ENGINE CONTROL SYSTEM

SECTION EC

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CONTENTS (Cont'd.)

CONTENTS (Cont'd.)

When you read wiring diagrams:
- **Read GI section, "HOW TO READ WIRING DIAGRAMS".**
- **Read EL section, "POWER SUPPLY ROUTING" for power distribution circuit.**

When you perform trouble diagnoses, read GI section, "HOW TO FOLLOW FLOW CHART IN TROUBLE DIAGNOSES" and "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT".

Alphabetical & P No. Index for DTC

ALPHABETICAL INDEX FOR DTC

Items (CONSULT-II screen terms)	DTC*4 CONSULT-II GST*1	Reference page
Unable to access ECM	—	EC-90
*COOLAN T SEN/CIRC	P0125	EC-151
A/T 1ST GR FNCTN	P0731	AT-95
A/T 2ND GR FNCTN	P0732	AT-101
A/T 3RD GR FNCTN	P0733	AT-107
A/T 4TH GR FNCTN	P0734	AT-113
A/T COMM LINE	P0600	EC-341
A/T DIAG COMM LINE	P1605	EC-425
A/T TCC S/V FNCTN	P0744	AT-125
ABSL PRES SEN/CIRC	P0105	EC-127
AIR TEMP SEN/CIRC	P0110	EC-129
ATF TEMP SEN/CIRC	P0710	AT-83
CMP SEN/CIRCUIT	P0340	EC-259
CLOSED LOOP-B1	P1148	EC-348
CLOSED TP SW/CIRC	P0510	EC-335
COOLANT T SEN/CIRC	P0115	EC-134
CKP SENSOR (COG)	P1336	EC-351
CKP SEN/CIRCUIT	P0335	EC-254
CYL 1 MISFIRE	P0301	EC-244
CYL 2 MISFIRE	P0302	EC-244
CYL 3 MISFIRE	P0303	EC-244
CYL 4 MISFIRE	P0304	EC-244
ECM	P0605	EC-345
EGR SYSTEM	P0400	EC-266
EGR SYSTEM	P1402	EC-367
EGR TEMP SEN/CIRC	P1401	EC-361
EGRC SOLENOID/V	P1400	EC-356
EGRC-BPT VALVE	P0402	EC-275
ENGINE SPEED SIG	P0725	AT-92
EVAP PURG FLOW/MON	P1447	EC-398
EVAP SMALL LEAK	P0440	EC-284
EVAPO SYS PRES SEN	P0450	EC-304
EVAP GROSS LEAK	P0455	EC-310
EVAP SMALL LEAK	P1440	EC-374
EVAP VERY SML LEAK	P1441	EC-376
FUEL LEVL SEN/CIRC	P0464	EC-323
FUEL LEV SEN SLOSH	P0460	EC-318
FUEL LEVEL SENSOR	P0461	EC-321
FUEL LEVL SEN/CIRC	P1464	EC-412
FUEL SYS-LEAN BK1	P0171	EC-230
FUEL SYS-RICH BK1	P0172	EC-235
FUEL TEMP SEN/CIRC	P0180	EC-240

Items (CONSULT-II screen terms)	DTC*4 CONSULT-II GST*1	Reference page
HO2S1 (B1)	P0130	EC-156
HO2S1 (B1)	P0133	EC-178
HO2S1 (B1)	P0132	EC-170
HO2S1 (B1)	P0131	EC-163
HO2S1 (B1)	P0134	EC-186
HO2S1 HTR (B1)	P0135	EC-192
HO2S2 (B1)	P0138	EC-204
HO2S2 (B1)	P0137	EC-196
HO2S2 (B1)	P0140	EC-219
HO2S2 (B1)	P0139	EC-212
HO2S2 HTR (B1)	P0141	EC-225
IACV/AAC VLV/CIRC	P0505	EC-330
KNOCK SEN/CIRC-B1	P0325	EC-249
L/PRESS SOL/CIRC	P0745	AT-133
MAF SEN/CIRCUIT*2	P0100	EC-118
MULTI CYL MISFIRE	P0300	EC-244
NATS MALFUNC	—	EC-59 or EL-257
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	P0000	—
O/R CLTCH SOL/CIRC	P1760	AT-154
OVERHEAT	—	EC-433
P-N POS SW/CIRCUIT	P1706	EC-428
PNP SW/CIRC	P0705	AT-78
PURG VOLUME CONT/V	P1444	EC-386
PURG VOLUME CONT/V	P0443	EC-293
SFT SOL A/CIRC*2	P0750	AT-138
SFT SOL B/CIRC*2	P0755	AT-143
TCC SOLENOID/CIRC	P0740	AT-120
THERMSTAT FNCTN	P1126	EC-347
THRTL POS SEN/CIRC*2	P0120	EC-139
TP SEN/CIRC A/T*2	P1705	AT-148
TW CATALYST SYS-B1	P0420	EC-280
VC CUT/V BYPASS/V	P1491	EC-420
VC/V BYPASS/V	P1490	EC-415
VEH SPD SEN/CIR AT*3	P0720	AT-88
VEH SPEED SEN/CIRC*3	P0500	EC-326
VENT CONTROL VALVE	P1446	EC-393
VENT CONTROL VALVE	P1448	EC-405
VENT CONTROL VALVE	P0446	EC-299

