XX V

SEF677Y

6. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-367, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace EVAP canister purge volume control solenoid valve.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

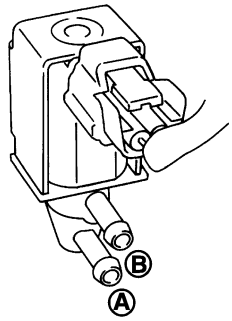
UBS001JC

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

Condition (PURG VOL CONT/V value)	Air passage continuity between A and B
100.0%	Yes
0.0%	No

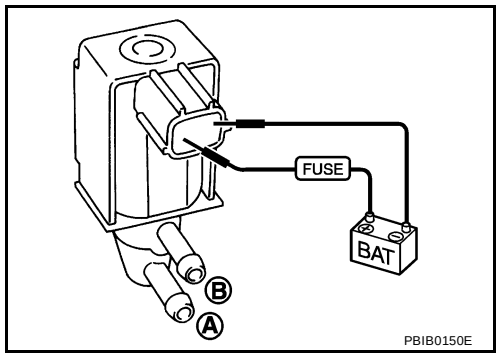


PBIB0149E

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



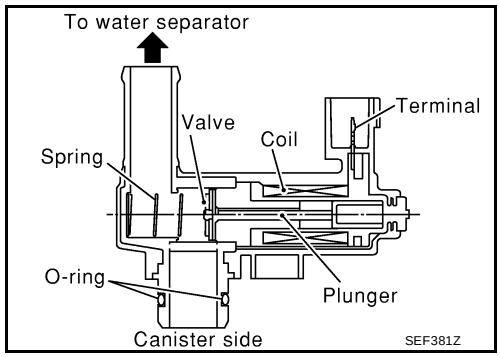
DTC P0447 EVAP CANISTER VENT CONTROL VALVE

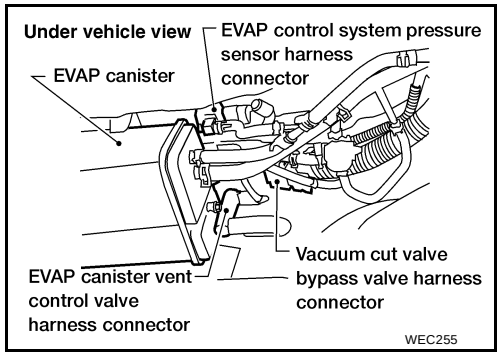
PFP:14935

Component Description

UBS001JD

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" diagnoses.





CONSULT-II Reference Value in Data Monitor Mode

UBS001JE

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	● Ignition switch: ON	OFF

On Board Diagnosis Logic

UBS001JF

Malfunction is detected when an improper voltage signal is sent to ECM through EVAP canister vent control valve.

Possible Cause

UBS001JG

- Harness or connectors
  (The valve circuit is open or shorted.)
- EVAP canister vent control valve

DTC Confirmation Procedure

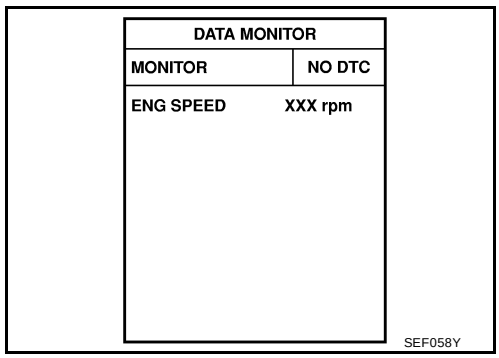
UBS001JH

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-371, "Diagnostic Procedure"
.



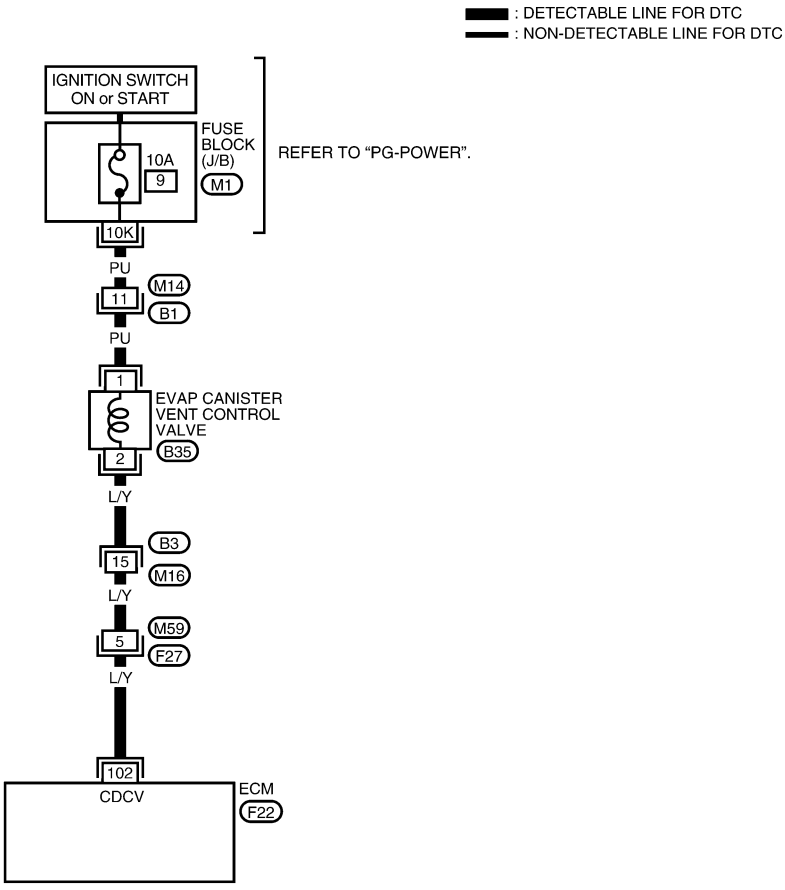
WITH GST

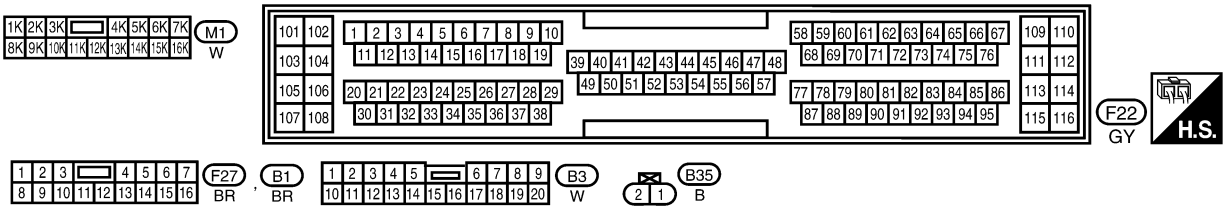
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS001JI

EC-VENT/V-01





BBWA0126E

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
102	L/Y	EVAP CANISTER VENT CONTROL VALVE	IGN ON	BATTERY VOLTAGE

SEF577Y

Diagnostic Procedure

UBS001JJ

1. INSPECTION START

Do you have CONSULT-II?

Yes or No

Yes >> GO TO 2.
No >> GO TO 3.

2. CHECK EVAP CANISTER VENT CONTROL VALVE CIRCUIT

With CONSULT-II

1. Turn ignition switch "OFF" and then turn "ON".
2. Select "VENT CONTROL/V" in "ACTIVE TEST" mode with CONSULT-II.
3. Touch "ON/OFF" on CONSULT-II screen.
4. Check for operating sound of the valve.
   Clicking noise should be heard.

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XX %
A/F ALPHA-B2	XX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN
THRTL POS SEN	X. XX V

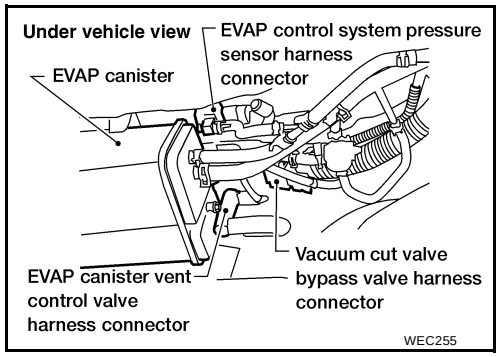
SEF677Y

OK or NG

OK >> GO TO 7.
NG >> GO TO 3.

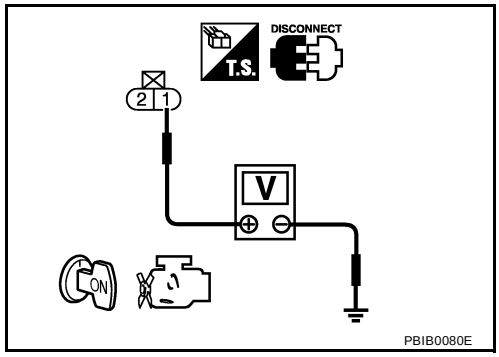
3. CHECK EVAP CANISTER VENT CONTROL VALVE POWER SUPPLY CIRCUIT

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 M14, B1
- Fuse block (J/B) connector M1
- 10A fuse
- Harness for open or short between EVAP canister vent control valve and fuse

>> Repair harness or connectors.

5. CHECK EVAP CANISTER VENT CONTROL VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 102 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 B3, M16
- Harness connectors M59, F27
- Harness for open or short between EVAP canister vent control valve and ECM

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

7. CHECK RUBBER TUBE FOR CLOGGING

1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

OK or NG

OK >> GO TO 8.
NG >> Clean the rubber tube using an air blower.

8. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-373, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace EVAP canister vent control valve.

9. CHECK INTERMITTENT INCIDENT

Refer to EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

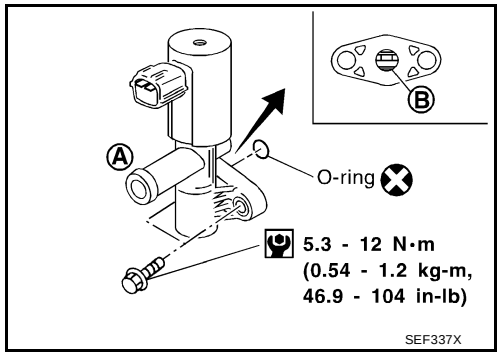
Component Inspection

UBS001JK

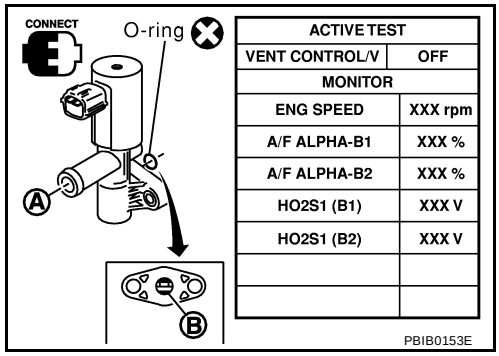
EVAP CANISTER VENT CONTROL VALVE

With CONSULT-II

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.
3. Reconnect harness connectors disconnected.
4. Turn ignition switch “ON”.
5. Perform “VENT CONTROL/V” in “ACTIVE TEST” mode.

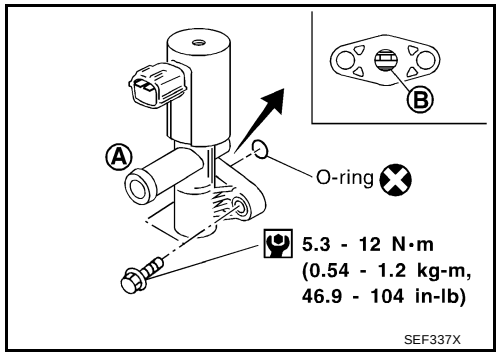


6. Check air passage continuity and operation delay time.
7. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
8. Perform Test No. 5 again.

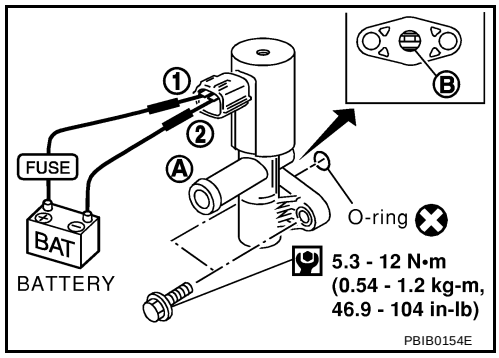


Without CONSULT-II

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.



3. Check air passage continuity and operation delay time under the following conditions.
   Make sure new O-ring is installed properly.
4. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
5. Perform Test No. 3 again.



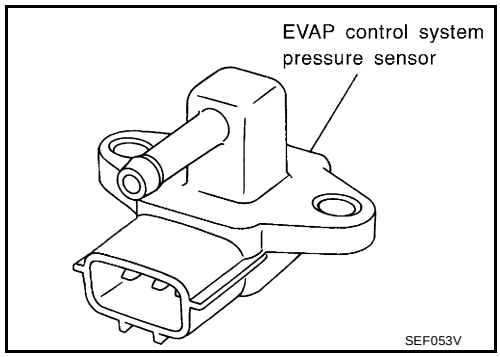
DTC P0452, P0453 EVAP SYSTEM PRESSURE SENSOR

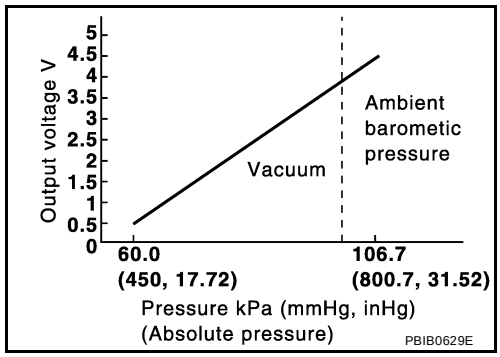
PFP:25085

Component Description

UBS001JL

The EVAP control system pressure sensor detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases. The EVAP control system pressure sensor is not used to control the engine system. It is used only for on board diagnosis.





CONSULT-II Reference Value in Data Monitor Mode

UBS001JM

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
EVAP SYS PRES	● Ignition switch: ON	Approx. 1.8 - 4.8V

On Board Diagnosis Logic

UBS001JN

Malfunction is detected when an improper voltage signal from EVAP control system pressure sensor is sent to ECM.

Possible Cause

UBS001JO

- Harness or connectors
  (The EVAP control system pressure sensor circuit is open or shorted.)
- Rubber hose to EVAP control system pressure sensor is clogged, vent, kinked, disconnected or improper connection.
- EVAP control system pressure sensor
- EVAP canister vent control valve
- EVAP canister purge volume control solenoid valve
- EVAP canister
- Rubber hose from EVAP canister vent control valve to water separator

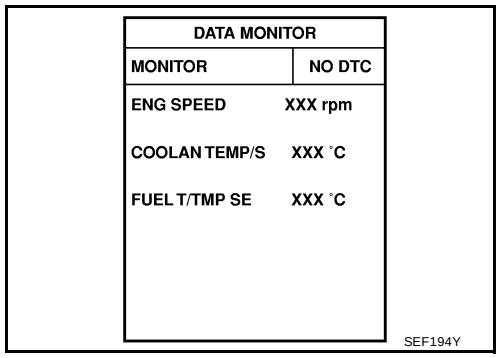
DTC Confirmation Procedure

UBS001JP

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.

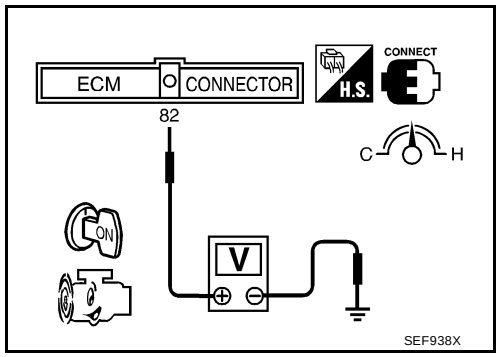
WITH CONSULT-II

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-378, "Diagnostic Procedure"
.



WITH GST

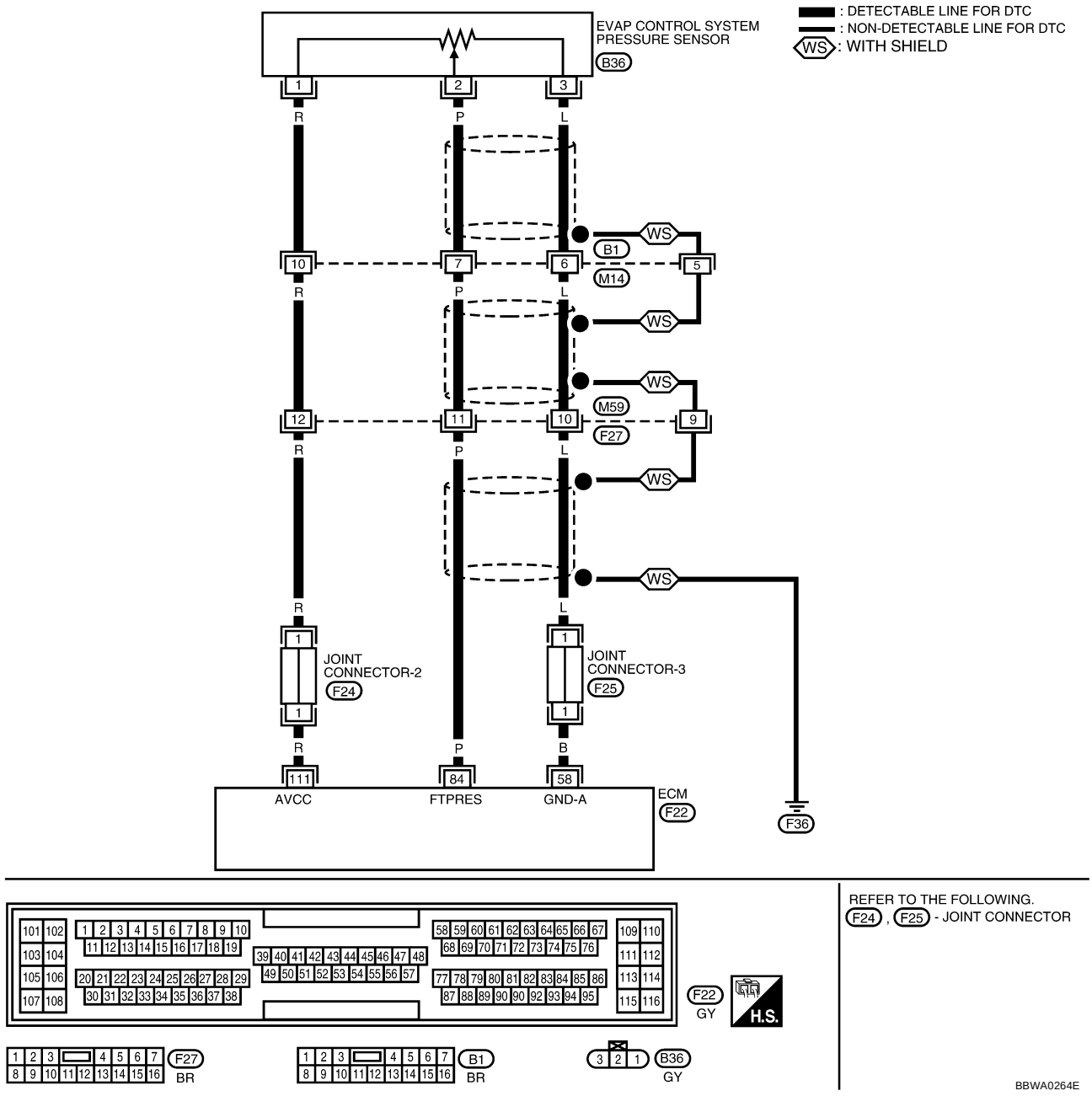
1. Start engine and warm it up to normal operating temperature.
2. Check that voltage between ECM terminal 82 (Fuel tank temperature sensor signal) and ground is less than 4.2V.
3. Turn ignition switch “OFF” and wait at least 10 seconds.
4. Start engine and wait at least 20 seconds.
5. Select “MODE 7” with GST.
6. If 1st trip DTC is detected, go to EC-378, "Diagnostic Procedure"
.



Wiring Diagram

UBS001JQ

EC-PRE/SE-01



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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
58	B	Sensor's ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
84	P	EVAP control system pressure sensor	**[Ignition switch “ON”]**	Approximately 1.8 - 4.8V
111	R	Sensor's power supply	**[Ignition switch “ON”]**	Approximately 5V

Diagnostic Procedure

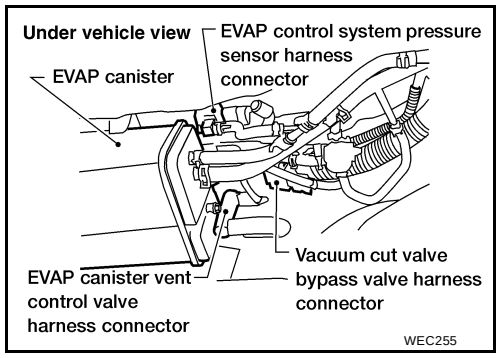
UBS001JR

1. CHECK RUBBER TUBE

1. Turn ignition switch “OFF”.
2. Check rubber tube connected to the EVAP control system pressure sensor for clogging, vent, kink, disconnection or improper connection.

OK or NG

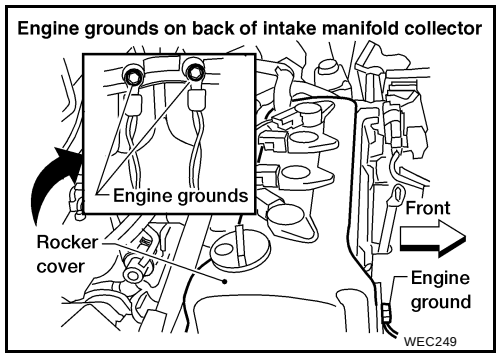
OK >> GO TO 2.
NG >> Reconnect, repair or replace.



2. RETIGHTEN GROUND SCREWS

Loosen and retighten engine ground screws.

>> GO TO 3.



3. CHECK CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check sensor harness connector for water.

Water should not exist.

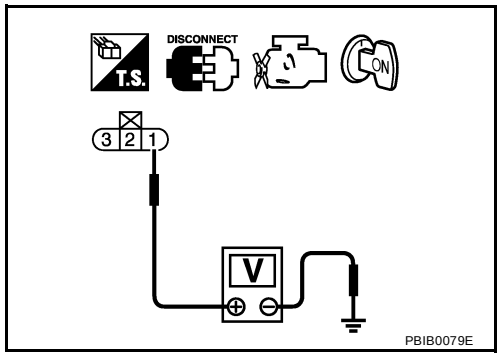
OK or NG

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

4. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT

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

Voltage: Approximately 5V



OK or NG

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

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B1, M14
- Harness connectors M59, F27
- Joint connector-2
- Harness for open or short between EVAP control system pressure sensor and ECM

>> Repair harness or connectors.

6. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

Continuity should exist.

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

OK or NG

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

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B1, M14
- Harness connectors M59, F27
- Joint connector-3
- Harness for open or short between EVAP control system pressure sensor and ECM
- Harness for open or short between EVAP control system pressure sensor and TCM (Transmission control module)

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

8. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 84 and EVAP control system pressure sensor terminal 2.
   Refer to Wiring Diagram.

   Continuity should exist.
3. Also check harness for short to ground and short to power.

OK or NG

OK (With CONSULT-II)>>GO TO 10.
OK (Without CONSULT-II)>>GO TO 11.
NG >> GO TO 9.

9. DETECT MALFUNCTIONING PART

Check the following.

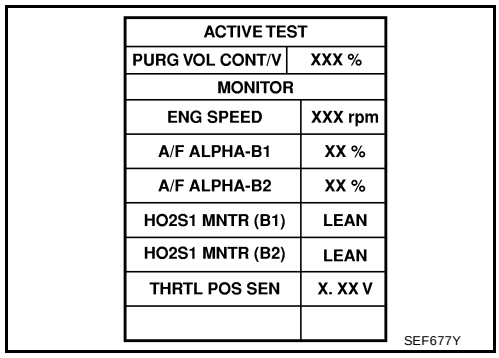
- Harness connectors B1, M14
- Harness connectors M59, F27
- Harness for open or short between ECM and EVAP control system pressure sensor

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

10. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

1. Start engine.
2. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-II. Check that engine speed varies according to the valve opening.



OK or NG

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

11. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-367, "Component Inspection" .

OK or NG

OK >> GO TO 12.
NG >> Replace EVAP canister purge volume control solenoid valve.

12. CHECK RUBBER TUBE FOR CLOGGING

1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

OK or NG

OK >> GO TO 13.
NG >> Clean the rubber tube using an air blower.

13. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-373, "Component Inspection" .

OK or NG

OK >> GO TO 14.
NG >> Replace EVAP canister vent control valve.

14. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-382, "Component Inspection" .

OK or NG

OK >> GO TO 15.
NG >> Replace EVAP control system pressure sensor.

15. CHECK RUBBER TUBE

Check obstructed rubber tube connected to EVAP canister vent control valve.

OK or NG

OK >> GO TO 16.
NG >> Clean rubber tube using an air blower, repair or replace rubber tube.

16. CHECK WATER SEPARATOR

Refer to EC-363, "Component Inspection" .

OK or NG

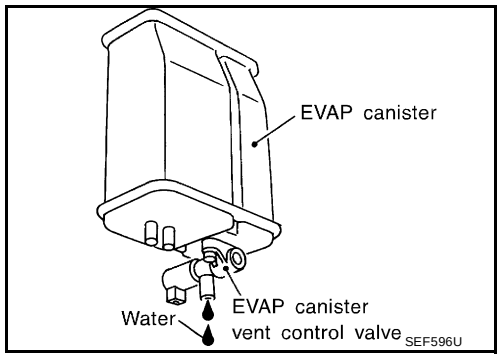
OK >> GO TO 17.
NG >> Replace water separator.

17. CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Check if water will drain from the EVAP canister.

Yes or No

Yes >> GO TO 18.
No >> GO TO 20.



18. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve attached.
The weight should be less than 1.8 kg (4.0 lb).

OK or NG

OK >> GO TO 20.
NG >> GO TO 19.

19. DETECT MALFUNCTIONING PART

Check the following.

- EVAP canister for damage
- EVAP hose between EVAP canister and water separator for clogging or poor connection

>> Repair hose or replace EVAP canister.

20. CHECK INTERMITTENT INCIDENT

Refer to EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

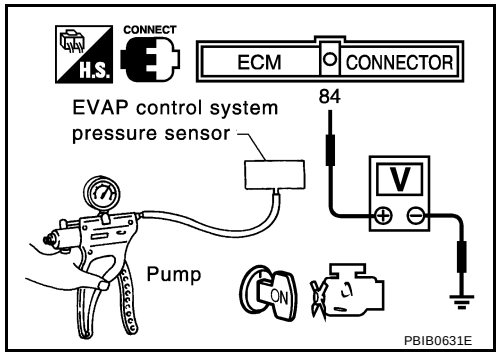
Component Inspection

UBS001JS

EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.
2. Remove hose from EVAP control system pressure sensor.
3. Install a pressure pump to EVAP control system pressure sensor.
4. Turn ignition switch “ON” and check output voltage between ECM terminal 84 and ground.

Applied vacuum kPa (mmHg, inHg)	Voltage V
Not applied	1.8 - 4.8
-26.7 kPa (-200, -7.7)	2.1 - 2.5 lower than above value



CAUTION:

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

5. If NG, replace EVAP control system pressure sensor.

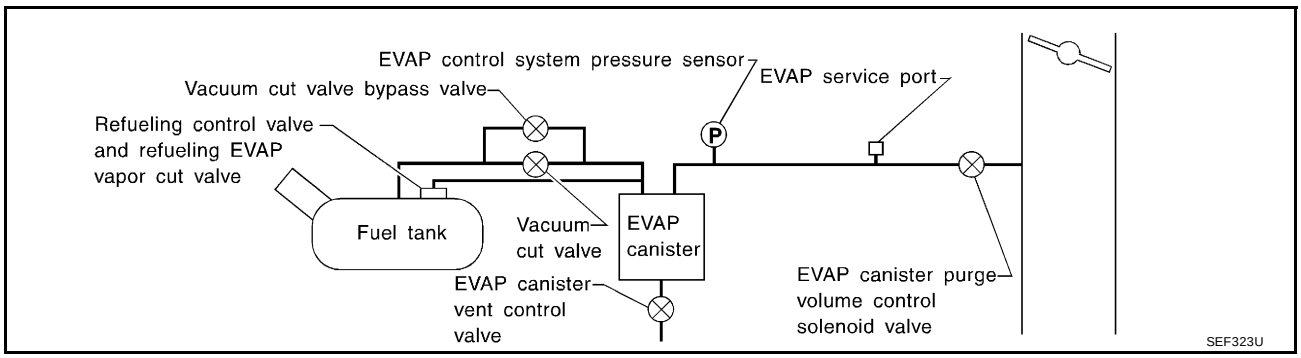
DTC P0455 EVAP CONTROL SYSTEM

PFP:14950

On Board Diagnosis Logic

UBS001JT

NOTE:
If DTC P0455 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-515 .)
This diagnosis detects a very large leak (fuel filler cap fell off, etc.) in the EVAP system between the fuel tank and the EVAP canister purge volume control solenoid valve.



Malfunction is detected when EVAP control system has very large leaks such as when fuel filler cap has fallen off, EVAP control system does not operate properly.

CAUTION:
- **Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.**
- **If the fuel filler cap is not tightened properly, the MIL may come on.**
- **Use only a genuine NISSAN rubber tube as a replacement.**

Possible Cause

UBS001JU

- Fuel filler cap remains open or fails to close
- Incorrect fuel tank vacuum relief valve
- Incorrect fuel filler cap used
- Foreign matter caught in fuel filler cap
- Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve
- Foreign matter caught in EVAP canister vent control valve
- EVAP canister or fuel tank leaks
- EVAP purge line (pipe and rubber tube) leaks
- EVAP purge line rubber tube bent
- Blocked or bent rubber tube to EVAP control system pressure sensor
- Loose or disconnected rubber tube
- EVAP canister vent control valve and the circuit
- EVAP canister purge volume control solenoid valve and the circuit
- Fuel tank temperature sensor
- O-ring of EVAP canister vent control valve is missing or damaged.
- EVAP control system pressure sensor
- Refueling control valve
- ORVR system leaks

DTC Confirmation Procedure

UBS001JV

CAUTION:
Never remove fuel filler cap during the DTC Confirmation Procedure.

NOTE:
- **If DTC P0455 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-515 .)**
- **Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.**

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

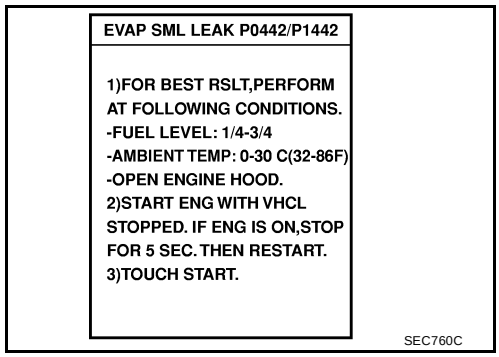
TESTING CONDITION:

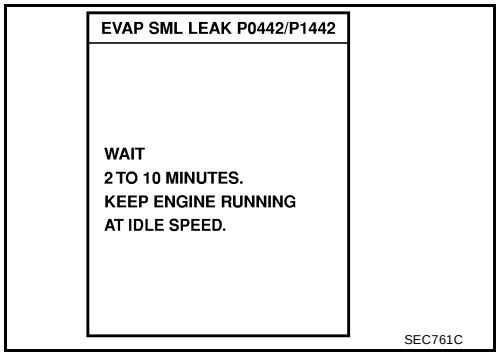
- **Perform “DTC WORK SUPPORT” when the fuel level is between 1/4 to 3/4 full and vehicle is placed on flat level surface.**
- **Open engine hood before conducting the following procedure.**

WITH CONSULT-II

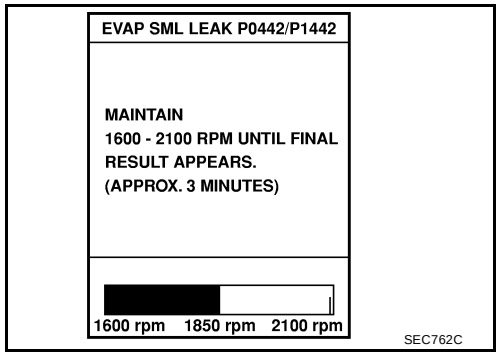
1. Tighten fuel filler cap securely until ratcheting sound is heard.
2. Turn ignition switch “ON”.
3. Turn ignition switch “OFF” and wait at least 10 seconds.
4. Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II.
5. Make sure that the following conditions are met.
   COOLAN TEMP/S: 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-87, "Basic Inspection" .





7. Make sure that “OK” is displayed.
   If “NG” is displayed, select “SELF-DIAG RESULTS” mode with CONSULT-II and make sure that “EVAP GROSS LEAK [P0455]” is displayed. If it is displayed, refer to EC-385, "Diagnostic Procedure" .
   If P0442 is displayed, perform “Diagnostic Procedure” for DTC P0442, EC-355 .



WITH GST

NOTE:
Be sure to read the explanation of “Driving Pattern” on EC-70 before driving vehicle.

1. Start engine.
2. Drive vehicle according to EC-70, "Driving Pattern" .
3. Stop vehicle.

4. Select “MODE 1” with GST.
- If SRT of EVAP system is not set yet, go to the following step.
- If SRT of EVAP system is set, the result will be OK.
5. Turn ignition switch “OFF” and wait at least 10 seconds.
6. Start engine.
   It is not necessary to cool engine down before driving.
7. Drive vehicle again according to the EC-70, "Driving Pattern" .
8. Stop vehicle.
9. Select “MODE 3” with GST.
- If P0455 is displayed on the screen, go to EC-385, "Diagnostic Procedure" .
- If P0442 or P1442 is displayed on the screen, go to “Diagnostic Procedure”, for DTC P0442, EC-355 .
- If P0441 is displayed on the screen, go to “Diagnostic Procedure” for DTC P0441, EC-348 .
- If P0441, P0442, P0455 and P1442 are not displayed on the screen, go to the following step.
10. Select “MODE 1” with GST.
- If SRT of EVAP system is set, the result will be OK.
- If SRT of EVAP system is not set, go to step 6.

Diagnostic Procedure

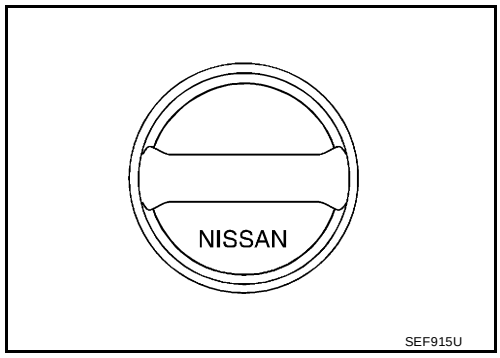
UBS001JW

1. CHECK FUEL FILLER CAP DESIGN

1. Turn ignition switch “OFF”.
2. Check for genuine NISSAN fuel filler cap design.

OK or NG

OK >> GO TO 2.
NG >> Replace with genuine NISSAN fuel filler cap.



2. CHECK FUEL FILLER CAP INSTALLATION

Check that the cap is tightened properly by rotating the cap clockwise.

OK or NG

OK >> GO TO 3.
NG >> ● Open fuel filler cap, then clean cap and fuel filler neck threads using air blower.
● Retighten until ratcheting sound is heard.

3. CHECK FUEL FILLER CAP FUNCTION

Check for air releasing sound while opening the fuel filler cap.

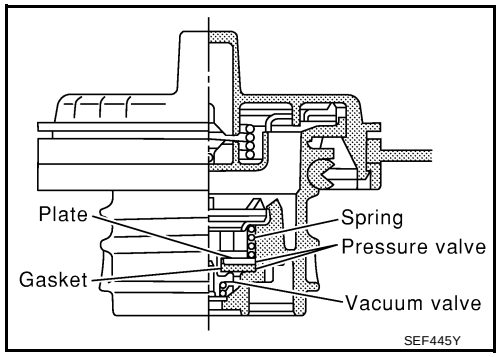
OK or NG

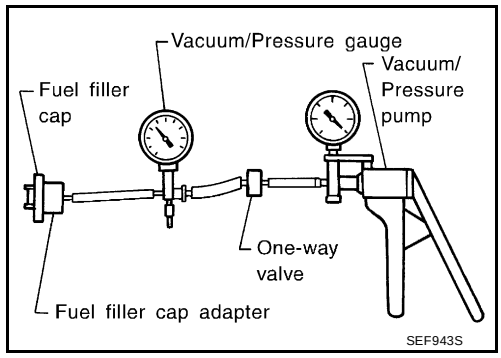
OK >> GO TO 5.
NG >> GO TO 4.

4. CHECK FUEL TANK VACUUM RELIEF VALVE

1. Wipe clean valve housing.
2. Check valve opening pressure and vacuum.

Pressure:
15.3 - 20.0 kPa
(0.156 - 0.204 kg/cm^2 , 2.22 - 2.90 psi)
Vacuum:
–6.0 to –3.4 kPa
(–0.061 to –0.035 kg/cm^2 , –0.87 to –0.48 psi)





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

OK or NG

OK >> GO TO 5.
NG >> Replace fuel filler cap with a genuine one.

5. 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-578, "EVAPORATIVE EMISSION SYSTEM" .

OK or NG

OK >> GO TO 6.
NG >> Repair or reconnect the hose.

6. CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 7.

7. CHECK EVAP CANISTER VENT CONTROL VALVE, O-RING AND CIRCUIT

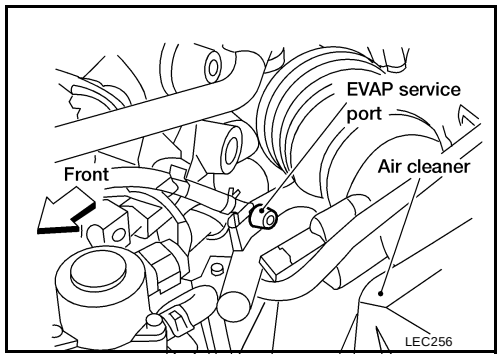
Refer to EC-369, "DTC Confirmation Procedure" .

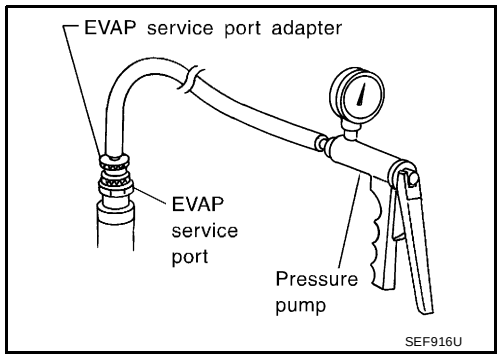
OK or NG

OK >> GO TO 8.
NG >> Repair or replace EVAP canister vent control valve and O-ring or harness/connector.

8. INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.





NOTE:
Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.

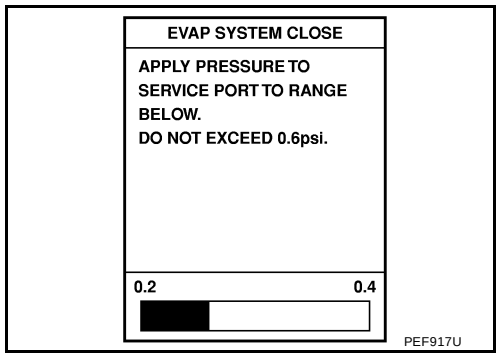
Models with CONSULT-II>>GO TO 9.
Models without CONSULT-II>>GO TO 10.

9. CHECK FOR EVAP LEAK

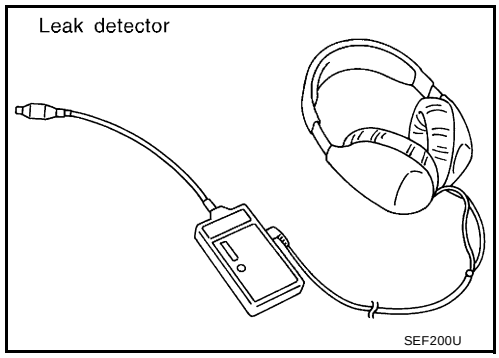
With CONSULT-II

1. Turn ignition switch “ON”.
2. Select “EVAP SYSTEM CLOSE” of “WORK SUPPORT” mode with CONSULT-II.
3. Touch “START” and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.

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



4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details.
   Refer to EC-579, "EVAPORATIVE EMISSION LINE DRAWING"
   .



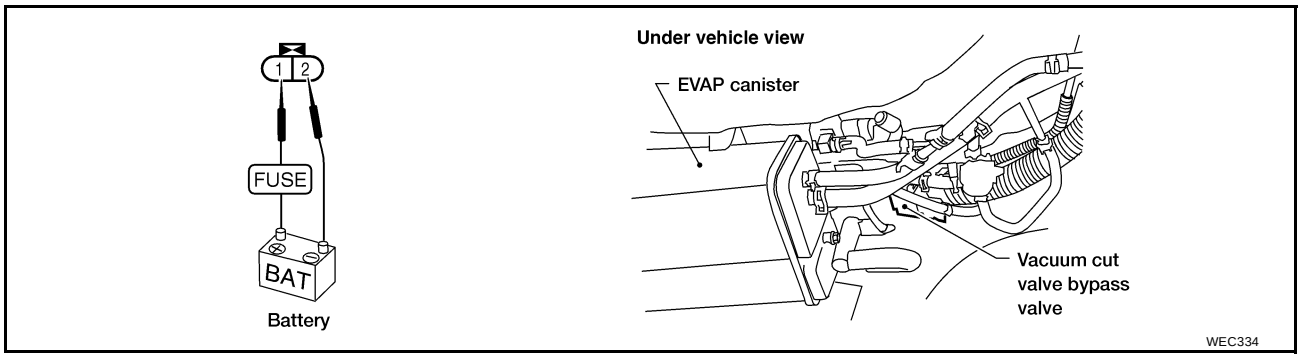
OK or NG

OK >> GO TO 11.
NG >> Repair or replace.

10. CHECK FOR EVAP LEAK

Without CONSULT-II

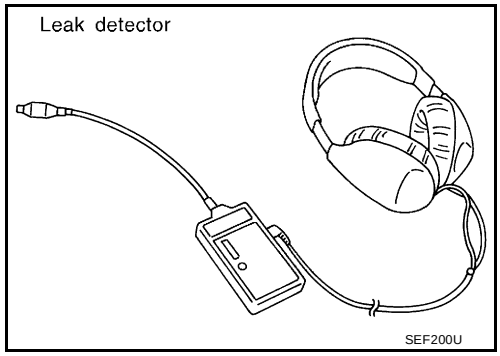
1. Turn ignition switch “OFF”.
2. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)
3. Apply 12 volts DC to vacuum cut valve bypass valve. The valve will open. (Continue to apply 12V until the end of test.)



4. Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg), then remove pump and EVAP service port adapter.

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

5. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to EC-579, "EVAPORATIVE EMISSION LINE DRAWING" .



OK or NG

OK >> GO TO 11.
NG >> Repair or replace.

11. RELEASE EVAP LINE PRESSURE

With CONSULT-II

1. Touch “BACK” on CONSULT-II screen.
2. Start engine warm it up to normal operating temperature.
3. Turn ignition switch “OFF” and wait at least 10 seconds.
4. Start engine and let it idle for 90 seconds.
5. Keep engine speed at about 2,000 rpm for 30 seconds.
6. Turn ignition switch “OFF”.

Without CONSULT-II

1. Stop applying 12 volts DC to EVAP canister vent control valve and vacuum cut valve bypass valve.
2. Reconnect harness connectors to EVAP canister vent control valve and vacuum cut valve bypass valve.
3. Start engine warm it up to normal operating temperature.
4. Turn ignition switch “OFF” and wait at least 10 seconds.
5. Start engine and let it idle for 90 seconds.
6. Keep engine speed at about 2,000 rpm for 30 seconds.
7. Turn ignition switch “OFF”.

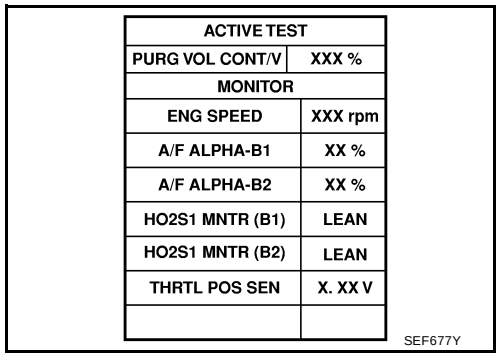
With CONSULT-II>>GO TO 12.
Without CONSULT-II>>GO TO 13.

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 100.0%.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

Vacuum should exist.



OK or NG

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

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.

Vacuum should exist.

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-34, "Vacuum Hose Drawing" .

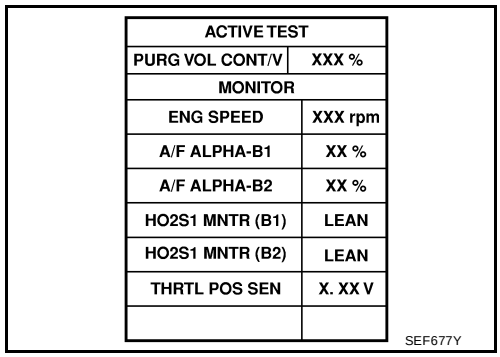
OK or NG

OK (With CONSULT-II)>>GO TO 15.
OK (Without CONSULT-II)>>GO TO 16.
NG >> Repair or reconnect the hose.

15. 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 17.
NG >> GO TO 16.

16. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-367, "Component Inspection" .

OK or NG

OK >> GO TO 17.
NG >> Replace EVAP canister purge volume control solenoid valve.

17. CHECK FUEL TANK TEMPERATURE SENSOR

1. Remove fuel level sensor unit.
2. Check fuel tank temperature sensor.
   Refer to EC-274, "Component Inspection" .

OK or NG

OK >> GO TO 18.
NG >> Replace fuel level sensor unit.

18. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-382, "Component Inspection" .

OK or NG

OK >> GO TO 19.
NG >> Replace EVAP control system pressure sensor.

19. CHECK REFUELING EVAP VAPOR LINE

Check refueling EVAP vapor line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to EC-584, "ON BOARD REFUELING VAPOR RECOVERY (ORVR)" .

OK or NG

OK >> GO TO 20.
NG >> Repair or replace hoses and tubes.

20. CHECK SIGNAL LINE AND RECIRCULATION LINE

Check signal line and recirculation line between filler neck tube and fuel tank for clogging, kink, cracks, looseness and improper connection.

OK or NG

OK >> GO TO 21.
NG >> Repair or replace hoses, tubes or filler neck tube.

21. CHECK REFUELING CONTROL VALVE

Refer to EC-588, "Component Inspection" .

OK or NG

OK >> GO TO 22.
NG >> Replace refueling control valve with fuel tank.

22. CHECK INTERMITTENT INCIDENT

Refer to EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

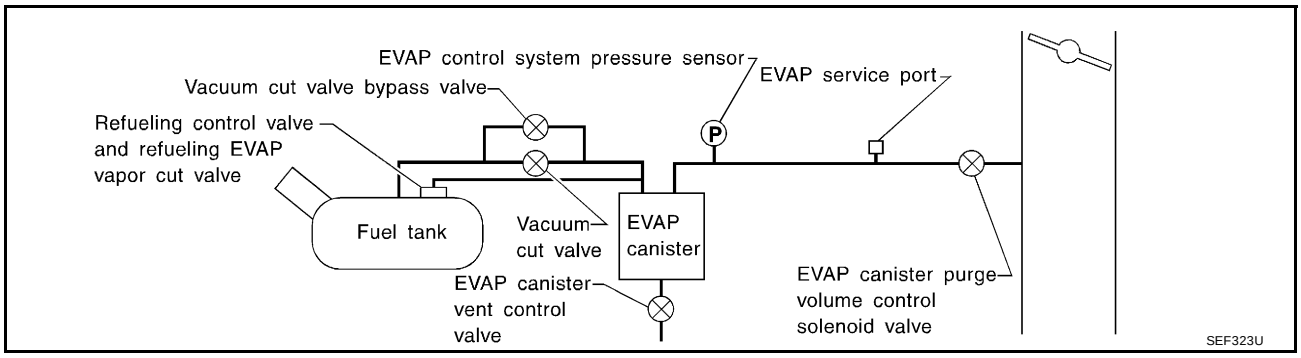
DTC P0456, P1456 EVAP CONTROL SYSTEM

PFP:14950

On Board Diagnosis Logic

UBS001JX

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 (P0456) or vapor pressure in the fuel tank (P1456) 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 or P1456 will be detected.
If ECM judges a leak equivalent to a small leak, EVAP small leak P0442 or P1442 will be detected.
If ECM judges there are no leaks, the diagnosis will be OK.



DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0456 P1456	● EVAP system has a very small leak. ● EVAP system does not operate properly.	● Incorrect fuel tank vacuum relief valve. ● Incorrect fuel filler cap used. ● Fuel filler cap remains open or fails to close ● Foreign matter caught in fuel filler cap. ● Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve. ● Foreign matter caught in EVAP canister vent control valve. ● EVAP canister or fuel tank leaks. ● EVAP purge line (Pipe and rubber tube) leaks. ● EVAP purge line rubber tube bent. ● Blocked or bent rubber tube to EVAP control system pressure sensor. ● Loose or disconnected rubber tube. ● EVAP canister vent control valve and the circuit. ● EVAP canister purge volume control valve and the circuit ● EVAP canister purge volume control solenoid valve ● O-ring of EVAP canister vent control valve is missing or damaged. ● Water separator ● EVAP canister saturated with water ● EVAP control system pressure sensor ● Refueling control valve ● ORVR system leaks ● Fuel level sensor and the circuit

DTC Confirmation Procedure

UBS001JY

CAUTION:
Never remove fuel filler cap during the DTC confirmation procedure.

NOTE:
- **If DTC P0456 or P1456 is displayed with P0442 or P1442, perform TROUBLE DIAGNOSIS FOR DTC P0456 or P1456 first.**

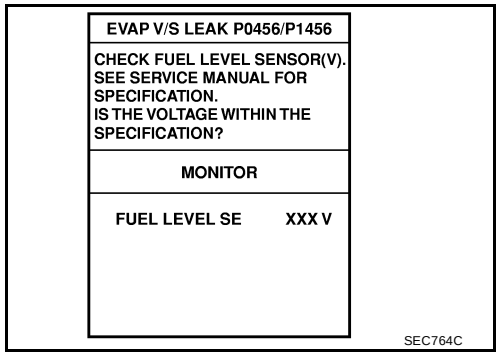
- **If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test.**
- **After repair, make sure that the hoses and clips are installed properly.**

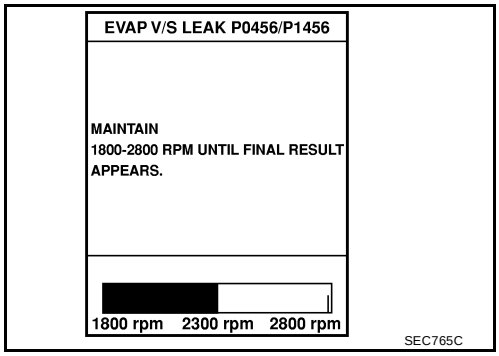
TESTING CONDITION:

- **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

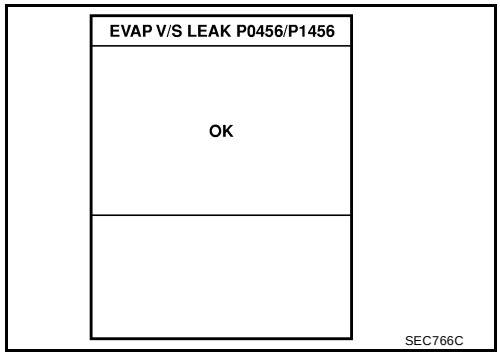
1. Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
2. Make sure the following conditions are met.
   FUEL LEVEL SE: 0.25 - 1.15V
   COOLAN TEMP/S: 0 - 32°C (32 - 90°F)
   FUEL T/TMP SE: 0 - 35°C (32 - 95°F)
   INT A/TEMP SE: More than 0°C (32°F)
   If NG, turn ignition switch "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-396, "Diagnostic Procedure" .

   NOTE:
   - **If the engine speed cannot be maintained within the range displayed on CONSULT-II screen, go to EC-87, "Basic Inspection" .**
   - **Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.**



Overall Function Check

UBS001JZ

WITH GST

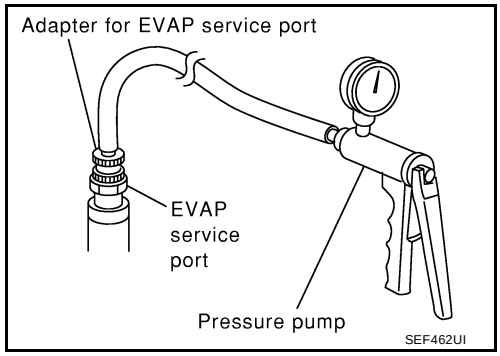
Use this procedure to check the overall function of the EVAP very small leak function. During this check, a 1st trip DTC might not be confirmed.

CAUTION:

- **Never use compressed air, doing so may damage the EVAP system.**
- **Do not start engine.**
- **Do not exceeded 4.12 kPa (0.042 kg/cm^2 , 0.6 psi).**

1. Attach the EVAP service port adapter securely to the EVAP service port.
2. Set the pressure pump and a hose.
3. Also set a vacuum gauge via 3-way connector and a hose.
4. Turn ignition switch “ON”.
5. Connect GST and select mode 8.
6. Using mode 8 control the EVAP canister vent control valve (close) and vacuum cut valve bypass valve (open).
7. Apply pressure and make sure the following conditions are satisfied.
   Pressure to be applied: 2.7 kPa (20 mmHg, 0.79 inHg)
   Time to be waited after the pressure drawn in to the EVAP system and the pressure to be dropped: 60 seconds and the pressure should not be dropped more than 0.4 kPa (3 mmHg, 0.12 inHg).
   If NG, go to EC-396, "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.

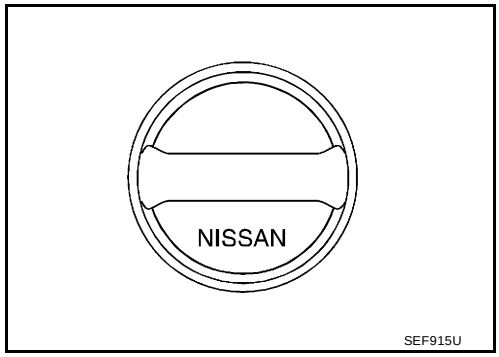


Diagnostic Procedure

UBS001K0

1. CHECK FUEL FILLER CAP DESIGN

1. Turn ignition switch “OFF”.
2. Check for genuine NISSAN fuel filler cap design.



OK or NG

OK >> GO TO 2.
NG >> Replace with genuine NISSAN fuel filler cap.

2. CHECK FUEL FILLER CAP INSTALLATION

Check that the cap is tightened properly by rotating the cap clockwise.

OK or NG

OK >> GO TO 3.
NG >>
- Open fuel filler cap, then clean cap and fuel filler neck threads using air blower.
- Retighten until ratcheting sound is heard.

3. CHECK FUEL FILLER CAP FUNCTION

Check for air releasing sound while opening the fuel filler cap.

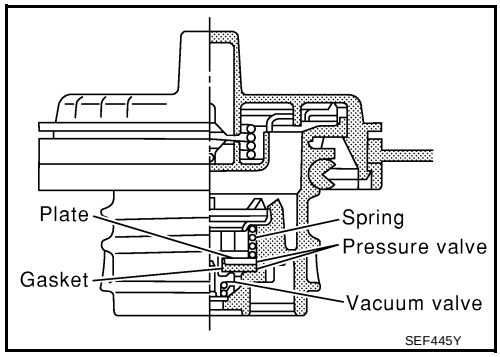
OK or NG

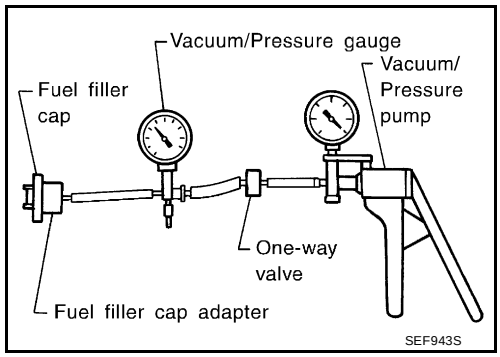
OK >> GO TO 6.
NG >> GO TO 4.

4. CHECK FUEL TANK VACUUM RELIEF VALVE

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 –3.4 kPa
(–0.061 to –0.035 kg/cm^2 , –0.87 to –0.48 psi)





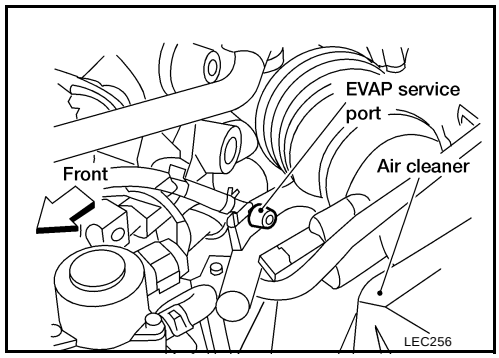
CAUTION:
Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.

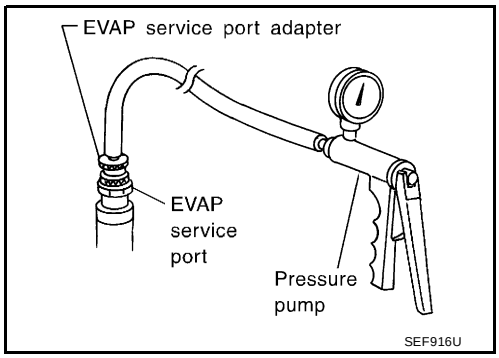
OK or NG

OK >> GO TO 5.
NG >> Replace fuel filler cap with a genuine one.

5. INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.





NOTE:
Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.

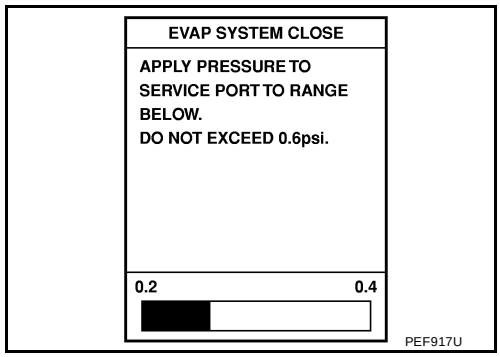
Models with CONSULT-II>>GO TO 6.
Models without CONSULT-II>>GO TO 7.

6. CHECK FOR EVAP LEAK

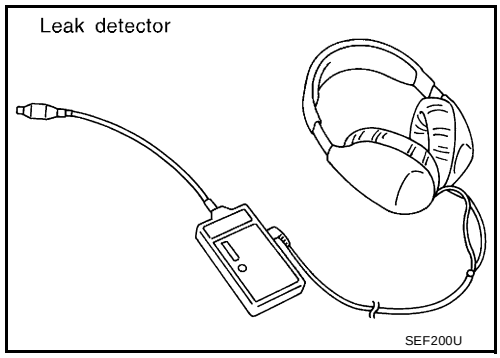
With CONSULT-II

1. Turn ignition switch “ON”.
2. Select “EVAP SYSTEM CLOSE” of “WORK SUPPORT” mode with CONSULT-II.
3. Touch “START” and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.

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



4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details.
   Refer to EC-579, "EVAPORATIVE EMISSION LINE DRAWING"
   .



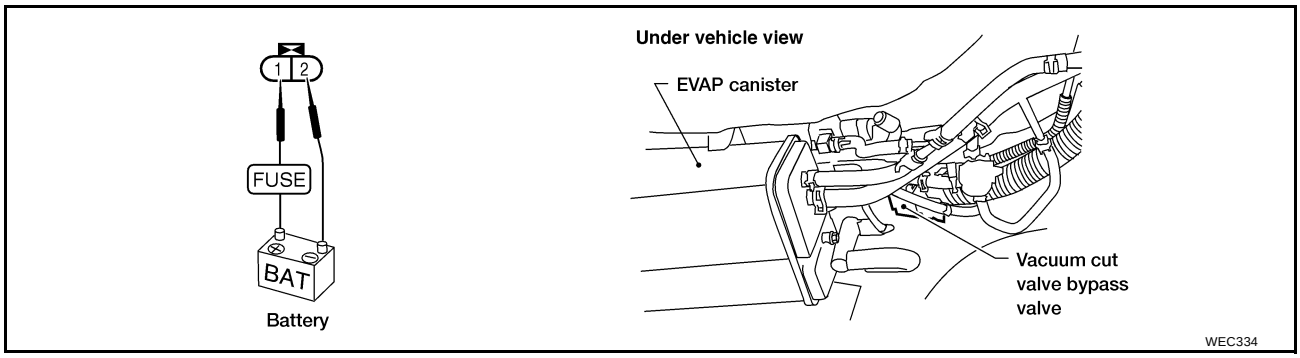
OK or NG

OK >> GO TO 8.
NG >> Repair or replace.

7. CHECK FOR EVAP LEAK

Without CONSULT-II

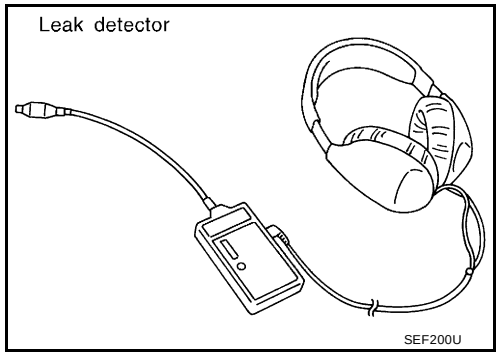
1. Turn ignition switch “OFF”.
2. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)
3. Apply 12 volts DC to vacuum cut valve bypass valve. The valve will open. (Continue to apply 12V until the end of test.)



4. Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg), then remove pump and EVAP service port adapter.

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

5. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to EC-579, "EVAPORATIVE EMISSION LINE DRAWING" .



OK or NG

OK >> GO TO 8.
NG >> Repair or replace.

8. RELEASE EVAP LINE PRESSURE

With CONSULT-II

1. Touch “BACK” on CONSULT-II screen.
2. Start engine warm it up to normal operating temperature.
3. Turn ignition switch “OFF” and wait at least 10 seconds.
4. Start engine and let it idle for 90 seconds.
5. Keep engine speed at about 2,000 rpm for 30 seconds.
6. Turn ignition switch “OFF”.

Without CONSULT-II

1. Stop applying 12 volts DC to EVAP canister vent control valve and vacuum cut valve bypass valve.
2. Reconnect harness connectors to EVAP canister vent control valve and vacuum cut valve bypass valve.
3. Start engine warm it up to normal operating temperature.
4. Turn ignition switch “OFF” and wait at least 10 seconds.
5. Start engine and let it idle for 90 seconds.
6. Keep engine speed at about 2,000 rpm for 30 seconds.
7. Turn ignition switch “OFF”.

>> GO TO 9.

9. CHECK WATER SEPARATOR

Refer to EC-363, "Component Inspection" .

OK or NG

OK >> GO TO 10.
NG >> Replace water separator.

10. CHECK EVAP CANISTER VENT CONTROL VALVE, O-RING AND CIRCUIT

Refer to EC-369, "DTC Confirmation Procedure" .

OK or NG

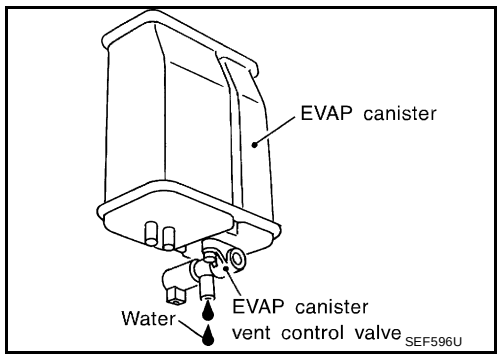
OK >> GO TO 11.
NG >> Repair or replace EVAP canister vent control valve and O-ring or harness/connector.

11. CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Does water drain from the EVAP canister?

Yes or No

Yes >> GO TO 12.
No (With CONSULT-II)>>GO TO 14.
No (Without CONSULT-II)>>GO TO 15.



12. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve attached.
The weight should be less than 1.8 kg (4.0 lb).

OK or NG

OK (With CONSULT-II)>>GO TO 14.
OK (Without CONSULT-II)>>GO TO 15.
NG >> GO TO 13.

13. DETECT MALFUNCTIONING PART

Check the following.

- EVAP canister for damage
- EVAP hose between EVAP canister and water separator for clogging or poor connection

>> Repair hose or replace EVAP canister.

14. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-II

1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
2. Start engine.
3. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode.
4. Touch “Qu” on CONSULT-II screen to increase “PURG VOL CONT/V” opening to 100.0%.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

Vacuum should exist.

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XX %
A/F ALPHA-B2	XX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN
THRTL POS SEN	X. XX V

SEF677Y

OK or NG

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

15. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
4. Start engine and let it idle for at least 80 seconds.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

Vacuum should exist.

OK or NG

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

16. CHECK VACUUM HOSE

Check vacuum hoses for clogging or disconnection. Refer to EC-34, "Vacuum Hose Drawing" .

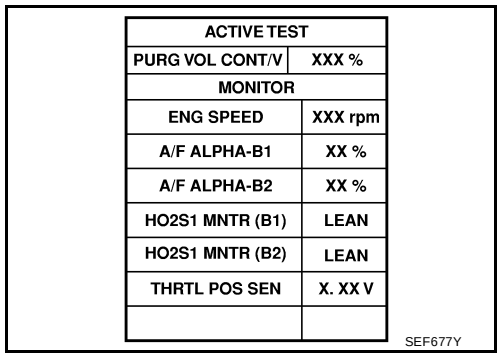
OK or NG

OK (With CONSULT-II)>>GO TO 17.
OK (Without CONSULT-II)>>GO TO 18.
NG >> Repair or reconnect the hose.

17. 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 19.
NG >> GO TO 18.

18. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-367, "Component Inspection" .

OK or NG

OK >> GO TO 19.
NG >> Replace EVAP canister purge volume control solenoid valve.

19. CHECK FUEL TANK TEMPERATURE SENSOR

1. Remove fuel level sensor unit.
2. Check fuel tank temperature sensor.
   Refer to EC-274, "Component Inspection" .

OK or NG

OK >> GO TO 20.
NG >> Replace fuel level sensor unit.

20. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-382, "Component Inspection" .

OK or NG

OK >> GO TO 21.
NG >> Replace EVAP control system pressure sensor.

21. CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection.
Refer to EC-578, "EVAPORATIVE EMISSION SYSTEM" .

OK or NG

OK >> GO TO 22.
NG >> Repair or reconnect the hose.

22. CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 23.

23. CHECK REFUELING EVAP VAPOR LINE

Check refueling EVAP vapor line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to EC-584, "ON BOARD REFUELING VAPOR RECOVERY (ORVR)" .

OK or NG

OK >> GO TO 24.
NG >> Repair or replace hoses and tubes.

24. CHECK SIGNAL LINE AND RECIRCULATION LINE

Check signal line and recirculation line between filler neck tube and fuel tank for clogging, kink, cracks, looseness and improper connection.

OK or NG

OK >> GO TO 25.
NG >> Repair or replace hoses, tubes or filler neck tube.

25. CHECK REFUELING CONTROL VALVE

Refer to EC-588, "Component Inspection" .

OK or NG

OK >> GO TO 26.
NG >> Replace refueling control valve with fuel tank.

26. CHECK FUEL LEVEL SENSOR

Refer to DI-23, "FUEL LEVEL SENSOR UNIT CHECK" .

OK or NG

OK >> GO TO 27.
NG >> Replace fuel level sensor unit.

27. CHECK INTERMITTENT INCIDENT

Refer to EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

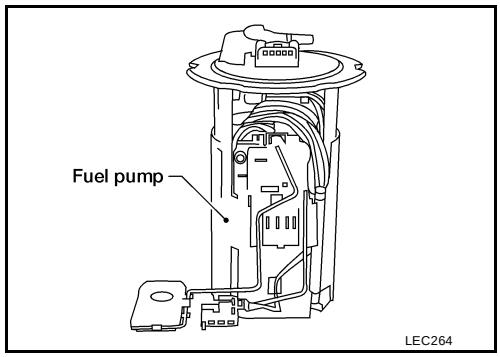
DTC P0460 FUEL LEVEL SENSOR

PFP:25060

Component Description

UBS001K1

The fuel level sensor is mounted in the fuel level sensor unit. The sensor detects a fuel level in the fuel tank and transmits a signal to the ECM.
It consists of two parts, one is mechanical float and the other side is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.



On Board Diagnostic Logic

UBS001K2

When the vehicle is parked, the fuel level in the fuel tank is stable. It means the output signal of the fuel level sensor does not change. If ECM senses sloshing signal from the sensor, fuel level sensor malfunction is detected.
Malfunction is detected when even though the vehicle is parked, a signal being varied is sent from the fuel level sensor to ECM.

Possible Cause

UBS001K3

- Fuel level sensor circuit
  (The fuel level sensor circuit is open or shorted.)
- Fuel level sensor

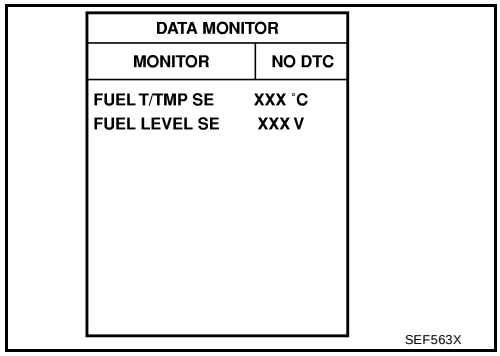
DTC Confirmation Procedure

UBS001K4

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-407, "Diagnostic Procedure"
   .

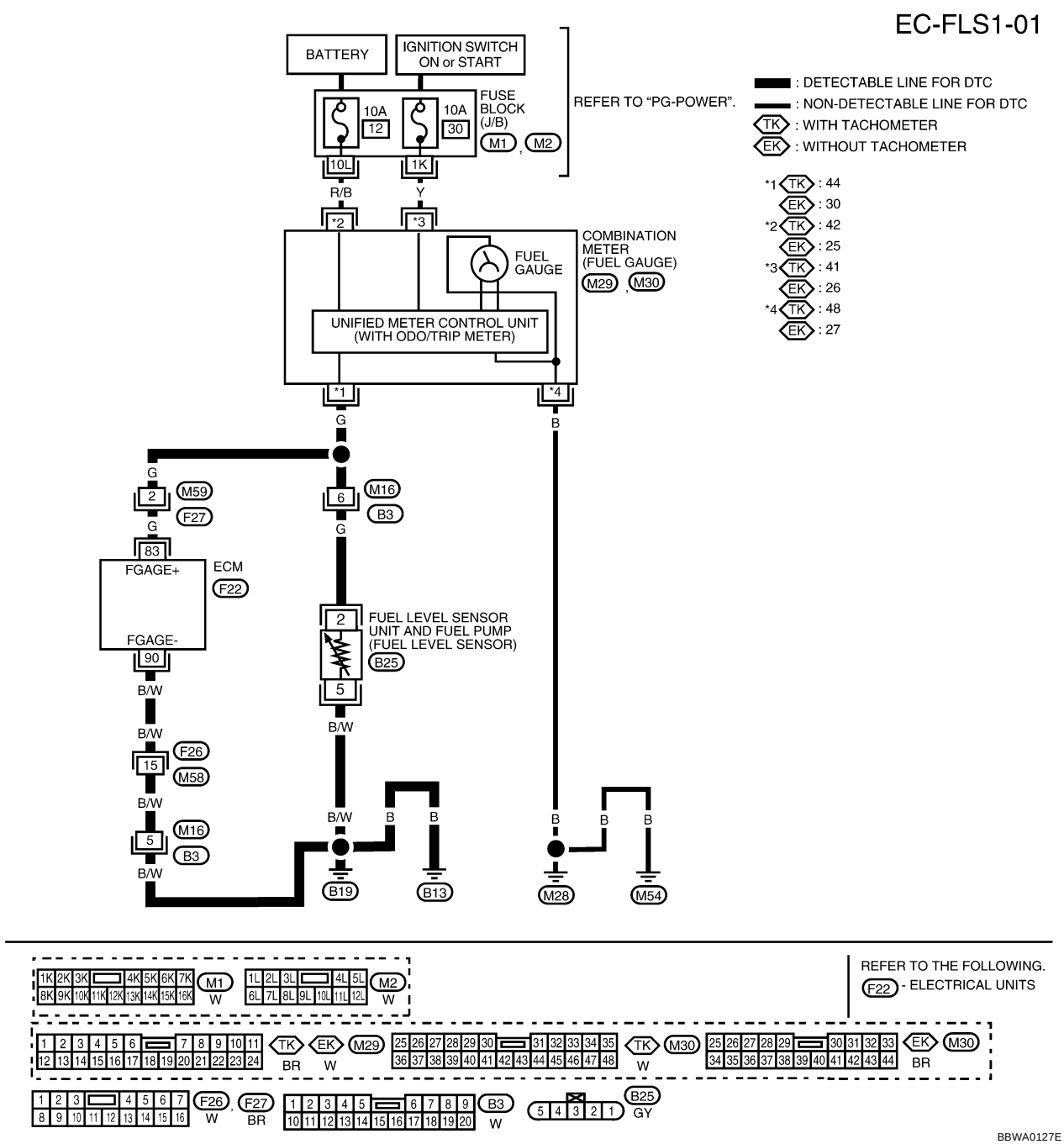


WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS001K5



ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
83	G	FUEL LEVEL SENSOR	IGN ON	APPROX. 0 - 4.8V
90	B/W	FUEL LEVEL SENSOR GROUND	ENGINE RUNNING AT IDLE SPEED	APPROX. 0V

SEF579Y

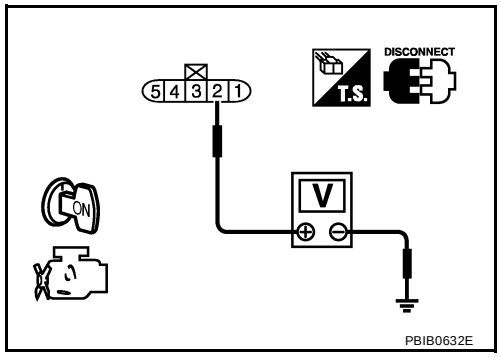
Diagnostic Procedure

UBS001K6

1. CHECK FUEL LEVEL SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect fuel level sensor until and fuel pump harness connector.
3. Turn ignition switch “ON”.
4. Check voltage between fuel level sensor unit terminal 2 and ground with CONSULT-II or a tester.

Voltage: Battery voltage



OK or NG

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

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M16, B3
- Harness for open or short between combination meter and fuel level sensor unit

>> Repair or replace harness or connectors.

3. CHECK FUEL LEVEL SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Check harness continuity between fuel level sensor unit terminal 5 and body ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

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

4. CHECK FUEL LEVEL SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 83 and fuel level sensor unit terminal 2, ECM terminal 90 and fuel level sensor unit terminal 5. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

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

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F26, M58
- Harness connectors M59, F27
- Harness connectors M16, B3
- Harness for open or short between ECM and fuel level sensor and combination meter

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

6. CHECK FUEL LEVEL SENSOR

Refer to DI-23, "FUEL LEVEL SENSOR UNIT CHECK" .

OK or NG

OK >> GO TO 7.
NG >> Replace fuel level sensor unit.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

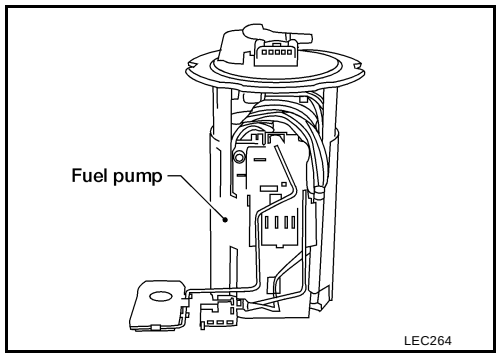
DTC P0461 FUEL LEVEL SENSOR

PFP:25060

Component Description

UBS001K7

The fuel level sensor is mounted in the fuel level sensor unit. The sensor detects a fuel level in the fuel tank and transmits a signal to the ECM.
It consists of two parts, one is mechanical float and the other side is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.



On Board Diagnostic Logic

UBS001K8

Driving long distances affects fuel gauge level.
This diagnosis detects the fuel gauge malfunction of the gauge not moving even after a long distance has been driven.
Malfunction is detected when the output signal of the fuel level sensor does not change within the specified range even though the vehicle has been driven a long distance.

Possible Cause

UBS001K9

- Harness or connectors
  (The level sensor circuit is open or shorted.)
- Fuel level sensor

Overall Function Check

UBS001KA

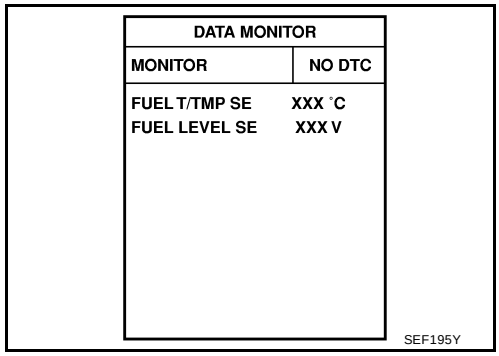
Use this procedure to check the overall function of the fuel level sensor function. During this check, a 1st trip DTC might not be confirmed.

WARNING:
When performing following procedure, be sure to observe the handling of the fuel. Refer to FL-2, "FUEL SYSTEM" .
TESTING CONDITION:
Before starting overall function check, preparation of draining fuel and refilling fuel is required.

WITH CONSULT-II

NOTE:
Start from step 11, if it is possible to confirm that the fuel cannot be drained by 30 l (7-7/8 US gal, 6-5/8 Imp gal) in advance.

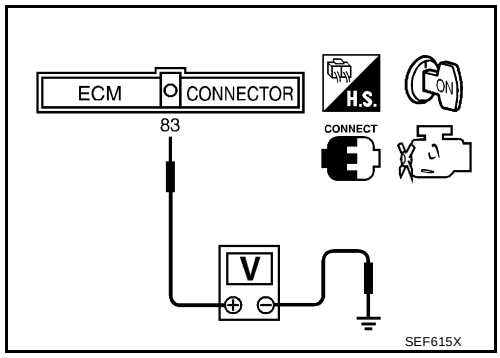
1. Prepare a fuel container and a spare hose.
2. Release fuel pressure from fuel line, refer to EC-58, "FUEL PRESSURE RELEASE" .
3. Remove the fuel feed hose on the fuel level sensor unit.
4. Connect a spare fuel hose where the fuel feed hose was removed.
5. Turn ignition switch “OFF” and wait at least 10 seconds then turn “ON”.
6. Select “FUEL LEVEL SE” in “DATA MONITOR” mode with CONSULT-II.
7. Check “FUEL LEVEL SE” output voltage and note it.
8. Select “FUEL PUMP” in “ACTIVE TEST” mode with CONSULT-II.
9. Touch “ON” and drain fuel approximately 30 l (7-7/8 US gal, 6-5/8 Imp gal) and stop it.
10. Fill fuel into the fuel tank for 30 l (7-7/8 US gal, 6-5/8 Imp gal).
11. Check “FUEL LEVEL SE” output voltage and note it.
12. Check “FUEL LEVEL SE” output voltage and confirm whether the voltage changes more than 0.03V during step 7 to 11.
    If NG, check the fuel level sensor, refer to DI-23, "FUEL LEVEL SENSOR UNIT CHECK" .



WITH GST

NOTE:
Start from step 11, if it is possible to confirm that the fuel cannot be drained by 30 l (7-7/8 US gal, 6-5/8 Imp gal) in advance.

1. Prepare a fuel container and a spare hose.
2. Release fuel pressure from fuel line, refer to EC-58, "FUEL PRESSURE RELEASE" .
3. Remove the fuel feed hose on the fuel level sensor unit.
4. Connect a spare fuel hose where the fuel feed hose was removed.
5. Turn ignition switch “OFF”.
6. Set voltmeters probe between ECM terminal 83 (fuel level sensor signal) and ground.
7. Turn ignition switch “ON”.
8. Check voltage between ECM terminal 83 and ground and note it.
9. Drain fuel by 30 l (7-7/8 US gal, 6-5/8 Imp gal) from the fuel tank using proper equipment.
10. Fill fuel into the fuel tank for 30 l (7-7/8 US gal, 6-5/8 Imp gal).
11. Confirm that the voltage between ECM terminal 83 and ground changes more than 0.03V during step 8 - 10.
    If NG, check component of fuel level sensor, refer to DI-23, "FUEL LEVEL SENSOR UNIT CHECK" .



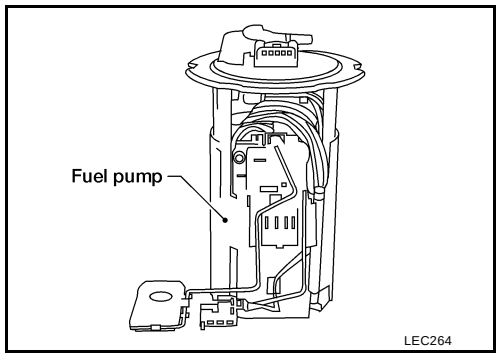
DTC P0462, P0463 FUEL LEVEL SENSOR

PFP:25060

Component Description

UBS001KB

The fuel level sensor is mounted in the fuel level sensor unit. The sensor detects a fuel level in the fuel tank and transmits a signal to the ECM.
It consists of two parts, one is mechanical float and the other side is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.



On Board Diagnostic Logic

UBS001KC

ECM receives two signals from the fuel level sensor circuit.
One is fuel level sensor power supply circuit, and the other is fuel level sensor ground circuit.
This diagnosis indicates the former, to detect open or short circuit malfunction.
Malfunction is detected when an excessively low (P0462) or high (P0463) voltage is sent from the sensor is sent to ECM.

Possible Cause

UBS001KD

- Fuel level sensor circuit
  (The fuel level sensor circuit is open or shorted.)
- Fuel level sensor

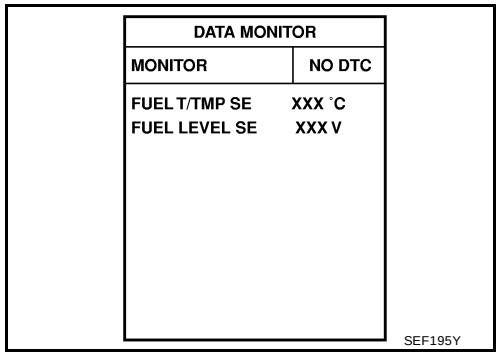
DTC Confirmation Procedure

UBS001KE

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-414, "Diagnostic Procedure"
   .

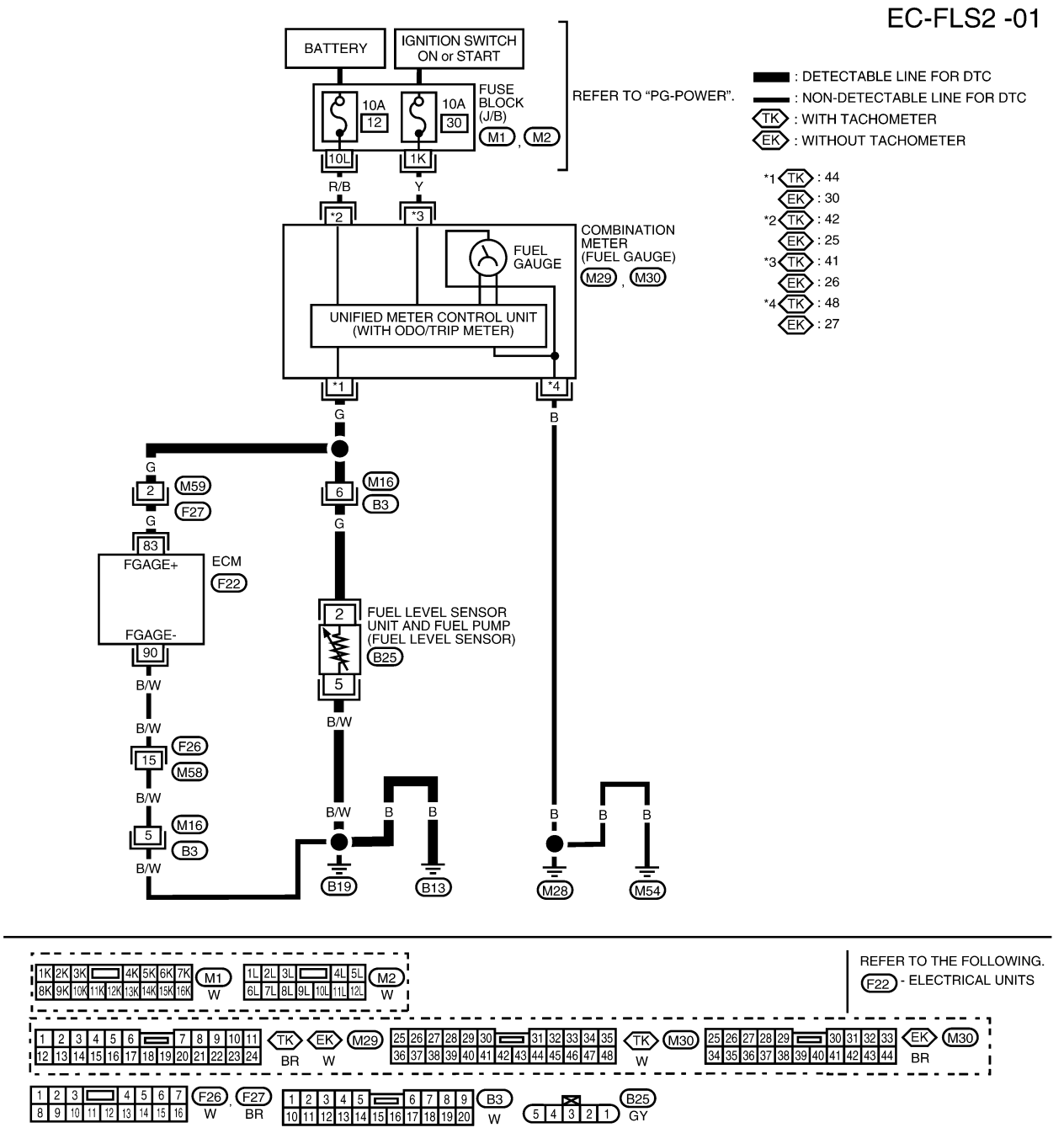


WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS001KF



BBWA0128E

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
83	G	FUEL LEVEL SENSOR	IGN ON	APPROX. 0 - 4.8V
90	B/W	FUEL LEVEL SENSOR GROUND	ENGINE RUNNING AT IDLE SPEED	APPROX. 0V

SEF579Y

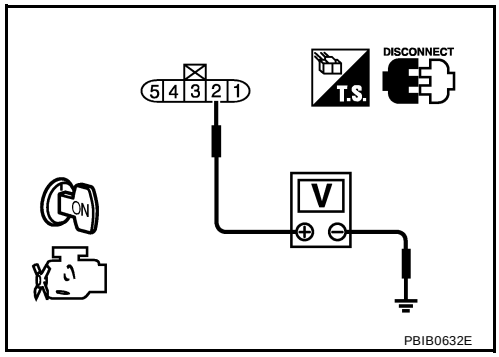
Diagnostic Procedure

UBS001KG

1. CHECK FUEL LEVEL SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect fuel level sensor until and fuel pump harness connector.
3. Turn ignition switch “ON”.
4. Check voltage between fuel level sensor unit 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 M16, B3
- Harness for open or short between combination meter and fuel level sensor unit

>> Repair or replace harness or connectors.

3. CHECK FUEL LEVEL SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Check harness continuity between fuel level sensor unit terminal 5 and body ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

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

4. CHECK FUEL LEVEL SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 83 and fuel level sensor unit terminal 2. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

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

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F26, M58
- Harness connectors M16, B3
- Harness connectors F27, M59
- Harness for open or short between ECM and fuel level sensor

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

6. CHECK FUEL LEVEL SENSOR

Refer to DI-23, "FUEL LEVEL SENSOR UNIT CHECK" .

OK or NG

OK >> GO TO 7.
NG >> Replace fuel level sensor unit.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

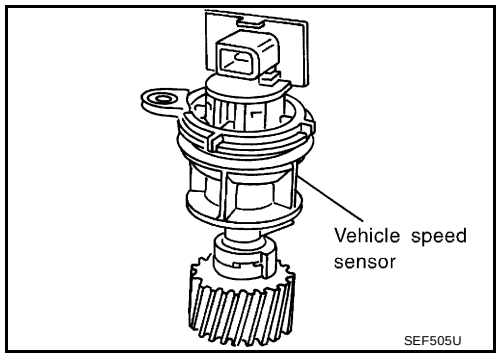
DTC P0500 VSS

PFP:32702

Component Description

UBS001KH

The vehicle speed sensor is installed in the transaxle. It contains a pulse generator which provides a vehicle speed signal to the speedometer. The speedometer then sends a signal to the ECM.



On Board Diagnosis Logic

UBS001KI

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0500	● The almost 0 km/h (0 MPH) signal from vehicle speed sensor is sent to ECM even when vehicle is being driven.	● Harness or connector (The vehicle speed sensor circuit is open or shorted.) ● Vehicle speed sensor

DTC Confirmation Procedure

UBS001KJ

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

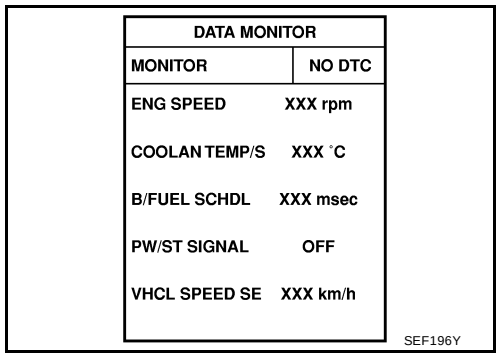
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

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

WITH CONSULT-II

1. Start engine
2. Read “VHCL SPEED SE” in “DATA MONITOR” mode with CONSULT-II. The vehicle speed on CONSULT-II should exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.
3. If NG, go to EC-418, "Diagnostic Procedure" .
   If OK, go to following step.
4. Select “DATA MONITOR” mode with CONSULT-II.
5. Warm engine up to normal operating temperature.
6. Maintain the following conditions for at least 60 consecutive seconds.



ENG SPEED	1,800 - 3,400 rpm (A/T) 2,200 - 4,100 rpm (M/T)
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	4.8 - 10.5 msec (A/T) 4.8 - 10.7 msec (M/T)
Selector lever	Suitable position
PW/ST SIGNAL	OFF

7. If 1st trip DTC is detected, go to EC-418, "Diagnostic Procedure" .

Overall Function Check

UBS001KK

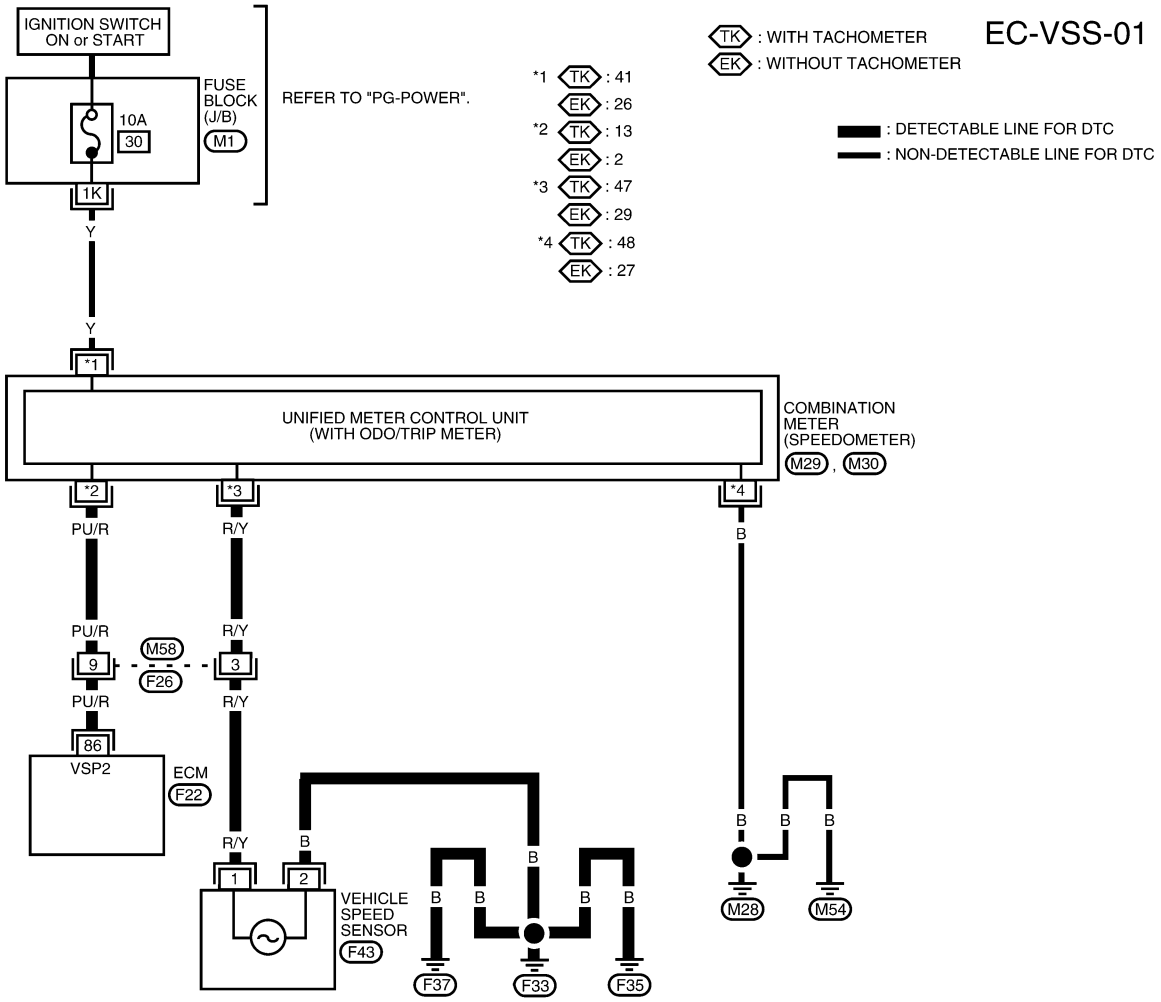
Use this procedure to check the overall function of the EVAP canister vent control valve circuit. During this check, a 1st trip DTC might not be confirmed.

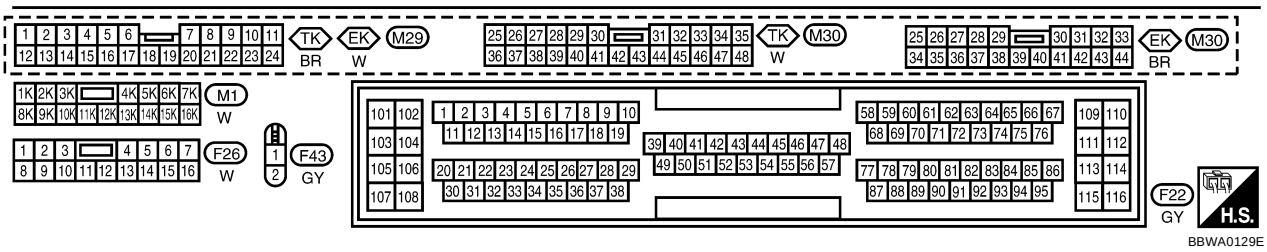
WITH GST

1. Lift up drive wheels.
2. Start engine.
3. Read vehicle speed sensor signal in “MODE 1” with GST.
   The vehicle speed sensor on GST should be able to exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.
4. If NG, go to EC-418, "Diagnostic Procedure" .

Wiring Diagram

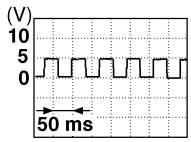
UBS001KL





BBWA0129E

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
86	PU/R	VEHICLE SPEED SENSOR	VEHICLE DRIVING AT 40 KM/H (25 MPH) IN 2ND GEAR POSITION UNDER LIFTED UP CONDITION	0 - APPROX. 4.2V 

SEF580Y

Diagnostic Procedure

UBS001KM

1. CHECK INPUT SIGNAL CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector and combination meter harness connector.
3. Check harness continuity between ECM terminal 86 and combination meter terminal 13 (with tachometer) or 2 (without tachometer).
   Refer to Wiring Diagram.

   Continuity should exist.

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

OK or NG

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

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M58, F26
- Harness for open or short between ECM and combination meter

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

3. CHECK SPEEDOMETER FUNCTION

Make sure that speedometer functions properly.

OK or NG

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

4. CHECK SPEEDOMETER CIRCUIT FOR OPEN AND SHORT

Check the following.

- Harness connectors M58, F26
- Harness for open or short between combination meter and vehicle speed sensor

OK or NG

OK >> Check combination meter and vehicle speed sensor. Refer to DI-3, "METERS AND GAUGES" .
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK INTERMITTENT INCIDENT

Perform EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

DTC P0505, P0506, P0507 ISC SYSTEM

PFP:23781

Description

UBS001KN

SYSTEM DESCRIPTION

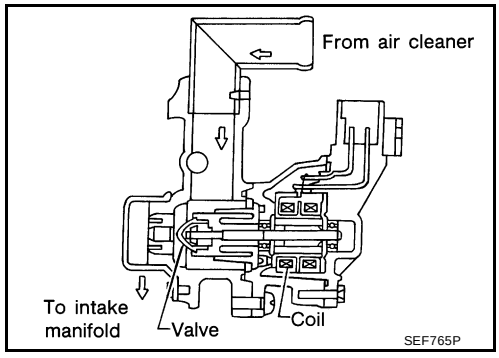
Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed	Idle air control	IACV-AAC valve
Camshaft position sensor (PHASE)	Engine speed and cylinder position		
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		
Park/neutral position (PNP) switch	Park/neutral position		
Air conditioner switch	Air conditioner operation		
Power steering oil pressure switch	Power steering load signal		
Battery	Battery voltage		
Vehicle speed sensor	Vehicle speed		
Intake air temperature sensor	Intake air temperature		

This system automatically controls engine idle speed to a specified level. Idle speed is controlled through fine adjustment of the amount of air which bypasses the throttle valve via IACV-AAC valve. The IACV-AAC valve changes the opening of the air bypass passage to control the amount of auxiliary air. This valve is actuated by a step motor built into the valve, which moves the valve in the axial direction in steps corresponding to the ECM output signals. One step of IACV-AAC valve movement causes the respective opening of the air bypass passage. (i.e., when the step advances, the opening is enlarged.) The opening of the valve is varied to allow for optimum control of the engine idling speed. The camshaft position sensor detects the actual engine speed and sends a signal to the ECM. The ECM then controls the step position of the IACV-AAC valve so that engine speed coincides with the target value memorized in ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by taking into consideration various engine conditions, such as during warm up, deceleration, and engine load (air conditioner, power steering and cooling fan operation).

COMPONENT DESCRIPTION

IACV-AAC Valve

The IACV-AAC valve is operated by a step motor for centralized control of auxiliary air supply. This motor has four winding phases and is actuated by the output signals of ECM which turns ON and OFF two windings each in sequence. Each time the IACV-AAC valve opens or closes to change the auxiliary air quantity, the ECM sends a pulse signal to the step motor. When no change in the auxiliary air quantity is needed, the ECM does not issue the pulse signal. A certain voltage signal is issued so that the valve remains at that particular opening.



CONSULT-II Reference Value in Data Monitor Mode

UBS001KO

MONITOR ITEM	CONDITION		SPECIFICATION
IACV-AAC/V	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: “N” ● No-load	Idle	5 - 20 steps
		2,000 rpm	—

On Board Diagnosis Logic

UBS001KP

DTC No.	Malfunction is detected when ...		Check Items (Possible Cause)
P0505	A)	The IACV-AAC valve does not operate properly.	● Harness or connectors (The IACV-AAC valve circuit is open.) ● IACV-AAC valve
P0506	B)	The idle speed is less than the target idle speed by 100 rpm or more.	● Harness or connectors (The IACV-AAC valve circuit is open or shorted.) ● Air control valve (Power steering) ● IACV-AAC valve
P0507	C)	The idle speed is more than the target idle speed by 200 rpm or more.	● Harness or connectors (The IACV-AAC valve circuit is open or shorted.) ● IACV-AAC valve ● Air control valve (Power steering) ● Intake air leaks ● PCV system

DTC Confirmation Procedure

UBS001KQ

NOTE:

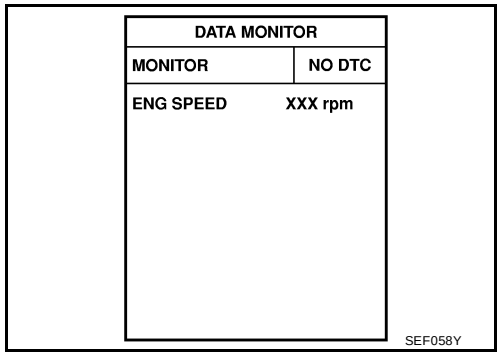
- If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.
- **If the target idle speed is out of the specified value, perform EC-56, "Idle Air Volume Learning" , before conducting “DTC Confirmation Procedure”. For the target idle speed, refer to EC-593, "SERVICE DATA AND SPECIFICATIONS (SDS)" .**

PROCEDURE FOR MALFUNCTION A

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10.5V with ignition switch “ON”.

With CONSULT-II

1. Turn ignition switch “ON”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle.
4. Keep engine speed at 2,500 rpm for three seconds, then let it idle for three seconds.
5. Perform step 4 once more.
6. If 1st trip DTC is detected, go to EC-423, "Diagnostic Procedure" .



With GST

Follow the procedure “With CONSULT-II” above.

PROCEDURE FOR MALFUNCTION B AND C

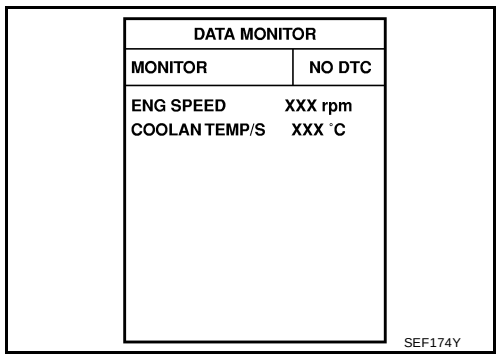
TESTING CONDITION:

- **Before performing the following procedure, make sure battery voltage is more than 11V at idle.**
- **For best results, perform the test at a temperature above –10°C (14°F).**
- **Electrical load not applied.**

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-423, "Diagnostic Procedure" .



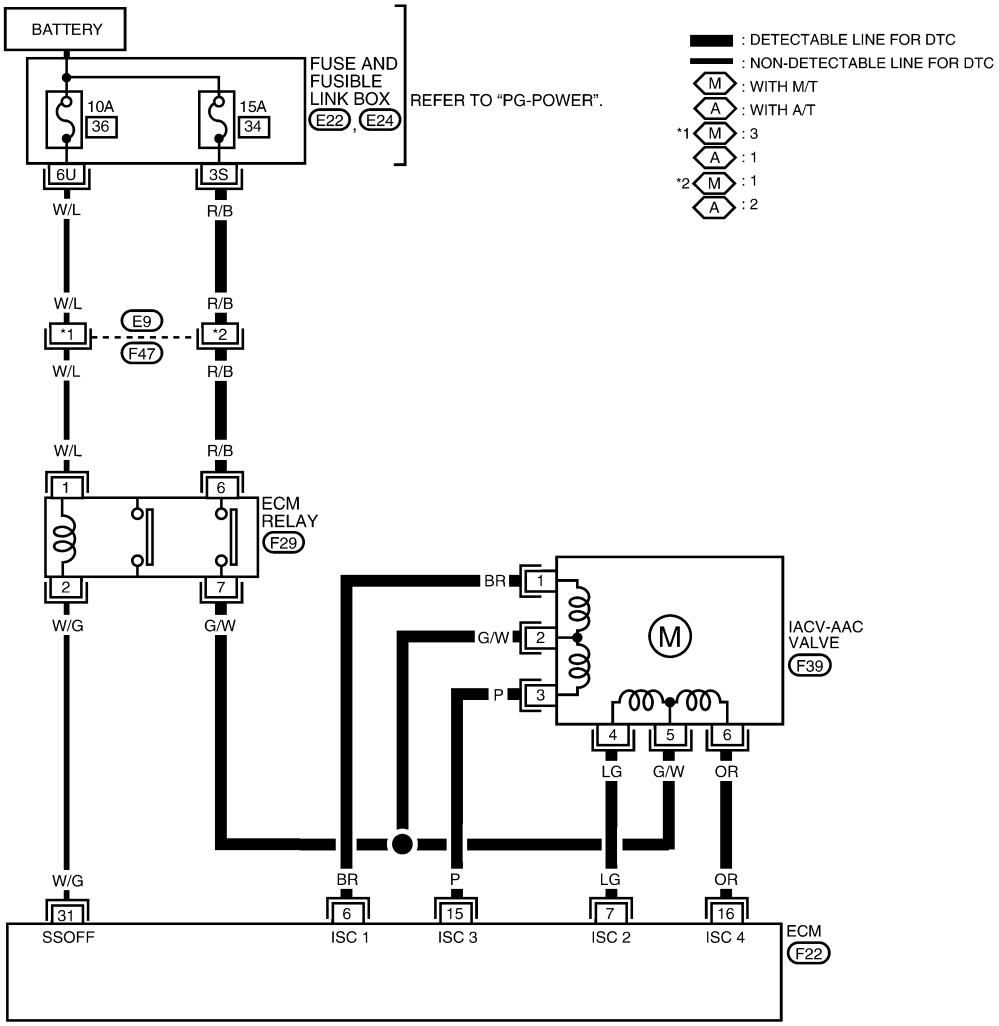
With GST

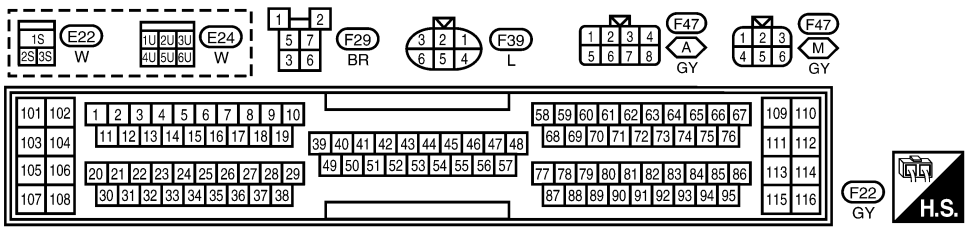
Follow the procedure “With CONSULT-II” above.

Wiring Diagram

UBS001KR

EC-AAC/V-01





BBWA0130E

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
6 7 15 16	BR LG P OR	IACV-AAC VALVE	ENGINE RUNNING AT IDLE SPEED	0.1 - 14V

SEF581Y

Diagnostic Procedure

UBS001KS

1. CHECK PCV HOSE CONNECTION

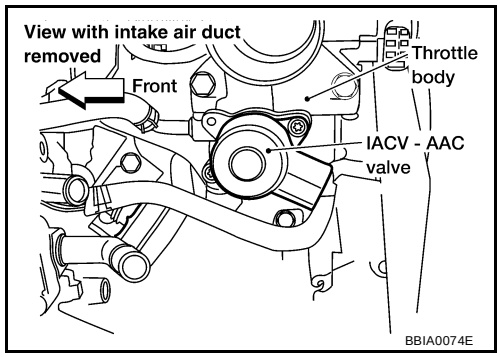
Confirm that PCV hose is connected correctly.

OK or NG

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

2. CHECK IACV-AAC VALVE POWER SUPPLY CIRCUIT

1. Stop engine.
2. Disconnect IACV-AAC valve harness connector.
3. Turn ignition switch "ON".

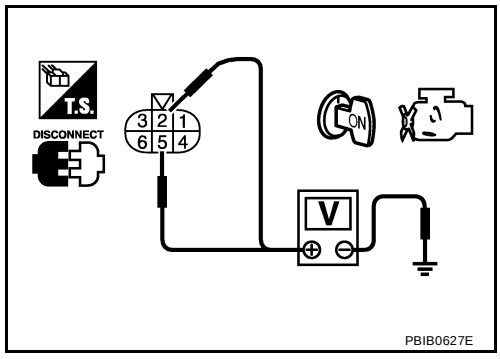


4. Check voltage between IACV-AAC valve terminals 2, 5 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

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



3. DETECT MALFUNCTIONING PART

Check the following.

- Fuse and fusible link box connector E22
- 15A fuse
- Harness connectors E9, F47
- Harness for open or short between fuse and ECM relay
- ECM relay
- Harness for open or short between IACV-AAC valve and ECM relay

>> Repair harness or connectors, or replace fuse or ECM relay.

4. CHECK IACV-AAC VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminals and IACV-AAC valve terminals as follows. Refer to Wiring Diagram.

ECM terminal	IACV-AAC valve terminal
6	1
7	4
15	3
16	6

Continuity should exist.

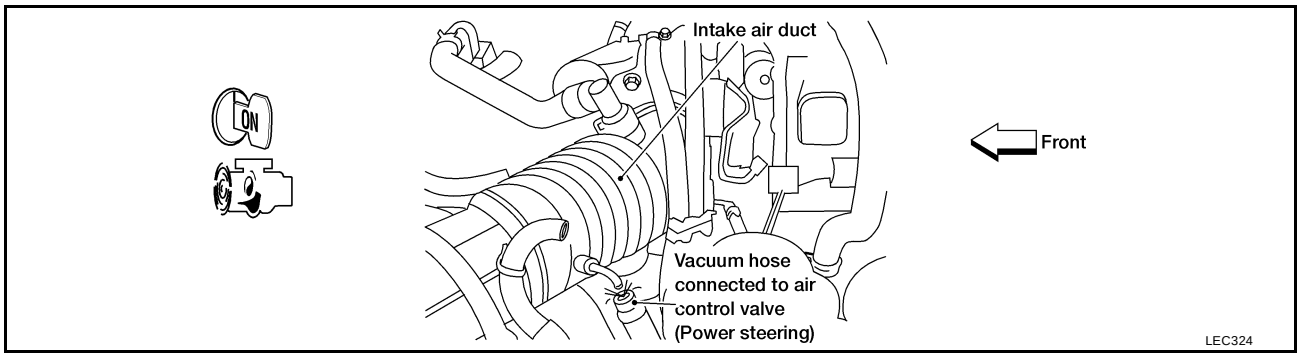
4. Also check harness for short to ground and short to power.

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 AIR CONTROL VALVE (POWER STEERING) OPERATION-I

1. Reconnect ECM harness connector and IACV-AAC valve harness connector.
2. Disconnect vacuum hose connected to air control valve (Power steering) at intake air duct.
3. Start engine and let it idle.
4. Check vacuum hose for vacuum existence.



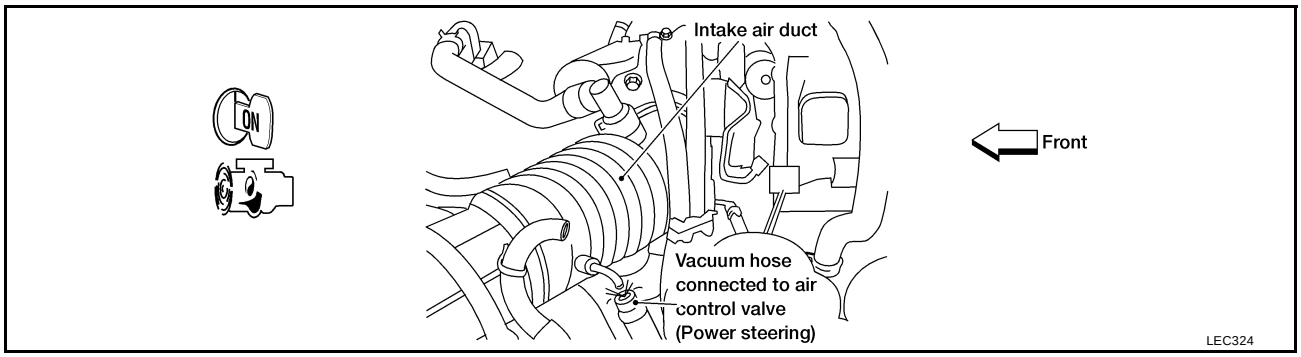
Vacuum slightly exists or does not exist.

OK or NG

OK >> GO TO 6.
NG >> Replace air control valve (Power steering).

6. CHECK AIR CONTROL VALVE (POWER STEERING) OPERATION-II

Check vacuum hose for vacuum existence when steering wheel is turned.



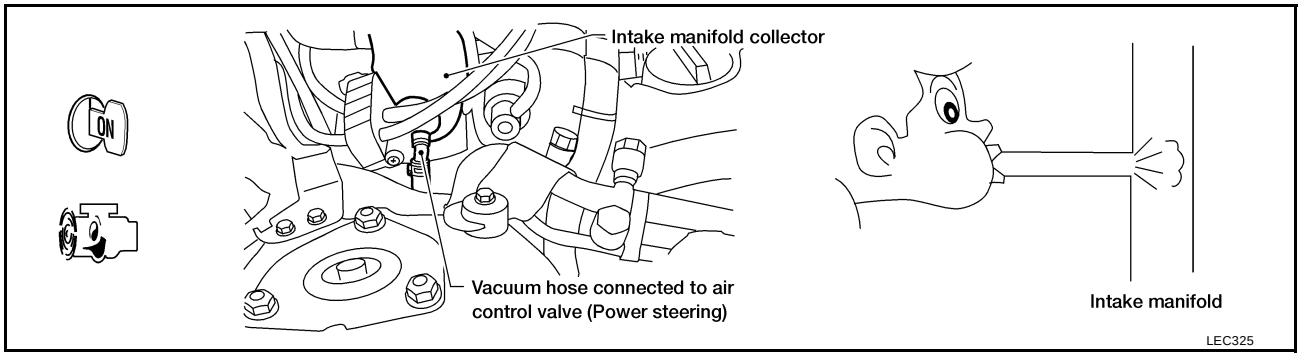
Vacuum should exist.

OK or NG

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

7. CHECK VACUUM PORT

1. Stop engine.
2. Disconnect vacuum hose connected to air control valve (Power steering) at the vacuum port.
3. Blow air into vacuum port.
4. Check that air flows freely.



OK or NG

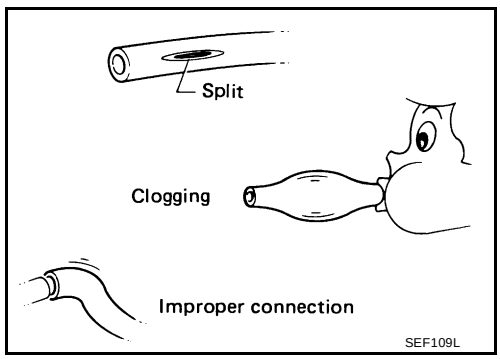
OK >> GO TO 8.
NG >> Repair or clean vacuum port.

8. CHECK VACUUM HOSES AND TUBES

1. Disconnect vacuum hoses between air control valve (Power steering) and vacuum port, air control valve (Power steering) and intake air duct.
2. Check the hoses and tubes for cracks, clogging, improper connection or disconnection.

OK or NG

OK >> GO TO 9.
NG >> Repair hoses or tubes.



9. CHECK IACV-AAC VALVE

Refer to EC-426, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> GO TO 10.

10. REPLACE IACV-AAC VALVE

1. Replace IACV-AAC valve assembly.
2. Perform EC-56, "Idle Air Volume Learning" .

Is the result CMPLT or INCMP?

CMPLT or INCMP

CMPLT >> **INSPECTION END**
INCMP >> Follow the construction of “Idle Air Volume Learning”.

11. CHECK TARGET IDLE SPEED

1. Turn ignition switch “OFF”.
2. Reconnect all harness connectors and vacuum hoses.
3. Start engine and warm it up to normal operating temperature.
4. Also warm up transmission to normal operating temperature.

- For A/T models with CONSULT-II, drive vehicle until “FLUID TEMP SE”, in “DATA MONITOR” mode of “A/T” system indicates less than 0.9V.
- For A/T models without CONSULT-II and M/T models, drive vehicle for 10 minutes.

5. Stop vehicle with engine running.
6. Check target idle speed.

M/T = 650 ± 50 rpm

A/T = 800 ± 50 rpm (in “P” or “N” position)

OK or NG

OK >> GO TO 12.
NG >> Perform EC-56, "Idle Air Volume Learning" .

12. CHECK INTERMITTENT INCIDENT

Refer to EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

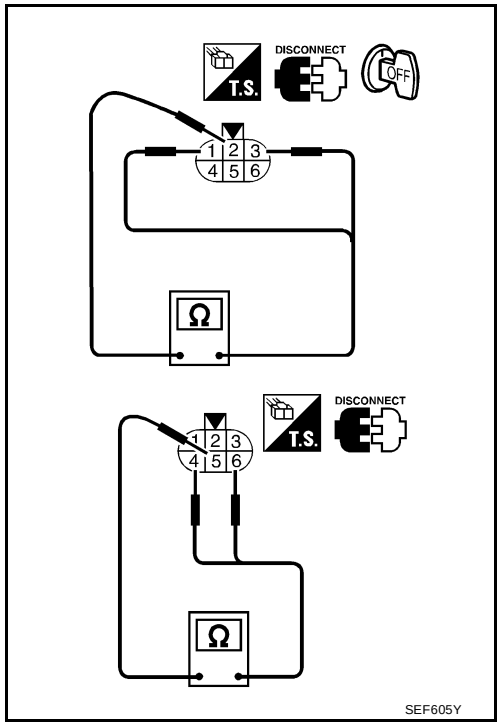
UBS001KT

IACV-AAC VALVE

1. Disconnect IACV-AAC valve harness connector.

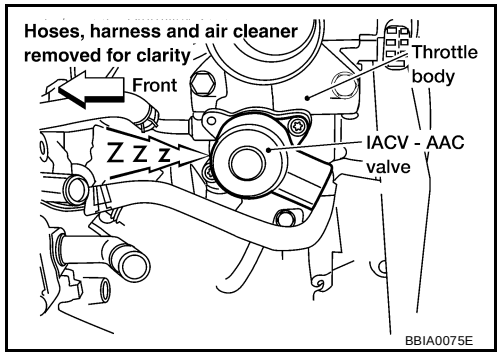
2. Check IACV-AAC valve resistance.

Condition	Resistance
Terminal 2 and terminals 1, 3	20 - 24Ω [at 20°C (68°F)]
Terminal 5 and terminals 4, 6	



3. Reconnect IACV-AAC valve harness connector and ECM harness connector.

4. Turn ignition switch “ON” and “OFF”, and ensure the IACV-AAC valve makes operating sound according to the ignition switch position.
If NG, replace the IACV-AAC valve.



Removal and Installation

UBS001KU

IACV-AAC VALVE

Refer to EM-15, "OUTER COMPONENT PARTS" .

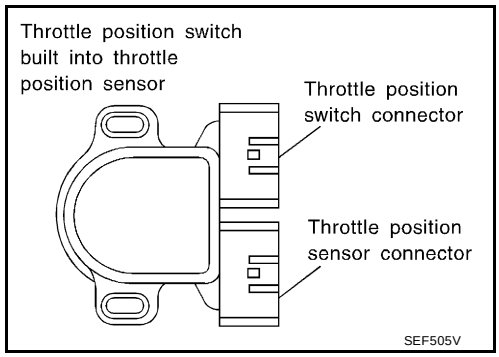
DTC P0510 CTP SWITCH

PFP:22620

Component Description

UBS001KV

A closed throttle position switch and wide open throttle position switch are built into the throttle position sensor unit. The wide open throttle position switch is used only for A/T control.
When the throttle valve is in the closed position, the closed throttle position switch sends a voltage signal to the ECM. The ECM only uses this signal to open or close the EVAP canister purge control valve when the throttle position sensor is malfunctioning.



CONSULT-II Reference Value in Data Monitor Mode

UBS001KW

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
CLSD THL/P SW	● Engine: After warming up, idle the engine	Throttle valve: Idle position	ON
		Throttle valve: Slightly open	OFF

On Board Diagnosis Logic

UBS001KX

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0510	● Battery voltage from the closed throttle position switch is sent to ECM with the throttle valve opened.	● Harness or connectors (The closed throttle position switch circuit is shorted.) ● Closed throttle position switch ● Throttle position sensor

DTC Confirmation Procedure

UBS001KY

CAUTION:
Always drive vehicle at a safe speed.

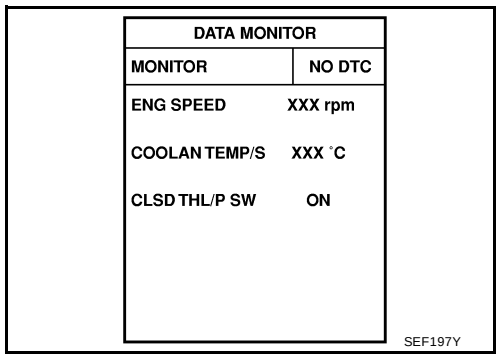
NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF”, wait at least 10 seconds and then start engine.
3. Select “CLSD THL/P SW” in “DATA MONITOR” mode with CONSULT-II.
4. Check the signal under the following conditions.

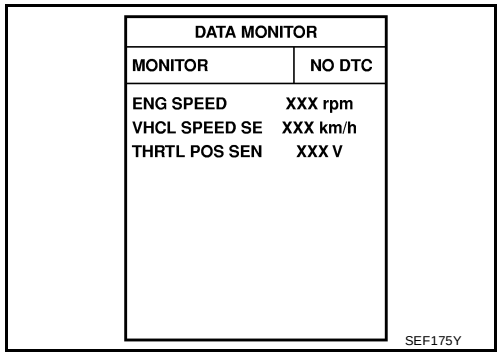
Condition	Signal indication
Throttle valve: Idle position	ON
Throttle valve: Slightly open	OFF

If the result is NG, go to EC-431, "Diagnostic Procedure" .
If OK, go to following step.



5. Select “DATA MONITOR” mode with CONSULT-II.
6. Drive the vehicle for at least 5 consecutive seconds under the following condition.

THRTL POS SEN	More than 2.3V
VHCL SPEED SE	More than 4 km/h (2 MPH)
Selector lever	Suitable position
Driving location	Driving vehicle uphill (Increased engine load) will help maintain the driving conditions required for this test.



7. If 1st trip DTC is detected, go to EC-431, "Diagnostic Procedure" .

Overall Function Check

UBS001KZ

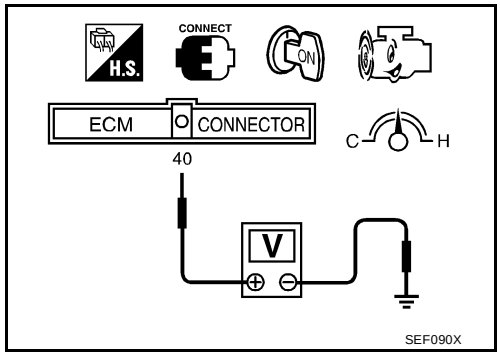
Use this procedure to check the overall function of the closed throttle position switch circuit. During this check, a 1st trip DTC might not be confirmed.

WITHOUT CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Check the voltage between ECM terminal 40 (Closed throttle position switch signal) and ground under the following conditions.

Condition	Voltage
At idle	Battery voltage
At 2,000 rpm	Approximately 0V

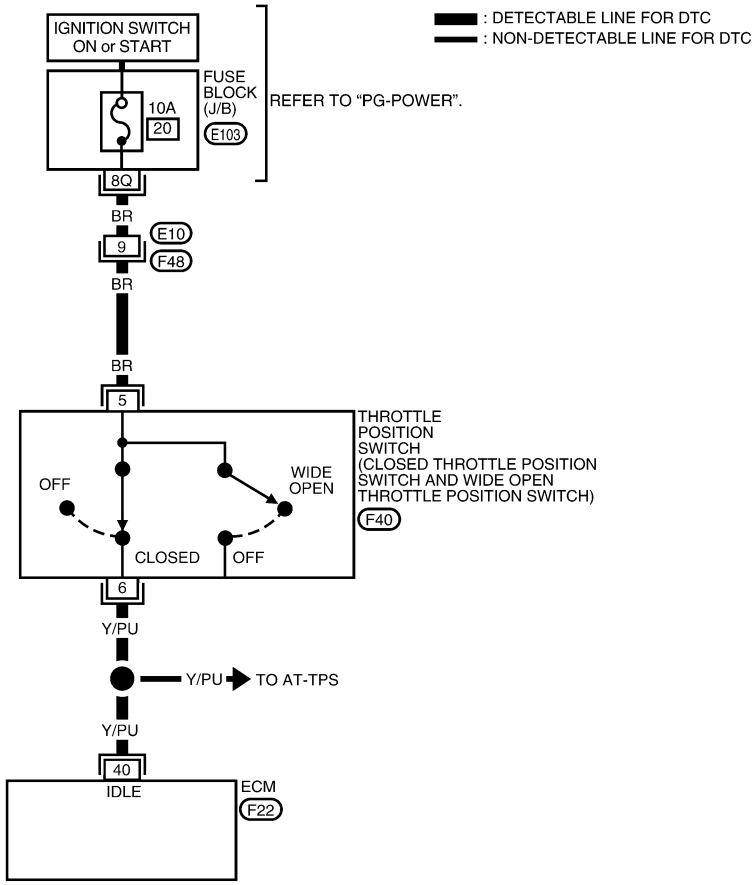
3. If NG, go to EC-431, "Diagnostic Procedure" .

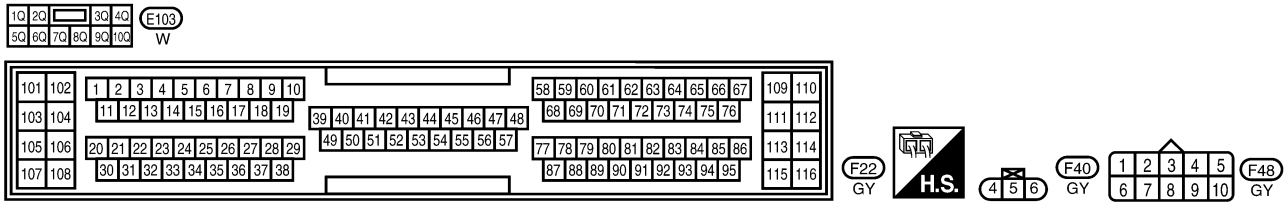


Wiring Diagram

UBS001L0

EC-TP/SW-01





BBWA0131E

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
40	Y/PU	THROTTLE POSITION SWITCH (CLOSED POSITION)	ENGINE RUNNING WITH ACCELERATOR PEDAL FULLY RELEASED UNDER WARM-UP CONDITION	BATTERY VOLTAGE
			IGN ON WITH ACCELERATOR PEDAL DEPRESSED	APPROX. 0V

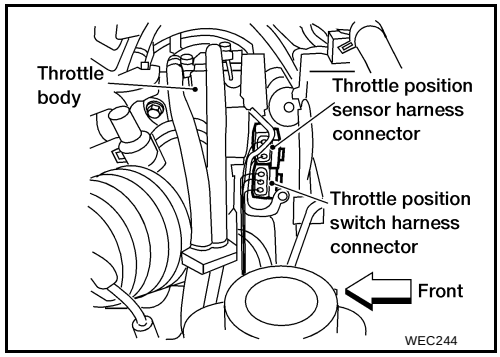
SEF582Y

Diagnostic Procedure

UBS001L1

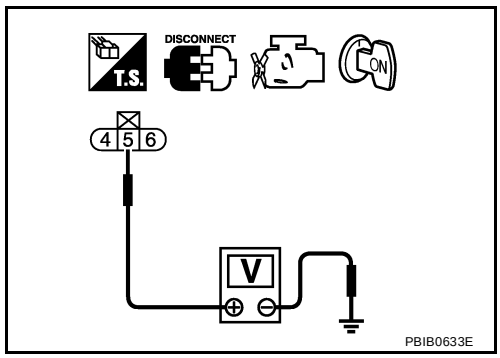
1. CHECK CLOSED THROTTLE POSITION SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect throttle position switch harness connector.
3. Turn ignition switch “ON”.



4. Check voltage between throttle position switch terminal 5 and engine ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

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

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E10, F48
- Fuse block (J/B) connector E103
- 10A fuse
- Harness for open or short between throttle position switch and fuse

>> Repair harness or connectors.

3. CHECK CLOSED THROTTLE POSITION SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 40 and throttle position switch terminal 6. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

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

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between ECM and throttle position switch
- Harness for open or short between TCM (Transmission control module) and throttle position sensor

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

5. CHECK IGNITION TIMING AND ENGINE IDLE SPEED

Check the following items. Refer to EC-87, "Basic Inspection" .

Items	Specifications
Ignition timing	9°±5° BTDC
Idle speed	M/T: 650±50 rpm A/T: 800±50rpm (in “P” or “N” position)

>> GO TO 6.

6. CHECK CLOSED THROTTLE POSITION SWITCH

Refer to EC-433, "Component Inspection" .

OK or NG

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

7. ADJUST THROTTLE POSITION SWITCH

Check the following items. Refer to EC-87, "Basic Inspection" .

Items	Specifications
Ignition timing	9°±5° BTDC
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.05 mm (0.0020 in): ON 0.15 mm (0.0059 in): OFF
Target idle speed	M/T: 650±50 rpm A/T: 800±50rpm (in “P” or “N” position)

Is it possible to adjust closed throttle position switch?

Yes or No

Yes >> GO TO 8.
No >> Replace throttle position switch.

8. CHECK THROTTLE POSITION SENSOR

Refer to EC-199, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace throttle position sensor.

9. CHECK INTERMITTENT INCIDENT

Refer to EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

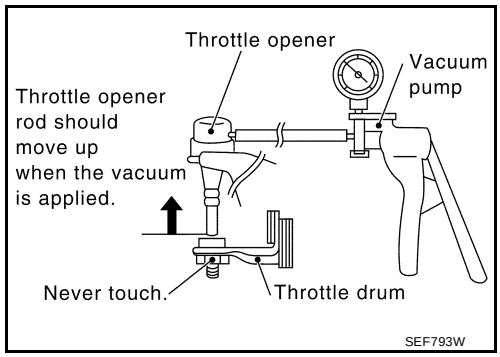
Component Inspection

UBS001L2

CLOSED THROTTLE POSITION SWITCH

With CONSULT-II

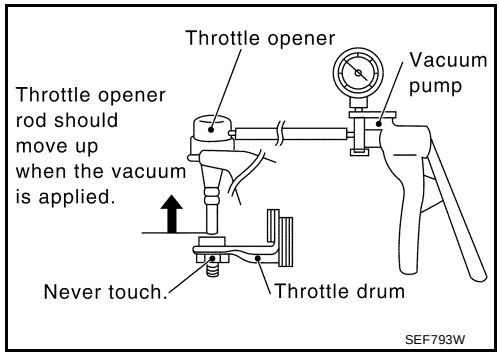
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF”.
3. Remove vacuum hose connected to throttle opener.
4. Connect suitable vacuum hose to vacuum pump and throttle opener.
5. Apply vacuum [more than -40.0 kPa (-300 mmHg, -11.81 inHg)] until the throttle drum becomes free from the rod of the throttle opener.
6. Turn ignition switch “ON”.
7. Select "DATA MONITOR" mode with CONSULT-II.
8. Check indication of “CLSD THL/P SW” under the following conditions. Measurement must be made with closed throttle position switch installed in vehicle.



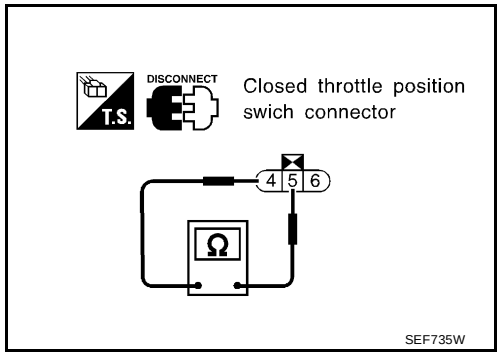
Throttle valve conditions	CLSD THL/P SW
Completely closed	ON
Partially open or completely open	OFF

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF”.
3. Remove vacuum hose connected to throttle opener.
4. Connect suitable vacuum hose to vacuum pump and throttle opener.
5. Apply vacuum [more than -40.0 kPa (-300 mmHg, -11.81 inHg)] until the throttle drum becomes free from the rod of the throttle opener.
6. Disconnect closed throttle position switch harness connector.



7. Check continuity between closed throttle position switch terminals 6 and 5 under the following conditions.
   Resistance measurement must be made with closed throttle position switch installed in vehicle.



Throttle valve conditions	Continuity
Completely closed	Yes
Partially open or completely open	No

Removal and Installation

UBS001L3

THROTTLE POSITION SENSOR

Refer to EM-15, "OUTER COMPONENT PARTS" .

DTC P0600 A/T COMMUNICATION LINE

PFP:23710

System Description

UBS001L4

These circuit lines are used to control the smooth shifting up and down of A/T during the hard acceleration/ deceleration. Voltage signals are exchanged between ECM and TCM (Transmission control module).

On Board Diagnosis Logic

UBS001L5

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0600*	● ECM receives incorrect voltage from TCM (Transmission control module) continuously.	● Harness or connectors [The circuit between ECM and TCM (Transmission control module) is open or shorted.]

*: This DTC can be detected only by “DATA MONITOR (AUTO TRIG)” with CONSULT-II.

DTC Confirmation Procedure

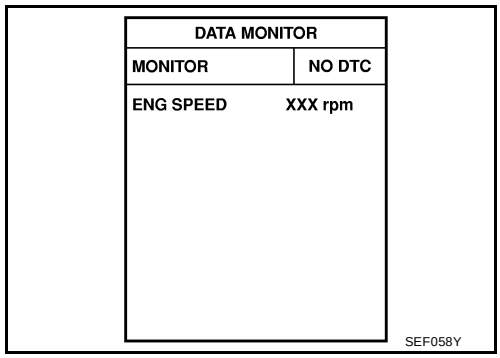
UBS001L6

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

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10.5V at ignition switch “ON”.

With CONSULT-II

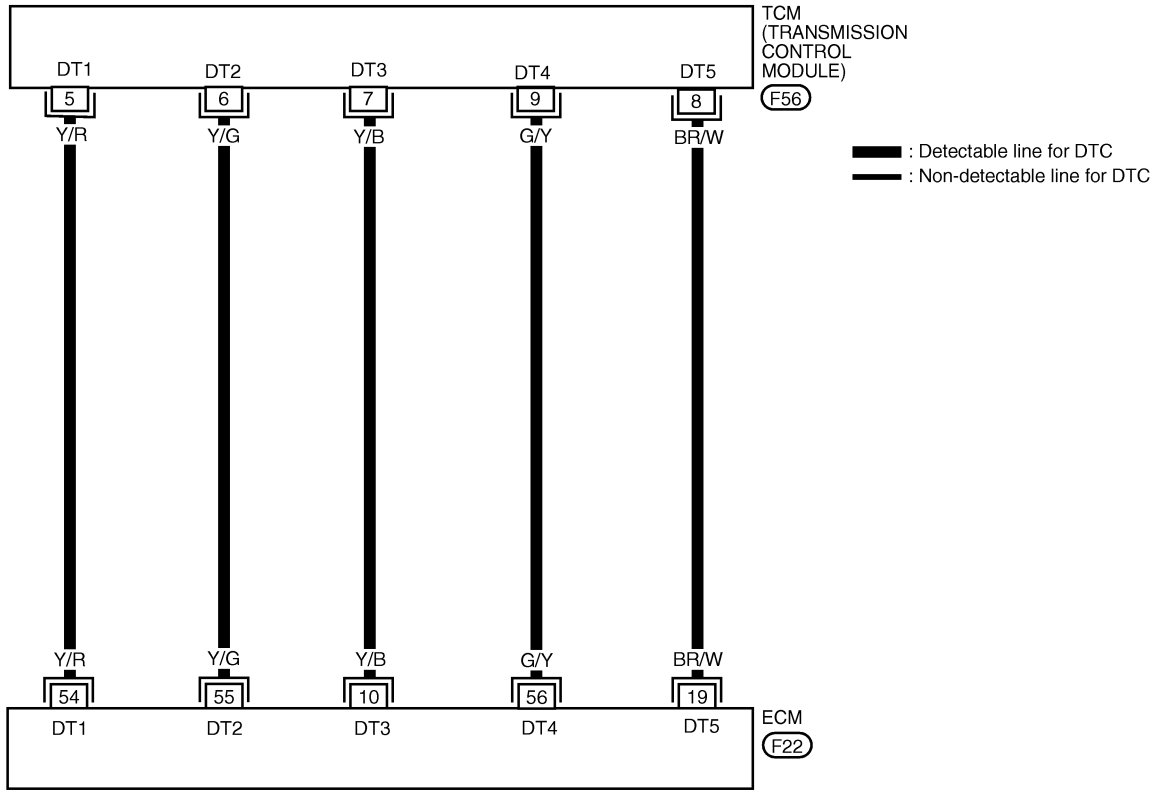
1. Turn ignition switch “ON”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 10 seconds.
4. If DTC is detected, go to EC-437, "Diagnostic Procedure" .

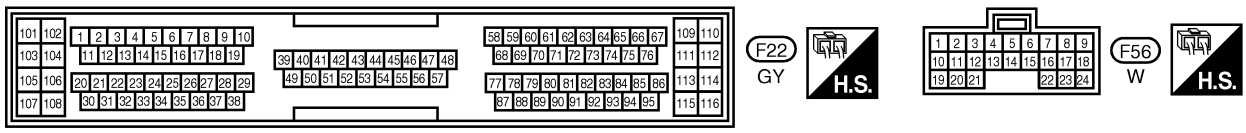


Wiring Diagram

UBS001L7

EC-AT/C-01





LEC376

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
10	Y/B	A/T SIGNAL NO. 3	ENGINE RUNNING AT IDLE SPEED	APPROX. 0 - 1.0V
19	BR/W	A/T SIGNAL NO. 5	ENGINE RUNNING AT IDLE SPEED	APPROX. 8V
54	Y/R	A/T SIGNAL NO. 1	ENGINE RUNNING AT IDLE SPEED	APPROX. 0 - 1.0V
55	Y/G	A/T SIGNAL NO. 2	ENGINE RUNNING AT IDLE SPEED	APPROX. 0 - 1.0V
56	G/Y	A/T SIGNAL NO. 4	ENGINE RUNNING AT IDLE SPEED	APPROX. 0 - 1.0V

SEF583Y

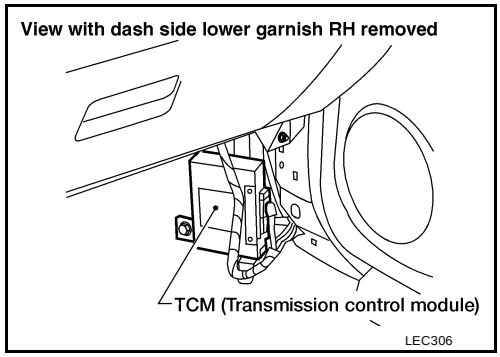
Diagnostic Procedure

UBS001L8

1. CHECK INPUT SIGNAL CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector and TCM (Transmission control module) harness connector.
3. Check harness continuity between ECM terminal 10 and TCM terminal 7, ECM terminal 19 and TCM terminal 8, ECM terminal 54 and terminal 5, ECM terminal 55 and TCM terminal 6, ECM terminal 56 and TCM terminal 9.
   Refer to Wiring Diagram.

   Continuity should exist.



OK or NG

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

2. CHECK INPUT SIGNAL CIRCUIT

1. Check harness continuity between ECM terminal 10 and ground, ECM terminal 19 and ground, ECM terminal 54 and ground, ECM terminal 55 and ground, ECM terminal 56 and ground.
   Refer to Wiring Diagram.

   Continuity should not exist.

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

OK or NG

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

3. CHECK INTERMITTENT INCIDENT

Refer to EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

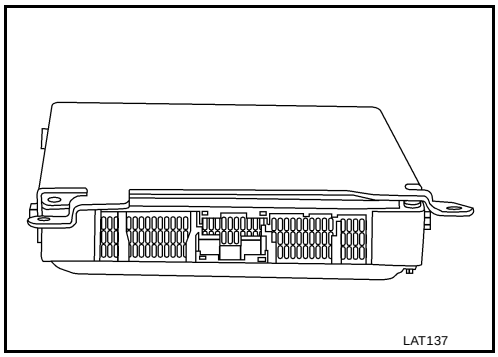
DTC P0605 ECM

PFP:23710

Component Description

UBS001L9

The ECM consists of a microcomputer and connector for signal input and output and for power supply. The ECM controls the engine.



On Board Diagnosis Logic

UBS001LA

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0605	● ECM calculation function is malfunctioning.	● ECM

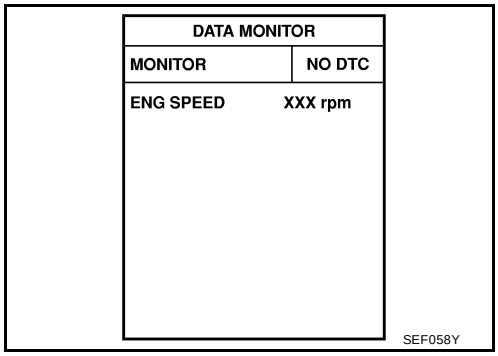
DTC Confirmation Procedure

UBS001LB

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

WITH CONSULT-II

1. Turn ignition switch “ON”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine.
4. Run engine for at least 30 seconds at idle speed.
5. If 1st trip DTC is detected, go to EC-439, "Diagnostic Procedure" .



WITH GST

Follow the procedure “With CONSULT-II” above.

Diagnostic Procedure

UBS001LC

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-438 .
5. Is the 1st trip DTC P0605 displayed again?

With GST

1. Turn ignition switch “ON”.
2. Select MODE 4 with GST.
3. Touch “ERASE”.
4. Perform “DTC Confirmation Procedure”.
   See EC-438 .
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 EC-56, "Idle Air Volume Learning" ,

Which is the result CMPLT or INCMP?

CMPLT or INCMP

CMPLT >> **INSPECTION END**
INCMP >> Follow the instruction of “Idle Air Volume Learning”.

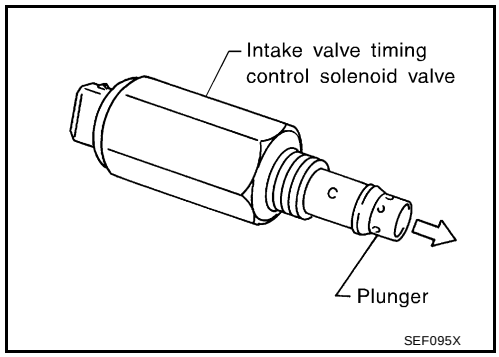
DTC P1111 IVT CONTROL SOLENOID VALVE

PFP:23796

Component Description

UBS001LD

The valve timing control system is utilized to control intake valve opening and closing timing. Engine coolant temperature signals, engine speed and throttle position are used to determine intake valve timing.
The intake camshaft sprocket position is regulated by oil pressure controlled by the intake valve timing control.
When ECM sends ON signal to intake valve timing control solenoid valve, oil pressure is transmitted to camshaft sprocket. Then, intake side camshaft is advanced.



Operation

UBS001LE

Engine operating condition				Intake valve timing control solenoid valve	Intake valve opening and closing time	Valve overlap
Engine coolant temperature	Engine speed	B/FUEL SCHDL	Neutral switch			
15°C (59°F) - 55°C (131°F)	1,100 - 4,200 rpm	Above 0 msec	OFF	ON	Advance	Increased
Above 70°C (158°F)		Above 6 msec				
Conditions other than those above				OFF	Normal	Normal

CONSULT-II Reference Value in Data Monitor Mode

UBS001LF

MONITOR ITEM	CONDITION		SPECIFICATION
INT/V TIM SOL	● Engine: After warming up	Idle	OFF
		Revving engine with full throttle opening (Under 4,200 rpm)	ON

On Board Diagnosis Logic

UBS001LG

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1111	● An improper voltage signal is entered to ECM through intake valve timing control solenoid valve.	● Harness or connectors (The intake valve timing control solenoid valve circuit is open or shorted.) ● Intake valve timing control solenoid valve

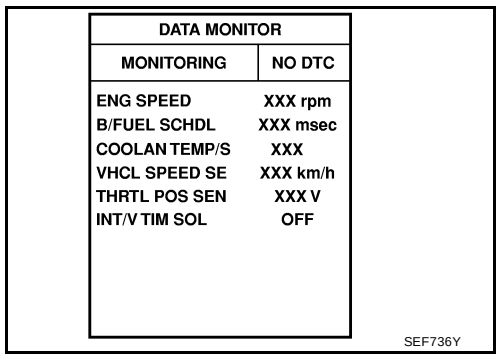
DTC Confirmation Procedure

UBS001LH

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-443, "Diagnostic Procedure"
.



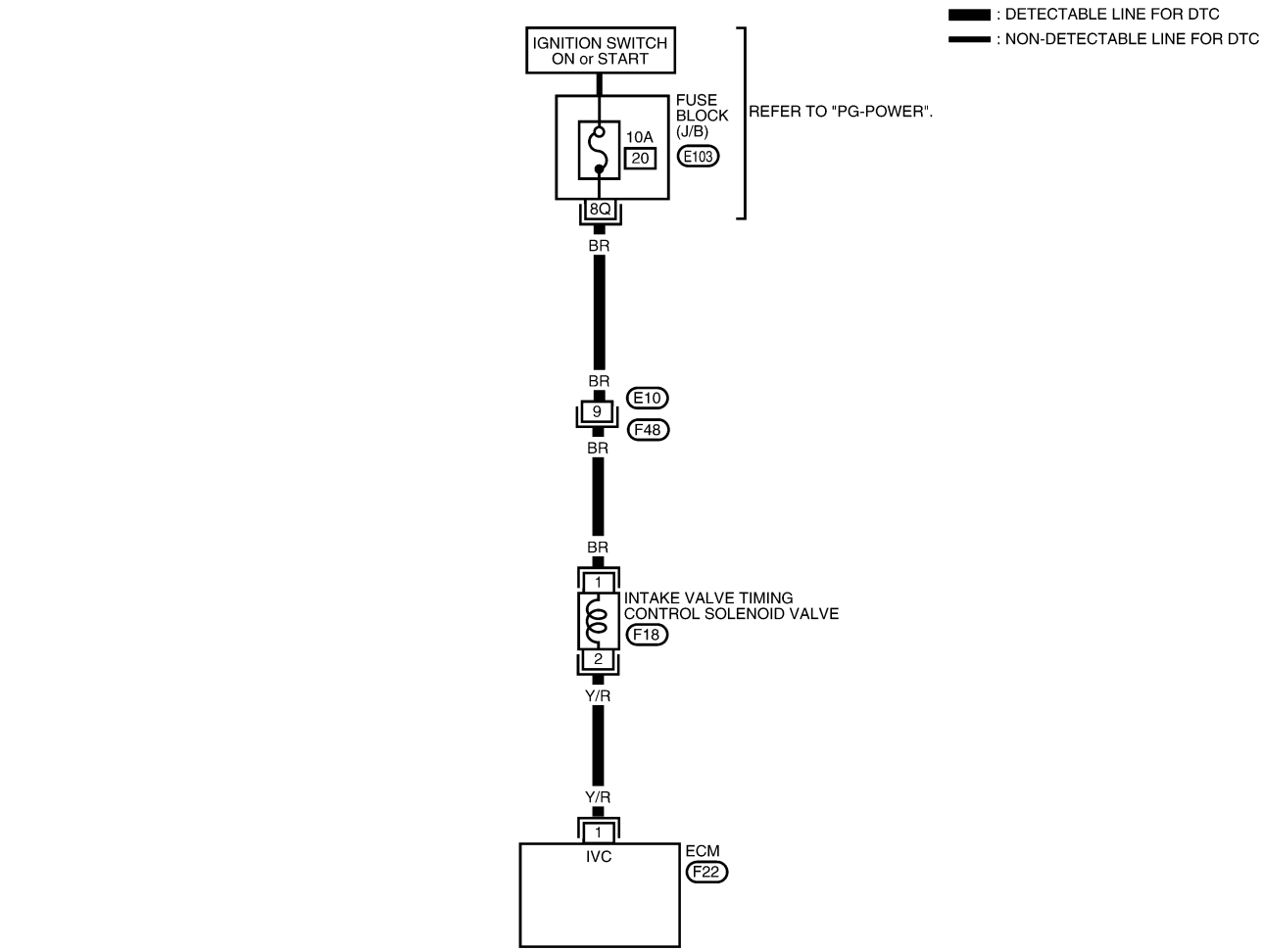
WITH GST

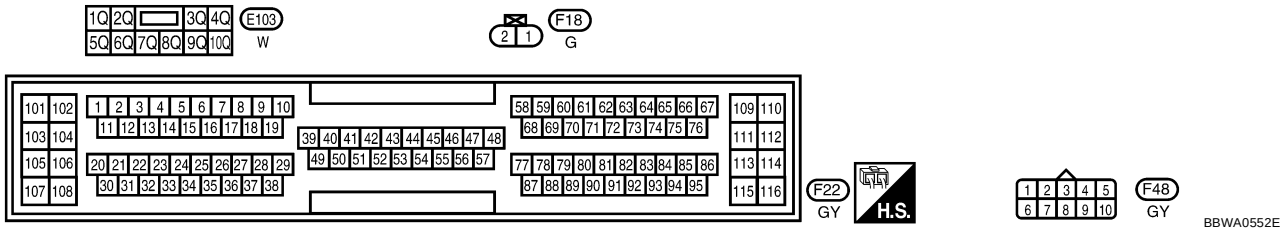
Follow the procedure “With CONSULT-II” above.

Wiring Diagram

UBS001LI

EC-IVC-01





ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
1	Y/R	INTAKE VALVE TIMING CONTROL SOLENOID VALVE	SOLENOID VALVE IS OPERATING AT ENGINE RUNNING UNDER WARM-UP CONDITION	APPROX. 0V
			SOLENOID VALVE IS NOT OPERATING AT ENGINE RUNNING UNDER WARM-UP CONDITION	BATTERY VOLTAGE

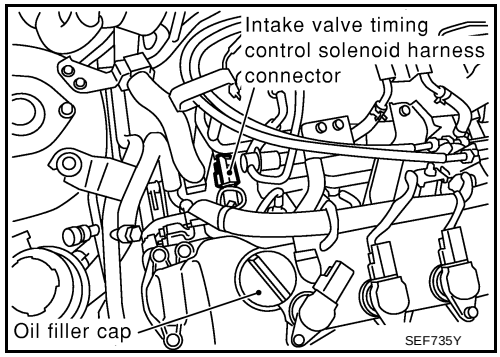
SEF737YA

Diagnostic Procedure

UBS001LJ

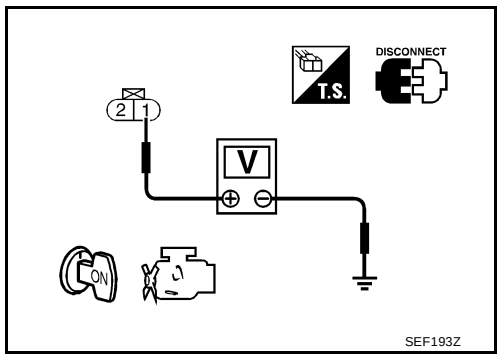
1. CHECK POWER SUPPLY

1. Turn ignition switch “OFF”.
2. Disconnect intake valve timing control solenoid valve harness connector.
3. Turn ignition switch “ON”.



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

Voltage: Battery voltage



OK or NG

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

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connector F48, E10
- Fuse block (J/B) connector E103
- 10A fuse
- Harness for open or short between valve timing control solenoid valve and fuse

>> Repair harness or connectors.

3. CHECK OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 1 and intake valve timing control solenoid valve harness connector 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 to short to power or connectors.

4. CHECK VALVE TIMING CONTROL SOLENOID VALVE

Refer to EC-444, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace valve timing control solenoid valve.

5. CHECK INTERMITTENT INCIDENT

Perform EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

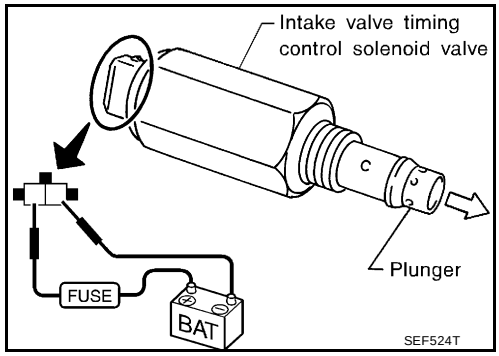
>> **INSPECTION END**

Component Inspection

UBS001LK

INTAKE VALVE TIMING CONTROL SOLENOID VALVE

1. Check oil passage visually for any metal debris.
2. Supply intake valve timing control solenoid valve terminals with battery voltage.
3. Make sure that inside plunger protrudes.
   If NG, replace intake valve timing control solenoid valve.



Removal and Installation

UBS001LL

INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EM-36, "CYLINDER HEAD" .

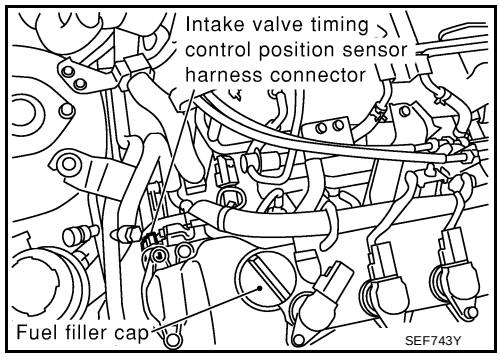
DTC P1140 IVT CONTROL POSITION SENSOR

PFP:23731

Component Description

UBS001LM

The intake valve timing control position sensor is located in front of the cylinder head. This sensor detects a signal (intake valve position) generated by the protrusion of camshaft sprocket and sends it to the ECM. This sensor is not used to control the engine system. It is used only for the on board diagnosis of intake valve timing control.



On Board Diagnosis Logic

UBS001LN

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1140	● The proper pulse signal from the intake valve timing control position sensors is not sent to ECM while the engine is running at the specified engine speed.	● Harness or connectors (The intake valve timing control position sensor circuit is open.) ● Intake valve timing control position sensor ● Accumulation of debris to the signal pick-up portion of the camshaft

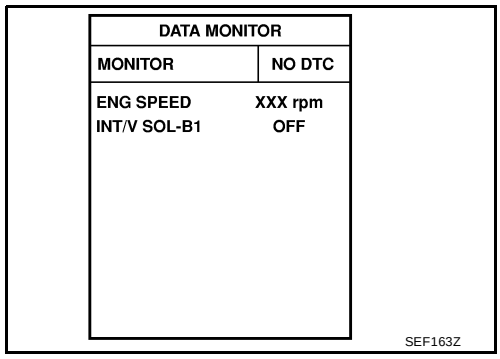
DTC Confirmation Procedure

UBS001LO

NOTE:
If “DIAGNOSTIC TROUBLE CODE 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 keep the engine speed at 2,000 rpm and wait at least 15 seconds.
3. If 1st trip DTC is detected, go to EC-447, "Diagnostic Procedure" .



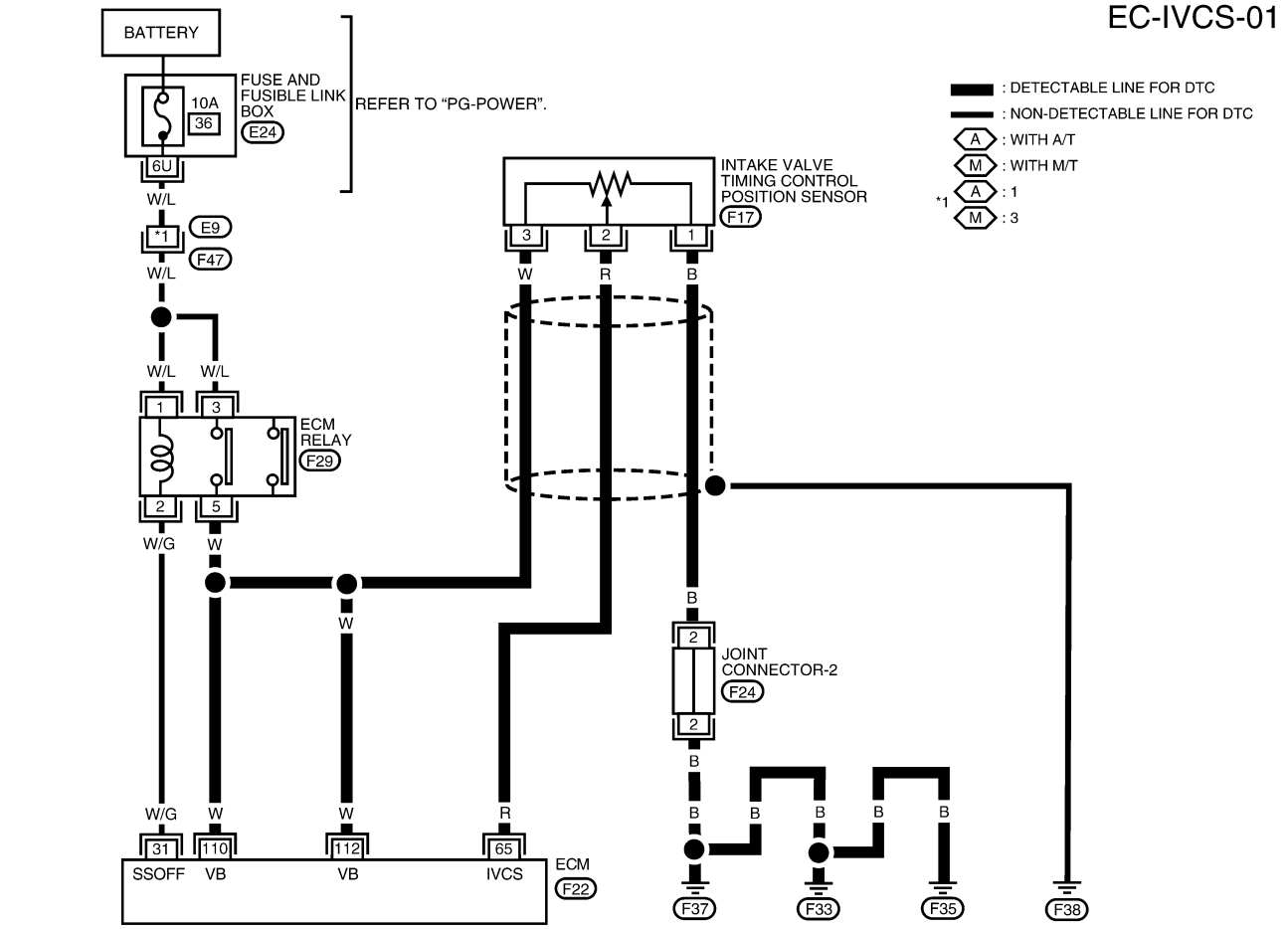
WITH GST

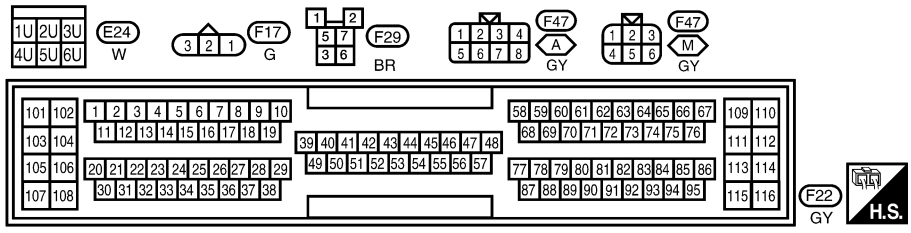
Follow the procedure “With CONSULT-II” above.

Wiring Diagram

UBS001LP

EC-IVCS-01

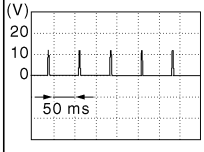
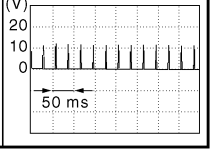




REFER TO THE FOLLOWING.
F24 - JOINT CONNECTOR

BBWA0553E

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
65	R	INTAKE VALVE TIMING CONTROL POSITION SENSOR	ENGINE RUNNING AT IDLE UNDER WARM-UP CONDITION	APPROX. 0V 
			ENGINE RUNNING AT 2,000 RPM UNDER WARM-UP CONDITION	APPROX. 0V 

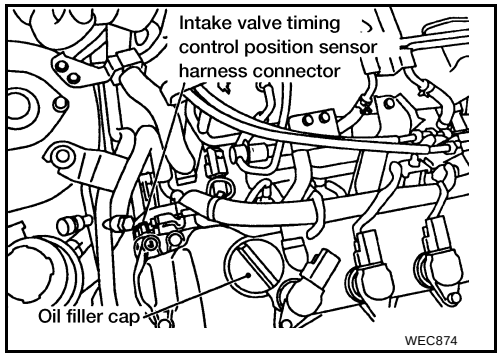
SEF744YB

Diagnostic Procedure

UBS001LQ

1. CHECK POWER SUPPLY

1. Turn ignition switch “OFF”.
2. Disconnect intake valve timing control position sensor harness connector.
3. Turn ignition switch “ON”.

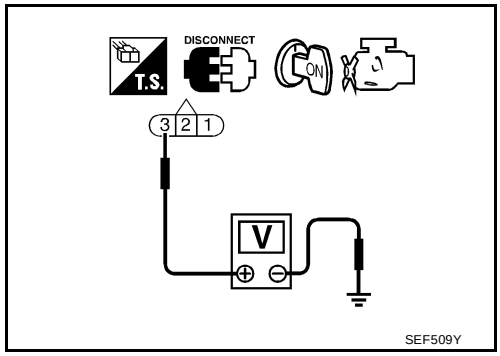


4. Check voltage between terminal 3 and engine ground.

Voltage: Battery voltage

OK or NG

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



2. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between the intake valve timing control position sensor and ECM relay
- Harness for open or short between the intake valve timing control position sensor and ECM

>> Repair harness or connectors.

3. CHECK INPUT SIGNAL CIRCUIT

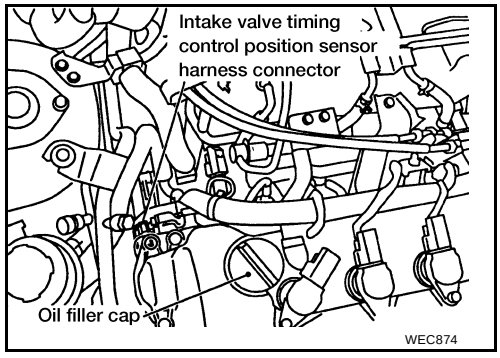
1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Disconnect intake valve timing control position sensor harness connector.
4. Check harness continuity between ECM terminal 65 and terminal 2.
   Refer to Wiring Diagram.

Continuity should exist.

If OK, check harness for short to ground and short to power.

OK or NG

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



4. CHECK GROUND CIRCUIT

1. Loosen and retighten engine ground screws.
2. Check harness continuity between intake valve timing position sensor terminal 1 and engine ground. Refer to wiring diagram.

Continuity should exist.

If OK, check harness for short to power.

OK or NG

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

5. DETECT MALFUNCTIONING PART

Check the following.

- Joint connector-2
- Harness for open or short between the intake valve timing control position sensor and ground

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

6. CHECK INTAKE VALVE TIMING POSITION SENSOR

Refer to EC-159, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace intake valve timing position sensor.

7. CHECK CAMSHAFT

Check accumulation of debris to the signal pick-up portion of the camshaft. Refer to EM-24, "TIMING CHAIN" .

OK or NG

OK >> 1. Replace intake valve timing control position sensor.
2. GO TO 8.
NG >> Remove debris and clean the signal pick-up cutout of camshaft.

8. CHECK INTERMITTENT INCIDENT

Perform EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

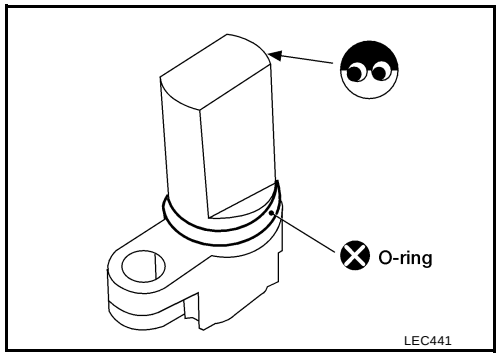
>> **INSPECTION END**

Component Inspection

UBS001LR

INTAKE VALVE TIMING CONTROL POSITION SENSOR

1. Disconnect intake valve timing control position sensor harness connector.
2. Loosen fixing bolt of the sensor.
3. Visually check the sensor for chipping.

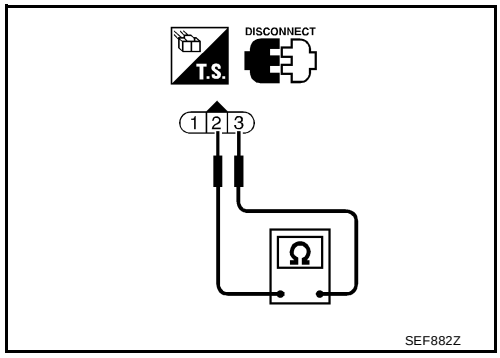


4. Check resistance between terminals 2 and 3.

Resistance;

600 - 740Ω [at 20°C (68°F)]

If NG, replace intake valve timing control position sensor.



Removal and Installation

UBS001LS

INTAKE VALVE TIMING CONTROL POSITION SENSOR

Refer to EM-15, "Removal and Installation" .

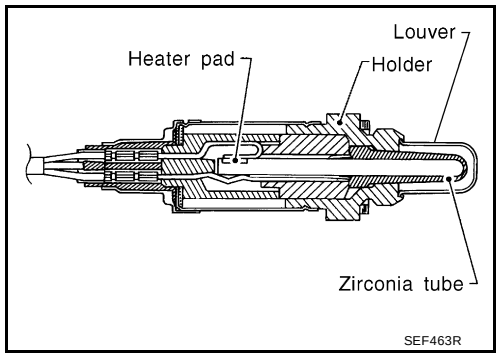
DTC P1143, P1163 HO2S1

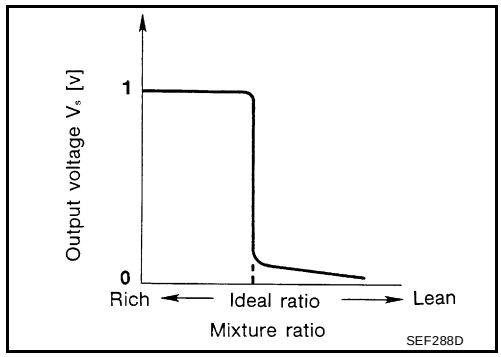
PFP:22690

Component Description

UBS001LT

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





CONSULT-II Reference Value in Data Monitor Mode

UBS001LU

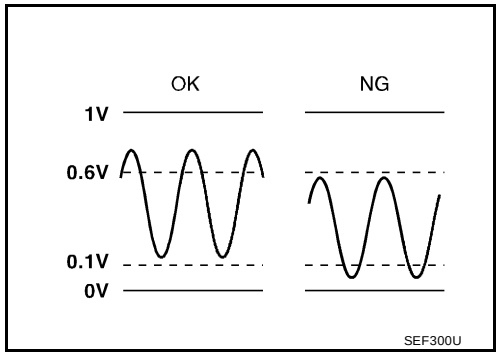
Specification data are reference values.

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

On Board Diagnosis Logic

UBS001LV

To judge the malfunction, the output from the heated oxygen sensor 1 is monitored to determine whether the “rich” output is sufficiently high and whether the “lean” output is sufficiently low. When both the outputs are shifting to the lean side, the malfunction will be detected.



DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1143 (Bank 1) P1163 (Bank 2)	● The maximum and minimum voltages from the sensor are not reached to the specified voltages.	● Heated oxygen sensor 1 ● Heated oxygen sensor 1 heater ● Fuel pressure ● Injectors ● Intake air leaks

DTC Confirmation Procedure

UBS001LW

CAUTION:
Always drive vehicle at a safe speed.

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

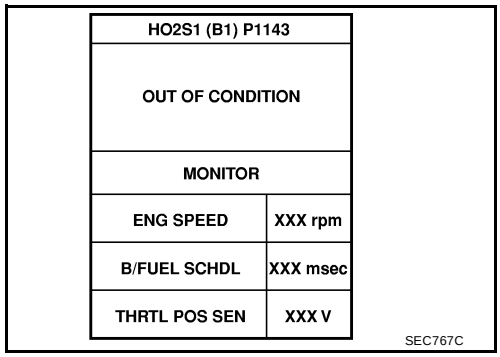
TESTING CONDITION:

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

WITH CONSULT-II

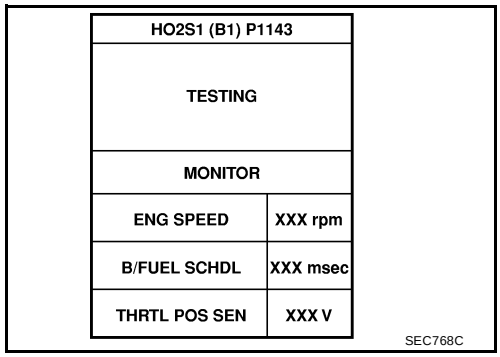
1. Start engine and warm it up to normal operating temperature.
2. Stop engine and wait at least 5 seconds.
3. Turn ignition switch "ON" and select "HO2S1 (B1)/(B2) P1143 (P1163)" of "HO2S1 (B1)/(B2)" in "DTC WORK SUPPORT" mode with CONSULT-II.
4. Touch "START".
5. Start engine and let it idle for at least 3.5 minutes.

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



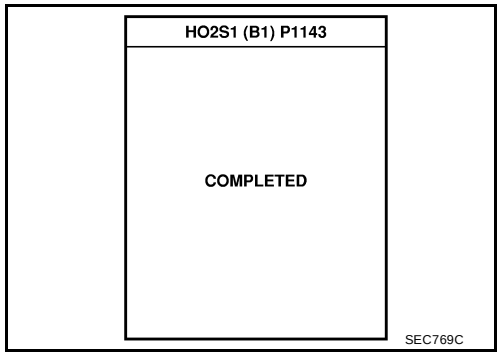
6. When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take approximately 20 seconds or more.)

ENG SPEED	1,350 - 2,700 rpm (A/T) 1,450 - 3,200 rpm (M/T)
Vehicle speed	Less than 100 km/h (62 MPH)
B/FUEL SCHDL	2.6 - 12.5 msec (A/T) 2.4 - 10.0 msec (M/T)
Selector lever	Suitable position



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

7. Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to EC-452, "Diagnostic Procedure" .



Overall Function Check

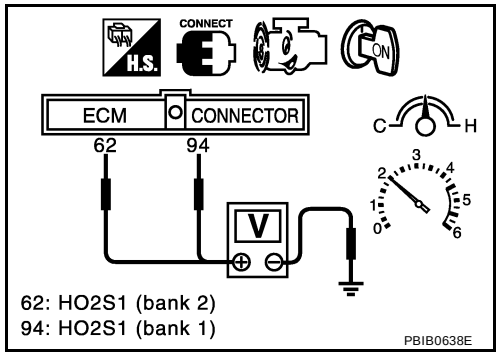
UBS001LX

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

WITH GST

1. Start engine and warm it up to normal operating temperature.

2. Set voltmeter probes between ECM terminal 62 (HO2S1 bank 2) or 94 (HO2S1 bank 1) and engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.
- The maximum voltage is over 0.6V at at least one time.
- The minimum voltage is over 0.1V at least one time.
4. If NG, go to EC-452, "Diagnostic Procedure" .



Diagnostic Procedure

UBS001LY

1. RETIGHTEN HEATED OXYGEN SENSOR 1

1. Turn ignition switch “OFF”.
2. Loosen and retighten the corresponding heated oxygen sensor 1.

Tightening torque:

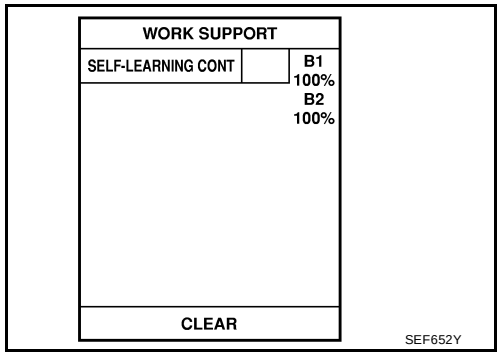
40 - 60 N-m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)

>> GO TO 2.

2. CLEAR THE SELF-LEARNING DATA.

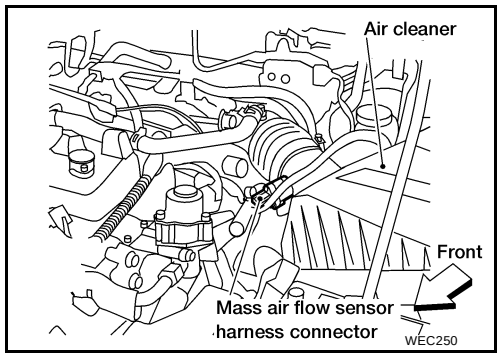
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 (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 3 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC P0102 is displayed.
6. Erase the 1st trip DTC memory. Refer to EC-73, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 (P0174) detected? Is it difficult to start engine?



Yes or No

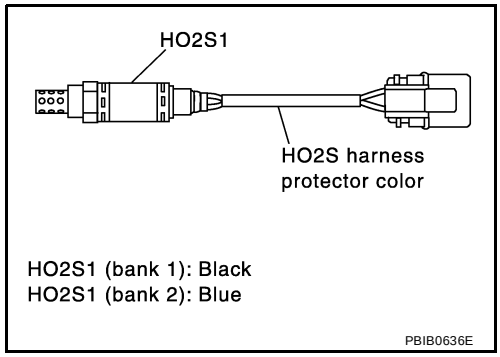
Yes >> Perform trouble diagnosis for DTC P0171 (P0174). Refer to EC-252 .
No >> GO TO 3.

3. CHECK HEATED OXYGEN SENSOR 1 HEATER

1. Turn ignition switch “OFF”.
2. Check the HO2S1 harness protector color, and disconnect the corresponding HO2S1 harness connector.
3. Check HO2S1 heater, refer to EC-165, "Component Inspection" .

OK or NG

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



4. CHECK HEATED OXYGEN SENSOR 1

Refer to EC-454, "Component Inspection" .

OK or NG

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

5. CHECK INTERMITTENT INCIDENT

Perform EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .
Refer to EC-210, "Wiring Diagram" , for circuit.

>> **INSPECTION END**

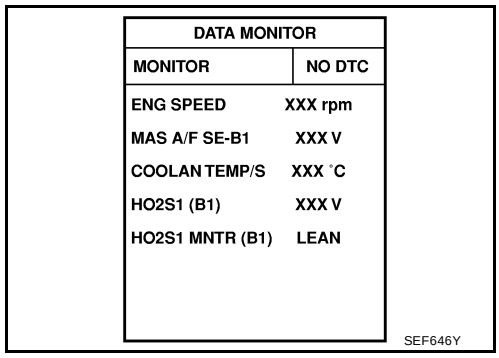
Component Inspection

UBS001LZ

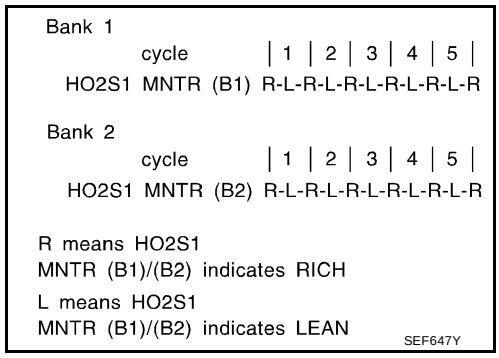
HEATED OXYGEN SENSOR 1

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “MANU TRIG” in “DATA MONITOR” mode, and select “HO2S1 (B1)/(B2)” and “HO2S1 MNTR (B1)/(B2)”.
3. Hold engine speed at 2,000 rpm under no load during the following steps.
4. Touch “RECORD” on CONSULT-II screen.
5. Check the following.

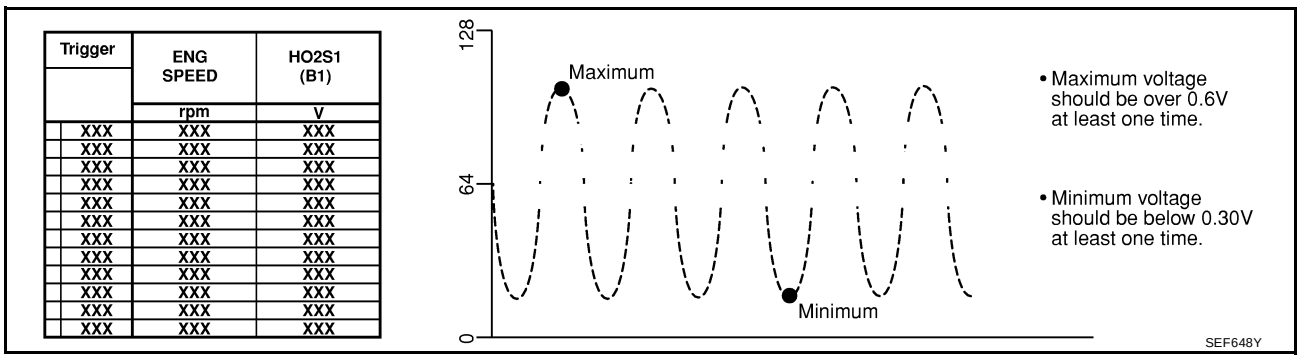


- “HO2S1 MNTR (B1)/(B2)” in “DATA MONITOR” mode changes from “RICH” to “LEAN” to “RICH” 5 times in 10 seconds.
  5 times (cycles) are counted as shown below:
  R = “HO2S1 MNTR (B1)/(B2)”, “RICH”
  L = “HO2S1 MNTR (B1)/(B2)”, “LEAN”
- “HO2S1 (B1)/(B2)” voltage goes above 0.6V at least once.
- “HO2S1 (B1)/(B2)” voltage goes below 0.3V at least once.
- “HO2S1 (B1)/(B2)” voltage never exceeds 1.0V.



CAUTION:

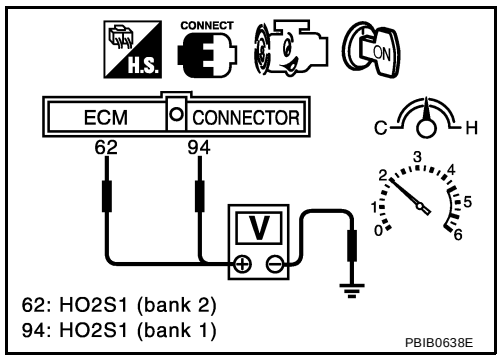
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18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



Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 62 (HO2S1 bank 2) or 94 (HO2S1 bank 1) and engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.

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



CAUTION:

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

Removal and Installation

UBS001M0

HEATED OXYGEN SENSOR 1

Refer to EM-15, "Removal and Installation" .

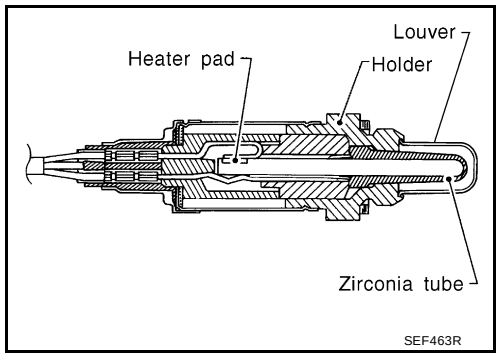
DTC P1144, P1164 HO2S1

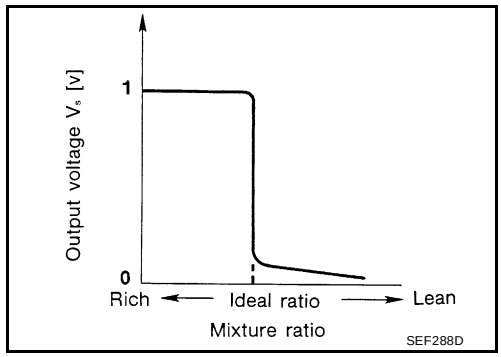
PFP:22690

Component Description

UBS001M1

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





CONSULT-II Reference Value in Data Monitor Mode

UBS001M2

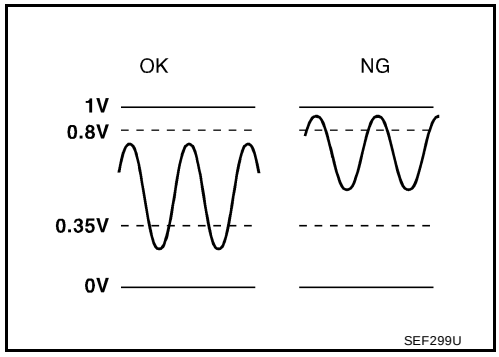
Specification data are reference values.

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

On Board Diagnosis Logic

UBS001M3

To judge the malfunction, the output from the heated oxygen sensor 1 is monitored to determine whether the “rich” output is sufficiently high. The “lean” output is sufficiently low. When both the outputs are shifting to the rich side, the malfunction will be detected.



DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1144 (Bank 1) P1164 (Bank 2)	● The maximum and minimum voltages from the sensor are beyond the specified voltages.	● Heated oxygen sensor 1 ● Heated oxygen sensor 1 heater ● Fuel pressure ● Injectors

DTC Confirmation Procedure

UBS001M4

CAUTION:
Always drive vehicle at a safe speed.

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

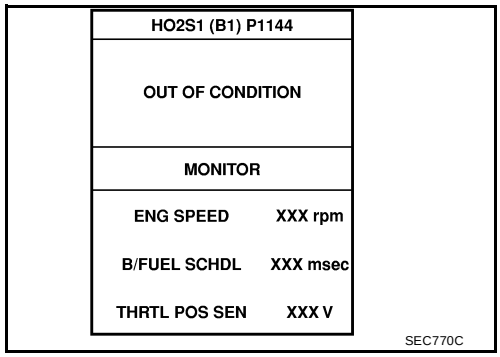
TESTING CONDITION:

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

WITH CONSULT-II

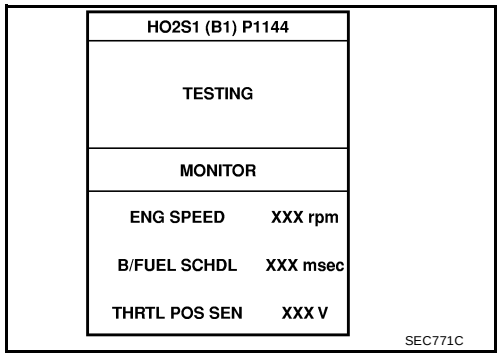
1. Start engine and warm it up to normal operating temperature.
2. Stop engine and wait at least 10 seconds.
3. Turn ignition switch "ON" and select "HO2S1 (B1)/(B2) P1144 (P1164)" of "HO2S1 (B1)/(B2)" in "DTC WORK SUPPORT" mode with CONSULT-II.
4. Touch "START".
5. Start engine and let it idle for at least 3.5 minutes.

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



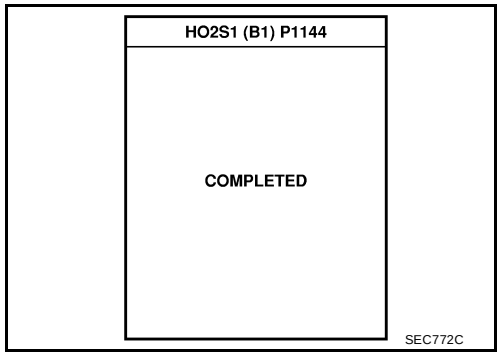
6. When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take approximately 20 seconds or more.)

ENG SPEED	1,350 - 2,700 rpm (A/T) 1,450 - 3,200 rpm (M/T)
Vehicle speed	Less than 100 km/h (62 MPH)
B/FUEL SCHDL	2.6 - 12.5 msec (A/T) 2.4 - 10.0 msec (M/T)
Selector lever	Suitable position



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

7. Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to EC-459, "Diagnostic Procedure" .



Overall Function Check

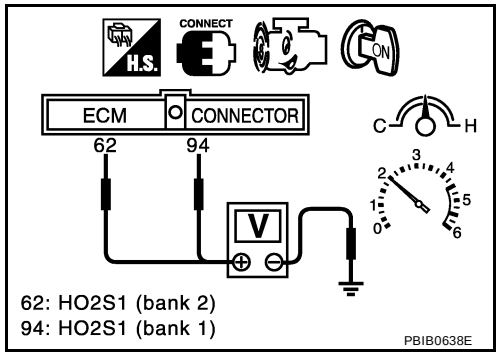
UBS001M5

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

WITH GST

1. Start engine and warm it up to normal operating temperature.

2. Set voltmeter probes between ECM terminal 62 (HO2S1 bank 2) or 94 (HO2S1 bank 1) and engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.
   - The maximum voltage is below 0.8V at least one time.
   - The minimum voltage is below 0.35V at least one time.
4. If NG, go to EC-459, "Diagnostic Procedure" .



Diagnostic Procedure

UBS001M6

1. RETIGHTEN HEATED OXYGEN SENSOR 1

1. Turn ignition switch “OFF”.
2. Loosen and retighten the corresponding heated oxygen sensor 1.

Tightening torque:

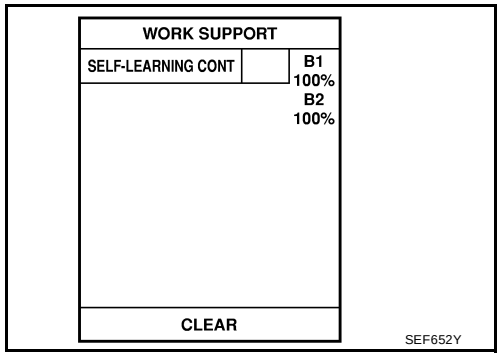
40 - 60 N-m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)

>> GO TO 2.

2. CLEAR THE SELF-LEARNING DATA

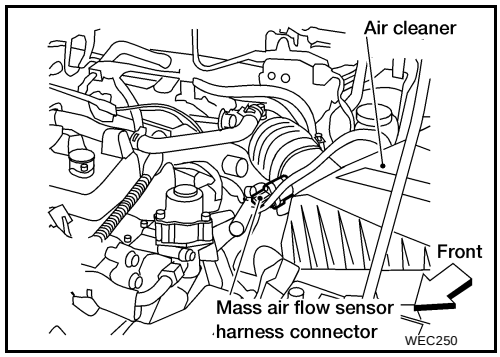
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 (P0175) detected? Is it difficult to start engine?



Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF”.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 3 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC P0102 is displayed.
6. Erase the 1st trip DTC memory. Refer to EC-73, "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 (P0175) detected? Is it difficult to start engine?



Yes or No

Yes >> Perform trouble diagnosis for DTC P0172 (P0175). Refer to EC-261 .
No >> GO TO 3.

3. CHECK HARNESS CONNECTOR

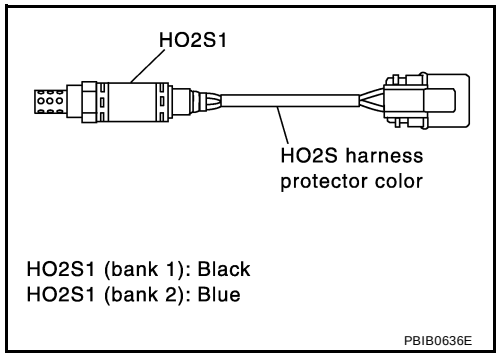
1. Turn ignition switch “OFF”.
2. Disconnect heated oxygen sensor 1 harness connector.
3. Check harness connector for water.
   Water should not exit.

OK or NG

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

4. CHECK HEATED OXYGEN SENSOR 1 HEATER

1. Turn ignition switch “OFF”.
2. Make sure HO2S1 harness protector color, and disconnect the corresponding HO2S1 harness connector.
3. Check HO2S1 heater, refer to EC-160 .



OK or NG

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

5. CHECK HEATED OXYGEN SENSOR 1

Refer to EC-460, "Component Inspection" .

OK or NG

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

6. CHECK INTERMITTENT INCIDENT

Perform EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .
Refer to EC-210, "Wiring Diagram" , for circuit.

>> **INSPECTION END**

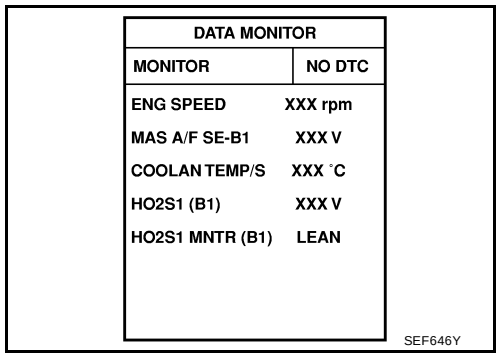
Component Inspection

UBS001M7

HEATED OXYGEN SENSOR 1

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “MANU TRIG” in “DATA MONITOR” mode, and select “HO2S1 (B1)/(B2)” and “HO2S1 MNTR (B1)/(B2)”.
3. Hold engine speed at 2,000 rpm under no load during the following steps.
4. Touch “RECORD” on CONSULT-II screen.



5. Check the following.

- "HO2S1 MNTR (B1)/(B2)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds.
  5 times (cycles) are counted as shown below:
  R = "HO2S1 MNTR (B1)/(B2)", "RICH"
  L = "HO2S1 MNTR (B1)/(B2)", "LEAN"
- "HO2S1 (B1)/(B2)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)/(B2)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)/(B2)" voltage never exceeds 1.0V.

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

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

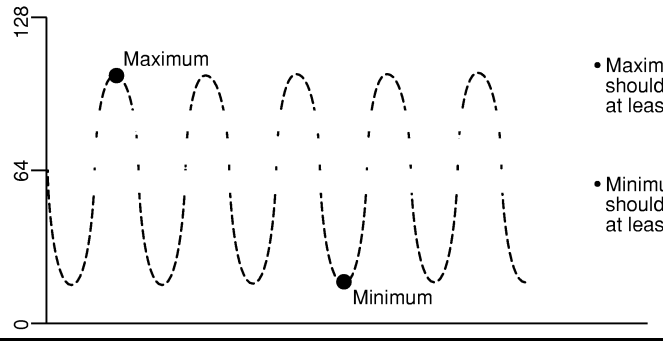
R means HO2S1 MNTR (B1)/(B2) indicates RICH
L means HO2S1 MNTR (B1)/(B2) indicates LEAN

SEF647Y

CAUTION:

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

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

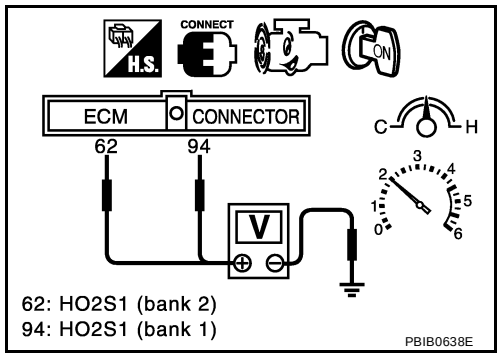


SEF648Y

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 62 (HO2S1 bank 2) or 94 (HO2S1 bank 1) and engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.

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



PBIB0638E

CAUTION:

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

Removal and Installation

UBS001M8

HEATED OXYGEN SENSOR 1

Refer to EM-15, "Removal and Installation" .

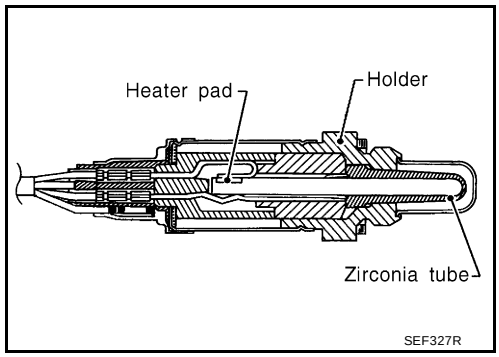
DTC P1146, P1166 HO2S2

PFP:226A0

Component Description

UBS001M9

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



CONSULT-II Reference Value in Data Monitor Mode

UBS001MA

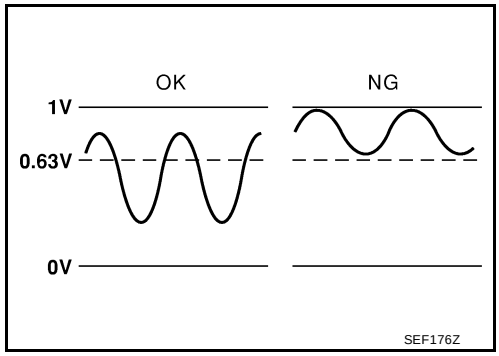
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1)/(B2)	● Engine: After warming up	Revving engine from idle to 3,000 rpm	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)/(B2)			LEAN ←→ RICH

On Board Diagnosis Logic

UBS001MB

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



DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1146 (Bank 1) P1166 (Bank 2)	● The minimum voltage from the sensor does not reach the specified voltage.	● Harness or connectors (The sensor circuit is open or shorted.) ● Heated oxygen sensor 2 ● Fuel pressure ● Injectors

DTC Confirmation Procedure

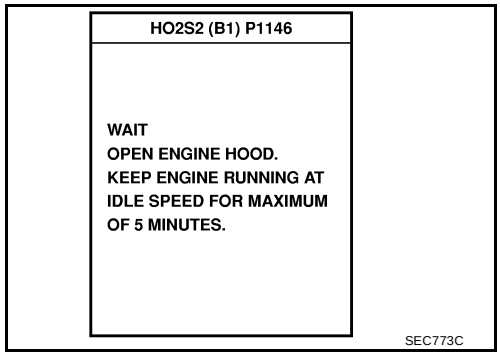
UBS001MC

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

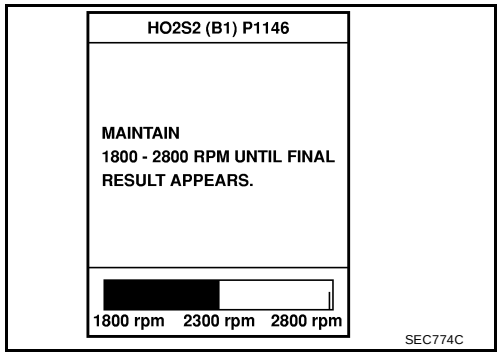
WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Turn ignition switch “ON”.
4. Select “DATA MONITOR” mode with CONSULT-II.
5. Make sure that “COOLAN TEMP/S” indicates more than 70°C (158°F).

6. Select “HO2S2 (B1)/(B2) P1146 (P1166)” of “HO2S2 (B1)/(B2)” in “DTC WORK SUPPORT” mode with CONSULT-II.
7. Start engine and follow the instruction of CONSULT-II.

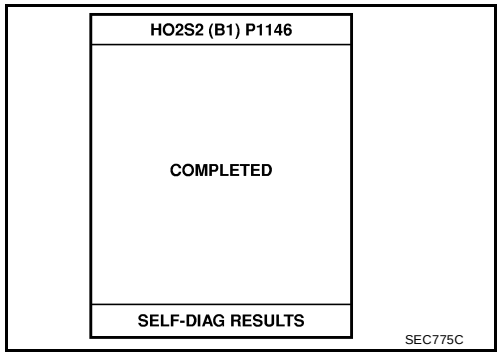


8. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”.
   If NG is displayed, refer to EC-466, "Diagnostic Procedure" .



If “CANNOT BE DIAGNOSED” is displayed, perform the following.

- Stop engine and cool down until “COOLAN TEMP/S” indicates less than 70°C (158°F).
- Turn ignition switch “ON”.
- Select “DATA MONITOR” mode with CONSULT-II.
- Start engine.



- Return to step 6 again when the “COOLAN TEMP/S” reaches to 70°C (158°F).

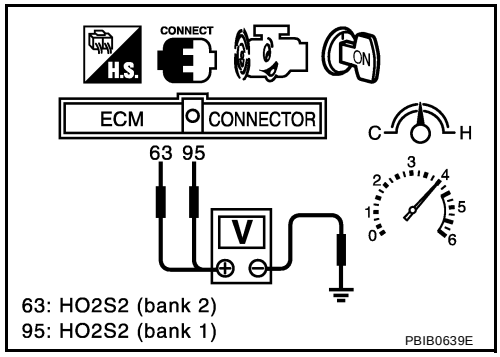
Overall Function Check

UBS001MD

Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Set voltmeter probes between ECM terminals 63 (HO2S2 bank 2) or 95 (HO2S2 bank 1) and engine ground.
4. Check the voltage when revving engine up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be below 0.43V at least once during this procedure.
   If the voltage can be confirmed in step 4, step 5 is not necessary.
5. Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), D position with “OD” OFF (A/T).
   The voltage should be below 0.43V at least once during this procedure.

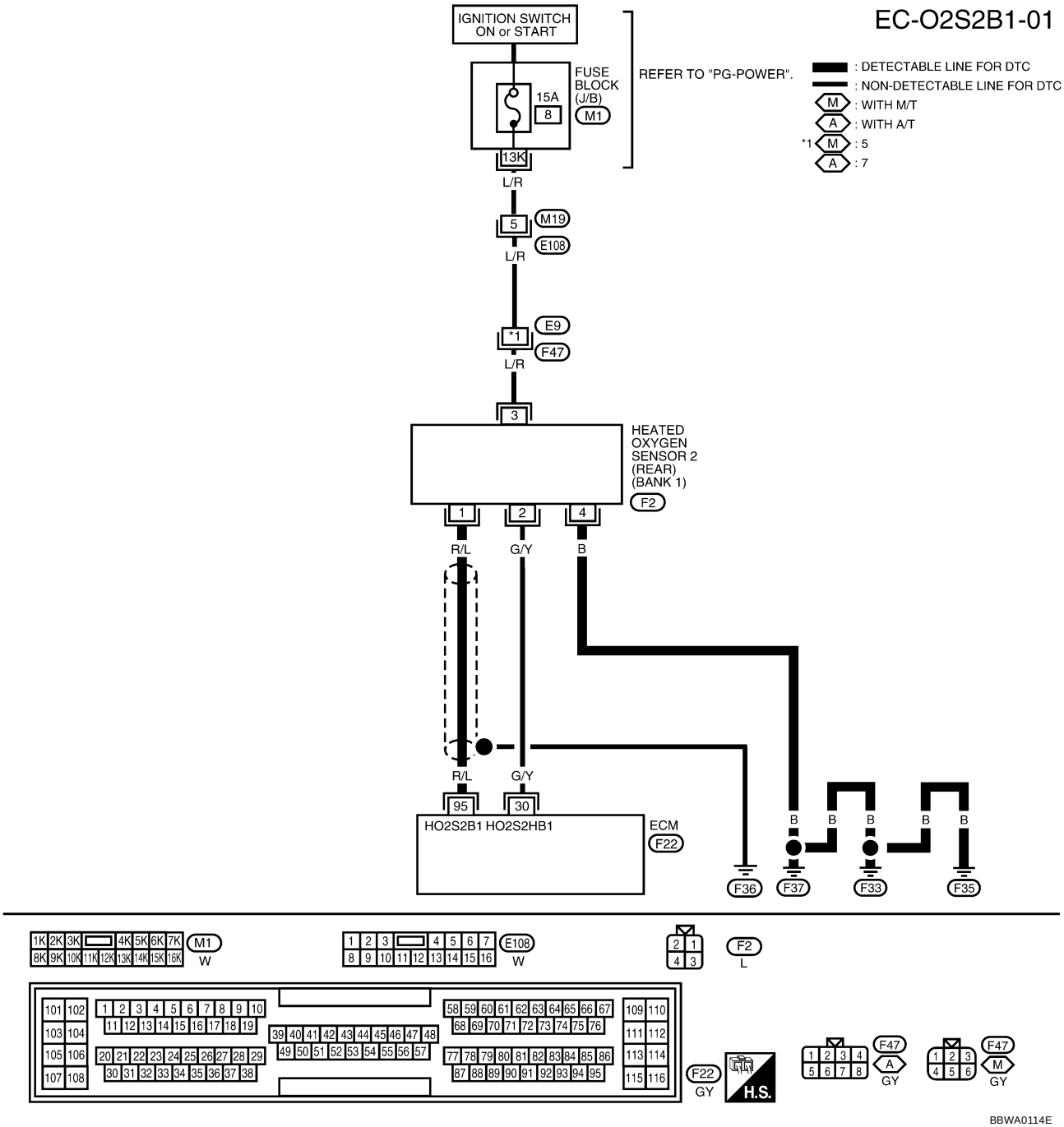


6. If NG, go to EC-466, "Diagnostic Procedure" .

Wiring Diagram

UBS001ME

BANK 1



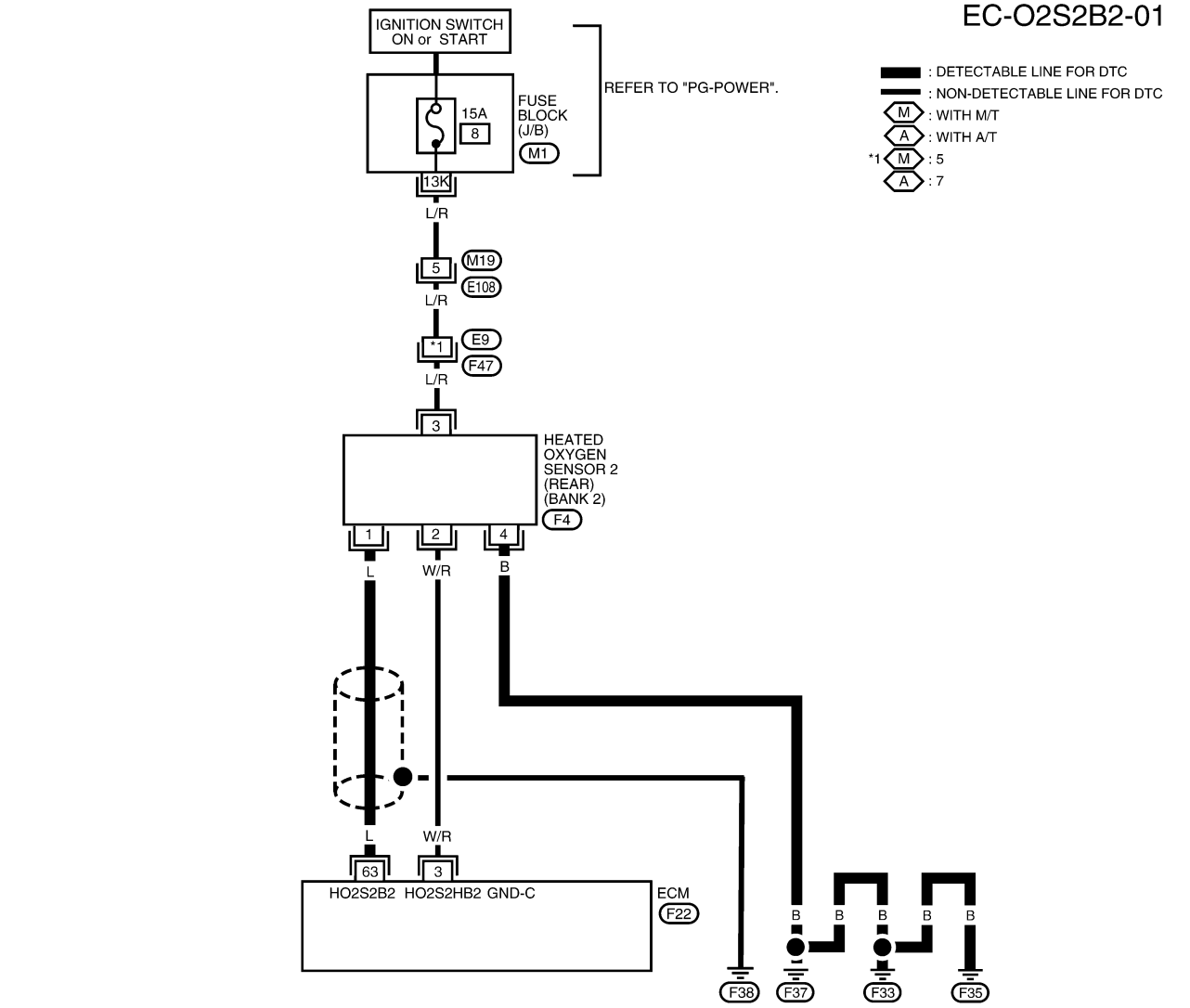
BBWA0114E

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
95	R/L	HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)	ENGINE RUNNING FROM IDLE UP TO 2,000 RPM UNDER WARM-UP CONDITION	0 - APPROX. 1.0V

WEC914

BANK 2



ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
63	L	HEATED OXYGEN SENSOR 2 (REAR) (BANK 2)	ENGINE RUNNING FROM IDLE UP TO 2,000 RPM UNDER WARM-UP CONDITION	0 - APPROX. 1.0V

WEC900

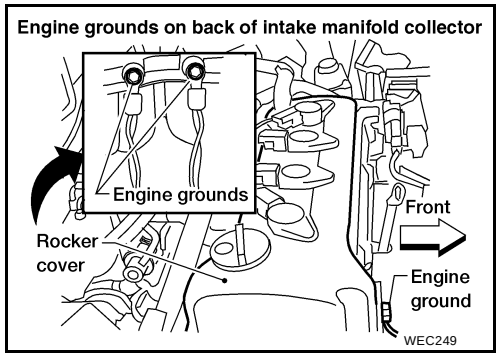
Diagnostic Procedure

UBS001MF

1. RETIGHTEN GROUND SCREWS

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

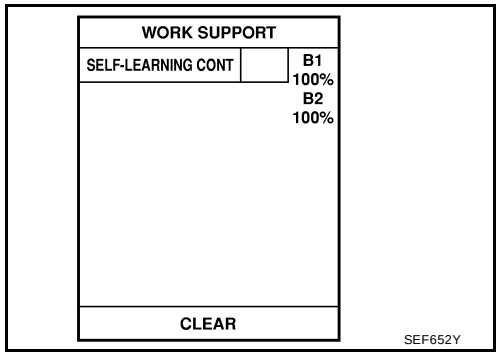
>> GO TO 2.



2. CLEAR THE SELF-LEARNING DATA

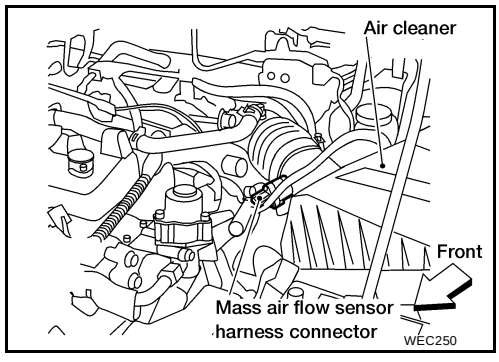
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 or P0175 detected? Is it difficult to start engine?



Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF”.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 3 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC P0102 is displayed.
6. Erase the 1st trip DTC memory. Refer to EC-73, "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?

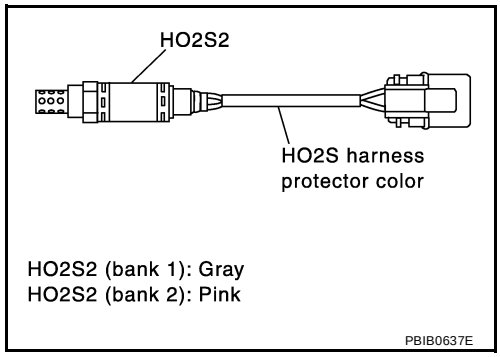


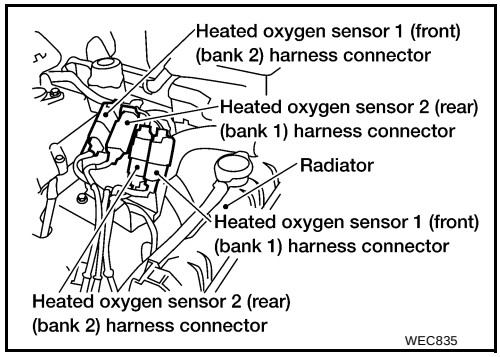
Yes or No

Yes >> Perform trouble diagnosis for DTC P0172 or P0175. Refer to EC-261 .
No >> GO TO 3.

3. CHECK INPUT SIGNAL CIRCUIT

1. Turn ignition switch “OFF”.
2. Check the HO2S2 harness protector color, and disconnect the corresponding heated oxygen sensor 2 harness connector and ECM harness connector.





3. Check harness continuity between ECM terminal and HO2S2 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P1146	95	1	1
P1166	63	1	2

Continuity should exist.

4. Check harness continuity between ECM terminal or HO2S2 and ground as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM or Sensor	Ground	
P1146	95 or 1	Ground	1
P1166	63 or 1	Ground	2

Continuity should not exist.

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

OK or NG

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

4. CHECK GROUND CIRCUIT

1. Check harness continuity between HO2S2 terminal 4 and body ground.
   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 HEATED OXYGEN SENSOR 2

Refer to EC-468, "Component Inspection" .

OK or NG

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

6. CHECK INTERMITTENT INCIDENT

Perform EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

UBS001MG

HEATED OXYGEN SENSOR 2

With CONSULT-II

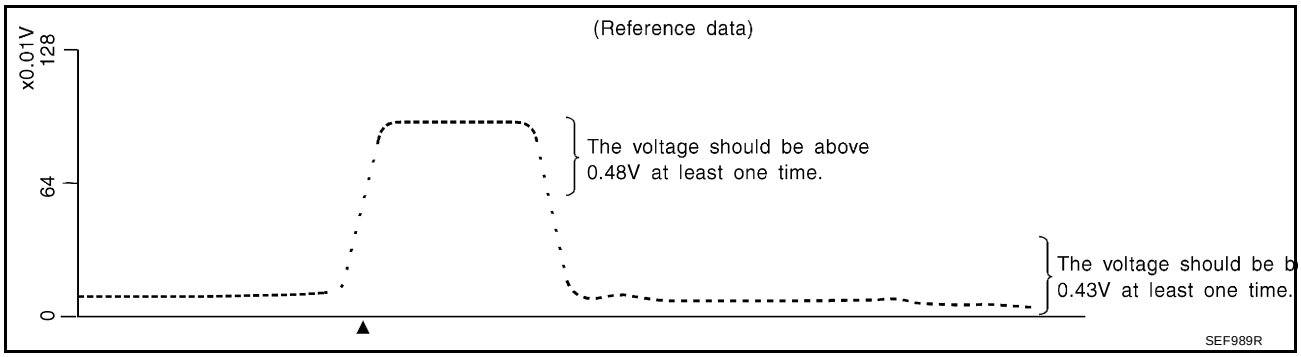
1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)/(B2)” as the monitor item with CONSULT-II.
4. Check “HO2S2 (B1)/(B2)” at idle speed when adjusting “FUEL INJECTION” to ±25%.
   “HO2S2 (B1)/(B2)” should be above 0.48V at least once when the “FUEL INJECTION” is +25%.“HO2S2 (B1)/(B2)” should be below 0.43V at least once when the “FUEL INJECTION” is −25%.

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

SEF662Y

CAUTION:

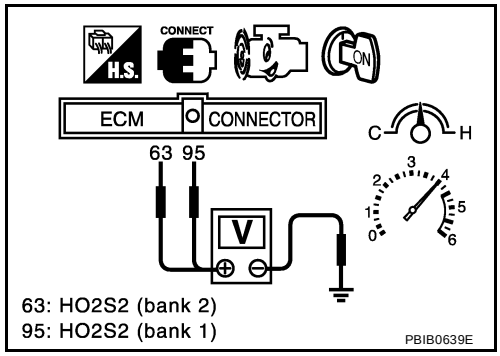
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18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



Without CONSULT-II

1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.

2. Stop vehicle with engine running.
3. Set voltmeter probes between ECM terminals 63 (HO2S2 bank 2) or 95 (HO2S2 bank 1) and engine ground.
4. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.48V at least once.
   If the voltage is above 0.48V at step 4, step 5 is not necessary.
5. Check the voltage when revving up to 6,000 rpm under no load. Or keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), D position with “OD” OFF (A/T).
   The voltage should be below 0.43V at least once.



CAUTION:

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

Removal and Installation

UBS001MH

HEATED OXYGEN SENSOR 2

Refer to EX-3, "Removal and Installation" .

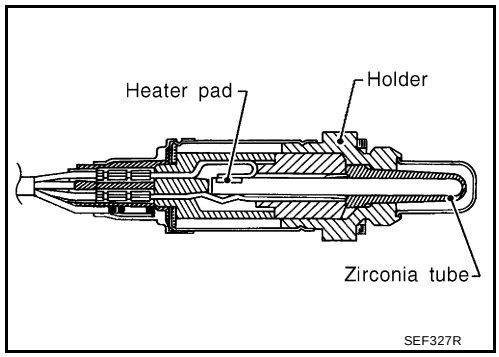
DTC P1147, P1167 HO2S2

PFP:226A0

Component Description

UBS001MI

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



CONSULT-II Reference Value in Data Monitor Mode

UBS001MJ

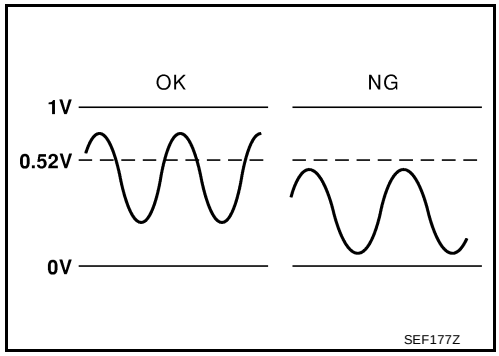
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1)/(B2)	● Engine: After warming up	Revving engine from idle to 3,000 rpm	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)/(B2)			LEAN ←→ RICH

On Board Diagnosis Logic

UBS001MK

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



DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1147 (Bank 1) P1167 (Bank 2)	● The maximum voltage from the sensor does not reach the specified voltage.	● Harness or connectors (The sensor circuit is open or shorted.) ● Heated oxygen sensor 2 ● Fuel pressure ● Injectors ● Intake air leaks

DTC Confirmation Procedure

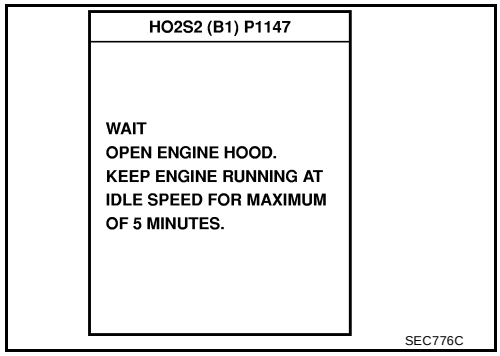
UBS001ML

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

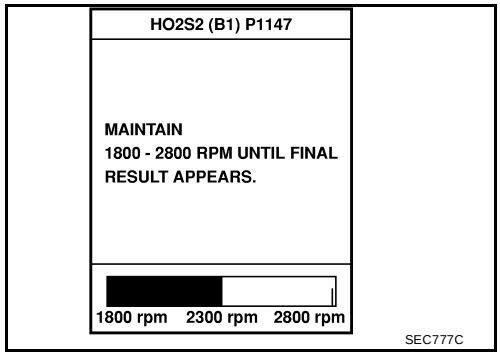
WITH CONSULT-II

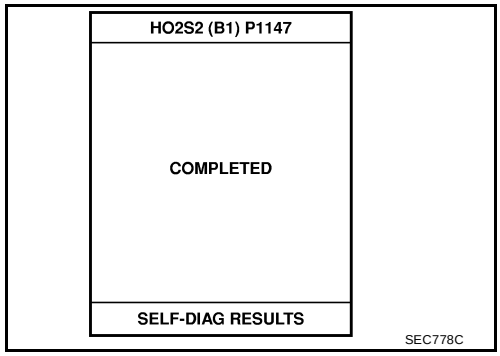
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Turn ignition switch “ON”.
4. Select “DATA MONITOR” mode with CONSULT-II.
5. Make sure that “COOLAN TEMP/S” indicates more than 70°C (158°F).

6. Select “HO2S2 (B1)/(B2) P1147 (P1167)” of “HO2S2 (B1)/(B2)” in “DTC WORK SUPPORT” mode with CONSULT-II.
7. Start engine and follow the instruction of CONSULT-II.



8. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”.





If NG is displayed, refer to EC-475, "Diagnostic Procedure" .
If “CANNOT BE DIAGNOSED” is displayed, perform the following.

- Stop engine and cool down until “COOLAN TEMP/S” indicates less than 70°C (158°F).
- Turn ignition switch “ON”.
- Select “DATA MONITOR” mode with CONSULT-II.
- Start engine.
- Return to step 6 again when the “COOLAN TEMP/S” reaches to 70°C (158°F).

Overall Function Check

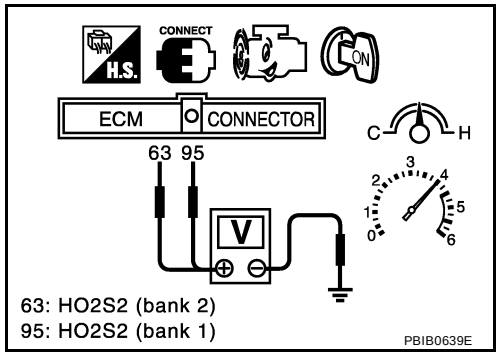
UBS001MM

Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

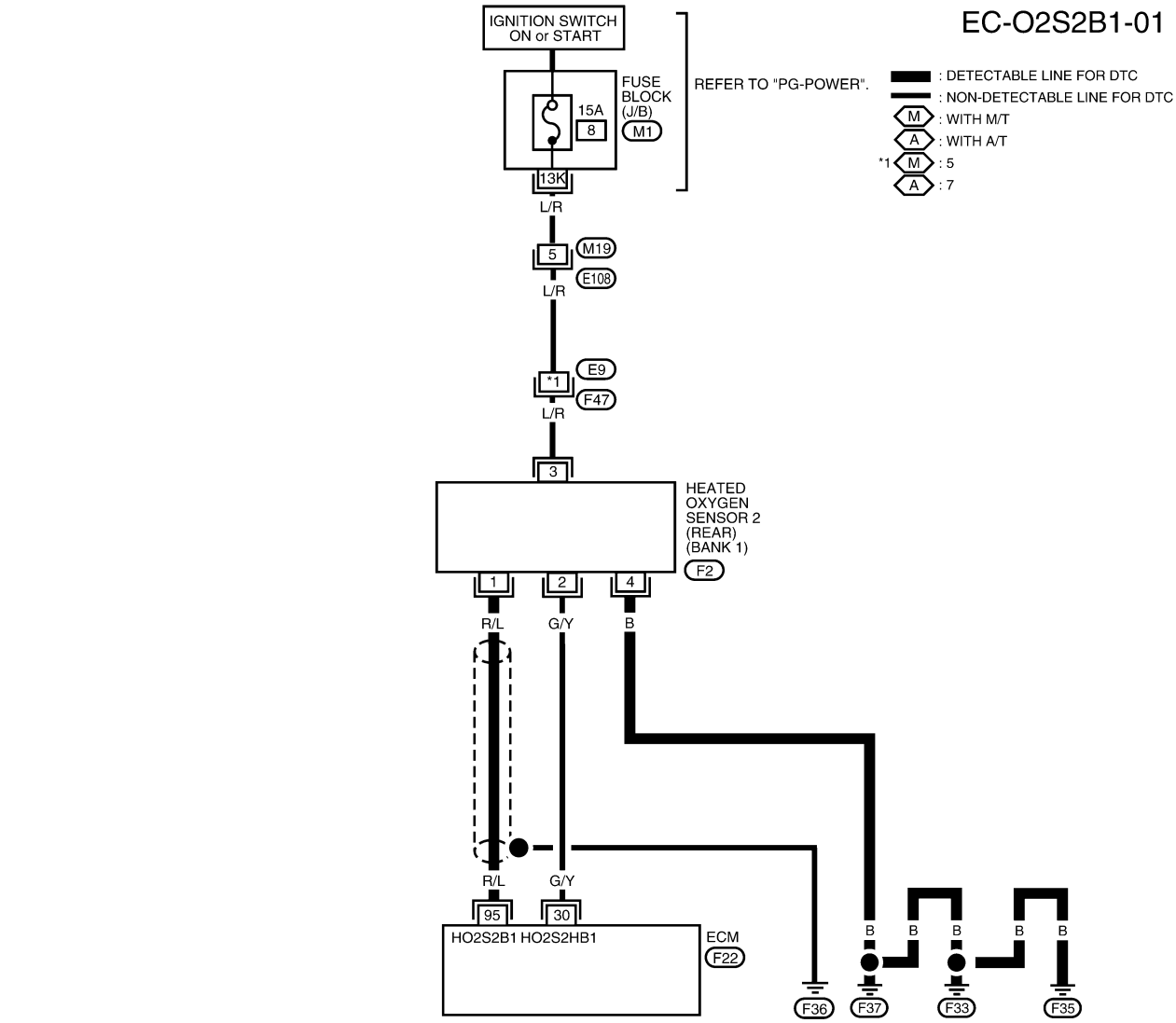
1. Start engine and drive vehicle at a speed of 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.

3. Set voltmeter probes between ECM terminals 63 (HO2S2 bank 2) or 95 (HO2S2 bank 1) and engine ground.
4. Check the voltage when revving engine up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.48V at least once during this procedure.
   If the voltage can be confirmed in step 4, step 5 is not necessary.
5. Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), D position with “OD” OFF (A/T).
   The voltage should be above 0.48V at least once during this procedure.
6. If NG, go to EC-475, "Diagnostic Procedure" .



Wiring Diagram
BANK 1

UBS001MN



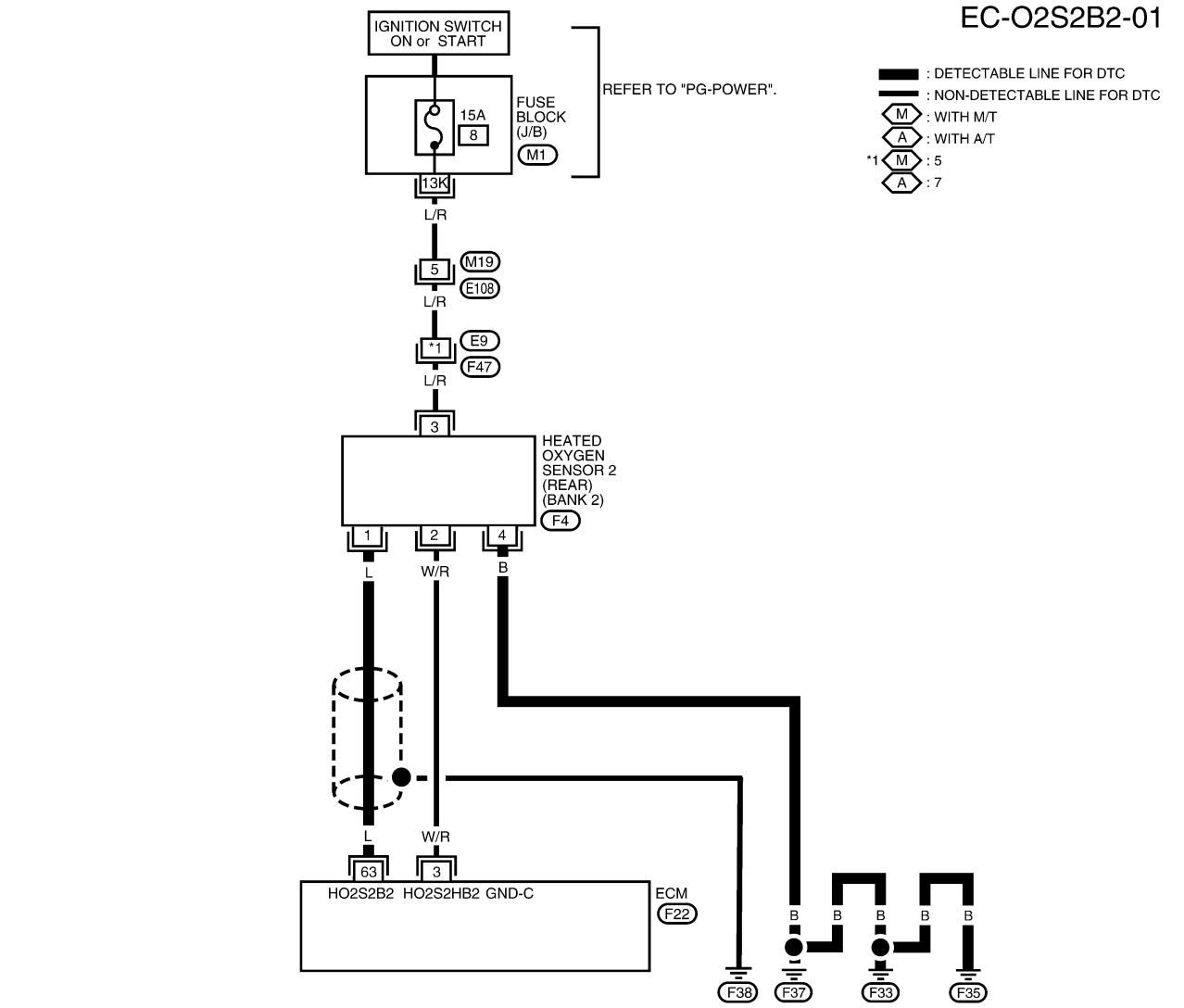
BBWA0114E

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
95	R/L	HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)	ENGINE RUNNING FROM IDLE UP TO 2,000 RPM UNDER WARM-UP CONDITION	0 - APPROX. 1.0V

WEC914

BANK 2



ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
63	L	HEATED OXYGEN SENSOR 2 (REAR) (BANK 2)	ENGINE RUNNING FROM IDLE UP TO 2,000 RPM UNDER WARM-UP CONDITION	0 - APPROX. 1.0V

WEC900

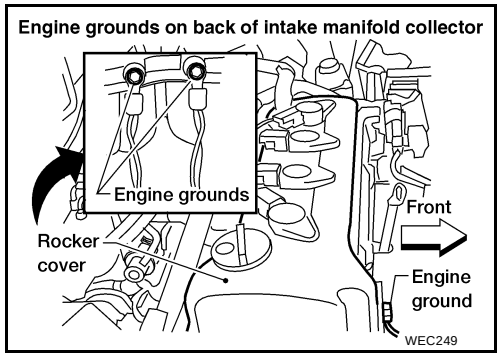
Diagnostic Procedure

UBS001MO

1. RETIGHTEN GROUND SCREWS

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

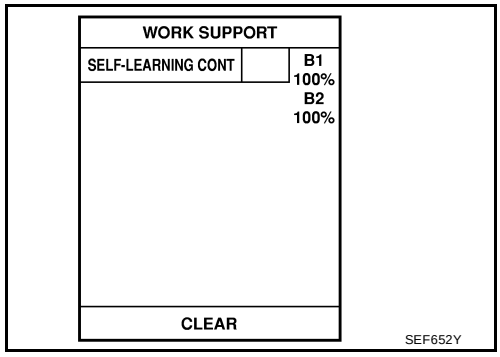
>> GO TO 2.



2. CLEAR THE SELF-LEARNING DATA

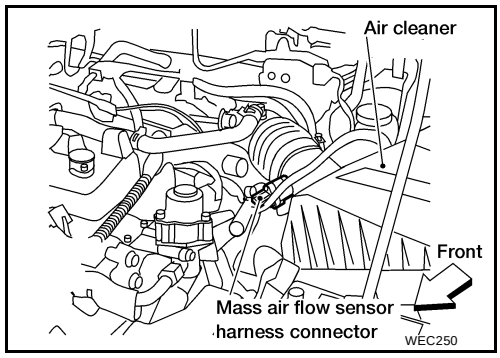
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171, 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 3 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC P0102 is displayed.
6. Erase the 1st trip DTC memory. Refer to EC-73, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171, P0174 detected? Is it difficult to start engine?

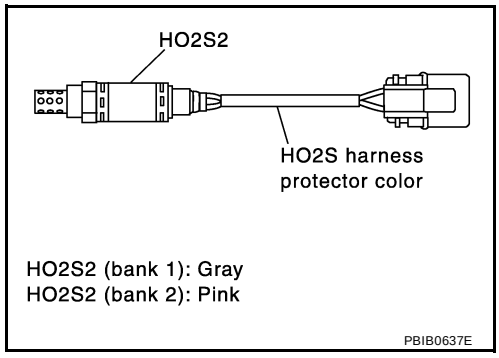


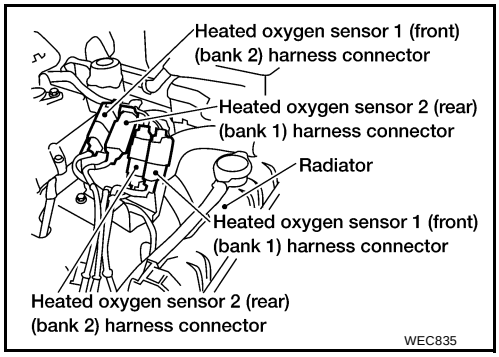
Yes or No

Yes >> Perform trouble diagnosis for DTC P0171, P0174. Refer to EC-252 .
No >> GO TO 3.

3. CHECK INPUT SIGNAL CIRCUIT

1. Turn ignition switch “OFF”.
2. Check the HO2S2 harness protector color, and disconnect the corresponding heated oxygen sensor 2 harness connector and ECM harness connector.





3. Check harness continuity between ECM terminal and HO2S2 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P1147	95	1	1
P1167	63	1	2

Continuity should exist.

4. Check harness continuity between ECM terminal or HO2S2 and ground as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM or Sensor	Ground	
P1147	95 or 1	Ground	1
P1167	63 or 1	Ground	2

Continuity should not exist.

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

OK or NG

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

4. CHECK GROUND CIRCUIT

1. Check harness continuity between HO2S2 terminal 4 and engine ground. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to 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

Refer to EC-477, "Component Inspection" .

OK or NG

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

6. CHECK INTERMITTENT INCIDENT

Perform EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

UBS001MP

HEATED OXYGEN SENSOR 2

With CONSULT-II

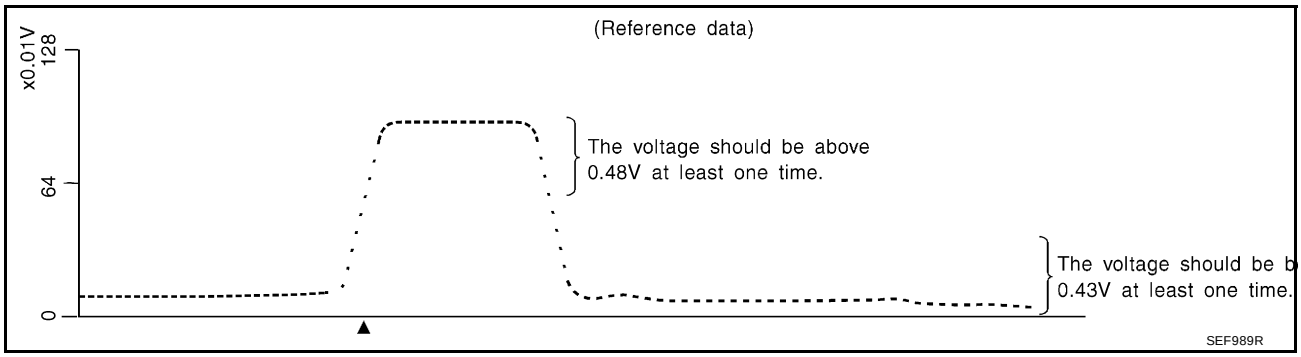
1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)/(B2)” as the monitor item with CONSULT-II.
4. Check “HO2S2 (B1)/(B2)” at idle speed when adjusting “FUEL INJECTION” to ±25%.
   “HO2S2 (B1)/(B2)” should be above 0.48V at least once when the “FUEL INJECTION” is +25%.
   “HO2S2 (B1)/(B2)” should be below 0.43V at least once when the “FUEL INJECTION” is −25%.

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

SEF662Y

CAUTION:

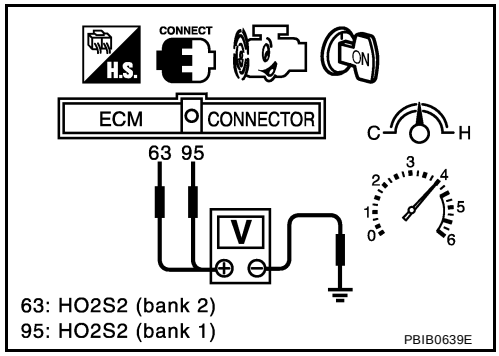
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18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



Without CONSULT-II

1. Start engine and drive vehicle at a speed of 70 km/h (43 MPH) for 2 consecutive minutes.

2. Stop vehicle with engine running.
3. Set voltmeter probes between ECM terminals 63 (HO2S2 bank 2) or 95 (HO2S2 bank 1) and engine ground.
4. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.48V at least once.
   If the voltage is above 0.48V at step 4, step 5 is not necessary.
5. Check the voltage when revving up to 6,000 rpm under no load. Or keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), D position with “OD” OFF (A/T).
   The voltage should be below 0.43V at least once.



CAUTION:

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

Removal and installation

UBS001MQ

HEATED OXYGEN SENSOR 2

Refer to EX-3, "Removal and Installation" .

DTC P1148, P1168 CLOSED LOOP CONTROL

PFP:22690

On Board Diagnosis Logic

UBS001MR

★ The closed loop control has the one trip detection logic.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1148 (Bank 1) P1168 (Bank 2)	● The closed loop control function does not operate even when vehicle is driving in the specified condition.	● The heated oxygen sensor 1 circuit is open or shorted. ● Heated oxygen sensor 1 ● Heated oxygen sensor 1 heater

DTC Confirmation Procedure

UBS001MS

CAUTION:
Always drive vehicle at a safe speed.

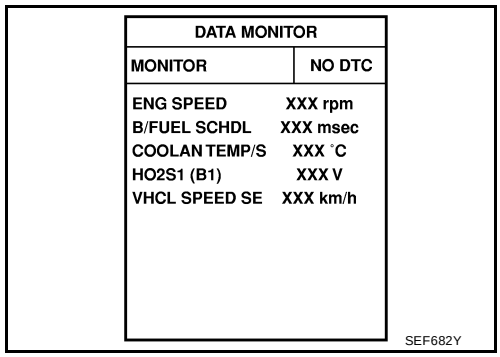
NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

- **Never raise engine speed above 3,600 rpm during the “DTC Confirmation Procedure”. If the engine speed limit is exceeded, retry the procedure from step 4.**
- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Hold engine speed at 2,000 rpm and check the following.
   - “HO2S1 (B1)/(B2)” voltage should go above 0.70V at least once.
   - “HO2S1 (B1)/(B2)” voltage should go below 0.21V at least once.
     If the result is NG, perform EC-480, "Diagnostic Procedure" .
     If the result is OK, perform the following step.
4. Let engine idle at least 5 minutes.
5. Maintain the following condition at least 50 consecutive seconds.



B/FUEL SCHDL	More than 3.3 msec (A/T), 2.8 msec (M/T)
ENG SPEED	More than 1,750 rpm (A/T), 2,100 rpm (M/T)
Selector lever	Suitable position
VHCL SPEED SE	More than 70 km/h (43 MPH)

During this test, P0133 and/or P0154 may be displayed on CONSULT-II screen.

6. If DTC is detected, go to EC-480, "Diagnostic Procedure" .

Overall Function Check

UBS001MT

Use this procedure to check the overall function of the closed loop control. During this check, a DTC might not be confirmed.

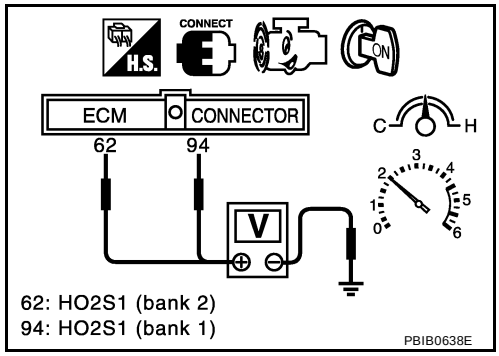
WITH GST

1. Start engine and warm it up to normal operating temperature.

2. Set voltmeter probes between ECM terminal 62, 94 (heated oxygen sensor 1 signal) and engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.

- The voltage should go above 0.70V at least once.
- The voltage should go below 0.21V at least once.

4. If NG, go to EC-480, "Diagnostic Procedure" .



Diagnostic Procedure

UBS001MU

Refer to “Diagnostic Procedure” for DTC P0133, P0154 EC-216 .

DTC P1217 ENGINE OVER TEMPERATURE

PFP:00000

System Description

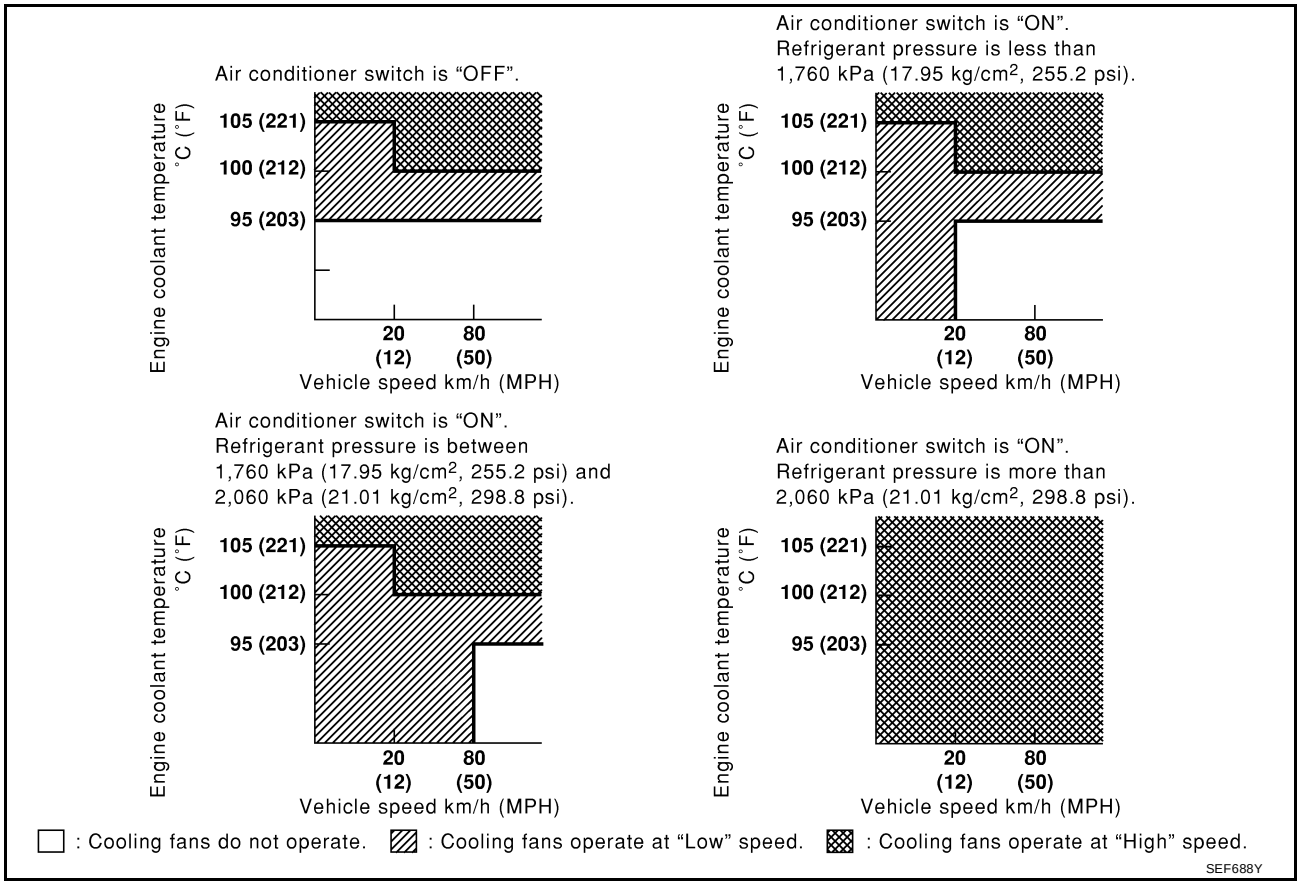
UBS001MV

COOLING FAN CONTROL

Sensor	Input Signal to ECM	ECM function	Actuator
Vehicle speed sensor	Vehicle speed	Cooling fan control	Cooling fan relay(s)
Engine coolant temperature sensor	Engine coolant temperature		
Air conditioner switch	Air conditioner “ON” signal		
Ignition switch	Start signal		
Refrigerant pressure sensor	Refrigerant pressure		

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].

OPERATION



CONSULT-II Reference Value in Data Monitor Mode

UBS001MW

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

MONITOR ITEM	CONDITION		SPECIFICATION
COOLING FAN	● After warming up engine, idle the engine. ● Air conditioner switch: OFF	Engine coolant temperature is 94°C (201°F) or less	OFF
		Engine coolant temperature is between 95°C (203°F) and 104°C (219°F)	LOW
		Engine coolant temperature is 105°C (221°F) or more	HIGH

On Board Diagnosis Logic

UBS001MX

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.

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1217	● Cooling fan does not operate properly (Overheat). ● Cooling fan system does not operate properly (Overheat). ● Engine coolant was not added to the system using the proper filling method.	● Harness or connectors (The cooling fan circuit is open or shorted.) ● Cooling fan ● Radiator hose ● Radiator ● Radiator cap ● Water pump ● Thermostat For more information, refer to EC-492, "Main 12 Causes of Overheating" .

CAUTION:
When a malfunction is indicated, be sure to replace the coolant. Refer to MA-15, "Changing Engine Coolant" . Also, replace the engine oil. Refer to MA-19, "Changing Engine Oil" .

1. **Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute. Be sure to use coolant with the proper mixture ratio. Refer to MA-14, "Anti-freeze Coolant Mixture Ratio" .**
2. **After refilling coolant, run engine to ensure that no water-flow noise is emitted.**

Overall Function Check

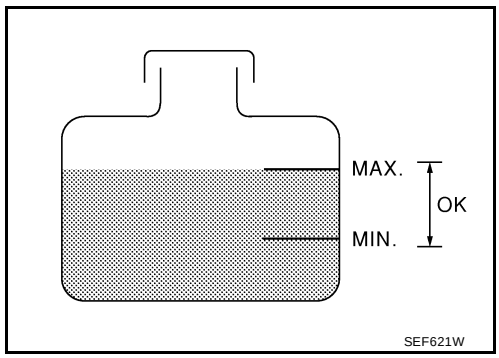
UBS001MY

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-485, "Diagnostic Procedure" .
2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to EC-485, "Diagnostic Procedure" .
3. Turn ignition switch “ON”.



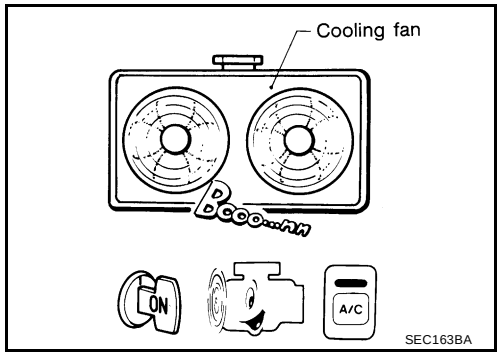
4. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-II.
5. If the results are NG, go to EC-485, "Diagnostic Procedure" .

ACTIVE TEST	
COOLING FAN	OFF
MONITOR	
COOLAN TEMP/S	XXX °C

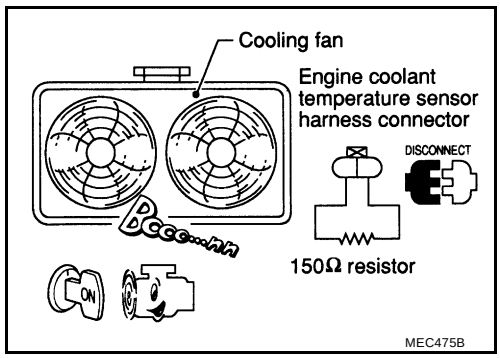
SEF646X

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-485, "Diagnostic Procedure" .
2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to EC-485, "Diagnostic Procedure" .
3. Start engine.
   Be careful not to overheat engine.
4. Set temperature control lever to full cold position.
5. Turn air conditioner switch “ON”.
6. Turn blower fan switch “ON”.
7. Run engine at idle for a few minutes with air conditioner operating.
   Be careful not to overheat engine.
8. Make sure that cooling fan operates at low speed.
   If NG, go to EC-485, "Diagnostic Procedure" .
   If OK, go to the following step.
9. Turn ignition switch “OFF”.
10. Turn air conditioner switch and blower fan switch “OFF”.
11. Disconnect engine coolant temperature sensor harness connector.
12. Connect 150Ω resistor to engine coolant temperature sensor harness connector.
13. Restart engine and make sure that cooling fan operates at higher speed than low speed.
    Be careful not to overheat engine.
14. If NG, go to EC-485, "Diagnostic Procedure" .



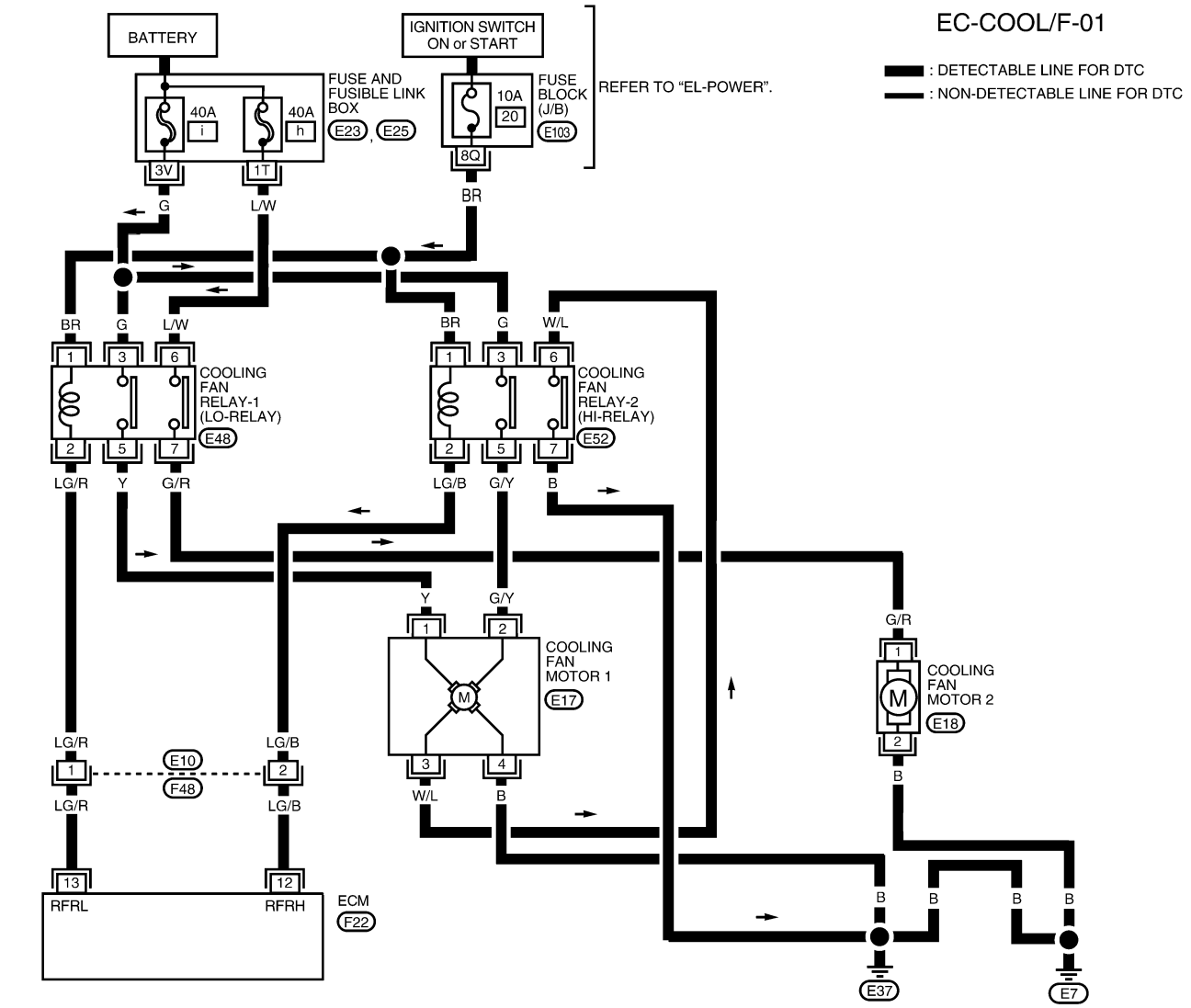
SEC163BA

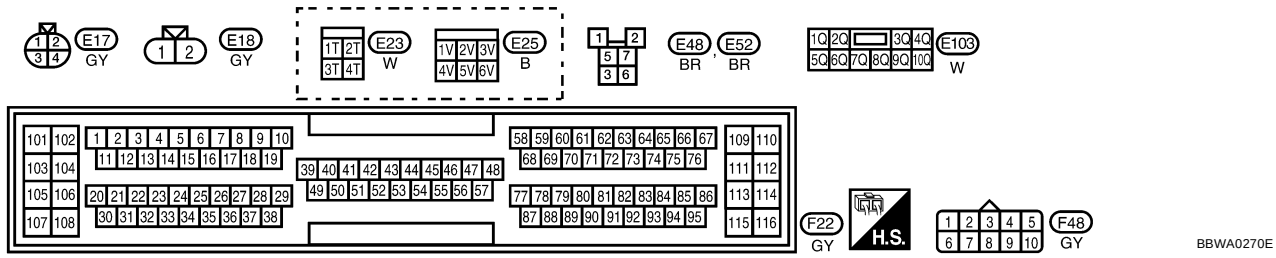


MEC475B

Wiring Diagram

UBS001MZ





BBWA0270E

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
12	LG/B	COOLING FAN RELAY (HIGH)	ENGINE RUNNING WITH COOLING FAN NOT OPERATING	BATTERY VOLTAGE
			ENGINE RUNNING WITH COOLING FAN OPERATING AT HIGH SPEED	0 - 0.6V
13	LG/R	COOLING FAN RELAY (LOW)	ENGINE RUNNING WITH COOLING FAN NOT OPERATING	BATTERY VOLTAGE
			ENGINE RUNNING WITH COOLING FAN OPERATING AT LOW SPEED	0 - 0.6V

SEF571Y

Diagnostic Procedure

UBS001N0

1. INSPECTION START

Do you have CONSULT-II?

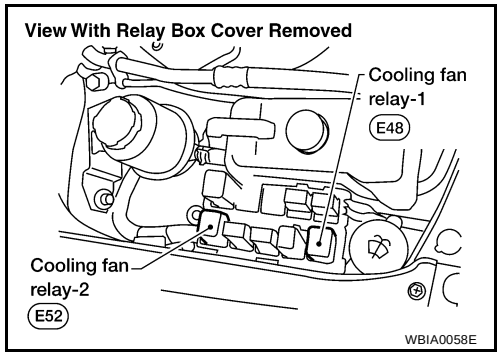
Yes or No

Yes >> GO TO 2.
No >> GO TO 4.

2. CHECK COOLING FAN LOW SPEED OPERATION

With CONSULT-II

1. Disconnect cooling fan relay-2.
2. Turn ignition switch “ON”.



3. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-II.
4. 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-489, "PROCEDURE A" .)

ACTIVE TEST	
COOLING FAN	OFF
MONITOR	
COOLAN TEMP/S	XXX °C

SEF646X

3. CHECK COOLING FAN HIGH SPEED OPERATION

With CONSULT-II

1. Turn ignition switch “OFF”.
2. Reconnect cooling fan relay-2.
3. Disconnect cooling fan relay-1.
4. Turn ignition switch “ON”.
5. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-II.
6. Make sure that cooling fan-1 operates at higher speed than low speed.

OK or NG

OK >> GO TO 6.
NG >> Check cooling fan high speed control circuit. (Go to EC-491, "PROCEDURE B" .)

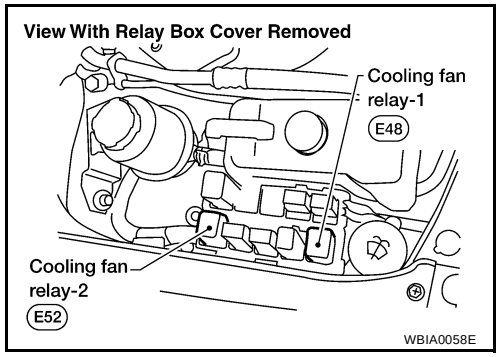
ACTIVE TEST	
COOLING FAN	OFF
MONITOR	
COOLAN TEMP/S	XXX °C

SEF646X

4. CHECK COOLING FAN LOW SPEED OPERATION

Without CONSULT-II

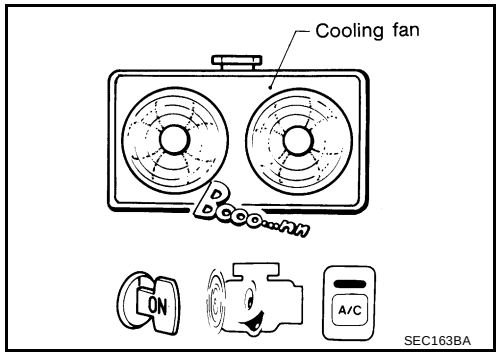
1. Disconnect cooling fan relay-2.
2. Start engine and let it idle.
3. Set temperature lever at full cold position.
4. Turn air conditioner switch “ON”.
5. Turn blower fan switch “ON”.



6. 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-489, "PROCEDURE A" .)



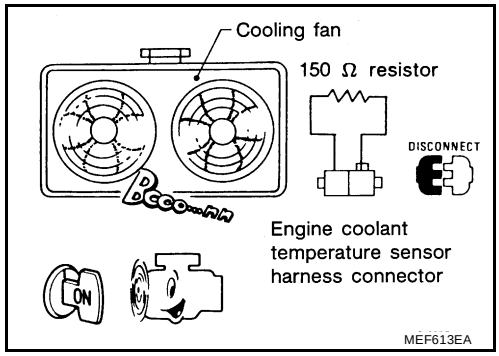
5. CHECK COOLING FAN HIGH SPEED OPERATION

Without CONSULT-II

1. Turn ignition switch “OFF”.
2. Reconnect cooling fan relay-2.
3. Disconnect cooling fan relay-1.
4. Turn air conditioner switch and blower fan switch “OFF”.
5. Disconnect engine coolant temperature sensor harness connector.
6. Connect 150Ω resistor to engine coolant temperature sensor harness connector.
7. Restart engine and make sure that cooling fan-1 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-491, "PROCEDURE B" .)

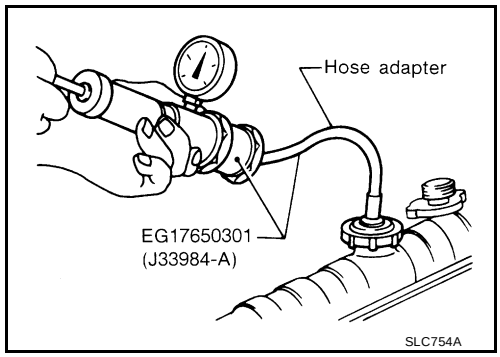


6. CHECK COOLING SYSTEM FOR LEAK

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 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following for leaks.

- Hose
- Radiator
- Water pump (Refer to CO-10, "WATER PUMP" .)

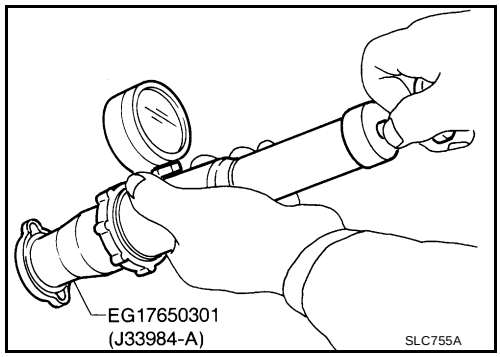
>> Repair or replace.

8. CHECK RADIATOR CAP

Apply pressure to cap with a tester and check radiator cap relief pressure.

Radiator cap relief pressure:

59 - 98 kPa (0.6 - 1.0 kg/cm^2 , 9 - 14 psi)



OK or NG

OK >> GO TO 9.
NG >> Replace radiator cap.

9. CHECK THERMOSTAT

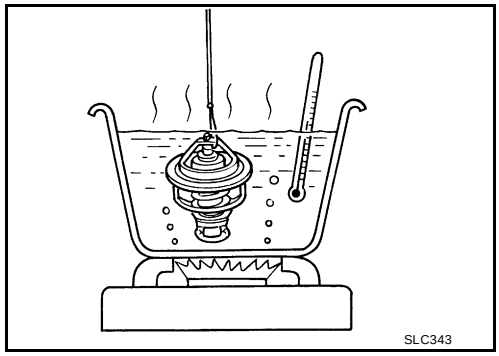
1. Remove thermostat.
2. Check valve seating condition at normal room temperatures.
   It should seat tightly.
3. Check valve opening temperature and valve lift.

   Valve opening temperature:

   76.5°C (170°F) [standard]

   Valve lift:

   More than 9 mm/90°C (0.35 in/194°F)



4. Check if valve is closed at 5°C (9°F) below valve opening temperature. For details, refer to CO-12, "THERMOSTAT AND THERMOSTAT HOUSING" .

OK or NG

OK >> GO TO 10.
NG >> Replace thermostat

10. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-190, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> Replace engine coolant temperature sensor.

11. CHECK MAIN 12 CAUSES

If the cause cannot be isolated, go to EC-492, "Main 12 Causes of Overheating" .

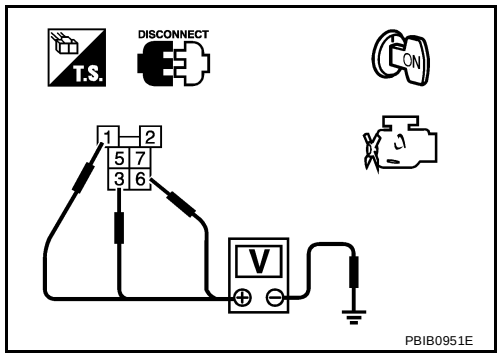
>> **INSPECTION END**

PROCEDURE A

1. CHECK COOLING FAN POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect cooling fan relay-1.
3. Turn ignition switch “ON”.
4. Check voltage between cooling fan relay-1 terminals 1, 3, 6 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.

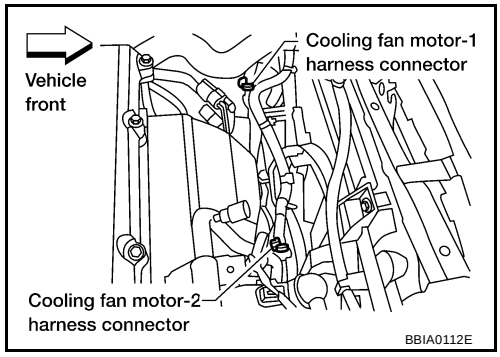
- 10A fuse
- 40A fusible links
- Harness for open or short between cooling fan relay-1 and fuse
- Harness for open or short between cooling fan relay-1 and battery

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

3. CHECK COOLING FAN GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect cooling fan motor-1 harness connector and cooling fan motor-2 harness connector.
3. Check harness continuity between cooling fan relay-1 terminal 5 and cooling fan motor-1 terminal 1, cooling fan motor-1 terminal 4 and body 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 cooling fan relay-1 terminal 7 and cooling fan motor-2 terminal 2, cooling fan motor-2 terminal 1 and body 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 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK COOLING FAN OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 13 and cooling fan relay-1 terminal 2. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

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

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E10, F48
- Harness for open or short between cooling fan relay-1 and ECM

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

6. CHECK COOLING FAN RELAY-1

Refer to EC-493, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace cooling fan relay.

7. CHECK COOLING FAN MOTORS-1 AND -2

Refer to EC-493, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace cooling fan motors.

8. CHECK INTERMITTENT INCIDENT

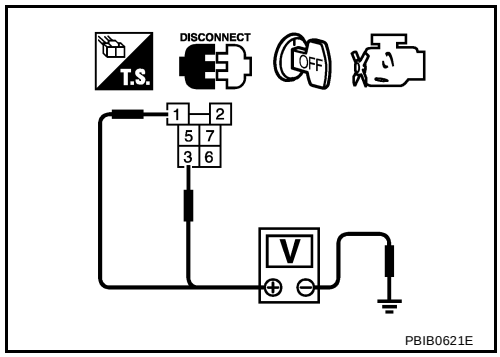
Perform EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

PROCEDURE B

1. CHECK COOLING FAN POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect cooling fan relay-2.
3. Turn ignition switch “ON”.
4. Check voltage between cooling fan relay-2 terminals 1, 3 and ground with CONSULT-II or tester.



OK or NG

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

2. DETECT MALFUNCTIONING PART

Check the following.

- 10A fuse
- 40A fusible link
- Harness for open or short between cooling fan relay-2 and fuse
- Harness for open or short between cooling fan relay-2 and fusible link

>> Repair harness or connectors.

3. CHECK COOLING FAN GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect cooling fan motor-2 harness connector.
3. Check harness continuity between cooling fan relay-2 terminal 5 and cooling fan motor-1 terminal 2, cooling fan relay-2 terminal 6 and cooling fan motor-1 terminal 3, cooling fan relay-2 terminal 7 and body ground.
   Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

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

4. CHECK COOLING FAN OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 12 and cooling fan relay-2 terminal 2.
   Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

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

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E10, F48
- Harness for open or short between cooling fan relay-2 and ECM

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

6. CHECK COOLING FAN RELAY-2

Refer to EC-493, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace cooling fan relays.

7. CHECK COOLING FAN MOTORS-1 AND -2

Refer to EC-493, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace cooling fan motors.

8. CHECK INTERMITTENT INCIDENT

Perform EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Main 12 Causes of Overheating

UBS001N1

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	● Blocked radiator ● Blocked condenser ● Blocked radiator grille ● Blocked bumper	● Visual	No blocking	—
	2	● Coolant mixture	● Coolant tester	50 - 50% coolant mixture	See MA-13, "RECOMMENDED FLUIDS AND LUBRICANTS" .
	3	● Coolant level	● Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	See MA-15, "Changing Engine Coolant" .
	4	● Radiator cap	● Pressure tester	59 - 98 kPa (0.6 - 1.0 kg/cm^2 , 9 - 14 psi) (Limit)	See CO-8, "System Check" .
ON*2	5	● Coolant leaks	● Visual	No leaks	See CO-8, "System Check" .
ON*2	6	● Thermostat	● Touch the upper and lower radiator hoses	Both hoses should be hot	See CO-12, "THERMOSTAT AND THERMOSTAT HOUSING" , and CO-14, "RADIATOR" .
ON*1	7	● Cooling fan	● CONSULT-II	Operating	See trouble diagnosis for EC-481, "DTC P1217 ENGINE OVER TEMPERATURE"
OFF	8	● Combustion gas leak	● Color checker chemical tester 4 Gas analyzer	Negative	—

Engine	Step	Inspection item	Equipment	Standard	Reference page
ON*3	9	● Coolant temperature gauge	● Visual	Gauge less than 3/4 when driving	—
		● Coolant overflow to reservoir tank	● Visual	No overflow during driving and idling	See MA-15, "Changing Engine Coolant" .
OFF*4	10	● Coolant return from reservoir tank to radiator	● Visual	Should be initial level in reservoir tank	See CO-8, "System Check" .
OFF	11	● Cylinder head	● Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	See EM-40, "Inspection" .
	12	● Cylinder block and pistons	● Visual	No scuffing on cylinder walls or piston	See EM-60, "Inspection" .

*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-5, "OVERHEATING CAUSE ANALYSIS" .

Component Inspection

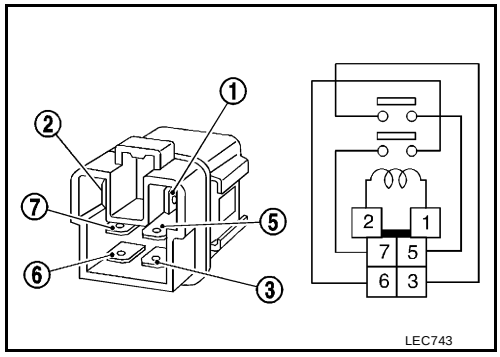
UBS001N2

COOLING FAN RELAYS-1 AND -2

Check continuity between terminals 3 and 5, 6 and 7.

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

If NG, replace relay.

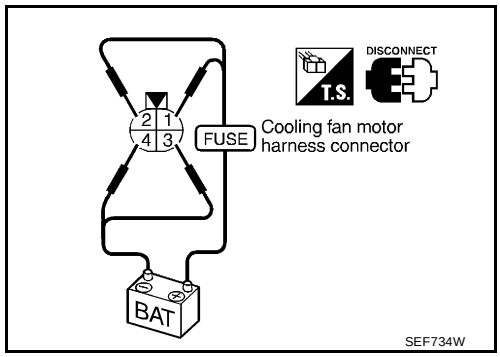


COOLING FAN MOTOR-1

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
	High	1, 2	3, 4

Cooling should operate
If NG, replace cooling fan motor.

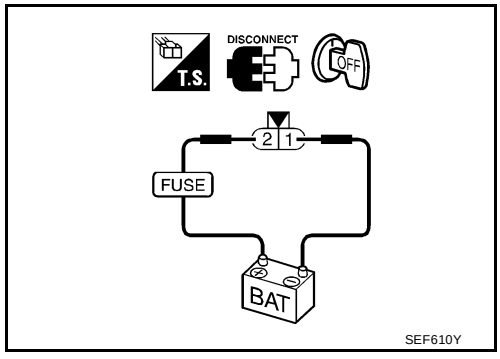


COOLING FAN MOTOR-2

1. Disconnect cooling fan motor harness connectors.
2. Supply cooling fan motor terminals with battery voltage and check operation.

	Terminals	
	(+)	(–)
Cooling fan motor	2	1

Cooling should operate
If NG, replace cooling fan motor.



DTC P1402 EGR FUNCTION

PFP:14710

Description

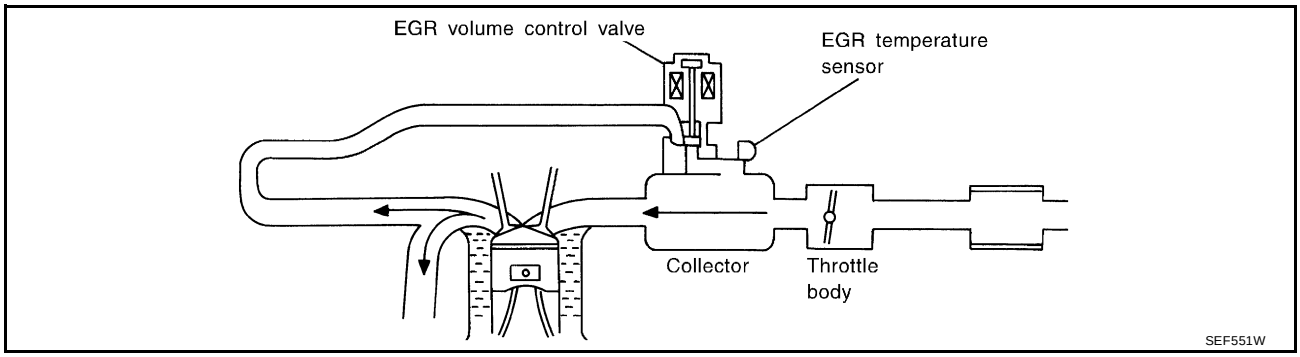
UBS001N3

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed	EGR volume control	EGR volume control valve
Camshaft position sensor (PHASE)	Engine speed and cylinder position		
Vehicle speed sensor	Vehicle speed		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		
Battery	Battery voltage		
Mass air flow sensor	Amount of intake air		
Air conditioner switch	Air conditioner operation		
Power steering oil pressure switch	Power steering load signal		
Electrical load	Electrical load signal		
Park/Neutral position switch	Park/Neutral position		
TCM (Transmission control module)	Gear position, shifting signal		

This system controls flow rate of EGR led from exhaust manifold to intake manifold. The opening of the EGR bypass passage in the EGR volume control valve changes to control the flow rate. A built-in step motor moves the valve in steps corresponding to the ECM output pulses. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions. The EGR volume control valve remains close under the following conditions.

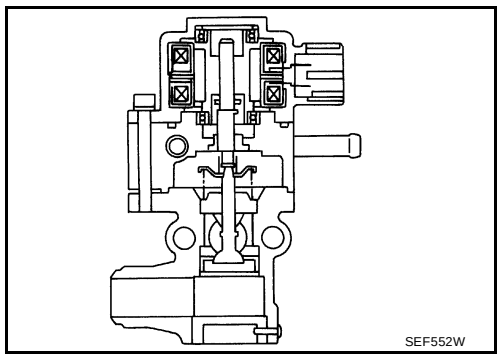
- Engine stopped
- Engine starting
- Engine idling
- Low engine coolant temperature
- Excessively high engine coolant temperature
- High engine speed
- Wide open throttle
- Low battery voltage



COMPONENT DESCRIPTION

EGR Volume Control Valve

The EGR volume control valve uses a step motor to control the flow rate of EGR from exhaust manifold. This motor has four winding phases. It operates according to the output pulse signal of the ECM. Two windings are turned ON and OFF in sequence. Each time an ON pulse is issued, the valve opens or closes, changing the flow rate. When no change in the flow rate is needed, the ECM does not issue the pulse signal. A certain voltage signal is issued so that the valve remains at that particular opening.


SEF552W

CONSULT-II Reference Value in Data Monitor Mode

UBS001N4

Specification data are reference values.

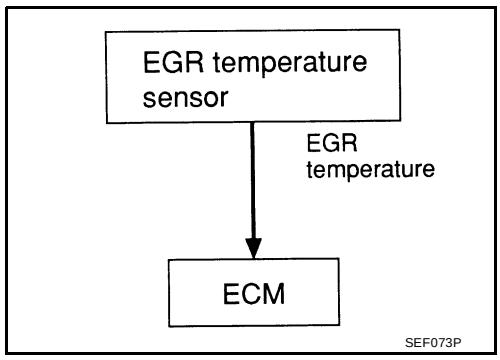
MONITOR ITEM	CONDITION		SPECIFICATION
EGR TEMP SEN	● Engine: After warming up		Less than 4.5V
EGR VOL CON/V	● Engine: After warming up ● Air conditioner switch: “OFF” ● Shift lever: “N” ● No-load	Idle	0 step
		Revving engine up to 3,000 rpm quickly	10 - 55 steps

On Board Diagnosis Logic

UBS001N5

If the EGR temperature sensor detects EGR flow under the condition that does not call for EGR, a high-flow malfunction is diagnosed.
Malfunction is detected when EGR flow is detected under condition that does not call for EGR.

NOTE:
Diagnosis for this DTC will occur when engine coolant temperature is below 50 to 60°C (122 to 140°F). Therefore, it will be better to turn ignition switch “ON” (start engine) at the engine coolant temperature below 30°C (86°F) when starting DTC confirmation procedure.



SEF073P

Possible Cause

UBS001N6

- Harness or connectors
  (EGR volume control valve circuit is open or shorted.)
- EGR volume control valve leaking or stuck open
- EGR temperature sensor

DTC Confirmation Procedure

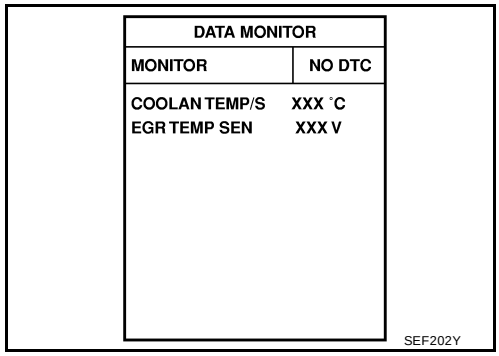
UBS001N7

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 the test at a temperature above −10°C (14°F).**

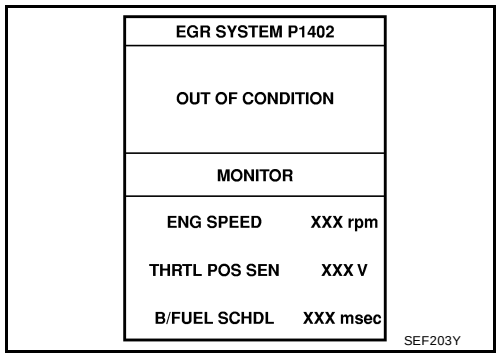
- **Engine coolant temperature and EGR temperature must be verified in “DATA MONITOR” mode with CONSULT-II before starting DTC WORK SUPPORT test. If it is out of range below, the test cannot be conducted.**
  COOLAN TEMP/S: –10 to 50°C (14 to 122°F)*
  EGR TEMP SEN: Less than 4.8V
  If the values are out of the ranges indicated above, park the vehicle in a cool place and allow the engine temperature to stabilize. Do not attempt to reduce the engine coolant temperature or EGR temperature with a fan or means other than ambient air. Doing so may produce an inaccurate diagnostic result.



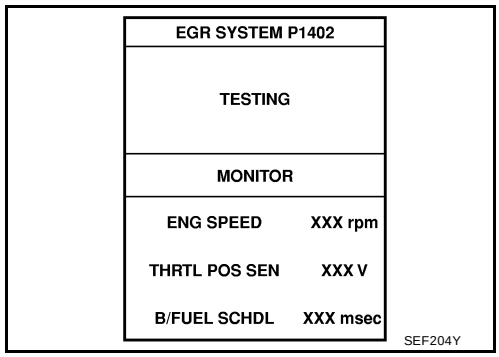
*: Although CONSULT-II screen displays “–10 to 40°C (14 to 104°F)” as a range of engine coolant temperature, ignore it.

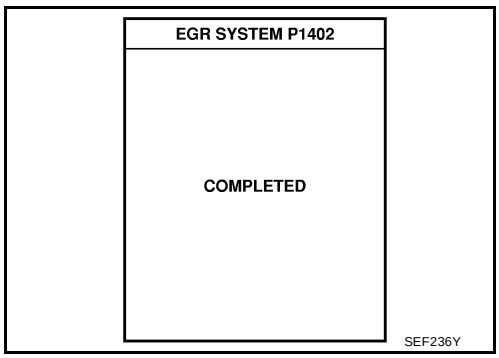
WITH CONSULT-II

1. Turn ignition switch “OFF”, and wait at least 5 seconds, and then turn “ON”.
2. Select “EGR SYSTEM P1402” of “EGR SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II.
3. Touch “START”.
4. Start engine and let it idle until “TESTING” on CONSULT-II screen is turned to “COMPLETED”. (It will take 80 seconds or more.)



If “TESTING” is not displayed after 5 minutes, turn ignition “OFF” and cool the engine coolant temperature to the range of –10 to 50°C (14 to 122°F). Retry from step 1.

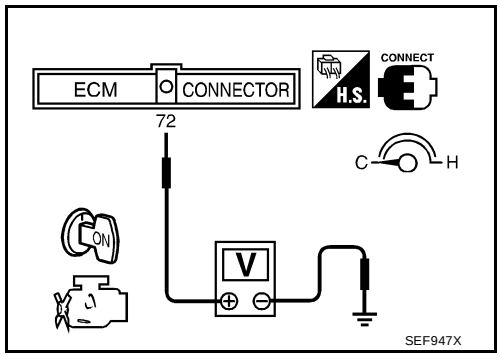




5. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to EC-499, "Diagnostic Procedure" .

WITH GST

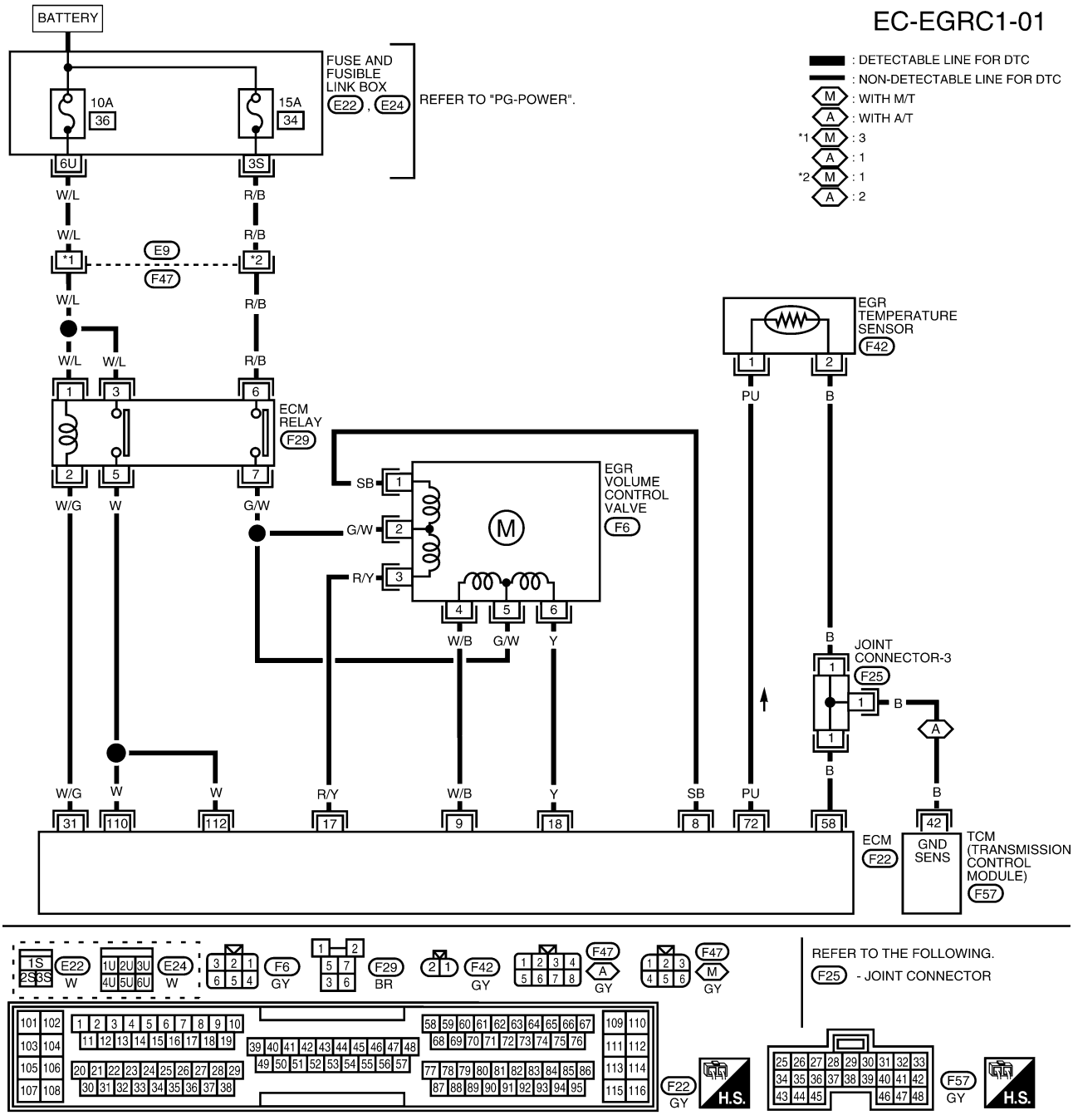
1. Turn ignition switch “ON” and select “MODE 1” with GST.
2. Check that engine coolant temperature is within the range of –10 to 50°C (14 to 122°F).
3. Check that voltage between ECM terminal 72 (EGR temperature sensor signal) and ground is less than 4.8V.
4. Start engine and let it idle for at least 80 seconds.
5. Stop engine.
6. Perform from step 1 to 4.
7. Select “MODE 3” with GST.
8. If DTC is detected, go to EC-499, "Diagnostic Procedure" .



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

Wiring Diagram

UBS001N8



ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
8	SB	EGR VOLUME CONTROL VALVE	ENGINE RUNNING AT IDLE SPEED	0.1 - 14V
9	W/B			
17	R/Y			
18	Y			

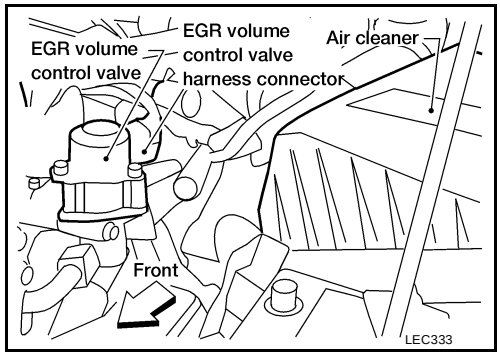
SEF196ZA

Diagnostic Procedure

UBS001N9

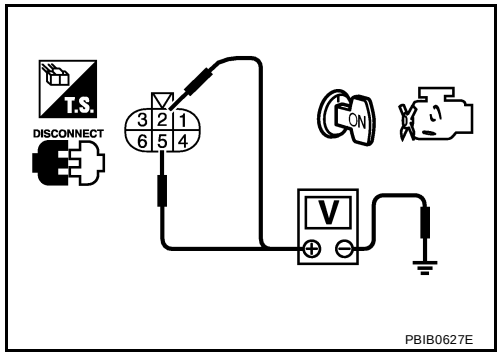
1. CHECK EGR VOLUME CONTROL VALVE POWER SUPPLY CIRCUIT

1. Disconnect EGR volume control valve harness connector.



2. Turn ignition switch ON.
3. Check voltage between EGR volume control valve terminals 2, 5 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

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

2. DETECT MALFUNCTIONING PART

Check the harness for open or short between ECM relay and EGR volume control valve.

>> Repair harness or connectors.

3. CHECK EGR VOLUME 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 terminals and EGR volume control valve terminals as follows. Refer to Wiring Diagram.

ECM terminal	EGR volume control valve
8	1
9	4
17	3
18	6

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 EGR TEMPERATURE SENSOR

Refer to EC-340, "Component Inspection" .

OK or NG

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

5. CHECK EGR VOLUME CONTROL VALVE

Refer to EC-332, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace EGR volume control valve.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

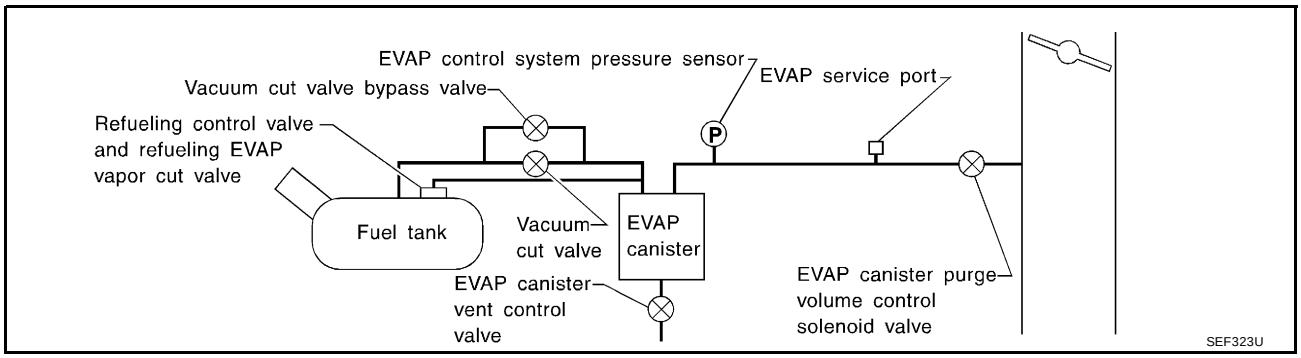
DTC P1442 EVAP CONTROL SYSTEM

PFP:14950

On Board Diagnosis Logic

UBS001NA

NOTE:
If DTC P1442 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-515 .)
This diagnosis detects leaks in the EVAP purge line using of vapor pressure in the fuel tank.
The EVAP canister vent control valve is closed to shut the EVAP purge line. The vacuum cut valve bypass valve will then be opened to clear the line between the fuel tank and the EVAP canister purge volume control solenoid valve. The EVAP control system pressure sensor can now monitor the pressure inside the fuel tank.
If pressure increases, the ECM will check for leaks in the line between the vacuum cut valve and EVAP canister purge volume control solenoid valve.



Malfunction is detected when EVAP control system has a leak, EVAP control system does not operate properly.

CAUTION:

- **Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.**
- **If the fuel filler cap is not tightened properly, the MIL may come on.**
- **Use only a genuine NISSAN rubber tube as a replacement.**

Possible Cause

UBS001NB

- Incorrect fuel tank vacuum relief valve
- Incorrect fuel filler cap used
- Fuel filler cap remains open or fails to close
- Foreign matter caught in fuel filler cap
- Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve
- Foreign matter caught in EVAP canister vent control valve
- EVAP canister
- EVAP purge line (pipe and rubber tube) leaks
- EVAP purge line rubber tube bent
- Blocked or bent rubber tube to EVAP control system pressure sensor
- Loose or disconnected rubber tube
- EVAP canister vent control valve and the circuit
- EVAP canister purge volume control solenoid valve
- Fuel tank temperature sensor
- O-ring of EVAP canister vent control valve is missing or damaged
- Water separator
- EVAP canister is saturated with water
- Fuel level sensor and the circuit
- EVAP control system pressure sensor
- Refueling control valve
- ORVR system leaks
- Foreign matter caught in EVAP canister purge volume control solenoid valve

DTC Confirmation Procedure

UBS001NC

Refer to EC-393, "DTC P0456, P1456 EVAP CONTROL SYSTEM" .

Diagnostic Procedure

UBS001ND

Refer to EC-393, "DTC P0456, P1456 EVAP CONTROL SYSTEM" .

DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

PFP:14920

Description

UBS001NE

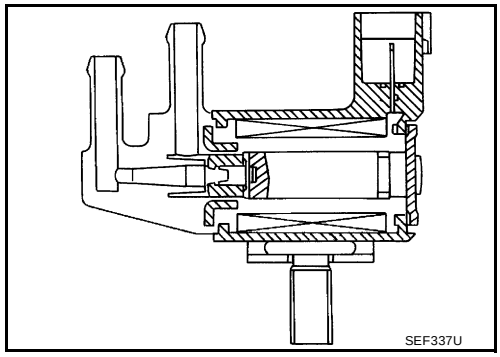
SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
Camshaft position sensor (PHASE)	Engine speed and cylinder position		
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		
Throttle position switch	Closed throttle position		
Heated oxygen sensors 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Fuel tank temperature sensor	Fuel temperature in fuel tank		
Vehicle speed sensor	Vehicle speed		

This system controls flow rate of fuel vapor from the EVAP canister. The opening of the vapor bypass 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

UBS001NF

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PURG VOL C/V	● Engine: After warming up ● Air conditioner switch “OFF” ● Shift lever: “N” ● No-load	Idle (Vehicle stopped)	0%
		2,000 rpm	—

On Board Diagnosis Logic

UBS001NG

Malfunction is detected when the canister purge flow is detected during the specified driving conditions, even when EVAP canister purge volume control solenoid valve is completely closed.

Possible Cause

UBS001NH

- EVAP control system pressure sensor
- EVAP canister purge volume control solenoid valve (The valve is stuck open.)
- EVAP canister vent control valve

- EVAP canister
- Hoses
  (Hoses are connected incorrectly or clogged.)

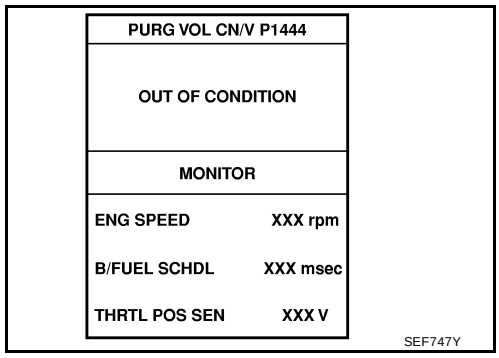
DTC Confirmation Procedure

UBS001NI

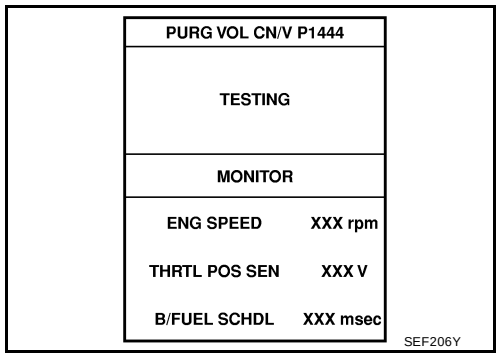
NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
For best results, perform test at a temperature of 0°C (32°F) or more.

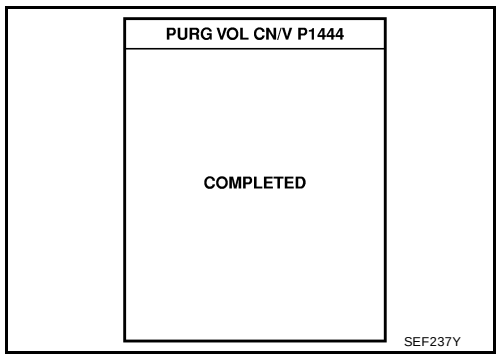
WITH CONSULT-II

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 for approximately 10 seconds.)



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





7. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to EC-506, "Diagnostic Procedure" .

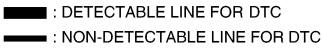
WITH GST

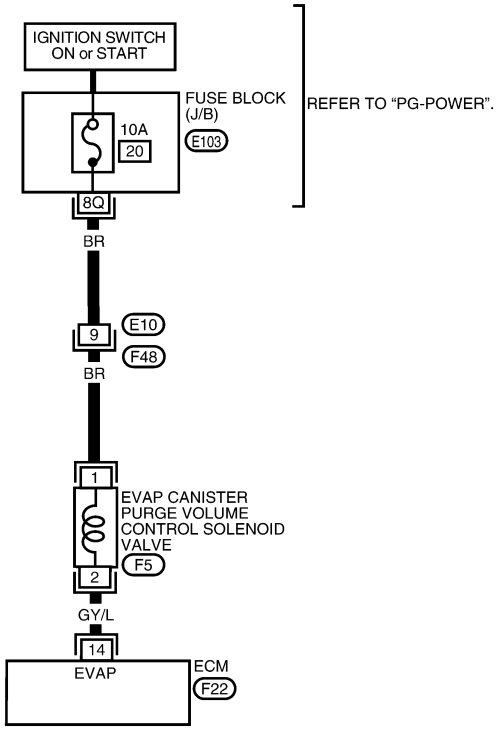
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Start engine and let it idle for at least 20 seconds.
4. Select “MODE 7” with GST.
5. If 1st trip DTC is detected, go to EC-506, "Diagnostic Procedure" .

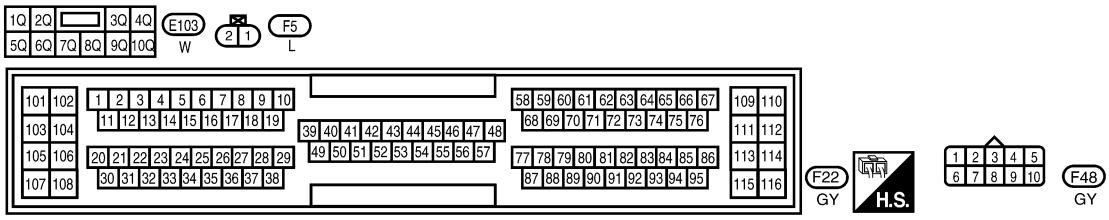
Wiring Diagram

UBS001NJ

EC-PGC/V-01







ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
14	GY/L	EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE	ENGINE RUNNING AT IDLE SPEED	BATTERY VOLTAGE (V) 40 20 0 50 ms
			ENGINE RUNNING AT 2,000 RPM (MORE THAN 100 SECONDS AFTER STARTING ENGINE)	BATTERY VOLTAGE (V) 40 20 0 50 ms

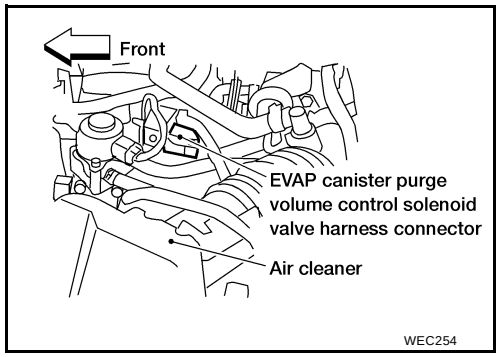
SEF576Y

Diagnostic Procedure

UBS001NK

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".

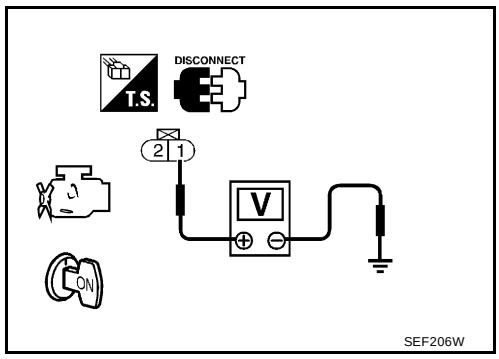


4. Check voltage between EVAP canister purge volume control solenoid valve terminal 1 and engine ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

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



2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E10, F48
- Fuse block (J/B) connector E103
- 10A fuse
- Harness for open or short between EVAP canister purge volume control solenoid valve and fuse

>> Repair harness or connectors.

3. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 14 and EVAP canister purge volume control solenoid valve terminal 2. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

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

4. DETECT MALFUNCTIONING PART

Check the harness for open or short between EVAP canister purge volume control solenoid valve and ECM.

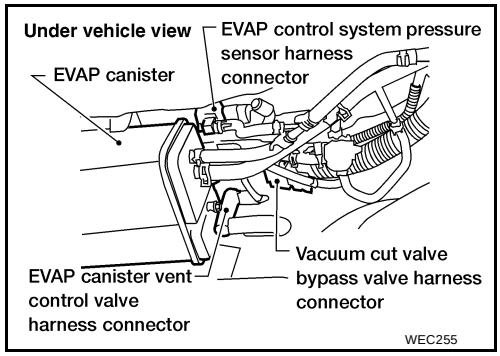
>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE

Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.

OK or NG

OK >> GO TO 6.
NG >> Repair it.



6. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check connectors for water.

Water should not exist.

OK or NG

OK >> GO TO 7.
NG >> Replace EVAP control system pressure sensor.

7. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-382, "Component Inspection" .

OK or NG

OK (With CONSULT-II)>>GO TO 8.
OK (Without CONSULT-II)>>GO TO 9.
NG >> Replace EVAP control system pressure sensor.

8. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

1. 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.

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XX %
A/F ALPHA-B2	XX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN
THRTL POS SEN	X. XX V

SEF677Y

OK or NG

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

9. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-509, "Component Inspection" .

OK or NG

OK >> GO TO 10.
NG >> Replace EVAP canister purge volume control solenoid valve.

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-373, "Component Inspection" .

OK or NG

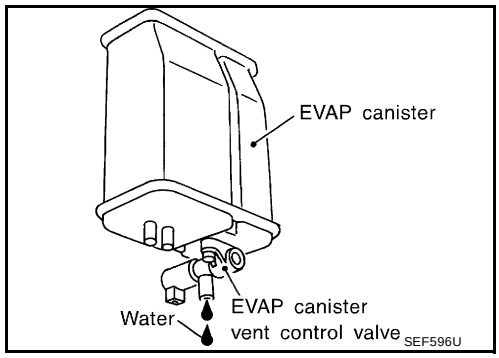
OK >> GO TO 12.
NG >> Replace EVAP canister vent control valve.

12. CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Check if water will drain from the EVAP canister.

Yes or No

Yes >> GO TO 13.
No >> GO TO 16.



13. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve attached.

The weight should be less than 1.8 kg (4.0 lb).

OK or NG

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

14. DETECT MALFUNCTIONING PART

Check the following.

- EVAP canister for damage
- EVAP hose between EVAP canister and water separator for clogging or poor connection

>> Repair hose or replace EVAP canister.

15. CHECK WATER SEPARATOR

Refer to EC-363, "Component Inspection" .

OK or NG

OK >> GO TO 18.
NG >> Clean or replace water separator.

16. CHECK INTERMITTENT INCIDENT

Refer to EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

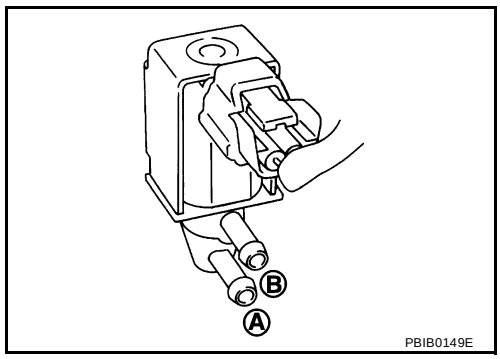
UBS001NL

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

Condition (PURG VOL CONT/V value)	Air passage continuity between A and B
100.0%	Yes
0.0%	No

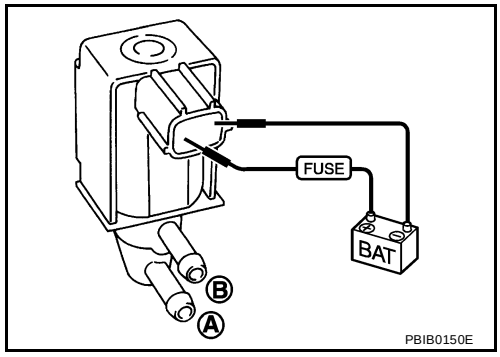


PBIB0149E

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

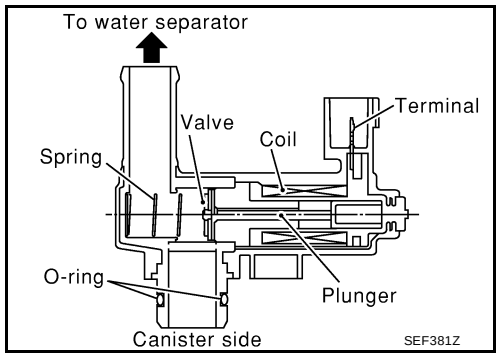
DTC P1446 EVAP CANISTER VENT CONTROL VALVE

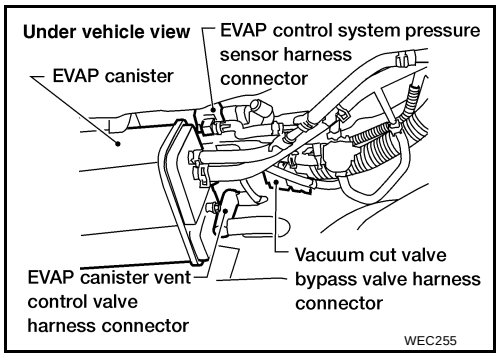
PFP:14935

Component Description

UBS001NM

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent.
This solenoid valve responds to signals from the ECM. When the ECM sends an ON signal, the coil in the solenoid valve is energized. A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.
This solenoid valve is used only for diagnosis, and usually remains opened.
When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows “EVAP Control System (Small Leak, Gross Leak, Very Small Leak)” diagnosis.





CONSULT-II Reference Value in Data Monitor Mode

UBS001NN

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	● Ignition switch: ON	OFF

On Board Diagnosis Logic

UBS001NO

Malfunction is detected when EVAP canister vent control valve remains closed under specified driving conditions.

Possible Cause

UBS001NP

- EVAP canister vent control valve
- EVAP control system pressure sensor and the circuit
- Blocked rubber tube to EVAP canister vent control valve
- Water separator
- EVAP canister is saturated with water

DTC Confirmation Procedure

UBS001NQ

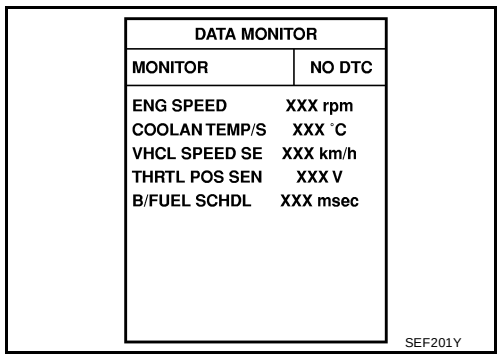
CAUTION:
Always drive vehicle at a safe speed.

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

WITH CONSULT-II

1. Turn ignition switch “ON”.

2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine.
4. Drive vehicle at a speed of approximately 80 km/h (50 MPH) for a maximum of 15 minutes.
   NOTE:
   If a malfunction exists, NG result may be displayed quicker.
5. If 1st trip DTC is detected, go to EC-512, "Diagnostic Procedure"
   .



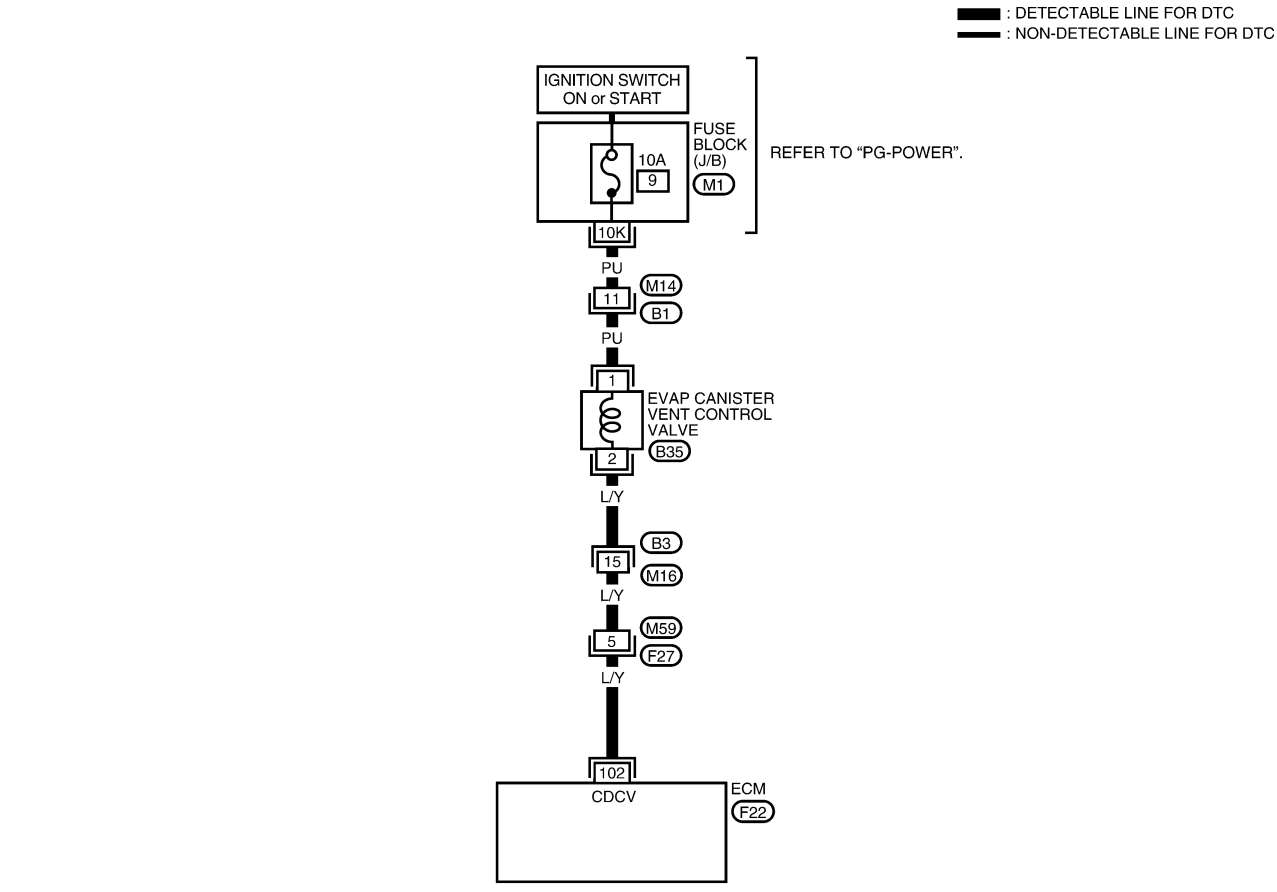
WITH GST

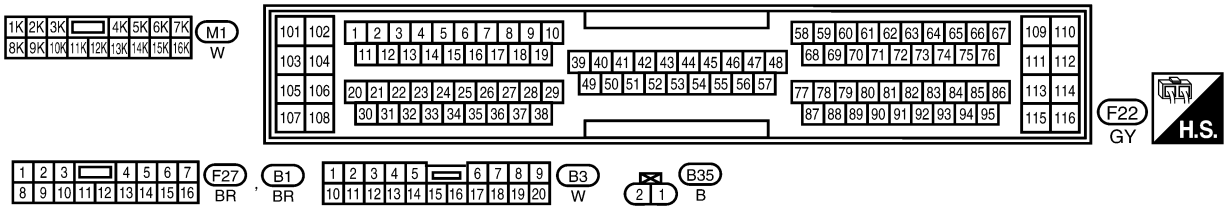
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS001NR

EC-VENT/V-01





BBWA0126E

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
102	L/Y	EVAP CANISTER VENT CONTROL VALVE	IGN ON	BATTERY VOLTAGE

SEF577Y

Diagnostic Procedure

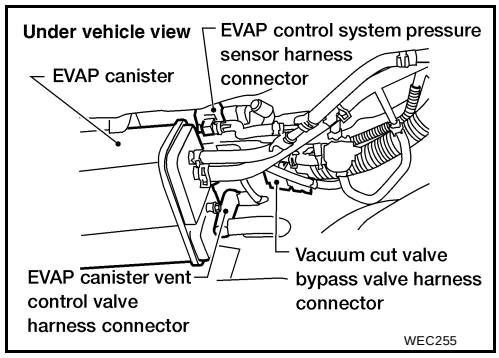
UBS001NS

1. CHECK RUBBER TUBE

1. Turn ignition switch "OFF".
2. Disconnect rubber tube connected to EVAP canister vent control valve.
3. Check the rubber tube for clogging.

OK or NG

OK >> GO TO 2.
NG >> Clean rubber tube using an air blower.



2. CHECK WATER SEPARATOR

Refer to EC-363, "Component Inspection" .

OK or NG

OK >> GO TO 3.
NG >> Clean or replace water separator.

3. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-513, "Component Inspection" .

OK or NG

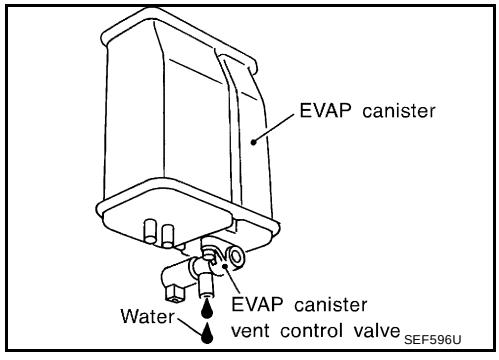
OK >> GO TO 4.
NG >> Replace EVAP canister vent control valve.

4. CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Check if water will drain from the EVAP canister.

Yes or No

Yes >> GO TO 5.
No >> GO TO 7.



5. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve attached.
The weight should be less than 1.8 kg (4.0 lb).

OK or NG

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

6. DETECT MALFUNCTIONING PART

Check the following.

- EVAP canister for damage
- EVAP hose between EVAP canister and water separator for clogging or poor connection

>> Repair hose or replace EVAP canister.

7. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE

Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.

OK or NG

OK >> GO TO 8.
NG >> Repair it.

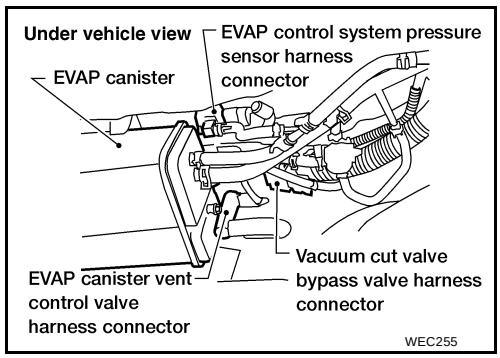
8. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check connectors for water.

Water should not exist.

OK or NG

OK >> GO TO 9.
NG >> Replace EVAP control system pressure sensor.



9. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-382, "Component Inspection" .

OK or NG

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

10. CHECK INTERMITTENT INCIDENT

Refer to EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

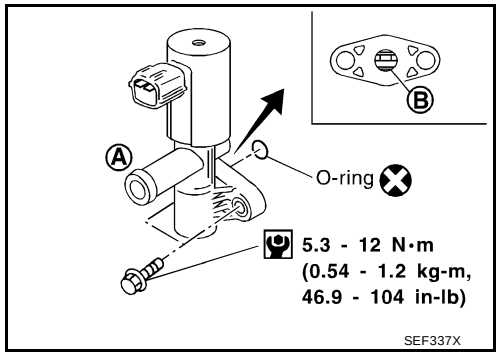
UBS001NT

EVAP CANISTER VENT CONTROL VALVE

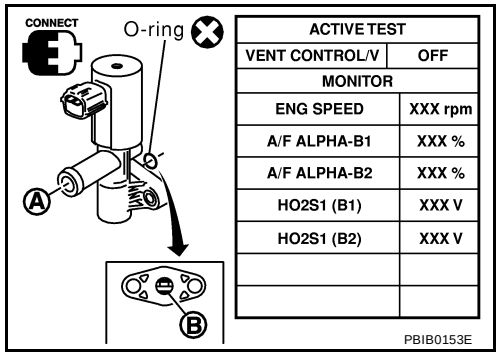
With CONSULT-II

1. Remove EVAP canister vent control valve from EVAP canister.

2. Check portion **B** of EVAP canister vent control valve for being rusted.
3. Reconnect harness connectors disconnected.
4. Turn ignition switch “ON”.

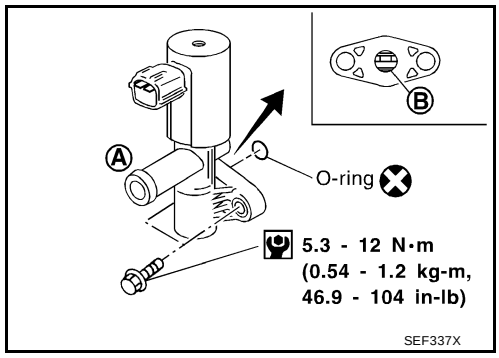


5. Perform “VENT CONTROL/V” in “ACTIVE TEST” mode.
6. Check air passage continuity and operation delay time.
7. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
8. Perform Test No. 5 again.

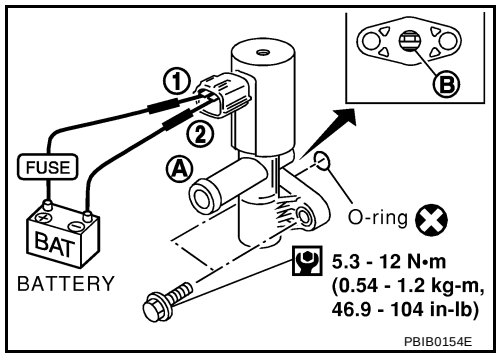


Without CONSULT-II

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.



3. Check air passage continuity and operation delay time under the following conditions.
   Make sure new O-ring is installed properly.
4. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
5. Perform Test No. 3 again.



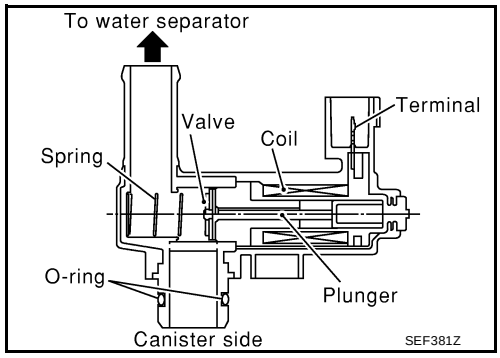
DTC P1448 EVAP CANISTER VENT CONTROL VALVE

PFP:14935

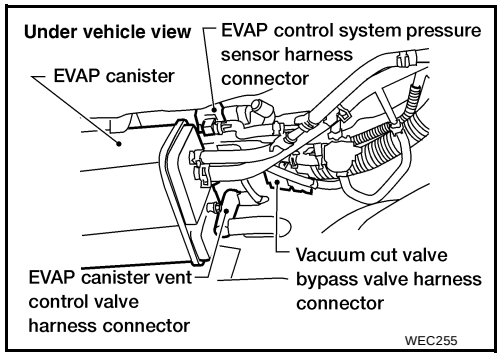
Component Description

UBS001NU

NOTE:
If DTC P1448 is displayed with P0442 or P1442, perform trouble diagnosis for DTC P1448 first.
The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent.
This solenoid valve responds to signals from the ECM. When the ECM sends an ON signal, the coil in the solenoid valve is energized. A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.
This solenoid valve is used only for diagnosis, and usually remains opened.



When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows “EVAP Control System (Small Leak)” diagnosis.



CONSULT-II Reference Value in Data Monitor Mode

UBS001NV

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	● Ignition switch: ON	OFF

On Board Diagnosis Logic

UBS001NW

Malfunction is detected when EVAP canister vent control valve remains opened under specified driving conditions.

Possible Cause

UBS001NX

- EVAP canister vent control valve
- EVAP control system pressure sensor and circuit
- Blocked rubber tube to EVAP canister vent control valve
- Water separator
- EVAP canister is saturated with water
- Vacuum cut valve

DTC Confirmation Procedure

UBS001NY

NOTE:
- **If DTC P1448 is displayed with P0442 or P1442, perform trouble diagnosis for DTC P1448 first.**
- If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

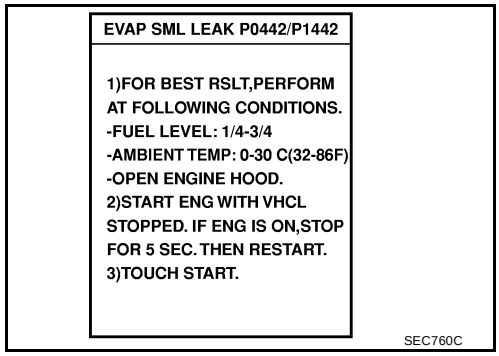
WITH CONSULT-II

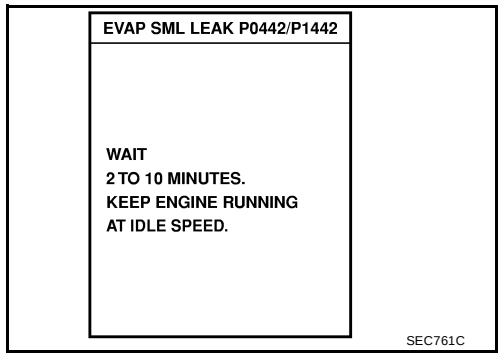
TESTING CONDITION:
- **Perform “DTC WORK SUPPORT” when the fuel level is between 1/4 to 3/4 full and vehicle is placed on flat level surface.**
- **Open engine hood before conducting following procedure.**

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.

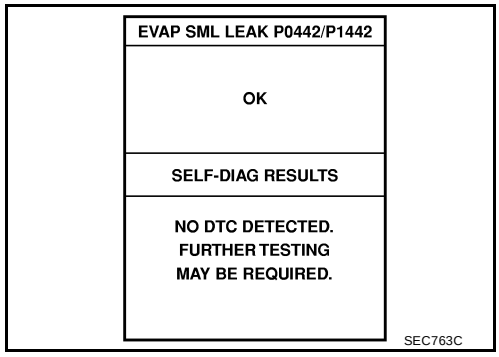
COOLAN TEMP/S	0 - 70°C (32 - 158°F)
INT/A TEMP SE	0 - 30°C (32 - 86°F)

5. Select “EVAP SML LEAK P0442/P1442” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II. Follow the instruction displayed.
   If the engine speed cannot be maintained within the range displayed on the CONSULT-II screen, go to EC-87, "Basic Inspection" .



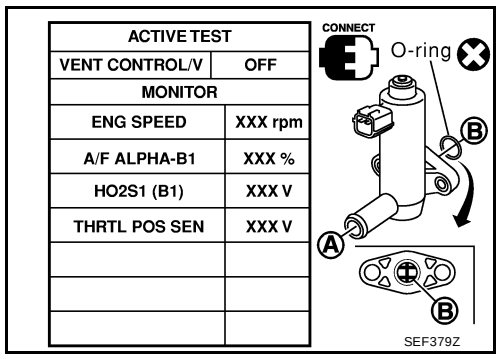


6. Make sure that “OK” is displayed.
   If “NG” is displayed, go to the following step.
   NOTE:
   Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.
7. Stop engine and wait at least 5 seconds, then turn “ON”.
8. Disconnect hose from water separator.



9. Select “VENT CONTROL/V” of “ACTIVE TEST” mode with CONSULT-II.
10. Touch “ON” and “OFF” alternately.
11. Make sure the following.

Condition VENT CONTROL/V	Air passage continuity between **A** and **B**
ON	No
OFF	Yes



If the result is NG, go to EC-519, "Diagnostic Procedure" .
If the result is OK, go to “Diagnostic Procedure” for DTC P0442, EC-355 .

Overall Function Check

UBS001NZ

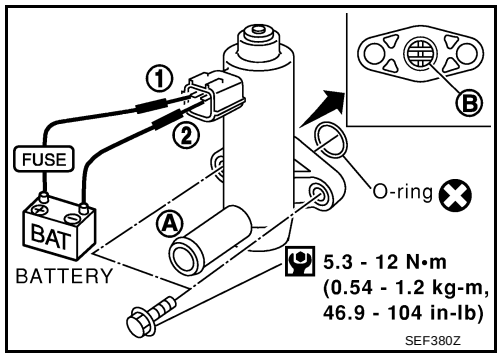
Use this procedure to check the overall function of the EVAP canister vent control valve circuit. During this check, a DTC might not be confirmed.

WITH GST

1. Disconnect hose from water separator.
2. Disconnect EVAP canister vent control valve harness connector.
3. Verify the following.

Condition	Air passage continuity
12V direct current supply between terminals 1 and 2	No
No supply	Yes

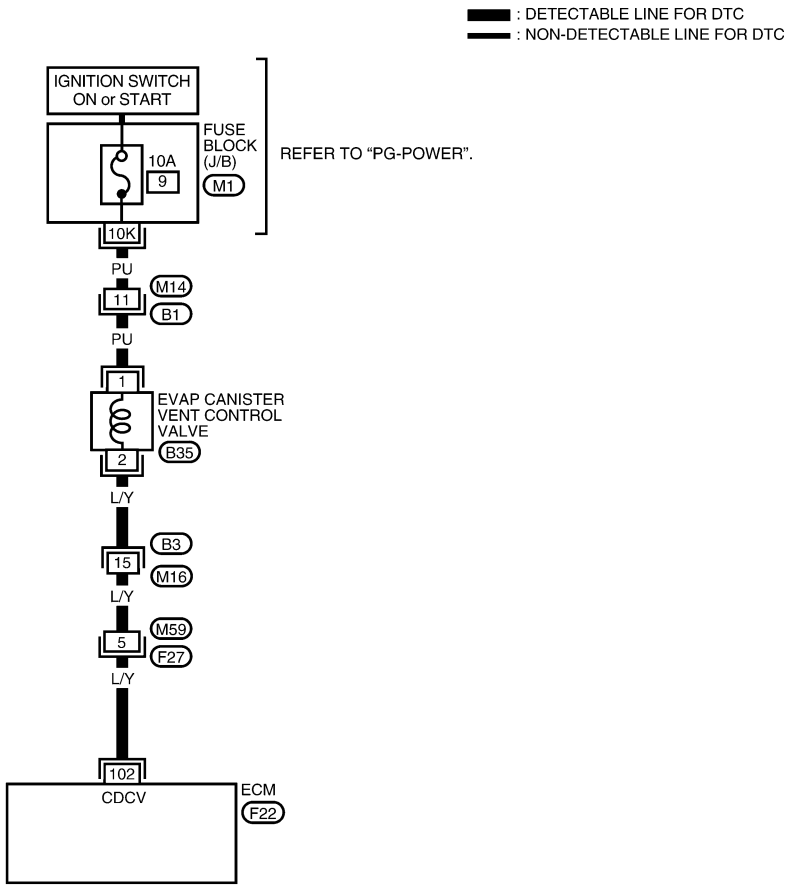
If the result is NG, go to EC-519, "Diagnostic Procedure" .
If the result is OK, go to “Diagnostic Procedure” for DTC P0442, EC-355 .

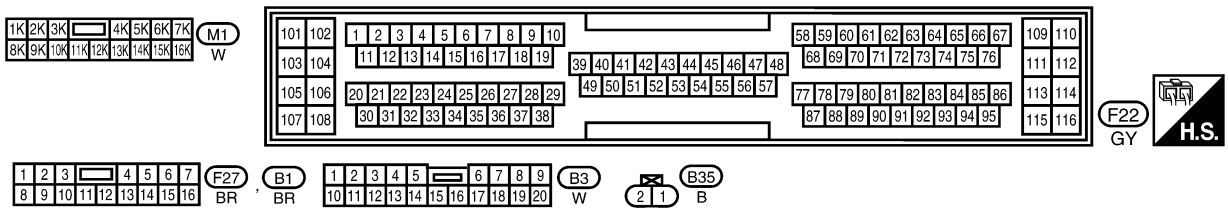


Wiring Diagram

UBS001O0

EC-VENT/V-01





BBWA0126E

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
102	L/Y	EVAP CANISTER VENT CONTROL VALVE	IGN ON	BATTERY VOLTAGE

SEF577Y

Diagnostic Procedure

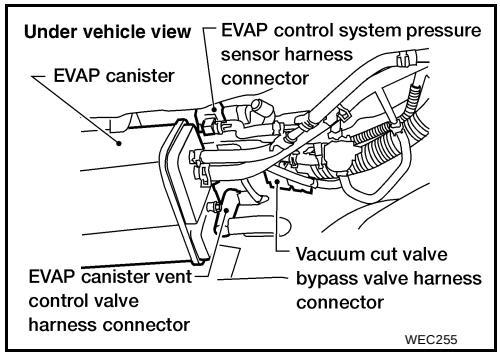
UBS001O1

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-520, "Component Inspection" .

OK or NG

OK >> GO TO 3.
NG >> Replace EVAP canister vent control valve.

3. CHECK VACUUM CUT VALVE

Refer to EC-536, "Component Inspection" .

OK or NG

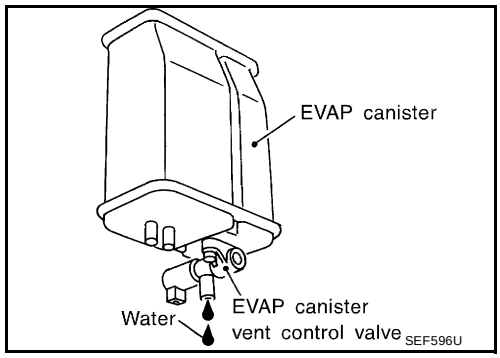
OK >> GO TO 6.
NG >> Replace vacuum cut valve.

4. CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Check if water will drain from the EVAP canister.

Yes or No

Yes >> GO TO 5.
No >> GO TO 7.



5. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve attached.
The weight should be less than 1.8 kg (4.0 lb).

OK or NG

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

6. DETECT MALFUNCTIONING PART

Check the following.

- EVAP canister for damage
- EVAP hose between EVAP canister and water separator for clogging or poor connection

>> Repair hose or replace EVAP canister.

7. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE

Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.

OK or NG

OK >> GO TO 8.
NG >> Repair it.

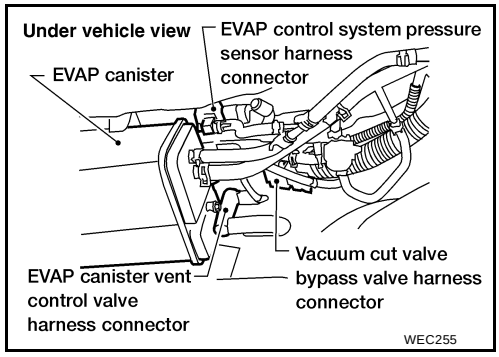
8. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check connectors for water.

Water should not exist.

OK or NG

OK >> GO TO 9.
NG >> Replace EVAP control system pressure sensor.



9. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-382, "Component Inspection" .

OK or NG

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

10. CHECK INTERMITTENT INCIDENT

Refer to EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

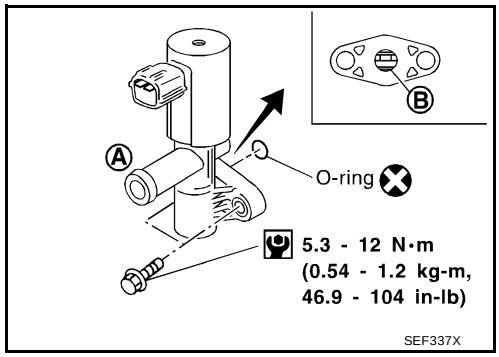
Component Inspection

UBS001O2

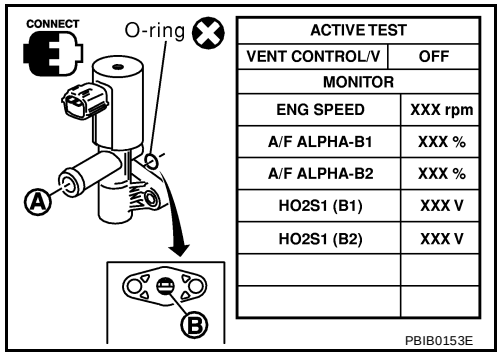
EVAP CANISTER VENT CONTROL VALVE

With CONSULT-II

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.
3. Reconnect harness connectors disconnected.
4. Turn ignition switch “ON”.

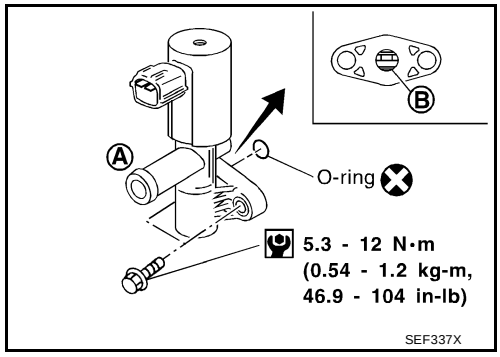


5. Perform “VENT CONTROL/V” in “ACTIVE TEST” mode.
6. Check air passage continuity and operation delay time.
7. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
8. Perform Test No. 5 again.

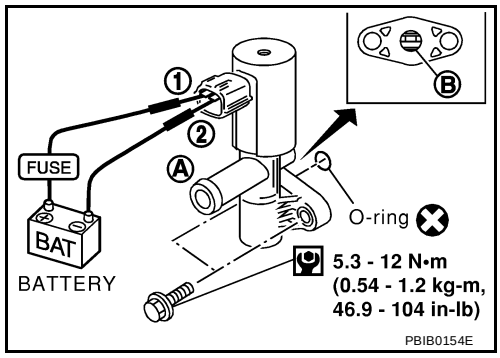


Without CONSULT-II

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.



3. Check air passage continuity and operation delay time under the following conditions.
   Make sure new O-ring is installed properly.
4. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
5. Perform Test No. 3 again.



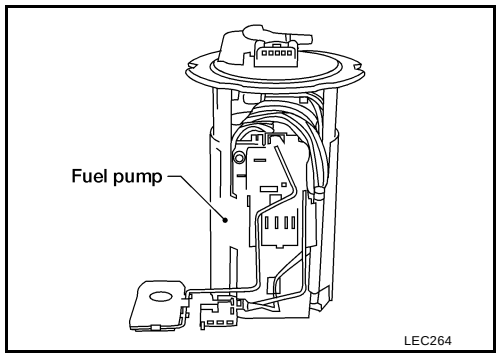
DTC P1464 FUEL LEVEL SENSOR

PFP:25060

Component Description

UBS001O3

The fuel level sensor is mounted in the fuel level sensor unit. The sensor detects a fuel level in the fuel tank and transmits a signal to the ECM.
It consists of two parts, one is mechanical float and the other side is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.



On Board Diagnostic Logic

UBS001O4

ECM receives two signals from the fuel level sensor.
One is fuel level sensor power supply circuit, and the other is fuel level sensor ground circuit.
This diagnosis indicates the latter to detect open circuit malfunction. Malfunction is detected when a high voltage from the sensor is sent to ECM.

Possible Cause

UBS001O5

- Fuel level sensor circuit
  (The fuel level sensor circuit is open or shorted.)

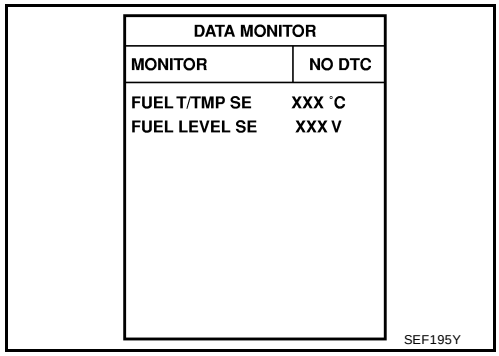
DTC Confirmation Procedure

UBS001O6

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-524, "Diagnostic Procedure"
   .

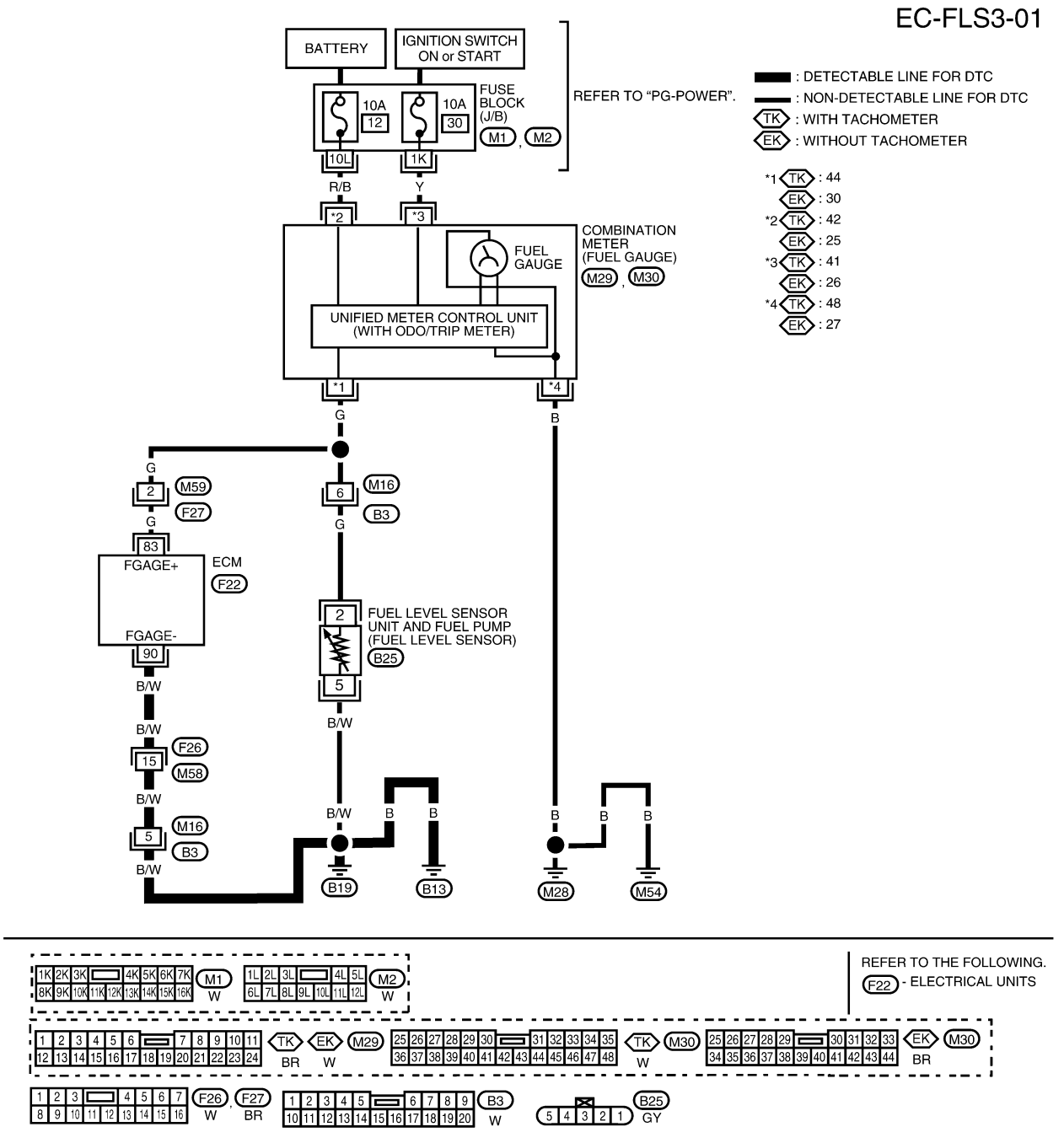


WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS001O7



BBWA0138E

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
83	G	FUEL LEVEL SENSOR	IGN ON	APPROX. 0 - 4.8V
90	B/W	FUEL LEVEL SENSOR GROUND	ENGINE RUNNING AT IDLE SPEED	APPROX. 0V

SEF204ZA

Diagnostic Procedure

UBS001O8

1. CHECK FUEL LEVEL SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 90 and body ground.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for short to power.

OK or NG

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

2. DETECT MALFUNCTIONING PART

1. Check the following.

- Harness connectors F26, M58
- Harness connectors M16, B3
- Harness for open and short between ECM and body ground

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

3. CHECK FUEL LEVEL SENSOR

Refer to DI-23, "FUEL LEVEL SENSOR UNIT CHECK" .

OK or NG

OK >> GO TO 4.
NG >> Replace fuel level sensor unit.

4. CHECK INTERMITTENT INCIDENT

Refer to EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"

OK or NG

>> **INSPECTION END**

DTC P1490 VACUUM CUT VALVE BYPASS VALVE

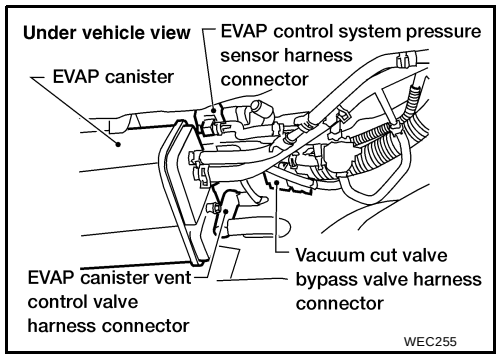
PFP:17372

Description

UBS001O9

COMPONENT DESCRIPTION

The vacuum cut valve bypass valve is a solenoid type valve and generally remains closed. It opens only for on board diagnosis.
The vacuum cut valve bypass valve responds to signals from the ECM. When the ECM sends an ON (ground) signal, the valve is opened.



CONSULT-II Reference Value in Data Monitor Mode

UBS001OA

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VC/V BYPASS/V	● Ignition switch: ON	OFF

On Board Diagnosis Logic

UBS001OB

Malfunction is detected when an improper voltage signal is sent to ECM through vacuum cut valve bypass valve.

Possible Cause

UBS001OC

- Harness or connectors
  (The vacuum cut valve bypass valve circuit is open or shorted.)
- Vacuum cut valve bypass valve

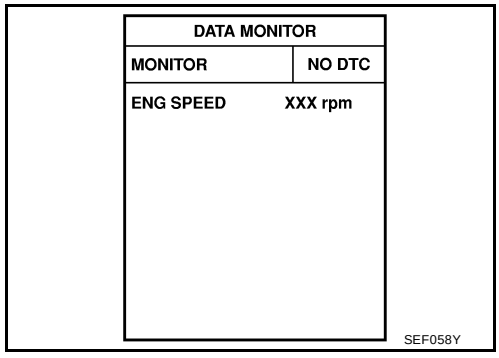
DTC Confirmation Procedure

UBS001OD

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11V at idle speed.

WITH CONSULT-II

1. Turn ignition switch “ON”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and wait at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-528, "Diagnostic Procedure"
   .



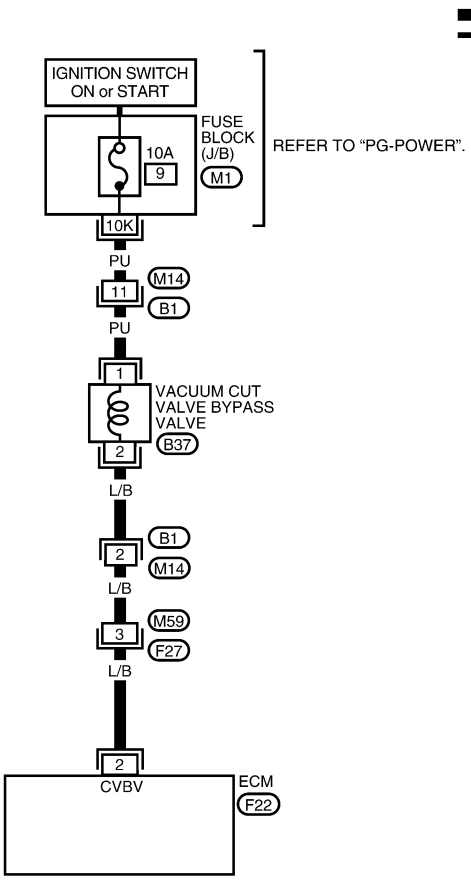
WITH GST

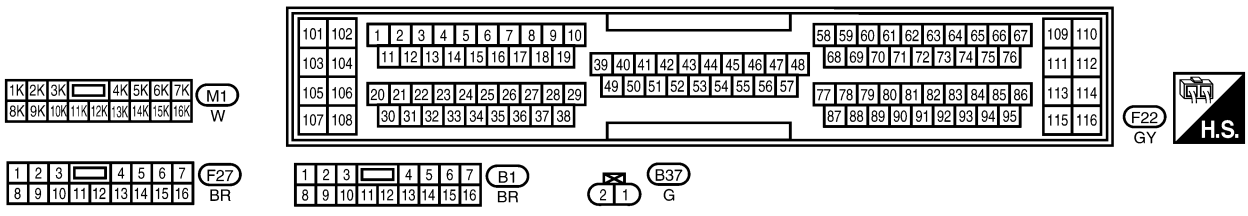
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS001OE

EC-BYPS/V-01





BBWA0139E

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
2	L/B	VACUUM CUT VALVE BYPASS VALVE	IGN ON	BATTERY VOLTAGE

SEF585Y

Diagnostic Procedure

UBS001OF

1. INSPECTION START

Do you have CONSULT-II?

Yes or No

Yes >> GO TO 2.
No >> GO TO 3.

2. CHECK VACUUM CUT VALVE BYPASS VALVE CIRCUIT

With CONSULT-II

1. Turn ignition switch “OFF” and then “ON”.
2. Select “VC/V BYPASS/V” in “ACTIVE TEST” mode with CONSULT-II.
3. Touch “ON/OFF” on CONSULT-II screen.
4. Make sure that clicking sound is heard from the vacuum cut valve bypass valve.

ACTIVE TEST	
VC/V BYPASS/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA- B1	XXX %
A/F ALPHA- B2	XXX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN
THRTL POS SEN	X.XX V

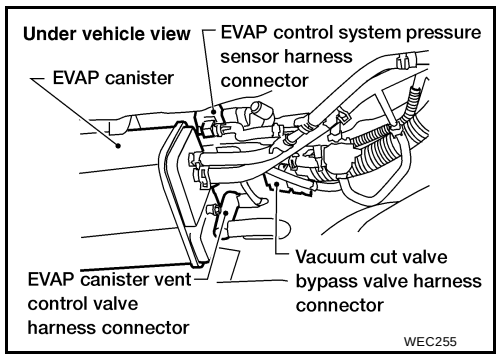
SEF694Y

OK or NG

OK >> GO TO 7.
NG >> GO TO 3.

3. CHECK VACUUM CUT VALVE BYPASS VALVE POWER SUPPLY CIRCUIT

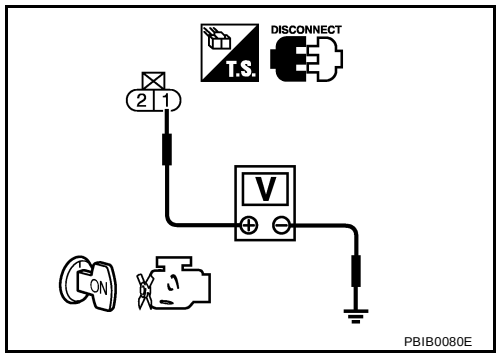
1. Turn ignition switch “OFF”.
2. Disconnect vacuum cut valve bypass valve harness connector.
3. Turn ignition switch “ON”.



WEC255

4. Check voltage between vacuum cut valve bypass valve terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage



PBIB0080E

OK or NG

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

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M14, B1
- Fuse block (J/B) connector M1
- 10A fuse
- Harness for open or short between vacuum cut valve bypass valve and fuse

>> Repair harness or connectors.

5. CHECK VACUUM CUT VALVE BYPASS VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 2 and vacuum cut valve bypass valve terminal 2. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

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

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B1, M14
- Harness connectors M57, F27
- Harness for open or short between vacuum cut valve bypass valve and ECM

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

7. CHECK VACUUM CUT VALVE BYPASS VALVE

Refer to EC-529, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace vacuum cut valve bypass valve.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

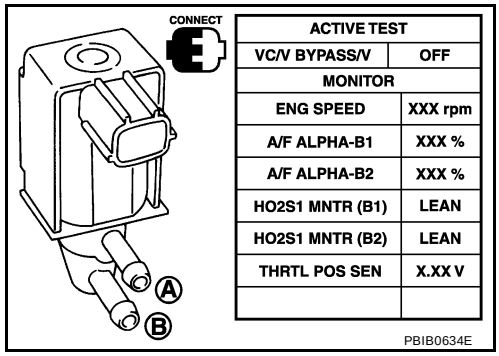
UBS001OG

VACUUM CUT VALVE BYPASS VALVE

With CONSULT-II

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

3. Perform “VC/V BYPASS/V” in “ACTIVE TEST” mode.
4. Check air passage continuity and operation delay time under the following conditions.

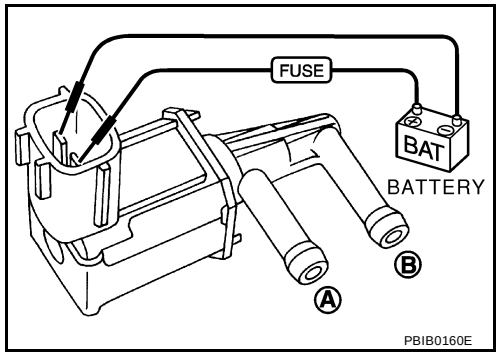


Condition VC/V BUPASS/V	Air passage continuity between A and B
ON	Yes
OFF	No

Operation takes less than 1 second.

With GST

Check air passage continuity and operation delay time under the following conditions.



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

Operation takes less than 1 second.

DTC P1491 VACUUM CUT VALVE BYPASS VALVE

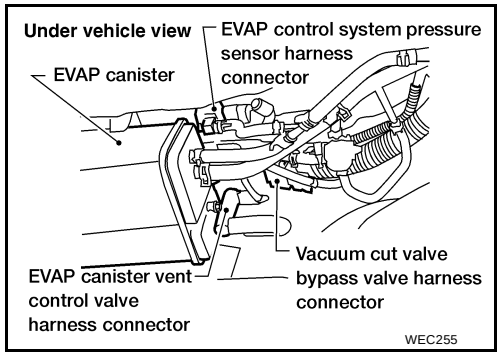
PFP:17372

Description

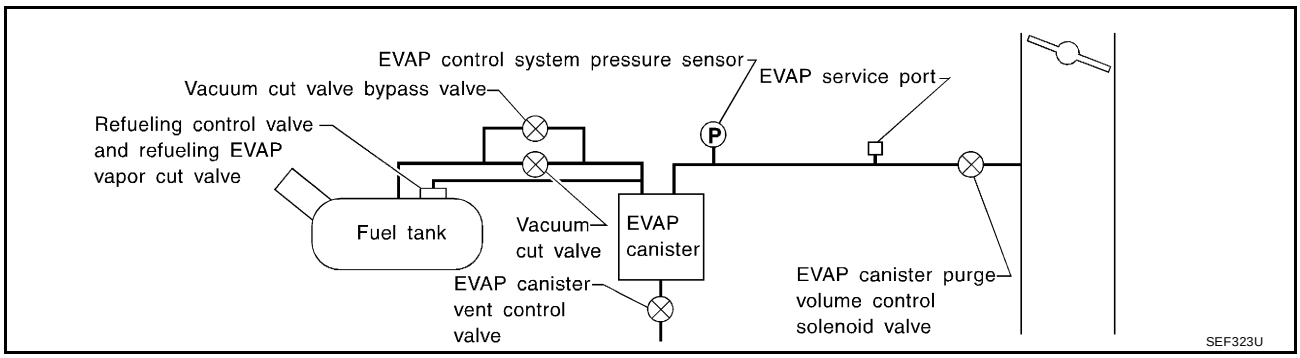
UBS001OH

COMPONENT DESCRIPTION

The vacuum cut valve and vacuum cut valve bypass valve are installed in parallel on the EVAP purge line between the fuel tank and the EVAP canister.
The vacuum cut valve prevents the intake manifold vacuum from being applied to the fuel tank.
The vacuum cut valve bypass valve is a solenoid type valve and generally remains closed. It opens only for on board diagnosis.
The vacuum cut valve bypass valve responds to signals from the ECM. When the ECM sends an ON (ground) signal, the valve is opened. The vacuum cut valve is then bypassed to apply intake manifold vacuum to the fuel tank.



EVAPORATIVE EMISSION SYSTEM DIAGRAM



CONSULT-II Reference Value in Data Monitor Mode

UBS001OI

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VC/V BYPASS/V	● Ignition switch: ON	OFF

On Board Diagnosis Logic

UBS001OJ

Malfunction is detected when vacuum cut valve bypass valve does not operate properly.

Possible Cause

UBS001OK

- Vacuum cut valve bypass valve
- Vacuum cut valve
- Bypass hoses for clogging
- EVAP control system pressure sensor and circuit
- EVAP canister vent control valve
- Hose between fuel tank and vacuum cut valve clogged
- Hose between vacuum cut valve and EVAP canister clogged
- EVAP canister
- EVAP purge port of fuel tank for clogging

DTC Confirmation Procedure

UBS001OL

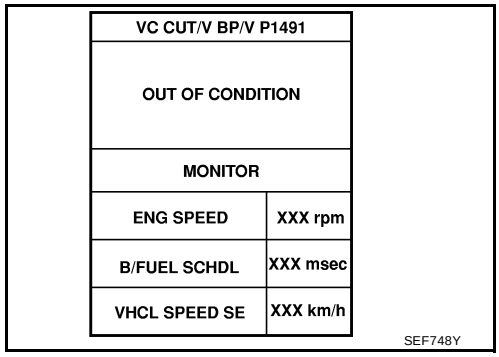
CAUTION:
Always drive vehicle at a safe speed.

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.

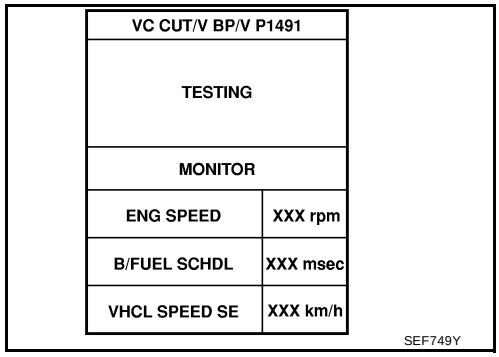
TESTING CONDITION:
For best results, perform test at a temperature of 0°C (32°F) or higher.

WITH CONSULT-II

1. Turn ignition switch “ON”.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch “OFF” and wait at least 10 seconds.
4. Start engine and let it idle for at least 70 seconds.
5. Select “VC CUT/V BP/V P1491” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II.



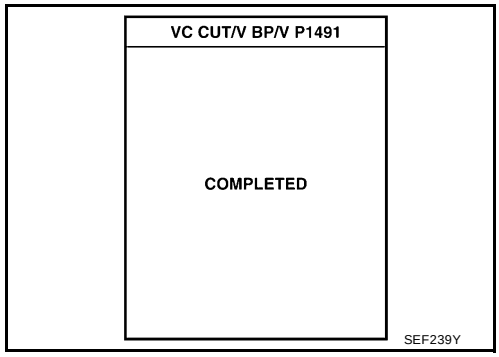
6. Touch “START”.



7. When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take at least 30 seconds.)

ENG SPEED	1,000 - 3,800 rpm
Selector lever	Suitable position
Vehicle speed	36 - 120 km/h (22 - 75 MPH)
B/FUEL SCHDL	1.0 - 8.2 msec

If “TESTING” is not displayed after 5 minutes, retry from step 3.



8. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to EC-533, "Diagnostic Procedure" .

Overall Function Check

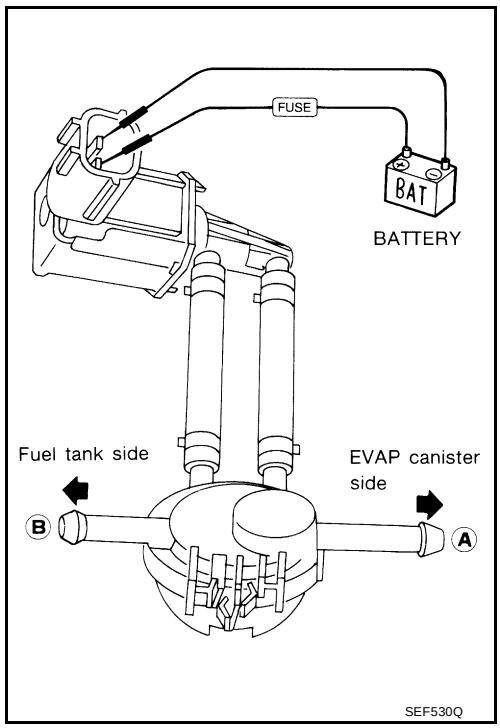
UBS001OM

Use this procedure to check the overall function of vacuum cut valve bypass valve. During this check, the 1st trip DTC might not be confirmed.

WITH GST

1. Remove vacuum cut valve and vacuum cut valve bypass valve as an assembly.

2. Apply vacuum to port **A** and check that there is no suction from port **B** .
3. Apply vacuum to port **B** and check that there is suction from port **A** .
4. Blow air in port **B** and check that there is a resistance to flow out of port **A** .
5. Supply battery voltage to the terminal.
6. Blow air in port **A** and check that air flows freely out of port **B** .
7. Blow air in port **B** and check that air flows freely out of port **A** .
8. If NG, go to EC-533, "Diagnostic Procedure" .



Diagnostic Procedure

UBS001ON

1. INSPECTION START

Do you have CONSULT-II?

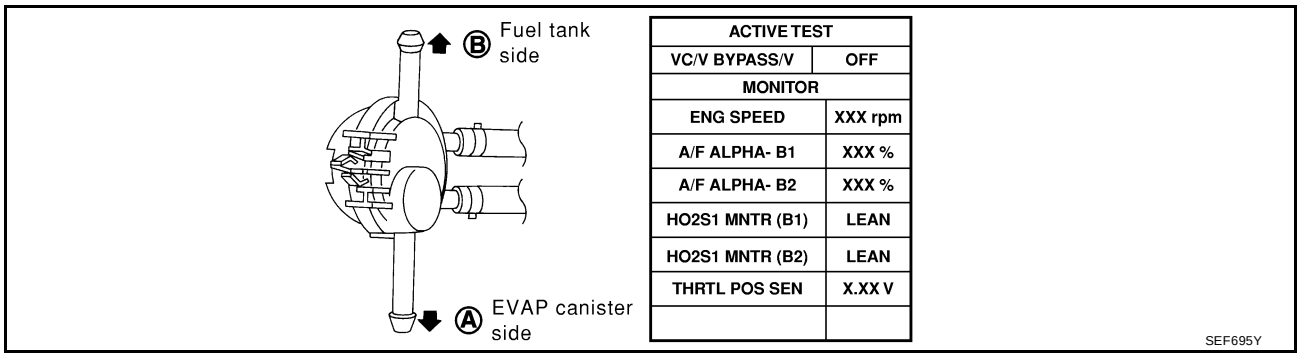
Yes or No

Yes >> GO TO 2.
No >> GO TO 3.

2. CHECK VACUUM CUT VALVE BYPASS VALVE OPERATION

With CONSULT-II

1. Turn ignition switch “OFF”.
2. Remove vacuum cut valve and vacuum cut valve bypass valve as an assembly.
3. Apply vacuum to port A and check that there is no suction from port B.
4. Apply vacuum to port B and check that there is suction from port A.
5. Blow air in port B and check that there is a resistance to flow out of port A.
6. Turn ignition switch “ON”.
7. Select “VC/V BYPASS/V” in “ACTIVE TEST” mode with CONSULT-II and touch “ON”.
8. Blow air in port A and check that air flows freely out of port B.
9. Blow air in port B and check that air flows freely out of port A.



ACTIVE TEST	
VC/V BYPASS/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA- B1	XXX %
A/F ALPHA- B2	XXX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN
THRTL POS SEN	X.XX V

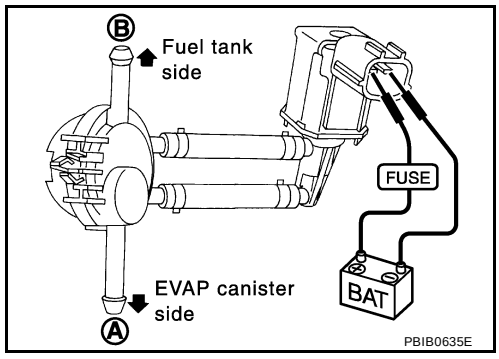
OK or NG

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

3. CHECK VACUUM CUT VALVE BYPASS VALVE OPERATION

Without CONSULT-II

1. Turn ignition switch “OFF”.
2. Remove vacuum cut valve and vacuum cut valve bypass valve as an assembly.
3. Apply vacuum to port A and check that there is no suction from port B.
4. Apply vacuum to port B and check that there is suction from port A.
5. Blow air in port B and check that there is a resistance to flow out of port A.
6. Disconnect vacuum cut valve bypass valve harness connector.
7. Supply battery voltage to the terminal.
8. Blow air in port A and check that air flows freely out of port B.
9. Blow air in port B and check that air flows freely out of port A.



OK or NG

OK >> GO TO 4.
NG >> GO TO 7.

4. CHECK EVAP PURGE LINE

Check EVAP purge line between EVAP canister and fuel tank for clogging or disconnection.

OK or NG

OK >> GO TO 5.
NG >> Repair it.

5. CHECK EVAP PURGE PORT

Check EVAP purge port of fuel tank for clogging.

OK or NG

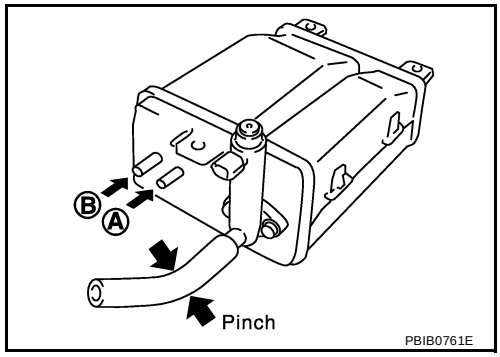
OK >> GO TO 6.
NG >> Clean EVAP purge port.

6. CHECK EVAP CANISTER

1. Pinch the fresh air hose.
2. Blow air into port **A** and check that it flows freely out of port **B** .

OK or NG

OK >> GO TO 12.
NG >> Replace EVAP canister.



7. CHECK BYPASS HOSE

Check bypass hoses for clogging.

OK or NG

OK >> GO TO 8.
NG >> Repair or replace hoses.

8. CHECK VACUUM CUT VALVE BYPASS VALVE

Refer to EC-536, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace vacuum cut valve bypass valve.

9. CHECK VACUUM CUT VALVE

Refer to EC-536, "Component Inspection" .

OK or NG

OK >> GO TO 10.
NG >> Replace vacuum cut valve.

10. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE

1. Turn ignition switch “OFF”.
2. Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.

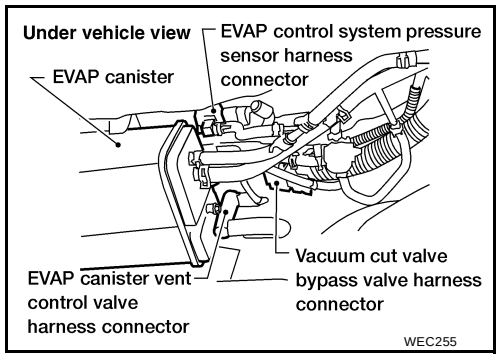
OK or NG

OK >> GO TO 11.
NG >> Repair or replace.

11. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check connectors for water.

Water should not exist.



OK or NG

OK >> GO TO 12.
NG >> Replace EVAP control system pressure sensor.

12. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-382, "Component Inspection" .

OK or NG

OK >> GO TO 13.
NG >> Replace EVAP control system pressure sensor.

13. CHECK RUBBER TUBE FOR CLOGGING

1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

OK or NG

OK >> GO TO 14.
NG >> Clean the rubber tube using an air blower.

14. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-373, "Component Inspection" .

OK or NG

OK >> GO TO 15.
NG >> Replace EVAP canister vent control valve.

15. CHECK INTERMITTENT INCIDENT

Refer to EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

UBS001OO

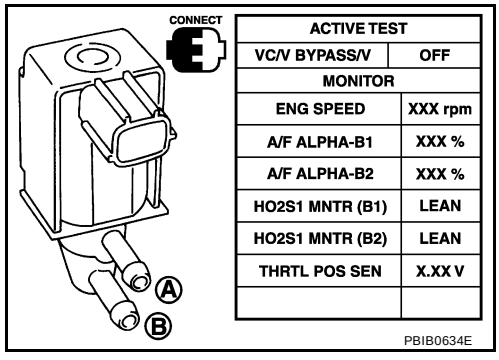
VACUUM CUT VALVE BYPASS VALVE

With CONSULT-II

1. Reconnect harness disconnected connectors.
2. Turn ignition switch ON.
3. Perform “VC/V BYPASS/V” in “ACTIVE TEST” mode.
4. Check air passage continuity and operation delay time under the following conditions.

Condition VC/V BYPASS/V	Air passage continuity between A and B
ON	Yes
OFF	No

Operation takes less than 1 second.

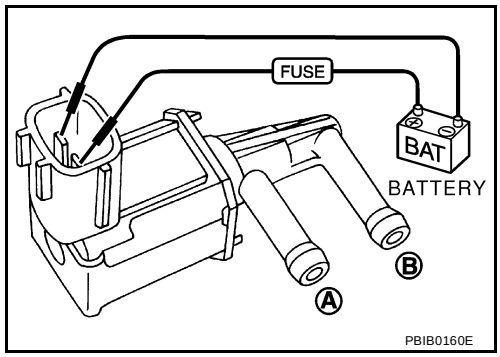


With GST

Check air passage continuity and operation delay time under the following conditions.

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

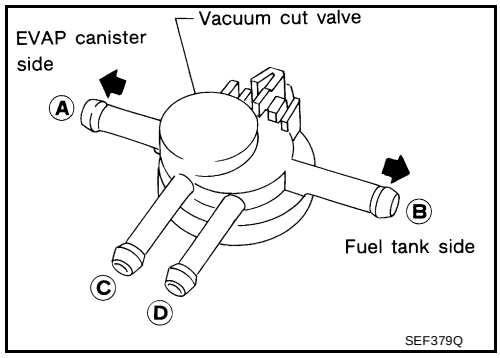
Operation takes less than 1 second.



VACUUM CUT VALVE

Check vacuum cut valve as follows:

- Plug port **C** and **D** with fingers.
- Apply vacuum to port **A** and check that there is no suction from port **B** .
- Apply vacuum to port **B** and check that there is suction from port **A** .
- Blow air in port **B** and check that there is a resistance to flow out of port **A** .
- Open port **C** and **D** .
- Blow air in port **A** check that air flows freely out of port **C** .
- Blow air in port **B** check that air flows freely out of port **D** .



DTC P1605 A/T DIAGNOSIS COMMUNICATION LINE

PFP:23710

System Description

UBS001OP

The malfunction information related to A/T (Automatic Transaxle) is transferred through the line (circuit) from TCM (Transmission control module) to ECM. Therefore, be sure to erase the malfunction information such as DTC not only in TCM (Transmission Control Module) but also ECM after the A/T related repair.

On Board Diagnosis Logic

UBS001OQ

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1605	● An incorrect signal from TCM (Transmission control module) is sent to ECM.	● Harness or connectors [The communication line circuit between ECM and TCM (Transmission Control Module) is open or shorted.] ● Dead (Weak) battery ● TCM (Transmission Control Module)

DTC Confirmation Procedure

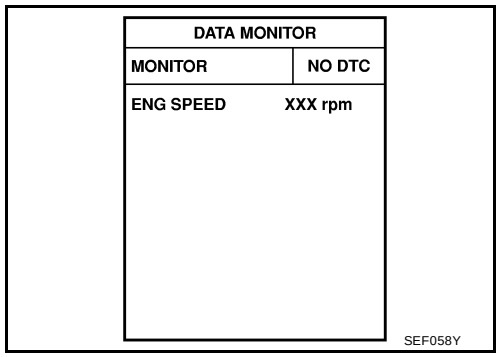
UBS001OR

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 the battery voltage is more than 10.5V with the ignition switch “ON”.

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 40 seconds.
4. If 1st trip DTC is detected, go to EC-540, "Diagnostic Procedure"
.



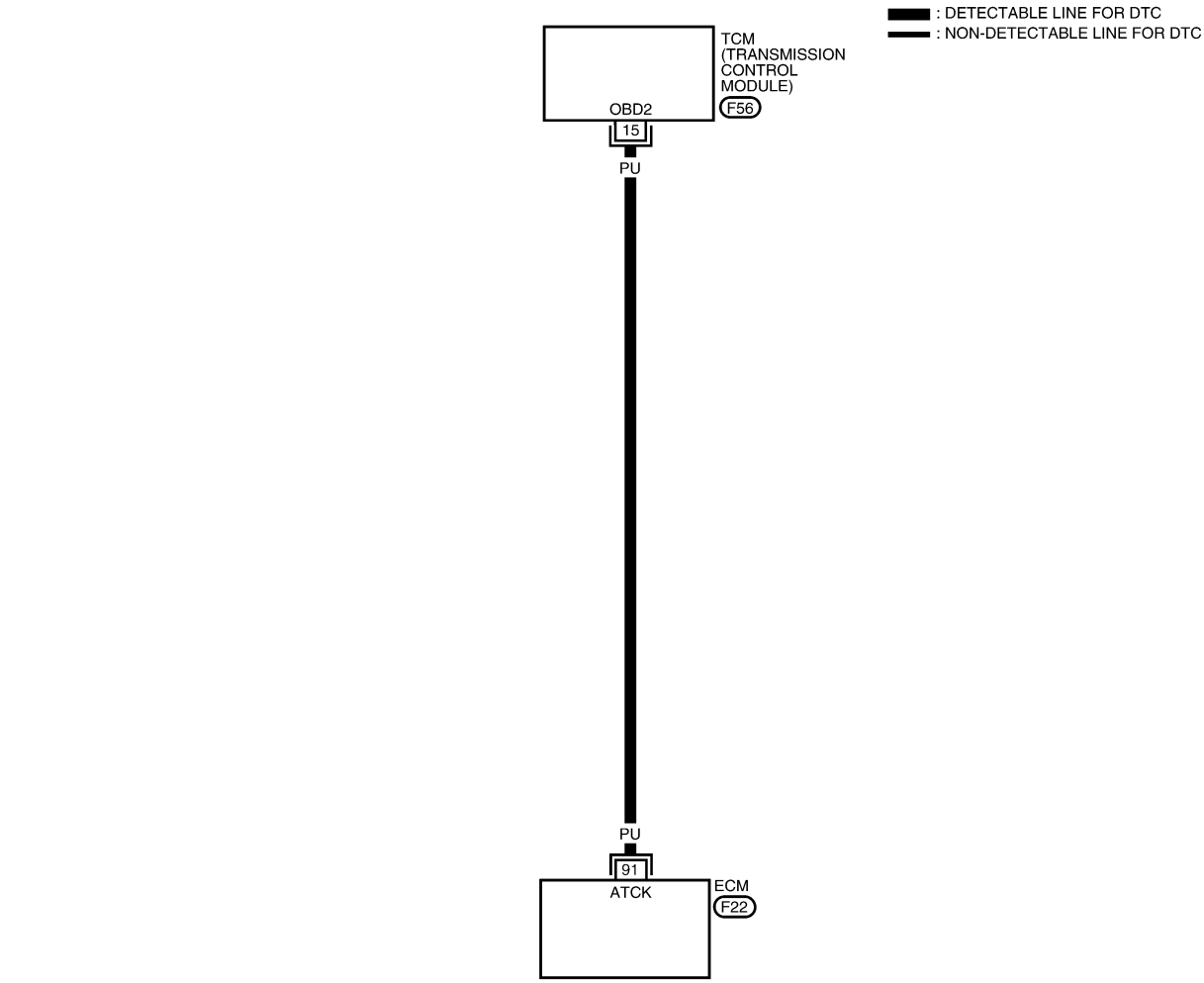
WITH GST

Follow the procedure “With CONSULT-II” above.

Wiring Diagram

UBS001OS

EC-ATDIAG-01



WEC598

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
91	PU	A/T CHECK SIGNAL	IGN ON	0 - APPROX. 5V

SEF586Y

Diagnostic Procedure

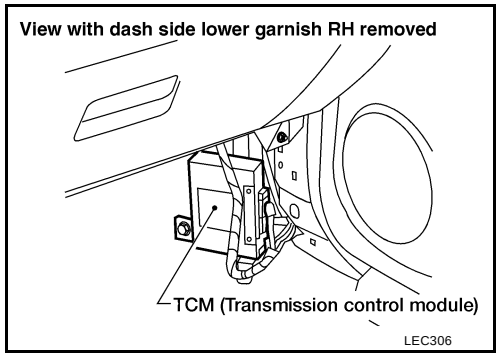
UBS001OT

1. CHECK INPUT SIGNAL CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector and TCM harness connector.
3. Check harness continuity between ECM terminal 91 and TCM terminal 15.
   Refer to Wiring Diagram.

   Continuity should exist.

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



OK or NG

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

2. CHECK INTERMITTENT INCIDENT

Perform EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

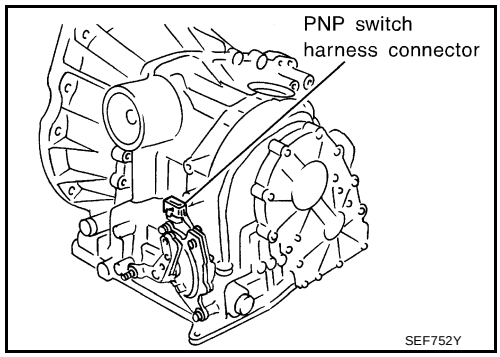
DTC P1706 PNP SWITCH

PFP:32006

Component Description

UBS001OU

When the gear position is “P” (A/T models only) or “N”, park/neutral position (PNP) switch is “ON”.
ECM detects the park/neutral position when continuity with ground exists.



CONSULT-II Reference Value in Data Monitor Mode

UBS001OV

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
P/N POSI SW	● Ignition switch: ON	Shift lever: “P” or “N”	ON
		Except above	OFF

On Board Diagnosis Logic

UBS001OW

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1706	● The signal of the PNP switch is not changed in the process of engine starting and driving.	● Harness or connectors (The PNP switch circuit is open or shorted.) ● PNP switch

DTC Confirmation Procedure

UBS001OX

CAUTION:
Always drive vehicle at a safe speed.

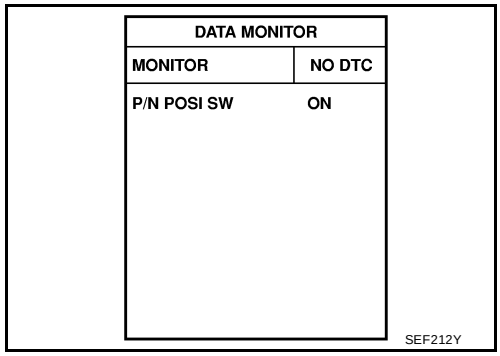
NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

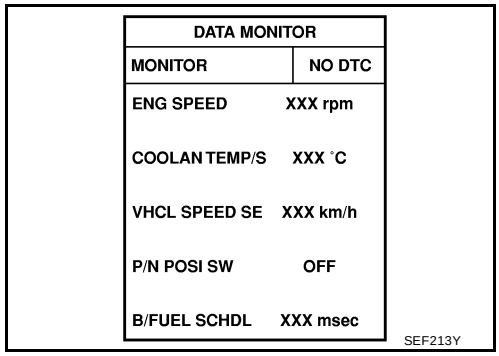
1. Turn ignition switch “ON”.
2. Select “P/N POSI SW” in “DATA MONITOR” mode with CONSULT-II. Then check the “P/N POSI SW” signal under the following conditions.

Position (Selector lever)	Known good signal
“N” and “P” (A/T only) position	ON
Except the above position	OFF

If NG, go to EC-544, "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 50 consecutive seconds.



ENG SPEED	1,550 - 3,450 rpm (A/T) 1,850 - 4,100 rpm (M/T)
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	3.0 - 12.5 msec (A/T) 2.8 - 10.0 msec (M/T)
VHCL SPEED SE	More than 64 km/h (40 MPH)
Selector lever	Suitable position

6. If 1st trip DTC is detected, go to EC-544, "Diagnostic Procedure" .

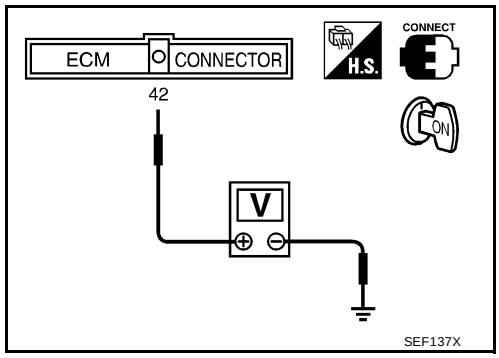
Overall Function Check

UBS001OY

Use this procedure to check the overall function of the park/neutral position switch circuit. During this check, a 1st trip DTC might not be confirmed.

WITHOUT CONSULT-II

1. Turn ignition switch “ON”.
2. Check voltage between ECM terminal 42 (PNP switch signal) and body ground under the following conditions.



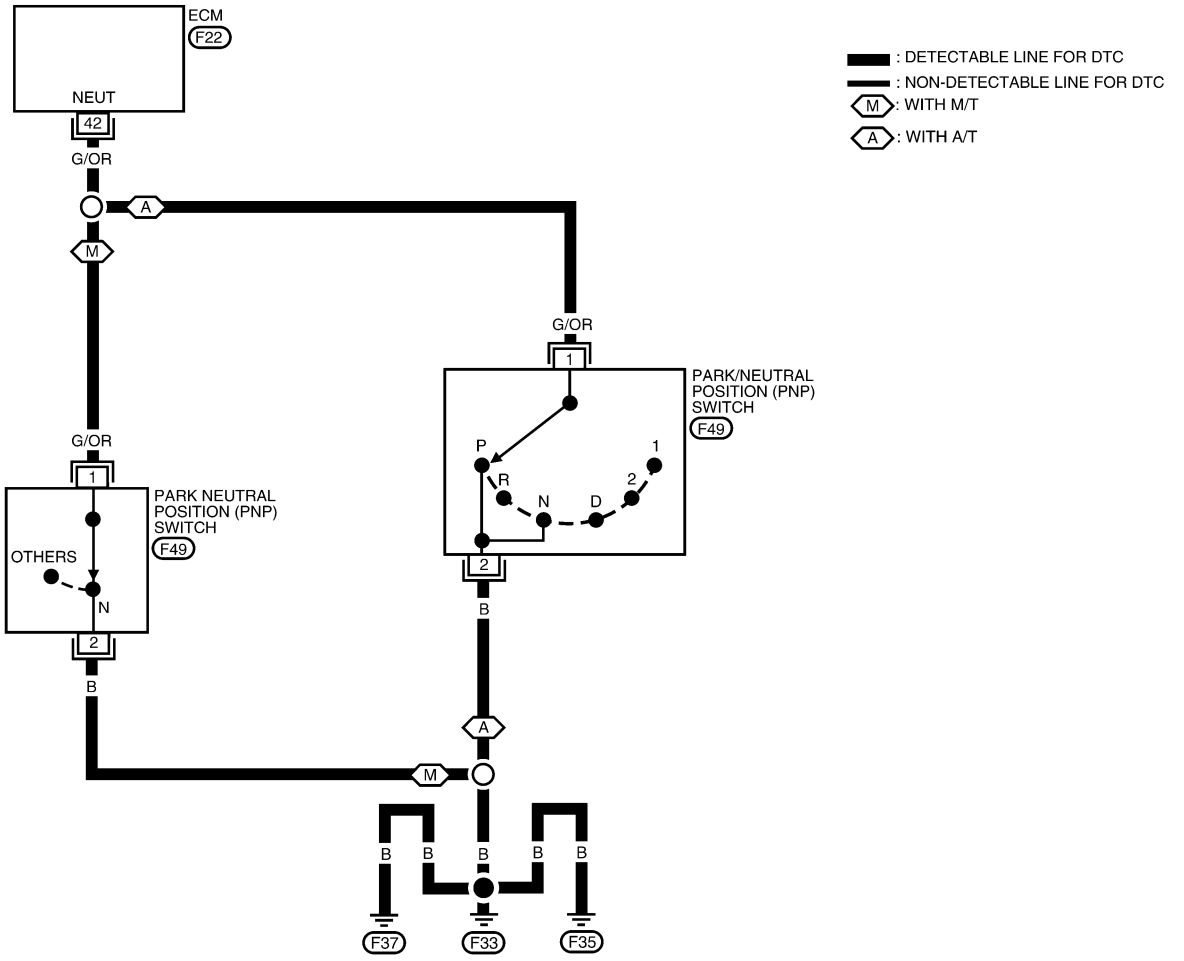
Condition (Gear position)	Voltage (V) (Known good data)
“P” (A/T only) and “N” position	Approx. 0
Except the above position	BATTERY VOLTAGE (11 - 14V)

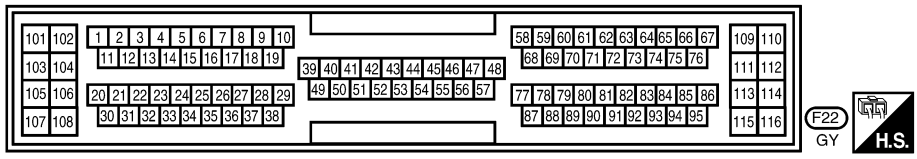
3. If NG, go to EC-544, "Diagnostic Procedure" .

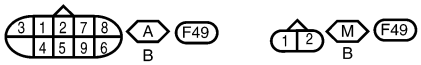
Wiring Diagram

UBS001OZ

EC-PNP/SW-01







BBWA0140E

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
42	G/OR	PARK/NEUTRAL POSITION (PNP) SWITCH	IGN ON WITH GEAR POSITION "N" OR "P"	APPROX. 0V
			IGN ON WITHOUT THE ABOVE GEAR POSITION	BATTERY VOLTAGE

SEF587Y

Diagnostic Procedure

UBS001P0

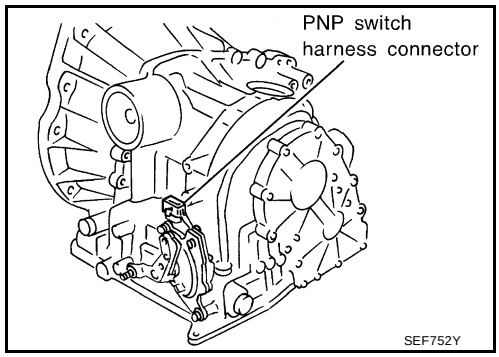
FOR M/T MODELS

1. CHECK GROUND CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect PNP switch harness connector.
3. Check harness continuity between PNP switch terminal 2 and body ground.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for short to power.



OK or NG

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

2. DETECT MALFUNCTIONING PART

Check the harness for open or short between PNP switch and body ground.

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

3. CHECK INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 42 and PNP switch terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.

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

OK or NG

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

4. DETECT MALFUNCTIONING PART

Check the harness for open or short between ECM and PNP switch.

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

5. CHECK PNP SWITCH

Refer to MT-13, "Position Switch Check" .

OK or NG

OK >> GO TO 6.
NG >> Replace PNP switch.

6. CHECK INTERMITTENT INCIDENT

Perform EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

FOR A/T MODELS

1. CHECK GROUND CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect PNP switch harness connector.
3. Check continuity between PNP switch terminal 2 and ground with CONSULT-II or tester. 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 harness for open or short between PNP switch and body ground.

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

3. CHECK INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 42 and PNP switch terminals 1. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

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

4. DETECT MALFUNCTIONING PART

Check the harness for open or short between PNP switch and ECM.

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

5. CHECK PNP SWITCH

Refer to AT-116, "Diagnostic Procedure" .

OK or NG

OK >> GO TO 6.
NG >> Replace PNP switch.

6. CHECK INTERMITTENT INCIDENT

Perform EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

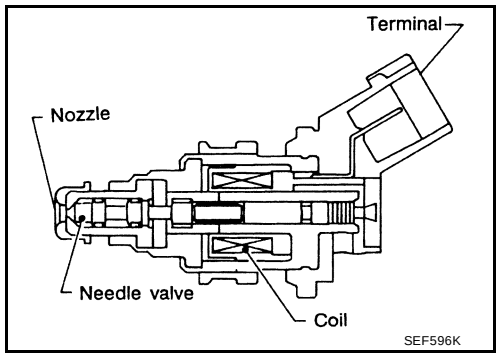
INJECTOR

PFP:16600

Component Description

UBS001P1

The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the injector circuit, the coil in the injector is energized. The energized coil pulls the needle valve back and allows fuel to flow through the injector into the intake manifold. The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the injector remains open. The ECM controls the injection pulse duration based on engine fuel needs.



CONSULT-II Reference Value in Data Monitor Mode

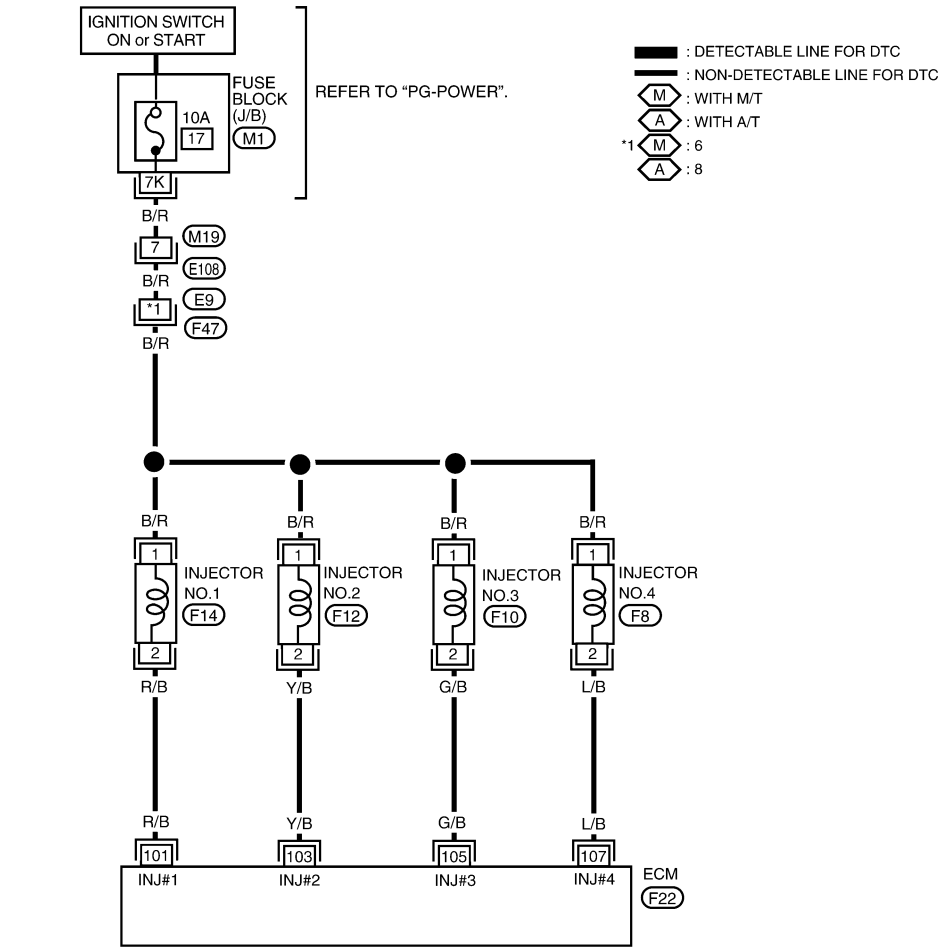
UBS001P2

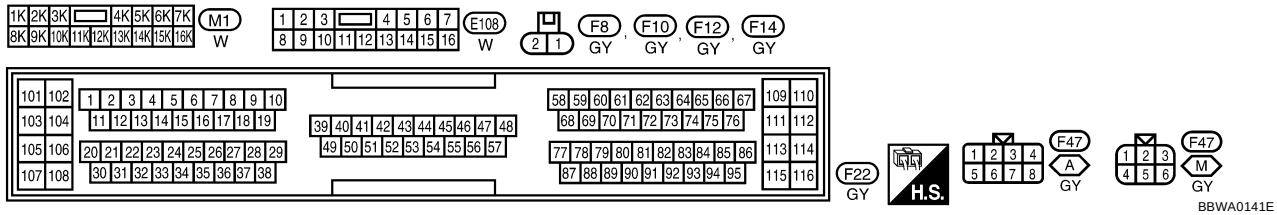
MONITOR ITEM	CONDITION		SPECIFICATION
INJ PULSE-B1	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: “N” ● No-load	Idle	2.4 - 3.2 msec
		2,000 rpm	1.9 - 3.2 msec
B/FUEL SCHDL	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: “N” ● No-load	Idle	1.0 - 1.6 msec
		2,000 rpm	0.7 - 1.3 msec

Wiring Diagram

UBS001P3

EC-INJECT-01





BBWA0141E

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
101	R/B	INJECTOR NO. 1	ENGINE RUNNING AT IDLE SPEED UNDER WARM-UP CONDITION	BATTERY VOLTAGE (V) 40 20 0 — 20 ms
103	Y/B	INJECTOR NO. 2		
105	G/B	INJECTOR NO. 3		
107	L/B	INJECTOR NO. 4		
			ENGINE RUNNING AT 2,000 RPM UNDER WARM-UP CONDITION	BATTERY VOLTAGE (V) 40 20 0 — 20 ms

SEF588Y

Diagnostic Procedure

UBS001P4

1. CHECK OVERALL FUNCTION

With CONSULT-II

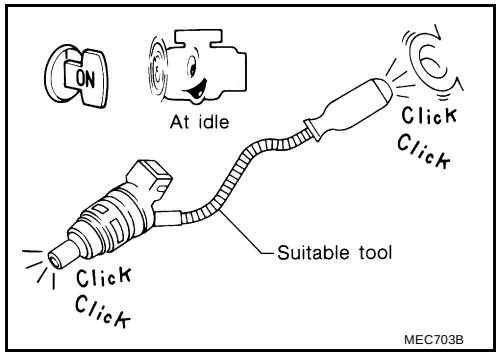
1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-II.
3. Make sure that each circuit produces a momentary engine speed drop.

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

SEF190Y

Without CONSULT-II

1. Start engine.
2. Listen to each injector operating sound.
   Clicking noise should be heard.



MEC703B

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

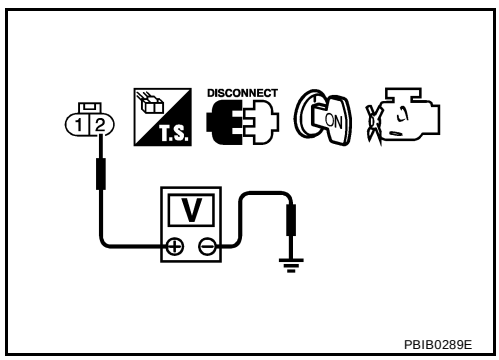
2. CHECK POWER SUPPLY

1. Stop engine.
2. Disconnect injector harness connector.
3. Turn ignition switch “ON”.
4. Check voltage between injector terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

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



PBIB0289E

3. DETECT MALFUNCTIONING PART

Check the following.

- 10A fuse
- Harness connectors M19, E108
- Harness connectors E9, F47
- Harness for open or short between injector and fuse

>> Repair harness or connectors.

4. CHECK OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between injector harness connector terminal 2 and ECM terminals 101, 103, 105, 107.
   Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

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

5. DETECT MALFUNCTIONING PART

Check the harness for open or short between ECM and injector.

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

6. CHECK INJECTOR

Refer to EC-549, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace injector.

7. CHECK INTERMITTENT INCIDENT

Perform EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

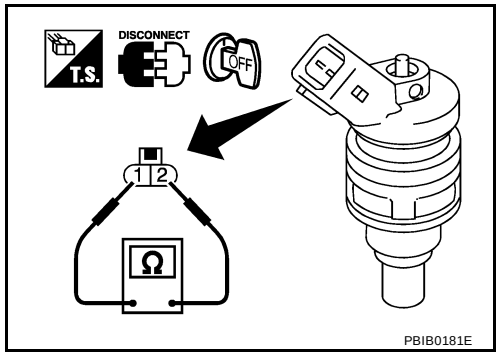
UBS001P5

INJECTOR

1. Disconnect injector harness connector.

2. Check resistance between terminals as shown in the figure.

Resistance: 13.5 - 17.5Ω [at 20°C (68°F)]



Removal and Installation

UBS001P6

INJECTOR

Refer to EM-15, "OUTER COMPONENT PARTS" .

START SIGNAL

PFP:48750

CONSULT-II Reference Value in Data Monitor Mode

UBS001P7

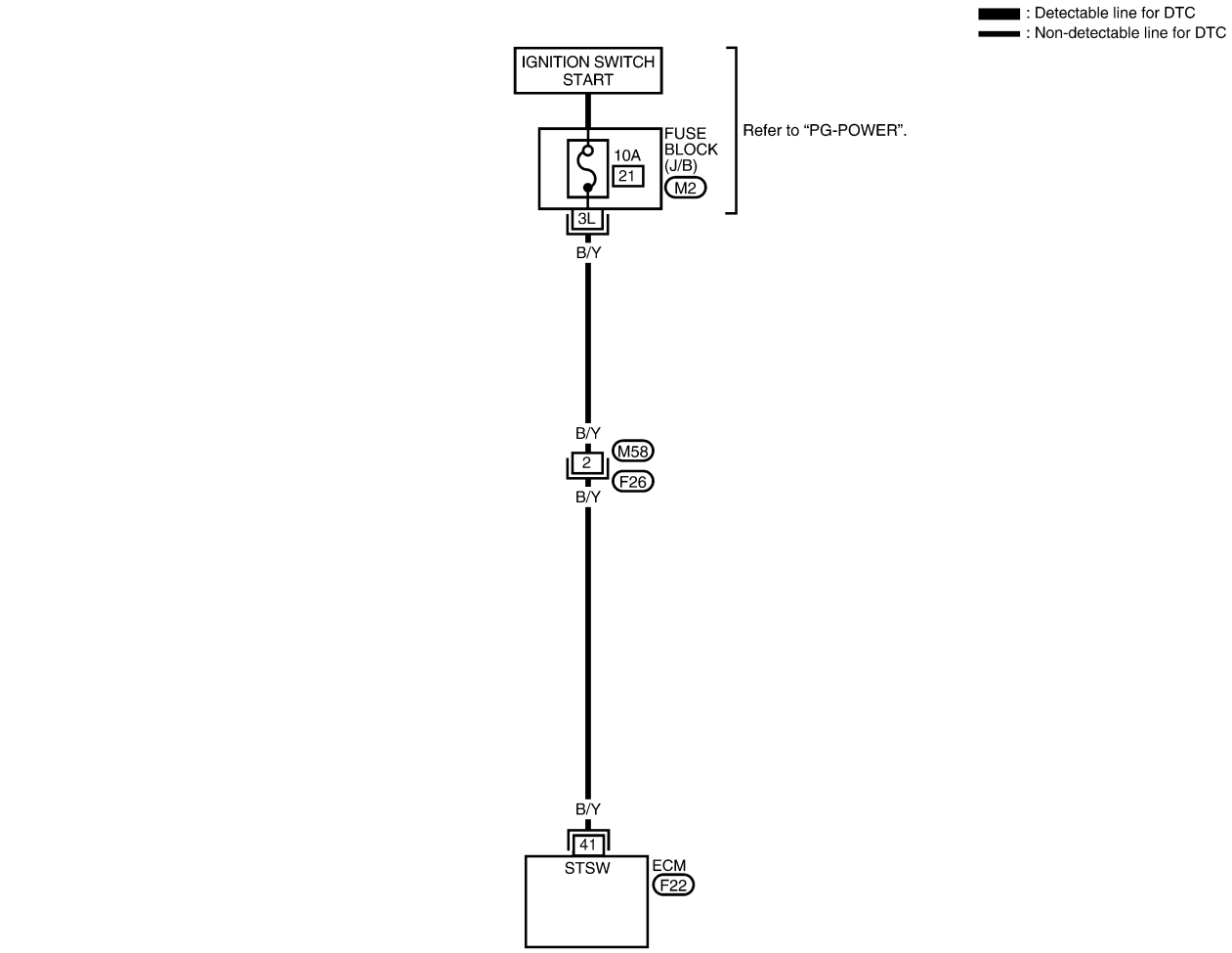
Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
START SIGNAL	● Ignition switch: ON → START → ON	OFF → ON → OFF

Wiring Diagram

UBS001P8

EC-S/SIG-01



BBWA0142E

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
41	B/Y	START SIGNAL	IGN ON	APPROX. 0V
			IGN START	9 - 14V

SEF589Y

Diagnostic Procedure

UBS001P9

1. INSPECTION START

Do you have CONSULT-II?

Yes or No

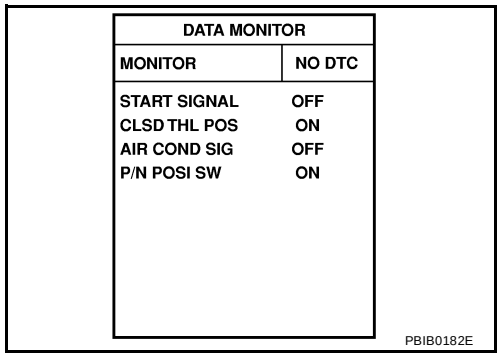
Yes >> GO TO 2.
No >> GO TO 3.

2. CHECK OVERALL FUNCTION

With CONSULT-II

1. Turn ignition switch “ON”.
2. Check “START SIGNAL” in “DATA MONITOR” mode with CONSULT-II under the following conditions.

Condition	“START SIGNAL”
Ignition switch “ON”	OFF
Ignition switch “START”	ON



OK or NG

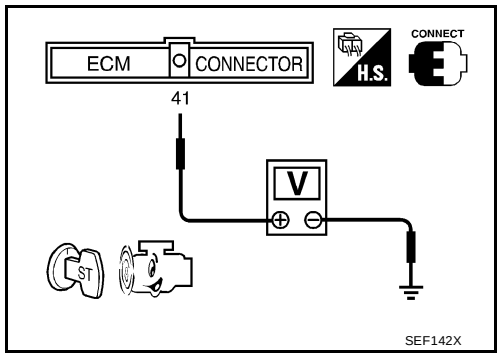
OK >> **INSPECTION END**
NG >> GO TO 4.

3. CHECK OVERALL FUNCTION

Without CONSULT-II

1. Turn ignition switch to “START”.
2. Check voltage between ECM terminal 41 and ground under the following conditions.

Condition	Voltage
Ignition switch “START”	Battery voltage
Except above	Approximately 0V



OK or NG

OK >> **INSPECTION END**
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M58, F26
- 10A fuse
- Harness for open or short between ECM and fuse

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-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

FUEL PUMP

PFP:17042

System Description

UBS001PA

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed	Fuel pump control	Fuel pump relay
Camshaft position sensor (PHASE)	Engine speed and cylinder number		
Ignition switch	Start signal		

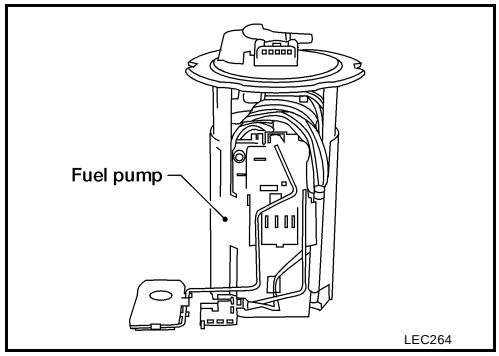
The ECM activates the fuel pump for several seconds after the ignition switch is turned on to improve engine startability. If the ECM receives a 180° signal from the camshaft position sensor (PHASE), it knows that the engine is rotating, and causes the pump to perform. If the 180° signal is not received when the ignition switch is on, the engine stalls. The ECM stops pump operation and prevents battery discharging, thereby improving safety. The ECM does not directly drive the fuel pump. It controls the ON/OFF fuel pump relay, which in turn controls the fuel pump.

Condition	Fuel pump operation
Ignition switch is turned to ON.	Operates for 5 seconds
Engine running and cranking	Operates
When engine is stopped	Stops in 1 second
Except as shown above	Stops

Component Description

UBS001PB

A turbine type design fuel pump is used in the fuel tank.



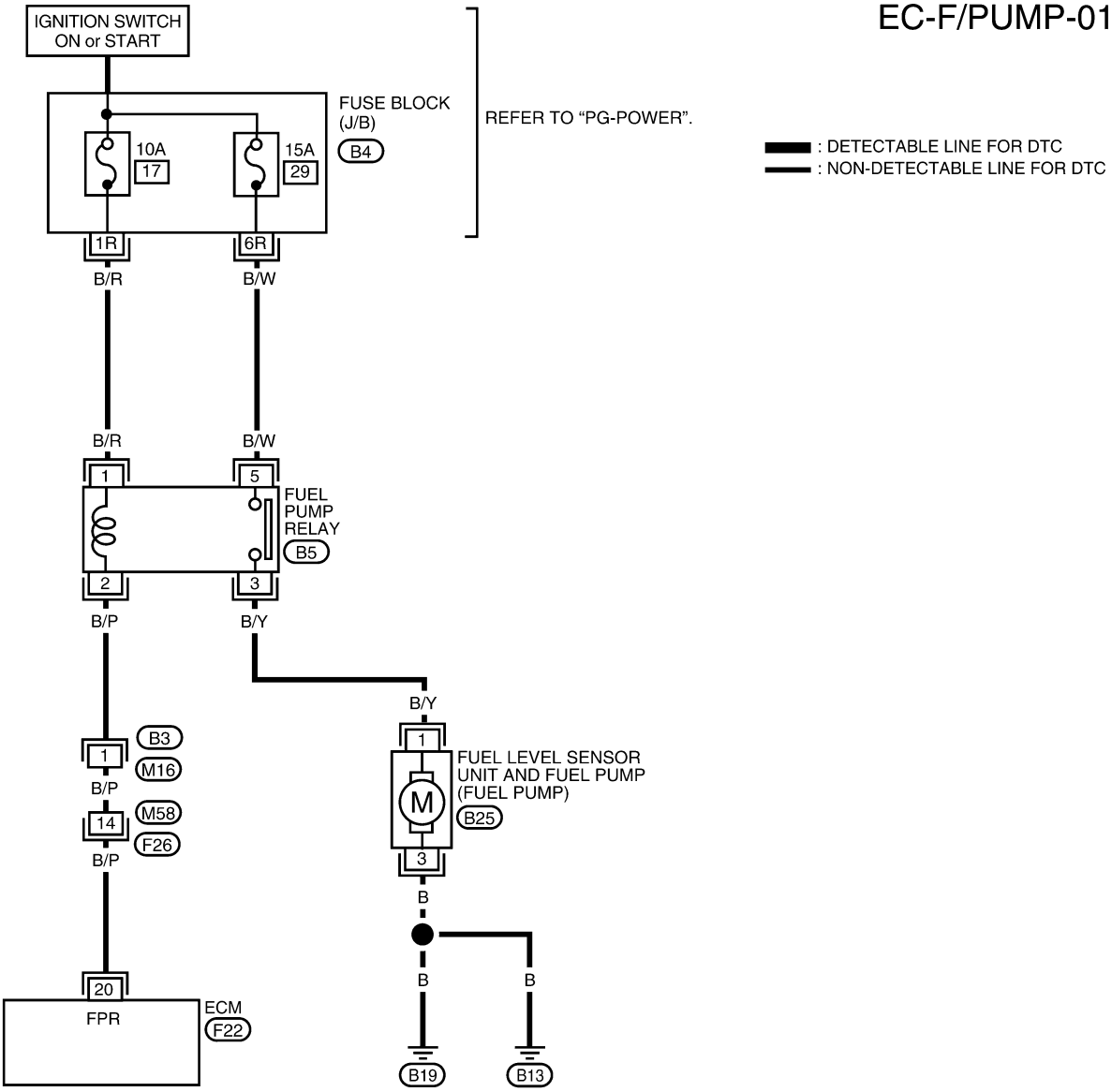
CONSULT-II Reference Value in Data Monitor Mode

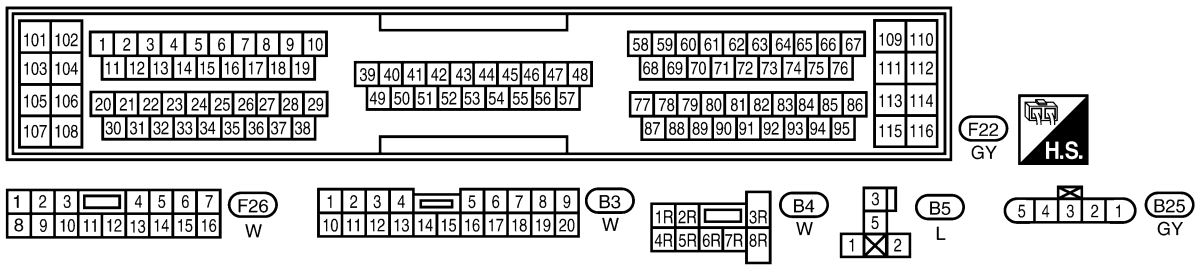
UBS001PC

MONITOR ITEM	CONDITION	SPECIFICATION
FUEL PUMP RLY	● Ignition switch is turned to ON (Operates for 5 seconds) ● Engine running and cranking ● When engine is stopped (stops in 1.0 seconds)	ON
	● Except as shown above	OFF

Wiring Diagram

UBS001PD





BBWA0143E

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

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

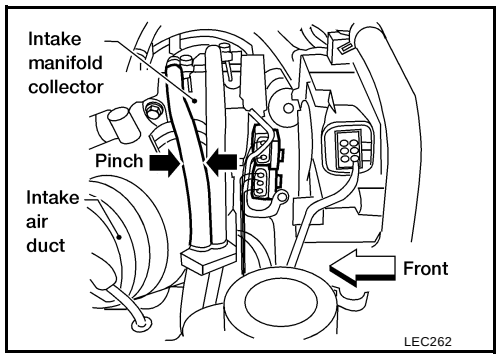
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
20	B/P	Fuel pump relay	**[Ignition switch "ON"]** ● For 5 seconds after turning ignition switch "ON" **[Engine is running]**	0 - 1V
			[Ignition switch "ON"] ● More than 5 seconds after turning ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

UBS001PE

1. CHECK OVERALL FUNCTION

1. Turn ignition switch "ON".
2. Pinch fuel feed hose with fingers.
   Fuel pressure pulsation should be felt on the fuel feed hose for 5 seconds after ignition switch is turned "ON".

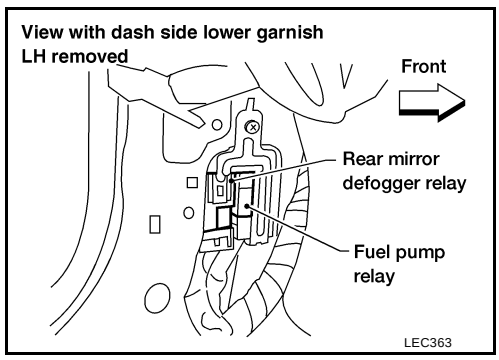


OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

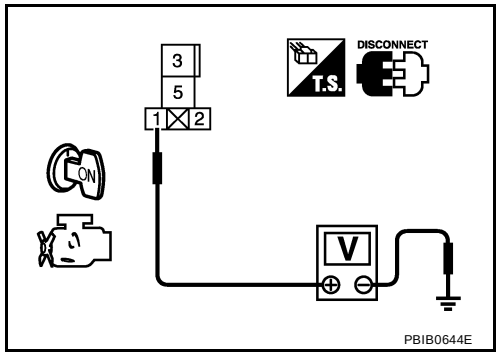
2. CHECK POWER SUPPLY-I

1. Turn ignition switch "OFF".
2. Disconnect fuel pump relay.
3. Turn ignition switch "ON".



4. Check voltage between fuel pump relay 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
- Harness for open or short between fuse and fuel pump relay

>> Repair harness or connectors.

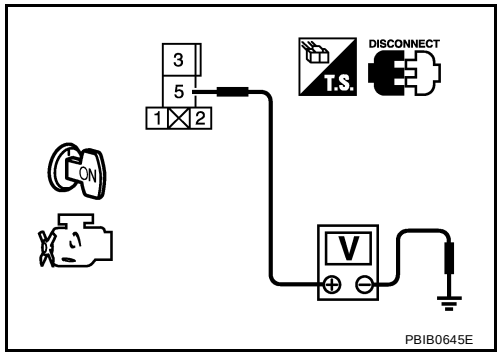
4. CHECK POWER SUPPLY-II

Check voltage between fuel pump relay terminal 5 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 9.
NG >> GO TO 5.



5. DETECT MALFUNCTIONING PART

Check the following.

- 15A fuse
- Harness for open or short between fuse and fuel pump relay

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

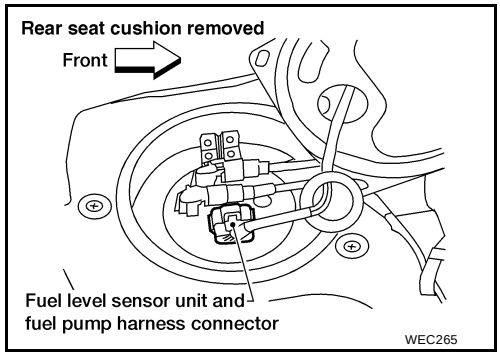
6. CHECK POWER GROUND CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect fuel pump harness connector.
3. Check harness continuity between fuel pump terminal 3 and body ground, fuel pump terminal 1 and fuel pump relay terminal 3.
   Refer to Wiring Diagram.

   Continuity should exist.
4. Also check harness for short to ground and short to power.

OK or NG

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



7. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between fuel pump and body ground
- Harness for open or short between fuel pump and fuel pump relay

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

8. CHECK OUTPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 20 and fuel pump relay connector terminal 2. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

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

9. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B3, M16
- Harness connector M58, F26
- Harness for open or short between ECM and fuel pump relay

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

10. CHECK FUEL PUMP RELAY

Refer to EC-559, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> Replace fuel pump relay.

11. CHECK FUEL PUMP

Refer to EC-559, "Component Inspection" .

OK or NG

OK >> GO TO 12.
NG >> Replace fuel pump.

12. CHECK INTERMITTENT INCIDENT

Perform EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

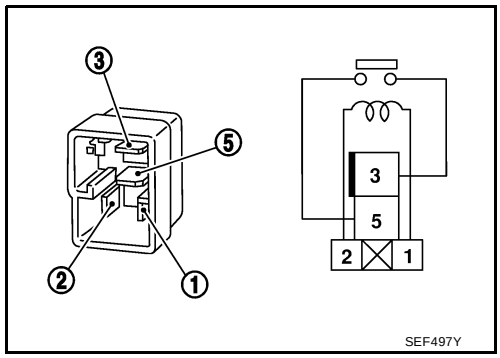
UBS001PF

FUEL PUMP RELAY

Check continuity between terminals 3 and 5.

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

If NG, replace relay.

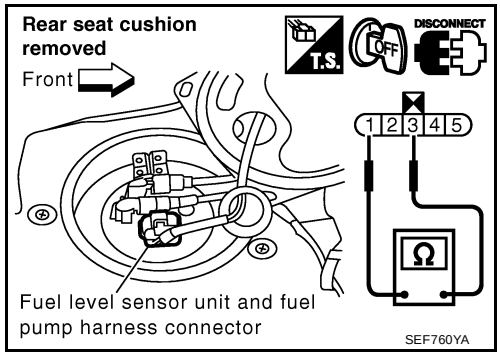


FUEL PUMP

1. Disconnect fuel pump harness connector.
2. Check resistance between terminals 1 and 3.

Resistance: 0.2 - 5.0Ω [at 25°C (77°F)]

If NG, replace fuel pump.



Removal and Installation

UBS001PG

FUEL PUMP

Refer to FL-3, "QG18DE (EXCEPT CALIF. CA MODEL)" .

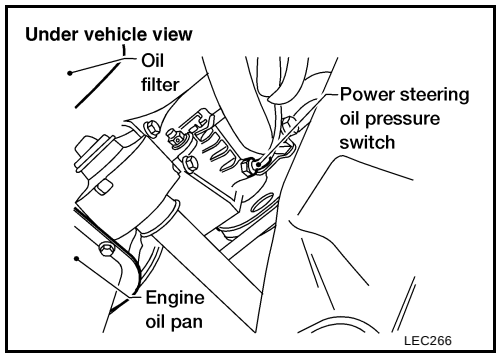
POWER STEERING OIL PRESSURE SWITCH

PFP:49761

Component Description

UBS001PH

The power steering oil pressure switch is attached to the power steering high-pressure tube and detects a power steering load. When a power steering load is detected, it signals the ECM. The ECM adjusts the IACV-AAC valve to increase the idle speed and adjust for the increased load.



CONSULT-II Reference Value in Data Monitor Mode

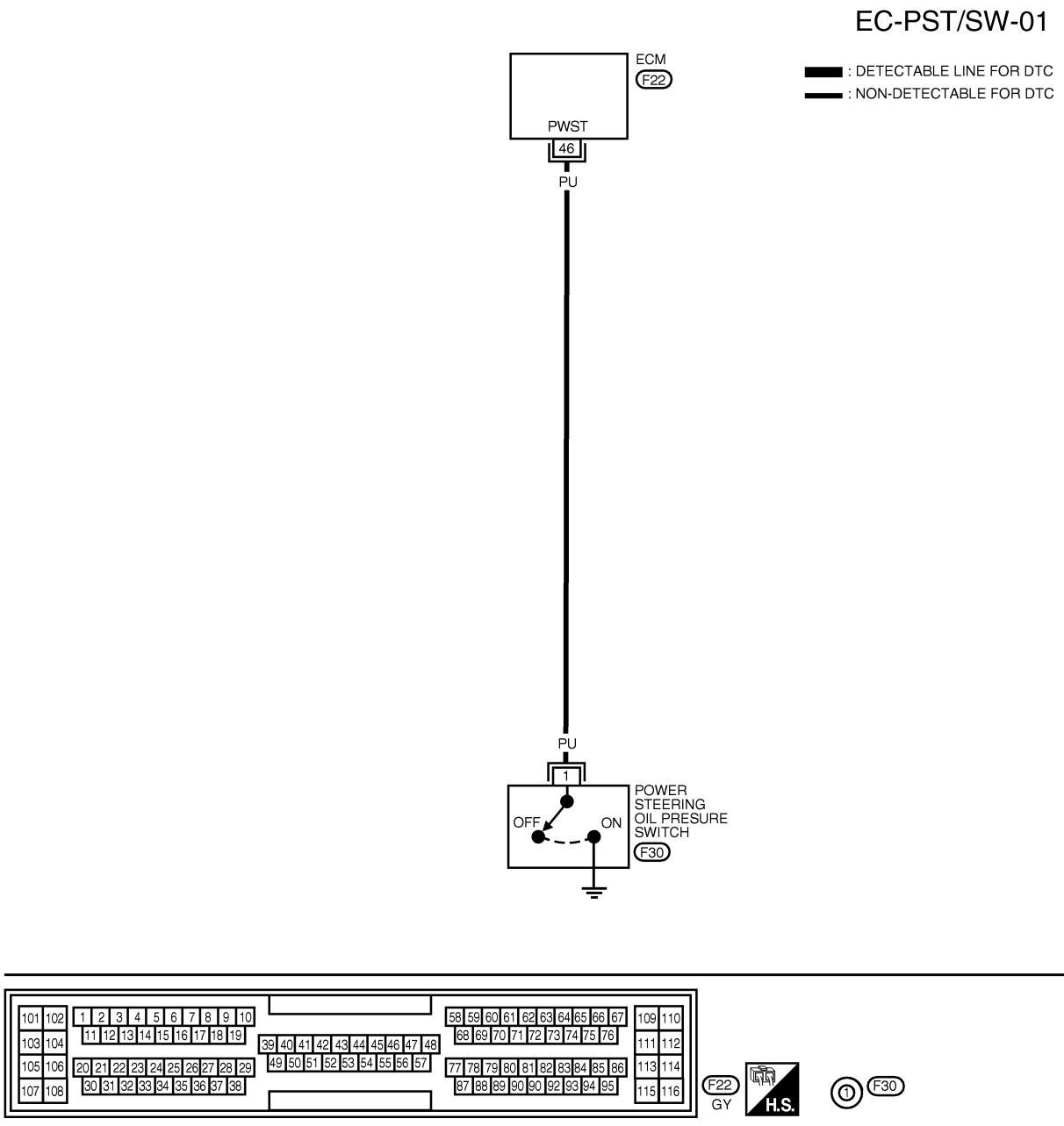
UBS001PI

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PW/ST SIGNAL	● Engine: After warming up, idle the engine	Steering wheel in neutral position (forward direction)	OFF
		The steering wheel is fully turned	ON

Wiring Diagram

UBS001PJ



WEC416

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
46	PU	POWER STEERING OIL PRESSURE SWITCH	ENGINE RUNNING WITH STEERING WHEEL BEING FULLY TURNED	APPROX. 0V
			ENGINE RUNNING WITH STEERING WHEEL NOT BEING TURNED	APPROX. 5V

SEF591YA

Diagnostic Procedure

UBS001PK

1. INSPECTION START

Do you have CONSULT-II?

Yes or No

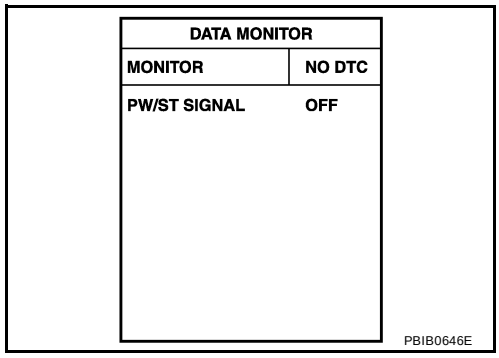
Yes >> GO TO 2.
No >> GO TO 3.

2. CHECK OVERALL FUNCTION

With CONSULT-II

1. Start engine.
2. Check “PW/ST SIGNAL” in “DATA MONITOR” mode with CONSULT-II under the following conditions.

Steering in neutral position	OFF
Steering is turned	ON



OK or NG

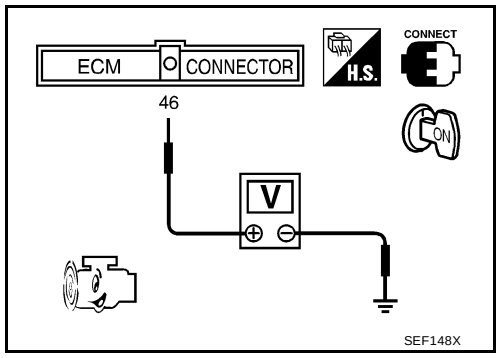
OK >> **INSPECTION END**
NG >> GO TO 4.

3. CHECK OVERALL FUNCTION

Without CONSULT-II

1. Start engine.
2. Check voltage between ECM terminal 46 and ground under the following conditions.

Condition	Voltage
When steering wheel is turned quickly	Approximately 0V
Except above	Approximately 5V



OK or NG

OK >> **INSPECTION END**
NG >> GO TO 4.

4. CHECK INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 46 and terminal 1. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

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

5. DETECT MALFUNCTIONING PART

Check the harness for open or short between ECM and power steering oil pressure switch.

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

6. CHECK POWER STEERING OIL PRESSURE SWITCH

Refer to EC-563, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace power steering oil pressure switch.

7. CHECK INTERMITTENT INCIDENT

Perform EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

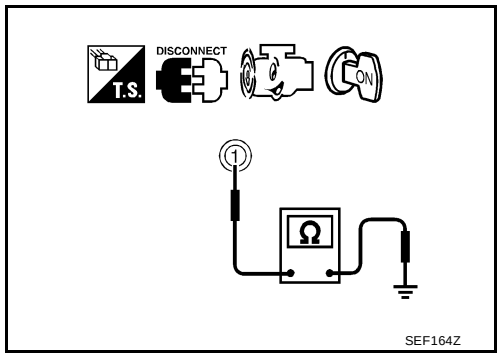
>> **INSPECTION END**

Component Inspection

UBS001PL

POWER STEERING OIL PRESSURE SWITCH

1. Turn ignition switch “OFF”.
2. Disconnect power steering oil pressure switch harness connector.
3. Start engine.
4. Check continuity between terminal 1 and body ground.



Conditions	Continuity
Steering wheel is being turned	Yes
Steering wheel is not being turned	No

If NG, replace power steering oil pressure switch.

Removal and Installation

UBS001PM

POWER STEERING OIL PRESSURE SWITCH

Refer to PS-21, "POWER STEERING OIL PUMP" .

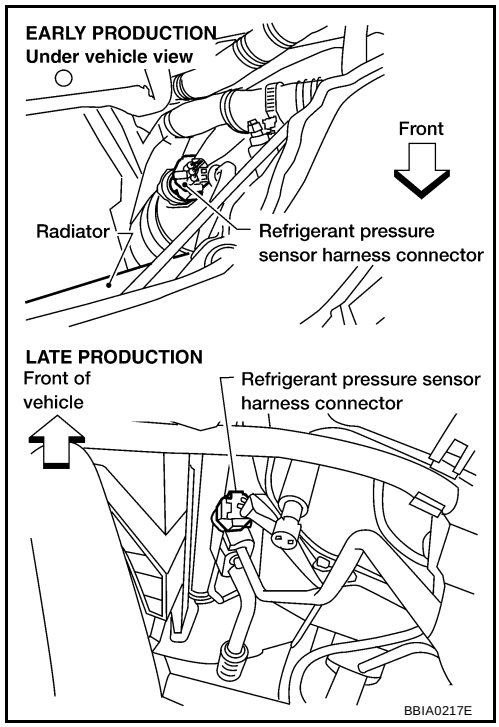
REFRIGERANT PRESSURE SENSOR

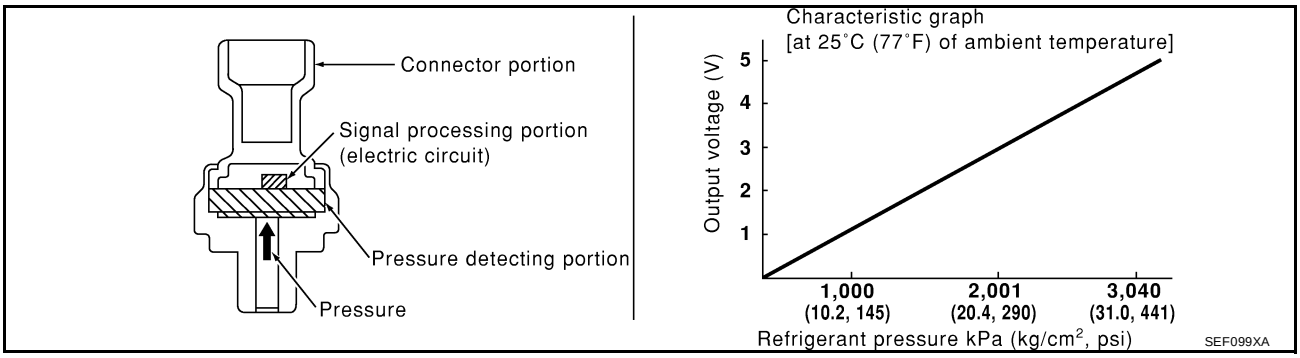
PFP:92136

Description

UBS001PN

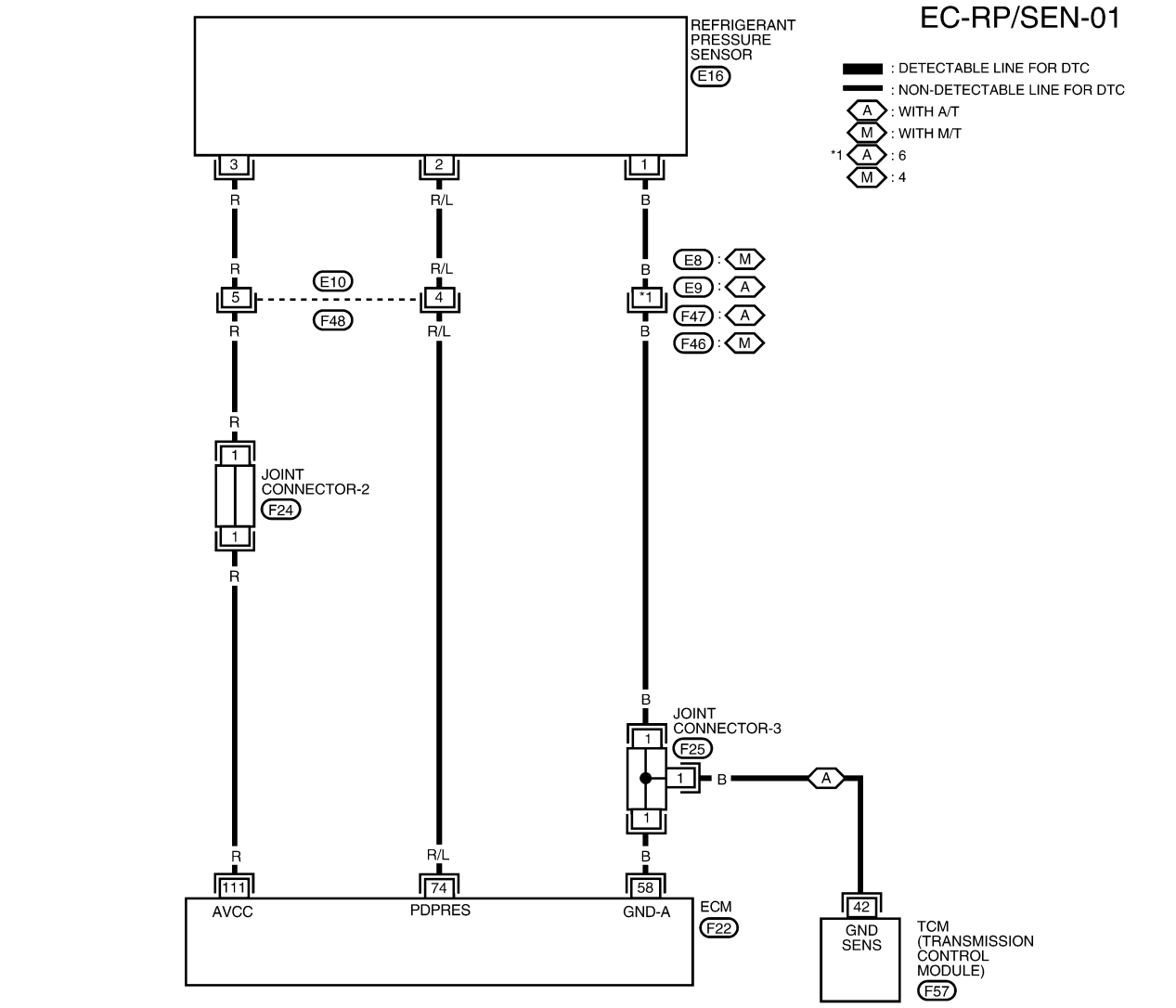
The refrigerant pressure sensor is installed at the liquid tank of the air conditioner system. The sensor uses an electrostatic volume pressure transducer to convert refrigerant pressure to voltage. The voltage signal is sent to ECM, and ECM controls cooling fan system.





Wiring Diagram

UBS001PO



ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
58	B	SENSOR'S GROUND	IGN ON	APPROX. 0V
74	R/L	REFRIGERANT PRESSURE SENSOR	ENGINE RUNNING UNDER WARM-UP CONDITION WITH A/C SWITCH AND BLOWER SWITCH ON	1.0 - 4.0V
111	R	SENSOR'S POWER SUPPLY	IGN ON	APPROX. 5V

SEF211ZA

Diagnostic Procedure

UBS001PP

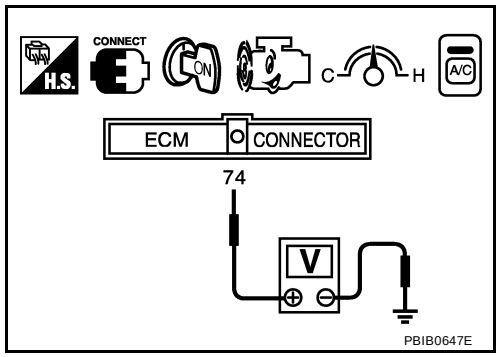
1. CHECK REFRIGERANT PRESSURE SENSOR OVERALL FUNCTION

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 74 and ground with CONSULT-II or tester.

Voltage: 1.0 - 4.0V

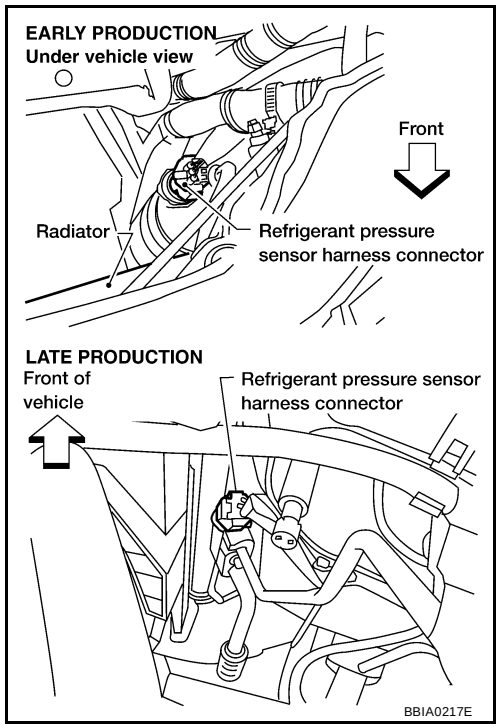
OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.



2. CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn A/C switch and blower switch “OFF”.
2. Stop engine.
3. Disconnect refrigerant pressure sensor harness connector.
4. Turn ignition switch “ON”.

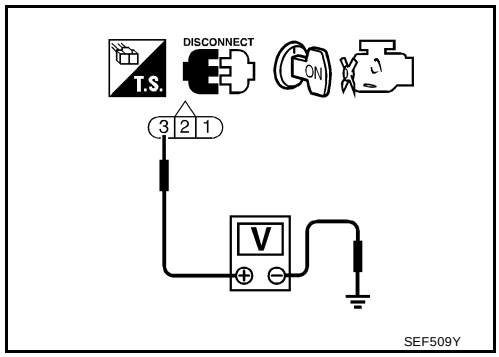


5. Check voltage between refrigerant pressure sensor terminal 3 and ground with CONSULT-II or tester.

Voltage: Approximately 5V

OK or NG

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



3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E10, F48
- Joint connector-2
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair harness or connectors.

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

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

Continuity should exist.

3. Also check harness for short to power.

OK or NG

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

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F46 or E9, F47
- Joint connector-3
- Harness for open or short between ECM and refrigerant pressure sensor
- Harness for open or short between TCM (Transmission control module) and refrigerant pressure sensor

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

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

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 74 and refrigerant pressure sensor terminal 2. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

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

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E10, F48
- Harness for open or short between ECM and refrigerant pressure sensor

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

8. CHECK REFRIGERANT PRESSURE SENSOR

Refer to MTC-16, "Refrigerant Pressure Sensor" .

OK or NG

OK >> GO TO 9.
NG >> Replace refrigerant pressure sensor.

9. CHECK INTERMITTENT INCIDENT

Refer to EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

ELECTRICAL LOAD SIGNAL

PFP:25350

CONSULT-II Reference Value in Data Monitor Mode

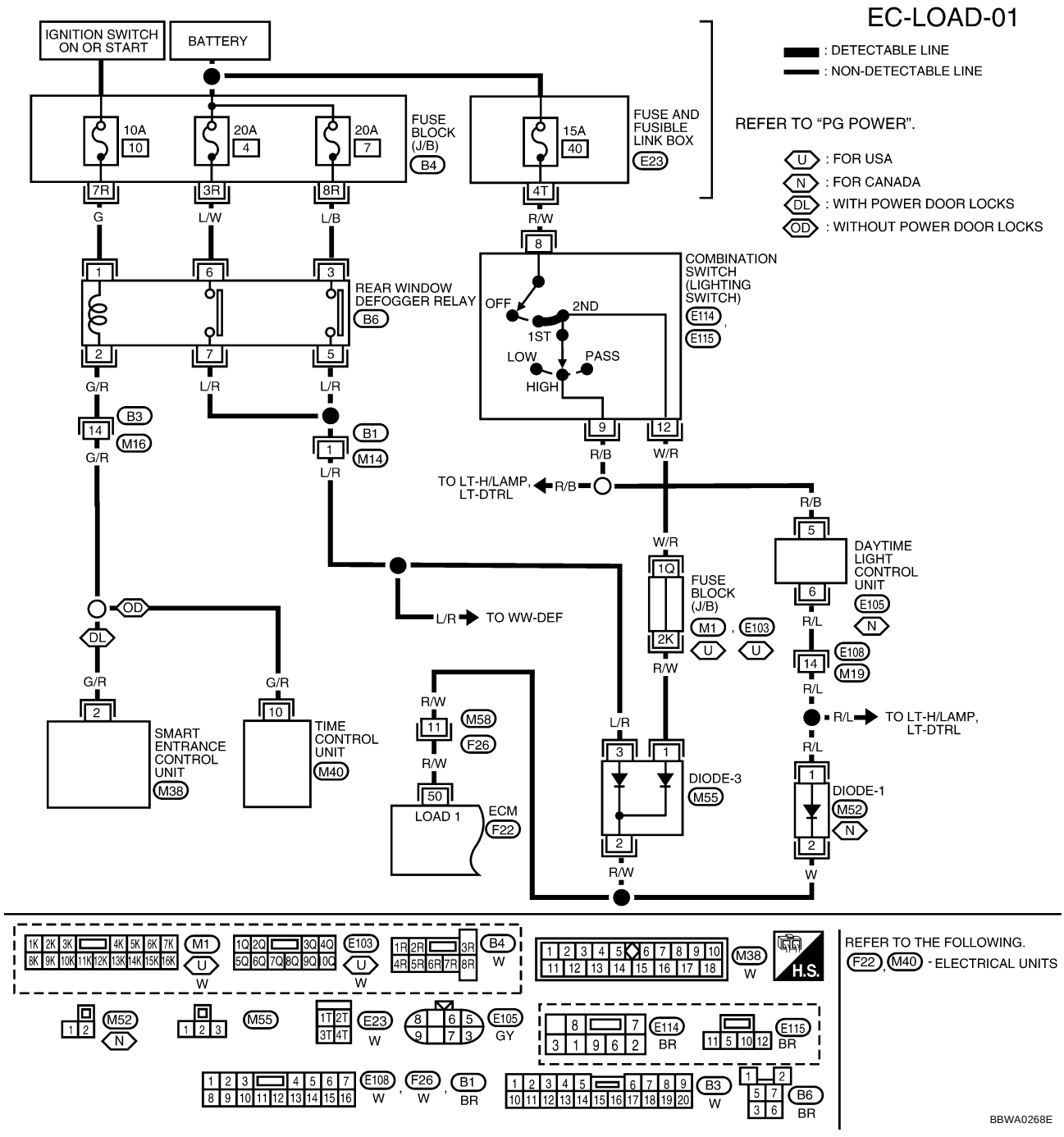
UBS001PQ

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
LOAD SIGNAL	● Ignition switch: ON	Rear window defogger switch and/ or lighting switch “ON”	ON
		Rear window defogger switch and lighting switch “OFF”	OFF

Wiring Diagram

UBS001PR

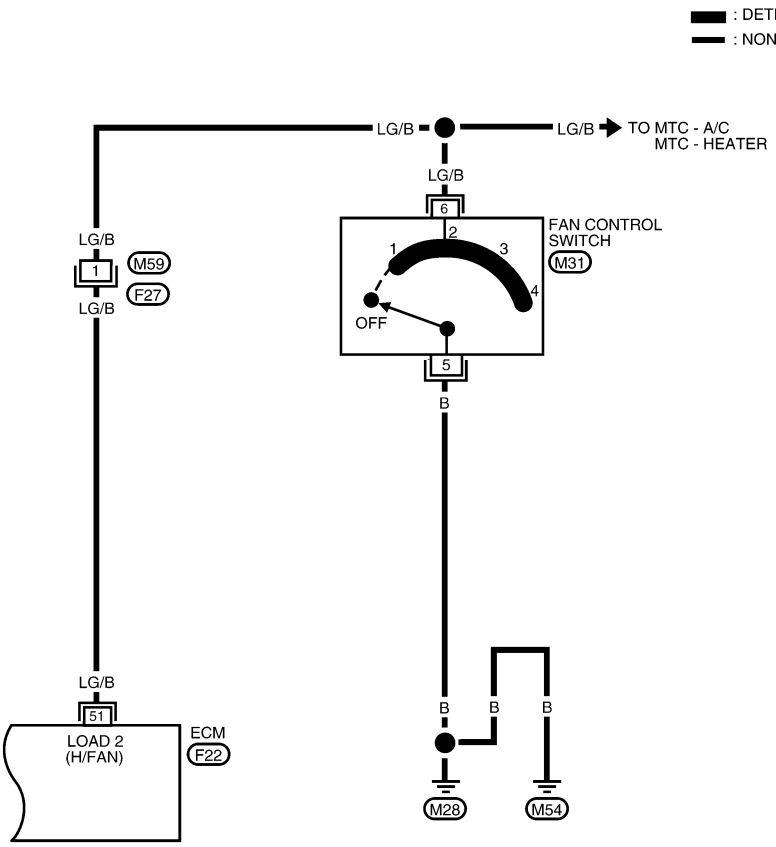


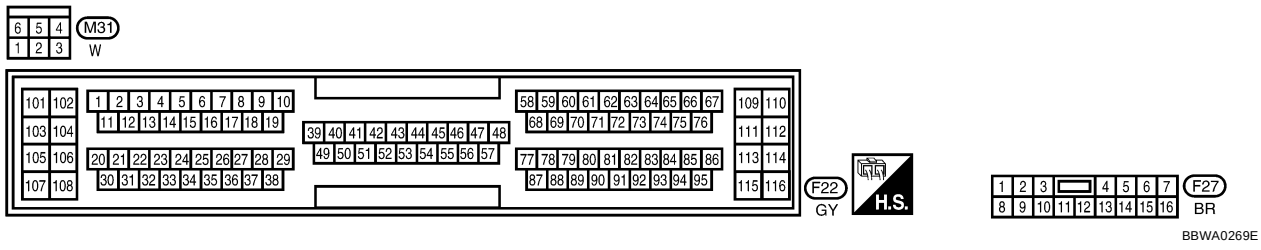
ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
50	R	ELECTRICAL LOAD SIGNAL	IGN ON WITH REAR WINDOW DEFOGGER SWITCH ON OR LIGHTING SWITCH ON AT 2ND POSITION	BATTERY VOLTAGE
			IGN ON WITH REAR WINDOW DEFOGGER SWITCH AND LIGHTING SWITCH OFF	0V

SEF212ZA

EC-LOAD-02





BBWA0269E

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
51	LG/B	HEATER FAN SWITCH	IGN ON WITH FAN CONTROL SWITCH ON	APPROX. 0V
			IGN ON WITH FAN CONTROL SWITCH OFF	APPROX. 5V

SEF594Y

Diagnostic Procedure

UBS001PS

1. INSPECTION START

Do you have CONSULT-II?

Yes or No

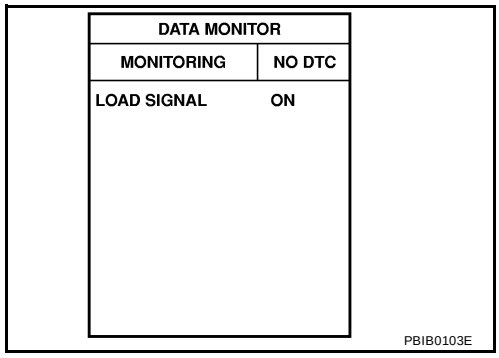
Yes >> GO TO 2.
No >> GO TO 5.

2. CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-I

With CONSULT-II

1. Turn ignition switch “ON”.
2. Check “LOAD SIGNAL” in “DATA MONITOR” mode with CONSULT-II under the following conditions.

Condition	LOAD SIGNAL
Rear window defogger switch “ON”	ON
Rear window defogger switch “OFF”	OFF



OK or NG

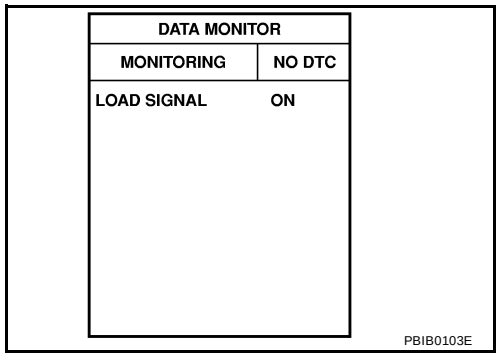
OK >> GO TO 3.
NG >> GO TO 8.

3. CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-II

With CONSULT-II

1. Turn ignition switch “ON”.
2. Check “LOAD SIGNAL” in “DATA MONITOR” mode with CONSULT-II under the following conditions.

Condition	LOAD SIGNAL
Lighting switch “ON” at 1st or 2nd position	ON
Lighting switch “OFF”	OFF



OK or NG

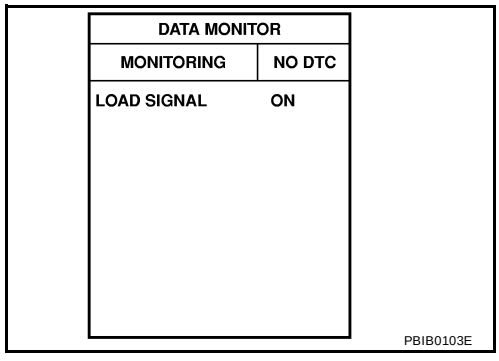
OK >> GO TO 4.
NG >> GO TO 9.

4. CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-III

With CONSULT-II

1. Turn ignition switch “ON”.
2. Check “LOAD SIGNAL” in “DATA MONITOR” mode with CONSULT-II under the following conditions.

Condition	LOAD SIGNAL
Fan control switch “ON”	ON
Fan control switch “OFF”	OFF



OK or NG

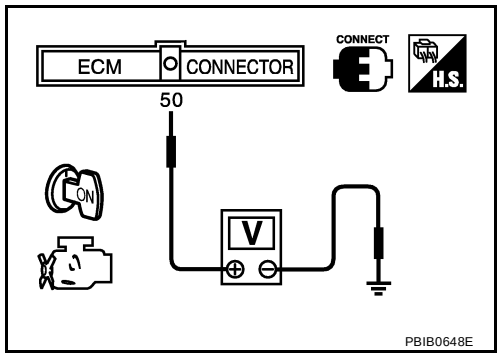
OK >> **INSPECTION END**
NG >> GO TO 10.

5. CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-I

Without CONSULT-II

1. Turn ignition switch “ON”.
2. Check voltage between ECM terminal 50 and ground under the following conditions.

Condition	Voltage
Rear window defogger switch “ON”	Battery voltage
Rear window defogger switch “OFF”	0V



OK or NG

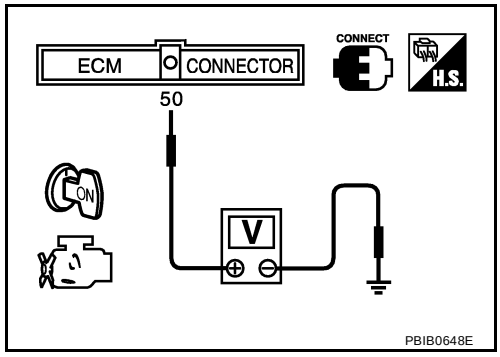
OK >> GO TO 6.
NG >> GO TO 8.

6. CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-II

Without CONSULT-II

1. Turn ignition switch “ON”.
2. Check voltage between ECM terminal 50 and ground under the following conditions.

Condition	Voltage
Lighting switch “ON” at 2nd position	Battery voltage
Lighting switch “OFF”	0V



OK or NG

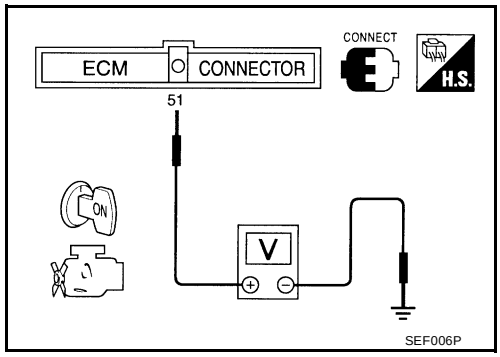
OK >> GO TO 7.
NG >> GO TO 9.

7. CHECK FAN CONTROL CIRCUIT OVERALL FUNCTION-III

Without CONSULT-II

1. Turn ignition switch “ON”.
2. Check voltage between ECM terminal 51 and ground under the following conditions.

Condition	Voltage
Fan control switch “ON”	Battery voltage
Fan control switch “OFF”	0V



OK or NG

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

8. CHECK REAR WINDOW DEFOGGER FUNCTION

1. Start engine.
2. Turn “ON” the rear window defogger switch.
3. Check the rear windshield. Is the rear windshield heated up?

Yes or No

Yes >> GO TO 11.
No >> Refer to GW-17, "REAR WINDOW DEFOGGER" .

9. CHECK HEADLAMP FUNCTION

1. Start engine.
2. Turn the lighting switch “ON” at 2nd position.
3. Check that headlamps are illuminated.

OK or NG

OK >> GO TO 13.
NG >> Refer to LT-6, "HEADLAMP (FOR USA)" or LT-10, "HEADLAMP (FOR CANADA) — DAYTIME LIGHT SYSTEM —" .

10. CHECK FAN CONTROL FUNCTION

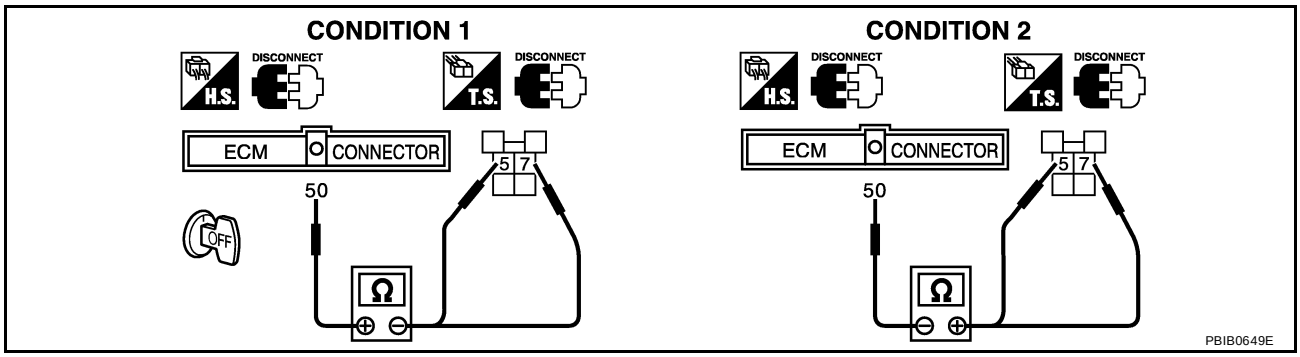
1. Start engine.
2. Turn “ON” the fan control switch.
3. Check the blower fan motor. Does the blower fan motor activate?

YES or NO

YES >> GO TO 15.
NO >> Refer to MTC-48, "BLOWER MOTOR" .

11. CHECK REAR WINDOW DEFOGGER INPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Stop engine.
2. Disconnect ECM harness connector.
3. Disconnect rear window defogger relay.
4. Check harness continuity between ECM terminal 50 and rear window defogger relay terminals 5 and 7.



Condition	Continuity
1	Should not exist.
2	Should exist.

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

OK or NG

OK >> GO TO 17.
NG >> GO TO 12.

12. DETECT MALFUNCTIONING PART

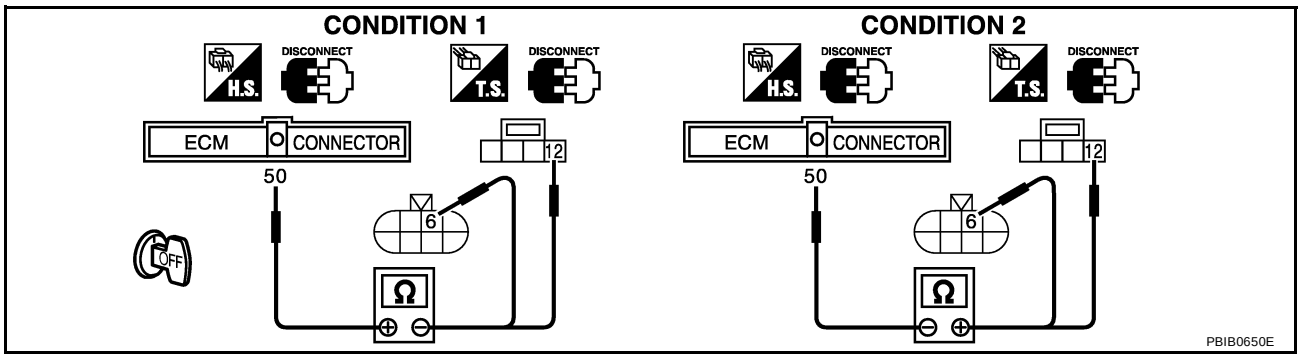
Check the following.

- Harness connectors B1, M14
- Harness connectors M58, F26
- Diode M55
- Harness for open and short between ECM and rear window defogger relay

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

13. CHECK HEADLAMP INPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Stop engine.
2. Disconnect ECM harness connector.
3. Disconnect combination switch harness connectors (Models for USA), daytime light control unit harness connector (Models for Canada).
4. Check harness continuity between ECM terminal 50 and combination switch terminal 12 or daytime light control unit terminal 6 under the following conditions.



Condition	Continuity
1	Should not exist.
2	Should exist.

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

OK or NG

OK >> GO TO 17.
NG >> GO TO 14.

14. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M58, F26
- Harness connectors E108, M19
- Fuse block M1, E103
- Diode M52
- Diode M55
- Harness for open and short between ECM and combination switch or daytime light control unit

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

15. CHECK FAN CONTROL CIRCUIT FOR OPEN OR SHORT

1. Stop engine.
2. Disconnect ECM harness connector.
3. Disconnect fan control switch harness connector.
4. Check harness continuity between ECM terminal 51 and fan control switch terminal 6.

Continuity should exist.

5. Check harness continuity between fan control switch terminal 5 and body 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 17.
NG >> GO TO 16.

16. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M59, F27
- Harness for open and short between ECM and fan control switch
- Harness for open or short between fan control switch and body ground

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

17. CHECK INTERMITTENT INCIDENT

Perform EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

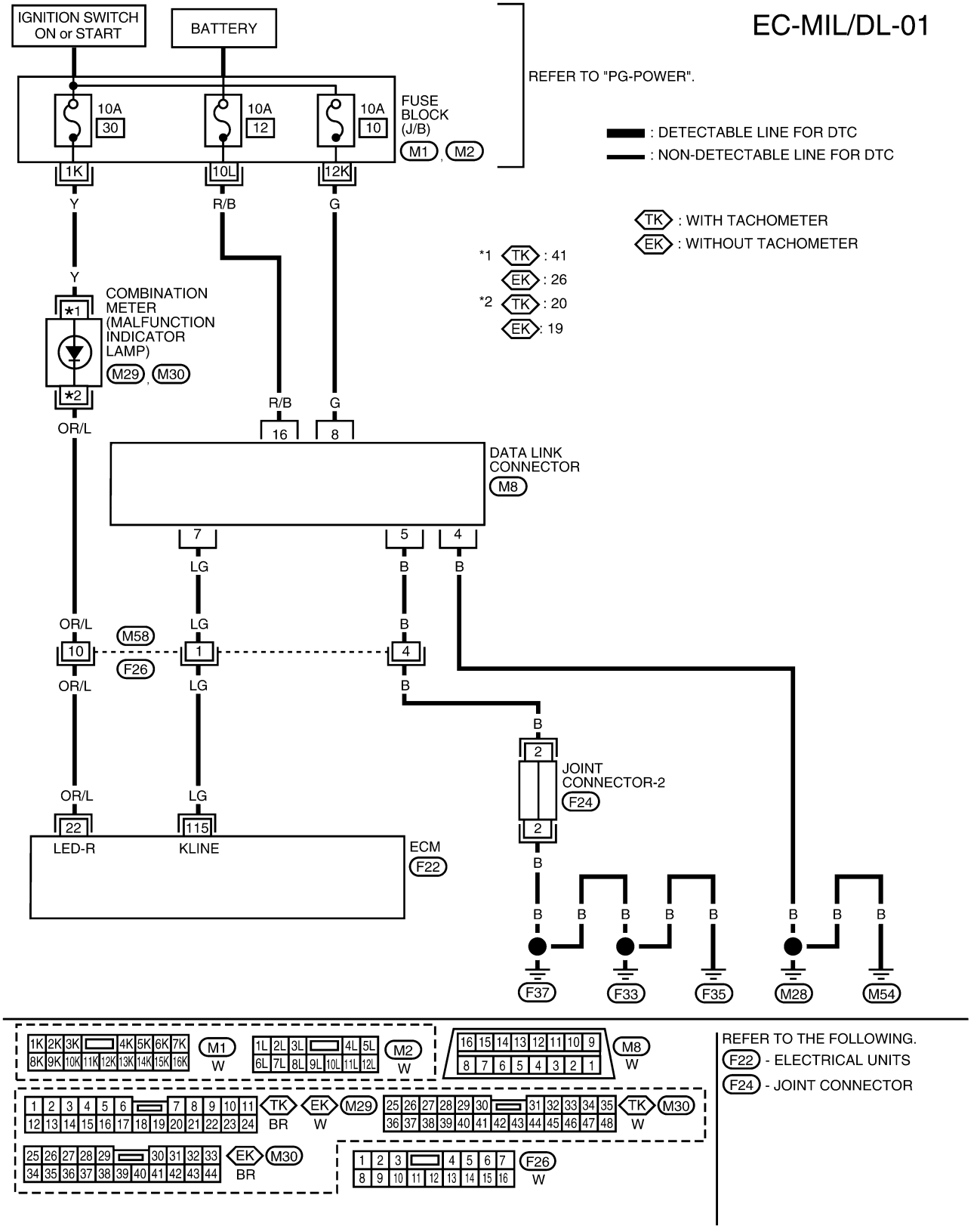
>> **INSPECTION END**

MIL AND DATA LINK CONNECTOR

PFP:24814

Wiring Diagram

UBS001PT



BBWA0147E

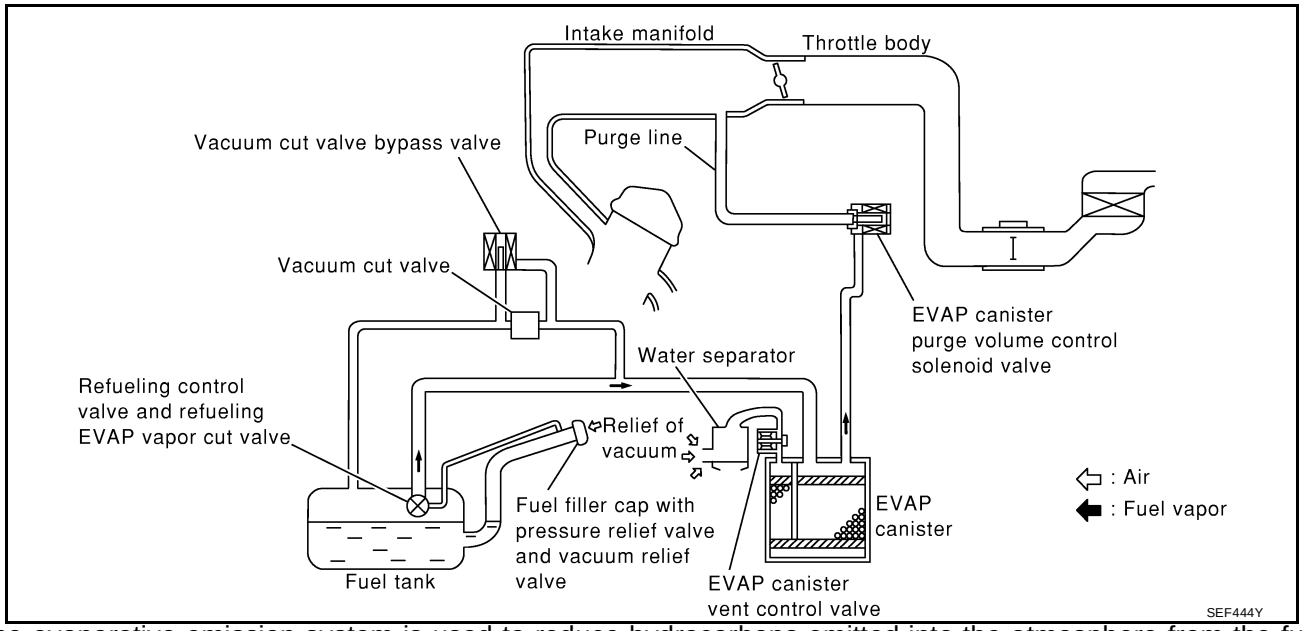
EVAPORATIVE EMISSION SYSTEM

PFP:14950

Description

UBS001PU

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.

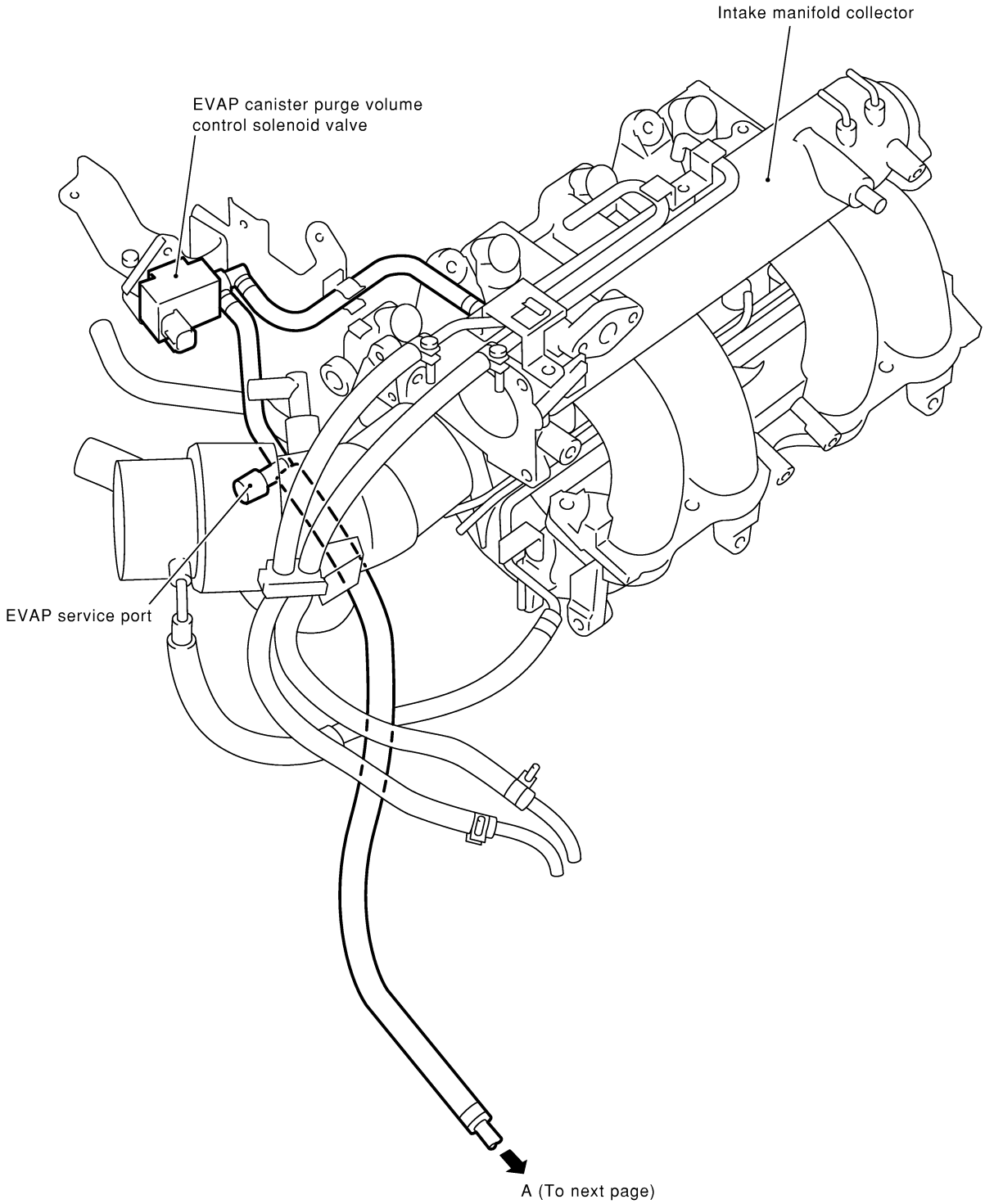
The fuel vapor in the sealed fuel tank is led into the EVAP canister which contains activated carbon and the vapor is stored there when the engine is not operating or when refueling to the fuel tank.

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

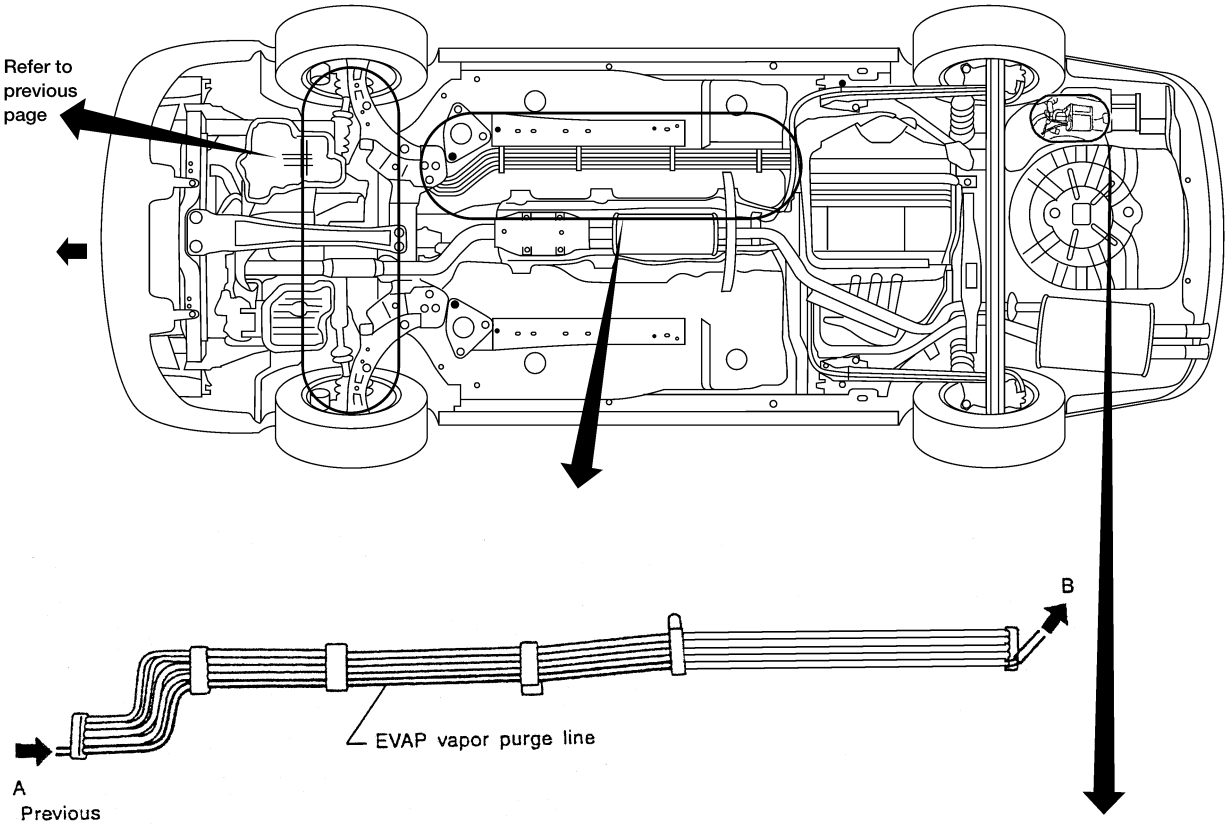
EVAPORATIVE EMISSION LINE DRAWING

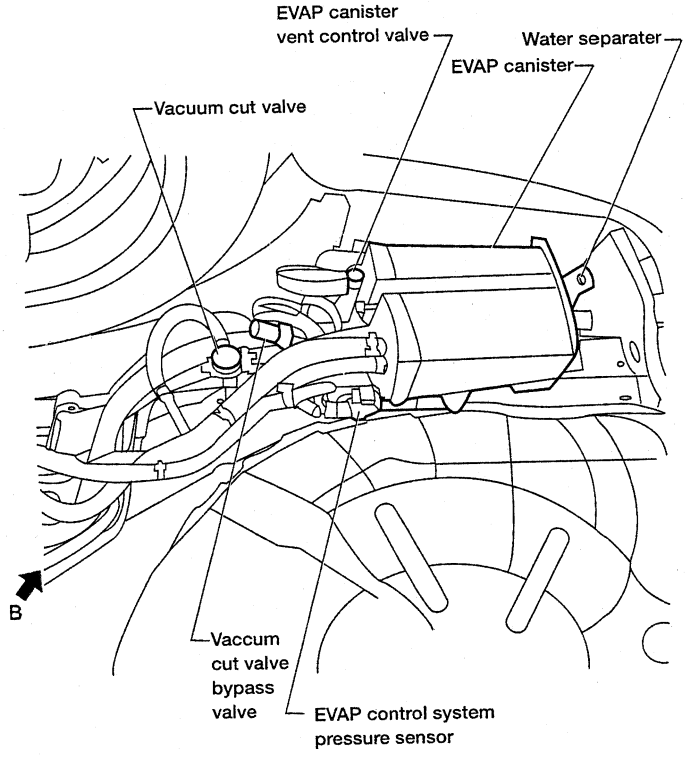


NOTE : Do not use soapy water or any type of solvent while installing vacuum hoses or purge hoses.

SEF446Y

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





WEC362

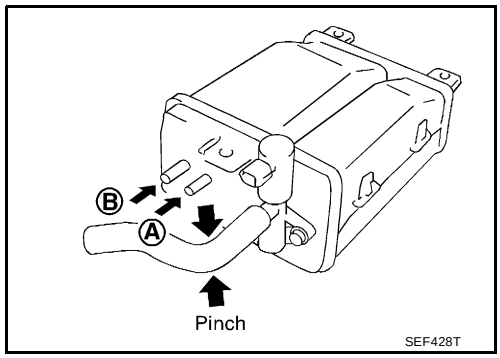
Inspection

UBS001PV

EVAP CANISTER

Check EVAP canister as follows:

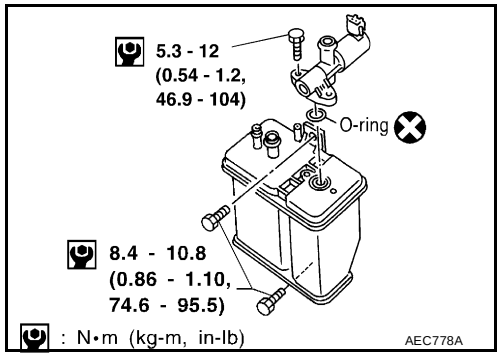
1. Pinch the fresh air hose.
2. Blow air into port **A** and check that air flows freely through port **B** .



TIGHTENING TORQUE

Tighten EVAP canister as shown in the figure.

Make sure new O-ring is installed properly between EVAP canister and EVAP canister vent control valve.

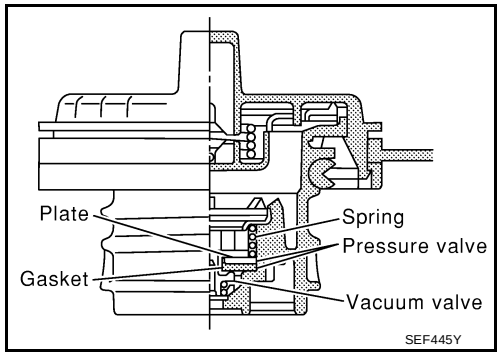


FUEL TANK VACUUM RELIEF VALVE (BUILT INTO FUEL FILLER CAP)

NOTE:

Refer to fuel filler cap adapter instruction manual before performing following inspection.

1. Wipe clean valve housing.



2. Check valve opening pressure and vacuum.

Pressure:

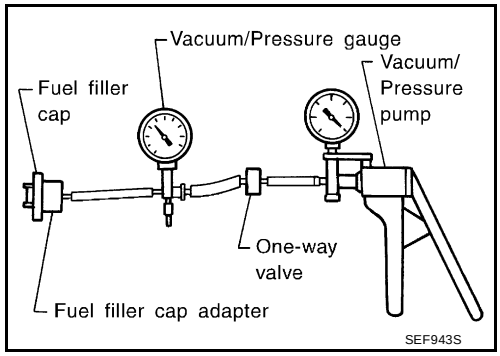
15.3 - 20.0 kPa

(0.156 - 0.204 kg/cm^2 , 2.22 - 2.90 psi)

Vacuum:

–6.0 to –3.4 kPa

(–0.061 to –0.035 kg/cm^2 , –0.87 to –0.48 psi)



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

CAUTION:

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

VACUUM CUT VALVE AND VACUUM CUT VALVE BYPASS VALVE

Refer to EC-531, "DTC P1491 VACUUM CUT VALVE BYPASS VALVE" .

EVAPORATIVE EMISSION (EVAP) CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

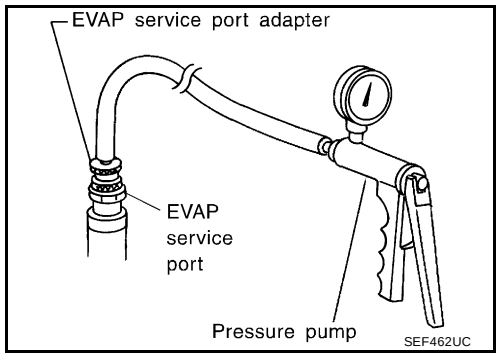
Refer to EC-364, "DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE" .

FUEL TANK TEMPERATURE SENSOR

Refer to EC-270, "DTC P0181, P0182, P0183 FTT SENSOR" .

EVAP SERVICE PORT

Positive pressure is delivered to the EVAP system through the EVAP service port. If fuel vapor leakage in the EVAP system occurs, use a leak detector to locate the leak.



How to Detect Fuel Vapor Leakage

UBS001PW

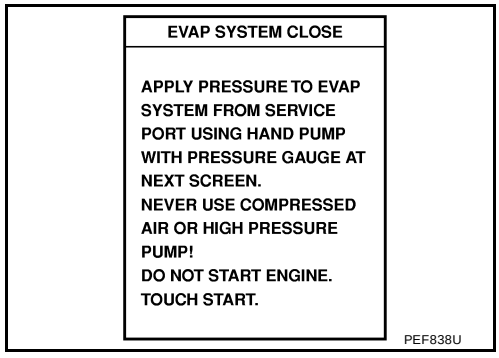
CAUTION:

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

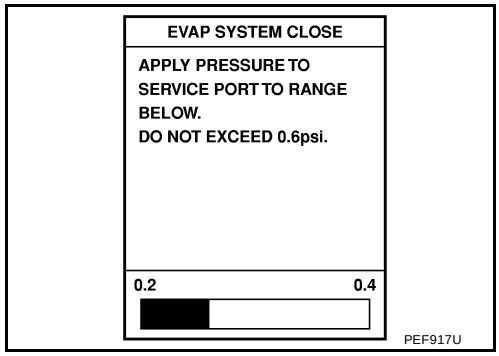
NOTE:
Improper installation of adapter to the service port may cause a leak.

WITH CONSULT-II

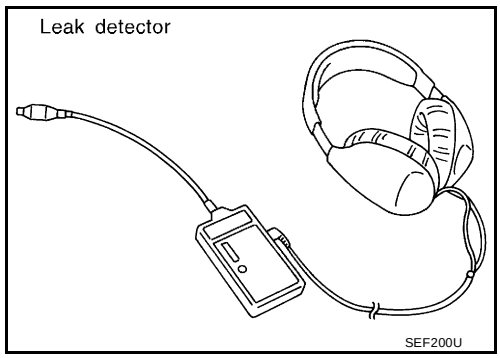
1. Attach the EVAP service port adapter securely to the EVAP service port.
2. Also attach the pressure pump and hose.
3. Turn ignition switch “ON”.
4. Select the “EVAP SYSTEM CLOSE” of “WORK SUPPORT MODE” with CONSULT-II.



5. Touch “START”. A bar graph (Pressure indicating display) will appear on the screen.
6. Apply positive pressure to the EVAP system until the pressure indicator reaches the middle of the bar graph.
7. Remove the EVAP service port adapter and hose with pressure pump.

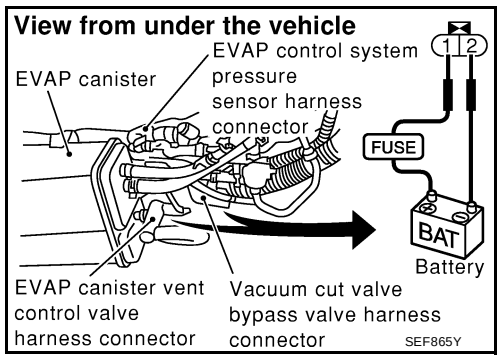


8. Locate the leak using a leak detector. Refer to EC-579, "EVAPORATIVE EMISSION LINE DRAWING" .

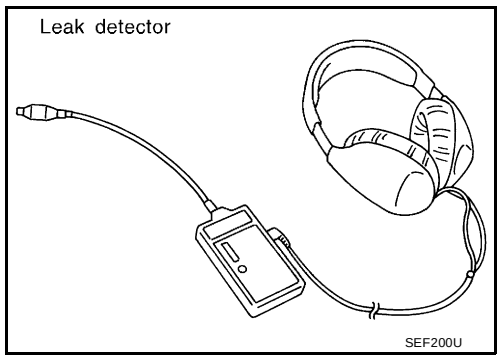


WITHOUT CONSULT-II

1. Attach the EVAP service port adapter securely to the EVAP service port and pressure pump with pressure gauge to the EVAP service port.
2. Apply battery voltage to between the terminals of both EVAP canister vent control valve and vacuum cut valve bypass valve to make a closed EVAP system.
3. To locate the leak, deliver positive pressure to the EVAP system until pressure gauge points reach 1.38 to 2.76 kPa (0.014 to 0.028 kg/cm^2 , 0.2 to 0.4 psi).
4. Remove the EVAP service port adapter and hose with pressure pump.



5. Locate the leak using a leak detector. Refer to EC-579, "EVAPORATIVE EMISSION LINE DRAWING" .

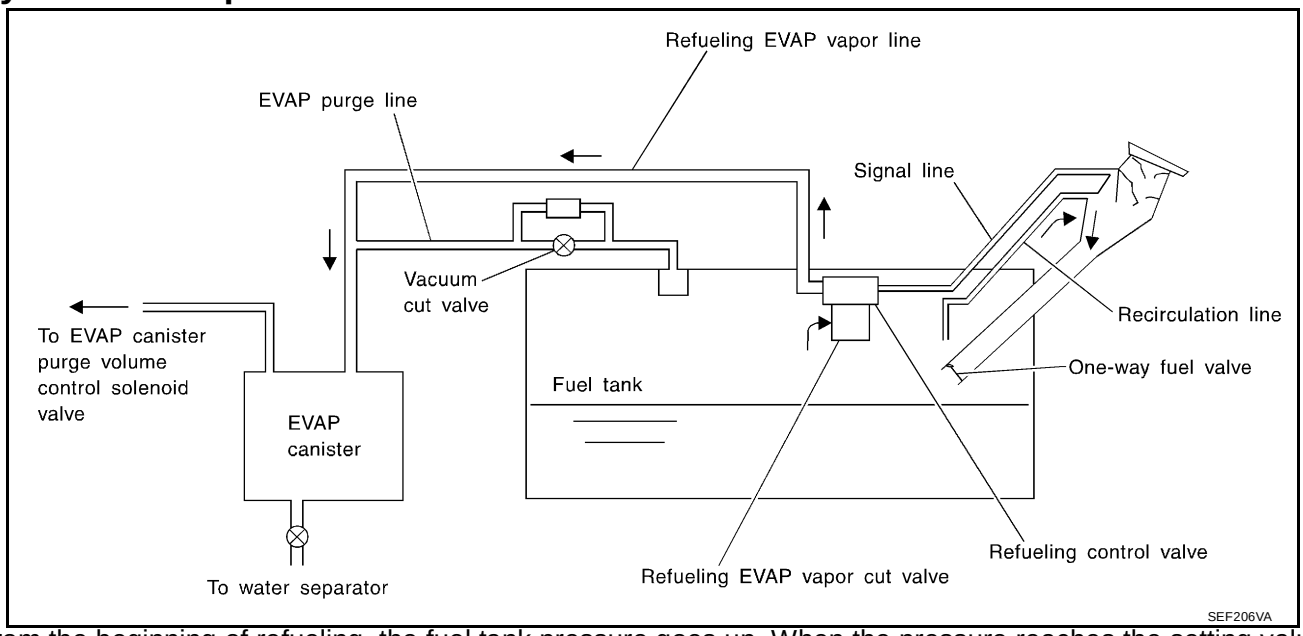


ON BOARD REFUELING VAPOR RECOVERY (ORVR)

PFP:00032

System Description

UBS001PX



From the beginning of refueling, the fuel tank pressure goes up. When the pressure reaches the setting value of the refueling control valve (RCV) opening pressure, the RCV is opened. After RCV opens, the air and vapor inside the fuel tank go through refueling EVAP vapor cut valve, RCV and refueling vapor line to the EVAP canister. The vapor is absorbed by the EVAP canister and the air is released to the atmosphere.

When the refueling has reached the full level of the fuel tank, the refueling EVAP vapor cut valve is closed and refueling is stopped because of auto shut-off. The vapor which was absorbed by the EVAP canister is purged during driving.

The RCV is always closed during driving and the evaporative emission control system is operated the same as conventional system.

WARNING:

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

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

CAUTION:

- **Before removing fuel line parts, carry out the following procedures:**
  - **Put drained fuel in an explosion-proof container and put lid on securely.**
  - **Release fuel pressure from fuel line. Refer to EC-58, "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

UBS001PY

SYMPTOM: FUEL ODOR FROM EVAP CANISTER IS STRONG.

1. CHECK EVAP CANISTER

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Weigh the EVAP canister with EVAP canister vent control valve attached.
   The weight should be less than 1.8 kg (4.0 lb).

OK or NG

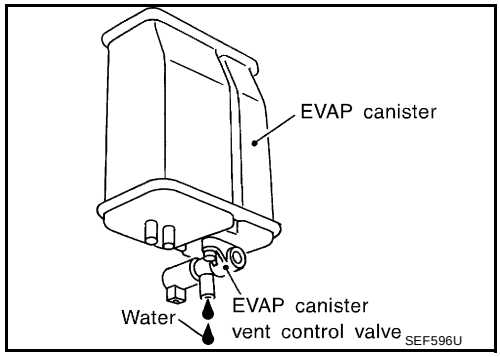
OK >> GO TO 2.
NG >> GO TO 3.

2. CHECK IF EVAP CANISTER SATURATED WITH WATER

Does water drain from the EVAP canister?

Yes or No

Yes >> GO TO 3.
No >> GO TO 6.



3. REPLACE EVAP CANISTER

Replace EVAP canister with a new one.

>> GO TO 4.

4. CHECK WATER SEPARATOR

Refer to EC-588, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace water separator.

5. DETECT MALFUNCTIONING PART

Check the EVAP hose between EVAP canister and water separator for clogging or poor connection.

>> Repair or replace EVAP hose.

6. CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-588, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace refueling EVAP vapor cut valve with fuel tank.

7. CHECK REFUELING CONTROL VALVE

Refer to EC-588, "Component Inspection" .

OK or NG

OK >> **INSPECTION END**
NG >> Replace refueling control valve with fuel tank.

SYMPTOM: CANNOT REFUEL/FUEL ODOR FROM THE FUEL FILLER OPENING IS STRONG WHILE REFUELING.

1. CHECK EVAP CANISTER

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Weigh the EVAP canister with EVAP canister vent control valve attached.
   The weight should be less than 1.8 kg (4.0 lb).

OK or NG

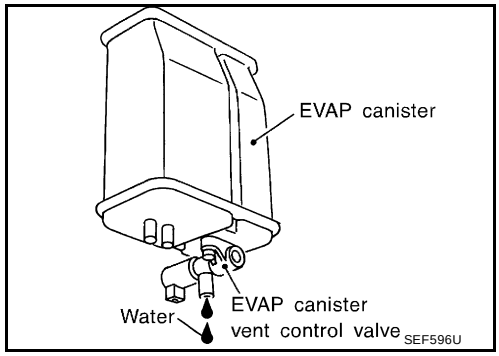
OK >> GO TO 2.
NG >> GO TO 3.

2. CHECK IF EVAP CANISTER SATURATED WITH WATER

Does water drain from the EVAP canister?

Yes or No

Yes >> GO TO 3.
No >> GO TO 6.



3. REPLACE EVAP CANISTER

Replace EVAP canister with a new one.

>> GO TO 4.

4. CHECK WATER SEPARATOR

Refer to EC-588, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace water separator.

5. DETECT MALFUNCTIONING PART

Check the EVAP hose between EVAP canister and water separator for clogging or poor connection.

>> Repair or replace EVAP hose.

6. CHECK VENT HOSES AND VENT TUBES

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

OK or NG

OK >> GO TO 7.
NG >> Repair or replace hoses and tubes.

7. CHECK FILLER NECK TUBE

Check signal line and recirculation line for clogging, dents and cracks.

OK or NG

OK >> GO TO 8.
NG >> Replace filler neck tube.

8. CHECK REFUELING CONTROL VALVE

Refer to EC-588, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace refueling control valve with fuel tank.

9. CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-588, "Component Inspection" .

OK or NG

OK >> GO TO 10.
NG >> Replace refueling EVAP vapor cut valve with fuel tank.

10. CHECK FUEL FILLER TUBE

Check filler neck tube and hose connected to the fuel tank for clogging, dents and cracks.

OK or NG

OK >> GO TO 11.
NG >> Replace fuel filler tube.

11. CHECK ONE-WAY FUEL VALVE-I

Check one-way valve for clogging.

OK or NG

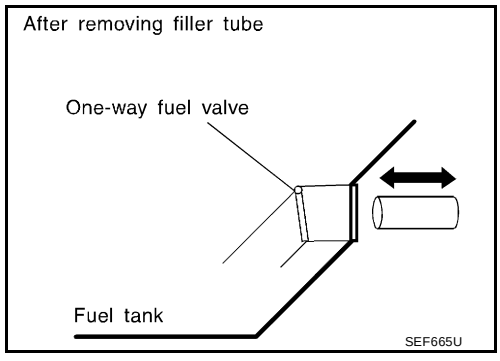
OK >> GO TO 12.
NG >> Repair or replace one-way fuel valve with fuel tank.

12. CHECK ONE-WAY FUEL VALVE-II

1. Make sure that fuel is drained from the tank.
2. Remove fuel filler tube and hose.
3. Check one-way fuel valve for operation as follows.
   When a stick is inserted, the valve should open, when removing stick it should close.
   Do not drop any material into the tank.

OK or NG

OK >> **INSPECTION END**
NG >> Replace fuel filler tube or replace one-way fuel valve with fuel tank.



Component Inspection

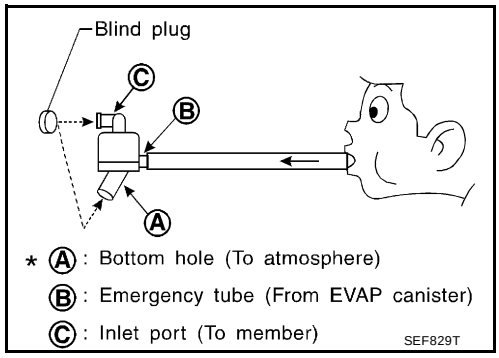
UBS001PZ

WATER SEPARATOR

1. Check visually for insect nests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that **A** and **C** are not clogged by blowing air into **B** with **A** , and then **C** plugged.
5. In case of NG in items 2 - 4, replace the parts.

NOTE:

- Do not disassemble water separator.



REFUELING EVAP VAPOR CUT VALVE

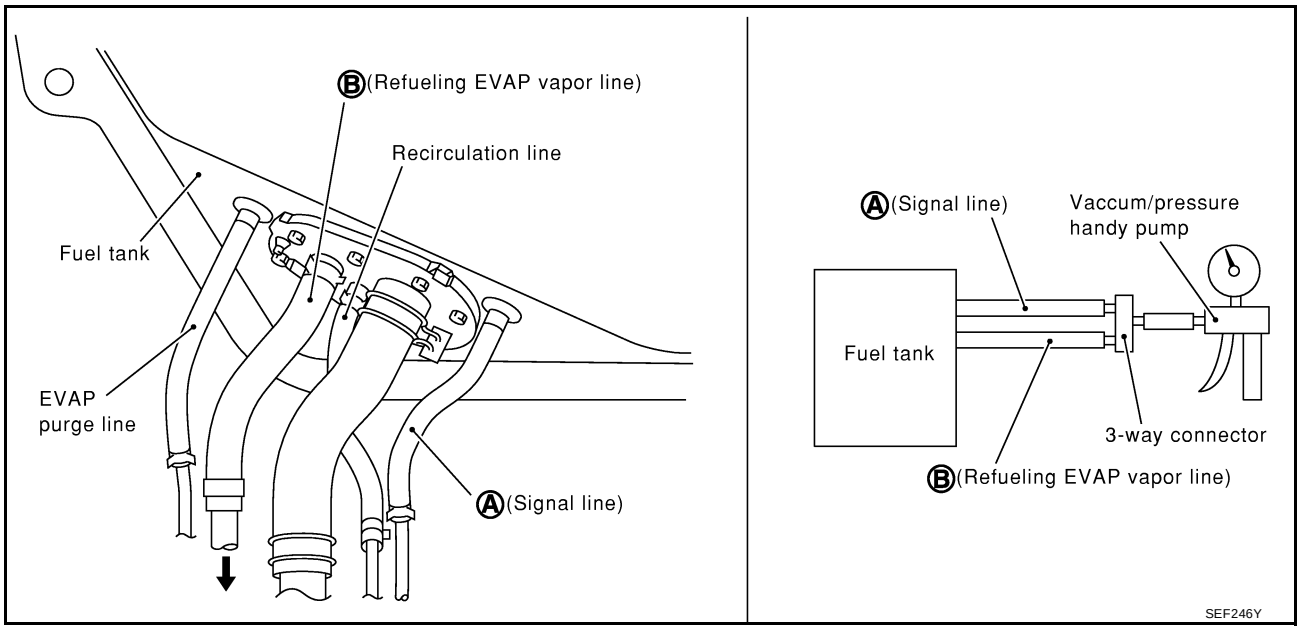
With CONSULT-II

1. Remove fuel tank. Refer to FL-10, "Removal and Installation" .
2. Drain fuel from the tank as follows:

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

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

- Connect vacuum pump to hose ends A and B using a suitable 3-way connector.
- Remove fuel gauge retainer with fuel gauge unit.
  Always replace O-ring with new one.
- Put fuel tank upside down.
- Apply vacuum pressure to both hose ends A and B [–13.3 kPa (–100 mmHg, –3.94 inHg)] with fuel level sensor unit retainer remaining open and check that the pressure is applicable.



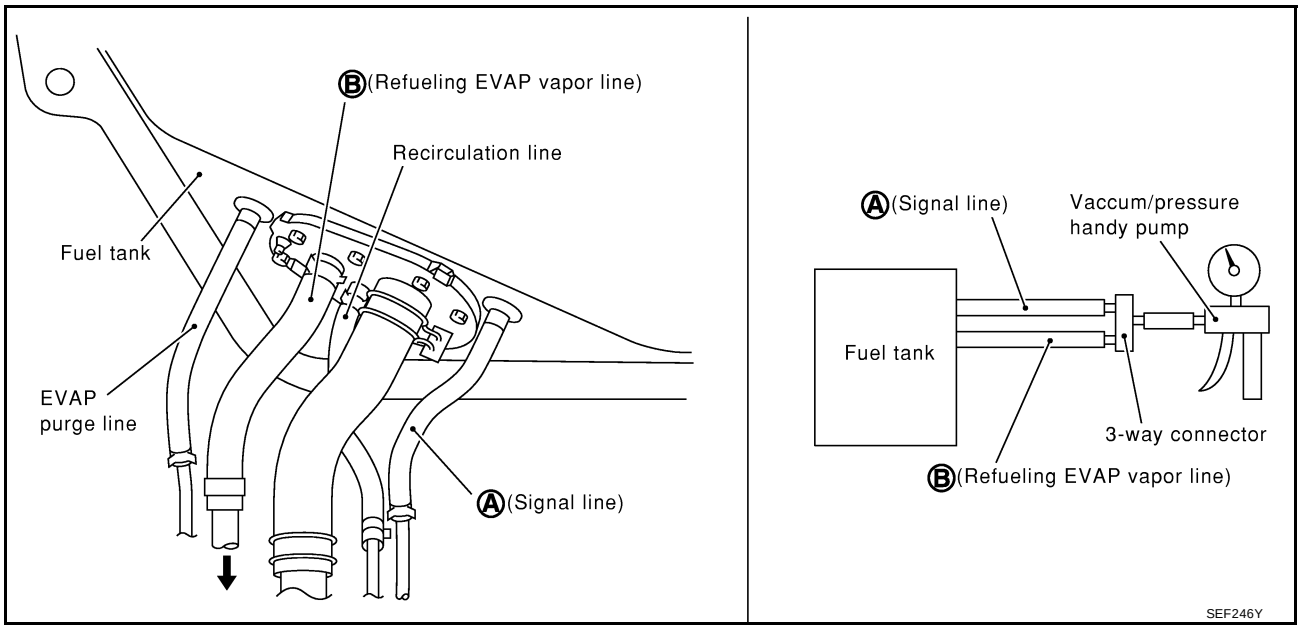
With GST

1. Remove fuel tank. Refer to FL-10, "Removal and Installation" .
2. Drain fuel from the tank as follows:

- Remove fuel level sensor unit retainer.
- Drain fuel from the tank using a hand pump into a fuel container.

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

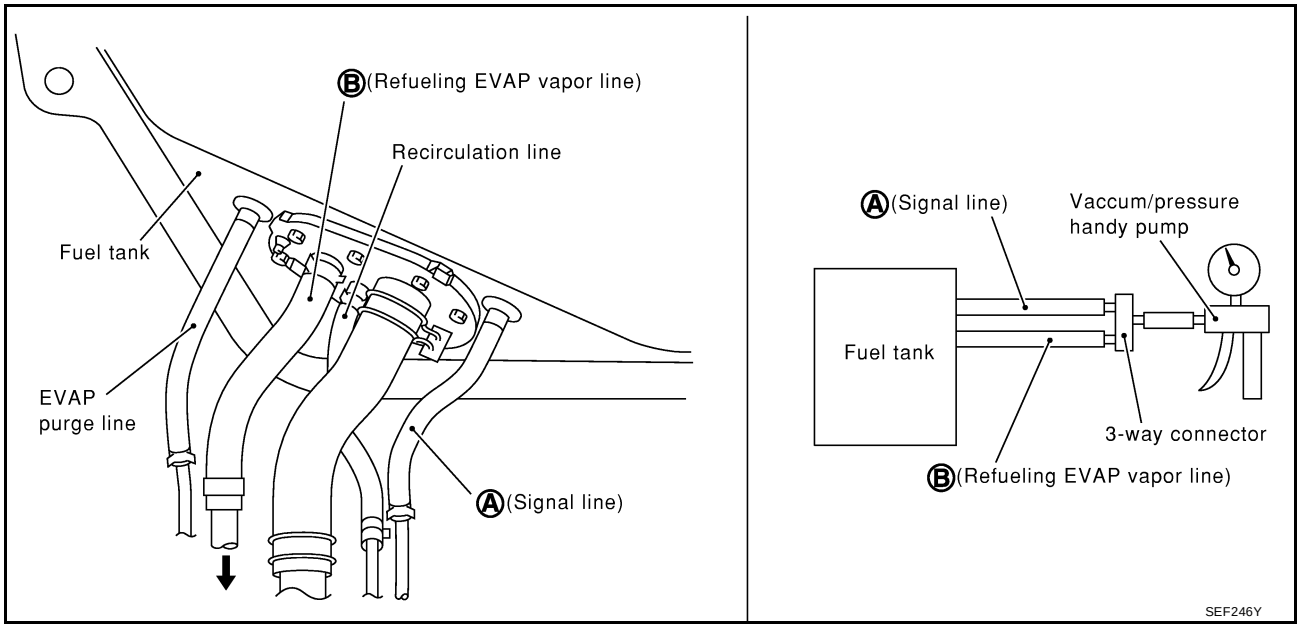
- Connect vacuum pump to hose ends A and B using a suitable 3-way connector.
- Remove fuel gauge retainer with fuel level sensor unit.
  Always replace O-ring with new one.
- Put fuel tank upside down.
- Apply vacuum pressure to both hose ends A and B [–13.3 kPa (–100 mmHg, –3.94 inHg)] with fuel level sensor unit retainer remaining open and check that the pressure is applicable.



REFUELING CONTROL VALVE

1. Remove fuel filler cap.
2. Check air continuity between hose ends A and B.
   Blow air into the hose end B. Air should flow freely into the fuel tank.
3. Blow air into hose end A and check there is no leakage.

4. Apply pressure to both hose ends A and B [20 kPa (150 mmHg, 5.91 inHg)] using a pressure pump and a suitable 3-way connector. Check that there is no leakage.

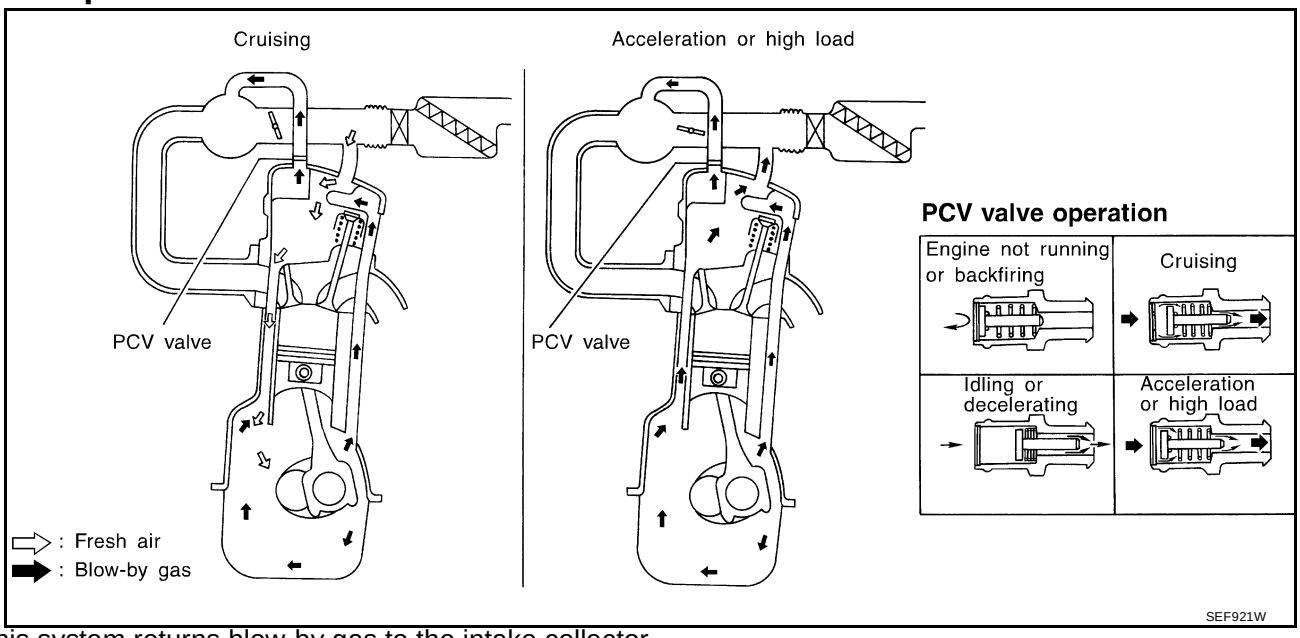


POSITIVE CRANKCASE VENTILATION

PFP:11810

Description

UBS001Q0



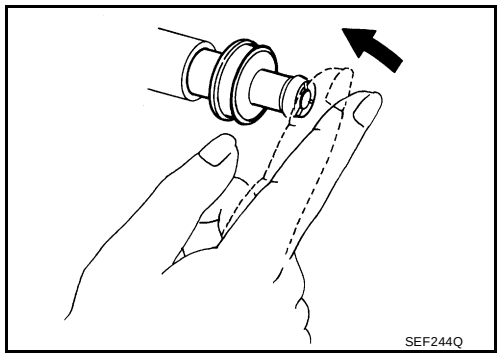
This system returns blow-by gas to the intake collector.
The positive crankcase ventilation (PCV) valve is provided to conduct crankcase blow-by gas to the intake manifold.
During partial throttle operation of the engine, the intake manifold sucks the blow-by gas through the PCV valve.
Normally, the capacity of the valve is sufficient to handle any blow-by and a small amount of ventilating air.
The ventilating air is then drawn from the air duct into the crankcase. In this process the air passes through the hose connecting air inlet tubes to rocker cover.
Under full-throttle condition, the manifold vacuum is insufficient to draw the blow-by flow through the valve. The flow goes through the hose connection in the reverse direction.
On vehicles with an excessively high blow-by, the valve does not meet the requirement. This is because some of the flow will go through the hose connection to the intake collector under all conditions.

Inspection

UBS001Q1

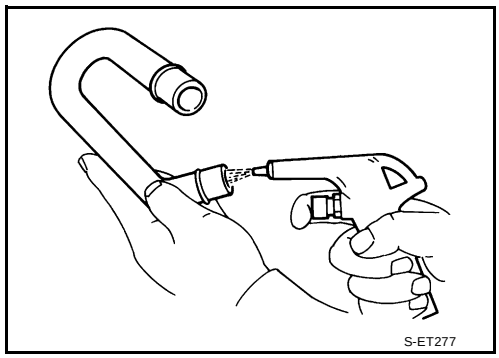
PCV (POSITIVE CRANKCASE VENTILATION) VALVE

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 the valve inlet.



VENTILATION HOSE

1. Check hoses and hose connections for leaks.
2. Disconnect all hoses and clean with compressed air. If any hose cannot be freed of obstructions, replace.



SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

Fuel Pressure Regulator

UBS001Q2

Fuel pressure at idling kPa (kg/cm^2 , psi)	Vacuum hose is connected	Approximately 235 (2.4, 34)
	Vacuum hose is disconnected	Approximately 294 (3.0, 43)

Idle Speed and Ignition Timing

UBS001Q3

Target idle speed*1 rpm	No-load*2 (in “P” or “N” position)	M/T: 650±50A/T: 800±50
Air conditioner: ON rpm	In “P” or “N” position	850 or more
Ignition timing*1	In “P” or “N” position	9°±5° BTDC
Throttle position sensor idle position V		0.2 - 0.8

*1: Throttle position sensor harness connector connected
*2: Under the following conditions:

- Air conditioner switch: OFF
- Electrical load: OFF (Lights & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Mass Air Flow Sensor

UBS001Q4

Supply voltage V	Battery voltage (11 - 14)
Output voltage V	1.0 - 1.7*
Mass air flow (Using CONSULT-II or GST) g·m/sec	1.4 - 4.0 at idle* 5.0 - 10.0 at 2,500 rpm*

*: Engine is warmed up to normal operating temperature and idling under no-load.

Engine Coolant Temperature Sensor

UBS001Q5

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260

EGR Temperature Sensor

UBS001Q6

EGR temperature °C (°F)	Voltage V	Resistance MΩ
0 (32)	4.56	0.62 - 1.05
50 (122)	2.25	0.065 - 0.094
100 (212)	0.59	0.011 - 0.015

Fuel Pump

UBS001Q7

Resistance [at 25°C (77°F)] Ω	0.2 - 5.0

IACV-AAC Valve

UBS001Q8

Resistance [at 20°C (68°F)] Ω	Approximately 22

Injector

UBS001Q9

Resistance [at 20°C (68°F)] Ω	13.5 - 17.5

Resistor

UBS001QA

Resistance [at 25°C (77°F)] Ω	4 - 8

Throttle Position Sensor

UBS001QB

Throttle valve conditions	Voltage (at normal operating temperature, engine off, ignition switch ON, throttle opener disengaged)
Completely closed (a)	0.15 - 0.85V
Partially open	Between (a) and (b)
Completely open (b)	3.5 - 4.7V

Heated Oxygen Sensor 1 Heater (Front)

UBS001QC

Resistance [at 25°C (77°F)] Ω	2.3 - 4.3

Calculated Load Value

UBS001QD

	Calculated load value % (Using CONSULT-II or GST)
At idle	20.0 - 35.5
At 2,500 rpm	12.0 - 27.0

Intake Air Temperature Sensor

UBS001QE

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

EVAP Canister Purge Volume Control Valve

UBS001QF

Resistance [at 20°C (68°F)] Ω	22 - 26

Heated Oxygen Sensor 2 Heater (Rear)

UBS001QG

Resistance [at 25°C (77°F)] Ω	2.3 - 4.3

Crankshaft Position Sensor (POS)

UBS001QH

Resistance [at 20°C (68°F)] Ω	166 - 204

Fuel Tank Temperature Sensor

UBS001QI

Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90

INDEX FOR DTC

PFP:00024

Alphabetical Index

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A/F SENSOR1 (B1)	P1272	EC-1080
A/F SENSOR1 (B1)	P1273	EC-1085
A/F SENSOR1 (B1)	P1274	EC-1091
A/F SENSOR1 (B1)	P1276	EC-1097
A/F SENSOR1 (B1)	P1278	EC-1102
A/F SENSOR1 (B1)	P1279	EC-1102
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APP SEN/CIRC*3	P0123	EC-759
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A/T 3RD GR FNCTN	P0733	AT-142
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EGR SYSTEM	P1402	EC-1110
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EGR VOL CONT/V CIR	P0403	EC-877
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EVAP SYS PRES SEN	P0453	EC-934
EVAP SMALL LEAK	P0442	EC-908
EVAP SMALL LEAK	P1442	EC-1119
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MAF SEN/CIRCUIT*3	P0103	EC-734
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VENT CONTROL VALVE	P1446	EC-1130
VENT CONTROL VALVE	P1448	EC-1136

*1: 1st trip DTC No. is the same as DTC No.
*2: This DTC is displayed with CONSULT-II only.
*3: When the fail-safe operation occurs, the MIL illuminates.
*4: The MIL illuminates when both the “Revolution sensor signal” and the “Vehicle speed sensor signal” meet the fail-safe condition at the same time.

DTC No. Index

UBS001QK

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PRECAUTIONS

PFP:00001

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

UBS001QL

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. Information necessary to service the system safely is included in the SRS and SB section of this Service Manual.

WARNING:

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

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

UBS001QM

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

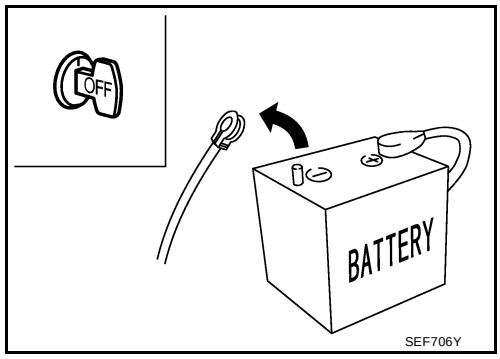
CAUTION:

- **Be sure to turn the ignition switch “OFF” and disconnect the negative battery terminal before any repair or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will cause the MIL to light up.**
- **Be sure to connect and lock the connectors securely after work. A loose (unlocked) connector will cause the MIL to light up due to the open circuit. (Be sure the connector is free from water, grease, dirt, bent terminals, etc.)**
- **Certain systems and components, especially those related to OBD, may use a new style slide-locking type harness connector.**
  For description and how to disconnect, refer to EL section, “Description”, “HARNESS CONNECTOR”.
- **Be sure to route and secure the harnesses properly after work. The interference of the harness with a bracket, etc. may cause the MIL to light up due to the short circuit.**
- **Be sure to connect rubber tubes properly after work. A misconnected or disconnected rubber tube may cause the MIL to light up due to the malfunction of the EGR system or fuel injection system, etc.**
- **Be sure to erase the unnecessary malfunction information (repairs completed) from the ECM and TCM (Transmission Control Module) before returning the vehicle to the customer.**

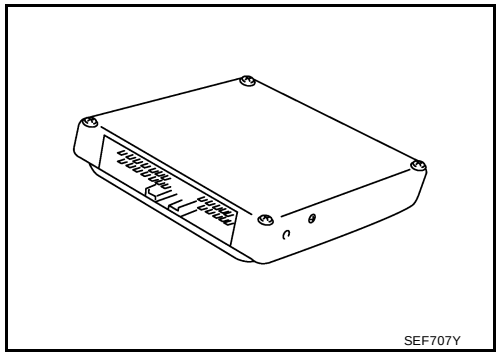
Precautions

UBS001QN

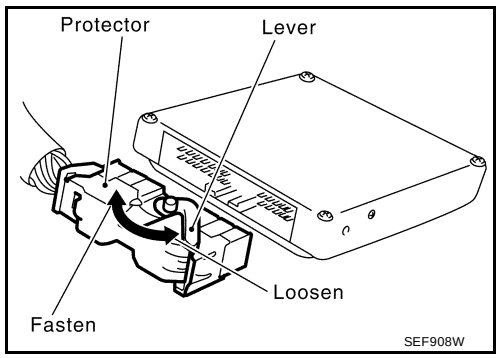
- **Always use a 12 volt battery as power source.**
- **Do not attempt to disconnect battery cables while engine is running.**
- **Before connecting or disconnecting the engine control system harness connector, turn ignition switch OFF and disconnect negative battery terminal. Failure to do so may damage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



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

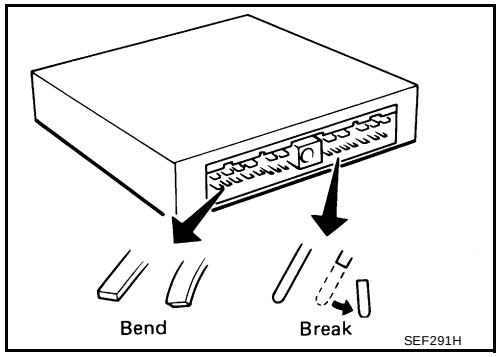

SEF707Y

- **When connecting engine control system harness connector, fasten it securely with a lever as far as it will go as shown at left.**

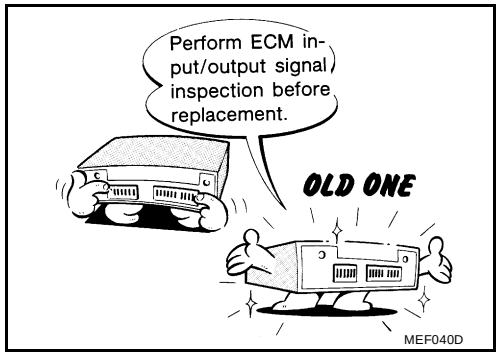


SEF908W

- **When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).**
  Make sure that there are not any bends or breaks on ECM pin terminals when connecting pin connectors.
- **Securely connect engine control system harness connectors.**
  A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to ICs.
- **Keep engine control system harness at least 10 cm (4 in) away from adjacent harness, to prevent engine control system malfunctions due to receiving external noise, degraded operation of ICs, etc.**
- **Keep engine control system parts and harness dry.**
- **Before replacing ECM, perform Terminals and Reference Value inspection and make sure ECM functions properly. Refer to EC-677 .**

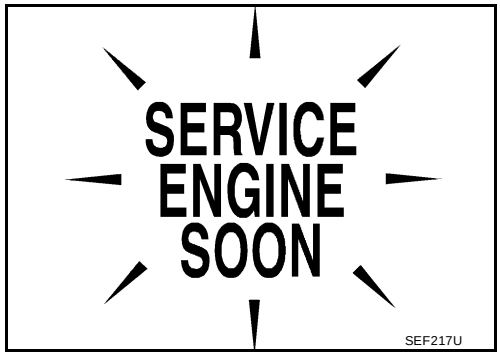


SEF291H



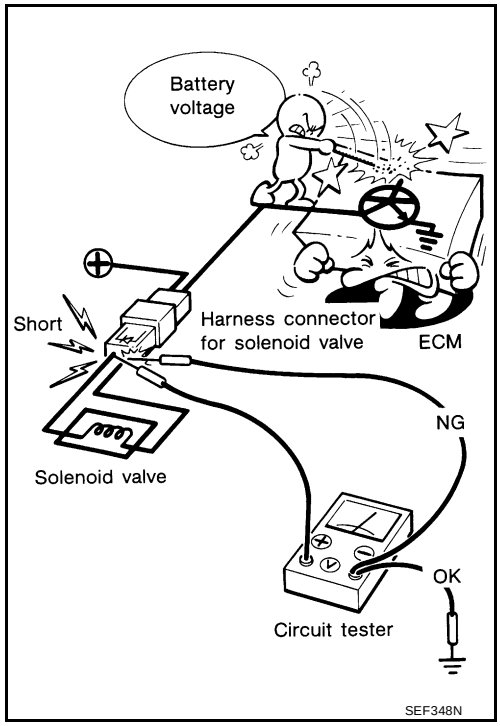
MEF040D

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



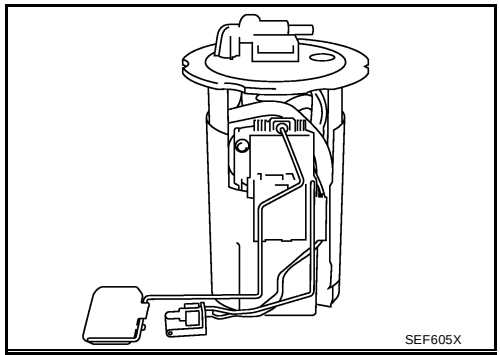
SEF217U

- **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 body ground.**
- **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 IAC valve-AAC valve.**
- **Even a slight leak in the air intake system can cause serious problems.**
- **Do not shock or jar the camshaft position sensor.**

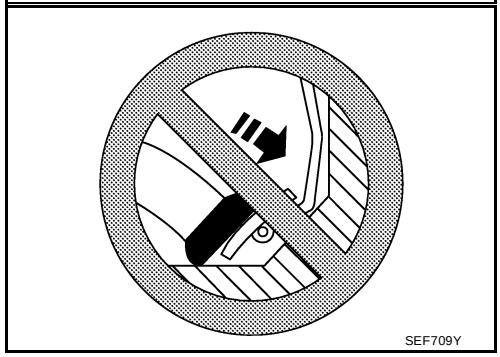


SEF348N

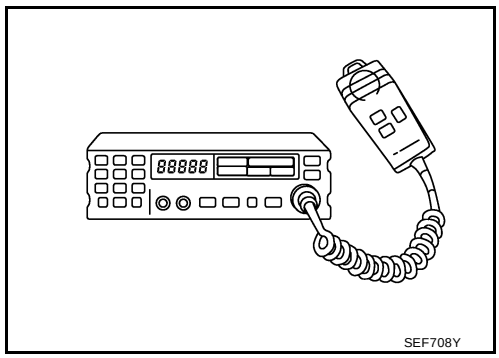
- **Do not operate fuel pump when there is no fuel in lines.**
- **Tighten fuel hose clamps to the specified torque.**


SEF605X

- **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.**


SEF709Y

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



Wiring Diagrams and Trouble Diagnosis

UBS001QO

When you read Wiring diagrams, refer to the following:

- GI-13, "How to Read Wiring Diagrams".
- PG-2, "POWER SUPPLY ROUTING". for power distribution circuit

When you perform trouble diagnosis, refer to the following:

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

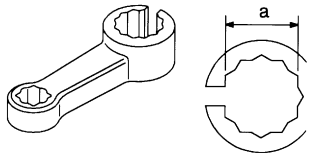
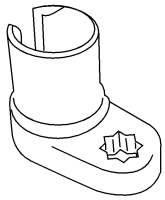
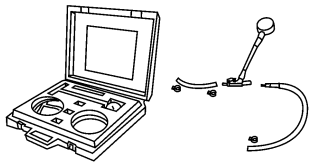
PREPARATION

PFP:00002

Special Service Tools

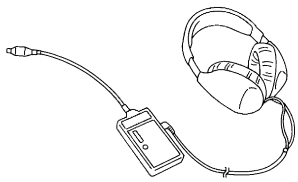
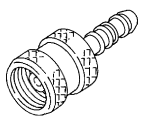
UBS001QP

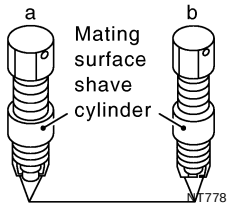
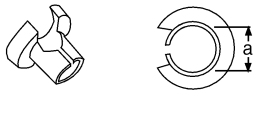
The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description	
KV10114400 (J-38365) Heated oxygen sensor wrench	 NT636	Loosening or tightening heated oxygen sensor **a: 22 mm (0.87 in)**
(J44626) Air fuel ratio (A/F) sensor wrench	 LEM054	Loosening or tightening air fuel ratio (A/F) sensor 1
(J-44321) Fuel pressure gauge kit	 WBIA0097E	Checking fuel pressure
Fuel filler cap adapter (J-45356)	 NT815	Checking fuel tank vacuum relief valve opening pressure

Commercial Service Tools

UBS001QQ

Tool name	Description	
Leak detector (J41416)	 NT703	Locating the EVAP leak
EVAP service port adapter (J41413-OBD)	 NT704	Applying positive pressure through EVAP service port

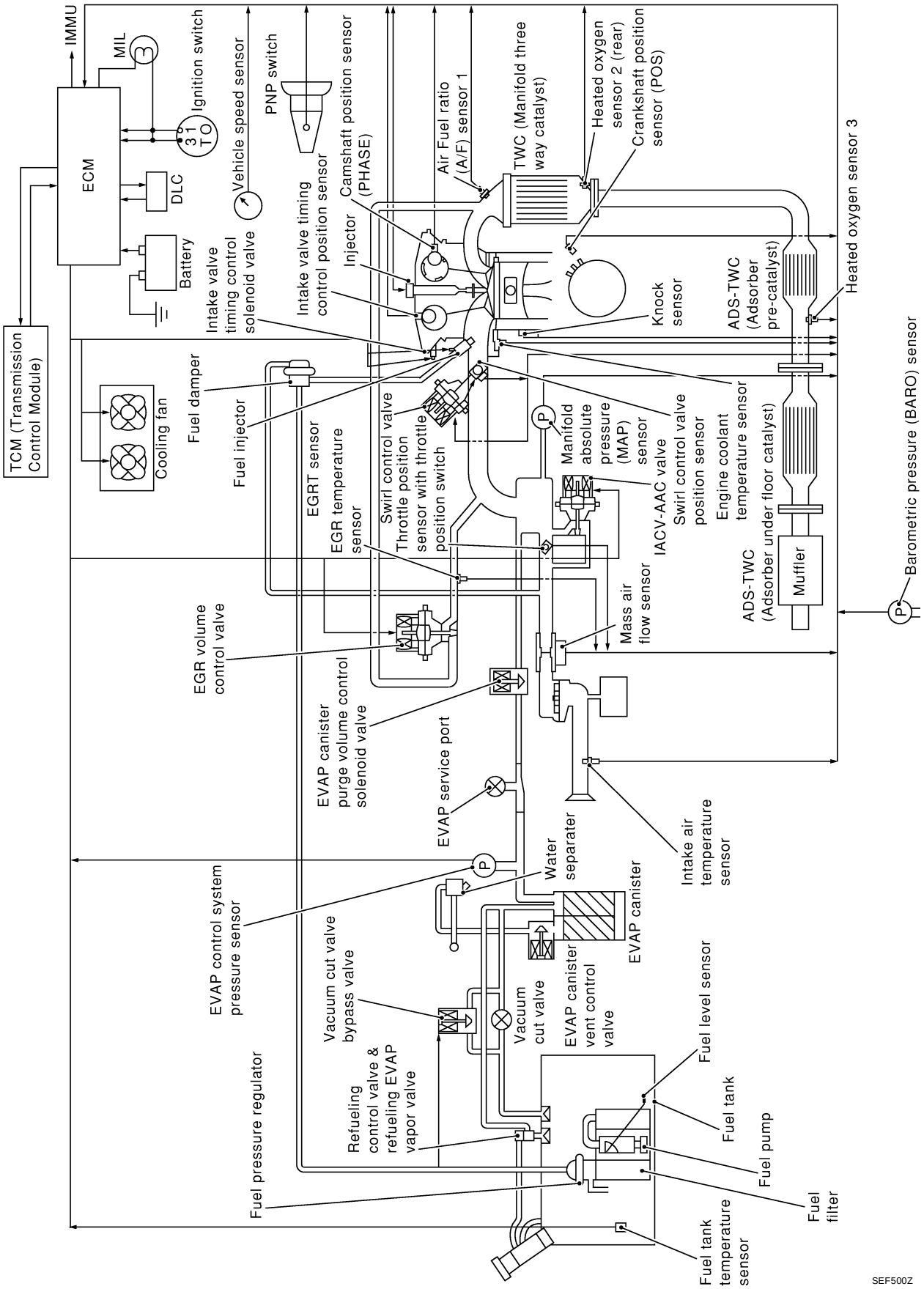
Tool name	Description	
Oxygen sensor thread cleaner (J-43897-18) (J-43897-12)		Reconditioning the exhaust system threads before installing a new oxygen sensor or A/F sensor. Use with anti-seize lubricant shown below. **a: J-43897-18 18 mm with 1.5 mm pitch dia., for Zirconia Oxygen Sensor or A/F sensor** **b: J-43897-12 12 mm with 1.25 mm pitch dia., for Titania Oxygen Sensor**
Anti-seize lubricant (Permatex^{TM} 133AR or equivalent meeting MIL specification MIL-A-907)		Lubricating oxygen sensor thread cleaning tool when reconditioning exhaust system threads.
Fuel tube removal tool		For disconnecting fuel tube quick connectors **a: 7.9 mm (5/16 in)**

ENGINE CONTROL SYSTEM

PFP:23710

System Diagram

UBS001QR



System Chart

UBS001QS

Input (Sensor)	ECM Function	Output (Actuator)
● Camshaft position sensor (PHASE) ● Crankshaft position sensor (POS) ● Mass air flow sensor ● Engine coolant temperature sensor ● Air fuel ratio (A/F) sensor 1 ● Ignition switch ● Throttle position sensor ● PNP switch ● Air conditioner switch ● Knock sensor ● EGR temperature sensor*1 ● EVAP control system pressure sensor*1 ● Fuel tank temperature sensor*1 ● Battery voltage ● Power steering oil pressure switch ● Vehicle speed sensor ● Intake air temperature sensor ● Manifold absolute pressure (MAP) sensor ● Barometric pressure (BARO) sensor ● Heated oxygen sensor 2 ● Heated oxygen sensor 3*3 ● TCM (Transmission control module)*2 ● Closed throttle position switch*4 ● Electrical load ● Intake valve timing control position sensor*1 ● Swirl control valve position sensor*1 ● Fuel level sensor*1 ● Refrigerant pressure sensor	Fuel injection & mixture ratio control	Injectors
	Electronic ignition system	Power transistor
	Idle air control system	IACV-AAC valve
	Intake valve timing control	Intake valve timing control solenoid valve
	Fuel pump control	Fuel pump relay
	On board diagnostic system	Malfunction indicator lamp (On the instrument panel)
	EGR control	EGR volume control valve
	Swirl control valve control	Swirl control valve
	A/F sensor 1 heater and heated oxygen sensor 2 and 3 heater control	A/F sensor 1 heater and heated oxygen sensor heater
	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
	Cooling fan control	Cooling fan relays
	Air conditioning cut control	Air conditioner relay
	ON BOARD DIAGNOSIS for EVAP system	● EVAP canister vent control valve ● Vacuum cut valve bypass valve

*1: These sensors are not used to control the engine system. They are used only for the on board diagnosis.
*2: The DTC related to A/T will be sent to ECM.
*3: Under normal conditions, this sensor is not for engine control operation.
*4: This switch will operate in place of the throttle position sensor to control EVAP parts if the sensor malfunctions.

Multiport Fuel Injection (MFI) System

UBS001QT

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE)	Engine speed and piston number	Fuel injection & mixture ratio control	Injector
Crankshaft position sensor (POS)	Engine speed		
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 Throttle valve idle position		
PNP switch	Gear position		
Vehicle speed sensor	Vehicle speed		
Ignition switch	Start signal		
Air conditioner switch	Air conditioner operation		
Knock sensor	Engine knocking condition		
Electrical load	Electrical load signal		
Battery	Battery voltage		
Power steering oil pressure switch	Power steering operation		
Heated oxygen sensor 2	Density of oxygen in exhaust gas		
Barometric pressure (BARO) sensor	Ambient air barometric pressure		

SYSTEM DESCRIPTION

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

VARIOUS FUEL INJECTION INCREASE/DECREASE COMPENSATION

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

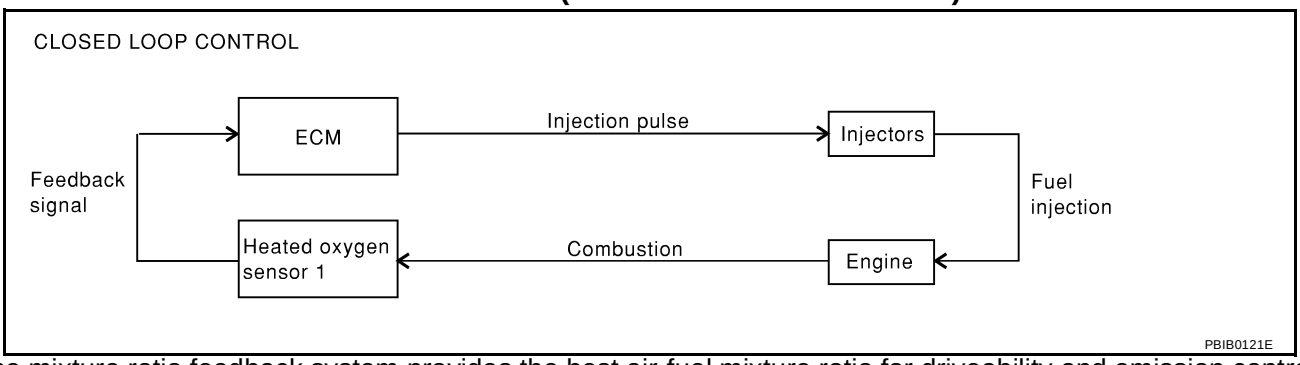
<Fuel increase>

- During warm-up
- When starting the engine
- During acceleration
- Hot-engine operation
- When selector lever is changed from “N” to “D”
- High-load, high-speed operation

<Fuel decrease>

- During deceleration
- During high engine speed operation
- During high vehicle speed operation
- Extremely high engine coolant temperature

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 can then better reduce CO, HC and NOx emissions. This system uses an air fuel ratio (A/F) sensor 1 in the exhaust manifold to monitor if the engine operation is rich or lean. The ECM adjusts the injection pulse width according to the sensor voltage signal. For more information about the air fuel ratio (A/F) sensor 1, refer to EC-1075 . This maintains the mixture ratio within the stoichiometric range (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. Even if the switching characteristics of the A/F sensor 1 shift, the air-fuel ratio is controlled to stoichiometric by the signal from heated oxygen sensor 2.

Open Loop Control

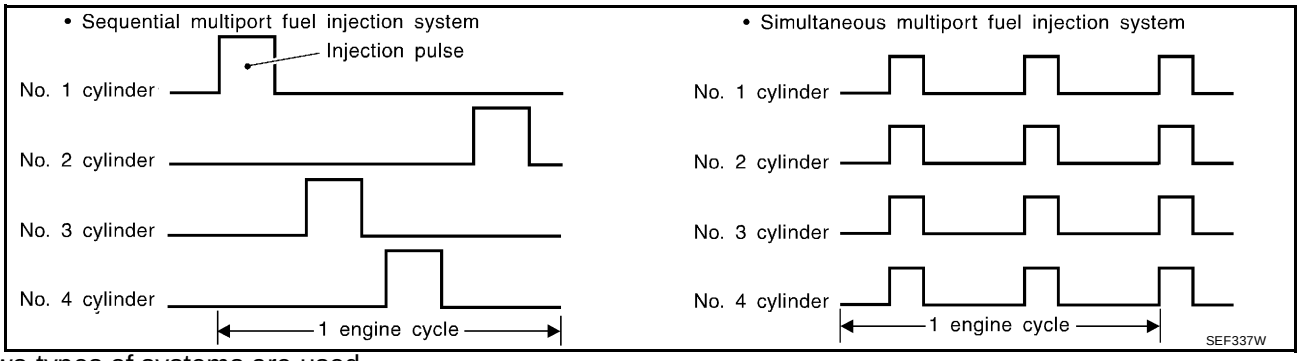
The open loop system condition refers to when the ECM detects any of the following conditions. Feedback control stops in order to maintain stabilized fuel combustion.

- Deceleration and acceleration
- High-load, high-speed operation
- Malfunction of A/F sensor 1 or its circuit
- Insufficient activation of A/F sensor 1 at low engine coolant temperature
- High engine coolant temperature
- During warm-up
- When starting the engine

MIXTURE RATIO SELF-LEARNING CONTROL

The mixture ratio feedback control system monitors the mixture ratio signal transmitted from 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 film) and characteristic changes during operation (i.e., injector clogging) directly affect mixture ratio.
Accordingly, the difference between the basic and theoretical mixture ratios is monitored in this system. This is then computed in terms of “injection pulse duration” to automatically compensate for the difference between the two ratios.
“Fuel trim” refers to the feedback compensation value compared against the basic injection duration. Fuel trim includes short term fuel trim and long term fuel trim.
“Short term fuel trim” is the short-term fuel compensation used to maintain the mixture ratio at its theoretical value. The signal from 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 four cylinders twice each engine cycle. In other words, pulse signals of the same width are simultaneously transmitted from the ECM.
The four injectors will then receive the signals two times for each engine cycle.
This system is used when the engine is being started and/or if the fail-safe system (CPU) is operating.

FUEL SHUT-OFF

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

Electronic Ignition (EI) System

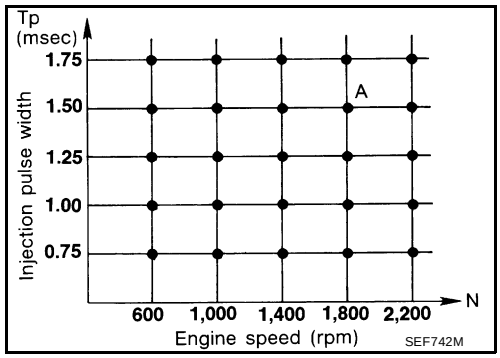
UBS001QU

INPUT/OUTPUT SIGNAL CHART

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

SYSTEM DESCRIPTION

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



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

- At starting
- During warm-up

- At idle
- At low battery voltage
- During acceleration

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

Air Conditioning Cut Control

UBS001QV

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Air conditioner switch	Air conditioner “ON” signal	Air conditioner cut control	Air conditioner relay
PNP switch	Neutral position		
Throttle position sensor	Throttle valve opening angle		
Camshaft position sensor (PHASE)	Engine speed		
Crankshaft position sensor (POS)	Engine speed		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Refrigerant pressure sensor	Refrigerant pressure		

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 the refrigerant pressure is excessively high or low.

Fuel Cut Control (at no load & high engine speed)

UBS001QW

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Vehicle speed sensor	Vehicle speed	Fuel cut control	Injectors
PNP switch	Neutral position		
Throttle position sensor	Throttle position		
Engine coolant temperature sensor	Engine coolant temperature		
Crankshaft position sensor (POS)	Engine speed		
Camshaft position sensor (PHASE)	Engine speed and piston number		

If the engine speed is above 2,500 rpm with no load, (for example, in Neutral and engine speed over 2,500 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed. Fuel cut will operate until the engine speed reaches 2,000 rpm, then fuel cut is cancelled.

NOTE:
This function is different from deceleration control listed under EC-609, "Multiport Fuel Injection (MFI) System" .

BASIC SERVICE PROCEDURE

PFP:00018

Idle Speed and Ignition Timing Check

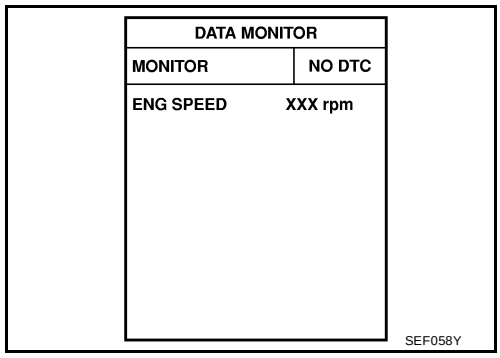
UBS001QX

IDLE SPEED

Method A

With CONSULT-II

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



With GST

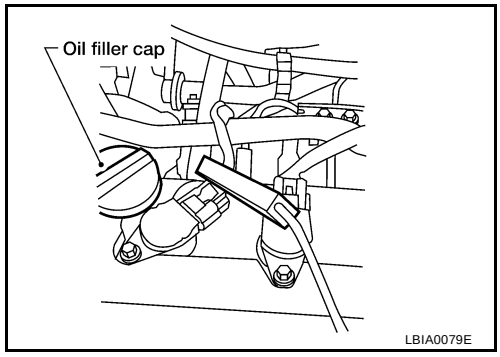
Check idle speed in “MODE 1” with GST.

IGNITION TIMING

Any of following two methods may be used.

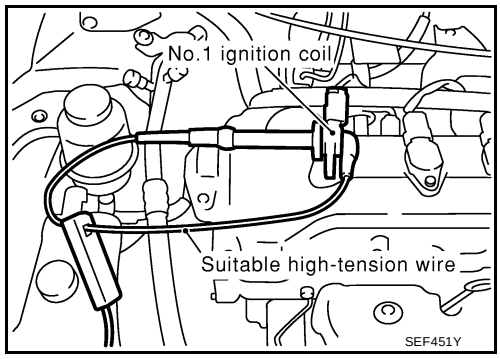
Method A

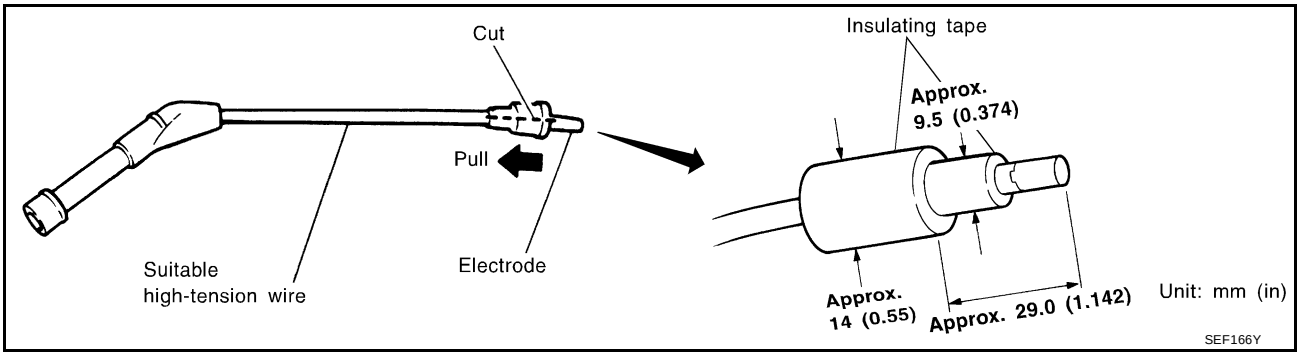
1. Slide the harness protector off ignition coil No. 1 to clear the wires.
2. Attach timing light to the wires as shown in the figure.
3. Check ignition timing.



Method B

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





Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment

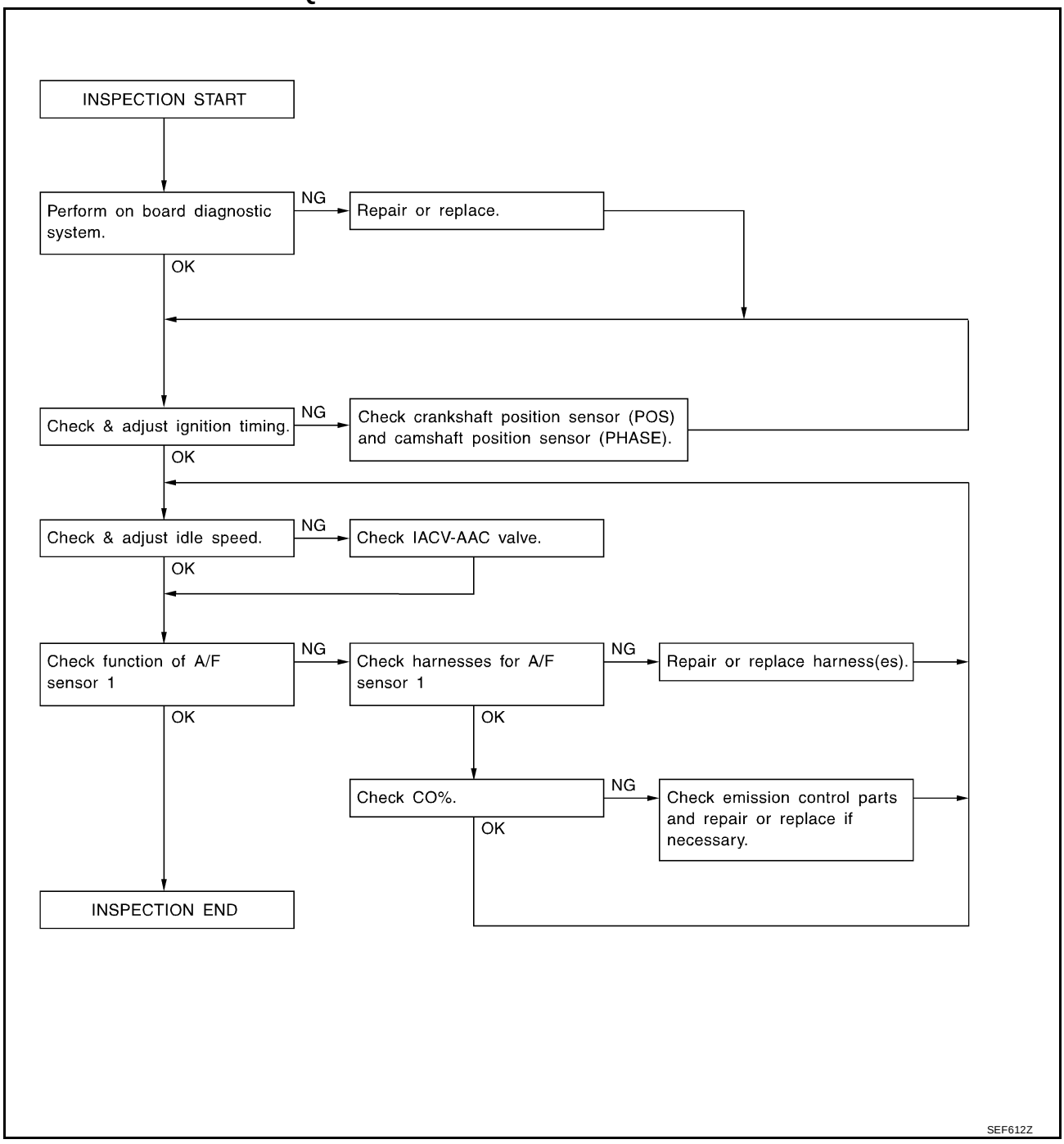
UBS001QY

PREPARATION

1. Make sure that the following parts are in good order.
- Battery
- Ignition system
- Engine oil and coolant levels
- Fuses
- ECM harness connector
- Vacuum hoses
- Air intake system
  (Oil filler cap, oil level gauge, etc.)
- Fuel pressure
- Engine compression
- EGR valve operation
- Throttle valve
- EVAP system

2. On models equipped with air conditioner, checks should be carried out while the air conditioner is “OFF”.
3. On models equipped with automatic transaxle, when checking idle speed, 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 headlamps, heater blower, rear window defogger.
6. Keep front wheels pointed straight ahead.
7. Make the check after the cooling fan has stopped.

OVERALL INSPECTION SEQUENCE



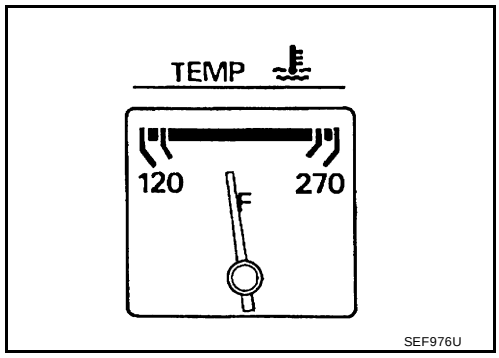
NOTE:
If a vehicle contains a part which is operating outside of design specifications with no MIL illumination, the part shall not be replaced prior to emission testing unless it is determined that the part has been tampered with or abused in such a way that the diagnostic system cannot reasonably be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

INSPECTION PROCEDURE

1. INSPECTION START

1. Visually check the following:
- Air cleaner clogging
- Hoses and ducts for leaks
- EGR valve operation
- Electrical connectors
- Gasket
- Throttle position and throttle position sensor operation

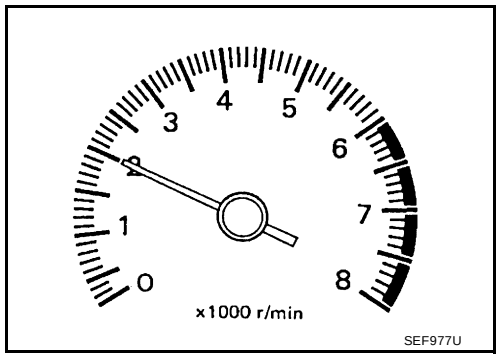
2. Start engine and warm it up until engine coolant temperature indicator points to the middle of gauge.
   Ensure engine stays below 1,000 rpm.



3. Open engine hood and run engine at about 2,000 rpm for about 2 minutes under no-load.
4. Make sure that no DTC is displayed with CONSULT-II or GST.

OK or NG

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



2. REPAIR OR REPLACE

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

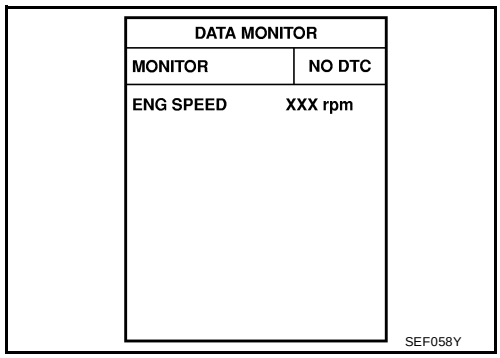
>> GO TO 3.

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.

800±50 rpm (in “P” or “N” position)



Without CONSULT-II

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

800±50 rpm (in “P” or “N” position)

OK or NG

OK >> GO TO 6.
NG >> GO TO 4.

4. CHECK TARGET IDLE SPEED AGAIN

Perform test No. 3 again.

OK or NG

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

5. DETECT MALFUNCTIONING PART

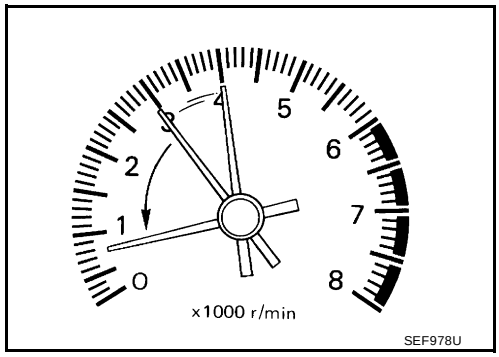
Check the following.

- Check IACV-AAC valve and replace if necessary. Refer to EC-971 .
- Check IACV-AAC valve harness and repair if necessary. Refer to EC-971 .
- Check ECM function by substituting another known-good ECM.
  (ECM may be the cause of a problem, but this is rarely the case.)

>> GO TO 3.

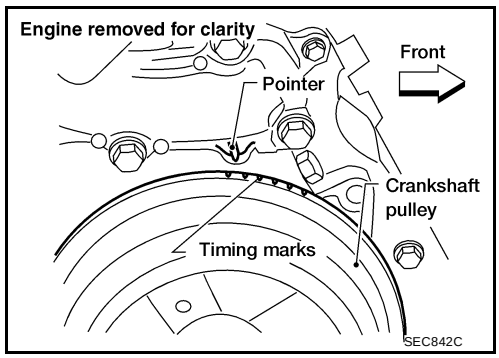
6. CHECK IGNITION TIMING

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



3. Check ignition timing with a timing light.

9°±5° BTDC (in "P" or "N" position)



OK or NG

OK (With CONSULT-II)>>GO TO 8.
OK (Without CONSULT-II)>>GO TO 9.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Check camshaft position sensor (PHASE) and circuit, repair or replace if necessary. Refer to EC-852 .
- Check crankshaft position sensor (POS) and circuit, repair or replace if necessary. Refer to EC-847 .
- Check ECM function by substituting another known-good ECM.
  (ECM may be the cause of a problem, but this is rarely the case.)

>> GO TO 3.

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

With CONSULT-II

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 "D" position with "OD" OFF.
   NOTE:
   Keep the accelerator pedal as steady as possible during the cruising.
3. Set "OD" ON, 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 five times.
5. Stop vehicle and connect CONSULT-II to the vehicle.
6. Make sure that no 1st trip DTC is displayed in "SELF-DIAG RESULTS" mode.

OK or NG

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

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

Without CONSULT-II

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 “D” position with “OD” OFF.

   NOTE:
   Keep the accelerator pedal as steady as possible during the cruising.
3. Set “OD” ON, 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 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 five times.
8. Stop vehicle and connect GST to the vehicle.
9. Make sure that no DTC is displayed.

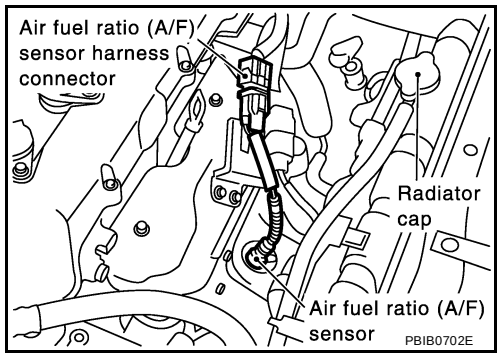
OK or NG

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

10. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

1. Turn ignition switch “OFF” and disconnect battery ground cable.
2. Disconnect ECM harness connector and A/F sensor 1 harness connector.
3. Check harness continuity between the following terminals. Refer to “Wiring Diagram”.

ECM Terminal	A/F sensor 1 terminal
62	2
63	5
64	1
65	6



Continuity should exist.

4. Check harness continuity between ECM terminals 62, 63, 64, 65 or A/F sensor 1 terminals 1, 2, 5, 6 and ground. Refer to Wiring Diagram.

Continuity should exist.

5. Also check harness for short to power.

OK or NG

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

11. REPAIR OR REPLACE

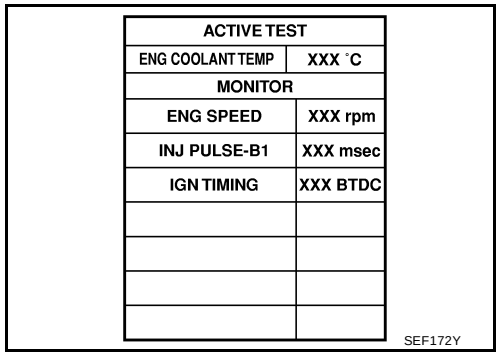
Repair open circuit or short to ground or short to power in harness or connectors between ECM and A/F sensor 1.

>> GO TO 3.

12. PREPARATION FOR “CO” % CHECK

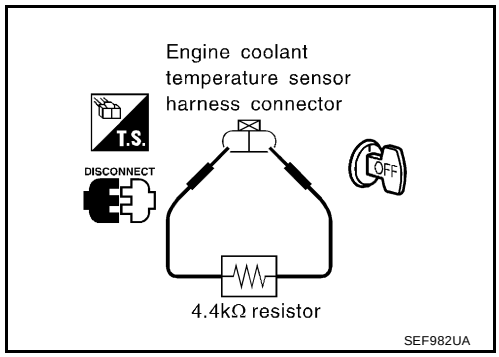
With CONSULT-II

1. Reconnect ECM harness connector.
2. Turn ignition switch “ON”.
3. Select “COOLANT TEMP” in “ACTIVE TEST” mode.
4. Set “COOLANT TEMP” to 5°C (41°F) by touching “DWN” and “Qd”.



Without CONSULT-II

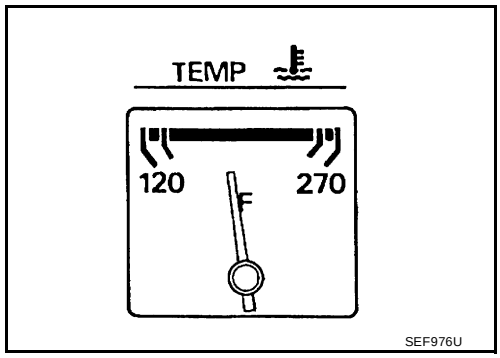
1. Reconnect ECM harness connector.
2. Disconnect engine coolant temperature sensor harness connector.
3. Connect a resistor (4.4 kΩ) between terminals of engine coolant temperature sensor harness connector.



>> GO TO 13.

13. CHECK “CO” %

1. Start engine and warm it up until engine coolant temperature indicator points to the middle of gauge.

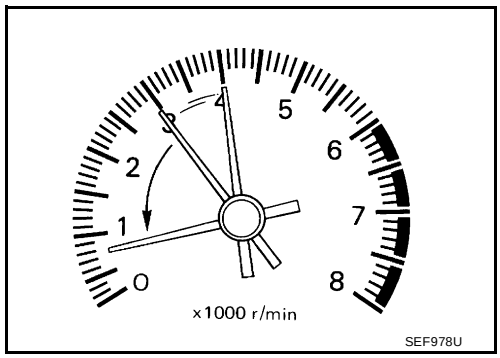


2. Rev engine (2,000 to 3,000 rpm) two or three times under no-load, then run engine at idle speed.
3. Check “CO” %.

Idle CO: 3 - 11% and engine runs smoothly.

4. **Without CONSULT-II**
After checking CO%,

- Disconnect the resistor from terminals of engine coolant temperature sensor harness connector.
- Connect engine coolant temperature sensor harness connector to engine coolant temperature sensor.



OK or NG

OK >> GO TO 3.
NG >> GO TO 14.

14. DETECT MALFUNCTIONING PART

Check the following.

- Connect A/F sensor 1 harness connector to A/F sensor 1.
- Check fuel pressure. Refer toEC-623 .
- Check mass air flow sensor and its circuit. Refer toEC-734 .
- Check injector and its circuit. Refer to EC-1169 .
Clean or replace if necessary.
- Check engine coolant temperature sensor and its circuit. Refer to EC-769 .
- Check ECM function by substituting another known-good ECM.
(ECM may be the cause of a problem, but this is rarely the case.)

>> GO TO 3.

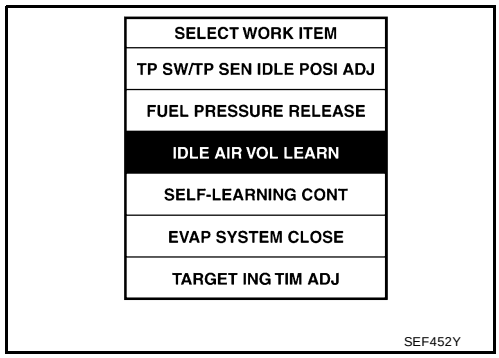
Idle Air Volume Learning

UBS001QZ

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 IACV-AAC valve, throttle body or ECM is replaced.
- Idle speed or ignition timing is out of specification.



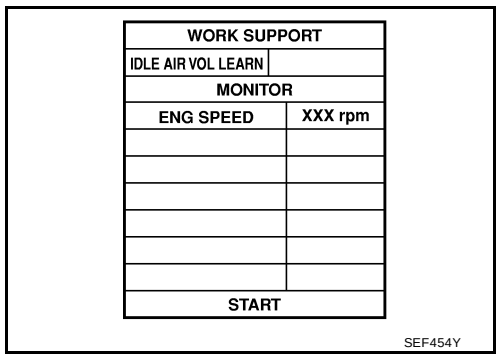
PRE-CONDITIONING

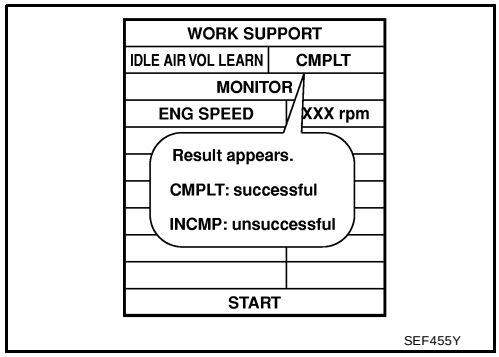
Before performing "Idle Air Volume Learning", make sure that all of the following conditions are satisfied.
Learning will be cancelled if any of the following conditions are missed for even a moment.

- Battery voltage: More than 12.9V (At idle)
- Engine coolant temperature: 70 - 95°C (158 - 203°F)
- PNP switch: ON
- Electric load switch: OFF
  (Air conditioner, headlamp, rear window defogger)

On vehicles equipped with daytime light systems, if the parking brake is applied before the engine is started, the headlamp will not be illuminated.

- Cooling fan motor: Not operating
- Steering wheel: Neutral (Straight-ahead position)
- Vehicle speed: Stopped
- Transmission: Warmed-up
  For models with CONSULT-II, drive vehicle until "FLUID TEMP SE" in "DATA MONITOR" mode of "A/T" system indicates less than 0.9 V.
  For models without CONSULT-II, drive vehicle for 10 minutes.





OPERATION PROCEDURE

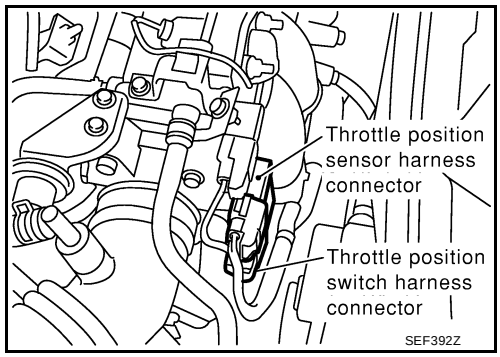
With CONSULT-II

1. Turn ignition switch "ON" and wait at least 1 second.
2. Turn ignition switch "OFF" and wait at least 10 seconds.
3. Start engine and warm it up to normal operating temperature.
4. Check that all items listed under the topic "PRE-CONDITIONING" (previously mentioned) are in good order.
5. Turn ignition switch "OFF" and wait at least 10 seconds.
6. Start the engine and let it idle for at least 30 seconds.
7. Select "IDLE AIR VOL LEARN" in "WORK SUPPORT" mode.
8. Touch "START" and wait 20 seconds.
9. Make sure that "CMPLT" is displayed on CONSULT-II screen. If "INCMP" is displayed, "Idle Air Volume Learning" will not be carried out successfully. In this case, find the cause of the problem by referring to the NOTE below.
10. Rev up the engine two or three times. Make sure that idle speed and ignition timing are within specifications.

ITEM	SPECIFICATION
Idle speed	800±50 rpm (in “P” or “N” position)
Ignition timing	9°±5° BTDC (in “P” or “N” position)

Without CONSULT-II

1. Turn ignition switch “ON” and wait at least 1 second.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Start engine and warm it up to normal operating temperature.
4. Check that all items listed under the topic “PRE-CONDITIONING” (previously mentioned) are in good order.
5. Turn ignition switch “OFF” and wait at least 10 seconds.
6. Start the engine and let it idle for at least 30 seconds.
7. Disconnect throttle position sensor harness connector (brown), then reconnect it within 5 seconds.
8. Wait 20 seconds.



9. Make sure that idle speed is within specifications. If not, the result will be incomplete. In this case, find the cause of the problem by referring to the NOTE below.
10. Rev up the engine two or three times. Make sure that idle speed and ignition timing are within specifications.

ITEM	SPECIFICATION
Idle speed	800±50 rpm (in “P” or “N” position)
Ignition timing	9°±5° BTDC (in “P” or “N” position)

NOTE:
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. **Adjust closed throttle position switch and reset memory. (Refer to EC-652, "Basic Inspection" .)**
5. **When the above three items check out OK, engine component parts and their installation condition are questionable. Check and eliminate the cause of the problem.**
   It is useful to perform EC-707, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" .
6. **If any of the following conditions occur after the engine has started, eliminate the cause of the problem and perform “Idle air volume learning” all over again:**

- **Engine stalls.**
- **Erroneous idle.**
- **Blown fuses related to the IACV-AAC valve system.**

Fuel Pressure Check

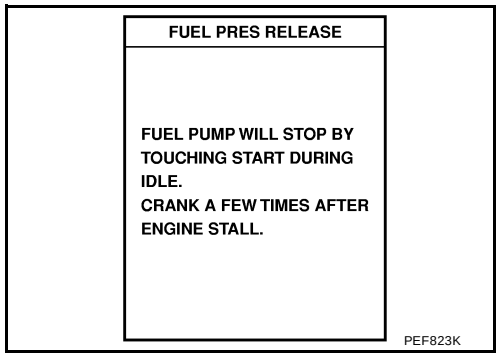
UBS001R0

FUEL PRESSURE RELEASE

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

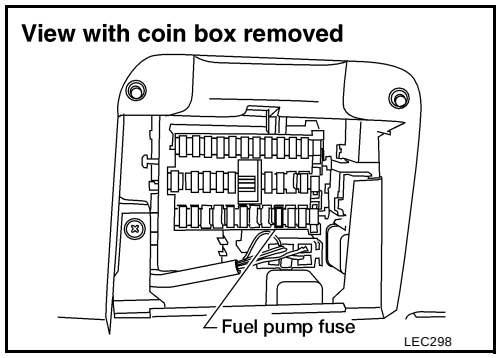
With CONSULT-II

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



With CONSULT-II

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



FUEL PRESSURE CHECK

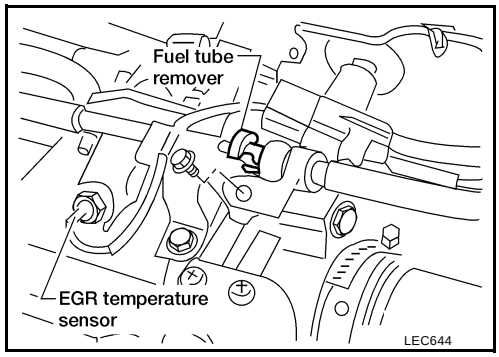
- **Make sure that clamp screws do not contact adjacent parts.**
- **Use a torque driver to tighten clamps.**
- **Use Fuel Pressure Gauge Kit J-44321 to check fuel pressure.**
- **Do not perform fuel pressure check with electrical systems operating (i.e. lights, rear defogger, A/C, etc.) Fuel pressure gauge may indicate false readings due to varying engine loads and changes in manifold vacuum.**

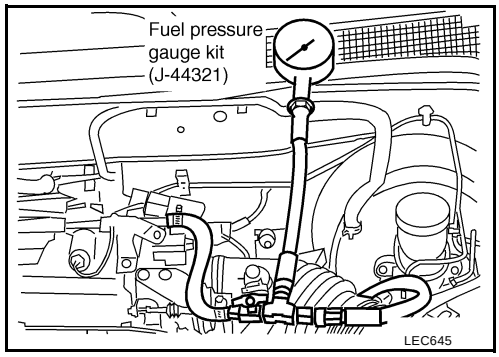
1. Release fuel pressure to zero.
2. Disconnect fuel hose from fuel feed tube (engine side) using fuel tube quick connect removal tool.
3. Release quick connector and disconnect fuel hose from fuel feed tube (underbody side). Remove fuel hose assembly.

   CAUTION:
   Do not install hose clamps over flared portions of fuel feed tubes or damage to fuel feed tubes may result.
4. Install fuel pressure gauge from kit J-44321 between fuel tubes using hose and clamps from kit.
5. Turn ignition switch “ON” and check for fuel leakage.
6. Start engine and read the indication on fuel pressure gauge.

   At idle speed:

   Approximately 350 kPa (3.57 kg/cm^2 , 51 psi)





If results are unsatisfactory, check for fuel leakage in fuel line between fuel tank and injector, and check fuel filter for clogging.
If fuel line and fuel filter are OK, replace fuel pressure regulator. Refer to EM-22 .

ON BOARD DIAGNOSTIC (OBD) SYSTEM

PFP:00028

Introduction

UBS001R1

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

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

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

X: Applicable —: Not applicable

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

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

The malfunction indicator lamp (MIL) on the instrument panel lights up when the same malfunction is detected in two consecutive trips (Two trip detection logic), or when the ECM enters fail-safe mode. (Refer to EC-652)

Two Trip Detection Logic

UBS001R2

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

X: Applicable —: Not applicable

Items	MIL				DTC		1st trip DTC	
	1st trip		2nd trip		1st trip display-ing	2nd trip display-ing	1st trip display-ing	2nd trip display-ing
	Blinking	Lighting up	Blinking	Lighting up				
Coolant over temperature enrichment protection — DTC: P0217	—	×	—	—	×	—	×	—
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0304 is being detected	×	—	—	—	—	—	×	—
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0304 is being detected	—	—	×	—	—	×	—	—
Closed loop control — DTC: P1148	—	×	—	—	×	—	×	—
Fail-safe items (Refer to EC-652)	—	×	—	—	×*1	—	×*1	—
Except above	—	—	—	×	—	×	×	—

*1: Except “ECM”

Emission-related Diagnostic Information

UBS001R3

EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS

X: Applicable —: Not applicable

Items (CONSULT-II screen terms)	DTC*1	SRT code	Test value/ Test limit (GST only)	1st trip DTC*1	Reference page
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	**P0000**	—	—	—	—
INT/V TIMING CONT	P0011	—	—	×	EC-719
HO2S2 HTR (B1)	P0037	×	×	×*2	EC-725
HO2S2 HTR (B1)	P0038				EC-725
HO2S3 HTR (B1)	P0043	×	×	×*2	EC-729
HO2S3 HTR (B1)	P0044				EC-729
MAF SEN/CIRCUIT	P0101	—	—	×	EC-734
MAF SEN/CIRCUIT	P0102				EC-734
MAF SEN/CIRCUIT	P0103				EC-734
MAF SEN/CIRCUIT	P1102				EC-734
ABSL PRES SEN/CIRC	P0107	—	—	×	EC-743
ABSL PRES SEN/CIRC	P0108				EC-743
IAT SEN/CIRCUIT	P0112	—	—	×	EC-748
IAT SEN/CIRCUIT	P0113				EC-748
IAT SEN/CIRCUIT	P0127				EC-748
ECT SEN/CIRC	P0117	—	—	×	EC-754
ECT SEN/CIRC	P0118				EC-754
APP SEN/CIRC	P0121	—	—	×	EC-759
APP SEN/CIRC	P0122				EC-759
APP SEN/CIRC	P0123				EC-759
*ECT SEN/CIRC	P0125	—	—	×	EC-769
THERMSTAT FNCTN	P0128	—	—	×	EC-774
HO2S2 (B1)	P0138	×	×	×*2	EC-776
HO2S2 (B1)	P0139	×	×	×*2	EC-782
HO2S3 (B1)	P0144	×	×	×*2	EC-789
HO2S3 (B1)	P0145	×	×	×*2	EC-795
FUEL SYS-LEAN-B1	P0171	—	—	×	EC-802
FUEL SYS-RICH-B1	P0172	—	—	×	EC-809
FTT SENSOR	P0181	—	—	×	EC-816
FTT SEN/CIRCUIT	P0182				EC-816
FTT SEN/CIRCUIT	P0183				EC-816
ENG OVER TEMP	P0217	—	—	×	EC-821
MULTI CYL MISFIRE	P0300	—	—	×	EC-836
CYL 1 MISFIRE	P0301	—	—	×	EC-836
CYL 2 MISFIRE	P0302	—	—	×	EC-836
CYL 3 MISFIRE	P0303	—	—	×	EC-836
CYL 4 MISFIRE	P0304	—	—	×	EC-836
KNOCK SEN/CIRC-B1	P0327	—	—	—	EC-843

Items (CONSULT-II screen terms)	DTC*1	SRT code	Test value/ Test limit (GST only)	1st trip DTC*1	Reference page
KNOCK SEN/CIRC-B1	P0328				EC-843
CKP SEN/CIRCUIT	P0335	—	—	×	EC-847
CMP SEN/CIRCUIT	P0340	—	—	×	EC-852
IGN SIGNAL-PRIMARY	P0350	—	—	×	EC-857
EGR SYSTEM	P0400	×	×	×*2	EC-866
EGR VOL CONT/V CIR	P0403	—	—	×	EC-877
EGR TEMP SEN/CIRC	P0405	—	—	×	EC-884
EGR TEMP SEN/CIRC	P0406				EC-884
TW CATALYST SYS-B1	P0420	×	×	×*2	EC-893
EVAP PURG FLOW/MON	P0441	×	×	×*2	EC-897
EVAP SMALL LEAK	P0442	×	×	×*2	EC-908
PURG VOLUME CONT/V	P0444	—	—	×	EC-922
PURG VOLUME CONT/V	P0445				EC-922
VENT CONTROL VALVE	P0447	—	—	×	EC-928
EVAPO SYS PRES SEN	P0452	—	—	×	EC-934
EVAPO SYS PRES SEN	P0453	—	—	×	EC-934
EVAP GROSS LEAK	P0455	—	×	×*2	EC-944
FUEL LEV SEN SLOSH	P0460	—	—	×	EC-957
FUEL LEVEL SENSOR	P0461	—	—	×	EC-961
FUEL LEVEL SEN/CIRC	P0462	—	—	×	EC-964
FUEL LEVEL SEN/CIRC	P0463	—	—	×	EC-964
VEH SPEED SEN/CIRC	P0500	—	—	×	EC-968
ISC SYSTEM/CIRC	P0505	—	—	×	EC-971
CLOSED TP SW/CIRC	P0510	—	—	×	EC-980
A/T COMM LINE	P0600	—	—	×	EC-988
ECM	P0605	—	—	×	EC-991
PNP SW/CIRC	P0705	—	—	×	AT-114
ATF TEMP SEN/CIRC	P0710	—	—	×	AT-119
VEH SPD SEN/CIR AT	P0720	—	—	×	AT-124
ENGINE SPEED SIG	P0725	—	—	×	AT-128
A/T 1ST GR FNCTN	P0731	—	—	×	AT-132
A/T 2ND GR FNCTN	P0732	—	—	×	AT-137
A/T 3RD GR FNCTN	P0733	—	—	×	AT-142
A/T 4TH GR FNCTN	P0734	—	—	×	AT-147
TCC SOLENOID/CIRC	P0740	—	—	×	AT-155
A/T TCC S/V FNCTN	P0744	—	—	×	AT-160
L/PRESS SOL/CIRC	P0745	—	—	×	AT-170
SFT SOL A/CIRC	P0750	—	—	×	AT-176
SFT SOL B/CIRC	P0755	—	—	×	AT-180
A/F SEN1 HTR (B1)	P1031	×	×	×	EC-993
A/F SEN1 HTR (B1)	P1032				EC-993
MAP SENSOR	P1103	—	—	×	EC-997

Items (CONSULT-II screen terms)	DTC*1	SRT code	Test value/ Test limit (GST only)	1st trip DTC*1	Reference page
MAP SENSOR	P1104				EC-997
MAP SENSOR	P1108				EC-997
INT/V TIM V/CIR-B1	P1111	—	—	×	EC-1003
VARI SWL CON/SV-B1	P1132	—	—	×	EC-1008
SWIRL CON/V POSI SEN	P1137	—	—	×	EC-1013
SWIRL CONT VALVE	P1138	—	—	×	EC-1019
INT TIM S/CIR-B1	P1140	—	—	×	EC-1026
HO2S2 (B1)	P1146	×	×	×*2	EC-1031
HO2S2 (B1)	P1147	×	×	×*2	EC-1038
CLOSED LOOP-B1	P1148	—	—	×	EC-1045
HO2S3 (B1)	P1169	×	×	×*2	EC-1046
HO2S3 (B1)	P1170	×	×	×*2	EC-1053
ENG OVER TEMP	P1217	—	—	×	EC-1060
A/F SENSOR 1 (B1)	P1271	×	×	×	EC-1075
A/F SENSOR 1 (B1)	P1272	×	×	×	EC-1080
A/F SENSOR 1 (B1)	P1273	×	×	×	EC-1085
A/F SENSOR 1 (B1)	P1274	×	×	×	EC-1091
A/F SENSOR 1 (B1)	P1276	×	×	×	EC-1097
A/F SENSOR 1 (B1)	P1278	×	×	×	EC-1102
A/F SENSOR 1 (B1)	P1279				EC-1102
EGR SYSTEM	P1402	×	×	×*2	EC-1110
EVAP SMALL LEAK	P1442	×	×	×*2	EC-1119
PURG VOLUME CONT/V	P1444	—	—	×	EC-1121
VENT CONTROL VALVE	P1446	—	—	×	EC-1130
VENT CONTROL VALVE	P1448	—	—	×	EC-1136
FUEL LEVEL SEN/CIRC	P1464	—	—	×	EC-1143
VC/V BYPASS/V	P1490	—	—	×	EC-1146
VC CUT/V BYPASS/V	P1491	—	—	×	EC-1152
A/T DIAG COMM LINE	P1605	—	—	×	EC-1162
TP SEN/CIRC A/T	P1705	—	—	×	AT-184
P-N POS SW/CIRCUIT	P1706	—	—	×	EC-1165
O/R CLTCH SOL/CIRC	P1760	—	—	×	AT-192

*1: 1st trip DTC No. is the same as DTC No.
*2: These are not displayed with GST.

DTC AND 1ST TRIP DTC

The 1st trip DTC (whose number is the same as the DTC number) is displayed for the latest self-diagnostic result obtained. If the ECM memory was cleared previously, and the 1st trip DTC did not reoccur, the 1st trip DTC will not be displayed.
If a malfunction is detected during the 1st trip, the 1st trip DTC is stored in the ECM memory. The MIL will not light up (two trip detection logic). If the same malfunction is not detected in the 2nd trip (meeting the required driving pattern), the 1st trip DTC is cleared from the ECM memory. If the same malfunction is detected in the 2nd trip, both the 1st trip DTC and DTC are stored in the ECM memory and the MIL lights up. In other words, the DTC is stored in the ECM memory and the MIL lights up when the same malfunction occurs in two consecutive trips. If a 1st trip DTC is stored and a non-diagnostic operation is performed between the 1st and 2nd

trips, only the 1st trip DTC will continue to be stored. For malfunctions that blink or light up the MIL during the 1st trip, the DTC and 1st trip DTC are stored in the ECM memory.
Procedures for clearing the DTC and the 1st trip DTC from the ECM memory are described in “HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION”,EC-637 .
For malfunctions in which 1st trip DTCs are displayed, refer to EC-628 . These items are required by legal regulations to continuously monitor the system/component. In addition, the items monitored non-continuously are also displayed on CONSULT-II.
1st trip DTC is specified in Mode 7 of SAE J1979. 1st trip DTC detection occurs without lighting up the MIL and therefore does not warn the driver of a problem. However, 1st trip DTC detection will not prevent the vehicle from being tested, for example during Inspection/Maintenance (I/M) tests.
When a 1st trip DTC is detected, check, print out or write down and erase (1st trip) DTC and Freeze Frame data as specified in “Work Flow” procedure Step II, refer to EC-647 . Then perform “DTC Confirmation Procedure” or “Overall Function Check” to try to duplicate the problem. If the malfunction is duplicated, the item requires repair.

How to Read DTC and 1st Trip DTC

DTC and 1st trip DTC can be read by the following methods.

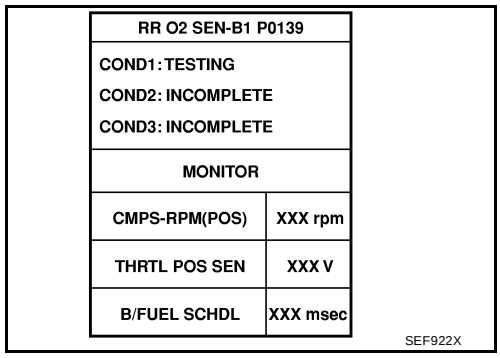
With CONSULT-II

With GST

CONSULT-II or GST (Generic Scan Tool) Examples: P0340, P0350, P0705, P0750, etc.
These DTCs are prescribed by SAE J2012.
(CONSULT-II also displays the malfunctioning component or system.)

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

A sample of CONSULT-II display for DTC 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]”.



FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA

The ECM records driving conditions such as fuel system status, calculated load value, engine coolant temperature, short term fuel trim, long term fuel trim, engine speed, vehicle speed and absolute pressure at the moment a malfunction is detected.
Data which are stored in the ECM memory, along with the 1st trip DTC, are called 1st trip freeze frame data. The data, stored together with the DTC data, are called freeze frame data and displayed on CONSULT-II or GST. The 1st trip freeze frame data can only be displayed on the CONSULT-II screen, not on the GST. For details, see EC-692 .
Only one set of freeze frame data (either 1st trip freeze frame data or freeze frame data) can be stored in the ECM. 1st trip freeze frame data is stored in the ECM memory along with the 1st trip DTC. There is no priority for 1st trip freeze frame data and it is updated each time a different 1st trip DTC is detected. However, once freeze frame data (2nd trip detection/MIL on) is stored in the ECM memory, 1st trip freeze frame data is no longer stored. Remember, only one set of freeze frame data can be stored in the ECM. The ECM has the following priorities to update the data.

Priority	Items	
1	Freeze frame data	Misfire — DTC: P0300 - P0304 Fuel Injection System Function — DTC: P0171, P0172
2		Except the above items (Includes A/T related items)
3	1st trip freeze frame data	

For example, the EGR malfunction (Priority: 2) was detected and the freeze frame data was stored in the 2nd trip. After that when the misfire (Priority: 1) is detected in another trip, the freeze frame data will be updated from the EGR malfunction to the misfire. The 1st trip freeze frame data is updated each time a different malfunction is detected. There is no priority for 1st trip freeze frame data. However, once freeze frame data is stored in the ECM memory, 1st trip freeze data is no longer stored (because only one freeze frame data or 1st trip freeze frame data can be stored in the ECM). If freeze frame data is stored in the ECM memory and freeze frame data with the same priority occurs later, the first (original) freeze frame data remains unchanged in the ECM memory.
Both 1st trip freeze frame data and freeze frame data (along with the DTCs) are cleared when the ECM memory is erased. Procedures for clearing the ECM memory are described in “HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION”, EC-637 .

SYSTEM READINESS TEST (SRT) CODE

System Readiness Test (SRT) code is specified in Mode 1 of SAE J1979.
As part of an enhanced emissions test for Inspection & Maintenance (I/M), certain states require the status of SRT be used to indicate whether the ECM has completed self-diagnosis of major emission systems and components. Completion must be verified in order for the emissions inspection to proceed.
If a vehicle is rejected for a State emissions inspection due to one or more SRT items indicating “INCMP”, use the information in this Service Manual to set the SRT to “CMPLT”.
In most cases the ECM will automatically complete its self-diagnosis cycle during normal usage, and the SRT status will indicate “CMPLT” for each application system. Once set as “CMPLT”, the SRT status remains “CMPLT” until the self-diagnosis memory is erased.
Occasionally, certain portions of the self-diagnostic test may not be completed as a result of the customer's normal driving pattern; the SRT will indicate “INCMP” for these items.

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

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

SRT Item

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

SRT item (CONSULT-II indication)	Performance Priority*2	Required self-diagnostic items to set the SRT to “CMPLT”	Corresponding DTC No.
CATALYST	3	Three way catalyst function	P0420
EVAP SYSTEM	2	EVAP control system	P0442
	—	EVAP control system	P1442*1
	3	EVAP control system	P0441
HO2S	3	Air fuel ratio (A/F) sensor 1	P1271
		Air fuel ratio (A/F) sensor 1	P1272
		Air fuel ratio (A/F) sensor 1	P1273
		Air fuel ratio (A/F) sensor 1	P1274
		Air fuel ratio (A/F) sensor 1	P1276
		Air fuel ratio (A/F) sensor 1	P1278, P1279
		Heated oxygen sensor 2	P0138, P0140
		Heated oxygen sensor 2	P0139
		Heated oxygen sensor 2	P1146
		Heated oxygen sensor 2	P1147
		Heated oxygen sensor 3	P0144
		Heated oxygen sensor 3	P0145
		Heated oxygen sensor 3	P1169
		Heated oxygen sensor 3	P1170
HO2S HTR	3	Air fuel ratio (A/F) sensor heater	P1031, P1032
		Heated oxygen sensor 2 heater	P0037
		Heated oxygen sensor 3 heater	P0043, P0044
EGR SYSTEM	3	EGR function	P0400
	1	EGR function	P1402

*1: P1442 [EVAP control system (Small Leak) (positive pressure) diagnosis] is one type of SRT related diagnosis. This diagnosis, however, does not contribute to setting the SRT as “CMPLT” when no malfunction exists in the EVAP system. Therefore, P0442 must be used instead of P1442.

*2: If completion of several SRTs is required, perform driving patterns (DTC confirmation procedure), one by one based on the performance 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.

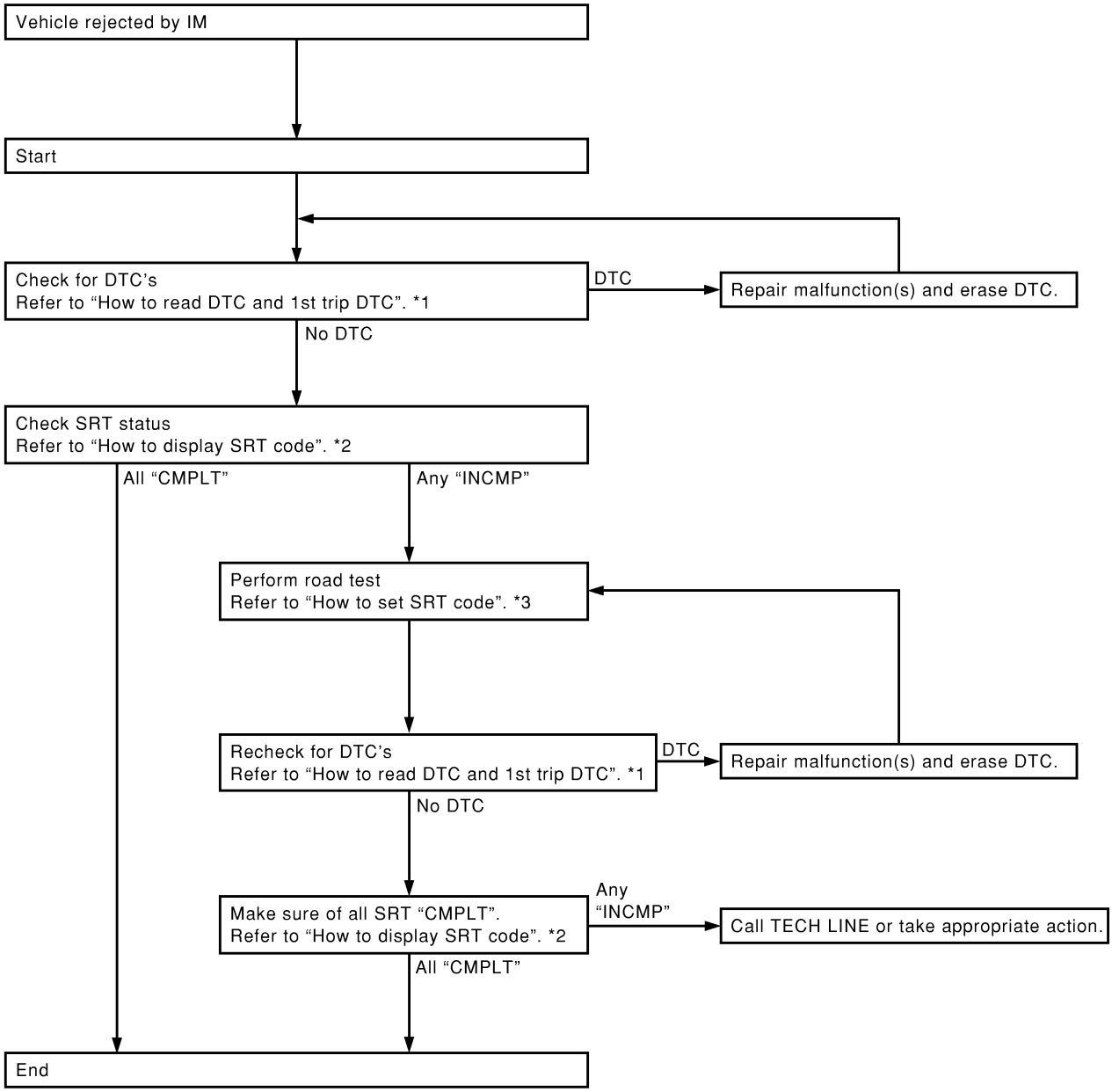
When all SRT related self-diagnoses show OK results in a single cycle (Ignition OFF-ON-OFF), the SRT will indicate “CMPLT”. → Case 1 above
When all SRT related self-diagnoses show OK results through several different cycles, the SRT will indicate “CMPLT” at the time the respective self-diagnoses have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



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*1 EC-629 *2 EC-633 *3 EC-634

How to Display SRT Code

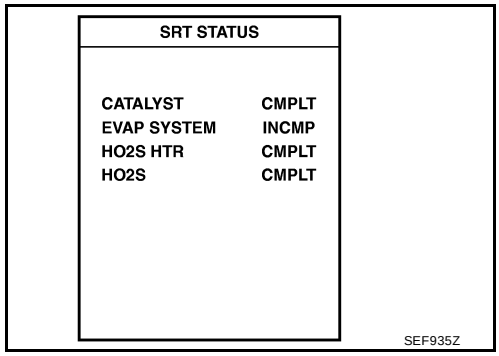
With CONSULT-II

Selecting "SRT STATUS" in "DTC CONFIRMATION" mode with CONSULT-II.
For items whose SRT codes are set, a "CMPLT" is displayed on the CONSULT-II screen; for items whose SRT codes are not set, "INCMP" is displayed.

With GST

Selecting Mode 1 with GST (Generic Scan Tool)
A sample of CONSULT-II display for SRT code is shown below.

“INCMP” means the self-diagnosis is incomplete and SRT is not set.
“CMPLT” means the self-diagnosis is complete and SRT is set.



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

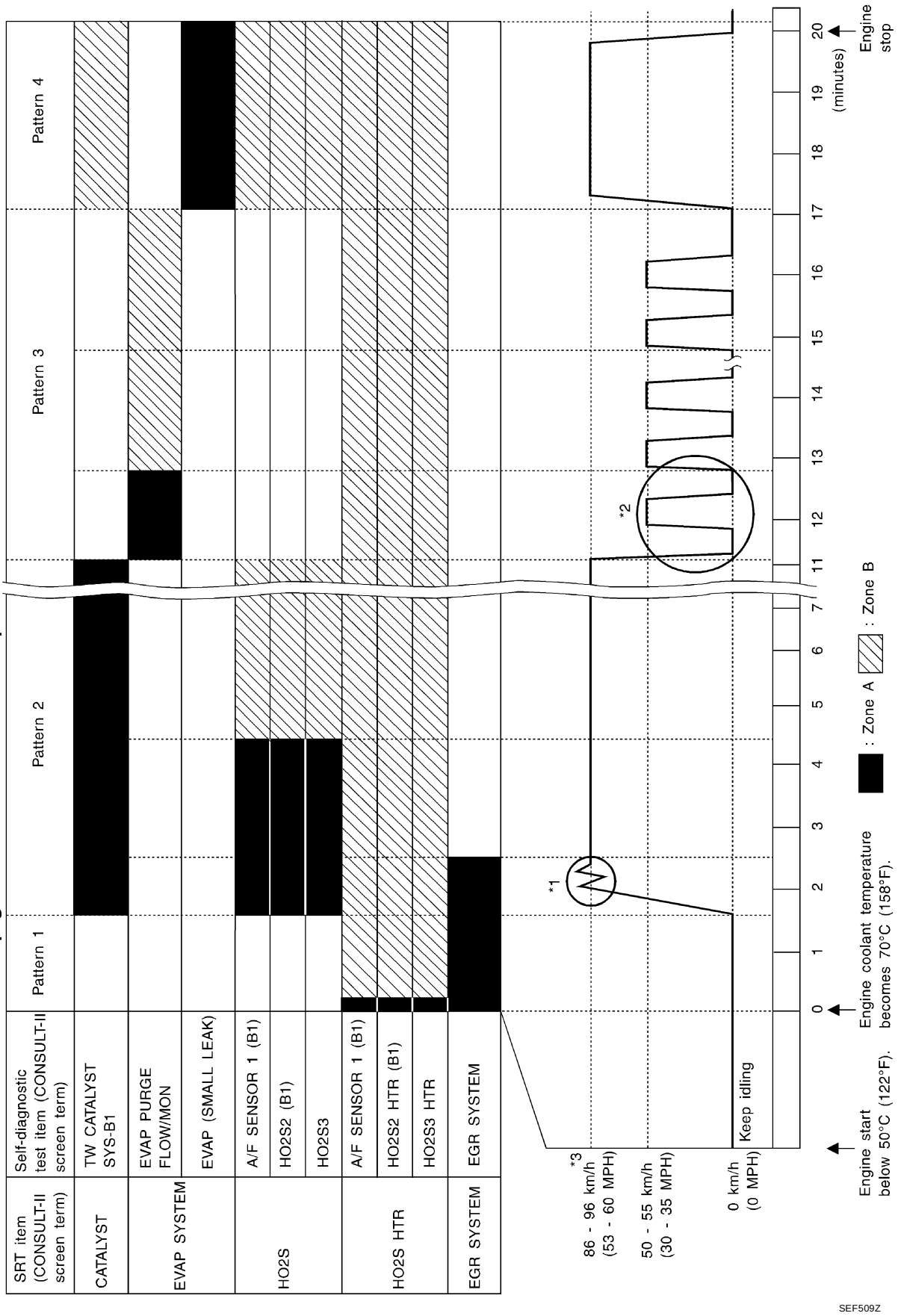
Perform corresponding DTC Confirmation Procedure one by one based on “Performance Priority” in the table onEC-631 .

Without CONSULT-II

The most efficient driving pattern in which SRT codes can be properly set is explained on the next page. The driving pattern should be performed one or more times to set all SRT codes.

Driving Pattern

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



- 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 70 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 70 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 82 and ground is less than 4.1V).**

Pattern 2:

- When steady-state driving is performed again even after it is interrupted, each diagnosis can be conducted. In this case, the time required for diagnosis may be extended.

Pattern 3:

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

Pattern 4:

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

*1: Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH), then release the accelerator pedal and keep it released for more than 10 seconds. Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH) again.
*2: Operate the vehicle in the following driving pattern.

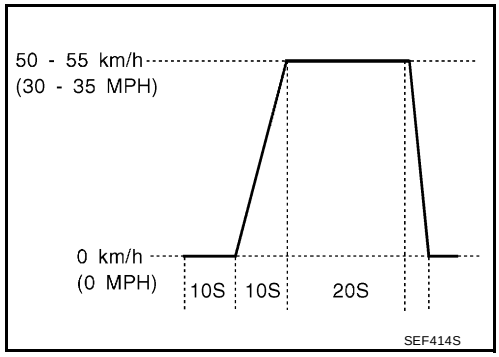
1. Decelerate vehicle to 0 km/h (0 MPH) and let engine idle.
2. Repeat driving pattern shown below at least 10 times.

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

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

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

Suggested Transmission Gear Position for A/T Models
Set the selector lever in the “D” position with the overdrive switch turned ON.



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

The following is the information specified in Mode 6 of SAE J1979.
The test value is a parameter used to determine whether a system/circuit diagnostic test is “OK” or “NG” while being monitored by the ECM during self-diagnosis. The test limit is a reference value which is specified as the maximum or minimum value and is compared with the test value being monitored.
Items for which these data (test value and test limit) are displayed are the same as SRT code items (11 test items).

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

X: Applicable —: Not applicable

SRT item	Self-diagnostic test item	Test value (GST display)		Test limit	Application
		TID	CID		
CATALYST	Three way catalyst function	01H	01H	Max.	×
		02H	81H	Min.	×
EVAP SYSTEM	EVAP control system (Small leak)	05H	03H	Max.	×
	EVAP control system purge flow monitoring	06H	83H	Min.	×
HO2S	A/F sensor 1	43H	0EH	Max.	×
		44H	8EH	Min.	×
		45H	8EH	Min.	×
	Heated oxygen sensor 2	19H	86H	Min.	×
		1AH	86H	Min.	×
		1BH	06H	Max.	×
		1CH	06H	Max.	×
	Heated oxygen sensor 3	61H	92H	Min.	×
		62H	92H	Min.	×
		63H	12H	Max.	×
		64H	12H	Max.	×
HO2S HTR	A/F sensor 1 heater	57H	10H	Max.	×
		58H	90H	Min.	×
	Heated oxygen sensor 2 heater	2DH	0AH	Max.	×
		2EH	8AH	Min.	×
	Heated oxygen sensor 3 heater	71H	14H	Max.	×
		72H	94H	Min.	×
EGR SYSTEM	EGR function	31H	8CH	Min.	×
		32H	8CH	Min.	×
		33H	8CH	Min.	×
		34H	8CH	Min.	×
		35H	0CH	Max.	×

HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION

How to Erase DTC (With CONSULT-II)

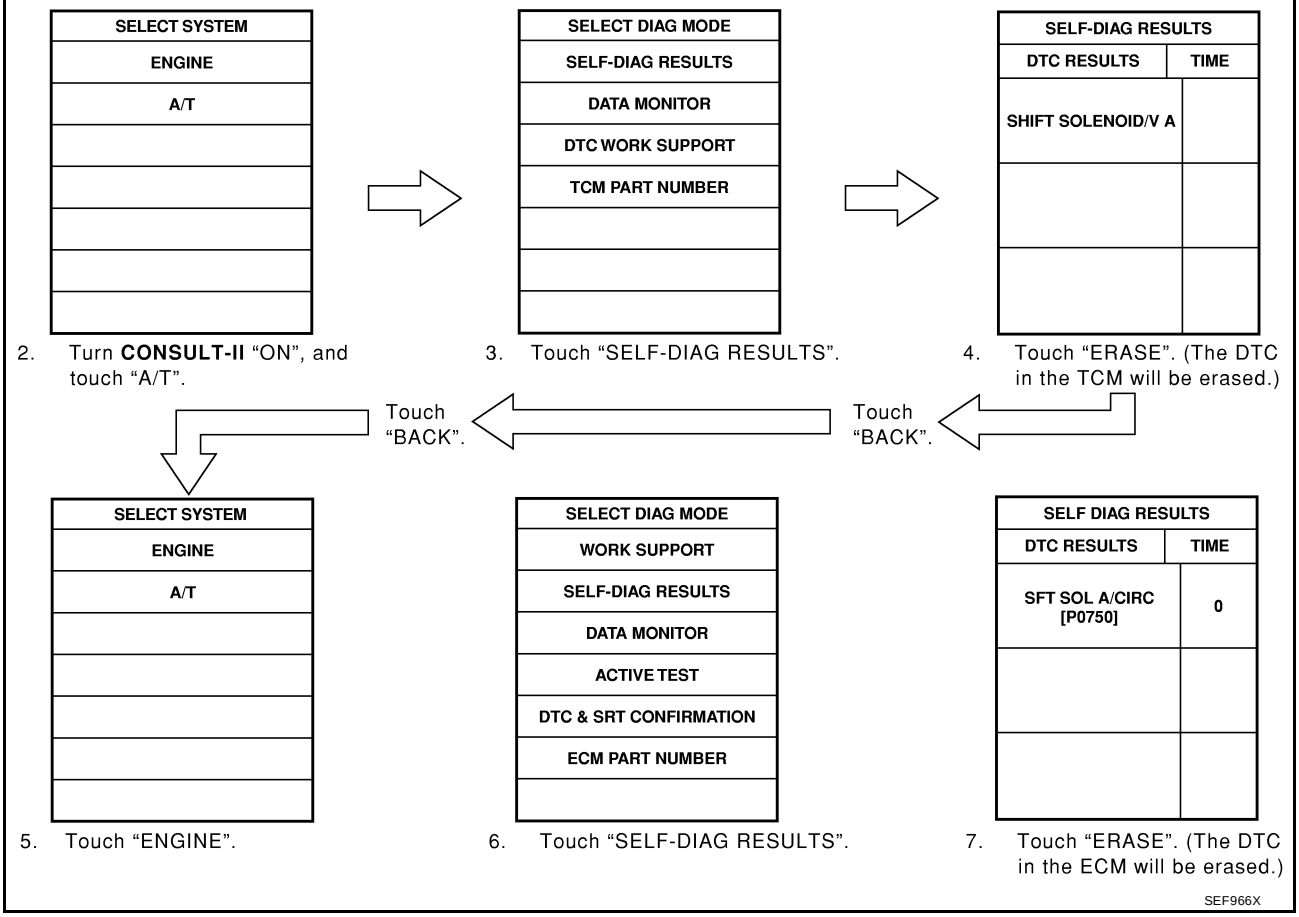
NOTE:
If the DTC is not for A/T related items (see EC-595), skip steps 2 through 4.

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.)

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

How to erase DTC (With CONSULT-II)

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



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

How to Erase DTC (With GST)

NOTE:
If the DTC is not for A/T related items (see EC-595), skip step 2.

1. If the ignition switch stays “ON” after repair work, be sure to turn ignition switch “OFF” once. Wait at least 10 seconds and then turn it “ON” (engine stopped) again.
2. Perform “SELF-DIAGNOSTIC PROCEDURE (Without CONSULT-II)” in AT section titled “TROUBLE DIAGNOSIS”, “Self-diagnosis”. (The engine warm-up step can be skipped when performing the diagnosis only to erase the DTC.)
3. Select Mode 4 with GST (Generic Scan Tool).

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

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

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

7. Others

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

NVIS (Nissan Vehicle Immobilizer System — NATS)

UBS001R4

- **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-96 , "NVIS (NISSAN Vehicle Immobilizer System — NATS)".**
- **Confirm no self-diagnostic results of NVIS (NATS) is displayed before touching "ERASE" in "SELF-DIAG RESULTS" mode with CONSULT-II.**
- **When replacing ECM, initialization of NVIS (NATS) system and registration of all NVIS (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 NVIS (NATS) initialization and NVIS (NATS) ignition key ID registration, refer to CONSULT-II operation manual, IVIS/NVIS.

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

SEF543X

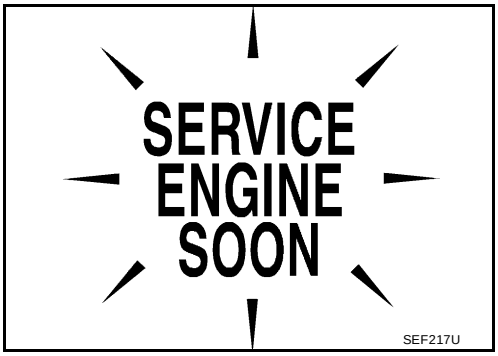
Malfunction Indicator Lamp (MIL)

UBS001R5

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-24, "WARNING LAMPS" or see EC-1200 .
2. When the engine is started, the MIL should go off.
   If the MIL remains on, the on board diagnostic system has detected an engine system malfunction.



SEF217U

On Board Diagnostic System Function

The on board diagnostic system has the following two functions.

Diagnostic Test Mode	KEY and ENG. Status	Function	Explanation of Function
Mode I	Ignition switch in "ON" position  Engine stopped 	BULB CHECK	This function checks the MIL bulb for damage (blown, open circuit, etc.). If the MIL does not come on, check MIL circuit.
	Engine running 	MALFUNCTION WARNING	This is a usual driving condition. When a malfunction is detected twice in two consecutive driving cycles (two trip detection logic), the MIL will light up to inform the driver that a malfunction has been detected. The following malfunctions will light up or blink the MIL in the 1st trip. ● Coolant over temperature enrichment protection ● "Misfire (Possible three way catalyst damage)" ● "Closed loop control" ● Fail-safe mode

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-24 “WARNING LAMPS” or see EC-1200 .

Diagnostic Test Mode I — Malfunction Warning

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

OBD System Operation Chart

UBS001R6

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

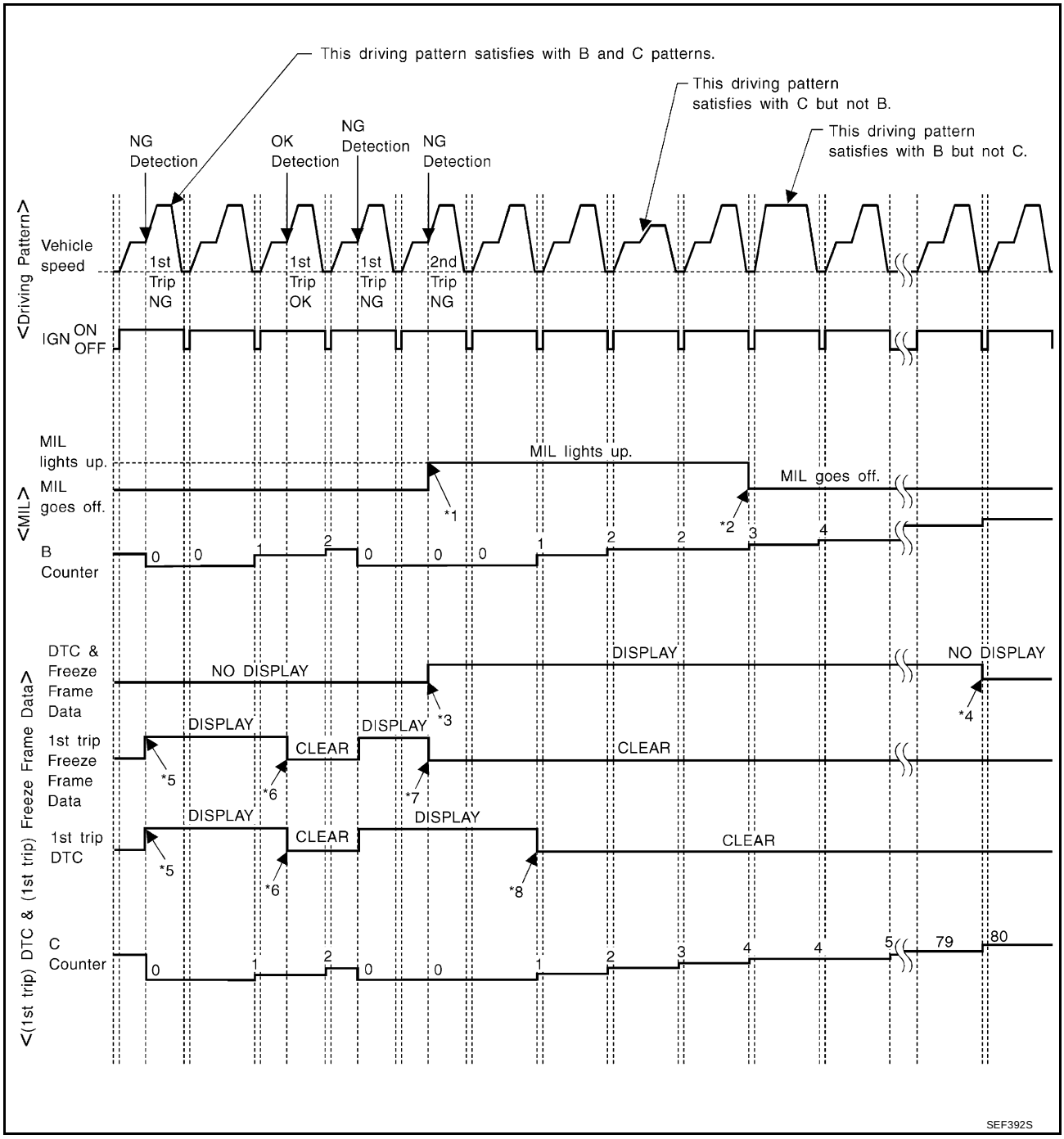
- When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data are stored in the ECM memory.
- When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data are stored in the ECM memory, and the MIL will come on. For details, refer to “Two Trip Detection Logic” on EC-625 .
- The MIL will go off after the vehicle is driven 3 times with no malfunction. The drive is counted only when the recorded driving pattern is met (as stored in the ECM). If another malfunction occurs while counting, the counter will reset.
- The DTC and the freeze frame data will be stored until the vehicle is driven 40 times (driving pattern A) without the same malfunction recurring (except for Misfire and Fuel Injection System). For Misfire and Fuel Injection System, the DTC and freeze frame data will be stored until the vehicle is driven 80 times (driving pattern C) without the same malfunction recurring. The “TIME” in “SELF-DIAGNOSTIC RESULTS” mode of CONSULT-II will count the number of times the vehicle is driven.
- The 1st trip DTC is not displayed when the self-diagnosis results in “OK” for the 2nd trip.

SUMMARY CHART

Items	Fuel Injection System	Misfire	Other
MIL (goes off)	3 (pattern B)	3 (pattern B)	3 (pattern B)
DTC, Freeze Frame Data (no display)	80 (pattern C)	80 (pattern C)	40 (pattern A)
1st Trip DTC (clear)	1 (pattern C), *1	1 (pattern C), *1	1 (pattern B)
1st Trip Freeze Frame Data (clear)	*1, *2	*1, *2	1 (pattern B)

For details about patterns “B” and “C” under “Fuel Injection System” and “Misfire”, see EC-635 .
For details about patterns “A” and “B” under “Other”, see EC-635 .
*1: Clear timing is at the moment OK is detected.
*2: Clear timing is when the same malfunction is detected in the 2nd trip.

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



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

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

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

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

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

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

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

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

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

Driving Pattern B

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

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

Driving Pattern C

Driving pattern C means the vehicle operation as follows:

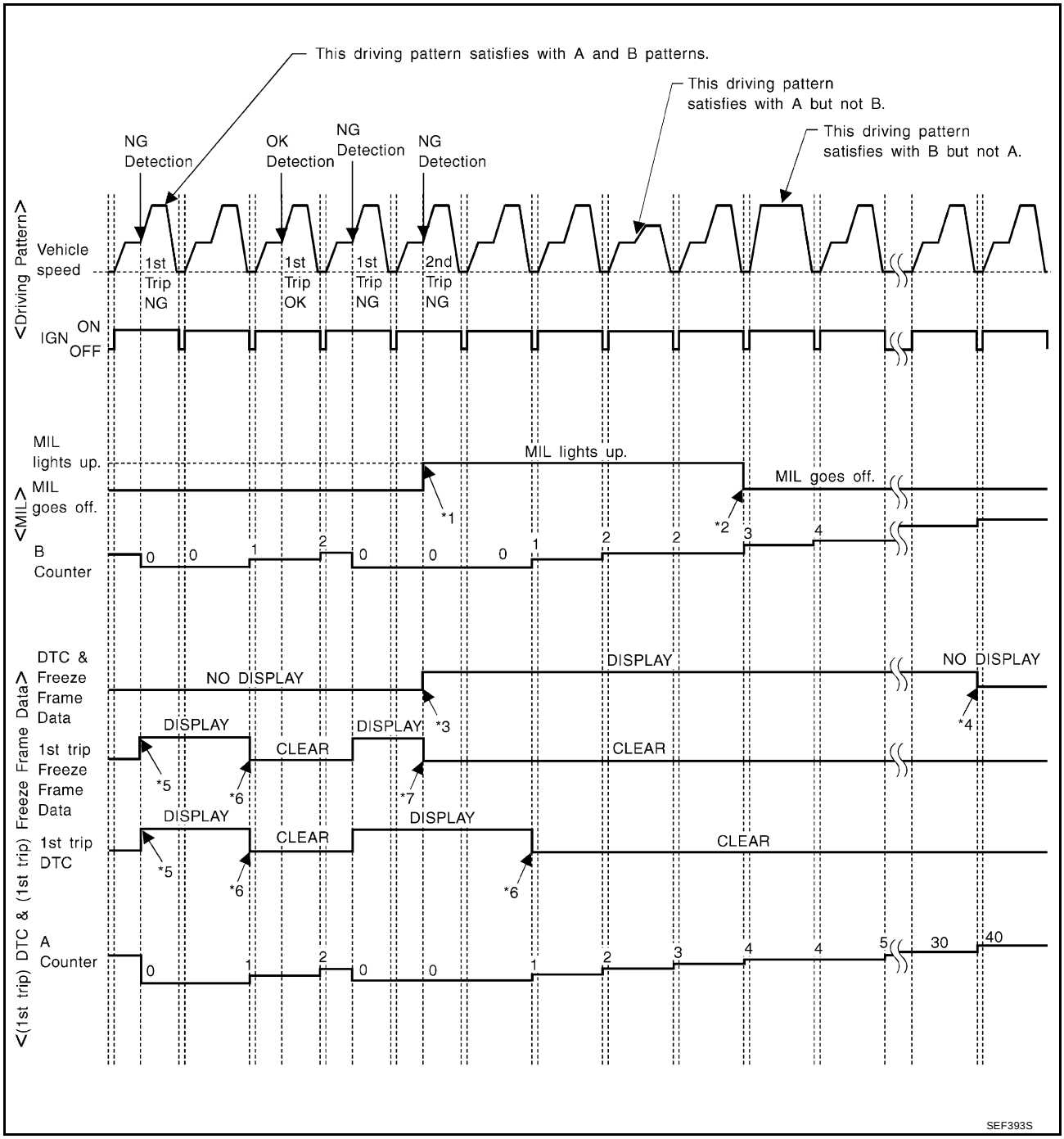
1. The following conditions should be satisfied at the same time:
   Engine speed: (Engine speed in the freeze frame data) ±375 rpm
   Calculated load value: (Calculated load value in the freeze frame data) × (1±0.1) [%]
   Engine coolant temperature (T) condition:

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

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

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

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



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

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

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

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

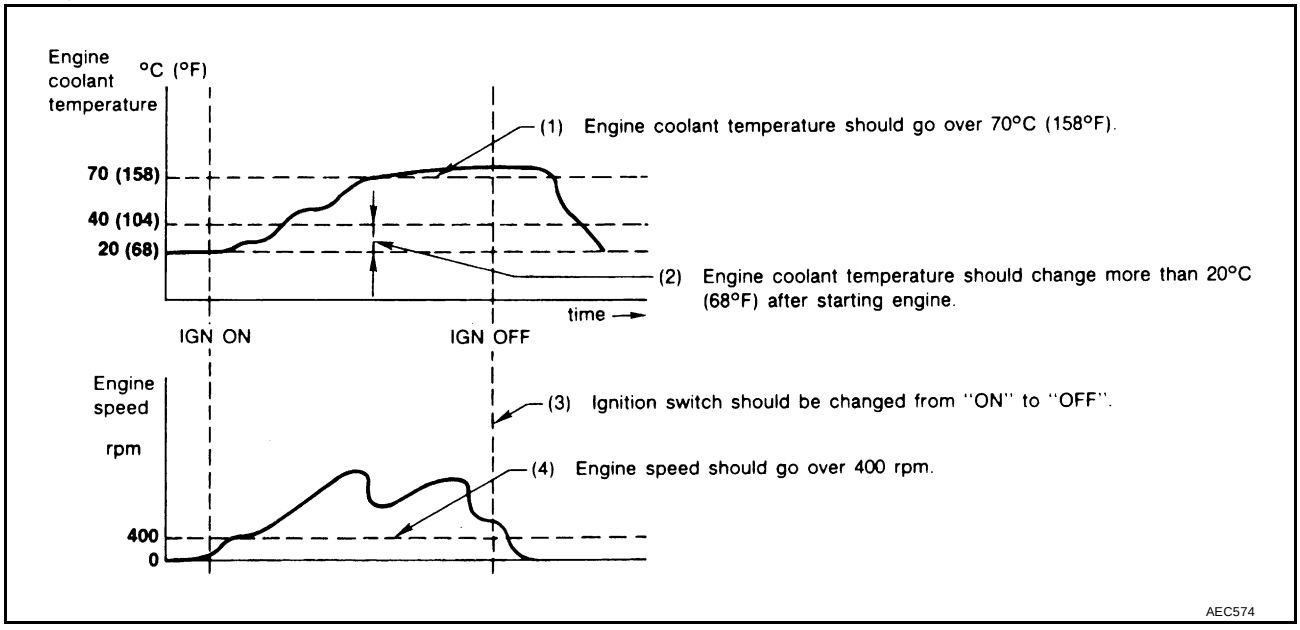
*5: When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM.

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

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

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

Driving Pattern A



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

Driving Pattern B

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

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

TROUBLE DIAGNOSIS

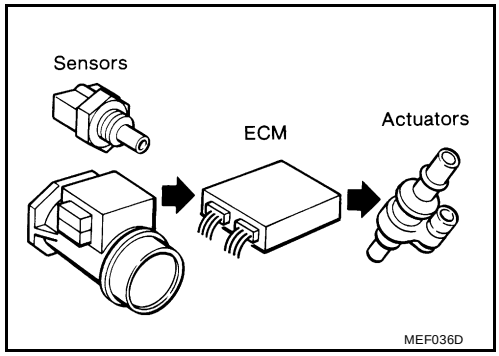
PFP:00004

Trouble Diagnosis Introduction

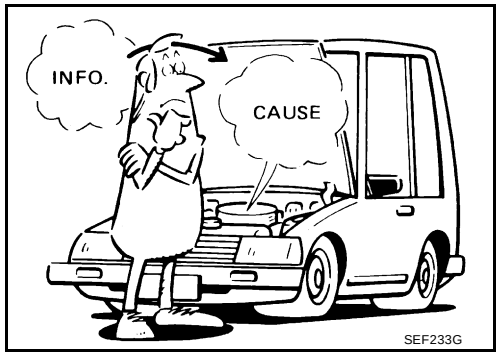
UBS001R7

INTRODUCTION

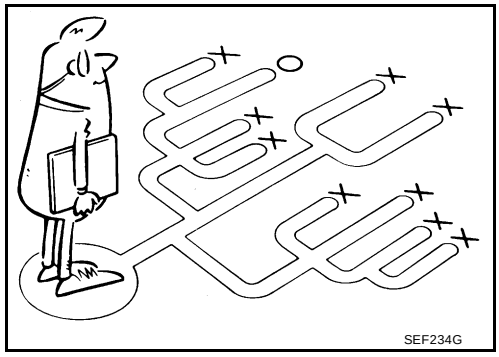
The engine has an ECM to control major systems such as fuel control, ignition control, idle air control system, etc. The ECM accepts input signals from sensors and instantly drives actuators. It is essential that both input and output signals are proper and stable. At the same time, it is important that there are no problems such as vacuum leaks, fouled spark plugs, or other problems with the engine.
It is much more difficult to diagnose a problem that occurs intermittently rather than continuously. Most intermittent problems are caused by poor electric connections or improper wiring. In this case, careful checking of suspected circuits may help prevent the replacement of good parts.



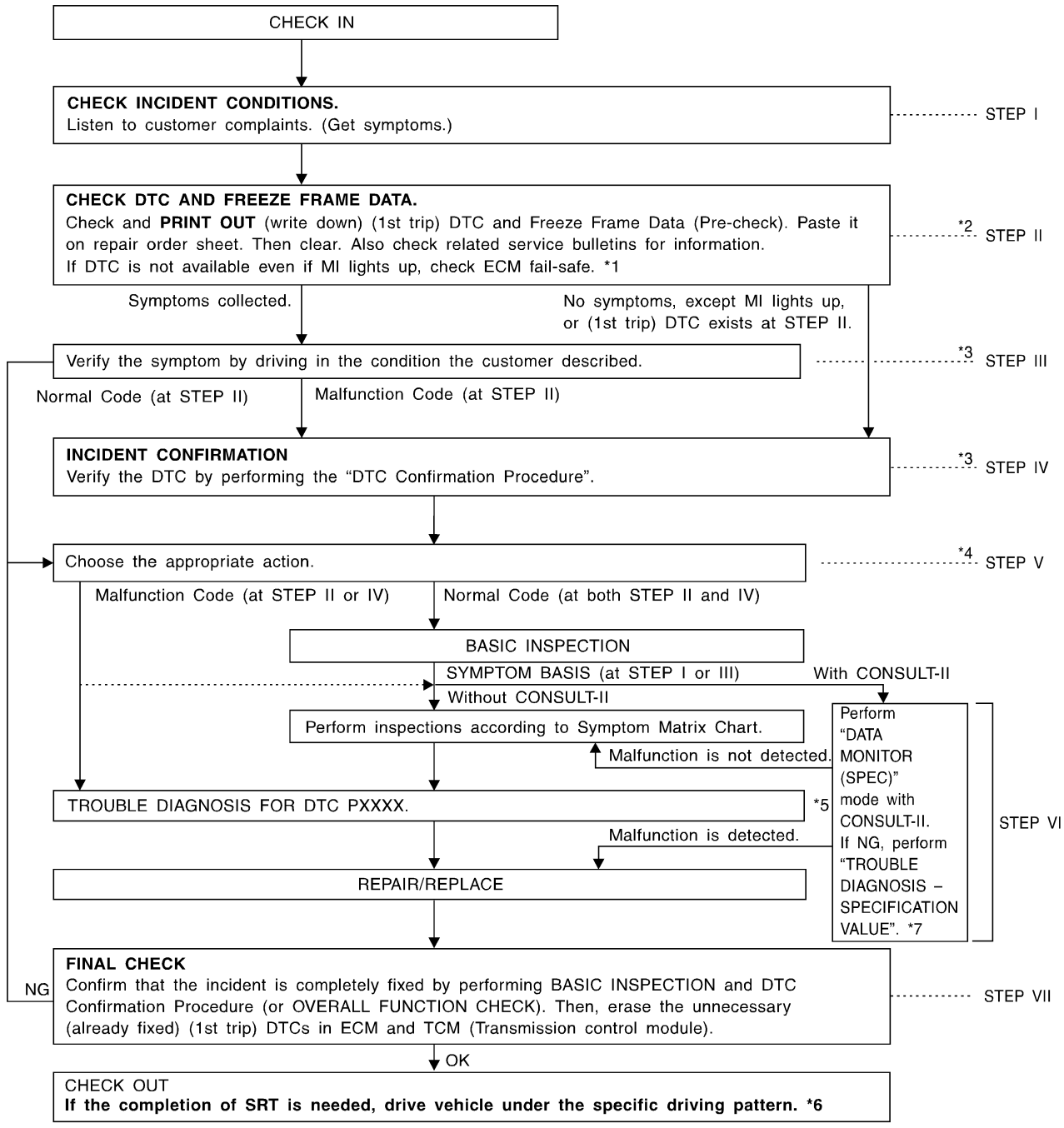
A visual check only may not find the cause of the problems. A road test with CONSULT-II (or GST) or a circuit tester connected should be performed. Follow the EC-647, "Work Flow" .
Before undertaking actual checks, take a few minutes to talk with a customer who approaches with a driveability complaint. The customer can supply good information about such problems, especially intermittent ones. Find out what symptoms are present and under what conditions they occur. A “Diagnostic Worksheet” like the example on next page should be used.



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



Work Flow



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*1: EC-652

*2: If time data of "SELF-DIAG RESULTS" is other than "0" or "1t", refer to EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

*3: If the incident cannot be duplicated, refer to EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

*4: If the on board diagnostic system cannot be performed, check main power supply and ground circuit. Refer to EC-712, "POWER SUPPLY CIRCUIT FOR ECM" .

*5: If the malfunctioning part cannot be found, refer to EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

*6: EC-635

*7: EC-707

Description for Work Flow

STEP	DESCRIPTION FOR WORK FLOW
STEP I	Get detailed information about the conditions and the environment when the incident/symptom occurred using the EC-649, "DIAGNOSTIC WORKSHEET" .
STEP II	Before confirming the concern, check and write down (print out using CONSULT-II or Generic Scan Tool) the (1st trip) Diagnostic Trouble Code (DTC) and the (1st trip) freeze frame data, then erase the code and the data. (Refer to EC-625 .) The (1st trip) DTC and the (1st trip) freeze frame data can be used when duplicating the incident at STEP III & IV. Study the relationship between the cause, specified by (1st trip) DTC, and the symptom described by the customer. (The " Symptom Matrix Chart" will be useful. See EC-666 .) Also check related service bulletins for information.
STEP III	Try to confirm the symptom and under what conditions the incident occurs. The "DIAGNOSTIC WORK SHEET" and the freeze frame data are useful to verify the incident. Connect CONSULT-II to the vehicle in DATA MONITOR (AUTO TRIG) mode and check real time diagnosis results. If the incident cannot be verified, perform INCIDENT SIMULATION TESTS. (Refer to GI-26, "How to Perform Efficient Diagnosis for an Electrical Incident" .) If the malfunction code is detected, skip STEP IV and perform STEP V.
STEP IV	Try to detect the (1st trip) Diagnostic Trouble Code by driving in (or performing) The " DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE". Check and read the (1st trip) DTC and (1st trip) freeze frame data by using CONSULT-II or Generic Scan Tool. During the (1st trip) DTC verification, be sure to connect CONSULT-II to the vehicle in DATA MONITOR (AUTO TRIG) mode and check real time diagnosis results. If the incident cannot be verified, perform INCIDENT SIMULATION TESTS. (Refer to GI-26, "How to Perform Efficient Diagnosis for an Electrical Incident" .) In case the "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" is not available, perform the "OVERALL FUNCTION CHECK" instead. The (1st trip) DTC cannot be displayed by this check, however, this simplified "check" is an effective alternative. The "NG" result of the "OVERALL FUNCTION CHECK" is the same as the (1st trip) DTC detection.
STEP V	Take the appropriate action based on the results of STEP I through IV. If the malfunction code is indicated, proceed to TROUBLE DIAGNOSIS FOR DTC PXXXX. If the normal code is indicated, proceed to the BASIC INSPECTION. (Refer to EC-652 .) If CONSULT-II is available, perform "DATA MONITOR (SPEC) " mode with CONSULT-II and proceed to the EC-707, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" . If malfunction is detected, proceed to "REPAIR/REPLACE". Then perform inspections according to the Symptom Matrix Chart. (Refer to EC-666 .)
STEP VI	Identify where to begin diagnosis based on the relationship study between symptom and possible causes. Inspect the system for mechanical binding, loose connectors or wiring damage using (tracing) "Harness Layouts". Gently shake the related connectors, components or wiring harness with CONSULT-II set in "DATA MONITOR (AUTO TRIG)" mode. Check the voltage of the related ECM terminals or monitor the output data from the related sensors with CONSULT-II. Refer to EC-677 . The "DIAGNOSTIC PROCEDURE" in EC section contains a description based on open circuit inspection. A short circuit inspection is also required for the circuit check in the DIAGNOSTIC PROCEDURE. For details, refer to GI section ("HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT", "Circuit Inspection"). Repair or replace the malfunction parts. If malfunctioning part cannot be detected, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-711 .
STEP VII	Once you have repaired the circuit or replaced a component, you need to run the engine in the same conditions and circumstances which resulted in the customer's initial complaint. Perform the "DTC CONFIRMATION PROCEDURE" and confirm the normal code [DTC No. P0000 or 0505] is detected. If the incident is still detected in the final check, perform STEP VI by using a different method from the previous one. Before returning the vehicle to the customer, be sure to erase the unnecessary (already fixed) (1st trip) DTC in ECM and TCM (Transmission control module). (Refer to EC-626 .)

DIAGNOSTIC WORKSHEET

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

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

KEY POINTS

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

SEF907L

Worksheet Sample

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

MTBL0017

DTC Inspection Priority Chart

UBS001R8

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

Priority	Detected items (DTC)
1	● P0101, P0102, P0103, P1102 MAF sensor ● P0112, P0113, P0127 IAT sensor ● P0117, P0118, P0125 ECT sensor ● P0121, P0122, P0123 TP sensor ● P0128 Thermostat function ● P0181, P0182, P0183 FTT sensor ● P0327, P0328 KS ● P0335 CKP sensor (POS) ● P0340 CMP sensor (PHASE) ● P0350 Ignition signal ● P0403 EGR volume control valve ● P0460, P0461, P0464, P1464 Fuel level sensor ● P0500 VSS ● P0605 ECM ● P1605 A/T diagnosis communication line ● P1706 PNP switch

Priority	Detected items (DTC)
2	● P0037, P0038 HO2S2 ● P0043, P0044 HO2S3 ● P0107, P0108 BARO sensor ● P0138, P0139, P1146, P1148 HO2S2 ● P0144, P0145, P1169, P1170 HO2S3 ● P0217 Coolant over temperature enrichment protection ● P0405, P0406 EGRT sensor ● P0441 EVAP control system ● P0444, P0445, P1444 EVAP canister purge volume control solenoid valve ● P0447, P1446, P1448 EVAP canister vent control valve ● P0452, P0453 EVAP control system pressure sensor ● P0510 CTP switch ● P0705-P0725, P0740-P1760 A/T related sensors, solenoid valves and switches ● P1031, P1032 A/F sensor heater ● P1103, P1104, P1108 MAP sensor ● P1137 Swirl control valve control position sensor ● P1138 Swirl control valve ● P1140 Intake valve timing control position sensor ● P1271, P1274, P1276, P1278, P1279 A/F sensor ● P1490, P1491 Vacuum cut valve bypass valve
3	● P0011 IVT control ● P0171, P0172 Fuel injection system function ● P0300-P0304 Cylinder misfire ● P0400, P1402 EGR function ● P0420 Three way catalyst function ● P0442/P1442 EVAP control system ● P0455 EVAP control system ● P0505, P0506, P0507 ISC system ● P0600 A/T control ● P0731-P0734, P0744 A/T function ● P1111 IVT control solenoid valve ● P1132 Swirl control valve ● P1148 Closed loop control

Fail-safe Chart

UBS001R9

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

DTC No.	Detected items	Engine operating condition in fail-safe mode
P0102 P0103 P1102	Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.
P0117 P0118	Engine coolant temperature sensor circuit	Engine coolant temperature will be determined by ECM based on the time after turning ignition switch “ON” or “START”. CONSULT-II displays the engine coolant temperature decided by ECM.
		Condition
		Just as ignition switch is turned ON or Start
		More than approx. 4 minutes after ignition ON or Start
		Except as shown above
P0122 P0123	Throttle position sensor circuit	Throttle position will be determined based on the injected fuel amount and the engine speed. Therefore, acceleration will be poor.
		Condition
		When engine is idling
		When accelerating
Unable to access ECM	ECM	**ECM fail-safe activating condition** The computing function of the ECM was judged to be malfunctioning. When the fail-safe system activates (i.e., if the ECM detects a malfunction condition in the CPU of ECM), the MIL on the instrument panel lights to warn the driver. However it is not possible to access ECM and DTC cannot be confirmed. **Engine control with fail-safe** When ECM fail-safe is operating, fuel injection, ignition timing, fuel pump operation and IACV-AAC valve operation are controlled under certain limitations.
		Engine speed
		Fuel injection
		Ignition timing
		Fuel pump
		IACV-AAC valve
		Replace ECM, if ECM fail-safe condition is confirmed.

*: In Diagnostic Test Mode II (Self-diagnostic results)

Basic Inspection

UBS001RA

Precaution:
Perform Basic Inspection without electrical or mechanical loads applied;

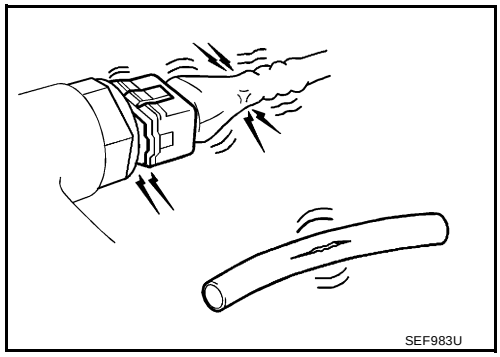
- **Headlamp switch is OFF,**
- **Air conditioner switch is OFF,**
- **Rear window defogger switch is OFF,**
- **Steering wheel is in the straight-ahead position, etc.**

1. INSPECTION START

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

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

>> GO TO 2.

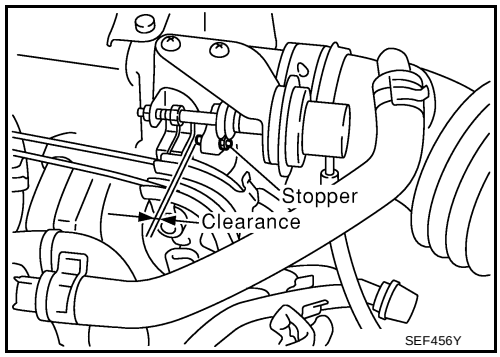

SEF983U

2. CHECK THROTTLE OPENER OPERATION-I

Confirm that there is a clearance between throttle drum and stopper.

OK or NG

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



SEF456Y

3. CHECK THROTTLE OPENER FIXING BOLTS

Check throttle opener fixing bolts for loosening.

OK or NG

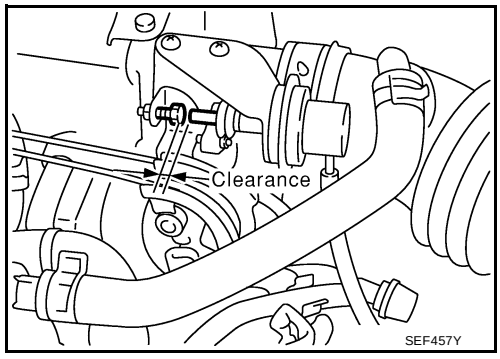
OK >> Repair or replace throttle body assembly.
NG >> Retighten the fixing bolts.

4. CHECK THROTTLE OPENER OPERATION-II

1. Start engine and let it idle.
2. Confirm that throttle opener rod moves backward and there is a clearance between throttle drum and throttle opener rod.

OK or NG

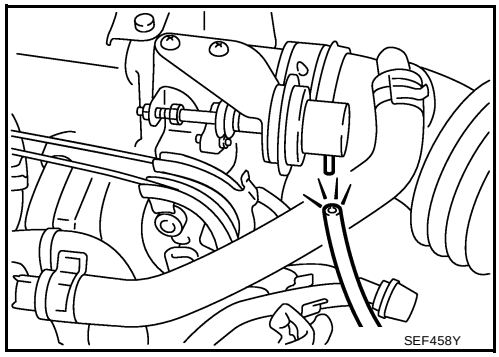
OK >> GO TO 7.
NG >> GO TO 5.



SEF457Y

5. CHECK VACUUM SOURCE FOR THROTTLE OPENER

1. Disconnect vacuum hose connected to throttle opener.
2. Check vacuum existence with engine running.

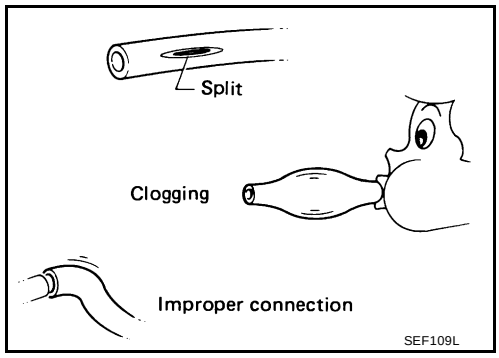


OK or NG

OK >> Repair or replace throttle body assembly.
NG >> GO TO 6.

6. CHECK VACUUM HOSE

1. Stop engine.
2. Remove the vacuum hose.
3. Check the vacuum hose for splits, kinks and clogging.

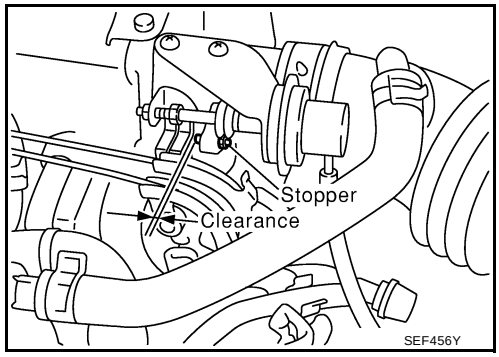


OK or NG

OK >> Clean vacuum port by blowing air.
NG >> Replace vacuum hose.

7. CHECK THROTTLE DRUM OPERATION

Confirm that throttle drum moves to contact the stopper.



OK or NG

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

8. CHECK ACCELERATOR WIRE INSTALLATION

1. Stop engine.
2. Check accelerator wire for slack.

OK or NG

OK >> GO TO 9.
NG >> Adjust accelerator wire. Refer to ACC-2, "Adjusting Accelerator Wire" .

9. CHECK THROTTLE VALVE OPERATION

1. Remove intake air ducts.
2. Check throttle valve operation when moving throttle drum by hand.

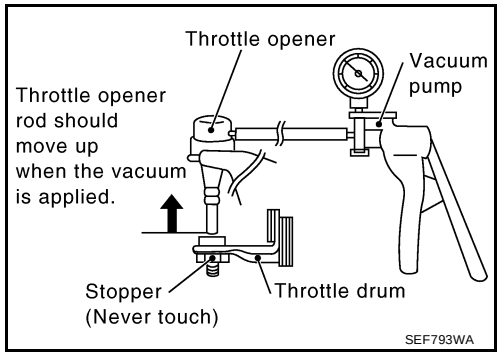
OK or NG

OK >> Retighten the throttle drum fixing nuts.
NG >> Clean the throttle body and throttle valve.

10. CHECK THROTTLE POSITION SWITCH CLOSED POSITION-I

NOTE:
Always check ignition timing before performing the following.

1. Warm up engine to normal operating temperature.
2. Stop engine.
3. Remove the vacuum hose connected to the throttle opener.
4. Connect suitable vacuum hose to vacuum pump as shown below.
5. Apply vacuum [more than −40.0 kPa (−300 mmHg, −11.81 inHg)] until the throttle drum is free from the throttle opener rod.



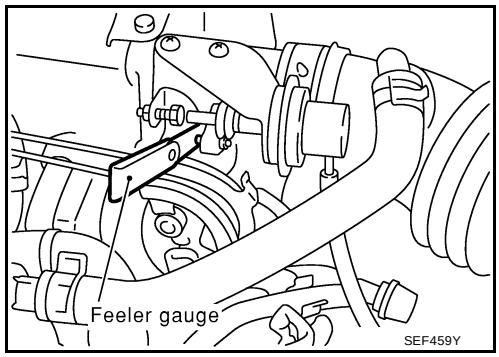
With CONSULT-II>>GO TO 11.
Without CONSULT-II>>GO TO 17.

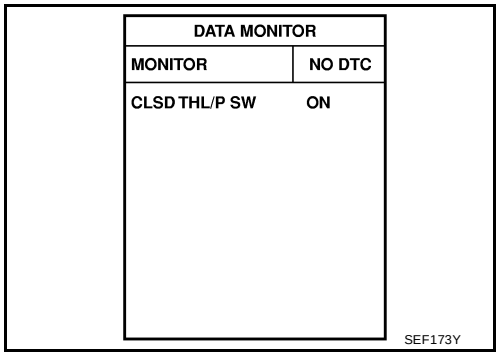
11. CHECK THROTTLE POSITION SWITCH CLOSED POSITION-II

With CONSULT-II

1. Turn ignition switch “ON”.
2. Select “A/T”, then “DATA MONITOR” mode with CONSULT-II.
3. Select “CLOSED THL/SW” from the menu.
4. Read “CLOSED THL/SW” signal under the following conditions.

- Insert a 0.05 mm (0.0020 in) and 0.15 mm (0.0059 in) feeler gauge alternately between stopper and throttle drum as shown in the figure and check the signal.
  “CLOSED THL/SW” signal should remain “ON” while inserting 0.05 mm (0.0020 in) feeler gauge.
  “CLOSED THL/SW” signal should remain “OFF” while inserting 0.15 mm (0.0059 in) feeler gauge.





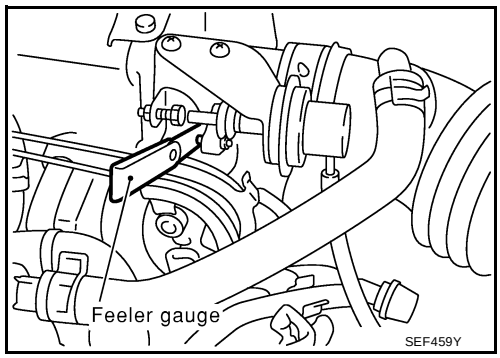
OK or NG

OK >> GO TO 14.
NG >> GO TO 12.

12. ADJUSTMENT THROTTLE POSITION SWITCH CLOSED POSITION-I

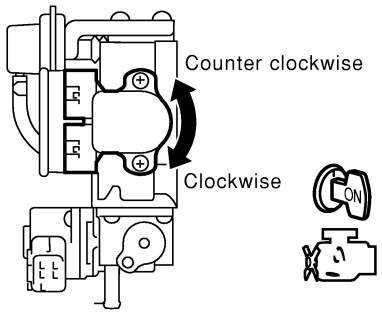
With CONSULT-II

1. Loosen throttle position sensor fixing bolts.
2. Confirm that proper vacuum is applied. Refer to test No. 10. During adjustment, vacuum should be applied.
3. Insert 0.05 mm (0.0020 in) feeler gauge between stopper and throttle drum as shown in the figure.



4. Turn throttle position sensor body counterclockwise until “CLOSED THL/SW” signal switches to “OFF”.

DATA MONITOR	
MONITOR	NO DTC
CLOSED THL/SW	OFF



>> GO TO 13.

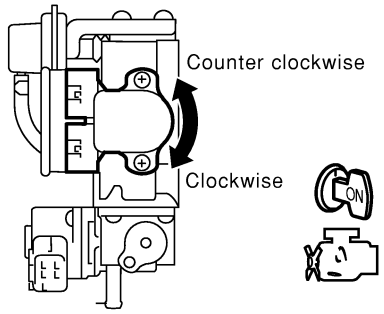
13. ADJUSTMENT THROTTLE POSITION SWITCH CLOSED POSITION-II

With CONSULT-II

1. Temporarily tighten sensor body fixing bolts as follows.

– **Gradually move the sensor body clockwise and stop it when “CLOSED THL/SW” signal switches from “OFF” to “ON”, then temporarily tighten sensor body fixing bolts.**

DATA MONITOR	
MONITOR	NO DTC
CLOSED THL/SW	ON



SEF512Z

2. Make sure two or three times that the signal is “ON” when the throttle valve is closed and “OFF” when it is opened.
3. Remove 0.05 mm (0.0020 in) feeler gauge then insert 0.15 mm (0.0059 in) feeler gauge.
4. Make sure two or three times that the signal remains “OFF” when the throttle valve is closed.
5. Tighten throttle position sensor.
6. Check the “CLOSED THL/SW” signal again.
   The signal remains “OFF” while closing throttle valve.

OK or NG

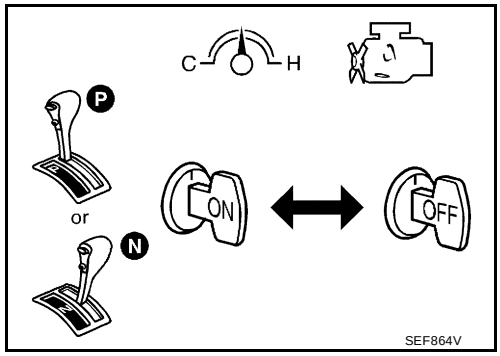
OK >> GO TO 14.
NG >> GO TO 12.

14. RESET THROTTLE POSITION SENSOR IDLE POSITION MEMORY

With CONSULT-II

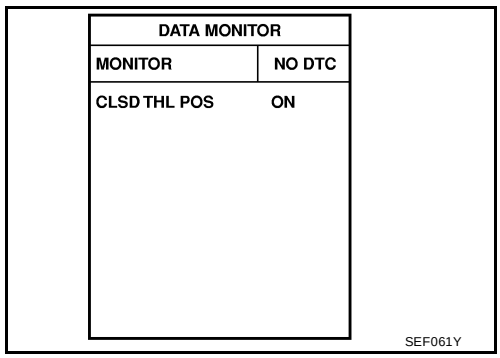
NOTE:
Always warm up engine to normal operating temperature. If engine is cool, the throttle position sensor idle position memory will not be reset correctly.

1. Remove 0.15 mm (0.0059 in) feeler gauge.
2. Confirm that proper vacuum is applied. Refer to Test No. 10.
3. Attach blind cap to vacuum port from which vacuum hose to throttle opener was disconnected.
4. Start engine.
5. Warm up engine to normal operating temperature.
6. Select “ENGINE”, then select “CLSD THL POS” in “DATA MONITOR” mode.
7. Stop engine. (Turn ignition switch “OFF”.)
8. Turn ignition switch “ON” and wait at least 5 seconds.
9. Turn ignition switch “OFF” and wait at least 10 seconds.



10. Repeat steps 8 and 9 until “CLSD THL POS” signal changes to “ON”.

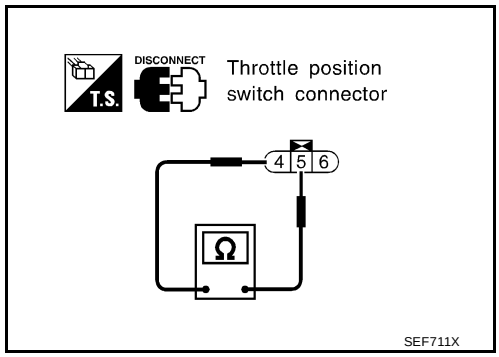
>> GO TO 19.



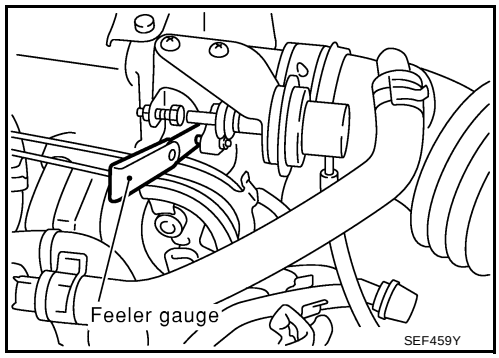
15. CHECK THROTTLE POSITION SWITCH CLOSED POSITION-II

Without CONSULT-II

1. Disconnect closed throttle position switch harness connector.
2. Check continuity between closed throttle position switch terminals **4** and **5** under the following conditions.



- Insert the 0.05 mm (0.0020 in) and 0.15 mm (0.0059 in) feeler gauge alternately between the stopper and throttle drum as shown in the figure.
  "Continuity should exist" while inserting 0.05 mm (0.0020 in) feeler gauge.
  "Continuity should not exist" while inserting 0.15 mm (0.0059 in) feeler gauge.



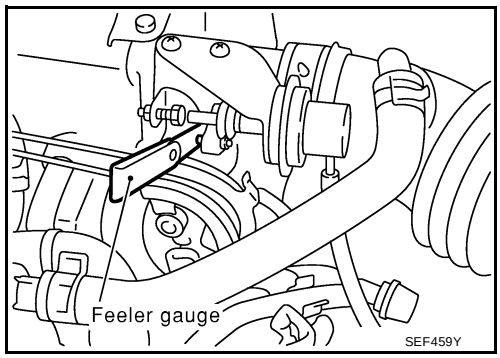
OK or NG

OK >> GO TO 18.
NG >> GO TO 16.

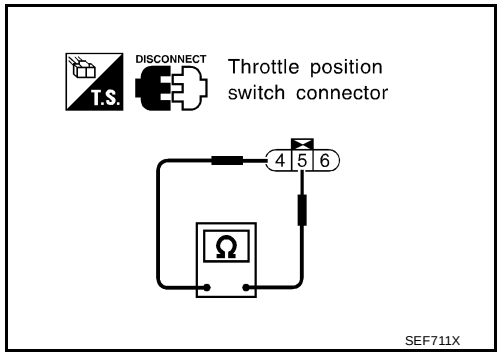
16. ADJUSTMENT THROTTLE POSITION SWITCH CLOSED POSITION-I

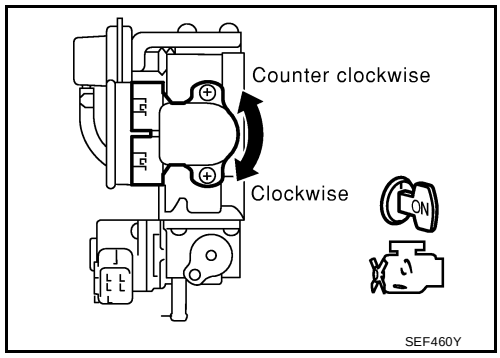
Without CONSULT-II

1. Loosen throttle position sensor fixing bolts.
2. Confirm that proper vacuum is applied. Refer to Test No. 10. During adjustment, vacuum should be applied.
3. Insert 0.05 mm (0.0020 in) feeler gauge between stopper and throttle drum as shown in the figure.



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





>> GO TO 17.

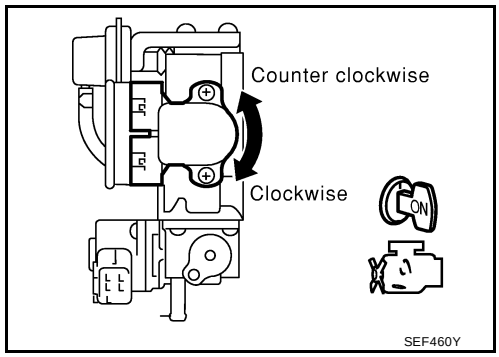
17. ADJUSTMENT THROTTLE POSITION SWITCH CLOSED POSITION-II

Without CONSULT-II

1. Temporarily tighten sensor body fixing bolts as follows.

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

2. Make sure two or three times that the continuity exists when the throttle valve is closed and continuity does not exist when it is opened.
3. Remove 0.05 mm (0.0020 in) feeler gauge then insert 0.15 mm (0.0059 in) feeler gauge.
4. Make sure two or three times that the continuity does not exist when the throttle valve is closed.
5. Tighten throttle position sensor.
6. Check the continuity again.



Continuity does not exist while closing the throttle valve.

OK or NG

OK >> GO TO 18.
NG >> GO TO 16.

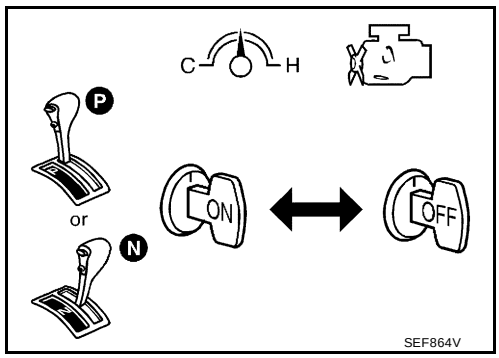
18. RESET THROTTLE POSITION SENSOR IDLE POSITION MEMORY

Without CONSULT-II

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

1. Remove 0.15 mm (0.0059 in) feeler gauge.
2. Reconnect throttle position switch harness connector.
3. Confirm that proper vacuum is applied. Refer to Test No. 10.
4. Attach blind cap to vacuum port from which vacuum hose to throttle opener was disconnected.
5. Start engine.
6. Warm up engine to normal operating temperature.
7. Stop engine. (Turn ignition switch “OFF”.)
8. Turn ignition switch “ON” and wait at least 5 seconds.
9. Turn ignition switch “OFF” and wait at least 10 seconds.
10. Repeat steps 8 and 9, 20 times.

>> GO TO 19.



19. CHECK (1ST TRIP) DTC

1. Turn ignition switch “OFF”.
2. Release vacuum from throttle opener.
3. Remove vacuum pump and vacuum hose from throttle opener.
4. Reinstall original vacuum hose to throttle opener securely.
5. Start engine and warm it up to normal operating temperature.
6. Rev engine (2,000 to 3,000 rpm) two or three times.
7. Make sure no (1st trip) DTC is displayed with CONSULT-II or GST.

OK or NG

OK (With CONSULT-II)>>GO TO 21.
OK (Without CONSULT-II)>>GO TO 22.
NG >> GO TO 20.

20. REPAIR OR REPLACE

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

>> GO TO 19.

21. CHECK TARGET IDLE SPEED

With CONSULT-II

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

800±50 rpm (in “P” or “N” position)

OK or NG

OK >> GO TO 28.
NG >> GO TO 23.

22. CHECK TARGET IDLE SPEED

Without CONSULT-II

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

800±50 rpm (in “P” or “N” position)

OK or NG

OK >> GO TO 28.
NG >> GO TO 23.

23. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-622, "Idle Air Volume Learning" .
Which is the result CMPLT or INCMP?

CMPLT or INCMP

CMPLT >> GO TO 24.
INCMP >> 1. Follow the instruction of “Idle Air Volume Learning”, EC-622 .
2. GO TO 23.

24. CHECK TARGET IDLE SPEED AGAIN

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

800±50 rpm (in “P” or “N” position)

OK or NG

OK >> GO TO 26.
NG >> GO TO 25.

25. CHECK ECM FUNCTION

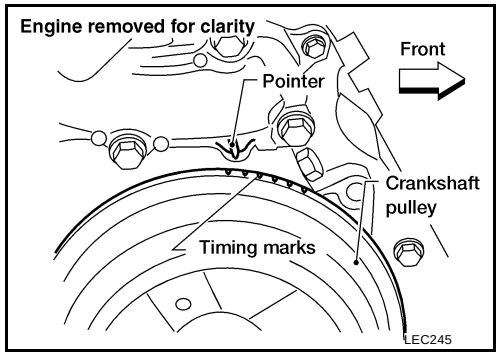
1. Substitute another known-good ECM to check ECM function.
   (ECM may be the cause of a problem, but this is rarely the case.)
2. Perform initialization of NVIS (NATS) system and registration of NVIS (NATS) ignition key IDs. Refer to “NVIS (NISSAN VEHICLE IMMOBILIZER SYSTEM — NATS)”, EC-639 .

>> GO TO 23.

26. CHECK IGNITION TIMING

1. Rev engine (2,000 to 3,000 rpm) two or three times and let it idle.
2. Check ignition timing at idle using a timing light.

Ignition timing: 9°±5° BTDC (in “P” or “N” position)



OK or NG

OK >> GO TO 35.
NG >> GO TO 27.

27. CHECK TIMING CHAIN INSTALLATION

Check timing chain installation, refer to EM-24, "Components" .

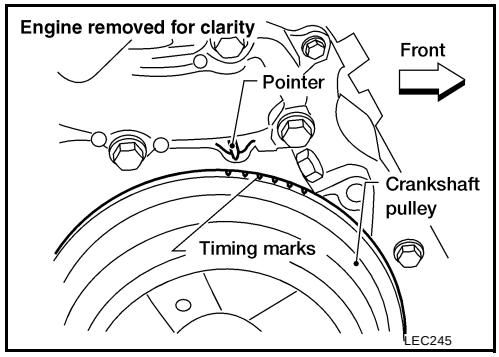
OK or NG

OK >> GO TO 25.
NG >> 1. Repair the timing chain installation.
2. GO TO 23.

28. CHECK IGNITION TIMING

1. Rev engine (2,000 to 3,000 rpm) two or three times and let it idle.
2. Check ignition timing at idle using a timing light.

Ignition timing: 9°±5° BTDC (in “P” or “N” position)



OK or NG

OK >> GO TO 35.
NG >> GO TO 29.

29. PERFORM IDLE AIR VOLUME LEARNING

Refer to “Idle Air Volume Learning”, EC-622 .
Which is the result CMPLT or INCMP?

CMPLT or INCMP

CMPLT >> GO TO 30.
INCMP >> 1. Follow the construction of “Idle Air Volume Leaning”.
2. GO TO 29.

30. CHECK IGNITION TIMING AGAIN

Check ignition timing, refer to Test No. 28.

OK or NG

OK (With CONSULT-II)>>GO TO 33.
OK (Without CONSULT-II)>>GO TO 34.
NG >> GO TO 31.

31. CHECK TIMING CHAIN INSTALLATION

Check timing chain installation, refer to EM-24, "Components" .

OK or NG

OK >> GO TO 32.
NG >> 1. Repair the timing chain installation.
2. GO TO 29.

32. CHECK ECM FUNCTION

1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of a problem, but this is rarely the case.)
2. Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs. Refer to “NVIS (NISSAN VEHICLE IMMOBILIZER SYSTEM — NATS)”, EC-639 .

>> GO TO 29.

33. CHECK TARGET IDLE SPEED AGAIN

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “ENG SPEED” in “DATA MONITOR” mode.
3. Make sure idle speed is within the range below.

800±50 rpm (in “P” or “N” position)

>> GO TO 35.

34. CHECK TARGET IDLE SPEED AGAIN

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Make sure idle speed is within the range below.

800±50 rpm (in “P” or “N” position)

>> GO TO 35.

35. ERASE UNNECESSARY DTC

After this inspection, unnecessary DTC No. might be displayed.
Erase the stored memory in ECM and TCM (Transmission control module).
Refer to EC-637, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" . and AT-39, "HOW TO ERASE DTC" .

>> **INSPECTION END**

Symptom Matrix Chart

UBS001RB

SYSTEM — ENGINE CONTROL SYSTEM

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel pump circuit	1	1	2	3	2		2	2			3		2	EC-1176
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			FL section
	Injector circuit	1	1	2	3	2		2	2			2			EC-1169
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			EC-1201
Air	Positive crankcase ventilation system	3	3	4	4	4	4	4	4	4		4	1		EC-1217
	Incorrect idle speed adjustment	3	3				1	1	1	1		1			EC-87
	IACV-AAC valve circuit	1	1	2	3	3	2	2	2	2		2		2	EC-971
Igni-tion	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC-652
	Ignition circuit	1	1	2	2	2		2	2			2			EC-857
EGR	EGR volume control valve circuit		2	2	3	3						3			EC-877
	EGR system	2	1	2	3	3	3	2	2	3		3			EC-866, EC-1110
Main power supply and ground circuit		2	2	3	3	3		3	3		2	3		2	EC-712
Air conditioner circuit		2	2	3	3	3	3	3	3	3		3		2	MTC section

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

	SYMPTOM													Reference page
	HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Camshaft position sensor circuit	2	2	3	3	3		3	3			3			EC-836
Mass air flow sensor circuit	1	1	2	2	2		2	2			2			EC-734
A/F sensor 1		1	2	3	2		2	2			2			EC-1075
Engine coolant temperature sensor circuit	1	1	2	3	2	3	2	2	3		2			EC-754, EC-769
Throttle position sensor circuit		1	2		2	2	2	2	2		2			EC-759
Incorrect throttle position sensor adjustment		3	1		1	1	1	1	1		1			EC-652
Swirl control valve circuit	3	3						2						EC-1019
Intake valve timing control system		3	3		3		3				3			EC-1003
Vehicle speed sensor circuit		2	3		3						3			EC-968
Knock sensor circuit			2								3			EC-843
ECM	2	2	3	3	3	3	3	3	3	3	3			EC-991, EC-652
Start signal circuit	2													EC-1173
PNP switch circuit			3		3		3	3			3			EC-1165
Power steering oil pressure switch circuit		2					3	3						EC-1182
Electrical load signal circuit							3	3						EC-1191

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 section
	Fuel piping			5	5	5		5	5			5			—
	Vapor lock														
	Valve deposit	5		5	5	5		5	5			5			
	Poor fuel (Heavy weight gasoline, Low octane)														
Air	Air duct	5	5	5	5	5	5	5	5	5		5			
	Air cleaner														
	Air leakage from air duct (Mass air flow sensor — throttle body)														
	Throttle body, Throttle wire														FL section
	Air leakage from intake manifold/Collector/Gasket														—
Cranking	Battery	1	1	1		1		1	1			1		1	SC section
	Generator circuit														
	Starter circuit	3													
	Flywheel/Drive plate/Signal plate	6													EM section
	PNP switch	4													AT section

1 - 6: The numbers refer to the order of inspection.

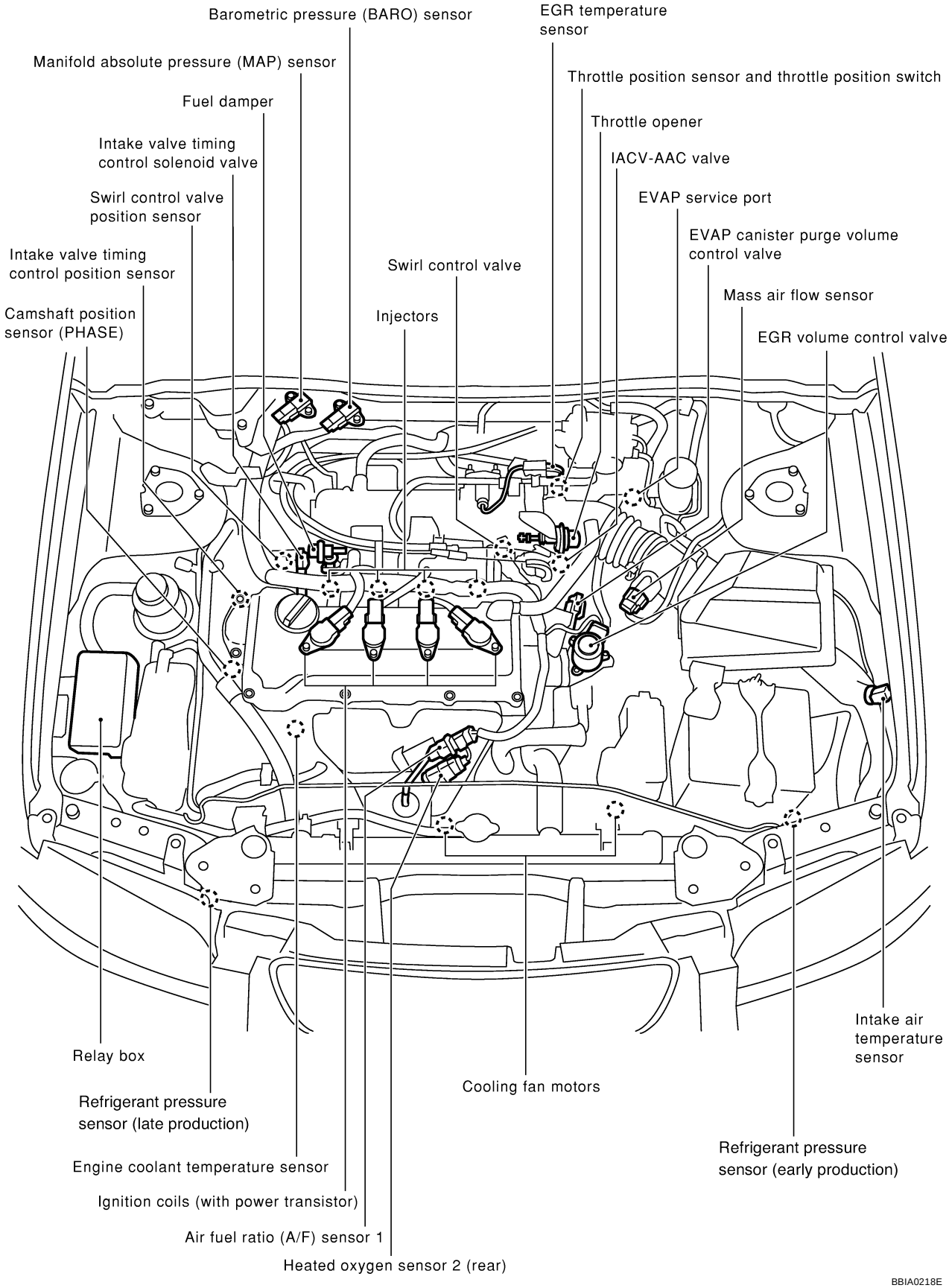
(continued on next page)

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Engine	Cylinder head	5	5	5	5	5		5	5			5			EM section
	Cylinder head gasket										4		3		
	Cylinder block	6	6	6	6	6		6	6			6	4		
	Piston														
	Piston ring														
	Connecting rod														
	Bearing														
	Crankshaft														
Valve mechanism	Timing chain	5	5	5	5	5		5	5			5			EM section
	Camshaft														
	Intake valve												3		
	Exhaust valve														
Exhaust	Exhaust manifold/Tube/Muffler/Gasket	5	5	5	5	5		5	5			5			EX section
	Three way catalyst														
Lubrication	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery	5	5	5	5	5		5	5			5			MA, EM and LU sections
	Oil level (Low)/Filthy oil														
Cooling	Radiator/Hose/Radiator filler cap	5	5	5	5	5		5	5		4	5			CO section
	Thermostat									5					
	Water pump														
	Water gallery														
	Cooling fan									5					EC-1060
	Coolant level (low)/Contaminated coolant														MA section

1 - 6: The numbers refer to the order of inspection.

Engine Control Component Parts Location

UBS001RC



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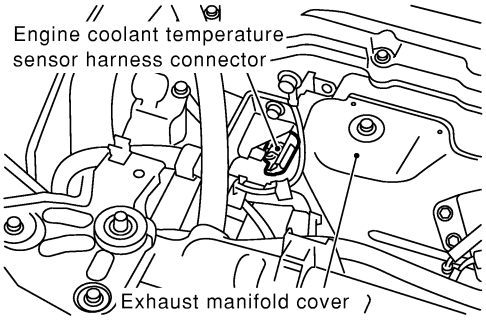
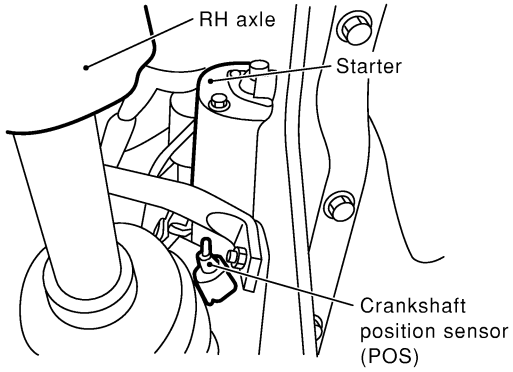
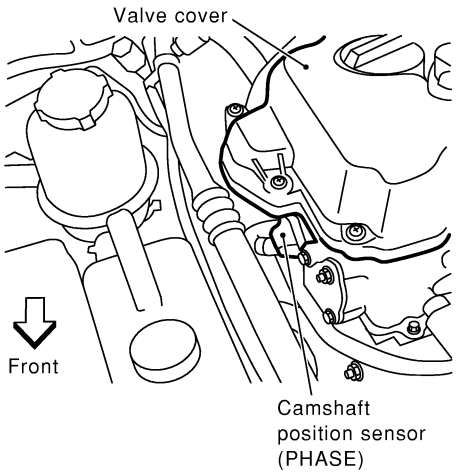
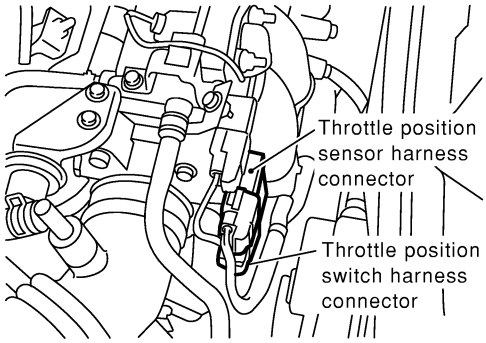
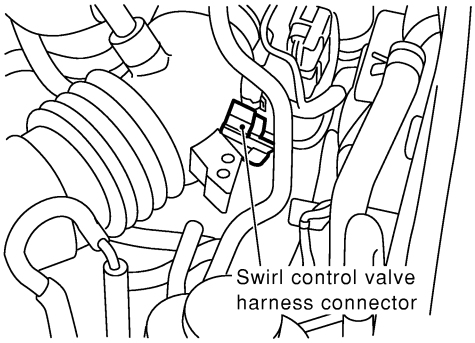


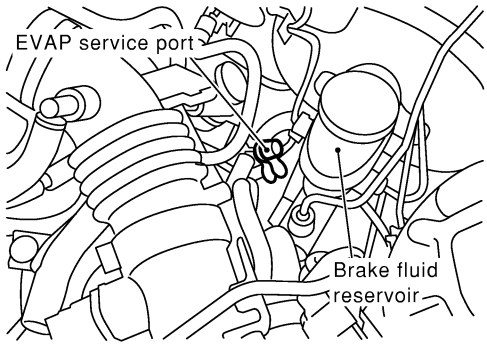
Under vehicle view



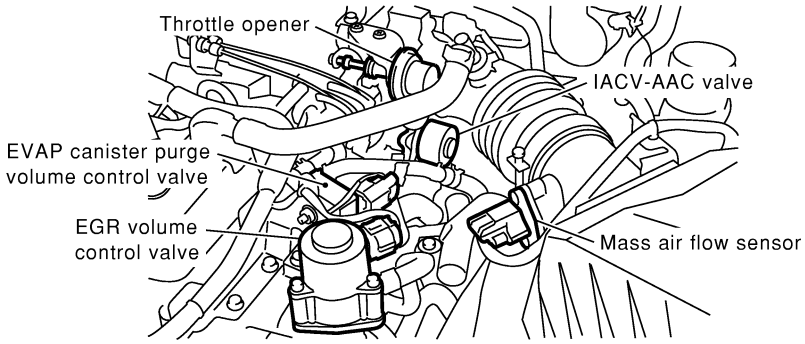


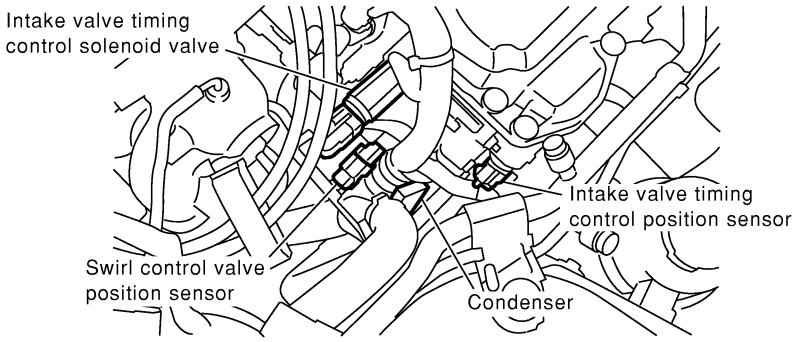




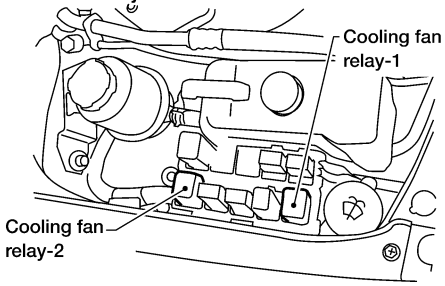


SEF383Z

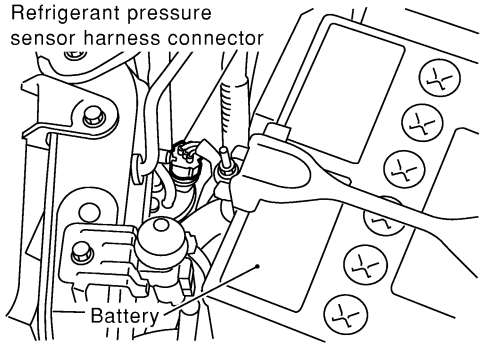




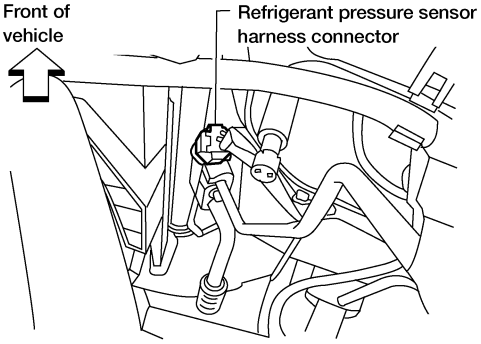
View With Relay Box Cover Removed



EARLY PRODUCTION



LATE PRODUCTION



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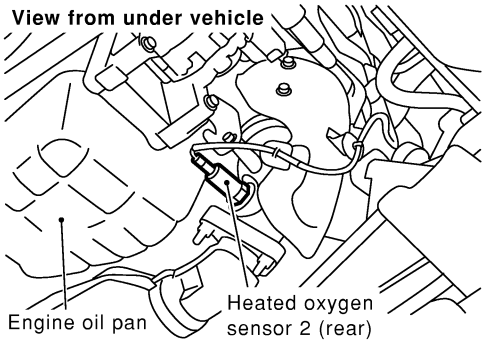
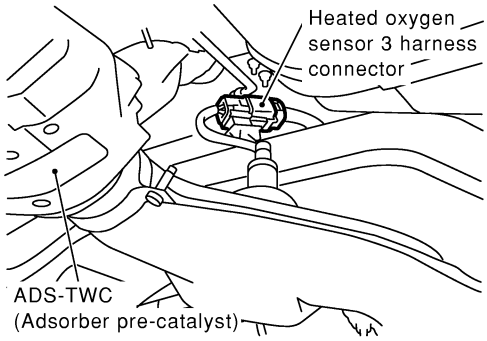
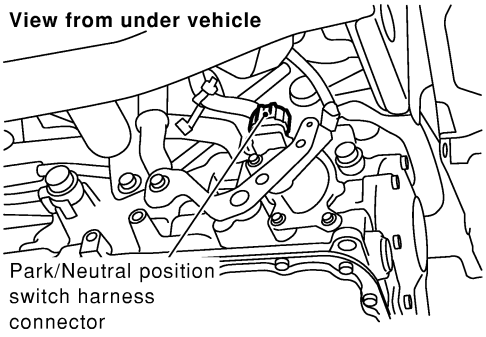
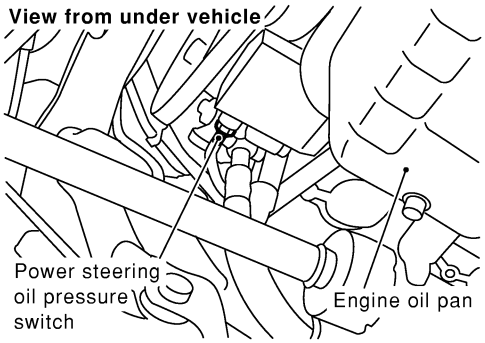
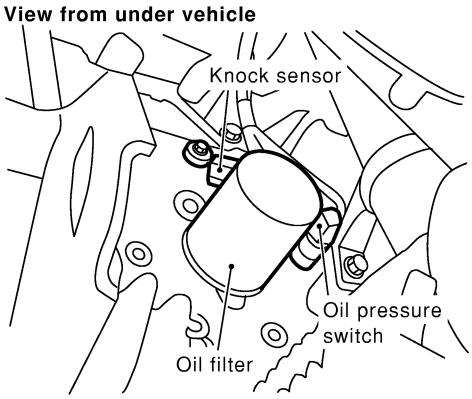
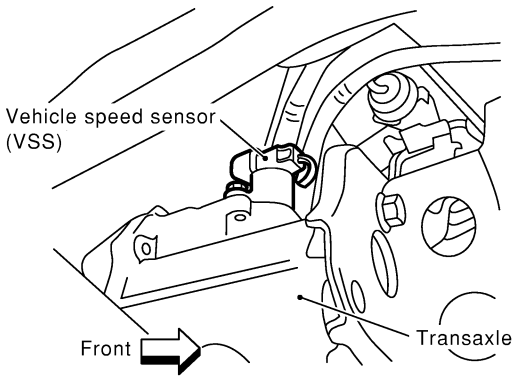

View from under vehicle
Engine oil pan
Heated oxygen
sensor 2 (rear)


Heated oxygen
sensor 3 harness
connector
ADS-TWC
(Adsorber pre-catalyst)


View from under vehicle
Park/Neutral position
switch harness
connector

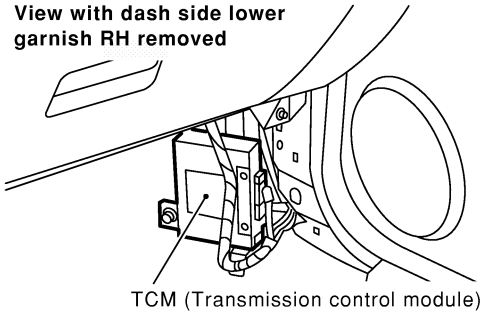

View from under vehicle
Power steering
oil pressure
switch
Engine oil pan


View from under vehicle
Knock sensor
Oil pressure
switch
Oil filter

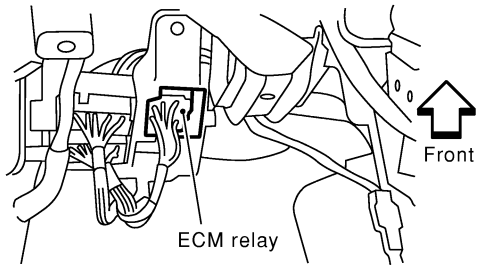

Vehicle speed sensor
(VSS)
Front
Transaxle

SEF385Z

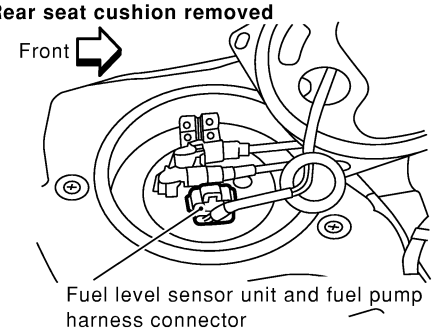
View with dash side lower garnish RH removed

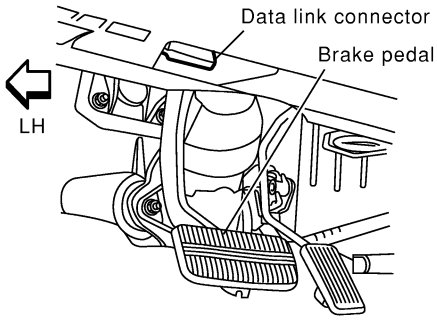


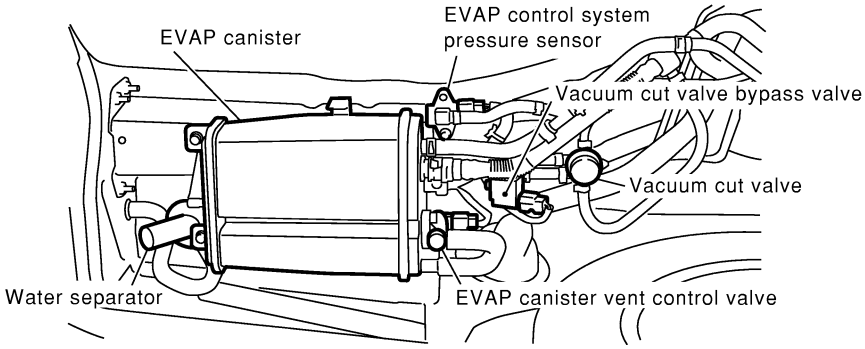
Passenger side view with instrument panel removed for clarity



Rear seat cushion removed



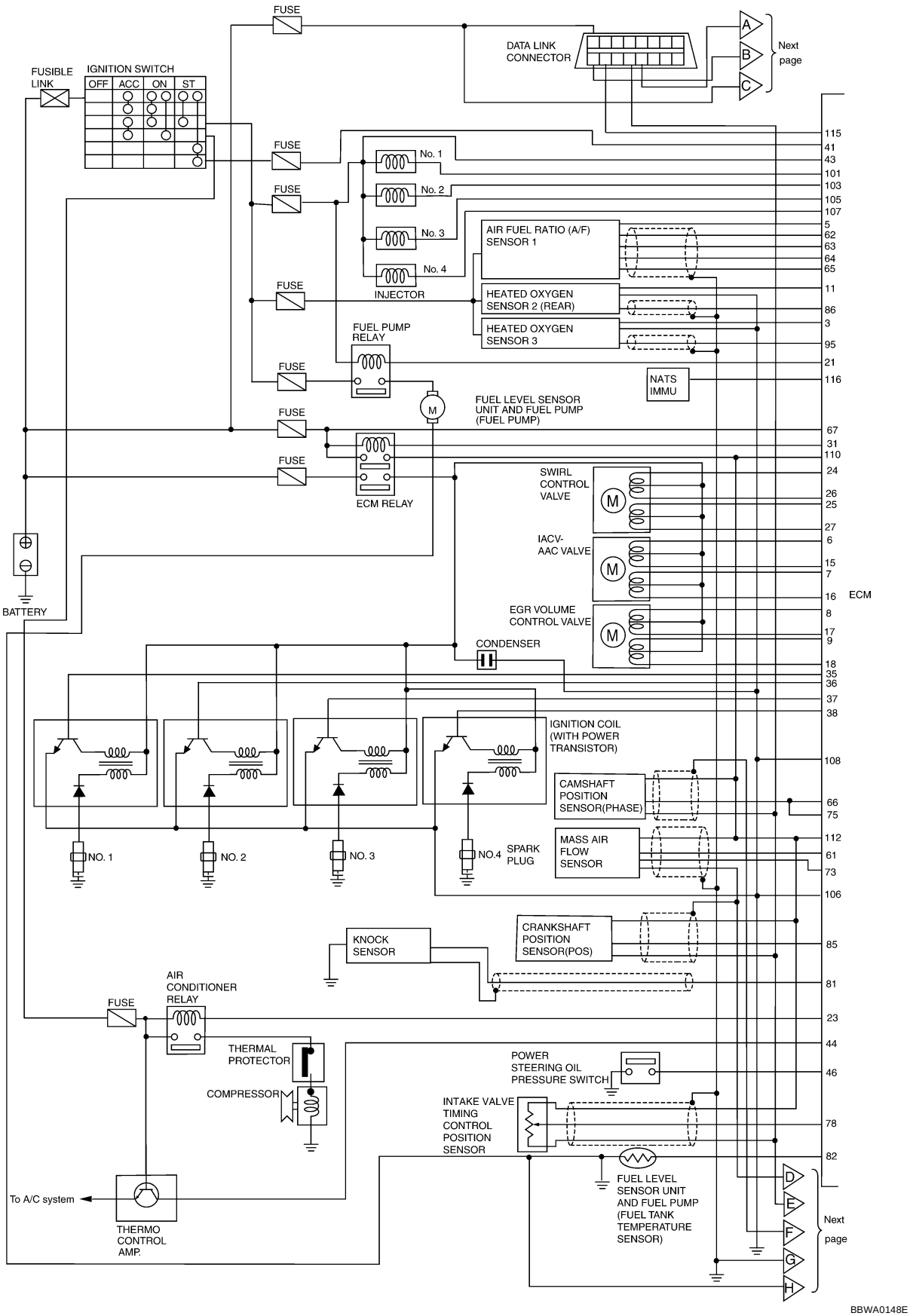




SEF386Z

Circuit Diagram

UBS001RD



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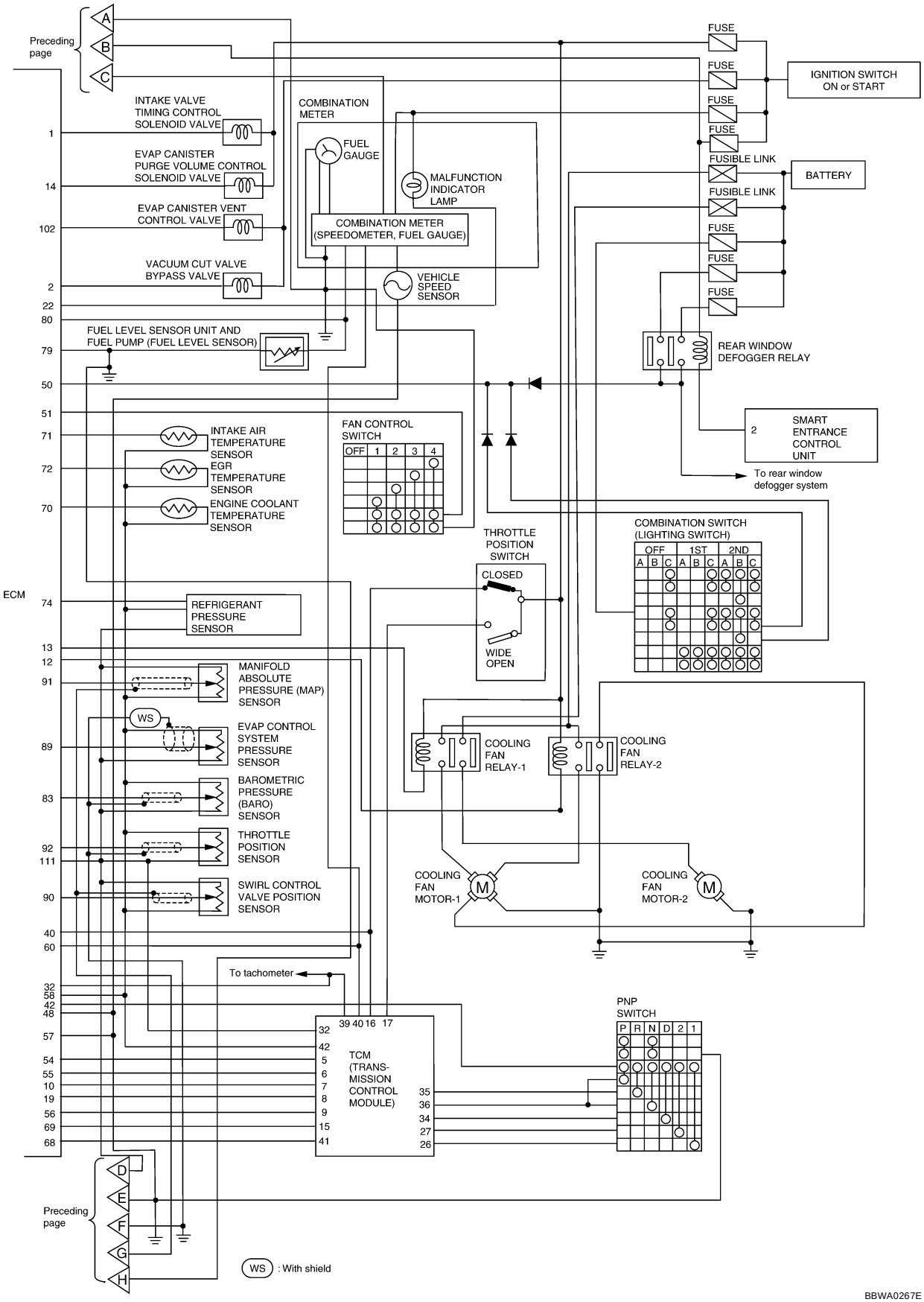
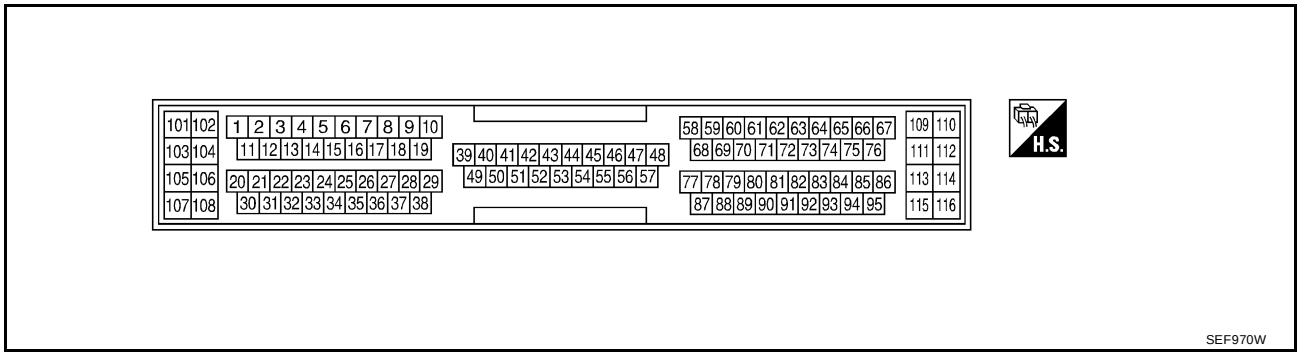

Preceding page
A
B
C
INTAKE VALVE TIMING CONTROL SOLENOID VALVE
EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE
EVAP CANISTER VENT CONTROL VALVE
VACUUM CUT VALVE BYPASS VALVE
FUEL LEVEL SENSOR UNIT AND FUEL PUMP (FUEL LEVEL SENSOR)
COMBINATION METER
FUEL GAUGE
MALFUNCTION INDICATOR LAMP
COMBINATION METER (SPEEDOMETER, FUEL GAUGE)
VEHICLE SPEED SENSOR
FUSE
IGNITION SWITCH ON or START
FUSIBLE LINK
BATTERY
REAR WINDOW DEFOGGER RELAY
SMART ENTRANCE CONTROL UNIT
To rear window defogger system
FAN CONTROL SWITCH
OFF 1 2 3 4
INTAKE AIR TEMPERATURE SENSOR
EGR TEMPERATURE SENSOR
ENGINE COOLANT TEMPERATURE SENSOR
THROTTLE POSITION SWITCH
CLOSED
WIDE OPEN
COMBINATION SWITCH (LIGHTING SWITCH)
OFF 1ST 2ND
A B C A B C A B C
ECM
REFRIGERANT PRESSURE SENSOR
MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR
WS
EVAP CONTROL SYSTEM PRESSURE SENSOR
BAROMETRIC PRESSURE (BARO) SENSOR
THROTTLE POSITION SENSOR
SWIRL CONTROL VALVE POSITION SENSOR
COOLING FAN RELAY-1
COOLING FAN RELAY-2
COOLING FAN MOTOR-1
COOLING FAN MOTOR-2
M
To tachometer
TCM (TRANS-MISSION CONTROL MODULE)
39 40 16 17
PNP SWITCH
P R N D 2 1
Preceding page
D
E
F
G
H
WS : With shield
BBWA0267E

ECM Harness Connector Terminal Layout

UBS001RE

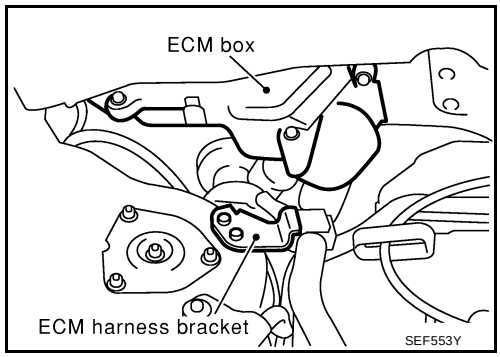


ECM Terminals and Reference Value

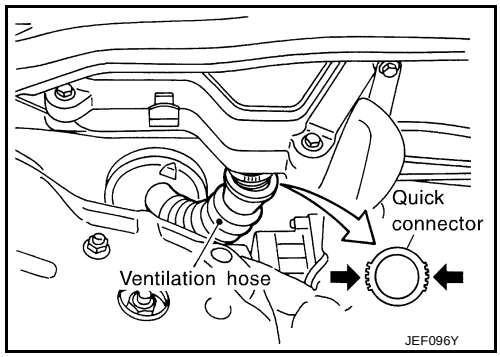
UBS001RF

PREPARATION

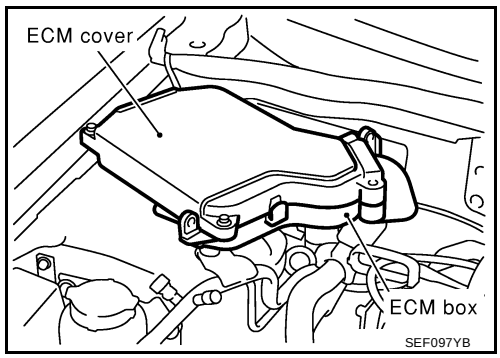
1. ECM is located in the right side of the cowl top (behind the strut tower).
   For this inspection:
   - Remove engine control harness bracket on the strut tower.
   - Remove quick connector on the ventilation hose.
   - Remove ECM fixing bolts and pull it out all the way.

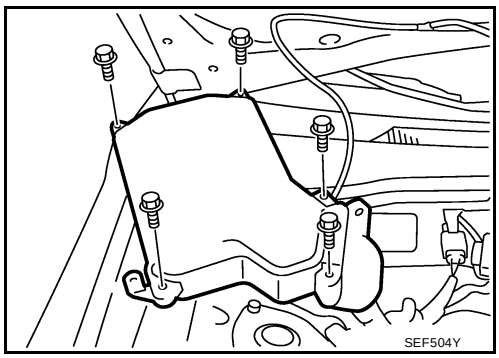


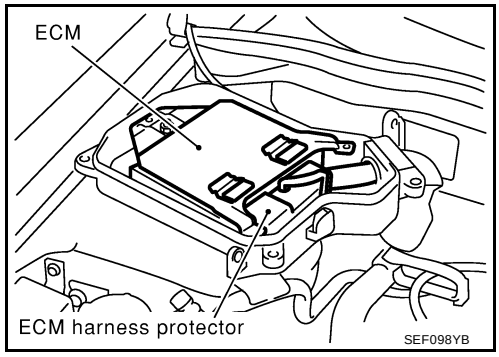
   - Remove ECM cover fixing bolts.



   - Remove ECM fixing bolts.
   - Remove ECM with it's harness from the cover.

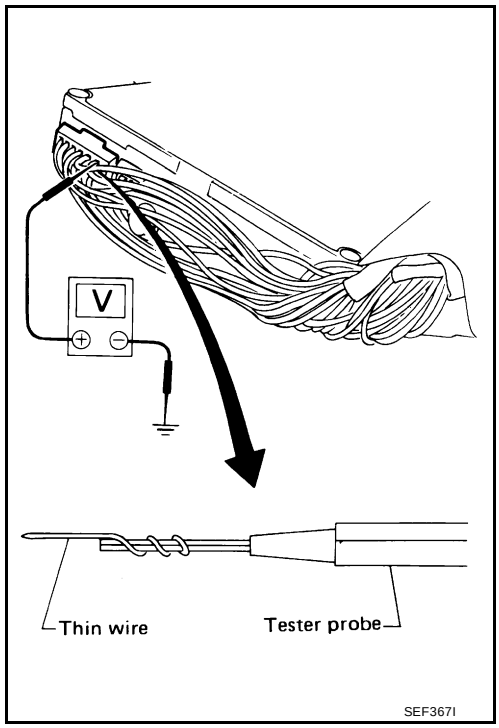






2. Remove ECM harness protector.
3. Perform all voltage measurements with the connector connected. Extend tester probe as shown to perform tests easily.
   - Open harness securing clip to make testing easier.
   - Use extreme care not to touch 2 pins at one time.
   - Data is for comparison and may not be exact.

   CAUTION:
   Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the body ground.

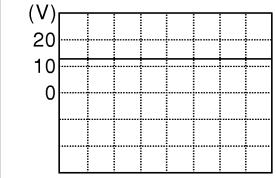
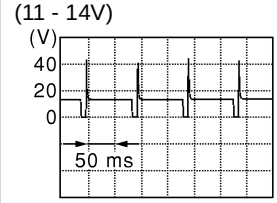


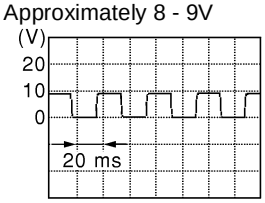
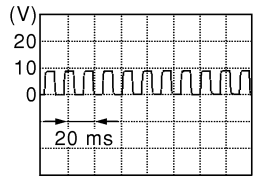
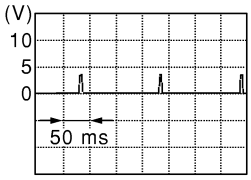
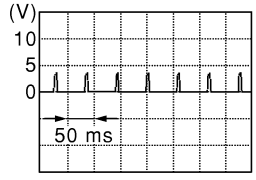
ECM INSPECTION TABLE

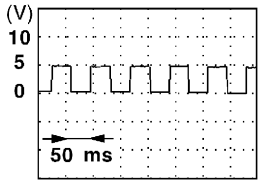
Specification data are reference values and are measured between each terminal and ground.

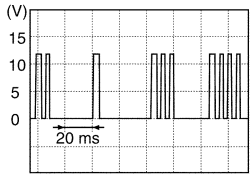
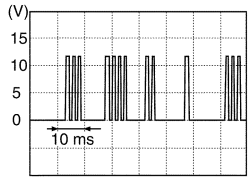
CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the body ground.

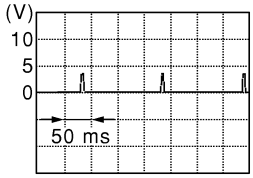
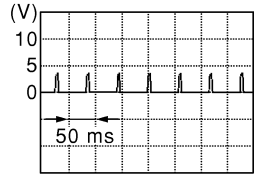
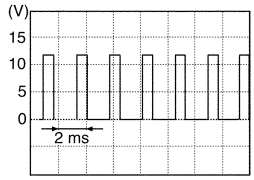
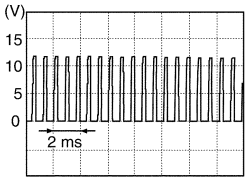
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	Y/R	Intake valve timing control solenoid valve	**[Engine is running]** ● Intake valve timing control is operating	0 - 1V
			[Engine is not running] ● Intake valve timing control is not operating	BATTERY VOLTAGE (11 - 14V)
2	L/B	Vacuum cut valve bypass valve	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)
3	W/R	Heated oxygen sensor 3 heater	**[Engine is running]** ● Engine speed is below 3,600 rpm ● After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more	0 - 1.0V
			[Ignition switch "ON"] ● Engine stopped **[Engine is running]** ● Engine speed is above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)
5	R	A/F sensor 1 heater	**[Engine is running]** ● **Warmed-up condition** ● Idle speed	Approximately 5V
6 7 15 16	BR LG P OR	IACV-AAC valve	**[Engine is running]** ● Idle speed	0.1 - 14V
8 9 17 18	SB W/B R/Y BR/R	EGR volume control valve	**[Engine is running]** ● Idle speed	0.1 - 14V
10	Y/B	A/T signal No. 3	**[Engine is running]** ● Idle speed	Voltage fluctuates between 0 and 9V.
11	R/B	Heated oxygen sensor 2 heater	**[Engine is running]** ● Engine speed is below 3,600 rpm ● After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more	0 - 1.0V
			[Engine is running] ● Engine speed is above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)
12	LG/B	Cooling fan relay (High)	**[Engine is running]** ● Cooling fan is not operating	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Cooling fan (High) is operating	0 - 0.6V
13	LG/R	Cooling fan relay (Low)	**[Engine is running]** ● Cooling fan is not operating	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Cooling fan is operating	0 - 0.6V

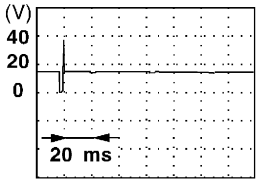
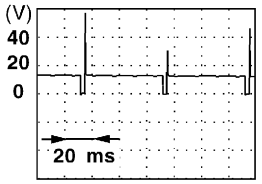
TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
14	GY/L	EVAP canister purge volume control solenoid valve	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)  SEF462Y
			[Engine is running] ● Engine speed is about 2,000 rpm (More than 100 seconds after starting engine).	BATTERY VOLTAGE (11 - 14V)  SEF461Y
19	BR/W	A/T signal No. 5	**[Engine is running]** ● Idle speed	Voltage fluctuates between 0 and 9V.
21	B/P	Fuel pump relay	**[Ignition switch “ON”]** ● For 5 seconds after turning ignition switch “ON” **[Engine is running]**	0 - 1V
			[Ignition switch “ON”] ● More than 5 seconds after turning ignition switch “ON”	BATTERY VOLTAGE (11 - 14V)
22	OR/L	Malfunction indicator lamp	**[Ignition switch “ON”]**	0 - 1.0V
			[Engine is running] ● Idle speed	BATTERY VOLTAGE (11 - 14V)
23	L	Air conditioner relay	**[Engine is running]** ● Both A/C switch and blower switch are “ON” (Compressor operates)	0 - 0.6V
			[Engine is running] ● A/C switch is “OFF”	BATTERY VOLTAGE (11 - 14V)
24 25 26 27	L/R G R/B G/OR	Swirl control valve	**[Engine is running]** ● Idle speed	0.1 - 14V
31	W/G	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch “OFF”]** ● For 7 seconds after turning ignition switch “OFF”	0 - 1.0V
			[Ignition switch “OFF”] ● More than 7 seconds passed after turning ignition switch “OFF”	BATTERY VOLTAGE (11 - 14V)

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
32	L/OR	Tachometer	**[Engine is running]** ● **Warmed-up condition** ● Idle speed	Approximately 8 - 9V  SEF463Y
			[Engine is running] ● Engine speed is 2,000 rpm	Approximately 8 - 9V  SEF464Y
35 36 37 38	B/R PU L/R GY/R	Ignition signal	**[Engine is running]** ● **Warmed-up condition** ● Idle speed	Approximately 0.3V  SEF465Y
			[Engine is running] ● Engine speed is 2,000 rpm	Approximately 0.5V  SEF466Y
40	Y/PU	Throttle position switch (Closed position)	**[Engine is running]** ● **Warmed-up condition** ● Accelerator pedal fully released	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Accelerator pedal depressed	Approximately 0V
41	B/Y	Start signal	**[Ignition switch “ON”]**	Approximately 0V
			[Ignition switch “START”]	9 - 12V
42	G/OR	PNP switch	**[Ignition switch “ON”]** ● Gear position is “P” or “N”	Approximately 0V
			[Ignition switch “ON”] ● Except the above gear position	BATTERY VOLTAGE (11 - 14V)
43	B/R	Ignition switch	**[Ignition switch “OFF”]**	0V
			[Ignition switch “ON”]	BATTERY VOLTAGE (11 - 14V)
44	L/R	Air conditioner switch	**[Engine is running]** ● Both A/C switch and blower switch are “ON”	Approximately 0V
			[Engine is running] ● A/C switch is “OFF”	BATTERY VOLTAGE (11 - 14V)

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
46	PU	Power steering oil pressure switch	**[Engine is running]** ● Steering wheel is being turned.	Approximately 0V
			[Engine is running] ● Steering wheel is not being turned.	Approximately 5V
48	B	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
50	R/W	Electrical load signal	**[Ignition switch "ON"]** ● Lighting switch and/or rear window defogger switch "ON"	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch "ON"] ● Lighting switch and rear window defogger switch "OFF"	0V
51	LG/B	Heater fan switch	**[Engine is running]** ● Heater fan switch "ON"	Approximately 0V
			[Engine is running] ● Heater fan switch "OFF"	Approximately 5V
54	Y/R	A/T signal No. 1	**[Engine is running]** ● Idle speed	Voltage fluctuates between 0 and 9V.
55	Y/G	A/T signal No. 2	**[Engine is running]** ● Idle speed	Voltage fluctuates between 0 and 9V.
56	G/Y	A/T signal No. 4	**[Engine is running]** ● Idle speed	Voltage fluctuates between 0 and 9V.
57	B	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
58	B	Sensor ground	**[Engine is running]** ● **Warmed-up condition** ● Idle speed	Approximately 0V
60	PU/R	Vehicle speed sensor	**[Engine is running]** ● Lift up the vehicle ● In 2nd gear position ● Vehicle speed is 40 km/h (25 MPH)	0 - Approximately 4.2V  SEF003W
61	G	Mass air flow sensor	**[Engine is running]** ● **Warmed-up condition** ● Idle speed	1.0 - 1.7V
			[Engine is running] ● **Warmed-up condition** ● Engine speed is 2,500 rpm	1.5 - 2.4V
62	W/L	A/T sensor 1	**[Engine is running]** ● **Warmed-up condition** ● Idle speed	2 - 3V
63	W			Approximately 2.6V
64	OR/L			Approximately 3.1V
65	OR			2 - 3V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
66 75	R	Camshaft position sensor (PHASE)	**[Engine is running]** ● **Warmed-up condition** ● Idle speed	Approximately 2.0 - 3.0V  SEF977W
			[Engine is running] ● Engine speed is 2,000 rpm	Approximately 2.0 - 3.0V  SEF978W
67	W/L	Power supply for ECM (Back-up)	**[Ignition switch “OFF”]**	BATTERY VOLTAGE (11 - 14V)
68	OR/L	Throttle position sensor signal output	**[Engine is running]** ● **Warmed-up condition** ● Accelerator pedal fully released	Approximately 0.5V
			[Ignition switch “ON”] ● Accelerator pedal fully depressed	Approximately 4V
69	PU	A/T diagnosis communication line	**[Engine is running]** ● Idle speed	Voltage fluctuates between 0 and 9V.
70	BR/W	Engine coolant temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with engine coolant temperature.
71	Y/B	Intake air temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with intake air temperature.
72	PU	EGR temperature sensor	**[Engine is running]** ● **Warmed-up condition** ● Idle speed	Less than 4.5V
			[Engine is running] ● **Warmed-up condition** ● EGR system is operating	0 - 1.5V
73	B	Mass air flow sensor ground	**[Engine is running]** ● **Warmed-up condition** ● Idle speed	Approximately 0V
74	R/L	Refrigerant pressure sensor	**[Engine is running]** ● **Warmed-up condition** ● Both A/C switch and blower switch are “ON” (Compressor operates)	0.36 - 3.88V

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
78	R	Intake valve timing control position sensor	**[Engine is running]** ● **Warmed-up condition** ● Idle speed	Approximately 0.5 - 0.6V  SEF465Y
			[Engine is running] ● Engine speed is 2,000 rpm	Approximately 0.5 - 0.6V  SEF466Y
79	B/W	Fuel level sensor ground	**[Engine is running]** ● Idle speed	Approximately 0V
80	G	Fuel level sensor	**[Ignition switch "ON"]**	Approximately 0 - 4.8V Output voltage varies with fuel level.
81	W	Knock sensor	**[Engine is running]** ● Idle speed	Approximately 2.5V
82	G/OR	Fuel tank temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with fuel tank temperature.
83	W	BARO sensor	**[Ignition switch "ON"]**	Approximately 4.4V
85	R	Crankshaft position sensor (POS)	**[Engine is running]** ● **Warmed-up condition** ● Idle speed	Approximately 3.0 - 4.0V  SEF979W
			[Engine is running] ● Engine speed is 2,000 rpm	Approximately 3.0 - 4.0V  SEF980W
86	W	Heated oxygen sensor 2	**[Engine is running]** ● **Warmed-up condition** ● Engine speed is 2,000 rpm	0 - Approximately 1.0V
89	P	EVAP control system pressure sensor	**[Ignition switch "ON"]**	Approximately 1.8 - 4.8V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
90	P/L	Swirl control valve position sensor	**[Engine is running]** ● Idle speed ● Engine coolant temperature is below 44°C (111°F).	Approximately 5V
			[Engine is running] ● Idle speed ● Engine coolant temperature is above 45°C (113°F).	0 - 1.0V
91	W	MAP sensor	**[Engine is running]** ● **Warmed-up condition** ● Idle speed	Approximately 1.3V
92	W	Throttle position sensor	**[Engine is running]** ● **Warmed-up condition** ● Accelerator pedal fully released ● Vacuum is created using vacuum pump	0.15 - 0.85V
			[Ignition switch "ON"] ● Accelerator pedal fully depressed ● Vacuum is created using vacuum pump	3.5 - 4.7V
95	L	Heated oxygen sensor 3	**[Engine is running]** ● **Warmed-up condition** ● Engine speed is 2,000 rpm	0 - approximately 1.0V
101 103 105 107	R/B Y/B G/B L/B	Injector No. 1 Injector No. 2 Injector No. 3 Injector No. 4	**[Engine is running]** ● **Warmed-up condition** ● Idle speed	BATTERY VOLTAGE (11 - 14V)  SEF011W
			[Engine is running] ● **Warmed-up condition** ● Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14V)  SEF012W
102	L/Y	EVAP canister vent control valve	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)
106 108	B B	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
110 112	W W	Power supply for ECM	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)
111	R	Sensor's power supply	**[Ignition switch "ON"]**	Approximately 5V
115	LG	DATA link connector	**[Ignition switch "ON"]** ● CONSULT-II or GST is disconnected.	Approximately 8V

CONSULT-II Function

UBS001RG

FUNCTION

Diagnostic test mode	Function
Work support	This mode enables a technician to adjust some devices faster and more accurately by following the indications on the CONSULT-II unit.
Self-diagnostic results	Self-diagnostic results such as 1st trip DTC, DTCs and 1st trip freeze frame data or freeze frame data can be read and erased quickly.*1
Data monitor	Input/Output data in the ECM can be read.
Data monitor (SPEC)	Input/Output specification of the Basic fuel schedule, AFM, A/F feedback control value and the other data monitor items can be read.
Active test	Diagnostic Test Mode in which CONSULT-II drives some actuators apart from the ECMs and also shifts some parameters in a specified range.
DTC & SRT confirmation	The status of system monitoring tests and the self-diagnosis status/result can be confirmed.
Function test	Conducted by CONSULT-II instead of a technician to determine each system is "OK" or "NG".
ECM part number	ECM part number can be read.

*1 The following emission-related diagnostic information is cleared when the ECM memory is erased.

1. Diagnostic trouble codes
2. 1st trip diagnostic trouble codes
3. Freeze frame data
4. 1st trip freeze frame data
5. System readiness test (SRT) codes
6. Test values
7. Others

ENGINE CONTROL COMPONENT PARTS/CONTROL SYSTEMS APPLICATION

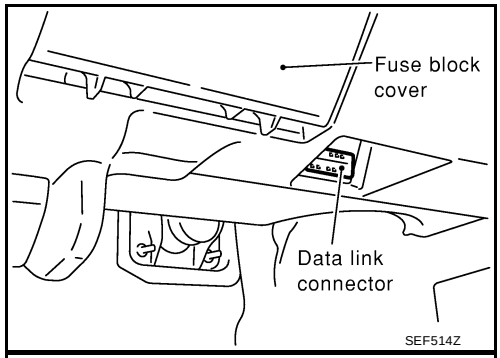
		Item	DIAGNOSTIC TEST MODE							
			WORK SUPPORT	SELF-DIAGNOSTIC RESULTS		DATA MONITOR	DATA MONITOR (SPEC)	ACTIVE TEST	DTC & SRT CONFIRMATION	
				DTC*1	FREEZE FRAME DATA*2				SRT STATUS	DTC WORK SUPPORT
ENGINE CONTROL COMPONENT PARTS	INPUT	Camshaft position sensor (PHASE)		×	×					
		Crankshaft position sensor (POS)		×			×			
		Mass air flow sensor		×		×	×			
		Engine coolant temperature sensor		×	×	×	×	×		
		A/F sensor 1		×		×			×	×
		Heated oxygen sensor 2		×		×	×		×	×
		Heated oxygen sensor 3		×		×	×		×	×
		Vehicle speed sensor		×	×	×	×			
		Throttle position sensor		×		×	×			
		Fuel tank temperature sensor		×		×	×	×		
		EVAP control system pressure sensor		×		×	×			
		MAP sensor		×	×	×	×			
		BARO sensor		×						
		EGR temperature sensor		×		×	×			
		Intake air temperature sensor		×	×	×	×			
		Knock sensor		×						
		Ignition switch (start signal)				×	×			
		Closed throttle position switch		×		×	×			
		Closed throttle position switch (throttle position sensor signal)				×	×			
		Air conditioner switch				×	×			
		Park/neutral position (PNP) switch		×		×	×			
		Power steering oil pressure switch				×	×			
		Battery voltage				×	×			
		Load signal				×	×			
		Swirl control valve position sensor		×		×	×			
		Fuel level sensor		×		×	×			

Item			DIAGNOSTIC TEST MODE							
			WORK SUPPORT	SELF-DIAGNOSTIC RESULTS		DATA MONITOR	DATA MONITOR (SPEC)	ACTIVE TEST	DTC & SRT CONFIRMATION	
				DTC*1	FREEZE FRAME DATA*2				SRT STATUS	DTC WORK SUPPORT
ENGINE CONTROL COMPONENT PARTS	OUTPUT	Injectors				×	×	×		
		Power transistor (Ignition timing)	×	X (Ignition signal)		×	×	×		
		IACV-AAC valve		×		×	×	×		
		EVAP canister purge volume control solenoid valve		×		×	×	×		×
		Air conditioner relay				×	×			
		Fuel pump relay	×			×	×	×		
		Cooling fan		×		×	×	×		
		EGR volume control valve		×		×	×	×		
		A/F sensor 1 heater		×		×	×		×	
		Heated oxygen sensor 2 heater		×		×	×		×	
		Heated oxygen sensor 3 heater		×		×	×		×	
		EVAP canister vent control valve		×		×	×	×		
		Vacuum cut valve bypass valve		×		×	×	×		×
		Swirl control valve		×		×	×	×		
		Intake valve timing control solenoid valve		×		×	×	×		
		Calculated load value			×	×	×			

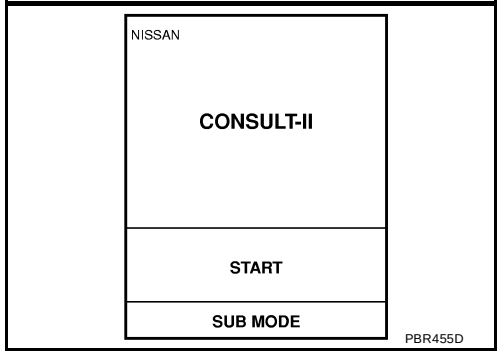
X: Applicable
*1: This item includes 1st trip DTCs.
*2: This mode includes 1st trip freeze frame data or freeze frame data. The items appear on CONSULT-II screen in freeze frame data mode only if a 1st trip DTC or DTC is detected. For details, refer toEC-626 .

CONSULT-II INSPECTION PROCEDURE

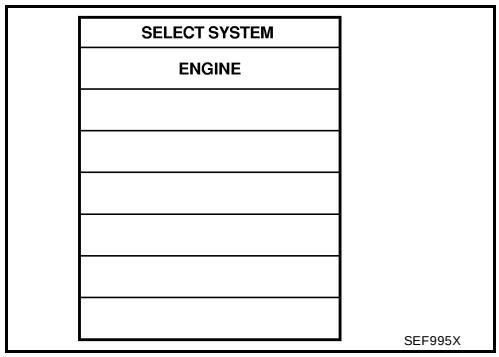
1. Turn ignition switch OFF.
2. Connect CONSULT-II to data link connector, which is located under LH dash panel near the fuse box cover.



3. Turn ignition switch ON.
4. Touch “START”.

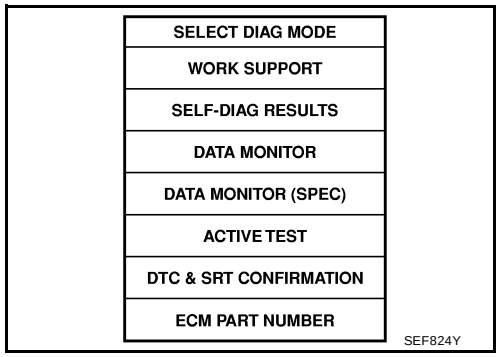


5. Touch “ENGINE”.



6. Perform each diagnostic test mode according to each service procedure.

For further information, see the CONSULT-II Operation Manual.



WORK SUPPORT MODE

WORK ITEM	CONDITION	USAGE
TP SW/TP SEN IDLE POSI ADJ	● FOLLOW THE BASIC INSPECTION INSTRUCTION IN THE SERVICE MANUAL.	When adjusting the idle throttle position
FUEL PRESSURE RELEASE	● FUEL PUMP WILL STOP BY TOUCHING “START” DURING IDLING. CRANK A FEW TIMES AFTER ENGINE STALLS.	When releasing fuel pressure from fuel line
IDLE AIR VOL LEARN	● THE IDLE AIR VOLUME THAT KEEPS THE ENGINE WITHIN THE SPECIFIED RANGE IS MEMORIZED IN ECM.	When learning the idle air volume
SELF-LEARNING CONT	● THE COEFFICIENT OF SELF-LEARNING CONTROL MIXTURE RATIO RETURNS TO THE ORIGINAL COEFFICIENT.	When clearing the coefficient of self-learning control value
EVAP SYSTEM CLOSE	OPEN THE VACUUM CUT VALVE BYPASS VALVE AND CLOSE THE EVAP CANISTER VENT CONTROL VALVE IN ORDER TO MAKE EVAP SYSTEM CLOSE UNDER THE FOLLOWING CONDITIONS. ● IGN SW “ON” ● ENGINE NOT RUNNING ● AMBIENT TEMPERATURE IS ABOVE 0°C (32°F). ● NO VACUUM AND NO HIGH PRESSURE IN EVAP SYSTEM ● TANK FUEL TEMP. IS MORE THAN 0°C (32°F). ● WITHIN 10 MINUTES AFTER STARTING “EVAP SYSTEM CLOSE” ● WHEN TRYING TO EXECUTE “EVAP SYSTEM CLOSE” UNDER ANY CONDITION OTHER THAN THE ABOVE, CONSULT-II WILL DISCONTINUE IT AND DISPLAY APPROPRIATE INSTRUCTIONS. **NOTE:** **WHEN STARTING ENGINE, CONSULT-II MAY DISPLAY “BATTERY VOLTAGE IS LOW. CHARGE BATTERY”, EVEN IN USING CHARGED BATTERY.**	When detecting EVAP vapor leak point of EVAP system

WORK ITEM	CONDITION	USAGE
TARGET IDLE RPM ADJ*	● IDLE CONDITION	When setting target idle speed
TARGET IGNITION TIMING ADJ*	● IDLE CONDITION	● When adjusting target ignition timing After adjustment, confirm target ignition timing with a timing light. ● If the “TARGET IDLE RPM ADJ” has been done, the Idle Air Volume Learning procedure will not be completed.

*: 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 “TROUBLE DIAGNOSIS — INDEX” (See EC-595 .)

Freeze Frame Data and 1st Trip Freeze Frame Data

Freeze frame data item*1	Description
DIAG TROUBLE CODE [PXXXX]	● The engine control component part/control system has a trouble code, it is displayed as “PXXXX”. (Refer to “TROUBLE DIAGNOSIS — INDEX”, EC-595 .)
FUEL SYS-B1	● “Fuel injection system status” at the moment a malfunction is detected is displayed. ● One mode in the following is displayed. “MODE 2”: Open loop due to detected system malfunction “MODE 3”: Open loop due to driving conditions (power enrichment, deceleration enrichment) “MODE 4”: Closed loop - using oxygen sensor(s) as feedback for fuel control “MODE 5”: Open loop - has not yet satisfied condition to go to closed loop
CAL/LD VALUE [%]	● The calculated load value at the moment a malfunction is detected is displayed.
COOLANT TEMP [°C] or [°F]	● The engine coolant temperature at the moment a malfunction is detected is displayed.
S-FUEL TRIM-B1 [%]	● “Short-term fuel trim” at the moment a malfunction is detected is displayed. ● The short-term fuel trim indicates dynamic or instantaneous feedback compensation to the base fuel schedule.
L-FUEL TRIM-B1 [%]	● “Long-term fuel trim” at the moment a malfunction is detected is displayed. ● The long-term fuel trim indicates much more gradual feedback compensation to the base fuel schedule than short-term fuel trim.
ENGINE SPEED [rpm]	● The engine speed at the moment a malfunction is detected is displayed.
VEHICLE SPEED [km/h] or [mph]	● The vehicle speed at the moment a malfunction is detected is displayed.
INT MANI PRES [kPa]	● The intake manifold absolute pressure at the moment a malfunction is detected is displayed.
ABSOL TH-P/S [%]	● The throttle valve opening angle at the moment a malfunction is detected is displayed.
B/FUEL SCHDL [msec]	● The base fuel schedule at the moment a malfunction is detected is displayed.
INT/A TEMP SE [°C] or [°F]	● The intake air temperature at the moment a malfunction is detected is displayed.

*1: The items are the same as those of 1st trip freeze frame data.

DATA MONITOR MODE

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
ENG SPEED [rpm]	×	×	● Indicates the engine speed computed from the POS signal of the crankshaft position sensor.	
MAS A/F SE-B1 [V]	×	×	● The signal voltage of the mass air flow sensor is displayed.	● When the engine is stopped, a certain value is indicated.
B/FUEL SCHDL [msec]		×	● “Base fuel schedule” indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.	
A/F ALPHA-B1 [%]		×	● The mean value of the air-fuel ratio feedback correction factor per cycle is indicated.	● When the engine is stopped, a certain value is indicated. ● This data also includes the data for the air-fuel ratio learning control.
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.	
HO2S2 (B1) [V]	×	×	● The signal voltage of the heated oxygen sensor 2 is displayed.	
HO2S2 MNTR (B1) [RICH/LEAN]	×		● Display of heated oxygen sensor 2 signal: RICH ... means the amount of oxygen after TWC (Manifold three way catalyst) is relatively small. LEAN ... means the amount of oxygen after TWC (Manifold three way catalyst) is relatively large.	● When the engine is stopped, a certain value is indicated.
VHCL SPEED SE [km/h] or [mph]	×	×	● The vehicle speed computed from the vehicle speed sensor signal is displayed.	
BATTERY VOLT [V]	×	×	● The power supply voltage of ECM is displayed.	
THRTL POS SEN [V]	×	×	● The throttle position sensor signal voltage is displayed.	
FUEL T/TMP SE [°C] or [°F]			● The fuel temperature judged from the tank fuel temperature sensor signal voltage is displayed.	
INT/A TEMP SE [°C] or [°F]	×	×	● The intake air temperature determined by the signal voltage of the intake air temperature sensor is indicated.	
EGR TEMP SEN [V]	×	×	● The signal voltage of the EGR temperature sensor is displayed.	
EVAP SYS PRES [V]	×		● The signal voltage of EVAP control system pressure sensor is displayed.	
ABSOL PRES/SE [V]	×		● The signal voltage of the BARO sensor is displayed.	
FUEL LEVEL SE [V]	×		● The signal voltage of the fuel level sensor is displayed.	
START SIGNAL [ON/OFF]	×	×	● Indicates [ON/OFF] condition from the starter signal.	● After starting the engine, [OFF] is displayed regardless of the starter signal.

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
CLSD THL POS [ON/OFF]	×	×	● Indicates idle position [ON/OFF] computed by ECM according to the throttle position sensor signal.	
AIR COND SIG [ON/OFF]	×	×	● Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioner signal.	
P/N POSI SW [ON/OFF]	×	×	● Indicates [ON/OFF] condition from the park/neutral position (PNP) switch signal.	
PW/ST SIGNAL [ON/OFF]	×	×	● [ON/OFF] condition of the power steering oil pressure switch determined by the power steering oil pressure signal is indicated.	
LOAD SIGNAL [ON/OFF]	×	×	● Indicates [ON/OFF] condition from the electrical load signal and/or lighting switch. ON ... rear defogger is operating and/or lighting switch is on. OFF ... rear defogger is not operating and lighting switch is not on.	
IGNITION SW [ON/OFF]	×		● Indicates [ON/OFF] condition from ignition switch.	
INJ PULSE-B1 [msec]		×	● Indicates the actual fuel injection pulse width compensated by ECM according to the input signals.	● When the engine is stopped, a certain computed value is indicated.
IGN TIMING [BTDC]		×	● Indicates the ignition timing computed by ECM according to the input signals.	● When the engine is stopped, a certain value is indicated.
CAL/LD VALUE [%]			● “Calculated load value” indicates the value of the current airflow divided by peak airflow.	
ABSOL TH·P/S [degree]			● “Absolute throttle position sensor” indicates the throttle valve opening angle computed by ECM according to the signal voltage of the throttle position sensor.	
MASS AIRFLOW [g·m/s]			● Indicates the mass airflow computed by ECM according to the signal voltage of the mass airflow sensor.	
IACV-AAC/V [step]		×	● Indicates the IACV-AAC valve control value computed by ECM according to the input signals.	
PURG VOL C/V [%]			● Indicates the EVAP canister purge volume control solenoid valve control value computed by the ECM according to the input signals. ● The opening becomes larger as the value increases.	
EGR VOL CON/V [step]		×	● Indicates the EGR volume control value computed by the ECM according to the input signals. ● The opening becomes larger as the value increases.	

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
SWRL C/V (B1)[step]			● Indicates the swirl control valve control value computed by the ECM according to the input signals. ● The opening becomes larger as the value increases.	
INT/V SOL-B1 [ON/OFF]			● The control condition of the intake valve timing control solenoid valve is indicated. ON ... Intake valve timing control solenoid is operating. OFF ... Intake valve timing control solenoid is not operating.	
AIR COND RLY [ON/OFF]		×	● The air conditioner relay control condition (determined by ECM according to the input signal) is indicated.	
FUEL PUMP RLY [ON/OFF]		×	● Indicates the fuel pump relay control condition determined by ECM according to the input signals.	
VC/V BYPASS/V [ON/OFF]			● The control condition of the vacuum cut valve bypass valve (determined by ECM according to the input signal) is indicated. ● ON ... Open OFF ... Closed	
VENT CONT/V [ON/OFF]			● The control condition of the EVAP canister vent control valve (determined by ECM according to the input signal) is indicated. ● ON ... Closed OFF ... Open	
COOLING FAN [ON/OFF]		×	● Indicates the control condition of the cooling fan (determined by ECM according to the input signal). HIGH ... High speed operation LOW ... Low speed operation 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.	
IDL A/V LEAN			● Display the condition of idle air volume learning YET ... Idle air volume learning has not been performed yet. CMPLT ... Idle air volume learning has already been performed successfully. INCMP ... Idle air volume learning has not been performed successfully.	
TRVL AFTER MIL [km] or [Mile]			● Distance traveled while MIL is activated	
MAP SENSOR [V]			● The signal voltage of MAP sensor is displayed.	
HO2S3 (B1) [V]	×		● The signal voltage of the heated oxygen sensor 3 is displayed.	

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
A/F S1 HTR (B1) [%]			● Indicates A/F sensor 1 heater control value computed by ECM according to the input signal. ● The current flow to the heater becomes larger as the value increases.	
HO2S3 HTR (B1) [ON/OFF]			● Indicates [ON/OFF] condition of heated oxygen sensor 3 heater determined by ECM according to the input signals.	
SWL/C POSI SE [degree]	×		● Indicates the swirl control value opening angle computed by ECM according to signal voltage of the swirl control valve position sensor.	
Voltage [V]			● Voltage measured by the voltage probe.	
Frequency [msec] or [Hz] or [%]			● Pulse width, frequency or duty cycle measured by the pulse probe.	● Only “#” is displayed if item is unable to be measured. ● Figures with “#”s are temporary ones. They are the same figures as an actual piece of data which was just previously measured.

NOTE:
- Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.

DATA MONITOR (SPEC) MODE

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
ENG SPEED [rpm]	×	×	● Indicates the engine speed computed from the POS signal of the crankshaft position sensor.	
MAS A/F SE-B1 [V]	×	×	● The signal voltage of the mass air flow sensor specification is displayed.	● When engine is running, specification range is indicated.
B/FUEL SCHDL [msec]		×	● “Base fuel schedule” indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.	● When engine is running, specification range is indicated.
A/F ALPHA-B1 [%]		×	● The mean value of the air-fuel ratio feedback correction factor per cycle is indicated.	● When engine is running, specification range is indicated. ● This data also includes the data for the air-fuel ratio learning control.

ACTIVE TEST MODE

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
FUEL INJECTION	● Engine: Return to the original trouble condition ● Change the amount of fuel injection using CONSULT-II.	If trouble symptom disappears, see CHECK ITEM.	● Harness and connector ● Fuel injectors ● A/F sensor 1
IGNITION TIMING	● Engine: Return to the original trouble condition ● Timing light: Set ● Retard the ignition timing using CONSULT-II.	If trouble symptom disappears, see CHECK ITEM.	● “Idle Air Volume Learning” (Refer toEC-622 .) ● Crankshaft position sensor (POS) ● Crankshaft position sensor (PHASE) ● Engine component parts and installing conditions
IACV-AAC/V OPENING	● Engine: After warming up, idle the engine. ● Change the IACV-AAC valve opening percent using CONSULT-II.	Engine speed changes according to the opening percent.	● Harness and connector ● IACV-AAC valve
POWER BALANCE	● Engine: After warming up, idle the engine. ● A/C switch “OFF” ● Shift lever “N” ● Cut off each injector signal one at a time using CONSULT-II.	Engine runs rough or dies.	● Harness and connector ● Compression ● Injectors ● Power transistor ● Spark plugs ● Ignition coils
COOLING FAN	● Ignition switch: ON ● Turn the cooling fan “ON” and “OFF” using CONSULT-II.	Cooling fan moves and stops.	● Harness and connector ● Cooling fan motor ● Cooling fan relay
ENG COOLANT TEMP	● Engine: Return to the original trouble condition ● Change the engine coolant temperature using CONSULT-II.	If trouble symptom disappears, see CHECK ITEM.	● Harness and connector ● Engine coolant temperature sensor ● Fuel injectors
FUEL PUMP RELAY	● Ignition switch: ON (Engine stopped) ● Turn the fuel pump relay “ON” and “OFF” using CONSULT-II and listen to operating sound.	Fuel pump relay makes the operating sound.	● Harness and connector ● Fuel pump relay

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
EGR VOL CONT/V	● Ignition switch: ON (Engine stopped) ● Change EGR volume control valve opening step using CONSULT-II.	EGR volume control valve makes an operating sound.	● Harness and connector ● EGR volume control valve
VALVE TIMING SOL	● Ignition switch: ON (Engine stopped) ● Turn solenoid valve “ON” and “OFF” with CONSULT-II and listen for operating sound	Solenoid valve makes an operating sound.	● Harness and connector ● Solenoid valve
PURG VOL CONT/V	● Engine: After warming up, run engine at 1,500 rpm. ● Change the EVAP canister purge volume control solenoid valve opening percent using CONSULT-II.	Engine speed changes according to the opening percent.	● Harness and connector ● Solenoid valve
FUEL/T TEMP SEN	● Change the fuel tank temperature using CONSULT-II.		
VENT CONTROL/V	● Ignition switch: ON (Engine stopped) ● Turn solenoid valve “ON” and “OFF” with the CONSULT-II and listen to operating sound.	Solenoid valve makes an operating sound.	● Harness and connector ● Solenoid valve
VC/V BYPASS/V	● Ignition switch: ON (Engine stopped) ● Turn solenoid valve “ON” and “OFF” with the CONSULT-II and listen to operating sound.	Solenoid valve makes an operating sound.	● Harness and connector ● Solenoid valve
SWIRL CONTROL VALVE	● Ignition switch: ON (Engine stopped) ● Change swirl control valve opening step using CONSULT-II.	Swirl control valve makes an operating sound.	● Harness and connector ● Swirl control valve

DTC & SRT CONFIRMATION MODE

SRT STATUS Mode

For details, refer to EC-630, "SYSTEM READINESS TEST (SRT) CODE" .

SRT Work Support Mode

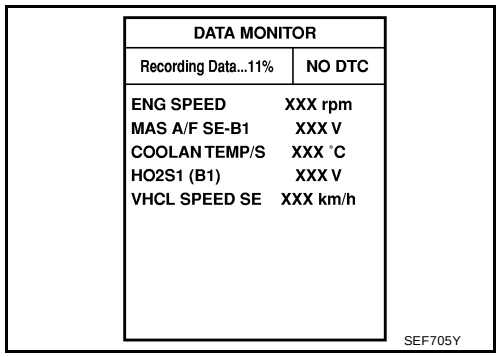
This mode enables a technician to drive a vehicle to set the SRT while monitoring the SRT status.

DTC Work Support Mode

Test mode	Test item	Condition	Reference page
EVAPORATIVE SYSTEM	EVAP SML LEAK P0442/P1442	Refer to corresponding trouble diagnosis for DTC.	EC-908
	PURG VOL CN/V P1444		EC-1121
	PURGE FLOW P0441		EC-897
	VC CUT/V BP/V P1491		EC-1152
A/F SEN1	A/F SEN1 (B1) P1273		EC-1085
	A/F SEN1 (B1) P1274		EC-1091
	A/F SEN1 (B1) P1278		EC-1102
	A/F SEN1 (B1) P1279		EC-1102
	A/F SEN1 (B1) P1276		EC-1097
HO2S2	HO2S2 (B1) P1146		EC-1031
	HO2S2 (B1) P1147		EC-1038
	HO2S2 (B1) P0139		EC-782
HO2S3	HO2S3 (B1) P1169		EC-1046
	HO2S3 (B1) P1170		EC-1053
	HO2S3 (B1) P0145		EC-795
EGR SYSTEM	EGR SYSTEM P0400		EC-866
	EGR SYSTEM P1402		EC-1110

REAL TIME DIAGNOSIS IN DATA MONITOR MODE (RECORDING VEHICLE DATA)

CONSULT-II has two kinds of triggers and they can be selected by touching “SETTING” in “DATA MONITOR” mode.

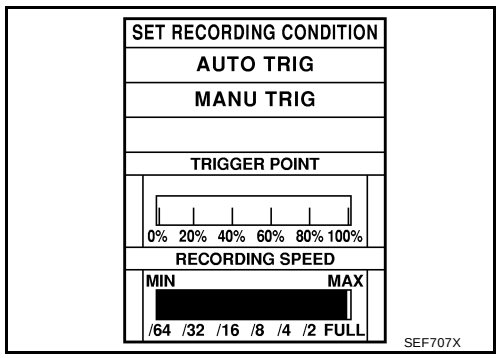


1. “AUTO TRIG” (Automatic trigger):

- The malfunction will be identified on the CONSULT-II screen in real time.
  In other words, DTC/1st trip DTC and malfunction item will be displayed if the malfunction is detected by ECM.
  At the moment a malfunction is detected by ECM, “MONITOR” in “DATA MONITOR” screen is changed to “Recording Data ... xx%” as shown at left, and the data after the malfunction detection is recorded. Then when the percentage reached 100%, “REAL-TIME DIAG” screen is displayed. If “STOP” is touched on the screen during “ Recording Data ... xx%”, “REAL-TIME DIAG” screen is also displayed.
  The recording time after the malfunction detection and the recording speed can be changed by “TRIGGER POINT” and “Recording Speed”. Refer to CONSULT-II OPERATION MANUAL.

2. “MANU TRIG” (Manual trigger):

- DTC/1st trip DTC and malfunction item will not be displayed automatically on CONSULT-II screen even though a malfunction is detected by ECM.
  DATA MONITOR can be performed continuously even though a malfunction is detected.



Use these triggers as follows:

1. “AUTO TRIG”

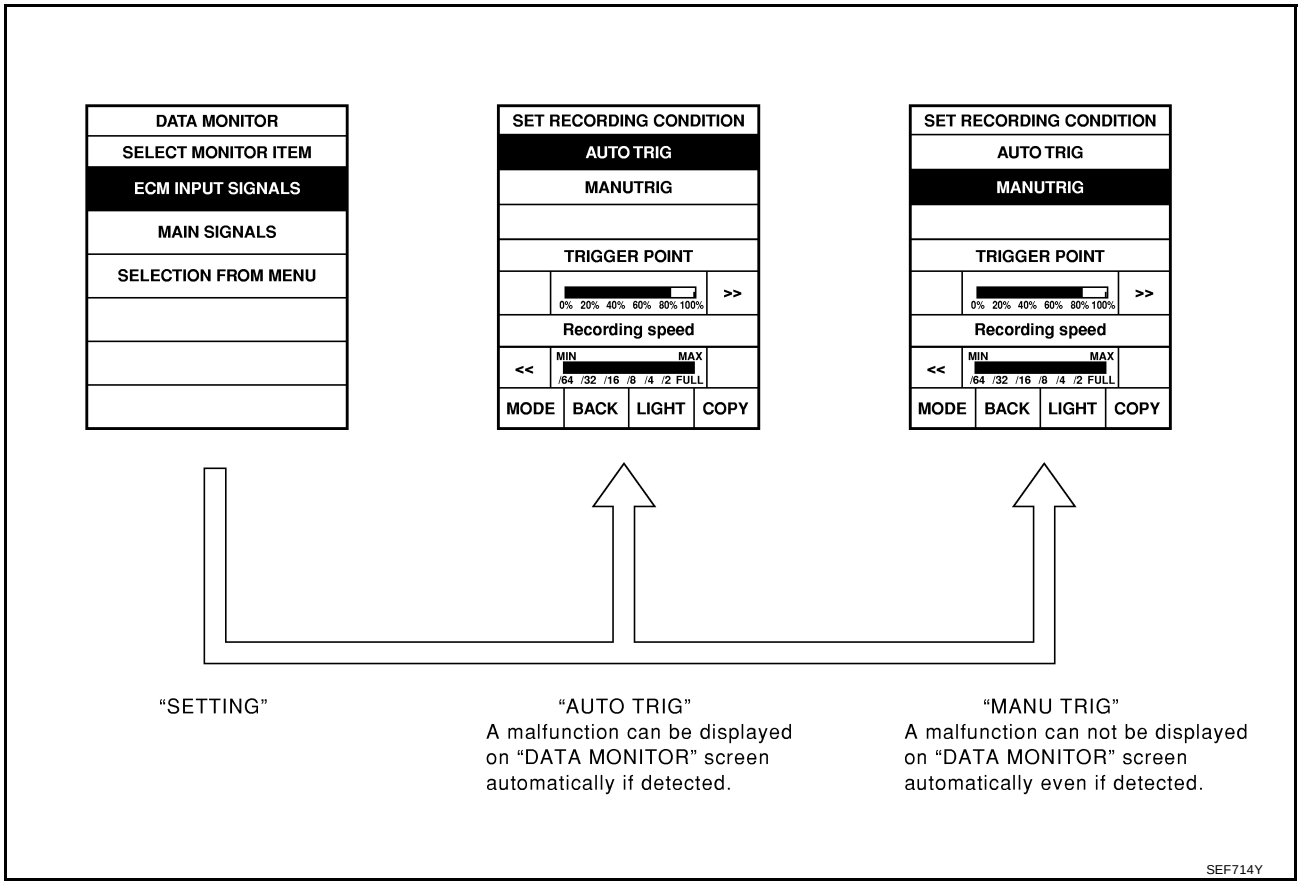
- While trying to detect the DTC/1st trip DTC by performing the “DTC Confirmation Procedure”, be sure to select to “DATA MONITOR (AUTO TRIG)” mode. You can confirm the malfunction at the moment it is detected.

- While narrowing down the possible causes, CONSULT-II should be set in “DATA MONITOR (AUTO TRIG)” mode, especially in case the incident is intermittent.
  When you are inspecting the circuit by gently shaking (or twisting) the suspicious connectors, components and harness in the “DTC Confirmation Procedure”, the moment a malfunction is found the DTC/1st trip

DTC will be displayed. (Refer to GI-26, "How to Perform Efficient Diagnosis for an Electrical Incident" , “Incident Simulation Tests”.)

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.

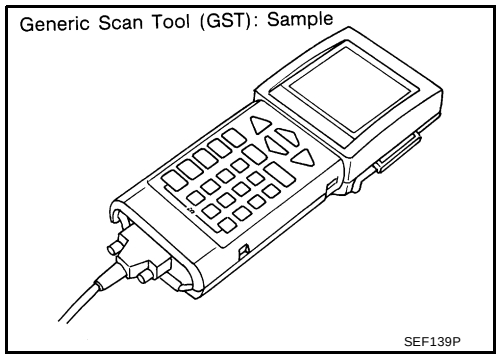


Generic Scan Tool (GST)

UBS001RH

DESCRIPTION

Generic Scan Tool (OBDII scan tool) complying with SAE J1978 has 8 different functions explained on the next page.
ISO9141 is used as the protocol.
The name “GST” or “Generic Scan Tool” is used in this service manual.

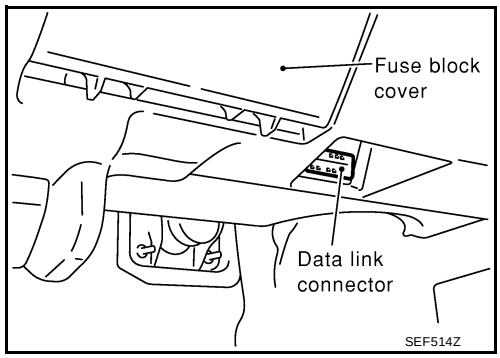


FUNCTION

Diagnostic test mode		Function
MODE 1	READINESS TESTS	This mode gains access to current emission-related data values, including analog inputs and outputs, digital inputs and outputs, and system status information.
MODE 2	(FREEZE DATA)	This mode gains access to emission-related data value which were stored by ECM during the freeze frame. [For details, refer to “Freeze Frame Data” EC-629).]
MODE 3	DTCs	This mode gains access to emission-related power train trouble codes which were stored by ECM.
MODE 4	CLEAR DIAG INFO	This mode can clear all emission-related diagnostic information. This includes: ● Clear number of diagnostic trouble codes (MODE 1) ● Clear diagnostic trouble codes (MODE 3) ● Clear trouble code for freeze frame data (MODE 1) ● Clear freeze frame data (MODE 2) ● Reset status of system monitoring test (MODE 1) ● Clear on board monitoring test results (MODE 6 and 7)
MODE 6	(ON BOARD TESTS)	This mode accesses the results of on board diagnostic monitoring tests of specific components/systems that are not continuously monitored.
MODE 7	(ON BOARD TESTS)	This mode enables the off board test drive to obtain test results for emission-related powertrain components/systems that are continuously monitored during normal driving conditions.
MODE 8	—	This mode can close EVAP system in ignition switch “ON” position (Engine stopped). When this mode is performed, following parts can be opened or closed. ● EVAP canister vent control valve open ● Vacuum cut valve bypass valve closed In the following conditions, this mode cannot function. ● Low ambient temperature ● Low battery voltage ● Engine running ● Ignition switch “OFF” ● Low fuel temperature ● Too much pressure is applied to EVAP system
MODE 9	(CALIBRATION ID)	This mode enables the off-board test device to request specific vehicle information such as Vehicle Identification Number (VIN) and Calibration IDs.

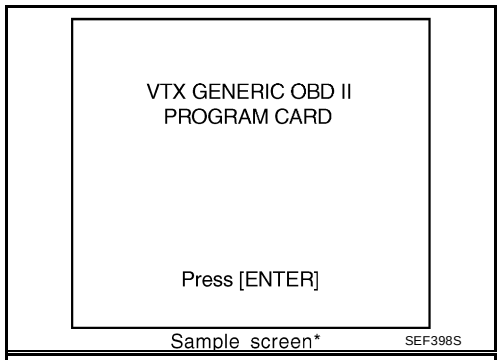
GST INSPECTION PROCEDURE

1. Turn ignition switch OFF.
2. Connect GST to data link connector for GST which is located under LH dash panel near the fuse box cover.



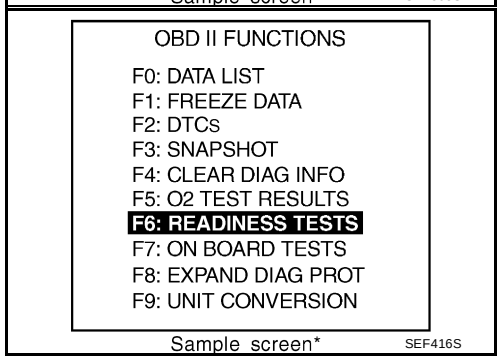
3. Turn ignition switch ON.
4. Enter the program according to instruction on the screen or in the operation manual.

(*: Regarding GST screens in this section, sample screens are shown.)



5. Perform each diagnostic mode according to each service procedure.

For further information, see the GST Operation Manual of the tool maker.



CONSULT-II Reference Value in Data Monitor Mode

UBS001RI

Remarks:
- Specification data are reference values.
- Specification data are output/input values which are detected or supplied by the ECM at the connector.
  * Specification data may not be directly related to their components signals/values/operations.
  (i.e., Adjust ignition timing with a timing light before monitoring IGN TIMING. Specification data might be displayed even when ignition timing is not adjusted to specification. This IGN TIMING monitors the data calculated by the ECM according to the input signals from the camshaft position sensor and other ignition timing related sensors.)
- If the real-time diagnosis results are NG, and the on board diagnostic system results are OK, when diagnosing the mass air flow sensor, first check to see if the fuel pump control circuit is normal.

MONITOR ITEM	CONDITION		SPECIFICATION
ENG SPEED	• Tachometer: Connect • Run engine and compare tachometer indication with the CONSULT-II value.		Almost the same speed as the CONSULT-II value.
MAS A/F SE-B1	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: “N” • No-load	Idle	1.0 - 1.7V
		2,500 rpm	1.5 - 2.4V
B/FUEL SCHDL	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: “N” • No-load	Idle	1.0 - 1.6 msec
		2,000 rpm	0.7 - 1.3 msec

MONITOR ITEM	CONDITION		SPECIFICATION
A/F ALPHA-B1	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	53 - 155%
COOLAN TEMP/S	● Engine: After warming up		More than 70°C (158°F)
A/F SEN1 (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 1.5V
HO2S2 (B1)	● Engine: After warming up	Revving engine from idle to 3,000 rpm quickly	0 - 0.3V ←→ 0.6 - 1.0V
HO2S2 MNTR (B1)	● Engine: After warming up	Revving engine from idle to 3,000 rpm quickly	LEAN ←→ RICH
VHCL SPEED SE	● Turn drive wheels and compare speedometer indication with the CONSULT-II value		Almost the same speed as the CONSULT-II value
BATTERY VOLT	● Ignition switch: ON (Engine stopped)		11 - 14V
THRTL POS SEN	● Engine: After warming up, idle the engine	Throttle valve: fully closed	0.15 - 0.85V
	● Engine: After warming up ● Ignition switch: ON (Engine stopped) ● Vacuum is applied using a vacuum pump	Throttle valve: fully opened	3.5 - 4.7V
FUEL T/TMP SE	● Engine: After warming up		Less than 60°C (140°F)
EGR TEMP SEN	● Engine: After warming up		Less than 4.5V
EVAP SYS PRES	● Ignition switch: ON		Approx. 1.8 - 4.8V
ABSOL PRES/SE	● Ignition switch: ON		Approx. 4.4V
FUEL LEVEL SE	● Ignition switch: ON		Approx. 0 - 2.5V
START SIGNAL	● Ignition switch: ON → START → ON		OFF → ON → OFF
CLSD THL POS	● Engine: After warming up ● Ignition switch: ON (Engine stopped) ● Vacuum is applied using a vacuum pump	Throttle valve: Idle position	ON
		Throttle valve: Slightly open	OFF
AIR COND SIG	● Engine: After warming up, idle the engine	A/C switch “OFF”	OFF
		A/C switch “ON” (Compressor operates)	ON
P/N POSI SW	● Ignition switch: ON	Shift lever “P” or “N”	ON
		Except above	OFF
PW/ST SIGNAL	● Engine: After warming up, idle the engine	Steering wheel in neutral position (forward direction)	OFF
		The steering wheel is turned	ON
LOAD SIGNAL	● Ignition switch: ON	Rear window defogger or headlamp is “ON”	ON
		Rear window defogger and headlamp is “OFF”	OFF
IGNITION SW	● Ignition switch: ON → OFF		ON → OFF
INJ PULSE-B1	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: “N” ● No-load	Idle	2.4 - 3.2 msec
		2,000 rpm	1.9 - 3.2 msec

MONITOR ITEM	CONDITION		SPECIFICATION
IGN TIMING	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: “N” ● No-load	Idle	9°±2° BTDC
		2,000 rpm	More than 25° BTDC
CAL/LD VALUE	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: “N” ● No-load	Idle	20.0 - 35.5%
		2,500 rpm	12.0 - 30.0%
ABSOL TH·P/S	● Engine: After warming up, idle the engine	Throttle valve: fully closed	0.0%
	● Engine: After warming up ● Ignition switch: ON (Engine stopped)	Throttle valve: fully opened	Approx. 80.0%
MASS AIRFLOW	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: N ● No-load	Idle	1.4 - 4.0 g·m/s
		2,500 rpm	5.0 - 10.0 g·m/s
IACV-AAC/V	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: “N” ● No-load	Idle	5 - 20 steps
		2,000 rpm	—
PURG VOL C/V	● Engine: After warming up ● Air conditioner switch: “OFF” ● Shift lever: “N” ● No-load	Idle	0%
		2,000 rpm	—
EGR VOL CON/V	● Engine: After warming up ● Air conditioner switch: “OFF” ● Shift lever: “N” ● No-load	Idle	0 step
		Engine speed: Revving from idle up to 3,000 rpm quickly	10 - 55 step
SWL C/V (B1)	● Engine: Idle the engine	Engine coolant temperature is below 44°C (111°F)	0 - 5 step
		Engine coolant temperature is above 45°C (113°F)	115 - 120 step
INT/V SOL-B1	● Engine is running ● Engine speed is more than 2,000 rpm ● Quickly depressed accelerator pedal. ● Vehicle speed is more than 4 km/h (2 MPH)		OFF → ON
AIR COND RLY	● Air conditioner switch: OFF → ON		OFF → ON
FUEL PUMP RLY	● Ignition switch is turned to ON (Operates for 5 seconds) ● Engine running and cranking ● When engine is stopped (stops in 1.0 seconds)		ON
	● Except as shown above		OFF
VC/V BYPASS/V	● Ignition switch: ON		OFF
VENT CONT/V	● Ignition switch: ON		OFF

MONITOR ITEM	CONDITION		SPECIFICATION
COOLING FAN	● After warming up engine, idle the engine. ● Air conditioner switch: OFF	Engine coolant temperature is 94°C (201°F) or less	OFF
		Engine coolant temperature is between 95°C (203°F) and 104°C (219°F)	LOW
		Engine coolant temperature is 105°C (221°F) or more	HIGH
HO2S2 HTR (B1) HO2S3 HTR (B1)	● Ignition switch: ON (Engine stopped) ● Engine speed: Above 3,600 rpm		OFF
	● Engine speed: Below 3,600 rpm [After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more]		ON
TRVL AFTER MIL	● Ignition switch: ON	MIL is not illuminated	0 km (0 mile)
		MIL is illuminated	0 km (0 mile) or more
MAP SENSOR	● Engine: After warming up, idle the engine		Approx. 1.3V
HO2S3 (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	Approx. 0 - 1.0V
A/F S1 HTR (B1)	● Engine: After warming up, idle the engine		0 - 100%
SWL/C POSI SE	● Engine: Idle the engine	Engine coolant temperature is below 44°C (111°F)	Approx. 0 deg.
		Engine coolant temperature is above 45°C (113°F)	Approx. 80 deg.

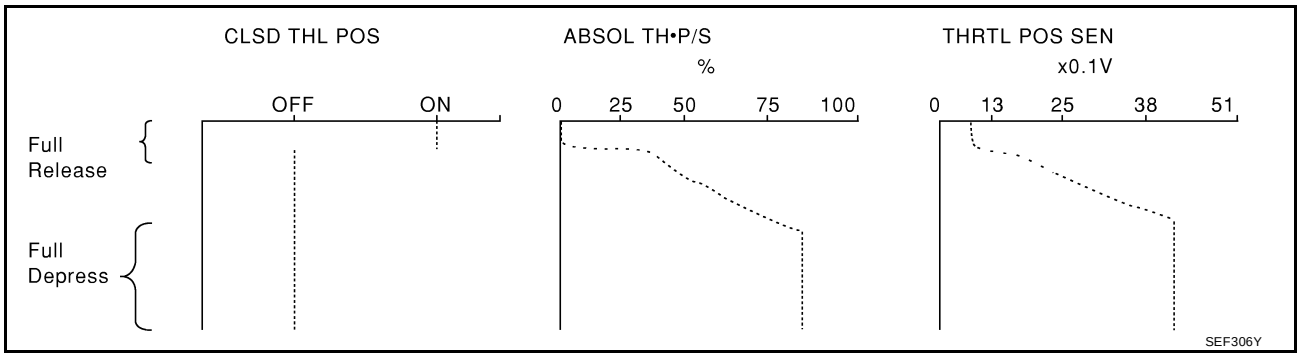
Major Sensor Reference Graph in Data Monitor Mode

UBS001RJ

The following are the major sensor reference graphs in “DATA MONITOR” mode.

THRTL POS SEN, ABSOL TH·P/S, CLSD THL POS

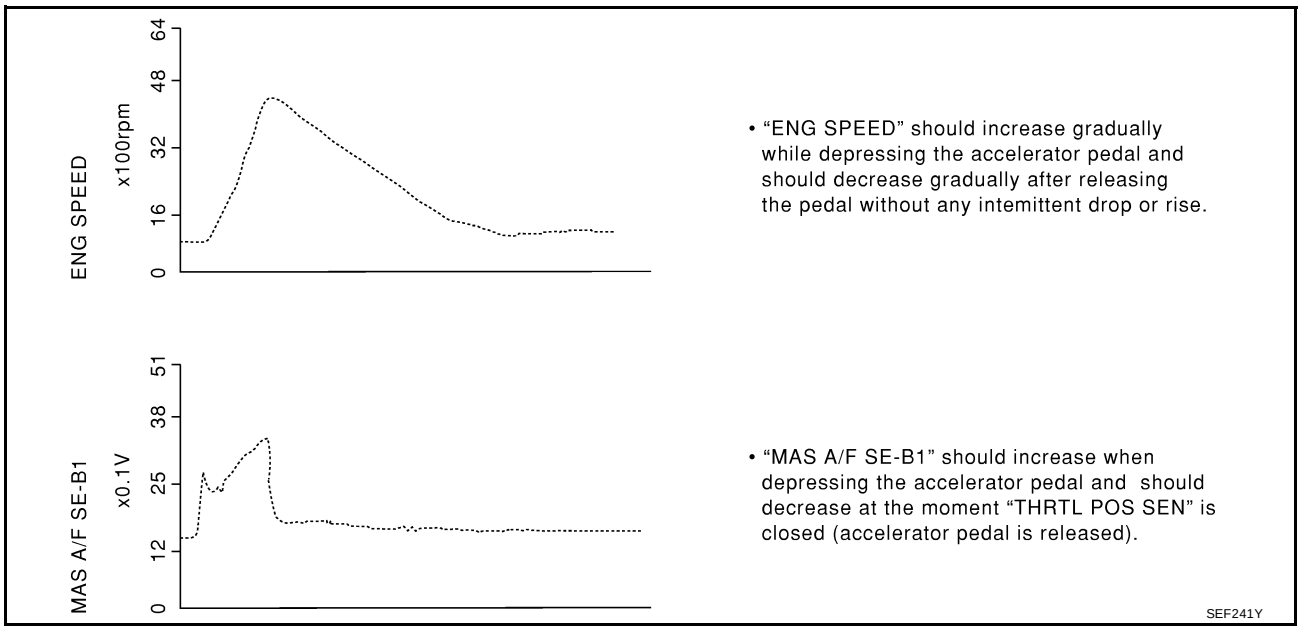
Below is the data for “THRTL POS SEN”, “ABSOL TH·P/S” and “CLSD THL POS” when depressing the accelerator pedal with the ignition switch “ON”.
The signal of “THRTL POS SEN” and “ABSOL TH·P/S” should rise gradually without any intermittent drop or rise after “CLSD THL POS” is changed from “ON” to “OFF”.



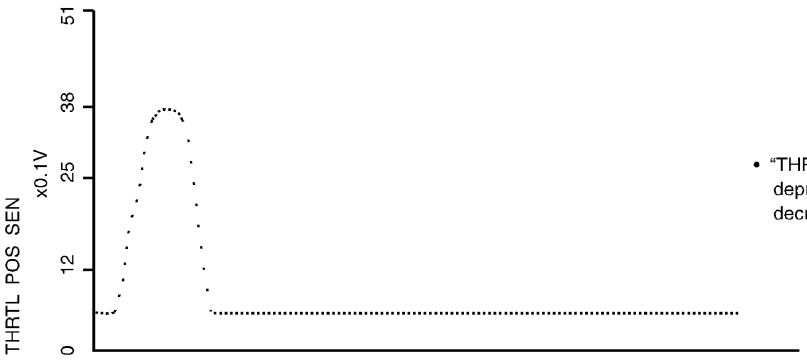
ENG SPEED, MAS A/F SE-B1, THRTL POS SEN, HO2S2 (B1), INJ PULSE-B1

Below is the data for “ENG SPEED”, “MAS A/F SE-B1”, “THRTL POS SEN”, “HO2S2 (B1/B2)” and “INJ PULSE” when revving engine quickly up to 4,800 rpm under no load after warming up engine to normal operating temperature.

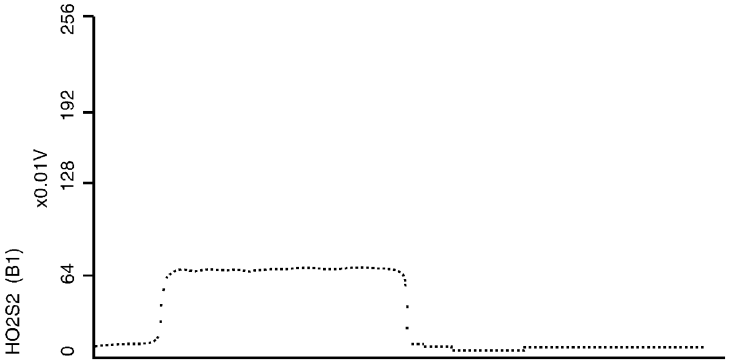
Each value is for reference, the exact value may vary.



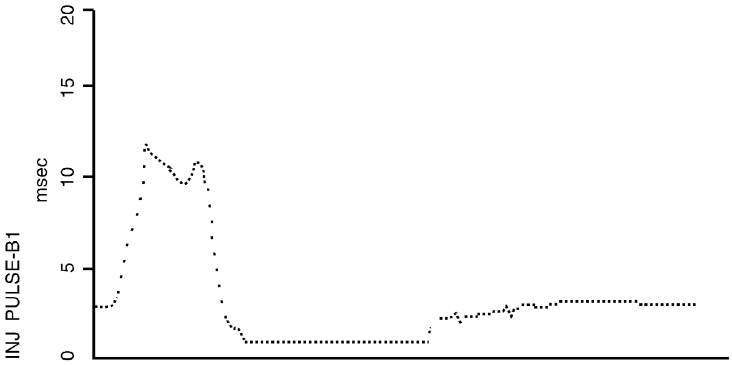
- "ENG SPEED" should increase gradually while depressing the accelerator pedal and should decrease gradually after releasing the pedal without any intemittent drop or rise.
- "MAS A/F SE-B1" should increase when depressing the accelerator pedal and should decrease at the moment "THRTL POS SEN" is closed (accelerator pedal is released).



- "THRTL POS SEN" should increase while depressing the accelerator pedal and should decrease while releasing it.



- "HO2S2 (B1)" may increase immediately after depressing the accelerator pedal and may decrease after releasing the pedal.



- "INJ PULSE-B1" should increase when depressing the accelerator pedal and should decrease when the pedal is released.

SEF600Z

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

PFP:00031

Description

UBS001RK

The specification (SP) value indicates the tolerance of the value that is displayed in “DATA MONITOR (SPEC)” mode of CONSULT-II during normal operation of the Engine Control System. When the value in “DATA MONITOR (SPEC)” mode is within the SP value, the Engine Control System is confirmed OK. When the value in “DATA MONITOR (SPEC)” mode is NOT within the SP value, the Engine Control System may have one or more malfunctions.
The SP value is used to detect malfunctions that may affect the Engine Control System, but will not light the MIL.
The SP value will be displayed for the following three items:

- B/FUEL SCHDL (The fuel injection pulse width programmed into ECM prior to any learned on board correction)
- A/F ALPHA-B1 (The mean value of air-fuel ratio feedback correction factor per cycle)
- MAS A/F SE-B1 (The signal voltage of the mass air flow sensor)

Testing Condition

UBS001RL

- 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

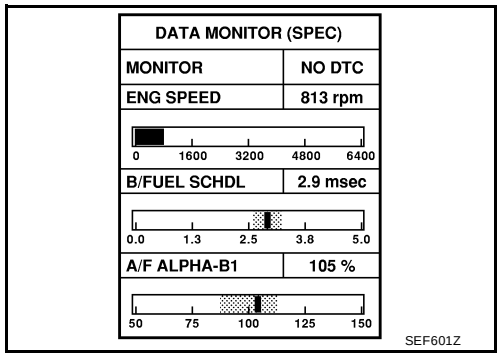
*1: For A/T or CVT models, after the engine is warmed up to normal operating temperature, drive vehicle until “FLUID TEMP SE” (A/T or CVT fluid temperature sensor signal) indicates more than 60°C (140°F). For MT models, drive vehicle for 5 minutes after the engine is warmed up to normal operating temperature.
*2: Rear window defogger switch, air conditioner switch, lighting switch are “OFF”. Cooling fans are not operating. Steering wheel is straight ahead.

Inspection Procedure

UBS001RM

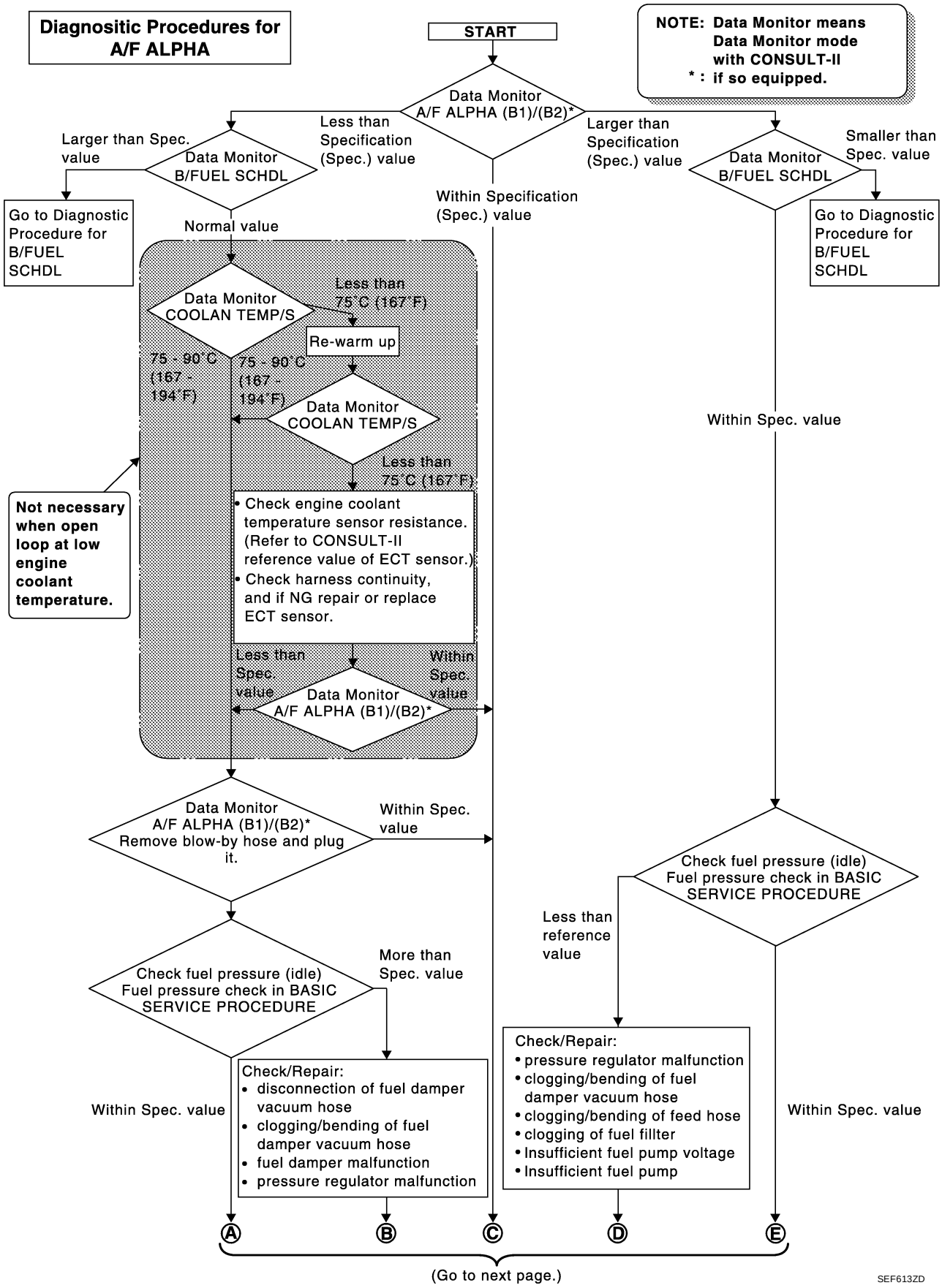
NOTE:
Perform “DATA MONITOR (SPEC)” mode in maximum scale display.

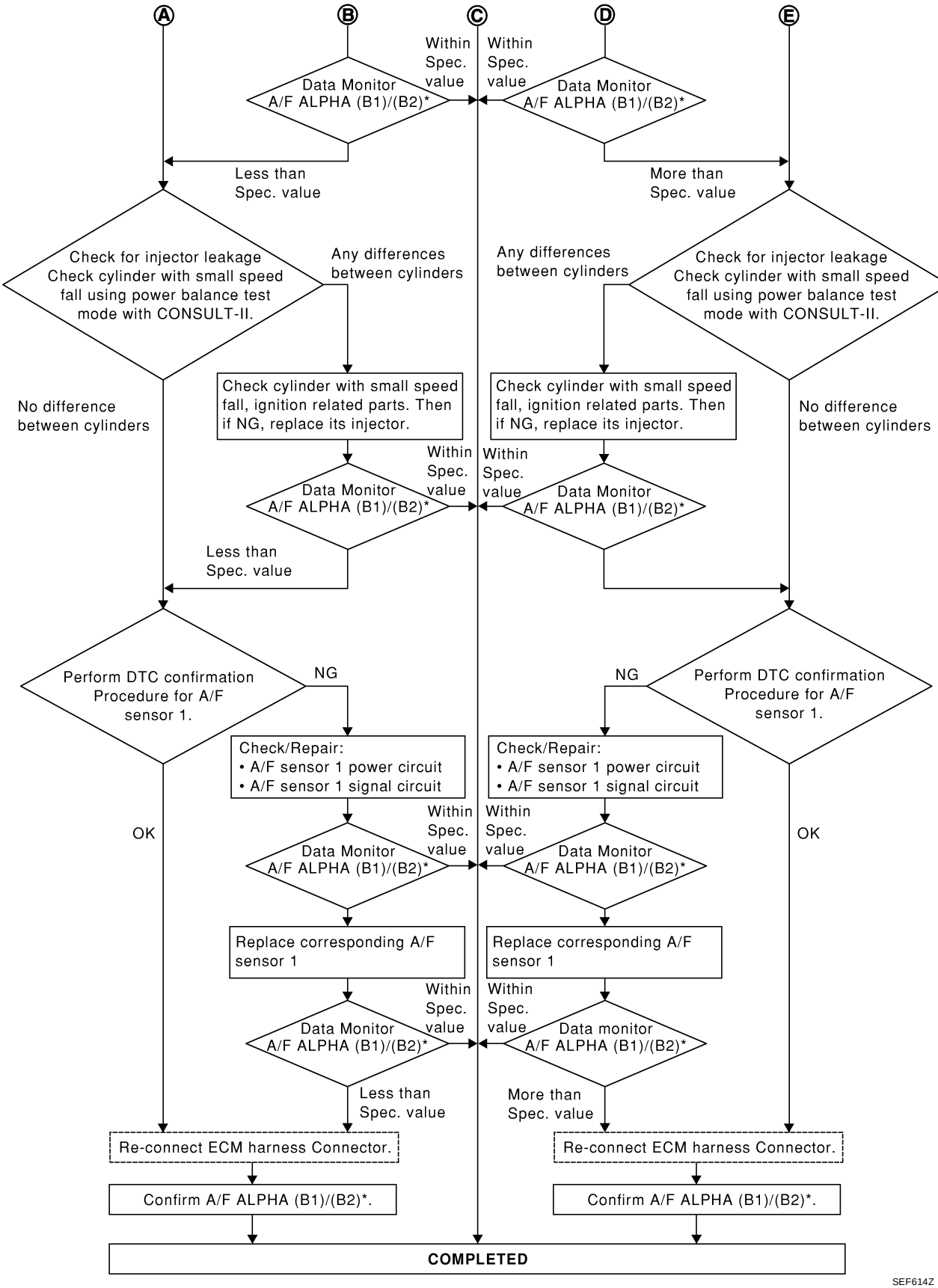
1. Perform EC-652, "Basic Inspection" “.
2. Confirm that the testing conditions indicated above are met.
3. Select “B/FUEL SCHDL”, “A/F ALPHA-B1” and “MAS A/F SE-B1” in “DATA MONITOR (SPEC)” mode with CONSULT-II.
4. Make sure that monitor items are within the SP value.
5. If NG, go to EC-708, "Diagnostic Procedure" .



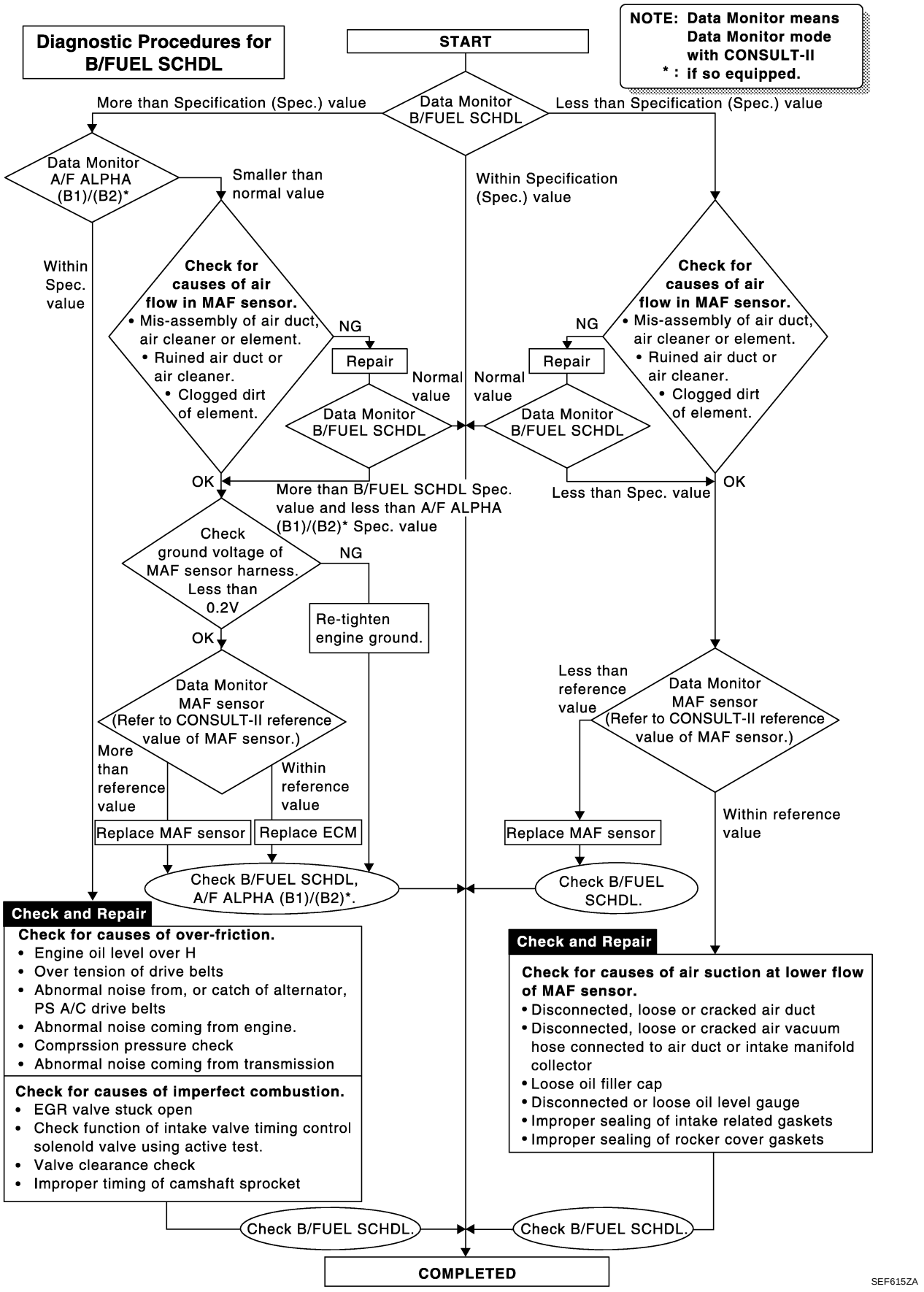
Diagnostic Procedure

UBS001RN




Ⓐ
Ⓑ
Ⓒ
Ⓓ
Ⓔ
Within Spec. value
Within Spec. value
Data Monitor A/F ALPHA (B1)/(B2)*
Data Monitor A/F ALPHA (B1)/(B2)*
Less than Spec. value
More than Spec. value
Check for injector leakage Check cylinder with small speed fall using power balance test mode with CONSULT-II.
Any differences between cylinders
Any differences between cylinders
Check for injector leakage Check cylinder with small speed fall using power balance test mode with CONSULT-II.
No difference between cylinders
Check cylinder with small speed fall, ignition related parts. Then if NG, replace its injector.
Check cylinder with small speed fall, ignition related parts. Then if NG, replace its injector.
No difference between cylinders
Within Spec. value
Within Spec. value
Data Monitor A/F ALPHA (B1)/(B2)*
Data Monitor A/F ALPHA (B1)/(B2)*
Less than Spec. value
Perform DTC confirmation Procedure for A/F sensor 1.
NG
NG
Perform DTC confirmation Procedure for A/F sensor 1.
Check/Repair:
• A/F sensor 1 power circuit
• A/F sensor 1 signal circuit
Check/Repair:
• A/F sensor 1 power circuit
• A/F sensor 1 signal circuit
OK
Within Spec. value
Within Spec. value
OK
Data Monitor A/F ALPHA (B1)/(B2)*
Data Monitor A/F ALPHA (B1)/(B2)*
Replace corresponding A/F sensor 1
Replace corresponding A/F sensor 1
Within Spec. value
Within Spec. value
Data Monitor A/F ALPHA (B1)/(B2)*
Data monitor A/F ALPHA (B1)/(B2)*
Less than Spec. value
More than Spec. value
Re-connect ECM harness Connector.
Re-connect ECM harness Connector.
Confirm A/F ALPHA (B1)/(B2)*.
Confirm A/F ALPHA (B1)/(B2)*.
COMPLETED

SEF614Z


Diagnostic Procedures for B/FUEL SCHDL
START
NOTE: Data Monitor means Data Monitor mode with CONSULT-II
* : if so equipped.
Data Monitor B/FUEL SCHDL
More than Specification (Spec.) value
Less than Specification (Spec.) value
Within Specification (Spec.) value
Data Monitor A/F ALPHA (B1)/(B2)*
Smaller than normal value
Within Spec. value
Check for causes of air flow in MAF sensor.
• Mis-assembly of air duct, air cleaner or element.
• Ruined air duct or air cleaner.
• Clogged dirt of element.
NG
Repair
Normal value
Data Monitor B/FUEL SCHDL
OK
More than B/FUEL SCHDL Spec. value and less than A/F ALPHA (B1)/(B2)* Spec. value
Less than Spec. value
Check ground voltage of MAF sensor harness. Less than 0.2V
Re-tighten engine ground.
Data Monitor MAF sensor (Refer to CONSULT-II reference value of MAF sensor.)
More than reference value
Within reference value
Less than reference value
Replace MAF sensor
Replace ECM
Check B/FUEL SCHDL, A/F ALPHA (B1)/(B2)*.
Check B/FUEL SCHDL.
Check and Repair
Check for causes of over-friction.
• Engine oil level over H
• Over tension of drive belts
• Abnormal noise from, or catch of alternator, PS A/C drive belts
• Abnormal noise coming from engine.
• Comprssion pressure check
• Abnormal noise coming from transmission
Check for causes of imperfect combustion.
• EGR valve stuck open
• Check function of intake valve timing control solenold valve using active test.
• Valve clearance check
• Improper timing of camshaft sprocket
Check and Repair
Check for causes of air suction at lower flow of MAF sensor.
• Disconnected, loose or cracked air duct
• Disconnected, loose or cracked air vacuum hose connected to air duct or intake manifold collector
• Loose oil filler cap
• Disconnected or loose oil level gauge
• Improper sealing of intake related gaskets
• Improper sealing of rocker cover gaskets
Check B/FUEL SCHDL.
Check B/FUEL SCHDL.
COMPLETED
SEF615ZA

TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT

PFP:00006

Description

UBS001RO

Intermittent incidents (I/I) may occur. In many cases, the problem resolves itself (the part or circuit function returns to normal without intervention). It is important to realize that the symptoms described in the customer's complaint often do not recur on DTC (1st trip) visits. Realize also that the most frequent cause of I/I occurrences is poor electrical connections. Because of this, the conditions under which the incident occurred may not be clear. Therefore, circuit checks made as part of the standard diagnostic procedure may not indicate the specific problem area.

COMMON I/I REPORT SITUATIONS

STEP in Work Flow	Situation
II	The CONSULT-II is used. The SELF-DIAG RESULTS screen shows time data other than “0” or “1t”.
III	The symptom described by the customer does not recur.
IV	(1st trip) DTC data does not appear during the DTC CONFIRMATION PROCEDURE.
VI	The TROUBLE DIAGNOSIS for PXXXX does not indicate the problem area.

Diagnostic Procedure

UBS001RP

1. INSPECTION START

Erase (1st trip) DTCs. Refer to EC-637, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .

>> GO TO 2.

2. CHECK GROUND TERMINALS

Check ground terminals for corroding or loose connection. Refer to GI-26, "How to Perform Efficient Diagnosis for an Electrical Incident" , “GROUND INSPECTION”.

OK or NG

OK >> GO TO 3.
NG >> Repair or replace.

3. SEARCH FOR ELECTRICAL INCIDENT

Refer to 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 Check Enlarged Contact Spring of Terminal”.

OK or NG

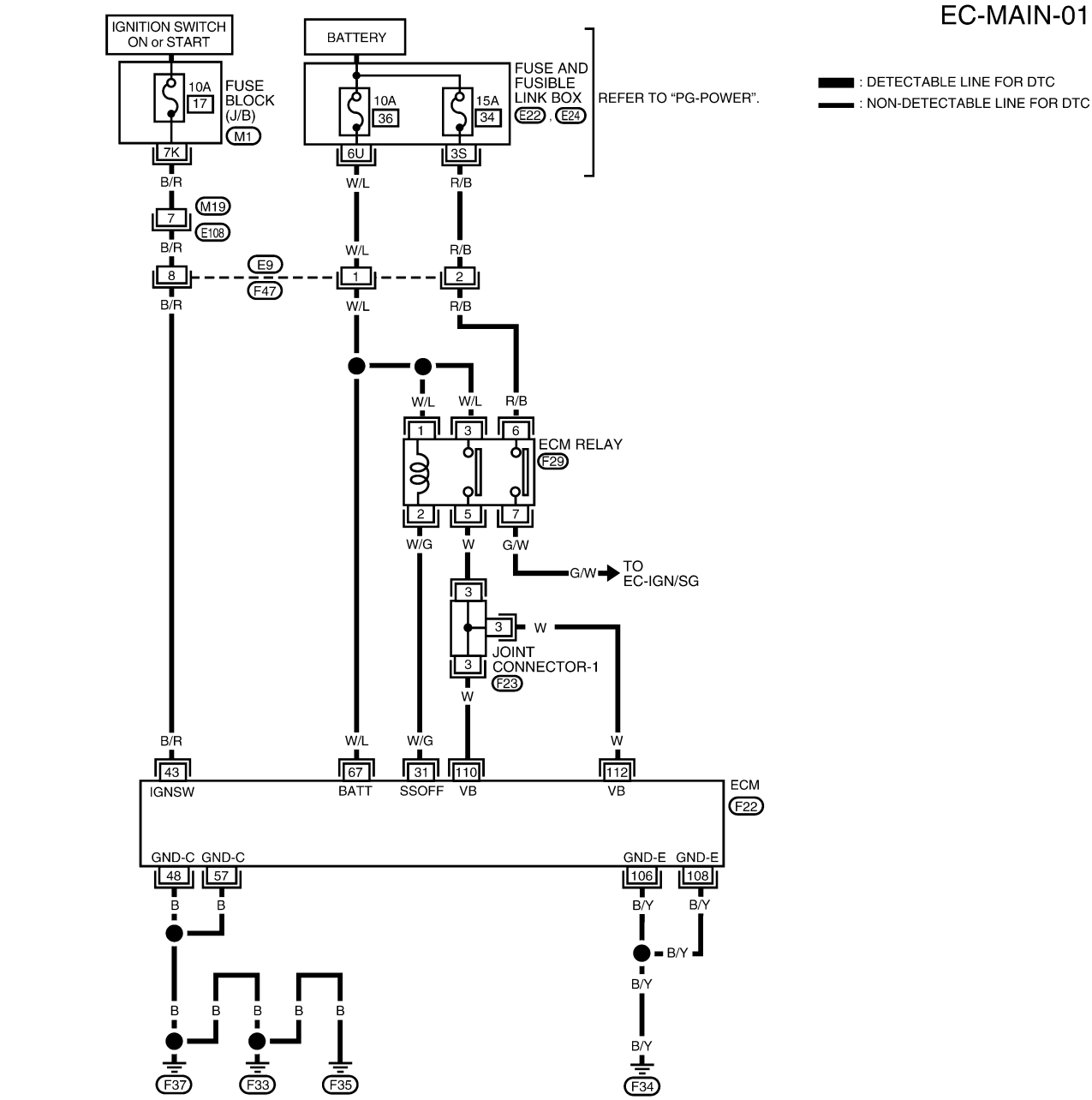
OK >> **INSPECTION END**
NG >> Repair or replace connector.

POWER SUPPLY CIRCUIT FOR ECM

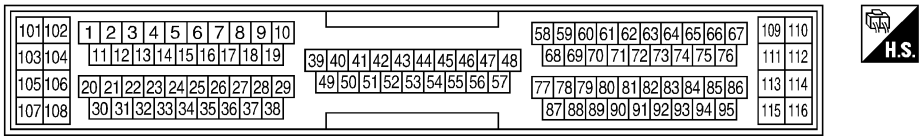
PFP:24110

Wiring Diagram

UBS001RQ



BBWA0150E



SEF970W

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
31	W/G	ECM RELAY (SELF-SHUTOFF)	ENGINE RUNNING FOR 5 SECONDS AFTER TURNING IGN OFF	0 - 1.0V
			5 SECONDS PASSED AFTER TURNING IGN OFF	BATTERY VOLTAGE
43	B/R	IGN	IGN OFF	0V
			IGN ON	BATTERY VOLTAGE
48 57	B B	ECM GROUND	ENGINE RUNNING	ENGINE GROUND
67	W/L	POWER SUPPLY (BACK-UP)	IGN OFF	BATTERY VOLTAGE
106 108	B/Y B/Y	ECM GROUND	ENGINE RUNNING AT IDLE SPEED	ENGINE GROUND
110 112	W W	POWER SUPPLY FOR ECM	IGN ON	BATTERY VOLTAGE

SEF603Z

Diagnostic Procedure

UBS001RR

1. INSPECTION START

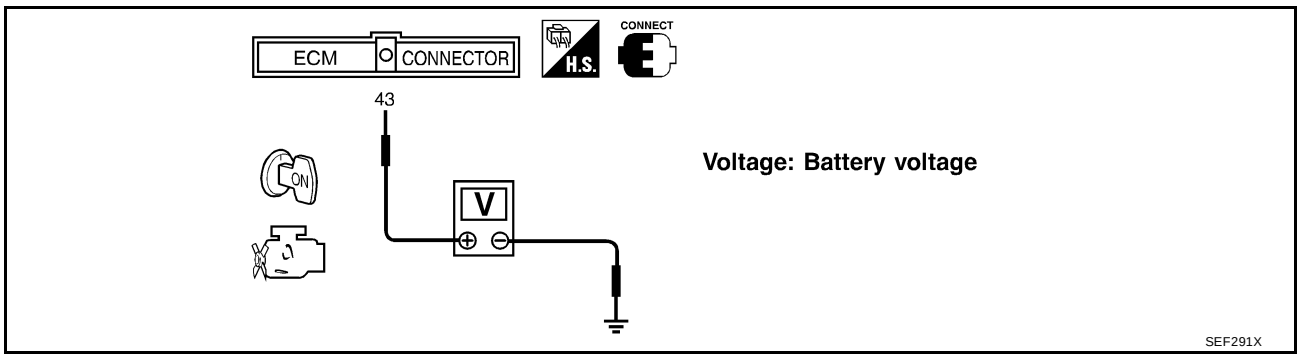
Start engine.
Is engine running?

Yes or No

Yes >> GO TO 8.
No >> GO TO 2.

2. CHECK POWER SUPPLY-I

1. Turn ignition switch “OFF” and then “ON”.
2. Check voltage between ECM terminal 43 and ground with CONSULT-II or tester.



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E9, F47
- Harness connectors M19, E108
- Fuse block (J/B) connector M1
- 10A fuse
- Harness for open or short between ECM and 10A fuse

>> Repair harness or connectors.

4. CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-I

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminals 48, 57, 106, 108 and engine ground. Refer to WIRING DIAGRAM.

Continuity should exist.

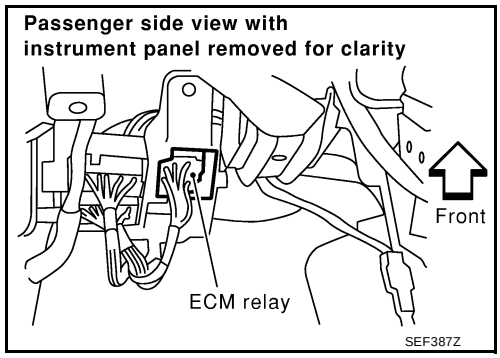
4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK POWER SUPPLY-II

1. Disconnect ECM relay.

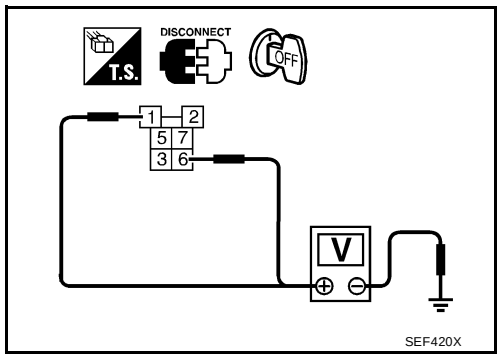


2. Check voltage between ECM relay terminals 1, 6 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.



6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E9, F47
- Fuse and fusible link box connectors E22, E24
- 10A fuse
- 15A fuse
- Harness for open or short between ECM relay and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 31 and ECM relay terminal 1.

Continuity should exist.

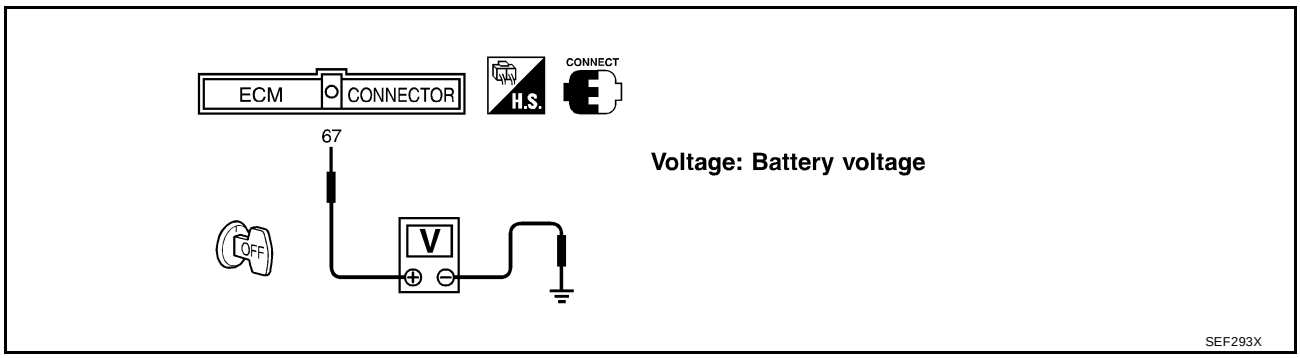
2. Also check harness for short to ground and short to power.

OK or NG

OK >> Go to EC-857, "DTC P0350 IGNITION SIGNAL" .
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK POWER SUPPLY-III

1. Stop engine.
2. Check voltage between ECM terminal 67 and ground with CONSULT-II or tester.



OK or NG

OK >> GO TO 10.
NG >> GO TO 9.

9. DETECT MALFUNCTIONING PART

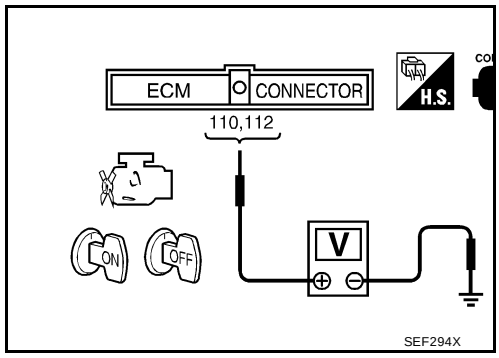
Check the harness for open or short between ECM and harness connector F47.

>> Repair harness or connectors.

10. CHECK POWER SUPPLY-III

1. Turn ignition switch “ON” and then “OFF”.
2. Check voltage between ECM terminals 110, 112 and ground with CONSULT-II or tester.

Voltage: After turning ignition switch "OFF", battery voltage will exist for a few seconds, then drop to approximately 0V.



OK or NG

OK >> GO TO 14.
NG (Battery voltage does not exist.)>>GO TO 7.
NG (Battery voltage exists for more than a few seconds.)>>GO TO 13.

11. CHECK HARNESS CONTINUITY BETWEEN ECM RELAY AND ECM

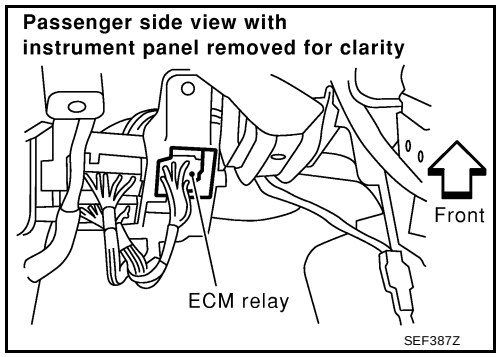
1. Disconnect ECM harness connector.
2. Disconnect ECM relay.
3. Check harness continuity between ECM terminals 110, 112 and ECM relay terminal 5.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 13.
NG >> GO TO 12.



12. DETECT MALFUNCTIONING PART

Check the following.

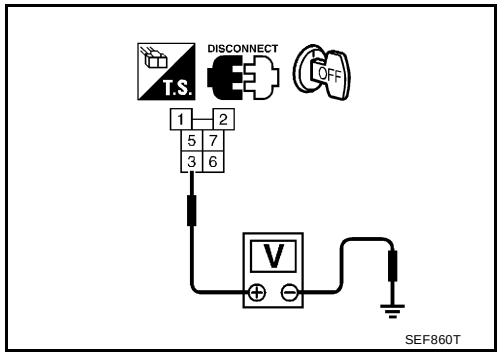
- Joint connector-1
- Harness for open or short between ECM relay and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

13. CHECK VOLTAGE BETWEEN ECM RELAY AND GROUND

Check voltage between ECM relay terminal 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 15.
NG >> GO TO 14.

14. DETECT MALFUNCTIONING PART

Check the harness for open or short between ECM relay and harness connector F47.

>> Repair harness or connectors.

15. CHECK OUTPUT SIGNAL CIRCUIT

1. Check harness continuity between ECM terminal 31 and ECM relay terminal 2. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

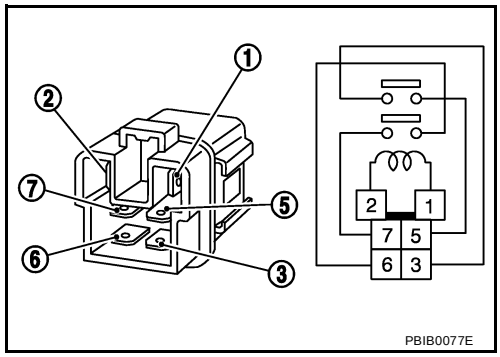
OK or NG

OK >> GO TO 16.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

16. CHECK ECM RELAY

1. Apply 12V direct current between ECM relay terminals 1 and 2.
2. Check continuity between ECM relay terminals 3 and 5, 6 and 7.

Condition	Continuity
12V direct current supply between terminals 1 and 2	Yes
OFF	No



OK or NG

OK >> GO TO 17.
NG >> Replace ECM relay.

17. CHECK GROUND CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminals 48, 57, 106, 108 and engine ground.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 18.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

18. CHECK INTERMITTENT INCIDENT

Perform EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

DTC P0011 IVT CONTROL

PFP:23796

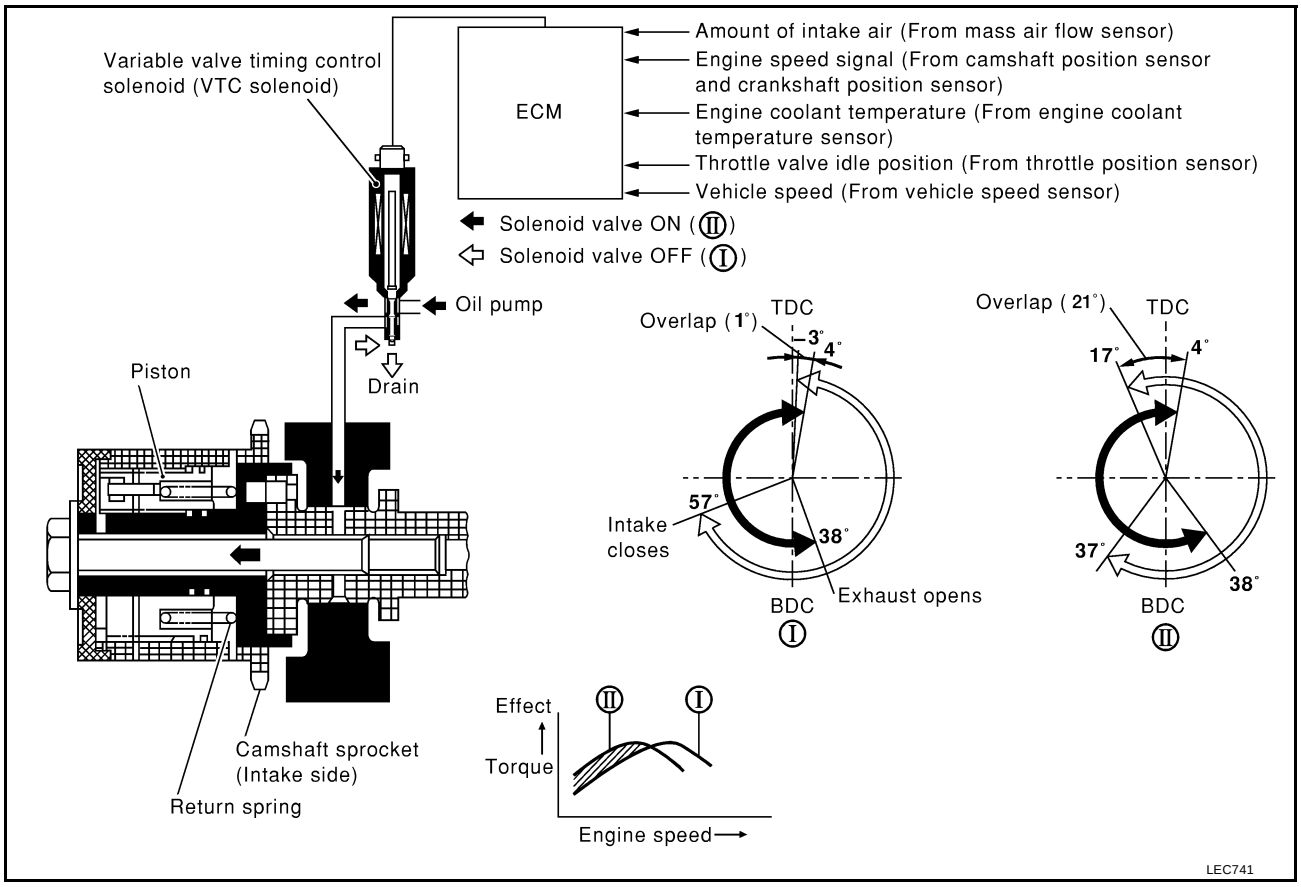
Description

UBS001RS

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE)	Engine speed and cylinder number	Intake valve timing control	Intake valve timing control solenoid valve
Crankshaft position sensor (POS)	Engine speed		
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Throttle position sensor	Throttle position		
Vehicle speed sensor	Vehicle speed		

The intake valve timing control system is utilized to control intake valve opening and closing timing. Engine coolant temperature signals, engine speed, amount of intake air, vehicle speed and throttle position are used to determine intake valve timing.
The intake camshaft sprocket position is regulated by oil pressure controlled by the intake valve timing control. When ECM sends ON signal to intake valve timing control solenoid valve, oil pressure is transmitted to camshaft sprocket. Then, intake side camshaft is advanced.



OPERATION

Engine operating condition	Intake valve timing control solenoid valve	Intake valve opening and closing time	Valve overlap	Engine valve timing
● Engine coolant temperature is between 15°C (59°F) to 119°C (246°F) and engine speed is between 1,100 rpm and 4,200 rpm. ● During high load condition	ON	Advance	Increased	II
Those other than above	OFF	Normal	Normal	I

CONSULT-II Reference Value in Data Monitor Mode

UBS001RT

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
INT/V SOL-B1	● Engine is in warm up condition. ● Engine speed is more than 2,000 rpm. ● Quickly depressed accelerator pedal	OFF → ON

On Board Diagnosis Logic

UBS001RU

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0011	● Comparing the intake valve timing position when the intake valve timing solenoid is ON with that when the solenoid is OFF, the difference does not exceed a certain limit.	● Harness or connectors (The intake valve timing control position sensor circuit is open.) ● Intake valve timing control position sensor ● Accumulation of debris to the signal pick-up portion of the camshaft

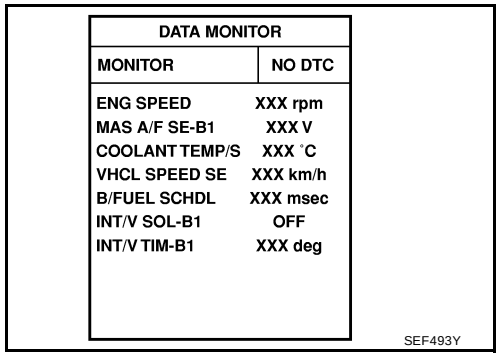
DTC Confirmation Procedure

UBS001RV

CAUTION:
Always drive at 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:
Do not apply electrical load (e.g. cooling fan, rear defogger, headlamp, etc.).



WITH CONSULT-II

1. Warm up engine to normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II.
4. Restart engine and wait at least 30 seconds.
5. Keep engine speed between idle and 1,000 rpm for at least 50 seconds. (Test is completed when “INT/V SOL - B1” in “DATA MONITOR” with CONSULT-II remains “OFF”. If indication is “ON”, repeat step 6.
6. Shift selector lever to “2nd” position.
7. Quickly raise engine speed to more than 2,000 rpm and maintain the following conditions for at least 30 seconds. (Test is completed when “INT/V SOL - B1” in “DATA MONITOR” with CONSULT-II remains “ON”. If indication is “OFF”, repeat step 7.

ENG SPEED	More than 2,000 rpm
B/FUEL SCHDL	More than 6 msec

8. If 1st trip DTC is detected, go to EC-723, "Diagnostic Procedure" .

WITH GST

1. Warm up engine to normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 5 seconds.
3. Restart engine and wait at least 30 seconds.
4. Keep engine speed between idle and 1,000 rpm for at least 50 seconds.
5. Shift selector lever to “2nd” position.
6. Quickly raise engine speed to more than 2,000 rpm and keep it there for at least 30 seconds.

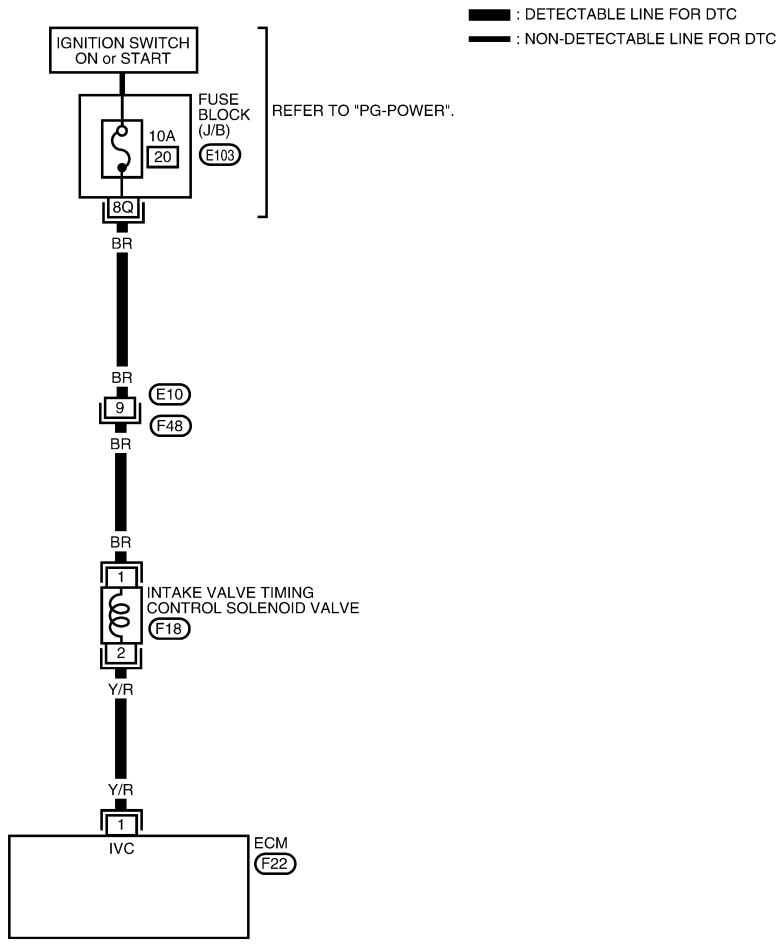
– Driving location: Driving vehicle uphill (increased engine load) will help maintain the driving conditions required for this test.

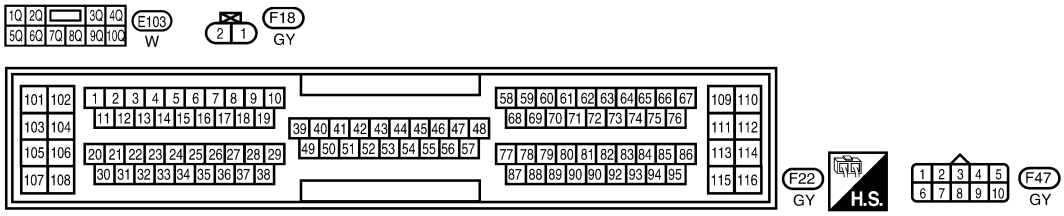
7. Select “MODE 7” with GST.
8. If 1st trip DTC is detected, go to EC-723, "Diagnostic Procedure" .

Wiring Diagram

UBS001RW

EC-IVC/V-01





BBWA0171E

PCM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE PCM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE PCM'S TRANSISTOR. USE A GROUND OTHER THAN PCM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
1	Y/R	INTAKE VALVE TIMING CONTROL SOLENOID VALVE	SOLENOID VALVE IS OPERATING AT ENGINE RUNNING UNDER WARM-UP CONDITION	APPROX. 0V
			SOLENOID VALVE IS NOT OPERATING AT ENGINE RUNNING UNDER WARM-UP CONDITION	BATTERY VOLTAGE

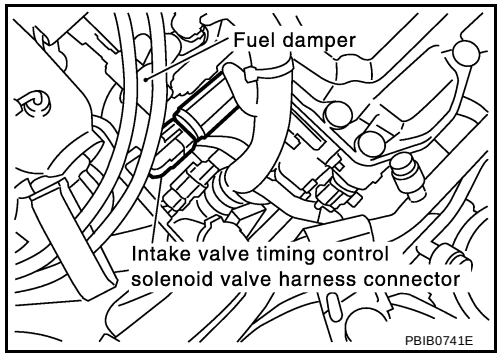
SEF737Y

Diagnostic Procedure

UBS001RX

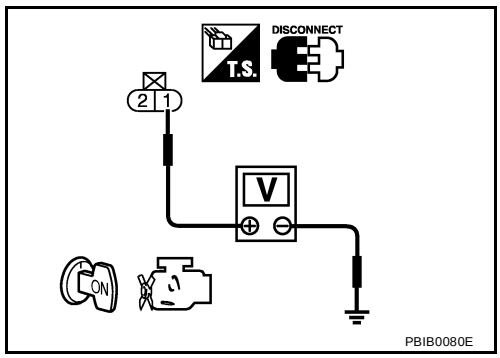
1. CHECK POWER SUPPLY

1. Stop engine.
2. Disconnect intake valve timing control solenoid valve harness connector.
3. Turn ignition switch “ON”.



4. Check voltage between terminal 1 and ground.

Voltage: Battery voltage



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

- Harness connectors F47, E9
- 10A fuse
- Harness for open or short between the intake valve timing control solenoid valve and fuse

>> Repair harness or connectors.

3. CHECK OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 1 and intake valve timing control solenoid valve terminal 2.
   Refer to wiring diagram.

Continuity should exist.

If OK, check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair harness or connectors.

4. CHECK ENGINE OIL PRESSURE

Refer to LU-5, "OIL PRESSURE CHECK" .

OK or NG

OK >> GO TO 5.
NG >> Repair lubrication system.

5. CHECK INTAKE AIR SYSTEM

Check intake air system for leaks.

OK or NG

OK >> GO TO 6.
NG >> Repair intake air system.

6. CHECK INTAKE VALVE TIMING CONTROL POSITION SENSOR

Refer to EC-724, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Repair or replace.

7. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EC-724, "Component Inspection" .

OK or NG

OK >> Replace intake valve timing control sprocket with camshaft.
NG >> Replace intake valve timing control solenoid valve.

8. CHECK INTERMITTENT INCIDENT

Perform EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

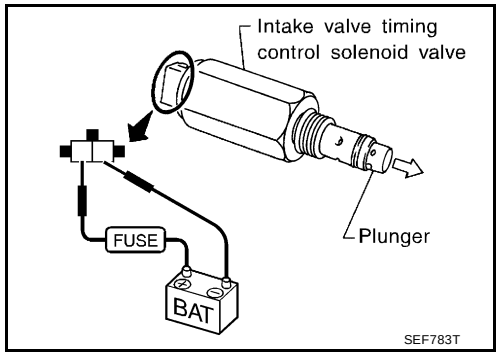
>> **INSPECTION END**

Component Inspection

UBS001RY

INTAKE VALVE TIMING CONTROL SOLENOID VALVE

1. Check oil passage visually for any metal debris.
2. Supply intake valve timing control solenoid valve terminals with battery voltage.
3. Make sure that inside plunger protrudes.
   If NG, replace intake valve timing control solenoid valve.



Removal and Installation

UBS001RZ

INTAKE VALVE TIMING CONTROL POSITION SENSOR

Refer to EM-15, "Removal and Installation" .

DTC P0037, P0038 HO2S2 HEATER

PFP:226A0

Description

UBS001S0

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)			

The ECM performs ON/OFF control of the heated oxygen sensor 2 heater corresponding to the engine speed.

OPERATION

Engine speed rpm	Heated oxygen sensor 2 heater
Above 3,600	OFF
Below 3,600	ON

CONSULT-II Reference Value in Data Monitor Mode

UBS001S1

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 HTR (B1)	● Ignition switch: ON (Engine stopped) ● Engine speed: Above 3,600 rpm	OFF
	● Engine speed: Below 3,600 rpm [After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more]	ON

On Board Diagnosis Logic

UBS001S2

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0037 P0038	● The current amperage in the heated oxygen sensor 2 heater circuit is out of the normal range. [An excessively high (P0038) or low (P0037) voltage signal is sent to ECM through the heated oxygen sensor 2 heater.]	● Harness or connectors (The heated oxygen sensor 2 heater circuit is open or shorted.) ● Heated oxygen sensor 2 heater

DTC Confirmation Procedure

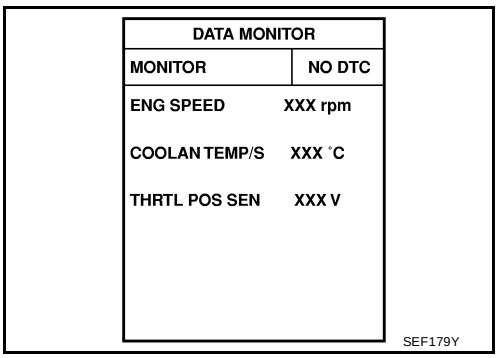
UBS001S3

NOTE:
If “DTC Confirmation Procedure ” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10.5V at idle.

WITH CONSULT-II

1. Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
3. Stop vehicle and let engine idle for at least 6 seconds.
4. If 1st trip DTC is detected, go to EC-727, "Diagnostic Procedure".



WITH GST

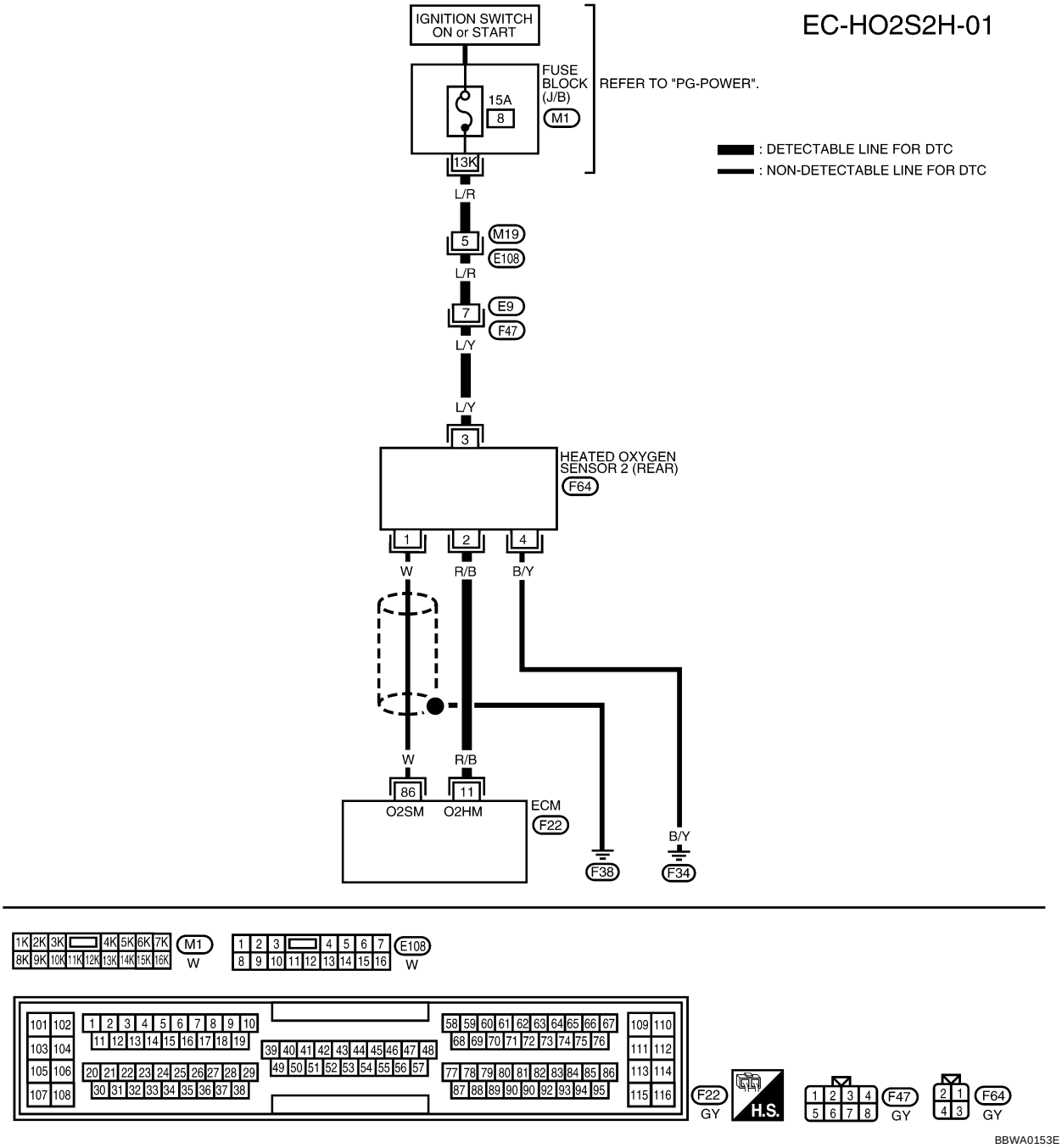
1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle and let engine idle for at least 6 seconds.

3. Turn ignition switch “OFF” and wait at least 10 seconds.
4. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
5. Stop vehicle and let engine idle for at least 6 seconds.
6. Select “MODE 3” with GST.
7. If DTC is detected, go to EC-727, "Diagnostic Procedure" .

When using GST, “DTC Confirmation Procedure” should be performed twice as much as when using CONSULT-II because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II is recommended.

Wiring Diagram

UBS001S4



ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
11	R/B	HEATED OXYGEN SENSOR 2 (REAR) HEATER	IGN ON ENGINE RUNNING ABOVE 3,600 RPM	BATTERY VOLTAGE
			ENGINE RUNNING BELOW 3,600 RPM AFTER DRIVING FOR 2 MINITES AT A SPEED OF 70 KM/H (43 MPH) OR MORE	0 - 1.0V

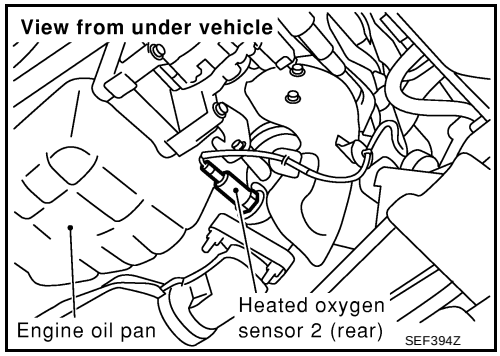
SEF728YA

Diagnostic Procedure

UBS001S5

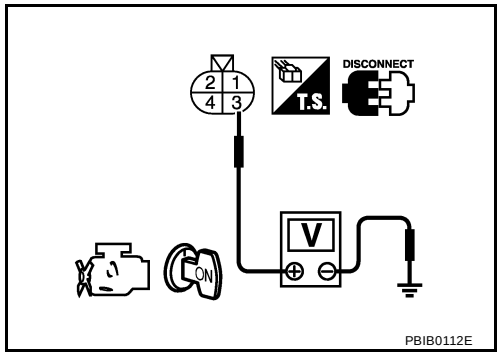
1. CHECK POWER SUPPLY

1. Turn ignition switch "OFF".
2. Disconnect heated oxygen sensor HO2S2 harness connector.
3. Turn ignition switch "ON".



4. Check voltage between rear HO2S2 terminal 3 and ground.

Voltage: Battery voltage



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E9, F47
- Harness connectors M19, E108
- Fuse block (J/B) connector M1
- 15A fuse
- Harness for open or short between heated oxygen sensor 2 and fuse

>> Repair harness or connectors.

3. CHECK OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between HO2S2 terminal 2 and ECM terminal 11.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK HEATED OXYGEN SENSOR 2 HEATER

Refer to EC-728, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace heated oxygen sensor 2.

5. CHECK INTERMITTENT INCIDENT

Perform EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

UBS001S6

HEATED OXYGEN SENSOR 2 HEATER (REAR)

Check the following.

1. Check resistance between terminals 2 and 3.

Resistance: 2.3 - 4.3Ω at 25°C (77°F)

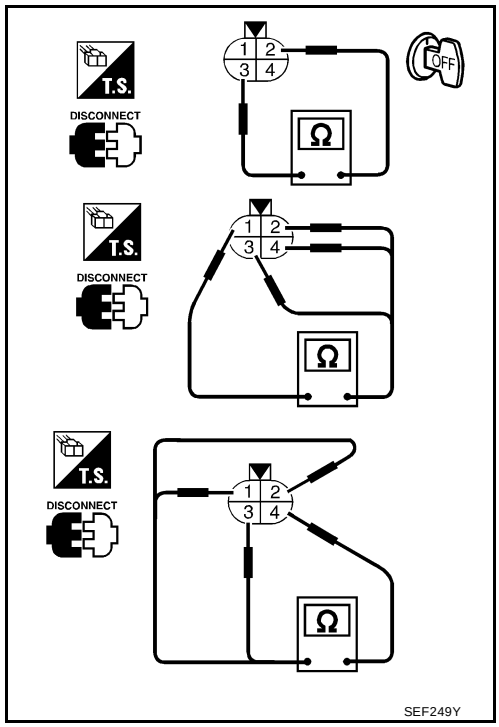
2. Check continuity.

Terminal No.	Continuity
1 and 2, 3, 4	No
4 and 1, 2, 3	

If NG, replace the heated oxygen sensor 2.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**



Removal and Installation

UBS001S7

HEATED OXYGEN SENSOR 2

Refer to EX-3, "Removal and Installation" .

DTC P0043, P0044 HO2S3 HEATER

PFP:226A0

Description

UBS001S8

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE)	Engine speed	Heated oxygen sensor 3 heater control	Heated oxygen sensor 3 heater
Crankshaft position sensor (POS)			

The ECM performs ON/OFF control of the heated oxygen sensor 3 heater corresponding to the engine speed.

OPERATION

Engine speed rpm	Heated oxygen sensor 3 heater
Above 3,600	OFF
Below 3,600	ON

On Board Diagnosis Logic

UBS001S9

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0043 P0044	● The current amperage in the heated oxygen sensor 3 heater circuit is out of the normal range. (An excessively high (P0044) or low (P0043) voltage signal is sent to ECM through the heated oxygen sensor 3 heater.)	● Harness or connectors (The heated oxygen sensor 3 heater circuit is open or shorted.) ● Heated oxygen sensor 3 heater

DTC Confirmation Procedure

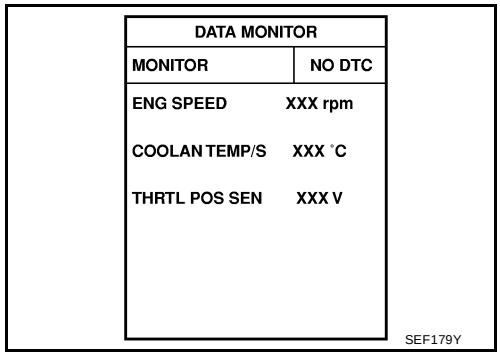
UBS001SA

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 in 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 drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
3. Stop vehicle and let engine idle for at least 6 seconds.
4. If 1st trip DTC is detected, go to EC-732, "Diagnostic Procedure" .



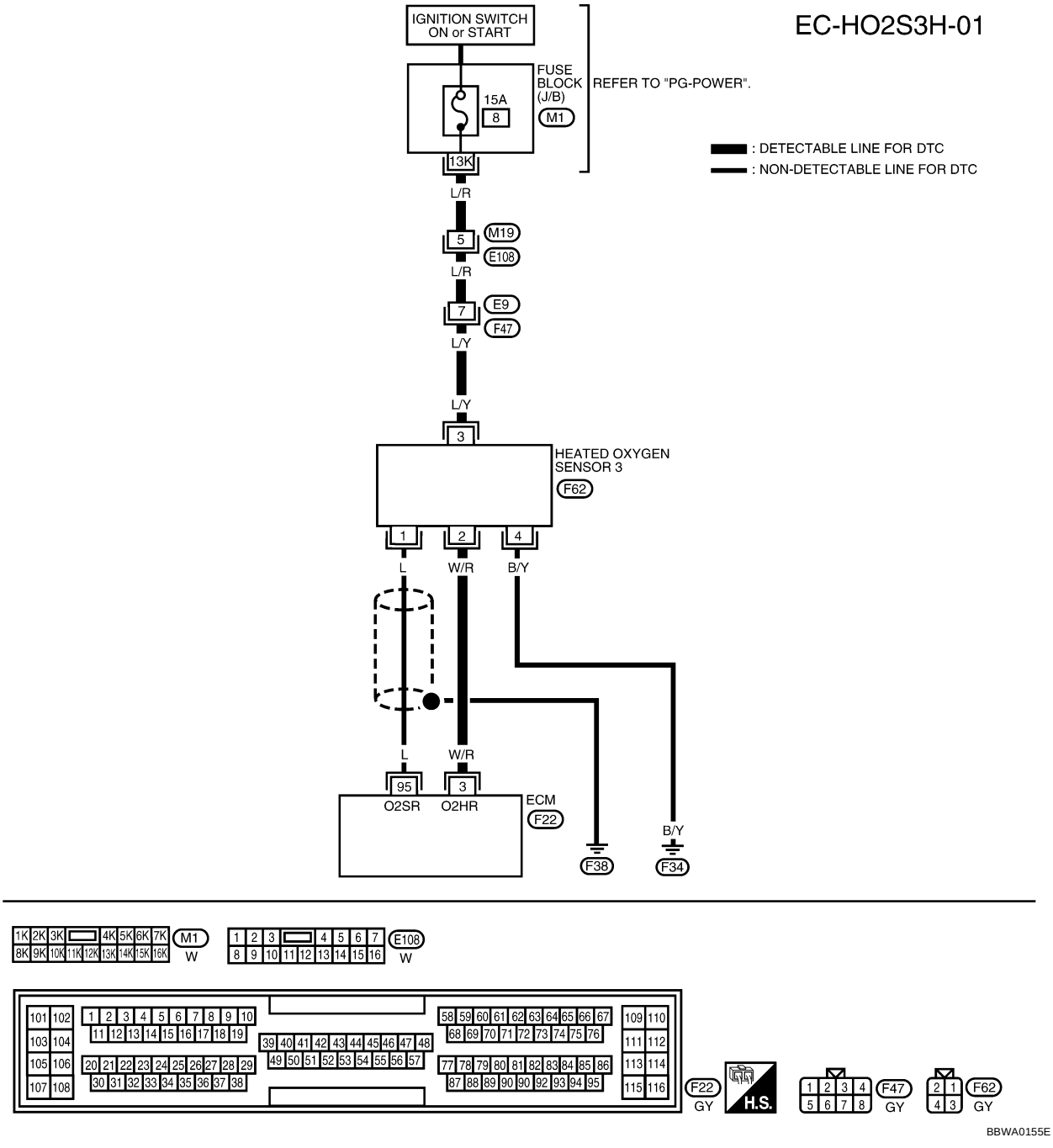
WITH GST

1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle and let engine idle for at least 6 seconds.
3. Turn ignition switch “OFF” and wait at least 5 seconds.
4. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
5. Stop vehicle and let engine idle for at least 6 seconds.
6. Select “MODE 3” with GST.
7. If DTC is detected, go to EC-732, "Diagnostic Procedure" .

When using GST, “DTC Confirmation Procedure” should be performed twice as much as when using CONSULT-II because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II is recommended.

Wiring Diagram

UBS001SB



BBWA0155E

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
3	W/R	HEATED OXYGEN SENSOR 3 HEATER	IGN ON ENGINE RUNNING ABOVE 3,600 RPM	BATTERY VOLTAGE
			ENGINE RUNNING BELOW 3,600 RPM AFTER DRIVING FOR 2 MINITES AT A SPEED OF 70 KM/H (43 MPH) OR MORE	0 - 1.0V

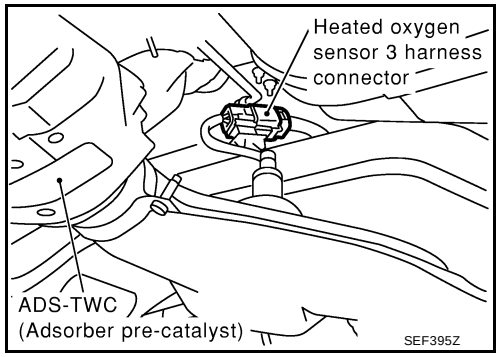
SEF728YB

Diagnostic Procedure

UBS001SC

1. CHECK POWER SUPPLY

1. Turn ignition switch “OFF”.
2. Disconnect heated oxygen sensor 3 harness connector.
3. Turn ignition switch “ON”.

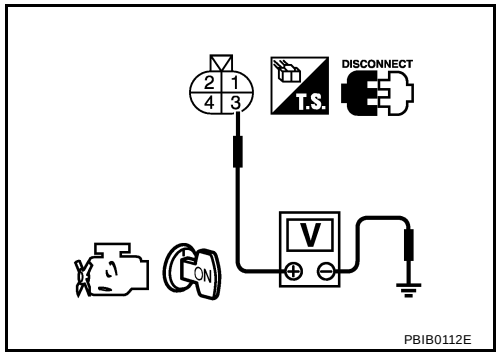


4. Check voltage between rear HO2S3 terminal 3 and ground.

Voltage: Battery voltage

OK or NG

OK >> GO TO 3.
NG >> GO TO 2.



2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E9, F47
- Harness connectors M19, E108
- Fuse block (J/B) connector M1
- 15A fuse
- Harness for open or short between heated oxygen sensor 3 and fuse

>> Repair harness or connectors.

3. CHECK OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between HO2S3 terminal 2 and ECM terminal 3.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK HEATED OXYGEN SENSOR 3 HEATER

Check HO2S3 heater, refer to EC-733, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace corresponding heated oxygen sensor 3.

5. CHECK INTERMITTENT INCIDENT

Perform EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

UBS001SD

HEATED OXYGEN SENSOR 3 HEATER

Check the following.

1. Check resistance between terminals 2 and 3.

Resistance: 2.3 - 4.3Ω at 25°C (77°F)

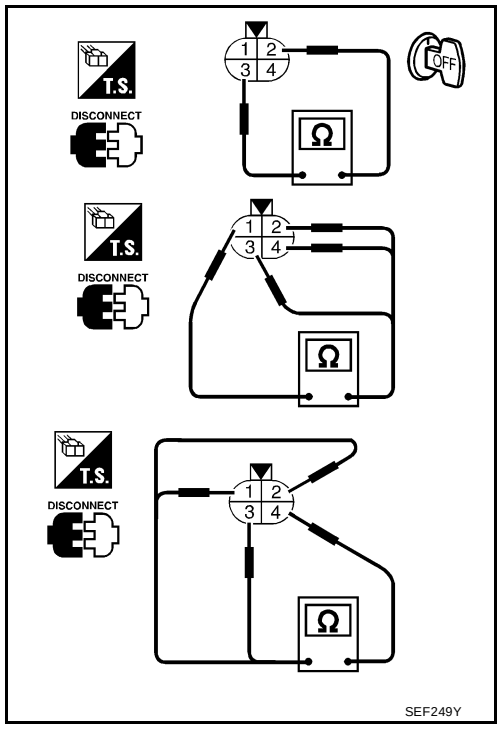
2. Check continuity.

Terminal No.	Continuity
1 and 2, 3, 4	No
4 and 1, 2, 3	

If NG, replace the heated oxygen sensor 3.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**



Removal and Installation

UBS001SE

HEATED OXYGEN SENSOR 3

Refer to EX-3, "Removal and Installation" .

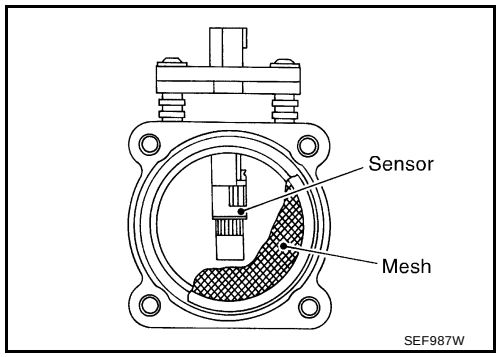
DTC P0101, P0102, P0103, P1102 MAF SENSOR

PFP:22680

Component Description

UBS001SF

The mass air flow sensor is placed in the stream of intake air. It measures the intake flow rate by measuring a part of the entire intake flow. It consists of a hot film that is supplied with electric current from the ECM. The temperature of the hot film is controlled by the ECM a certain amount. The heat generated by the hot film is reduced as the intake air flows around it. The more air, the greater the heat loss.
Therefore, the ECM must supply more electric current to maintain the temperature of the hot film as air flow increases. The ECM detects the air flow by means of this current change.



CONSULT-II Reference Value in Data Monitor Mode

UBS001SG

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAS A/F SE-B1	● Engine: After warming up ● Air conditioner switch: “OFF” ● Shift lever: “N” ● No-load	Idle	1.0 - 1.7V
		2,500 rpm	1.5 - 2.4V
CAL/LD VALUE	● Engine: After warming up ● Air conditioner switch: “OFF” ● Shift lever: “N” ● No-load	Idle	20.0 - 35.5%
		2,500 rpm	12.0 - 30.0%
MASS AIRFLOW	● Engine: After warming up ● Air conditioner switch: “OFF” ● Shift lever: “N” ● No-load	Idle	1.4 - 4.0 g·m/s
		2,500 rpm	5.0 - 10.0 g·m/s

On Board Diagnosis Logic

UBS001SH

DTC No.	Malfunction is detected when ...		Check Items (Possible Cause)
P0103	A)	An excessively high voltage from the sensor is sent to ECM when engine is not running.	● Harness or connectors (The sensor circuit is open or shorted.) ● Mass air flow sensor
P0102	C)	A high voltage from the sensor is sent to ECM under light load driving condition.	
P0101	B)	An excessively low voltage from the sensor is sent to ECM* when engine is running.	● Harness or connectors (The sensor circuit is open or shorted.) ● Intake air leaks ● Mass air flow sensor
	D)	A low voltage from the sensor is sent to ECM under heavy load driving condition.	
P1102	E)	A voltage from the sensor exists constantly approx. 1.0V when engine is running.	● Harness or connectors (The sensor circuit is open or shorted.) ● Mass air flow sensor

*: When this malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

Detected items	Engine operating condition in fail-safe mode
Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.

DTC Confirmation Procedure

UBS001SI

Perform “PROCEDURE FOR MALFUNCTION A” first. If the 1st trip DTC cannot be confirmed, perform “PROCEDURE FOR MALFUNCTION B and E”. If there is no problem on “PROCEDURE FOR MALFUNC-

TION B and E", perform "PROCEDURE FOR MALFUNCTION C". If there is no problem on "PROCEDURE FOR MALFUNCTION C", perform "PROCEDURE FOR MALFUNCTION D".

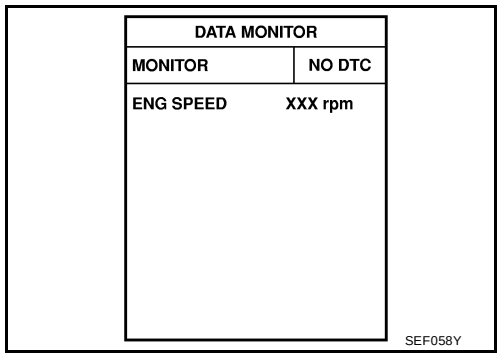
CAUTION:
Always drive vehicle at a safe speed.

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 A

With CONSULT-II

1. Turn ignition switch "ON".
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Wait at least 6 seconds.
4. If 1st trip DTC is detected, go to EC-739, "Diagnostic Procedure"
.



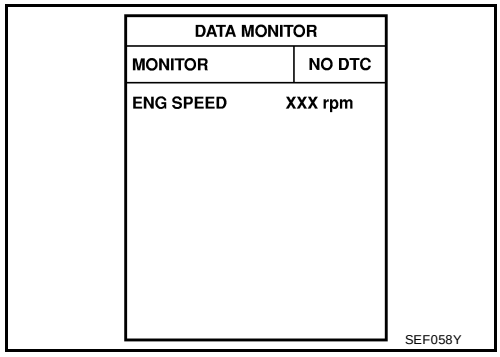
With GST

Follow the procedure "With CONSULT-II" above.

PROCEDURE FOR MALFUNCTION B AND E

With CONSULT-II

1. Turn ignition switch "ON".
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Start engine and wait 5 seconds at most.
4. If 1st trip DTC is detected, go to EC-739, "Diagnostic Procedure"
.



With GST

Follow the procedure "With CONSULT-II" above.

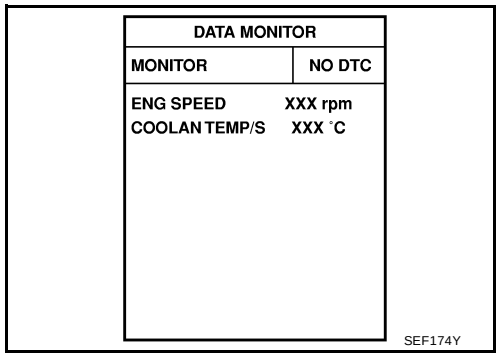
NOTE:
If 1st trip DTC is confirmed after more than 5 seconds, there may be malfunction C.

PROCEDURE FOR MALFUNCTION C

NOTE:
If engine will not start or stops soon wait at least 10 seconds with engine stopped (Ignition switch "ON") instead of running engine at idle speed.

With CONSULT-II

1. Turn ignition switch “ON”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and warm it up to normal operating temperature.
4. Run engine for at least 10 seconds at idle speed.
5. If 1st trip DTC is detected, go to EC-739, "Diagnostic Procedure" “.



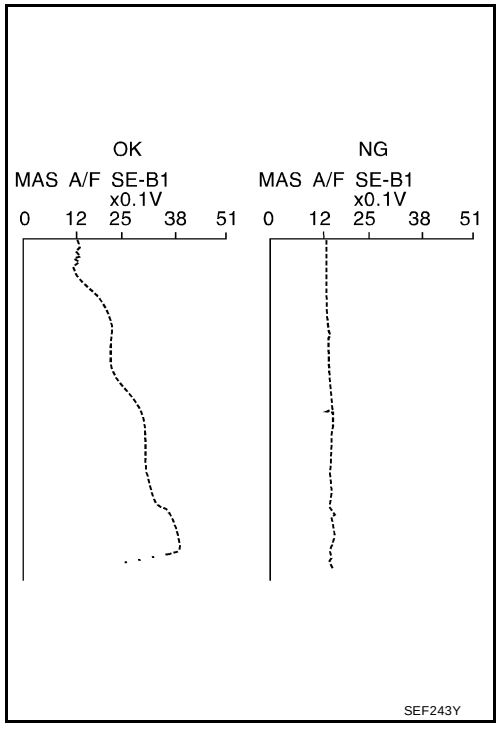
With GST

Follow the procedure “With CONSULT-II” above.

PROCEDURE FOR MALFUNCTION D

With CONSULT-II

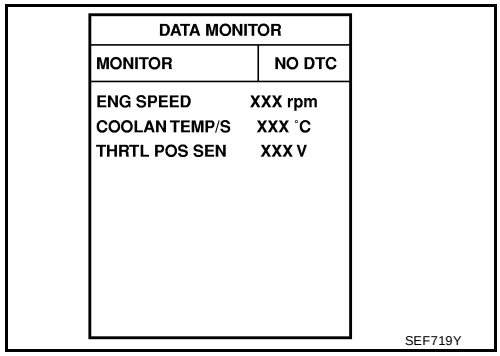
1. Turn ignition switch “ON”.
2. Start engine and warm it up to normal operating temperature.
   If engine cannot be started, go to EC-739, "Diagnostic Procedure" .
3. Select “DATA MONITOR” mode with CONSULT-II.
4. Check the voltage of “MAS A/F SE-B1” with “DATA MONITOR”.
5. Increases engine speed to about 4,000 rpm.
6. Monitor the linear voltage rise in response to engine speed increases.
   If NG, go to EC-739, "Diagnostic Procedure" .
   If OK, go to following step.



7. Maintain the following conditions for at least 10 consecutive seconds.

ENG SPEED	More than 2,000 rpm
THRTL POS SEN	More than 3V
Selector lever	Suitable position
Driving location	Driving vehicle uphill (Increased engine load) will help maintain the driving conditions required for this test.

8. If 1st trip DTC is detected, go to EC-739, "Diagnostic Procedure" .



Overall Function Check

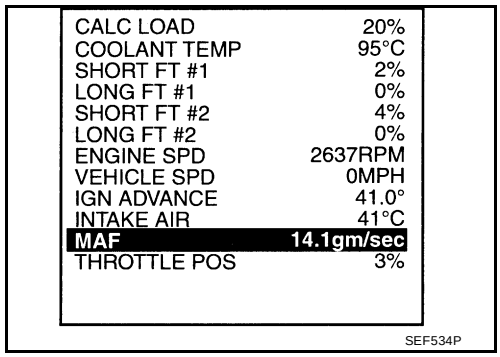
UBS001SJ

Use this procedure to check the overall function of the mass air flow sensor circuit. During this check, a 1st trip DTC might not be confirmed.

PROCEDURE FOR MALFUNCTION D

With GST

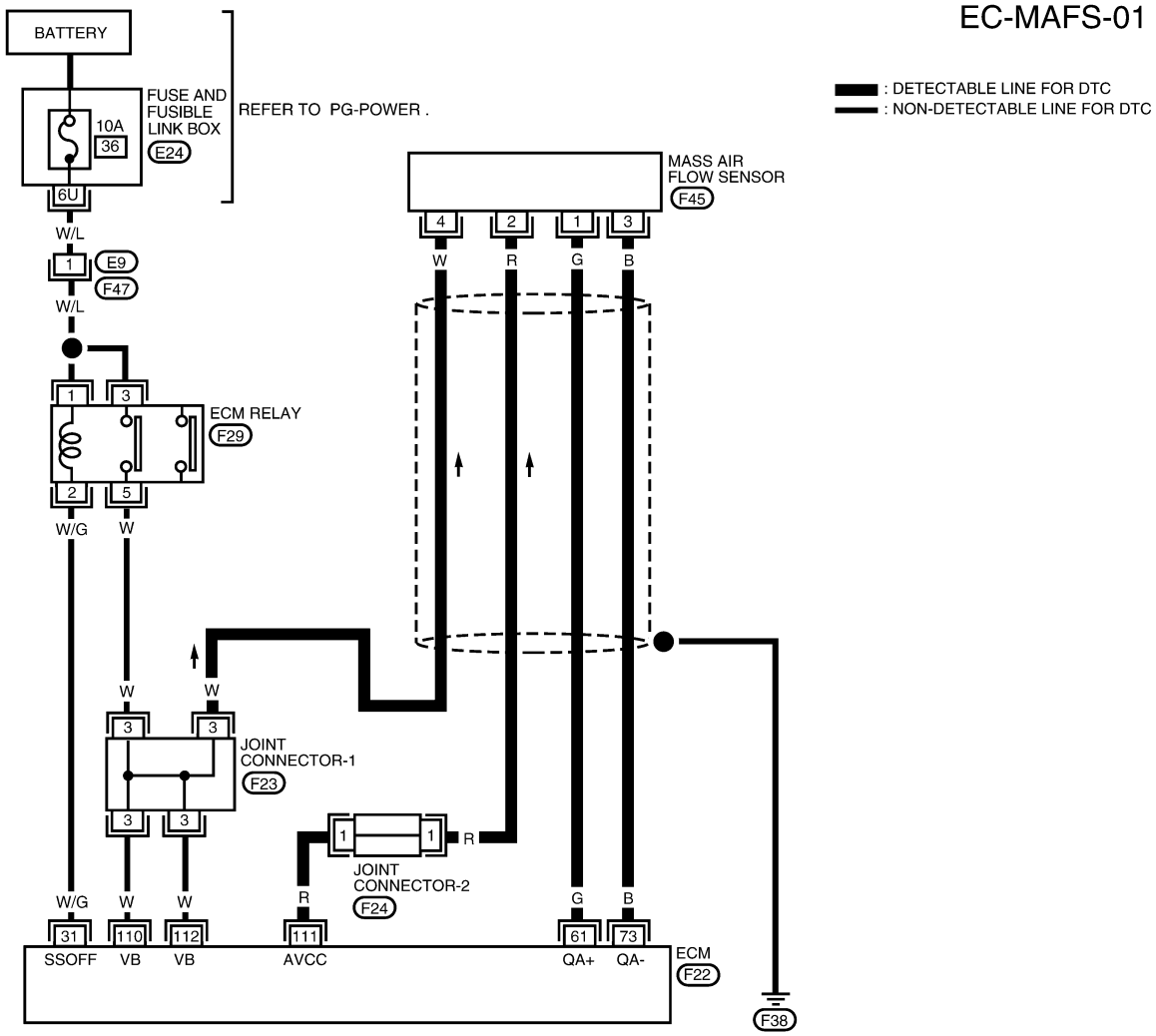
1. Turn ignition switch “ON”.
2. Start engine and warm it up to normal operating temperature.
3. Select “MODE 1” with GST.
4. Check the mass air flow sensor signal with “MODE 1”.
5. Check for linear mass air flow rise in response to increases to about 4,000 rpm in engine speed.
6. If NG, go to EC-739, "Diagnostic Procedure" .