*1: These numbers are prescribed by SAE J2012.
*2: When the fail-safe operation occurs, the MIL illuminates.
*3: The MIL illuminates when both the “Revolution sensor signal” and the “Vehicle speed sensor” meet the fail-safe condition at the same time.
*4: 1st trip DTC No. is the same as DTC No.

P NO. INDEX FOR DTC

DTC*4 CONSULT-II GST*1	Items (CONSULT-II screen terms)	Reference page
—	Unable to access ECM	EC-90
—	NATS MALFUNC	EC-59 or EL section
P0000	NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	—
P0100	MAF SEN/CIRCUIT*2	EC-118
P0105	ABSL PRES SEN/CIRC	EC-127
P0110	AIR TEMP SEN/CIRC	EC-129
P0115	COOLANT T SEN/CIRC	EC-134
P0120	THRTL POS SEN/CIRC*2	EC-139
P0125	*COOLAN T SEN/CIRC	EC-151
P0130	HO2S1 (B1)	EC-156
P0131	HO2S1 (B1)	EC-163
P0132	HO2S1 (B1)	EC-170
P0133	HO2S1 (B1)	EC-178
P0134	HO2S1 (B1)	EC-186
P0135	HO2S1 HTR (B1)	EC-192
P0137	HO2S2 (B1)	EC-196
P0138	HO2S2 (B1)	EC-204
P0139	HO2S2 (B1)	EC-212
P0140	HO2S2 (B1)	EC-219
P0141	HO2S2 HTR (B1)	EC-225
P0171	FUEL SYS-LEAN/BK1	EC-230
P0172	FUEL SYS-RICH/BK1	EC-235
P0180	FUEL TEMP SEN/CIRC	EC-240
P0300	MULTI CYL MISFIRE	EC-244
P0301	CYL 1 MISFIRE	EC-244
P0302	CYL 2 MISFIRE	EC-244
P0303	CYL 3 MISFIRE	EC-244
P0304	CYL 4 MISFIRE	EC-244
P0325	KNOSK SEN/CIRC-B1	EC-249
P0335	CKP SEN/CIRCUIT	EC-254
P0340	CMP SEN/CIRCUIT	EC-259
P0400	EGR SYSTEM	EC-266
P0402	EGRC-BPT VALVE	EC-275
P0420	TW CATALYST SYS-B1	EC-280
P0440	EVAP SMALL LEAK	EC-284
P0443	PURG VOLUME CONT/V	EC-293
P0446	VENT CONTROL VALVE	EC-299
P0450	EVAPO SYS PRES SEN	EC-304
P0455	EVAP GROSS LEAK	EC-310
P0460	FUEL LEV SEN SLOSH	EC-318
P0461	FUEL LEVEL SENSOR	EC-321
P0464	FUEL LEVL SEN/CIRC	EC-323
P0500	VEH SPEED SEN/CIRC*3	EC-326
P0505	IACV/AAC VLV/CIRC	EC-330
P0510	CLOSED TP SW/CIRC	EC-335
P0600	A/T COMM LINE	EC-341
P0605	ECM	EC-345
P0705	PNP SW/CIRC	AT-78
P0710	ATF TEMP SEN/CIRC	AT-83
P0720	VEH SPD SEN/CIR AT*3	AT-88
P0725	ENGINE SPEED SIG	AT-92
P0731	A/T 1ST GR FNCTN	AT-95
P0732	A/T 2ND GR FNCTN	AT-101
P0733	A/T 3RD GR FNCTN	AT-107
P0734	A/T 4TH GR FNCTN	AT-113
P0740	TCC SOLENOID/CIRC	AT-120
P0744	A/T TCC S/V FNCTN	AT-125
P0745	L/PRESS SOL/CIRC	AT-133
P0750	SFT SOL A/CIRC*2	AT-138
P0755	SFT SOL B/CIRC*2	AT-143
P1126	THERMSTAT FNCTN	EC-347
P1148	CLOSED LOOP-B1	EC-348
P1336	CKP SENSOR (COG)	EC-351
P1400	EGRC SOLENOID/V	EC-356
P1401	EGR TEMP SEN/CIRC	EC-361
P1402	EGR SYSTEM	EC-367
P1440	EVAP SMALL LEAK	EC-374
P1441	EVAP VERY SML LEAK	EC-376
P1444	PURG VOLUME CONT/V	EC-386
P1446	VENT CONTROL VALVE	EC-393
P1464	FUEL LEVL SEN/CIRC	EC-412
P1447	EVAP PURG FLOW/MON	EC-398
P1448	VENT CONTROL VALVE	EC-405
P1490	VC/V BYPASS/V	EC-415
P1491	VC CUT/V BYPASS/V	EC-420
P1605	A/T DIAG COMM LINE	EC-425
P1705	TP SEN/CIRC A/T*2	AT-148
P1706	P-N POS SW/CIRCUIT	EC-428
P1760	O/R CLTCH SOL/CIRC	AT-154
—	OVERHEAT	EC-433