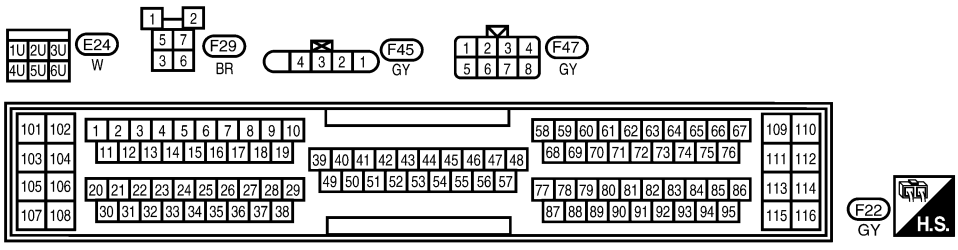


Wiring Diagram

UBS001SK

EC-MAFS-01





REFER TO THE FOLLOWING.
F23 F24 - JOINT CONNECTOR

BBWA0554E

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
61	G	MASS AIR FLOW SENSOR	ENGINE RUNNING AT IDLE SPEED UNDER WARM-UP CONDITION	1.3 - 1.7V
			ENGINE RUNNING AT 2,500 RPM UNDER WARM-UP CONDITION	1.8 - 2.4V
73	B	MASS AIR FLOW SENSOR GROUND	ENGINE RUNNING AT IDLE SPEED UNDER WARM-UP CONDITION	APPROX. 0V
111	R	SENSOR'S POWER SUPPLY	IGN ON	APPROX. 5V

SEF564Y

Diagnostic Procedure

UBS001SL

1. INSPECTION START

Which malfunction (A, B, C, D or E) is duplicated?

MALFUNCTION	TYPE
A, C and/or E	I
B and/or D	II

Type I or Type II

Type I >> GO TO 3.
Type II >> GO TO 2.

2. CHECK INTAKE SYSTEM

Check the following for connections.

- Air duct
- Vacuum hoses
- Intake air passage between air duct and collector

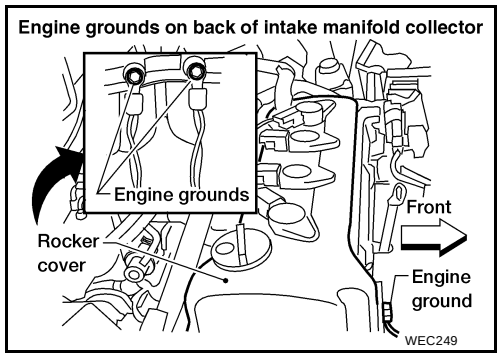
OK or NG

OK >> GO TO 3.
NG >> Reconnect the parts.

3. RETIGHTEN GROUND SCREWS

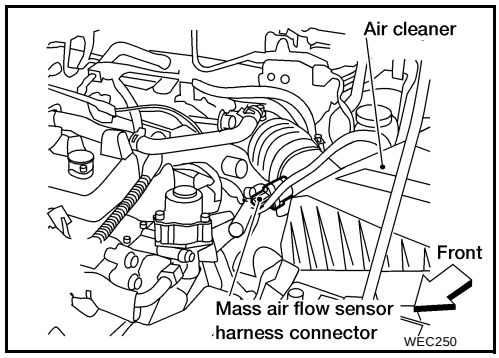
1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

>> GO TO 4.



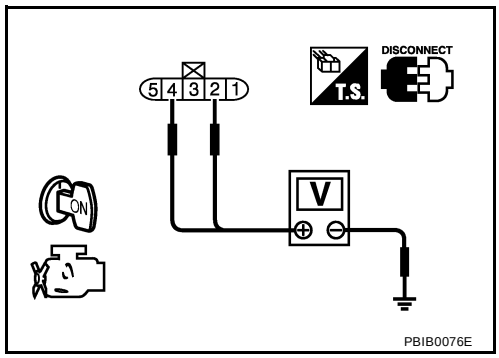
4. CHECK POWER SUPPLY

1. Disconnect mass air flow sensor harness connector.
2. Turn ignition switch “ON”.



3. Check voltage between MAFS terminal 4 and ground with CONSULT-II or tester.

Terminal	Voltage
2	Approximately 5V
4	Battery voltage



OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Joint connector-1
- Joint connector-2
- Harness for open or short between ECM relay and mass air flow sensor
- Harness for open or short between mass air flow sensor and ECM

>> Repair harness or connectors.

6. CHECK GROUND CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between MAFS terminal 3 and ECM terminal 73.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK INPUT SIGNAL CIRCUIT

1. Check harness continuity between MAFS terminal 1 and ECM terminal 61.
   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-742, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace mass air flow sensor.

9. CHECK INTERMITTENT INCIDENT

Perform EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

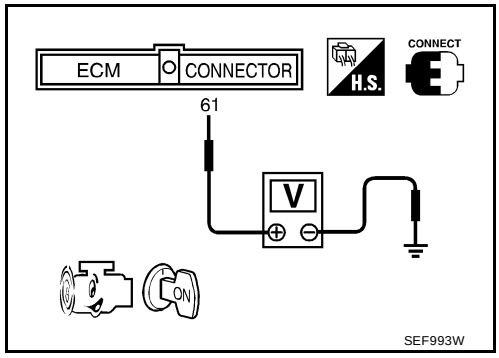
>> **INSPECTION END**

Component Inspection

UBS001SM

MASS AIR FLOW SENSOR

1. Turn ignition switch “ON”.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 61 (Mass air flow sensor signal) and ground.



Conditions	Voltage V
Ignition switch “ON” (Engine stopped.)	Less than 1.0
Idle (Engine is warmed-up to normal operating temperature.)	1.0 - 1.7
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.5 - 2.4
Idle to about 4,000 rpm*	1.0 - 1.7 to Approx. 4.0

*: Check for linear voltage rise in response to increases to about 4,000 rpm in engine speed.

4. If the voltage is out of specification, disconnect mass air flow sensor harness connector and connect it again. Repeat above check.
5. If NG, remove mass air flow sensor from air duct. Check hot film for damage or dust.

Removal and Installation

UBS001SN

MASS AIR FLOW SENSOR

Refer to EM-15, "Removal and Installation" .

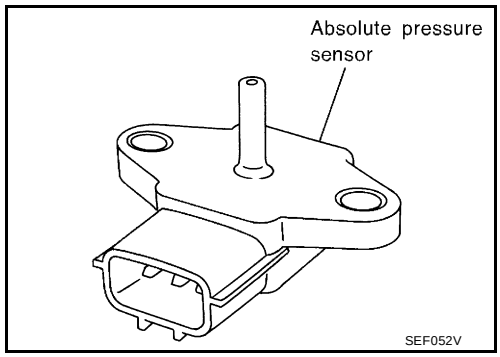
DTC P0107, P0108 BARO SENSOR

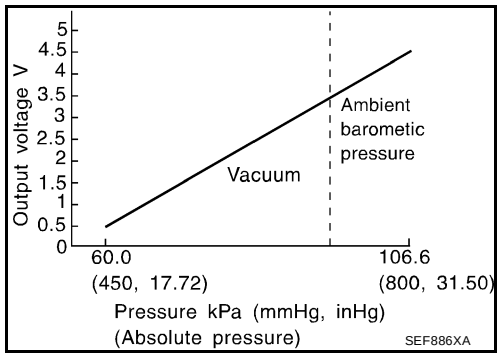
PFP:22365

Component Description

UBS001SO

The barometric pressure (BARO) sensor detects ambient barometric pressure and sends the voltage signal to the ECM. As the pressure increases, the voltage rises.





On Board Diagnosis Logic

UBS001SP

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0107 P0108	An excessively low (P0107) or high (P0108) voltage from the sensor is sent to ECM.	● Harness or connectors (Barometric pressure sensor circuit is open or shorted.) ● Barometric pressure sensor

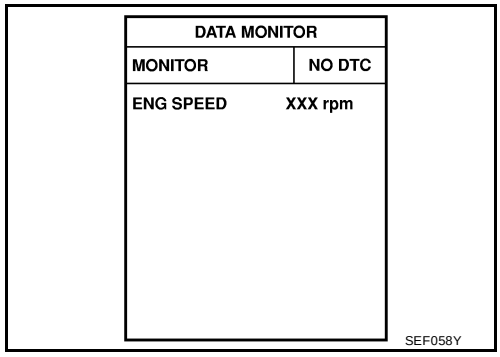
DTC Confirmation Procedure

UBS001SQ

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 6 seconds.
4. If 1st trip DTC is detected, go to EC-745, "Diagnostic Procedure" .



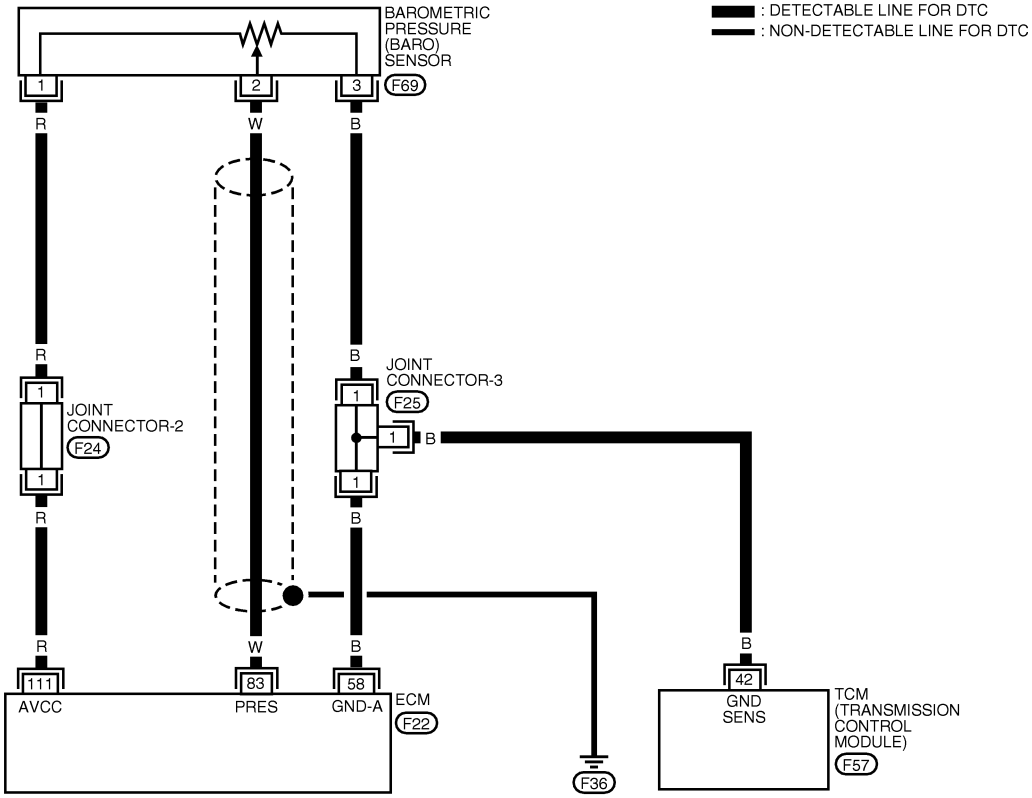
WITH GST

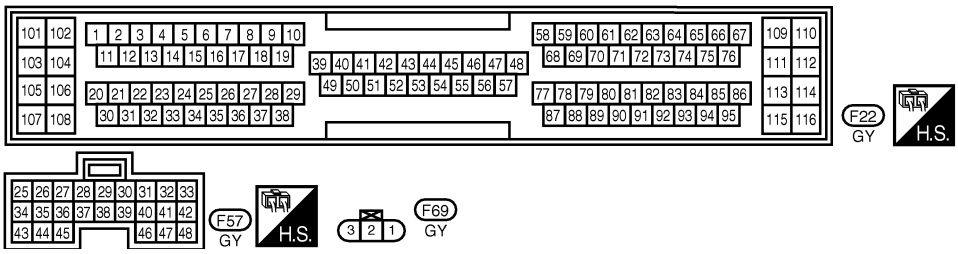
Follow the procedure “With CONSULT-II” above.

Wiring Diagram

UBS001SR

EC-BARO-01





REFER TO THE FOLLOWING.
F24, F25 - JOINT CONNECTOR

WEC382

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
58	B	SENSOR'S GROUND	IGN ON	APPROX. 0V
83	W	BARO SENSOR	IGN ON	APPROX. 4.4V
111	R	SENSOR'S POWER SUPPLY	IGN ON	APPROX. 5V

SEF604Z

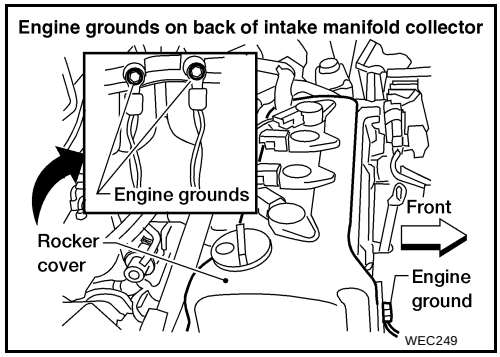
Diagnostic Procedure

UBS001SS

1. RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

>> GO TO 2.



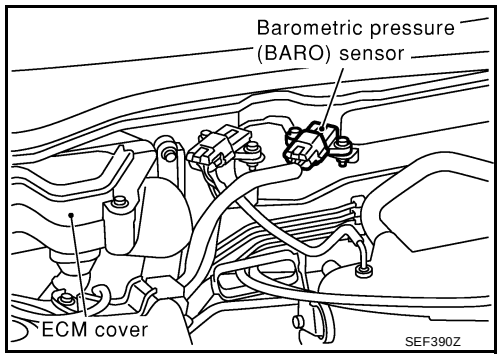
2. CHECK CONNECTOR

1. Disconnect barometric pressure (BARO) 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.



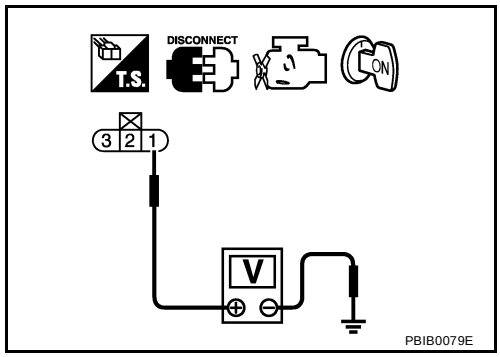
3. CHECK POWER SUPPLY

1. Turn ignition switch “ON”.
2. Check voltage between BARO sensor terminal 1 and engine 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.

- Joint connector-2
- Harness for open or short between ECM and BARO sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK GROUND CIRCUIT

1. Turn ignition switch “OFF”.
2. Check harness continuity between BARO sensor terminal 3 and engine ground.
   Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Joint connector-3
- Harness for open or short between ECM and BARO sensor
- Harness for open or short between TCM and BARO sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 83 and BARO sensor terminal 2.
   Refer to Wiring Diagram.

Continuity should exist.

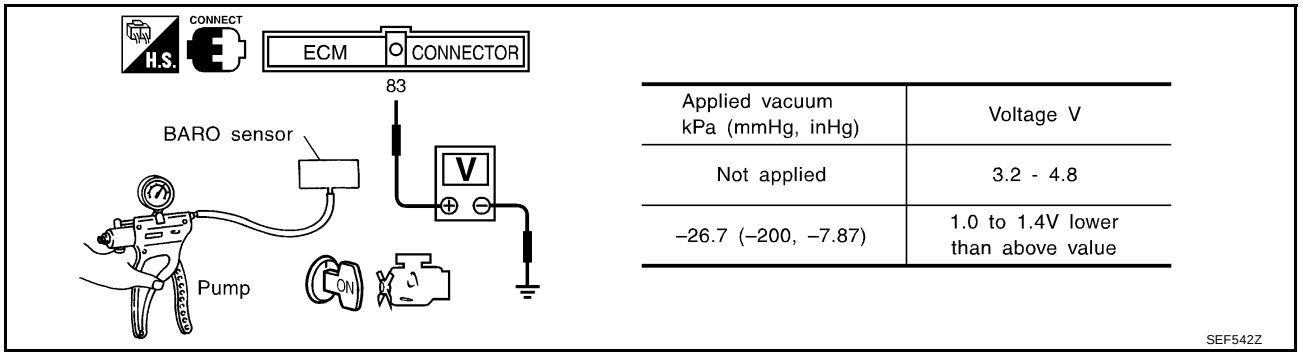
3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK BARO SENSOR

1. Reconnect ECM harness connector.
2. Reconnect BARO sensor harness connector.
3. Install a vacuum pump to BARO sensor.
4. Turn ignition switch “ON” and check output voltage between ECM terminal 83 and engine ground under the following conditions.



Applied vacuum kPa (mmHg, inHg)	Voltage V
Not applied	3.2 - 4.8
–26.7 (–200, –7.87)	1.0 to 1.4V lower than above value

CAUTION:

- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply below –93.3 kPa (–700 mmHg, –27.56 inHg) or over 101.3 kPa (760 mmHg, 29.92 inHg) of pressure.**

OK or NG

OK >> GO TO 9.
NG >> Replace BARO sensor.

9. CHECK INTERMITTENT INCIDENT

Perform EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Removal and Installation

UBS001ST

BAROMETRIC PRESSURE SENSOR

Refer to EM-15, "OUTER COMPONENT PARTS" .

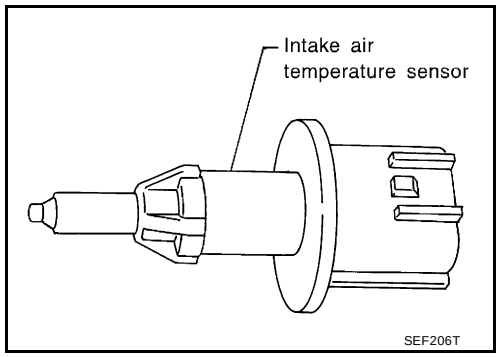
DTC P0112, P0113, P0127 IAT SENSOR

PFP:22630

Component Description

UBS001SU

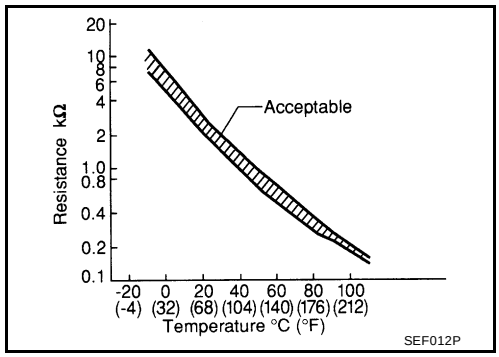
The intake air temperature sensor is mounted to the air duct housing. The sensor detects intake air temperature and transmits a signal to the ECM.
The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.



<Reference data>

Intake air temperature °C (°F)	Voltage* V	Resistance kΩ
20 (68)	3.5	2.1 - 2.9
80 (176)	1.23	0.27 - 0.38

*: These data are reference values and are measured between ECM terminal 71 (Intake air temperature sensor) and ground.



CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use ground other than ECM, such as body ground.

On Board Diagnosis Logic

UBS001SV

DTC No.		Malfunction is detected when ...	Check Items (Possible Cause)
P0112 P0113	A)	An excessively low (P0112) or high (P0113) voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Intake air temperature sensor
P0127	B)	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signal from engine coolant temperature sensor.	

DTC Confirmation Procedure

UBS001SW

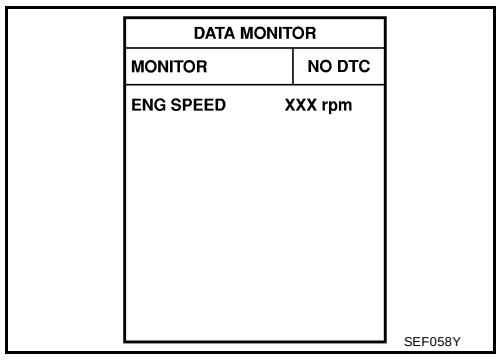
Perform “PROCEDURE FOR MALFUNCTION A” first. If the 1st trip DTC cannot be confirmed, perform “PROCEDURE FOR MALFUNCTION B”.

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR MALFUNCTION A

With CONSULT-II

1. Turn ignition switch “ON”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-751, "Diagnostic Procedure"
.



With GST

Follow the procedure “With CONSULT-II” above.

PROCEDURE FOR MALFUNCTION B

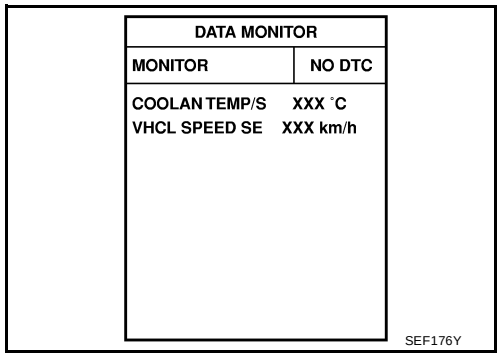
CAUTION:
Always drive vehicle at a safe speed.
TESTING CONDITION:
This test may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

With CONSULT-II

1. Wait until engine coolant temperature is less than 90°C (194°F).

- Turn ignition switch “ON”.
- Select “DATA MONITOR” mode with CONSULT-II.
- Check the engine coolant temperature.
- If the engine coolant temperature is not less than 90°C (194°F), turn ignition switch “OFF” and cool down engine.
- Perform the following steps before engine coolant temperature is above 90°C (194°F).

2. Turn ignition switch “ON”.
3. Select “DATA MONITOR” mode with CONSULT-II.
4. Start engine.
5. Hold vehicle speed more than 70 km/h (43 MPH) for 105 consecutive seconds.
6. If 1st trip DTC is detected, go to EC-751, "Diagnostic Procedure" .



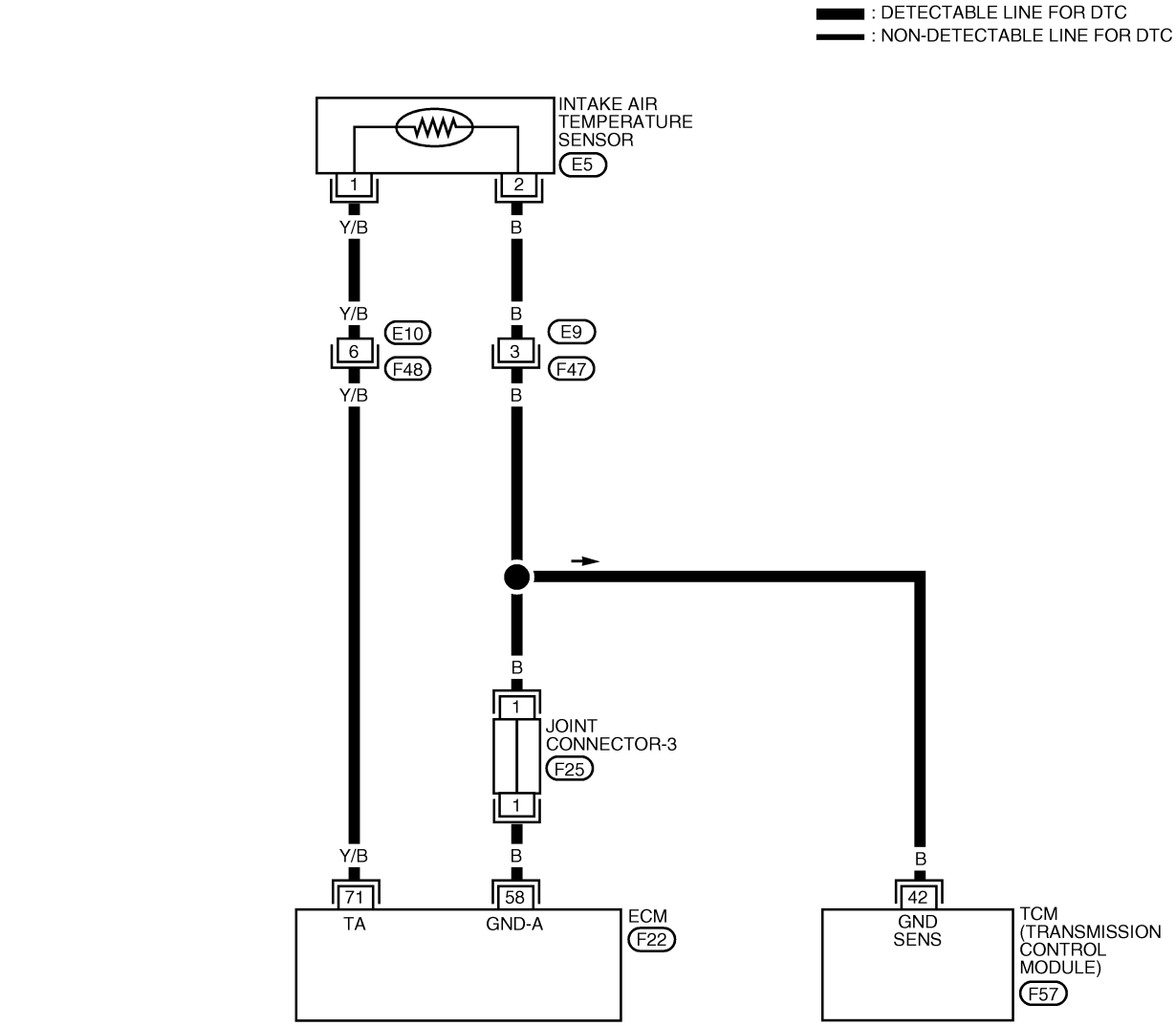
With GST

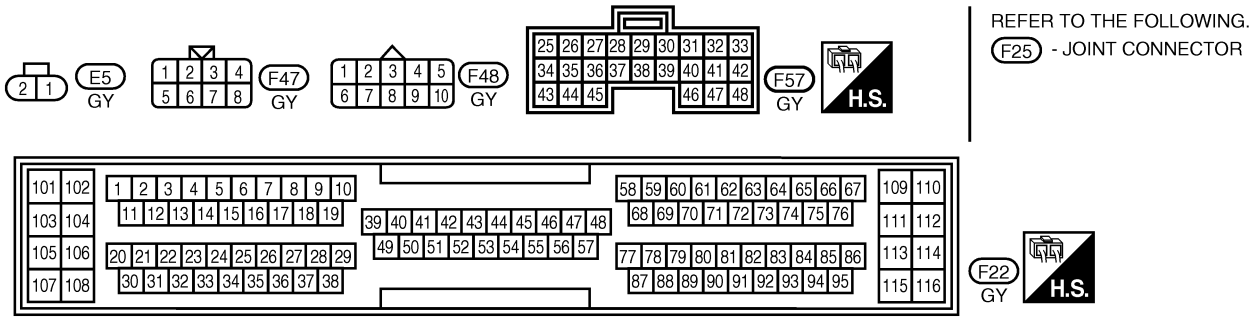
Follow the procedure “With CONSULT-II” above.

Wiring Diagram

UBS001SX

EC-IATS-01





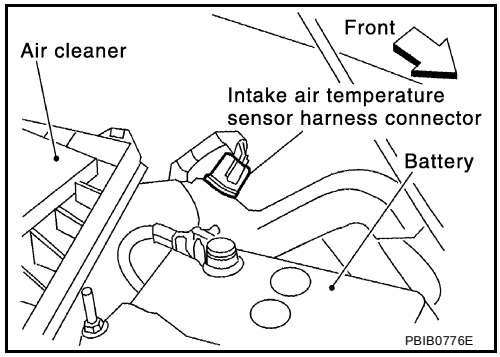
WEC383

Diagnostic Procedure

UBS001SY

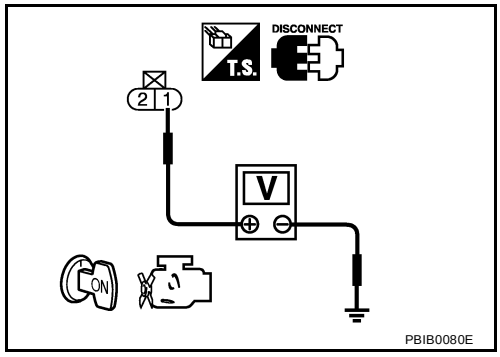
1. CHECK POWER SUPPLY

1. Turn ignition switch “OFF”.
2. Disconnect intake air temperature sensor harness connector.
3. Turn ignition switch “ON”.



4. Check voltage between intake air temperature sensor terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E10, F48
- Harness for open or short between ECM and intake air temperature sensor

>> Repair harness or connectors.

3. CHECK GROUND CIRCUIT

1. Turn ignition switch “OFF”.
2. Check harness continuity between terminal 2 and engine ground.
   Refer to wiring diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E9, F47
- Joint connector-3
- Harness for open or short between TCM and intake air temperature sensor
- Harness for open or short between ECM and intake air temperature sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-753, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace intake air temperature sensor.

6. CHECK INTERMITTENT INCIDENT

Perform EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

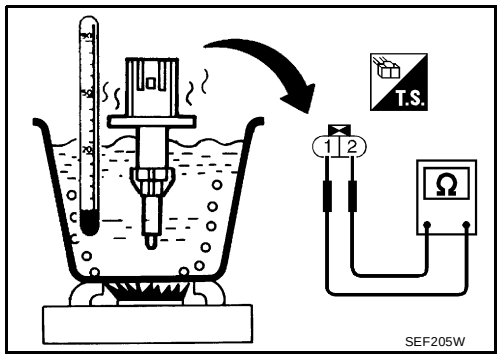
>> **INSPECTION END**

Component Inspection

UBS001SZ

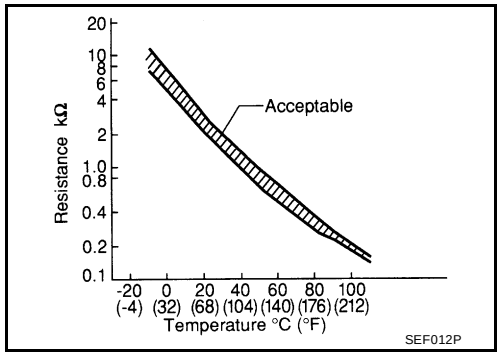
INTAKE AIR TEMPERATURE SENSOR

Check resistance as shown in the figure.



<Reference data>

Intake air temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
80 (176)	0.27 - 0.38



If NG, replace intake air temperature sensor.

Removal and Installation

UBS001T0

INTAKE AIR TEMPERATURE SENSOR

Refer to EM-15, "Removal and Installation" .

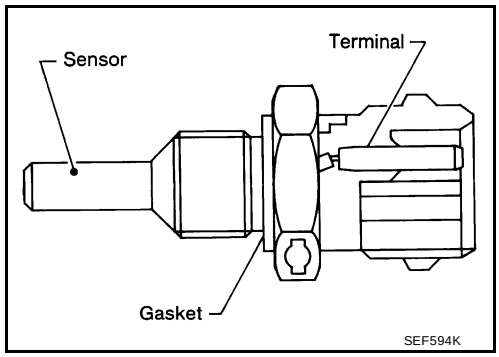
DTC P0117, P0118 ECT SENSOR

PFP:22630

Component Description

UBS001T1

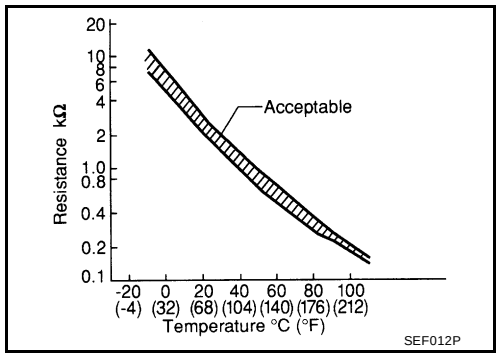
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



<Reference data>

Engine coolant temperature °C (°F)	Voltage* V	Resistance kΩ
–10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.1 - 2.9
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

*: These data are reference values and are measured between ECM terminal 70 (Engine coolant temperature sensor) and ground.



CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use ground other than ECM, such as body ground.

CONSULT-II Reference Value in Data Monitor Mode

UBS001T2

MONITOR ITEM	CONDITION	SPECIFICATION
COOLAN TEMP/S	● Engine: After warming up	More than 70°C (158°F)

On Board Diagnosis Logic

UBS001T3

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0117 P0118	● An excessively high (P0118) or low (P0117) voltage from the sensor is sent to ECM.*	● Harness or connectors (The sensor circuit is open or shorted.) ● Engine coolant temperature sensor

*: When this malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

Detected items	Engine operating condition in fail-safe mode	
Engine coolant temperature sensor circuit	Engine coolant temperature will be determined by ECM based on the time after turning ignition switch “ON” or “START”. CONSULT-II displays the engine coolant temperature decided by ECM.	
	Condition	Engine coolant temperature decided (CONSULT-II display)
	Just as ignition switch is turned ON or Start	40°C (104°F)
	More than approx. 4 minutes after ignition ON or Start	80°C (176°F)
	Except as shown above	40 - 80°C (104 - 176°F) (Depends on the time)
	When the fail-safe system for engine coolant temperature sensor is activated, the cooling fan operates while the engine is running.	

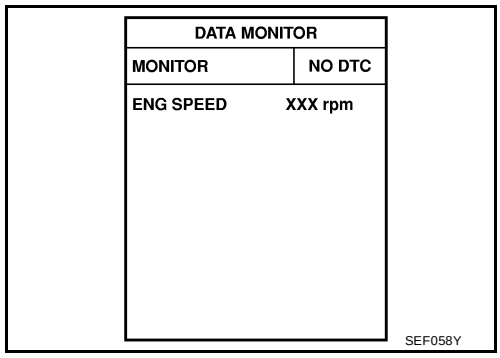
DTC Confirmation Procedure

UBS001T4

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-757, "Diagnostic Procedure"
.



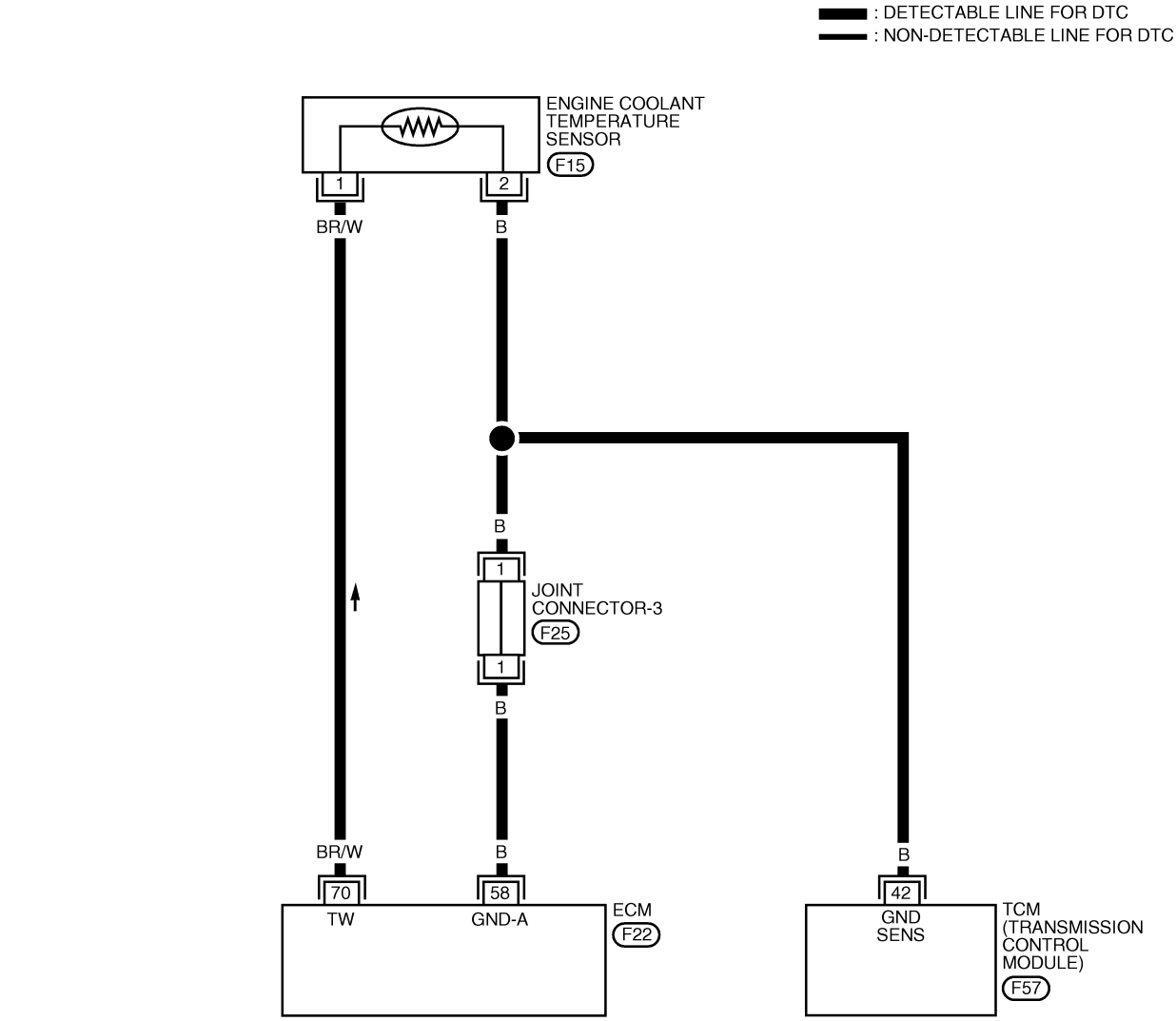
WITH GST

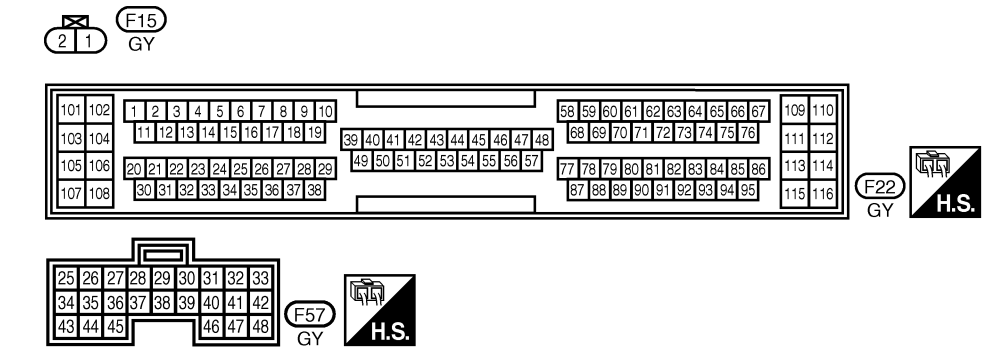
Follow the procedure “With CONSULT-II” above.

Wiring Diagram

UBS001T5

EC-ECTS-01





REFER TO THE FOLLOWING.
F25 - JOINT CONNECTOR

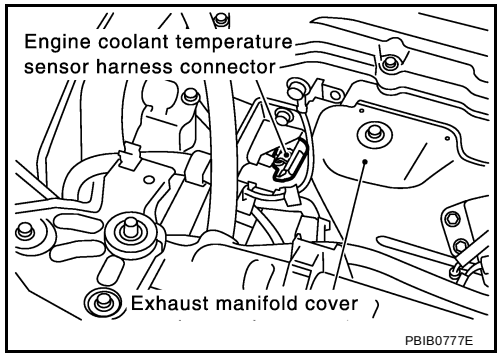
WEC385

Diagnostic Procedure

UBS001T6

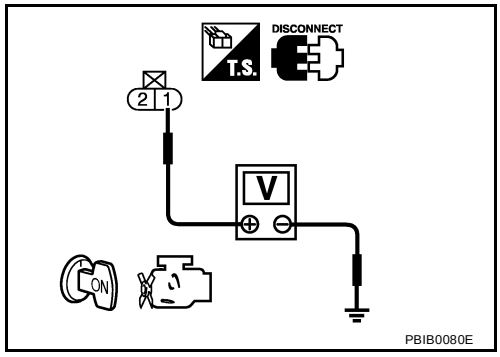
1. CHECK POWER SUPPLY

1. Turn ignition switch “OFF”.
2. Disconnect engine coolant temperature sensor (ECTS) harness connector.
3. Turn ignition switch “ON”.



4. Check voltage between ECTS terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 2.
NG >> Repair or replace harness or connectors.

2. CHECK GROUND CIRCUIT

1. Turn ignition switch “OFF”.
2. Check harness continuity between ECTS terminal 2 and engine ground. Refer to wiring diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Joint connector-3
- Harness for open or short between TCM and engine control temperature sensor
- Harness for open or short between ECM and engine coolant temperature sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-758, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace engine coolant temperature sensor.

5. CHECK INTERMITTENT INCIDENT

Perform EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

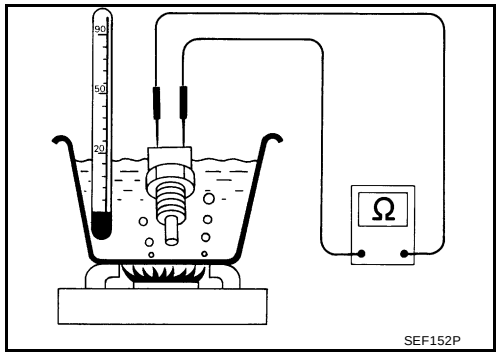
>> **INSPECTION END**

Component Inspection

UBS001T7

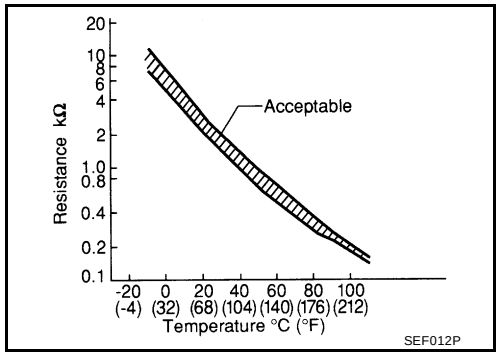
ENGINE COOLANT TEMPERATURE SENSOR

Check resistance as shown in the figure.



<Reference data>

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260



If NG, replace engine coolant temperature sensor.

Removal and Installation

UBS001T8

ENGINE COOLANT TEMPERATURE SENSOR

Refer to EM-15, "OUTER COMPONENT PARTS" .

DTC P0121, P0122, P0123 TP SENSOR

PFP:16119

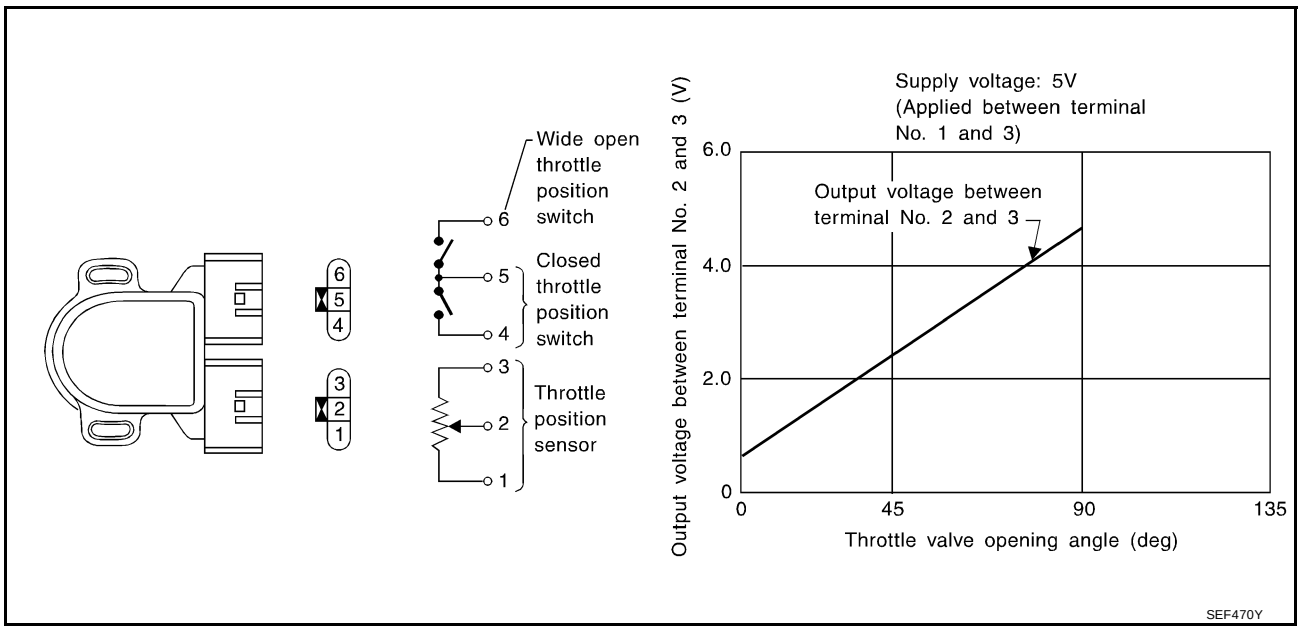
Component Description

UBS001T9

NOTE:
If DTC P0121 or P0122 or P0123 is displayed with DTC P0510, first perform trouble diagnosis for DTC P0510, EC-980 .

The throttle position sensor responds to the accelerator pedal movement. This sensor is a kind of potentiometer which transforms the throttle position into output voltage, and emits the voltage signal to the ECM. In addition, the sensor detects the opening and closing speed of the throttle valve and feeds the voltage signal to the ECM.

Idle position of the throttle valve is determined by the ECM receiving the signal from the throttle position sensor. This sensor controls engine operation such as fuel cut. On the other hand, the “Wide open and closed throttle position switch”, which is built into the throttle position sensor unit, is not used for engine control.



CONSULT-II Reference Value in Data Monitor Mode

UBS001TA

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
THRTL POS SEN	● Engine: After warming up, idle the engine	Throttle valve: fully closed	0.15 - 0.85V
	● Engine: After warming up ● Ignition switch: ON (Engine stopped)	Throttle valve: fully open	3.5 - 4.7V
ABSOL TH·P/S	● Engine: After warming up, idle the engine	Throttle valve: fully closed	0.0%
	● Engine: After warming up ● Ignition switch: ON (Engine stopped)	Throttle valve: fully open	Approx. 80.0%

On Board Diagnosis Logic

UBS001TB

DTC No.		Malfunction is detected when ...	Check Items (Possible Cause)
P0122 P0123	A)	An excessively low (P0122) or high (P0123) voltage from the sensor is sent to ECM.*	● Harness or connectors (The throttle position sensor circuit is open or shorted.) ● Throttle position sensor
P0121	B)	A high voltage from the sensor is sent to ECM under light load driving condition.	● Harness or connectors (The throttle position sensor circuit is open or shorted.) ● Throttle position sensor ● Fuel injector ● Camshaft position sensor ● Mass air flow sensor
	C)	A low voltage from the sensor is sent to ECM under heavy load driving condition.	● Harness or connectors (The throttle position sensor circuit is open or shorted.) ● Intake air leaks ● Throttle position sensor

*: When this malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

Detected items	Engine operating condition in fail-safe mode	
Throttle position sensor circuit	Throttle position will be determined based on the injected fuel amount and the engine speed. Therefore, acceleration will be poor.	
	Condition	Driving condition
	When engine is idling	Normal
	When accelerating	Poor acceleration

DTC Confirmation Procedure

UBS001TC

Perform “PROCEDURE FOR MALFUNCTION A” first. If the 1st trip DTC cannot be confirmed, perform “PROCEDURE FOR MALFUNCTION B”. If there is no problem 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

CAUTION:
Always drive vehicle at a safe speed.
TESTING CONDITION:

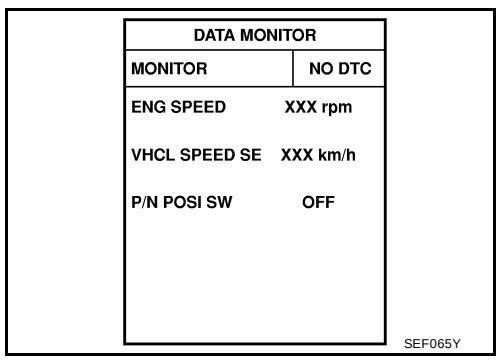
- **Before performing the following procedure, confirm that battery voltage is more than 10V at idle.**
- **This test may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.**

With CONSULT-II

1. Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and maintain the following conditions for at least 5 consecutive seconds.

VHCL SPEED SE	More than 4 km/h (2 MPH)
Selector lever	Suitable position except “P” or “N” position

3. If 1st trip DTC is detected, go to EC-764, "Diagnostic Procedure" .



With GST

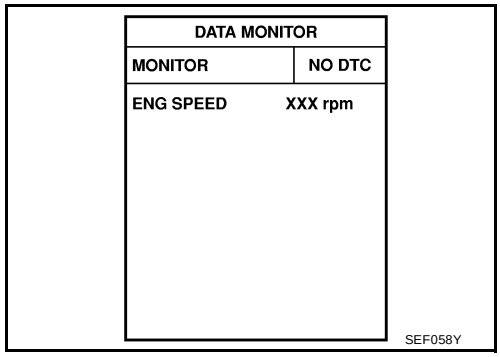
Follow the procedure “With CONSULT-II” above.

PROCEDURE FOR MALFUNCTION B

With CONSULT-II

1. Turn ignition switch “ON”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 10 seconds.
   If idle speed is over 1,000 rpm, maintain the following conditions for at least 10 seconds to keep engine speed below 1,000 rpm.

Selector lever	Suitable position except “P” or “N” position
Brake pedal	Depressed
Vehicle speed	0 km/h (0 MPH)



4. If 1st trip DTC is detected, go to EC-764, "Diagnostic Procedure" .

With GST

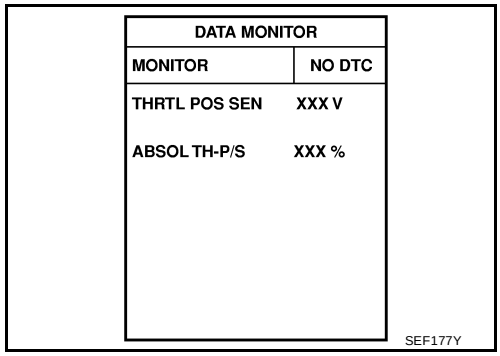
Follow the procedure “With CONSULT-II” above.

PROCEDURE FOR MALFUNCTION C

CAUTION:
Always drive vehicle at a safe speed.

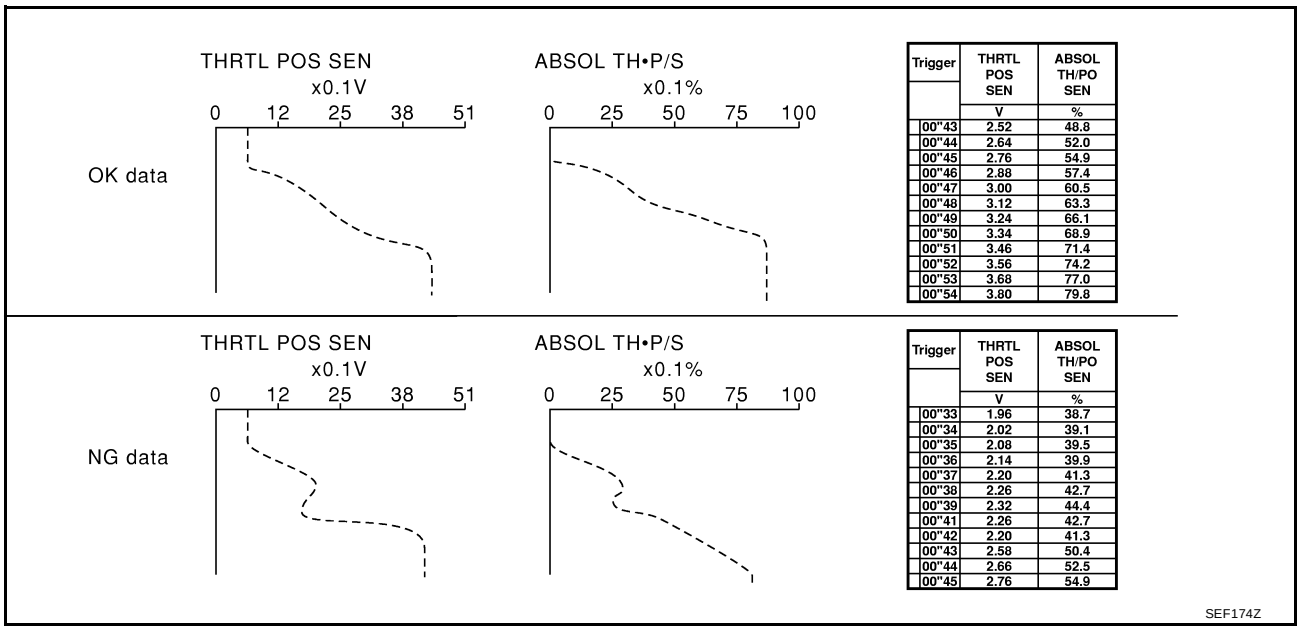
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Turn ignition switch “ON”.
4. Select “MANU TRIG” in “DATA MONITOR” mode with CONSULT-II.
5. Select “THRTL POS SEN” and “ABSOL TH·P/S” in “DATA MONITOR” mode with CONSULT-II.
6. Press RECORD on CONSULT-II SCREEN at the same time accelerator pedal is depressed.
7. Print out the recorded graph and check the following:



- The voltage rise is linear in response to accelerator pedal depression.
- The voltage when accelerator pedal is fully depressed is approximately 4V.
  If NG, go to EC-764, "Diagnostic Procedure" .

If OK, go to following step.



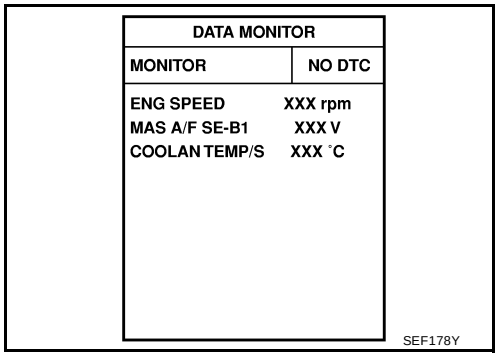
Trigger	THRTL POS SEN	ABSOL TH/PO SEN
	V	%
00"43	2.52	48.8
00"44	2.64	52.0
00"45	2.76	54.9
00"46	2.88	57.4
00"47	3.00	60.5
00"48	3.12	63.3
00"49	3.24	66.1
00"50	3.34	68.9
00"51	3.46	71.4
00"52	3.56	74.2
00"53	3.68	77.0
00"54	3.80	79.8

Trigger	THRTL POS SEN	ABSOL TH/PO SEN
	V	%
00"33	1.96	38.7
00"34	2.02	39.1
00"35	2.08	39.5
00"36	2.14	39.9
00"37	2.20	41.3
00"38	2.26	42.7
00"39	2.32	44.4
00"41	2.26	42.7
00"42	2.20	41.3
00"43	2.58	50.4
00"44	2.66	52.5
00"45	2.76	54.9

SEF174Z

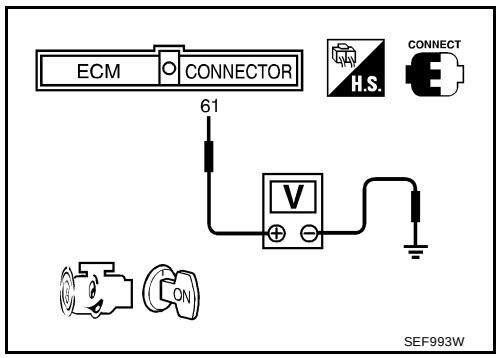
8. Select “AUTO TRIG” in “DATA MONITOR” mode with CONSULT-II.
9. Maintain the following conditions for at least 10 consecutive seconds.

ENG SPEED	More than 2,000 rpm
MAS AIR/FL SE	More than 3V
COOLAN TEMP/S	More than 70°C (158°F)
Selector lever	Suitable position
Driving location	Driving vehicle uphill (Increased engine load) will help maintain the driving conditions required for this test.



SEF178Y

10. If 1st trip DTC is detected, go to EC-764, "Diagnostic Procedure" .



SEF993W

With GST

1. Maintain the following conditions for at least 10 consecutive seconds.

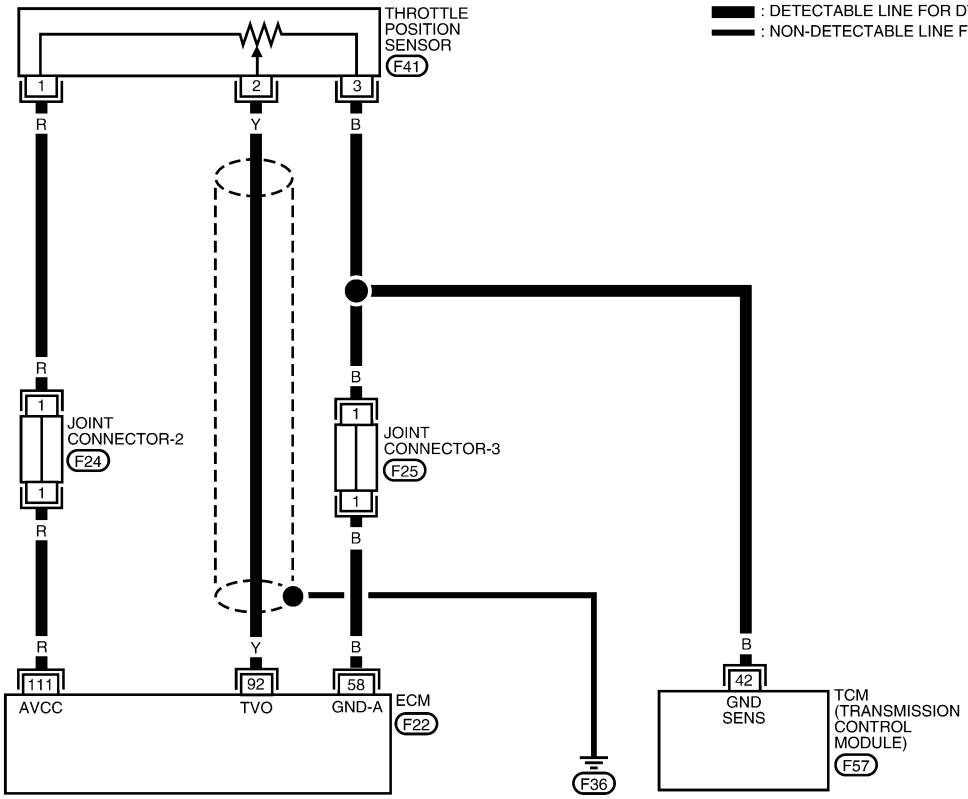
Gear position	Suitable position
Engine speed	More than 2,000 rpm
Engine coolant temperature	More than 70°C (158°F)
Voltage between ECM terminal 61 (Mass air flow sensor signal) and ground	More than 3V

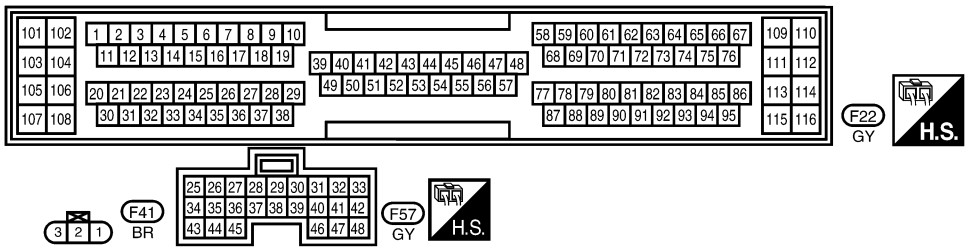
2. If 1st trip DTC is detected, go to EC-764, "Diagnostic Procedure" .

Wiring Diagram

UBS001TD

EC-TPS-01





REFER TO THE FOLLOWING.
F24, F25 - JOINT CONNECTOR

WEC387

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
58	B	SENSOR'S GROUND	IGN ON	APPROX. 0V
92	Y	THROTTLE POSITION SENSOR	ENGINE RUNNING UNDER WARM-UP CONDITION WITH ACCELERATOR PEDAL FULLY RELEASED	0.15 - 0.85V
			IGN ON WITH ACCELERATOR PEDAL FULLY DEPRESSED	3.5 - 4.7V
111	R	SENSOR'S POWER SUPPLY	IGN ON	APPROX. 5V

SEF566YB

Diagnostic Procedure

UBS001TE

1. INSPECTION START

Which malfunction A, B or C is duplicated?

MALFUNCTION	Type
A	A
B	B
C	C

Type A, B or C

Type A or B>>GO TO 4.
Type C >> GO TO 2.

2. ADJUST THROTTLE POSITION SENSOR

Perform EC-652, "Basic Inspection" .

>> GO TO 3.

3. CHECK INTAKE SYSTEM

Check the following for connections.

- Air duct
- Vacuum hoses
- Intake air passage between air duct and intake manifold collector

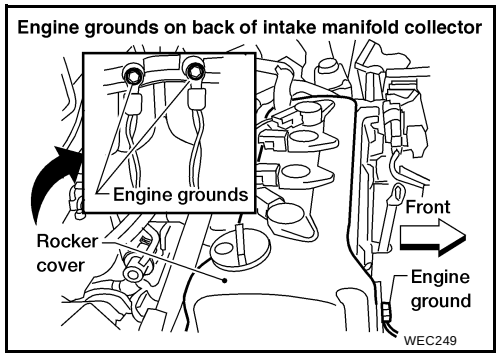
OK or NG

OK >> GO TO 4.
NG >> Reconnect the parts.

4. RETIGHTEN GROUND SCREWS

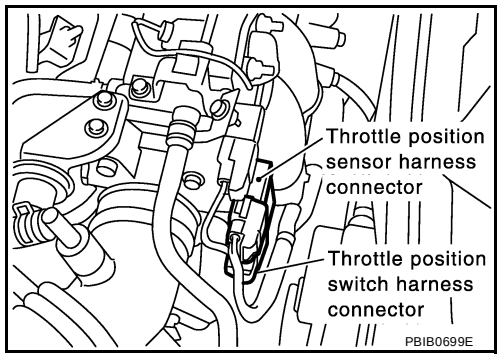
1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

>> GO TO 5.



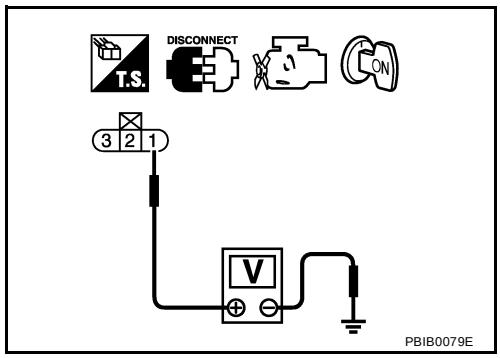
5. CHECK POWER SUPPLY

1. Disconnect throttle position sensor harness connector.
2. Turn ignition switch “ON”.



3. Check voltage between throttle position sensor terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PARTS

Check the following.

- Joint connector-2
- Harness for open or short between throttle position sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK GROUND CIRCUIT

1. Turn ignition switch “OFF”.
2. Check harness continuity between throttle position sensor terminal 3 and engine ground. Refer to the wiring diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

- Joint connector-3
- Harness for open or short between TCM and throttle position sensor
- Harness for open or short between ECM and throttle position sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 92 and throttle position sensor terminal 2. Refer to the wiring diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 10.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK THROTTLE POSITION SENSOR

Refer to EC-767, "Component Inspection" .

OK or NG

OK (Type B in step1)>>GO TO 11.
OK (Type A or C in step1)>>GO TO 14.
NG >> Replace throttle position sensor. To adjust it, perform EC-652, "Basic Inspection" .

11. CHECK MASS AIR FLOW SENSOR

Refer to EC-767, "Component Inspection" .

OK or NG

OK >> GO TO 12.
NG >> Replace mass air flow sensor.

12. CHECK CAMSHAFT POSITION SENSOR

Refer to EC-767, "Component Inspection" .

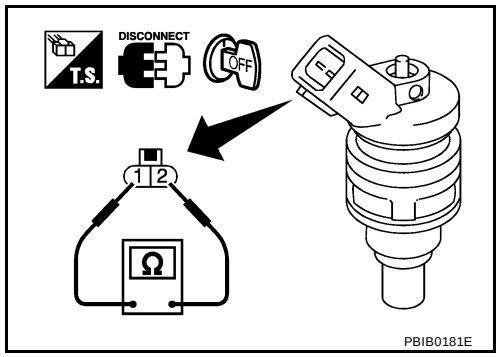
OK or NG

OK >> GO TO 13.
NG >> Replace camshaft position sensor.

13. CHECK FUEL INJECTOR

1. Disconnect injector harness connector.
2. Check resistance between terminals as shown in the figure.

Resistance: 13.5 - 17.5 Ω [at 20°C (68°F)]



OK or NG

OK >> GO TO 14.
NG >> Replace fuel injector.

14. CHECK INTERMITTENT INCIDENT

Perform EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

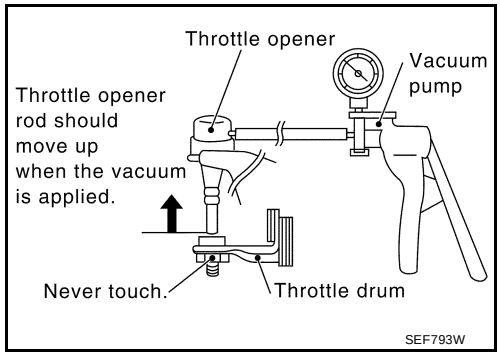
Component Inspection

UBS001TF

THROTTLE POSITION SENSOR

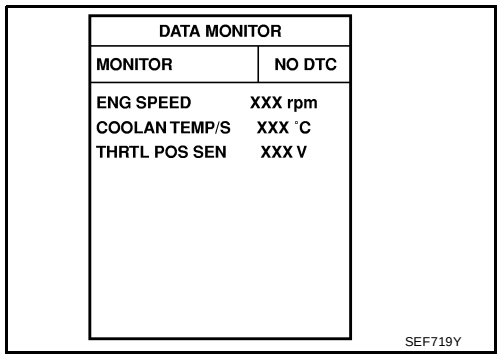
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine (ignition switch OFF).
3. Remove the vacuum hose connected to the throttle opener.
4. Connect suitable vacuum hose to the vacuum pump and the opener.
5. Apply vacuum [more than –40.0 kPa (–300 mmHg, –11.81 inHg)] until the throttle drum becomes free from the rod of the throttle opener.
6. Turn ignition switch ON.



7. Select “DATA MONITOR” mode with CONSULT-II.
8. Check voltage of “THRTL POS SEN” under the following conditions.

   NOTE:
   Voltage measurement must be made with throttle position sensor installed in vehicle.



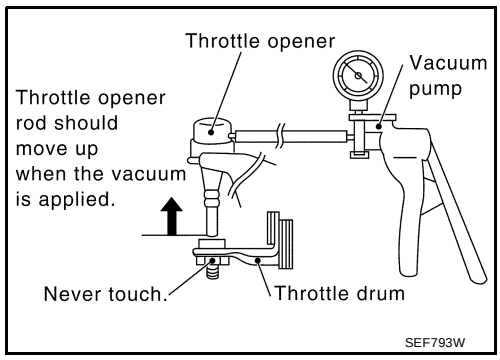
Throttle valve conditions	Voltage V
Completely closed	0.15 - 0.85 (a)
Partially open	Between (a) and (b)
Completely open	3.5 - 4.7 (b)

If NG, adjust closed throttle position switch. Refer to EC-652, "Basic Inspection" .

9. If it is impossible to adjust closed throttle position switch in “Basic Inspection”, replace throttle position sensor.

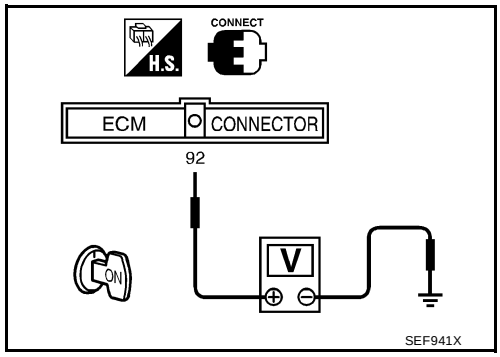
Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine (ignition switch OFF).
3. Remove the vacuum hose connected to the throttle opener.
4. Connect suitable vacuum hose to the vacuum pump and the opener.
5. Apply vacuum [more than –40.0 kPa (–300 mmHg, –11.81 inHg)] until the throttle drum becomes free from the rod of the throttle opener.



6. Turn ignition switch ON.
7. Check voltage between ECM terminal 92 (Throttle position sensor signal) and ground under the following conditions.

   NOTE:
   Voltage measurement must be made with throttle position sensor installed in vehicle.



Throttle valve conditions	Voltage V
Completely closed	0.15 - 0.85 (a)
Partially open	Between (a) and (b)
Completely open	3.5 - 4.7 (b)

If NG, adjust closed throttle position switch. Refer to EC-652, "Basic Inspection" .

8. If it is impossible to adjust closed throttle position switch in “Basic Inspection”, replace throttle position sensor.

Removal and Installation

UBS001TG

THROTTLE POSITION SENSOR

Refer to EM-15, "OUTER COMPONENT PARTS" .

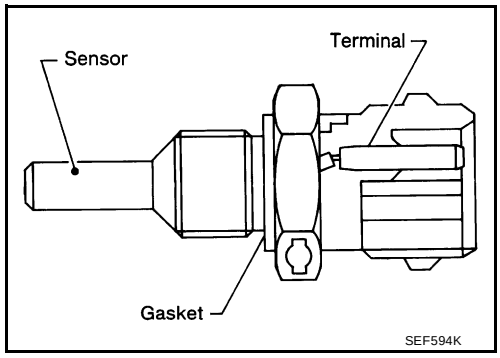
DTC P0125 ECT SENSOR

PFP:22630

Component Description

UBS001TH

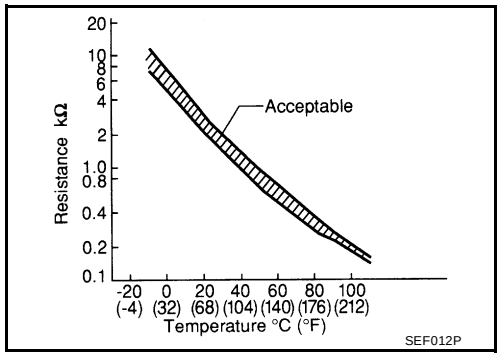
NOTE:
If DTC P0125 is displayed with P0117, P0118, first perform trouble diagnosis for DTC P0117, P0118, EC-754 .
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



<Reference data>

Engine coolant temperature °C (°F)	Voltage* V	Resistance kΩ
–10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.1 - 2.9
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

*: These data are reference values and are measured between ECM terminal 70 (Engine coolant temperature sensor) and ground.



CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use ground other than ECM, such as body ground.

CONSULT-II Reference Value in Data Monitor Mode

UBS001TI

MONITOR ITEM	CONDITION	SPECIFICATION
COOLAN TEMP/S	● Engine: After warming up	More than 70°C (158°F)

On Board Diagnosis Logic

UBS001TJ

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0125	● Voltage sent to ECM from the sensor is not practical, even when some time has passed after starting the engine. ● Engine coolant temperature is insufficient for closed loop fuel control.	● Harness or connectors (High resistance in the circuit) ● Engine coolant temperature sensor ● Thermostat

DTC Confirmation Procedure

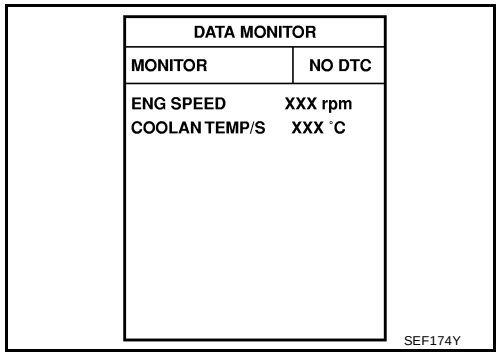
UBS001TK

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 15°C (59°F).
   If it is above 15°C (59°F), the test result will be OK. If it is below 15°C (59°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 15°C (59°F) within 65 minutes, stop engine because the test result will be OK.
5. If 1st trip DTC is detected, go to EC-772, "Diagnostic Procedure"
   .



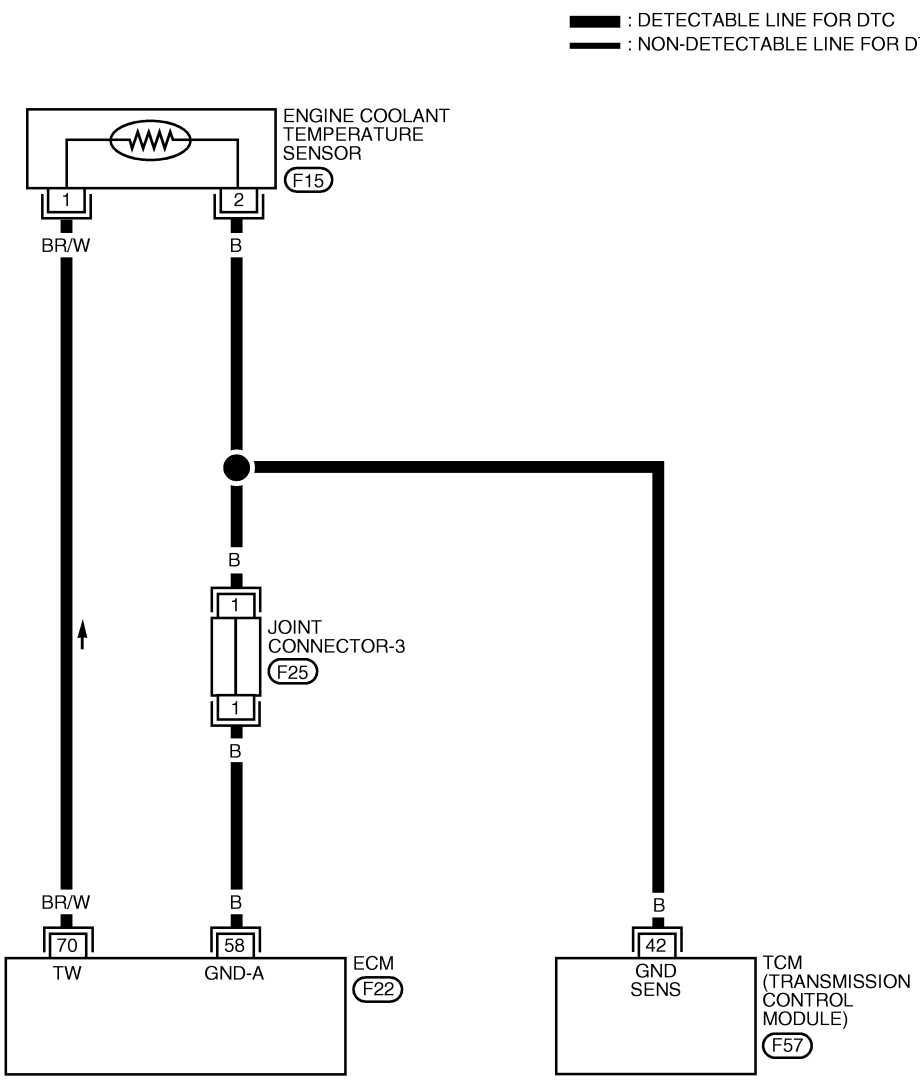
WITH GST

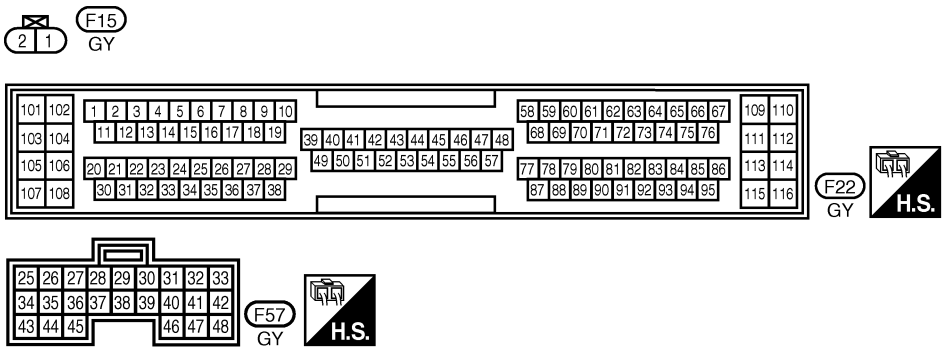
Follow the procedure “With CONSULT-II” above.

Wiring Diagram

UBS001TL

EC-ECTS-01





REFER TO THE FOLLOWING.
F25 - JOINT CONNECTOR

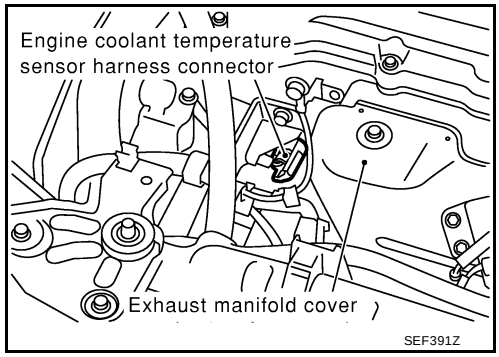
WEC385

Diagnostic Procedure

UBS001TM

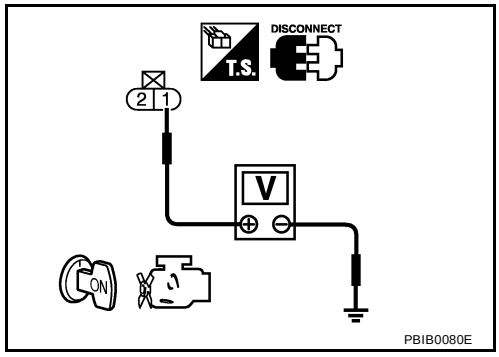
1. CHECK POWER SUPPLY

1. Turn ignition switch “OFF”.
2. Disconnect engine coolant temperature sensor harness connector.
3. Turn ignition switch “ON”.



4. Check voltage between ECTS terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 2.
NG >> Repair or replace harness or connectors.

2. CHECK GROUND CIRCUIT

1. Turn ignition switch “OFF”.
2. Check harness continuity between ECTS terminal 2 and engine ground. Refer to the 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.

- Joint connector
- Harness for open or short between TCM and engine coolant temperature sensor
- Harness for open or short between ECM and engine coolant temperature sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-773, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace engine coolant temperature sensor.

5. CHECK THERMOSTAT OPERATION

When the engine is cooled [lower than 82°C (180°F)], grasp lower radiator hose and confirm the engine coolant does not flow.

OK or NG

OK >> GO TO 6.
NG >> Repair or replace thermostat. Refer to CO-12, "THERMOSTAT AND THERMOSTAT HOUSING" .

6. CHECK INTERMITTENT INCIDENT

Perform EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

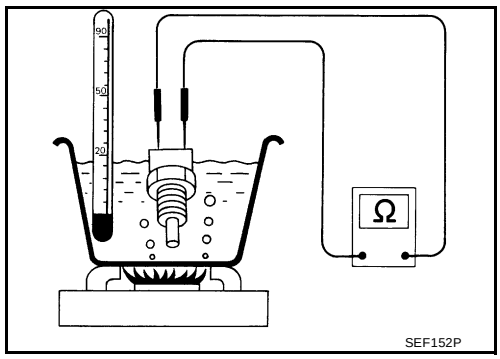
>> **INSPECTION END**

Component Inspection

UBS001TN

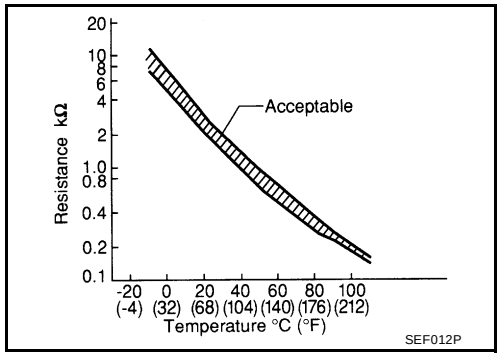
ENGINE COOLANT TEMPERATURE SENSOR

Check resistance as shown in the figure.



<Reference data>

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.0
90 (194)	0.236 - 0.260



If NG, replace engine coolant temperature sensor.

Removal and Installation

UBS001TO

ENGINE COOLANT TEMPERATURE SENSOR

Refer to EM-15, "OUTER COMPONENT PARTS" .

DTC P0128 THERMOSTAT FUNCTION

PFP:21200

On Board Diagnosis Logic

UBS001TP

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 is stuck open.
Malfunction is detected when the engine coolant temperature does not reach the specified temperature even though the engine has run long enough.

Possible Cause

UBS001TQ

- Thermostat function
- Leakage from sealing portion of thermostat
- Engine coolant temperature sensor

DTC Confirmation Procedure

UBS001TR

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-12, "THERMOSTAT AND THERMOSTAT HOUSING" . Use only a genuine NISSAN thermostat as a replacement. If an incorrect thermostat is used, the MIL may come on.
2. Turn ignition switch “ON”.
3. Select “COOLAN TEMP/S” in “DATA MONITOR” mode with CONSULT-II.
4. Check that the “COOLAN TEMP/S” is above 60°C (140°F).
   If it is below 60°C (140°F), go to following step.
   If it is above 60°C (140°F), stop engine and cool down the engine to less than 60°C (140°F), then retry from step 1.
5. Drive vehicle for 10 consecutive minutes under the following conditions.

VHCL SPEED SE	80 - 120 km/h (50 - 75 MPH)

   If 1st trip DTC is detected, go to EC-775, "Diagnostic Procedure" .

WITH GST

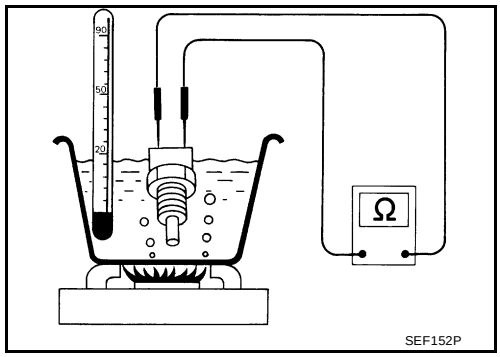
1. Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

UBS001TS

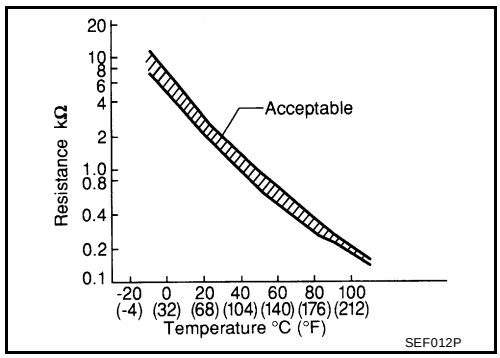
1. CHECK ENGINE COOLANT TEMPERATURE SENSOR

1. Turn ignition switch OFF.
2. Remove engine coolant temperature sensor.
3. Check resistance between engine coolant temperature sensor terminals under the following conditions.



<Reference data>

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.0
90 (194)	0.236 - 0.260



OK or NG

OK >> **INSPECTION END**
NG >> Replace engine coolant temperature sensor.

Removal and Installation

UBS001TT

ENGINE COOLANT TEMPERATURE SENSOR

Refer to EM-15, "OUTER COMPONENT PARTS" .

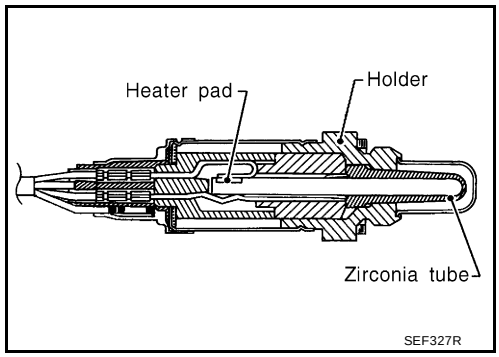
DTC P0138 HO2S2

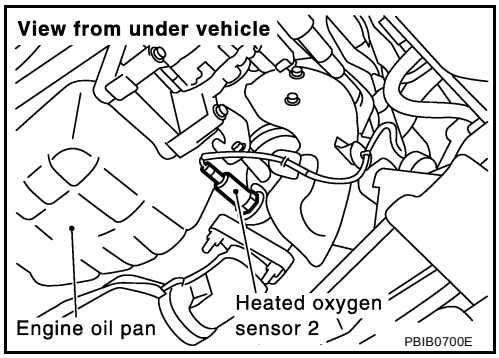
PFP:226A0

Component Description

UBS001TU

The heated oxygen sensor 2, after TWC (Manifold three way catalyst), monitors the oxygen level in the exhaust gas.
Even if switching characteristics of air fuel ratio (A/F) sensor 1 are shifted, the air fuel ratio is controlled to stoichiometric by the signal from 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 heated oxygen sensor 2 is not used for engine control operation.





CONSULT-II Reference Value in Data Monitor Mode

UBS001TV

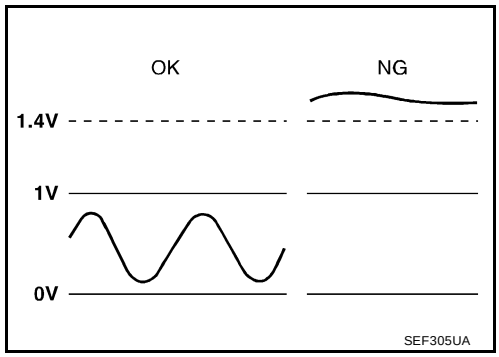
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1)	● Engine: After warming up	Revving engine from idle to 3,000 rpm	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)			LEAN ←→ RICH

On Board Diagnosis Logic

UBS001TW

The heated oxygen sensor 2 has a much longer switching time between rich and lean than air fuel ratio (A/F) sensor 1. The oxygen storage capacity before the TWC (Manifold three way catalyst) causes the longer switching time. To judge the malfunctions of rear heated oxygen sensor 2, ECM monitors whether or not the voltage is too high during various driving conditions such as fuel-cut.



DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0138	● An excessively high voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Heated oxygen sensor 2

DTC Confirmation Procedure

UBS001TX

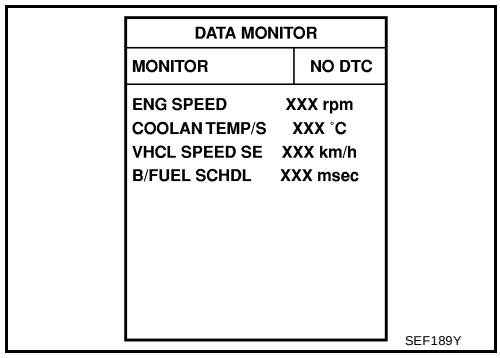
CAUTION:
Always drive vehicle at a safe speed.

NOTE:
If “DTC Confirmation Procedure ” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
3. Stop vehicle with engine running.
4. Let engine idle for 1 minute.
5. Maintain the following conditions for at least 5 consecutive seconds.

ENG SPEED	1,000 - 3,000 rpm
VHCL SPEED SE	More than 64 km/h (40 MPH)
B/FUEL SCHDL	2.0 - 12.5 msec
Selector lever	Suitable position



6. If 1st trip DTC is detected, go to EC-779, "Diagnostic Procedure" .

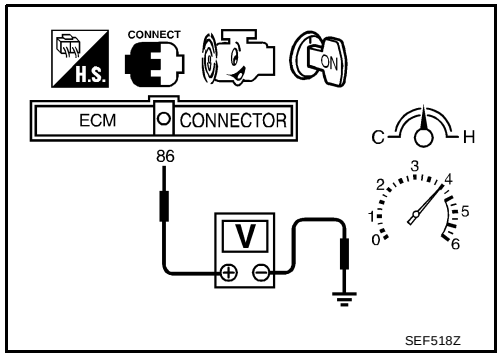
Overall Function Check

UBS001TY

Use this procedure to check the overall function of the rear heated oxygen sensor circuit. During this check, a 1st trip DTC might not be confirmed.

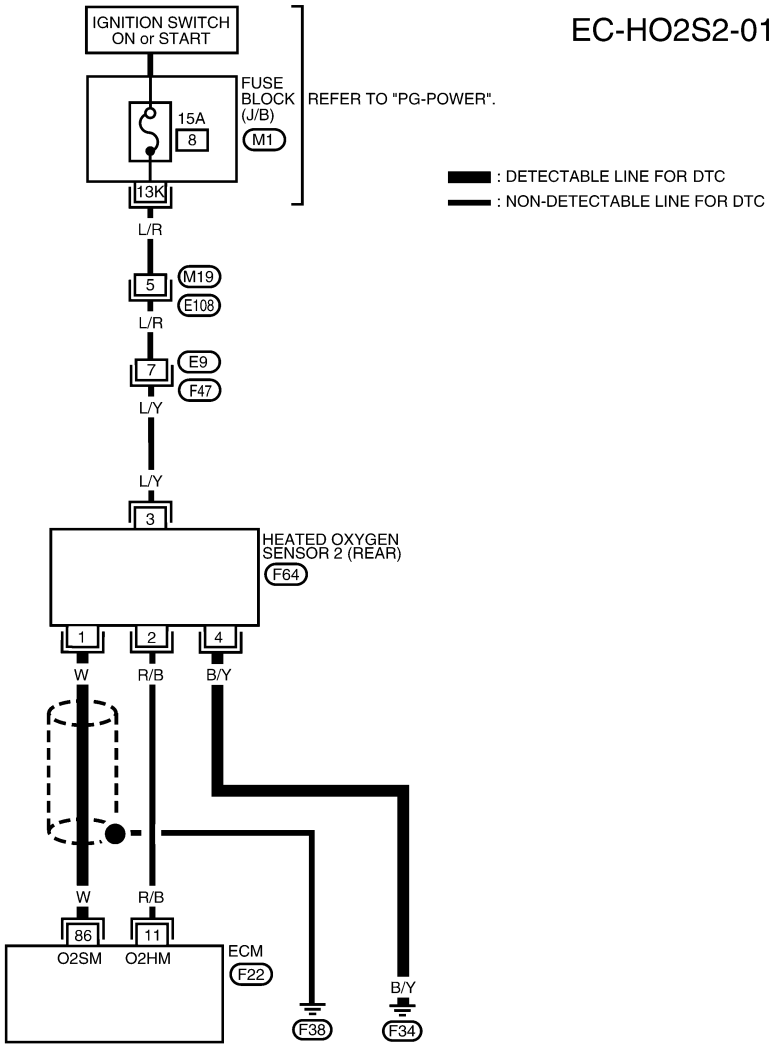
WITHOUT CONSULT-II

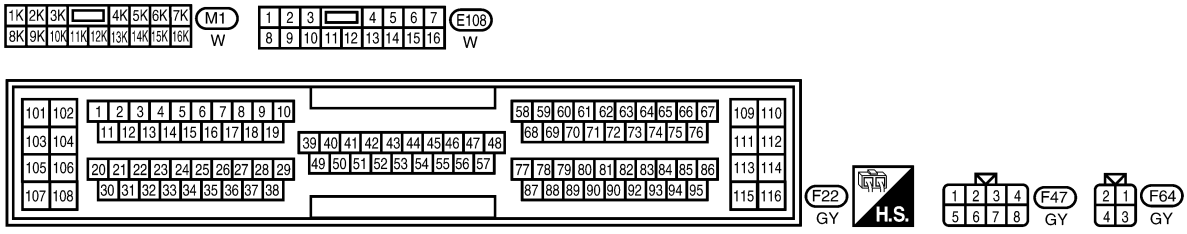
1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Set voltmeter probes between ECM terminals 86 (HO2S2 signal) and engine ground.
4. Check the voltage after revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be below 2V during this procedure.
5. If NG, go to EC-779, "Diagnostic Procedure" .



Wiring Diagram

UBS001TZ





BBWA0152E

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
86	W	HEATED OXYGEN SENSOR 2 (REAR)	ENGINE RUNNING FROM IDLE UP TO 2,000 RPM UNDER WARM-UP CONDITION	0 - APPROX. 1.0V

SEF724YA

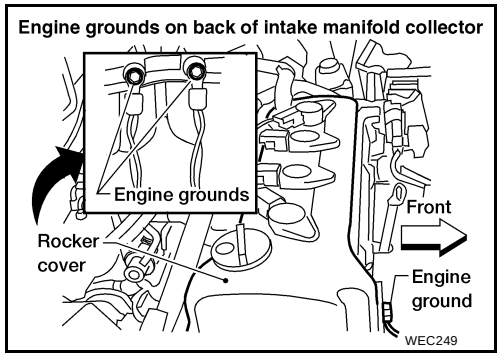
Diagnostic Procedure

UBS001U0

1. RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

>> GO TO 2.



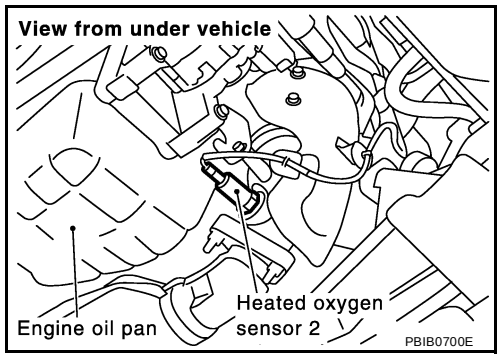
2. CHECK INPUT SIGNAL CIRCUIT

1. Disconnect heated oxygen sensor HO2S2 harness connector and ECM harness connector.
2. Check harness continuity between ECM terminal 86 and HO2S2 terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.

3. Check harness continuity between ECM terminal 86 or HO2S2 terminal 1 and ground.
   Refer to Wiring Diagram.

   Continuity should not exist.



4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK GROUND CIRCUIT

1. Check harness continuity between HO2S2 terminal 4 and engine ground.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Also check harness for short to 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 HARNESS CONNECTOR

Check heated oxygen sensor 2 harness connector for water.

Water should not exist.

OK or NG

OK >> GO TO 5.
NG >> Repair or replace harness connector.

5. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-780, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace heated oxygen sensor 2.

6. CHECK INTERMITTENT INCIDENT

Perform EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

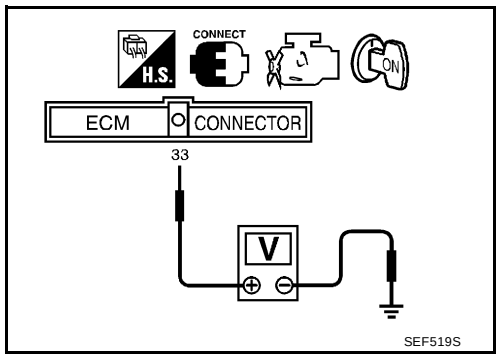
Component Inspection

UBS001U1

HEATED OXYGEN SENSOR 2

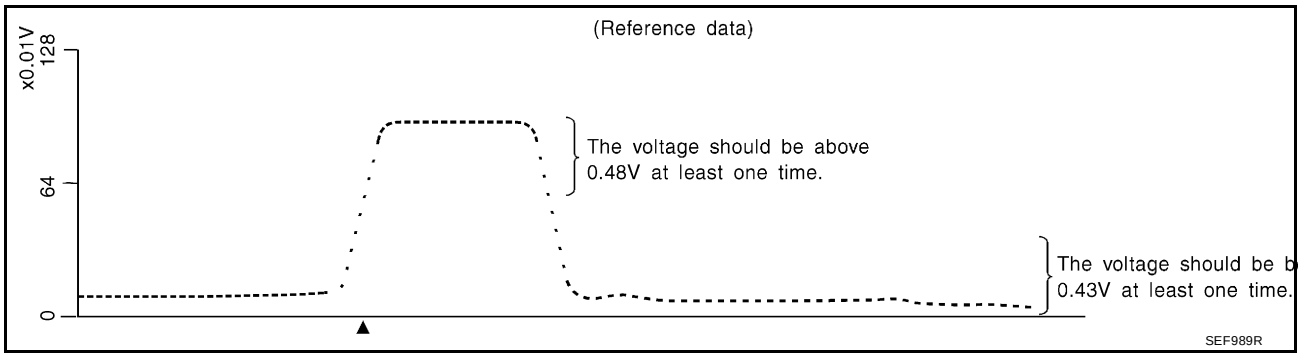
With CONSULT-II

1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)” as the monitor item with CONSULT-II.
4. Check “HO2S2 (B1)” at idle speed when adjusting “FUEL INJECTION” to ±25%.
   “HO2S2 (B1)” should be above 0.48V at least once when the “FUEL INJECTION” is +25%.
   “HO2S2 (B1)” should be below 0.43V at least once when the “FUEL INJECTION” is −25%.



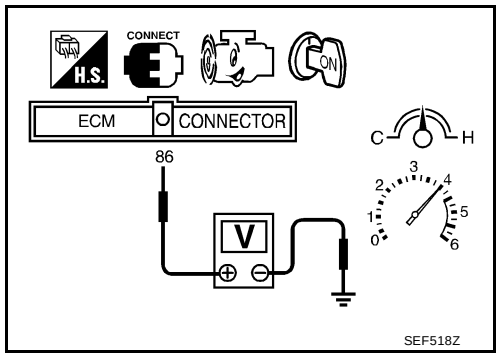
CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**



Without CONSULT-II

1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Set voltmeter probes between ECM terminals 86 (HO2S2 signal) and engine ground.
4. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.48V at least once.
   If the voltage is above 0.48V at step 4, step 5 is not necessary.



5. Check the voltage when revving up to 6,000 rpm under no load. Or keep vehicle idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with “OD” OFF.
   The voltage should be below 0.43V at least once.

   CAUTION:
   - **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
   - **Before installing new heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

UBS001U2

HEATED OXYGEN SENSOR 2

Refer to EX-3, "Removal and Installation"

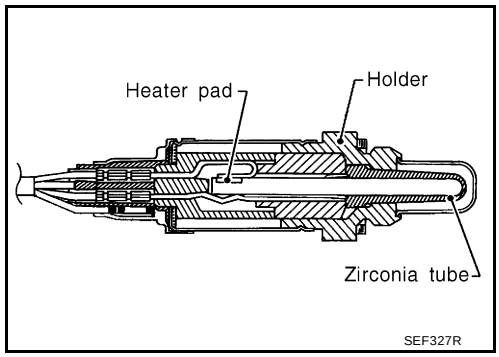
DTC P0139 HO2S2

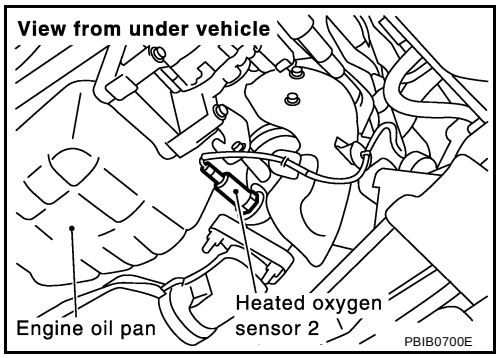
PFP:226A0

Component Description

UBS001U3

The heated oxygen sensor 2, after TWC (Manifold three way catalyst), monitors the oxygen level in the exhaust gas.
Even if switching characteristics of air fuel ratio (A/F) sensor 1 are shifted, the air fuel ratio is controlled to stoichiometric by the signal from 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 heated oxygen sensor 2 is not used for engine control operation.





CONSULT-II Reference Value in Data Monitor Mode

UBS001U4

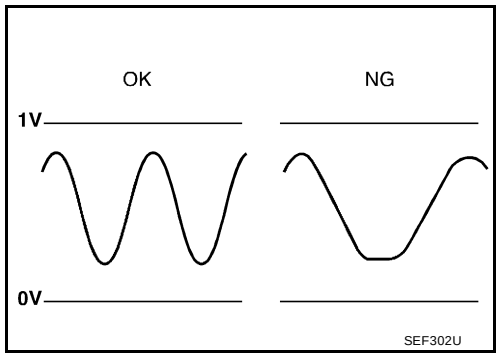
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1)	● Engine: After warming up	Revving engine from idle to 3,000 rpm	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)			LEAN ←→ RICH

On Board Diagnosis Logic

UBS001U5

The heated oxygen sensor 2 has a much longer switching time between rich and lean than air fuel ratio (A/F) sensor 1. The oxygen storage capacity before the TWC (Manifold three way catalyst) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the switching response of the sensor's voltage is faster than specified during various driving conditions such as fuel-cut.



DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0139	● It takes more than the specified time for the sensor to respond between rich and lean.	● Harness or connectors (The sensor circuit is open or shorted.) ● Heated oxygen sensor 2 ● Fuel pressure ● Injectors ● Intake air leaks

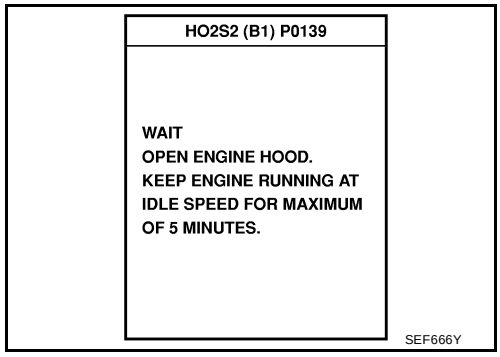
DTC Confirmation Procedure

UBS001U6

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Open engine hood before conducting following procedure.

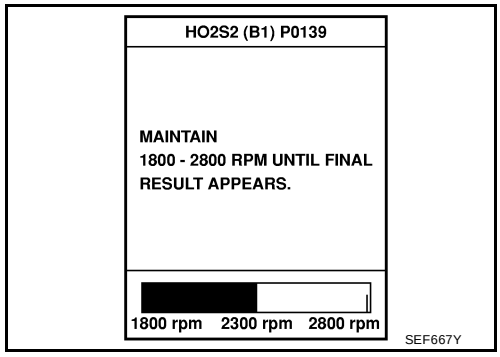
WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Turn ignition switch “ON”.
4. Select “DATA MONITOR” mode with CONSULT-II.
5. Make sure that “COOLAN TEMP/S” indicates more than 70°C (158°F).
6. Select “HO2S2 (B1) P0139” of “HO2S2” in “DTC WORK SUPPORT” mode with CONSULT-II.

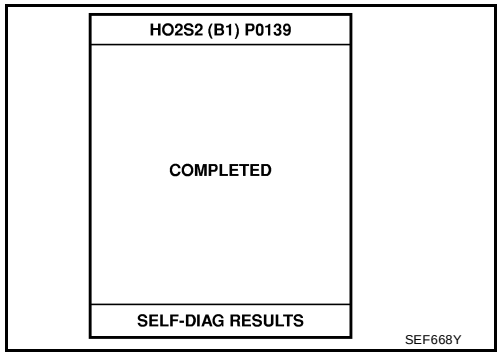


7. Start engine and follow the instruction of CONSULT-II.
8. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”.
   If NG is displayed, refer to EC-786, "Diagnostic Procedure" .
   If “CANNOT BE DIAGNOSED” is displayed, perform the following.

- Stop engine and cool down until “COOLAN TEMP/S” indicates less than 70°C (158°F).
- Turn ignition switch “ON”.
- Select “DATA MONITOR” mode with CONSULT-II.
- Start engine.



- Return to step 6 again when the “COOLAN TEMP/S” reaches to 70°C (158°F).



Overall Function Check

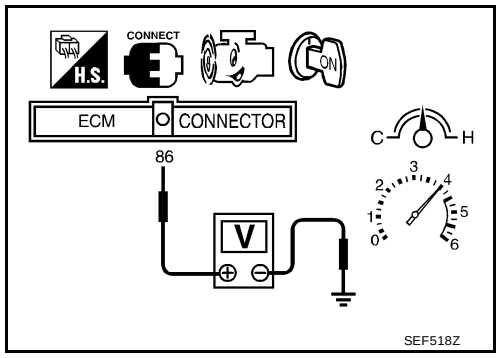
UBS001U7

Use this procedure to check the overall function of the rear heated oxygen sensor circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

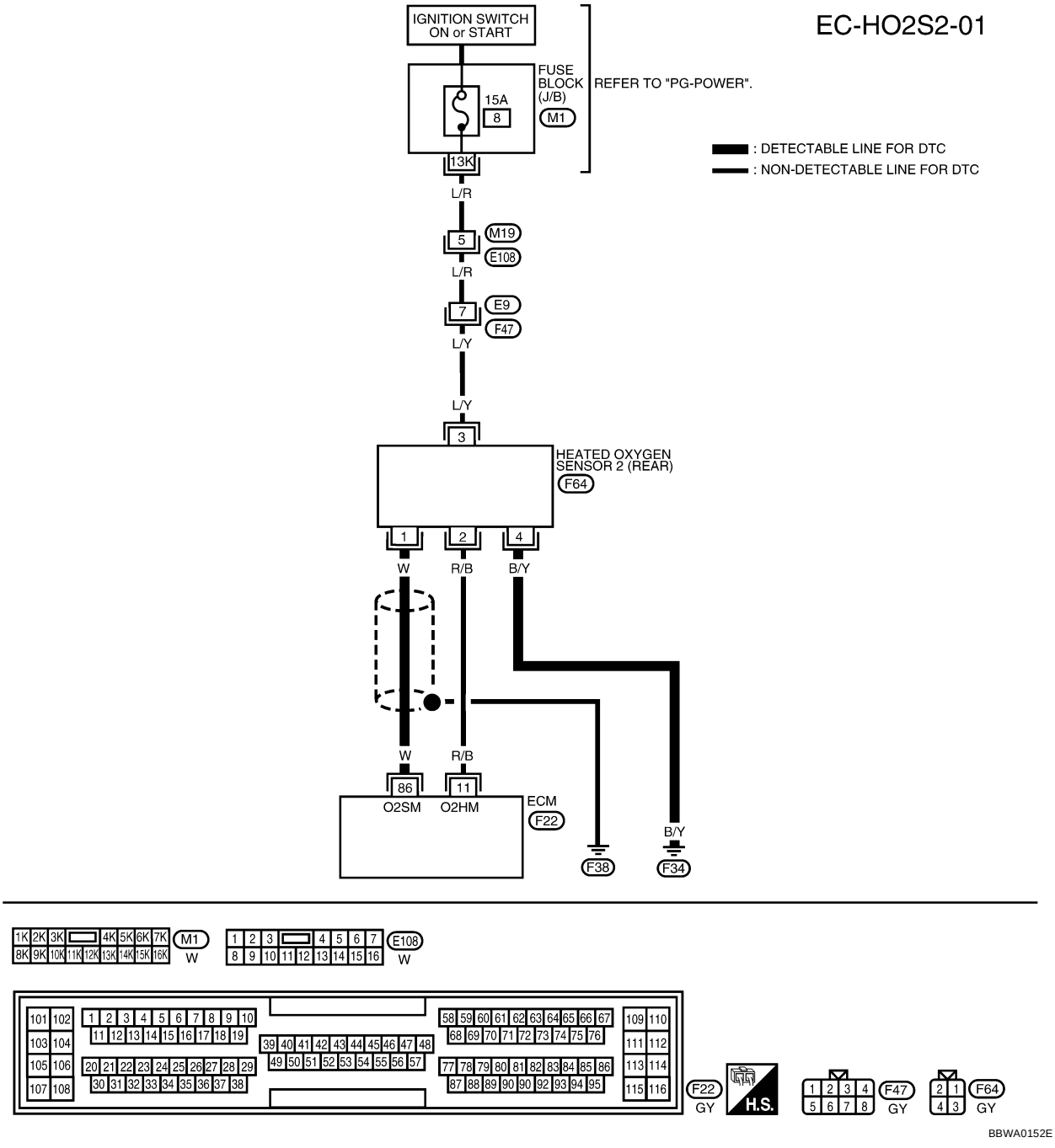
1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.

2. Stop vehicle with engine running.
3. Set voltmeter probes between ECM terminals 86 (HO2S2 signal) and engine ground.
4. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should change at more than 0.06V for 1 second during this procedure.
   If the voltage can be confirmed in step 4, step 5 is not necessary.
5. Keep vehicle idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with “OD” OFF.
   The voltage should change at more than 0.06V for 1 second during this procedure.
6. If NG, go to EC-786, "Diagnostic Procedure" .



Wiring Diagram

UBS001U8



BBWA0152E

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
86	W	HEATED OXYGEN SENSOR 2 (REAR)	ENGINE RUNNING FROM IDLE UP TO 2,000 RPM UNDER WARM-UP CONDITION	0 - APPROX. 1.0V

SEF724YA

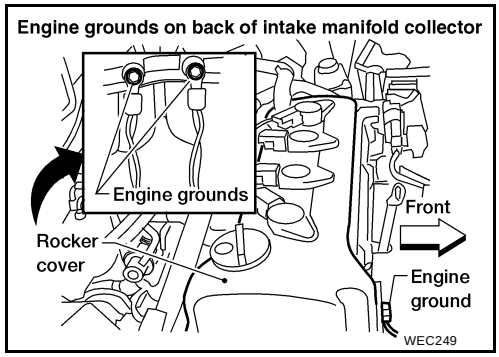
Diagnostic Procedure

UBS001U9

1. RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

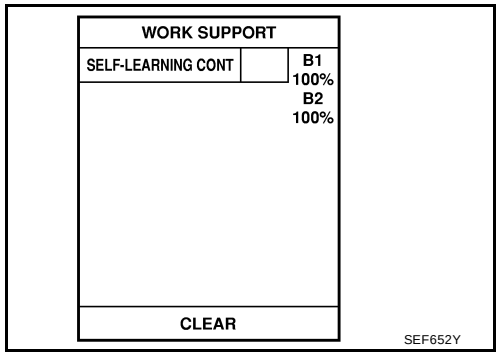
>> GO TO 2.



2. CLEAR THE SELF-LEARNING DATA

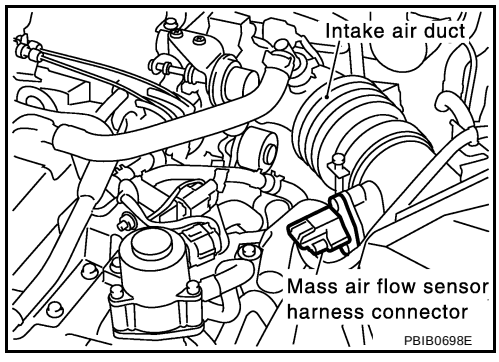
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171, P0172 detected? Is it difficult to start engine?



Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF”.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 3 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC P0102 is displayed.
6. Erase the 1st trip DTC memory. Refer to EC-637, "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 detected? Is it difficult to start engine?



Yes or No

Yes >> Perform trouble diagnosis for DTC P0171, P0172. Refer to EC-802, "DTC P0171 FUEL INJECTION SYSTEM FUNCTION" , or EC-809, "DTC P0172 FUEL INJECTION SYSTEM FUNCTION" .

No >> GO TO 3.

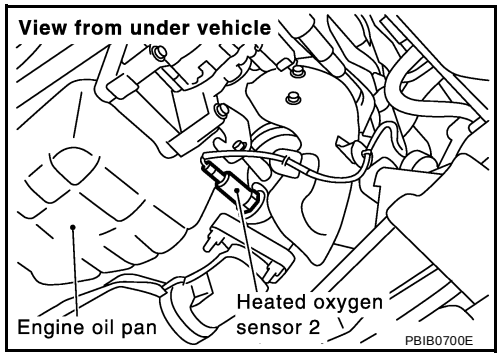
3. CHECK INPUT SIGNAL CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect heated oxygen sensor 2 harness connector and ECM harness connector.
3. Check harness continuity between ECM terminal 86 and HO2S2 terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Check harness continuity between ECM terminal 86 or HO2S2 terminal 1 and ground.
   Refer to Wiring Diagram.

   Continuity should not exist.



5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK GROUND CIRCUIT

1. Check harness continuity between HO2S2 terminal 4 and engine ground.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Also check harness for short to 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

Refer to EC-788, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace heated oxygen sensor 2.

6. CHECK INTERMITTENT INCIDENT

Perform EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

UBS001UA

HEATED OXYGEN SENSOR 2

With CONSULT-II

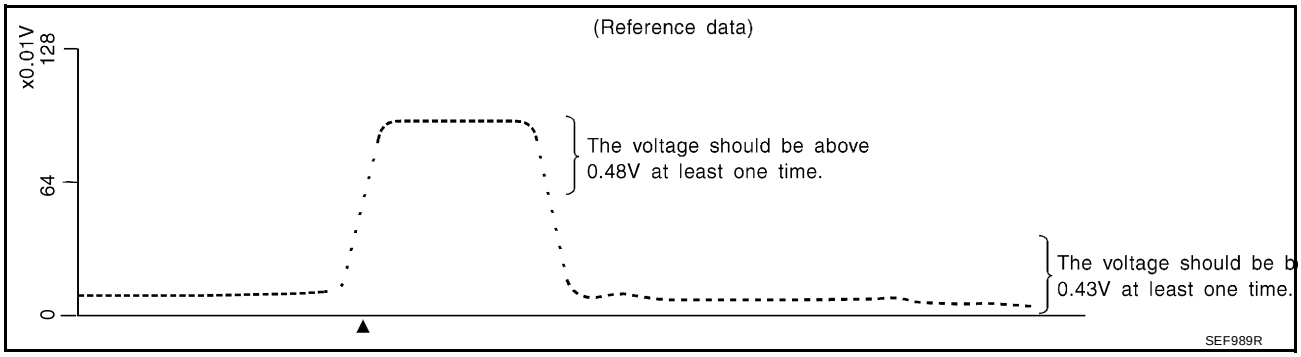
1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)” as the monitor item with CONSULT-II.
4. Check “HO2S2 (B1)” at idle speed when adjusting “FUEL INJECTION” to ±25%.
   “HO2S2 (B1)” should be above 0.48V at least once when the “FUEL INJECTION” is +25%.
   “HO2S2 (B1)” should be below 0.43V at least once when the “FUEL INJECTION” is −25%.

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
A/F SEN1 (B1)	XXX V
HO2S2 (B1)	XXX V
HO2S3 (B1)	XXX V

SEF519Z

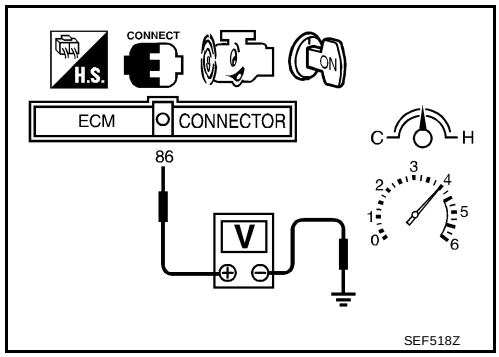
CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**



With CONSULT-II

1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Set voltmeter probes between ECM terminals 86 (HO2S2 signal) and engine ground.
4. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.48V at least once.
   If the voltage is above 0.48V at step 4, step 5 is not necessary.



5. Check the voltage when revving up to 6,000 rpm under no load. Or keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with “OD” OFF.
   The voltage should be below 0.43V at least once.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

UBS001UB

HEATED OXYGEN SENSOR 2

Refer to EX-3, "Removal and Installation" .

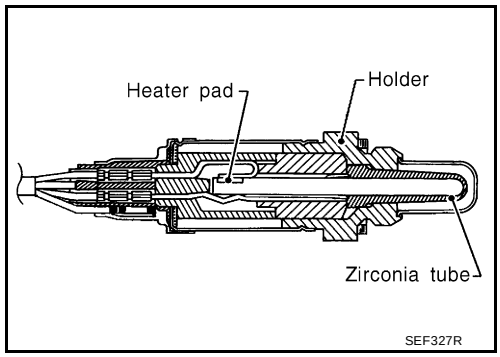
DTC P0144 HO2S3

PFP:226A0

Component Description

UBS001UC

The heated oxygen sensor 3, after ADS-TWC (Adsorber pre-catalyst), monitors the oxygen level in the exhaust gas.
This sensor is used for recovery control of air fuel ratio after the fuel cut operation.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.



CONSULT-II Reference Value in Data Monitor Mode

UBS001UD

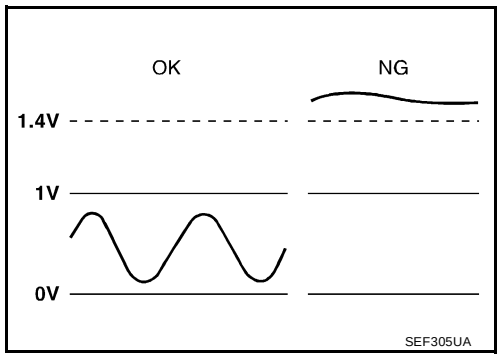
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S3 (B1)	● Engine: After warming up	Revving engine from idle to 3,000 rpm	0 - 0.3V ←→ Approx. 0.6 - 1.0V

On Board Diagnosis Logic

UBS001UE

The heated oxygen sensor 3 has a much longer switching time between rich and lean than air fuel ratio (A/F) sensor 1. The oxygen storage capacity before the TWC (Manifold three way catalyst) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 3, ECM monitors whether or not the voltage is too high during various driving conditions such as fuel-cut.



DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0144	● An excessively high voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Heated oxygen sensor 3

DTC Confirmation Procedure

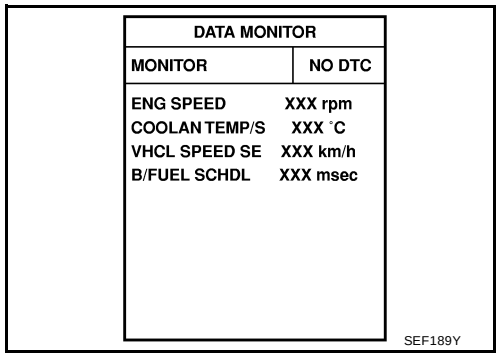
UBS001UF

CAUTION:
Always drive vehicle at a safe speed.

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
3. Stop vehicle with engine running.
4. Let engine idle for 1 minute.
5. Maintain the following conditions for at least 5 consecutive seconds.



ENG SPEED	1,000 - 3,000 rpm
VHCL SPEED SE	More than 64 km/h (40 MPH)
B/FUEL SCHDL	2.0 - 12.5 msec
Selector lever	Suitable position

6. If 1st trip DTC is detected, go to EC-792, "Diagnostic Procedure" .

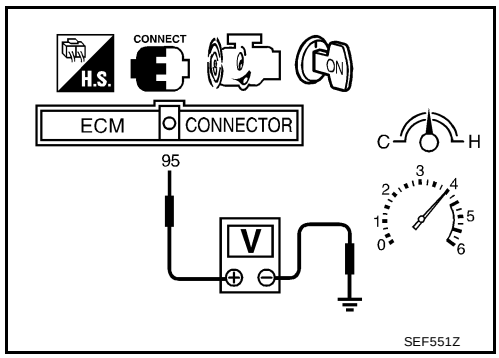
Overall Function Check

UBS001UG

Use this procedure to check the overall function of the rear heated oxygen sensor circuit. During this check, a 1st trip DTC might not be confirmed.

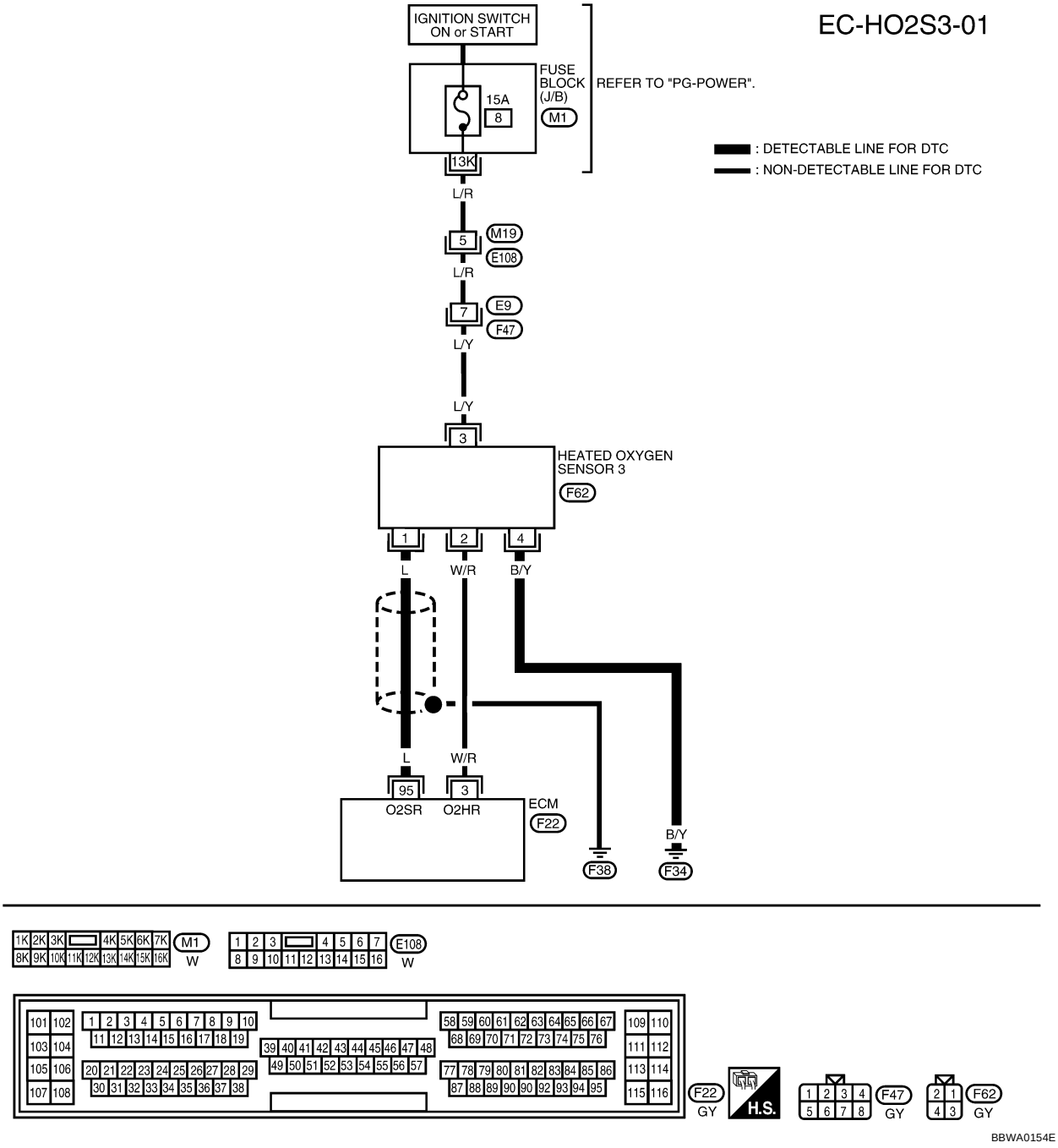
WITHOUT CONSULT-II

1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Set voltmeter probes between ECM terminals 95 (HO2S3 signal) and engine ground.
4. Check the voltage after 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 2V during this procedure.
5. If NG, go to EC-792, "Diagnostic Procedure" .



Wiring Diagram

UBS001UH



ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
95	L	HEATED OXYGEN SENSOR 3	ENGINE RUNNING FROM IDLE UP TO 2,000 RPM UNDER WARM-UP CONDITION	0 - APPROX. 1.0V

SEF724YB

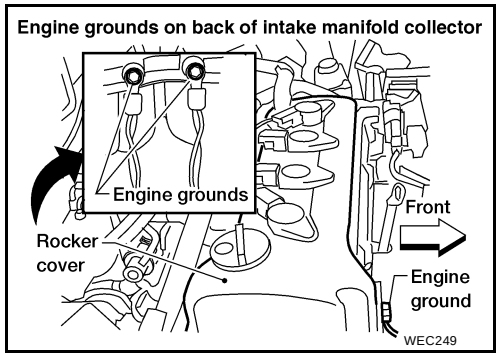
Diagnostic Procedure

UBS001UI

1. RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

>> GO TO 2.



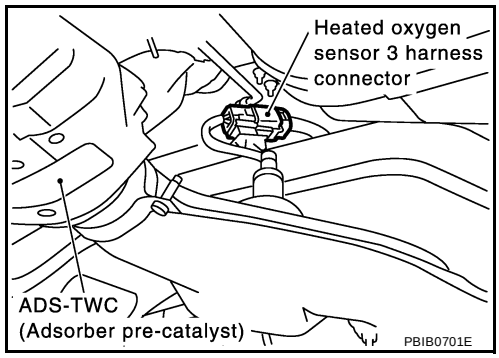
2. CHECK INPUT SIGNAL CIRCUIT

1. Disconnect heated oxygen sensor 3 harness connector and ECM harness connector.
2. Check harness continuity between ECM terminal 95 and HO2S3 terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.

3. Check harness continuity between ECM terminal 95 or HO2S3 terminal 1 and ground.
   Refer to Wiring Diagram.

   Continuity should not exist.



4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK GROUND CIRCUIT

1. Check harness continuity between HO2S3 terminal 4 and engine ground.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK HARNESS CONNECTOR

Check heated oxygen sensor 3 harness connector for water.

Water should not exist.

OK or NG

OK >> GO TO 5.
NG >> Repair or replace harness connector.

5. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-793, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace corresponding heated oxygen sensor 3.

6. CHECK INTERMITTENT INCIDENT

Perform EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

UBS001UJ

HEATED OXYGEN SENSOR 3

With CONSULT-II

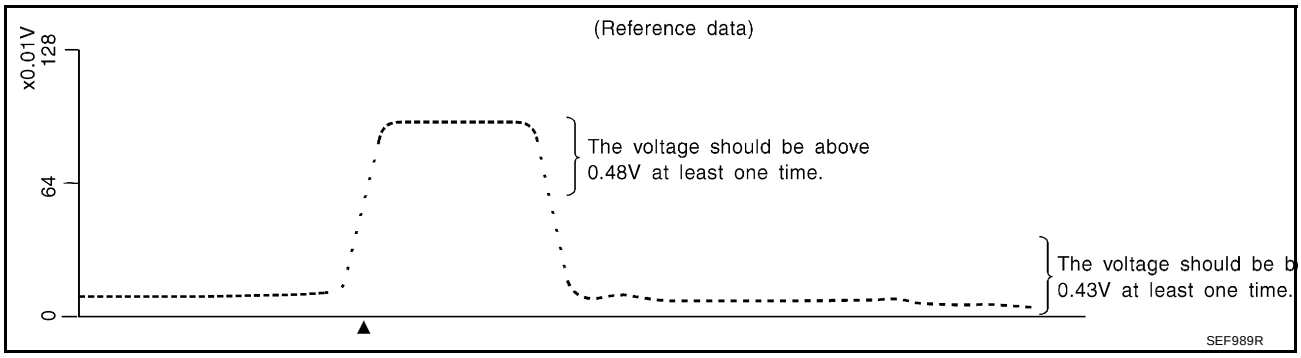
1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S3 (B1)” as the monitor item with CONSULT-II.
4. Check “HO2S3 (B1)” at idle speed when adjusting “FUEL INJECTION” to ±25%.
   “HO2S3 (B1)” should be above 0.48V at least once when the “FUEL INJECTION” is +25%.
   “HO2S3 (B1)” should be below 0.43V at least once when the “FUEL INJECTION” is −25%.

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
A/F SEN1 (B1)	XXX V
HO2S2 (B1)	XXX V
HO2S3 (B1)	XXX V

SEF519Z

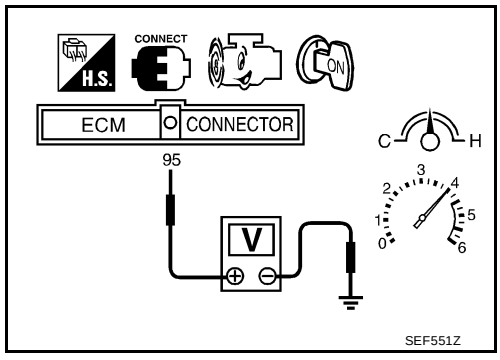
CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**



Without CONSULT-II

1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Set voltmeter probes between ECM terminals 95 (HO2S3 signal) and engine ground.
4. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.48V at least once.
   If the voltage is above 0.48V at step 4, step 5 is not necessary.



5. Check the voltage when revving up to 6,000 rpm under no load. Or keep vehicle idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with “OD” OFF.
   The voltage should be below 0.43V at least once.

   CAUTION:
   - **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
   - **Before installing new heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

UBS001UK

HEATED OXYGEN SENSOR 3

Refer to EX-3, "Removal and Installation" .

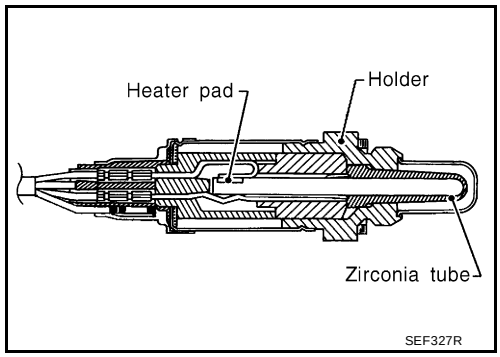
DTC P0145 HO2S3

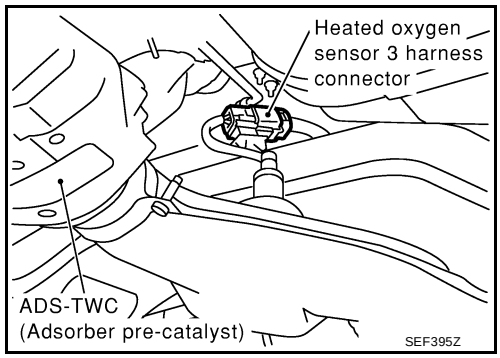
PFP:226A0

Component Description

UBS001UL

The heated oxygen sensor 3, after ADS-TWC (Adsorber pre-catalyst), monitors the oxygen level in the exhaust gas.
This sensor is used for recovery control of air fuel ratio after the fuel cut operation.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.





CONSULT-II Reference Value in Data Monitor Mode

UBS001UM

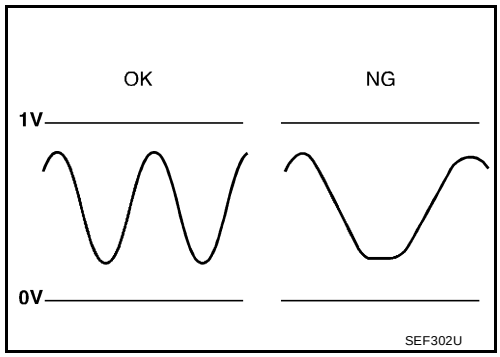
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S3 (B1)	● Engine: After warming up	Revving engine from idle to 3,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V

On Board Diagnosis Logic

UBS001UN

The heated oxygen sensor 3 has a much longer switching time between rich and lean than air fuel ratio (A/F) sensor 1. The oxygen storage capacity before the TWC (Manifold three way catalyst) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 3, ECM monitors whether the switching response of the sensor's voltage is faster than specified during various driving conditions such as fuel-cut.



DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0145	● It takes more than the specified time for the sensor to respond between rich and lean.	● Harness or connectors (The sensor circuit is open or shorted.) ● Heated oxygen sensor 3 ● Fuel pressure ● Injectors ● Intake air leaks

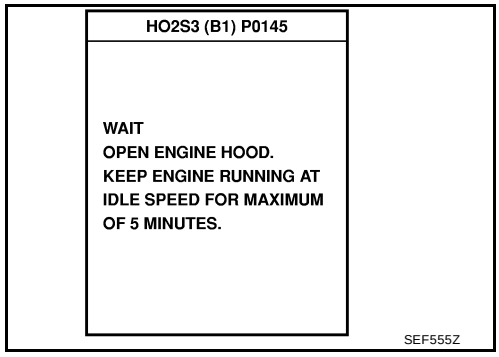
DTC Confirmation Procedure

UBS001UO

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Open engine hood before conducting following procedure.

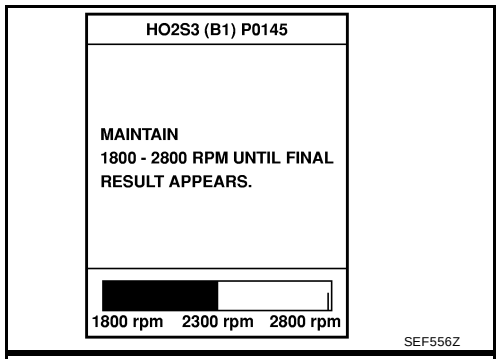
WITH CONSULT-II

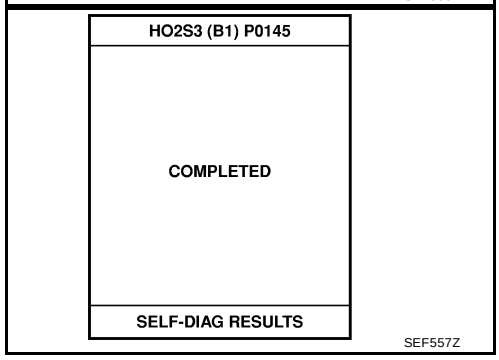
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Turn ignition switch “ON”.
4. Select “DATA MONITOR” mode with CONSULT-II.
5. Make sure that “COOLAN TEMP/S” indicates more than 70°C (158°F).
6. Select “HO2S3 (B1) P0145” of “HO2S3” in “DTC WORK SUPPORT” mode with CONSULT-II.
7. Start engine and follow the instruction of CONSULT-II.



8. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”.
   If NG is displayed, refer to EC-799, "Diagnostic Procedure" .
   If “CANNOT BE DIAGNOSED” is displayed, perform the following.

- Stop engine and cool down until “COOLAN TEMP/S” indicates less than 70°C (158°F).
- Turn ignition switch “ON”.
- Select “DATA MONITOR” mode with CONSULT-II.
- Start engine.
- Return to step 6 again when the “COOLAN TEMP/S” reaches to 70°C (158°F).

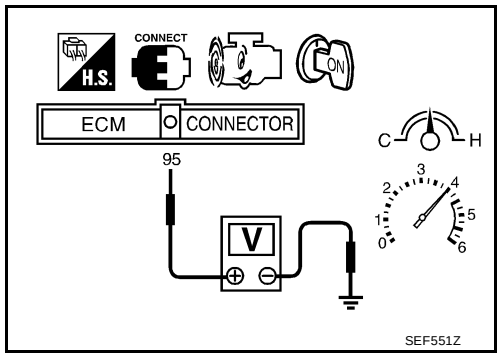




Overall Function Check

UBS001UP

Use this procedure to check the overall function of the rear heated oxygen sensor circuit. During this check, a 1st trip DTC might not be confirmed.

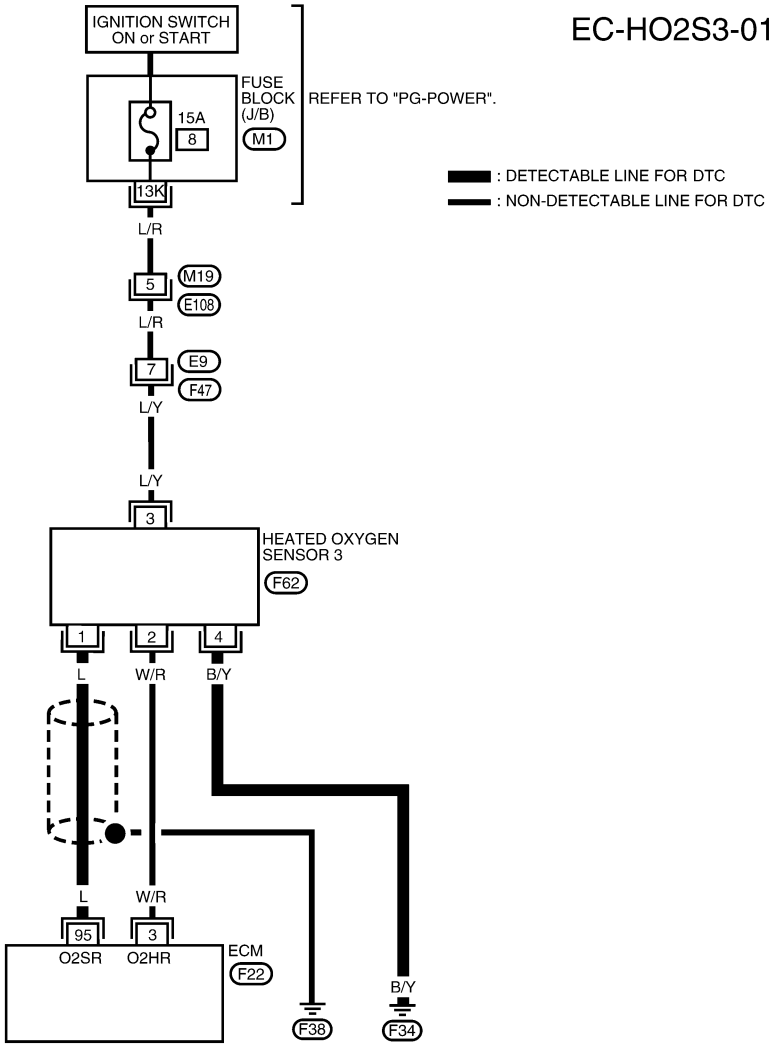


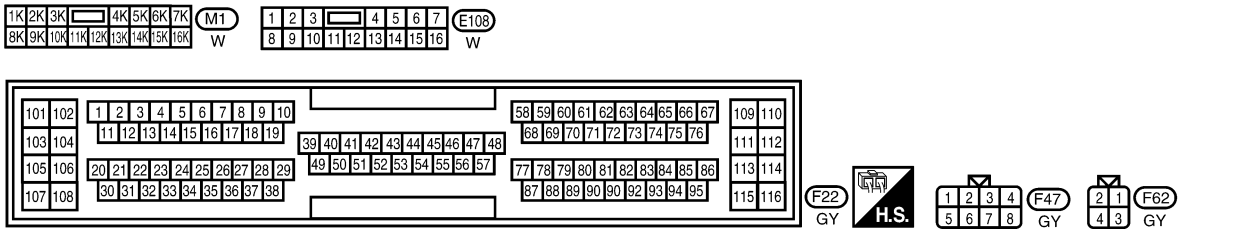
WITH GST

1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Set voltmeter probes between ECM terminals 95 (HO2S3 signal) and engine ground.
4. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should change at more than 0.06V for 1 second during this procedure.
   If the voltage can be confirmed in step 4, step 5 is not necessary.
5. Keep vehicle idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with “OD” OFF.
   The voltage should change at more than 0.06V for 1 second during this procedure.
6. If NG, go to EC-799, "Diagnostic Procedure" .

Wiring Diagram

UBS001UQ





BBWA0154E

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
95	L	HEATED OXYGEN SENSOR 3	ENGINE RUNNING FROM IDLE UP TO 2,000 RPM UNDER WARM-UP CONDITION	0 - APPROX. 1.0V

SEF724YB

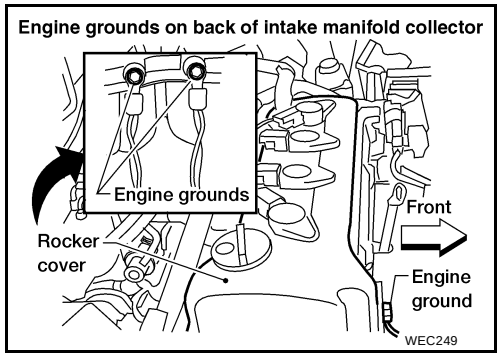
Diagnostic Procedure

UBS001UR

1. RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

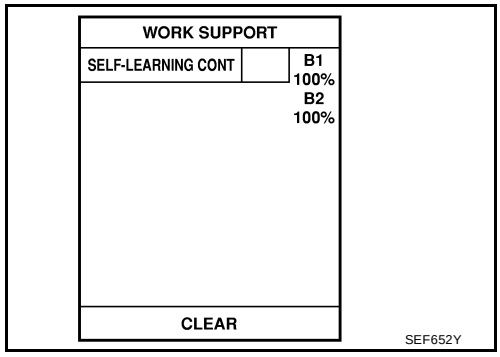
>> GO TO 2.



2. CLEAR THE SELF-LEARNING DATA

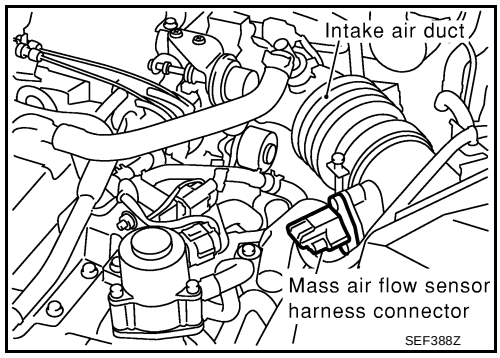
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171, P0172 detected? Is it difficult to start engine?



Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF”.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 3 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC P0102 is displayed.
6. Erase the 1st trip DTC memory. Refer to EC-637, "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 detected? Is it difficult to start engine?



Yes or No

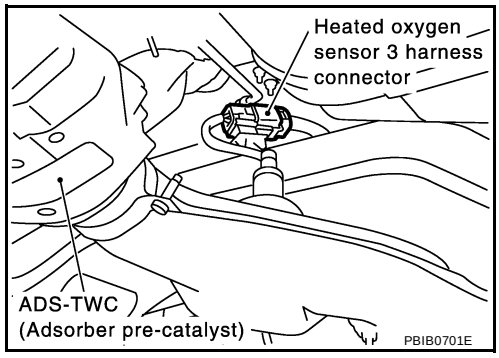
Yes >> Perform trouble diagnosis for DTC P0171, P0172. Refer to EC-802 , EC-809 .
No >> GO TO 3.

3. CHECK INPUT SIGNAL CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect heated oxygen sensor 3 harness connector and ECM harness connector.
3. Check harness continuity between ECM terminal 95 and HO2S3 terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.
4. Check harness continuity between ECM terminal 95 HO2S3 terminal 1 and ground.
   Refer to Wiring Diagram.

   Continuity should not exist.



5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK GROUND CIRCUIT

1. Check harness continuity between HO2S3 terminal 4 and engine ground.
   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 HEATED OXYGEN SENSOR 3

Refer to EC-801, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace corresponding heated oxygen sensor 3.

6. CHECK INTERMITTENT INCIDENT

Perform EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

UBS001US

HEATED OXYGEN SENSOR 3

With CONSULT-II

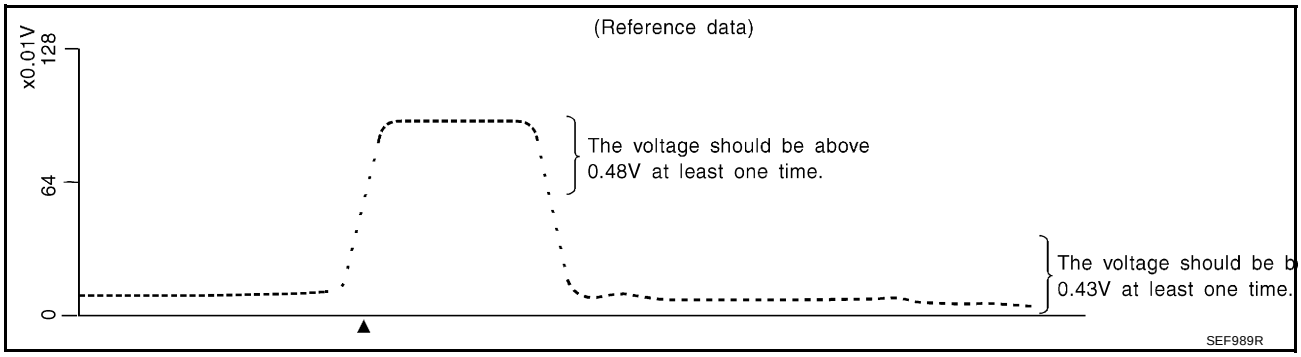
1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S3 (B1)” as the monitor item with CONSULT-II.
4. Check “HO2S3 (B1)” at idle speed when adjusting “FUEL INJECTION” to ±25%.
   “HO2S3 (B1)” should be above 0.48V at least once when the “FUEL INJECTION” is +25%.
   “HO2S3 (B1)” should be below 0.43V at least once when the “FUEL INJECTION” is −25%.

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
A/F SEN1 (B1)	XXX V
HO2S2 (B1)	XXX V
HO2S3 (B1)	XXX V

SEF519Z

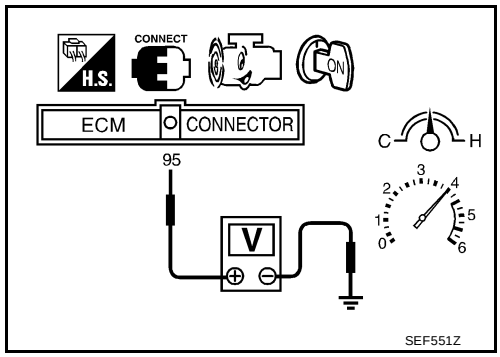
CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**



Without CONSULT-II

1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Set voltmeter probes between ECM terminals 95 (HO2S3 terminal) and engine ground.
4. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.48V at least once.
   If the voltage is above 0.48V at step 4, step 5 is not necessary.



5. Check the voltage when revving up to 6,000 rpm under no load. Or keep vehicle idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with “OD” OFF.
   The voltage should be below 0.43V at least once.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

UBS001UT

HEATED OXYGEN SENSOR 2

Refer to EX-3, "Removal and Installation" .

DTC P0171 FUEL INJECTION SYSTEM FUNCTION

PFP:16600

On Board Diagnosis Logic

UBS001UU

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) sensor 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios.
In case the amount of the compensation value is extremely large (The actual mixture ratio is too lean.), the ECM judges the condition as the fuel injection system malfunction and lights up the MIL (2 trip detection logic).

Sensor	Input Signal to ECM	ECM function	Actuator
Air fuel ratio (A/F) sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection & mixture ratio control	Injectors

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0171	● Fuel injection system does not operate properly. ● The amount of mixture ratio compensation is too large. (The mixture ratio is too lean.)	● Intake air leaks ● Air fuel ratio (A/F) sensor 1 ● Injectors ● Exhaust gas leaks ● Incorrect fuel pressure ● Lack of fuel ● Mass air flow sensor ● Incorrect PCV hose connection

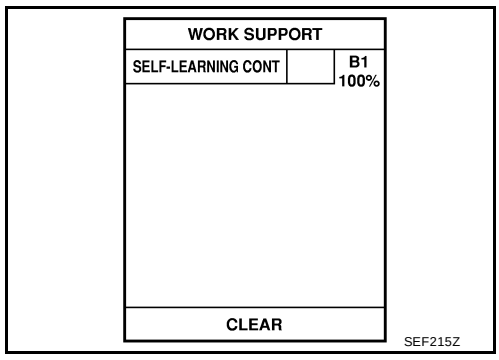
DTC Confirmation Procedure

UBS001UV

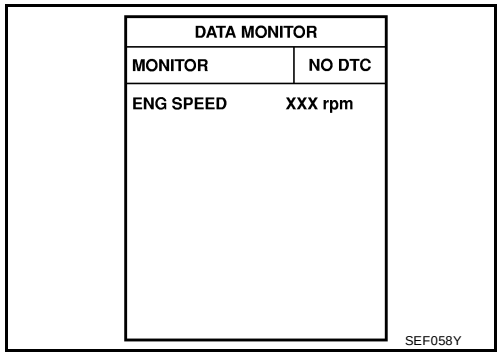
NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

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.

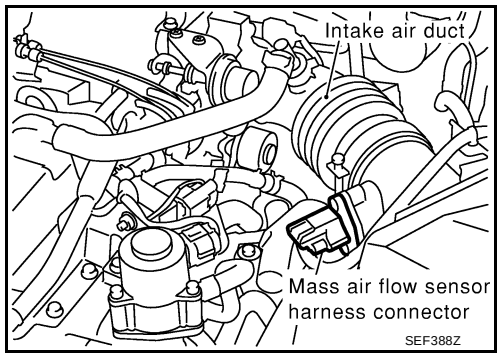


6. Start engine again and let it idle for at least 10 minutes.
   The 1st trip DTC P0171 should be detected at this stage, if a malfunction exists. If so, go to EC-805, "Diagnostic Procedure" .
7. If it is difficult to start engine at step 6, the fuel injection system has a malfunction.
8. Crank engine while depressing accelerator pedal. If engine starts, go to EC-805, "Diagnostic Procedure" . If engine does not start, visually check for exhaust and intake air leak.



WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Disconnect mass air flow sensor harness connector. Then restart and run engine for at least 3 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Select “MODE 7” with GST. Make sure 1st trip DTC P0102 is detected.
6. Select “MODE 4” with GST and erase the 1st trip DTC P0102.
7. Start engine again and run it for at least 10 minutes at idle speed.

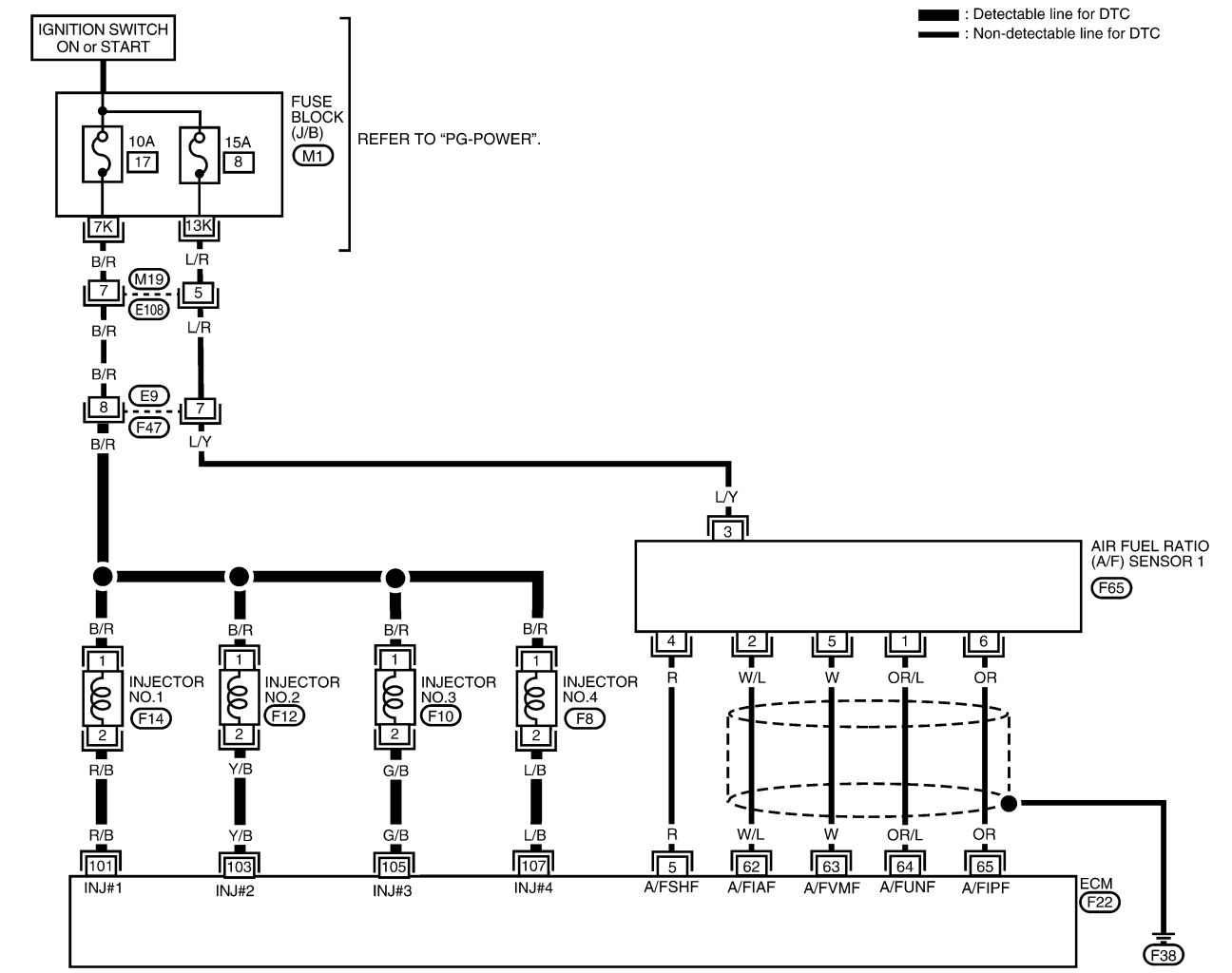


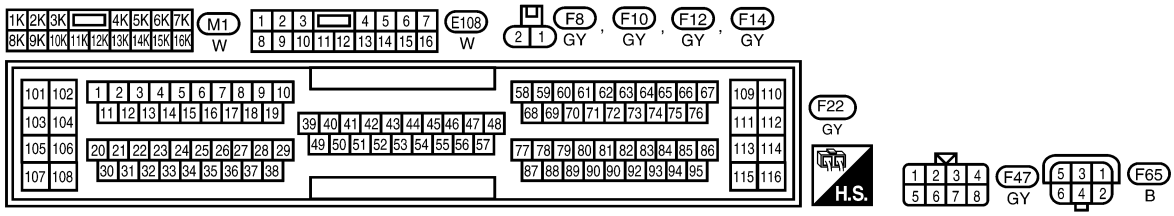
8. Select “MODE 7” with GST. The 1st trip DTC P0171 should be detected at this stage, if a malfunction exists. If so, go to EC-805, "Diagnostic Procedure" .
9. If it is difficult to start engine at step 8, the fuel injection system has a malfunction.
10. Crank engine while depressing accelerator pedal. If engine starts, go to EC-805, "Diagnostic Procedure" . If engine does not start, visually check for exhaust and intake air leak.

Wiring Diagram

UBS001UW

EC-FUEL-01





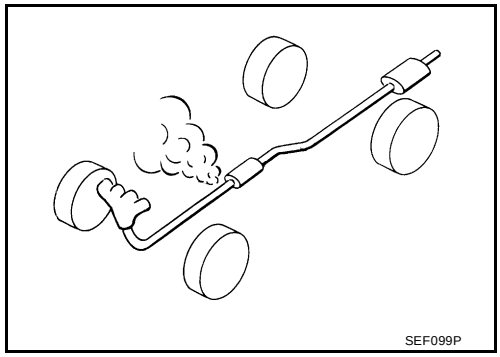
BBWA0156E

Diagnostic Procedure

UBS001UX

1. CHECK EXHAUST AIR LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust air leak before TWC (Manifold three way catalyst).



OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2. CHECK FOR INTAKE AIR LEAK AND PCV HOSE

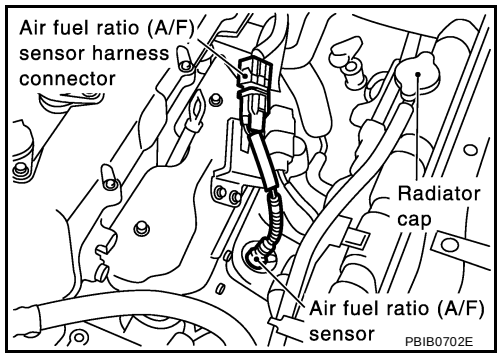
1. Listen for an intake air leak after the mass air flow sensor.
2. Check PCV hose connection.

OK or NG

OK >> GO TO 3.
NG >> Repair or replace.

3. CHECK AIR FUEL RATIO (A/F) SENSOR 1 CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect A/F sensor 1 harness connector and ECM harness connector.
3. Check harness continuity between ECM terminals and A/F sensor 1 terminals as follows.
   Refer to Wiring Diagram.



ECM terminal	A/F sensor 1
62	2
63	5
64	1
65	6

Continuity should exist.

4. Check harness continuity between ECM terminals 62, 63, 64, 65 and ground, or A/F sensor 1 terminals 1, 2, 5, 6 and ground.
   Refer to Wiring Diagram.

Continuity should not exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK FUEL PRESSURE

1. Release fuel pressure to zero.
   Refer to EC-624 .
2. Install fuel pressure gauge and check fuel pressure.

At idling: 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-1176 .
- Fuel lines. Refer to MA-18, "Checking Fuel Lines" .
- Fuel filter for clogging

OK or NG

OK >> Replace fuel pressure regulator.
NG >> 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.

at idling:	**1.4 - 4.0 g·m/sec**
at 2,500 rpm:	**5.0 - 10.0 g·m/sec**

With GST

1. Install all removed parts.
2. Check mass air flow sensor signal in MODE 1 with GST.

at idling:	**1.4 - 4.0 g·m/sec**
at 2,500 rpm:	**5.0 - 10.0 g·m/sec**

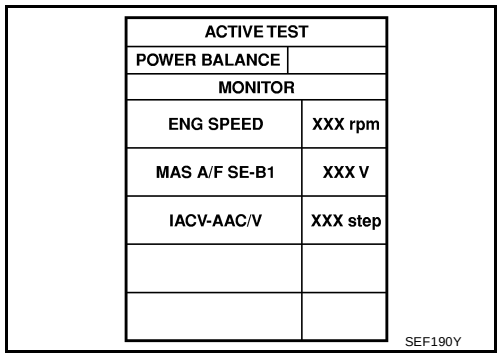
OK or NG

OK >> GO TO 7.
NG >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-734 .

7. CHECK FUNCTION OF INJECTORS

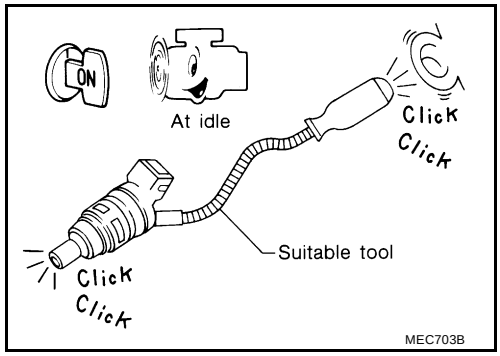
With CONSULT-II

1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-II.
3. Make sure that each circuit produces a momentary engine speed drop.



Without CONSULT-II

1. Start engine.
2. Listen to each injector operating sound.
   Clicking noise should be heard.



OK or NG

OK >> GO TO 8.
NG >> Perform trouble diagnosis for EC-1169, "INJECTOR" .

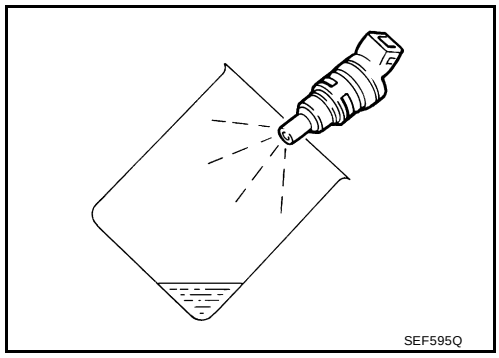
8. REMOVE INJECTOR

1. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
2. Turn ignition switch “OFF”.
3. Remove injector with fuel tube assembly. Refer to EM-22, "FUEL INJECTOR AND FUEL TUBE" .
   Keep fuel hose and all injectors connected to injector gallery. The injector harness connectors should remain connected.

>> GO TO 9.

9. CHECK INJECTOR

1. Disconnect all ignition wires.
2. Place pans or saucers under each injector.
3. Crank engine for about 3 seconds. Make sure that fuel sprays out from injectors.
   Fuel should be sprayed evenly for each cylinder.



OK or NG

OK >> GO TO 10.
NG >> Replace injectors from which fuel does not spray out. Always replace O-ring with new one.

10. CHECK INTERMITTENT INCIDENT

Perform EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

DTC P0172 FUEL INJECTION SYSTEM FUNCTION

PFP:16600

On Board Diagnosis Logic

UBS001UY

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) sensor 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios.
In case the amount of the compensation value is extremely large (The actual mixture ratio is too rich.), the ECM judges the condition as the fuel injection system malfunction and lights up the MIL (2 trip detection logic).

Sensor	Input Signal to ECM	ECM function	Actuator
Air fuel ratio (A/F) sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection & mixture ratio control	Injectors

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0172	● Fuel injection system does not operate properly. ● The amount of mixture ratio compensation is too large. (The mixture ratio is too rich.)	● Air fuel ratio (A/F) sensor 1 ● Injectors ● Exhaust gas leaks ● Incorrect fuel pressure ● Mass air flow sensor

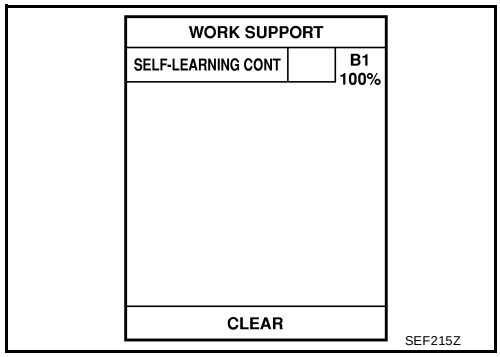
DTC Confirmation Procedure

UBS001UZ

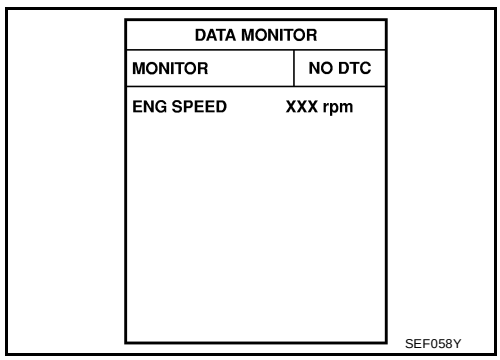
NOTE:
If “DTC Confirmation Procedure ” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

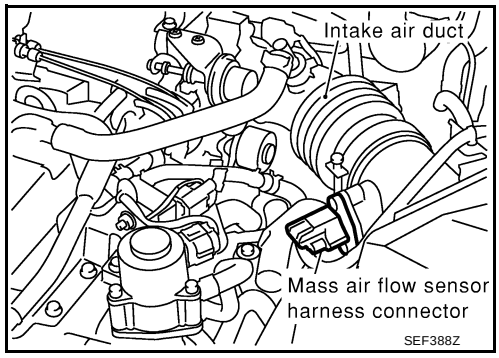
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Turn ignition switch “ON” and select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
4. Clear the self-learning control coefficient by touching “CLEAR” or “START”.
5. Select “DATA MONITOR” mode with CONSULT-II.



6. Start engine again and let it idle for at least 10 minutes.
   The 1st trip DTC P0172 should be detected at this stage, if a malfunction exists. If so, go to EC-812, "Diagnostic Procedure" .
7. If it is difficult to start engine at step 6, the fuel injection system has a malfunction.
8. Crank engine while depressing accelerator pedal. If engine starts, go to EC-812, "Diagnostic Procedure" . If engine does not start, remove ignition plugs and check for fouling, etc.



WITH GST

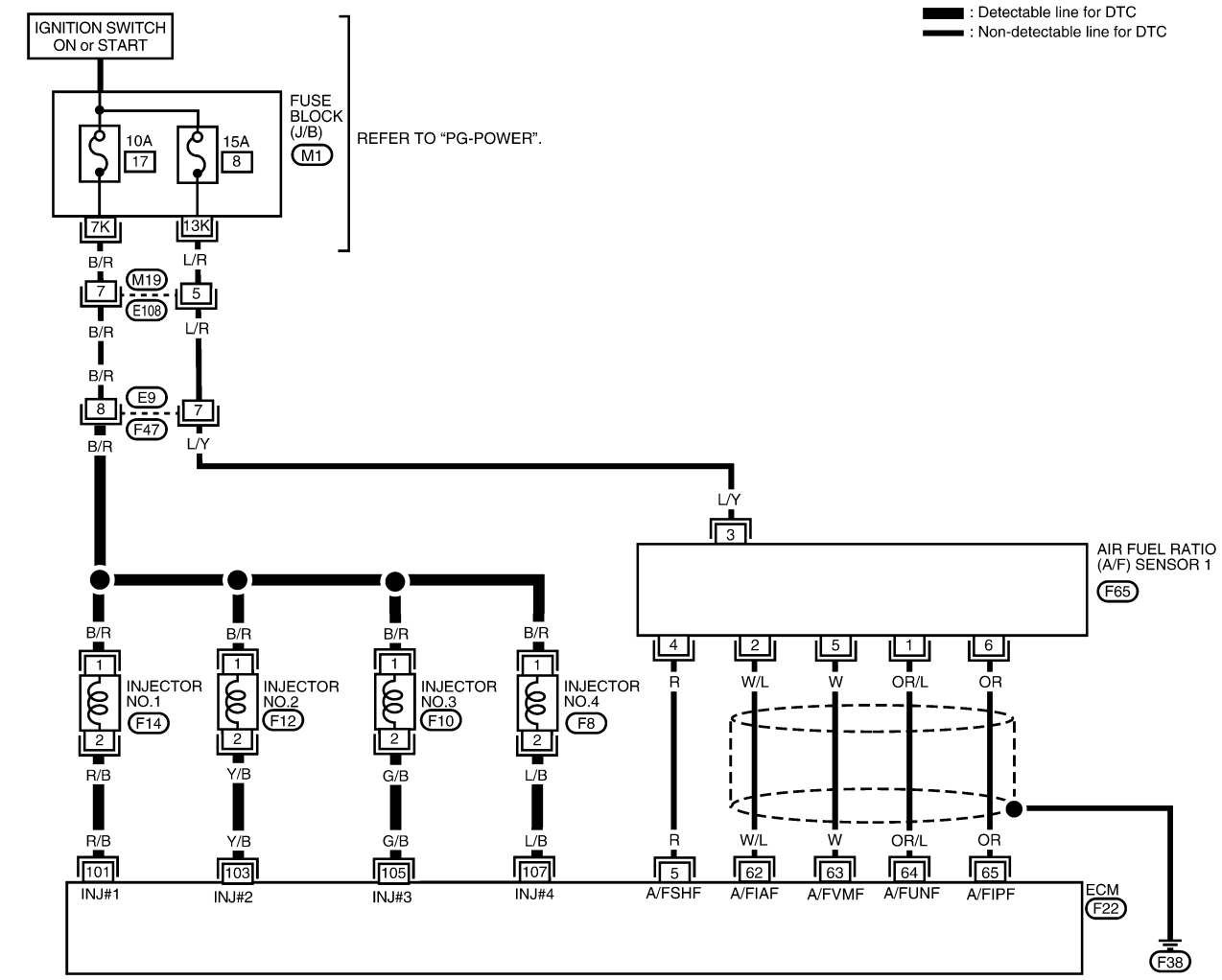


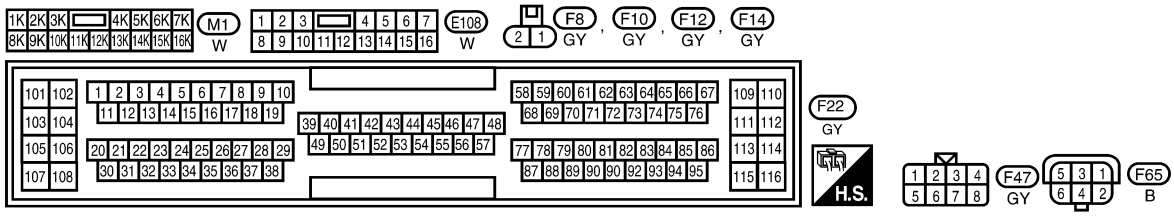
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Disconnect mass air flow sensor harness connector. Then restart and run engine for at least 3 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Select “MODE 7” with GST. Make sure 1st trip DTC P0102 is detected.
6. Select “MODE 4” with GST and erase the 1st trip DTC P0102.
7. Start engine again and run it for at least 10 minutes at idle speed.
8. Select “MODE 7” with GST. The 1st trip DTC P0172 should be detected at this stage, if a malfunction exists. If so, go to EC-812, "Diagnostic Procedure" .
9. If it is difficult to start engine at step 8, the fuel injection system has a malfunction.
10. Crank engine while depressing accelerator pedal.
    If engine starts, go to EC-812, "Diagnostic Procedure" . If engine does not start, remove ignition plugs and check for fouling, etc.

Wiring Diagram

UBS001V0

EC-FUEL-01





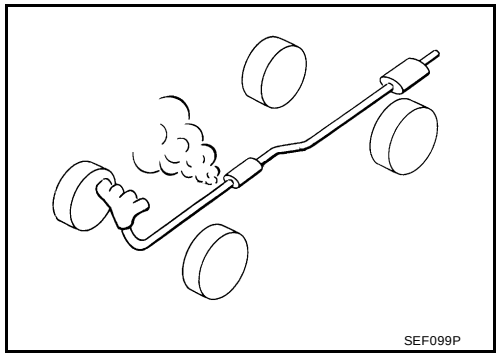
BBWA0156E

Diagnostic Procedure

UBS001V1

1. CHECK FOR EXHAUST AIR LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust air leak before TWC (Manifold three way catalyst).

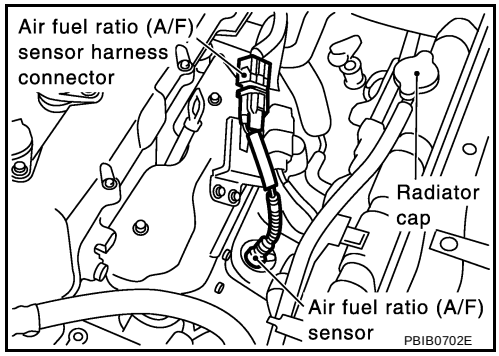


OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2. CHECK AIR FUEL RATIO (A/F) SENSOR 1 CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect A/F sensor 1 harness connector and ECM harness connector.
3. Check harness continuity between ECM terminals and A/F sensor 1 terminals as follows.
   Refer to Wiring Diagram.



ECM terminal	A/F sensor 1
62	2
63	5
64	1
65	6

Continuity should exist.

4. Check harness continuity between ECM terminals 62, 63, 64, 65 and ground, or A/F sensor 1 terminals 1, 2, 5, 6 and ground.
   Refer to Wiring Diagram.

Continuity should not exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK FUEL PRESSURE

1. Release fuel pressure to zero.
   Refer to EC-623 .
2. Install fuel pressure gauge and check fuel pressure.

At idling: Approximately 350 kPa (3.57 kg/cm^2 , 51 psi)

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Fuel pump and circuit (Refer to EC-1176 .)

OK or NG

OK >> Replace fuel pressure regulator.
NG >> Repair or replace.

5. 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.

at idling : 1.4 - 4.0 g·m/sec
at 2,500 rpm : 5.0 - 10.0 g·m/sec

With GST

1. Install all removed parts.
2. Check mass air flow sensor signal in MODE 1 with GST.

at idling : 1.4 - 4.0 g·m/sec
at 2,500 rpm : 5.0 - 10.0 g·m/sec

OK or NG

OK >> GO TO 6.
NG >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer toEC-734 .

6. CHECK FUNCTION OF INJECTORS

With CONSULT-II

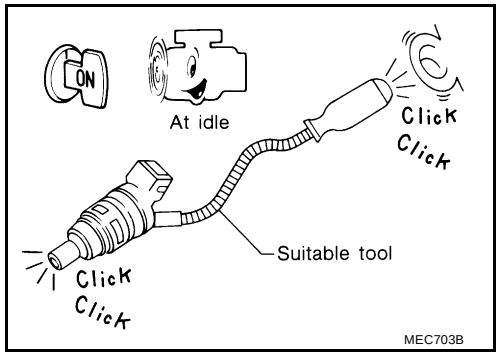
1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-II.
3. Make sure that each circuit produces a momentary engine speed drop.

ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
IACV-AAC/V	XXX step

SEF190Y

Without CONSULT-II

1. Start engine.
2. Listen to each injector operating sound.
   Clicking noise should be heard.



OK or NG

OK >> GO TO 7.
NG >> Perform trouble diagnosis for "Injector", EC-1169 .

7. REMOVE INJECTOR

1. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
2. Turn ignition switch “OFF”.
3. Remove injector assembly. Refer to EM-22, "FUEL INJECTOR AND FUEL TUBE" .
   Keep fuel hose and all injectors connected to injector gallery.

>> GO TO 8.

8. CHECK INJECTOR

1. Disconnect all injector harness connectors.
2. Disconnect all ignition coil harness connectors.
3. Prepare pans or saucers under each injectors.
4. Crank engine for about 3 seconds.
   Make sure fuel does not drip from injector.

OK or NG

OK (Does not drip)>>GO TO 9.
NG (Drips)>>Replace the injectors from which fuel is dripping. Always replace O-ring with new one.

9. CHECK INTERMITTENT INCIDENT

Perform EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

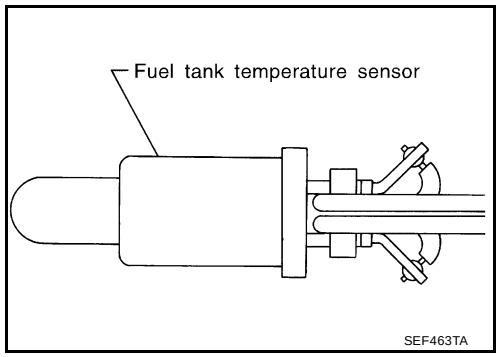
DTC P0181, P0182, P0183 FTT SENSOR

PFP:22630

Component Description

UBS001V2

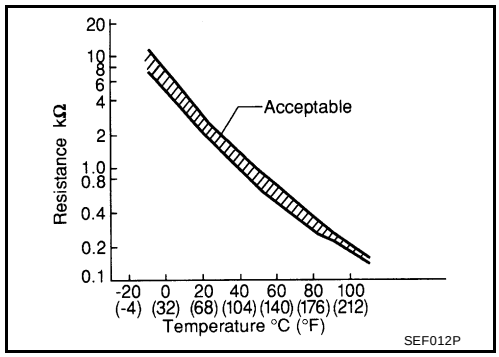
The fuel tank temperature sensor is used to detect the fuel temperature inside the fuel tank. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the fuel temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



<Reference data>

Fluid temperature °C (°F)	Voltage* V	Resistance kΩ
20 (68)	3.5	2.3 - 2.7
50 (122)	2.2	0.79 - 0.90

*: These data are reference values and are measured between ECM terminal 82 (Fuel tank temperature sensor) and ground.



CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use ground other than ECM, such as body ground.

On Board Diagnosis Logic

UBS001V3

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0182 P0183	● An excessively high (P0183) or low (P0182) voltage is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Fuel tank temperature sensor
P0181	● Rationally incorrect voltage is sent to ECM, compared with the voltage signals from engine coolant temperature sensor and intake air temperature sensor.	

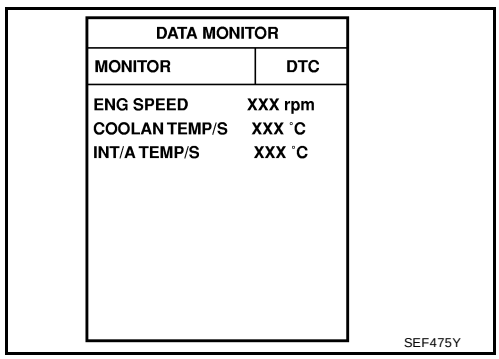
DTC Confirmation Procedure

UBS001V4

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch “ON”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 10 seconds.
   If 1st trip DTC is detected, go to EC-819, "Diagnostic Procedure".
   If the result is OK, go to following step.
4. Check “COOLAN TEMP/S” signal.
   If the signal is less than 50°C (122°F), the result will be OK.
   If the signal is above 50°C (122°F), go to the following step.
5. Cool engine down until “COOLAN TEMP/S” signal is less than 50°C (122°F).
6. Wait at least 10 seconds.
7. If 1st trip DTC is detected, go to EC-819, "Diagnostic Procedure".



WITH GST

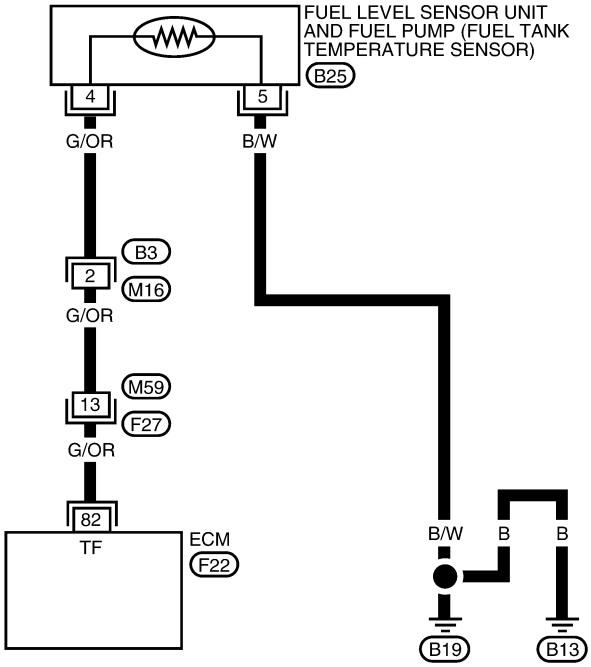
Follow the procedure “With CONSULT-II” above.

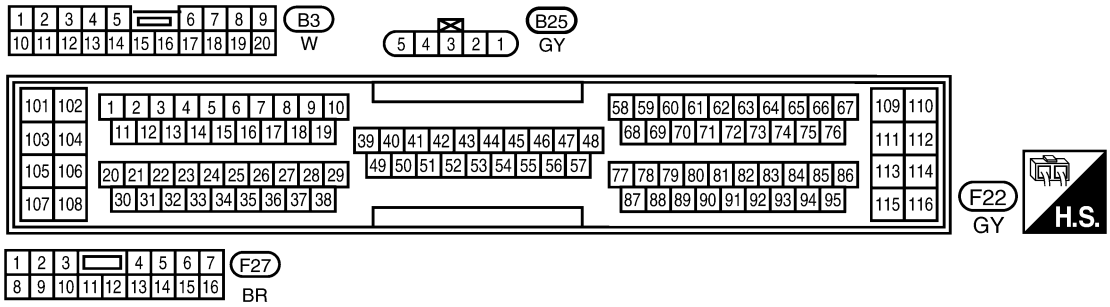
Wiring Diagram

UBS001V5

EC-FTTS-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC





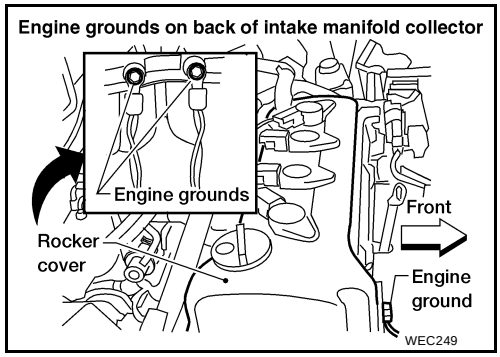
WEC573

Diagnostic Procedure

UBS001V6

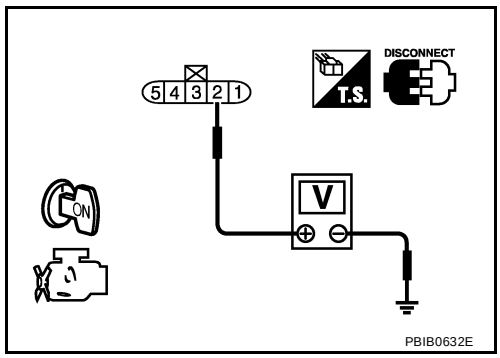
1. CHECK POWER SUPPLY

1. Turn ignition switch “OFF”.
2. Disconnect fuel level sensor unit and fuel pump harness connector.
3. Turn ignition switch “ON”.



4. Check voltage between fuel level sensor unit and fuel pump terminal 4 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M59, F27
- Harness connectors B3, M16
- Harness for open or short between ECM and fuel level sensor unit and fuel pump

>> Repair harness or connector.

3. CHECK GROUND CIRCUIT

1. Turn ignition switch “OFF”.
2. Check harness continuity between fuel level sensor unit and fuel pump terminal 3 and body ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK FUEL TANK TEMPERATURE SENSOR

Refer to, EC-820, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace fuel level sensor unit and fuel pump.

5. CHECK INTERMITTENT INCIDENT

Perform EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

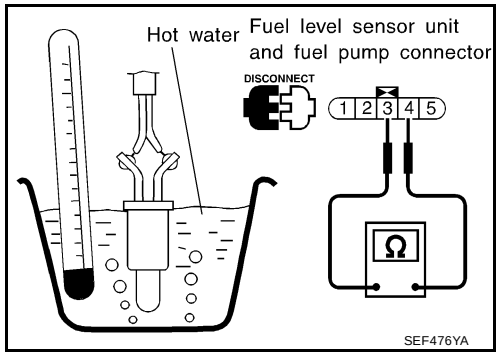
UBS001V7

FUEL TANK TEMPERATURE SENSOR

Check resistance by heating with hot water or heat gun as shown in the figure.

Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90

If NG, replace fuel level sensor unit and fuel pump.



Removal and Installation

UBS001V8

FUEL TANK TEMPERATURE SENSOR

Refer to FL-7, "QG18DE (CALIF. CA MODEL) AND QR25DE MODEL" .

DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION

PFP:00019

System Description

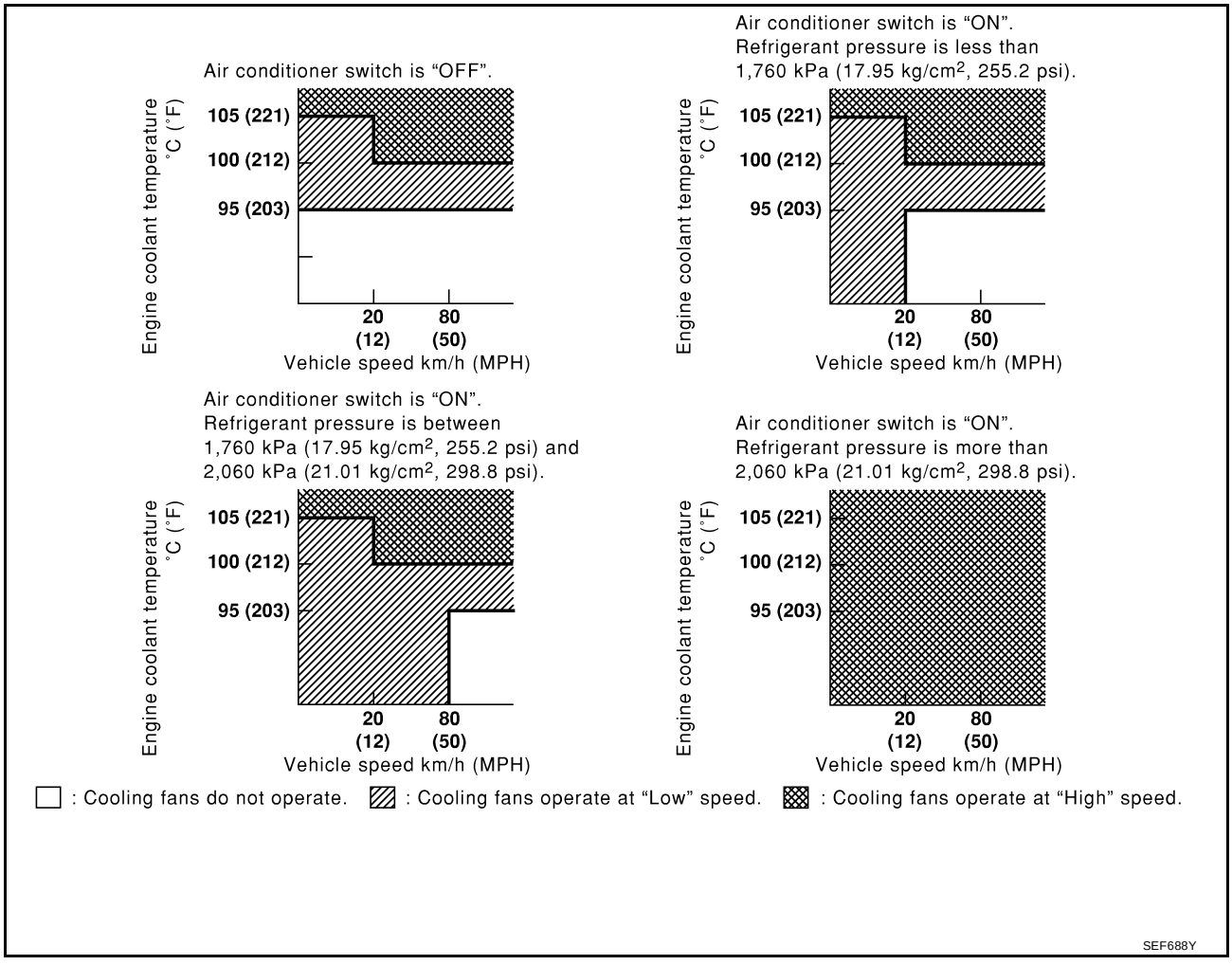
UBS001V9

COOLING FAN CONTROL

Sensor	Input Signal to ECM	ECM function	Actuator
Vehicle speed sensor	Vehicle speed	Cooling fan control	Cooling fan relay(s)
Engine coolant temperature sensor	Engine coolant temperature		
Air conditioner switch	Air conditioner “ON” signal		
Ignition switch	Start signal		
Refrigerant pressure sensor	Refrigerant pressure		

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].

OPERATION



CONSULT-II Reference Value in Data Monitor Mode

UBS001VA

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

MONITOR ITEM	CONDITION		SPECIFICATION
COOLING FAN	● After warming up engine, idle the engine. ● Air conditioner switch: OFF	Engine coolant temperature is 94°C (201°F) or less	OFF
		Engine coolant temperature is between 95°C (203°F) and 104°C (219°F)	LOW
		Engine coolant temperature is 105°C (221°F) or more	HIGH

On Board Diagnosis Logic

UBS001VB

This diagnosis checks whether the engine coolant temperature is extraordinary high, even when the load is not heavy.
When malfunction is detected, the malfunction indicator lamp (MIL) will light up even in the first trip.
Malfunction is detected when engine coolant temperature is excessively high under normal engine speed.

Possible Cause

UBS001VC

- Harness or connectors
  (The cooling fan circuit is open or shorted)
- Cooling fan
- Thermostat
- Improper ignition timing
- Engine coolant temperature sensor
- Blocked radiator
- Blocked front end (Improper fitting of nose mask)
- Crushed vehicle frontal area (Vehicle frontal is collided but not repaired)
- Blocked air passage by improper installation of front fog lamp or fog lamps.
- Improper mixture ratio of coolant
- Damaged bumper

For more information, refer to EC-833, "Main 12 Causes of Overheating" .

CAUTION:
When a malfunction is indicated, be sure to replace the coolant. Refer to MA-15, "Changing Engine Coolant" . Also, replace the engine oil. Refer toMA-19, "Changing Engine Oil" .

1. **Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute. Be sure to use coolant with the proper mixture ratio. Refer to MA-14, "Anti-freeze Coolant Mixture Ratio" .**
2. **After refilling coolant, run engine to ensure that no water-flow noise is emitted.**

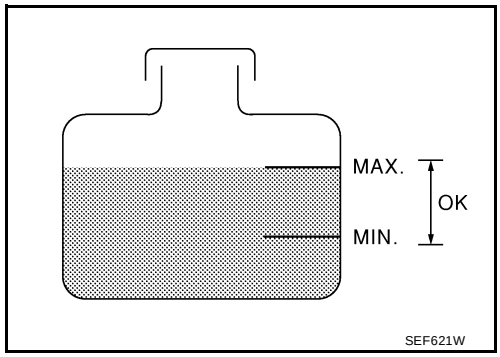
Overall Function Check

UBS001VD

Use this procedure to check the overall function of the coolant over temperature enrichment protection check, a DTC might not be confirmed.

WARNING:
Never remove the radiator cap when the engine is hot. Serious burns could be caused by high-pressure fluid escaping from the radiator.
Wrap a thick cloth around the cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.

WITH CONSULT-II



1. Check the coolant level and mixture ratio (using coolant tester) in the reservoir tank and radiator.
   Allow engine to cool before checking coolant level and mixture ratio.
   - If the coolant level in the reservoir and/or radiator is below the proper range, go to EC-826, "Diagnostic Procedure" .
   - If the coolant mixture ratio is out of the range of 45 to 55%, replace the coolant in the following procedure MA-15, "Changing Engine Coolant" .
   - Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute like pouring coolant from a kettle. Be sure to use coolant with the proper mixture ratio. Refer to MA-14, "Anti-freeze Coolant Mixture Ratio" .
   - After refilling coolant, run engine to ensure that no water-flow noise is emitted.
   - After checking or replacing coolant, go to step 3 below.
2. Ask the customer if engine coolant has been added. If it has been added, go to EC-826, "Diagnostic Procedure" . After repair, go to the next step.
3. Start engine and let it idle.
4. Make sure that A/C switch is “OFF” and air conditioner is not operating. If NG, check air conditioner circuit. Refer to EC-646, "TROUBLE DIAGNOSIS" . After repair, go to the next step.
5. Perform “ENG COOLANT TEMP” in “ACTIVE TEST” mode with CONSULT-II at idle.
   - Set “ENG COOLANT TEMP” to 95°C (203°F) and make sure that cooling fan operates at low speed.
     If NG, go to EC-826, "Diagnostic Procedure" .
   - Set “ENG COOLANT TEMP” to 105°C (221°F) and make sure that cooling fan operates at high speed. If NG, go to EC-826, "Diagnostic Procedure" . After repair, go to the next step.
6. Check for blocked coolant passage.
   - Warm up engine to normal operating temperature, then grasp radiator upper hose and lower hose and make sure that coolant flows.
     If NG, go to EC-826, "Diagnostic Procedure" . After repair, go to the next step.
     Be extremely careful not to touch any moving or adjacent parts.
7. Check for blocked radiator air passage.
   - When aftermarket fog lamps have been installed, check for damaged fans and clogging in the condenser and radiator.
   - Check the front end for clogging caused by insects or debris.
   - Check for improper fitting of front-end cover, damaged radiator grille or bumper, damaged vehicle front.
     If NG, take appropriate action and then go to the next step.
8. Check function of ECT sensor.
   Refer to step 7 of EC-826, "Diagnostic Procedure" .
   If NG, replace ECT sensor and go to the next step.
9. Check ignition timing. Refer to EC-652, "Basic Inspection" .
   Make sure that ignition timing is 9°±2° at idle.
   If NG, follow the procedure under “Basic Inspection”.

WITH GST

1. Check the coolant level and mixture ratio (using coolant tester) in the reservoir tank and radiator.
   Allow engine to cool before checking coolant level and mixture ratio.
   - If the coolant level in the reservoir and/or radiator is below the proper range, and go to EC-826, "Diagnostic Procedure" .
   - If the coolant mixture ratio is out of the range of 45 to 55%, replace the coolant in the following procedure MA-15, "Changing Engine Coolant" .
   - Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute like pouring coolant from a kettle. Be sure to use coolant with the proper mixture ratio. Refer to MA-14, "Anti-freeze Coolant Mixture Ratio" .
   - After refilling coolant, run engine to ensure that no water-flow noise is emitted.

- After checking or replacing coolant, go to step 3 below.

2. Ask the customer if engine coolant has been added. If it has been added, go to EC-826, "Diagnostic Procedure" . After repair, go to the next step.
3. Start engine and let it idle.
4. Make sure that A/C switch is “OFF” and air conditioner is not operating. If NG, check air conditioner circuit. Refer to EC-646, "TROUBLE DIAGNOSIS" . After repair, go to the next step.
5. Turn ignition switch “OFF”
6. Disconnect engine coolant temperature sensor harness connector.
7. Connect 150Ω resistor to engine coolant temperature sensor.
8. Start engine and make sure that cooling fan operates.
   Be careful not to overheat engine.
   If NG, go to EC-826, "Diagnostic Procedure" . After repair, go to the next step.
9. Check for blocked coolant passage.

- Warm up engine to normal operating temperature, then grasp radiator upper hose and lower hose and make sure that coolant flows.
  If NG, go to EC-826, "Diagnostic Procedure" . After repair, go to the next step.
  Be extremely careful not to touch any moving or adjacent parts.

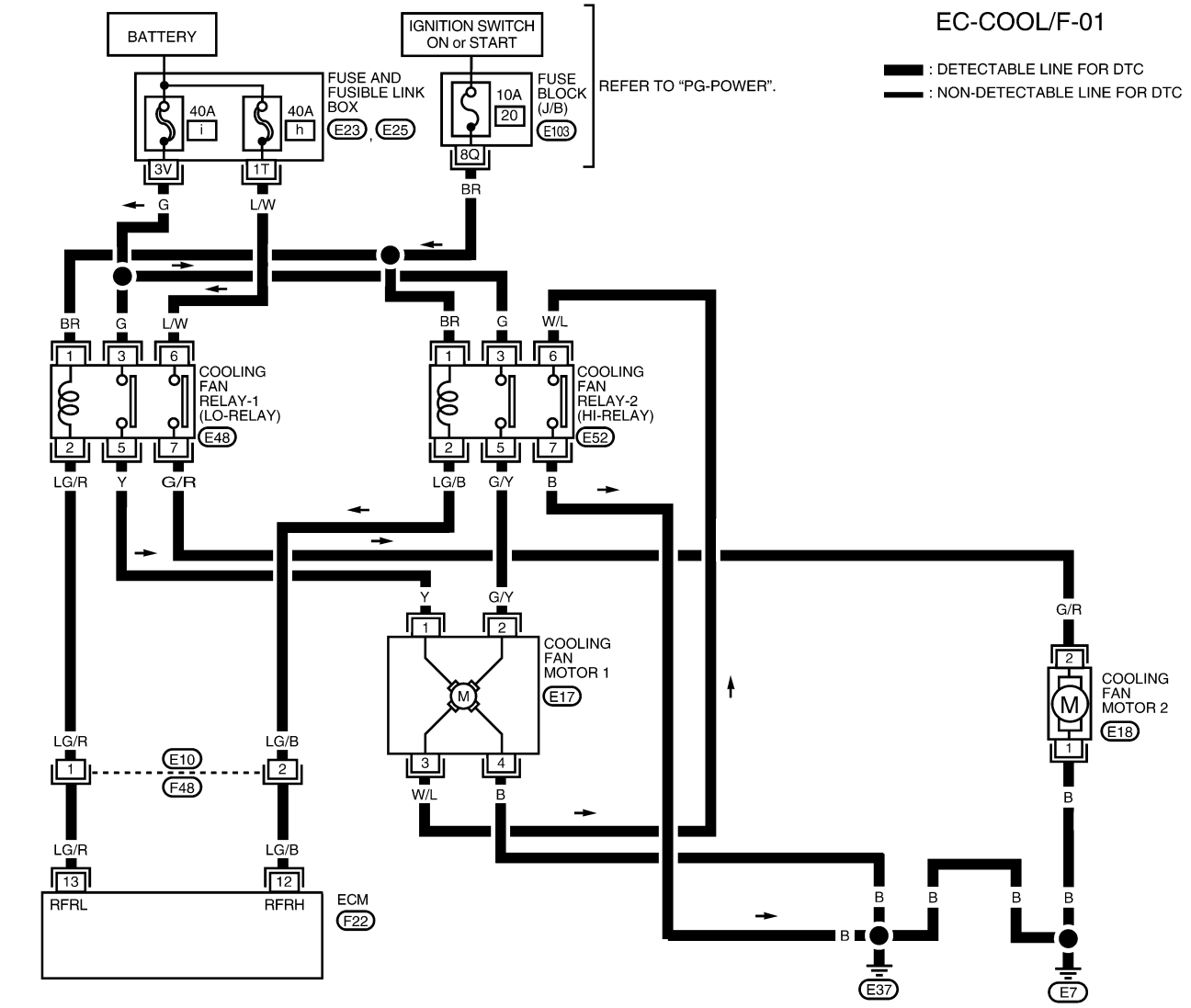
10. Check for blocked radiator air passage.

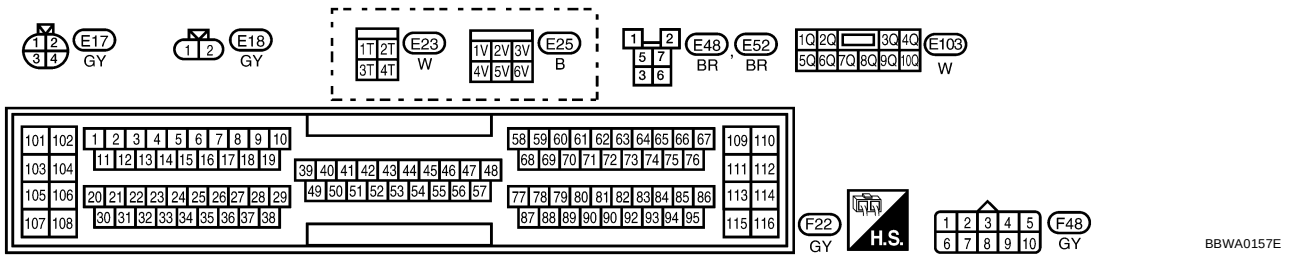
- When aftermarket fog lamps have been installed, check for damaged fans and clogging in the condenser and radiator.
- Check the front end for clogging caused by insects or debris.
- Check for improper fitting of front-end cover, damaged radiator grille or bumper, damaged vehicle front.
  If NG, take appropriate action and then go to the next step.

11. Check function of ECT sensor.
    Refer to step 6 of EC-826, "Diagnostic Procedure" .
    If NG, replace ECT sensor and go to the next step.
12. Check ignition timing. Refer to EC-652, "Basic Inspection" .
    Make sure that ignition timing is 9°±2° at idle.
    If NG, follow the procedure under “Basic Inspection”.

Wiring Diagram

UBS001VE





ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
12	LG/B	COOLING FAN RELAY (HIGH)	ENGINE RUNNING WITH COOLING FAN NOT OPERATING	BATTERY VOLTAGE
			ENGINE RUNNING WITH COOLING FAN OPERATING AT HIGH SPEED	0 - 0.6V
13	LG/R	COOLING FAN RELAY (LOW)	ENGINE RUNNING WITH COOLING FAN NOT OPERATING	BATTERY VOLTAGE
			ENGINE RUNNING WITH COOLING FAN OPERATING AT LOW SPEED	0 - 0.6V

SEF571Y

Diagnostic Procedure

UBS001VF

1. INSPECTION START

Do you have CONSULT-II?

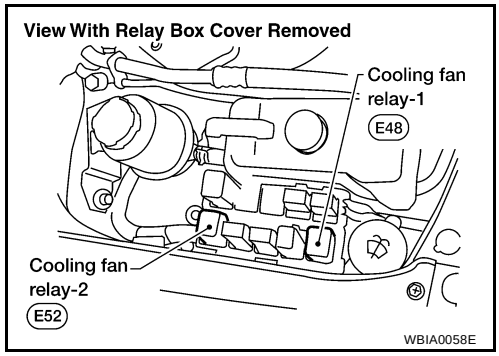
Yes or No

Yes >> GO TO 2.
No >> GO TO 4.

2. CHECK COOLING FAN LOW SPEED OPERATION

With CONSULT-II

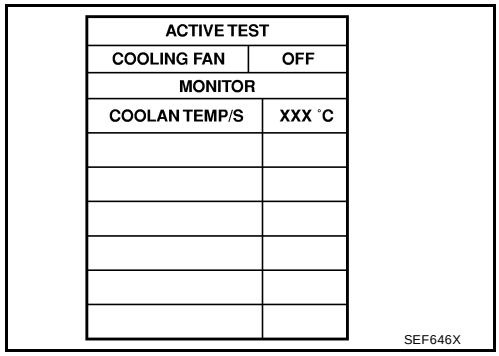
1. Disconnect cooling fan relay-2.
2. Turn ignition switch “ON”.



3. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-II.
4. 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 PROCEDURE A, EC-830 .)



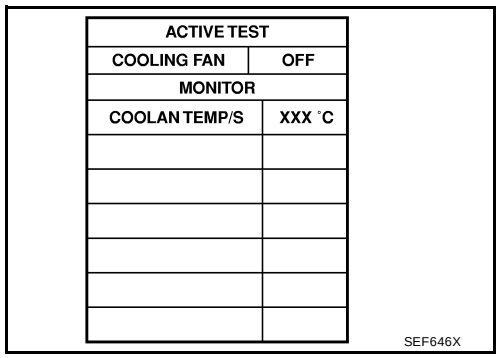
3. CHECK COOLING FAN HIGH SPEED OPERATION

With CONSULT-II

1. Turn ignition switch “OFF”.
2. Reconnect cooling fan relay-2 .
3. Turn ignition switch “ON”.
4. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-II.
5. Make sure that cooling fan-1 operates at high speed.

OK or NG

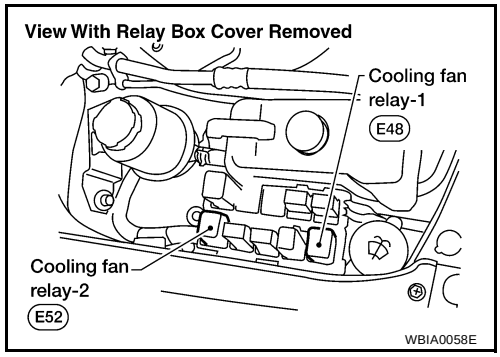
OK >> GO TO 6.
NG >> Check cooling fan high speed control circuit. (Go to PROCEDURE B, EC-832 .)



4. CHECK COOLING FAN LOW SPEED OPERATION

Without CONSULT-II

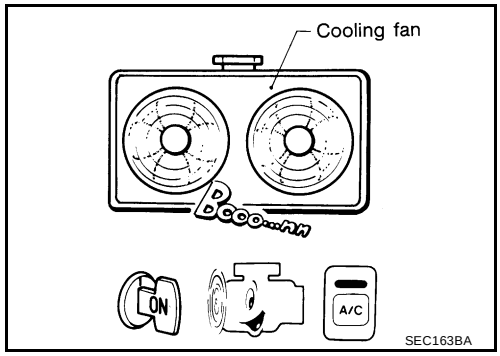
1. Disconnect cooling fan relay-2.
2. Start engine and let it idle.
3. Set temperature lever at full cold position.
4. Turn air conditioner switch “ON”.
5. Turn blower fan switch “ON”.



6. 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 PROCEDURE A, EC-830 .)



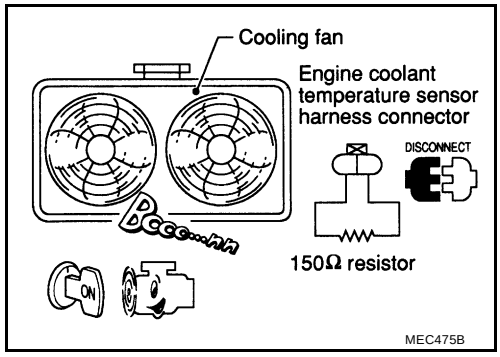
5. CHECK COOLING FAN HIGH SPEED OPERATION

Without CONSULT-II

1. Turn ignition switch “OFF”.
2. Reconnect cooling fan relay-2.
3. Turn air conditioner switch and blower fan switch “OFF”.
4. Disconnect engine coolant temperature sensor harness connector.
5. Connect 150Ω resistor to engine coolant temperature sensor harness connector.
6. Restart engine and make sure that cooling fan-1 operates at high speed.

OK or NG

OK >> GO TO 6.
NG >> Check cooling fan high speed control circuit. (Go to PROCEDURE B, EC-832 .)

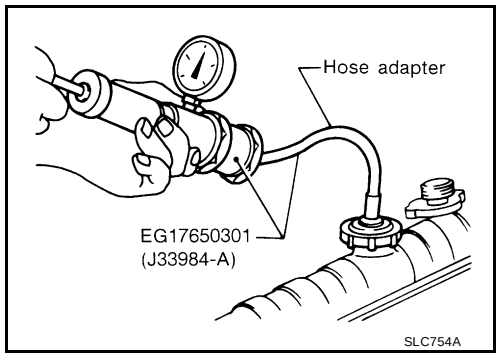


6. CHECK COOLING SYSTEM FOR LEAK

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 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following for leak.

- Hose
- Radiator
- Water pump (Refer to CO-10, "WATER PUMP" .)

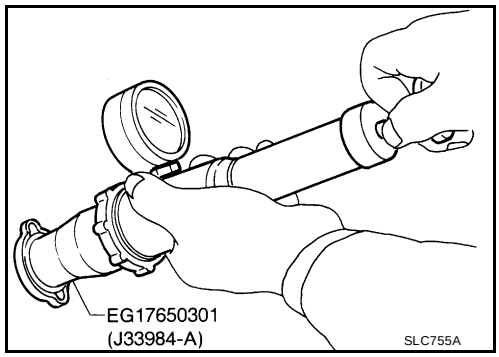
>> Repair or replace.

8. CHECK RADIATOR CAP

Apply pressure to cap with a tester and check radiator cap relief pressure.

Radiator cap relief pressure:

59 - 98 kPa (0.6 - 1.0 kg/cm^2 , 9 - 14 psi)



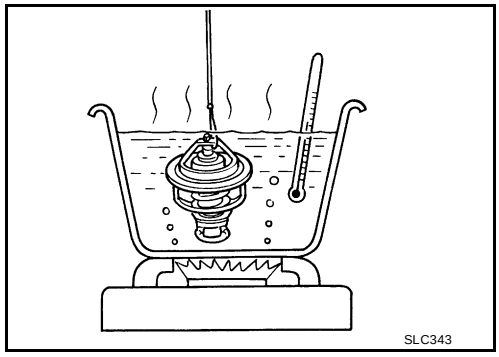
OK or NG

OK >> GO TO 9.
NG >> Replace radiator cap.

9. CHECK THERMOSTAT

1. Remove thermostat.
2. Check valve seating condition at normal room temperatures.
   It should seat tightly.
3. Check valve opening temperature and valve lift.

   Valve opening temperature: 76.5°C (170°F) [standard]
   Valve lift: More than 9 mm/90°C (0.35 in/194°F)



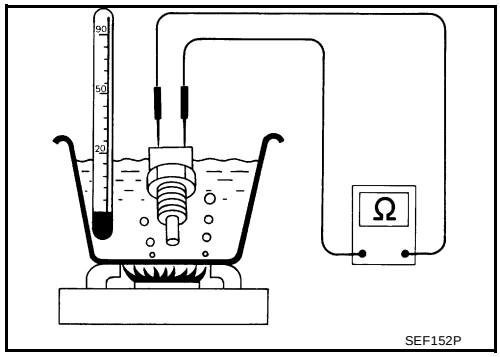
4. Check if valve is closed at 5°C (9°F) below valve opening temperature. For details, refer to CO-12, "THERMOSTAT AND THERMOSTAT HOUSING" .

OK or NG

OK >> GO TO 10.
NG >> Replace thermostat

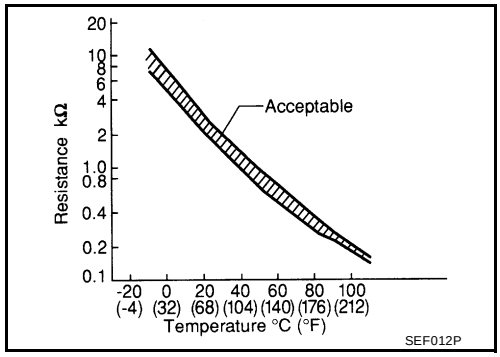
10. CHECK ENGINE COOLANT TEMPERATURE SENSOR

1. Remove engine coolant temperature sensor.
2. Check resistance between engine coolant temperature sensor terminals 1 and 2 as shown in the figure.



<Reference data>

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260



OK or NG

OK >> GO TO 11.
NG >> Replace engine coolant temperature sensor.

11. CHECK MAIN 12 CAUSES

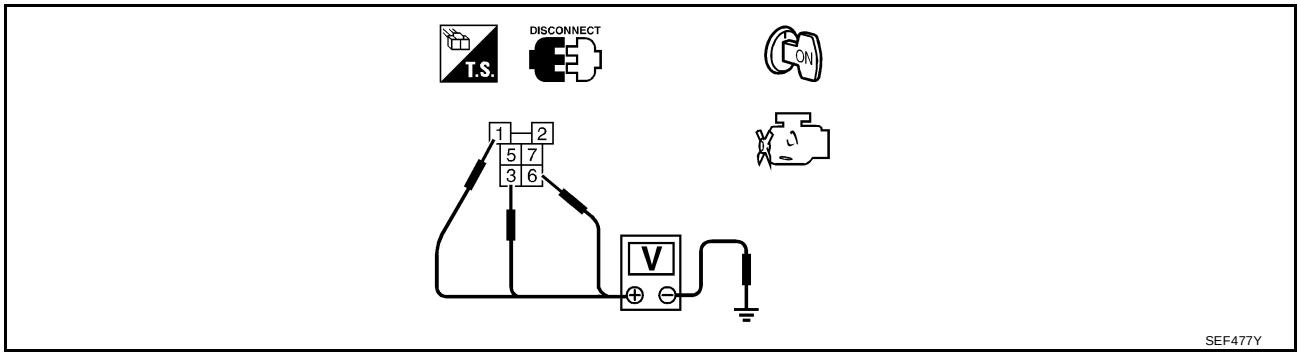
If the cause cannot be isolated, go to EC-833, "Main 12 Causes of Overheating" .

>> **INSPECTION END**

PROCEDURE A

1. CHECK COOLING FAN POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect cooling fan relay-1.
3. Turn ignition switch “ON”.
4. Check voltage between cooling fan relay-1 terminals 1, 3, 6 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.

- 10A fuse
- 40A fusible links
- Harness for open or short between cooling fan relay-1 and fuse
- Harness for open or short between cooling fan relay-1 and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

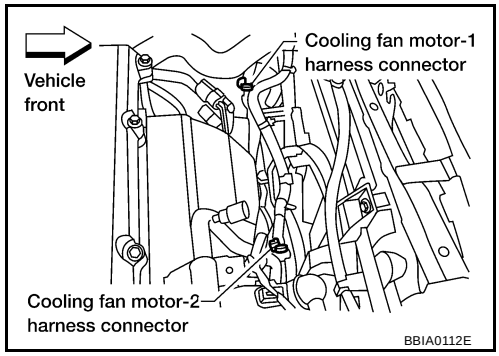
3. CHECK COOLING FAN GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect cooling fan motor-1 harness connector and cooling fan motor-2 harness connector.
3. Check harness continuity between cooling fan relay-1 terminal 5 and cooling fan motor-1 terminal 1, cooling fan motor-1 terminal 4 and body 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 cooling fan relay-1 terminal 7 and cooling fan motor-2 terminal 2, cooling fan motor-2 terminal 1 and body 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 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK COOLING FAN OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 13 and cooling fan relay-1 terminal 2. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

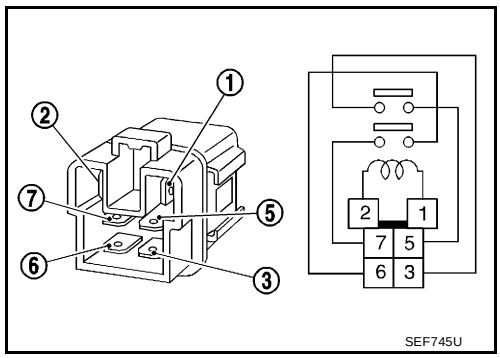
- Harness connectors E10, F48
- Harness for open or short between cooling fan relay-1 and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK COOLING FAN RELAY-1

Check continuity between cooling fan relay-1 terminals 3 and 5, 6 and 7 under the following conditions.

Conditions	Continuity
12V direct current supply between terminals 1 and 2	Yes
No current supply	No



OK or NG

OK >> GO TO 7.
NG >> Replace cooling fan relay.

7. CHECK COOLING FAN MOTORS-1 AND -2

Refer to .

OK or NG

OK >> GO TO 8.
NG >> Replace cooling fan motors.

8. CHECK INTERMITTENT INCIDENT

Perform EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

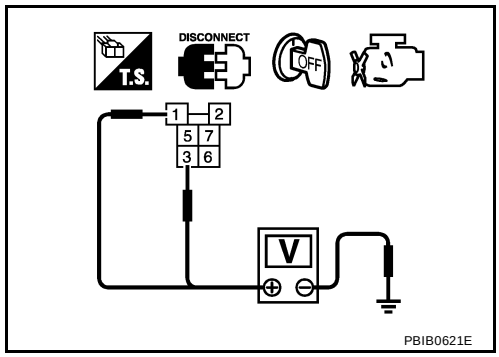
>> **INSPECTION END**

PROCEDURE B

1. CHECK COOLING FAN POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect cooling fan relay-2.
3. Turn ignition switch “ON”.
4. Check voltage between cooling fan relay-2 terminals 1, 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- Fuse and fusible link box connector E25
- Fuse block (J/B) connector E103
- 10A fuse
- 40A fusible link
- Harness for open or short between cooling fan relay-2 and fuse
- Harness for open or short between cooling fan relay-2 and fusible link

>> Repair harness or connectors.

3. CHECK COOLING FAN GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect cooling fan motor-2 harness connector.
3. Check harness continuity between cooling fan relay-2 terminal 5 and cooling fan motor-1 terminal 2, cooling fan relay-2 terminal 6 and cooling fan motor-1 terminal 3, cooling fan relay-2 terminal 7 and body ground.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK COOLING FAN OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 12 and cooling fan relay-2 terminal 2. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E10, F48
- Harness for open or short between cooling fan relay-2 and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK COOLING FAN RELAY-2

Refer to EC-834, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace cooling fan relays.

7. CHECK COOLING FAN MOTORS-1 AND -2

Refer to EC-834, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace cooling fan motors.

8. CHECK INTERMITTENT INCIDENT

Perform EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Main 12 Causes of Overheating

UBS001VG

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	● Blocked radiator ● Blocked condenser ● Blocked radiator grille ● Blocked bumper	● Visual	No blocking	—
	2	● Coolant mixture	● Coolant tester	50 - 50% coolant mixture	See MA-13, "RECOMMENDED FLUIDS AND LUBRICANTS" .
	3	● Coolant level	● Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	See MA-15, "Changing Engine Coolant" .
	4	● Radiator cap	● Pressure tester	59 - 98 kPa (0.6 - 1.0 kg/cm^2 , 9 - 14 psi) (Limit)	See CO-8, "System Check" .

Engine	Step	Inspection item	Equipment	Standard	Reference page
ON*2	5	● Coolant leaks	● Visual	No leaks	See CO-8, "System Check" .
ON*2	6	● Thermostat	● Touch the upper and lower radiator hoses	Both hoses should be hot	See CO-12, "THERMOSTAT AND THERMOSTAT HOUSING" . and CO-14, "RADIATOR" .
ON*1	7	● Cooling fan	● CONSULT-II	Operating	SeeEC-821, "DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION" .
OFF	8	● Combustion gas leak	● Color checker chemical tester 4 Gas analyzer	Negative	—
ON*3	9	● Coolant temperature gauge	● Visual	Gauge less than 3/4 when driving	—
		● Coolant overflow to reservoir tank	● Visual	No overflow during driving and idling	See MA-15, "Changing Engine Coolant" .
OFF*4	10	● Coolant return from reservoir tank to radiator	● Visual	Should be initial level in reservoir tank	See MA-15, "ENGINE MAINTENANCE (QG18DE ENGINE)" .
OFF	11	● Cylinder head	● Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	See EM-40, "Inspection" .
	12	● Cylinder block and pistons	● Visual	No scuffing on cylinder walls or piston	See EM-60, "Inspection" .

*1: Turn the ignition switch ON.
*2: Engine running at 3,000 rpm for 10 minutes.
*3: Drive at 90 km/h (56 MPH) for 30 minutes and then let idle for 10 minutes.
*4: After 60 minutes of cool down time.
For more information, refer to CO-5, "OVERHEATING CAUSE ANALYSIS" .

Component Inspection

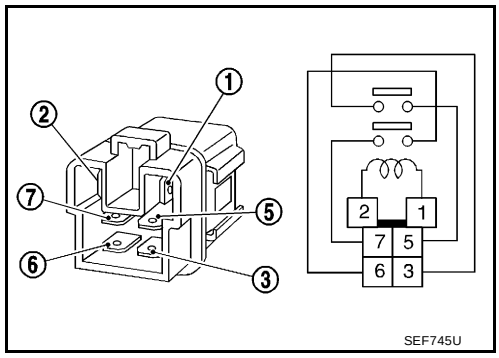
UBS001VH

COOLING FAN RELAYS-1 AND -2

Check continuity between terminals 3 and 5, 6 and 7.

Conditions	Continuity
12V direct current supply between terminals 1 and 2	Yes
No current supply	No

If NG, replace relay.

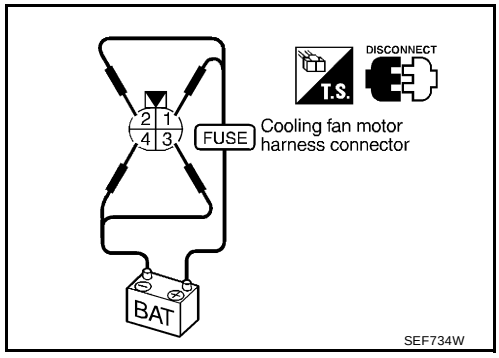


COOLING FAN MOTOR-1

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
	High	1, 2	3, 4

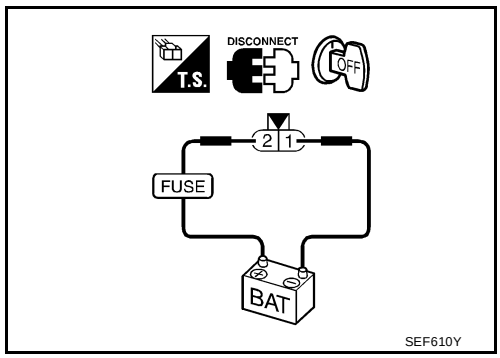
Cooling fan motor should operate.
If NG, replace cooling fan motor.



COOLING FAN MOTOR-2

1. Disconnect cooling fan motor harness connectors.
2. Supply cooling fan motor terminals with battery voltage and check operation.

	Terminals	
	(+)	(–)
Cooling fan motor	2	1



Cooling fan motor should operate.
If NG, replace cooling fan motor.

DTC P0300 - P0304 NO. 4 - 1 CYLINDER MISFIRE, MULTIPLE CYLINDER MISFIRE

PFP:00020

On Board Diagnosis Logic

UBS001VI

When a misfire occurs, engine speed will fluctuate. If the engine speed fluctuates enough to cause the crankshaft position sensor (POS) signal to vary, the 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. On the first trip that a misfire condition occurs that can damage the TWC (Manifold three way catalyst) due to overheating, the MIL will blink.
   When a misfire condition occurs, the ECM monitors the crankshaft position sensor (POS) signal every 200 engine revolutions for a change.
   When the misfire condition decreases to a level that will not damage the TWC (Manifold three way catalyst), the MIL will turn off.
   If another misfire condition occurs that can damage the TWC (Manifold three way catalyst) on a second trip, the MIL will blink.
   When the misfire condition decreases to a level that will not damage the TWC (Manifold three way catalyst), the MIL will remain on.
   If another misfire condition occurs that can damage the TWC (Manifold three way catalyst), the MIL will begin to blink again.
2. Two Trip Detection Logic (Exhaust quality deterioration)
   For misfire conditions that will not damage the TWC (Manifold three way catalyst) (but will affect vehicle emissions), the MIL will only light when the misfire is detected on a second trip. During this condition, the ECM monitors the crankshaft position sensor (POS) signal every 1,000 engine revolutions.
   A misfire malfunction can be detected on any one cylinder or on multiple cylinders.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0300	● Multiple cylinders misfire.	● Improper spark plug ● Insufficient compression ● Incorrect fuel pressure ● EGR volume control valve ● The injector circuit is open or shorted ● Injectors ● Intake air leak ● The ignition secondary circuit is open or shorted ● Lack of fuel ● Drive plate ● Air fuel ratio (A/F) sensor 1 ● PCV hose connection
P0301	● No. 1 cylinder misfires.	
P0302	● No. 2 cylinder misfires.	
P0303	● No. 3 cylinder misfires.	
P0304	● No. 4 cylinder misfires.	

DTC Confirmation Procedure

UBS001VJ

CAUTION:

Always drive vehicle at a safe speed.

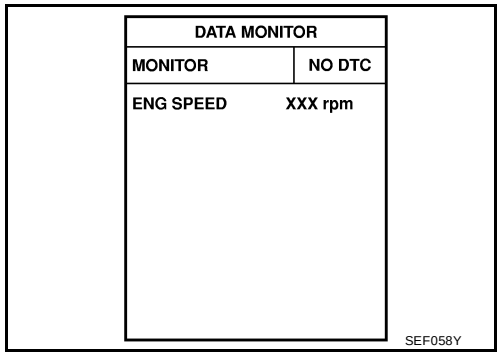
NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch “ON”, and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch “OFF” and wait at least 10 seconds.

4. Start engine again and drive at 1,500 to 3,000 rpm for at least 3 minutes.
   Hold the accelerator pedal as steady as possible.
   NOTE:
   Refer to the freeze frame data for the test driving conditions.
5. If 1st trip DTC is detected, go to EC-837, "Diagnostic Procedure" .



WITH GST

Follow the procedure “With CONSULT-II” above.

Diagnostic Procedure

UBS001VK

1. CHECK FOR INTAKE AIR LEAK

1. Start engine and run it at idle speed.
2. Listen for the sound of the intake air leak.
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, TWC (Manifold three way catalyst) and muffler for dents.

OK or NG

OK >> GO TO 3.
NG >> Repair or replace it.

3. CHECK EGR FUNCTION

Perform DTC Confirmation Procedure for DTC P1402 EGR FUNCTION (OPEN).
Refer to EC-1110 .

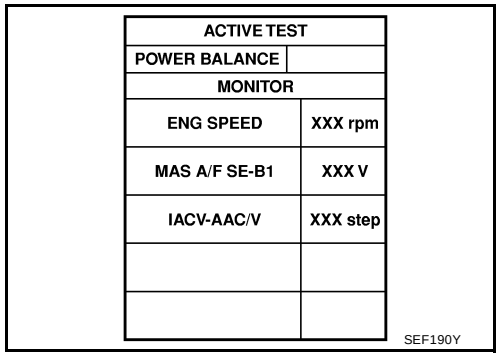
OK or NG

OK >> GO TO 4.
NG >> Repair EGR system.

4. PERFORM POWER BALANCE TEST

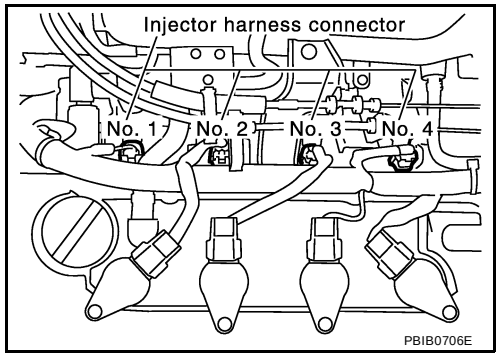
With CONSULT-II

1. Perform “POWER BALANCE” in “ACTIVE TEST” mode.
2. Is there any cylinder which does not produce a momentary engine speed drop?



Without CONSULT-II

When disconnecting each injector harness connector one at a time, is there any cylinder which does not produce a momentary engine speed drop?



Yes or No

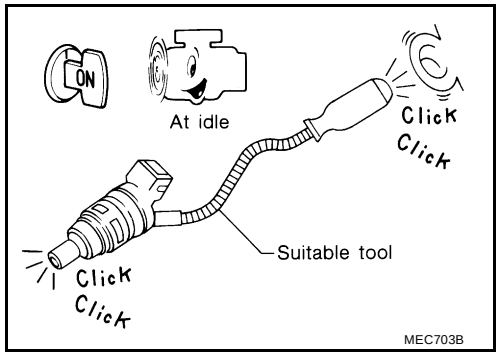
Yes >> GO TO 5.
No >> GO TO 8.

5. CHECK INJECTOR

Does each injector make an operating sound at idle?

Yes or No

Yes >> GO TO 6.
No >> Check injector(s) and circuit(s). Refer to EC-1169 .

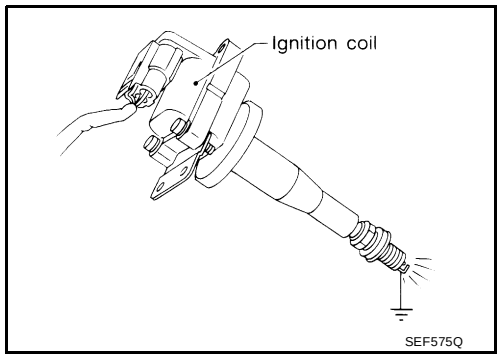


6. CHECK IGNITION SPARK

1. Turn Ignition switch “OFF”.
2. Remove ignition coil from the engine.
3. Place end of spark plug against a suitable ground and crank engine.
4. Check for proper spark.

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

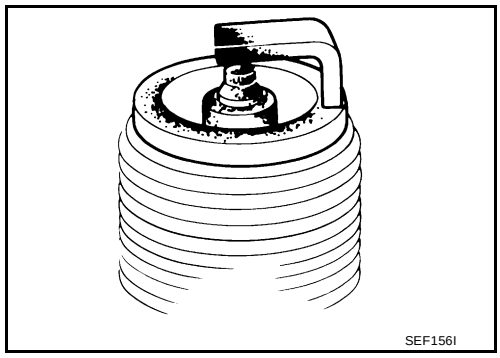


7. CHECK SPARK PLUGS

Check the spark plugs for fouling, etc.

OK or NG

OK >> GO TO 8.
NG >> Repair or replace ignition coil.



8. CHECK COMPRESSION PRESSURE

Refer to EM-13, "Measurement of Compression Pressure" .
Check compression pressure.

Standard:	**1,324 kPa (13.5 kg/cm^2 , 192 psi)/300 rpm**
Minimum:	**1,128 kPa (11.5 kg/cm^2 , 164 psi)/300 rpm**
Difference between each cylinder:	**98 kPa (1.0 kg/cm^2 , 14 psi)/300 rpm**

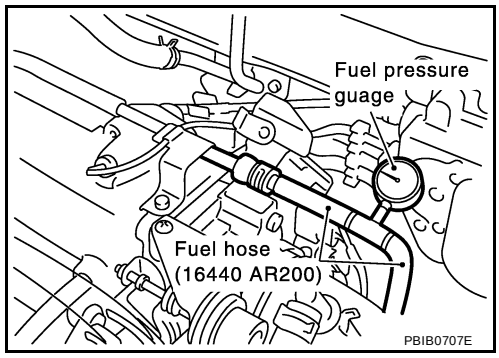
OK or NG

OK >> GO TO 9.
NG >> Check pistons, piston rings, valves, valve seats and cylinder head gaskets.

9. CHECK FUEL PRESSURE

1. Install any parts removed.
2. Release fuel pressure to zero. Refer to EC-623, "FUEL PRESSURE RELEASE" .
3. Install fuel pressure gauge and check fuel pressure.

At idle: Approx. 350 kPa (3.57 kg/cm^2 , 51 psi)



OK or NG

OK >> GO TO 11.
NG >> GO TO 10.

10. DETECT MALFUNCTIONING PART

Check the following.

- Fuel pump and circuit Refer to EC-1176, "FUEL PUMP" .
- Fuel lines. Refer to MA-18, "Checking Fuel Lines" .
- Fuel filter for clogging

OK or NG

NG >> Replace fuel pressure regulator.
OK >> Repair or replace.

11. CHECK IGNITION TIMING

Perform EC-652, "Basic Inspection" .

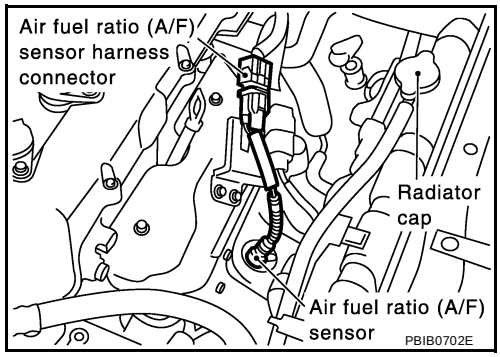
OK or NG

OK >> GO TO 12.
NG >> Adjust ignition timing.

12. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector and A/F sensor 1 harness connector.
3. Check harness continuity between the following terminals. Refer to “Wiring Diagram”.

ECM terminal	A/F sensor 1 terminal
62	2
63	5
64	1
65	6



Continuity should exist.

4. Check harness continuity between ECM terminals 62, 63, 64, 65 or A/F sensor 1 terminals 1, 2, 5, 6 and ground. Refer to Wiring Diagram.

Continuity should not exist.

5. Also check harness for short to power.

OK or NG

OK >> GO TO 13.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

13. CHECK A/F SENSOR 1 HEATER

Refer to EC-996, "Component Inspection" .

OK or NG

OK >> GO TO 14.
NG >> Replace A/F sensor 1.

14. CHECK MASS AIR FLOW SENSOR

With CONSULT-II

Check “MASS AIR FLOW” in “DATA MONITOR” mode with CONSULT-II.

at idling: 1.4 - 4.0 g·m/sec
at 2,500 rpm: 5.0 - 10.0 g·m/sec

With GST

Check mass air flow sensor signal in MODE 1 with GST.

at idling: 1.4 - 4.0 g·m/sec
at 2,500 rpm: 5.0 - 10.0 g·m/sec

OK or NG

OK >> GO TO 16.
NG >> GO TO 15.

15. CHECK CONNECTORS

Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds.
Refer to EC-734, "DTC P0101, P0102, P0103, P1102 MAF SENSOR" .

OK or NG

OK >> GO TO 16.
NG >> Repair or replace it.

16. CHECK SYMPTOM MATRIX CHART

Check items on the rough idle symptom in EC-666, "Symptom Matrix Chart" .

OK or NG

OK >> GO TO 17.
NG >> Repair or replace.

17. ERASE THE 1ST TRIP DTC

Some tests may cause a 1st trip DTC to be set.
Erase the 1st trip DTC from the ECM memory after performing the tests. Refer to EC-637, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .

>> GO TO 18.

18. CHECK INTERMITTENT INCIDENT

Perform EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

DTC P0327, P0328 KS

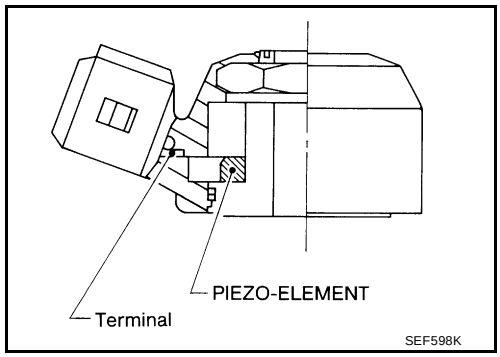
PFP:22060

Component Description

UBS001VL

The knock sensor is attached to the cylinder block. It senses engine knocking using a piezoelectric element. A knocking vibration from the cylinder block is sensed as vibrational pressure. This pressure is converted into a voltage signal and sent to the ECM.

Freeze frame data will not be stored in the ECM for the knock sensor. The MIL will not light for knock sensor malfunction. The knock sensor has one trip detection logic.



On Board Diagnosis Logic

UBS001VM

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0327 P0328	● An excessively low (P0327) or high (P0328) voltage from the knock sensor is sent to ECM.	● Harness or connectors (The knock sensor circuit is open or shorted.) ● Knock sensor

DTC Confirmation Procedure

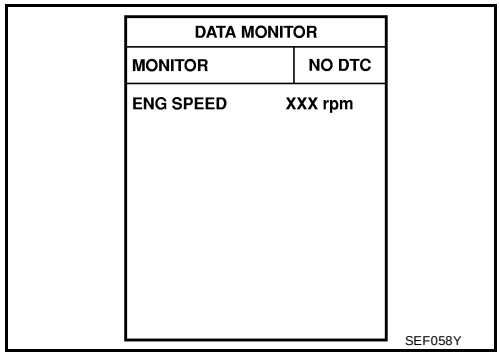
UBS001VN

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. Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and run it for at least 5 seconds at idle speed.
3. If DTC is detected, go to EC-845, "Diagnostic Procedure" .



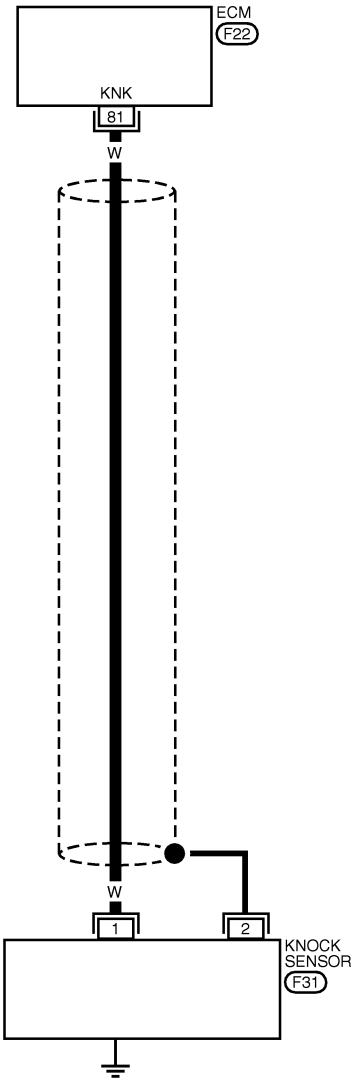
WITH GST

Follow the procedure “With CONSULT-II” above.

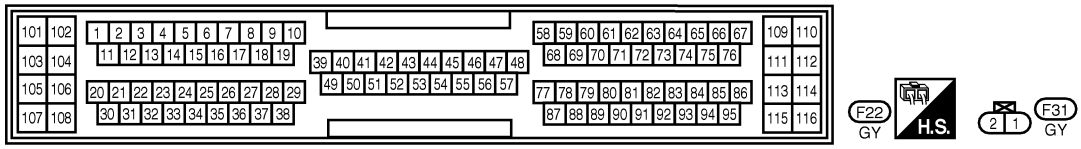
Wiring Diagram

UBS001VO

EC-KS-01



: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC



WEC386

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
81	W	KNOCK SENSOR	ENGINE RUNNING AT IDLE SPEED	APPROX. 2.5V

SEF572Y

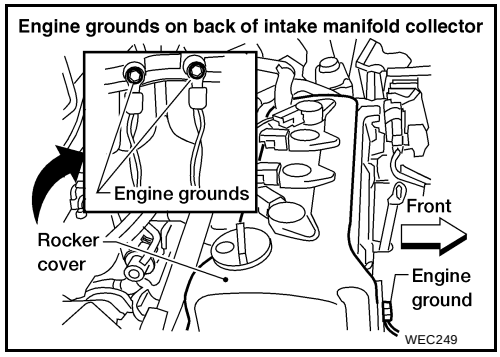
Diagnostic Procedure

UBS001VP

1. RETIGHTEN GROUND SCREWS

Loosen and retighten engine ground screws.

>> GO TO 2.



2. CHECK INPUT SIGNAL CIRCUIT-1

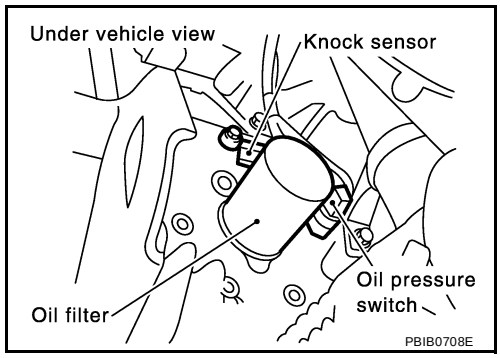
1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector and knock sensor harness connector.
3. Check harness continuity between knock sensor terminal 1 and ECM terminal 81.
   Refer to Wiring Diagram.

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 KNOCK SENSOR

Knock sensor
Refer to EC-846, "Component Inspection" .

OK or NG

OK >> GO TO 4.
NG >> Replace knock sensor.

4. CHECK INTERMITTENT INCIDENT

Perform EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

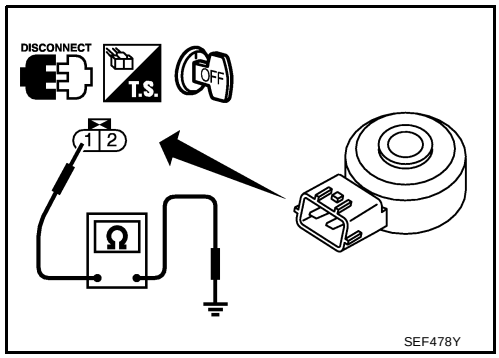
UBS001VQ

KNOCK SENSOR

Use an ohmmeter which can measure more than 10 MΩ.

1. Disconnect knock sensor harness connector.
2. Check resistance between terminal 1 and ground.

Resistance: 500 - 620 kΩ [at 20°C (68°F)]



CAUTION:

Discard any knock sensors that have been dropped or physically damaged. Use only new ones.

Removal and Installation

UBS001VR

KNOCK SENSOR

Refer to EM-58, "CYLINDER BLOCK" .

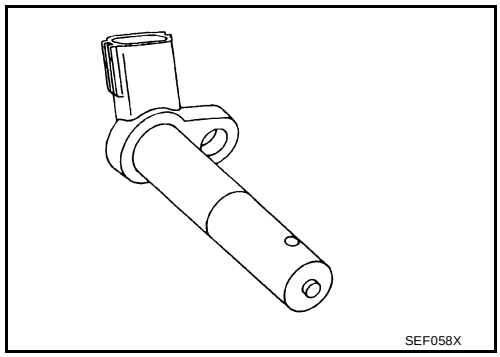
DTC P0335 CKP SENS0R (POS)

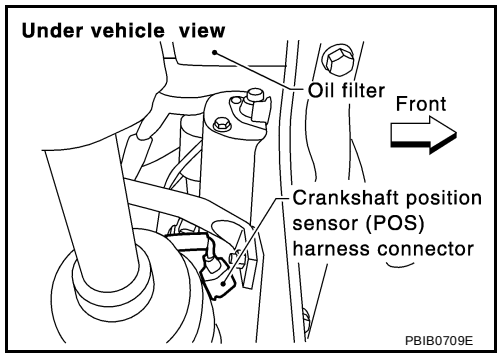
PFP:23731

Component Description

UBS001VS

The crankshaft position sensor (POS) is located on the cylinder block rear housing facing the gear teeth (cogs) of the signal plate at the end of crankshaft. It detects the fluctuation of the engine revolution.
The sensor consists of a permanent magnet and hall IC.
When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.
The changing gap causes the magnetic field near the sensor to change.
Due to the changing magnetic field, the voltage from the sensor changes.
The ECM receives the voltage signal and detects the fluctuation of the engine revolution.


SEF058X



PBIB0709E

On Board Diagnosis Logic

UBS001VT

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0335	● The crankshaft position sensor (POS) signal is not sent to ECM during the first few seconds of engine cranking. ● The proper pulse signal from the crankshaft position sensor (POS) is not sent to ECM while the engine is running. ● The crankshaft position sensor (POS) signal is not in the normal pattern during engine running.	● Harness or connectors (The crankshaft position sensor (POS) circuit is open.) ● Crankshaft position sensor (POS)

DTC Confirmation Procedure

UBS001VU

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. Start engine and run it for at least 10 seconds at idle speed.
3. If 1st trip DTC is detected, go to EC-849, "Diagnostic Procedure"
.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

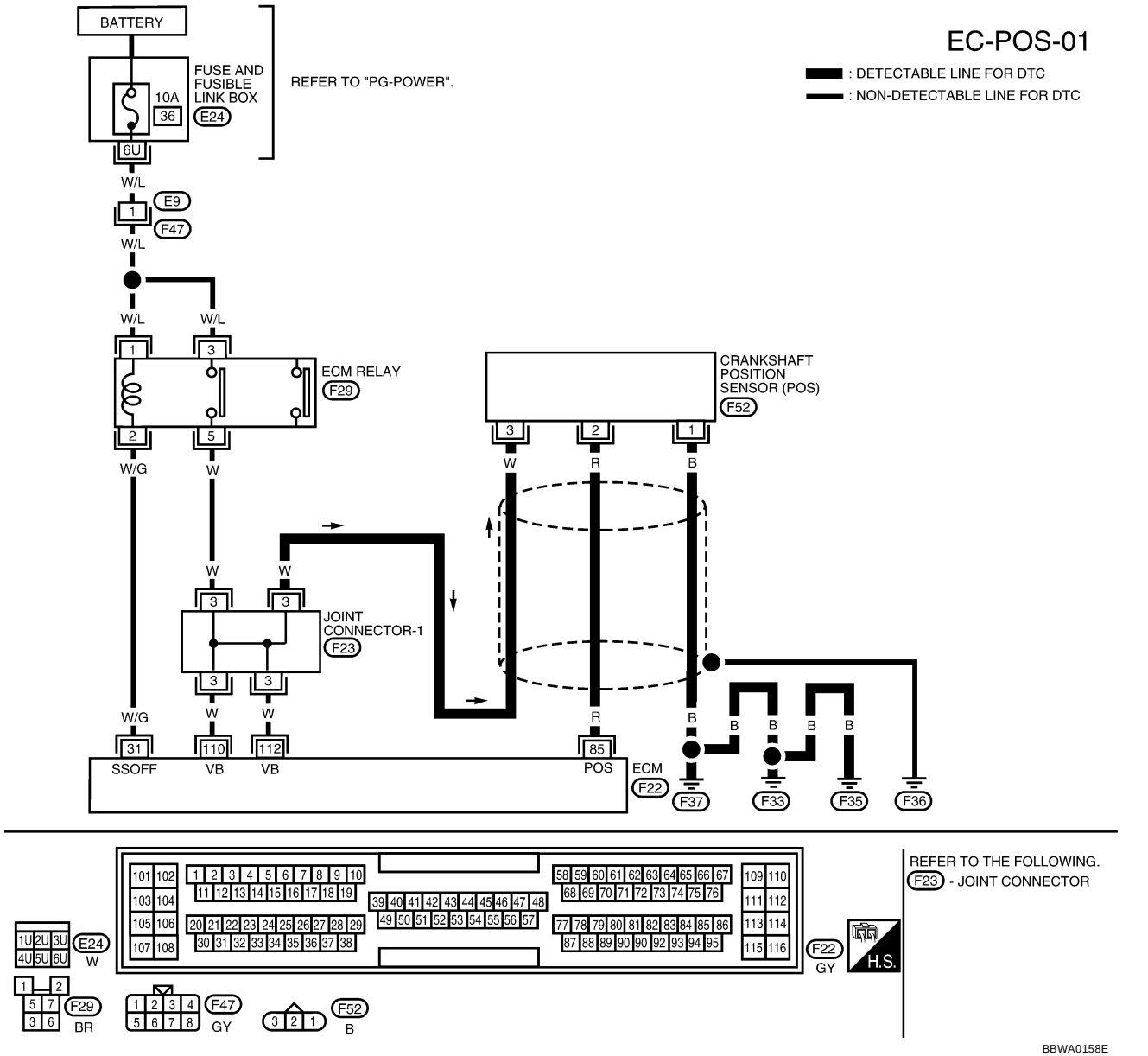
SEF058Y

WITH GST

Follow the procedure “With CONSULT-II” above.

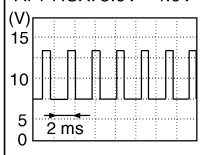
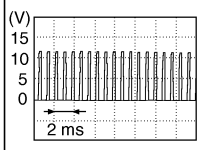
Wiring Diagram

UBS001VV



BBWA0158E

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
85	R	CRANKSHAFT POSITION SENSOR (POS)	ENGINE RUNNING AT IDLE SPEED UNDER WARM-UP CONDITION	APPROX. 3.0V - 4.0V 
			ENGINE RUNNING AT 2,000 RPM	APPROX. 3.0V - 4.0V 

SEF605Z

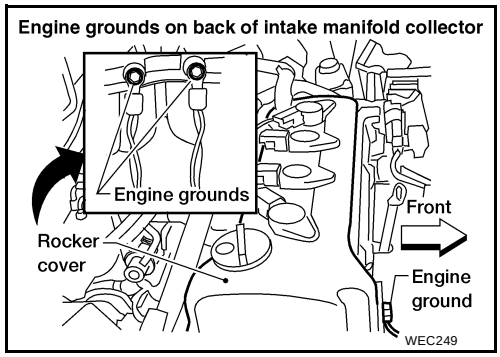
Diagnostic Procedure

UBS001VW

1. RETIGHTEN GROUND SCREWS

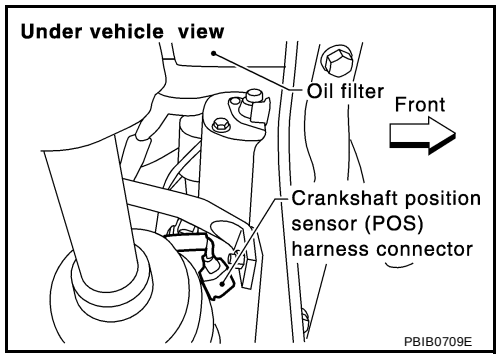
1. Turn ignition switch "OFF".
2. Loosen and retighten engine ground screws.

>> GO TO 2.



2. CHECK POWER SUPPLY

1. Disconnect crankshaft position sensor (POS) harness connector.



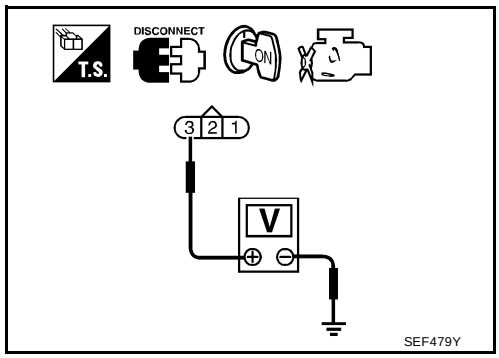
2. Check voltage between crankshaft position sensor (POS) harness connector terminal 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage

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.

- Joint connector-1
- Harness for open and short between ECM and crankshaft position sensor (POS)
- Harness for open or short between ECM relay and crankshaft position sensor (POS)

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK INPUT SIGNAL CIRCUIT

1. Check continuity between ECM terminal 85 and CKPS (POS) terminal 2.
Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK GROUND CIRCUIT

1. Reconnect ECM harness connector.
2. Check harness continuity between CKPS (POS) terminal 1 and engine ground.
Refer to the wiring diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to EC-851, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace crankshaft position sensor (POS).

7. CHECK INTERMITTENT INCIDENT

Perform EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

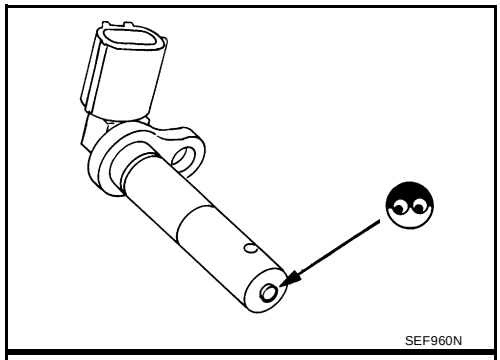
>> **INSPECTION END**

Component Inspection

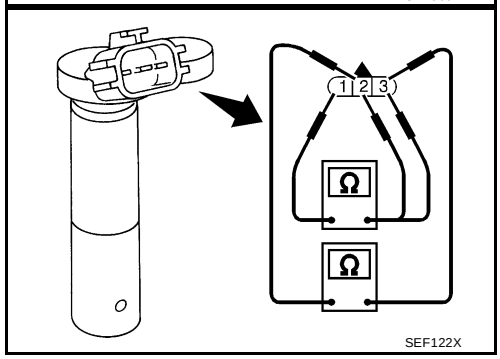
UBS001VX

CRANKSHAFT POSITION SENSOR (POS)

1. Disconnect crankshaft position sensor (POS) harness connector.
2. Loosen the fixing bolt of the sensor.
3. Remove the sensor.
4. Visually check the sensor for chipping.


SEF960N

5. Check resistance as shown in the figure.



SEF122X

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
3 (+) - 1 (–)	Except 0 or ∞
2 (+) - 1 (–)	
3 (+) - 2 (–)	

If NG, replace crankshaft position sensor (POS).

Removal and Installation

UBS001VY

CRANKSHAFT POSITION SENSOR (POS)

Refer to EM-58, "CYLINDER BLOCK" .

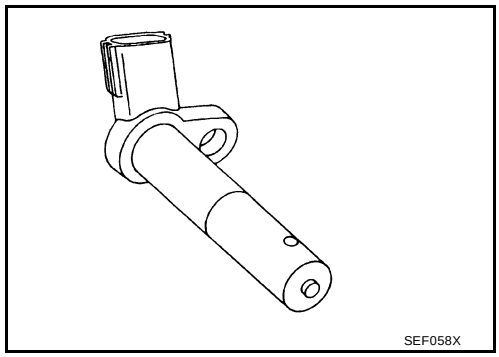
DTC P0340 CMP SENSOR (PHASE)

PFP:23731

Component Description

UBS001VZ

The camshaft position sensor senses the protrusion provided with exhaust valve cam sprocket to identify a particular cylinder. The crankshaft position sensor senses the piston position.
When the crankshaft position sensor system becomes inoperative, the camshaft position sensor provides various controls of engine parts instead, utilizing timing of cylinder identification signals.
The sensor consists of a permanent magnet, core and coil.
When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.
The changing gap causes the magnetic field near the sensor to change.
Due to the changing magnetic field, the voltage from the sensor changes.


SEF058X

On Board Diagnosis Logic

UBS001W0

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0340	● The cylinder No. signal is not entered to ECM for the first few seconds during engine cranking. ● The cylinder No. signal is not enter to ECM during engine running. ● The cylinder No. signal is not in the normal pattern during engine running.	● Harness or connectors (The camshaft position sensor (PHASE) circuit is open or shorted.) ● Camshaft position sensor (PHASE) ● Starter motor (Refer to SC section.) ● Starting system circuit (Refer to SC section.)

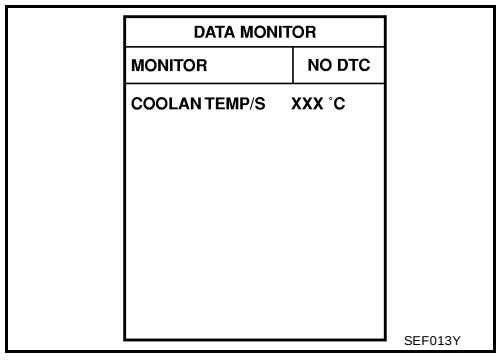
DTC Confirmation Procedure

UBS001W1

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10.5V.

WITH CONSULT-II

1. Turn ignition switch “ON”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Crank engine for at least 2 seconds and run it at idle speed for at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-854, "Diagnostic Procedure" .



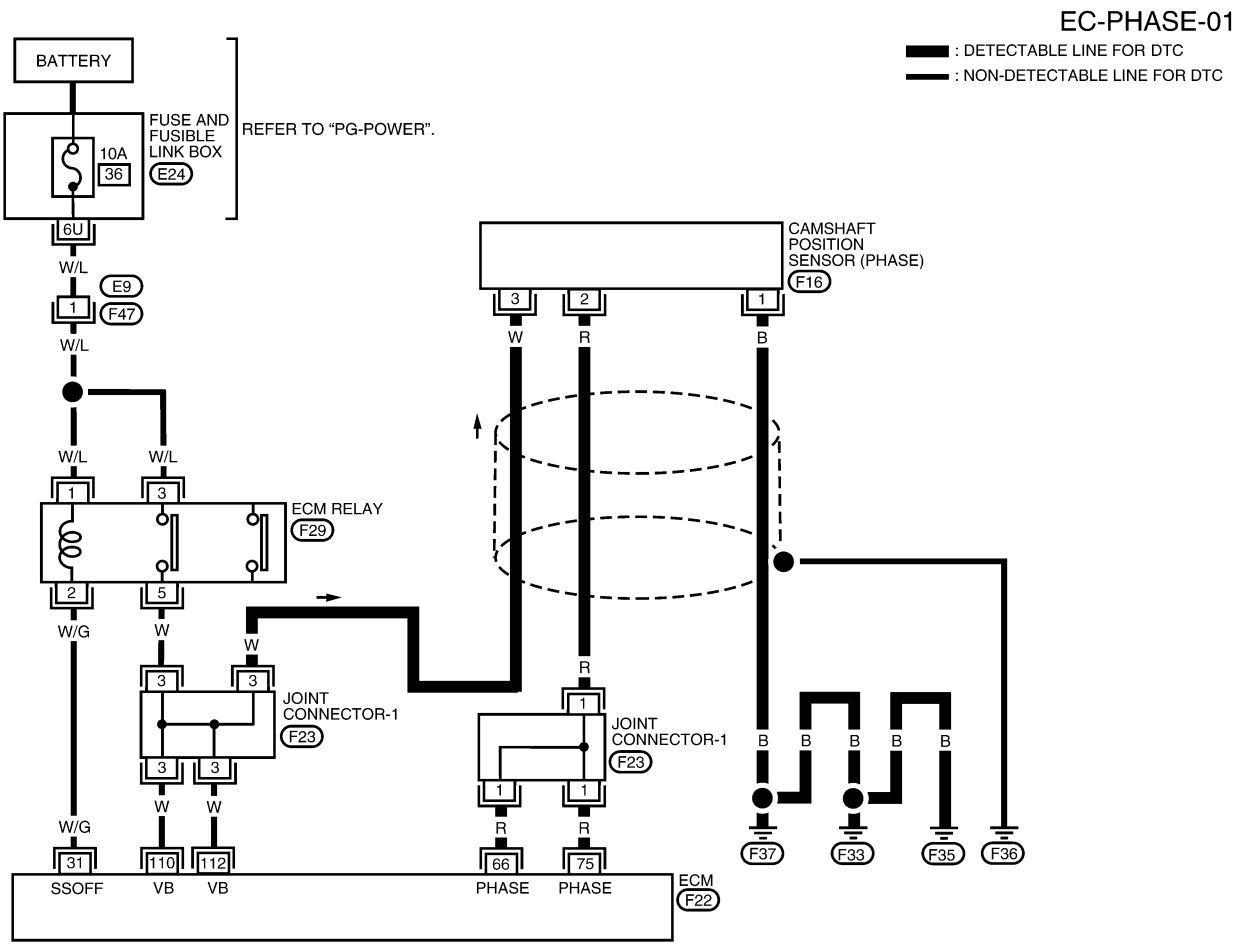
SEF013Y

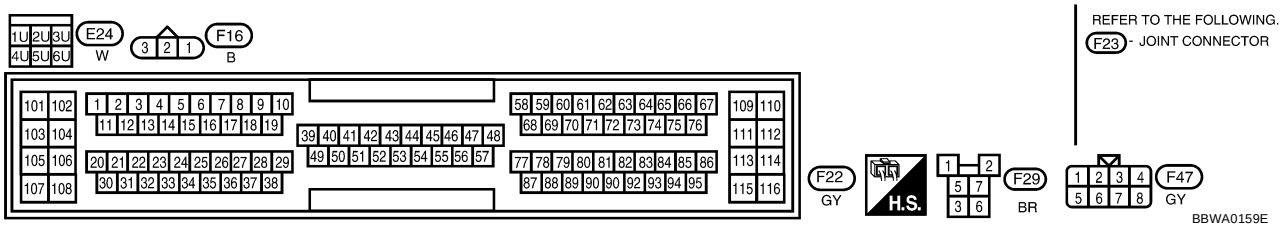
WITH GST

Follow the procedure “With CONSULT-II” above.

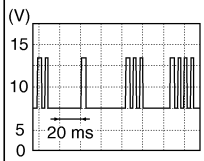
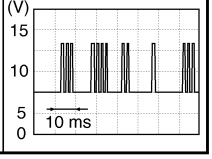
Wiring Diagram

UBS001W2





ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
66, 75	R	CAMSHAFT POSITION SENSOR (PHASE)	ENGINE RUNNING AT IDLE SPEED UNDER WARM-UP CONDITION	APPROX. 3.0V - 4.0V 
			ENGINE RUNNING AT 2,000 RPM	APPROX. 3.0V - 4.0V 

SEF606Z

Diagnostic Procedure

UBS001W3

1. CHECK STARTING SYSTEM

Does the engine turn over?
(Does the starter motor operate?)

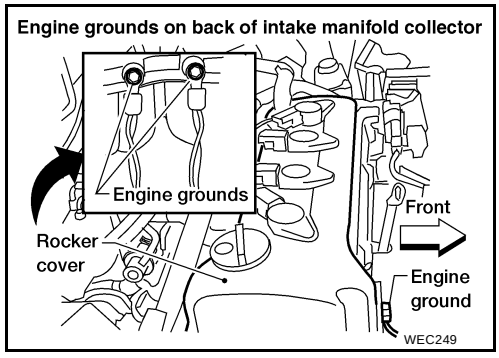
Yes or No

Yes >> GO TO 2.
No >> Check starting system. (Refer to SC-9, "STARTING SYSTEM" .)

2. RETIGHTEN GROUND SCREWS

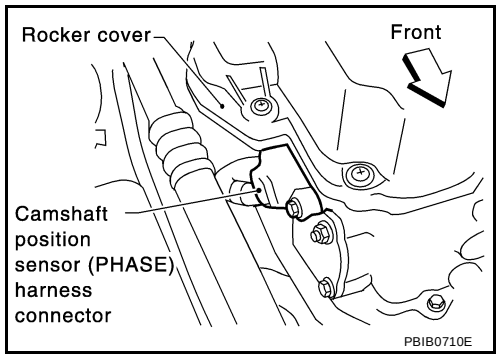
1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

>> GO TO 3.



3. CHECK POWER SUPPLY

1. Disconnect camshaft position sensor (PHASE) harness connector.
2. Turn ignition switch “ON”.

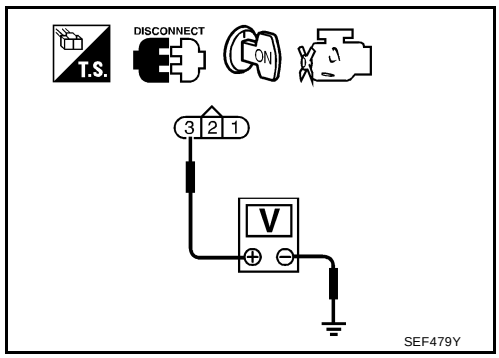


3. Check voltage between distributor terminal 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.



4. DETECT MALFUNCTIONING PART

Check the following.

- Joint connector-1
- Harness for open or short between camshaft position sensor (PHASE) and ECM relay
- Harness for open or short between camshaft position sensor (PHASE) and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK INPUT SIGNAL CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between camshaft position sensor (PHASE) terminal 2 and ECM terminals 66, 75.
   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.

- Joint connector-1
- Harness for open or short between camshaft position sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK GROUND CIRCUIT

1. Turn ignition switch “OFF”.
2. Check harness continuity between camshaft position sensor terminal 1 and engine ground.
   Refer to the 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

Refer to EC-856, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace camshaft position sensor.

9. CHECK INTERMITTENT INCIDENT

Perform EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

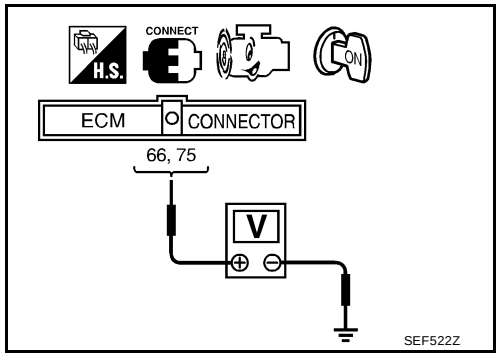
>> **INSPECTION END**

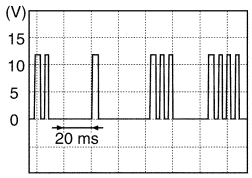
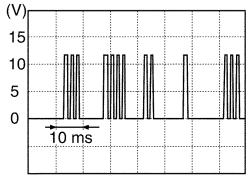
Component Inspection

UBS001W4

CAMSHAFT POSITION SENSOR (PHASE)

1. Start engine and warm it up to normal operating temperature.
2. Check voltage between ECM terminals 66, 75 and engine ground.



Condition	Idle	2,000 rpm
Voltage	Approximately 2.0 - 3.0V	Approximately 2.0 - 3.0V
Pulse signal	 SEF977W	 SEF978W

If NG, replace camshaft position sensor.

Removal and Installation

UBS001W5

CAMSHAFT POSITION SENSOR (PHASE)

Refer to EM-24, "TIMING CHAIN" .

DTC P0350 IGNITION SIGNAL

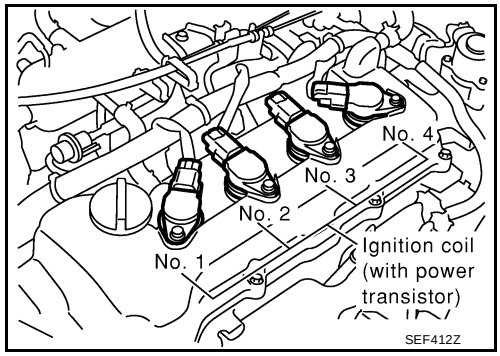
PFP:22448

Component Description

UBS001W6

IGNITION COIL & POWER TRANSISTOR

The ignition signal from the ECM is sent to and amplified by the power transistor. The power transistor turns on and off the ignition coil primary circuit. This on-off operation induces the proper high voltage in the coil secondary circuit.



On Board Diagnosis Logic

UBS001W7

Malfunction is detected when the ignition signal in the primary circuit is not sent to ECM during engine cranking or running.

Possible Cause

UBS001W8

- Harness or connectors (The ignition primary circuit is open or shorted.)
- Power transistor unit built into ignition coil
- Condenser
- Crankshaft position sensor (POS)
- Crankshaft position sensor (POS) circuit
- Camshaft position sensor (PHASE)
- Camshaft position sensor (PHASE) circuit

DTC Confirmation Procedure

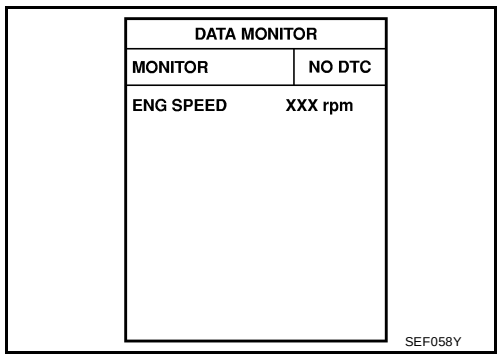
UBS001W9

NOTE:

- If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.
- **If DTC P0350 is displayed with DTC P0335, P0340 perform trouble diagnosis for DTC P0335, P0340 first. Refer to EC-847 , EC-852 .**

WITH CONSULT-II

1. Turn ignition switch “ON”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine. (If engine does not run, turn ignition switch to “START” for at least 5 seconds.)
4. If 1st trip DTC is detected, go to EC-861, "Diagnostic Procedure" .



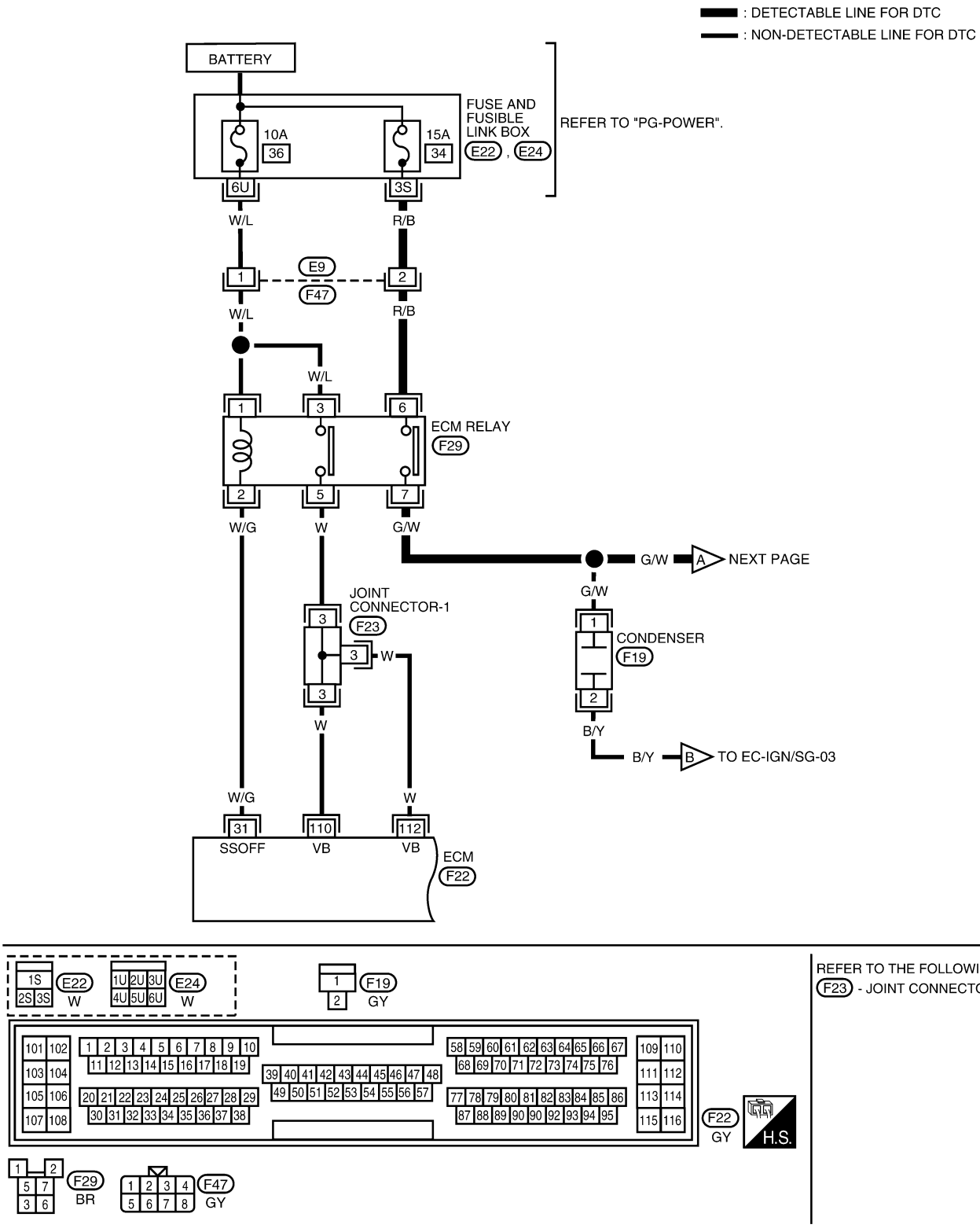
WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS001WA

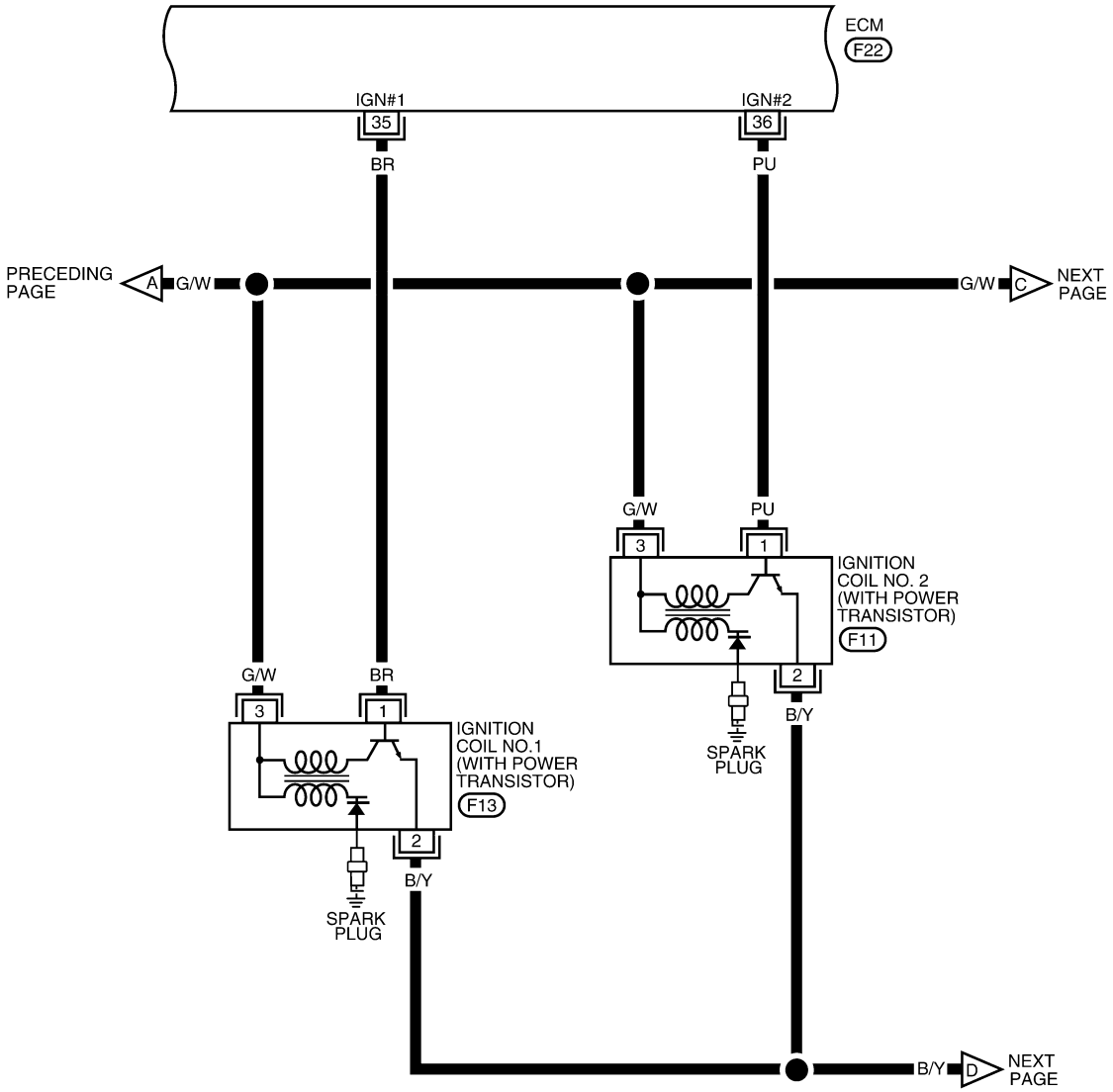
EC-IGN/SG-01

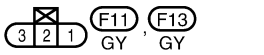


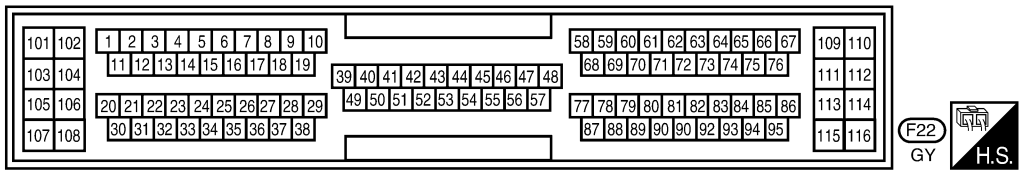
BBWA0177E

EC-IGN/SG-02

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC

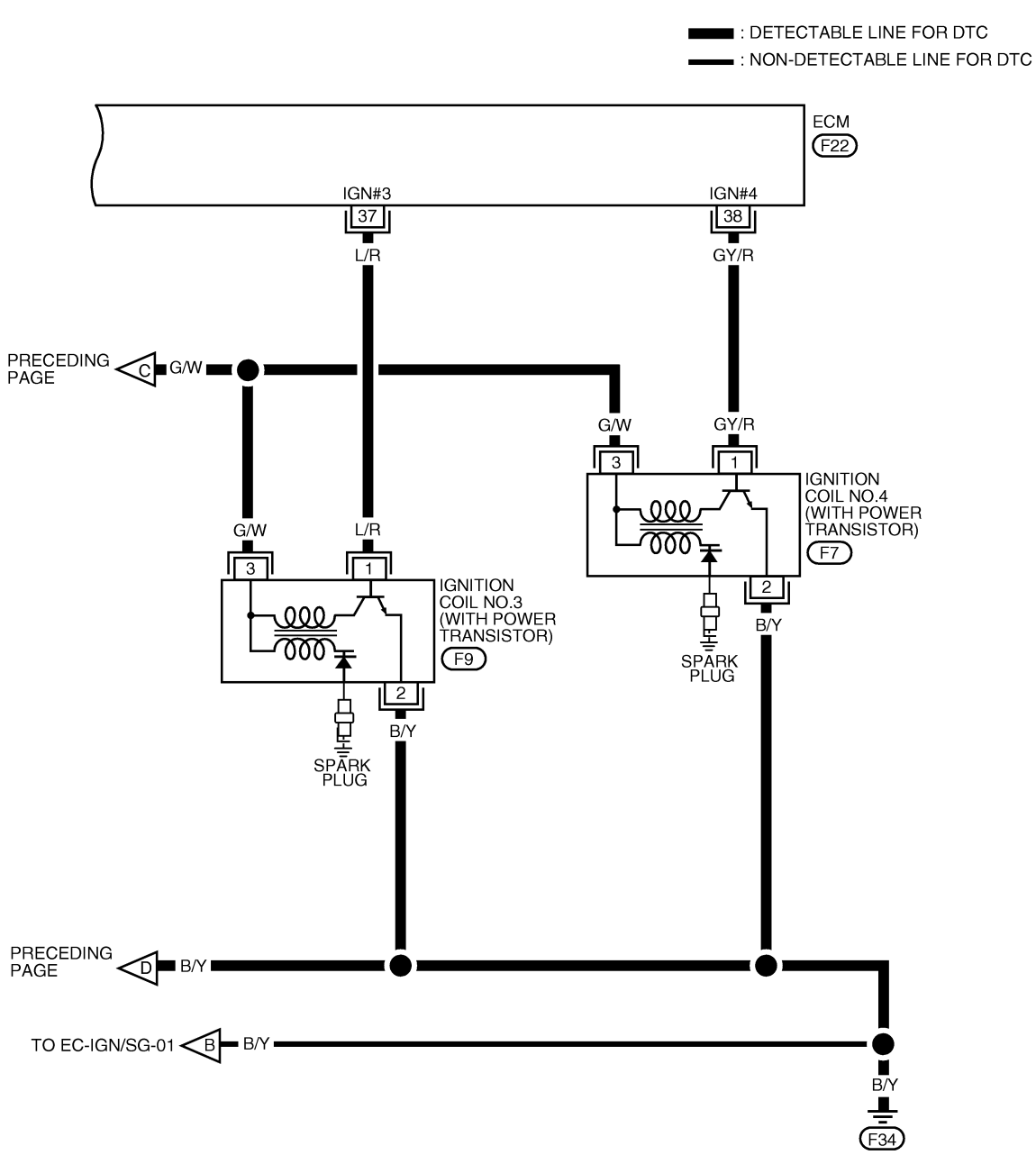


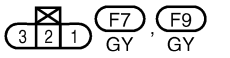


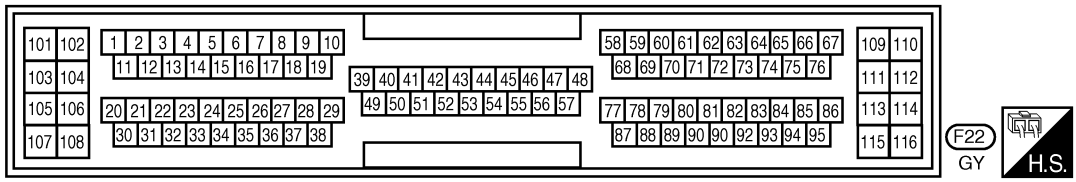


BBWA0178E

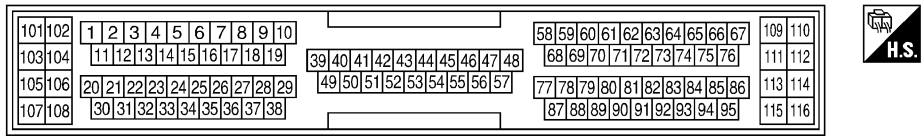
EC-IGN/SG-03





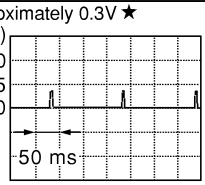
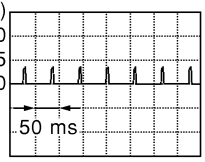


WEC407



SEF970W

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
35	B/R	IGNITION SIGNAL NO. 1	ENGINE RUNNING AT IDLE SPEED UNDER WARM-UP CONDITION	Approximately 0.3V ★ 
36	PU	IGNITION SIGNAL NO. 2		
37	L/R	IGNITION SIGNAL NO. 3	ENGINE RUNNING AT 2,000 RPM	Approximately 0.5V ★ 
38	GY/R	IGNITION SIGNAL NO. 4		

★ : AVERAGE VOLTAGE FOR PULSE SIGNAL (ACTUAL PULSE SIGNAL CAN BE CONFIRMED BY OSCILLOSCOPE.)

SEF746YA

Diagnostic Procedure

UBS001WB

1. CHECK ENGINE START

Turn ignition switch "OFF", and restart engine.
Is engine running?

Yes or No

Yes (With CONSULT-II)>>GO TO 2.
Yes (Without CONSULT-II)>>GO TO 12.
No >> GO TO 3.

2. SEARCH FOR MALFUNCTIONING CIRCUIT

With CONSULT-II

1. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-II.
2. Search for circuit which does not produce a momentary engine speed drop.

>> GO TO 12.

ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
IACV-AAC/V	XXX step

SEF190Y

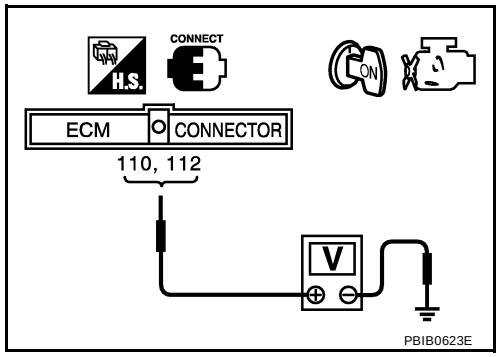
3. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-I

1. Turn ignition switch ON.
2. Check voltage between ECM terminals 110, 112 and ground with CONSULT-II or tester.

Voltage: Battery voltage

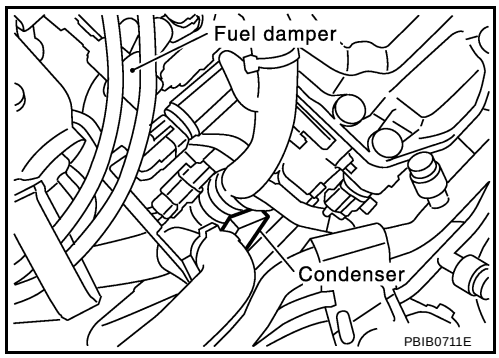
OK or NG

OK >> GO TO 4.
NG >> Go to POWER SUPPLY CIRCUIT FOR ECM, EC-712 .



4. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect condenser harness connector.
3. Turn ignition switch ON.

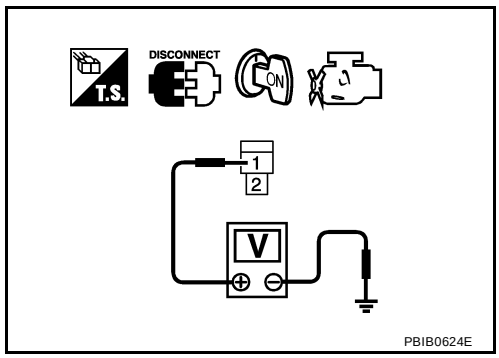


4. Check voltage between condenser terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 10.
NG >> GO TO 5.



5. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-III

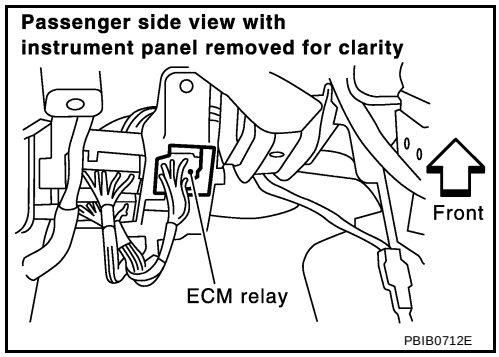
1. Turn ignition switch OFF.
2. Disconnect ECM relay.
3. Check harness continuity between ECM relay terminal 7 and condenser terminal 1. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.



6. DETECT MALFUNCTIONING PART

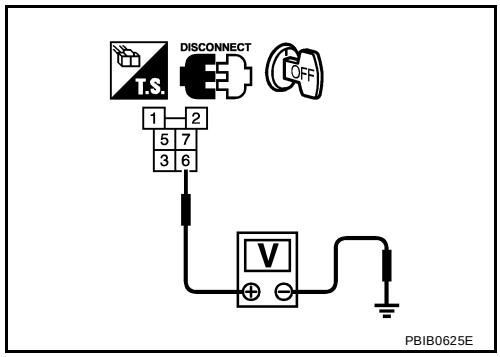
Check the harness for open or short between ECM relay and condenser.

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-IV

Check voltage between ECM relay terminal 6 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 9.
NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

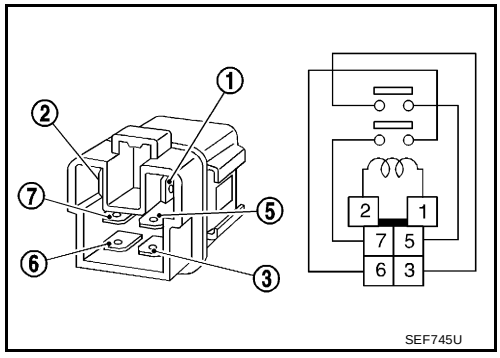
- Harness connectors E9, F47
- 15A fuse
- Harness for open and short between ECM relay and fuse

>> Repair or replace harness or connectors.

9. CHECK ECM RELAY

1. Apply 12V direct current between ECM relay terminals 1 and 2.
2. Check continuity between ECM relay terminals 3 and 5, 6 and 7.

Condition	Continuity
12V direct current supply between terminals 1 and 2	Yes
OFF	No



OK or NG

OK >> GO TO 17.
NG >> Replace ECM relay.

10. CHECK CONDENSER GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between condenser terminal 2 and engine ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

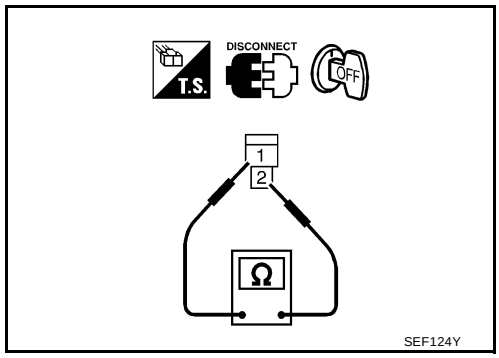
OK or NG

OK >> GO TO 11.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

11. CHECK CONDENSER

Check resistance between condenser terminals 1 and 2.

Resistance: Above 1MΩ at 25°C (77°F)

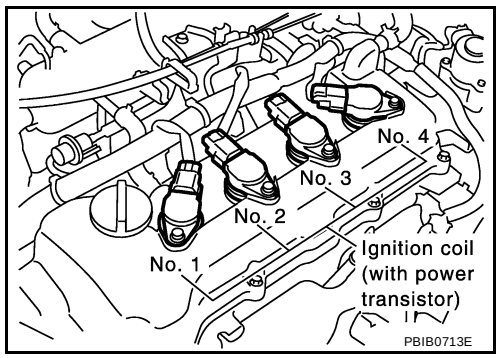


OK or NG

OK >> GO TO 12.
NG >> Replace condenser.

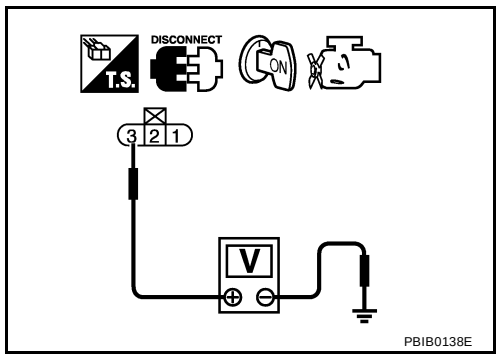
12. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-V

1. Turn ignition switch OFF.
2. Reconnect disconnected harness connectors.
3. Disconnect ignition coil harness connector.
4. Turn ignition switch ON.



5. Check voltage between ignition coil terminal 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 14.
NG >> GO TO 13.

13. DETECT MALFUNCTIONING PART

Check the harness for open or short between ignition coil and ECM relay.

>> Repair or replace harness or connectors.

14. CHECK IGNITION COIL GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between ignition coil terminal 2 and engine ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 15.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

15. CHECK IGNITION COIL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminals 35, 36, 37, 38 and ignition coil terminal 1. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

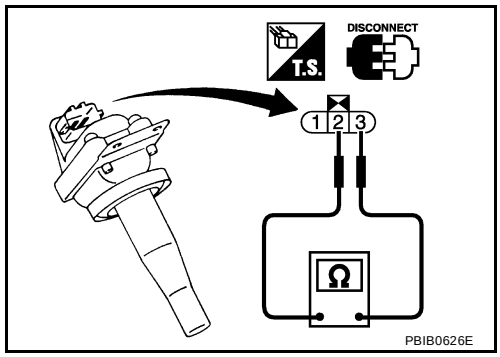
OK or NG

OK >> GO TO 16.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

16. CHECK IGNITION COIL WITH POWER TRANSISTOR

Check resistance between ignition coil terminals 2 and 3.

Terminals	Resistance	Result
2 and 3	Not 0Ω	OK
	0Ω	NG



OK or NG

OK >> GO TO 17.
NG >> Replace ignition coil with power transistor.

17. CHECK INTERMITTENT INCIDENT

Refer to EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Removal and Installation

UBS001WC

IGNITION COIL WITH POWER TRANSISTOR

Refer to EM-15, "Removal and Installation" .

DTC P0400 EGR FUNCTION

PFP:14710

Description

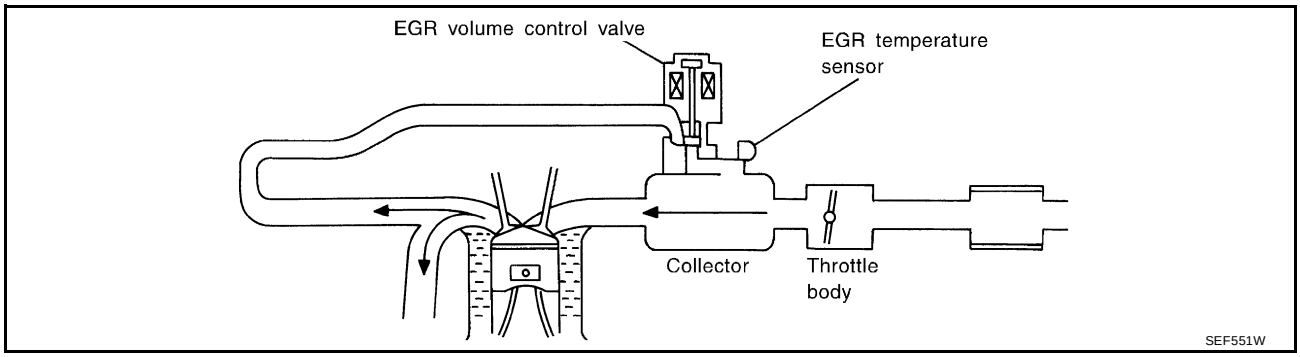
UBS001WD

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed	EGR volume control	EGR volume control valve
Camshaft position sensor (PHASE)	Engine speed and cylinder position		
Vehicle speed sensor	Vehicle speed		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		
Battery	Battery voltage		
Mass air flow sensor	Amount of intake air		
Air conditioner switch	Air conditioner operation		
Power steering oil pressure switch	Power steering load signal		
Electrical load	Electrical load signal		
PNP switch	Park/Neutral position signal		
TCM	Gear position, shifting signal		

This system controls flow rate of EGR led from exhaust manifold to intake manifold. The opening of the EGR by-pass passage in the EGR volume control valve changes to control the flow rate. A built-in step motor moves the valve in steps corresponding to the ECM output pulses. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions. The EGR volume control valve remains closed under the following conditions.

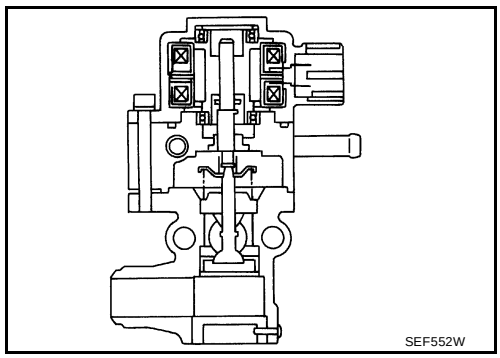
- Engine stopped
- Engine starting
- Engine idling
- Low engine coolant temperature
- Excessively high engine coolant temperature
- High engine speed
- Wide open throttle
- Low battery voltage



COMPONENT DESCRIPTION

EGR volume control valve

The EGR volume control valve uses a step motor to control the flow rate of EGR from exhaust manifold. This motor has four winding phases. It operates according to the output pulse signal of the ECM. Two windings are turned ON and OFF in sequence. Each time an ON pulse is issued, the valve opens or closes, changing the flow rate. When no change in the flow rate is needed, the ECM does not issue the pulse signal. A certain voltage signal is issued so that the valve remains at that particular opening.


SEF552W

CONSULT-II Reference Value in Data Monitor Mode

UBS001WE

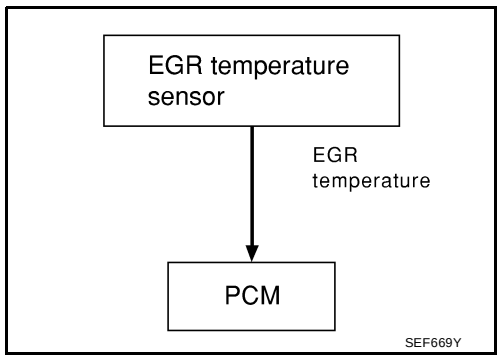
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
EGR TEMP SEN	● Engine: After warming up		Less than 4.5V
EGR VOL CON/V	● Engine: After warming up ● Air conditioner switch: “OFF” ● Shift lever: “N” ● No-load	Idle	0 step
		Revving engine up to 3,000 rpm quickly	10 - 55 step

On Board Diagnosis Logic

UBS001WF

If the absence of EGR flow is detected by EGR temperature sensor under the condition that calls for EGR, a low-flow malfunction is diagnosed.
Malfunction is detected when no EGR flow is detected under condition that calls for EGR.



SEF669Y

Possible Cause

UBS001WG

- Harness or connectors
  (EGR volume control valve circuit is open or shorted.)
- EGR volume control valve stuck closed
- Dead (Weak) battery
- EGR passage clogged
- EGR temperature sensor and circuit
- Exhaust gas leaks

DTC Confirmation Procedure

UBS001WH

CAUTION:
Always drive vehicle at a safe speed.

NOTE:

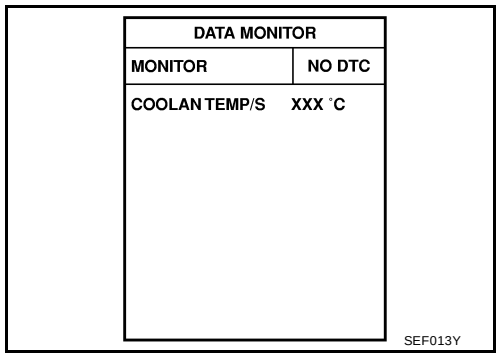
- If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 5 seconds before conducting the next test.
- P0400 will not be displayed at “SELF-DIAG RESULTS” mode with CONSULT-II even though DTC work support test result is NG.

TESTING CONDITION:

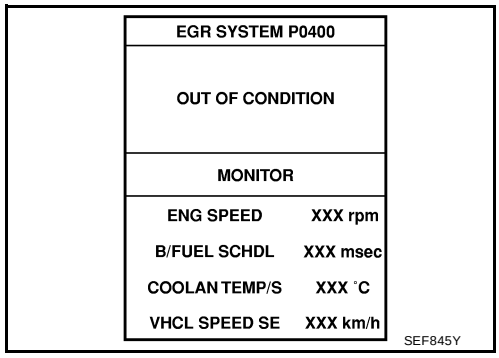
- **Before performing the following procedure, confirm battery voltage is more than 10V at idle, then stop engine immediately.**
- **For best results, perform the test at a temperature of 5°C (41°F) or higher.**

WITH CONSULT-II

1. Turn ignition switch “OFF” and wait at least 10 seconds.
2. Turn ignition switch “ON”
3. Check “COOLAN TEMP/S” in “DATA MONITOR” mode with CONSULT-II.
   Confirm COOLAN TEMP/S value is within the range listed below.
   COOLAN TEMP/S: Less than 40°C (104°F)
   If the value is out of range, park the vehicle in a cool place and allow the engine temperature to stabilize. Do not attempt to lower the engine coolant temperature with a fan or means other than ambient air. Doing so may produce an inaccurate diagnostic result.

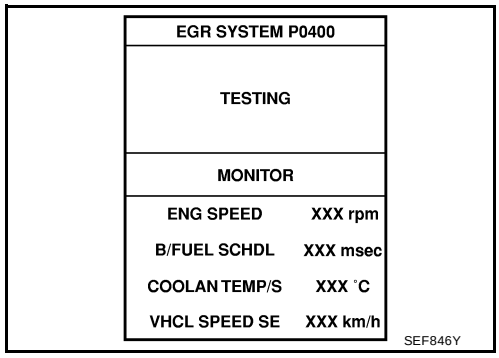


4. Start engine and let it idle monitoring “COOLAN TEMP/S” value. When the “COOLAN TEMP/S” value reaches 70°C (158°F), immediately go to the next step.
5. Select “EGR SYSTEM P0400” of “EGR SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II.
6. Touch “START”.
7. Accelerate vehicle to a speed of 40 km/h (25 MPH) once and then stop vehicle with engine running.
   If “COMPLETED” appears on CONSULT-II screen, go to step 9.
   If “COMPLETED” does not appear on CONSULT-II screen, go to the following step.



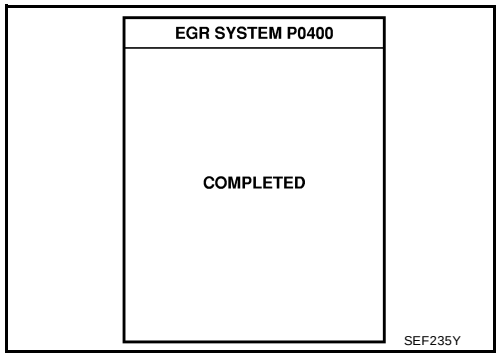
8. Check the output voltage of “THRTL POS SEN” (at closed throttle position) and note it.
9. When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions until “TESTING” changes to “COMPLETED”. (It will take approximately 30 seconds or more.)

ENG SPEED	1,200 - 3,600 rpm
Vehicle speed	More than 10 km/h (6 MPH)
B/FUEL SCHDL	4.5 - 8.0 msec
Selector lever	Suitable position

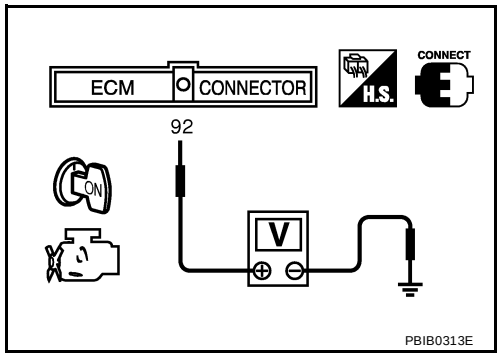


If “TESTING” is not displayed after 5 minutes, retry from step 2.

10. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to EC-871, "Diagnostic Procedure" .



WITH GST

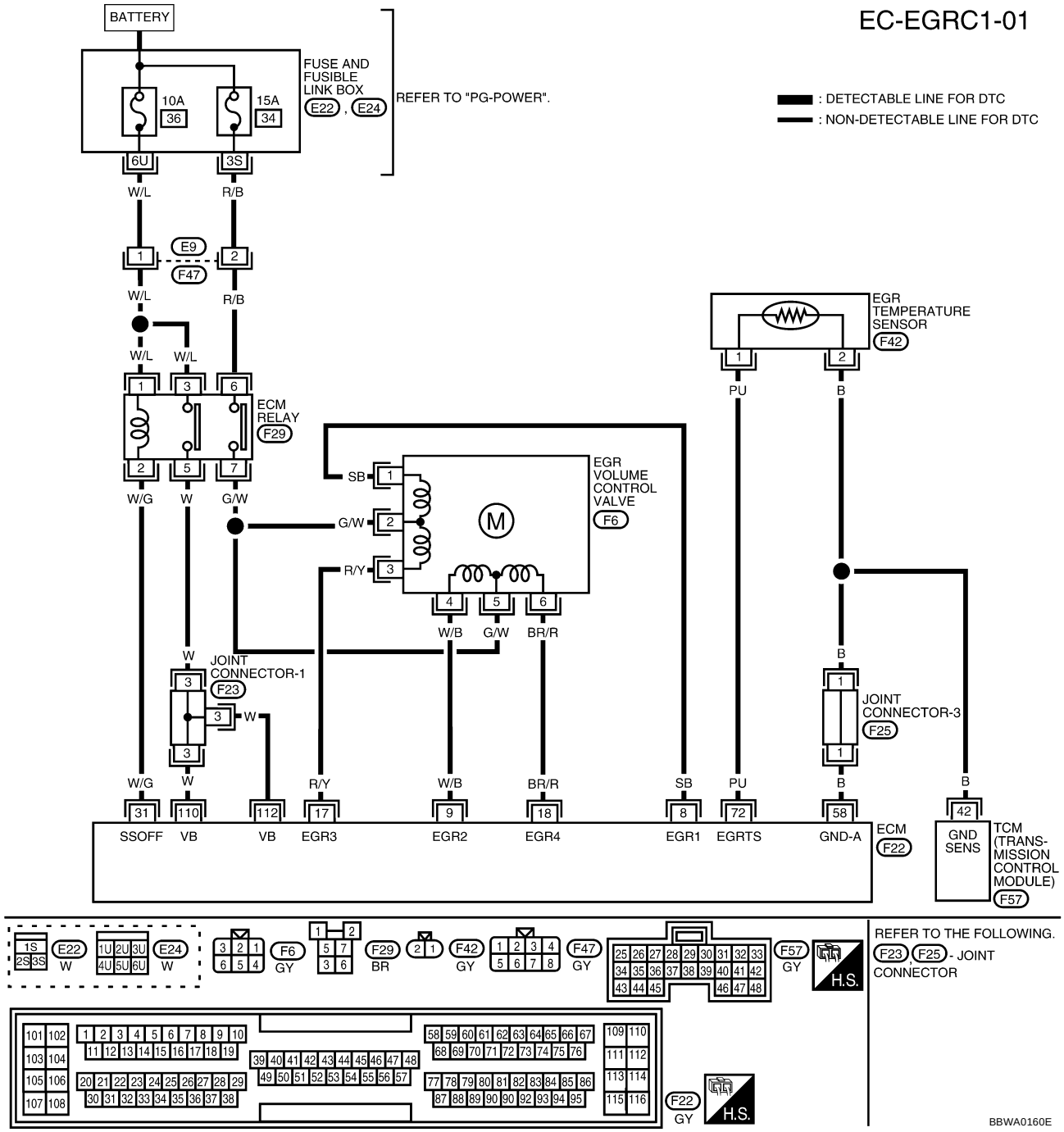


1. Turn ignition switch “OFF” and wait at least 10 seconds.
2. Turn ignition switch “ON”.
3. Check engine coolant temperature in MODE 1 with GST.
   Engine coolant temperature: Less than 40°C (104°F)
   If the value is out of range, park the vehicle in a cool place and allow the engine temperature to stabilize. Do not attempt to lower the coolant temperature with a fan or means other than ambient air. Doing so may produce an inaccurate diagnostic result.
4. Start engine and let it idle monitoring the value of “COOLAN TEMP/S”. When the engine coolant temperature reaches 70°C (158°F), immediately go to the next step.
5. Maintain the following conditions for at least 1 minute.
   Engine speed: 1,200 - 3,600 rpm
   Vehicle speed: More than 10 km/h (6 MPH)
   Selector lever: Suitable position
6. Stop vehicle.
7. Turn ignition switch “OFF” and wait at least 10 seconds, then turn “ON”.
8. Repeat step 3 to 5.
9. Select “MODE 3” with GST.
10. If DTC is detected, go to EC-871, "Diagnostic Procedure" .

- **When using GST, “DTC Confirmation Procedure” should be performed twice as much as when using CONSULT-II because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II is recommended**.

Wiring Diagram

UBS001WI



ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
8	SB	EGR VOLUME CONTROL VALVE	ENGINE RUNNING AT IDLE SPEED	0.1 - 14V
9	W/B			
17	R/Y			
18	BR/R			

SEF575YA

Diagnostic Procedure

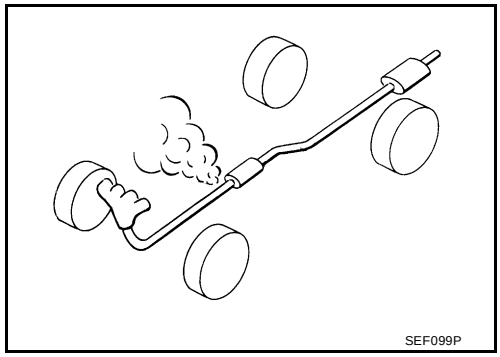
UBS001WJ

1. CHECK EXHAUST SYSTEM

1. Start engine.
2. Check exhaust pipes and muffler for leaks.

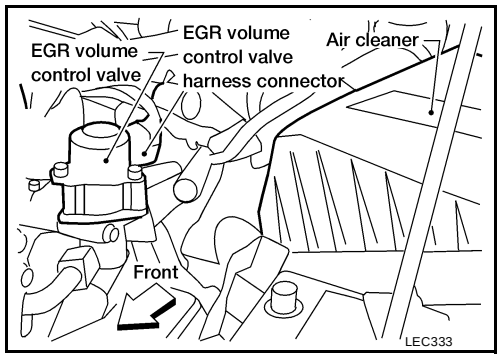
OK or NG

OK >> GO TO 2.
NG >> Repair or replace exhaust system.



2. CHECK EGR VOLUME CONTROL VALVE POWER SUPPLY CIRCUIT

1. Disconnect EGR volume control valve harness connector.
2. Turn ignition switch “ON”.

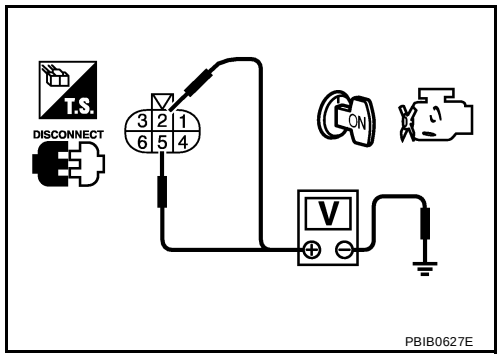


3. Check voltage between EGR volume control valve terminals 2, 5 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.



3. DETECT MALFUNCTIONING PART

Check the harness for open or short between ECM relay and EGR volume control valve.

>> Repair harness or connectors.

4. CHECK EGR VOLUME 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 terminals and EGR volume control valve terminals as follows. Refer to Wiring Diagram.

ECM terminal	EGR volume control valve
8	1
9	4
17	3
18	6

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 EGR PASSAGE

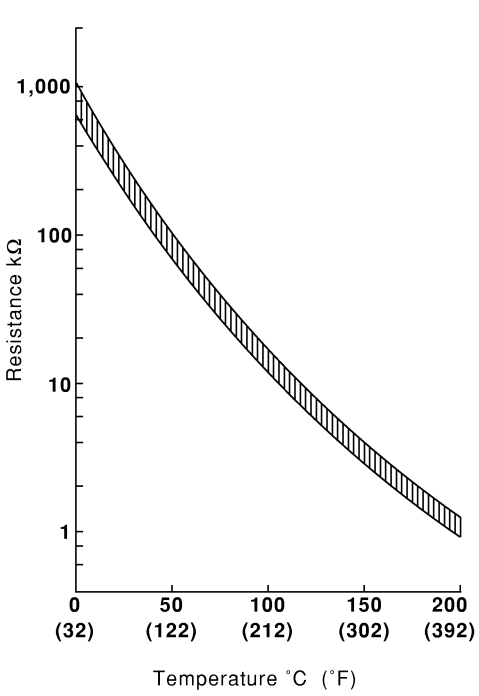
Check EGR passage for clogging and cracks.

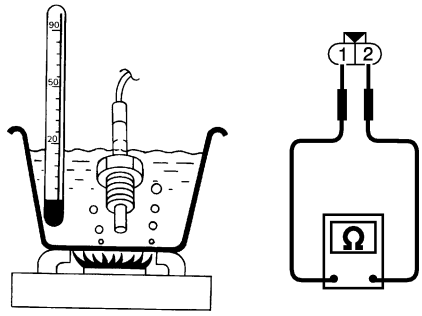
OK or NG

OK >> GO TO 6.
NG >> Repair or replace EGR passage.

6. CHECK EGR TEMPERATURE SENSOR AND CIRCUIT

1. Remove EGR temperature sensor.
2. Check resistance between EGR temperature sensor terminals 1 and 2 under the following conditions.





<Reference data>

EGR temperature ˚C (˚F)	Voltage V	Resistance MΩ
0 (32)	4.56	0.62 - 1.05
50 (122)	2.25	0.065 - 0.094
100 (212)	0.59	0.011 - 0.015

SEF483Y

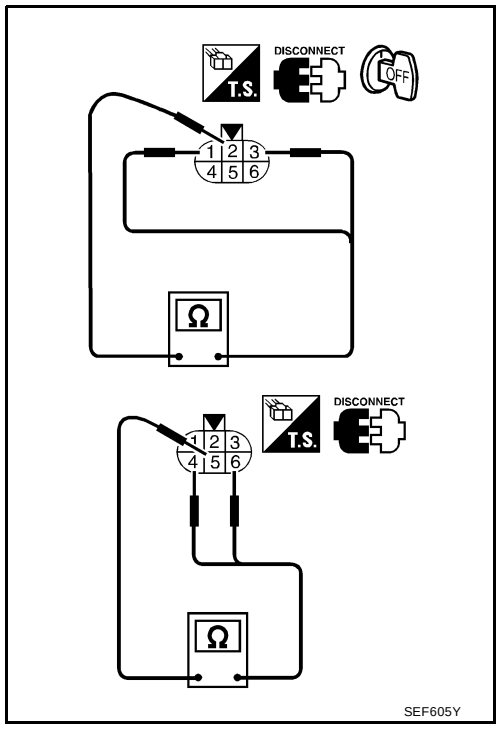
OK or NG

OK >> GO TO 7.
NG >> Replace EGR temperature sensor.

7. CHECK EGR VOLUME CONTROL VALVE-I

Check resistance between EGR volume control valve terminal 2 and terminals 1, 3, terminal 5 and terminals 4, 6.

Resistance: 20.9 - 23.1 Ω [at 20°C (68°F)]



OK or NG

OK (With CONSULT-II)>>GO TO 8.
OK (Without CONSULT-II)>>GO TO 9.
NG >> Replace EGR volume control valve.

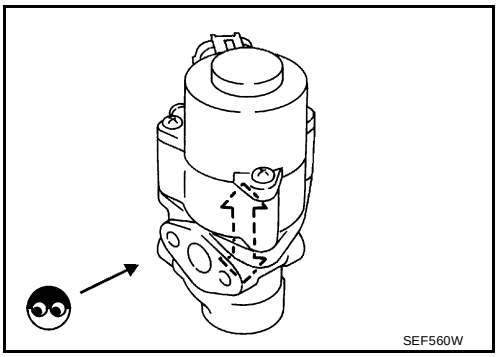
8. CHECK EGR VOLUME CONTROL VALVE-II

With CONSULT-II

1. Remove EGR volume control valve.
2. Reconnect ECM harness connector and EGR volume control valve harness connector.
3. Turn ignition switch “ON”.
4. Perform “EGR VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-II.
5. Check that EGR volume control valve shaft moves smoothly forward and backward according to the valve opening steps.

ACTIVE TEST	
EGR VOL CONT/V	20 step
MONITOR	
ENG SPEED	XXX rpm
EGR TEMP SEN	XXX V

SEF015Y



SEF560W

OK or NG

OK >> GO TO 10.
NG >> Replace EGR volume control valve.

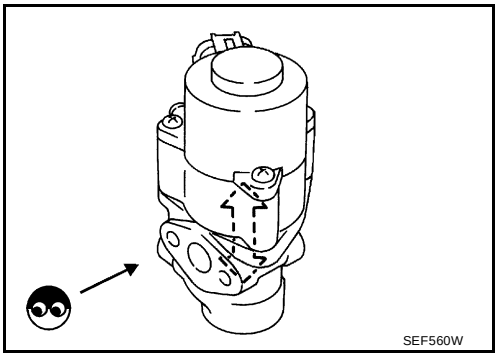
9. CHECK EGR VOLUME CONTROL VALVE-II

Without CONSULT-II

1. Remove EGR volume control valve.
2. Reconnect ECM harness connector and EGR volume control valve harness connector.
3. Turn ignition switch “ON” and “OFF”.
4. Check that EGR volume control valve shaft moves smoothly forward and backward according to the ignition switch position.

OK or NG

OK >> GO TO 10.
NG >> Replace EGR volume control valve.



SEF560W

10. CHECK INTERMITTENT INCIDENT

Refer to EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

DTC P0403 EGR VOLUME CONTROL VALVE

PFP:14710

Description

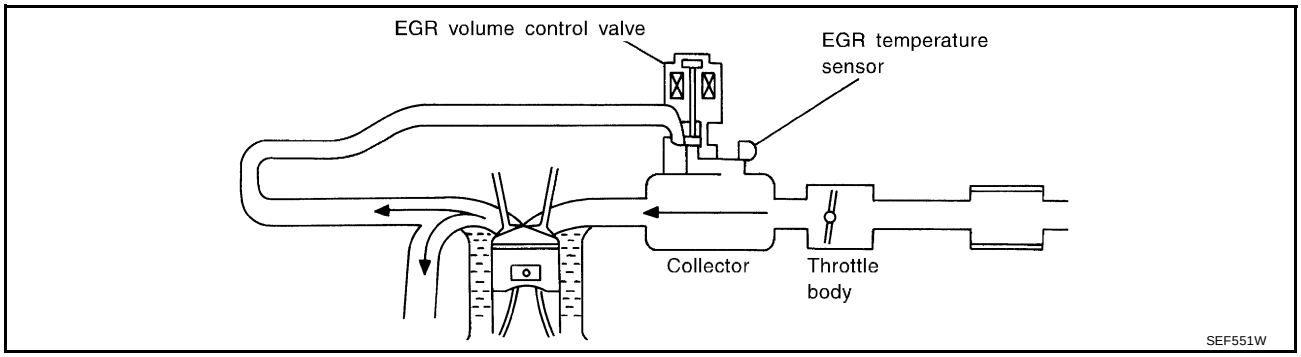
UBS001WK

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE)	Engine speed and cylinder position	EGR volume control	EGR volume control valve
Crankshaft position sensor (POS)	Engine speed		
Vehicle speed sensor	Vehicle speed		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		
Battery	Battery voltage		
Mass air flow sensor	Amount of intake air		
Air conditioner switch	Air conditioner operation		
Power steering oil pressure switch	Power steering load signal		
Electrical load	Electrical load signal		
PNP switch	Park/Neutral position signal		
TCM	Gear position, shifting signal		

This system controls flow rate of EGR led from exhaust manifold to intake manifold. The opening of the EGR by-pass passage in the EGR volume control valve changes to control the flow rate. A built-in step motor moves the valve in steps corresponding to the ECM output pulses. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions. The EGR volume control valve remains close under the following conditions.

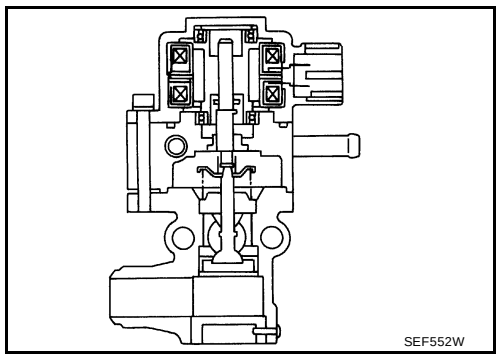
- Engine stopped
- Engine starting
- Engine idling
- Low engine coolant temperature
- Excessively high engine coolant temperature
- High engine speed
- Wide open throttle
- Low battery voltage



COMPONENT DESCRIPTION

EGR volume control valve

The EGR volume control valve uses a step motor to control the flow rate of EGR from exhaust manifold. This motor has four winding phases. It operates according to the output pulse signal of the ECM. Two windings are turned ON and OFF in sequence. Each time an ON pulse is issued, the valve opens or closes, changing the flow rate. When no change in the flow rate is needed, the ECM does not issue the pulse signal. A certain voltage signal is issued so that the valve remains at that particular opening.


SEF552W

CONSULT-II Reference Value in Data Monitor Mode

UBS001WL

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
EGR VOL CON/V	● Engine: After warming up ● Air conditioner switch: “OFF” ● Shift lever: “N” ● No-load	Idle	0 step
		Revving engine up to 3,000 rpm quickly	10 - 55 step

On Board Diagnosis Logic

UBS001WM

Malfunction is detected when an improper voltage signal is sent to ECM through the valve.

Possible Cause

UBS001WN

- Harness or connectors
  (EGR volume control valve circuit is open or shorted.)
- EGR volume control valve

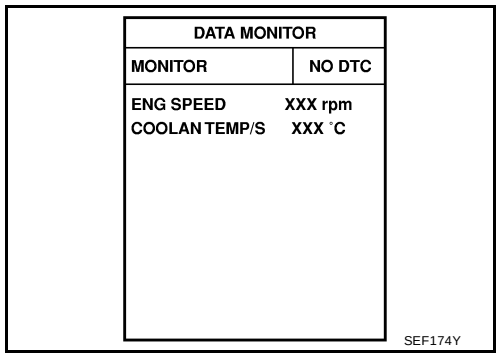
DTC Confirmation Procedure

UBS001WO

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 warm it up to normal operating temperature.
3. Rev engine from idle to 2,000 rpm 10 times.
4. If 1st trip DTC is detected, go to EC-880, "Diagnostic Procedure"
   .



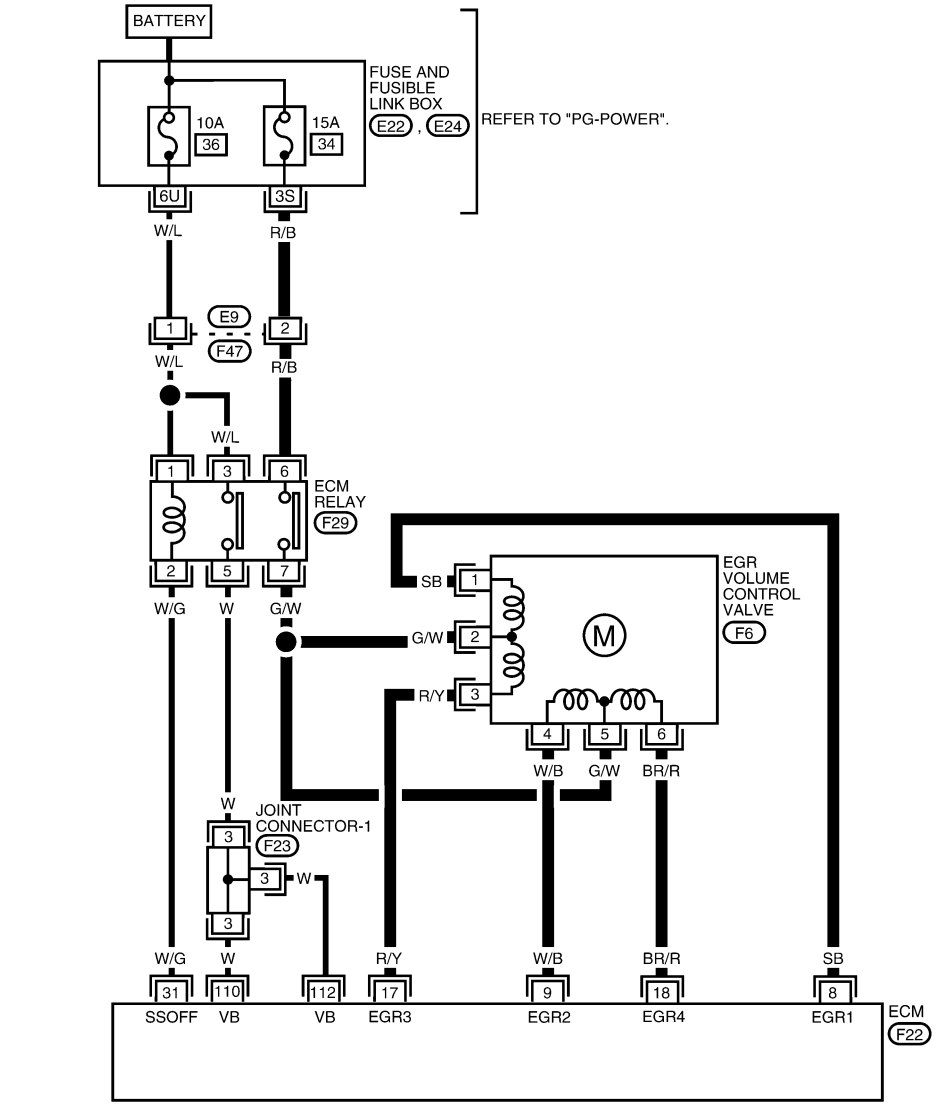
SEF174Y

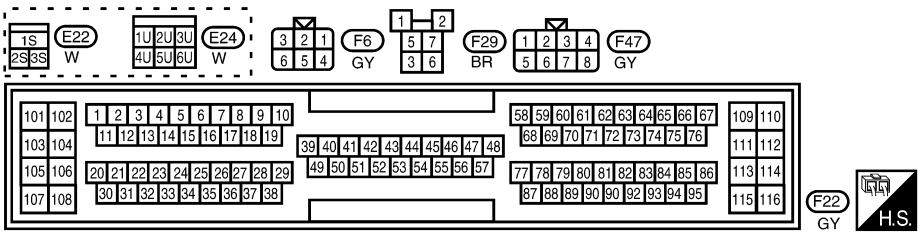
WITH GST

Follow the procedure “With CONSULT-II” above.

Wiring Diagram

UBS001WP





REFER TO THE FOLLOWING.
F23 -JOINT CONNECTOR

BBWA0161E

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
8	SB	EGR VOLUME CONTROL VALVE	ENGINE RUNNING AT IDLE SPEED	0.1 - 14V
9	W/B			
17	R/Y			
18	BR/R			

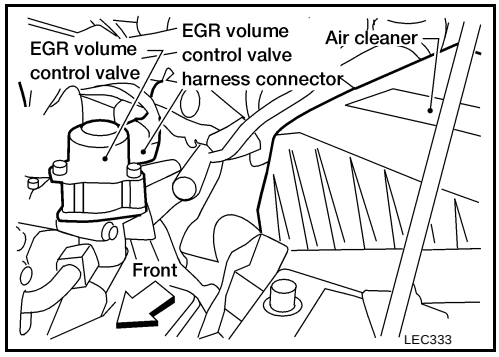
SEF575YA

Diagnostic Procedure

UBS001WQ

1. CHECK EGR VOLUME CONTROL VALVE POWER SUPPLY CIRCUIT

1. Disconnect EGR volume control valve harness connector.
2. Turn ignition switch “ON”.

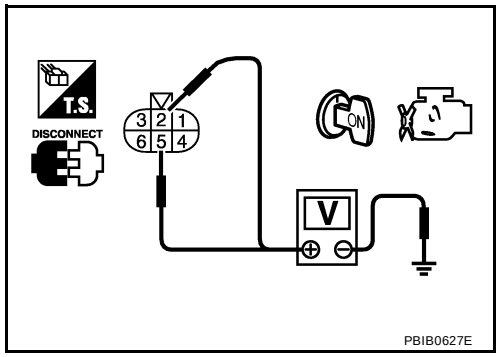


3. Check voltage between EGR volume control valve terminals 2, 5 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 3.
NG >> GO TO 2.



2. DETECT MALFUNCTIONING PART

Check the harness for open or short between ECM relay and EGR volume control valve.

>> Repair harness or connectors.

3. CHECK EGR VOLUME 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 terminals and EGR volume control valve terminals as follows. Refer to Wiring Diagram.

ECM terminal	EGR volume control valve
8	1
9	4
17	3
18	6

Continuity should exist.

4. Also check harness for short to ground and short to power.

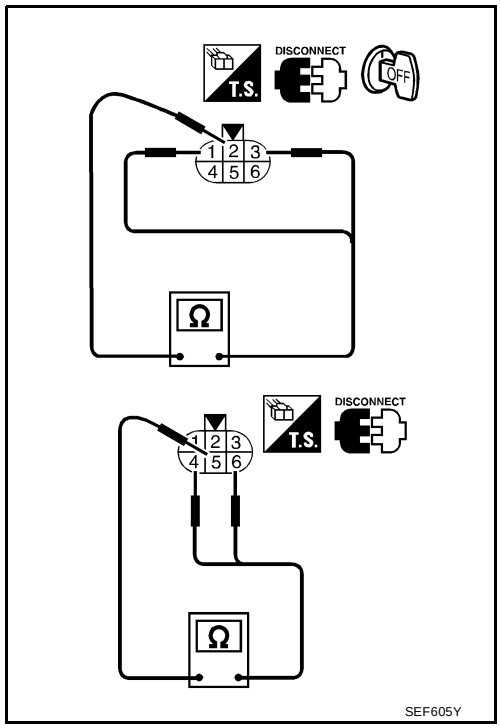
OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK EGR VOLUME CONTROL VALVE-I

Check resistance between EGR volume control valve terminal 2 and terminals 1, 3, terminal 5 and terminals 4, 6.

Resistance: 20.9 - 23.1 Ω [at 20°C (68F°)]



OK or NG

OK (With CONSULT-II)>>GO TO 5.
OK (Without CONSULT-II)>>GO TO 6.
NG >> Replace EGR volume control valve.

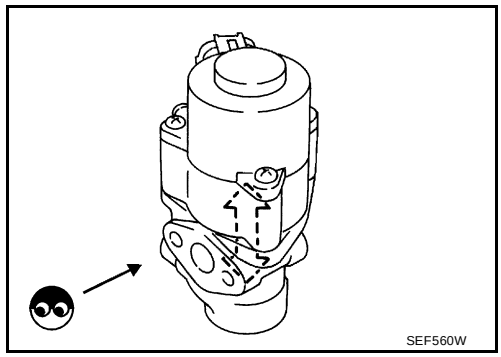
5. CHECK EGR VOLUME CONTROL VALVE-II

With CONSULT-II

1. Remove EGR volume control valve.
2. Reconnect ECM harness connector and EGR volume control valve harness connector.
3. Turn ignition switch “ON”.
4. Perform “EGR VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-II.
5. Check that EGR volume control valve shaft moves smoothly forward and backward according to the valve opening steps.

ACTIVE TEST	
EGR VOL CONT/V	20 step
MONITOR	
ENG SPEED	XXX rpm
EGR TEMP SEN	XXX V

SEF015Y



SEF560W

OK or NG

OK >> GO TO 7.
NG >> Replace EGR volume control valve.

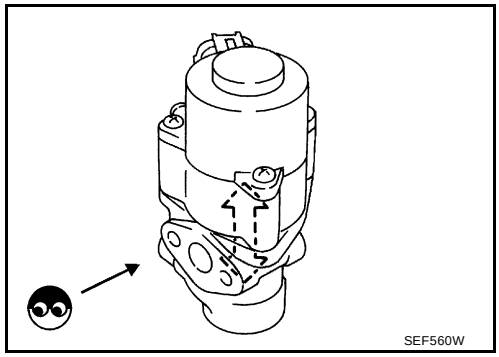
6. CHECK EGR VOLUME CONTROL VALVE-II

Without CONSULT-II

1. Remove EGR volume control valve.
2. Reconnect ECM harness connector and EGR volume control valve harness connector.
3. Turn ignition switch “ON” and “OFF”.
4. Check that EGR volume control valve shaft moves smoothly forward and backward according to the ignition switch position.

OK or NG

OK >> GO TO 7.
NG >> Replace EGR volume control valve.



SEF560W

7. CHECK INTERMITTENT INCIDENT

Refer to EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Removal and Installation

UBS001WR

EGR VOLUME CONTROL VALVE

Refer to EM-15, "OUTER COMPONENT PARTS" .

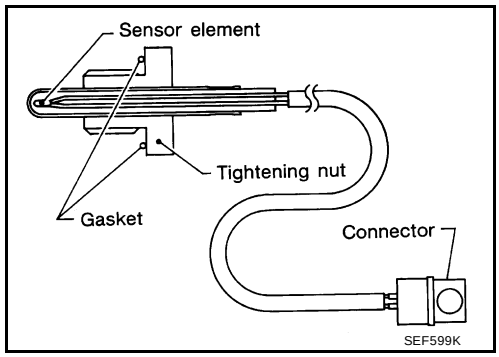
DTC P0405, P0406 EGRT SENSOR

PFP:14710

Component Description

UBS001WS

The EGR temperature sensor detects temperature changes in the EGR passageway. When the EGR volume control valve opens, hot exhaust gases flow, and the temperature in the passageway changes. The EGR temperature sensor is a thermistor that modifies a voltage signal sent from the ECM. This modified signal then returns to the ECM as an input signal. As the temperature increases, EGR temperature sensor resistance decreases.
This sensor is not directly used to control the engine system. It is used only for the on board diagnosis.



<Reference data>

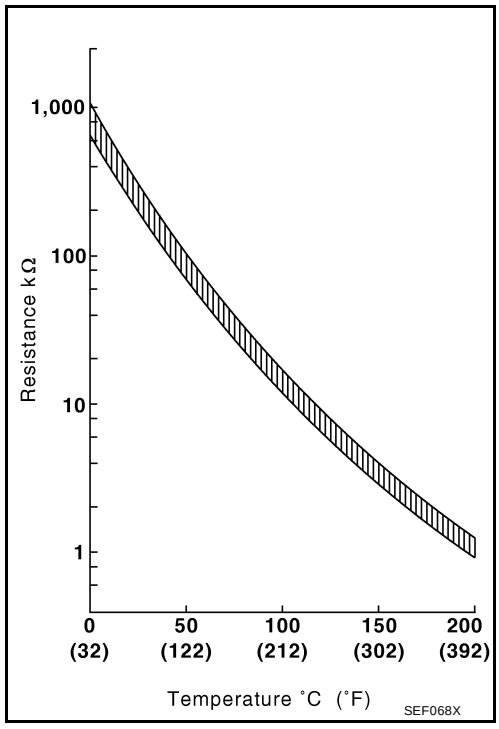
EGR temperature °C (°F)	Voltage* V	Resistance MΩ
0 (32)	4.56	0.62 - 1.05
50 (122)	2.25	0.065 - 0.094
100 (212)	0.59	0.011 - 0.015

*: These data are reference values and are measured between ECM terminal 72 (EGR temperature sensor) and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use a ground other than ECM terminals, such as the body ground.

When EGR system is operating.
Voltage: 0 - 1.5V



On Board Diagnosis Logic

UBS001WT

Malfunction is detected when
(Malfunction A) an excessively low (P0405) voltage from the EGR temperature sensor is sent to ECM even when engine coolant temperature is low.
(Malfunction B) an excessively high (P0406) voltage from the EGR temperature sensor is sent to ECM even when engine coolant temperature is high.

Possible Cause

UBS001WU

MALFUNCTION A

- Harness or connectors (The EGR temperature sensor circuit is shorted.)
- EGR temperature sensor
- Malfunction of EGR function

MALFUNCTION B

- Harness or connectors (The EGR temperature sensor circuit is open.)
- EGR temperature sensor
- Malfunction of EGR function

DTC Confirmation Procedure

UBS001WV

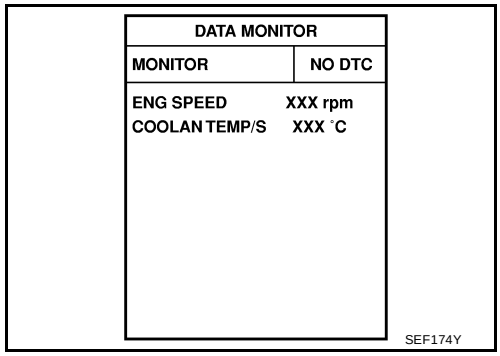
Perform “PROCEDURE FOR MALFUNCTION A” first. If 1st trip DTC cannot be confirmed, perform “PROCEDURE FOR MALFUNCTION B”.

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR MALFUNCTION A

With CONSULT-II

1. Turn ignition switch “ON”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Verify that “COOLAN TEMP/S” is less than 50°C (122°F).
   If the engine coolant temperature is above the range, cool the engine down.
4. Start engine and let it idle for at least 8 seconds.
5. If 1st trip DTC is detected, go to EC-888, "Diagnostic Procedure"
   .



With GST

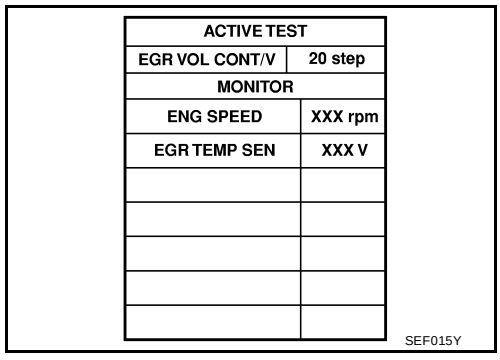
Follow the procedure “With CONSULT-II” above.

PROCEDURE FOR MALFUNCTION B

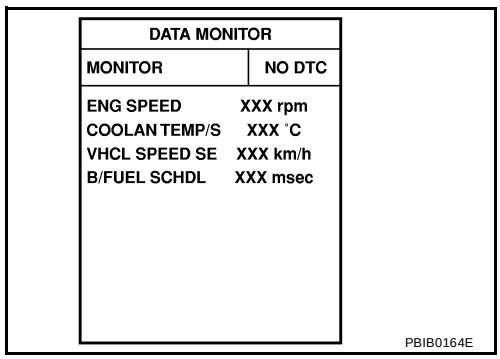
CAUTION:
Always drive vehicle at a safe speed.
TESTING CONDITION:
Always perform the test at a temperature above –10°C (14°F).

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “EGR VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-II.
3. Hold engine speed at 1,500 rpm.
4. Touch “Qu” and set the EGR volume control valve opening to 50 step and check EGR TEMP SEN.
   EGR TEMP SEN should decrease to less than 1.0V.
   If the check result is NG, go to EC-888, "Diagnostic Procedure" .
   If the check result is OK, go to the following step.
5. Turn ignition switch “OFF” and wait at least 5 seconds then turn “ON”.
6. Check the output voltage of “THRTL POS SEN” (at closed throttle position) and note it.
7. Start engine and maintain the following conditions for at least 5 consecutive seconds.



ENG SPEED	1,200 - 3,600 rpm
VHCL SPEED SE	10 km/h (6 MPH) or more
B/FUEL SCHDL	4.5 - 8.0 msec
Selector lever	Suitable position



8. If 1st trip DTC is detected, go to EC-888, "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, then turn “ON”.
3. Select “MODE 1” with GST and maintain the following conditions for at least 5 consecutive seconds.

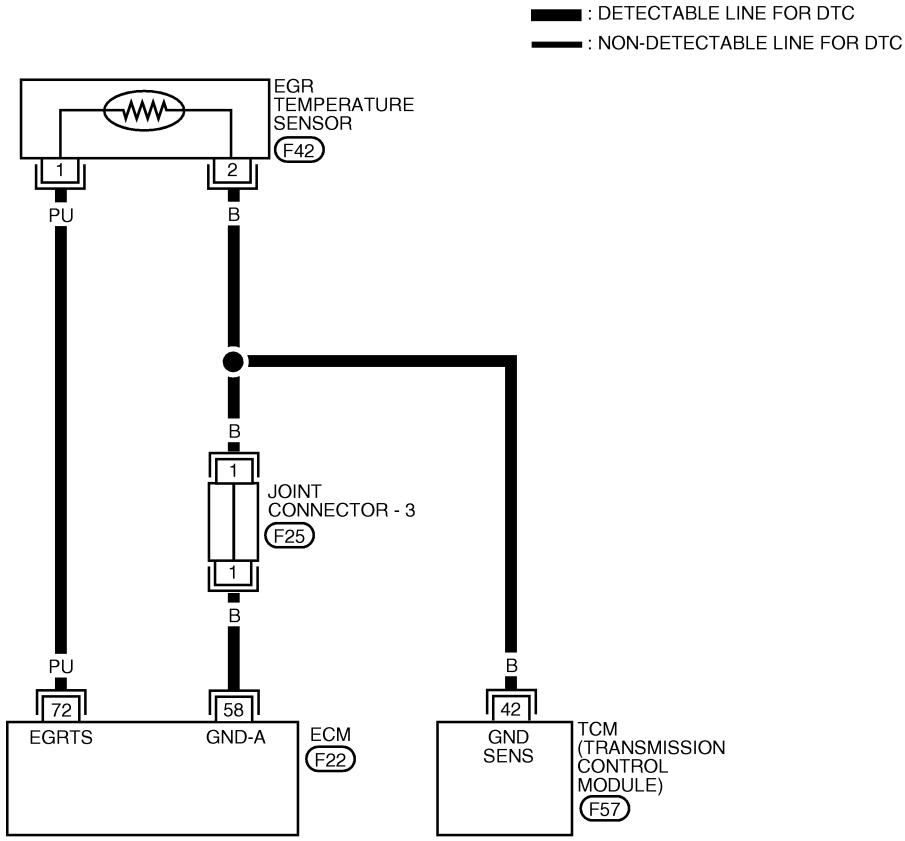
Engine speed	1,200 - 3,600 rpm
Vehicle speed	10 km/h (6 MPH) or more
Selector lever	Suitable position

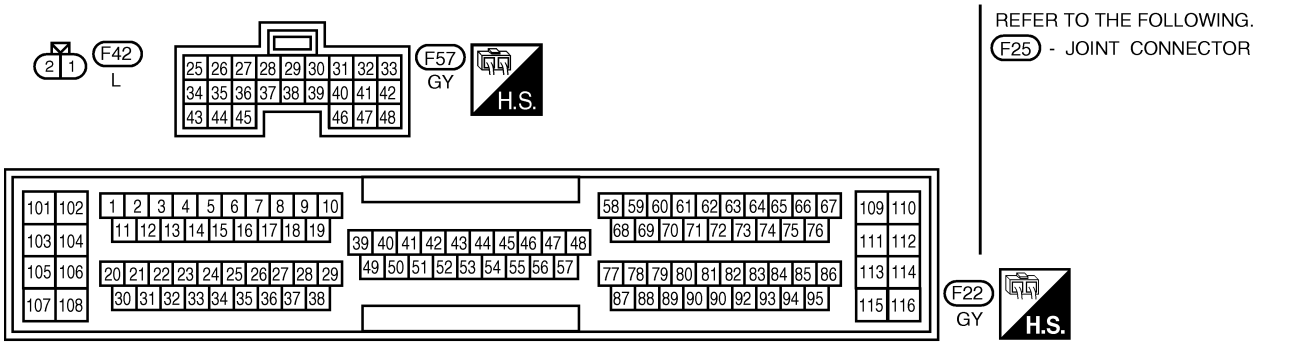
4. Select “MODE 7” with GST.
5. If 1st trip DTC is detected, go to EC-888, "Diagnostic Procedure" .

Wiring Diagram

UBS001WW

EC-EGR/TS-01





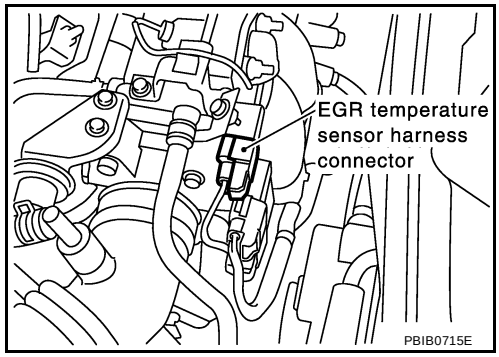
WEC399

Diagnostic Procedure

UBS001WX

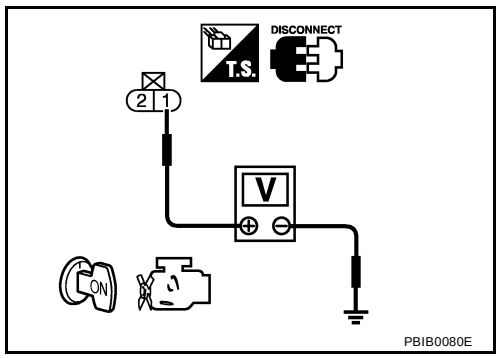
1. CHECK EGR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect EGR temperature sensor harness connector.
3. Turn ignition switch “ON”.



4. Check voltage between EGR temperature sensor terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 2.
NG >> Repair or replace harness or connectors.

2. CHECK EGR TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Check harness continuity between EGR temperature sensor terminal 2 and engine ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground or short to power.

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

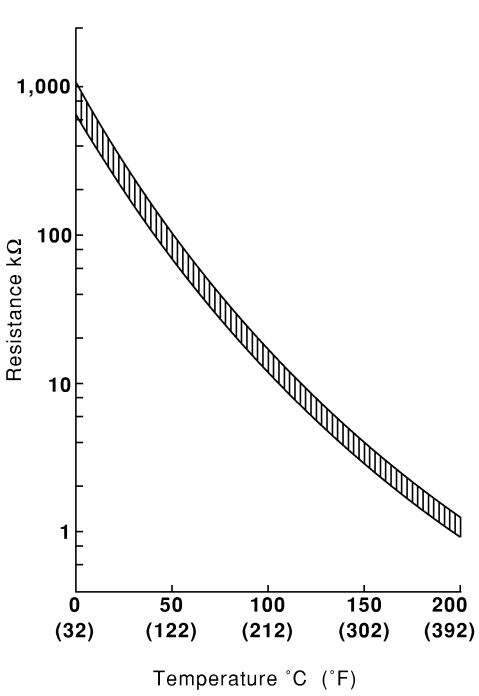
Check the following.

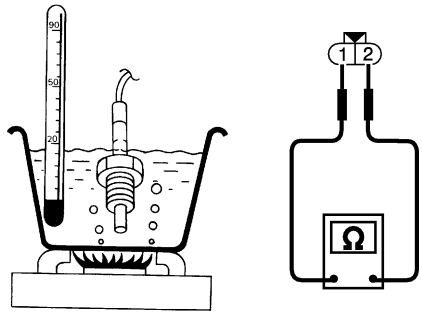
- Joint connector-3
- Harness for open or short between TCM and EGR temperature sensor
- Harness for open or short between ECM and EGR temperature sensor

>> Repair open circuit or short to ground or short to power in harness or connector.

4. CHECK EGR TEMPERATURE SENSOR

1. Remove EGR temperature sensor.
2. Check resistance between EGR temperature sensor terminals 1 and 2 under the following conditions.





<Reference data>

EGR temperature ˚C (˚F)	Voltage V	Resistance MΩ
0 (32)	4.56	0.62 - 1.05
50 (122)	2.25	0.065 - 0.094
100 (212)	0.59	0.011 - 0.015

SEF483Y

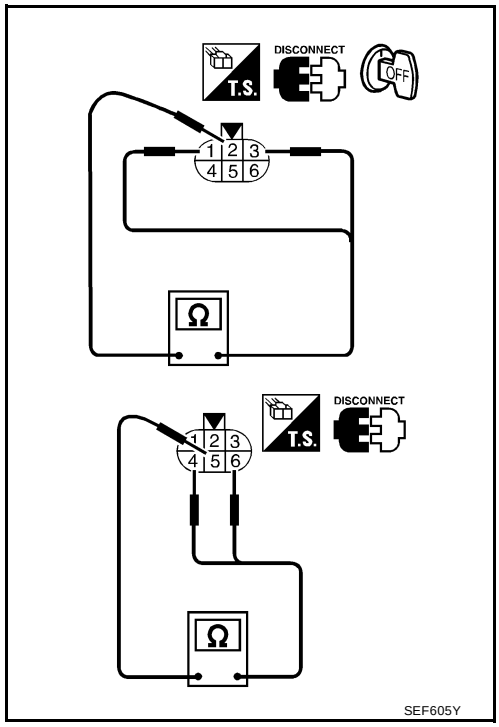
OK or NG

OK >> GO TO 5.
NG >> Replace EGR temperature sensor.

5. CHECK EGR VOLUME CONTROL VALVE-I

1. Disconnect EGR volume control valve.
2. Check resistance between EGR volume control valve terminal 2 and terminals 1, 3, terminal 5 and terminals 4, 6.

Resistance: 20.9 - 23.1 Ω [at 20°C (68F°)]



OK or NG

OK (With CONSULT-II)>>GO TO 6.
OK (Without CONSULT-II)>>GO TO 7.
NG >> Replace EGR volume control valve.

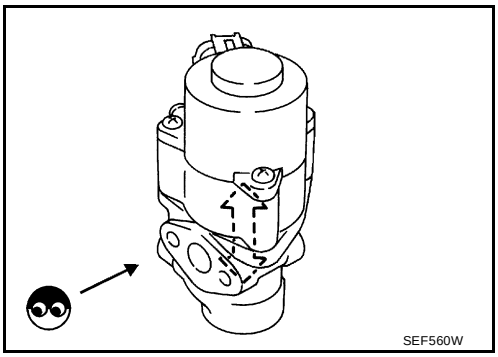
6. CHECK EGR VOLUME CONTROL VALVE-II

With CONSULT-II

1. Remove EGR volume control valve.
2. Reconnect ECM harness connector and EGR volume control valve harness connector.
3. Turn ignition switch ON.
4. Perform “EGR VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-II.
5. Check that EGR volume control valve shaft moves smoothly forward and backward according to the valve opening steps.

ACTIVE TEST	
EGR VOL CONT/V	20 step
MONITOR	
ENG SPEED	XXX rpm
EGR TEMP SEN	XXX V

SEF015Y



SEF560W

OK or NG

OK >> GO TO 8.
NG >> Replace EGR volume control valve.

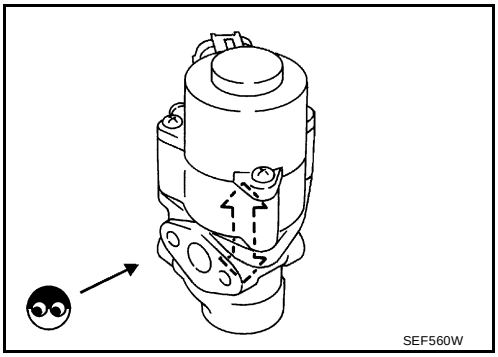
7. CHECK EGR VOLUME CONTROL VALVE-II

Without CONSULT-II

1. Remove EGR volume control valve.
2. Reconnect ECM harness connector and EGR volume control valve harness connector.
3. Turn ignition switch ON and OFF.
4. Check that EGR volume control valve shaft moves smoothly forward and backward according to the ignition switch position.

OK or NG

OK >> GO TO 8.
NG >> Replace EGR volume control valve.



SEF560W

8. CHECK INTERMITTENT INCIDENT

Refer to EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Removal and Installation

UBS001WY

EGR TEMPERATURE SENSOR

Refer to EM-15, "OUTER COMPONENT PARTS" .

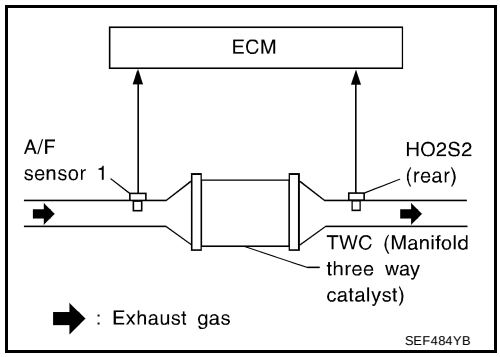
DTC P0420 THREE WAY CATALYST FUNCTION

PFP:20905

On Board Diagnosis Logic

UBS001WZ

The ECM monitors the switching frequency ratio of air fuel ratio (A/F) sensor 1 and heated oxygen sensor 2.
A TWC (Manifold three way catalyst) 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 malfunction is diagnosed.



DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0420	● TWC (Manifold three way catalyst) does not operate properly. ● TWC (Manifold three way catalyst) does not have enough oxygen storage capacity.	● TWC (Manifold three way catalyst) ● Exhaust tube ● Intake air leaks ● Injectors ● Injector leaks ● Spark plug ● Improper ignition timing

DTC Confirmation Procedure

UBS001X0

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

TESTING CONDITION:

- **Open engine hood before conducting the following procedure.**
- **Do not hold engine speed for more than the specified minutes below.**

1. Turn ignition switch “ON”.

SRT WORK SUPPORT	
CATALYST	INCMP
EVAP SYSTEM	INCMP
HO2S HTR	CMPLT
HO2S	INCMP
EGR SYSTEM	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

SEF533Z

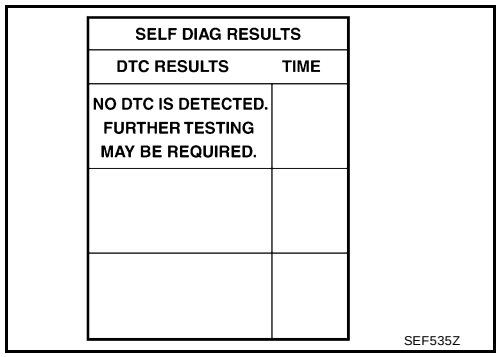
2. Select “DTC & SRT CONFIRMATION” then “SRT WORK SUPPORT” mode with CONSULT-II.
3. Start engine.
4. Rev engine up to 3,000±500 rpm and hold it for 3 consecutive minutes then release the accelerator pedal completely.
   If “INCMP” of CATALYST changes to “CMPLT”, go to step 7.
5. Wait 5 seconds at idle.
6. Rev engine up to 2,500±500 rpm and maintain it until “INCMP” of CATALYST changes to “CMPLT” (It will take approximately 5 minutes).

SRT WORK SUPPORT	
CATALYST	CMPLT
EVAP SYSTEM	INCMP
HO2S HTR	CMPLT
HO2S	INCMP
EGR SYSTEM	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

SEF534Z

If not “CMPLT”, stop engine and cool it down to less than 70°C (158°F) and then retest from step 1.

7. Select “SELF-DIAG RESULTS” mode with CONSULT-II.
8. Confirm that the 1st trip DTC is not detected.
   If the 1st trip DTC is detected, go to EC-894, "Diagnostic Procedure" .



Overall Function Check

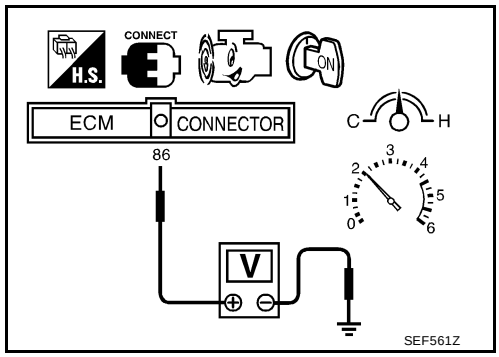
UBS001X1

Use this procedure to check the overall function of the three way catalyst. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Set voltmeter probe between ECM terminal 86 and ground.
4. Keep engine speed at 2,500 rpm constant under no load.
5. 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-894, "Diagnostic Procedure" .

– 1 cycle: 0.6 - 1.0 V → 0 - 0.3 V → 0.6 - 1.0 V



Diagnostic Procedure

UBS001X2

1. CHECK EXHAUST SYSTEM

Visually check exhaust tubes and muffler for dent.

OK or NG

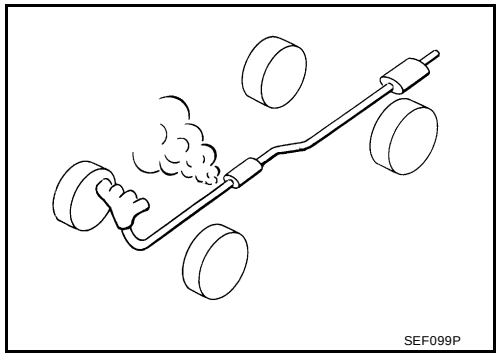
OK >> GO TO 2.
NG >> Repair or replace.

2. CHECK EXHAUST AIR LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust air leak before the TWC (Manifold three way catalyst).

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 for ignition timing.
Refer to EC-652, "Basic Inspection" .

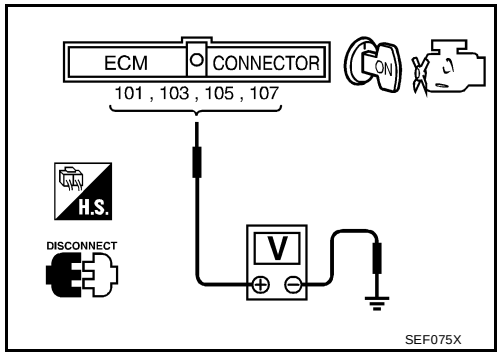
OK or NG

OK >> GO TO 5.
NG >> Adjust ignition timing.

5. CHECK INJECTORS

1. Refer to Wiring Diagram for Injectors, EC-1170 .
2. Stop engine and then turn ignition switch “ON”.
3. Check voltage between ECM terminals 101, 103, 105, 107 and ground with CONSULT-II or tester.

Battery voltage should exist.

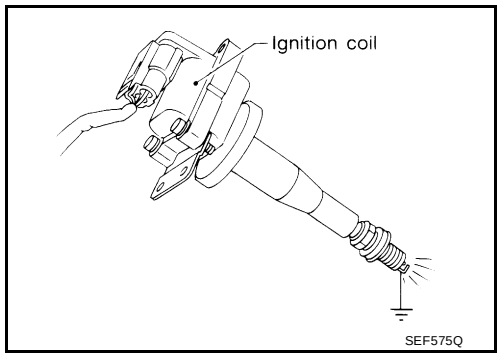


OK or NG

OK >> GO TO 6.
NG >> Perform “Diagnostic Procedure” INJECTOR, EC-1170 .

6. CHECK IGNITION SPARK

1. Turn ignition switch “OFF”.
2. Remove ignition coil from the engine.
3. Place end of spark plug against a suitable ground and crank engine.
4. Check for proper spark.



OK or NG

OK >> GO TO 7.
NG >> Replace ignition coil.

7. CHECK INJECTOR

1. Turn ignition switch “OFF”.
2. Remove injector assembly. Refer to EM-22, "FUEL INJECTOR AND FUEL TUBE" .
   Keep fuel hose and all injectors connected to injector gallery.
3. Disconnect ignition coil assembly harness connector.
4. Turn ignition switch “ON”.
   Make sure fuel does not drip from injector.

OK or NG

OK (Does not drip)>>GO TO 8.
NG (Drips)>>Replace the injector(s) from which fuel is dripping.

8. CHECK INTERMITTENT INCIDENT

Perform EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

Trouble is fixed>>**INSPECTION END**
Trouble is not fixed>>Replace TWC (Manifold three way catalyst) together with ADS-TWC (Adsorber pre-catalyst).

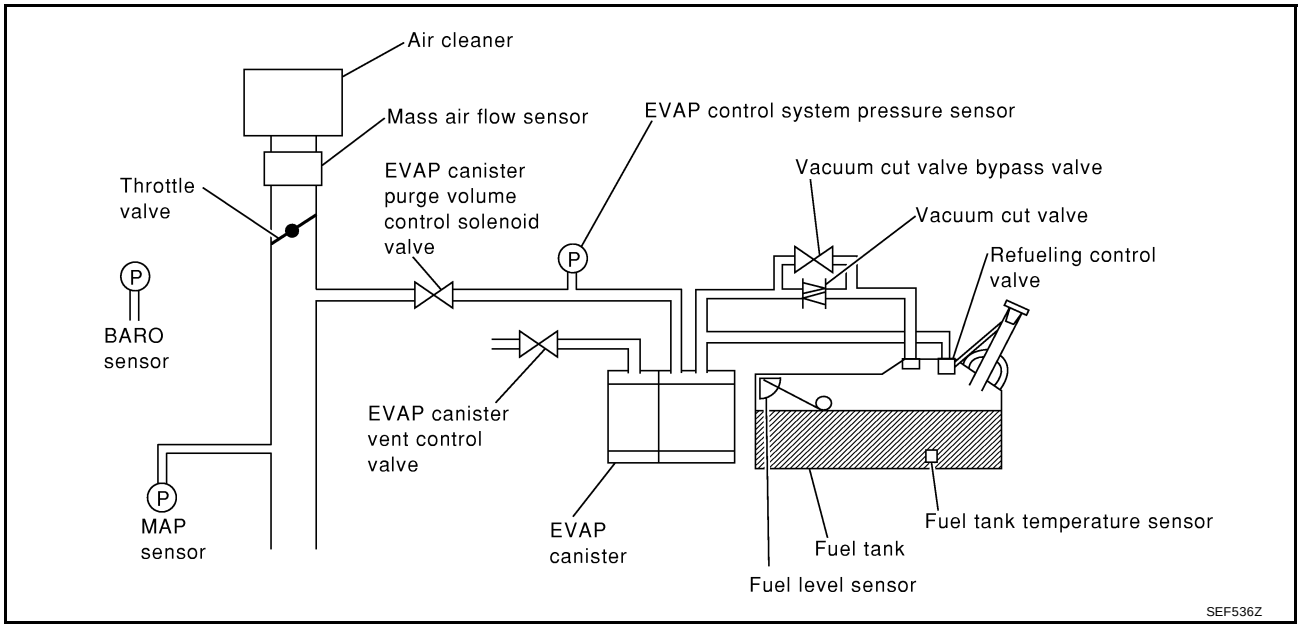
DTC P0441 EVAP CONTROL SYSTEM

PFP:14950

System Description

UBS001X3

NOTE:
If DTC P0441 is displayed with P0510, perform trouble diagnosis for DTC P0510 first. (See EC-980 .)



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

UBS001X4

Under normal conditions (non-closed throttle), sensor output voltage indicates if pressure drop and purge flow are adequate. If not, a fault is determined.
Malfunction is detected when EVAP control system does not operate properly, EVAP control system has a leak between intake manifold and EVAP control system pressure sensor.

Possible Cause

UBS001X5

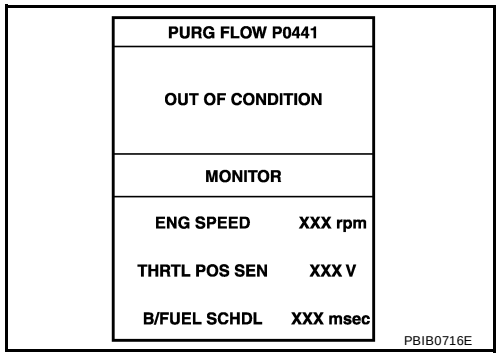
- EVAP canister purge volume control solenoid valve stuck closed
- EVAP control system pressure sensor and the circuit
- Loose, disconnected or improper connection of rubber tube
- Blocked rubber tube
- Cracked EVAP canister
- EVAP canister purge volume control solenoid valve circuit
- Closed throttle position switch
- Blocked purge port
- EVAP canister vent control valve

DTC Confirmation Procedure

UBS001X6

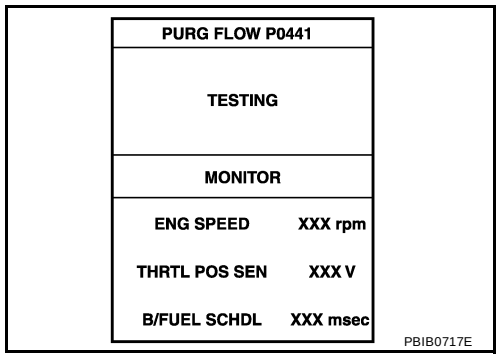
CAUTION:
Always drive vehicle at a safe speed.

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:
For best results, perform test at a temperature of 0°C (32°F) or more.



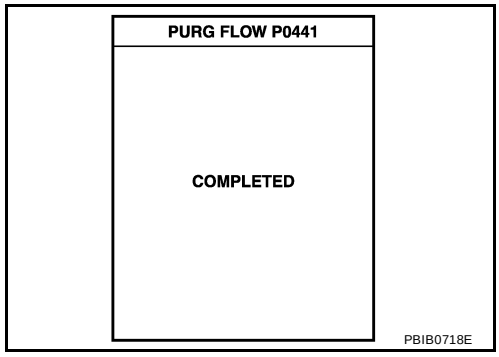
WITH CONSULT-II

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.)

Selector lever	Suitable position
Vehicle speed	32 - 120 km/h (20 - 75 MPH)
ENG SPEED	500 - 3,800 rpm
B/FUEL SCHDL	1.0 - 8.2 msec
Engine coolant temperature	More than 70°C (158°F)



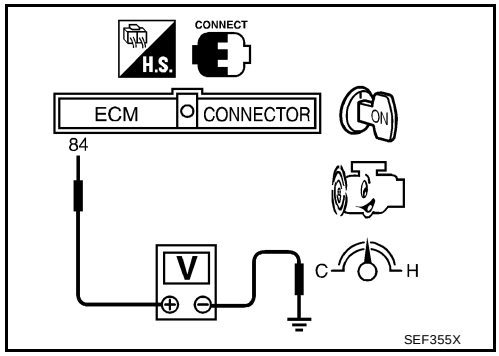
If “TESTING” is not changed for a long time, retry from step 2.

7. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to EC-900, "Diagnostic Procedure" .

Overall Function Check

UBS001X7

Use this procedure to check the overall monitoring function of the EVAP control system purge flow monitoring. During this check, a 1st trip DTC might not be confirmed.



WITH GST

1. Lift up drive wheels.
2. Start engine and warm it up to normal operating temperature.

3. Turn ignition switch “OFF”, wait at least 10 seconds.
4. Start engine and wait at least 70 seconds.
5. Set voltmeter probes to ECM terminals 84 (EVAP control system pressure sensor signal) and ground.
6. Check EVAP control system pressure sensor value at idle speed and note it.
7. Establish and maintain the following conditions for at least 1 minute.

Air conditioner switch	ON
Steering wheel	Fully turned
Headlamp switch	ON
Rear window defogger switch	ON
Engine speed	Approx. 3,000 rpm
Gear position	Any position other than “P”, “N” or “R”

8. Verify that EVAP control system pressure sensor value stays 0.1V less than the value at idle speed (measured at step 6) for at least 1 second.
9. If NG, go to EC-900, "Diagnostic Procedure" .

Diagnostic Procedure

UBS001X8

1. CHECK EVAP CANISTER

1. Turn ignition switch “OFF”.
2. Check EVAP canister for cracks.

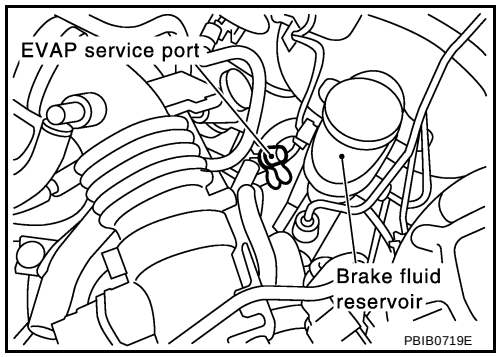
OK or NG

OK (With CONSULT-II)>>GO TO 2.
OK (Without CONSULT-II)>>GO TO 3.
NG >> Replace EVAP canister.

2. CHECK PURGE FLOW

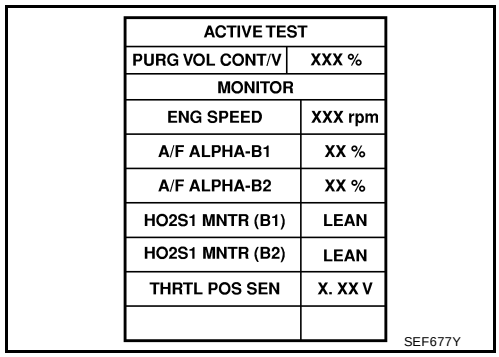
With CONSULT-II

1. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge.
2. Start engine and let it idle.
3. Select “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-II.
4. Rev engine up to 2,000 rpm.



5. Touch “Qd” and “Qu” on CONSULT-II screen to adjust “PURG VOL CONT/V” opening and check vacuum existence.

PURG VOL CONT/V	VACUUM
100.0%	Should exist.
0.0%	should not exist.



OK or NG

OK >> GO TO 7.
NG >> GO TO 4.

3. CHECK PURGE FLOW

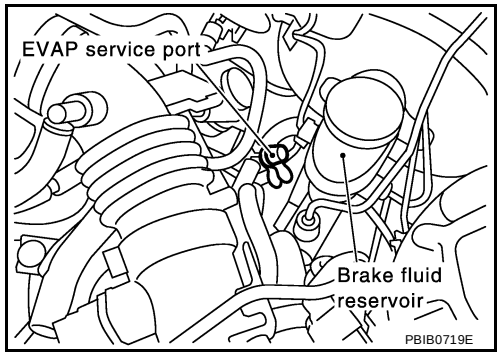
Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge.
4. Start engine and let it idle for at least 80 seconds.
5. Check vacuum gauge indication when revving engine up to 2,000 rpm.

Vacuum should exist.

6. Release the accelerator pedal fully and let idle.

Vacuum should not exist.



OK or NG

OK >> GO TO 7.
NG >> GO TO 4.

4. CHECK EVAP PURGE LINE

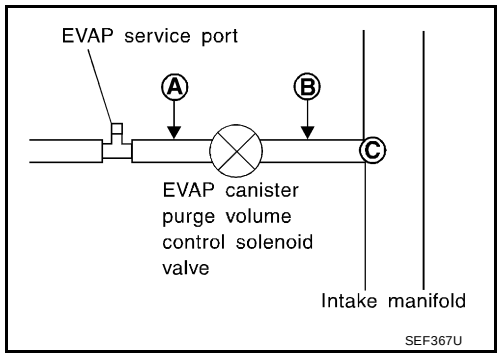
1. Turn ignition switch “OFF”.
2. Check EVAP purge line for improper connection or disconnection. Refer to EC-1202, "EVAPORATIVE EMISSION LINE DRAWING" .

OK or NG

OK >> GO TO 5.
NG >> Repair it.

5. CHECK EVAP PURGE HOSE AND PURGE PORT

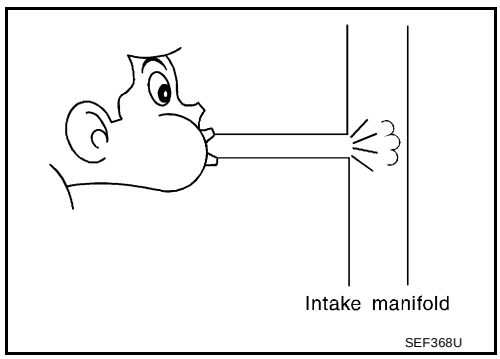
1. Disconnect purge hoses connected to EVAP service port **A** and EVAP canister purge volume control solenoid valve **B** .
2. Blow air into each hose and EVAP purge port **C** .



3. Check that air flows freely.

OK or NG

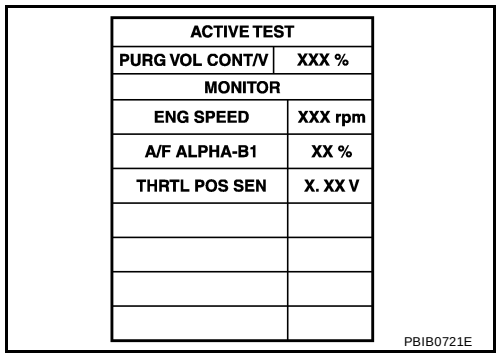
OK (With CONSULT-II)>>GO TO 6.
OK (Without CONSULT-II)>>GO TO 7.
NG >> Repair or clean hoses and/or purge port.



6. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

1. Start engine.
2. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-II. Check that engine speed varies according to the valve opening.



OK or NG

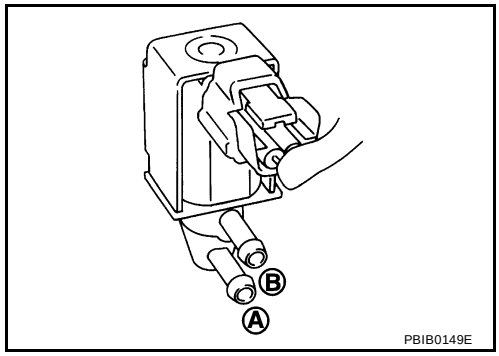
OK >> GO TO 8.
NG >> GO TO 7.

7. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

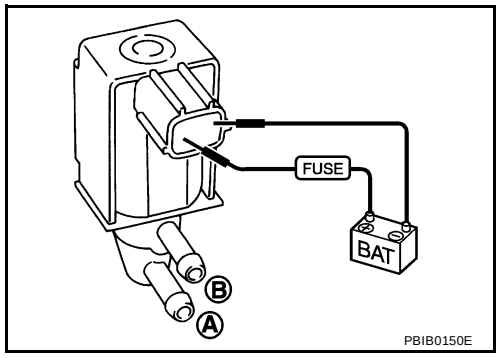
Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No



Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No



OK or NG

OK >> GO TO 8.
NG >> Replace EVAP canister purge volume control solenoid valve.

8. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE

1. Turn ignition switch “OFF”.
2. Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.

OK or NG

OK >> GO TO 9.
NG >> Repair it.

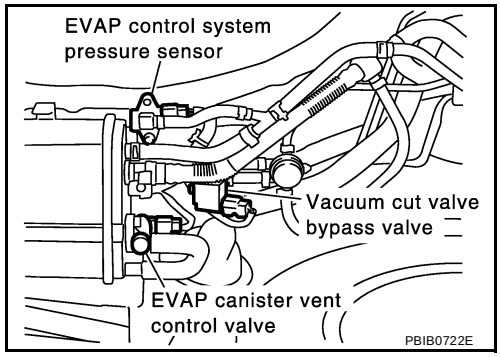
9. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check connectors for water.

Water should not exist.

OK or NG

OK >> GO TO 10.
NG >> Replace EVAP control system pressure sensor.



10. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR FUNCTION

Refer to “DTC Confirmation Procedure” for DTC P0452, P0453, EC-934 .

OK or NG

OK >> GO TO 11.
NG >> Replace EVAP control system pressure sensor.

11. CHECK RUBBER TUBE FOR CLOGGING

1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

OK or NG

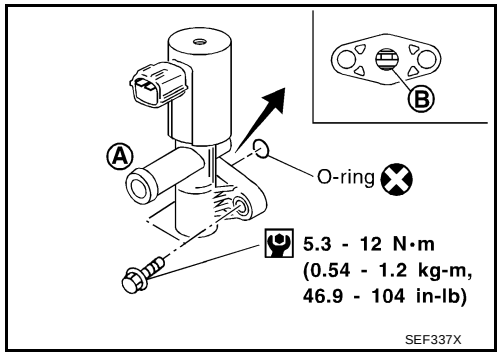
OK >> GO TO 12.
NG >> Clean the rubber tube using an air blower.

12. CHECK EVAP CANISTER VENT CONTROL VALVE-I

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.

OK or NG

OK >> GO TO 13.
NG >> Replace EVAP canister vent control valve.



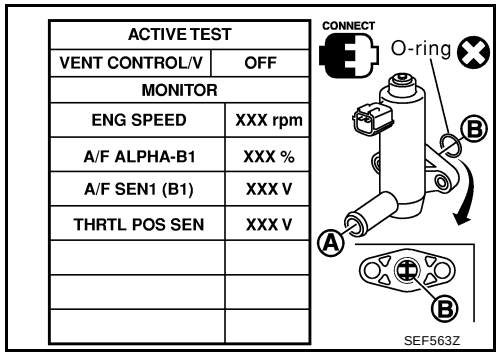
13. CHECK EVAP CANISTER VENT CONTROL VALVE-II

With CONSULT-II

1. Reconnect disconnected harness connectors.
2. Turn ignition switch “ON”.
3. Perform “VENT CONTROL/V” in “ACTIVE TEST” mode.
4. Check air passage continuity and operation delay time.

Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

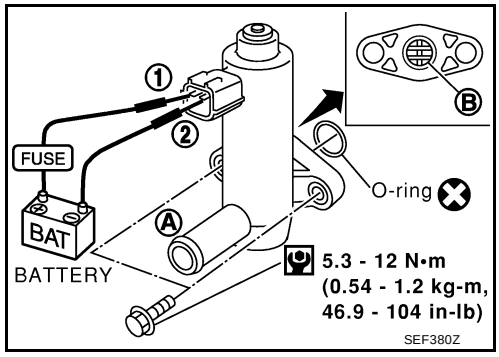


Without CONSULT-II

Check air passage continuity and operation delay time under the following conditions.

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
OFF	Yes

Operation takes less than 1 second.



Make sure new O-ring is installed properly.

OK or NG

OK (With CONSULT-II)>>GO TO 15.
OK (Without CONSULT-II)>>GO TO 16.
NG >> GO TO 14.

14. CHECK EVAP CANISTER VENT CONTROL VALVE-III

1. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
2. Perform Test No. 13 again.

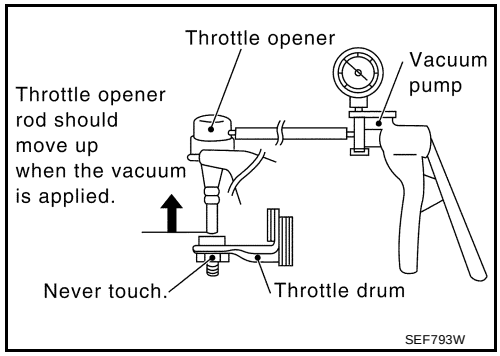
OK or NG

OK (With CONSULT-II)>>GO TO 15.
OK (Without CONSULT-II)>>GO TO 16.
NG >> Replace EVAP canister vent control valve.

15. CHECK THROTTLE POSITION SWITCH

With CONSULT-II

1. Install all removed parts.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch “OFF”.
4. Remove vacuum hose connected to throttle opener.
5. Connect suitable vacuum hose to vacuum pump and the throttle opener.
6. Apply vacuum [more than –40.0 kPa (–300 mmHg, –11.81 inHg)] until the throttle drum becomes free from the rod of the throttle opener.
7. Turn ignition switch “ON”.
8. Select “A/T” then select “DATA MONITOR” mode with CONSULT-II.
9. Check indication of “CLSD THL/P SW” under the following conditions.
   Measurement must be made with throttle position switch installed in vehicle.



Throttle valve conditions	CLSD THL/P SW
Completely closed	ON
Partially open completely open	OFF

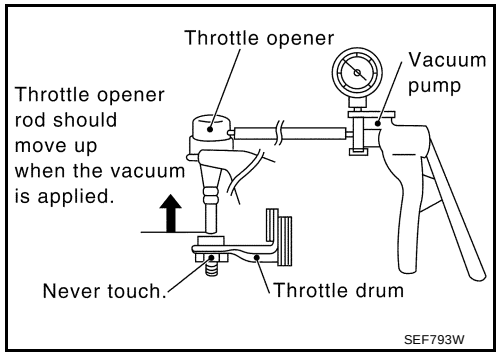
OK or NG

OK >> GO TO 18.
NG >> GO TO 17.

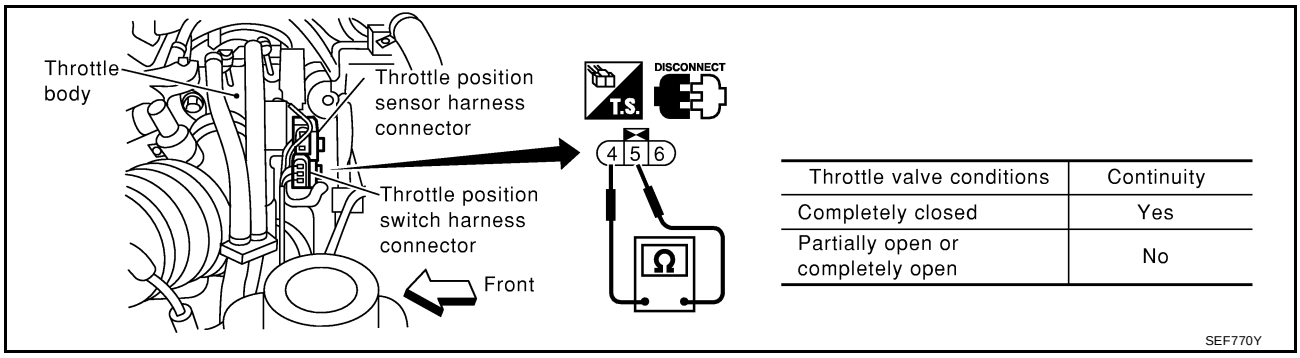
16. CHECK THROTTLE POSITION SWITCH

Without CONSULT-II

1. Install all removed parts.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch “OFF”.
4. Remove vacuum hose connected to throttle opener.
5. Connect suitable vacuum hose to vacuum pump and the throttle opener.
6. Apply vacuum [more than −40.0 kPa (−300 mmHg, −11.81 inHg)] until the throttle drum becomes free from the rod of the throttle opener.
7. Disconnect closed throttle position switch harness connector.



8. Check continuity between closed throttle position switch terminals 4 and 5 under the following conditions. Resistance measurement must be made with throttle position switch installed in vehicle.



Throttle valve conditions	Continuity
Completely closed	Yes
Partially open or completely open	No

OK or NG

OK >> GO TO 18.
NG >> GO TO 17.

17. ADJUST THROTTLE POSITION SWITCH

Check the following items. Refer to EC-652, "Basic Inspection" .

Items	Specifications
Ignition timing	9° ± 5° BTDC
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.05 mm (0.0020 in): ON 0.15 mm (0.0059 in): OFF
Target idle speed	800 ± 50 rpm (in "P" or "N" position)

Is it possible to adjust closed throttle position switch?

Yes or No

Yes >> GO TO 18.
No >> Replace throttle position switch.

18. CHECK EVAP PURGE LINE

Inspect EVAP purge line (pipe and rubber tube). Check for evidence of leaks.
Refer to EC-1202, "EVAPORATIVE EMISSION LINE DRAWING" .

OK or NG

OK >> GO TO 19.
NG >> Replace it.

19. CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 20.

20. CHECK INTERMITTENT INCIDENT

Refer to EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

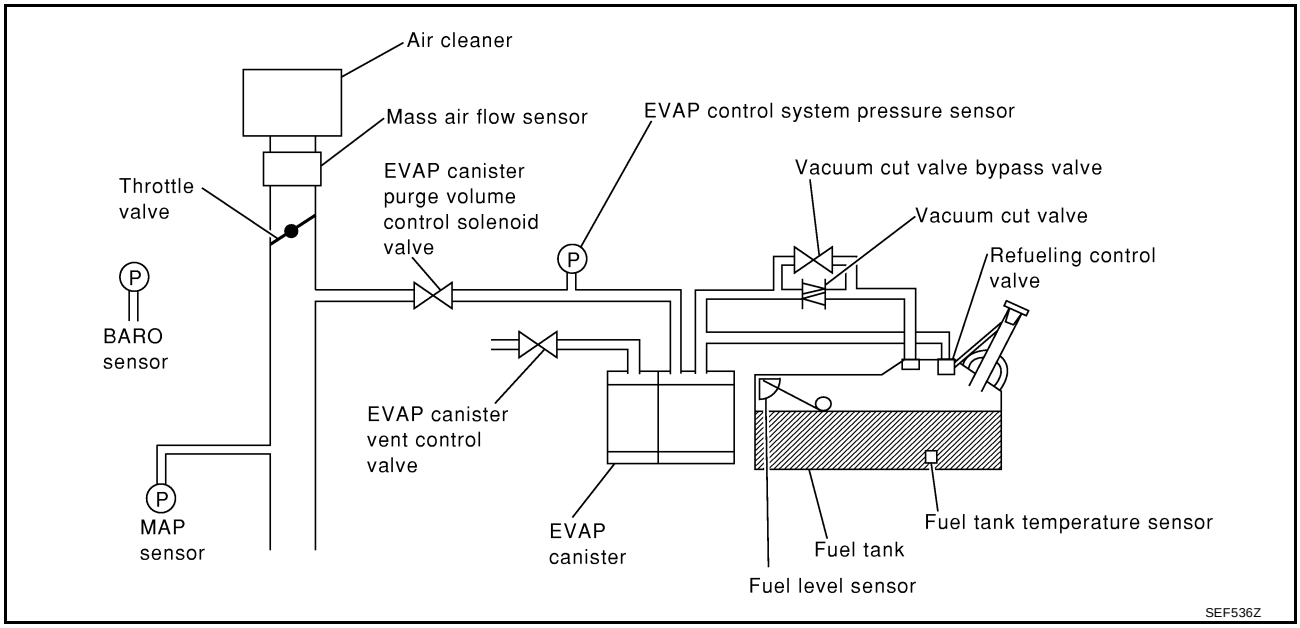
DTC P0442 EVAP CONTROL SYSTEM

PFP:14950

On Board Diagnosis Logic

UBS001X9

NOTE:
If DTC P0442 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-1136 .)
This diagnosis detects leaks in the EVAP purge line using engine intake manifold vacuum.
If pressure does not increase, the ECM will check for leaks in the line between the fuel tank and EVAP canister purge volume control solenoid valve, under the following “Vacuum test” conditions.
The vacuum cut valve bypass valve is opened to clear the line between the fuel tank and the EVAP canister purge volume control solenoid valve. The EVAP canister vent control valve will then be closed to shut the EVAP purge line off. The EVAP canister purge volume control solenoid valve is opened to depressurize the EVAP purge line using intake manifold vacuum. After this occurs, the EVAP canister purge volume control solenoid valve will be closed.



Malfunction is detected when EVAP control system has a leak, EVAP control system does not operate properly.

CAUTION:

- **Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.**
- **If the fuel filler cap is not tightened properly, the MIL may come on.**
- **Use only a genuine NISSAN rubber tube as a replacement.**

Possible Cause

UBS001XA

- Incorrect fuel tank vacuum relief valve
- Incorrect fuel filler cap used
- Fuel filler cap remains open or fails to close.
- Foreign matter caught in fuel filler cap.
- Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.
- Foreign matter caught in EVAP canister vent control valve.
- EVAP canister or fuel tank leaks
- EVAP purge line (pipe and rubber tube) leaks
- EVAP purge line rubber tube bent.
- Blocked or bent rubber tube to EVAP control system pressure sensor
- Loose or disconnected rubber tube
- EVAP canister vent control valve and the circuit
- EVAP canister purge volume control solenoid valve and the circuit
- Manifold absolute pressure (MAP) sensor

- Fuel tank temperature sensor
- O-ring of EVAP canister vent control valve is missing or damaged.
- Water separator
- EVAP canister is saturated with water.
- EVAP control system pressure sensor
- Fuel level sensor and the circuit
- Refueling control valve
- ORVR system leaks

DTC Confirmation Procedure

UBS001XB

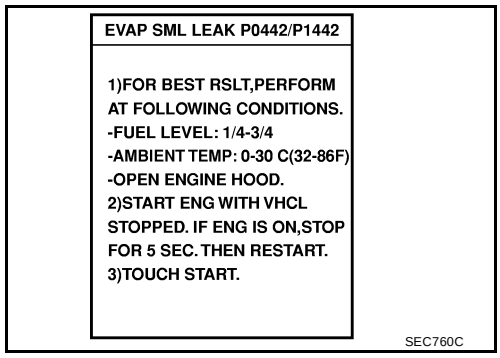
CAUTION:
Never remove fuel filler cap during the DTC confirmation procedure.

NOTE:

- **If DTC P0442 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-1136 .)**
- **Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.**
- If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test.

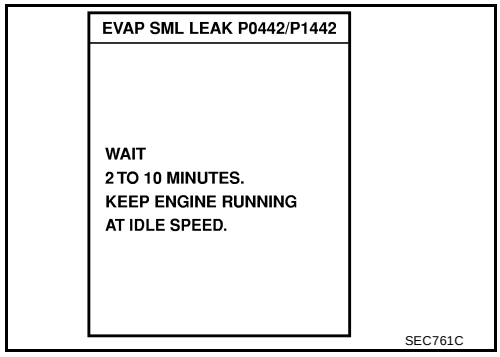
TESTING CONDITION:

- **Perform "DTC WORK SUPPORT" when the fuel level is between 1/4 to 3/4 full and vehicle is placed on flat level surface.**
- **Open engine hood before conducting following procedure.**



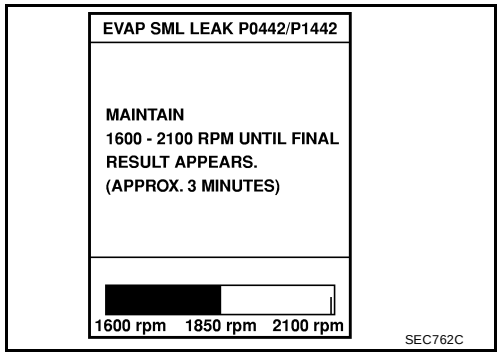
WITH CONSULT-II

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. Check the following conditions are met.
   COOLAN TEMP/S: 0 - 70°C (32 - 158°F)
   INT/A TEMP SE: 0 - 60°C (32 - 140°F)



5. Select "EVAP SML LEAK P0440/P1440" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II. Follow the instruction displayed.

   NOTE:
   - If the engine speed cannot be maintained within the range displayed on the CONSULT-II screen, go to EC-652, "Basic Inspection" .
   - Make sure that EVAP hoses are connected to the EVAP canister purge volume control solenoid valve properly.
6. Make sure that "OK" is displayed.
   If "NG" is displayed, refer to EC-910, "Diagnostic Procedure" .



WITH GST

NOTE:
Be sure to read the explanation of “Driving Pattern” on EC-635 before driving vehicle.

1. Start engine.
2. Drive vehicle according to “Driving Pattern”, EC-635 .
3. Stop vehicle.
4. Select “MODE 1” with GST.

- If SRT of EVAP system is not set yet, go to the following step.
- If SRT of EVAP system is set, the result will be OK.

5. Turn ignition switch “OFF” and wait at least 10 seconds.
6. Start engine.
   It is not necessary to cool engine down before driving.
7. Drive vehicle again according to the “Driving Pattern”, EC-635 .
8. Stop vehicle.
9. Select “MODE 3” with GST.

- If P0442 or P1442 is displayed on the screen, go to EC-910, "Diagnostic Procedure" .
- If P0441 is displayed on the screen, go to “Diagnostic Procedure” for DTC P0441, EC-900 .
- If P0442, P1442 and P0441 are not displayed on the screen, go to the following step.

10. Select “MODE 1” with GST.

- If SRT of EVAP system is set, the result will be OK.
- If SRT of EVAP system is not set, go to step 6.

Diagnostic Procedure

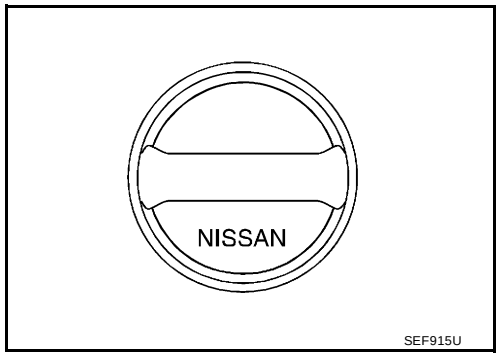
UBS001XC

1. CHECK FUEL FILLER CAP DESIGN

1. Turn ignition switch “OFF”.
2. Check for genuine NISSAN fuel filler cap design.

OK or NG

OK >> GO TO 2.
NG >> Replace with genuine NISSAN fuel filler cap.



2. CHECK FUEL FILLER CAP INSTALLATION

Check that the cap is tightened properly by rotating the cap clockwise.

OK or NG

OK >> GO TO 3.
NG >>
- Open fuel filler cap, then clean cap and fuel filler neck threads using air blower.
- Retighten until ratcheting sound is heard.

3. CHECK FUEL FILLER CAP FUNCTION

Check for air releasing sound while opening the fuel filler cap.

OK or NG

OK >> GO TO 6.
NG >> GO TO 4.

4. CHECK FUEL TANK VACUUM RELIEF VALVE

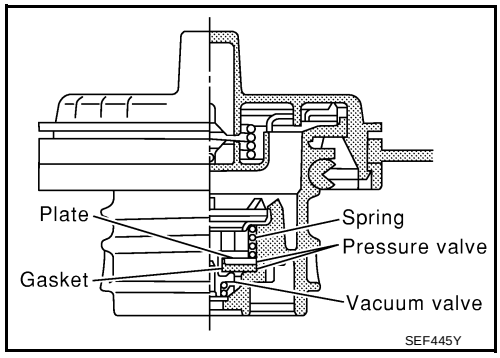
1. Wipe clean valve housing.
2. Check valve opening pressure and vacuum.

Pressure:

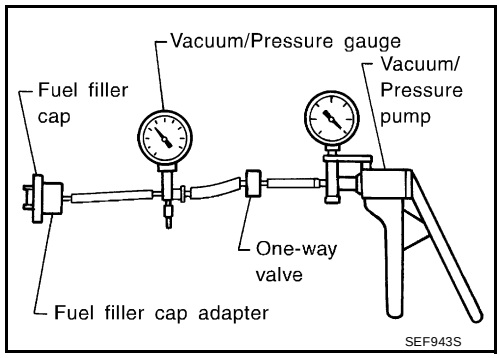
15.3 - 20.0 kPa (0.156 - 0.204 kg/cm^2 , 2.22 - 2.90 psi)

Vacuum:

−6.0 to −3.3 kPa (−0.061 to −0.035 kg/cm^2 , −0.87 to −0.50 psi)



CAUTION:
Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.



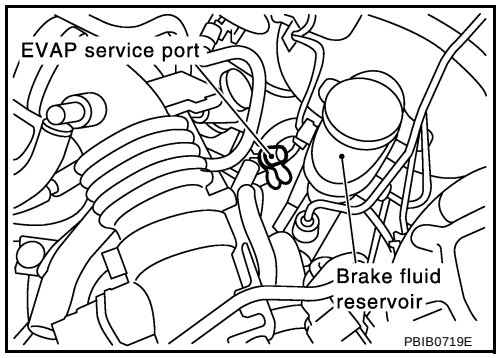
OK or NG

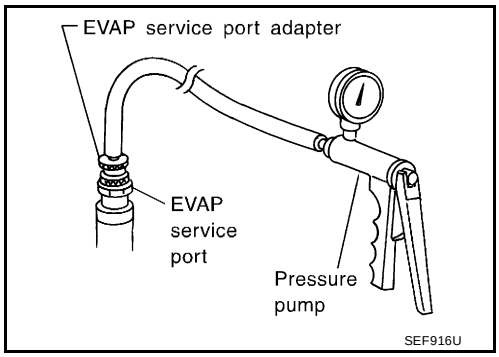
OK >> GO TO 5.
NG >> Replace fuel filler cap with a genuine one.

5. INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.

NOTE:
Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.





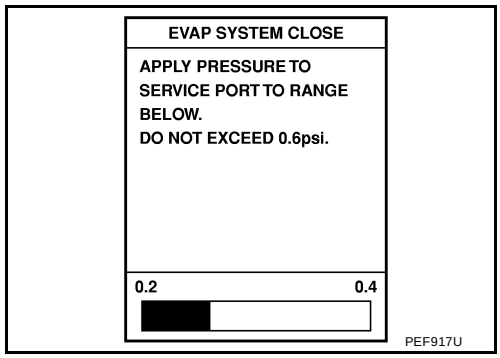
Models with CONSULT-II>>GO TO 6.
Models without CONSULT-II>>GO TO 7.

6. CHECK FOR EVAP LEAK

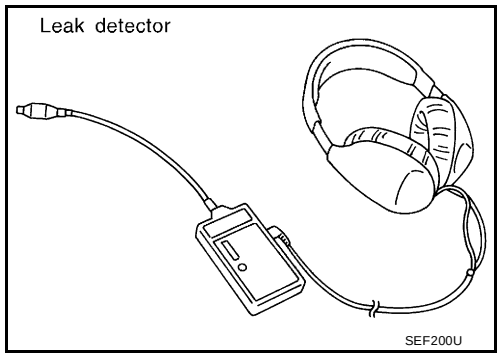
With CONSULT-II

1. Turn ignition switch “ON”.
2. Select “EVAP SYSTEM CLOSE” of “WORK SUPPORT” mode with CONSULT-II.
3. Touch “START” and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.

   NOTE:
   - **Never use compressed air or a high pressure pump.**
   - **Do not exceed 4.12 kPa (0.042 kg/cm^2 , 0.6 psi) of pressure in the system.**



4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details.
   Refer to EC-1202, "EVAPORATIVE EMISSION LINE DRAWING" .



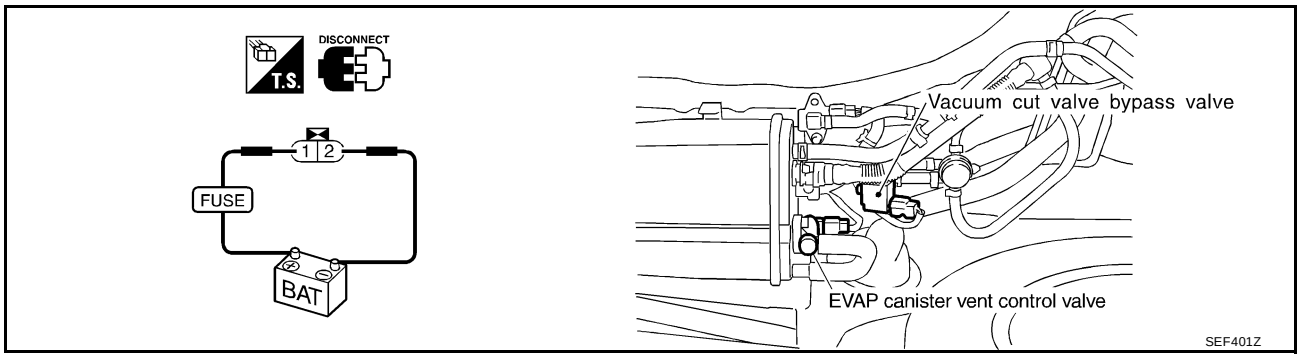
OK or NG

OK >> GO TO 8.
NG >> Repair or replace.

7. CHECK FOR EVAP LEAK

Without CONSULT-II

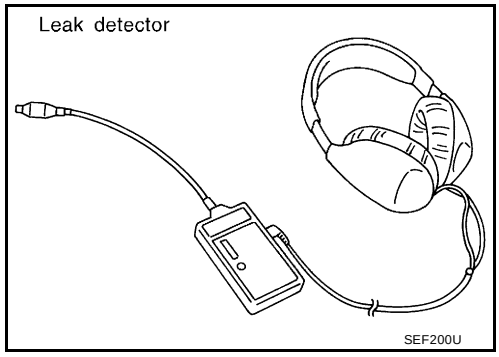
1. Turn ignition switch “OFF”.
2. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)
3. Apply 12 volts DC to vacuum cut valve bypass valve. The valve will open. (Continue to apply 12V until the end of test.)



4. Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg), then remove pump and EVAP service port adapter.

   NOTE:
   - **Never use compressed air or a high pressure pump.**
   - **Do not exceed 4.12 kPa (0.042 kg/cm^2 , 0.6 psi) of pressure in the system.**

5. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to EC-1202, "EVAPORATIVE EMISSION LINE DRAWING" .



OK or NG

OK >> GO TO 8.
NG >> Repair or replace.

8. RELEASE EVAP LINE PRESSURE

With CONSULT-II

1. Touch “BACK” on CONSULT-II screen.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch “OFF” and wait at least 10 seconds.
4. Start engine and let it idle for 90 seconds.
5. Keep engine speed at about 2,000 rpm for 30 seconds.
6. Tun ignition switch “OFF”.

Without CONSULT-II

1. Stop applying 12 volts DC to EVAP canister vent control valve and vacuum cut valve bypass valve.
2. Reconnect harness connectors to EVAP canister vent control valve and vacuum cut valve bypass valve.
3. Start engine and warm it up to normal operating temperature.
4. Turn ignition switch “OFF” and wait at least 10 seconds.
5. Start engine and let it idle for 90 seconds.
6. Keep engine speed at about 2,000 rpm for 30 seconds.
7. Tun ignition switch “OFF”.

>> GO TO 9.

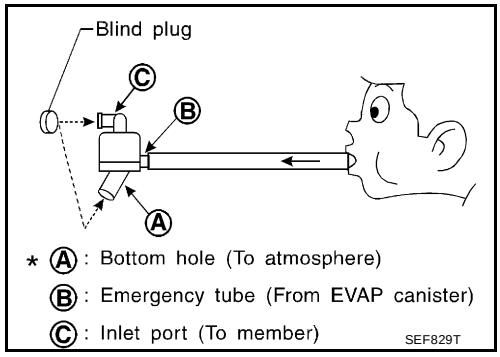
9. CHECK WATER SEPARATOR

1. Check visually for insect nests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that **A** and **C** are not clogged by blowing air into **B** with **A** , and then **C** plugged.
5. In case of NG in items 2 - 4, replace the parts.

NOTE:
Do not disassemble water separator.

OK or NG

OK >> GO TO 10.
NG >> Replace water separator.



10. CHECK EVAP CANISTER VENT CONTROL VALVE, O-RING AND CIRCUIT

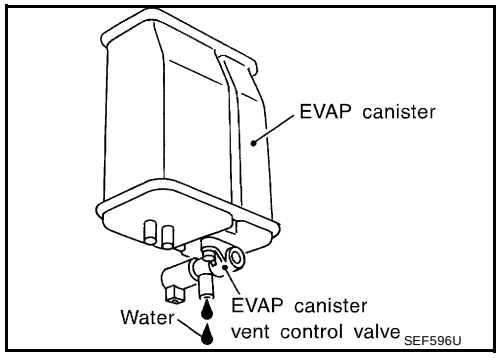
Refer to EC-909, "DTC Confirmation Procedure" .

OK or NG

OK >> GO TO 11.
NG >> Repair or replace EVAP canister vent control valve and O-ring or harness/connector.

11. CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Does water drain from the EVAP canister?



Yes or No

Yes >> GO TO 12.
No (With CONSULT-II)>>GO TO 14.
No (Without CONSULT-II)>>GO TO 15.

12. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve attached.
The weight should be less than 1.8 kg (4.0 lb).

OK or NG

OK (With CONSULT-II)>>GO TO 14.
OK (Without CONSULT-II)>>GO TO 15.
NG >> GO TO 13.

13. DETECT MALFUNCTIONING PART

Check the following.

- EVAP canister for damage
- EVAP hose between EVAP canister and water separator for clogging or poor connection

>> Repair hose or replace EVAP canister.

14. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-II

1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
2. Start engine.
3. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode.
4. Touch “Qu” on CONSULT-II screen to increase “PURG VOL CONT/V” opening to 100.0%.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

Vuccum should exist.

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XX %
THRTL POS SEN	X. XX V

PBIB0726E

OK or NG

OK >> GO TO 17.
NG >> GO TO 16.

15. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
4. Start engine and let it idle for at least 80 seconds.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

Vacuum should exist.

OK or NG

OK >> GO TO 19.
NG >> GO TO 16.

16. CHECK VACUUM HOSE

Check vacuum hoses for clogging or disconnection. Refer to EC-1202, "EVAPORATIVE EMISSION LINE DRAWING" .

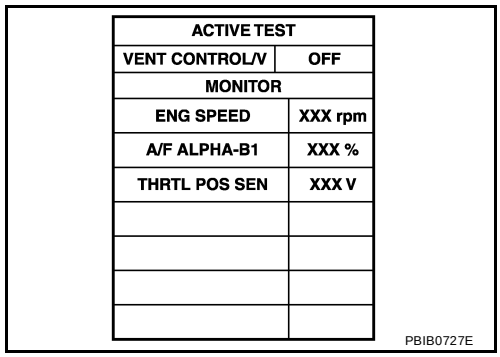
OK or NG

OK (With CONSULT-II)>>GO TO 17.
OK (Without CONSULT-II)>>GO TO 18.
NG >> Repair or reconnect the hose.

17. 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.



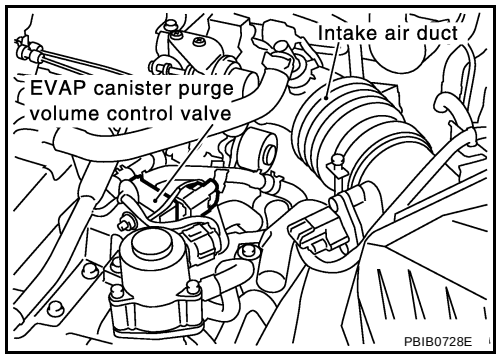
OK or NG

OK >> GO TO 19.
NG >> GO TO 18.

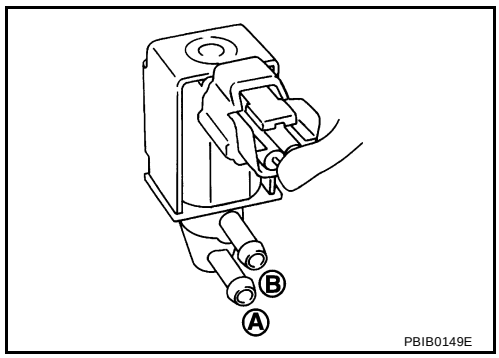
18. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

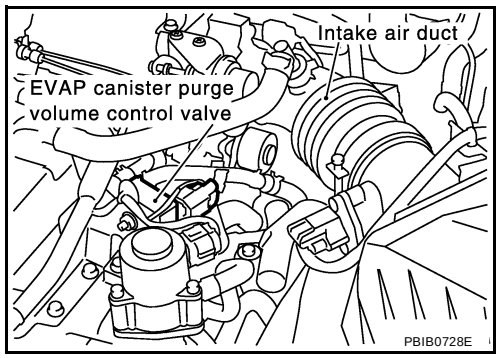


Condition PURG VOL CONT/V value	Air passage continuity between A and B
1.00%	Yes
0.0%	No

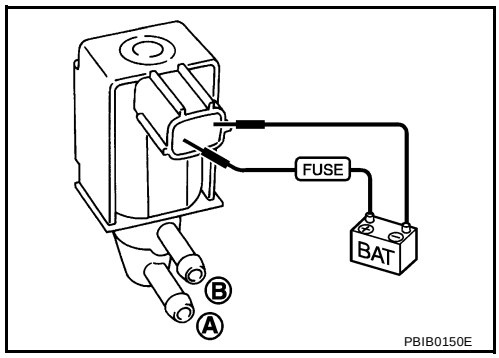


Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

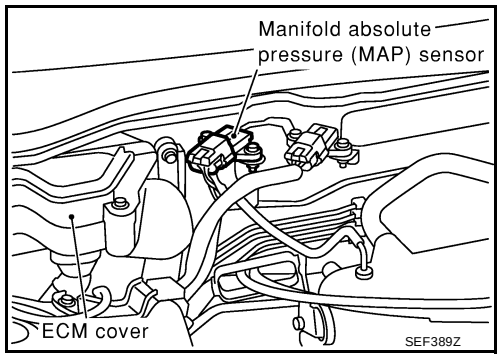


OK or NG

OK >> GO TO 19.
NG >> Replace EVAP canister purge volume control solenoid valve.

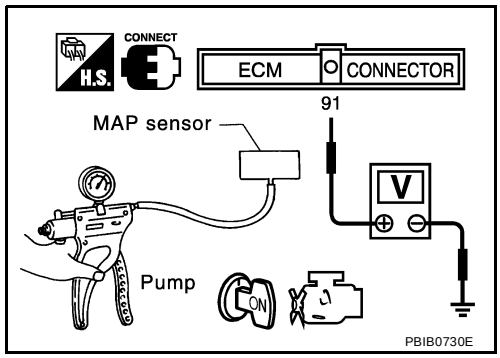
19. CHECK MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR

1. Remove manifold absolute pressure (MAP) sensor with its harness connector connected.
2. Install a vacuum pump to MAP sensor.



3. Turn ignition switch “ON” and check output voltage between ECM terminal 91 and engine ground under the following conditions.

Applied vacuum kPa (mmHg, inHg)	Voltage V
Not applied	1.8 - 4.8
-26.7 (-200, -7.87)	1.0 to 1.4V lower than above value



CAUTION:

- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply below −93.3 kPa (–700 mmHg, –27.56 inHg) or over 101.3 kPa (760 mmHg, 29.92 inHg) of pressure.**

OK or NG

OK >> GO TO 20.
NG >> Replace MAP sensor.

20. CHECK FUEL TANK TEMPERATURE SENSOR

1. Remove fuel level sensor unit.
2. Check fuel tank temperature sensor.
   Refer to EC-820, "Component Inspection" .

OK or NG

OK >> GO TO 21.
NG >> Replace fuel level sensor unit.

21. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

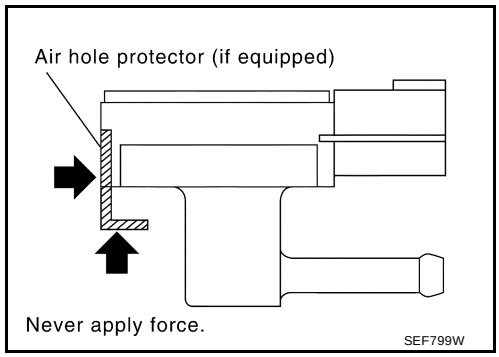
1. Remove EVAP control system pressure sensor with its harness connector connected.

CAUTION:
- **Never apply force to the air hole protector of the sensor if equipped.**

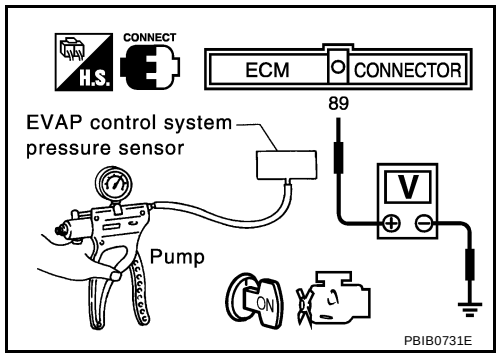
2. Remove hose from EVAP control system pressure sensor.
3. Turn ignition switch “ON”.
4. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.

CAUTION:
- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply below −20 kPa (−150 mmHg, −5.91 inHg) or over 20 kPa (150 mmHg, 5.91 inHg) of pressure.**

5. Check input voltage between ECM terminal 89 and ground.



Pressure (Relative to atmospheric pressure)	Voltage V
0 kPa (0 mmHg, 0 inHg)	3.0 - 3.6
-9.3 kPa (-70 mmHg, -2.76 inHg)	0.4 - 0.6



CAUTION:
- **Discard any EVAP control system pressure sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**

OK or NG

OK >> GO TO 22.
NG >> Replace EVAP control system pressure sensor.

22. CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection. Refer to EC-1201, "EVAPORATIVE EMISSION SYSTEM" .

OK or NG

OK >> GO TO 23.
NG >> Repair or reconnect the hose.

23. CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 24.

24. CHECK REFUELING EVAP VAPOR LINE

Check refueling EVAP vapor line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to EC-1207, "ON BOARD REFUELING VAPOR RECOVERY (ORVR)" .

OK or NG

OK >> GO TO 25.
NG >> Repair or replace hoses and tubes.

25. CHECK SIGNAL LINE AND RECIRCULATION LINE

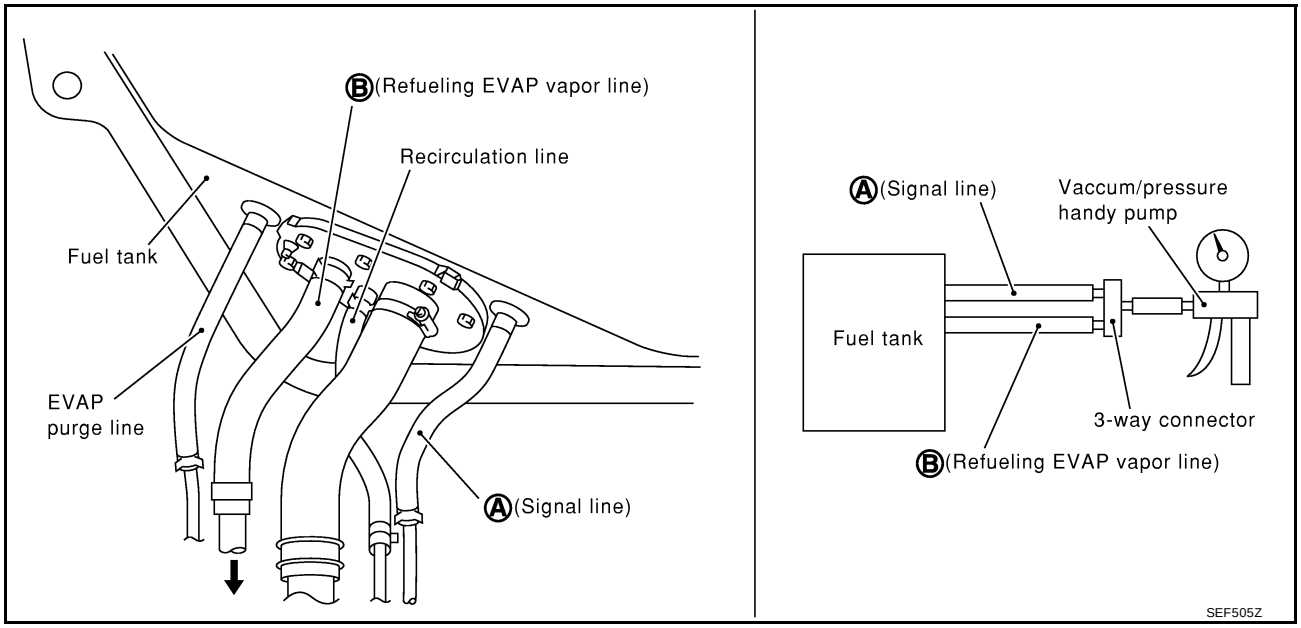
Check signal line and recirculation line between filler neck tube and fuel tank for clogging, kink, cracks, looseness and improper connection.

OK or NG

OK >> GO TO 26.
NG >> Repair or replace hoses, tubes or filler neck tube.

26. CHECK REFUELING CONTROL VALVE

1. Remove fuel filler cap.
2. Check air continuity between hose ends A and B.
   Blow air into the hose end B. Air should flow freely into the fuel tank.
3. Blow air into hose end A and check there is no leakage.
4. Apply pressure to both hose ends A and B [20 kPa (150 mmHg, 5.91 inHg)] using a pressure pump and a suitable 3-way connector. Check that there is no leakage.



OK or NG

OK >> GO TO 27.
NG >> Replace refueling control valve with fuel tank.

27. CHECK FUEL LEVEL SENSOR

Refer to DI-23, "FUEL LEVEL SENSOR UNIT CHECK" .

OK or NG

OK >> GO TO 28.
NG >> Replace fuel level sensor unit.

28. CHECK INTERMITTENT INCIDENT

Refer to EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

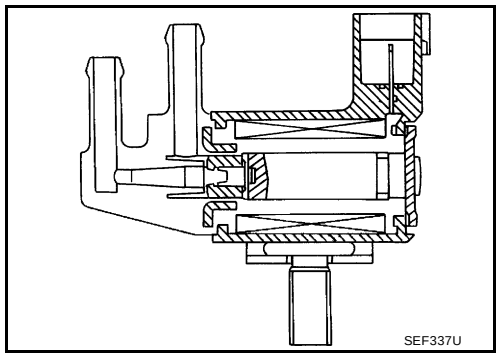
PFP:14920

Description

UBS001XD

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

UBS001XE

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PURG VOL C/V	● Engine: After warming up ● Air conditioner switch “OFF” ● Shift lever: “N” ● No-load	Idle (Vehicle stopped)	0%
		2,000 rpm	—

On Board Diagnosis Logic

UBS001XF

Malfunction is detected when an excessively low (P0444) or high (P0445) voltage signal is sent to ECM through the valve.

Possible Cause

UBS001XG

- Harness or connectors
  (The valve circuit is open or shorted.)
- EVAP canister purge volume control solenoid valve

DTC Confirmation Procedure

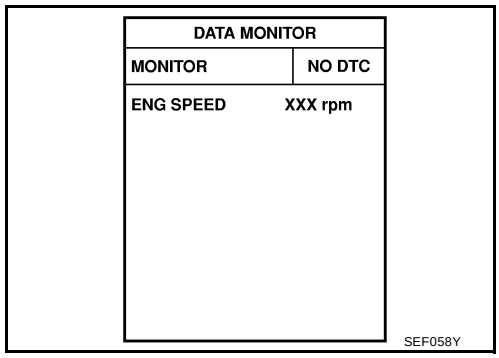
UBS001XH

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-925, "Diagnostic Procedure"
   .



WITH GST

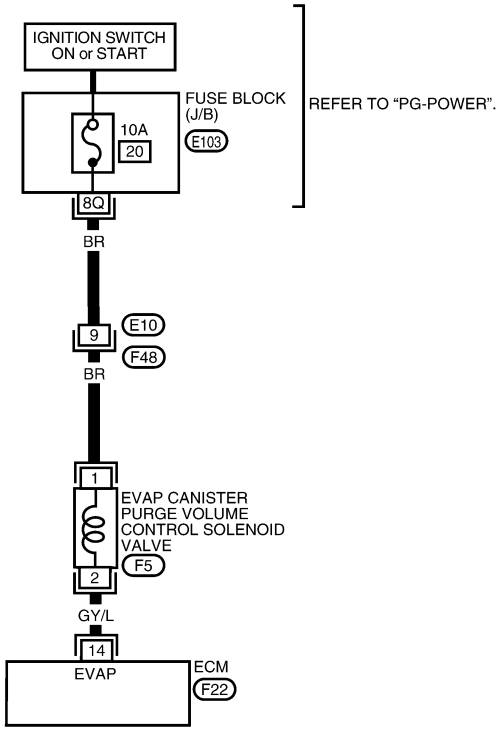
Follow the procedure “WITH CONSULT-II” above.

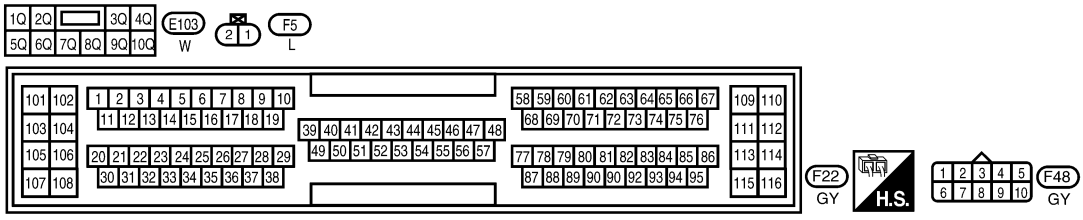
Wiring Diagram

UBS001XI

EC-PGC/V-01

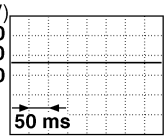
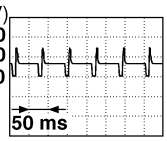
: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC





BBWA0162E

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
14	GY/L	EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE	ENGINE RUNNING AT IDLE SPEED	BATTERY VOLTAGE 
			ENGINE RUNNING AT 2,000 RPM (MORE THAN 100 SECONDS AFTER STARTING ENGINE)	BATTERY VOLTAGE 

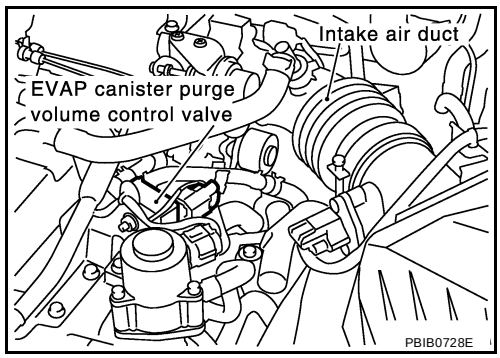
SEF576Y

Diagnostic Procedure

UBS001XJ

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”.

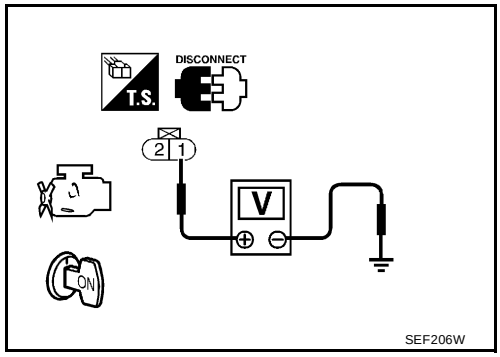


4. Check voltage between EVAP canister purge volume control solenoid valve terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 3.
NG >> GO TO 2.



2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E9, F47
- Fuse block (J/B) connector E103
- 10A fuse
- Harness for open or short between EVAP canister purge volume control solenoid valve and fuse

>> Repair harness or connectors.

3. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 14 and EVAP canister purge volume control solenoid valve terminal 2.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK (With CONSULT-II)>>GO TO 5.
OK (Without CONSULT-II)>>GO TO 6.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the harness for open or short between EVAP canister purge volume control solenoid valve and ECM.

>> Repair open circuit or short to ground and short to power in harness or connectors.

5. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-II

1. Start engine.
2. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-II. Check that engine speed varies according to the valve opening.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XX %
THRTL POS SEN	X. XX V

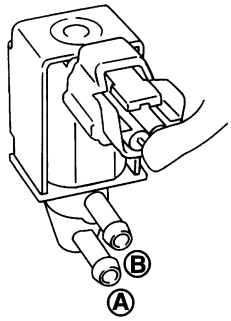
PBIB0721E

6. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

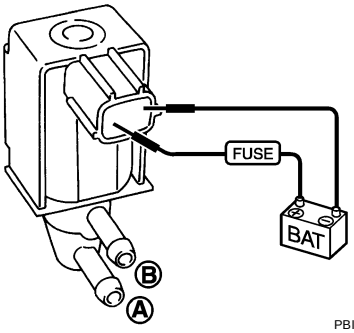


PBIB0149E

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

OK or NG

OK >> GO TO 7.
NG >> Replace EVAP canister purge volume control solenoid valve.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

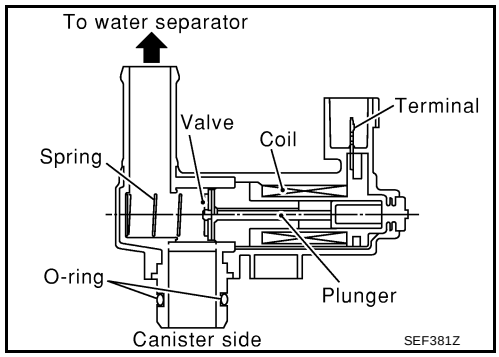
DTC P0447 EVAP CANISTER VENT CONTROL VALVE

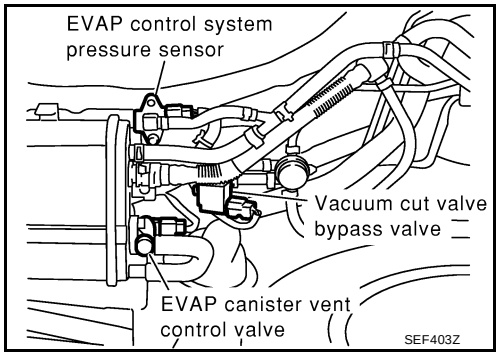
PFP:14935

Component Description

UBS001XK

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” diagnoses.





CONSULT-II Reference Value in Data Monitor Mode

UBS001XL

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	● Ignition switch: ON	OFF

On Board Diagnosis Logic

UBS001XM

Malfunction is detected when an improper voltage signal is sent to ECM through EVAP canister vent control valve.

Possible Cause

UBS001XN

- Harness or connectors
  (The valve circuit is open or shorted.)
- EVAP canister vent control valve

DTC Confirmation Procedure

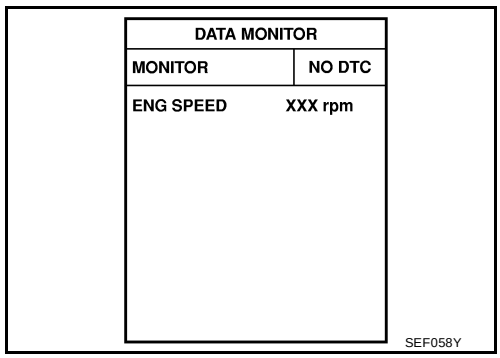
UBS001XO

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-930, "Diagnostic Procedure"
.



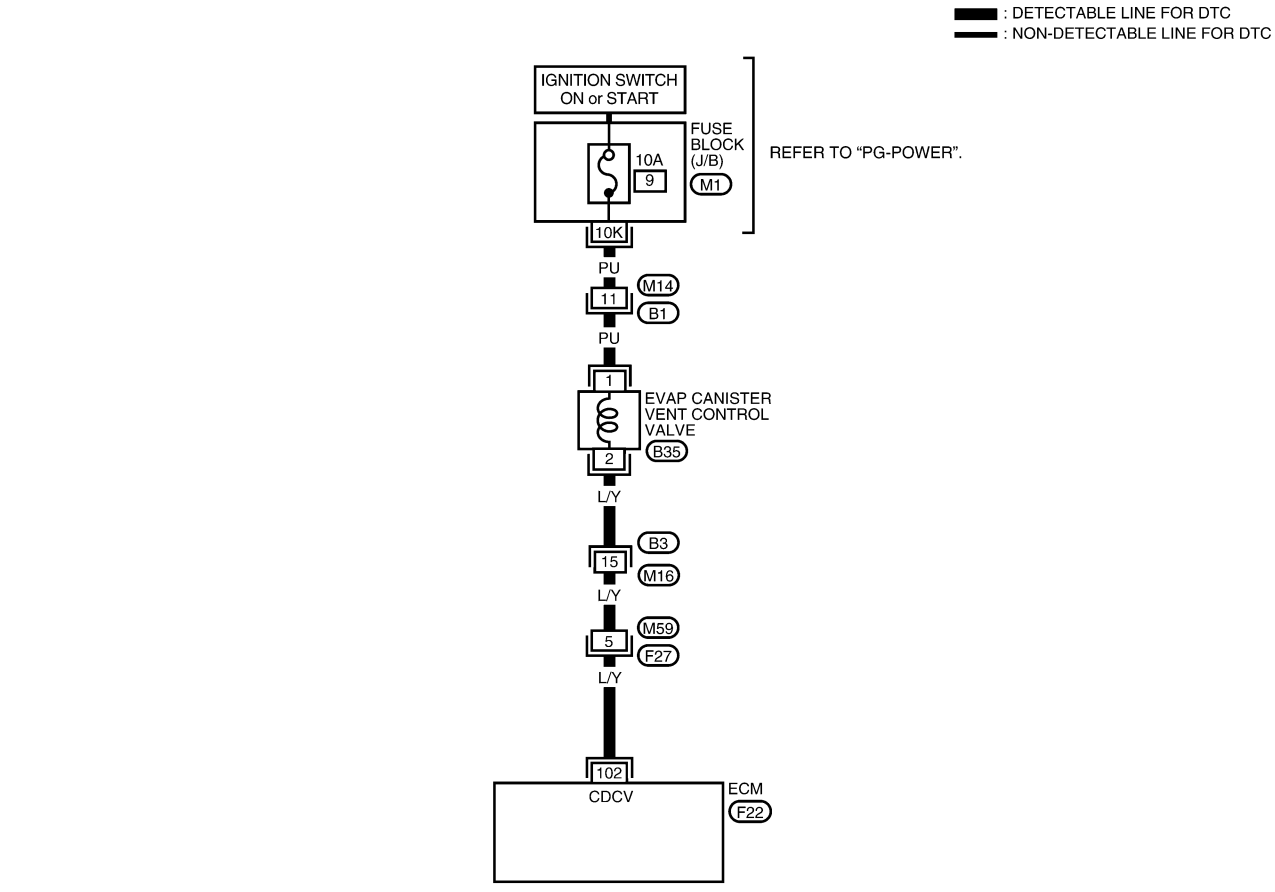
WITH GST

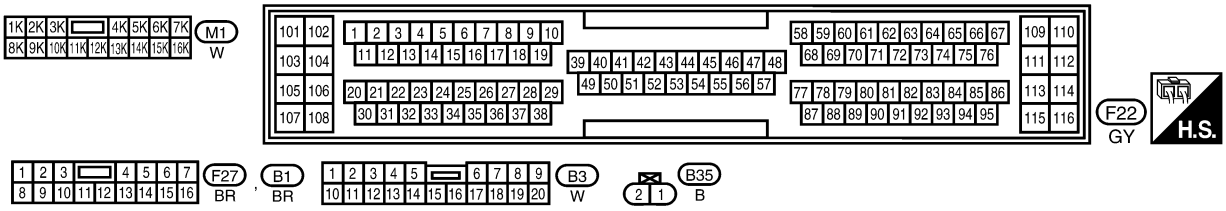
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS001XP

EC-VENT/V-01





BBWA0163E

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
102	L/Y	EVAP CANISTER VENT CONTROL VALVE	IGN ON	BATTERY VOLTAGE

SEF577Y

Diagnostic Procedure

UBS001XQ

1. INSPECTION START

1. Do you have CONSULT-II?

Yes or No

Yes >> GO TO 2.
No >> GO TO 3.

2. CHECK EVAP CANISTER VENT CONTROL VALVE CIRCUIT

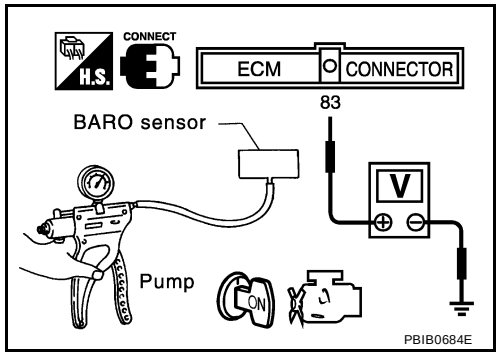
With CONSULT-II

1. Turn ignition switch "OFF" and then turn "ON".
2. Select "VENT CONTROL/V" in "ACTIVE TEST" mode with CONSULT-II.
3. Touch "ON/OFF" on CONSULT-II screen.
4. Check for operating sound of the valve.
   Clicking noise should be heard.

Applied vacuum kPa (mmHg, inHg)	Voltage V
Not applied	3.2 - 4.8
-26.7 (-200, -7.87)	1.0 to 1.4V lower than above value

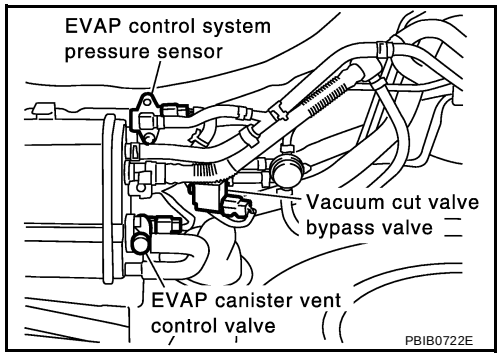
OK or NG

OK >> GO TO 7.
NG >> GO TO 3.



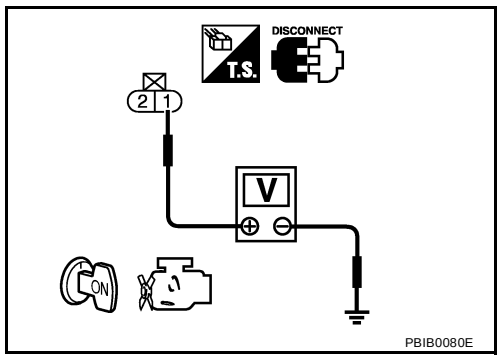
3. CHECK EVAP CANISTER VENT CONTROL VALVE POWER SUPPLY CIRCUIT

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 M14, B1
- Fuse block (J/B) connector M1
- 10A fuse
- Harness for open or short between EVAP canister vent control valve and fuse

>> Repair harness or connectors.

5. CHECK EVAP CANISTER VENT CONTROL VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 102 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 B3, M16
- Harness connectors M59, F27
- Harness for open or short between EVAP canister vent control valve and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK RUBBER TUBE FOR CLOGGING

1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

OK or NG

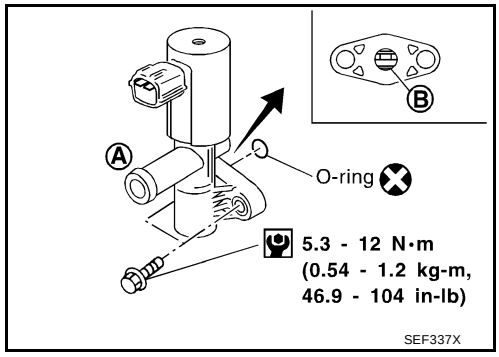
OK >> GO TO 8.
NG >> Clean the rubber tube using an air blower.

8. CHECK EVAP CANISTER VENT CONTROL VALVE-I

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.

OK or NG

OK >> GO TO 9.
NG >> Replace EVAP canister vent control valve.



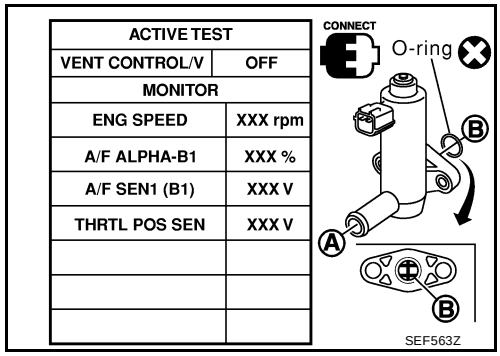
9. CHECK EVAP CANISTER VENT CONTROL VALVE-II

With CONSULT-II

1. Reconnect harness connectors disconnected.
2. Turn ignition switch “ON”.
3. Perform “VENT CONTROL/V” in “ACTIVE TEST” mode.
4. Check air passage continuity and operation delay time.

Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.



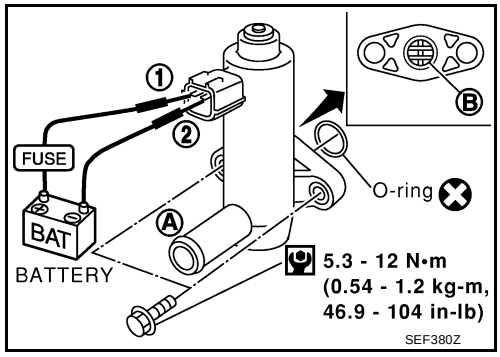
Without CONSULT-II

Check air passage continuity and operation delay time under the following conditions.

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
OFF	Yes

Operation takes less than 1 second.

Make sure new O-ring is installed properly.



OK or NG

OK >> GO TO 11.
NG >> GO TO 10.

10. CHECK EVAP CANISTER VENT CONTROL VALVE-III

1. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
2. Perform Test No. 9 again.

OK or NG

OK >> GO TO 11.
NG >> Replace EVAP canister vent control valve.

11. CHECK INTERMITTENT INCIDENT

Refer to EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

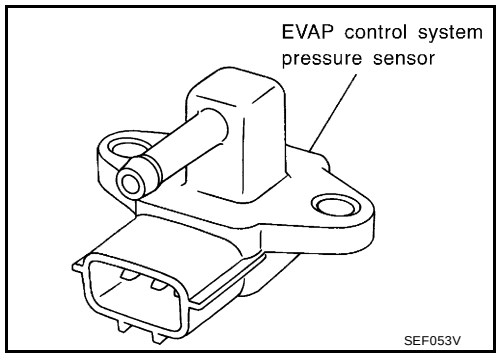
DTC P0452, P0453 EVAP SYSTEM PRESSURE SENSOR

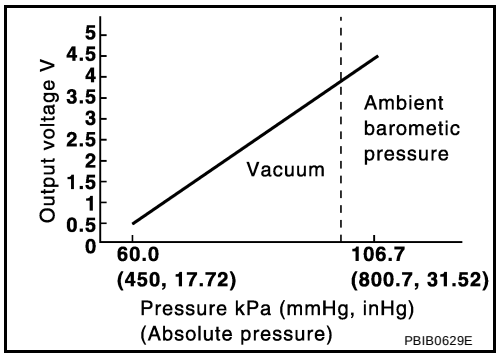
PFP:25085

Component Description

UBS001XR

The EVAP control system pressure sensor detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases. The EVAP control system pressure sensor is not used to control the engine system. It is used only for on board diagnosis.





CONSULT-II Reference Value in Data Monitor Mode

UBS001XS

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
EVAP SYS PRES	● Ignition switch: ON	Approx. 1.8 - 4.8V

On Board Diagnosis Logic

UBS001XT

Malfunction is detected when an excessively low (P0452) or high (P0453) voltage signal from EVAP control system pressure sensor is sent to ECM.

Possible Cause

UBS001XU

- Harness or connectors
  (The EVAP control system pressure sensor circuit is open or shorted.)
- Rubber hose to EVAP control system pressure sensor is clogged, vent, kinked, disconnected or improper connection.
- EVAP control system pressure sensor
- EVAP canister vent control valve
- EVAP canister purge volume control solenoid valve
- EVAP canister
- Rubber hose from EVAP canister vent control valve to water separator

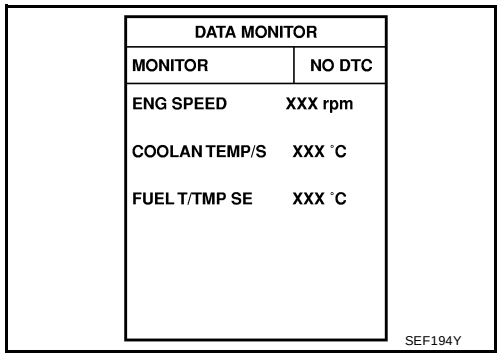
DTC Confirmation Procedure

UBS001XV

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.

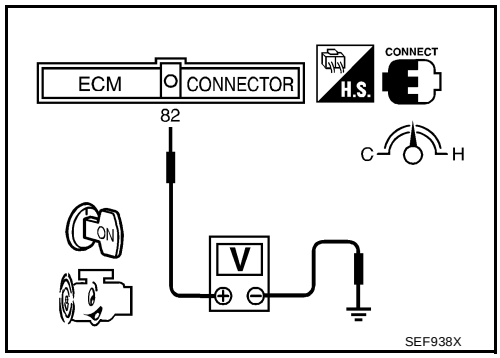
WITH CONSULT-II

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-937, "Diagnostic Procedure"
.



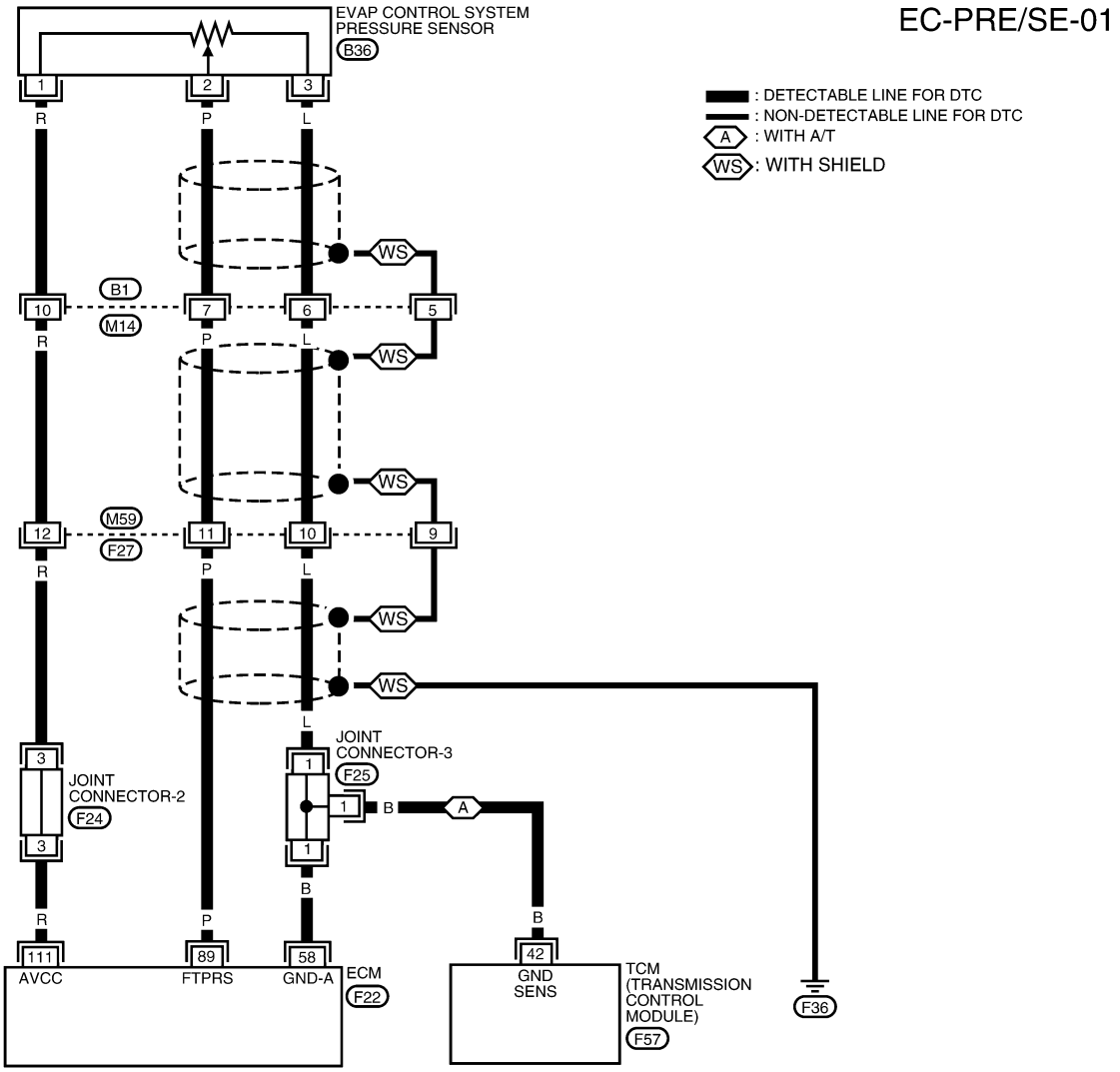
WITH GST

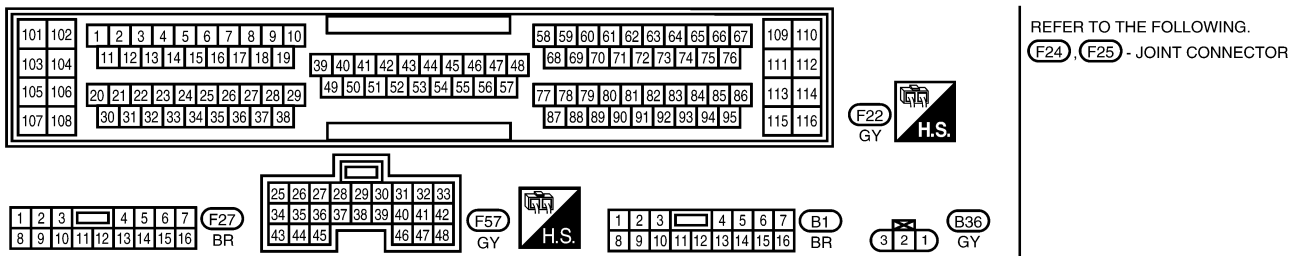
1. Start engine and warm it up to normal operating temperature.
2. Check that voltage between ECM terminal 82 (Fuel tank temperature sensor signal) and ground is less than 4.2V.
3. Turn ignition switch “OFF” and wait at least 10 seconds.
4. Start engine and wait at least 20 seconds.
5. Select “MODE 7” with GST.
6. If 1st trip DTC is detected, go to EC-937, "Diagnostic Procedure"
.



Wiring Diagram

UBS001XW





REFER TO THE FOLLOWING.
F24 , F25 - JOINT CONNECTOR

BBWA0265E

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE ENGINE GROUND.

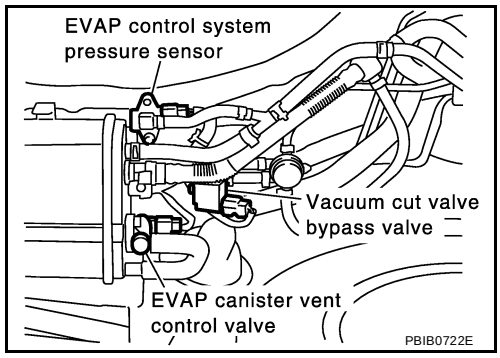
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
58	B	SENSOR GROUND	IGN ON	APPROX. 0V
89	P	EVAP CONTROL SYSTEM PRESSURE SENSOR	IGN ON	APPROX. 1.8 - 4.8V
111	R	SENSOR POWER	IGN ON	APPROX. 5V

Diagnostic Procedure

UBS001XX

1. CHECK RUBBER TUBE

1. Turn ignition switch “OFF”.
2. Check rubber tube connected to the EVAP control system pressure sensor for clogging, vent, kink, disconnection or improper connection.

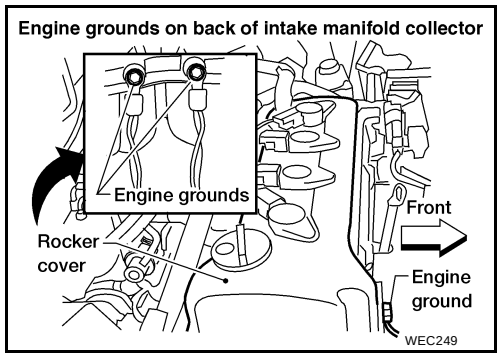


OK or NG

OK >> GO TO 2.
NG >> Reconnect, repair or replace.

2. RETIGHTEN GROUND SCREWS

Loosen and retighten engine ground screws.



>> GO TO 3.

3. CHECK CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check sensor harness connector for water.

Water should not exist.

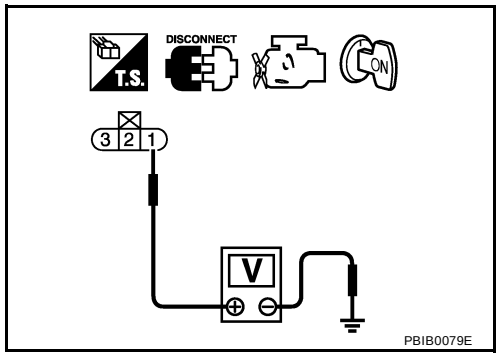
OK or NG

OK >> GO TO 4.
NG >> Repair or replace harness connector.

4. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch “ON”.
2. Check voltage between EVAP control system pressure sensor terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B1, M14
- Harness connectors M59, F27
- Joint connector-2
- Harness for open or short between EVAP control system pressure sensor and ECM

>> Repair harness or connectors.

6. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Check harness continuity between EVAP control system pressure sensor terminal 3 and engine ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B1, M14
- Harness connectors M59, F27
- Joint connector-3
- Harness for open or short between EVAP control system pressure sensor and TCM
- Harness for open or short between EVAP control system pressure sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 89 and EVAP control system pressure sensor terminal 2.
   Refer to Wiring Diagram.

   Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK (With CONSULT-II)>>GO TO 10.
OK (Without CONSULT-II)>>GO TO 11.
NG >> GO TO 9.

9. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B1, M14
- Harness connectors M59, F27
- Harness for open or short between ECM and EVAP control system pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

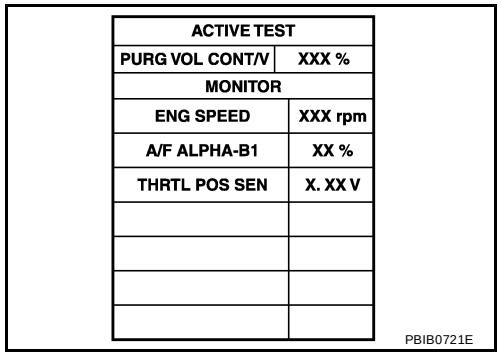
10. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

1. Start engine.
2. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-II. Check that engine speed varies according to the valve opening.

OK or NG

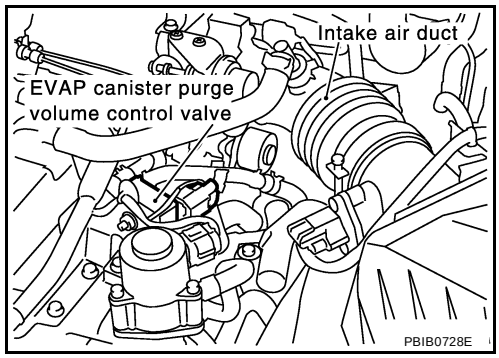
OK >> GO TO 12.
NG >> GO TO 11.



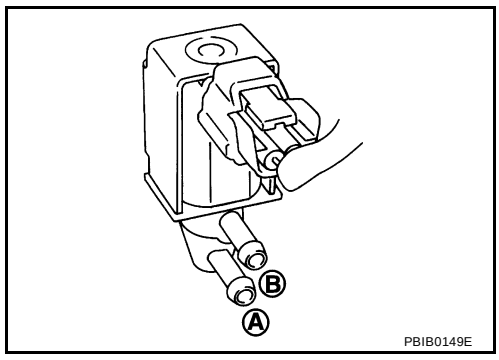
11. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

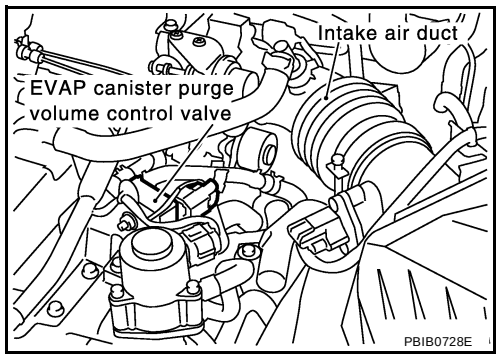


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

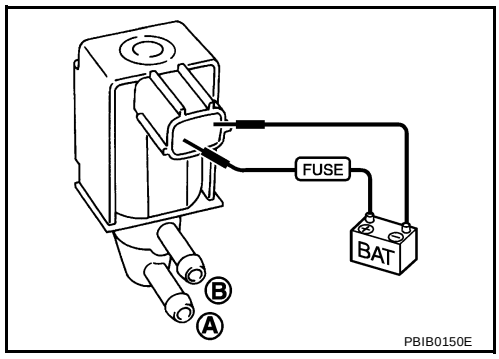


Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No



OK or NG

OK >> GO TO 12.
NG >> Replace EVAP canister purge volume control solenoid valve.

12. CHECK RUBBER TUBE FOR CLOGGING

1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

OK or NG

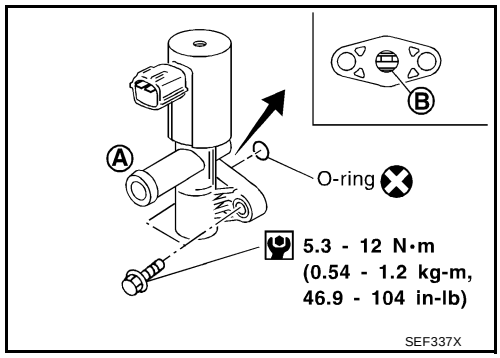
OK >> GO TO 13.
NG >> Clean the rubber tube using an air blower.

13. CHECK EVAP CANISTER VENT CONTROL VALVE-I

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.

OK or NG

OK >> GO TO 14.
NG >> Replace EVAP canister vent control valve.



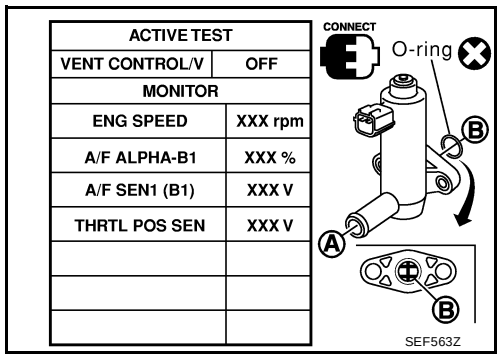
14. CHECK EVAP CANISTER VENT CONTROL VALVE

With CONSULT-II

1. Perform “VENT CONTROL/V” in “ACTIVE TEST” mode.
2. Check air passage continuity and operation delay time under the following conditions.

Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.



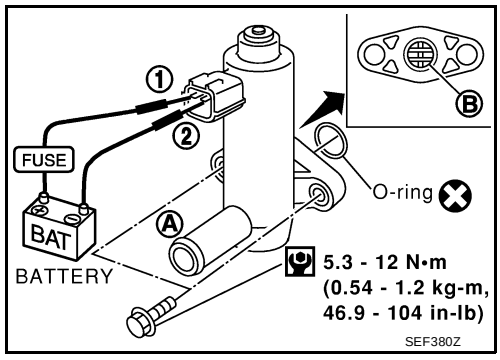
Without CONSULT-II

Check air passage continuity and operation delay time under the following conditions.

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
OFF	Yes

Operation takes less than 1 second.

Make sure new O-ring is installed properly.



OK or NG

OK >> GO TO 16.
NG >> GO TO 15.

15. CHECK EVAP CANISTER VENT CONTROL VALVE-III

1. Clean the air passage (portion **A** to **B**) of EVAP canister vent control valve using an air blower.
2. Perform Test No. 14 again.

OK or NG

OK >> GO TO 16.
NG >> Replace EVAP canister vent control valve.

16. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Perform component inspection, refer to EC-943, "EVAP CONTROL SYSTEM PRESSURE SENSOR" .

OK or NG

OK >> GO TO 17.
NG >> Replace EVAP control system pressure sensor.

17. CHECK RUBBER TUBE

Check obstructed rubber tube connected to EVAP canister vent control valve.

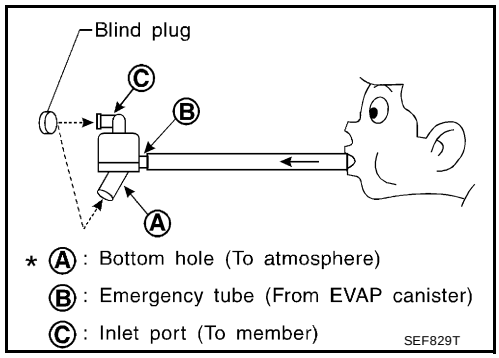
OK or NG

OK >> GO TO 18.
NG >> Clean rubber tube using an air blower, repair or replace rubber tube.

18. CHECK WATER SEPARATOR

1. Check visually for insect nests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that **A** and **C** are not clogged by blowing air into **B** with **A** , and then **C** plugged.
5. In case of NG in items 2 - 4, replace the parts.

NOTE:
Do not disassemble water separator.

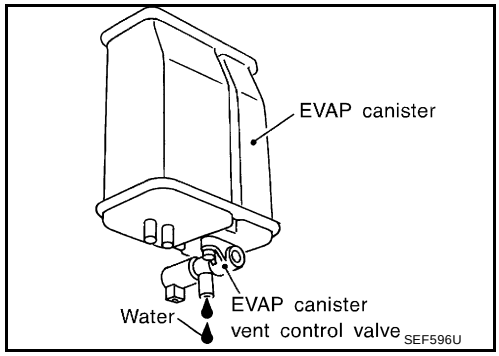


OK or NG

OK >> GO TO 19.
NG >> Replace water separator.

19. CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Check if water will drain from the EVAP canister.



Yes or No

Yes >> GO TO 20.
No >> GO TO 22.

20. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve attached.
The weight should be less than 1.8 kg (4.0 lb).

OK or NG

OK >> GO TO 18.
NG >> GO TO 21.

21. DETECT MALFUNCTIONING PART

Check the following.

- EVAP canister for damage
- EVAP hose between EVAP canister and water separator for clogging or poor connection

>> Repair hose or replace EVAP canister.

22. CHECK INTERMITTENT INCIDENT

Refer to EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

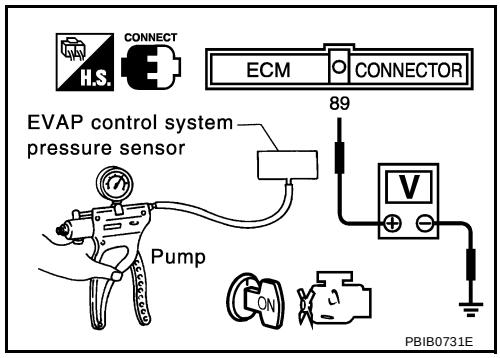
Component Inspection

EBS00G49

EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.
2. Remove hose from EVAP control system pressure sensor.
3. Install a pressure pump to EVAP control system pressure sensor.
4. Turn ignition switch “ON” and check output voltage between ECM terminal 89 and ground.

Applied vacuum kPa (mmHg, inHg)	Voltage V
Not applied	1.8 - 4.8
-26.7 kPa (-200, -7.7)	2.1 - 2.5 lower than above value



CAUTION:

- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply vacuum below −93.3 kPa (−700 mmHg, −27.56 inHg) or pressure over 101.3 kPa (760 mmHg, 29.92 inHg).**

5. If NG, replace EVAP control system pressure sensor.

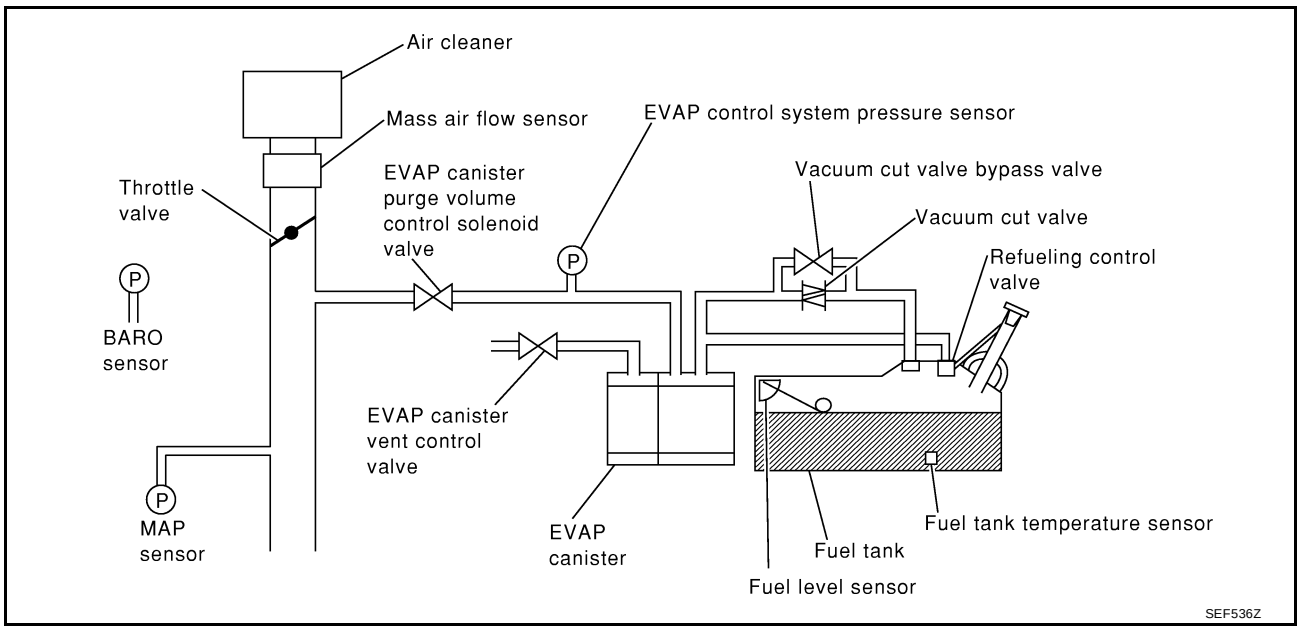
DTC P0455 EVAP CONTROL SYSTEM

PFP:14950

On Board Diagnosis Logic

UBS001XY

NOTE:
If DTC P0455 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-1045 .)
This diagnosis detects a very large leak (fuel filler cap fell off etc.) in the EVAP system between the fuel tank and the EVAP canister purge volume control solenoid valve.



Malfunction is detected when EVAP control system has very large leaks such as when fuel filler cap has fallen off, EVAP control system does not operate properly.

CAUTION:

- **Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.**
- **If the fuel filler cap is not tightened properly, the MIL may come on.**
- **Use only a genuine NISSAN rubber tube as a replacement.**

Possible Cause

UBS001XZ

- Fuel filler cap remains open or fails to close.
- Incorrect fuel tank vacuum relief valve
- Incorrect fuel filler cap used
- Foreign matter caught in fuel filler cap.
- Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.
- Foreign matter caught in EVAP canister vent control valve.
- EVAP canister or fuel tank leaks
- EVAP purge line (pipe and rubber tube) leaks
- EVAP purge line rubber tube bent.
- Blocked or bent rubber tube to EVAP control system pressure sensor
- Loose or disconnected rubber tube
- EVAP canister vent control valve and the circuit
- EVAP canister purge volume control solenoid valve and the circuit
- Manifold absolute pressure (MAP) sensor
- Fuel tank temperature sensor
- O-ring of EVAP canister vent control valve is missing or damaged.
- EVAP control system pressure sensor
- Refueling control valve

- ORVR system leaks

DTC Confirmation Procedure

UBS001Y0

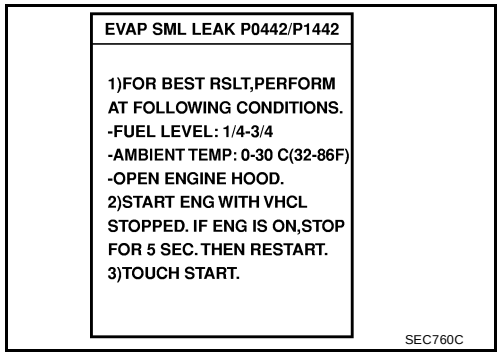
CAUTION:
Never remove fuel filler cap during the DTC Confirmation Procedure.

NOTE:

- **If DTC P0455 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-1045 .)**
- **Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.**
- If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

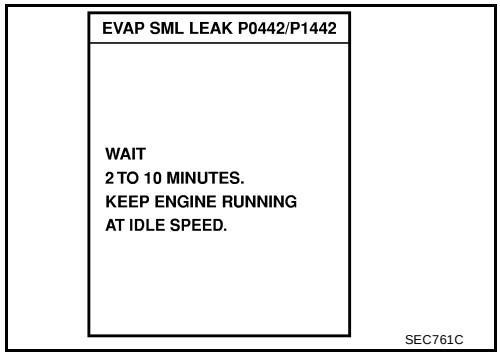
TESTING CONDITION:

- **Perform “DTC WORK SUPPORT” when the fuel level is between 1/4 to 3/4 full and vehicle is placed on flat level surface.**
- **Open engine hood before conducting the following procedure.**



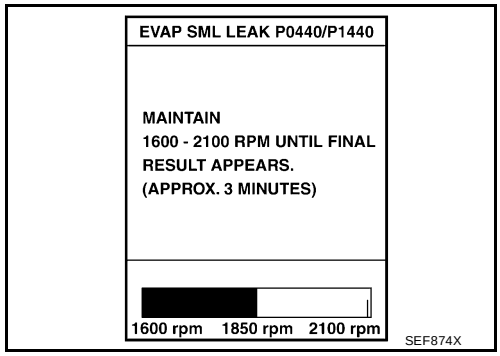
WITH CONSULT-II

1. Tighten fuel filler cap securely until ratcheting sound is heard.
2. Turn ignition switch “ON”.
3. Turn ignition switch “OFF” and wait at least 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)

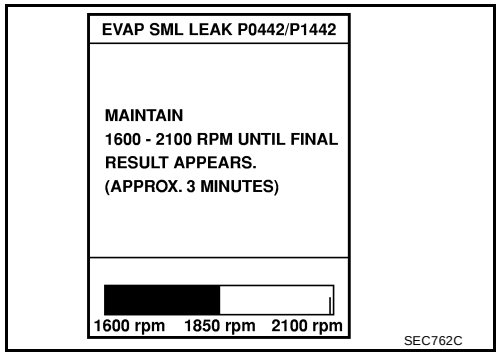


6. Select “EVAP SML LEAK P0442/P1442” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II. Follow the instruction displayed.

   NOTE:
   If the engine speed cannot be maintained within the range displayed on the CONSULT-II screen, go to EC-652, "Basic Inspection" .



7. Make sure that “OK” is displayed.
If “NG” is displayed, select “SELF-DIAG RESULTS” mode with CONSULT-II and make sure that “EVAP GROSS LEAK [P0455]” is displayed. If it is displayed, refer to EC-946, "Diagnostic Procedure" .
If P0442 is displayed, perform “Diagnostic Procedure” for DTC P0442, EC-910 .



WITH GST

NOTE:
Be sure to read the explanation of “Driving Pattern” on EC-635 before driving vehicle.

1. Start engine.
2. Drive vehicle according to “Driving Pattern”, EC-635 .
3. Stop vehicle.
4. Select “MODE 1” with GST.
- If SRT of EVAP system is not set yet, go to the following step.
- If SRT of EVAP system is set, the result will be OK.
5. Turn ignition switch “OFF” and wait at least 10 seconds.
6. Start engine.
It is not necessary to cool engine down before driving.
7. Drive vehicle again according to the “Driving Pattern”, EC-635 .
8. Stop vehicle.
9. Select “MODE 3” with GST.
- If P0455 is displayed on the screen, go to EC-946, "Diagnostic Procedure" .
- If P0442 or P1442 is displayed on the screen, go to “Diagnostic Procedure”, for DTC P0442, EC-910 .
- If P0441 is displayed on the screen, go to “Diagnostic Procedure” for DTC P0441, EC-900 .
- If P0441, P0442, P0455 and P1442 are not displayed on the screen, go to the following step.
10. Select “MODE 1” with GST.
- If SRT of EVAP system is set, the result will be OK.
- If SRT of EVAP system is not set, go to step 6.

Diagnostic Procedure

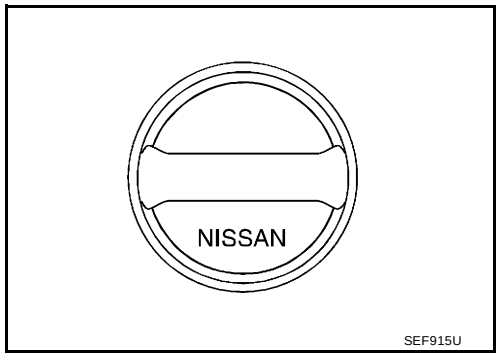
UBS001Y1

1. CHECK FUEL FILLER CAP DESIGN

1. Turn ignition switch “OFF”.
2. Check for genuine NISSAN fuel filler cap design.

OK or NG

OK >> GO TO 2.
NG >> Replace with genuine NISSAN fuel filler cap.



2. CHECK FUEL FILLER CAP INSTALLATION

Check that the cap is tightened properly by rotating the cap clockwise.

OK or NG

OK >> GO TO 3.
NG >> ● Open fuel filler cap, then clean cap and fuel filler neck threads using air blower.
● Retighten until ratcheting sound is heard.

3. CHECK FUEL FILLER CAP FUNCTION

Check for air releasing sound while opening the fuel filler cap.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. CHECK FUEL TANK VACUUM RELIEF VALVE

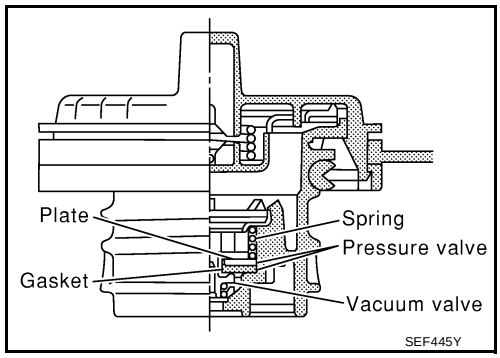
1. Wipe clean valve housing.
2. Check valve opening pressure and vacuum.

Pressure:

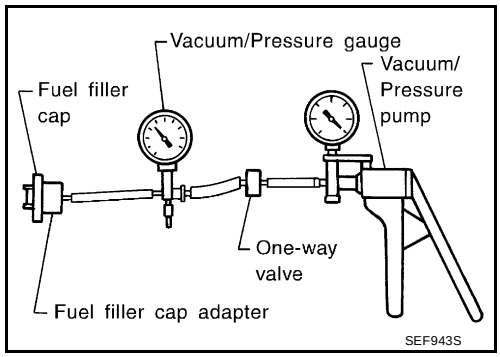
15.3 - 20.0 kPa (0.156 - 0.204 kg/cm^2 , 2.22 - 2.90 psi)

Vacuum:

−6.0 to −3.3 kPa (−0.061 to −0.035 kg/cm^2 , −0.87 to −0.50 psi)



CAUTION:
Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.



OK or NG

OK >> GO TO 5.
NG >> Replace fuel filler cap with a genuine one.

5. CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks, improper connection or disconnection.
Refer to EC-1201, "EVAPORATIVE EMISSION SYSTEM" .

OK or NG

OK >> GO TO 6.
NG >> Repair or reconnect the hose.

6. CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 7.

7. CHECK EVAP CANISTER VENT CONTROL VALVE, O-RING AND CIRCUIT

Refer to EC-945, "DTC Confirmation Procedure" .

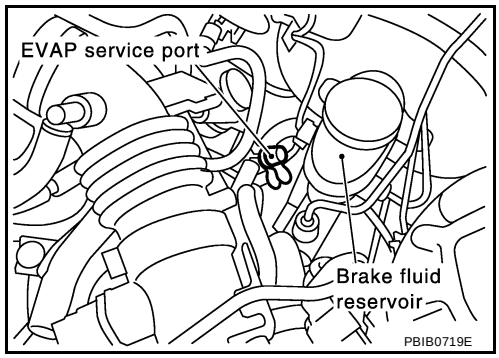
OK or NG

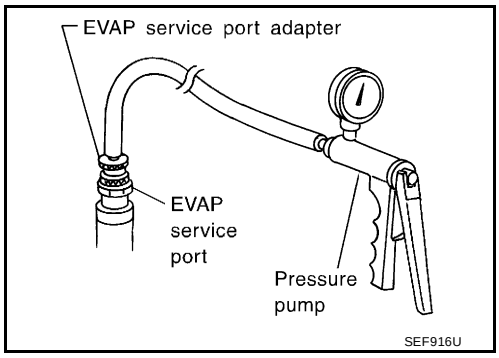
OK >> GO TO 8.
NG >> Repair or replace EVAP canister vent control valve and O-ring or harness/connector.

8. INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.

NOTE:
Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.





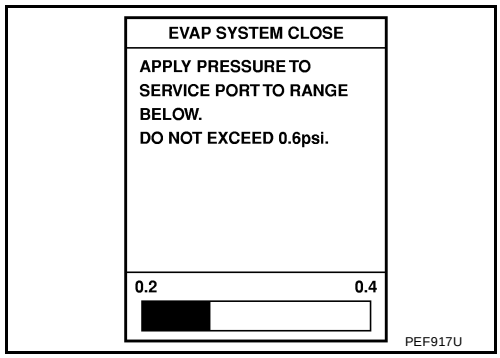
Models with CONSULT-II>>GO TO 9.
Models without CONSULT-II>>GO TO 10.

9. CHECK FOR EVAP LEAK

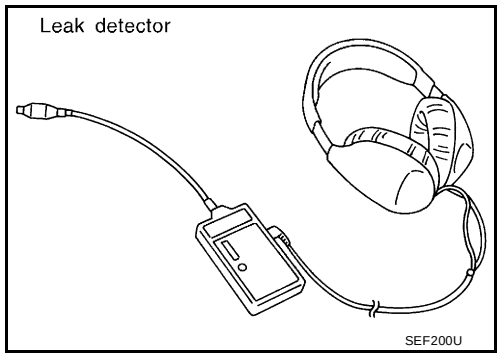
With CONSULT-II

1. Turn ignition switch “ON”.
2. Select “EVAP SYSTEM CLOSE” of “WORK SUPPORT” mode with CONSULT-II.
3. Touch “START” and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.

   NOTE:
   - **Never use compressed air or a high pressure pump.**
   - **Do not exceed 4.12 kPa (0.042 kg/cm^2 , 0.6 psi) of pressure in the system.**



4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details.
   Refer to EC-1202, "EVAPORATIVE EMISSION LINE DRAWING" .



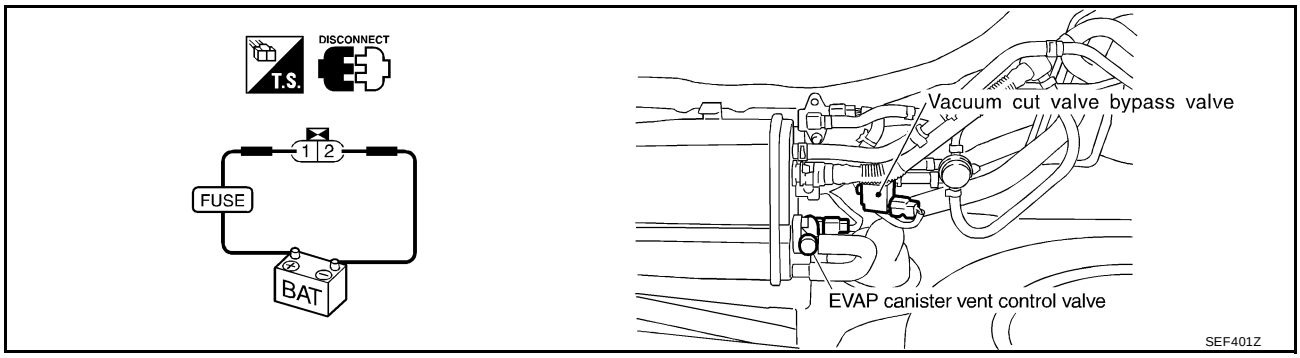
OK or NG

OK >> GO TO 11.
NG >> Repair or replace.

10. CHECK FOR EVAP LEAK

Without CONSULT-II

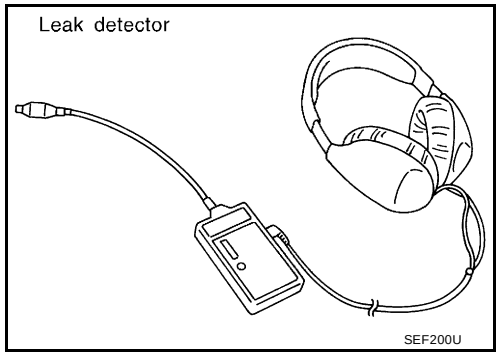
1. Turn ignition switch “OFF”.
2. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)
3. Apply 12 volts DC to vacuum cut valve bypass valve. The valve will open. (Continue to apply 12V until the end of test.)



4. Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg), then remove pump and EVAP service port adapter.

   NOTE:
   - **Never use compressed air or a high pressure pump.**
   - **Do not exceed 4.12 kPa (0.042 kg/cm^2 , 0.6 psi) of pressure in the system.**

5. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to EC-1202, "EVAPORATIVE EMISSION LINE DRAWING" .



OK or NG

OK >> GO TO 11.
NG >> Repair or replace.

11. RELEASE EVAP LINE PRESSURE

With CONSULT-II

1. Touch “BACK” on CONSULT-II screen.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch “OFF” and wait at least 10 seconds.
4. Start engine and let it idle for 90 seconds.
5. Keep engine speed at about 2,000 rpm for 30 seconds.
6. Tun ignition switch “OFF”.

Without CONSULT-II

1. Stop applying 12 volts DC to EVAP canister vent control valve and vacuum cut valve bypass valve.
2. Reconnect harness connectors to EVAP canister vent control valve and vacuum cut valve bypass valve.
3. Start engine and warm it up to normal operating temperature.
4. Turn ignition switch “OFF” and wait at least 10 seconds.
5. Start engine and let it idle for 90 seconds.
6. Keep engine speed at about 2,000 rpm for 30 seconds.
7. Tun ignition switch “OFF”.

Models with CONSULT-II>>GO TO 12.
Models without CONSULT-II>>GO TO 13.

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 100.0%.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

Vacuum should exist.

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XX %
THRTL POS SEN	X. XX V

PBIB0726E

OK or NG

OK >> GO TO 15.
NG >> GO TO 14.

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.

Vacuum should exist.

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-1202, "EVAPORATIVE EMISSION LINE DRAWING" .

OK or NG

OK (With CONSULT-II)>>GO TO 15.
OK (Without CONSULT-II)>>GO TO 16.
NG >> Repair or reconnect the hose.

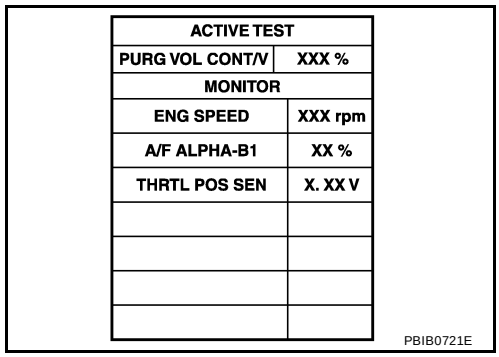
15. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

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

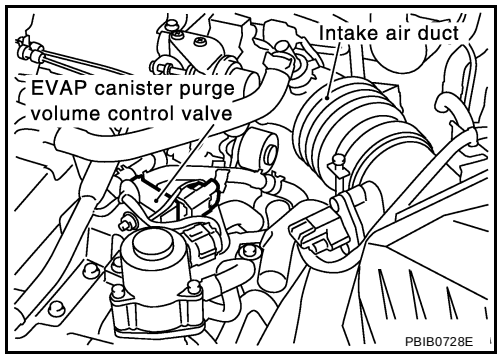
OK >> GO TO 17.
NG >> GO TO 16.



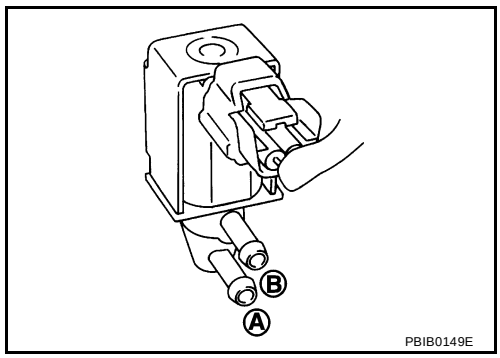
16. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

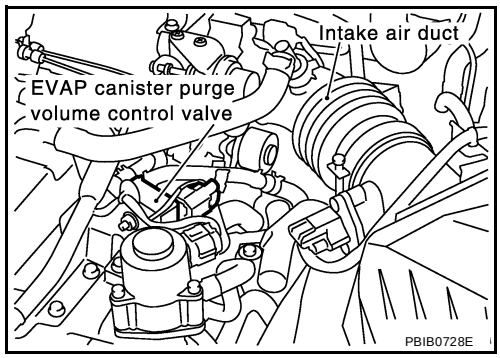


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

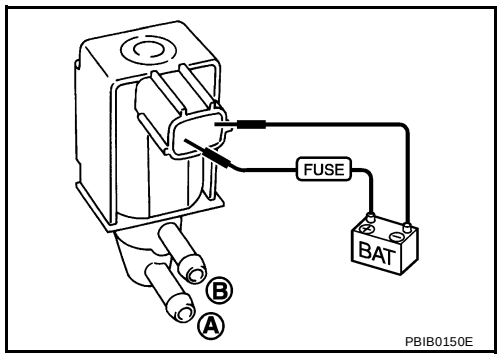


Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

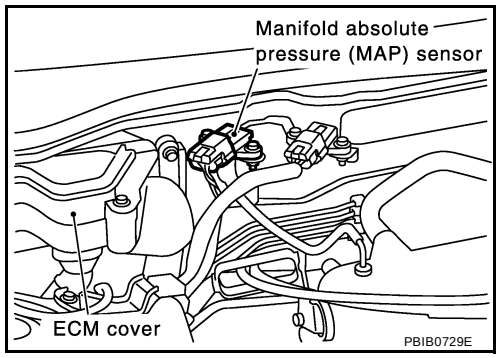


OK or NG

OK >> GO TO 17.
NG >> Replace EVAP canister purge volume control solenoid valve.

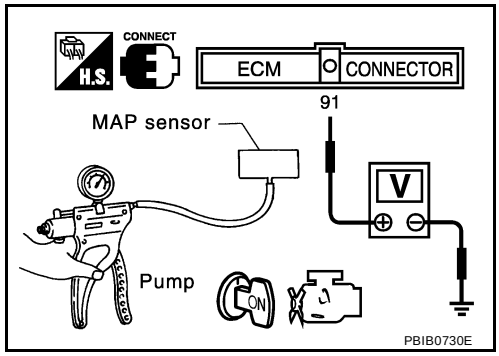
17. CHECK MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR

1. Remove manifold absolute pressure (MAP) sensor with its harness connector connected.
2. Install a vacuum pump to MAP sensor.



3. Turn ignition switch “ON” and check output voltage between ECM terminal 91 and engine ground under the following conditions.

Applied vacuum kPa (mmHg, inHg)	Voltage V
Not applied	1.8 - 4.8
-26.7 (-200, -7.87)	1.0 to 1.4V lower than above value



CAUTION:

- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply below −93.3 kPa (−700 mmHg, −27.56 inHg) or over 101.3 kPa (760 mmHg, 29.92 inHg) of pressure.**

OK or NG

OK >> GO TO 18.
NG >> Replace MAP sensor.

18. CHECK FUEL TANK TEMPERATURE SENSOR

1. Remove fuel level sensor unit.
2. Check fuel tank temperature sensor.
   Refer to EC-820, "Component Inspection" .

OK or NG

OK >> GO TO 19.
NG >> Replace fuel level sensor unit.

19. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

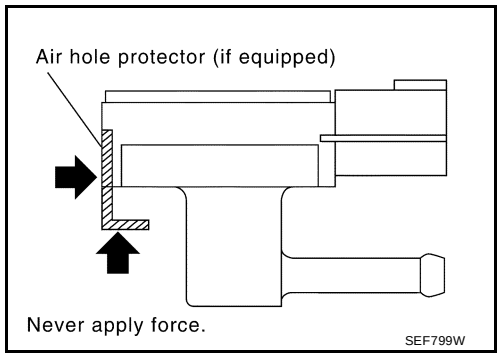
1. Remove EVAP control system pressure sensor with its harness connector connected.

CAUTION:
- **Never apply force to the air hole protector of the sensor if equipped.**

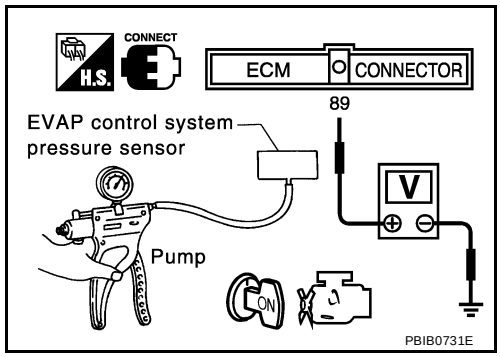
2. Remove hose from EVAP control system pressure sensor.
3. Turn ignition switch “ON”.
4. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.

CAUTION:
- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply below –20 kPa (–150 mmHg, –5.91 inHg) or over 20 kPa (150 mmHg, 5.91 inHg) of pressure.**

5. Check input voltage between ECM terminal 89 and ground.



Pressure (Relative to atmospheric pressure)	Voltage V
0 kPa (0 mmHg, 0 inHg)	3.0 - 3.6
-9.3 kPa (-70 mmHg, -2.76 inHg)	0.4 - 0.6



CAUTION:
- **Discard and EVAP control system pressure sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**

OK or NG

OK >> GO TO 20.
NG >> Replace EVAP control system pressure sensor.

20. CHECK REFUELING EVAP VAPOR LINE

Check refueling EVAP vapor line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to EC-1207, "ON BOARD REFUELING VAPOR RECOVERY (ORVR)" .

OK or NG

OK >> GO TO 21.
>> Repair or replace hoses and tubes.

21. CHECK SIGNAL LINE AND RECIRCULATION LINE

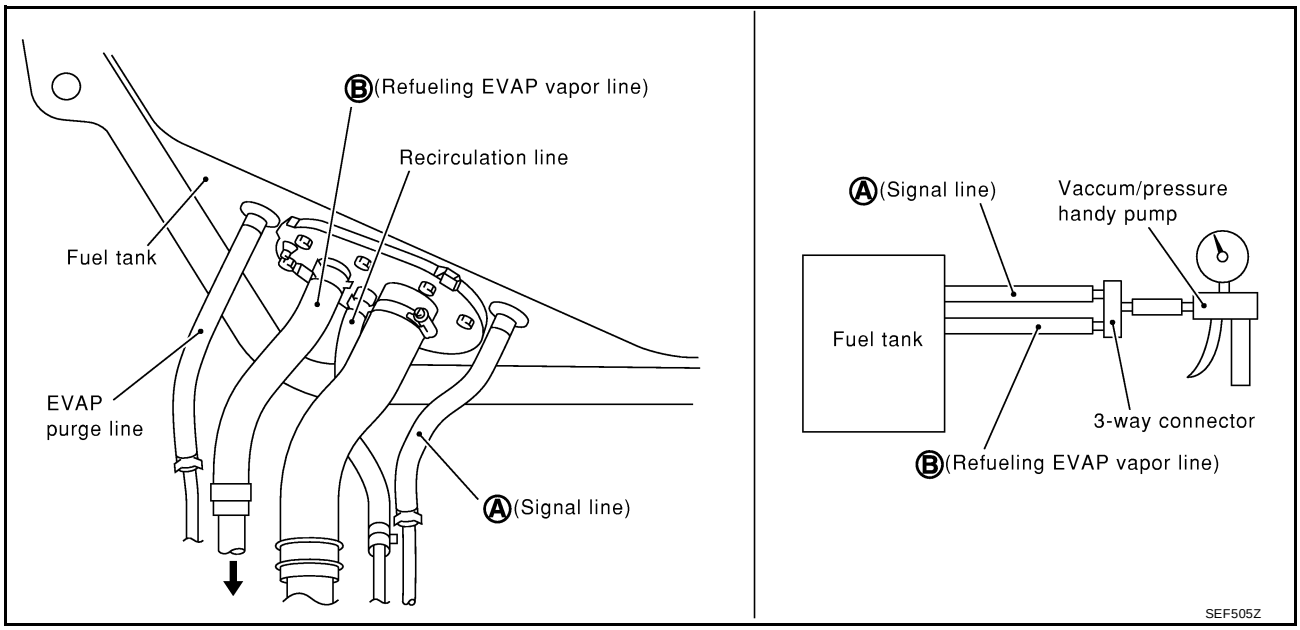
Check signal line and recirculation line between filler neck tube and fuel tank for clogging, kink, cracks, looseness and improper connection.

OK or NG

OK >> GO TO 22.
>> Repair or replace hoses, tubes or filler neck tube.

22. CHECK REFUELING CONTROL VALVE

1. Remove fuel filler cap.
2. Check air continuity between hose ends A and B.
   Blow air into hose end B. Air should flow freely into the fuel tank.
3. Blow air into hose end A and check there is no leakage.
4. Apply pressure to both hose ends A and B [20 kPa (150 mmHg, 5.91 inHg)] using a pressure pump and a suitable 3-way connector. Check that there is no leakage.



OK or NG

OK >> GO TO 23.
>> Replace refueling control valve with fuel tank.

23. CHECK INTERMITTENT INCIDENT

Refer to EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

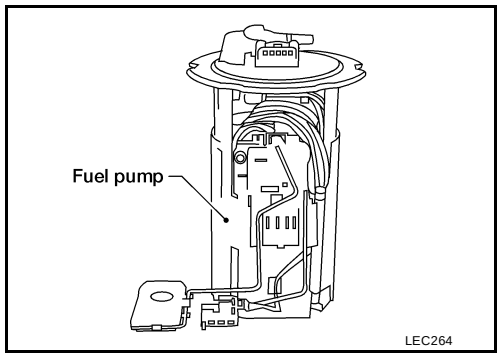
DTC P0460 FUEL LEVEL SENSOR

PFP:25060

Component Description

UBS001Y2

The fuel level sensor is mounted in the fuel level sensor unit. The sensor detects a fuel level in the fuel tank and transmits a signal to the ECM.
It consists of two parts, one is mechanical float and the other side is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.



On Board Diagnostic Logic

UBS001Y3

When the vehicle is parked, naturally the fuel level in the fuel tank is stable. It means that output signal of the fuel level sensor does not change. If ECM senses sloshing signal from the sensor, fuel level sensor malfunction is detected.
Malfunction is detected when even though the vehicle is parked, a signal being varied is sent from the fuel level sensor to ECM.

Possible Cause

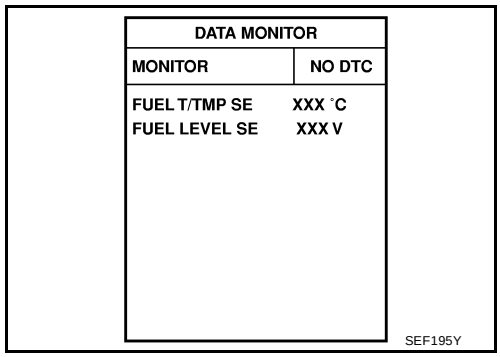
UBS001Y4

- Fuel level sensor circuit
  (The fuel level sensor circuit is open or shorted.)
- Fuel level sensor

DTC Confirmation Procedure

UBS001Y5

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

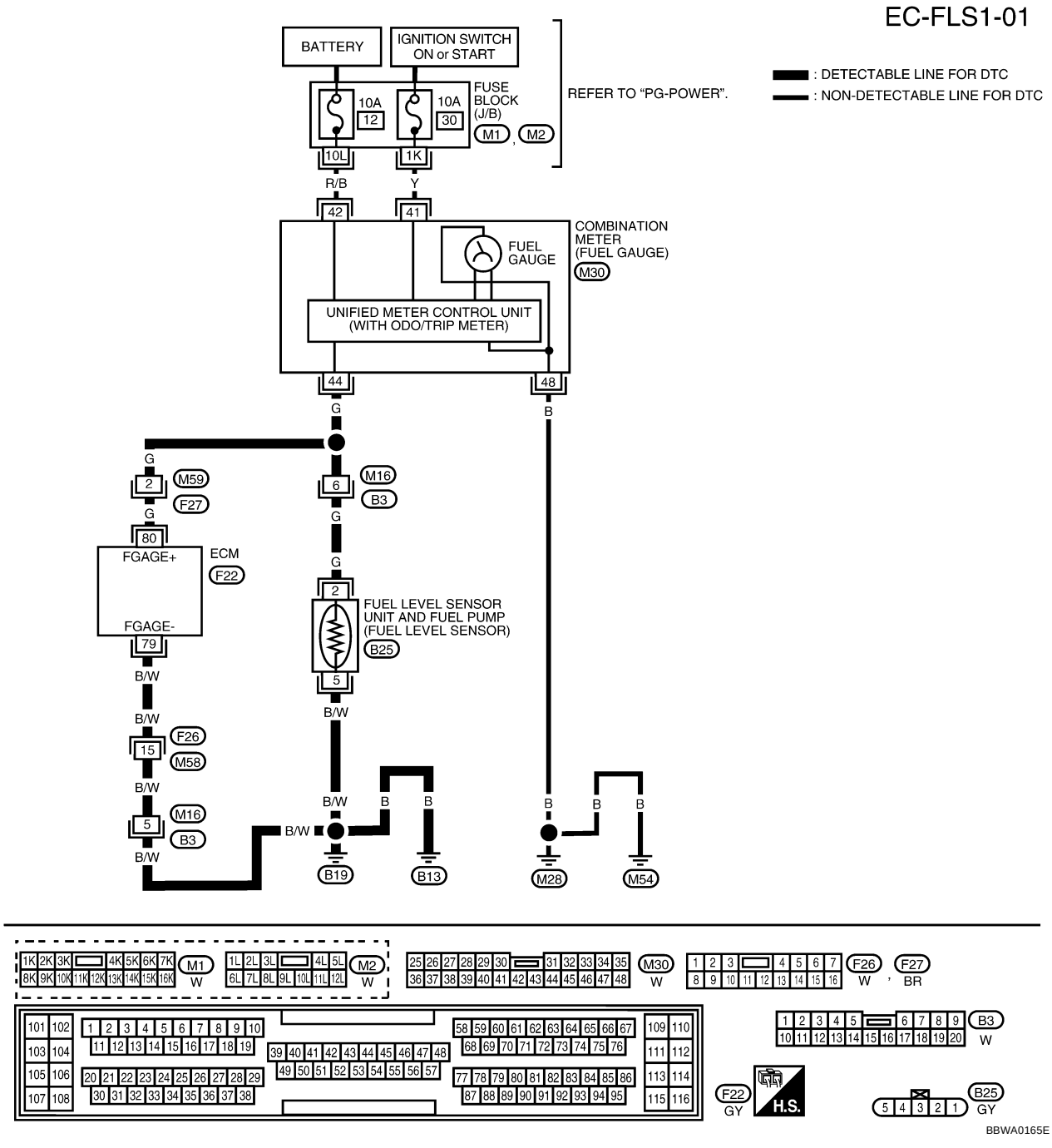
1. Turn ignition switch “ON”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and wait maximum of 2 consecutive minutes.
4. If 1st trip DTC is detected, go to EC-959, "Diagnostic Procedure" .

WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS001Y6



BBWA0165E

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
80	G	FUEL LEVEL SENSOR	IGN ON	APPROX. 0 - 4.8V
79	B/W	FUEL LEVEL SENSOR GROUND	ENGINE RUNNING AT IDLE SPEED	APPROX. 0V

SEF579YA

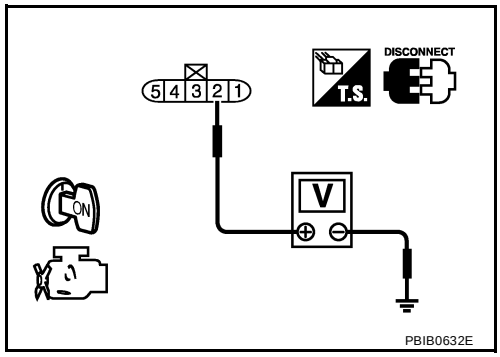
Diagnostic Procedure

UBS001Y7

1. CHECK FUEL LEVEL SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect fuel level sensor unit and fuel pump harness connector.
3. Turn ignition switch “ON”.
4. Check voltage between fuel level sensor unit terminal 2 and ground with CONSULT-II or a tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M16, B3
- Harness for open or short between combination meter and fuel level sensor unit

>> Repair or replace harness or connectors.

3. CHECK FUEL LEVEL SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Check harness continuity between fuel level sensor unit terminal 5 and body ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK FUEL LEVEL SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 80 and fuel level sensor unit terminal 2, ECM terminal 79 and fuel level sensor unit terminal 5. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F27, M59
- Harness connectors F26, M58
- Harness connectors M16, B3
- Harness for open or short between ECM and combination meter
- Harness for open or short between ECM and fuel level sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK FUEL LEVEL SENSOR

Refer to DI-23, "FUEL LEVEL SENSOR UNIT CHECK" .

OK or NG

OK >> GO TO 7.
NG >> Replace fuel level sensor unit.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

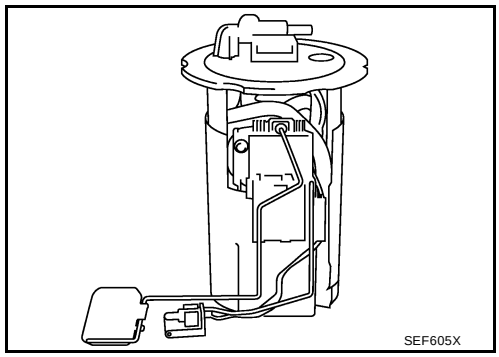
DTC P0461 FUEL LEVEL SENSOR

PFP:25060

Component Description

UBS001Y8

The fuel level sensor is mounted in the fuel level sensor unit. The sensor detects a fuel level in the fuel tank and transmits a signal to the ECM.
It consists of two parts, one is mechanical float and the other side is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.



On Board Diagnostic Logic

UBS001Y9

Driving long distances naturally affects fuel gauge level.
This diagnosis detects the fuel gauge malfunction of the gauge not moving even after a long distance has been driven.
Malfunction is detected when the output signal of the fuel level sensor does not change within the specified range even though the vehicle has been driven a long distance.

Possible Cause

UBS001YA

- Harness or connectors
  (The level sensor circuit is open or shorted.)
- Fuel level sensor

Overall Function Check

UBS001YB

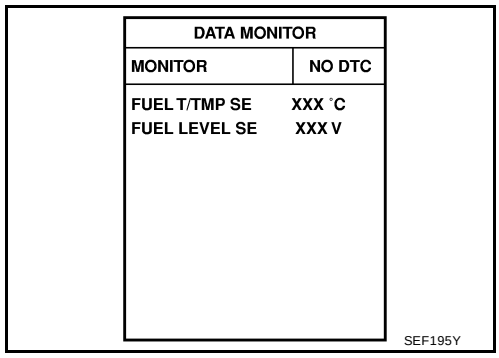
Use this procedure to check the overall function of the fuel level sensor function. During this check, a 1st trip DTC might not be confirmed.

WARNING:
When performing following procedure, be sure to observe the handling of the fuel. Refer to FL-2, "FUEL SYSTEM" .
TESTING CONDITION:
Before starting overall function check, preparation of draining fuel and refilling fuel is required.

WITH CONSULT-II

NOTE:
Start from step 11, if it is possible to confirm that the fuel cannot be drained by 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) in advance.

1. Prepare a fuel container and a spare hose.
2. Release fuel pressure from fuel line, refer to EC-623, "FUEL PRESSURE RELEASE" .
3. Remove the fuel feed hose on the fuel level sensor unit.
4. Connect a spare fuel hose where the fuel feed hose was removed.
5. Turn ignition switch “OFF” and wait at least 10 seconds then turn “ON”.
6. Select “FUEL LEVEL SE” in “DATA MONITOR” mode with CONSULT-II.

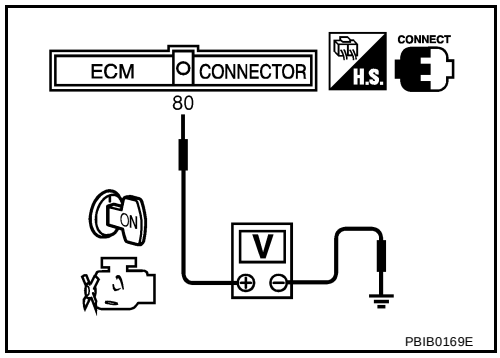


7. Check “FUEL LEVEL SE” output voltage and note it.
8. Select “FUEL PUMP” in “ACTIVE TEST” mode with CONSULT-II.
9. Touch “ON” and drain fuel approximately 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) and stop it.
10. Fill fuel into the fuel tank for 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal).
11. Check “FUEL LEVEL SE” output voltage and note it.
12. Check “FUEL LEVEL SE” output voltage and confirm whether the voltage changes more than 0.03V during step 7 to 11.
    If NG, check the fuel level sensor, refer to DI-23, "FUEL LEVEL SENSOR UNIT CHECK" .

WITH GST

NOTE:
Start from step 11, if it is possible to confirm that the fuel cannot be drained by 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) in advance.

1. Prepare a fuel container and a spare hose.
2. Release fuel pressure from fuel line, refer to EC-623, "FUEL PRESSURE RELEASE" .
3. Remove the fuel feed hose on the fuel level sensor unit.
4. Connect a spare fuel hose where the fuel feed hose was removed.
5. Turn ignition switch “OFF”.
6. Set voltmeters probe between ECM terminal 80 (fuel level sensor signal) and ground.
7. Turn ignition switch “ON”.
8. Check voltage between ECM terminal 80 and ground and note it.



9. Drain fuel by 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) from the fuel tank using proper equipment.
10. Fill fuel into the fuel tank for 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal).
11. Confirm that the voltage between ECM terminal 80 and ground changes more than 0.03V during step 8 - 10.
    If NG, check component of fuel level sensor, refer to DI-23, "FUEL LEVEL SENSOR UNIT CHECK" .

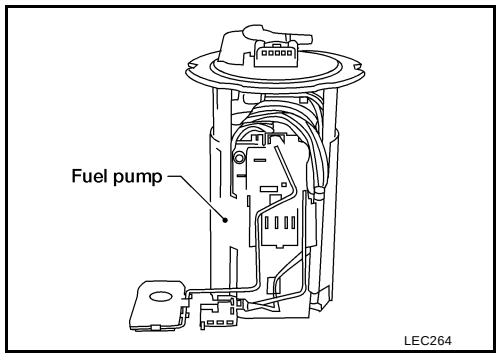
DTC P0462, P0463 FUEL LEVEL SENSOR

PFP:25060

Component Description

UBS001YC

The fuel level sensor is mounted in the fuel level sensor unit. The sensor detects a fuel level in the fuel tank and transmits a signal to the ECM.
It consists of two parts, one is mechanical float and the other side is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.



On Board Diagnostic Logic

UBS001YD

ECM receives two signals from the fuel level sensor circuit.
One is fuel level sensor power supply circuit, and the other is fuel level sensor ground circuit.
This diagnosis indicates the former, to detect open or short circuit malfunction.
Malfunction is detected when an excessively low (P0462) or high (P0463) voltage is sent from the sensor is sent to the ECM.

Possible Cause

UBS001YE

- Fuel level sensor circuit
  (The fuel level sensor circuit is open or shorted.)
- Fuel level sensor

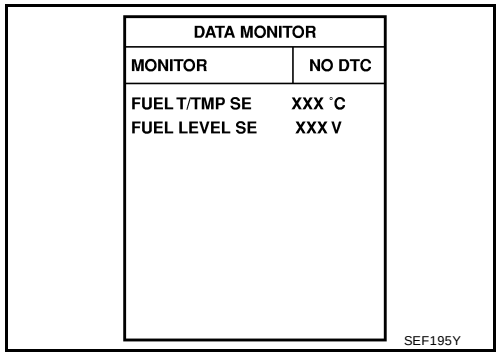
DTC Confirmation Procedure

UBS001YF

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-966, "Diagnostic Procedure"
   .

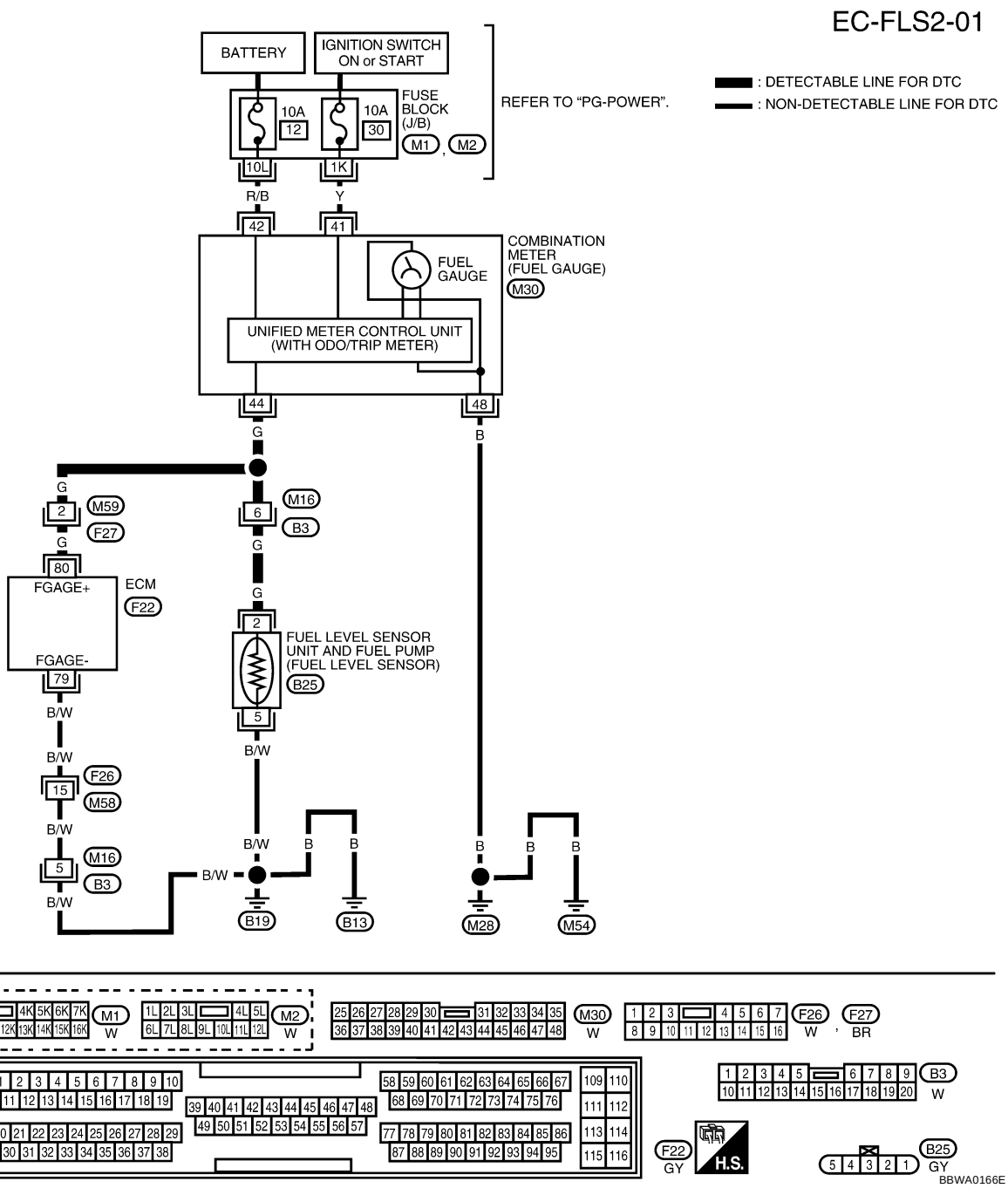


WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS001YG



ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
80	G	FUEL LEVEL SENSOR	IGN ON	APPROX. 0 - 4.8V
79	B/W	FUEL LEVEL SENSOR GROUND	ENGINE RUNNING AT IDLE SPEED	APPROX. 0V

SEF579YA

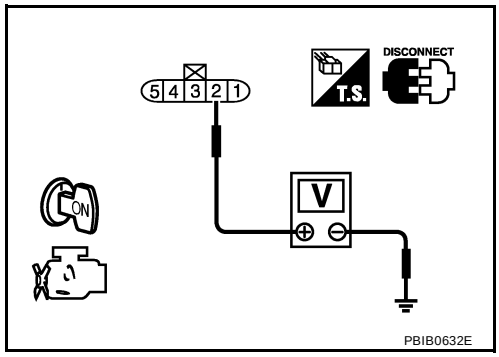
Diagnostic Procedure

UBS001YH

1. CHECK FUEL LEVEL SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect fuel level sensor unit and fuel pump harness connector.
3. Turn ignition switch “ON”.
4. Check voltage between fuel level sensor unit 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 M16, B3
- Harness for open or short between combination meter and fuel level sensor unit

>> Repair or replace harness or connectors.

3. CHECK FUEL LEVEL SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Check harness continuity between fuel level sensor unit terminal 5 and body ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK FUEL LEVEL SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 80 and fuel level sensor unit terminal 2. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F27, M59
- Harness for open or short between ECM and combination meter

>> Repair open circuit or short to ground or short to power in harness on connectors.

6. CHECK FUEL LEVEL SENSOR

Refer to DI-23, "FUEL LEVEL SENSOR UNIT CHECK" .

OK or NG

OK >> GO TO 7.
NG >> Replace fuel level sensor unit.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

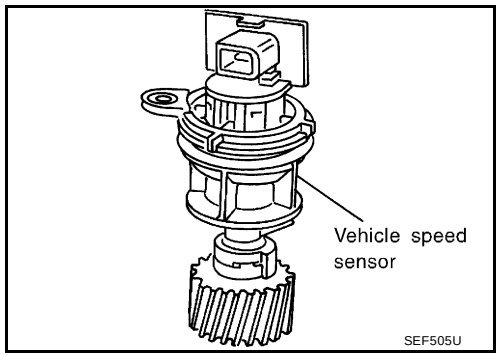
DTC P0500 VSS

PFP:32702

Component Description

UBS001YI

The vehicle speed sensor is installed in the transaxle. It contains a pulse generator which provides a vehicle speed signal to the speedometer. The speedometer then sends a signal to the ECM.



On Board Diagnosis Logic

UBS001YJ

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0500	● The almost 0 km/h (0 MPH) signal from vehicle speed sensor is sent to ECM even when vehicle is being driven.	● Harness or connector (The vehicle speed sensor circuit is open or shorted.) ● Vehicle speed sensor

DTC Confirmation Procedure

UBS001YK

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.

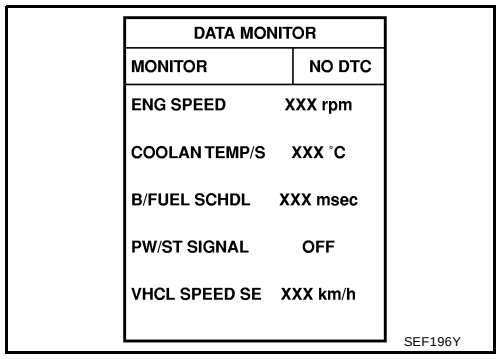
TESTING CONDITION:

This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

WITH CONSULT-II

1. Start engine
2. Read “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.
3. If NG, go to EC-970, "Diagnostic Procedure" .
   If OK, go to following step.
4. Select “DATA MONITOR” mode with CONSULT-II.
5. Warm engine up to normal operating temperature.
6. Maintain the following conditions for at least 60 consecutive seconds.

ENG SPEED	2,100 - 3,000 rpm
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	6.5 - 10.75 msec
Selector lever	Suitable position
PW/ST SIGNAL	OFF



7. If 1st trip DTC is detected, go to EC-970, "Diagnostic Procedure" .

Overall Function Check

UBS001YL

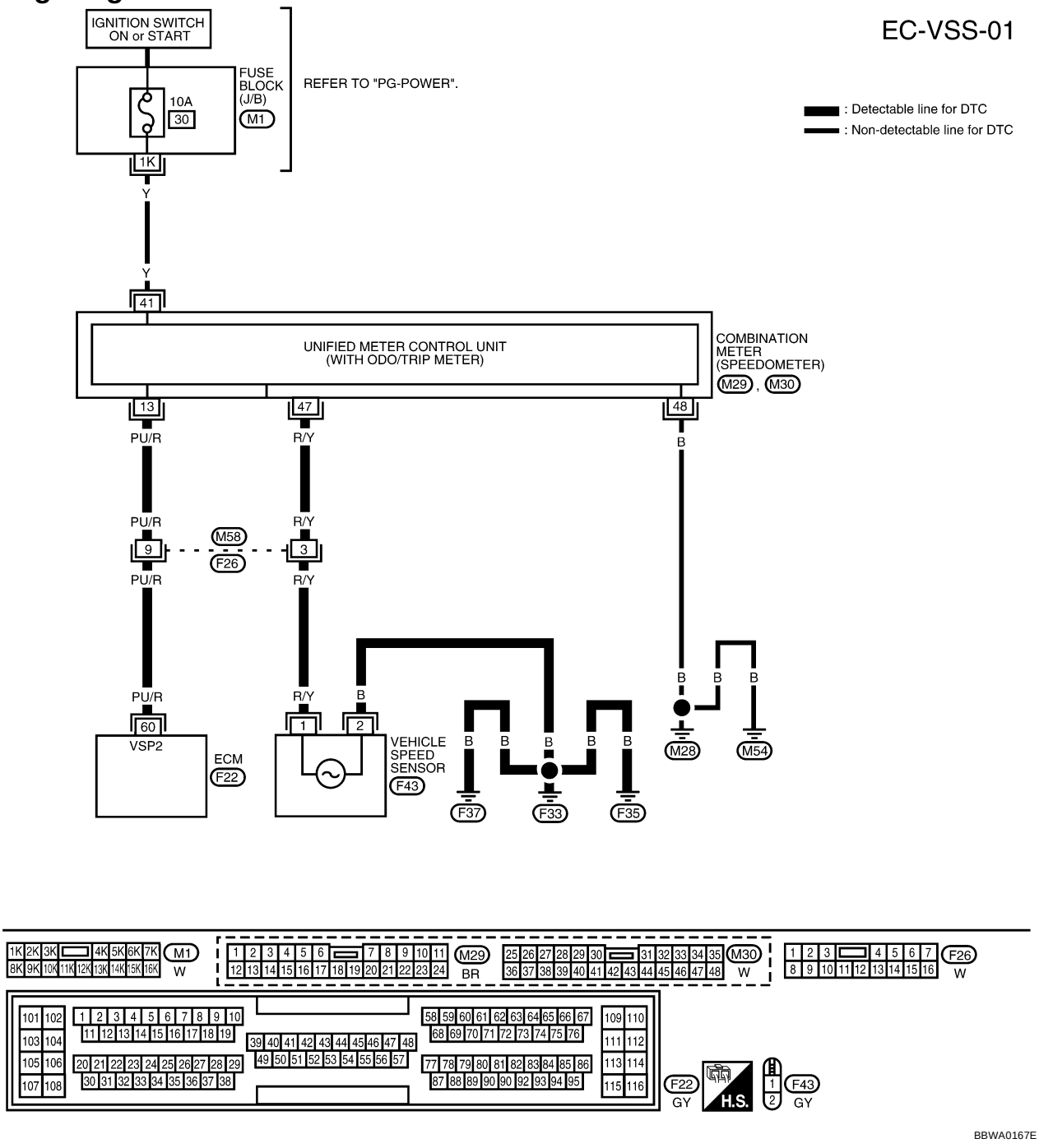
Use this procedure to check the overall function of the EVAP canister vent control valve circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Lift up drive wheels.
2. Start engine.
3. Read vehicle speed sensor signal in “MODE 1” with GST.
   The vehicle speed sensor on GST should be able to exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.
4. If NG, go to EC-970, "Diagnostic Procedure" .

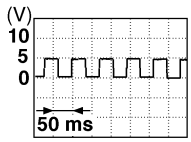
Wiring Diagram

UBS001YM



BBWA0167E

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
60	PU/R	VEHICLE SPEED SENSOR	VEHICLE DRIVING AT 40 KM/H (25 MPH) IN 2ND GEAR POSITION UNDER LIFTED UP CONDITION	0 - APPROX. 4.2V 

SEF580YA

Diagnostic Procedure

UBS001YN

1. CHECK INPUT SIGNAL CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector and combination meter harness connector.
3. Check harness continuity between ECM terminal 60 and combination meter terminal 13. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M58, F26
- Harness for open or short between ECM and combination meter

>> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK SPEEDOMETER FUNCTION

Make sure that speedometer functions properly.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. CHECK SPEEDOMETER CIRCUIT FOR OPEN AND SHORT

Check the following.

- Harness connectors M58, F26
- Harness for open or short between combination meter and vehicle speed sensor

OK or NG

OK >> Check combination meter and vehicle speed sensor. Refer to DI-3, "METERS AND GAUGES" .
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK INTERMITTENT INCIDENT

Perform EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

DTC P0505, P0506, P0507 ISC SYSTEM

PFP:23781

Description

UBS001YO

SYSTEM DESCRIPTION

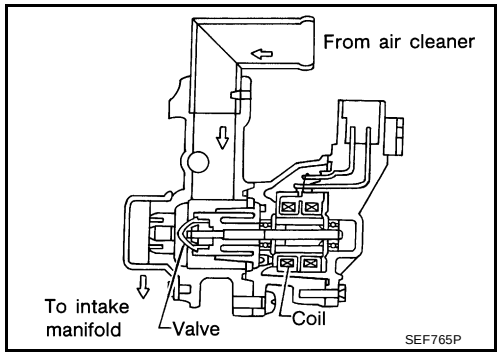
Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed	Idle air control	IACV-AAC valve
Camshaft position sensor (PHASE)	Engine speed and cylinder position		
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		
Park/neutral position (PNP) switch	Park/neutral position		
Air conditioner switch	Air conditioner operation		
Power steering oil pressure switch	Power steering load signal		
Battery	Battery voltage		
Vehicle speed sensor	Vehicle speed		
Intake air temperature sensor	Intake air temperature		
Absolute pressure sensor	Ambient barometic pressure		

This system automatically controls engine idle speed to a specified level. Idle speed is controlled through fine adjustment of the amount of air which by-passes the throttle valve via IACV-AAC valve. The IACV-AAC valve changes the opening of the air by-pass passage to control the amount of auxiliary air. This valve is actuated by a step motor built into the valve, which moves the valve in the axial direction in steps corresponding to the ECM output signals. One step of IACV-AAC valve movement causes the respective opening of the air by-pass passage. (i.e. when the step advances, the opening is enlarged.) The opening of the valve is varied to allow for optimum control of the engine idling speed. The camshaft position sensor detects the actual engine speed and sends a signal to the ECM. The ECM then controls the step position of the IACV-AAC valve so that engine speed coincides with the target value memorized in ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by taking into consideration various engine conditions, such as during warm up, deceleration, and engine load (air conditioner, power steering and cooling fan operation).

COMPONENT DESCRIPTION

IACV-AAC Valve

The IACV-AAC valve is operated by a step motor for centralized control of auxiliary air supply. This motor has four winding phases and is actuated by the output signals of ECM which turns ON and OFF two windings each in sequence. Each time the IACV-AAC valve opens or closes to change the auxiliary air quantity, the ECM sends a pulse signal to the step motor. When no change in the auxiliary air quantity is needed, the ECM does not issue the pulse signal. A certain voltage signal is issued so that the valve remains at that particular opening.



CONSULT-II Reference Value in Data Monitor Mode

UBS001YP

MONITOR ITEM	CONDITION		SPECIFICATION
IACV-AAC/V	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: “N” ● No-load	Idle	5 - 20 steps
		2,000 rpm	—

On Board Diagnosis Logic

UBS001YQ

DTC No.	Malfunction is detected when ...		Check Items (Possible Cause)
P0505	A)	The IACV-AAC valve does not operate properly.	● Harness or connectors (The IACV-AAC valve circuit is open.) ● IACV-AAC valve
P0506	B)	The idle speed is less than the target idle speed by 100 rpm or more.	● Harness or connectors (The IACV-AAC valve circuit is open or shorted.) ● Air control valve (Power steering) ● IACV-AAC valve
P0507	C)	The idle speed is more than the target idle speed by 200 rpm or more.	● Harness or connectors (The IACV-AAC valve circuit is open or shorted.) ● IACV-AAC valve ● Air control valve (Power steering) ● Intake air leaks ● PCV valve

DTC Confirmation Procedure

UBS001YR

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 EC-622, "Idle Air Volume Learning" , before conducting “DTC Confirmation Procedure”. For the target idle speed, refer to EC-1219, "SERVICE DATA AND SPECIFICATIONS (SDS)" .**

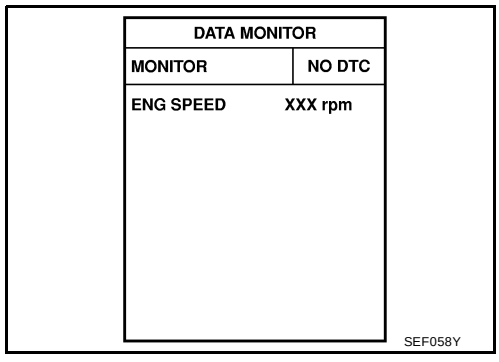
PROCEDURE FOR MALFUNCTION A

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5V with ignition switch “ON”.

With CONSULT-II

1. Turn ignition switch “ON”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle.
4. Keep engine speed at 2,500 rpm for three seconds, then let it idle for three seconds.
5. Perform step 4 once more.
6. If 1st trip DTC is detected, go to EC-975, "Diagnostic Procedure" .



With GST

Follow the procedure “With CONSULT-II” above.

PROCEDURE FOR MALFUNCTION B AND C

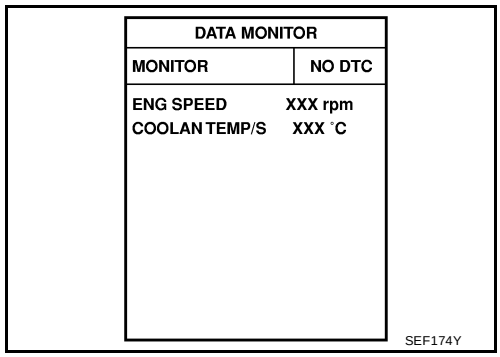
TESTING CONDITION:

- **Before performing the following procedure, make sure battery voltage is more than 11V at idle.**
- **For best results, perform the test at a temperature above –10°C (14°F).**
- **Electrical load (rear window defogger, headlamps, air conditioner, etc.) is not applied.**

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-975, "Diagnostic Procedure" .



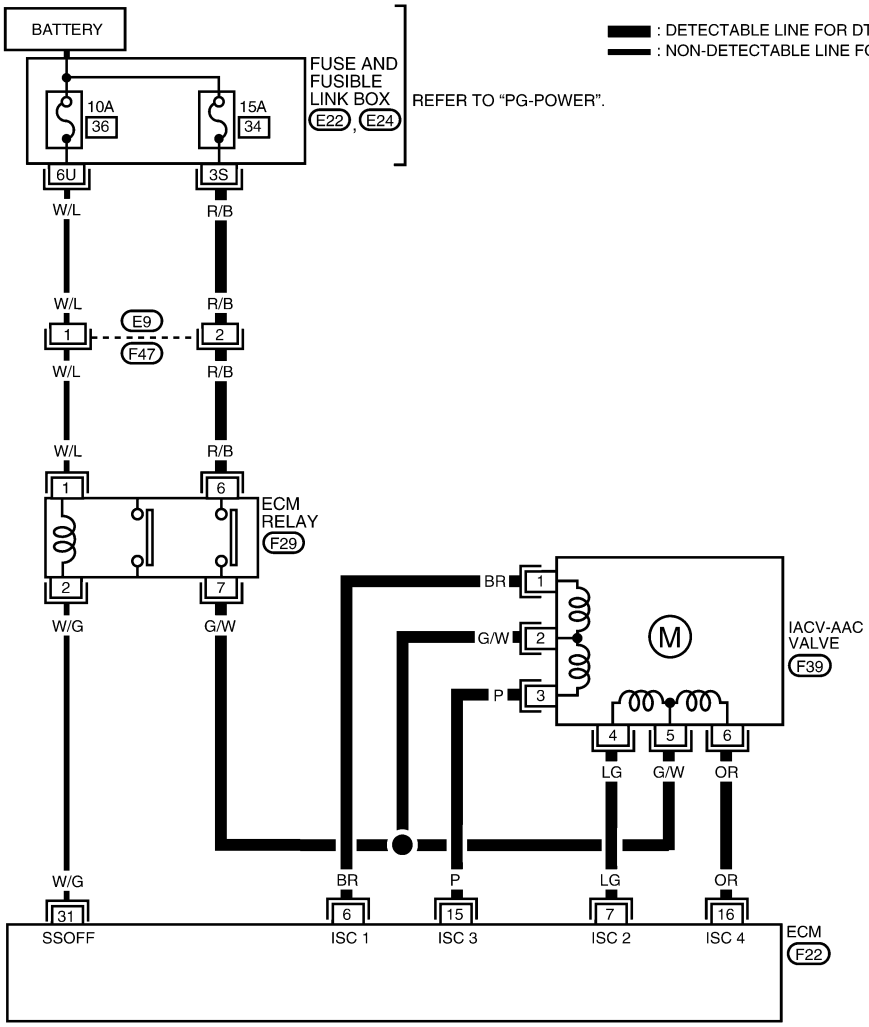
With GST

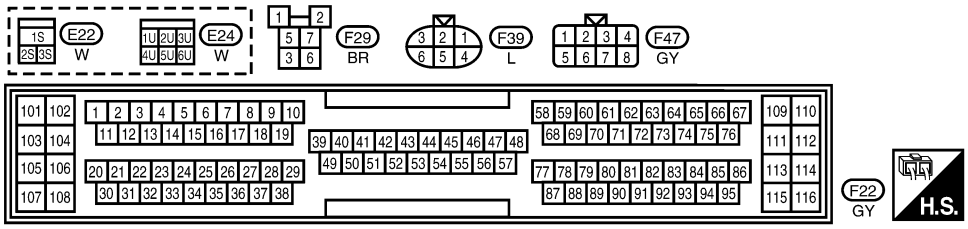
Follow the procedure “With CONSULT-II” above.

Wiring Diagram

UBS001YS

EC-AAC/V-01





BBWA0168E

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
6	BR	IACV-AAC VALVE	ENGINE RUNNING AT IDLE SPEED	0.1 - 14V
7	LG			
15	P			
16	OR			

SEF581Y

Diagnostic Procedure

UBS001YT

1. CHECK PCV HOSE CONNECTION

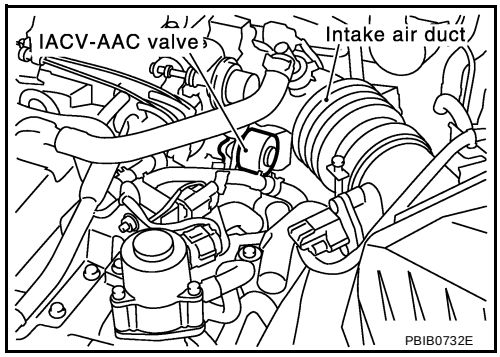
Confirm that PCV hose is connected correctly.

OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2. CHECK IACV-AAC VALVE POWER SUPPLY CIRCUIT

1. Stop engine.
2. Disconnect IACV-AAC valve harness connector.
3. Turn ignition switch “ON”.

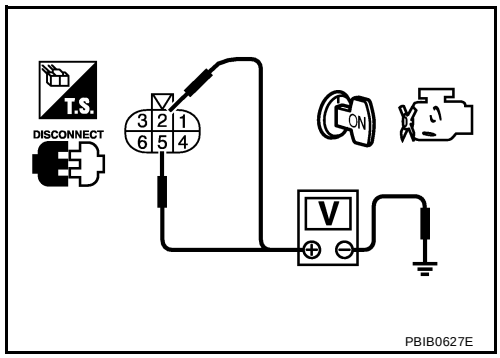


4. Check voltage between IACV-AAC valve terminals 2, 5 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.



3. DETECT MALFUNCTIONING PART

Check the harness for open or short between IACV-AAC valve and ECM relay.

>> Repair harness or connectors.

4. CHECK IACV-AAC VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminals and IACV-AAC valve terminals as follows. Refer to Wiring Diagram.

ECM terminal	IACV-AAC valve terminal
6	1
7	4
15	3
16	6

Continuity should exist.

4. Also check harness for short to ground and short to power.

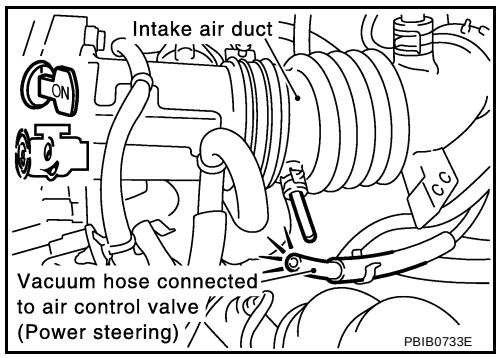
OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK AIR CONTROL VALVE (POWER STEERING) OPERATION-I

1. Reconnect ECM harness connector and IACV-AAC valve harness connector.
2. Disconnect vacuum hose connected to air control valve (Power steering) at intake air duct.
3. Start engine and let it idle.
4. Check vacuum hose for vacuum existence.

Vacuum slightly exists or does not exist.



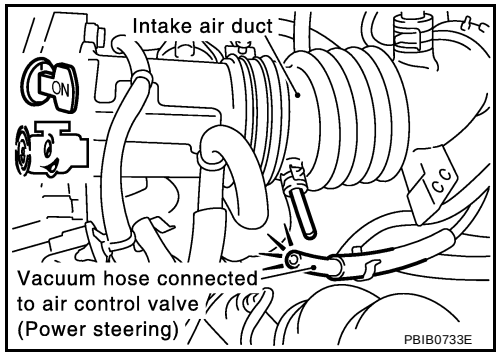
OK or NG

OK >> GO TO 6.
NG >> Replace air control valve (Power steering).

6. CHECK AIR CONTROL VALVE (POWER STEERING) OPERATION-II

Check vacuum hose for vacuum existence when steering wheel is turned.

Vacuum should exist.

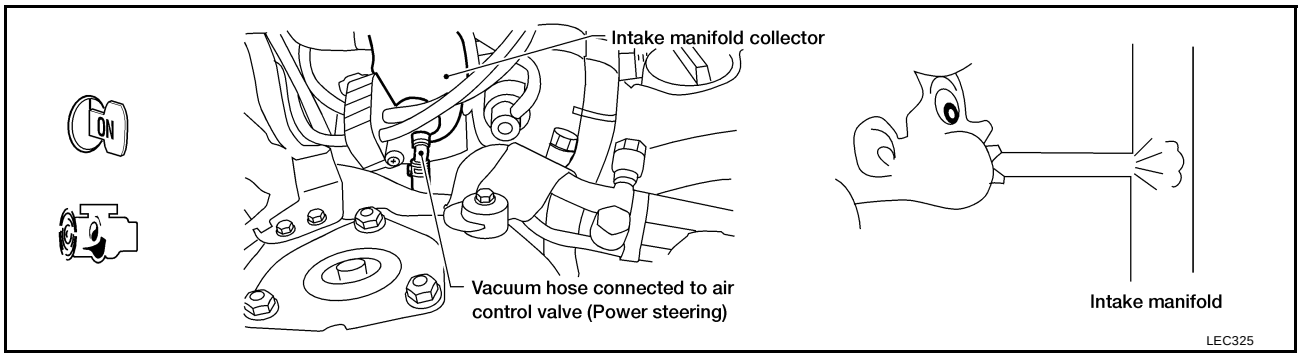


OK or NG

OK >> GO TO 9.
NG >> GO TO 7.

7. CHECK VACUUM PORT

1. Stop engine.
2. Disconnect vacuum hose connected to air control valve (Power steering) at the vacuum port.
3. Blow air into vacuum port.
4. Check that air flows freely.



OK or NG

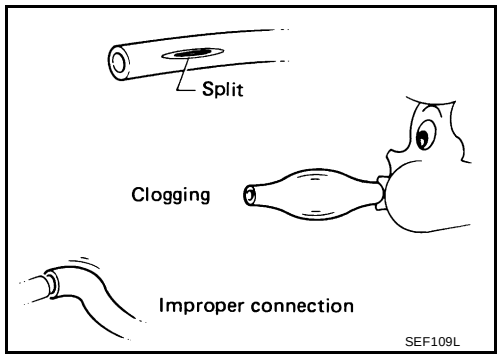
OK >> GO TO 8.
NG >> Repair or clean vacuum port.

8. CHECK VACUUM HOSES AND TUBES

1. Disconnect vacuum hoses between air control valve (Power steering) and vacuum port, air control valve (Power steering) and intake air duct.
2. Check the hoses and tubes for cracks, clogging, improper connection or disconnection.

OK or NG

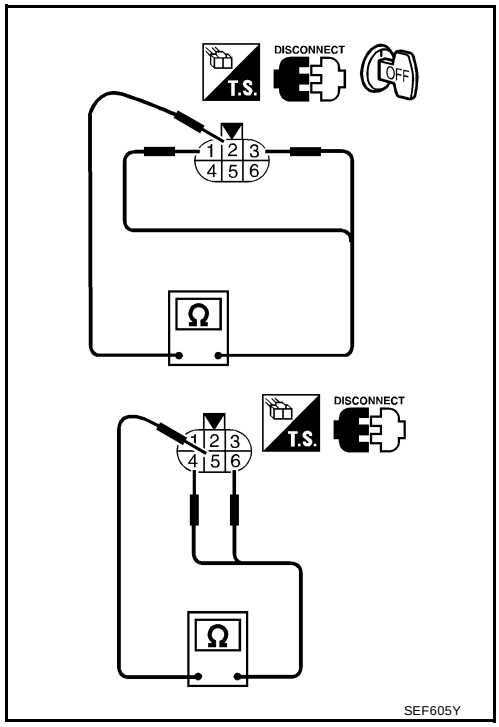
OK >> GO TO 9.
NG >> Repair hoses or tubes.



9. CHECK IACV-AAC VALVE-I

1. Disconnect IACV-AAC valve harness connector.
2. Check resistance between IACV-AAC valve terminal 2 and terminals 1, 3, terminal 5 and terminals 4, 6.

Resistance: 20 - 24 Ω [at 20°C (68°F)]

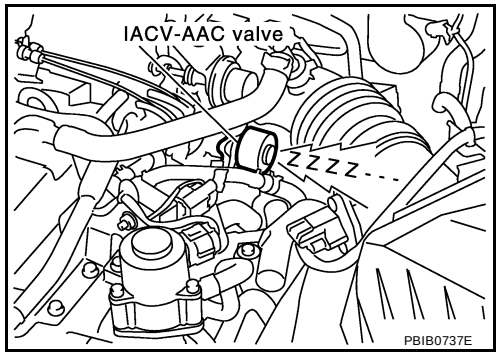


OK or NG

OK >> GO TO 10.
NG >> GO TO 11.

10. CHECK IACV-AAC VALVE-II

1. Reconnect IACV-AAC valve harness connector and ECM harness connector.
2. Turn ignition switch “ON” and “OFF”, and ensure the IACV-AAC valve makes operating sound according to the ignition switch position.



OK or NG

OK >> GO TO 12.
NG >> GO TO 11.

11. REPLACE IACV-AAC VALVE

1. Replace IACV-AAC valve assembly.
2. Perform EC-622, "Idle Air Volume Learning" .

Is the result CMPLT or INCMP?

CMPLT or INCMP

CMPLT >> **INSPECTION END**
INCMP >> Follow the construction of “Idle Air Volume Learning”.

12. CHECK TARGET IDLE SPEED

1. Turn ignition switch “OFF”.
2. Reconnect all harness connectors and vacuum hoses.
3. Start engine and warm it up to normal operating temperature.
4. Also warm up transmission to normal operating temperature.

- For models with CONSULT-II, drive vehicle until “FUEL TEMP SE” in “DATA MONITOR” mode of “A/T” system indicates less than 0.9 V.
- For models without CONSULT-II, drive vehicle for 10 minutes.

5. Check target idle speed.

800±50 rpm (in “P” or “N” position)

OK or NG

OK >> GO TO 13.
NG >> Perform EC-622, "Idle Air Volume Learning" .

13. CHECK INTERMITTENT INCIDENT

Refer to EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Removal and Installation

UBS001YU

IACV-AAC VALVE

Refer to EM-15, "OUTER COMPONENT PARTS" .

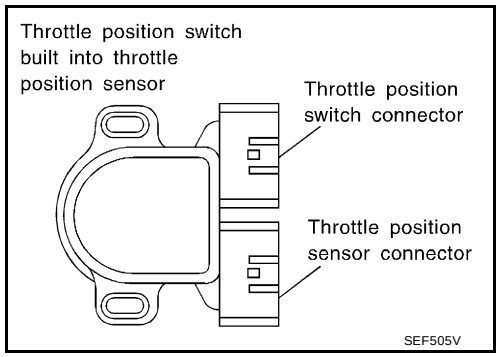
DTC P0510 CTP SWITCH

PFP:22620

Component Description

UBS001YV

A closed throttle position switch and wide open throttle position switch are built into the throttle position sensor unit. The wide open throttle position switch is used only for A/T control.
When the throttle valve is in the closed position, the closed throttle position switch sends a voltage signal to the ECM. The ECM only uses this signal to open or close the EVAP canister purge control valve when the throttle position sensor is malfunctioning.



On Board Diagnosis Logic

UBS001YW

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0510	● Battery voltage from the closed throttle position switch is sent to ECM with the throttle valve opened.	● Harness or connectors (The closed throttle position switch circuit is shorted.) ● Closed throttle position switch ● Throttle position sensor

DTC Confirmation Procedure

UBS001YX

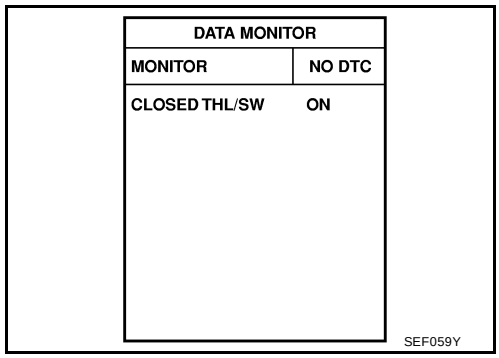
CAUTION:
Always drive vehicle at a safe speed.

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”, wait at least 10 seconds and then start engine.
3. Select “A/T”, then select “CLOSED THL/SW” in “DATA MONITOR” mode with CONSULT-II.
4. Check the signal under the following conditions.

Condition	Signal indication
Throttle valve: Idle position	ON
Throttle valve: Slightly open	OFF

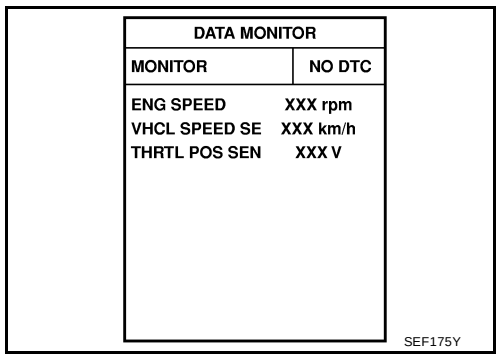


If the result is NG, go to EC-983, "Diagnostic Procedure" .
If OK, go to following step.

5. Select “ENGINE”, then select “DATA MONITOR” mode with CONSULT-II.

6. Drive the vehicle for at least 5 consecutive seconds under the following condition.

THRTL POS SEN	More than 2.3V
VHCL SPEED SE	More than 4 km/h (2 MPH)
Selector lever	Suitable position
Driving location	Driving vehicle uphill (Increased engine load) will help maintain the driving conditions required for this test.



7. If 1st trip DTC is detected, go to EC-983, "Diagnostic Procedure" .

Overall Function Check

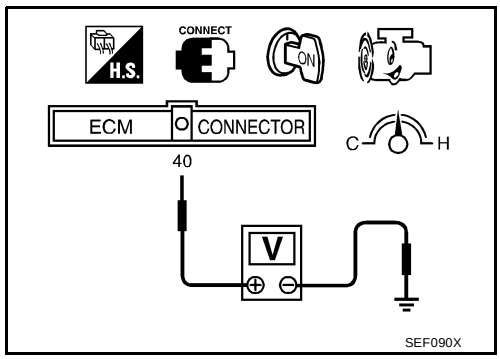
UBS001YY

Use this procedure to check the overall function of the closed throttle position switch circuit. During this check, a 1st trip DTC might not be confirmed.

WITHOUT CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Check the voltage between ECM terminal 40 (Closed throttle position switch signal) and ground under the following conditions.

Condition	Voltage
At idle	Battery voltage
At 2,000 rpm	Approximately 0V

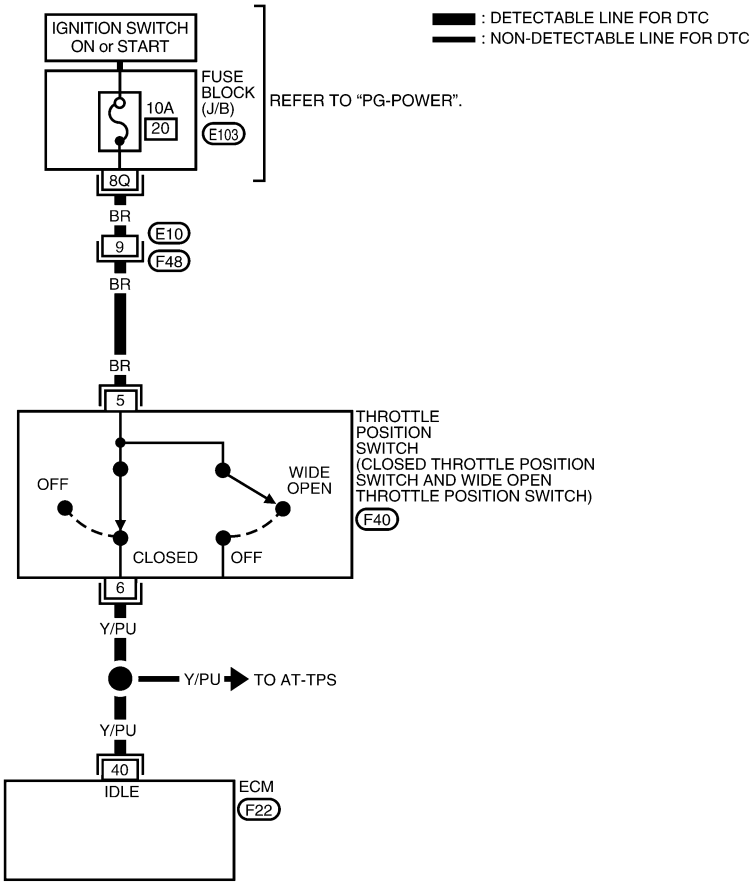


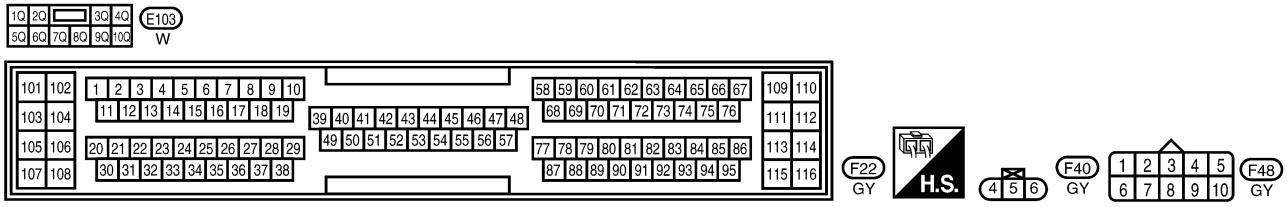
3. If NG, go to EC-983, "Diagnostic Procedure" .

Wiring Diagram

UBS001YZ

EC-TP/SW-01





BBWA0169E

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
40	Y/PU	THROTTLE POSITION SWITCH (CLOSED POSITION)	ENGINE RUNNING WITH ACCELERATOR PEDAL FULLY RELEASED UNDER WARM-UP CONDITION	BATTERY VOLTAGE
			IGN ON WITH ACCELERATOR PEDAL DEPRESSED	APPROX. 0V

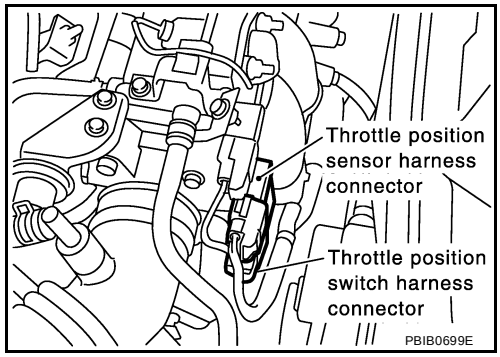
SEF582Y

Diagnostic Procedure

UBS001Z0

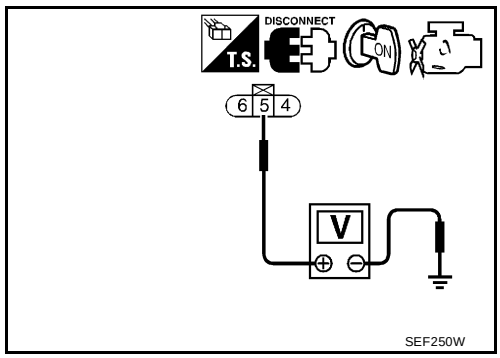
1. CHECK CLOSED THROTTLE POSITION SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect throttle position switch harness connector.
3. Turn ignition switch “ON”.



4. Check voltage between throttle position switch terminal 5 and engine ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E9, F47
- 10A fuse
- Harness for open or short between throttle position switch and fuse

>> Repair harness or connectors.

3. CHECK CLOSED THROTTLE POSITION SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 40 and throttle position switch terminal 4. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the harness for open or short between ECM and throttle position switch.

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK IGNITION TIMING AND ENGINE IDLE SPEED

Check the following items. Refer to EC-652, "Basic Inspection" .

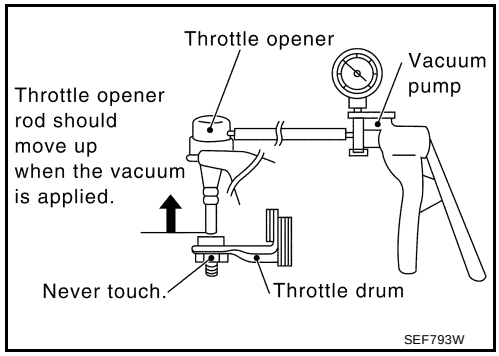
Items	Specifications
Ignition timing	9° ± 5° BTDC
Idle speed	800 ± 50 rpm (in "P" or "N" position)

Models with CONSULT-II>>GO TO 6.
Models without CONSULT-II>>GO TO 7.

6. CHECK THROTTLE POSITION SWITCH

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF”.
3. Remove vacuum hose connected to throttle opener.
4. Connect suitable vacuum hose to vacuum pump and the throttle opener.
5. Apply vacuum [more than –40.0 kPa (–300 mmHg, –11.81 inHg)] until the throttle drum becomes free from the rod of the throttle opener.
6. Turn ignition switch “ON”.
7. Select “A/T” then select “DATA MONITOR” mode with CONSULT-II.
8. Check indication of “CLSD THL/P SW” under the following conditions.
   Measurement must be made with throttle position switch installed in vehicle.



Throttle valve conditions	CLSD THL/ SW
Completely closed	ON
Partially open or completely open	OFF

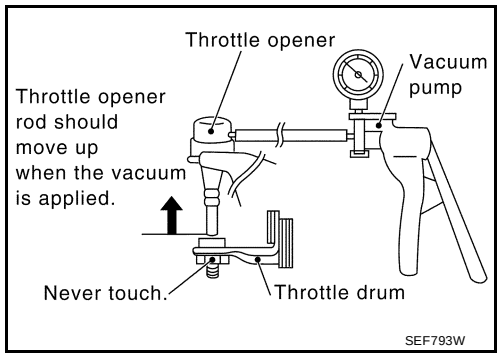
OK or NG

OK (With CONSULT-II)>>GO TO 9.
OK (Without CONSULT-II)>>GO TO 10.
NG >> GO TO 8.

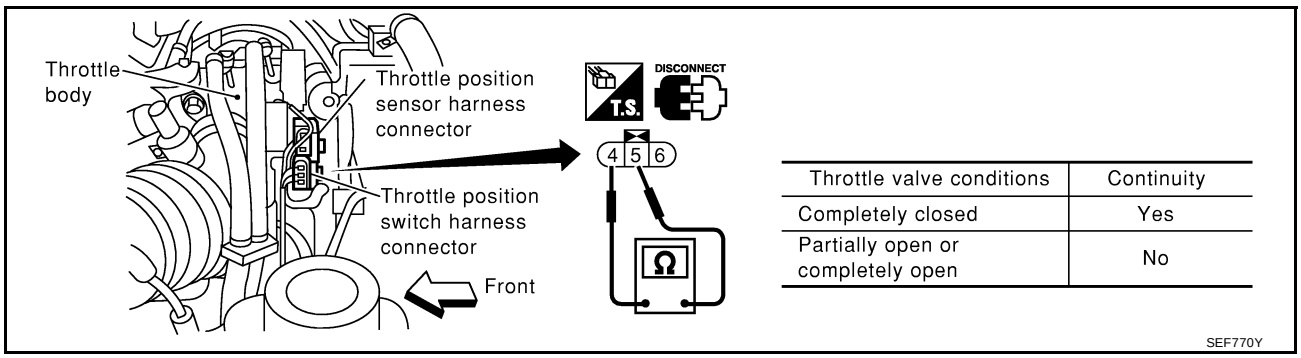
7. CHECK THROTTLE POSITION SWITCH

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF”.
3. Remove vacuum hose connected to throttle opener.
4. Connect suitable vacuum hose to vacuum pump and the throttle opener.
5. Apply vacuum [more than –40.0 kPa (–300 mmHg, –11.81 inHg)] until the throttle drum becomes free from the rod of the throttle opener.
6. Disconnect closed throttle position switch harness connector.



7. Check continuity between closed throttle position switch terminals 4 and 5 under the following conditions. Resistance measurement must be made with throttle position switch installed in vehicle.



Throttle valve conditions	Continuity
Completely closed	Yes
Partially open or completely open	No

OK or NG

OK (With CONSULT-II)>>GO TO 9.
OK (Without CONSULT-II)>>GO TO 10.
NG >> GO TO 8.

8. ADJUST THROTTLE POSITION SWITCH

Check the following items. Refer to EC-652, "Basic Inspection" .

Items	Specifications
Ignition timing	9° ± 5° BTDC
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.05 mm (0.0020 in): ON 0.15 mm (0.0059 in): OFF
Target idle speed	800 ± 50 rpm (in "P" or "N" position)

Is it possible to adjust closed throttle position switch?

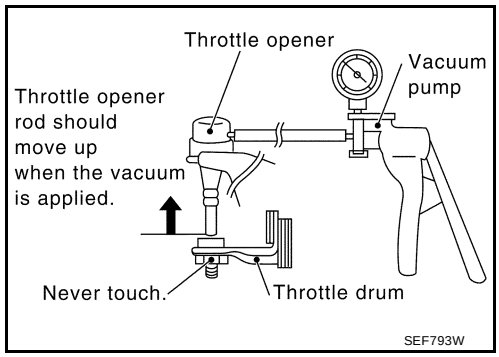
Yes or No

Yes (With CONSULT-II)>>GO TO 9.
Yes (Without CONSULT-II)>>GO TO 10.
No >> Replace throttle position switch.

9. CHECK THROTTLE POSITION SENSOR

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine (ignition switch OFF).
3. Remove the vacuum hose connected to the throttle opener.
4. Connect suitable vacuum hose to the vacuum pump and the opener.
5. Apply vacuum [more than –40.0 kPa (–300 mmHg, –11.81 inHg)] until the throttle drum becomes free from the rod of the throttle opener.
6. Turn ignition switch ON.
7. Select “DATA MONITOR” mode with CONSULT-II.
8. Check voltage of “THRTL POS SEN” under the following conditins.
   Voltage measurement must be made with throttle position sensor installed in vehicle.



Throttle valve conditions	Voltage
Completely	0.15 - 0.85V
Partially	Between (a) and (b)
Completely open (b)	3.5 - 4.7 V

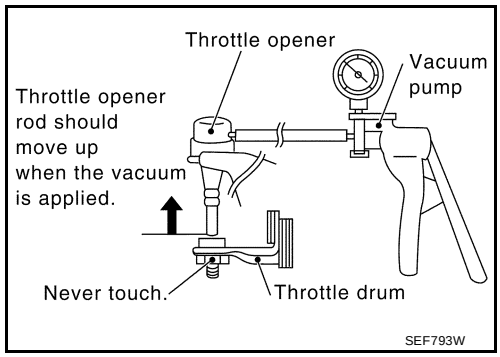
OK or NG

OK >> GO TO 11.
NG >> Replace throttle position sensor.

10. CHECK THROTTLE POSITION SENSOR

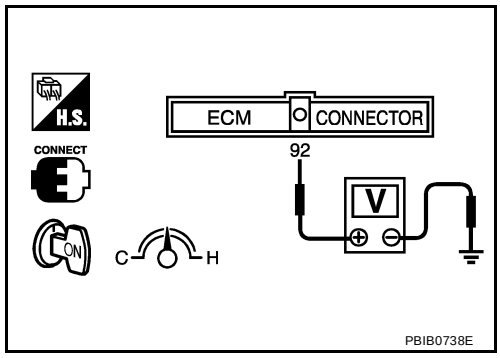
Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine (ignition switch OFF).
3. Remove the vacuum hose connected to the throttle opener.
4. Connect suitable vacuum hose to the vacuum pump and the opener.
5. Apply vacuum [more than –40.0 kPa (–300 mmHg, –11.81 inHg)] until the throttle drum becomes free from the rod of the throttle opener.
6. Turn ignition switch ON.



7. Check voltage between ECM terminal 92 (Throttle position sensor signal) and ground.
Voltage measurement must be made with throttle position sensor installed in vehicle.

Throttle valve conditions	Voltage
Completely closed (a)	0.15 - 0.85V
Partially open	Between (a) and (b)
Completely open (b)	3.5 - 4.7V



OK or NG

OK >> GO TO 11.
NG >> Replace throttle position sensor.

11. CHECK INTERMITTENT INCIDENT

Refer to EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Removal and Installation

UBS001Z1

THROTTLE POSITION SENSOR

Refer to EM-15, "OUTER COMPONENT PARTS" .

DTC P0600 A/T COMMUNICATION LINE

PFP:23710

System Description

UBS001Z2

These circuit lines are used to control the smooth shifting up and down of A/T during the hard acceleration/ deceleration. Voltage signals are exchanged between ECM and TCM (Transmission control module).

On Board Diagnosis Logic

UBS001Z3

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0600*	● ECM receives incorrect signal from TCM (Transmission control module) continuously.	● Harness or connectors [The circuit between ECM and TCM (Transmission control module) is open or shorted.]

*: This DTC can be detected only by “DATA MONITOR (AUTO TRIG)” with CONSULT-II.

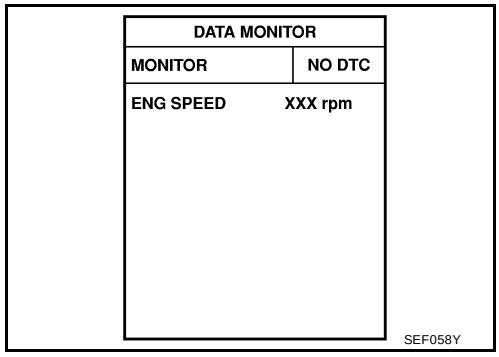
DTC Confirmation Procedure

UBS001Z4

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10.5V with ignition switch “ON”.

WITH CONSULT-II

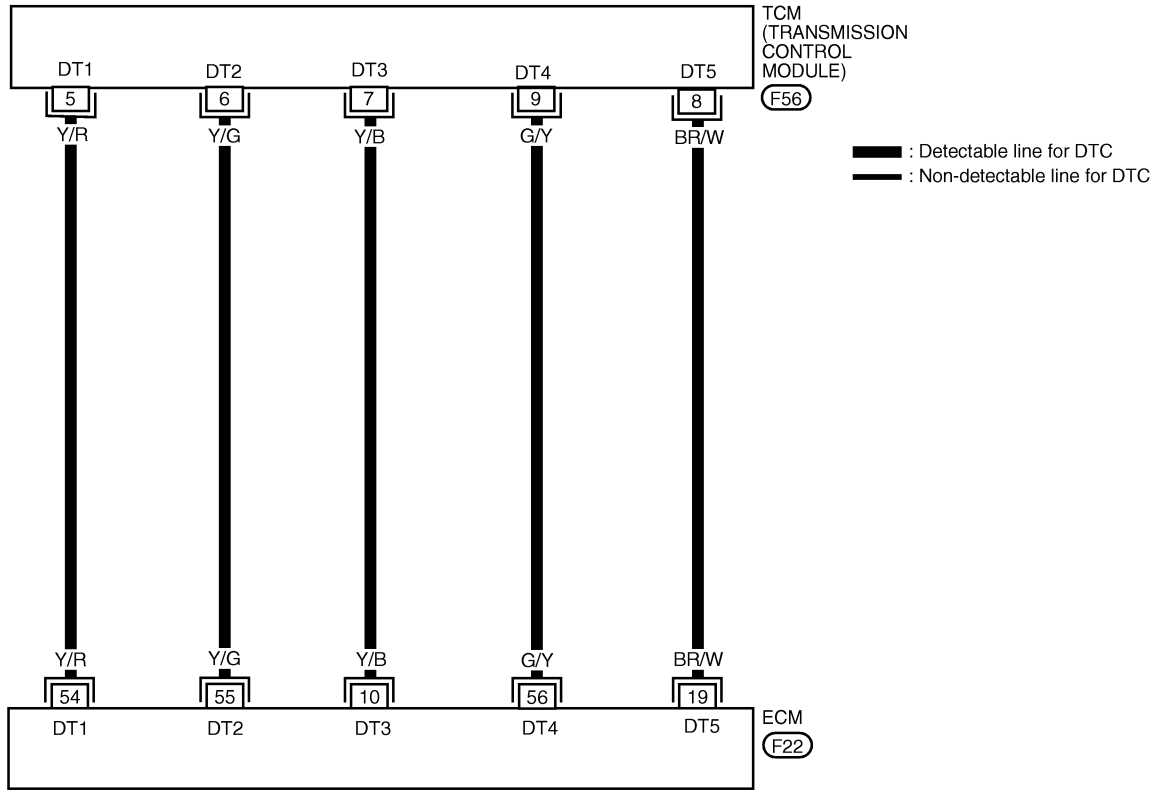
1. Turn ignition switch “ON”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 10 seconds.
4. If DTC is detected, go to EC-990, "Diagnostic Procedure" .

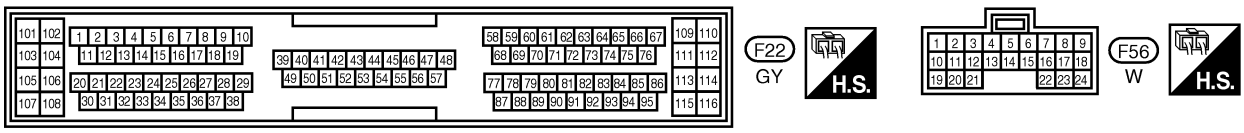


Wiring Diagram

UBS001Z5

EC-AT/C-01





LEC376

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
10	Y/B	A/T SIGNAL NO. 3	ENGINE RUNNING AT IDLE SPEED	APPROX. 0 - 1.0V
19	BR/W	A/T SIGNAL NO. 5	ENGINE RUNNING AT IDLE SPEED	APPROX. 8V
54	Y/R	A/T SIGNAL NO. 1	ENGINE RUNNING AT IDLE SPEED	APPROX. 0 - 1.0V
55	Y/G	A/T SIGNAL NO. 2	ENGINE RUNNING AT IDLE SPEED	APPROX. 0 - 1.0V
56	G/Y	A/T SIGNAL NO. 4	ENGINE RUNNING AT IDLE SPEED	APPROX. 0 - 1.0V

SEF583Y

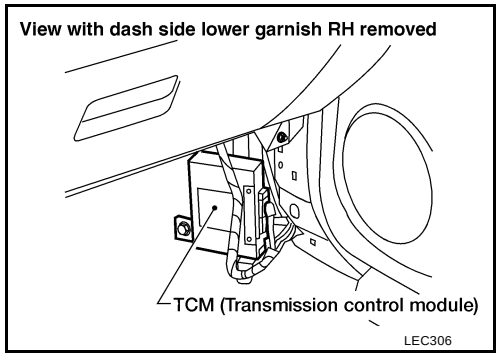
Diagnostic Procedure

UBS001Z6

1. CHECK INPUT SIGNAL CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector and TCM (Transmission control module) harness connector.
3. Check harness continuity between ECM terminal 10 and TCM terminal 7, ECM terminal 19 and TCM terminal 8, ECM terminal 54 and terminal 5, ECM terminal 55 and TCM terminal 6, ECM terminal 56 and TCM terminal 9.
   Refer to Wiring Diagram.

   Continuity should exist.



OK or NG

OK >> GO TO 2.
NG >> Repair harness or connectors.

2. CHECK INPUT SIGNAL CIRCUIT

1. Check harness continuity between ECM terminal 10 and ground, ECM terminal 19 and ground, ECM terminal 54 and ground, ECM terminal 55 and ground, ECM terminal 56 and ground.
   Refer to Wiring Diagram.

   Continuity should not exist.

2. Also check harness for short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair short to ground or short to power in harness.

3. CHECK INTERMITTENT INCIDENT

Refer to EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

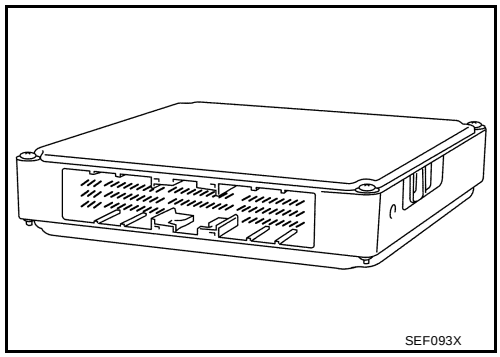
DTC P0605 ECM

PFP:23710

Component Description

UBS001Z7

The ECM consists of a microcomputer and connector for signal input and output and for power supply. The ECM controls the engine.


SEF093X

On Board Diagnosis Logic

UBS001Z8

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0605	● ECM calculation function is malfunctioning.	● ECM

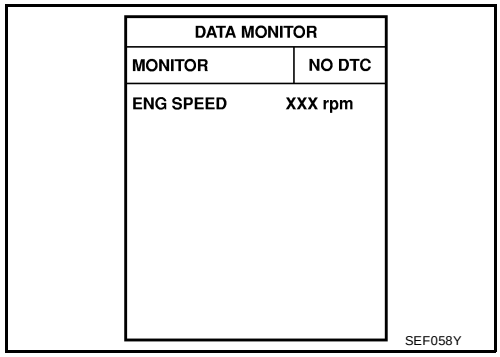
DTC Confirmation Procedure

UBS001Z9

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch “ON”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine.
4. Run engine for at least 30 seconds at idle speed.
5. If 1st trip DTC is detected, go to EC-992, "Diagnostic Procedure"
.



SEF058Y

WITH GST

Follow the procedure “With CONSULT-II” above.

Diagnostic Procedure

UBS001ZA

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-991 .
5. Is the 1st trip DTC P0605 displayed again?

With GST

1. Turn ignition switch “ON”.
2. Select MODE 4 with GST.
3. Touch “ERASE”.
4. Perform “DTC Confirmation Procedure”.
   See EC-991 .
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 NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs. Refer to EC-639, "NVIS (Nissan Vehicle Immobilizer System — NATS)" .
3. Perform EC-622, "Idle Air Volume Learning" ,

Which is the result CMPLT or INCMP?

CMPLT or INCMP

CMPLT >> **INSPECTION END**
INCMP >> Follow the construction of “Idle Air Volume Learning”.

DTC P1031, P1032 A/F SENSOR HEATER

PFP:22693

Description

UBS001ZB

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE) 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

UBS001ZC

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
A/F S1 HTR (B1)	● Engine speed: Idle	Approx. 70%

On Board Diagnosis Logic

UBS001ZD

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1031 P1032	● The current amperage in the A/F sensor 1 heater circuit is out of the normal range. (An excessively low (P1031) or high (P1032) voltage signal is sent to ECM through the A/F sensor 1 heater.)	● Harness or connectors (The A/F sensor 1 heater circuit is open or shorted.) ● A/F sensor 1 heater

DTC Confirmation Procedure

UBS001ZE

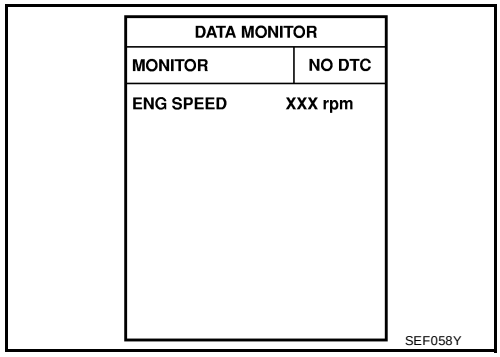
NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is between 10.5V and 16V at idle.

With CONSULT-II

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 10 seconds at idle speed.
3. If 1st trip DTC is detected, go to EC-995, "Diagnostic Procedure" .



WITH GST

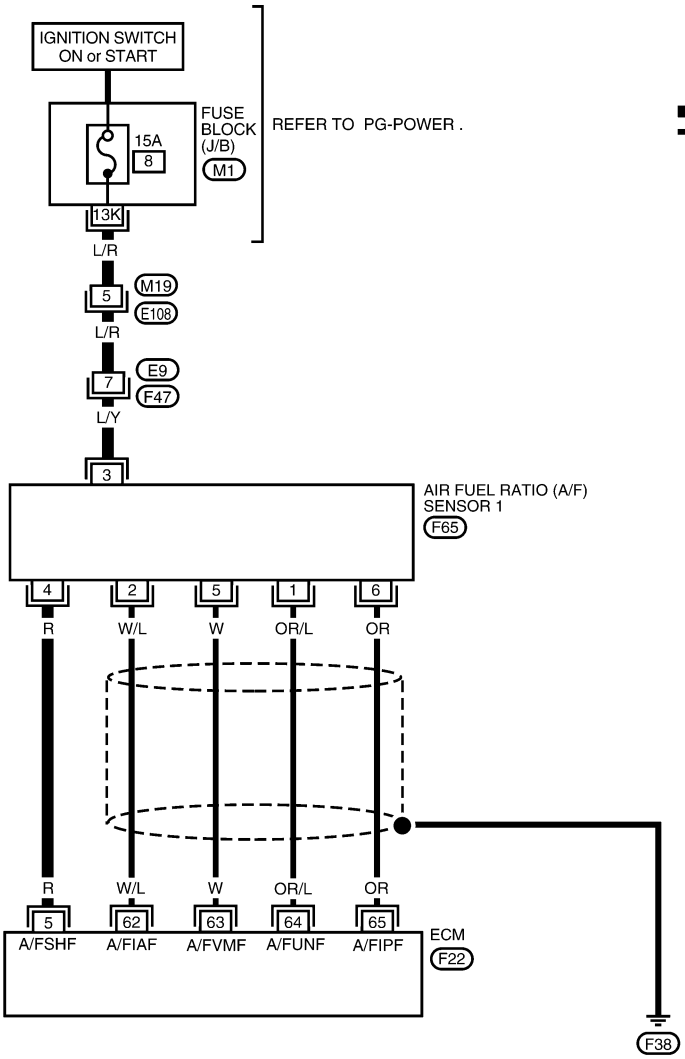
1. Start engine and run it for at least 10 seconds at idle speed.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Start engine and run it for at least 10 seconds at idle speed.
4. Select “MODE 3” with GST.
5. If DTC is detected, go to EC-995, "Diagnostic Procedure" .

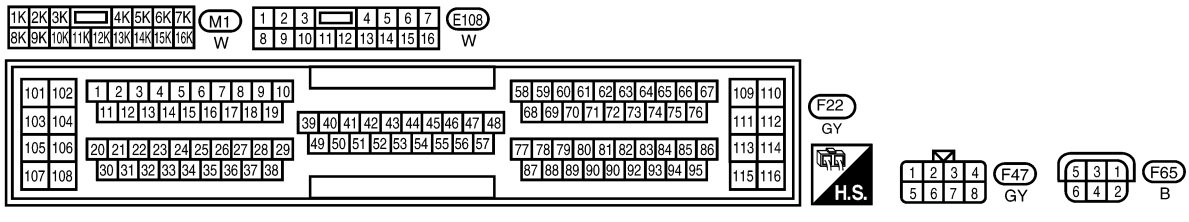
- **When using GST, “DTC Confirmation Procedure” should be performed twice as much as when using CONSULT-II because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II is recommended.**

Wiring Diagram

UBS001ZF

EC-A/FH-01





BBWA0555E

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
5	R	A/F SENSOR 1 HEATER	ENGINE RUNNING AT IDLE SPEED AFTER WARMING UP TO NORMAL OPERATING TEMPERATURE	APPROX. 5V

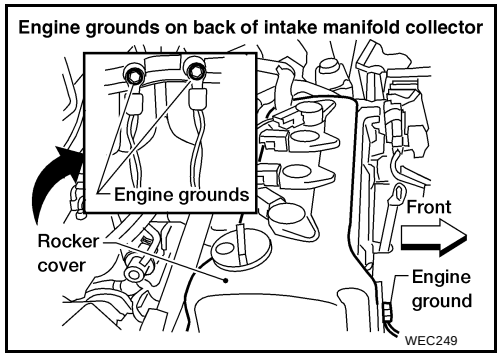
SEF610Z

Diagnostic Procedure

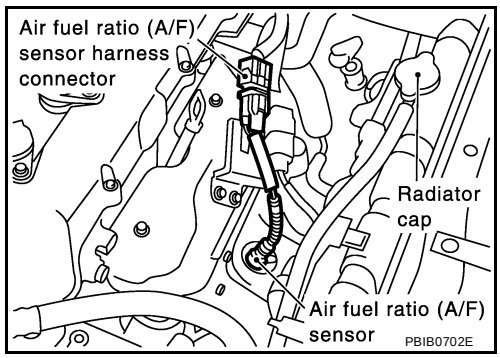
UBS001ZG

1. CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.



3. Disconnect air fuel ratio (A/F) sensor 1 harness connector.
4. Turn ignition switch “ON”.

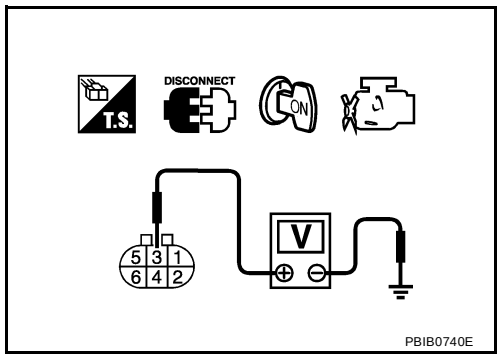


5. Check voltage between A/F sensor 1 terminal 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 3.
NG >> GO TO 2.



2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M19, E109
- Harness connectors E9, F47
- Fuse block (J/B) connector M1
- 15A fuse
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

3. CHECK A/F SENSOR 1 OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 5 and A/F sensor 1 terminal 4. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK A/F SENSOR 1 HEATER

Refer to EC-996, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace A/F sensor 1.

5. CHECK INTERMITTENT INCIDENT

Perform EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> Replace A/F sensor 1.
NG >> Repair or replace.

Component Inspection

UBS001ZH

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)

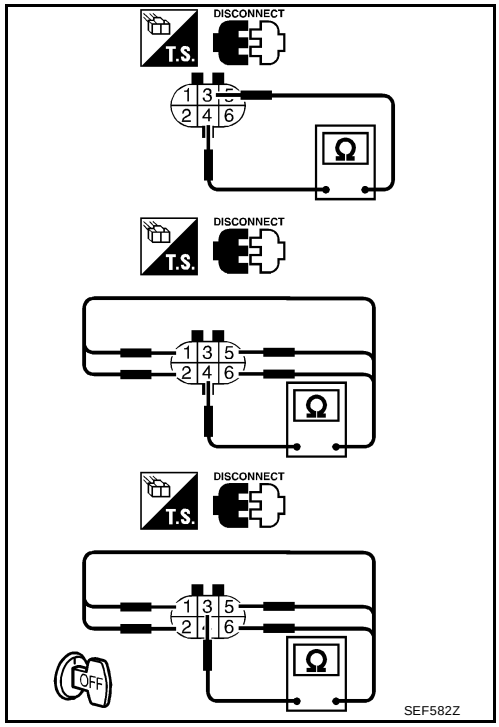
Check continuity between terminals 3 and 1, 2, 5, 6, terminals 4 and 1, 2, 5, 6.

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

UBS001ZI

AIR FUEL RATIO SENSOR HEATER

Refer to EM-15, "Removal and Installation" .

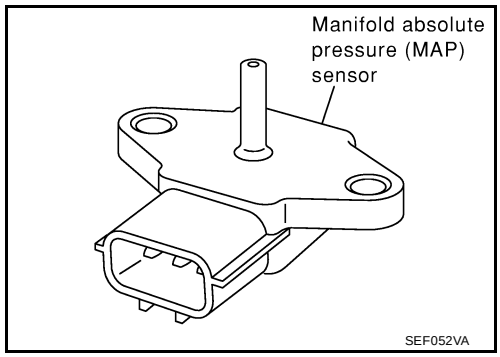
DTC P1103, P1104, P1108 MAP SENSOR

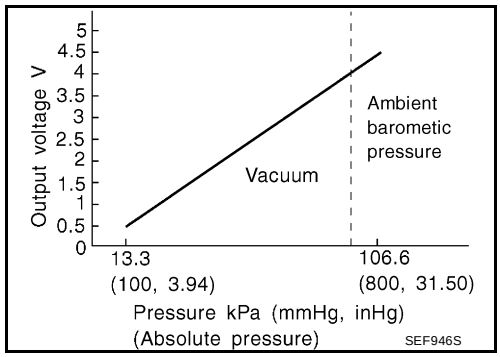
PFP:25085

Component Description

UBS001ZJ

The manifold absolute pressure (MAP) sensor detects intake manifold pressure and sends the voltage signal to the ECM. As the pressure increases, the voltage rises.





On Board Diagnosis Logic

UBS001ZK

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1103 P1108	An excessively low (P1103) or high (P1108) voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Manifold absolute pressure sensor
P1104	An improper voltage signal from the sensor is sent to ECM under the specific driving condition.	● Harness or connectors (The sensor circuit is open or shorted.) ● Manifold absolute pressure sensor ● Vacuum hose

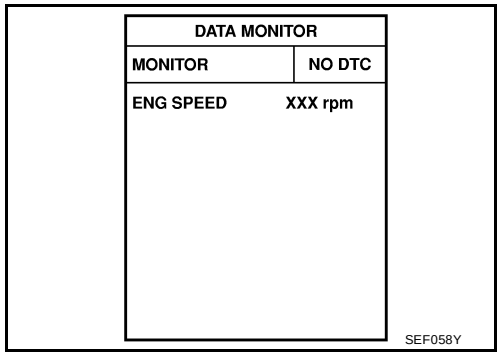
DTC Confirmation Procedure

UBS001ZL

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”, wait at least 10 seconds and then turn it “ON”.
3. Select “DATA MONITOR” mode with CONSULT-II.
4. Start engine and let it idle for at least 10 seconds.
5. If 1st trip DTC is detected, go to EC-1000, "Diagnostic Procedure" .
   If 1st trip DTC is not detected, go to the next step.
6. Drive vehicle for at least 10 seconds under conditions similar to the freeze frame data.
   TESTING CONDITION:
   The condition in which “B/FUEL SCHDL” indication is more than that of the freeze frame data is advised.



7. If 1st trip DTC is detected, go to EC-1000, "Diagnostic Procedure" .

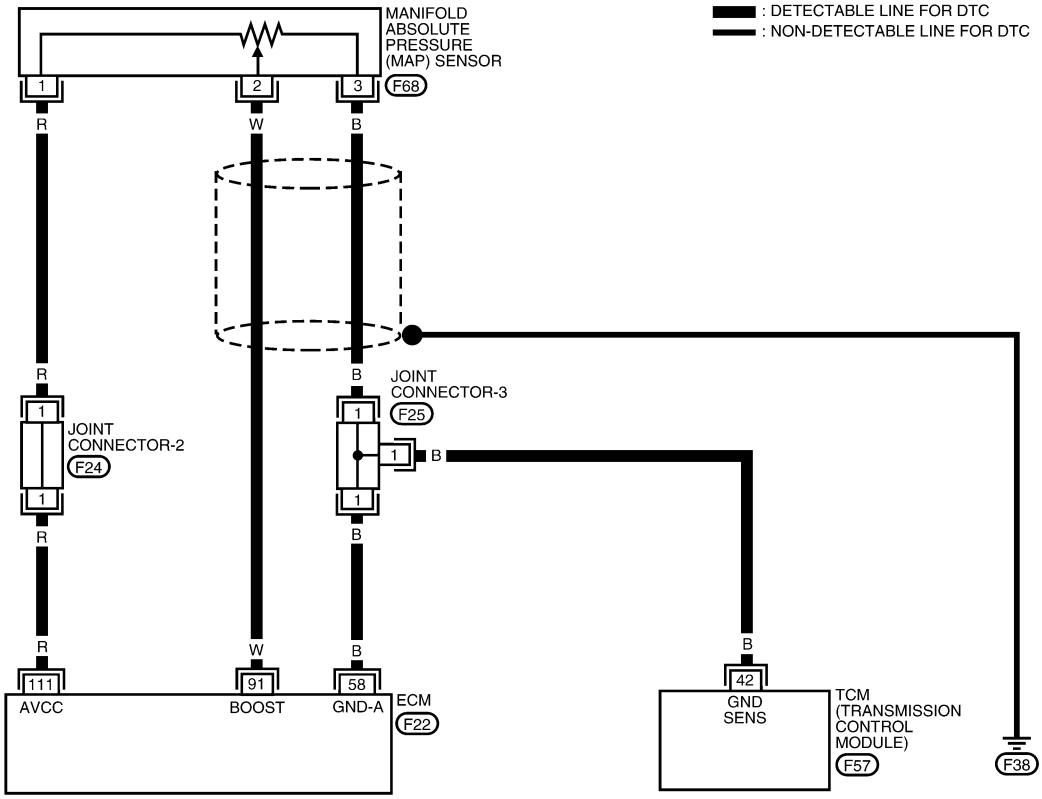
WITH GST

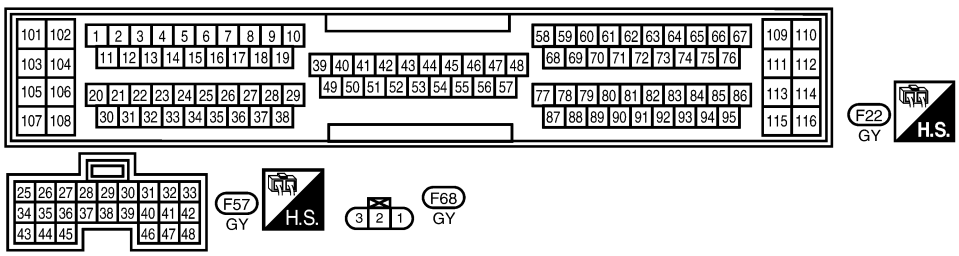
Follow the procedure “With CONSULT-II” above.

Wiring Diagram

UBS001ZM

EC-MAP-01





REFER TO THE FOLLOWING.
F24, F25 - JOINT CONNECTOR

BBWA0170E

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
58	B	SENSOR'S GROUND	IGN ON	APPROX. 0V
91	W	MAP SENSOR	IGN ON	APPROX. 1.3V
111	R	SENSOR'S POWER SUPPLY	IGN ON	APPROX. 5V

SEF607Z

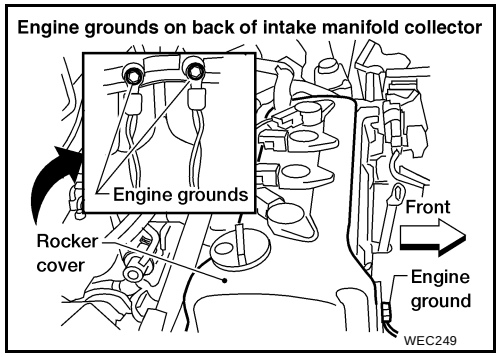
Diagnostic Procedure

UBS001ZN

1. RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

>> GO TO 2.



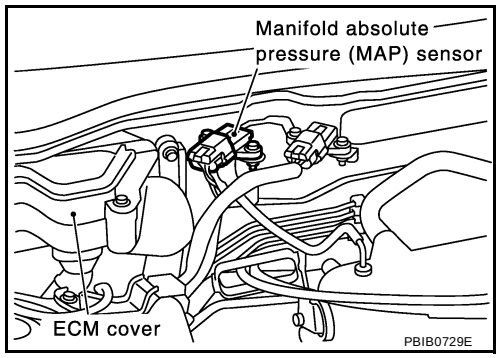
2. CHECK CONNECTOR

1. Disconnect manifold absolute pressure (MAP) sensor harness connector.
2. Check MAP sensor harness connector for water.

Water should not exist.

OK or NG

OK >> GO TO 3.
NG >> Repair or replace harness connector.



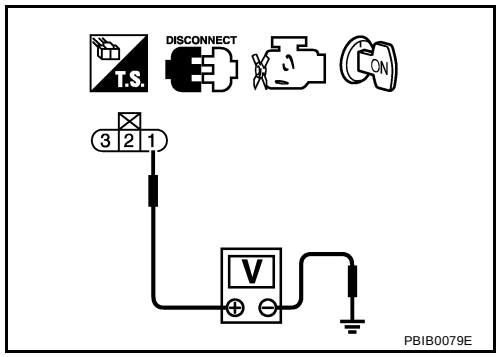
3. CHECK POWER SUPPLY

1. Turn ignition switch “ON”.
2. Check voltage between MAP sensor terminal 1 and engine 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.

- Joint connector-2
- Harness for open or short between ECM and MAP sensor

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 GROUND CIRCUIT

1. Turn ignition switch “OFF”.
2. Check harness continuity between MAP sensor terminal 3 and engine ground.
   Refer to Wiring Diagram.

   Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Joint connector-3
- Harness for open or short between TCM and MAP sensor
- Harness for open or short between ECM and MAP sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 91 and MAP sensor terminal 2.
   Refer to Wiring Diagram.

   Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

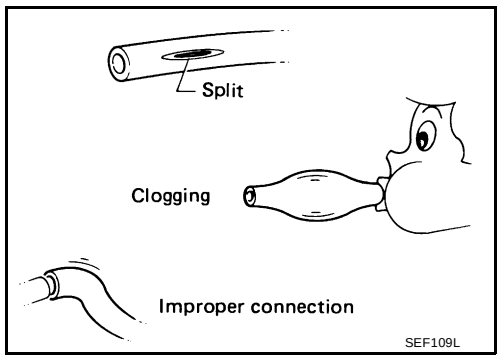
OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK HOSE

1. Remove hose connected to MAP sensor.
2. Check hose for clogging, cracks or improper connection.

OK or NG

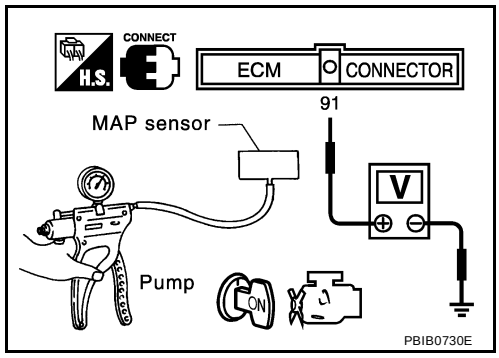
OK >> GO TO 9.
NG >> Replace hose.



9. CHECK MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR

1. Remove MAP sensor with its harness connector connected.
2. Install a vacuum pump to MAP sensor.
3. Turn ignition switch “ON” and check output voltage between ECM terminal 91 and engine ground under the following conditions.

Applied vacuum kPa (mmHg, inHg)	Voltage V
Not applied	1.8 - 4.8
-26.7 (-200, -7.87)	1.0 to 1.4V lower than above value



CAUTION:

- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply below −93.3 kPa (–700 mmHg, –27.56 inHg) or over 101.3 kPa (760 mmHg, 29.92 inHg) of pressure.**

OK or NG

OK >> GO TO 10.
NG >> Replace MAP sensor.

10. CHECK INTERMITTENT INCIDENT

Perform EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Removal and Installation

UBS001ZO

MANIFOLD ABSOLUTE PRESSURE SENSOR

Refer to EM-15, "Removal and Installation" .

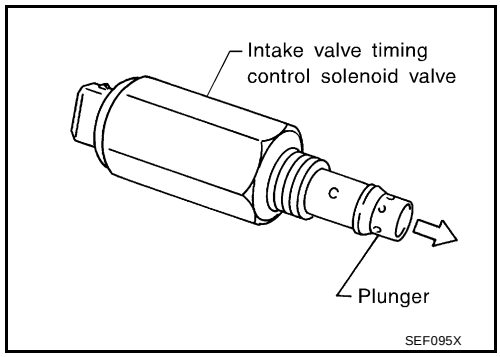
DTC P1111 IVT CONTROL SOLENOID VALVE

PFP:23796

Component Description

UBS001ZP

The valve timing control system is utilized to control intake valve opening and closing timing. Engine coolant temperature signals, engine speed and throttle position are used to determine intake valve timing.
The intake camshaft sprocket position is regulated by oil pressure controlled by the intake valve timing control.
When ECM sends ON signal to intake valve timing control solenoid valve, oil pressure is transmitted to camshaft sprocket. Then, intake side camshaft is advanced.



Operation

UBS001ZQ

Engine operating condition				Intake valve timing control solenoid valve	Intake valve opening and closing time	Valve overlap
Engine coolant temperature	Engine speed	B/FUEL SCHDL	Neutral switch			
15°C (59°F) - 55°C (131°F)	1,100 - 4,200 rpm	Above 0 msec	OFF	ON	Advance	Increased
Above 55°C (131°F)		Above 6 msec				
Conditions other than those above				OFF	Normal	Normal

CONSULT-II Reference Value in Data Monitor Mode

UBS001ZR

MONITOR ITEM	CONDITION		SPECIFICATION
INT/V TIM SOL	● Engine: After warming up	Idle	OFF
		Revving engine with full throttle opening (Under 4,200 rpm)	ON

On Board Diagnosis Logic

UBS001ZS

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1111	● An improper voltage signal is entered to ECM through intake valve timing control solenoid valve.	● Harness or connectors (The intake valve timing control solenoid valve circuit is open or shorted.) ● Intake valve timing control solenoid valve

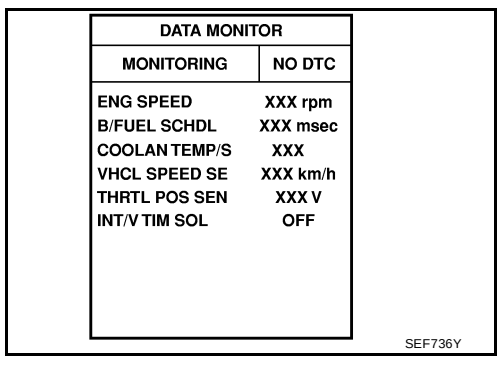
DTC Confirmation Procedure

UBS001ZT

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-1006, "Diagnostic Procedure" .



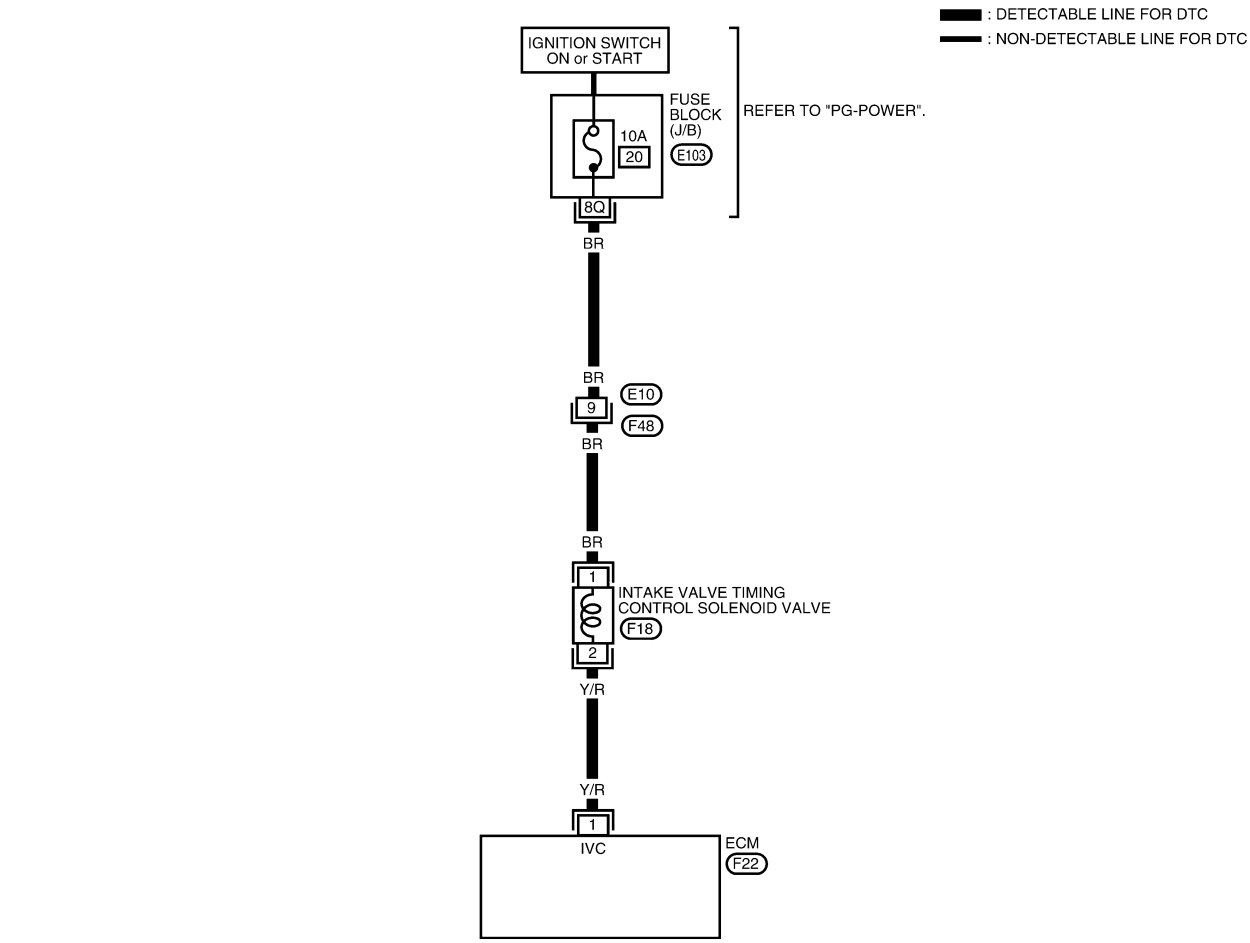
⊗ WITHOUT CONSULT-II

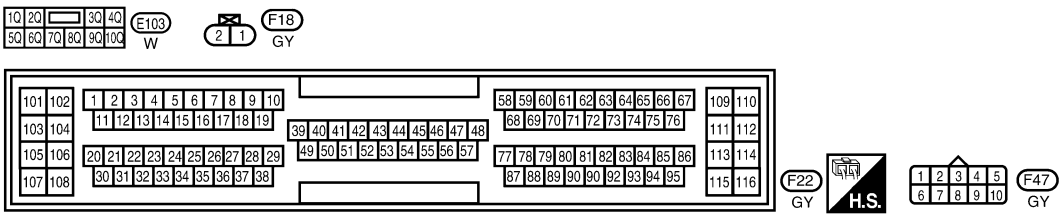
Follow the procedure “With CONSULT-II” above.

Wiring Diagram

UBS001ZU

EC-IVC/V-01





BBWA0171E

PCM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE PCM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE PCM'S TRANSISTOR. USE A GROUND OTHER THAN PCM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
1	Y/R	INTAKE VALVE TIMING CONTROL SOLENOID VALVE	SOLENOID VALVE IS OPERATING AT ENGINE RUNNING UNDER WARM-UP CONDITION	APPROX. 0V
			SOLENOID VALVE IS NOT OPERATING AT ENGINE RUNNING UNDER WARM-UP CONDITION	BATTERY VOLTAGE

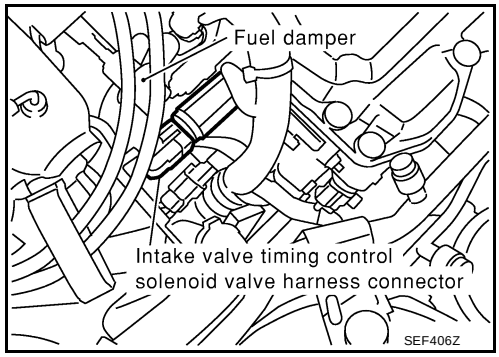
SEF737Y

Diagnostic Procedure

UBS001ZV

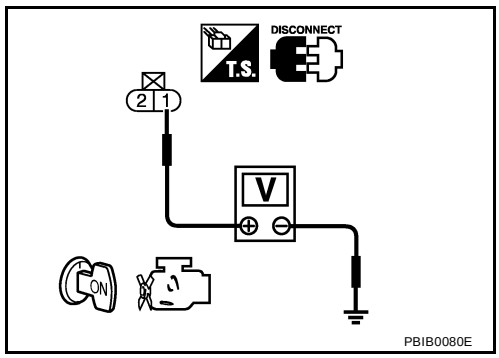
1. CHECK POWER SUPPLY

1. Turn ignition switch “OFF”.
2. Disconnect intake valve timing control solenoid valve harness connector.
3. Turn ignition switch “ON”.



4. Check voltage between terminal 2 and engine ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connector F47, E9
- 10A fuse
- Harness for open or short between valve timing control solenoid valve and fuse

>> Repair harness or connectors.

3. CHECK OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 1 and intake valve timing control solenoid valve harness connector terminal 1. Refer to wiring diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground to short to power or connectors.

4. CHECK VALVE TIMING CONTROL SOLENOID VALVE

Refer to EC-1007, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace valve timing control solenoid valve.

5. CHECK INTERMITTENT INCIDENT

Perform EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

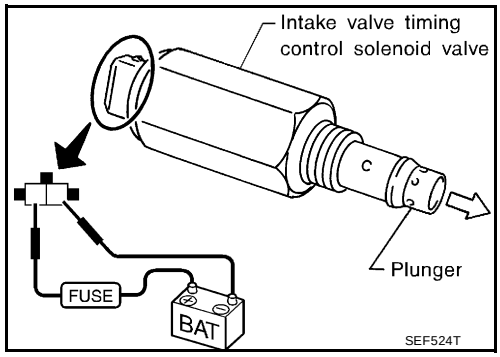
>> **INSPECTION END**

Component Inspection

UBS001ZW

INTAKE VALVE TIMING CONTROL SOLENOID VALVE

1. Check oil passage visually for any metal debris.
2. Supply intake valve timing control solenoid valve terminals with battery voltage.
3. Make sure that inside plunger protrudes.
   If NG, replace intake valve timing control solenoid valve.



Removal and Installation

UBS001ZX

INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EM-36, "CYLINDER HEAD" .

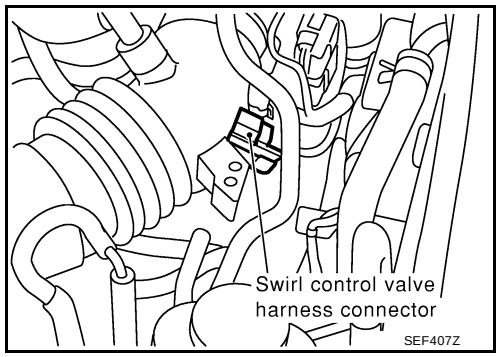
DTC P1132 SWIRL CONTROL VALVE

PFP:00000

Component Description

UBS001ZY

Swirl control valve consists of actuator and valve. The valve is installed in the intake manifold, and the actuator is connected to the rear end of the valve shaft.
The swirl control valve uses a step motor which has four winding phases. It operates according to the output pulse signal of the ECM. Two windings are turned ON and OFF in sequence. Each time an ON pulse is issued, the valve opens or closes. When no change in the control position is needed, the ECM does not issue the pulse signal. A certain voltage signal is issued so that the valve remains at that particular opening.



CONSULT-II Reference Value in Data Monitor Mode

UBS001ZZ

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
SWL C/V (B1)	● Engine speed: Idle	Engine coolant temperature is below 44°C (111°F).	0 - 5 step
		Engine coolant temperature is above 45°C (113°F).	115 - 120 step
SWL/C POSI SE	● Engine speed: Idle ● Engine coolant temperature is below 44°C (111°F).		Approximately 0 deg
	● Engine speed: Idle ● Engine coolant temperature is above 45°C (113°F).		Approximately 80 deg

On Board Diagnosis Logic

UBS00200

Malfunction is detected when
An improper voltage signal is sent to ECM through swirl control valve.

Possible Cause

UBS00201

- Harness or connectors
  (The swirl control valve circuit is open or shorted.)
- Swirl control valve

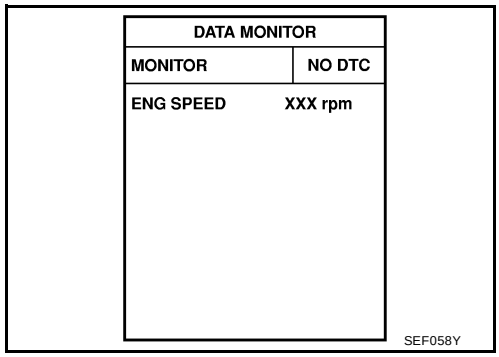
DTC Confirmation Procedure

UBS00202

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 at least 10 seconds.
4. Turn ignition switch “OFF” and wait at least 10 seconds.
5. Turn ignition switch “ON” and wait at least 2 seconds.
6. Start engine and let it idle for at least 10 seconds.
7. Maintain engine speed at about 2,000 rpm for at least 10 seconds.
8. Turn ignition switch “OFF”, wait at least 10 seconds and then turn “ON”.
   If 1st trip DTC is detected, go to EC-1011, "Diagnostic Procedure" .
   If 1st trip DTC is not detected, go to next step.



9. Perform step 5 through 8 three times.

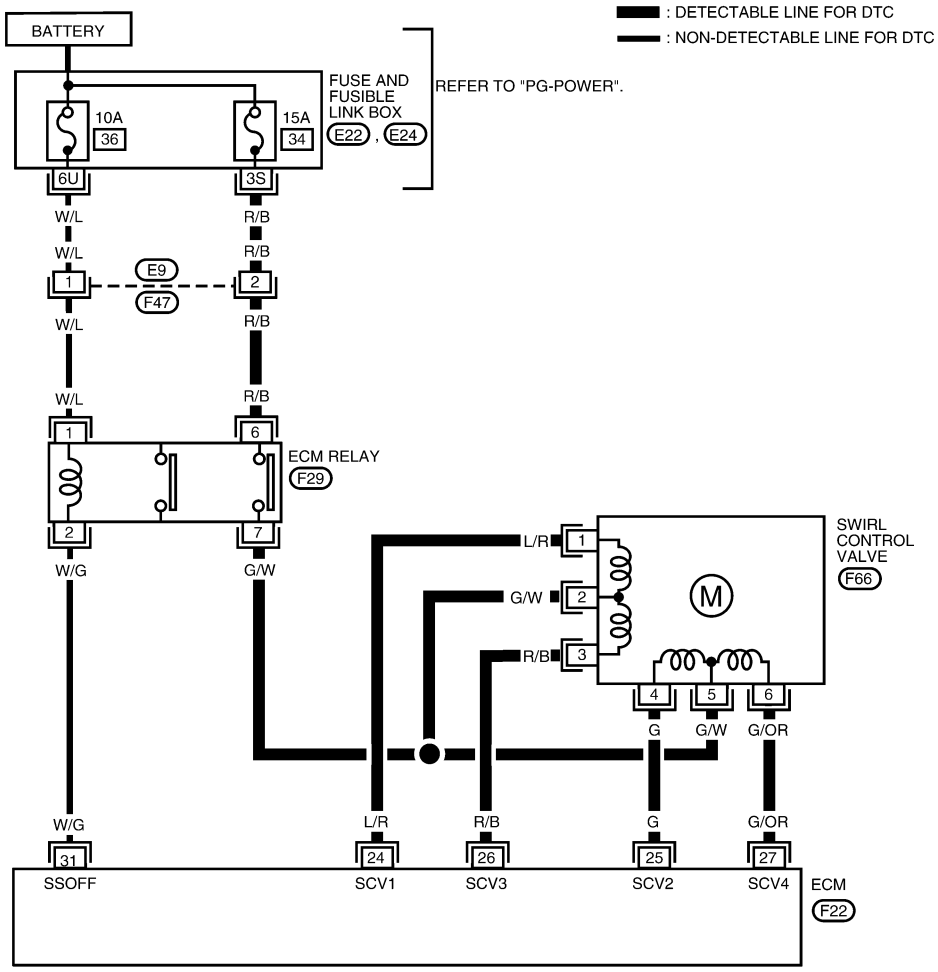
WITH GST

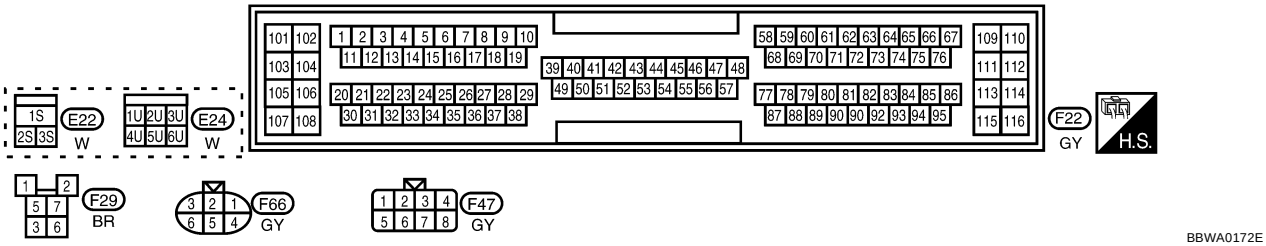
Follow the procedure “With CONSULT-II” above.

Wiring Diagram

UBS00203

EC-SWL/V-01





BBWA0172E

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
24	L/R	SWIRL CONTROL VALVE	ENGINE RUNNING AT IDLE SPEED	0.1 - 14V
25	G			
26	R/B			
27	G/OR			

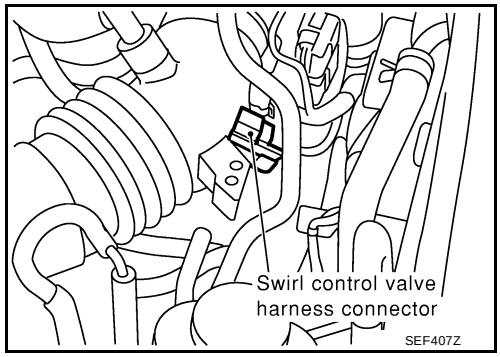
SEF575YB

Diagnostic Procedure

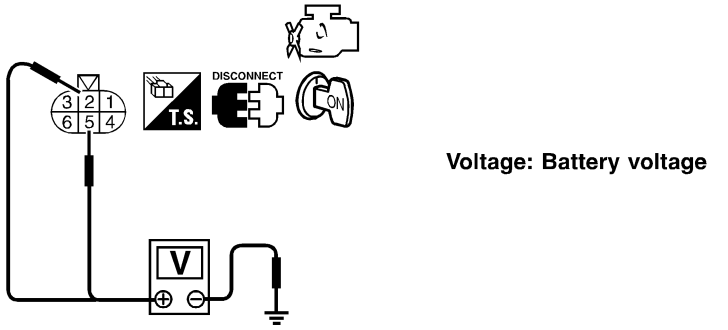
UBS00204

1. CHECK SWIRL CONTROL VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect swirl control valve harness connector.
3. Turn ignition switch “ON”.



4. Check voltage between swirl control valve terminals 2, 5 and ground with CONSULT-II or tester.



Voltage: Battery voltage

OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the harness for open or short between ECM relay and swirl control valve.

>> Repair harness or connectors.

3. CHECK SWIRL 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 terminals and swirl control valve terminals as follows. Refer to Wiring Diagram.

ECM terminal	Swirl volume control valve
24	1
25	4
26	3
27	6

Continuity should exist.

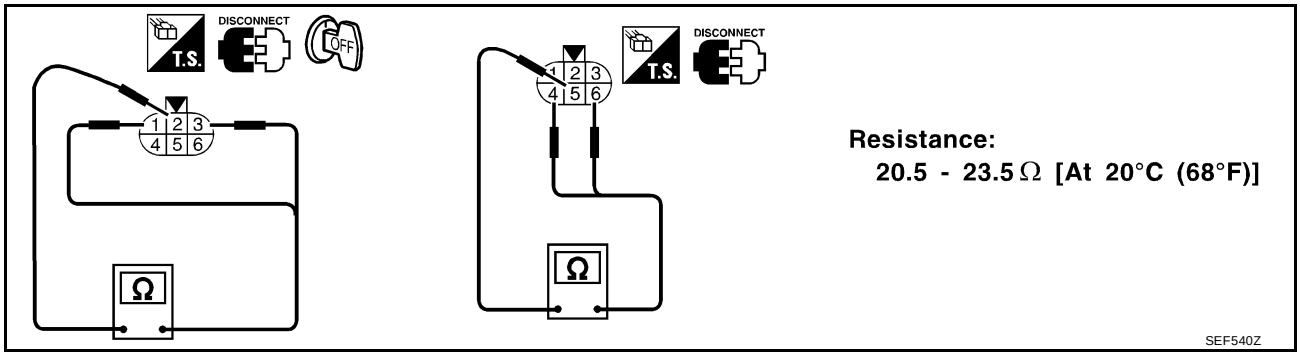
4. Also check harness for short to ground and short to power.

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 SWIRL CONTROL VALVE

Check resistance between swirl control valve terminal 2 and terminals 1, 3, terminal 5 and terminals 4, 6.



Resistance:
20.5 - 23.5 Ω [At 20°C (68°F)]

OK or NG

OK >> GO TO 5.
NG >> Replace intake manifold assembly.

5. CHECK INTERMITTENT INCIDENT

Refer to EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Removal and Installation

UBS00205

SWIRL CONTROL VALVE

Refer to EM-15, "Removal and Installation" .

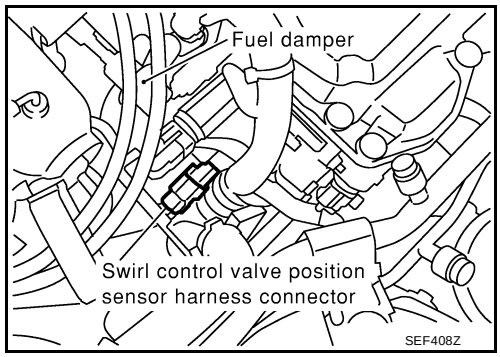
DTC P1137 SWIRL CONTROL VALVE CONTROL POSITION SENSOR

PFP:23731

Component Description

UBS00206

Swirl control valve position sensor is installed on the intake manifold. The sensor is connected to the front end of the valve shaft of the swirl control valve.
The sensor responds to the valve shaft movement. This sensor is a kind of potentiometer which transforms the swirl control valve position into output voltage, and emits the voltage signal to the ECM.



CONSULT-II Reference Value in Data Monitor Mode

UBS00207

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
SWL C/V (B1)	● Engine speed: Idle	Engine coolant temperature is below 44°C (111°F).	0 - 5 step
		Engine coolant temperature is above 45°C (113°F).	115 - 120 step
SWL/C POSI SE	● Engine speed: Idle ● Engine coolant temperature is below 44°C (111°F).		Approximately 0 deg
	● Engine speed: Idle ● Engine coolant temperature is above 45°C (113°F).		Approximately 80 deg

On Board Diagnosis Logic

UBS00208

Malfunction is detected when an excessively low or high voltage from the sensor is sent to ECM.

Possible Cause

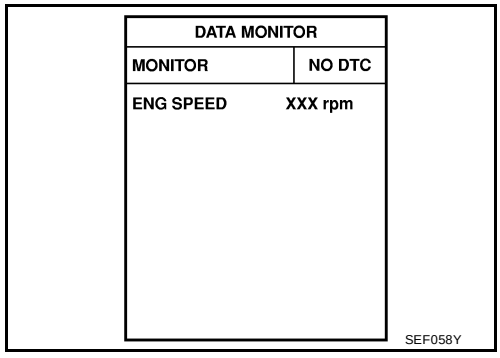
UBS00209

- Harness or connectors
  (Swirl control valve position sensor circuit is open or shorted.)
- Swirl control valve position sensor
- Harness or connectors
  (Swirl control valve circuit is open or shorted.)
- Swirl control valve

DTC Confirmation Procedure

UBS0020A

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”.
3. Select “DATA MONITOR” mode with CONSULT-II and wait at least 5 seconds.

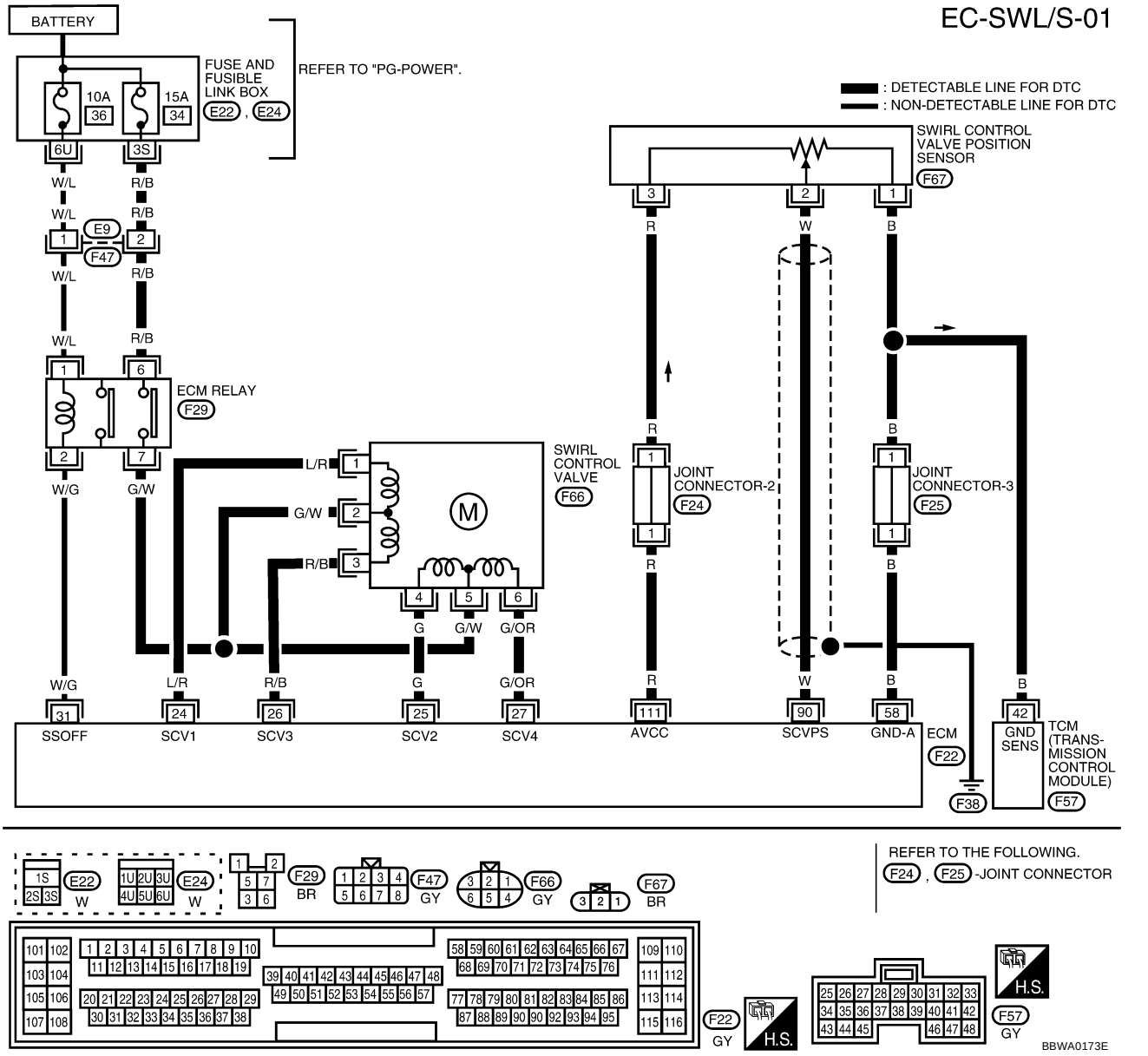
If 1st trip DTC is detected, go to EC-1015, "Diagnostic Procedure" .

WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS0020B



ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
24 25 26 27	L/R G R/B G/OR	SWIRL CONTROL VALVE	ENGINE RUNNING AT IDLE SPEED	0.1 - 14V
58	B	SENSOR'S GROUND	IGN ON	APPROX. 0V
90	W	SWIRL CONTROL VALVE CONTROL POSITION SENSOR	IGN ON	0.21 - 4.4V
111	R	SENSOR'S POWER SUPPLY	IGN ON	APPROX. 5V

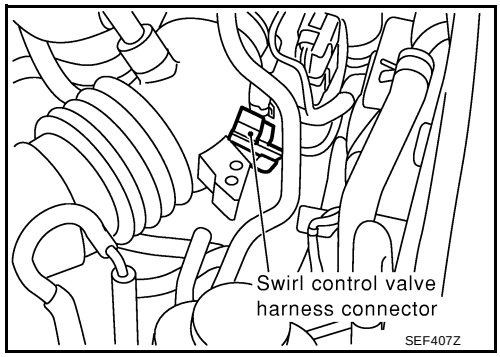
SEF608Z

Diagnostic Procedure

UBS0020C

1. CHECK SWIRL CONTROL VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect swirl control valve harness connector.
3. Turn ignition switch "ON".

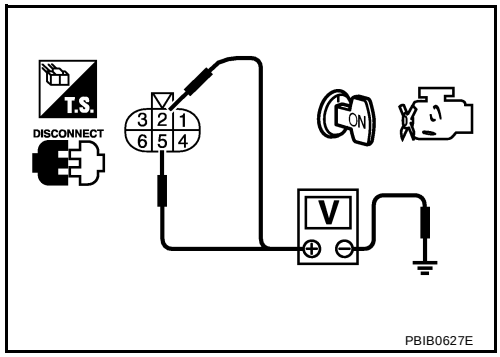


4. Check voltage between swirl control valve terminals 2, 5 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 3.
NG >> GO TO 2.



2. DETECT MALFUNCTIONING PART

Check the harness for open or short between ECM relay and swirl control valve.

>> Repair harness or connectors.

3. CHECK SWIRL 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 terminals and swirl control valve terminals as follows. Refer to Wiring Diagram.

ECM terminal	Swirl volume control valve
24	1
25	4
26	3
27	6

Continuity should exist.

4. Also check harness for short to ground and short to power.

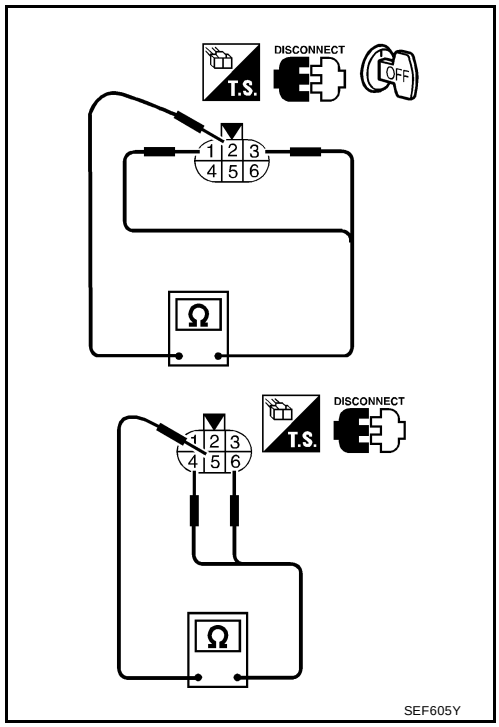
OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK SWIRL CONTROL VALVE

Check resistance between swirl control valve terminal 2 and terminals 1, 3, terminal 5 and terminals 4, 6.

Resistance: 20.5 - 23.5 Ω [at 20°C (68°F)]



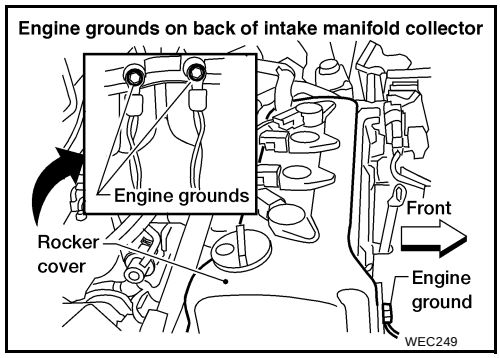
OK or NG

OK >> GO TO 5.
NG >> Replace intake manifold collector assembly.

5. RETIGHTEN GROUND SCREWS

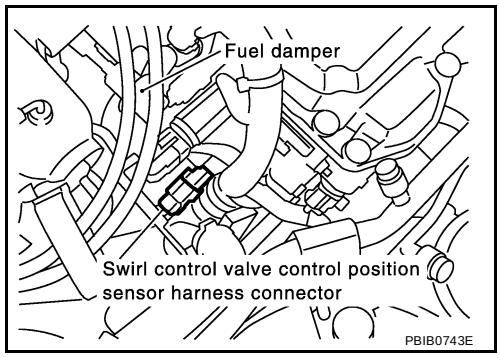
Loosen and retighten engine ground screws.

>> GO TO 6.



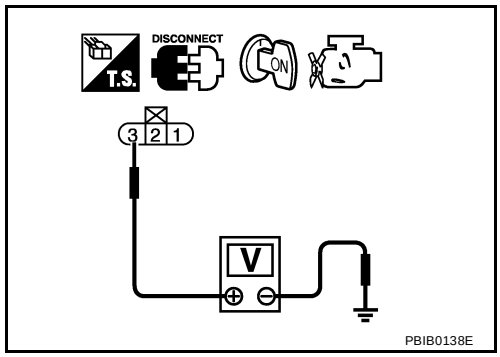
6. CHECK SWIRL CONTROL VALVE POSITION SENSOR POWER SUPPLY CIRCUIT

1. Disconnect swirl control valve position sensor harness connector.
2. Turn ignition switch “ON”.



3. Check voltage between swirl control valve position sensor terminal 3 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Joint connector-2
- Harness for open or short between swirl control valve position sensor and ECM

>> Repair harness or connectors.

8. CHECK SWIRL CONTROL VALVE POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Check harness continuity between swirl control valve position sensor terminal 1 and engine ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 10.
NG >> GO TO 9.

9. DETECT MALFUNCTIONING PART

Check the following.

- Joint connector-3
- Harness for open or short between swirl control valve position sensor and TCM
- Harness for open or short between swirl control valve position sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK SWIRL CONTROL VALVE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 90 and swirl control valve position sensor terminal 2. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK (With CONSULT-II)>>GO TO 11.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

11. CHECK INTERMITTENT INCIDENT

Refer to EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> Replace intake manifold assembly.
NG >> Repair or replace.

Removal and Installation

UBS0020D

SWIRL CONTROL VALVE CONTROL POSITION SENSOR

Refer to EM-15, "Removal and Installation" .

DTC P1138 SWIRL CONTROL VALVE

PFP:00000

Description

UBS0020E

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Throttle position sensor	Throttle position	Swirl control valve control	Swirl control valve
Ignition switch	Start signal		
Crankshaft position sensor (POS)	Engine speed		
Camshaft position sensor (PHASE)	Engine speed and cylinder position		
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Swirl control valve position sensor	Swirl control valve position		

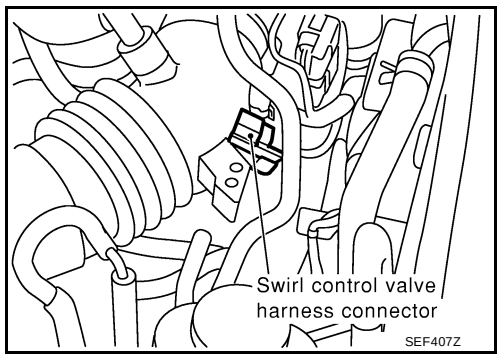
Swirl control valve has a valve portion in the intake passage of each cylinder.
While idling and during low engine coolant temperature, the swirl control valve closes, Thus the velocity of the air in the intake passage increases, promoting the vaporization of the fuel and producing a swirl in the combustion chamber.
Because of this operation, this system tends to increase the burning speed of the gas mixture, improve fuel consumption, and increase the stability in running conditions.
Also, except when idling and during low engine coolant temperature, this system opens the swirl control valve. In this condition, this system tends to increase power by improving intake efficiency via reduction of intake flow resistance, intake flow.
The swirl control valve is operated by the ECM.

Throttle position sensor (Idle position)	Engine coolant temperature	Swirl control valve
OFF	—	Open
ON	Above 45°C (113°F)	Open
	Below 44°C (111°F)	Close

COMPONENT DESCRIPTION

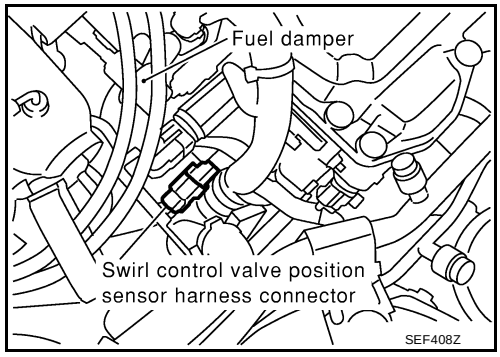
Swirl Control Valve

Swirl control valve consists of actuator and valve. The valve is installed in the intake manifold, and the actuator is connected to the rear end of the valve shaft.
The swirl control valve uses a step motor which has four winding phases. It operates according to the output pulse signal of the ECM. Two windings are turned ON and OFF in sequence. Each time an ON pulse is issued, the valve opens or closes. When no change in the control position is needed, the ECM does not issue the pulse signal. A certain voltage signal is issued so that the valve remains at that particular opening.



Swirl Control Valve Position Sensor

Swirl control valve position sensor is installed on the intake manifold. The sensor is connected to the front end of the valve shaft of the swirl control valve.
The sensor responds to the valve shaft movement. This sensor is a kind of potentiometer which transforms the swirl control valve position into output voltage, and emits the voltage signal to the ECM.



SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Throttle position sensor	Throttle position	Swirl control valve control	Swirl control valve
Ignition switch	Start signal		
Crankshaft position sensor (POS)	Engine speed		
Camshaft position sensor (PHASE)	Engine speed and cylinder position		
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Swirl control valve position sensor	Swirl control valve position		

Swirl control valve has a valve portion in the intake passage of each cylinder.
While idling and during low engine coolant temperature, the swirl control valve closes. Thus the velocity of the air in the intake passage increases, promoting the vaporization of the fuel and producing a swirl in the combustion chamber.
Because of this operation, this system tends to increase the burning speed of the gas mixture, improve fuel consumption, and increase the stability in running conditions.
Also, except when idling and during low engine coolant temperature, this system opens the swirl control valve. In this condition, this system tends to increase power by improving intake efficiency via reduction of intake flow resistance, intake flow.
The swirl control valve is operated by the ECM.

Throttle position sensor (Idle position)	Engine coolant temperature	Swirl control valve
OFF	—	Open
ON	Above 45°C (113°F)	Open
	Below 44°C (111°F)	Close

CONSULT-II Reference Value in Data Monitor Mode

UBS0020F

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
SWL C/V (B1)	● Engine speed: Idle	Engine coolant temperature is below 44°C (111°F).	0 - 5 step
		Engine coolant temperature is above 45°C (113°F).	115 - 120 step

On Board Diagnosis Logic

UBS0020G

Malfunction is detected when the target opening angle of swirl control valve controlled by ECM and the input signal from swirl control valve position sensor is not in the normal range.

Possible Cause

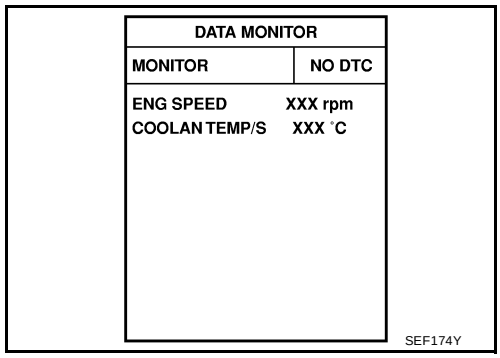
UBS0020H

- Harness or connectors
  (The swirl control valve circuit is open or shorted.)
- Swirl control valve
- Harness or connectors
  (The swirl control valve position sensor circuit is open or shorted.)
- Swirl control valve position sensor

DTC Confirmation Procedure

UBS0020I

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

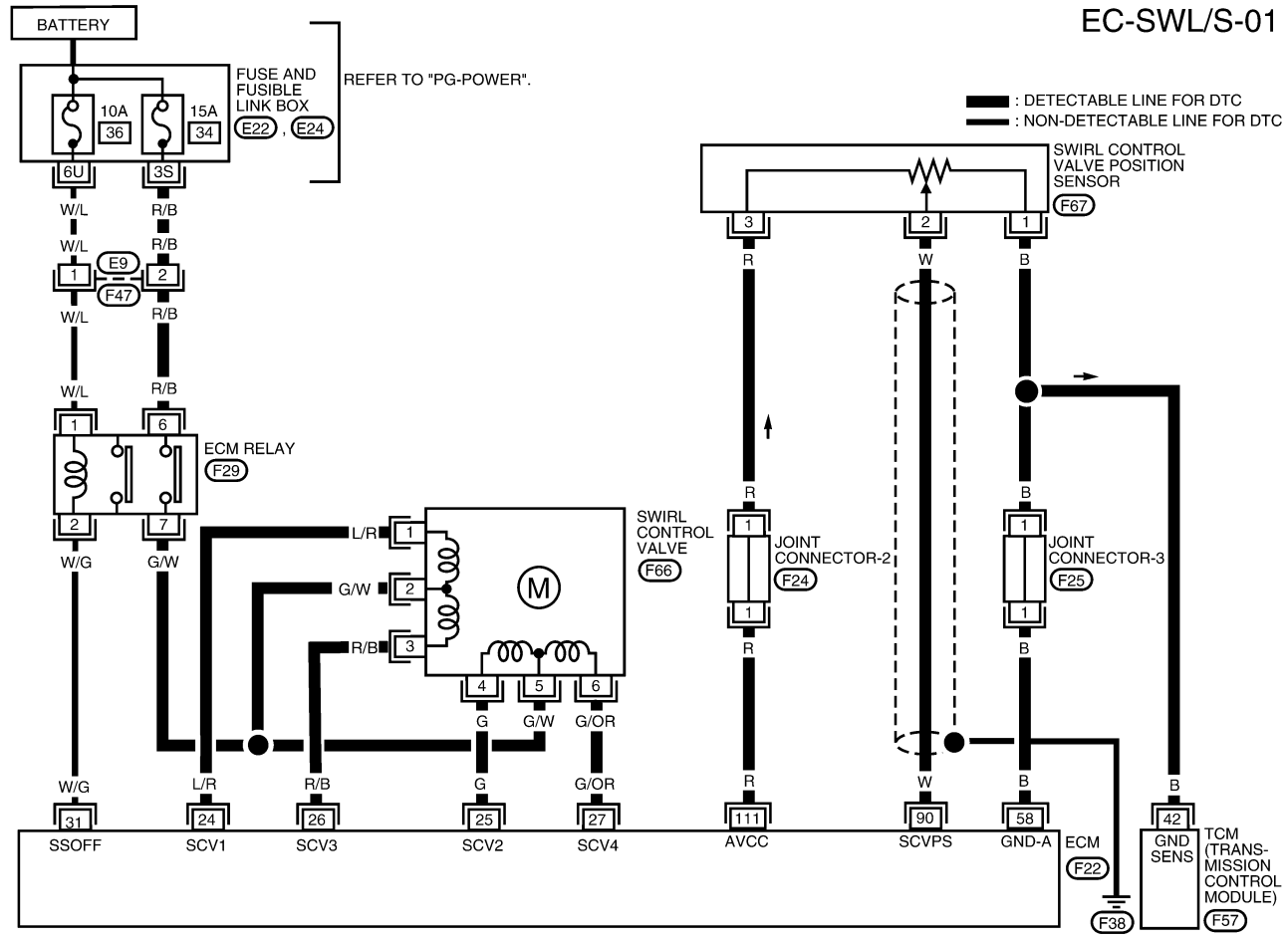
1. Turn ignition switch “ON” and wait at least 2 seconds.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 10 seconds.
4. Turn ignition switch “OFF” and wait at least 10 seconds.
5. Turn ignition switch “ON” and wait at least 2 seconds.
6. Start engine and let it idle for at least 10 seconds.
7. Maintain engine speed at about 2,000 rpm for at least 10 seconds.
8. Turn ignition switch “OFF”, wait at least 10 seconds and then turn “ON”.
   If 1st trip DTC is detected, go to EC-1023, "Diagnostic Procedure" .
   If 1st trip DTC is not detected, go to next step.
9. Perform step 5 through 8 three times.

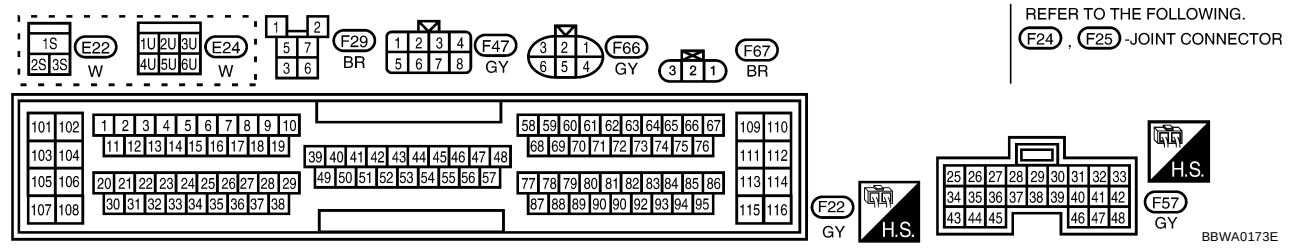
With GST

Follow the procedure “With CONSULT-II” above.

Wiring Diagram

UBS0020J





ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
24 25 26 27	L/R G R/B G/OR	SWIRL CONTROL VALVE	ENGINE RUNNING AT IDLE SPEED	0.1 - 14V
58	B	SENSOR'S GROUND	IGN ON	APPROX. 0V
90	W	SWIRL CONTROL VALVE CONTROL POSITION SENSOR	IGN ON	0.21 - 4.4V
111	R	SENSOR'S POWER SUPPLY	IGN ON	APPROX. 5V

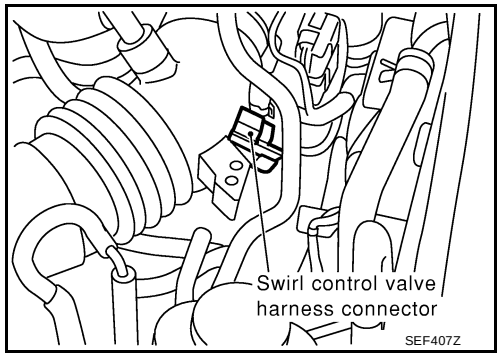
SEF608Z

Diagnostic Procedure

UBS0020K

1. CHECK SWIRL CONTROL VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect swirl control valve harness connector.
3. Turn ignition switch “ON”.

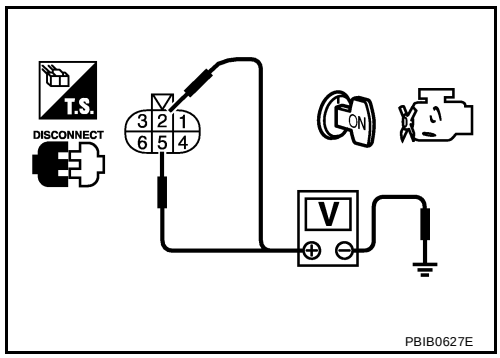


4. Check voltage between swirl control valve terminals 2, 5 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 3.
NG >> GO TO 2.



2. DETECT MALFUNCTIONING PART

Check the harness for open or short between ECM relay and swirl control valve.

>> Repair harness or connectors.

3. CHECK SWIRL 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 terminals and swirl control valve terminals as follows. Refer to Wiring Diagram.

ECM terminal	Swirl volume control valve
24	1
25	4
26	3
27	6

Continuity should exist.

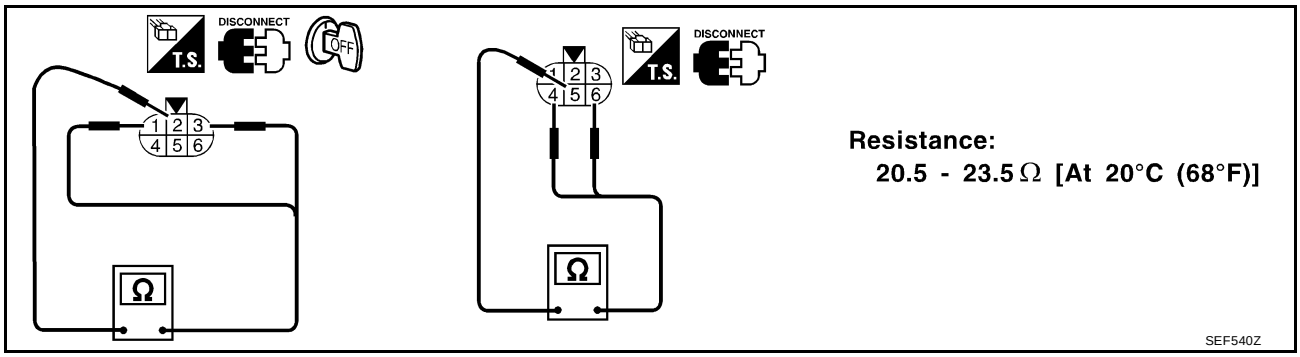
4. Also check harness for short to ground and short to power.

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 SWIRL CONTROL VALVE

Check resistance between swirl control valve terminal 2 and terminals 1, 3, terminal 5 and terminals 4, 6.



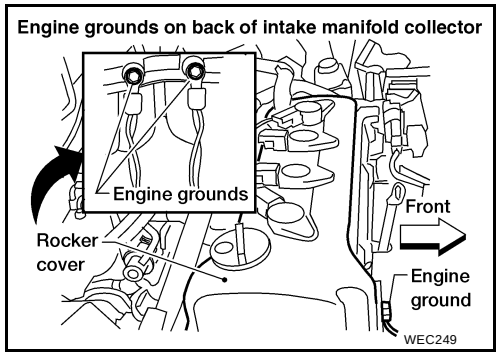
OK or NG

OK >> GO TO 5.
NG >> Replace intake manifold collector assembly.

5. RETIGHTEN GROUND SCREWS

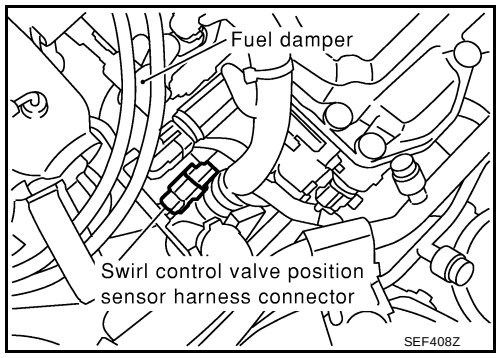
Loosen and retighten engine ground screws.

>> GO TO 6.



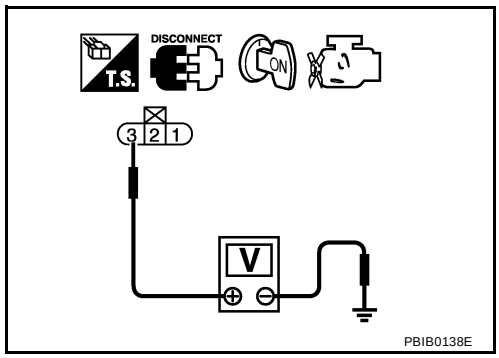
6. CHECK SWIRL CONTROL VALVE POSITION SENSOR POWER SUPPLY CIRCUIT

1. Disconnect swirl control valve position sensor harness connector.
2. Turn ignition switch “ON”.



3. Check voltage between swirl control valve position sensor terminal 3 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Joint connector-2
- Harness for open or short between swirl control valve position sensor and ECM

>> Repair harness or connectors.

8. CHECK SWIRL CONTROL VALVE POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Check harness continuity between swirl control valve position sensor terminal 1 and engine ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 10.
NG >> GO TO 9.

9. DETECT MALFUNCTIONING PART

Check the following.

- Joint connector-3
- Harness for open or short between swirl control valve position sensor and TCM
- Harness for open or short between swirl control valve position sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK SWIRL CONTROL VALVE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 90 and swirl control valve position sensor terminal 2. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK (With CONSULT-II)>>GO TO 11.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

11. CHECK INTERMITTENT INCIDENT

Refer to EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> Replace intake manifold assembly.
NG >> Repair or replace.

Removal and Installation

UBS0020L

SWIRL CONTROL VALVE

Refer to EM-15, "Removal and Installation" .

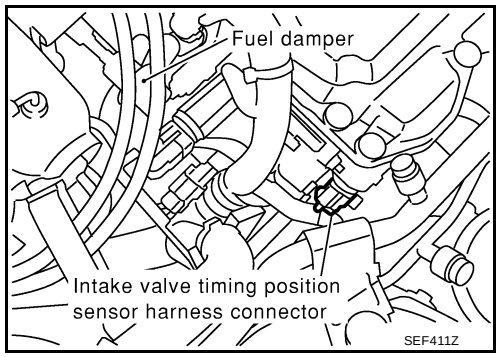
DTC P1140 IVT CONTROL POSITION SENSOR

PFP:23731

Component Description

UBS0020M

The intake valve timing control position sensor is located front-end of the cylinder head. This sensor detects a signal (intake valve position) generated by the protrusion of camshaft sprocket and sends it to the ECM. This sensor is not used to control the engine system. It is used only for the on board diagnosis of intake valve timing control.



On Board Diagnosis Logic

UBS0020N

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1140	● The proper pulse signal from the intake valve timing control position sensors is not sent to ECM while the engine is running at the specified engine speed.	● Harness or connectors (The intake valve timing control position sensor circuit is open.) ● Intake valve timing control position sensor ● Accumulation of debris to the signal pick-up portion of the camshaft

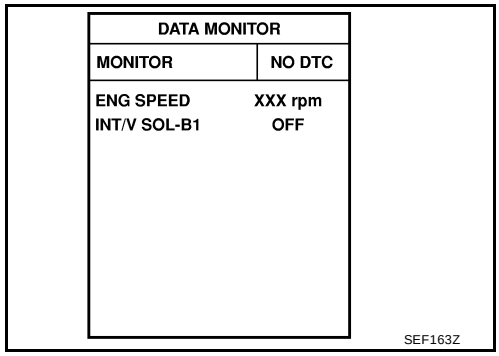
DTC Confirmation Procedure

UBS0020O

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 keep the engine speed at 2,000 rpm and wait at least 15 seconds.
3. If 1st trip DTC is detected, go to EC-1028, "Diagnostic Procedure" .



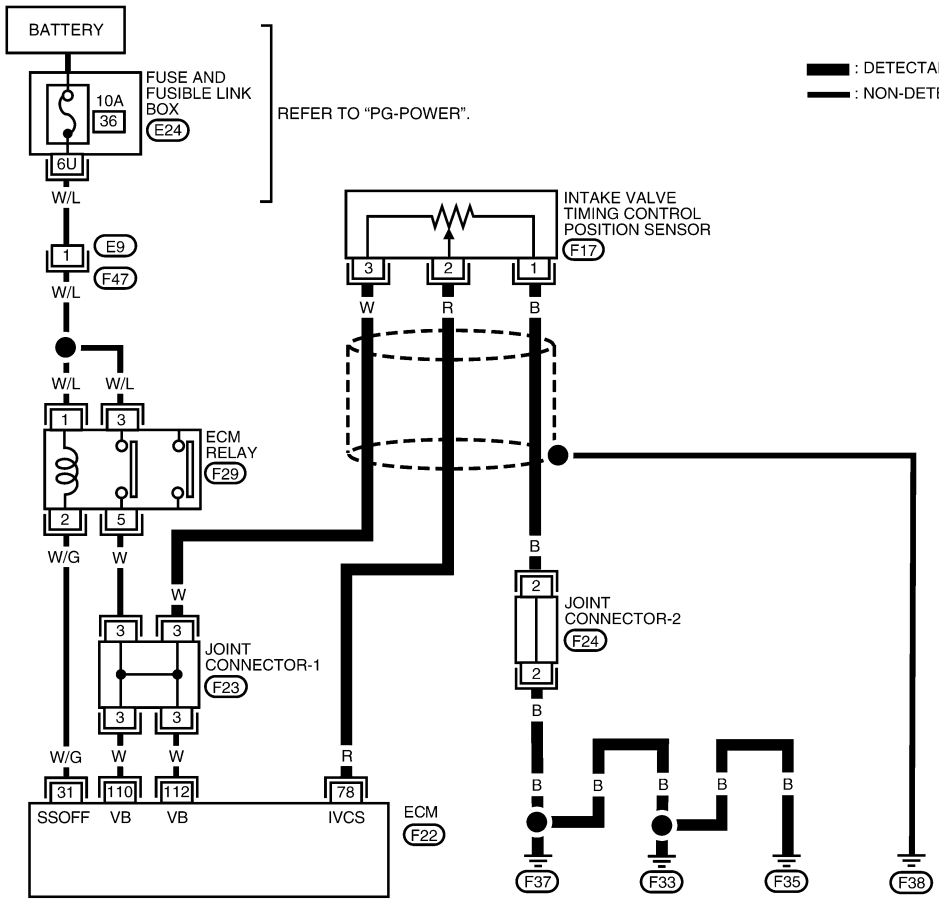
WITH GST

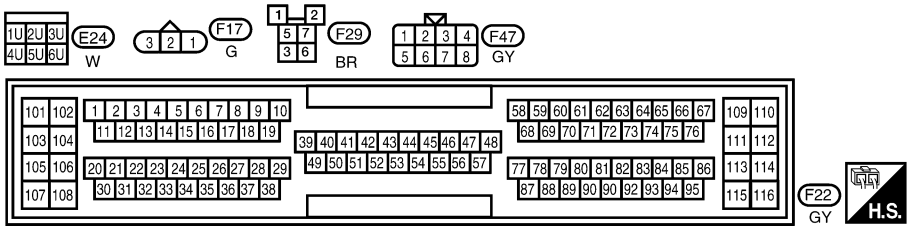
Follow the procedure “With CONSULT-II” above.

Wiring Diagram

UBS0020P

EC-IVCS-01

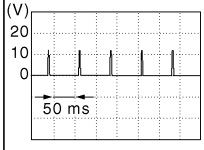
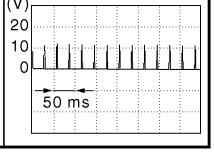




REFER TO THE FOLLOWING.
F23 , F24 -JOINT CONNECTOR

BBWA0174E

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
78	R	INTAKE VALVE TIMING CONTROL POSITION SENSOR	ENGINE RUNNING AT IDLE UNDER WARM-UP CONDITION	APPROX. 0V 
			ENGINE RUNNING AT 2,000 RPM UNDER WARM-UP CONDITION	APPROX. 0V 

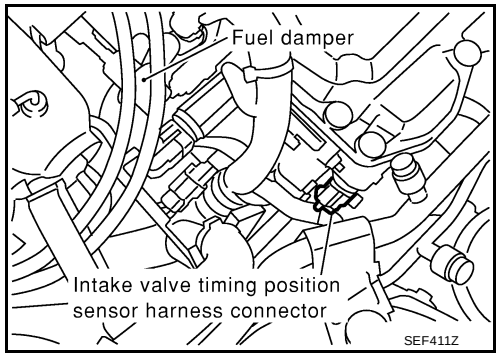
SEF744YA

Diagnostic Procedure

UBS0020Q

1. CHECK POWER SUPPLY

1. Turn ignition switch “OFF”.
2. Disconnect intake valve timing control position sensor harness connector.
3. Turn ignition switch “ON”.

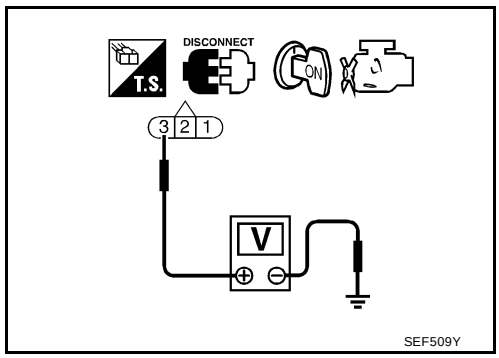


4. Check voltage between terminal 3 and engine ground.

Voltage: Battery voltage

OK or NG

OK >> GO TO 3.
NG >> GO TO 2.



2. DETECT MALFUNCTIONING PART

- Joint connector-1
- Harness for open or short between the intake valve timing control position sensor and ECM relay

>> Repair harness or connectors.

3. CHECK INPUT SIGNAL CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 78 and intake valve timing control position sensor terminal 2.
   Refer to wiring diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair harness or connectors.

4. CHECK GROUND CIRCUIT

1. Loosen and retighten engine ground screws.
2. Check harness continuity between sensor intake valve timing control position sensor terminal 1 and engine ground.
   Refer to wiring diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Joint connector-2
- Harness for open or short between intake valve timing control position sensor and engine ground

>> Repair open circuit or short to power in harness or connectors.

6. CHECK CAMSHAFT

Check accumulation of debris to the signal pick-up portion of the camshaft. Refer to EM-36, "Components" .

OK or NG

OK >> GO TO 7.
NG >> Remove debris and clean the signal pick-up cutout of camshaft.

7. CHECK INTAKE VALVE TIMING CONTROL POSITION SENSOR

Refer to EC-1029, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace intake valve timing control position sensor.

8. CHECK INTERMITTENT INCIDENT

Perform EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

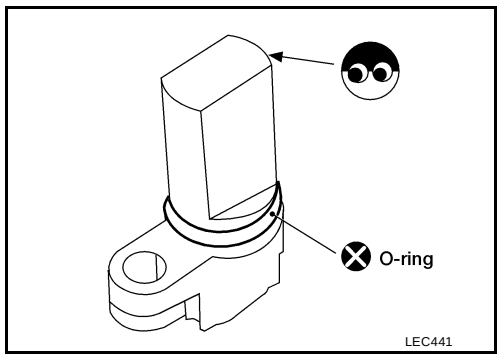
Component Inspection

UBS0020R

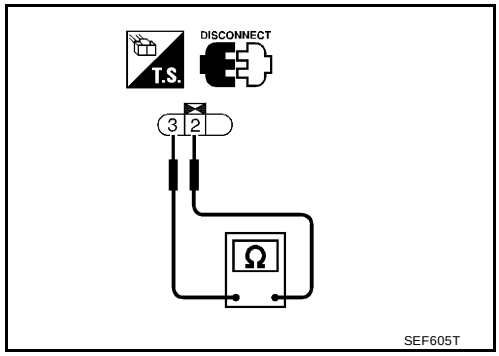
INTAKE VALVE TIMING CONTROL POSITION SENSOR

1. Disconnect intake valve timing control position sensor harness connector.
2. Loosen fixing bolt of the sensor.
3. Visually check the sensor for chipping.
4. Check resistance between terminals 2 and 3.

Resistance: 600 - 740Ω [at 20°C (68°F)]



If NG, replace intake valve timing control position sensor.



Removal and Installation

UBS0020S

INTAKE VALVE TIMING CONTROL POSITION SENSOR

Refer to EM-15, "Removal and Installation" .

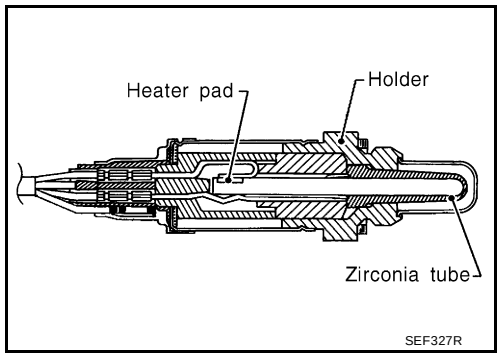
DTC P1146 HO2S2

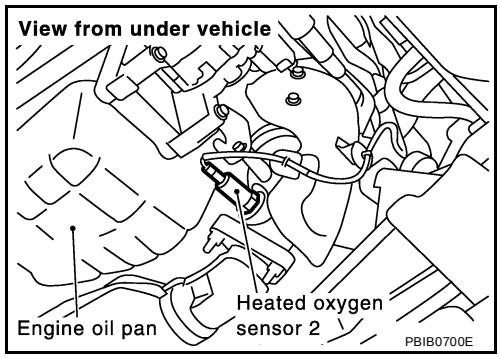
PFP:226A0

Component Description

UBS0020T

The heated oxygen sensor 2, after TWC (Manifold three way catalyst), monitors the oxygen level in the exhaust gas.
Even if switching characteristics of air fuel ratio (A/F) sensor 1 are shifted, the air fuel ratio is controlled to stoichiometric by the signal from 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 heated oxygen sensor 2 is not used for engine control operation.





CONSULT-II Reference Value in Data Monitor Mode

UBS0020U

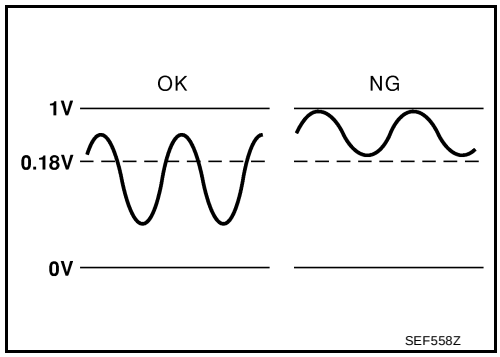
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1)	● Engine: After warming up	Revving engine from idle to 3,000 rpm	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)			LEAN ←→ RICH

On Board Diagnosis Logic

UBS0020V

The heated oxygen sensor 2 has a much longer switching time between rich and lean than air fuel ratio (A/F) sensor 1. The oxygen storage capacity before the TWC (Manifold three way catalyst) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the minimum voltage of the sensor is sufficiently low during various driving conditions such as fuel-cut.



DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1146	● The minimum voltage from the sensor does not reach the specified voltage.	● Harness or connectors (The sensor circuit is open or shorted.) ● Heated oxygen sensor 2 ● Fuel pressure ● Injectors

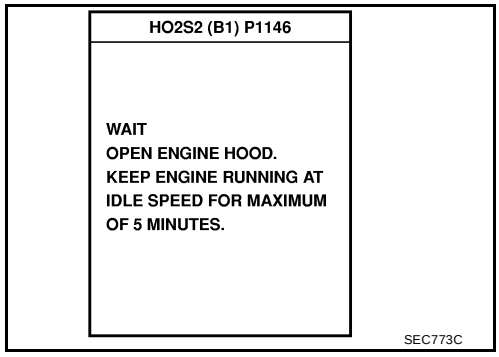
DTC Confirmation Procedure

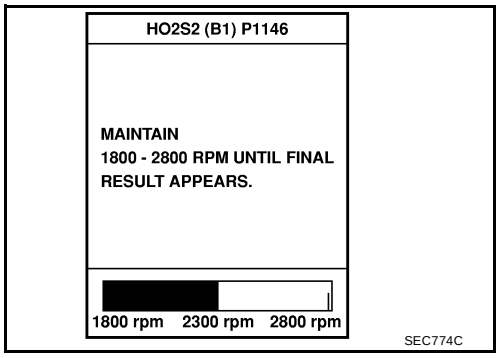
UBS0020W

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Open engine hood before conducting following procedure.

WITH CONSULT-II

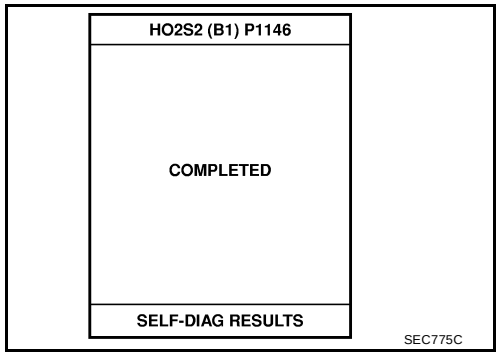
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Turn ignition switch “ON”.
4. Select “DATA MONITOR” mode with CONSULT-II.
5. Make sure that “COOLAN TEMP/S” indicates more than 70°C (158°F).
6. Select “HO2S2 (B1) P1146” of “HO2S2” in “DTC WORK SUPPORT” mode with CONSULT-II.





7. Start engine and follow the instruction of CONSULT-II.
8. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”.
   If NG is displayed, refer to EC-1035, "Diagnostic Procedure" .
   If “CANNOT BE DIAGNOSED” is displayed, perform the following.

- Stop engine and cool down until “COOLAN TEMP/S” indicates less than 70°C (158°F).
- Turn ignition switch “ON”.
- Select “DATA MONITOR” mode with CONSULT-II.
- Start engine.
- Return to step 6 again when the “COOLAN TEMP/S” reaches to 70°C (158°F).



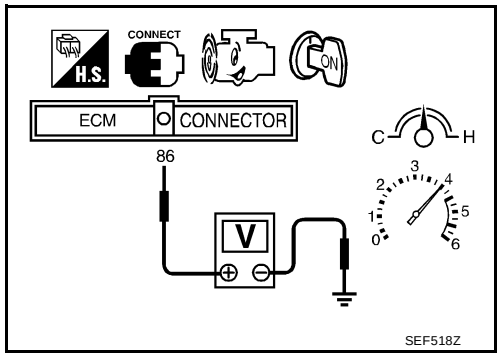
Overall Function Check

UBS0020X

Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

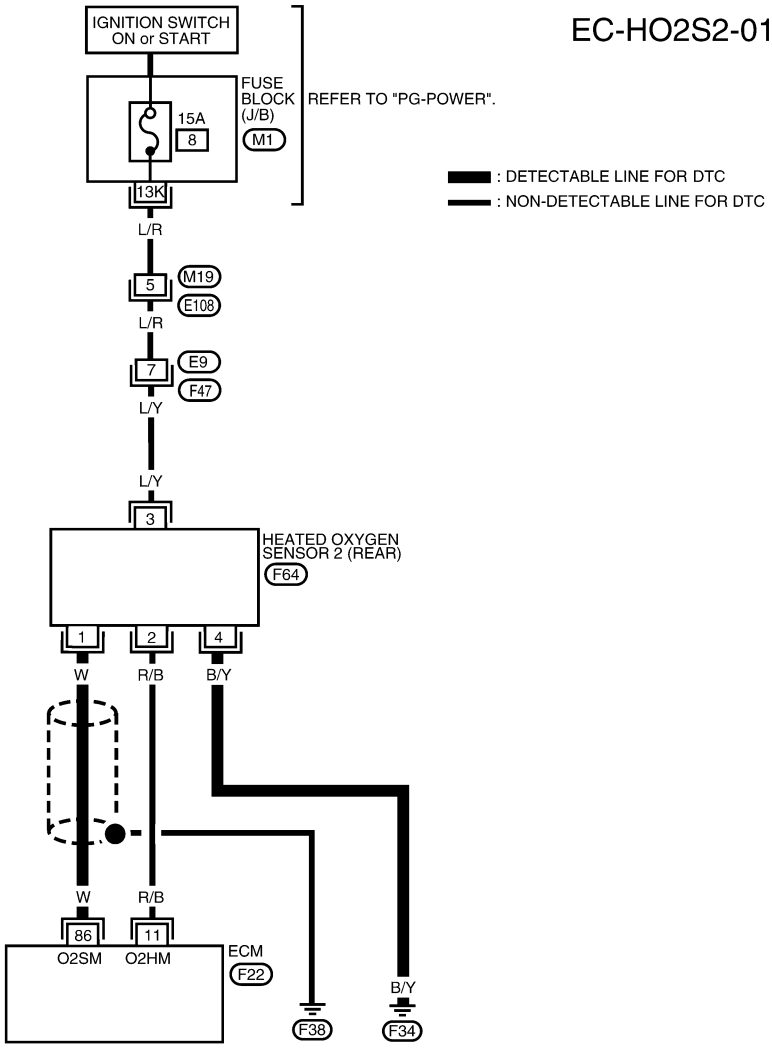
1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Set voltmeter probes between ECM terminals 86 (HO2S2 signal) and engine ground.
4. Check the voltage when revving engine up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be below 0.43V at least once during this procedure.
   If the voltage can be confirmed in step 4, step 5 is not necessary.

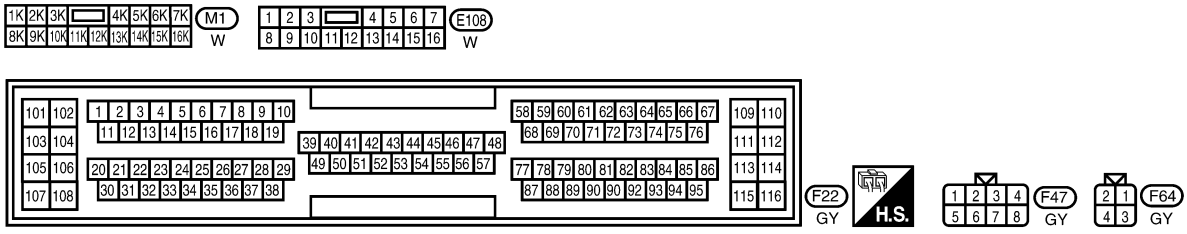


5. Keep vehicle idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with “OD” OFF.
   The voltage should be below 0.43V at least once during this procedure.
6. If NG, go to EC-1035, "Diagnostic Procedure" .

Wiring Diagram

UBS0020Y





BBWA0152E

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
86	W	HEATED OXYGEN SENSOR 2 (REAR)	ENGINE RUNNING FROM IDLE UP TO 2,000 RPM UNDER WARM-UP CONDITION	0 - APPROX. 1.0V

SEF724YA

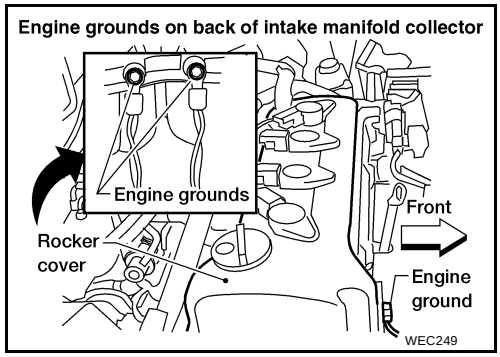
Diagnostic Procedure

UBS0020Z

1. RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

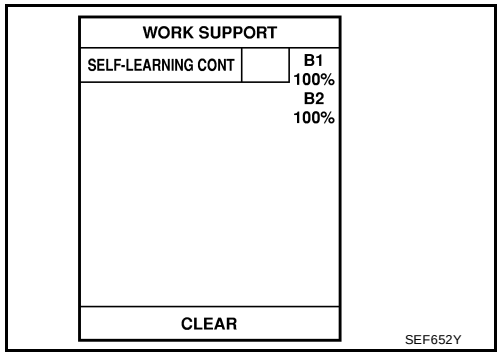
>> GO TO 2.



2. CLEAR THE SELF-LEARNING DATA

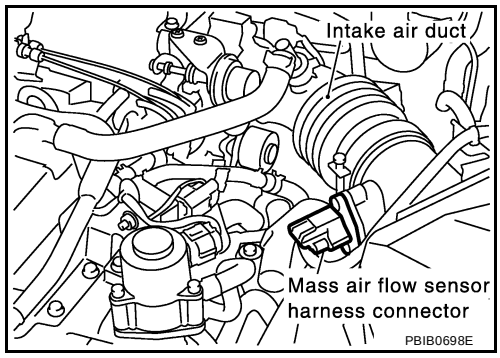
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 detected? Is it difficult to start engine?



Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF”.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 3 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC P0102 is displayed.
6. Erase the 1st trip DTC memory. Refer to EC-637, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 detected? Is it difficult to start engine?



Yes or No

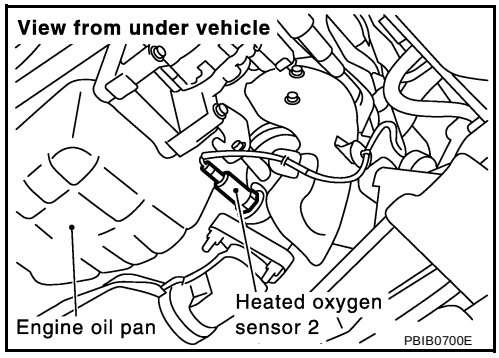
Yes >> Perform trouble diagnosis for DTC P0172. Refer to EC-809 .
No >> GO TO 3.

3. CHECK INPUT SIGNAL CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect heated oxygen sensor 2 harness connector and ECM harness connector.
3. Check harness continuity between ECM terminal 86 and HO2S2 terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.
4. Check harness continuity between ECM terminal 86 or HO2S2 terminal 1 and ground.
   Refer to Wiring Diagram.

   Continuity should not exist.



5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK GROUND CIRCUIT

1. Check harness continuity between HO2S2 terminal 4 and body ground.
   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 HEATED OXYGEN SENSOR 2

Refer to EC-1036, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace heated oxygen sensor 2.

6. CHECK INTERMITTENT INCIDENT

Perform EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

UBS00210

HEATED OXYGEN SENSOR 2

With CONSULT-II

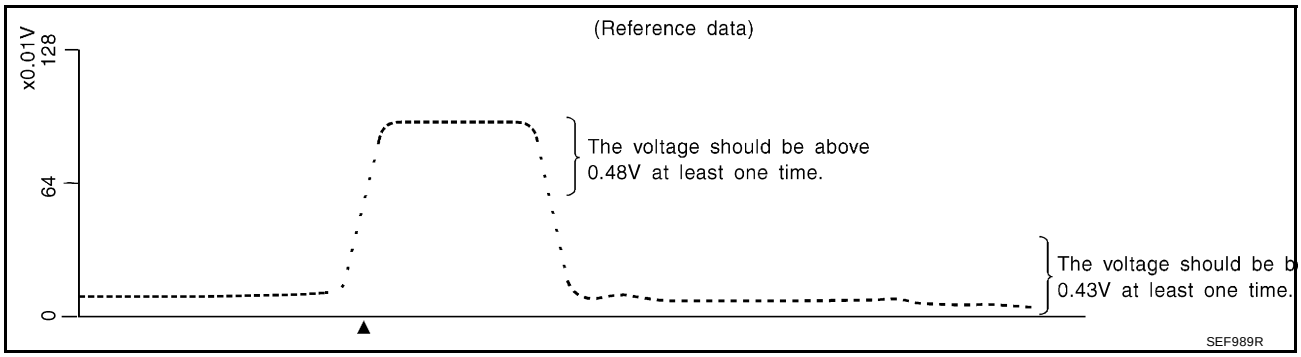
1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.

3. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)” as the monitor item with CONSULT-II.
4. Check “HO2S2 (B1)” at idle speed when adjusting “FUEL INJECTION” to ±25%.
   “HO2S2 (B1)” should be above 0.48V at least once when the “FUEL INJECTION” is +25%.
   “HO2S2 (B1)” should be below 0.43V at least once when the “FUEL INJECTION” is −25%.

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
A/F SEN1 (B1)	XXX V
HO2S2 (B1)	XXX V
HO2S3 (B1)	XXX V

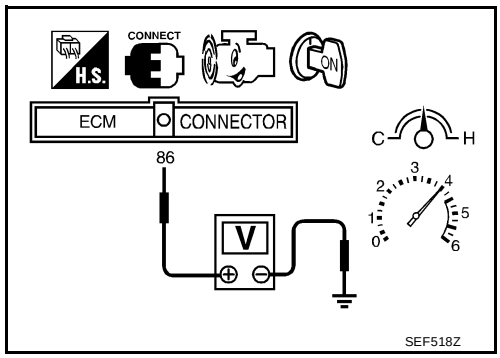
SEF519Z

CAUTION:
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**



Without CONSULT-II

1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Set voltmeter probes between ECM terminals 86 (HO2S2 signal) and engine ground.
4. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.48V at least once.
   If the voltage is above 0.48V at step 4, step 5 is not necessary.



5. Check the voltage when revving up to 6,000 rpm under no load. Or keep vehicle idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with “OD” OFF.
   The voltage should be below 0.43V at least once.

CAUTION:
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

UBS00211

HEATED OXYGEN SENSOR 2

Refer to EX-3, "Removal and Installation" .

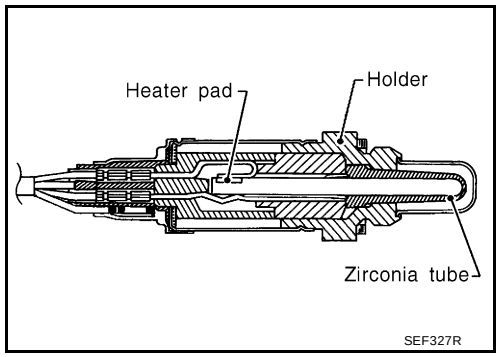
DTC P1147 HO2S2

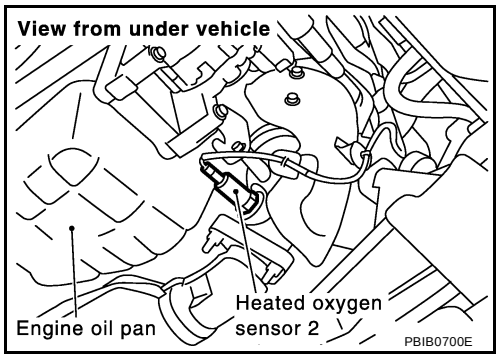
PFP:226A0

Component Description

UBS00212

The heated oxygen sensor 2, after TWC (Manifold three way catalyst), monitors the oxygen level in the exhaust gas.
Even if switching characteristics of air fuel ratio (A/F) sensor 1 are shifted, the air fuel ratio is controlled to stoichiometric by the signal from 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 heated oxygen sensor 2 is not used for engine control operation.





CONSULT-II Reference Value in Data Monitor Mode

UBS00213

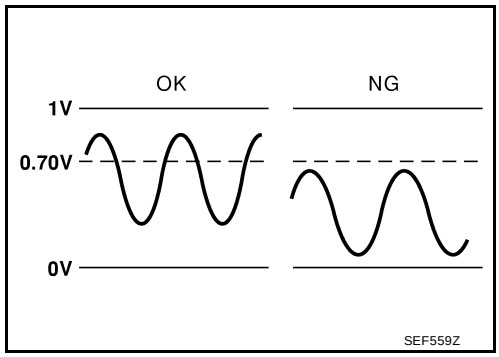
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1)	● Engine: After warming up	Revving engine from idle to 3,000 rpm	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)			LEAN ←→ RICH

On Board Diagnosis Logic

UBS00214

The heated oxygen sensor 2 has a much longer switching time between rich and lean than air fuel ratio (A/F) sensor 1. The oxygen storage capacity before the TWC (Manifold three way catalyst) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the maximum voltage of the sensor is sufficiently high during various driving conditions such as fuel-cut.



DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1147	● The maximum voltage from the sensor does not reach the specified voltage.	● Harness or connectors (The sensor circuit is open or shorted.) ● Heated oxygen sensor 2 ● Fuel pressure ● Injectors ● Intake air leaks

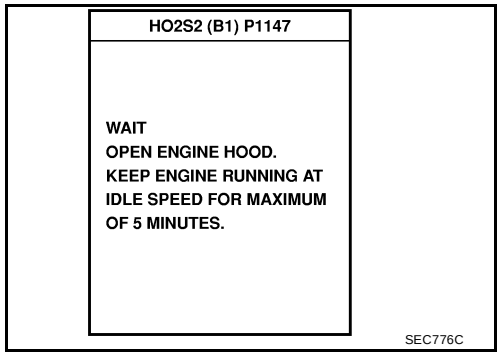
DTC Confirmation Procedure

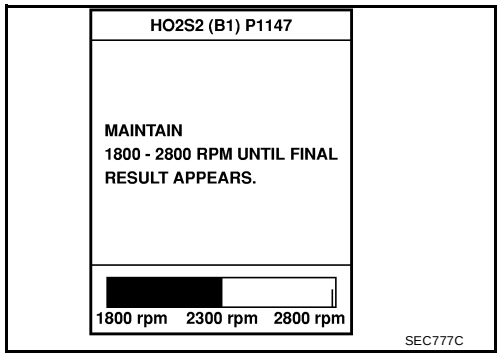
UBS00215

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Open engine hood before conducting following procedure.

WITH CONSULT-II

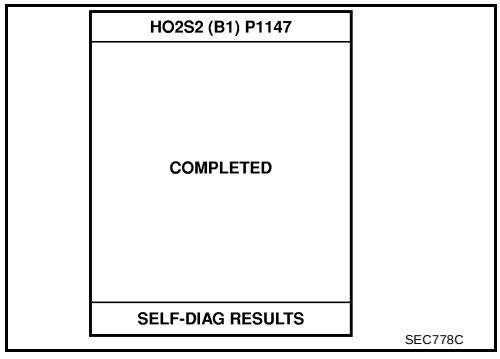
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Turn ignition switch “ON”.
4. Select “DATA MONITOR” mode with CONSULT-II.
5. Make sure that “COOLAN TEMP/S” indicates more than 70°C (158°F).
6. Select “HO2S2 (B1) P1147” of “HO2S2” in “DTC WORK SUPPORT” mode with CONSULT-II.





7. Start engine and follow the instruction of CONSULT-II.

8. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”.
   If NG is displayed, refer to EC-1042, "Diagnostic Procedure" .
   If “CANNOT BE DIAGNOSED” is displayed, perform the following.
   - Stop engine and cool down until “COOLAN TEMP/S” indicates less than 70°C (158°F).
   - Turn ignition switch “ON”.
   - Select “DATA MONITOR” mode with CONSULT-II.
   - Start engine.
   - Return to step 6 again when the “COOLAN TEMP/S” reaches to 70°C (158°F).



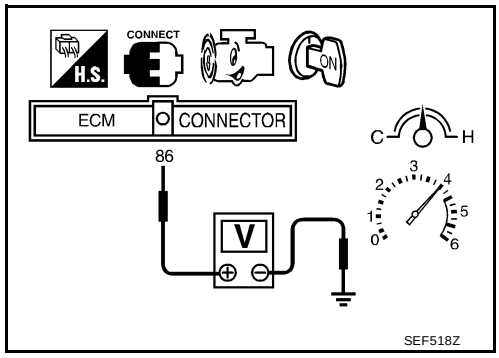
Overall Function Check

UBS00216

Use this procedure to check the overall function of the rear heated oxygen sensor circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

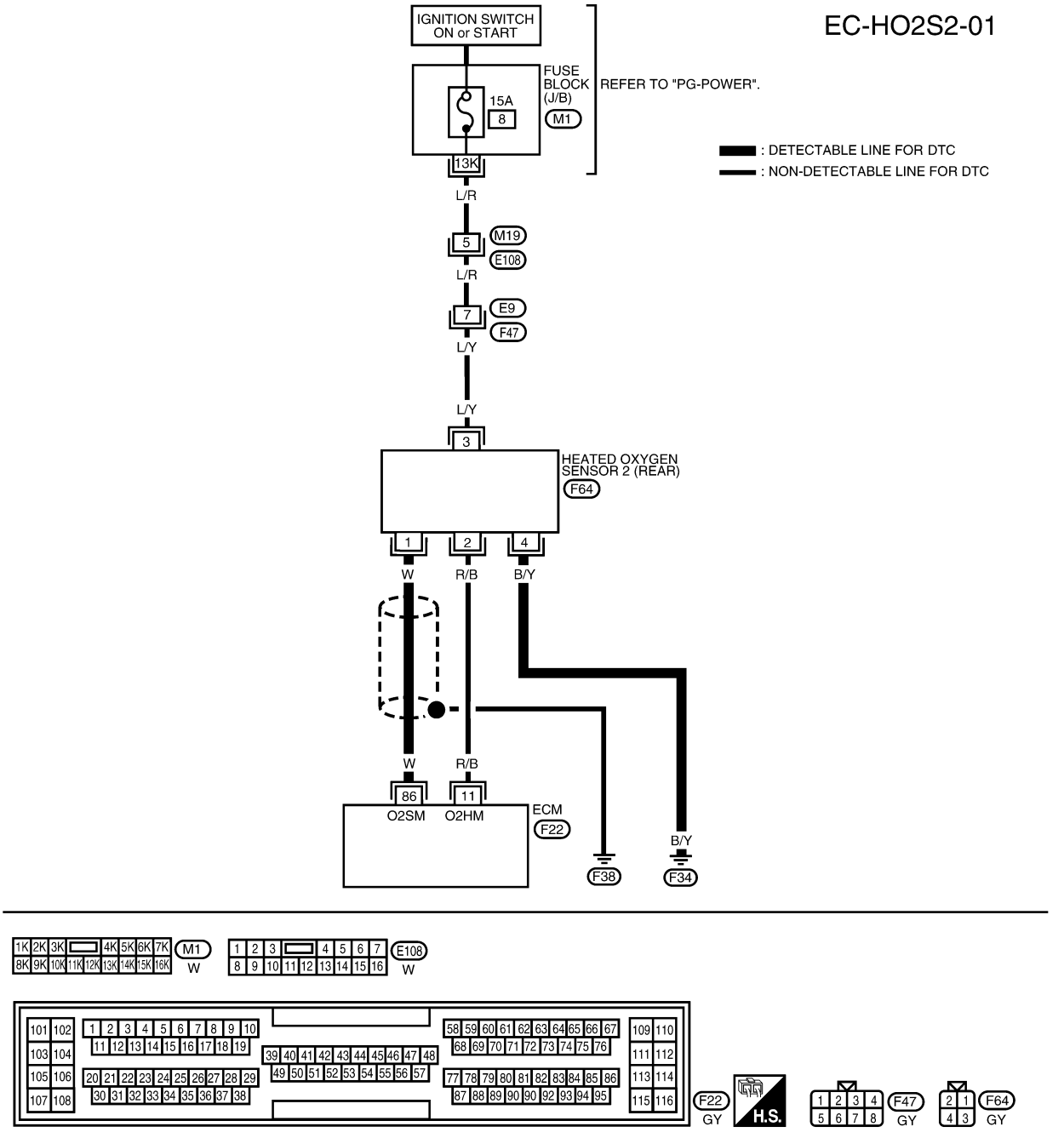
1. Start engine and drive vehicle at a speed of 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Set voltmeter probes between ECM terminals 86 (HO2S2 signal) and engine ground.
4. Check the voltage when revving engine up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.48V at least once during this procedure.
   If the voltage can be confirmed in step 4, step 5 is not necessary.



5. Keep vehicle idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with “OD” OFF.
   The voltage should be above 0.48V at least once during this procedure.
6. If NG, go to EC-1042, "Diagnostic Procedure" .

Wiring Diagram

UBS00217



BBWA0152E

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
86	W	HEATED OXYGEN SENSOR 2 (REAR)	ENGINE RUNNING FROM IDLE UP TO 2,000 RPM UNDER WARM-UP CONDITION	0 - APPROX. 1.0V

SEF724YA

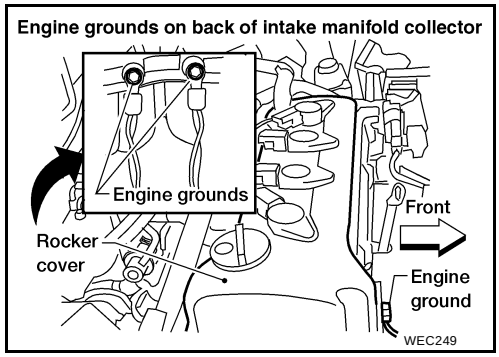
Diagnostic Procedure

UBS00218

1. RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

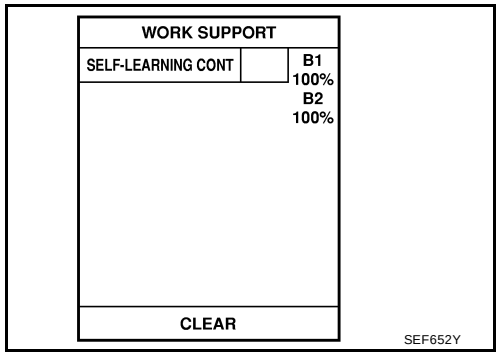
>> GO TO 2.



2. CLEAR THE SELF-LEARNING DATA

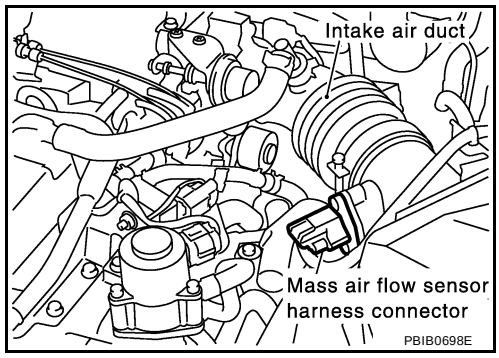
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 detected? Is it difficult to start engine?



Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF”.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 3 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC P0102 is displayed.
6. Erase the 1st trip DTC memory. Refer to EC-637, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 detected? Is it difficult to start engine?



Yes or No

Yes >> Perform trouble diagnosis for DTC P0171. Refer to EC-802, "DTC P0171 FUEL INJECTION SYSTEM FUNCTION" .

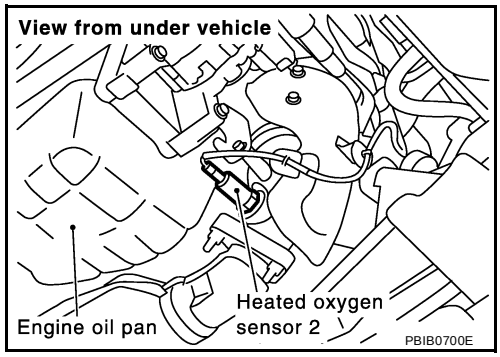
No >> GO TO 3.

3. CHECK INPUT SIGNAL CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect heated oxygen sensor 2 harness connector and ECM harness connector.
3. Check harness continuity between ECM terminal 86 and HO2S2 terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.
4. Check harness continuity between ECM terminal 86 or HO2S2 terminal 1 and ground.
   Refer to Wiring Diagram.

   Continuity should not exist.



5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK GROUND CIRCUIT

1. Check harness continuity between HO2S2 terminal 4 and engine ground.
   Refer to Wiring Diagram.

   Continuity should exist.
2. Also check harness for short to 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

Refer to EC-1043, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace heated oxygen sensor 2.

6. CHECK INTERMITTENT INCIDENT

Perform EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

UBS00219

HEATED OXYGEN SENSOR 2

With CONSULT-II

1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.

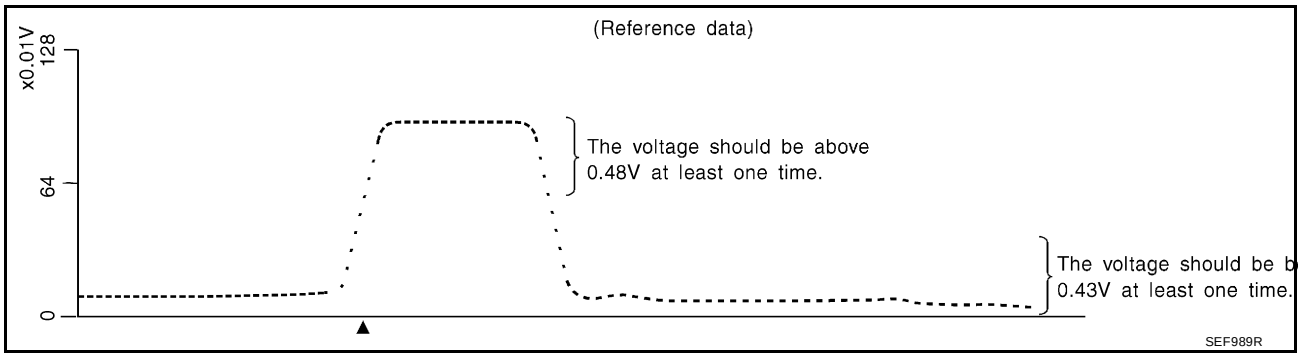
3. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)” as the monitor item with CONSULT-II.
4. Check “HO2S2 (B1)” at idle speed when adjusting “FUEL INJECTION” to ±25%.
   “HO2S2 (B1)” should be above 0.48V at least once when the “FUEL INJECTION” is +25%.
   “HO2S2 (B1)” should be below 0.43V at least once when the “FUEL INJECTION” is −25%.

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
A/F SEN1 (B1)	XXX V
HO2S2 (B1)	XXX V
HO2S3 (B1)	XXX V

SEF519Z

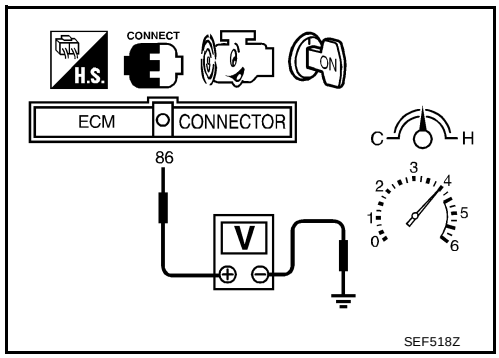
CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**



Without CONSULT-II

1. Start engine and drive vehicle at a speed of 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Set voltmeter probes between ECM terminals 86 (HO2S2 signal) and engine ground.
4. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.48V at least once.
   If the voltage is above 0.48V at step 4, step 5 is not necessary.



5. Check the voltage when revving up to 6,000 rpm under no load. Or keep vehicle idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with “OD” OFF.
   The voltage should be below 0.43V at least once.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and installation

UBS0021A

HEATED OXYGEN SENSOR 2

Refer to EX-3, "Removal and Installation" .

DTC P1148 CLOSED LOOP CONTROL

PFP:22690

On Board Diagnosis Logic

UBS0021B

★ The closed loop control has the one trip detection logic.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1148	● The closed loop control function does not operate even when vehicle is driving in the specified condition.	● The air fuel ratio (A/F) sensor 1 circuit is open or shorted. ● Air fuel ratio (A/F) sensor 1 ● Air fuel ratio (A/F) sensor 1 heater

DTC P1148 is displayed with another DTC for air fuel ratio (A/F) sensor 1. Perform the trouble diagnosis for the corresponding DTC.

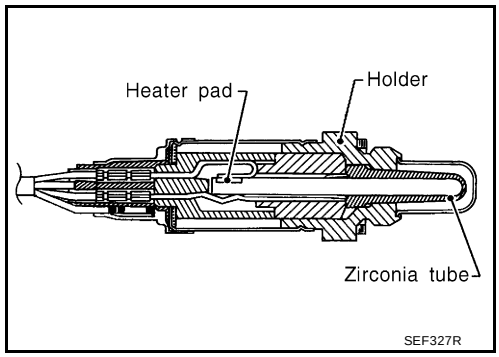
DTC P1169 HO2S3

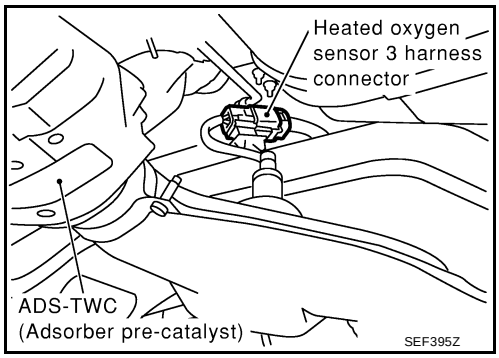
PFP:226A0

Component Description

UBS0021C

The heated oxygen sensor 3, after ADS-TWC (Adsorber pre-catalyst), monitors the oxygen level in the exhaust gas.
This sensor is used for recovery control of air fuel ratio after the fuel cut operation.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.





CONSULT-II Reference Value in Data Monitor Mode

UBS0021D

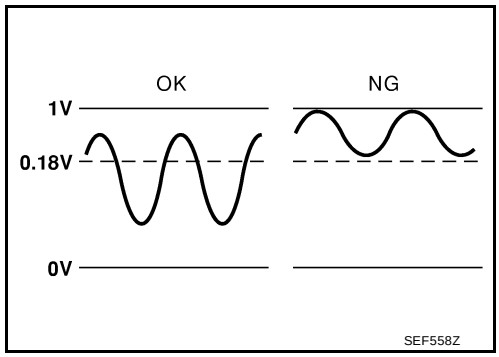
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S3 (B1)	● Engine: After warming up	Revving engine from idle to 3,000 rpm	0 - 0.3V ←→ Approx. 0.6 - 1.0V

On Board Diagnosis Logic

UBS0021E

The heated oxygen sensor 3 has a much longer switching time between rich and lean than air fuel ratio (A/F) sensor 1. The oxygen storage capacity before the TWC (Manifold three way catalyst) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 3, ECM monitors whether the minimum voltage of the sensor is sufficiently low during various driving conditions such as fuel-cut.



DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1169	● The minimum voltage from the sensor does not reach the specified voltage.	● Harness or connectors (The sensor circuit is open or shorted.) ● Heated oxygen sensor 3 ● Fuel pressure ● Injectors

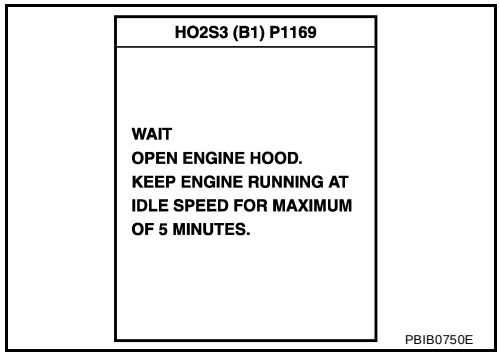
DTC Confirmation Procedure

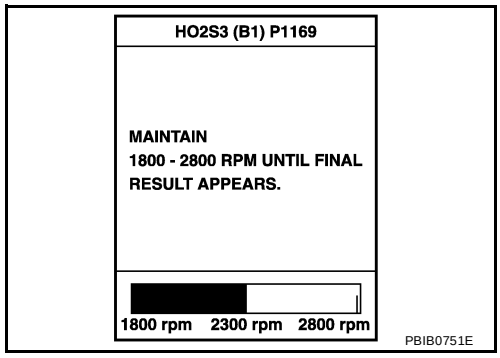
UBS0021F

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Open engine hood before conducting following procedure.

WITH CONSULT-II

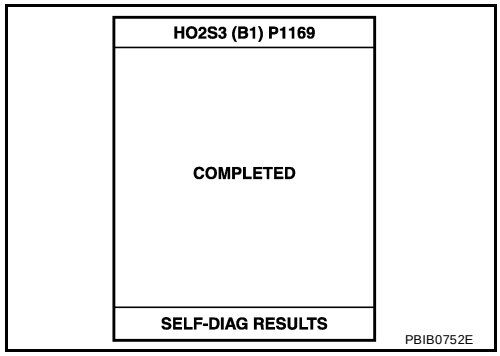
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Turn ignition switch “ON”.
4. Select “DATA MONITOR” mode with CONSULT-II.
5. Make sure that “COOLAN TEMP/S” indicates more than 70°C (158°F).
6. Select “HO2S3 (B1) P1169” of “HO2S3” in “DTC WORK SUPPORT” mode with CONSULT-II.





7. Start engine and follow the instruction of CONSULT-II.
8. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”.
   If NG is displayed, refer to EC-1050, "Diagnostic Procedure" .
   If “CANNOT BE DIAGNOSED” is displayed, perform the following.

- Stop engine and cool down until “COOLAN TEMP/S” indicates less than 70°C (158°F).
- Turn ignition switch “ON”.
- Select “DATA MONITOR” mode with CONSULT-II.
- Start engine.
- Return to step 6 again when the “COOLAN TEMP/S” reaches to 70°C (158°F).



Overall Function Check

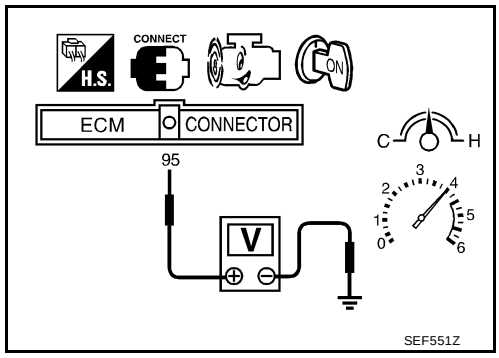
UBS0021G

Use this procedure to check the overall function of the rear heated oxygen sensor circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

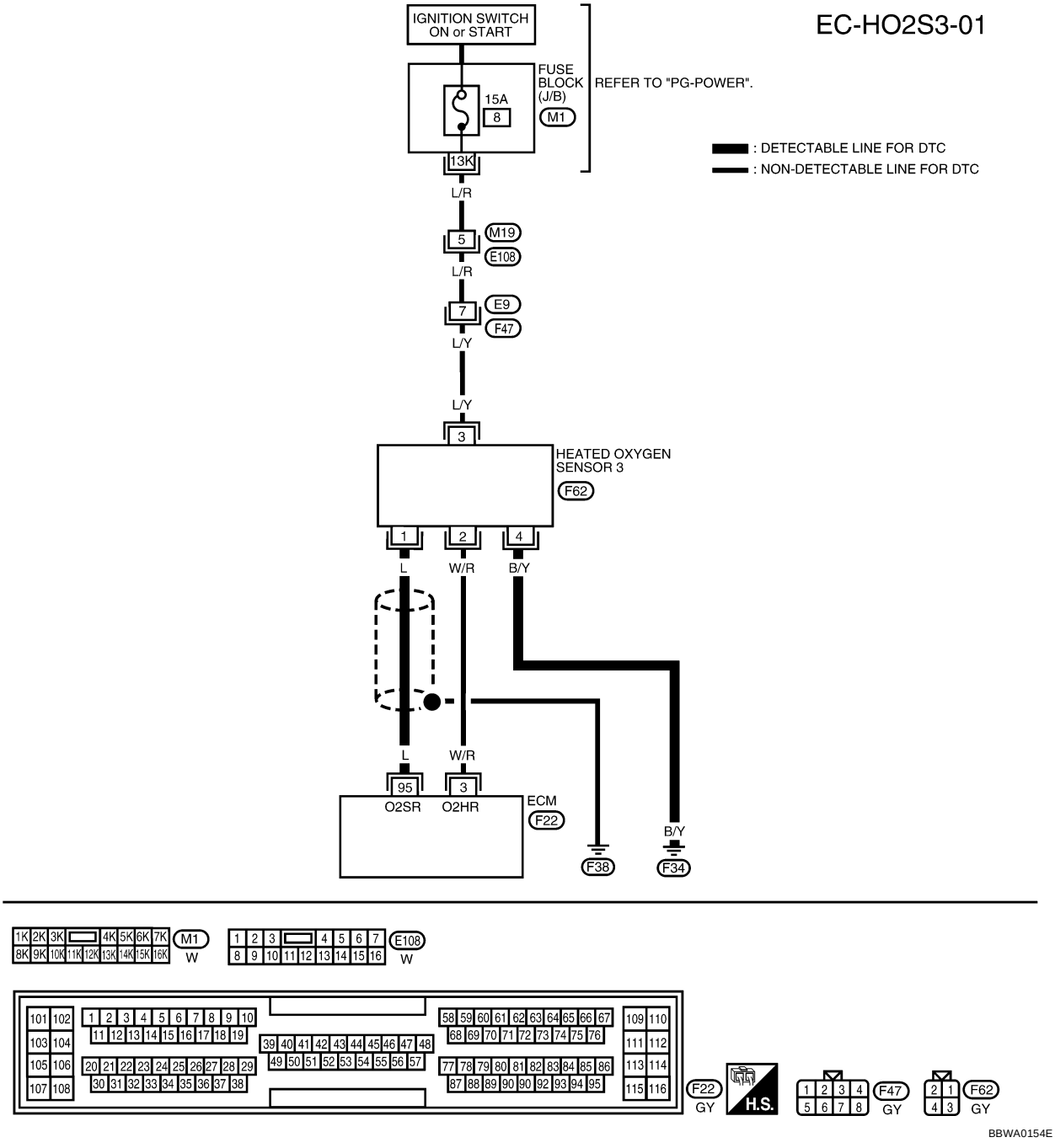
1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.

2. Stop vehicle with engine running.
3. Set voltmeter probes between ECM terminals 95 (HO2S3 signal) and engine ground.
4. Check the voltage when revving engine up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be below 0.43V at least once during this procedure.
   If the voltage can be confirmed in step 4, step 5 is not necessary.
5. Keep vehicle idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with “OD” OFF.
   The voltage should be below 0.43V at least once during this procedure.
6. If NG, go to EC-1050, "Diagnostic Procedure" .



Wiring Diagram

UBS0021H



ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
95	L	HEATED OXYGEN SENSOR 3	ENGINE RUNNING FROM IDLE UP TO 2,000 RPM UNDER WARM-UP CONDITION	0 - APPROX. 1.0V

SEF724YB

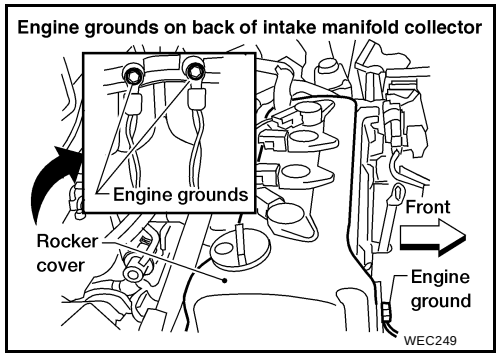
Diagnostic Procedure

UBS0021I

1. RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

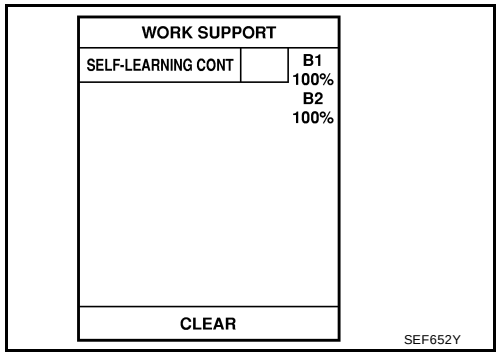
>> GO TO 2.



2. CLEAR THE SELF-LEARNING DATA

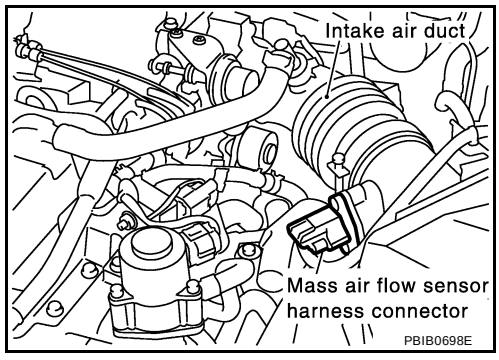
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 detected? Is it difficult to start engine?



Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF”.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 3 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC P0102 is displayed.
6. Erase the 1st trip DTC memory. Refer to EC-637, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 detected? Is it difficult to start engine?



Yes or No

Yes >> Perform trouble diagnosis for DTC P0172. Refer to EC-809, "DTC P0172 FUEL INJECTION SYSTEM FUNCTION" .

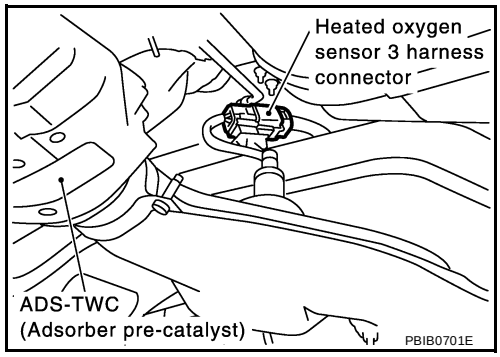
No >> GO TO 3.

3. CHECK INPUT SIGNAL CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect heated oxygen sensor 3 harness connector and ECM harness connector.
3. Check harness continuity between ECM terminal 95 and HO2S3 terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.
4. Check harness continuity between ECM terminal 95 or HO2S3 terminal 1 and ground.
   Refer to Wiring Diagram.

   Continuity should not exist.



5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK GROUND CIRCUIT

1. Check harness continuity between HO2S3 terminal 4 and body ground.
   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 HEATED OXYGEN SENSOR 2

Refer to EC-1051, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace corresponding heated oxygen sensor 3.

6. CHECK INTERMITTENT INCIDENT

Perform EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

UBS0021J

HEATED OXYGEN SENSOR 3

With CONSULT-II

1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.

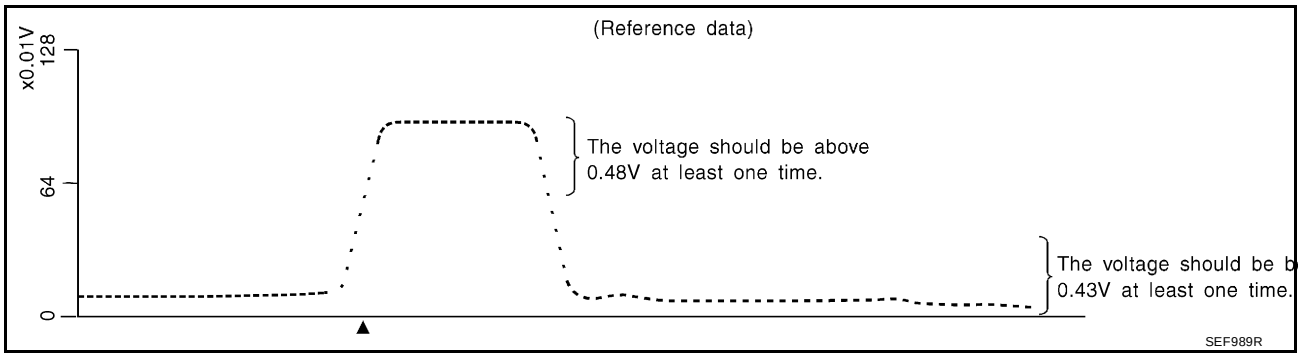
3. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S3 (B1)” as the monitor item with CONSULT-II.
4. Check “HO2S3 (B1)” at idle speed when adjusting “FUEL INJECTION” to ±25%.
   “HO2S3 (B1)” should be above 0.48V at least once when the “FUEL INJECTION” is +25%.
   “HO2S3 (B1)” should be below 0.43V at least once when the “FUEL INJECTION” is −25%.

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
A/F SEN1 (B1)	XXX V
HO2S2 (B1)	XXX V
HO2S3 (B1)	XXX V

SEF519Z

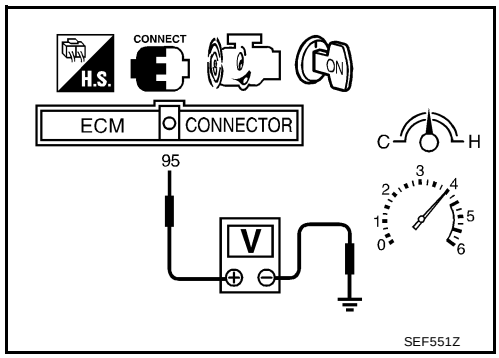
CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**



Without CONSULT-II

1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Set voltmeter probes between ECM terminals 95 (HO2S3 signal) and engine ground.
4. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.48V at least once.
   If the voltage is above 0.48V at step 4, step 5 is not necessary.



5. Check the voltage when revving up to 6,000 rpm under no load. Or keep vehicle idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with “OD” OFF.
   The voltage should be below 0.43V at least once.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

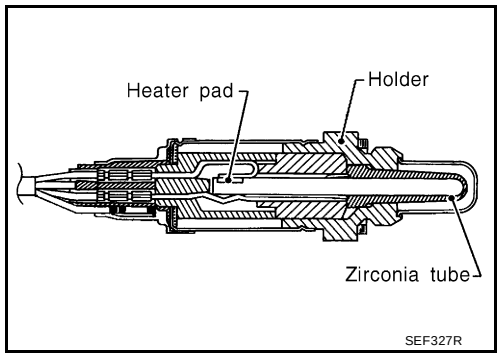
DTC P1170 HO2S3

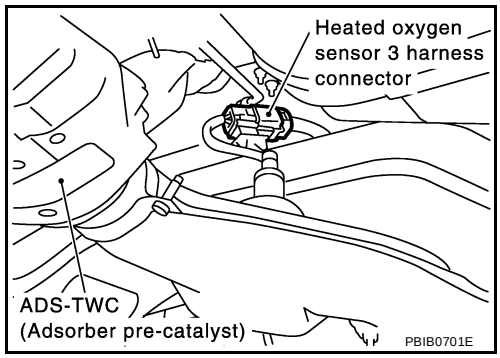
PFP:226A0

Component Description

UBS0021K

The heated oxygen sensor 3, after ADS-TWC (Adsorber pre-catalyst) monitors the oxygen level in the exhaust gas.
This sensor is used for recovery control of air fuel ratio after the fuel cut operation.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.





CONSULT-II Reference Value in Data Monitor Mode

UBS0021L

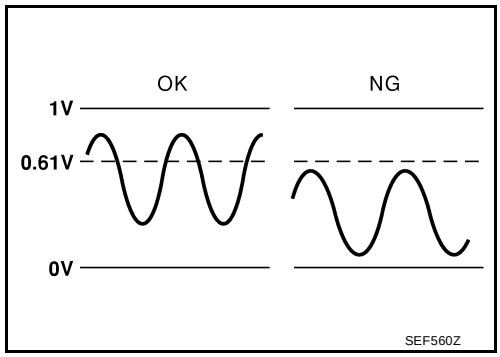
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S3 (B1)	● Engine: After warming up	Revving engine from idle to 3,000 rpm	0 - 0.3V ←→ Approx. 0.6 - 1.0V

On Board Diagnosis Logic

UBS0021M

The heated oxygen sensor 3 has a much longer switching time between rich and lean than air fuel ratio (A/F) sensor 1. The oxygen storage capacity before the TWC (Manifold three way catalyst) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 3, ECM monitors whether the maximum voltage of the sensor is sufficiently high during various driving conditions such as fuel-cut.



DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1170	● The maximum voltage from the sensor does not reach the specified voltage.	● Harness or connectors (The sensor circuit is open or shorted.) ● Heated oxygen sensor 3 ● Fuel pressure ● Injectors ● Intake air leaks

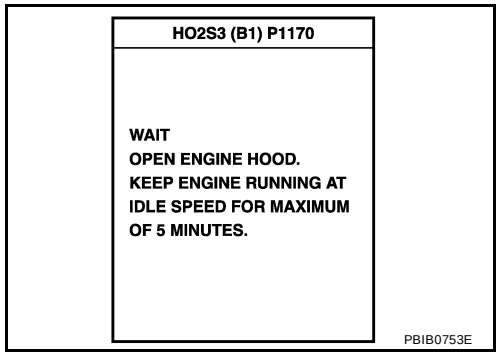
DTC Confirmation Procedure

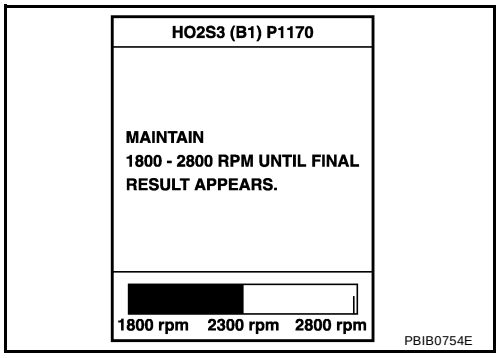
UBS0021N

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Open engine hood before conducting following procedure.

WITH CONSULT-II

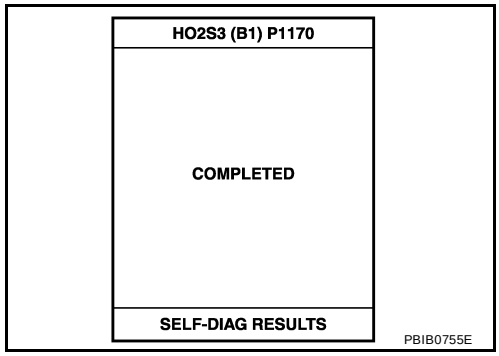
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Turn ignition switch “ON”.
4. Select “DATA MONITOR” mode with CONSULT-II.
5. Make sure that “COOLAN TEMP/S” indicates more than 70°C (158°F).
6. Select “HO2S3 (B1) P1170” of “HO2S3” in “DTC WORK SUPPORT” mode with CONSULT-II.





7. Start engine and follow the instruction of CONSULT-II.
8. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”.
   If NG is displayed, refer to EC-1057, "Diagnostic Procedure" .
   If “CANNOT BE DIAGNOSED” is displayed, perform the following.

- Stop engine and cool down until “COOLAN TEMP/S” indicates less than 70°C (158°F).
- Turn ignition switch “ON”.
- Select “DATA MONITOR” mode with CONSULT-II.
- Start engine.
- Return to step 6 again when the “COOLAN TEMP/S” reaches to 70°C (158°F).



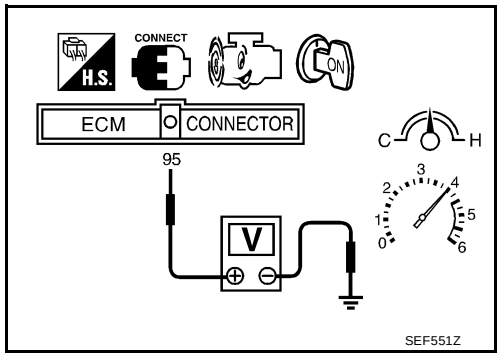
Overall Function Check

UBS0021O

Use this procedure to check the overall function of the rear heated oxygen sensor circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

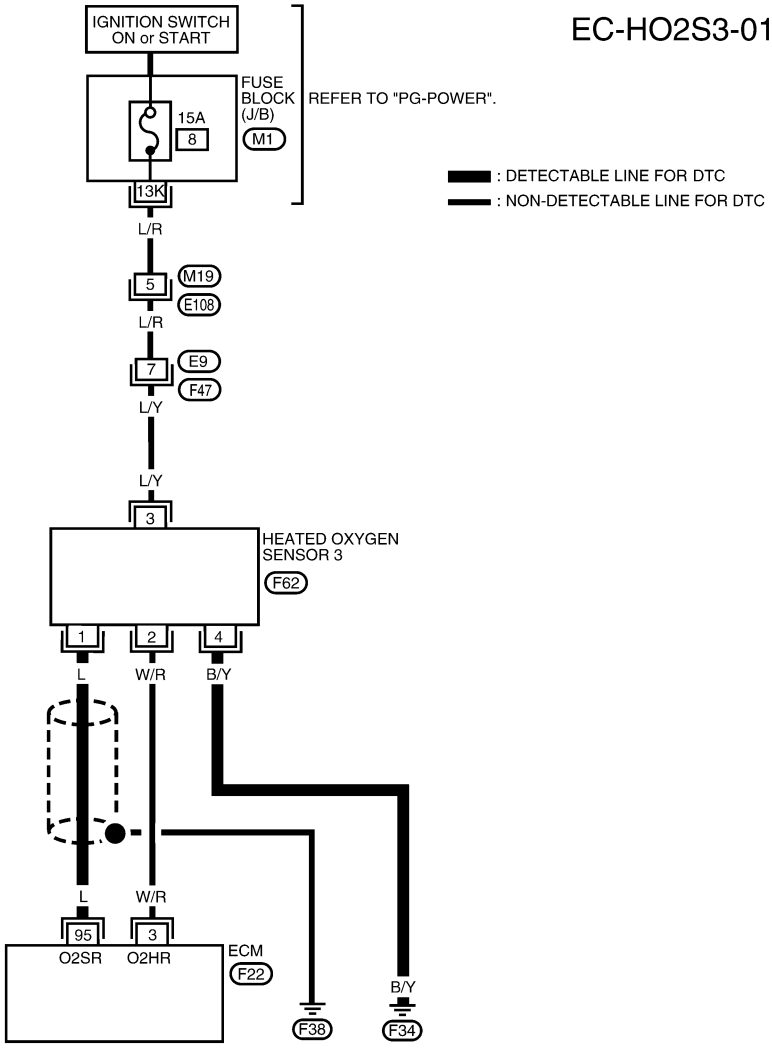
1. Start engine and drive vehicle at a speed of 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Set voltmeter probes between ECM terminals 95 (HO2S3 signal) and engine ground.
4. Check the voltage when revving engine up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.48V at least once during this procedure.
   If the voltage can be confirmed in step 4, step 5 is not necessary.

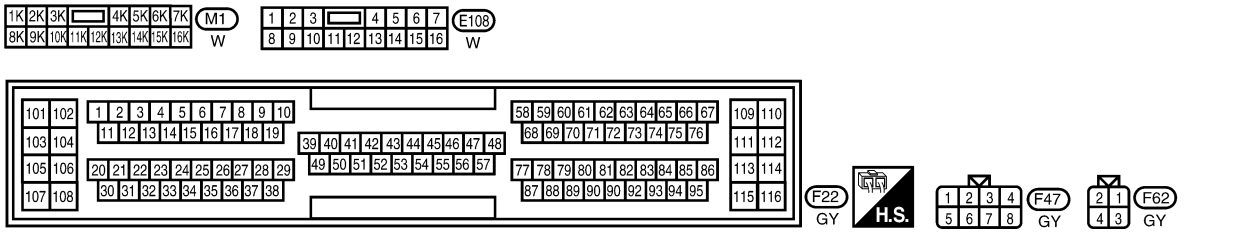


5. Keep vehicle idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with “OD” OFF.
   The voltage should be above 0.48V at least once during this procedure.
6. If NG, go to EC-1057, "Diagnostic Procedure" .

Wiring Diagram

UBS0021P





BBWA0154E

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
95	L	HEATED OXYGEN SENSOR 3	ENGINE RUNNING FROM IDLE UP TO 2,000 RPM UNDER WARM-UP CONDITION	0 - APPROX. 1.0V

SEF724YB

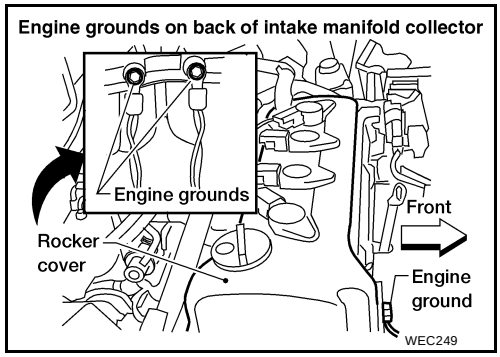
Diagnostic Procedure

UBS0021Q

1. RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

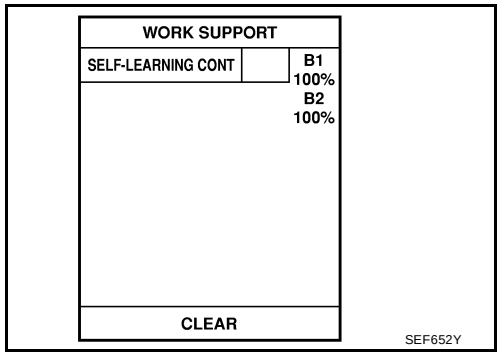
>> GO TO 2.



2. CLEAR THE SELF-LEARNING DATA

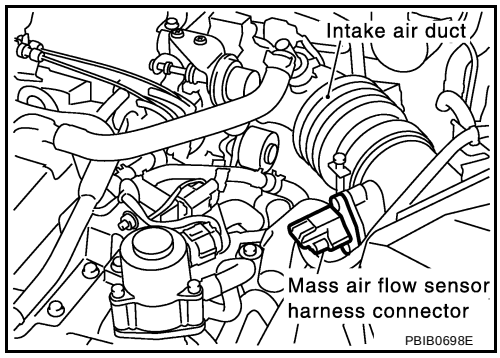
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 detected? Is it difficult to start engine?



Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF”.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 3 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC P0102 is displayed.
6. Erase the 1st trip DTC memory. Refer to EC-637, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 detected? Is it difficult to start engine?



Yes or No

Yes >> Perform trouble diagnosis for DTC P0171. Refer to EC-802, "DTC P0171 FUEL INJECTION SYSTEM FUNCTION" .

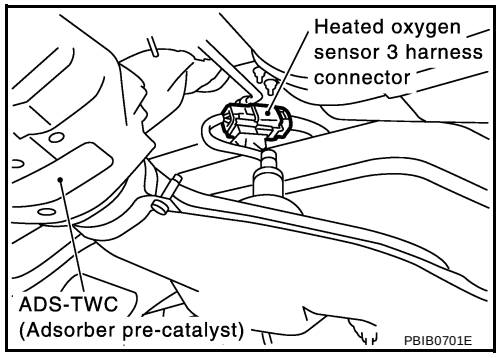
No >> GO TO 3.

3. CHECK INPUT SIGNAL CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect heated oxygen sensor 3 harness connector and ECM harness connector.
3. Check harness continuity between ECM terminal 95 and HO2S3 terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.
4. Check harness continuity between ECM terminal 95 or HO2S3 terminal 1 and ground.
   Refer to Wiring Diagram.

   Continuity should not exist.



5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK GROUND CIRCUIT

1. Check harness continuity between HO2S3 terminal 4 and engine ground.
   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 HEATED OXYGEN SENSOR 2

Refer to EC-1058, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace corresponding heated oxygen sensor 3.

6. CHECK INTERMITTENT INCIDENT

Perform EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

UBS0021R

HEATED OXYGEN SENSOR 3

With CONSULT-II

1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.

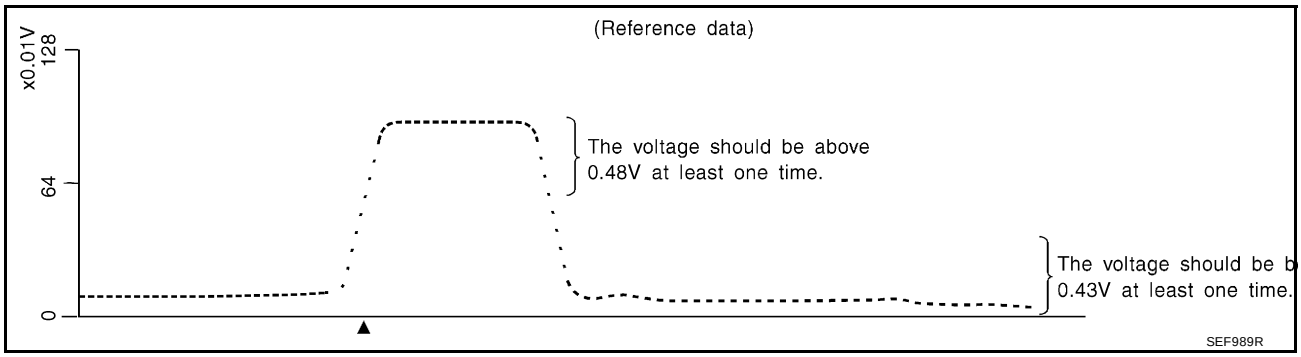
3. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S3 (B1)” as the monitor item with CONSULT-II.
4. Check “HO2S3 (B1)” at idle speed when adjusting “FUEL INJECTION” to ±25%.
   “HO2S3 (B1)” should be above 0.48V at least once when the “FUEL INJECTION” is +25%.
   “HO2S3 (B1)” should be below 0.43V at least once when the “FUEL INJECTION” is −25%.

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
A/F SEN1 (B1)	XXX V
HO2S2 (B1)	XXX V
HO2S3 (B1)	XXX V

SEF519Z

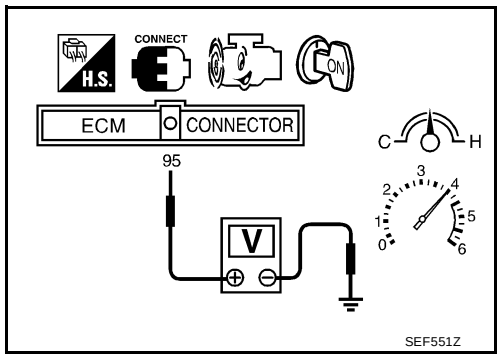
CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**



WIthout COSULT-II

1. Start engine and drive vehicle at a speed of 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Set voltmeter probes between ECM terminals 95 (HO2S3 signal) and engine ground.
4. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.48V at least once.
   If the voltage is above 0.48V at step 4, step 5 is not necessary.



5. Check the voltage when revving up to 6,000 rpm under no load. Or keep vehicle idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with “OD” OFF.
   The voltage should be below 0.43V at least once.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

DTC P1217 ENGINE OVER TEMPERATURE

PFP:00000

System Description

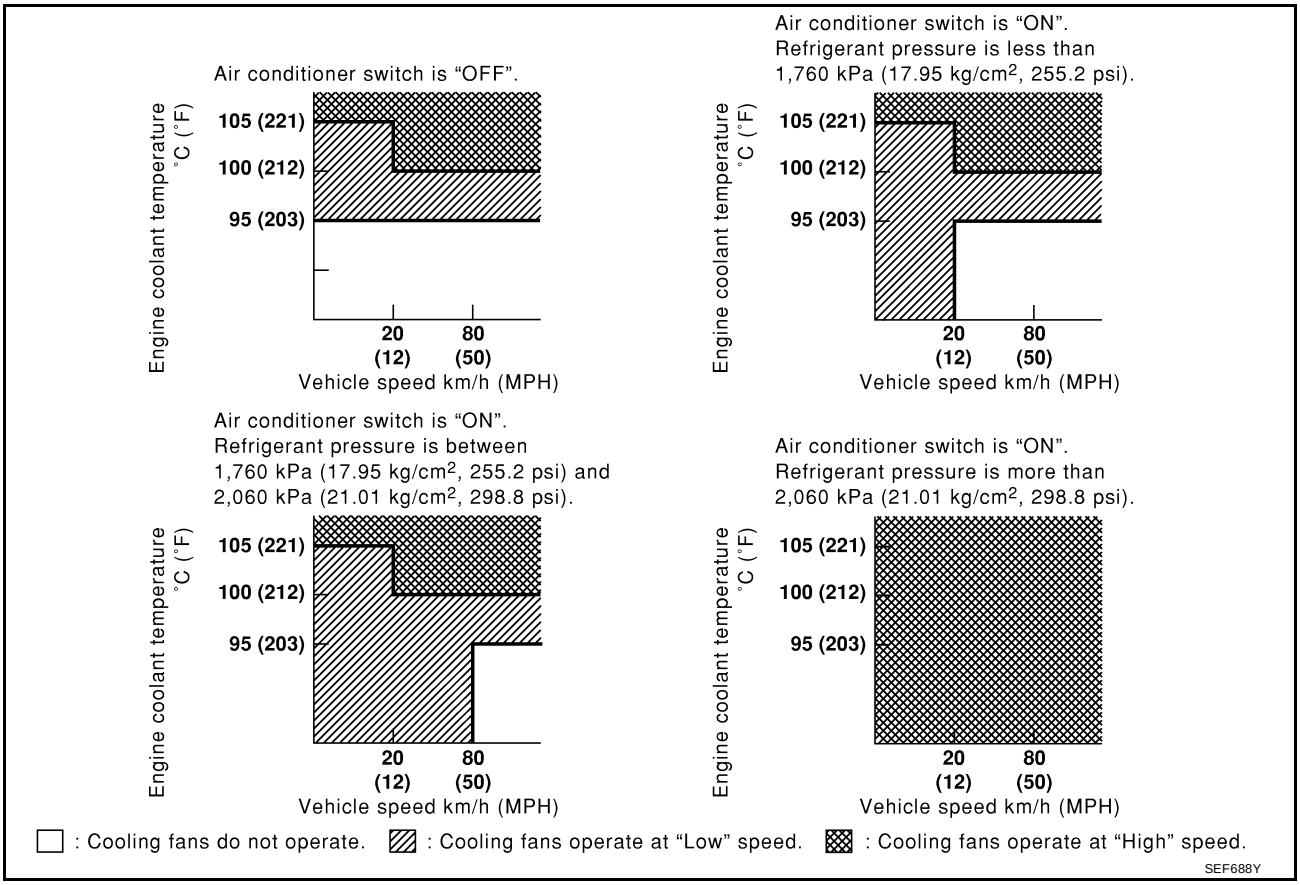
UBS0021S

COOLING FAN CONTROL

Sensor	Input Signal to ECM	ECM function	Actuator
Vehicle speed sensor	Vehicle speed	Cooling fan control	Cooling fan relay(s)
Engine coolant temperature sensor	Engine coolant temperature		
Air conditioner switch	Air conditioner “ON” signal		
Ignition switch	Start signal		
Refrigerant pressure sensor	Refrigerant pressure		

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].

OPERATION



CONSULT-II Reference Value in Data Monitor Mode

UBS0021T

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

MONITOR ITEM	CONDITION		SPECIFICATION
COOLING FAN	● After warming up engine, idle the engine. ● Air conditioner switch: OFF	Engine coolant temperature is 94°C (201°F) or less	OFF
		Engine coolant temperature is between 95°C (203°F) and 104°C (219°F)	LOW
		Engine coolant temperature is 105°C (221°F) or more	HIGH

On Board Diagnosis Logic

UBS0021U

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.

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1217	● Cooling fan does not operate properly (Overheat). ● Cooling fan system does not operate properly (Overheat). ● Engine coolant was not added to the system using the proper filling method.	● Harness or connectors (The cooling fan circuit is open or shorted.) ● Cooling fan ● Radiator hose ● Radiator ● Radiator cap ● Water pump ● Thermostat For more information, refer to EC-1072, "Main 12 Causes of Overheating" .

CAUTION:
When a malfunction is indicated, be sure to replace the coolant. Refer to MA-15, "Changing Engine Coolant" . Also, replace the engine oil. Refer to MA-19, "Changing Engine Oil" .

1. **Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute. Be sure to use coolant with the proper mixture ratio. Refer to MA-14, "Anti-freeze Coolant Mixture Ratio" .**
2. **After refilling coolant, run engine to ensure that no water-flow noise is emitted.**

Overall Function Check

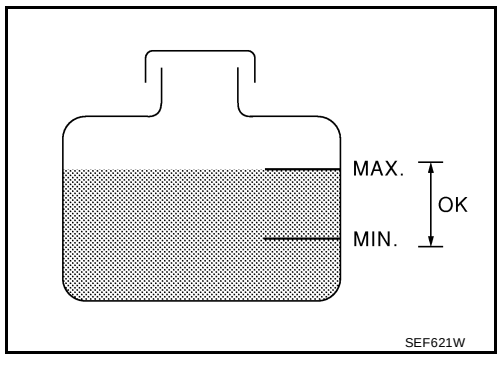
UBS0021V

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-1064, "Diagnostic Procedure" .
2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to EC-1064, "Diagnostic Procedure" .
3. Turn ignition switch “ON”.



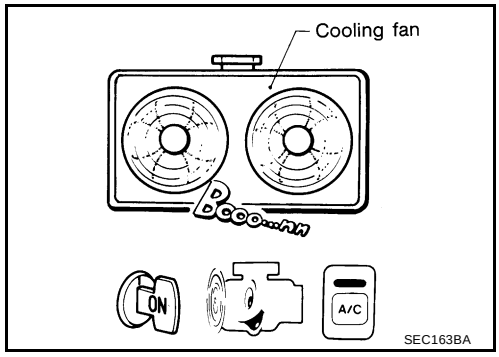
4. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-II.
5. If the results are NG, go to EC-1064, "Diagnostic Procedure" .

ACTIVE TEST	
COOLING FAN	OFF
MONITOR	
COOLAN TEMP/S	XXX °C

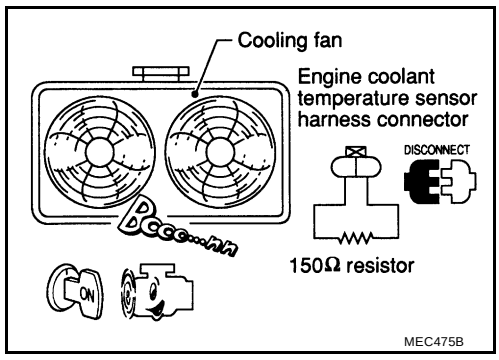
SEF646X

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-1064, "Diagnostic Procedure" .
2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to EC-1064, "Diagnostic Procedure" .
3. Start engine.
   Be careful not to overheat engine.
4. Set temperature control lever to full cold position.
5. Turn air conditioner switch “ON”.
6. Turn blower fan switch “ON”.
7. Run engine at idle for a few minutes with air conditioner operating.
   Be careful not to overheat engine.
8. Make sure that cooling fan operates at low speed.
   If NG, go to EC-1064, "Diagnostic Procedure" .
   If OK, go to the following step.
9. Turn ignition switch “OFF”.
10. Turn air conditioner switch and blower fan switch “OFF”.
11. Disconnect engine coolant temperature sensor harness connector.
12. Connect 150Ω resistor to engine coolant temperature sensor harness connector.
13. Restart engine and make sure that cooling fan operates at higher speed than low speed.
    Be careful not to overheat engine.
14. If NG, go to EC-1064, "Diagnostic Procedure" .



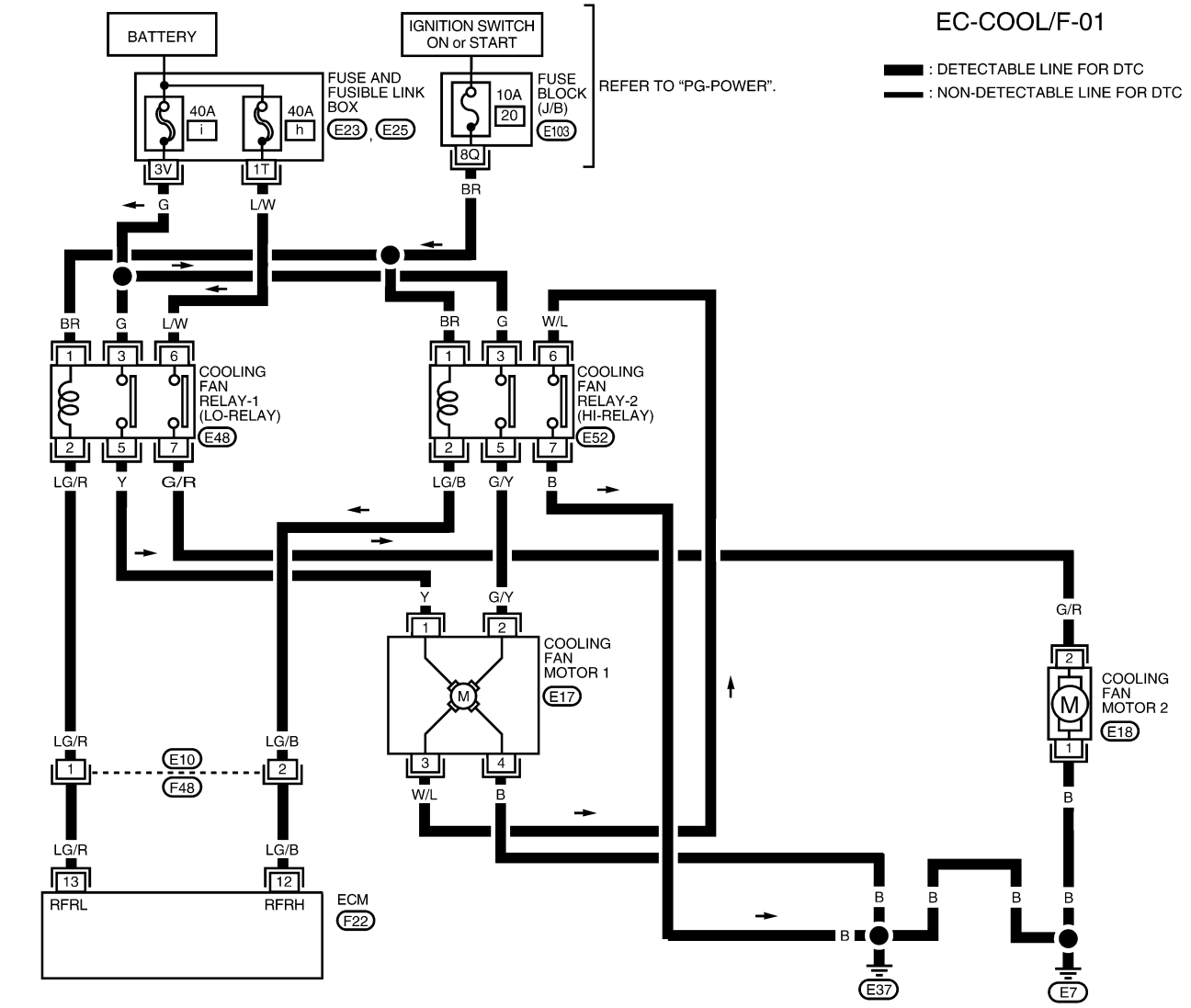
SEC163BA

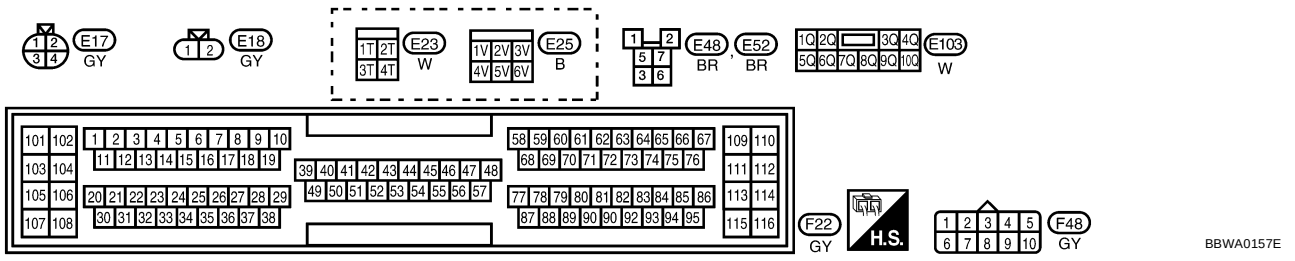


MEC475B

Wiring Diagram

UBS0021W





ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
12	LG/B	COOLING FAN RELAY (HIGH)	ENGINE RUNNING WITH COOLING FAN NOT OPERATING	BATTERY VOLTAGE
			ENGINE RUNNING WITH COOLING FAN OPERATING AT HIGH SPEED	0 - 0.6V
13	LG/R	COOLING FAN RELAY (LOW)	ENGINE RUNNING WITH COOLING FAN NOT OPERATING	BATTERY VOLTAGE
			ENGINE RUNNING WITH COOLING FAN OPERATING AT LOW SPEED	0 - 0.6V

SEF571Y

Diagnostic Procedure

UBS0021X

1. INSPECTION START

Do you have CONSULT-II?

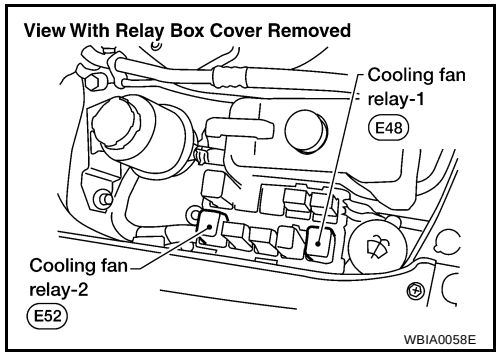
Yes or No

Yes >> GO TO 2.
No >> GO TO 4.

2. CHECK COOLING FAN LOW SPEED OPERATION

With CONSULT-II

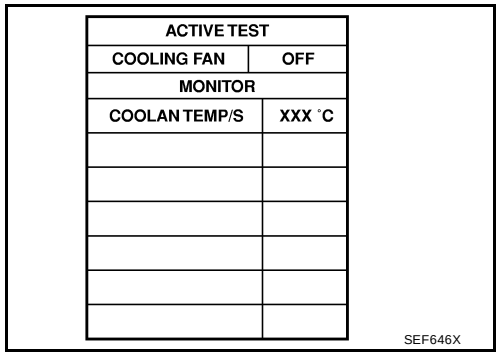
1. Disconnect cooling fan relay-2.
2. Turn ignition switch “ON”.



3. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-II.
4. 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 PROCEDURE A, EC-1068 .)



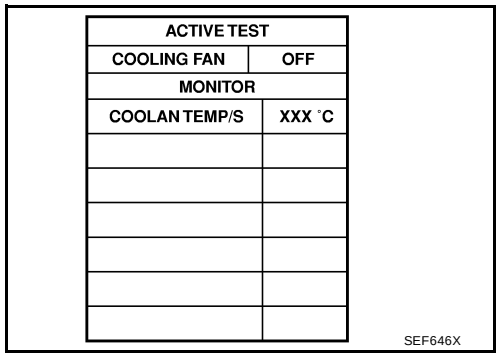
3. CHECK COOLING FAN HIGH SPEED OPERATION

With CONSULT-II

1. Turn ignition switch “OFF”.
2. Reconnect cooling fan relay-2.
3. Turn ignition switch “ON”.
4. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-II.
5. Make sure that cooling fan-1 operates at high speed.

OK or NG

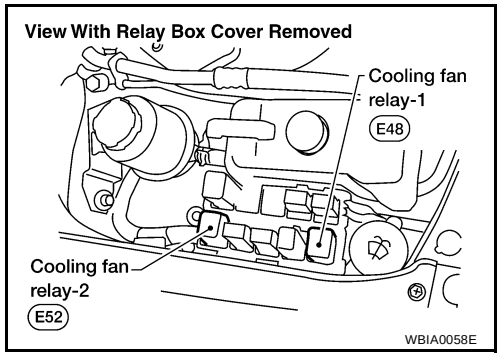
OK >> GO TO 6.
NG >> Check cooling fan high speed control circuit. (Go to PROCEDURE B, EC-1071 .)



4. CHECK COOLING FAN LOW SPEED OPERATION

Without CONSULT-II

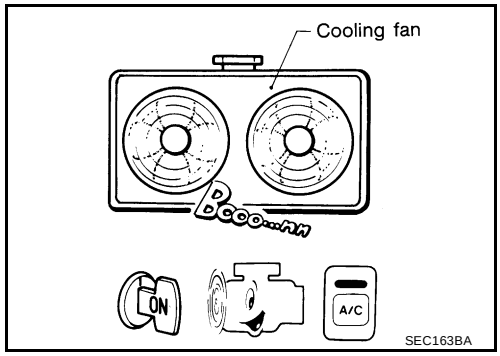
1. Disconnect cooling fan relays-2.
2. Start engine and let it idle.
3. Set temperature lever at full cold position.
4. Turn air conditioner switch “ON”.
5. Turn blower fan switch “ON”.



6. 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 PROCEDURE A, EC-1068 .)



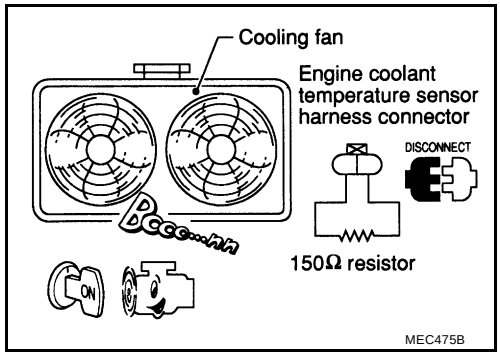
5. CHECK COOLING FAN HIGH SPEED OPERATION

Without CONSULT-II

1. Turn ignition switch “OFF”.
2. Reconnect cooling fan relay-2.
3. Turn air conditioner switch and blower fan switch “OFF”.
4. Disconnect engine coolant temperature sensor harness connector.
5. Connect 150Ω resistor to engine coolant temperature sensor harness connector.
6. Restart engine and make sure that cooling fan-1 operates at high speed.

OK or NG

OK >> GO TO 6.
NG >> Check cooling fan high speed control circuit. (Go to PROCEDURE B, EC-1071 .)

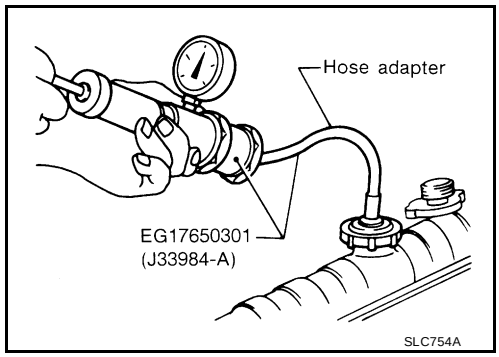


6. CHECK COOLING SYSTEM FOR LEAK

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 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following for leak.

- Hose
- Radiator
- Water pump (Refer to CO-10, "WATER PUMP" .)

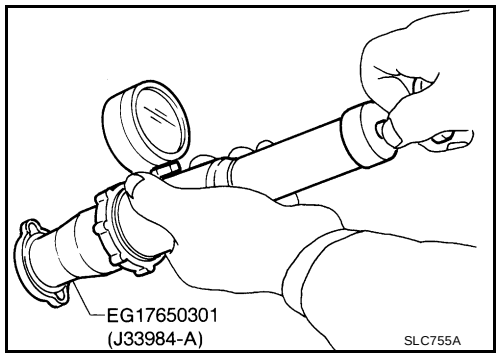
>> Repair or replace.

8. 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 9.
NG >> Replace radiator cap.

9. CHECK THERMOSTAT

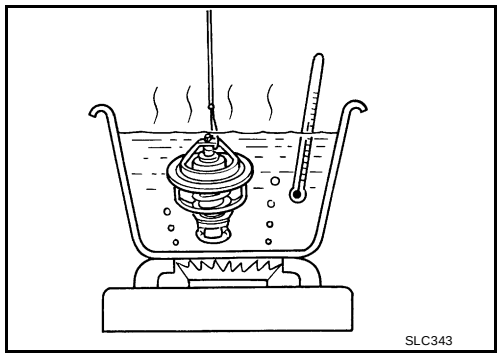
1. Check valve seating condition at normal room temperatures.
It should seat tightly.
2. Check valve opening temperature and valve lift.

Valve opening temperature:

76.5°C (170°F) [standard]

Valve lift:

More than 9 mm/90°C (0.35 in/194°F)



3. Check if valve is closed at 5°C (9°F) below valve opening temperature.

For details, refer toCO-12, "THERMOSTAT AND THERMOSTAT HOUSING" .

OK or NG

OK >> GO TO 10.
NG >> Replace thermostat.

10. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-1073, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> Replace engine coolant temperature sensor.

11. CHECK MAIN 12 CAUSES

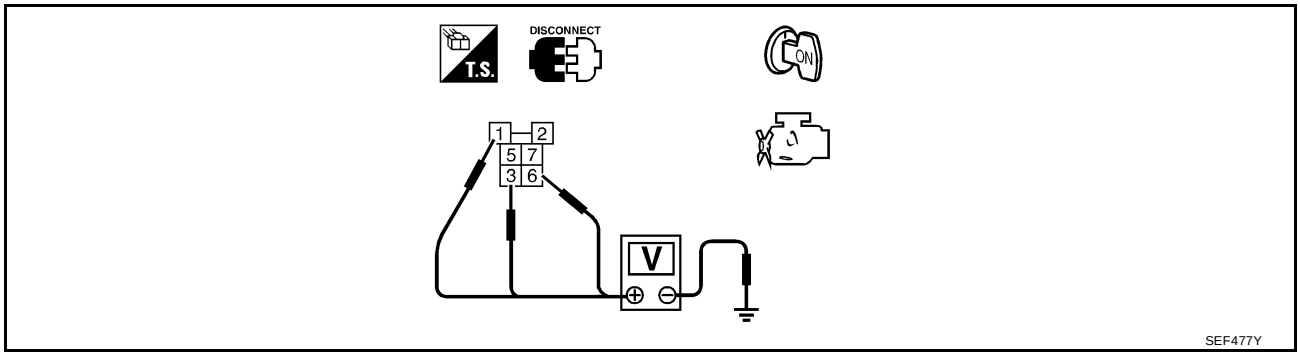
If the cause cannot be isolated, go to EC-1072, "Main 12 Causes of Overheating" .

>> **INSPECTION END**

PROCEDURE A

1. CHECK POWER SUPPLY

1. Turn ignition switch “OFF”.
2. Disconnect cooling fan relay-1.
3. Turn ignition switch “ON”.
4. Check voltage between cooling fan relay-1 terminals 1, 3, 6 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.

- 10A fuse
- 40A fusible links
- Harness for open or short between cooling fan relay-1 and fuse
- Harness for open or short between cooling fan relay-1 and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

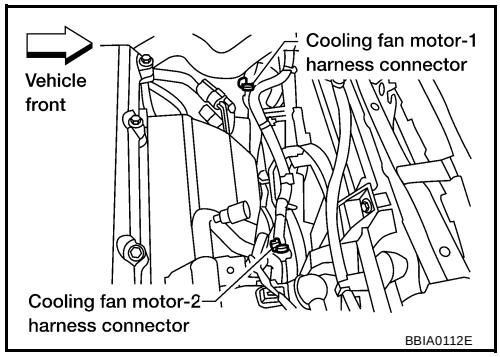
3. CHECK COOLING FAN GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect cooling fan motor-1 harness connector and cooling fan motor-2 harness connector.
3. Check harness continuity between cooling fan relay-1 terminal 5 and cooling fan motor-1 terminal 1, cooling fan motor-1 terminal 4 and body 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 cooling fan relay-1 terminal 7 and cooling fan motor-2 terminal 2, cooling fan motor-2 terminal 1 and body 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 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK OUTPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 13 and cooling fan relay-1 terminal 2.
   Refer to Wiring Diagram.

   Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E10, F48
- Harness for open or short between cooling fan relay-1 and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK COOLING FAN RELAY-1

Refer to EC-1073, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace cooling fan relay.

7. CHECK COOLING FAN MOTORS-1 AND -2

Refer to EC-1073, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace cooling fan motors.

8. CHECK INTERMITTENT INCIDENT

Perform EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

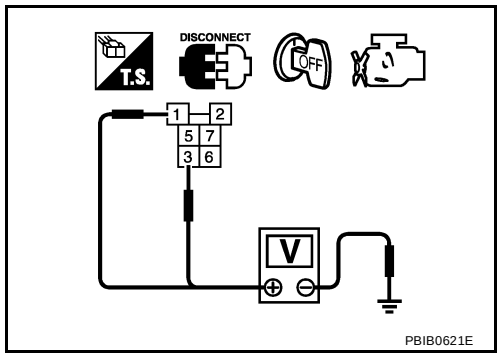
>> **INSPECTION END**

PROCEDURE B

1. CHECK COOLING FAN POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect cooling fan relay-2.
3. Turn ignition switch “ON”.
4. Check voltage between cooling fan relay-2 terminals 1, 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- Fuse and fusible link box connector E25
- Fuse block (J/B) connector E103
- 10A fuse
- 40A fusible link
- Harness for open or short between cooling fan relay-2 and fuse
- Harness for open or short between cooling fan relay-2 and fusible link

>> Repair harness or connectors.

3. CHECK COOLING FAN GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect cooling fan motor-2 harness connector.
3. Check harness continuity between cooling fan relay-2 terminal 5 and cooling fan motor-1 terminal 2, cooling fan relay-2 terminal 6 and cooling fan motor-1 terminal 3, cooling fan relay-2 terminal 7 and body ground.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK COOLING FAN OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 12 and cooling fan relay-2 terminal 2. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E10, F48
- Harness for open or short between cooling fan relay-2 and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK COOLING FAN RELAY-2

Refer to EC-288, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace cooling fan relays.

7. CHECK COOLING FAN MOTORS-1 AND -2

Refer to EC-288, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace cooling fan motors.

8. CHECK INTERMITTENT INCIDENT

Perform EC-147, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Main 12 Causes of Overheating

UBS0021Y

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	● Blocked radiator ● Blocked condenser ● Blocked radiator grille ● Blocked bumper	● Visual	No blocking	—
	2	● Coolant mixture	● Coolant tester	50 - 50% coolant mixture	See MA-13, "RECOMMENDED FLUIDS AND LUBRICANTS" .
	3	● Coolant level	● Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	See MA-15, "Changing Engine Coolant" .
	4	● Radiator cap	● Pressure tester	59 - 98 kPa (0.6 - 1.0 kg/cm^2 , 9 - 14 psi) (Limit)	SeeCO-8, "System Check" .

Engine	Step	Inspection item	Equipment	Standard	Reference page
ON*2	5	● Coolant leaks	● Visual	No leaks	See CO-8, "System Check" .
ON*2	6	● Thermostat	● Touch the upper and lower radiator hoses	Both hoses should be hot	See CO-12, "THERMOSTAT AND THERMOSTAT HOUSING" and CO-14, "RADIATOR" .
ON*1	7	● Cooling fan	● CONSULT-II	Operating	See trouble diagnosis for DTC P0217 (EC-821).
OFF	8	● Combustion gas leak	● Color checker chemical tester 4 Gas analyzer	Negative	—
ON*3	9	● Coolant temperature gauge	● Visual	Gauge less than 3/4 when driving	—
		● Coolant overflow to reservoir tank	● Visual	No overflow during driving and idling	See MA-15, "Changing Engine Coolant" .
OFF*4	10	● Coolant return from reservoir tank to radiator	● Visual	Should be initial level in reservoir tank	See MA-15, "ENGINE MAINTENANCE (QG18DE ENGINE)" .
OFF	11	● Cylinder head	● Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	See EM-40, "Inspection" .
	12	● Cylinder block and pistons	● Visual	No scuffing on cylinder walls or piston	See EM-60, "Inspection" .

*1: Turn the ignition switch ON.
*2: Engine running at 3,000 rpm for 10 minutes.
*3: Drive at 90 km/h (56 MPH) for 30 minutes and then let idle for 10 minutes.
*4: After 60 minutes of cool down time.
For more information, refer to CO-5, "OVERHEATING CAUSE ANALYSIS" .

Component Inspection

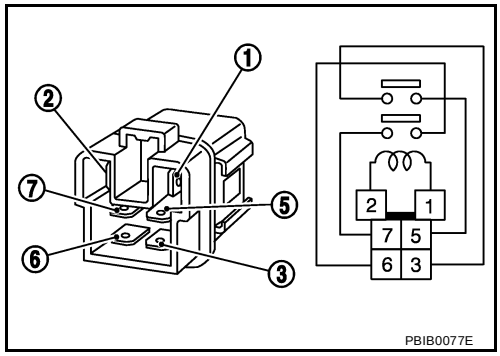
UBS0021Z

COOLING FAN RELAYS-1 AND -2

Check continuity between terminals 3 and 5, 6 and 7.

Conditions	Continuity
12V direct current supply between terminals 1 and 2	Yes
No current supply	No

If NG, replace relay.

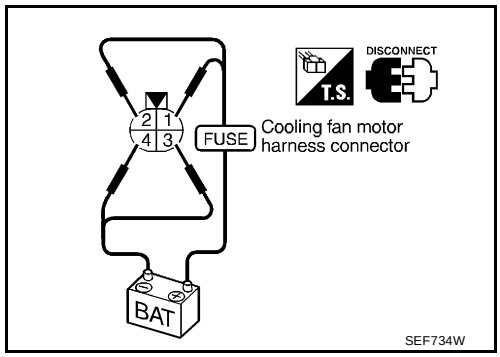


COOLING FAN MOTOR-1

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
	High	1, 2	3, 4

Cooling fan motor should operate.
If NG, replace cooling fan motor.

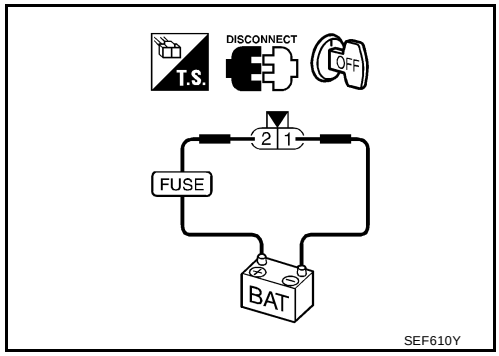


COOLING FAN MOTOR-2

1. Disconnect cooling fan motor harness connectors.

2. Supply cooling fan motor terminals with battery voltage and check operation.

	Terminals	
	(+)	(–)
Cooling fan motor	2	1



Cooling fan motor should operate.
If NG, replace cooling fan motor.

DTC P1271 A/F SENSOR

PFP:22693

Component Description

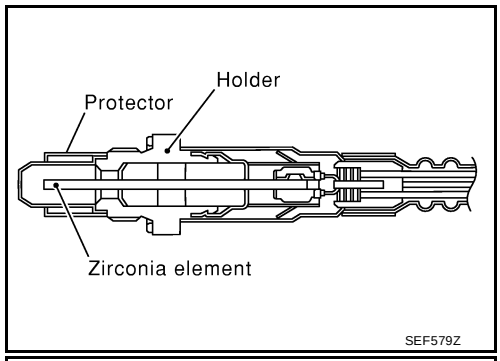
UBS00220

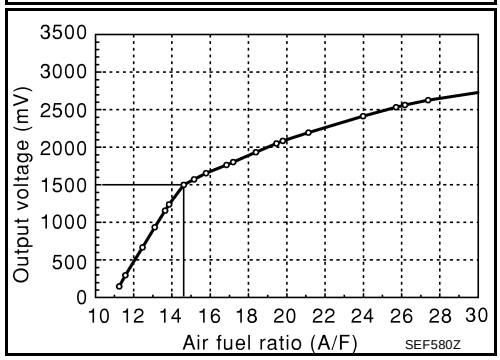
The A/F sensor is a planar dual-cell limit current sensor. The sensor element of the A/F sensor is the combination of a Nernst concentration cell (sensor cell) with an oxygen-pump cell, which transports ions. It has a heater in the element.

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 λ 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 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

UBS00221

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
A/F SEN1 (B1)	● Engine: Idle speed after warming up	Fluctuates around 1.5V

On Board Diagnosis Logic

UBS00222

To judge the malfunction, the diagnosis checks that the A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal is not inordinately low.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1271	● The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 0V.	● Harness or connectors (The sensor circuit is open or shorted.) ● Air fuel ratio (A/F) sensor 1

DTC Confirmation Procedure

UBS00223

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.

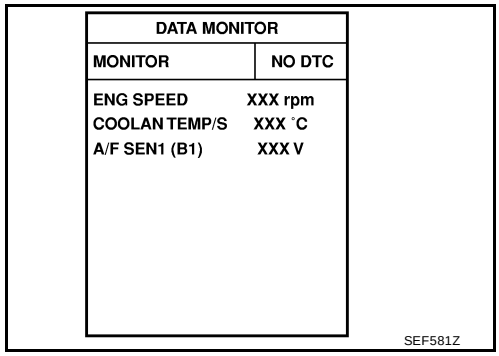
TESTING CONDITION:

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)” in “DATA MONITOR” mode with CONSULT-II.

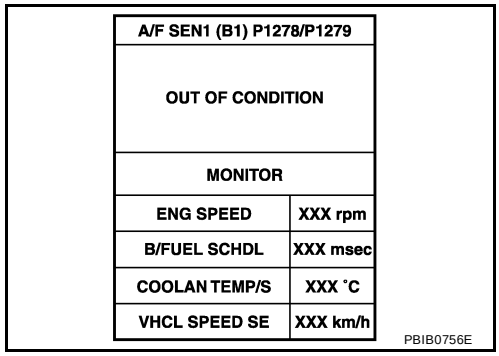
3. Check “A/F SEN1 (B1)” indication.
   If the indication is constantly approx. 0V, go to EC-1079, "Diagnostic Procedure" .
   If the indication is not constantly approx. 0V, go to next step.
4. Select “A/F SEN1 (B1) P1278/P1279” of “A/F SEN1” in “DTC WORK SUPPORT” mode.
5. Touch “START”.



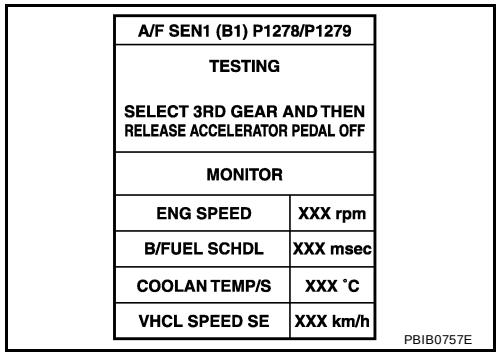
6. When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen.

ENG SPEED	1,500 - 3,000 rpm
Vehicle speed	70 - 120 km/h (43 - 75 MPH)
B/FUEL SCHDL	1.0 - 8.0 msec
Selector lever	“D” position with “OD” ON

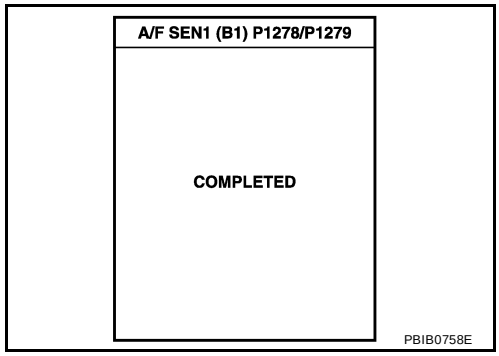
If “TESTING” is not displayed after 20 seconds, retry from step 2.



7. Following the instructions of CONSULT-II screen, set “OD” OFF and release accelerator pedal fully.



8. Make sure that “TESTING” changes to “COMPLETED”.
   If “TESTING” changed to “OUT OF CONDITION”, retry from step 6.
9. Touch “BACK” and “MODE”, then select “SELF-DIAG RESULT” mode.
   If P1271 is displayed, go to EC-1079, "Diagnostic Procedure" .
   If another DTC is displayed, go to the corresponding “Diagnostic Procedure”.



Overall Function Check

UBS00224

Use this procedure to check the overall function of the front heated oxygen sensor circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes in “D” position with “OD” OFF.
   NOTE:
   Keep the accelerator pedal as steady as possible during the cruising.

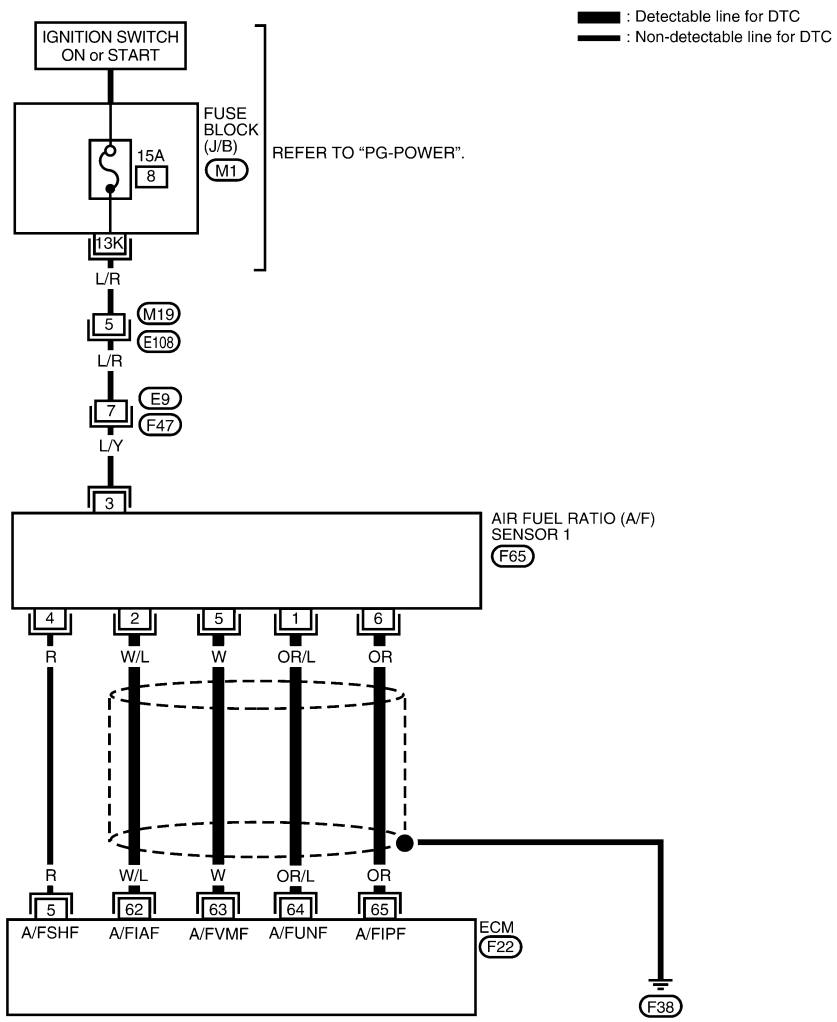
3. Set “OD” on, then release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (30 MPH).

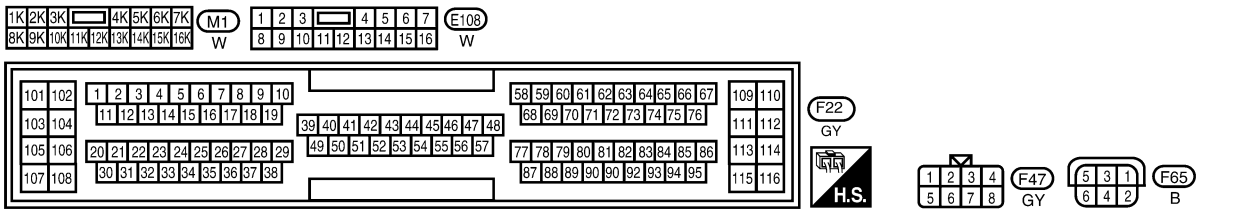
   NOTE:
   Never apply brake during releasing the accelerator pedal.
4. Repeat steps 2 to 3 five times.
5. Stop the vehicle and turn ignition switch “OFF”.
6. Wait at least 10 seconds and restart engine.
7. Repeat steps 2 to 3 five times.
8. Stop the vehicle and connect GST to the vehicle.
9. Make sure that no DTC is displayed.
   If the DTC is displayed, go to EC-1079, "Diagnostic Procedure" .

Wiring Diagram

UBS00225

EC-A/F-01





BBWA0175E

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
62	W/L	A/F SENSOR	ENGINE RUNNING AT IDLE SPEED UNDER WARM-UP CONDITION	2.0 - 3.5V
63	W			2.0 - 3.0V
64	OR/L			2.5 - 3.5V
65	OR			2.0 - 3.5V

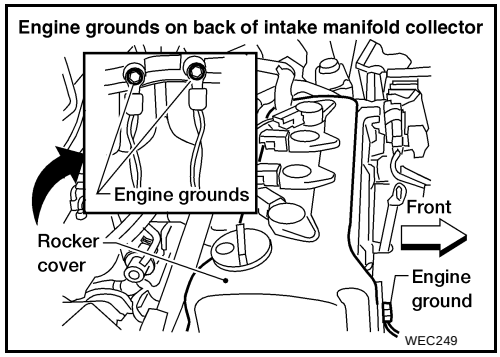
SEF609Z

Diagnostic Procedure

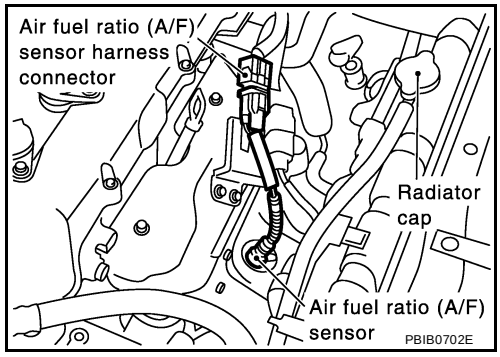
UBS00226

1. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.



3. Disconnect ECM harness connector and A/F sensor 1 harness connector.
4. Check harness continuity between the following terminals. Refer to Wiring Diagram.



ECM terminal	Swirl volume control valve
62	2
63	5
64	1
65	6

Continuity should exist.

5. Check harness continuity between ECM terminals 62, 63, 64, 65 or A/F sensor 1 terminals 1, 2, 5, 6 and ground. Refer to Wiring Diagram.

Continuity should not exist.

6. Also check harness for short to power.

OK or NG

OK >> GO TO 2.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

2. CHECK INTERMITTENT INCIDENT

Perform EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> Replace A/F sensor 1.
NG >> Repair or replace.

Removal and Installation

UBS00227

AIR FUEL RATIO SENSOR

Refer to EM-15, "Removal and Installation" .

DTC P1272 A/F SENSOR

PFP:22693

Component Description

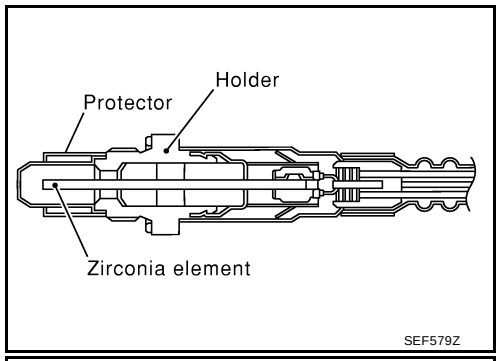
UBS00228

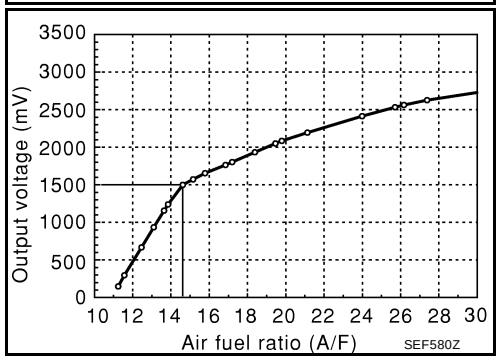
The A/F sensor is a planar dual-cell limit current sensor. The sensor element of the A/F sensor is the combination of a Nernst concentration cell (sensor cell) with an oxygen-pump cell, which transports ions. It has a heater in the element.

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 λ 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 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

UBS00229

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
A/F SEN1 (B1)	● Engine: Idle speed after warming up	Fluctuates around 1.5V.

On Board Diagnosis Logic

UBS0022A

To judge the malfunction, the diagnosis checks that the A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal is not inordinately high.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1272	● The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 4.5V.	● Harness or connectors (The sensor circuit is open or shorted.) ● Air fuel ratio (A/F) sensor 1

DTC Confirmation Procedure

UBS0022B

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.

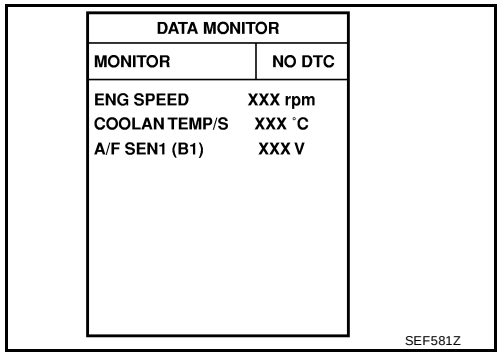
TESTING CONDITION:

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)” in “DATA MONITOR” mode with CONSULT-II.

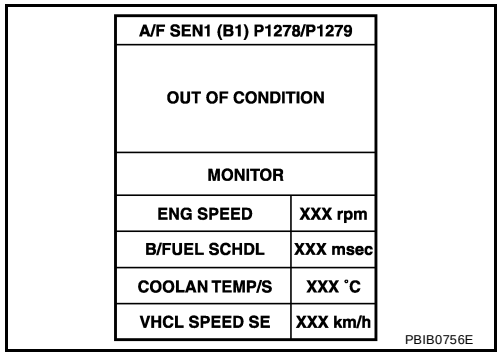
3. Check “A/F SEN1 (B1)” indication.
   If the indication is constantly approx. 4.5V, go to EC-1083, "Diagnostic Procedure" .
   If the indication is not constantly approx. 4.5V, go to next step.
4. Select “A/F SEN1 (B1) P1278/P1279” of “A/F SEN1” in “DTC WORK SUPPORT” mode.
5. Touch “START”.



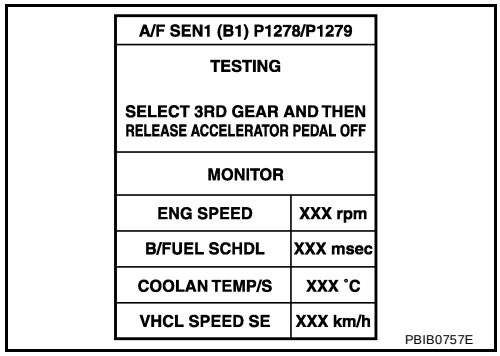
6. When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen.

ENG SPEED	1,500 - 3,000 rpm
Vehicle speed	70 - 120 km/h (43 - 75 MPH)
B/FUEL SCHDL	1.0 - 8.0 msec
Selector lever	“D” position with “OD” ON

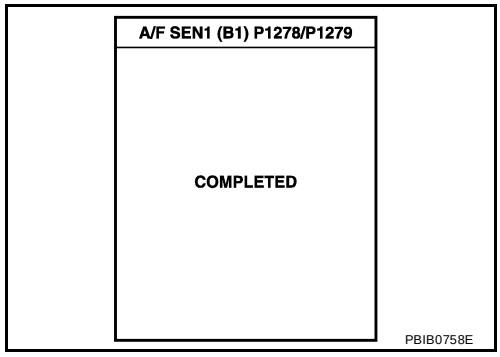
If “TESTING” is not displayed after 20 seconds, retry from step 2.



7. Following the instructions of CONSULT-II screen, set “OD” OFF and release accelerator pedal fully.



8. Make sure that “TESTING” changes to “COMPLETED”.
   If “TESTING” changed to “OUT OF CONDITION”, retry from step 6.
9. Touch “BACK” and “MODE”, then select “SELF-DIAG RESULT” mode.
   If P1272 is displayed, go to EC-1083, "Diagnostic Procedure" “.
   If another DTC is displayed, go to the corresponding “Diagnostic Procedure”.



Overall Function Check

UBS0022C

Use this procedure to check the overall function of the front heated oxygen sensor circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes in “D” position with “OD” OFF.
   NOTE:
   Keep the accelerator pedal as steady as possible during the cruising.

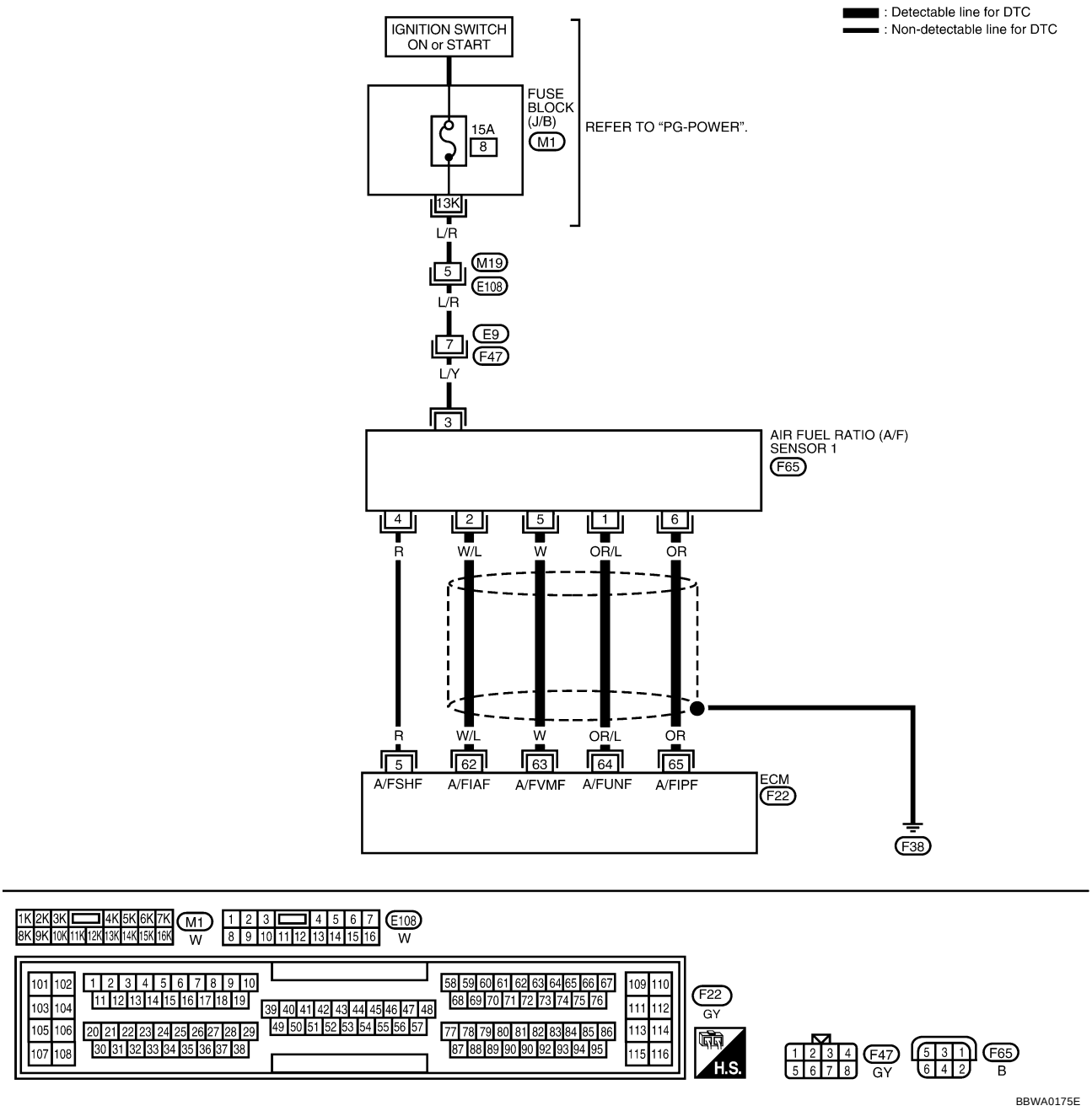
3. Set “OD” on, then release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (30 MPH).

   NOTE:
   Never apply brake during releasing the accelerator pedal.
4. Repeat steps 2 to 3 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 five times.
8. Stop the vehicle and connect GST to the vehicle.
9. Make sure that no DTC is displayed.
   If the DTC is displayed, go to EC-1083, "Diagnostic Procedure" .

Wiring Diagram

UBS0022D

EC-A/F-01



ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
62	W/L	A/F SENSOR	ENGINE RUNNING AT IDLE SPEED UNDER WARM-UP CONDITION	2.0 - 3.5V
63	W			2.0 - 3.0V
64	OR/L			2.5 - 3.5V
65	OR			2.0 - 3.5V

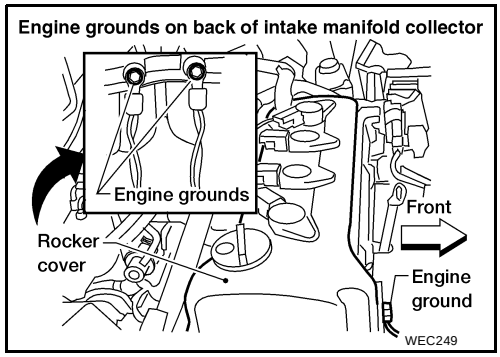
SEF609Z

Diagnostic Procedure

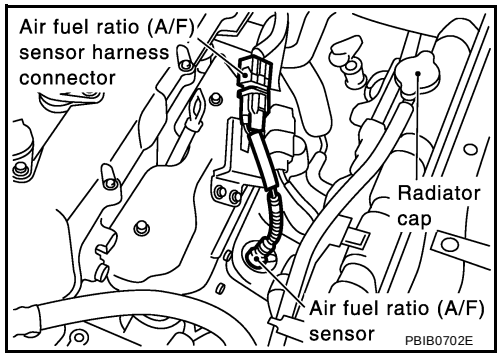
UBS0022E

1. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

1. Turn ignition switch "OFF".
2. Loosen and retighten engine ground screws.



3. Disconnect ECM harness connector and A/F sensor 1 harness connector.
4. Check harness continuity between the following terminals. Refer to Wiring Diagram.



ECM terminal	Swirl volume control valve
62	2
63	5
64	1
65	6

Continuity should exist.

5. Check harness continuity between ECM terminals 62, 63, 64, 65 or A/F sensor 1 terminals 1, 2, 5, 6 and ground. Refer to Wiring Diagram.

Continuity should not exist.

6. Also check harness for short to power.

OK or NG

OK >> GO TO 2.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

2. CHECK INTERMITTENT INCIDENT

Perform EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> Replace A/F sensor 1.
NG >> Repair or replace.

Removal and Installation

UBS0022F

AIR FUEL RATIO SENSOR

Refer to EM-15, "Removal and Installation" .

DTC P1273 A/F SENSOR

PFP:22693

Component Description

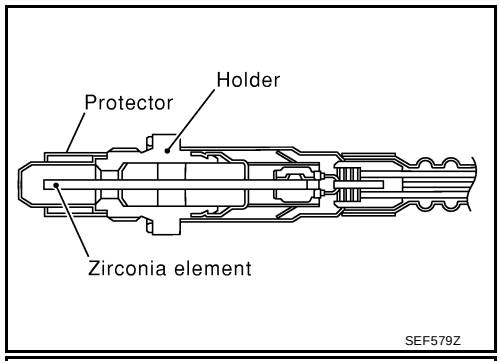
UBS0022G

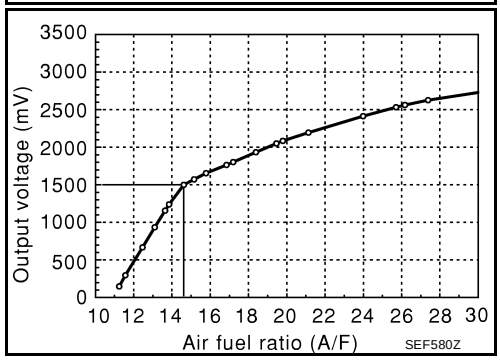
The A/F sensor is a planar dual-cell limit current sensor. The sensor element of the A/F sensor is the combination of a Nernst concentration cell (sensor cell) with an oxygen-pump cell, which transports ions. It has a heater in the element.

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 λ 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 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

UBS0022H

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
A/F SEN1 (B1)	● Engine: Idle speed after warming up	Fluctuates around 1.5V.

On Board Diagnosis Logic

UBS0022I

To judge the malfunction, the A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal is monitored not to be shifted “lean” side or “rich” side. When the A/F signal is shifting to the lean side, the malfunction will be detected.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1273	● 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 ● Air fuel ratio (A/F) sensor heater 1 ● Fuel pressure ● Injectors ● Intake air leaks

DTC Confirmation Procedure

UBS0022J

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

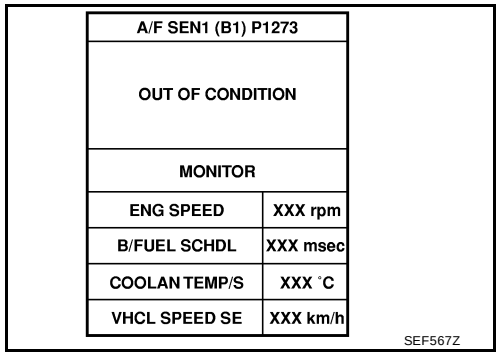
1. Start engine and warm it up to normal operating temperature.
2. Select “A/F SEN1 (B1) P1273” of “A/F SEN1” in “DTC WORK SUPPORT” mode.
3. Touch “START”.

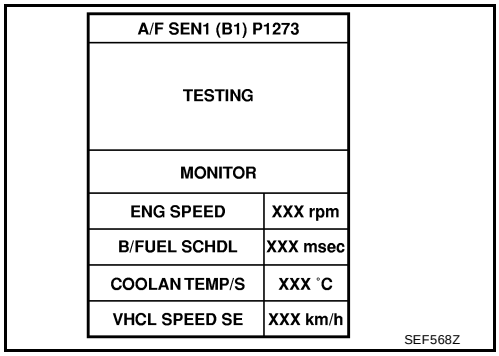
4. Maintain the following conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 400 to 800 seconds.)

   NOTE:
   Keep the accelerator pedal as steady as possible.

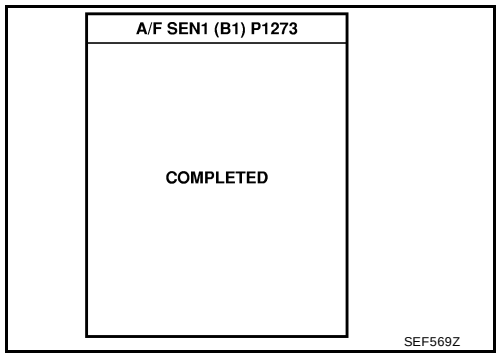
ENG SPEED	Below 3,000 rpm
B/FUEL SCHDL	Below 9.0 msec
Selector lever	“P” or “N” position

If “TESTING” is not displayed after 20 minutes, retry from step 2.





5. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”.
   If “NG” is displayed, go to EC-1089, "Diagnostic Procedure" .



Overall Function Check

UBS0022K

Use this procedure to check the overall function of the front heated oxygen sensor circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes in “D” position with “OD” OFF.

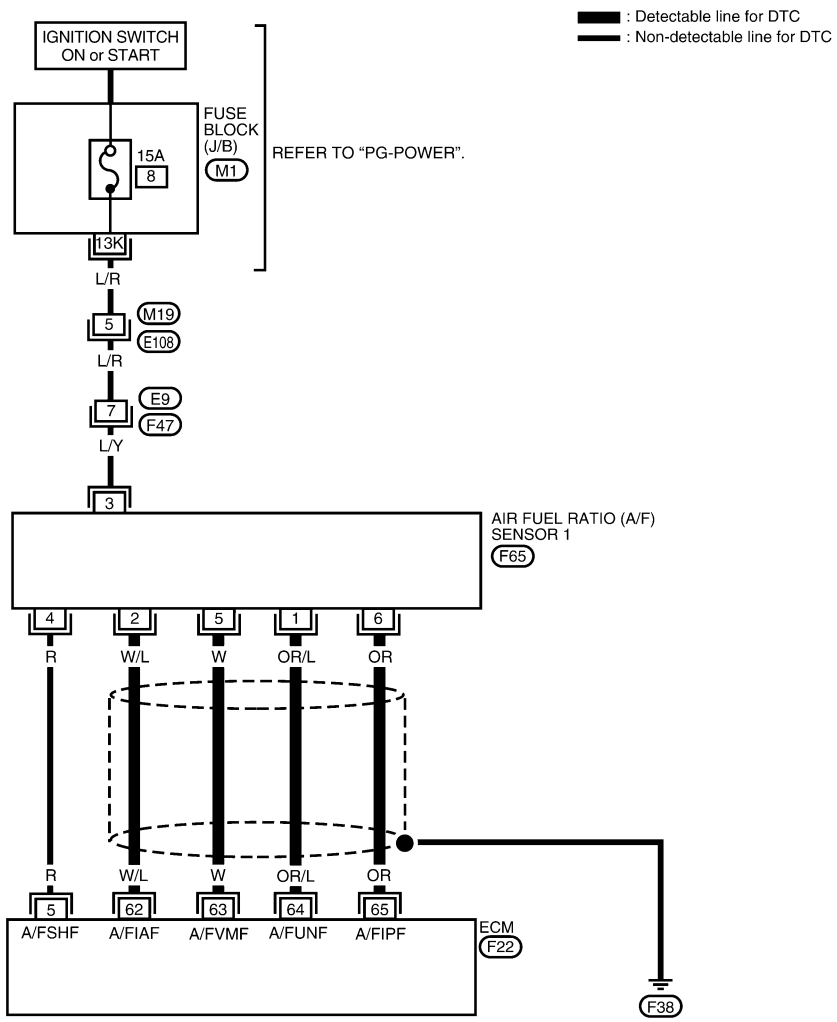
   NOTE:
   Keep accelerator pedal as steady as possible during the cruising.
3. Set “OD” on, then release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (30 MPH).

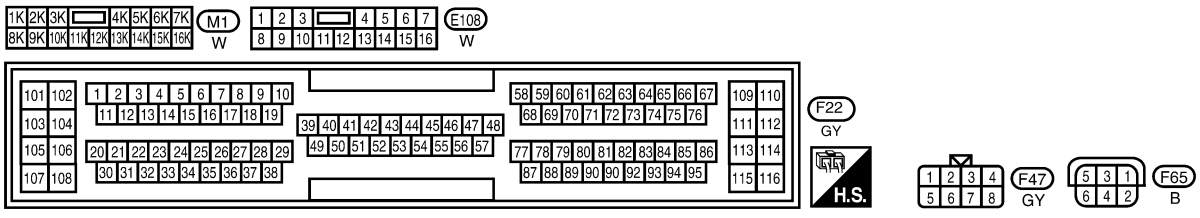
   NOTE:
   Never apply brake during releasing the accelerator pedal.
4. Repeat steps 2 to 3 five times.
5. Stop the vehicle and turn ignition switch “OFF”.
6. Wait at least 10 seconds and restart engine.
7. Repeat steps 2 to 3 five times.
8. Stop the vehicle and connect GST to the vehicle.
9. Make sure that no DTC is displayed.
   If the DTC is displayed, go to EC-1089, "Diagnostic Procedure" .

Wiring Diagram

UBS0022L

EC-A/F-01





BBWA0175E

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
62	W/L	A/F SENSOR	ENGINE RUNNING AT IDLE SPEED UNDER WARM-UP CONDITION	2.0 - 3.5V
63	W			2.0 - 3.0V
64	OR/L			2.5 - 3.5V
65	OR			2.0 - 3.5V

SEF609Z

Diagnostic Procedure

UBS0022M

1. RETIGHTEN AIR FUEL RATIO (A/F) SENSOR 1

1. Turn ignition switch “OFF”.
2. Loosen and retighten the air fuel ratio (A/F) sensor 1.

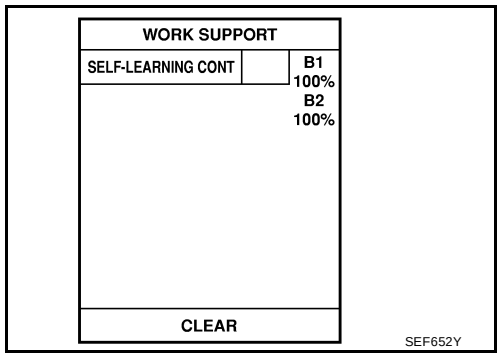
Tightening torque: 40 - 60 N-m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)

>> GO TO 2.

2. CLEAR THE SELF-LEARNING DATA.

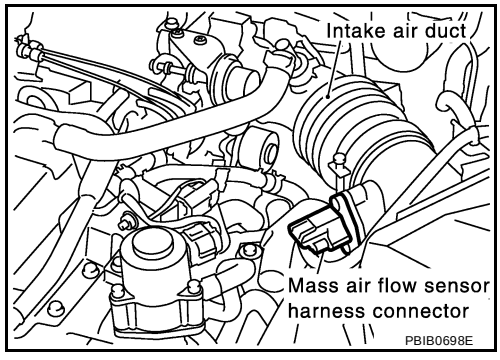
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 detected? Is it difficult to start engine?



Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF”.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 3 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC P0102 is displayed.
6. Erase the 1st trip DTC memory. Refer to EC-637, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 detected? Is it difficult to start engine?



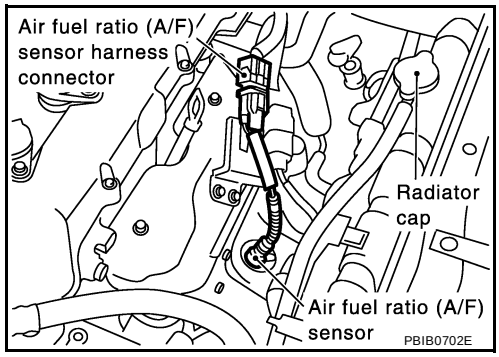
Yes or No

Yes >> Perform trouble diagnosis for DTC P0171. Refer to EC-802 .
No >> GO TO 3.

3. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector and A/F sensor 1 harness connector.
3. Check harness continuity between the following terminals. Refer to Wiring Diagram.

ECM terminal	A/F sensor terminal
62	2
63	5
64	1
65	6



Continuity should exist.

4. Check harness continuity between ECM terminals 62, 63, 64, 65 or A/F sensor 1 terminals 1, 2, 5, 6 and ground. Refer to Wiring Diagram.

Continuity should not exist.

5. Also check harness for short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK A/F SENSOR 1 HEATER

Refer to EC-996, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace A/F sensor 1.

5. CHECK INTERMITTENT INCIDENT

Perform EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> Replace A/F sensor 1.
NG >> Repair or replace.

Removal and Installation

UBS0022N

AIR FUEL RATIO SENSOR

Refer to EM-15, "Removal and Installation" .

DTC P1274 A/F SENSOR

PFP:22693

Component Description

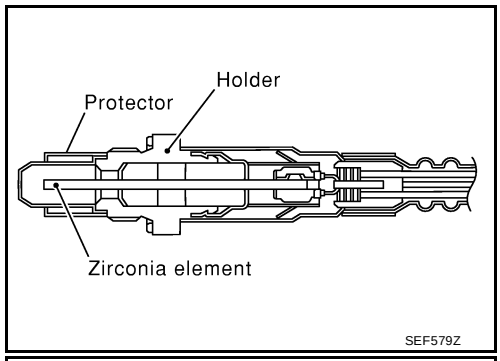
UBS0022O

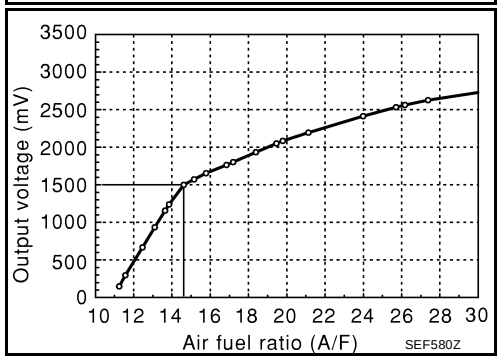
The A/F sensor is a planar dual-cell limit current sensor. The sensor element of the A/F sensor is the combination of a Nernst concentration cell (sensor cell) with an oxygen-pump cell, which transports ions. It has a heater in the element.

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 λ 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 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

UBS0022P

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
A/F SEN1 (B1)	● Engine: Idle speed after warming up	Fluctuates around 1.5V.

On Board Diagnosis Logic

UBS0022Q

To judge the malfunction, the A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal is monitored not to be shifted to the “lean” side or “rich” side. When the A/F signal is shifting to the rich side, the malfunction will be detected.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1274	● 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 ● Air fuel ratio (A/F) sensor heater 1 ● Fuel pressure ● Injectors

DTC Confirmation Procedure

UBS0022R

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

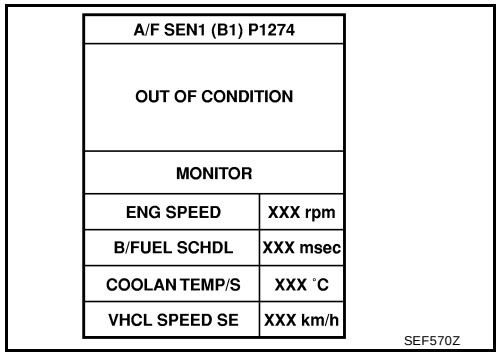
1. Start engine and warm it up to normal operating temperature.
2. Select “A/F SEN1 (B1) P1274” of “A/F SEN1” in “DTC WORK SUPPORT” mode.
3. Touch “START”.

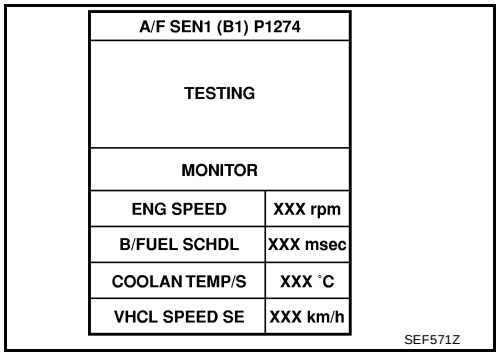
4. Maintain the following conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 400 to 800 seconds.)

   NOTE:
   Keep the accelerator pedal as steady as possible.

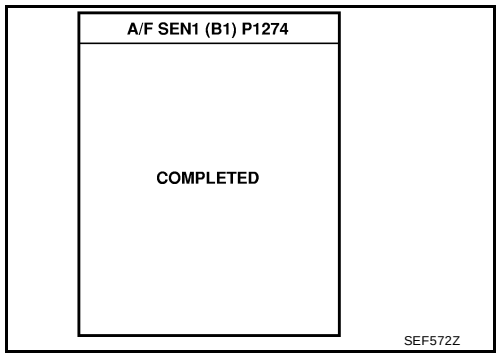
ENG SPEED	Below 3,000 rpm
B/FUEL SCHDL	Below 9.0 msec
Selector lever	“P” or “N” position

If “TESTING” is not displayed after 20 minutes, retry from step 2.





5. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”.
   If “NG” is displayed, go to EC-1095, "Diagnostic Procedure" .



Overall Function Check

UBS0022S

Use this procedure to check the overall function of the front heated oxygen sensor circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes in “D” position with “OD” OFF.

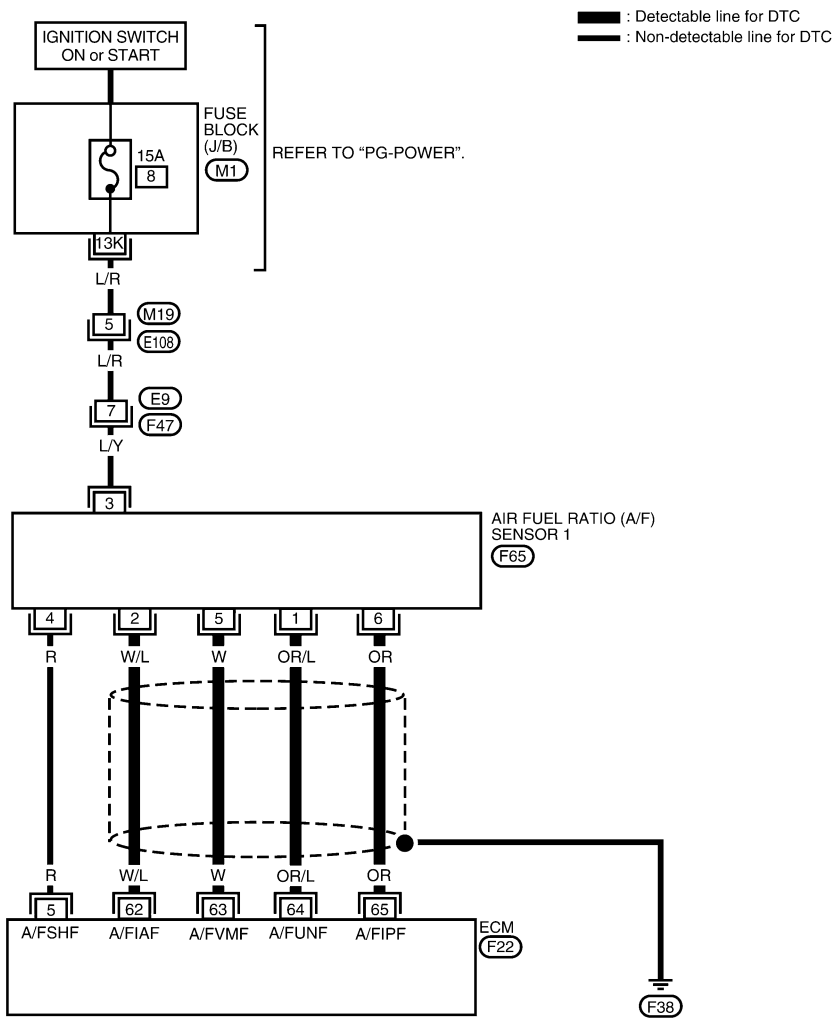
   NOTE:
   Keep accelerator pedal as steady as possible during the cruising.
3. Set “OD” on, then release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (30 MPH).

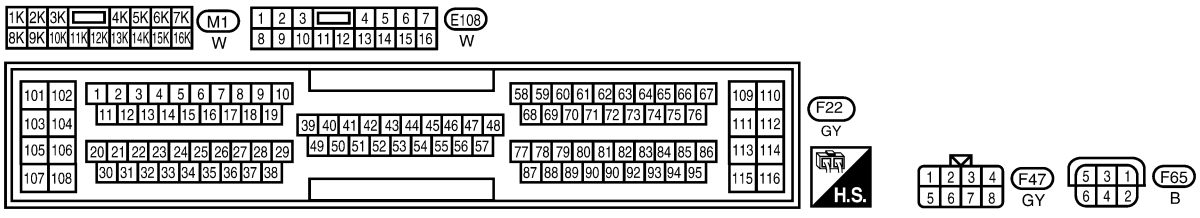
   NOTE:
   Never apply brake during releasing the accelerator pedal.
4. Repeat steps 2 to 3 five times.
5. Stop the vehicle and turn ignition switch “OFF”.
6. Wait at least 10 seconds and restart engine.
7. Repeat steps 2 to 3 five times.
8. Stop the vehicle and connect GST to the vehicle.
9. Make sure that no DTC is displayed.
   If the DTC is displayed, go to EC-1095, "Diagnostic Procedure" .

Wiring Diagram

UBS0022T

EC-A/F-01





BBWA0175E

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
62	W/L	A/F SENSOR	ENGINE RUNNING AT IDLE SPEED UNDER WARM-UP CONDITION	2.0 - 3.5V
63	W			2.0 - 3.0V
64	OR/L			2.5 - 3.5V
65	OR			2.0 - 3.5V

SEF609Z

Diagnostic Procedure

UBS0022U

1. RETIGHTEN AIR FUEL RATIO (A/F) SENSOR 1

1. Turn ignition switch “OFF”.
2. Loosen and retighten the air fuel ratio (A/F) sensor 1.

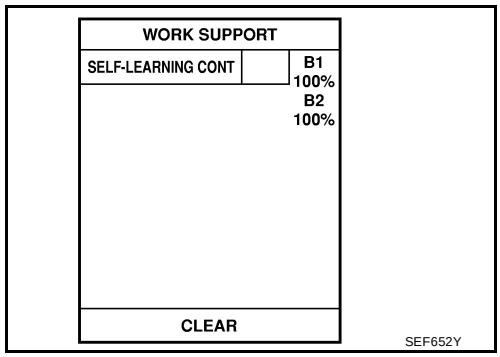
Tightening torque: 40 - 60 N-m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)

>> GO TO 2.

2. CLEAR THE SELF-LEARNING DATA

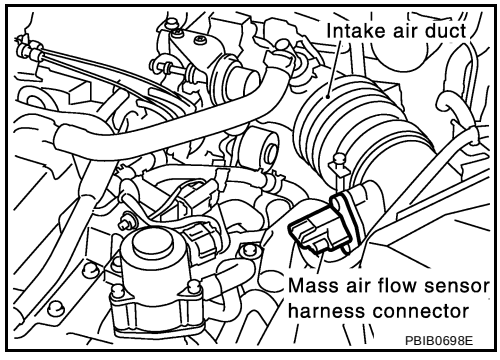
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 detected? Is it difficult to start engine?



Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF”.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 3 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC P0102 is displayed.
6. Erase the 1st trip DTC memory. Refer to EC-637, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 detected? Is it difficult to start engine?



Yes or No

Yes >> Perform trouble diagnosis for DTC P0172. Refer to EC-809 .
No >> GO TO 3.

3. CHECK HARNESS CONNECTOR

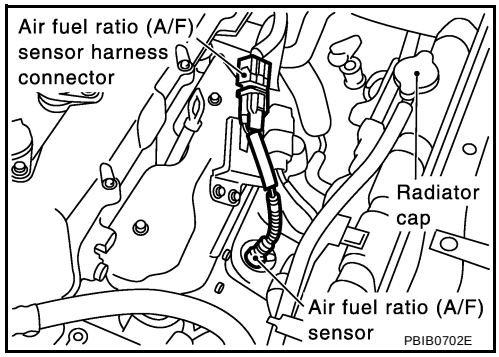
1. Turn ignition switch “OFF”.
2. Disconnect A/F sensor 1 harness connector.
3. Check harness connector for water.
   Water should not exit.

OK or NG

OK >> GO TO 4.
NG >> Repair or replace harness connector.

4. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector and A/F sensor 1 harness connector.
3. Check harness continuity between the following terminals. Refer to Wiring Diagram.



ECM terminal	A/F sensor terminal
62	2
63	5
64	1
65	6

Continuity should exist.

4. Check harness continuity between ECM terminals 62, 63, 64, 65 or A/F sensor 1 terminals 1, 2, 5, 6 and ground. Refer to Wiring Diagram.

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 A/F SENSOR 1 HEATER

Refer to EC-996, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace A/F sensor 1.

6. CHECK INTERMITTENT INCIDENT

Perform EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> Replace A/F sensor 1.
NG >> Repair or replace.

Removal and Installation

UBS0022V

AIR FUEL RATIO SENSOR

Refer to EM-15, "Removal and Installation" .

DTC P1276 A/F SENSOR

PFP:22693

Component Description

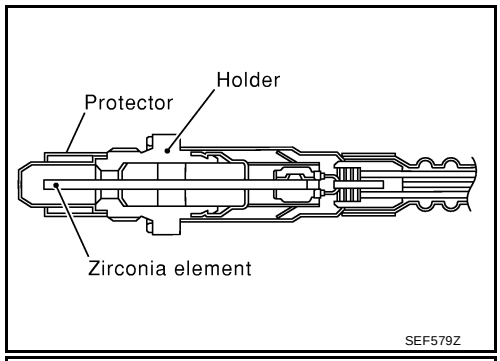
UBS0022W

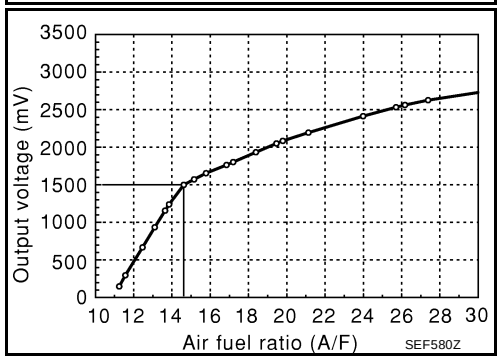
The A/F sensor is a planar dual-cell limit current sensor. The sensor element of the A/F sensor is the combination of a Nernst concentration cell (sensor cell) with an oxygen-pump cell, which transports ions. It has a heater in the element.

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 λ 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 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

UBS0022X

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
A/F SEN1 (B1)	● Engine: Idle speed after warming up	Fluctuates around 1.5V.

On Board Diagnosis Logic

UBS0022Y

To judge the malfunction, the diagnosis checks that the A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal fluctuates according to fuel feedback control.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1276	● The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 1.5V.	● Harness or connectors (The sensor circuit is open or shorted.) ● Air fuel ratio (A/F) sensor 1

DTC Confirmation Procedure

UBS0022Z

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.

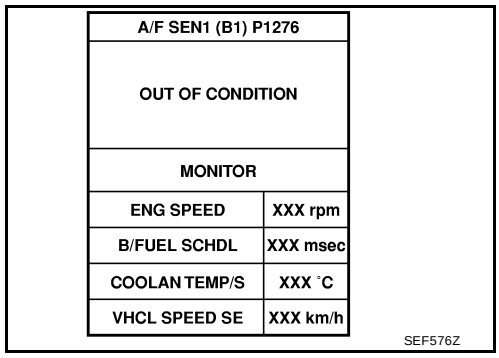
WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “A/F SEN1 (B1)” of “DATA MONITOR” mode with CONSULT-II.
3. Check “A/F SEN1 (B1)” indication.
   If the indication is constantly approx. 1.5V and does not fluctuates, go to EC-1101, "Diagnostic Procedure".
   If the indication fluctuates around 1.5V, go to next step.
4. Select “A/F SEN1 (B1) P1276” of “A/F SEN1” in “DTC WORK SUPPORT” mode.

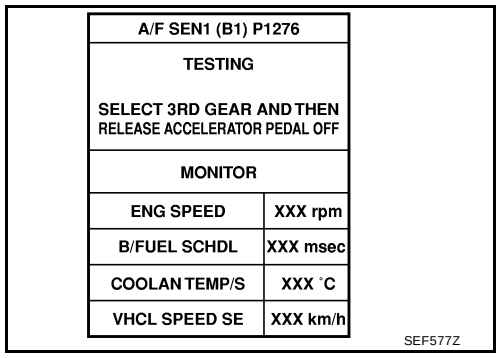
5. Touch “START”.
6. When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen.

ENG SPEED	1,500 - 3,000 rpm
Vehicle speed	70 - 120 km/h (43 - 75 MPH)
B/FUEL SCHDL	1.0 - 8.0 msec
Selector lever	“D” position with “OD” ON

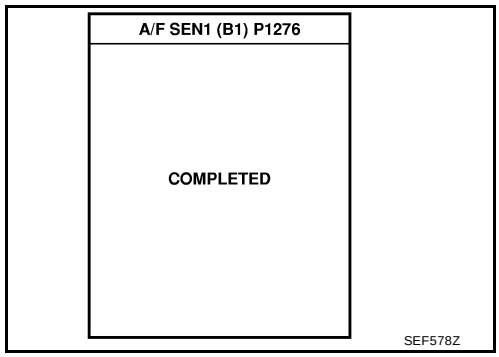
If “TESTING” is not displayed after 20 seconds, retry from step 2.



7. Following the instructions of CONSULT-II screen, set “OD” OFF and release accelerator pedal fully.



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-1101, "Diagnostic Procedure" .



Overall Function Check

UBS00230

Use this procedure to check the overall function of the front heated oxygen sensor circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

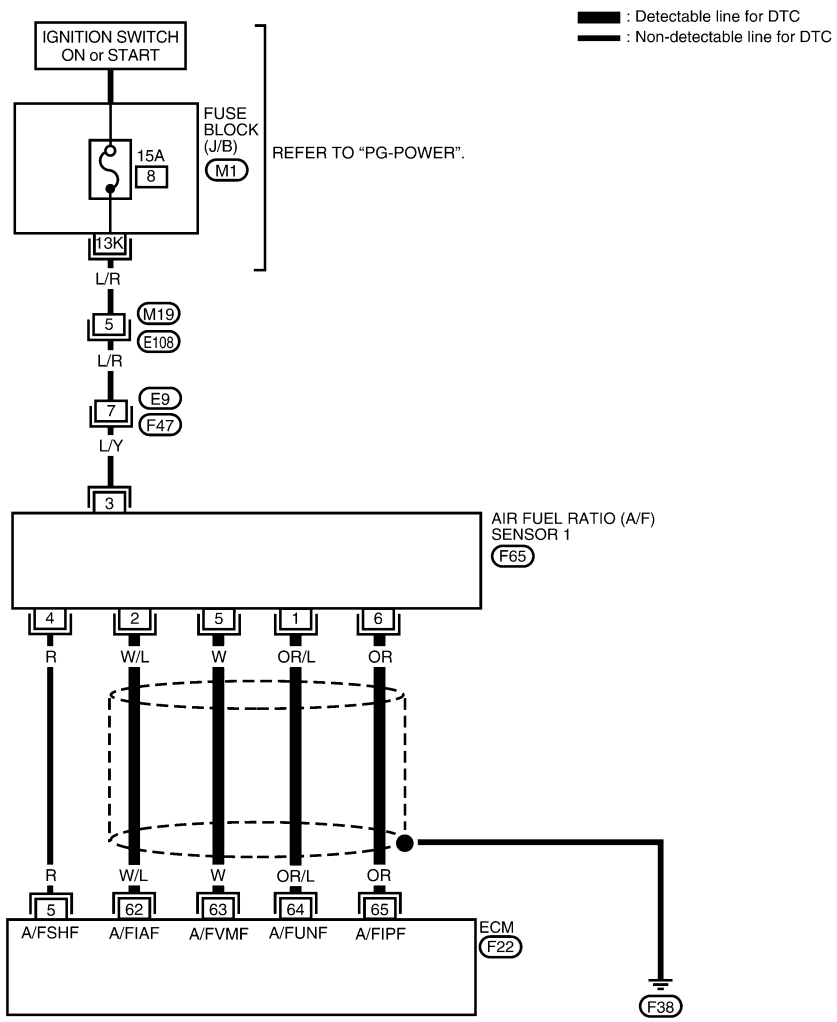
1. Start engine and warm it up to normal operating temperature.
2. Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes in “D” position with “OD” OFF.
   NOTE:
   Keep the accelerator pedal as steady as possible during the cruising.
3. Set “OD” on, then release the accelerator pedal fully 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 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 five times.
8. Stop the vehicle and connect GST to the vehicle.
9. Make sure that no DTC is displayed.

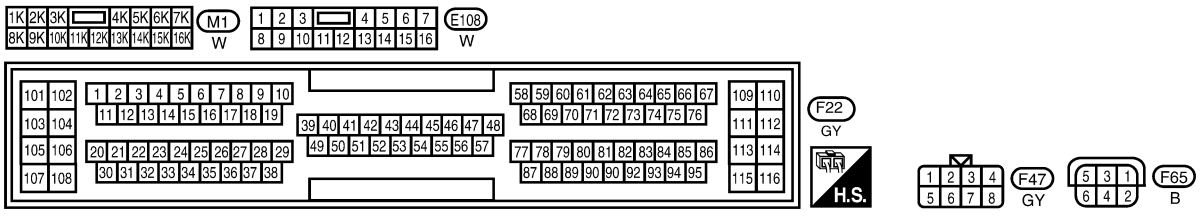
If the DTC is displayed, go to EC-1101, "Diagnostic Procedure" .

Wiring Diagram

UBS00231

EC-A/F-01





BBWA0175E

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
62	W/L	A/F SENSOR	ENGINE RUNNING AT IDLE SPEED UNDER WARM-UP CONDITION	2.0 - 3.5V
63	W			2.0 - 3.0V
64	OR/L			2.5 - 3.5V
65	OR			2.0 - 3.5V

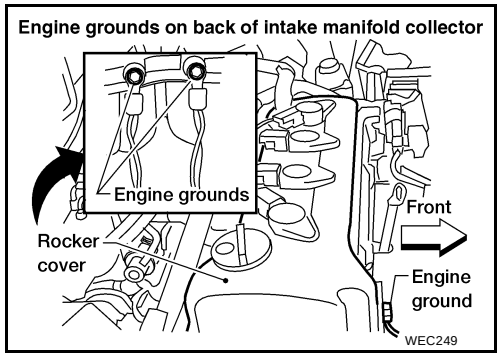
SEF609Z

Diagnostic Procedure

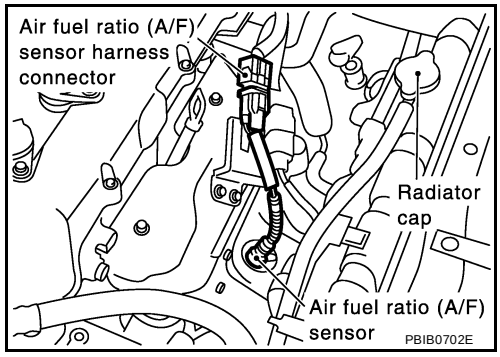
UBS00232

1. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.



3. Disconnect ECM harness connector and A/F sensor 1 harness connector.
4. Check harness continuity between the following terminals. Refer to Wiring Diagram.



ECM terminal	A/F sensor terminal
62	2
63	5
64	1
65	6

Continuity should exist.

5. Check harness continuity between ECM terminals 62, 63, 64, 65 or A/F sensor 1 terminals 1, 2, 5, 6 and ground. Refer to Wiring Diagram.

Continuity should not exist.

6. Also check harness for short to power.

OK or NG

OK >> GO TO 2.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

2. CHECK INTERMITTENT INCIDENT

Perform EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> Replace A/F sensor 1.
NG >> Repair or replace.

Removal and Installation

UBS00233

AIR FUEL RATIO SENSOR

Refer to EM-15, "Removal and Installation" .

DTC P1278, P1279 A/F SENSOR

PFP:22693

Component Description

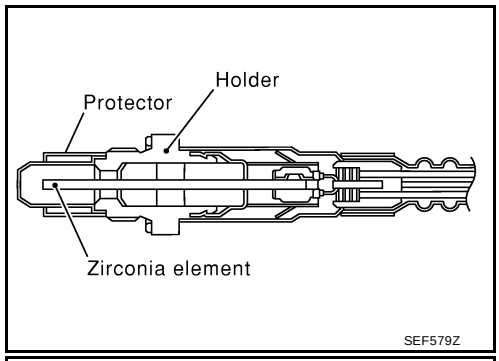
UBS00234

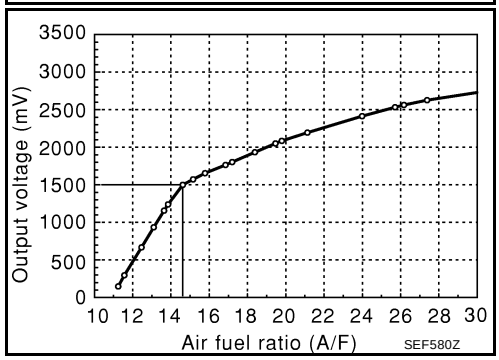
The A/F sensor is a planar dual-cell limit current sensor. The sensor element of the A/F sensor is the combination of a Nernst concentration cell (sensor cell) with an oxygen-pump cell, which transports ions. It has a heater in the element.

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 λ 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 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

UBS00235

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
A/F SEN1 (B1)	● Engine: Idle speed after warming up	Fluctuates around 1.5V.

On Board Diagnosis Logic

UBS00236

To judge the malfunction of air fuel ratio (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 air fuel ration (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.	Malfunction is detected when ...	Check Items (Possible Cause)
P1278 P1279	● The response (P1278: from RICH to LEAN or P1279: 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 sensor circuit is open or shorted.) ● Air fuel ratio (A/F) sensor 1 ● Air fuel ratio (A/F) sensor heater 1 ● Fuel pressure ● Injectors ● Intake air leaks ● Exhaust gas leaks ● PCV ● Mass air flow sensor

DTC Confirmation Procedure

UBS00237

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:

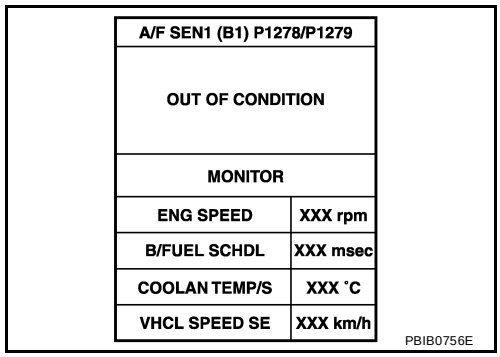
Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

WITH CONSULT-II

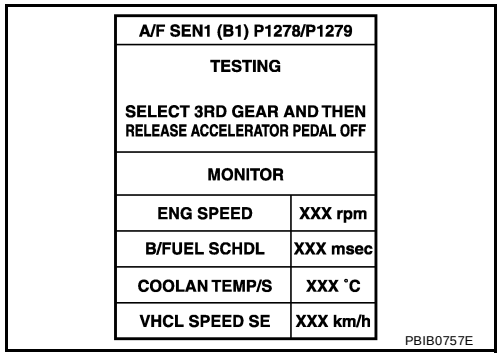
1. Perform EC-622, "Idle Air Volume Learning" . Make sure that “CMPLT” is displayed on CONSULT-II screen. If “INCMP” is displayed, follow the instruction for “Idle Air Volume Learning”.
2. Select “A/F SEN1 (B1) P1278/P1279” of “A/F SEN1” in “DTC WORK SUPPORT” mode.
3. Touch “START”.
4. When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen.

ENG SPEED	1,500 - 3,000 rpm
Vehicle speed	70 - 120 km/h (43 - 75 MPH)
B/FUEL SCHDL	1.0 - 8.0 msec
Selector lever	“D” position with “OD” ON

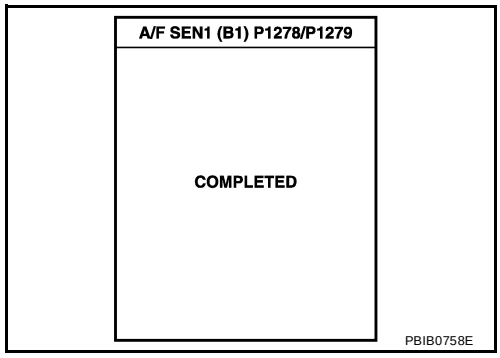
If “TESTING” is not displayed after 20 seconds, retry from step 2.



5. Following the instructions of CONSULT-II screen, set “OD” OFF and release accelerator pedal fully.



6. Make sure that “TESTING” changes to “COMPLETED”.
   If “TESTING” changed to “OUT OF CONDITION”, retry from step 6.
7. Make sure that “OK” is displayed after touching “SELF-DIAG RESULT”.
   If “NG” is displayed, go to EC-1106, "Diagnostic Procedure" .



Overall Function Check

UBS00238

Use this procedure to check the overall function of the front heated oxygen sensor circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

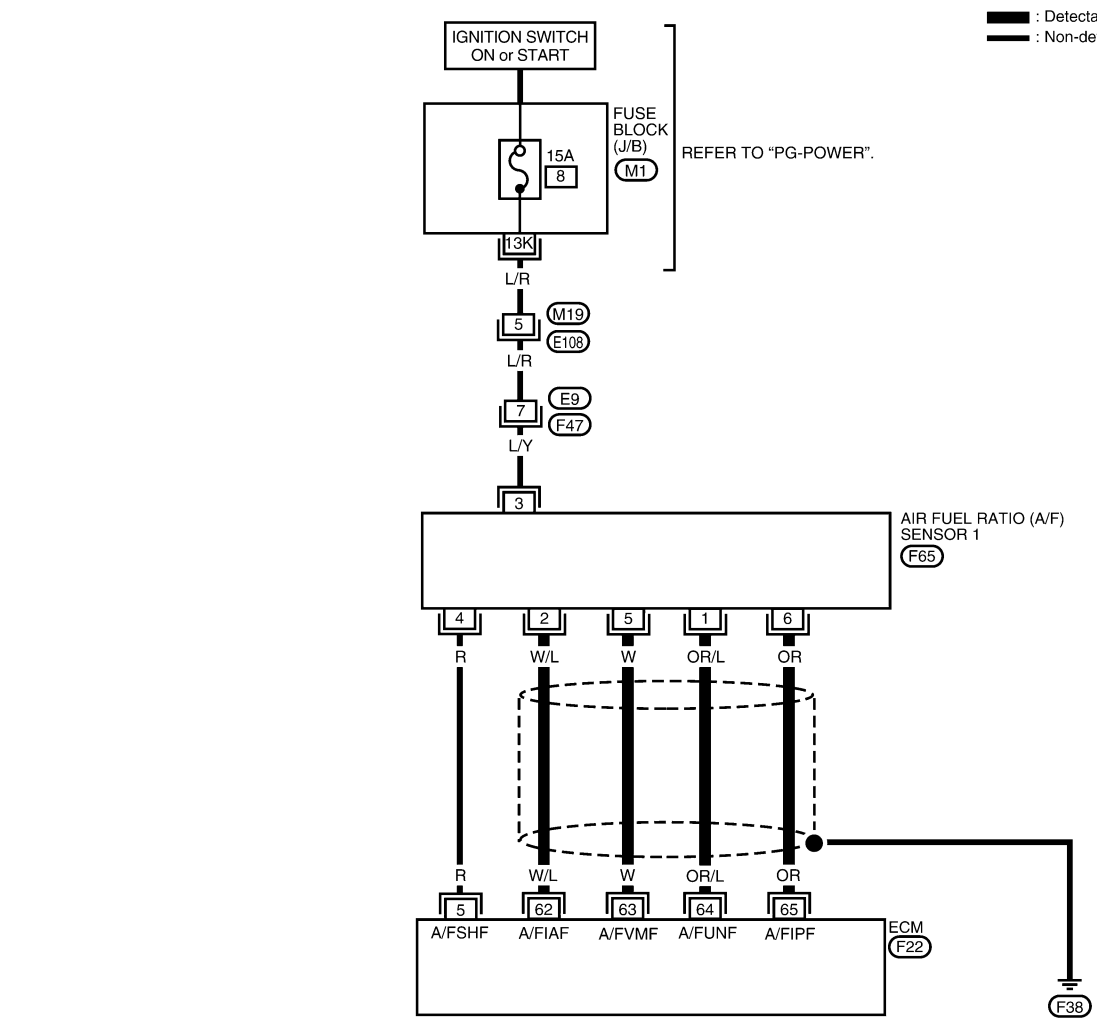
1. Perform EC-622, "Idle Air Volume Learning" . Make sure the result is OK. If NG, follow the instruction for “Idle Air Volume Learning”.
2. Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes in “D” position with “OD” OFF.
   NOTE:
   Keep the accelerator pedal as steady as possible during the cruising.
3. Set “OD” on, 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 five times.

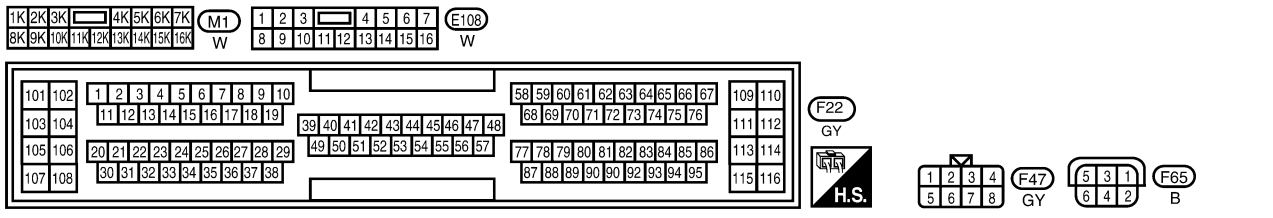
5. Stop the vehicle and turn ignition switch “OFF”.
6. Wait at least 10 seconds and restart engine.
7. Repeat steps 2 to 3 five times.
8. Stop the vehicle and connect GST to the vehicle.
9. Make sure that no DTC is displayed.
   If the DTC is displayed, go to EC-1106, "Diagnostic Procedure" .

Wiring Diagram

UBS00239

EC-A/F-01





BBWA0175E

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
62	W/L	A/F SENSOR	ENGINE RUNNING AT IDLE SPEED UNDER WARM-UP CONDITION	2.0 - 3.5V
63	W			2.0 - 3.0V
64	OR/L			2.5 - 3.5V
65	OR			2.0 - 3.5V

SEF609Z

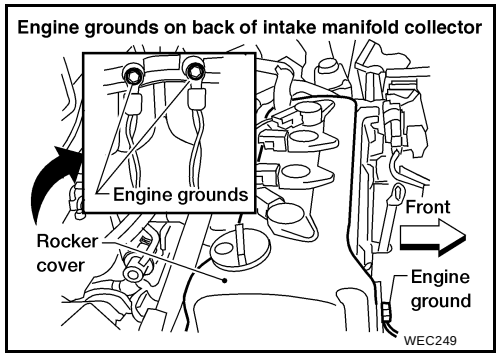
Diagnostic Procedure

UBS0023A

1. RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

>> GO TO 2.



2. RETIGHTEN AIR FUEL RATIO (A/F) SENSOR 1

Loosen and retighten the air fuel ratio (A/F) sensor 1.

Tightening torque: 40 - 60 N-m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)

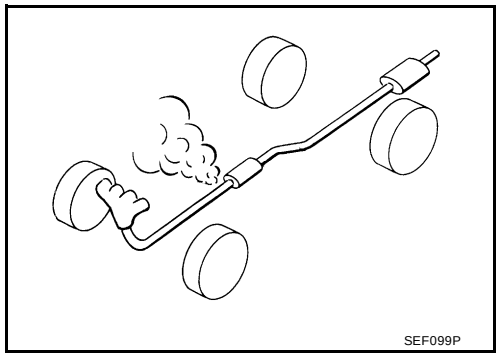
>> GO TO 3.

3. CHECK EXHAUST AIR LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust air leak before TWC (Manifold three way catalyst).

OK or NG

OK >> GO TO 4.
NG >> Repair or replace.



4. CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

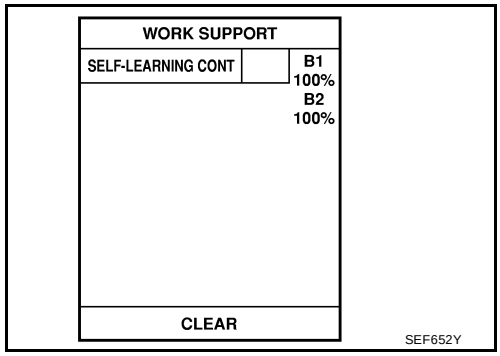
OK or NG

OK >> GO TO 5.
NG >> Repair or replace.

5. CLEAR THE SELF-LEARNING DATA

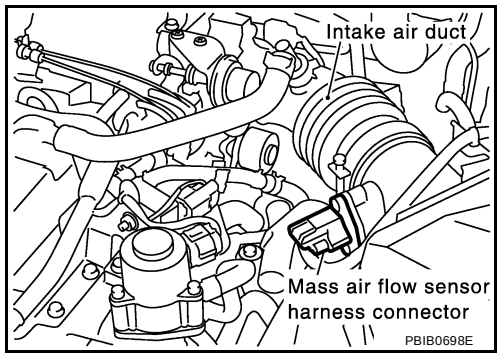
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR” or “START”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 or P0172 detected? Is it difficult to start engine?



Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF”.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 3 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC P0102 is displayed.
6. Erase the 1st trip DTC memory. Refer to EC-637, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 or P0172 detected? Is it difficult to start engine?

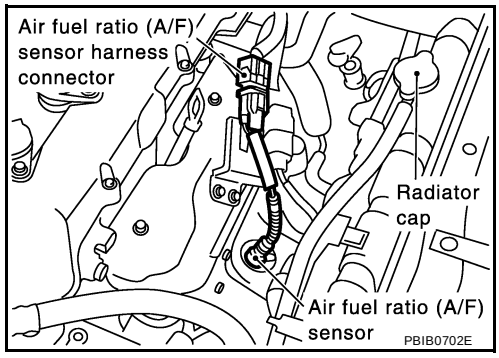


Yes or No

Yes >> Perform trouble diagnosis for DTC P0171, P0172. Refer to EC-802 , EC-809 .
No >> GO TO 6.

6. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector and A/F sensor 1 harness connector.
3. Check harness continuity between the following terminals. Refer to Wiring Diagram.



ECM terminal	A/F sensor terminal
62	2
63	5
64	1
65	6

Continuity should exist.

4. Check harness continuity between ECM terminals 62, 63, 64, 65 or A/F sensor 1 terminals 1, 2, 5, 6 and ground. Refer to Wiring Diagram.

Continuity should 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 AIR FUEL RATIO (A/F) SENSOR 1 HEATER

Refer to EC-996, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace A/F sensor 1.

8. CHECK MASS AIR FLOW SENSOR

Refer to EC-742, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace mass air flow sensor.

9. CHECK PCV VALVE

Refer to EC-1217, "POSITIVE CRANKCASE VENTILATION" .

OK or NG

OK >> GO TO 10.
NG >> Repair or replace PCV valve.

10. CHECK INTERMITTENT INCIDENT

Perform EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> Replace A/F sensor 1.
NG >> Repair or replace.

Removal and Installation

UBS0023B

AIR FUEL RATIO SENSOR

Refer to EM-15, "Removal and Installation" .

DTC P1402 EGR FUNCTION

PFP:14710

Description

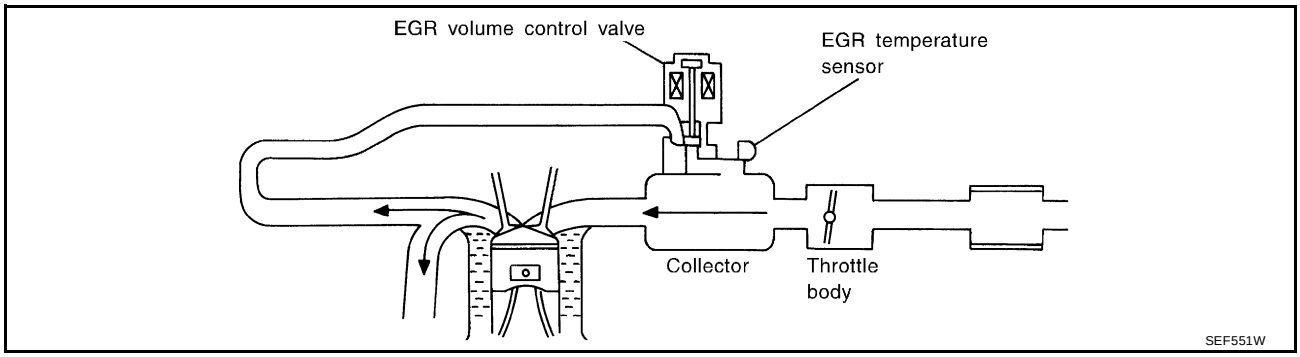
UBS0023C

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed	EGR volume control	EGR volume control valve
Camshaft position sensor (PHASE)	Engine speed and cylinder position		
Vehicle speed sensor	Vehicle speed		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		
Battery	Battery voltage		
Mass air flow sensor	Amount of intake air		
Air conditioner switch	Air conditioner operation		
Power steering oil pressure switch	Power steering load signal		
Electrical load	Electrical load signal		
Park/Neutral position switch	Park/Neutral position		
ECM	Gear position, shifting signal		

This system controls flow rate of EGR led from exhaust manifold to intake manifold. The opening of the EGR by-pass passage in the EGR volume control valve changes to control the flow rate. A built-in step motor moves the valve in steps corresponding to the ECM output pulses. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions. The EGR volume control valve remains closed under the following conditions.

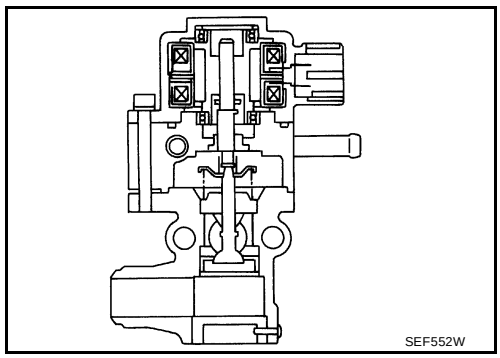
- Engine stopped
- Engine starting
- Engine idling
- Low engine coolant temperature
- Excessively high engine coolant temperature
- High engine speed
- Wide open throttle
- Low battery voltage



COMPONENT DESCRIPTION

EGR Volume Control Valve

The EGR volume control valve uses a step motor to control the flow rate of EGR from exhaust manifold. This motor has four winding phases. It operates according to the output pulse signal of the ECM. Two windings are turned ON and OFF in sequence. Each time an ON pulse is issued, the valve opens or closes, changing the flow rate. When no change in the flow rate is needed, the ECM does not issue the pulse signal. A certain voltage signal is issued so that the valve remains at that particular opening.


SEF552W

CONSULT-II Reference Value in Data Monitor Mode

UBS0023D

Specification data are reference values.

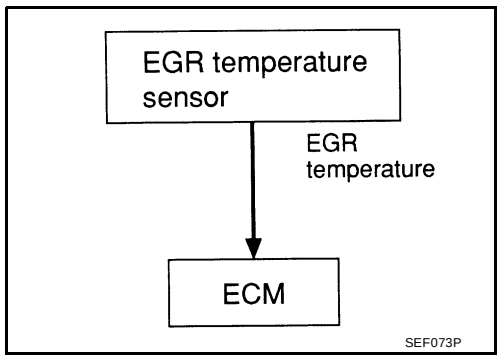
MONITOR ITEM	CONDITION		SPECIFICATION
EGR TEMP SEN	● Engine: After warming up		Less than 4.5V
EGR VOL CON/V	● Engine: After warming up ● Air conditioner switch: “OFF” ● Shift lever: “N” ● No-load	Idle	0 step
		Revving engine up to 3,000 rpm quickly	10 - 55 step

On Board Diagnosis Logic

UBS0023E

If the EGR temperature sensor detects EGR flow under the condition that does not call for EGR, a high-flow malfunction is diagnosed.
Malfunction is detected when EGR flow is detected under condition that does not call for EGR.

NOTE:
Diagnosis for this DTC will occur when engine coolant temperature is below 50 to 60°C (122 to 140°F). Therefore, it will be better to turn ignition switch “ON” (start engine) at the engine coolant temperature below 30°C (86°F) when starting DTC confirmation procedure.



SEF073P

Possible Cause

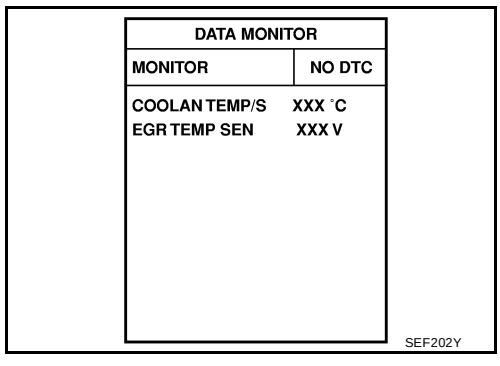
UBS0023F

- Harness or connectors
  (EGR volume control valve circuit is open or shorted.)
- EGR volume control valve leaking or stuck open
- EGR temperature sensor

DTC Confirmation Procedure

UBS0023G

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.



SEF202Y

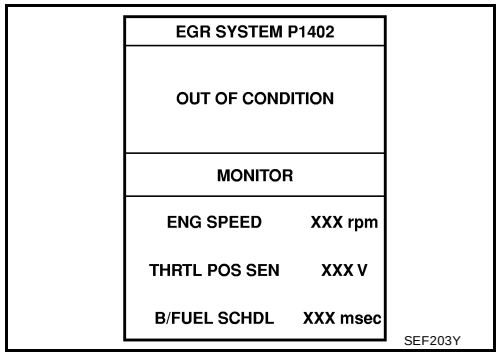
TESTING CONDITION:

- **Always perform the test at a temperature above −10°C (14°F).**
- **Engine coolant temperature and EGR temperature must be verified in "DATA MONITOR" mode with CONSULT-II before starting DTC WORK SUPPORT test. If it is out of range below, the test cannot be conducted.**

  COOLAN TEMP/S : −10 to 50°C (14 to 122°F)*

  EGR TEMP SEN : Less than 4.8V

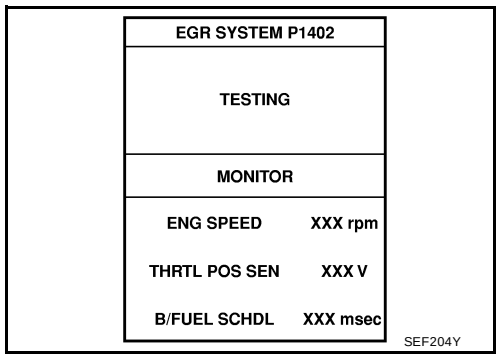
  If the values are out of the ranges indicated above, park the vehicle in a cool place and allow the engine temperature to stabilize. Do not attempt to reduce the engine coolant temperature or EGR temperature with a fan or means other than ambient air. Doing so may produce an inaccurate diagnostic result.



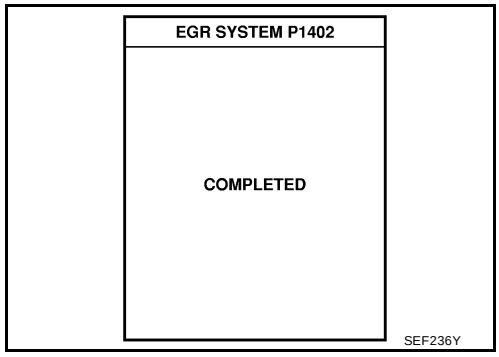
*: Although CONSULT-II screen displays "–10 to 40°C (14 to 104°F)" as a range of engine coolant temperature, ignore it.

WITH CONSULT-II

1. Turn ignition switch "OFF", and wait at least 5 seconds, and then turn "ON".
2. Select "EGR SYSTEM P1402" of "EGR SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
3. Touch "START".
4. Start engine and let it idle until "TESTING" on CONSULT-II screen is turned to "COMPLETED". (It will take 80 seconds or more.)
   If "TESTING" is not displayed after 5 minutes, turn ignition "OFF" and cool the engine coolant temperature to the range of −10 to 50°C (14 to 122°F). Retry from step 1.

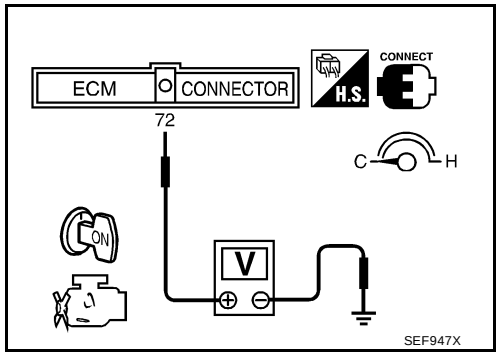


5. Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to EC-1114, "Diagnostic Procedure" .



WITH GST

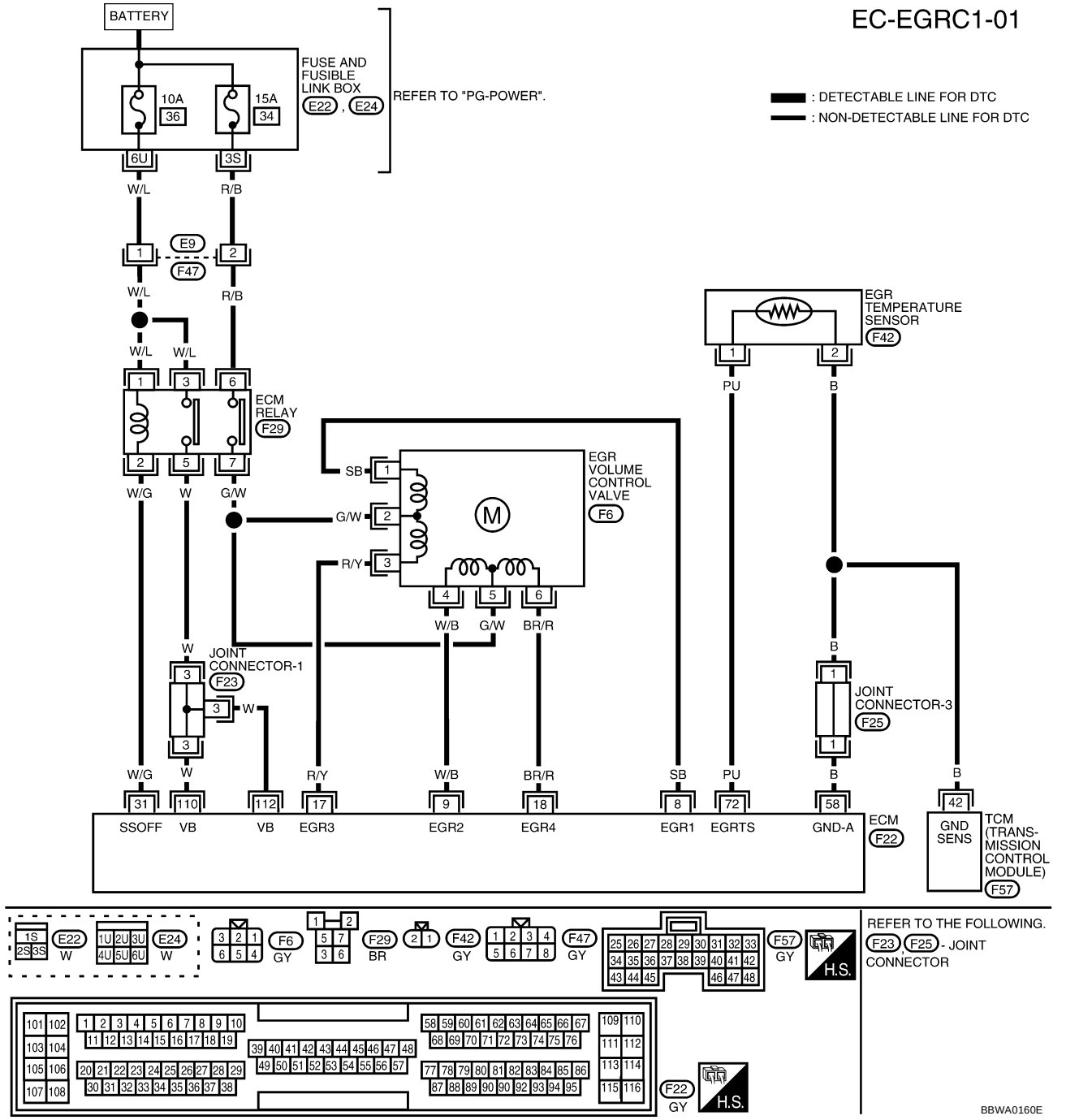
1. Turn ignition switch "ON" and select "MODE 1" with GST.
2. Check that engine coolant temperature is within the range of −10 to 50°C (14 to 122°F).
3. Check that voltage between ECM terminal 72 (EGR temperature sensor signal) and ground is less than 4.8V.
4. Start engine and let it idle for at least 80 seconds.
5. Stop engine.
6. Perform from step 1 to 4.
7. Select "MODE 3" with GST.
8. If DTC is detected, go toEC-1114, "Diagnostic Procedure" .



– **When using GST, “DTC Confirmation Procedure” should be performed twice as much as when using CONSULT-II because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II is recommended.**

Wiring Diagram

UBS0023H



ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
8	SB	EGR VOLUME CONTROL VALVE	ENGINE RUNNING AT IDLE SPEED	0.1 - 14V
9	W/B			
17	R/Y			
18	BR/R			

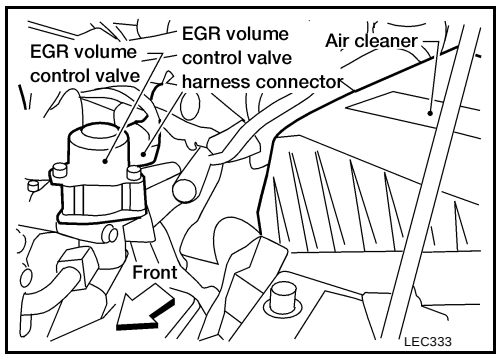
SEF575YA

Diagnostic Procedure

UBS0023I

1. CHECK EGR VOLUME CONTROL VALVE POWER SUPPLY CIRCUIT

1. Disconnect EGR volume control valve harness connector.
2. Turn ignition switch ON.

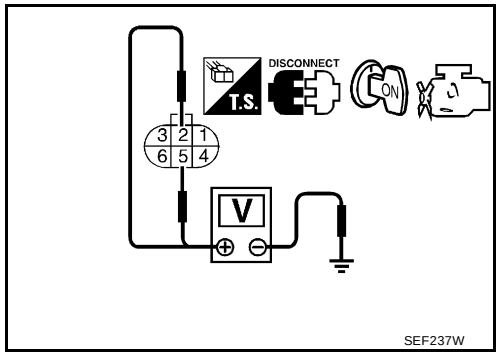


3. Check voltage between EGR volume control valve terminals 2, 5 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 3.
NG >> GO TO 2.



2. DETECT MALFUNCTIONING PART

Check harness for open or short between ECM relay and EGR volume control valve.

>> Repair harness or connectors.

3. CHECK EGR VOLUME 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 terminals and EGR volume control valve terminals as follows. Refer to Wiring Diagram.

ECM terminal	A/F sensor terminal
8	1
9	4
17	3
18	6

Continuity should exist.

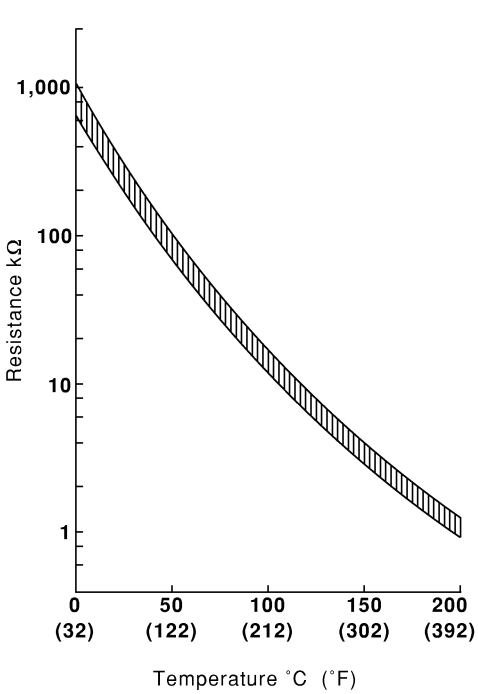
4. Also check harness for short to ground and short to power.

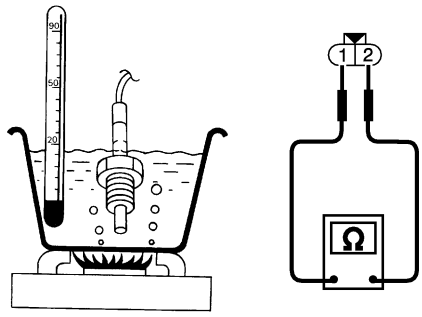
OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK EGR TEMPERATURE SENSOR

1. Remove EGR temperature sensor.
2. Check resistance between EGR temperature sensor terminals 1 and 2 under the following conditions.





<Reference data>

EGR temperature °C (°F)	Voltage V	Resistance MΩ
0 (32)	4.56	0.62 - 1.05
50 (122)	2.25	0.065 - 0.094
100 (212)	0.59	0.011 - 0.015

SEF483Y

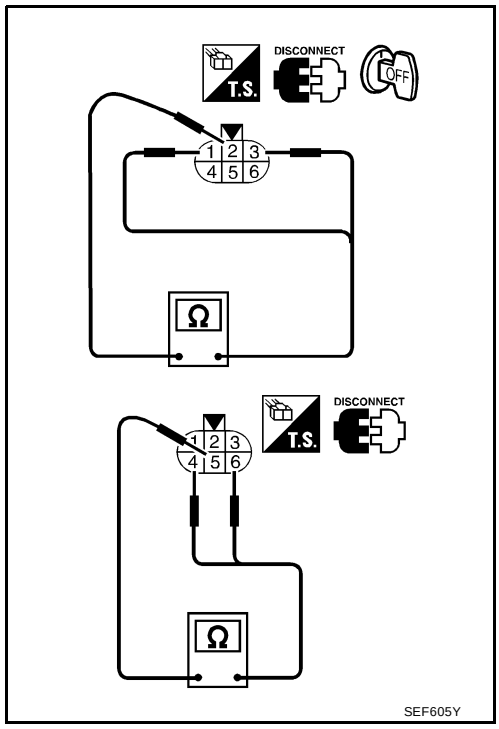
OK or NG

OK >> GO TO 5.
NG >> Replace EGR temperature sensor.

5. CHECK EGR VOLUME CONTROL VALVE-I

Check resistance between EGR volume control valve terminal 2 and terminals 1, 3, terminal 5 and terminals 4, 6.

Resistance: 20.9 - 23.1 Ω [at 20°C (68°F)]



OK or NG

OK (With CONSULT-II)>>GO TO 6.
OK (Without CONSULT-II)>>GO TO 7.
NG >> Replace EGR volume control valve.

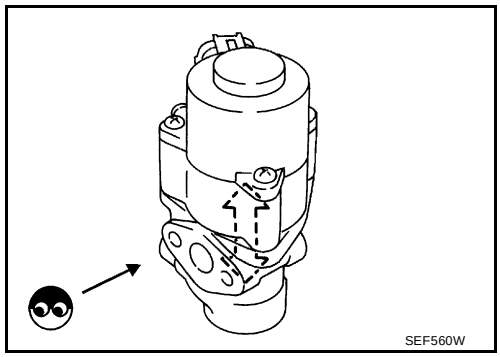
6. CHECK EGR VOLUME CONTROL VALVE-II

With CONSULT-II

1. Remove EGR volume control valve.
2. Reconnect ECM harness connector and EGR volume control valve harness connector.
3. Turn ignition switch “ON”.
4. Perform “EGR VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-II.
5. Check that EGR volume control valve shaft moves smoothly forward and backward according to the valve opening steps.

ACTIVE TEST	
EGR VOL CONT/V	20 step
MONITOR	
ENG SPEED	XXX rpm
EGR TEMP SEN	XXX V

SEF015Y



SEF560W

OK or NG

OK >> GO TO 8.
NG >> Replace EGR volume control valve.

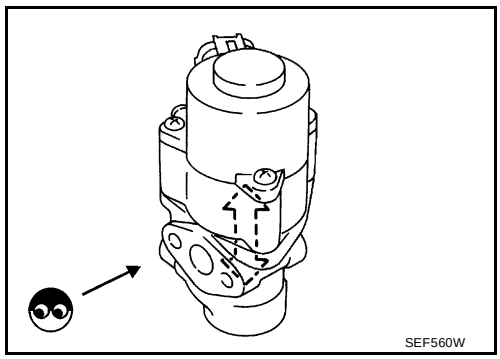
7. CHECK EGR VOLUME CONTROL VALVE-II

Without CONSULT-II

1. Remove EGR volume control valve.
2. Reconnect ECM harness connector and EGR volume control valve harness connector.
3. Turn ignition switch ON and OFF.
4. Check that EGR volume control valve shaft moves smoothly forward and backward according to the ignition switch position.

OK or NG

OK >> GO TO 8.
NG >> Replace EGR volume control valve.



SEF560W

8. CHECK INTERMITTENT INCIDENT

Refer to EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

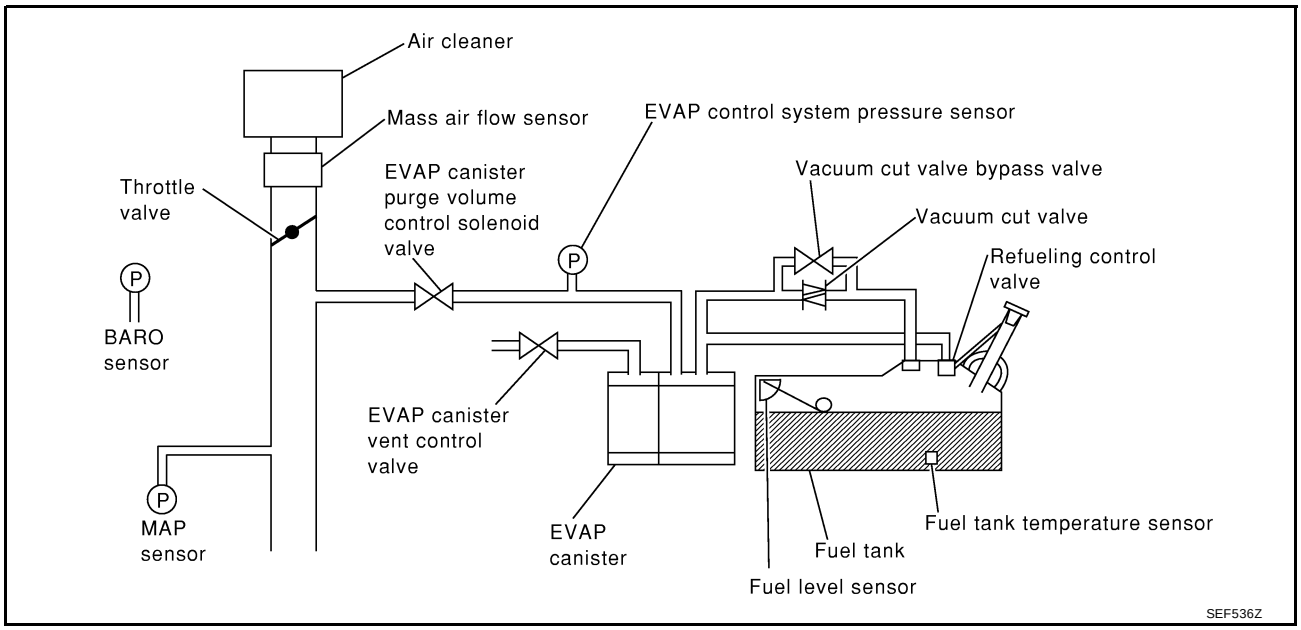
DTC P1442 EVAP CONTROL SYSTEM

PFP:14950

On Board Diagnosis Logic

UBS0023J

NOTE:
If DTC P1442 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-1045 .)
This diagnosis detects leaks in the EVAP purge line using vapor pressure in the fuel tank.
The EVAP canister vent control valve is closed to shut the EVAP purge line. The vacuum cut valve bypass valve will then be opened to clear the line between the fuel tank and the EVAP canister purge volume control solenoid valve. The EVAP control system pressure sensor can now monitor the pressure inside the fuel tank.
If pressure increases, the ECM will check for leaks in the line between the vacuum cut valve and EVAP canister purge volume control solenoid valve.



Malfunction is detected when EVAP control system has a leak, EVAP control system does not operate properly.

CAUTION:

- **Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.**
- **If the fuel filler cap is not tightened properly, the MIL may come on.**
- **Use only a genuine NISSAN rubber tube as a replacement.**

Possible Cause

UBS0023K

- Incorrect fuel tank vacuum relief valve
- Incorrect fuel filler cap used
- Fuel filler cap remains open or fails to close.
- Foreign matter caught in fuel filler cap.
- Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.
- Foreign matter caught in EVAP canister vent control valve.
- EVAP canister
- EVAP purge line (pipe and rubber tube) leaks
- EVAP purge line rubber tube bent.
- Blocked or bent rubber tube to EVAP control system pressure sensor
- Loose or disconnected rubber tube
- EVAP canister vent control valve and the circuit
- EVAP canister purge volume control solenoid valve
- Manifold absolute pressure (MAP) sensor
- Fuel tank temperature sensor

- O-ring of EVAP canister vent control valve is missing or damaged.
- Water separator
- EVAP canister is saturated with water.
- Fuel level sensor and the circuit
- EVAP control system pressure sensor
- Refueling control valve
- ORVR system leaks
- Foreign matter caught in EVAP canister purge volume control solenoid valve

DTC Confirmation Procedure

UBS0023L

Refer to EC-908, "DTC P0442 EVAP CONTROL SYSTEM" .

Diagnostic Procedure

UBS0023M

Refer to EC-908, "DTC P0442 EVAP CONTROL SYSTEM" .

DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

PFP:14920

Description

UBS0023N

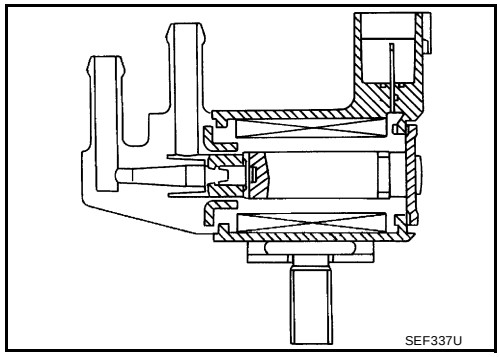
SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
Camshaft position sensor (PHASE)	Engine speed and cylinder position		
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		
Throttle position switch	Closed throttle position		
Air fuel ratio (A/F) sensors 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Fuel tank temperature sensor	Fuel temperature in fuel tank		
Vehicle speed sensor	Vehicle speed		

This system controls flow rate of fuel vapor from the EVAP canister. The opening of the vapor by-pass passage in the EVAP canister purge volume control solenoid valve changes to control the flow rate. The EVAP canister purge volume control solenoid valve repeats ON/OFF operation according to the signal sent from the ECM. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions. When the engine is operating, the flow rate of fuel vapor from the EVAP canister is regulated as the air flow changes.

COMPONENT DESCRIPTION

The EVAP canister purge volume control solenoid valve uses a ON/OFF duty to control the flow rate of fuel vapor from the EVAP canister. The EVAP canister purge volume control solenoid valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of fuel vapor that will flow through the valve.



CONSULT-II Reference Value in Data Monitor Mode

UBS0023O

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PURG VOL C/V	● Engine: After warming up ● Air conditioner switch “OFF” ● Shift lever: “N” ● No-load	Idle (Vehicle stopped)	0%
		2,000 rpm	—

On Board Diagnosis Logic

UBS0023P

Malfunction is detected when the canister purge flow is detected during the specified driving conditions, even when EVAP canister purge volume control solenoid valve is completely closed.

Possible Cause

UBS0023Q

- EVAP control system pressure sensor
- EVAP canister purge volume control solenoid valve (The valve is stuck open.)
- EVAP canister vent control valve

- EVAP canister
- Hoses
  (Hoses are connected incorrectly or clogged.)

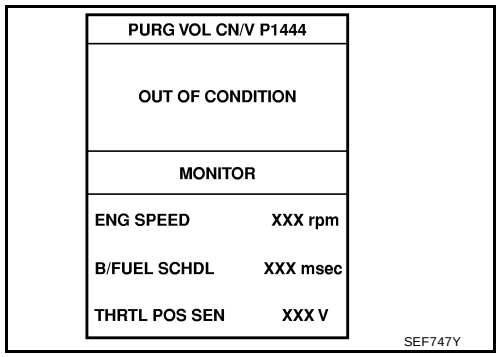
DTC Confirmation Procedure

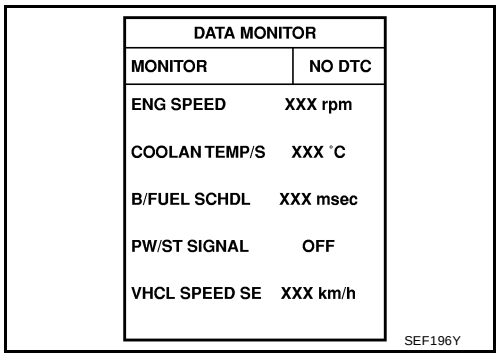
UBS0023R

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 test at a temperature of 0°C (32°F) or more.

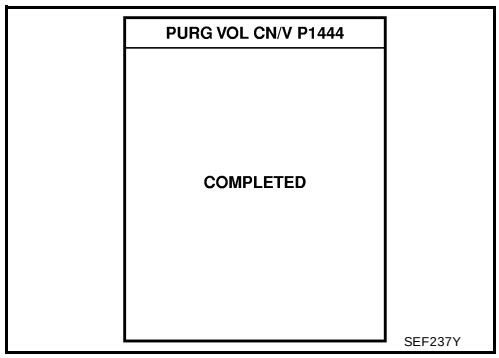
WITH CONSULT-II

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-1124, "Diagnostic Procedure" .



WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Start engine and let it idle for at least 20 seconds.

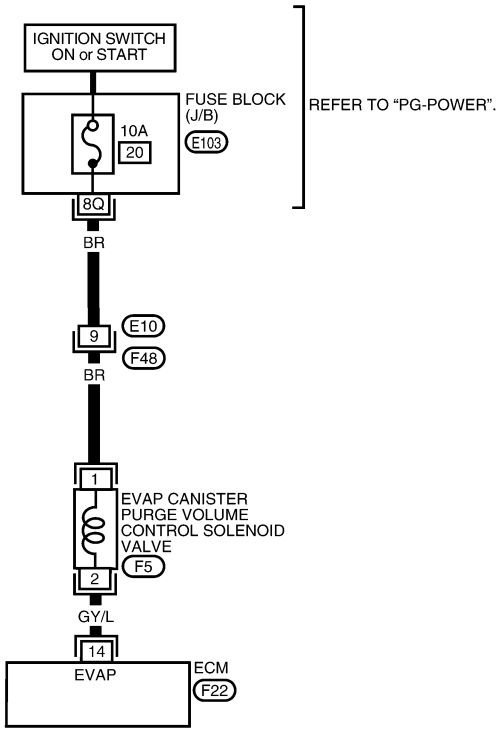
4. Select “MODE 7” with GST.
5. If 1st trip DTC is detected, go to EC-1124, "Diagnostic Procedure" .

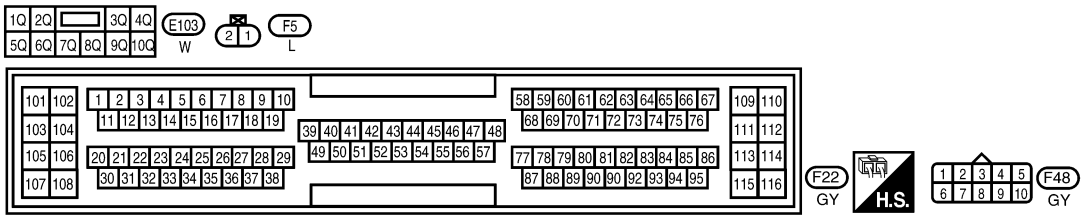
Wiring Diagram

UBS0023S

EC-PGC/V-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC





BBWA0162E

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
14	GY/L	EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE	ENGINE RUNNING AT IDLE SPEED	BATTERY VOLTAGE (V) 40 20 0 50 ms
			ENGINE RUNNING AT 2,000 RPM (MORE THAN 100 SECONDS AFTER STARTING ENGINE)	BATTERY VOLTAGE (V) 40 20 0 50 ms

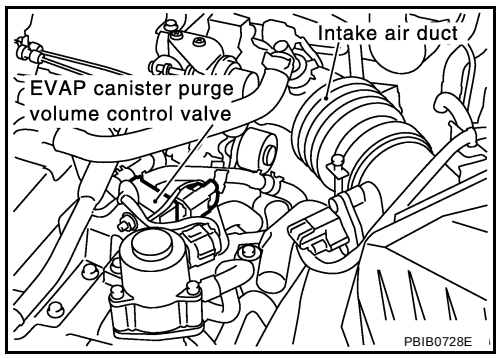
SEF576Y

Diagnostic Procedure

UBS0023T

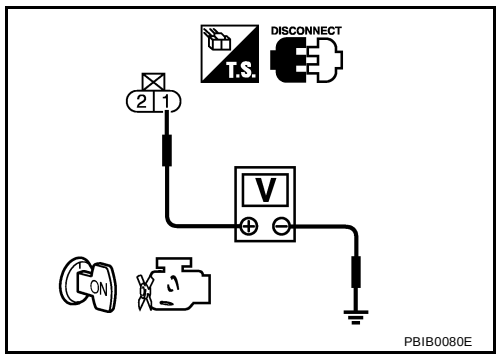
1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

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 engine ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E9, F47
- Fuse block (J/B) connector E103
- 10A fuse
- Harness for open or short between EVAP canister purge volume control solenoid valve and fuse

>> Repair harness or connectors.

3. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 14 and EVAP canister purge volume control solenoid valve terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the harness for open or short between EVAP canister purge volume control solenoid valve and ECM.

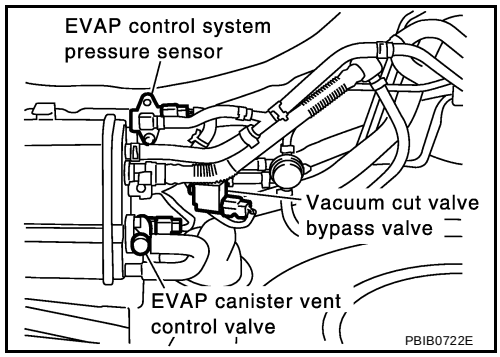
>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE

Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.

OK or NG

OK >> GO TO 6.
NG >> Repair it.



6. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check connectors for water.

Water should not exist.

OK or NG

OK >> GO TO 7.
NG >> Replace EVAP control system pressure sensor.

7. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

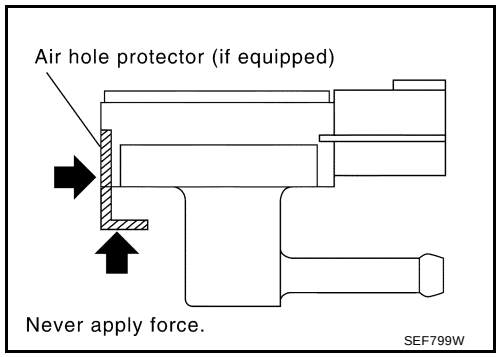
1. Remove EVAP control system pressure sensor with its harness connector connected.

   CAUTION:
   - **Never apply force to the air hole protector of the sensor if equipped.**

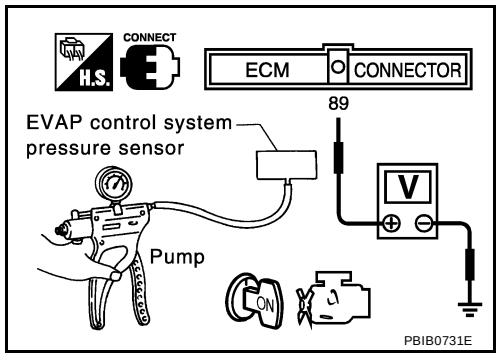
2. Remove hose from EVAP control system pressure sensor.
3. Turn ignition switch “ON”.
4. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.

   CAUTION:
   - **Always calibrate the vacuum pump gauge when using it.**
   - **Do not apply below −20 kPa (−150 mmHg, −5.91 inHg) or over 20 kPa (150 mmHg, 5.91 inHg) of pressure.**

5. Check input voltage between ECM terminal 89 and ground.



Pressure (Relative to atmospheric pressure)	Voltage V
0 kPa (0 mmHg, 0 inHg)	3.0 - 3.6
-9.3 kpa (-70 mmHg, -2.76 inHg)	0.4 - 0.6



CAUTION:
Discard any EVAP control system pressure sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

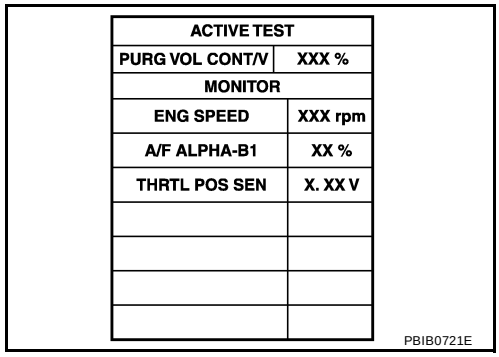
OK or NG

OK (With CONSULT-II)>>GO TO 8.
OK (Without CONSULT-II)>>GO TO 9.
NG >> Replace EVAP control system pressure sensor.

8. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

1. 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

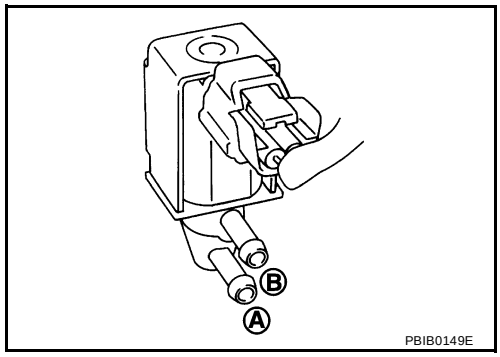
OK >> GO TO 10.
NG >> GO TO 9.

9. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

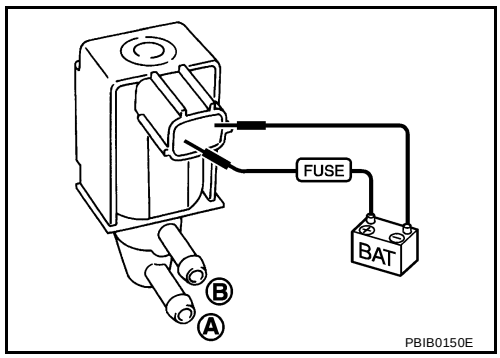
Condition PURG VOL CONT/V valve	Air passage continuity between A and B
100.0%	Yes
0.0%	No



Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

Condition	Air passage continuity between A and B
12V direct current supply between terminal 1 and 2	Yes
No supply	No



OK or NG

OK >> GO TO 10.
NG >> Replace EVAP canister purge volume control solenoid valve.

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

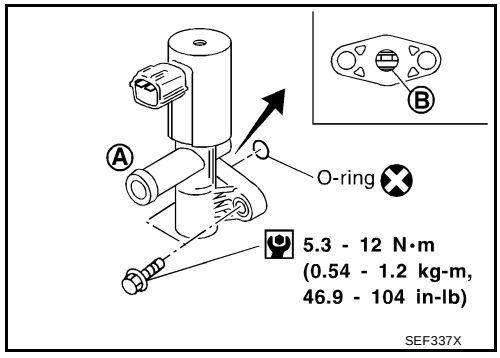
OK >> GO TO 11.
NG >> Clean the rubber tube using an air blower.

11. CHECK EVAP CANISTER VENT CONTROL VALVE-I

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.

OK or NG

OK >> GO TO 12.
NG >> Replace EVAP canister vent control valve.



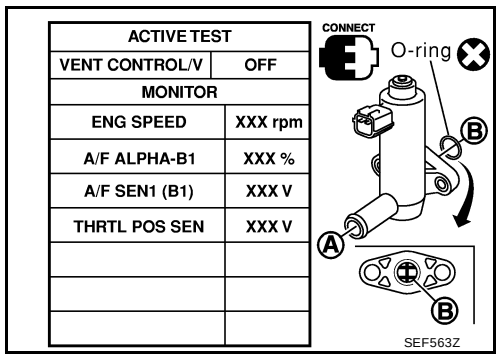
12. CHECK EVAP CANISTER VENT CONTROL VALVE-II

With CONSULT-II

1. Reconnect harness connectors disconnected.
2. Turn ignition switch “ON”.
3. Perform “VENT CONTROL/V” in “ACTIVE TEST” mode.
4. Check air passage continuity and operation delay time.

Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.



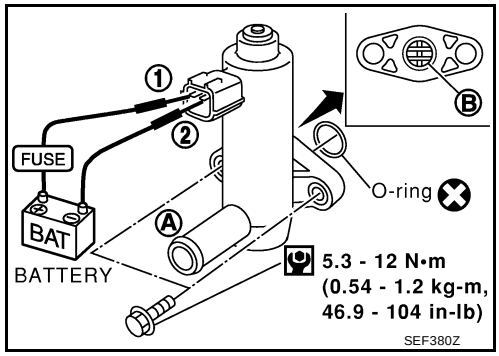
Without CONSULT-II

Check air passage continuity and operation delay time under the following conditions.

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
OFF	Yes

Operation takes less than 1 second.

Make sure new O-ring is installed properly.



OK or NG

OK >> GO TO 14.
NG >> GO TO 13.

13. CHECK EVAP CANISTER VENT CONTROL VALVE-III

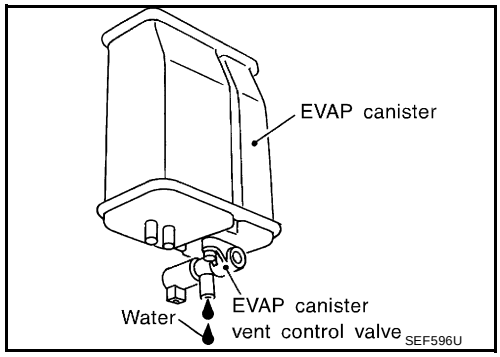
1. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
2. Perform procedure 10 again.

OK or NG

OK >> GO TO 14.
NG >> Replace EVAP canister vent control valve.

14. CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Check if water will drain from the EVAP canister.



Yes or No

Yes >> GO TO 15.
No >> GO TO 18.

15. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve attached.
The weight should be less than 1.8 kg (4.0 lb).

OK or NG

OK >> GO TO 17.
NG >> GO TO 16.

16. DETECT MALFUNCTIONING PART

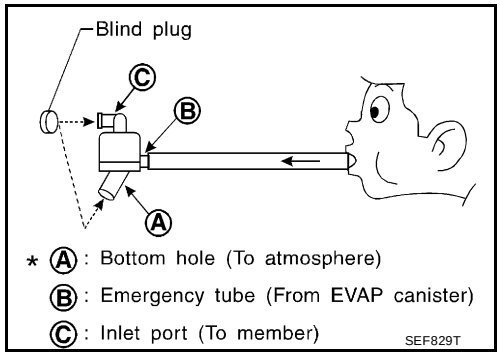
Check the following.

- EVAP canister for damage
- EVAP hose between EVAP canister and water separater for clogging or poor connection

>> Repair hose or replace EVAP canister.

17. CHECK WATER SEPARATOR

1. Check visually for insect nests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that **A** and **C** are not clogged by blowing air into **B** with **A** , and then **C** plugged.
5. In case of NG in items 2 - 4, replace the parts.



NOTE:
Do not disassemble water separator.

OK or NG

OK >> GO TO 18.
NG >> Clean or replace water separator.

18. CHECK INTERMITTENT INCIDENT

Refer to EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

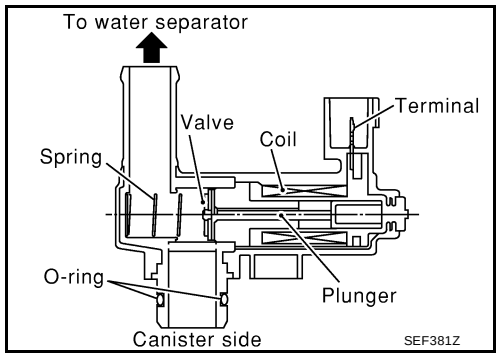
DTC P1446 EVAP CANISTER VENT CONTROL VALVE

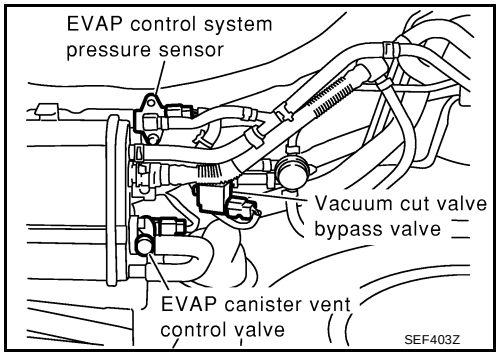
PFP:14935

Component Description

UBS0023U

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” diagnoses.





CONSULT-II Reference Value in Data Monitor Mode

UBS0023V

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	● Ignition switch: ON	OFF

On Board Diagnosis Logic

UBS0023W

Malfunction is detected when EVAP canister vent control valve remains closed under specified driving conditions.

Possible Cause

UBS0023X

- EVAP canister vent control valve
- EVAP control system pressure sensor and the circuit
- Blocked rubber tube to EVAP canister vent control valve
- Water separator
- EVAP canister is saturated with water.

DTC Confirmation Procedure

UBS0023Y

CAUTION:
Always drive vehicle at a safe speed.

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch “ON”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine.

4. Drive vehicle at a speed of approximately 80 km/h (50 MPH) for a maximum of 15 minutes.

   NOTE:
   If a malfunction exists, NG result may be displayed quicker.

5. If 1st trip DTC is detected, go to EC-1132, "Diagnostic Procedure" .

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h
THRTL POS SEN	XXX V
B/FUEL SCHDL	XXX msec

SEF201Y

WITH GST

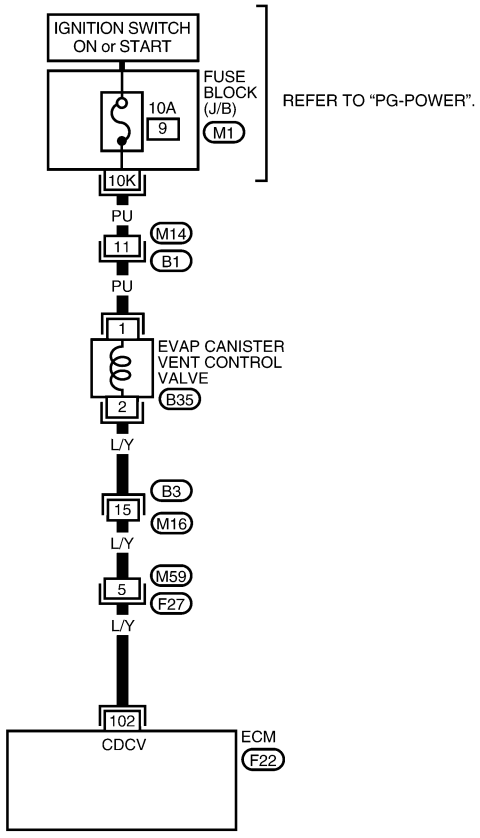
Follow the procedure “WITH CONSULT-II” above.

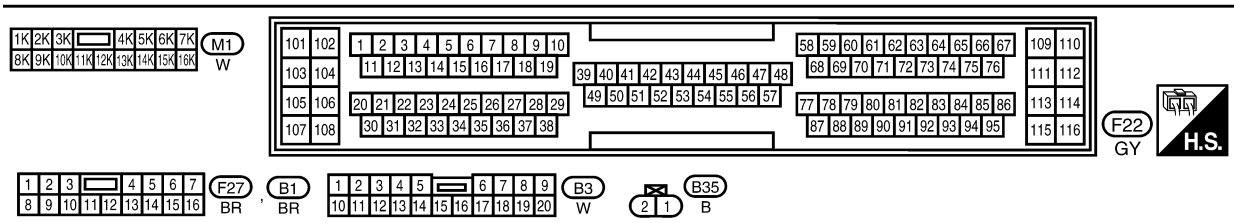
Wiring Diagram

UBS0023Z

EC-VENT/V-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC





BBWA0163E

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
102	L/Y	EVAP CANISTER VENT CONTROL VALVE	IGN ON	BATTERY VOLTAGE

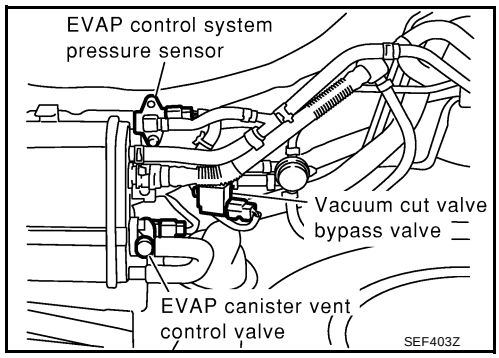
SEF577Y

Diagnostic Procedure

UBS00240

1. CHECK RUBBER TUBE

1. Turn ignition switch "OFF".
2. Disconnect rubber tube connected to EVAP canister vent control valve.
3. Check the rubber tube for clogging.



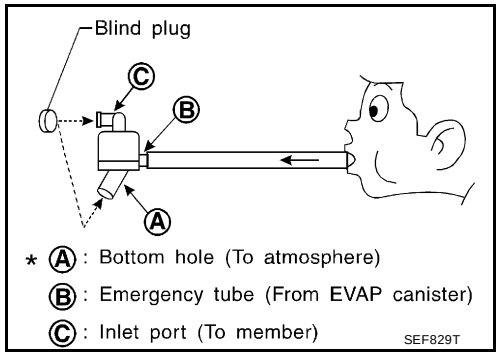
OK or NG

OK >> GO TO 2.
NG >> Clean rubber tube using an air blower.

2. CHECK WATER SEPARATOR

1. Check visually for insect nests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that **A** and **C** are not clogged by blowing air into **B** with **A** , and then **C** plugged.
5. In case of NG in items 2 - 4, replace the parts.

NOTE:
Do not disassemble water separator.



OK or NG

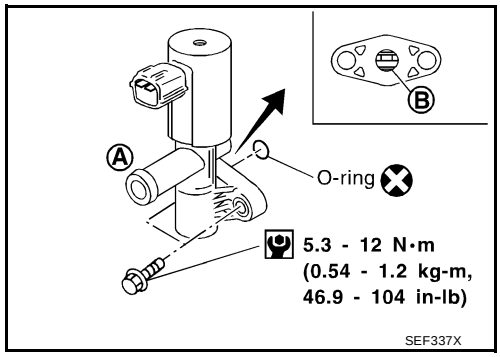
OK >> GO TO 3.
NG >> Clean or replace water separator.

3. CHECK EVAP CANISTER VENT CONTROL VALVE-I

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.

OK or NG

OK >> GO TO 4.
NG >> Replace EVAP canister vent control valve.



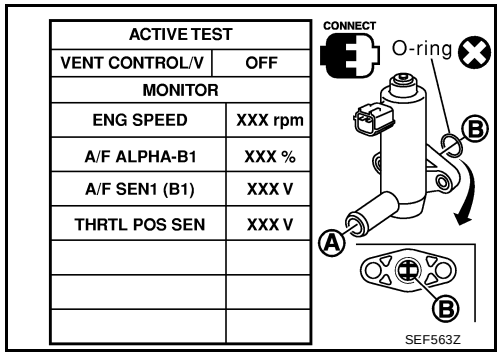
4. CHECK EVAP CANISTER VENT CONTROL VALVE-II

With CONSULT-II

1. Turn ignition switch ON.
2. Perform “VENT CONTROL/V” in “ACTIVE TEST” mode.
3. Check air passage continuity and operation delay time.

Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.



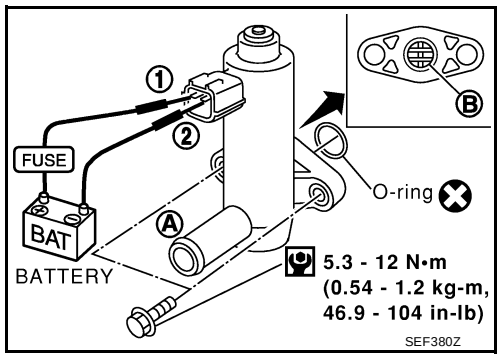
Without CONSULT-II

Check air passage continuity and operation delay time under the following conditions.

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
OFF	Yes

Operation takes less than 1 second.

Make sure new O-ring is installed properly.



OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. CHECK EVAP CANISTER VENT CONTROL VALVE-III

1. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
2. Perform the procedure 4 again.

OK or NG

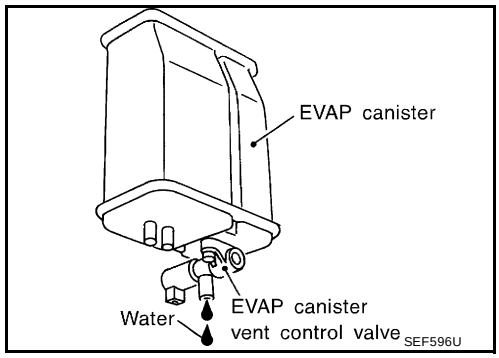
OK >> GO TO 6.
NG >> Replace EVAP canister vent control valve.

6. CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Check if water will drain from the EVAP canister.

Yes or No

Yes >> GO TO 7.
No >> GO TO 9.



7. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve attached.
The weight should be less than 1.8 kg (4.0 lb).

OK or NG

OK >> GO TO 9.
NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

- EVAP canister for damage
- EVAP hose between EVAP canister and water separator for clogging or poor connection

>> Repair hose or replace EVAP canister.

9. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE

Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.

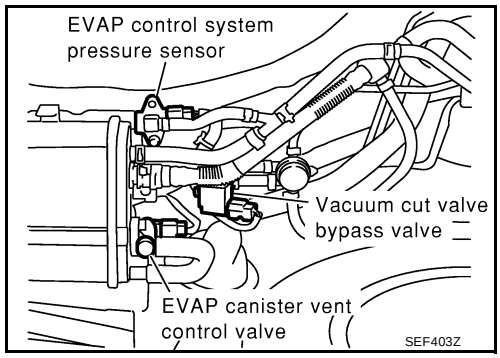
OK or NG

OK >> GO TO 10.
NG >> Repair it.

10. 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 11.
NG >> Replace EVAP control system pressure sensor.

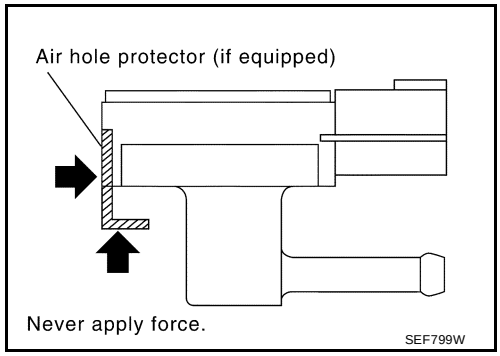
11. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.

CAUTION:
- **Never apply force to the air hole protector of the sensor if equipped.**

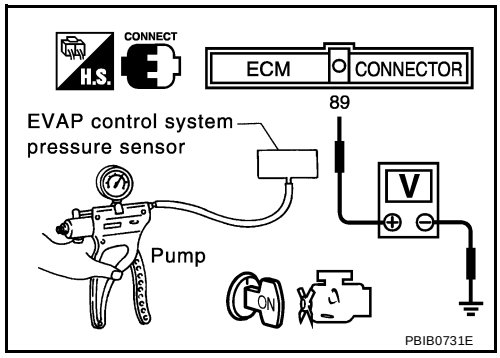
2. Remove hose from EVAP control system pressure sensor.
3. Turn ignition switch “ON”.
4. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.

CAUTION:
- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply below –20 kPa (–150 mmHg, –5.91 inHg) or over 20 kPa (150 mmHg, 5.91 inHg) of pressure.**



5. Check input voltage between ECM terminal 89 and ground.

Pressure (Relative to atmospheric pressure)	Voltage V
0 kPa (0 mmHg, 0 inHg)	3.0 - 3.6
-9.3 kPa (-70 mmHg, -2.76 inHg)	0.4 - 0.6



CAUTION:
- **Discard any EVAP control system pressure sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**

OK or NG

OK >> GO TO 12.
NG >> Replace EVAP control system pressure sensor.

12. CHECK INTERMITTENT INCIDENT

Refer to EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

DTC P1448 EVAP CANISTER VENT CONTROL VALVE

PFP:14935

Component Description

UBS00241

NOTE:
If DTC P1448 is displayed with P0442, perform trouble diagnosis for DTC P1448 first.
The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent.
This solenoid valve responds to signals from the ECM. When the ECM sends an ON signal, the coil in the solenoid valve is energized. A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.
This solenoid valve is used only for diagnosis, and usually remains opened.
When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows “EVAP Control System” diagnoses.

CONSULT-II Reference Value in Data Monitor Mode

UBS00242

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	● Ignition switch: ON	OFF

On Board Diagnosis Logic

UBS00243

Malfunction is detected when EVAP canister vent control valve remains opened under specified driving conditions.

Possible Cause

UBS00244

- EVAP canister vent control valve
- EVAP control system pressure sensor and circuit
- Blocked rubber tube to EVAP canister vent control valve
- Water separator
- EVAP canister is saturated with water.
- Vacuum cut valve

DTC Confirmation Procedure

UBS00245

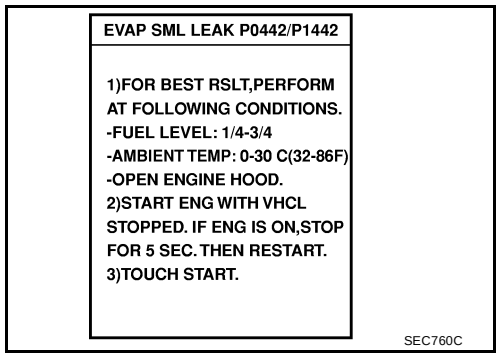
NOTE:
- **If DTC P1448 is displayed with P0442 or P1442, perform trouble diagnosis for DTC P1448 first.**
- If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

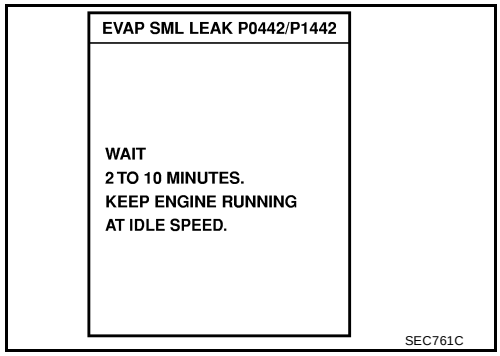
TESTING CONDITION:
- **Perform “DTC WORK SUPPORT” when the fuel level is between 1/4 to 3/4 full and vehicle is placed on flat level surface.**
- **Open engine hood before conducting following procedure.**

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.

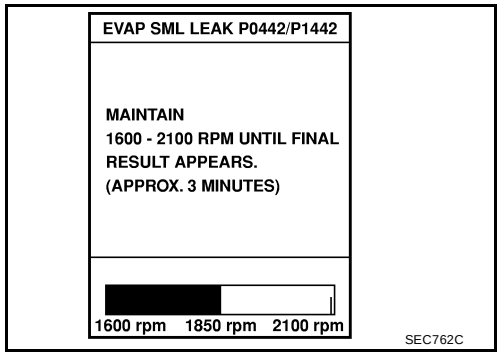
COOLAN TEMP/S	0 - 70°C (32 - 158°F)
INT/A TEMP SE	0 - 30°C (32 - 86°F)



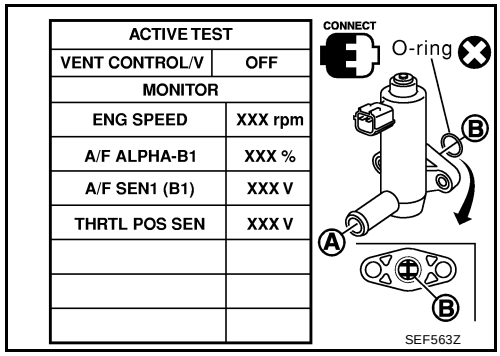
5. Select “EVAP SML LEAK P0442/P1442” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II. Follow the instruction displayed.
If the engine speed cannot be maintained within the range displayed on the CONSULT-II screen, go to EC-652, "Basic Inspection" .



6. Make sure that “OK” is displayed.
If “NG” is displayed, go to the following step.
NOTE:
Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.
7. Stop engine and wait at least 5 seconds, then turn “ON”.
8. Disconnect hose from water separator.
9. Select “VENT CONTROL/V” of “ACTIVE TEST” mode with CONSULT-II.
10. Touch “ON” and “OFF” alternately.
11. Make sure the following.



Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

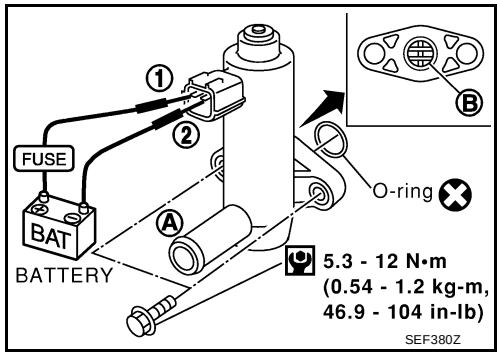


If the result is NG, go to EC-1139, "Diagnostic Procedure" .
If the result is OK, go to “Diagnostic Procedure” for DTC P0442, EC-910 .

Overall Function Check

UBS00246

Use this procedure to check the overall function of the EVAP canister vent control valve circuit. During this check, a DTC might not be confirmed.



WITH GST

1. Disconnect hose from water separator.
2. Disconnect EVAP canister vent control valve harness connector.
3. Verify the following.

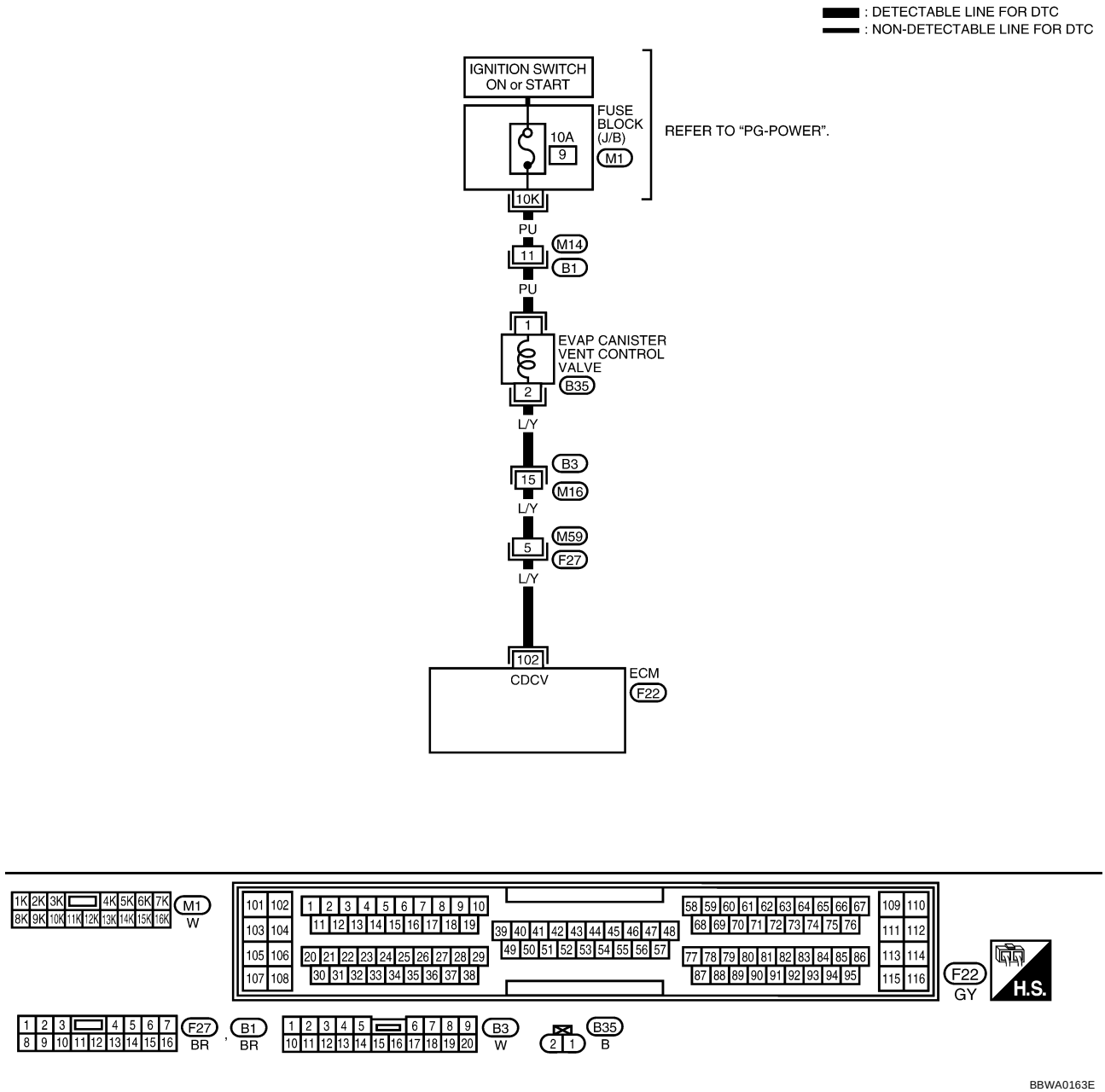
Condition	Air passage continuity
12V direct current supply between terminals 1 and 2	No
No supply	Yes

If the result is NG, go to “Diagnostic Procedure”, EC-1139 .
If the result is OK, go to “Diagnostic Procedure” for DTC P0442, EC-910 .

Wiring Diagram

UBS00247

EC-VENT/V-01



BBWA0163E

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
102	L/Y	EVAP CANISTER VENT CONTROL VALVE	IGN ON	BATTERY VOLTAGE

SEF577Y

Diagnostic Procedure

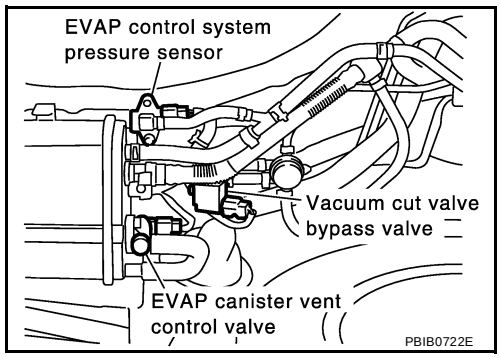
UBS00248

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.

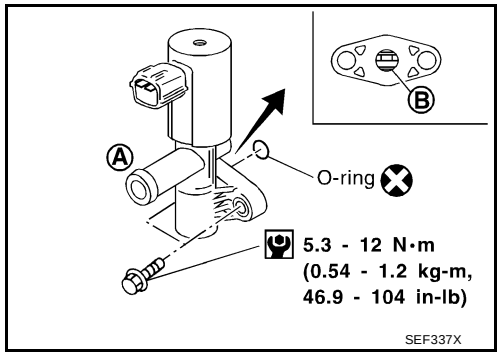


2. CHECK EVAP CANISTER VENT CONTROL VALVE-I

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.

OK or NG

OK >> GO TO 3.
NG >> Replace EVAP canister vent control valve.



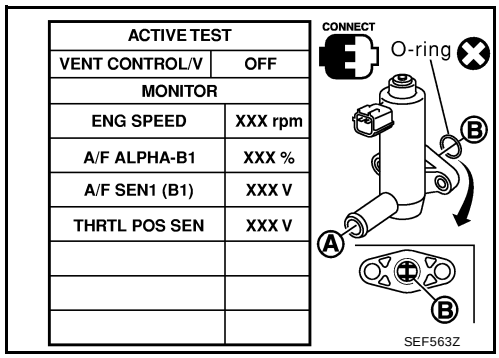
3. CHECK EVAP CANISTER VENT CONTROL VALVE-II

With CONSULT-II

1. Turn ignition switch ON.
2. Perform “VENT CONTROL/V” in “ACTIVE TEST” mode.
3. Check air passage continuity and operation delay time.

Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.



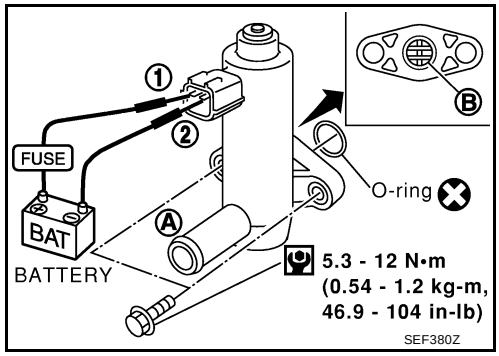
Without CONSULT-II

Check air passage continuity and operation delay time under the following conditions.

Condition	Air passage continuity between A and B
12V direct current supply between terminal 1 and 2	No
OFF	Yes

Operation takes less than 1 second.

Make sure new O-ring is installed properly.



OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. CHECK EVAP CANISTER VENT CONTROL VALVE-III

1. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
2. Perform Test No. 3 again.

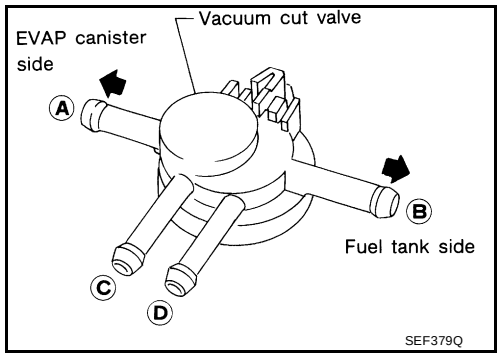
OK or NG

OK >> GO TO 5.
NG >> Replace EVAP canister vent control valve.

5. CHECK VACUUM CUT VALVE

1. Turn ignition switch OFF.
2. Remove vacuum cut valve.
3. Check vacuum cut valve as follows:

- Plug port **C** and **D** with fingers.
- Apply vacuum to port **A** and check that there is no suction from port **B** .
- Apply vacuum to port **B** and check that there is suction from port **A** .
- Blow air in port **B** and check that there is a resistance to flow out of port **A** .
- Open port **C** and **D** .
- Blow air in port **A** check that air flows freely out of port **C** .
- Blow air in port **B** check that air flows freely out of port **D** .



OK or NG

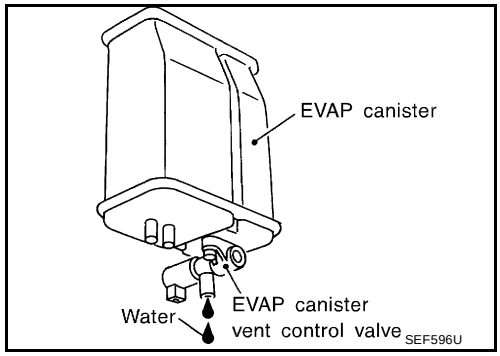
OK >> GO TO 6.
NG >> Replace vacuum cut valve.

6. CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Check if water will drain from the EVAP canister.

Yes or No

Yes >> GO TO 7.
No >> GO TO 9.



7. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve attached.
The weight should be less than 1.8 kg (4.0 lb).

OK or NG

OK >> GO TO 9.
NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

- EVAP canister for damage
- EVAP hose between EVAP canister and water separator for clogging or poor connection

>> Repair hose or replace EVAP canister.

9. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE

Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.

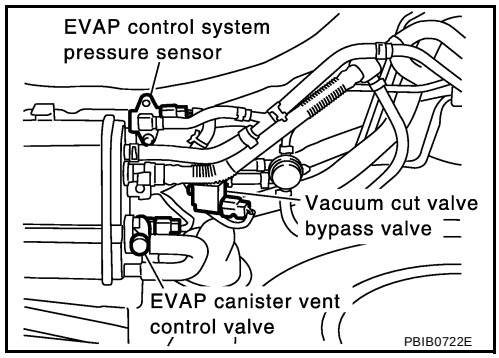
OK or NG

OK >> GO TO 10.
NG >> Repair it.

10. 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 11.
NG >> Replace EVAP control system pressure sensor.

11. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

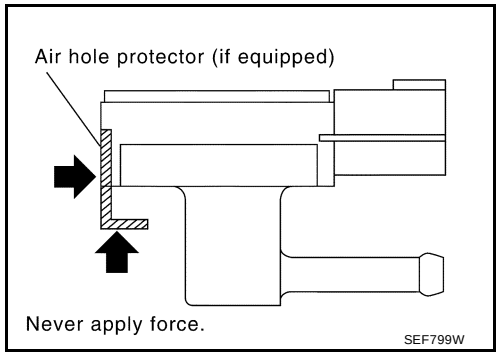
1. Remove EVAP control system pressure sensor with its harness connector connected.

CAUTION:
- **Never apply force to the air hole protector of the sensor if equipped.**

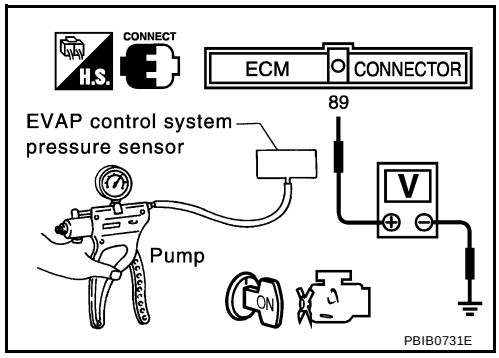
2. Remove hose from EVAP control system pressure sensor.
3. Turn ignition switch “ON”.
4. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.

CAUTION:
- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply below −20 kPa (−150 mmHg, −5.91 inHg) or over 20 kPa (150 mmHg, 5.91 inHg) of pressure.**

5. Check input voltage between ECM terminal 89 and ground.



Pressure (Relative to atmospheric pressure)	Voltage V
0 kPa (0 mmHg, 0 inHg)	3.0 - 3.6
-9.3 kPa (-70 mmHg, -2.76 inHg)	0.4 - 0.6



CAUTION:
- **Discard any EVAP control system pressure sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**

OK or NG

OK >> GO TO 12.
NG >> Replace EVAP control system pressure sensor.

12. CHECK INTERMITTENT INCIDENT

Refer to EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

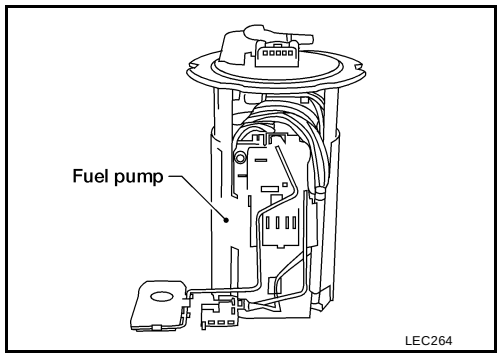
DTC P1464 FUEL LEVEL SENSOR

PFP:25060

Component Description

UBS00249

The fuel level sensor is mounted in the fuel level sensor unit. The sensor detects a fuel level in the fuel tank and transmits a signal to the ECM.
It consists of two parts, one is mechanical float and the other side is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.



On Board Diagnostic Logic

UBS0024A

ECM receives two signals from the fuel level sensor.
One is fuel level sensor power supply circuit, and the other is fuel level sensor ground circuit.
This diagnosis indicates the latter to detect open circuit malfunction. Malfunction is detected when a high voltage from the sensor is sent to ECM.

Possible Cause

UBS0024B

- Fuel level sensor circuit
  (The fuel level sensor circuit is open or shorted.)

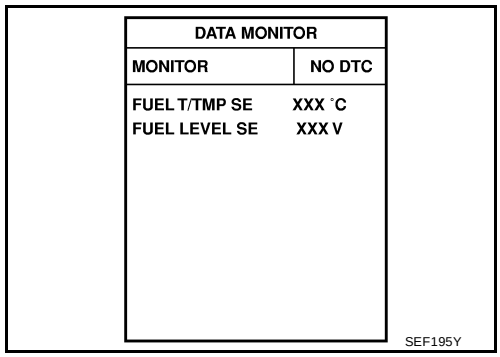
DTC Confirmation Procedure

UBS0024C

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-1145, "Diagnostic Procedure" .



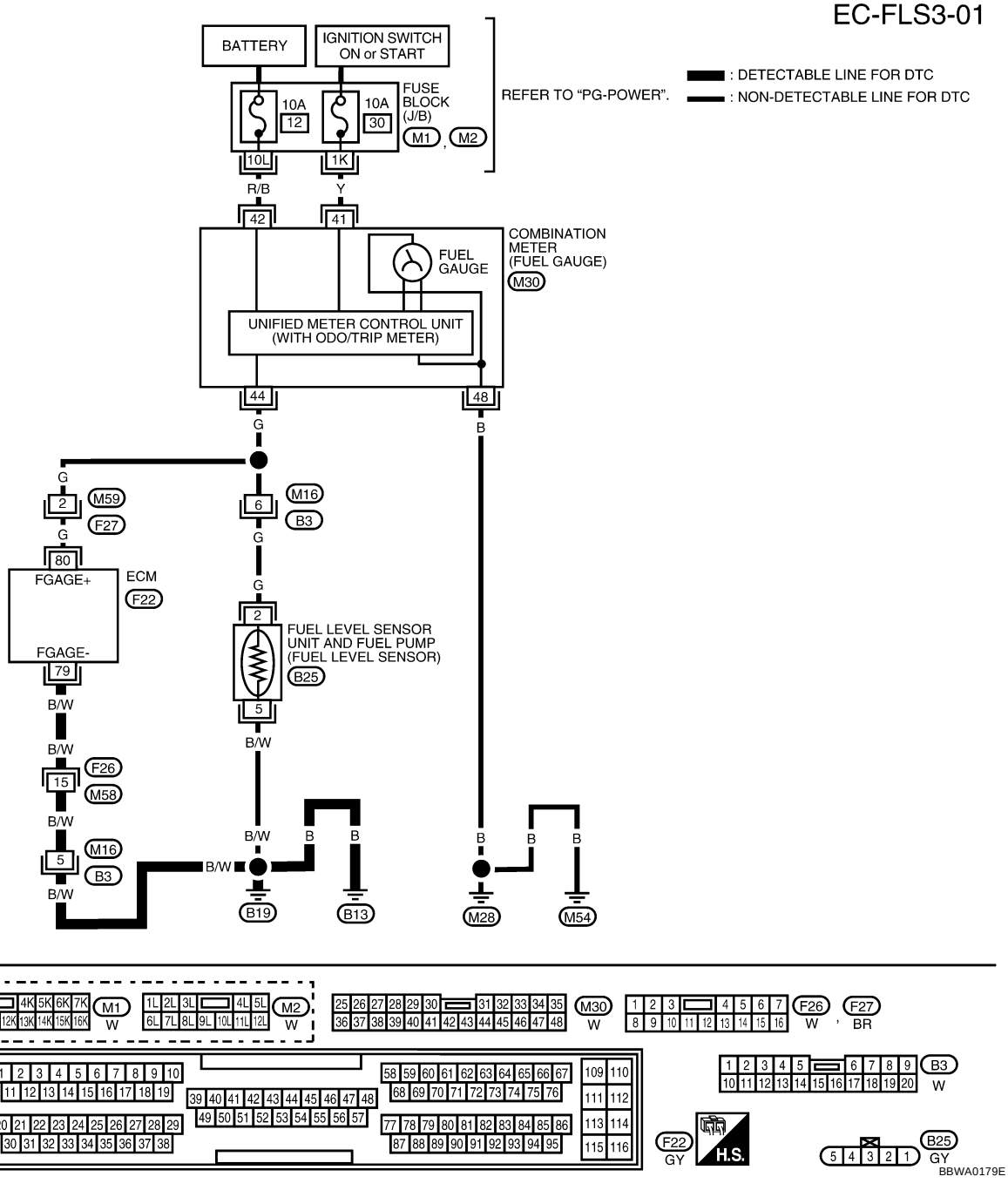
WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS0024D

EC-FLS3-01



BBWA0179E

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
80	G	FUEL LEVEL SENSOR	IGN ON	APPROX. 0 - 4.8V
79	B/W	FUEL LEVEL SENSOR GROUND	ENGINE RUNNING AT IDLE SPEED	APPROX. 0V

SEF579YA

Diagnostic Procedure

UBS0024E

1. CHECK FUEL LEVEL SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 79 and body ground. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F26, M58
- Harness connectors M16, B3
- Harness for open and short between ECM and body ground

>> Replace open circuit or short to ground or short to power in harness or connectors.

3. CHECK FUEL LEVEL SENSOR

Refer to DI-23, "FUEL LEVEL SENSOR UNIT CHECK" .

OK or NG

OK >> GO TO 4.
NG >> Replace fuel level sensor unit.

4. CHECK INTERMITTENT INCIDENT

Refer to EC-809, "DTC P0172 FUEL INJECTION SYSTEM FUNCTION" .

>> **INSPECTION END**

DTC P1490 VACUUM CUT VALVE BYPASS VALVE

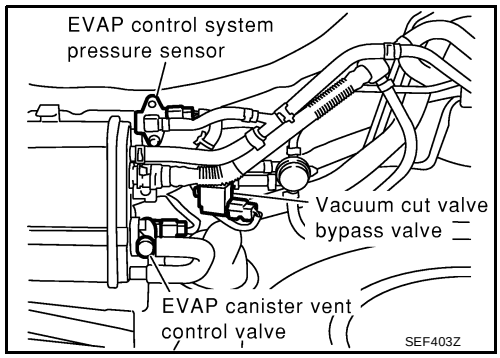
PFP:17372

Description

UBS0024F

COMPONENT DESCRIPTION

The vacuum cut valve bypass valve is a solenoid type valve and generally remains closed. It opens only for on board diagnosis.
The vacuum cut valve bypass valve responds to signals from the ECM. When the ECM sends an ON (ground) signal, the valve is opened.



CONSULT-II Reference Value in Data Monitor Mode

UBS0024G

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VC/V BYPASS/V	● Ignition switch: ON	OFF

On Board Diagnosis Logic

UBS0024H

Malfunction is detected when an improper voltage signal is sent to ECM through vacuum cut valve bypass valve.

Possible Cause

UBS0024I

- Harness or connectors
  (The vacuum cut valve bypass valve circuit is open or shorted.)
- Vacuum cut valve bypass valve

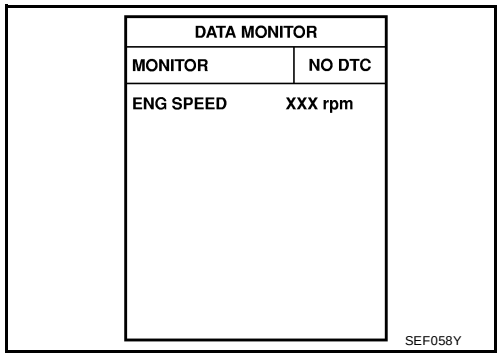
DTC Confirmation Procedure

UBS0024J

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11V at idle speed.

WITH CONSULT-II

1. Turn ignition switch “ON”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and wait at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-1149, "Diagnostic Procedure" .



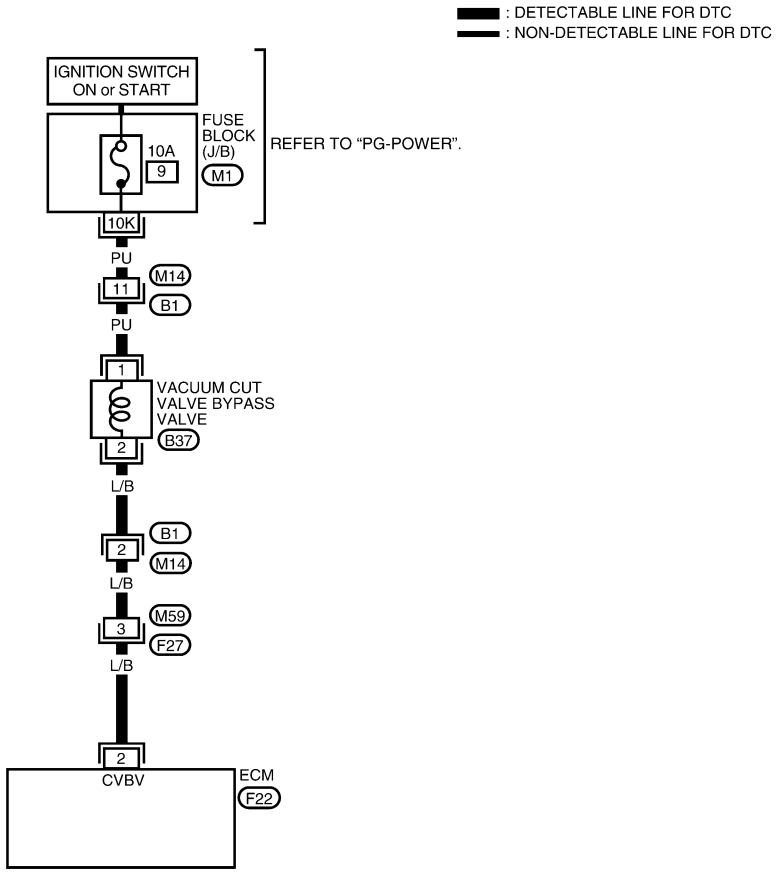
WITH GST

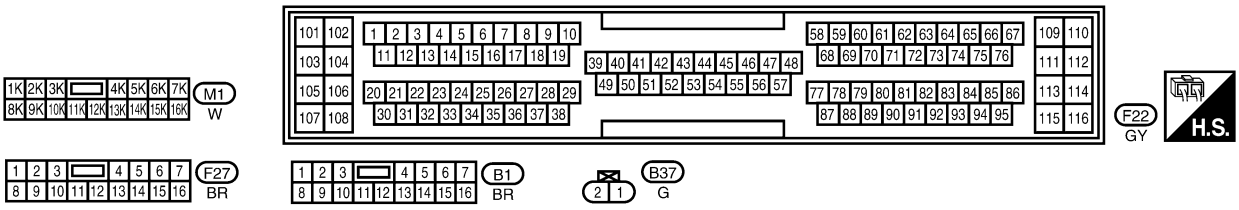
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS0024K

EC-BYPS/V-01





BBWA0180E

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
2	L/B	VACUUM CUT VALVE BYPASS VALVE	IGN ON	BATTERY VOLTAGE

SEF585Y

Diagnostic Procedure

UBS0024L

1. INSPECTION START

Do you have CONSULT-II?

Yes or No

Yes >> GO TO 2.
No >> GO TO 3.

2. CHECK VACUUM CUT VALVE BYPASS VALVE CIRCUIT

With CONSULT-II

1. Turn ignition switch “OFF” and then “ON”.
2. Select “VC/V BYPASS/V” in “ACTIVE TEST” mode with CONSULT-II.
3. Touch “ON/OFF” on CONSULT-II screen.
4. Make sure that clicking sound is heard from the vacuum cut valve bypass valve.

ACTIVE TEST	
VC/V BYPASS/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA- B1	XXX %
A/F SEN1 (B1)	XXX V
THRTL POS SEN	X.XX V

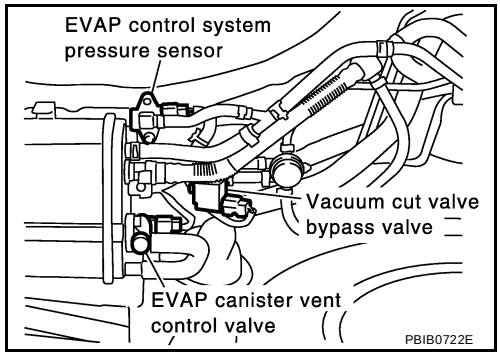
PBIB0759E

OK or NG

OK >> GO TO 7.
NG >> GO TO 3.

3. CHECK VACUUM CUT VALVE BYPASS VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect vacuum cut valve bypass valve harness connector.
3. Turn ignition switch “ON”.

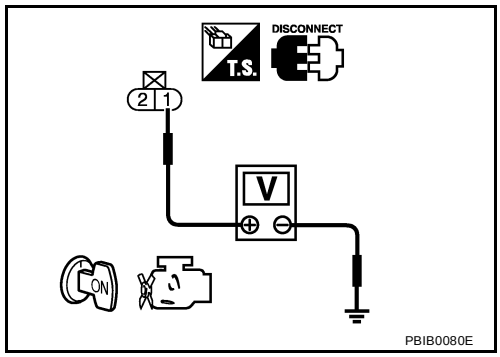


4. Check voltage between vacuum cut valve bypass valve terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.



4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M14, B1
- Fuse block (J/B) connector M1
- 10A fuse
- Harness for open or short between vacuum cut valve bypass valve and fuse

>> Repair harness or connectors.

5. CHECK VACUUM CUT VALVE BYPASS VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 2 and vacuum cut valve bypass valve terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B1, M14
- Harness connectors M59, F27
- Harness for open or short between vacuum cut valve bypass valve and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

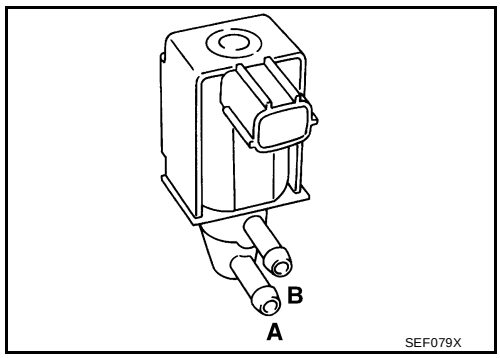
7. CHECK VACUUM CUT VALVE BYPASS VALVE

With CONSULT-II

1. Reconnect harness disconnected connectors.
2. Turn ignition switch ON.
3. Perform “VC/V BYPASS/V” in “ACTIVE TEST” mode.
4. Check air passage continuity and operation delay time under the following conditions.

Condition VC/V BYPASS/V	Air passage continuity between A and B
ON	Yes
OFF	No

Operation takes less than 1 second.

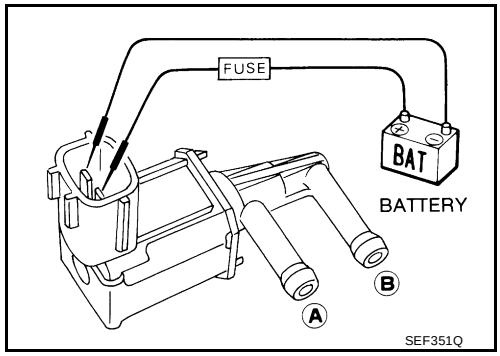


Without CONSULT-II

Check air passage continuity and operation delay time under the following conditions.

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

Operation takes less than 1 second.



OK or NG

OK >> GO TO 8.
NG >> Replace vacuum cut valve bypass valve.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

DTC P1491 VACUUM CUT VALVE BYPASS VALVE

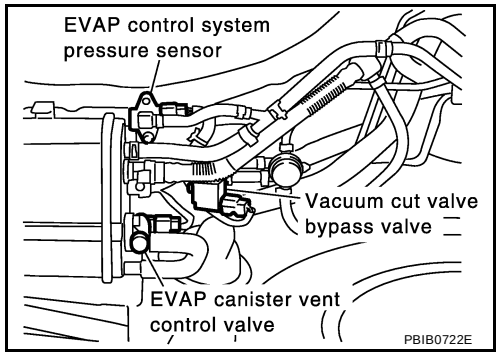
PFP:17372

Description

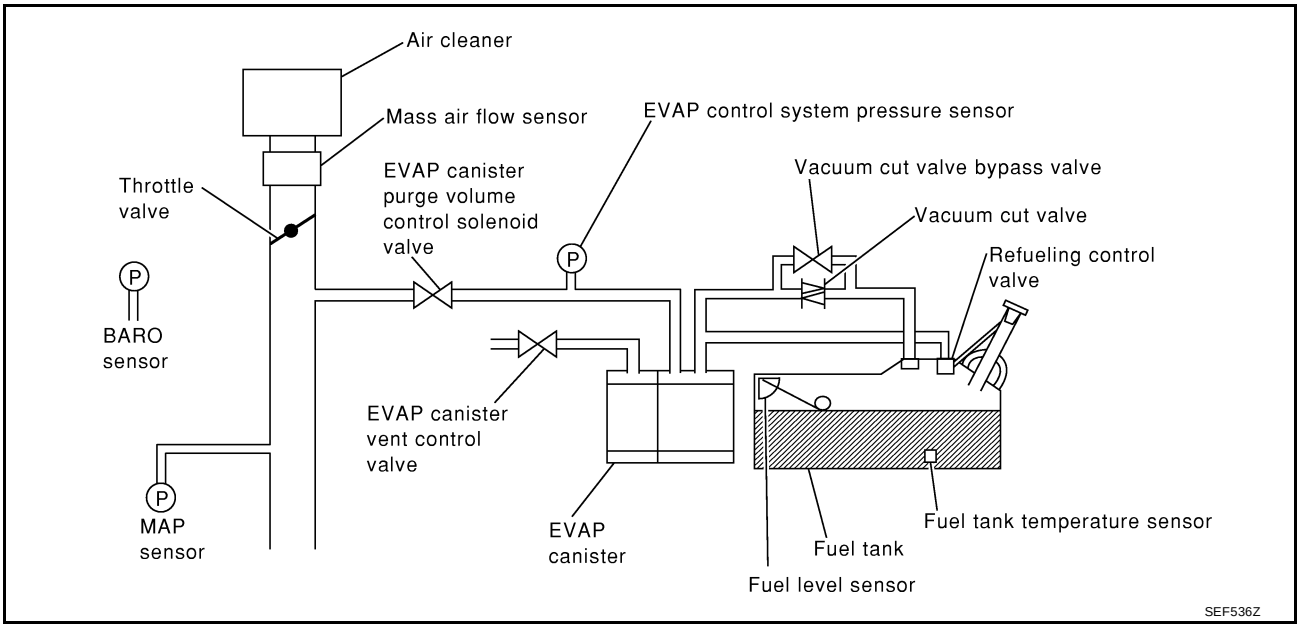
UBS0024M

COMPONENT DESCRIPTION

The vacuum cut valve and vacuum cut valve bypass valve are installed in parallel on the EVAP purge line between the fuel tank and the EVAP canister.
The vacuum cut valve prevents the intake manifold vacuum from being applied to the fuel tank.
The vacuum cut valve bypass valve is a solenoid type valve and generally remains closed. It opens only for on board diagnosis.
The vacuum cut valve bypass valve responds to signals from the ECM. When the ECM sends an ON (ground) signal, the valve is opened. The vacuum cut valve is then bypassed to apply intake manifold vacuum to the fuel tank.



EVAPORATIVE EMISSION SYSTEM DIAGRAM



CONSULT-II Reference Value in Data Monitor Mode

UBS0024N

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VC/V BYPASS/V	● Ignition switch: ON	OFF

On Board Diagnosis Logic

UBS0024O

Malfunction is detected when vacuum cut valve bypass valve does not operate properly.

Possible Cause

UBS0024P

- Vacuum cut valve bypass valve
- Vacuum cut valve
- Bypass hoses for clogging
- EVAP control system pressure sensor and circuit
- EVAP canister vent control valve
- Hose between fuel tank and vacuum cut valve clogged
- Hose between vacuum cut valve and EVAP canister clogged
- EVAP canister
- EVAP purge port of fuel tank for clogging

DTC Confirmation Procedure

UBS0024Q

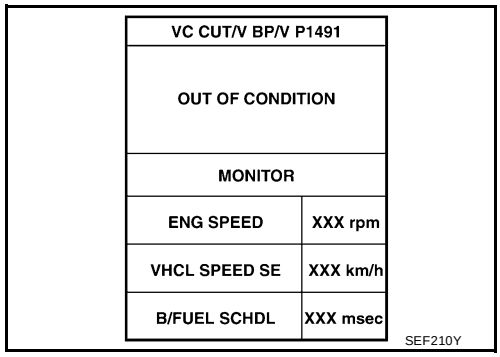
CAUTION:
Always drive vehicle at a safe speed.

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:
For best results, perform test at a temperature of 0°C (32°F) or higher.

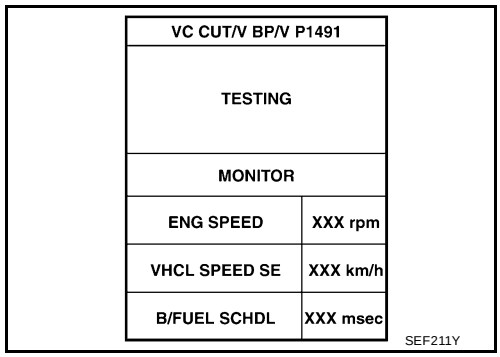
WITH CONSULT-II

1. Turn ignition switch "ON".
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch "OFF" and wait at least 10 seconds.
4. Start engine and let it idle for at least 70 seconds.
5. Select "VC CUT/V BP/V P1491" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
6. Touch "START".



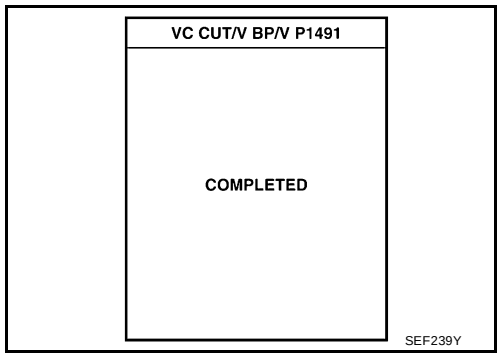
7. When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take at least 30 seconds.)

ENG SPEED	1,000 - 3,800 rpm
Selector lever	Suitable position
Vehicle speed	36 - 120 km/h (22 - 75 MPH)
B/FUEL SCHDL	1.0 - 8.2 msec



If "TESTING" is not displayed after 5 minutes, retry from step 3.

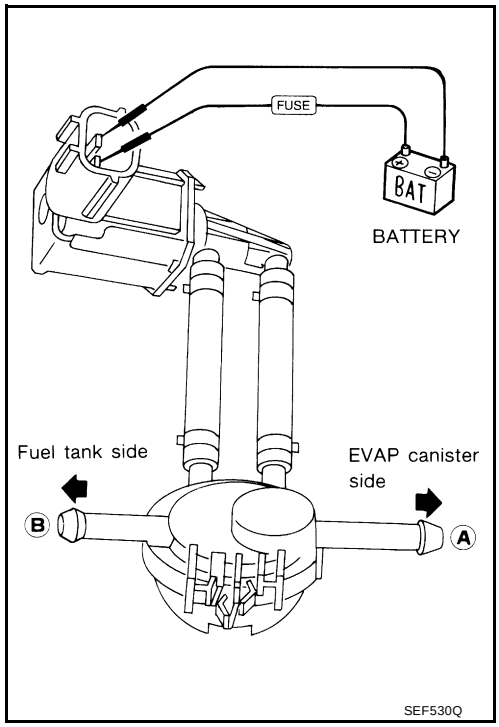
8. Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to EC-1156, "Diagnostic Procedure" .



Overall Function Check

UBS0024R

Use this procedure to check the overall function of vacuum cut valve bypass valve. During this check, the 1st trip DTC might not be confirmed.



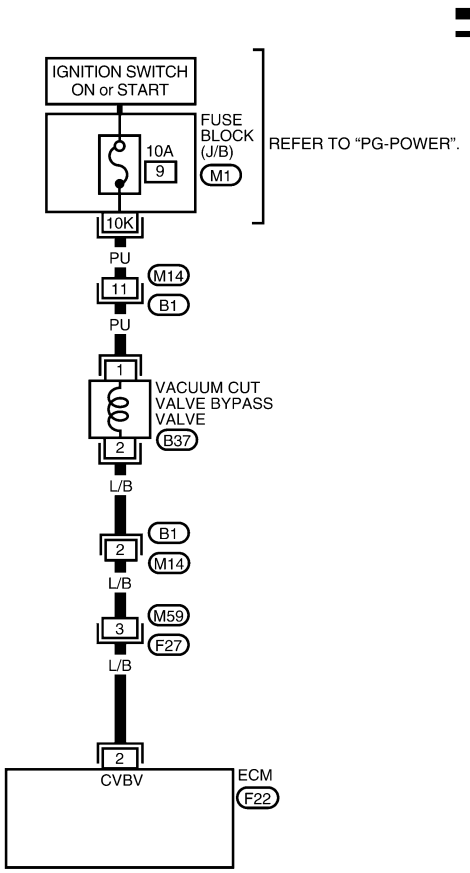
WITH GST

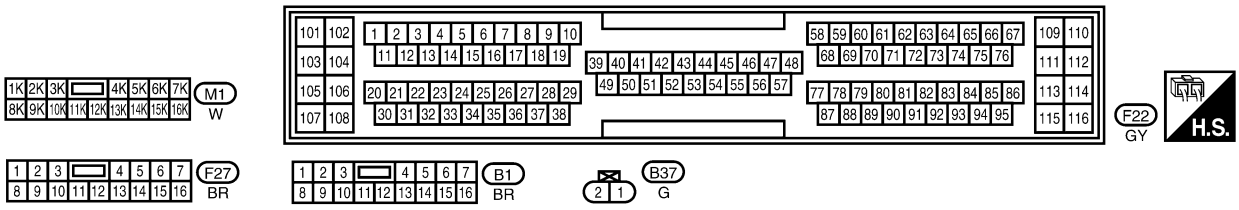
1. Remove vacuum cut valve and vacuum cut valve bypass valve as an assembly.
2. Apply vacuum to port **A** and check that there is no suction from port **B** .
3. Apply vacuum to port **B** and check that there is suction from port **A** .
4. Blow air in port **B** and check that there is a resistance to flow out of port **A** .
5. Supply battery voltage to the terminal.
6. Blow air in port **A** and check that air flows freely out of port **B** .
7. Blow air in port **B** and check that air flows freely out of port **A** .
8. If NG, go to EC-1156, "Diagnostic Procedure" .

Wiring Diagram

UBS0024S

EC-BYPS/V-01





BBWA0180E

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
2	L/B	VACUUM CUT VALVE BYPASS VALVE	IGN ON	BATTERY VOLTAGE

SEF585Y

Diagnostic Procedure

UBS0024T

1. INSPECTION START

Do you have CONSULT-II?

Yes or No

Yes >> GO TO 2.
No >> GO TO 3.

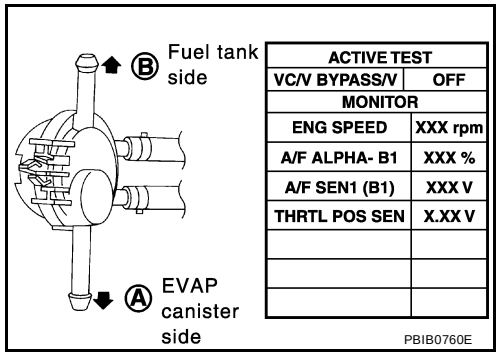
2. CHECK VACUUM CUT VALVE BYPASS VALVE OPERATION

With CONSULT-II

1. Turn ignition switch “OFF”.
2. Remove vacuum cut valve and vacuum cut valve bypass valve as an assembly.
3. Apply vacuum to port **A** and check that there is no suction from port **B** .
4. Apply vacuum to port **B** and check that there is suction from port **A** .
5. Blow air in port **B** and check that there is a resistance to flow out of port **A** .
6. Turn ignition switch “ON”.
7. Select “VC/V BYPASS/V” in “ACTIVE TEST” mode with CONSULT-II and touch “ON”.
8. Blow air in port **A** and check that air flows freely out of port **B** .
9. Blow air in port **B** and check that air flows freely out of port **A** .

OK or NG

OK >> GO TO 4.
NG >> GO TO 5.



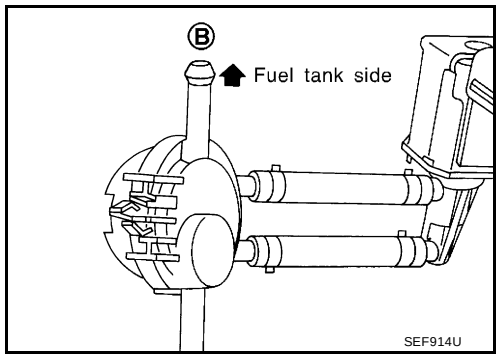
3. CHECK VACUUM CUT VALVE BYPASS VALVE OPERATION

Without CONSULT-II

1. Turn ignition switch “OFF”.
2. Remove vacuum cut valve and vacuum cut valve bypass valve as an assembly.
3. Apply vacuum to port **A** and check that there is no suction from port **B** .
4. Apply vacuum to port **B** and check that there is suction from port **A** .
5. Blow air in port **B** and check that there is a resistance to flow out of port **A** .
6. Disconnect vacuum cut valve bypass valve harness connector.
7. Supply battery voltage to the terminal.
8. Blow air in port **A** and check that air flows freely out of port **B** .
9. Blow air in port **B** and check that air flows freely out of port **A** .

OK or NG

OK >> GO TO 4.
NG >> GO TO 7.



4. CHECK EVAP PURGE LINE

Check EVAP purge line between EVAP canister and fuel tank for clogging or disconnection.

OK or NG

OK >> GO TO 5.
NG >> Repair it.

5. CHECK EVAP PURGE PORT

Check EVAP purge port of fuel tank for clogging.

OK or NG

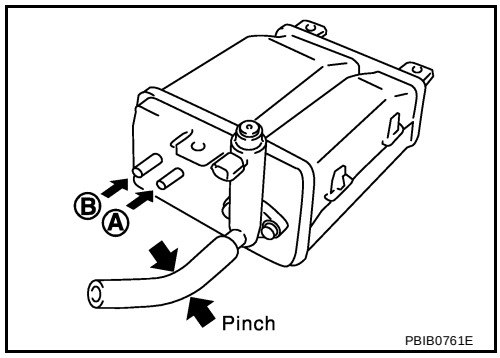
OK >> GO TO 6.
NG >> Clean EVAP purge port.

6. CHECK EVAP CANISTER

1. Pinch the fresh air hose.
2. Blow air into port **A** and check that it flows freely out of port **B** .

OK or NG

OK >> GO TO 12.
NG >> Replace EVAP canister.



7. CHECK BYPASS HOSE

Check bypass hoses for clogging.

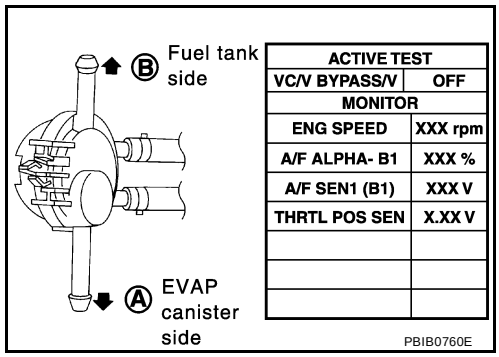
OK or NG

OK >> GO TO 8.
NG >> Repair or replace hoses.

8. CHECK VACUUM CUT VALVE BYPASS VALVE

With CONSULT-II

1. Perform “VC/V BYPASS/V” in “ACTIVE TEST” mode.
2. Check air passage continuity and operation delay time under the following conditions.

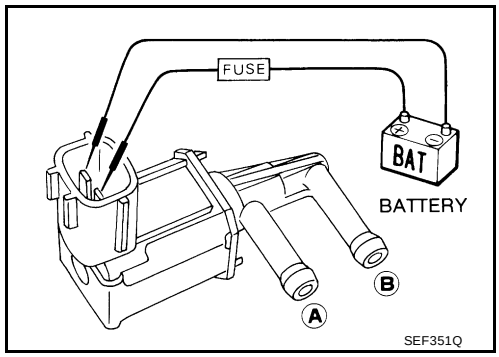


Without CONSULT-II

Check air passage continuity and operation delay time under the following conditions.

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

Operation takes less than 1 second.



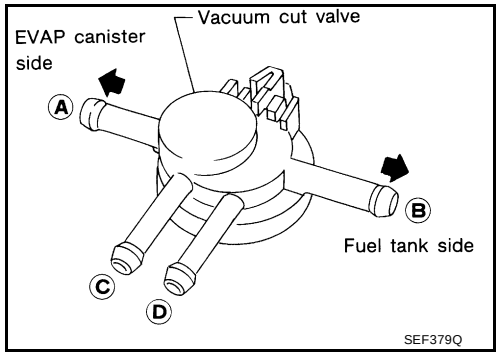
OK or NG

OK >> GO TO 9.
NG >> Replace vacuum cut valve bypass valve.

9. CHECK VACUUM CUT VALVE

Check vacuum cut valve as follows:

- Plug port **C** and **D** with fingers.
- Apply vacuum to port **A** and check that there is no suction from port **B** .
- Apply vacuum to port **B** and check that there is suction from port **A** .
- Blow air in port **B** and check that there is a resistance to flow out of port **A** .
- Open port **C** and **D** .
- Blow air in port **A** check that air flows freely out of port **C** .
- Blow air in port **B** check that air flows freely out of port **D** .



OK or NG

OK >> GO TO 10.
NG >> Replace vacuum cut valve.

10. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE

1. Turn ignition switch “OFF”.
2. Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.

OK or NG

OK >> GO TO 11.
NG >> Repair or replace.

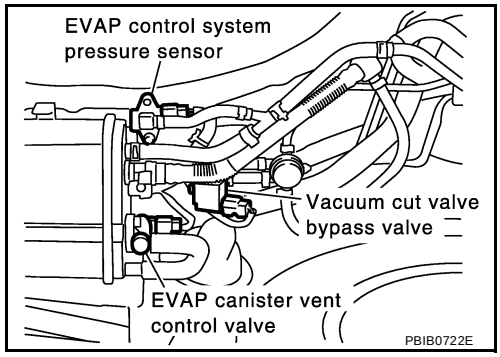
11. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check connectors for water.

Water should not exist.

OK or NG

OK >> GO TO 12.
NG >> Replace EVAP control system pressure sensor.



12. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.

CAUTION:

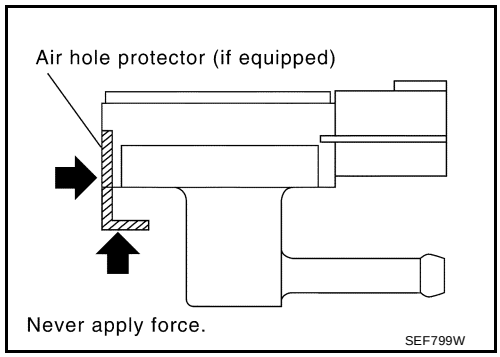
- **Never apply force to the air hole protector of the sensor if equipped.**

2. Remove hose from EVAP control system pressure sensor.
3. Turn ignition switch “ON”.
4. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.

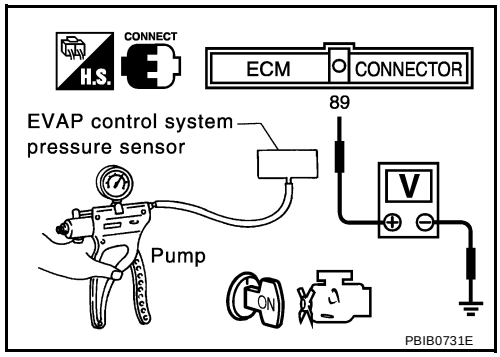
CAUTION:

- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply below –20 kPa (–150 mmHg, –5.91 inHg) or over 20 kPa (150 mmHg, 5.91 inHg) of pressure.**

5. Check input voltage between ECM terminal 89 and ground.



Pressure (Relative to atmospheric pressure)	Voltage V
0 kPa (0 mmHg, 0 inHg)	3.0 - 3.6
-9.3 kPa (-70 mmHg, -2.76 inHg)	0.4 - 0.6



CAUTION:

- **Discard any EVAP control system pressure sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**

OK or NG

OK >> GO TO 13.
NG >> Replace EVAP control system pressure sensor.

13. CHECK RUBBER TUBE FOR CLOGGING

1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

OK or NG

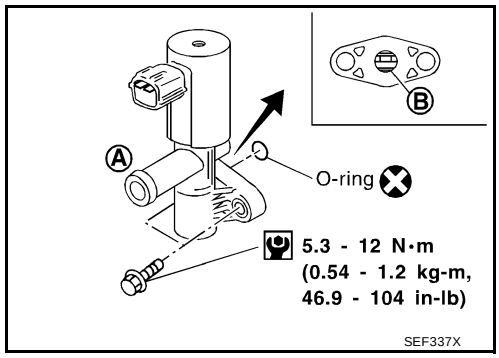
OK >> GO TO 14.
NG >> Clean the rubber tube using an air blower.

14. CHECK EVAP CANISTER VENT CONTROL VALVE-I

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.

OK or NG

OK >> GO TO 15.
NG >> Replace EVAP canister vent control valve.



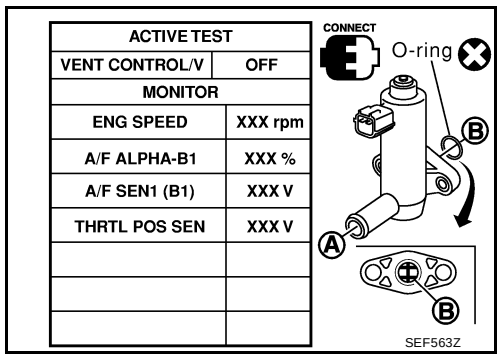
15. CHECK EVAP CANISTER VENT CONTROL VALVE-II

With CONSULT-II

1. Reconnect harness disconnected connectors.
2. Turn ignition switch ON.
3. Perform “VENT CONTROL/V” in “ACTIVE TEST” mode.
4. Check air passage continuity and operation delay time.

Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.



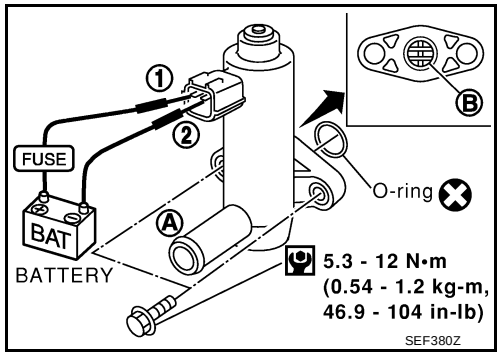
Without CONSULT-II

Check air passage continuity and operation delay time under the following conditions.

Condition	Air passage continuity between A and B
12V direct current supply between terminal 1 and 2	No
OFF	Yes

Operation takes less than 1 second.

Make sure new O-ring is installed properly.



OK or NG

OK >> GO TO 17.
NG >> GO TO 16.

16. CHECK EVAP CANISTER VENT CONTROL VALVE-III

1. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
2. Perform the Test No. 15 again.

OK or NG

OK >> GO TO 17.
NG >> Replace EVAP canister vent control valve.

17. CHECK INTERMITTENT INCIDENT

Refer to EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

DTC P1605 A/T DIAGNOSIS COMMUNICATION LINE

PFP:23710

System Description

UBS0024U

The malfunction information related to A/T (Automatic Transaxle) is transferred through the line (circuit) from TCM (Transmission Control Module) to ECM. Therefore, be sure to erase the malfunction information such as DTC not only in TCM (Transmission Control Module) but also ECM after the A/T related repair.

On Board Diagnosis Logic

UBS0024V

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1605	● An incorrect signal from TCM (Transmission Control Module) is sent to ECM.	● Harness or connectors [The communication line circuit between ECM and TCM (Transmission Control Module) is open or shorted.] ● Dead (Weak) battery ● TCM (Transmission Control Module)

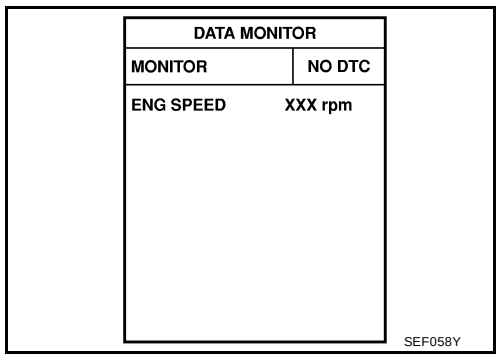
DTC Confirmation Procedure

UBS0024W

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 is more than 10.5V with the ignition switch “ON”.

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 40 seconds.
4. If 1st trip DTC is detected, go to EC-1164, "Diagnostic Procedure" .



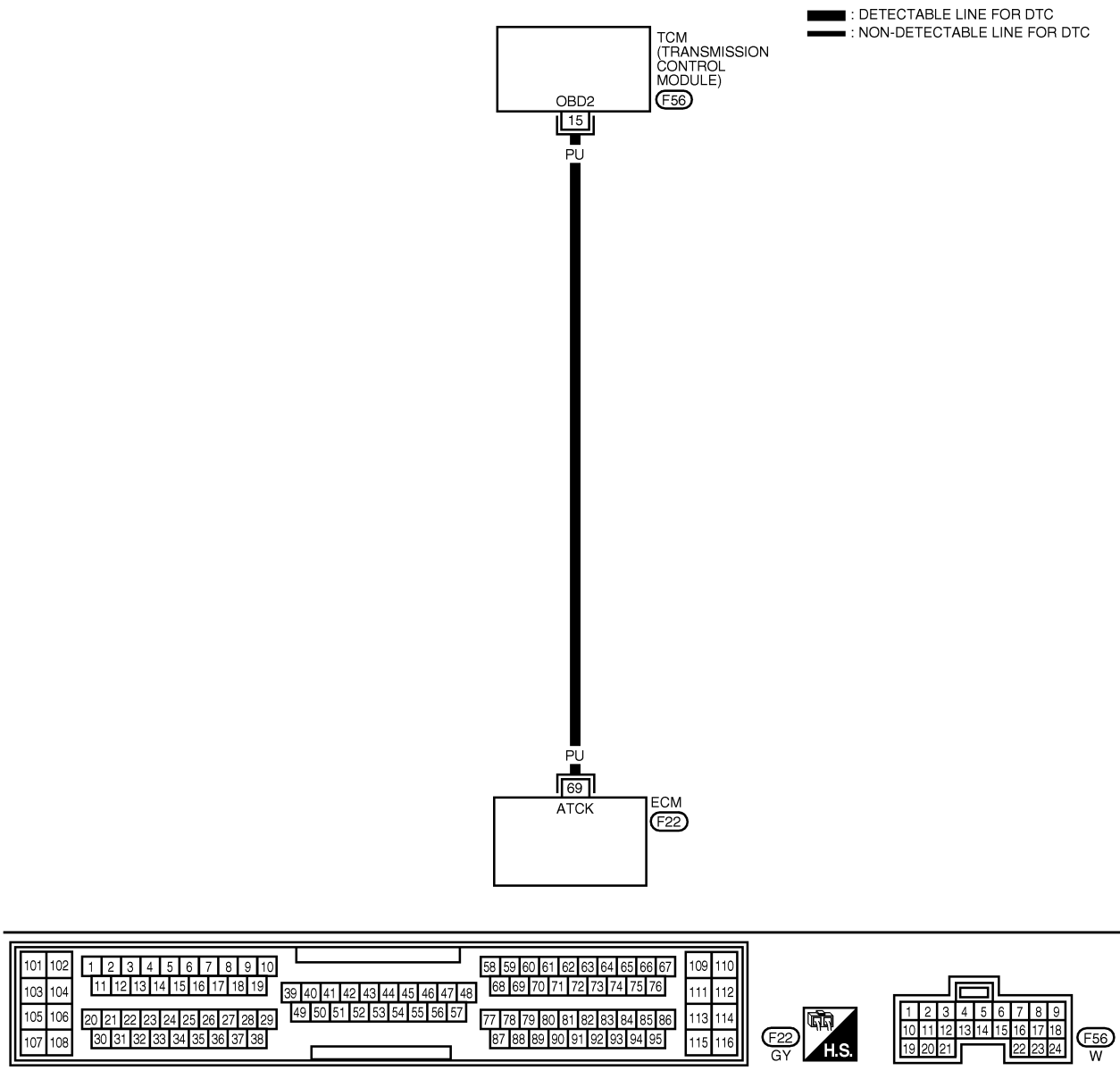
WITH GST

Follow the procedure “With CONSULT-II” above.

Wiring Diagram

UBS0024X

EC-ATDIAG-01



WEC404

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
69	PU	A/T CHECK SIGNAL	IGN ON	0 - APPROX. 5V

SEF586YA

Diagnostic Procedure

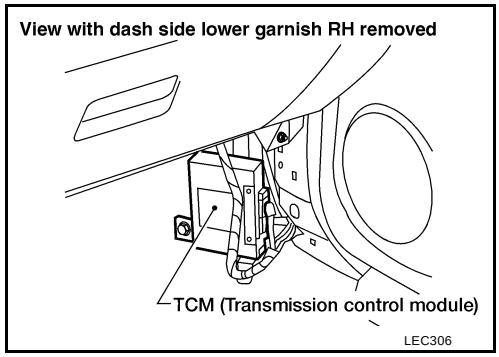
UBS0024Y

1. CHECK INPUT SIGNAL CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector and TCM harness connector.
3. Check harness continuity between ECM terminal 69 and TCM terminal 15.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for short to ground and short to power.



OK or NG

OK >> GO TO 2.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

2. CHECK INTERMITTENT INCIDENT

Perform EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

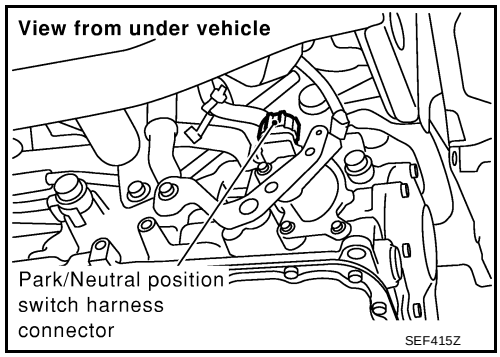
DTC P1706 PNP SWITCH

PFP:32006

Component Description

UBS0024Z

When the gear position is “P” or “N”, park/neutral position (PNP) switch is “ON”.
ECM detects the park/neutral position when continuity with ground exists.



CONSULT-II Reference Value in Data Monitor Mode

UBS00250

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
P/N POSI SW	● Ignition switch: ON	Shift lever: “P” or “N”	ON
		Except above	OFF

On Board Diagnosis Logic

UBS00251

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1706	● The signal of the PNP switch is not changed in the process of engine starting and driving.	● Harness or connectors (The PNP switch circuit is open or shorted.) ● PNP switch

DTC Confirmation Procedure

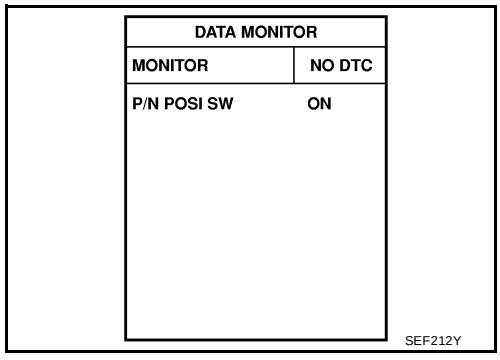
UBS00252

CAUTION:
Always drive vehicle at a safe speed.

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch “ON”.
2. Select “P/N POSI SW” in “DATA MONITOR” mode with CONSULT-II. Then check the “P/N POSI SW” signal under the following conditions.



Position (Selector lever)	Known good signal
“N” and “P” position	ON
Except the above position	OFF

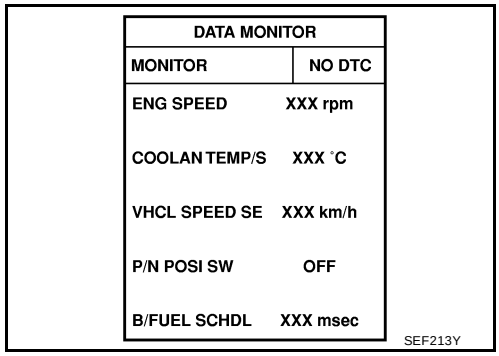
If NG, go to EC-1168, "Diagnostic Procedure" .
If OK, go to following step.

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 50 consecutive seconds.

ENG SPEED	1,600 - 3,400 rpm
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	3.0 - 12.5 msec
VHCL SPEED SE	More than 64 km/h (40 MPH)
Selector lever	Suitable position

6. If 1st trip DTC is detected, go to EC-1168, "Diagnostic Procedure" .



Overall Function Check

UBS00253

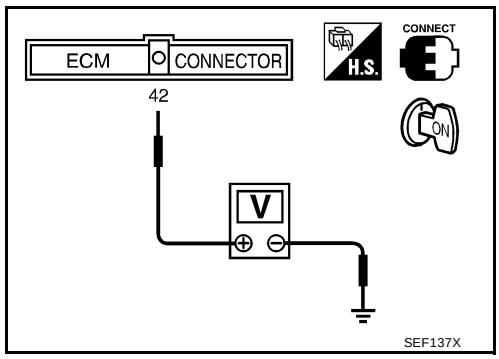
Use this procedure to check the overall function of the park/neutral position switch circuit. During this check, a 1st trip DTC might not be confirmed.

WITHOUT CONSULT-II

1. Turn ignition switch “ON”.
2. Check voltage between ECM terminal 42 (PNP switch signal) and body ground under the following conditions.

Condition (Gear position)	Voltage (V) (Known-good data)
“P” (A/T only) and “N” position	Approx. 0
Except the above position	BATTERY VOLTAGE (11 - 14V)

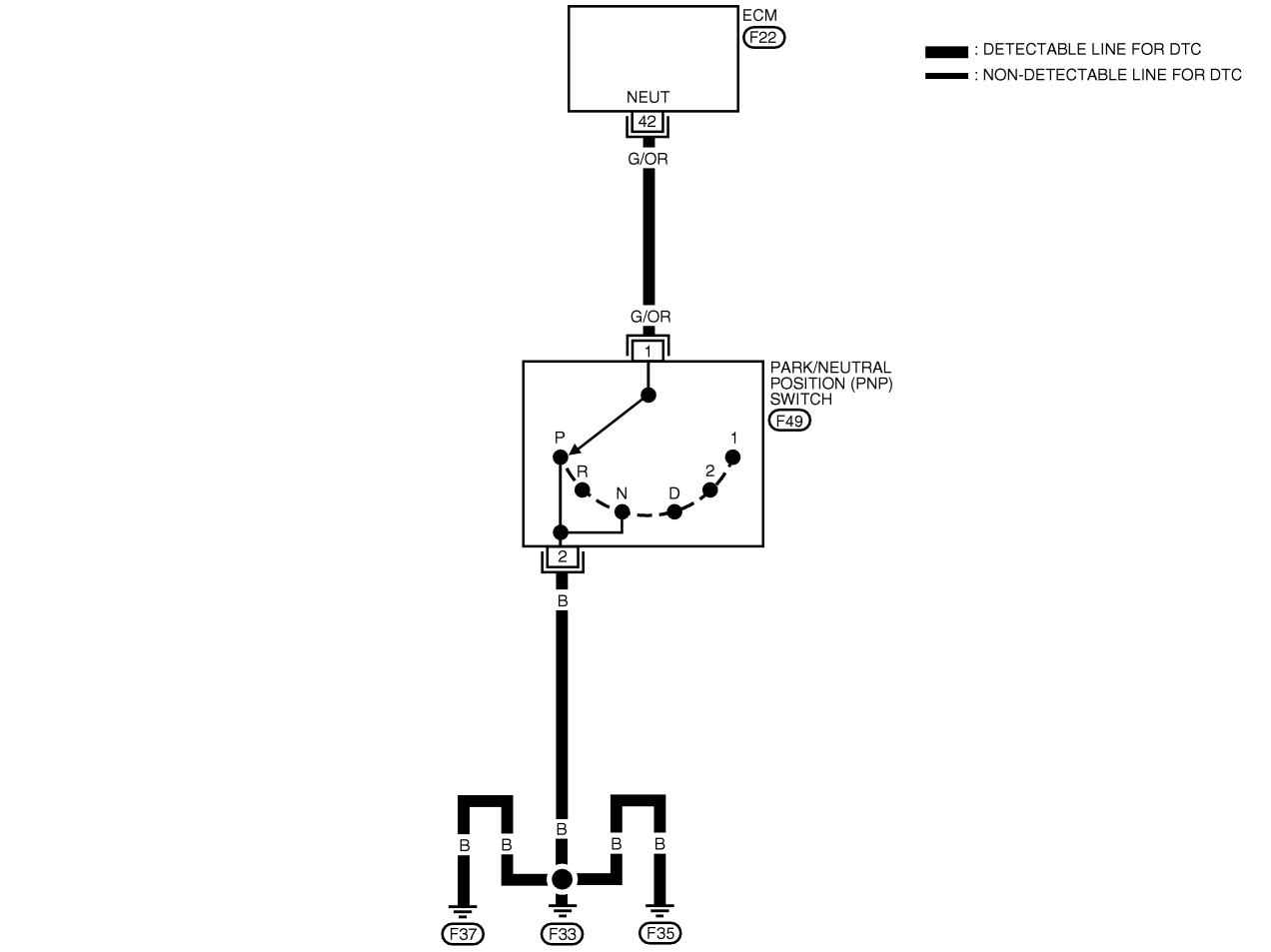
3. If NG, go to EC-1168, "Diagnostic Procedure" .

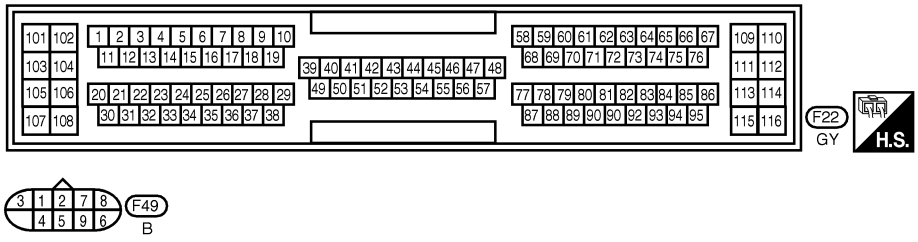


Wiring Diagram

UBS00254

EC-PNP/SW-01





WEC409

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
42	G/OR	PARK/NEUTRAL POSITION (PNP) SWITCH	IGN ON WITH GEAR POSITION "N" OR "P"	APPROX. 0V
			IGN ON WITHOUT THE ABOVE GEAR POSITION	BATTERY VOLTAGE

SEF587Y

Diagnostic Procedure

UBS00255

1. CHECK GROUND CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect PNP switch harness connector.
3. Check harness continuity between PNP switch terminal 2 and body ground.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 2.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

2. CHECK INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 42 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 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK PNP SWITCH

Refer to AT-118, "Component Inspection" .

OK or NG

OK >> GO TO 4.
NG >> Replace PNP switch.

4. CHECK INTERMITTENT INCIDENT

Perform EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

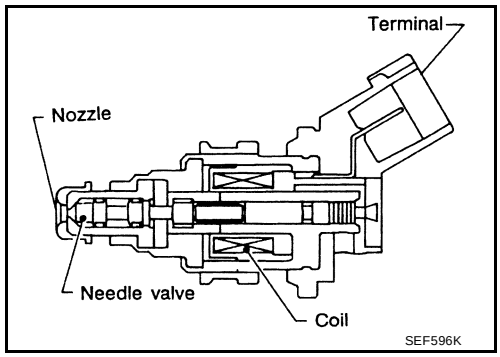
INJECTOR

PFP:16600

Component Description

UBS00256

The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the injector circuit, the coil in the injector is energized. The energized coil pulls the needle valve back and allows fuel to flow through the injector into the intake manifold. The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the injector remains open. The ECM controls the injection pulse duration based on engine fuel needs.



CONSULT-II Reference Value in Data Monitor Mode

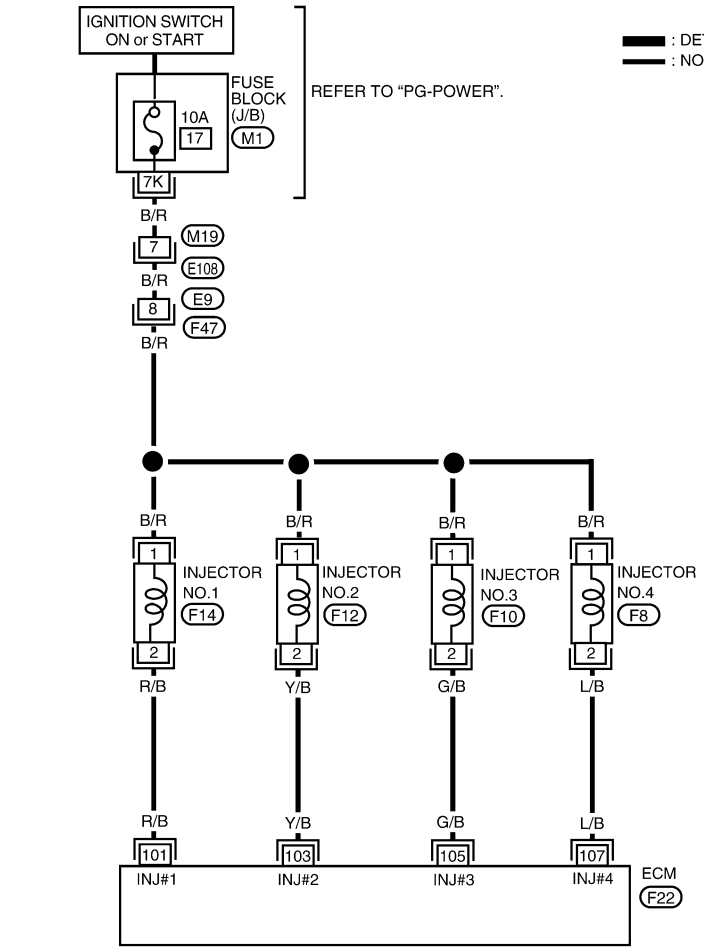
UBS00257

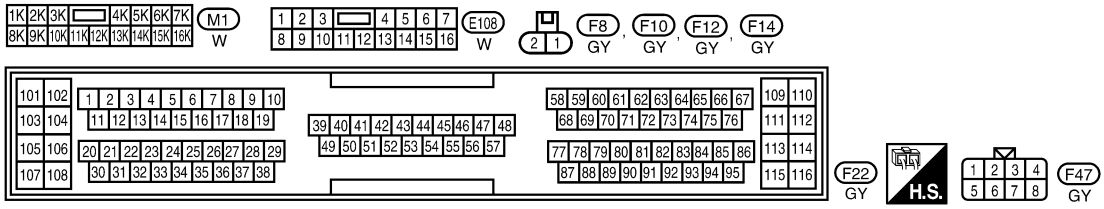
MONITOR ITEM	CONDITION		SPECIFICATION
INJ PULSE-B1	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: “N” ● No-load	Idle	2.4 - 3.2 msec
		2,000 rpm	1.9 - 2.8 msec
B/FUEL SCHDL	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: “N” ● No-load	Idle	1.0 - 1.6 msec
		2,000 rpm	0.7 - 1.3 msec

Wiring Diagram

UBS00258

EC-INJECT-01





BBWA0181E

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
101	R/B	INJECTOR NO. 1	ENGINE RUNNING AT IDLE SPEED UNDER WARM-UP CONDITION	BATTERY VOLTAGE (V) 40 20 0 — 20 ms
103	Y/B	INJECTOR NO. 2		
105	G/B	INJECTOR NO. 3		
107	L/B	INJECTOR NO. 4		
			ENGINE RUNNING AT 2,000 RPM UNDER WARM-UP CONDITION	BATTERY VOLTAGE (V) 40 20 0 — 20 ms

SEF588Y

Diagnostic Procedure

UBS00259

1. CHECK OVERALL FUNCTION

With CONSULT-II

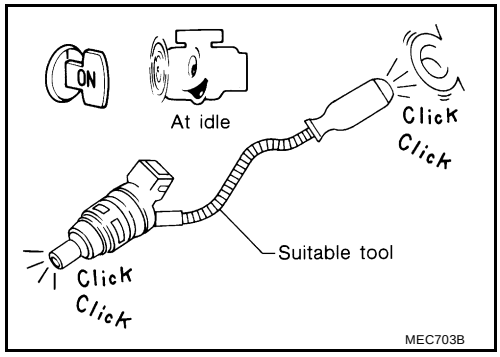
1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-II.
3. Make sure that each circuit produces a momentary engine speed drop.

ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
IACV-AAC/V	XXX step

SEF190Y

Without CONSULT-II

1. Start engine.
2. Listen to each injector operating sound.
   Clicking noise should be heard.



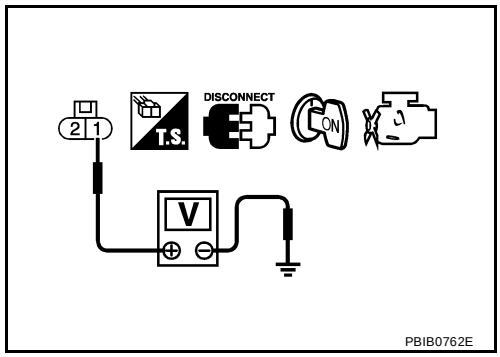
OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

2. CHECK POWER SUPPLY

1. Stop engine.
2. Disconnect injector harness connector.
3. Turn ignition switch “ON”.
4. Check voltage between injector terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- 10A fuse
- Harness connectors M19, E108
- Harness connectors E9, F47
- Harness for open or short between injector and fuse

>> Repair harness or connectors.

4. CHECK OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between injector harness connector terminal 2 and ECM terminals 101, 103, 105, 107.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

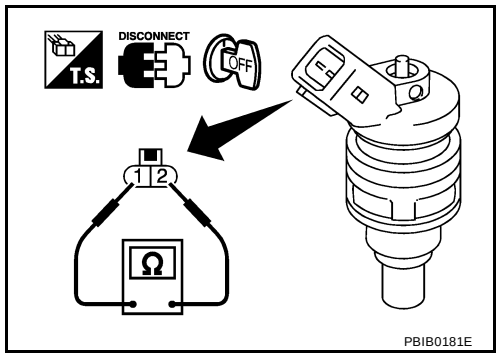
OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK INJECTOR

1. Disconnect injector harness connector.
2. Check resistance between terminals as shown in the figure.

Resistance: 13.5 - 17.5 Ω [at 20°C (68°F)]



OK or NG

OK >> GO TO 6.
NG >> Replace injector.

6. CHECK INTERMITTENT INCIDENT

Perform EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Removal and Installation

UBS0025A

INJECTOR

Refer to EM-22, "FUEL INJECTOR AND FUEL TUBE" .

START SIGNAL

PFP:48750

CONSULT-II Reference Value in Data Monitor Mode

UBS0025B

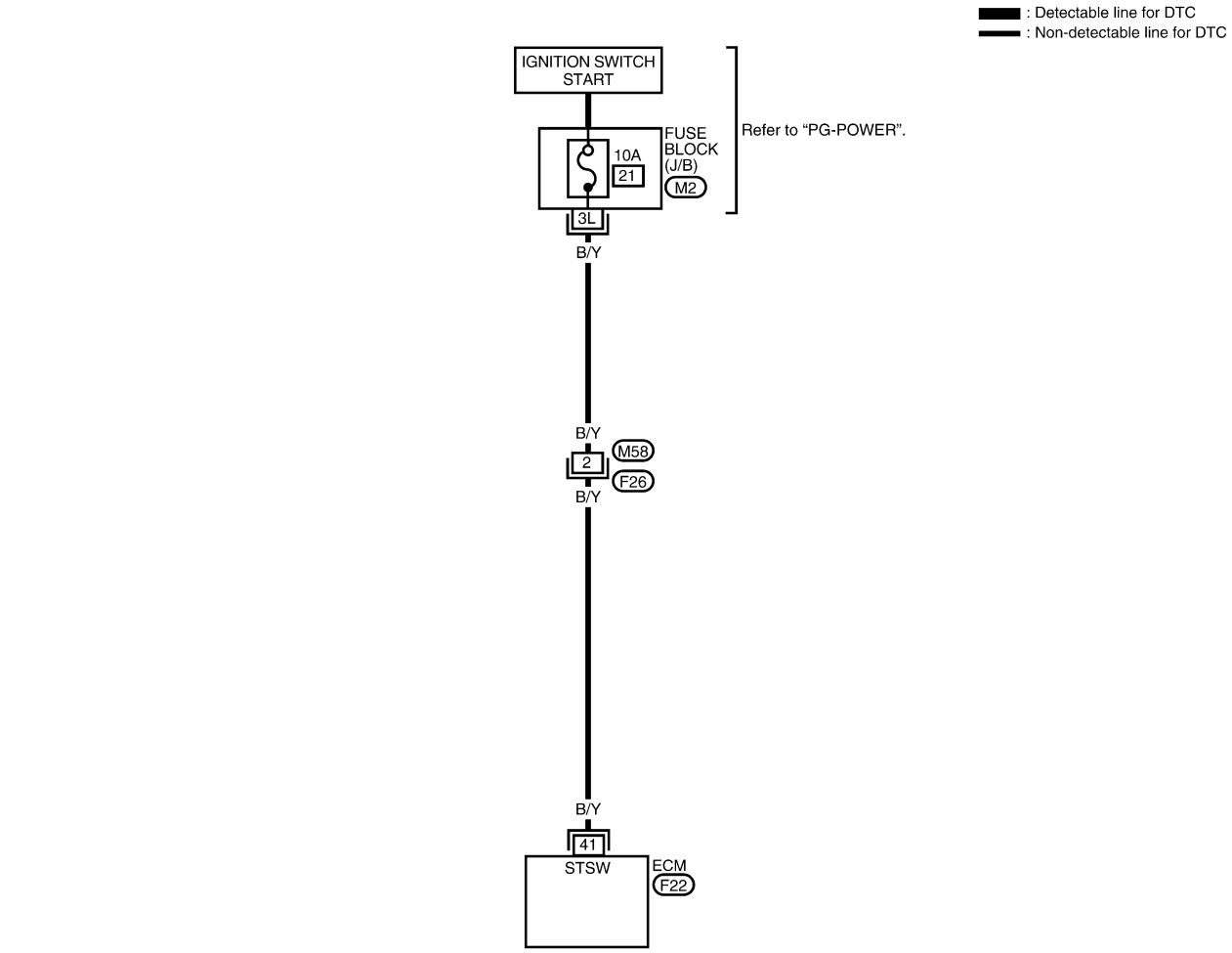
Specification data are reference values.

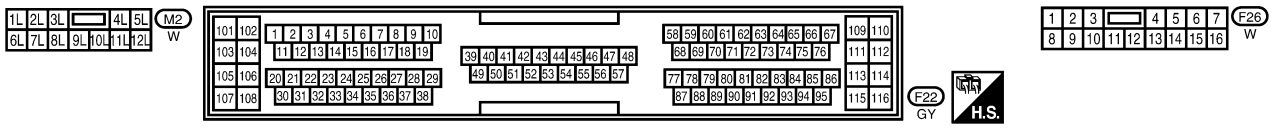
MONITOR ITEM	CONDITION	SPECIFICATION
START SIGNAL	● Ignition switch: ON → START → ON	OFF → ON → OFF

Wiring Diagram

UBS0025C

EC-S/SIG-01





BBWA0182E

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
41	B/Y	START SIGNAL	IGN ON	APPROX. 0V
			IGN START	9 - 14V

SEF589Y

Diagnostic Procedure

UBS0025D

1. INSPECTION START

Do you have CONSULT-II?

Yes or No

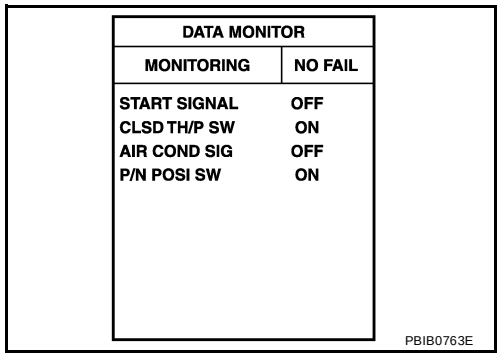
Yes >> GO TO 2.
No >> GO TO 3.

2. CHECK OVERALL FUNCTION

With CONSULT-II

1. Turn ignition switch “ON”.
2. Check “START SIGNAL” in “DATA MONITOR” mode with CONSULT-II under the following conditions.

Condition	START SIGNAL
Ignition switch "ON"	OFF
Ignition switch "OFF"	ON



OK or NG

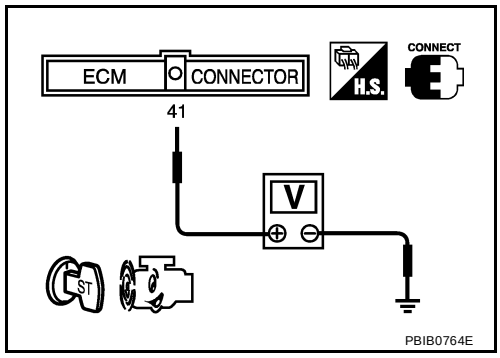
OK >> **INSPECTION END**
NG >> GO TO 4.

3. CHECK OVERALL FUNCTION

Without CONSULT-II

1. Turn ignition switch to “START”.
2. Check voltage between ECM terminal 41 and ground under the following conditions.

Condition	START SIGNAL
Ignition switch "START"	Battery voltage
Other positions	Approximately 0V



OK or NG

OK >> **INSPECTION END**
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M58, F26
- 10A fuse
- Harness for open or short between ECM and fuse

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-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

FUEL PUMP

PFP:17042

System Description

UBS0025E

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed	Fuel pump control	Fuel pump relay
Camshaft position sensor (PHASE)	Engine speed and cylinder number		
Ignition switch	Start signal		

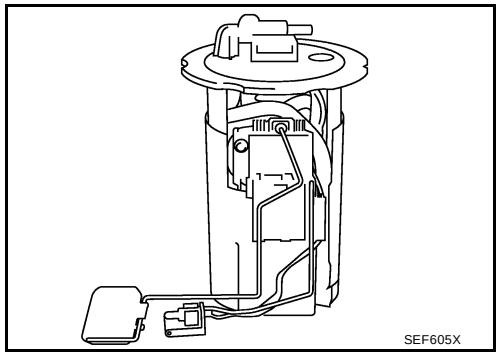
The ECM activates the fuel pump for several seconds after the ignition switch is turned on to improve engine startability. If the ECM receives a 180° signal from the camshaft position sensor, it knows that the engine is rotating, and causes the pump to perform. If the 180° signal is not received when the ignition switch is on, the engine stalls. The ECM stops pump operation and prevents battery discharging, thereby improving safety. The ECM does not directly drive the fuel pump. It controls the ON/OFF fuel pump relay, which in turn controls the fuel pump.

Condition	Fuel pump operation
Ignition switch is turned to ON.	Operates for 5 seconds
Engine running and cranking	Operates
When engine is stopped	Stops in 1 second
Except as shown above	Stops

Component Description

UBS0025F

A turbine type design fuel pump is used in the fuel tank.



CONSULT-II Reference Value in Data Monitor Mode

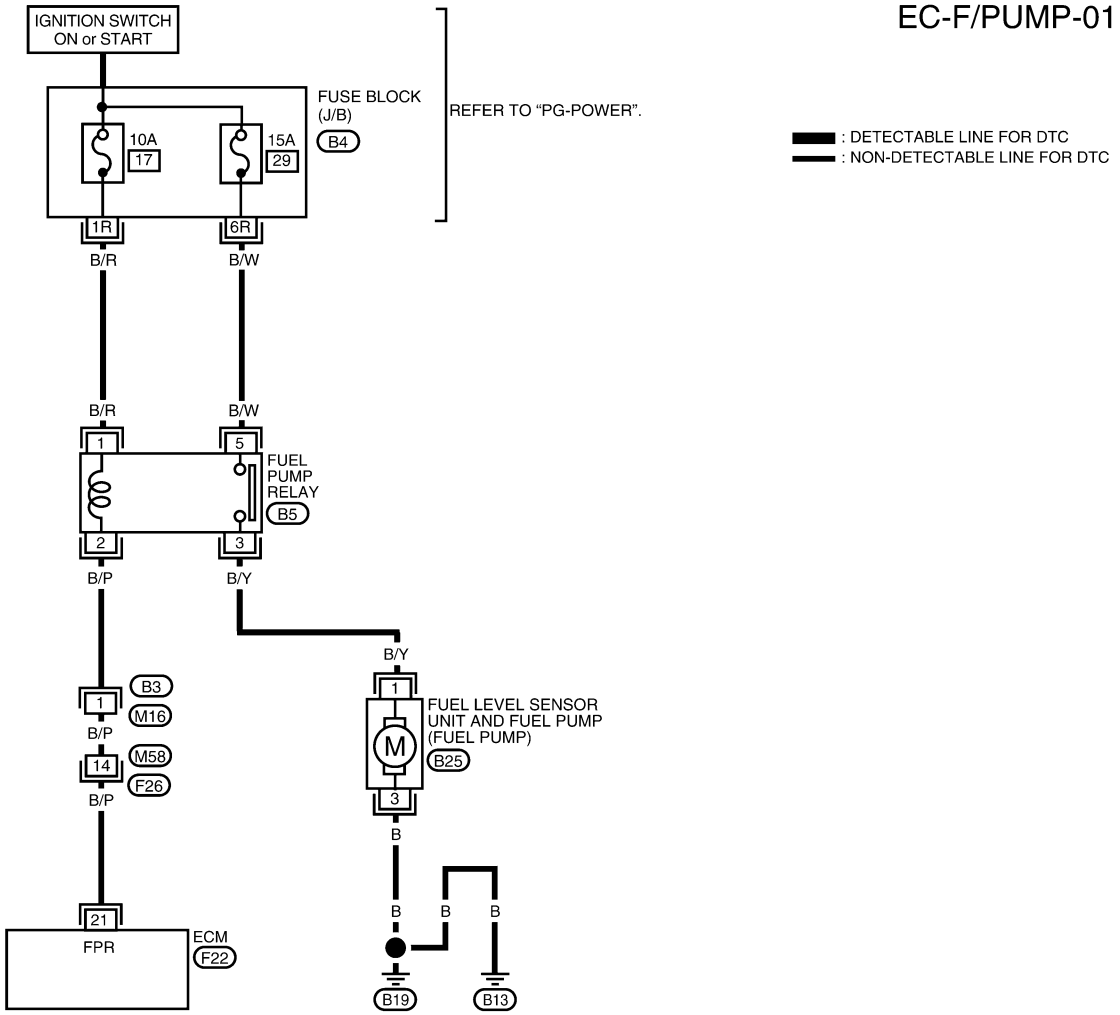
UBS0025G

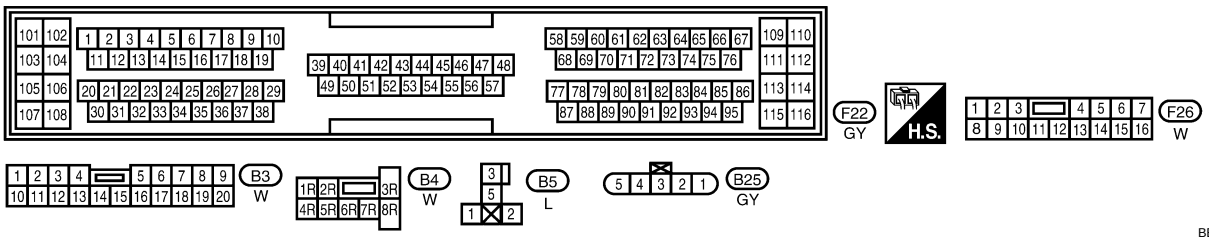
MONITOR ITEM	CONDITION	SPECIFICATION
FUEL PUMP RLY	● Ignition switch is turned to ON (Operates for 5 seconds) ● Engine running and cranking ● When engine is stopped (stops in 1.0 seconds)	ON
	● Except as shown above	OFF

Wiring Diagram

UBS0025H

EC-F/PUMP-01





BBWA0183E

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
21	B/P	FUEL PUMP RELAY	FOR 5 SECONDS AFTER IGN ON	0 - 1V
			ENGINE RUNNING	
			MORE THAN 5 SECONDS AFTER IGN ON	BATTERY VOLTAGE

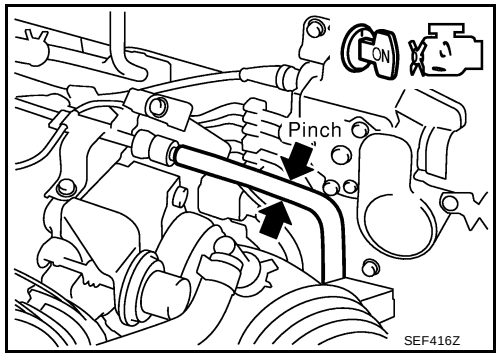
SEF611Z

Diagnostic Procedure

UBS0025I

1. CHECK OVERALL FUNCTION

1. Turn ignition switch “ON”.
2. Pinch fuel feed hose with fingers.
   Fuel pressure pulsation should be felt on the fuel feed hose for 5 seconds after ignition switch is turned “ON”.

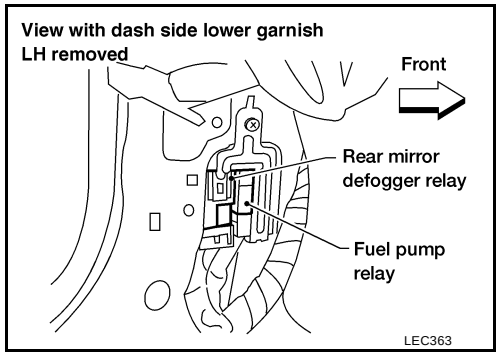


OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

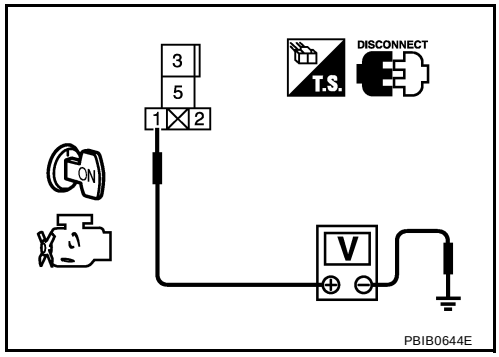
2. CHECK POWER SUPPLY-I

1. Turn ignition switch “OFF”.
2. Disconnect fuel pump relay-1.
3. Turn ignition switch “ON”.



4. Check voltage between fuel pump relay terminals 1, 5 and ground with CONSULT-II or tester.

   Voltage: Battery voltage



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- 10A fuse
- 15A fuse
- Harness for open or short between fuse and fuel pump relay

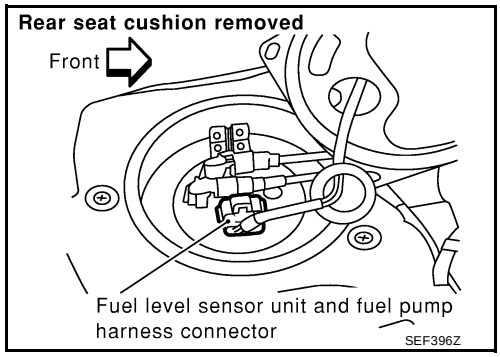
>> Repair harness or connectors.

4. CHECK POWER GROUND CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect fuel level sensor unit and fuel pump harness connector.
3. Check harness continuity between fuel level sensor unit and fuel pump terminal 3 and body ground, fuel level sensor unit and fuel pump terminal 1 and fuel pump relay terminal 3. Refer to wiring diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.



OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between fuel level sensor unit and fuel pump and body ground
- Harness for open or short between fuel level sensor unit and fuel pump and fuel pump relay

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK OUTPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 21 and fuel pump relay connector terminal 2. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B3, M16
- Harness connector M58, F26
- Harness for open or short between ECM and fuel pump relay

>> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK FUEL PUMP RELAY

Refer to EC-1181, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace fuel pump relay.

9. CHECK FUEL PUMP

Refer to EC-1181, "Component Inspection" .

OK or NG

OK >> GO TO 10.
NG >> Replace fuel pump.

10. CHECK INTERMITTENT INCIDENT

Perform EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

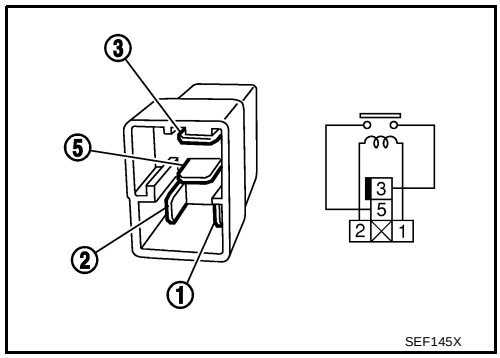
UBS0025J

FUEL PUMP RELAY

Check continuity between terminals 3 and 5.

Condition	Continuity
12V direct current supply between terminals 1 and 2	Yes
No current supply	No

If NG, replace relay.

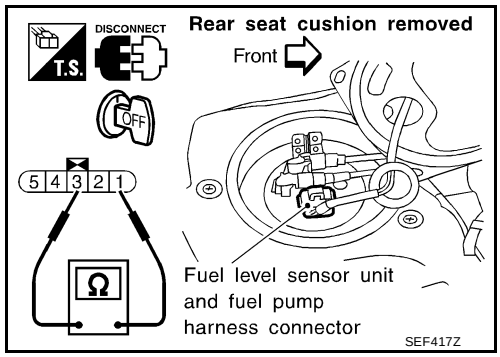


FUEL PUMP

1. Disconnect fuel pump harness connector.
2. Check resistance between terminals 1 and 2.

Resistance: 0.2 - 5.0Ω [at 25°C (77°F)]

If NG, replace fuel pump.



Removal and Installation

UBS0025K

FUEL PUMP

Refer to FL-7, "QG18DE (CALIF. CA MODEL) AND QR25DE MODEL" .

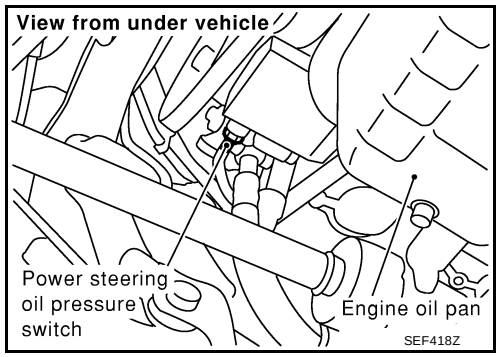
POWER STEERING OIL PRESSURE SWITCH

PFP:49761

Component Description

UBS0025L

The power steering oil pressure switch is attached to the power steering high-pressure tube and detects a power steering load. When a power steering load is detected, it signals the ECM. The ECM adjusts the IACV-AAC valve to increase the idle speed and adjust for the increased load.



CONSULT-II Reference Value in Data Monitor Mode

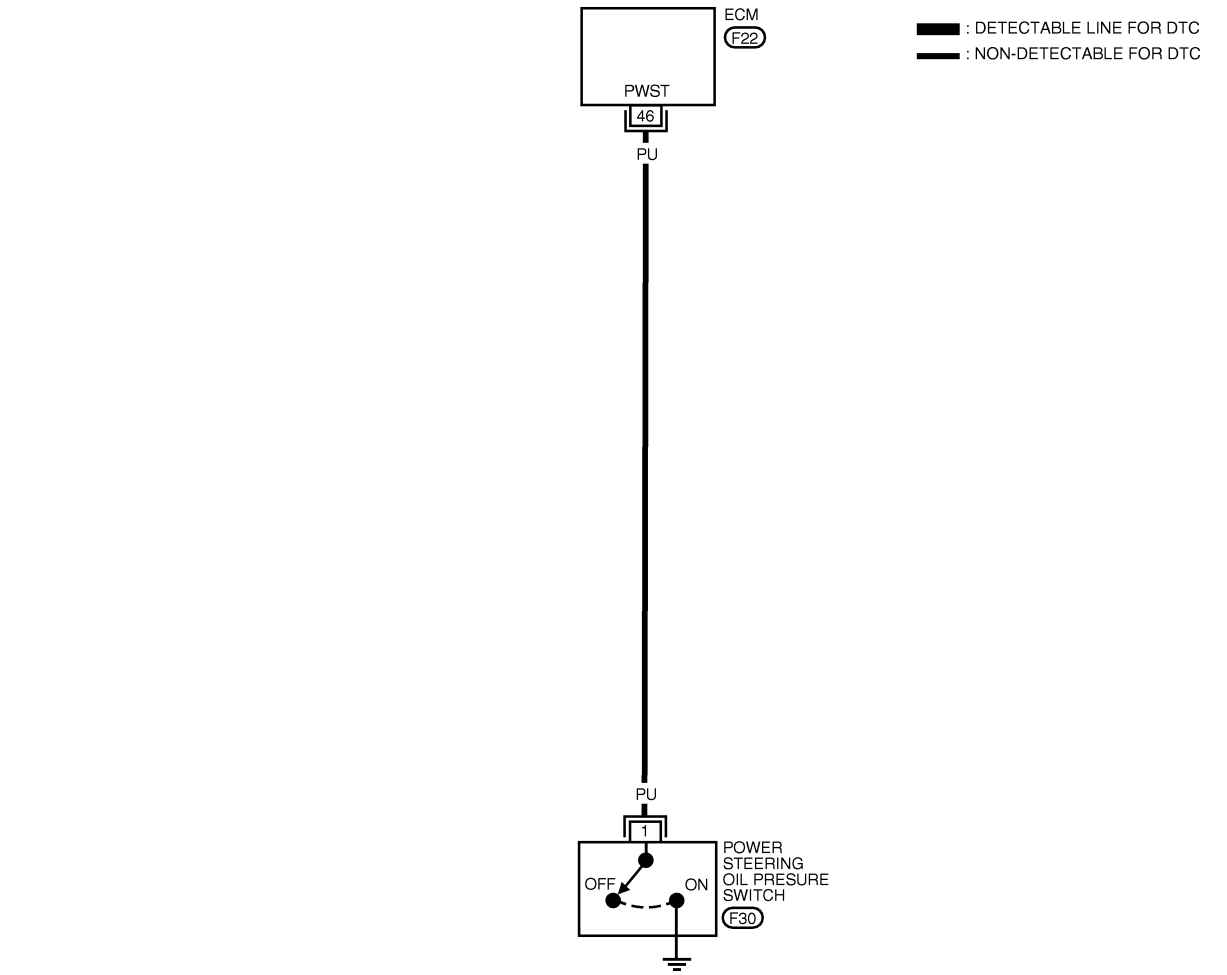
UBS0025M

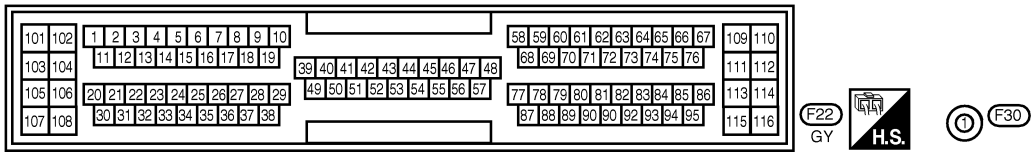
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PW/ST SIGNAL	● Engine: After warming up, idle the engine	Steering wheel in neutral position (forward direction)	OFF
		The steering wheel is fully turned	ON

Wiring Diagram

UBS0025N





WEC416

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
46	PU	POWER STEERING OIL PRESSURE SWITCH	ENGINE RUNNING WITH STEERING WHEEL BEING FULLY TURNED	APPROX. 0V
			ENGINE RUNNING WITH STEERING WHEEL NOT BEING TURNED	APPROX. 5V

SEF591YA

Diagnostic Procedure

UBS0025O

1. INSPECTION START

Do you have CONSULT-II?

Yes or No

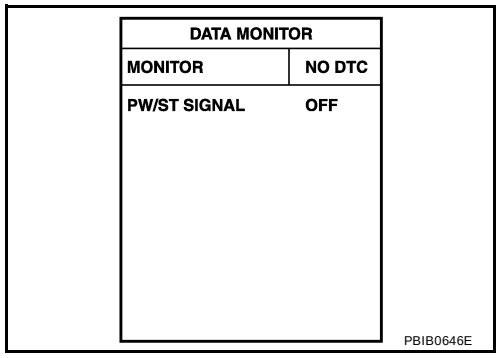
Yes >> GO TO 2.
No >> GO TO 3.

2. CHECK OVERALL FUNCTION

With CONSULT-II

1. Start engine.
2. Check “PW/ST SIGNAL” in “DATA MONITOR” mode with CONSULT-II under the following conditions.

Condition	PW/ST SIGNAL indication
Steering is in neutral position	OFF
Steering is turned	ON



OK or NG

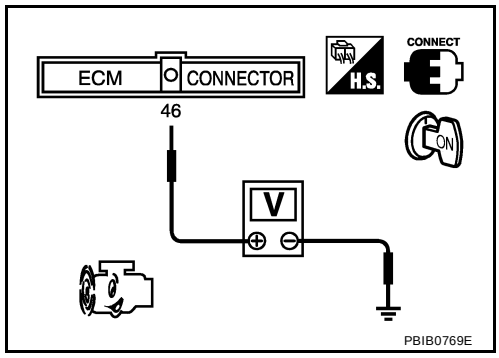
OK >> **INSPECTION END**
NG >> GO TO 4.

3. CHECK OVERALL FUNCTION

Without CONSULT-II

1. Start engine.
2. Check voltage between ECM terminal 46 and ground under the following conditions.

Condition	Voltage
When steering wheel is turned quickly	Approximately 0V
Except above	Approximately 5V



OK or NG

OK >> **INSPECTION END**
NG >> GO TO 4.

4. CHECK INPUT SIGNAL CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect power steering oil pressure switch harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal 46 and terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK POWER STEERING OIL PRESSURE SWITCH

Refer to EC-1185, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace power steering oil pressure switch.

6. CHECK INTERMITTENT INCIDENT

Perform EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

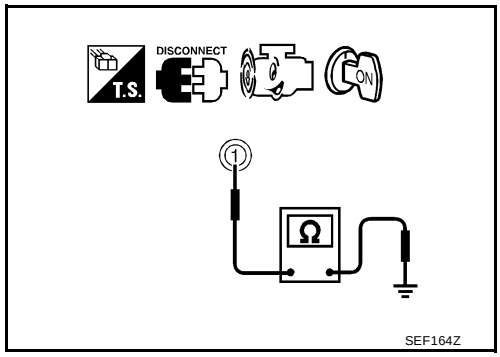
>> **INSPECTION END**

Component Inspection

UBS0025P

POWER STEERING OIL PRESSURE SWITCH

1. Turn ignition switch “OFF”.
2. Disconnect power steering oil pressure switch harness connector.
3. Start engine and let it idle.
4. Check continuity between terminals 1 and body ground.



Condition	Continuity
Steering wheel is being turned	Yes
Steering wheel is not being turned	No

If NG, replace power steering oil pressure switch.

Removal and Installation

UBS0025Q

POWER STEERING OIL PRESSURE SWITCH

Refer to PS-21, "POWER STEERING OIL PUMP" .

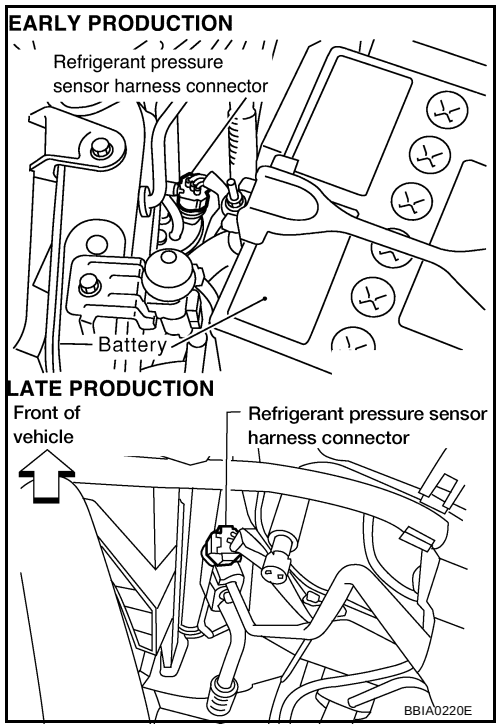
REFRIGERANT PRESSURE SENSOR

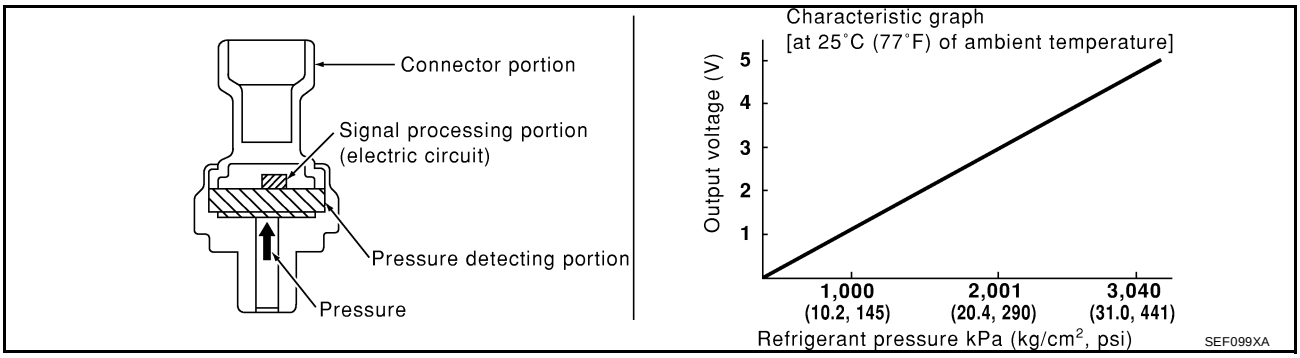
PFP:92136

Description

UBS0025R

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.

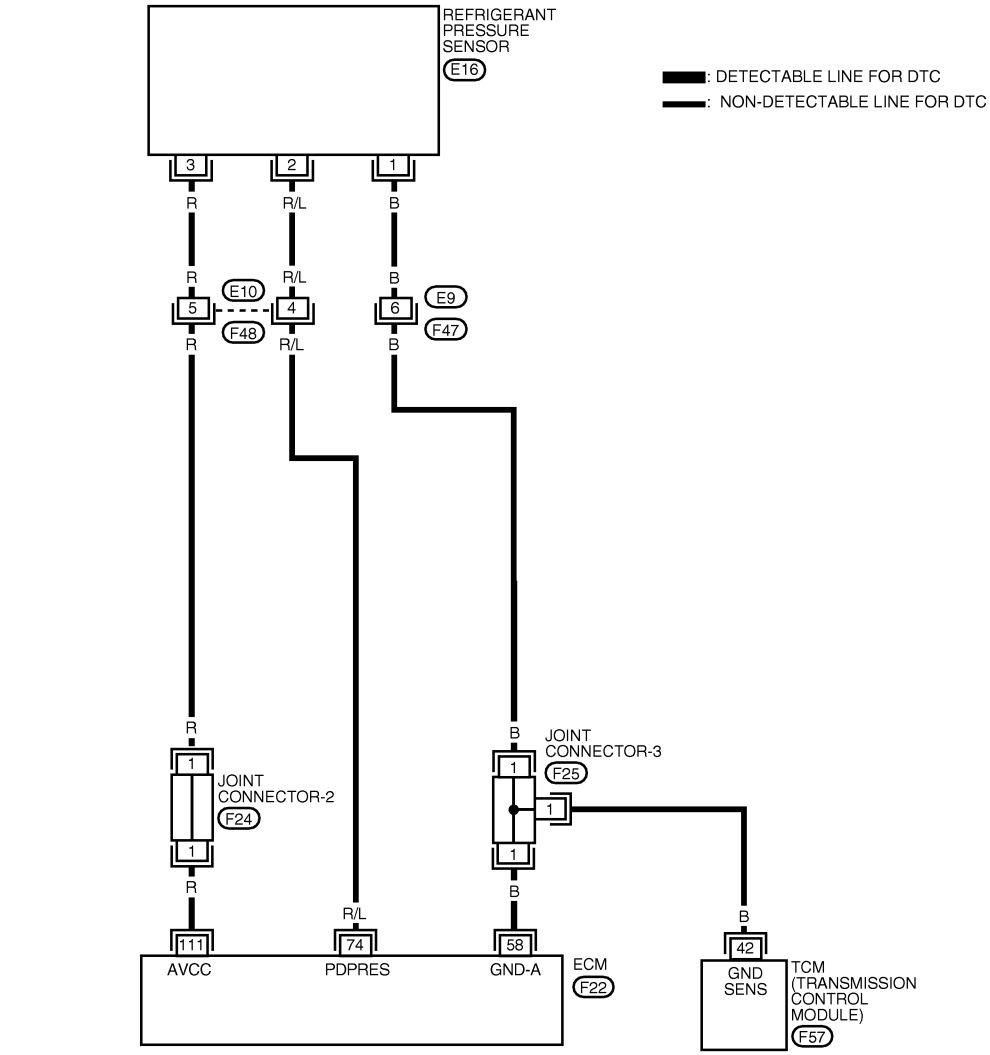


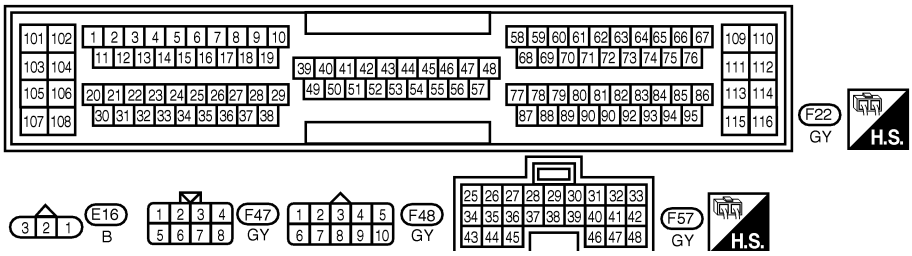


Wiring Diagram

UBS0025S

EC-RP/SEN-01





REFER TO THE FOLLOWING.
F24, F25 - JOINT CONNECTOR

WEC417

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
58	B	SENSOR'S GROUND	IGN ON	APPROX. 0V
74	R/L	REFRIGERANT PRESSURE SENSOR	ENGINE RUNNING UNDER WARM-UP CONDITION WITH A/C SWITCH AND BLOWER SWITCH ON	0.36 - 3.88V
111	R	SENSOR'S POWER SUPPLY	IGN ON	APPROX. 5V

SEF592Y

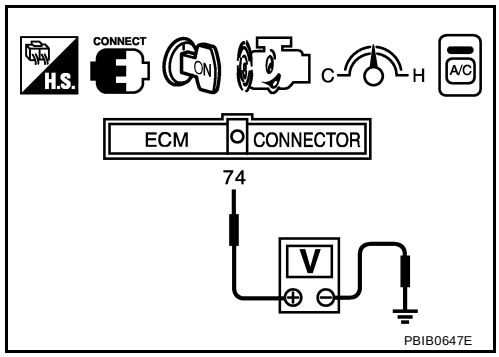
Diagnostic Procedure

UBS0025T

1. CHECK REFRIGERANT PRESSURE SENSOR OVERALL FUNCTION

1. Start engine and warm it up to normal operating temperature.
2. Turn A/C switch and fan control switch “ON”.
3. Check voltage between ECM terminal 74 and ground with CONSULT-II or tester.

Voltage: 0.36 - 3.88V

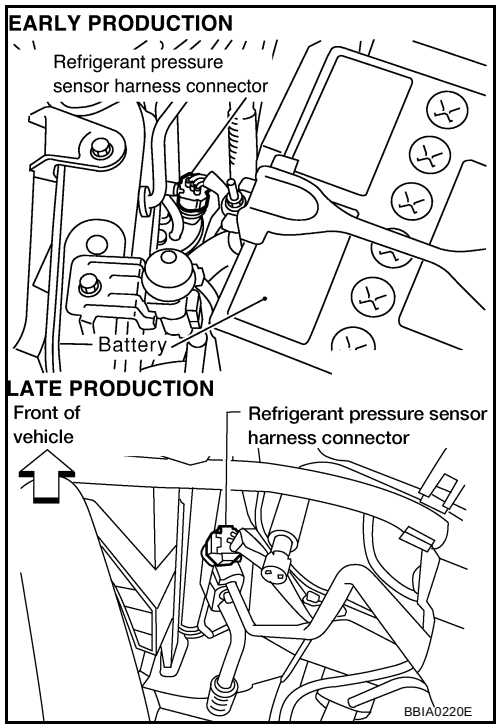


OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

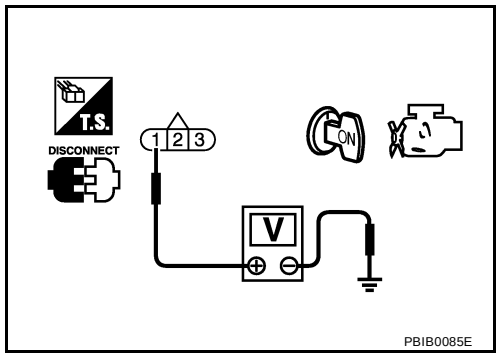
2. CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn A/C switch and fan control switch “OFF”.
2. Stop engine.
3. Disconnect refrigerant pressure sensor harness connector.
4. Turn ignition switch “ON”.



5. Check voltage between refrigerant pressure sensor terminal 3 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E10, F48
- Joint connector-2
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair harness or connectors.

4. CHECK REFRIGERANT PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Check harness continuity between refrigerant pressure sensor terminal 1 and engine ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E9, F47
- Joint connector-3
- Harness for open or short between TCM and refrigerant pressure sensor
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK REFRIGERANT PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 74 and refrigerant pressure sensor terminal 2. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E10, F48
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK REFRIGERANT PRESSURE SENSOR

Refer to MTC-16, "Refrigerant Pressure Sensor" .

OK or NG

OK >> GO TO 9.
NG >> Replace refrigerant pressure sensor.

9. CHECK INTERMITTENT INCIDENT

Refer to EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

ELECTRICAL LOAD SIGNAL

PFP:25350

CONSULT-II Reference Value in Data Monitor Mode

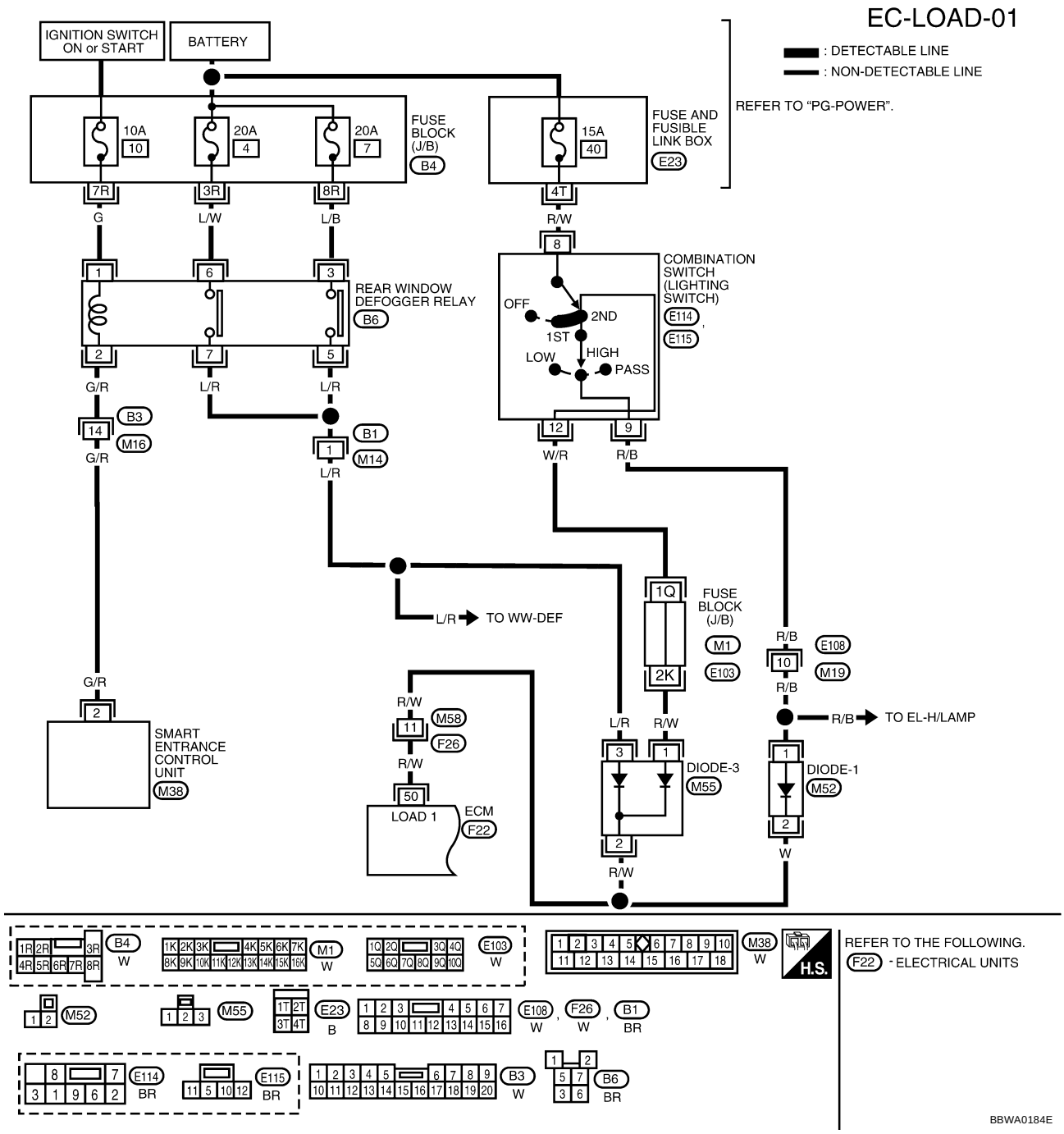
UBS0025U

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
LOAD SIGNAL	● Ignition switch: ON	Rear window defogger switch and/ or lighting switch “ON”	ON
		Rear window defogger switch and lighting switch “OFF”	OFF

Wiring Diagram

UBS0025V

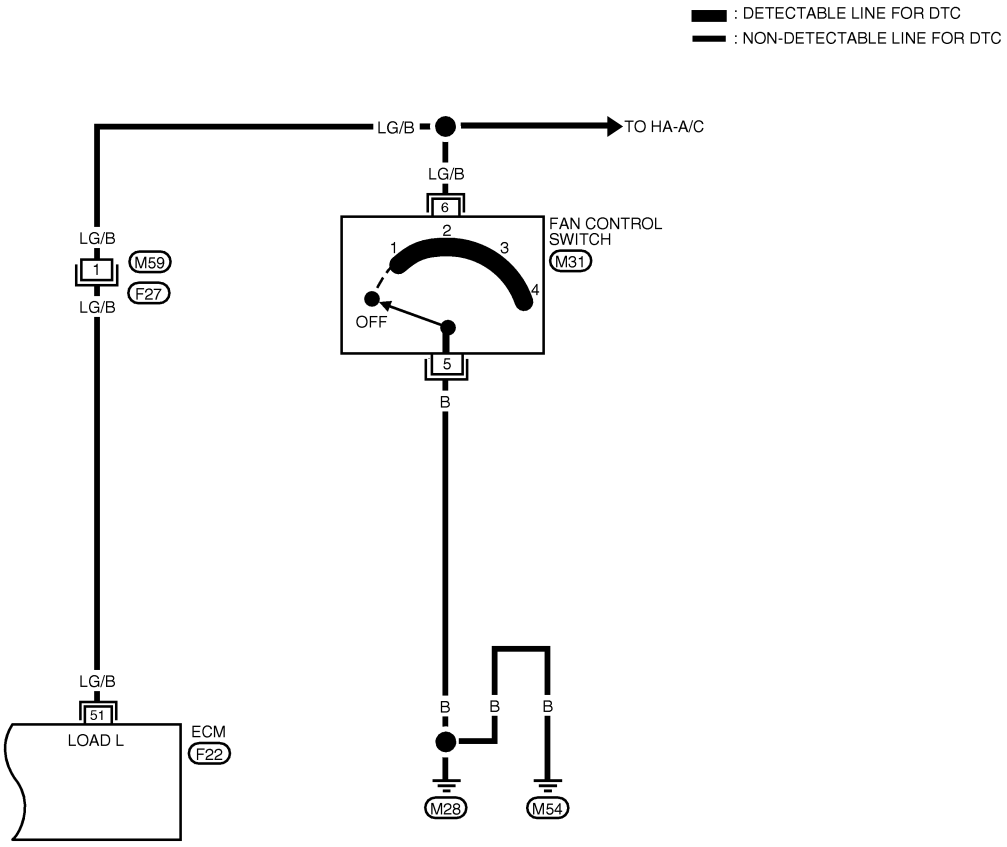


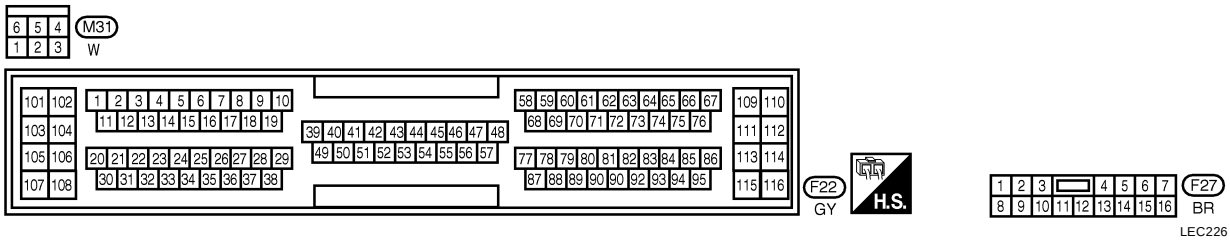
ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
50	R/W	ELECTRICAL LOAD SIGNAL	IGN ON WITH REAR WINDOW DEFOGGER SWITCH ON OR LIGHTING SWITCH 2ND POSITION	BATTERY VOLTAGE
			IGN ON WITH REAR WINDOW DEFOGGER SWITCH AND LIGHTING SWITCH OFF	0V

SEF593YA

EC-LOAD-02





ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
51	LG/B	HEATER FAN SWITCH	IGN ON WITH FAN CONTROL SWITCH ON	APPROX. 0V
			IGN ON WITH FAN CONTROL SWITCH OFF	APPROX. 5V

SEF594Y

Diagnostic Procedure

UBS0025W

1. INSPECTION START

Do you have CONSULT-II?

Yes or No

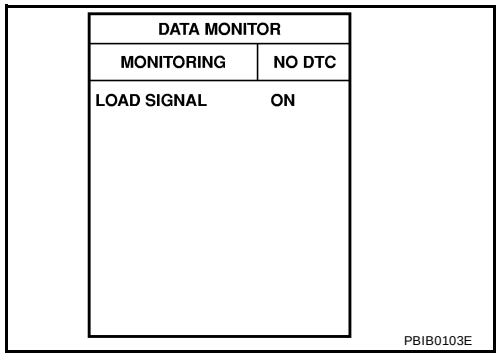
Yes >> GO TO 2.
No >> GO TO 5.

2. CHECK LOAD SIGNAL (REAR WINDOW DEFOGGER) CIRCUIT OVERALL FUNCTION

With CONSULT-II

1. Turn ignition switch “ON”.
2. Check “LOAD SIGNAL” in “DATA MONITOR” mode with CONSULT-II under the following conditions.

Condition	"LOAD SIGNAL"
Rear window defogger switch "ON"	ON
Rear window defogger switch "OFF"	OFF



OK or NG

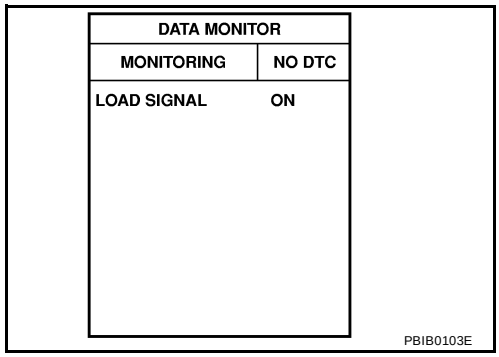
OK >> GO TO 3.
NG >> GO TO 9.

3. CHECK LOAD SIGNAL (HEADLAMP LOW BEAM) CIRCUIT OVERALL FUNCTION

With CONSULT-II

Check “LOAD SIGNAL” in “DATA MONITOR” mode with CONSULT-II under the following conditions.

Condition	"LOAD SIGNAL"
Lighting switch "2ND" and "LOW" position	ON
Lighting switch "OFF"	OFF



OK or NG

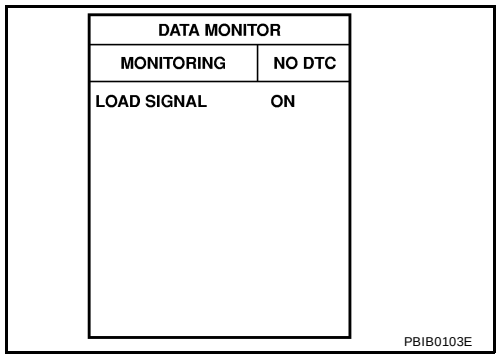
OK >> GO TO 4.
NG >> GO TO 13.

4. CHECK LOAD SIGNAL (HEADLAMP HIGH BEAM) CIRCUIT OVERALL FUNCTION

With CONSULT-II

Check “LOAD SIGNAL” in “DATA MONITOR” mode with CONSULT-II under the following conditions.

Condition	"LOAD SIGNAL"
Lighting switch "2ND" and "HIGH" position	ON
Lighting switch "OFF"	OFF



OK or NG

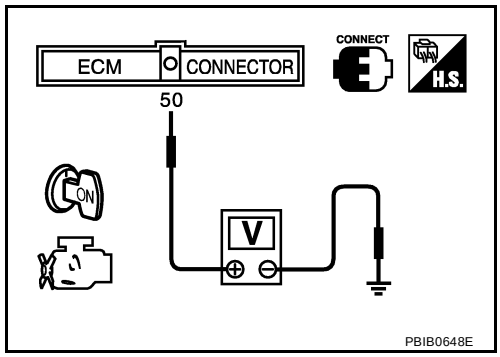
OK >> GO TO 8.
NG >> GO TO 17.

5. CHECK LOAD SIGNAL (REAR WINDOW DEFOGGER) CIRCUIT OVERALL FUNCTION

Without CONSULT-II

1. Turn ignition switch “ON”.
2. Check voltage between ECM terminal 50 and ground under the following conditions.

Condition	Voltage
Rear window defogger switch "ON"	BATTERY VOLTAGE
Rear window defogger switch "OFF"	0V



OK or NG

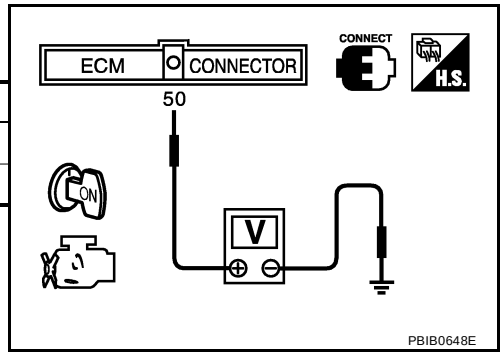
OK >> GO TO 6.
NG >> GO TO 9.

6. CHECK LOAD SIGNAL (HEADLAMP LOW BEAM) CIRCUIT OVERALL FUNCTION

Without CONSULT-II

Check voltage between ECM terminal 50 and ground under the following conditions.

Condition	Voltage
Lighting switch "2ND" and "LOW" position	BATTERY VOLTAGE
Lighting switch "OFF"	0V



OK or NG

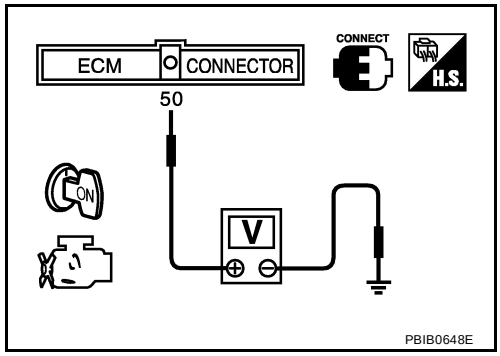
OK >> GO TO 7.
NG >> GO TO 13.

7. CHECK LOAD SIGNAL (HEADLAMP HIGH BEAM) CIRCUIT OVERALL FUNCTION

Without CONSULT-II

Check voltage between ECM terminal 50 and ground under the following conditions.

Condition	Voltage
Lighting switch "2ND" and "HIGH" position	BATTERY VOLTAGE
Lighting switch "OFF"	0V



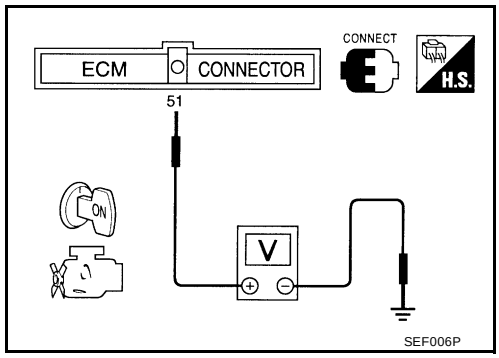
OK or NG

OK >> GO TO 8.
NG >> GO TO 17.

8. CHECK LOAD SIGNAL (FAN CONTROL SWITCH) CIRCUIT OVERALL FUNCTION

Check voltage between ECM terminal 51 and ground under the following conditions.

Condition	Voltage
Fan control switch "ON"	BATTERY VOLTAGE
Fan control switch "OFF"	0V



OK or NG

OK >> **INSPECTION END**
NG >> GO TO 21.

9. CHECK REAR WINDOW DEFOGGER FUNCTION

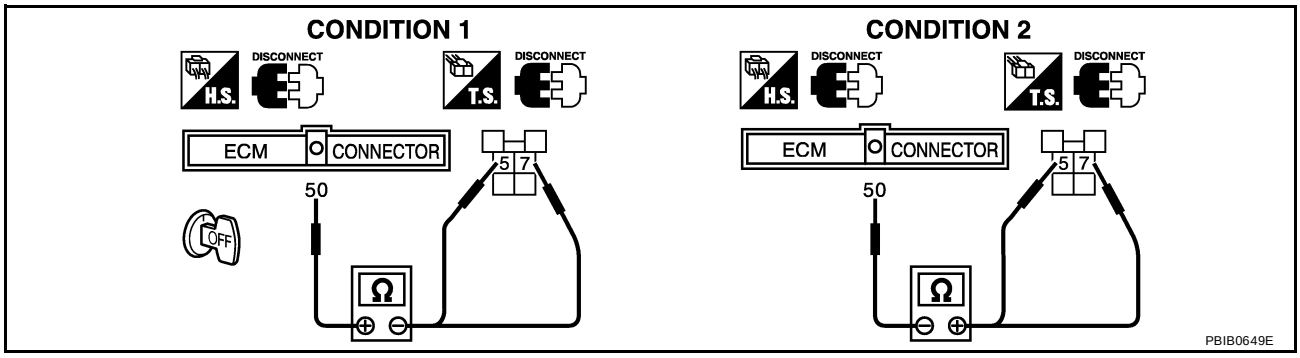
1. Start engine.
2. Turn “ON” the rear window defogger switch.
3. Check the rear windshield. Is the rear windshield heated up?

Yes or No

Yes >> GO TO 10.
No >> Refer to GW-17, "REAR WINDOW DEFOGGER" .

10. CHECK REAR WINDOW DEFOGGER INPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Stop engine.
2. Disconnect ECM harness connector.
3. Disconnect rear window defogger relay.
4. Check harness continuity between ECM terminal 50 and rear window defogger relay terminals 5 and 7 under the following conditions.



CONDITION	CONTINUITY
1	Should not exist.
2	Should exist.

5. 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 B1, M14
- Harness connectors M58, F26
- Diode M55
- Harness for open and short between ECM and rear window defogger relay

>> Repair open circuit or short to ground or short to power in harness or connectors.

12. CHECK INTERMITTENT INCIDENT

Perform EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

13. CHECK HEADLAMP LOW BEAM FUNCTION

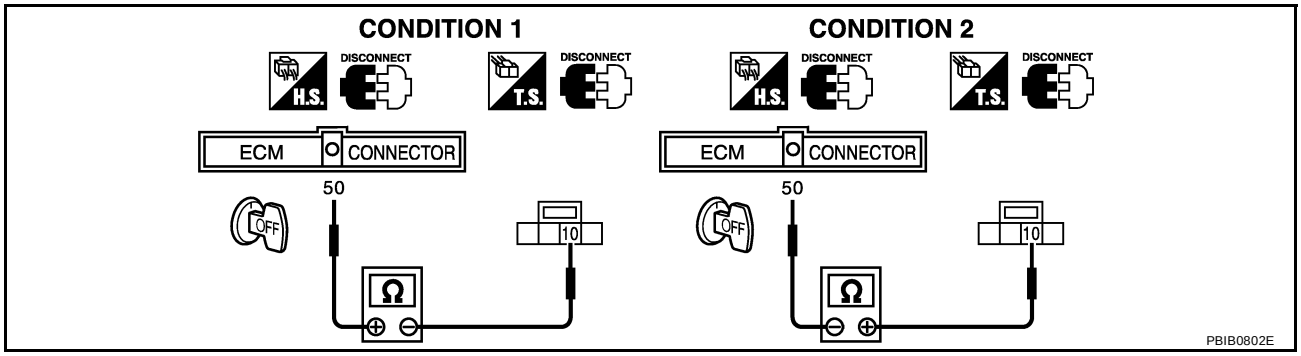
1. Start engine.
2. Turn the lighting switch “2ND” and “LOW” position.
3. Check that headlamp low beams are illuminated.

OK or NG

OK >> GO TO 14.
NG >> Refer to LT-6, "HEADLAMP (FOR USA)" .

14. CHECK HEADLAMP INPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Stop engine.
2. Disconnect ECM harness connector.
3. Disconnect lighting switch harness connectors.
4. Check harness continuity between ECM terminal 50 and lighting switch terminal 10 under the following conditions.



CONDITION	CONTINUITY
1	Should exist.
2	Should not exist.

5. 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 M58, F26
- Harness connectors M19, E108
- Diode M55
- Harness for open and short between ECM and lighting switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

16. CHECK INTERMITTENT INCIDENT

Perform EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

17. CHECK HEADLAMP HIGH BEAM FUNCTION

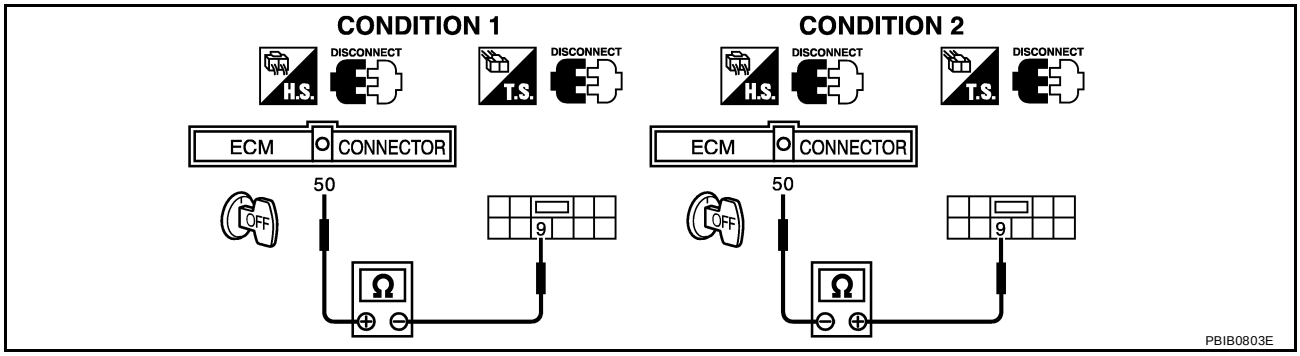
1. Start engine.
2. Turn the lighting switch “2ND” and “HIGH” position.
3. Check that headlamp high beams are illuminated.

OK or NG

OK >> GO TO 18.
NG >> Refer to LT-6, "HEADLAMP (FOR USA)" .

18. CHECK HEADLAMP HIGH BEAM INPUT SIGNAL CIRCUIT FOR OPEN OR SHORT (FOR USA)

1. Stop engine.
2. Disconnect ECM harness connector.
3. Disconnect lighting switch harness connector.
4. Check harness continuity between ECM terminal 50 and lighting switch terminal 9 under the following conditions.



CONDITION	CONTINUITY
1	Should exist.
2	Should not exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 20.
NG >> GO TO 19.

19. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M58, F26
- Harness connectors E108, M19
- Diode-1 M52
- Diode-3 M55
- Harness for open and short between ECM and lighting switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

20. CHECK INTERMITTENT INCIDENT

Perform EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

21. CHECK FAN CONTROL SWITCH FUNCTION

1. Start engine.
2. Turn “ON” the fan control switch.
3. Check the blower fan motor. Is the blower fan motor operating?

Yes or No

Yes >> GO TO 22.
No >> Refer to MTC-37, "1. Check Blower" .

22. CHECK FAN CONTROL SWITCH INPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Stop engine.
2. Disconnect ECM harness connector.
3. Disconnect fan control switch harness connector.
4. Check harness continuity between ECM terminal 51 and fan control switch terminal 6. 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 24.
NG >> GO TO 23.

23. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M59, F27
- Harness for open and short between ECM and fan control switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

24. CHECK INTERMITTENT INCIDENT

Perform EC-711, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

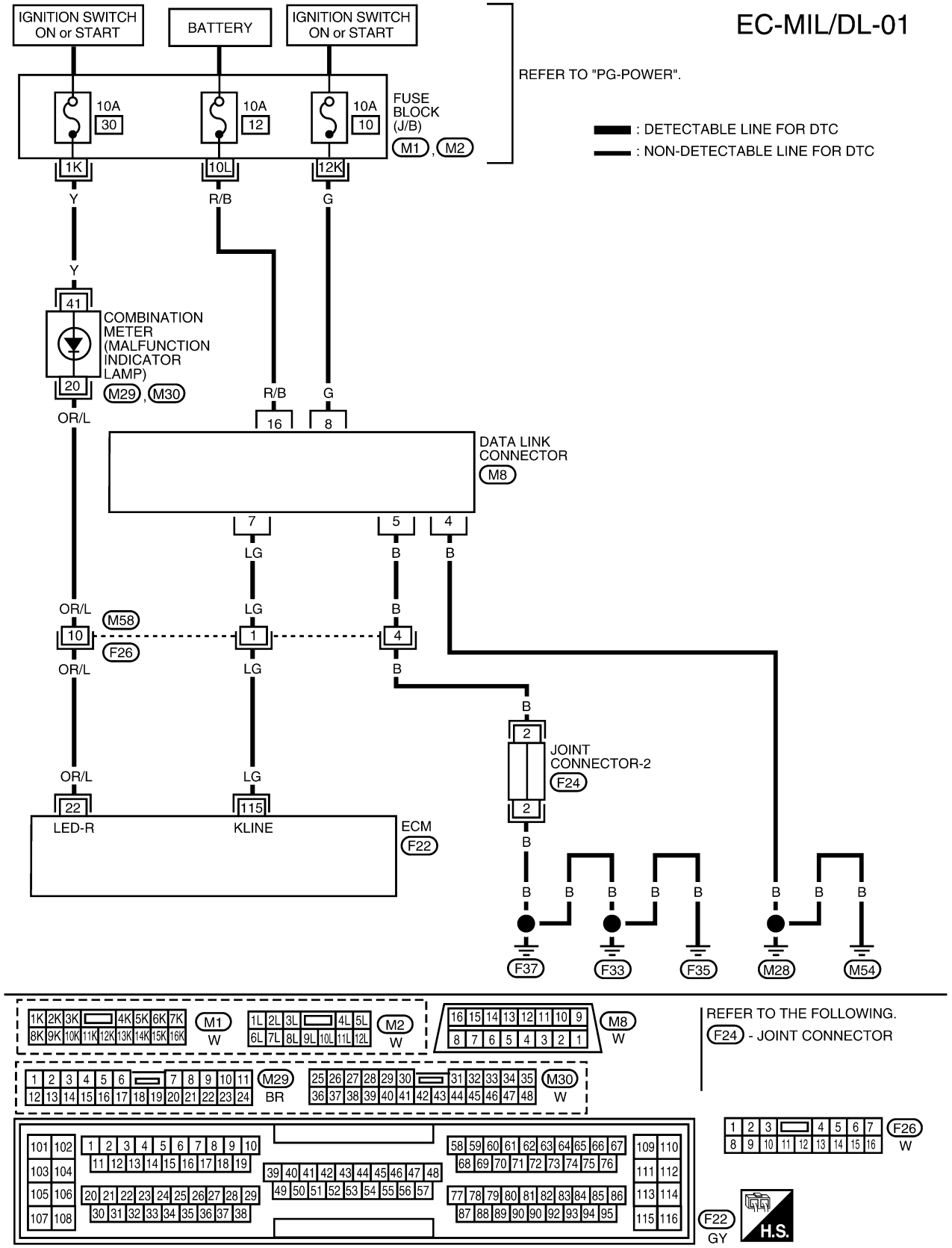
>> **INSPECTION END**

MIL & DATA LINK CONNECTORS

PFP:24814

Wiring Diagram

UBS0025X



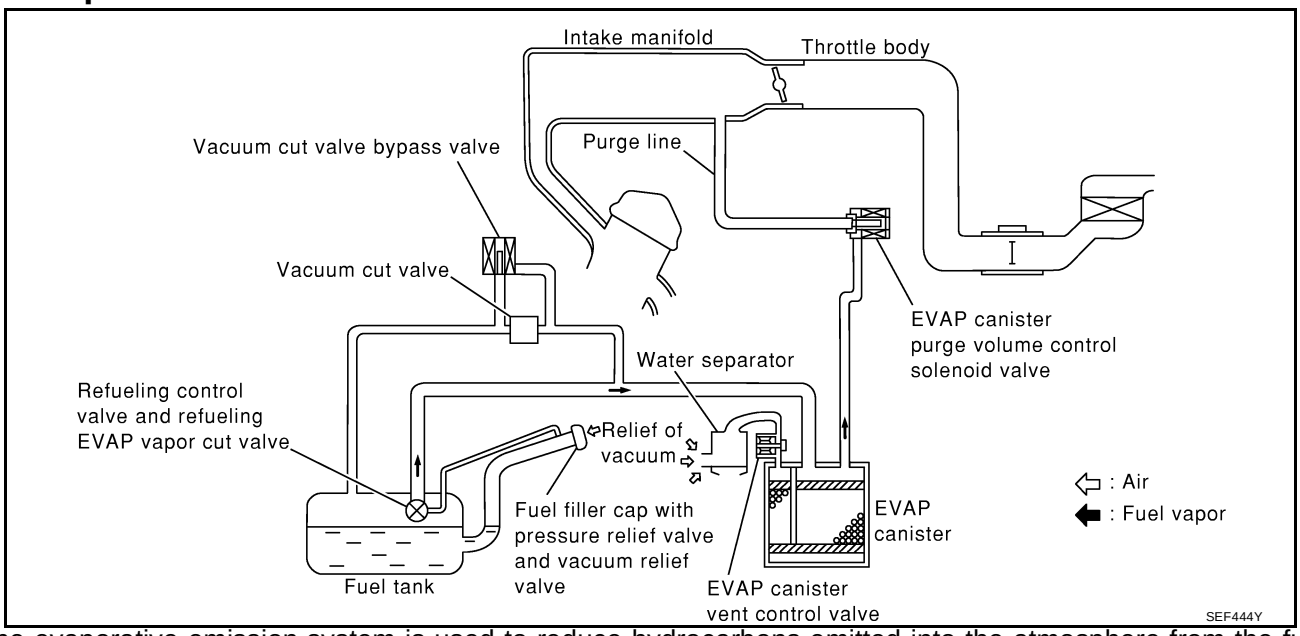
BBWA0185E

EVAPORATIVE EMISSION SYSTEM

PFP:14950

Description

UBS0025Y



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.

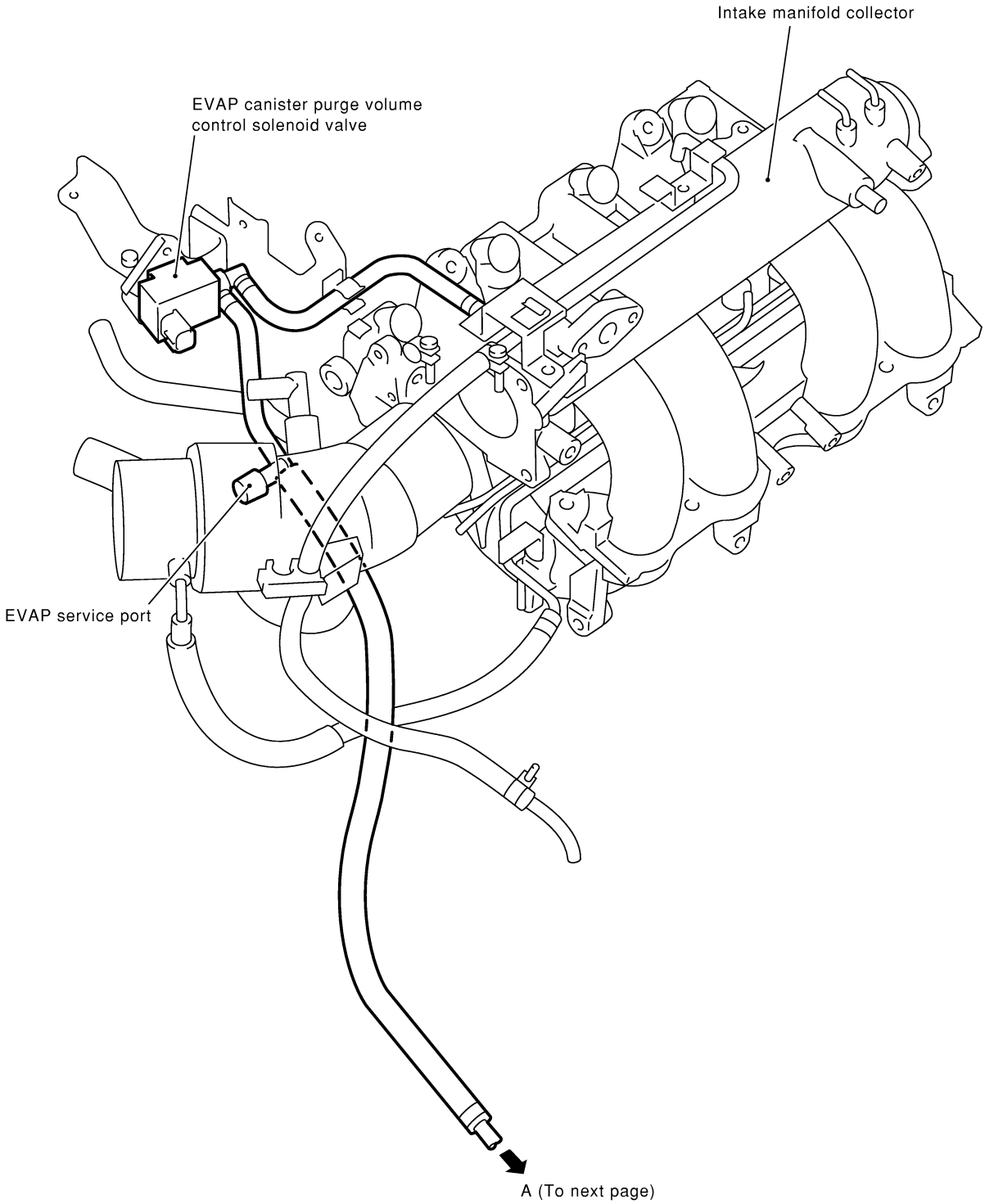
The fuel vapor in the sealed fuel tank is led into the EVAP canister which contains activated carbon and the vapor is stored there when the engine is not operating or when refueling to the fuel tank.

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.

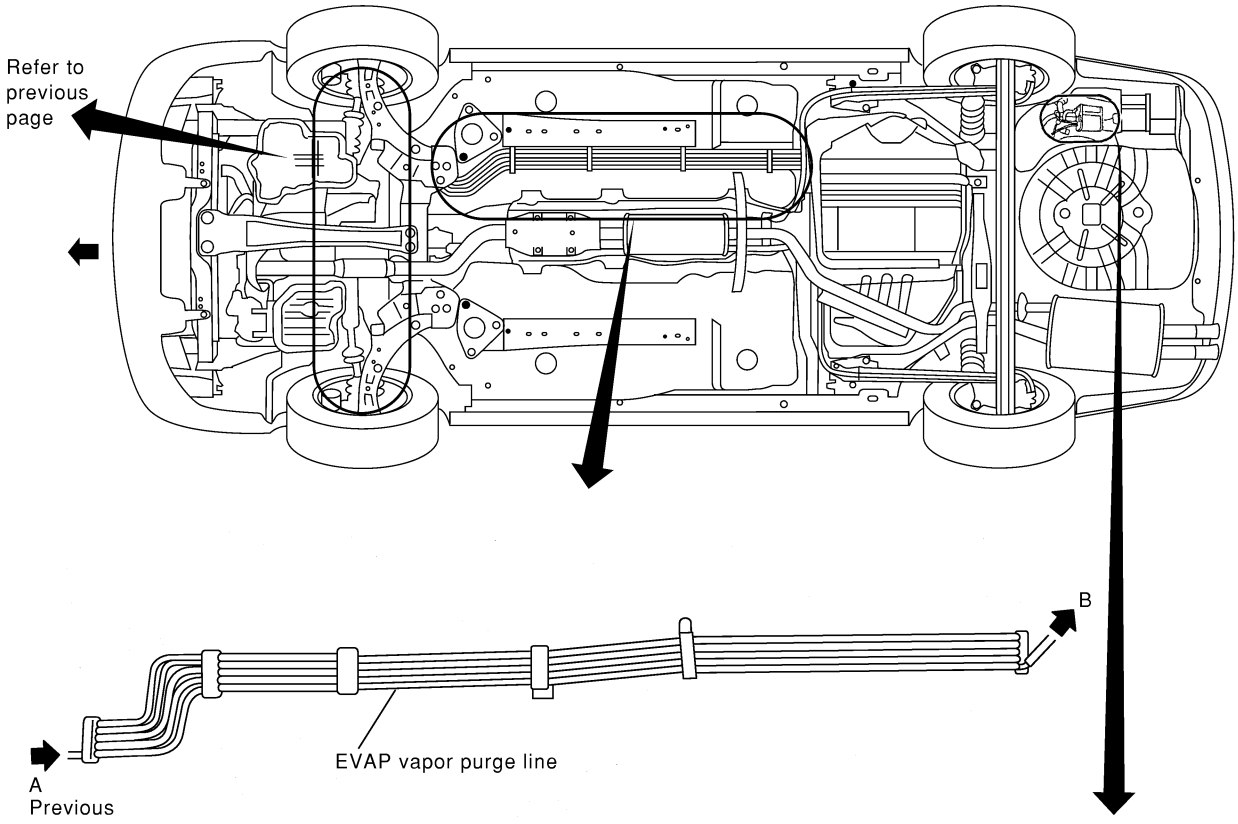
EVAP canister purge control solenoid valve also shuts off the vapor purge line during decelerating and idling.

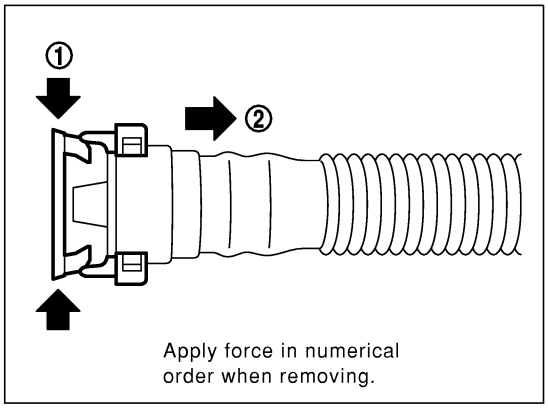
EVAPORATIVE EMISSION LINE DRAWING

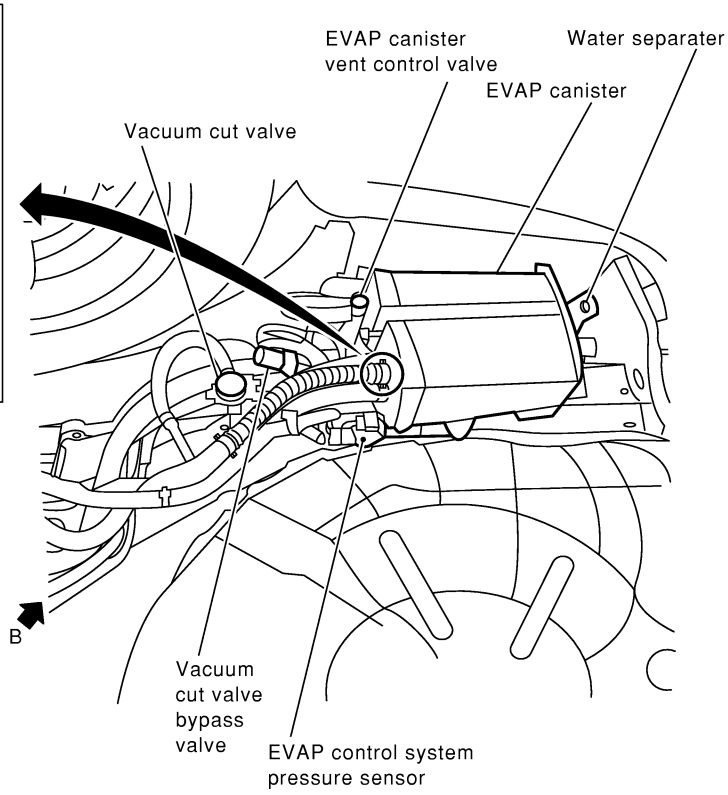


NOTE : Do not use soapy water or any type of solvent while installing vacuum hoses or purge hoses.

SEF503Z







INSTALLATION PRECAUTIONS:

- **This hose can be reused, but do not remove it unless necessary.**
- **Remove any foreign matter (dust, sand, etc.) from the hose connection before installing.**
- **Apply oil to the O-ring before installing.**
- **Replace the hose assembly if the O-ring is scratched or cracked.**

SEF515Z

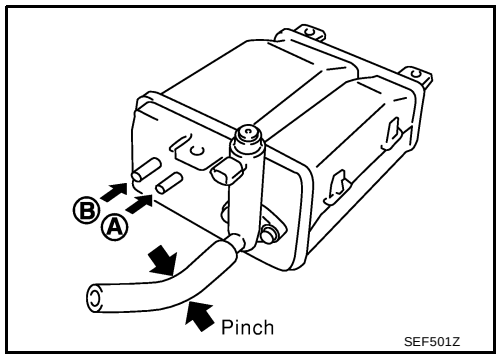
Component Inspection

UBS0025Z

EVAP CANISTER

Check EVAP canister as follows:

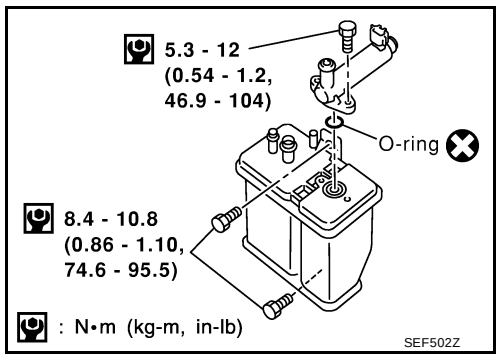
1. Pinch the fresh air hose.
2. Blow air into port **A** and check that air flows freely through port **B** .



Tightening Torque

Tighten EVAP canister as shown in the figure.

Make sure new O-ring is installed properly between EVAP canister and EVAP canister vent control valve.



FUEL TANK VACUUM RELIEF VALVE (BUILT INTO FUEL FILLER CAP)

NOTE:

Refer to fuel filler cap adapter instruction manual before performing following inspection.

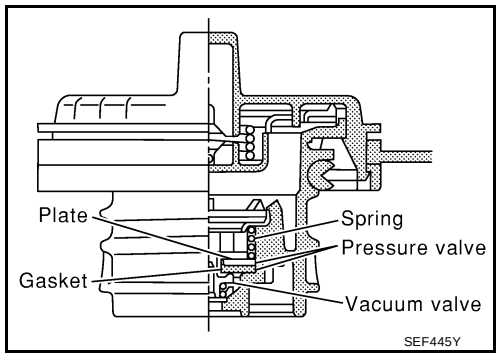
1. Wipe clean valve housing.
2. Check valve opening pressure and vacuum.

Pressure:

15.3 - 20.0 kPa (0.156 - 0.204 kg/cm^2 , 2.22 - 2.90 psi)

Vacuum:

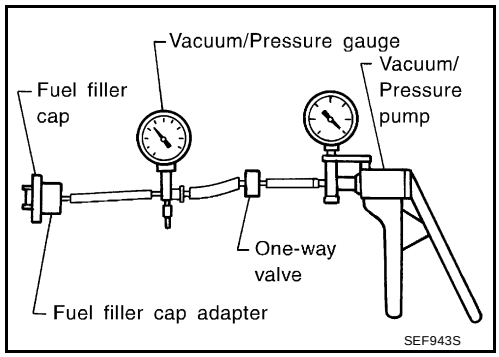
−6.0 to −3.4 kPa (−0.061 to −0.035 kg/cm^2 , −0.87 to −0.48 psi)



3. If out of specification, replace fuel filler cap as an assembly.

CAUTION:

Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.



VACUUM CUT VALVE AND VACUUM CUT VALVE BYPASS VALVE

Refer to EC-1152, "DTC P1491 VACUUM CUT VALVE BYPASS VALVE" .

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

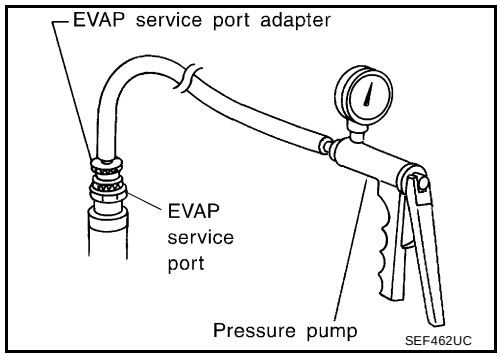
Refer to EC-922, "DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE" .

FUEL TANK TEMPERATURE SENSOR

Refer to EC-816, "DTC P0181, P0182, P0183 FTT SENSOR" .

EVAP SERVICE PORT

Positive pressure is delivered to the EVAP system through the EVAP service port. If fuel vapor leakage in the EVAP system occurs, use a leak detector to locate the leak.



How to Detect Fuel Vapor Leakage

UBS00260

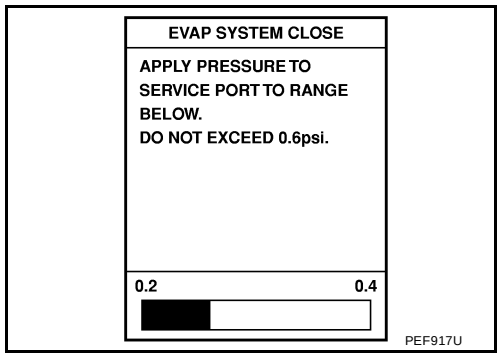
CAUTION:

- **Never use compressed air or a high pressure pump.**
- **Do not start engine.**
- **Do not exceed 4.12 kPa (0.042 kg/cm^2 , 0.6 psi) of pressure in EVAP system.**

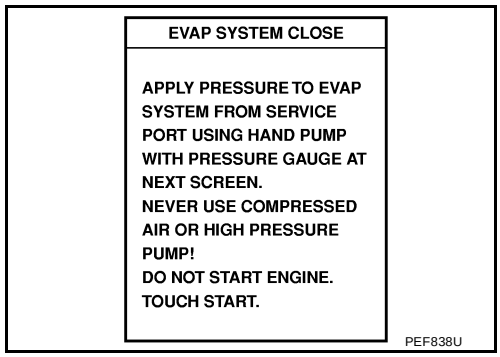
NOTE:
Improper installation of adapter to the service port may cause a leak.

WITH CONSULT-II

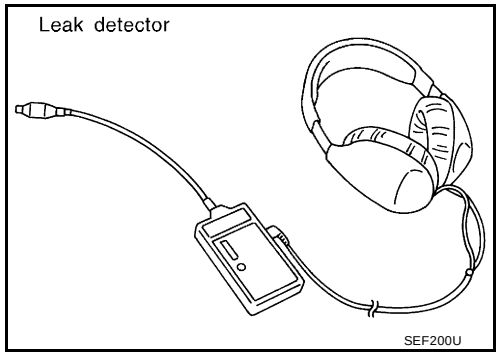
1. Attach the EVAP service port adapter securely to the EVAP service port.
2. Also attach the pressure pump and hose.
3. Turn ignition switch “ON”.
4. Select the “EVAP SYSTEM CLOSE” of “WORK SUPPORT” mode with CONSULT-II.
5. Touch “START”. A bar graph (Pressure indicating display) will appear on the screen.



6. Apply positive pressure to the EVAP system until the pressure indicator reaches the middle of the bar graph.
7. Remove the EVAP service port adapter and hose with pressure pump.

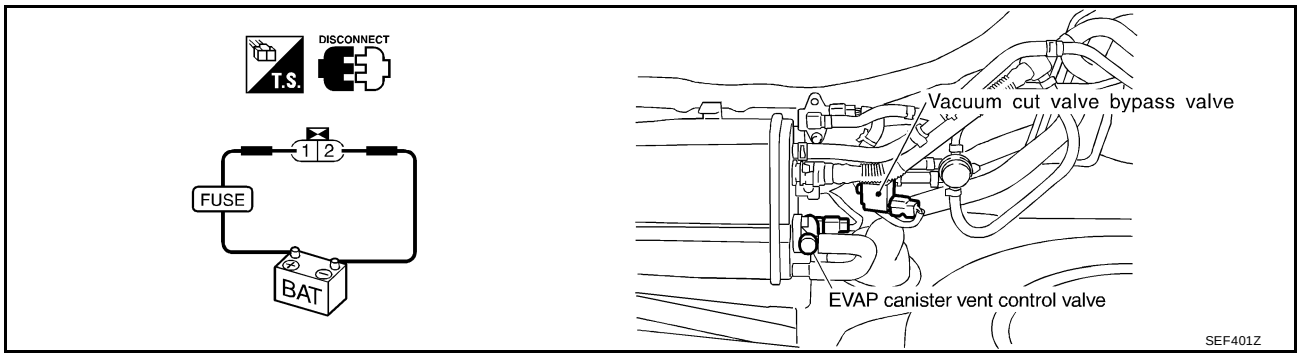


8. Locate the leak using a leak detector. Refer to EC-1202, "EVAPORATIVE EMISSION LINE DRAWING" .
9. If the check result is NG, repair or replace the malfunctioning parts. If OK, touch “BACK” on CONSULT-II screen.
10. Start engine and warm it up to normal operating temperature.
11. Turn ignition switch “OFF” and wait at least 10 seconds.
12. Restart engine and let it idle for 90 seconds.
13. Keep engine speed at 2,000 rpm for 30 seconds.
14. Turn ignition switch “OFF”.



WITHOUT CONSULT-II

1. Attach the EVAP service port adapter securely to the EVAP service port and pressure pump with pressure gauge to the EVAP service port.
2. Apply battery voltage to between the terminals of both EVAP canister vent control valve and vacuum cut valve bypass valve to make a closed EVAP system.
3. To locate the leak, deliver positive pressure to the EVAP system until pressure gauge points reach 1.38 to 2.76 kPa (0.014 to 0.028 kg/cm^2 , 0.2 to 0.4 psi).
4. Remove the EVAP service port adapter and hose with pressure pump.
5. Locate the leak using a leak detector. Refer to EC-1202, "EVAPORATIVE EMISSION LINE DRAWING" .
6. If the check result is NG, repair or replace the malfunctioning parts. If OK, stop applying battery voltage to EVAP canister vent control valve and vacuum cut valve bypass valve.
7. Reconnect harness connectors to EVAP canister vent control valve and vacuum cut valve bypass valve.
8. Start engine and warm it up to normal operating temperature.
9. Turn ignition switch “OFF” and wait at least 10 seconds.
10. Restart engine and let it idle for 90 seconds.
11. Keep engine speed at 2,000 rpm for 30 seconds.
12. Turn ignition switch “OFF”.

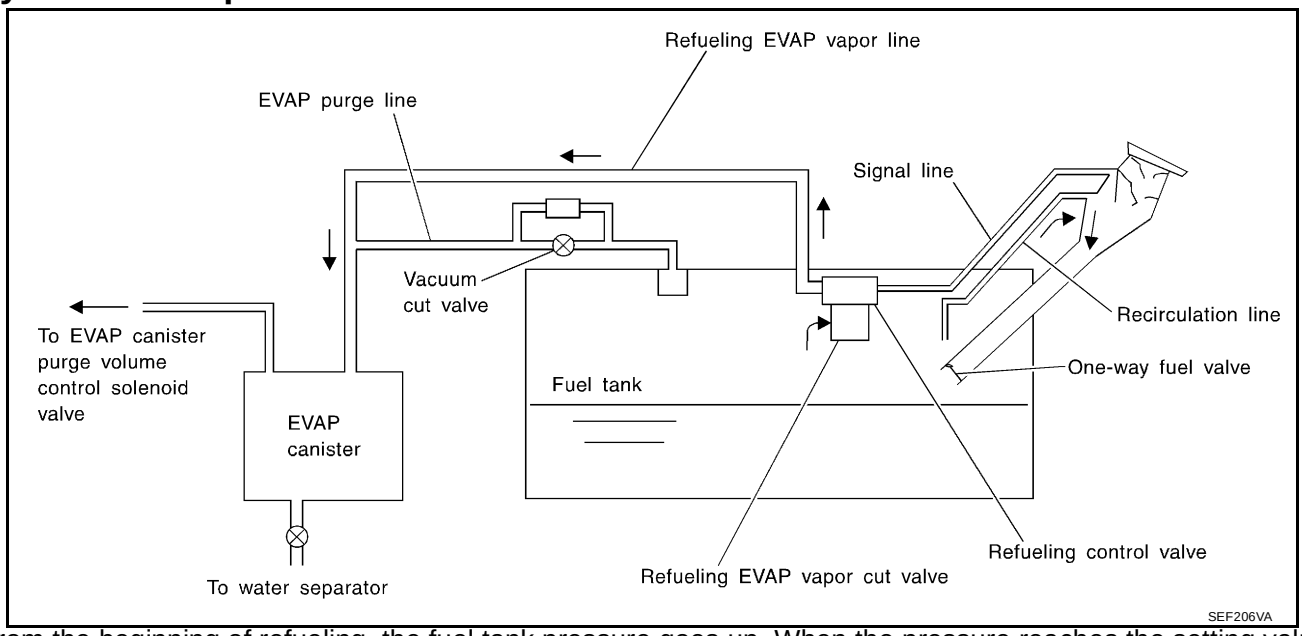


ON BOARD REFUELING VAPOR RECOVERY (ORVR)

PFP:00000

System Description

UBS00261



From the beginning of refueling, the fuel tank pressure goes up. When the pressure reaches the setting value of the refueling control valve (RCV) opening pressure, the RCV is opened. After RCV opens, the air and vapor inside the fuel tank go through refueling EVAP vapor cut valve, RCV and refueling vapor line to the EVAP canister. The vapor is absorbed by the EVAP canister and the air is released to the atmosphere.

When the refueling has reached the full level of the fuel tank, the refueling EVAP vapor cut valve is closed and refueling is stopped because of auto shut-off. The vapor which was absorbed by the EVAP canister is purged during driving.

The RCV is always closed during driving and the evaporative emission control system is operated the same as conventional system.

WARNING:

When conducting inspections below, be sure to observe the following:

- **Put a “CAUTION: FLAMMABLE” 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-623, "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

UBS00262

SYMPTOM: FUEL ODOR FROM EVAP CANISTER IS STRONG.

1. CHECK EVAP CANISTER

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Weigh the EVAP canister with EVAP canister vent control valve attached.
   The weight should be less than 1.8 kg (4.0 lb).

OK or NG

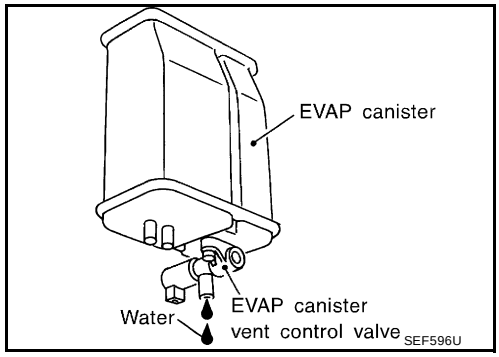
OK >> GO TO 2.
NG >> GO TO 3.

2. CHECK IF EVAP CANISTER SATURATED WITH WATER

Does water drain from the EVAP canister?

Yes or No

Yes >> GO TO 3.
No (With CONSULT-II)>>GO TO 6.
No (Without CONSULT-II)>>GO TO 7.



3. REPLACE EVAP CANISTER

Replace EVAP canister with a new one.

>> GO TO 4.

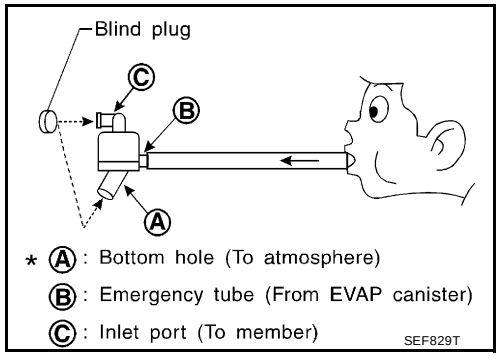
4. CHECK WATER SEPARATOR

1. Check visually for insect nests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that **A** and **C** are not clogged by blowing air into **B** with **A** , and then **C** plugged.
5. In case of NG in items 2 - 4, replace the parts.

NOTE:
Do not disassemble water separator.

OK or NG

OK >> GO TO 5.
NG >> Replace water separator.



5. DETECT MALFUNCTIONING PART

Check the EVAP hose between EVAP canister and water separator for clogging or poor connection.

>> Repair or replace EVAP hose.

6. CHECK REFUELING EVAP VAPOR CUT VALVE

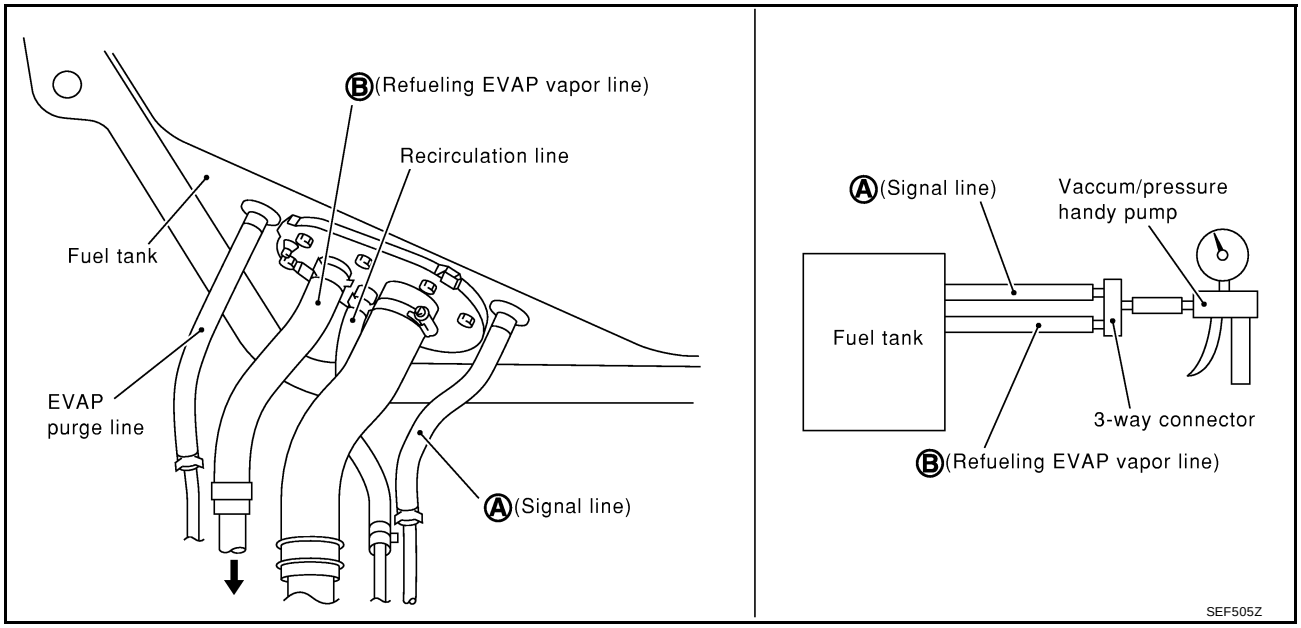
With CONSULT-II

1. Remove fuel tank. Refer to FL-10, "Removal and Installation" .
2. Drain fuel from the tank as follows:

- Remove fuel feed hose located on the fuel level sensor unit retainer.
- Connect a spare fuel hose, one side to fuel level sensor unit retainer where the hose was removed and the other side to a fuel container.
- Drain fuel using “FUEL PUMP RELAY” in “ACTIVE TEST” mode with CONSULT-II.

3. Check refueling EVAP vapor cut valve for being stuck to closed as follows.
Blow air into the refueling EVAP vapor cut valve (from hose end B), and check that the air flows freely into the tank.
4. Check EVAP vapor cut valve for being stuck to open as follows.

- Connect vacuum pump to hose ends **A** and **B** using a suitable 3-way connector.
- Remove fuel gauge retainer with fuel level sensor unit.
Always replace O-ring with new one.
- Put fuel tank upside down.
- Apply vacuum pressure to both hose ends **A** and **B** [–13.3 kPa (–100 mmHg, –3.94 inHg)] with fuel level sensor unit retainer remaining open and check that the pressure is applicable.



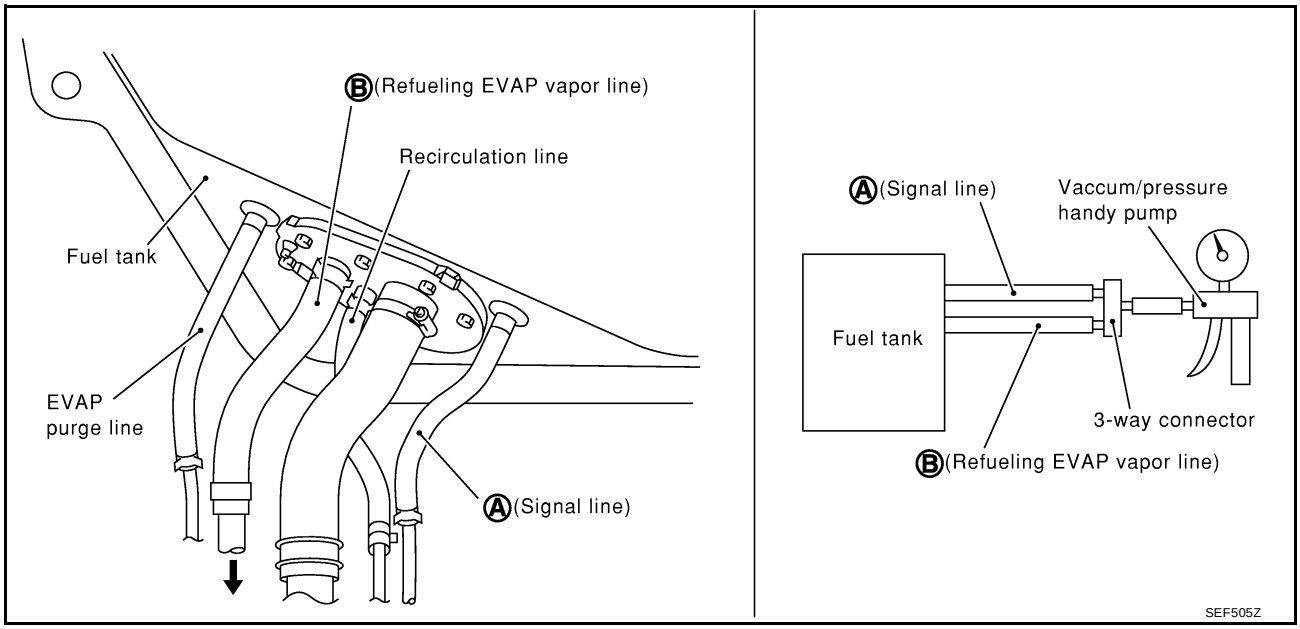
OK or NG

OK >> GO TO 8.
NG >> Replace refueling EVAP vapor cut valve with fuel tank.

7. CHECK REFUELING EVAP VAPOR CUT VALVE

Without CONSULT-II

1. Remove fuel tank. Refer to FL-10, "Removal and Installation" .
2. Drain fuel from the tank as follows:
- Remove fuel level sensor unit retainer.
- Drain fuel from the tank using a hand pump into a fuel container.
3. Check refueling EVAP vapor cut valve for being stuck to closed as follows.
   Blow air into the refueling EVAP vapor cut valve (from hose end **B**), and check that the air flows freely into the tank.
4. Check EVAP vapor cut valve for being stuck to open as follows.
- Connect vacuum pump to hose ends **A** and **B** using a suitable 3-way connector.
- Remove fuel level sensor unit retainer with fuel level sensor unit.
  Always replace O-ring with new one.
- Put fuel tank upside down.
- Apply vacuum pressure to both hose ends **A** and **B** [–13.3 kPa (–100 mmHg, –3.94 inHg)] with fuel level sensor unit retainer remaining open and check that the pressure is applicable.

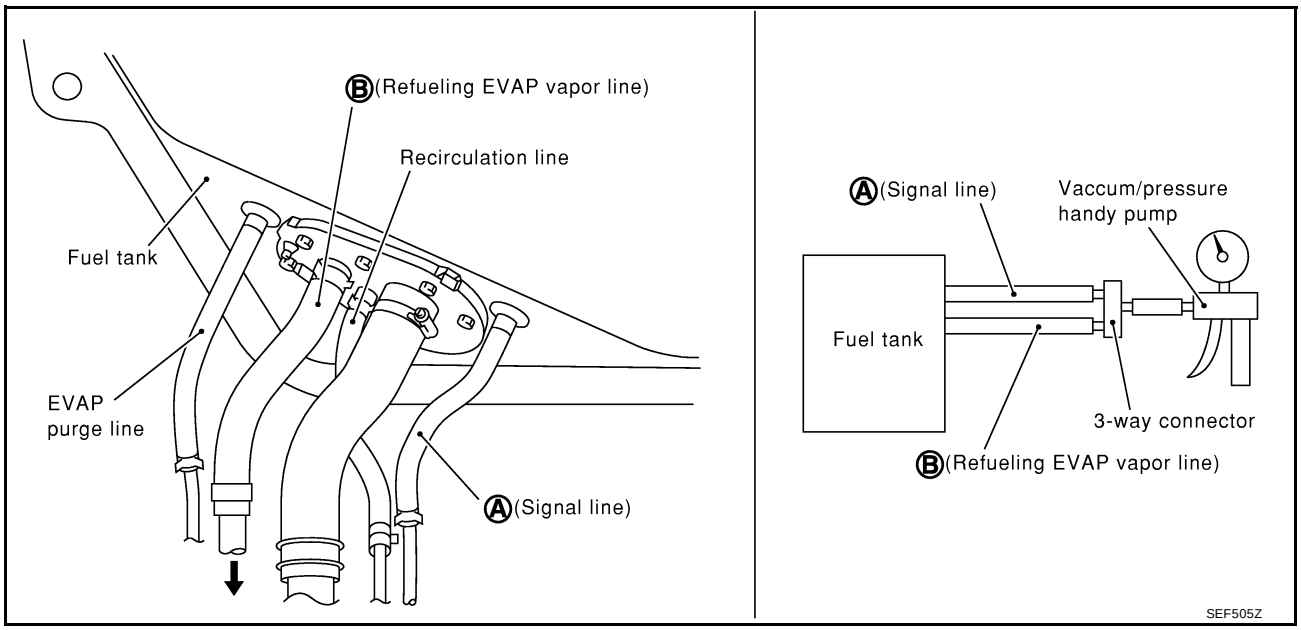


OK or NG

OK >> GO TO 8.
NG >> Replace refueling EVAP vapor cut valve with fuel tank.

8. CHECK REFUELING CONTROL VALVE

1. Remove fuel filler cap.
2. Check air continuity between hose ends **A** and **B** .
   Blow air into the hose end **B** . Air should flow freely into the fuel tank.
3. Blow air into hose end **A** and check there is no leakage.
4. Apply pressure to both hose ends **A** and **B** [20 kPa (150 mmHg, 5.91 inHg)] using a pressure pump and a suitable 3-way connector. Check that there is no leakage.



OK or NG

OK >> **INSPECTION END**
NG >> Replace refueling control valve with fuel tank.

SYMPTOM: CANNOT REFUEL/FUEL ODOR FROM THE FUEL FILLER OPENING IS STRONG WHILE REFUELING.

1. CHECK EVAP CANISTER

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Weigh the EVAP canister with EVAP canister vent control valve attached.
   The weight should be less than 1.8 kg (4.0 lb).

OK or NG

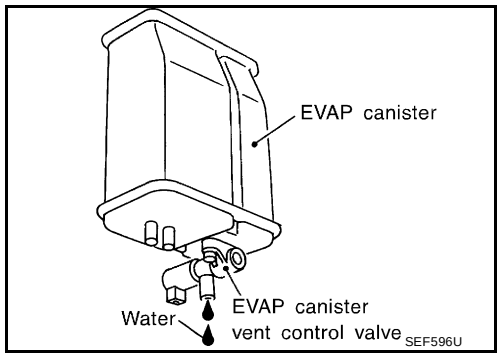
OK >> GO TO 2.
NG >> GO TO 3.

2. CHECK IF EVAP CANISTER SATURATED WITH WATER

Does water drain from the EVAP canister?

Yes or No

Yes >> GO TO 3.
No >> GO TO 6.



3. REPLACE EVAP CANISTER

Replace EVAP canister with a new one.

>> GO TO 4.

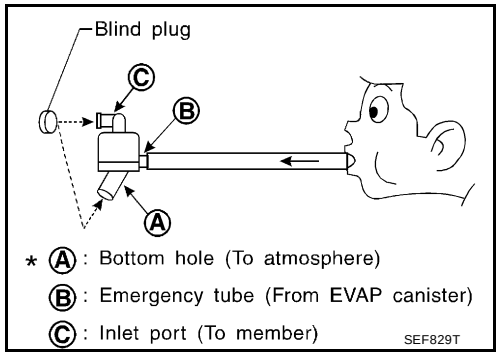
4. CHECK WATER SEPARATOR

1. Check visually for insect nests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that **A** and **C** are not clogged by blowing air into **B** with **A** , and then **C** plugged.
5. In case of NG in items 2 - 4, replace the parts.

NOTE:
Do not disassemble water separator.

OK or NG

OK >> GO TO 5.
NG >> Replace water separator.



5. DETECT MALFUNCTIONING PART

Check the EVAP hose between EVAP canister and water separator for clogging or poor connection.

>> Repair or replace EVAP hose.

6. CHECK VENT HOSES AND VENT TUBES

Check hoses and tubes between EVAP canister and refueling control valve for clogging, kink, looseness and improper connection.

OK or NG

OK >> GO TO 7.
NG >> Repair or replace hoses and tubes.

7. CHECK FILLER NECK TUBE

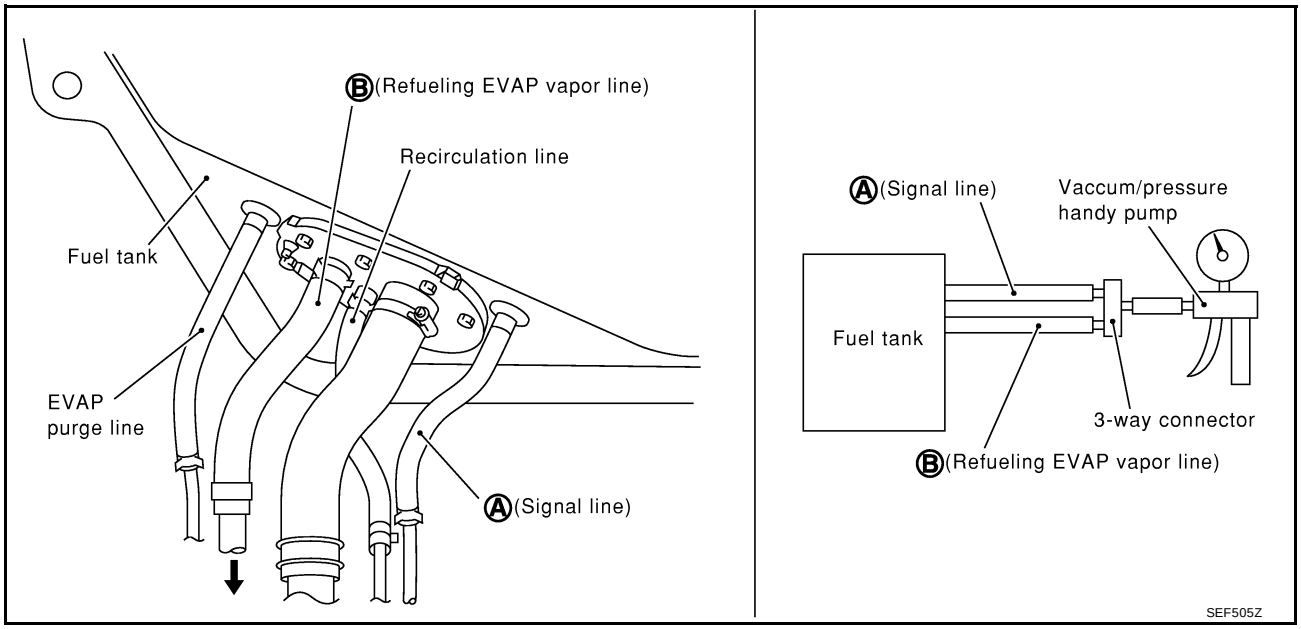
Check signal line and recirculation line for clogging, dents and cracks.

OK or NG

OK >> GO TO 8.
NG >> Replace filler neck tube.

8. CHECK REFUELING CONTROL VALVE

1. Remove fuel filler cap.
2. Check air continuity between hose ends **A** and **B** .
   Blow air into the hose end **B** . Air should flow freely into the fuel tank.
3. Blow air into hose end **A** and check there is no leakage.
4. Apply pressure to both hose ends **A** and **B** [20 kPa (150 mmHg, 5.91 inHg)] using a pressure pump and a suitable 3-way connector. Check that there is no leakage.



OK or NG

OK (With CONSULT-II)>>GO TO 9.
OK (Without CONSULT-II)>>GO TO 10.
NG >> Replace refueling control valve with fuel tank.

9. CHECK REFUELING EVAP VAPOR CUT VALVE

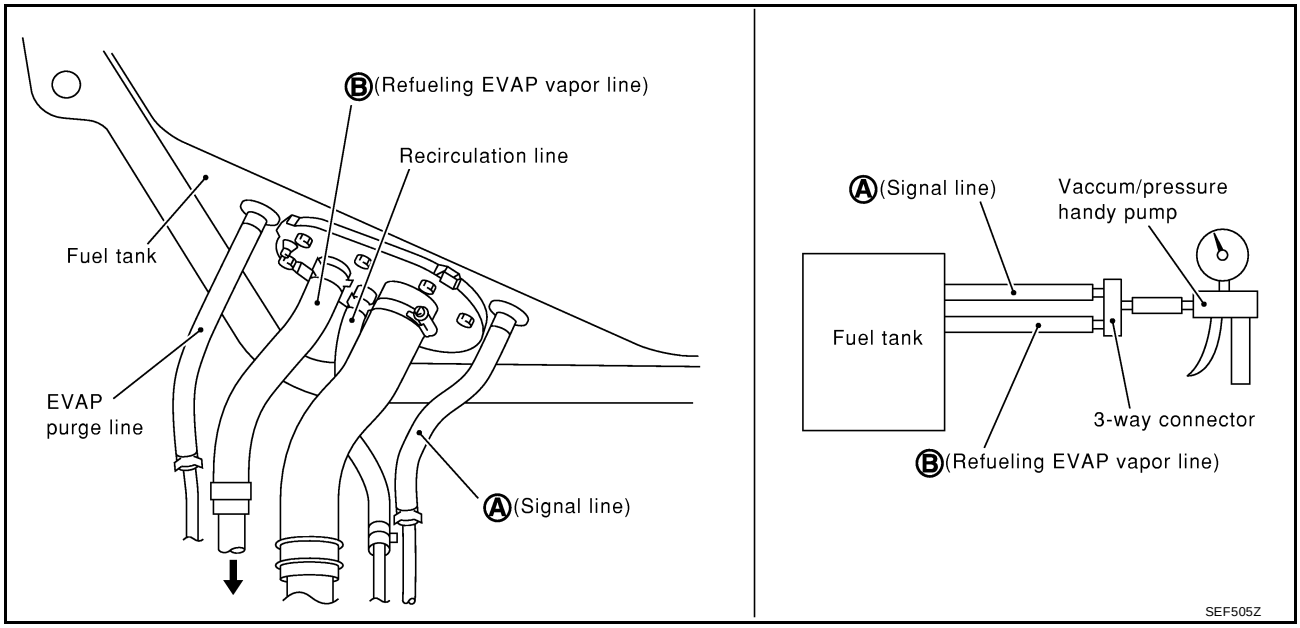
With CONSULT-II

1. Remove fuel tank. Refer to FL-10, "Removal and Installation" .
2. Drain fuel from the tank as follows:

- Remove fuel feed hose located on the fuel level sensor unit retainer.
- Connect a spare fuel hose, one side to fuel level sensor unit retainer where the hose was removed and the other side to a fuel container.
- Drain fuel using “FUEL PUMP RELAY” in “ACTIVE TEST” mode with CONSULT-II.

3. Check refueling EVAP vapor cut valve for being stuck closed as follows.
   Blow air into the refueling EVAP vapor cut valve (from hose end **B**), and check that the air flows freely into the tank.
4. Check EVAP vapor cut valve for being stuck open as follows.

- Connect vacuum pump to hose ends **A** and **B** using a suitable 3-way connector.
- Remove fuel level sensor unit retainer with fuel level sensor unit.
  Always replace O-ring with new one.
- Put fuel tank upside down.
- Apply vacuum pressure to both hose ends **A** and **B** [–13.3 kPa (–100 mmHg, –3.94 inHg)] with fuel level sensor unit retainer remaining open and check that the pressure is applicable.



OK or NG

OK >> GO TO 11.
NG >> Replace refueling EVAP vapor cut valve with fuel tank.

10. CHECK REFUELING EVAP VAPOR CUT VALVE

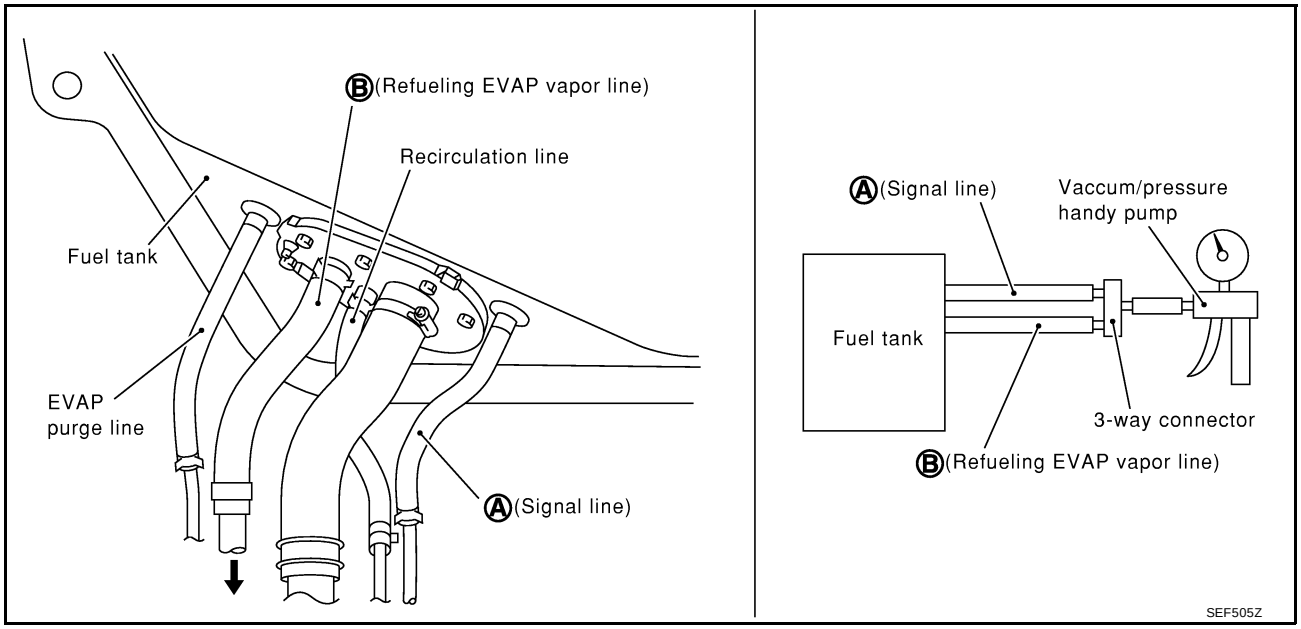
Without CONSULT-II

1. Remove fuel tank. Refer to FL-10, "Removal and Installation" .
2. Drain fuel from the tank as follows:

- Remove fuel level sensor unit retainer.
- Drain fuel from the tank using a hand pump into a fuel container.

3. Check refueling EVAP vapor cut valve for being stuck closed as follows.
   Blow air into the refueling EVAP vapor cut valve (from hose end **B**), and check that the air flows freely into the tank.
4. Check EVAP vapor cut valve for being stuck open as follows.

- Connect vacuum pump to hose ends **A** and **B** using a suitable 3-way connector.
- Remove fuel level sensor unit retainer with fuel level sensor unit.
  Always replace O-ring with new one.
- Put fuel tank upside down.
- Apply vacuum pressure to both hose ends **A** and **B** [–13.3 kPa (–100 mmHg, –3.94 inHg)] with fuel level sensor unit retainer remaining open and check that the pressure is applicable.



OK or NG

OK >> GO TO 11.
NG >> Replace refueling EVAP vapor cut valve with fuel tank.

11. CHECK FUEL FILLER TUBE

Check filler neck tube and hose connected to the fuel tank for clogging, dents and cracks.

OK or NG

OK >> GO TO 12.
NG >> Replace fuel filler tube.

12. CHECK ONE-WAY FUEL VALVE-I

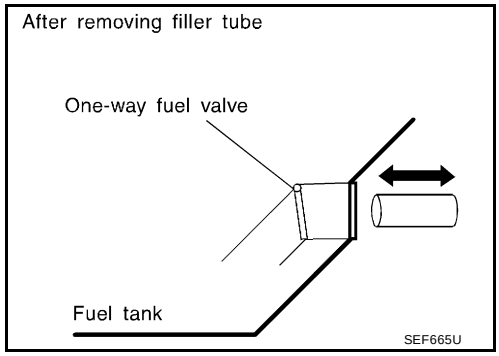
Check one-way valve for clogging.

OK or NG

OK >> GO TO 13.
NG >> Repair or replace one-way fuel valve with fuel tank.

13. CHECK ONE-WAY FUEL VALVE-II

1. Make sure that fuel is drained from the tank.
2. Remove fuel filler tube and hose.
3. Check one-way fuel valve for operation as follows.
   When a stick is inserted, the valve should open, when removing stick it should close.
   Do not drop any material into the tank.



OK or NG

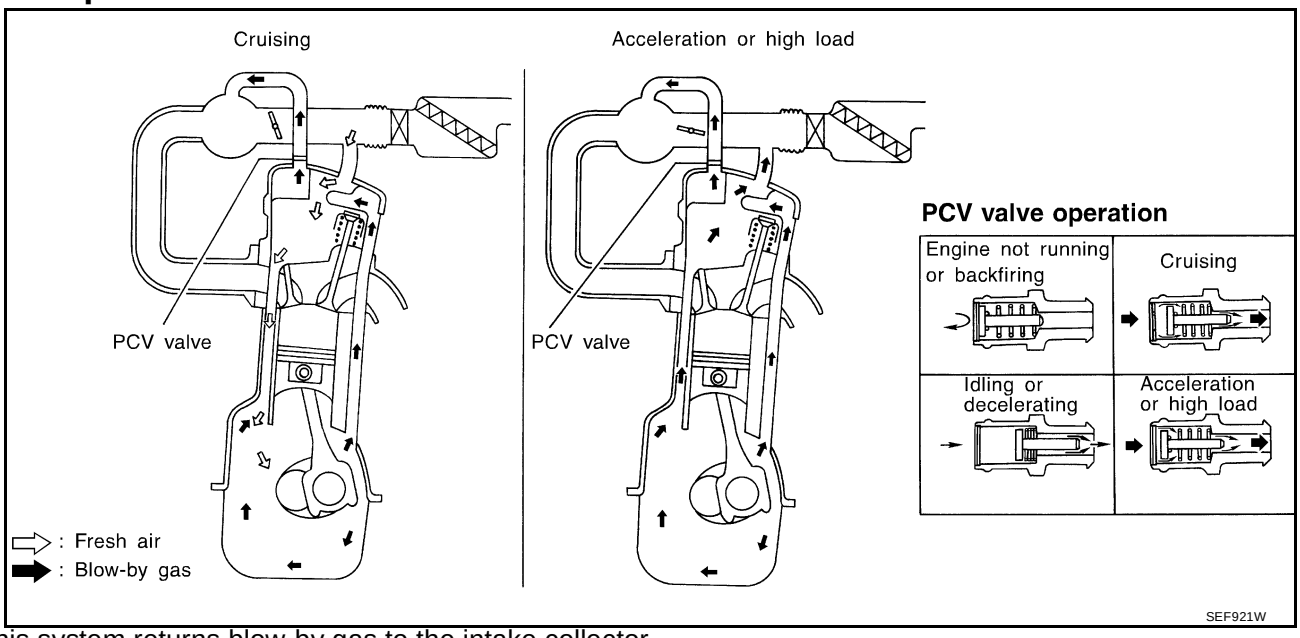
OK >> **INSPECTION END**
NG >> Replace fuel filler tube or replace one-way fuel valve with fuel tank.

POSITIVE CRANKCASE VENTILATION

PFP:11810

Description

UBS00263



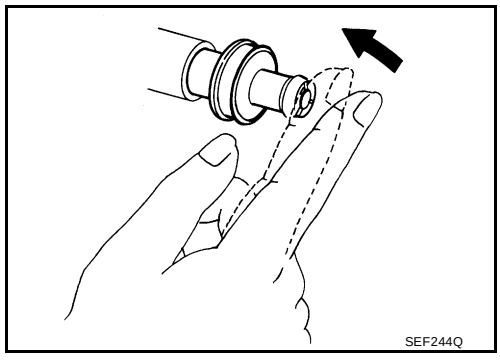
This system returns blow-by gas to the intake collector.
The positive crankcase ventilation (PCV) valve is provided to conduct crankcase blow-by gas to the intake manifold.
During partial throttle operation of the engine, the intake manifold sucks the blow-by gas through the PCV valve.
Normally, the capacity of the valve is sufficient to handle any blow-by and a small amount of ventilating air.
The ventilating air is then drawn from the air duct into the crankcase. In this process the air passes through the hose connecting air inlet tubes to rocker cover.
Under full-throttle condition, the manifold vacuum is insufficient to draw the blow-by flow through the valve. The flow goes through the hose connection in the reverse direction.
On vehicles with an excessively high blow-by, the valve does not meet the requirement. This is because some of the flow will go through the hose connection to the intake collector under all conditions.

Component Inspection

UBS00264

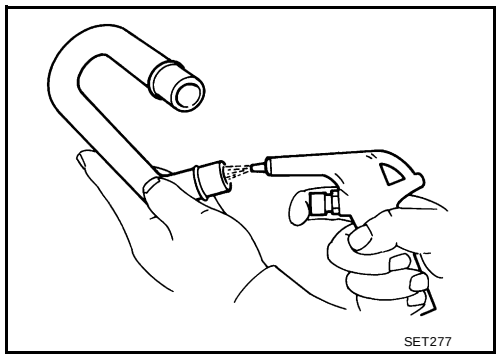
PCV (POSITIVE CRANKCASE VENTILATION) VALVE

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 the valve inlet.



VENTILATION HOSE

1. Check hoses and hose connections for leaks.
2. Disconnect all hoses and clean with compressed air. If any hose cannot be freed of obstructions, replace.



SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

Fuel Pressure Regulator

UBS00265

Fuel pressure at idling kPa (kg/cm^2 , psi)	Approximately 350 (3.57, 51)

Idle Speed and Ignition Timing

UBS00266

Target idle speed*1 rpm (Engine is warmed up to normal operating temperature)	No-load*2 (in “P” or “N” position)	800±50
Air conditioner: ON rpm	In “P” or “N” position	850 or more
Ignition timing*1	In “P” or “N” position	9°±5° BTDC
Throttle position sensor idle position V		0.15 - 0.85

*1: Throttle position sensor harness connector connected
*2: Under the following conditions:

- Air conditioner switch: OFF
- Electrical load: OFF (Lights & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Mass Air Flow Sensor

UBS00267

Supply voltage V	Battery voltage (11 - 14)
Output voltage V	1.0 - 1.7*
Mass air flow (Using CONSULT-II or GST) g·m/sec	1.4 - 4.0 at idle* 5.0 - 10.0 at 2,500 rpm*

*: Engine is warmed up to normal operating temperature and idling under no-load.

Engine Coolant Temperature Sensor

UBS00268

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260

EGR Temperature Sensor

UBS00269

EGR temperature °C (°F)	Voltage V	Resistance MΩ
0 (32)	4.56	0.62 - 1.05
50 (122)	2.25	0.065 - 0.094
100 (212)	0.59	0.011 - 0.015

Fuel Pump

UBS0026A

Resistance [at 25°C (77°F)] Ω	0.2 - 5.0

IACV-AAC Valve

UBS0026B

Resistance [at 20°C (68°F)] Ω	Approximately 22

Injector

UBS0026C

Resistance [at 20°C (68°F)] Ω	13.5 - 17.5

Resistor

UBS0026D

Resistance [at 25°C (77°F)] Ω	4 - 8

Throttle Position Sensor

UBS0026E

Throttle valve conditions	Voltage (at normal operating temperature, engine off, ignition switch ON, throttle opener disengaged)
Completely closed (a)	0.15 - 0.85V
Partially open	Between (a) and (b)
Completely open (b)	3.5 - 4.7V

Air Fuel Ratio (A/F) Sensor 1 Heater

UBS0026F

Resistance [at 25°C (77°F)] Ω	2.3 - 4.3

Calculated Load Value

UBS0026G

	Calculated load value % (Using CONSULT-II or GST)
At idle	20.0 - 35.5
At 2,500 rpm	17.0 - 30.0

Intake Air Temperature Sensor

UBS0026H

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
80 (176)	0.27 - 0.38

EVAP Canister Purge Volume Control Valve

UBS0026I

Resistance [at 20°C (68°F)] Ω	22 - 26

Heated Oxygen Sensor 2 Heater

UBS0026J

Resistance [at 25°C (77°F)] Ω	2.3 - 4.3

Crankshaft Position Sensor (POS)

UBS0026K

Resistance [at 20°C (68°F)] Ω	166 - 204

Fuel Tank Temperature Sensor

UBS0026L

Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90

Heated Oxygen Sensor 3 Heater

UBS0026M

Resistance [at 25°C (77°F)] Ω	2.3 - 4.3

INDEX FOR DTC

PFP:00024

Alphabetical Index

UBS0026N

NOTE:
If DTC U1000 or U1001 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-1348, "DTC U1000, U1001 CAN COMMUNICATION LINE" .

Items (CONSULT-II screen terms)	DTC*1		Reference page
	CONSULT-II GST*2	ECM*3	
A/T 1ST GR FNCTN	P0731	0731	AT-517
A/T 2ND GR FNCTN	P0732	0732	AT-522
A/T 3RD GR FNCTN	P0733	0733	AT-527
A/T 4TH GR FNCTN	P0734	0734	AT-532
A/T TCC S/V FNCTN	P0744	0744	AT-544
APP SEN 1/CIRC*5	P0227	0227	EC-1482
APP SEN 1/CIRC*5	P0228	0228	EC-1482
APP SEN 2/CIRC*5	P1227	1227	EC-1684
APP SEN 2/CIRC*5	P1228	1228	EC-1684
APP SENSOR*5	P0226	0226	EC-1475
ASCD BRAKE SW	P1572	1572	EC-1752
ASCD SW	P1564	1564	EC-1745
ASCD VHL SPD SEN	P1574	1574	EC-1761
ATF TEMP SEN/CIRC	P0710	0710	AT-501
BRAKE SW/CIRCUIT	P1805	1805	EC-1767
CAN COMM CIRCUIT	U1000	1000*6	EC-1348
CAN COMM CIRCUIT	U1001	1001*6	EC-1348
CKP SEN/CIRCUIT	P0335	0335	EC-1497
CLOSED LOOP-B1	P1148	1148	EC-1659
CMP SEN/CIRC-B1	P0340	0340	EC-1504
CTP LEARNING	P1225	1225	EC-1680
CTP LEARNING	P1226	1226	EC-1682
CYL 1 MISFIRE	P0301	0301	EC-1488
CYL 2 MISFIRE	P0302	0302	EC-1488
CYL 3 MISFIRE	P0303	0303	EC-1488
CYL 4 MISFIRE	P0304	0304	EC-1488
ECM	P0605	0605	EC-1593
ECM BACK UP/CIRC	P1065	1065	EC-1600
ECT SEN/CIRCUIT*5	P0117	0117	EC-1382
ECT SEN/CIRCUIT*5	P0118	0118	EC-1382
ECT SENSOR	P0125	0125	EC-1387
ENG OVER TEMP	P0217	0217	EC-1448
ENG OVER TEMP	P1217	1217	EC-1661
ENGINE SPEED SIG	P0725	0725	AT-513
ETC ACTR*5	P1121	1121	EC-1614
ETC FUNCTION/CIRC*5	P1122	1122	EC-1616

Items (CONSULT-II screen terms)	DTC*1		Reference page
	CONSULT-II GST*2	ECM*3	
ETC MOT*5	P1128	1128	EC-1628
ETC MOT PWR*5	P1124	1124	EC-1623
ETC MOT PWR*5	P1126	1126	EC-1623
EVAP GROSS LEAK	P0455	0455	EC-1557
EVAP PURG FLOW/MON	P0441	0441	EC-1514
EVAP SMALL LEAK	P0442	0442	EC-1520
EVAP SYS PRES SEN	P0452	0452	EC-1542
EVAP SYS PRES SEN	P0453	0453	EC-1549
EVAP VERY SML LEAK	P0456	0456	EC-1565
EVAP VERY SML LEAK	P1456	1456	EC-1717
FTT SEN/CIRCUIT	P0182	0182	EC-1444
FTT SEN/CIRCUIT	P0183	0183	EC-1444
FTT SENSOR	P0181	0181	EC-1442
FUEL LEV SEN SLOSH	P0460	0460	EC-1574
FUEL LEVEL SEN/CIRC	P1464	1464	EC-1726
FUEL LEVEL SENSOR	P0461	0461	EC-1579
FUEL LEVL SEN/CIRC	P0462	0462	EC-1581
FUEL LEVL SEN/CIRC	P0463	0463	EC-1581
FUEL SYS-LEAN-B1	P0171	0171	EC-1430
FUEL SYS-RICH-B1	P0172	0172	EC-1436
HO2S1 (B1)	P0132	0132	EC-1395
HO2S1 (B1)	P0133	0133	EC-1401
HO2S1 (B1)	P0134	0134	EC-1410
HO2S1 (B1)	P1143	1143	EC-1633
HO2S1 (B1)	P1144	1144	EC-1639
HO2S1 HTR (B1)	P0031	0031	EC-1354
HO2S1 HTR (B1)	P0032	0032	EC-1354
HO2S2 (B1)	P0138	0138	EC-1417
HO2S2 (B1)	P0139	0139	EC-1423
HO2S2 (B1)	P1146	1146	EC-1645
HO2S2 (B1)	P1147	1147	EC-1652
HO2S2 HTR (B1)	P0037	0037	EC-1359
HO2S2 HTR (B1)	P0038	0038	EC-1359
IAT SEN/CIRCUIT	P0112	0112	EC-1377
IAT SEN/CIRCUIT	P0113	0113	EC-1377
IAT SENSOR	P0127	0127	EC-1390
INT/V TIM CONT-B1	P0011	0011	EC-1351
INT/V TIM V/CIR-B1	P1111	1111	EC-1610
ISC SYSTEM	P0506	0506	EC-1589
ISC SYSTEM	P0507	0507	EC-1591
KNOCK SEN/CIRC-B1	P0327	0327	EC-1493
KNOCK SEN/CIRC-B1	P0328	0328	EC-1493

Items (CONSULT-II screen terms)	DTC*1		Reference page
	CONSULT-II GST*2	ECM*3	
L/PRESS SOL/CIRC	P0745	0745	AT-552
MAF SEN/CIRCUIT	P0101	0101	EC-1364
MAF SEN/CIRCUIT*5	P0102	0102	EC-1371
MAF SEN/CIRCUIT*5	P0103	0103	EC-1371
MAF SENSOR*5	P1102	1102	EC-1604
MIL/CIRC	P0650	0650	EC-1596
MULTI CYL MISFIRE	P0300	0300	EC-1488
NATS MALFUNCTION	P1610 - P1615	1610 - 1615	EC-1273
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	No DTC	Flashing*4	EC-1274
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	**P0000**	**0000**	**—**
O/R CLTCH SOL/CIRC	P1760	1760	AT-574
P-N POS SW/CIRCUIT	P1706	1706	EC-1763
PNP SW/CIRC	P0705	0705	AT-495
PURG VOLUME CONT/V	P0444	0444	EC-1529
PURG VOLUME CONT/V	P0445	0445	EC-1529
PURG VOLUME CONT/V	P1444	1444	EC-1694
SENSOR POWER/CIRC*5	P1229	1229	EC-1690
SFT SOL A/CIRC*5	P0750	0750	AT-558
SFT SOL B/CIRC*5	P0755	0755	AT-563
TCC SOLENOID/CIRC	P0740	0740	AT-539
THERMSTAT FNCTN	P0128	0128	EC-1393
TP SEN 1/CIRC*5	P0222	0222	EC-1469
TP SEN 1/CIRC*5	P0223	0223	EC-1469
TP SEN 2/CIRC*5	P1223	1223	EC-1674
TP SEN 2/CIRC*5	P1224	1224	EC-1674
TP SENSOR*5	P0221	0221	EC-1462
TPV SEN/CIRC A/T	P1705	1705	AT-568
TW CATALYST SYS-B1	P0420	0420	EC-1510
VC CUT/V BYPASS/V	P1491	1491	EC-1736
VC/V BYPASS/V	P1490	1490	EC-1729
VEH SPD SEN/CIR AT*7	P0720	0720	AT-508
VEH SPEED SEN/CIRC*7	P0500	0500	EC-1585
VENT CONTROL VALVE	P0447	0447	EC-1535
VENT CONTROL VALVE	P1446	1446	EC-1702
VENT CONTROL VALVE	P1448	1448	EC-1709

*1: 1st trip DTC No. is the same as DTC No.
*2: These numbers are prescribed by SAE J2012.
*3: In Diagnostic Test Mode II (Self-diagnostic results), these numbers are controlled by NISSAN.
*4: When engine is running.

*5: When the fail-safe operation occurs, the MIL illuminates.
*6: The troubleshooting for this DTC needs CONSULT-II.
*7: When the fail-safe operations for both self-diagnoses occur, the MIL illuminates.

DTC No. Index

UBS0026O

NOTE:
If DTC U1000 or U1001 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-1348, "DTC U1000, U1001 CAN COMMUNICATION LINE" .

DTC*1		Items (CONSULT-II screen terms)	Reference page
CONSULT-II GST*2	ECM*3		
No DTC	Flashing*4	NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	EC-1274
U1000	1000*6	CAN COMM CIRCUIT	EC-1348
U1001	1001*6	CAN COMM CIRCUIT	EC-1348
P0000	**0000**	**NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.**	**—**
P0011	0011	INT/V TIM CONT-B1	EC-1351
P0031	0031	HO2S1 HTR (B1)	EC-1354
P0032	0032	HO2S1 HTR (B1)	EC-1354
P0037	0037	HO2S2 HTR (B1)	EC-1359
P0038	0038	HO2S2 HTR (B1)	EC-1359
P0101	0101	MAF SEN/CIRCUIT	EC-1364
P0102	0102	MAF SEN/CIRCUIT*5	EC-1371
P0103	0103	MAF SEN/CIRCUIT*5	EC-1371
P0112	0112	IAT SEN/CIRCUIT	EC-1377
P0113	0113	IAT SEN/CIRCUIT	EC-1377
P0117	0117	ECT SEN/CIRCUIT*5	EC-1382
P0118	0118	ECT SEN/CIRCUIT*5	EC-1382
P0125	0125	ECT SENSOR	EC-1387
P0127	0127	IAT SENSOR	EC-1390
P0128	0128	THERMSTAT FNCTN	EC-1393
P0132	0132	HO2S1 (B1)	EC-1395
P0133	0133	HO2S1 (B1)	EC-1401
P0134	0134	HO2S1 (B1)	EC-1410
P0138	0138	HO2S2 (B1)	EC-1417
P0139	0139	HO2S2 (B1)	EC-1423
P0171	0171	FUEL SYS-LEAN-B1	EC-1430
P0172	0172	FUEL SYS-RICH-B1	EC-1436
P0181	0181	FTT SENSOR	EC-1442
P0182	0182	FTT SEN/CIRCUIT	EC-1444
P0183	0183	FTT SEN/CIRCUIT	EC-1444
P0217	0217	ENG OVER TEMP	EC-1448
P0221	0221	TP SENSOR*5	EC-1462
P0222	0222	TP SEN 1/CIRC*5	EC-1469

DTC*1		Items (CONSULT-II screen terms)	Reference page
CONSULT-II GST*2	ECM*3		
P0223	0223	TP SEN 1/CIRC*5	EC-1469
P0226	0226	APP SENSOR*5	EC-1475
P0227	0227	APP SEN 1/CIRC*5	EC-1482
P0228	0228	APP SEN 1/CIRC*5	EC-1482
P0300	0300	MULTI CYL MISFIRE	EC-1488
P0301	0301	CYL 1 MISFIRE	EC-1488
P0302	0302	CYL 2 MISFIRE	EC-1488
P0303	0303	CYL 3 MISFIRE	EC-1488
P0304	0304	CYL 4 MISFIRE	EC-1488
P0327	0327	KNOCK SEN/CIRC-B1	EC-1493
P0328	0328	KNOCK SEN/CIRC-B1	EC-1493
P0335	0335	CKP SEN/CIRCUIT	EC-1497
P0340	0340	CMP SEN/CIRC-B1	EC-1504
P0420	0420	TW CATALYST SYS-B1	EC-1510
P0441	0441	EVAP PURG FLOW/MON	EC-1514
P0442	0442	EVAP SMALL LEAK	EC-1520
P0444	0444	PURG VOLUME CONT/V	EC-1529
P0445	0445	PURG VOLUME CONT/V	EC-1529
P0447	0447	VENT CONTROL VALVE	EC-1535
P0452	0452	EVAP SYS PRES SEN	EC-1542
P0453	0453	EVAP SYS PRES SEN	EC-1549
P0455	0455	EVAP GROSS LEAK	EC-1557
P0456	0456	EVAP VERY SML LEAK	EC-1565
P0460	0460	FUEL LEV SEN SLOSH	EC-1574
P0461	0461	FUEL LEVEL SENSOR	EC-1579
P0462	0462	FUEL LEVL SEN/CIRC	EC-1581
P0463	0463	FUEL LEVL SEN/CIRC	EC-1581
P0500	0500	VEH SPEED SEN/CIRC*7	EC-1585
P0506	0506	ISC SYSTEM	EC-1589
P0507	0507	ISC SYSTEM	EC-1591
P0605	0605	ECM	EC-1593
P0650	0650	MIL/CIRC	EC-1596
P0705	0705	PNP SW/CIRC	AT-495
P0710	0710	ATF TEMP SEN/CIRC	AT-501
P0720	0720	VEH SPD SEN/CIR AT*7	AT-508
P0725	0725	ENGINE SPEED SIG	AT-513
P0731	0731	A/T 1ST GR FNCTN	AT-517
P0732	0732	A/T 2ND GR FNCTN	AT-522
P0733	0733	A/T 3RD GR FNCTN	AT-527
P0734	0734	A/T 4TH GR FNCTN	AT-532
P0740	0740	TCC SOLENOID/CIRC	AT-539
P0744	0744	A/T TCC S/V FNCTN	AT-544

DTC*1		Items (CONSULT-II screen terms)	Reference page
CONSULT-II GST*2	ECM*3		
P0745	0745	L/PRESS SOL/CIRC	AT-552
P0750	0750	SFT SOL A/CIRC*5	AT-558
P0755	0755	SFT SOL B/CIRC*5	AT-563
P1065	1065	ECM BACK UP/CIRC	EC-1600
P1102	1102	MAF SENSOR*5	EC-1604
P1111	1111	INT/V TIM V/CIR-B1	EC-1610
P1121	1121	ETC ACTR*5	EC-1614
P1122	1122	ETC FUNCTION/CIRC*5	EC-1616
P1124	1124	ETC MOT PWR*5	EC-1623
P1126	1126	ETC MOT PWR*5	EC-1623
P1128	1128	ETC MOT*5	EC-1628
P1143	1143	HO2S1 (B1)	EC-1633
P1144	1144	HO2S1 (B1)	EC-1639
P1146	1146	HO2S2 (B1)	EC-1645
P1147	1147	HO2S2 (B1)	EC-1652
P1148	1148	CLOSED LOOP-B1	EC-1659
P1217	1217	ENG OVER TEMP	EC-1661
P1223	1223	TP SEN 2/CIRC*5	EC-1674
P1224	1224	TP SEN 2/CIRC*5	EC-1674
P1225	1225	CTP LEARNING	EC-1680
P1226	1226	CTP LEARNING	EC-1682
P1227	1227	APP SEN 2/CIRC*5	EC-1684
P1228	1228	APP SEN 2/CIRC*5	EC-1684
P1229	1229	SENSOR POWER/CIRC*5	EC-1690
P1444	1444	PURG VOLUME CONT/V	EC-1694
P1446	1446	VENT CONTROL VALVE	EC-1702
P1448	1448	VENT CONTROL VALVE	EC-1709
P1456	1456	EVAP VERY SML LEAK	EC-1717
P1464	1464	FUEL LEVEL SEN/CIRC	EC-1726
P1490	1490	VC/V BYPASS/V	EC-1729
P1491	1491	VC CUT/V BYPASS/V	EC-1736
P1564	1564	ASCD SW	EC-1745
P1572	1572	ASCD BRAKE SW	EC-1752
P1574	1574	ASCD VHL SPD SEN	EC-1761
P1610 - P1615	1610 - 1615	NATS MALFUNCTION	EC-1273
P1705	1705	TPV SEN/CIRC A/T	AT-568
P1706	1706	P-N POS SW/CIRCUIT	EC-1763
P1760	1760	O/R CLTCH SOL/CIRC	AT-574
P1805	1805	BRAKE SW/CIRCUIT	EC-1767

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PRECAUTIONS

PFP:00001

Precautions for Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER”

UBS0026P

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. Information necessary to service the system safely is included in the SRS and SB section of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the SRS section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harness connectors.**

On Board Diagnostic (OBD) System of Engine and A/T

UBS0026Q

The ECM has an on board diagnostic system. It will light up the malfunction indicator (MIL) to warn the driver of a malfunction causing emission deterioration.

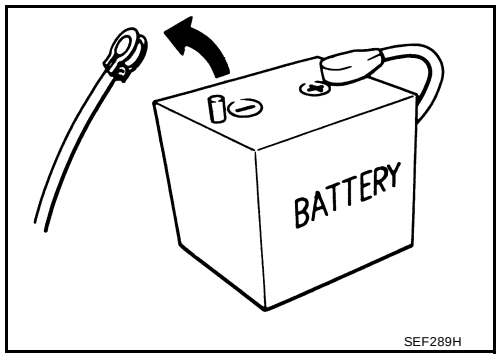
CAUTION:

- **Be sure to turn the ignition switch OFF and disconnect the battery ground cable before any repair or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will cause the 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-49, "HARNESS CONNECTOR" .**
- **Be sure to route and secure the harnesses properly after work. The interference of the harness with a bracket, etc. may cause the MIL to light up due to the short circuit.**
- **Be sure to connect rubber tubes properly after work. A misconnected or disconnected rubber tube may cause the MIL to light up due to the malfunction of the fuel injection system, etc.**
- **Be sure to erase the unnecessary malfunction information (repairs completed) from the ECM and TCM (Transmission control module) before returning the vehicle to the customer.**

Precaution

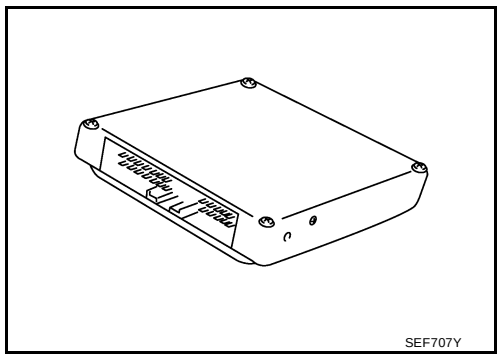
UBS0026R

- **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.**

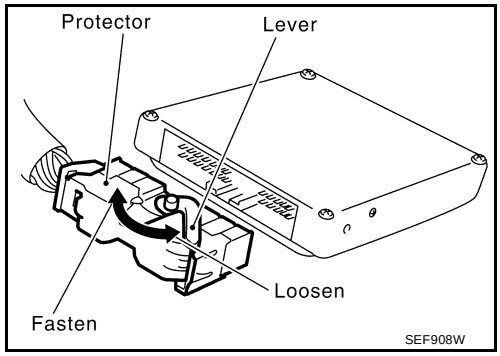


SEF289H

- **Do not disassemble ECM.**
- **If battery cable is disconnected, the memory will return to the initial ECM values.**
  The ECM will now start to self-control at its initial values. Engine operation can vary slightly when the cable is disconnected. However, this is not an indication of a problem. Do not replace parts because of a slight variation.

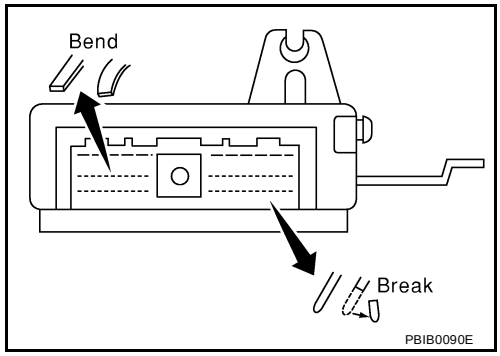

SEF707Y

- **When connecting ECM harness connector, fasten it securely with a lever as far as it will go as shown at right.**



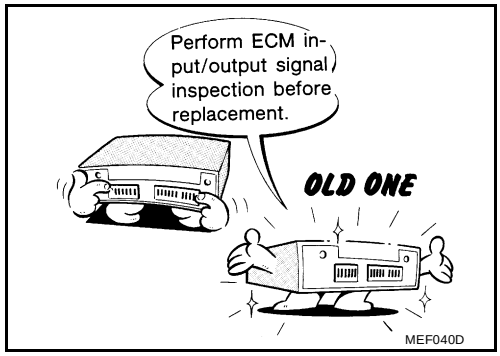
SEF908W

- **When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).**
  Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.
- **Securely connect ECM harness connectors.**
  A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to ICs.
- **Keep engine control system harness at least 10 cm (4 in) away from adjacent harness, to prevent engine control system malfunctions due to receiving external noise, degraded operation of ICs, etc.**
- **Keep engine control system parts and harness dry.**



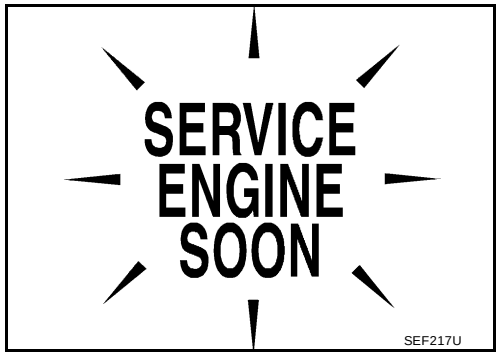
PBIB0090E

- **Before replacing ECM, perform “ECM Terminals and Reference Value” inspection and make sure ECM functions properly. Refer to EC-1304 .**
- **Handle mass air flow sensor carefully to avoid damage.**
- **Do not disassemble mass air flow sensor.**
- **Do not clean mass air flow sensor with any type of detergent.**
- **Do not disassemble electric throttle control actuator.**
- **Even a slight leak in the air intake system can cause serious problems.**
- **Do not shock or jar the camshaft position sensor (PHASE), crankshaft position sensor (POS).**

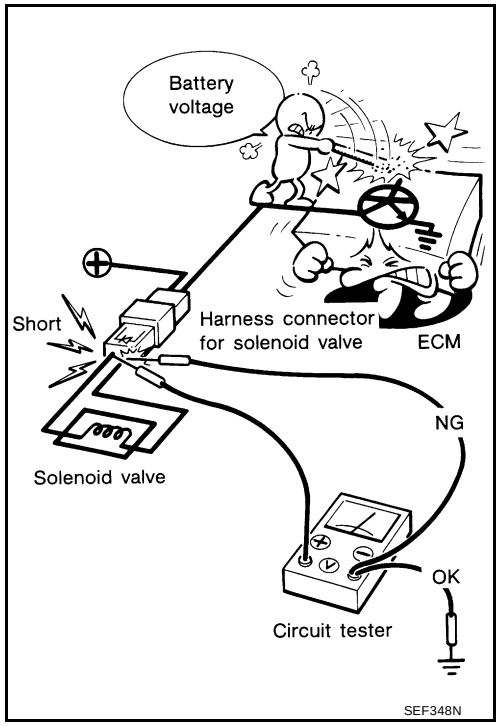


MEF040D

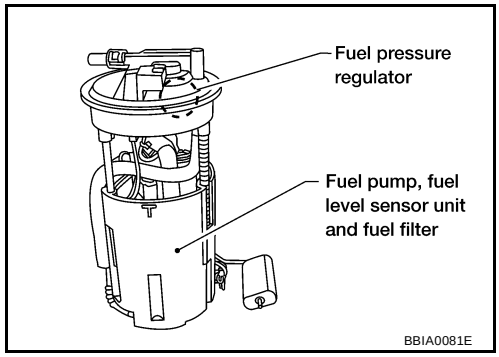
- **After performing each TROUBLE DIAGNOSIS, perform "DTC Confirmation Procedure" or "Overall Function Check".**
  The DTC should not be displayed in the "DTC Confirmation Procedure" if the repair is completed. The "Overall Function Check" should be a good result if the repair is completed.



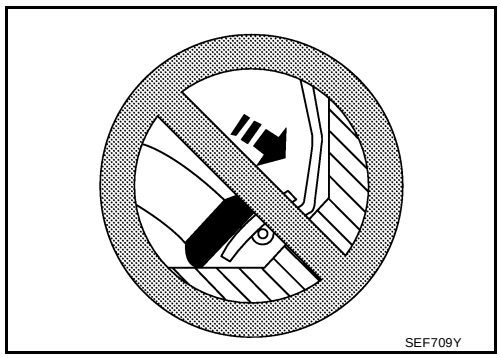
- **When measuring ECM signals with a circuit tester, never allow the two tester probes to contact.**
  Accidental contact of probes will cause a short circuit and damage the ECM power transistor.
- **Do not use ECM ground terminals when measuring input/ output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**



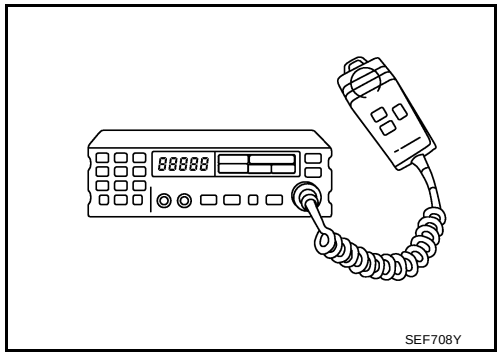
- **Do not operate fuel pump when there is no fuel in lines.**
- **Tighten fuel hose clamps to the specified torque.**



- **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.**


SEF709Y

- **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.**


SEF708Y

Wiring Diagrams and Trouble Diagnosis

UBS0026S

When you read wiring diagrams, refer to the following:

- GI-13, "How to Read Wiring Diagrams"
- PG-2, "POWER SUPPLY ROUTING" for power distribution circuit

When you perform trouble diagnosis, refer to the following:

- GI-10, "HOW TO FOLLOW TEST GROUPS IN TROUBLE DIAGNOSES"
- GI-26, "How to Perform Efficient Diagnosis for an Electrical Incident"

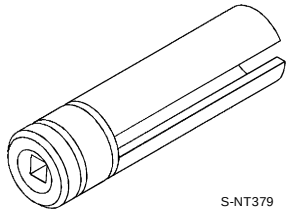
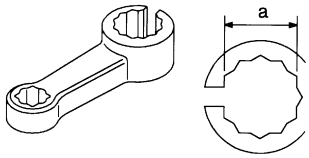
PREPARATION

PFP:00002

Special Service Tools

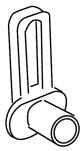
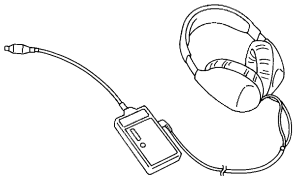
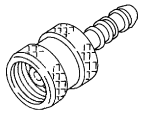
UBS0026T

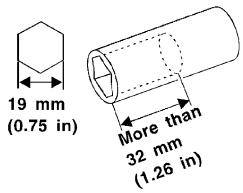
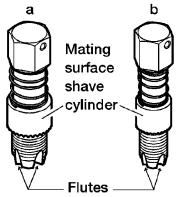
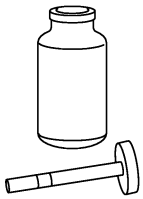
The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number Tool name	Description	
KV10117100 Heated oxygen sensor wrench	 S-NT379	Loosening or tightening heated oxygen sensors with 22 mm (0.87 in) hexagon nut
KV10114400 Heated oxygen sensor wrench	 S-NT636	Loosening or tightening heated oxygen sensors **a: 22 mm (0.87 in)**
Fuel filler cap adapter (J-45356)	 S-NT815	Checking fuel tank vacuum relief valve opening pressure

Commercial Service Tools

UBS0026U

Tool name (Kent-Moore No.)	Description	
Quick connector release	 PBIC0198E	Removing fuel tube quick connectors in engine room (Available in SEC. 164 of PARTS CATALOG: Part No. 16441 6N210)
Leak detector ie: (J41416)	 S-NT703	Locating the EVAP leak
EVAP service port adapter ie: (J41413-OBD)	 S-NT704	Applying positive pressure through EVAP service port

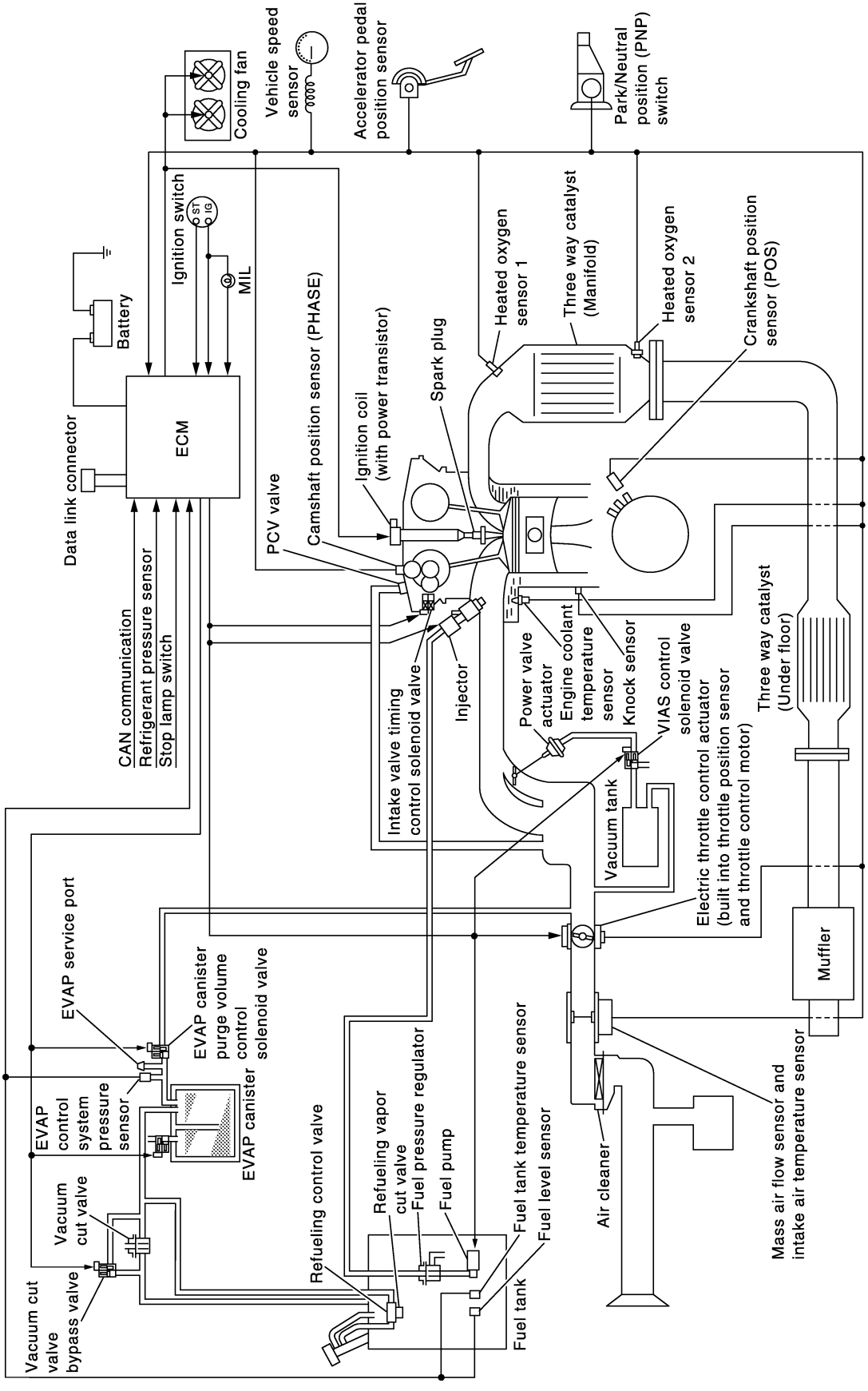
Tool name (Kent-Moore No.)	Description	
Socket wrench	 S-NT705	Removing and installing engine coolant temperature sensor
Oxygen sensor thread cleaner ie: (J-43897-18) (J-43897-12)	 AEM488	Reconditioning the exhaust system threads before installing a new oxygen sensor. Use with anti-seize lubricant shown below. **a: 18 mm diameter with pitch 1.5 mm for Zirconia Oxygen Sensor** **b: 12 mm diameter with pitch 1.25 mm for Titania Oxygen Sensor**
Anti-seize lubricant ie: (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

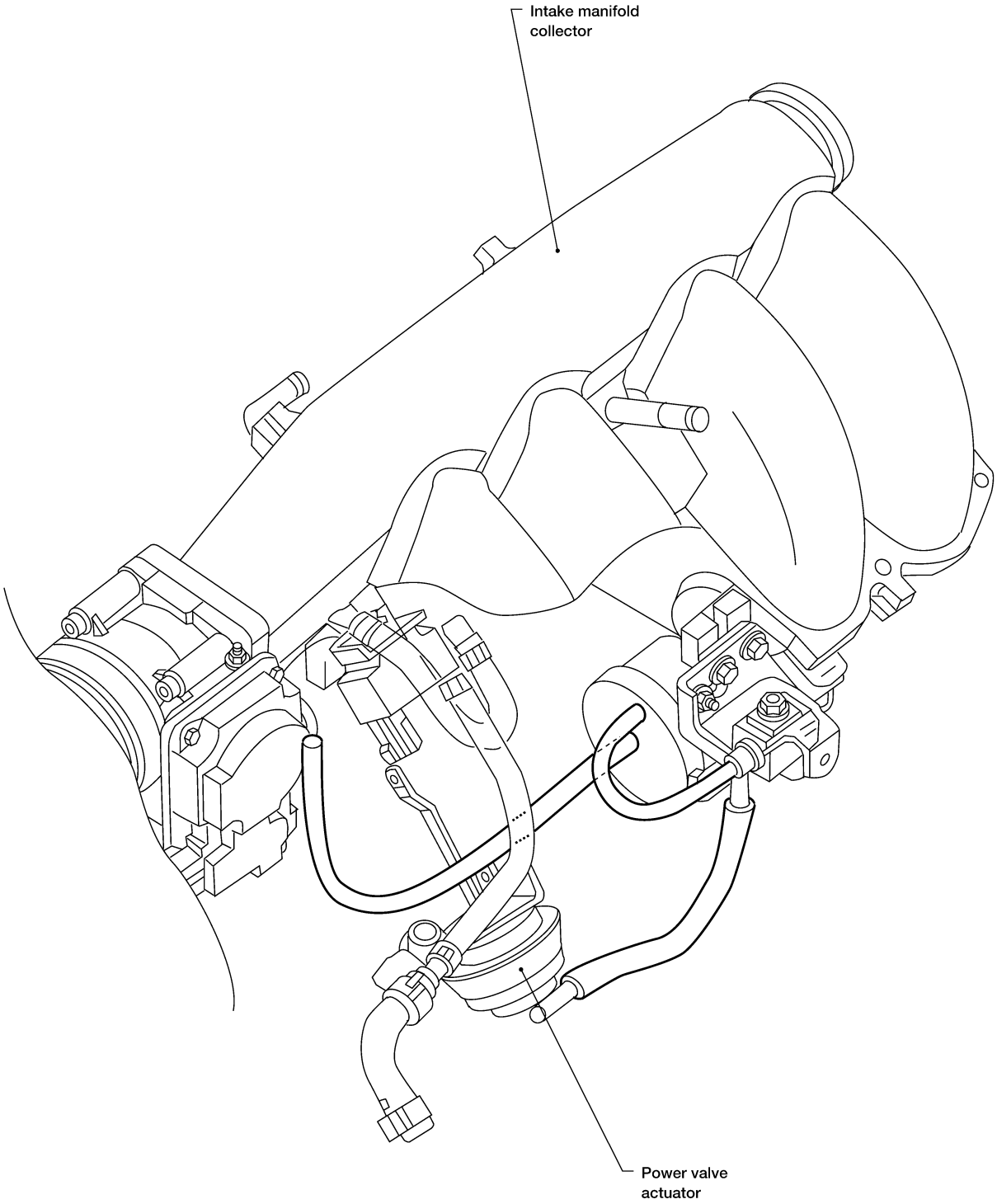
UBS0026V



PBIB0821E

Vacuum Hose Drawing

UBS0026W



BBIA0050E

Refer to EC-1234, "System Diagram" for Vacuum Control System.

System Chart

UBS0026X

Input (Sensor)	ECM Function	Output (Actuator)
● Camshaft position sensor (PHASE) ● Crankshaft position sensor (POS) ● Mass air flow sensor ● Engine coolant temperature sensor ● Heated oxygen sensor 1 ● Throttle position sensor ● Accelerator pedal position sensor ● Park/neutral position (PNP) switch ● Intake air temperature sensor ● Power steering oil pressure switch ● Ignition switch ● Battery voltage ● Knock sensor ● Refrigerant pressure sensor ● Stop lamp switch ● ASCD steering switch ● ASCD brake switch ● ASCD clutch switch ● Fuel level sensor*1 ● EVAP control system pressure sensor ● Fuel tank temperature sensor*1 ● Heated oxygen sensor 2 *2 ● TCM (Transmission control module) *3 ● Air conditioner switch ● Vehicle speed sensor ● Electrical load signal	Fuel injection & mixture ratio control	Fuel injectors
	Electronic ignition system	Power transistor
	Fuel pump control	Fuel pump relay
	ASCD vehicle speed control	Electric throttle control actuator
	On board diagnostic system	MIL (On the instrument panel)
	Power valve control	VIAS control solenoid valve
	Heated oxygen sensor 1 heater control	Heated oxygen sensor 1 heater
	Heated oxygen sensor 2 heater control	Heated oxygen sensor 2 heater
	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
	Air conditioning cut control	Air conditioner relay
	Cooling fan control	Cooling fan relays
	ON BOARD DIAGNOSIS for EVAP system	● EVAP canister vent control valve ● Vacuum cut valve bypass valve

*1: These sensors are not used to control the engine system. They are used only for the on board diagnosis.
*2: This sensor is not used to control the engine system under normal conditions.
*3: The signal is sent to the ECM through CAN communication line.

Multiport Fuel Injection (MFI) System

UBS0026Y

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed	Fuel injection & mixture ratio control	Fuel injectors
Camshaft position sensor (PHASE)	Engine speed and piston position		
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Heated oxygen sensor 1	Density of oxygen in exhaust gas		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Park/neutral position (PNP) switch	Gear position		
Ignition switch	Start signal		
Knock sensor	Engine knocking condition		
Battery	Battery voltage		
Power steering oil pressure switch	Power steering operation		
Heated oxygen sensor 2 *	Density of oxygen in exhaust gas		
Vehicle speed sensor	Vehicle speed		
Air conditioner switch	Air conditioner operation		

*: Under normal conditions, this sensor is not for engine control operation.

SYSTEM DESCRIPTION

The amount of fuel injected from the fuel injector is determined by the ECM. The ECM controls the length of time the valve remains open (injection pulse duration). The amount of fuel injected is a program value in the ECM memory. The program value is preset by engine operating conditions. These conditions are determined by input signals (for engine speed and intake air) from both the 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.

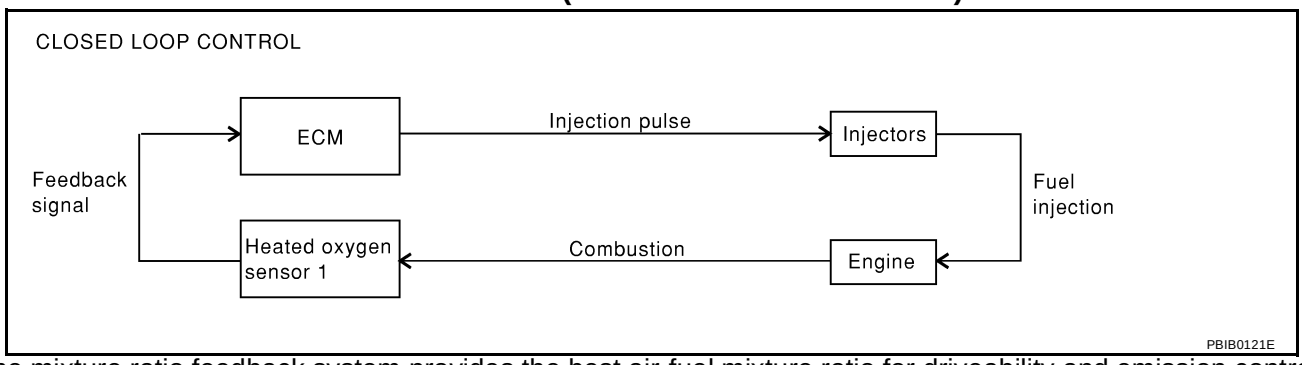
<Fuel increase>

- 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 (manifold) can then better reduce CO, HC and NOx emissions. This system uses heated oxygen sensor 1 in the exhaust manifold to monitor if the engine operation is rich or lean. The ECM adjusts the injection pulse width according to the sensor voltage signal. For more information about heated oxygen sensor 1, refer to EC-1395 . This maintains the mixture ratio within the range of stoichiometric (ideal air-fuel mixture).
This stage is referred to as the closed loop control condition.
Heated oxygen sensor 2 is located downstream of the three way catalyst (manifold). Even if the switching characteristics of heated oxygen sensor 1 shift, the air-fuel ratio is controlled to stoichiometric by the signal from heated oxygen sensor 2.

Open Loop Control

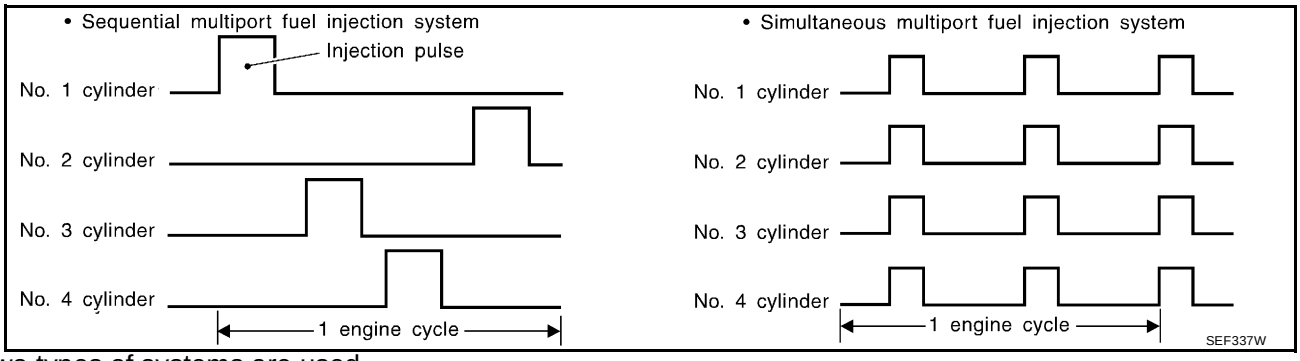
The open loop system condition refers to when the ECM detects any of the following conditions. Feedback control stops in order to maintain stabilized fuel combustion.

- Deceleration and acceleration
- High-load, high-speed operation
- Malfunction of heated oxygen sensor 1 or its circuit
- Insufficient activation of heated oxygen sensor 1 at low engine coolant temperature
- High engine coolant temperature
- During warm-up
- After shifting from “N” to “D” (A/T models)
- When starting the engine

MIXTURE RATIO SELF-LEARNING CONTROL

The mixture ratio feedback control system monitors the mixture ratio signal transmitted from heated oxygen sensor 1. This feedback signal is then sent to the ECM. The ECM controls the basic mixture ratio as close to the theoretical mixture ratio as possible. However, the basic mixture ratio is not necessarily controlled as originally designed. Both manufacturing differences (i.e., mass air flow sensor hot film) and characteristic changes during operation (i.e., injector clogging) directly affect mixture ratio.
Accordingly, the difference between the basic and theoretical mixture ratios is monitored in this system. This is then computed in terms of “injection pulse duration” to automatically compensate for the difference between the two ratios.
“Fuel trim” refers to the feedback compensation value compared against the basic injection duration. Fuel trim includes short term fuel trim and long term fuel trim.
“Short term fuel trim” is the short-term fuel compensation used to maintain the mixture ratio at its theoretical value. The signal from heated oxygen sensor 1 indicates whether the mixture ratio is RICH or LEAN compared to the theoretical value. The signal then triggers a reduction in fuel volume if the mixture ratio is rich, and an increase in fuel volume if it is lean.
“Long term fuel trim” is overall fuel compensation carried out long-term to compensate for continual deviation of the short term fuel trim from the central value. Such deviation will occur due to individual engine differences, wear over time and changes in the usage environment.

FUEL INJECTION TIMING



Two types of systems are used.

Sequential Multiport Fuel Injection System

Fuel is injected into each cylinder during each engine cycle according to the firing order. This system is used when the engine is running.

Simultaneous Multiport Fuel Injection System

Fuel is injected simultaneously into all four cylinders twice each engine cycle. In other words, pulse signals of the same width are simultaneously transmitted from the ECM.
The four injectors will then receive the signals two times for each engine cycle.
This system is used when the engine is being started and/or if the fail-safe system (CPU) is operating.

FUEL SHUT-OFF

Fuel to each cylinder is cut off during deceleration or operation of the engine at excessively high speeds.

Electronic Ignition (EI) System

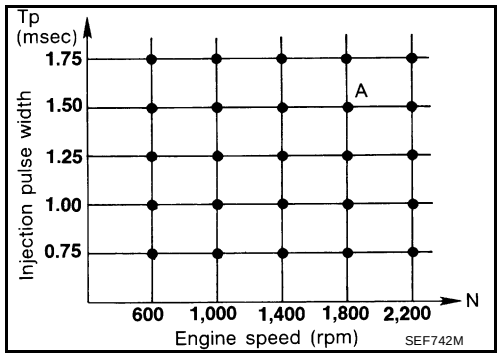
UBS0026Z

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed	Ignition timing control	Power transistor
Camshaft position sensor (PHASE)	Engine speed and piston position		
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Ignition switch	Start signal		
Knock sensor	Engine knocking		
Park/neutral position (PNP) switch	Gear position		
Battery	Battery voltage		
Vehicle speed sensor	Vehicle speed		

SYSTEM DESCRIPTION

The ignition timing is controlled by the ECM to maintain the best air-fuel ratio for every running condition of the engine. The ignition timing data is stored in the ECM. This data forms the map shown.
The ECM receives information such as the injection pulse width and camshaft position sensor signal. Computing this information, ignition signals are transmitted to the power transistor.
e.g., N: 1,800 rpm, Tp: 1.50 msec
A °BTDC
During the following conditions, the ignition timing is revised by the ECM according to the other data stored in the ECM.



- At starting
- During warm-up
- At idle

- At low battery voltage
- During acceleration

The knock sensor retard system is designed only for emergencies. The basic ignition timing is programmed within the anti-knocking zone, if recommended fuel is used under dry conditions. The retard system does not operate under normal driving conditions. If engine knocking occurs, the knock sensor monitors the condition. The signal is transmitted to the ECM. The ECM retards the ignition timing to eliminate the knocking condition.

Air Conditioning Cut Control

UBS00270

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Air conditioner switch	Air conditioner “ON” signal	Air conditioner cut control	Air conditioner relay
Throttle position sensor	Throttle valve opening angle		
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Refrigerant pressure sensor	Refrigerant pressure		
Power steering oil pressure switch	Power steering operation		
Vehicle speed sensor	Vehicle speed		

SYSTEM DESCRIPTION

This system improves engine operation when the air conditioner is used.
Under the following conditions, the air conditioner is turned off.

- When the accelerator pedal is fully depressed.
- When cranking the engine.
- At high engine speeds.
- When the engine coolant temperature becomes excessively high.
- When operating power steering during low engine speed or low vehicle speed.
- When engine speed is excessively low.
- When refrigerant pressure is excessively low or high.

Fuel Cut Control (at No Load and High Engine Speed)

UBS00271

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Park/neutral position (PNP) switch	Neutral position	Fuel cut control	Fuel injectors
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Engine coolant temperature sensor	Engine coolant temperature		
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed		
Vehicle speed sensor	Vehicle speed		

SYSTEM DESCRIPTION

If the engine speed is above 1,800 rpm with no load (for example, in neutral and engine speed over 1,800 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed. Fuel cut will operate until the engine speed reaches 1,500 rpm, then fuel cut is cancelled.

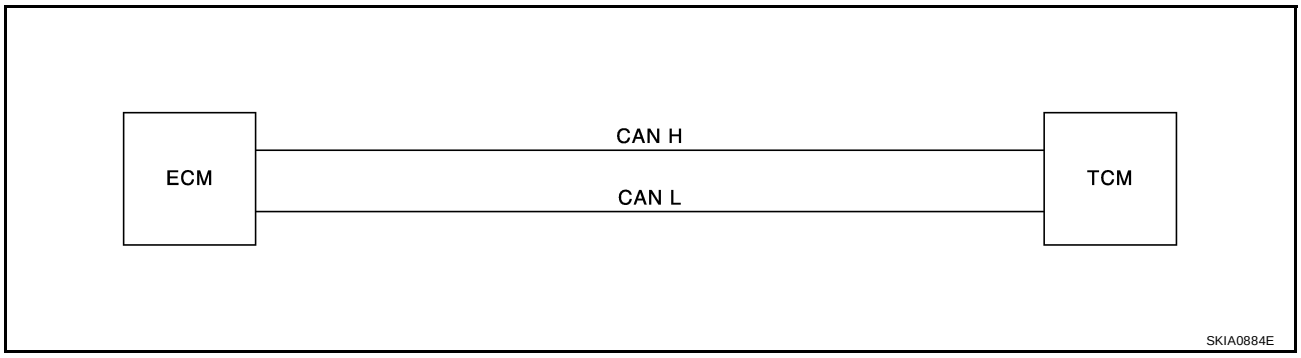
NOTE:
This function is different from deceleration control listed under “Multiport Fuel Injection (MFI) System”, EC-1237 .

CAN communication

UBS00272

SYSTEM DESCRIPTION

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.



INPUT/OUTPUT SIGNAL CHART

T: Transmit R: Receive

Signals	ECM	TCM
Accelerator pedal position signal	T	R
Output shaft revolution signal	R	T
A/T self-diagnosis signal	R	T

BASIC SERVICE PROCEDURE

PFP:00018

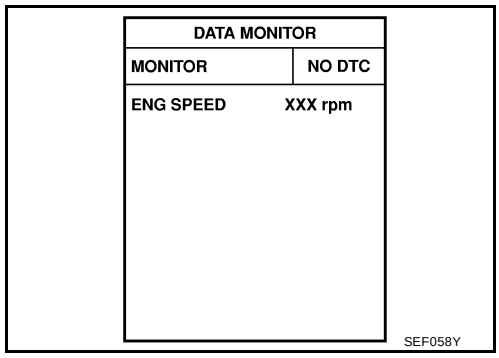
Idle Speed and Ignition Timing Check

UBS00273

IDLE SPEED

With CONSULT-II

Check idle speed in “DATA MONITOR” mode with CONSULT-II.



With GST

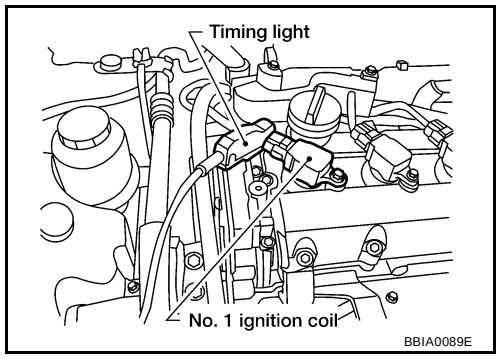
Check idle speed in “MODE 1” with GST.

IGNITION TIMING

Any of following two methods may be used.

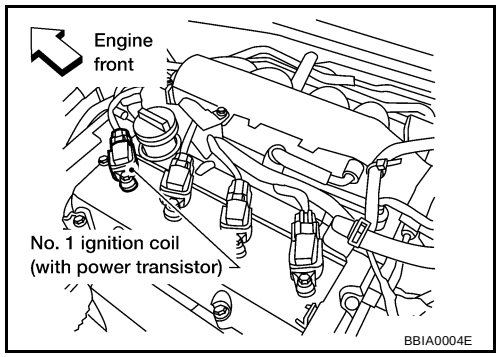
Method A

1. Slide the harness protector of ignition coil No. 1 to clear the wires.
2. Attach timing light to the wires as shown in the figure.
3. Check ignition timing.

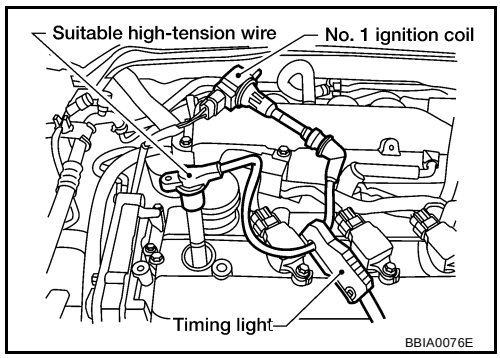


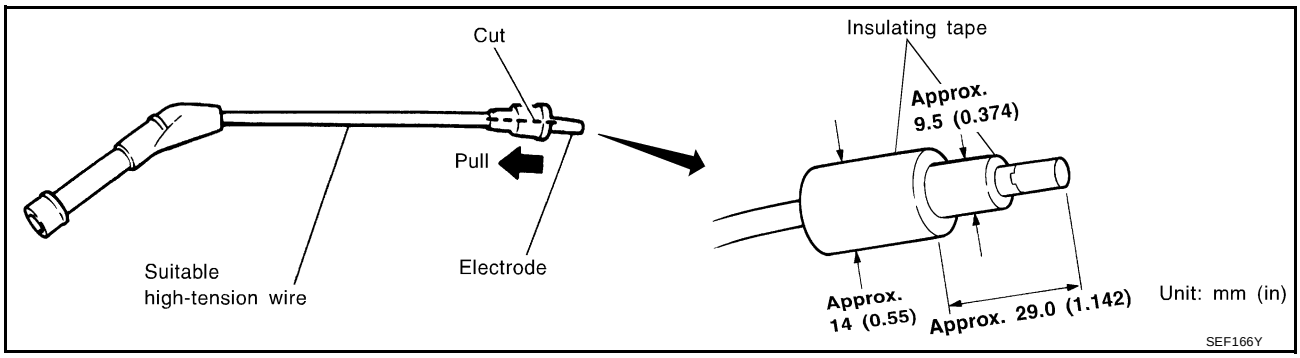
Method B

1. Remove No. 1 ignition coil.

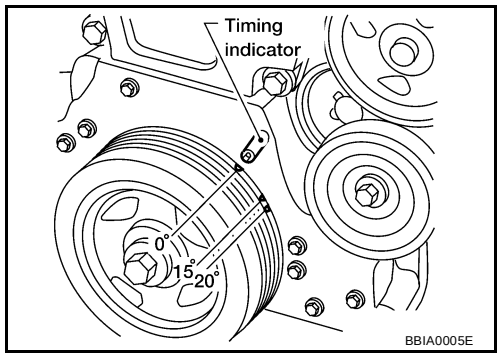


2. Connect No. 1 ignition coil and No. 1 spark plug with suitable high-tension wire as shown, and attach timing light clamp to this wire.





3. Check ignition timing.



Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment

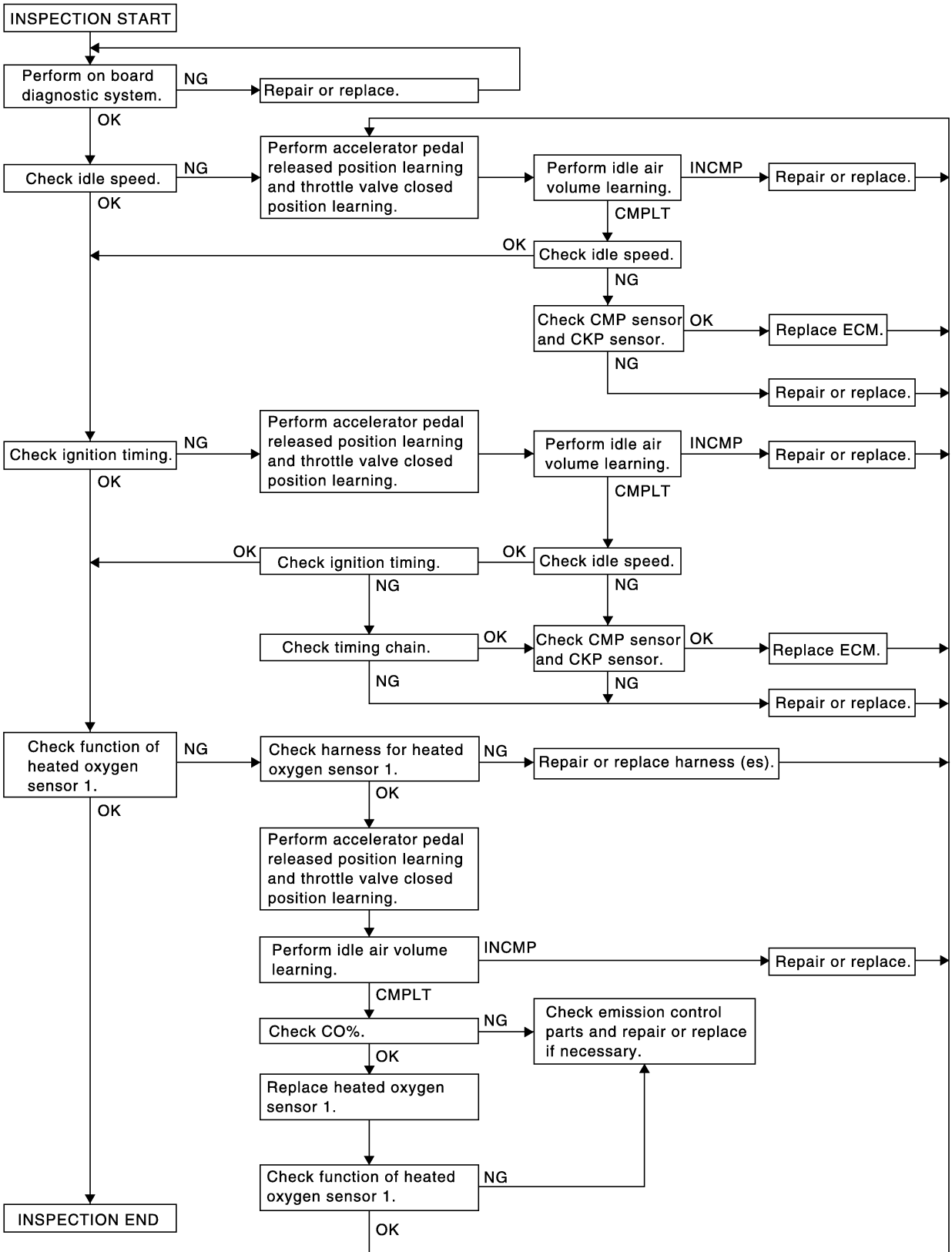
UBS00274

PREPARATION

1. Make sure that the following parts are in good order.
   - Battery
   - Ignition system
   - Engine oil and coolant levels
   - Fuses
   - ECM harness connector
   - Vacuum hoses
   - Air intake system
     (Oil filler cap, oil level gauge, etc.)
   - Fuel pressure
   - Engine compression
   - Throttle valve
   - Evaporative emission system
2. On air conditioner equipped models, checks should be carried out while the air conditioner is “OFF”.
3. On automatic transmission equipped models, when checking idle rpm, ignition timing and mixture ratio, checks should be carried out while shift lever is in “N” position.
4. When measuring “CO” percentage, insert probe more than 40 cm (15.7 in) into tail pipe.
5. Turn off headlamps, heater blower, rear window defogger.

6. Keep front wheels pointed straight ahead.

OVERALL INSPECTION SEQUENCE



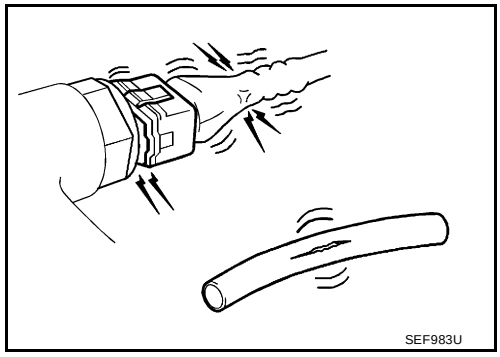
NOTE:
If a vehicle contains a part which is operating outside of design specifications with no MIL illumination, the part shall not be replaced prior to emission testing unless it is determined that the part has been tampered with or abused in such a way that the diagnostic system cannot reasonably be expected to detect the resulting malfunction.

SEC154D

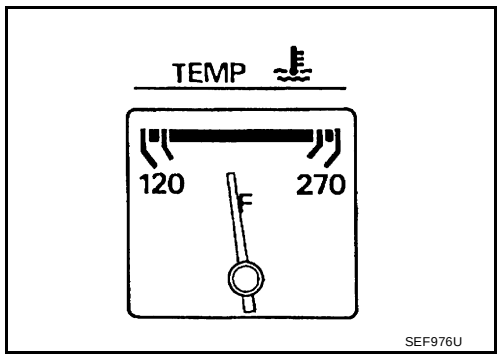
INSPECTION PROCEDURE

1. INSPECTION START

1. Check service records for any recent repairs that may indicate a related problem, or a current need for scheduled maintenance.
2. Open engine hood and check the following:
- Harness connectors for improper connections
- Wiring harness for improper connections, pinches and cut
- Vacuum hoses for splits, kinks and improper connections
- Hoses and ducts for leaks
- Air cleaner clogging
- Gasket


SEF983U

3. Confirm that electrical or mechanical loads are not applied.
- Headlamp switch is OFF.
- Air conditioner switch is OFF.
- Rear window defogger switch is OFF.
- Steering wheel is in the straight-ahead position, etc.
4. Start engine and warm it up until engine coolant temperature indicator points the middle of gauge.
Ensure engine stays below 1,000 rpm.

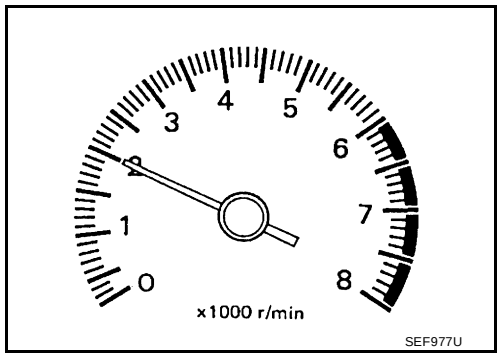


SEF976U

5. Run engine at about 2,000 rpm for about 2 minutes under no-load.
6. Make sure that no DTC is displayed with CONSULT-II or GST.

OK or NG

OK >> GO TO 3.
NG >> GO TO 2.



SEF977U

2. REPAIR OR REPLACE

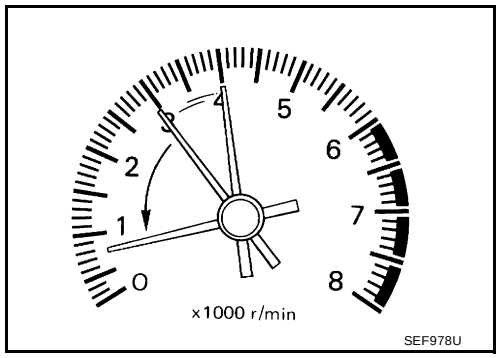
Repair or replace components as necessary according to corresponding “Diagnostic Procedure”.

>> GO TO 3.

3. CHECK TARGET IDLE SPEED

With CONSULT-II

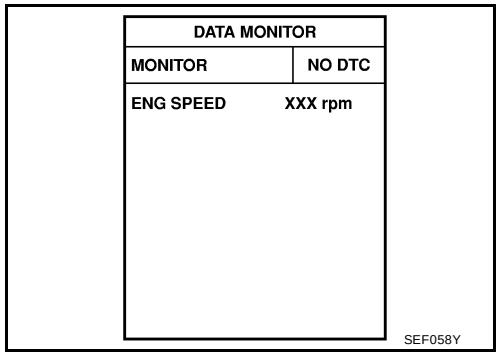
1. Run engine at about 2,000 rpm for about 2 minutes under no-load.
2. Rev engine (2,000 to 3,000 rpm) two or three times under no-load, then run engine at idle speed for about 1 minute.



3. Read idle speed in “DATA MONITOR” mode with CONSULT-II.

M/T: 700 ± 50 rpm

A/T: 700 ± 50 rpm (in “P” or “N” position)



Without CONSULT-II

1. Run engine at about 2,000 rpm for about 2 minutes under no-load.
2. Rev engine (2,000 to 3,000 rpm) two or three times under no-load, then run engine at idle speed for about 1 minute.
3. Check idle speed.

M/T: 700 ± 50 rpm

A/T: 700 ± 50 rpm (in “P” or “N” position)

OK or NG

OK >> GO TO 10.
NG >> GO TO 4.

4. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform EC-1253, "Accelerator Pedal Released Position Learning" .

>> GO TO 5.

5. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-1253, "Throttle Valve Closed Position Learning" .

>> GO TO 6.

6. PERFORM IDLE AIR VOLUME LEARNING

Perform EC-1253, "Idle Air Volume Learning" .
Which is the result CMPLT or INCMP?

CMPLT or INCMP

CMPLT >> GO TO 7.
INCMP >> 1. Follow the construction of “Idle Air Volume Learning”.
2. GO TO 4.

7. CHECK TARGET IDLE SPEED AGAIN

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Read idle speed in “DATA MONITOR” mode with CONSULT-II.

M/T: 700 ± 50 rpm
A/T: 700 ± 50 rpm (in “P” or “N” position)

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.

M/T: 700 ± 50 rpm
A/T: 700 ± 50 rpm (in “P” or “N” position)

OK or NG

OK >> GO TO 10.
NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

- Check camshaft position sensor (PHASE) and circuit. Refer to EC-1504 .
- Check crankshaft position sensor (POS) and circuit. Refer to EC-1497 .

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 a problem, but this is the rarely the case.)
2. Perform initialization of NVIS (NATS) system and registration of NVIS (NATS) ignition key IDs. Refer to EC-1273, "NVIS (Nissan Vehicle Immobilizer System — NATS)" .

>> GO TO 4.

10. CHECK IGNITION TIMING

1. Run engine at idle.
2. Check ignition timing with a timing light.

M/T: 15 ± 5° BTDC

A/T: 15 ± 5° BTDC (in “P” or “N” position)

OK or NG

OK (With CONSULT-II)>>GO TO 19.
OK (Without CONSULT-II)>>GO TO 20.
NG >> GO TO 11.

11. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform EC-1253, "Accelerator Pedal Released Position Learning" .

>> GO TO 12.

12. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-1253, "Throttle Valve Closed Position Learning" .

>> GO TO 13.

13. PERFORM IDLE AIR VOLUME LEARNING

Perform EC-1253, "Idle Air Volume Learning" .

Which is the result CMPLT or INCMP?

CMPLT or INCMP

CMPLT >> GO TO 14.
INCMP >> 1. Follow the construction of “Idle Air Volume Learning”.
2. GO TO 4.

14. CHECK TARGET IDLE SPEED AGAIN

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Read idle speed in “DATA MONITOR” mode with CONSULT-II.

M/T: 700 ± 50 rpm

A/T: 700 ± 50 rpm (in “P” or “N” position)

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.

M/T: 700 ± 50 rpm

A/T: 700 ± 50 rpm (in “P” or “N” position)

OK or NG

OK >> GO TO 15.
NG >> GO TO 17.

15. CHECK IGNITION TIMING AGAIN

1. Run engine at idle.
2. Check ignition timing with a timing light.

M/T: 15 ± 5° BTDC

A/T: 15 ± 5° BTDC (in “P” or “N” position)

OK or NG

OK (With CONSULT-II)>>GO TO 19.
OK (Without CONSULT-II)>>GO TO 20.
NG >> GO TO 16.

16. CHECK TIMING CHAIN INSTALLATION

Check timing chain installation. Refer to EM-121, "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-1504 .
- Check crankshaft position sensor (POS) and circuit. Refer to EC-1497 .

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 problem, but this is the rarely the case.)
2. Perform initialization of NVIS (NATS) system and registration of NVIS (NATS) ignition key IDs. Refer to EC-1273, "NVIS (Nissan Vehicle Immobilizer System — NATS)" .

>> GO TO 4.

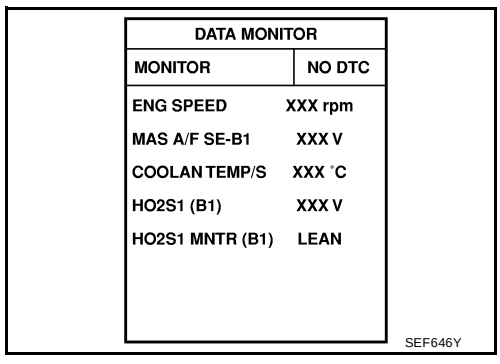
19. CHECK HEATED OXYGEN SENSOR 1 SIGNAL

With CONSULT-II

1. Run engine at about 2,000 rpm for about 2 minutes under no-load.
2. See “HO2S1 MNTR (B1)” in “DATA MONITOR” mode.
3. Running engine at 2,000 rpm under no-load (The engine is warmed up to normal operating temperature.), check that the monitor fluctuates between LEAN and RICH more than 5 times during 10 seconds.

1 time: RICH → LEAN → RICH

2 times: RICH → LEAN → RICH → LEAN → RICH



OK or NG

OK >> **INSPECTION END**
NG (Monitor does not fluctuate.)>>GO TO 21.
NG (Monitor fluctuates less than 5 times.)>>GO TO 28.

20. CHECK HEATED OXYGEN SENSOR 1 SIGNAL

Without CONSULT-II

1. Stop engine and set ECM to Self-diagnostic mode II (Heated oxygen sensor 1 monitor). Refer to EC-1274, "HOW TO SWITCH DIAGNOSTIC TEST MODE" .
2. Start engine and run it at about 2,000 rpm for about 2 minutes under no-load.
3. Running engine at 2,000 rpm under no-load (The engine is warmed up to normal operating temperature.), check that the MIL comes on more than 5 times during 10 seconds.

OK or NG

OK >> **INSPECTION END**
NG (MIL does not come on)>>GO TO 21.
NG (MIL comes on less than 5 times)>>GO TO 28.

21. CHECK HEATED OXYGEN SENSOR 1 HARNESS

1. Turn ignition switch “OFF” and disconnect battery ground cable.
2. Disconnect ECM harness connector.
3. Disconnect heated oxygen sensor 1 harness connector.
4. Check harness continuity between ECM terminal 92 and heated oxygen sensor 1 terminal 1. Refer to EC-1397, "Wiring Diagram" .

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 or replace harness between ECM and heated oxygen sensor 1.
2. GO TO 4.

22. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Reconnect ECM harness connector.
2. Perform EC-1253, "Accelerator Pedal Released Position Learning" .

>> GO TO 23.

23. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-1253, "Throttle Valve Closed Position Learning" .

>> GO TO 24.

24. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-1253, "Idle Air Volume Learning" .

Which is the result CMPLT or INCMP?

CMPLT or INCMP

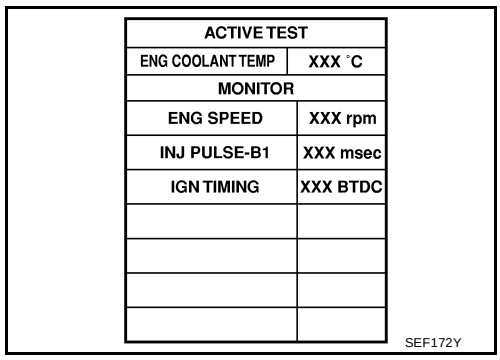
CMPLT (With CONSULT-II)>>GO TO 25.
CMPLT (Without CONSULT-II)>>GO TO 26.
INCMP >> 1. Follow the construction of “Idle Air Volume Learning”.
2. GO TO 4.

25. CHECK “CO”%

With CONSULT-II

1. Start engine and warm it up until engine coolant temperature indicator points the middle of gauge.
2. Turn ignition switch “OFF”, wait at least 10 seconds and then turn “ON”.
3. Select “ENG COOLANT TEMP” in “ACTIVE TEST” mode.
4. Set “ENG COOLANT TEMP” to 5°C (41°F) by touching “DWN” and “Qd”.
5. Start engine and rev it (2,000 to 3,000 rpm) two or three times under no-load, then run engine at idle speed.
6. Check “CO”%.

Idle CO: 0.3 – 9.5% and engine runs smoothly.



OK or NG

OK >> GO TO 28.
NG >> GO TO 27.

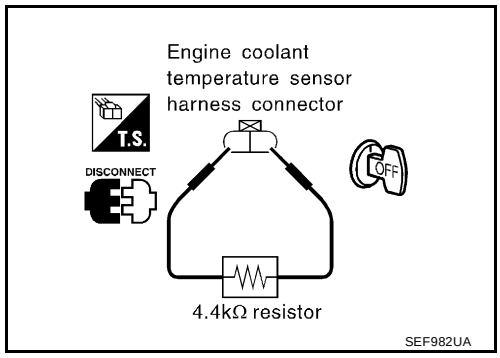
26. CHECK “CO”%

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: 0.3 – 9.5% and engine runs smoothly.

7. After checking “CO”%, turn ignition switch “OFF”, disconnect the resistor from the terminals of engine coolant temperature sensor harness connector, and then connect engine coolant temperature sensor harness connector to engine coolant temperature sensor.



OK or NG

OK >> GO TO 28.
NG >> GO TO 27.

27. RECONNECT HEATED OXYGEN SENSOR 1 HARNESS CONNECTOR

1. Turn ignition switch “OFF”.
2. Reconnect heated oxygen sensor 1 harness connector.

>> GO TO 31.

28. REPLACE HEATED OXYGEN SENSOR 1

1. Stop engine.
2. Replace heated oxygen sensor 1.

With CONSULT-II>>GO TO 29.
Without CONSULT-II>>GO TO 30.

29. CHECK HEATED OXYGEN SENSOR 1 SIGNAL

With CONSULT-II

1. Start engine and warm it up until engine coolant temperature indicator points the middle of gauge.
2. See “HO2S1 MNTR (B1)” in “DATA MONITOR” mode.
3. Running engine at 2,000 rpm under no-load (The engine is warmed up to normal operating temperature.), check that the monitor fluctuates between LEAN and RICH more than 5 times during 10 seconds.

1 time: RICH → LEAN → RICH

2 times: RICH → LEAN → RICH → LEAN → RICH

OK or NG

OK >> GO TO 4.
NG >> GO TO 31.

30. CHECK HEATED OXYGEN SENSOR 1 SIGNAL

Without CONSULT-II

1. Set ECM to Self-diagnostic mode II (Heated oxygen sensor 1 monitor). Refer to EC-1275, "How to Set Diagnostic Test Mode II (Heated Oxygen Sensor 1 Monitor)" .
2. Running engine at 2,000 rpm under no-load (The engine is warmed up to normal operating temperature.), check that the MIL comes on more than 5 times during 10 seconds.

OK or NG

OK >> 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-1255, "Fuel Pressure Check" .
- Check mass air flow sensor and its circuit, and repair or replace if necessary. Refer to EC-1364 , EC-1371 and EC-1604 .
- Check injector and its circuit, and repair or replace if necessary. Refer to EC-1791 .
- Check engine coolant temperature sensor and its circuit, and repair or replace if necessary. Refer to EC-1382 and EC-1387 .

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-1271, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .

>> GO TO 4.

33. CHECK ECM FUNCTION

1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of a problem, but this is the rarely the case.)
2. Perform initialization of NVIS (NATS) system and registration of NVIS (NATS) ignition key IDs. Refer to EC-1273, "NVIS (Nissan Vehicle Immobilizer System — NATS)" .

>> GO TO 4.

Accelerator Pedal Released Position Learning

UBS00275

DESCRIPTION

"Accelerator Pedal Released Position Learning" is an operation to learn the fully released position of the accelerator pedal by monitoring the accelerator pedal position sensor output signal. It must be performed each time harness connector of accelerator pedal position sensor or ECM is disconnected.

OPERATION PROCEDURE

1. Make sure that accelerator pedal is fully released.
2. Turn ignition switch "ON" and wait at least 2 seconds.
3. Turn ignition switch "OFF" wait at least 10 seconds.
4. Turn ignition switch "ON" and wait at least 2 seconds.
5. Turn ignition switch "OFF" wait at least 10 seconds.

Throttle Valve Closed Position Learning

UBS00276

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" wait at least 10 seconds.
   Make sure that throttle valve moves during above 10 seconds by confirming the operating sound.

Idle Air Volume Learning

UBS00277

DESCRIPTION

"Idle Air Volume Learning" is an operation to learn the idle air volume that keeps each engine within the specific range. It must be performed under any of the following conditions:

- Each time electric throttle control actuator or ECM is replaced.
- Idle speed or ignition timing is out of specification.

PREPARATION

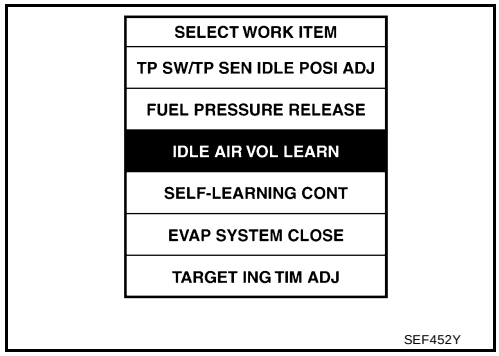
Before performing "Idle Air Volume Learning", make sure that all of the following conditions are satisfied.
Learning will be cancelled if any of the following conditions are missed for even a moment.

- Battery voltage: More than 12.9V (At idle)
- Engine coolant temperature: 70 - 95°C (158 - 203°F)
- PNP switch: ON
- Electric load switch: OFF
  (Air conditioner, headlamp, rear window defogger)
  On vehicles equipped with daytime light systems, set lighting switch to the 1st position to light only small lamps.
- Steering wheel: Neutral (Straight-ahead position)
- Vehicle speed: Stopped
- Transmission: Warmed-up
  For A/T models with CONSULT-II, drive vehicle until "FLUID TEMP SE" in "DATA MONITOR" mode of "A/T" system indicates less than 0.9V.
  For A/T models without CONSULT-II and M/T models, drive vehicle for 10 minutes.

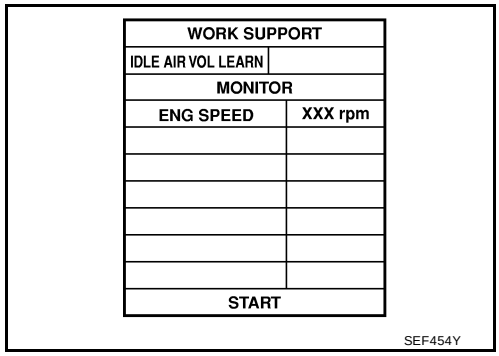
OPERATION PROCEDURE

With CONSULT-II

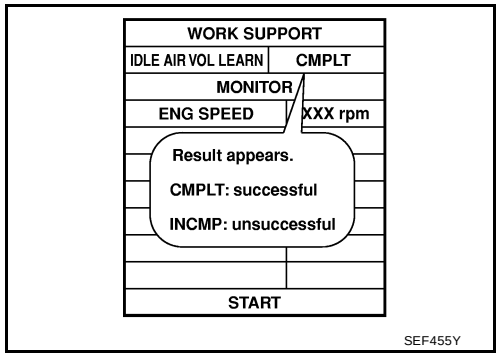
1. Perform EC-1253, "Accelerator Pedal Released Position Learning" .
2. Perform EC-1253, "Throttle Valve Closed Position Learning" .
3. Start engine and warm it up to normal operating temperature.
4. Check that all items listed under the topic “PRE-CONDITIONING” (previously mentioned) are in good order.
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 “INCMP” is displayed, “Idle Air Volume Learning” will not be carried out successfully. In this case, find the cause of the problem by referring to the “Diagnostic Procedure” below.
8. Rev up the engine two or three times and make sure that idle speed and ignition timing are within the specifications.



ITEM	SPECIFICATION
Idle speed	M/T: 700±50 rpm A/T: 700±50 rpm (in “P” or “N” position)
Ignition timing	M/T: 15±5° BTDC A/T: 15±5° BTDC (in “P” or “N” position)

Without CONSULT-II

NOTE:

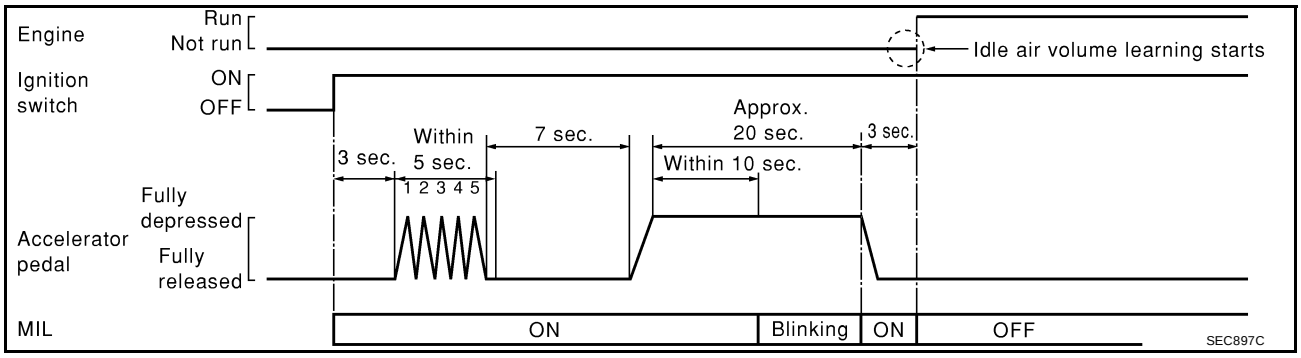
- **It is better to count the time accurately with a clock.**
- **It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.**

1. Perform EC-1253, "Accelerator Pedal Released Position Learning" .
2. Perform EC-1253, "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 “PRE-CONDITIONING” (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 goes off.
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	M/T: 700±50 rpm A/T: 700±50 rpm (in “P” or “N” position)
Ignition timing	M/T: 15±5° BTDC A/T: 15±5° BTDC (in “P” or “N” position)

13. If idle speed and ignition timing are not within the specification, the result will be incomplete. In this case, find the cause of the problem by referring to the “Diagnostic Procedure” below.

DIAGNOSTIC PROCEDURE

If idle air volume learning cannot be performed successfully, proceed as follows:

1. **Check that throttle valve is fully closed.**
2. **Check PCV valve operation.**
3. **Check that downstream of throttle valve is free from air leakage.**
4. **When the above three items check out OK, engine component parts and their installation condition are questionable. Check and eliminate the cause of the problem.**
   It is useful to perform EC-1335, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" .
5. **If any of the following conditions occur after the engine has started, eliminate the cause of the problem and perform “Idle air volume learning” all over again:**

- **Engine stalls.**
- **Erroneous idle.**

Fuel Pressure Check

UBS00278

FUEL PRESSURE RELEASE

Before disconnecting fuel line, release fuel pressure from fuel line to eliminate danger.

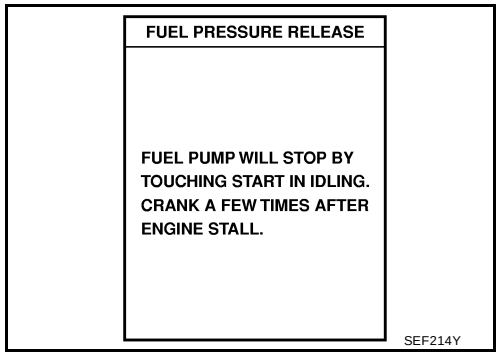
NOTE:

Prepare pans or saucers under the disconnected fuel line because the fuel may spill out. The fuel pressure cannot be completely released because L31 models do not have fuel return system.

With CONSULT-II

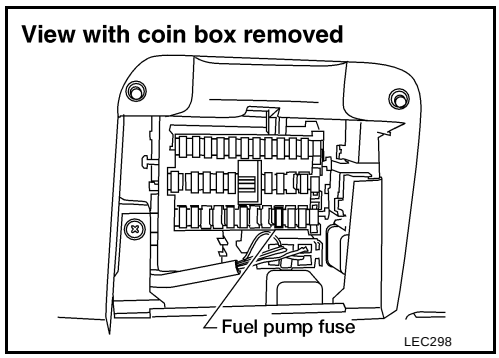
1. Turn ignition switch “ON”.

2. Perform “FUEL PRESSURE RELEASE” in “WORK SUPPORT” mode with CONSULT-II.
3. Start engine.
4. After engine stalls, crank it two or three times to release all fuel pressure.
5. Turn ignition switch “OFF”.



Without CONSULT-II

1. Remove fuel pump fuse.
2. Start engine.
3. After engine stalls, crank it two or three times to release all fuel pressure.
4. Turn ignition switch “OFF”.
5. Reinstall fuel pump fuse after servicing fuel system.

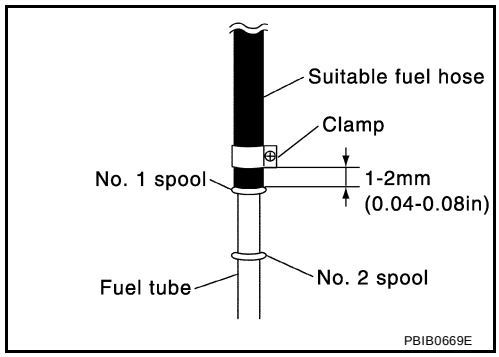


FUEL PRESSURE CHECK

CAUTION:

- **The fuel hose connection method used when taking fuel pressure check must not be used for other purposes.**
- **Be careful not to scratch or put debris around connection area when servicing, so that the quick connector maintains sealability with O-rings inside.**
- **Do not perform fuel pressure check with electrical systems operating (i.e. lights, rear defogger, A/C, etc.) Fuel pressure gauge may indicate false readings due to varying engine loads and changes in manifold vacuum.**

1. Release fuel pressure to zero. Refer to EC-1255, "FUEL PRESSURE RELEASE" .
2. Prepare fuel hose and fuel hose clamp for fuel pressure check, and connect fuel pressure gauge.
   - Use suitable fuel hose for fuel pressure check (genuine NISSAN fuel hose without quick connector).
   - To avoid unnecessary force or tension to hose, use moderately long fuel hose for fuel pressure check.
   - Do not use the fuel hose for checking fuel pressure with damage or cracks on it.
   - Use Pressure Gauge to check fuel pressure.
3. Remove fuel hose. Refer to EM-93, "INTAKE MANIFOLD" .
   - Do not twist or kink fuel hose because it is plastic hose.
   - Do not remove fuel hose from quick connector.
   - Keep the original fuel hose to be free from intrusion of dust or foreign substances with a suitable cover.
4. Install the fuel pressure gauge as shown in the figure.
   - Wipe off oil or dirt from hose insertion part using cloth moistened with gasoline.
   - Apply proper amount of gasoline between top of the fuel tube and No.1 spool.
   - Insert fuel hose for fuel pressure check until it touches the No.1 spool on fuel tube.
   - Use NISSAN genuine hose clamp (part number: 16439 N4710 or 16439 40U00).
   - When reconnecting fuel line, always use new clamps.
   - When reconnecting fuel hose, check the original fuel hose for damage and abnormality.

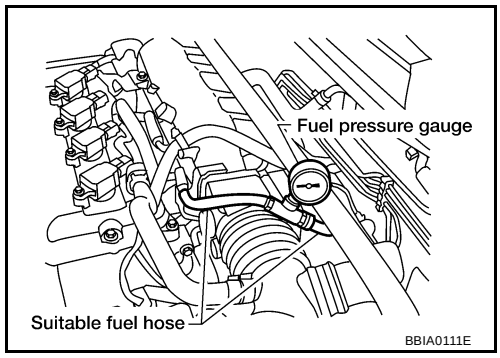


- Use a torque driver to tighten clamps.
- Install hose clamp to the position within 1 - 2 mm (0.04 - 0.08 in).

Tightening torque:

1 - 1.5 N·m (0.1 - 0.15 kg-m, 9 - 13 in-lb)

- Make sure that clamp screw does not contact adjacent parts.



5. After connecting fuel hose for fuel pressure check, pull the hose with a force of approximately 98 N (10 kg, 22 lb) to confirm fuel tube does not come off.
6. Turn ignition switch “ON”, and check for fuel leakage.
7. Start engine and check for fuel leakage.
8. Read the indication of fuel pressure gauge.
   - Do not perform fuel pressure check with system operating. Fuel pressure gauge may indicate false readings.
   - During fuel pressure check, confirm for fuel leakage from fuel connection every 3 minutes.

   At idling: Approximately 350 kPa (3.7 kg/cm^2 , 51 psi)
9. If result is unsatisfactory, go to next step.
10. Check the following.
    - Fuel hoses and fuel tubes for clogging
    - Fuel filter for clogging
    - Fuel pump
    - Fuel pressure regulator for clogging

    If OK, replace fuel pressure regulator.
    If NG, repair or replace.

ON BOARD DIAGNOSTIC (OBD) SYSTEM

PFP:00028

Introduction

UBS00279

The ECM has an on board diagnostic system, which detects malfunctions related to engine sensors or actuators. The ECM also records various emission-related diagnostic information including:

Emission-related diagnostic information	SAE Mode
Diagnostic Trouble Code (DTC)	Mode 3 of SAE J1979
Freeze Frame data	Mode 2 of SAE J1979
System Readiness Test (SRT) code	Mode 1 of SAE J1979
1st Trip Diagnostic Trouble Code (1st Trip DTC)	Mode 7 of SAE J1979
1st Trip Freeze Frame data	
Test values and Test limits	Mode 6 of SAE J1979
Calibration ID	Mode 9 of SAE J1979

The above information can be checked using procedures listed in the table below.

×: Applicable —: Not applicable

	DTC	1st trip DTC	Freeze Frame data	1st trip Freeze Frame data	SRT code	Test value
CONSULT-II	×	×	×	×	×	—
GST	×	×*1	×	—	×	×
ECM	×	×*2	—	—	—	—

*1: 1st trip DTCs for self-diagnoses concerning SRT items cannot be shown on the GST display.
*2: When DTC and 1st trip DTC simultaneously appear on the display, they cannot be clearly distinguished from each other.

The malfunction indicator lamp (MIL) on the instrument panel lights up when the same malfunction is detected in two consecutive trips (Two trip detection logic), or when the ECM enters fail-safe mode. (Refer to EC-1288.)

Two Trip Detection Logic

UBS0027A

When a malfunction is detected for the first time, 1st trip DTC and 1st trip Freeze Frame data are stored in the ECM memory. The MIL will not light up at this stage. <1st trip>
If the same malfunction is detected again during the next drive, the DTC and Freeze Frame data are stored in the ECM memory, and the MIL lights up. The MIL lights up at the same time when the DTC is stored. <2nd trip> The “trip” in the “Two Trip Detection Logic” means a driving mode in which self-diagnosis is performed during vehicle operation. Specific on board diagnostic items will cause the ECM to light up or blink the MIL, and store DTC and Freeze Frame data, even in the 1st trip, as shown below.

×: Applicable —: Not applicable

Items	MIL				DTC		1st trip DTC	
	1st trip		2nd trip		1st trip displaying	2nd trip displaying	1st trip displaying	2nd trip displaying
	Blinking	Lighting up	Blinking	Lighting up				
Coolant overtemperature enrichment protection — DTC: P0217	—	×	—	—	×	—	—	—
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0304 is being detected	×	—	—	—	—	—	×	—
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0304 is being detected	—	—	×	—	—	×	—	—
Closed loop control — DTC: P1148	—	×	—	—	×	—	—	—
Fail-safe items (Refer to EC-1288.)	—	×	—	—	×	—	×	—
Except above	—	—	—	×	—	×	×	—

Emission-related Diagnostic Information

UBS0027B

EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS

Items (CONSULT-II screen terms)	DTC*1 *2		SRT code	Test value/ Test limit (GST only)	1st trip DTC	Reference page
	CONSULT-II GST	ECM				
CAN COMM CIRCUIT	U1000	1000*6	—	—	×	EC-1348
CAN COMM CIRCUIT	U1001	1001*6	—	—	×	EC-1348
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	**P0000**	**0000**	—	—	—	—
INT/V TIM CONT-B1	P0011	0011	—	—	×	EC-1351
HO2S1 HTR (B1)	P0031	0031	×	×	×*5	EC-1354
HO2S1 HTR (B1)	P0032	0032	×	×	×*5	EC-1354
HO2S2 HTR (B1)	P0037	0037	×	×	×*5	EC-1359
HO2S2 HTR (B1)	P0038	0038	×	×	×*5	EC-1359
MAF SEN/CIRCUIT	P0101	0101	—	—	×	EC-1364
MAF SEN/CIRCUIT*3	P0102	0102	—	—	—	EC-1371
MAF SEN/CIRCUIT*3	P0103	0103	—	—	—	EC-1371
IAT SEN/CIRCUIT	P0112	0112	—	—	×	EC-1377
IAT SEN/CIRCUIT	P0113	0113	—	—	×	EC-1377
ECT SEN/CIRCUIT*3	P0117	0117	—	—	—	EC-1382
ECT SEN/CIRCUIT*3	P0118	0118	—	—	—	EC-1382
ECT SENSOR	P0125	0125	—	—	×	EC-1387
IAT SENSOR	P0127	0127	—	—	×	EC-1390
THERMSTAT FNCTN	P0128	0128	—	—	×	EC-1393
HO2S1 (B1)	P0132	0132	×	×	×*5	EC-1395
HO2S1 (B1)	P0133	0133	×	×	×*5	EC-1401
HO2S1 (B1)	P0134	0134	×	×	×*5	EC-1410
HO2S2 (B1)	P0138	0138	×	×	×*5	EC-1417
HO2S2 (B1)	P0139	0139	×	×	×*5	EC-1423
FUEL SYS-LEAN-B1	P0171	0171	—	—	×	EC-1430
FUEL SYS-RICH-B1	P0172	0172	—	—	×	EC-1436
FTT SENSOR	P0181	0181	—	—	×	EC-1442
FTT SEN/CIRCUIT	P0182	0182	—	—	×	EC-1444
FTT SEN/CIRCUIT	P0183	0183	—	—	×	EC-1444
ENG OVER TEMP	P0217	0217	—	—	—	EC-1448
TP SENSOR*3	P0221	0221	—	—	—	EC-1462
TP SEN 1/CIRC*3	P0222	0222	—	—	—	EC-1469
TP SEN 1/CIRC*3	P0223	0223	—	—	—	EC-1469
APP SENSOR*3	P0226	0226	—	—	—	EC-1475
APP SEN 1/CIRC*3	P0227	0227	—	—	—	EC-1482
APP SEN 1/CIRC*3	P0228	0228	—	—	—	EC-1482
MULTI CYL MISFIRE	P0300	0300	—	—	×	EC-1488

Items (CONSULT-II screen terms)	DTC*1 *2		SRT code	Test value/ Test limit (GST only)	1st trip DTC	Reference page
	CONSULT-II GST	ECM				
CYL 1 MISFIRE	P0301	0301	—	—	×	EC-1488
CYL 2 MISFIRE	P0302	0302	—	—	×	EC-1488
CYL 3 MISFIRE	P0303	0303	—	—	×	EC-1488
CYL 4 MISFIRE	P0304	0304	—	—	×	EC-1488
KNOCK SEN/CIRC-B1	P0327	0327	—	—	×	EC-1493
KNOCK SEN/CIRC-B1	P0328	0328	—	—	×	EC-1493
CKP SEN/CIRCUIT	P0335	0335	—	—	×	EC-1497
CMP SEN/CIRC-B1	P0340	0340	—	—	×	EC-1504
TW CATALYST SYS-B1	P0420	0420	×	×	×*5	EC-1510
EVAP PURG FLOW/MON	P0441	0441	×	×	×*5	EC-1514
EVAP SMALL LEAK	P0442	0442	×	×	×*5	EC-1520
PURG VOLUME CONT/V	P0444	0444	—	—	×	EC-1529
PURG VOLUME CONT/V	P0445	0445	—	—	×	EC-1529
VENT CONTROL VALVE	P0447	0447	—	—	×	EC-1535
EVAP SYS PRES SEN	P0452	0452	—	—	×	EC-1542
EVAP SYS PRES SEN	P0453	0453	—	—	×	EC-1549
EVAP GROSS LEAK	P0455	0455	—	×	×*5	EC-1557
EVAP VERY SML LEAK	P0456	0456	×*4	×	×*5	EC-1565
FUEL LEV SEN SLOSH	P0460	0460	—	—	×	EC-1574
FUEL LEVEL SENSOR	P0461	0461	—	—	×	EC-1579
FUEL LEVL SEN/CIRC	P0462	0462	—	—	×	EC-1581
FUEL LEVL SEN/CIRC	P0463	0463	—	—	×	EC-1581
VEH SPEED SEN/CIRC*7	P0500	0500	—	—	×	EC-1585
ISC SYSTEM	P0506	0506	—	—	×	EC-1589
ISC SYSTEM	P0507	0507	—	—	×	EC-1591
ECM	P0605	0605	—	—	×	EC-1593
MIL/CIRC	P0650	0650	—	—	×	EC-1596
PNP SW/CIRC	P0705	0705	—	—	×	AT-495
ATF TEMP SEN/CIRC	P0710	0710	—	—	×	AT-501
VEH SPD SEN/CIR AT*7	P0720	0720	—	—	×	AT-508
ENGINE SPEED SIG	P0725	0725	—	—	×	AT-513
A/T 1ST GR FNCTN	P0731	0731	—	—	×	AT-517
A/T 2ND GR FNCTN	P0732	0732	—	—	×	AT-522
A/T 3RD GR FNCTN	P0733	0733	—	—	×	AT-527
A/T 4TH GR FNCTN	P0734	0734	—	—	×	AT-532
TCC SOLENOID/CIRC	P0740	0740	—	—	×	AT-539
A/T TCC S/V FNCTN	P0744	0744	—	—	×	AT-544
L/PRESS SOL/CIRC	P0745	0745	—	—	×	AT-552
SFT SOL A/CIRC*3	P0750	0750	—	—	×	AT-558
SFT SOL B/CIRC*3	P0755	0755	—	—	×	AT-563
ECM BACK UP/CIRC	P1065	1065	—	—	×	EC-1600

Items (CONSULT-II screen terms)	DTC*1 *2		SRT code	Test value/ Test limit (GST only)	1st trip DTC	Reference page
	CONSULT-II GST	ECM				
MAF SENSOR*3	P1102	1102	—	—	—	EC-1604
INT/V TIM V/CIR-B1	P1111	1111	—	—	×	EC-1610
ETC ACTR*3	P1121	1121	—	—	—	EC-1614
ETC FUNCTION/CIRC*3	P1122	1122	—	—	—	EC-1616
ETC MOT PWR*3	P1124	1124	—	—	×	EC-1623
ETC MOT PWR*3	P1126	1126	—	—	—	EC-1623
ETC MOT*3	P1128	1128	—	—	—	EC-1628
HO2S1 (B1)	P1143	1143	×	×	×*5	EC-1633
HO2S1 (B1)	P1144	1144	×	×	×*5	EC-1639
HO2S2 (B1)	P1146	1146	×	×	×*5	EC-1645
HO2S2 (B1)	P1147	1147	×	×	×*5	EC-1652
CLOSED LOOP-B1	P1148	1148	—	—	—	EC-1659
ENG OVER TEMP	P1217	1217	—	—	×	EC-1661
TP SEN 2/CIRC*3	P1223	1223	—	—	—	EC-1674
TP SEN 2/CIRC*3	P1224	1224	—	—	—	EC-1674
CTP LEARNING	P1225	1225	—	—	×	EC-1680
CTP LEARNING	P1226	1226	—	—	×	EC-1682
APP SEN 2/CIRC*3	P1227	1227	—	—	—	EC-1684
APP SEN 2/CIRC*3	P1228	1228	—	—	—	EC-1684
SENSOR POWER/CIRC*3	P1229	1229	—	—	—	EC-1690
PURG VOLUME CONT/V	P1444	1444	—	—	×	EC-1694
VENT CONTROL VALVE	P1446	1446	—	—	×	EC-1702
VENT CONTROL VALVE	P1448	1448	—	—	×	EC-1709
EVAP VERY SML LEAK	P1456	1456	×*4	×	×*5	EC-1717
FUEL LEVEL SEN/CIRC	P1464	1464	—	—	×	EC-1726
VC/V BYPASS/V	P1490	1490	—	—	×	EC-1729
VC CUT/V BYPASS/V	P1491	1491	—	—	×	EC-1736
ASCD SW	P1564	1564	—	—	×	EC-1745
ASCD BRAKE SW	P1572	1572	—	—	×	EC-1752
ASCD VHL SPD SEN	P1574	1574	—	—	×	EC-1761
TPV SEN/CIRC A/T	P1705	1705	—	—	×	AT-568
P-N POS SW/CIRCUIT	P1706	1706	—	—	×	EC-1763
O/R CLTCH SOL/CIRC	P1760	1760	—	—	×	AT-574
BRAKE SW/CIRCUIT	P1805	1805	—	—	×	EC-1767

*1: 1st trip DTC No. is the same as DTC No.
*2: These numbers are prescribed by SAE J2012.
*3: When the fail-safe operation occurs, the MIL illuminates.
*4: SRT code will not be set if the self-diagnostic result is NG.
*5: These are not displayed with GST.
*6: The troubleshooting for this DTC needs CONSULT-II.
*7: When the fail-safe operations for both self-diagnoses occur at the same time, the MIL illuminates.

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-1271, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
For malfunctions in which 1st trip DTCs are displayed, refer to EC-1259, "EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS" . These items are required by legal regulations to continuously monitor the system/component. In addition, the items monitored non-continuously are also displayed on CONSULT-II.
1st trip DTC is specified in Mode 7 of SAE J1979. 1st trip DTC detection occurs without lighting up the MIL and therefore does not warn the driver of a problem. However, 1st trip DTC detection will not prevent the vehicle from being tested, for example during Inspection/Maintenance (I/M) tests.
When a 1st trip DTC is detected, check, print out or write down and erase (1st trip) DTC and Freeze Frame data as specified in “Work Flow” procedure Step II, refer to EC-1283, "WORK FLOW" . Then perform “DTC Confirmation Procedure” or “Overall Function Check” to try to duplicate the problem. If the malfunction is duplicated, the item requires repair.

How to Read DTC and 1st Trip DTC

DTC and 1st trip DTC can be read by the following methods.

WITH CONSULT-II

WITH GST

CONSULT-II or GST (Generic Scan Tool) Examples: P0340, P1148, P1706, etc.
These DTCs are prescribed by SAE J2012.
(CONSULT-II also displays the malfunctioning component or system.)

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
MAF SEN/CIRCUIT [P0101]	0

1st trip DTC display

SELF DIAG RESULTS	
DTC RESULTS	TIME
MAF SEN/CIRCUIT [P0101]	1t

SEC745C

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-1318, "Freeze Frame Data and 1st Trip Freeze Frame Data" .
Only one set of freeze frame data (either 1st trip freeze frame data or freeze frame data) can be stored in the ECM. 1st trip freeze frame data is stored in the ECM memory along with the 1st trip DTC. There is no priority for 1st trip freeze frame data and it is updated each time a different 1st trip DTC is detected. However, once freeze frame data (2nd trip detection/MIL on) is stored in the ECM memory, 1st trip freeze frame data is no longer stored. Remember, only one set of freeze frame data can be stored in the ECM. The ECM has the following priorities to update the data.

Priority	Items	
1	Freeze frame data	Misfire — DTC: P0300 - P0304 Fuel Injection System Function — DTC: P0171, P0172
2		Except the above items (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-1259, "EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS" .

SYSTEM READINESS TEST (SRT) CODE

System Readiness Test (SRT) code is specified in Mode 1 of SAE J1979.
As part of an enhanced emissions test for Inspection & Maintenance (I/M), certain states require the status of SRT be used to indicate whether the ECM has completed self-diagnosis of major emission systems and components. Completion must be verified in order for the emissions inspection to proceed.
If a vehicle is rejected for a State emissions inspection due to one or more SRT items indicating “INCMP”, use the information in this Service Manual to set the SRT to “CMPLT”.
In most cases the ECM will automatically complete its self-diagnosis cycle during normal usage, and the SRT status will indicate “CMPLT” for each application system. Once set as “CMPLT”, the SRT status remains “CMPLT” until the self-diagnosis memory is erased.
Occasionally, certain portions of the self-diagnostic test may not be completed as a result of the customer's normal driving pattern; the SRT will indicate “INCMP” for these items.

NOTE:
The SRT will also indicate “INCMP” if the self-diagnosis memory is erased for any reason or if the ECM memory power supply is interrupted for several hours.
If, during the state emissions inspection, the SRT indicates “CMPLT” for all test items, the inspector will continue with the emissions test. However, if the SRT indicates “INCMP” for one or more of the SRT items the vehicle is returned to the customer untested.

NOTE:
If MIL is “ON” during the state emissions inspection, the vehicle is also returned to the customer untested even though the SRT indicates “CMPLT” for all test items. Therefore, it is important to check SRT (“CMPLT”) and DTC (No DTCs) before the inspection.

SRT Item

The table below shows required self-diagnostic items to set the SRT to “CMPLT”.

SRT item (CONSULT-II indication)	Perfor-mance Priority*1	Required self-diagnostic items to set the SRT to “CMPLT”	Corresponding DTC No.
CATALYST	2	Three way catalyst function	P0420
EVAP SYSTEM	1	EVAP control system	P0442
	2	EVAP control system	P0456, P1456
	2	EVAP control system purge flow monitoring	P0441
HO2S	2	Heated oxygen sensor 1	P0132
		Heated oxygen sensor 1	P0133
		Heated oxygen sensor 1	P0134
		Heated oxygen sensor 1	P1143
		Heated oxygen sensor 1	P1144
		Heated oxygen sensor 2	P0138
		Heated oxygen sensor 2	P0139
		Heated oxygen sensor 2	P1146
		Heated oxygen sensor 2	P1147
HO2S HTR	2	Heated oxygen sensor 1 heater	P0031, P0032
		Heated oxygen sensor 2 heater	P0037, P0038

*1: 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.

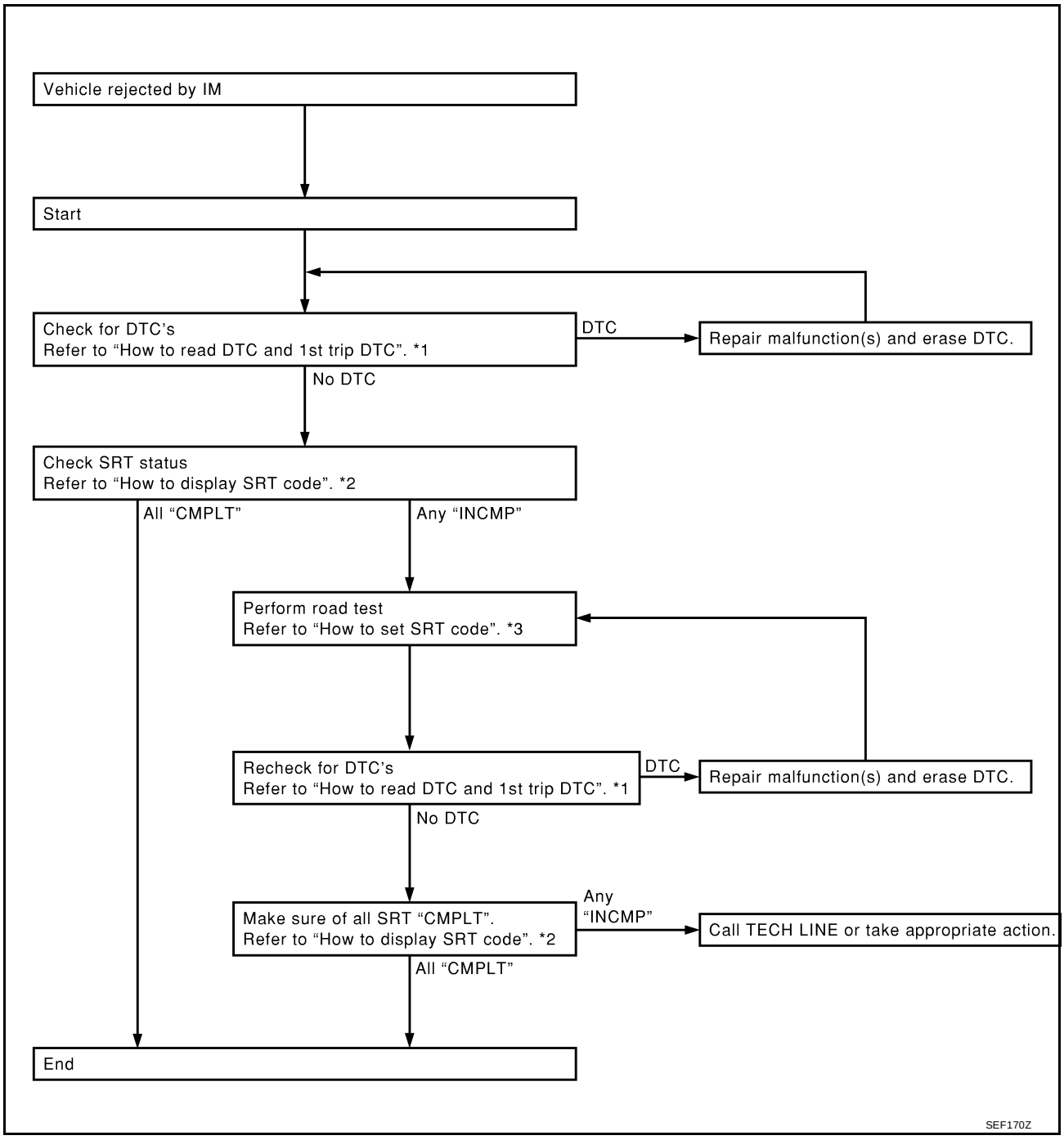
When all SRT related self-diagnoses showed OK results in a single cycle (Ignition OFF-ON-OFF), the SRT will indicate “CMPLT”. → Case 1 above
When all SRT related self-diagnoses showed OK results through several different cycles, the SRT will indicate “CMPLT” at the time the respective self-diagnoses 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-1262 *2 EC-1266 *3 EC-1267

How to Display SRT Code

WITH CONSULT-II

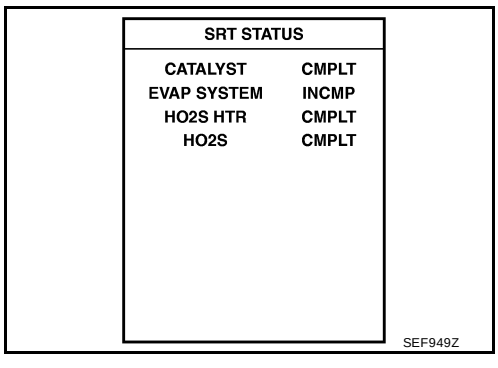
Selecting "SRT STATUS" in "DTC CONFIRMATION" mode with CONSULT-II.

For items whose SRT codes are set, a "CMPLT" is displayed on the CONSULT-II screen; for items whose SRT codes are not set, "INCMP" is displayed.

A sample of CONSULT-II display for SRT code is shown at right.

"INCMP" means the self-diagnosis is incomplete and SRT is not set.

"CMPLT" means the self-diagnosis is complete and SRT is set.



WITH GST

Selecting Mode 1 with GST (Generic Scan Tool)

How to Set SRT Code

To set all SRT codes, self-diagnosis for the items indicated above must be performed one or more times. Each diagnosis may require a long period of actual driving under various conditions.

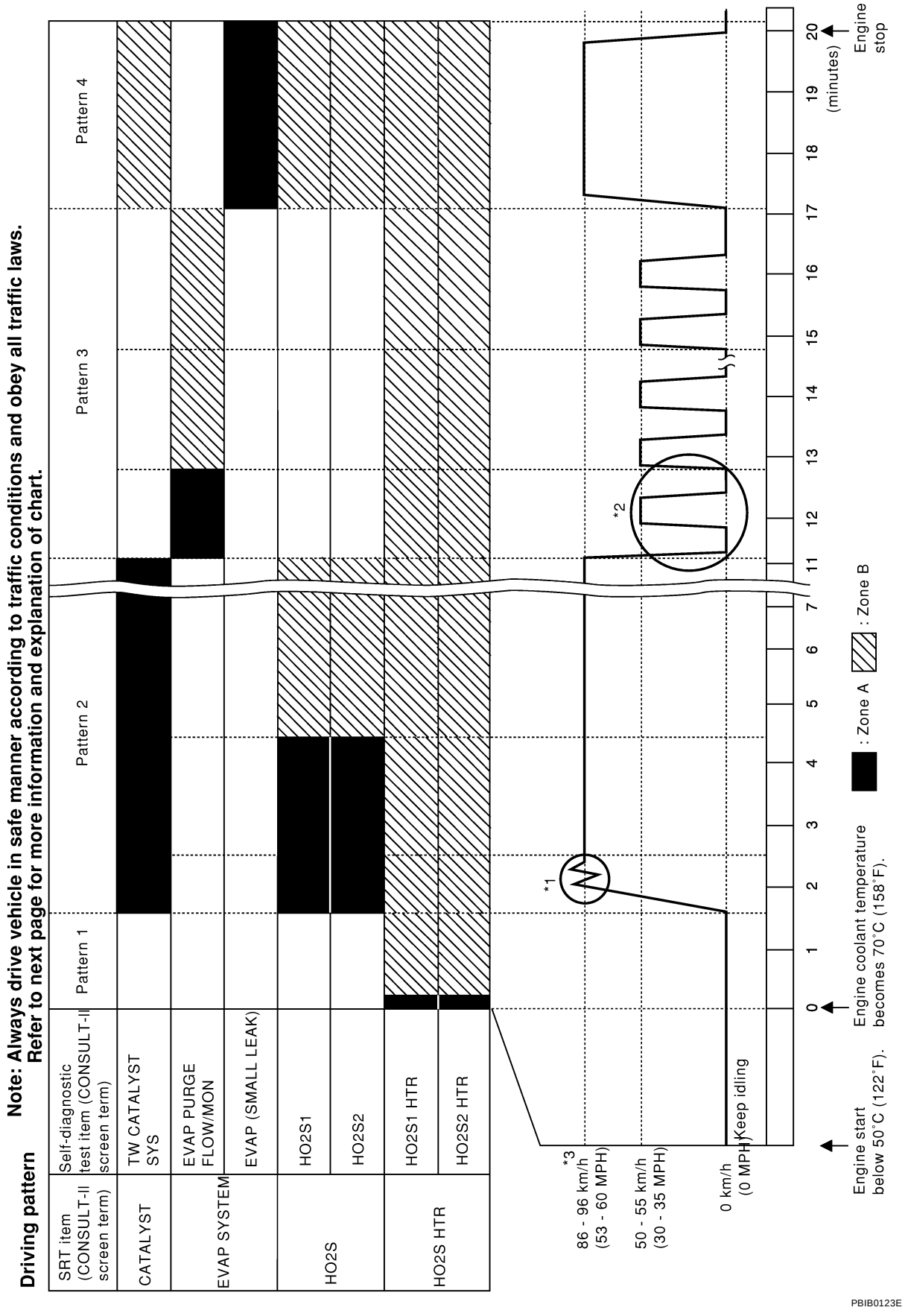
WITH CONSULT-II

Perform corresponding DTC Confirmation Procedure one by one based on “Performance Priority” in the table on EC-1264, "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 93 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 93 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 70 and ground is less than 4.1V).**

Pattern 2:

- When steady-state driving is performed again even after it is interrupted, each diagnosis can be conducted. In this case, the time required for diagnosis may be extended.

Pattern 3:

- The driving pattern outlined in *2 must be repeated at least 3 times.

Pattern 4:

- Tests are performed after the engine has been operated for at least 17 minutes.
- The accelerator pedal must be held very steady during steady-state driving.
- If the accelerator pedal is moved, the test must be conducted all over again.

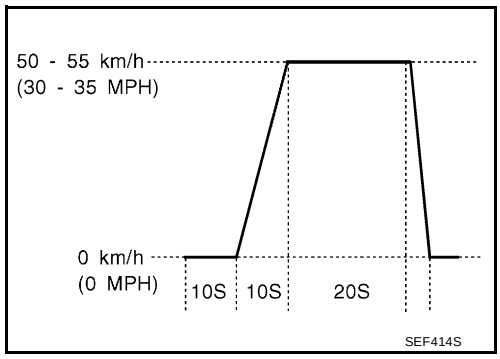
*1: Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH), then release the accelerator pedal and keep it released for more than 10 seconds. Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH) again.

*2: Operate the vehicle in the following driving pattern.

1. Decelerate vehicle to 0 km/h (0 MPH) and let engine idle.
2. Repeat driving pattern shown at right at least 10 times.

– **During acceleration, hold the accelerator pedal as steady as possible.**

*3: Checking the vehicle speed with GST is advised.



Suggested Transmission Gear Position for A/T Models

Set the selector lever in the “D” position with the overdrive switch turned ON.

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.

MODELS WITH 5-SPEED

	For normal acceleration in low altitude areas [less than 1,219 m (4,000 ft)]:		For quick acceleration in low altitude areas and high altitude areas [over 1,219 m (4,000 ft)]:
Gear change	ACCEL shift point km/h (MPH)	CRUISE shift point km/h (MPH)	km/h (MPH)
1st to 2nd	24 (15)	24 (15)	25 (15)
2nd to 3rd	40 (25)	29 (18)	40 (25)
3rd to 4th	58 (36)	48 (30)	65 (40)
4th to 5th	64 (40)	62 (39)	75 (45)

Suggested Maximum Speed in Each Gear

Downshift to a lower gear if the engine is not running smoothly, or if you need to accelerate.
Do not exceed the maximum suggested speed (shown below) in any gear. For level road driving, use the highest gear suggested for that speed. Always observe posted speed limits and drive according to the road conditions to ensure safe operation. Do not over-rev the engine when shifting to a lower gear as it may cause engine damage or loss of vehicle control.

Gear	Km/h (MPH)
1st	55 (35)
2nd	95 (60)
3rd	135 (85)
4th	—
5th	—

MODELS WITH 6-SPEED

Gear change	Km/h (MPH)
1st to 2nd	24 (15)
2nd to 3rd	40 (25)
3rd to 4th	64 (40)
4th to 5th	72 (45)
5th to 6th	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 safe operation. Do not over-rev the engine when shifting to a lower gear as it may cause engine damage or loss of vehicle control.

Gear	Km/h (MPH)
1st	45 (25)
2nd	80 (50)
3rd	130 (80)
4th	—
5th	—
6th	—

TEST VALUE AND TEST LIMIT (GST ONLY — NOT APPLICABLE TO CONSULT-II)

The following is the information specified in Mode 6 of SAE J1979.
The test value is a parameter used to determine whether a system/circuit diagnostic test is “OK” or “NG” while being monitored by the ECM during self-diagnosis. The test limit is a reference value which is specified as the maximum or minimum value and is compared with the test value being monitored.
Items for which these data (test value and test limit) are displayed are the same as SRT code items (30 test items).
These data (test value and test limit) are specified by Test ID (TID) and Component ID (CID) and can be displayed on the GST screen.

×: Applicable —: Not applicable

SRT item	Self-diagnostic test item	Test value (GST display)		Test limit	Application
		TID	CID		
CATALYST	Three way catalyst function	01H	01H	Max.	×
		02H	81H	Min.	×
EVAP SYSTEM	EVAP control system (Small leak)	05H	03H	Max.	×
	EVAP control system purge flow monitoring	06H	83H	Min.	×
	EVAP control system (Very small leak)	07H	03H	Max.	×
HO2S	Heated oxygen sensor 1	09H	04H	Max.	×
		0AH	84H	Min.	×
		0BH	04H	Max.	×
		0CH	04H	Max.	×
		0DH	04H	Max.	×
	Heated oxygen sensor 2	19H	86H	Min.	×
		1AH	86H	Min.	×
		1BH	06H	Max.	×
		1CH	06H	Max.	×
HO2S HTR	Heated oxygen sensor 1 heater	29H	08H	Max.	×
		2AH	88H	Min.	×
	Heated oxygen sensor 2 heater	2DH	0AH	Max.	×
		2EH	8AH	Min.	×

HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION

How to Erase DTC (With CONSULT-II)

The emission related diagnostic information in the ECM can be erased by selecting “ERASE” in the “SELF-DIAG RESULTS” mode with CONSULT-II.
If DTCs are displayed for both ECM and TCM (Transmission control module), they need to be erased individually from the ECM and TCM (Transmission control module).

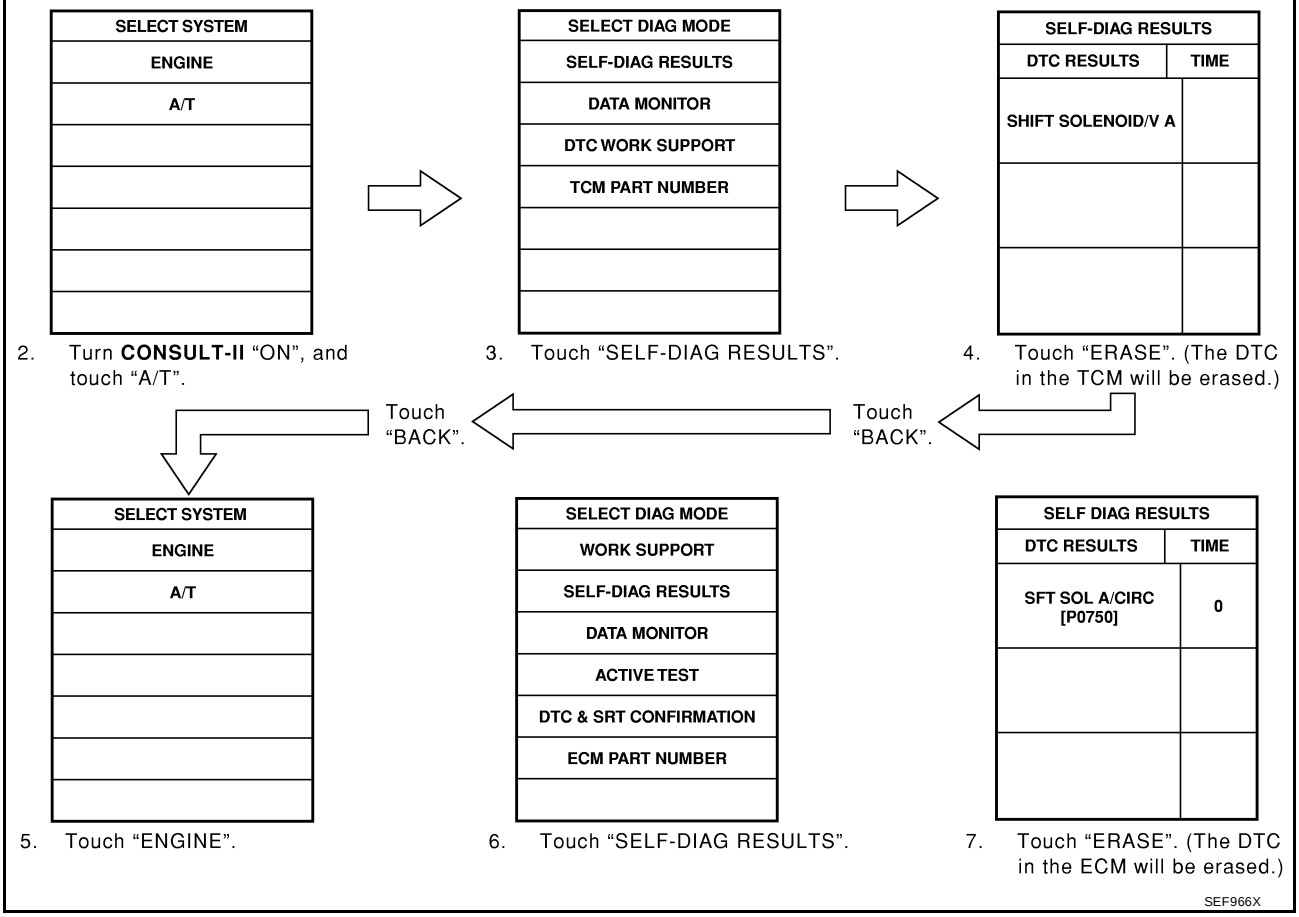
NOTE:
If the DTC is not for A/T related items (see EC-1221), skip steps 2 through 4.

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.



How to Erase DTC (With GST)

The emission related diagnostic information in the ECM can be erased by selecting Mode 4 with GST.

NOTE:
If the DTC is not for A/T related items (see EC-1221), skip step 2.

1. If the ignition switch stays “ON” after repair work, be sure to turn ignition switch “OFF” once. Wait at least 10 seconds and then turn it “ON” (engine stopped) again.
2. Perform “SELF-DIAGNOSTIC PROCEDURE (Without CONSULT-II)” in AT section titled “TROUBLE DIAGNOSIS”, “Self-diagnosis”. (The engine warm-up step can be skipped when performing the diagnosis only to erase the DTC.)
3. Select Mode 4 with GST (Generic Scan Tool).

How to Erase DTC (No Tools)

1. If the ignition switch stays “ON” after repair work, be sure to turn ignition switch “OFF” once.
2. Wait at least 10 seconds and then turn it “ON” (engine stopped) again.
3. Change the diagnostic test mode from Mode II to Mode I by depressing the accelerator pedal. Refer to EC-1274, "HOW TO SWITCH DIAGNOSTIC TEST MODE" .

- **If the battery is disconnected, the emission-related diagnostic information will be lost after approx. 24 hours.**
- **The following data are cleared when the ECM memory is erased.**

– Diagnostic trouble codes
– 1st trip diagnostic trouble codes
– Freeze frame data
– 1st trip freeze frame data

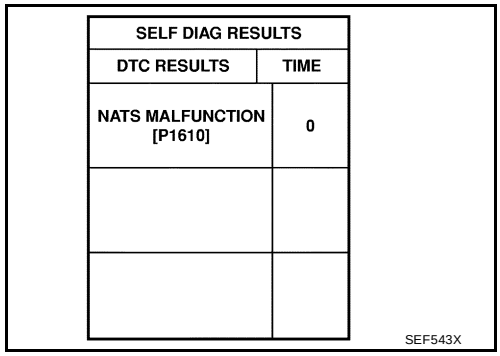
- System readiness test (SRT) codes
- Test values
- Others

Actual work procedures are explained using a DTC as an example. Be careful so that not only the DTC, but all of the data listed above, are cleared from the ECM memory during work procedures.

NVIS (Nissan Vehicle Immobilizer System — NATS)

UBS0027C

- **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-96, "NVIS (NISSAN VEHICLE IMMOBILIZER SYSTEM — NATS)" .**
- **Confirm no self-diagnostic results of NVIS (NATS) is displayed before touching "ERASE" in "SELF-DIAG RESULTS" mode with CONSULT-II.**
- **When replacing ECM, initialization of NVIS (NATS) system and registration of all NVIS (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 NVIS (NATS) initialization and NVIS (NATS) ignition key ID registration, refer to CONSULT-II operation manual, IVIS/NVIS.



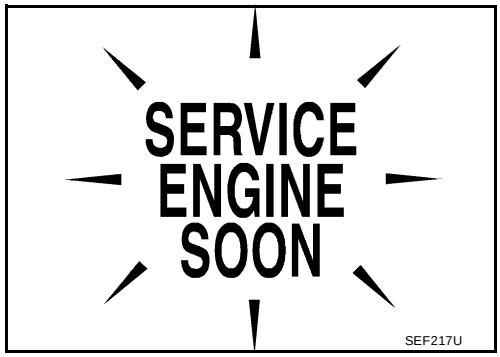
Malfunction Indicator Lamp (MIL)

UBS0027D

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-24, "WARNING LAMPS" , or see EC-1596 .
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 four functions.

Diagnostic Test Mode	KEY and ENG. Status	Function	Explanation of Function
Mode I	Ignition switch in “ON” position  Engine stopped 	BULB CHECK	This function checks the MIL bulb for damage (blown, open circuit, etc.). If the MIL does not come on, check MIL circuit.
	Engine running 	MALFUNCTION WARNING	This is a usual driving condition. When a malfunction is detected twice in two consecutive driving cycles (two trip detection logic), the MIL will light up to inform the driver that a malfunction has been detected. The following malfunctions will light up or blink the MIL in the 1st trip. ● “Coolant overtemperature enrichment protection” ● “Misfire (Possible three way catalyst damage)” ● “Closed loop control” ● Fail-safe mode
Mode II	Ignition switch in “ON” position  Engine stopped 	SELF-DIAGNOSTIC RESULTS	This function allows DTCs and 1st trip DTCs to be read.
	Engine running 	HEATED OXYGEN SENSOR 1 MONITOR	This function allows the fuel mixture condition (lean or rich), monitored by heated oxygen sensor 1, to be read.

MIL Flashing Without DTC

If the ECM is in Diagnostic Test Mode II, MIL may flash when engine is running. In this case, check ECM diagnostic test mode. EC-1274, "HOW TO SWITCH DIAGNOSTIC TEST MODE" .
How to switch the diagnostic test (function) modes, and details of the above functions are described later.EC-1274, "HOW TO SWITCH DIAGNOSTIC TEST MODE" .
The following emission-related diagnostic information is cleared when the ECM memory is erased.

- Diagnostic trouble codes
- 1st trip diagnostic trouble codes
- Freeze frame data
- 1st trip freeze frame data
- System readiness test (SRT) codes
- Test values
- Others

HOW TO SWITCH DIAGNOSTIC TEST MODE

NOTE:

- **It is better to count the time accurately with a clock.**
- **It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.**
- **Always ECM returns to Diagnostic Test Mode I after ignition switch is turned “OFF”.**

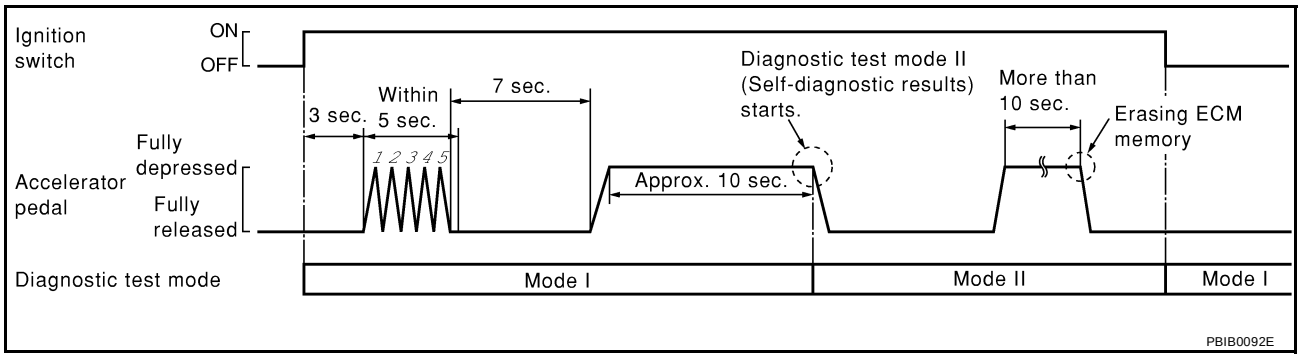
How to Set Diagnostic Test Mode II (Self-diagnostic Results)

1. Confirm that accelerator pedal is fully released, turn ignition switch “ON” and wait 3 seconds.
2. Repeat the following procedure quickly five times within 5 seconds.

a. Fully depress the accelerator pedal.

b. Fully release the accelerator pedal.

3. Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 10 seconds until the MIL starts blinking.
4. Fully release the accelerator pedal.
   ECM has entered to Diagnostic Test Mode II (Self-diagnostic results).



How to Set Diagnostic Test Mode II (Heated Oxygen Sensor 1 Monitor)

1. Set the ECM in Diagnostic Test Mode II (Self-diagnostic results). Refer to EC-1275, "How to Set Diagnostic Test Mode II (Self-diagnostic Results)" .
2. Start Engine.
   ECM has entered to Diagnostic Test Mode II (Heated oxygen sensor 1 monitor).
   ECM will start heated oxygen sensor 1 monitoring from the bank 1 sensor.

How to Erase Diagnostic Test Mode II (Self-diagnostic Results)

1. Set ECM in Diagnostic Test Mode II (Self-diagnostic results). Refer to EC-1275, "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-24, "WARNING LAMPS" or see EC-1596 .

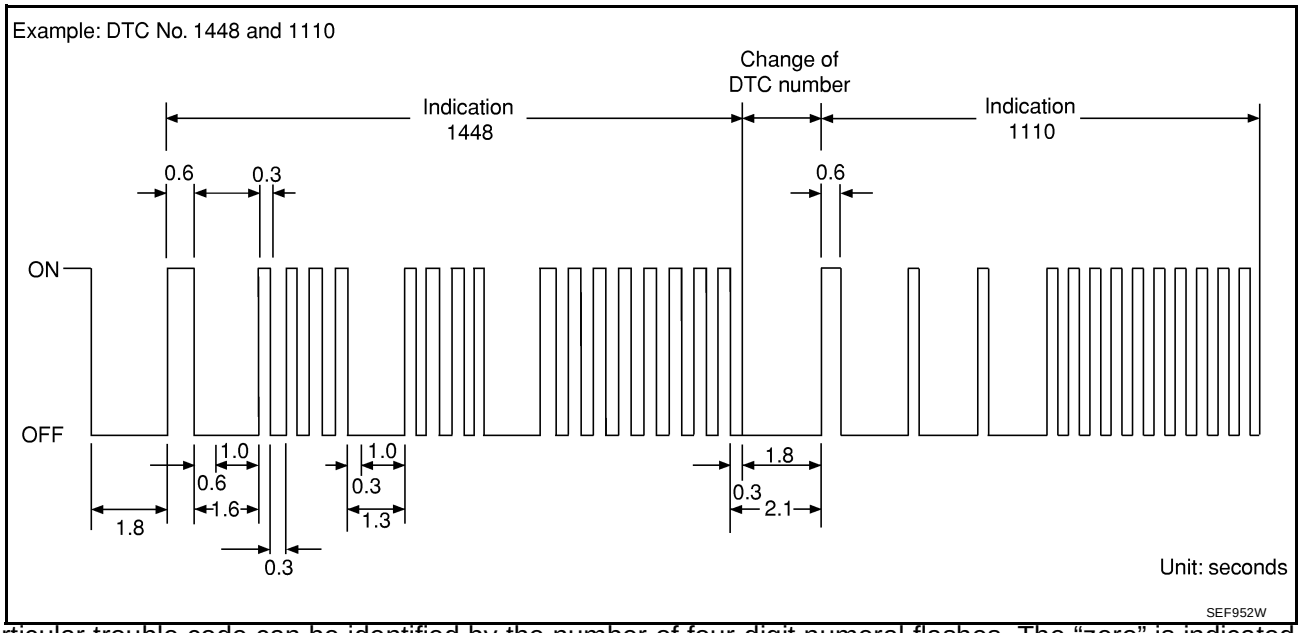
DIAGNOSTIC TEST MODE I — MALFUNCTION WARNING

MIL	Condition
ON	When the malfunction is detected or the ECM's CPU is malfunctioning.
OFF	No malfunction.

These DTC numbers are clarified in Diagnostic Test Mode II (SELF-DIAGNOSTIC RESULTS)

DIAGNOSTIC TEST MODE II — SELF-DIAGNOSTIC RESULTS

In this mode, the DTC and 1st trip DTC are indicated by the number of blinks of the MIL as shown below. The DTC and 1st trip DTC are displayed at the same time. If the MIL does not illuminate in diagnostic test mode I (Malfunction warning), all displayed items are 1st trip DTCs. If only one code is displayed when the MIL illuminates in diagnostic test mode II (SELF-DIAGNOSTIC RESULTS), it is a DTC; if two or more codes are displayed, they may be either DTCs or 1st trip DTCs. DTC No. is same as that of 1st trip DTC. These unidentified codes can be identified by using the CONSULT-II or GST. A DTC will be used as an example for how to read a code.



A particular trouble code can be identified by the number of four-digit numeral flashes. The “zero” is indicated by the number of ten flashes. The length of time the 1,000th-digit numeral flashes on and off is 1.2 seconds consisting of an ON (0.6-second) - OFF (0.6-second) cycle.
The 100th-digit numeral and lower digit numerals consist of a 0.3-second ON and 0.3-second OFF cycle.
A change from one digit numeral to another occurs at an interval of 1.0-second OFF. In other words, the later numeral appears on the display 1.3 seconds after the former numeral has disappeared.
A change from one trouble code to another occurs at an interval of 1.8-second OFF.
In this way, all the detected malfunctions are classified by their DTC numbers. The DTC “0000” refers to no malfunction. (See EC-1221, "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-1275, "How to Erase Diagnostic Test Mode II (Self-diagnostic Results)" .

- **If the battery is disconnected, the DTC will be lost from the backup memory after approx 24 hours.**
- **Be careful not to erase the stored memory before starting trouble diagnoses.**

DIAGNOSTIC TEST MODE II — HEATED OXYGEN SENSOR 1 MONITOR

In this mode, the MIL displays the condition of the fuel mixture (lean or rich) which is monitored by the heated oxygen sensor 1.

MIL	Fuel mixture condition in the exhaust gas	Air fuel ratio feedback control condition
ON	Lean	Closed loop system
OFF	Rich	
*Remains ON or OFF	Any condition	Open loop system

*: Maintains conditions just before switching to open loop.

To check the heated oxygen sensor 1 function, start engine in the Diagnostic Test Mode II and warm it up until engine coolant temperature indicator points to the middle of the gauge.
Next run engine at about 2,000 rpm for about 2 minutes under no-load conditions. Then make sure that the MIL comes ON more than 5 times within 10 seconds with engine running at 2,000 rpm under no-load.

OBD System Operation Chart

UBS0027E

RELATIONSHIP BETWEEN MIL, 1ST TRIP DTC, DTC, AND DETECTABLE ITEMS

- When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data are stored in the ECM memory.
- When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data are stored in the ECM memory, and the MIL will come on. For details, refer to EC-1258, "Two Trip Detection Logic" .

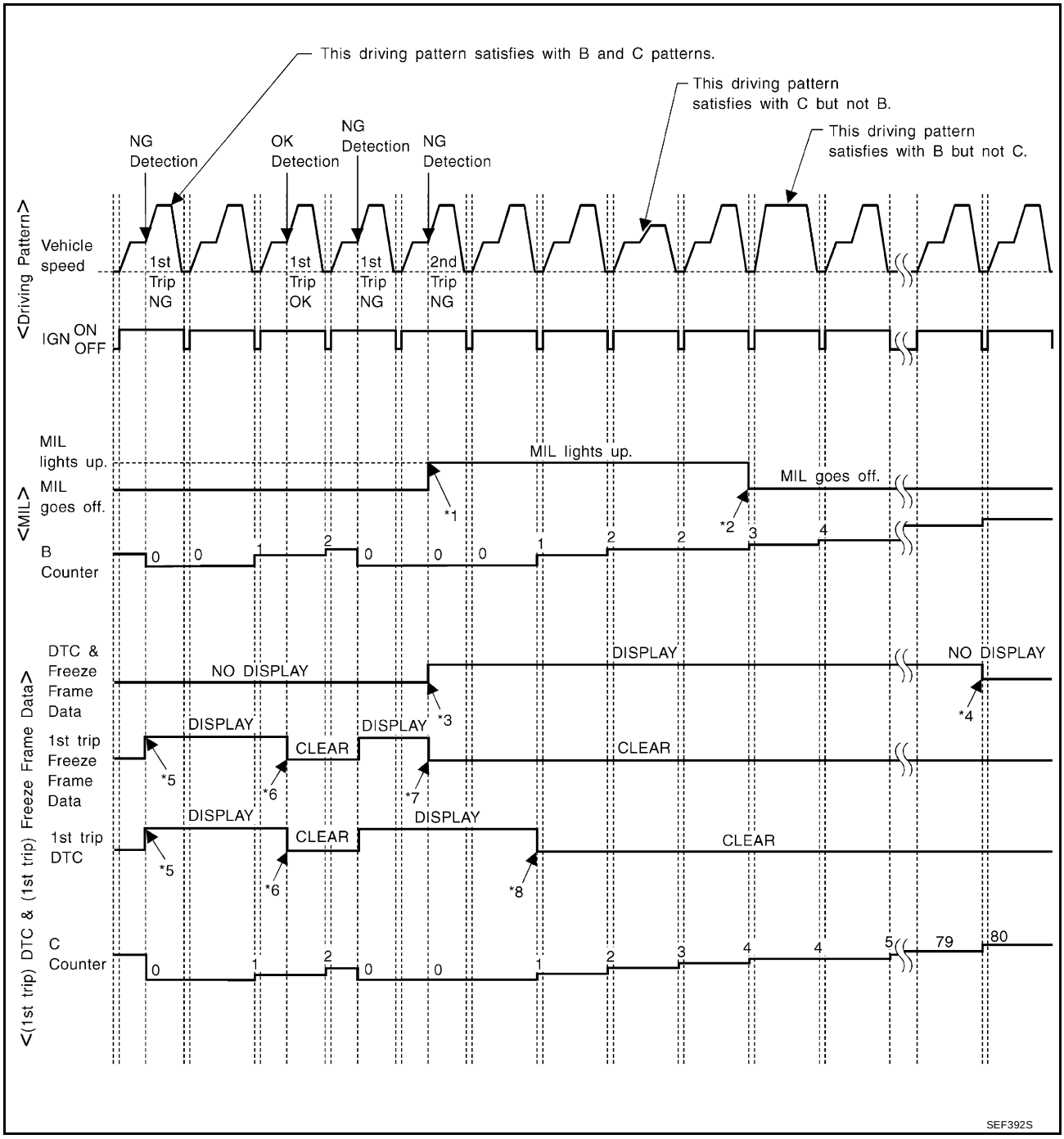
- The MIL will go off after the vehicle is driven 3 times with no malfunction. The drive is counted only when the recorded driving pattern is met (as stored in the ECM). If another malfunction occurs while counting, the counter will reset.
- The DTC and the freeze frame data will be stored until the vehicle is driven 40 times (driving pattern A) without the same malfunction recurring (except for Misfire and Fuel Injection System). For Misfire and Fuel Injection System, the DTC and freeze frame data will be stored until the vehicle is driven 80 times (driving pattern C) without the same malfunction recurring. The “TIME” in “SELF-DIAGNOSTIC RESULTS” mode of CONSULT-II will count the number of times the vehicle is driven.
- The 1st trip DTC is not displayed when the self-diagnosis results in “OK” for the 2nd trip.

SUMMARY CHART

Items	Fuel Injection System	Misfire	Other
MIL (goes off)	3 (pattern B)	3 (pattern B)	3 (pattern B)
DTC, Freeze Frame Data (no display)	80 (pattern C)	80 (pattern C)	40 (pattern A)
1st Trip DTC (clear)	1 (pattern C), *1	1 (pattern C), *1	1 (pattern B)
1st Trip Freeze Frame Data (clear)	*1, *2	*1, *2	1 (pattern B)

For details about patterns “B” and “C” under “Fuel Injection System” and “Misfire”, see EC-1279 .
For details about patterns “A” and “B” under “Other”, see EC-1281 .
*1: Clear timing is at the moment OK is detected.
*2: Clear timing is when the same malfunction is detected in the 2nd trip.

RELATIONSHIP BETWEEN MIL, DTC, 1ST TRIP DTC AND DRIVING PATTERNS FOR "MISFIRE <EXHAUST QUALITY DETERIORATION>", "FUEL INJECTION SYSTEM"



*1: When the same malfunction is detected in two consecutive trips, MIL will light up.

*2: MIL will go off after vehicle is driven 3 times (pattern B) without any malfunctions.

*3: When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data will be stored in ECM.

*4: The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 80 times (pattern C) without the same malfunction. (The DTC and the freeze frame data still remain in ECM.)

*5: When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM.

*6: The 1st trip DTC and the 1st trip freeze frame data will be cleared at the moment OK is detected.

*7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.

*8: 1st trip DTC will be cleared when vehicle is driven once (pattern C) without the same malfunction after DTC is stored in ECM.

EXPLANATION FOR DRIVING PATTERNS FOR “MISFIRE <EXHAUST QUALITY DETERIORATION>”, “FUEL INJECTION SYSTEM”

<Driving Pattern B>

Driving pattern B means the vehicle operation as follows:
All components and systems should be monitored at least once by the OBD system.

- The B counter will be cleared when the malfunction is detected once regardless of the driving pattern.
- The B counter will be counted up when driving pattern B is satisfied without any malfunction.
- The MIL will go off when the B counter reaches 3. (*2 in “OBD SYSTEM OPERATION CHART”)

<Driving Pattern C>

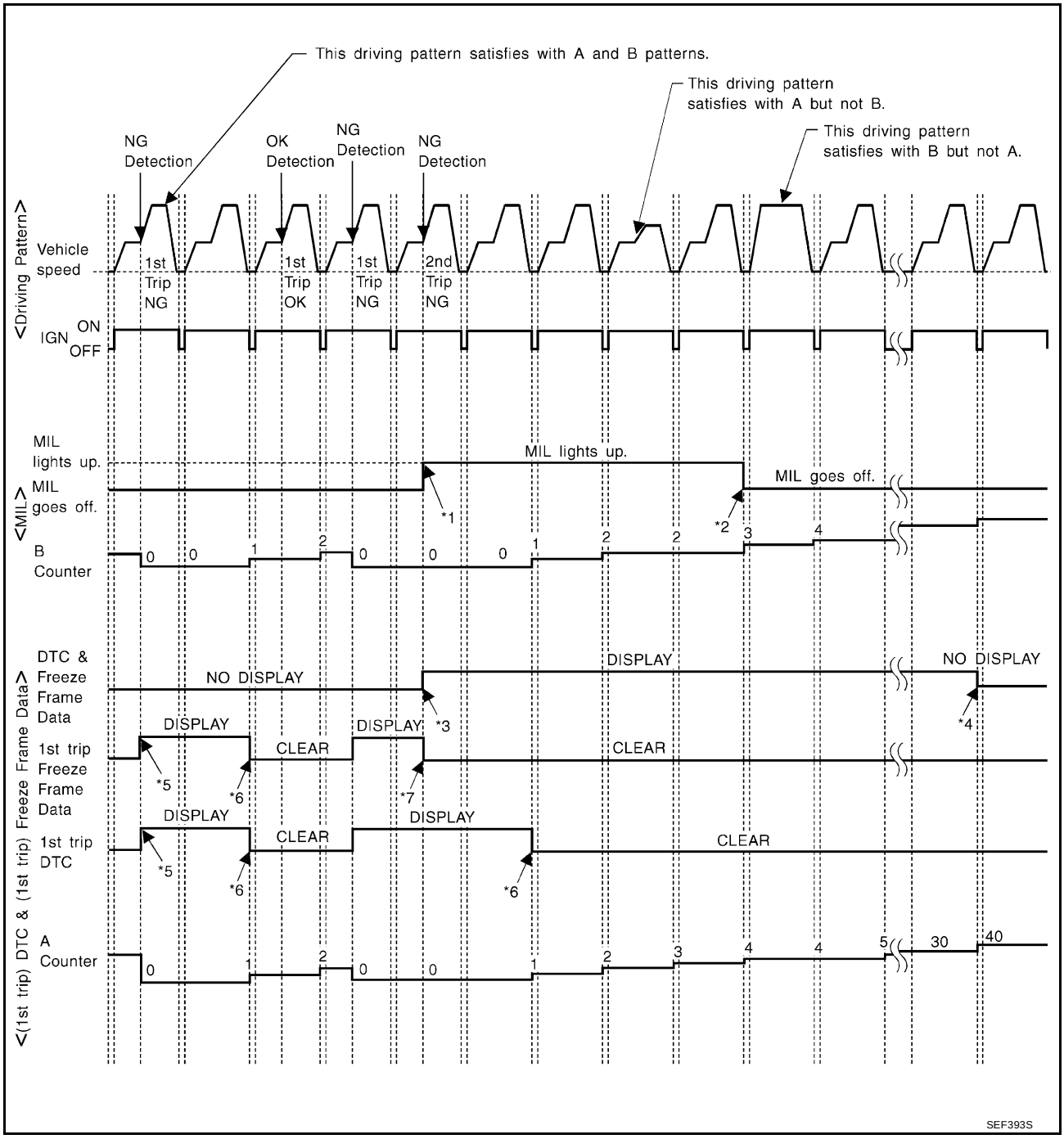
Driving pattern C means the vehicle operation as follows:
The following conditions should be satisfied at the same time:
Engine speed: (Engine speed in the freeze frame data) ±375 rpm
Calculated load value: (Calculated load value in the freeze frame data) x (1±0.1) [%]
Engine coolant temperature (T) condition:

- When the freeze frame data shows lower than 70°C (158°F), “T” should be lower than 70°C (158°F).
- When the freeze frame data shows higher than or equal to 70°C (158°F), “T” should be higher than or equal to 70°C (158°F).

Example:
If the stored freeze frame data is as follows:
Engine speed: 850 rpm, Calculated load value: 30%, Engine coolant temperature: 80°C (176°F)
To be satisfied with driving pattern C, the vehicle should run under the following conditions:
Engine speed: 475 - 1,225 rpm, Calculated load value: 27 - 33%, Engine coolant temperature: more than 70°C (158°F)

- The C counter will be cleared when the malfunction is detected regardless of (1).
- The C counter will be counted up when (1) is satisfied without the same malfunction.
- The DTC will not be displayed after C counter reaches 80.
- The 1st trip DTC will be cleared when C counter is counted once without the same malfunction after DTC is stored in ECM.

RELATIONSHIP BETWEEN MIL, DTC, 1ST TRIP DTC AND DRIVING PATTERNS EXCEPT FOR "MISFIRE <EXHAUST QUALITY DETERIORATION>", "FUEL INJECTION SYSTEM"



*1: When the same malfunction is detected in two consecutive trips, MIL will light up.

*2: MIL will go off after vehicle is driven 3 times (pattern B) without any malfunctions.

*3: When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data will be stored in ECM.

*4: The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 40 times (pattern A) without the same malfunction. (The DTC and the freeze frame data still remain in ECM.)

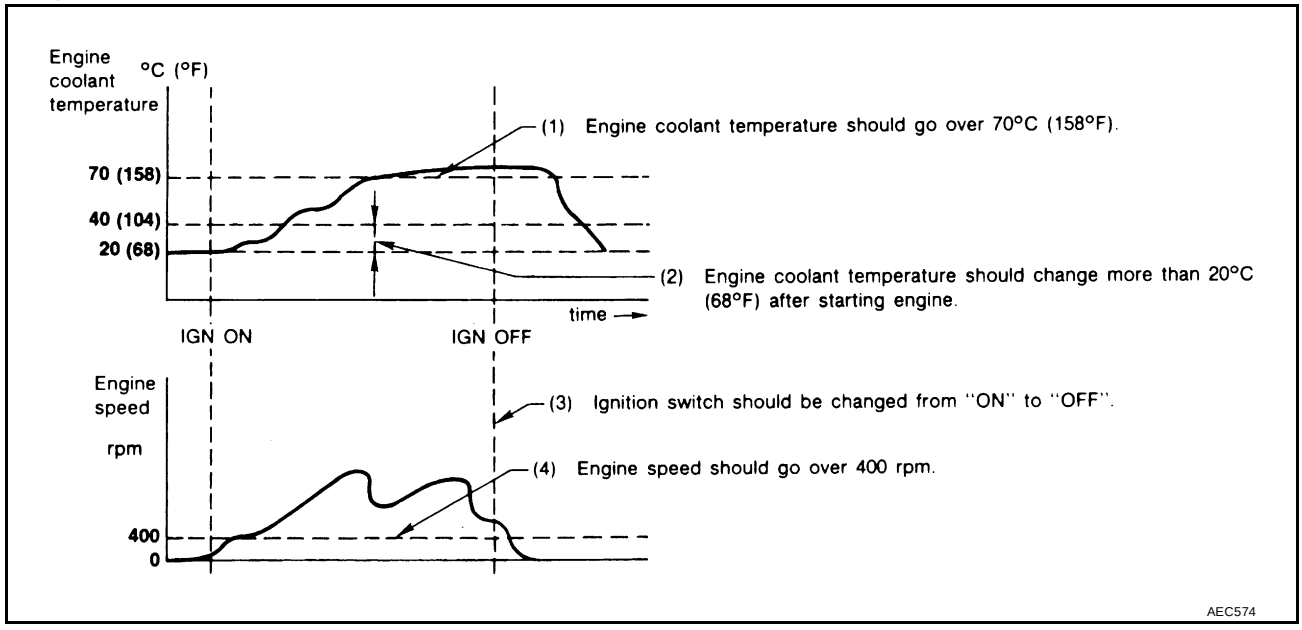
*5: When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM.

*6: 1st trip DTC will be cleared after vehicle is driven once (pattern B) without the same malfunction.

*7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.

EXPLANATION FOR DRIVING PATTERNS EXCEPT FOR "MISFIRE <EXHAUST QUALITY DETERIORATION>", "FUEL INJECTION SYSTEM"

<Driving Pattern A>



- The A counter will be cleared when the malfunction is detected regardless of (1) - (4).
- The A counter will be counted up when (1) - (4) are satisfied without the same malfunction.
- The DTC will not be displayed after the A counter reaches 40.

<Driving Pattern B>

Driving pattern B means the vehicle operation as follows:
All components and systems should be monitored at least once by the OBD system.

- The B counter will be cleared when the malfunction is detected once regardless of the driving pattern.
- The B counter will be counted up when driving pattern B is satisfied without any malfunctions.
- The MIL will go off when the B counter reaches 3 (*2 in "OBD SYSTEM OPERATION CHART").

TROUBLE DIAGNOSIS

PFP:00004

Trouble Diagnosis Introduction

UBS0027F

INTRODUCTION

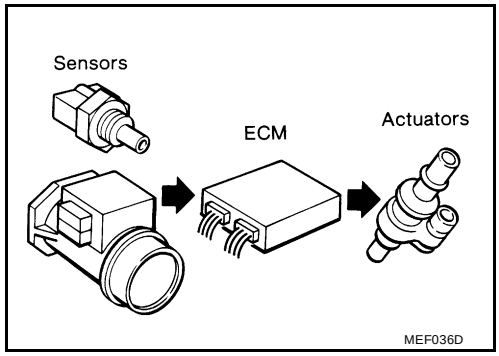
The engine has an ECM to control major systems such as fuel control, ignition control, idle air control system, etc. The ECM accepts input signals from sensors and instantly drives actuators. It is essential that both input and output signals are proper and stable. At the same time, it is important that there are no problems such as vacuum leaks, fouled spark plugs, or other problems with the engine.

It is much more difficult to diagnose a problem that occurs intermittently rather than continuously. Most intermittent problems are caused by poor electric connections or improper wiring. In this case, careful checking of suspected circuits may help prevent the replacement of good parts.

A visual check only may not find the cause of the problems. A road test with CONSULT-II (or GST) or a circuit tester connected should be performed. Follow the “Work Flow” on EC-1283 .

Before undertaking actual checks, take a few minutes to talk with a customer who approaches with a driveability complaint. The customer can supply good information about such problems, especially intermittent ones. Find out what symptoms are present and under what conditions they occur. A “Diagnostic Worksheet” like the example on EC-1286 should be used.

Start your diagnosis by looking for “conventional” problems first. This will help troubleshoot driveability problems on an electronically controlled engine vehicle.



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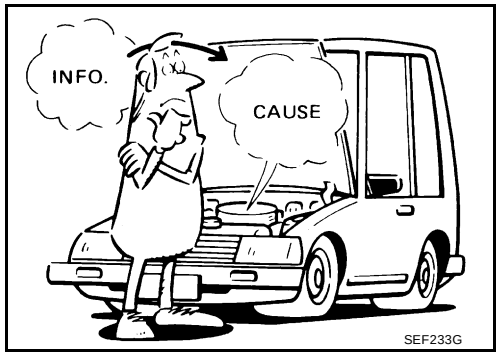

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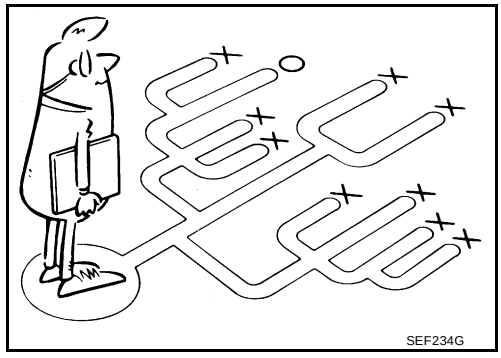
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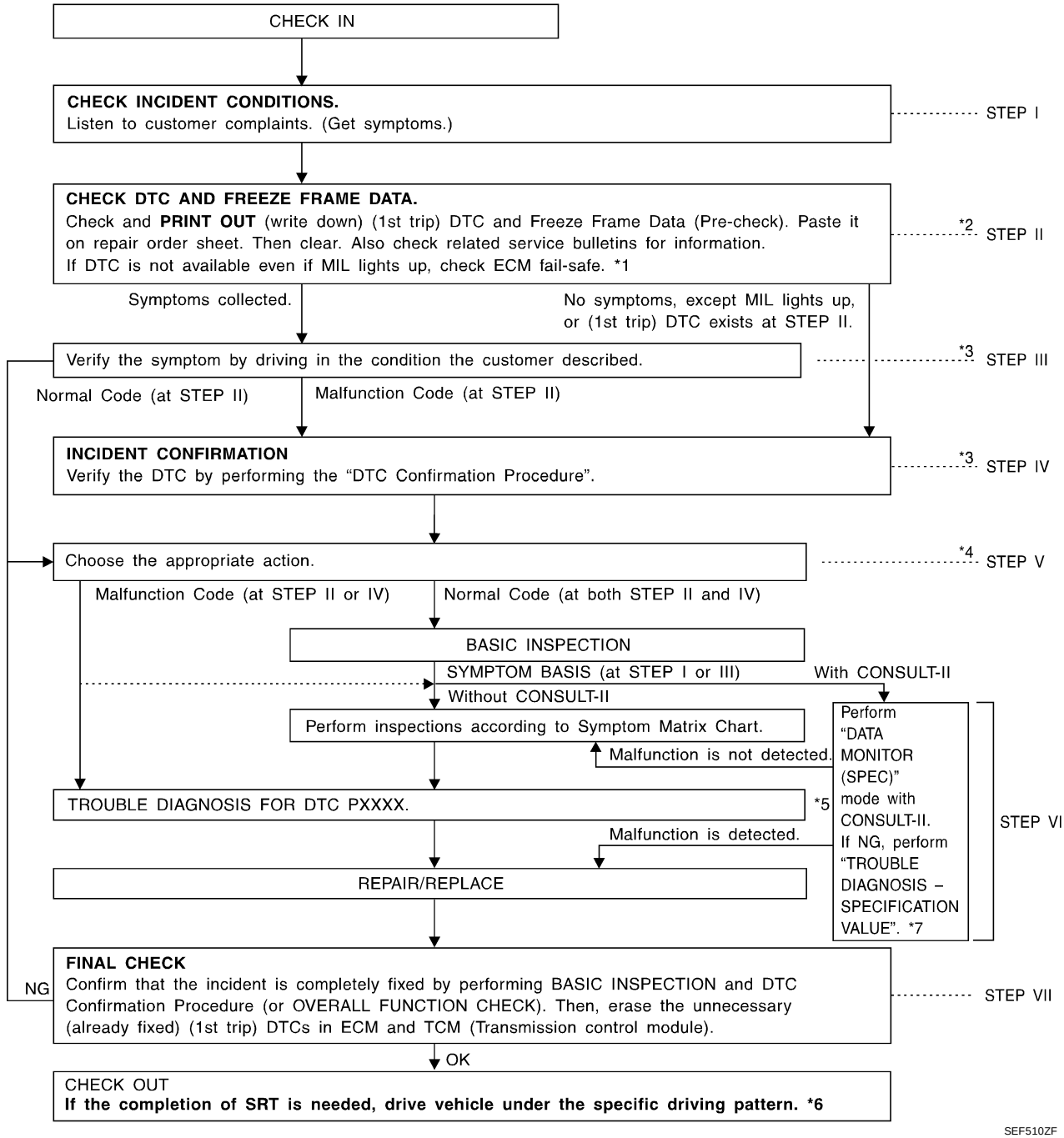
WORK FLOW

Flow Chart



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*1 EC-1288

*2 If time data of “SELF-DIAG RESULTS” is other than “0” or “[1t]”, perform EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

*3 If the incident cannot be verified, perform EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

*4 If the on board diagnostic system cannot be performed, check main power supply and ground circuit. Refer to EC-1340, "POWER SUPPLY CIRCUIT FOR ECM" .

*5 If malfunctioning part cannot be detected, perform EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

*6 EC-1268

*7 EC-1335

Description for Work Flow

STEP	DESCRIPTION
STEP I	Get detailed information about the conditions and the environment when the incident/symptom occurred using the “DIAGNOSTIC WORK SHEET”, EC-1285 .
STEP II	Before confirming the concern, check and write down (print out using CONSULT-II or GST) the (1st trip) DTC and the (1st trip) freeze frame data, then erase the DTC and the data. (Refer to EC-1271 .) The (1st trip) DTC and the (1st trip) freeze frame data can be used when duplicating the incident at STEP III & IV. If the incident cannot be verified, perform EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" . Study the relationship between the cause, specified by (1st trip) DTC, and the symptom described by the customer. (The “Symptom Matrix Chart” will be useful. See EC-1294 .) Also check related service bulletins for information.
STEP III	Try to confirm the symptom and under what conditions the incident occurs. The “DIAGNOSTIC WORK SHEET” and the freeze frame data are useful to verify the incident. Connect CONSULT-II to the vehicle in DATA MONITOR (AUTO TRIG) mode and check real time diagnosis results. If the incident cannot be verified, perform EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" . If the malfunction code is detected, skip STEP IV and perform STEP V.
STEP IV	Try to detect the (1st trip) DTC by driving in (or performing) the “DTC Confirmation Procedure”. Check and read the (1st trip) DTC and (1st trip) freeze frame data by using CONSULT-II or GST. During the (1st trip) DTC verification, be sure to connect CONSULT-II to the vehicle in DATA MONITOR (AUTO TRIG) mode and check real time diagnosis results. If the incident cannot be verified, perform EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" . In case the “DTC Confirmation Procedure” is not available, perform the “Overall Function Check” instead. The (1st trip) DTC cannot be displayed by this check, however, this simplified “check” is an effective alternative. The “NG” result of the “Overall Function Check” is the same as the (1st trip) DTC detection.
STEP V	Take the appropriate action based on the results of STEP I through IV. If the malfunction code is indicated, proceed to TROUBLE DIAGNOSIS FOR DTC PXXXX. If the normal code is indicated, proceed to the BASIC INSPECTION. (Refer to EC-1289 .) If CONSULT-II is available, perform “DATA MONITOR (SPEC)” mode with CONSULT-II and proceed to the “TROUBLE DIAGNOSIS – SPECIFICATION VALUE”. (Refer to EC-1335 .) (If malfunction is detected, proceed to “PARER/REPLACE”.) Then perform inspections according to the Symptom Matrix Chart. (Refer to EC-1294 .)
STEP VI	Identify where to begin diagnosis based on the relationship study between symptom and possible causes. Inspect the system for mechanical binding, loose connectors or wiring damage using (tracing) “Harness Layouts”. Gently shake the related connectors, components or wiring harness with CONSULT-II set in “DATA MONITOR (AUTO TRIG)” mode. Check the voltage of the related ECM terminals or monitor the output data from the related sensors with CONSULT-II. Refer to EC-1304 , EC-1329 . The “Diagnostic Procedure” in EC section contains a description based on open circuit inspection. A short circuit inspection is also required for the circuit check in the Diagnostic Procedure. For details, refer to “Circuit Inspection” in GI-26, "How to Perform Efficient Diagnosis for an Electrical Incident" . Repair or replace the malfunction parts. If malfunctioning part cannot be detected, perform EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .
STEP VII	Once you have repaired the circuit or replaced a component, you need to run the engine in the same conditions and circumstances which resulted in the customer's initial complaint. Perform the “DTC Confirmation Procedure” and confirm the normal code [DTC No. P0000] is detected. If the incident is still detected in the final check, perform STEP VI by using a method different from the previous one. Before returning the vehicle to the customer, be sure to erase the unnecessary (already fixed) (1st trip) DTC in ECM and TCM (Transmission control module). (Refer to EC-1271, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" and AT-435, "HOW TO ERASE DTC" .)

DIAGNOSTIC WORKSHEET

Description

There are many operating conditions that lead to the malfunction of engine components. A good grasp of such conditions can make troubleshooting faster and more accurate.

In general, each customer feels differently about a problem. It is important to fully understand the symptoms or conditions for a customer complaint.

Utilize a diagnostic worksheet like the one on the next page in order to organize all the information for troubleshooting.

Some conditions may cause the MIL to come on steady or blink and DTC to be detected. Examples:

- Vehicle ran out of fuel, which caused the engine to misfire.
- Fuel filler cap was left off or incorrectly screwed on, allowing fuel to evaporate into the atmosphere.

KEY POINTS

WHAT ..... Vehicle & engine model
WHEN ..... Date, Frequencies
WHERE..... Road conditions
HOW ..... Operating conditions, Weather conditions, Symptoms

SEF907L

Worksheet Sample

Customer name MR/MS		Model & Year	VIN
Engine #		Trans.	Mileage
Incident Date		Manuf. Date	In Service Date
Fuel and fuel filler cap		☐ Vehicle ran out of fuel causing misfire ☐ Fuel filler cap was left off or incorrectly screwed on.	
Symptoms	☐ Startability	☐ Impossible to start ☐ No combustion ☐ Partial combustion ☐ Partial combustion affected by throttle position ☐ Partial combustion NOT affected by throttle position ☐ Possible but hard to start ☐ Others [ ]	
	☐ Idling	☐ No fast idle ☐ Unstable ☐ High idle ☐ Low idle ☐ Others [ ]	
	☐ Driveability	☐ Stumble ☐ Surge ☐ Knock ☐ Lack of power ☐ Intake backfire ☐ Exhaust backfire ☐ Others [ ]	
	☐ Engine stall	☐ At the time of start ☐ While idling ☐ While accelerating ☐ While decelerating ☐ Just after stopping ☐ While loading	
Incident occurrence		☐ Just after delivery ☐ Recently ☐ In the morning ☐ At night ☐ In the daytime	
Frequency		☐ All the time ☐ Under certain conditions ☐ Sometimes	
Weather conditions		☐ Not affected	
	Weather	☐ Fine ☐ Raining ☐ Snowing ☐ Others [ ]	
	Temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold ☐ Humid °F	
Engine conditions		☐ Cold ☐ During warm-up ☐ After warm-up Engine speed 0 2,000 4,000 6,000 8,000 rpm	
Road conditions		☐ In town ☐ In suburbs ☐ Highway ☐ Off road (up/down)	
Driving conditions		☐ Not affected ☐ At starting ☐ While idling ☐ At racing ☐ While accelerating ☐ While cruising ☐ While decelerating ☐ While turning (RH/LH) Vehicle speed 0 10 20 30 40 50 60 MPH	
Malfunction indicator lamp		☐ Turned on ☐ Not turned on	

MTBL0017

DTC Inspection Priority Chart

UBS0027G

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 and U1001. Refer to EC-1348 .

Priority	Detected items (DTC)
1	● U1000 U1001 CAN communication line ● P0101 P0102 P0103 P1102 Mass air flow sensor ● P0112 P0113 P0127 Intake air temperature sensor ● P0117 P0118 P0125 Engine coolant temperature sensor ● P0128 Thermostat function ● P0181 P0182 P0183 Fuel tank temperature sensor ● P0221 P0222 P0223 P1223 P1224 P1225 P1226 Throttle position sensor ● P0226 P0227 P0228 P1227 P1228 Accelerator pedal position sensor ● P0327 P0328 Knock sensor ● P0335 Crankshaft position sensor (POS) ● P0340 Camshaft position sensor (PHASE) ● P0460 P0461 P0462 P0463 P1464 Fuel level sensor ● P0500 Vehicle speed sensor ● P0605 ECM ● P1229 Sensor power supply ● P1610-P1615 NATS ● P1706 Park/Neutral position (PNP) switch
2	● P0031 P0032 Heated oxygen sensor 1 heater ● P0037 P0038 Heated oxygen sensor 2 heater ● P0132 P0133 P0134 P1143 P1144 Heated oxygen sensor 1 ● P0138 P0139 P1146 P1147 Heated oxygen sensor 2 ● P0217 Coolant overtemperature enrichment protection ● P0441 EVAP control system purge flow monitoring ● P0444 P0445 P1444 EVAP canister purge volume control solenoid valve ● P0447 P1446 P1448 EVAP canister vent control valve ● P0452 P0453 EVAP control system pressure sensor ● P0506 P0507 Idle speed control system ● P0650 MIL ● P0705-P0725, P0740-P0755, P1705 P1760 A/T related sensors and solenoid valves ● P1065 ECM power supply ● P1111 Intake valve timing control solenoid valve ● P1122 Electric throttle control function ● P1124 P1126 Throttle control motor relay ● P1128 Throttle control actuator ● P1490 P1491 Vacuum cut valve bypass valve ● P1805 Brake switch
3	● P0011 Intake valve timing control ● P0171 P0172 Fuel injection system function ● P0300 - P0304 Misfire ● P0420 Three way catalyst function ● P0442 P0456 P1456 EVAP control system (SMALL LEAK, VERY SMALL LEAK) ● P0455 EVAP control system (GROSS LEAK) ● P0731 - P0734 A/T function ● P1121 Electric throttle control actuator ● P1148 Closed loop control ● P1217 Engine over temperature (OVERHEAT) ● P1564 ASCD steering switch ● P1572 ASCD brake switch ● P1574 ASCD vehicle speed sensor

Fail-safe Chart

UBS0027H

The ECM enters fail-safe mode, if any of the following malfunctions is detected. When the ECM enters the fail-safe mode, the MIL illuminates.

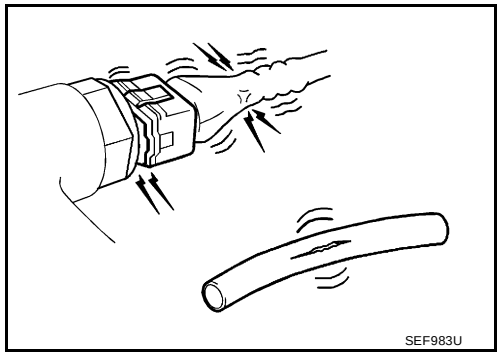
<table>
<tr><th>DTC No.</th><th>Detected items</th><th colspan="2">Engine operating condition in fail-safe mode</th></tr>
<tr><td>P0102
P0103
P1102</td><td>Mass air flow sensor circuit</td><td colspan="2">Engine speed will not rise more than 2,400 rpm due to the fuel cut.</td></tr>
<tr><td rowspan="6">P0117
P0118</td><td rowspan="6">Engine coolant temperature sensor circuit</td><td colspan="2">Engine coolant temperature will be determined by ECM based on the time after turning ignition switch “ON” or “START”.
CONSULT-II displays the engine coolant temperature decided by ECM.</td></tr>
<tr><td>Condition</td><td>Engine coolant temperature decided (CONSULT-II display)</td></tr>
<tr><td>Just as ignition switch is turned ON or Start</td><td>40°C (104°F)</td></tr>
<tr><td>More than approx. 4 minutes after ignition ON or Start</td><td>80°C (176°F)</td></tr>
<tr><td>Except as shown above</td><td>40 - 80°C (104 - 176°F)
(Depends on the time)</td></tr>
<tr><td colspan="2">When the fail-safe system for engine coolant temperature sensor is activated, the cooling fan operates while engine is running.</td></tr>
<tr><td>P0221
P0222
P0223
P1223
P1224</td><td>Throttle position sensor</td><td colspan="2">The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees.
The ECM regulates an opening speed of approx. 5 seconds to an opening of 10 degrees.
So, the acceleration will be poor.</td></tr>
<tr><td>P0226
P0227
P0228
P1227
P1228</td><td>Accelerator pedal position sensor</td><td colspan="2">The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees.
The ECM regulates an opening speed of approx. 5 seconds to an opening of 10 degrees.
So, the acceleration will be poor.</td></tr>
<tr><td>P1121</td><td>Electric throttle control actuator
(ECM detect the throttle valve is stuck open.)</td><td colspan="2">While the vehicle is driving, it slows down gradually by fuel cut. After the vehicle stops, the engine stalls.
The engine can restart in “N” or “P” position, and engine speed will not exceed 1,000 rpm or more.</td></tr>
<tr><td>P1122</td><td>Electric throttle control function</td><td colspan="2">ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.</td></tr>
<tr><td>P1124
P1126</td><td>Throttle control motor relay</td><td colspan="2">ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.</td></tr>
<tr><td>P1128</td><td>Throttle control motor</td><td colspan="2">ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.</td></tr>
<tr><td>P1229</td><td>Sensor power supply</td><td colspan="2">ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.</td></tr>
</table>

Basic Inspection

UBS0027I

1. INSPECTION START

1. Check service records for any recent repairs that may indicate a related problem, or a current need for scheduled maintenance.
2. Open engine hood and check the following:
- Harness connectors for improper connections
- Wiring harness for improper connections, pinches and cut
- Vacuum hoses for splits, kinks and improper connections
- Hoses and ducts for leaks
- Air cleaner clogging
- Gasket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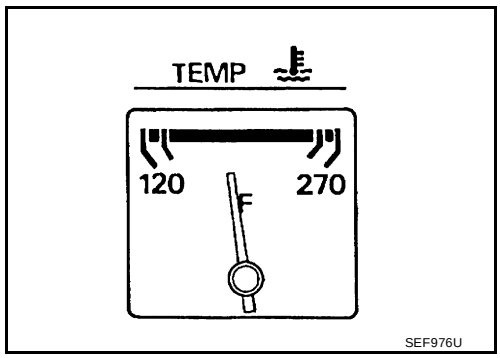
3. Confirm that electrical or mechanical loads are not applied.
- Headlamp switch is OFF.
- Air conditioner switch is OFF.
- Rear window defogger switch is OFF.
- Steering wheel is in the straight-ahead position, etc.

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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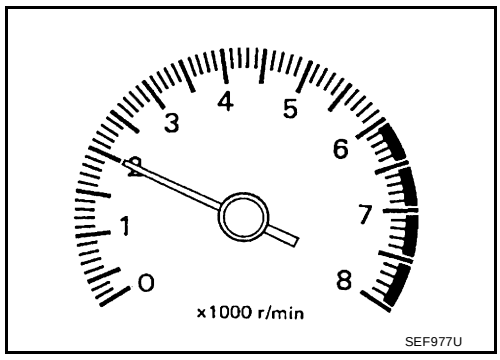
5. Run engine at about 2,000 rpm for about 2 minutes under no-load.
6. Make sure that no DTC is displayed with CONSULT-II or GST.

OK or NG

OK >> GO TO 3.
NG >> GO TO 2.



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2. REPAIR OR REPLACE

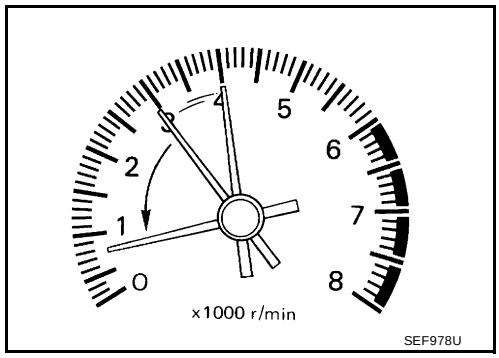
Repair or replace components as necessary according to corresponding “Diagnostic Procedure”.

>> GO TO 3.

3. CHECK TARGET IDLE SPEED

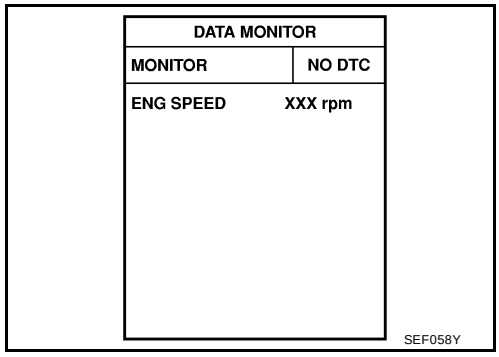
With CONSULT-II

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.

M/T: 700 ± 50 rpm
A/T: 700 ± 50 rpm (in “P” or “N” position)



Without CONSULT-II

1. Run engine at about 2,000 rpm for about 2 minutes under no-load.
2. Rev engine (2,000 to 3,000 rpm) two or three times under no-load, then run engine at idle speed for about 1 minute.
3. Check idle speed.

M/T: 700 ± 50 rpm
A/T: 700 ± 50 rpm (in “P” or “N” position)

OK or NG

OK >> GO TO 10.
NG >> GO TO 4.

4. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform EC-1253, "Accelerator Pedal Released Position Learning" .

>> GO TO 5.

5. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

1. Stop engine.
2. Perform EC-1253, "Throttle Valve Closed Position Learning" .

>> GO TO 6.

6. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-1253, "Idle Air Volume Learning" .

Which is the result CMPLT or INCMP

CMPLT or INCMP

CMPLT >> GO TO 7.
INCMP >> 1. Follow the construction of “Idle Air Volume Learning”.
2. GO TO 4.

7. CHECK TARGET IDLE SPEED AGAIN

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Read idle speed in “DATA MONITOR” mode with CONSULT-II.

M/T: 700 ± 50 rpm
A/T: 700 ± 50 rpm (in “P” or “N” position)

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.

M/T: 700 ± 50 rpm
A/T: 700 ± 50 rpm (in “P” or “N” position)

OK or NG

OK >> GO TO 10.
NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

- Check camshaft position sensor (PHASE) and circuit. Refer to EC-1504 .
- Check crankshaft position sensor (POS) and circuit. Refer to EC-1497 .

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 a problem, but this is the rarely the case.)
2. Perform initialization of NATS system and registration of NATS ignition key IDs. Refer to EC-1273, "NVIS (Nissan Vehicle Immobilizer System — NATS)" .

>> GO TO 4.

10. CHECK IGNITION TIMING

1. Run engine at idle.
2. Check ignition timing with a timing light.

M/T: 15 ± 5° BTDC
A/T: 15 ± 5° BTDC (in “P” or “N” position)

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 11.

11. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform EC-1253, "Accelerator Pedal Released Position Learning" .

>> GO TO 12.

12. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

1. Stop engine.
2. Perform EC-1253, "Throttle Valve Closed Position Learning" .

>> GO TO 13.

13. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-1253, "Idle Air Volume Learning" .

Which is the result CMPLT or INCMP

CMPLT or INCMP

CMPLT >> GO TO 14.
INCMP >> 1. Follow the construction of “Idle Air Volume Learning”.
2. GO TO 4.

14. CHECK TARGET IDLE SPEED AGAIN

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Read idle speed in “DATA MONITOR” mode with CONSULT-II.

M/T: 700 ± 50 rpm
A/T: 700 ± 50 rpm (in “P” or “N” position)

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.

M/T: 700 ± 50 rpm
A/T: 700 ± 50 rpm (in “P” or “N” position)

OK or NG

OK >> GO TO 15.
NG >> GO TO 17.

15. CHECK IGNITION TIMING AGAIN

1. Run engine at idle.
2. Check ignition timing with a timing light.

M/T: 15 ± 5° BTDC
A/T: 15 ± 5° BTDC (in "P" or "N" position)

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 16.

16. CHECK TIMING CHAIN INSTALLATION

Check timing chain installation. Refer to EM-121, "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-1504 .
- Check crankshaft position sensor (POS) and circuit. Refer to EC-1497 .

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 problem, but this is the rarely the case.)
2. Perform initialization of NATS system and registration of NATS ignition key IDs. Refer to EC-1273, "NVIS (Nissan Vehicle Immobilizer System — NATS)" .

>> GO TO 4.

Symptom Matrix Chart

UBS0027J

SYSTEM — BASIC ENGINE CONTROL SYSTEM

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel pump circuit	1	1	2	3	2		2	2			3		2	EC-1801
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			EC-1255
	Injector circuit	1	1	2	3	2		2	2			2			EC-1791
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			EC-1836
Air	Positive crankcase ventilation system	3	3	4	4	4	4	4	4	4		4	1		EC-1848
	Incorrect idle speed adjustment	3	3				1	1	1	1		1			EC-1289
	Electric throttle control actuator	1	1	2	3	3	2	2	2	2		2		2	EC-1614, EC-1616, EC-1623, EC-1628
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC-1289
	Ignition circuit	1	1	2	2	2		2	2			2			EC-1772
Main power supply and ground circuit		2	2	3	3	3		3	3		2	3			EC-1340
Mass air flow sensor circuit		1	1	2	2	2		2	2			2			EC-1364, EC-1371, EC-1604
Engine coolant temperature sensor circuit		1	1	2	2	2	3	2	2	3	1	2			EC-1382, EC-1387
Throttle position sensor circuit			1	2		2	2	2	2	2		2			EC-1462, EC-1469, EC-1674, EC-1680, EC-1682, EC-1690
Accelerator pedal position sensor circuit				3	2	1	2			2					EC-1475, EC-1482, EC-1684
Heated oxygen sensor 1 circuit			1	2	3	2		2	2			2			EC-1395, EC-1401, EC-1410, EC-1633, EC-1639
Knock sensor circuit				2	2							3			EC-1493
Crankshaft position sensor (POS) circuit		2	2												EC-1497
Camshaft position sensor (PHASE) circuit		2	2												EC-1504

	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-1585
Power steering oil pressure switch circuit		2				3	3	3	3					EC-1806
ECM	2	2	3	3	3	3	3	3	3	3	3			EC-1593, EC-1600
Intake valve timing control solenoid valve circuit	3	3	2		1	3	2	2	3		3			EC-1610
VIAS control solenoid valve circuit					1									EC-1783
PNP switch circuit			3		3	3	3	3	3		3			EC-1763
Start signal circuit	2													EC-1797
Refrigerant pressure sensor circuit		2				3	3	3	3		4			EC-1811
Electrical load signal circuit						3	3	3	3					EC-1816
Air conditioner circuit	2	2	3	3	3	3	3	3	3		3		2	MTC-21

1 - 6: The numbers refer to the order of inspection.

(continued on next page)

SYSTEM — ENGINE MECHANICAL & OTHER

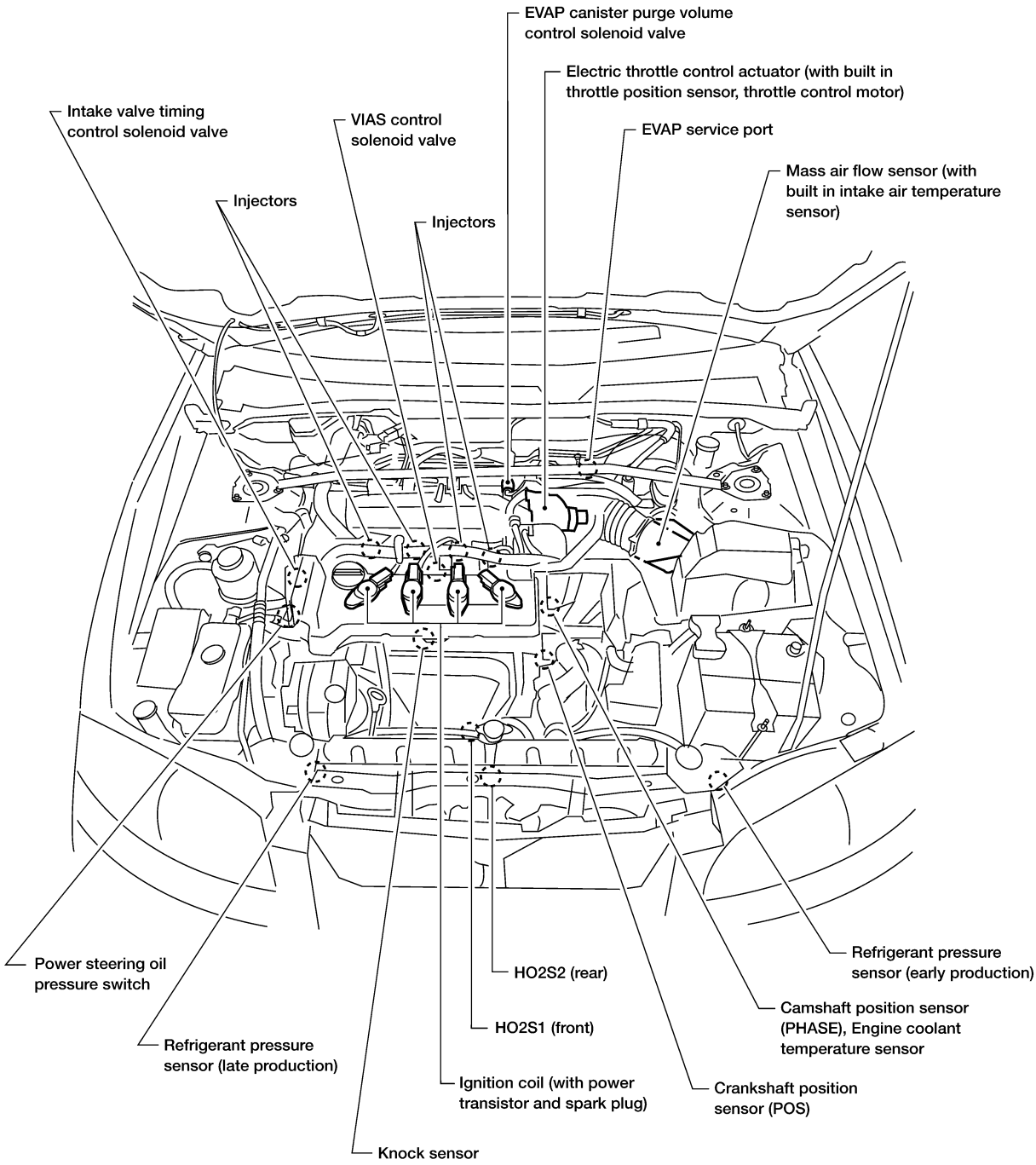
		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	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-10
	Fuel piping			5	5	5		5	5			5			EM-106, FL-2
	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-91
	Air cleaner														EM-91
	Air leakage from air duct (Mass air flow sensor —electric throttle control actuator)														EM-91
	Electric throttle control actuator														EM-93
	Air leakage from intake manifold/ Collector/Gasket														EM-93
Cranking	Battery	1	1	1		1		1	1			1		1	SC-4
	Alternator circuit														SC-22
	Starter circuit	3													SC-9
	Signal plate/Flywheel/Drive plate	6													EM-142
	PNP switch	4													MT-77, MT-136 or AT-495
Engine	Cylinder head	5	5	5	5	5		5	5			5			EM-129
	Cylinder head gasket										4		3		
	Cylinder block	6	6	6	6	6		6	6			6	4		EM-142
	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-121
	Camshaft														EM-111
	Intake valve timing control														EM-121
	Intake valve												3		EM-129
	Exhaust valve														
Exhaust	Exhaust manifold/Tube/Muffler/Gasket	5	5	5	5	5		5	5			5			EM-98, EX-3
	Three way catalyst														
Lubrication	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery	5	5	5	5	5		5	5			5	2		EM-100, LU-19 , LU-18
	Oil level (Low)/Filthy oil														LU-16
Cooling	Radiator/Hose/Radiator filler cap	5	5	5	5	5		5	5		2	5			CO-32
	Thermostat									5					CO-30
	Water pump														CO-28
	Water gallery														CO-25
	Cooling fan									5					CO-37
	Coolant level (low)/Contaminated coolant														CO-26
NVIS (NISSAN Vehicle Immobilizer System — NATS)		1	1												EC-1273 or BL-96

1 - 6: The numbers refer to the order of inspection.

Engine Control Component Parts Location

UBS0027K



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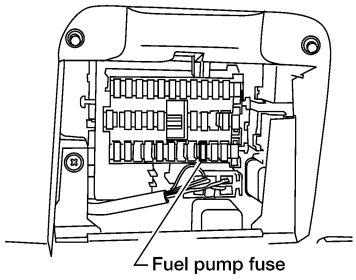
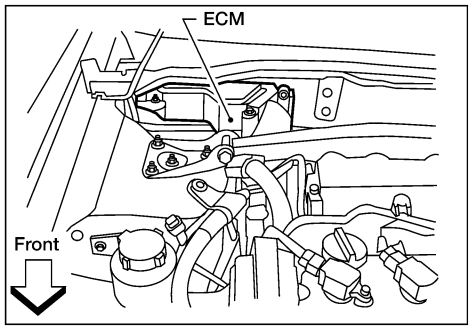
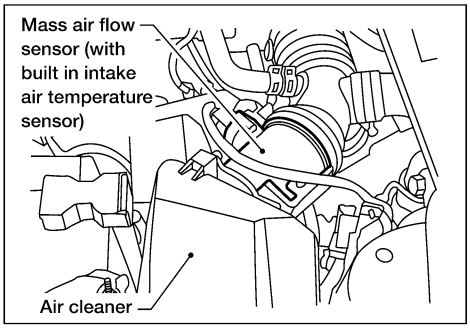
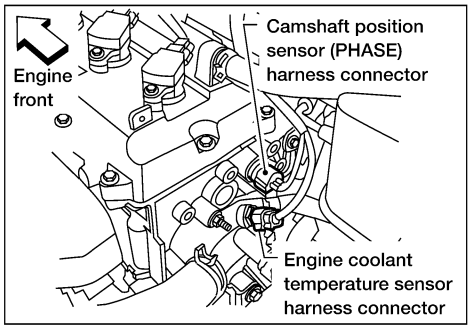
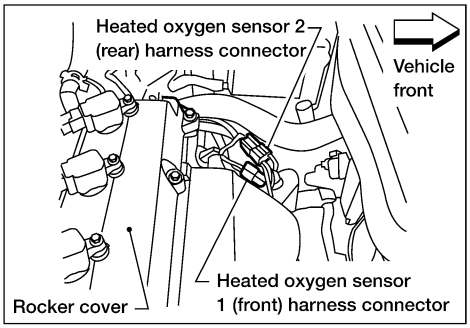
View with coin box removed



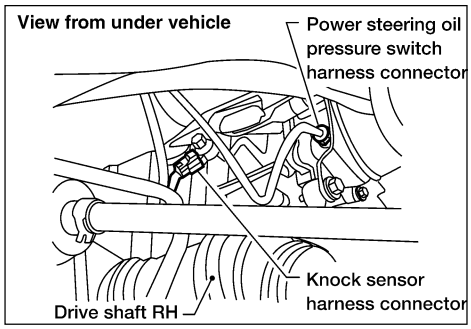




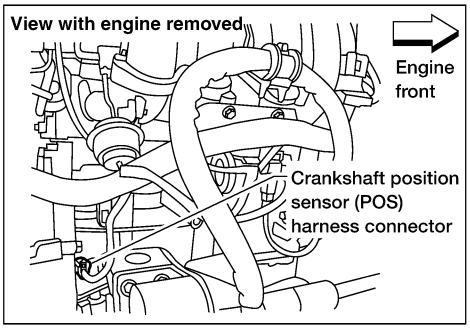


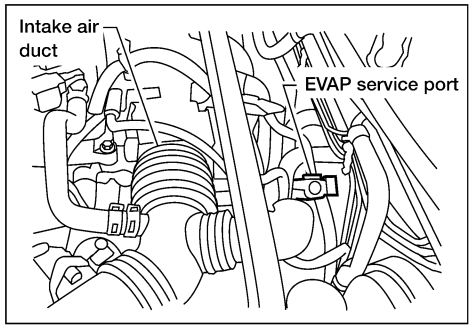


View from under vehicle



View with engine removed





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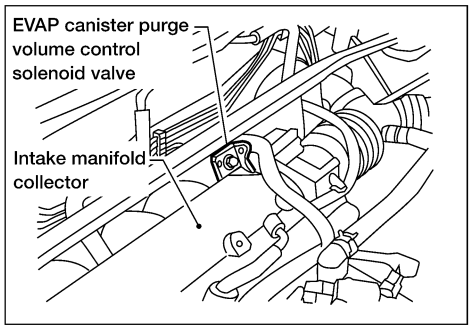
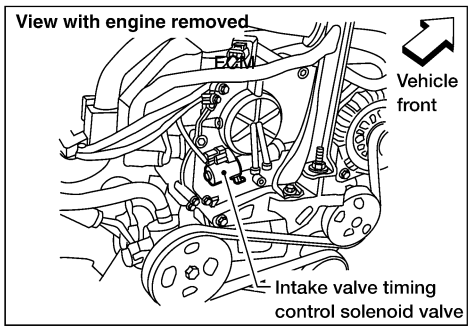
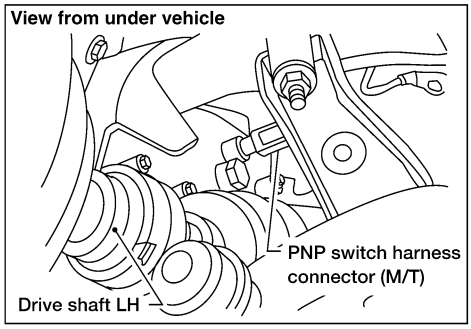
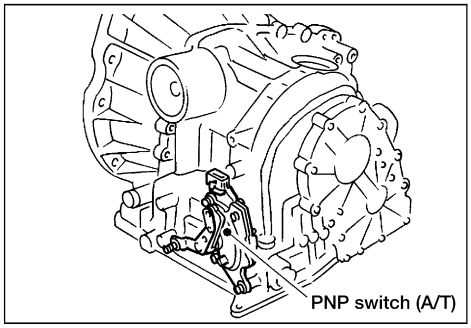
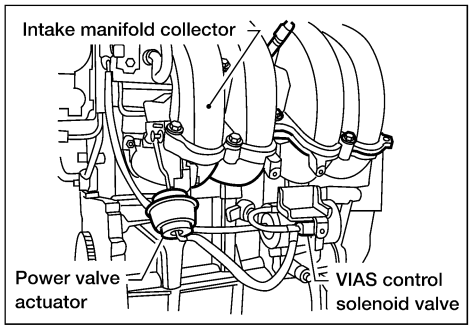
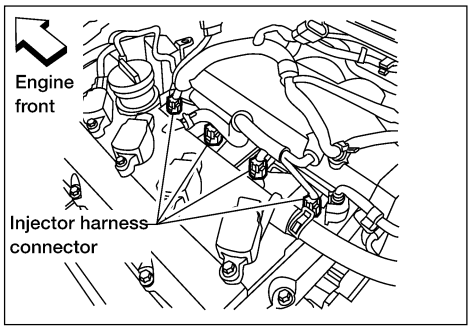

EVAP canister purge volume control solenoid valve
Intake manifold collector

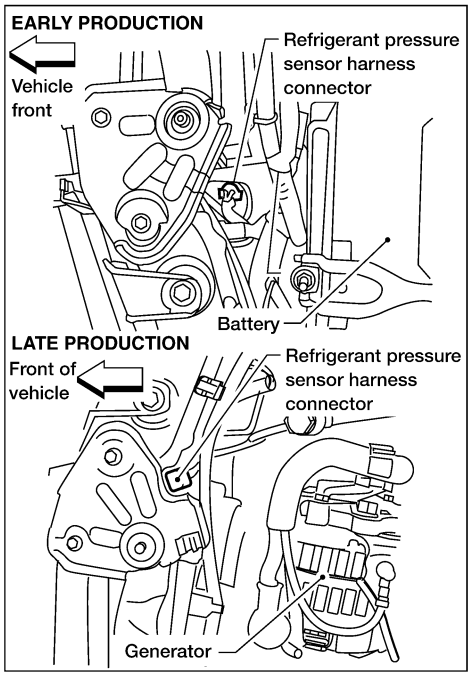

View with engine removed
ECM
Vehicle front
Intake valve timing control solenoid valve

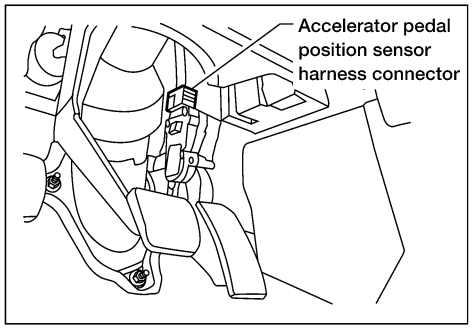

View from under vehicle
PNP switch harness connector (M/T)
Drive shaft LH


PNP switch (A/T)


Intake manifold collector
Power valve actuator
VIAS control solenoid valve


Engine front
Injector harness connector


EARLY PRODUCTION
Vehicle front
Refrigerant pressure sensor harness connector
Battery
LATE PRODUCTION
Front of vehicle
Refrigerant pressure sensor harness connector
Generator


Accelerator pedal position sensor harness connector

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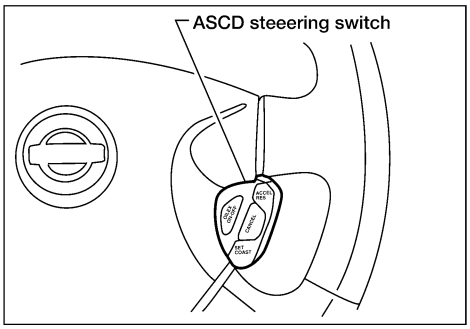
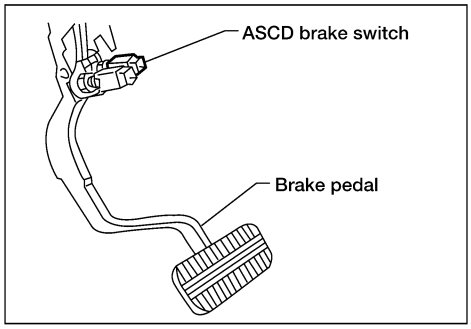
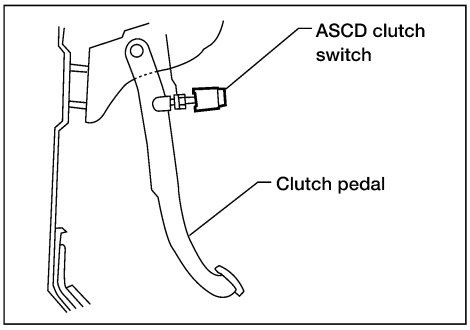
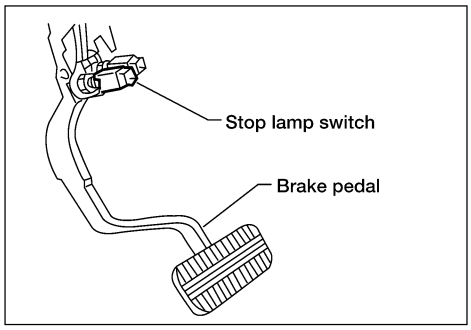
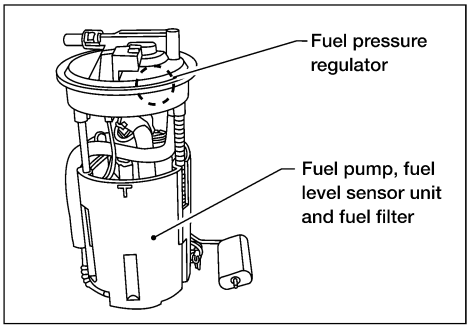
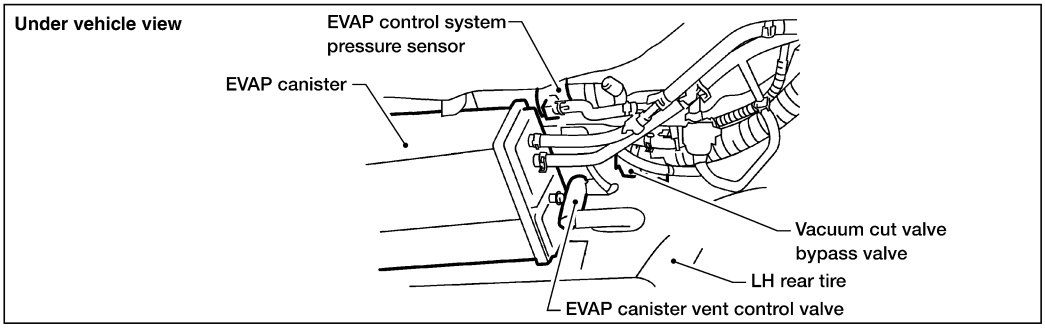

ASCD steeering switch


ASCD brake switch
Brake pedal


ASCD clutch switch
Clutch pedal


Stop lamp switch
Brake pedal

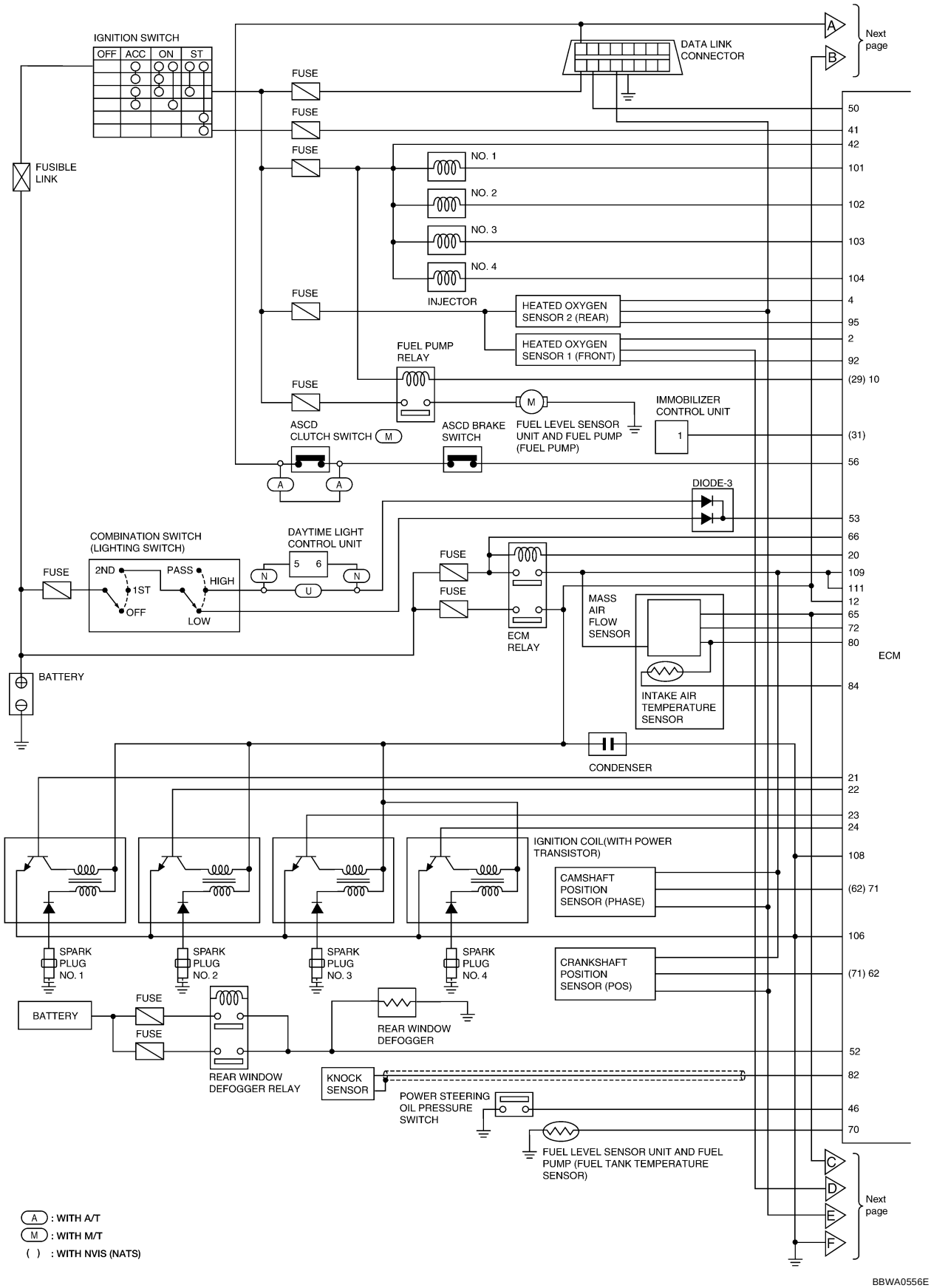

Fuel pressure regulator
Fuel pump, fuel level sensor unit and fuel filter


Under vehicle view
EVAP control system pressure sensor
EVAP canister
Vacuum cut valve bypass valve
LH rear tire
EVAP canister vent control valve

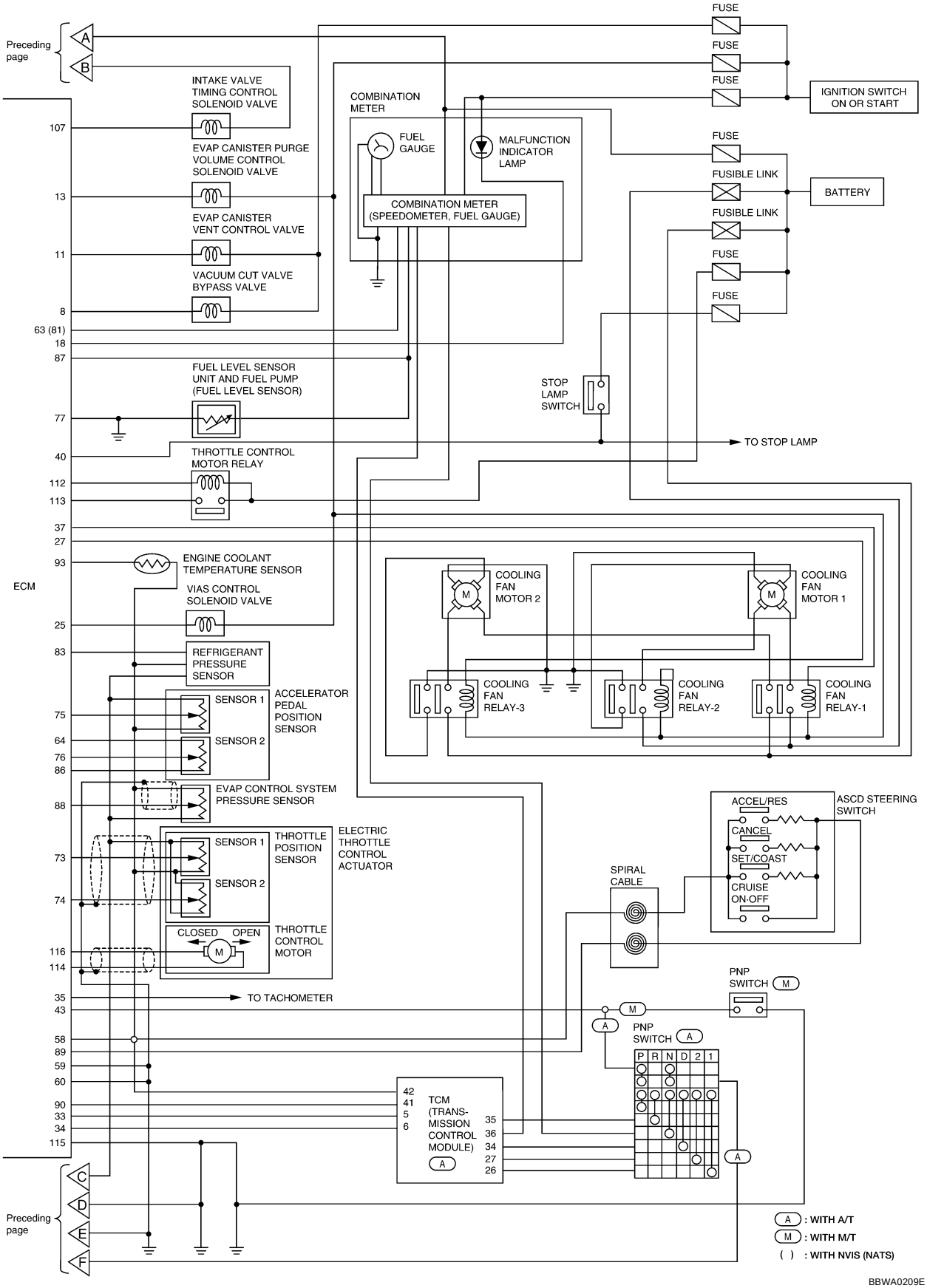
BBIA0123E

Circuit Diagram

UBS0027L



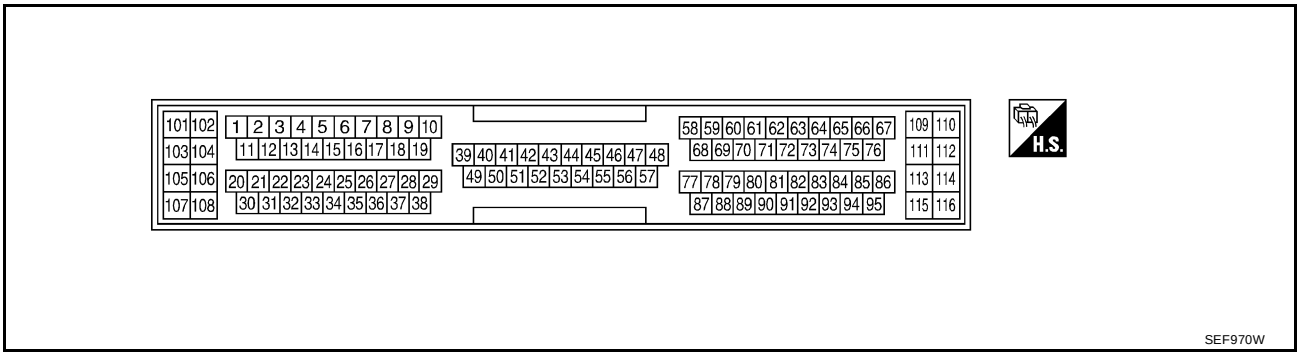
BBWA0556E


Preceding page
A
B
INTAKE VALVE TIMING CONTROL SOLENOID VALVE
107
EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE
13
EVAP CANISTER VENT CONTROL VALVE
11
VACUUM CUT VALVE BYPASS VALVE
8
63 (81)
18
87
FUEL LEVEL SENSOR UNIT AND FUEL PUMP (FUEL LEVEL SENSOR)
77
40
THROTTLE CONTROL MOTOR RELAY
112
113
37
27
93
ENGINE COOLANT TEMPERATURE SENSOR
ECM
VIAS CONTROL SOLENOID VALVE
25
83
REFRIGERANT PRESSURE SENSOR
75
64
76
86
SENSOR 1
SENSOR 2
ACCELERATOR PEDAL POSITION SENSOR
88
EVAP CONTROL SYSTEM PRESSURE SENSOR
73
74
SENSOR 1
SENSOR 2
THROTTLE POSITION SENSOR
ELECTRIC THROTTLE CONTROL ACTUATOR
CLOSED
OPEN
M
116
114
THROTTLE CONTROL MOTOR
35
TO TACHOMETER
43
58
89
59
60
90
33
34
115
COMBINATION METER
FUEL GAUGE
MALFUNCTION INDICATOR LAMP
COMBINATION METER (SPEEDOMETER, FUEL GAUGE)
FUSE
FUSE
FUSE
IGNITION SWITCH ON OR START
FUSE
FUSIBLE LINK
BATTERY
FUSIBLE LINK
FUSE
FUSE
STOP LAMP SWITCH
TO STOP LAMP
COOLING FAN MOTOR 2
COOLING FAN MOTOR 1
COOLING FAN RELAY-3
COOLING FAN RELAY-2
COOLING FAN RELAY-1
ACCEL/RES
CANCEL
SET/COAST
CRUISE ON-OFF
ASCD STEERING SWITCH
SPIRAL CABLE
PNP SWITCH
M
A
PNP SWITCH
A
P R N D 2 1
42
41
5
6
TCM (TRANS-MISSION CONTROL MODULE)
A
35
36
34
27
26
A
Preceding page
C
D
E
F
A : WITH A/T
M : WITH M/T
( ) : WITH NVIS (NATS)

BBWA0209E

ECM Harness Connector Terminal Layout

UBS0027M

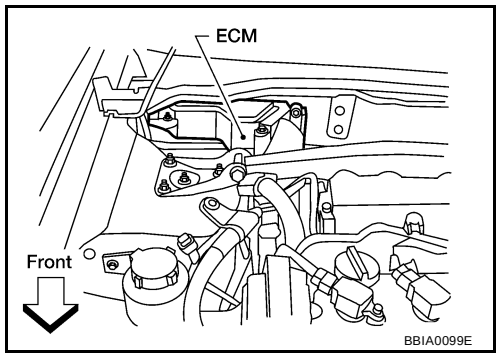


ECM Terminals and Reference Value

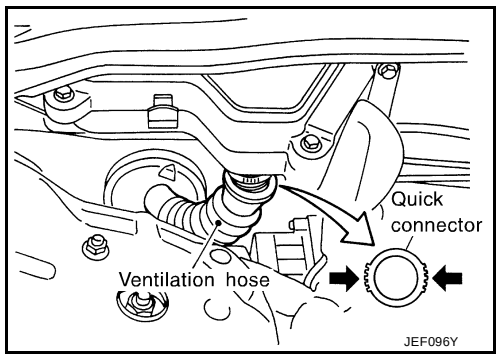
UBS0027N

PREPARATION

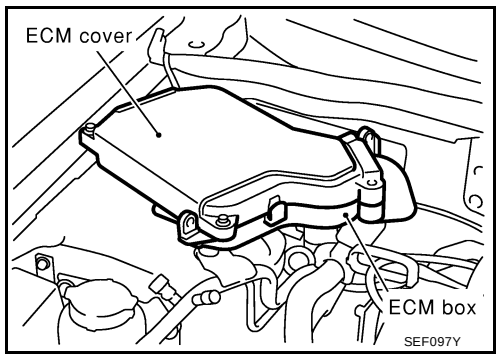
1. ECM is located in the right side of the cowl top (behind the strut tower).
   For this inspection:
   - Remove front strut tower bar. Refer to FSU-5, "FRONT SUSPENSION ASSEMBLY" .
   - Remove engine control harness bracket on the strut tower.



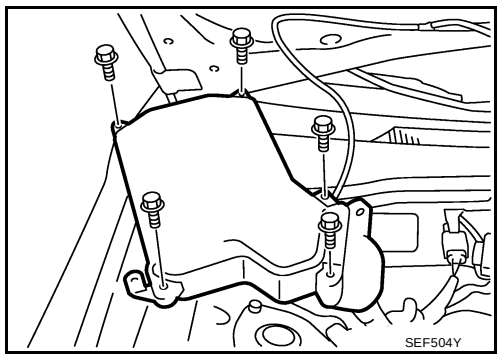
   - Remove quick connector on the ventilation hose.



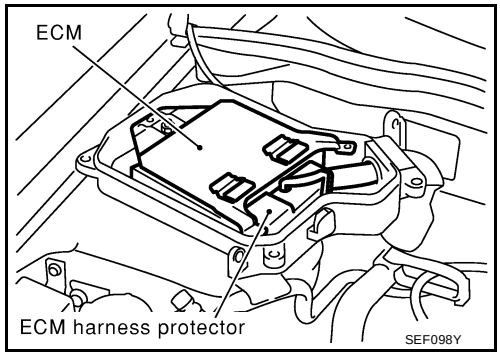
   - Remove ECM fixing bolts and pull it out all the way.



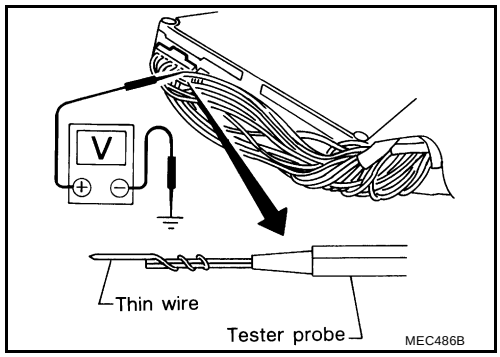
- Remove ECM cover fixing bolts.



- Remove ECM fixing bolts.
- Remove ECM with the harness from the cover.



2. Remove ECM harness protector.
3. Perform all voltage measurements with the connector connected. Extend tester probe as shown to perform tests easily.
   - Open harness securing clip to make testing easier.
   - Use extreme care not to touch 2 pins at one time.
   - Data is for comparison and may not be exact.

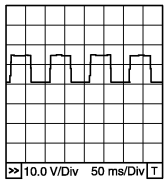


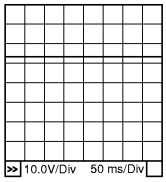
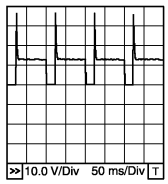
ECM INSPECTION TABLE

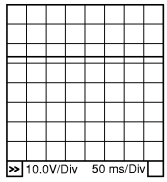
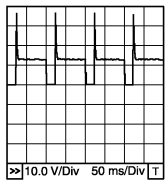
Specification data are reference values and are measured between each terminal and ground.

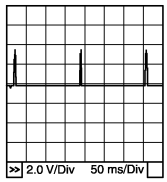
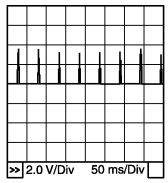
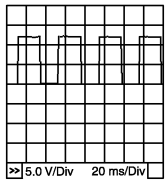
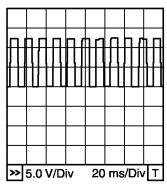
CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

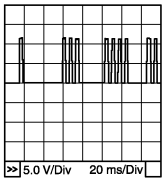
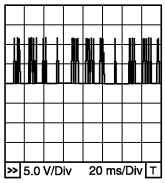
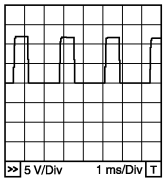
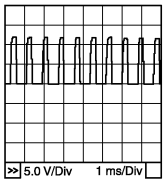
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
2	R/L	Heated oxygen sensor 1 heater	**[Engine is running]** ● **Warm-up condition.** ● Engine speed is below 3,600 rpm.	Approximately 7.0V  PBIB0519E
			[Engine is running] ● Engine speed is above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)

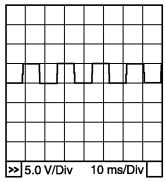
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	P/B	Heated oxygen sensor 2 heater	**[Engine is running]** ● Engine speed is below 3,600 rpm. ● After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more.	0 - 1.0V
			[Ignition switch “ON”] ● Engine stopped **[Engine is running]** ● Engine speed is above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)
8	L/B	Vacuum cut valve bypass valve	**[Ignition switch “ON”]**	BATTERY VOLTAGE (11 - 14V)
10 (Without NVIS) 29 (With NVIS)	B/P	Fuel pump relay	**[Ignition switch “ON”]** ● For 1 seconds after turning ignition switch “ON” **[Engine is running]**	0 - 1.0V
			[Ignition switch “ON”] ● More than 1 seconds after turning ignition switch “ON”.	BATTERY VOLTAGE (11 - 14V)
11	L/Y	EVAP canister vent control valve	**[Ignition switch “ON”]**	BATTERY VOLTAGE (11 - 14V)
12	R	Counter current return	**[Ignition switch “ON”]**	BATTERY VOLTAGE (11 - 14V)
13	PU/W	EVAP canister purge volume control solenoid valve	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)★  PBIB0050E
			[Engine is running] ● Engine speed is about 2,000 rpm (More than 100 seconds after starting engine)	Approximately 10V★  PBIB0520E
18	OR/L	MIL	**[Ignition switch “ON”]**	0 - 1.0V
			[Engine is running] ● Idle speed	BATTERY VOLTAGE (11 - 14V)
20	W/G	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch “OFF”]** ● For 3 seconds after turning ignition switch “OFF”	0 - 1.0V
			[Ignition switch “OFF”] ● 3 seconds passed after turning ignition switch “OFF”	BATTERY VOLTAGE (11 - 14V)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	P/B	Heated oxygen sensor 2 heater	**[Engine is running]** ● Engine speed is below 3,600 rpm. ● After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more.	0 - 1.0V
			[Ignition switch “ON”] ● Engine stopped **[Engine is running]** ● Engine speed is above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)
8	L/B	Vacuum cut valve bypass valve	**[Ignition switch “ON”]**	BATTERY VOLTAGE (11 - 14V)
10 (Without NVIS) 29 (With NVIS)	B/P	Fuel pump relay	**[Ignition switch “ON”]** ● For 1 seconds after turning ignition switch “ON” **[Engine is running]**	0 - 1.0V
			[Ignition switch “ON”] ● More than 1 seconds after turning ignition switch “ON”.	BATTERY VOLTAGE (11 - 14V)
11	L/Y	EVAP canister vent control valve	**[Ignition switch “ON”]**	BATTERY VOLTAGE (11 - 14V)
12	R	Counter current return	**[Ignition switch “ON”]**	BATTERY VOLTAGE (11 - 14V)
13	PU/W	EVAP canister purge volume control solenoid valve	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V) ★  PBIB0050E
			[Engine is running] ● Engine speed is about 2,000 rpm (More than 100 seconds after starting engine)	Approximately 10V ★  PBIB0520E
18	OR/L	MIL	**[Ignition switch “ON”]**	0 - 1.0V
			[Engine is running] ● Idle speed	BATTERY VOLTAGE (11 - 14V)
20	W/G	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch “OFF”]** ● For 3 seconds after turning ignition switch “OFF”	0 - 1.0V
			[Ignition switch “OFF”] ● 3 seconds passed after turning ignition switch “OFF”	BATTERY VOLTAGE (11 - 14V)

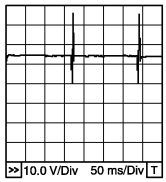
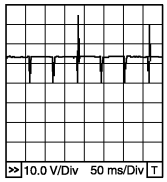
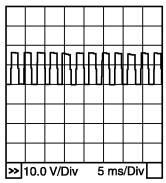
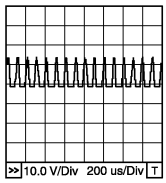
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
21 22 23 24	BR PU L/R GY/R	Ignition signal No. 1 Ignition signal No. 2 Ignition signal No. 3 Ignition signal No. 4	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 0.1V★  PBIB0521E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - 0.2V★  PBIB0522E
25	Y/G	VIAS control solenoid valve	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Engine speed is above 5,000 rpm	0 - 1.0V
26	L/W	Air conditioner relay	**[Engine is running]** ● Both A/C switch and blower switch are “ON” (Compressor operates)	0 - 0.6V
			[Engine is running] ● A/C switch is “OFF”	BATTERY VOLTAGE (11 - 14V)
27	LG/B	Cooling fan relay (High)	**[Engine is running]** ● Cooling fan is not operating	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Cooling fan is high speed operating	0 - 1.0V
33	L	CAN communication line	**[Ignition switch “ON”]**	Approximately 2.6 - 3.2V Output voltage varies with the communication status.
34	Y	CAN communication line	**[Ignition switch “ON”]**	Approximately 1.7 - 2.3V Output voltage varies with the communication status.
36	L/OR	Tachometer	**[Engine is running]** ● **Warm-up condition** ● Idle speed	6 - 7V★  PBIB0523E
			[Engine is running] ● Engine speed is 2,500 rpm	6 - 7V★  PBIB0524E

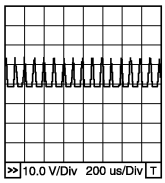
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
37	LG/R	Cooling fan relay (Low)	**[Engine is running]** ● Cooling fan is not operating.	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Cooling fan is operating.	0 - 1.0V
39	SB	ASCD CRUISE lamp	**[Ignition switch “ON”]** ● CRUISE switch is depressed at first time → second time	Approximately 0V ↓ BATTERY VOLTAGE (11 - 14V)
40	R/G	Stop lamp switch	**[Engine is running]** ● Brake pedal fully released	Approximately 0V
			[Engine is running] ● Brake pedal depressed	BATTERY VOLTAGE (11 - 14V)
41	B/Y	Start signal	**[Ignition switch “ON”]**	Approximately 0V
			[Ignition switch “START”]	9 - 14V
42	B/R	Ignition switch	**[Ignition switch “OFF”]**	0V
			[Ignition switch “ON”]	BATTERY VOLTAGE (11 - 14V)
43	G/OR	PNP switch	**[Ignition switch “ON”]** ● Shift lever position is “P” or “N” (A/T models), “Neutral” (M/T models).	Approximately 0V
			[Ignition switch “ON”] ● Except the above gear position	**A/T models** BATTERY VOLTAGE (11 - 14V) **M/T models** Approximately 5V
44	L/R	Air conditioner switch	**[Engine is running]** ● Both A/C switch and blower switch are “ON”	Approximately 0V
			[Engine is running] ● A/C switch is “OFF”	BATTERY VOLTAGE (11 - 14V)
46	G	Power steering oil pressure switch	**[Engine is running]** ● Steering wheel is being turned	Approximately 0V
			[Engine is running] ● Steering wheel is not being turned	Approximately 5V
47	Y/B	ASCD SET lamp	**[Engine is running]** ● SET switch is “ON”. ● ASCD control is operating.	Approximately 0V
			[Engine is running] ● ASCD control is not operating.	BATTERY VOLTAGE (11 - 14V)
50	L/G	Data link connector	**[Ignition switch “ON”]** ● CONSULT-II or GST is disconnected.	Approximately 5V
52	L/W	Electrical load signal (Rear window defogger signal)	**[Ignition switch “ON”]** ● Rear window defogger switch is “ON”	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch “ON”] ● Rear window defogger switch is “OFF”	Approximately 0V
53	R/W	Electrical load signal (Headlamp signal)	**[Ignition switch “ON”]** ● Lighting switch is “2ND” position	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch “ON”] ● Lighting switch is “OFF”	Approximately 0V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
55	LG/B	Heater fan switch	**[Engine is running]** ● Heater fan switch “ON”	Approximately 0V
			[Engine is running] ● Heater fan switch “OFF”	Approximately 5V
56	P/L	ASCD brake switch	**[Ignition switch “ON”]** ● Brake pedal is depressed ● Clutch pedal is depressed (M/T models)	Approximately 0V
			[Ignition switch “ON”] ● Brake pedal is fully released ● Clutch pedal is fully released (M/T models)	BATTERY VOLTAGE (11 - 14V)
58	B	Sensors' ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
59 60 106 108	B/R B B B	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
62 (With NVIS) 71 (Without NVIS)	R	Camshaft position sensor (PHASE)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	1.0 - 4.0V★  PBIB0525E
			[Engine is running] ● Engine speed is 2,000 rpm.	1.0 - 4.0V★  PBIB0526E
62 (Without NVIS) 71 (With NVIS)	R	Crankshaft position sensor (POS)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 3V★  PBIB0527E
			[Engine is running] ● Engine speed is 2,000 rpm	Approximately 3V★  PBIB0528E

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
63 (Without NVIS) 81 (With NVIS)	R/W	Vehicle speed sensor	**[Engine is running]** ● Lift up the vehicle ● Vehicle speed is 40 km/h (25MPH)	Approximately 2.3V★  PBIB0531E
64	R/G	Accelerator pedal position sensor 2 power supply	**[Ignition switch "ON"]**	Approximately 2.5V
65	R	Sensor's power supply	**[Ignition switch "ON"]**	Approximately 5V
66	W/L	Power supply for ECM (Buck-up)	**[Ignition switch "OFF"]**	BATTERY VOLTAGE (11 - 14V)
70	G/OR	Fuel tank temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with fuel tank temperature.
72	OR/L	Mass air flow sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	1.1 - 1.5V
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,500 rpm.	1.6 - 2.0V
73	W	Throttle position sensor 1	**[Ignition switch "ON"]** ● Shift lever position is "D" (A/T model) ● Shift lever position is "1st" (M/T model) ● Accelerator pedal fully released	More than 0.36V
			[Ignition switch "ON"] ● Shift lever position is "D" (A/T model) ● Shift lever position is "1st" (M/T model) ● Accelerator pedal fully depressed	Less than 4.75V
74	G	Throttle position sensor 2	**[Ignition switch "ON"]** ● Shift lever position is "D" (A/T model) ● Shift lever position is "1st" (M/T model) ● Accelerator pedal fully released	Less than 4.75V
			[Ignition switch "ON"] ● Shift lever position is "D" (A/T model) ● Shift lever position is "1st" (M/T model) ● Accelerator pedal fully depressed	More than 0.36V
75	W	Accelerator pedal position sensor 1	**[Ignition switch "ON"]** ● Accelerator pedal fully released	0.41 - 0.71V
			[Ignition switch "ON"] ● Accelerator pedal fully depressed	More than 4.2V
76	R/B	Accelerator pedal position sensor 2	**[Ignition switch "ON"]** ● Accelerator pedal fully released	0.21 - 0.36V
			[Ignition switch "ON"] ● Accelerator pedal fully depressed	More than 2.1V
77	B/W	Fuel level sensor ground	**[Engine is running]** ● Idle speed	Approximately 0V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
80	W/L	Mass air flow sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
82	W	Knock sensor	**[Engine is running]** ● Idle speed	Approximately 2.5V
83	L	Refrigerant pressure sensor	**[Engine is running]** ● **Warm-up condition** ● Both A/C switch and blower switch are “ON”. (Compressor operates.)	1.0 - 4.0V
84	Y/G	Intake air temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with intake air temperature.
86	G	Accelerator pedal position sensor 2 ground	**[Ignition switch “ON”]**	Approximately 0V
87	G/R	Fuel level sensor	**[Ignition switch “ON”]**	Approximately 0 - 4.8V Output voltage varies with fuel level.
88	B/R	EVAP control system pressure sensor	**[Ignition switch “ON”]**	Approximately 1.8 - 4.8V
89	G	ASCD steering switch	**[Ignition switch “ON”]** ● ASCD steering switch is “OFF”.	Approximately 4.0V
			[Ignition switch “ON”] ● CRUISE switch is “ON”.	Approximately 0.5V
			[Ignition switch “ON”] ● CANCEL switch is “ON”.	Approximately 1V
			[Ignition switch “ON”] ● SET/COAST switch is “ON”.	Approximately 2V
			[Ignition switch “ON”] ● ACCEL/RES switch is “ON”.	Approximately 3V
90	W	Accelerator pedal position sensor signal output	**[Ignition switch “ON”]** ● Accelerator pedal fully released	0.41 - 0.71V
			[Ignition switch “ON”] ● Accelerator pedal fully depressed	More than 4.2V
92	W/G	Heated oxygen sensor 1	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)
93	Y	Engine coolant temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with engine coolant temperature.
95	W	Heated oxygen sensor 2	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101 102 103 104	R/B R/W R/Y R/L	Injector No. 1 Injector No. 2 Injector No. 3 Injector No. 4	**[Engine is running]** ● **Warm-up condition** ● Idle speed	BATTERY VOLTAGE (11 - 14V)★  PBIB0529E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14V)★  PBIB0530E
107	G	Intake valve timing control solenoid valve	**[Engine is running]** ● **Warm-up condition** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	Approximately 9V★  PBIB0532E
109 111	R/G R/G	Power supply for ECM	**[Ignition switch “ON”]**	BATTERY VOLTAGE (11 - 14V)
112	OR	Throttle control motor relay	**[Ignition switch “OFF”]**	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch “ON”]	0 - 1.0V
113	R	Throttle control motor relay power supply	**[Ignition switch “ON”]**	BATTERY VOLTAGE (11 - 14V)
114	L	Throttle control motor (Open)	**[Ignition switch “ON”]** ● Shift lever position is “D” (A/T model) ● Shift lever position is “1st” (M/T model) ● Accelerator pedal is depressing	0 - 14V★  PBIB0533E

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
115	B	Throttle control motor ground	**[Engine is running]** ● Idle speed	Approximately 0V
116	P	Throttle control motor (Close)	**[Ignition switch "ON"]** ● Shift lever position is "D" (A/T model) ● Shift lever position is "1st" (M/T model) ● Accelerator pedal is releasing	0 - 14V★  PBIB0534E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

CONSULT-II Function

UBS0027O

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.
Active test	Diagnostic Test Mode in which CONSULT-II drives some actuators apart from the ECMs and also shifts some parameters in a specified range.
Function test	This mode is used to inform customers when their vehicle condition requires periodic maintenance.
DTC & SRT confirmation	The status of system monitoring tests and the self-diagnosis status/result can be confirmed.
ECM part number	ECM part number can be read.

*: The following emission-related diagnostic information is cleared when the ECM memory is erased.

- Diagnostic trouble codes
- 1st trip diagnostic trouble codes
- Freeze frame data
- 1st trip freeze frame data
- System readiness test (SRT) codes
- Test values
- Others

ENGINE CONTROL COMPONENT PARTS/CONTROL SYSTEMS APPLICATION

		Item	DIAGNOSTIC TEST MODE							
			WORK SUP-PORT	SELF-DIAGNOSTIC RESULTS		DATA MONI-TOR	DATA MONI-TOR (SPEC)	ACTIVE TEST	DTC & SRT CONFIRMATION	
				DTC*1	FREEZE FRAME DATA*2				SRT STATUS	DTC WORK SUP-PORT
ENGINE CONTROL COMPONENT PARTS	INPUT	Crankshaft position sensor (POS)		×	×	×	×			
		Camshaft position sensor (PHASE)		×		×	×			
		Mass air flow sensor		×		×	×			
		Engine coolant temperature sensor		×	×	×	×	×		
		Heated oxygen sensor 1		×		×	×		×	×
		Heated oxygen sensor 2		×		×	×		×	×
		Vehicle speed sensor		×	×	×	×			
		Accelerator pedal position sensor		×		×	×			
		Throttle position sensor		×		×	×			
		Fuel tank temperature sensor		×		×	×	×		
		EVAP control system pressure sensor		×		×	×			
		Intake air temperature sensor		×		×	×			
		Knock sensor		×						
		Refrigerant pressure sensor				×	×			
		Ignition switch (start signal)				×	×			
		Closed throttle position switch (accelerator pedal position sensor signal)				×	×			
		Air conditioner switch				×	×			
		Park/neutral position (PNP) switch		×		×	×			
		Stop lamp switch		×		×	×			
		Power steering oil pressure switch				×	×			
		Battery voltage				×	×			
		Load signal				×	×			
		Fuel level sensor		×		×	×			
		ASCD steering switch		×		×	×			
		ASCD brake 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	Injectors				×	×	×		
		Power transistor (Ignition timing)				×	×	×		
		Throttle control motor relay		×		×	×			
		Throttle control motor		×						
		EVAP canister purge volume control solenoid valve		×		×	×	×		×
		Air conditioner relay				×	×			
		Fuel pump relay	×			×	×	×		
		Cooling fan relay		×		×	×	×		
		Heated oxygen sensor 1 heater		×		×	×		×	
		Heated oxygen sensor 2 heater		×		×	×		×	
		EVAP canister vent control valve		×		×	×	×		
		Vacuum cut valve bypass valve		×		×	×	×		×
		Intake valve timing control solenoid valve		×		×	×	×		
		VIAS control solenoid valve				×	×	×		
		Calculated load value			×	×	×			

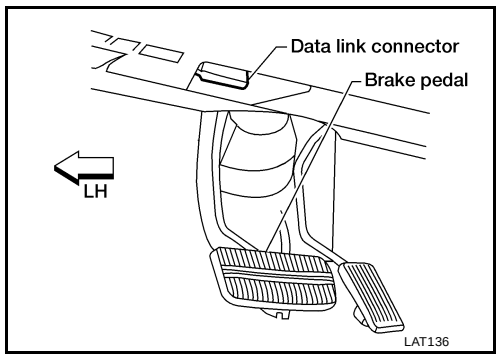
X: Applicable

*1: This item includes 1st trip DTCs.

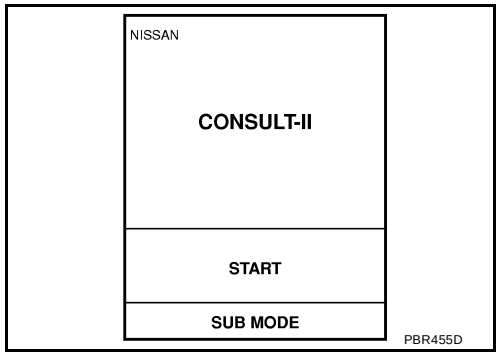
*2: This mode includes 1st trip freeze frame data or freeze frame data. The items appear on CONSULT-II screen in freeze frame data mode only if a 1st trip DTC or DTC is detected. For details, refer to EC-1263 .

CONSULT-II INSPECTION PROCEDURE

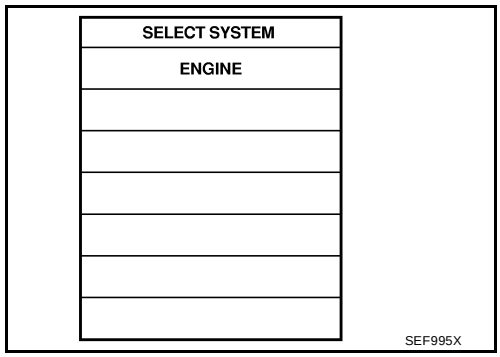
1. Turn ignition switch OFF.
2. Connect “CONSULT-II” to data link connector, which is located under LH dash panel.
3. Turn ignition switch ON.



4. Touch “START”.

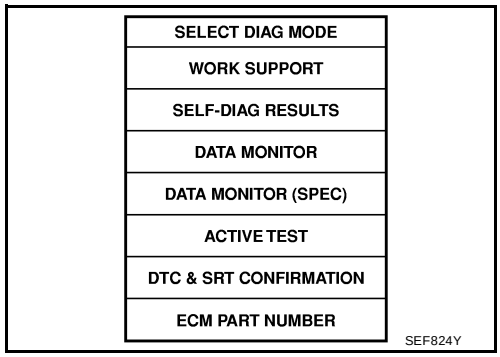


5. Touch “ENGINE”.



6. Perform each diagnostic test mode according to each service procedure.

For further information, see the CONSULT-II Operation Manual.



WORK SUPPORT MODE

Work Item

WORK ITEM	CONDITION	USAGE
FUEL PRESSURE RELEASE	● FUEL PUMP WILL STOP BY TOUCHING “START” DURING IDLING. CRANK A FEW TIMES AFTER ENGINE STALLS.	When releasing fuel pressure from fuel line
IDLE AIR VOL LEARN	● THE IDLE AIR VOLUME THAT KEEPS THE ENGINE WITHIN THE SPECIFIED RANGE IS MEMORIZED IN ECM.	When learning the idle air volume
SELF-LEARNING CONT	● THE COEFFICIENT OF SELF-LEARNING CONTROL MIXTURE RATIO RETURNS TO THE ORIGINAL COEFFICIENT.	When clearing the coefficient of self-learning control value
EVAP SYSTEM CLOSE	OPEN THE VACUUM CUT VALVE BYPASS VALVE AND CLOSE THE EVAP CANISTER VENT CONTROL VALVE IN ORDER TO MAKE EVAP SYSTEM CLOSE UNDER THE FOLLOWING CONDITIONS. ● IGN SW “ON” ● ENGINE NOT RUNNING ● AMBIENT TEMPERATURE IS ABOVE 0°C (32°F). ● NO VACUUM AND NO HIGH PRESSURE IN EVAP SYSTEM ● FUEL TANK TEMP. IS MORE THAN 0°C (32°F). ● WITHIN 10 MINUTES AFTER STARTING “EVAP SYSTEM CLOSE” ● WHEN TRYING TO EXECUTE “EVAP SYSTEM CLOSE” UNDER THE CONDITION EXCEPT ABOVE, CONSULT-II WILL DISCONTINUE IT AND DISPLAY APPROPRIATE INSTRUCTION. **NOTE:** **WHEN STARTING ENGINE, CONSULT-II MAY DISPLAY “BATTERY VOLTAGE IS LOW. CHARGE BATTERY”, EVEN IN USING CHARGED BATTERY.**	When detecting EVAP vapor leak point of EVAP system

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 After adjustment, confirm target ignition timing with a timing light.

*: This function is not necessary in the usual service procedure.

SELF-DIAG RESULTS MODE

Self Diagnostic Item

Regarding items of “DTC and 1st trip DTC”, refer to EC-1221, "INDEX FOR DTC" .)

Freeze Frame Data and 1st Trip Freeze Frame Data

Freeze frame data item*	Description
DIAG TROUBLE CODE [PXXXX]	● The engine control component part/control system has a trouble code, it is displayed as “PXXXX”. (Refer to EC-1221, "INDEX FOR DTC" .)
FUEL SYS-B1	● “Fuel injection system status” at the moment a malfunction is detected is displayed. ● One mode in the following is displayed. “MODE 2”: Open loop due to detected system malfunction “MODE 3”: Open loop due to driving conditions (power enrichment, deceleration enrichment) “MODE 4”: Closed loop - using oxygen sensor(s) as feedback for fuel control “MODE 5”: Open loop - has not yet satisfied condition to go to closed loop
CAL/LD VALUE [%]	● The calculated load value at the moment a malfunction is detected is displayed.
COOLANT TEMP [°C] or [°F]	● The engine coolant temperature at the moment a malfunction is detected is displayed.
L-FUEL TRIM-B1 [%]	● “Long-term fuel trim” at the moment a malfunction is detected is displayed. ● The long-term fuel trim indicates much more gradual feedback compensation to the base fuel schedule than short-term fuel trim.
S-FUEL TRIM-B1 [%]	● “Short-term fuel trim” at the moment a malfunction is detected is displayed. ● The short-term fuel trim indicates dynamic or instantaneous feedback compensation to the base fuel schedule.
ENGINE SPEED [rpm]	● The engine speed at the moment a malfunction is detected is displayed.
VHCL SPEED [km/h] or [mph]	● The vehicle speed at the moment a malfunction is detected is displayed.
B/FUEL SCHDL [msec]	● The base fuel schedule at the moment a malfunction is detected is displayed.
INT/A TEMP SE [°C] or [°F]	● The intake air temperature at the moment a malfunction is detected is displayed.

*: The items are the same as those of 1st trip freeze frame data.

DATA MONITOR MODE

Monitored Item

×: Applicable

Monitored item [Unit]	ECM INPUT SIGNALS	MAIN SIGNALS	CAN DIAG SUPPORT MNTR	Description	Remarks
ENG SPEED [rpm]	×	×		● Indicates the engine speed computed from the signals of the crankshaft position sensor (POS) and camshaft position sensor (PHASE).	● Accuracy becomes poor if engine speed drops below the idle rpm. ● If the signal is interrupted while the engine is running, an abnormal value may be indicated.
MAS A/F SE-B1 [V]	×	×		● The signal voltage of the mass air flow sensor is displayed.	● When the engine is stopped, a certain value is indicated.
B/FUEL SCHDL [msec]		×		● “Base fuel schedule” indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.	
A/F ALPHA-B1 [%]		×		● The mean value of the air-fuel ratio feedback correction factor per cycle is indicated.	● When the engine is stopped, a certain value is indicated. ● This data also includes the data for the air-fuel ratio learning control.
COOLAN TEMP/S [°C] or [°F]	×	×		● The engine coolant temperature (determined by the signal voltage of the engine coolant temperature sensor) is displayed.	● When the engine coolant temperature sensor is open or short-circuited, ECM enters fail-safe mode. The engine coolant temperature determined by the ECM is displayed.
HO2S1 (B1) [V]	×	×		● The signal voltage of the heated oxygen sensor 1 is displayed.	
HO2S2 (B1) [V]	×	×		● The signal voltage of the heated oxygen sensor 2 is displayed.	
HO2S1 MNTR (B1) [RICH/LEAN]	×	×		● Display of heated oxygen sensor 1 signal during air-fuel ratio feedback control: RICH ... means the mixture became “rich”, and control is being affected toward a leaner mixture. LEAN ... means the mixture became “lean”, and control is being affected toward a rich mixture.	● After turning ON the ignition switch, “RICH” is displayed until air-fuel mixture ratio feedback control begins. ● When the air-fuel ratio feedback is clamped, the value just before the clamping is displayed continuously.
HO2S2 MNTR (B1) [RICH/LEAN]	×			● Display of heated oxygen sensor 2 signal: RICH ... means the amount of oxygen after three way catalyst is relatively small. LEAN ... means the amount of oxygen after three way catalyst is relatively large.	● When the engine is stopped, a certain value is indicated.
VHCL SPEED SE [km/h] or [mph]	×	×		● The vehicle speed computed from the vehicle speed signal is displayed.	
BATTERY VOLT [V]	×	×		● The power supply voltage of ECM is displayed.	
ACCEL SEN 1 [V]	×	×		● The accelerator pedal position sensor signal voltage is displayed.	
ACCEL SEN 2 [V]	×				
THRTL SEN 1 [V]	×	×		● The throttle position sensor signal voltage is displayed.	
THRTL SEN 2 [V]	×				

Monitored item [Unit]	ECM INPUT SIG-NALS	MAIN SIG-NALS	CAN DIAG SUP-PORT MNTR	Description	Remarks
FUEL T/TEMP SE [°C] or [°F]	×			● The fuel temperature (determined by the signal voltage of the fuel tank temperature sensor) is displayed.	
INT/A TEMP SE [°C] or [°F]	×	×		● The intake air temperature (determined by the signal voltage of the intake air temperature sensor) is indicated.	
EVAP SYS PRES [V]	×			● The signal voltage of EVAP control system pressure sensor is displayed.	
ABSOL PRES/SE [V]	×			● The signal voltage of EVAP control system pressure sensor is displayed.	
FUEL LEVEL SE [V]	×			● The signal voltage of the fuel level sensor is displayed.	
START SIGNAL [ON/OFF]	×	×		● Indicates [ON/OFF] condition from the starter signal.	● After starting the engine, [OFF] is displayed regardless of the starter signal.
CLSD THL POS [ON/OFF]	×	×		● Indicates idle position [ON/OFF] computed by ECM according to the accelerator pedal position sensor signal.	
AIR COND SIG [ON/OFF]	×	×		● Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioner signal.	
P/N POSI SW [ON/OFF]	×	×		● Indicates [ON/OFF] condition from the park/neutral position (PNP) switch signal.	
PW/ST SIGNAL [ON/OFF]	×	×		● [ON/OFF] condition of the power steering oil pressure switch as determined by the power steering oil pressure signal is indicated.	
LOAD SIGNAL [ON/OFF]	×	×		● Indicates [ON/OFF] condition from the electrical load signal. ON ... Rear window defogger switch is ON and/or lighting switch is in 2nd position. OFF ... Both rear window defogger switch and lighting switch are OFF.	
IGNITION SW [ON/OFF]	×	×		● Indicates [ON/OFF] condition from ignition switch.	
HEATER FAN SW [ON/OFF]	×			● Indicates [ON/OFF] condition from the heater fan switch signal.	
BRAKE SW [ON/OFF]	×			● Indicates [ON/OFF] condition from the stop lamp switch signal.	
INJ PULSE-B1 [msec]		×		● Indicates the actual fuel injection pulse width compensated by ECM according to the input signals.	● When the engine is stopped, a certain computed value is indicated.
IGN TIMING [BTDC]		×		● Indicates the ignition timing computed by ECM according to the input signals.	● When the engine is stopped, a certain value is indicated.
CAL/LD VALUE [%]				● “Calculated load value” indicates the value of the current airflow divided by peak airflow.	
MASS AIRFLOW [g·m/s]				● Indicates the mass airflow computed by ECM according to the signal voltage of the mass air flow sensor.	

Monitored item [Unit]	ECM INPUT SIG-NALS	MAIN SIG-NALS	CAN DIAG SUP-PORT MNTR	Description	Remarks
PURG VOL C/V [%]				● Indicates the EVAP canister purge volume control solenoid valve control value computed by the ECM according to the input signals. ● The opening becomes larger as the value increases.	
INT/V TIM (B1) [°CA]				● Indicates [°CA] of intake camshaft advanced angle.	
INT/V SOL (B1) [%]				● The control condition of the intake valve timing control solenoid valve (determined by ECM according to the input signals) is indicated. ON ... intake valve timing control is operating. OFF ... Intake valve timing control is not operating.	
VIAS S/V [ON/OFF]				● The control condition of the VIAS control solenoid valve (determined by ECM according to the input signals) is indicated. ON ... VIAS control solenoid valve is operating. OFF ... VIAS control solenoid valve is not operating.	
AIR COND RLY [ON/OFF]		×		● The air conditioner relay control condition (determined by ECM according to the input signals) is indicated.	
FUEL PUMP RLY [ON/OFF]		×		● Indicates the fuel pump relay control condition determined by ECM according to the input signals.	
VC/V BYPASS/V [ON/OFF]				● The control condition of the vacuum cut valve bypass valve (determined by ECM according to the input signals) is indicated. ON ... Open OFF ... Closed	
VENT CONT/V [ON/OFF]				● The control condition of the EVAP canister vent control valve (determined by ECM according to the input signals) is indicated. ON ... Closed OFF ... Open	
THRTL RELAY [ON/OFF]				● Indicates the throttle control motor relay control condition determined by the ECM according to the input signals.	
COOLING FAN [HI/LOW/OFF]				● Indicates the condition of the cooling fan (determined by ECM according to the input signals). HI ... High speed operation LOW ... Low speed operation OFF ... Stop	
HO2S1 HTR (B1) [ON/OFF]				● Indicates [ON/OFF] condition of heated oxygen sensor 1 heater determined by ECM according to the input signals.	

Monitored item [Unit]	ECM INPUT SIG-NALS	MAIN SIG-NALS	CAN DIAG SUP-PORT MNTR	Description	Remarks
HO2S2 HTR (B1) [ON/OFF]				● Indicates [ON/OFF] condition of heated oxygen sensor 2 heater determined by ECM according to the input signals.	
IDL A/V LEARN [YET/CMPLT/ INCMP]				● Display the condition of idle air volume learning YET ... Idle air volume learning has not been performed yet. CMPLT ... Idle air volume learning has already been performed successfully. INCMP ... Idle air volume learning has not been performed successfully.	
TRVL AFTER MIL [km] or [mile]				● Distance traveled while MIL is activated.	
O2SEN HTR DTY [%]				● Indicates the heated oxygen sensor 1 heater control value computed by the ECM according to the input signals.	
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.	
SET VHCL SPD [km/h] or [mph]				● The preset vehicle speed is displayed.	
MAIN SW [ON/OFF]				● Indicates [ON/OFF] condition from CRUISE switch signal.	
CANCEL SW [ON/OFF]				● Indicates [ON/OFF] condition from CAN-CEL switch signal.	
RESUME/ACC SW [ON/OFF]				● Indicates [ON/OFF] condition from ACCEL/RES switch signal.	
SET SW [ON/OFF]				● Indicates [ON/OFF] condition from COAST/SET switch signal.	
BRAKE SW1 SW [ON/OFF]				● Indicates [ON/OFF] condition from ASCD brake switch signal, and ASCD clutch switch signal (M/T models).	
BRAKE SW2 SW [ON/OFF]				● Indicates [ON/OFF] condition of stop lamp switch signal.	
VHCL SPD CUT [NON/CUT]				● Indicates the vehicle cruise condition. NON ... Vehicle speed is maintained at the ASCD set speed. 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. NON ... Vehicle speed is maintained at the ASCD set speed. 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.	

Monitored item [Unit]	ECM INPUT SIG-NALS	MAIN SIG-NALS	CAN DIAG SUP-PORT MNTR	Description	Remarks
AT OD CANCEL [ON/OFF]				● Indicates [ON/OFF] condition of A/T O/D cancel signal sent from the TCM.	
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. ● Figures with "#"s are temporary ones. They are the same figures as an actual piece of data which was just previously measured.
Frequency [msec], [Hz] or [%]					
DUTY-HI					
DUTY-LOW					
PLS WIDTH-HI					
PLS WIDTH-LOW					
CAN COMM [OK/NG]			×	● Indicates the communication condition of CAN communication line.	● These items are not displayed in "SELECTION FROM MENU" mode.
CAN CIRC 1 [OK/UNKWN]			×		
CAN CIRC 2 [OK/UNKWN]			×		
CAN CIRC 3 [OK/UNKWN]			×		
CAN CIRC 4 [OK/UNKWN]			×		
CAN CIRC 5 [OK/UNKWN]			×		
CAN CIRC 6 [OK/UNKWN]			×		
CAN CIRC 7 [OK/UNKWN]			×		

NOTE:
- Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.

DATA MONITOR (SPEC) MODE

Monitored Item

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
ENG SPEED [rpm]	×		● Indicates the engine speed computed from the signal of the crankshaft position sensor (POS).	
MAS A/F SE-B1 [V]	×	×	● The signal voltage of the mass air flow sensor specification is displayed.	● When engine is running specification range is indicated.

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
B/FUEL SCHDL [msec]			● “Base fuel schedule” indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.	● When engine is running specification range is indicated.
A/F ALPHA-B1 [%]		×	● The mean value of the air-fuel ratio feedback correction factor per cycle is indicated.	● When engine is running specification range is indicated. ● This data also includes the data for the air-fuel ratio learning control.

NOTE:
- Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.

ACTIVE TEST MODE

Test Item

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
FUEL INJECTION	● Engine: Return to the original trouble condition ● Change the amount of fuel injection using CONSULT-II.	If trouble symptom disappears, see CHECK ITEM.	● Harness and connectors ● Fuel injectors ● Heated oxygen sensor 1
IGNITION TIMING	● Engine: Return to the original trouble condition ● Timing light: Set ● Retard the ignition timing using CONSULT-II.	If trouble symptom disappears, see CHECK ITEM.	● Perform “Idle Air Volume Learning”.
POWER BALANCE	● Engine: After warming up, idle the engine. ● A/C switch “OFF” ● Shift lever “N” ● Cut off each injector signal one at a time using CONSULT-II.	Engine runs rough or dies.	● Harness and connectors ● Compression ● Fuel injectors ● Power transistor ● Spark plugs ● Ignition coils
COOLING FAN	● Ignition switch: ON ● Turn the cooling fan “ON” and “OFF” with CONSULT-II.	Cooling fan moves and stops.	● Harness and connectors ● Cooling fan relay ● Cooling fan motor
ENG COOLANT TEMP	● Engine: Return to the original trouble condition ● Change the engine coolant temperature using CONSULT-II.	If trouble symptom disappears, see CHECK ITEM.	● Harness and connectors ● Engine coolant temperature sensor ● Fuel injectors
FUEL PUMP RELAY	● Ignition switch: ON (Engine stopped) ● Turn the fuel pump relay “ON” and “OFF” using CONSULT-II and listen to operating sound.	Fuel pump relay makes the operating sound.	● Harness and connectors ● Fuel pump relay
VIAS SOL VALVE	● Ignition switch: ON ● Turn solenoid valve “ON” and “OFF” with CONSULT-II and listen for operating sound.	Solenoid valve makes an operating sound.	● Harness and connectors ● Solenoid valve
PURG VOL CONT/V	● Engine: After warming up, run engine at 1,500 rpm. ● Change the EVAP canister purge volume control solenoid valve opening percent using CONSULT-II.	Engine speed changes according to the opening percent.	● Harness and connectors ● Solenoid valve

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
FUEL/T TEMP SEN	● Change the fuel tank temperature using CONSULT-II.		
VENT CONTROL/V	● Ignition switch: ON (Engine stopped) ● Turn solenoid valve “ON” and “OFF” with the CONSULT-II and listen to operating sound.	Solenoid valve makes an operating sound.	● Harness and connectors ● Solenoid valve
VC/V BYPASS/V	● Ignition switch: ON (Engine stopped) ● Turn solenoid valve “ON” and “OFF” with the CONSULT-II and listen to operating sound.	Solenoid valve makes an operating sound.	● Harness and connectors ● Solenoid valve
V/T ASSIGN ANGLE	● Engine: Return to the original trouble condition ● Change intake valve timing using CONSULT-II.	If trouble symptom disappears, see CHECK ITEM.	● Harness and connectors ● Intake valve timing control solenoid valve

DTC & SRT CONFIRMATION MODE

SRT STATUS Mode

For details, refer to EC-1263, "SYSTEM READINESS TEST (SRT) CODE" .

SRT Work Support Mode

This mode enables a technician to drive a vehicle to set the SRT while monitoring the SRT status.

DTC Work Support Mode

Test mode	Test item	Condition	Reference page
EVAP SYSTEM	PURGE FLOW P0441	Refer to corresponding trouble diagnosis for DTC.	EC-1514
	EVAP SML LEAK P0442/P1442*		EC-1520
	EVAP V/S SML LEAK P0456/P1456		EC-1565, EC-1717
	PURG VOL CN/V P1444		EC-1694
	VC CUT/V BP/V P1491		EC-1736
HO2S1	HO2S1 (B1) P0133		EC-1401
	HO2S1 (B1) P0134		EC-1410
	HO2S1 (B1) P1143		EC-1633
	HO2S1 (B1) P1144		EC-1639
H02S2	HO2S2 (B1) P0139		EC-1423
	HO2S2 (B1) P1146		EC-1645
	HO2S2 (B1) P1147		EC-1652

*: DTC P1442 does not apply to QR25DE Sentra models, but appears in DTC Work Support Mode screens for other Sentra Models.

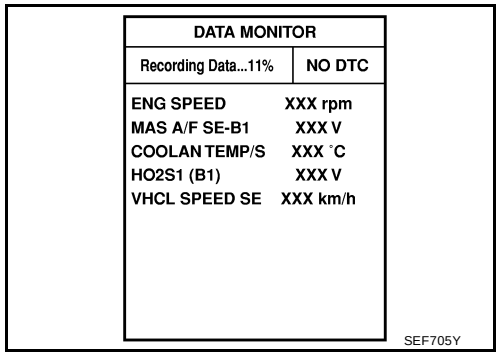
REAL TIME DIAGNOSIS IN DATA MONITOR MODE (RECORDING VEHICLE DATA)

Description

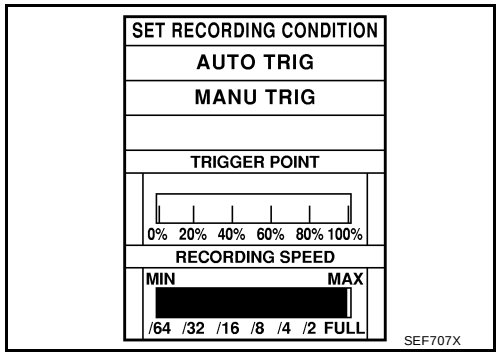
CONSULT-II has two kinds of triggers and they can be selected by touching “SETTING” in “DATA MONITOR” mode.

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.

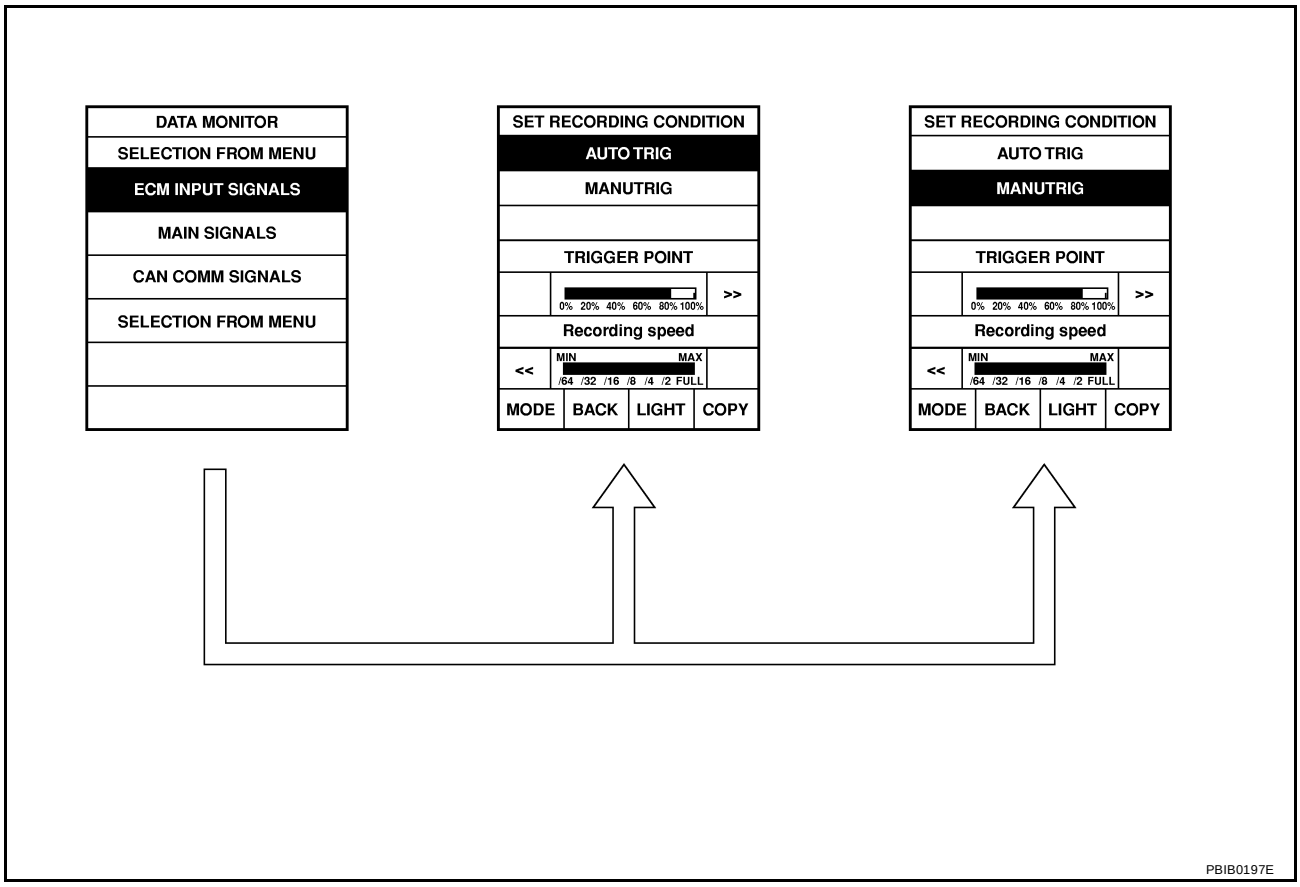


2. “MANU TRIG” (Manual trigger):
   - DTC/1st trip DTC and malfunction item will not be displayed automatically on CONSULT-II screen even though a malfunction is detected by ECM.
     DATA MONITOR can be performed continuously even though a malfunction is detected.



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.



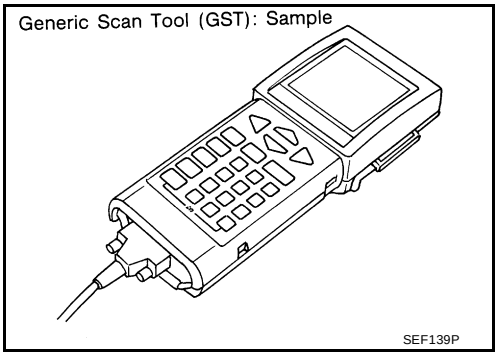
PBIB0197E

Generic Scan Tool (GST) Function

UBS0027P

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.



SEF139P

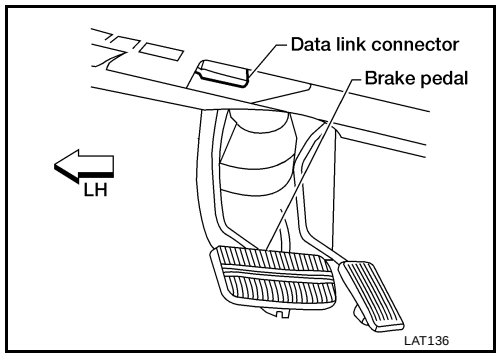
FUNCTION

Diagnostic test mode		Function
MODE 1	READINESS TESTS	This mode gains access to current emission-related data values, including analog inputs and outputs, digital inputs and outputs, and system status information.
MODE 2	(FREEZE DATA)	This mode gains access to emission-related data value which were stored by ECM during the freeze frame. For details, refer to EC-1263, "FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA" .
MODE 3	DTCs	This mode gains access to emission-related power train trouble codes which were stored by ECM.

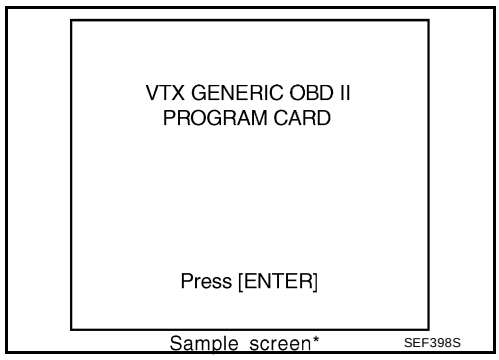
Diagnostic test mode		Function
MODE 4	CLEAR DIAG INFO	This mode can clear all emission-related diagnostic information. This includes: ● Clear number of diagnostic trouble codes (MODE 1) ● Clear diagnostic trouble codes (MODE 3) ● Clear trouble code for freeze frame data (MODE 1) ● Clear freeze frame data (MODE 2) ● Reset status of system monitoring test (MODE 1) ● Clear on board monitoring test results (MODE 6 and 7)
MODE 6	(ON BOARD TESTS)	This mode accesses the results of on board diagnostic monitoring tests of specific components/systems that are not continuously monitored.
MODE 7	(ON BOARD TESTS)	This mode enables the off board test drive to obtain test results for emission-related powertrain components/systems that are continuously monitored during normal driving conditions.
MODE 8	—	This mode can close EVAP system in ignition switch “ON” position (Engine stopped). When this mode is performed, the following parts can be opened or closed. ● EVAP canister vent control valve open ● Vacuum cut valve bypass valve closed In the following conditions, this mode cannot function. ● Low ambient temperature ● Low battery voltage ● Engine running ● Ignition switch “OFF” ● Low fuel temperature ● Too much pressure is applied to EVAP system
MODE 9	(CALIBRATION ID)	This mode enables the off-board test device to request specific vehicle information such as Vehicle Identification Number (VIN) and Calibration IDs.

GST INSPECTION PROCEDURE

1. Turn ignition switch OFF.
2. Connect “GST” to data link connector, which is located under LH dash panel near the fuse box cover.
3. Turn ignition switch ON.

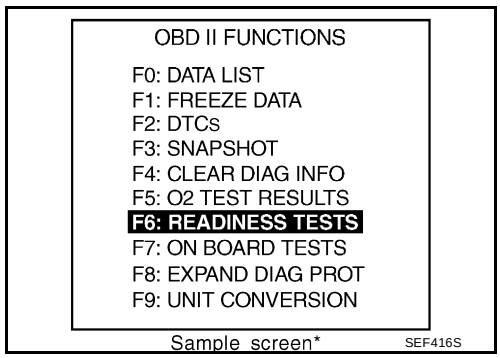


4. Enter the program according to instruction on the screen or in the operation manual.
   (*: Regarding GST screens in this section, sample screens are shown.)



5. Perform each diagnostic mode according to each service procedure.

For further information, see the GST Operation Manual of the tool maker.



CONSULT-II Reference Value in Data Monitor Mode

UBS0027Q

Remarks:
- Specification data are reference values.
- Specification data are output/input values which are detected or supplied by the ECM at the connector.
  * Specification data may not be directly related to their components signals/values/operations.
  i.e. Adjust ignition timing with a timing light before monitoring IGN TIMING, because the monitor may show the specification data in spite of the ignition timing not being adjusted to the specification data. This IGN TIMING monitors the data calculated by the ECM according to the signals input from the camshaft position sensor and other ignition timing related sensors.

MONITOR ITEM	CONDITION		SPECIFICATION
ENG SPEED	● Tachometer: Connect ● Run engine and compare tachometer indication with the CONSULT-II value.		Almost the same speed as the CONSULT-II value.
MAS A/F SE-B1	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: N ● No-load	Idle	Approx. 1.1 - 1.5V
		2,500 rpm	Approx. 1.6 - 2.0V
B/FUEL SCHDL	● Engine: After warming up ● Shift lever: N ● Air conditioner switch: OFF ● No-load	Idle	2.5 - 3.5 msec
		2,000 rpm	2.5 - 3.5 msec
A/F ALPHA-B1	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	54% - 155%
COOLAN TEMP/S	● Engine: After warming up		More than 70°C (158°F)
HO2S1 (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 (B1)	● Engine: After warming up	Revving engine from idle to 3,000 rpm quickly.	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	LEAN ←→ RICH Changes more than 5 times during 10 seconds.
HO2S2 MNTR (B1)	● Engine: After warming up	Revving engine from idle to 3,000 rpm quickly.	LEAN ←→ RICH
VEH SPEED SE	● Turn drive wheels and compare speedometer indication with the CONSULT-II value.		Almost the same speed as the CONSULT-II value
BATTERY VOLT	● Ignition switch: ON (Engine stopped)		11 - 14V
ACCEL SEN1 ACCEL SEN2	● Ignition switch: ON (engine stopped)	Accelerator pedal: Fully released	0.41 - 0.71V
		Accelerator pedal: Fully depressed	More than 4.2V
THRTL SEN1 THRTL SEN2	● Ignition switch: ON (Engine stopped) ● Shift lever: D (A/T model) 1st (M/T model)	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V
EVAP SYS PRES	● Ignition switch: ON		Approx. 1.8 - 4.8V
ABSOL PRES/SE	● Ignition switch: ON		Approx. 4.4V

MONITOR ITEM	CONDITION		SPECIFICATION
START SIGNAL	● Ignition switch: ON → START → ON		OFF → ON → OFF
CLSD THL POS	● Ignition switch: ON	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 model) Neutral (M/T model)	ON
		Shift lever: Except above	OFF
PW/ST SIGNAL	● Engine: After warming up, idle the engine	Steering wheel is in neutral position. (Forward direction)	OFF
		Steering wheel is turned.	ON
LOAD SIGNAL	● Ignition switch: ON	Rear window defogger switch is ON and/or lighting switch is in 2nd.	ON
		Rear window defogger switch is OFF and lighting switch is OFF.	OFF
IGNITION SW	● Ignition switch: ON → OFF → ON		ON → OFF → ON
HEATER FAN SW	● Engine: After warming up, idle the engine	Heater fan is operating.	ON
		Heater fan is not operating	OFF
BRAKE SW	● Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON
INJ PULSE-B1	● Engine: After warming up ● Shift lever: N ● Air conditioner switch: OFF ● No-load	Idle	2.0 - 3.0 msec
		2,000 rpm	1.9 - 2.9 msec
IGN TIMING	● Engine: After warming up ● Shift lever: N ● Air conditioner switch: OFF ● No-load	Idle	10° - 20° BTDC
		2,000 rpm	25° - 45° BTDC
CAL/LD VALUE	● Engine: After warming up ● Shift lever: N ● Air conditioner switch: OFF ● No-load	Idle	10% - 35%
		2,500 rpm	10% - 35%
MASS AIRFLOW	● Engine: After warming up ● Shift lever: N ● Air conditioner switch: OFF ● No-load	Idle	1.0 - 4.0 g·m/s
		2,500 rpm	4.0 - 10.0 g·m/s
PURG VOL C/V	● Engine: After warming up ● Shift lever: N ● Air conditioner switch: OFF ● No-load	Idle	0%
		2,000 rpm	20 - 30%
INT/V TIM (B1)	● Engine: After warming up ● Shift lever: N ● Air conditioner switch: OFF ● No-load	Idle	–5° - 5°CA
		2,000 rpm	Approx. 0° - 20°CA

MONITOR ITEM	CONDITION		SPECIFICATION
INT/V SOL (B1)	● Engine: After warming up ● Shift lever: N ● Air conditioner switch: OFF ● No-load	Idle	0% - 2%
		2,000 rpm	Approx. 25% - 60%
AIR COND RLY	● Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates)	ON
VIAS S/V	● Engine: After warming up	Idle	OFF
		More than 5,000 rpm	ON
FUEL PUMP RLY	● For 1 seconds after turning ignition switch ON ● Engine running or cranking		ON
	● Except above conditions		OFF
VC/V BYPAS S/V	● Ignition switch: ON		OFF
VENT CONT/V	● Ignition switch: ON		OFF
THRTL RELAY	● Ignition switch: ON		ON
COOLING FAN	● Engine: After warming up, idle the engine ● Air conditioner switch: OFF	Engine coolant temperature is 94°C (201°F) or less	OFF
		Engine coolant temperature is between 95°C (203°F) and 104°C (219°F)	LOW
		Engine coolant temperature is 105°C (221°F) or more	HIGH
HO2S1 HTR (B1)	● Engine: After warming up ● Engine speed: Below 3,600 rpm		ON
	● Engine speed: Above 3,600 rpm		OFF
HO2S2 HTR (B1)	● Engine speed: Below 3,600 rpm [After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more]		ON
	● Engine speed: Above 3,600 rpm		OFF
TRVL AFTER MIL	● Ignition switch: ON	Vehicle has traveled after MIL has turned ON.	0 - 65,535 km (0 - 40,723 mile)
O2SEN HTR DTY	● Engine coolant temperature when engine started: More than 80°C (176°F) ● Engine speed: Below 3,600 rpm		Approx. 50%
AC PRESS SEN	● Ignition switch: ON (Engine stopped)		Approx. 0V
	● Engine: Idle ● 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
SET VHCL SPD	● Engine: Running	ASCD: Operating	The preset vehicle speed is displayed.
MAIN SW	● Ignition switch: ON	CRUISE switch: Depressed	ON
		CRUISE switch: Released	OFF
CANCEL SW	● Ignition switch: ON	CANCEL switch: Depressed	ON
		CANCEL switch: Released	OFF
RESUME/ACC SW	● Ignition switch: ON	ACCEL/RES switch: Depressed	ON
		ACCEL/RES switch: Released	OFF
SET SW	● Ignition switch: ON	COAST/SET switch: Depressed	ON
		COAST/SET switch: Released	OFF

MONITOR ITEM	CONDITION		SPECIFICATION
BRAKE SW1	● Ignition switch: ON	Brake pedal: Fully released	ON
		Brake pedal: Slightly depressed	OFF
BRAKE SW2	● Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON
CRUISE LAMP	● Ignition switch: ON	CRUISE switch is depressed at first time → second time	ON → OFF
SET LAMP	● CRUISE switch: ON ● When vehicle is between 40 km/h (25 MPH) and 144 km/h (89 MPH)	SET switch pressed	ON
		ASCD control is canceled.	OFF
CAN COMM	● Ignition switch: ON		OK
CAN CIRC 1			OK
CAN CIRC 2			OK
CAN CIRC 3			UNKWN
CAN CIRC 4			UNKWN
CAN CIRC 5			UNKWN
CAN CIRC 6			UNKWN
CAN CIRC 7			UNKWN

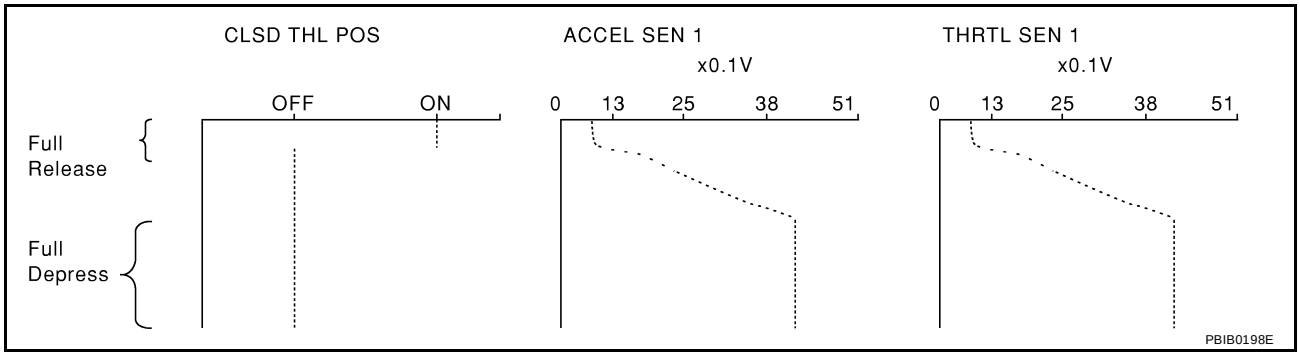
Major Sensor Reference Graph in Data Monitor Mode

UBS0027R

The following are the major sensor reference graphs in “DATA MONITOR” mode.

CLSD THL POS, ACCEL SEN 1, THRTL SEN 1

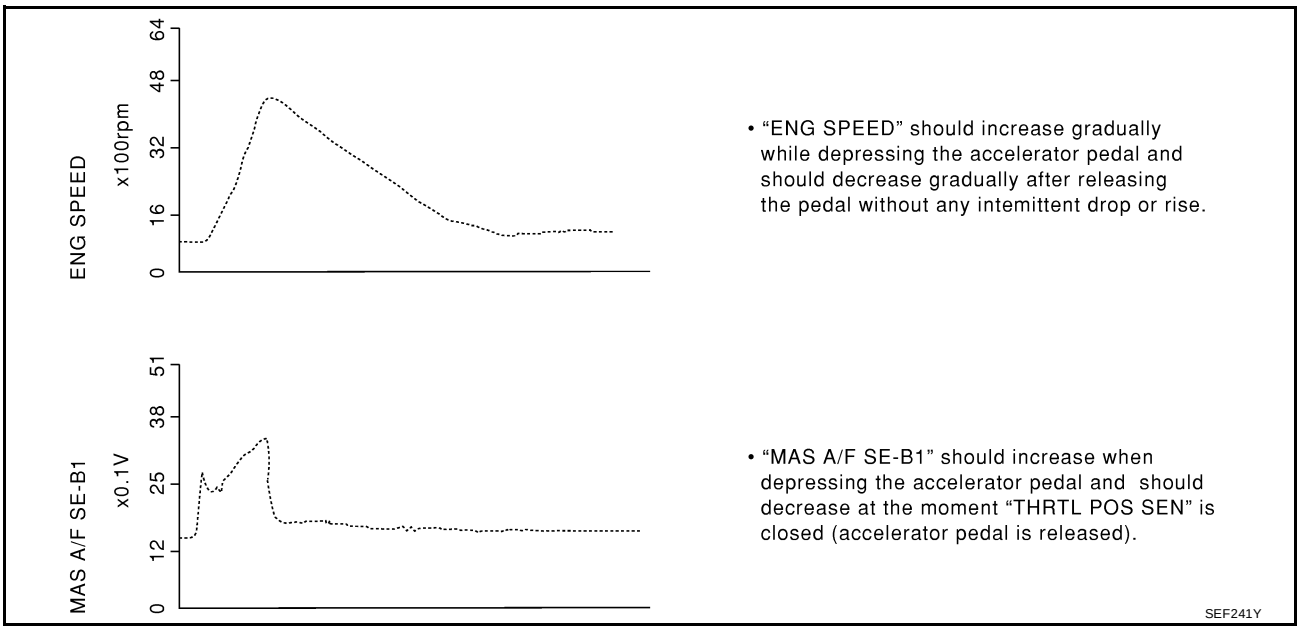
Below is the data for “CLSD THL POS”, “ACCEL SEN 1” and “THRTL SEN 1” when depressing the accelerator pedal with the ignition switch “ON” and with selector lever in “D” position (A/T models) or with shift lever in “1st” position (M/T models).
The signal of “ACCEL SEN 1” and “THRTL SEN 1” should rise gradually without any intermittent drop or rise after “CLSD THL POS” is changed from “ON” to “OFF”.

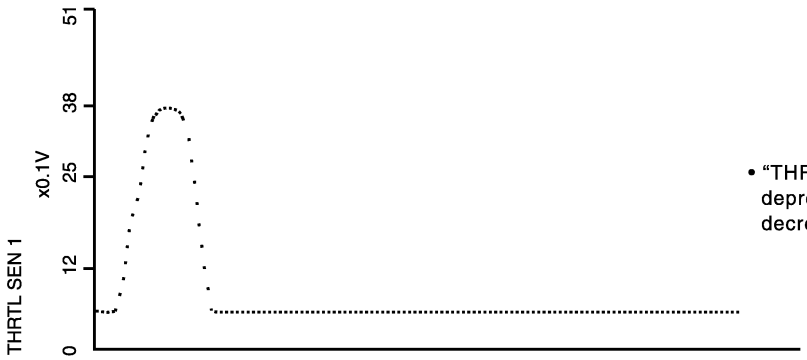


ENG SPEED, MAS A/F SE-B1, THRTL SEN 1, HO2S2 (B1), HO2S1 (B1), INJ PULSE-B1

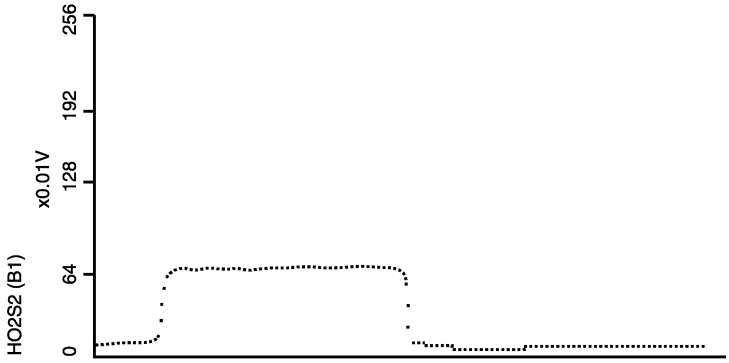
Below is the data for “ENG SPEED”, “MAS A/F SE-B1”, “THRTL SEN 1”, “HO2S2 (B1)”, “HO2S1 (B1)” and “INJ PULSE-B1” when revving engine quickly up to 4,800 rpm under no load after warming up engine sufficiently.

Each value is for reference, the exact value may vary.

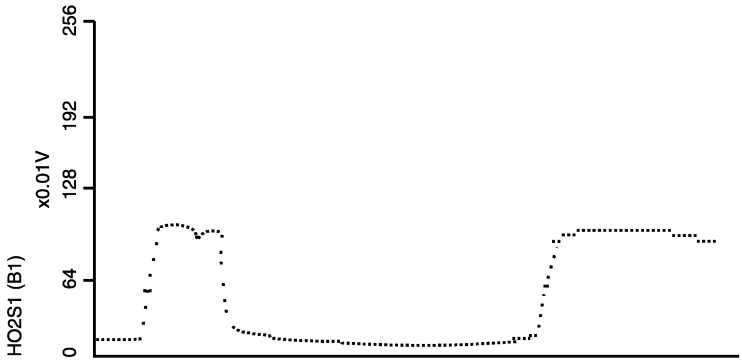




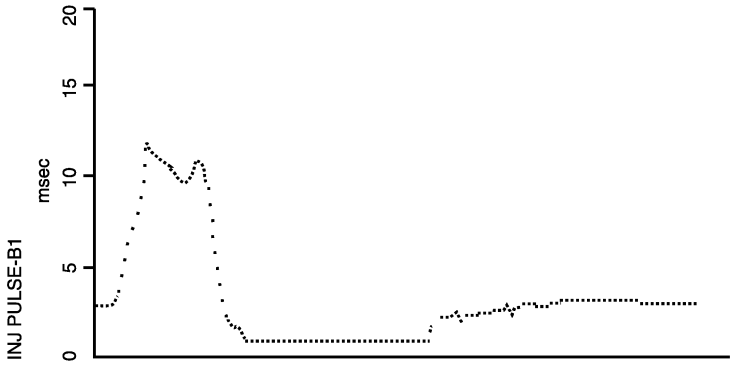
- "THRTL SEN 1" should increase while depressing the accelerator pedal and should decrease while releasing it.



- "HO2S2 (B1)" may increase immediately after depressing the accelerator pedal and may decrease after releasing the pedal.



- "HO2S1 (B1)" may increase immediately after depressing the accelerator pedal and may decrease after releasing the pedal.



- "INJ PULSE-B1" should increase when depressing the accelerator pedal and should decrease when the pedal is released.

PBIB0668E

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

PFP:00031

Description

UBS0027S

The specification (SP) value indicates the tolerance of the value that is displayed in “DATA MONITOR (SPEC)” mode of CONSULT-II during normal operation of the Engine Control System. When the value in “DATA MONITOR (SPEC)” mode is within the SP value, the Engine Control System is confirmed OK. When the value in “DATA MONITOR (SPEC)” mode is NOT within the SP value, the Engine Control System may have one or more malfunctions.
The SP value is used to detect malfunctions that may affect the Engine Control System, but will not light the MIL.
The SP value will be displayed for the following three items:

- B/FUEL SCHDL (The fuel injection pulse width programmed into ECM prior to any learned on board correction)
- A/F ALPHA-B1 (The mean value of air-fuel ratio feedback correction factor per cycle)
- MAS A/F SE-B1 (The signal voltage of the mass air flow sensor)

Testing Condition

UBS0027T

- 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

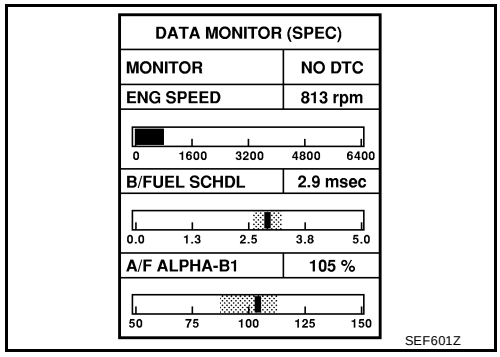
*1: For A/T models with CONSULT-II, after the engine is warmed up to normal operating temperature, drive vehicle until “FLUID TEMP SE” (A/T fluid temperature sensor signal) indicates more than 60°C (140°F).
For A/T models without CONSUT-II and M/T models, after the engine is warmed up to normal operating temperature, drive vehicle for 5 minutes.
*2: Rear window defogger switch, air conditioner switch, lighting switch are “OFF”. Steering wheel is straight ahead.

Inspection Procedure

UBS0027U

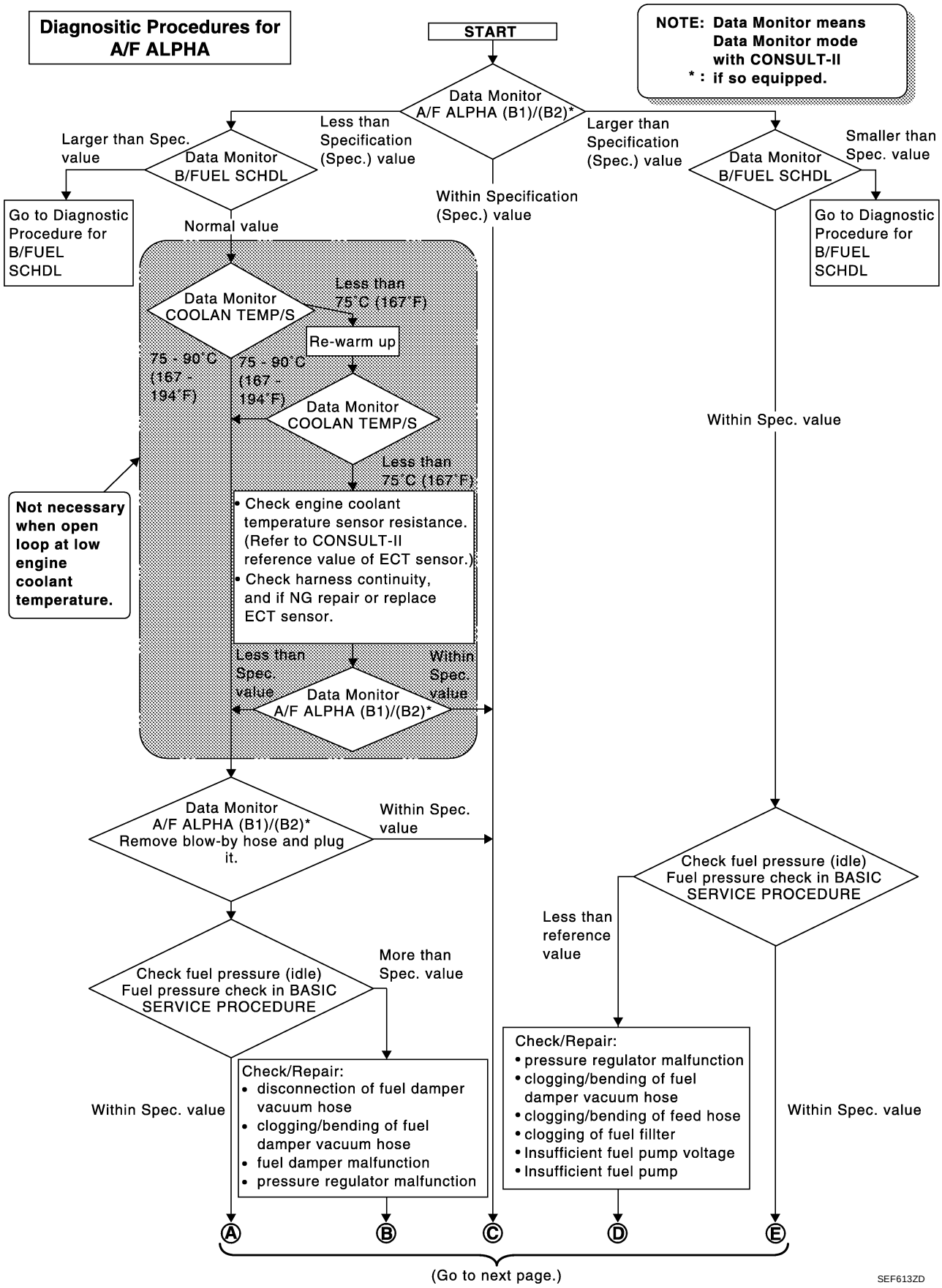
NOTE:
Perform “DATA MONITOR (SPEC)” mode in maximum scale display.

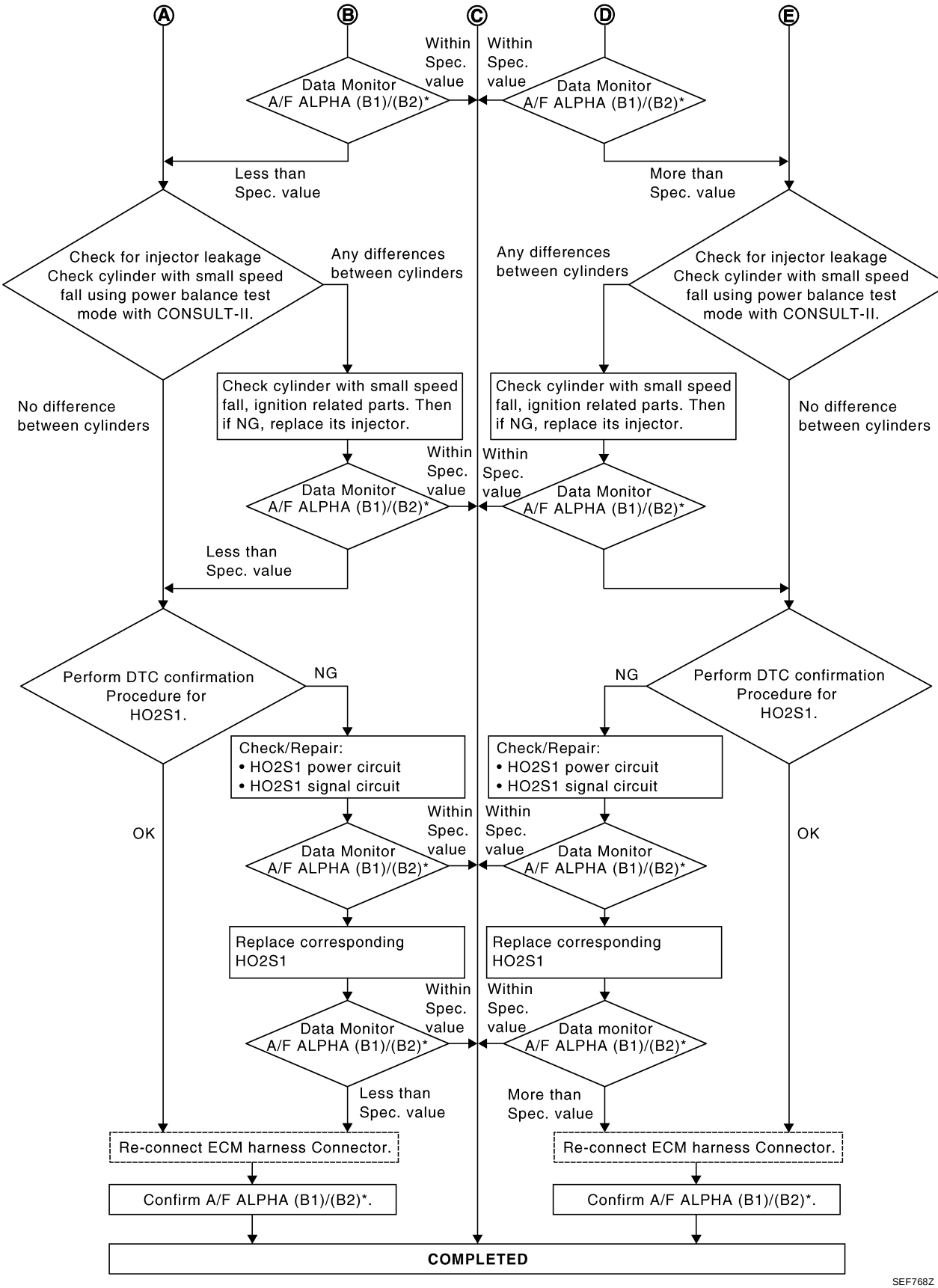
1. Perform EC-1289, "Basic Inspection" .
2. Confirm that the testing conditions indicated above are met.
3. Select “B/FUEL SCHDL”, “A/F ALPHA-B1” and “MAS A/F SE-B1” in “DATA MONITOR (SPEC)” mode with CONSULT-II.
4. Make sure that monitor items are within the SP value.
5. If NG, go to EC-1336, "Diagnostic Procedure" .



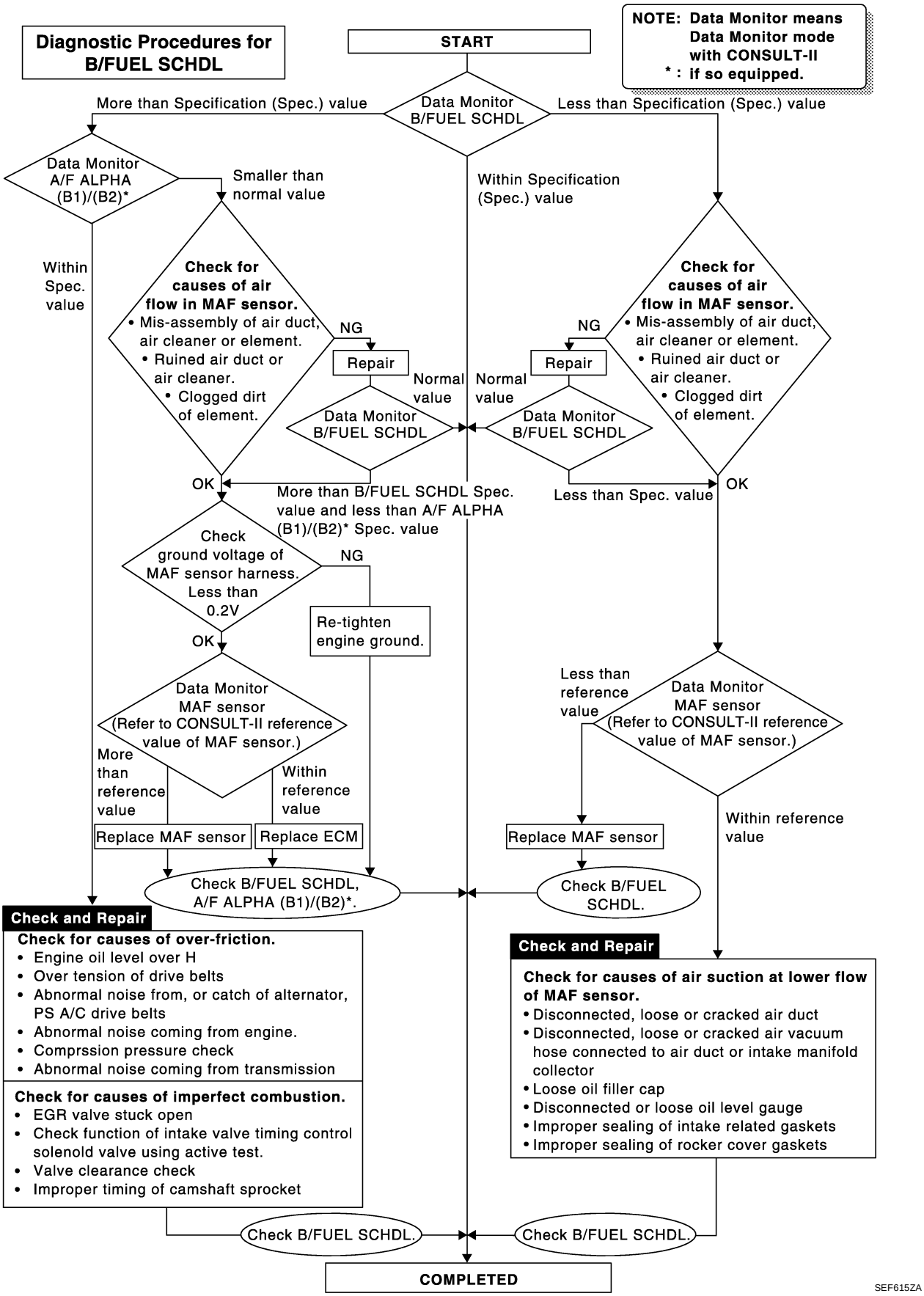
Diagnostic Procedure

UBS0027V




Ⓐ
Ⓑ
Ⓒ
Ⓓ
Ⓔ
Within Spec. value
Within Spec. value
Data Monitor A/F ALPHA (B1)/(B2)*
Data Monitor A/F ALPHA (B1)/(B2)*
Less than Spec. value
More than Spec. value
Check for injector leakage Check cylinder with small speed fall using power balance test mode with CONSULT-II.
Any differences between cylinders
Any differences between cylinders
Check for injector leakage Check cylinder with small speed fall using power balance test mode with CONSULT-II.
No difference between cylinders
Check cylinder with small speed fall, ignition related parts. Then if NG, replace its injector.
Check cylinder with small speed fall, ignition related parts. Then if NG, replace its injector.
No difference between cylinders
Within Spec. value
Within Spec. value
Data Monitor A/F ALPHA (B1)/(B2)*
Data Monitor A/F ALPHA (B1)/(B2)*
Less than Spec. value
Perform DTC confirmation Procedure for HO2S1.
NG
NG
Perform DTC confirmation Procedure for HO2S1.
Check/Repair:
• HO2S1 power circuit
• HO2S1 signal circuit
Check/Repair:
• HO2S1 power circuit
• HO2S1 signal circuit
OK
Within Spec. value
Within Spec. value
OK
Data Monitor A/F ALPHA (B1)/(B2)*
Data Monitor A/F ALPHA (B1)/(B2)*
Replace corresponding HO2S1
Replace corresponding HO2S1
Within Spec. value
Within Spec. value
Data Monitor A/F ALPHA (B1)/(B2)*
Data monitor A/F ALPHA (B1)/(B2)*
Less than Spec. value
More than Spec. value
Re-connect ECM harness Connector.
Re-connect ECM harness Connector.
Confirm A/F ALPHA (B1)/(B2)*.
Confirm A/F ALPHA (B1)/(B2)*.
COMPLETED

SEF768Z


Diagnostic Procedures for B/FUEL SCHDL
START
NOTE: Data Monitor means Data Monitor mode with CONSULT-II
* : if so equipped.
Data Monitor B/FUEL SCHDL
More than Specification (Spec.) value
Less than Specification (Spec.) value
Within Specification (Spec.) value
Data Monitor A/F ALPHA (B1)/(B2)*
Smaller than normal value
Within Spec. value
Check for causes of air flow in MAF sensor.
• Mis-assembly of air duct, air cleaner or element.
• Ruined air duct or air cleaner.
• Clogged dirt of element.
NG
Repair
Normal value
Data Monitor B/FUEL SCHDL
OK
More than B/FUEL SCHDL Spec. value and less than A/F ALPHA (B1)/(B2)* Spec. value
Less than Spec. value
Check ground voltage of MAF sensor harness. Less than 0.2V
Re-tighten engine ground.
Data Monitor MAF sensor (Refer to CONSULT-II reference value of MAF sensor.)
More than reference value
Within reference value
Less than reference value
Replace MAF sensor
Replace ECM
Check B/FUEL SCHDL, A/F ALPHA (B1)/(B2)*.
Check B/FUEL SCHDL.
Check and Repair
Check for causes of over-friction.
• Engine oil level over H
• Over tension of drive belts
• Abnormal noise from, or catch of alternator, PS A/C drive belts
• Abnormal noise coming from engine.
• Comprssion pressure check
• Abnormal noise coming from transmission
Check for causes of imperfect combustion.
• EGR valve stuck open
• Check function of intake valve timing control solenold valve using active test.
• Valve clearance check
• Improper timing of camshaft sprocket
Check and Repair
Check for causes of air suction at lower flow of MAF sensor.
• Disconnected, loose or cracked air duct
• Disconnected, loose or cracked air vacuum hose connected to air duct or intake manifold collector
• Loose oil filler cap
• Disconnected or loose oil level gauge
• Improper sealing of intake related gaskets
• Improper sealing of rocker cover gaskets
Check B/FUEL SCHDL.
Check B/FUEL SCHDL.
COMPLETED
SEF615ZA

TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT

PFP:00006

Description

UBS0027W

Intermittent incidents (I/I) may occur. In many cases, the problem resolves itself (the part or circuit function returns to normal without intervention). It is important to realize that the symptoms described in the customer's complaint often do not recur on (1st trip) DTC visits. Realize also that the most frequent cause of I/I occurrences is poor electrical connections. Because of this, the conditions under which the incident occurred may not be clear. Therefore, circuit checks made as part of the standard diagnostic procedure may not indicate the specific problem area.

Common I/I Report Situations

STEP in Work Flow	Situation
II	The CONSULT-II is used. The SELF-DIAG RESULTS screen shows time data other than “0” or “[1t]”.
III	The symptom described by the customer does not recur.
IV	(1st trip) DTC does not appear during the DTC Confirmation Procedure.
VI	The Diagnostic Procedure for PXXXX does not indicate the problem area.

Diagnostic Procedure

UBS0027X

1. INSPECTION START

Erase (1st trip) DTCs. Refer to EC-1271, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .

>> GO TO 2.

2. CHECK GROUND TERMINALS

Check ground terminals for corroding or loose connection.
Refer to GI-26, "How to Perform Efficient Diagnosis for an Electrical Incident" , “Incident Simulation Tests”.

OK or NG

OK >> GO TO 3.
NG >> Repair or replace.

3. SEARCH FOR ELECTRICAL INCIDENT

Perform GI-26, "How to Perform Efficient Diagnosis for an Electrical Incident" , “Incident Simulation Tests”.

OK or NG

OK >> GO TO 4.
NG >> Repair or replace.

4. CHECK CONNECTOR TERMINALS

Refer to GI-23, "How to Check Terminal" , “HOW TO PROBE CONNECTORS”, “How to Check Enlarged Contact Spring of Terminal”.

OK or NG

OK >> **INSPECTION END**
NG >> Repair or replace connector.

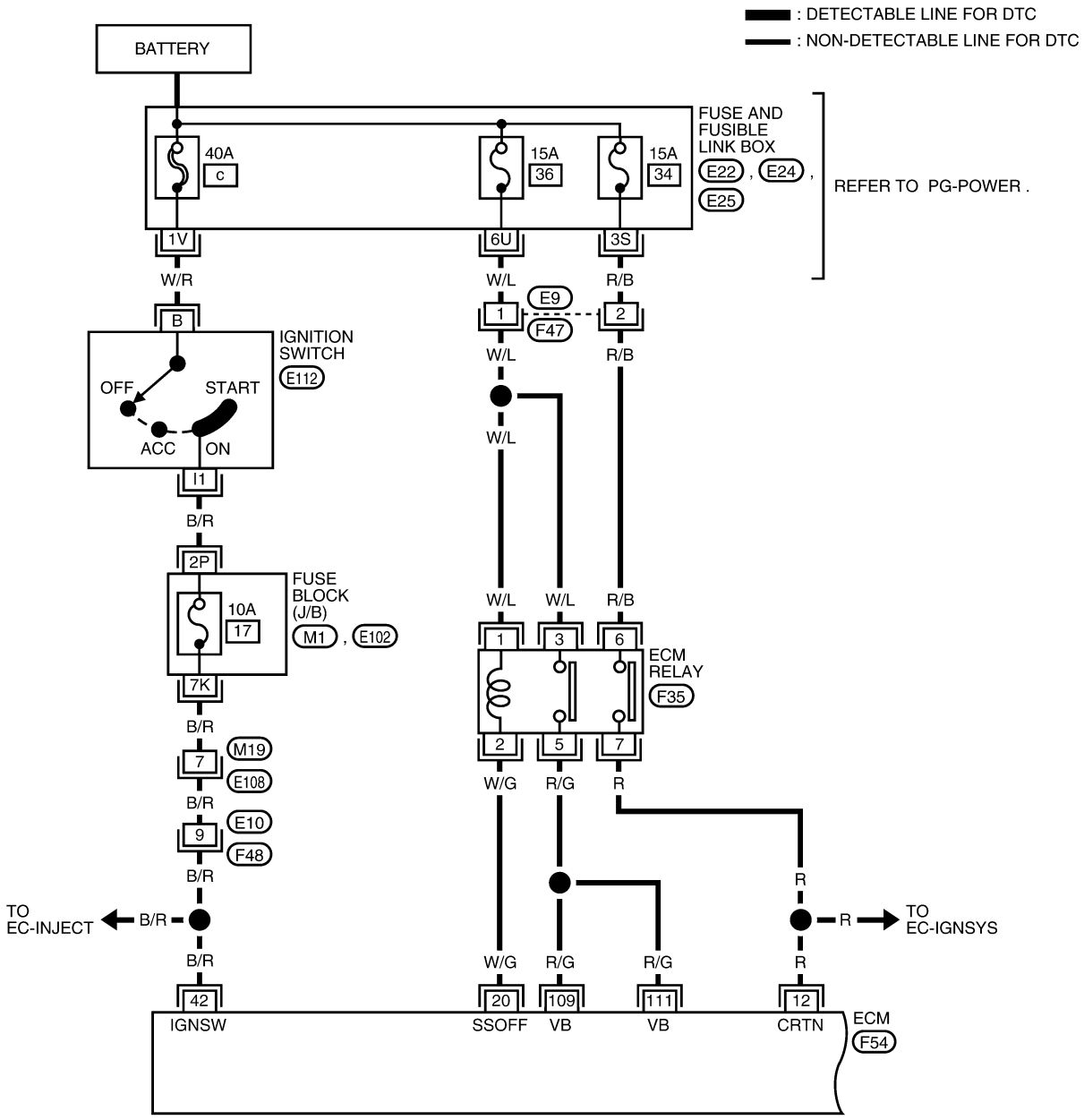
POWER SUPPLY CIRCUIT FOR ECM

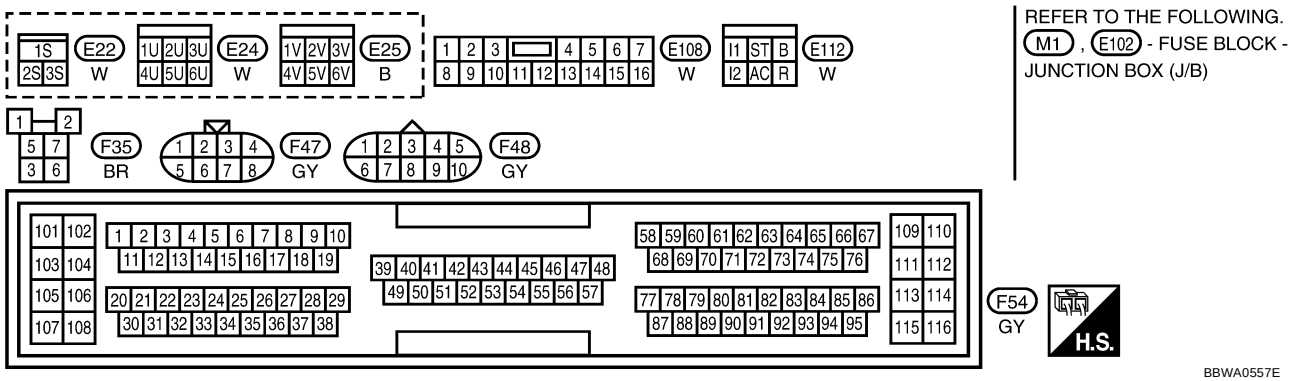
PFP:24110

Wiring Diagram

UBS0027Y

EC-MAIN-01





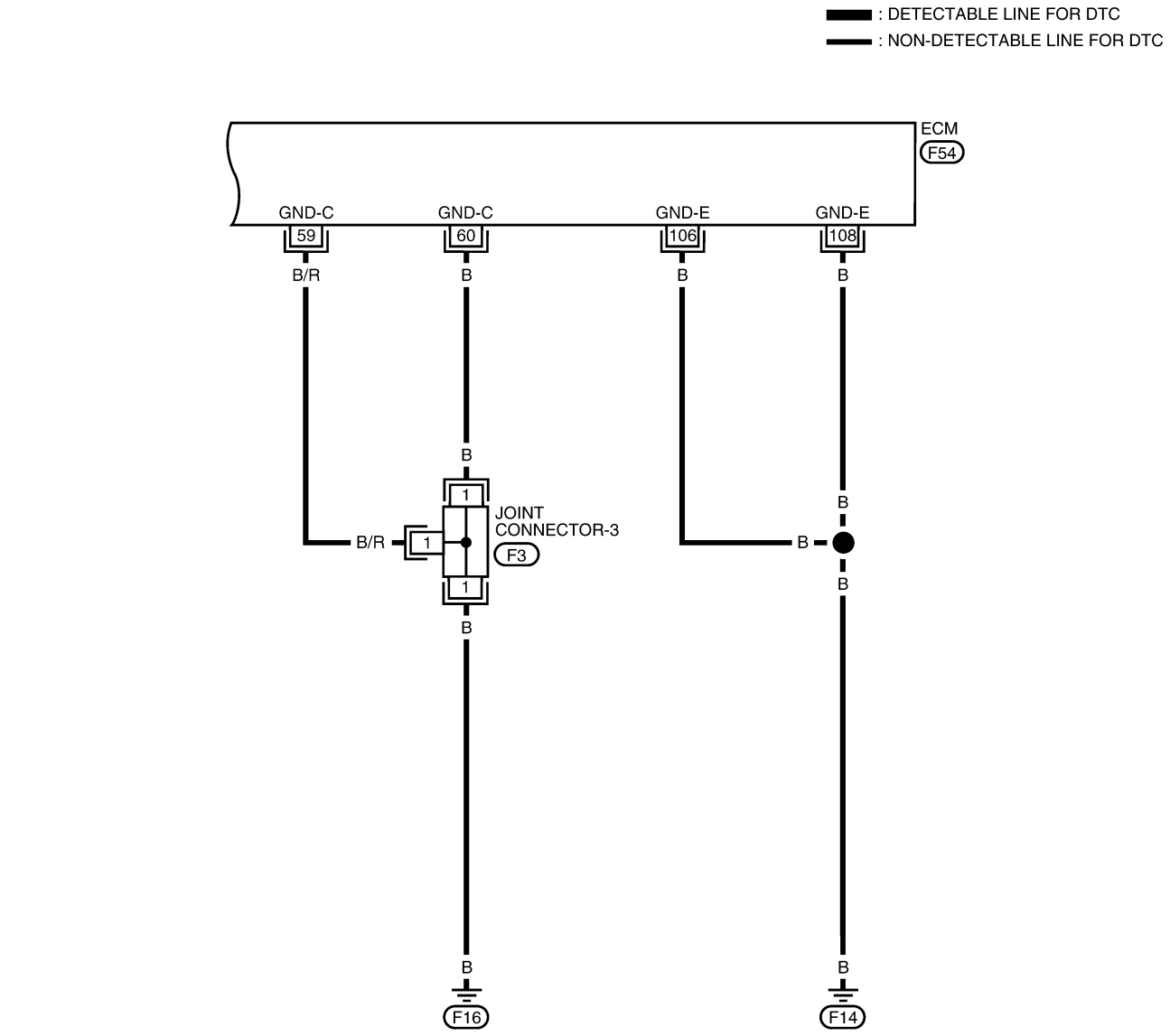
BBWA0557E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/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	R	Counter current return	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)
20	W/G	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch "OFF"]** ● For 3 seconds after turning ignition switch "OFF"	0 - 1.0V
			[Ignition switch "OFF"] ● More than 3 seconds passed after turning ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
42	B/R	Ignition switch	**[Ignition switch "OFF"]**	0V
			[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)
109 111	R/G R/G	Power supply for ECM	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)

EC-MAIN-02



Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
59 60 106 108	B/R B B B	ECM ground	**[Engine is running]** ● Idle speed	Engine ground

Diagnostic Procedure

UBS0027Z

1. INSPECTION START

Start engine.
Is engine running?

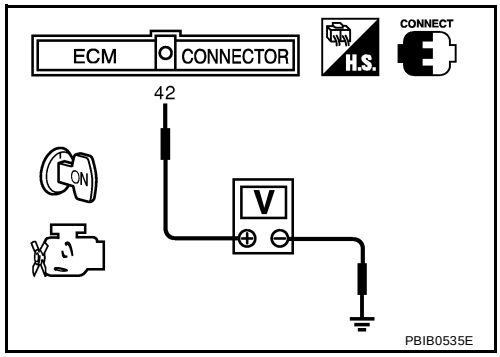
Yes or No

Yes >> GO TO 9.
No >> GO TO 2.

2. CHECK ECM POWER SUPPLY CIRCUIT-I

1. Turn ignition switch “OFF” and then “ON”.
2. Check voltage between ECM terminal 42 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 M19, E108
- Harness connectors E10, F48
- Fuse block (J/B) connectors E112, M1
- 10A fuse
- Harness for open or short between ECM and fuse

>> Repair harness or connectors.

4. CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-I

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminals 59, 60, 106, 108 and engine ground. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

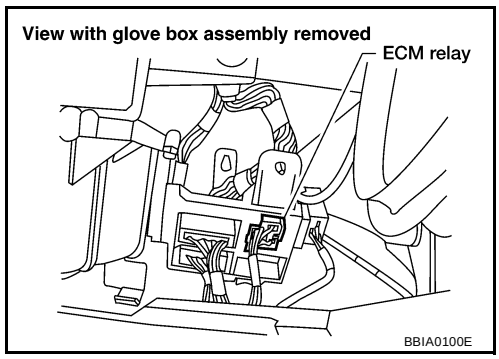
Check the following.

- Joint connector-3
- Harness for open or short between ECM and ground

>> Repair harness or connectors.

6. CHECK ECM POWER SUPPLY CIRCUIT-II

1. Disconnect ECM relay.

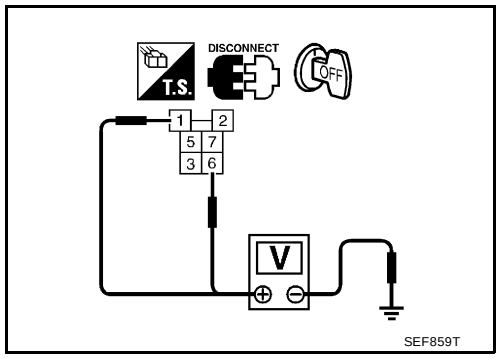


2. Check voltage between ECM relay terminals 1, 6 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.



7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E9, F47
- 15 fuses
- Fuse and fusible link box connectors E22, E24
- Harness for open or short between ECM relay and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 20 and ECM relay terminal 2. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

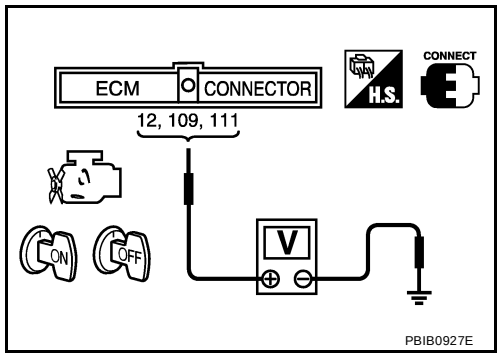
OK or NG

OK >> Go to EC-1772, "IGNITION SIGNAL" .
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK ECM POWER SUPPLY CIRCUIT-II

1. Turn ignition switch “ON” and then “OFF”.
2. Check voltage between ECM terminals 12, 109, 111 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.

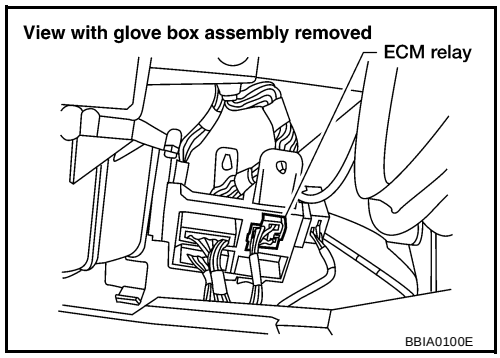


OK or NG

OK >> GO TO 14.
NG (Battery voltage does not exist.)>>GO TO 10.
NG (Battery voltage exists for more than a few seconds.)>>GO TO 13.

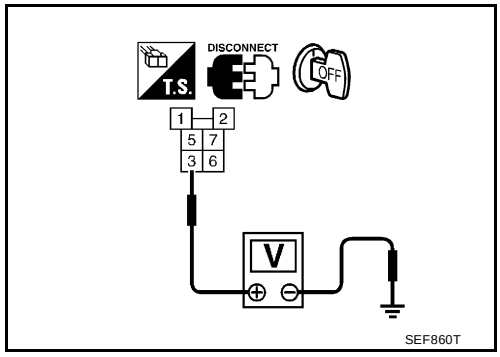
10. CHECK ECM POWER SUPPLY CIRCUIT-III

1. Disconnect ECM relay.



2. Check voltage between ECM relay 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 or connectors E9, F47
- Harness for open or short between ECM relay and 15A fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

12. CHECK HARNESS CONTINUITY BETWEEN ECM RELAY AND ECM FOR OPEN AND SHORT

1. Check harness continuity between ECM terminals and ECM relay terminals as follows. Refer to Wiring Diagram.

ECM terminal	ECM relay terminal
12	7
109, 111	5

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 13.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

13. CHECK ECM RELAY

Refer to EC-1347, "Component Inspection" .

OK or NG

OK >> GO TO 14.
NG >> Replace ECM relay.

14. CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-II

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminals 59, 60, 106, 108 and engine ground. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to power.

OK or NG

OK >> GO TO 16.
NG >> GO TO 15.

15. DETECT MALFUNCTIONING PART

Check the following.

- Joint connector-3
- Harness for open or short between ECM and ground

>> Repair or replace.

16. CHECK INTERMITTENT INCIDENT

Refer to EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

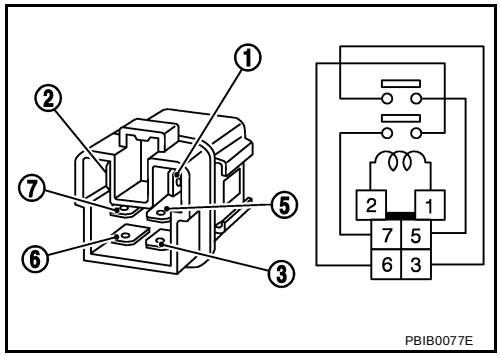
UBS00280

ECM RELAY

1. Apply 12V direct current between ECM relay terminals 1 and 2.
2. Check continuity between relay terminals 3 and 5, 6 and 7.

Condition	Continuity
12V direct current supply between terminals1 and 2	Yes
OFF	No

3. If NG, replace ECM relay.



DTC U1000, U1001 CAN COMMUNICATION LINE

PFP:23710

Description

UBS00281

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

UBS00282

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U1000 1000	CAN communication line	● ECM cannot communicate to other control unit. ● ECM cannot communicate for more than the specified time.	● Harness or connectors (CAN communication line is open or shorted)
U1001 1001			

DTC Confirmation Procedure

UBS00283

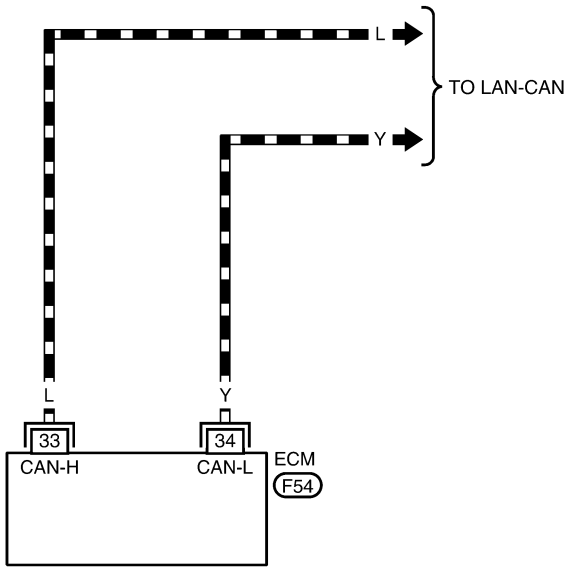
1. Turn ignition switch “ON” and wait at least 3 seconds.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. If 1st trip DTC is detected, go to EC-1350, "Diagnostic Procedure" .

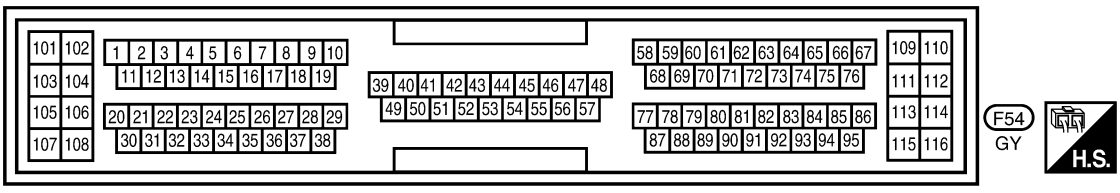
Wiring Diagram

UBS00284

EC-CAN-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC
: DATA LINE





BBWA0212E

Diagnostic Procedure

UBS00285

1. INSPECTION START

1. Turn ignition switch “ON”.
2. Select “CAN DIAG SUPPORT MNTR” in “DATA MONITOR” mode with CONSULT-II.
3. Print out the CONSULT-II screen.

OK data

DATA MONITOR	
MONITOR	NO DTC
CAN COMM	OK
CAN CIRC 1	OK
CAN CIRC 2	OK
CAN CIRC 3	UNKWN
CAN CIRC 4	UNKWN
CAN CIRC 5	UNKWN
CAN CIRC 6	UNKWN
CAN CIRC 7	UNKWN

NG data

DATA MONITOR	
MONITOR	NO DTC
CAN COMM	OK
CAN CIRC 1	UNKWN
CAN CIRC 2	UNKWN
CAN CIRC 3	UNKWN
CAN CIRC 4	UNKWN
CAN CIRC 5	UNKWN
CAN CIRC 6	UNKWN
CAN CIRC 7	UNKWN

PBIB0941E

>> Go to LAN-3, "CAN SYSTEM" .

DTC P0011 IVT CONTROL

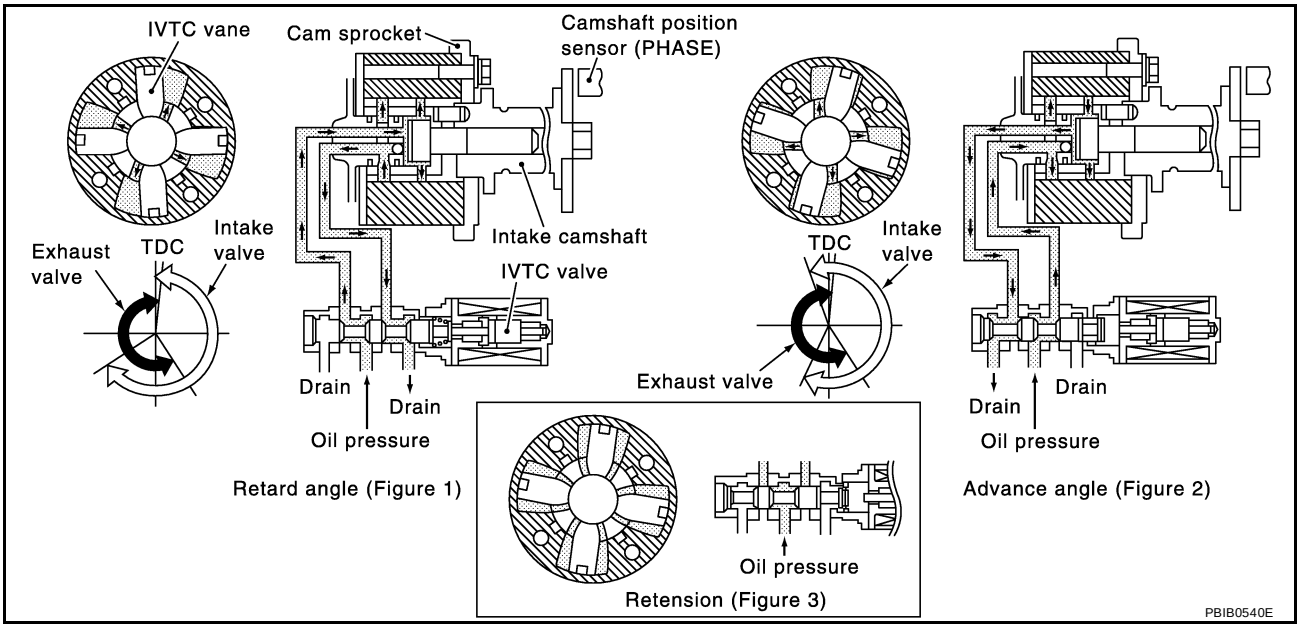
PFP:23796

Description

UBS00286

SYSTEM DESCRIPTION

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed	Intake valve timing control	Intake valve timing control solenoid valve
Camshaft position sensor (PHASE)			
Engine coolant temperature sensor	Engine coolant temperature		
Vehicle speed sensor	Vehicle speed		



This mechanism hydraulically controls cam phases continuously with the fixed operating angle of the intake valve.

The ECM receives signals such as crankshaft position, camshaft position, engine speed, and engine coolant temperature. Then, the ECM sends ON/OFF pulse duty signals to the intake valve timing control solenoid valve depending on driving status. This makes it possible to control the shut/open timing of the intake valve to increase engine torque in low/mid speed range and output in high-speed range.

CONSULT-II Reference Value in Data Monitor Mode

UBS00287

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
INT/V TIM (B1)	● Engine: After warming up ● Shift lever: N ● Air conditioner switch: OFF ● No-load	Idle	–5° - 5°CA
		2,000 rpm	Approx. 0° - 20°CA
INT/V SOL (B1)	● Engine: After warming up ● Shift lever: N ● Air conditioner switch: OFF ● No-load	Idle	0% - 2%
		2,000 rpm	Approx. 25% - 60%

On Board Diagnosis Logic

UBS00288

DTC No.	Trouble diagnosis name	Detecting condition	Possible cause
P0011 0011	Intake valve timing control performance	There is a gap between angle of target and phase-control angle degree.	● Crankshaft position sensor (POS) ● Camshaft position sensor (PHASE) ● Accumulation of debris to the signal pick-up portion of the camshaft

FAIL-SAFE MODE

ECM enters in fail-safe mode when the malfunction is detected.

Detected items	Engine operating condition in fail-safe mode
Intake valve timing control	The signal is not energized to the solenoid valve and the valve control does not function

DTC Confirmation Procedure

UBS00289

CAUTION:
Always drive at a safe speed.

NOTE:

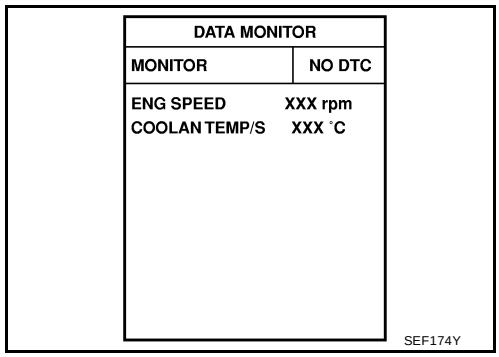
- **If DTC P0011 is displayed with DTC P1111, first perform trouble diagnosis for "DTC P1111". See EC-1610 .**
- If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is between 10V and 16V at idle.

WITH CONSULT-II

1. Turn ignition switch "ON".
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Maintain the following conditions for at least 20 consecutive seconds.

ENG SPEED	1,700 - 3,175 rpm (A constant rotation is maintained.)
COOLANT TEMPS	70 - 105°C (158 - 221°F)
Selector lever	1st or 2nd position
Driving location uphill	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)



4. If 1st trip DTC is detected, go to EC-1352, "Diagnostic Procedure" .

WITH GST

Follow the procedure "WITH CONSULT-II" above.

Diagnostic Procedure

UBS0028A

1. CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to EC-1502, "Component Inspection" .

OK or NG

OK >> GO TO 2.
NG >> Replace crankshaft position sensor (POS).

2. CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-1508, "Component Inspection" .

OK or NG

OK >> GO TO 3.
NG >> Replace camshaft position sensor (PHASE).

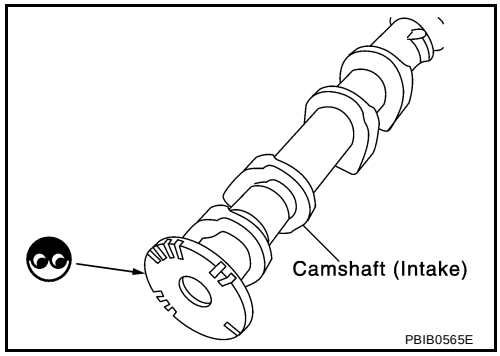
3. CHECK CAMSHAFT (INTAKE)

Check the following.

- Accumulation of debris to the signal plate of camshaft rear end
- Chipping signal plate of camshaft rear end

OK or NG

OK >> GO TO 4.
NG >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft.



4. CHECK INTERMITTENT INCIDENT

Refer to EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .
For wiring diagram refer to CKP sensor (POS) EC-1499 and CMP sensor (PHASE) EC-1505 .

>> **INSPECTION END**

DTC P0031, P0032 HO2S1 HEATER

PFP:22690

Description

UBS0028B

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE) Crankshaft position sensor (POS)	Engine speed	Heated oxygen sensor 1 heater control	Heated oxygen sensor 1 heater
Engine coolant temperature sensor	Engine coolant temperature		

The ECM performs ON/OFF duty control of the heated oxygen sensor 1 heater corresponding to the engine speed and engine coolant temperature. The duty percent varies with engine coolant temperature when engine is started.

OPERATION

Engine speed rpm	Heated oxygen sensor 1 heater
Above 3,600	OFF
Below 3,600	ON

CONSULT-II Reference Value in Data Monitor Mode

UBS0028C

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S1 HTR (B1)	● Engine: After warming up ● Engine speed: Below 3,600 rpm	ON
	● Engine speed: Above 3,600 rpm	OFF
O2SEN HTR DTY	● Engine coolant temperature when engine started: More than 80°C (176°F) ● Engine speed: Below 3,600 rpm	Approx. 50%

On Board Diagnosis Logic

UBS0028D

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0031 0031	Heated oxygen sensor 1 heater control circuit low	The current amperage in the heated oxygen sensor 1 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the heated oxygen sensor 1 heater.)	● Harness or connectors (The heated oxygen sensor 1 heater circuit is open or shorted.) ● Heater oxygen sensor 1 heater
P0032 0032	Heated oxygen sensor 1 heater control circuit high	The current amperage in the heated oxygen sensor 1 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the heated oxygen sensor 1 heater.)	● Harness or connectors (The heated oxygen sensor 1 heater circuit is shorted.) ● Heater oxygen sensor 1 heater

DTC Confirmation Procedure

UBS0028E

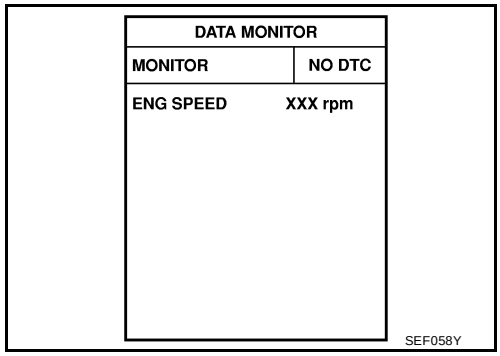
NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is between 10.5V and 16V at idle.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 10 seconds.

3. Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II.
4. Start engine and run it for at least 6 seconds at idle speed.
5. If 1st trip DTC is detected, go to EC-1357, "Diagnostic Procedure" .



WITH GST

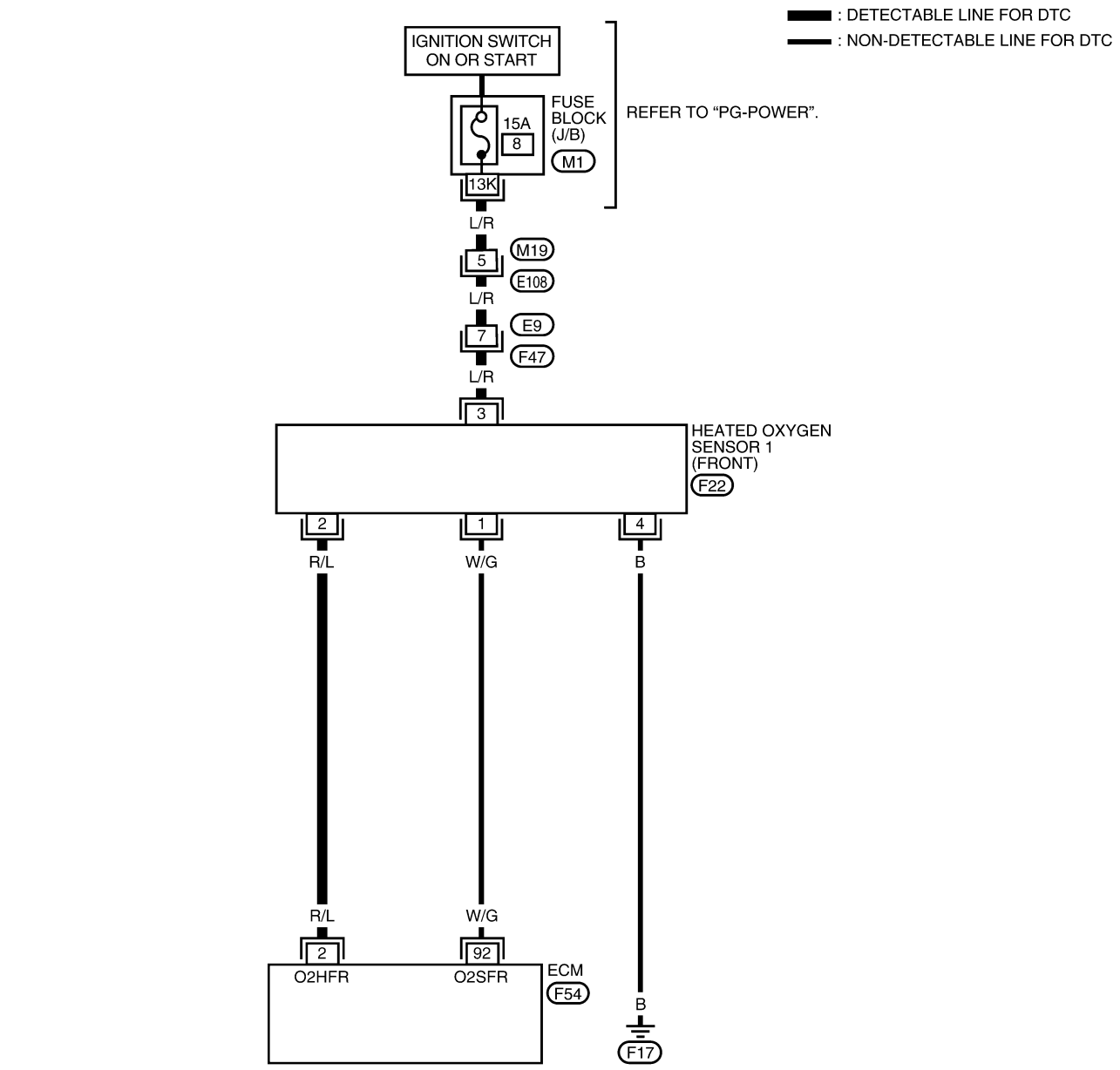
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Start engine and run it for at least 6 seconds at idle speed.
4. Turn ignition switch “OFF” and wait at least 10 seconds.
5. Start engine and run it for at least 6 seconds at idle speed.
6. Select “MODE 3” with GST.
7. If DTC is detected, go to EC-1357, "Diagnostic Procedure" .

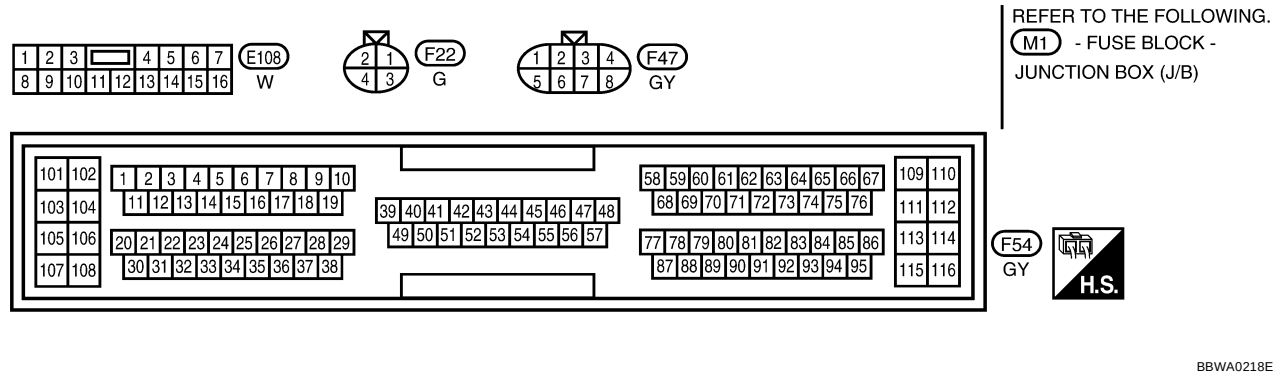
- **When using GST, “DTC Confirmation Procedure” should be performed twice as much as when using CONSULT-II because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II is recommended.**

Wiring Diagram

UBS0028F

EC-HO2S1H-01

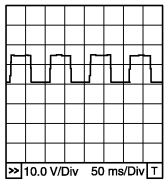




BBWA0218E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/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	R/L	Heated oxygen sensor 1 heater	**[Engine is running]** ● **Warm-up condition.** ● Engine speed is below 3,600 rpm.	Approximately 7.0V  PBIB0519E
			[Engine is running] ● Engine speed is above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)

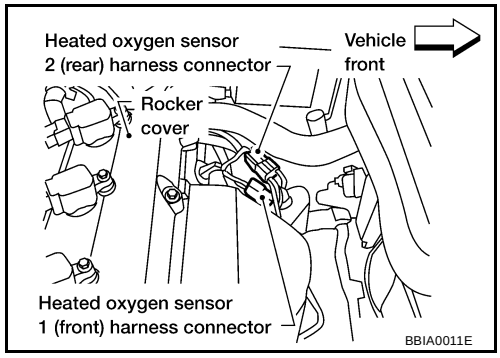
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

UBS0028G

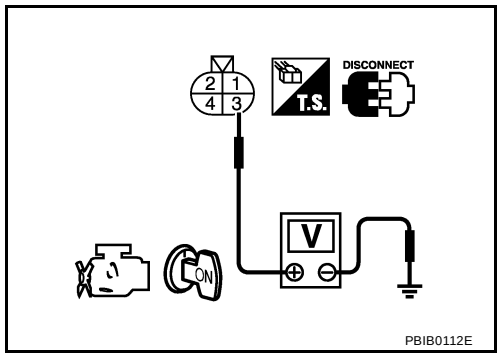
1. CHECK HO2S1 POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect heated oxygen sensor 1 harness connector.
3. Turn ignition switch “ON”.



4. Check voltage between HO2S1 terminal 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M19, E108
- Harness connectors E9, F47
- Fuse block (J/B) connector M1
- 15A fuse
- Harness for open or short between heated oxygen sensor 1 and fuse

>> Repair harness or connectors.

3. CHECK HO2S1 OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 2 and HO2S1 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 HEATED OXYGEN SENSOR 1 HEATER

Refer to EC-1358, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace heated oxygen sensor 1.

5. CHECK INTERMITTENT INCIDENT

Refer to EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

UBS0028H

HEATED OXYGEN SENSOR 1 HEATER

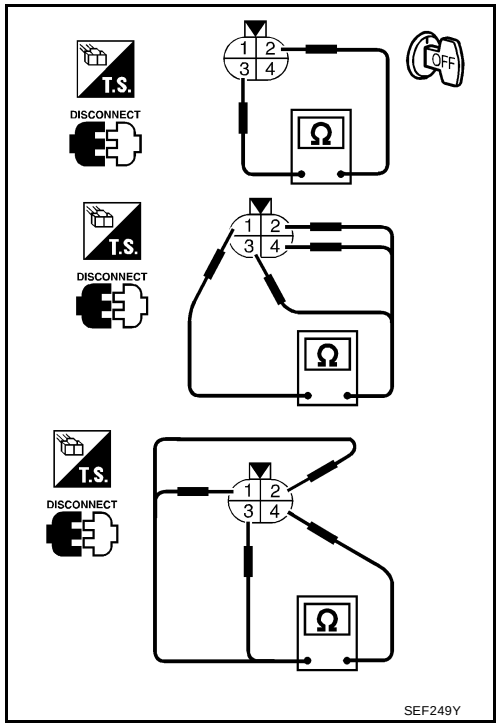
1. Check resistance between HO2S1 terminals as follows.

Terminal No.	Resistance
2 and 3	2.3 - 4.3 Ω at 25°C (77°F)
1 and 2, 3, 4	∞ Ω (Continuity should not exist)
4 and 1, 2, 3	

2. If NG, replace heated oxygen sensor 1.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new 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

UBS0028I

HEATED OXYGEN SENSOR 1

Refer to EM-98, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .

DTC P0037, P0038 HO2S2 HEATER

PFP:226A0

Description

UBS0028J

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)			

The ECM performs ON/OFF control of the heated oxygen sensor 2 heater corresponding to the engine speed.

OPERATION

Engine speed rpm	Heated oxygen sensor 2 heater
Above 3,600	OFF
Below 3,600	ON

CONSULT-II Reference Value in Data Monitor Mode

UBS0028K

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 HTR (B1)	● Engine speed: Below 3,600 rpm [After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more]	ON
	● Engine speed: Above 3,600 rpm	OFF

On Board Diagnosis Logic

UBS0028L

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0037 0037	Heated oxygen sensor 2 heater control circuit low	The current amperage in the heated oxygen sensor 2 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)	● Harness or connectors (The heated oxygen sensor 2 heater circuit is open or shorted.) ● Heater oxygen sensor 2 heater
P0038 0038	Heated oxygen sensor 2 heater control circuit high	The current amperage in the heated oxygen sensor 2 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)	● Harness or connectors (The heated oxygen sensor 2 heater circuit is shorted.) ● Heater oxygen sensor 2 heater

DTC Confirmation Procedure

UBS0028M

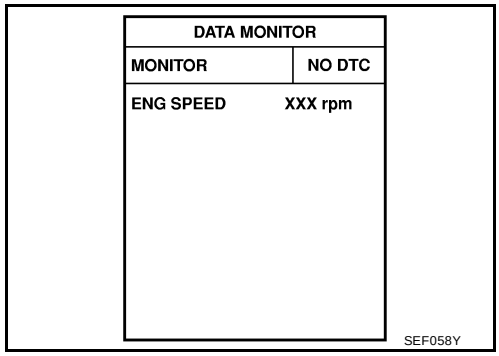
NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

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.
3. Drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.

4. Stop vehicle and let engine idle for at least 6 seconds.
5. If 1st trip DTC is detected, go to EC-1362, "Diagnostic Procedure" .



WITH GST

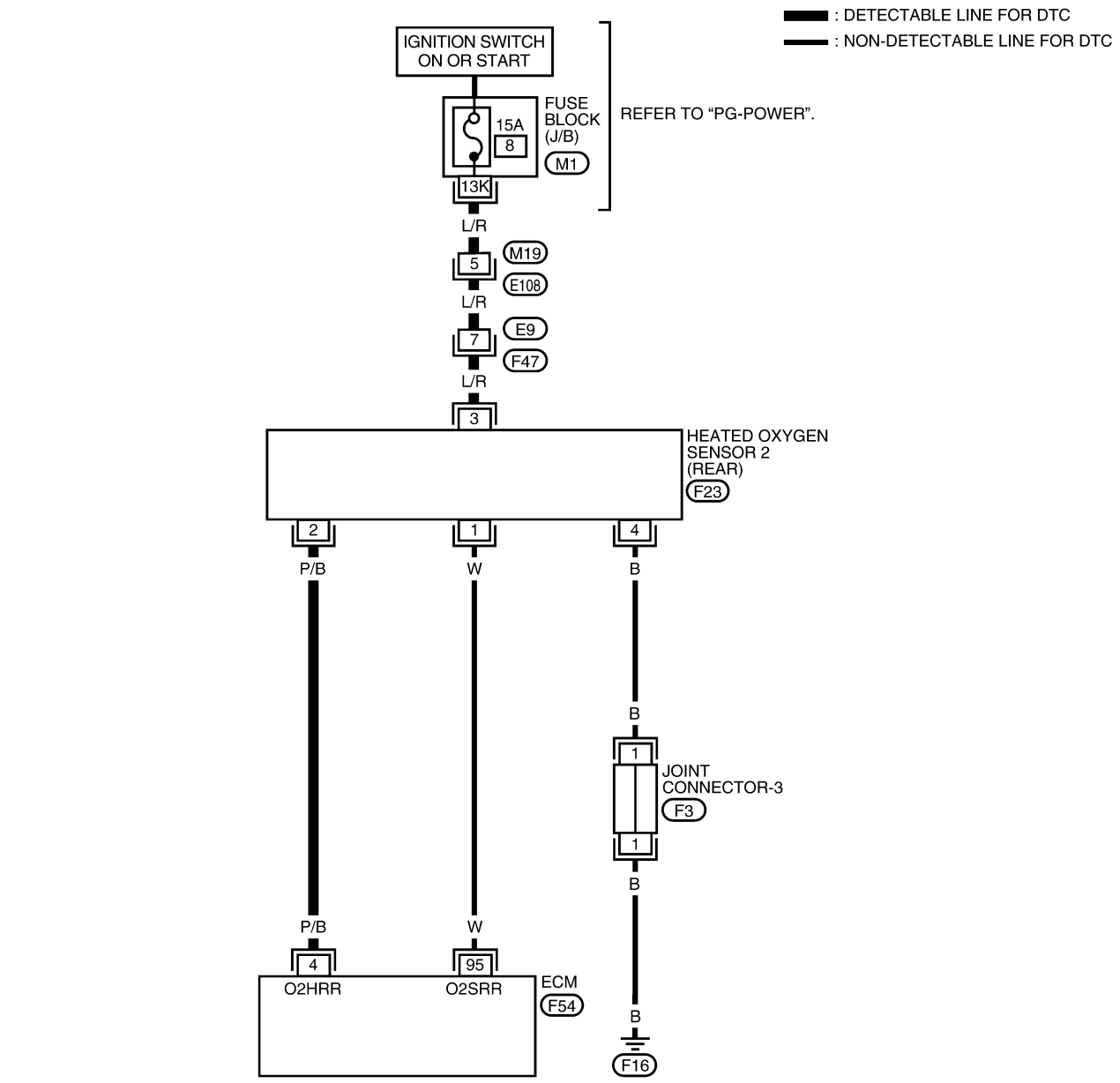
1. Start engine.
2. Drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
3. Stop vehicle and let engine idle for at least 6 seconds.
4. Turn ignition switch “OFF” and wait at least 10 seconds.
5. Start engine.
6. Drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
7. Stop vehicle and let engine idle for at least 6 seconds.
8. Select “MODE 3” with GST.
9. If DTC is detected, go to EC-1362, "Diagnostic Procedure" .

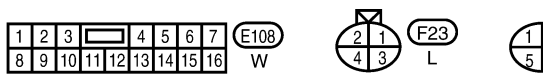
- **When using GST, “DTC Confirmation Procedure” should be performed twice as much as when using CONSULT-II because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II is recommended.**

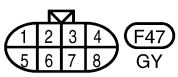
Wiring Diagram

UBS0028N

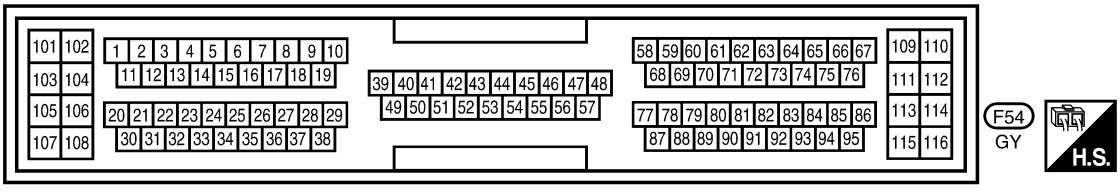
EC-HO2S2H-01







REFER TO THE FOLLOWING.
M1 - FUSE BLOCK - JUNCTION BOX (J/B)
F3 - JOINT CONNECTOR



BBWA0219E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

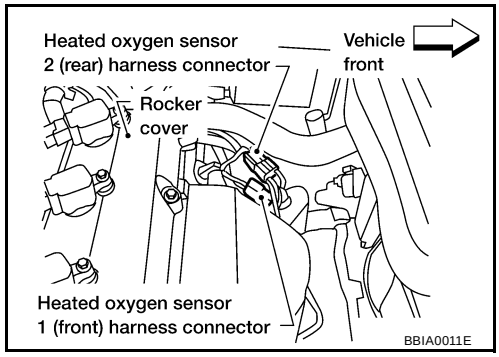
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	P/B	Heated oxygen sensor 2 heater	**[Engine is running]** ● Engine speed is below 3,600 rpm. ● After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more.	0 - 1.0V
			[Ignition switch "ON"] ● Engine stopped **[Engine is running]** ● Engine speed is above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

UBS0028O

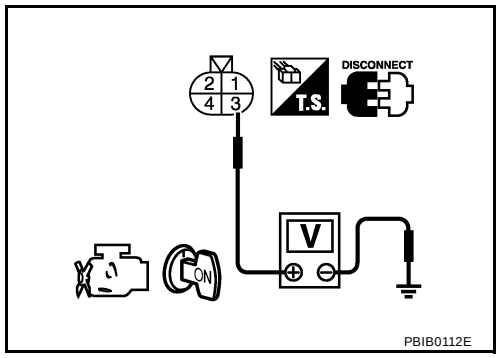
1. CHECK HO2S2 POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect heated oxygen sensor 2 harness connector.
3. Turn ignition switch "ON".



4. Check voltage between HO2S2 terminal 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M19, E108
- Harness connectors E9, F47
- Fuse block (J/B) connector M1
- 15A fuse
- Harness for open or short between heated oxygen sensor 2 and fuse

>> Repair harness or connectors.

3. CHECK HO2S2 OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 4 and HO2S2 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 harness or connectors.

4. CHECK HEATED OXYGEN SENSOR 2 HEATER

Refer to EC-1363, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace heated oxygen sensor 2.

5. CHECK INTERMITTENT INCIDENT

Refer to EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

UBS0028P

HEATED OXYGEN SENSOR 2 HEATER

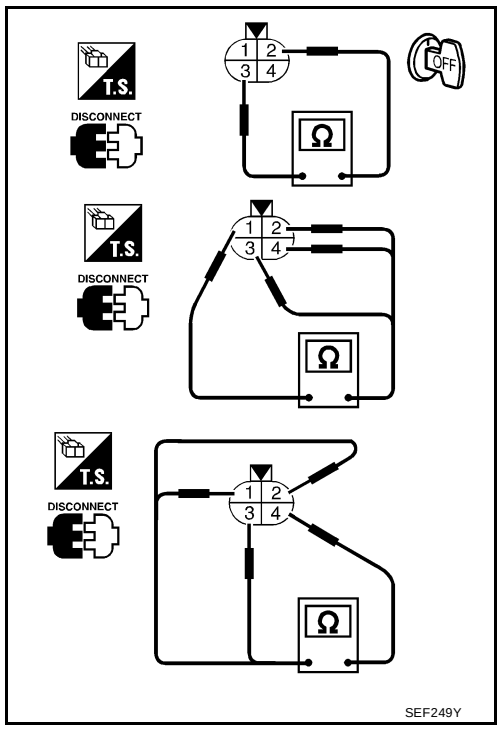
1. Check resistance between HO2S2 terminals as follows.

Terminal No.	Resistance
2 and 3	2.3 - 4.3 Ω at 25°C (77°F)
1 and 2, 3, 4	∞ Ω (Continuity should not exist)
4 and 1, 2, 3	

2. If NG, replace heated oxygen sensor 2.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new 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

UBS0028Q

HEATED OXYGEN SENSOR 2

Refer to EX-3, "EXHAUST SYSTEM" .

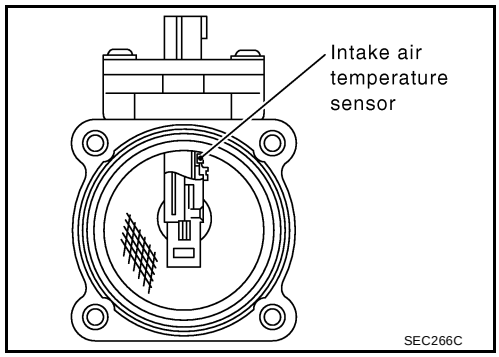
DTC P0101 MAF SENSOR

PFP:22680

Component Description

UBS0028R

The mass air flow sensor is placed in the stream of intake air. It measures the intake flow rate by measuring a part of the entire intake flow. It consists of a hot film that is supplied with electric current from the ECM. The temperature of the hot film is controlled by the ECM a certain amount. The heat generated by the hot film is reduced as the intake air flows around it. The more air, the greater the heat loss.
Therefore, the ECM must supply more electric current to maintain the temperature of the hot film as air flow increases. The ECM detects the air flow by means of this current change.



CONSULT-II Reference Value in Data Monitor Mode

UBS0028S

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAS A/F SE-B1	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: N ● No-load	Idle	Approx. 1.1 - 1.5V
		2,500 rpm	Approx. 1.6 - 2.0V
CAL/LD VALUE	● Engine: After warming up ● Shift lever: N ● Air conditioner switch: OFF ● No-load	Idle	10% - 35%
		2,500 rpm	10% - 35%
MASS AIRFLOW	● Engine: After warming up ● Shift lever: N ● Air conditioner switch: OFF ● No-load	Idle	1.0 - 4.0 g·m/s
		2,500 rpm	4.0 - 10.0 g·m/s

On Board Diagnosis Logic

UBS0028T

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P0101 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.) ● Mass air flow sensor
		B)	A low voltage from the sensor is sent to ECM under heavy load driving condition.	● Harness or connectors (The sensor circuit is open or shorted.) ● Intake air leaks ● Mass air flow sensor

DTC Confirmation Procedure

UBS0028U

Perform “PROCEDURE FOR MALFUNCTION A” first.
If the 1st trip DTC cannot be confirmed, perform “PROCEDURE FOR MALFUNCTION B”.

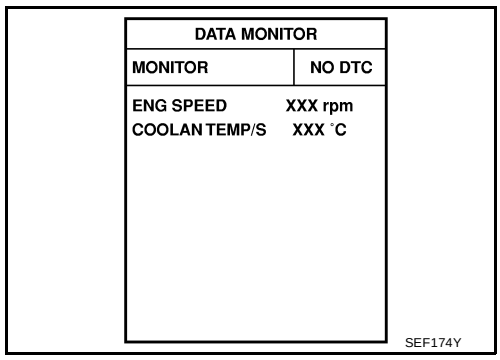
NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

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-1368, "Diagnostic Procedure" .



With GST

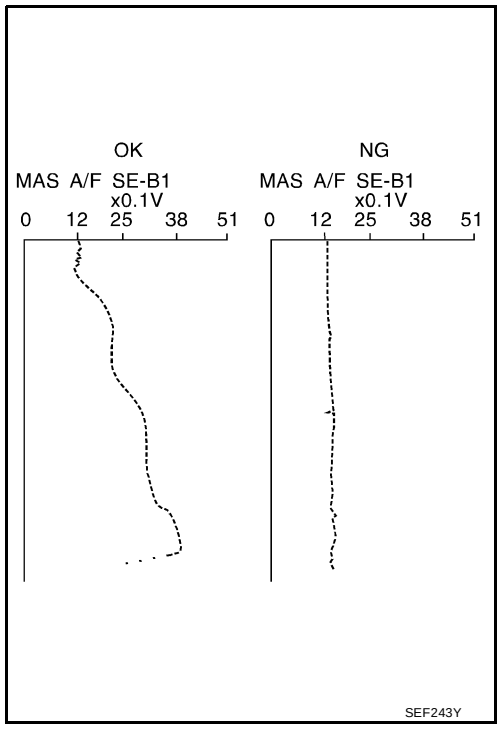
Follow the procedure “With CONSULT-II” above.

PROCEDURE FOR MALFUNCTION B

CAUTION:
Always drive vehicle at a safe speed.

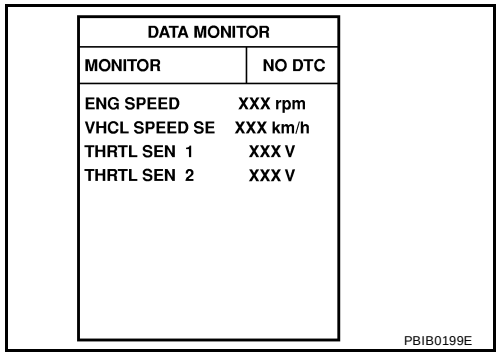
With CONSULT-II

1. Turn ignition switch “ON”.
2. Start engine and warm it up to normal operating temperature.
   If engine cannot be started, go to EC-1368, "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-1368, "Diagnostic Procedure" .
   If OK, go to following step.



7. Maintain the following conditions for at least 10 consecutive seconds.

ENG SPEED	More than 2,000 rpm
THRTL SEN 1	More than 3V
THRTL SEN 2	More than 3V
Selector lever	Suitable position
Driving location	Driving vehicle uphill (Increased engine load) will help maintain the driving conditions required for this test.



8. If 1st trip DTC is detected, go to EC-1368, "Diagnostic Procedure" .

Overall Function Check

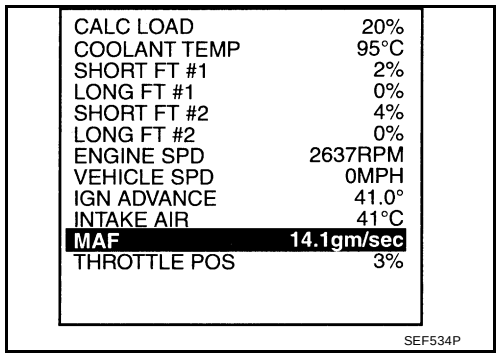
UBS0028V

PROCEDURE FOR MALFUNCTION B

Use this procedure to check the overall function of the mass air flow sensor circuit. During this check, a 1st trip DTC might not be confirmed.

With GST

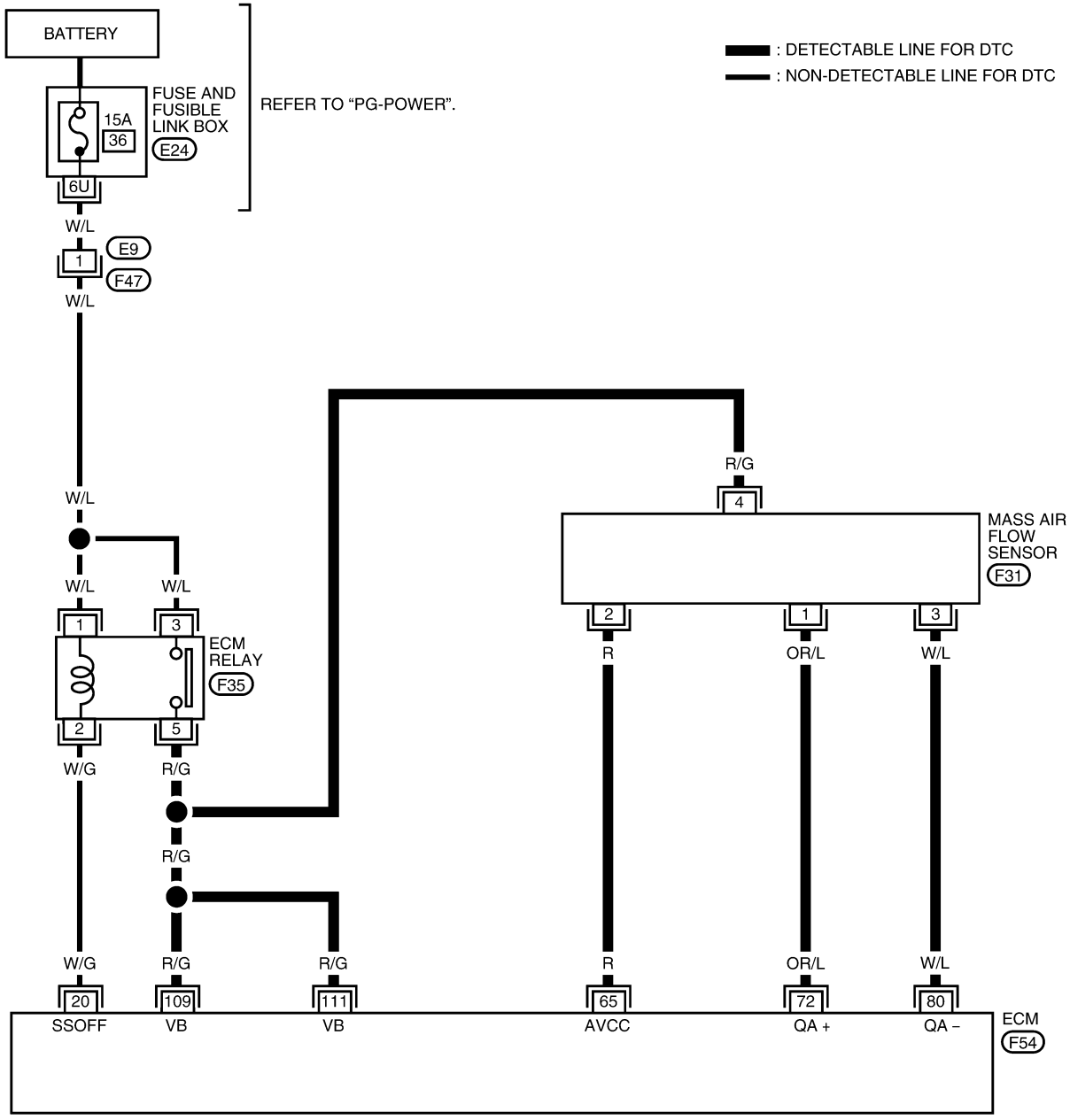
1. Start engine and warm it up to normal operating temperature.
2. Select “MODE 1” with GST.
3. Check the mass air flow sensor signal with “MODE 1”.
4. Check for linear mass air flow sensor signal value rise in response to increases to about 4,000 rpm in engine speed.
5. If NG, go to EC-1368, "Diagnostic Procedure" .

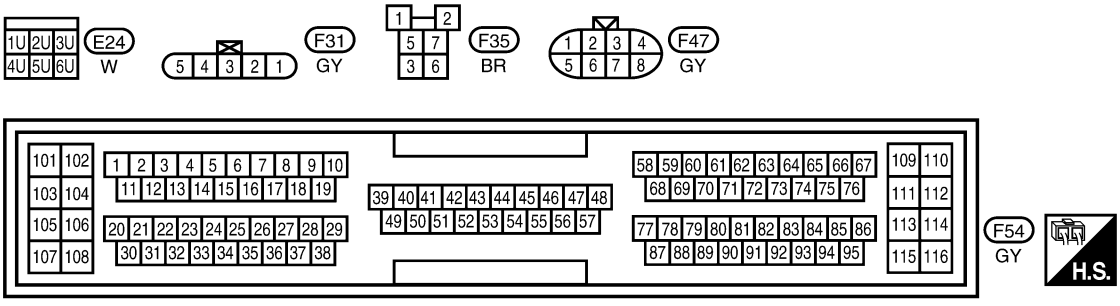


Wiring Diagram

UBS0028W

EC-MAFS-01





BBWA0213E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/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)
65	R	Sensor's power supply	**[Ignition switch "ON"]**	Approximately 5V
72	OR/L	Mass air flow sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	1.1 - 1.5V
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,500 rpm.	1.6 - 2.0V
80	W/L	Mass air flow sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

Diagnostic Procedure

UBS0028X

1. INSPECTION START

Which malfunction (A or B) is duplicated?

A or B

A >> GO TO 3.
B >> GO TO 2.

2. CHECK INTAKE SYSTEM

Check the following for connection.

- Air duct
- Vacuum hoses
- Intake air passage between air duct to intake manifold

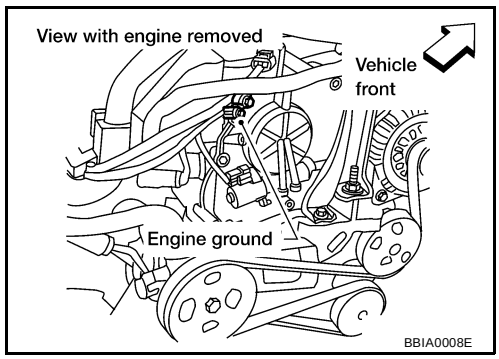
OK or NG

OK >> GO TO 3.
NG >> Reconnect the parts.

3. RETIGHTEN GROUND SCREWS

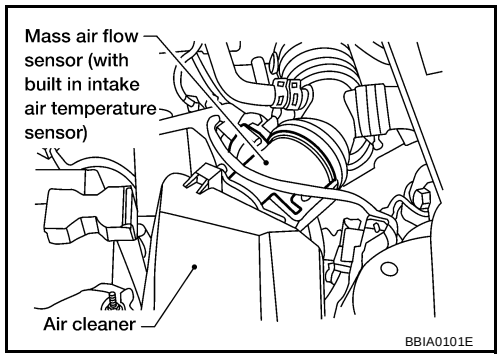
1. Turn ignition switch "OFF".
2. Loosen and retighten engine ground screws.

>> GO TO 4.



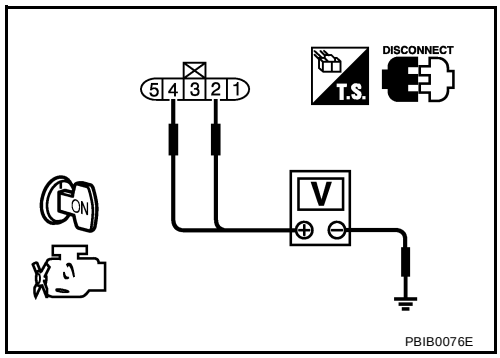
4. CHECK MAF SENSOR POWER SUPPLY CIRCUIT

1. Disconnect MAF sensor harness connector.
2. Turn ignition switch “ON”.



3. Check voltage between MAF sensor terminals 2, 4 and ground with CONSULT-II or tester.

Terminal	Voltage
2	Approximately 5V
4	Battery voltage



OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between mass air flow sensor and ECM
- Harness for open or short between mass air flow sensor and ECM relay

>> Repair harness or connectors.

6. CHECK MAF SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between MAF sensor terminal 3 and ECM terminal 80. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK MAF SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between MAF sensor terminal 1 and ECM terminal 72. 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-1370, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace mass air flow sensor.

9. CHECK INTERMITTENT INCIDENT

Refer to EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

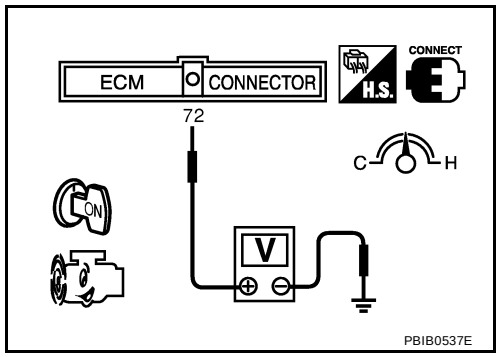
UBS0028Y

MASS AIR FLOW SENSOR

1. Reconnect harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 72 (Mass air flow sensor signal) and ground.

Condition	Voltage V
Ignition switch “ON” (Engine stopped.)	Approx. 1.0
Idle (Engine is warmed-up to normal operating temperature.)	1.1 - 1.5
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.6 - 2.0
Idle to about 4,000 rpm*	1.5 - 2.0 to Approx. 4.0

*: Check for liner voltage rise in response to engine being increased to about 4,000 rpm.



4. If the voltage is out of specification, proceed the following.

a. Turn ignition switch “OFF”.
b. Disconnect mass air flow sensor harness connector and reconnect it again.
c. Perform steps 2 and 3 again.

5. If NG, remove mass air flow sensor from air duct. Check hot film for damage or dust.
6. If NG, clean or replace mass air flow sensor.

Removal and Installation

UBS0028Z

MASS AIR FLOW SENSOR

Refer to EM-91, "AIR CLEANER AND AIR DUCT" .

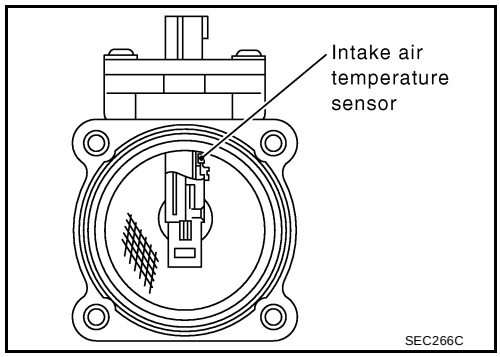
DTC P0102, P0103 MAF SENSOR

PFP:22680

Component Description

UBS00290

The mass air flow sensor is placed in the stream of intake air. It measures the intake flow rate by measuring a part of the entire intake flow. It consists of a hot film that is supplied with electric current from the ECM. The temperature of the hot film is controlled by the ECM a certain amount. The heat generated by the hot film is reduced as the intake air flows around it. The more air, the greater the heat loss.
Therefore, the ECM must supply more electric current to maintain the temperature of the hot film as air flow increases. The ECM detects the air flow by means of this current change.



CONSULT-II Reference Value in Data Monitor Mode

UBS00291

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAS A/F SE-B1	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: N ● No-load	Idle	Approx. 1.1 - 1.5V
		2,500 rpm	Approx. 1.6 - 2.0V
CAL/LD VALUE	● Engine: After warming up ● Shift lever: N ● Air conditioner switch: OFF ● No-load	Idle	10% - 35%
		2,500 rpm	10% - 35%
MASS AIRFLOW	● Engine: After warming up ● Shift lever: N ● Air conditioner switch: OFF ● No-load	Idle	1.0 - 4.0 g·m/s
		2,500 rpm	4.0 - 10.0 g·m/s

On Board Diagnosis Logic

UBS00292

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0102 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.) ● Intake air leaks ● Mass air flow sensor
P0103 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.) ● 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

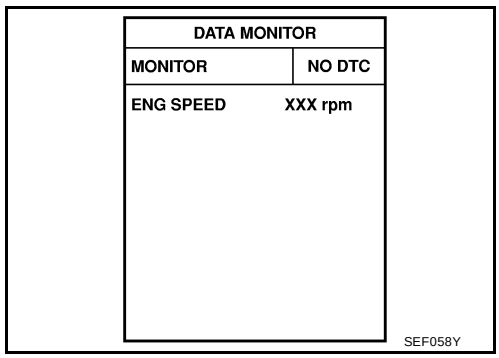
UBS00293

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 5 seconds at most.
4. If DTC is detected, go to EC-1374, "Diagnostic Procedure" .



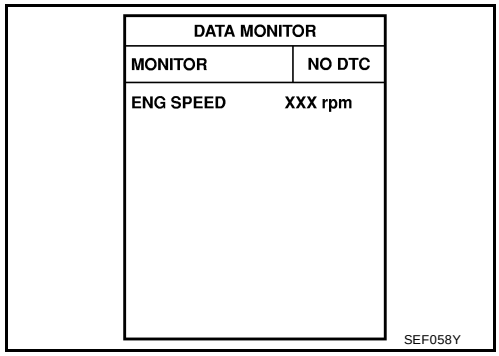
With GST

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-1374, "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-1374, "Diagnostic Procedure" .



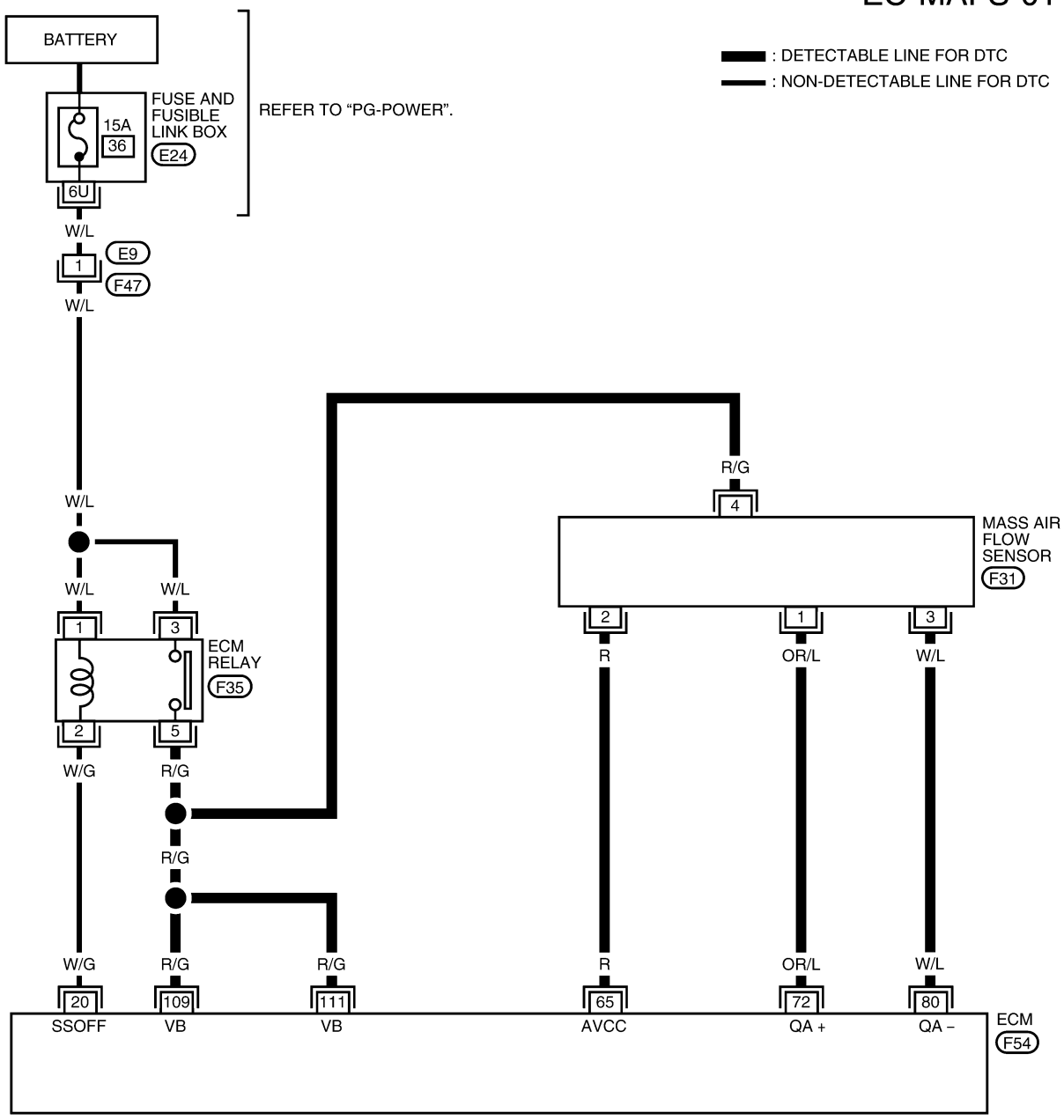
With GST

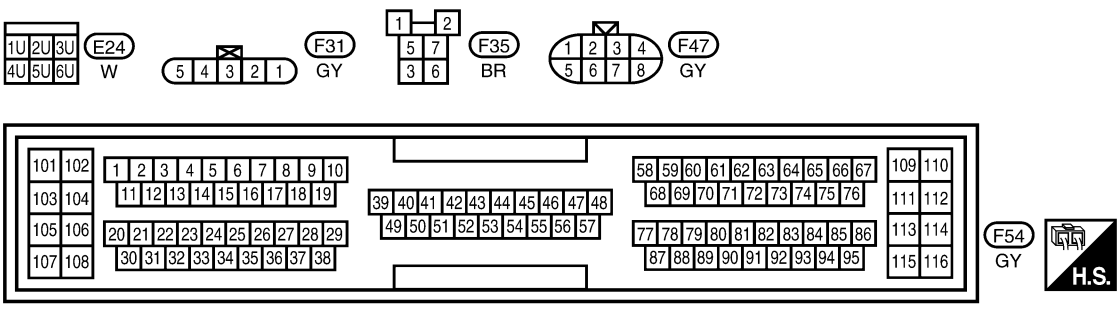
Follow the procedure “With CONSULT-II” above.

Wiring Diagram

UBS00294

EC-MAFS-01





BBWA0213E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/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)
65	R	Sensor's power supply	**[Ignition switch "ON"]**	Approximately 5V
72	OR/L	Mass air flow sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	1.1 - 1.5V
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,500 rpm.	1.6 - 2.0V
80	W/L	Mass air flow sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

Diagnostic Procedure

UBS00295

1. INSPECTION START

Which malfunction (P0102 or P0103) is duplicated?

P0102 or P0103

P0102 >> GO TO 2.
P0103 >> GO TO 3.

2. CHECK INTAKE SYSTEM

Check the following for connection.

- Air duct
- Vacuum hoses
- Intake air passage between air duct to intake manifold

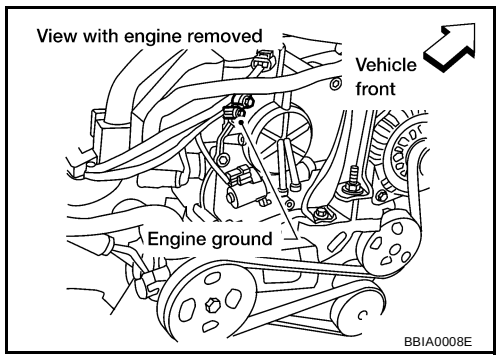
OK or NG

OK >> GO TO 3.
NG >> Reconnect the parts.

3. RETIGHTEN GROUND SCREWS

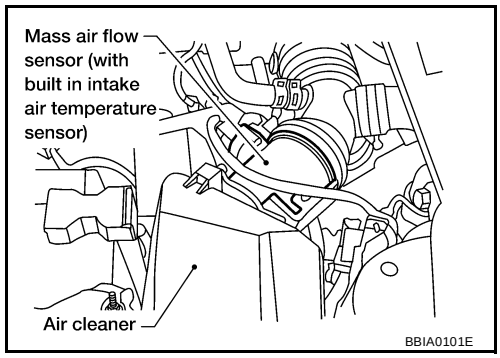
1. Turn ignition switch "OFF".
2. Loosen and retighten engine ground screws.

>> GO TO 4.



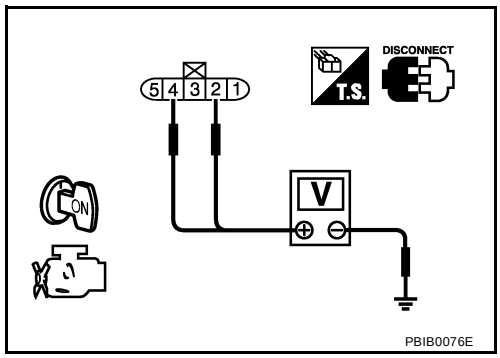
4. CHECK MAF SENSOR POWER SUPPLY CIRCUIT

1. Disconnect MAF sensor harness connector.
2. Turn ignition switch “ON”.



3. Check voltage between MAF sensor terminals 2, 4 and ground with CONSULT-II or tester.

Terminal	Voltage
2	Approximately 5V
4	Battery voltage



OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between ECM relay and mass air flow sensor
- Harness for open or short between mass air flow sensor and ECM

>> Repair harness or connectors.

6. CHECK MAF SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between MAF sensor terminal 3 and ECM terminal 80. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK MAF SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between MAF sensor terminal 1 and ECM terminal 72. 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-1376, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace mass air flow sensor.

9. CHECK INTERMITTENT INCIDENT

Refer to EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

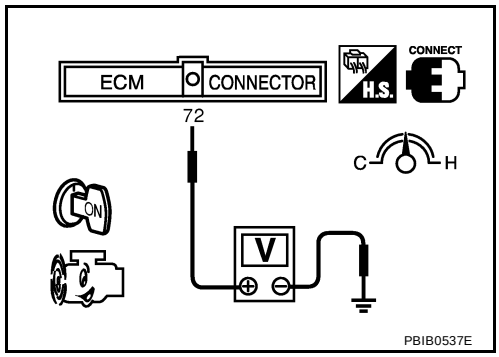
UBS00296

MASS AIR FLOW SENSOR

1. Reconnect harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 72 (Mass air flow sensor signal) and ground.

Condition	Voltage V
Ignition switch “ON” (Engine stopped.)	Approx. 1.0
Idle (Engine is warmed-up to normal operating temperature.)	1.1 - 1.5
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.6 - 2.0
Idle to about 4,000 rpm*	1.5 - 2.0 to Approx. 4.0

*: Check for liner voltage rise in response to engine being increased to about 4,000 rpm.



4. If the voltage is out of specification, proceed the following.

a. Turn ignition switch “OFF”.
b. Disconnect mass air flow sensor harness connector and reconnect it again.
c. Perform steps 2 and 3 again.

5. If NG, remove mass air flow sensor from air duct. Check hot film for damage or dust.
6. If NG, clean or replace mass air flow sensor.

Removal and Installation

UBS00297

MASS AIR FLOW SENSOR

Refer to EM-91, "AIR CLEANER AND AIR DUCT" .

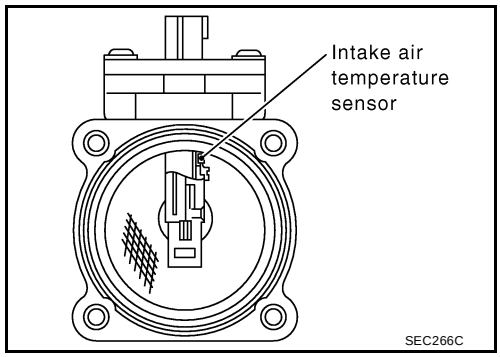
DTC P0112, P0113 IAT SENSOR

PFP:22630

Component Description

UBS00298

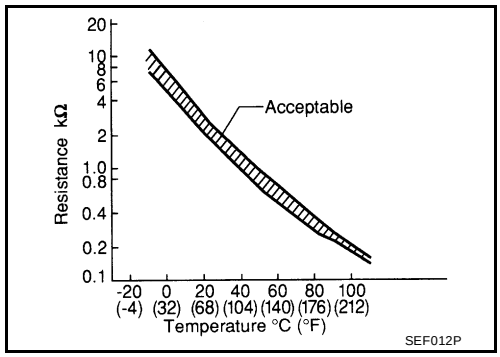
The intake air temperature sensor is built into mass air flow sensor. The sensor detects intake air temperature and transmits a signal to the ECM.
The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.



<Reference data>

Intake air temperature °C (°F)	Voltage* V	Resistance kΩ
–10 (14)	4.43	7.9 - 9.3
25 (77)	3.32	1.9 - 2.1
80 (176)	1.23	0.31 - 0.37

*: These data are reference values and are measured between ECM terminal 84 (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

UBS00299

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0112 0112	Intake air temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Intake air temperature sensor
P0113 0113	Intake air temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

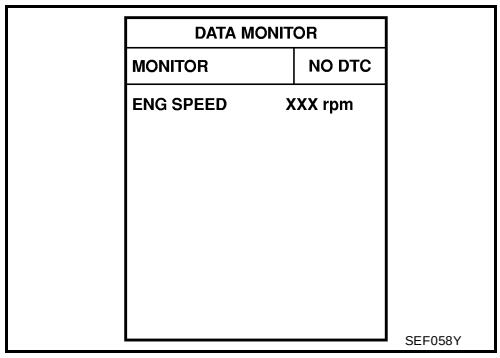
DTC Confirmation Procedure

UBS0029A

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-1380, "Diagnostic Procedure" .



WITH GST

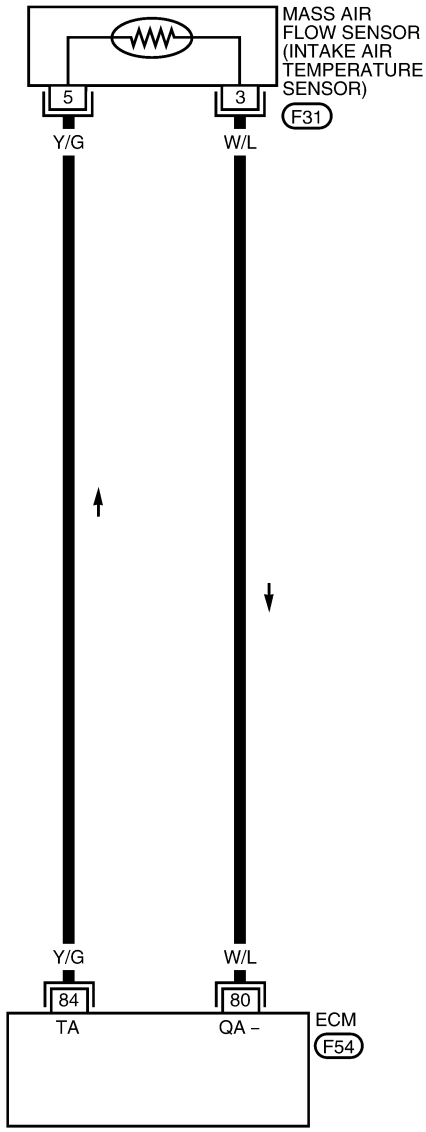
Follow the procedure “With CONSULT-II” above.

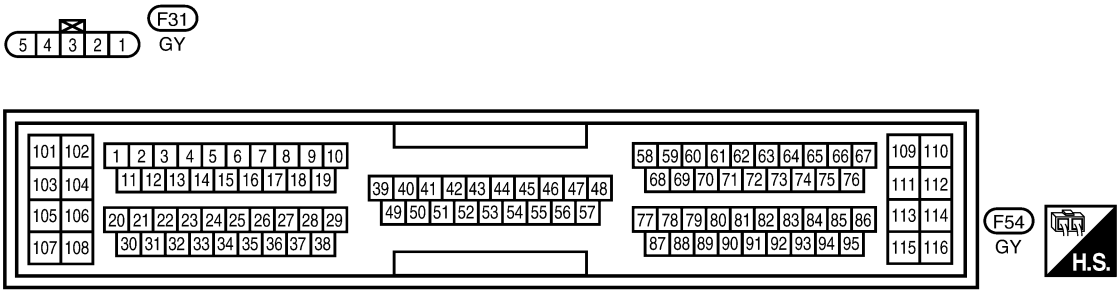
Wiring Diagram

UBS0029B

EC-IATS-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC





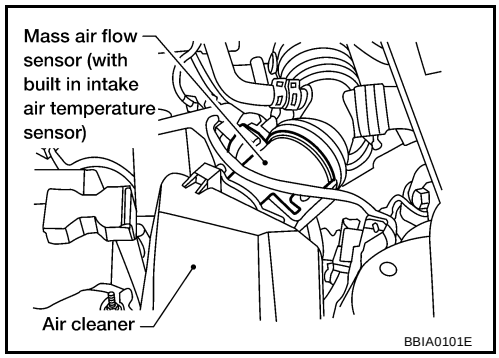
BBWA0214E

Diagnostic Procedure

UBS0029C

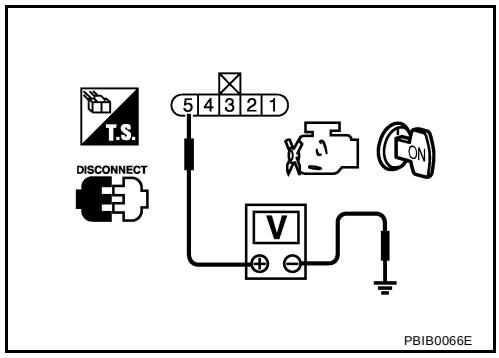
1. CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect mass air flow sensor (intake air temperature sensor is built-into) harness connector.
3. Turn ignition switch “ON”.



4. Check voltage between MAF sensor terminal 5 and ground.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 2.
NG >> Repair harness or connectors.

2. CHECK INTAKE AIR TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Check harness continuity between MAF sensor terminal 3 and ECM terminal 80. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair harness or connectors.

3. CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-1381, "Component Inspection" .

OK or NG

OK >> GO TO 4.
NG >> Replace mass air flow sensor (with intake air temperature sensor).

4. CHECK INTERMITTENT INCIDENT

Refer to EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

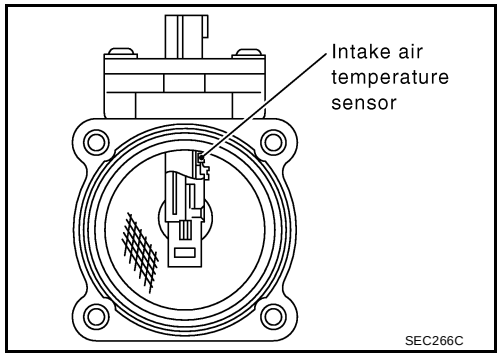
UBS0029D

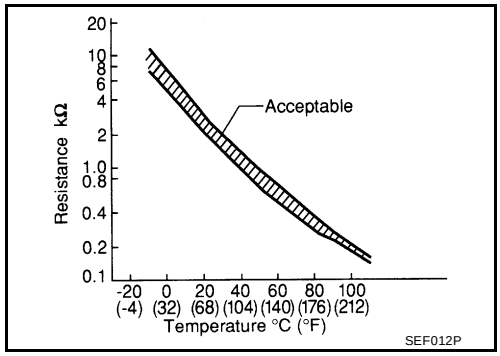
INTAKE AIR TEMPERATURE SENSOR

1. Check resistance between intake air temperature sensor terminals 3 and 5 under the following conditions.

Intake air temperature °C (°F)	Resistance kΩ
25 (77)	1.9 - 2.1

2. If NG, replace mass air flow sensor (with intake air temperature sensor).





Removal and Installation

UBS0029E

MASS AIR FLOW SENSOR

Refer to EM-91, "AIR CLEANER AND AIR DUCT" .

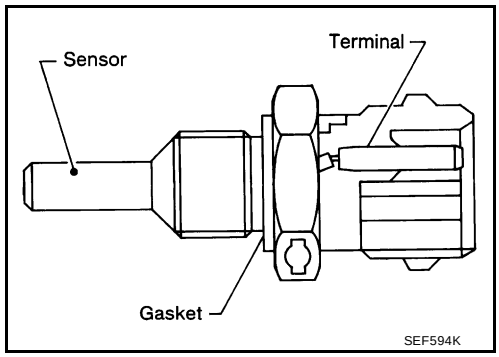
DTC P0117, P0118 ECT SENSOR

PFP:22630

Component Description

UBS0029F

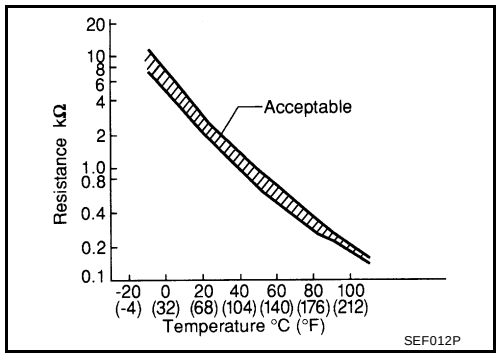
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



<Reference data>

Engine coolant temperature °C (°F)	Voltage* V	Resistance kΩ
–10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.1 - 2.9
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

*: These data are reference values and are measured between ECM terminal 93 (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

UBS0029G

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P0117 0117	Engine coolant temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Engine coolant temperature sensor
P0118 0118	Engine coolant temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

FAIL-SAFE MODE

When this malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

<table>
<tr><th>Detected items</th><th colspan="2">Engine operating condition in fail-safe mode</th></tr>
<tr><td rowspan="5">Engine coolant temperature sensor circuit</td><td colspan="2">Engine coolant temperature will be determined by ECM based on the time after turning ignition switch “ON” or “START”.
CONSULT-II displays the engine coolant temperature decided by ECM.</td></tr>
<tr><td>Condition</td><td>Engine coolant temperature decided
(CONSULT-II display)</td></tr>
<tr><td>Just as ignition switch is turned ON or Start</td><td>40°C (104°F)</td></tr>
<tr><td>More than approx. 4 minutes after ignition ON or Start</td><td>80°C (176°F)</td></tr>
<tr><td>Except as shown above</td><td>40 - 80°C (104 - 176°F)
(Depends on the time)</td></tr>
<tr><td colspan="2">When the fail-safe system for engine coolant temperature sensor is activated, the cooling fan operates while engine is running.</td></tr>
</table>

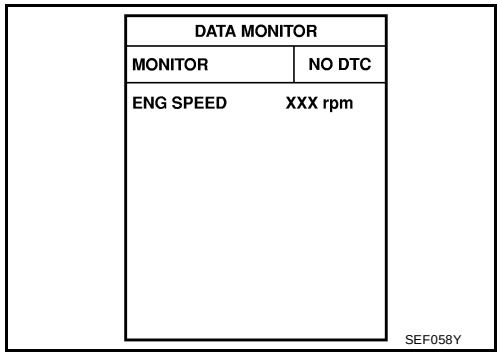
DTC Confirmation Procedure

UBS0029H

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-1385, "Diagnostic Procedure" .



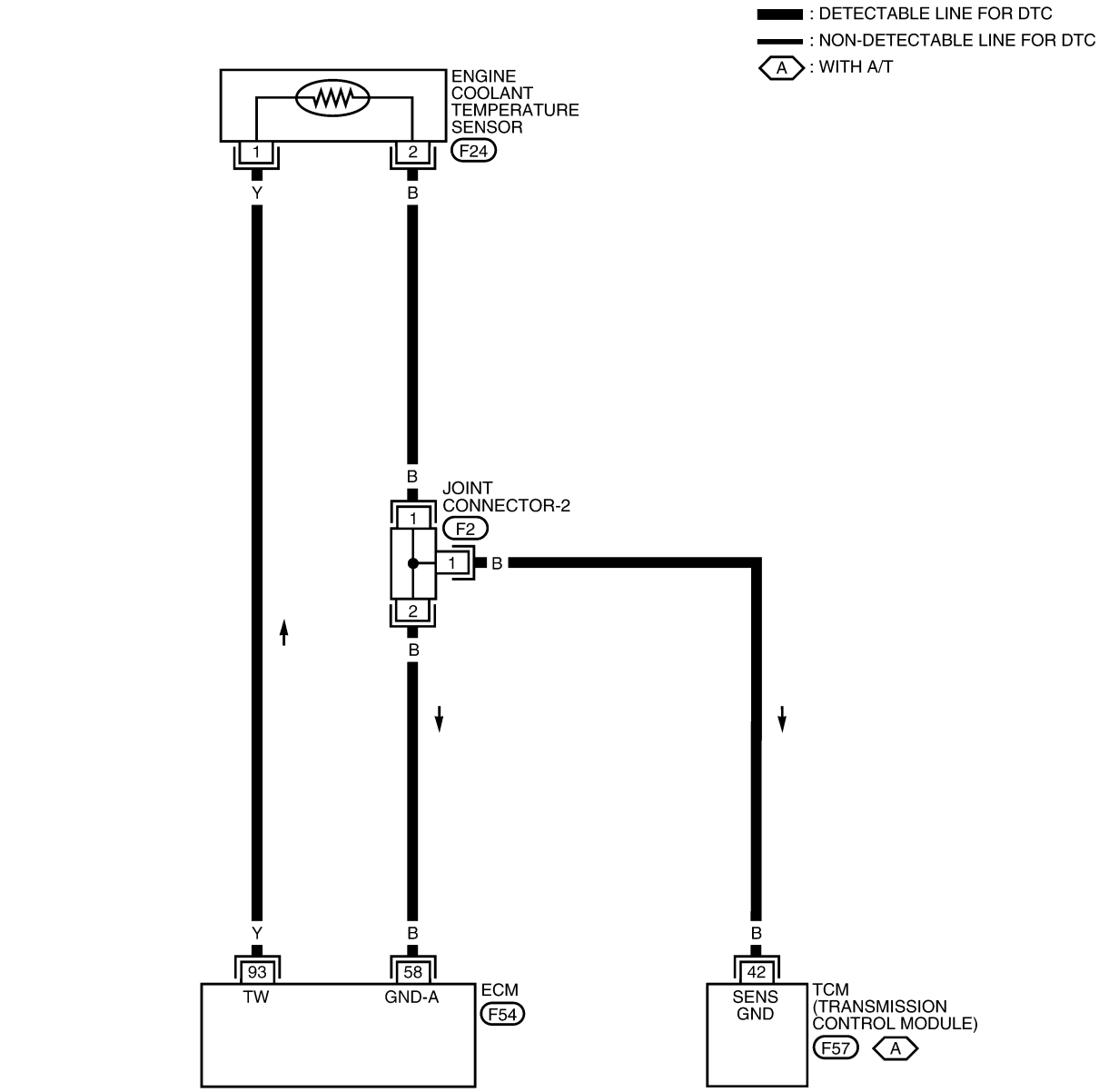
WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS0029I

EC-ECTS-01



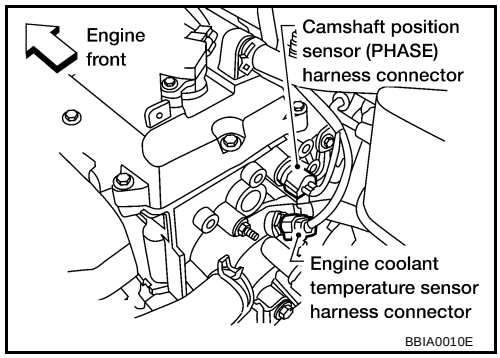
BBWA0215E

Diagnostic Procedure

UBS0029J

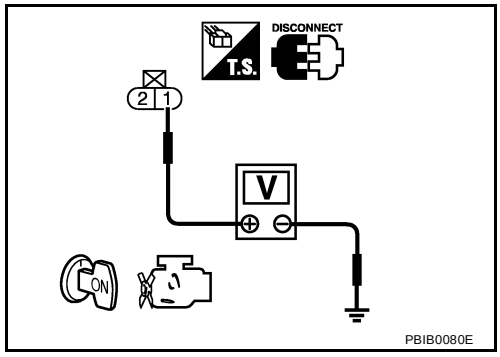
1. CHECK ECT SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect engine coolant temperature (ECT) sensor harness connector.
3. Turn ignition switch “ON”.



4. Check voltage between ECT sensor terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 2.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

2. CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Check harness continuity between ECT sensor terminal 2 and engine ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Joint connector-2
- Harness for open or short between engine coolant temperature sensor and ECM
- Harness for open or short between engine coolant temperature sensor and TCM

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-1386, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace engine coolant temperature sensor.

5. CHECK INTERMITTENT INCIDENT

Refer to EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

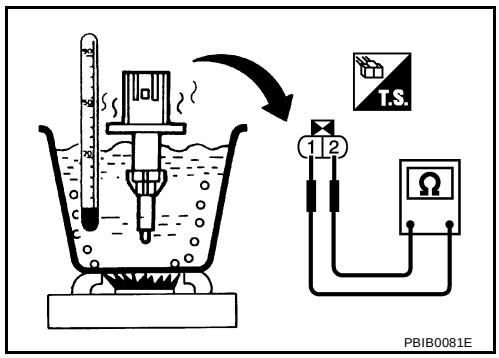
>> **INSPECTION END**

Component Inspection

UBS0029K

ENGINE COOLANT TEMPERATURE SENSOR

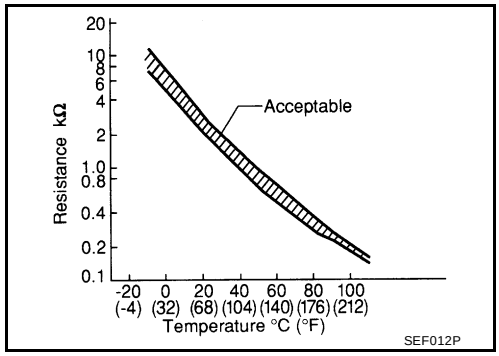
1. Check resistance between engine coolant temperature sensor terminals 1 and 2 as shown in the figure.



<Reference data>

Engine coolant temperature °C (°F)	Voltage* V	Resistance kΩ
–10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.1 - 2.9
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

*: These data are reference values and are measured between ECM terminal 93 (Engine coolant temperature sensor) and ground.



2. If NG, replace engine coolant temperature sensor.

Removal and Installation

UBS0029L

ENGINE COOLANT TEMPERATURE SENSOR

Refer to CO-30, "THERMOSTAT AND THERMOSTAT HOUSING" .

DTC P0125 ECT SENSOR

PFP:22630

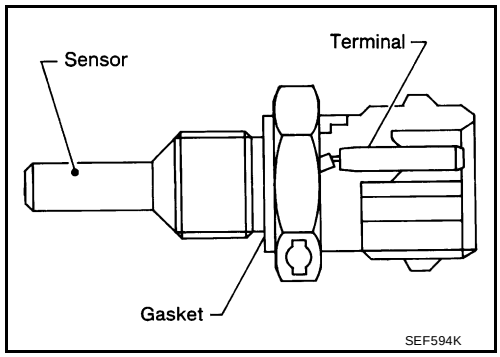
Description

UBS0029M

NOTE:
If DTC P0125 is displayed with P0117 or P0118, first perform the trouble diagnosis for DTC P0117 or P0118. Refer to EC-1382 .

COMPONENT DESCRIPTION

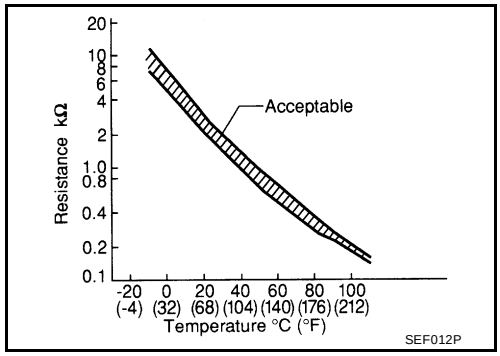
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



<Reference data>

Engine coolant temperature °C (°F)	Voltage* V	Resistance kΩ
–10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.1 - 2.9
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

*: These data are reference values and are measured between ECM terminal 93 (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

UBS0029N

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0125 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. ● Engine coolant temperature is insufficient for closed loop fuel control.	● Harness or connectors (High resistance in the circuit) ● Engine coolant temperature sensor ● Thermostat

DTC Confirmation Procedure

UBS0029O

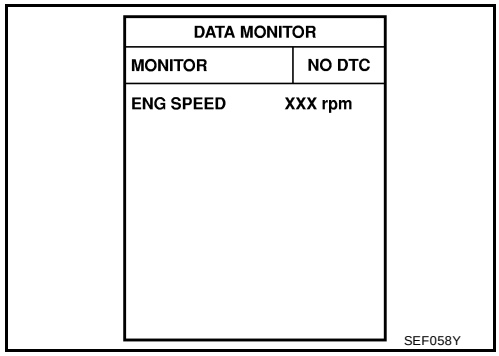
CAUTION:
Be careful not to overheat engine.

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch “ON”.

2. Select “DATA MONITOR” mode with CONSULT-II.
3. Check that “COOLAN TEMP/S” is above 10°C (50°F).
   If it is above 10°C (50°F), the test result will be OK.
   If it is below 10°C (50°F), go to following step.
4. Start engine and run it for 65 minutes at idle speed.
   If “COOLAN TEMP/S” increases to more than 10°C (50°F) within 65 minutes, stop engine because the test result will be OK.
5. If 1st trip DTC is detected, go to EC-1388, "Diagnostic Procedure" .



WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

UBS0029P

1. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-1388, "Component Inspection" .

OK or NG

OK >> GO TO 2.
NG >> Replace engine coolant temperature sensor.

2. CHECK THERMOSTAT OPERATION

When the engine is cold [lower than 70°C (158°F)] condition, grasp lower radiator hose and confirm the engine coolant does not flow.

OK or NG

OK >> GO TO 3.
NG >> Repair or replace thermostat. Refer to CO-30, "THERMOSTAT AND THERMOSTAT HOUSING" .

3. CHECK INTERMITTENT INCIDENT

Refer to EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

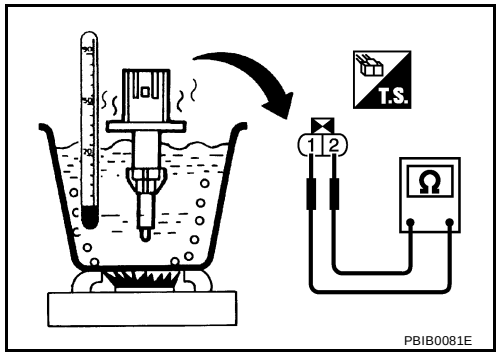
>> **INSPECTION END**

Component Inspection

UBS0029Q

ENGINE COOLANT TEMPERATURE SENSOR

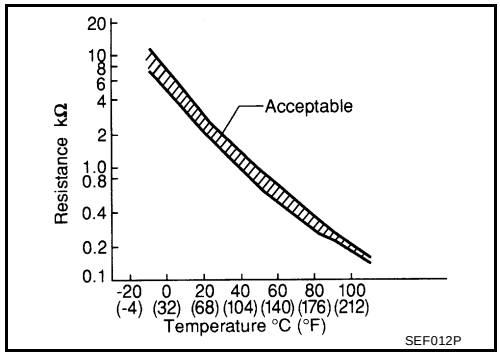
1. Check resistance between engine coolant temperature sensor terminals 1 and 2 as shown in the figure.



<Reference data>

Engine coolant temperature °C (°F)	Voltage* V	Resistance kΩ
–10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.1 - 2.9
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

*: These data are reference values and are measured between ECM terminal 93 (Engine coolant temperature sensor) and ground.



2. If NG, replace engine coolant temperature sensor.

Removal and Installation

UBS0029R

ENGINE COOLANT TEMPERATURE SENSOR

Refer to CO-30, "THERMOSTAT AND THERMOSTAT HOUSING" .

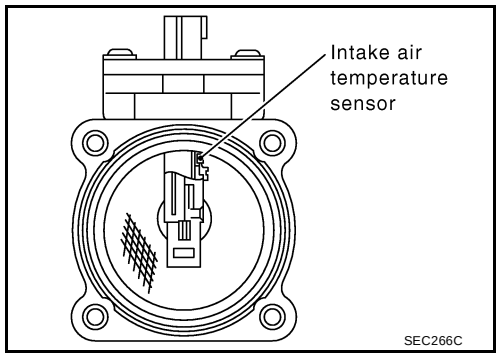
DTC P0127 IAT SENSOR

PFP:22630

Component Description

UBS0029S

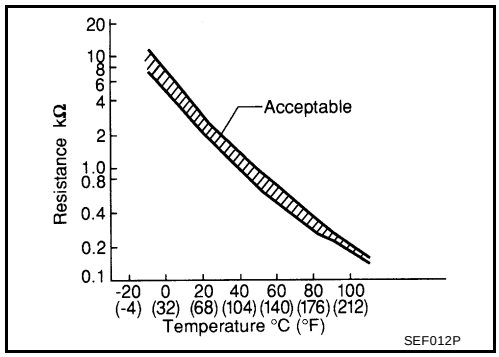
The intake air temperature sensor is built into mass air flow sensor. The sensor detects intake air temperature and transmits a signal to the ECM.
The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.



<Reference data>

Intake air temperature °C (°F)	Voltage* V	Resistance kΩ
–10 (14)	4.43	7.9 - 9.3
25 (77)	3.32	1.9 - 2.1
80 (176)	1.23	0.31 - 0.37

*: These data are reference values and are measured between ECM terminal 84 (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

UBS0029T

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0127 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) ● Intake air temperature sensor

DTC Confirmation Procedure

UBS0029U

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.

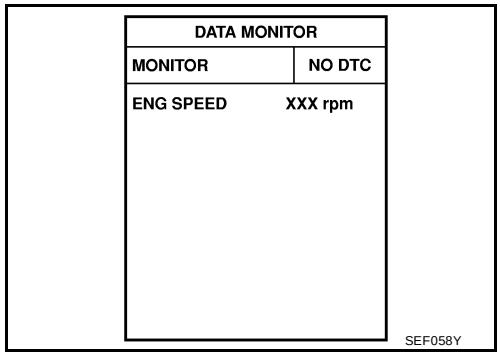
TESTING CONDITION:
This test may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

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-1391, "Diagnostic Procedure" .



WITH GST

Follow the procedure “With CONSULT-II” above.

Diagnostic Procedure

UBS0029V

1. CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-1391, "Component Inspection" .

OK or NG

OK >> GO TO 2.
NG >> Replace mass air flow sensor (with intake air temperature sensor).

2. CHECK INTERMITTENT INCIDENT

Refer to EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .
Refer to EC-1379, "Wiring Diagram" .

>> **INSPECTION END**

Component Inspection

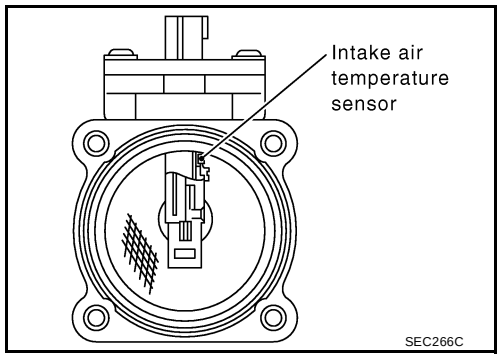
UBS0029W

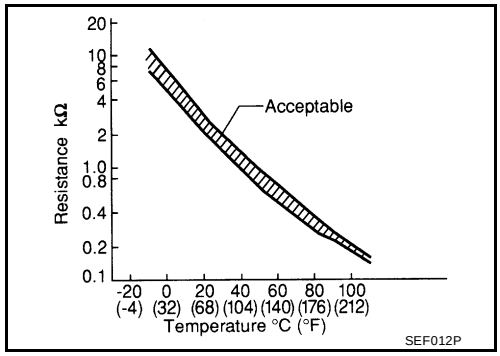
INTAKE AIR TEMPERATURE SENSOR

1. Check resistance between intake air temperature sensor terminals 3 and 5 under the following conditions.

Intake air temperature °C (°F)	Resistance kΩ
25 (77)	1.9 - 2.1

2. If NG, replace mass air flow sensor (with intake air temperature sensor).





Removal and Installation

UBS0029X

MASS AIR FLOW SENSOR

Refer to EM-91, "AIR CLEANER AND AIR DUCT" .

DTC P0128 THERMOSTAT FUNCTION

PFP:21200

On Board Diagnosis Logic

UBS0029Y

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 0128	Thermostat function	The engine coolant temperature does not reach to specified temperature even though the engine has run long enough.	● Thermostat function ● Leakage from sealing portion of thermostat ● Engine coolant temperature sensor

DTC Confirmation Procedure

UBS0029Z

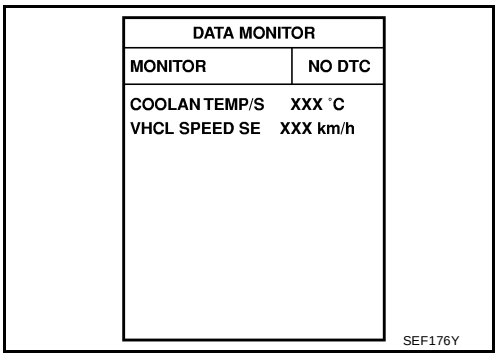
NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:

- **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-30, "THERMOSTAT AND THERMOSTAT HOUSING" . Use only a genuine NISSAN thermostat as a replacement. If an incorrect thermostat is used, the MIL may come on.
2. Turn ignition switch “ON”.
3. Select “COOLAN TEMP/S” in “DATA MONITOR” mode with CONSULT-II.
4. Check that the “COOLAN TEMP/S” is above 60°C (140°F).
   If it is below 60°C (140°F), go to following step.
   If it is above 60°C (140°F), stop engine and cool down the engine to less than 60°C (140°F), then retry from step 2.
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-1393, "Diagnostic Procedure" .

WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

UBS002A0

1. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-1394, "Component Inspection" .

OK or NG

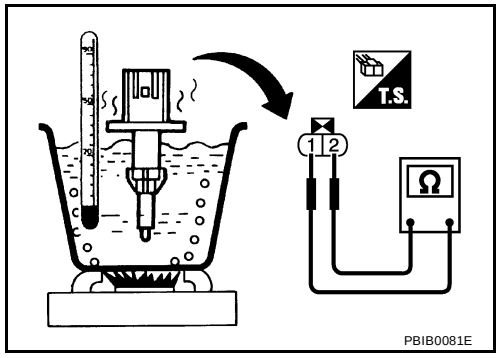
OK >> **INSPECTION END**
NG >> Replace engine coolant temperature sensor.

Component Inspection

UBS002A1

ENGINE COOLANT TEMPERATURE SENSOR

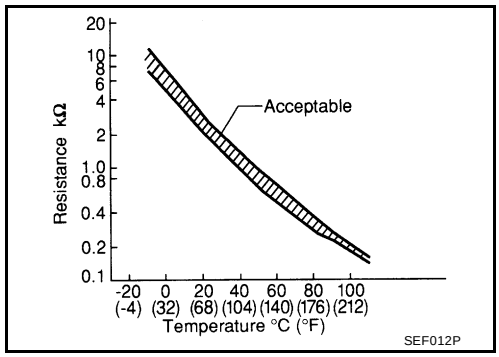
1. Check resistance between engine coolant temperature sensor terminals 1 and 2 as shown in the figure.



<Reference data>

Engine coolant temperature °C (°F)	Voltage* V	Resistance kΩ
−10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.1 - 2.9
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

*: These data are reference values and are measured between ECM terminal 93 (Engine coolant temperature sensor) and ground.



2. If NG, replace engine coolant temperature sensor.

Removal and Installation

UBS002A2

ENGINE COOLANT TEMPERATURE SENSOR

Refer to CO-30, "THERMOSTAT AND THERMOSTAT HOUSING" .

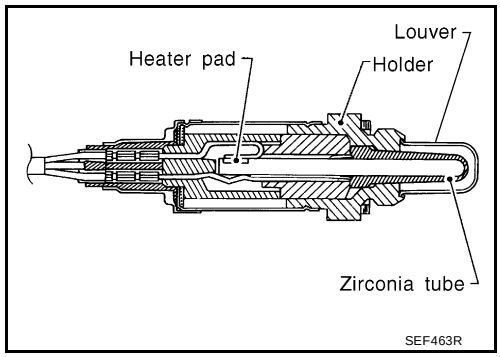
DTC P0132 HO2S1

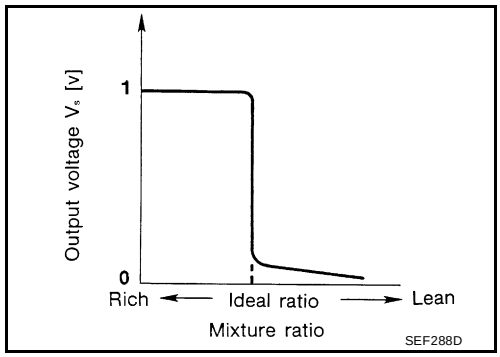
PFP:22690

Component Description

UBS002A3

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.





CONSULT-II Reference Value in Data Monitor Mode

UBS002A4

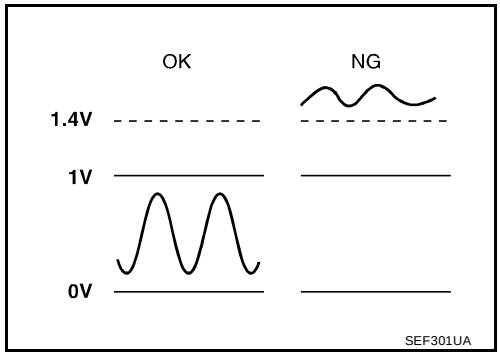
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	LEAN ←→ RICH Changes more than 5 times during 10 seconds.

On Board Diagnosis Logic

UBS002A5

To judge the malfunction, the diagnosis checks that the heated oxygen sensor 1 output is not inordinately high.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0132 0132	Heated oxygen sensor 1 circuit high voltage	An excessively high voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted) ● Heated oxygen sensor 1

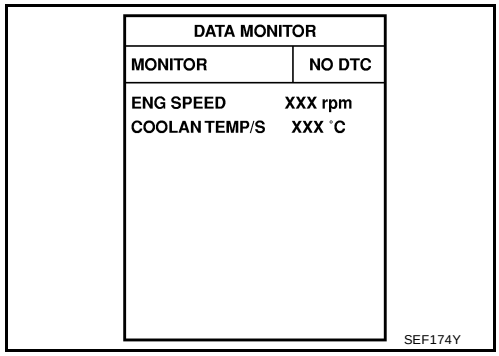
DTC Confirmation Procedure

UBS002A6

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Turn ignition switch “ON”.
4. Select “DATA MONITOR” mode with CONSULT-II.
5. Restart engine and let it idle for 2 minutes.
6. If 1st trip DTC is detected, go to EC-1398, "Diagnostic Procedure" .



WITH GST

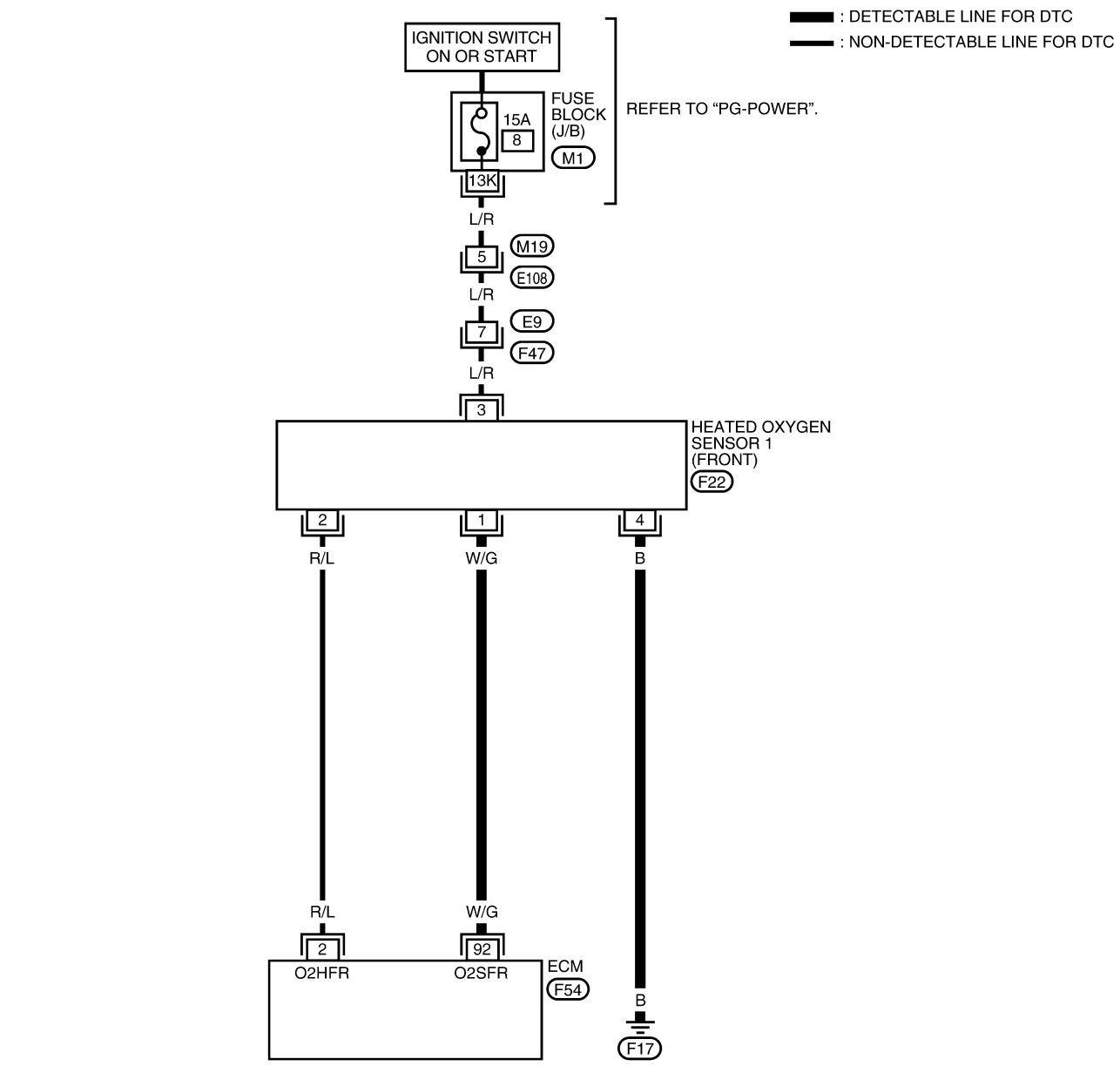
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Restart engine and let it idle for 2 minutes.
4. Turn ignition switch “OFF” and wait at least 10 seconds.
5. Restart engine and let it idle for 2 minutes.
6. Select “MODE 3” with GST.
7. If DTC is detected, go to EC-1398, "Diagnostic Procedure" .

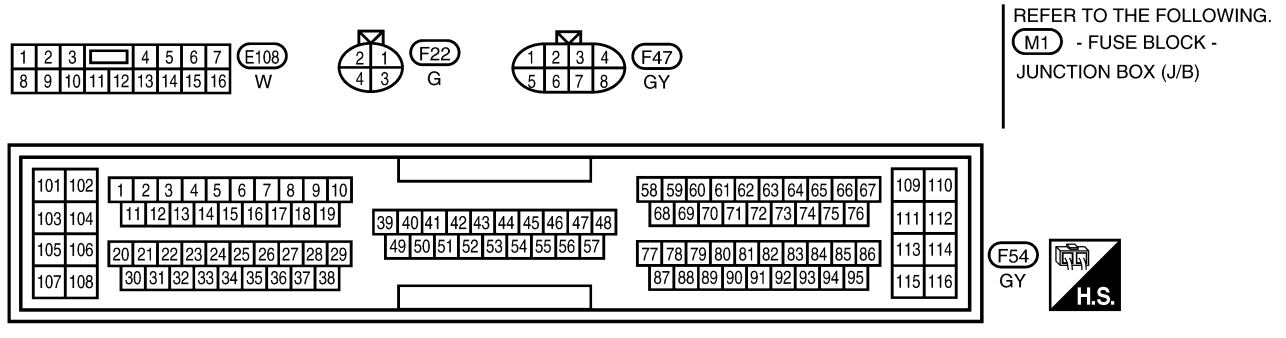
- **When using GST, “DTC Confirmation Procedure” should be performed twice as much as when using CONSULT-II because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II is recommended.**

Wiring Diagram

UBS002A7

EC-HO2S1-01





BBWA0216E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/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)
92	W/G	Heated oxygen sensor 1	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)

Diagnostic Procedure

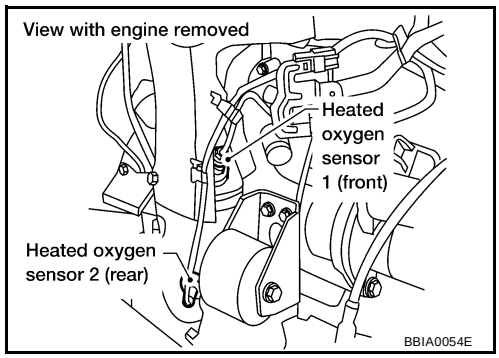
UBS002A8

1. RETIGHTEN HEATED OXYGEN SENSOR 1

Loosen and retighten heated oxygen sensor 1.

Tightening torque: 40 - 50 N·m (4.1 - 5.1 kg-m, 30 - 37 ft-lb)

>> GO TO 2.



2. CHECK HO2S1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Check harness continuity between HO2S1 terminal 4 and engine ground.
   Refer to Wiring Diagram.

   Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to power in harness or connectors.

3. CHECK HO2S1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

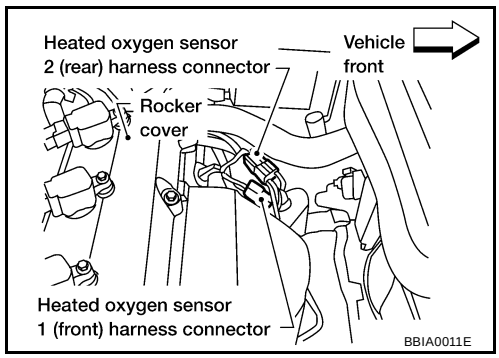
1. Disconnect heated oxygen sensor 1 harness connector.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 92 and HO2S1 terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Check harness continuity between ECM terminal 92 or HO2S1 terminal 1 and ground.
   Refer to Wiring Diagram.

   Continuity should not exist.

5. Also check harness for short to power.



OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK HO2S1 CONNECTOR FOR WATER

1. Disconnect heated oxygen sensor 1 harness connector.
2. Check connectors for water.

Water should not exist.

OK or NG

OK >> GO TO 5.
NG >> Repair or replace harness or connectors.

5. CHECK HEATED OXYGEN SENSOR 1

Refer to EC-1399, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace heated oxygen sensor 1.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

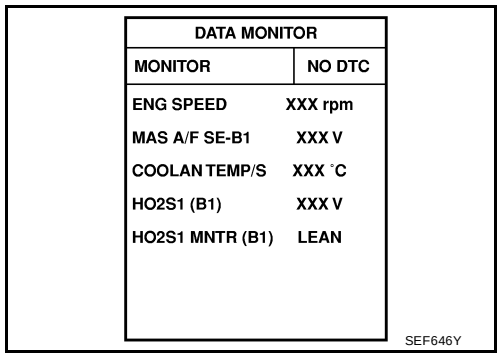
Component Inspection

UBS002A9

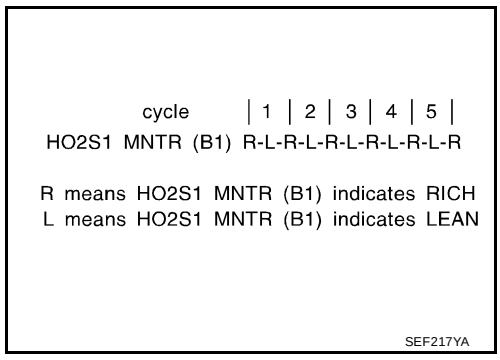
HEATED OXYGEN SENSOR 1

With CONSULT-II

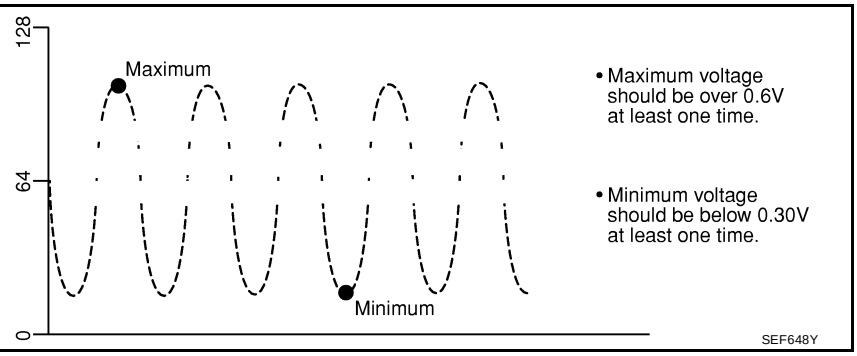
1. Start engine and warm it up to normal operating temperature.
2. Select “MANU TRIG” and adjust “TRIGGER POINT” to 100% in “DATA MONITOR” mode with CONSULT-II.
3. Select “HO2S1 (B1)” and “HO2S1 MNTR (B1)”.
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch “RECORD” on CONSULT-II screen.



6. Check the following.
   - “HO2S1 MNTR (B1)” in “DATA MONITOR” mode changes from “RICH” to “LEAN” to “RICH” 5 times in 10 seconds.
     5 times (cycles) are counted as shown at right.
   - “HO2S1 (B1)” voltage goes above 0.6V at least once.
   - “HO2S1 (B1)” voltage goes below 0.3V at least once.
   - “HO2S1 (B1)” voltage never exceeds 1.0V.



Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX



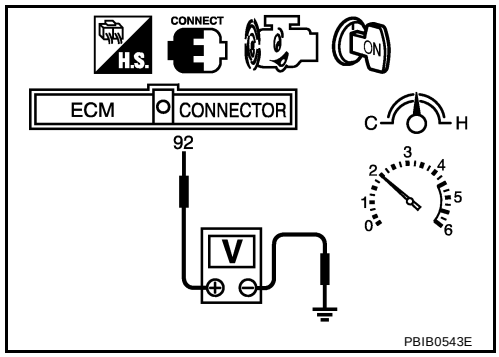
CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 92 [HO2S1 (B1) signal] and engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.
   - The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.
   - The maximum voltage is over 0.6V at least one time.
   - The minimum voltage is below 0.3V at least one time.
   - The voltage never exceeds 1.0V.

   1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
   2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V



CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

UBS002AA

HEATED OXYGEN SENSOR 1

Refer to EM-98, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .

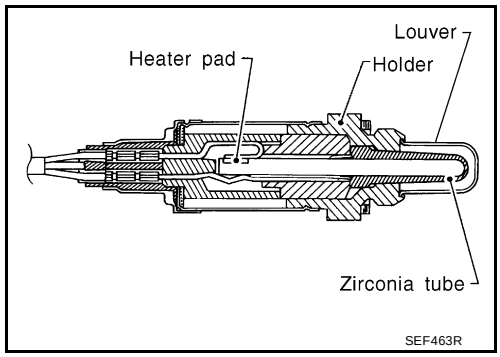
DTC P0133 HO2S1

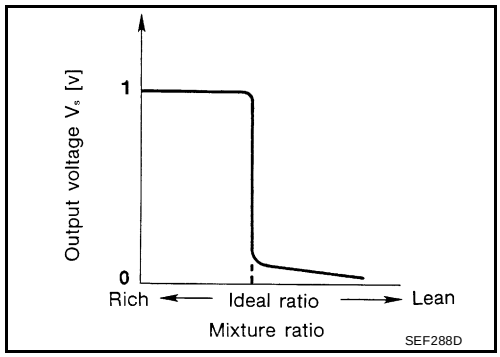
PFP:22690

Component Description

UBS002AB

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.





CONSULT-II Reference Value in Data Monitor Mode

UBS002AC

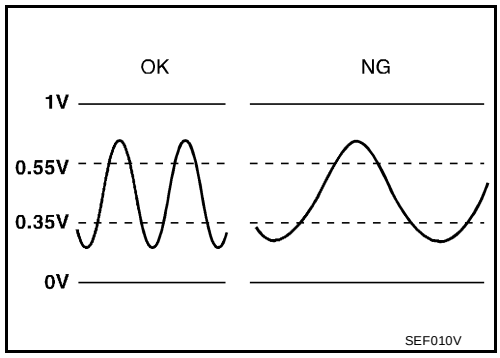
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	LEAN ←→ RICH Changes more than 5 times during 10 seconds.

On Board Diagnosis Logic

UBS002AD

To judge the malfunction of heated oxygen sensor 1, this diagnosis measures response time of heated oxygen sensor 1 signal. The time is compensated by engine operating (speed and load), fuel feedback control constant, and heated oxygen sensor 1 temperature index. Judgment is based on whether the compensated time (heated oxygen sensor 1 cycling time index) is inordinately long or not.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0133 0133	Heated oxygen sensor 1 circuit slow response	The response of the voltage signal from the sensor takes more than the specified time.	● Harness or connectors (The sensor circuit is open or shorted) ● Heated oxygen sensor 1 ● Heated oxygen sensor 1 heater ● Fuel pressure ● Injectors ● Intake air leaks ● Exhaust gas leaks ● PCV valve ● Mass air flow sensor

DTC Confirmation Procedure

UBS002AE

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

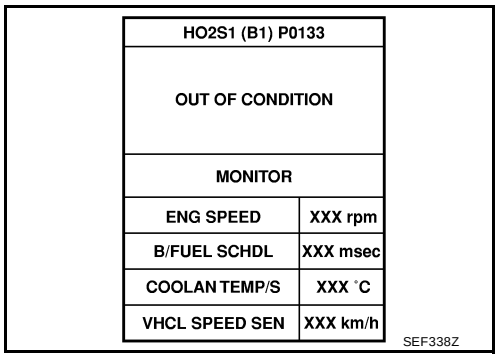
- **Always perform at a temperature above −10°C (14°F).**
- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine and wait at least 10 seconds.
3. Turn ignition switch “ON” and select “HO2S1 (B1) P0133” of “HO2S1” in “DTC WORK SUPPORT” mode with CONSULT-II.
4. Touch “START”.
5. Start engine and let it idle for at least 3 minutes.

   NOTE:

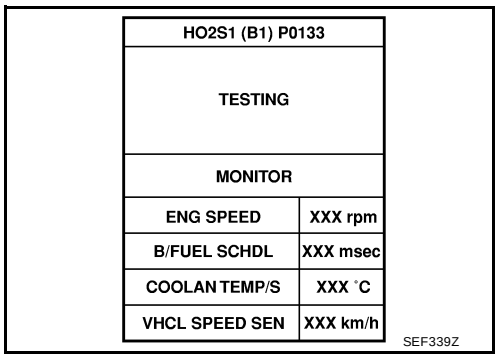
   Never raise engine speed above 3,600 rpm after this step. If the engine speed limit is exceeded, return to step 5.



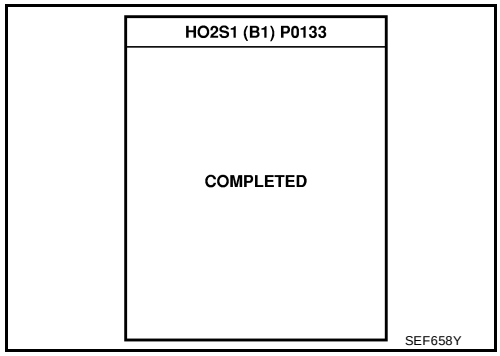
6. When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 20 to 50 seconds.)

ENG SPEED	1,200 - 3,200 rpm
Vehicle speed	More than 80 km/h (50 MPH)
B/FUEL SCHDL	1.9 - 13.0 msec
Selector lever	Suitable position

If “TESTING” is not displayed after 5 minutes, retry from step 2.



7. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to EC-1405, "Diagnostic Procedure" .



Overall Function Check

UBS002AF

Use this procedure to check the overall function of the heated oxygen sensor 1 circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

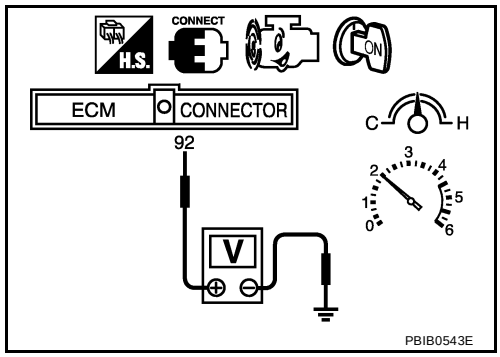
1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 92 [HO2S1(B1) signal] and engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.

- The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.

1 time: **0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V**

2 times: **0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V**

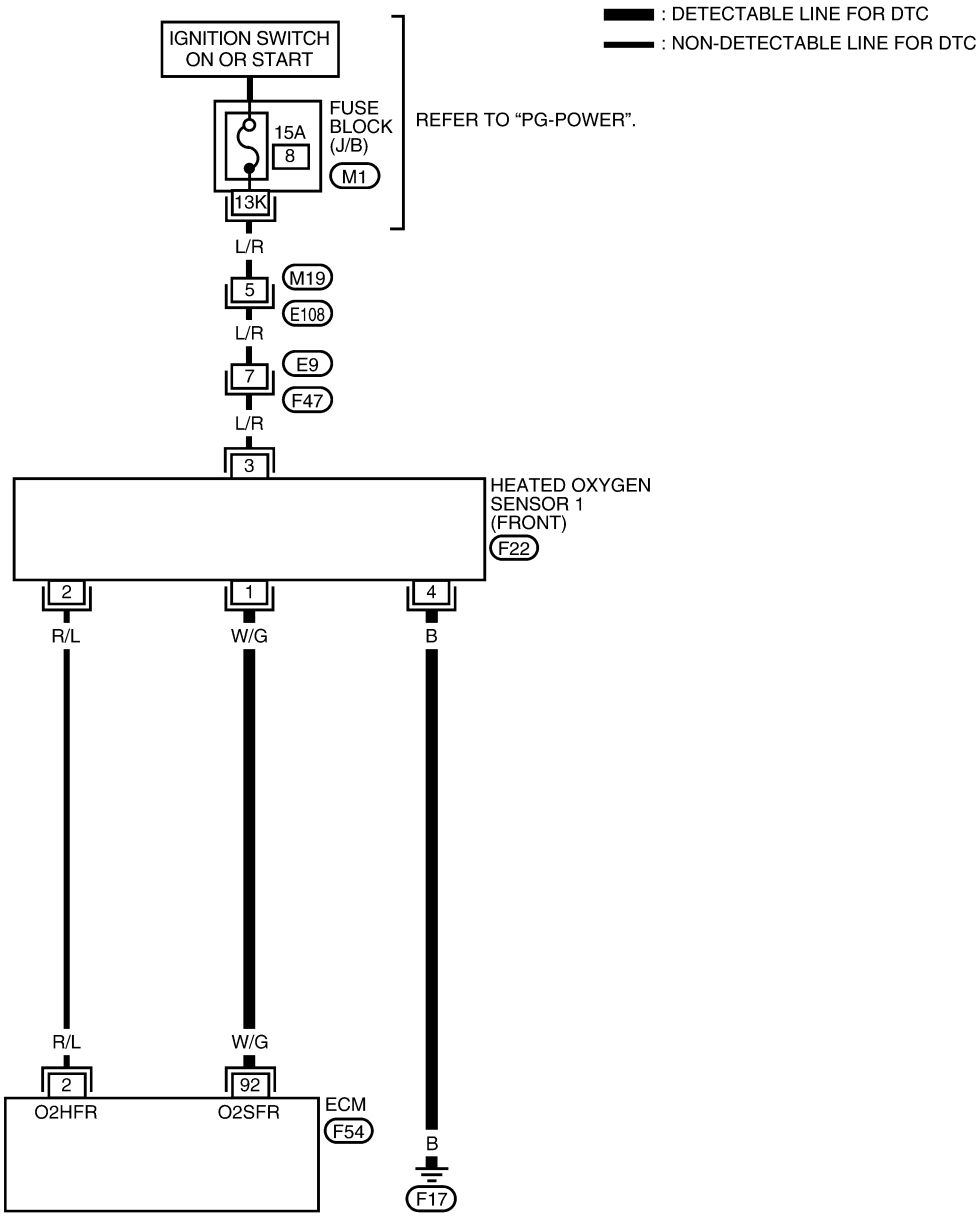
4. If NG, go to EC-1405, "Diagnostic Procedure" .

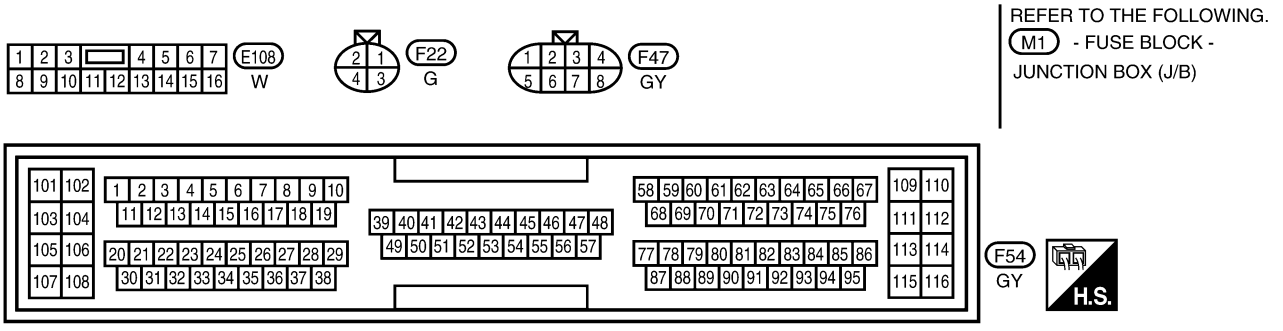


Wiring Diagram

UBS002AG

EC-HO2S1-01





BBWA0216E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/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)
92	W/G	Heated oxygen sensor 1	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)

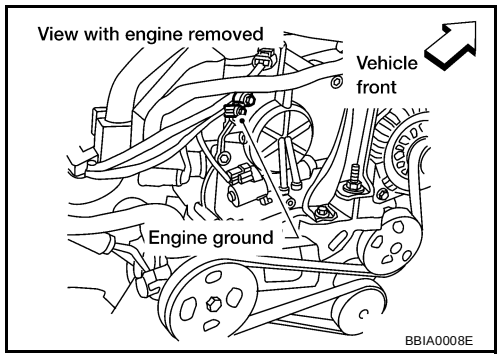
Diagnostic Procedure

UBS002AH

1. RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

>> GO TO 2.

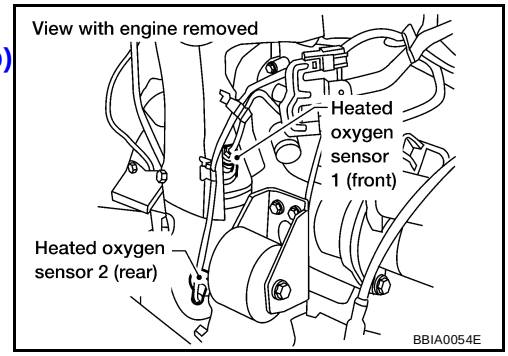


2. RETIGHTEN HEATED OXYGEN SENSOR 1

Loosen and retighten heated oxygen sensor 1.

Tightening torque: 40 - 50 N·m (4.1 - 5.1 kg-m, 30 - 37 ft-lb)

>> GO TO 3.

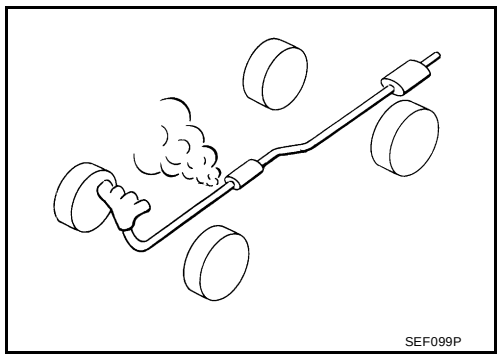


3. CHECK FOR EXHAUST AIR LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust air leak before three way catalyst (Manifold).

OK or NG

OK >> GO TO 4.
NG >> Repair or replace.



4. CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

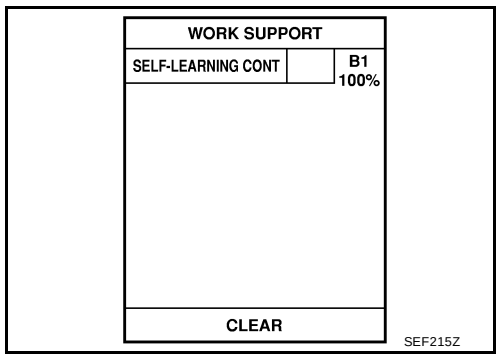
OK or NG

OK >> GO TO 5.
NG >> Repair or replace.

5. CLEAR THE SELF-LEARNING DATA

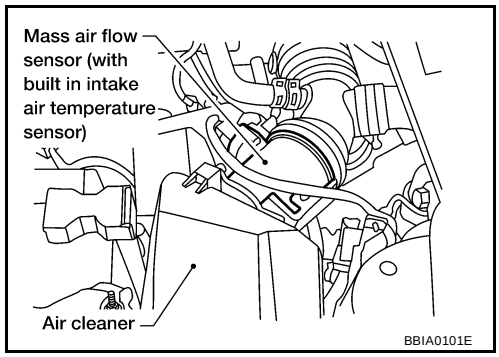
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 or P0172 detected?
   Is it difficult to start engine?



Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF”.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure DTC P0102 is displayed.
6. Erase the DTC memory. Refer to EC-1271, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 or P0172 detected?
   Is it difficult to start engine?



Yes or No

Yes >> Perform trouble diagnosis for DTC P0171 or DTC P0172 (Refer to EC-1430 or EC-1436).
No >> GO TO 6.

6. CHECK HO2S1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Check harness continuity between HO2S1 terminal 4 and engine ground.
   Refer to Wiring Diagram.

   Continuity should exist.

3. Also check harness for short to power.

OK or NG

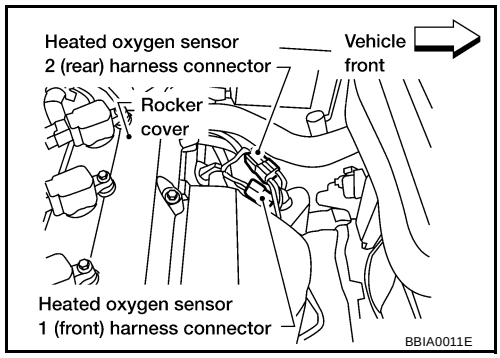
OK >> GO TO 7.
NG >> Repair open circuit or short to power in harness or connectors.

7. CHECK HO2S1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect heated oxygen sensor 1 harness connector.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 92 and HO2S1 terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.
4. Check harness continuity between ECM terminal 92 or HO2S1 terminal 1 and ground.
   Refer to Wiring Diagram.

   Continuity should not exist.



5. Also check harness for short to power.

OK or NG

OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK HEATED OXYGEN SENSOR 1 HEATER

Refer to EC-1358, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace malfunctioning heated oxygen sensor 1.

9. CHECK MASS AIR FLOW SENSOR

Refer to EC-1370, "Component Inspection" .

OK or NG

OK >> GO TO 10.
NG >> Replace mass air flow sensor.

10. CHECK PCV VALVE

Refer to EC-1848, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> Replace PCV valve.

11. CHECK HEATED OXYGEN SENSOR 1

Refer to EC-1407, "Component Inspection" .

OK or NG

OK >> GO TO 12.
NG >> Replace heated oxygen sensor 1.

12. CHECK INTERMITTENT INCIDENT

Refer to EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

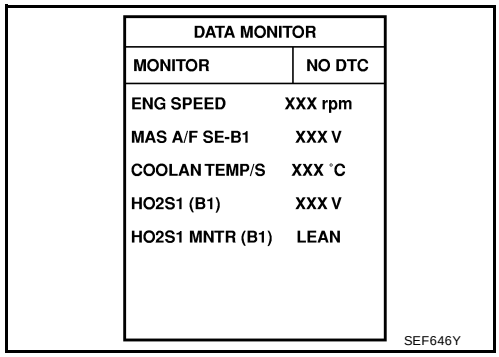
UBS002AI

HEATED OXYGEN SENSOR 1

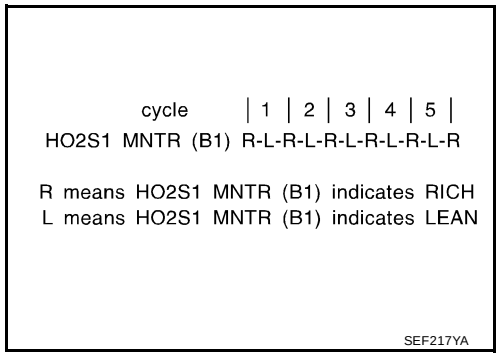
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.

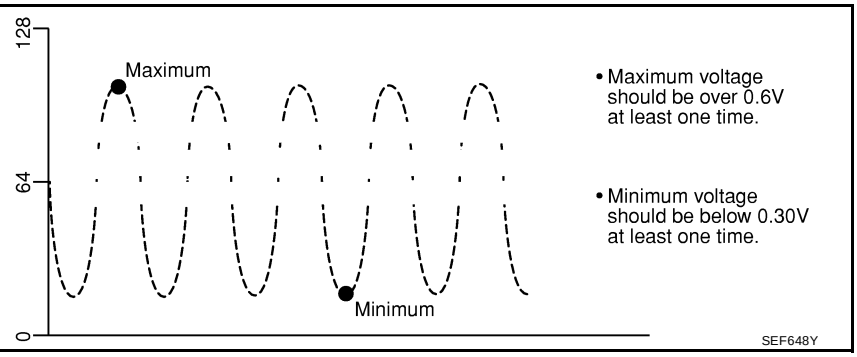
2. Select “MANU TRIG” and adjust “TRIGGER POINT” to 100% in “DATA MONITOR” mode with CONSULT-II.
3. Select “HO2S1 (B1)” and “HO2S1 MNTR (B1)”.
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch “RECORD” on CONSULT-II screen.



6. Check the following.
   - “HO2S1 MNTR (B1)” in “DATA MONITOR” mode changes from “RICH” to “LEAN” to “RICH” 5 times in 10 seconds.
     5 times (cycles) are counted as shown at right.
   - “HO2S1 (B1)” voltage goes above 0.6V at least once.
   - “HO2S1 (B1)” voltage goes below 0.3V at least once.
   - “HO2S1 (B1)” voltage never exceeds 1.0V.



Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX



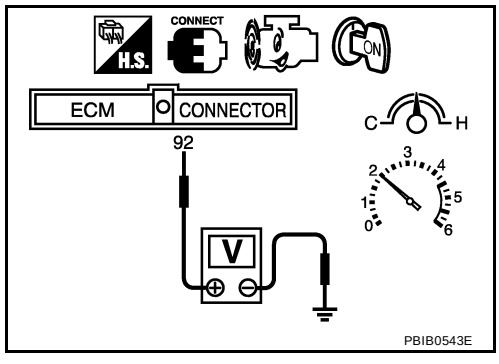
CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 92 [HO2S1 (B1) signal] and engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.
   - The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.
   - The maximum voltage is over 0.6V at least one time.
   - The minimum voltage is below 0.3V at least one time.
   - The voltage never exceeds 1.0V.

   1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
   2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V



CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

UBS002AJ

HEATED OXYGEN SENSOR 1

Refer to EM-98, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .

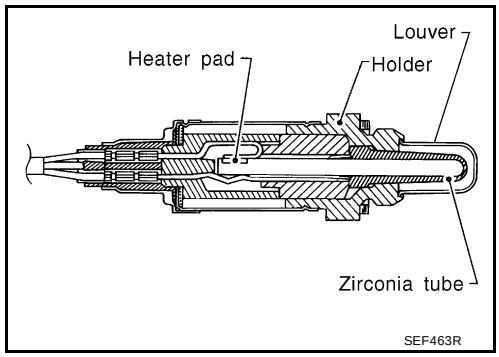
DTC P0134 HO2S1

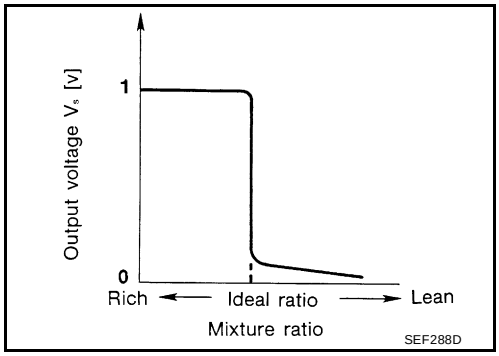
PFP:22690

Component Description

UBS002AK

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.





CONSULT-II Reference Value in Data Monitor Mode

UBS002AL

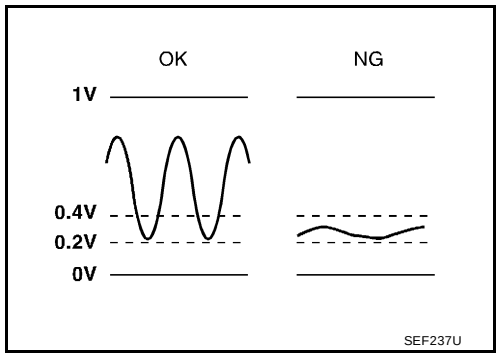
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	LEAN ←→ RICH Changes more than 5 times during 10 seconds.

On Board Diagnosis Logic

UBS002AM

Under the condition in which the heated oxygen sensor 1 signal is not input, the ECM circuits will read a continuous approximately 0.3V. Therefore, for this diagnosis, the time that output voltage is within 200 to 400 mV range is monitored, and the diagnosis checks that this time is not inordinately long.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0134 0134	Heated oxygen sensor 1 circuit no activity detected	The voltage from the sensor is constantly approx. 0.3V.	● Harness or connectors (The sensor circuit is open or shorted) ● Heated oxygen sensor 1

DTC Confirmation Procedure

UBS002AN

CAUTION:
Always drive vehicle at a safe speed.

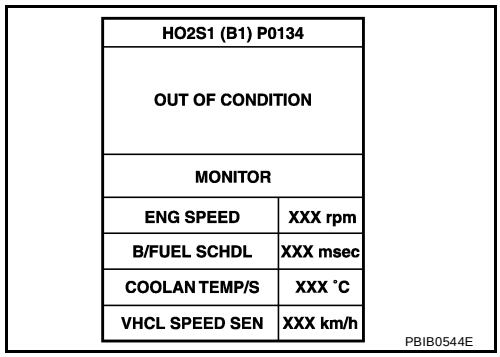
NOTE:
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

WITH CONSULT-II

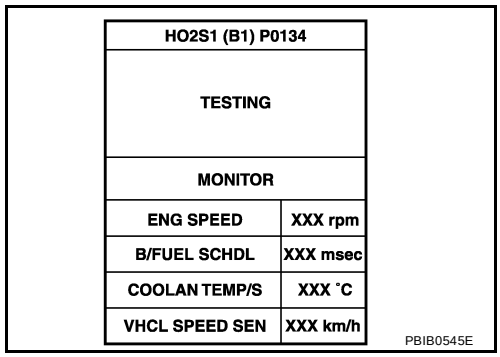
1. Start engine and warm it up to normal operating temperature.
2. Select "HO2S1 (B1) P0134" of "HO2S1" in "DTC WORK SUPPORT" mode with CONSULT-II.
3. Touch "START".
4. Let it idle for at least 3 minutes.

   NOTE:
   Never raise engine speed above 3,600 rpm after this step. If the engine speed limit is exceeded, return to step 4.



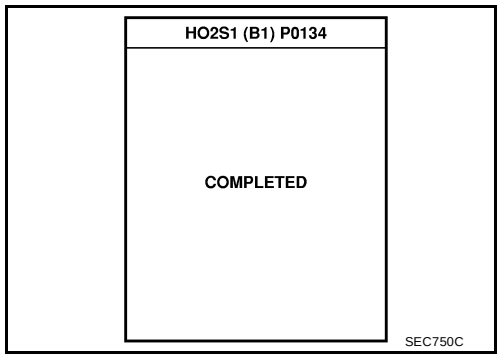
5. When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take approximately 10 to 60 seconds.)

ENG SPEED	1,200 - 3,200 rpm
Vehicle speed	More than 64 km/h (40 MPH)
B/FUEL SCHDL	1.9 - 13.0 msec
Selector lever	Suitable position



   If "TESTING" is not displayed after 5 minutes, retry from step 2.

6. Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to EC-1414, "Diagnostic Procedure" .



Overall Function Check

UBS002AO

Use this procedure to check the overall function of the heated oxygen sensor 1 circuit. During this check, a 1st trip DTC might not be confirmed.

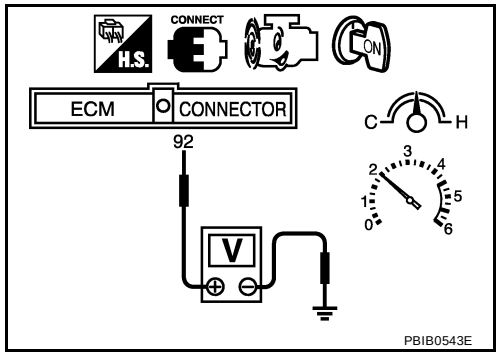
WITH GST

1. Start engine and warm it up to normal operating temperature.

2. Set voltmeter probes between ECM terminal 92 [HO2S1 (B1) signal] and engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.

- The voltage does not remain in the range of 0.2 - 0.4V.

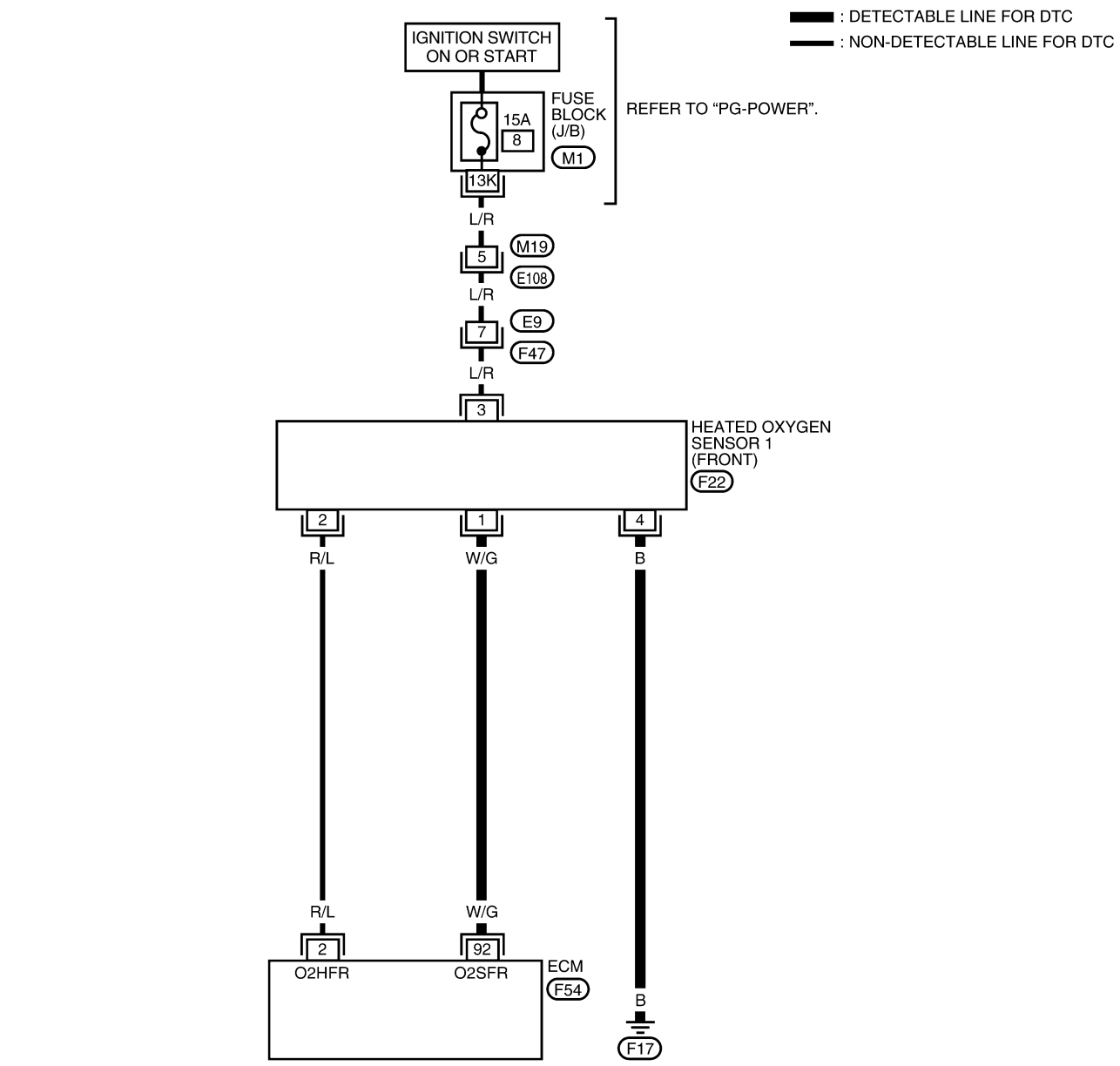
4. If NG, go to EC-1414, "Diagnostic Procedure" .

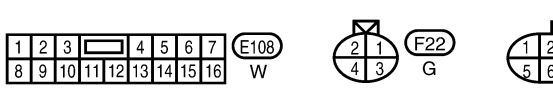


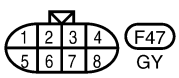
Wiring Diagram

UBS002AP

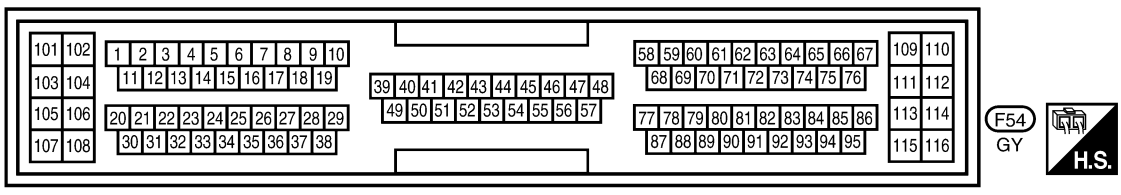
EC-HO2S1-01







REFER TO THE FOLLOWING.
M1 - FUSE BLOCK - JUNCTION BOX (J/B)



BBWA0216E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/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)
92	W/G	Heated oxygen sensor 1	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)

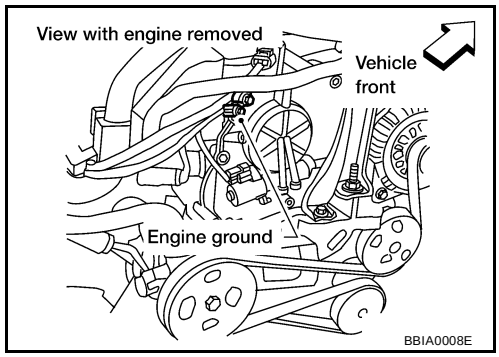
Diagnostic Procedure

UBS002AQ

1. INSPECTION START

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

>> GO TO 2.



2. CHECK HO2S1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Check harness continuity between HO2S1 terminal 4 and engine ground.
   Refer to Wiring Diagram.

   Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to power in harness or connectors.

3. CHECK HO2S1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 92 and HO2S1 terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.

3. Check harness continuity between ECM terminal 92 or HO2S1 terminal 1 and ground.
   Refer to Wiring Diagram.

   Continuity should not exist.

4. Also check harness for short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK HEATED OXYGEN SENSOR 1

Refer to EC-1415, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace heated oxygen sensor 1.

5. CHECK INTERMITTENT INCIDENT

Refer to EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

UBS002AR

HEATED OXYGEN SENSOR 1

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “MANU TRIG” and adjust “TRIGGER POINT” to 100% in “DATA MONITOR” mode with CONSULT-II.
3. Select “HO2S1 (B1)” and “HO2S1 MNTR (B1)”.
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch “RECORD” on CONSULT-II screen.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S1 MNTR (B1)	LEAN

SEF646Y

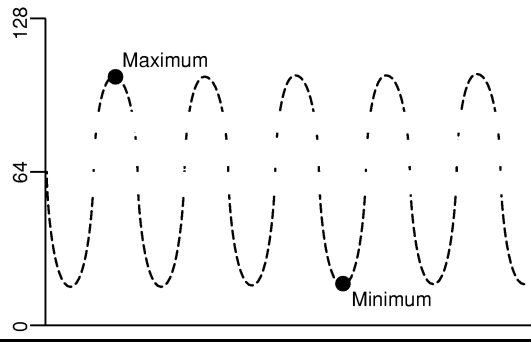
6. Check the following.
   - “HO2S1 MNTR (B1)” in “DATA MONITOR” mode changes from “RICH” to “LEAN” to “RICH” 5 times in 10 seconds.
     5 times (cycles) are counted as shown at right.
   - “HO2S1 (B1)” voltage goes above 0.6V at least once.
   - “HO2S1 (B1)” voltage goes below 0.3V at least once.
   - “HO2S1 (B1)” voltage never exceeds 1.0V.

cycle	1	2	3	4	5
HO2S1 MNTR (B1)	R-L	R-L	R-L	R-L	R-L

R means HO2S1 MNTR (B1) indicates RICH
L means HO2S1 MNTR (B1) indicates LEAN

SEF217YA

Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX



CAUTION:

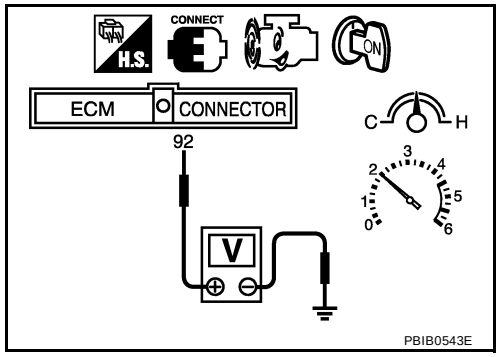
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**

- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 92 [HO2S1 (B1) signal] and engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.
   - The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.
   - The maximum voltage is over 0.6V at least one time.
   - The minimum voltage is below 0.3V at least one time.
   - The voltage never exceeds 1.0V.

   1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
   2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V



CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

UBS002AS

HEATED OXYGEN SENSOR 1

Refer to EM-98, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .

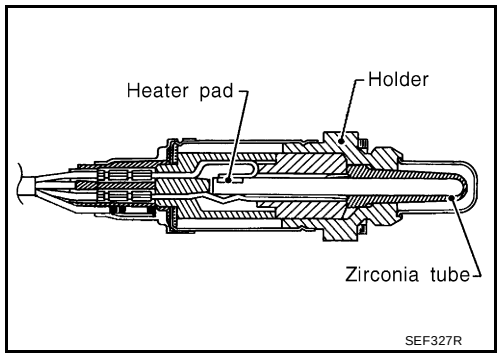
DTC P0138 HO2S2

PFP:226A0

Component Description

UBS002AT

The heated oxygen sensor 2, after three way catalyst (Manifold), monitors the oxygen level in the exhaust gas on each bank.
Even if switching characteristics of the heated oxygen sensor 1 are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



CONSULT-II Reference Value in Data Monitor Mode

UBS002AU

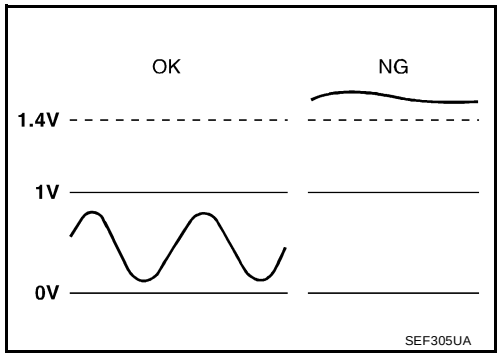
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1)	● Engine: After warming up	Revving engine from idle to 3,000 rpm quickly.	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)	● Engine: After warming up	Revving engine from idle to 3,000 rpm quickly.	LEAN ←→ RICH

On Board Diagnosis Logic

UBS002AV

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity before the three way catalyst causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the voltage is unusually high during the various driving condition such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0138 0138	Heated oxygen sensor 2 circuit high voltage	An excessively high voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted) ● Heated oxygen sensor 2

DTC Confirmation Procedure

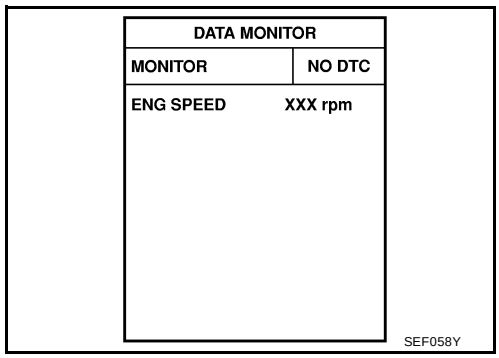
UBS002AW

CAUTION:
Always drive vehicle at a safe speed.

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
3. Stop vehicle with engine running.
4. Let engine idle for 1 minute.
5. If 1st trip DTC is detected, go to EC-1420, "Diagnostic Procedure" .



Overall Function Check

UBS002AX

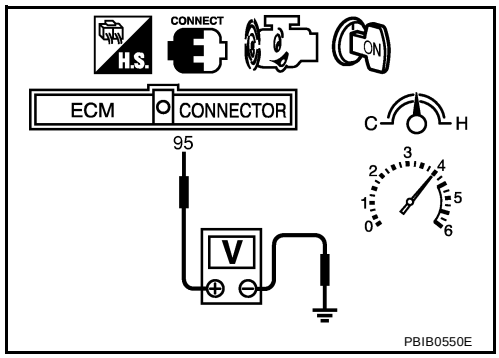
Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

CAUTION:

Always drive vehicle at a safe speed.

WITH GST

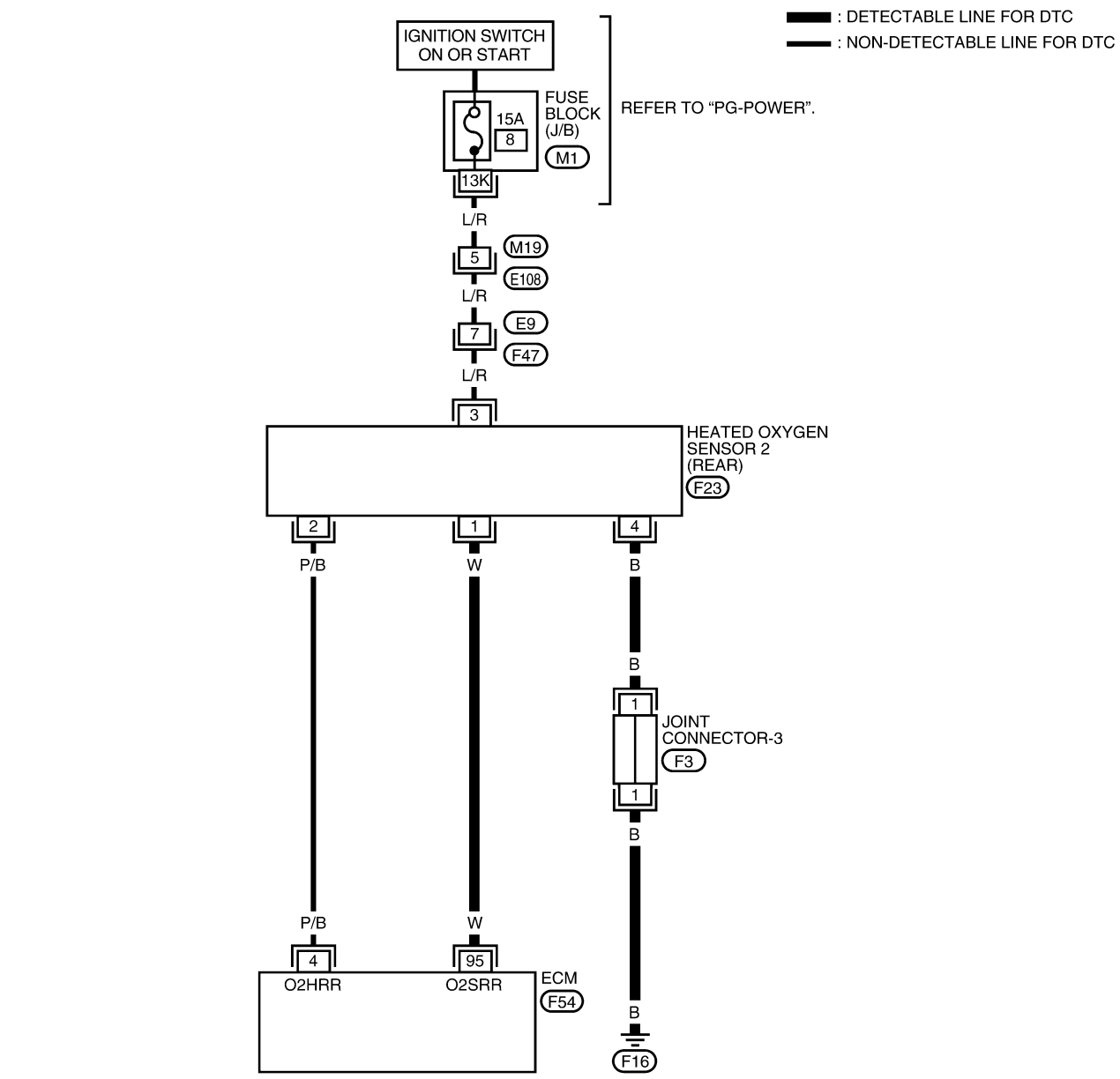
1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Set voltmeter probes between ECM terminal 95 [HO2S2 (B1) signal] and engine ground.
4. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be below 1.4V during this procedure.
5. If NG, go to EC-1420, "Diagnostic Procedure" .

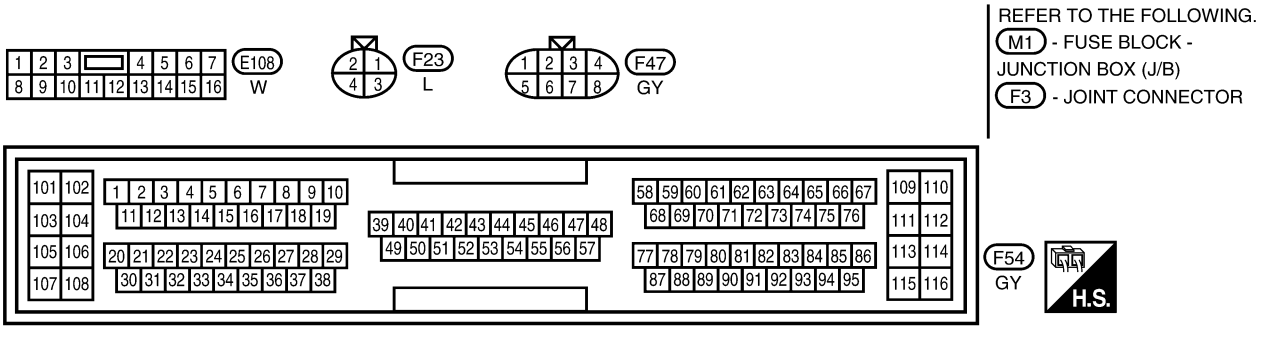


Wiring Diagram

UBS002AY

EC-HO2S2-01





BBWA0217E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
95	W	Heated oxygen sensor 2	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V

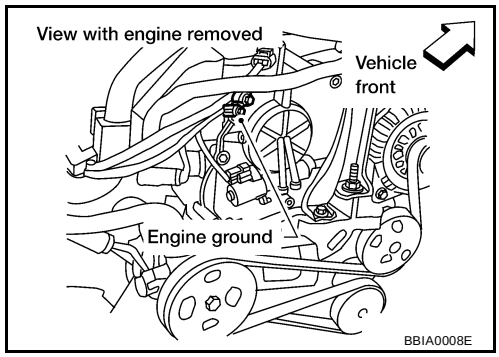
Diagnostic Procedure

UBS002AZ

1. RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

>> GO TO 2.



2. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

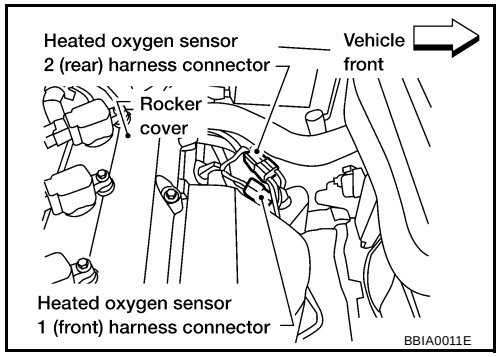
1. Turn ignition switch “OFF”.
2. Disconnect heated oxygen sensor 2 harness connector.
3. Check harness continuity between HO2S2 terminal 4 and engine ground.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to power.

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.



3. DETECT MALFUNCTIONING PART

Check the following.

- Joint connector-3
- Harness for open and short between HO2S2 and engine ground

>> Repair open circuit or short to power in harness connectors.

4. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 95 and HO2S2 terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.

3. Check harness continuity between ECM terminal 95 or HO2S2 terminal 1 and ground.
   Refer to Wiring Diagram.

   Continuity should not 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 HARNESS CONNECTOR

Check HO2S2 harness connector for water.

Water should not exist.

OK or NG

OK >> GO TO 6.
NG >> Repair or replace harness connector.

6. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-1421, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace heated oxygen sensor 2.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

UBS002B0

HEATED OXYGEN SENSOR 2

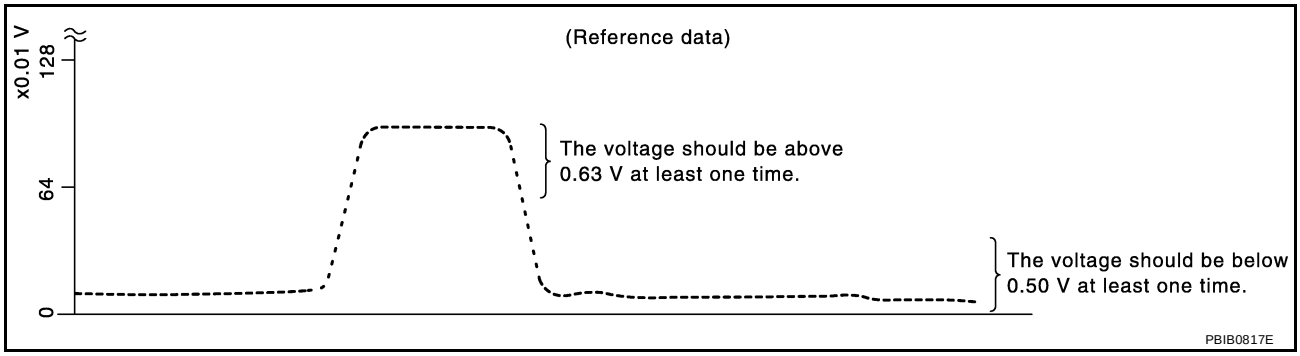
With CONSULT-II

1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)” as the monitor item with CONSULT-II.

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
HO2S1 (B1)	XXX V
HO2S2 (B1)	XXX V
HO2S1 MNTR (B1)	RICH
HO2S2 MNTR (B1)	RICH

SEF662Y

4. Check “HO2S2 (B1)” at idle speed when adjusting “FUEL INJECTION” to ±25%.



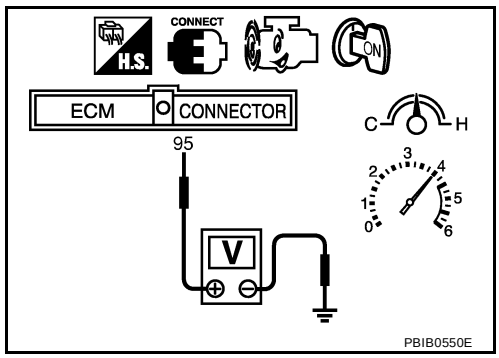
“HO2S2 (B1)” should be above 0.63V at least once when the “FUEL INJECTION” is +25%.
“HO2S2 (B1)” should be below 0.50V at least once when the “FUEL INJECTION” is −25%.

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 drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Set voltmeter probes between ECM terminal 95 [HO2S2 (B1) signal] and engine ground.
4. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.63V at least once during this procedure.
   If the voltage is above 0.63V at step 4, step 5 is not necessary.



5. Keep vehicle idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in “D” position with “OD” OFF (A/T), 3rd gear position (M/T).
   The voltage should be below 0.50V at least once during this procedure.
6. If NG, replace heated oxygen sensor 2.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new 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

UBS002B1

HEATED OXYGEN SENSOR 2

Refer to EX-3, "EXHAUST SYSTEM" .

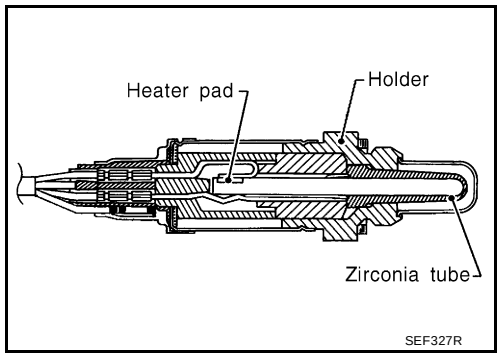
DTC P0139 HO2S2

PFP:226A0

Component Description

UBS002B2

The heated oxygen sensor 2, after three way catalyst (Manifold), monitors the oxygen level in the exhaust gas on each bank.
Even if switching characteristics of the heated oxygen sensor 1 are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



CONSULT-II Reference Value in Data Monitor Mode

UBS002B3

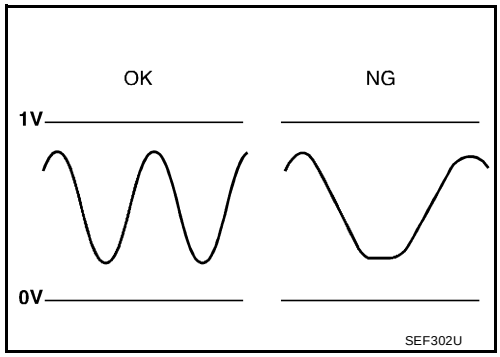
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1)	● Engine: After warming up	Revving engine from idle to 3,000 rpm quickly.	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)	● Engine: After warming up	Revving engine from idle to 3,000 rpm quickly.	LEAN ←→ RICH

On Board Diagnosis Logic

UBS002B4

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity before the three way catalyst causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the switching response of the sensor's voltage is faster than specified during the various driving condition such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0139 0139	Heated oxygen sensor 2 circuit slow response	It takes more time for the sensor to respond between rich and lean than the specified time.	● Harness or connectors (The sensor circuit is open or shorted) ● Heated oxygen sensor 2 ● Fuel pressure ● Injectors ● Intake air leaks

DTC Confirmation Procedure

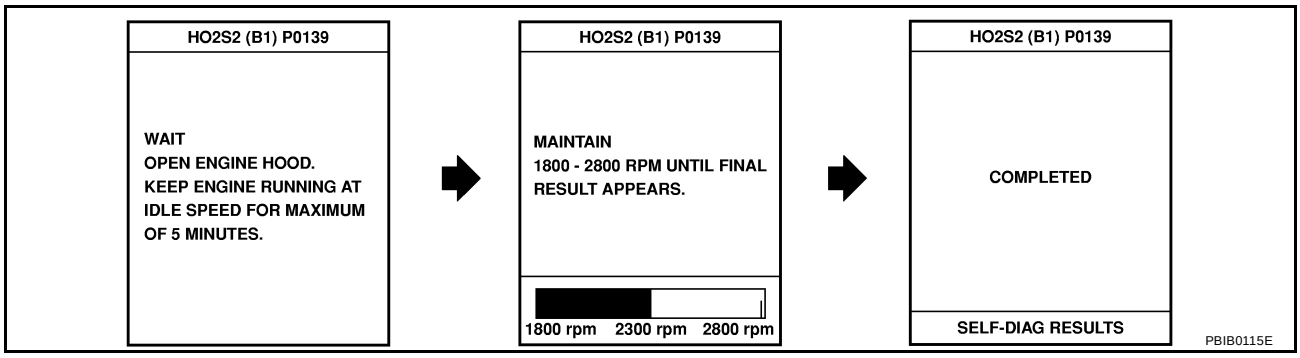
UBS002B5

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Open engine hood before conducting following procedure.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Turn ignition switch “ON”.
4. Select “DATA MONITOR” mode with CONSULT-II.

5. Make sure that “COOLAN TEMP/S” indicates more than 70°C (158°F).
6. Select “HO2S2 (B1) P0139” of “HO2S2” in “DTC WORK SUPPORT” mode with CONSULT-II.
7. Start engine and following the instruction of CONSULT-II.



8. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”.
   If “NG” is displayed, refer to EC-1426, "Diagnostic Procedure" .
   If “CAN NOT BE DIAGNOSED” is displayed, perform the following.

a. Stop engine and cool down until “COOLAN TEMP/S” indicates less than 70°C (158°F).
b. Turn ignition switch “ON”.
c. Select “DATA MONITOR” mode with CONSULT-II.
d. Start engine.
e. Return to step 6 again when the “COOLAN TEMP/S” reaches to 70°C (158°F).

Overall Function Check

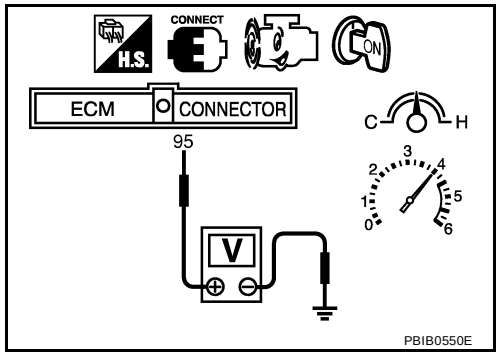
UBS002B6

Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

CAUTION:
Always drive vehicle at a safe speed.

WITH GST

1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Set voltmeter probes between ECM terminal 95 [HO2S2 (B1) signal] and engine ground.
4. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should change at more than 0.06V for 1 second during this procedure.
   If the voltage can be confirmed in step 4, step 5 is not necessary.

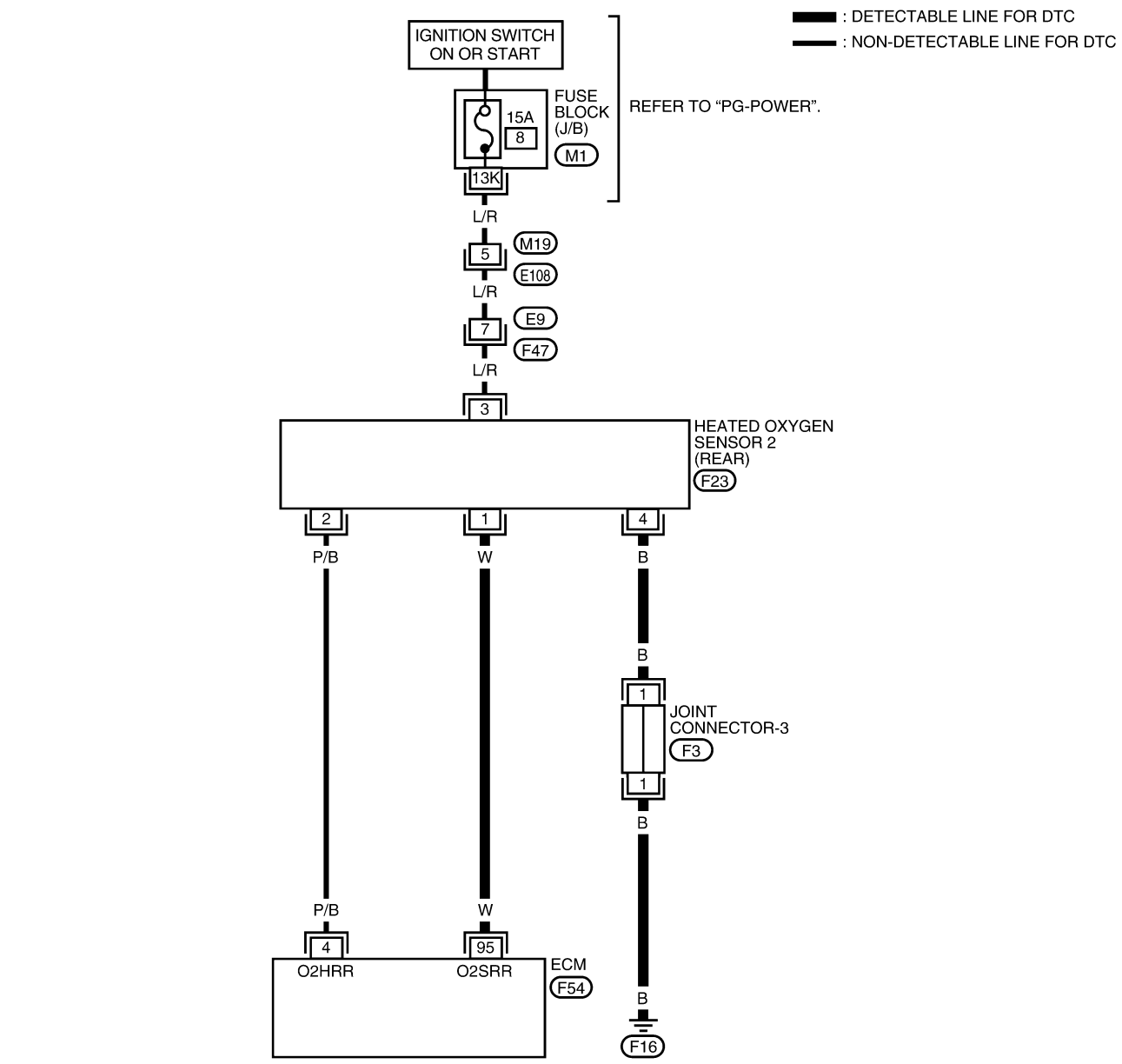


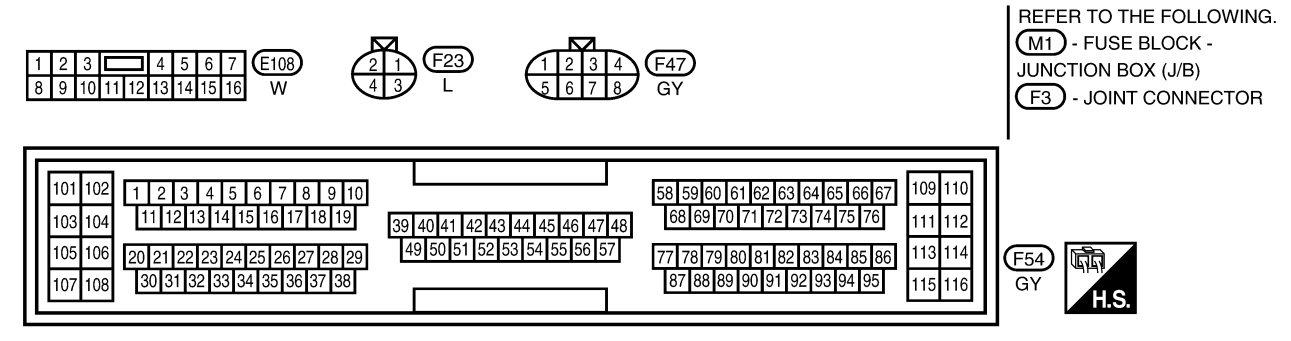
5. Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in “D” position with “OD” OFF (A/T), 3rd gear position (M/T).
   The voltage should change at more than 0.06V for 1 second during this procedure.
6. If NG, go to EC-1426, "Diagnostic Procedure" .

Wiring Diagram

UBS002B7

EC-HO2S2-01





BBWA0217E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
95	W	Heated oxygen sensor 2	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V

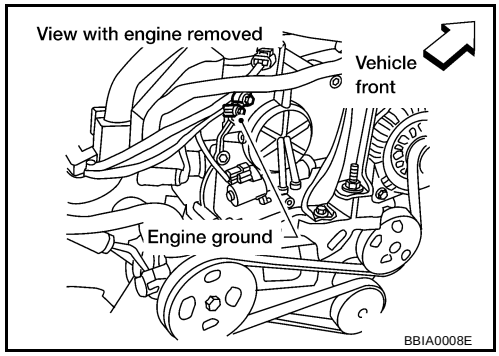
Diagnostic Procedure

UBS002B8

1. RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

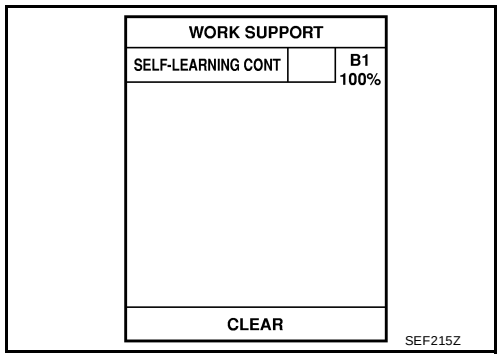
>> GO TO 2.



2. CLEAR THE SELF-LEARNING DATA

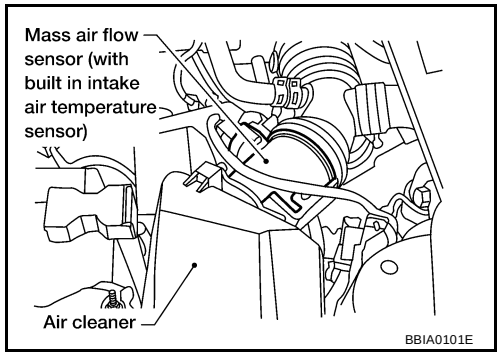
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 or P0172 detected?
   Is it difficult to start engine?



Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF”.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 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-1271, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 or P0172 detected?
   Is it difficult to start engine?



Yes or No

Yes >> Perform trouble diagnosis for DTC P0171 or P0172. Refer to EC-1430 or EC-1436 .
No >> GO TO 3.

3. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

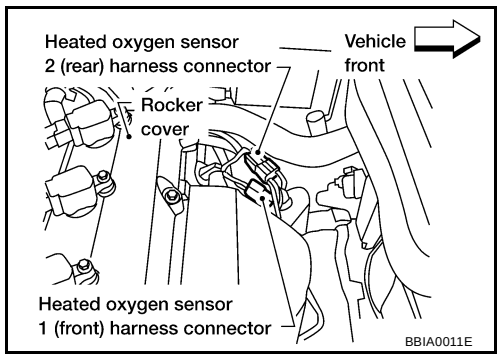
1. Turn ignition switch “OFF”.
2. Disconnect heated oxygen sensor 2 harness connector.
3. Check harness continuity between HO2S2 terminal 4 and engine ground.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.



4. DETECT MALFUNCTIONING PART

Check the following.

- Joint connector-3
- Harness for open and short between HO2S2 and engine ground

>> Repair open circuit or short to power in harness or connectors.

5. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 95 and HO2S2 terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.
3. Check harness continuity between ECM terminal 95 or HO2S2 terminal 1 and ground.
   Refer to Wiring Diagram.

   Continuity should not exist.
4. Also check harness for short to ground or short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-1428, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace heated oxygen sensor 2.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

UBS002B9

HEATED OXYGEN SENSOR 2

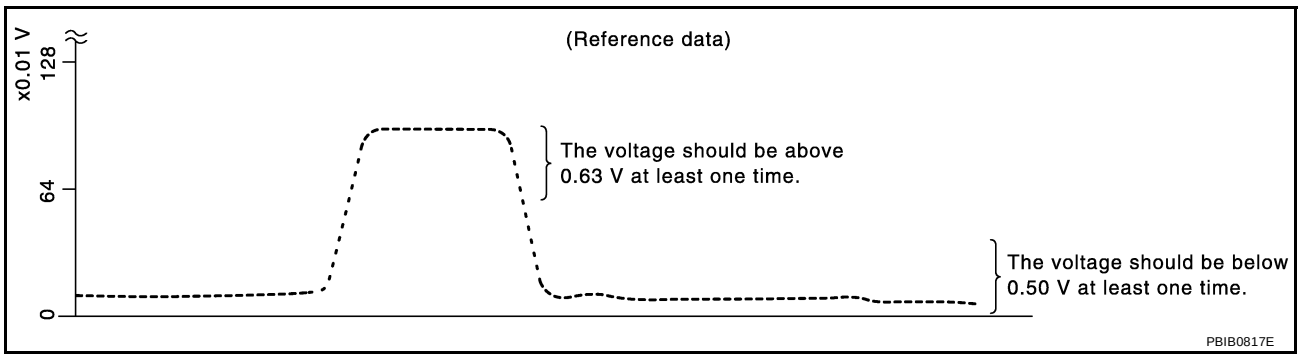
With CONSULT-II

1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)” as the monitor item with CONSULT-II.

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
HO2S1 (B1)	XXX V
HO2S2 (B1)	XXX V
HO2S1 MNTR (B1)	RICH
HO2S2 MNTR (B1)	RICH

SEF662Y

4. Check “HO2S2 (B1)” at idle speed when adjusting “FUEL INJECTION” to ±25%.



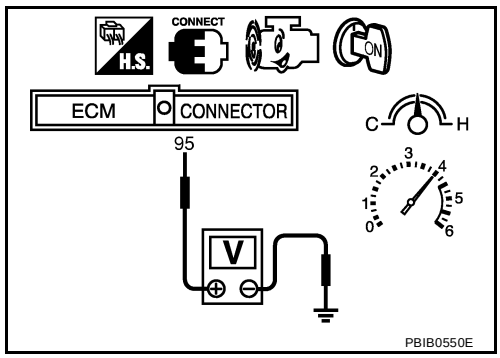
“HO2S2 (B1)” should be above 0.63V at least once when the “FUEL INJECTION” is +25%.
“HO2S2 (B1)” should be below 0.50V at least once when the “FUEL INJECTION” is −25%.

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 drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Set voltmeter probes between ECM terminal 95 [HO2S2 (B1) signal] and engine ground.
4. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.63V at least once during this procedure.
   If the voltage is above 0.63V at step 4, step 5 is not necessary.



5. Keep vehicle idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in “D” position with “OD” OFF (A/T), 3rd gear position (M/T).
   The voltage should be below 0.50V at least once during this procedure.
6. If NG, replace heated oxygen sensor 2.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new 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

UBS002BA

HEATED OXYGEN SENSOR 2

Refer to EX-3, "EXHAUST SYSTEM" .

DTC P0171 FUEL INJECTION SYSTEM FUNCTION

PFP:16600

On Board Diagnosis Logic

UBS002BB

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the heated oxygen sensor 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios.
In case the amount of the compensation value is extremely large (The actual mixture ratio is too lean.), the ECM judges the condition as the fuel injection system malfunction and light up the MIL (2 trip detection logic).

Sensor	Input Signal to ECM	ECM function	Actuator
Heated oxygen sensors 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Fuel injectors

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0171 0171	Fuel injection system too lean	● Fuel injection system does not operate properly. ● The amount of mixture ratio compensation is too large. (The mixture ratio is too lean.)	● Intake air leaks ● Heated oxygen sensor 1 ● Injectors ● Exhaust gas leaks ● Incorrect fuel pressure ● Lack of fuel ● Mass air flow sensor ● Incorrect PCV hose connection

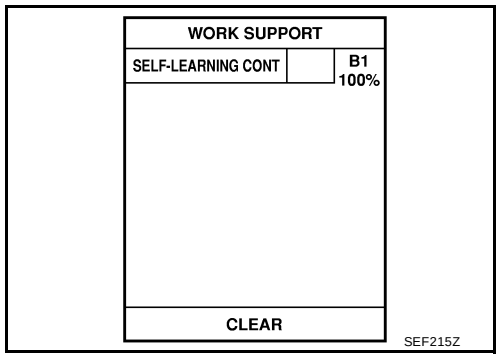
DTC Confirmation Procedure

UBS002BC

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

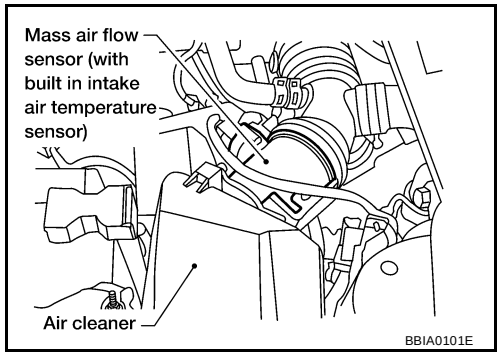
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Turn ignition switch “ON” and select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
4. Clear the self-learning control coefficient by touching “CLEAR”.
5. Select “DATA MONITOR” mode with CONSULT-II.
6. Start engine again and let it idle for at least 10 minutes.
   The 1st trip DTC P0171 should be detected at this stage, if a malfunction exists. If so, go to EC-1433, "Diagnostic Procedure" .
7. If it is difficult to start engine at step 6, the fuel injection system has a malfunction, too.
8. Crank engine while depressing accelerator pedal. If engine starts, go to EC-1433, "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. Then restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Select “MODE 3” with GST. Make sure DTC P0102 is detected.
6. Select “MODE 4” with GST and erase the DTC P0102.
7. Start engine again and let it idle for at least 10 minutes.
8. Select “MODE 7” with GST. The 1st trip DTC P0171 should be detected at this stage, if a malfunction exists. If so, go to EC-1433, "Diagnostic Procedure" .
9. If it is difficult to start engine at step 7, the fuel injection system has a malfunction.

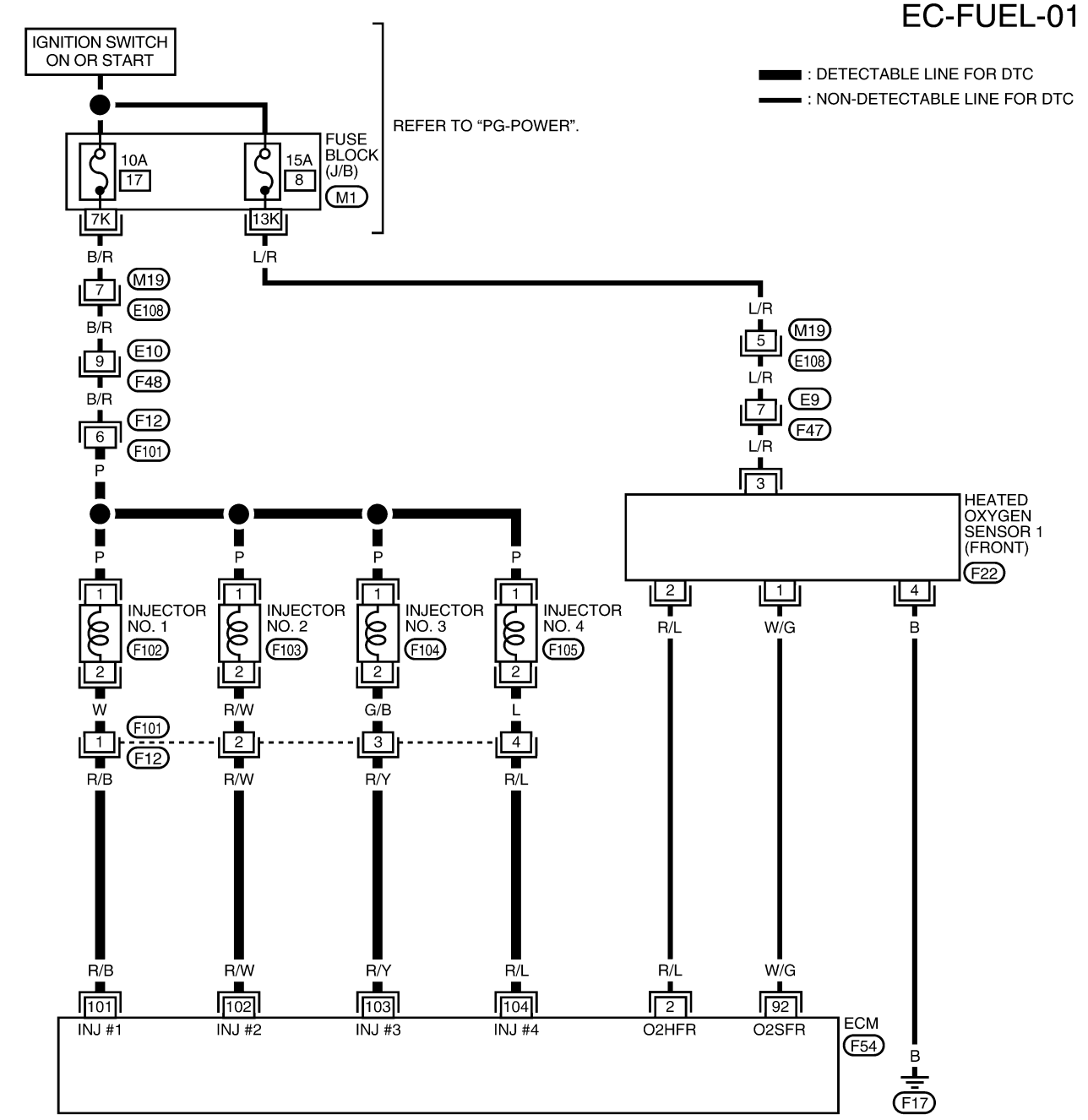


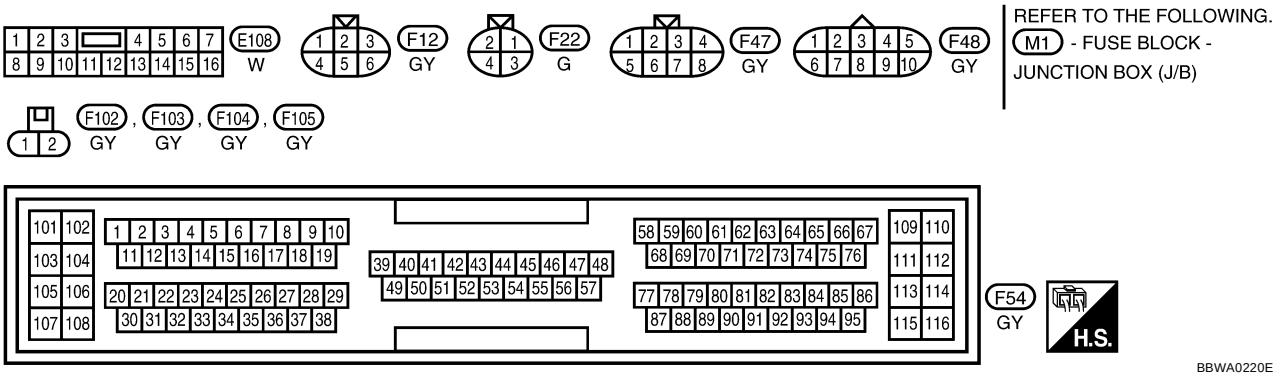
10. Crank engine while depressing accelerator pedal. If engine starts, go to EC-1433, "Diagnostic Procedure" .
    If engine does not start, check exhaust and intake air leak visually.

Wiring Diagram

UBS002BD

EC-FUEL-01





REFER TO THE FOLLOWING.
M1 - FUSE BLOCK - JUNCTION BOX (J/B)

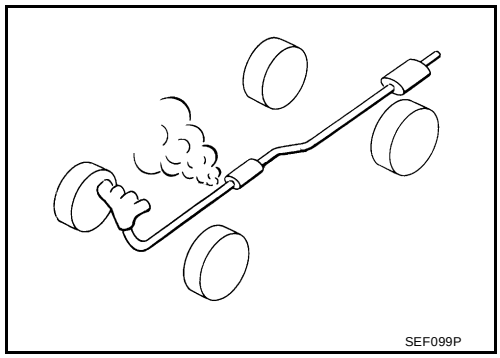
BBWA0220E

Diagnostic Procedure

UBS002BE

1. CHECK EXHAUST AIR LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust air leak before three way catalyst.



OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2. CHECK FOR INTAKE AIR LEAK AND PCV HOSE

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.

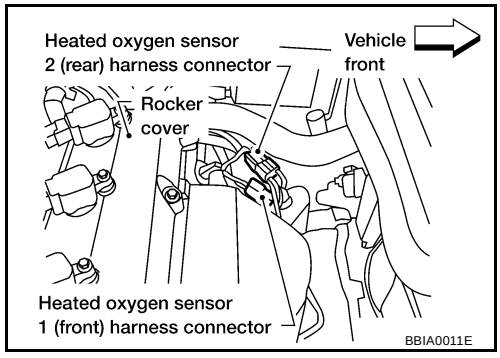
3. CHECK HEATED OXYGEN SENSOR 1 CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect heated oxygen sensor 1 (HO2S1) harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal 92 and HO2S1 terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.

5. Check harness continuity between ECM terminal 92 or HO2S1 terminal 1 and ground.
   Refer to Wiring Diagram.

   Continuity should not exist.



6. Also check harness for short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK FUEL PRESSURE

1. Release fuel pressure to zero. Refer to EC-1255, "FUEL PRESSURE RELEASE" .
2. Install fuel pressure gauge and check fuel pressure. Refer to EC-1255, "Fuel Pressure Check" .

   At idling: Approximately 350 kPa (3.7 kg/cm^2 , 51 psi)

OK or NG

OK >> GO TO 5.
NG >> Follow the construction of “FUEL PRESSURE CHECK”.

5. 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.

1.0 - 4.0 g·m/sec: at idling
4.0 - 10 g·m/sec: at 2,500 rpm

With GST

1. Install all removed parts.
2. Check mass air flow sensor signal in MODE 1 with GST.

1.0 - 4.0 g·m/sec: at idling
4.0 - 10 g·m/sec: at 2,500 rpm

OK or NG

OK >> GO TO 6.
NG >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-1371, "DTC P0102, P0103 MAF SENSOR" .

6. CHECK FUNCTION OF INJECTORS

With CONSULT-II

1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-II.
3. Make sure that each circuit produces a momentary engine speed drop.

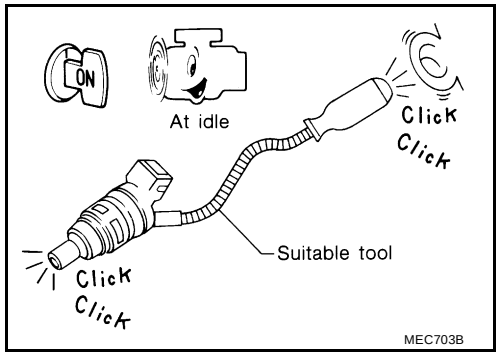
ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V

PBIB0133E

Without CONSULT-II

1. Start engine.
2. Listen to each injector operating sound.

Clicking noise should be heard.



MEC703B

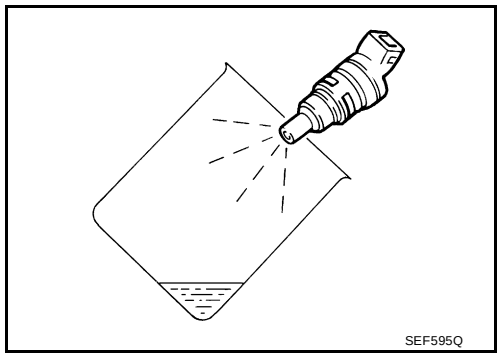
OK or NG

OK >> GO TO 7.
NG >> Perform trouble diagnosis for EC-1791, "INJECTOR CIRCUIT" .

7. CHECK INJECTOR

1. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
2. Turn ignition switch “OFF”.
3. Disconnect injector harness connectors.
4. Remove injector gallery assembly. Refer to EM-106, "FUEL INJECTOR AND FUEL TUBE" .
   Keep fuel hose and all injectors connected to injector gallery.
   The injector harness connectors should remain connected.
5. Disconnect all ignition coil harness connectors.
6. Prepare pans or saucers under each injector.
7. Crank engine for about 3 seconds. Make sure that fuel sprays out from injectors.

Fuel should be sprayed evenly for each injector.



OK or NG

OK >> GO TO 8.
NG >> Replace injectors from which fuel does not spray out. Always replace O-ring with new ones.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

DTC P0172 FUEL INJECTION SYSTEM FUNCTION

PFP:16600

On Board Diagnosis Logic

UBS002BF

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the heated oxygen sensors 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios.
In case the amount of the compensation value is extremely large (The actual mixture ratio is too rich.), the ECM judges the condition as the fuel injection system malfunction and light up the MIL (2 trip detection logic).

Sensor	Input Signal to ECM	ECM function	Actuator
Heated oxygen sensors 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Fuel injectors

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0172 0172	Fuel injection system too rich	● Fuel injection system does not operate properly. ● The amount of mixture ratio compensation is too large. (The mixture ratio is too rich.)	● Heated oxygen sensor 1 ● Injectors ● Exhaust gas leaks ● Incorrect fuel pressure ● Mass air flow sensor

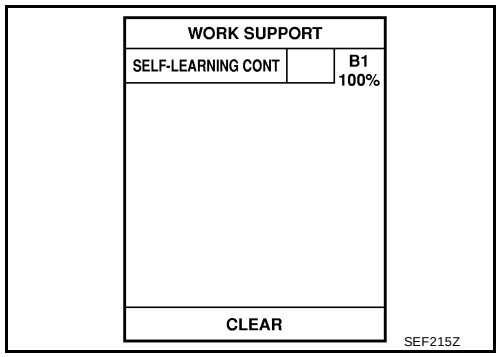
DTC Confirmation Procedure

UBS002BG

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

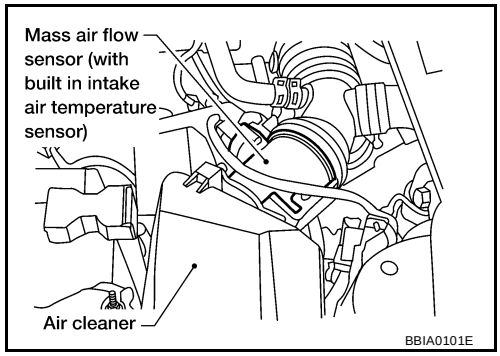
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Turn ignition switch “ON” and select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
4. Clear the self-learning control coefficient by touching “CLEAR”.
5. Select “DATA MONITOR” mode with CONSULT-II.
6. Start engine again and let it idle for at least 10 minutes.
   The 1st trip DTC P0172 should be detected at this stage, if a malfunction exists. If so, go to EC-1439, "Diagnostic Procedure" .
7. If it is difficult to start engine at step 6, the fuel injection system has a malfunction, too.
8. Crank engine while depressing accelerator pedal.
   If engine starts, go to EC-1439, "Diagnostic Procedure" . If engine does not start, remove ignition plugs and check for fouling, etc.



WITH GST

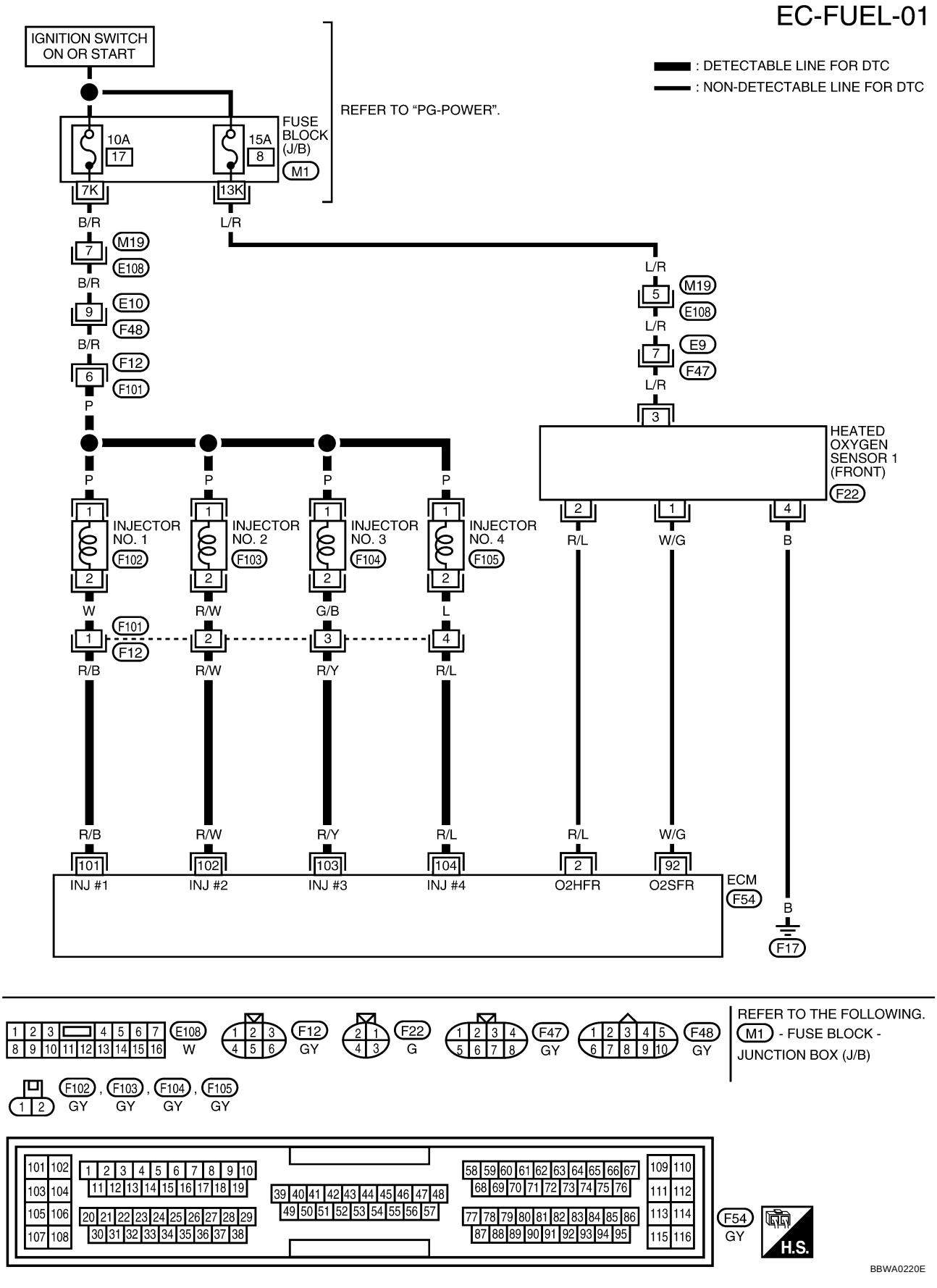
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 10 seconds.

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 “MODE 3” with GST. Make sure DTC P0102 is detected.
6. Select “MODE 4” with GST and erase the DTC P0102.
7. Start engine again and let it idle for at least 10 minutes.
8. Select “MODE 7” with GST. The 1st trip DTC P0172 should be detected at this stage, if a malfunction exists. If so, go to EC-1439, "Diagnostic Procedure" .
9. If it is difficult to start engine at step 7, the fuel injection system has a malfunction.
10. Crank engine while depressing accelerator pedal.
    If engine starts, go to EC-1439, "Diagnostic Procedure" . If engine does not start, check exhaust and intake air leak visually.



Wiring Diagram

UBS002BH

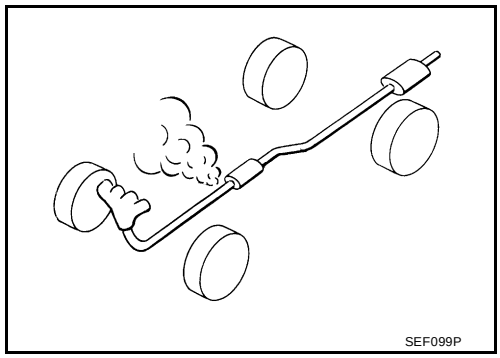


Diagnostic Procedure

UBS002BI

1. CHECK EXHAUST AIR LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust air leak before three way catalyst.



OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2. CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

OK or NG

OK >> GO TO 3.
NG >> Repair or replace.

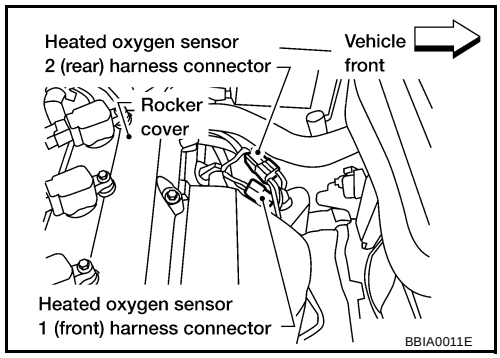
3. CHECK HEATED OXYGEN SENSOR 1 CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect heated oxygen sensor 1 (HO2S1) harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal 92 and HO2S1 terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.

5. Check harness continuity between ECM terminal 92 or HO2S1 terminal 1 and ground.
   Refer to Wiring Diagram.

   Continuity should not exist.



6. Also check harness for short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK FUEL PRESSURE

1. Release fuel pressure to zero. Refer to EC-1255, "FUEL PRESSURE RELEASE" .
2. Install fuel pressure gauge and check fuel pressure. Refer to EC-1255, "Fuel Pressure Check" .

   At idling: 350 kPa (3.7 kg/cm^2 , 51 psi)

OK or NG

OK >> GO TO 5.
NG >> Follow the construction of “FUEL PRESSURE CHECK”.

5. 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.

1.0 - 4.0 g·m/sec: at idling
4.0 - 10 g·m/sec: at 2,500 rpm

With GST

1. Install all removed parts.
2. Check mass air flow sensor signal in MODE 1 with GST.

1.0 - 4.0 g·m/sec: at idling
4.0 - 10 g·m/sec: at 2,500 rpm

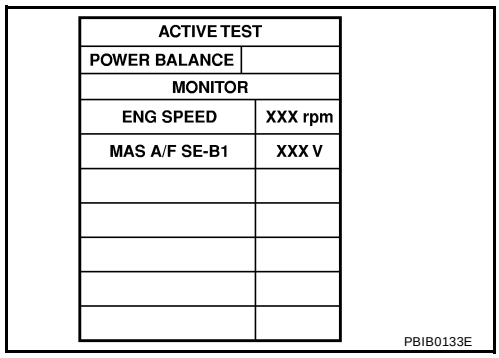
OK or NG

OK >> GO TO 6.
NG >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-1371, "DTC P0102, P0103 MAF SENSOR" .

6. CHECK FUNCTION OF INJECTORS

With CONSULT-II

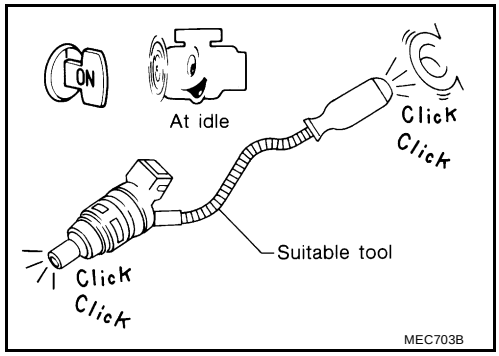
1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-II.
3. Make sure that each circuit produces a momentary engine speed drop.



Without CONSULT-II

1. Start engine.
2. Listen to each injector operating sound.

Clicking noise should be heard.



OK or NG

OK >> GO TO 7.
NG >> Perform trouble diagnosis for EC-1791, "INJECTOR CIRCUIT" .

7. CHECK INJECTOR

1. Remove injector assembly. Refer to EM-106, "FUEL INJECTOR AND FUEL TUBE" .
   Keep fuel hose and all injectors connected to injector gallery.
2. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
3. Disconnect injector harness connectors.
   The injector harness connectors should remain connected.
4. Disconnect all ignition coil harness connectors.
5. Prepare pans or saucers under each injectors.
6. Crank engine for about 3 seconds.
   Make sure fuel does not drip from injector.

OK or NG

OK (Does not drip.)>>GO TO 8.
NG (Drips.)>>Replace the injectors from which fuel is dripping. Always replace O-ring with new one.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

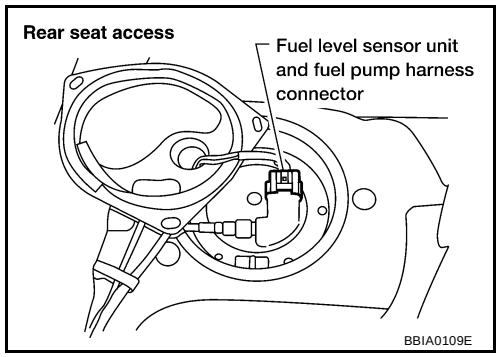
DTC P0181 FTT SENSOR

PFP:22630

Component Description

UBS002BJ

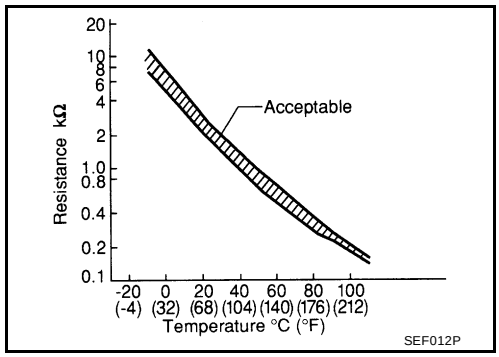
The fuel tank temperature sensor is used to detect the fuel temperature inside the fuel tank. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the fuel temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



<Reference data>

Fluid temperature °C (°F)	Voltage* V	Resistance kΩ
20 (68)	3.5	2.3 - 2.7
50 (122)	2.2	0.79 - 0.90

*: These data are reference values and are measured between ECM terminal 70 (Fuel tank temperature sensor) and ground.



CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may lead to ECM's transistor damage. Use ground other than ECM, such as engine ground.

On Board Diagnosis Logic

UBS002BK

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0181 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) ● Fuel tank temperature sensor

DTC Confirmation Procedure

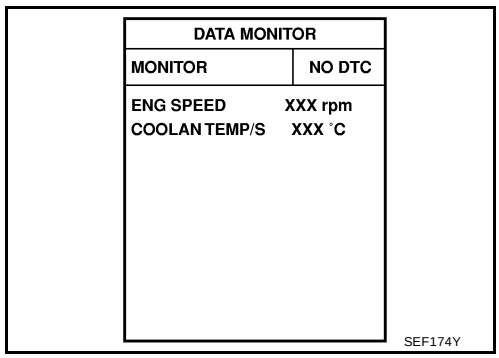
UBS002BL

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 “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.
4. Cool engine down until “COOLAN TEMP/S” signal is less than 60°C (140°F).
5. Wait at least 10 seconds.
6. If 1st trip DTC is detected, go to EC-1443, "Diagnostic Procedure" .



WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

UBS002BM

1. CHECK FUEL TANK TEMPERATURE SENSOR

Refer to EC-1443, "Component Inspection" .

OK or NG

OK >> GO TO 2.
NG >> Replace fuel tank temperature sensor.

2. CHECK INTERMITTENT INCIDENT

Perform EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .
Refer to EC-1445, "Wiring Diagram" .

>> **INSPECTION END**

Component Inspection

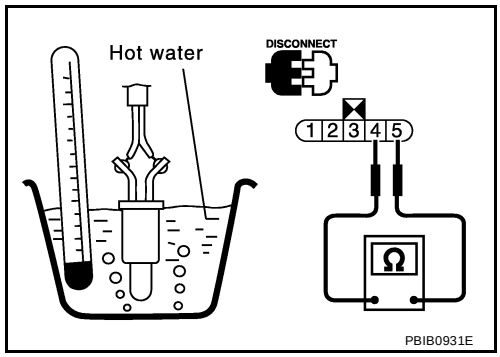
UBS002BN

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

If NG, replace fuel level sensor unit.



Removal and Installation

UBS002BO

FUEL TANK TEMPERATURE SENSOR

Refer to FL-3, "FUEL LEVEL SENSOR UNIT, FUEL FILTER AND FUEL PUMP ASSEMBLY" .

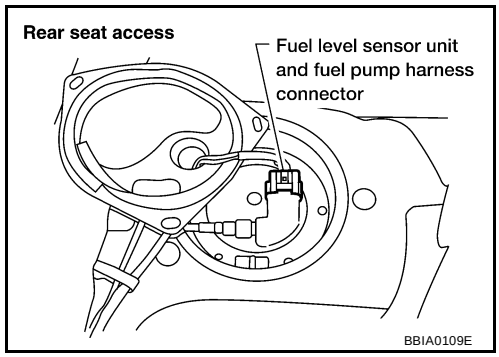
DTC P0182, P0183 FTT SENSOR

PFP:22630

Component Description

UBS002BP

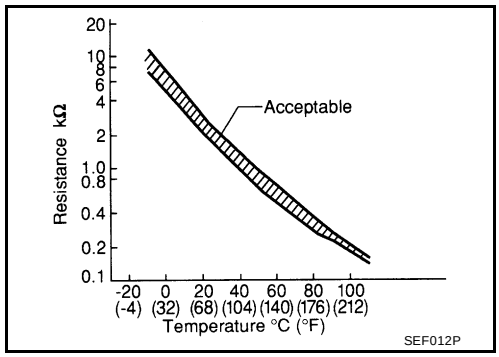
The fuel tank temperature sensor is used to detect the fuel temperature inside the fuel tank. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the fuel temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



<Reference data>

Fluid temperature °C (°F)	Voltage* V	Resistance kΩ
20 (68)	3.5	2.3 - 2.7
50 (122)	2.2	0.79 - 0.90

*: These data are reference values and are measured between ECM terminal 70 (Fuel tank temperature sensor) and ground.



CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may lead to ECM's transistor damage. Use ground other than ECM, such as engine ground.

On Board Diagnosis Logic

UBS002BQ

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0182 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.) ● Fuel tank temperature sensor
P0183 0183	Fuel tank temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

DTC Confirmation Procedure

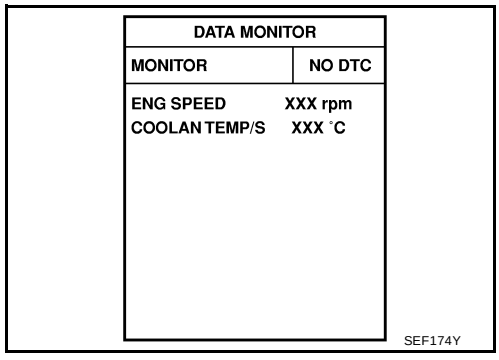
UBS002BR

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-1446, "Diagnostic Procedure" .



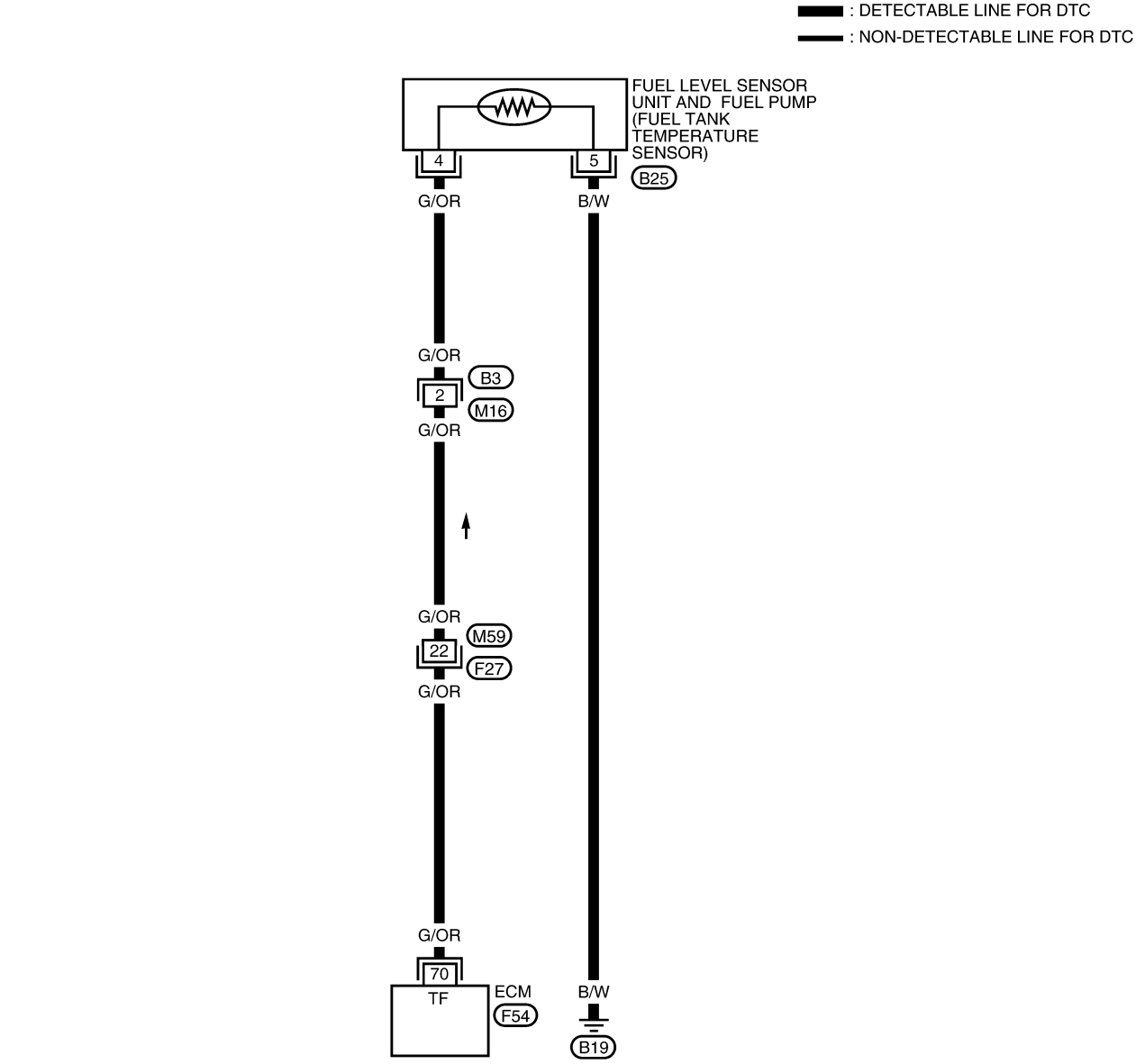
WITH GST

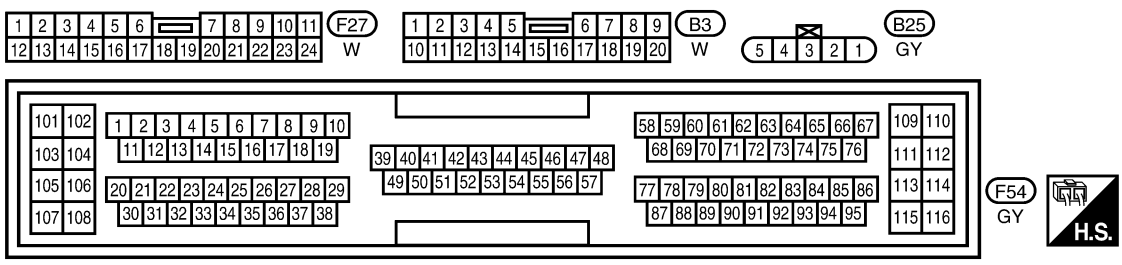
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS002BS

EC-FTTS-01





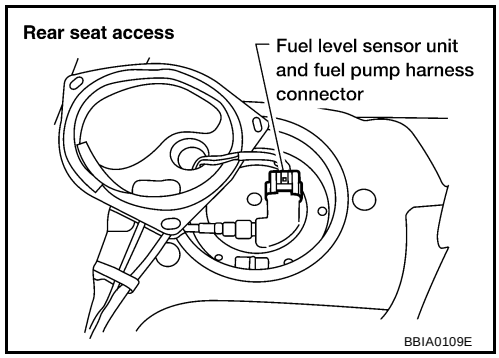
BBWA0221E

Diagnostic Procedure

UBS002BT

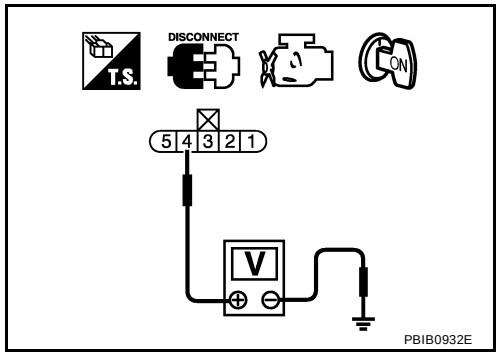
1. CHECK POWER SUPPLY

1. Turn ignition switch “OFF”.
2. Disconnect fuel level sensor unit and fuel pump harness connector.
3. Turn ignition switch “ON”.



4. Check voltage between fuel level sensor unit and fuel pump terminal 4 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B3, M6
- Harness connectors M59, F27
- Harness for open or short between ECM and fuel level sensor unit and fuel pump

>> Repair harness or connector.

3. CHECK GROUND CIRCUIT

1. Turn ignition switch “OFF”.
2. Check harness continuity between fuel level sensor unit and fuel pump terminal 5 and body ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to power in harness or connectors.

4. CHECK FUEL TANK TEMPERATURE SENSOR

Refer to EC-1447, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace fuel tank temperature sensor.

5. CHECK INTERMITTENT INCIDENT

Perform EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

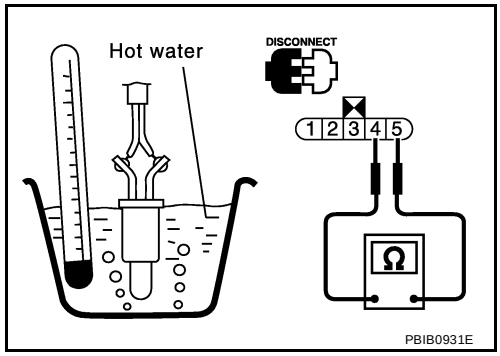
UBS002BU

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

If NG, replace fuel level sensor unit.



Removal and Installation

UBS002BV

FUEL TANK TEMPERATURE SENSOR

Refer to FL-3, "FUEL LEVEL SENSOR UNIT, FUEL FILTER AND FUEL PUMP ASSEMBLY" .

DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION

PFP:00019

System Description

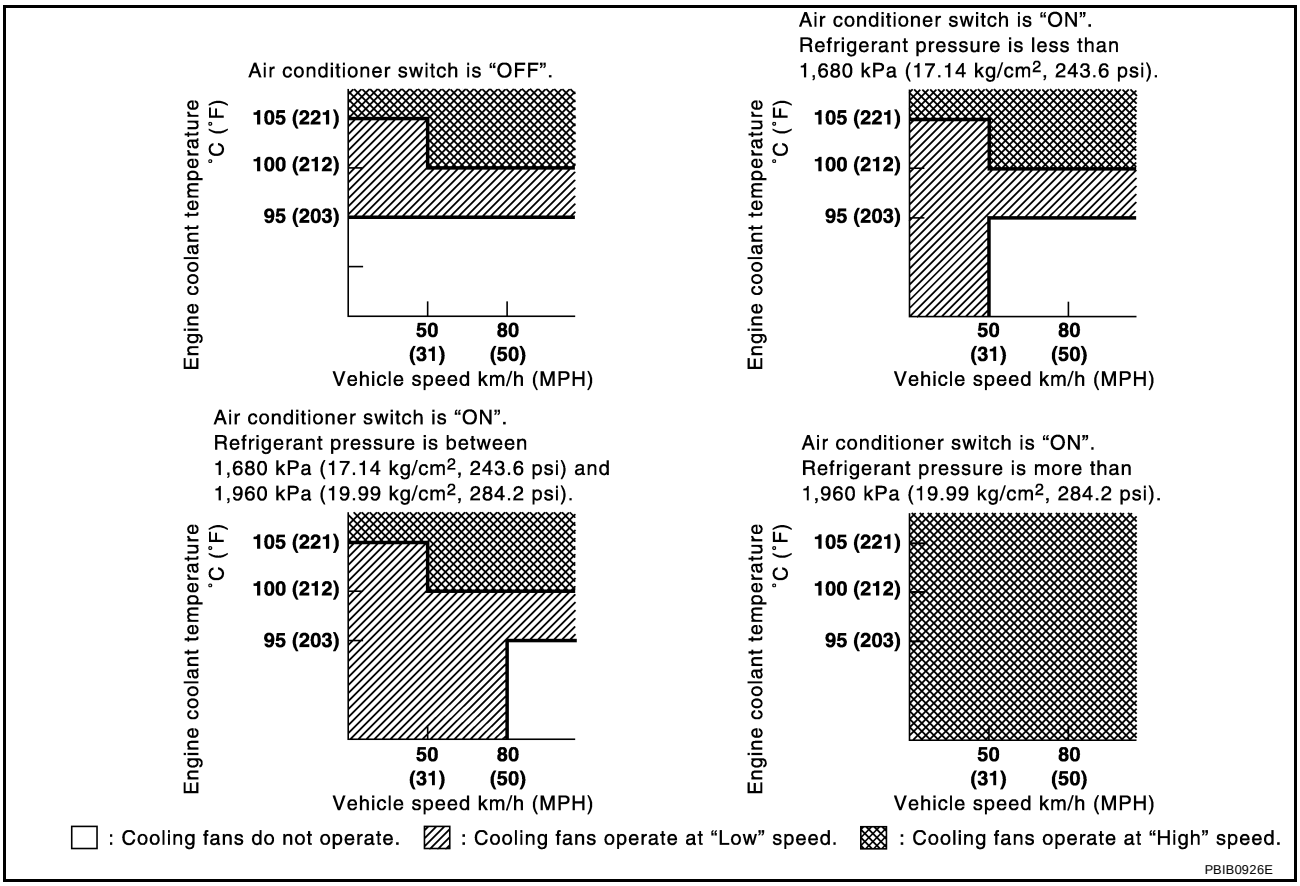
UBS002BW

COOLING FAN CONTROL

Sensor	Input Signal to ECM	ECM function	Actuator
Vehicle speed sensor	Vehicle speed	Cooling fan control	Cooling fan relay(s)
Engine coolant temperature sensor	Engine coolant temperature		
Air conditioner switch	Air conditioner “ON” signal		
Ignition switch	Start signal		
Refrigerant pressure sensor	Refrigerant pressure		

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].

OPERATION



CONSULT-II Reference Value in Data Monitor Mode

UBS002BX

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

MONITOR ITEM	CONDITION		SPECIFICATION
COOLING FAN	● Engine: After warming up, idle the engine ● Air conditioner switch: OFF	Engine coolant temperature is 94°C (201°F) or less	OFF
		Engine coolant temperature is between 95°C (203°F) and 104°C (219°F)	LOW
		Engine coolant temperature is 105°C (221°F) or more	HIGH

On Board Diagnosis Logic

UBS002BY

This diagnosis checks whether the engine coolant temperature is extraordinary high, even when the load is not heavy.
When malfunction is detected, the malfunction indicator lamp (MIL) will light up even in the first trip.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0217 0217	Engine coolant over temperature condition	Engine coolant temperature is excessively high under normal engine speed.	● Harness or connectors (The cooling fan circuit is open or shorted) ● Cooling fan ● Thermostat ● Improper ignition timing ● Engine coolant temperature sensor ● Blocked radiator ● Blocked front end (Improper fitting of nose mask) ● Crushed vehicle frontal area (Vehicle frontal is collided but not repaired) ● Blocked air passage by improper installation of front fog lamp or fog lamps ● Improper mixture ratio of coolant ● Damaged bumper For more information, refer to EC-1460, "Main 12 Causes of Overheating" .

CAUTION:
When a malfunction is indicated, be sure to replace the coolant. Refer to MA-22, "Changing Engine Coolant" . Also, replace the engine oil. Refer to LU-17, "Changing Engine Oil" .

1. **Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute. Be sure to use coolant with the proper mixture ratio. Refer to MA-14, "Anti-freeze Coolant Mixture Ratio" .**
2. **After refilling coolant, run engine to ensure that no water-flow noise is emitted.**

Overall Function Check

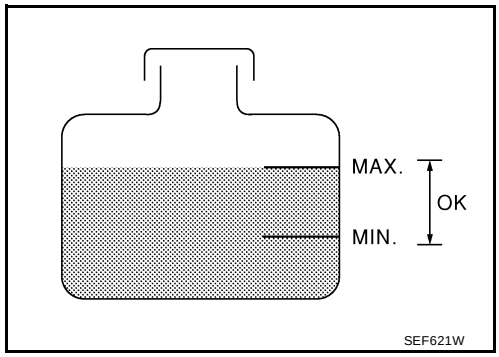
UBS002BZ

Use this procedure to check the overall function of the coolant overtemperature enrichment protection check, a DTC might not be confirmed.

WARNING:
Never remove the radiator cap when the engine is hot. Serious burns could be caused by high-pressure fluid escaping from the radiator.
Wrap a thick cloth around the cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.

WITH CONSULT-II

1. Check the coolant level and mixture ratio (using coolant tester) in the reservoir tank and radiator.
Allow engine to cool before checking coolant level and mixture ratio.
   - If the coolant level in the reservoir and/or radiator is below the proper range, go to EC-1453, "Diagnostic Procedure" .
   - If the coolant mixture ratio is out of the range of 45 to 55%, replace the coolant in the following procedure MA-22, "Changing Engine Coolant" .



a. Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute like pouring coolant from a kettle. Be sure to use coolant with the proper mixture ratio. Refer to MA-14, "Anti-freeze Coolant Mixture Ratio" .

b. After refilling coolant, run engine to ensure that no water-flow noise is emitted.

c. After checking or replacing coolant, go to step 3 below.

2. Ask the customer if engine coolant has been added. If it has been added, go to EC-1453, "Diagnostic Procedure" . After repair, go to the next step.

3. Start engine and let it idle.

4. Make sure that A/C switch is “OFF” and air conditioner is not operating. If NG, check air conditioner circuit. Refer to MTC-21, "TROUBLE DIAGNOSIS" After repair, go to the next step.

5. Perform “ENG COOLANT TEMP” in “ACTIVE TEST” mode with CONSULT-II at idle.

a. Set “ENG COOLANT TEMP” to 95°C (203°F) and make sure that cooling fan operates at low speed.
If NG, go to EC-1453, "Diagnostic Procedure" .

b. Set “ENG COOLANT TEMP” to 105°C (221°F) and make sure that cooling fan operates at high speed. If NG, go to EC-1453, "Diagnostic Procedure" . After repair, go to the next step.

6. Check for blocked coolant passage.

a. Warm up engine to normal operating temperature, then grasp radiator upper hose and lower hose and make sure that coolant flows.
If NG, go to EC-1453, "Diagnostic Procedure" . After repair, go to the next step.
Be extremely careful not to touch any moving or adjacent parts.

7. Check for blocked radiator air passage.

a. When market fog lamps have been installed, check for damaged fans and clogging in the condenser and radiator.

b. Check the front end for clogging caused by insects or debris.

c. Check for improper fitting of front-end cover, damaged radiator grille or bumper, damaged vehicle front.
If NG, take appropriate action and then go to the next step.

8. Check function of ECT sensor.
Refer to EC-1386, "Component Inspection" .
If NG, replace ECT sensor and go to the next step.

9. Check ignition timing. Refer to EC-1289, "Basic Inspection" .
Make sure that ignition timing is 15°±5° at idle.
If NG, refer to EC-1289, "Basic Inspection" , and then recheck.

WITH GST

1. Check the coolant level and mixture ratio (using coolant tester) in the reservoir tank and radiator.
Allow engine to cool before checking coolant level and mixture ratio.
   - If the coolant level in the reservoir and/or radiator is below the proper range, and go to EC-1453, "Diagnostic Procedure" .
   - If the coolant mixture ratio is out of the range of 45 to 55%, replace the coolant in the following procedure MA-22, "Changing Engine Coolant" .

a. Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute like pouring coolant from a kettle. Be sure to use coolant with the proper mixture ratio. Refer to MA-14, "Anti-freeze Coolant Mixture Ratio" .

b. After refilling coolant, run engine to ensure that no water-flow noise is emitted.

c. After checking or replacing coolant, go to step 3 below.

2. Ask the customer if engine coolant has been added. If it has been added, go to EC-1453, "Diagnostic Procedure" . After repair, go to the next step.
3. Start engine and let it idle.
4. Make sure that A/C switch is “OFF” and air conditioner is not operating. If NG, check air conditioner circuit. Refer to MTC-21, "TROUBLE DIAGNOSIS" . After repair, go to the next step.
5. Turn ignition switch “OFF”.
6. Disconnect engine coolant temperature sensor harness connector.
7. Connect 150Ω resistor to engine coolant temperature sensor.
8. Start engine and make sure that cooling fan operates.
   Be careful not to overheat engine.
   If NG, go to EC-1453, "Diagnostic Procedure" . After repair, go to the next step.
9. Check for blocked coolant passage.

a. Warm up engine to normal operating temperature, then grasp radiator upper hose and lower hose and make sure that coolant flows.
   If NG, go to EC-1453, "Diagnostic Procedure" . After repair, go to the next step.
   Be extremely careful not to touch any moving or adjacent parts.

10. Check for blocked radiator air passage.

a. When market fog lamps have been installed, check for damaged fans and clogging in the condenser and radiator.

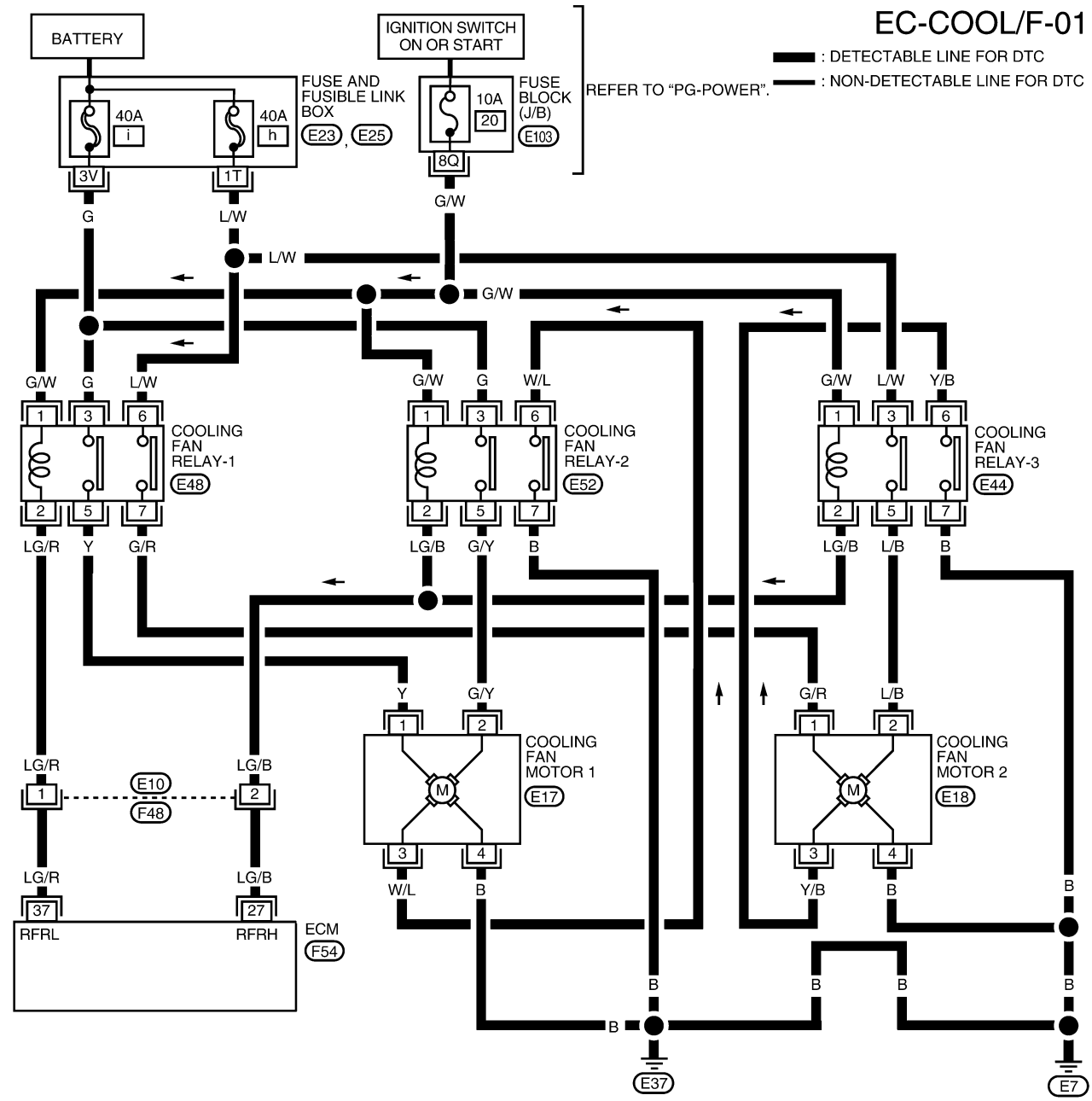
b. Check the front end for clogging caused by insects or debris.

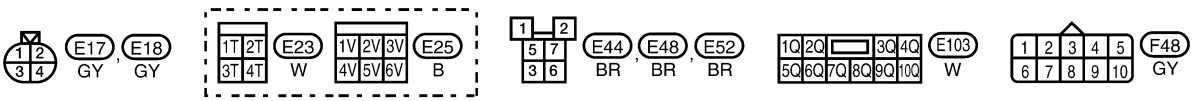
c. Check for improper fitting of front-end cover, damaged radiator grille or bumper, damaged vehicle front.
   If NG, take appropriate action and then go to the next step.

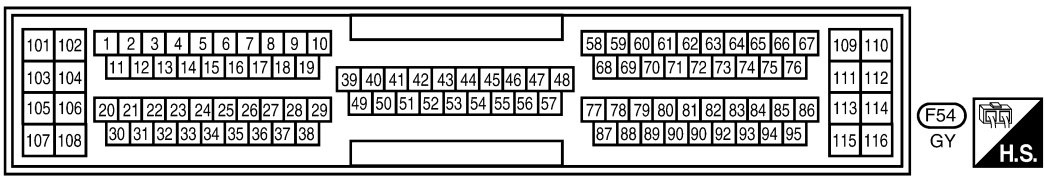
11. Check function of ECT sensor.
    Refer to EC-1386, "Component Inspection" .
    If NG, replace ECT sensor and go to the next step.
12. Check ignition timing. Refer to EC-1289, "Basic Inspection" .
    Make sure that ignition timing is 15°±5° at idle.
    If NG, refer to EC-1289, "Basic Inspection" , and then recheck.

Wiring Diagram

UBS002C0







BBWA0431E

Diagnostic Procedure

UBS002C1

1. INSPECTION START

Do you have CONSULT-II?

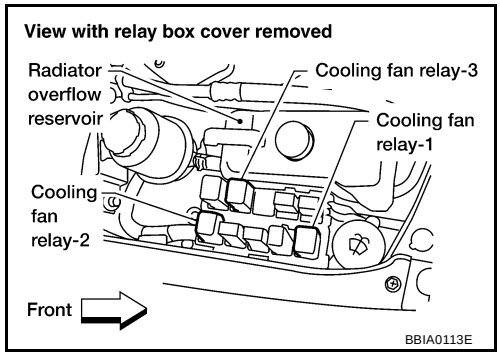
Yes or No

Yes >> GO TO 2.
No >> GO TO 4.

2. CHECK COOLING FAN LOW SPEED OPERATION

With CONSULT-II

1. Disconnect cooling fan relays-2 and -3.
2. Start engine and let it idle.



3. Select “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-II and touch “LOW” on the CONSULT-II screen.
4. 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-1457, "PROCEDURE A" .)

ACTIVE TEST	
COOLING FAN	LOW
MONITOR	
COOLAN TEMP/S	XXX °C

SEF784Z

3. CHECK COOLING FAN HIGH SPEED OPERATION

With CONSULT-II

1. Turn ignition switch “OFF”.
2. Reconnect cooling fan relays-2 and -3.
3. Start engine and let it idle.
4. Select “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-II and touch “HIGH” on the CONSULT-II screen.
5. Make sure that cooling fans-1 and -2 operate at high speed.

OK or NG

OK >> GO TO 6.
NG >> Check cooling fan high speed control circuit. (Go to EC-1459, "PROCEDURE B" .)

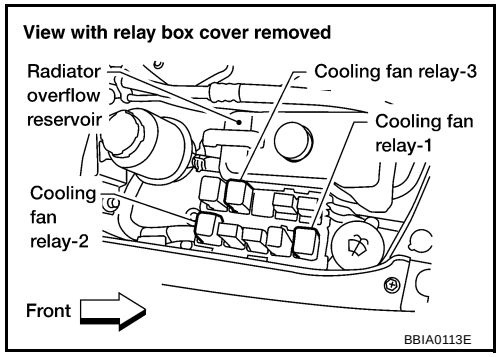
ACTIVE TEST	
COOLING FAN	HIGH
MONITOR	
COOLAN TEMP/S	XXX °C

SEF785Z

4. CHECK COOLING FAN LOW SPEED OPERATION

Without CONSULT-II

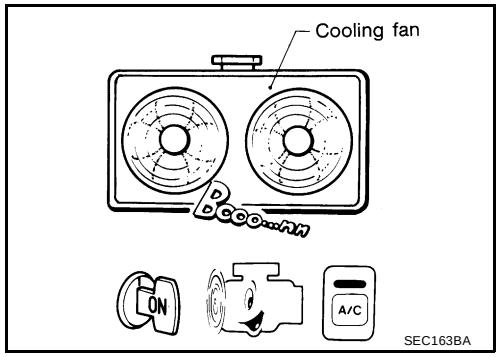
1. Disconnect cooling fan relays-2 and -3.
2. Start engine and let it idle.
3. Turn air conditioner switch “ON”.
4. Turn blower fan switch “ON”.



5. 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-1457, "PROCEDURE A" .)



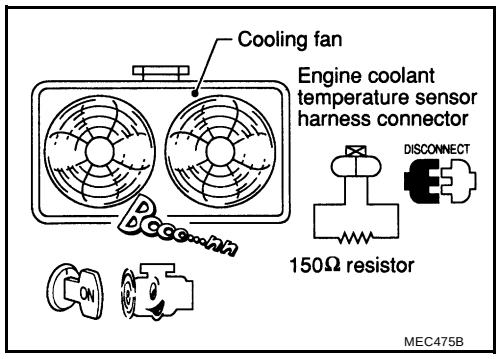
5. CHECK COOLING FAN HIGH SPEED OPERATION

Without CONSULT-II

1. Turn ignition switch “OFF”.
2. Reconnect cooling fan relays-2 and -3.
3. Turn air conditioner switch and blower fan switch “OFF”.
4. Disconnect engine coolant temperature sensor harness connector.
5. Connect 150Ω resistor to engine coolant temperature sensor harness connector.
6. Restart engine and make sure that cooling fans-1 and -2 operate at high speed.

OK or NG

OK >> GO TO 6.
NG >> Check cooling fan high speed control circuit. (Go to EC-1459, "PROCEDURE B" .)



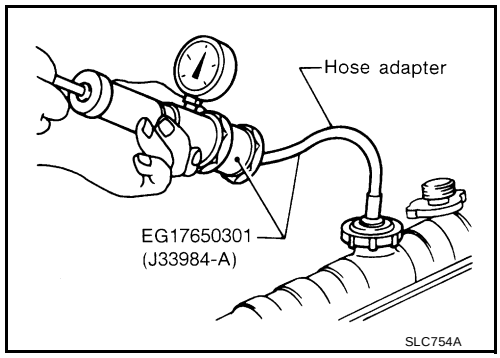
6. CHECK COOLING SYSTEM FOR LEAK

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.

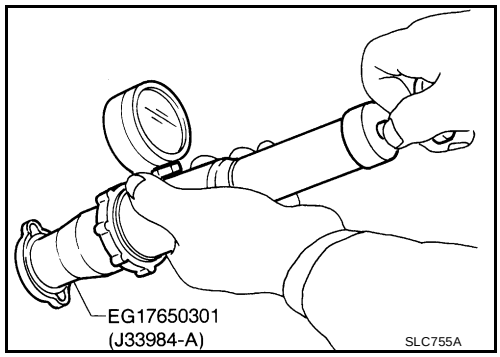
- Hose
- Radiator
- Water pump
  Refer to CO-28, "WATER PUMP" .

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

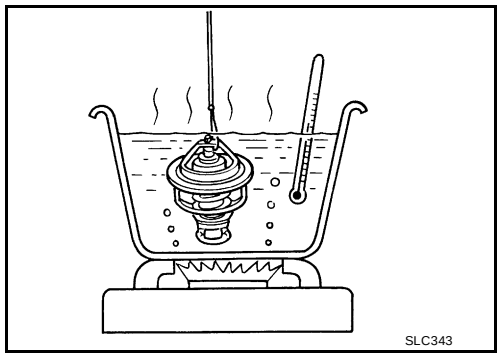
OK >> GO TO 8.
NG >> Replace radiator cap.

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 mm/95°C (0.31 in/203°F)
3. Check if valve is closed at 5°C (9°F) below valve opening temperature.



For details, refer to CO-30, "THERMOSTAT AND THERMOSTAT HOUSING" .

OK or NG

OK >> GO TO 9.
NG >> Replace thermostat.

9. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-1386, "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-1460, "Main 12 Causes of Overheating" .

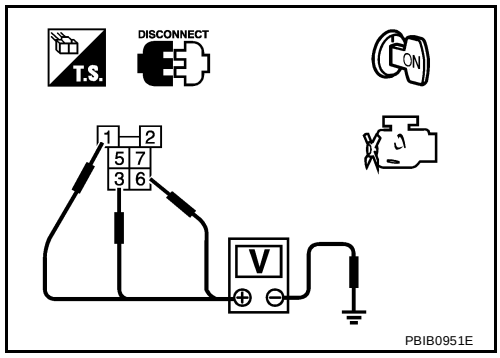
>> **INSPECTION END**

PROCEDURE A

1. CHECK POWER SUPPLY

1. Turn ignition switch “OFF”.
2. Disconnect cooling fan relay-1.
3. Turn ignition switch “ON”.
4. Check voltage between cooling fan relay-1 terminals 1, 3, 6 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.

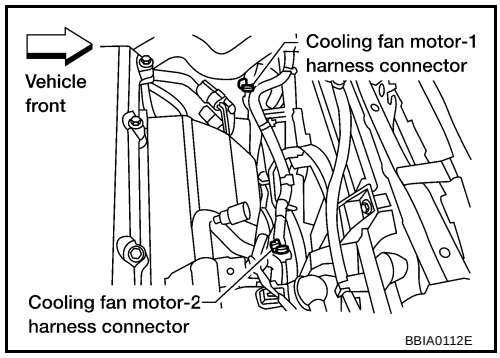
- 10A fuse
- Fuse block (J/B) connector E103
- 40A fusible links
- Fuse and fusible link box connectors E23, E25
- Harness for open or short between cooling fan relay-1 and fuse
- Harness for open or short between cooling fan relay-1 and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

3. 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. Check harness continuity between cooling fan relay-1 terminal 5 and cooling fan motor-1 terminal 1, cooling fan motor-1 terminal 4 and body 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 cooling fan relay-1 terminal 7 and cooling fan motor-2 terminal 1, cooling fan motor-2 terminal 4 and body 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 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK OUTPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 37 and cooling fan relay-1 terminal 2. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E10, F48
- Harness for open or short between cooling fan relay-1 and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK COOLING FAN RELAY-1

Refer to EC-1461, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace cooling fan relay.

7. CHECK COOLING FAN MOTORS-1 AND -2

Refer to EC-1461, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace cooling fan motors.

8. CHECK INTERMITTENT INCIDENT

Perform EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

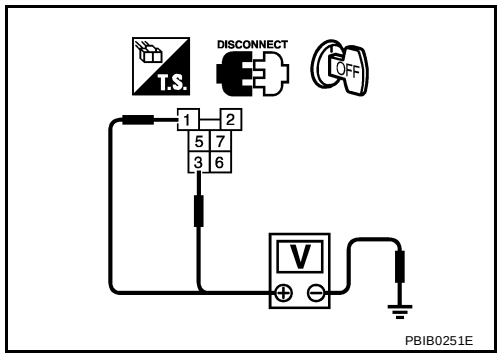
>> **INSPECTION END**

PROCEDURE B

1. CHECK POWER SUPPLY

1. Turn ignition switch “OFF”.
2. Disconnect cooling fan relays-2 and -3.
3. Turn ignition switch “ON”.
4. Check voltage between cooling fan relays-2 and -3 terminals 1, 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

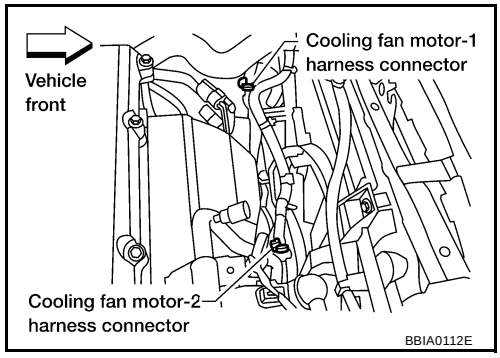
- Harness for open or short between cooling fan relays-2 and -3 and fuse
- Harness for open or short between cooling fan relays-2 and -3 and fusible links

>> Repair harness or connectors.

3. 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. Check harness continuity between the following;
cooling fan relay-2 terminal 5 and cooling fan motor-1 terminal 2,
cooling fan relay-2 terminal 6 and cooling fan motor-1 terminal 3,
cooling fan relay-2 terminal 7 and body 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 relay-3 terminal 5 and cooling fan motor-2 terminal 2,
cooling fan relay-3 terminal 6 and cooling fan motor-2 terminal 3,
cooling fan relay-3 terminal 7 and body 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 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK OUTPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 27 and cooling fan relay-2 terminal 2, cooling fan relay-3 terminal 2.
   Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E10, F48
- Harness for open or short between cooling fan relays-2, -3 and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK COOLING FAN RELAYS-2 AND -3

Refer to EC-1461, "COOLING FAN RELAYS-1, -2 AND -3" .

OK or NG

OK >> GO TO 7.
NG >> Replace cooling fan relays.

7. CHECK COOLING FAN MOTORS

Refer to EC-1461, "COOLING FAN MOTORS-1 AND -2" .

OK or NG

OK >> GO TO 8.
NG >> Replace cooling fan motors.

8. CHECK INTERMITTENT INCIDENT

Perform EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Main 12 Causes of Overheating

UBS002C2

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	● Blocked radiator ● Blocked condenser ● Blocked radiator grille ● Blocked bumper	● Visual	No blocking	—
	2	● Coolant mixture	● Coolant tester	50 - 50% coolant mixture	See MA-14, "Anti-freeze Coolant Mixture Ratio" .
	3	● Coolant level	● Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	See MA-22, "Changing Engine Coolant" .
	4	● Radiator cap	● Pressure tester	59 - 98 kPa (0.6 - 1.0 kg/cm^2 , 9 - 14 psi) (Limit)	See CO-9, "CHECKING RADIATOR CAP" .

Engine	Step	Inspection item	Equipment	Standard	Reference page
ON*2	5	● Coolant leaks	● Visual	No leaks	See CO-8, "CHECKING COOLING SYSTEM FOR LEAKS" .
ON*2	6	● Thermostat	● Touch the upper and lower radiator hoses	Both hoses should be hot	See CO-30, "THERMOSTAT AND THERMOSTAT HOUSING" , and CO-32, "RADIATOR" .
ON*1	7	● Cooling fan	● CONSULT-II	Operating	See trouble diagnosis for DTC P0217 (EC-1448).
OFF	8	● Combustion gas leak	● Color checker chemical tester 4 Gas analyzer	Negative	—
ON*3	9	● Coolant temperature gauge	● Visual	Gauge less than 3/4 when driving	—
		● Coolant overflow to reservoir tank	● Visual	No overflow during driving and idling	See MA-22, "Changing Engine Coolant" .
OFF*4	10	● Coolant return from reservoir tank to radiator	● Visual	Should be initial level in reservoir tank	See CO-26, "CHECKING RESERVOIR LEVEL" .
OFF	11	● Cylinder head	● Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	See EM-129, "CYLINDER HEAD" .
	12	● Cylinder block and pistons	● Visual	No scuffing on cylinder walls or piston	See EM-129, "CYLINDER HEAD" .

*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-23, "OVERHEATING CAUSE ANALYSIS" .

Component Inspection

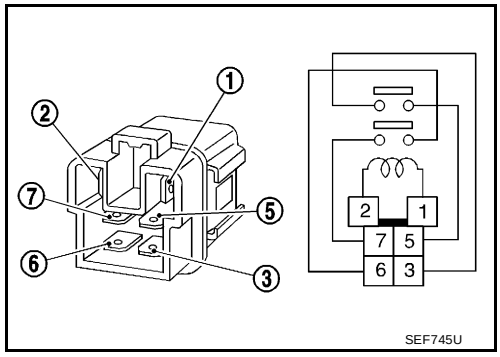
UBS002C3

COOLING FAN RELAYS-1, -2 AND -3

Check continuity between terminals 3 and 5, 6 and 7.

Conditions	Continuity
12V direct current supply between terminals 1 and 2	Yes
No current supply	No

If NG, replace relay.

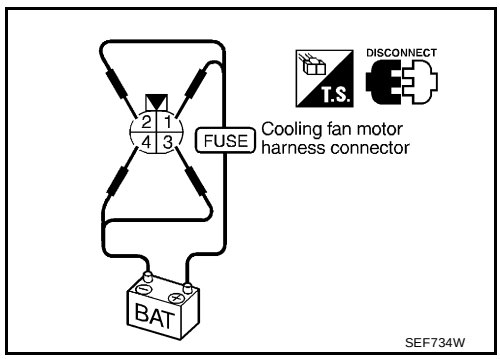


COOLING FAN MOTORS-1 AND -2

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
	High	1, 2	3, 4

Cooling fan motor should operate.
If NG, replace cooling fan motor.



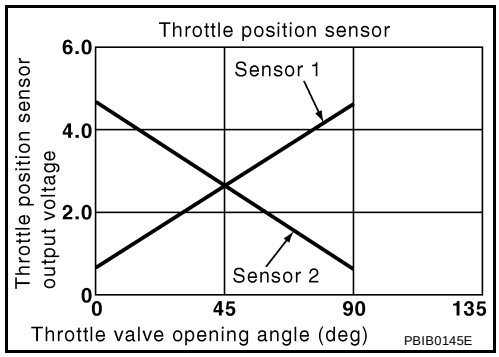
DTC P0221 TP SENSOR

PFP:16119

Component Description

UBS002C4

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

UBS002C5

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
THRTL SEN1 THRTL SEN2	● Ignition switch: ON (Engine stopped) ● Shift lever: D (A/T model) 1st (M/T model)	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V

On Board Diagnosis Logic

UBS002C6

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0221 0221	Throttle position sensor circuit range/performance problem	Rationally incorrect voltage is sent to ECM compared with the signals from TP sensor 1 and TP sensor 2.	● Harness or connector (The TP sensor 1 and 2 circuit is open or shorted.) ● Electric throttle control actuator (TP sensor 1 and 2)

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

Engine operation condition in fail-safe mode
The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates an opening speed of approx. 5 seconds to an opening of 10 degrees. So, the acceleration will be poor.

DTC Confirmation Procedure

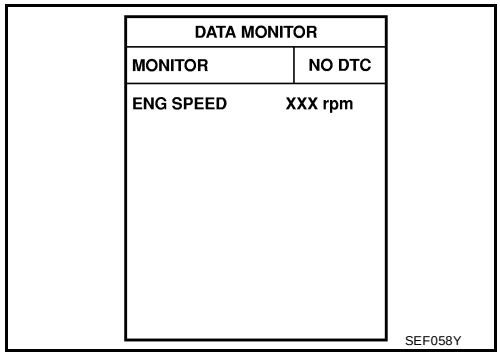
UBS002C7

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-1465, "Diagnostic Procedure" .

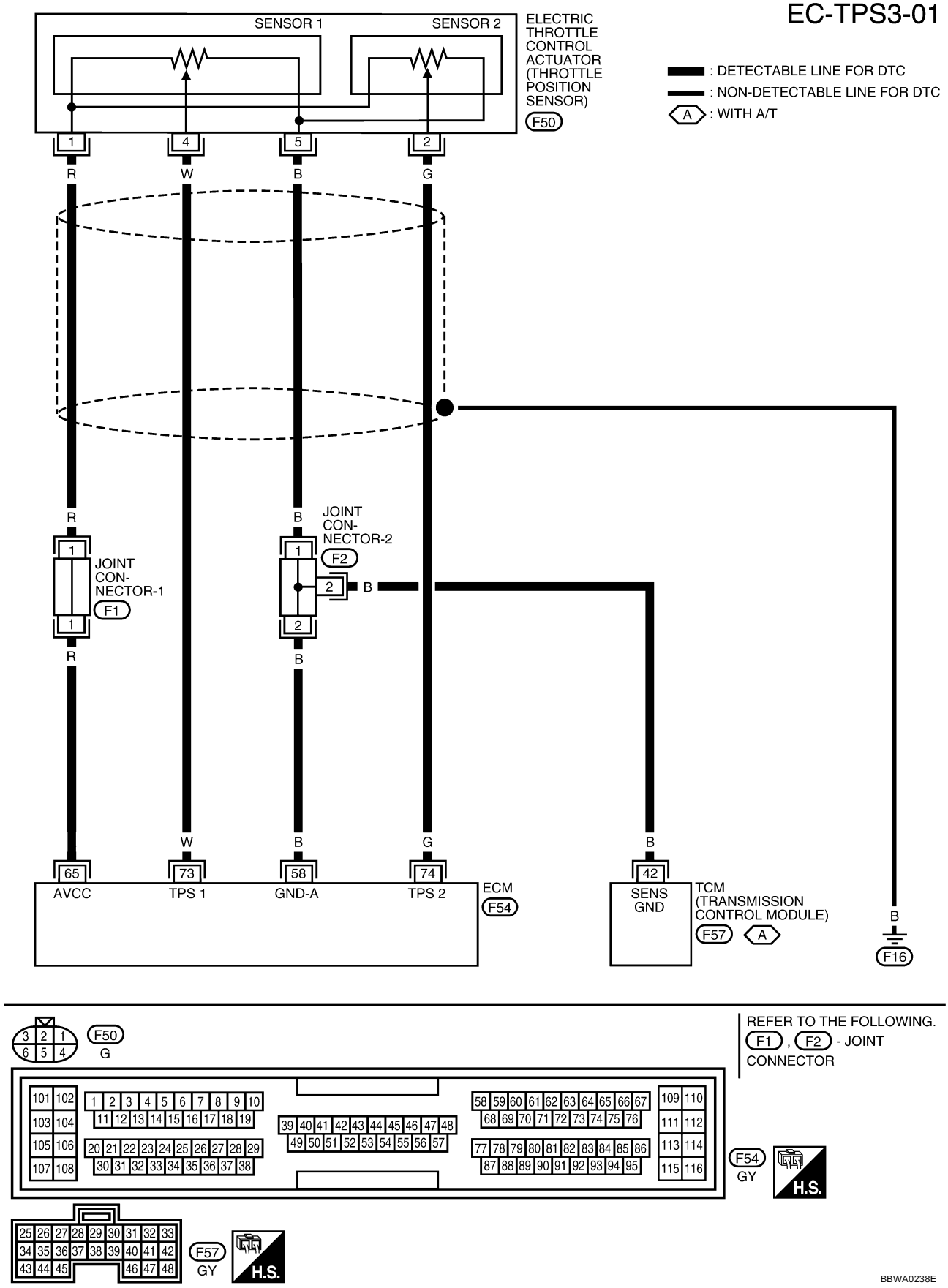


WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS002C8



Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/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)
58	B	Sensors' ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
65	R	Sensor's power supply	**[Ignition switch "ON"]**	Approximately 5V
73	W	Throttle position sensor 1	**[Ignition switch "ON"]** ● Shift lever position is "D" (A/T model) ● Shift lever position is "1st" (M/T model) ● Accelerator pedal fully released	More than 0.36V
			[Ignition switch "ON"] ● Shift lever position is "D" (A/T model) ● Shift lever position is "1st" (M/T model) ● Accelerator pedal fully depressed	Less than 4.75V
74	G	Throttle position sensor 2	**[Ignition switch "ON"]** ● Shift lever position is "D" (A/T model) ● Shift lever position is "1st" (M/T model) ● Accelerator pedal fully released	Less than 4.75V
			[Ignition switch "ON"] ● Shift lever position is "D" (A/T model) ● Shift lever position is "1st" (M/T model) ● Accelerator pedal fully depressed	More than 0.36V

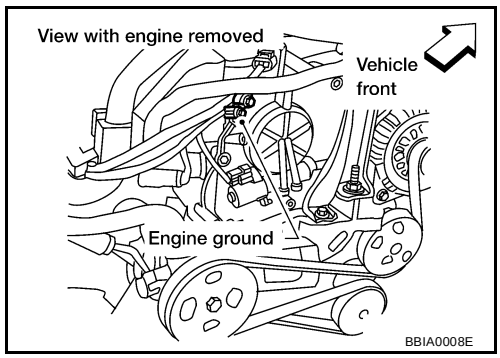
Diagnostic Procedure

UBS002C9

1. RETIGHTEN GROUND SCREWS

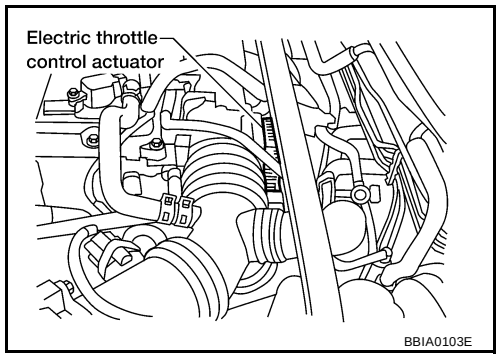
1. Turn ignition switch "OFF".
2. Loosen and retighten engine ground screws.

>> GO TO 2.



2. CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT

1. Disconnect electric throttle control actuator harness connector.
2. Turn ignition switch “ON”.

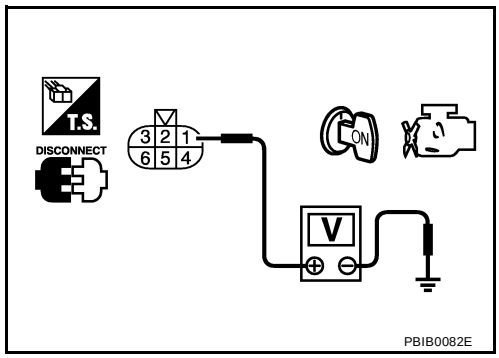


3. Check voltage between electric throttle control actuator terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5V

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.



3. DETECT MALFUNCTIONING PART

Check the following.

- Joint connector-1
- Harness for open or short between electric throttle control actuator and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK THROTTLE POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Check harness continuity between electric throttle control actuator terminal 5 and engine ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Joint connector-2
- Harness for open or short between electric throttle control actuator and ECM
- Harness for open or short between electric throttle control actuator and TCM

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 73 and electric throttle control actuator terminal 4, ECM terminal 74 and electric throttle control actuator 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 THROTTLE POSITION SENSOR

Refer to EC-1467, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> GO TO 8.

8. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-1253, "Throttle Valve Closed Position Learning" .
3. Perform EC-1253, "Idle Air Volume Learning" .

>> **INSPECTION END**

9. CHECK INTERMITTENT INCIDENT

Refer to EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

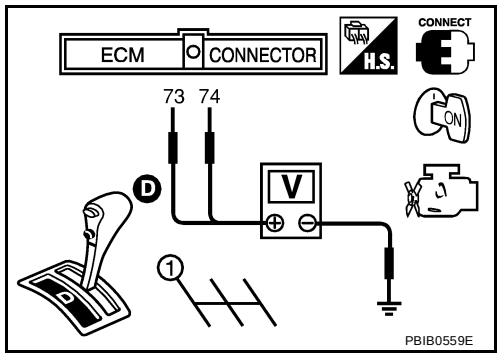
Component Inspection

UBS002CA

THROTTLE POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Perform EC-1253, "Throttle Valve Closed Position Learning" .
3. Turn ignition switch “ON”.
4. Set selector lever to “D” position (A/T models) or “1st” position (M/T models).
5. Check voltage between ECM terminals 73 (TP sensor 1), 74 (TP sensor 2) and engine ground under the following conditions.

Terminal	Accelerator pedal	Voltage
73 (Throttle position sensor 1)	Fully released	More than 0.36V
	Fully depressed	Less than 4.75V
74 (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-1253, "Throttle Valve Closed Position Learning" .
8. Perform EC-1253, "Idle Air Volume Learning" .

Remove and Installation

UBS002CB

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-93, "INTAKE MANIFOLD" .

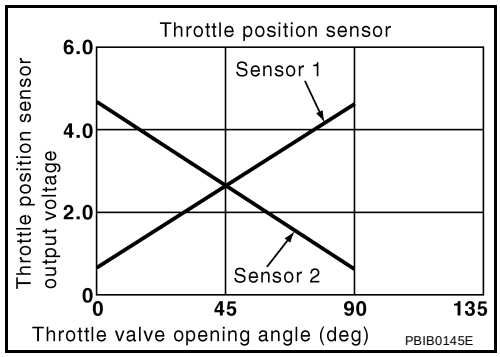
DTC P0222, P0223 TP SENSOR

PFP:16119

Component Description

UBS002CC

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

UBS002CD

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
THRTL SEN1	● Ignition switch: ON (Engine stopped) ● Shift lever: D (A/T model) 1st (M/T model)	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V

On Board Diagnosis Logic

UBS002CE

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0222 0222	Throttle position sensor 1 circuit low input	An excessively low voltage from the TP sensor 1 is sent to ECM.	● Harness or connectors (The TP sensor 1 circuit is open or shorted.) ● Electric throttle control actuator (TP sensor 1)
P0223 0223	Throttle position sensor 1 circuit high input	An excessively high voltage from the TP sensor 1 is sent to ECM.	

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters in fail-safe mode and the MIL lights up.

Engine operation condition in fail-safe mode
The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates an opening speed of approx. 5 seconds to an opening of 10 degrees. So, the acceleration will be poor.

DTC Confirmation Procedure

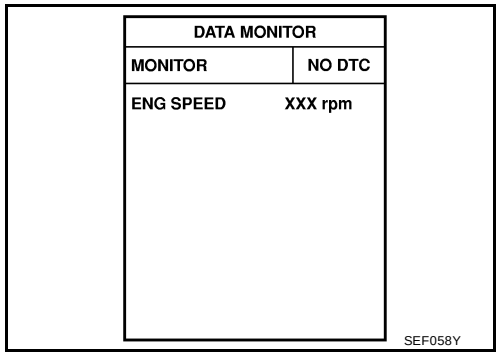
UBS002CF

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-1472, "Diagnostic Procedure" .

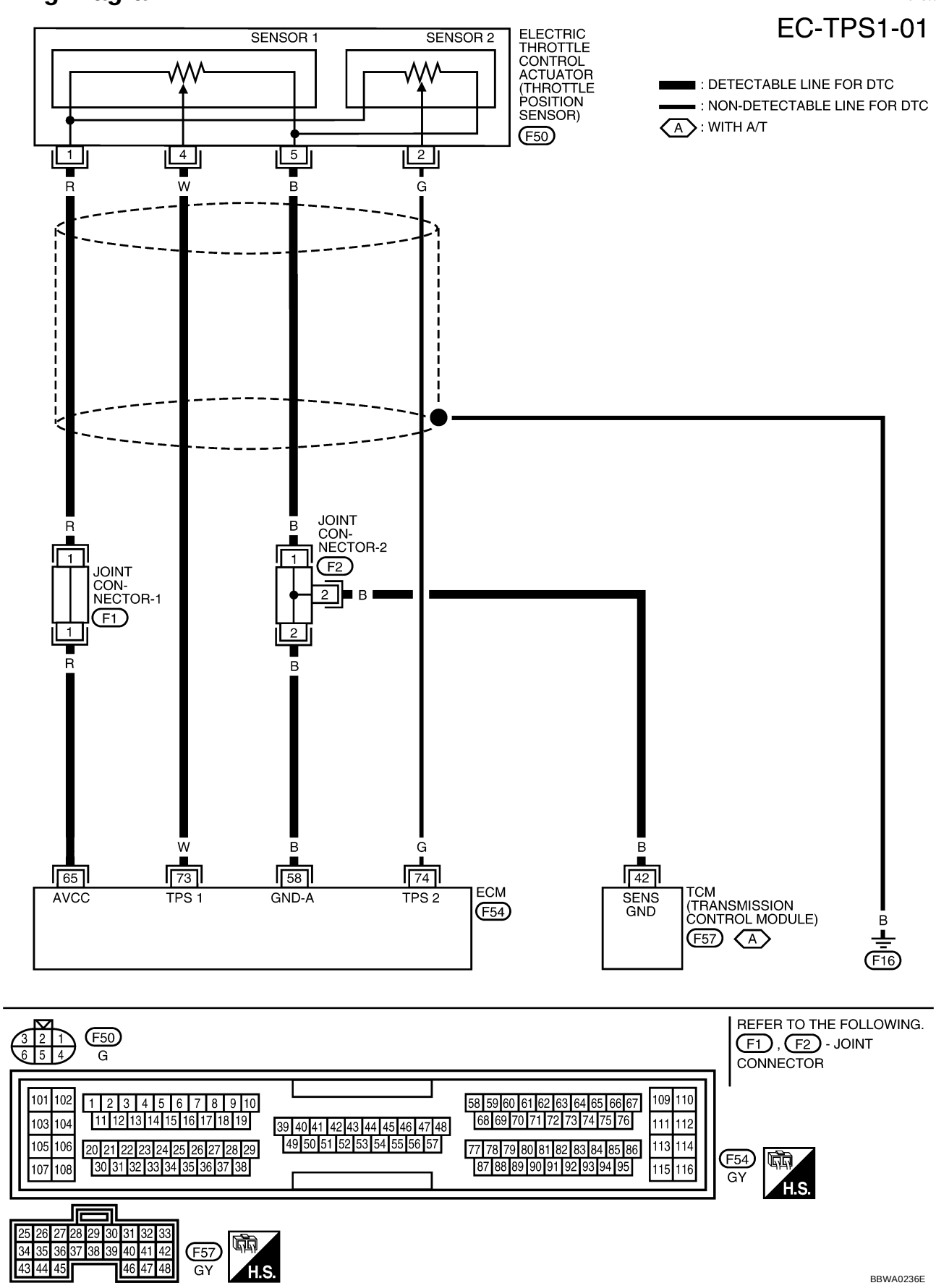


WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS002CG



Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/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)
58	B	Sensors' ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
65	R	Sensor's power supply	**[Ignition switch "ON"]**	Approximately 5V
73	W	Throttle position sensor 1	**[Ignition switch "ON"]** ● Shift lever position is "D" (A/T model) ● Shift lever position is "1st" (M/T model) ● Accelerator pedal fully released	More than 0.36V
			[Ignition switch "ON"] ● Shift lever position is "D" (A/T model) ● Shift lever position is "1st" (M/T model) ● Accelerator pedal fully depressed	Less than 4.75V
74	G	Throttle position sensor 2	**[Ignition switch "ON"]** ● Shift lever position is "D" (A/T model) ● Shift lever position is "1st" (M/T model) ● Accelerator pedal fully released	Less than 4.75V
			[Ignition switch "ON"] ● Shift lever position is "D" (A/T model) ● Shift lever position is "1st" (M/T model) ● Accelerator pedal fully depressed	More than 0.36V

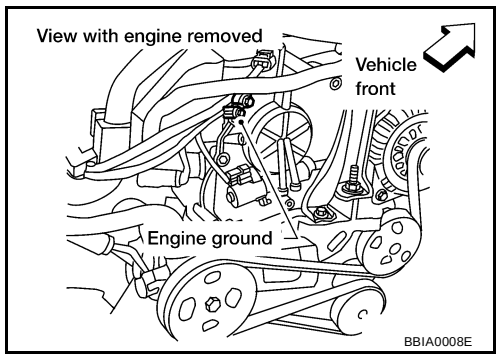
Diagnostic Procedure

UBS002CH

1. RETIGHTEN GROUND SCREWS

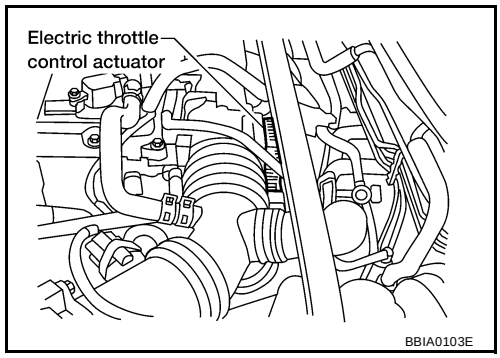
1. Turn ignition switch "OFF".
2. Loosen and retighten engine ground screws.

>> GO TO 2.



2. CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect electric throttle control actuator harness connector.
2. Turn ignition switch “ON”.

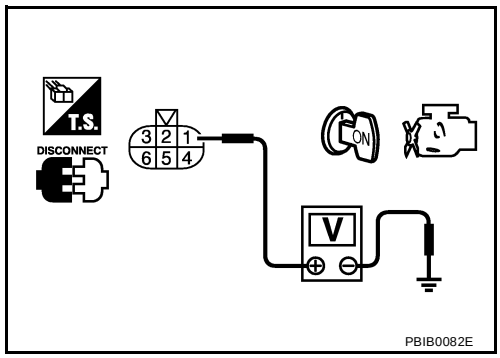


3. Check voltage between electric throttle control actuator terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5V

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.



3. DETECT MALFUNCTIONING PART

Check the following.

- Joint connector-1
- Harness for open or short between electric throttle control actuator and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK THROTTLE POSITION SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Check harness continuity between electric throttle control actuator terminal 5 and engine ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Joint connector-2
- Harness for open or short between electric throttle control actuator and ECM
- Harness for open or short between electric throttle control actuator and TCM

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK THROTTLE POSITION SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 73 and electric throttle control actuator terminal 4. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK THROTTLE POSITION SENSOR

Refer to EC-1474, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> GO TO 8.

8. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-1253, "Throttle Valve Closed Position Learning" .
3. Perform EC-1253, "Idle Air Volume Learning" .

>> **INSPECTION END**

9. CHECK INTERMITTENT INCIDENT

Refer to EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

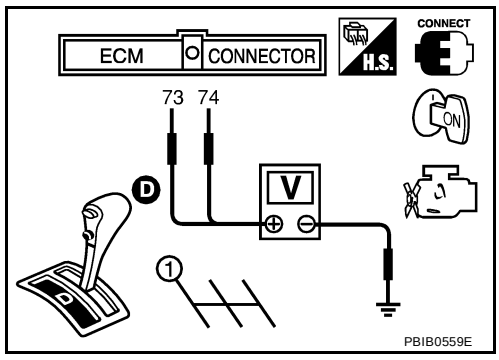
Component Inspection

UBS002CI

THROTTLE POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Perform EC-1253, "Throttle Valve Closed Position Learning" .
3. Turn ignition switch “ON”.
4. Set selector lever to “D” position (A/T models) or “1st” position (M/T models).
5. Check voltage between ECM terminals 73 (TP sensor 1), 74 (TP sensor 2) and engine ground under the following conditions.

Terminal	Accelerator pedal	Voltage
73 (Throttle position sensor 1)	Fully released	More than 0.36V
	Fully depressed	Less than 4.75V
74 (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-1253, "Throttle Valve Closed Position Learning" .
8. Perform EC-1253, "Idle Air Volume Learning" .

Remove and Installation

UBS002CJ

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-93, "INTAKE MANIFOLD" .

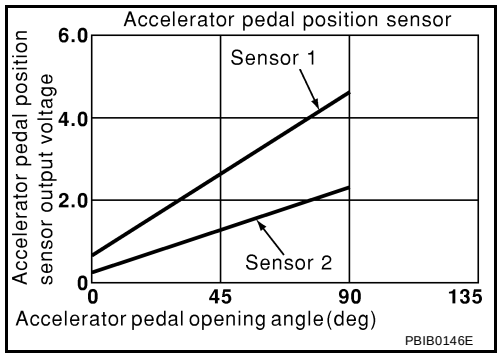
DTC P0226 APP SENSOR

PFP:18002

Component Description

UBS002CK

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

UBS002CL

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL SEN1 ACCEL SEN2	● Ignition switch: ON (engine stopped)	Accelerator pedal: Fully released	0.41 - 0.71V
		Accelerator pedal: Fully depressed	More than 4.2V
CLSD THL POS	● Ignition switch: ON	Accelerator pedal: Fully released	ON
		Accelerator pedal: Slightly depressed	OFF

On Board Diagnosis Logic

UBS002CM

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0226 0226	Accelerator pedal position sensor circuit range/performance problem	Rationally incorrect voltage is sent to ECM compared with the signals from APP sensor 1 and APP sensor 2.	● Harness or connector (The APP sensor 1 and 2 circuit is open or shorted.) ● Accelerator pedal position sensor 1 and 2

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters in fail-safe mode and the MIL lights up.

Engine operating condition in fail-safe mode
The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates an opening speed of approx. 5 seconds to an opening of 10 degrees. So, the acceleration will be poor.

DTC Confirmation Procedure

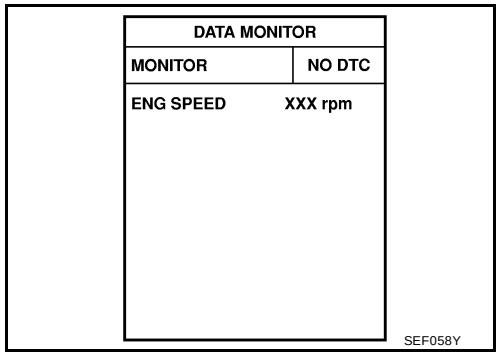
UBS002CN

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-1478, "Diagnostic Procedure" .



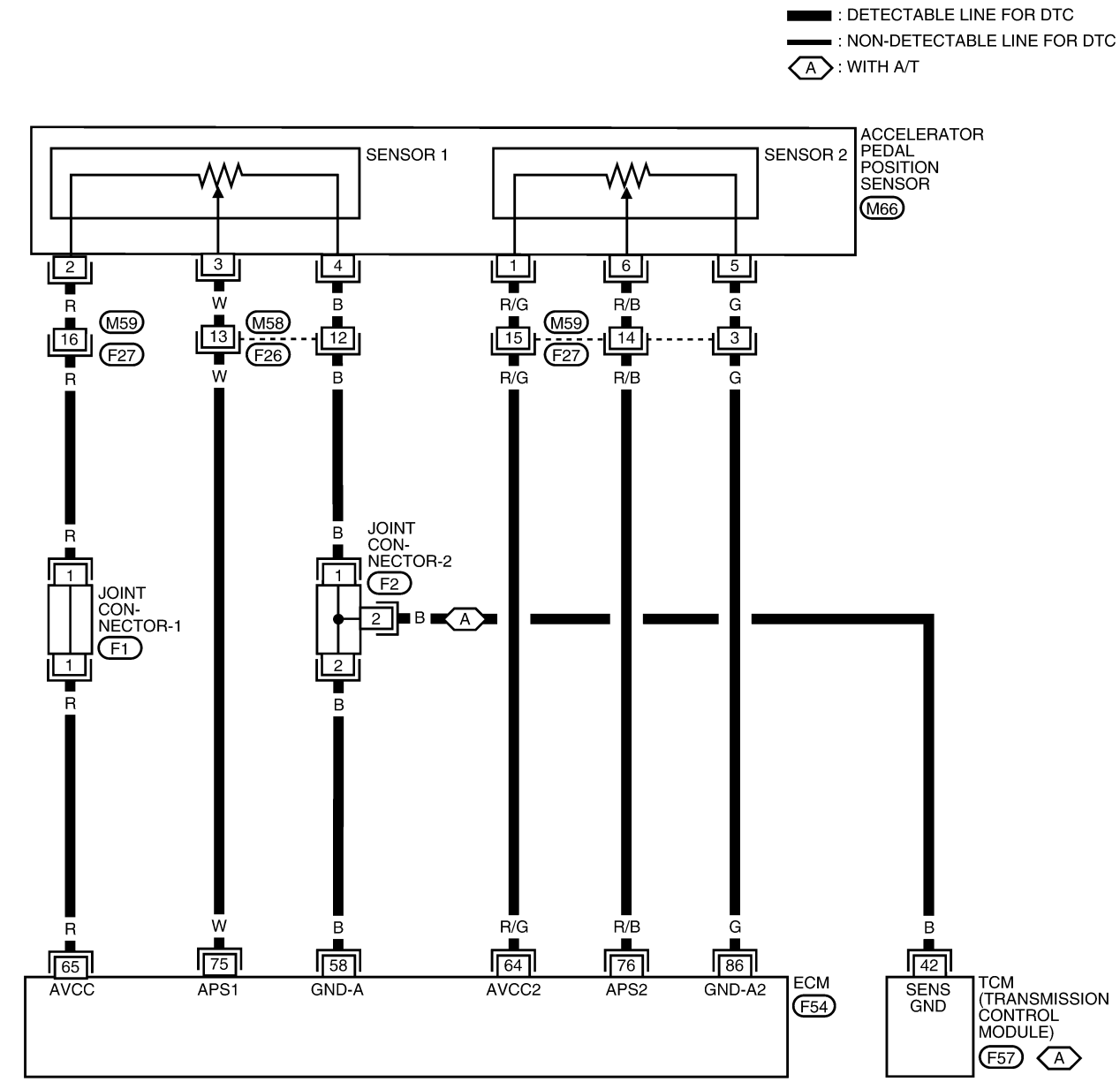
WITH GST

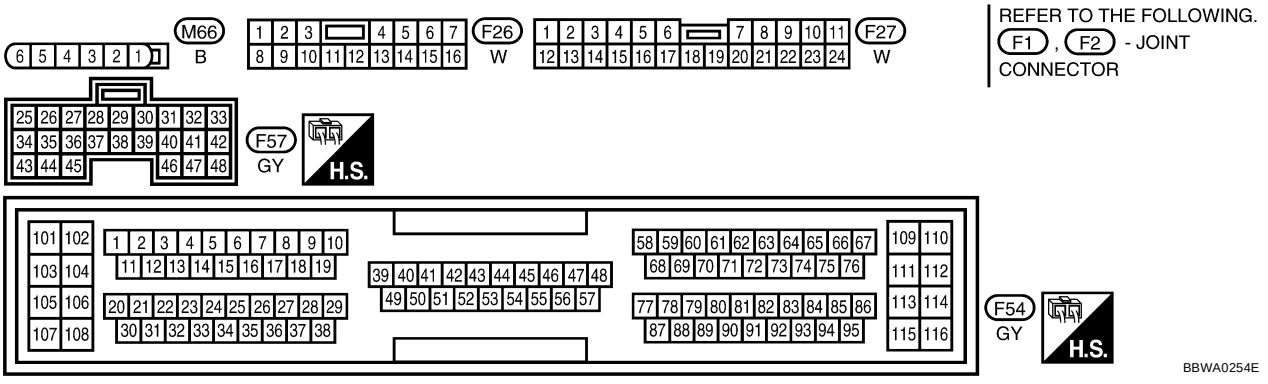
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS002CO

EC-APPS3-01





Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
58	B	Sensors' ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
64	R/G	Accelerator pedal position sensor 2 power supply	**[Ignition switch “ON”]**	Approximately 2.5V
65	R	Sensor's power supply	**[Ignition switch “ON”]**	Approximately 5V
75	W	Accelerator pedal position sensor 1	**[Ignition switch “ON”]** ● Accelerator pedal fully released	0.41 - 0.71V
			[Ignition switch “ON”] ● Accelerator pedal fully depressed	More than 4.2V
76	R/B	Accelerator pedal position sensor 2	**[Ignition switch “ON”]** ● Accelerator pedal fully released	0.21 - 0.36V
			[Ignition switch “ON”] ● Accelerator pedal fully depressed	More than 2.1V
86	G	Accelerator pedal position sensor 2 ground	**[Ignition switch “ON”]**	Approximately 0V

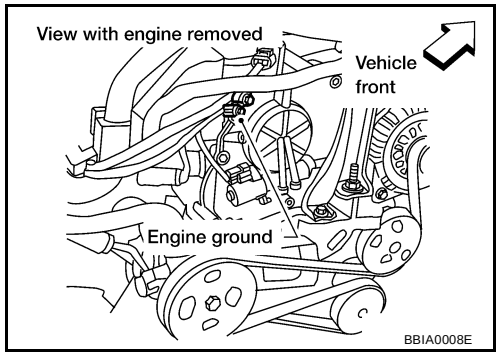
Diagnostic Procedure

UBS002CP

1. RETIGHTEN GROUND SCREWS

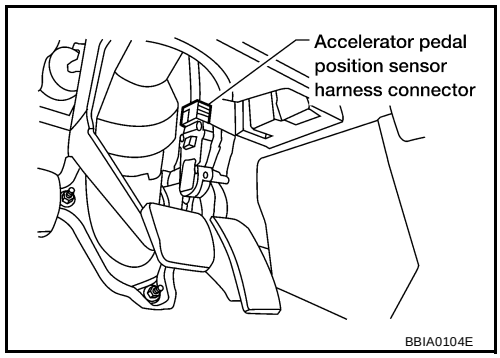
1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

>> GO TO 2.



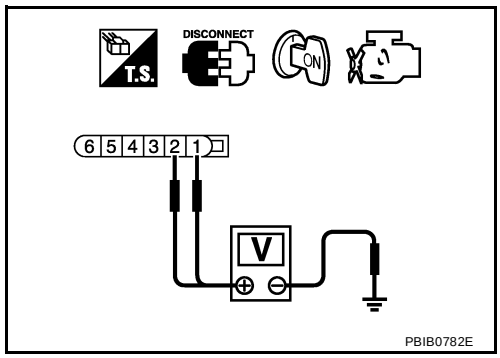
2. CHECK APP SENSOR POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch “ON”.



3. Check voltage between APP sensor terminals 1, 2 and ground with CONSULT-II or tester.

APP sensor terminal	Voltage (V)
1	Approximately 2.5
2	Approximately 5



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E59, F27
- Joint connector-1
- Harness for open or short between ECM and accelerator pedal position sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK APP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Check harness continuity between APP sensor terminal 4, 5 and engine ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M58, F26
- Harness connectors M59, F27
- Joint connector-2
- Harness for open or short between ECM and accelerator pedal position sensor
- Harness for open or short between TCM and accelerator pedal position sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 75 and APP sensor terminal 3, ECM terminal 76 and APP sensor terminal 6.
   Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M58, F26
- Harness connectors M59, F27
- Harness for open or short between ECM and accelerator pedal position sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK APP SENSOR

Refer to EC-1487, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace accelerator pedal assembly.

9. CHECK INTERMITTENT INCIDENT

Refer to EC-1340, "POWER SUPPLY CIRCUIT FOR ECM" .

>> **INSPECTION END**

Component Inspection

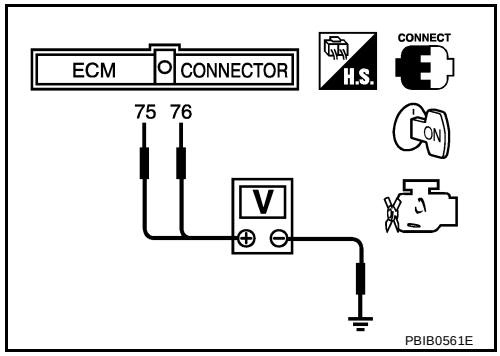
UBS002CQ

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch “ON”.

3. Check voltage between ECM terminals 75 (APP sensor 1 signal), 76 (APP sensor 2 signal) and engine ground under the following conditions.

Terminal	Accelerator pedal	Voltage
75 (Accelerator pedal position sensor 1)	Fully released	0.41 - 0.71V
	Fully depressed	More than 4.2V
76 (Accelerator pedal position sensor 2)	Fully released	0.21 - 0.36V
	Fully depressed	More than 2.1V



4. If NG, replace accelerator pedal assembly and go to next step.
5. Perform EC-1253, "Accelerator Pedal Released Position Learning" .
6. Perform EC-1253, "Throttle Valve Closed Position Learning" .
7. Perform EC-1253, "Idle Air Volume Learning" .

Remove and Installation

UBS002CR

ACCELERATOR PEDAL

Refer to ACC-4, "ACCELERATOR CONTROL SYSTEM" .

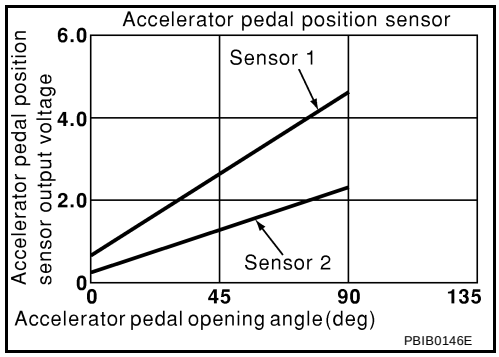
DTC P0227, P0228 APP SENSOR

PFP:18002

Component Description

UBS002CS

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

UBS002CT

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL SEN1	● Ignition switch: ON (engine stopped)	Accelerator pedal: Fully released	0.41 - 0.71V
		Accelerator pedal: Fully depressed	More than 4.2V
CLSD THL POS	● Ignition switch: ON	Accelerator pedal: Fully released	ON
		Accelerator pedal: Slightly depressed	OFF

On Board Diagnosis Logic

UBS002CU

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0227 0227	Accelerator pedal position sensor 1 circuit low input	An excessively low voltage from the APP sensor 1 is sent to ECM.	● Harness or connectors (The APP sensor 1 circuit is open or shorted.) ● Accelerator pedal position sensor (Accelerator pedal position sensor 1)
P0228 0228	Accelerator pedal position sensor 1 circuit high input	An excessively high voltage from the APP sensor 1 is sent to ECM.	

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters in fail-safe mode and the MIL lights up.

Engine operating condition in fail-safe mode
The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates an opening speed of approx. 5 seconds to an opening of 10 degrees. So, the acceleration will be poor.

DTC Confirmation Procedure

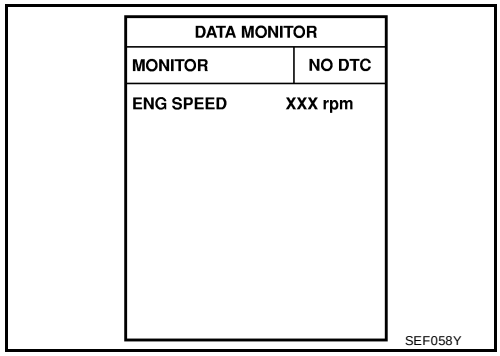
UBS002CV

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-1485, "Diagnostic Procedure" .



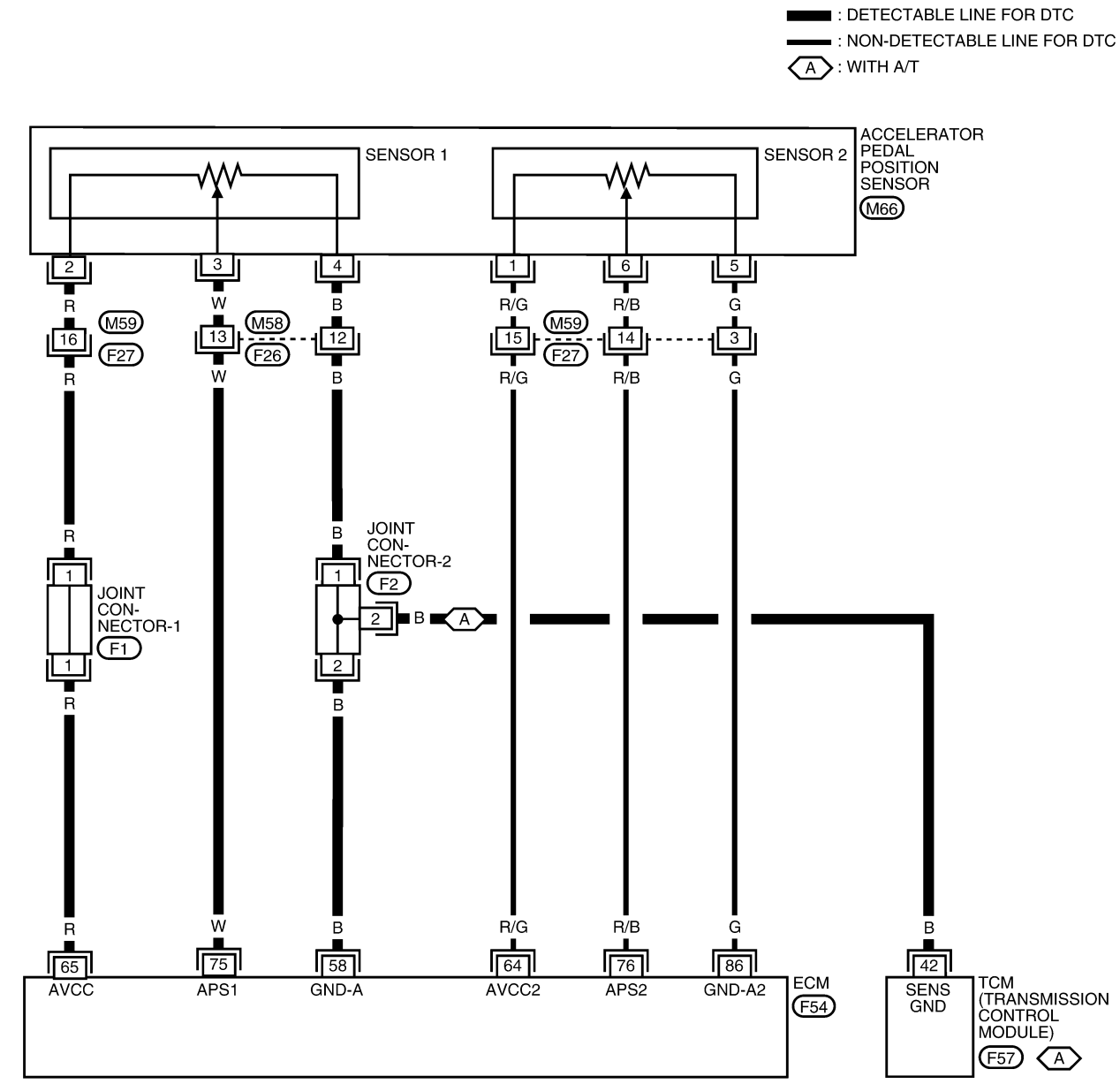
WITH GST

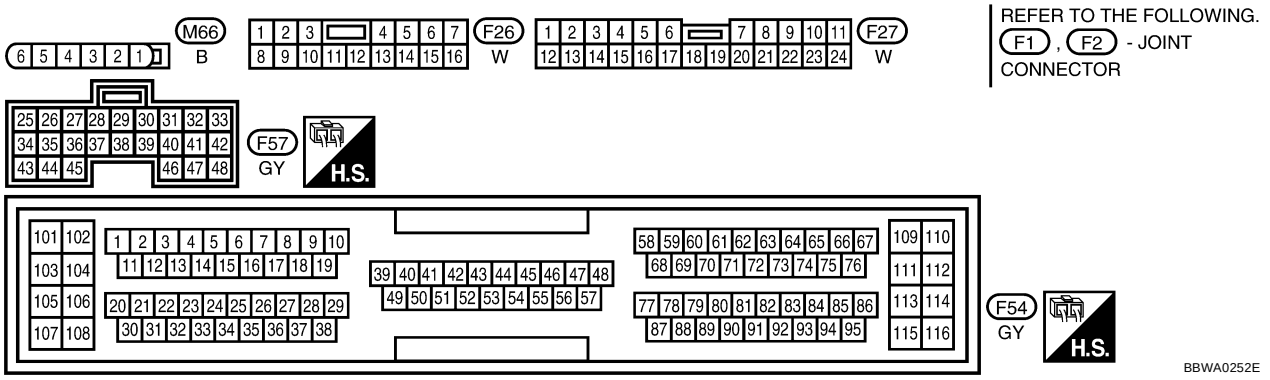
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS002CW

EC-APPS1-01





BBWA0252E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/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)
58	B	Sensors' ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
64	R/G	Accelerator pedal position sensor 2 power supply	**[Ignition switch "ON"]**	Approximately 2.5V
65	R	Sensor's power supply	**[Ignition switch "ON"]**	Approximately 5V
75	W	Accelerator pedal position sensor 1	**[Ignition switch "ON"]** ● Accelerator pedal fully released	0.41 - 0.71V
			[Ignition switch "ON"] ● Accelerator pedal fully depressed	More than 4.2V
76	R/B	Accelerator pedal position sensor 2	**[Ignition switch "ON"]** ● Accelerator pedal fully released	0.21 - 0.36V
			[Ignition switch "ON"] ● Accelerator pedal fully depressed	More than 2.1V
86	G	Accelerator pedal position sensor 2 ground	**[Ignition switch "ON"]**	Approximately 0V

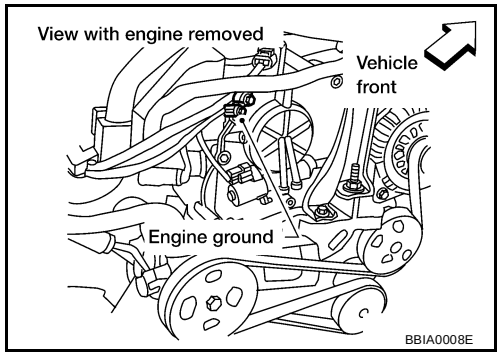
Diagnostic Procedure

UBS002CX

1. RETIGHTEN GROUND SCREWS

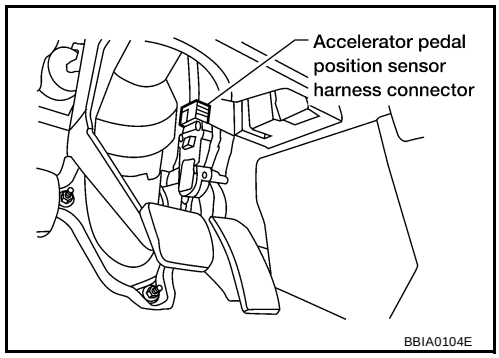
1. Turn ignition switch "OFF".
2. Loosen and retighten engine ground screws.

>> GO TO 2.



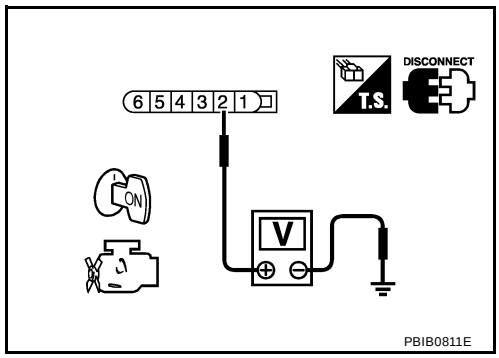
2. CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch “ON”.



3. Check voltage between APP sensor terminal 2 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 M59, F27
- Joint connector-1
- Harness for open or short between ECM and accelerator pedal position sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK APP SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Check harness continuity between APP sensor terminal 4 and engine ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M58, F26
- Joint connector-2
- Harness for open or short between ECM and accelerator pedal position sensor
- Harness for open or short between TCM and accelerator pedal position sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK APP SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 75 and APP sensor terminal 3. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E58, F26
- Harness for open or short between ECM and accelerator pedal position sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK APP SENSOR

Refer to EC-1487, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace accelerator pedal assembly.

9. CHECK INTERMITTENT INCIDENT

Refer to EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

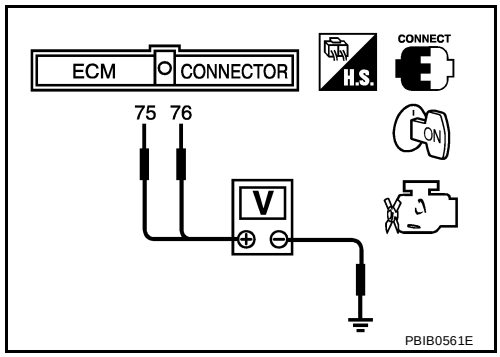
Component Inspection

UBS002CY

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch “ON”.
3. Check voltage between ECM terminals 75 (APP sensor 1 signal), 76 (APP sensor 2 signal) and engine ground under the following conditions.

Terminal	Accelerator pedal	Voltage
75 (Accelerator pedal position sensor 1)	Fully released	0.41 - 0.71V
	Fully depressed	More than 4.2V
76 (Accelerator pedal position sensor 2)	Fully released	0.21 - 0.36V
	Fully depressed	More than 2.1V



4. If NG, replace accelerator pedal assembly and go to next step.
5. Perform EC-1253, "Accelerator Pedal Released Position Learning" .
6. Perform EC-1253, "Throttle Valve Closed Position Learning" .
7. Perform EC-1253, "Idle Air Volume Learning" .

Remove and Installation

UBS002CZ

ACCELERATOR PEDAL

Refer to ACC-4, "ACCELERATOR CONTROL SYSTEM" .

DTC P0300 - P0304 MULTIPLE CYLINDER MISFIRE, NO. 1 - 4 CYLINDER MISFIRE

PFP:00000

On Board Diagnosis Logic

UBS002D0

When a misfire occurs, engine speed will fluctuate. If the engine speed fluctuates enough to cause the crankshaft position (CKP) sensor (POS) signal to vary, ECM can determine that a misfire is occurring.

Sensor	Input Signal to ECM	ECM function
Crankshaft position sensor (POS)	Engine speed	On board diagnosis of misfire

The misfire detection logic consists of the following two conditions.

1. One Trip Detection Logic (Three Way Catalyst Damage)
   On the first trip that a misfire condition occurs that can damage the three way catalyst (TWC) due to overheating, the MIL will blink.
   When a misfire condition occurs, the ECM monitors the CKP sensor (POS) signal every 200 engine revolutions for a change.
   When the misfire condition decreases to a level that will not damage the TWC, the MIL will turn off.
   If another misfire condition occurs that can damage the TWC on a second trip, the MIL will blink.
   When the misfire condition decreases to a level that will not damage the TWC, the MIL will remain on.
   If another misfire condition occurs that can damage the TWC, the MIL will begin to blink again.
2. Two Trip Detection Logic (Exhaust quality deterioration)
   For misfire conditions that will not damage the TWC (but will affect vehicle emissions), the MIL will only light when the misfire is detected on a second trip. During this condition, the ECM monitors the CKP sensor signal every 1,000 engine revolutions.
   A misfire malfunction can be detected on any one cylinder or on multiple cylinders.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0300 0300	Multiple cylinder misfire detected	Multiple cylinder misfire.	● Improper spark plug ● Insufficient compression ● Incorrect fuel pressure ● The injector circuit is open or shorted ● Fuel injectors ● Intake air leak ● The ignition signal circuit is open or shorted ● Lack of fuel ● Drive plate or flywheel ● Heated oxygen sensor 1 ● Incorrect PCV hose connection
P0301 0301	No.1 cylinder misfire detected	No. 1 cylinder misfires.	
P0302 0302	No. 2 cylinder misfire detected	No. 2 cylinder misfires.	
P0303 0303	No. 3 cylinder misfire detected	No. 3 cylinder misfires.	
P0304 0304	No. 4 cylinder misfire detected	No. 4 cylinder misfires.	

DTC Confirmation Procedure

UBS002D1

CAUTION:

Always drive vehicle at a safe speed.

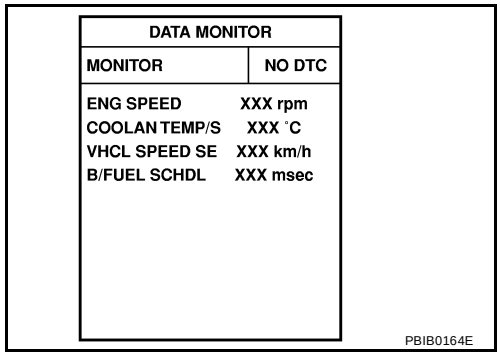
NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch “ON”, and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch “OFF” and wait at least 10 seconds.

4. Start engine again and drive at 1,500 to 3,000 rpm for at least 3 minutes.
   Hold the accelerator pedal as steady as possible.
   NOTE:
   Refer to the freeze frame data for the test driving conditions.
5. If 1st trip DTC is detected, go to EC-1489, "Diagnostic Procedure" .



WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

UBS002D2

1. CHECK FOR INTAKE AIR LEAK

1. Start engine and run it at idle speed.
2. Listen for the sound of the intake air leak.
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 >> GO TO 3.
NG >> Repair or replace it.

3. PERFORM POWER BALANCE TEST

With CONSULT-II

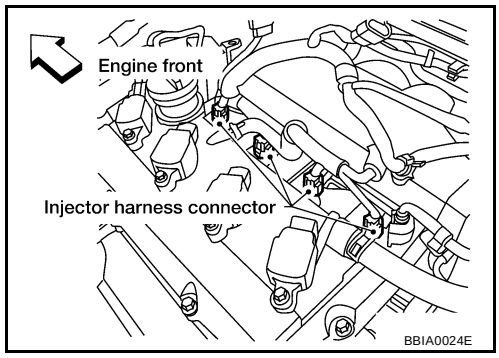
1. Perform “POWER BALANCE” in “ACTIVE TEST” mode.
2. Is there any cylinder which does not produce a momentary engine speed drop?

ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V

PBIB0133E

Without CONSULT-II

When disconnecting each injector harness connector one at a time, is there any cylinder which does not produce a momentary engine speed drop?



BBIA0024E

Yes or No

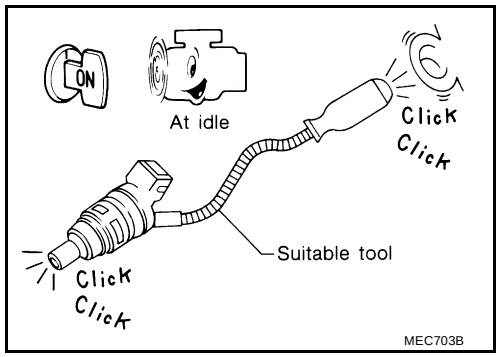
Yes >> GO TO 4.
No >> GO TO 7.

4. CHECK INJECTOR

Does each injector make an operating sound at idle?

Yes or No

Yes >> GO TO 5.
No >> Check injector(s) and circuit(s). Refer to EC-1791, "INJECTOR CIRCUIT" .



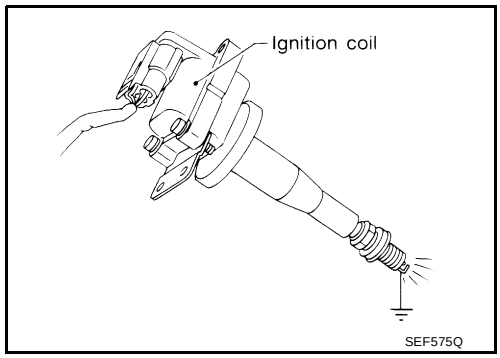
MEC703B

5. CHECK IGNITION SPARK

1. Disconnect ignition coil assembly from rocker cover.
2. Connect a known good spark plug to the ignition coil assembly.
3. Place end of spark plug against a suitable ground and crank engine.
4. Check for spark.

OK or NG

OK >> GO TO 6.
NG >> Check ignition coil, power transistor and their circuits. Refer to EC-1772, "IGNITION SIGNAL" .

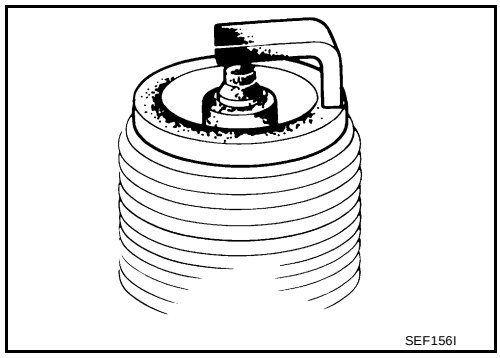


6. CHECK SPARK PLUGS

Remove the spark plugs and check for fouling, etc.

OK or NG

OK >> GO TO 7.
NG >> Repair or replace spark plug(s) with standard type one(s). For spark plug type, refer to MA-27, "Changing Spark Plugs (Double Platinum - Tipped Type)" .



7. CHECK COMPRESSION PRESSURE

Check compression pressure. Refer to EM-129, "CHECKING COMPRESSION PRESSURE" .

Standard:	**1,190 kPa (12.1 kg/cm^2 , 172 psi)/250 rpm**
Minimum:	**990 kPa (10.1 kg/cm^2 , 144 psi)/250 rpm**
Difference between each cylinder:	**98 kPa (1.0 kg/cm^2 , 14 psi)/250 rpm**

OK or NG

OK >> GO TO 8.
NG >> Check pistons, piston rings, valves, valve seats and cylinder head gaskets.

8. CHECK FUEL PRESSURE

1. Install all removed parts.
2. Release fuel pressure to zero. Refer to EC-1255, "FUEL PRESSURE RELEASE" .
3. Install fuel pressure gauge and check fuel pressure. Refer to EC-1255, "Fuel Pressure Check" .

At idle: Approx. 350 kPa (3.7 kg/cm^2 , 51 psi)

OK or NG

OK >> GO TO 9.
NG >> Follow the construction of “FUEL PRESSURE CHECK”.

9. CHECK IGNITION TIMING

Check the following items. Refer to EC-1289, "Basic Inspection" .

Items	Specifications	
Target idle speed	A/T	700 ± 50 rpm (in “P” or “N” position)
	M/T	700 ± 50 rpm
Ignition timing	A/T	15 ± 5° BTDC (in “P” or “N” position)
	M/T	15 ± 5° BTDC

OK or NG

OK >> GO TO 10.
NG >> Follow the “Basic Inspection”.

10. CHECK HEATED OXYGEN SENSOR 1

Refer to EC-1399, "Component Inspection" .

OK or NG

OK >> GO TO 12.
NG >> GO TO 11.

11. CHECK MASS AIR FLOW SENSOR

With CONSULT-II
Check mass air flow sensor signal in “DATA MONITOR” mode with CONSULT-II.

1.4 - 4.0 g·m/sec: at idling
4.0 - 10.0 g·m/sec: at 2,500 rpm

With GST
Check mass air flow sensor signal in MODE 1 with GST.

1.4 - 4.0 g·m/sec: at idling
4.0 - 10.0 g·m/sec: at 2,500 rpm

OK or NG

OK >> GO TO 12.
NG >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-1371, "DTC P0102, P0103 MAF SENSOR" .

12. CHECK SYMPTOM MATRIX CHART

Check items on the rough idle symptom in EC-1294, "Symptom Matrix Chart" .

OK or NG

OK >> GO TO 13.
NG >> Repair or replace.

13. ERASE THE 1ST TRIP DTC

Some tests may cause a 1st trip DTC to be set.
Erase the 1st trip DTC from the ECM memory after performing the tests. Refer to EC-1271, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .

>> GO TO 14.

14. CHECK INTERMITTENT INCIDENT

Refer to EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

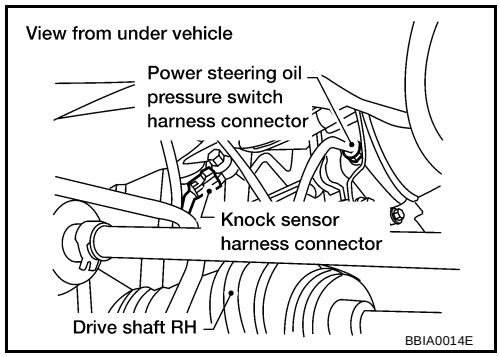
DTC P0327, P0328 KS

PFP:22060

Component Description

UBS002D3

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

UBS002D4

The MIL will not light for knock sensor malfunction.

DTC No.	Trouble Diagnosis Name	DTC Detected Condition	Possible Cause
P0327 0327	Knock sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Knock sensor
P0328 0328	Knock sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

DTC Confirmation Procedure

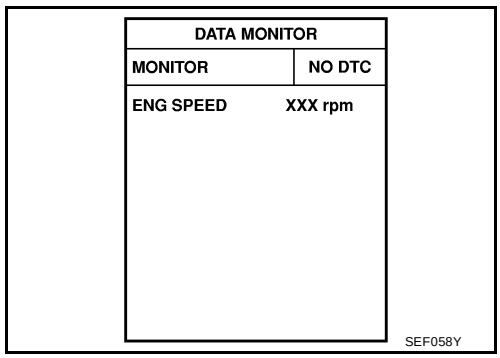
UBS002D5

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-1495, "Diagnostic Procedure" .



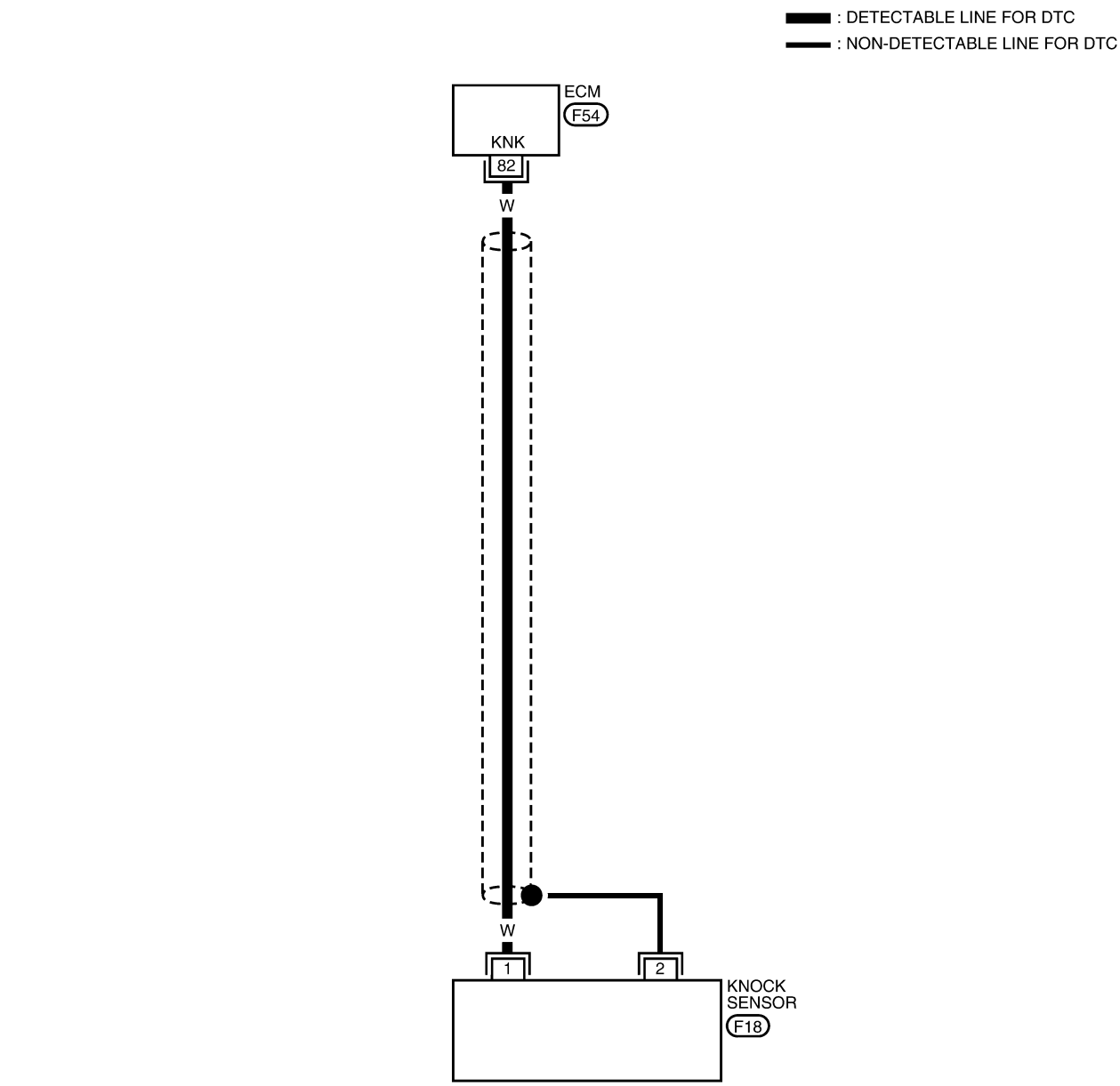
WITH GST

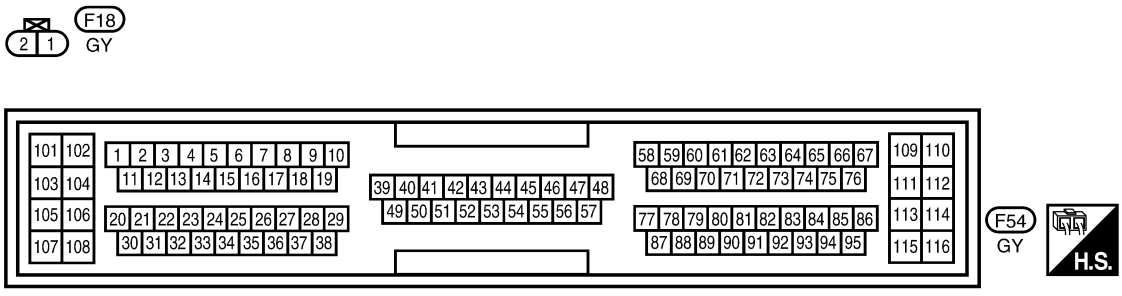
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS002D6

EC-KS-01





BBWA0016E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/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	W	Knock sensor	**[Engine is running]** ● Idle speed	Approximately 2.5V

Diagnostic Procedure

UBS002D7

1. CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT-I

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check resistance between ECM terminal 82 and engine ground. Refer to Wiring Diagram.

   NOTE:
   It is necessary to use an ohmmeter which can measure more than 10 MΩ.

   Resistance: Approximately 530 - 590kΩ [at 20°C (68°F)]

4. Also check harness for short to ground and short to power.

OK or NG

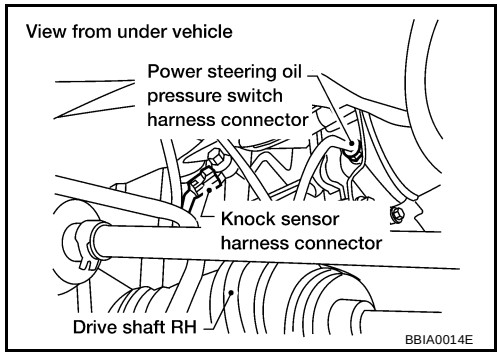
OK >> GO TO 4.
NG >> GO TO 2.

2. CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT-II

1. Disconnect knock sensor harness connector.
2. Check harness continuity between ECM terminal 82 and knock sensor terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.

3. Also check harness for short to ground and short to power.



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK KNOCK SENSOR

Refer to EC-1496, "Component Inspection" .

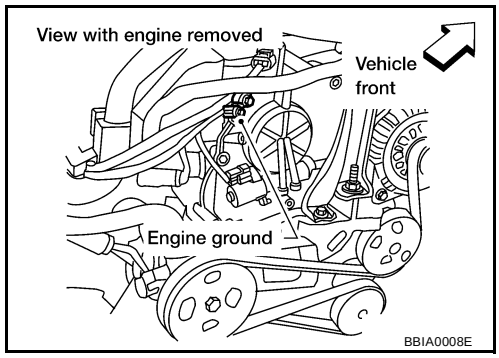
OK or NG

OK >> GO TO 5.
NG >> Replace knock sensor.

4. RETIGHTEN GROUND SCREWS

Loosen and retighten engine ground screws.

>> GO TO 5.



5. CHECK INTERMITTENT INCIDENT

Refer to EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

UBS002D8

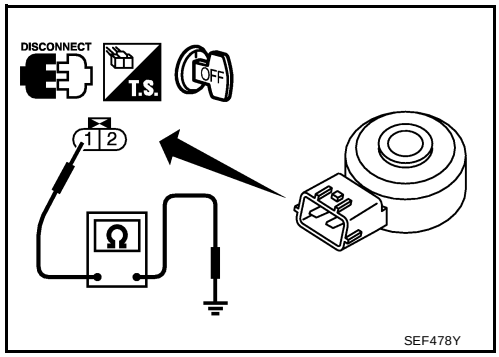
KNOCK SENSOR

Check resistance between knock sensor terminal 1 and ground.

NOTE:
It is necessary to use an ohmmeter which can measure more than 10 MΩ.

Resistance: Approximately 530 - 590kΩ [at 20°C (68°F)]

CAUTION:
Do not use any knock sensors that have been dropped or physically damaged. Use only new ones.



Removal and Installation

UBS002D9

KNOCK SENSOR

Refer to EM-142, "CYLINDER BLOCK" .

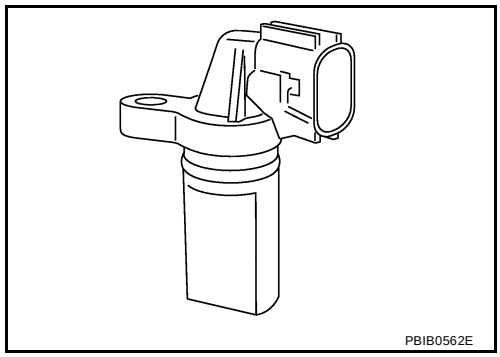
DTC P0335 CKP SENSOR (POS)

PFP:23731

Component Description

UBS002DA

The crankshaft position sensor (POS) is located on the cylinder block rear housing facing the gear teeth (cogs) of the signal plate at the end of the crankshaft. It detects the fluctuation of the engine revolution.
The sensor consists of a permanent magnet and Hall IC.
When the engine is running, the high and low parts of the teeth cause the gap with the sensor change.
The changing gap causes the magnetic field near the sensor to change.
Due to the changing magnetic field, the voltage from the sensor changes.
The ECM receives the voltage signal and detects the fluctuation of the engine revolution.


PBIB0562E

CONSULT-II Reference Value in Data Monitor Mode

UBS002DB

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
ENG SPEED·	● Tachometer: Connect ● Run engine and compare tachometer indication with the CONSULT-II value.	Almost the same speed as the CONSULT-II value.

On Board Diagnosis Logic

UBS002DC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0335 0335	Crankshaft position sensor (POS) circuit	● The crankshaft position sensor (POS) signal is not detected by the ECM during the first few seconds of engine cranking. ● The proper pulse signal from the crankshaft position sensor (POS) is not sent to ECM while the engine is running. ● The crankshaft position sensor (POS) signal is not in the normal pattern during engine running.	● Harness or connectors (The sensor circuit is open or shorted) ● Crankshaft position sensor (POS) ● Signal plate

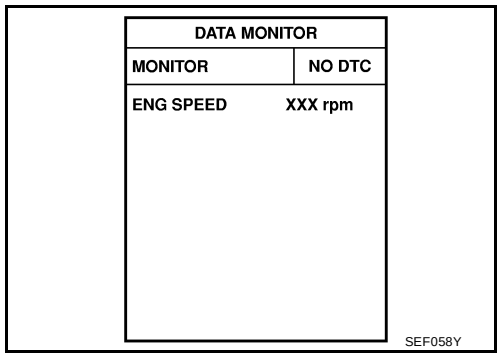
DTC Confirmation Procedure

UBS002DD

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-1500, "Diagnostic Procedure" .



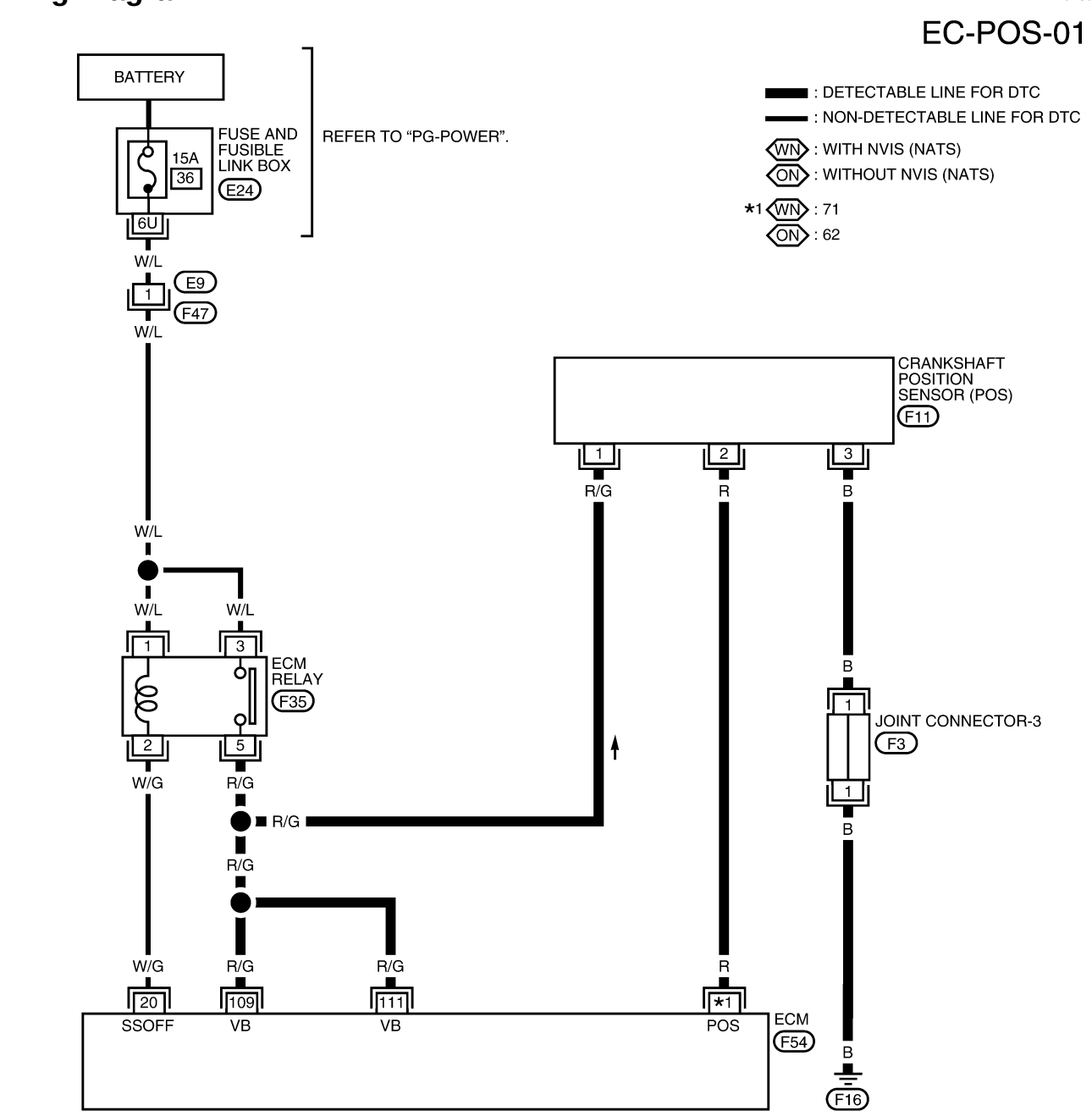
SEF058Y

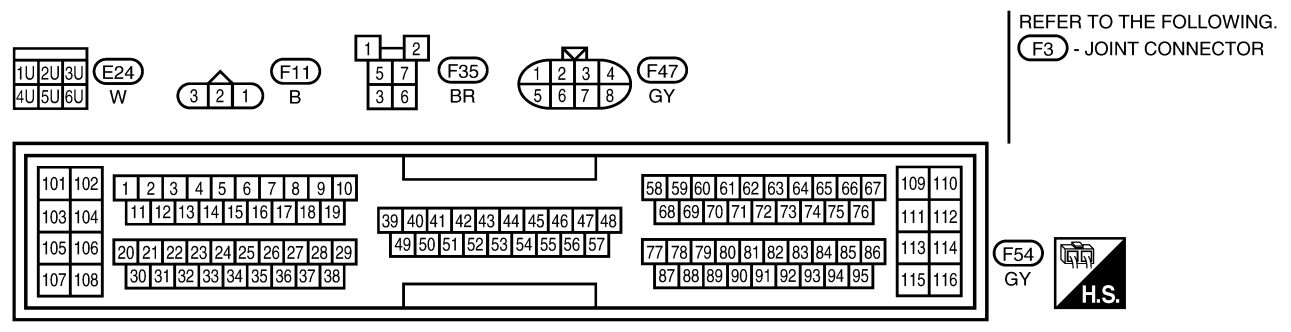
WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS002DE

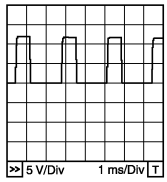
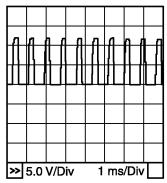




BBWA0222E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/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)
62 (Without NVIS) 71 (With NVIS)	R	Crankshaft position sensor (POS)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 3V★  PBIB0527E
			[Engine is running] ● Engine speed is 2,000 rpm	Approximately 3V★  PBIB0528E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

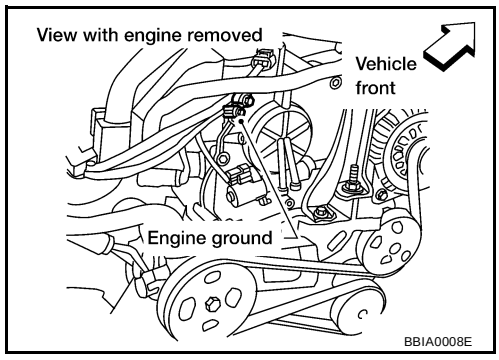
Diagnostic Procedure

UBS002DF

1. RETIGHTEN GROUND SCREWS

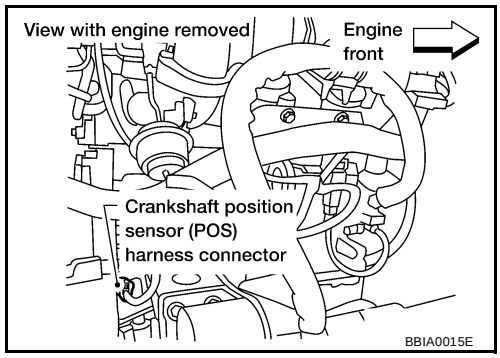
1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

>> GO TO 2.



2. CHECK CRANKSHAFT POSITION (CKP) SENSOR (POS) POWER SUPPLY CIRCUIT

1. Disconnect crankshaft position (CKP) sensor (POS) harness connector.
2. Turn ignition switch “ON”.



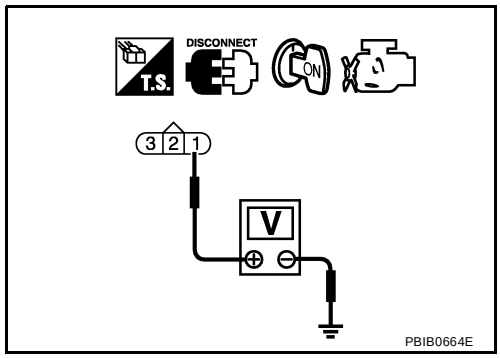
3. Check voltage between CKP sensor (POS) terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.



3. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between crankshaft position sensor (POS) and ECM
- Harness for open or short between crankshaft position sensor (POS) and ECM relay

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK CKP (POS) GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Check harness continuity between CKP sensor (POS) terminal 3 and engine ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for and short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Joint connector-3
- Harness for open or short between crankshaft position sensor (POS) and engine ground

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK CKP SENSOR (POS) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 62 or 71 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-1502, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace crankshaft 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-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

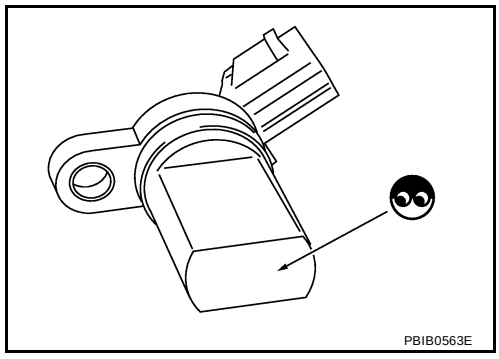
>> **INSPECTION END**

Component Inspection

UBS002DG

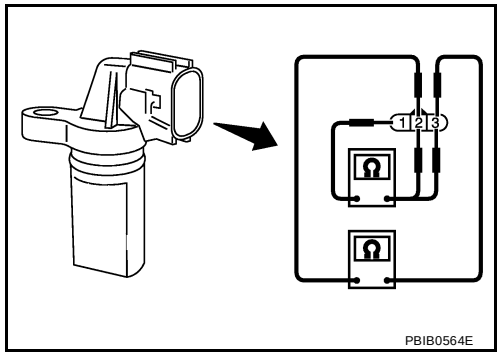
CRANKSHAFT POSITION SENSOR (POS)

1. Loosen the fixing bolt of the sensor.
2. Disconnect crankshaft position sensor (POS) harness connector.
3. Remove the sensor.
4. Visually check the sensor for chipping.



5. Check resistance as shown in the figure.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
1 (+) - 2 (-)	Except 0 or ∞
1 (+) - 3 (-)	
2 (+) - 3 (-)	



UBS002DH

6. If NG, replace crankshaft position sensor (POS).

Removal and Installation

CRANKSHAFT POSITION SENSOR (POS)

Refer to EM-142, "CYLINDER BLOCK" .

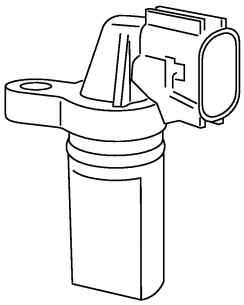
DTC P0340 CMP SENSOR (PHASE)

PFP:23731

Component Description

UBS002DI

The camshaft position sensor (PHASE) senses the retraction with intake valve camshaft to identify a particular cylinder. The camshaft position sensor (PHASE) senses the piston position.
When the crankshaft position sensor (POS) system becomes inoperative, the camshaft position sensor (PHASE) provides various controls of engine parts instead, utilizing timing of cylinder identification signals.
The sensor consists of a permanent magnet and Hall IC.
When engine is running, the high and low parts of the teeth cause the gap with the sensor to change.
The changing gap causes the magnetic field near the sensor to change.
Due to the changing magnetic field, the voltage from the sensor changes.


PBIB0562E

On Board Diagnosis Logic

UBS002DJ

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0340 0340	Camshaft position sensor (PHASE) circuit	● The cylinder No. signal is not sent to ECM for the first few seconds during engine cranking. ● The cylinder No. signal is not set to ECM during engine running. ● The cylinder No. signal is not in the normal pattern during engine running.	● Harness or connectors (The sensor circuit is open or shorted) ● Camshaft position sensor (PHASE) ● Camshaft (Intake) ● Starter motor (Refer to SC-9 .) ● Starting system circuit (Refer to SC-9 .) ● Dead (Weak) battery

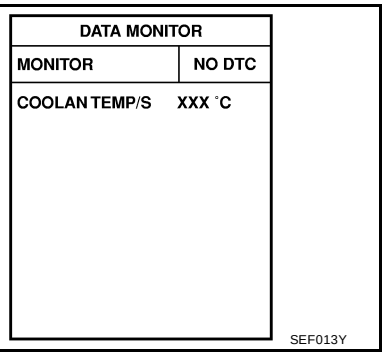
DTC Confirmation Procedure

UBS002DK

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-1506, "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-1506, "Diagnostic Procedure" .



SEF013Y

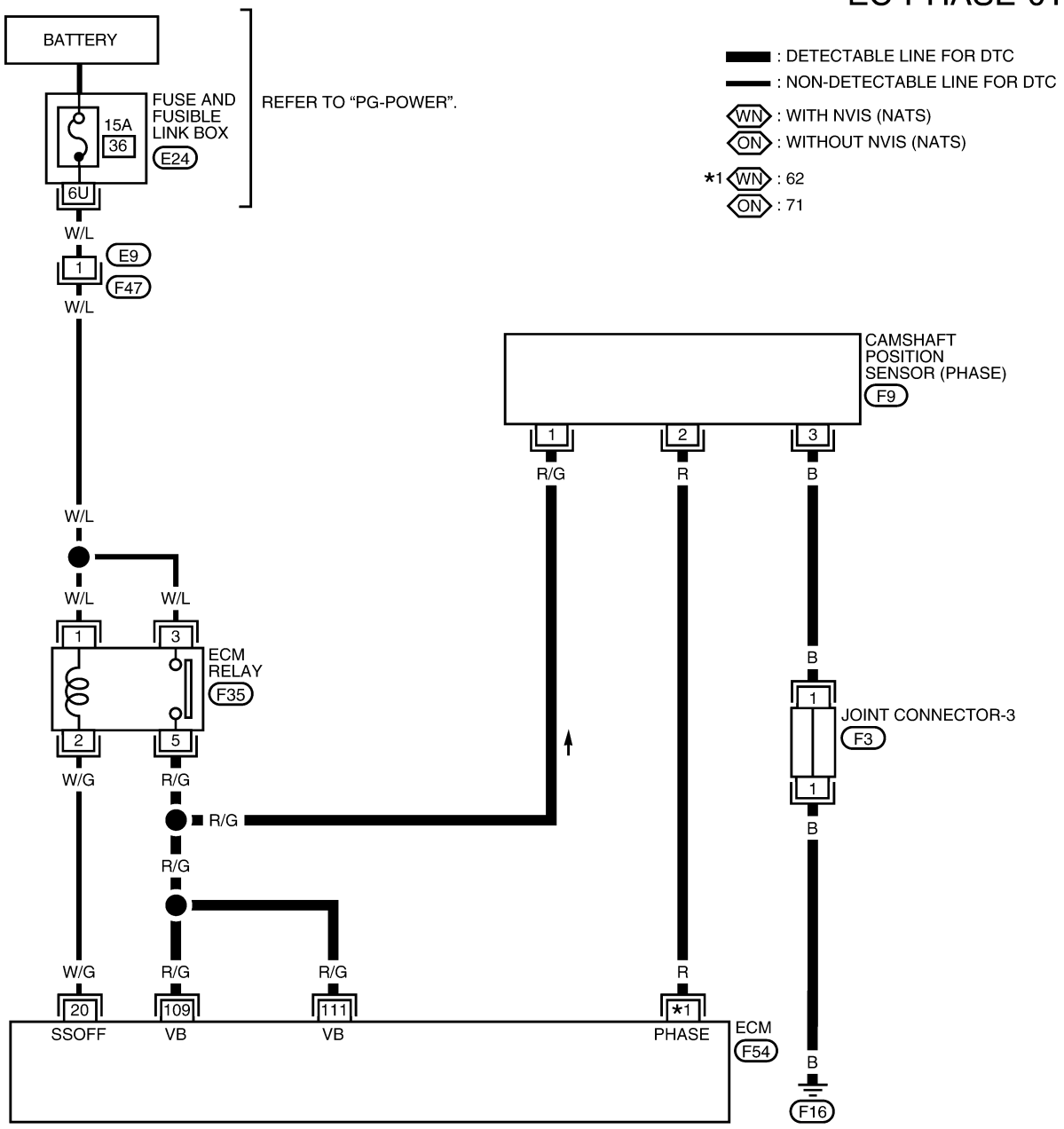
WITH GST

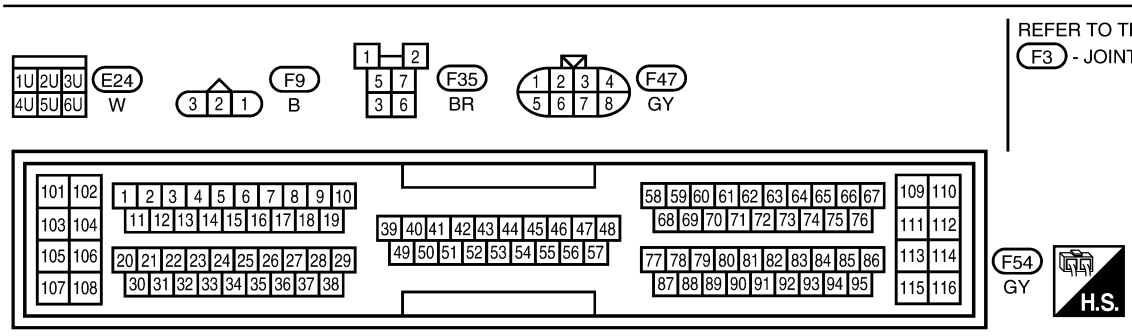
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS002DL

EC-PHASE-01

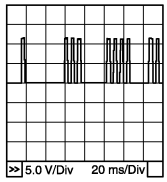
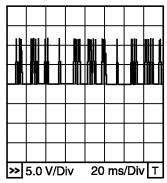




BBWA0223E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/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)
62 (With NVIS) 71 (Without NVIS)	R	Camshaft position sensor (PHASE)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	1.0 - 4.0V★  PBIB0525E
			[Engine is running] ● Engine speed is 2,000 rpm.	1.0 - 4.0V★  PBIB0526E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

UBS002DM

1. CHECK STARTING SYSTEM

Turn ignition switch to “START” position.

Does the engine turn over?
Does the starter motor operate?

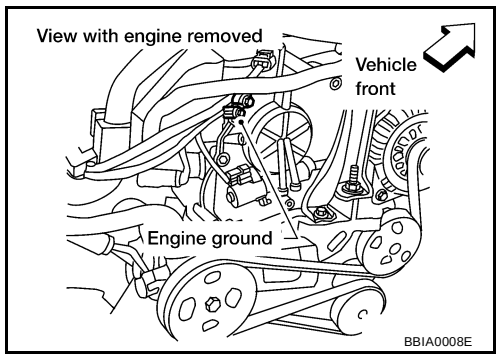
Yes or No

Yes >> GO TO 2.
No >> Check starting system. (Refer to SC-9, "STARTING SYSTEM" .)

2. RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

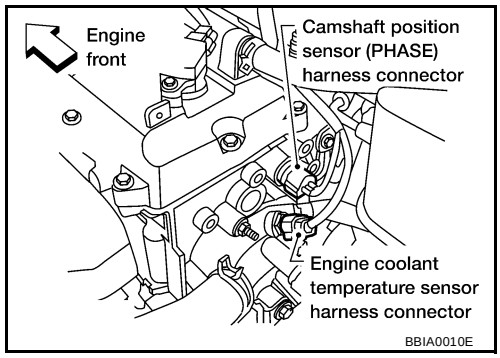
>> GO TO 3.



BBIA0008E

3. CHECK CAMSHAFT POSITION (CMP) SENSOR (PHASE) POWER SUPPLY CIRCUIT

1. Disconnect camshaft position (CMP) sensor (PHASE) harness connector.
2. Turn ignition switch “ON”.



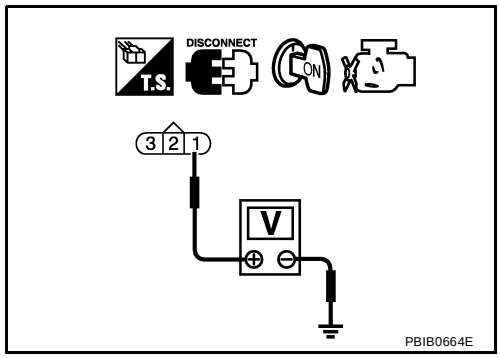
3. Check voltage between CMP sensor (PHASE) terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.



4. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between camshaft position sensor (PHASE) and ECM
- Harness for open or short between camshaft position sensor (PHASE) and ECM relay

>> 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 3 and engine ground.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Joint connector-3
- Harness for open or short between camshaft position sensor (PHASE) and engine ground

>> Repair open circuit or short to power in harness or connectors.

7. CHECK CMP SENSOR (PHASE) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 62 or 72 and CMP sensor (PHASE) terminal 2. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground or short to power.

OK or NG

OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-1508, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace camshaft position sensor (PHASE).

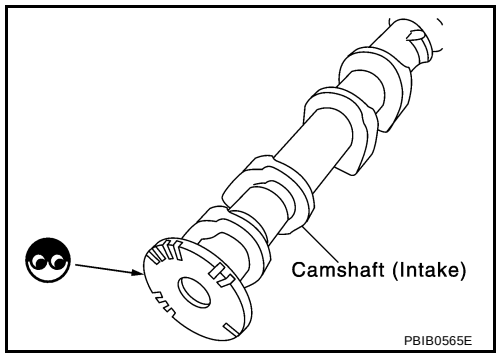
9. CHECK CAMSHAFT (INTAKE)

Check the following.

- Accumulation of debris to the signal plate of camshaft rear end
- Chipping signal plate of camshaft rear end

OK or NG

OK >> GO TO 10.
NG >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft.



10. CHECK INTERMITTENT INCIDENT

Refer to EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

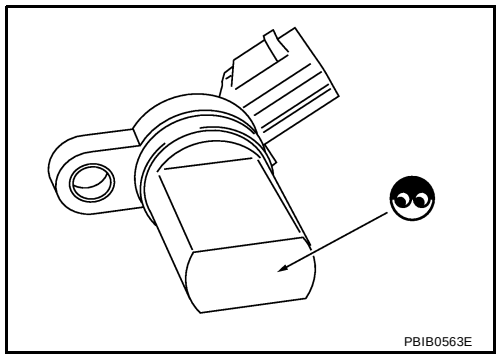
>> **INSPECTION END**

Component Inspection

UBS002DN

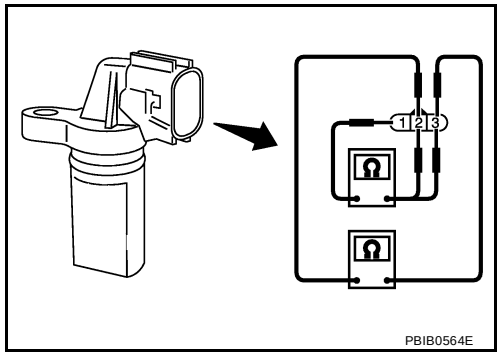
CAMSHAFT POSITION SENSOR (PHASE)

1. Loosen the fixing bolt of the sensor.
2. Disconnect camshaft position sensor (PHASE) harness connector.
3. Remove the sensor.
4. Visually check the sensor for chipping.



5. Check resistance as shown in the figure.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
1 (+) - 2 (-)	Except 0 or ∞
1 (+) - 3 (-)	
2 (+) - 3 (-)	



UBS002DO

Removal and Installation

CAMSHAFT POSITION SENSOR (PHASE)

Refer to EM-111, "CAMSHAFT" .

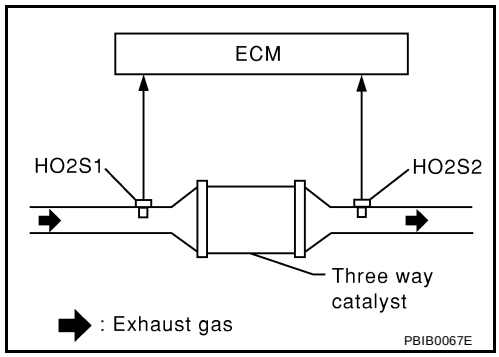
DTC P0420 THREE WAY CATALYST FUNCTION

PFP:20905

On Board Diagnosis Logic

UBS002DP

The ECM monitors the switching frequency ratio of heated oxygen sensors 1 and 2.
A three way catalyst (Manifold) with high oxygen storage capacity will indicate a low switching frequency of heated oxygen sensor 2. As oxygen storage capacity decreases, the heated oxygen sensor 2 switching frequency will increase.
When the frequency ratio of heated oxygen sensors 1 and 2 approaches a specified limit value, the three way catalyst (Manifold) malfunction is diagnosed.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0420 0420	Catalyst system efficiency below threshold	● Three way catalyst (Manifold) does not operate properly. ● Three way catalyst (Manifold) does not have enough oxygen storage capacity.	● Three way catalyst (Manifold) ● Exhaust tube ● Intake air leaks ● Fuel injectors ● Fuel injector leaks ● Spark plug ● Improper ignition timing

DTC Confirmation Procedure

UBS002DQ

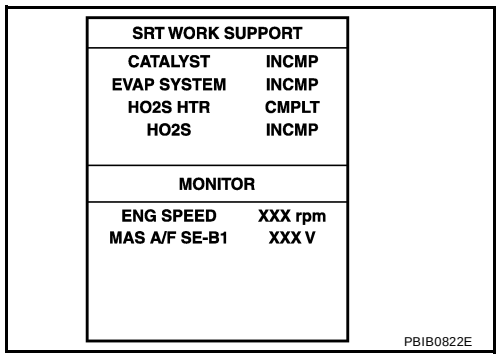
NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

TESTING CONDITION:

- **Open engine hood before conducting the following procedure.**
- **Do not hold engine speed for more than the specified minutes below.**

1. Turn ignition switch “ON”.
2. Select “DTC & SRT CONFIRMATION” then “SRT WORK SUPPORT” mode with CONSULT-II.
3. Start engine.
4. Rev engine up to 2,000 to 3,000 rpm and hold it for 3 consecutive minutes then release the accelerator pedal completely.
   If “INCMP” of “CATALYST” changed to “COMPLT”, go to step 7
5. Wait 5 seconds at idle.



6. Rev engine up to 2,000 to 3,000 rpm and maintain it until “INCMP” of “CATALYST” changes to “CMPLT” (It will take approximately 5 minutes).
If not “CMPLT”, stop engine and cool it down to less than 70°C (158°F) and then retest from step 1.

SRT WORK SUPPORT	
CATALYST	CMPLT
EVAP SYSTEM	INCMP
HO2S HTR	CMPLT
HO2S	INCMP
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V

PBIB0823E

7. Select “SELF-DIAG RESULTS” mode with CONSULT-II.
8. Confirm that the 1st trip DTC is not detected.
If the 1st trip DTC is detected, go to EC-1512, "Diagnostic Procedure" .

SELF DIAG RESULTS	
DTC RESULTS	TIME
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	

SEF535Z

Overall Function Check

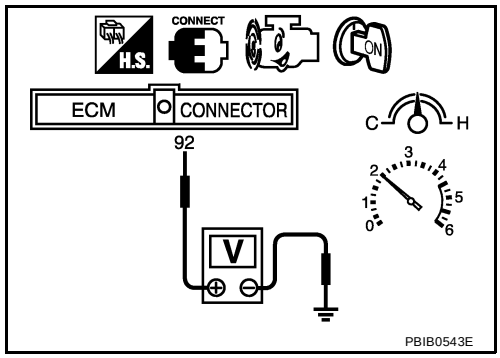
UBS002DR

Use this procedure to check the overall function of the three way catalyst (Manifold). During this check, a 1st trip DTC might not be confirmed.

CAUTION:
Always drive vehicle at a safe speed.

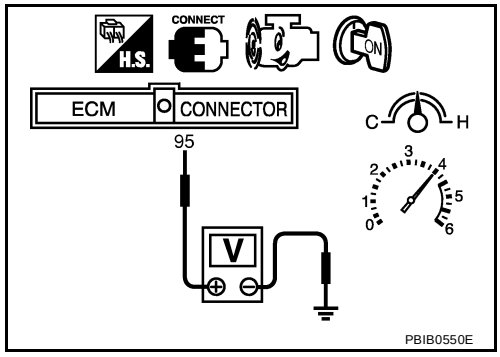
WITH GST

1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Set voltmeters probes between ECM terminal 92 [HO2S1 signal] and engine ground, and ECM terminal 95 [HO2S2 signal] and engine ground.
4. Keep engine speed at 2,000 rpm constant under no load.



PBIB0543E

5. Make sure that the voltage switching frequency (high & low) between ECM terminal 95 and engine ground is very less than that of ECM terminal 92 and engine ground.
Switching frequency ratio = A/B
A: Heated oxygen sensor 2 voltage switching frequency
B: Heated oxygen sensor 1 voltage switching frequency
This ratio should be less than 0.75.
If the ratio is greater than above, it means three way catalyst does not operate properly. Go to EC-1512, "Diagnostic Procedure" .



PBIB0550E

NOTE:
If the voltage at terminal 92 does not switch periodically more than 5 times within 10 seconds at step 5, perform trouble diagnosis for “DTC P0133” first. (See EC-1401 .)

Diagnostic Procedure

UBS002DS

1. CHECK EXHAUST SYSTEM

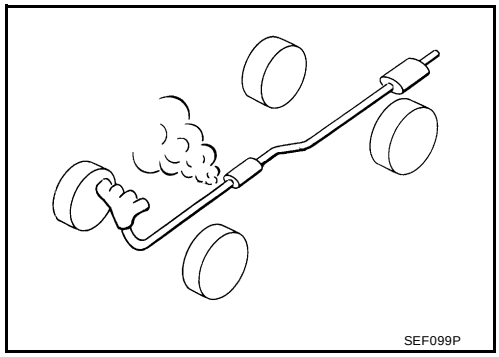
Visually check exhaust tubes and muffler for dent.

OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2. CHECK EXHAUST AIR LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust air leak before the three way catalyst (Manifold).



OK or NG

OK >> GO TO 3.
NG >> Repair or replace.

3. CHECK INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

OK or NG

OK >> GO TO 4.
NG >> Repair or replace.

4. CHECK IGNITION TIMING

Check the following items. Refer to EC-1289, "Basic Inspection" .

Items		Specifications
Ignition timing	A/T	15° ± 5° BTDC (in “P” or “N” position)
	M/T	15° ± 5° BTDC
Target idle speed	A/T	700 ± 50 rpm (in “P” or “N” position)
	M/T	700 ± 50 rpm

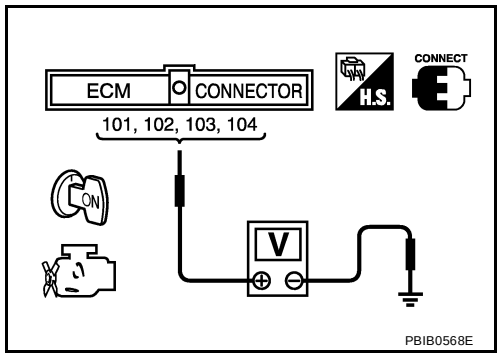
OK or NG

OK >> GO TO 5.
NG >> Follow the “Basic Inspection”.

5. CHECK INJECTORS

1. Refer to Wiring Diagram for Injectors, EC-1792 .
2. Stop engine and then turn ignition switch “ON”.
3. Check voltage between ECM terminals 101, 102, 103, 104 and ground with CONSULT-II or tester.

Battery voltage should exist.

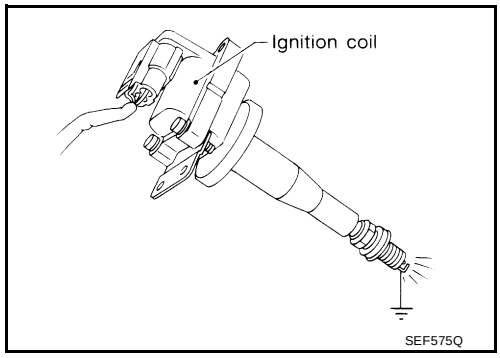


OK or NG

OK >> GO TO 6.
NG >> Perform EC-1793, "Diagnostic Procedure" .

6. CHECK IGNITION SPARK

1. Turn ignition switch “OFF”.
2. Disconnect ignition coil assembly from rocker cover.
3. Connect a known good spark plug to the ignition coil assembly.
4. Place end of spark plug against a suitable ground and crank engine.
5. Check for spark.



OK or NG

OK >> GO TO 7.
NG >> Check ignition coil with power transistor and their circuit. Refer to EC-1772, "IGNITION SIGNAL" .

7. CHECK INJECTOR

1. Turn ignition switch “OFF”.
2. Remove injector assembly.
   Refer to EM-106, "FUEL INJECTOR AND FUEL TUBE" .
   Keep fuel hose and all injectors connected to injector gallery.
3. Disconnect all ignition coil harness connectors.
4. Turn ignition switch “ON”.
   Make sure fuel does not drip from injector.

OK or NG

OK (Does not drip.)>>GO TO 8.
NG (Drips.)>>Replace the injector(s) from which fuel is dripping.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

Trouble is fixed.>>**INSPECTION END**
Trouble is not fixed.>>Replace three way catalyst (Manifold).

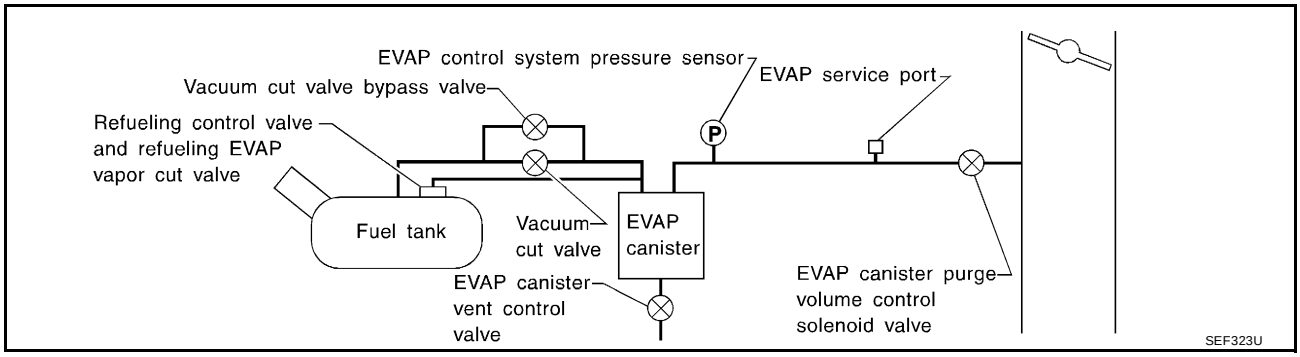
DTC P0441 EVAP CONTROL SYSTEM

PFP:14950

System Description

UBS002DT

NOTE:
If DTC P0441 is displayed with P0226, P0227, P0228, P1227 or P1228, perform trouble diagnosis for displayed 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

UBS002DU

Under normal conditions (non-closed throttle), sensor output voltage indicates if pressure drop and purge flow are adequate. If not, a fault is determined.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0441 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 ● EVAP control system pressure sensor and the circuit ● Loose, disconnected or improper connection of rubber tube ● Blocked rubber tube ● Cracked EVAP canister ● EVAP canister purge volume control solenoid valve circuit ● Accelerator pedal position sensor ● Blocked purge port ● EVAP canister vent control valve

DTC Confirmation Procedure

UBS002DV

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 0°C (32°F) or more.**
- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**

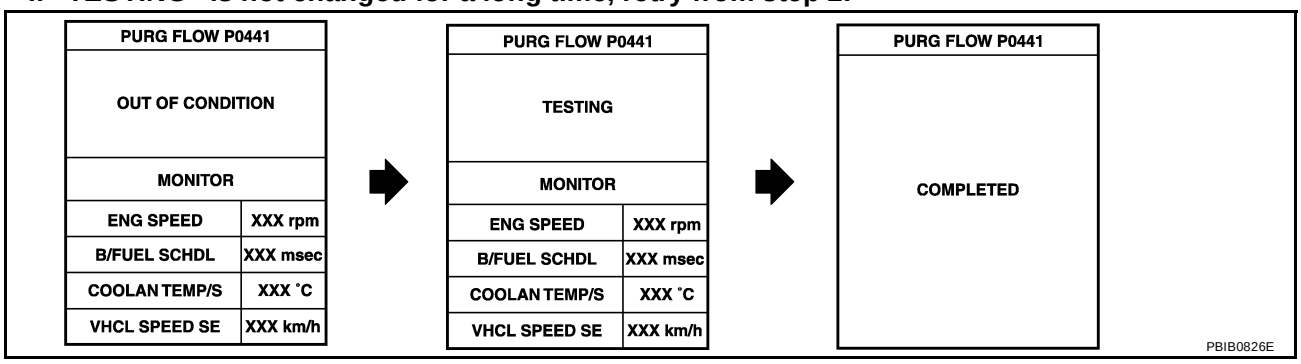
WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 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.)

Selector lever	Suitable position
Vehicle speed	32 - 120 km/h (20 - 75 MPH)
ENG SPEED	500 - 3,800 rpm
B/FUEL SCHDL	1.0 - 10.0 msec
Engine coolant temperature	70 - 100°C (158 - 212°F)

If “TESTING” is not changed for a long time, retry from step 2.



7. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to EC-1516, "Diagnostic Procedure" .

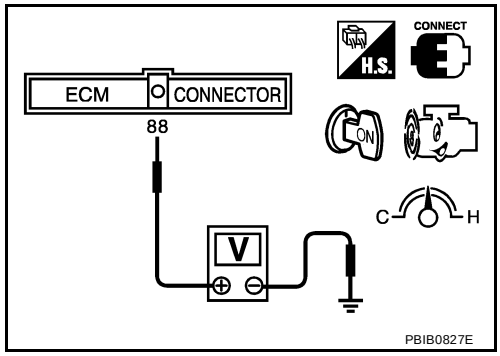
Overall Function Check

UBS002DW

Use this procedure to check the overall monitoring function of the EVAP control system purge flow monitoring. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Lift up drive wheels.
2. Start engine (TCS switch “OFF”) and warm it up to normal operating temperature.
3. Turn ignition switch “OFF”, wait at least 10 seconds.
4. Start engine and wait at least 70 seconds.
5. Set voltmeter probes to ECM terminals 88 (EVAP control system pressure sensor signal) and ground.
6. Check EVAP control system pressure sensor value at idle speed and note it.
7. Establish and maintain the following conditions for at least 1 minute.



Air conditioner switch	ON
Steering wheel	Fully turned
Headlamp switch	ON
Rear window defogger switch	ON
Engine speed	Approx. 3,000 rpm
Gear position	Any position other than “P”, “N” or “R”

8. Verify that EVAP control system pressure sensor value stays 0.1V less than the value at idle speed (measured at step 6) for at least 1 second.
9. If NG, go to EC-1516, "Diagnostic Procedure" .

Diagnostic Procedure

UBS002DX

1. CHECK EVAP CANISTER

1. Turn ignition switch “OFF”.
2. Check EVAP canister for cracks.

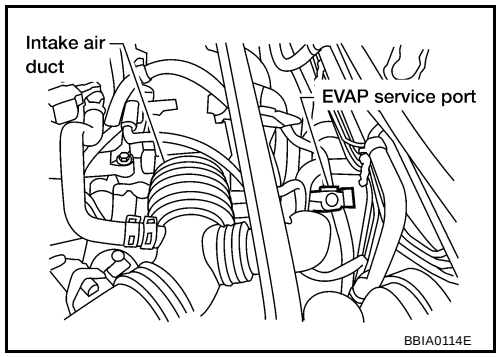
OK or NG

OK (With CONSULT-II)>>GO TO 2.
OK (Without CONSULT-II)>>GO TO 3.
NG >> Replace EVAP canister.

2. CHECK PURGE FLOW

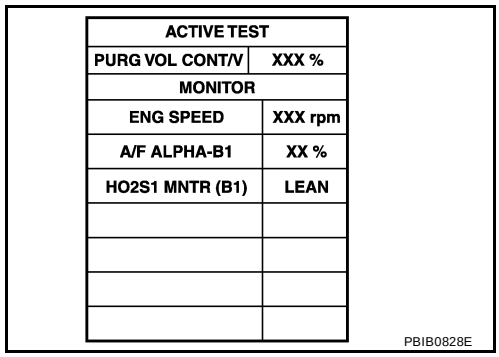
With CONSULT-II

1. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge.
2. Start engine and let it idle.



3. Select “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-II.
4. Rev engine up to 2,000 rpm.
5. Touch “Qd” and “Qu” on CONSULT-II screen to adjust “PURG VOL CONT/V” opening and check vacuum existence.

PURG VOL CONT/V	Vacuum
100.0%	Should exist.
0.0%	Should not exist.



OK or NG

OK >> GO TO 7.
NG >> GO TO 4.

3. CHECK PURGE FLOW

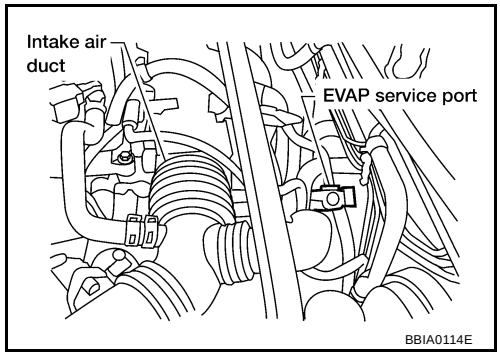
Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge.
4. Start engine and let it idle for at least 80 seconds.
5. Check vacuum gauge indication when revving engine up to 2,000 rpm.

   Vacuum should exist.

6. Release the accelerator pedal fully and let idle.

   Vacuum should not exist.



OK or NG

OK >> GO TO 7.
NG >> GO TO 4.

4. CHECK EVAP PURGE LINE

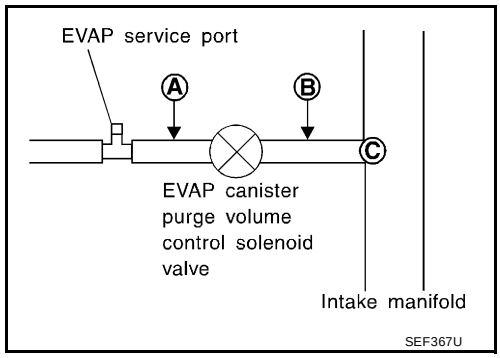
1. Turn ignition switch “OFF”.
2. Check EVAP purge line for improper connection or disconnection. Refer to EC-1837, "EVAPORATIVE EMISSION LINE DRAWING" .

OK or NG

OK (With CONSULT-II)>>GO TO 5.
OK (Without CONSULT-II)>>GO TO 6.
NG >> Repair it.

5. CHECK EVAP PURGE HOSE AND PURGE PORT

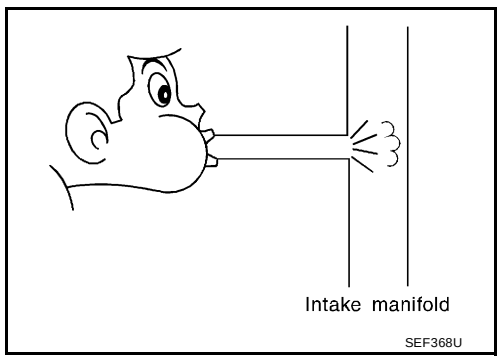
1. Disconnect purge hoses connected to EVAP service port **A** and EVAP canister purge volume control solenoid valve **B** .
2. Blow air into each hose and EVAP purge port **C** .



3. Check that air flows freely.

OK or NG

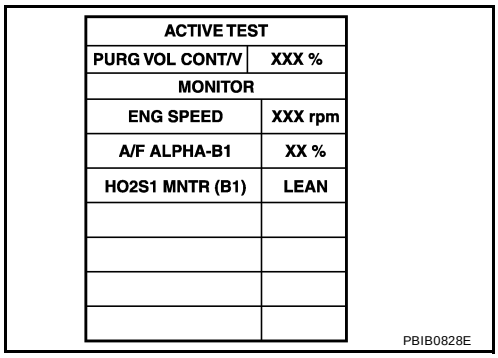
OK >> GO TO 6.
NG >> Repair or clean hoses and/or purge port.



6. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

1. Start engine.
2. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-II. Check that engine speed varies according to the valve opening.



OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-1534, "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 HOSE

1. Turn ignition switch “OFF”.
2. Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.

OK or NG

OK >> GO TO 9.
NG >> Repair it.

9. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check connectors for water.

Water should not exist.

OK or NG

OK >> GO TO 10.
NG >> Replace EVAP control system pressure sensor.

10. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR FUNCTION

Refer to “DTC Confirmation Procedure” for DTC P0452 (EC-1542) and P0453 (EC-1549).

OK or NG

OK >> GO TO 11.
NG >> Replace EVAP control system pressure sensor.

11. CHECK RUBBER TUBE FOR CLOGGING

1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

OK or NG

OK >> GO TO 12.
NG >> Clean the rubber tube using an air blower.

12. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-1540, "Component Inspection" .

OK or NG

OK >> GO TO 13.
NG >> Replace EVAP canister vent control valve.

13. CHECK EVAP PURGE LINE

Inspect EVAP purge line (pipe and rubber tube). Check for evidence of leaks.
Refer to EC-1837, "EVAPORATIVE EMISSION LINE DRAWING" .

OK or NG

OK >> GO TO 14.
NG >> Replace it.

14. CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 15.

15. CHECK INTERMITTENT INCIDENT

Refer to EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

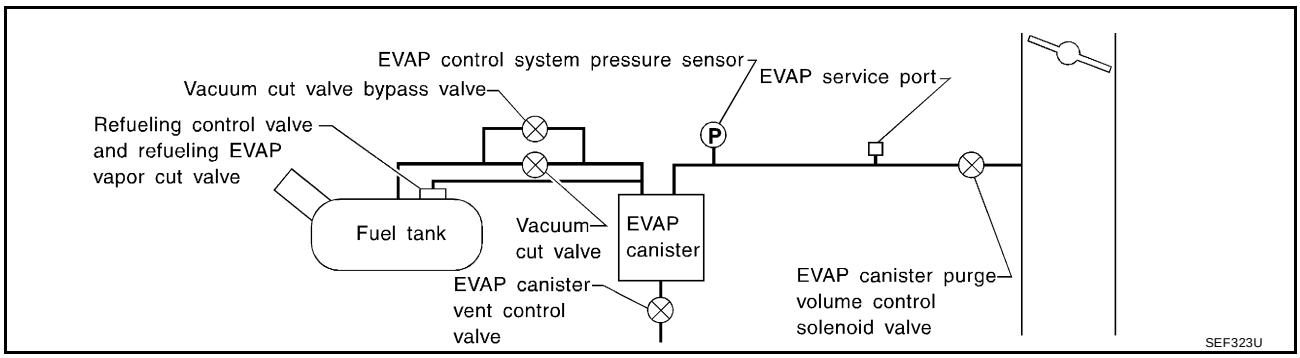
DTC P0442 EVAP CONTROL SYSTEM

PFP:14950

On Board Diagnosis Logic

UBS002DY

NOTE:
If DTC P0442 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-1709 .)
This diagnosis detects leaks in the EVAP purge line using engine intake manifold vacuum.
If pressure does not increase, the ECM will check for leaks in the line between the fuel tank and EVAP canister purge volume control solenoid valve, under the following “Vacuum test” conditions.
The vacuum cut valve bypass valve is opened to clear the line between the fuel tank and the EVAP canister purge volume control solenoid valve. The EVAP canister vent control valve will then be closed to shut the EVAP purge line off. The EVAP canister purge volume control solenoid valve is opened to depressurize the EVAP purge line using intake manifold vacuum. After this occurs, the EVAP canister purge volume control solenoid valve will be closed.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0442 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 ● Incorrect fuel filler cap used ● Fuel filler cap remains open or fails to close. ● Foreign matter caught in fuel filler cap. ● Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve. ● Foreign matter caught in EVAP canister vent control valve. ● EVAP canister or fuel tank leaks ● EVAP purge line (pipe and rubber tube) leaks ● EVAP purge line rubber tube bent ● Blocked or bent rubber tube to EVAP control system pressure sensor ● Loose or disconnected rubber tube ● EVAP canister vent control valve and the circuit ● EVAP canister purge volume control solenoid valve and the circuit ● Fuel tank temperature sensor ● O-ring of EVAP canister vent control valve is missing or damaged ● Water separator ● EVAP canister is saturated with water ● EVAP control system pressure sensor ● Fuel level sensor and the circuit ● Refueling control valve ● ORVR system leaks

CAUTION:

- **Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.**
- **If the fuel filler cap is not tightened properly, the MIL may come on.**
- **Use only a genuine NISSAN rubber tube as a replacement.**

DTC Confirmation Procedure

UBS002DZ

NOTE:

- **If DTC P0442 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-1709 .)**
- If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

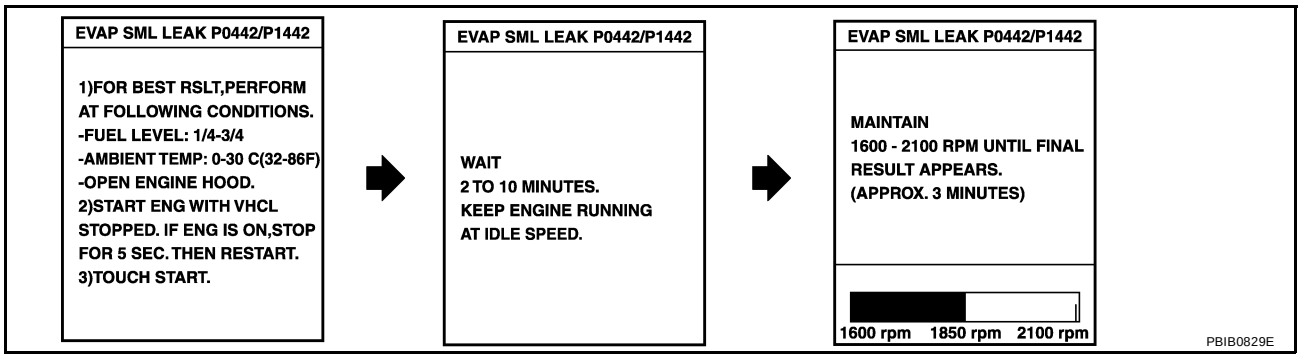
TESTING CONDITION:

- **Perform “DTC WORK SUPPORT” when the fuel level is between 1/4 to 3/4 full and vehicle is placed on flat level surface.**
- **Always perform test at a temperature of 0 to 30°C (32 to 86°F).**

WITH CONSULT-II

1. Turn ignition switch “ON”.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II.
4. Make sure that the following conditions are met.
   COOLAN TEMP/S: 0 - 70°C (32 - 158°F)
   INT/A TEMP SE: 0 - 30°C (32 - 86°F)
5. Select “EVAP SML LEAK P0442/P1442” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II.
   Follow the instruction displayed.

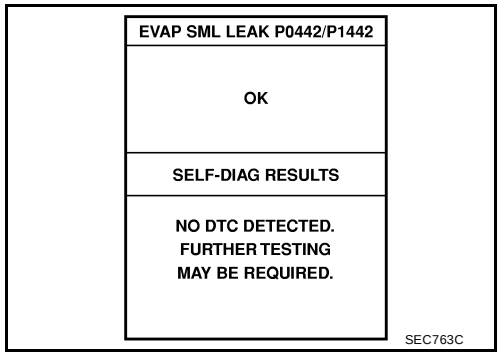
   NOTE:
   DTC P1442 does not apply to QR25DE Sentra models, but appears in DTC Work Support Mode screens for other Sentra models.



NOTE:
If the engine speed cannot be maintained within the range displayed on the CONSULT-II screen, go to EC-1289, "Basic Inspection" .

6. Make sure that “OK” is displayed.
   If “NG” is displayed, refer to EC-1522, "Diagnostic Procedure" .

   NOTE:
   Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.



WITH GST

NOTE:
Be sure to read the explanation of “Driving Pattern” on EC-1268 before driving vehicle.

1. Start engine.
2. Drive vehicle according to “Driving Pattern”, EC-1268 .
3. Stop vehicle.
4. Select “MODE 1” with GST.
   If SRT of EVAP system is not set yet, go to the following step.
   If SRT of EVAP system is set, the result will be OK.
5. Turn ignition switch “OFF” and wait at least 10 seconds.
6. Start engine.
   It is not necessary to cool engine down before driving.
7. Drive vehicle again according to the “Driving Pattern”, EC-1268 .
8. Stop vehicle.
9. Select “MODE 3” with GST.
   If P0442 is displayed on the screen, go to EC-1522, "Diagnostic Procedure" .
   If P0441 is displayed on the screen, go to “Diagnostic Procedure” for DTC P0441, EC-1516 .
   If P0441 and P0442 are not displayed on the screen, go to the following step.
10. Select “MODE 1” with GST.
    If SRT of EVAP system is set, the result will be OK.
    If SRT of EVAP system is not set, go to step 6.

Diagnostic Procedure

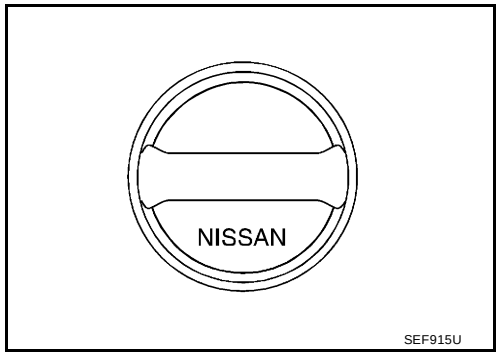
UBS002E0

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-1839, "FUEL TANK VACUUM RELIEF VALVE (BUILT INTO FUEL FULLER CAP)" .

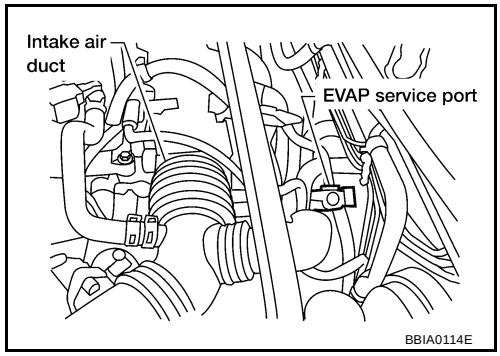
OK or NG

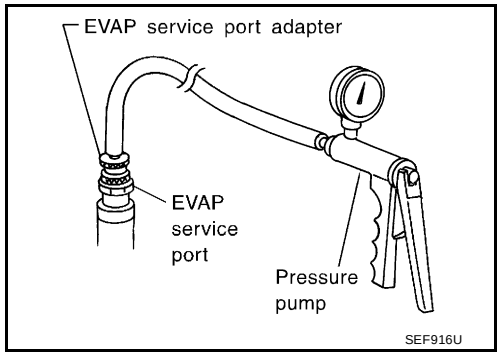
OK >> GO TO 5.
NG >> Replace fuel filler cap with a genuine one.

5. INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.

NOTE:
Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.





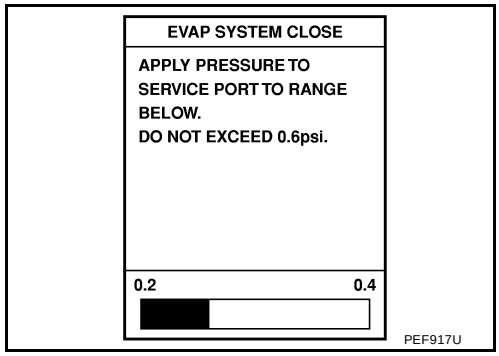
Models with CONSULT-II>>GO TO 6.
Models without CONSULT-II>>GO TO 7.

6. CHECK FOR EVAP LEAK

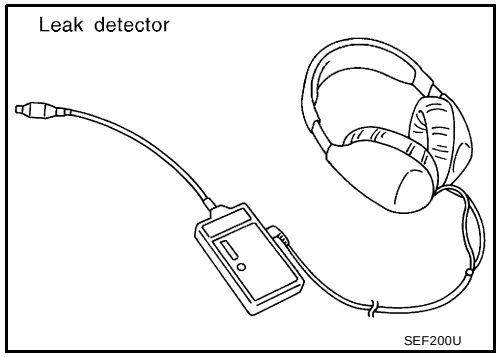
With CONSULT-II

1. Turn ignition switch “ON”.
2. Select “EVAP SYSTEM CLOSE” of “WORK SUPPORT” mode with CONSULT-II.
3. Touch “START” and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.

   NOTE:
   - **Never use compressed air or a high pressure pump.**
   - **Do not exceed 4.12 kPa (0.042 kg/cm^2 , 0.6 psi) of pressure in the system.**



4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details.
   Refer to EC-1837, "EVAPORATIVE EMISSION LINE DRAWING" .



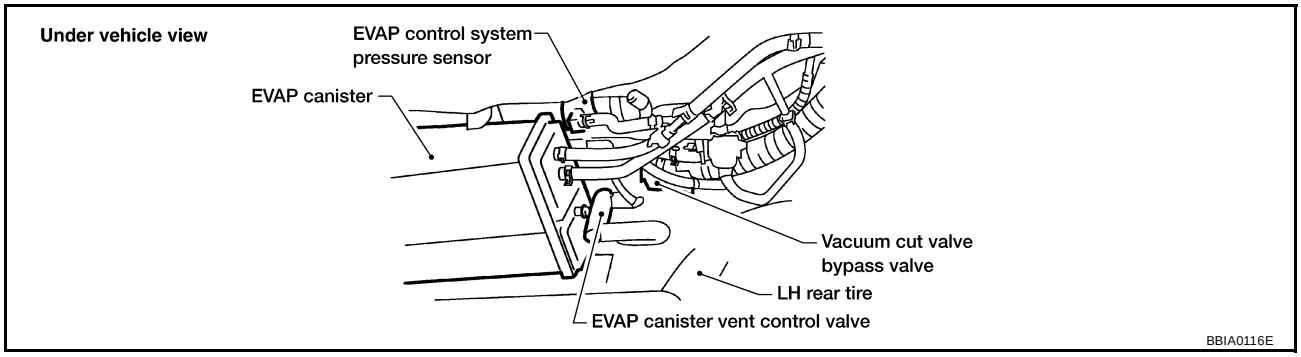
OK or NG

OK >> GO TO 8.
NG >> Repair or replace.

7. CHECK FOR EVAP LEAK

Without CONSULT-II

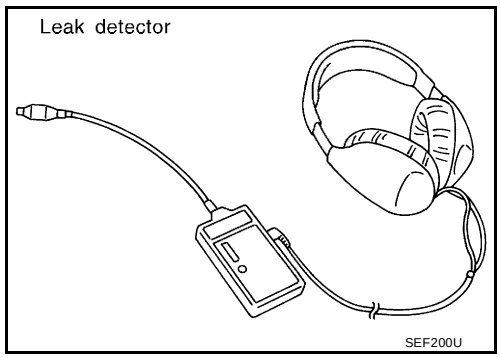
1. Turn ignition switch “OFF”.
2. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)
3. Apply 12 volts DC to vacuum cut valve bypass valve. The valve will open. (Continue to apply 12V until the end of test.)



4. Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg), then remove pump and EVAP service port adapter.

   NOTE:
   - **Never use compressed air or a high pressure pump.**
   - **Do not exceed 4.12 kPa (0.042 kg/cm^2 , 0.6 psi) of pressure in the system.**

5. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to EC-1837, "EVAPORATIVE EMISSION LINE DRAWING" .



OK or NG

OK >> GO TO 8.
NG >> Repair or replace.

8. CHECK WATER SEPARATOR

Refer to EC-1528, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace water separator.

9. CHECK EVAP CANISTER VENT CONTROL VALVE, O-RING AND CIRCUIT

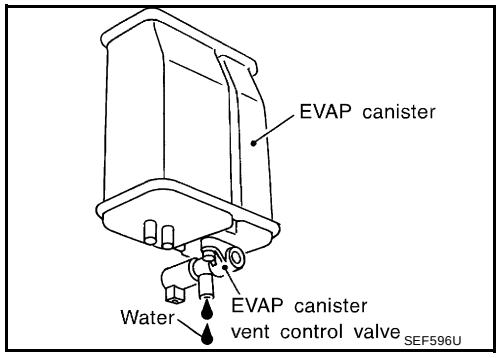
Refer to EC-1709, "DTC Confirmation Procedure" .

OK or NG

OK >> GO TO 10.
NG >> Repair or replace EVAP canister vent control valve and O-ring or harness/connector.

10. CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Does water drain from the EVAP canister?



Yes or No

Yes >> GO TO 11.
No (With CONSULT-II)>>GO TO 13.
No (Without CONSULT-II)>>GO TO 14.

11. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve attached.
The weight should be less than 1.8 kg (4.0 lb).

OK or NG

OK (With CONSULT-II)>>GO TO 13.
OK (Without CONSULT-II)>>GO TO 14.
NG >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.

- EVAP canister for damage
- EVAP hose between EVAP canister and water separator for clogging or poor connection

>> Repair hose or replace EVAP canister.

13. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-II

1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
2. Start engine.
3. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode.
4. Touch “Qu” on CONSULT-II screen to increase “PURG VOL CONT/V” opening to 100.0%.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XX %
HO2S1 MNTR (B1)	LEAN

PBIB0828E

OK or NG

OK >> GO TO 16.
NG >> GO TO 15.

14. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
4. Start engine and let it idle for at least 80 seconds.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

Vacuum should exist.

OK or NG

OK >> GO TO 17.
NG >> GO TO 15.

15. CHECK VACUUM HOSE

Check vacuum hoses for clogging or disconnection. Refer to EC-1235, "Vacuum Hose Drawing" .

OK or NG

OK >> GO TO 16.
NG >> Repair or reconnect the hose.

16. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-1534, "Component Inspection" .

OK or NG

OK >> GO TO 17.
NG >> Replace EVAP canister purge volume control solenoid valve.

17. CHECK FUEL TANK TEMPERATURE SENSOR

Refer to EC-1443, "Component Inspection" .

OK or NG

OK >> GO TO 18.
NG >> Replace fuel level sensor unit.

18. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-1548, "Component Inspection" .

OK or NG

OK >> GO TO 19.
NG >> Replace EVAP control system pressure sensor.

19. CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection. Refer to EC-1837, "EVAPORATIVE EMISSION LINE DRAWING" .

OK or NG

OK >> GO TO 20.
NG >> Repair or reconnect the hose.

20. CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 21.

21. CHECK REFUELING EVAP VAPOR LINE

Check refueling EVAP vapor line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to EC-1842, "ON BOARD REFUELING VAPOR RECOVERY (ORVR)" .

OK or NG

OK >> GO TO 22.
NG >> Repair or replace hoses and tubes.

22. CHECK SIGNAL LINE AND RECIRCULATION LINE

Check signal line and recirculation line between filler neck tube and fuel tank for clogging, kink, cracks, looseness and improper connection.

OK or NG

OK >> GO TO 23.
NG >> Repair or replace hoses, tubes or filler neck tube.

23. CHECK REFUELING CONTROL VALVE

Refer to EC-1845, "Component Inspection" .

OK or NG

OK >> GO TO 24.
NG >> Replace refueling control valve with fuel tank.

24. CHECK FUEL LEVEL SENSOR

Refer to DI-23, "FUEL LEVEL SENSOR UNIT CHECK" .

OK or NG

OK >> GO TO 25.
NG >> Replace fuel level sensor unit.

25. CHECK INTERMITTENT INCIDENT

Refer to EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

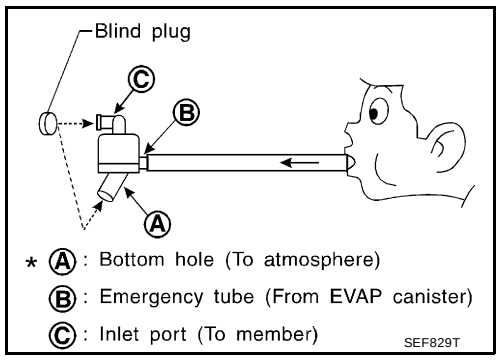
Component Inspection

UBS002E1

WATER SEPARATOR

1. Check visually for insect nests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that **A** and **C** are not clogged by blowing air into **B** with **A** , and then **C** plugged.
5. In case of NG in items 2 - 4, replace the parts.

NOTE:
Do not disassemble water separator.



DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

PFP:14920

Description

UBS002E2

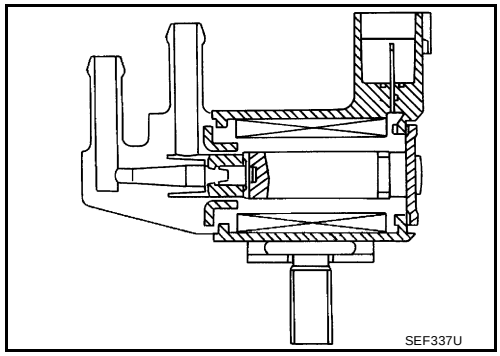
SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Closed throttle position		
Heated oxygen sensors 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Vehicle speed sensor	Vehicle speed		

This system controls flow rate of fuel vapor from the EVAP canister. The opening of the vapor by-pass passage in the EVAP canister purge volume control solenoid valve changes to control the flow rate. The EVAP canister purge volume control solenoid valve repeats ON/OFF operation according to the signal sent from the ECM. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions. When the engine is operating, the flow rate of fuel vapor from the EVAP canister is regulated as the air flow changes.

COMPONENT DESCRIPTION

The EVAP canister purge volume control solenoid valve uses a ON/OFF duty to control the flow rate of fuel vapor from the EVAP canister. The EVAP canister purge volume control solenoid valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of fuel vapor that will flow through the valve.



CONSULT-II Reference Value in Data Monitor Mode

UBS002E3

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PURG VOL C/V	● Engine: After warming up ● Shift lever: N ● Air conditioner switch: OFF ● No-load	Idle	0%
		2,000 rpm	20 - 30%

On Board Diagnosis Logic

UBS002E4

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0444 0444	EVAP canister purge volume control solenoid valve circuit open	An excessively low voltage signal is sent to ECM through the valve	● Harness or connectors (The sensor circuit is open or shorted.) ● EVAP canister purge volume control solenoid valve
P0445 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 sensor circuit is shorted.) ● EVAP canister purge volume control solenoid valve

DTC Confirmation Procedure

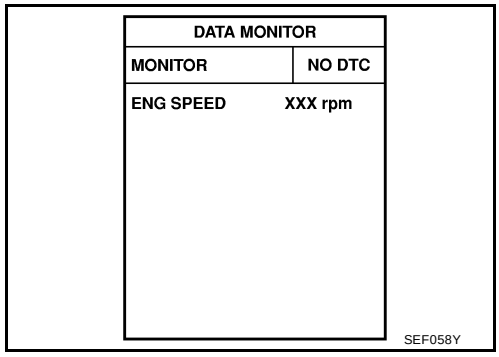
UBS002E5

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-1532, "Diagnostic Procedure" .



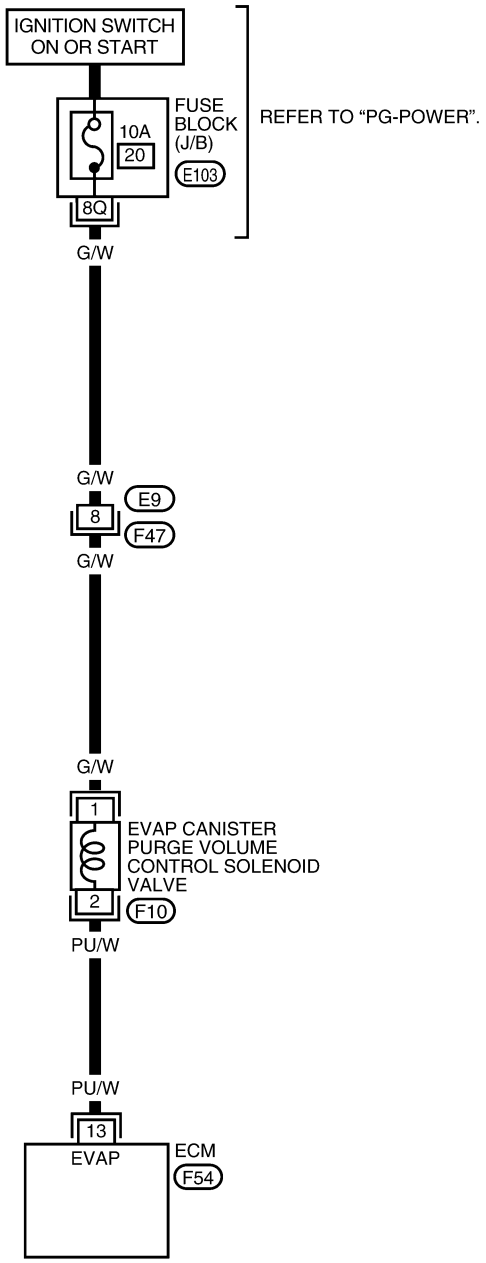
WITH GST

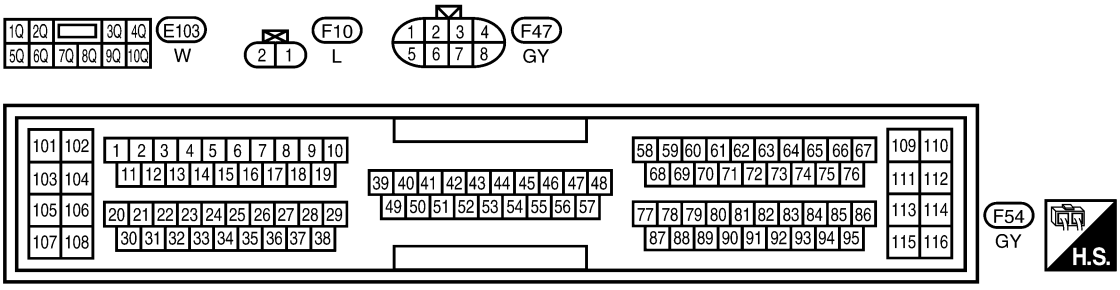
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS002E6

EC-PGC/V-01

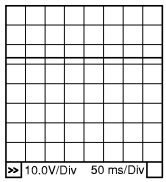
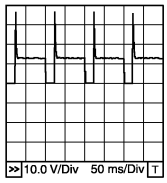




BBWA0224E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/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	PU/W	EVAP canister purge volume control solenoid valve	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)★  PBIB0050E
			[Engine is running] ● Engine speed is about 2,000 rpm (More than 100 seconds after starting engine)	Approximately 10V★  PBIB0520E

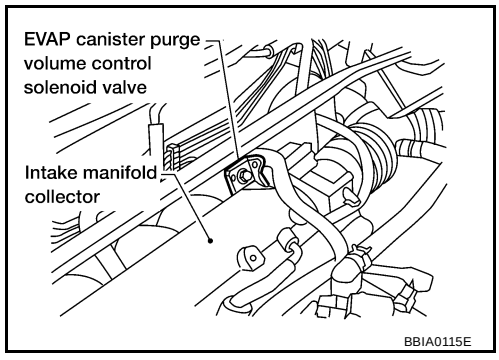
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

UBS002E7

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”.



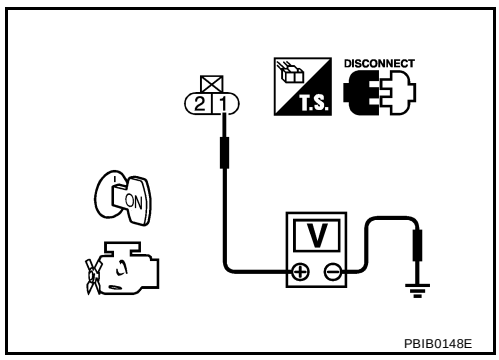
BBIA0115E

4. Check voltage between EVAP canister purge volume control solenoid valve terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 3.
NG >> GO TO 2.



PBIB0148E

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E9, F47
- Fuse block (J/B) connector E103
- 10A fuse
- Harness for open or short between EVAP canister purge volume control solenoid valve and fuse

>> Repair harness or connectors.

3. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 13 and EVAP canister purge volume control solenoid valve terminal 2.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

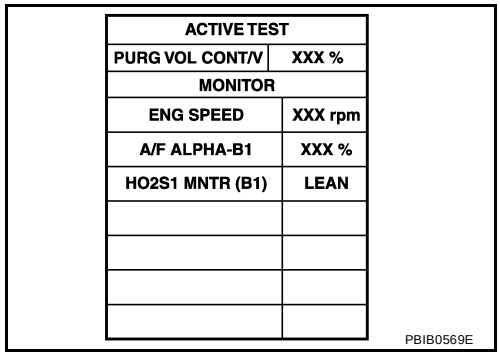
OK or NG

OK (With CONSULT-II)>>GO TO 4.
OK (Without CONSULT-II)>>GO TO 5.
NG >> Repair open circuit or short to ground and short to power in harness or connectors.

4. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-II

1. Reconnect all harness connectors disconnected.
2. Start engine.
3. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-II. Check that engine speed varies according to the valve opening.



OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-1534, "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-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

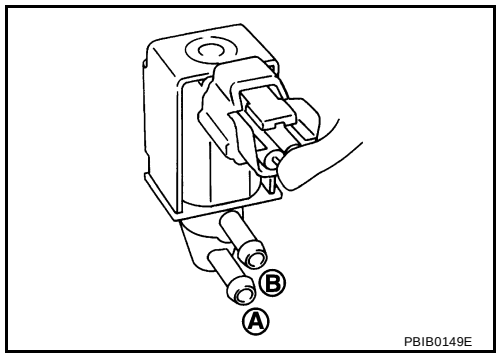
UBS002E8

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

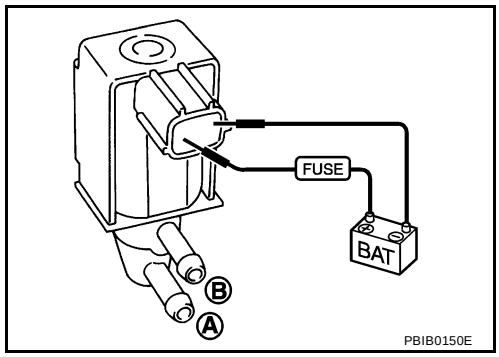
Condition (PURG VOL CONT/V value)	Air passage continuity between **A** and **B**
100.0%	Yes
0.0%	No



Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

Condition	Air passage continuity between **A** and **B**
12V direct current supply between terminals 1 and 2	Yes
No supply	No



Removal and Installation

UBS002E9

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EM-93, "INTAKE MANIFOLD" .

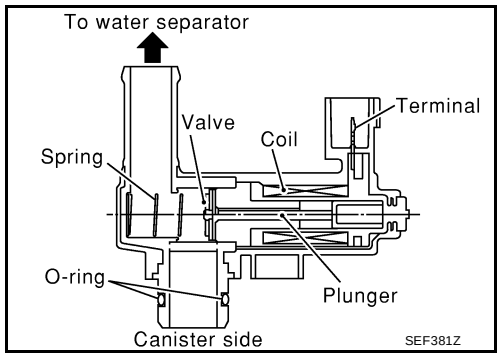
DTC P0447 EVAP CANISTER VENT CONTROL VALVE

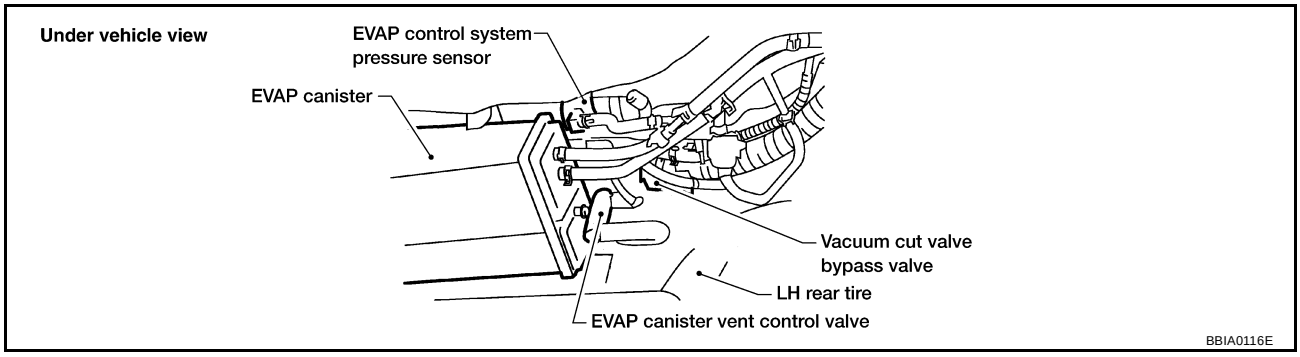
PFP:14935

Component Description

UBS002EA

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent.
This solenoid valve responds to signals from the ECM. When the ECM sends an ON signal, the coil in the solenoid valve is energized. A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.
This solenoid valve is used only for diagnosis, and usually remains opened.
When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows "EVAP Control System (Small Leak)" diagnosis.





CONSULT-II Reference Value in Data Monitor Mode

UBS002EB

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	● Ignition switch: ON	OFF

On Board Diagnosis Logic

UBS002EC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0447 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.) ● EVAP canister vent control valve

DTC Confirmation Procedure

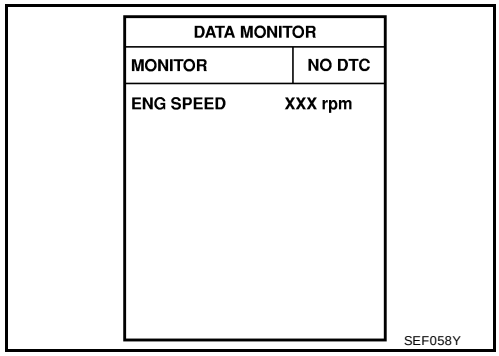
UBS002ED

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-1538, "Diagnostic Procedure" .



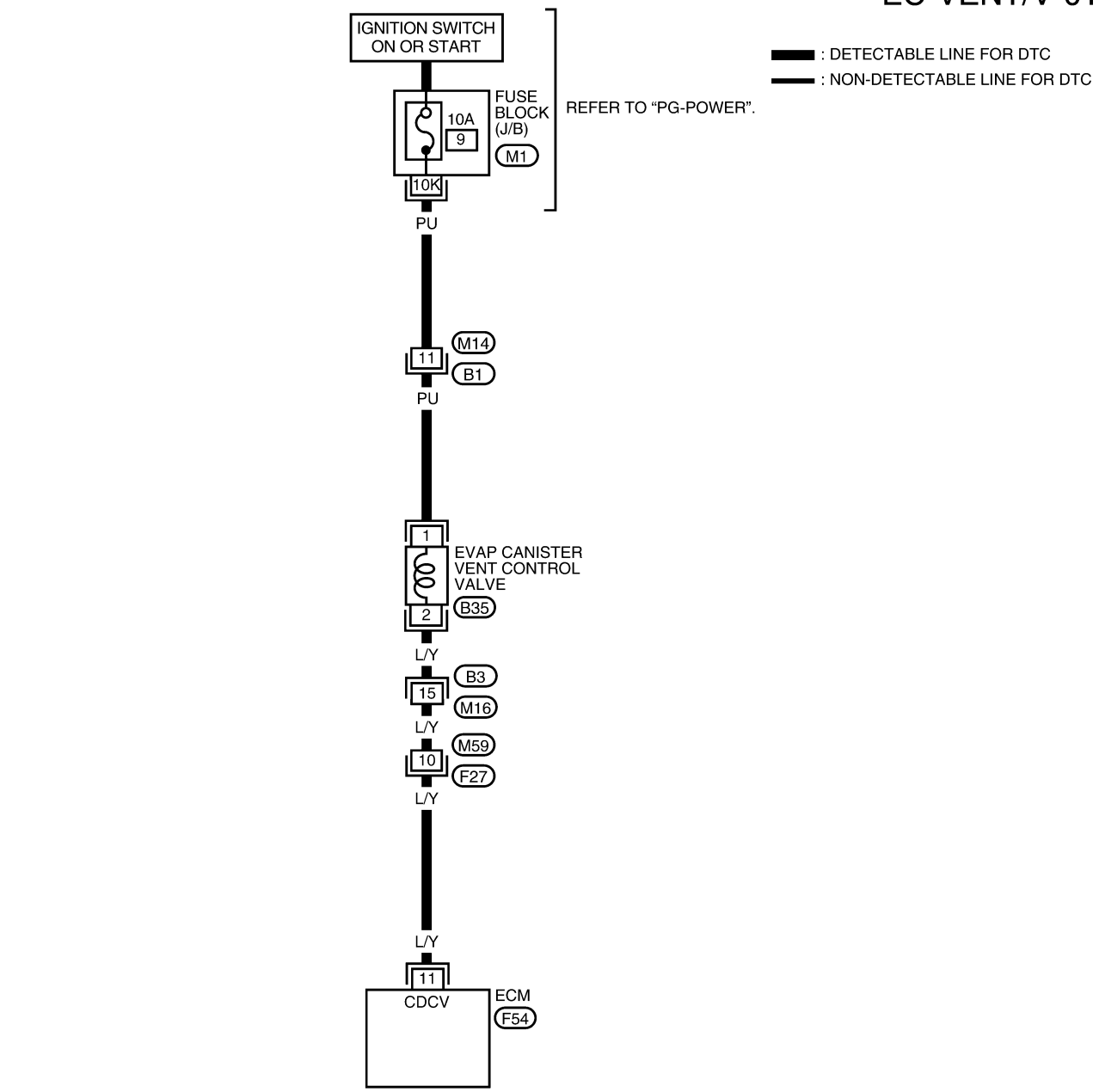
WITH GST

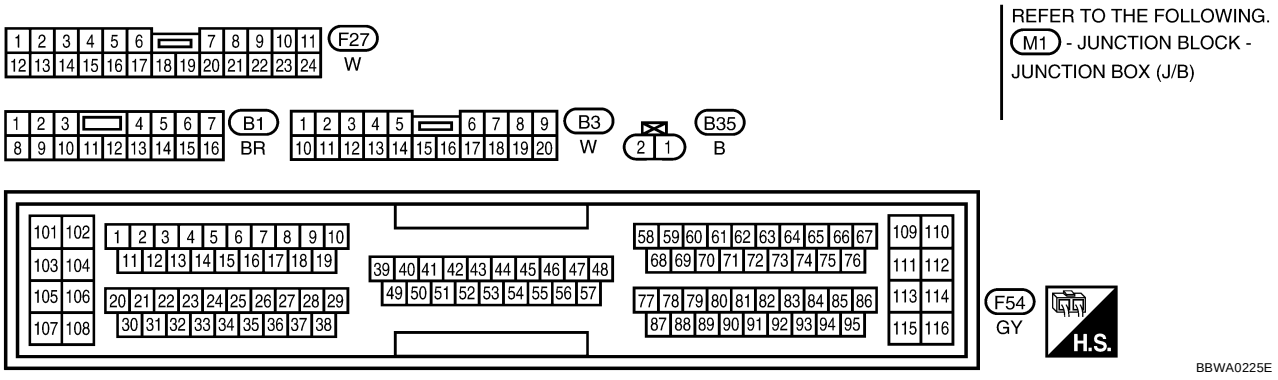
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS002EE

EC-VENT/V-01





BBWA0225E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/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	L/Y	EVAP canister vent control valve	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

UBS002EF

1. INSPECTION START

Do you have CONSULT-II?

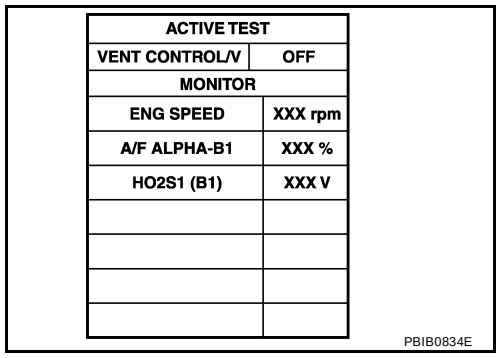
Yes or No

Yes >> GO TO 2.
No >> GO TO 3.

2. CHECK EVAP CANISTER VENT CONTROL VALVE CIRCUIT

With CONSULT-II

1. Turn ignition switch "OFF" and then turn "ON".
2. Select "VENT CONTROL/V" in "ACTIVE TEST" mode with CONSULT-II.
3. Touch "ON/OFF" on CONSULT-II screen.
4. Check for operating sound of the valve.
   Clicking noise should be heard.

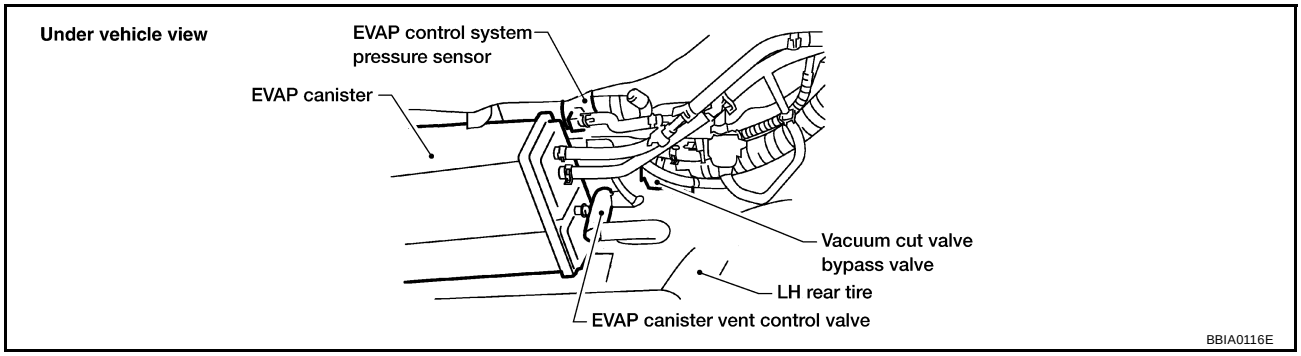


OK or NG

OK >> GO TO 7.
NG >> GO TO 3.

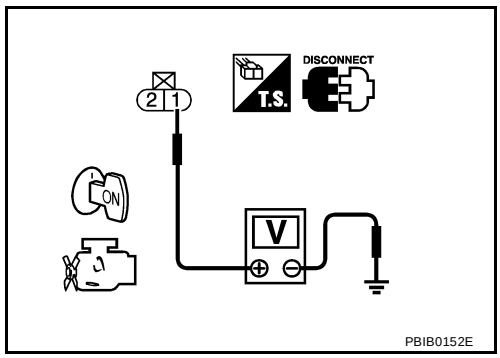
3. CHECK EVAP CANISTER VENT CONTROL VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect EVAP canister vent control valve harness connector.



3. Turn ignition switch “ON”.
4. Check voltage between EVAP canister vent control valve terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M14, B1
- Fuse block (J/B) connector M1
- 10A fuse
- Harness for open or short between EVAP canister vent control valve and fuse

>> Repair harness or connectors.

5. CHECK EVAP CANISTER VENT CONTROL VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 11 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 B3, M16
- Harness connectors M59, F27
- Harness for open or short between EVAP canister vent control valve and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK RUBBER TUBE FOR CLOGGING

1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

OK or NG

OK >> GO TO 8.
NG >> Clean the rubber tube using an air blower.

8. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-1540, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace EVAP canister vent control valve.

9. CHECK INTERMITTENT INCIDENT

Refer to EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

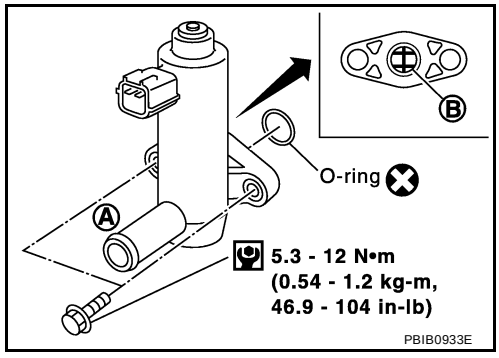
Component Inspection

UBS002EG

EVAP CANISTER VENT CONTROL VALVE

With CONSULT-II

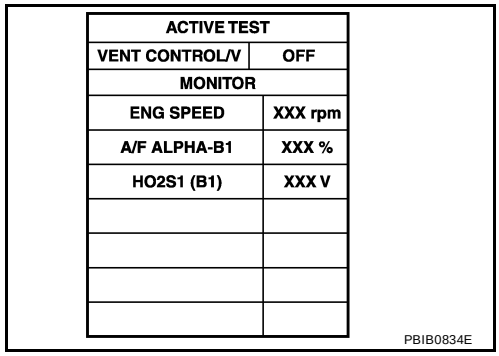
1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.
3. Reconnect harness connectors disconnected.
4. Turn ignition switch “ON”.



5. Perform “VENT CONTROL/V” in “ACTIVE TEST” mode.
6. Check air passage continuity and operation delay time.

Condition	Air passage continuity between **A** and **B**
ON	No
OFF	Yes

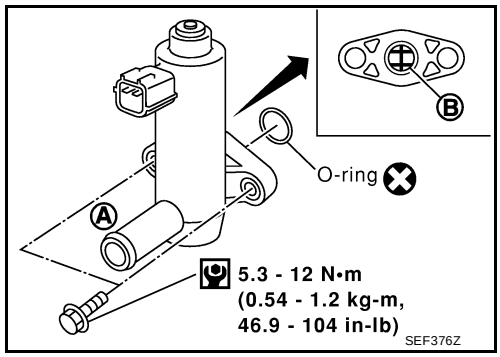
Operation takes less than 1 second.
Make sure new O-ring is installed properly.
If NG, go to next step.



7. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
8. Perform inspection again.

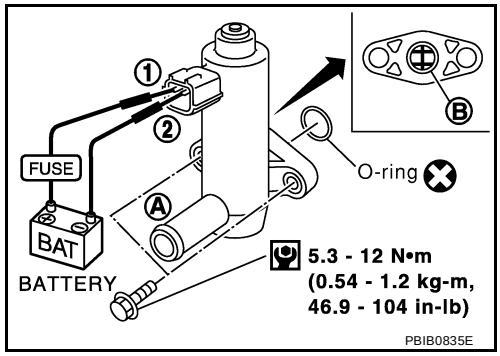
Without CONSULT-II

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.

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.
Make sure new O-ring is installed properly.
If NG, 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 inspection again.

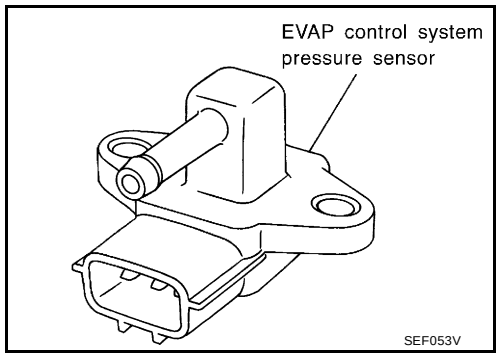
DTC P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

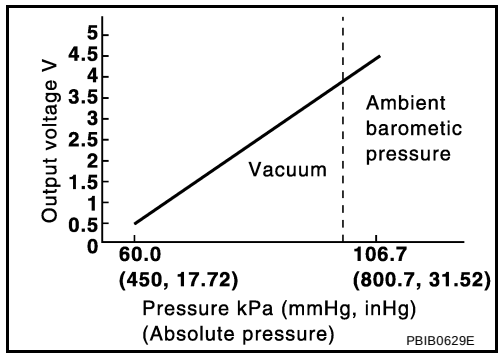
PFP:25085

Component Description

UBS002EH

The EVAP control system pressure sensor detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases. The EVAP control system pressure sensor is not used to control the engine system. It is used only for on board diagnosis.





CONSULT-II Reference Value in Data Monitor Mode

UBS002EI

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
EVAP SYS PRES	● Ignition switch: ON	Approx. 1.8 - 4.8V

On Board Diagnosis Logic

UBS002EJ

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0452 0452	EVAP control system pressure sensor low input	An excessively low voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● EVAP control system pressure sensor

DTC Confirmation Procedure

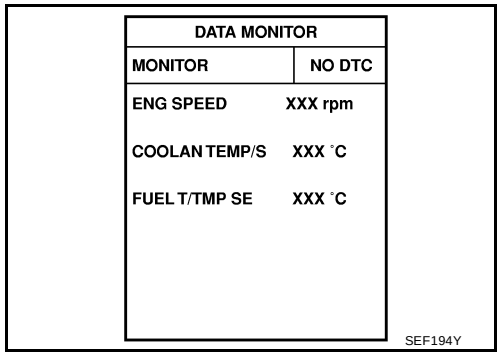
UBS002EK

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

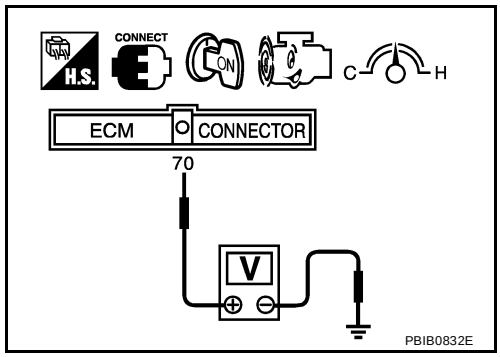
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Turn ignition switch “ON”.

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-1545, "Diagnostic Procedure" .



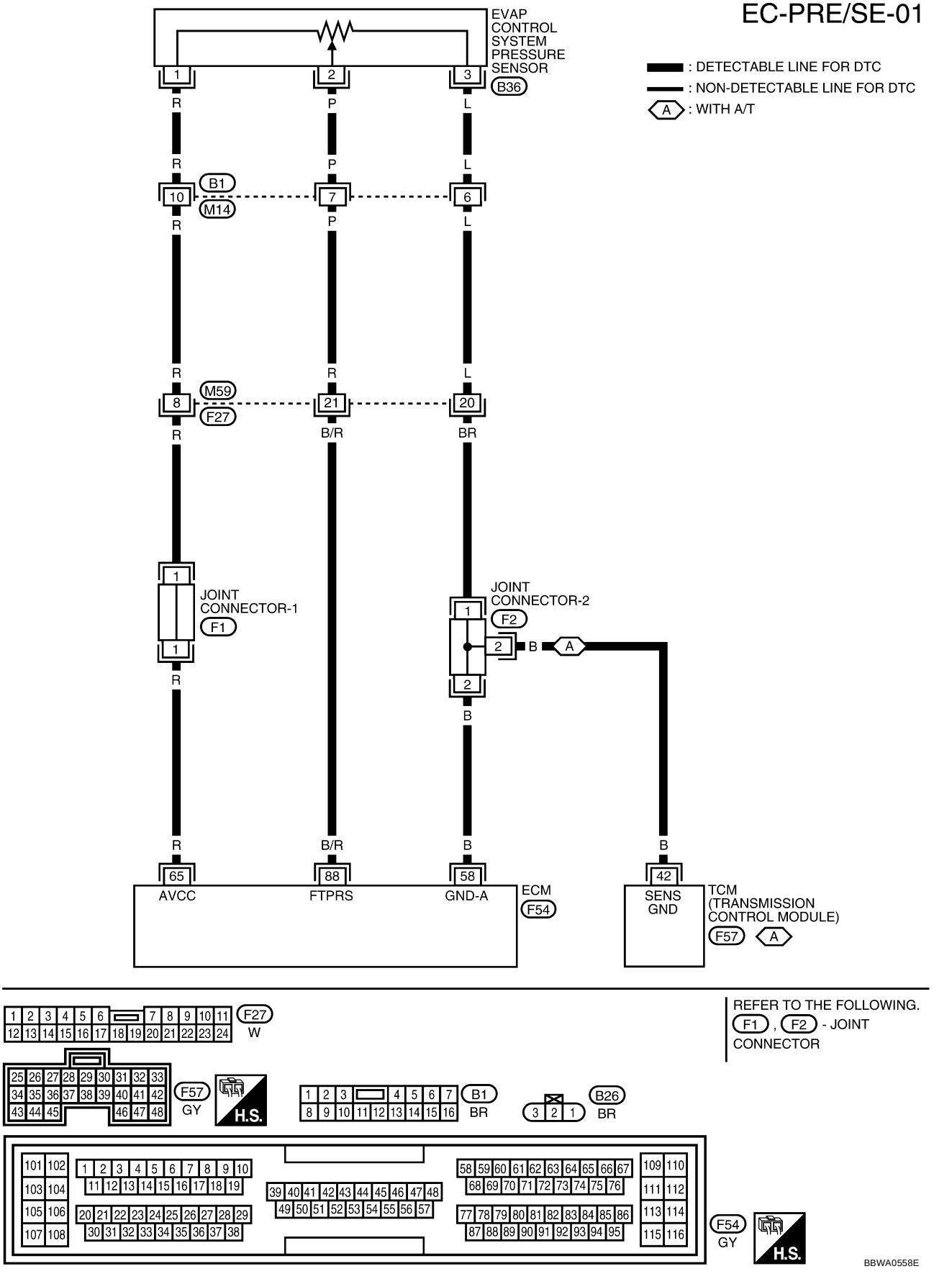
WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Check that voltage between ECM terminal 70 (Fuel tank temperature sensor signal) and ground is less than 4.2V.
3. Turn ignition switch “OFF” and wait at least 10 seconds.
4. Start engine and wait at least 20 seconds.
5. Select “MODE 7” with GST.
   If 1st trip DTC is detected, go to EC-1545, "Diagnostic Procedure" .



Wiring Diagram

UBS002EL



Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/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)
58	B	Sensors' ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
65	R	Sensor's power supply	**[Ignition switch "ON"]**	Approximately 5V
88	B/R	EVAP control system pressure sensor	**[Ignition switch "ON"]**	Approximately 1.8 - 4.8V

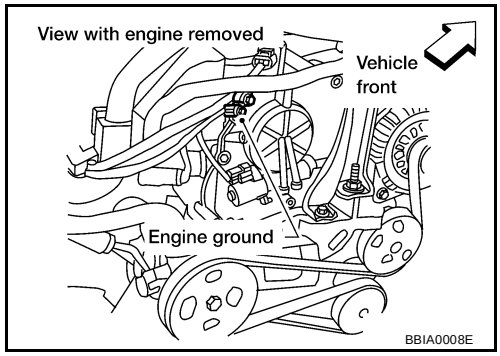
Diagnostic Procedure

UBS002EM

1. RETIGHTEN GROUND SCREWS

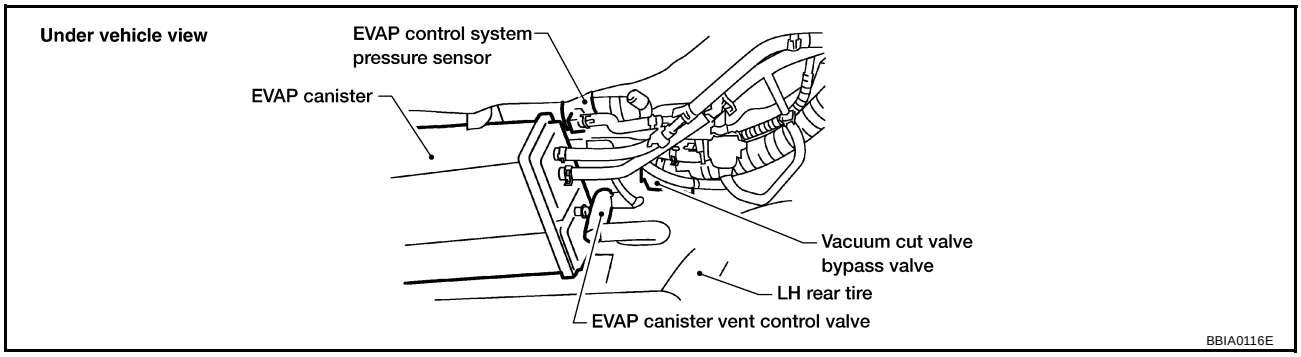
Loosen and retighten engine ground screws.

>> GO TO 2.



2. CHECK CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.



2. Check sensor harness connector for water.

Water should not exist.

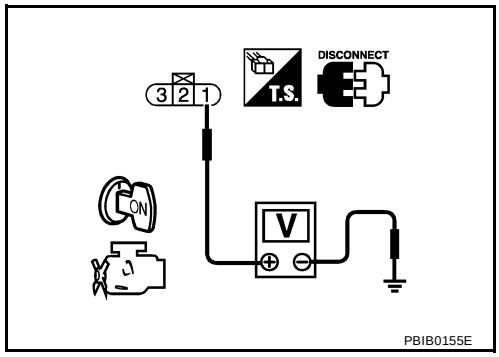
OK or NG

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 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 B1, M14
- Harness connectors M59, F27
- Joint connector-1
- Harness for open or short between EVAP control system pressure sensor and ECM

>> Repair harness or connectors.

5. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Check harness continuity between EVAP control system pressure sensor terminal 3 and engine ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B1, M14
- Harness connectors M59, F27
- Joint connector-2
- Harness for open or short between EVAP control system pressure sensor and ECM
- Harness for open or short between EVAP control system pressure sensor and TCM

>> 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. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 88 and EVAP control system pressure sensor terminal 2.
   Refer to Wiring Diagram.

   Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B1, M14
- Harness connectors M59, F27
- Harness for open or short between ECM and EVAP control system pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-1548, "Component Inspection" .

OK or NG

OK >> GO TO 10.
NG >> Replace EVAP control system pressure sensor.

10. CHECK SHIELD CIRCUIT

1. Disconnect harness connector M14.
2. Check the harness continuity between harness connector M14 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 12.
NG >> GO TO 11.

11. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B1, M14
- harness connectors M59, F27
- Harness for open or short between harness connector M14 and ground

>> Repair open circuit or short to power in harness or connectors.

12. CHECK INTERMITTENT INCIDENT

Refer to EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

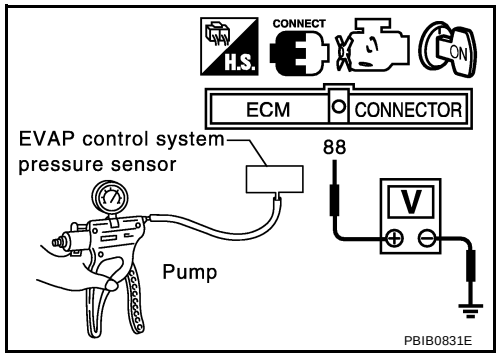
Component Inspection

UBS002EN

EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.
2. Remove hose from EVAP control system pressure sensor.
3. Install a vacuum pump to EVAP control system pressure sensor.
4. Turn ignition switch “ON” and check output voltage between ECM terminal 88 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 - 2.5V lower than above value



CAUTION:

- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply vacuum below -93.3 kPa (-700 mmHg, -27.56 inHg) or pressure over 101.3 kPa (760 mmHg, 29.92 inHg).**

5. If NG, replace EVAP control system pressure sensor.

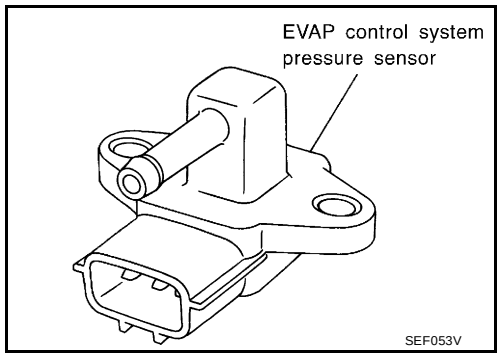
DTC P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

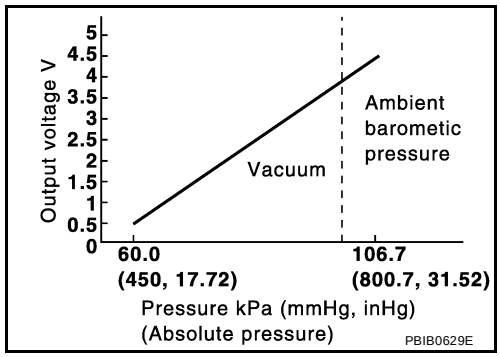
PFP:25085

Component Description

UBS002EO

The EVAP control system pressure sensor detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases. The EVAP control system pressure sensor is not used to control the engine system. It is used only for on board diagnosis.





CONSULT-II Reference Value in Data Monitor Mode

UBS002EP

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
EVAP SYS PRES	● Ignition switch: ON	Approx. 1.8 - 4.8V

On Board Diagnosis Logic

UBS002EQ

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0453 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.) ● EVAP control system pressure sensor ● EVAP canister vent control valve ● EVAP canister ● Water separator ● Rubber hose from EVAP canister vent control valve to water separator

DTC Confirmation Procedure

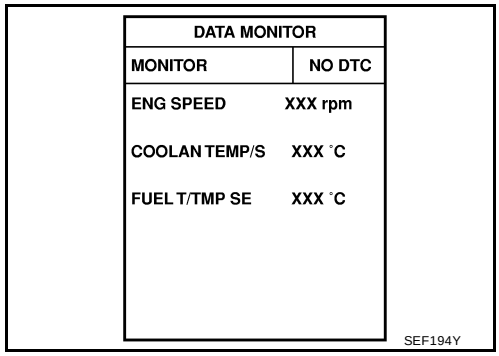
UBS002ER

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

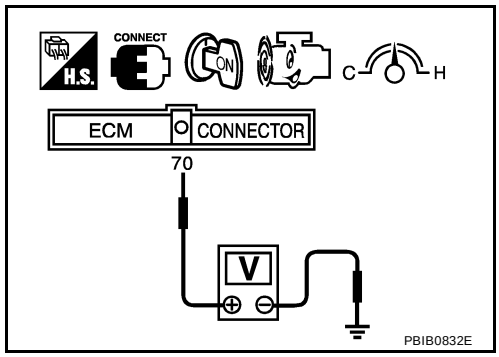
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Turn ignition switch “ON”.

4. Select “DATA MONITOR” mode with CONSULT-II.
5. Make sure that “FUEL T/TEMP SE” is more than 0°C (32°F).
6. Wait at least 10 seconds.
7. If 1st trip DTC is detected, go to EC-1552, "Diagnostic Procedure" .



WITH GST

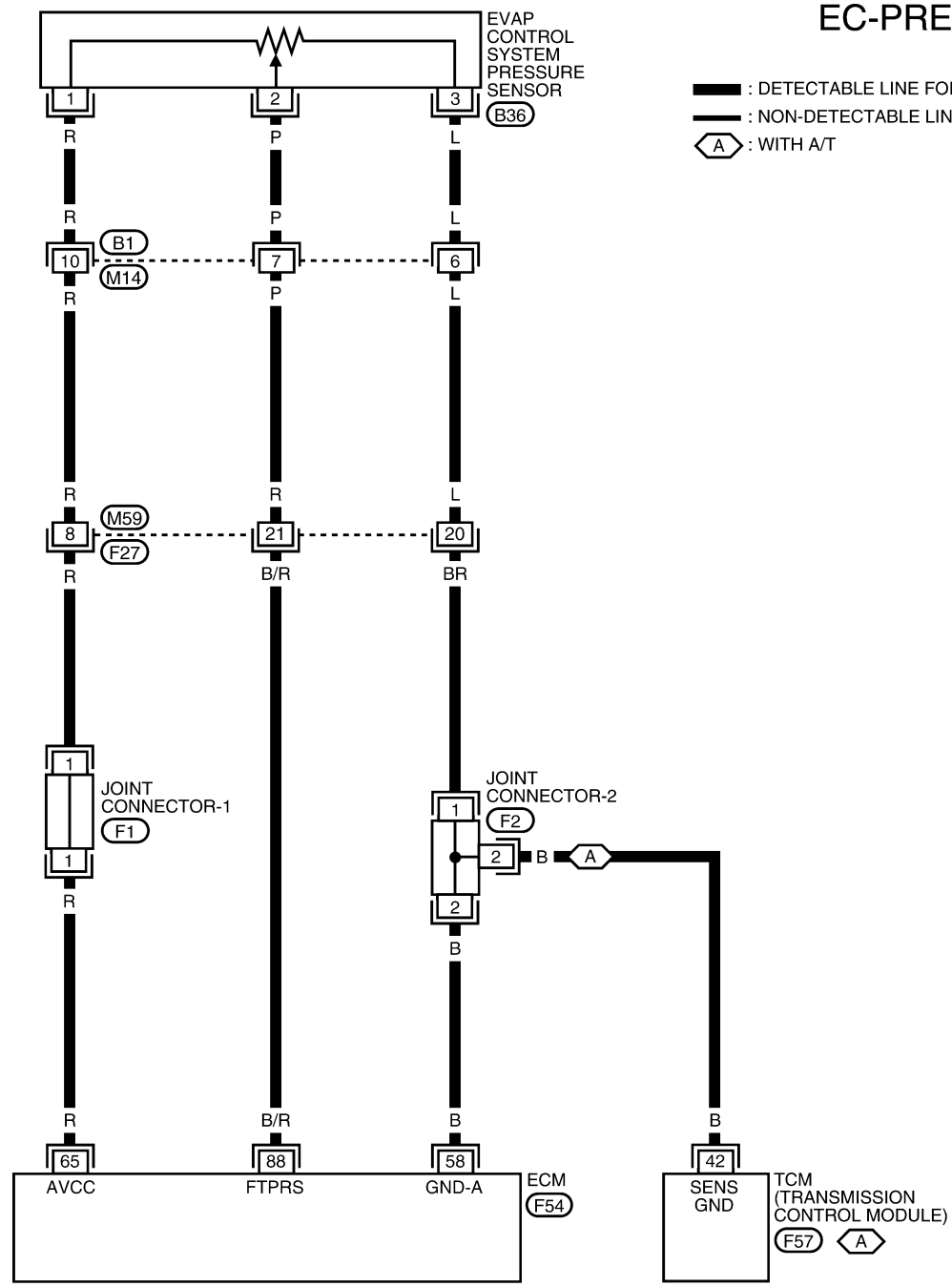
1. Start engine and warm it up to normal operating temperature.
2. Check that voltage between ECM terminal (Fuel tank temperature sensor signal) and ground is less than 4.2V.
3. Turn ignition switch “OFF” and wait at least 10 seconds.
4. Wait at least 10 seconds.
5. Select “MODE 7” with GST.
6. If 1st trip DTC is detected, go to EC-1552, "Diagnostic Procedure" .



Wiring Diagram

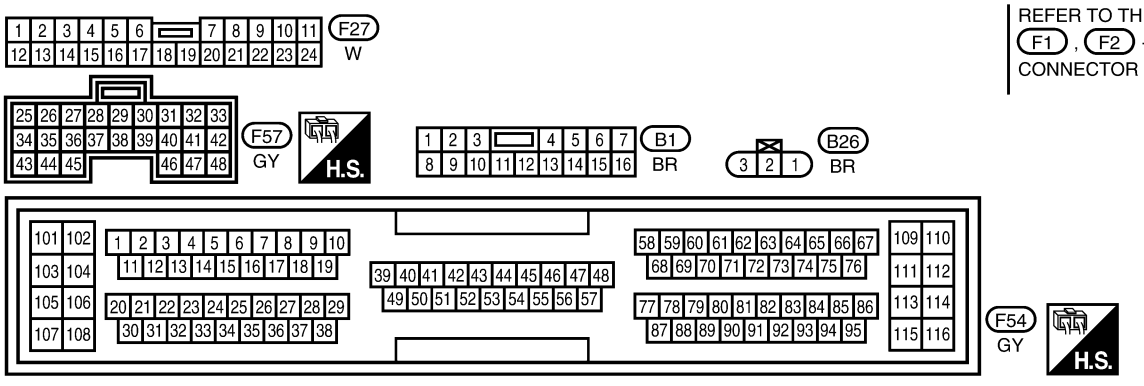
UBS002ES

EC-PRE/SE-01



: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC
A : WITH A/T

REFER TO THE FOLLOWING.
F1 , F2 - JOINT CONNECTOR



BBWA0558E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/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)
58	B	Sensors' ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
65	R	Sensor's power supply	**[Ignition switch "ON"]**	Approximately 5V
88	B/R	EVAP control system pressure sensor	**[Ignition switch "ON"]**	Approximately 1.8 - 4.8V

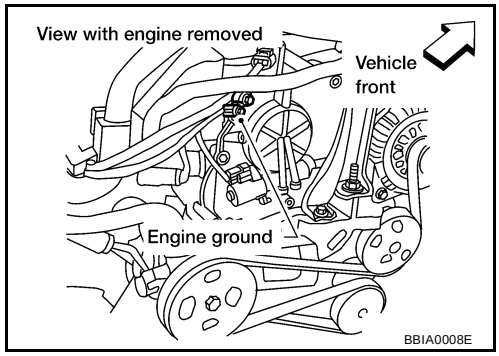
Diagnostic Procedure

UBS002ET

1. RETIGHTEN GROUND SCREWS

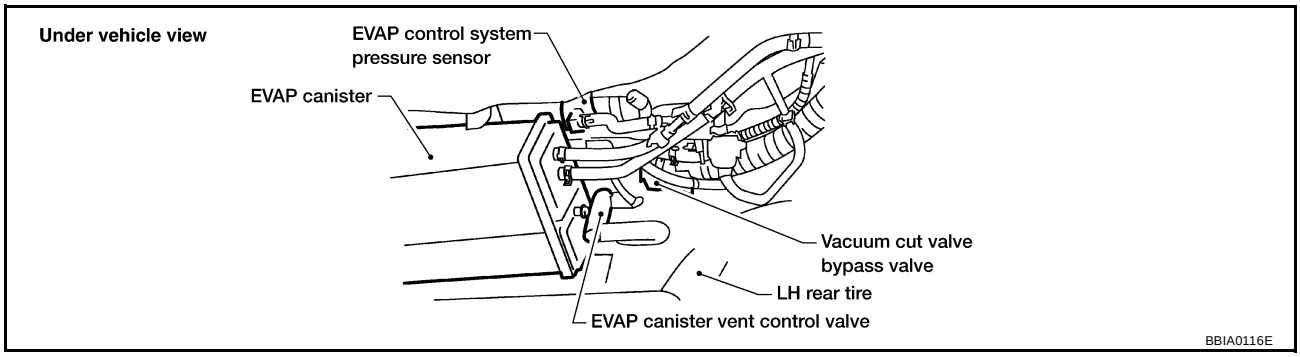
Loosen and retighten engine ground screws.

>> GO TO 2.



2. CHECK CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.



2. Check sensor harness connector for water.

Water should not exist.

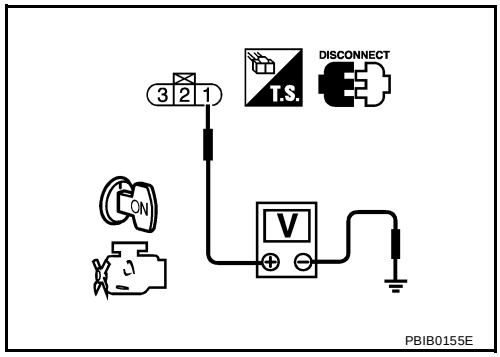
OK or NG

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 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 B1, M14
- Harness connectors M59, F27
- Joint connector-1
- Harness for open or short between EVAP control system pressure sensor and ECM

>> Repair harness or connectors.

5. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Check harness continuity between EVAP control system pressure sensor terminal 3 and engine ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B1, M14
- Harness connectors M59, F27
- Joint connector-2
- Harness for open or short between EVAP control system pressure sensor and ECM
- Harness for open or short between EVAP control system pressure sensor and TCM

>> 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. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 88 and EVAP control system pressure sensor terminal 2.
   Refer to Wiring Diagram.

   Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B1, M14
- Harness connectors M59, F27
- Harness for open or short between ECM and EVAP control system pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK RUBBER TUBE FOR CLOGGING

1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

OK or NG

OK >> GO TO 10.
NG >> Clean the rubber tube using an air blower.

10. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-1540, "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-1555, "Component Inspection" .

OK or NG

OK >> GO TO 12.
NG >> Replace EVAP control system pressure sensor.

12. CHECK RUBBER TUBE

Check obstructed rubber tube connected to EVAP canister vent control valve.

OK or NG

OK >> GO TO 13.
NG >> Clean rubber tube using an air blower, repair or replace rubber tube.

13. CHECK WATER SEPARATOR

Refer to EC-1528, "Component Inspection" .

OK or NG

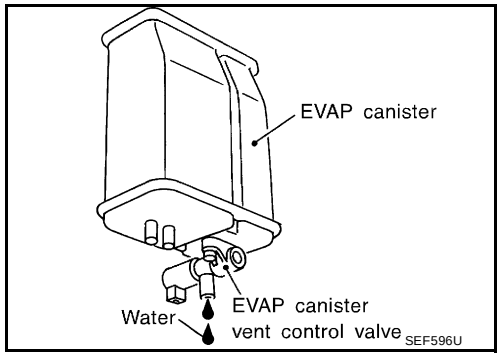
OK >> GO TO 14.
NG >> Replace water separator.

14. CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Check if water will drain from the EVAP canister.

Yes or No

Yes >> GO TO 15.
No >> GO TO 17.



15. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve attached.
The weight should be less than 1.8 kg (4.0 lb).

OK or NG

OK >> GO TO 17.
NG >> GO TO 16.

16. DETECT MALFUNCTIONING PART

Check the following.

- EVAP canister for damage
- EVAP hose between EVAP canister and water separator for clogging or poor connection

>> Repair hose or replace EVAP canister.

17. CHECK INTERMITTENT INCIDENT

Refer to EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

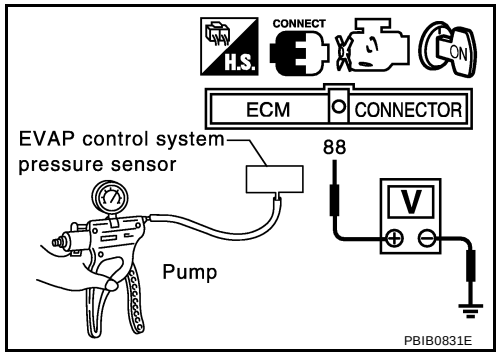
UBS002EU

EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.
2. Remove hose from EVAP control system pressure sensor.
3. Install a vacuum pump to EVAP control system pressure sensor.

4. Turn ignition switch “ON” and check output voltage between ECM terminal 88 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 - 2.5V lower than above value



CAUTION:

- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply vacuum below -93.3 kPa (-700 mmHg, -27.56 inHg) or pressure over 101.3 kPa (760 mmHg, 29.92 inHg).**

5. If NG, replace EVAP control system pressure sensor.

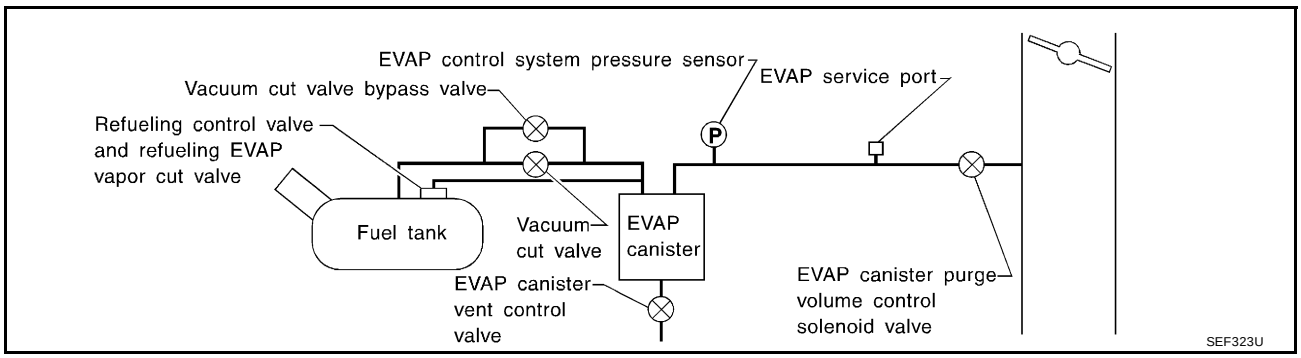
DTC P0455 EVAP CONTROL SYSTEM

PFP:14950

On Board Diagnosis Logic

UBS002EV

NOTE:
If DTC P0455 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (EC-1709 .)
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 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. ● Incorrect fuel tank vacuum relief valve ● Incorrect fuel filler cap used ● Foreign matter caught in fuel filler cap. ● Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve. ● Foreign matter caught in EVAP canister vent control valve. ● EVAP canister or fuel tank leaks ● EVAP purge line (pipe and rubber tube) leaks ● EVAP purge line rubber tube bent. ● Blocked or bent rubber tube to EVAP control system pressure sensor ● Loose or disconnected rubber tube ● EVAP canister vent control valve and the circuit ● EVAP canister purge volume control solenoid valve and the circuit ● Fuel tank temperature sensor ● O-ring of EVAP canister vent control valve is missing or damaged. ● EVAP control system pressure sensor ● Refueling control valve ● ORVR system leaks

CAUTION:
- **Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.**
- **If the fuel filler cap is not tightened properly, the MIL may come on.**
- **Use only a genuine NISSAN rubber tube as a replacement.**

DTC Confirmation Procedure

UBS002EW

CAUTION:
Never remove fuel filler cap during the DTC Confirmation Procedure.

NOTE:

- **If DTC P0455 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (EC-1709 .)**
- **Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.**
- If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

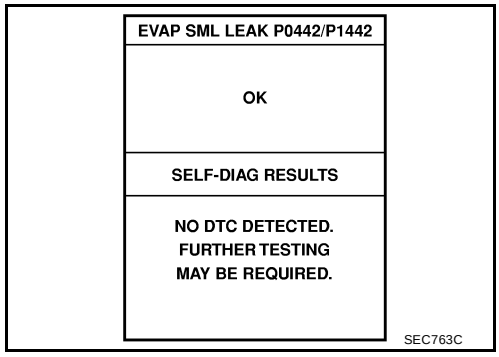
- **Perform “DTC WORK SUPPORT” when the fuel level is between 1/4 to 3/4 full and vehicle is placed on flat level surface.**
- **Open engine hood before conducting the following procedures.**

WITH CONSULT-II

1. Tighten fuel filler cap securely until ratcheting sound is heard.
2. Turn ignition switch “ON”.
3. Turn ignition switch “OFF” and wait at least 10 seconds.
4. Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II.
5. Make sure that the following conditions are met.
   COOLAN TEMP/S: 0 - 70°C (32 - 158°F)
   INT/A TEMP SE: 0 - 60°C (32 - 140°F)
6. Select “EVAP SML LEAK P0442/P1442” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II.
   Follow the instruction displayed.

   NOTE:
   DTC P1442 does not apply to QR25DE Sentra models, but appears in DTC Work Support Mode screens for other Sentra models.

   NOTE:
   If the engine speed cannot be maintained within the range displayed on the CONSULT-II screen, go to EC-1289, "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-1559, "Diagnostic Procedure" .
   If P0442 is displayed, perform “Diagnostic Procedure” for DTC P0442, EC-1522 .



WITH GST

NOTE:
Be sure to read the explanation of “Driving Pattern” on EC-1268 before driving vehicle.

1. Start engine.
2. Drive vehicle according to “Driving Pattern”, EC-1268 .
3. Stop vehicle.
4. Select “MODE 1” with GST.
   - If SRT of EVAP system is not set yet, go to the following step.
   - If SRT of EVAP system is set, the result will be OK.
5. Turn ignition switch “OFF” and wait at least 10 seconds.
6. Start engine.
   It is not necessary to cool engine down before driving.
7. Drive vehicle again according to the “Driving Pattern”, EC-1268 .
8. Stop vehicle.
9. Select “MODE 3” with GST.

- If P0455 is displayed on the screen, go to EC-1559, "Diagnostic Procedure" .
- If P0442 is displayed on the screen, go to “Diagnostic Procedure”, for DTC P0442, EC-1522 .
- If P0441 is displayed on the screen, go to “Diagnostic Procedure” for DTC P0441, EC-1516 .
- If P0455, P0441and P0442 are not displayed on the screen, go to the following step.

10. Select “MODE 1” with GST.
    - If SRT of EVAP system is set, the result will be OK.
    - If SRT of EVAP system is not set, go to step 6.

Diagnostic Procedure

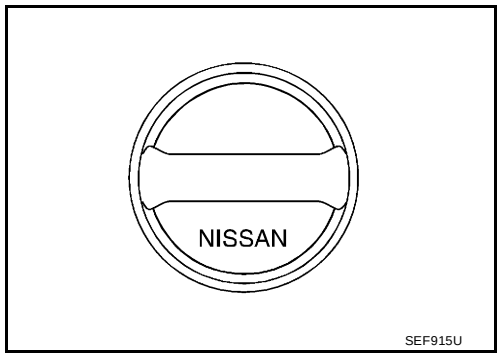
UBS002EX

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-1839, "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-1837, "EVAPORATIVE EMISSION LINE DRAWING" .

OK or NG

OK >> GO TO 6.
NG >> Repair or reconnect the hose.

6. CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 7.

7. CHECK EVAP CANISTER VENT CONTROL VALVE, O-RING AND CIRCUIT

Refer to EC-1709, "DTC Confirmation Procedure" .

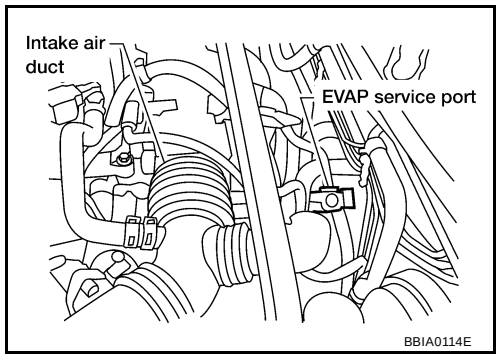
OK or NG

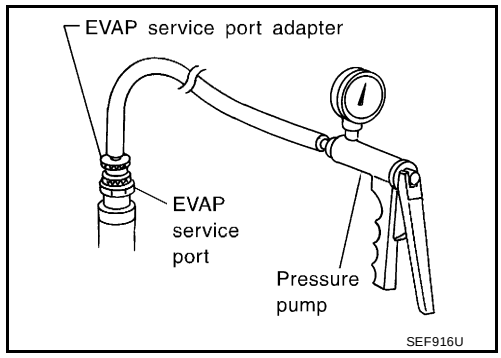
OK >> GO TO 8.
NG >> Repair or replace EVAP canister vent control valve and O-ring or harness/connector.

8. INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.

NOTE:
Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.





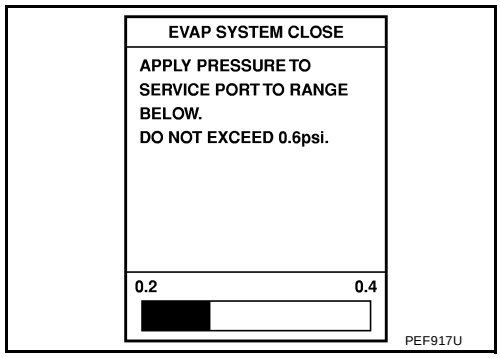
Models with CONSULT-II>>GO TO 9.
Models without CONSULT-II>>GO TO 10.

9. CHECK FOR EVAP LEAK

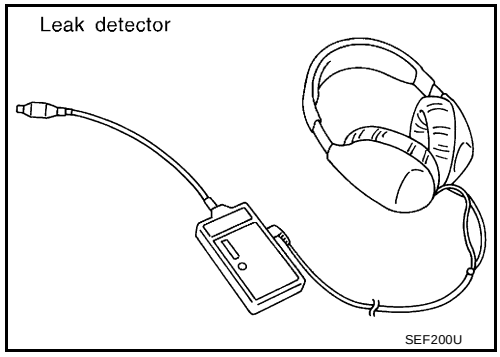
With CONSULT-II

1. Turn ignition switch “ON”.
2. Select “EVAP SYSTEM CLOSE” of “WORK SUPPORT” mode with CONSULT-II.
3. Touch “START” and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.

   NOTE:
   - **Never use compressed air or a high pressure pump.**
   - **Do not exceed 4.12 kPa (0.042 kg/cm^2 , 0.6 psi) of pressure in the system.**



4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details.
   Refer to EC-1837, "EVAPORATIVE EMISSION LINE DRAWING" .



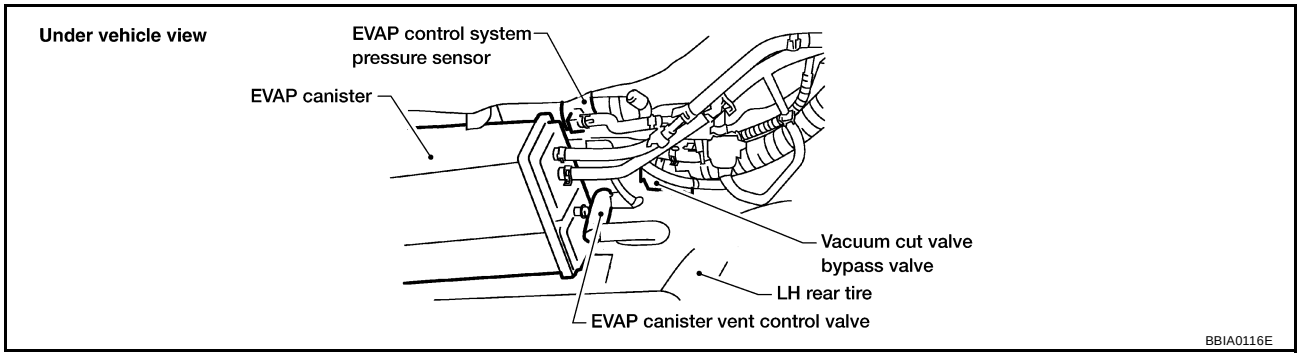
OK or NG

OK >> GO TO 11.
NG >> Repair or replace.

10. CHECK FOR EVAP LEAK

Without CONSULT-II

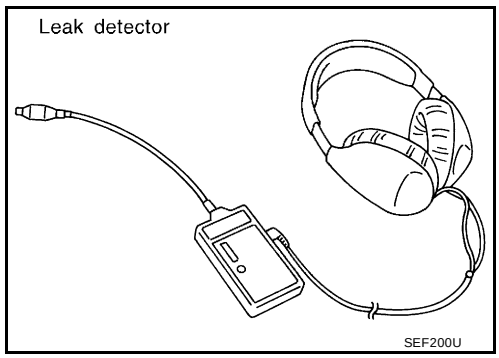
1. Turn ignition switch “OFF”.
2. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)
3. Apply 12 volts DC to vacuum cut valve bypass valve. The valve will open. (Continue to apply 12V until the end of test.)



4. Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg), then remove pump and EVAP service port adapter.

   NOTE:
   - **Never use compressed air or a high pressure pump.**
   - **Do not exceed 4.12 kPa (0.042 kg/cm^2 , 0.6 psi) of pressure in the system.**

5. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to EC-1837, "EVAPORATIVE EMISSION LINE DRAWING" .



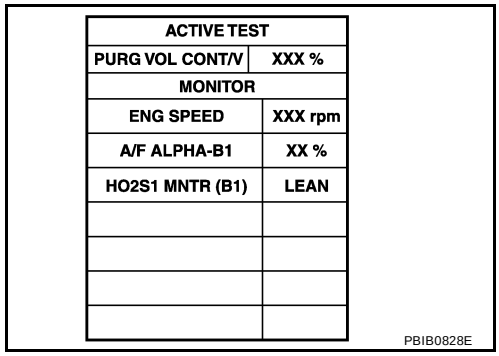
OK or NG

OK >> GO TO 12.
NG >> Repair or replace.

11. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-II

1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
2. Start engine.
3. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode.
4. Touch “Qu” on CONSULT-II screen to increase “PURG VOL CONT/V” opening to 100.0%.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.



OK or NG

OK >> GO TO 14.
NG >> GO TO 13.

12. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
4. Start engine and let it idle for at least 80 seconds.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

Vacuum should exist.

OK or NG

OK >> GO TO 15.
NG >> GO TO 13.

13. CHECK VACUUM HOSE

Check vacuum hoses for clogging or disconnection. Refer to EC-1235, "Vacuum Hose Drawing" .

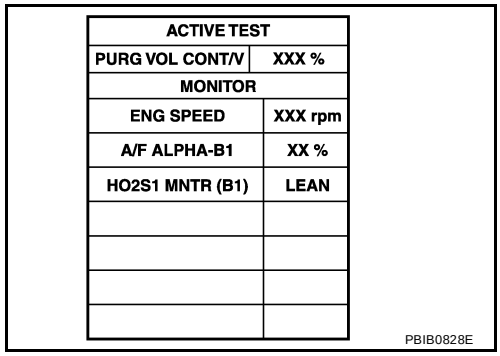
OK or NG

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-1534, "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-1443, "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-1548, "Component Inspection" .

OK or NG

OK >> GO TO 18.
NG >> Replace EVAP control system pressure sensor.

18. CHECK REFUELING EVAP VAPOR LINE

Check refueling EVAP vapor line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to EC-1842, "ON BOARD REFUELING VAPOR RECOVERY (ORVR)" .

OK or NG

OK >> GO TO 19.
NG >> Repair or replace hoses and tubes.

19. CHECK SIGNAL LINE AND RECIRCULATION LINE

Check signal line and recirculation line between filler neck tube and fuel tank for clogging, kink, cracks, looseness and improper connection.

OK or NG

OK >> GO TO 20.
NG >> Repair or replace hoses, tubes or filler neck tube.

20. CHECK REFUELING CONTROL VALVE

Refer to EC-1845, "Component Inspection" .

OK or NG

OK >> GO TO 21.
NG >> Replace refueling control valve with fuel tank.

21. CHECK INTERMITTENT INCIDENT

Refer to EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

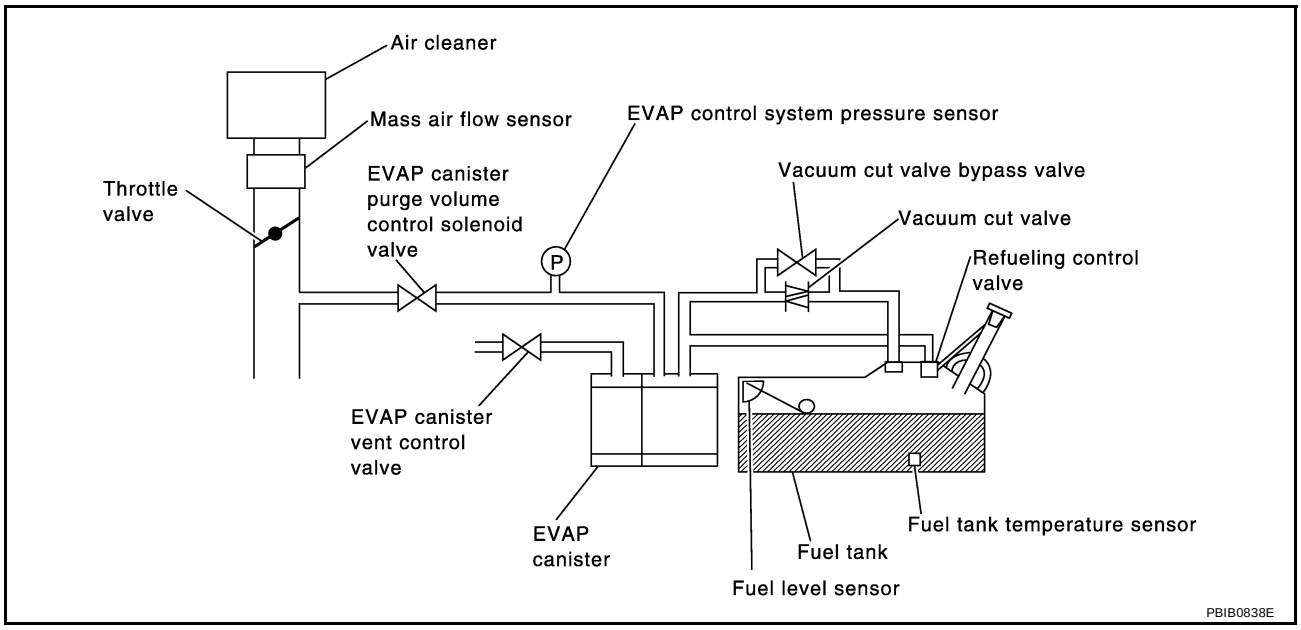
DTC P0456 EVAP CONTROL SYSTEM

PFP:14950

On Board Diagnosis Logic

UBS002EY

This diagnosis detects leaks in the EVAP purge line using engine intake manifold vacuum.
If pressure does not increase, the ECM will check for leaks in the line between the fuel tank and EVAP canister purge volume control solenoid valve, under the following “Vacuum test” conditions.
The vacuum cut valve bypass valve is opened to clear the line between the fuel tank and the EVAP canister purge volume control solenoid valve. The EVAP canister vent control valve will then be closed to shut the EVAP purge line off. The EVAP canister purge volume control solenoid valve is opened to depressurize the EVAP purge line using intake manifold vacuum. After this occurs, the EVAP canister purge volume control solenoid valve will be closed.
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 0456	Evaporative emission control system very small leak (negative pressure check)	● EVAP system has a very small leak. ● EVAP system does not operate properly.	● Incorrect fuel tank vacuum relief valve ● Incorrect fuel filler cap used ● Fuel filler cap remains open or fails to close. ● Foreign matter caught in fuel filler cap. ● Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve. ● Foreign matter caught in EVAP canister vent control valve. ● EVAP canister or fuel tank leaks ● EVAP purge line (pipe and rubber tube) leaks ● EVAP purge line rubber tube bent ● Blocked or bent rubber tube to EVAP control system pressure sensor ● Loose or disconnected rubber tube ● EVAP canister vent control valve and the circuit ● EVAP canister purge volume control solenoid valve and the circuit ● Fuel tank temperature sensor ● O-ring of EVAP canister vent control valve is missing or damaged ● Water separator ● EVAP canister is saturated with water ● EVAP control system pressure sensor ● Refueling control valve ● ORVR system leaks ● Fuel level sensor and the circuit ● Foreign matter caught in EVAP canister purge volume control solenoid valve

CAUTION:

- **Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.**
- **If the fuel filler cap is not tightened properly, the MIL may come on.**
- **Use only a genuine NISSAN rubber tube as a replacement.**

DTC Confirmation Procedure

UBS002EZ

NOTE:

- **If DTC P0456 is displayed with P0442, perform TROUBLE DIAGNOSIS FOR DTC P0456 first.**
- **After repair, make sure that the hoses and clips are installed properly.**
- If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

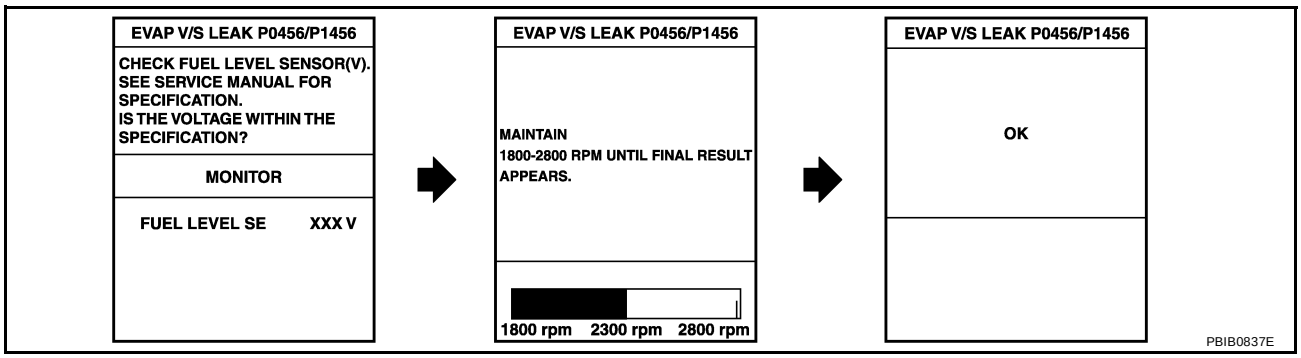
- **Open engine hood before conducting following procedure.**
- **If any of following conditions are met just before the DTC confirmation procedure, leave the vehicle for more than 1 hour.**
  - **Fuel filler cap is removed.**
  - **Refilled or drained the fuel.**
  - **EVAP component parts is/are removed.**
- **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 - 1.15V
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-1568, "Diagnostic Procedure" .

NOTE:
- **If the engine speed cannot be maintained within the range displayed on CONSULT-II screen, go to EC-1289, "Basic Inspection" .**
- **Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.**

Overall Function Check

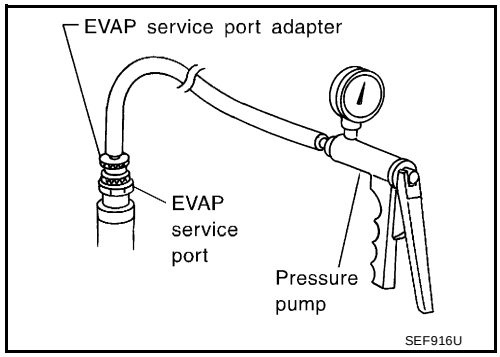
UBS002F0

WITH GST

Use this procedure to check the overall function of the EVAP very small leak function. During this check, a 1st trip DTC might not be confirmed.

CAUTION:
- **Never use compressed air, doing so may damage the EVAP system.**
- **Do not start engine.**
- **Do not exceeded 4.12 kPa (0.042 kg/cm^2 , 0.6 psi).**

1. Attach the EVAP service port adapter securely to the EVAP service port.
2. Set the pressure pump and a hose.
3. Also set a vacuum gauge via 3-way connector and a hose.
4. Turn ignition switch “ON”.
5. Connect GST and select MODE 8.
6. Using MODE 8 control the EVAP canister vent control valve (close) and vacuum cut valve bypass valve (open).
7. Apply pressure and make sure the following conditions are satisfied.
Pressure to be applied: 2.7 kPa (20 mmHg, 0.79 inHg)
Time to be waited after the pressure drawn in to the EVAP system and the pressure to be dropped: 60 seconds and the pressure should not be dropped more than 0.4 kPa (3 mmHg, 0.12 inHg).
If NG, go to EC-1568, "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

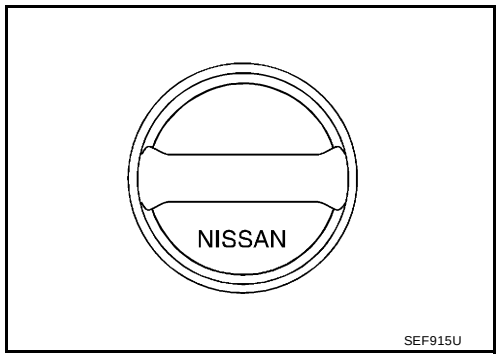
UBS002F1

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-1839, "Component Inspection" .

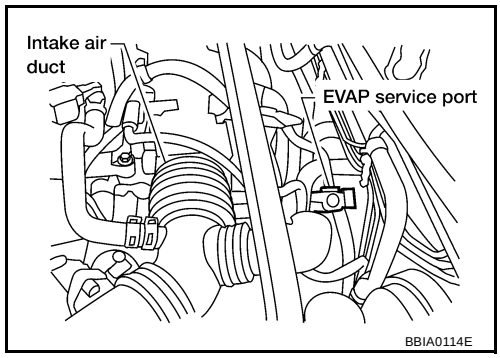
OK or NG

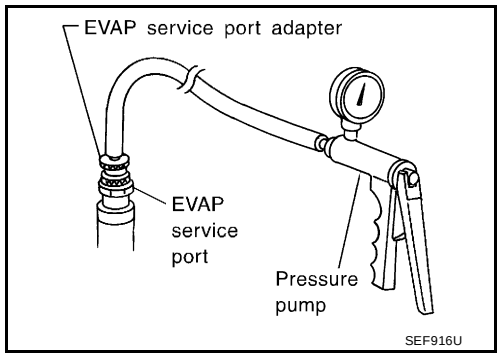
OK >> GO TO 5.
NG >> Replace fuel filler cap with a genuine one.

5. INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.

NOTE:
Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.





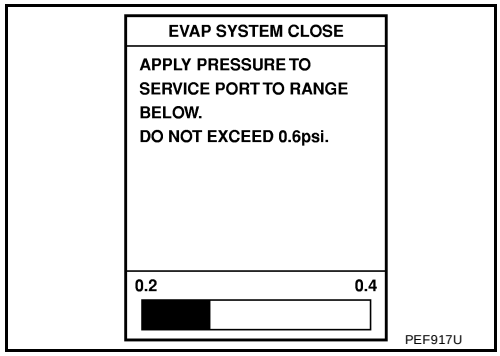
Models with CONSULT-II>>GO TO 6.
Models without CONSULT-II>>GO TO 7.

6. CHECK FOR EVAP LEAK

With CONSULT-II

1. Turn ignition switch “ON”.
2. Select “EVAP SYSTEM CLOSE” of “WORK SUPPORT” mode with CONSULT-II.
3. Touch “START” and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.

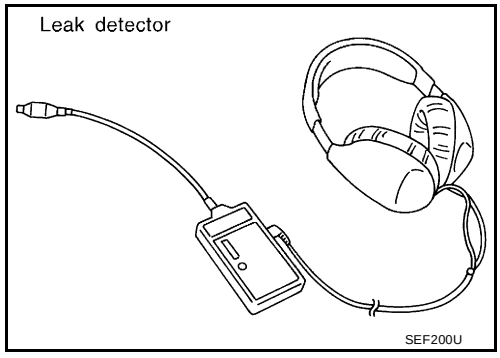
   NOTE:
   - **Never use compressed air or a high pressure pump.**
   - **Do not exceed 4.12 kPa (0.042 kg/cm^2 , 0.6 psi) of pressure in the system.**



4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details.
   Refer to EC-1837, "EVAPORATIVE EMISSION LINE DRAWING" .

OK or NG

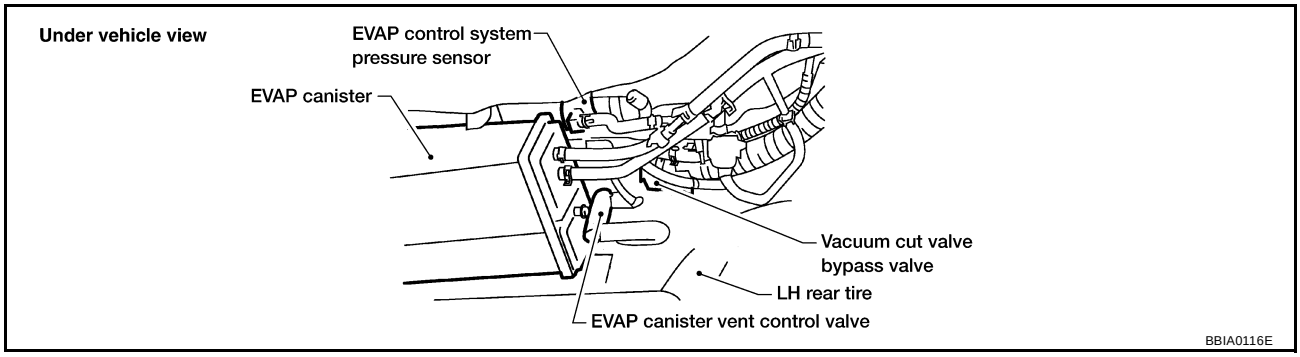
OK >> GO TO 8.
NG >> Repair or replace.



7. CHECK FOR EVAP LEAK

Without CONSULT-II

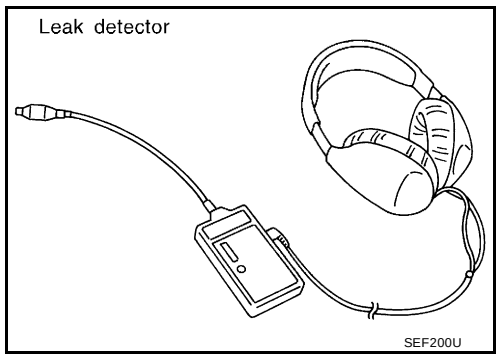
1. Turn ignition switch “OFF”.
2. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)
3. Apply 12 volts DC to vacuum cut valve bypass valve. The valve will open. (Continue to apply 12V until the end of test.)



4. Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg), then remove pump and EVAP service port adapter.

   NOTE:
   - **Never use compressed air or a high pressure pump.**
   - **Do not exceed 4.12 kPa (0.042 kg/cm^2 , 0.6 psi) of pressure in the system.**

5. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to EC-1837, "EVAPORATIVE EMISSION LINE DRAWING" .



OK or NG

OK >> GO TO 8.
NG >> Repair or replace.

8. CHECK WATER SEPARATOR

Refer to EC-1528, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace water separator.

9. CHECK EVAP CANISTER VENT CONTROL VALVE, O-RING AND CIRCUIT

Refer to EC-1715, "Component Inspection" .

OK or NG

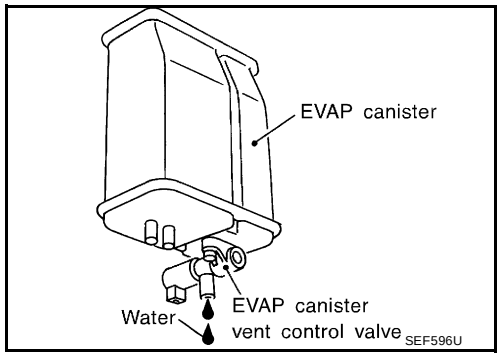
OK >> GO TO 10.
NG >> Repair or replace EVAP canister vent control valve and O-ring or harness/connector.

10. CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Does water drain from the EVAP canister?

Yes or No

Yes >> GO TO 11.
No (With CONSULT-II)>>GO TO 13.
No (Without CONSULT-II)>>GO TO 14.



11. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve attached.
The weight should be less than 1.8 kg (4.0 lb).

OK or NG

OK (With CONSULT-II)>>GO TO 13.
OK (Without CONSULT-II)>>GO TO 14.
NG >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.

- EVAP canister for damage
- EVAP hose between EVAP canister and water separator for clogging or poor connection

>> Repair hose or replace EVAP canister.

13. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-II

1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
2. Start engine.
3. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode.
4. Touch “Qu” on CONSULT-II screen to increase “PURG VOL CONT/V” opening to 100.0%.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

OK or NG

OK >> GO TO 16.
NG >> GO TO 15.

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XX %
HO2S1 MNTR (B1)	LEAN

PBIB0828E

14. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
4. Start engine and let it idle for at least 80 seconds.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

Vacuum should exist.

OK or NG

OK >> GO TO 17.
NG >> GO TO 15.

15. CHECK VACUUM HOSE

Check vacuum hoses for clogging or disconnection. Refer to EC-1235, "Vacuum Hose Drawing" .

OK or NG

OK >> GO TO 16.
NG >> Repair or reconnect the hose.

16. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-1534, "Component Inspection" .

OK or NG

OK >> GO TO 17.
NG >> Replace EVAP canister purge volume control solenoid valve.

17. CHECK FUEL TANK TEMPERATURE SENSOR

Refer to EC-1443, "FUEL TANK TEMPERATURE SENSOR" .

OK or NG

OK >> GO TO 18.
NG >> Replace fuel level sensor unit.

18. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-1548, "Component Inspection" .

OK or NG

OK >> GO TO 19.
NG >> Replace EVAP control system pressure sensor.

19. CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection. Refer to EC-1837, "EVAPORATIVE EMISSION LINE DRAWING" .

OK or NG

OK >> GO TO 20.
NG >> Repair or reconnect the hose.

20. CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 21.

21. CHECK REFUELING EVAP VAPOR LINE

Check refueling EVAP vapor line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to EC-1842, "ON BOARD REFUELING VAPOR RECOVERY (ORVR)" .

OK or NG

OK >> GO TO 22.
NG >> Repair or replace hoses and tubes.

22. CHECK SIGNAL LINE AND RECIRCULATION LINE

Check signal line and recirculation line between filler neck tube and fuel tank for clogging, kink, cracks, looseness and improper connection.

OK or NG

OK >> GO TO 23.
NG >> Repair or replace hoses, tubes or filler neck tube.

23. CHECK REFUELING CONTROL VALVE

Refer to EC-1845, "Component Inspection" .

OK or NG

OK >> GO TO 24.
NG >> Replace refueling control valve with fuel tank.

24. CHECK FUEL LEVEL SENSOR

Refer to DI-23, "FUEL LEVEL SENSOR UNIT CHECK" .

OK or NG

OK >> GO TO 25.
NG >> Replace fuel level sensor unit.

25. CHECK INTERMITTENT INCIDENT

Refer to EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

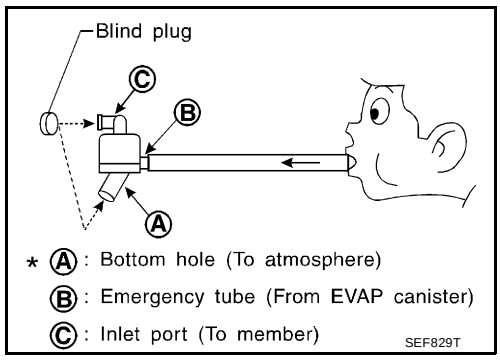
UBS002F2

WATER SEPARATOR

1. Check visually for insect nests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that **A** and **C** are not clogged by blowing air into **B** with **A** , and then **C** plugged.
5. In case of NG in items 2 - 4, replace the parts.

NOTE:

- Do not disassemble water separator.



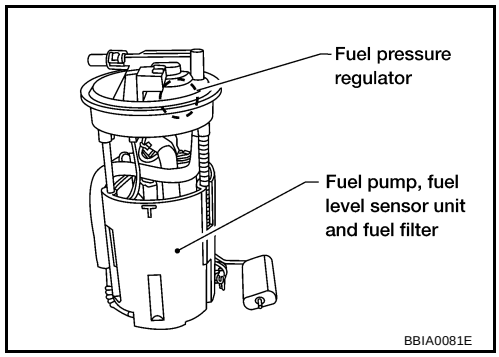
DTC P0460 FUEL LEVEL SENSOR

PFP:25060

Component Description

UBS002F3

The fuel level sensor is mounted in the fuel level sensor unit. The sensor detects a fuel level in the fuel tank and transmits a signal to the ECM.
It consists of two parts, one is mechanical float and the other side is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.



On Board Diagnosis Logic

UBS002F4

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 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 sensor circuit is open or shorted) ● Fuel level sensor

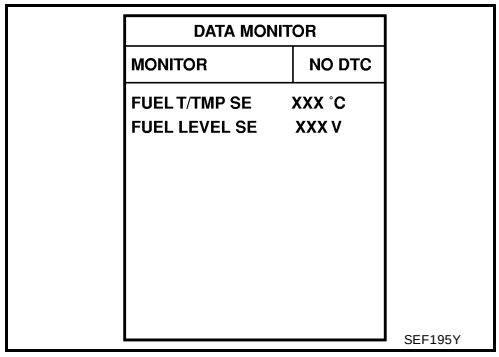
DTC Confirmation Procedure

UBS002F5

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-1576, "Diagnostic Procedure" .

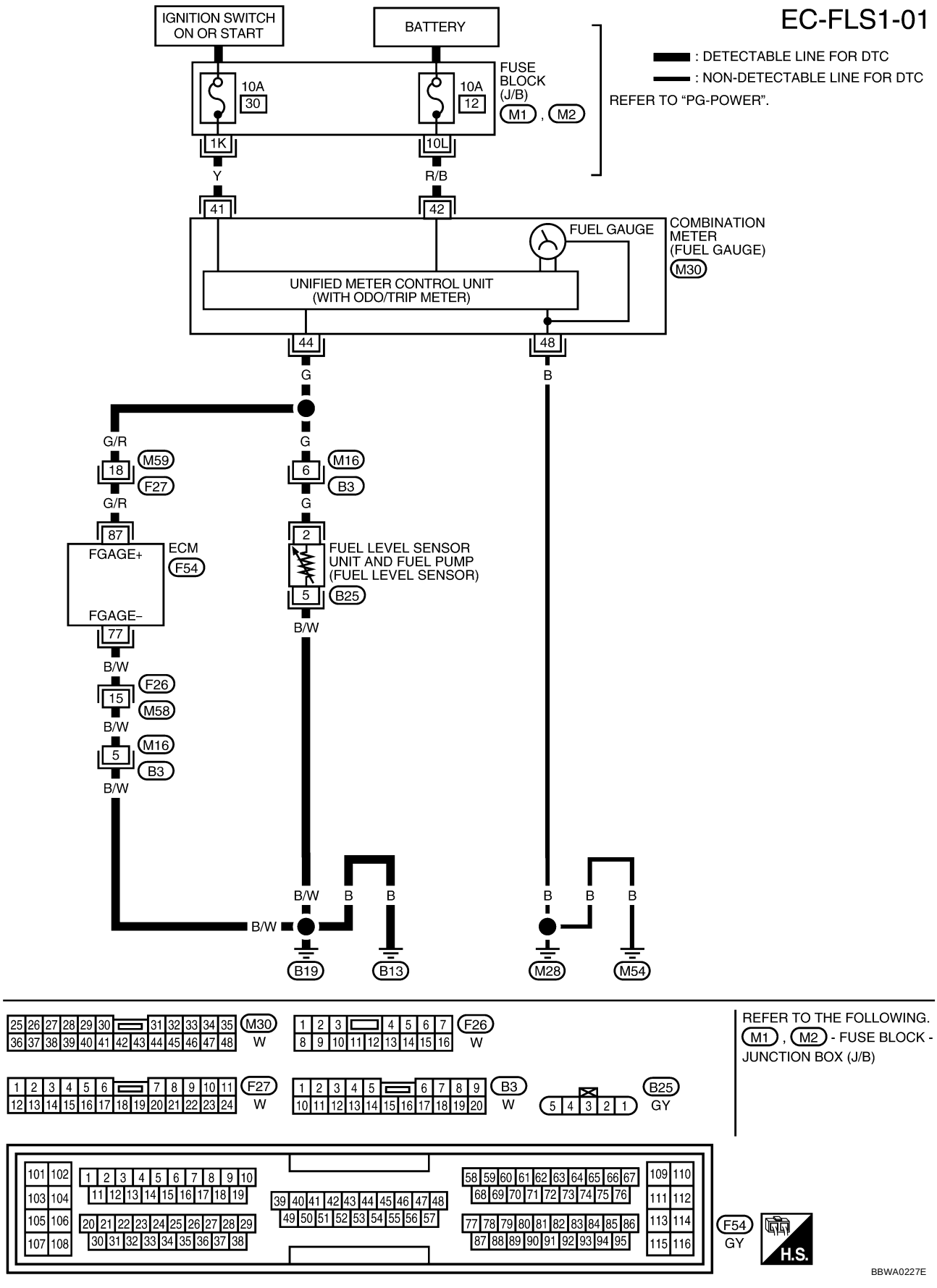


WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS002F6



Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

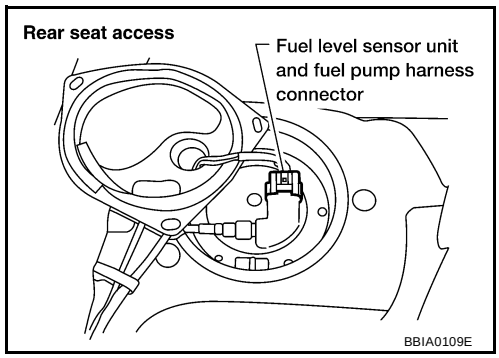
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
77	B/W	Fuel level sensor ground	**[Engine is running]** ● Idle speed	Approximately 0V
87	G/R	Fuel level sensor	**[Ignition switch "ON"]**	Approximately 0 - 4.8V Output voltage varies with fuel level.

Diagnostic Procedure

UBS002F7

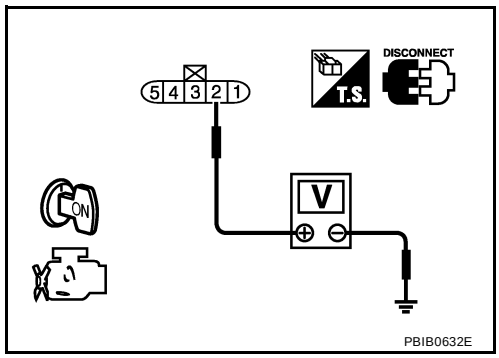
1. CHECK FUEL LEVEL SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect fuel level sensor unit and fuel pump harness connector.
3. Turn ignition switch "ON".



4. Check voltage between fuel level sensor unit and fuel pump terminal 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 M16, B3
- Harness for open or short between combination meter and fuel level sensor until and fuel pump

>> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK FUEL LEVEL SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Check harness continuity between fuel level sensor unit and fuel pump terminal 5 and body ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M59, F27
- Harness for open or short between fuel level sensor unit and fuel pump and body ground

>> Repair open circuit or short to power in harness or connectors.

5. CHECK FUEL LEVEL SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 87 and fuel level sensor unit and fuel pump terminal 2, ECM terminal 77 and fuel level sensor unit and fuel pump terminal 5. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground or short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M16, B3
- Harness connectors M58, F26
- Harness connectors M59, F27
- Harness for open or short between ECM and fuel level sensor unit and fuel pump

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK FUEL LEVEL SENSOR

Refer to DI-23, "FUEL LEVEL SENSOR UNIT CHECK" .

OK or NG

OK >> GO TO 8.
NG >> Replace fuel level sensor unit.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Remove and Installation

UBS002F8

FUEL LEVEL SENSOR

Refer to FL-3, "FUEL LEVEL SENSOR UNIT, FUEL FILTER AND FUEL PUMP ASSEMBLY" .

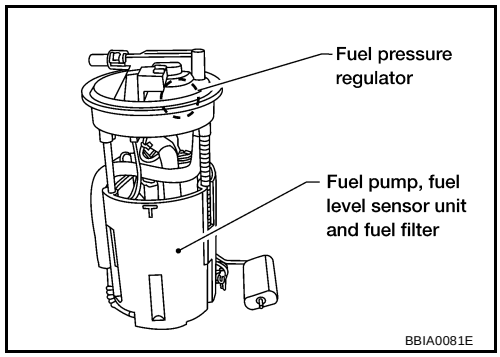
DTC P0461 FUEL LEVEL SENSOR

PFP:25060

Component Description

UBS002F9

The fuel level sensor is mounted in the fuel level sensor unit. The sensor detects a fuel level in the fuel tank and transmits a signal to the ECM.
It consists of two parts, one is mechanical float and the other side is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.



On Board Diagnosis Logic

UBS002FA

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 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 sensor circuit is open or shorted) ● Fuel level sensor

Overall Function Check

UBS002FB

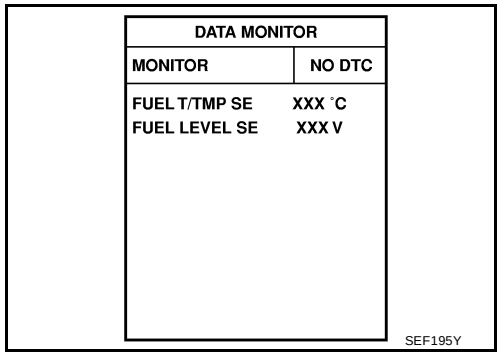
Use this procedure to check the overall function of the fuel level sensor function. During this check, a 1st trip DTC might not be confirmed.

WARNING:
When performing following procedure, be sure to observe the handling of the fuel. Refer to FL-10, "FUEL TANK" .
TESTING CONDITION:
Before starting overall function check, preparation of draining fuel and refilling fuel is required.

WITH CONSULT-II

NOTE:
Start from step 11, if it is possible to confirm that the fuel cannot be drained by 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) in advance.

1. Prepare a fuel container and a spare hose.
2. Release fuel pressure from fuel line, refer to EC-1255, "FUEL PRESSURE RELEASE" .
3. Remove the fuel feed hose on the fuel level sensor unit.
4. Connect a spare fuel hose where the fuel feed hose was removed.
5. Turn ignition switch “OFF” and wait at least 10 seconds then turn “ON”.
6. Select “FUEL LEVEL SE” in “DATA MONITOR” mode with CONSULT-II.
7. Check “FUEL LEVEL SE” output voltage and note it.
8. Select “FUEL PUMP” in “ACTIVE TEST” mode with CONSULT-II.
9. Touch “ON” and drain fuel approximately 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) and stop it.
10. Fill fuel into the fuel tank for 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal).
11. Check “FUEL LEVEL SE” output voltage and note it.
12. Check “FUEL LEVEL SE” output voltage and confirm whether the voltage changes more than 0.03V during step 7 to 11.
    If NG, check the fuel level sensor, refer to DI-23, "FUEL LEVEL SENSOR UNIT CHECK" .

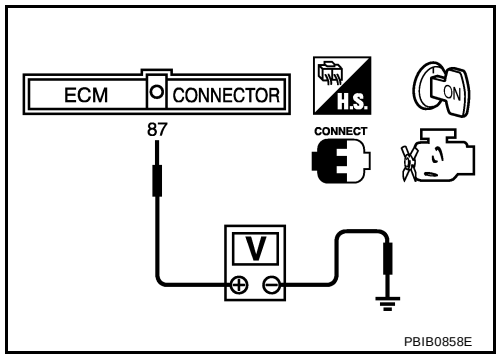


WITH GST

NOTE:

Start from step 11, if it is possible to confirm that the fuel cannot be drained by 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) in advance.

1. Prepare a fuel container and a spare hose.
2. Release fuel pressure from fuel line, refer to EC-1255, "FUEL PRESSURE RELEASE" .
3. Remove the fuel feed hose on the fuel level sensor unit.
4. Connect a spare fuel hose where the fuel feed hose was removed.
5. Turn ignition switch “OFF”.
6. Set voltmeters probe between ECM terminal 87 (fuel level sensor signal) and ground.
7. Turn ignition switch “ON”.
8. Check voltage between ECM terminal 87 and ground and note it.
9. Drain fuel by 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) from the fuel tank using proper equipment.
10. Fill fuel into the fuel tank for 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal).
11. Confirm that the voltage between ECM terminal 69 and ground changes more than 0.03V during step 8 - 10.
    If NG, check component of fuel level sensor, refer to DI-23, "FUEL LEVEL SENSOR UNIT CHECK" .



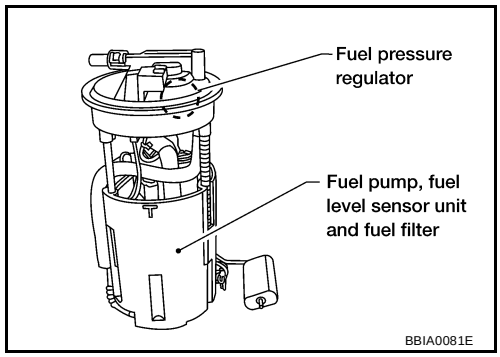
DTC P0462, P0463 FUEL LEVEL SENSOR

PFP:25060

Component Description

UBS002FC

The fuel level sensor is mounted in the fuel level sensor unit. The sensor detects a fuel level in the fuel tank and transmits a signal to the ECM.
It consists of two parts, one is mechanical float and the other side is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.



On Board Diagnosis Logic

UBS002FD

ECM receives two signals from the fuel level sensor circuit.
One is fuel level sensor power supply circuit, and the other is fuel level sensor ground circuit.
This diagnosis indicates the former, to detect open or short circuit malfunction.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0462 0462	Fuel level sensor circuit low input	An excessively low voltage is sent from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted) ● Fuel level sensor
P0463 0463	Fuel level sensor circuit high input	An excessively high voltage is sent from the sensor is sent to ECM.	

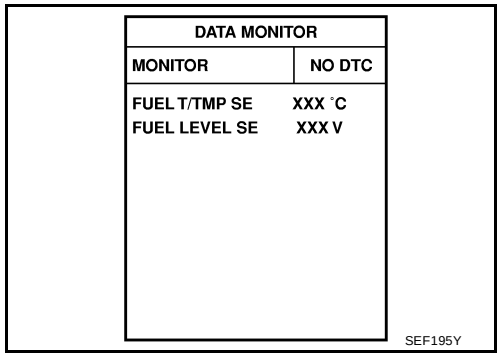
DTC Confirmation Procedure

UBS002FE

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-1583, "Diagnostic Procedure" .

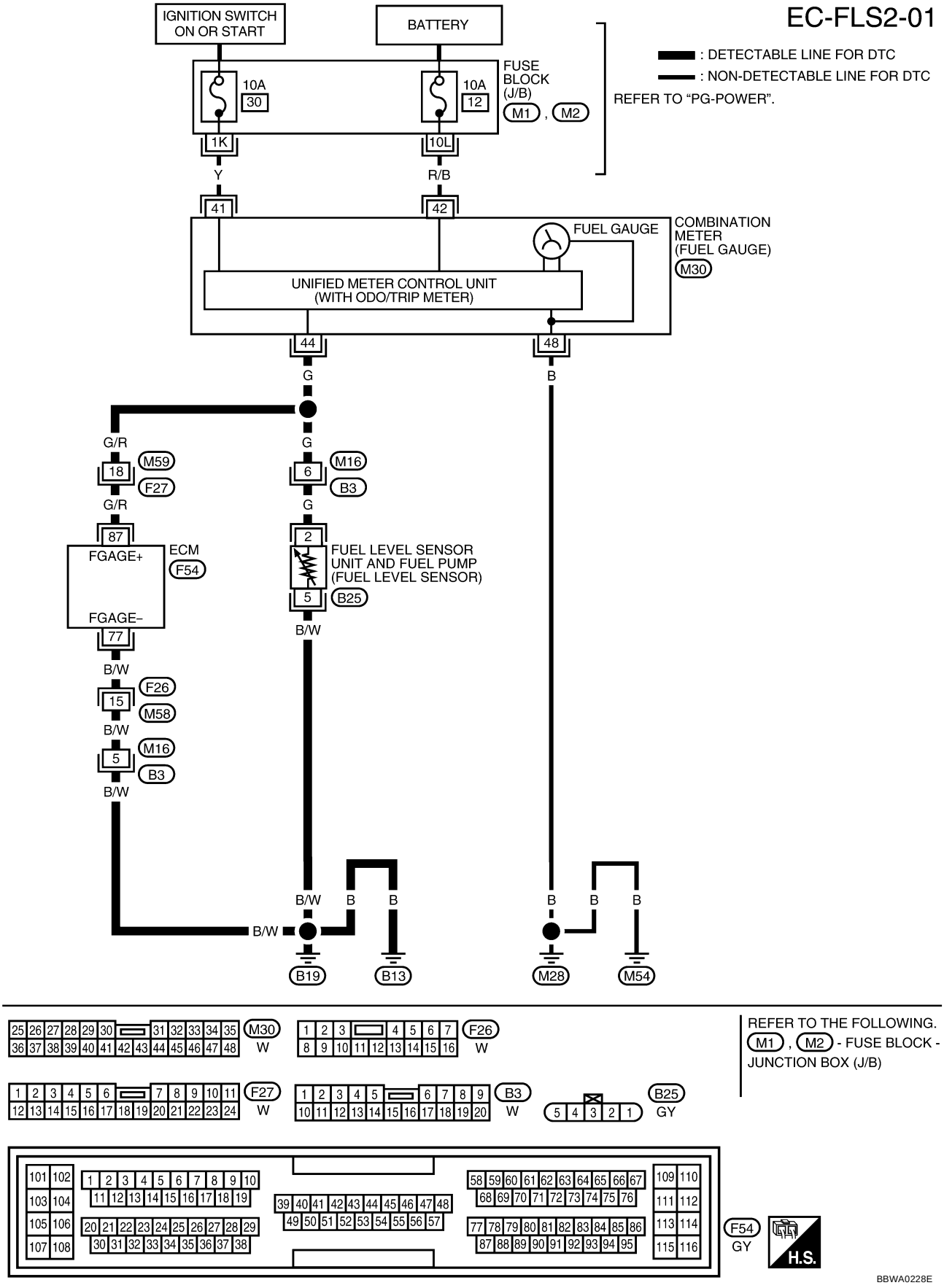


WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS002FF



BBWA0228E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

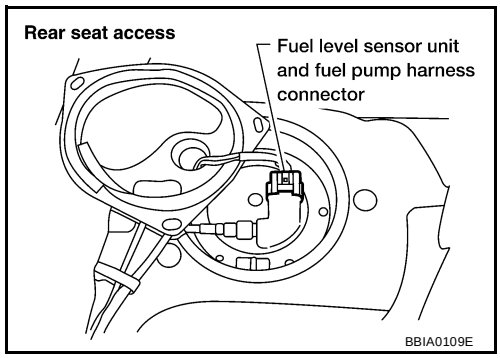
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
77	B/W	Fuel level sensor ground	**[Engine is running]** ● Idle speed	Approximately 0V
87	G/R	Fuel level sensor	**[Ignition switch "ON"]**	Approximately 0 - 4.8V Output voltage varies with fuel level.

Diagnostic Procedure

UBS002FG

1. CHECK FUEL LEVEL SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect fuel level sensor unit and fuel pump harness connector.
3. Turn ignition switch "ON".

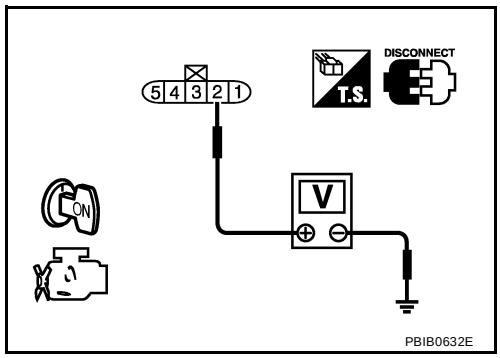


4. Check voltage between fuel level sensor unit and fuel pump terminal 2 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 3.
NG >> GO TO 2.



2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M16, B3
- Harness for open or short between combination meter and fuel level sensor unit and fuel pump

>> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK FUEL LEVEL SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Check harness continuity between fuel level sensor unit and fuel pump terminal 5 and body ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to power in harness or connectors.

4. CHECK FUEL LEVEL SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 87 and fuel level sensor unit and fuel pump terminal 2. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground or short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M16, B3
- Harness connectors M59, F27
- Harness for open or short between ECM and fuel level sensor unit and fuel pump

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK FUEL LEVEL SENSOR

Refer to DI-23, "FUEL LEVEL SENSOR UNIT CHECK" .

OK or NG

OK >> GO TO 7.
NG >> Replace fuel level sensor.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Removal and Installation

UBS002FH

FUEL LEVEL SENSOR

Refer to FL-3, "FUEL LEVEL SENSOR UNIT, FUEL FILTER AND FUEL PUMP ASSEMBLY" .

DTC P0500 VSS

PFP:32702

Description

UBS002FI

The vehicle speed sensor is installed in the transaxle. It contains a pulse generator which provides a vehicle speed signal to the combination meter. The combination meter then sends a signal to the ECM.

On Board Diagnosis Logic

UBS002FJ

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0500 0500	Vehicle speed sensor	The almost 0 km/h (0 MPH) signal from vehicle speed sensor is sent to ECM even when vehicle is being driven.	● Harness or connectors (The vehicle speed sensor circuit is open or shorted) ● Vehicle speed sensor ● Combination meter

DTC Confirmation Procedure

UBS002FK

CAUTION:
Always drive vehicle at a safe speed.

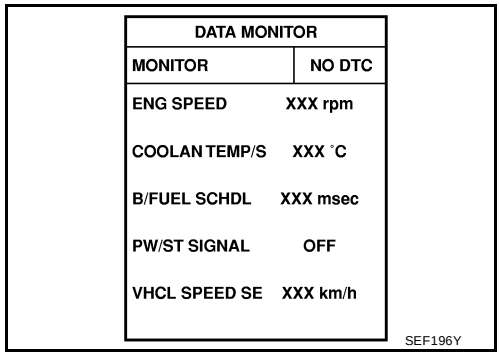
NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Steps 1 and 2 may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

WITH CONSULT-II

1. Start engine.
2. Read “VHCL SPEED SE” in “DATA MONITOR” mode with CONSULT-II. The vehicle speed on CONSULT-II should exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.
   If NG, go to EC-1587, "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	1,200 - 6,000 rpm
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	6.0 - 31.8 msec
Selector lever	Suitable position
PW/ST SIGNAL	OFF



6. If 1st trip DTC is detected, go to EC-1587, "Diagnostic Procedure" .

Overall Function Check

UBS002FL

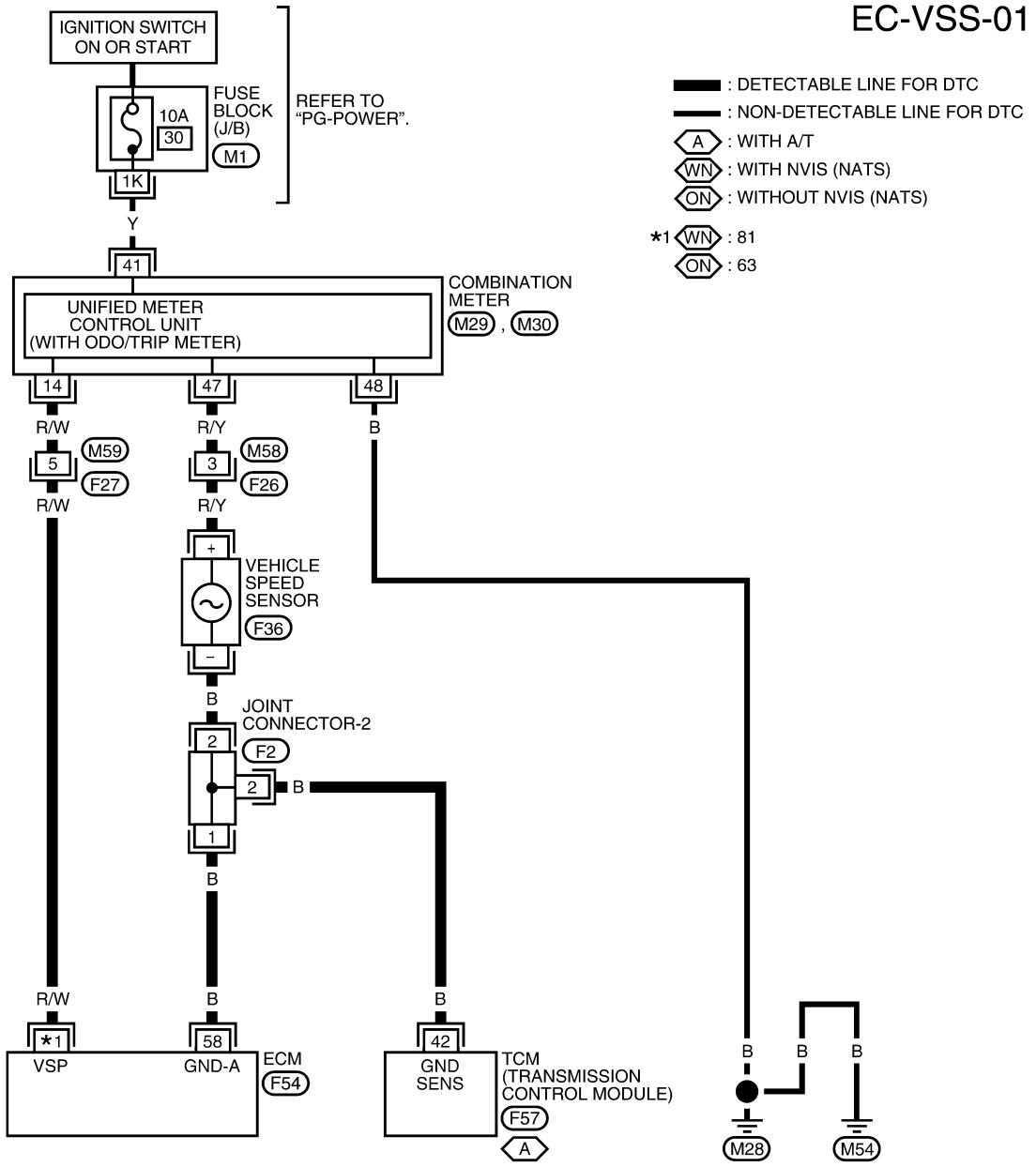
Use this procedure to check the overall function of the vehicle speed sensor circuit. During this check, a 1st trip DTC might not be confirmed.

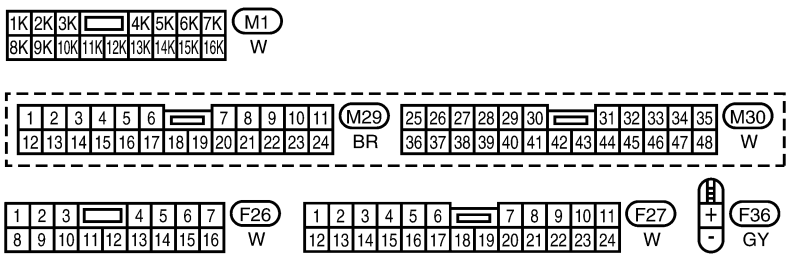
WITH GST

1. Lift up drive wheels.
2. Start engine.
3. Read vehicle speed sensor signal in “MODE 1” with GST.
   The vehicle speed sensor on GST should be able to exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.
4. If NG, go to EC-1587, "Diagnostic Procedure" .

Wiring Diagram

UBS002FM



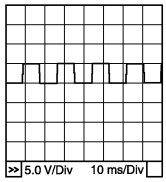


REFER TO THE FOLLOWING.
F2 - JOINT CONNECTOR
F54 , F57 - ELECTRICAL UNITS

BBWA0262E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
63 Without NVIS (NATS) 81 With NVIS (NATS)	R/W	Vehicle speed sensor	**[Engine is running]** ● Lift up the vehicle ● Vehicle speed is 40 km/h (25MPH)	Approximately 2.3V★  PBIB0531E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

UBS002FN

1. CHECK INPUT SIGNAL CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector and combination meter harness connector.
3. Check harness continuity between ECM terminal 81 (Models with NVIS) or 63 (Models without NVIS) and combination meter terminal 14.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M59, F27
- Harness for open or short between ECM and combination meter

>> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK SPEEDOMETER FUNCTION

Make sure that speedometer functions properly.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. CHECK SPEEDOMETER CIRCUIT FOR OPEN AND SHORT

Check the following.

- Harness connectors M58, F26
- Joint connector-2
- Harness for open or short between combination meter and vehicle speed sensor
- Harness for open or short between vehicle speed sensor and ECM
- Harness for open or short between vehicle speed sensor and TCM

OK or NG

OK >> Check combination meter and vehicle speed sensor. Refer to DI-3, "METERS AND GAUGES" .
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK INTERMITTENT INCIDENT

Perform EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

DTC P0506 ISC SYSTEM

PFP:23781

Description

UBS002FO

NOTE:
If DTC P0506 is displayed with other DTC, first perform the trouble diagnosis for the other DTC displayed.
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

UBS002FP

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0506 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 ● Intake air leak

DTC Confirmation Procedure

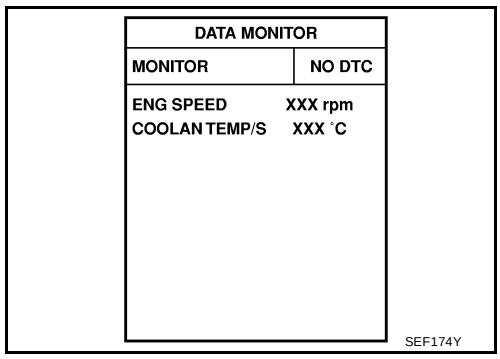
UBS002FQ

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 EC-1253, "Idle Air Volume Learning" , before conducting “DTC Confirmation Procedure”. For the target idle speed, refer to the EC-1852, "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-1590, "Diagnostic Procedure" .



WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

UBS002FR

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 NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs. Refer to EC-1273, "NVIS (Nissan Vehicle Immobilizer System — NATS)" .
4. Perform EC-1253, "Accelerator Pedal Released Position Learning" .
5. Perform EC-1253, "Throttle Valve Closed Position Learning" .
6. Perform EC-1253, "Idle Air Volume Learning" .

>> **INSPECTION END**

DTC P0507 ISC SYSTEM

PFP:23781

Description

UBS002FS

NOTE:
If DTC P0507 is displayed with other DTC, first perform the trouble diagnosis for the other DTC displayed.
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

UBS002FT

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0507 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 ● Intake air leak ● PCV system

DTC Confirmation Procedure

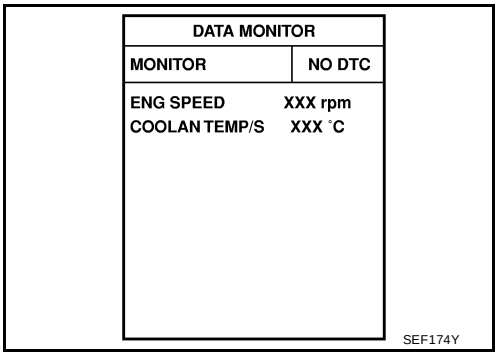
UBS002FU

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 EC-1253, "Idle Air Volume Learning" , before conducting “DTC Confirmation Procedure”. For the target idle speed, refer to the EC-1852, "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-1592, "Diagnostic Procedure" .



WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

UBS002FV

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 NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs. Refer to EC-1273, "NVIS (Nissan Vehicle Immobilizer System — NATS)" .
4. Perform EC-1253, "Accelerator Pedal Released Position Learning" .
5. Perform EC-1253, "Throttle Valve Closed Position Learning" .
6. Perform EC-1253, "Idle Air Volume Learning" .

>> **INSPECTION END**

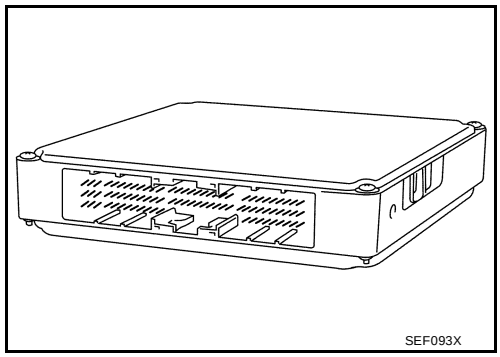
DTC P0605 ECM

PFP:23710

Component Description

UBS002FW

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The ECM controls the engine.



On Board Diagnosis Logic

UBS002FX

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P0605 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 malfunction A is detected.

Detected items	Engine operation condition in fail-safe mode
Malfunction A	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC Confirmation Procedure

UBS002FY

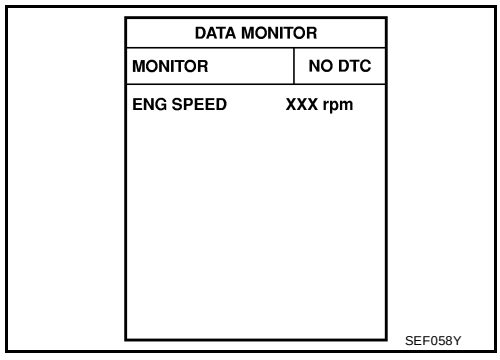
Perform “PROCEDURE FOR MALFUNCTION A” first. If the 1st trip DTC cannot be confirmed, perform “PROCEDURE FOR MALFUNCTION B”. If there is no problem on “PROCEDURE FOR MALFUNCTION B”, perform “PROCEDURE FOR MALFUNCTION C”.

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-1594, "Diagnostic Procedure" .



With GST

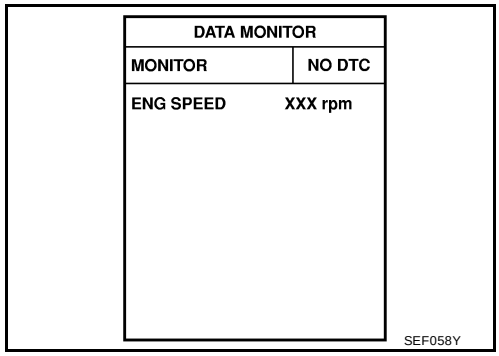
Follow the procedure “With CONSULT-II” above.

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-1594, "Diagnostic Procedure" .



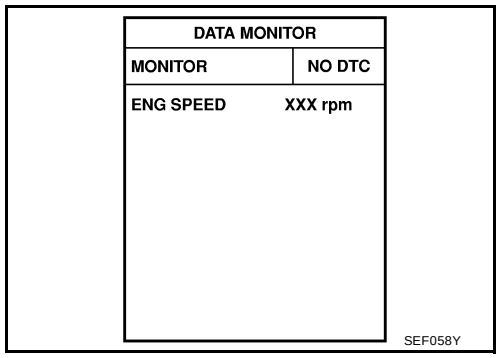
With GST

Follow the procedure “With CONSULT-II” above.

PROCEDURE FOR MALFUNCTION C

With CONSULT-II

1. Turn ignition switch “ON” and wait at least 1 second.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Turn ignition switch “OFF”, wait at least 10 seconds, and then turn “ON”.
4. Repeat step 3 procedure, 32 times.
5. If 1st trip DTC is detected, go to EC-1594, "Diagnostic Procedure" .



With GST

Follow the procedure “With CONSULT-II” above.

Diagnostic Procedure

UBS002FZ

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-1593 .
5. Is the 1st trip DTC P0605 displayed again?

With GST

1. Turn ignition switch “ON”.
2. Select MODE 4 with GST.
3. Touch “ERASE”.
4. **Perform “DTC Confirmation Procedure”.**
   See EC-1593 .
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 NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs. Refer to EC-1273, "NVIS (Nissan Vehicle Immobilizer System — NATS)" .
3. Perform EC-1253, "Accelerator Pedal Released Position Learning" .
4. Perform EC-1253, "Throttle Valve Closed Position Learning" .
5. Perform EC-1253, "Idle Air Volume Learning" .

>> **INSPECTION END**

DTC P0650 MIL

PFP:24810

Component Description

UBS002G0

Malfunction Indicator Lamp (MIL) is located on the instrument panel. When the ignition switch is turned ON without engine running, MIL will light up. This is a bulb check. When the engine is started, MIL should go off. If MIL remains on, the on board diagnostic system has detected an engine system malfunction.

On Board Diagnosis Logic

UBS002G1

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0650 0650	Malfunction indicator (MIL) control circuit	● An excessively high voltage is sent to ECM through the MIL circuit under the condition that calls for MIL light up. ● An excessively low voltage is sent to ECM through the MIL circuit under the condition that calls for MIL not to light up.	● Harness or connectors (MIL circuit is open or shorted.) ● MIL

FAIL-SAFE MODE

ECM enters in fail-safe mode when both DTC P0650 and another DTC, which calls for MIL to light up, are detected at the same time.

Detected items	Engine operating condition in fail-safe mode
MIL circuit	Engine speed will not rise more than 2,500 rpm due to the fuel cut

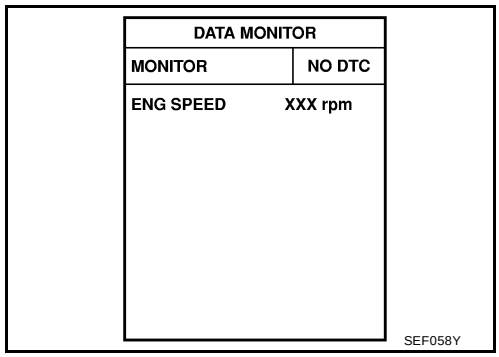
DTC Confirmation Procedure

UBS002G2

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch “ON” and wait at least 1 second.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to EC-1598, "Diagnostic Procedure" .



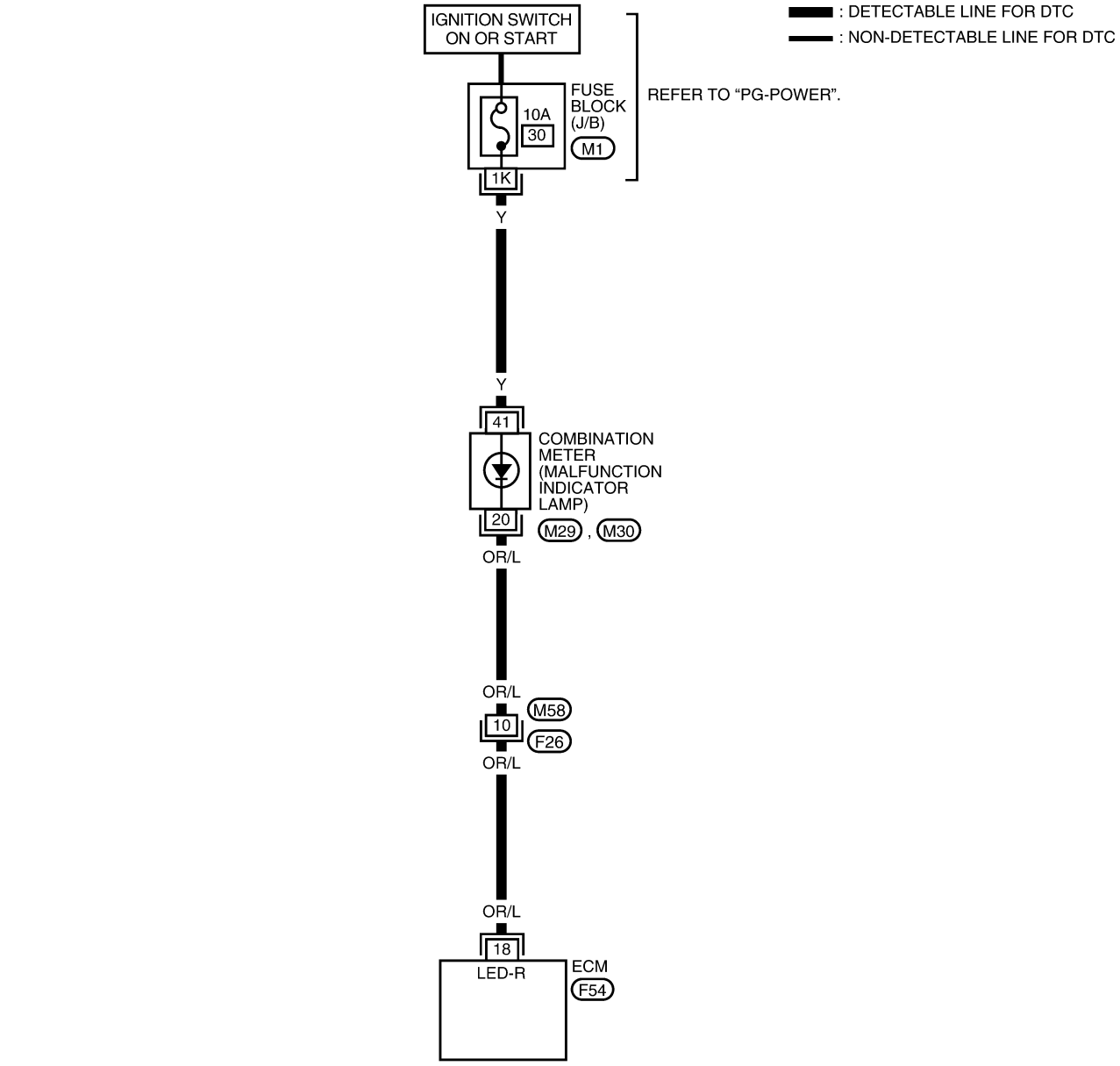
WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS002G3

EC-MIL-01



Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
18	OR/L	MIL	**[Ignition switch "ON"]**	0 - 1.0V
			[Engine is running] ● Idle speed	BATTERY VOLTAGE (11 - 14V)

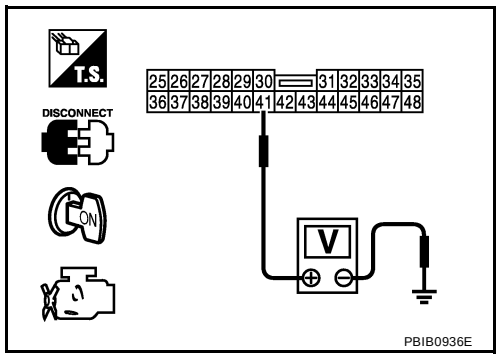
Diagnostic Procedure

UBS002G4

1. CHECK MIL POWER SUPPLY

1. Turn ignition switch "OFF".
2. Disconnect combination meter harness connector.
3. Turn ignition switch "ON".
4. Check voltage between combination meter terminal 41 and ground with CONSULT-II or tester

Voltage: Battery voltage



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector M1
- 10A fuse
- Harness for open or short between fuse and combination meter

>> Repair harness or connectors.

3. CHECK MIL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 18 and combination meter terminal 20. 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

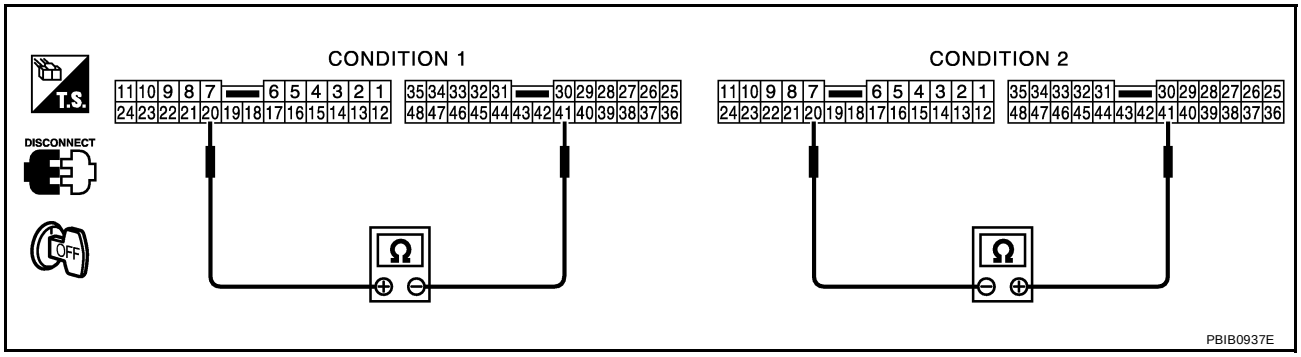
Check the following.

- Harness connectors M59, F26
- Harness for open or short between ECM and combination meter

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK COMBINATION METER

1. Turn ignition switch “OFF”.
2. Disconnect combination meter harness connectors.
3. Check continuity under the following conditions.



CONDITION	Combination meter terminal No. (Polarity)	Continuity
1	20 (+) - 41 (–)	Should exist.
2	41 (+) - 20 (–)	Should not exist.

OK or NG

OK >> GO TO 6.
NG >> Replace combination meter. Refer to DI-6, "Combination Meter" .

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

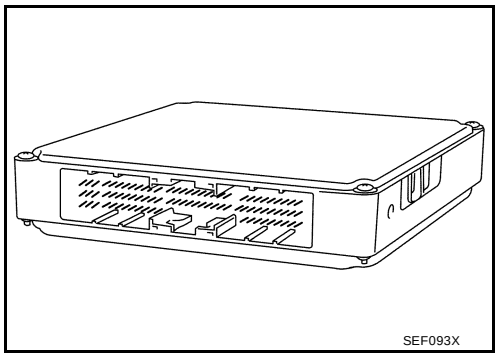
DTC P1065 ECM POWER SUPPLY

PFP:23710

Component Description

UBS002G5

Battery voltage is supplied to the ECM even when the ignition switch is turned OFF for the ECM memory function of the DTC memory, the air fuel ratio feedback compensation value memory, the idle air volume learning value memory, etc.



On Board Diagnosis Logic

UBS002G6

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1065 1065	ECM power supply circuit	ECM back up RAM system does not function properly.	● Harness or connectors [ECM power supply (back-up) circuit is open or shorted.] ● ECM

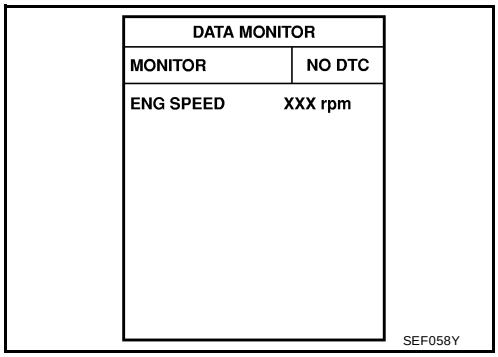
DTC Confirmation Procedure

UBS002G7

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch “ON” and wait at least 1 second.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. Turn ignition switch “OFF”, wait at least 10 seconds, and then turn “ON”.
5. Repeat steps 3 and 4 four times.
6. If 1st trip DTC is detected, go to EC-1602, "Diagnostic Procedure" .



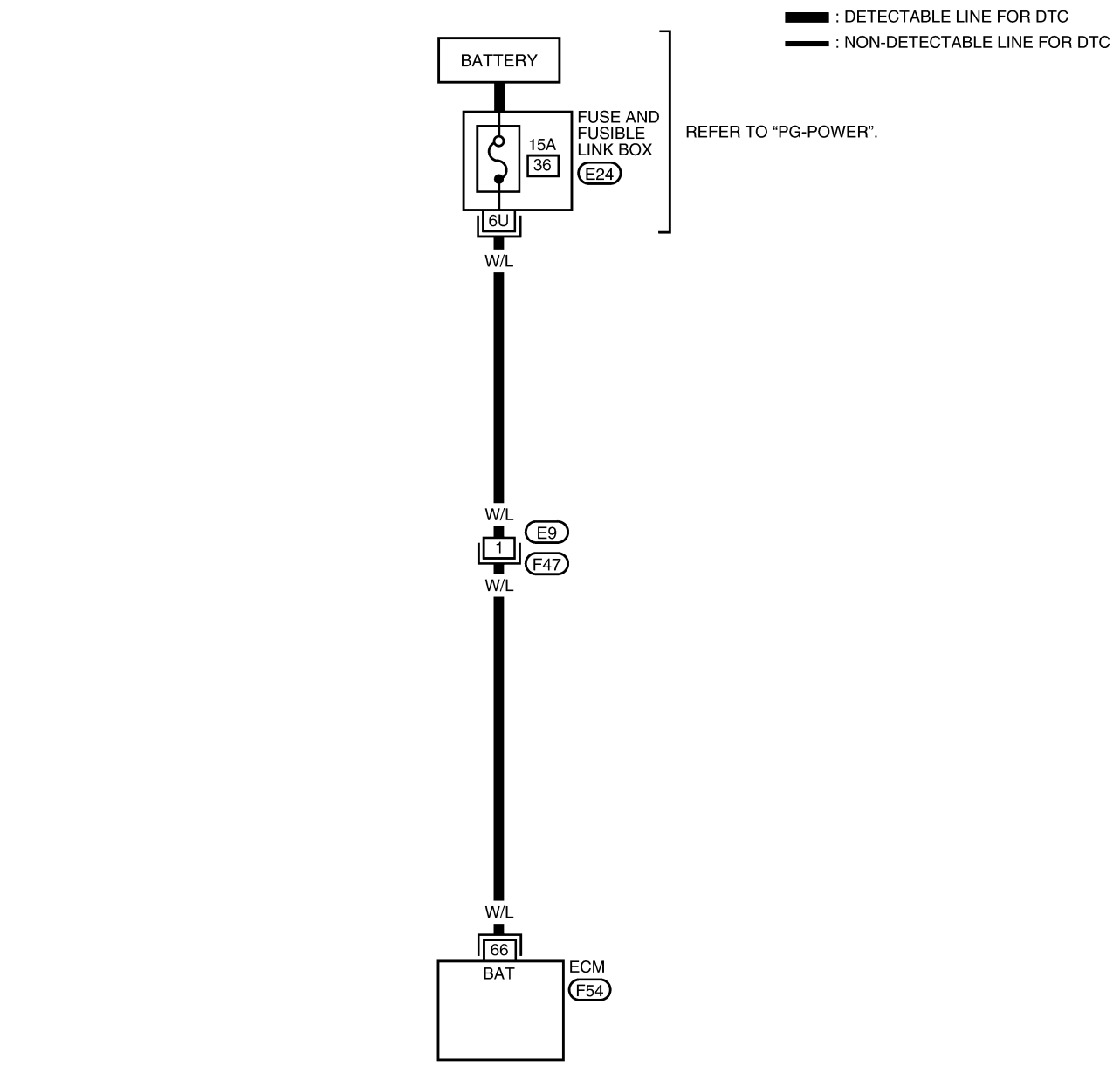
WITH GST

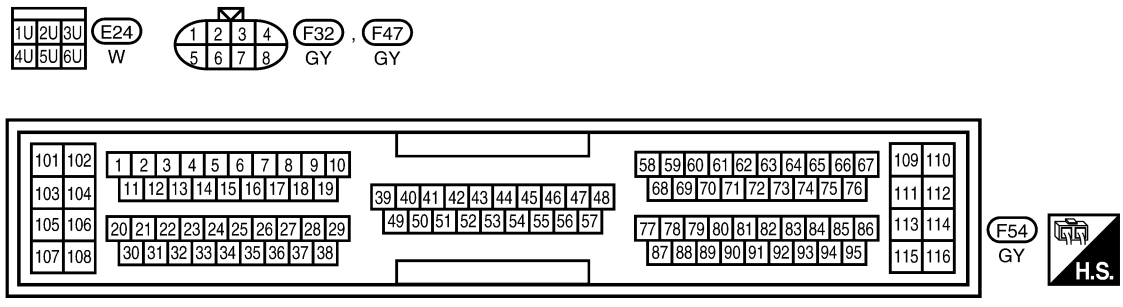
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS002G8

EC-ECM/PW-01





BBWA0231E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/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)
66	W/L	Power supply for ECM (Buck-up)	**[Ignition switch "OFF"]**	BATTERY VOLTAGE (11 - 14V)

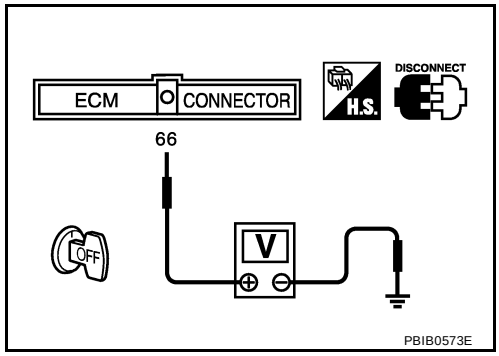
Diagnostic Procedure

UBS002G9

1. CHECK ECM POWER SUPPLY

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check voltage between ECM terminal 66 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 E9, F47
- Fuse and fusible link box connector E24
- 15A fuse
- Harness for open or short between ECM and battery

>> Repair or replace harness or connectors.

3. CHECK INTERMITTENT INCIDENT

Refer to EC-1339, "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-1600 .
5. Is the 1st trip DTC P1065 displayed again?

With GST

1. Turn ignition switch “ON”.
2. Select MODE 4 with GST.
3. Touch “ERASE”.
4. **Perform “DTC Confirmation Procedure”.**
   See EC-1600 .
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 NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs. Refer to EC-1273, "NVIS (Nissan Vehicle Immobilizer System — NATS)" .
3. Perform EC-1253, "Accelerator Pedal Released Position Learning" .
4. Perform EC-1253, "Throttle Valve Closed Position Learning" .
5. Perform EC-1253, "Idle Air Volume Learning" .

>> **INSPECTION END**

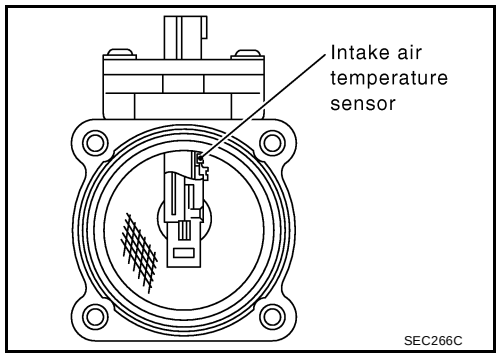
DTC P1102 MAF SENSOR

PFP:22680

Component Description

UBS002GA

The mass air flow sensor is placed in the stream of intake air. It measures the intake flow rate by measuring a part of the entire intake flow. It consists of a hot film that is supplied with electric current from the ECM. The temperature of the hot film is controlled by the ECM a certain amount. The heat generated by the hot film is reduced as the intake air flows around it. The more air, the greater the heat loss.
Therefore, the ECM must supply more electric current to maintain the temperature of the hot film as air flow increases. The ECM detects the air flow by means of this current change.



CONSULT-II Reference Value in Data Monitor Mode

UBS002GB

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAS A/F SE-B1	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: N ● No-load	Idle	Approx. 1.1 - 1.5V
		2,500 rpm	Approx. 1.6 - 2.0V
CAL/LD VALUE	● Engine: After warming up ● Shift lever: N ● Air conditioner switch: OFF ● No-load	Idle	10% - 35%
		2,500 rpm	10% - 35%
MASS AIRFLOW	● Engine: After warming up ● Shift lever: N ● Air conditioner switch: OFF ● No-load	Idle	1.0 - 4.0 g·m/s
		2,500 rpm	4.0 - 10.0 g·m/s

On Board Diagnosis Logic

UBS002GC

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1102 1102	Mass air flow sensor circuit range/performance problem	A voltage from the sensor is constantly approx.1.0V when engine is running.	● Harness or connectors (The sensor circuit is open or shorted.) ● Mass air flow sensor

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

Detected items	Engine operating condition in fail-safe mode
Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.

DTC Confirmation Procedure

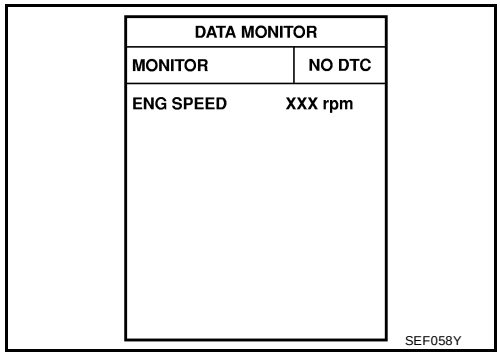
UBS002GD

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 5 seconds at most.
4. If DTC is detected, go to EC-1607, "Diagnostic Procedure" .

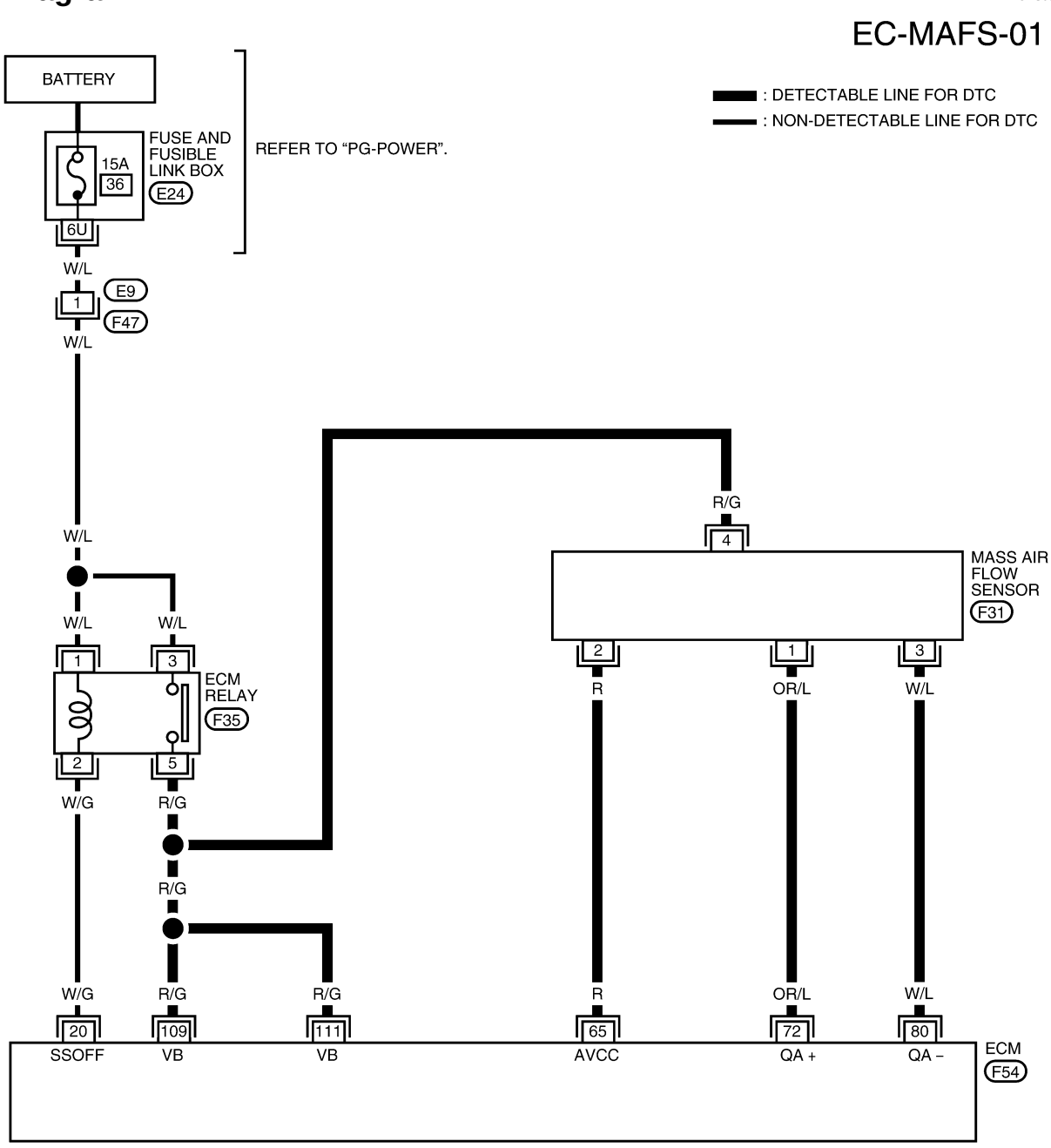


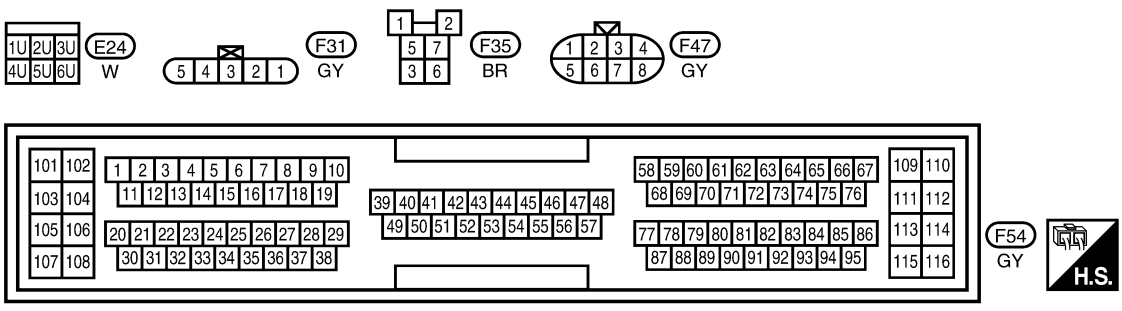
WITH GST

Follow the procedure “With CONSULT-II” above.

Wiring Diagram

UBS002GE





BBWA0213E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/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)
65	R	Sensor's power supply	**[Ignition switch "ON"]**	Approximately 5V
72	OR/L	Mass air flow sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	1.1 - 1.5V
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,500 rpm.	1.6 - 2.0V
80	W/L	Mass air flow sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

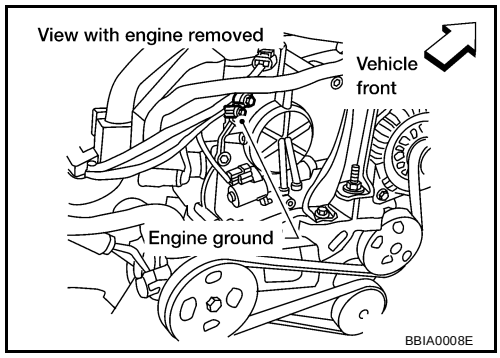
Diagnostic Procedure

UBS002GF

1. RETIGHTEN GROUND SCREWS

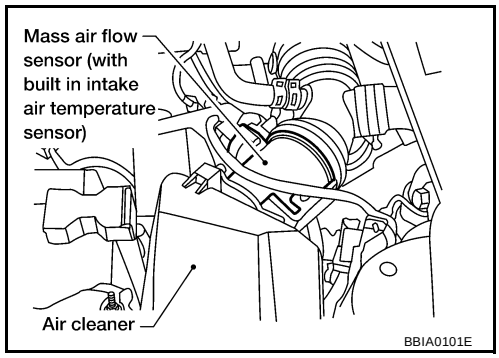
1. Turn ignition switch "OFF".
2. Loosen and retighten engine ground screws.

>> GO TO 2.



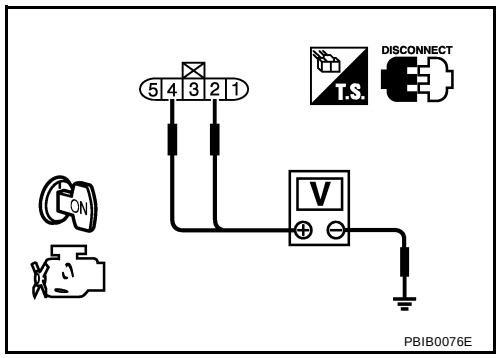
2. CHECK MAF SENSOR POWER SUPPLY CIRCUIT

1. Disconnect MAF sensor harness connector.
2. Turn ignition switch “ON”.



3. Check voltage between MAF sensor terminals 2, 4 and ground with CONSULT-II or tester.

Terminal	Voltage
2	Approximately 5V
4	Battery voltage



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between mass air flow sensor and ECM relay
- Harness for open or short between mass air flow sensor and ECM

>> Repair harness or connectors.

4. 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 80. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK MAF SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between MAF sensor terminal 1 and ECM terminal 72. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK MASS AIR FLOW SENSOR

Refer to EC-1609, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace mass air flow sensor.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

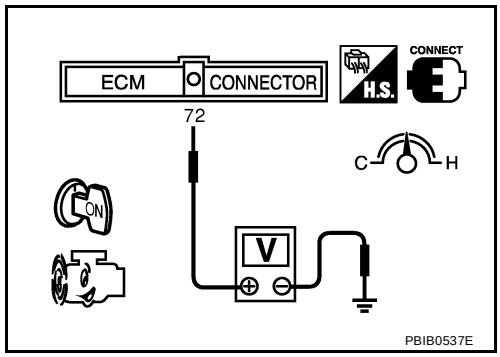
Component Inspection

UBS002GG

MASS AIR FLOW SENSOR

1. Reconnect harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 72 (Mass air flow sensor signal) and ground.

Condition	Voltage V
Ignition switch “ON” (Engine stopped.)	Approx. 1.0
Idle (Engine is warmed-up to normal operating temperature.)	1.1 - 1.5
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.6 - 2.0
Idle to about 4,000 rpm*	1.5 - 2.0 to Approx. 4.0



*: Check for liner voltage rise in response to engine being increased to about 4,000 rpm.

4. If the voltage is out of specification, proceed the following.

a. Turn ignition switch “OFF”.
b. Disconnect mass air flow sensor harness connector and reconnect it again.
c. Perform steps 2 and 3 again.

5. If NG, remove mass air flow sensor from air duct. Check hot film for damage or dust.
6. If NG, clean or replace mass air flow sensor.

Removal and Installation

UBS002GH

MASS AIR FLOW SENSOR

Refer to EM-91, "AIR CLEANER AND AIR DUCT" .

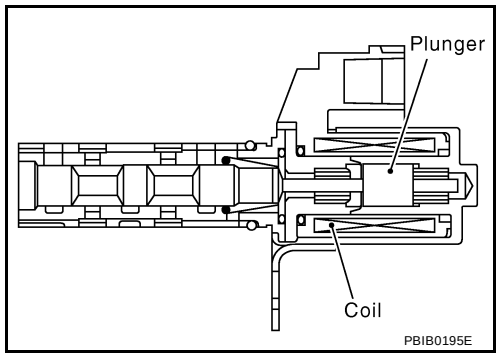
DTC P1111 IVT CONTROL SOLENOID VALVE

PFP:23796

Component Description

UBS002GI

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

UBS002GJ

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
INT/V SOL (B1)	● Engine: After warming up ● Shift lever: N ● Air conditioner switch: OFF ● No-load	Idle	0% - 2%
		2,000 rpm	Approx. 25% - 60%

On Board Diagnosis Logic

UBS002GK

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1111 1111	Intake valve timing control solenoid valve circuit	An improper voltage is sent to the ECM through intake valve timing control solenoid valve.	● Harness or connectors (Intake valve timing control solenoid valve circuit is open or shorted.) ● Intake valve timing control solenoid valve

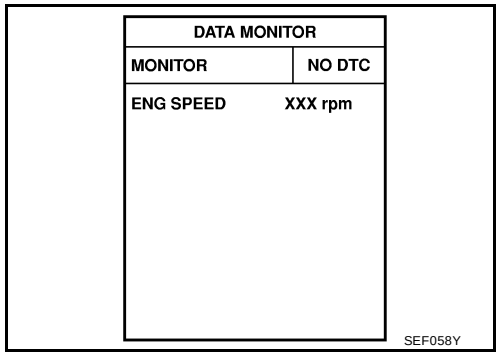
DTC Confirmation Procedure

UBS002GL

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-1612, "Diagnostic Procedure" .



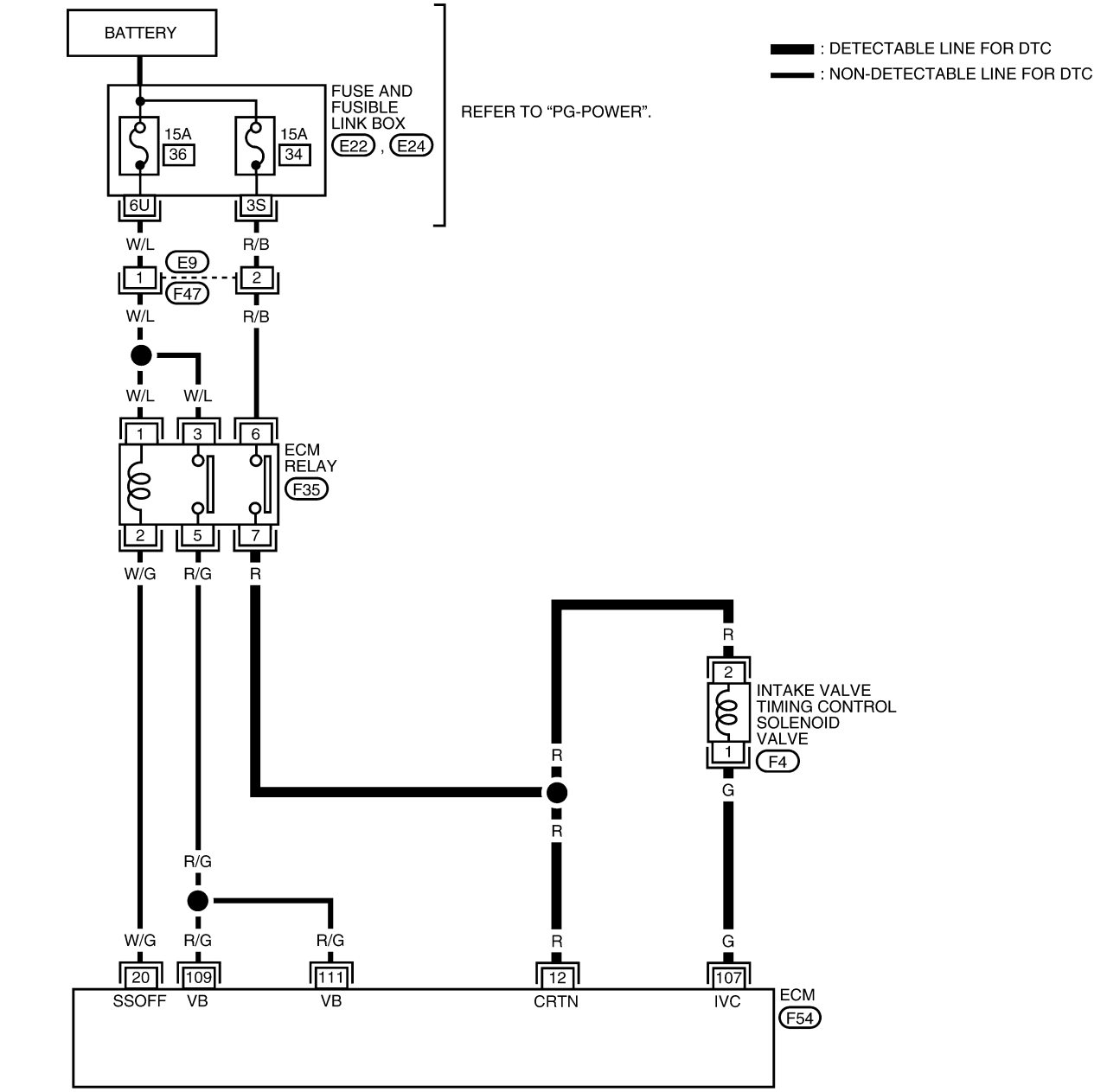
WITH GST

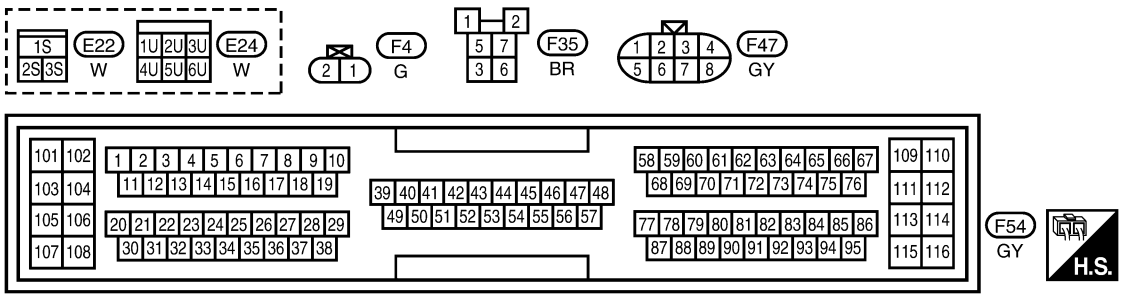
Following the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS002GM

EC-IVC-01

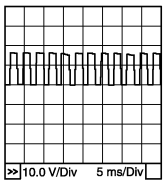




BBWA0232E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
107	G	Intake valve timing control solenoid valve	**[Engine is running]** ● **Warm-up condition** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	Approximately 9V★  PBIB0532E

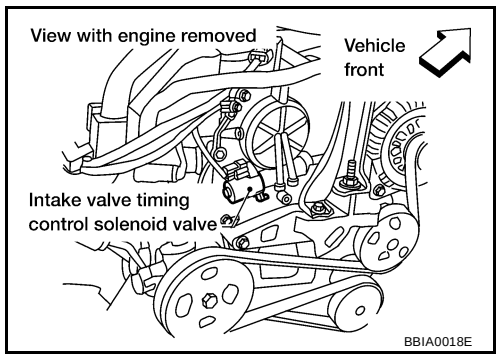
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

UBS002GN

1. CHECK POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect intake valve timing control solenoid valve harness connector.
3. Turn ignition switch “ON”.

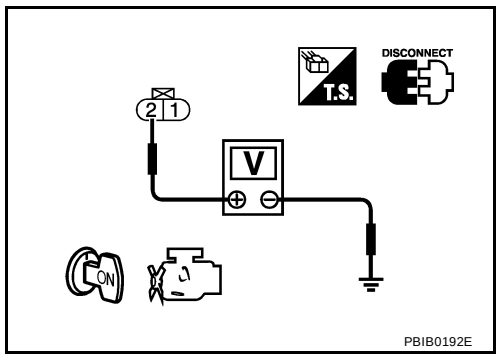


4. Check voltage between intake valve timing control solenoid valve terminal 2 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 3.
NG >> GO TO 2.



2. DETECT MALFUNCTION PART

Check the following.

- Harness for open or short between intake valve timing control solenoid valve and ECM
- Harness for open or short between intake valve timing control solenoid valve and ECM relay

>> Repair or replace harness or connectors.

3. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 107 and intake valve timing control solenoid valve terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.
4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EC-1613, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace intake valve timing control solenoid valve.

5. CHECK INTERMITTENT INCIDENT

Refer to EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

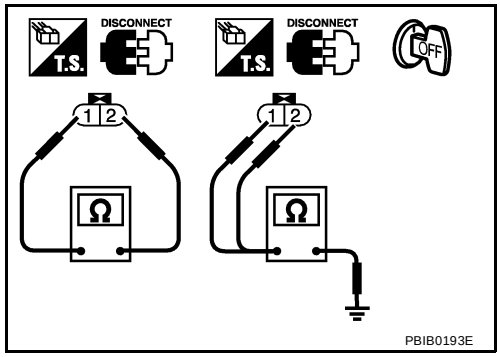
Component Inspection

UBS002GO

INTAKE VALVE TIMING CONTROL SOLENOID VALVE

1. Disconnect intake valve timing control solenoid valve harness connector.
2. Check resistance between intake valve timing control solenoid valve terminals 1 and 2.

Terminals	Resistance
1 and 2	Approximately 8Ω at 20°C (68°F)
1 or 2 and ground	∞Ω (Continuity should not exist)



Removal and Installation

UBS002GP

INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EM-121, "TIMING CHAIN" .

DTC P1121 ELECTRIC THROTTLE CONTROL ACTUATOR

PFP:16119

Component Description

UBS002GQ

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

UBS002GR

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P1121 1121	Electric throttle control actuator	A)	Electric throttle control actuator does not function properly due to the return spring malfunction.	● Electric throttle control actuator
		B)	Throttle valve opening angle in fail-safe mode is not in specified range.	
		C)	ECM detect the throttle valve is stuck open. **This self-diagnosis has the one trip detection logic.**	

FAIL-SAFE MODE

When the malfunction A or B is detected in the two consecutive trips, the ECM enters in fail-safe mode and the MIL lights up.
When the malfunction C is detected even in the 1st trip, the ECM enters in fail-safe mode and the MIL lights up.

Detected items	Engine operating condition in fail-safe mode
Malfunction A	The ECM controls the electric throttle actuator by regulating the throttle opening around the idle position. The engine speed will not rise more than 2,000 rpm.
Malfunction B	ECM controls the electric throttle control actuator by regulating the throttle opening to 20 degrees or less.
Malfunction C	While the vehicle is driving, it slows down gradually by fuel cut. After the vehicle stops, the engine stalls. The engine can restart in “N” or “P” position, and engine speed will not exceed 1,000 rpm or more.

DTC Confirmation Procedure

UBS002GS

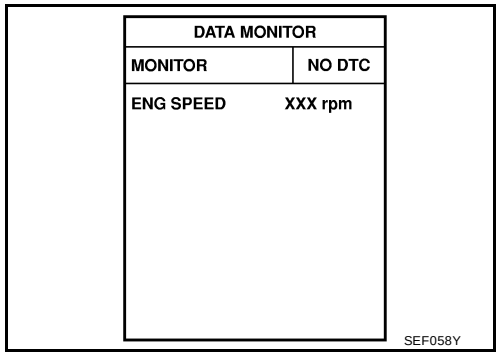
NOTE:

- **Perform “PROCEDURE FOR MALFUNCTION A AND B” first. If the 1st trip DTC cannot be confirmed, perform “PROCEDURE FOR MALFUNCTION C”.**
  If there is no problem on “PROCEDURE FOR MALFUNCTION A AND B”, perform “PROCEDURE FOR MALFUNCTION C”.
- If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR MALFUNCTION A AND B

With CONSULT-II

1. Turn ignition witch “ON” and wait at least 1 second.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Shift selector lever to “D” position (A/T), “1st” position (M/T) and wait at least 2 seconds.
4. Turn ignition switch “OFF”, wait at least 10 seconds, and then turn “ON”.
5. If 1st trip DTC is detected, go to EC-1618, "Diagnostic Procedure" .



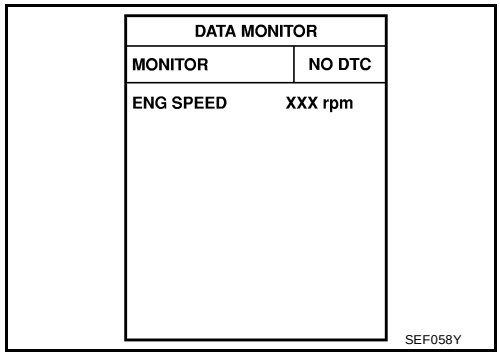
With GST

Follow the procedure “With CONSULT-II” above.

PROCEDURE FOR MALFUNCTION C

With CONSULT-II

1. Turn ignition switch “ON” and wait at least 1 second.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Shift selector lever to “D” position (A/T), “1st” position (M/T) and wait at least 2 seconds.
4. Shift selector lever to “N” or “P” position.
5. Start engine and let it idle for 3 seconds.
6. If DTC is detected, go to EC-1618, "Diagnostic Procedure" .



With GST

Follow the procedure “With CONSULT-II” above.

Diagnostic Procedure

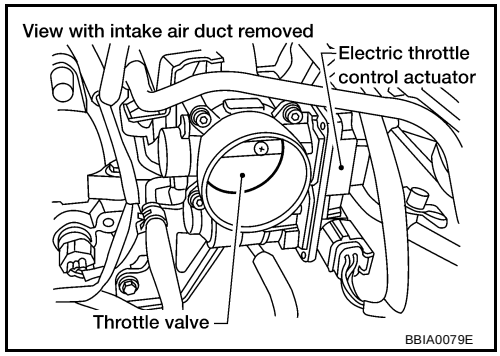
UBS002GT

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-1253, "Throttle Valve Closed Position Learning" .
3. Perform EC-1253, "Idle Air Volume Learning" .

>> **INSPECTION END**

DTC P1122 ELECTRIC THROTTLE CONTROL FUNCTION

PFP:16119

Description

UBS002GU

NOTE:
If DTC P1122 is displayed with DTC P1121 or 1126, first perform the trouble diagnosis for DTC P1121 or P1126. Refer to EC-1614 or EC-1623 .

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

UBS002GV

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1122 1122	Electric throttle control performance problem	Electric throttle control function does not operate properly.	● Harness or connectors (Throttle control motor circuit is open or shorted) ● Electric throttle control actuator

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the 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.

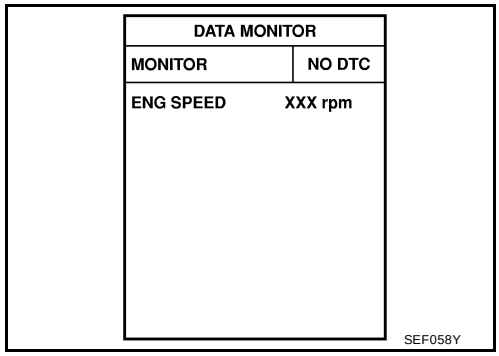
DTC Confirmation Procedure

UBS002GW

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-1618, "Diagnostic Procedure" .



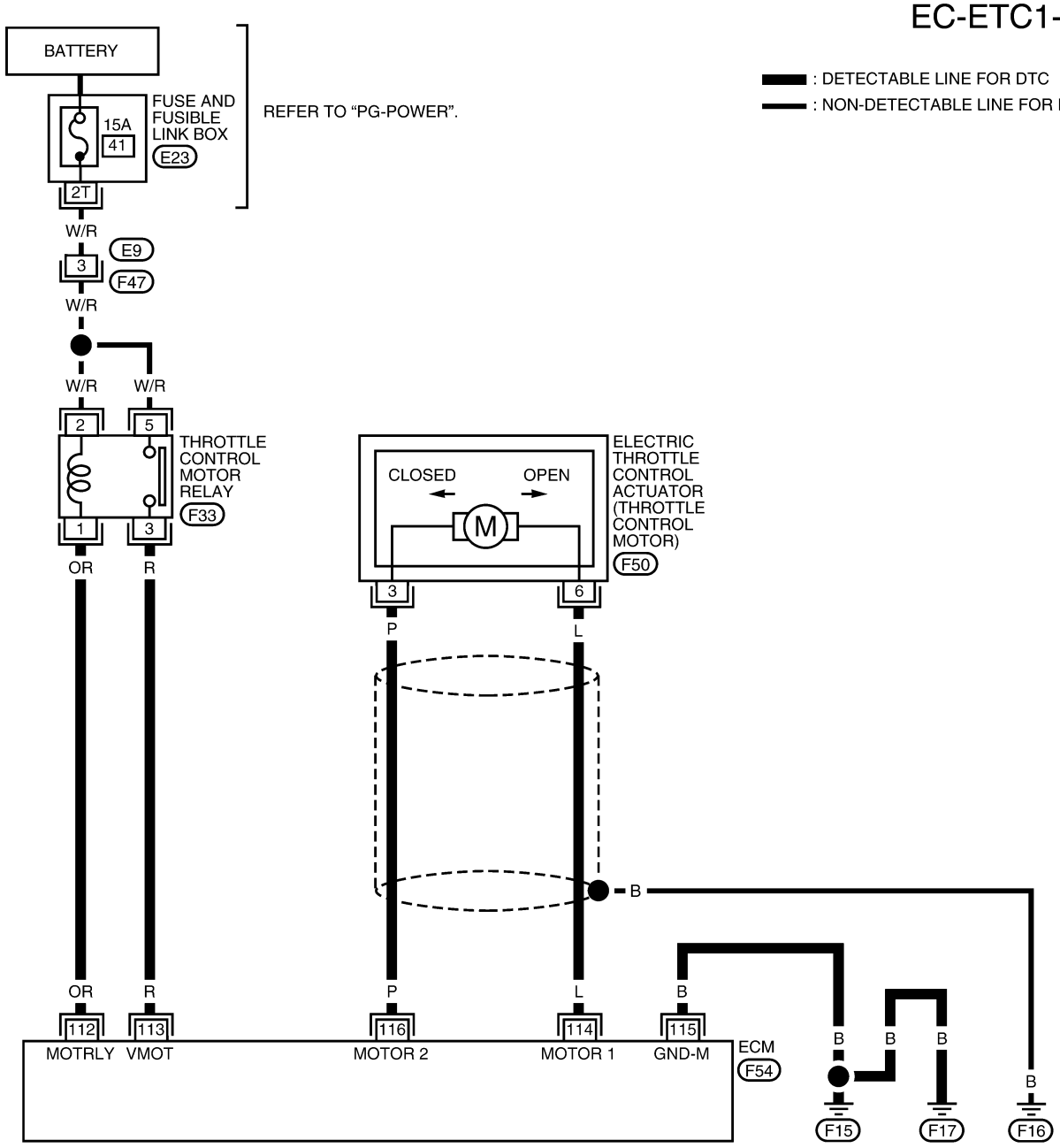
WITH GST

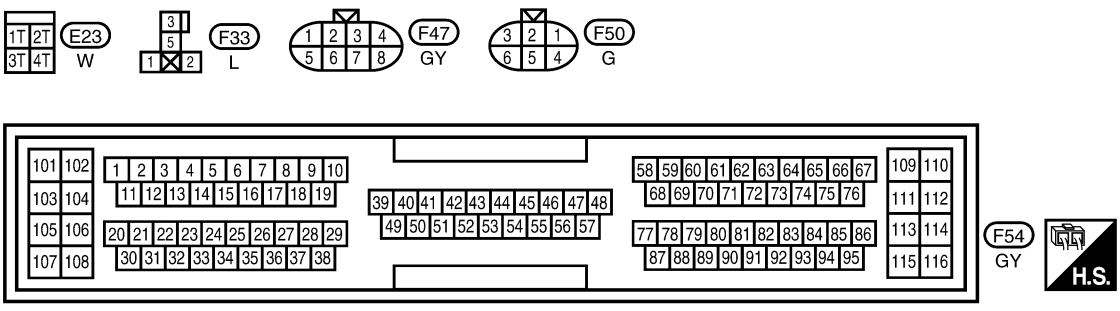
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS002GX

EC-ETC1-01

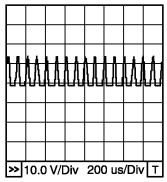
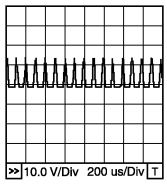




BBWA0249E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/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)
112	OR	Throttle control motor relay	**[Ignition switch "OFF"]**	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch "ON"]	0 - 1.0V
113	R	Throttle control motor relay power supply	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)
114	L	Throttle control motor (Open)	**[Ignition switch "ON"]** ● Shift lever position is "D" (A/T model) ● Shift lever position is "1st" (M/T model) ● Accelerator pedal is depressing	0 - 14V★  PBIB0533E
115	B	Throttle control motor ground	**[Engine is running]** ● Idle speed	Approximately 0V
116	P	Throttle control motor (Close)	**[Ignition switch "ON"]** ● Shift lever position is "D" (A/T model) ● Shift lever position is "1st" (M/T model) ● Accelerator pedal is releasing	0 - 14V★  PBIB0534E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

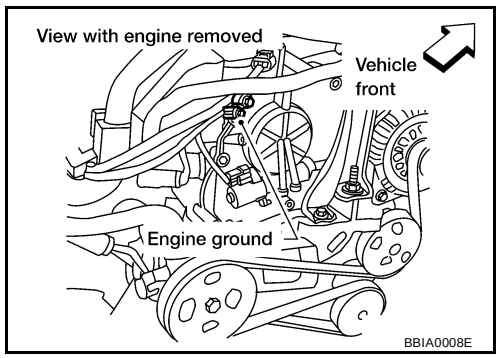
Diagnostic Procedure

UBS002GY

1. RETIGHTEN GROUND SCREWS

1. Turn ignition switch "OFF".
2. Loosen and retighten engine ground screws.

>> GO TO 2.



BBIA0008E

2. CHECK THROTTLE CONTROL MOTOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 115 and engine ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

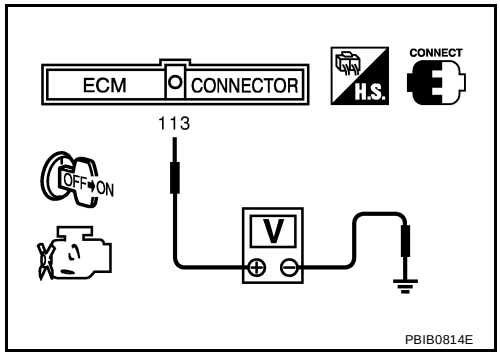
OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to power in harness or connectors.

3. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-I

1. Reconnect harness connectors disconnected.
2. Check voltage between ECM terminal 113 and ground under the following conditions with CONSULT-II or tester.

Ignition switch	Voltage
OFF	Approximately 0V
ON	Battery voltage (11 - 14V)

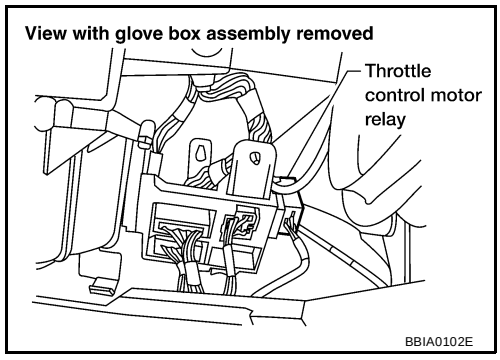


OK or NG

OK >> GO TO 10.
NG >> GO TO 4.

4. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY

1. Turn ignition switch “OFF”.
2. Disconnect throttle control motor relay harness connector.

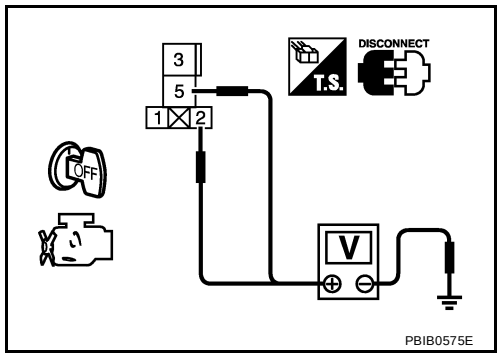


3. Check voltage between throttle control motor relay terminals 2, 5 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.



5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E9, F47
- Fuse and fusible link box connector E23
- 15A fuse
- Harness for open or short between throttle control motor relay and battery

>> Repair or replace harness or connectors.

6. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check continuity between ECM terminal 113 and throttle control motor relay terminal 3. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK THROTTLE CONTROL MOTOR RELAY OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check continuity between ECM terminal 112 and throttle control motor relay terminal 1. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK THROTTLE CONTROL MOTOR RELAY

Refer to EC-1622, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace throttle control motor relay.

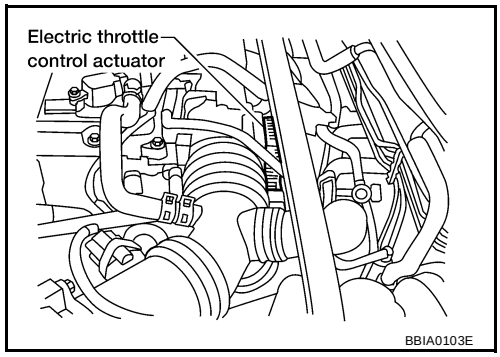
9. CHECK INTERMITTENT INCIDENT

Refer to EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

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	114	Should not exist
	116	Should exist
6	114	Should exist
	116	Should not exist

5. Also check harness for short to ground and short to power.

OK or NG

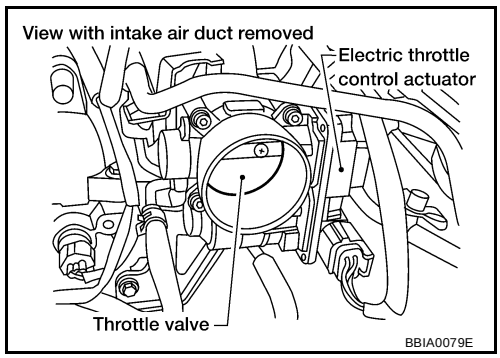
OK >> GO TO 11.
NG >> Repair or replace.

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-1622, "Component Inspection" .

OK or NG

OK >> GO TO 13.
NG >> GO TO 14.

13. CHECK INTERMITTENT INCIDENT

Refer to EC-1339, "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-1253, "Throttle Valve Closed Position Learning" .
3. Perform EC-1253, "Idle Air Volume Learning" .

>> **INSPECTION END**

Component Inspection

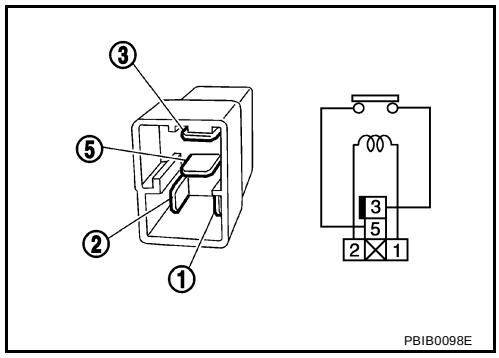
UBS002GZ

THROTTLE CONTROL MOTOR RELAY

1. Apply 12V direct current between relay terminals 1 and 2.
2. Check continuity between relay terminals 3 and 5.

Conditions	Continuity
12V direct current supply between terminals 1 and 2	Yes
No current supply	No

3. If NG, replace throttle control motor relay.



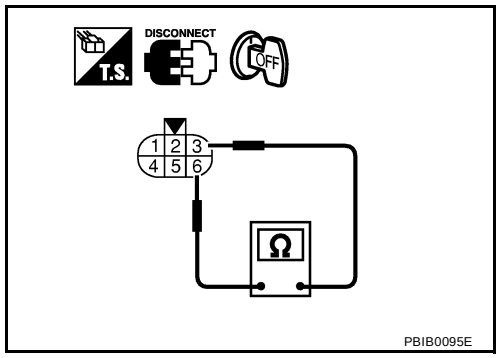
PBIB0098E

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-1253, "Throttle Valve Closed Position Learning" .
5. Perform EC-1253, "Idle Air Volume Learning" .



PBIB0095E

Remove and Installation

UBS002H0

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-93, "INTAKE MANIFOLD" .

DTC P1124, P1126 THROTTLE CONTROL MOTOR RELAY

PFP:16119

Component Description

UBS002H1

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

UBS002H2

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
THRTL RELAY	● Ignition switch: ON	ON

On Board Diagnosis Logic

UBS002H3

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1124 1124	Throttle control motor relay circuit short	ECM detect the throttle control motor relay is stuck ON.	● Harness or connectors (Throttle control motor relay circuit is shorted) ● Throttle control motor relay
P1126 1126	Throttle control motor relay circuit open	ECM detects a voltage of power source for throttle control motor is excessively low. **This self-diagnosis has the one trip detection logic.**	● Harness or connectors (Throttle control motor relay circuit is open) ● Throttle control motor relay

FAIL-SAFE MODE

When the DTC P1124 is detected in the two consecutive trips, the ECM enters fail-safe mode and the MIL lights up.
When the DTC P1126 is detected even in the 1st trip, 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

UBS002H4

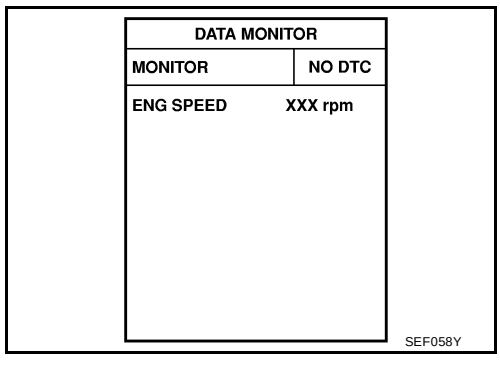
NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR DTC P1124

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

With CONSULT-II

1. Turn ignition switch “ON” and wait at least 1 second.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. If 1st trip DTC is detected, go to EC-1626, "Diagnostic Procedure" .



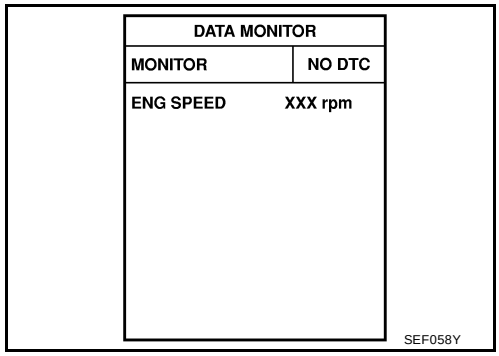
With GST

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-1626, "Diagnostic Procedure" .

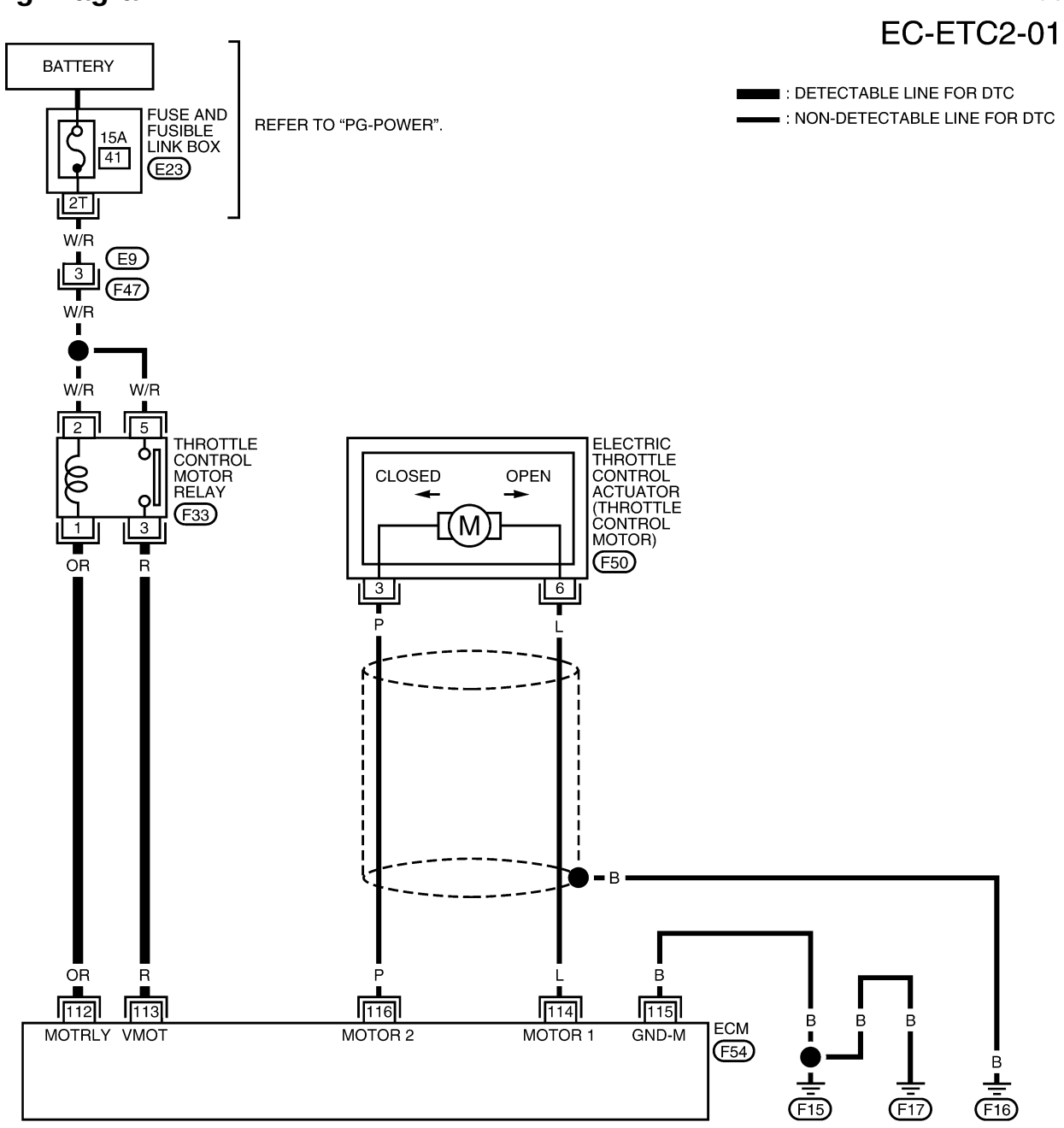


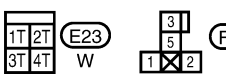
With GST

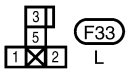
Follow the procedure “With CONSULT-II” above.

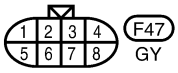
Wiring Diagram

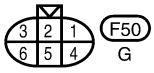
UBS002H5

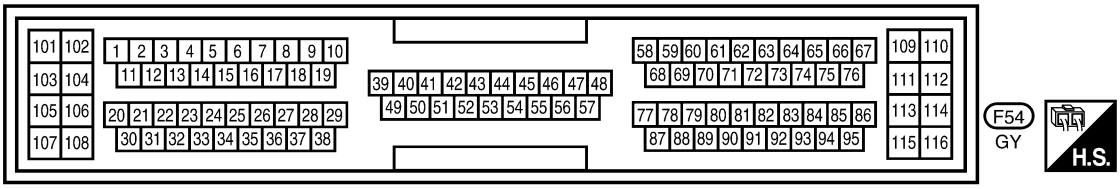












BBWA0250E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

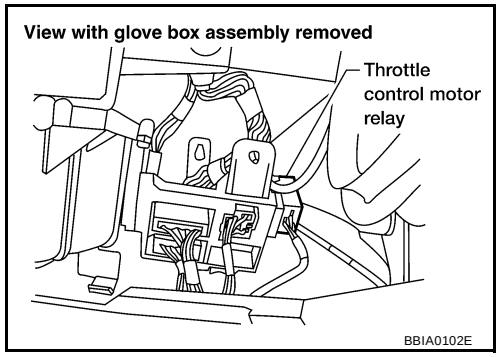
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
112	OR	Throttle control motor relay	**[Ignition switch "OFF"]**	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch "ON"]	0 - 1.0V
113	R	Throttle control motor relay power supply	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

UBS002H6

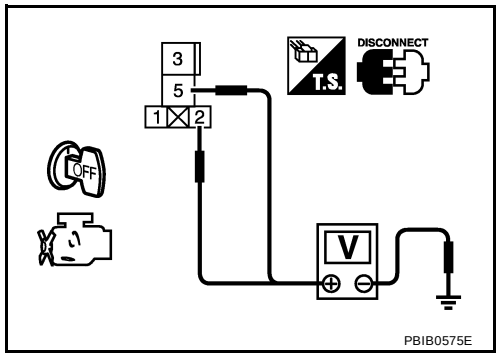
1. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY

1. Turn ignition switch "OFF".
2. Disconnect throttle control motor relay harness connector.



3. Check voltage between throttle control motor relay terminal 2, 5 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E9, F47
- Fuse and fusible link connector E23
- 15A fuse
- Harness for open or short between throttle control motor relay and battery

>> Repair or replace harness or connectors.

3. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check continuity between ECM terminal 113 and throttle control motor relay terminal 3. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK THROTTLE CONTROL MOTOR RELAY OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check continuity between ECM terminal 112 and throttle control motor relay terminal 1. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK THROTTLE CONTROL MOTOR RELAY

Refer to EC-1627, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace throttle control motor relay.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

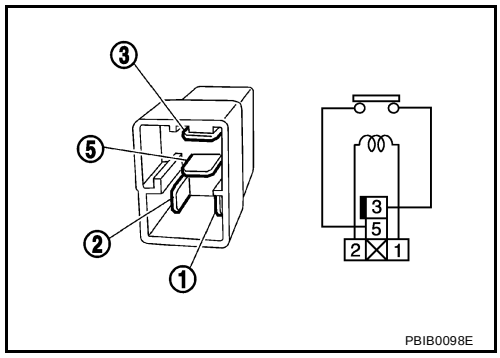
UBS002H7

THROTTLE CONTROL MOTOR RELAY

1. Apply 12V direct current between relay terminals 1 and 2.
2. Check continuity between relay terminals 3 and 5.

Conditions	Continuity
12V direct current supply between terminals 1 and 2	Yes
No current supply	No

3. If NG, replace throttle control motor relay.



PBIB0098E

DTC P1128 THROTTLE CONTROL MOTOR

PFP:16119

Component Description

UBS002H8

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

UBS002H9

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1128 1128	Throttle control motor circuit short	ECM detects short both circuits between ECM and throttle control motor.	● Harness or connectors (Throttle control motor circuit is shorted.) ● Electric throttle control actuator (Throttle control motor)

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the 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.

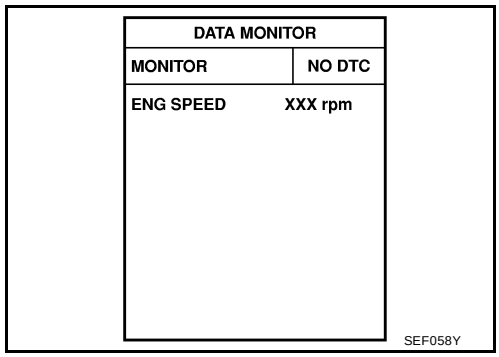
DTC Confirmation Procedure

UBS002HA

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-1630, "Diagnostic Procedure" .

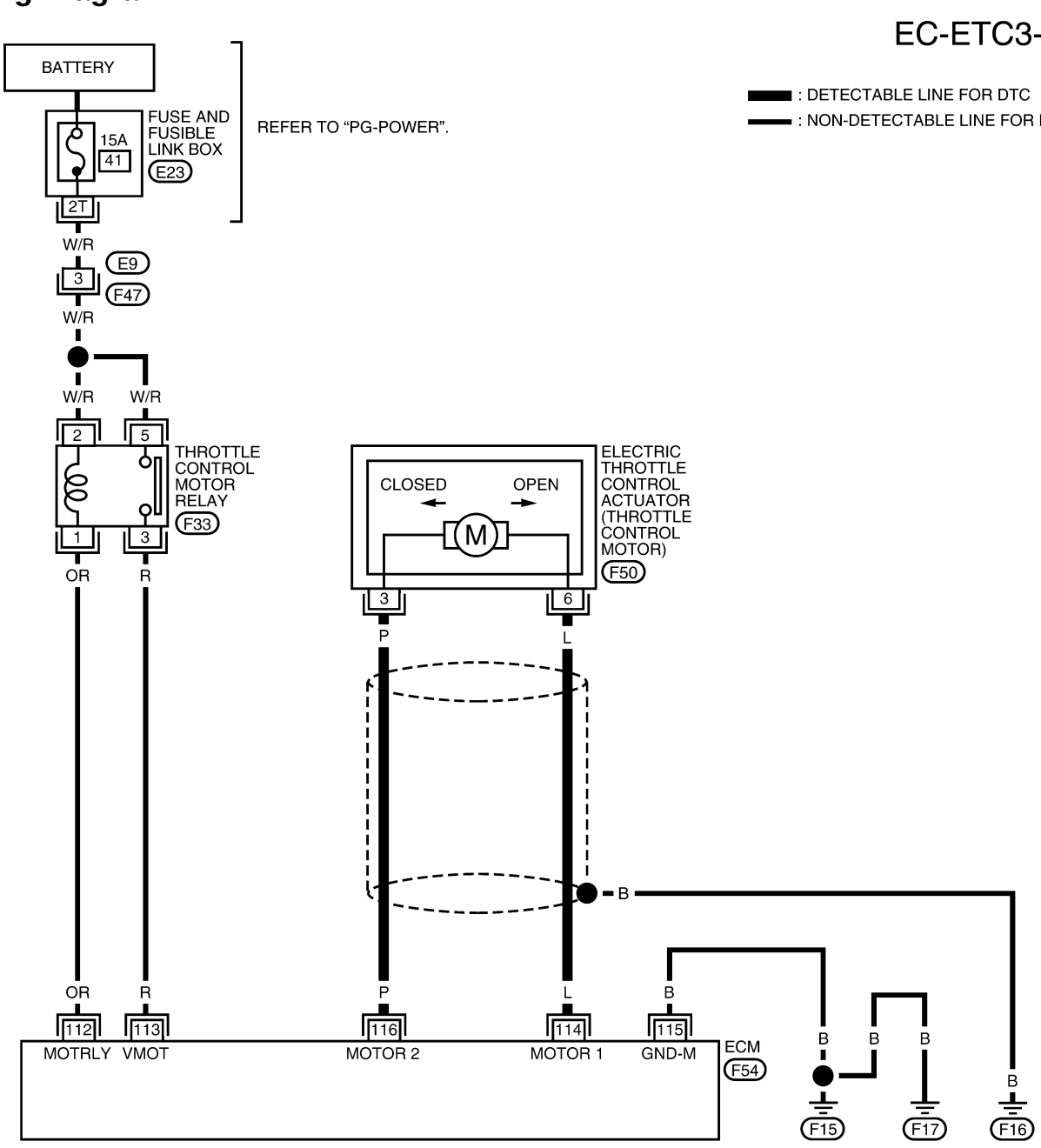


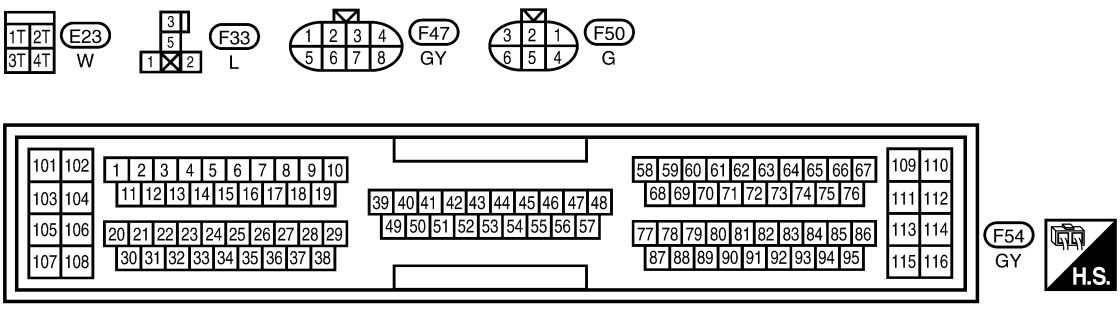
WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS002HB

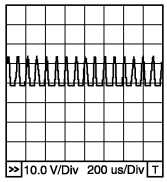
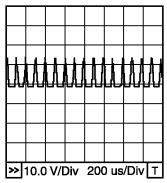




BBWA0251E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
114	L	Throttle control motor (Open)	**[Ignition switch "ON"]** ● Shift lever position is "D" (A/T model) ● Shift lever position is "1st" (M/T model) ● Accelerator pedal is depressing	0 - 14V★  PBIB0533E
116	P	Throttle control motor (Close)	**[Ignition switch "ON"]** ● Shift lever position is "D" (A/T model) ● Shift lever position is "1st" (M/T model) ● Accelerator pedal is releasing	0 - 14V★  PBIB0534E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

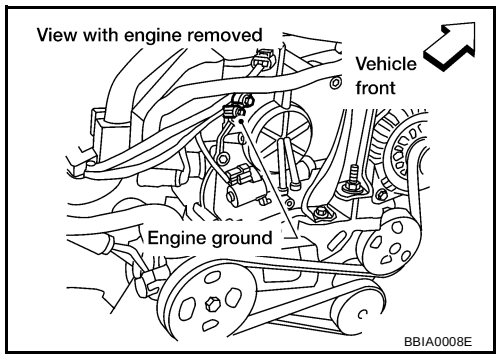
Diagnostic Procedure

UBS002HC

1. RETIGHTEN GROUND SCREWS

1. Turn ignition switch "OFF".
2. Loosen and retighten engine ground screws.

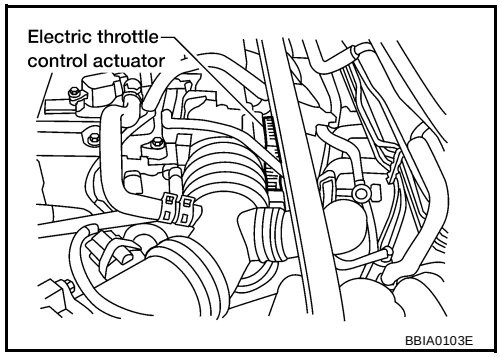
>> GO TO 2.



BBIA0008E

2. CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Turn ignition switch “OFF”.
2. Disconnect electric throttle control actuator harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between the following terminals. Refer to Wiring Diagram.



Electric throttle control actuator terminal	ECM terminal	Continuity
3	114	Should not exist
	116	Should exist
6	114	Should exist
	116	Should not exist

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair or replace.

3. CHECK THROTTLE CONTROL MOTOR

Refer to EC-1631, "Component Inspection" .

OK or NG

OK >> GO TO 4.
NG >> GO TO 5.

4. CHECK INTERMITTENT INCIDENT

Refer to EC-1339, "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-1253, "Throttle Valve Closed Position Learning" .
3. Perform EC-1253, "Idle Air Volume Learning" .

>> **INSPECTION END**

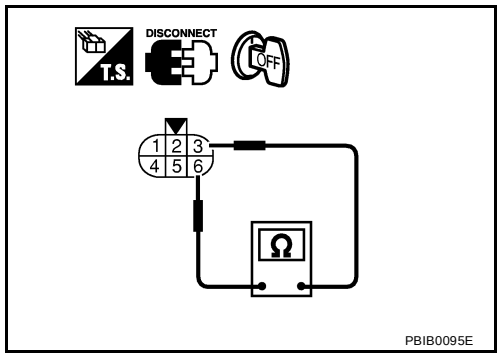
Component Inspection

UBS002HD

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-1253, "Throttle Valve Closed Position Learning" .
5. Perform EC-1253, "Idle Air Volume Learning" .

Remove and Installation

UBS002HE

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-93, "INTAKE MANIFOLD" .

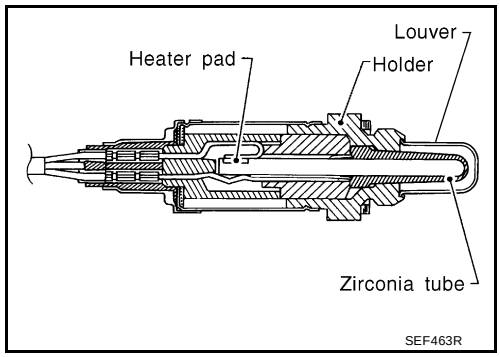
DTC P1143 HO2S1

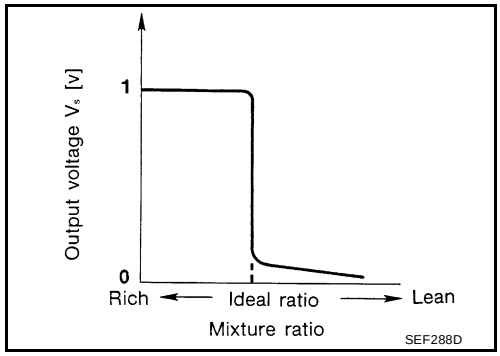
PFP:22690

Component Description

UBS002HF

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.





CONSULT-II Reference Value in Data Monitor Mode

UBS002HG

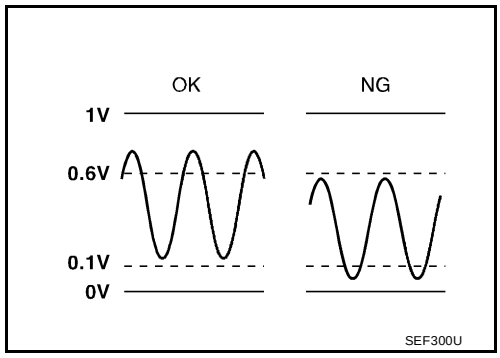
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	LEAN ←→ RICH Changes more than 5 times during 10 seconds.

On Board Diagnosis Logic

UBS002HH

To judge the malfunction, the output from the heated oxygen sensor 1 is monitored to determine whether the “rich” output is sufficiently high and whether the “lean” output is sufficiently low. When both the outputs are shifting to the lean side, the malfunction will be detected.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1143 1143	Heated oxygen sensor 1 lean shift monitoring	The maximum and minimum voltage from the sensor are not reached to the specified voltages.	● Heated oxygen sensor 1 ● Heated oxygen sensor 1 heater ● Fuel pressure ● Injectors ● Intake air leaks

DTC Confirmation Procedure

UBS002HI

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

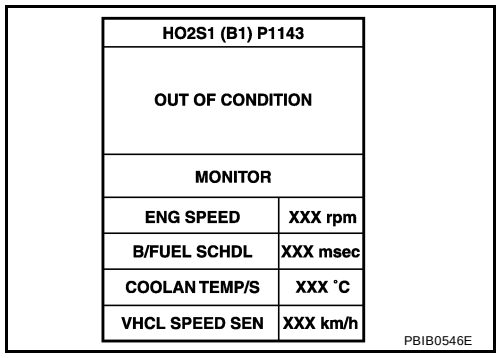
- **Always perform at a temperature above −10°C (14°F).**
- **Before performing following procedure, confirm that battery voltage is more than 11V at idle.**

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine and wait at least 10 seconds.
3. Turn ignition switch “ON” and select “HO2S1 (B1) P1143” of “HO2S1” in “DTC WORK SUPPORT” mode with CONSULT-II.
4. Touch “START”.
5. Start engine and let it idle for at least 3 minutes.

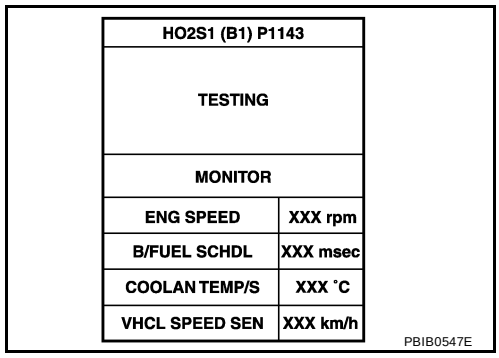
   NOTE:

   Never raise engine speed above 3,600 rpm after this step. If the engine speed limit is exceeded, return to step 5.



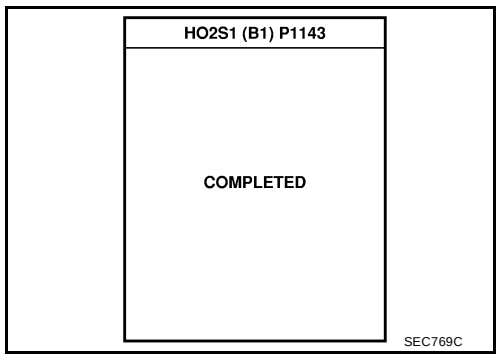
6. When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 50 seconds or more.)

ENG SPEED	1,200 - 3,200 rpm
Vehicle speed	Less than 100 km/h (62 MPH)
B/FUEL SCHDL	1.9 - 13.0 msec
Selector lever	Suitable position



   If “TESTING” is not displayed after 5 minutes, retry from step 2.

7. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to EC-1635, "Diagnostic Procedure" .



Overall Function Check

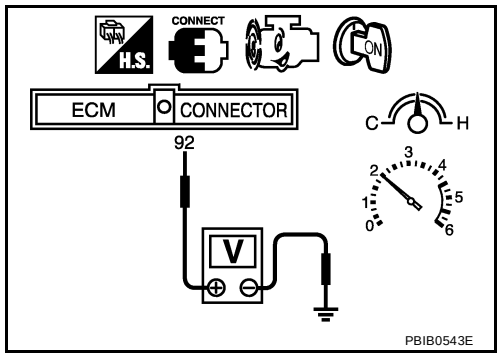
UBS002HJ

Use this procedure to check the overall function of the heated oxygen sensor 1 circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Start engine and warm it up to normal operating temperature.

2. Set voltmeter probes between ECM terminal 92 [HO2S1(B1) signal] and engine ground.
3. Check one of the following with engine speed held at 2,000 rpm constant under no load.
   - The maximum voltage is over 0.6V at at least one time.
   - The minimum voltage is over 0.1V at least one time.
4. If NG, go to EC-1635, "Diagnostic Procedure" .



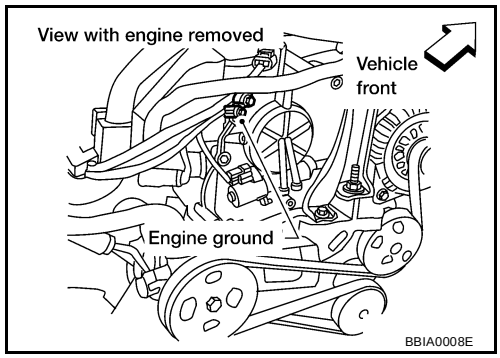
Diagnostic Procedure

UBS002HK

1. RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

>> GO TO 2.



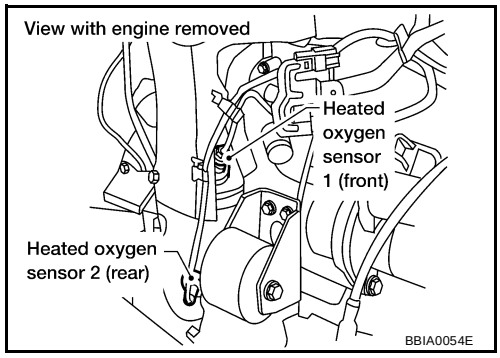
2. RETIGHTEN HEATED OXYGEN SENSOR 1

Loosen and retighten heated oxygen sensor 1.

Tightening torque:

40 - 50 N·m (4.1 - 5.1 kg-m, 30 - 37 ft-lb)

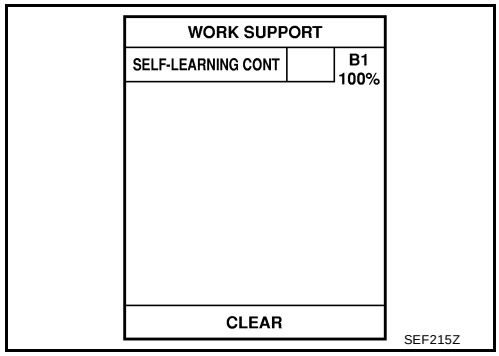
>> GO TO 3.



3. CLEAR THE SELF-LEARNING DATA

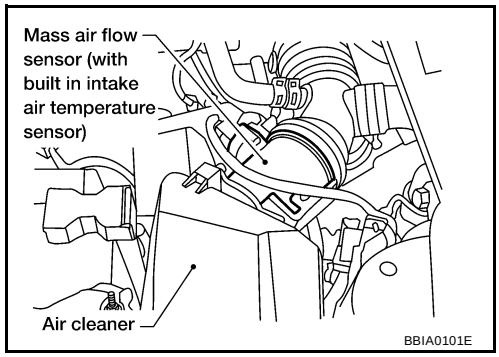
With CONSULT-II

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 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-1271, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 detected?
   Is it difficult to start engine?



Yes or No

Yes >> Perform trouble diagnosis for DTC P0171. Refer to EC-1430 .
No >> GO TO 4.

4. CHECK HEATED OXYGEN SENSOR 1 HEATER

Refer to EC-1358, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace heated oxygen sensor 1.

5. CHECK HEATED OXYGEN SENSOR 1

Refer to EC-1637, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace heated oxygen sensor 1.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .
For circuit, refer to EC-1397, "Wiring Diagram" .

>> **INSPECTION END**

Component Inspection

UBS002HL

HEATED OXYGEN SENSOR 1

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “MANU TRIG” and adjust “TRIGGER POINT” to 100% in “DATA MONITOR” mode with CONSULT-II.
3. Select “HO2S1 (B1)” and “HO2S1 MNTR (B1)”.
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch “RECORD” on CONSULT-II screen.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S1 MNTR (B1)	LEAN

SEF646Y

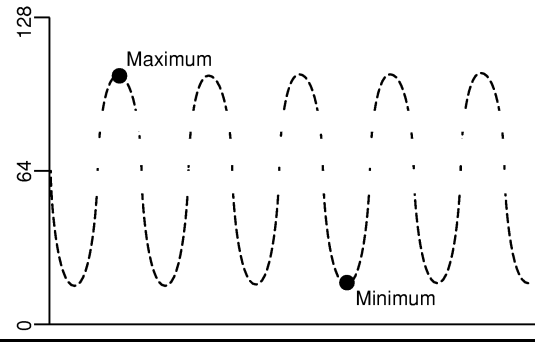
6. Check the following.
   - “HO2S1 MNTR (B1)” in “DATA MONITOR” mode changes from “RICH” to “LEAN” to “RICH” 5 times in 10 seconds.
     5 times (cycles) are counted as shown at right.
   - “HO2S1 (B1)” voltage goes above 0.6V at least once.
   - “HO2S1 (B1)” voltage goes below 0.3V at least once.
   - “HO2S1 (B1)” voltage never exceeds 1.0V.

cycle	1	2	3	4	5
HO2S1 MNTR (B1)	R-L	R-L	R-L	R-L	R-L

R means HO2S1 MNTR (B1) indicates RICH
L means HO2S1 MNTR (B1) indicates LEAN

SEF217YA

Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX



SEF648Y

CAUTION:

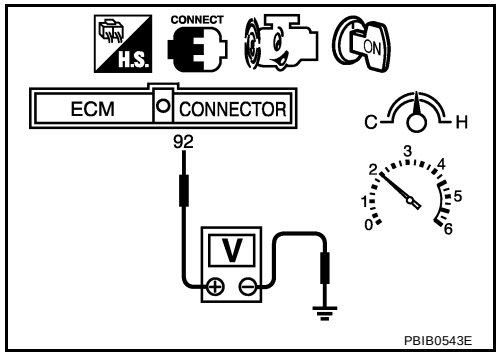
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 92 [HO2S1 (B1) signal] and engine ground.

3. Check the following with engine speed held at 2,000 rpm constant under no load.
   - The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.
   - The maximum voltage is over 0.6V at least one time.
   - The minimum voltage is below 0.3V at least one time.
   - The voltage never exceeds 1.0V.

   1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
   2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V



CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

UBS002HM

HEATED OXYGEN SENSOR 1

Refer to EM-98, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .

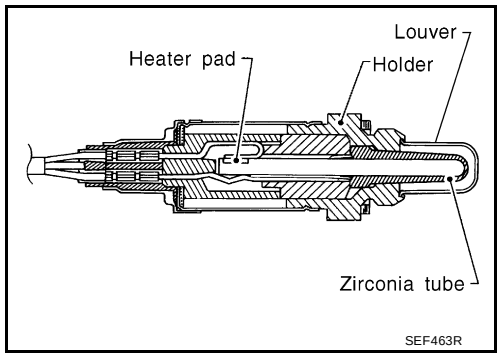
DTC P1144 HO2S1

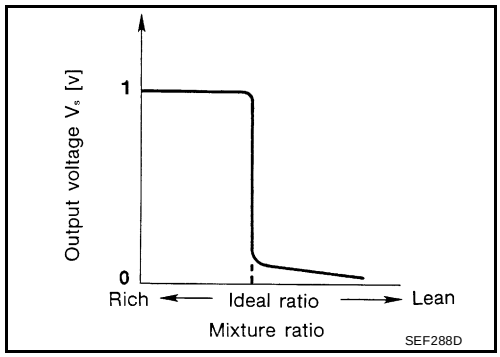
PFP:22690

Component Description

UBS002HN

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.





CONSULT-II Reference Value in Data Monitor Mode

UBS002HO

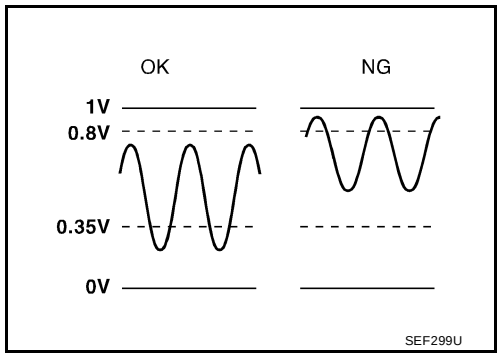
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	LEAN ←→ RICH Changes more than 5 times during 10 seconds.

On Board Diagnosis Logic

UBS002HP

To judge the malfunction, the output from the heated oxygen sensor 1 is monitored to determine whether the “rich” output is sufficiently high. The “lean” output is sufficiently low. When both the outputs are shifting to the rich side, the malfunction will be detected.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1144 1144	Heated oxygen sensor 1 rich shift monitoring	The maximum and minimum voltages from the sensor are beyond the specified voltages.	● Heated oxygen sensor 1 ● Heated oxygen sensor 1 heater ● Fuel pressure ● Injectors

DTC Confirmation Procedure

UBS002HQ

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

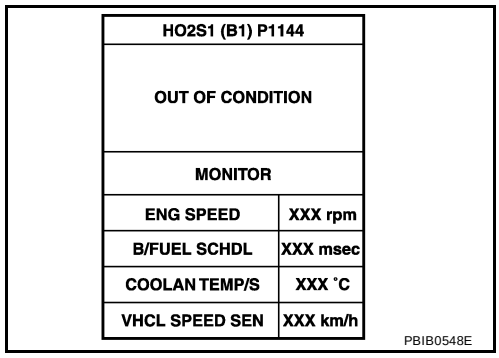
- **Always perform at a temperature above −10°C (14°F).**
- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine and wait at least 5 seconds.
3. Turn ignition switch “ON” and select “HO2S1 (B1) P1144” of “HO2S1” in “DTC WORK SUPPORT” mode with CONSULT-II.
4. Touch “START”.
5. Start engine and let it idle for at least 3 minutes.

   NOTE:

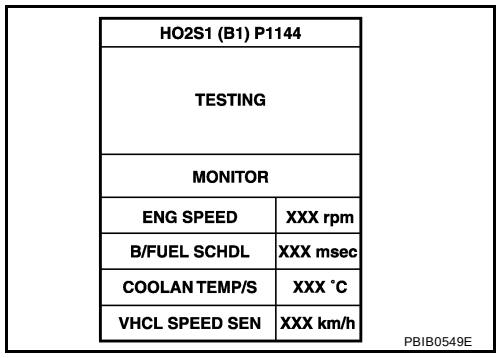
   Never raise engine speed above 3,600 rpm after this step. If the engine speed limit is exceeded, return to step 5.



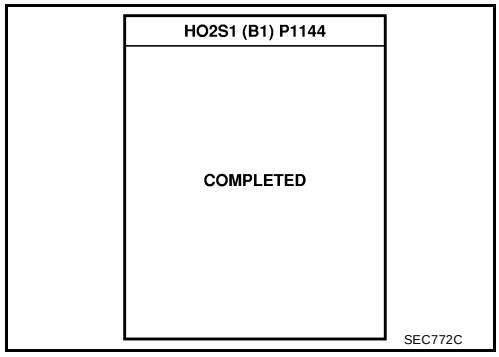
6. When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 50 seconds or more.)

ENG SPEED	1,200 - 3,200 rpm
Vehicle speed	Less than 100 km/h (62 MPH)
B/FUEL SCHDL	1.9 - 13.0 msec
Selector lever	Suitable position

If “TESTING” is not displayed after 5 minutes, retry from step 2.



7. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to EC-1641, "Diagnostic Procedure" .



Overall Function Check

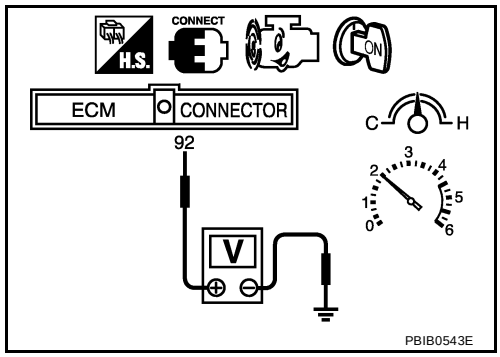
UBS002HR

Use this procedure to check the overall function of the heated oxygen sensor 1 circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Start engine and warm it up to normal operating temperature.

2. Set voltmeter probes between ECM terminal 92 [HO2S1(B1) signal] and engine ground.
3. Check one of the following with engine speed held at 2,000 rpm constant under no load.
   - The maximum voltage is below 0.8V at at least one time.
   - The minimum voltage is below 0.35V at least one time.
4. If NG, go to EC-1641, "Diagnostic Procedure" .



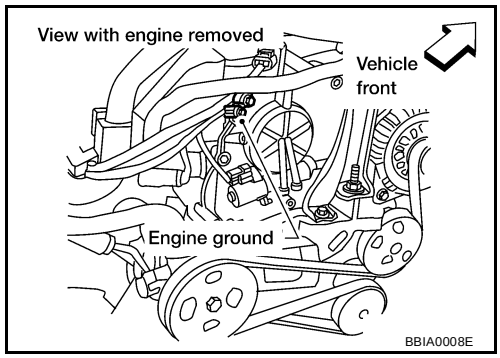
Diagnostic Procedure

UBS002HS

1. RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

>> GO TO 2.

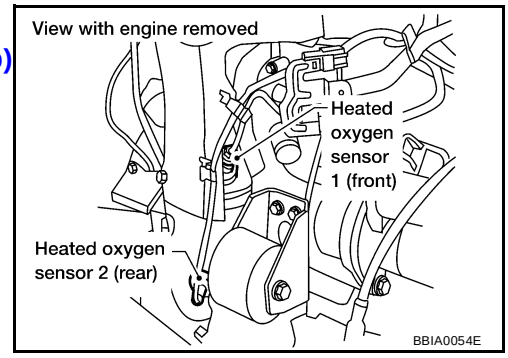


2. RETIGHTEN HEATED OXYGEN SENSOR 1

Loosen and retighten heated oxygen sensor 1.

Tightening torque: 40 - 50 N·m (4.1 - 5.1 kg-m, 30 - 37 ft-lb)

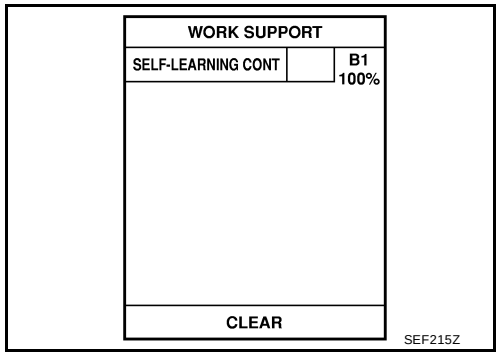
>> GO TO 3.



3. CLEAR THE SELF-LEARNING DATA

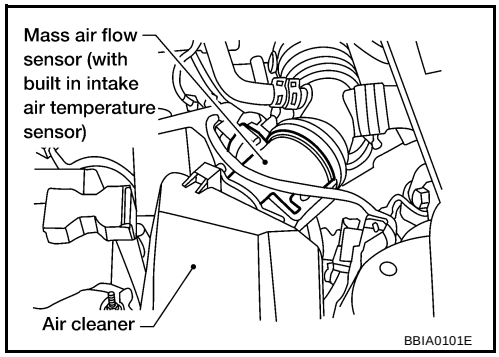
With CONSULT-II

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 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-1271, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 detected?
   Is it difficult to start engine?



Yes or No

Yes >> Perform trouble diagnosis for DTC P0172. Refer to EC-1436 .
No >> GO TO 4.

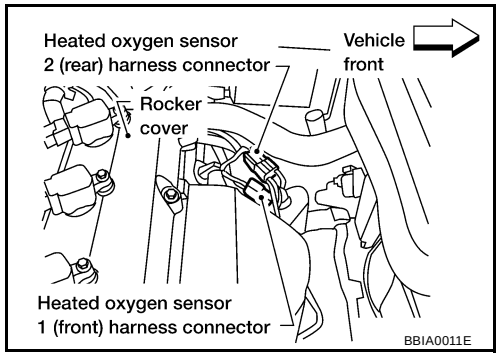
4. CHECK HO2S1 CONNECTOR FOR WATER

1. Turn ignition switch “OFF”.
2. Disconnect heated oxygen sensor 1 harness connector.
3. Check connectors for water.

Water should not exist.

OK or NG

OK >> GO TO 5.
NG >> Repair or replace harness or connectors.



5. CHECK HEATED OXYGEN SENSOR 1 HEATER

Refer to EC-1358, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace heated oxygen sensor 1.

6. CHECK HEATED OXYGEN SENSOR 1

Refer to EC-1643, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace heated oxygen sensor 1.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .
For circuit, refer to EC-1397, "Wiring Diagram" .

>> **INSPECTION END**

Component Inspection

UBS002HT

HEATED OXYGEN SENSOR 1

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “MANU TRIG” and adjust “TRIGGER POINT” to 100% in “DATA MONITOR” mode with CONSULT-II.
3. Select “HO2S1 (B1)” and “HO2S1 MNTR (B1)”.
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch “RECORD” on CONSULT-II screen.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S1 MNTR (B1)	LEAN

SEF646Y

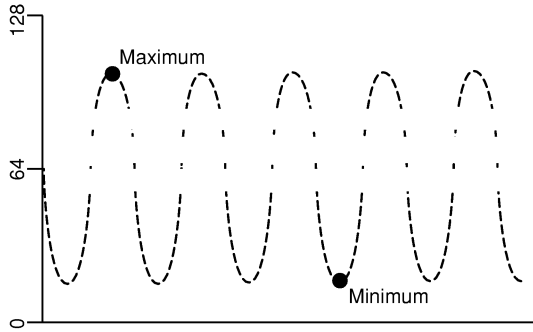
6. Check the following.
   - “HO2S1 MNTR (B1)” in “DATA MONITOR” mode changes from “RICH” to “LEAN” to “RICH” 5 times in 10 seconds.
     5 times (cycles) are counted as shown at right.
   - “HO2S1 (B1)” voltage goes above 0.6V at least once.
   - “HO2S1 (B1)” voltage goes below 0.3V at least once.
   - “HO2S1 (B1)” voltage never exceeds 1.0V.

cycle	1	2	3	4	5
HO2S1 MNTR (B1)	R-L	R-L	R-L	R-L	R-L

R means HO2S1 MNTR (B1) indicates RICH
L means HO2S1 MNTR (B1) indicates LEAN

SEF217YA

Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX



CAUTION:

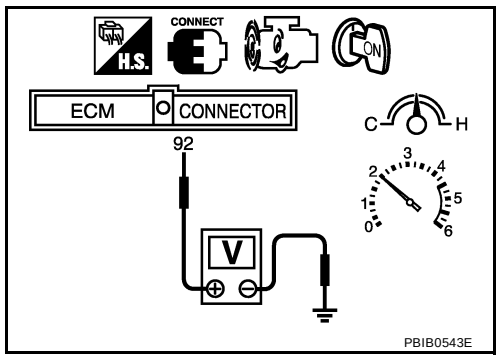
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**

- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 92 [HO2S1 (B1) signal] and engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.
   - The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.
   - The maximum voltage is over 0.6V at least one time.
   - The minimum voltage is below 0.3V at least one time.
   - The voltage never exceeds 1.0V.

   1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
   2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V



CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

UBS002HU

HEATED OXYGEN SENSOR 1

Refer to EM-98, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .

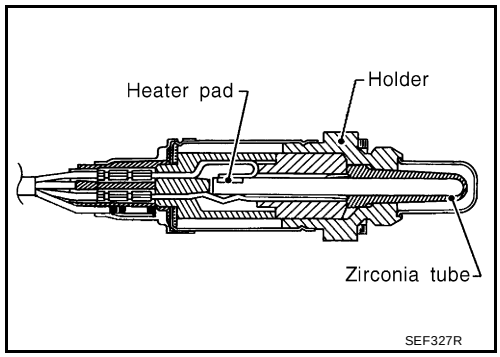
DTC P1146 HO2S2

PFP:226A0

Component Description

UBS002HV

The heated oxygen sensor 2, after three way catalyst (Manifold), monitors the oxygen level in the exhaust gas on each bank.
Even if switching characteristics of the heated oxygen sensor 1 are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



CONSULT-II Reference Value in Data Monitor Mode

UBS002HW

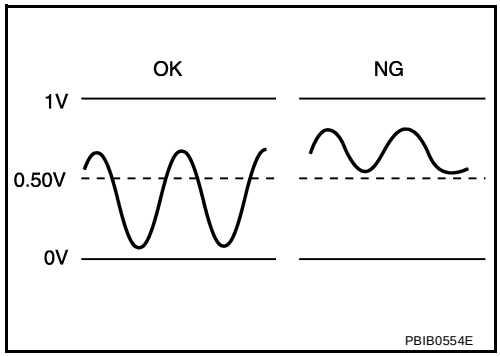
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1)	● Engine: After warming up	Revving engine from idle to 3,000 rpm quickly.	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)	● Engine: After warming up	Revving engine from idle to 3,000 rpm quickly.	LEAN ←→ RICH

On Board Diagnosis Logic

UBS002HX

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity before the three way catalyst causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the minimum voltage of sensor is sufficiently low during the various driving condition such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1146 1146	Heated oxygen sensor 2 minimum voltage monitoring	The minimum voltage from the sensor is not reached to the specified voltage.	● Harness or connectors (The sensor circuit is open or shorted) ● Heated oxygen sensor 2 ● Fuel pressure ● Injectors

DTC Confirmation Procedure

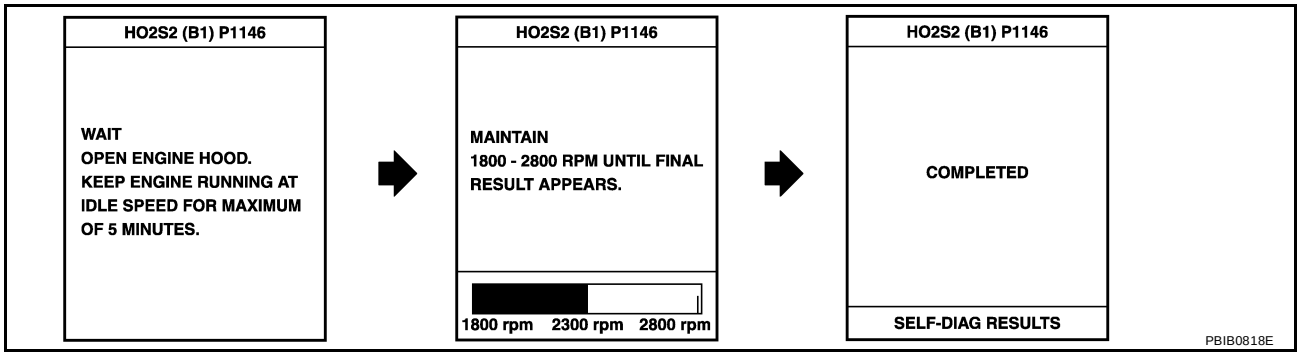
UBS002HY

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Open engine hood before conducting following procedure.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Turn ignition switch “ON”.
4. Select “DATA MONITOR” mode with CONSULT-II.
5. Make sure that “COOLAN TEMP/S” indicates more than 70°C (158°F).

6. Select “HO2S2 (B1) P1146” of “HO2S2” in “DTC WORK SUPPORT” mode with CONSULT-II.
7. Start engine and following the instruction of CONSULT-II.



8. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”.
   If “NG” is displayed, go to EC-1648, "Diagnostic Procedure" .
   If “CAN NOT BE DIAGNOSED” is displayed, perform the following.

a. Stop engine and cool down until “COOLAN TEMP/S” indicates less than 70°C (158°F).
b. Turn ignition switch “ON”.
c. Select “DATA MONITOR” mode with CONSULT-II.
d. Start engine.
e. Return to step 6 again when the “COOLAN TEMP/S” reaches to 70°C (158°F).

Overall Function Check

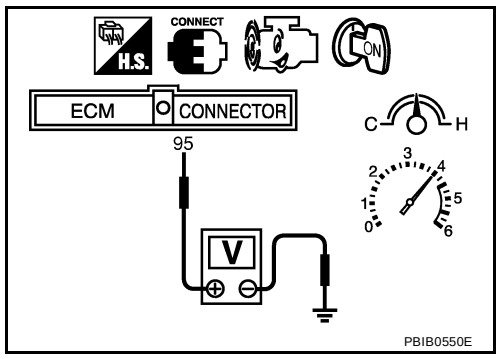
UBS002HZ

Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

CAUTION:
Always drive vehicle at a safe speed.

WITH GST

1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Set voltmeter probes between ECM terminal 95 [HO2S2 (B1) signal] and engine ground.
4. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be below 0.50V at least once during this procedure.
   If the voltage can be confirmed in step 4, step 5 is not necessary.

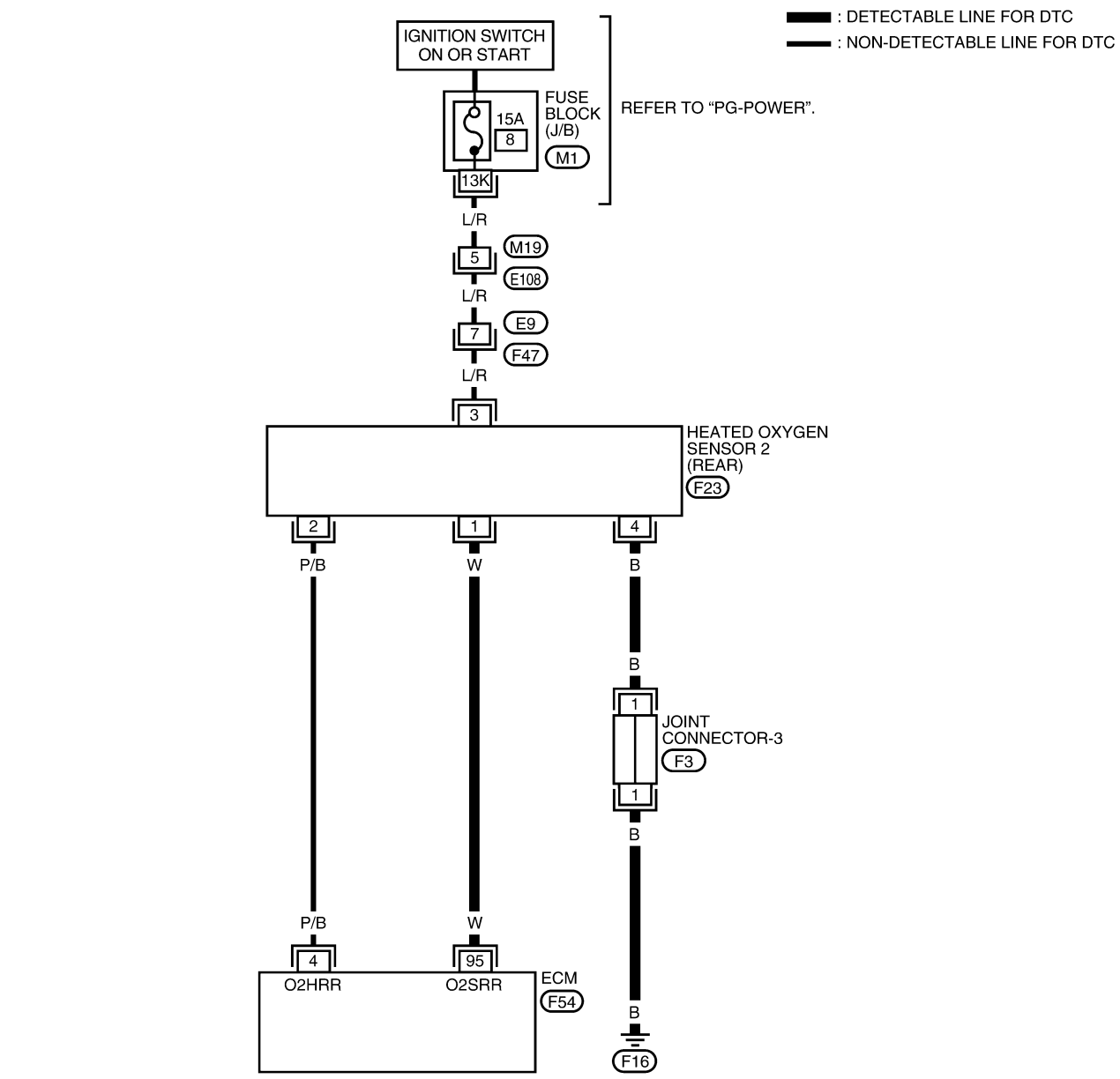


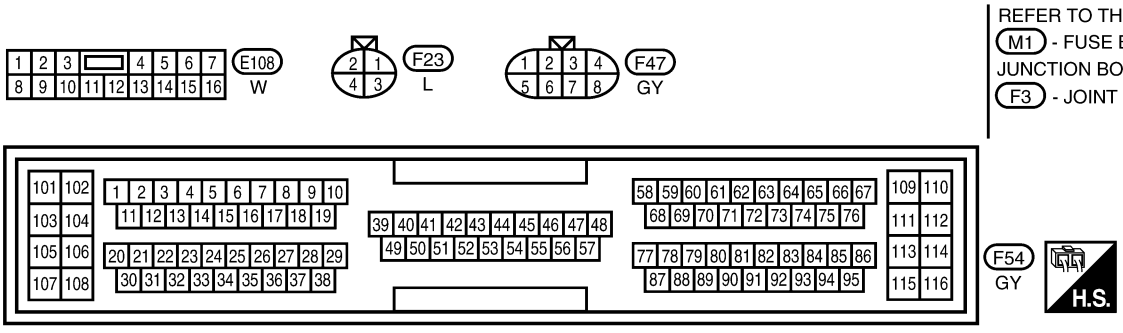
5. Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in “D” position with “OD” OFF (A/T), 3rd gear position (M/T).
   The voltage should be below 0.50V at least once during this procedure.
6. If NG, go to EC-1648, "Diagnostic Procedure" .

Wiring Diagram

UBS002I0

EC-HO2S2-01





BBWA0217E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
95	W	Heated oxygen sensor 2	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V

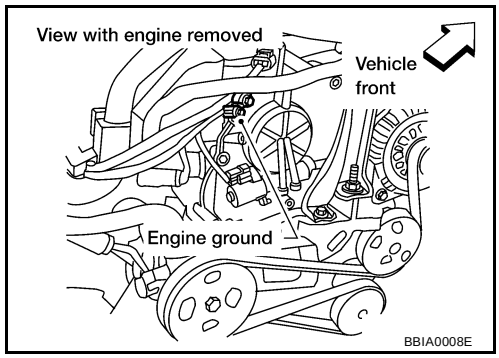
Diagnostic Procedure

UBS002I1

1. RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

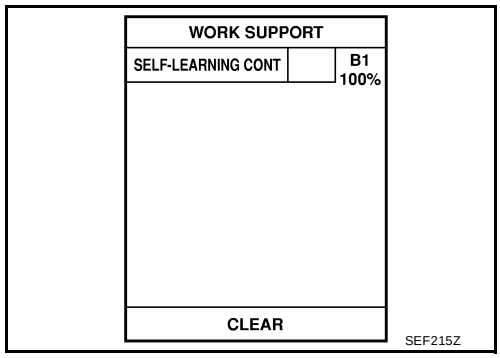
>> GO TO 2.



2. CLEAR THE SELF-LEARNING DATA

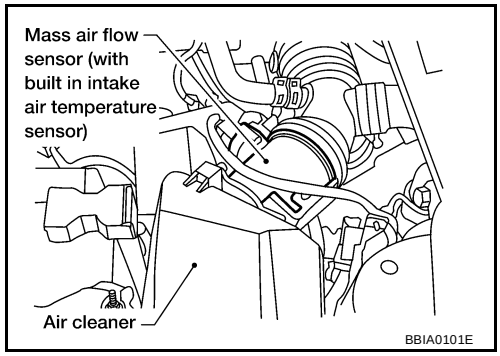
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 detected?
   Is it difficult to start engine?



Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF”.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 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-1271, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 detected?
   Is it difficult to start engine?



Yes or No

Yes >> Perform trouble diagnosis for DTC P0172. Refer to EC-1436 .
No >> GO TO 3.

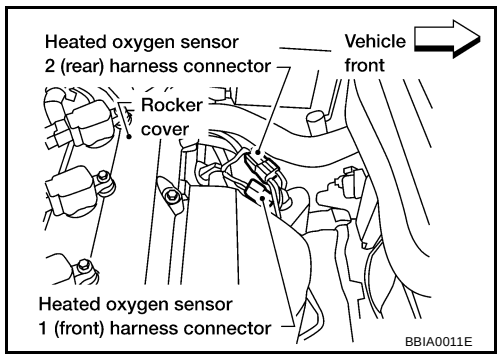
3. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect heated oxygen sensor 2 harness connector.
3. Check harness continuity between HO2S2 terminal 4 and engine ground.
   Refer to Wiring Diagram.

   Continuity should exist.
4. Also check harness for short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.



4. DETECT MALFUNCTIONING PART

Check the following.

- Joint connector-3
- Harness for open and short between HO2S2 and engine ground

>> Repair open circuit or short to power in harness or connectors.

5. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 95 and HO2S2 terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.
3. Check harness continuity between ECM terminal 95 or HO2S2 terminal 1 and ground.
   Refer to Wiring Diagram.

   Continuity should not exist.
4. Also check harness for short to ground or short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-1650, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace heated oxygen sensor 2.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

UBS002I2

HEATED OXYGEN SENSOR 2

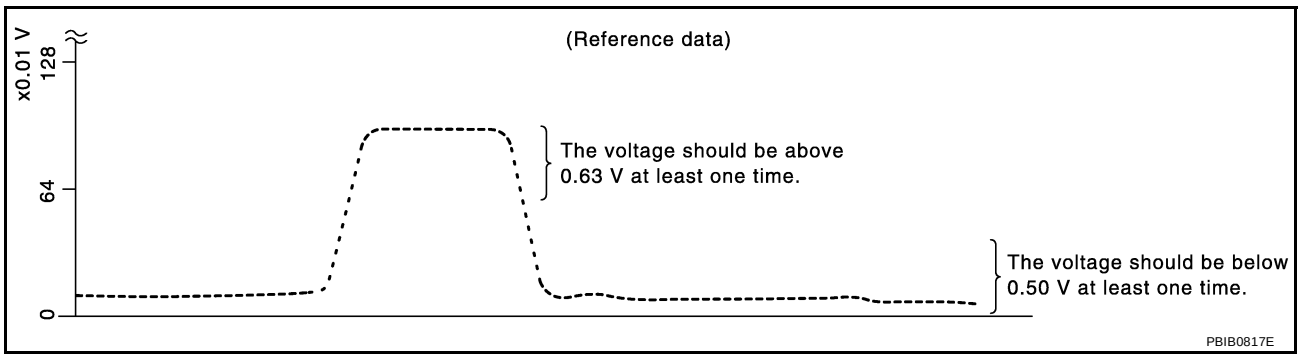
With CONSULT-II

1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)” as the monitor item with CONSULT-II.

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
HO2S1 (B1)	XXX V
HO2S2 (B1)	XXX V
HO2S1 MNTR (B1)	RICH
HO2S2 MNTR (B1)	RICH

SEF662Y

4. Check “HO2S2 (B1)” at idle speed when adjusting “FUEL INJECTION” to ±25%.



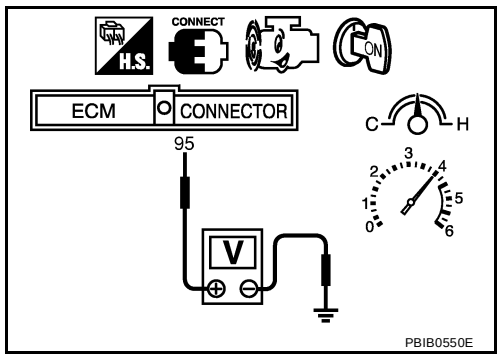
“HO2S2 (B1)” should be above 0.63V at least once when the “FUEL INJECTION” is +25%.
“HO2S2 (B1)” should be below 0.50V at least once when the “FUEL INJECTION” is −25%.

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 drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Set voltmeter probes between ECM terminal 95 [HO2S2 (B1) signal] and engine ground.
4. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.63V at least once during this procedure.
   If the voltage is above 0.63V at step 4, step 5 is not necessary.



5. Keep vehicle idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in “D” position with “OD” OFF (A/T), 3rd gear position (M/T).
   The voltage should be below 0.50V at least once during this procedure.
6. If NG, replace heated oxygen sensor 2.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new 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

UBS002I3

HEATED OXYGEN SENSOR 2

Refer to EX-3, "EXHAUST SYSTEM" .

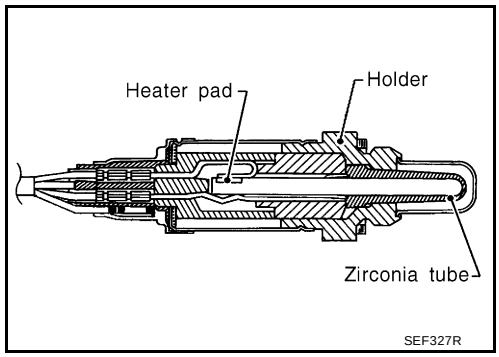
DTC P1147 HO2S2

PFP:226A0

Component Description

UBS002I4

The heated oxygen sensor 2, after three way catalyst (Manifold), monitors the oxygen level in the exhaust gas on each bank.
Even if switching characteristics of the heated oxygen sensor 1 are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



CONSULT-II Reference Value in Data Monitor Mode

UBS002I5

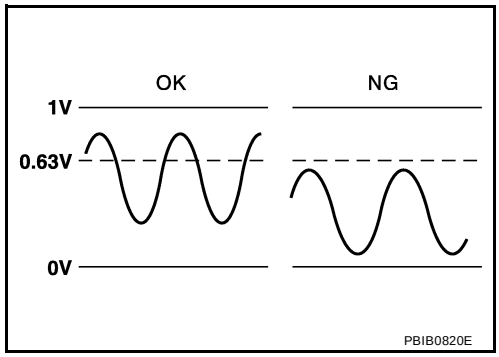
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1)	● Engine: After warming up	Revving engine from idle to 3,000 rpm quickly.	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)	● Engine: After warming up	Revving engine from idle to 3,000 rpm quickly.	LEAN ←→ RICH

On Board Diagnosis Logic

UBS002I6

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity before the three way catalyst causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the maximum voltage of the sensor is sufficiently high during the various driving condition such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1147 1147	Heated oxygen sensor 2 maximum voltage monitoring	The maximum voltage from the sensor is not reached to the specified voltage.	● Harness or connectors (The sensor circuit is open or shorted) ● Heated oxygen sensor 2 ● Fuel pressure ● Injectors ● Intake air leaks

DTC Confirmation Procedure

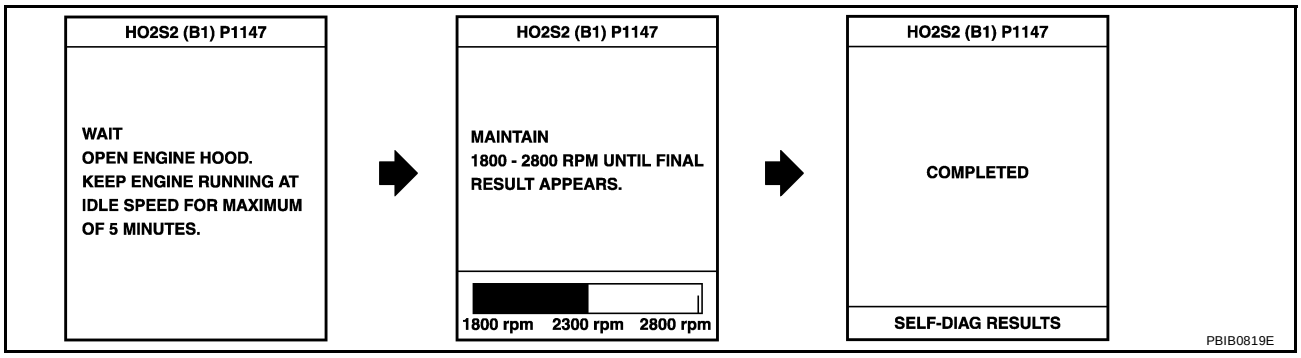
UBS002I7

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Open engine hood before conducting following procedure.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Turn ignition switch “ON”.
4. Select “DATA MONITOR” mode with CONSULT-II.

5. Make sure that “COOLAN TEMP/S” indicates more than 70°C (158°F).
6. Select “HO2S2 (B1) P1147” of “HO2S2” in “DTC WORK SUPPORT” mode with CONSULT-II.
7. Start engine and following the instruction of CONSULT-II.



8. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”.
   If “NG” is displayed, go to EC-1655, "Diagnostic Procedure" .
   If “CAN NOT BE DIAGNOSED” is displayed, perform the following.

a. Stop engine and cool down until “COOLAN TEMP/S” indicates less than 70°C (158°F).
b. Turn ignition switch “ON”.
c. Select “DATA MONITOR” mode with CONSULT-II.
d. Start engine.
e. Return to step 6 again when the “COOLAN TEMP/S” reaches to 70°C (158°F).

Overall Function Check

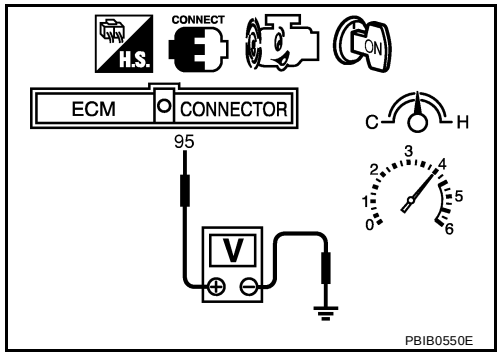
UBS002I8

Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

CAUTION:
Always drive vehicle at a safe speed.

WITH GST

1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Set voltmeter probes between ECM terminal 95 [HO2S2 (B1) signal] and engine ground.
4. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.63V at least once during this procedure.
   If the voltage can be confirmed in step 4, step 5 is not necessary.

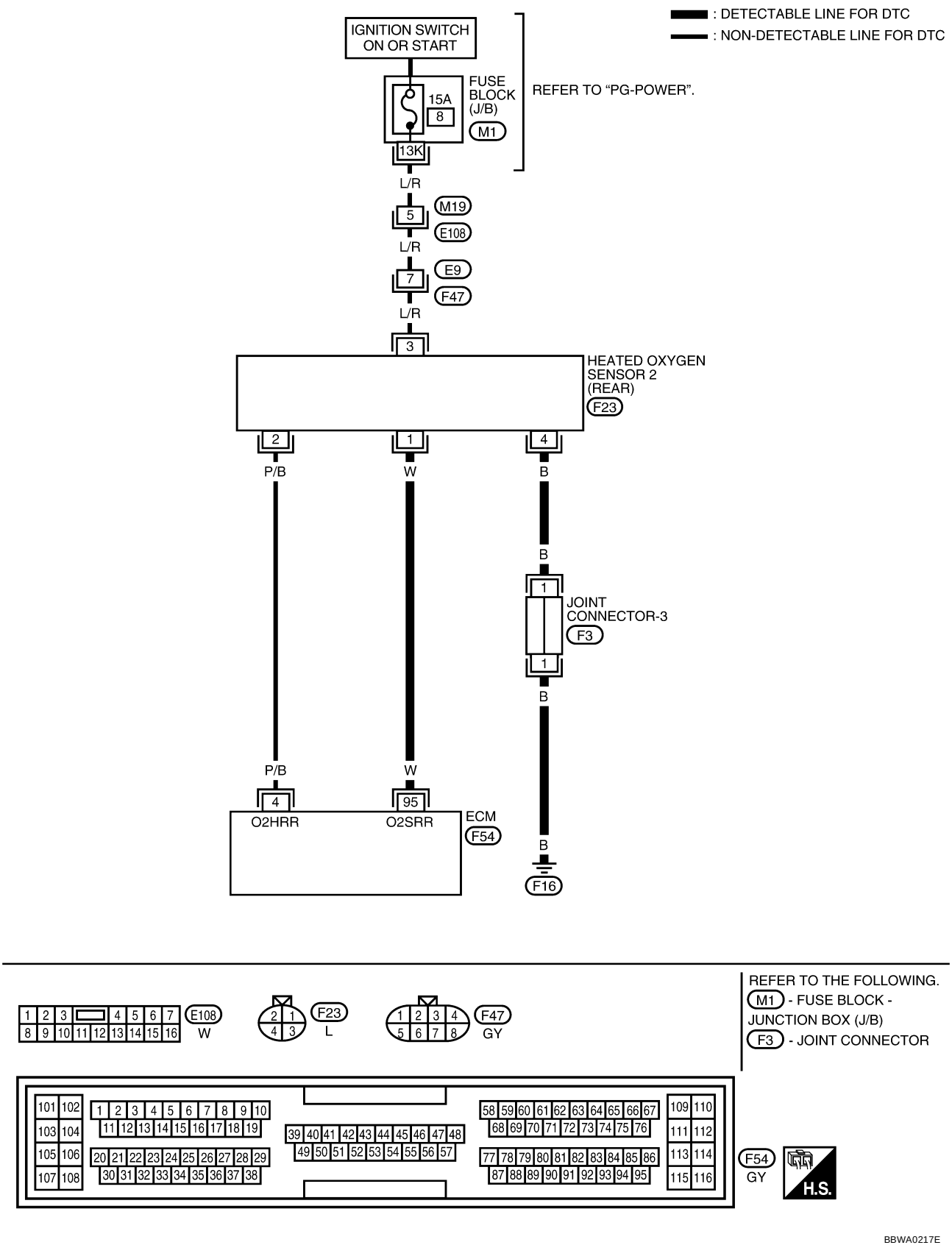


5. Keep vehicle idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in “D” position with “OD” OFF (A/T), 3rd gear position (M/T).
   The voltage should be above 0.63V at least once during this procedure.
6. If NG, go to EC-1655, "Diagnostic Procedure" .

Wiring Diagram

UBS002I9

EC-HO2S2-01



BBWA0217E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
95	W	Heated oxygen sensor 2	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V

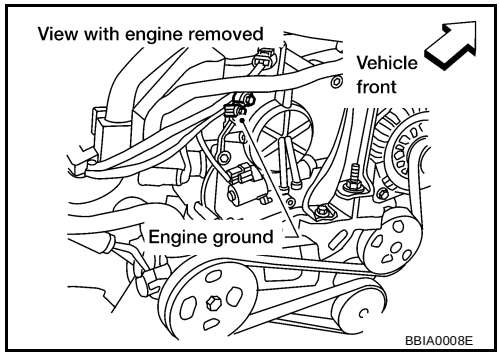
Diagnostic Procedure

UBS002IA

1. RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

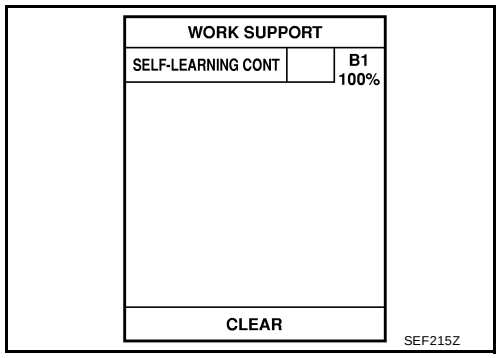
>> GO TO 2.



2. CLEAR THE SELF-LEARNING DATA

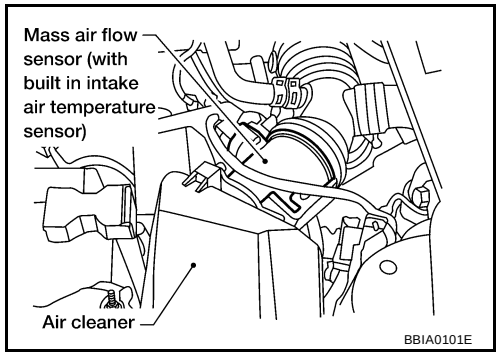
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 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-1271, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 detected?
   Is it difficult to start engine?



Yes or No

Yes >> Perform trouble diagnosis for DTC P0171. Refer to EC-1430 .
No >> GO TO 3.

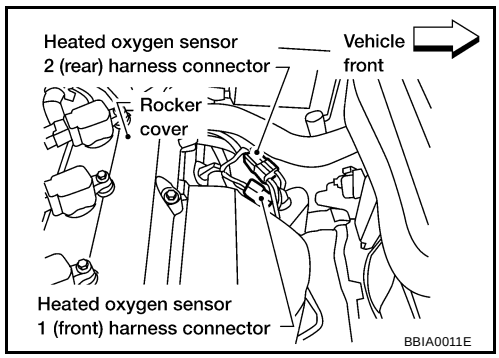
3. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect heated oxygen sensor 2 harness connector.
3. Check harness continuity between HO2S2 terminal 4 and engine ground.
   Refer to Wiring Diagram.

   Continuity should exist.
4. Also check harness for short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.



4. DETECT MALFUNCTIONING PART

Check the following.

- Joint connector-3
- Harness for open or short between HO2S2 and engine ground

>> Repair open circuit or short to power in harness or connectors.

5. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 95 and HO2S2 terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.

3. Check harness continuity between ECM terminal 95 or HO2S2 terminal 1 and ground.
   Refer to Wiring Diagram.

   Continuity should not exist.

4. Also check harness for short to ground or short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-1657, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace heated oxygen sensor 2.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

UBS002IB

HEATED OXYGEN SENSOR 2

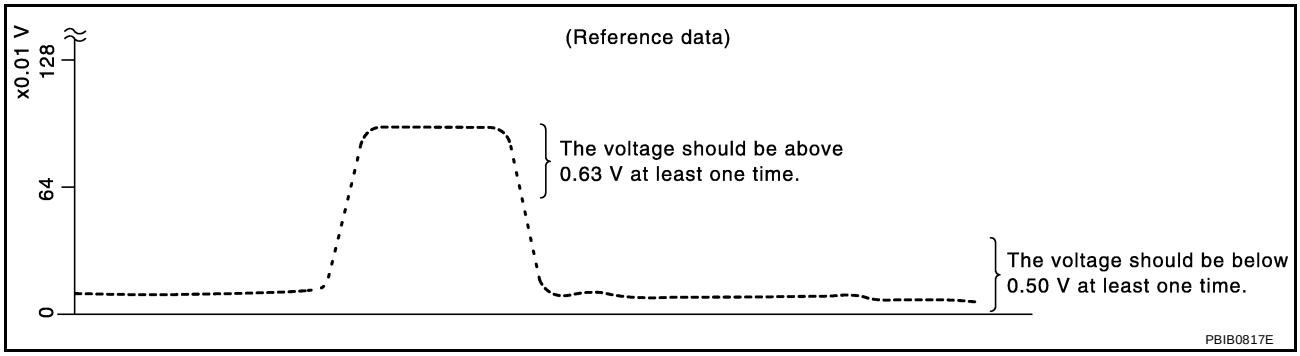
With CONSULT-II

1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)” as the monitor item with CONSULT-II.

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
HO2S1 (B1)	XXX V
HO2S2 (B1)	XXX V
HO2S1 MNTR (B1)	RICH
HO2S2 MNTR (B1)	RICH

SEF662Y

4. Check “HO2S2 (B1)” at idle speed when adjusting “FUEL INJECTION” to ±25%.



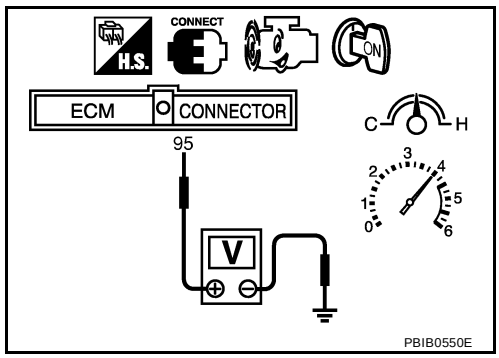
“HO2S2 (B1)” should be above 0.63V at least once when the “FUEL INJECTION” is +25%.
“HO2S2 (B1)” should be below 0.50V at least once when the “FUEL INJECTION” is −25%.

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 drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Set voltmeter probes between ECM terminal 95 [HO2S2 (B1) signal] and engine ground.
4. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.63V at least once during this procedure.
   If the voltage is above 0.63V at step 4, step 5 is not necessary.



5. Keep vehicle idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in “D” position with “OD” OFF (A/T), 3rd gear position (M/T).
   The voltage should be below 0.50V at least once during this procedure.
6. If NG, replace heated oxygen sensor 2.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new 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

UBS002IC

HEATED OXYGEN SENSOR 2

Refer to EX-3, "EXHAUST SYSTEM" .

DTC P1148 CLOSED LOOP CONTROL

PFP:22690

On Board Diagnosis Logic

UBS002ID

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1148 1148	Closed loop control function	The closed loop control function does not operate even when vehicle is driving in the specified condition.	● The heated oxygen sensor 1 circuit is open or shorted. ● Heated oxygen sensor 1 ● Heated oxygen sensor heater

DTC Confirmation Procedure

UBS002IE

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

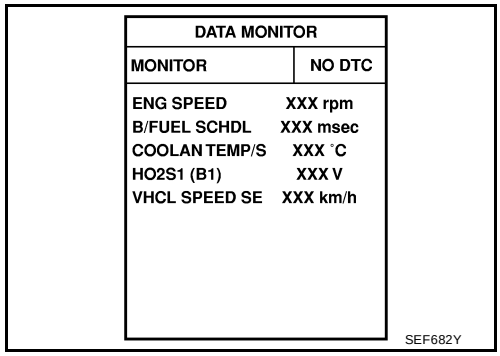
TESTING CONDITION:

- **Never raise engine speed above 3,600 rpm during the “DTC Confirmation Procedure”. If the engine speed limit is exceeded, retry the procedure from step 2.**
- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Hold engine speed at 2,000 rpm and check one of the following.
   - “HO2S1 (B1)” voltage should go above 0.70V at least once.
   - “HO2S1 (B1)” voltage should go below 0.21V at least once.

   If the check result is NG, perform EC-1660, "Diagnostic Procedure" .
   If the check result is OK, perform the following step.
4. Let engine idle at least 5 minutes.
5. Maintain the following condition at least 50 consecutive seconds.



B/FUEL SCHDL	2.8 msec or more
ENG SPEED	More than 1,600 rpm
Selector lever	Suitable position
VHCL SPEED SE	More than 70 km/h (43 MPH)

During this test, P0134 may be displayed on CONSULT-II screen.

6. If DTC is detected, go to EC-1660, "Diagnostic Procedure" .

Overall Function Check

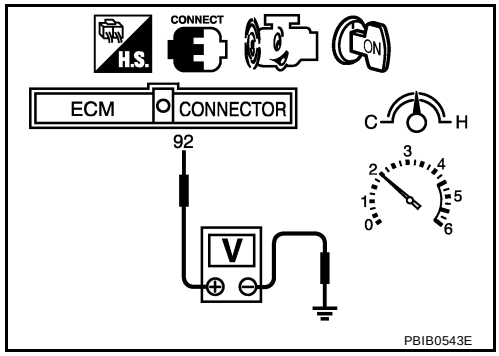
UBS002IF

Use this procedure to check the overall function of the closed loop control. During this check, a DTC might not be confirmed.

WITH GST

1. Start engine and warm it up to normal operating temperature.

2. Set voltmeter probes between ECM terminal 92 [HO2S1 (B1) signal] and engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no-load.
   - The voltage should go above 0.70V at least once.
   - The voltage should go below 0.21V at least once.
4. If NG, go to EC-1660, "Diagnostic Procedure" .



Diagnostic Procedure

UBS002IG

Perform trouble diagnosis for “DTC P0133”, EC-1405 .

DTC P1217 ENGINE OVER TEMPERATURE

PFP:00000

System Description

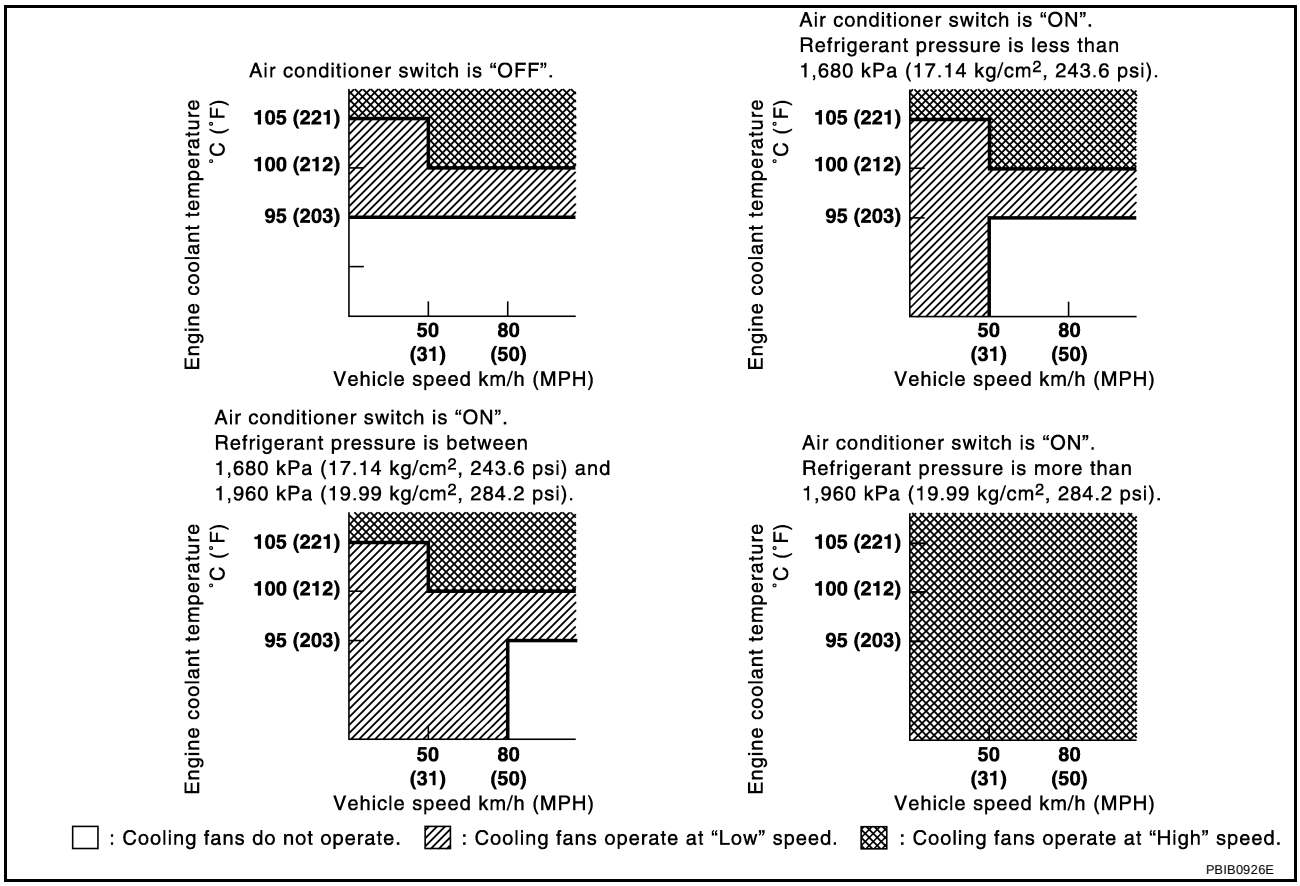
UBS002IH

COOLING FAN CONTROL

Sensor	Input Signal to ECM	ECM function	Actuator
Vehicle speed sensor	Vehicle speed	Cooling fan control	Cooling fan relay(s)
Engine coolant temperature sensor	Engine coolant temperature		
Air conditioner switch	Air conditioner “ON” signal		
Ignition switch	Start signal		
Refrigerant pressure sensor	Refrigerant pressure		

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].

OPERATION



CONSULT-II Reference Value in Data Monitor Mode

UBS002II

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 ● Air conditioner switch: OFF	Engine coolant temperature is 94°C (201°F) or less	OFF
		Engine coolant temperature is between 95°C (203°F) and 104°C (219°F)	LOW
		Engine coolant temperature is 105°C (221°F) or more	HIGH

On Board Diagnosis Logic

UBS002IJ

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.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1217 1217	Engine over temperature (Overheat)	● Cooling fan does not operate properly (Overheat). ● Cooling fan system does not operate properly (Overheat). ● Engine coolant was not added to the system using the proper filling method.	● Harness or connectors (The cooling fan circuit is open or shorted.) ● Cooling fan ● Radiator hose ● Radiator ● Radiator cap ● Water pump ● Thermostat For more information, refer to EC-1672, "Main 12 Causes of Overheating" .

CAUTION:

When a malfunction is indicated, be sure to replace the coolant. Refer to MA-22, "Changing Engine Coolant" . Also, replace the engine oil. Refer to LU-17, "Changing Engine Oil" .

1. **Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute. Be sure to use coolant with the proper mixture ratio. Refer to MA-14, "Anti-freeze Coolant Mixture Ratio" .**
2. **After refilling coolant, run engine to ensure that no water-flow noise is emitted.**

Overall Function Check

UBS002IK

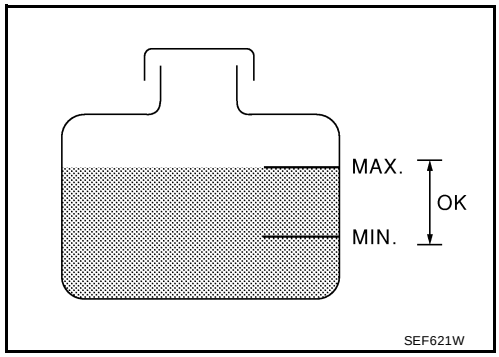
Use this procedure to check the overall function of the cooling fan. During this check, a DTC might not be confirmed.

WARNING:

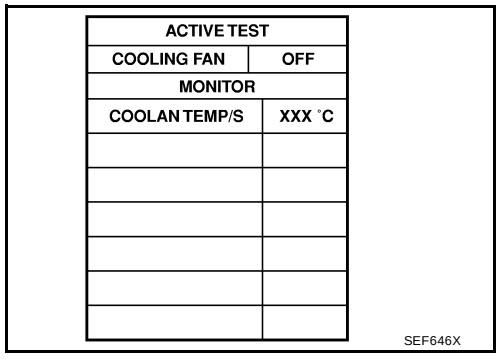
Never remove the radiator cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator.
Wrap a thick cloth around cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.

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-1665, "Diagnostic Procedure" .
2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to EC-1665, "Diagnostic Procedure" .
3. Turn ignition switch “ON”.

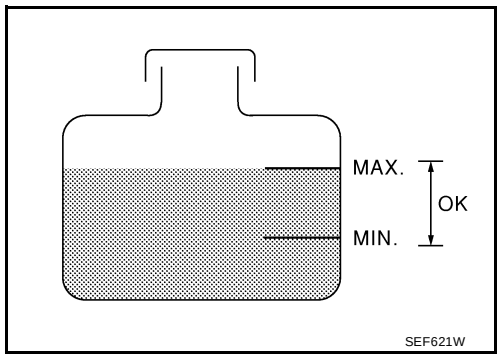


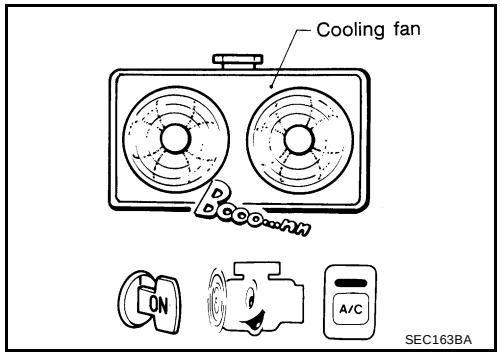
4. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-II.
5. If the results are NG, go to EC-1665, "Diagnostic Procedure" .

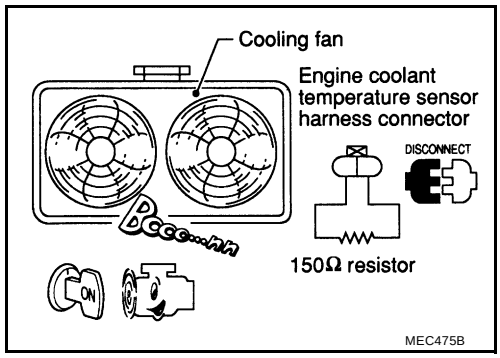


WITH GST

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-1665, "Diagnostic Procedure" .
2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to EC-1665, "Diagnostic Procedure" .
3. Start engine.
   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-1665, "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.
    Be careful not to overheat engine.
12. If NG, go to EC-1665, "Diagnostic Procedure" .

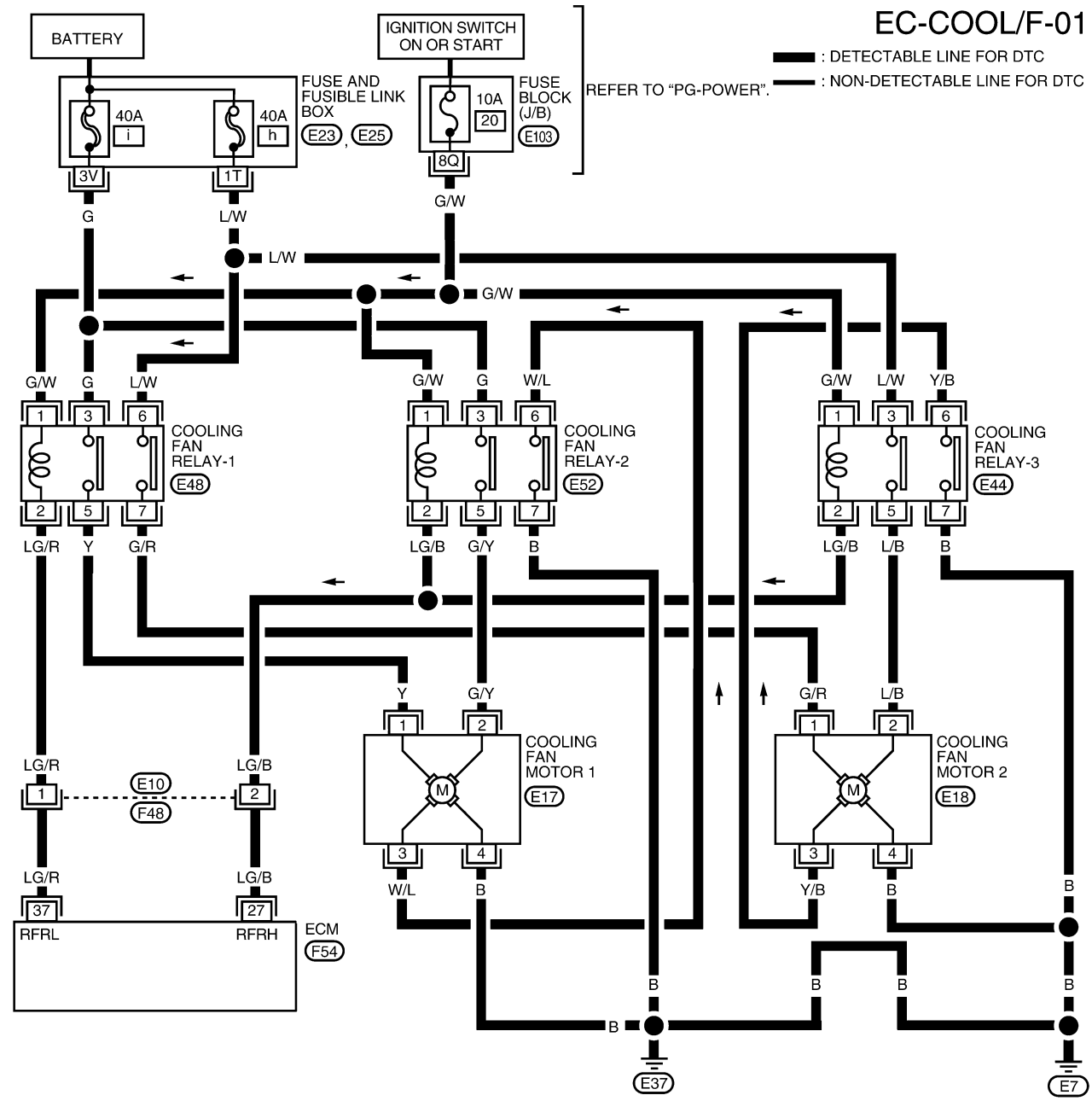


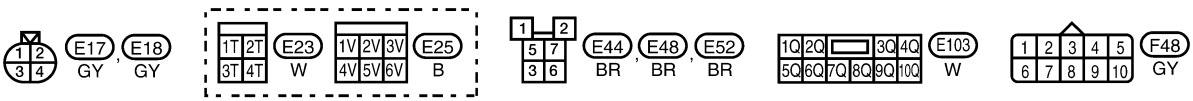


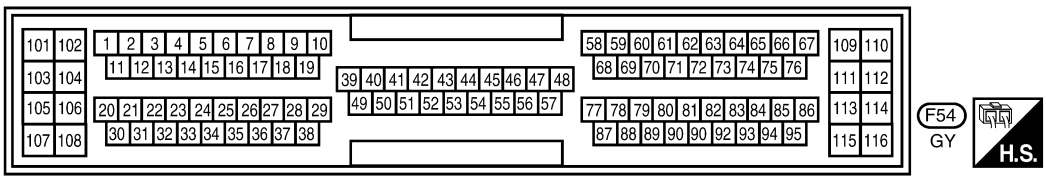


Wiring Diagram

UBS002IL







BBWA0431E

Diagnostic Procedure

UBS002IM

1. INSPECTION START

Do you have CONSULT-II?

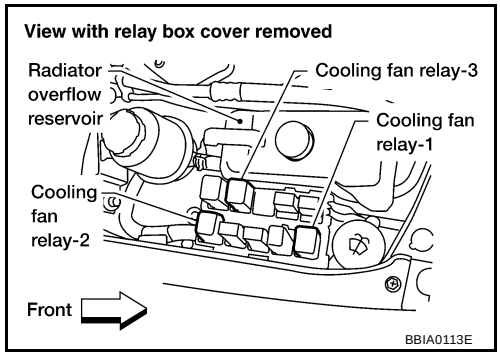
Yes or No

Yes >> GO TO 2.
No >> GO TO 4.

2. CHECK COOLING FAN LOW SPEED OPERATION

With CONSULT-II

1. Disconnect cooling fan relays-2 and -3.
2. Start engine and let it idle.



3. Select “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-II and touch “LOW” on the CONSULT-II screen.
4. 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-1669, "PROCEDURE A" .)

ACTIVE TEST	
COOLING FAN	LOW
MONITOR	
COOLAN TEMP/S	XXX °C

SEF784Z

3. CHECK COOLING FAN HIGH SPEED OPERATION

With CONSULT-II

1. Turn ignition switch “OFF”.
2. Reconnect cooling fan relays-2 and -3.
3. Start engine and let it idle.
4. Select “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-II and touch “HIGH” on the CONSULT-II screen.
5. Make sure that cooling fans-1 and -2 operate at high speed.

OK or NG

OK >> GO TO 6.
NG >> Check cooling fan high speed control circuit. (Go to EC-1671, "PROCEDURE B" .)

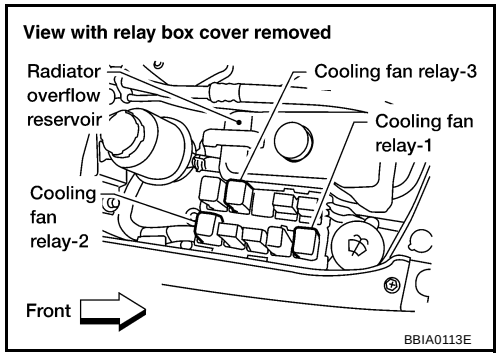
ACTIVE TEST	
COOLING FAN	HIGH
MONITOR	
COOLAN TEMP/S	XXX °C

SEF785Z

4. CHECK COOLING FAN LOW SPEED OPERATION

Without CONSULT-II

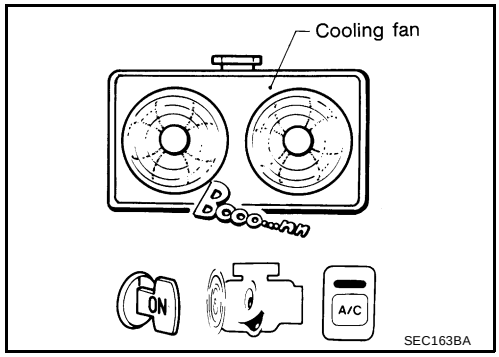
1. Disconnect cooling fan relays-2 and -3.
2. Start engine and let it idle.
3. Turn air conditioner switch “ON”.
4. Turn blower fan switch “ON”.



5. 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-1669, "PROCEDURE A" .)



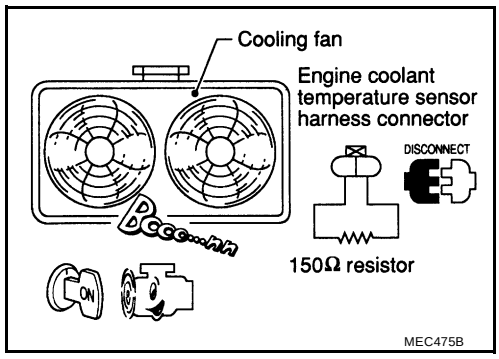
5. CHECK COOLING FAN HIGH SPEED OPERATION

Without CONSULT-II

1. Turn ignition switch “OFF”.
2. Reconnect cooling fan relays-2 and -3.
3. Turn air conditioner switch and blower fan switch “OFF”.
4. Disconnect engine coolant temperature sensor harness connector.
5. Connect 150Ω resistor to engine coolant temperature sensor harness connector.
6. Restart engine and make sure that cooling fans-1 and -2 operate at high speed.

OK or NG

OK >> GO TO 6.
NG >> Check cooling fan high speed control circuit. (Go to EC-1671, "PROCEDURE B" .)



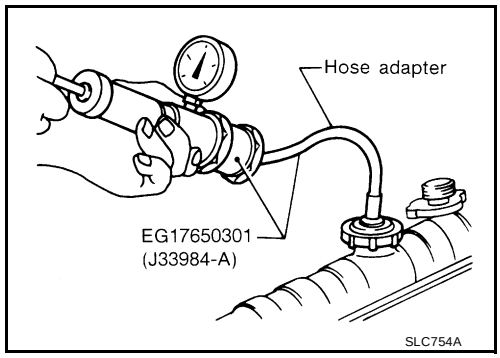
6. CHECK COOLING SYSTEM FOR LEAK

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.

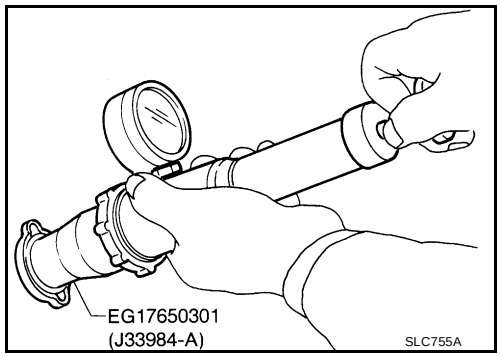
- Hose
- Radiator
- Water pump
  Refer to CO-28, "WATER PUMP" .

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

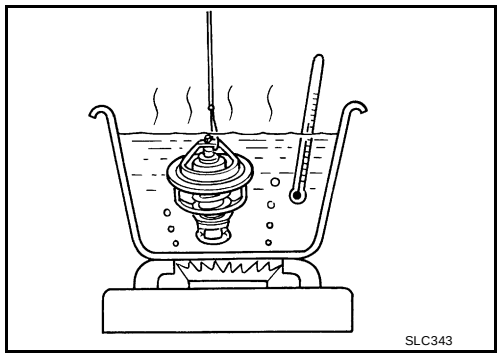
1. Check valve seating condition at normal room temperatures.
   It should seat tightly.
2. Check valve opening temperature and valve lift.

Valve opening temperature:

82°C (180°F) [standard]

Valve lift:

More than 8 mm/95°C (0.31 in/203°F)



3. Check if valve is closed at 5°C (9°F) below valve opening temperature.

For details, refer to CO-30, "THERMOSTAT AND THERMOSTAT HOUSING" .

OK or NG

OK >> GO TO 9.
NG >> Replace thermostat.

9. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-1386, "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-1672, "Main 12 Causes of Overheating" .

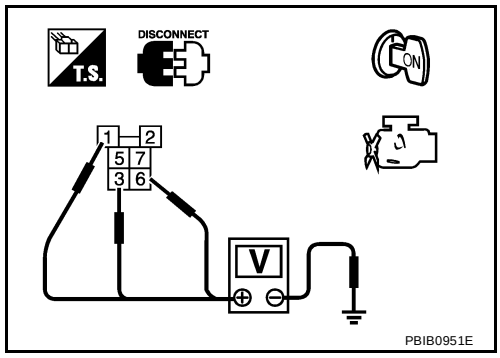
>> **INSPECTION END**

PROCEDURE A

1. CHECK POWER SUPPLY

1. Turn ignition switch “OFF”.
2. Disconnect cooling fan relay-1.
3. Turn ignition switch “ON”.
4. Check voltage between cooling fan relay-1 terminals 1, 3, 6 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.

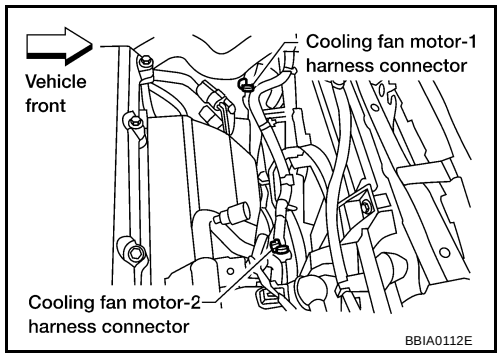
- 10A fuse
- Fuse block (J/B) connector E103
- 40A fusible links
- Fuse and fusible link box connectors E23, E25
- Harness for open or short between cooling fan relay-1 and fuse
- Harness for open or short between cooling fan relay-1 and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

3. 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. Check harness continuity between cooling fan relay-1 terminal 5 and cooling fan motor-1 terminal 1, cooling fan motor-1 terminal 4 and body 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 cooling fan relay-1 terminal 7 and cooling fan motor-2 terminal 1, cooling fan motor-2 terminal 4 and body 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 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK OUTPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 37 and cooling fan relay-1 terminal 2. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E10, F48
- Harness for open or short between cooling fan relay-1 and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK COOLING FAN RELAY-1

Refer to EC-1673, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace cooling fan relay.

7. CHECK COOLING FAN MOTORS-1 AND -2

Refer to EC-1673, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace cooling fan motors.

8. CHECK INTERMITTENT INCIDENT

Perform EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

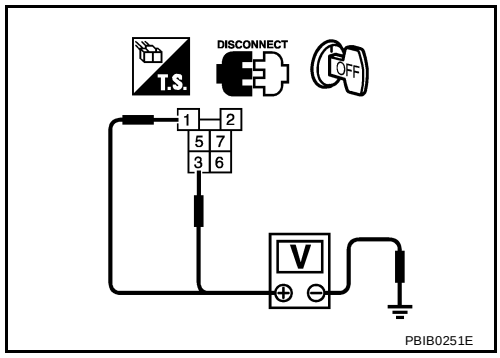
>> **INSPECTION END**

PROCEDURE B

1. CHECK POWER SUPPLY

1. Turn ignition switch “OFF”.
2. Disconnect cooling fan relays-2 and -3.
3. Turn ignition switch “ON”.
4. Check voltage between cooling fan relays-2 and -3 terminals 1, 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

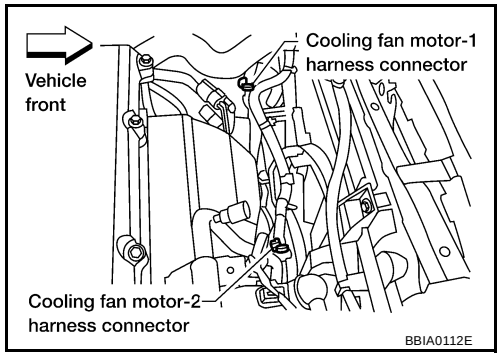
- Harness for open or short between cooling fan relays-2 and -3 and fuse
- Harness for open or short between cooling fan relays-2 and -3 and fusible links

>> Repair harness or connectors.

3. 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. Check harness continuity between the following;
   cooling fan relay-2 terminal 5 and cooling fan motor-1 terminal 2,
   cooling fan relay-2 terminal 6 and cooling fan motor-1 terminal 3,
   cooling fan relay-2 terminal 7 and body 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 relay-3 terminal 5 and cooling fan motor-2 terminal 2,
   cooling fan relay-3 terminal 6 and cooling fan motor-2 terminal 3,
   cooling fan relay-3 terminal 7 and body 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 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK OUTPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 27 and cooling fan relay-2 terminal 2, cooling fan relay-3 terminal 2.
   Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E10, F48
- Harness for open or short between cooling fan relays-2, -3 and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK COOLING FAN RELAYS-2 AND -3

Refer to EC-1673, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace cooling fan relays.

7. CHECK COOLING FAN MOTORS

Refer to EC-1673, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace cooling fan motors.

8. CHECK INTERMITTENT INCIDENT

Perform EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Main 12 Causes of Overheating

UBS002IN

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	● Blocked radiator ● Blocked condenser ● Blocked radiator grille ● Blocked bumper	● Visual	No blocking	—
	2	● Coolant mixture	● Coolant tester	50 - 50% coolant mixture	See MA-14, "Anti-freeze Coolant Mixture Ratio" .
	3	● Coolant level	● Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	See MA-22, "Changing Engine Coolant" .
	4	● Radiator cap	● Pressure tester	59 - 98 kPa (0.6 - 1.0 kg/cm^2 , 9 - 14 psi) (Limit)	See CO-27, "CHECKING RADIATOR CAP" .

Engine	Step	Inspection item	Equipment	Standard	Reference page
ON*2	5	● Coolant leaks	● Visual	No leaks	See CO-26, "CHECKING COOLING SYSTEM FOR LEAKS" .
ON*2	6	● Thermostat	● Touch the upper and lower radiator hoses	Both hoses should be hot	See CO-30, "THERMOSTAT AND THERMOSTAT HOUSING" , and CO-32, "RADIATOR" .
ON*1	7	● Cooling fan	● CONSULT-II	Operating	See trouble diagnosis for DTC P1217 (EC-1661).
OFF	8	● Combustion gas leak	● Color checker chemical tester 4 Gas analyzer	Negative	—
ON*3	9	● Coolant temperature gauge	● Visual	Gauge less than 3/4 when driving	—
		● Coolant overflow to reservoir tank	● Visual	No overflow during driving and idling	See MA-22, "Changing Engine Coolant" .
OFF*4	10	● Coolant return from reservoir tank to radiator	● Visual	Should be initial level in reservoir tank	See CO-26, "CHECKING RESERVOIR LEVEL" .
OFF	11	● Cylinder head	● Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	See EM-129, "CYLINDER HEAD" .
	12	● Cylinder block and pistons	● Visual	No scuffing on cylinder walls or piston	See EM-129, "CYLINDER HEAD" .

*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-23, "OVERHEATING CAUSE ANALYSIS" .

Component Inspection

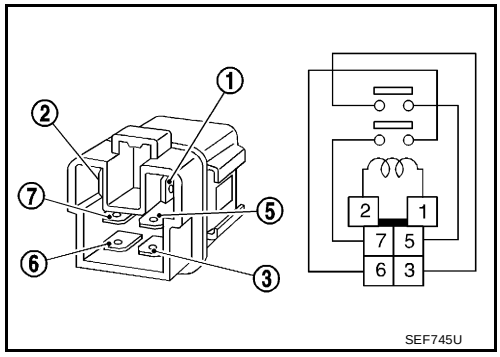
UBS002IO

COOLING FAN RELAYS-1, -2 AND -3

Check continuity between terminals 3 and 5, 6 and 7.

Conditions	Continuity
12V direct current supply between terminals 1 and 2	Yes
No current supply	No

If NG, replace relay.



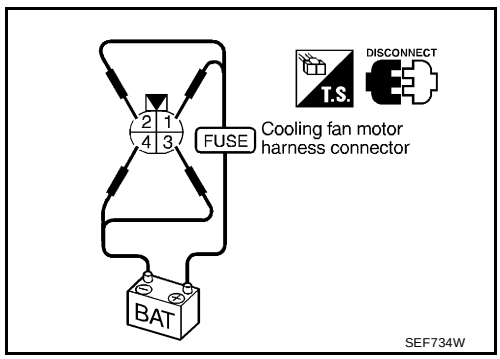
COOLING FAN MOTORS-1 AND -2

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
	High	1, 2	3, 4

Cooling fan motor should operate.

If NG, replace cooling fan motor.



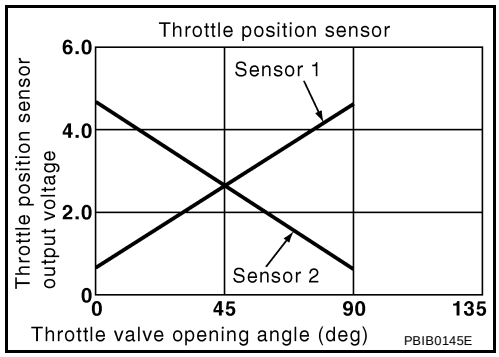
DTC P1223, P1224 TP SENSOR

PFP:16119

Component Description

UBS002IP

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

UBS002IQ

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
THRTL SEN2	● Ignition switch: ON (Engine stopped) ● Shift lever: D (A/T model) 1st (M/T model)	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V

On Board Diagnosis Logic

UBS002IR

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1223 1223	Throttle position sensor 2 circuit low input	An excessively low voltage from the TP sensor 2 is sent to ECM.	● Harness or connectors (The TP sensor 2 circuit is open or shorted.) ● Electric throttle control actuator (TP sensor 2)
P1224 1224	Throttle position sensor 2 circuit high input	An excessively high voltage from the TP sensor 2 is sent to ECM.	

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters in fail-safe mode and the MIL lights up.

Engine operation condition in fail-safe mode
The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates an opening speed of approx. 5 seconds to an opening of 10 degrees. So, the acceleration will be poor.

DTC Confirmation Procedure

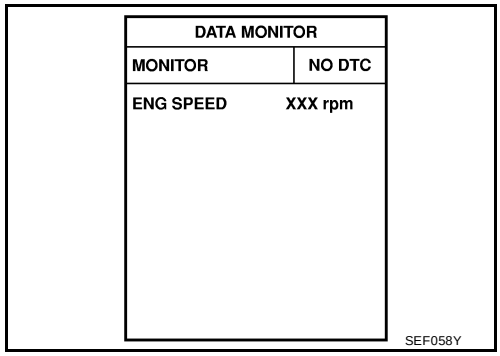
UBS002IS

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-1677, "Diagnostic Procedure" .

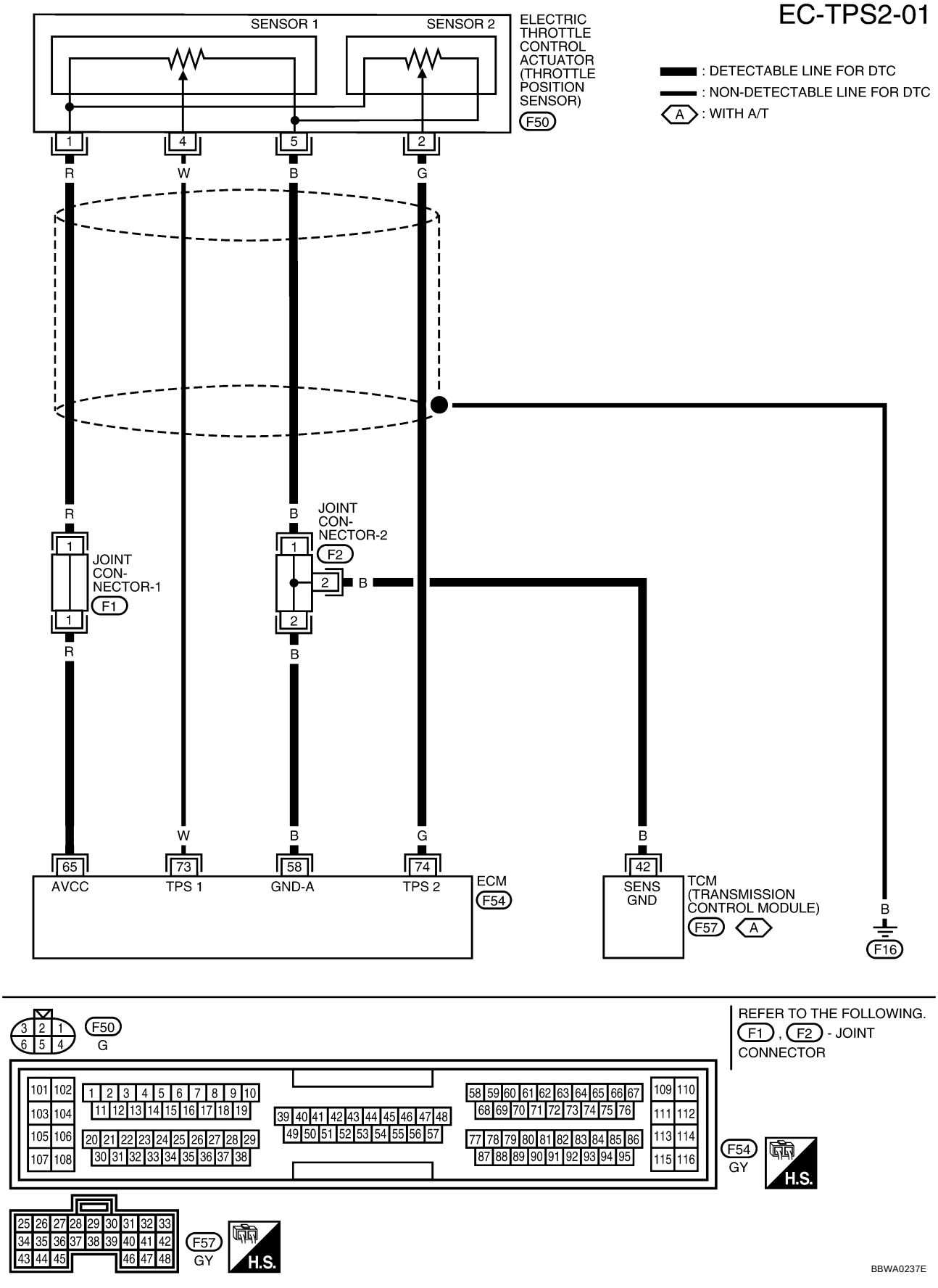


WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS002IT



Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/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)
58	B	Sensors' ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
65	R	Sensor's power supply	**[Ignition switch "ON"]**	Approximately 5V
73	W	Throttle position sensor 1	**[Ignition switch "ON"]** ● Shift lever position is "D" (A/T model) ● Shift lever position is "1st" (M/T model) ● Accelerator pedal fully released	More than 0.36V
			[Ignition switch "ON"] ● Shift lever position is "D" (A/T model) ● Shift lever position is "1st" (M/T model) ● Accelerator pedal fully depressed	Less than 4.75V
74	G	Throttle position sensor 2	**[Ignition switch "ON"]** ● Shift lever position is "D" (A/T model) ● Shift lever position is "1st" (M/T model) ● Accelerator pedal fully released	Less than 4.75V
			[Ignition switch "ON"] ● Shift lever position is "D" (A/T model) ● Shift lever position is "1st" (M/T model) ● Accelerator pedal fully depressed	More than 0.36V

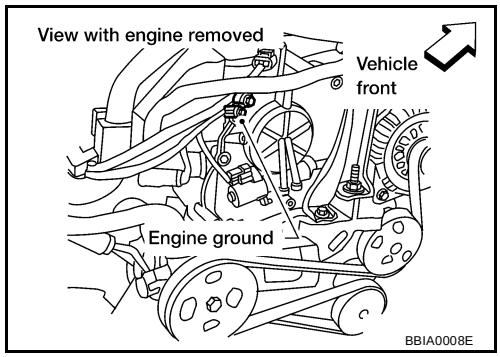
Diagnostic Procedure

UBS002IU

1. RETIGHTEN GROUND SCREWS

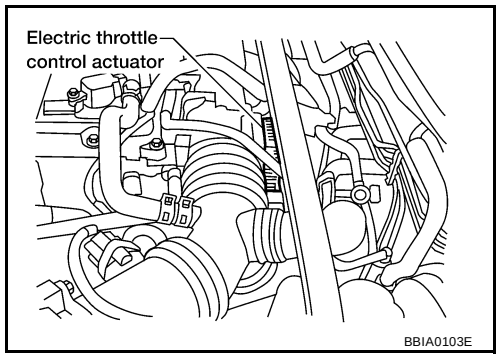
1. Turn ignition switch "OFF".
2. Loosen and retighten engine ground screws.

>> GO TO 2.



2. CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT

1. Disconnect electric throttle control actuator harness connector.
2. Turn ignition switch “ON”.

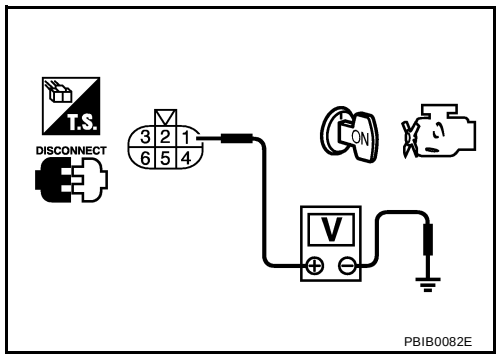


3. Check voltage between electric throttle control actuator terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5V

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.



3. DETECT MALFUNCTIONING PART

Check the following.

- Joint connector-1
- Harness for open or short between electric throttle control actuator and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK THROTTLE POSITION SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Check harness continuity between electric throttle control actuator terminal 5 and engine ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Joint connector-2
- Harness for open or short between electric throttle control actuator and ECM
- Harness for open or short between electric throttle control actuator and TCM

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK THROTTLE POSITION SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 74 and electric throttle control actuator 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 THROTTLE POSITION SENSOR

Refer to EC-1679, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> GO TO 8.

8. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-1253, "Throttle Valve Closed Position Learning" .
3. Perform EC-1253, "Idle Air Volume Learning" .

>> **INSPECTION END**

9. CHECK INTERMITTENT INCIDENT

Refer to EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

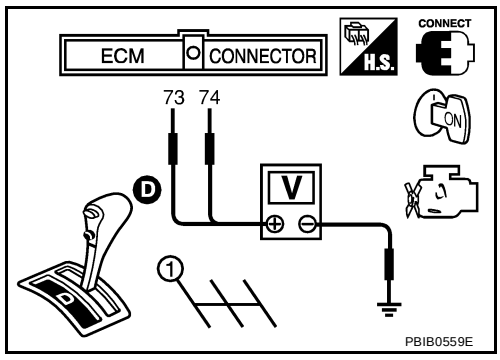
Component Inspection

UBS002IV

THROTTLE POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Perform EC-1253, "Throttle Valve Closed Position Learning" .
3. Turn ignition switch “ON”.
4. Set selector lever to “D” position (A/T models) or “1st” position (M/T models).
5. Check voltage between ECM terminals 73 (TP sensor 1), 74 (TP sensor 2) and engine ground under the following conditions.

Terminal	Accelerator pedal	Voltage
73 (Throttle position sensor 1)	Fully released	More than 0.36V
	Fully depressed	Less than 4.75V
74 (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-1253, "Throttle Valve Closed Position Learning" .
8. Perform EC-1253, "Idle Air Volume Learning" .

Remove and Installation

UBS002IW

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-93, "INTAKE MANIFOLD" .

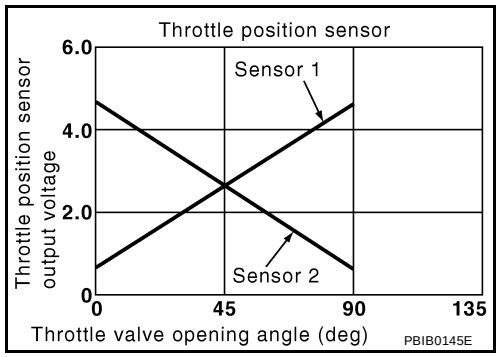
DTC P1225 TP SENSOR

PFP:16119

Component Description

UBS002IX

Electric Throttle Control Actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.
The throttle position sensor has the two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



On Board Diagnosis Logic

UBS002IY

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1225 1225	Closed throttle position learning performance problem	Closed throttle position learning value is excessively low.	● Electric throttle control actuator (TP sensor 1 and 2)

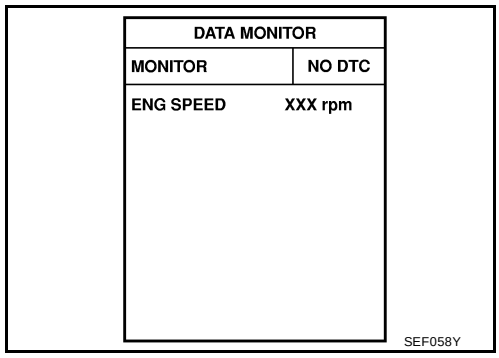
DTC Confirmation Procedure

UBS002IZ

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT-II

1. Turn ignition switch “ON”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Turn ignition switch “OFF”, wait at least 10 seconds.
4. Turn ignition switch “ON”.
5. If 1st trip DTC is detected, go to EC-1681, "Diagnostic Procedure" .



WITH GST

Follow the procedure “With CONSULT-II” above.

Diagnostic Procedure

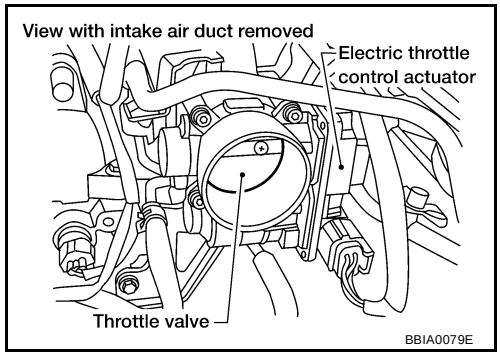
UBS002J0

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-1253, "Throttle Valve Closed Position Learning" .
3. Perform EC-1253, "Idle Air Volume Learning" .

>> **INSPECTION END**

Remove and Installation

UBS002J1

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-93, "INTAKE MANIFOLD" .

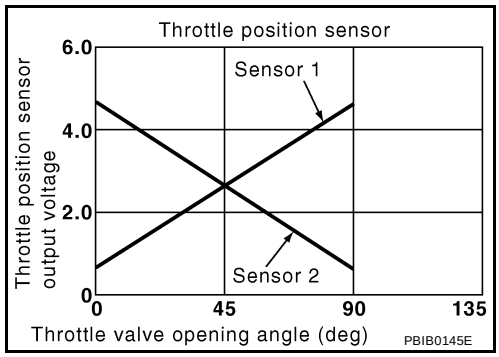
DTC P1226 TP SENSOR

PFP:16119

Component Description

UBS002J2

Electric Throttle Control Actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.
The throttle position sensor has the two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



On Board Diagnosis Logic

UBS002J3

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1226 1226	Closed throttle position learning performance problem	Closed throttle position learning is not performed successfully, repeatedly.	● Electric throttle control actuator (TP sensor 1 and 2)

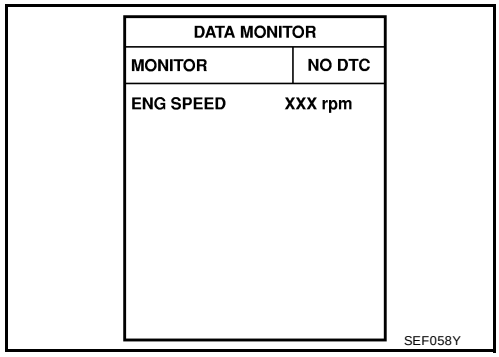
DTC Confirmation Procedure

UBS002J4

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT-II

1. Turn ignition switch “ON”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Turn ignition switch “OFF”, wait at least 10 seconds.
4. Turn ignition switch “ON”.
5. Repeat steps 3 and 4, 32 times.
6. If 1st trip DTC is detected, go to EC-1683, "Diagnostic Procedure" .



WITH GST

Follow the procedure “With CONSULT-II” above.

Diagnostic Procedure

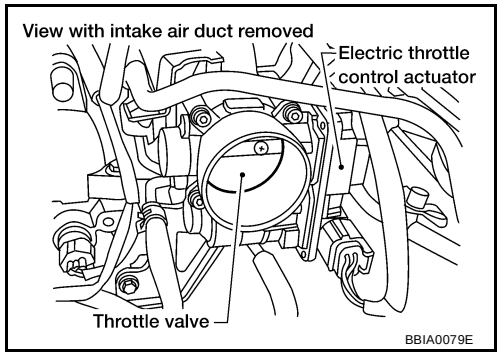
UBS002J5

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-1253, "Throttle Valve Closed Position Learning" .
3. Perform EC-1253, "Idle Air Volume Learning" .

>> **INSPECTION END**

Remove and Installation

UBS002J6

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-93, "INTAKE MANIFOLD" .

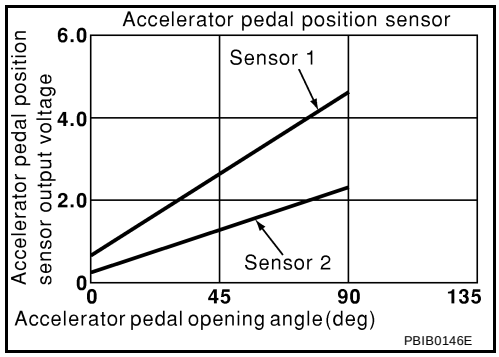
DTC P1227, P1228 APP SENSOR

PFP:18002

Component Description

UBS002J7

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

UBS002J8

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL SEN2	● Ignition switch: ON (engine stopped)	Accelerator pedal: Fully released	0.41 - 0.71V
		Accelerator pedal: Fully depressed	More than 4.2V
CLSD THL POS	● Ignition switch: ON	Accelerator pedal: Fully released	ON
		Accelerator pedal: Slightly depressed	OFF

On Board Diagnosis Logic

UBS002J9

These half-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1227 1227	Accelerator pedal position sensor 2 circuit low input	An excessively low voltage from the APP sensor 2 is sent to ECM.	● Harness or connectors (The APP sensor 2 circuit is open or shorted.) ● Accelerator pedal position sensor (Accelerator pedal position sensor 2)
P1228 1228	Accelerator pedal position sensor 2 circuit high input	An excessively high voltage from the APP sensor 2 is sent to ECM.	

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters in fail-safe mode and the MIL lights up.

Engine operating condition in fail-safe mode
The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates an opening speed of approx. 5 seconds to an opening of 10 degrees. So, the acceleration will be poor.

DTC Confirmation Procedure

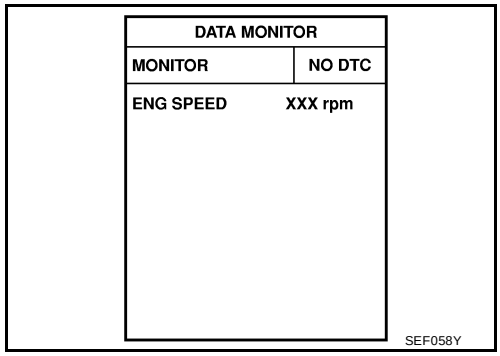
UBS002JA

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-1687, "Diagnostic Procedure" .



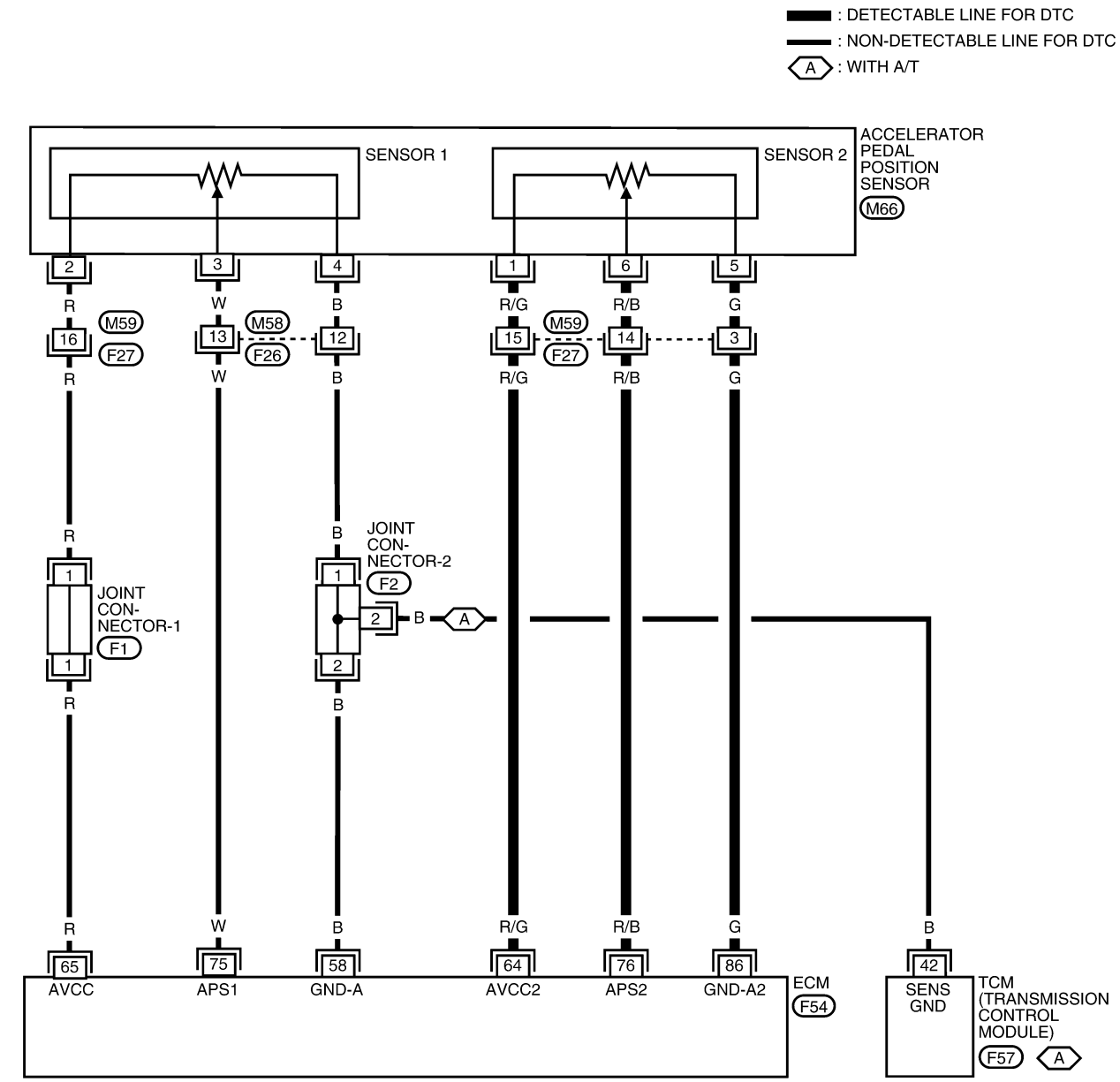
WITH GST

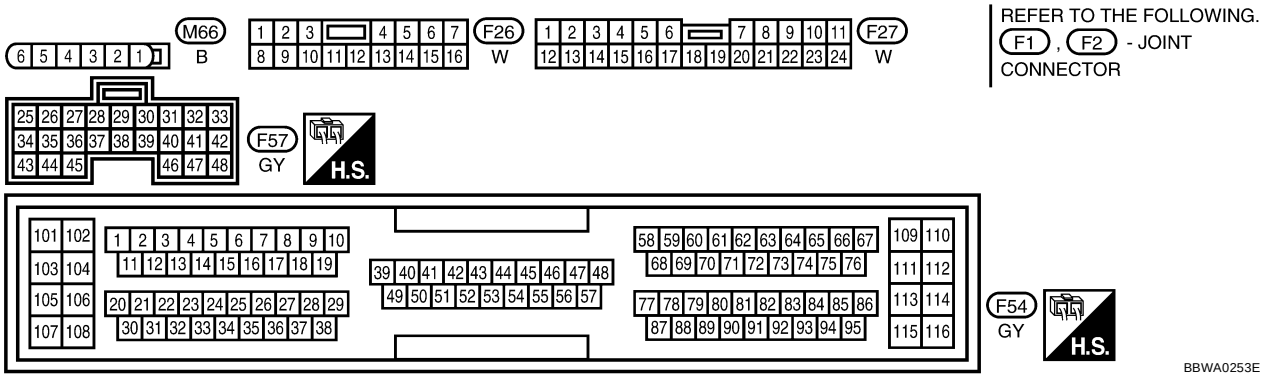
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS002JB

EC-APPS2-01





BBWA0253E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/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)
58	B	Sensors' ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
64	R/G	Accelerator pedal position sensor 2 power supply	**[Ignition switch "ON"]**	Approximately 2.5V
65	R	Sensor's power supply	**[Ignition switch "ON"]**	Approximately 5V
75	W	Accelerator pedal position sensor 1	**[Ignition switch "ON"]** ● Accelerator pedal fully released	0.41 - 0.71V
			[Ignition switch "ON"] ● Accelerator pedal fully depressed	More than 4.2V
76	R/B	Accelerator pedal position sensor 2	**[Ignition switch "ON"]** ● Accelerator pedal fully released	0.21 - 0.36V
			[Ignition switch "ON"] ● Accelerator pedal fully depressed	More than 2.1V
86	G	Accelerator pedal position sensor 2 ground	**[Ignition switch "ON"]**	Approximately 0V

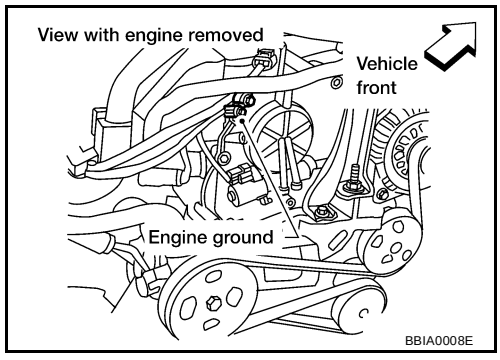
Diagnostic Procedure

UBS002JC

1. RETIGHTEN GROUND SCREWS

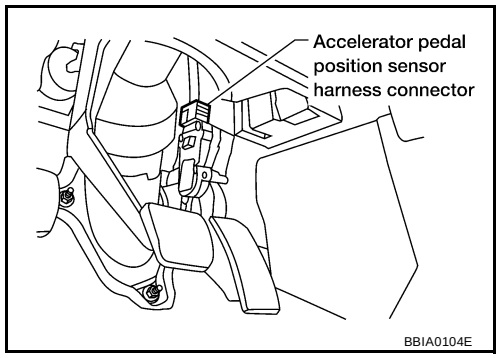
1. Turn ignition switch "OFF".
2. Loosen and retighten engine ground screws.

>> GO TO 2.



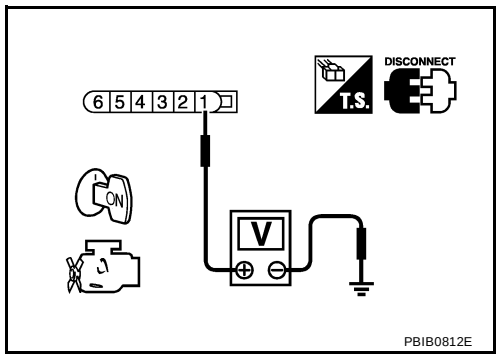
2. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch “ON”.



3. Check voltage between APP sensor terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 2.5V



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M59, F27
- Harness for open or short between ECM and accelerator pedal position sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK APP SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Check harness continuity between APP sensor terminal 5 and engine ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M59, F27
- Harness for open or short between ECM and accelerator pedal position sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK APP SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 76 and APP sensor terminal 6. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M59, F27
- Harness for open or short between ECM and accelerator pedal position sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK APP SENSOR

Refer to EC-1689, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace accelerator pedal assembly.

9. CHECK INTERMITTENT INCIDENT

Refer to EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

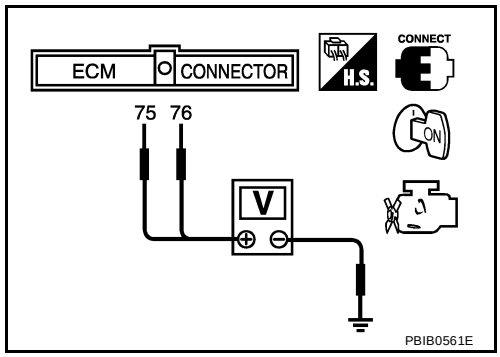
Component Inspection

UBS002JD

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch “ON”.
3. Check voltage between ECM terminals 75 (APP sensor 1 signal), 76 (APP sensor 2 signal) and engine ground under the following conditions.

Terminal	Accelerator pedal	Voltage
75 (Accelerator pedal position sensor 1)	Fully released	0.41 - 0.71V
	Fully depressed	More than 4.2V
76 (Accelerator pedal position sensor 2)	Fully released	0.21 - 0.36V
	Fully depressed	More than 2.1V



4. If NG, replace accelerator pedal assembly and go to next step.
5. Perform EC-1253, "Accelerator Pedal Released Position Learning" .
6. Perform EC-1253, "Throttle Valve Closed Position Learning" .
7. Perform EC-1253, "Idle Air Volume Learning" .

Remove and Installation

UBS002JE

ACCELERATOR PEDAL

Refer to ACC-4, "ACCELERATOR CONTROL SYSTEM" .

DTC P1229 SENSOR POWER SUPPLY

PFP:16119

On Board Diagnosis Logic

UBS002JF

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1229 1229	Sensor power supply circuit short	ECM detects a voltage of power source for sensor is excessively low or high.	● Harness or connectors (The TP sensor 1 and 2 circuit is shorted.) (APP sensor 1 circuit is shorted.) (MAF sensor circuit is shorted.) (EVAP control system pressure sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) ● Electric throttle control actuator (TP sensor 1 and 2) ● Accelerator pedal position sensor (APP sensor 1) ● MAF sensor ● EVAP control system pressure sensor ● Refrigerant pressures sensor ● ECM pin terminal

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters in 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.

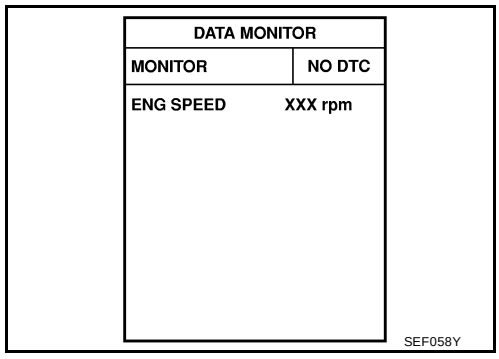
DTC Confirmation Procedure

UBS002JG

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-1692, "Diagnostic Procedure" .

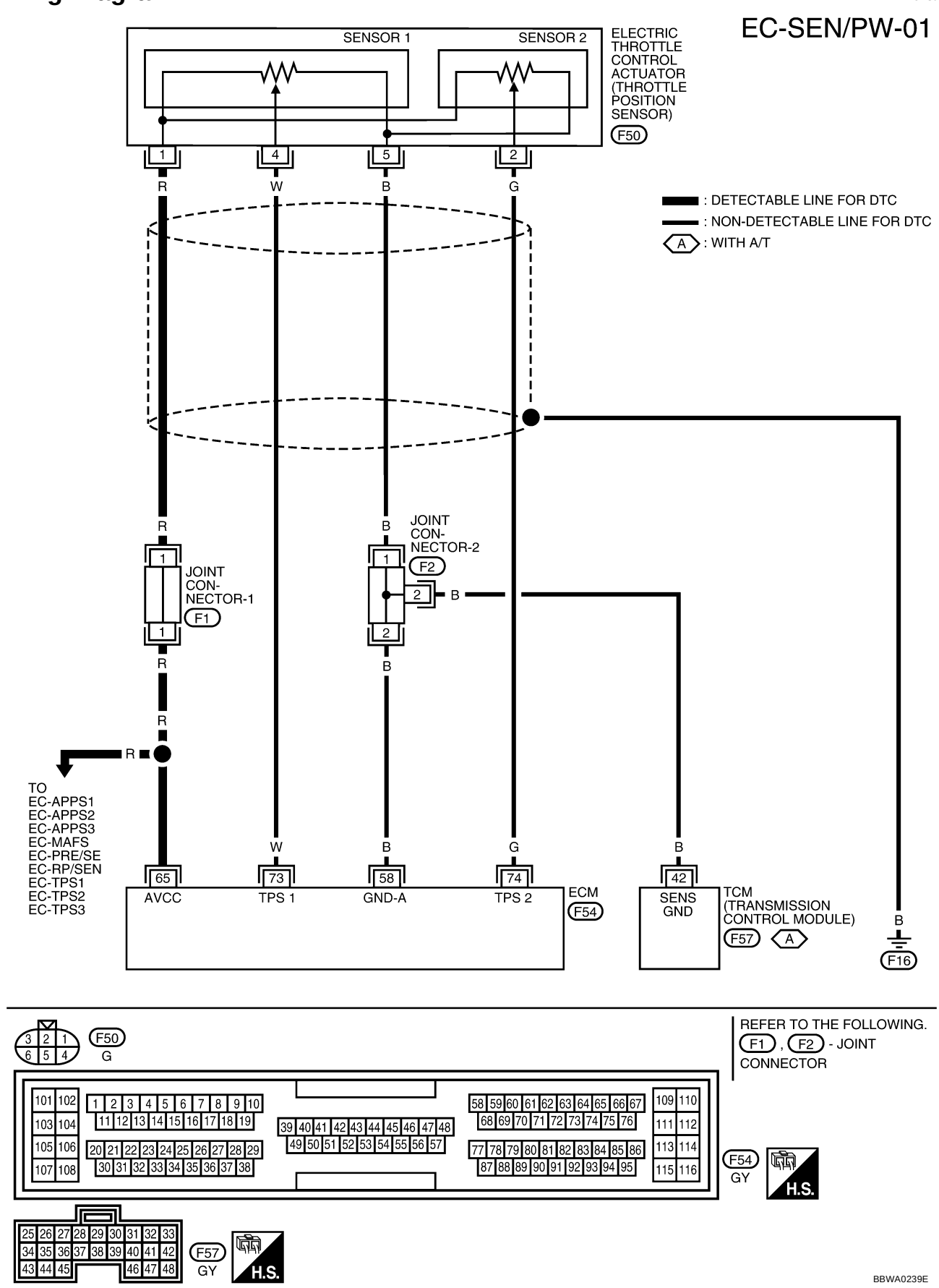


WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS002JH



Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/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)
65	R	Sensor's power supply	**[Ignition switch "ON"]**	Approximately 5V

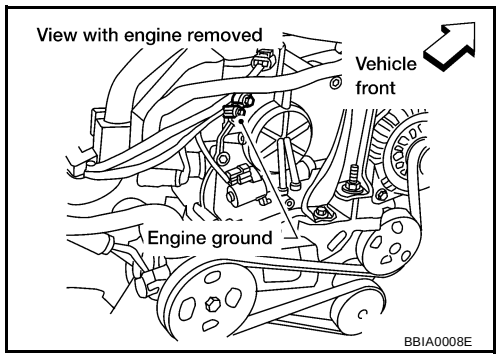
Diagnostic Procedure

UBS002JI

1. RETIGHTEN GROUND SCREWS

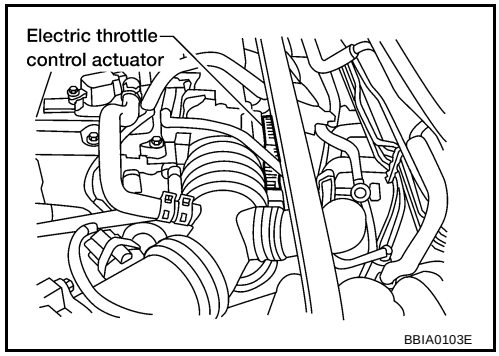
1. Turn ignition switch "OFF".
2. Loosen and retighten engine ground screws.

>> GO TO 2.



2. CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT

1. Disconnect electric throttle control actuator harness connector.
2. Turn ignition switch "ON".

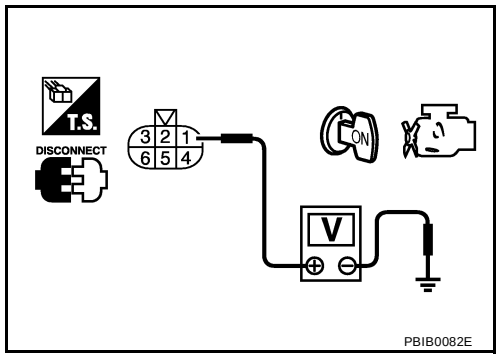


3. Check voltage between electric throttle control actuator terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5V

OK or NG

OK >> GO TO 5.
NG >> GO TO 3.



3. CHECK SENSOR POWER SUPPLY CIRCUITS FOR SHORT

Check the following.

- Harness for short to power and short to ground, between the following terminals

ECM terminal	Sensor terminals	Reference Wiring Diagram
65	Electric throttle control actuator terminal 1	EC-1464
	APP sensor terminal 2	EC-1477
	MAF sensor terminal 2	EC-1367
	EVAP control system pressure sensor terminal 1	EC-1544
	Refrigerant pressure sensor terminal 3	EC-1812

- Joint connector-1
- ECM pin terminal

OK or NG

OK >> GO TO 4.
NG >> Repair short to ground or short to power in harness or connectors.

4. CHECK COMPONENTS

Check the following.

- Accelerator pedal position sensor (Refer to EC-1480, "Component Inspection" .)
- Mass air flow sensor (Refer to EC-1370, "Component Inspection" .)
- EVAP control system pressure sensor (Refer to EC-1548, "Component Inspection" .)
- Refrigerant pressure sensor (Refer to MTC-21, "TROUBLE DIAGNOSIS" .)

OK or NG

OK >> GO TO 7.
NG >> Replace malfunctioning component.

5. CHECK THROTTLE POSITION SENSOR

Refer to EC-1467, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Perform EC-1253, "Throttle Valve Closed Position Learning" .
3. Perform EC-1253, "Idle Air Volume Learning" .

>> **INSPECTION END**

7. CHECK INTERMITTENT INCIDENT

Refer to EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

PFP:14920

Description

UBS002JJ

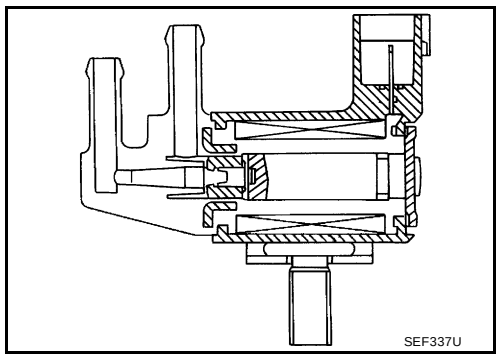
SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE) Crankshaft position sensor (POS)	Engine speed	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		
Accelerator pedal position switch	Accelerator pedal position		
Heated oxygen sensors 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Fuel tank temperature sensor	Fuel temperature in fuel tank		
Vehicle speed sensor (CAN communication line)	Vehicle speed		

This system controls flow rate of fuel vapor from the EVAP canister. The opening of the vapor by-pass passage in the EVAP canister purge volume control solenoid valve changes to control the flow rate. The EVAP canister purge volume control solenoid valve repeats ON/OFF operation according to the signal sent from the ECM. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions. When the engine is operating, the flow rate of fuel vapor from the EVAP canister is regulated as the air flow changes.

COMPONENT DESCRIPTION

The EVAP canister purge volume control solenoid valve uses a ON/OFF duty to control the flow rate of fuel vapor from the EVAP canister. The EVAP canister purge volume control solenoid valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of fuel vapor that will flow through the valve.



CONSULT-II Reference Value in Data Monitor Mode

UBS002JK

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PURG VOL C/V	● Engine: After warming up ● Shift lever: N ● Air conditioner switch: OFF ● No-load	Idle	0%
		2,000 rpm	20 - 30%

On Board Diagnosis Logic

UBS002JL

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1444 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 ● EVAP canister purge volume control solenoid valve (The valve is stuck open.) ● EVAP canister vent control valve ● EVAP canister ● Hoses (Hoses are connected incorrectly or clogged.)

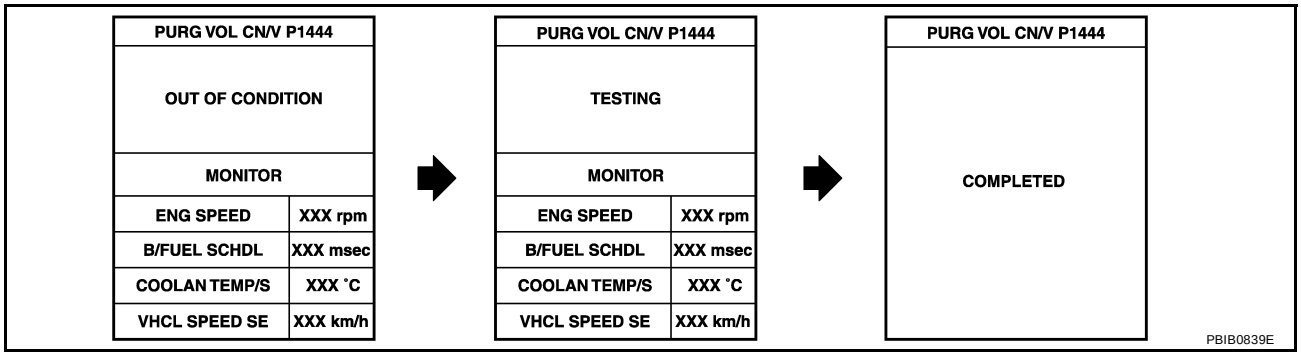
DTC Confirmation Procedure

UBS002JM

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-1697, "Diagnostic Procedure" .

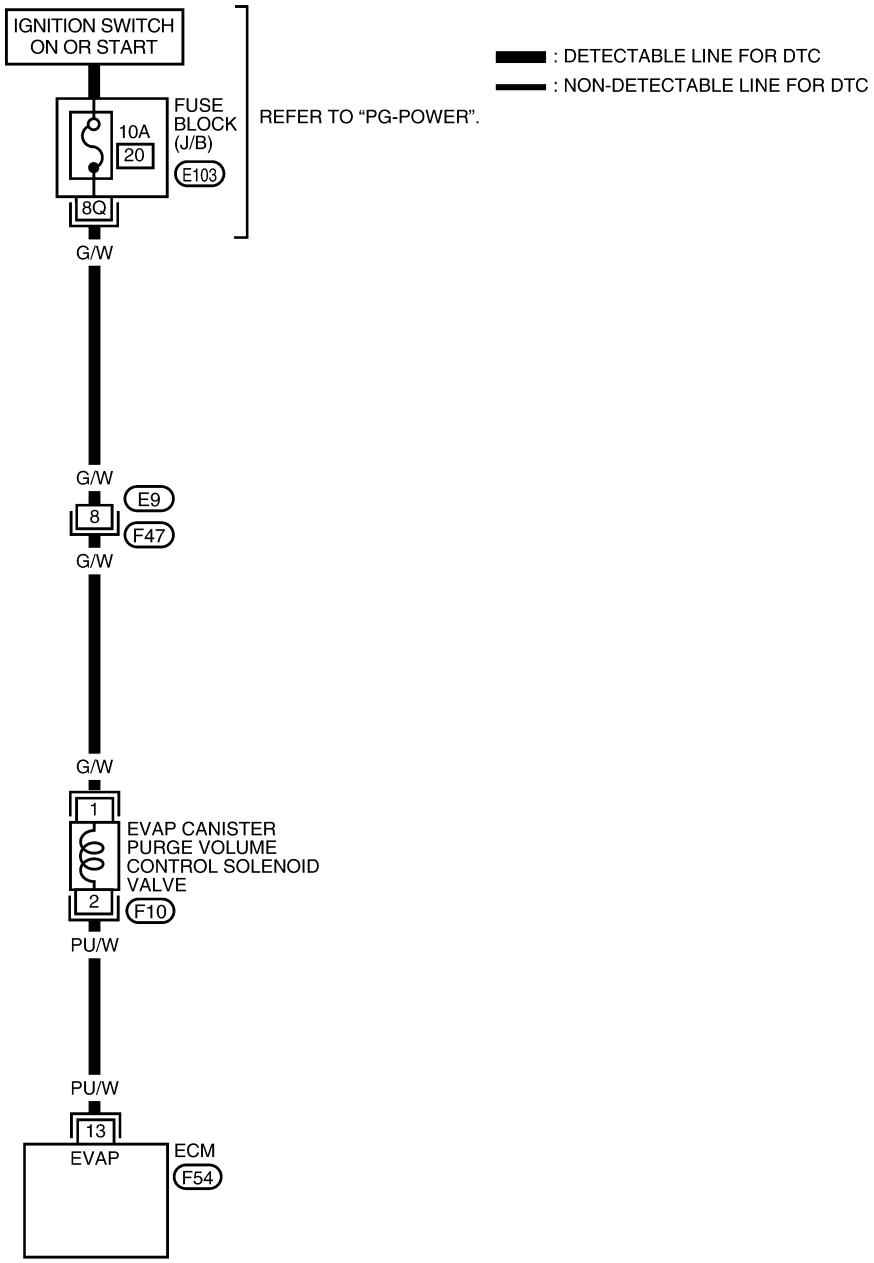
WITH GST

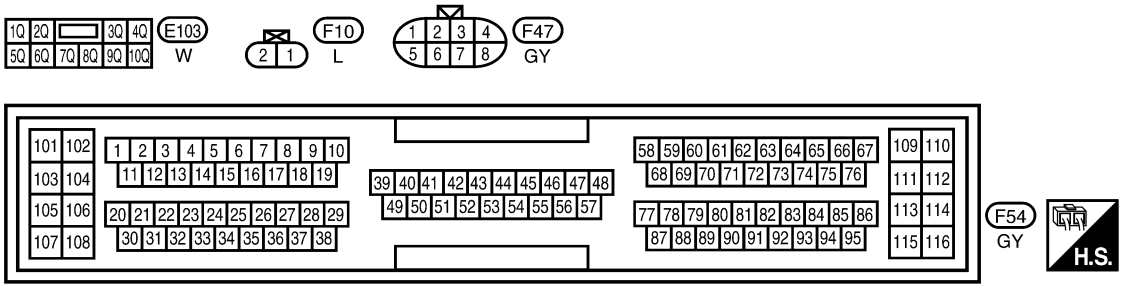
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Start engine and let it idle for at least 20 seconds.
4. Select “MODE 7” with GST.
5. If 1st trip DTC is detected, go to EC-1697, "Diagnostic Procedure" .

Wiring Diagram

UBS002JN

EC-PGC/V-01

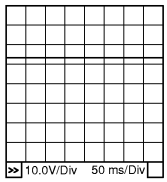
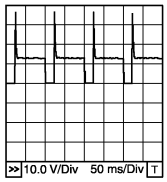




BBWA0224E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/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	PU/W	EVAP canister purge volume control solenoid valve	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)★  PBIB0050E
			[Engine is running] ● Engine speed is about 2,000 rpm (More than 100 seconds after starting engine)	Approximately 10V★  PBIB0520E

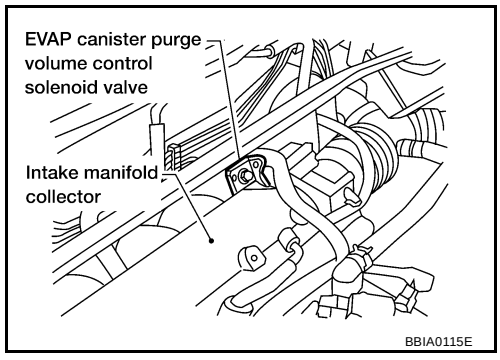
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

UBS002JO

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”.



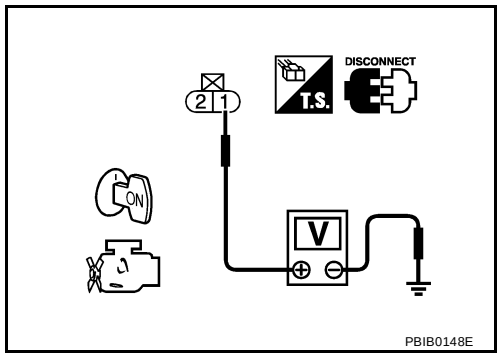
BBIA0115E

4. Check voltage between EVAP canister purge volume control solenoid valve terminal 1 and engine ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 3.
NG >> GO TO 2.



PBIB0148E

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E9, F47
- Fuse block (J/B) connector E103
- Harness for open or short between EVAP canister purge volume control solenoid valve and IPDM E/R

>> Repair harness or connectors.

3. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 13 and EVAP canister purge volume control solenoid valve terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE

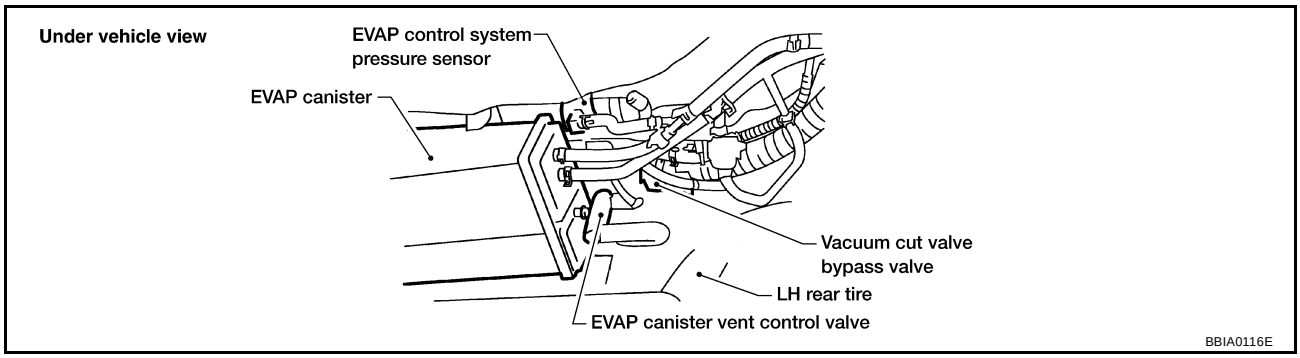
Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.

OK or NG

OK >> GO TO 5.
NG >> Repair it.

5. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.



2. Check connectors for water.

Water should not exist.

OK or NG

OK >> GO TO 6.
NG >> Replace EVAP control system pressure sensor.

6. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-1548, "Component Inspection" .

OK or NG

OK (With CONSULT-II)>>GO TO 7.
OK (Without CONSULT-II)>>GO TO 8.
NG >> Replace EVAP control system pressure sensor.

7. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

1. Turn ignition switch “OFF”.
2. Reconnect harness connectors disconnected.
3. Start engine.
4. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-II. Check that engine speed varies according to the valve opening.

OK or NG

OK >> GO TO 9.
NG >> GO TO 8.

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XX %
HO2S1 MNTR (B1)	LEAN

PBIB0828E

8. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-1534, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace EVAP canister purge volume control solenoid valve.

9. CHECK RUBBER TUBE FOR CLOGGING

1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

OK or NG

OK >> GO TO 10.
NG >> Clean the rubber tube using an air blower.

10. CHECK EVAP CANISTER VENT CONTROL VALVE

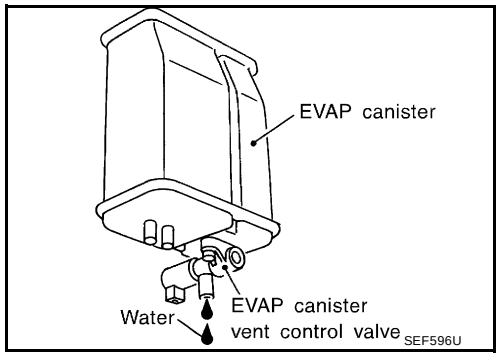
Refer to EC-1540, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> Replace EVAP canister vent control valve.

11. CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Check if water will drain from the EVAP canister.



Yes or No

Yes >> GO TO 12.
No >> GO TO 15.

12. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve attached.
The weight should be less than 1.8 kg (4.0 lb).

OK or NG

OK >> GO TO 14.
NG >> GO TO 13.

13. DETECT MALFUNCTIONING PART

Check the following.

- EVAP canister for damage
- EVAP hose between EVAP canister and water separator for clogging or poor connection

>> Repair hose or replace EVAP canister.

14. CHECK WATER SEPARATOR

Refer to EC-1528, "Component Inspection" .

OK or NG

OK >> GO TO 15.
NG >> Clean or replace water separator.

15. CHECK INTERMITTENT INCIDENT

Refer to EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

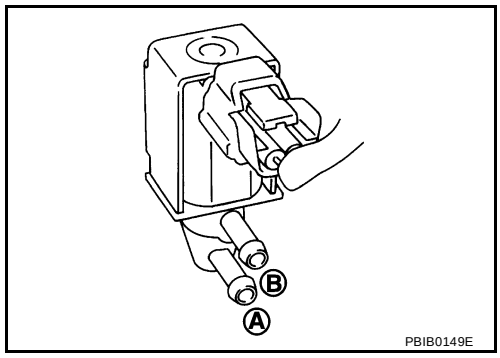
UBS002JP

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

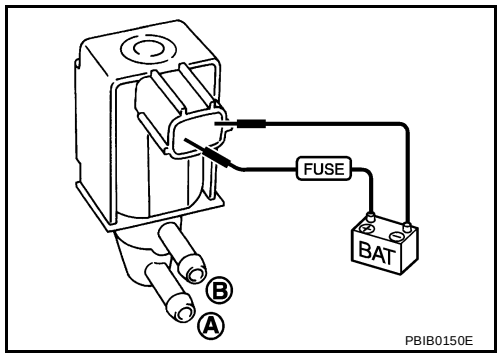
Condition (PURG VOL CONT/V value)	Air passage continuity between **A** and **B**
100.0%	Yes
0.0%	No



Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

Condition	Air passage continuity between **A** and **B**
12V direct current supply between terminals 1 and 2	Yes
No supply	No



Removal and Installation

UBS002JQ

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EM-93, "INTAKE MANIFOLD" .

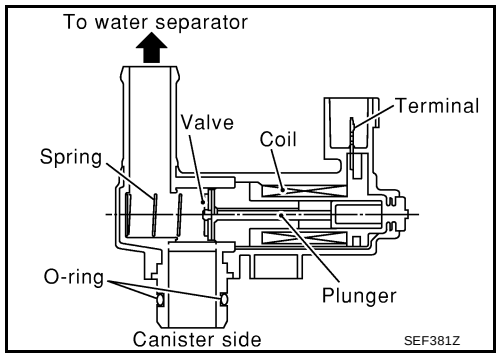
DTC P1446 EVAP CANISTER VENT CONTROL VALVE

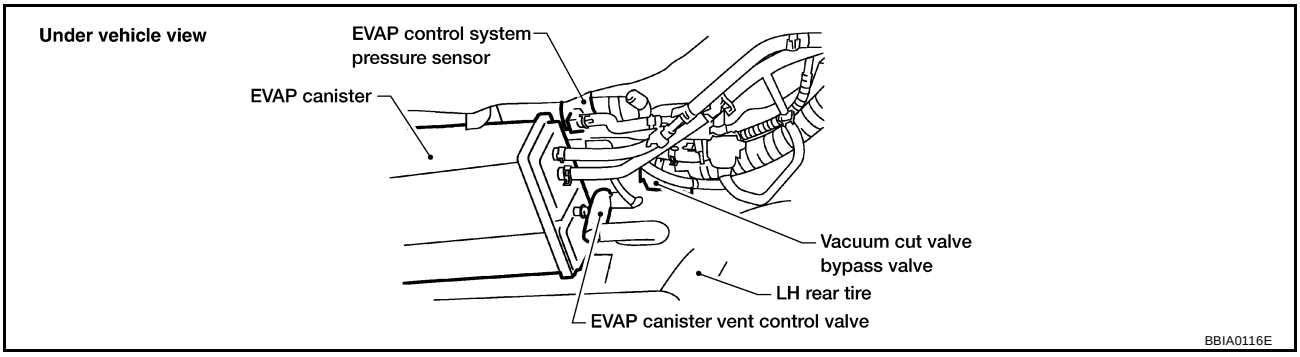
PFP:14935

Component Description

UBS002JR

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent.
This solenoid valve responds to signals from the ECM. When the ECM sends an ON signal, the coil in the solenoid valve is energized. A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.
This solenoid valve is used only for diagnosis, and usually remains opened.
When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows “EVAP Control System (Small Leak)” diagnosis.





CONSULT-II Reference Value in Data Monitor Mode

UBS002JS

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	● Ignition switch: ON	OFF

On Board Diagnosis Logic

UBS002JT

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1446 1446	EVAP canister vent control valve close	EVAP canister vent control valve remains closed under specified driving conditions.	● EVAP canister vent control valve ● EVAP control system pressure sensor and the circuit ● Blocked rubber tube to EVAP canister vent control valve ● Water separator ● EVAP canister is saturated with water

DTC Confirmation Procedure

UBS002JU

CAUTION:
Always drive vehicle at a safe speed.

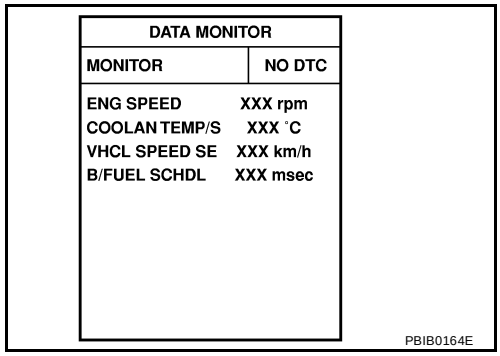
NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch “ON”.

2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine.
4. Drive vehicle at a speed of approximately 80 km/h (50 MPH) for a maximum of 15 minutes.

   NOTE:
   If a malfunction exists, NG result may be displayed quicker.
5. If 1st trip DTC is detected, go to EC-1705, "Diagnostic Procedure" .



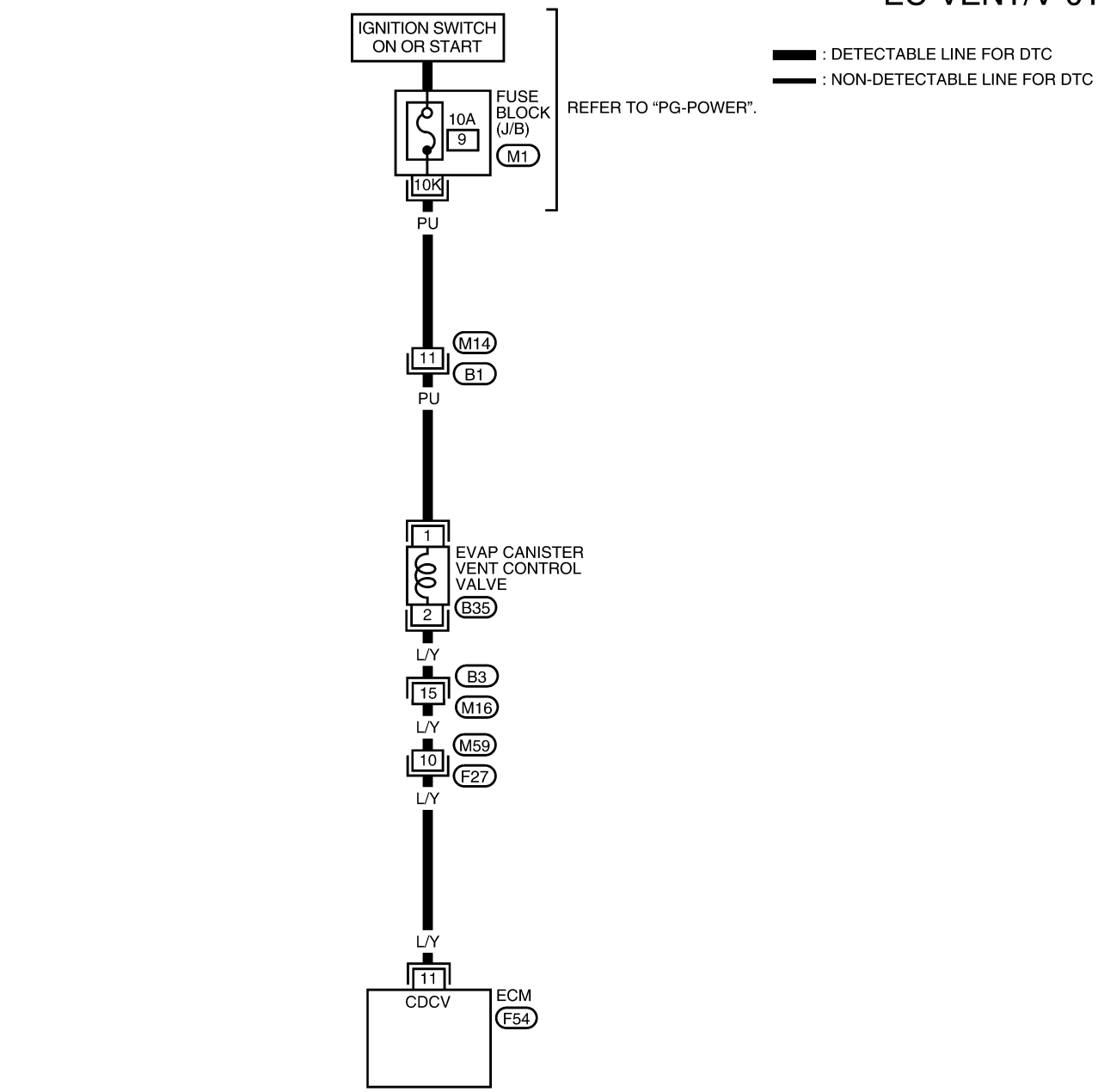
WITH GST

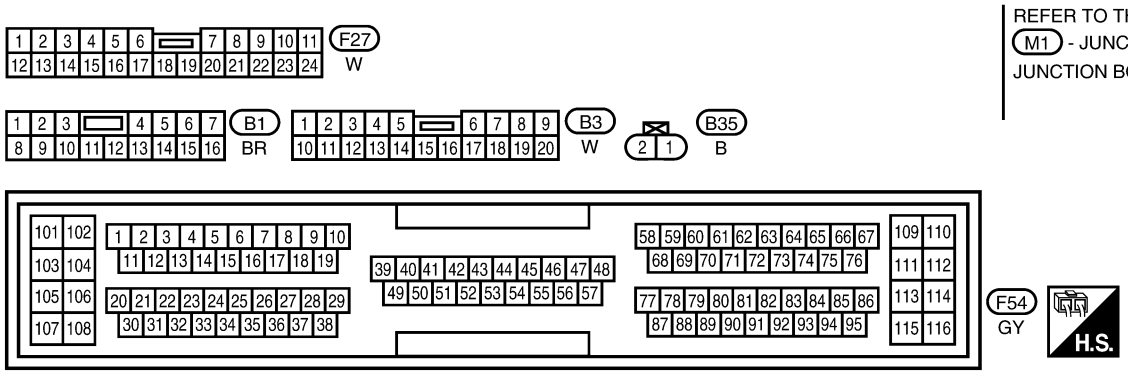
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS002JV

EC-VENT/V-01





REFER TO THE FOLLOWING.
M1 - JUNCTION BLOCK - JUNCTION BOX (J/B)

BBWA0225E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

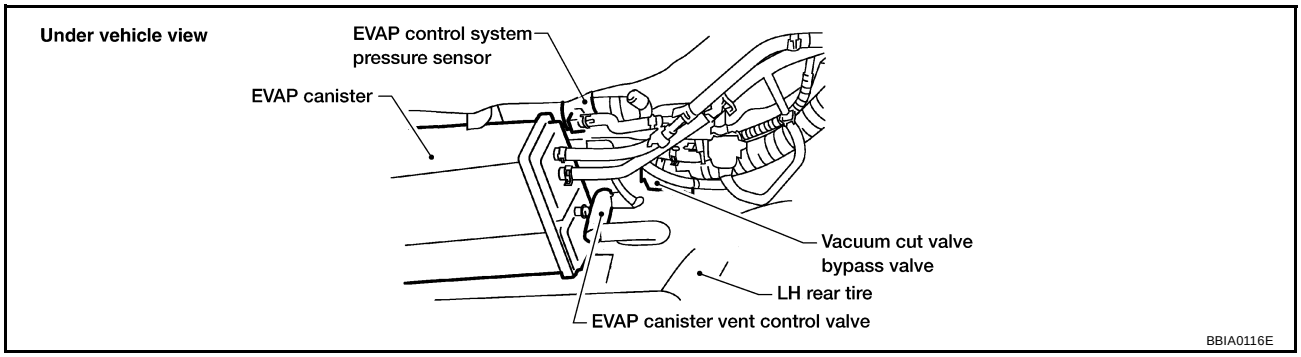
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
11	L/Y	EVAP canister vent control valve	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

UBS002JW

1. CHECK RUBBER TUBE

1. Turn ignition switch "OFF".
2. Disconnect rubber tube connected to EVAP canister vent control valve.



3. Check the rubber tube for clogging.

OK or NG

OK >> GO TO 2.
NG >> Clean rubber tube using an air blower.

2. CHECK WATER SEPARATOR

Refer to EC-1528, "Component Inspection" .

OK or NG

OK >> GO TO 3.
NG >> Clean or replace water separator.

3. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-1707, "Component Inspection" .

OK or NG

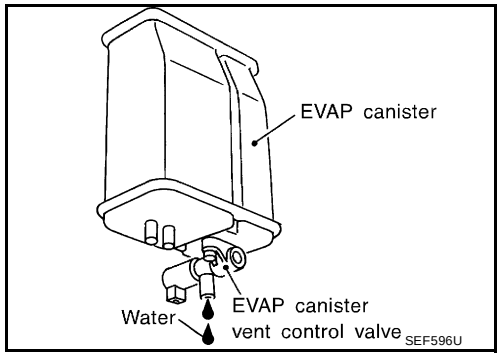
OK >> GO TO 4.
NG >> Replace EVAP canister vent control valve.

4. CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Check if water will drain from the EVAP canister.

Yes or No

Yes >> GO TO 5.
No >> GO TO 7.



5. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve attached.
The weight should be less than 1.8 kg (4.0 lb).

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- EVAP canister for damage
- EVAP hose between EVAP canister and water separator for clogging or poor connection

>> Repair hose or replace EVAP canister.

7. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE

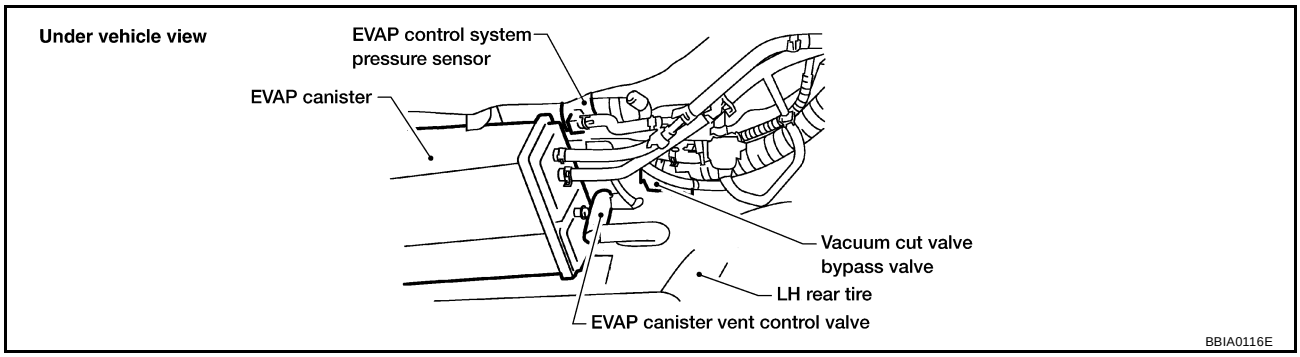
Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.

OK or NG

OK >> GO TO 8.
NG >> Repair it.

8. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.



2. Check connectors for water.

Water should not exist.

OK or NG

OK >> GO TO 9.
NG >> Replace EVAP control system pressure sensor.

9. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-1548, "Component Inspection" .

OK or NG

OK >> GO TO 10.
NG >> Replace EVAP control system pressure sensor.

10. CHECK INTERMITTENT INCIDENT

Refer to EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

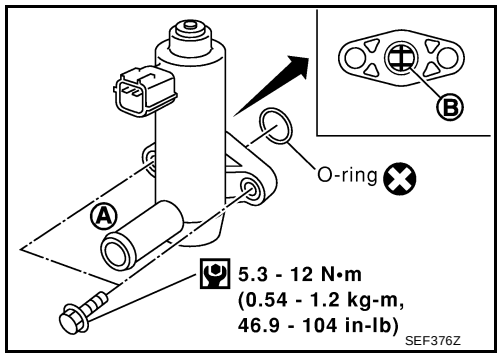
Component Inspection

UBS002JX

EVAP CANISTER VENT CONTROL VALVE

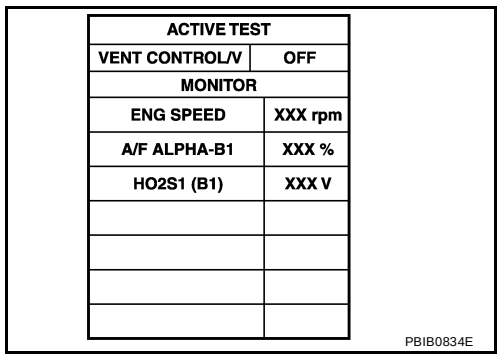
With CONSULT-II

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.
3. Reconnect harness connectors disconnected.
4. Turn ignition switch “ON”.



5. Perform “VENT CONTROL/V” in “ACTIVE TEST” mode.
6. Check air passage continuity and operation delay time.

Condition	Air passage continuity between **A** and **B**
ON	No
OFF	Yes

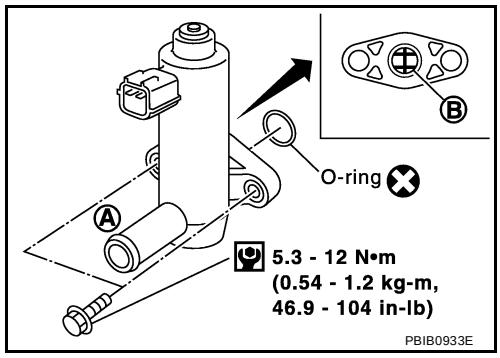


Operation takes less than 1 second.
Make sure new O-ring is installed properly.
If NG, go to next step.

7. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
8. Perform inspection again.

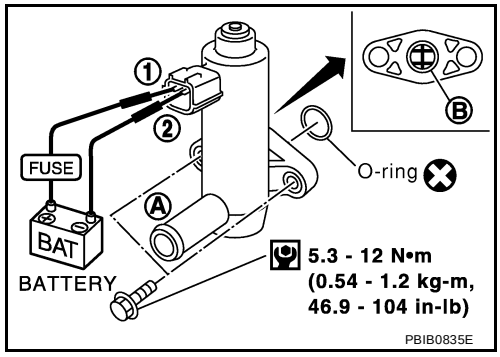
Without CONSULT-II

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.

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.
Make sure new O-ring is installed properly.
If NG, 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 inspection again.

DTC P1448 EVAP CANISTER VENT CONTROL VALVE

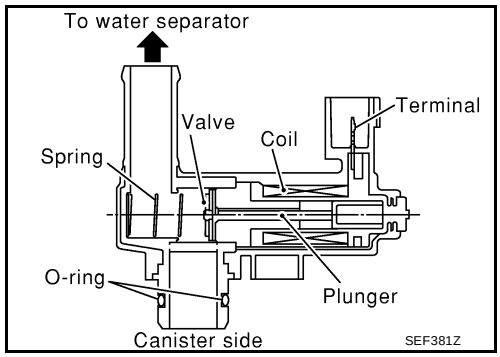
PFP:14935

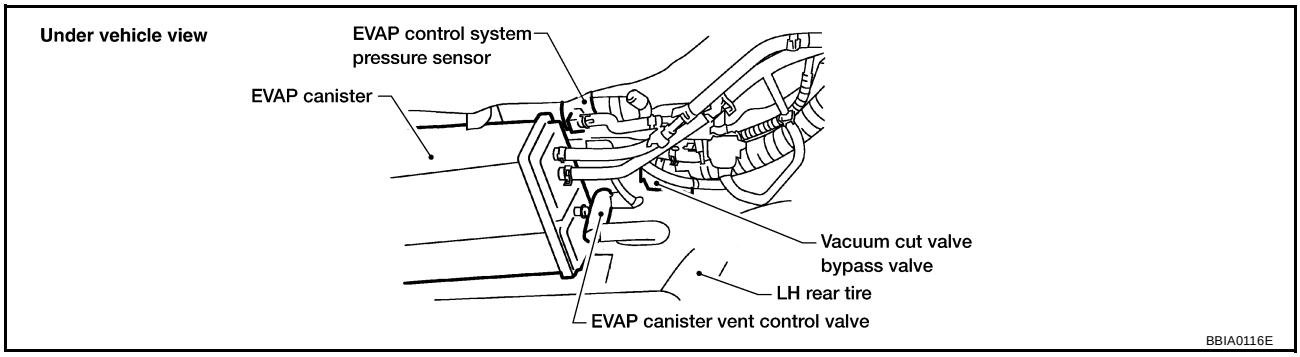
Component Description

UBS002JY

NOTE:
If DTC P1448 is displayed with P0442, perform trouble diagnosis for DTC P1448 first.

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent.
This solenoid valve responds to signals from the ECM. When the ECM sends an ON signal, the coil in the solenoid valve is energized. A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.
This solenoid valve is used only for diagnosis, and usually remains opened.
When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows "EVAP Control System (Small Leak)" diagnosis.





CONSULT-II Reference Value in Data Monitor Mode

UBS002JZ

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	● Ignition switch: ON	OFF

On Board Diagnosis Logic

UBS002K0

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1448 1448	EVAP canister vent control valve open	EVAP canister vent control valve remains opened under specified driving conditions.	● EVAP canister vent control valve ● EVAP control system pressure sensor and the circuit ● Blocked rubber tube to EVAP canister vent control valve ● Water separator ● EVAP canister is saturated with water ● Vacuum cut valve

DTC Confirmation Procedure

UBS002K1

NOTE:
- **If DTC P1448 is displayed with P0442, perform trouble diagnosis for DTC P1448 first.**
- If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

TESTING CONDITION:

- **Perform "DTC WORK SUPPORT" when the fuel level is between 1/4 to 3/4 full and vehicle is placed on flat level surface.**

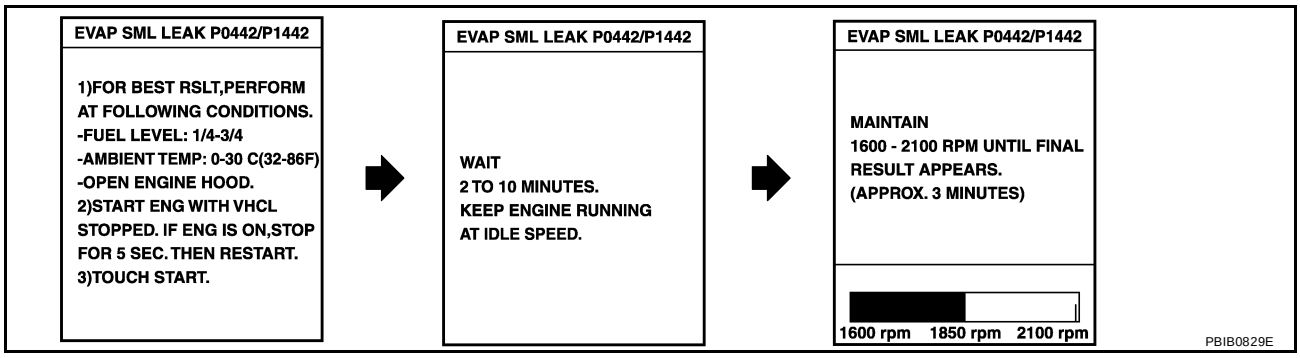
- **Always perform test at a temperature of 0 to 30°C (32 to 86°F).**

1. Turn ignition switch “ON”.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II.
4. Make sure that the following conditions are met.

COOLAN TEMP/S	0 - 70°C (32 - 158°F)
INT/A TEMP SE	0 - 30°C (32 - 86°F)

5. Select “EVAP SML LEAK P0442/P1442” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II.
   Follow the instruction displayed.

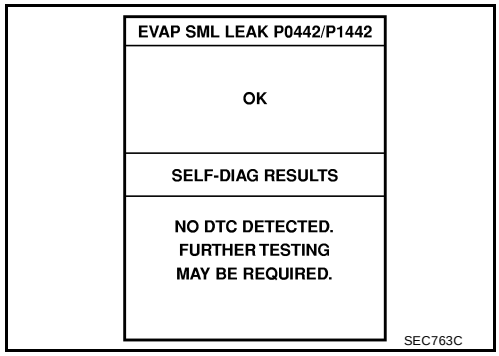
   NOTE:
   DTC P1442 does not apply to QR25DE Sentra models, but appears in DTC Work Support Mode screens for other Sentra models.



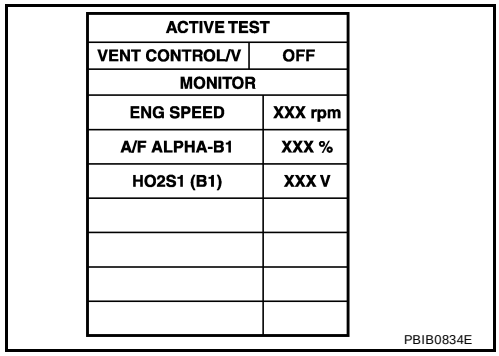
If the engine speed cannot be maintained within the range displayed on the CONSULT-II screen, go to EC-1289, "Basic Inspection" .

6. Make sure that “OK” is displayed.
   If “NG” is displayed, go to the following step.

   NOTE:
   Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.



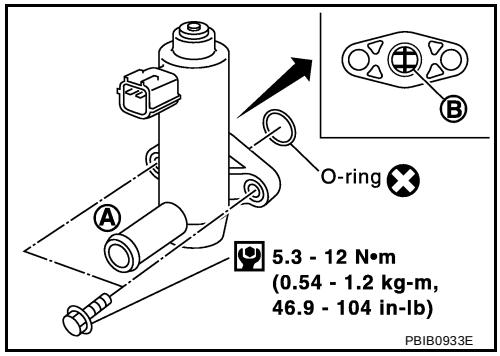
7. Stop engine and wait at least 10 seconds, then turn “ON”.
8. Disconnect hose from water separator.
9. Select “VENT CONTROL/V” of “ACTIVE TEST” mode with CONSULT-II.
10. Touch “ON” and “OFF” alternately.



11. Make sure the following.

Condition VENT CONTROL/V	Air passage continuity between **A** and **B**
ON	No
OFF	Yes

If the result is NG, go to EC-1713, "Diagnostic Procedure" .
If the result is OK, go to “Diagnostic Procedure” for DTC P0442, EC-1522 .



Overall Function Check

UBS002K2

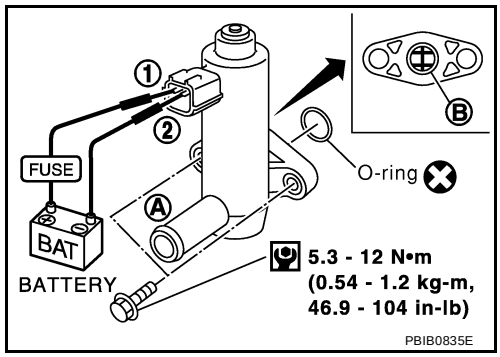
Use this procedure to check the overall function of the EVAP canister vent control valve circuit. During this check, a DTC might not be confirmed.

WITH GST

1. Disconnect hose from water separator.
2. Disconnect EVAP canister vent control valve harness connector.
3. Verify the following.

Condition	Air passage continuity
12V direct current supply between terminals 1 and 2	No
No supply	Yes

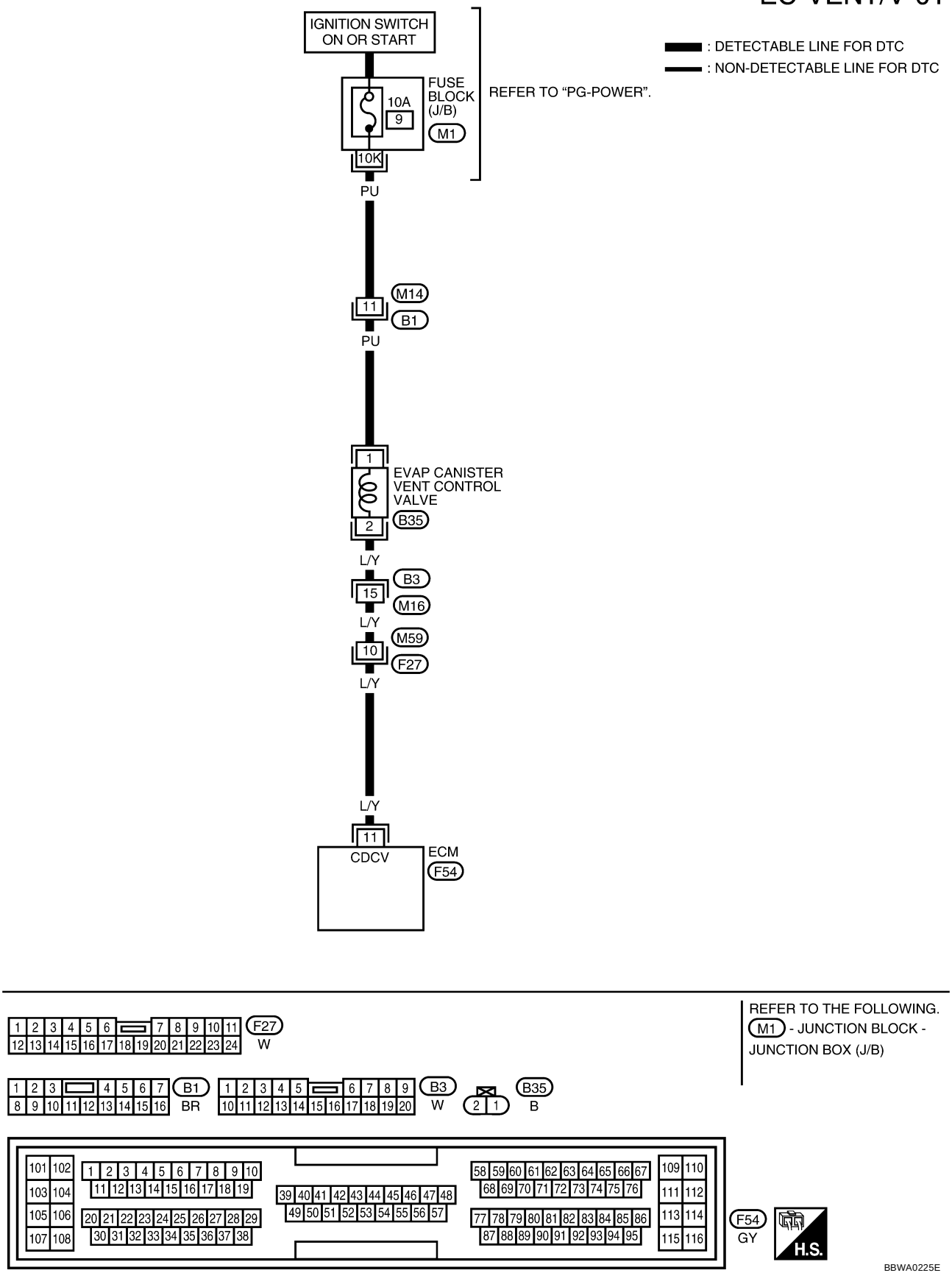
If the result is NG, go to EC-1713, "Diagnostic Procedure" .
If the result is OK, go to “Diagnostic Procedure” for DTC P0442, EC-1522 .



Wiring Diagram

UBS002K3

EC-VENT/V-01



Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

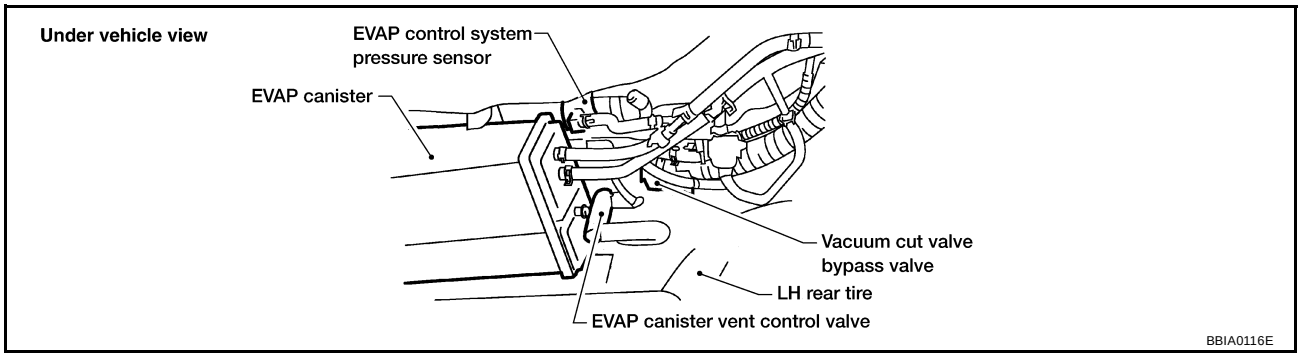
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
11	L/Y	EVAP canister vent control valve	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

UBS002K4

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-1715, "Component Inspection" .

OK or NG

OK >> GO TO 3.
NG >> Replace EVAP canister vent control valve.

3. CHECK VACUUM CUT VALVE

Refer to EC-1743, "Component Inspection" .

OK or NG

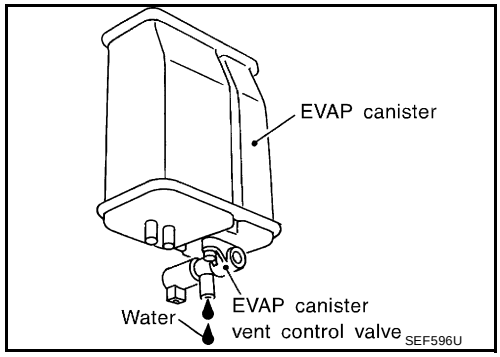
OK >> GO TO 4.
NG >> Replace vacuum cut valve.

4. CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Check if water will drain from the EVAP canister.

Yes or No

Yes >> GO TO 5.
No >> GO TO 7.



5. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve attached.
The weight should be less than 1.8 kg (4.0 lb).

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- EVAP canister for damage
- EVAP hose between EVAP canister and water separator for clogging or poor connection

>> Repair hose or replace EVAP canister.

7. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE

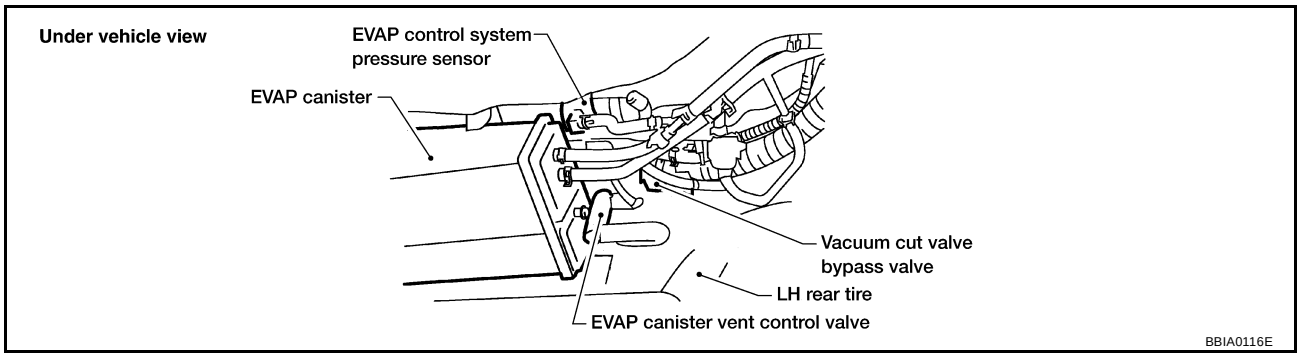
Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.

OK or NG

OK >> GO TO 8.
NG >> Repair it.

8. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.



2. Check connectors for water.

Water should not exist.

OK or NG

OK >> GO TO 9.
NG >> Replace EVAP control system pressure sensor.

9. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-1548, "Component Inspection" .

OK or NG

OK >> GO TO 10.
NG >> Replace EVAP control system pressure sensor.

10. CHECK INTERMITTENT INCIDENT

Refer to EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

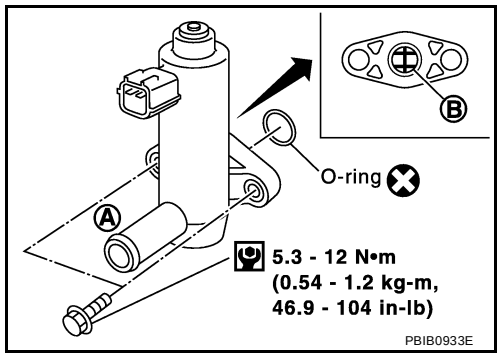
Component Inspection

UBS002K5

EVAP CANISTER VENT CONTROL VALVE

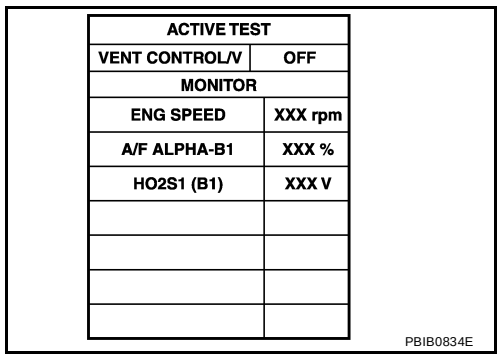
With CONSULT-II

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.
3. Reconnect harness connectors disconnected.
4. Turn ignition switch “ON”.



5. Perform “VENT CONTROL/V” in “ACTIVE TEST” mode.
6. Check air passage continuity and operation delay time.

Condition	Air passage continuity between **A** and **B**
ON	No
OFF	Yes

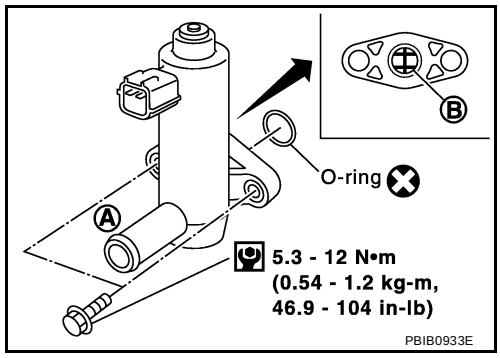


Operation takes less than 1 second.
Make sure new O-ring is installed properly.
If NG, go to next step.

7. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
8. Perform inspection again.

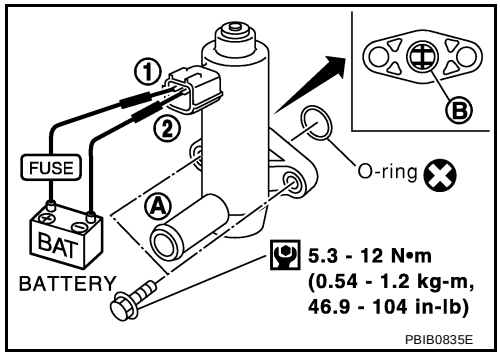
Without CONSULT-II

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.

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.
Make sure new O-ring is installed properly.
If NG, 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 inspection again.

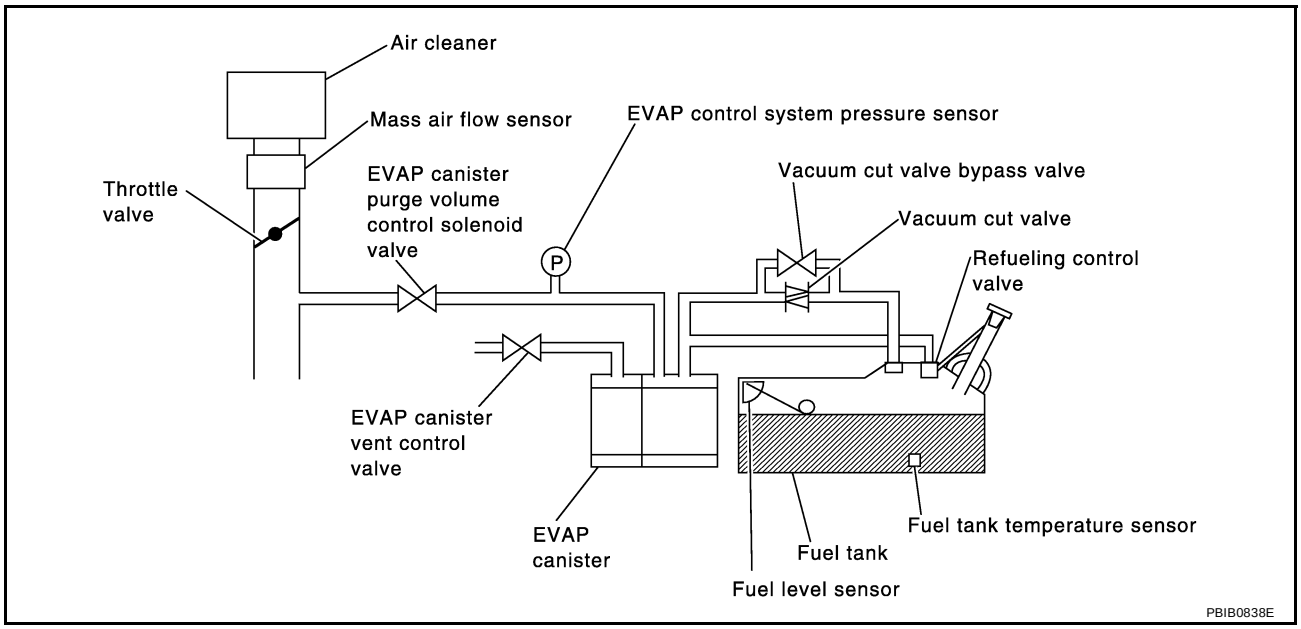
DTC P1456 EVAP CONTROL SYSTEM

PFP:14710

On Board Diagnosis Logic

UBS002K6

This diagnosis detects very small leaks in the EVAP line between fuel tank and EVAP canister purge volume control solenoid valve, using of vapor pressure in the fuel tank.
The EVAP canister vent control valve is closed to shut the EVAP purge line. The vacuum cut valve bypass valve will then be opened to clear the line between the fuel tank and the EVAP canister purge volume control solenoid valve. The EVAP control system pressure sensor can now monitor the pressure inside the fuel tank. If pressure increases, the ECM will check for leaks in the line between the vacuum cut valve and EVAP canister purge volume control solenoid valve.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1456 1456	Evaporative emission control system very small leak (positive pressure check)	● EVAP system has a very small leak. ● EVAP system does not operate properly.	● Incorrect fuel tank vacuum relief valve ● Incorrect fuel filler cap used ● Fuel filler cap remains open or fails to close. ● Foreign matter caught in fuel filler cap. ● Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve. ● Foreign matter caught in EVAP canister vent control valve. ● EVAP canister or fuel tank leaks ● EVAP purge line (pipe and rubber tube) leaks ● EVAP purge line rubber tube bent ● Blocked or bent rubber tube to EVAP control system pressure sensor ● Loose or disconnected rubber tube ● EVAP canister vent control valve and the circuit ● EVAP canister purge volume control solenoid valve and the circuit ● Fuel tank temperature sensor ● O-ring of EVAP canister vent control valve is missing or damaged ● Water separator ● EVAP canister is saturated with water ● EVAP control system pressure sensor ● Refueling control valve ● ORVR system leaks ● Fuel level sensor and the circuit ● Foreign matter caught in EVAP canister purge volume control solenoid valve

CAUTION:

- **Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.**
- **If the fuel filler cap is not tightened properly, the MIL may come on.**
- **Use only a genuine NISSAN rubber tube as a replacement.**

DTC Confirmation Procedure

UBS002K7

NOTE:

- **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:

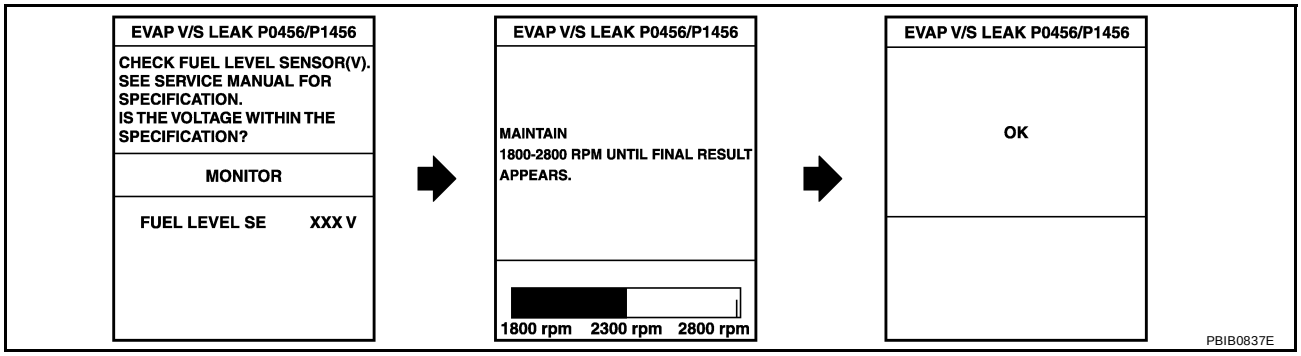
- **Open engine hood before conducting following procedure.**
- **If any of following conditions are met just before the DTC confirmation procedure, leave the vehicle for more than 1 hour.**
  - **Fuel filler cap is removed.**
  - **Refilled or drained the fuel.**
  - **EVAP component parts is/are removed.**
- **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 - 1.15V

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-1720, "Diagnostic Procedure" .

NOTE:
- **If the engine speed cannot be maintained within the range displayed on CONSULT-II screen, go to EC-1289, "Basic Inspection" .**
- **Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.**

Overall Function Check

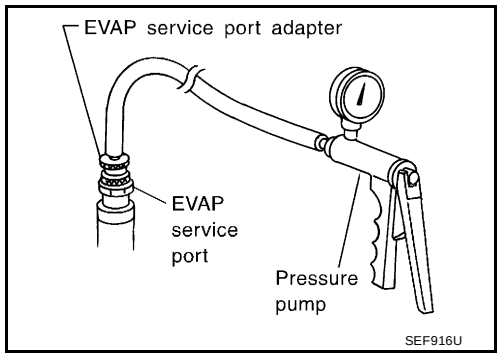
UBS002K8

WITH GST

Use this procedure to check the overall function of the EVAP very small leak function. During this check, a 1st trip DTC might not be confirmed.

CAUTION:
- **Never use compressed air, doing so may damage the EVAP system.**
- **Do not start engine.**
- **Do not exceeded 4.12 kPa (0.042 kg/cm^2 , 0.6 psi).**

1. Attach the EVAP service port adapter securely to the EVAP service port.
2. Set the pressure pump and a hose.
3. Also set a vacuum gauge via 3-way connector and a hose.
4. Turn ignition switch “ON”.
5. Connect GST and select MODE 8.
6. Using MODE 8 control the EVAP canister vent control valve (close) and vacuum cut valve bypass valve (open).
7. Apply pressure and make sure the following conditions are satisfied.
Pressure to be applied: 2.7 kPa (20 mmHg, 0.79 inHg)
Time to be waited after the pressure drawn in to the EVAP system and the pressure to be dropped: 60 seconds and the pressure should not be dropped more than 0.4 kPa (3 mmHg, 0.12 inHg).
If NG, go to EC-1720, "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

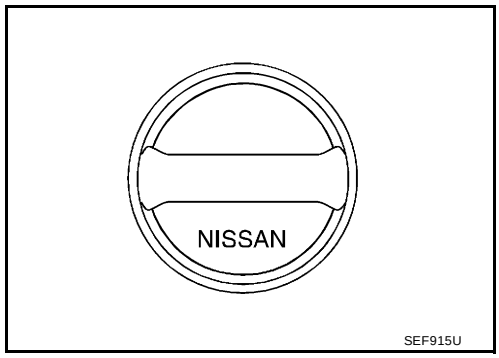
UBS002K9

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-1839, "FUEL TANK VACUUM RELIEF VALVE (BUILT INTO FUEL FULLER CAP)" .

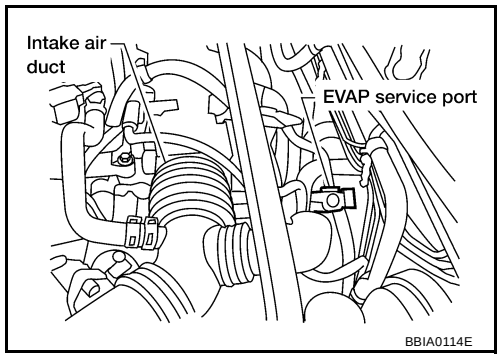
OK or NG

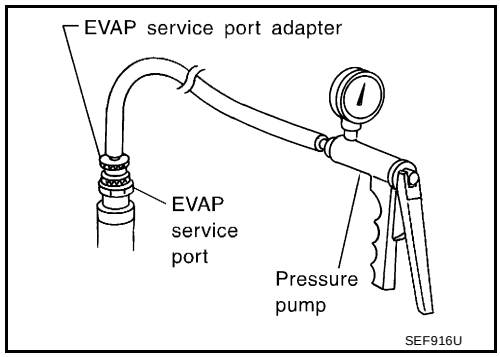
OK >> GO TO 5.
NG >> Replace fuel filler cap with a genuine one.

5. INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.

NOTE:
Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.





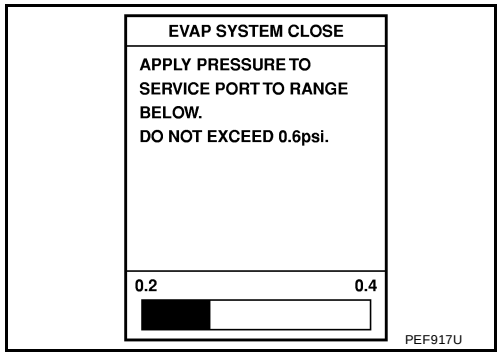
Models with CONSULT-II>>GO TO 6.
Models without CONSULT-II>>GO TO 7.

6. CHECK FOR EVAP LEAK

With CONSULT-II

1. Turn ignition switch “ON”.
2. Select “EVAP SYSTEM CLOSE” of “WORK SUPPORT” mode with CONSULT-II.
3. Touch “START” and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.

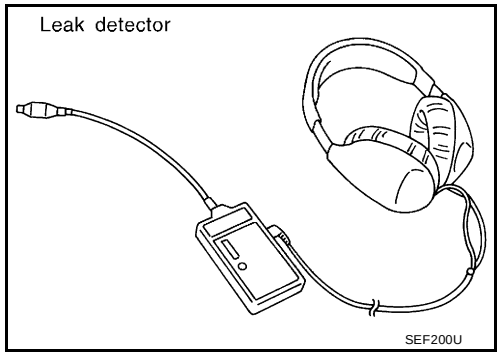
   NOTE:
   - **Never use compressed air or a high pressure pump.**
   - **Do not exceed 4.12 kPa (0.042 kg/cm^2 , 0.6 psi) of pressure in the system.**



4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details.
   Refer to EC-1837, "EVAPORATIVE EMISSION LINE DRAWING" .

OK or NG

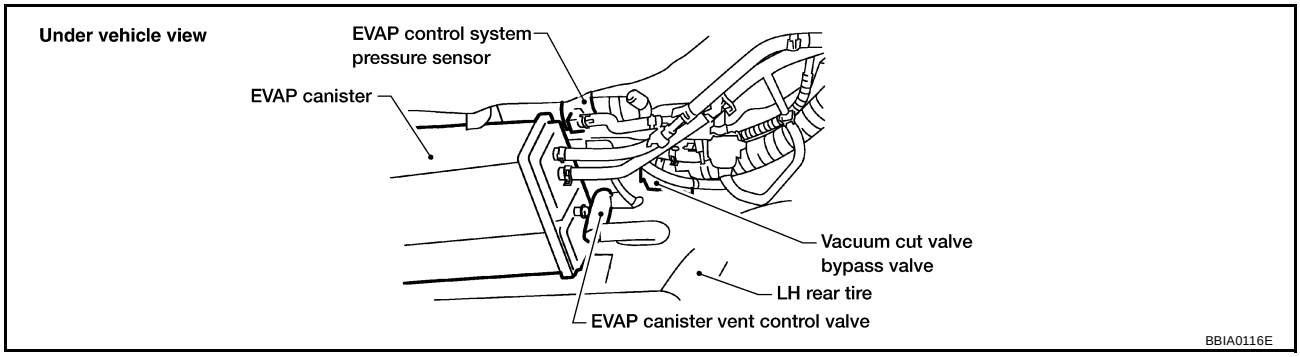
OK >> GO TO 8.
NG >> Repair or replace.



7. CHECK FOR EVAP LEAK

Without CONSULT-II

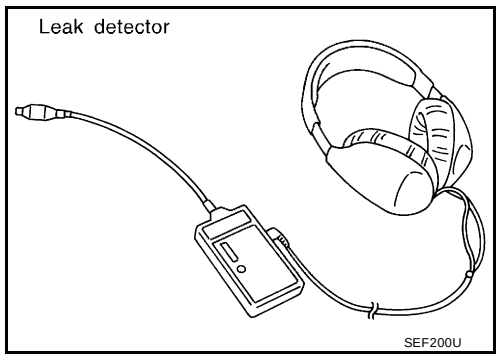
1. Turn ignition switch “OFF”.
2. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)
3. Apply 12 volts DC to vacuum cut valve bypass valve. The valve will open. (Continue to apply 12V until the end of test.)



4. Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg), then remove pump and EVAP service port adapter.

   NOTE:
   - **Never use compressed air or a high pressure pump.**
   - **Do not exceed 4.12 kPa (0.042 kg/cm^2 , 0.6 psi) of pressure in the system.**

5. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to EC-1837, "EVAPORATIVE EMISSION LINE DRAWING" .



OK or NG

OK >> GO TO 8.
NG >> Repair or replace.

8. CHECK WATER SEPARATOR

Refer to EC-1725, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace water separator.

9. CHECK EVAP CANISTER VENT CONTROL VALVE, O-RING AND CIRCUIT

Refer to “DTC Confirmation Procedure”, EC-1709 .

OK or NG

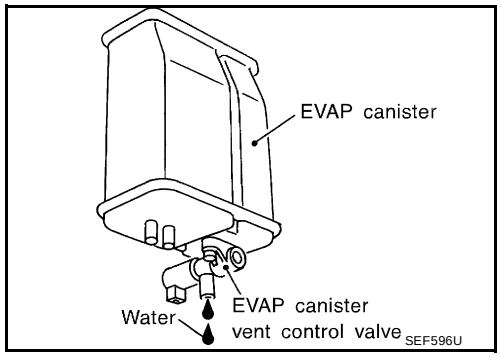
OK >> GO TO 10.
NG >> Repair or replace EVAP canister vent control valve and O-ring or harness/connector.

10. CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Does water drain from the EVAP canister?

Yes or No

Yes >> GO TO 11.
No (With CONSULT-II)>>GO TO 13.
No (Without CONSULT-II)>>GO TO 14.



11. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve attached.
The weight should be less than 1.8 kg (4.0 lb).

OK or NG

OK (With CONSULT-II)>>GO TO 13.
OK (Without CONSULT-II)>>GO TO 14.
NG >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.

- EVAP canister for damage
- EVAP hose between EVAP canister and water separator for clogging or poor connection

>> Repair hose or replace EVAP canister.

13. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-II

1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
2. Start engine.
3. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode.
4. Touch “Qu” on CONSULT-II screen to increase “PURG VOL CONT/V” opening to 100.0%.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

OK or NG

OK >> GO TO 16.
NG >> GO TO 15.

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XX %
HO2S1 MNTR (B1)	LEAN

PBIB0828E

14. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
4. Start engine and let it idle for at least 80 seconds.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

Vacuum should exist.

OK or NG

OK >> GO TO 17.
NG >> GO TO 15.

15. CHECK VACUUM HOSE

Check vacuum hoses for clogging or disconnection. Refer to EC-1235, "Vacuum Hose Drawing" .

OK or NG

OK >> GO TO 16.
NG >> Repair or reconnect the hose.

16. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-1534, "Component Inspection" .

OK or NG

OK >> GO TO 17.
NG >> Replace EVAP canister purge volume control solenoid valve.

17. CHECK FUEL TANK TEMPERATURE SENSOR

Refer to EC-1443, "Component Inspection" .

OK or NG

OK >> GO TO 18.
NG >> Replace fuel level sensor unit.

18. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-1548, "Component Inspection" .

OK or NG

OK >> GO TO 19.
NG >> Replace EVAP control system pressure sensor.

19. CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection.
Refer to EC-1837, "EVAPORATIVE EMISSION LINE DRAWING" .

OK or NG

OK >> GO TO 20.
NG >> Repair or reconnect the hose.

20. CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 21.

21. CHECK REFUELING EVAP VAPOR LINE

Check refueling EVAP vapor line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to EC-1842, "ON BOARD REFUELING VAPOR RECOVERY (ORVR)" .

OK or NG

OK >> GO TO 22.
NG >> Repair or replace hoses and tubes.

22. CHECK SIGNAL LINE AND RECIRCULATION LINE

Check signal line and recirculation line between filler neck tube and fuel tank for clogging, kink, cracks, looseness and improper connection.

OK or NG

OK >> GO TO 23.
NG >> Repair or replace hoses, tubes or filler neck tube.

23. CHECK REFUELING CONTROL VALVE

Refer to EC-1845, "Component Inspection" .

OK or NG

OK >> GO TO 24.
NG >> Replace refueling control valve with fuel tank.

24. CHECK FUEL LEVEL SENSOR

Refer to DI-23, "FUEL LEVEL SENSOR UNIT CHECK" .

OK or NG

OK >> GO TO 25.
NG >> Replace fuel level sensor unit.

25. CHECK INTERMITTENT INCIDENT

Refer to EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

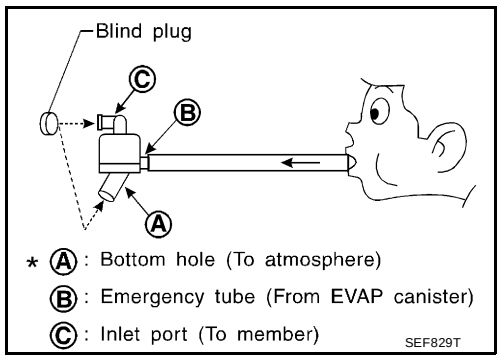
Component Inspection

UBS002KA

WATER SEPARATOR

1. Check visually for insect nests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that **A** and **C** are not clogged by blowing air into **B** with **A** , and then **C** plugged.
5. In case of NG in items 2 - 4, replace the parts.

NOTE:
Do not disassemble water separator.



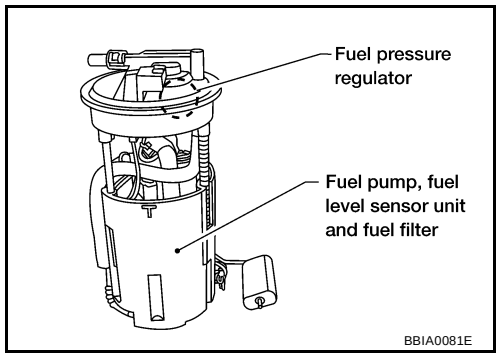
DTC P1464 FUEL LEVEL SENSOR

PFP:25060

Component Description

UBS002KB

The fuel level sensor is mounted in the fuel level sensor unit. The sensor detects a fuel level in the fuel tank and transmits a signal to the ECM.
It consists of two parts, one is mechanical float and the other side is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.



On Board Diagnosis Logic

UBS002KC

ECM receives two signals from the fuel level sensor.
One is fuel level sensor power supply circuit, and the other is fuel level sensor ground circuit.
This diagnosis indicates the latter to detect open circuit malfunction.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1464 1464	Fuel level sensor circuit ground signal	A high voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted)

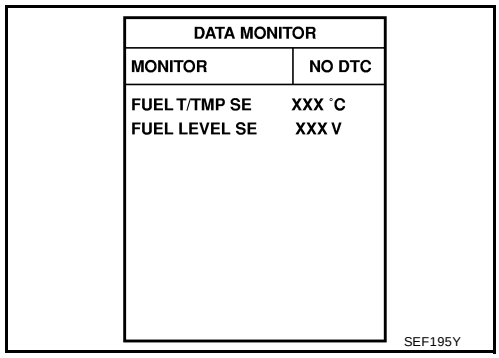
DTC Confirmation Procedure

UBS002KD

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-1728, "Diagnostic Procedure" .

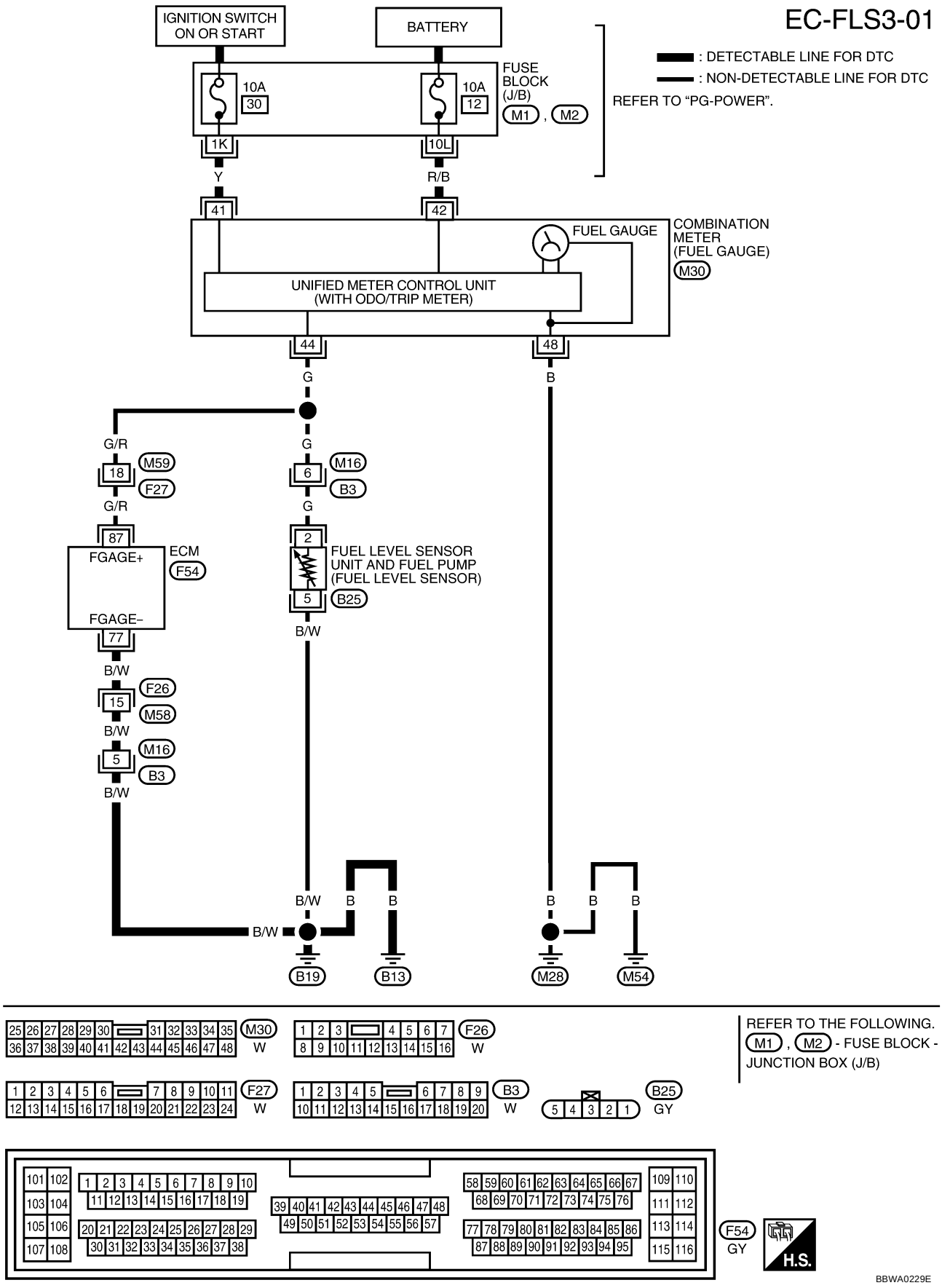


WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS002KE



Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/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)
77	B/W	Fuel level sensor ground	**[Engine is running]** ● Idle speed	Approximately 0V
87	G/R	Fuel level sensor	**[Ignition switch "ON"]**	Approximately 0 - 4.8V Output voltage varies with fuel level.

Diagnostic Procedure

UBS002KF

1. CHECK FUEL LEVEL SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 77 and body ground.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to power.

OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F26, M58
- Harness connectors M16, B3
- Harness for open and short between ECM and body ground

>> Replace open circuit or short to power in harness or connectors.

3. CHECK FUEL LEVEL SENSOR

Refer to DI-23, "FUEL LEVEL SENSOR UNIT CHECK" .

OK or NG

OK >> GO TO 4.
NG >> Replace fuel level sensor unit.

4. CHECK INTERMITTENT INCIDENT

Refer to EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Removal and Installation

UBS002KG

FUEL LEVEL SENSOR

Refer to FL-3, "FUEL LEVEL SENSOR UNIT, FUEL FILTER AND FUEL PUMP ASSEMBLY" .

DTC P1490 VACUUM CUT VALVE BYPASS VALVE

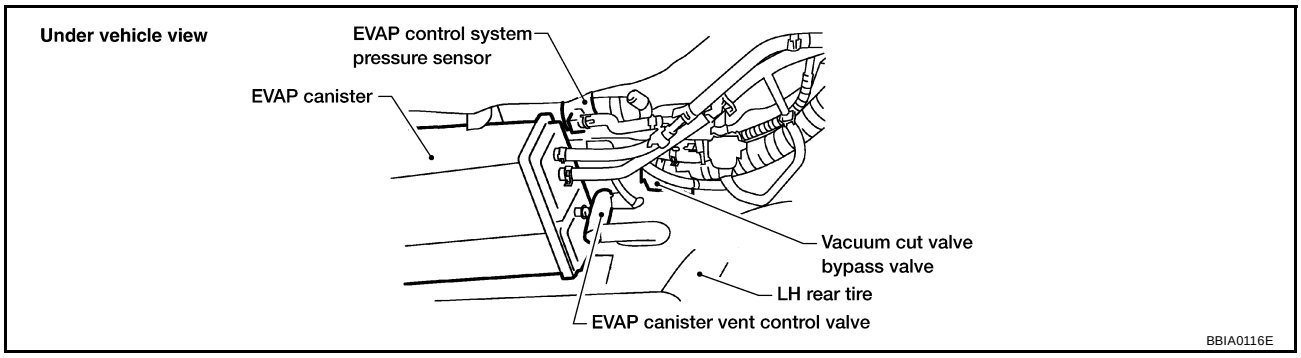
PFP:17372

Description

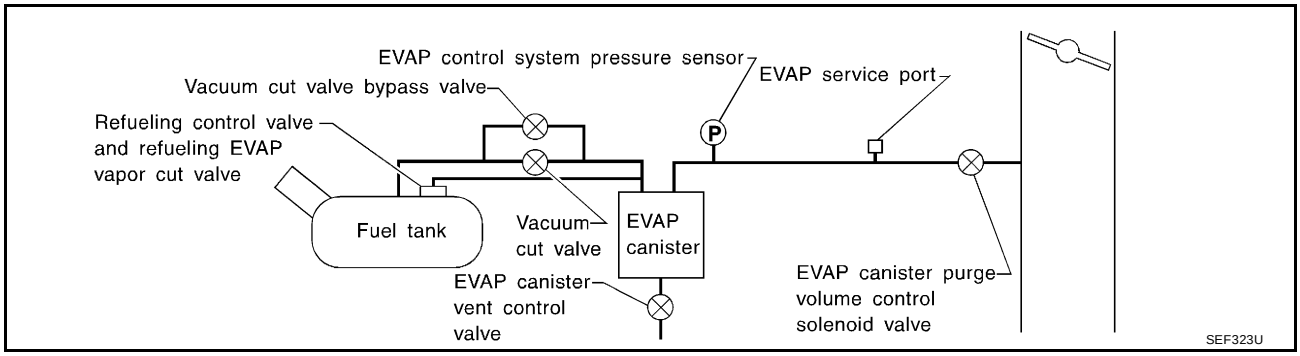
UBS002KH

COMPONENT DESCRIPTION

The vacuum cut valve and vacuum cut valve bypass valve are installed in parallel on the EVAP purge line between the fuel tank and the EVAP canister.
The vacuum cut valve prevents the intake manifold vacuum from being applied to the fuel tank.
The vacuum cut valve bypass valve is a solenoid type valve and generally remains closed. It opens only for on board diagnosis.
The vacuum cut valve bypass valve responds to signals from the ECM. When the ECM sends an ON (ground) signal, the valve is opened. The vacuum cut valve is then bypassed to apply intake manifold vacuum to the fuel tank.



EVAPORATIVE EMISSION SYSTEM DIAGRAM



CONSULT-II Reference Value in Data Monitor Mode

UBS002KI

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VC/V BYPAS S/V	● Ignition switch: ON	OFF

On Board Diagnosis Logic

UBS002KJ

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1490 1490	Vacuum cut valve bypass valve circuit	An improper voltage signal is sent to ECM through vacuum cut valve bypass valve.	● Harness or connectors (The vacuum cut valve bypass valve circuit is open or shorted) ● Vacuum cut valve bypass valve

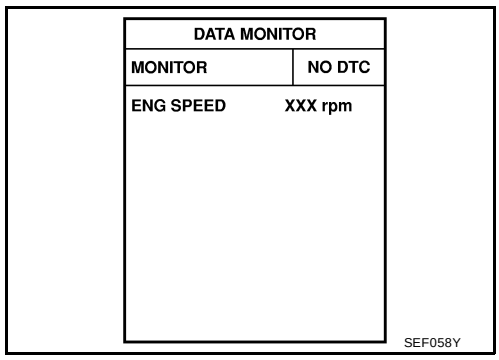
DTC Confirmation Procedure

UBS002KK

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11V at idle speed.

WITH CONSULT-II

1. Turn ignition switch “ON”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and wait at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-1732, "Diagnostic Procedure" .



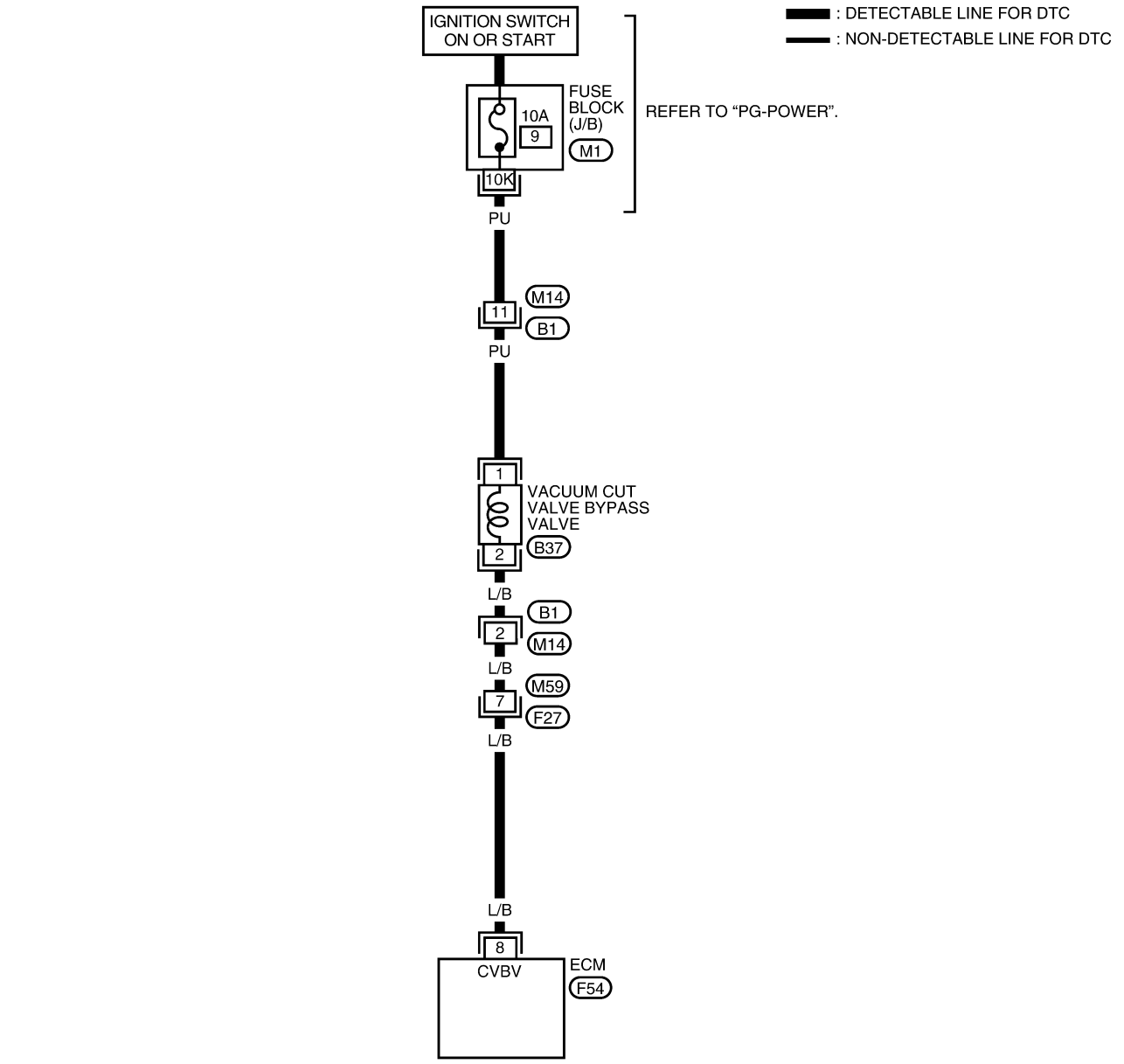
WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS002KL

EC-BYPS/V-01



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Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
8	L/B	Vacuum cut valve bypass valve	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

UBS002KM

1. INSPECTION START

Do you have CONSULT-II?

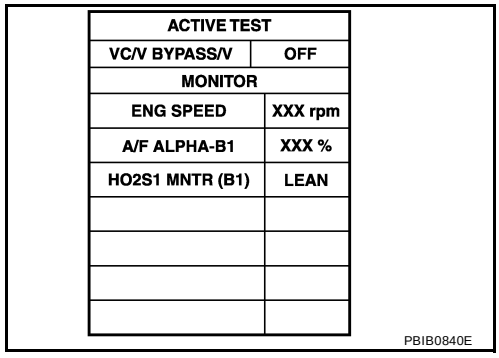
Yes or No

Yes >> GO TO 2.
No >> GO TO 3.

2. CHECK VACUUM CUT VALVE BYPASS VALVE CIRCUIT

With CONSULT-II

1. Turn ignition switch "OFF" and then "ON".
2. Select "VC/V BYPASS/V" in "ACTIVE TEST" mode with CONSULT-II.
3. Touch "ON/OFF" on CONSULT-II screen.
4. Make sure that clicking sound is heard from the vacuum cut valve bypass valve.

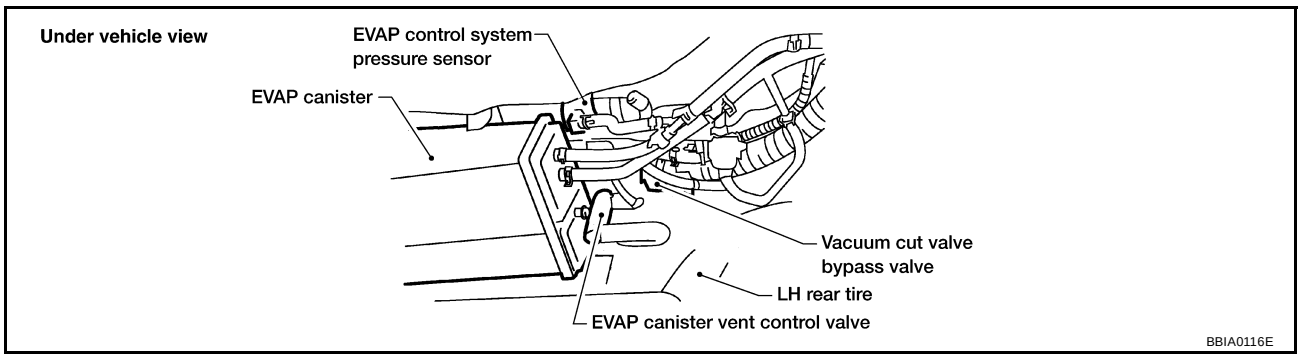


OK or NG

OK >> GO TO 7.
NG >> GO TO 3.

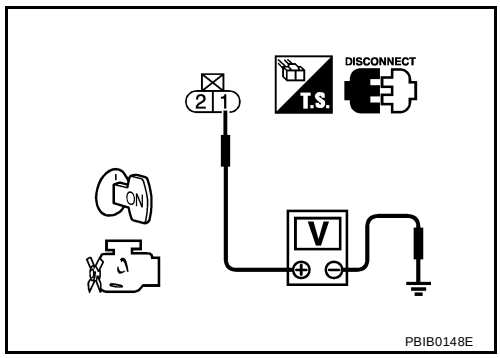
3. CHECK VACUUM CUT VALVE BYPASS VALUE POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect vacuum cut valve bypass valve harness connector.



3. Turn ignition switch “ON”.
4. Check voltage between vacuum cut valve bypass valve terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M14, B1
- Fuel block (J/B) connector M1
- 10A fuse
- Harness for open or short between vacuum cut valve bypass valve and fuse

>> Repair harness or connectors.

5. CHECK VACUUM CUT VALVE BYPASS VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 8 and vacuum cut valve bypass valve terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B1, M14
- Harness connectors M59, F27
- Harness for open or short between vacuum cut valve bypass valve and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK VACUUM CUT VALVE BYPASS VALVE

Refer to EC-1734, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace vacuum cut valve bypass valve.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

UBS002KN

VACUUM CUT VALVE BYPASS VALVE

With CONSULT-II

1. Reconnect harness disconnected connectors.
2. Turn ignition switch ON.
3. Perform “VC/V BYPASS/V” in “ACTIVE TEST” mode.

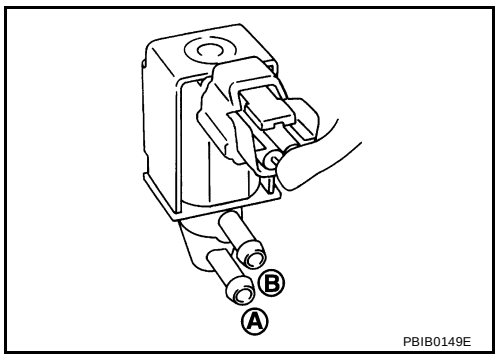
ACTIVE TEST	
VC/V BYPASS/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
HO2S1 MNTR (B1)	LEAN

PBIB0840E

4. Check air passage continuity and operation delay time under the following conditions.

Condition VC/V BYPASS/V	Air passage continuity between **A** and **B**
ON	Yes
OFF	No

Operation takes less than 1 second.
If NG, replace vacuum cut valve bypass valve.



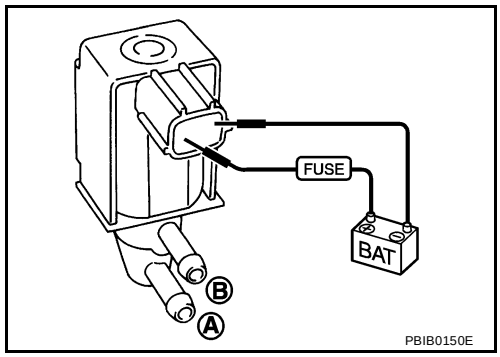
PBIB0149E

Without CONSULT-II

Check air passage continuity and operation delay time under the following conditions.

Condition	Air passage continuity between **A** and **B**
12V direct current supply between terminals 1 and 2	Yes
No supply	No

Operation takes less than 1 second.
If NG, replace vacuum cut valve bypass valve.



DTC P1491 VACUUM CUT VALVE BYPASS VALVE

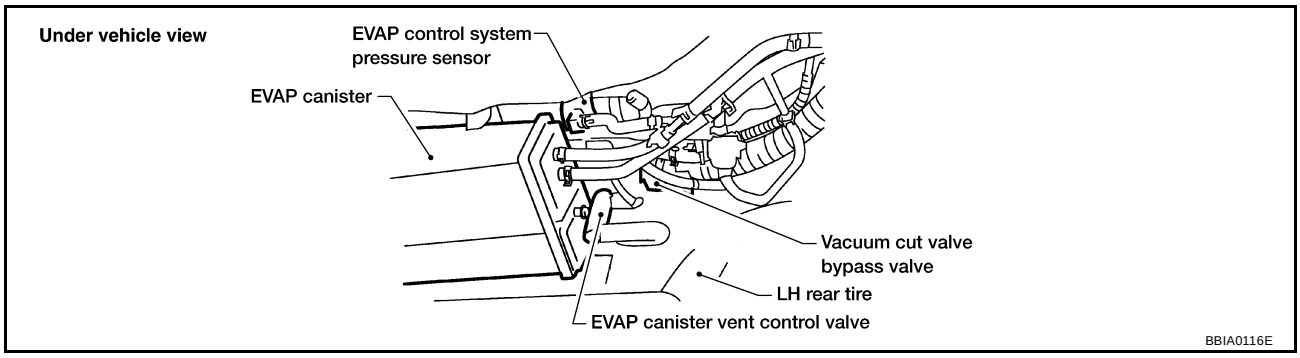
PFP:17372

Description

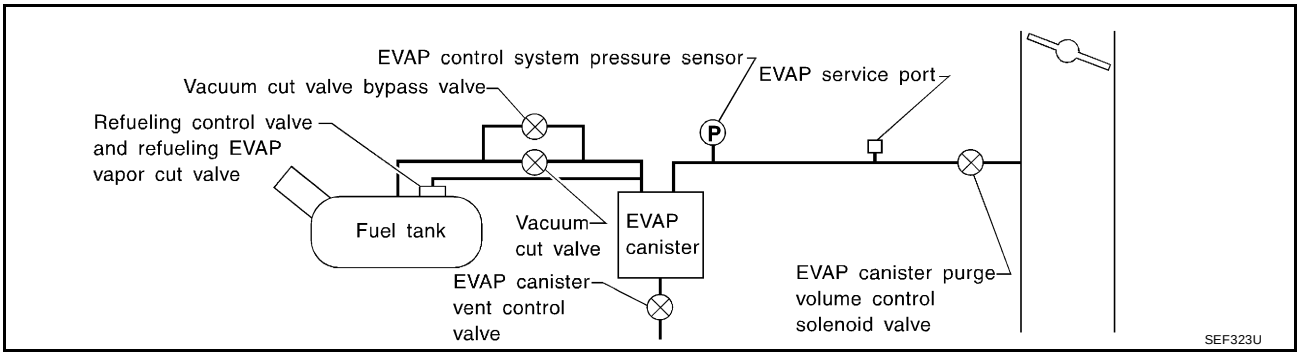
UBS002KO

COMPONENT DESCRIPTION

The vacuum cut valve and vacuum cut valve bypass valve are installed in parallel on the EVAP purge line between the fuel tank and the EVAP canister.
The vacuum cut valve prevents the intake manifold vacuum from being applied to the fuel tank.
The vacuum cut valve bypass valve is a solenoid type valve and generally remains closed. It opens only for on board diagnosis.
The vacuum cut valve bypass valve responds to signals from the ECM. When the ECM sends an ON (ground) signal, the valve is opened. The vacuum cut valve is then bypassed to apply intake manifold vacuum to the fuel tank.



EVAPORATIVE EMISSION SYSTEM DIAGRAM



CONSULT-II Reference Value in Data Monitor Mode

UBS002KP

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VC/V BYPAS S/V	● Ignition switch: ON	OFF

On Board Diagnosis Logic

UBS002KQ

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1491 1491	Vacuum cut valve bypass valve	Vacuum cut valve bypass valve does not operate properly.	● Vacuum cut valve bypass valve ● Vacuum cut valve ● Bypass hoses for clogging ● EVAP control system pressure sensor and circuit ● EVAP canister vent control valve ● Hose between fuel tank and vacuum cut valve clogged ● Hose between vacuum cut valve and EVAP canister clogged ● EVAP canister ● EVAP purge port of fuel tank for clogging

DTC Confirmation Procedure

UBS002KR

CAUTION:
Always drive vehicle at a safe speed.

NOTE:
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test.

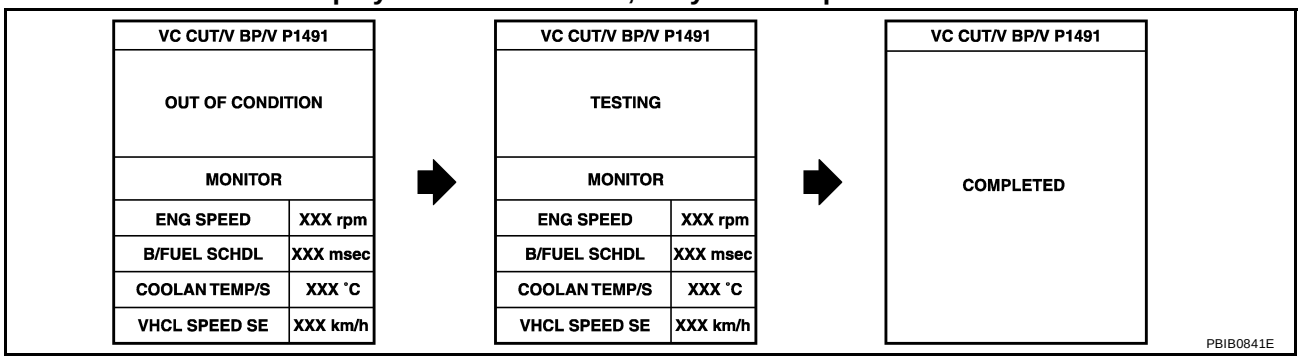
TESTING CONDITION:
Always perform test at a temperature of 5 to 30°C (41 to 86°F).

WITH CONSULT-II

1. Turn ignition switch "ON".
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch "OFF" and wait at least 10 seconds.
4. Start engine and let it idle for at least 70 seconds.
5. Select "VC CUT/V BP/V P1491" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
6. Touch "START".
7. When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take at least 30 seconds.)

ENG SPEED	1,000 - 3,800 rpm
Selector lever	Suitable position
Vehicle speed	36 - 120 km/h (22 - 75 MPH)
B/FUEL SCHDL	1.0 - 7.2 msec

If "TESTING" is not displayed after 5 minutes, retry from step 3.



8. Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to EC-1740, "Diagnostic Procedure" .

Overall Function Check

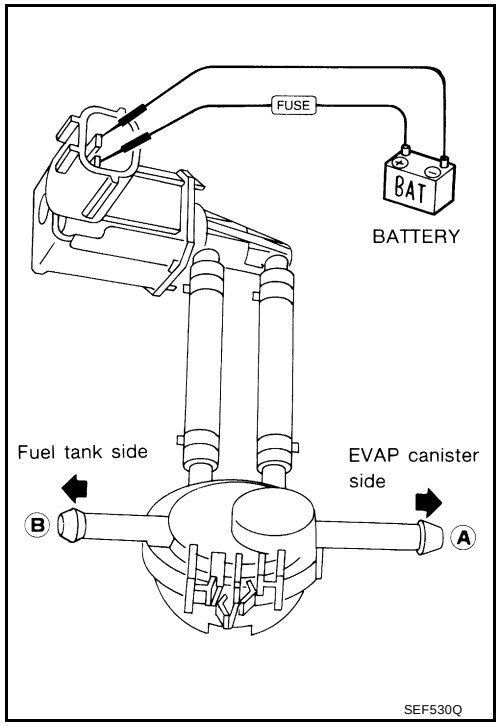
UBS002KS

Use this procedure to check the overall function of vacuum cut valve bypass valve. During this check, the 1st trip DTC might not be confirmed.

WITH GST

1. Remove vacuum cut valve and vacuum cut valve bypass valve as an assembly.

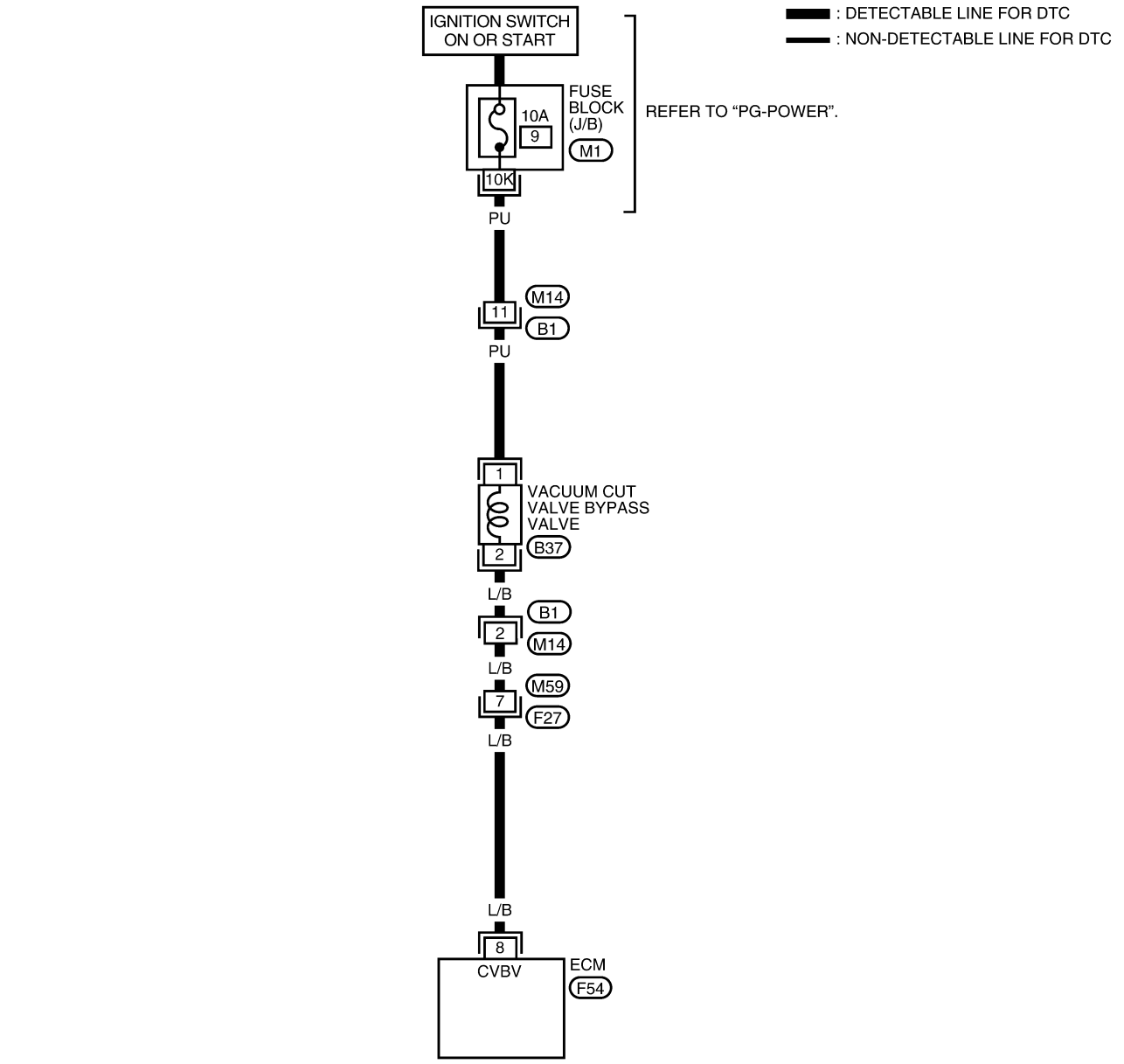
2. Apply vacuum to port **A** and check that there is no suction from port **B** .
3. Apply vacuum to port **B** and check that there is suction from port **A** .
4. Blow air in port **B** and check that there is a resistance to flow out of port **A** .
5. Supply battery voltage to the terminal.
6. Blow air in port **A** and check that air flows freely out of port **B** .
7. Blow air in port **B** and check that air flows freely out of port **A** .
8. If NG, go to EC-1740, "Diagnostic Procedure" .



Wiring Diagram

UBS002KT

EC-BYPS/V-01



BBWA0240E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
8	L/B	Vacuum cut valve bypass valve	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

UBS002KU

1. INSPECTION START

Do you have CONSULT-II?

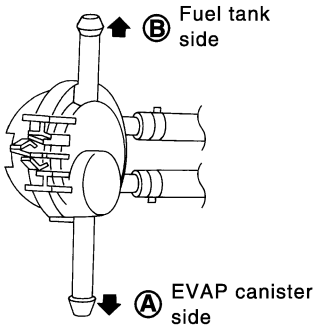
Yes or No

Yes >> GO TO 2.
No >> GO TO 3.

2. CHECK VACUUM CUT VALVE BYPASS VALVE OPERATION

With CONSULT-II

1. Turn ignition switch "OFF".
2. Remove vacuum cut valve and vacuum cut valve bypass valve as an assembly.
3. Apply vacuum to port **A** and check that there is no suction from port **B** .
4. Apply vacuum to port **B** and check that there is suction from port **A** .
5. Blow air in port **B** and check that there is a resistance to flow out of port **A** .
6. Turn ignition switch "ON".
7. Select "VC/V BYPASS/V" in "ACTIVE TEST" mode with CONSULT-II and touch "ON".
8. Blow air in port **A** and check that air flows freely out of port **B** .
9. Blow air in port **B** and check that air flows freely out of port **A** .



ACTIVE TEST	
VC/V BYPASS/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
HO2S1 MNTR (B1)	LEAN

PBIB0842E

OK or NG

OK >> GO TO 4.
NG >> GO TO 5.

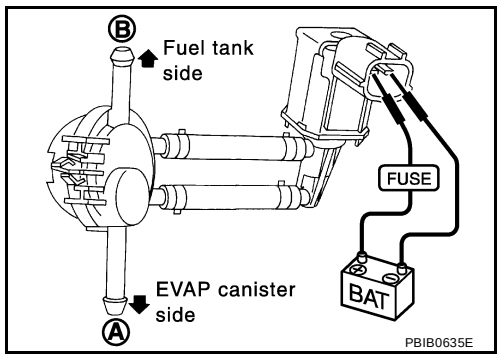
3. CHECK VACUUM CUT VALVE BYPASS VALVE OPERATION

Without CONSULT-II

1. Turn ignition switch “OFF”.
2. Remove vacuum cut valve and vacuum cut valve bypass valve as an assembly.
3. Apply vacuum to port **A** and check that there is no suction from port **B** .
4. Apply vacuum to port **B** and check that there is suction from port **A** .
5. Blow air in port **B** and check that there is a resistance to flow out of port **A** .
6. Disconnect vacuum cut valve bypass valve harness connector.
7. Supply battery voltage to the terminal.
8. Blow air in port **A** and check that air flows freely out of port **B** .
9. Blow air in port **B** and check that air flows freely out of port **A** .

OK or NG

OK >> GO TO 4.
NG >> GO TO 7.



4. CHECK EVAP PURGE LINE

Check EVAP purge line between EVAP canister and fuel tank for clogging or disconnection.

OK or NG

OK >> GO TO 5.
NG >> Repair it.

5. CHECK EVAP PURGE PORT

Check EVAP purge port of fuel tank for clogging.

OK or NG

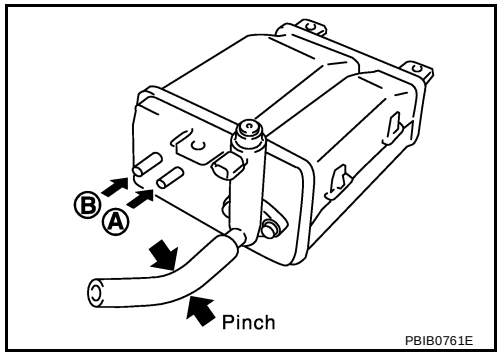
OK >> GO TO 6.
NG >> Clean EVAP purge port.

6. CHECK EVAP CANISTER

1. Pinch the fresh air hose.
2. Blow air into port **A** and check that it flows freely out of port **B** .

OK or NG

OK >> GO TO 12.
NG >> Replace EVAP canister.



7. CHECK BYPASS HOSE

Check bypass hoses for clogging.

OK or NG

OK >> GO TO 8.
NG >> Repair or replace hoses.

8. CHECK VACUUM CUT VALVE BYPASS VALVE

Refer to EC-1743, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace vacuum cut valve bypass valve.

9. CHECK VACUUM CUT VALVE

Refer to EC-1743, "Component Inspection" .

OK or NG

OK >> GO TO 10.
NG >> Replace vacuum cut valve.

10. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE

1. Turn ignition switch “OFF”.
2. Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.

OK or NG

OK >> GO TO 11.
NG >> Repair or replace.

11. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check connectors for water.

Water should not exist.

OK or NG

OK >> GO TO 12.
NG >> Replace EVAP control system pressure sensor.

12. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-1548, "Component Inspection" .

OK or NG

OK >> GO TO 13.
NG >> Replace EVAP control system pressure sensor.

13. CHECK RUBBER TUBE FOR CLOGGING

1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

OK or NG

OK >> GO TO 14.
NG >> Clean the rubber tube using an air blower.

14. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-1540, "Component Inspection" .

OK or NG

OK >> GO TO 15.
NG >> Replace EVAP canister vent control valve.

15. CHECK INTERMITTENT INCIDENT

Refer to EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

UBS002KV

VACUUM CUT VALVE BYPASS VALVE

With CONSULT-II

1. Reconnect harness disconnected connectors.
2. Turn ignition switch ON.
3. Perform “VC/V BYPASS/V” in “ACTIVE TEST” mode.

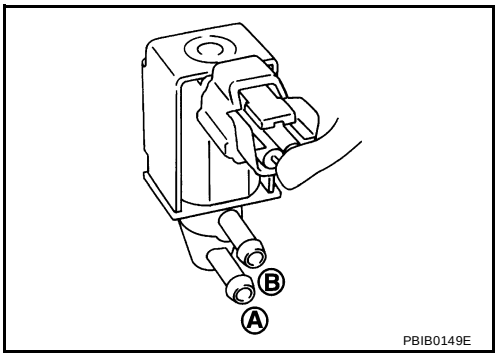
ACTIVE TEST	
VC/V BYPASS/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
HO2S1 MNTR (B1)	LEAN

PBIB0840E

4. Check air passage continuity and operation delay time under the following conditions.

Condition VC/V BYPASS/V	Air passage continuity between **A** and **B**
ON	Yes
OFF	No

Operation takes less than 1 second.
If NG, replace vacuum cut valve bypass valve.



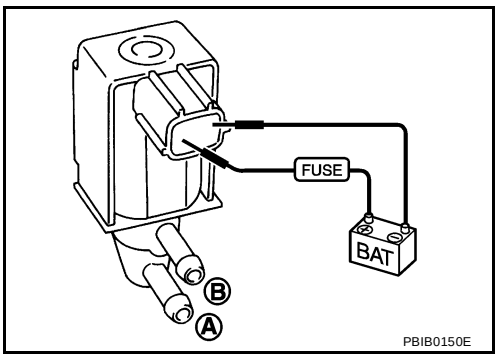
PBIB0149E

Without CONSULT-II

Check air passage continuity and operation delay time under the following conditions.

Condition	Air passage continuity between **A** and **B**
12V direct current supply between terminals 1 and 2	Yes
No supply	No

Operation takes less than 1 second.
If NG, replace vacuum cut valve bypass valve.

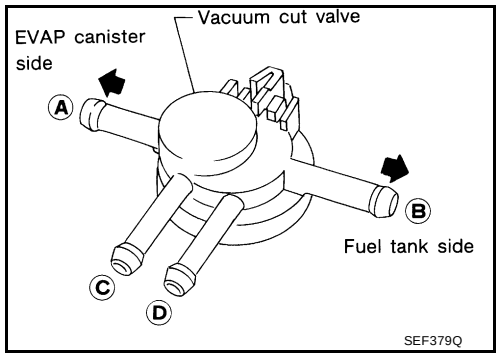


PBIB0150E

VACUUM CUT VALVE

Check vacuum cut valve as follows:

1. Plug port **C** and **D** with fingers.
2. Apply vacuum to port **A** and check that there is no suction from port **B** .
3. Apply vacuum to port **B** and check that there is suction from port **A** .
4. Blow air in port **B** and check that there is a resistance to flow out of port **A** .
5. Open port **C** and **D** .
6. Blow air in port **A** check that air flows freely out of port **C** .
7. Blow air in port **B** check that air flows freely out of port **D** .
8. If NG, replace vacuum cut valve.



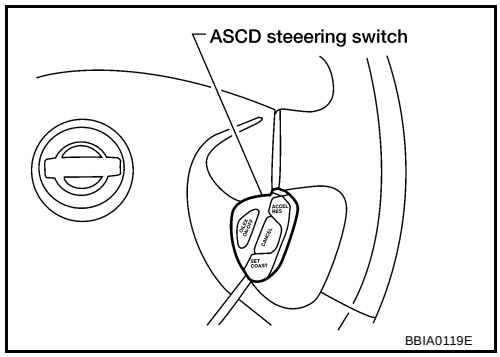
DTC P1564 ASCD STEERING SWITCH

PFP:25551

Component Description

UBS002KW

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-1850, "AUTOMATIC SPEED CONTROL DEVICE (ASCD)" for the ASCD function.



CONSULT-II Reference Value in Data Monitor Mode

UBS002KX

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAIN SW	● Ignition switch: ON	● CRUISE switch pressed	ON
		● CRUISE switch released	OFF
CANCEL	● Ignition switch: ON	● CANCEL switch pressed	ON
		● CANCEL switch released	OFF
RESUME/ACC SW	● Ignition switch: ON	● ACCEL/RES switch pressed	ON
		● ACCEL/RES switch released	OFF
SET SW	● Ignition switch: ON	● COAST/SET switch pressed	ON
		● COAST/SET switch released	OFF

On Board Diagnosis Logic

UBS002KY

NOTE:
If DTC P1564 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-1593 .

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P1564 1564	ASCD steering switch	● An excessively high voltage signal from the ASCD steering switch is sent to ECM. ● ECM detects that input signal from the ASCD steering switch is out of the specified range. ● ECM detects that the ASCD steering switch is stuck ON.	● Harness or connectors (The switch circuit is open or shorted.) ● ASCD steering switch ● ECM

DTC Confirmation Procedure

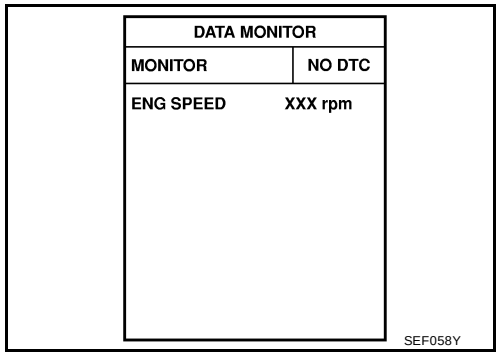
UBS002KZ

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 “CRUISE” switch for at least 10 seconds, then release it and wait at least 10 seconds.
5. Press “ACCEL/RES” switch for at least 10 seconds, then release it and wait at least 10 seconds.
6. Press “COAST/SET” switch for at least 10 seconds, then release it and wait at least 10 seconds.
7. Press “CANCEL” switch for at least 10 seconds, then release it and wait at least 10 seconds.
8. If 1st trip DTC is detected, go to EC-1749, "Diagnostic Procedure" .



WITH GST

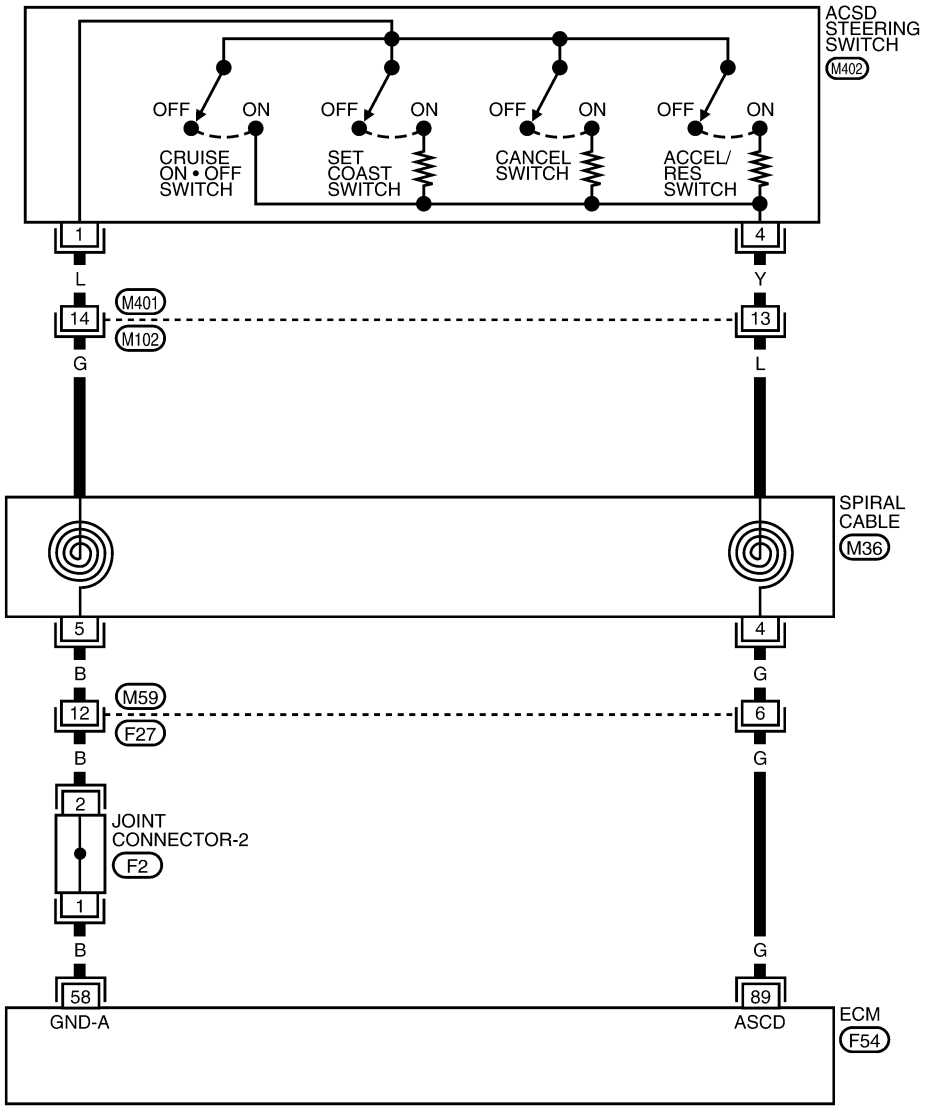
Follow the procedure “WITH CONSULT-II” above.

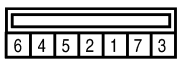
Wiring Diagram

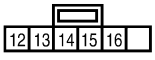
UBS002L0

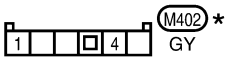
EC-ASC/SW

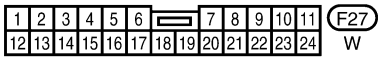
: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC











REFER TO THE FOLLOWING.
F2 - JOINT CONNECTOR
F54 - ELECTRICAL UNITS

*: THIS CONNECTOR IS NOT SHOWN IN “HARNESS LAYOUT” OF PG SECTION.

BBWA0258E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/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)
58	B	Sensors' ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
89	G	ASCD steering switch	**[Ignition switch "ON"]** ● ASCD steering switch is "OFF".	Approximately 4V
			[Ignition switch "ON"] ● CRUISE switch is "ON".	Approximately 0.5V
			[Ignition switch "ON"] ● CANCEL switch is "ON".	Approximately 1V
			[Ignition switch "ON"] ● COAST/SET switch is "ON".	Approximately 2V
			[Ignition switch "ON"] ● ACCEL/RES switch is "ON".	Approximately 3V

Diagnostic Procedure

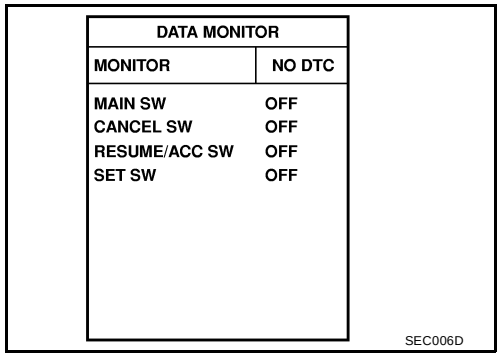
UBS002L1

1. 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.

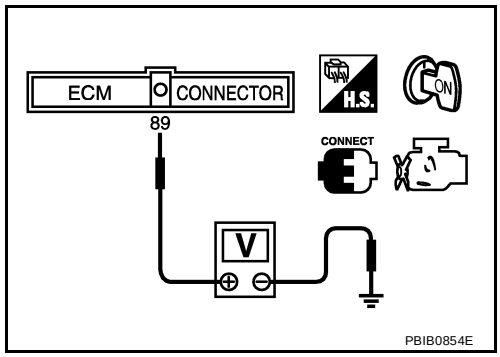
Switch	Monitor item	Condition	Indication
CUISE	MAIN SW	Pressed	ON
		Released	OFF
COAST/SET	SET SW	Pressed	ON
		Released	OFF
ACCEL/RES	RESUME/ACC SW	Pressed	ON
		Released	OFF
CANCEL	CANCEL SW	Pressed	ON
		Released	OFF



Without CONSULT-II

1. Turn ignition switch “ON”.
2. Check voltage between ECM terminal 89 and ground with pressing each button.

Switch	Condition	Voltage [V]
CRUISE	Pressed	Approx. 0.5
	Released	Approx. 4.0
COAST/SET	Pressed	Approx. 2.0
	Released	Approx. 4.0
ACCEL/RES	Pressed	Approx. 3.0
	Released	Approx. 4.0
CANCEL	Pressed	Approx. 1.0
	Released	Approx. 4.0



OK or NG

OK >> GO TO 7.
NG >> GO TO 2.

2. CHECK ASCD STEERING SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

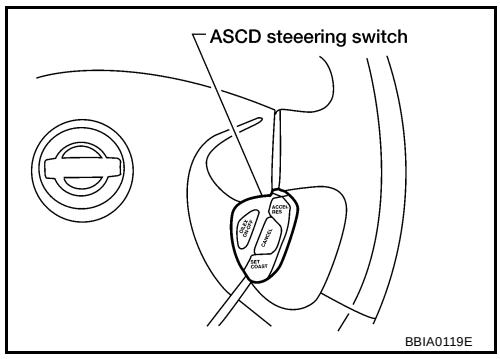
1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Disconnect ASCD steering switch harness connector.
4. Check harness continuity between ASCD steering switch terminal 1 and ECM terminal 58. Refer to Wiring Diagram.

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.



3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M59, F27
- Harness connectors M102, M401
- Joint connector-2
- Spiral cable
- Harness for open and short between ECM and ASCD steering switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK ASCD STEERING SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 89 and ASCD steering switch 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 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M59, F27
- Harness connectors M102, M401
- Spiral cable
- Harness for open and short between ECM and ASCD steering switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK ASCD STEERING SWITCH

Refer to EC-1750, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace ASCD steering switch.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-1616, "DTC P1122 ELECTRIC THROTTLE CONTROL FUNCTION" .

>> **INSPECTION END**

Component Inspection

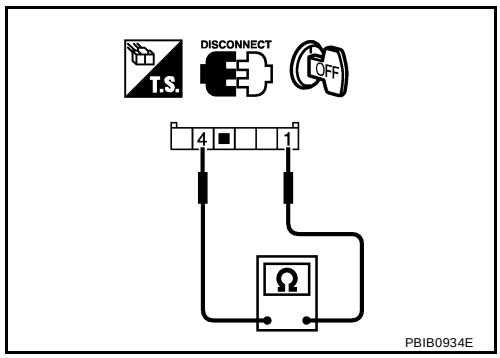
UBS002L2

ASCD STEERING SWITCH

1. Disconnect ASCD steering switch.

2. Check continuity between ASCD steering switch terminals 1 and 4 with pushing each switch.

Switch	Condition	Resistance [Ω]
CRUISE SW	Pressed	Approx. 4,000
	Released	Approx. 0
COAST/SET SW	Pressed	Approx. 660
	Released	Approx. 0
ACCEL/RES SW	Pressed	Approx. 1,000
	Released	Approx. 0
CANCEL SW	Pressed	Approx. 250
	Released	Approx. 0



If NG, replace ASCD steering switch.

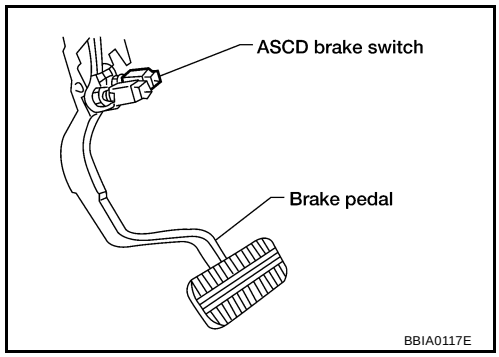
DTC P1572 ASCD BRAKE SWITCH

PFP:25320

Component Description

UBS002L3

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-1850, "AUTOMATIC SPEED CONTROL DEVICE (ASCD)" for the ASCD function.



CONSULT-II Reference Value in Data Monitor Mode

UBS002L4

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
BRAKE SW1 (ASCD brake switch)	● Ignition switch: ON	● Brake pedal fully released	ON
		● Brake pedal depressed	OFF
BRAKE SW2 (stop lamp switch)	● Ignition switch: ON	● Brake pedal fully released	OFF
		● Brake pedal depressed	ON

On Board Diagnosis Logic

UBS002L5

NOTE:
If DTC P1572 is displayed with DTC P0605 or P1805, first perform the trouble diagnosis for DTC P0605 or P1805. Refer to EC-1593 or EC-1767 .

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P1572 1572	ASCD brake switch	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 open or shorted.) ● Harness or connectors (The ASCD brake switch circuit is open or shorted.) ● Harness or connectors (The ASCD clutch switch circuit is open or shorted.) ● Stop lamp switch ● ASCD brake switch ● ASCD clutch switch ● Incorrect stop lamp switch installation ● Incorrect ASCD brake switch installation ● Incorrect ASCD clutch switch installation ● ECM

DTC Confirmation Procedure

UBS002L6

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 3 and 4 may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

WITH CONSULT-II

1. Start engine.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Drive the vehicle for at least 5 consecutive seconds under the following condition.

VHCL SPEED SE	More than 30 km/h (19 MPH)
Selector lever	Suitable position

If 1st trip DTC is detected, go to EC-1755, "Diagnostic Procedure" .
If 1st trip DTC is not detected, go to the following step.

4. Drive the vehicle for at least 5 consecutive seconds under the following condition.

VHCL SPEED SE	More than 30 km/h (19 MPH)
Selector lever	Suitable position
Driving location	Depress the brake pedal for more than five seconds so as not to come off from the above-mentioned condition.

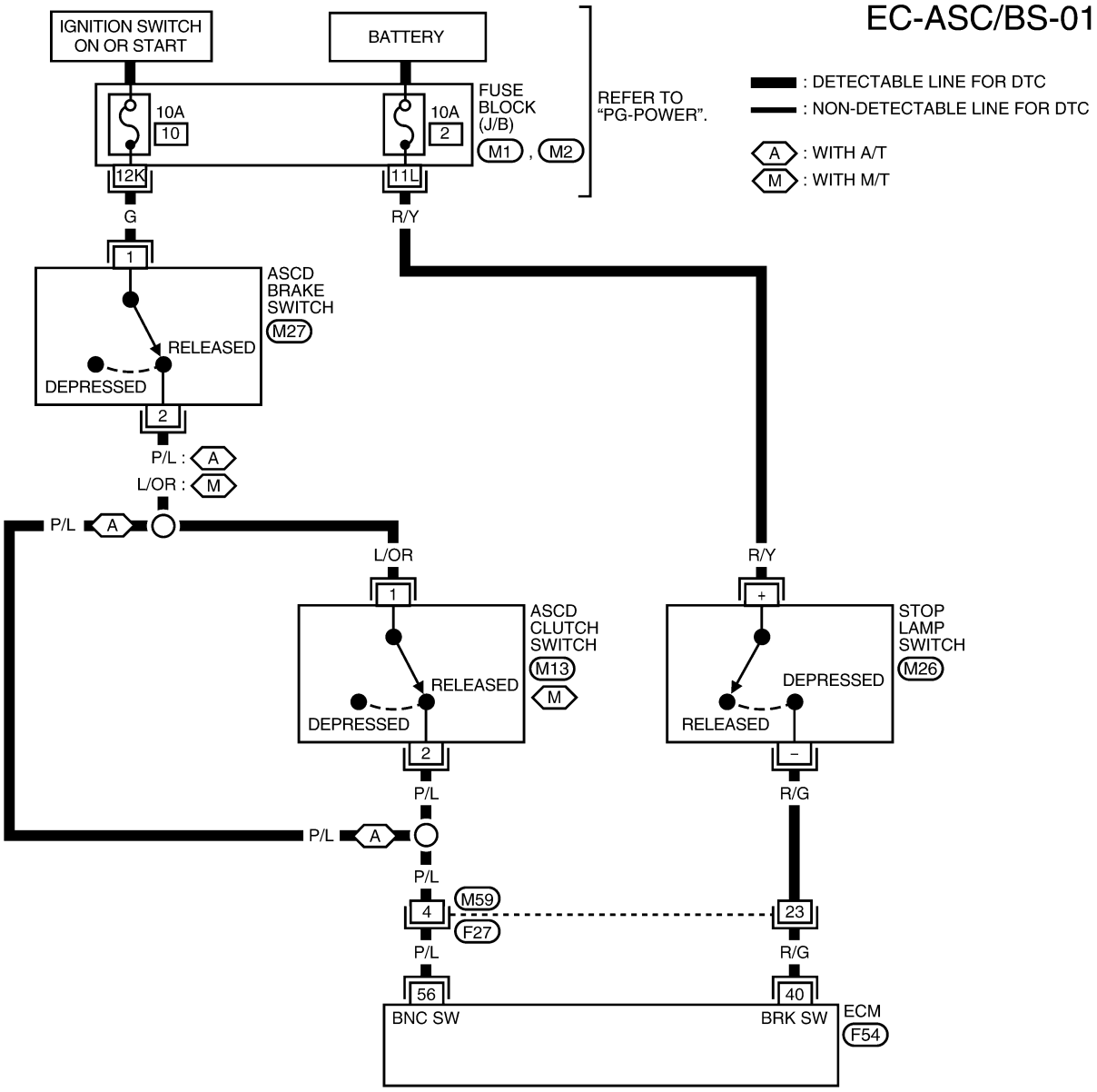
5. If 1st trip DTC is detected, go to EC-1755, "Diagnostic Procedure" .

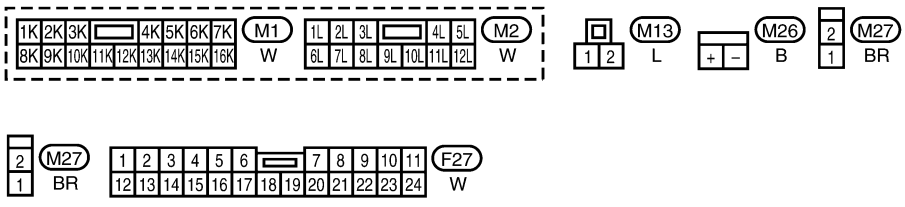
WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS002L7





REFER TO THE FOLLOWING.
F54 - ELECTRICAL UNITS

BBWA0259E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/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)
40	R/G	Stop lamp switch	**[Engine is running]** ● Brake pedal fully released	Approximately 0V
			[Engine is running] ● Brake pedal depressed	BATTERY VOLTAGE (11 - 14V)
56	P/L	ASCD brake switch	**[Ignition switch "ON"]** ● Brake pedal is depressed ● Clutch pedal is depressed (M/T models)	Approximately 0V
			[Ignition switch "ON"] ● Brake pedal is fully released ● Clutch pedal is fully released (M/T models)	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

UBS002L8

1. CHECK OVERALL FUNCTION-I

With CONSULT-II

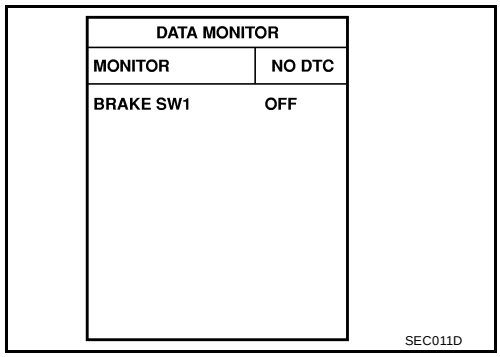
1. Turn ignition switch "ON".
2. Select "BRAKE SW1" in "DATA MONITOR" mode with CONSULT-II.
3. Check "BRAKE SW1" indication under the following conditions.

M/T models

CONDITION	INDICATION
When clutch pedal or brake pedal is depressed	OFF
When clutch pedal and brake pedal are fully released	ON

A/T models

CONDITION	INDICATION
When brake pedal is depressed	OFF
When brake pedal is fully released	ON



Without CONSULT-II

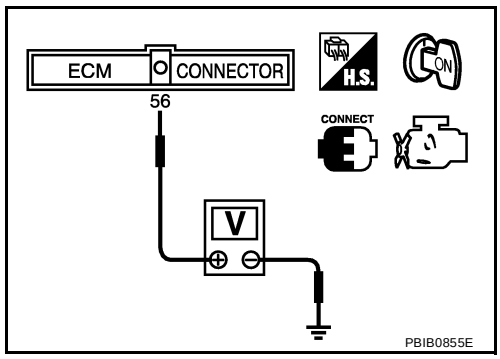
1. Turn ignition switch "ON".
2. Check voltage between ECM terminal 56 and ground under the following conditions.

M/T models

CONDITION	VOLTAGE
When clutch pedal or brake pedal is depressed	Approximately 0V
When clutch pedal and brake pedal are fully released	Battery voltage

A/T models

CONDITION	VOLTAGE
When brake pedal is depressed	Approximately 0V
When brake pedal is fully released	Battery voltage



OK or NG

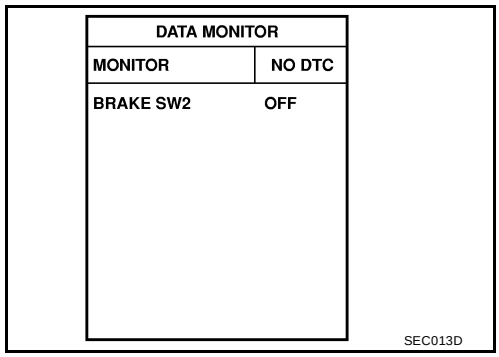
OK >> GO TO 2.
NG (M/T models) >>GO TO 3.
NG (A/T models) >>GO TO 4.

2. CHECK OVERALL FUNCTION-II

With CONSULT-II

Check “BRAKE SW2” indication in “DATA MONITOR” mode.

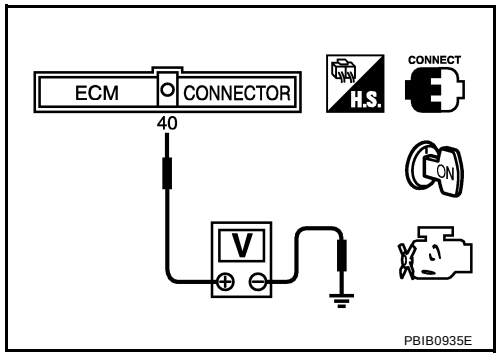
CONDITION	INDICATION
When brake pedal is released	OFF
When brake pedal is depressed	ON



Without CONSULT-II

Check voltage between ECM terminal 40 and ground under the following conditions.

CONDITION	VOLTAGE
When brake pedal is released	Approximately 0V
When brake pedal is depressed	Battery voltage

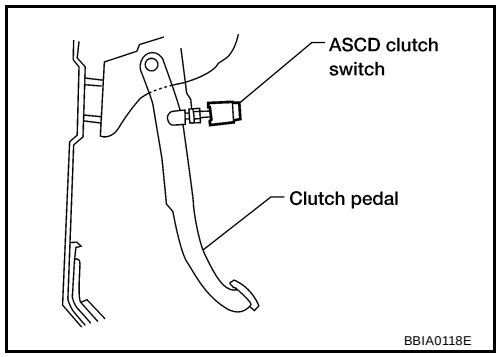


OK or NG

OK >> GO TO 18.
NG >> GO TO 13.

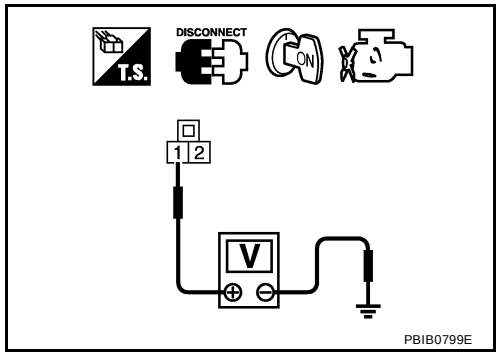
3. CHECK ASCD BRAKE SWITCH CIRCUIT

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
When brake pedal is released	Battery voltage
When brake pedal is depressed	Approx. 0V

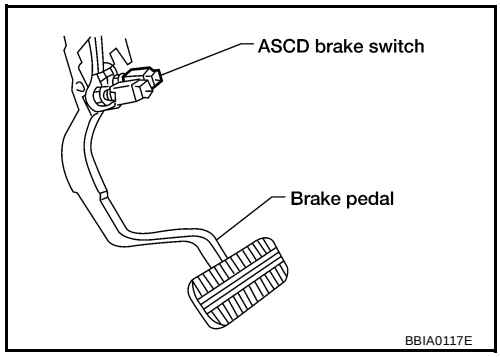


OK or NG

OK >> GO TO 10.
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”.

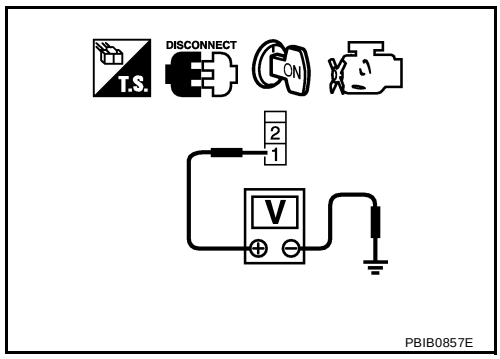


4. Check voltage between ASCD brake switch terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK (M/T models)>>GO TO 6.
OK (A/T models)>>GO TO 7.
NG >> GO TO 5.



5. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector M1
- 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 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

7. 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 56 and ASCD brake switch terminal 2. 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 9.
NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M59, F27
- 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.

9. CHECK ASCD BRAKE SWITCH

Refer to EC-1760, "Component Inspection"

OK or NG

OK >> GO TO 18.
NG >> Replace ASCD brake switch.

10. 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 56 and ASCD clutch switch terminal 2. 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 12.
NG >> GO TO 11.

11. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M59, F27
- 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.

12. CHECK ASCD CLUTCH SWITCH

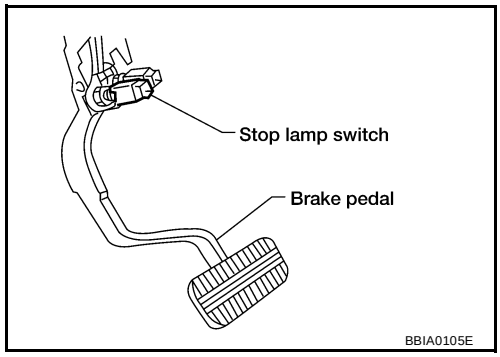
Refer to EC-1760, "Component Inspection"

OK or NG

OK >> GO TO 18.
NG >> Replace ASCD clutch switch.

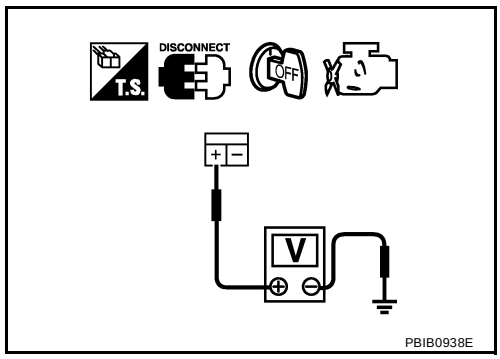
13. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect stop lamp switch harness connector.



3. Check voltage between stop lamp switch terminal **+** and ground with CONSULT -II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 15.
NG >> GO TO 14.

14. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector M2
- 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.

15. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 40 and stop lamp switch terminal **–** . 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 17.
NG >> GO TO 16.

16. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M59, F27
- 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.

17. CHECK STOP LAMP SWITCH

Refer to EC-1760, "Component Inspection" .

OK or NG

OK >> GO TO 18.
NG >> Replace stop lamp switch.

18. CHECK INTERMITTENT INCIDENT

Refer to EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

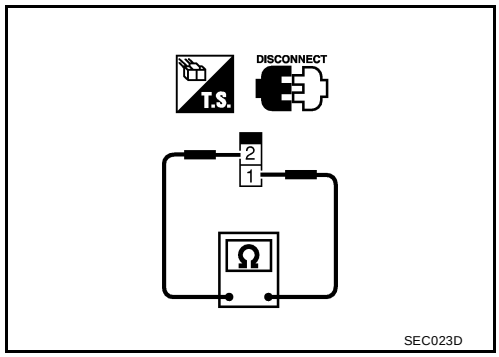
UBS002L9

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
When brake pedal is fully released.	Should exist.
When brake pedal is depressed.	Should not exist.

If NG, adjust ASCD brake switch installation, refer to BR-11, "BRAKE PEDAL AND BRACKET" , and perform step 3 again.

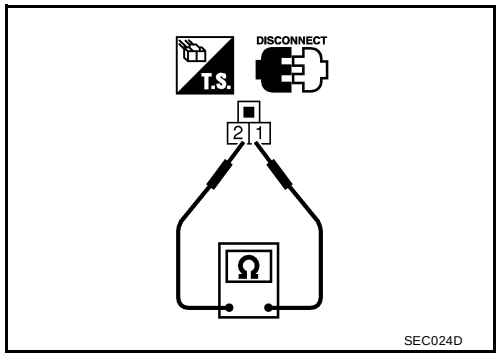


ASCD CLUTCH SWITCH (FOR M/T MODELS)

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
When clutch pedal is fully released.	Should exist.
When clutch pedal is depressed.	Should not exist.

If NG, adjust ASCD clutch switch installation, refer to CL-23, "CLUTCH SYSTEM" , and perform step 3 again.

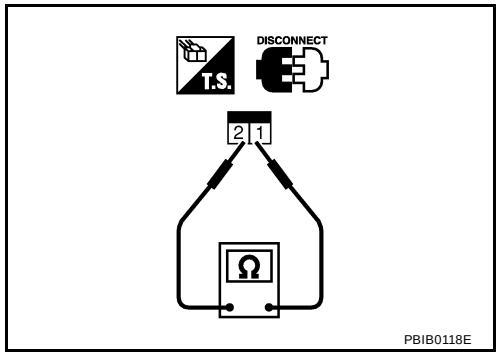


STOP LAMP SWITCH

1. Turn ignition switch “OFF”.
2. Disconnect stop lamp switch harness connector.
3. Check continuity between stop lamp switch terminals **+** and **–** under the following conditions.

Condition	Continuity
When brake pedal is fully released.	Should not exist.
When brake pedal is depressed.	Should exist.

If NG, adjust stop lamp switch installation, refer to BR-11, "BRAKE PEDAL AND BRACKET" , and perform step 3 again.



DTC P1574 ASCD VEHICLE SPEED SENSOR

PFP:31036

Component Description

UBS002LA

The ECM receives two vehicle speed sensor signals. One is sent from combination meter, and the other is from TCM (Transmission control module) via CAN communication line. The ECM uses these signals for ASCD control. Refer to EC-1850, "AUTOMATIC SPEED CONTROL DEVICE (ASCD)" for ASCD functions.

On Board Diagnosis Logic

UBS002LB

NOTE:

- **If DTC P1574 is displayed with DTC U1000, U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-1348, "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-1585, "DTC P0500 VSS" .**
- **If DTC P1574 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-1593, "DTC P0605 ECM" .**

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P1574 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.) ● Harness or connectors (The combination meter circuit is open or shorted.) ● TCM ● Combination meter ● Vehicle speed sensor ● ECM

DTC Confirmation Procedure

UBS002LC

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

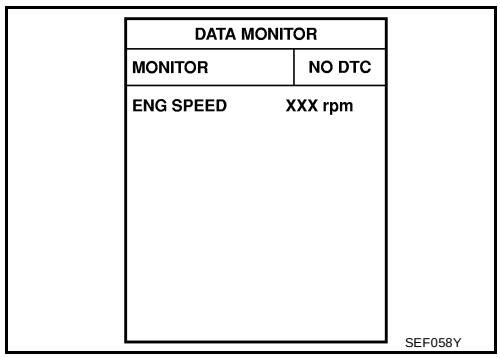
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

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.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Drive the vehicle at more than 40 km/h (25MPH).
4. If 1st trip DTC is detected, go to EC-1762, "Diagnostic Procedure" .



WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

UBS002LD

1. CHECK DTC WITH TCM

Check DTC with TCM. Refer to AT-433, "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION" .

OK or NG

OK >> GO TO 2.
NG >> Perform trouble shooting relevant to DTC indicated.

2. CHECK VEHICLE SPEED SENSOR CIRCUIT

Refer to DI-23, "VEHICLE SPEED SENSOR SIGNAL CHECK" .

OK or NG

OK >> GO TO 3.
NG >> Repair or replace.

3. CHECK COMBINATION METER

Check combination meter function.
Refer to DI-3, "METERS AND GAUGES" .

>> **INSPECTION END**

DTC P1706 PNP SWITCH

PFP:32006

Component Description

UBS002LE

When the shift lever position is “P” (A/T models only) or “N”, park/neutral position (PNP) switch is “ON”. ECM detects the position because the continuity of the line (the “ON” signal) exists.

CONSULT-II Reference Value in Data Monitor Mode

UBS002LF

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
P/N POSI SW	● Ignition switch: ON	Shift lever: P or N (A/T model) Neutral (M/T model)	ON
		Shift lever: Except above	OFF

On Board Diagnosis Logic

UBS002LG

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1706 1706	Park/neutral position switch	The signal of the park/neutral position (PNP) switch is not changed in the process of engine starting and driving.	● Harness or connectors [The park/neutral position (PNP) switch circuit is open or shorted.] ● Park/neutral position (PNP) switch

DTC Confirmation Procedure

UBS002LH

CAUTION:

Always drive vehicle at a safe speed.

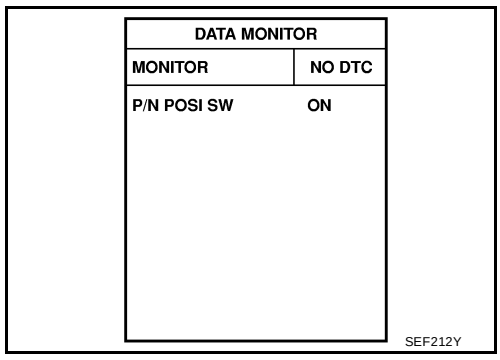
NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch “ON”.
2. Select “P/N POSI SW” in “DATA MONITOR” mode with CONSULT-II. Then check the “P/N POSI SW” signal under the following conditions.

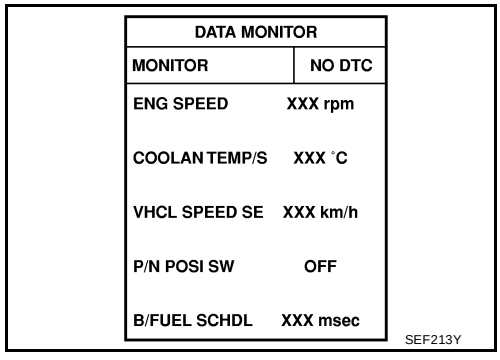
Position (Selector lever)	Known-good signal
“N” and “P” position	ON
Except the above position	OFF



If NG, go to EC-1766, "Diagnostic Procedure" .
If OK, go to following step.

3. Select “DATA MONITOR” mode with CONSULT-II.
4. Start engine and warm it up to normal operating temperature.
5. Maintain the following conditions for at least 60 consecutive seconds.

ENG SPEED	1,500 - 3,000 rpm
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	3.0 - 31.8 msec
VHCL SPEED SE	More than 64 km/h (40 MPH)
Selector lever	Suitable position



6. If 1st trip DTC is detected, go to EC-1766, "Diagnostic Procedure" .

Overall Function Check

UBS002LI

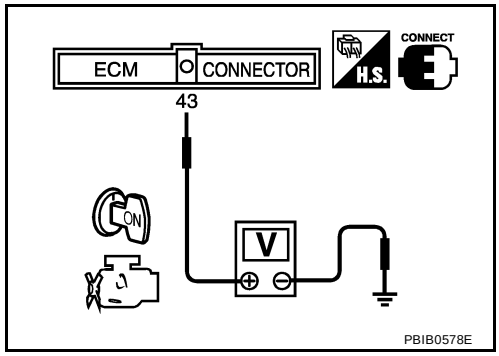
Use this procedure to check the overall function of the park/neutral position (PNP) switch circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Turn ignition switch “ON”.
2. Check voltage between ECM terminal 43 (PNP switch signal) and body ground under the following conditions.

Condition (Gear position)	Voltage V (Known good data)
“P” (A/T models only) and “N” position	Approx. 0
Except the above position	A/T models: Battery voltage M/T: Approximately 5V

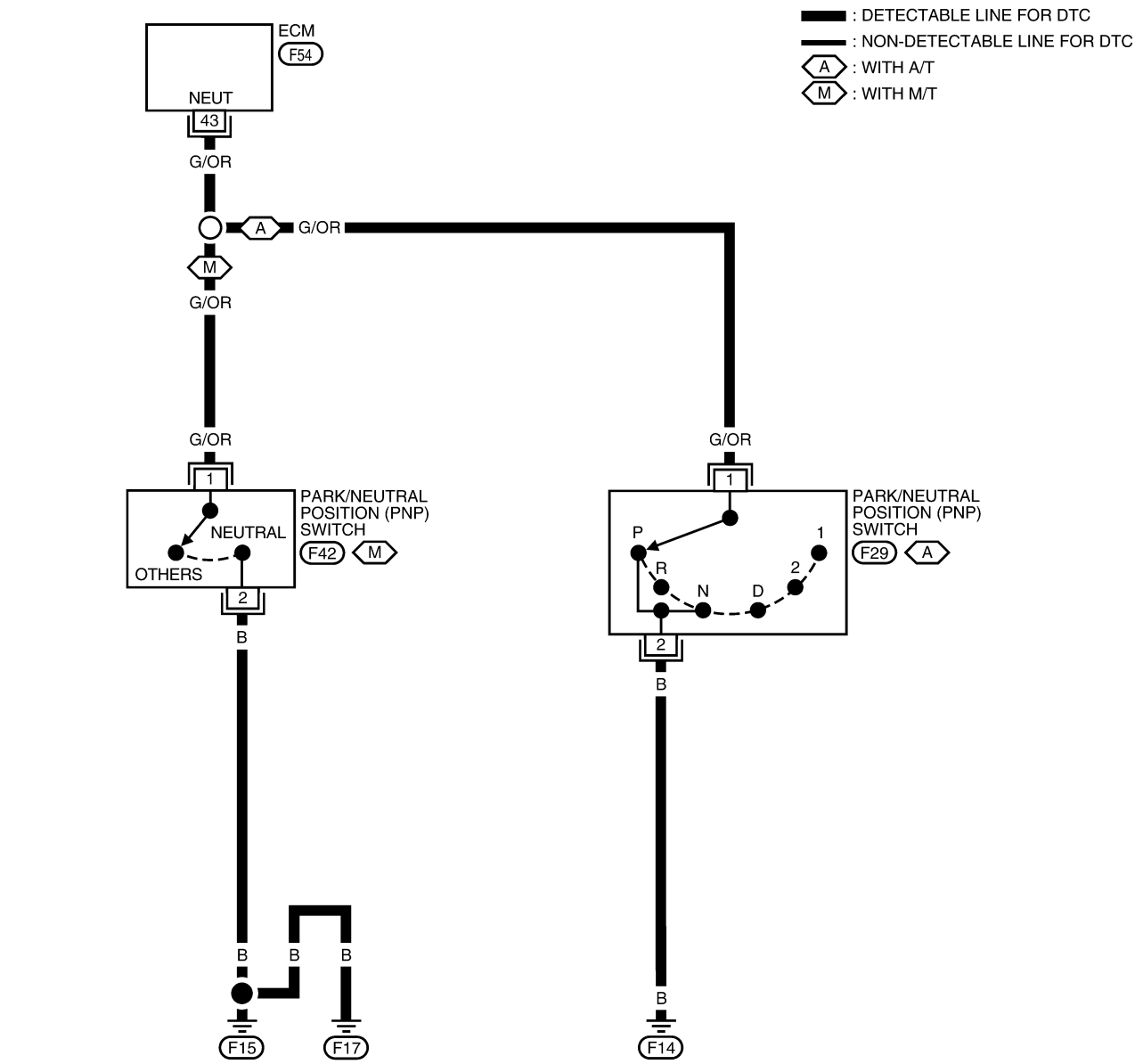
3. If NG, go to EC-1766, "Diagnostic Procedure" .

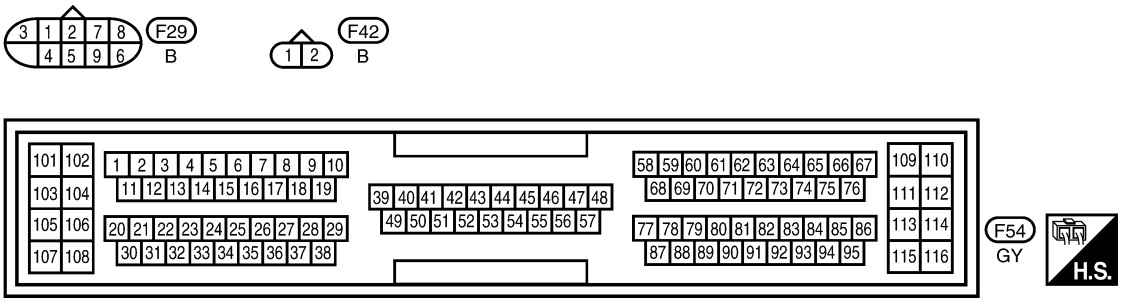


Wiring Diagram

UBS002LJ

EC-PNP/SW-01





BBWA0241E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
43	G/OR	PNP switch	**[Ignition switch "ON"]** ● Shift lever position is "P" or "N" (A/T models), "Neutral" (M/T models).	Approximately 0V
			[Ignition switch "ON"] ● Except the above gear position	**A/T models** BATTERY VOLTAGE (11 - 14V) **M/T models** Approximately 5V

Diagnostic Procedure

UBS002LK

1. CHECK GROUND CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect PNP switch harness connector.
3. Check harness continuity between PNP switch terminal 2 and body ground. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to power.

OK or NG

OK >> GO TO 2.
NG >> Repair open circuit or short to power in harness or connectors.

2. CHECK INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 43 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 3.
NG >> Repair open circuit or short to power in harness or connectors.

3. CHECK PNP SWITCH

Refer to AT-495, "DTC P0705 PARK/NEUTRAL POSITION SWITCH" (A/T models), MT-136, "POSITION SWITCH" (6M/T models) or MT-77, "POSITION SWITCH" (5M/T models).

OK or NG

OK >> GO TO 4.
NG >> Replace PNP switch.

4. CHECK INTERMITTENT INCIDENT

Refer to EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

DTC P1805 BRAKE SWITCH

PFP:25320

Description

UBS002LL

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

UBS002LM

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

UBS002LN

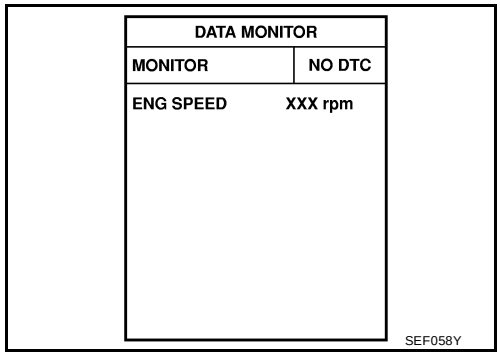
DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1805 1805	Brake switch	A brake switch signal is not sent to ECM for an extremely long time while the vehicle is driving.	● Harness or connectors (Stop lamp switch circuit is open or shorted.) ● Stop lamp switch

DTC Confirmation Procedure

UBS002LO

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-1769, "Diagnostic Procedure" .

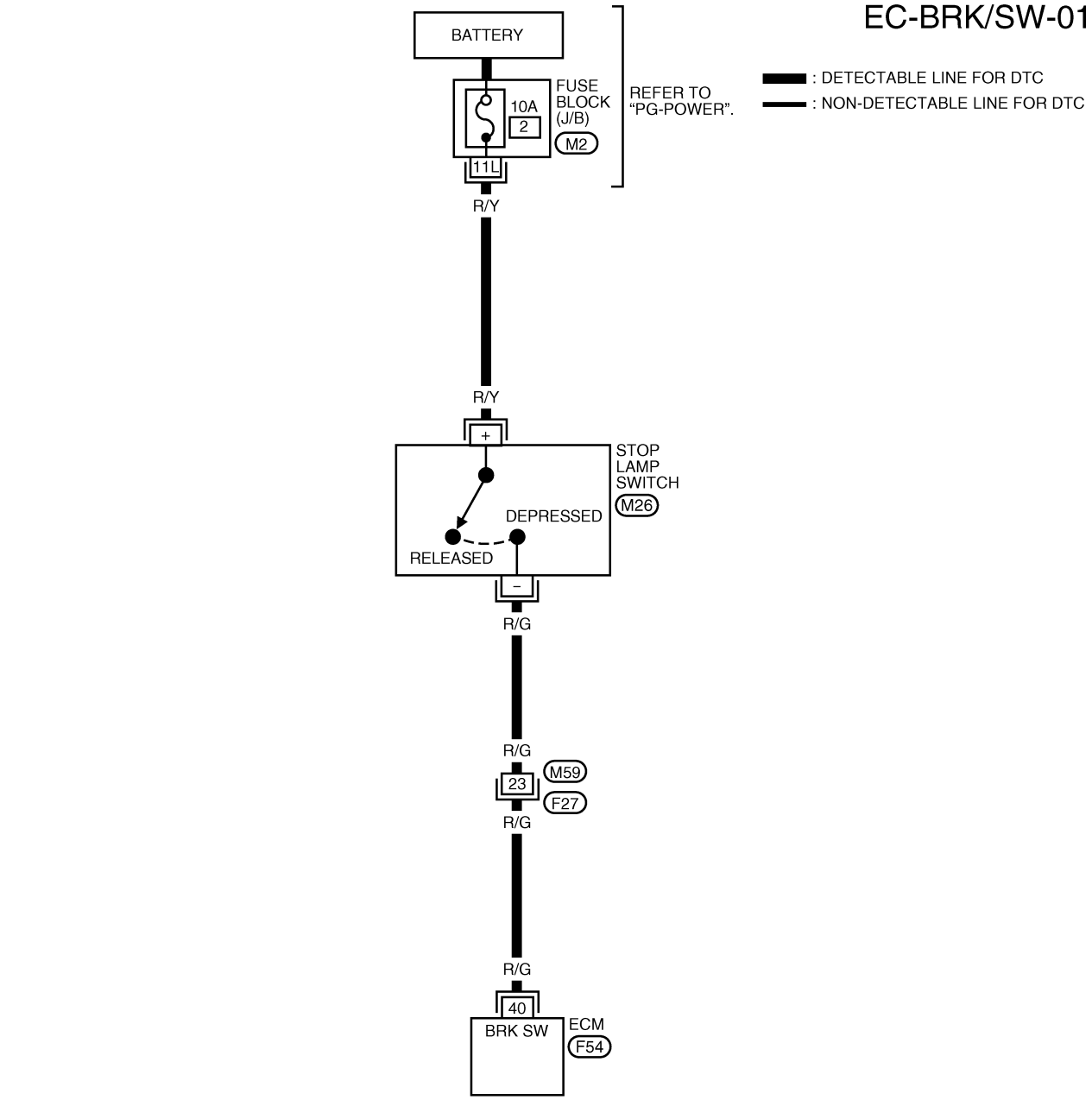


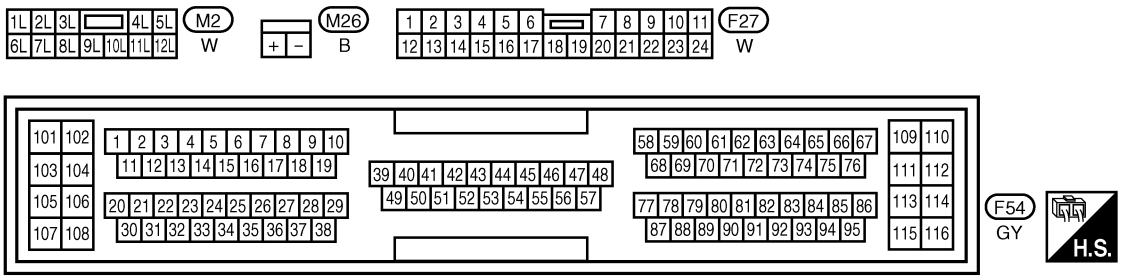
WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS002LP





BBWA0559E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/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)
40	R/G	Stop lamp switch	**[Engine is running]** ● Brake pedal fully released	Approximately 0V
			[Engine is running] ● Brake pedal depressed	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

UBS002LQ

1. CHECK STOP LAMP SWITCH CIRCUIT

1. Turn ignition switch “OFF”.
2. Check the stop lamp when depressing and releasing the brake pedal.

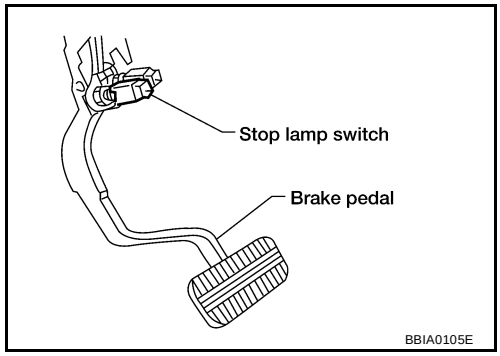
Brake pedal	Stop lamp
Fully released	Not illuminated
Depressed	Illuminated

OK or NG

OK >> GO TO 4.
NG >> GO TO 2.

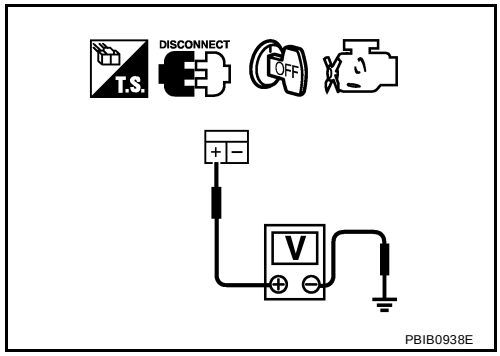
2. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Disconnect stop lamp switch harness connector.



2. Check voltage between stop lamp switch terminal **+** 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 M2
- Harness for open and short between stop lamp switch and fuse

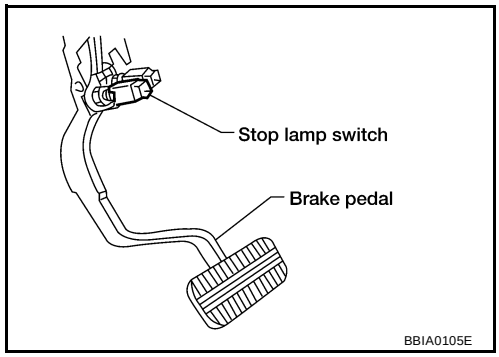
>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Disconnect stop lamp switch harness connector.
4. Check harness continuity between ECM terminal 40 and stop lamp switch terminal – .
   Refer to Wiring Diagram.

   Continuity should exist.

5. Also check harness for short to ground and short to power.



OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E28, M7
- Harness connectors M71, F59
- Joint connector-2
- 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-1771, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace stop lamp switch.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

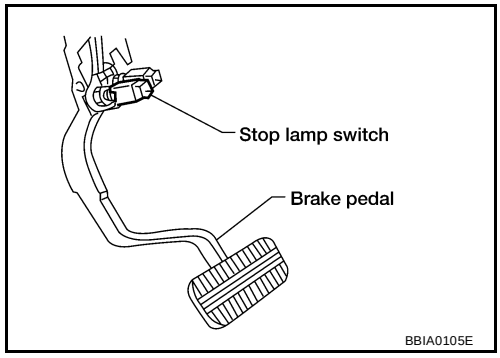
>> **INSPECTION END**

Component Inspection

UBS002LR

STOP LAMP SWITCH

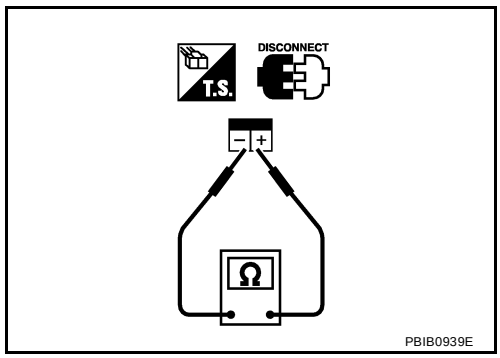
1. Disconnect stop lamp switch harness connector.



2. Check continuity between stop lamp switch terminals **+** and **–** under the following conditions.

Conditions	Continuity
Brake pedal fully released	Should not exist.
Brake pedal depressed	Should exist.

If NG, adjust brake pedal installation, refer to BR-11, "BRAKE PEDAL AND BRACKET" , and perform step 2 again.



IGNITION SIGNAL

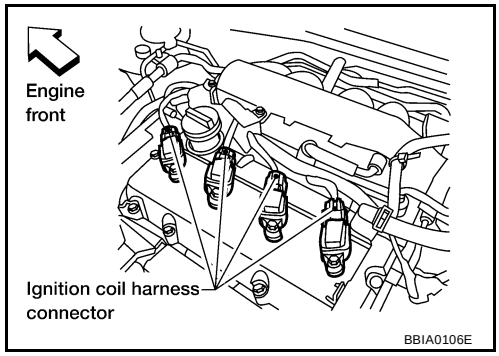
PFP:22448

Component Description

UBS002LS

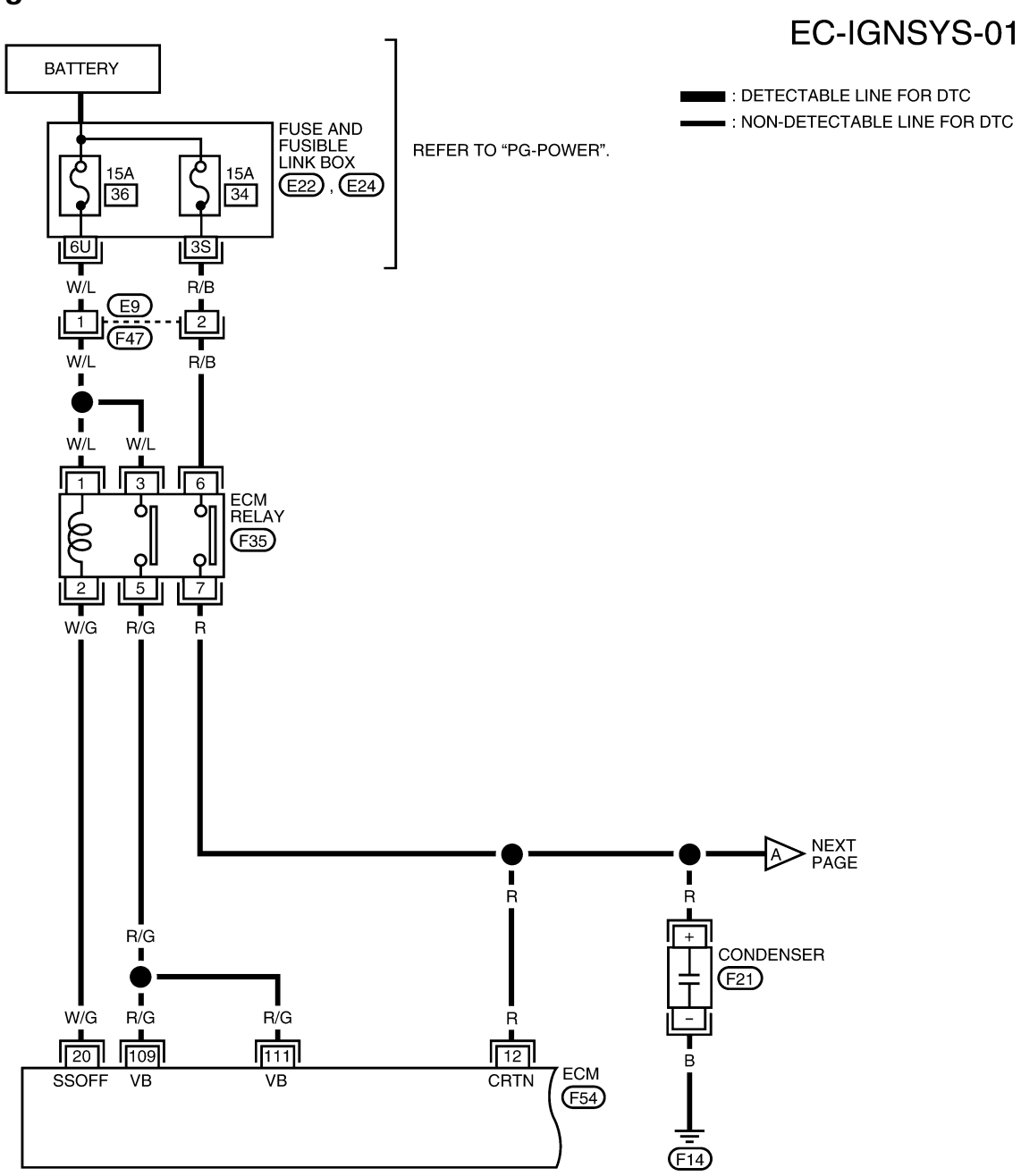
IGNITION COIL & POWER TRANSISTOR

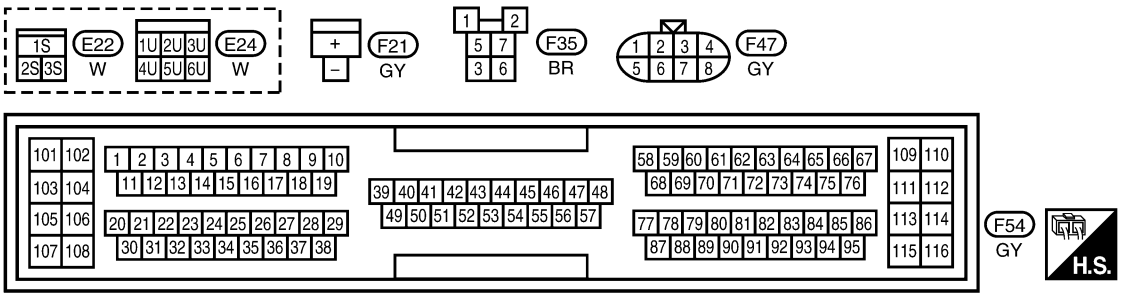
The ignition signal from the ECM is sent to and amplified by the power transistor. The power transistor turns on and off the ignition coil primary circuit. This on-off operation induces the proper high voltage in the coil secondary circuit.



Wiring Diagram

UBS002LT





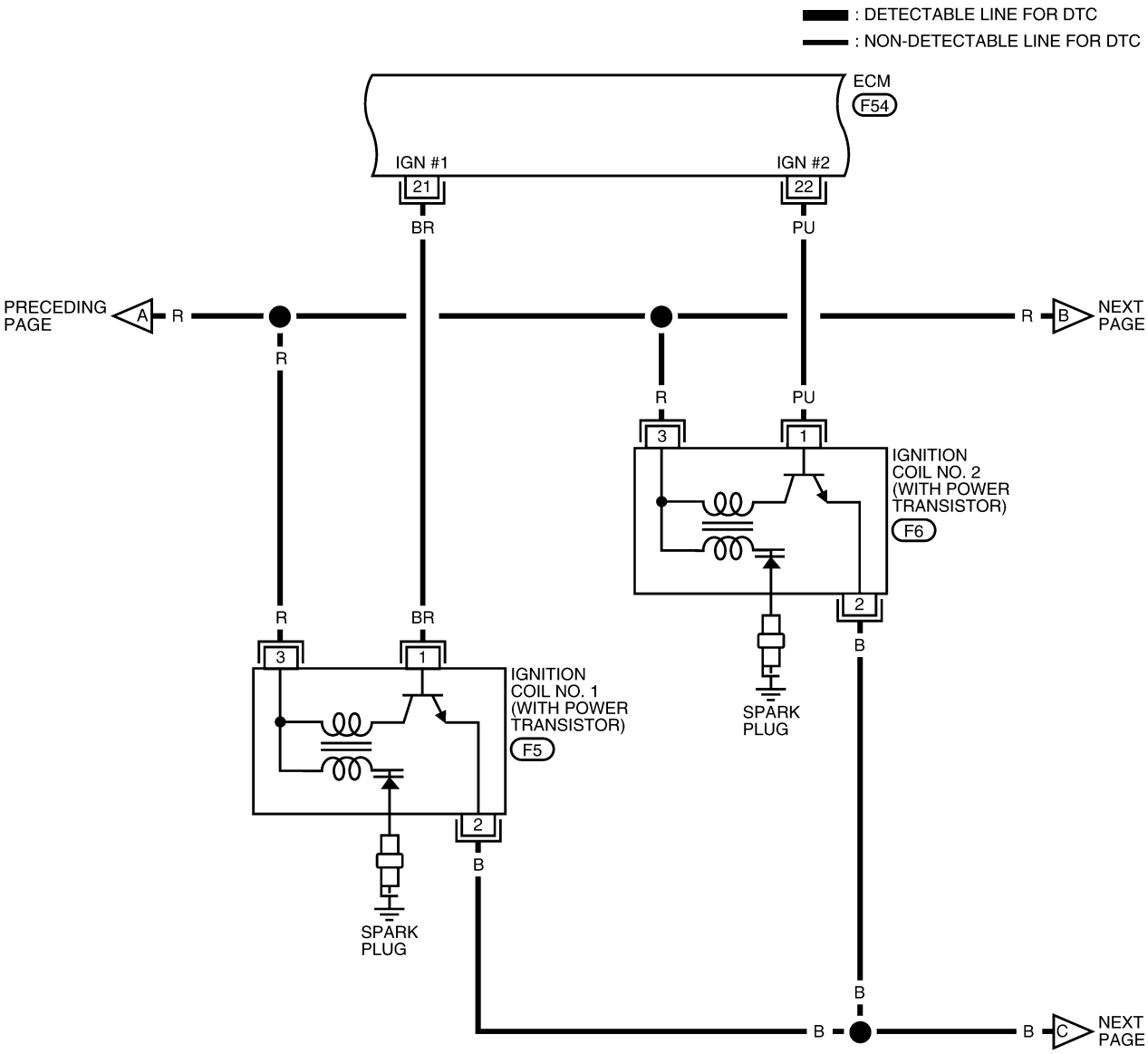
BBWA0233E

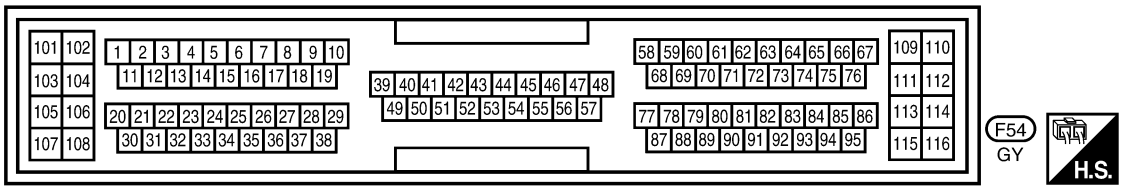
Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/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	R	Counter current return	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)
20	W/G	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch "OFF"]** ● For 3 seconds after turning ignition switch "OFF"	0 - 1.0V
			[Ignition switch "OFF"] ● More than 3 seconds passed after turning ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
109 111	R/G R/G	Power supply for ECM	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)

EC-IGNSYS-02



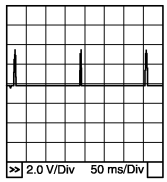
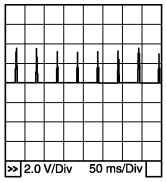


BBWA0234E

Specification data are reference values and are measured between each terminal and ground.

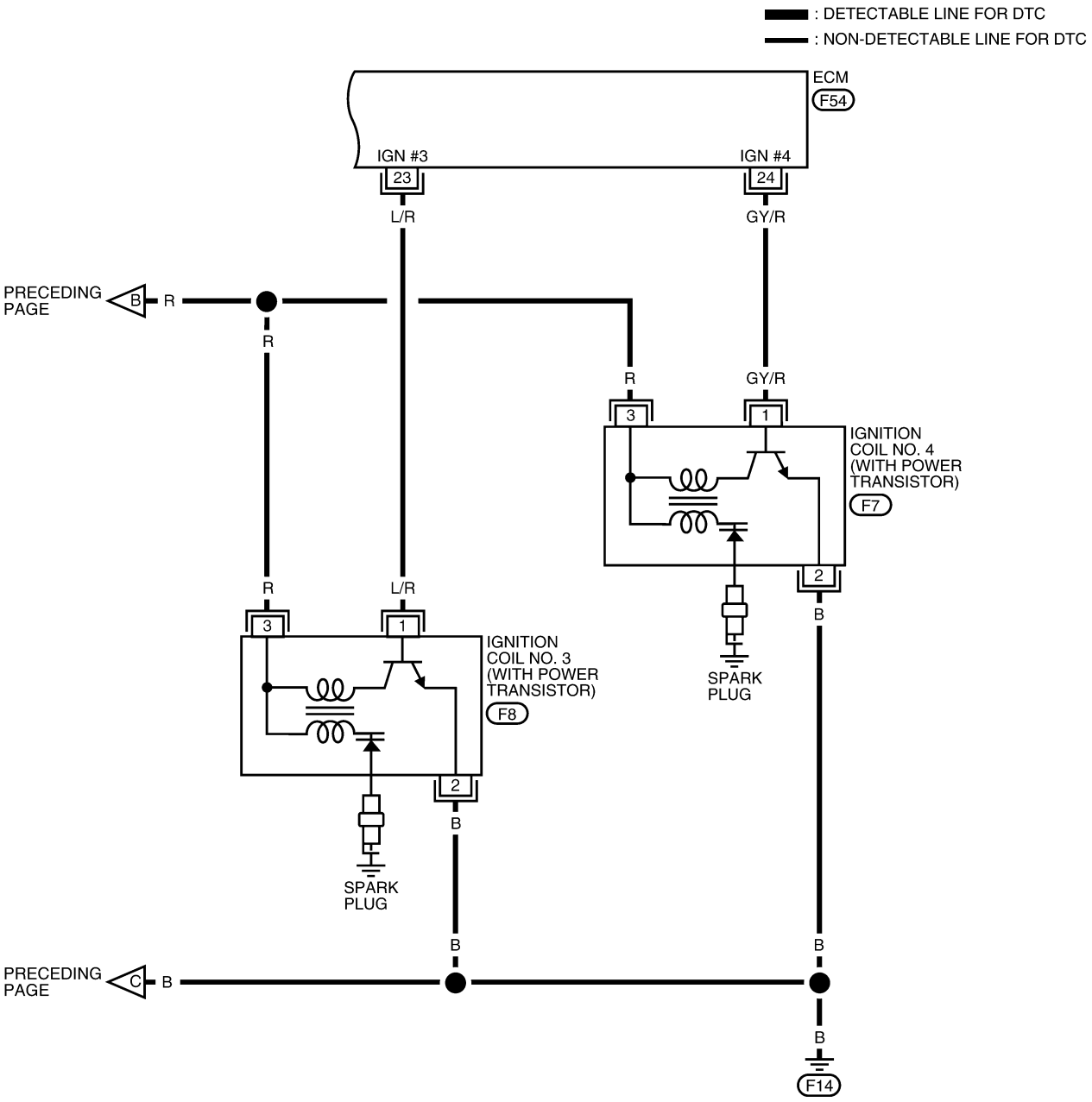
CAUTION:

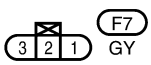
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

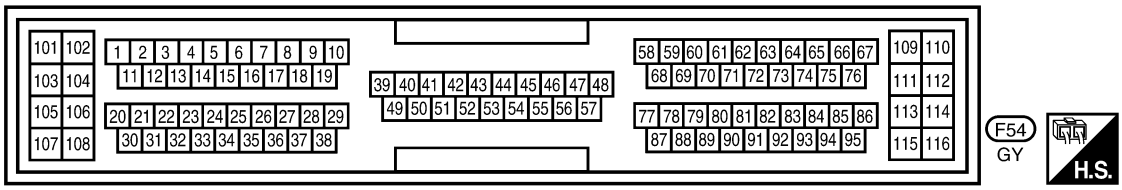
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
21 22	BR PU	Ignition signal No. 1 Ignition signal No. 2	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 0.1V★  PBIB0521E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - 0.2V★  PBIB0522E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

EC-IGNSYS-03



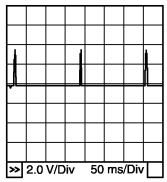
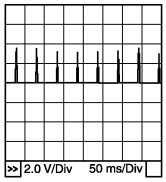




BBWA0235E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
23 24	L/R GY/R	Ignition signal No. 3 Ignition signal No. 4	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 0.1V★  PBIB0521E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - 0.2V★  PBIB0522E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

UBS002LU

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.

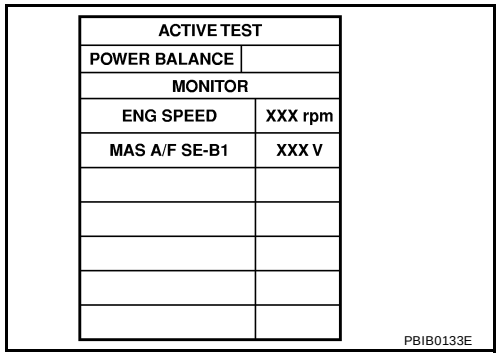
2. CHECK OVERALL FUNCTION

With CONSULT-II

1. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-II.
2. Make sure that all circuits do not produce a momentary engine speed drop.

OK or NG

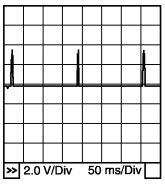
OK >> **INSPECTION END**
NG >> GO TO 8.



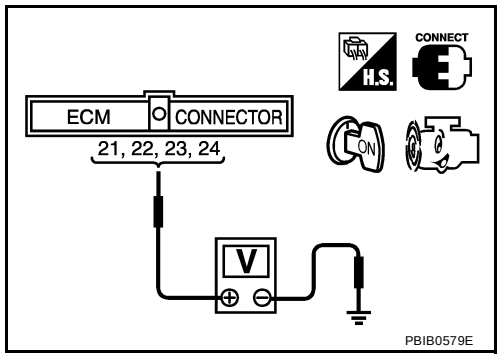
3. CHECK OVERALL FUNCTION

Without CONSULT-II

1. Let engine idle.
2. Read the voltage signal between ECM terminals 21, 22, 23, 24 and ground with an oscilloscope.
3. Verify that the oscilloscope screen shows the signal wave as shown below.



PBIB0521E



PBIB0579E

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 8.

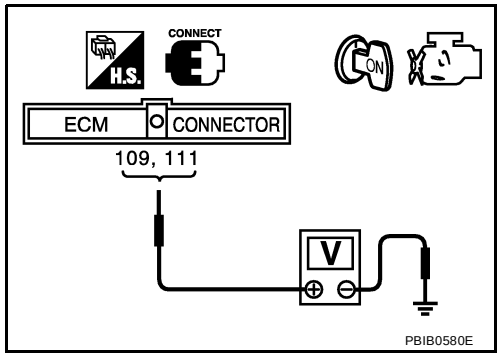
4. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-I

1. Turn ignition switch ON.
2. Check voltage between ECM terminals 109, 111 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 5.
NG >> Go to EC-1340, "POWER SUPPLY CIRCUIT FOR ECM" .



PBIB0580E

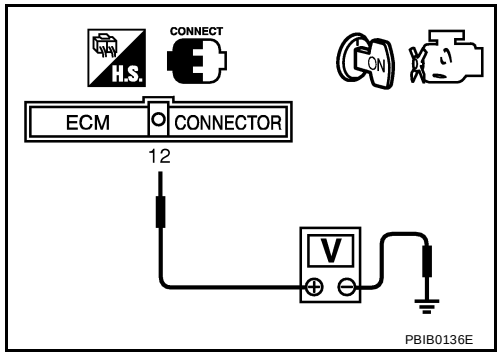
5. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-II

Check voltage between ECM terminal 12 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 6.
NG >> Go to EC-1340, "POWER SUPPLY CIRCUIT FOR ECM" .



PBIB0136E

6. CHECK CONDENSER CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect condenser harness connector.
3. Check harness continuity between ECM terminal 12 and condenser terminal **+** , condenser terminal **–** and engine ground. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK CONDENSER

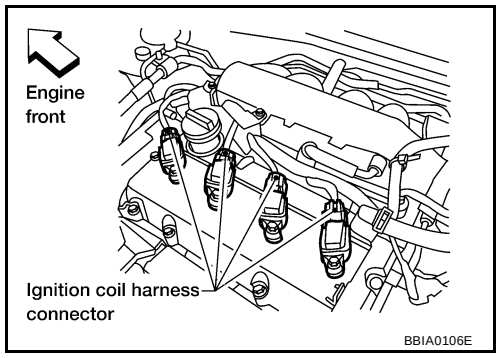
Refer to EC-1781, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace condenser.

8. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-V

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Disconnect ignition coil harness connector.
4. Turn ignition switch ON.

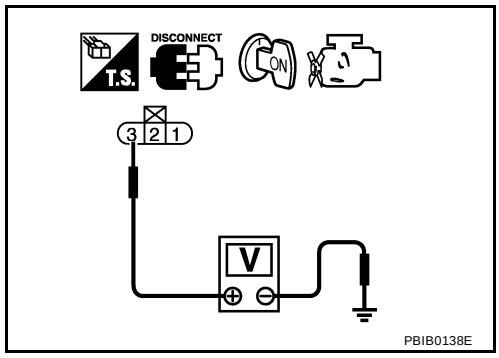


5. Check voltage between ignition coil terminal 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 10.
NG >> GO TO 9.



9. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between ignition coil and ECM relay
- Harness for open or short between ignition coil and ECM

>> Repair or replace harness or connectors.

10. CHECK IGNITION COIL GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between ignition coil terminal 2 and engine ground.
   Refer to Wiring Diagram.

   Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 11.
NG >> Repair open circuit or short to power in harness or connectors.

11. CHECK IGNITION COIL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminals 21, 22, 23, 24 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 12.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

12. CHECK IGNITION COIL WITH POWER TRANSISTOR

Refer to EC-1781, "Component Inspection" .

OK or NG

OK >> GO TO 13.
NG >> Replace ignition coil with power transistor.

13. CHECK INTERMITTENT INCIDENT

Refer to EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

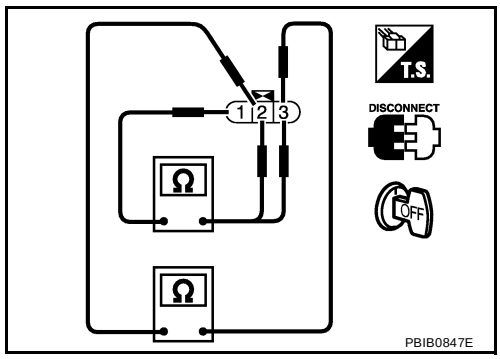
Component Inspection

UBS002LV

IGNITION COIL WITH POWER TRANSISTOR

1. Turn ignition switch “OFF”.
2. Disconnect ignition coil harness connector.
3. Check resistance between ignition coil terminals as follows.

Terminal No.	Resistance Ω [at 25°C (77°F)]
1 and 2	Except 0 or ∞
1 and 3	Except 0
2 and 3	

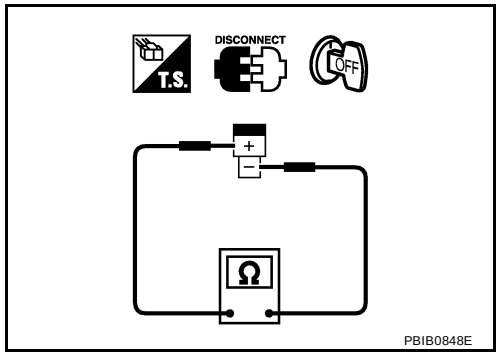


CONDENSER

1. Turn ignition switch “OFF”.
2. Disconnect condenser harness connector.

3. Check resistance between condenser terminals as **+** and **–** .

Resistance: Above 1 MΩ at 25°C (77°F)



Removal and Installation

UBS002LW

IGNITION COIL WITH POWER TRANSISTOR

Refer to EM-103, "IGNITION COIL" .

VIAS

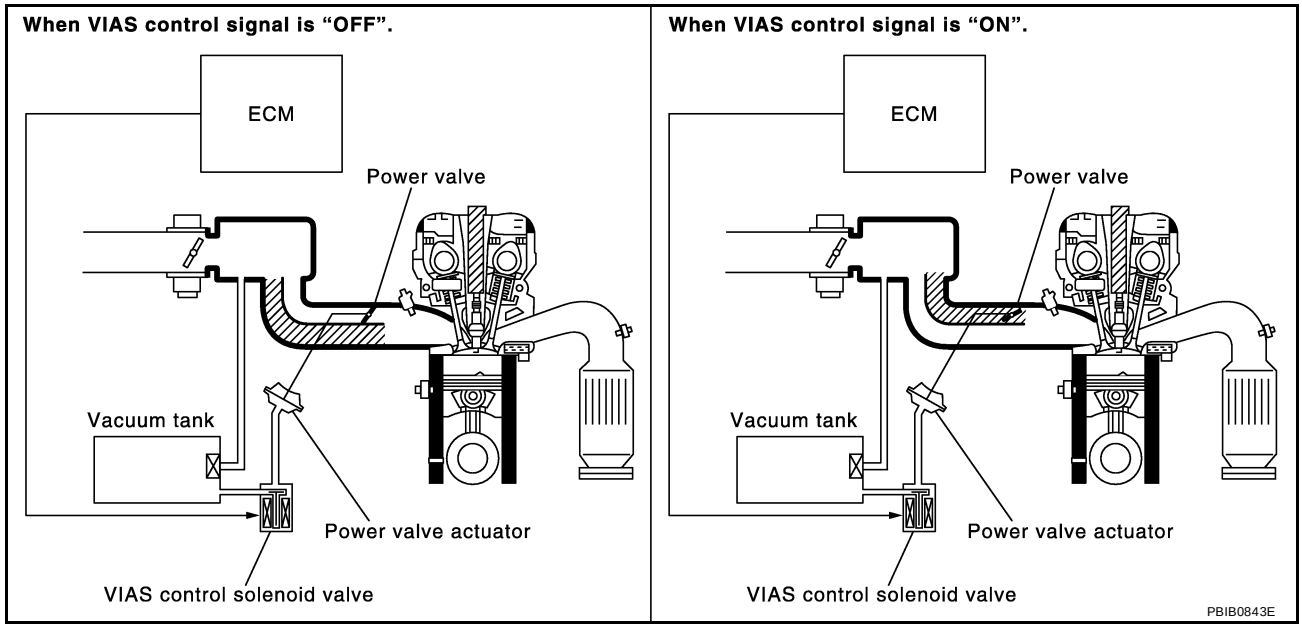
PFP:14956

Description

UBS002LX

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Mass air flow sensor	Amount of intake air	VIAS control	VIAS control solenoid valve
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Closed throttle position		
Ignition switch	Start signal		
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed		
Engine coolant temperature sensor	Engine coolant temperature		



When the engine is running at low or medium speed, the power valve is fully closed. Under this condition, the effective suction port length is equivalent to the total length of the intake manifold collector's suction port including the intake valve. This long suction port provides increased air intake which results in improved suction efficiency and higher torque generation.

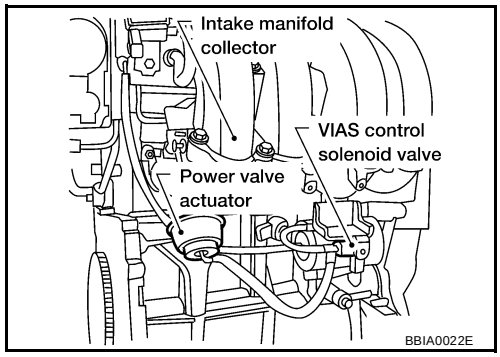
The surge tank and one-way valve are provided. When engine is running at high speed, the ECM sends the signal to the VIAS control solenoid valve. This signal introduces the intake manifold vacuum into the power valve actuator and therefore opens the power valve to two suction passages together in the collector.

Under this condition, the effective port length is equivalent to the length of the suction port provided independently for each cylinder. This shortened port length results in enhanced engine output with reduced suction resistance under high speeds.

COMPONENT DESCRIPTION

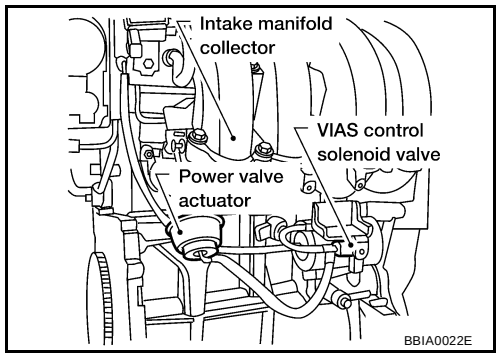
Power Valve

The power valve is installed in intake manifold collector and used to control the suction passage of the variable induction air control system. It is set in the fully closed or fully opened position by the power valve actuator operated by the vacuum stored in the surge tank. The vacuum in the surge tank is controlled by the VIAS control solenoid valve.



VIAS Control Solenoid Valve

The VIAS control solenoid valve cuts the intake manifold vacuum signal for power valve control. It responds to ON/OFF signals from the ECM. When the solenoid is off, the vacuum signal from the intake manifold is cut. When the ECM sends an ON signal the coil pulls the plunger downward and feeds the vacuum signal to the power valve actuator.



CONSULT-II Reference Value in Data Monitor Mode

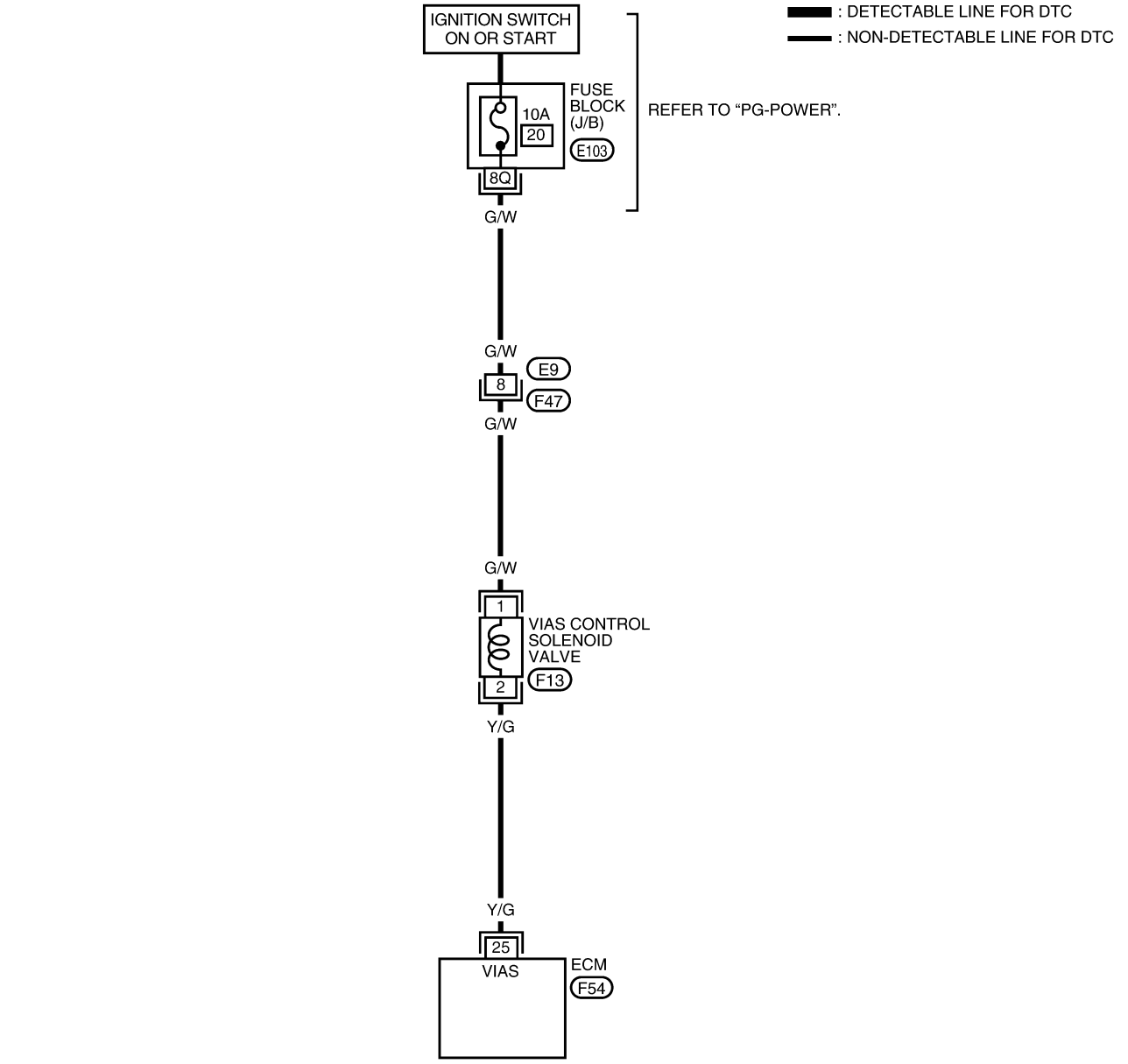
UBS002LY

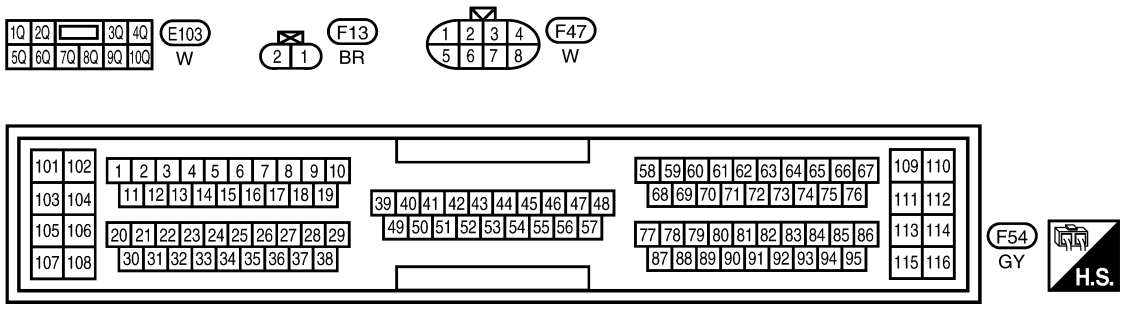
MONITOR ITEM	CONDITION		SPECIFICATION
VIAS S/V	● Engine: After warming up	Idle	OFF
		More than 5,000 rpm	ON

Wiring Diagram

UBS002LZ

EC-VIAS-01





BBWA0243E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/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	Y/G	VIAS control solenoid valve	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Engine speed is above 5,000 rpm	0 - 1.0V

Diagnostic Procedure

UBS002M0

1. CHECK OVERALL FUNCTION

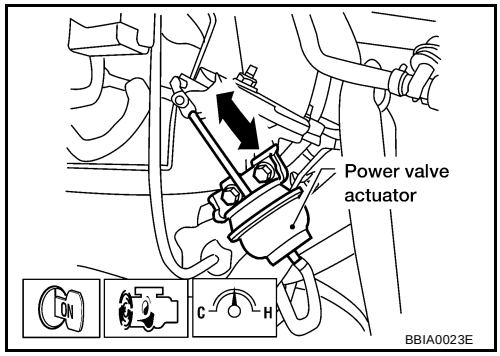
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Perform “VIAS SOL VALVE” in “ACTIVE TEST” mode with CONSULT-II.

ACTIVE TEST	
VIAS SOL VALVE	OFF
MONITOR	
ENG SPEED	XXX rpm

PBIB0844E

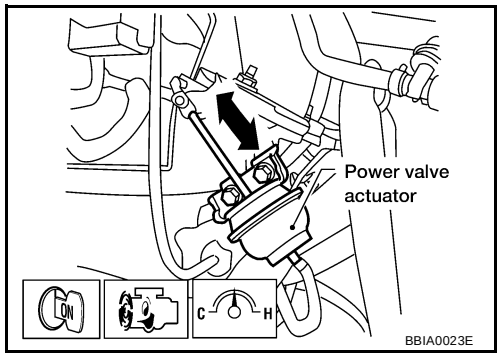
3. Turn VIAS control solenoid valve “ON” and “OFF”, and make sure that power valve actuator rod moves.



BBIA0023E

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Rev engine quickly up to above 5,000 rpm and make sure that power valve actuator rod moves.



BBIA0023E

OK or NG

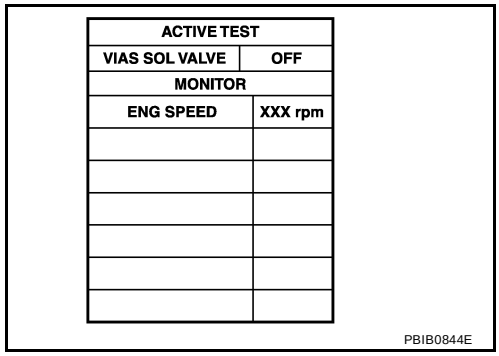
OK >> **INSPECTION END**
NG (With CONSULT-II)>>GO TO 2.
NG (Without CONSULT-II)>>GO TO 3.

2. CHECK VACUUM EXISTENCE

With CONSULT-II

1. Stop engine and disconnect vacuum hose connected to power valve actuator.
2. Start engine and let it idle.
3. Perform “VIAS SOL VALVE” in “ACTIVE TEST” mode with CONSULT-II.
4. Turn VIAS control solenoid valve “ON” and “OFF”, and check vacuum existence under the following conditions.

VIAS SOL VALVE	Vacuum
ON	Should exist.
OFF	Should not exist.



OK or NG

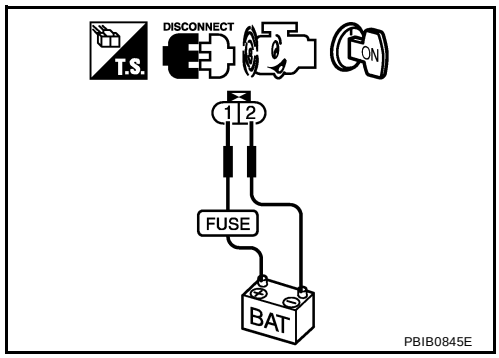
OK >> Repair or replace power valve actuator.
NG >> GO TO 4.

3. CHECK VACUUM EXISTENCE

Without CONSULT-II

1. Stop engine and disconnect vacuum hose connected to power valve actuator.
2. Disconnect VIAS control solenoid valve harness connector.
3. Start engine and let it idle.
4. Apply 12V of direct current between VIAS control solenoid valve terminals 1 and 2.
5. Check vacuum existence under the following conditions.

Condition	Vacuum
12V direct current supply	Should exist.
No supply	Should not exist.



OK or NG

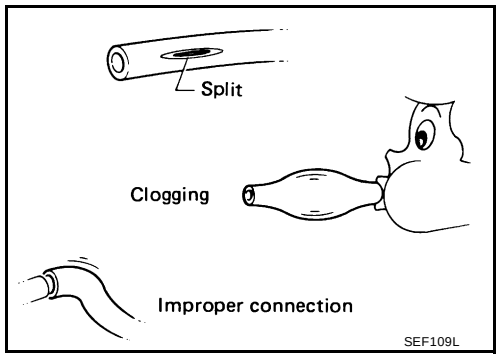
OK >> Repair or replace power valve actuator.
NG >> GO TO 4.

4. CHECK VACUUM HOSE

1. Stop engine.
2. Check hoses and tubes between intake manifold and power valve actuator for crack, clogging, improper connection or disconnection. Refer to EC-1235, "Vacuum Hose Drawing" .

OK or NG

OK >> GO TO 5.
NG >> Repair hoses or tubes.



5. CHECK VACUUM TANK

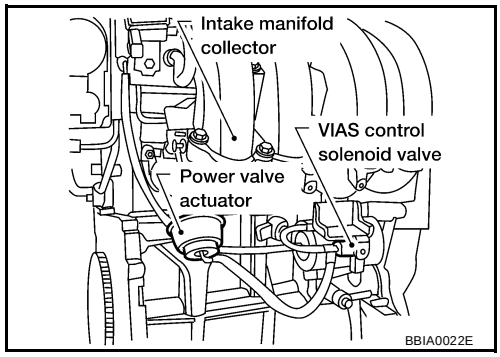
Refer to EC-1790, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace vacuum tank.

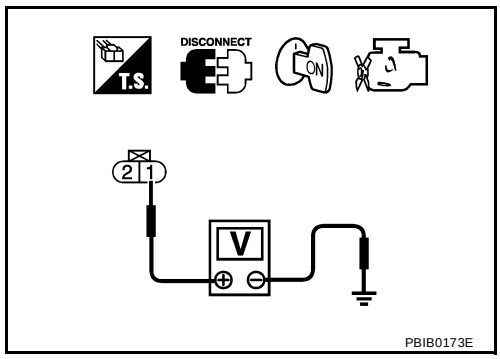
6. CHECK VIAS CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch “ON”.
2. Disconnect VIAS control solenoid valve harness connector.
3. Turn ignition switch “ON”.



4. Check voltage between VIAS control solenoid valve 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 E9, F47
- Fuse block (J/B) connector E103
- 10A fuse
- Harness continuity between fuse and VIAS control solenoid valve

>> Repair harness or connectors.

8. CHECK VIAS CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 25 and VIAS 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 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK VIAS CONTROL SOLENOID VALVE

Refer to EC-1790, "Component Inspection" .

OK or NG

OK >> GO TO 10.
NG >> Replace VIAS control solenoid valve.

10. CHECK INTERMITTENT INCIDENT

Refer to EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

UBS002M1

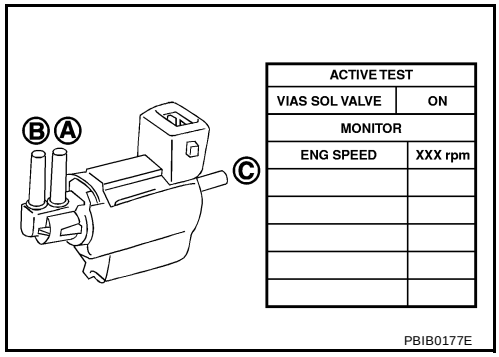
VIAS CONTROL SOLENOID VALVE

With CONSULT-II

1. Reconnect harness connectors disconnected.
2. Turn ignition switch ON.
3. Perform “VIAS SOL VALVE” in “ACTIVE TEST” mode.
4. Check air passage continuity and operation delay time under the following conditions.

Condition VIAS SOL VALVE	Air passage continuity between **A** and **B**	Air passage continuity between **A** and **C**
ON	Yes	No
OFF	No	Yes

Operation takes less than 1 second.

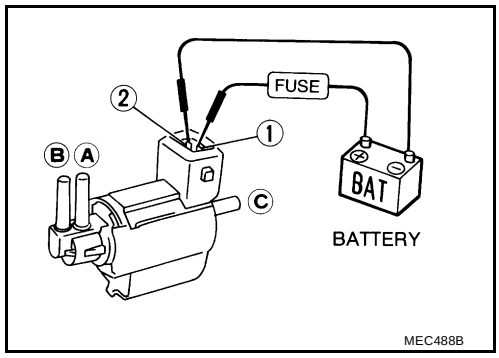


With GST

Check air passage continuity and operation delay time under the following conditions.

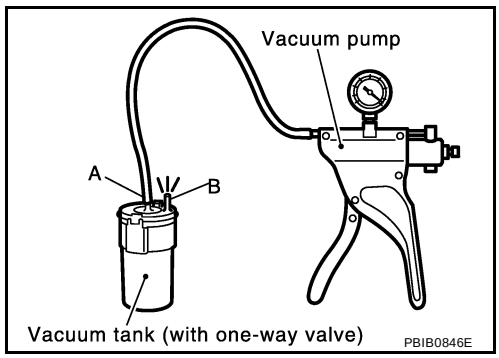
Condition	Air passage continuity between **A** and **B**	Air passage continuity between **A** and **C**
12V direct current supply between terminals 1 and 2	Yes	No
No supply	No	Yes

Operation takes less than 1 second.



VACUUM TANK

1. Disconnect vacuum hose connected to vacuum tank.
2. Connect a vacuum pump to the port **A** of vacuum pump.
3. Apply vacuum and make sure that vacuum exists at the port **B** .



Removal and Installation

UBS002M2

VIAS CONTROL SOLENOID VALVE

Refer to EM-93, "INTAKE MANIFOLD" .

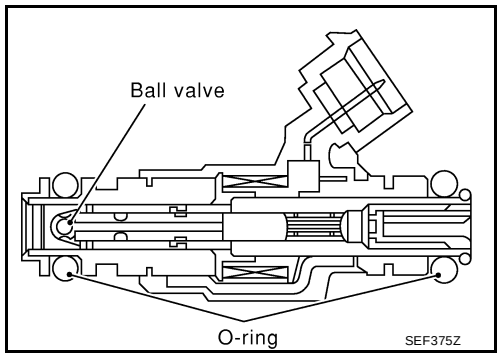
INJECTOR CIRCUIT

PFP:16600

Component Description

UBS002M3

The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the injector circuit, the coil in the injector is energized. The energized coil pulls the needle valve back and allows fuel to flow through the injector into the intake manifold. The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the injector remains open. The ECM controls the injection pulse duration based on engine fuel needs.



CONSULT-II Reference Value in Data Monitor Mode

UBS002M4

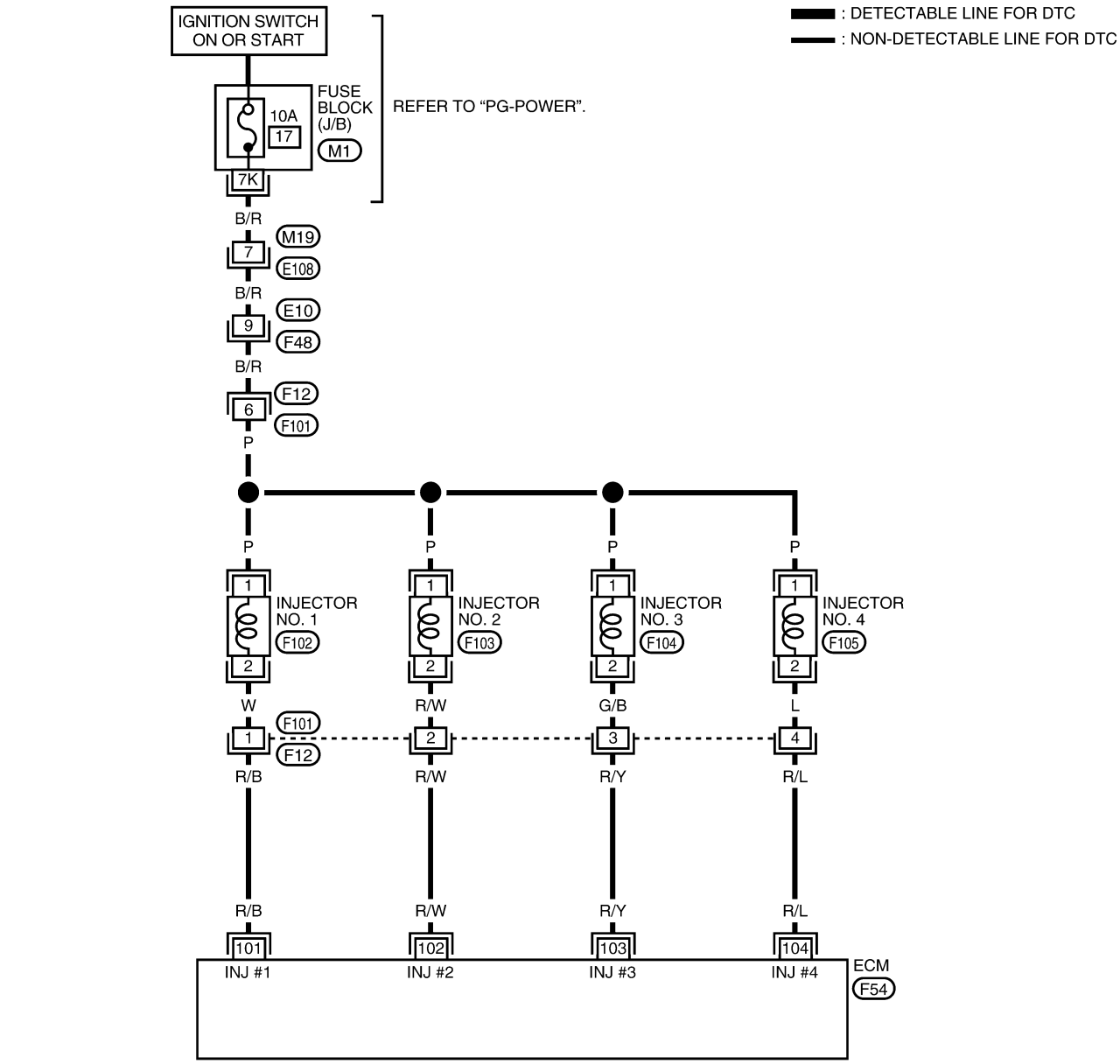
Specification data are reference values.

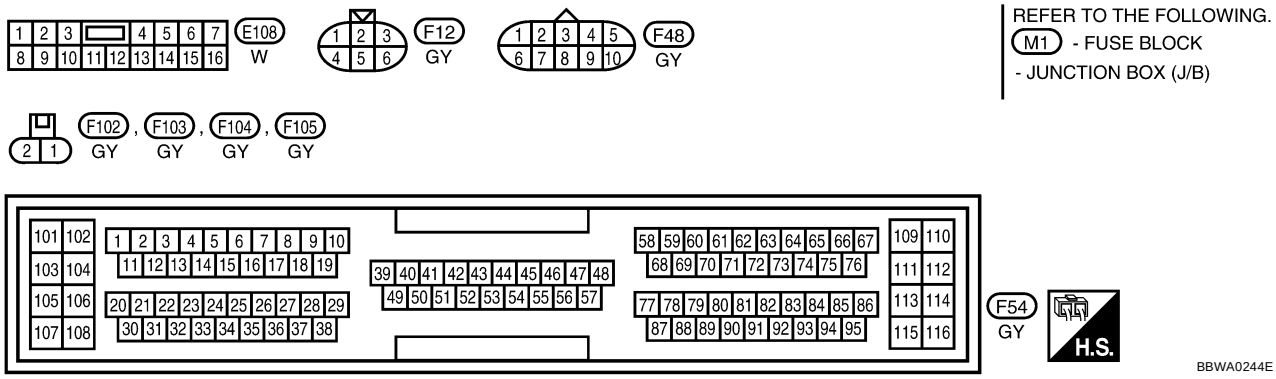
MONITOR ITEM	CONDITION		SPECIFICATION
B/FUEL SCHDL	● Engine: After warming up ● Shift lever: N ● Air conditioner switch: OFF ● No-load	Idle	2.5 - 3.5 msec
		2,000 rpm	2.5 - 3.5 msec
INJ PULSE-B1	● Engine: After warming up ● Shift lever: N ● Air conditioner switch: OFF ● No-load	Idle	2.0 - 3.0 msec
		2,000 rpm	1.9 - 2.9 msec

Wiring Diagram

UBS002M5

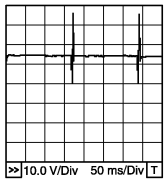
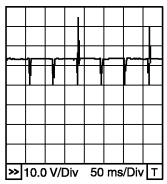
EC-INJECT-01





Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101 102 103 104	R/B R/W R/Y R/L	Injector No. 1 Injector No. 2 Injector No. 3 Injector No. 4	**[Engine is running]** ● **Warm-up condition** ● Idle speed	BATTERY VOLTAGE (11 - 14V)★  PBIB0529E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14V)★  PBIB0530E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

UBS002M6

1. INSPECTION START

Turn ignition switch to “START”.
Is any cylinder ignited?

Yes or No

Yes >> GO TO 2.
No >> GO TO 3.

2. CHECK OVERALL FUNCTION

With CONSULT-II

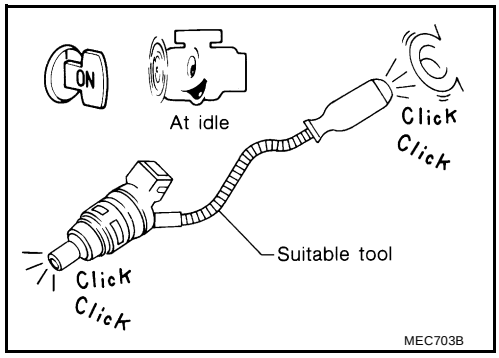
1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-II.
3. Make sure that each circuit produces a momentary engine speed drop.

ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V

PBIB0133E

Without CONSULT-II

1. Start engine.
2. Listen to each injector operating sound.
   Clicking noise should be heard.

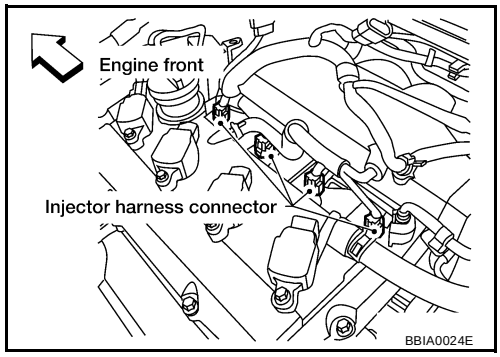


OK or NG

OK >> **INSPECTION END**
NG >> GO TO 3.

3. CHECK INJECTOR POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect injector harness connector.
3. Turn ignition switch “ON”.

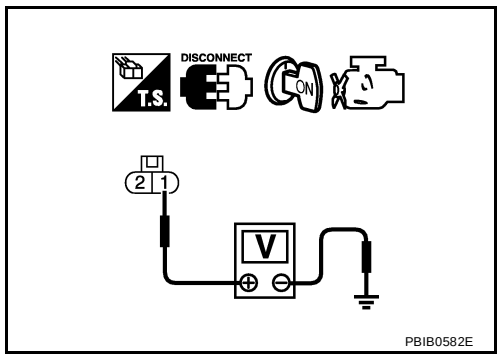


4. Check voltage between injector terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.



4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M19, E108
- Harness connectors E10, F48
- Harness connectors F12, F101
- Fuse block (J/B) connector M1
- 10A fuse
- Harness for open or short between injector and fuse

>> Repair harness or connectors.

5. CHECK INJECTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between injector terminal 2 and ECM terminals 101, 102, 103, 104. 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 F12, F101
- Harness for open or short between injector and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK INJECTOR

Refer to EC-1796, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace injector.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

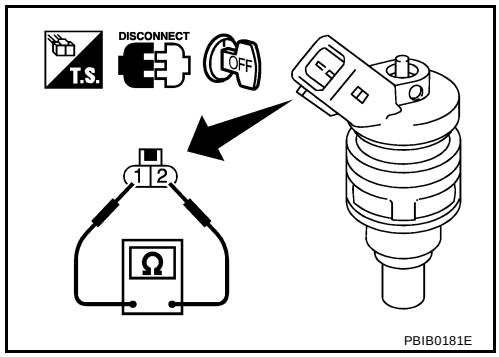
Component Inspection

UBS002M7

INJECTOR

1. Disconnect injector harness connector.
2. Check resistance between terminals as shown in the figure.

Resistance: 12.1 - 12.9Ω [at 20°C (68°F)]



Removal and Installation

UBS002M8

INJECTOR

Refer to EM-106, "FUEL INJECTOR AND FUEL TUBE" .

START SIGNAL

PFP:48750

CONSULT-II Reference Value in Data Monitor Mode

UBS002M9

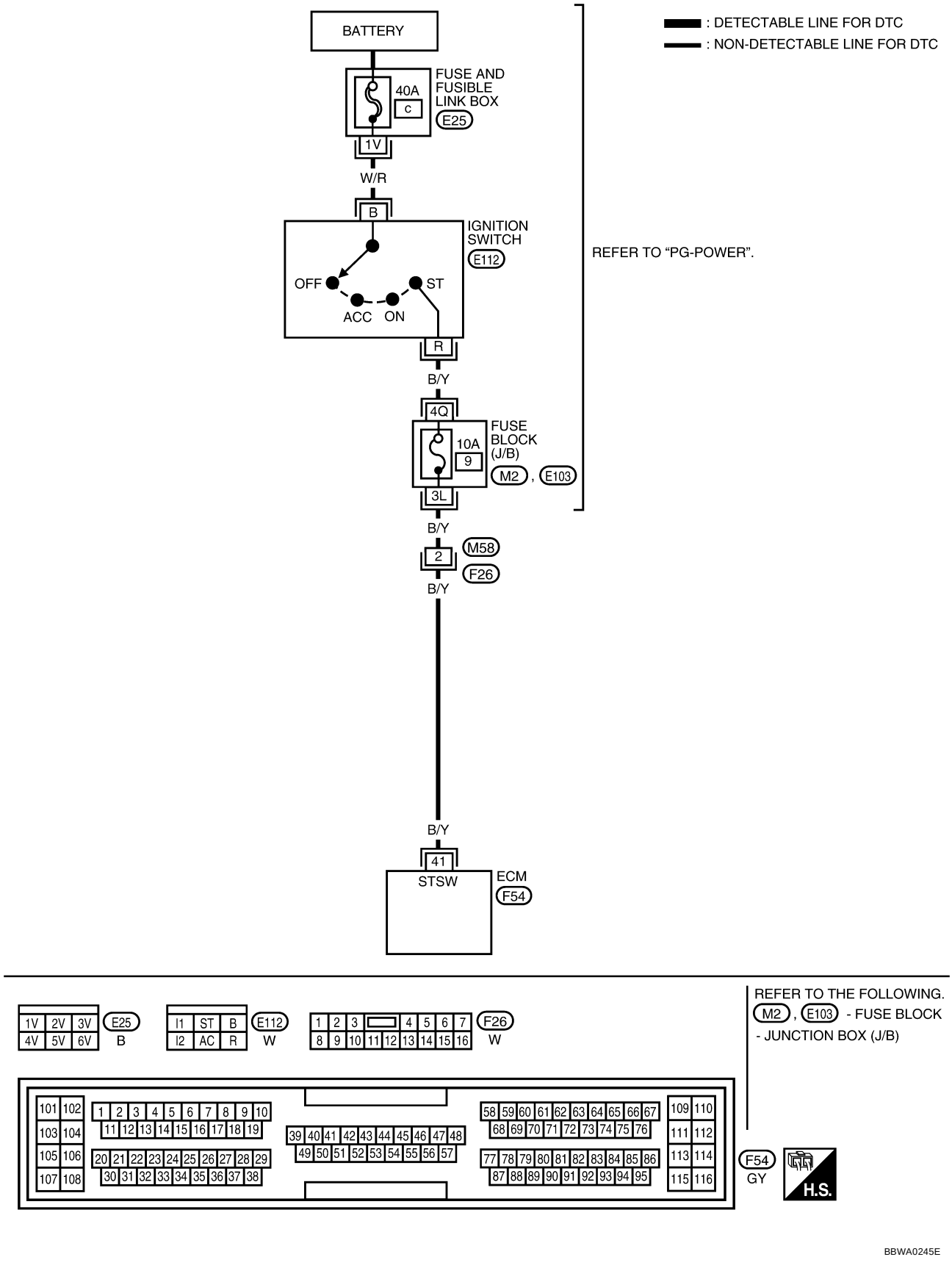
Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
START SIGNAL	● Ignition switch: ON → START → ON	OFF → ON → OFF

Wiring Diagram

UBS002MA

EC-S/SIG-01



BBWA0245E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
41	B/Y	Start signal	**[Ignition switch “ON”]**	Approximately 0V
			[Ignition switch “START”]	9 - 14V

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

UBS002MB

1. INSPECTION START

Do you have CONSULT-II?

Yes or No

Yes >> GO TO 2.
No >> GO TO 3.

2. CHECK OVERALL FUNCTION

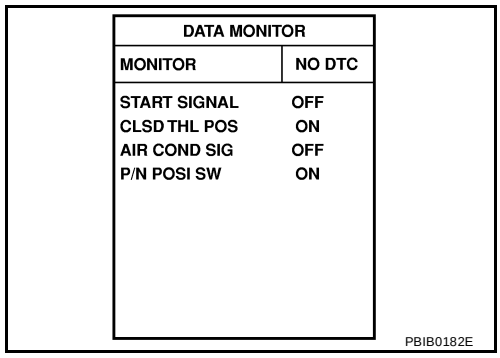
With CONSULT-II

1. Turn ignition switch “ON”.
2. Check “START SIGNAL” in “DATA MONITOR” mode with CONSULT-II under the following conditions.

Condition	START SIGNAL
Ignition switch “ON”	OFF
Ignition switch “START”	ON

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 4.



3. CHECK OVERALL FUNCTION

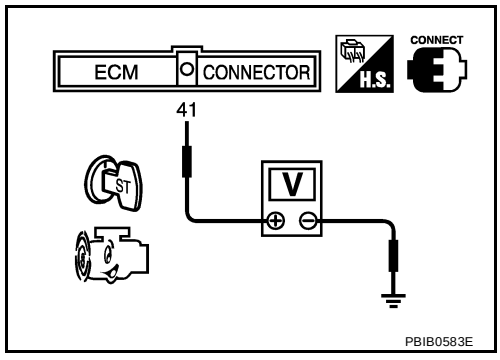
Without CONSULT-II

Check voltage between ECM terminal 41 and ground under the following conditions.

Condition	Voltage
Ignition switch “START”	Battery voltage
Other positions	Approximately 0V

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 4.



4. CHECK STARTING SYSTEM

Turn ignition switch “OFF”, then turn it to “START”.
Does starter motor operate?

Yes or No

Yes >> GO TO 5.
No >> Refer to SC-9, "STARTING SYSTEM" .

5. CHECK FUSE

1. Turn ignition switch “OFF”.
2. Disconnect 10A fuse.
3. Check if 10A fuse is OK.

OK or NG

OK >> GO TO 6.
NG >> Replace 10A fuse.

6. CHECK START SIGNAL INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Disconnect ignition switch harness connector.
3. Check harness continuity between ECM terminal 41 and fuse block (J/B), ignition switch and fuse block (J/B). 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 M58, F26
- Fuse block (J/B) connectors M2, E103
- Harness for open or short between ignition switch and fuse block (J/B)
- Harness for open or short between ECM and fuse block (J/B)

>> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

FUEL PUMP CIRCUIT

PFP:17042

Description

UBS002MC

SYSTEM DESCRIPTION

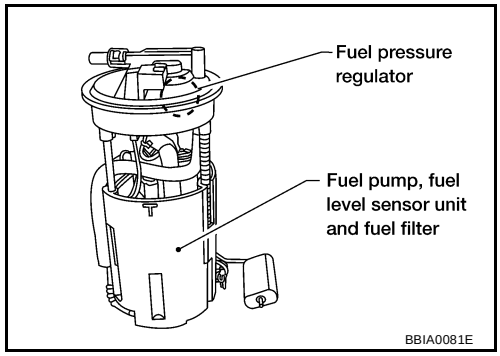
Sensor	Input Signal to ECM	ECM Function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed	Fuel pump control	Fuel pump relay
Ignition switch	Start signal		

The ECM activates the fuel pump for several seconds after the ignition switch is turned on to improve engine startability. If the ECM receives a engine speed signal from the crankshaft position sensor (POS) and camshaft position sensor (PHASE), it knows that the engine is rotating, and causes the pump to operate. If the engine speed signal is not received when the ignition switch is ON, the engine stalls. The ECM stops pump operation and prevents battery discharging, thereby improving safety. The ECM does not directly drive the fuel pump. It controls the ON/OFF fuel pump relay, which in turn controls the fuel pump.

Condition	Fuel pump operation
Ignition switch is turned to ON.	Operates for 1 second.
Engine running and cranking	Operates.
When engine is stopped	Stops in 1.5 seconds.
Except as shown above	Stops.

COMPONENT DESCRIPTION

A turbine type design fuel pump is used in the fuel tank.



CONSULT-II Reference Value in Data Monitor Mode

UBS002MD

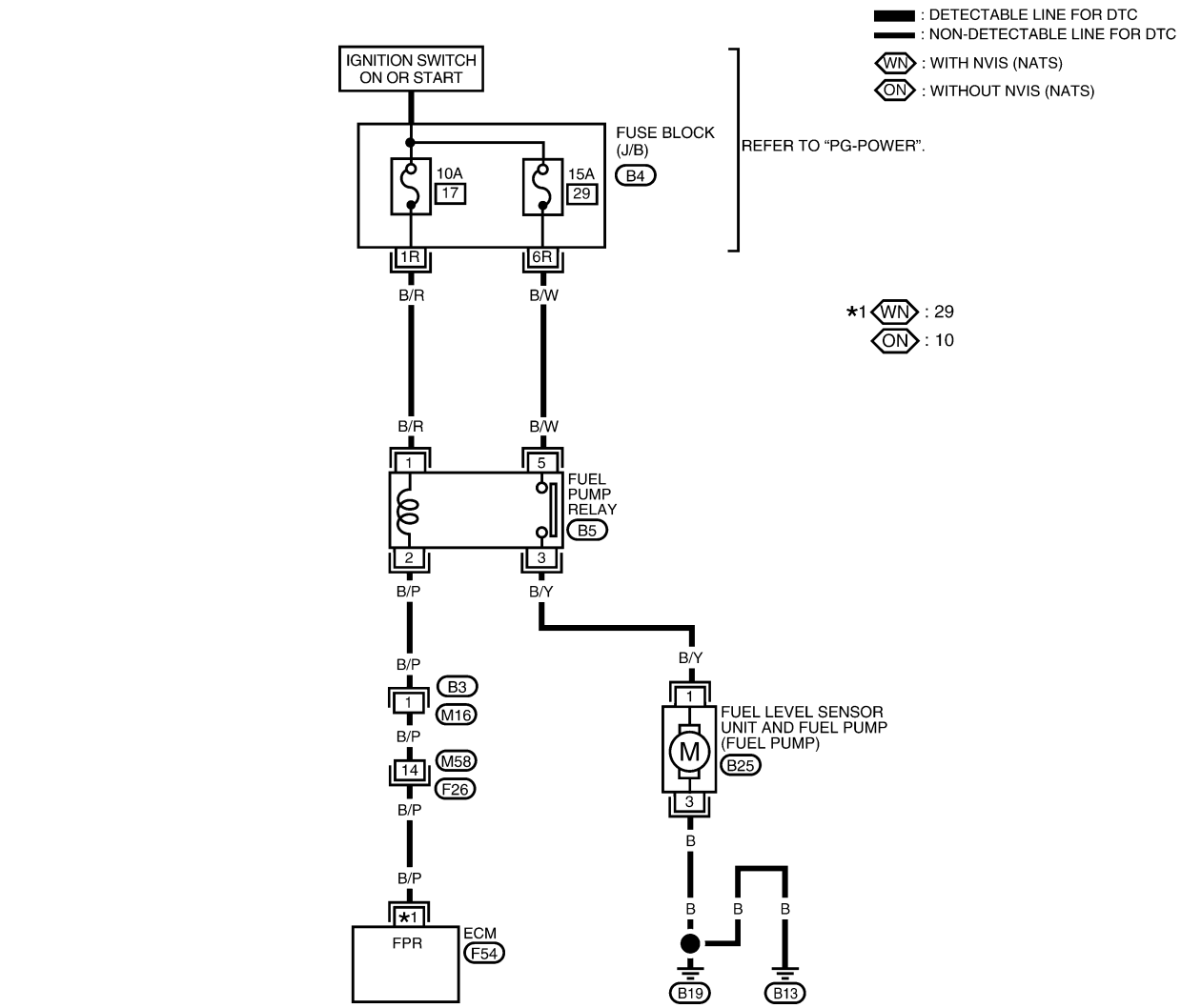
Specification data are reference values.

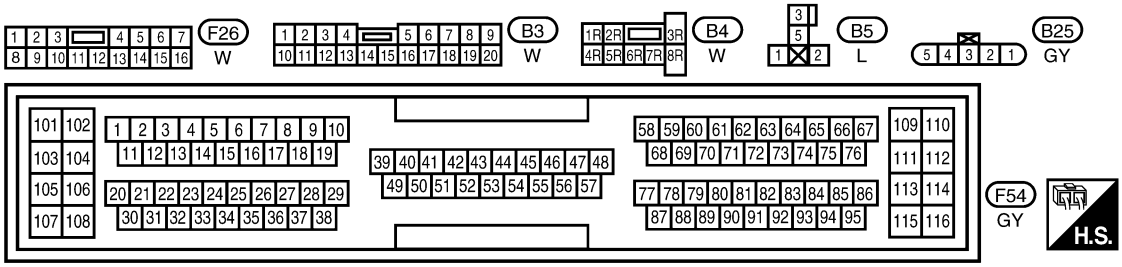
MONITOR ITEM	CONDITION	SPECIFICATION
FUEL PUMP RLY	● For 1 seconds after turning ignition switch ON ● Engine running or cranking	ON
	● Except above conditions	OFF

Wiring Diagram

UBS002ME

EC-F/PUMP-01





BBWA0246E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/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 Without NVIS (NATS)	B/P	Fuel pump relay	**[Ignition switch "ON"]** ● For 1 seconds after turning ignition switch "ON" **[Engine is running]**	0 - 1.0V
29 With NVIS (NATS)			**[Ignition switch "ON"]** ● More than 1 seconds after turning ignition switch "ON".	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

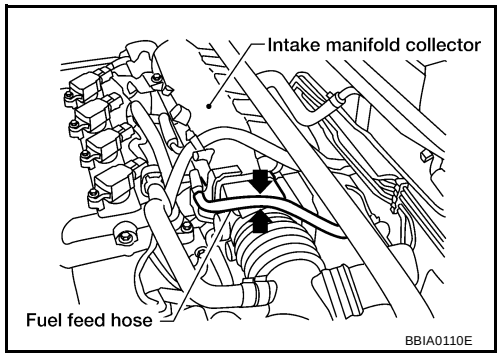
UBS002MF

1. CHECK OVERALL FUNCTION

1. Turn ignition switch "ON".
2. Pinch fuel feed hose with two fingers.
   Fuel pressure pulsation should be felt on the fuel hose for 1 second after ignition switch is turned "ON".

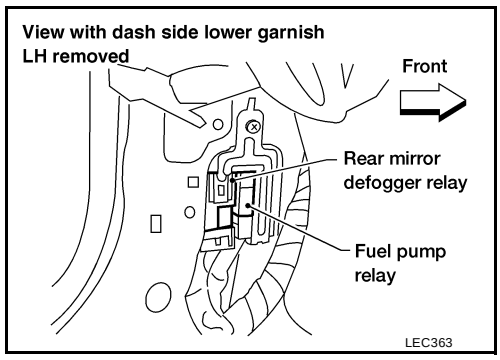
OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.



2. CHECK FUEL PUMP RELAY POWER SUPPLY CIRCUIT

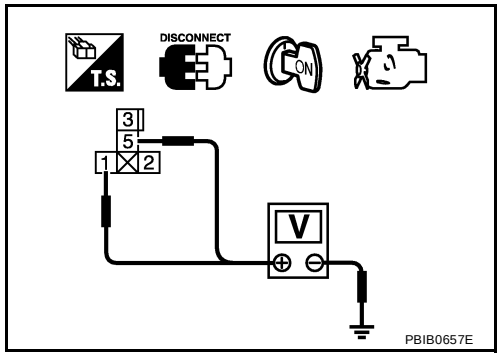
1. Turn ignition switch "OFF".
2. Disconnect fuel pump relay.
3. Turn ignition switch "ON".



4. Check voltage between fuel pump relay terminals 1, 5 and ground with CONSULT-II or tester.

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.



3. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector B4
- 10A fuse
- 15A fuse
- Harness for open or short between fuse and fuel pump relay

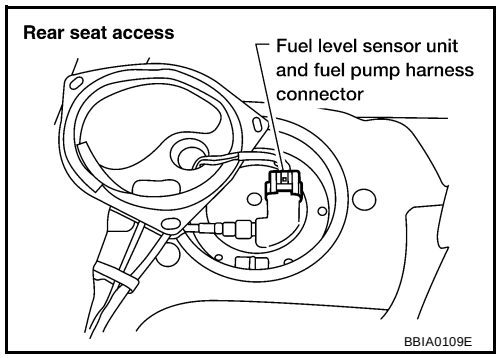
>> Repair harness or connectors.

4. CHECK FUEL PUMP POWER SUPPLY AND GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect fuel level sensor unit and fuel pump harness connector.
3. Check harness continuity between fuel pump relay terminal 3 and fuel pump terminal 1, fuel pump terminal 3 and body ground.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for short to ground and short to power.



OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK FUEL PUMP RELAY OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 10 or 29 and fuel pump relay 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 >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B3, M16
- Harness connectors M58, F26
- Harness for open or short between ECM and fuel pump relay

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK FUEL PUMP RELAY

Refer to EC-1805, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace fuel pump relay.

8. CHECK FUEL PUMP

Refer to EC-1805, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace fuel pump.

9. CHECK INTERMITTENT INCIDENT

Refer to EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

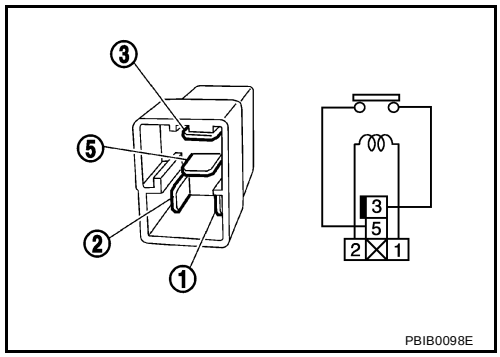
Component Inspection

UBS002MG

FUEL PUMP RELAY

Check continuity between terminals 3 and 5 under the following conditions.

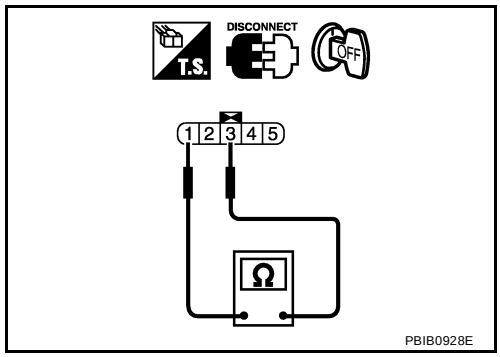
Conditions	Continuity
12V direct current supply between terminals 1 and 2	Yes
No current supply	No



FUEL PUMP

1. Disconnect fuel level sensor unit and fuel pump harness connector.
2. Check resistance between fuel level sensor unit and fuel pump terminals 1 and 3.

Resistance: Approximately 1.0Ω [at 25°C (77°F)]



Removal and Installation

UBS002MH

FUEL PUMP

Refer to FL-3, "FUEL LEVEL SENSOR UNIT, FUEL FILTER AND FUEL PUMP ASSEMBLY" .

POWER STEERING OIL PRESSURE SWITCH

PFP:49761

Component Description

UBS002MI

The power steering oil pressure switch is attached to the power steering high-pressure tube and detects a power steering load. When a power steering load is detected, it signals the ECM. The ECM 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

UBS002MJ

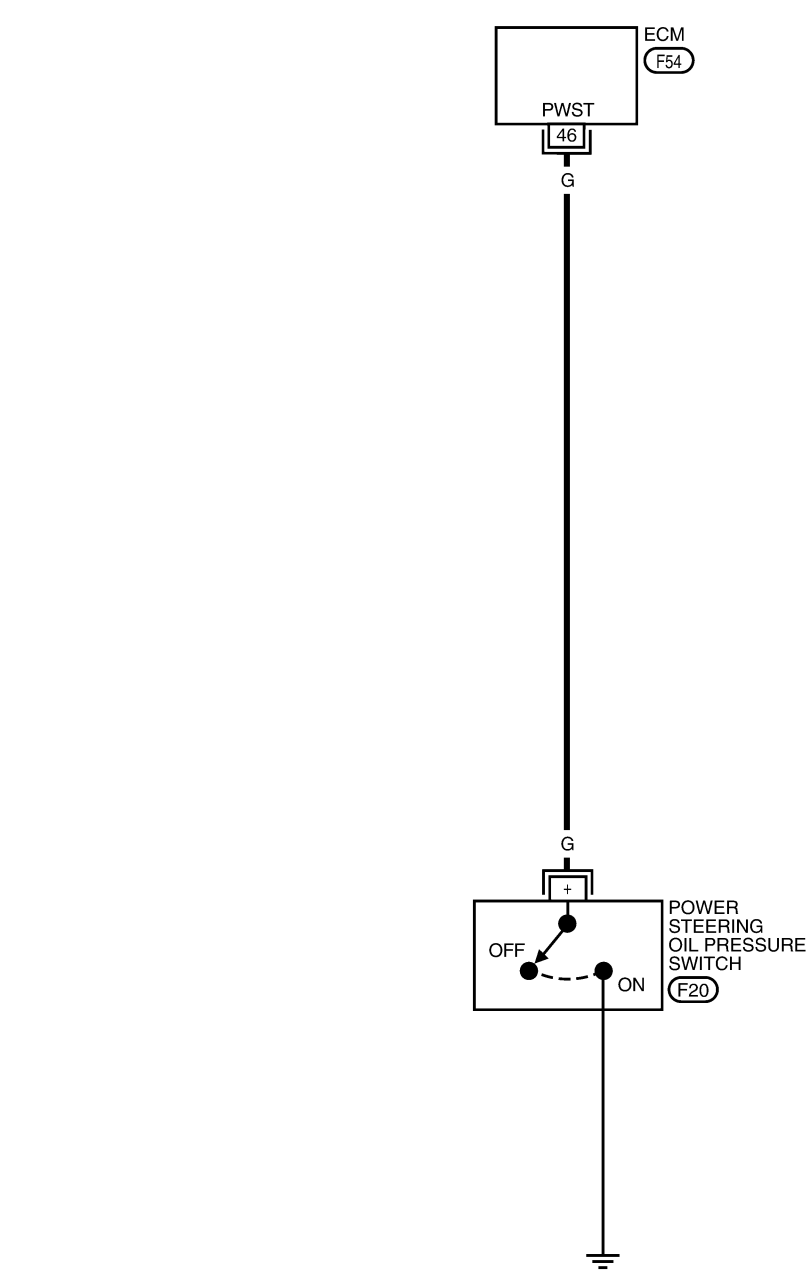
Specification data are reference values.

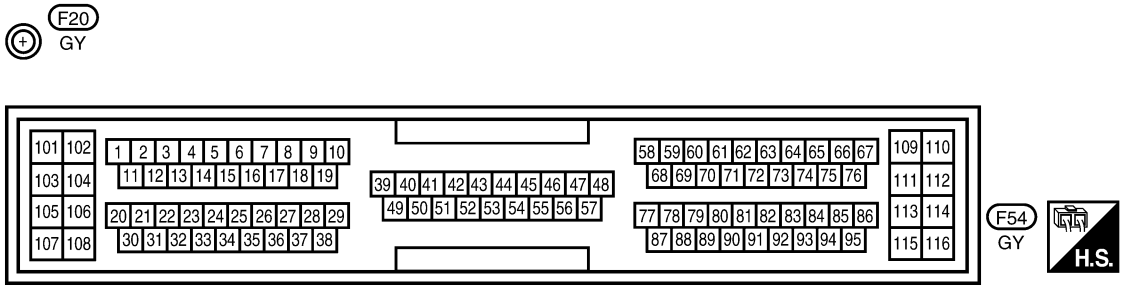
MONITOR ITEM	CONDITION		SPECIFICATION
PW/ST SIGNAL	● Engine: After warming up, idle the engine	Steering wheel in neutral position (forward direction)	OFF
		The steering wheel is fully turned	ON

Wiring Diagram

UBS002MK

EC-PST/SW-01





BBWA0247E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
46	G	Power steering oil pressure switch	**[Engine is running]** ● Steering wheel is being turned	Approximately 0V
			[Engine is running] ● Steering wheel is not being turned	Approximately 5V

Diagnostic Procedure

UBS002ML

1. INSPECTION START

Do you have CONSULT-II?

Yes or No

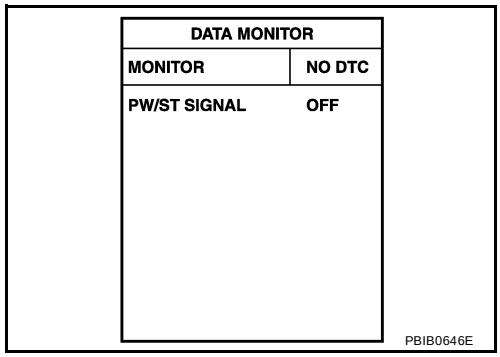
Yes >> GO TO 2.
No >> GO TO 3.

2. CHECK OVERALL FUNCTION

With CONSULT-II

1. Start engine.
2. Check “PW/ST SIGNAL” in “DATA MONITOR” mode with CONSULT-II under the following conditions.

Steering in neutral position	OFF
Steering is turned	ON



OK or NG

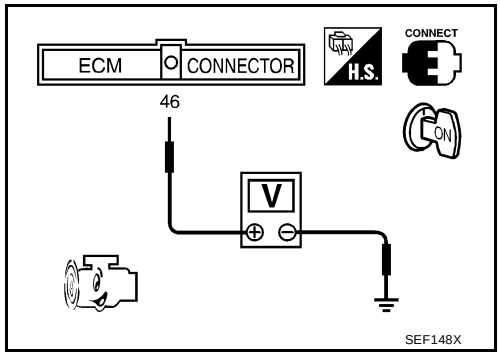
OK >> **INSPECTION END**
NG >> GO TO 4.

3. CHECK OVERALL FUNCTION

Without CONSULT-II

1. Start engine.
2. Check voltage between ECM terminal 46 and ground under the following conditions.

Condition	Voltage
When steering wheel is turned quickly	Approximately 0V
Except above	Approximately 5V



OK or NG

OK >> **INSPECTION END**
NG >> GO TO 4.

4. CHECK INPUT SIGNAL CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Disconnect power steering oil pressure switch harness connector.
4. Check harness continuity between ECM terminal 46 and power steering oil pressure switch terminal **+** . Refer to Wiring Diagram.

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the harness for open or short between ECM and power steering oil pressure switch.

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK POWER STEERING OIL PRESSURE SWITCH

Refer to EC-1810, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace power steering oil pressure switch.

7. CHECK INTERMITTENT INCIDENT

Perform EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

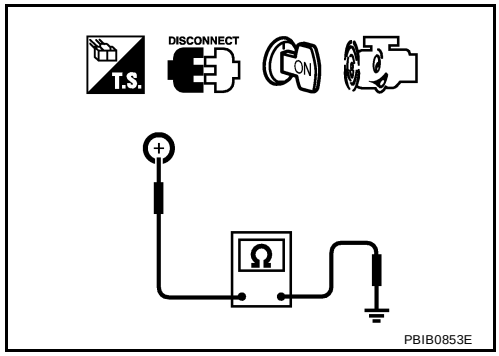
>> **INSPECTION END**

Component Inspection

UBS002MM

POWER STEERING OIL PRESSURE SWITCH

1. Turn ignition switch “OFF”.
2. Disconnect power steering oil pressure switch harness connector.
3. Start engine.
4. Check continuity between power steering oil pressure switch terminal **+** and body ground.



Conditions	Continuity
Steering wheel is being turned	Yes
Steering wheel is not being turned	No

If NG, replace power steering oil pressure switch.

Removal and Installation

UBS002MN

POWER STEERING OIL PRESSURE SWITCH

Refer to PS-21, "POWER STEERING OIL PUMP" .

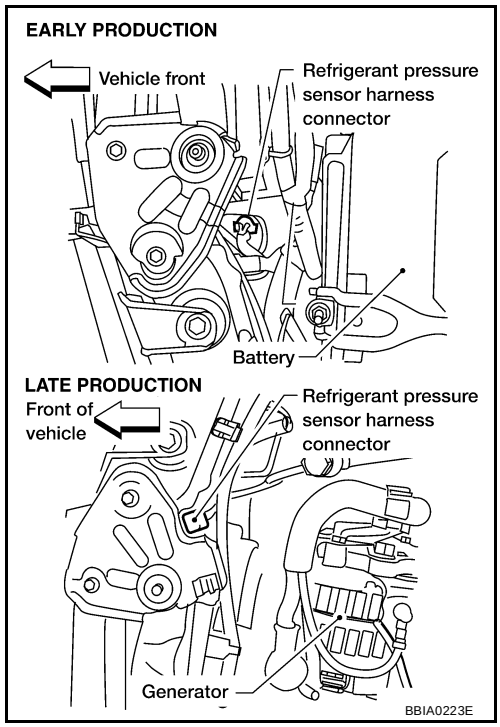
REFRIGERANT PRESSURE SENSOR

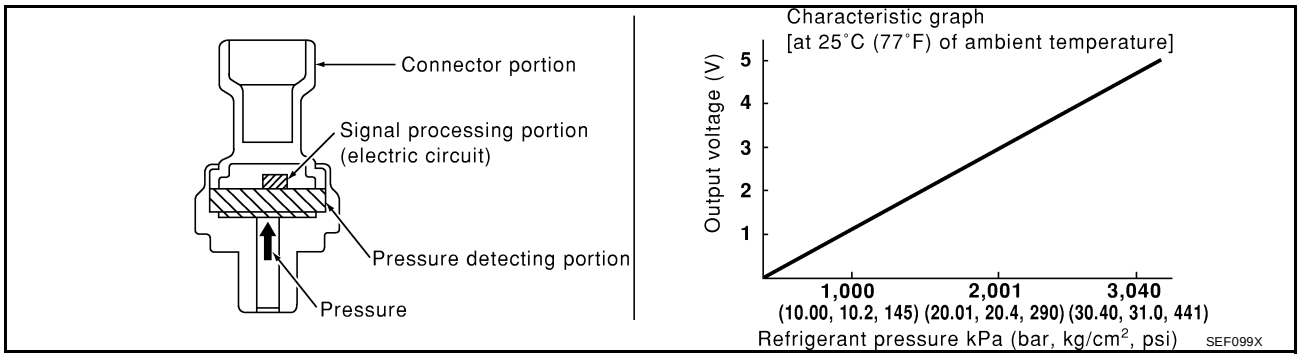
PFP:92136

Component Description

UBS002MO

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.

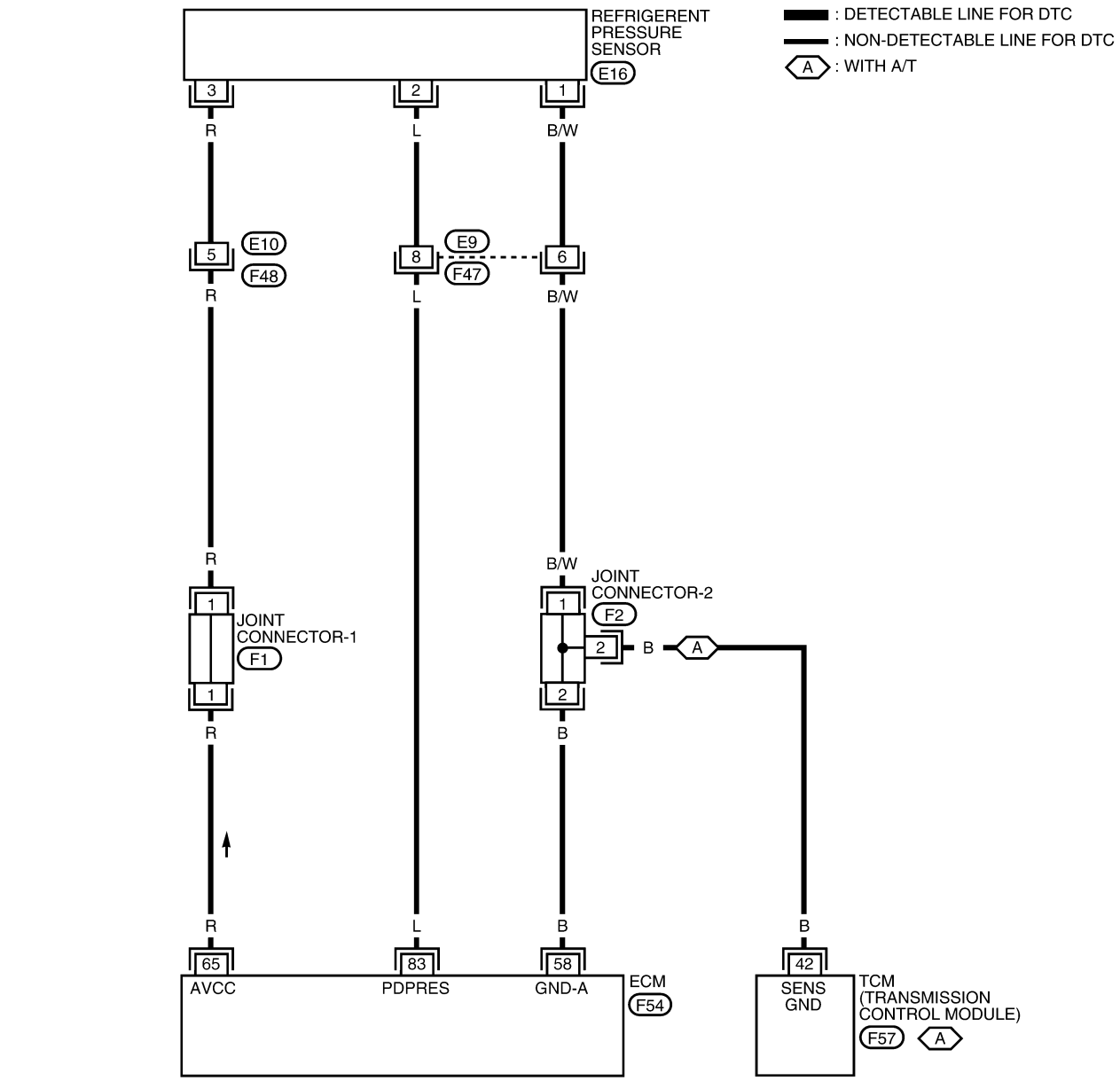


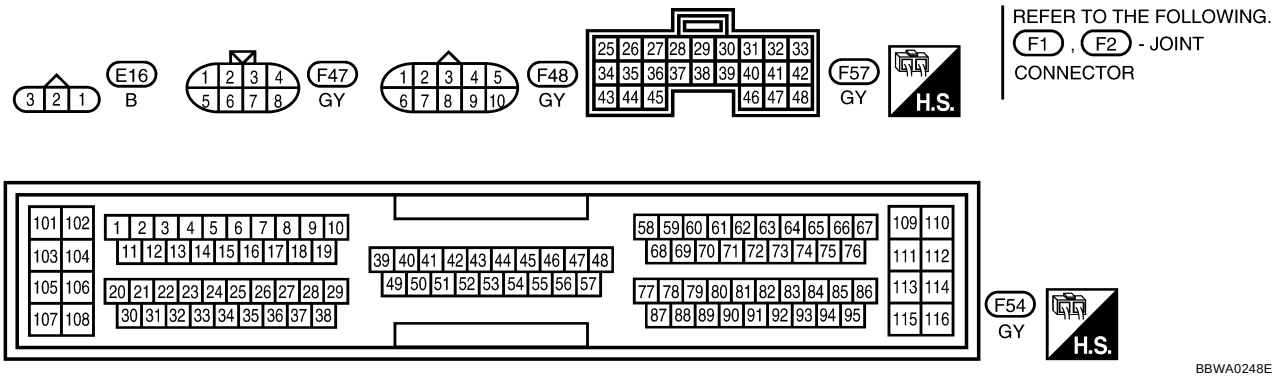


Wiring Diagram

UBS002MP

EC-RP/SEN-01





BBWA0248E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/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)
58	B	Sensors' ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
65	R	Sensor's power supply	**[Ignition switch "ON"]**	Approximately 5V
83	L	Refrigerant pressure sensor	**[Engine is running]** ● **Warm-up condition** ● Both A/C switch and blower switch are "ON". (Compressor operates.)	1.0 - 4.0V

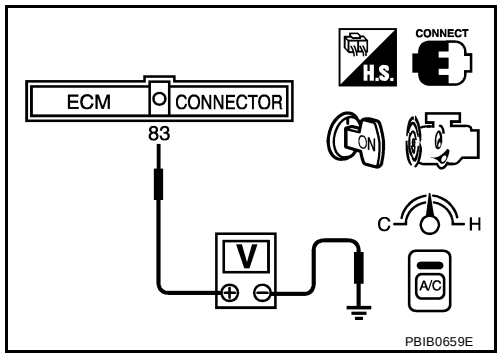
Diagnostic Procedure

UBS002MQ

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 83 and ground with CONSULT-II or tester.

Voltage: 1.0 - 4.0V

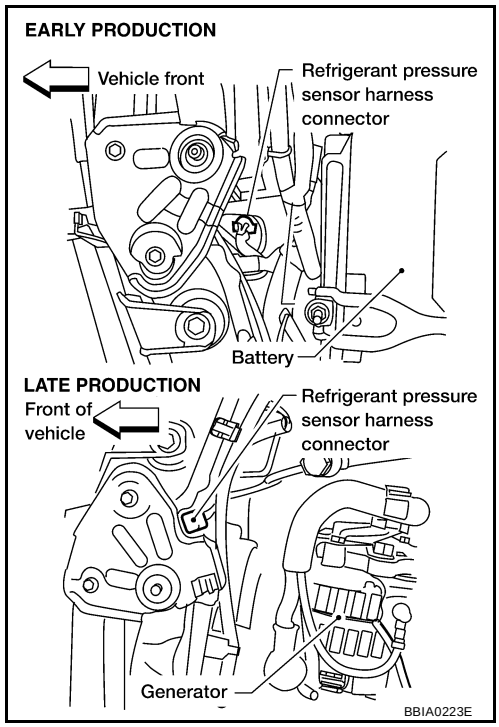


OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

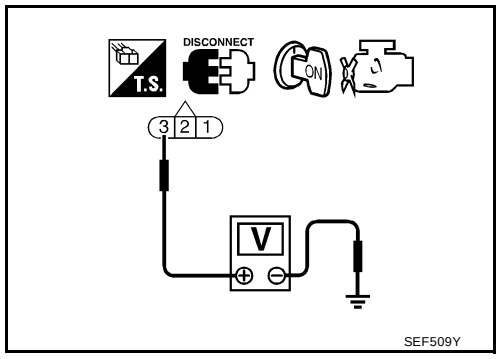
2. CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn A/C switch and blower switch “OFF”.
2. Stop engine.
3. Disconnect refrigerant pressure sensor harness connector.
4. Turn ignition switch “ON”.



5. Check voltage between refrigerant pressure sensor terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E10, F48
- Joint connector-1
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair harness or connectors.

4. CHECK REFRIGERANT PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Check harness continuity between refrigerant pressure sensor terminal 3 and engine ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E9, F47
- Joint connector-2
- Harness for open or short between ECM and refrigerant pressure sensor
- Harness for open or short between TCM and refrigerant pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK REFRIGERANT PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 83 and refrigerant pressure sensor terminal 2. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E9, F47
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> Replace refrigerant pressure sensor.
NG >> Repair or replace.

Removal and Installation

UBS002MR

REFRIGERANT PRESSURE SENSOR

Refer to MTC-85, "REFRIGERANT LINES" .

ELECTRICAL LOAD SIGNAL

PFP:25350

CONSULT-II Reference Value in Data Monitor Mode

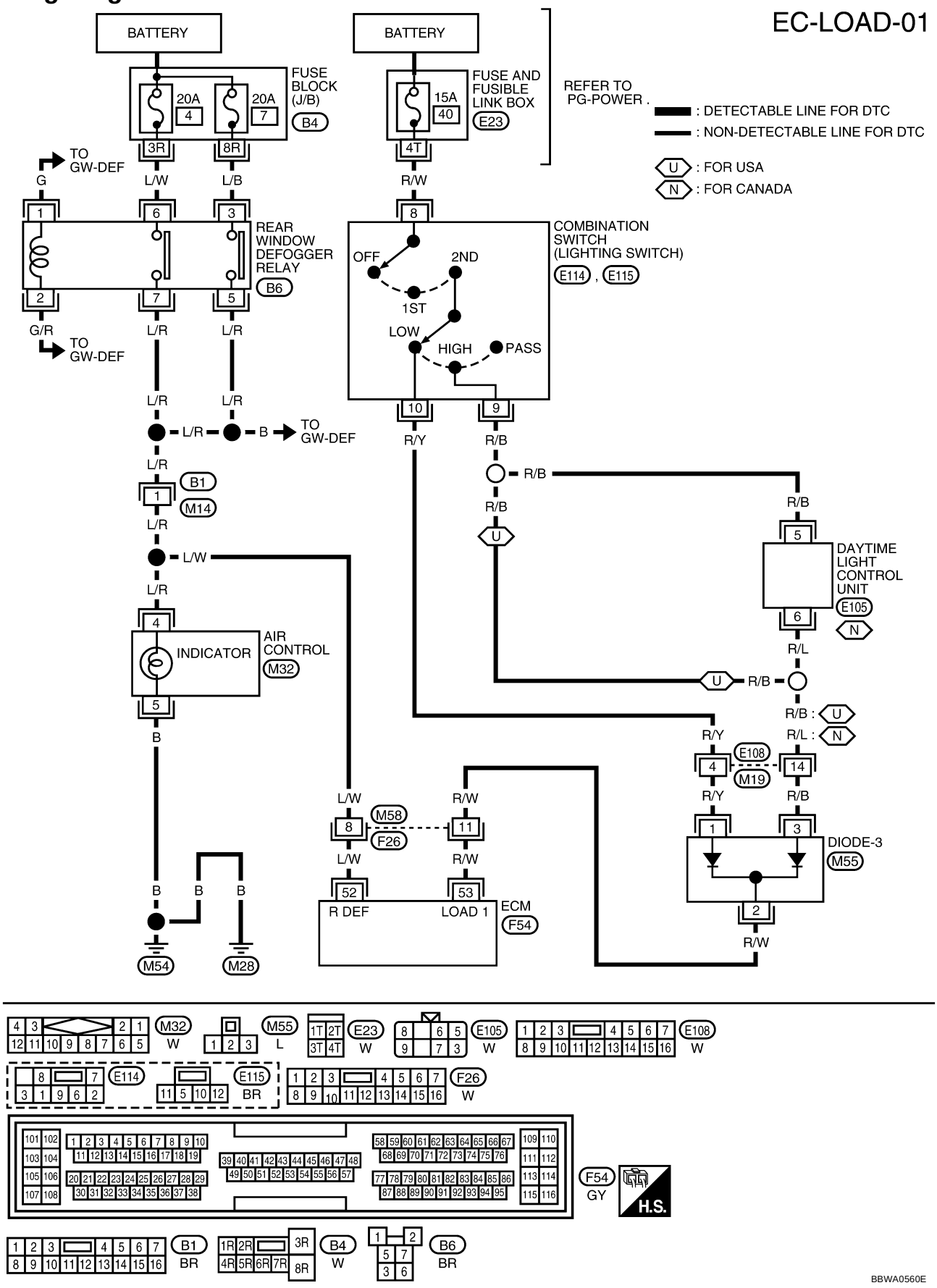
UBS002MS

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

Wiring Diagram

UBS002MT



Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/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)
52	L/W	Electrical load signal (Rear window defogger signal)	**[Ignition switch "ON"]** ● Rear window defogger system activated	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch "ON"] ● Rear window defogger system not activated	Approximately 0V
53	R/W	Electrical load signal (Headlamp signal)	**[Ignition switch "ON"]** ● Lighting switch is "2ND" position	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch "ON"] ● Lighting switch is "OFF"	Approximately 0V

Diagnostic Procedure for Lighting Switch

UBS002MU

1. INSPECTION START

Do you have CONSULT-II?

Yes or No

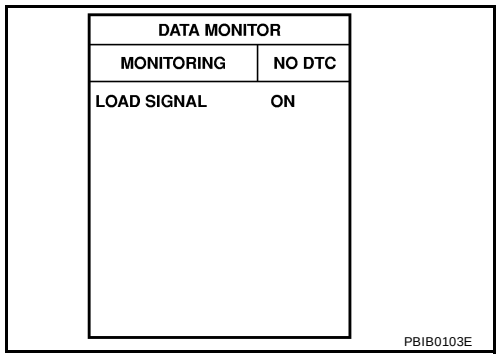
Yes >> GO TO 2.
No >> GO TO 3.

2. CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION

With CONSULT-II

1. Turn ignition switch "ON".
2. Check "LOAD SIGNAL" in "DATA MONITOR" mode with CONSULT-II under the following conditions.

Condition	LOAD SIGNAL
Lighting switch "ON" at 2nd position	ON
Lighting switch "OFF"	OFF



OK or NG

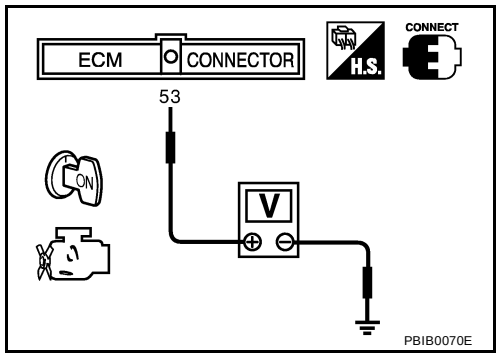
OK >> **INSPECTION END**
NG >> GO TO 4.

3. CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION

Without CONSULT-II

1. Turn ignition switch "ON".
2. Check voltage between ECM terminal 53 and ground under the following conditions.

Condition	Voltage
Lighting switch "ON" at 2nd position	BATTERY VOLTAGE
Lighting switch "OFF"	0V



OK or NG

OK >> **INSPECTION END**
NG >> GO TO 4.

4. CHECK HEADLAMP FUNCTION

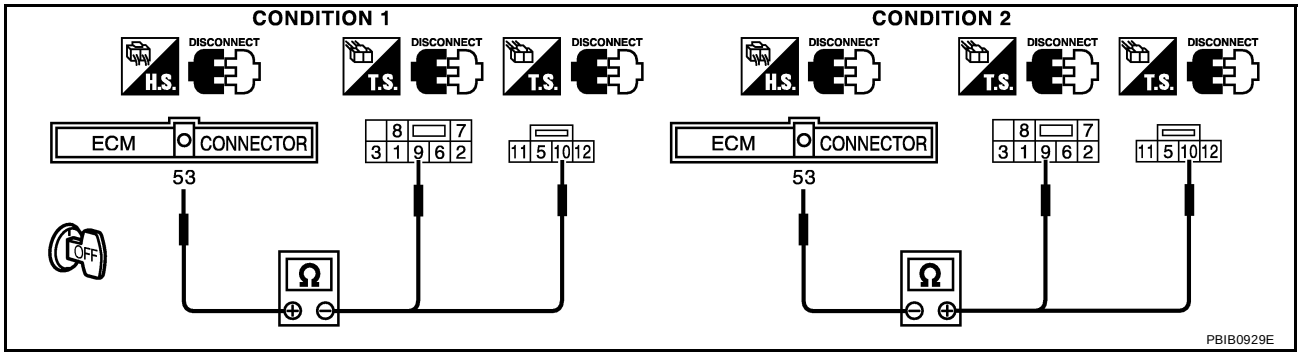
1. Start engine.
2. Turn the lighting switch “ON” at 2nd position.
3. Check that headlamps are illuminated.

OK or NG

OK (Models for USA)>>GO TO 5.
OK (Models for Canada)>>GO TO 7.
NG >> Refer to LT-6, "HEADLAMP (FOR USA)" or LT-10, "HEADLAMP (FOR CANADA) — DAYTIME LIGHT SYSTEM —" .

5. CHECK HEADLAMP INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Stop engine.
2. Disconnect ECM harness connector.
3. Disconnect lighting switch harness connectors.
4. Check harness continuity between ECM terminal 53 and lighting switch terminal 9, 10 under the following conditions.



Condition	Continuity
1	Should not exist
2	Should exist

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

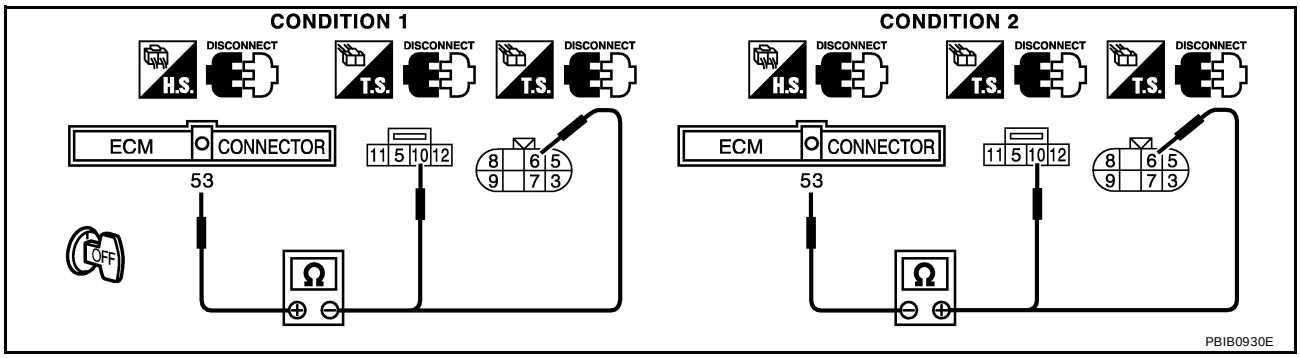
Check the following.

- Harness connectors E108, M19
- Harness connectors M58, F26
- Diode M55
- Harness for open and short between ECM and lighting switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK HEADLAMP INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Stop engine.
2. Disconnect ECM harness connector.
3. Disconnect lighting switch harness connector E115. (Models for USA)
   Disconnect daytime light control unit harness connector. (Models for CANADA)
4. Check harness continuity between ECM terminal 53 and lighting switch terminal 10, daytime light control unit terminal 6 under the following conditions.



Condition	Continuity
1	Should not exist
2	Should exist

5. 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 E108, M19
- Harness connectors M58, F26
- Diode M55
- Harness for open and short between ECM and lighting switch
- Harness for open and short between ECM and daytime light control unit

>> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK INTERMITTENT INCIDENT

Perform EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Diagnostic Procedure for Rear Window Defogger

EBS00G4A

1. INSPECTION START

Do you have CONSULT-II?

Yes or No

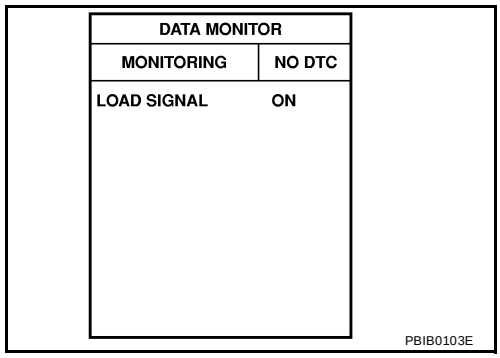
Yes >> GO TO 2.
No >> GO TO 3.

2. CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION

With CONSULT-II

1. Turn ignition switch “ON”.
2. Check “LOAD SIGNAL” in “DATA MONITOR” mode with CONSULT-II under the following conditions.

Condition	LOAD SIGNAL
Rear defogger system activated	ON
Rear defogger system not activated	OFF



OK or NG

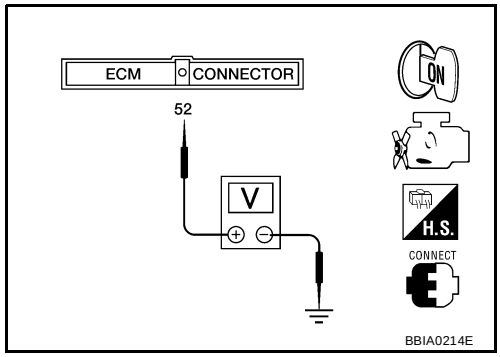
OK >> **INSPECTION END**
NG >> GO TO 4.

3. CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION

Without CONSULT-II

1. Turn ignition switch “ON”.
2. Check voltage between ECM terminal 52 and ground under the following conditions.

Condition	Voltage
Rear window defogger system activated	BATTERY VOLTAGE
Rear window defogger system not activated	0V



OK or NG

OK >> **INSPECTION END**
NG >> GO TO 4.

4. CHECK REAR WINDOW DEFOGGER FUNCTION

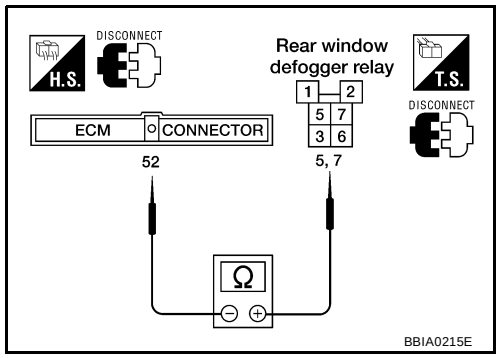
1. Start engine.
2. Activate the rear window defogger system.
3. Check that rear window defogger system is operating.

OK or NG

OK >> GO TO 5.
NG >> Refer to GW-24, "Trouble Diagnoses (Without Power Door Locks)" , or GW-26, "Trouble Diagnoses (With Power Door Locks)" .

5. CHECK REAR WINDOW DEFOGGER INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Stop engine.
2. Disconnect ECM harness connector.
3. Disconnect rear window defogger relay connector.
4. Check harness continuity between ECM connector terminal 52 and rear window defogger relay connector terminals 5 and 7.



Terminals				Continuity
(+)		(-)		
Connector	Terminal (Wire color)	Connector	Terminal (Wire color)	
F54	52 (L/W)	B6	5 (L/R)	Yes
F54	52 (L/W)	B6	7 (L/R)	Yes

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B1, M14
- Harness connectors M58, F26
- Harness for open and short between ECM and rear window defogger relay.

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK INTERMITTENT INCIDENT

Perform EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

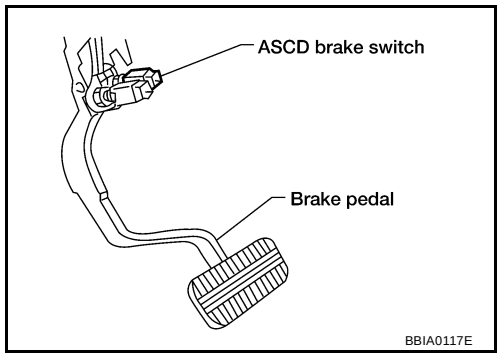
ASCD BRAKE SWITCH

PFP:25320

Component Description

UBS002MV

When depress on the brake pedal, 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-1850, "AUTOMATIC SPEED CONTROL DEVICE (ASCD)" for the ASCD function.



CONSULT-II Reference Value in Data Monitor Mode

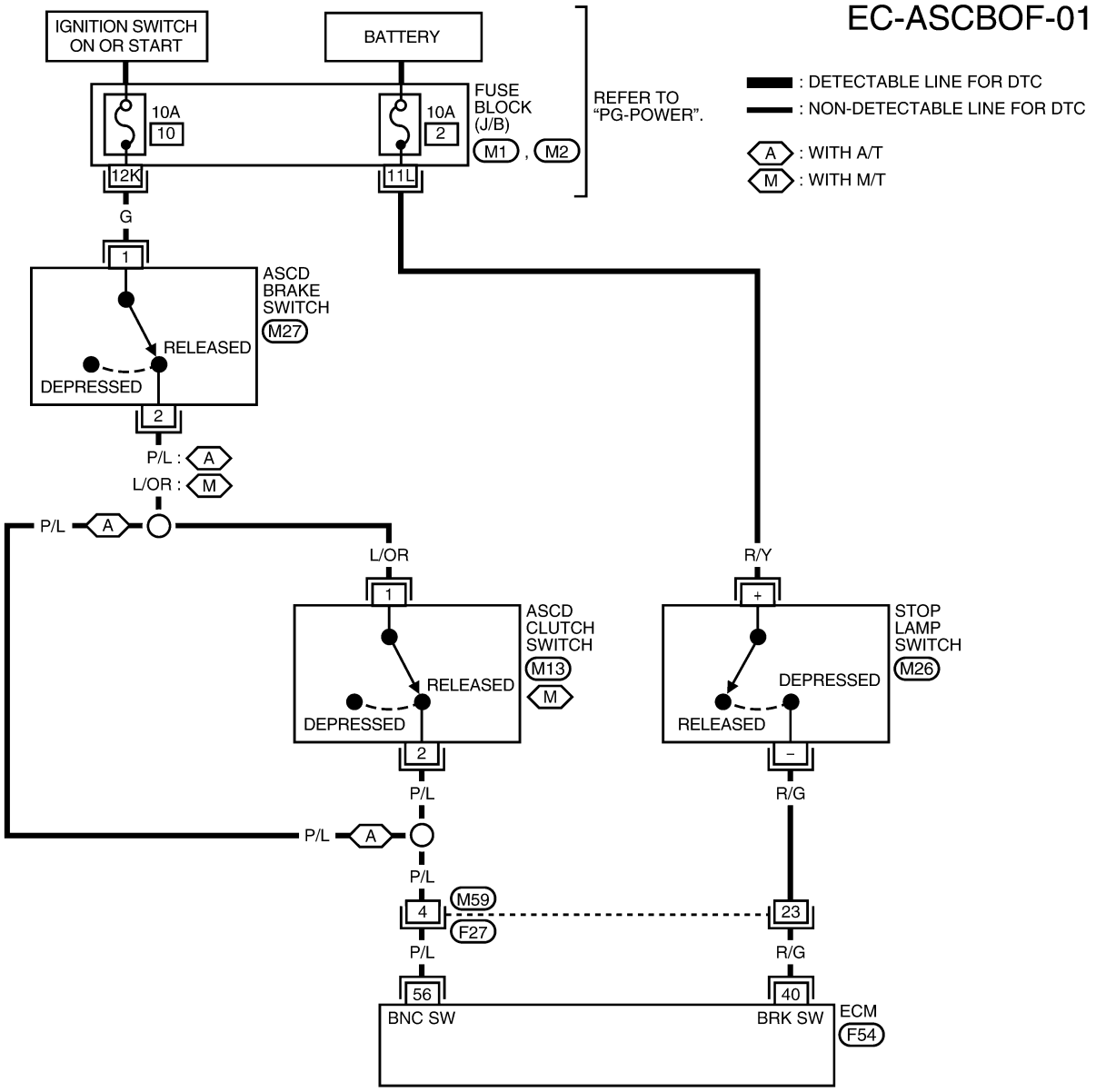
UBS002MW

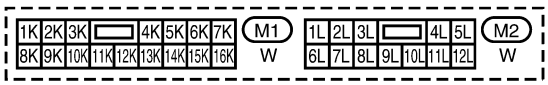
Specification data are reference values.

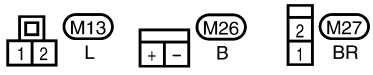
MONITOR ITEM	CONDITION		SPECIFICATION
BRAKE SW1 (ASCD brake switch)	● Ignition switch: ON	● Brake pedal fully released	ON
		● Brake pedal depressed	OFF
BRAKE SW2 (Stop lamp switch)	● Ignition switch: ON	● Brake pedal fully released	OFF
		● Brake pedal depressed	ON

Wiring Diagram

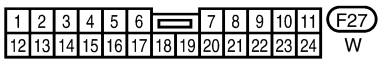
UBS002MX







REFER TO THE FOLLOWING.
F54 - ELECTRICAL UNITS



BBWA0260E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/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)
40	R/G	Stop lamp switch	**[Engine is running]** ● Brake pedal fully released	Approximately 0V
			[Engine is running] ● Brake pedal depressed	BATTERY VOLTAGE (11 - 14V)
56	P/L	ASCD brake switch	**[Ignition switch "ON"]** ● Brake pedal is depressed ● Clutch pedal is depressed (M/T models)	Approximately 0V
			[Ignition switch "ON"] ● Brake pedal is fully released ● Clutch pedal is fully released (M/T models)	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

UBS002MY

1. CHECK OVERALL FUNCTION-I

With CONSULT-II

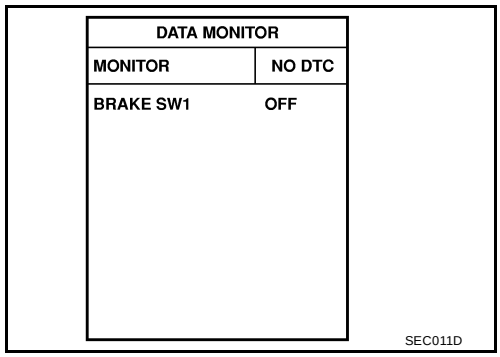
1. Turn ignition switch "ON".
2. Select "BRAKE SW1" in "DATA MONITOR" mode with CONSULT-II.
3. Check "BRAKE SW1" indication under the following conditions.

M/T models

CONDITION	INDICATION
When clutch pedal or brake pedal is depressed	OFF
When clutch pedal and brake pedal are fully released	ON

A/T models

CONDITION	INDICATION
When brake pedal is depressed	OFF
When brake pedal is fully released	ON



Without CONSULT-II

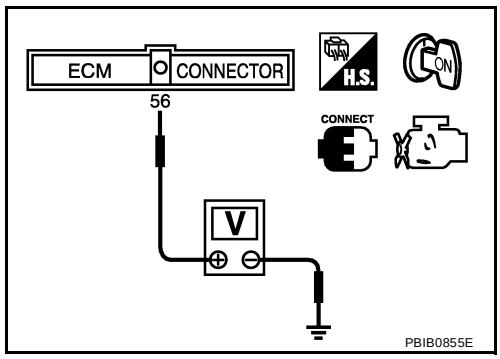
1. Turn ignition switch "ON".
2. Check voltage between ECM terminal 56 and ground under the following conditions.

M/T models

CONDITION	VOLTAGE
When clutch pedal or brake pedal is depressed	Approximately 0V
When clutch pedal and brake pedal are fully released	Battery voltage

A/T models

CONDITION	VOLTAGE
When brake pedal is depressed	Approximately 0V
When brake pedal is fully released	Battery voltage



OK or NG

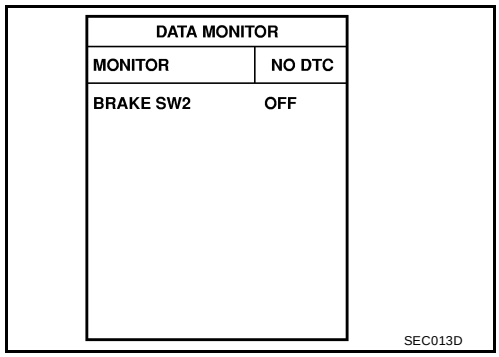
OK >> GO TO 2.
NG (M/T models) >>GO TO 3.
NG (A/T models) >>GO TO 4.

2. CHECK OVERALL FUNCTION-II

With CONSULT-II

Check “BRAKE SW2” indication in “DATA MONITOR” mode.

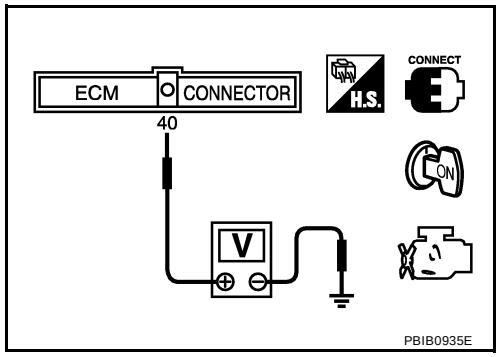
CONDITION	INDICATION
When brake pedal is released	OFF
When brake pedal is depressed	ON



Without CONSULT-II

Check voltage between ECM terminal 40 and ground under the following conditions.

CONDITION	VOLTAGE
When brake pedal is released	Approximately 0V
When brake pedal is depressed	Battery voltage

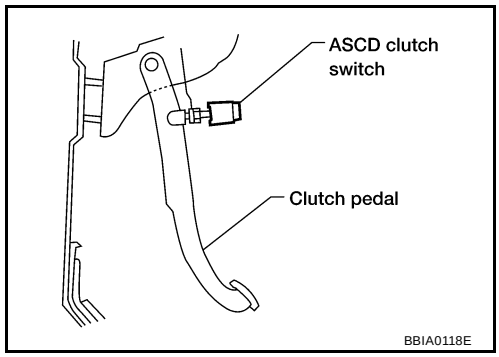


OK or NG

OK >> **INSPECTION END**
NG >> GO TO 13.

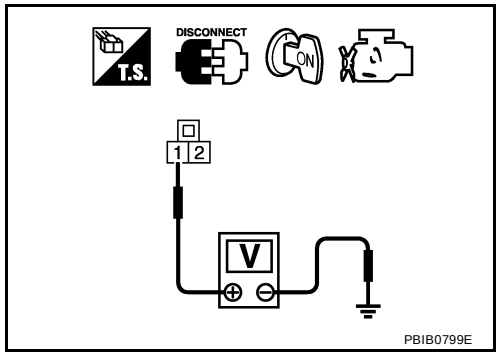
3. CHECK ASCD BRAKE SWITCH CIRCUIT

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
When brake pedal is released	Battery voltage
When brake pedal is depressed	Approx. 0V

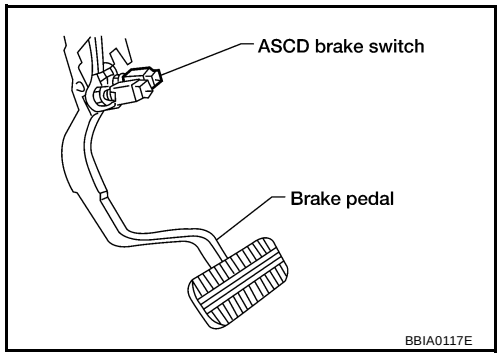


OK or NG

OK >> GO TO 10.
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”.

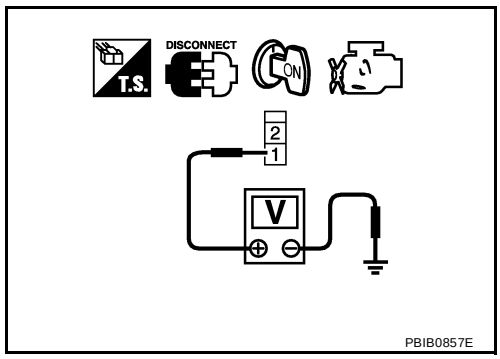


4. Check voltage between ASCD brake switch terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK (M/T models)>>GO TO 6.
OK (A/T models)>>GO TO 7.
NG >> GO TO 5.



5. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector M1
- 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 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

7. 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 56 and ASCD brake switch terminal 2. 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 9.
NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M59, F27
- 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.

9. CHECK ASCD BRAKE SWITCH

Refer to EC-1760, "Component Inspection"

OK or NG

OK >> GO TO 18.
NG >> Replace ASCD brake switch.

10. 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 56 and ASCD clutch switch terminal 2. 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 12.
NG >> GO TO 11.

11. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M59, F27
- 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.

12. CHECK ASCD CLUTCH SWITCH

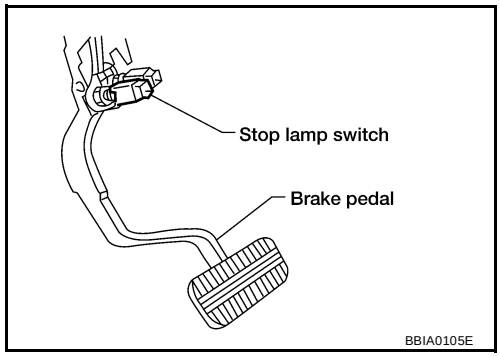
Refer to EC-1760, "Component Inspection"

OK or NG

OK >> GO TO 18.
NG >> Replace ASCD clutch switch.

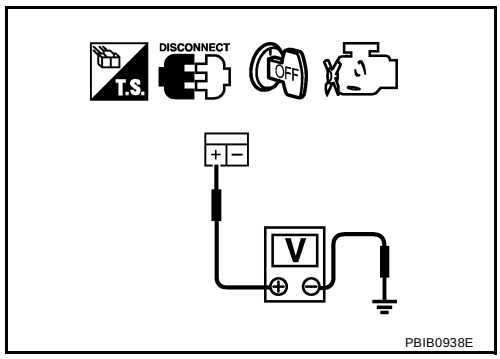
13. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect stop lamp switch harness connector.



3. Check voltage between stop lamp switch terminal **+** and ground with CONSULT -II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 15.
NG >> GO TO 14.

14. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector M2
- 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.

15. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 40 and stop lamp switch terminal **–** . 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 17.
NG >> GO TO 16.

16. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M59, F27
- 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.

17. CHECK STOP LAMP SWITCH

Refer to EC-1760, "Component Inspection" .

OK or NG

OK >> GO TO 18.
NG >> Replace stop lamp switch.

18. CHECK INTERMITTENT INCIDENT

Refer to EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

ASCD INDICATOR

PFP:24814

Component Description

UBS002MZ

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 CRUISE 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 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-1850, "AUTOMATIC SPEED CONTROL DEVICE (ASCD)" for the ASCD function.

CONSULT-II Reference Value in Data Monitor Mode

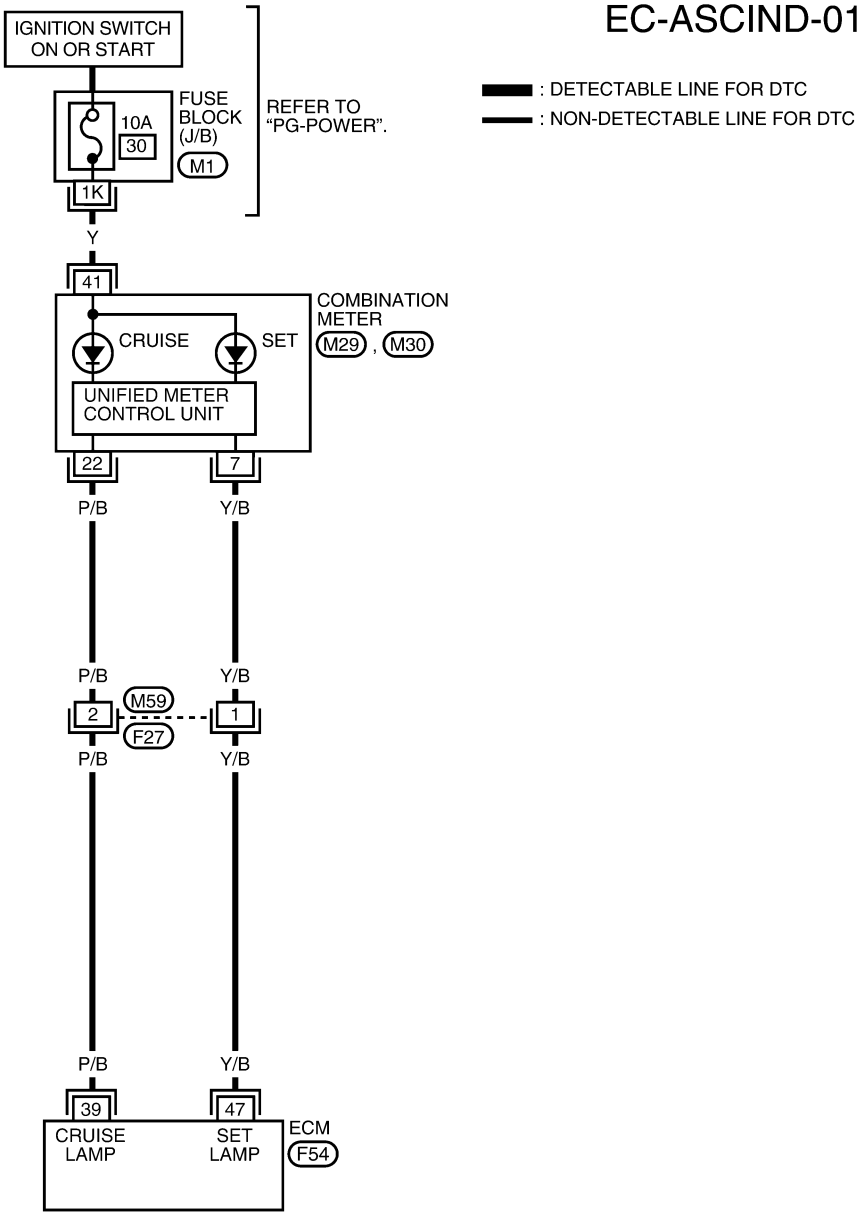
UBS002N0

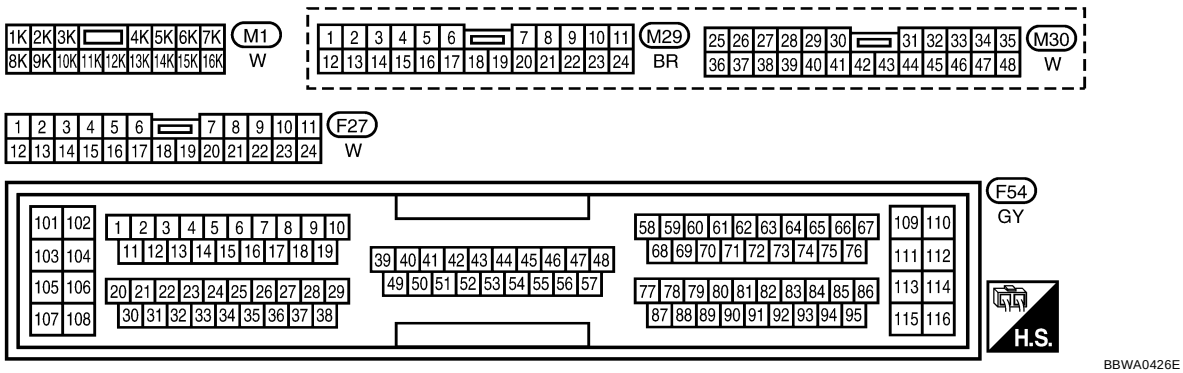
Specification data are reference value.

MONITOR ITEM	CONDITION		SPECIFICATION
CRUISE LAMP	● Ignition switch: ON	● CRUISE switch is depressed at first time → second time	ON → OFF
SET LAMP	● CRUISE switch: ON ● When vehicle speed is between 40 km/h (25 MPH) and 144 km/h (89 MPH)	● SET switch pressed	ON
		● ASCD control is canceled	OFF

Wiring Diagram

UBS002N1





BBWA0426E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
39	SB	ASCD CRUISE lamp	**[Ignition switch "ON"]** ● CRUISE switch is depressed at first time → second time	Approximately 0V ↓ BATTERY VOLTAGE (11 - 14V)
47	Y/B	ASCD SET lamp	**[Engine is running]** ● SET switch is "ON". ● ASCD control is operating.	Approximately 0V
			[Engine is running] ● ASCD control is not operating.	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

UBS002N2

1. CHECK OVERALL FUNCTION

Check ASCD indicator under the following conditions.

ASCD INDICATOR	CONDITION		SPECIFICATION
CRUISE lamp	● Ignition switch: ON	● CRUISE switch is depressed at first time → second time	ON → OFF
SET lamp	● CRUISE switch: ON ● When vehicle speed is between 40 km/h (25 MPH) and 144 km/h (89 MPH)	● SET switch pressed	ON
		● ASCD control is canceled	OFF

OK or NG

OK >> **INSPECTION END**

NG >> GO TO 2.

2. CHECK COMBINATION METER OPERATION

Does combination meter operate normally?

Yes or No

Yes >> GO TO 3.

No >> Check combination meter circuit. Refer to DI-6, "Combination Meter" .

3. CHECK ASCD INDICATOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect combination meter harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between the following terminals. Refer to Wiring Diagram.

ECM terminal	Combination meter terminal
39	22
47	7

Continuity should exist.

5. Also check harness for short to ground or short to power.

OK or NG

OK >> GO TO 5.

NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

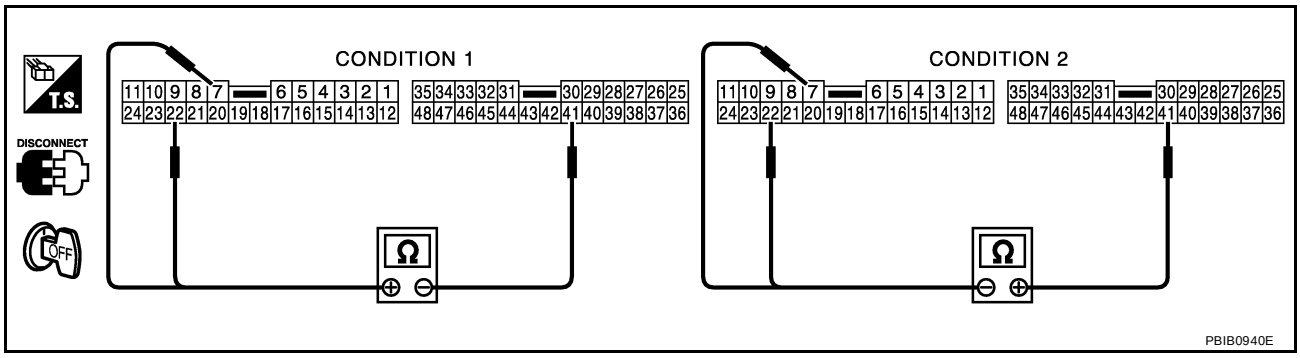
- Harness connectors M59, F27
- Harness for open and short between ECM and combination meter

>> Repair open circuit or short to ground or short to power in harness or connectors

5. CHECK COMBINATION METER

Check continuity under the following conditions.

CONDITION	Combination meter terminal No. (Polarity)	Continuity
1	7 (+) - 41 (–)	Should exist.
	22 (+) - 41 (–)	
2	41 (+) - 7 (–)	Should not exist.
	41 (+) - 22 (–)	



OK or NG

OK >> GO TO 6.
NG >> Replace combination meter. Refer to DI-6 .

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1339, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

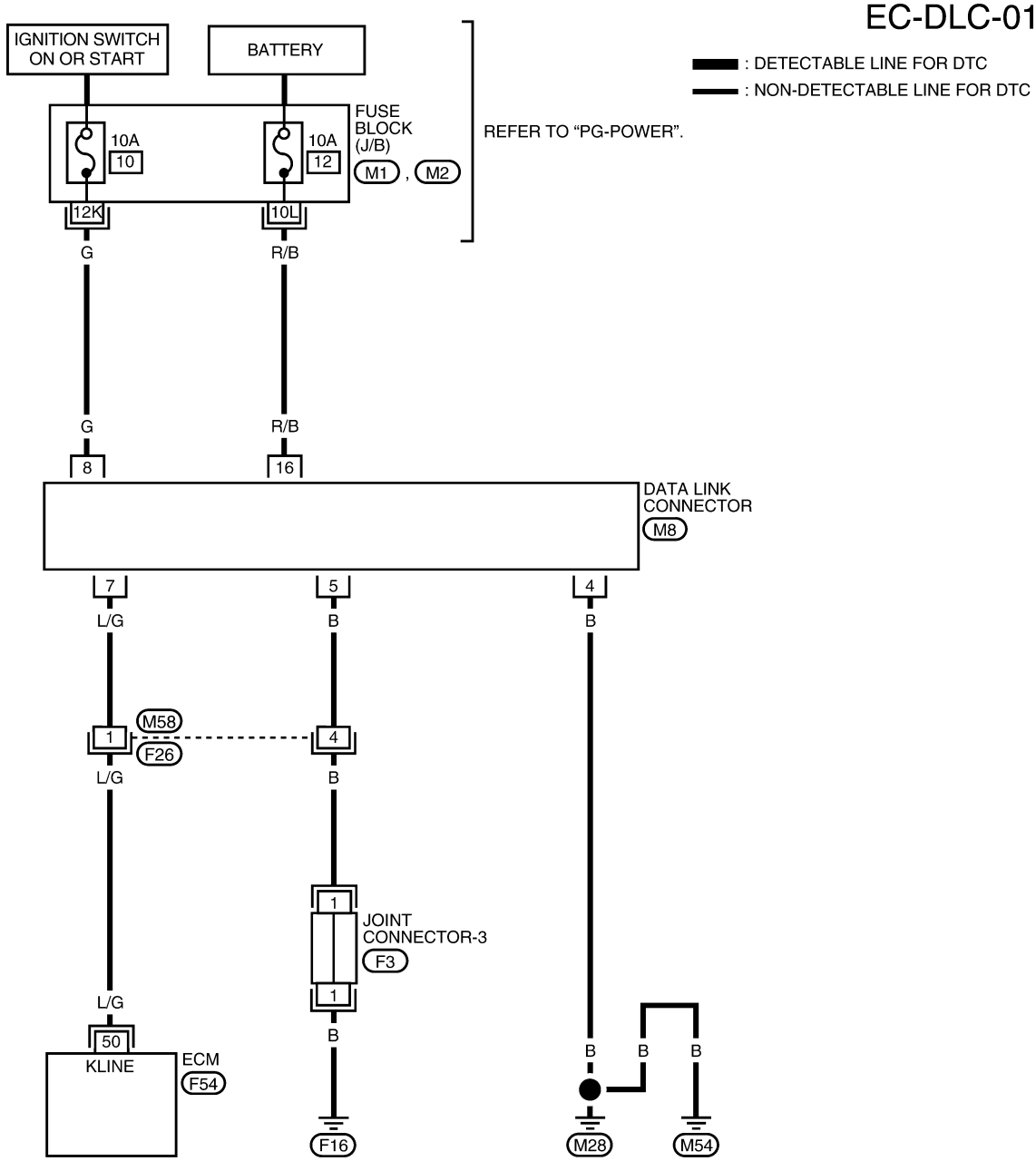
DATA LINK CONNECTOR

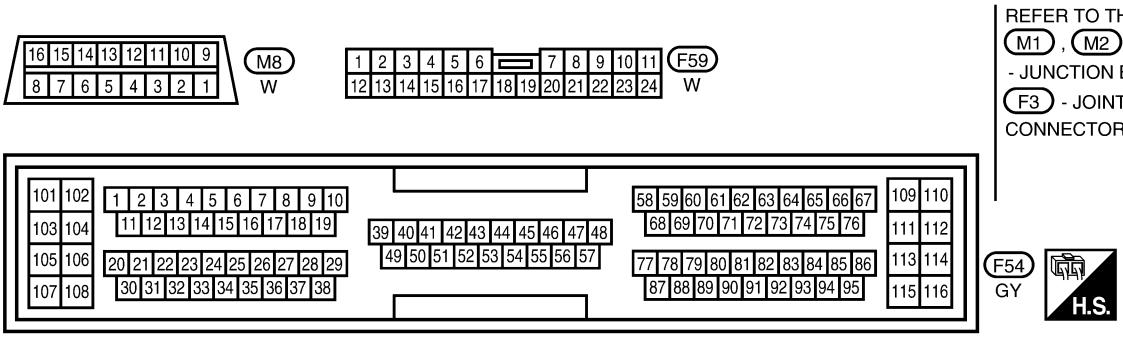
PFP:24814

Wiring Diagram

UBS002N3

EC-DLC-01





REFER TO THE FOLLOWING.
M1 , M2 - FUSE BLOCK - JUNCTION BOX (J/B)
F3 - JOINT CONNECTOR

BBWA0255E

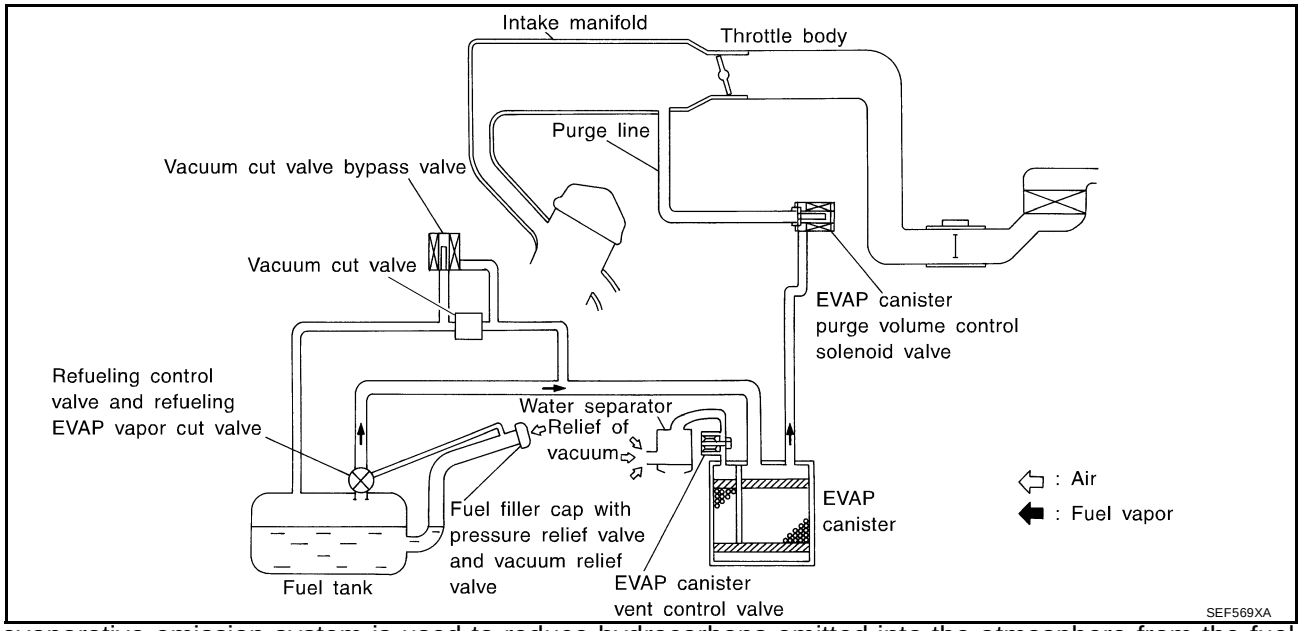
EVAPORATIVE EMISSION SYSTEM

PFP:14950

Description

UBS002N4

SYSTEM DESCRIPTION



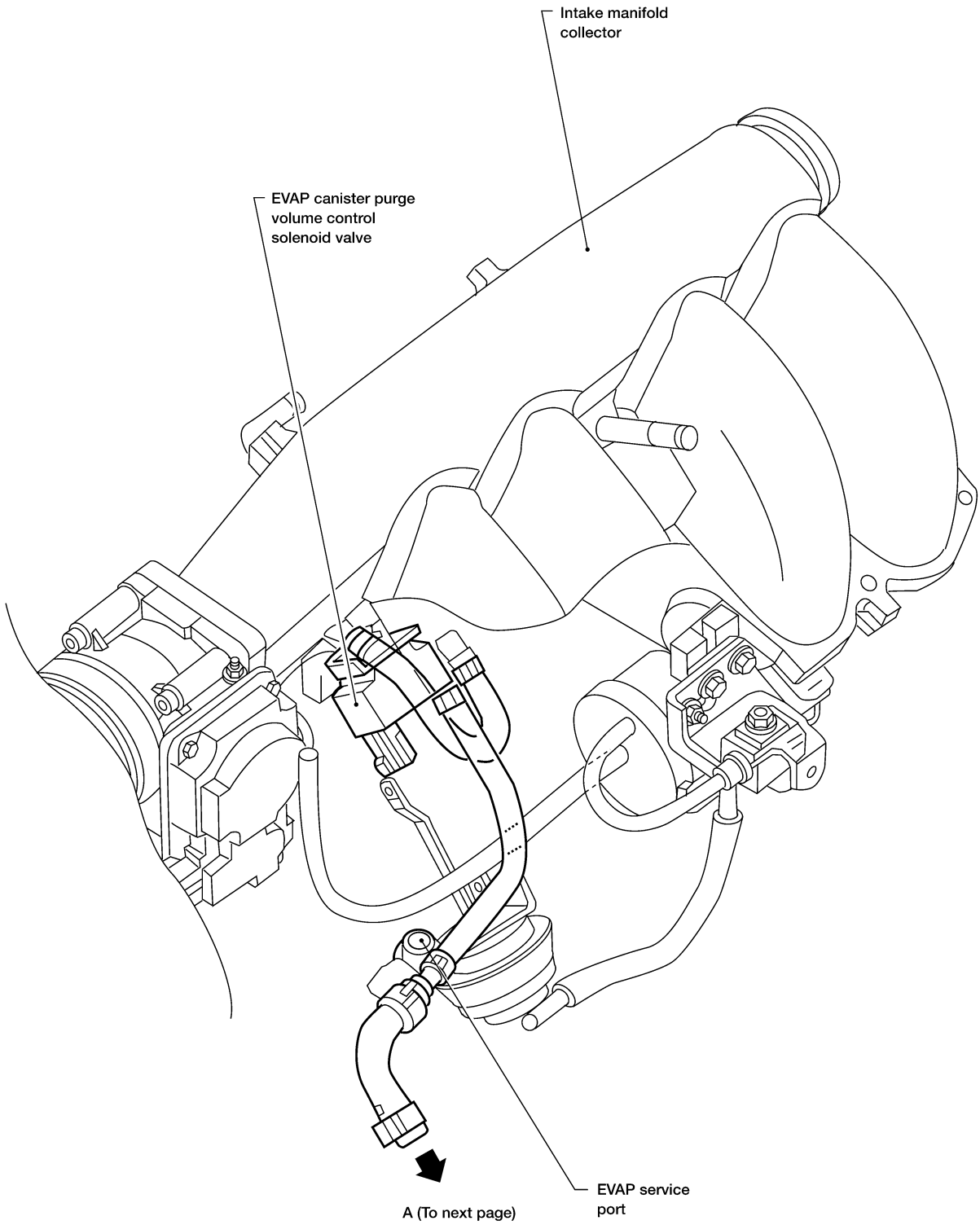
The evaporative emission system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the EVAP canister.

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.

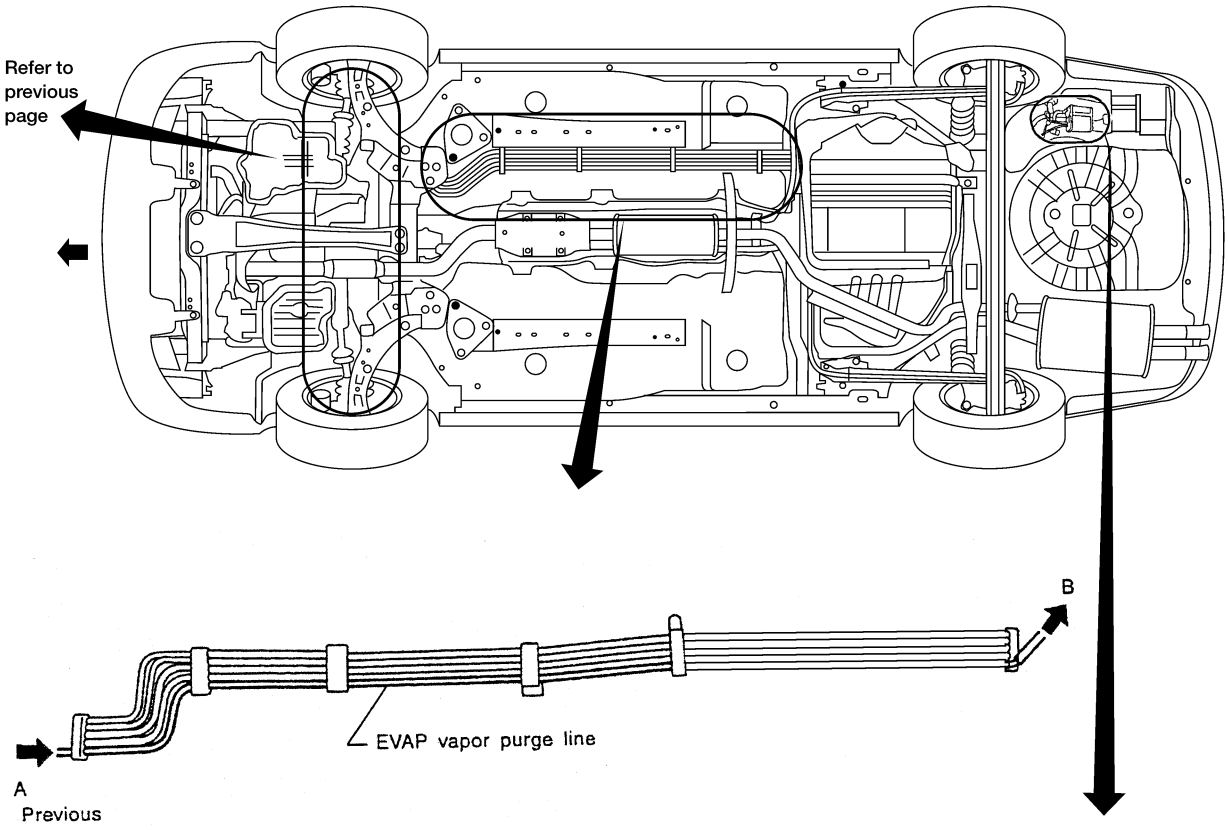
The vapor in the EVAP canister is purged by the air through the purge line to the intake manifold when the engine is operating. EVAP canister purge volume control solenoid valve is controlled by ECM. When the engine operates, the flow rate of vapor controlled by EVAP canister purge volume control solenoid valve is proportionally regulated as the air flow increases.

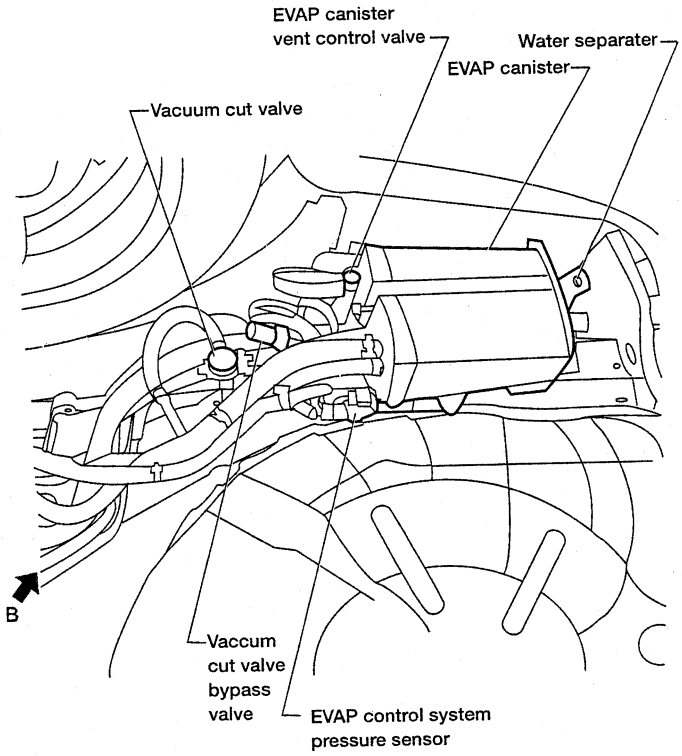
EVAP canister purge volume control solenoid valve also shuts off the vapor purge line during decelerating and idling.

EVAPORATIVE EMISSION LINE DRAWING



BBIA0051E


Refer to previous page
B
EVAP vapor purge line
A
Previous


EVAP canister vent control valve
Water separater
EVAP canister
Vacuum cut valve
B
Vaccum cut valve bypass valve
EVAP control system pressure sensor

WEC362

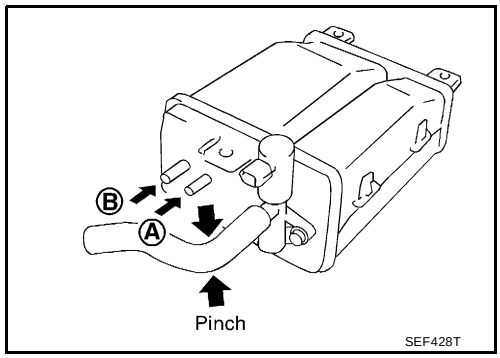
Component Inspection

UBS002N5

EVAP CANISTER

Check EVAP canister as follows:

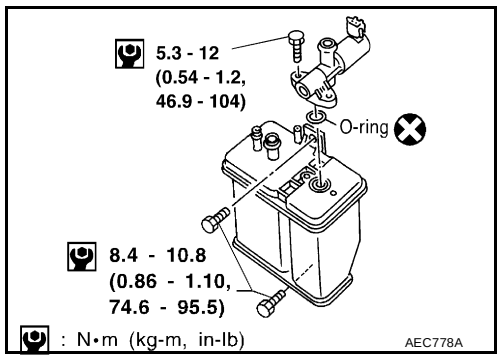
1. Pinch the fresh air hose.
2. Blow air into port **A** and check that it flows freely out of port **B** .



Tightening Torque

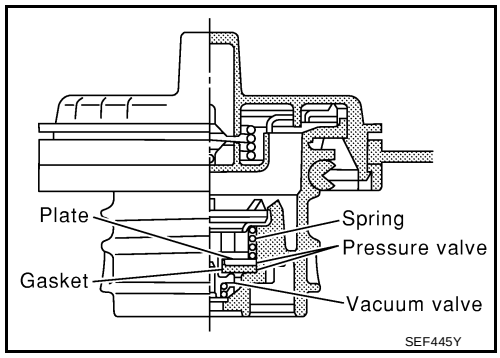
Tighten EVAP canister as shown in the figure.

Make sure new O-ring is installed properly between EVAP canister and EVAP canister vent control valve.



FUEL TANK VACUUM RELIEF VALVE (BUILT INTO FUEL FULLER CAP)

1. Wipe clean valve housing.

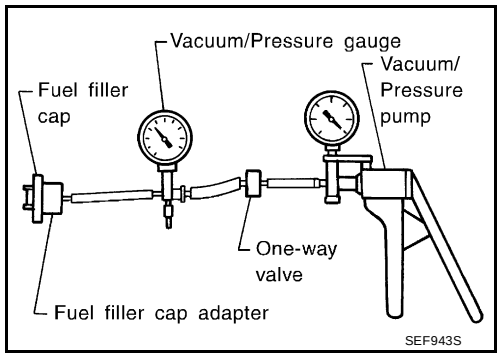


2. Check valve opening pressure and vacuum.

Pressure: 15.3 - 20.0 kPa
(0.156 - 0.204 kg/cm^2 , 2.22 - 2.90 psi)
Vacuum: −6.0 to −3.4 kPa
(−0.061 to −0.035 kg/cm^2 , −0.87 to −0.48 psi)

3. If out of specification, replace fuel filler cap as an assembly.

CAUTION:
Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.



VACUUM CUT VALVE AND VACUUM CUT VALVE BYPASS VALVE

Refer to EC-1734 .

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

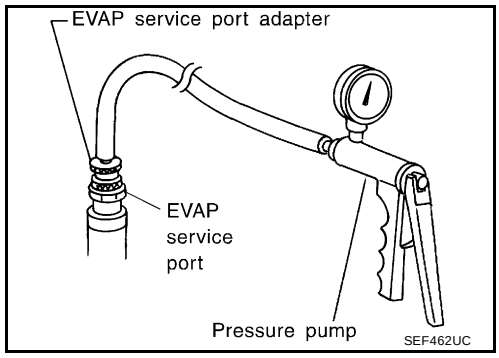
Refer to EC-1534 .

FUEL TANK TEMPERATURE SENSOR

Refer to EC-1443 .

EVAP SERVICE PORT

Positive pressure is delivered to the EVAP system through the EVAP service port. If fuel vapor leakage in the EVAP system occurs, use a leak detector to locate the leak.



How to Detect Fuel Vapor Leakage

UBS002N6

CAUTION:

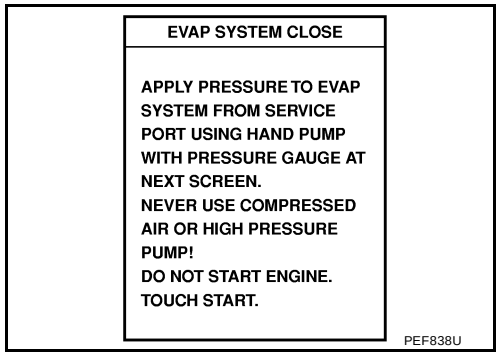
- **Never use compressed air or a high pressure pump.**
- **Do not exceed 4.12 kPa (0.042 kg/cm^2 , 0.6 psi) of pressure in EVAP system.**

NOTE:

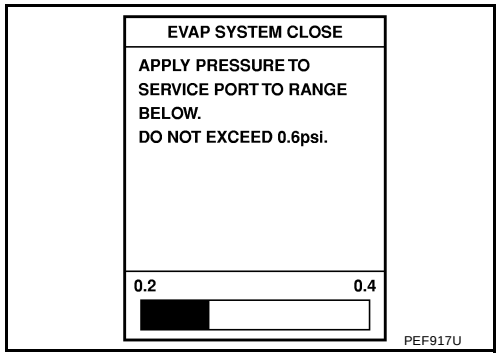
- Do not start engine.
- Improper installation of EVAP service port adapter to the EVAP service port may cause a leak.

WITH CONSULT-II

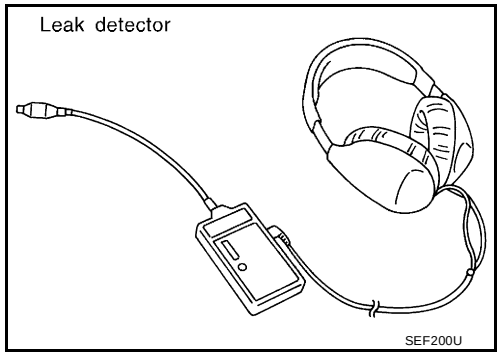
1. Attach the EVAP service port adapter securely to the EVAP service port.
2. Also attach the pressure pump and hose to the EVAP service port adapter.
3. Turn ignition switch “ON”.
4. Select the “EVAP SYSTEM CLOSE” of “WORK SUPPORT MODE” with CONSULT-II.
5. Touch “START”. A bar graph (Pressure indicating 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.

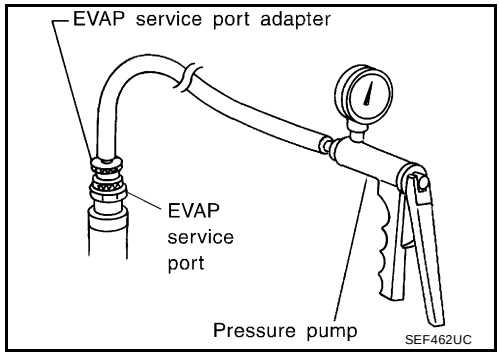


8. Locate the leak using a leak detector. Refer to EC-1837, "EVAPORATIVE EMISSION LINE DRAWING" .

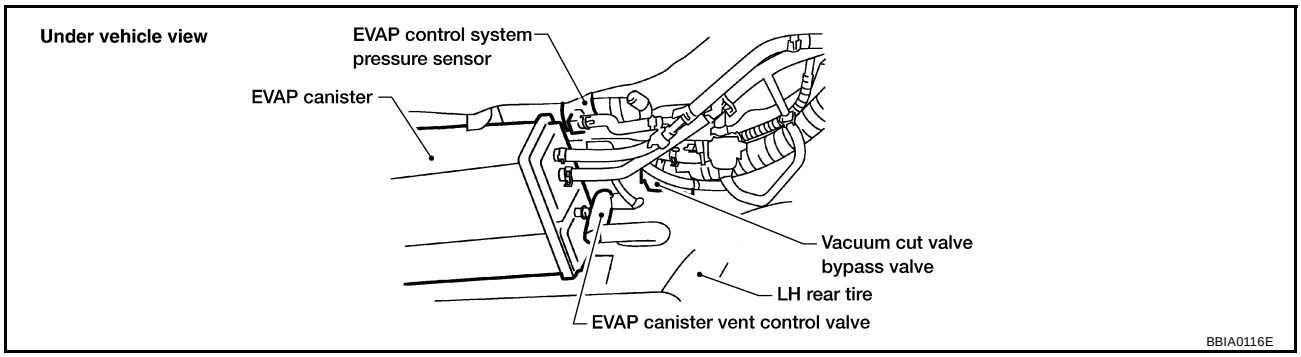


WITHOUT CONSULT-II

1. Attach the EVAP service port adapter securely to the EVAP service port.
2. Also attach the pressure pump with pressure gauge to the EVAP service port adapter.



3. Apply battery voltage to between the terminals of both EVAP canister vent control valve and vacuum cut valve bypass valve to make a closed EVAP system.



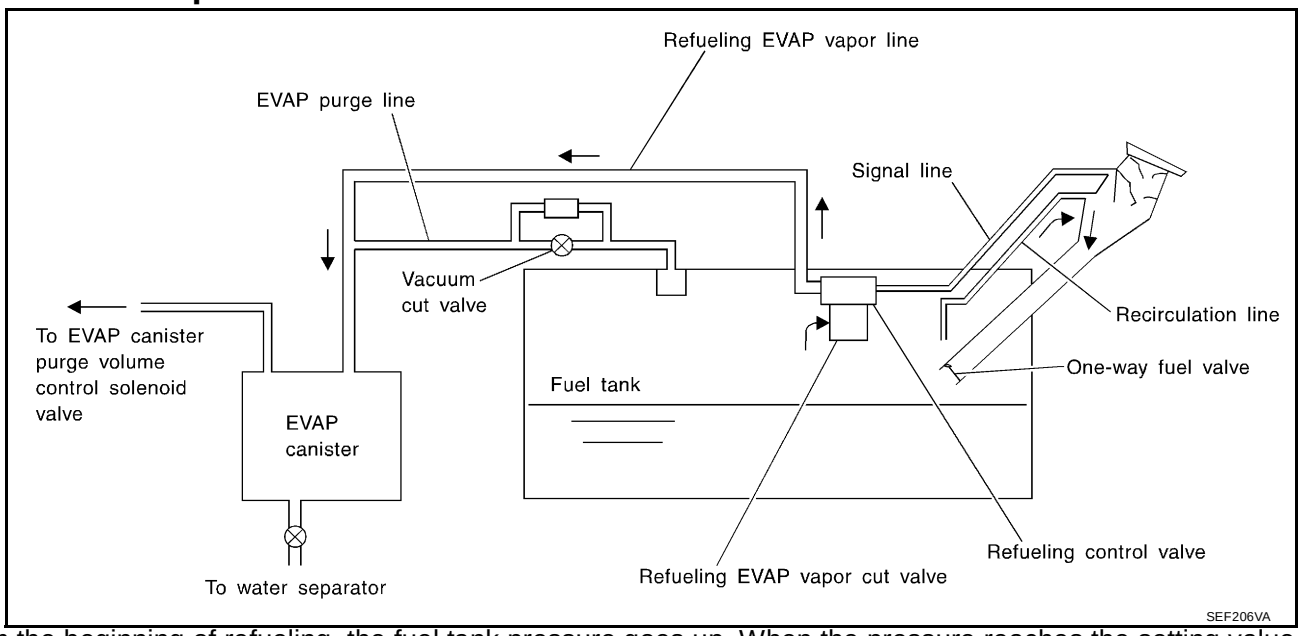
4. To locate the leak, deliver positive pressure to the EVAP system until pressure gauge points reach 1.38 to 2.76 kPa (0.014 to 0.028 kg/cm^2 , 0.2 to 0.4 psi).
5. Remove EVAP service port adapter and hose with pressure pump.
6. Locate the leak using a leak detector. Refer to EC-1837, "EVAPORATIVE EMISSION LINE DRAWING" .

ON BOARD REFUELING VAPOR RECOVERY (ORVR)

PFP:00032

System Description

UBS002N7



From the beginning of refueling, the fuel tank pressure goes up. When the pressure reaches the setting value of the refueling control valve (RCV) opening pressure, the RCV is opened. After RCV opens, the air and vapor inside the fuel tank go through refueling EVAP vapor cut valve, RCV and refueling vapor line to the EVAP canister. The vapor is absorbed by the EVAP canister and the air is released to the atmosphere.
When the refueling has reached the full level of the fuel tank, the refueling EVAP vapor cut valve is closed and refueling is stopped because of auto shut-off. The vapor which was absorbed by the EVAP canister is purged during driving.
The RCV is always closed during driving and the evaporative emission control system is operated the same as conventional system.

WARNING:

When conducting inspections below, be sure to observe the following:

- **Put a “CAUTION: INFLAMMABLE” sign in workshop.**
- **Do not smoke while servicing fuel system. Keep open flames and sparks away from work area.**
- **Be sure to furnish the workshop with a CO_2 fire extinguisher.**

CAUTION:

- **Before removing fuel line parts, carry out the following procedures:**
  - **Put drained fuel in an explosion-proof container and put lid on securely.**
  - **Release fuel pressure from fuel line. Refer to EC-1255, "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

UBS002N8

SYMPTOM: FUEL ODOR FROM EVAP CANISTER IS STRONG.

1. CHECK EVAP CANISTER

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Weigh the EVAP canister with EVAP canister vent control valve attached.
   The weight should be less than 1.8 kg (4.0 lb).

OK or NG

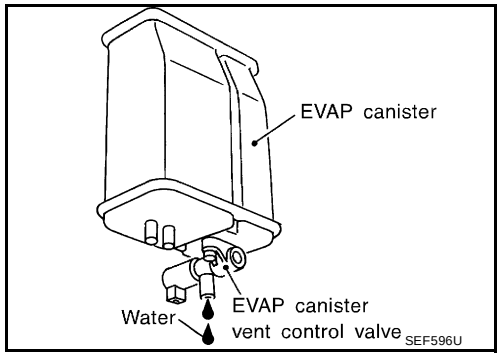
OK >> GO TO 2.
NG >> GO TO 3.

2. CHECK IF EVAP CANISTER SATURATED WITH WATER

Does water drain from the EVAP canister?

Yes or No

Yes >> GO TO 3.
No >> GO TO 6.



3. REPLACE EVAP CANISTER

Replace EVAP canister with a new one.

>> GO TO 4.

4. CHECK WATER SEPARATOR

Refer to EC-1845, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace water separator.

5. DETECT MALFUNCTIONING PART

Check the EVAP hose between EVAP canister and water separator for clogging or poor connection.

>> Repair or replace EVAP hose.

6. CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-1845, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace refueling EVAP vapor cut valve with fuel tank.

7. CHECK REFUELING CONTROL VALVE

Refer to EC-1845, "Component Inspection" .

OK or NG

OK >> **INSPECTION END**
NG >> Replace refueling control valve with fuel tank.

SYMPTOM: CANNOT REFUEL/FUEL ODOR FROM THE FUEL FILLER OPENING IS STRONG WHILE REFUELING.

1. CHECK EVAP CANISTER

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Weigh the EVAP canister with EVAP canister vent control valve attached.
   The weight should be less than 1.8 kg (4.0 lb).

OK or NG

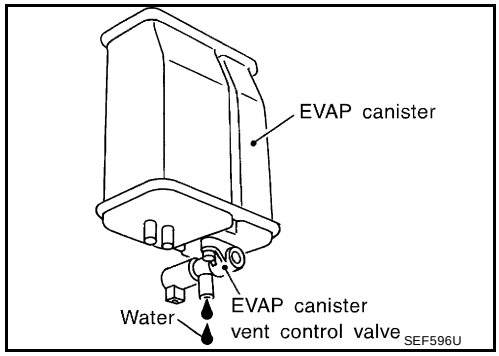
OK >> GO TO 2.
NG >> GO TO 3.

2. CHECK IF EVAP CANISTER SATURATED WITH WATER

Does water drain from the EVAP canister?

Yes or No

Yes >> GO TO 3.
No >> GO TO 6.



3. REPLACE EVAP CANISTER

Replace EVAP canister with a new one.

>> GO TO 4.

4. CHECK WATER SEPARATOR

Refer to EC-1845, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace water separator.

5. DETECT MALFUNCTIONING PART

Check the EVAP hose between EVAP canister and water separator for clogging or poor connection.

>> Repair or replace EVAP hose.

6. CHECK VENT HOSES AND VENT TUBES

Check hoses and tubes between EVAP canister and refueling control valve for clogging, kink, looseness and improper connection.

OK or NG

OK >> GO TO 7.
NG >> Repair or replace hoses and tubes.

7. CHECK FILLER NECK TUBE

Check signal line and recirculation line for clogging, dents and cracks.

OK or NG

OK >> GO TO 8.
NG >> Replace filler neck tube.

8. CHECK REFUELING CONTROL VALVE

Refer to EC-1845, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace refueling control valve with fuel tank.

9. CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-1845, "Component Inspection" .

OK or NG

OK >> GO TO 10.
NG >> Replace refueling EVAP vapor cut valve with fuel tank.

10. CHECK FUEL FILLER TUBE

Check filler neck tube and hose connected to the fuel tank for clogging, dents and cracks.

OK or NG

OK >> GO TO 11.
NG >> Replace fuel filler tube.

11. CHECK ONE-WAY FUEL VALVE-I

Check one-way valve for clogging.

OK or NG

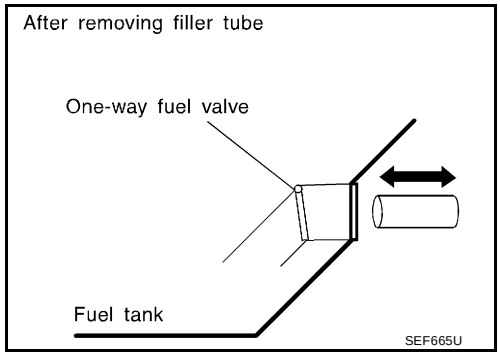
OK >> GO TO 12.
NG >> Repair or replace one-way fuel valve with fuel tank.

12. CHECK ONE-WAY FUEL VALVE-II

1. Make sure that fuel is drained from the tank.
2. Remove fuel filler tube and hose.
3. Check one-way fuel valve for operation as follows.
   When a stick is inserted, the valve should open, when removing stick it should close.
   Do not drop any material into the tank.

OK or NG

OK >> **INSPECTION END**
NG >> Replace fuel filler tube or replace one-way fuel valve with fuel tank.



Component Inspection

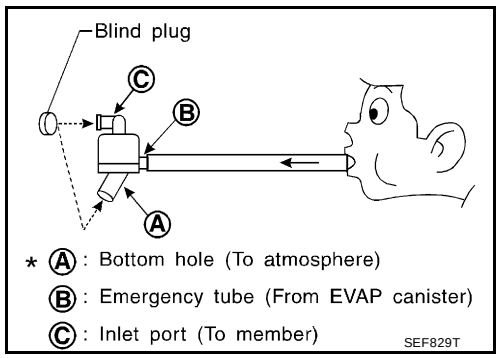
UBS002N9

WATER SEPARATOR

1. Check visually for insect nests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.

4. Check that **A** and **C** are not clogged by blowing air into **B** with **A** , and then **C** plugged.
5. In case of NG in items 2 - 4, replace the parts.

NOTE:
- Do not disassemble water separator.



REFUELING EVAP VAPOR CUT VALVE

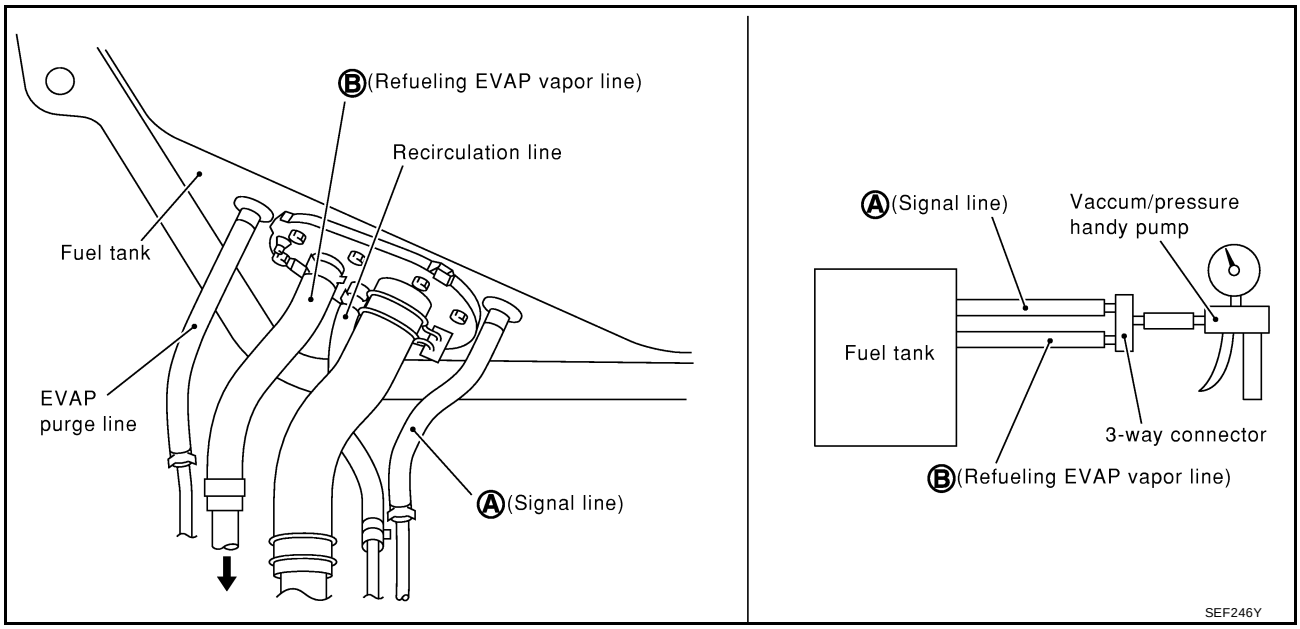
With CONSULT-II

1. Remove fuel tank. Refer to FL-10, "FUEL TANK" .
2. Drain fuel from the tank as follows:

a. Remove fuel feed hose located on the fuel gauge retainer.
b. Connect a spare fuel hose, one side to fuel gauge retainer where the hose was removed and the other side to a fuel container.
c. Drain fuel using “FUEL PUMP RELAY” in “ACTIVE TEST” mode with CONSULT-II.

3. Check refueling EVAP vapor cut valve for being stuck to close as follows.
Blow air into the refueling EVAP vapor cut valve (from hose end **B**), and check that the air flows freely into the tank.
4. Check EVAP vapor cut valve for being stuck to open as follows.

a. Connect vacuum pump to hose ends **A** and **B** using a suitable 3-way connector.
b. Remove fuel gauge retainer with fuel gauge unit.
Always replace O-ring with new one.
c. Put fuel tank upside down.
d. Apply vacuum pressure to both hose ends **A** and **B** [–13.3 kPa (–100 mmHg, –3.94 inHg)] with fuel gauge retainer remaining open and check that the pressure is applicable.



With GST

1. Remove fuel tank. Refer to FL-10, "FUEL TANK" .
2. Drain fuel from the tank as follows:

a. Remove fuel gauge retainer.
b. Drain fuel from the tank using a hand pump into a fuel container.

3. Check refueling EVAP vapor cut valve for being stuck to close as follows.

Blow air into the refueling EVAP vapor cut valve (from hose end **B**), and check that the air flows freely into the tank.

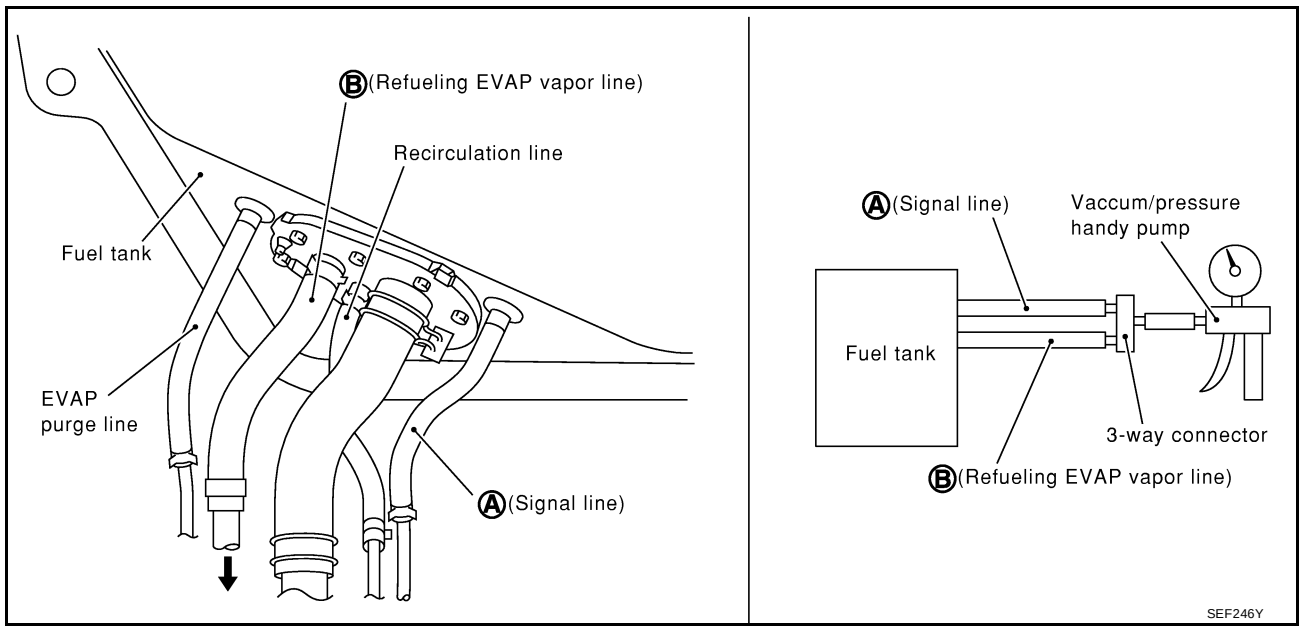
4. Check EVAP vapor cut valve for being stuck to open as follows.

a. Connect vacuum pump to hose ends **A** and **B** using a suitable 3-way connector.

b. Remove fuel gauge retainer with fuel gauge unit.
Always replace O-ring with new one.

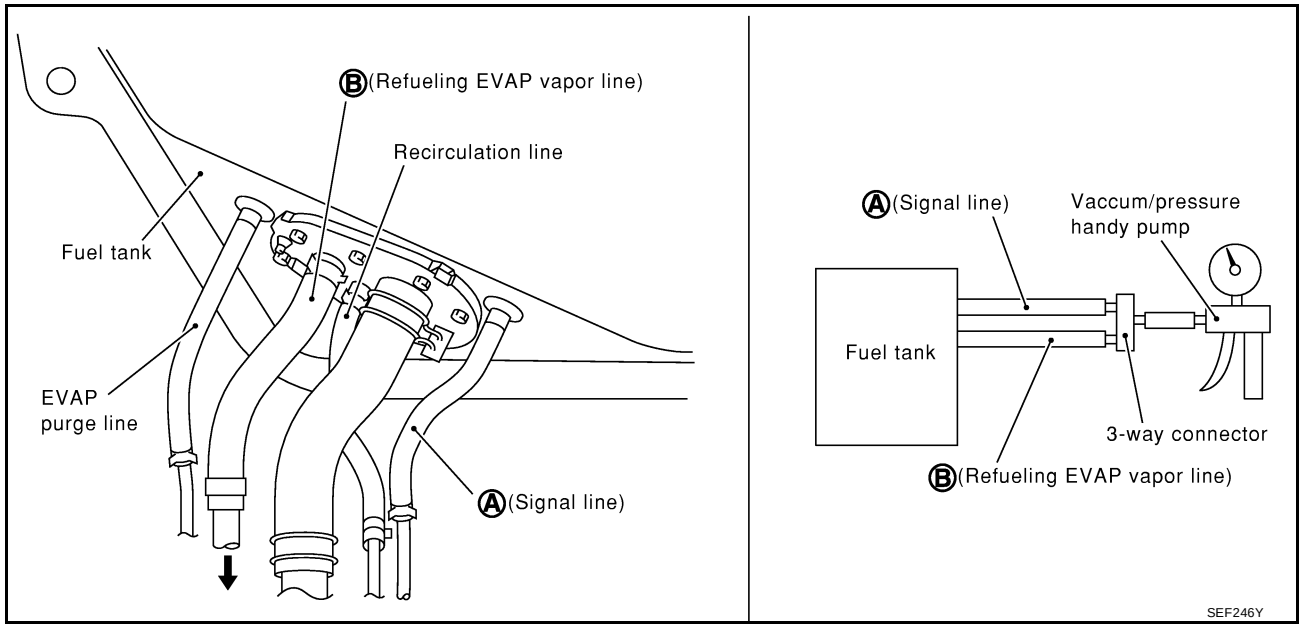
c. Put fuel tank upside down.

d. Apply vacuum pressure to both hose ends **A** and **B** [–13.3 kPa (–100 mmHg, –3.94 inHg)] with fuel gauge retainer remaining open and check that the pressure is applicable.



REFUELING CONTROL VALVE

1. Remove fuel filler cap.
2. Check air continuity between hose ends **A** and **B** .
Blow air into the hose end **B** . Air should flow freely into the fuel tank.
3. Blow air into hose end **A** and check there is no leakage.
4. Apply pressure to both hose ends **A** and **B** [20 kPa (150 mmHg, 5.91 inHg)] using a pressure pump and a suitable 3-way connector. Check that there is no leakage.



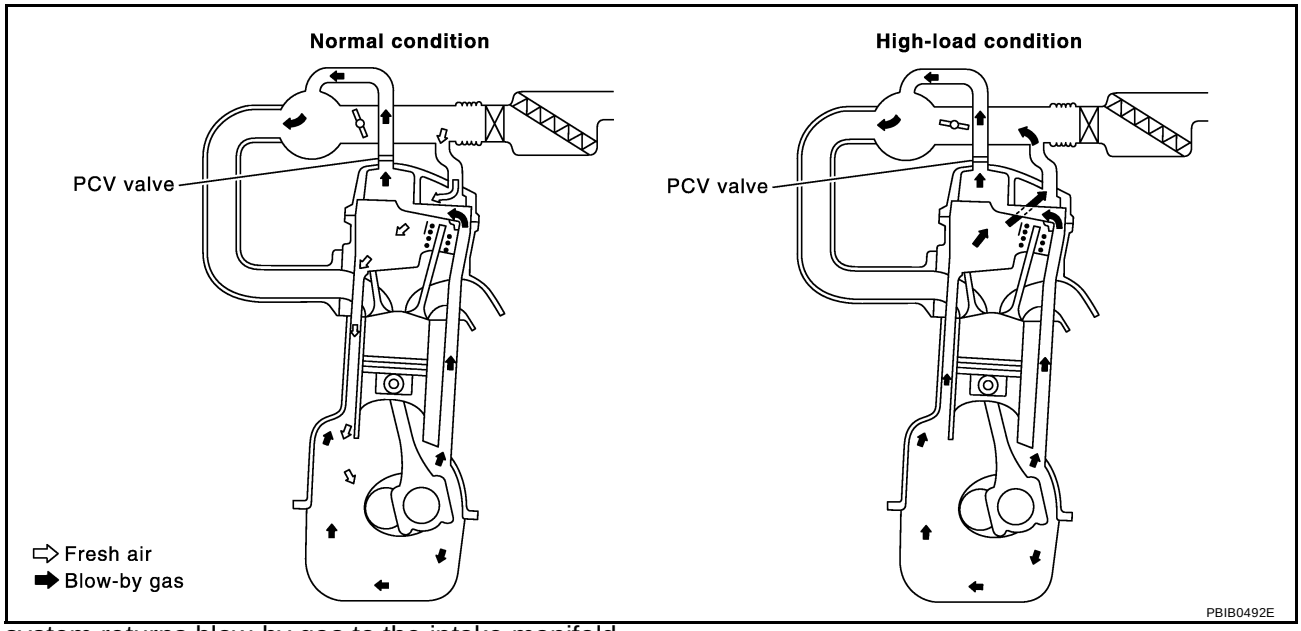
POSITIVE CRANKCASE VENTILATION

PFP:11810

Description

UBS002NA

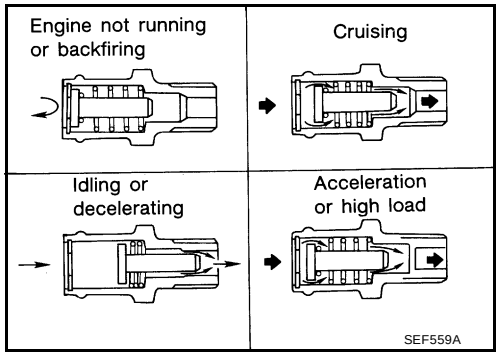
SYSTEM DESCRIPTION



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.

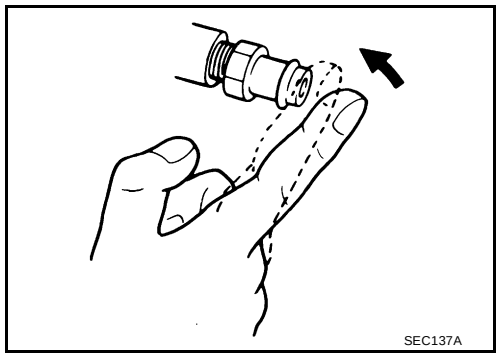


Component Inspection

UBS002NB

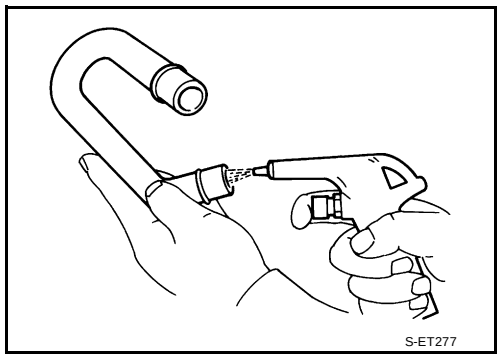
PCV (POSITIVE CRANKCASE VENTILATION) VALVE

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.



AUTOMATIC SPEED CONTROL DEVICE (ASCD)

PFP:18930

System Description

UBS002NC

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 (MT models)	Clutch pedal operation		
ASCD steering switch	ASCD steering switch operation		
Park/Neutral position (PNP) switch (AT models)	Gear position		
Combination meter	Vehicle speed		
TCM	Power train revolution		

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.

SET OPERATION

Press ASCD CRUISE switch (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 switch. (Then SET indicator in combination meter illuminates.)

ACCEL OPERATION

If the RESUME/ACCEL switch is depressed 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 depressed
- Brake pedal is depressed
- Clutch pedal is depressed (M/T models)
- A/T selector lever is shifted to P or N position (A/T models)

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 depressed 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/ACCEL switch is depressed after cancel operation other than depressing 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 position (A/T models)
- Vehicle speed is greater than 40 km/h (25 MPH) and less than 144 km/h (89 MPH)

Component Description

UBS002ND

ASCD STEERING SWITCH

Refer to EC-1745 .

ASCD BRAKE SWITCH

Refer to EC-1752 .

ASCD CLUTCH SWITCH

Refer to EC-1752 .

STOP LAMP SWITCH

Refer to EC-1752 .

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EC-1614 .

ASCD INDICATOR

Refer to EC-1831 .

SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

Fuel Pressure

UBS002NE

Fuel pressure at idle	Approximately 350 kPa (3.7kg/cm^2 , 51psi)

Idle Speed and Ignition Timing

UBS002NF

Target idle speed	No-load*1 (in “P” or N” position)	700±50 rpm
Air conditioner: ON	In “P” or N” position	800 rpm or more
Ignition timing	In “P” or N” position	15°±5° BTDC

*1: Under the following conditions:

- Air conditioner switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Calculated Load Value

UBS002NG

	Calculated load value % (Using CONSULT-II or GST)
At idle	10 - 35
At 2,500 rpm	10 - 35

Mass Air Flow Sensor

UBS002NH

Supply voltage	Battery voltage (11 - 14V)
Output voltage at idle	1.0 - 1.5*V
Mass air flow (Using CONSULT-II or GST)	1.4 - 4.0 g·m/sec at idle* 4.0 - 10.0 g·m/sec at 2,500 rpm*

*: Engine is warmed up to normal operating temperature and running under no-load.

Intake Air Temperature Sensor

UBS002NI

Temperature °C (°F)	Resistance kΩ
25 (77)	1.9 - 2.1
80 (176)	0.31 - 0.37

Engine Coolant Temperature Sensor

UBS002NJ

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260

Heated Oxygen Sensor 1 Heater

UBS002NK

Resistance [at 25°C (77°F)]	2.3 - 4.3Ω

Heated Oxygen Sensor 2 Heater

UBS002NL

Resistance [at 25°C (77°F)]	2.3 - 4.3Ω

Crankshaft Position Sensor (POS)

UBS002NM

Refer to EC-1502, "Component Inspection" .

Camshaft Position Sensor (PHASE)

UBS002NN

Refer to EC-1508, "Component Inspection" .

Throttle Control Motor

UBS002NO

Resistance [at 25°C (77°F)]	Approximately 1 - 15Ω

Injector

UBS002NP

Resistance [at 20°C (68°F)]	12.1 - 12.9Ω

Fuel Pump

UBS002NQ

Resistance [at 25°C (77°F)]	Approximately 1.0Ω