*1: These numbers are prescribed by SAE J2012.
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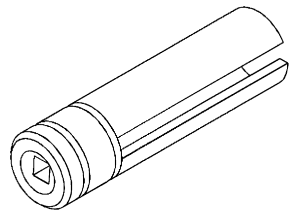
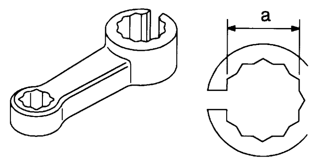
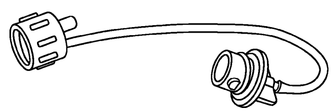
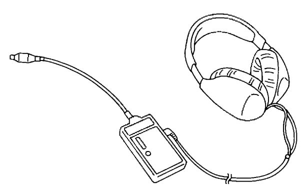
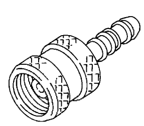
*4: 1st trip DTC No. is the same as DTC No.

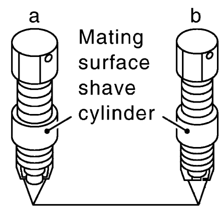
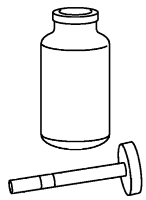
Special Service Tools

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 front heated oxygen sensor with 22 mm (0.87 in) hexagon nut
KV10114400 (J-38365) Heated oxygen sensor wrench	 NT636 Loosening or tightening rear heated oxygen sensor **a: 22 mm (0.87 in)**
(J-45356) Fuel filler cap adapter	 NT815 Checking fuel tank vacuum relief valve opening pressure

Commercial Service Tools

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

Tool name	Description	
Oxygen sensor thread cleaner (J-43897-18) (J-43897-12)	 NT778	Reconditioning the exhaust system threads before installing a new oxygen sensor. Use with anti-seize lubricant shown below. **a: J-43897-18 18 mm diameter, for Zirconia Oxygen Sensor** **b: J-43897-12 12 mm diameter, for Titania Oxygen Sensor**
Anti-seize lubricant (Permatex™ 133AR or equivalent meeting MIL specification MIL-A-907)	 NT779	Lubricating oxygen sensor thread cleaning tool when reconditioning exhaust system threads.

Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

The Supplemental Restraint System such as "AIR BAG" and "SEAT BELT PRE-TENSIONER" used along with a seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. The SRS system composition which is available to NISSAN MODEL L30 is as follows (The composition varies according to the optional equipment):

- For a frontal collision
  The Supplemental Restraint System consists of driver air bag module (located in the center of the steering wheel), front passenger air bag module (located on the instrument panel on passenger side), seat belt pre-tensioners, a diagnosis sensor unit, warning lamp, wiring harness and spiral cable.
- For a side collision
  The Supplemental Restraint System consists of side air bag module (located in the outer side of front seat), satellite sensor, diagnosis sensor unit (one of components of air bags for a frontal collision), wiring harness, warning lamp (one of components of air bags for a frontal collision).

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

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the RS section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. Spiral cable and wiring harnesses (except "SEAT BELT PRE-TENSIONER") covered with yellow insulation either just before the harness connectors or for the complete harness are related to the SRS.**

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

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-5 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.**

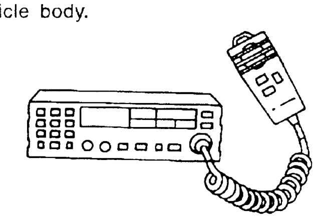
Engine Fuel & Emission Control System

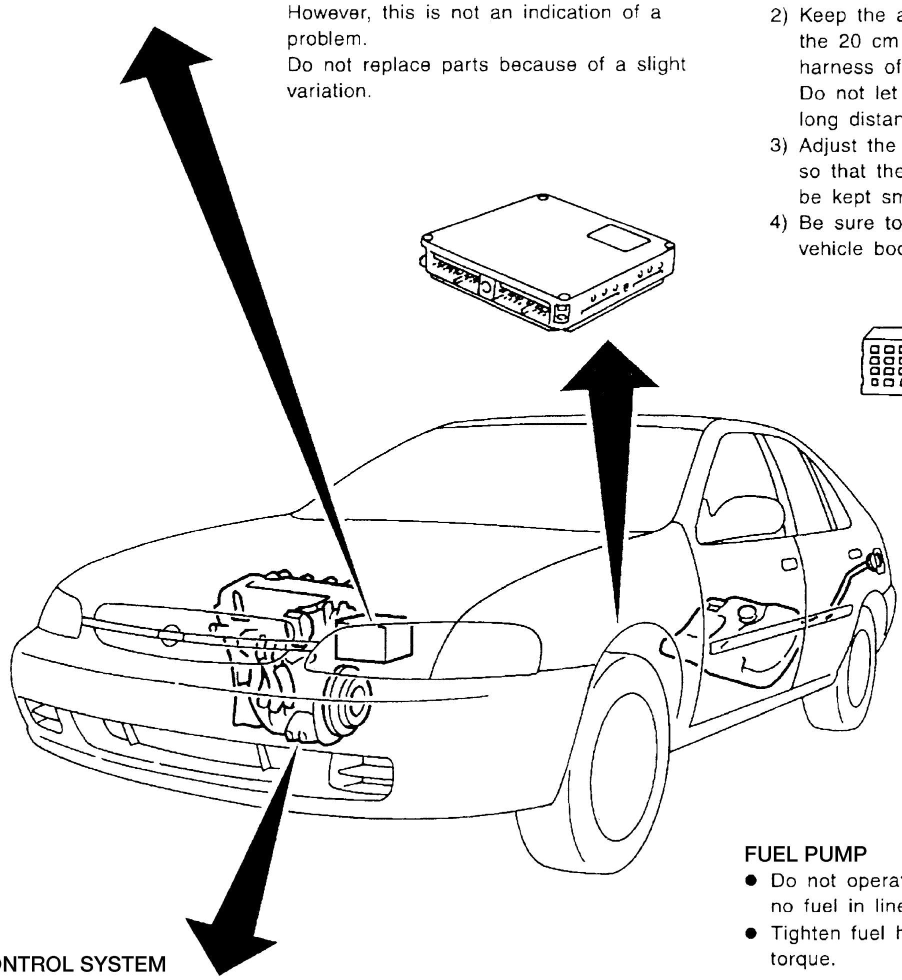
BATTERY
- Always use a 12 volt battery as power source.
- Do not attempt to disconnect battery cables while engine is running.

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

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

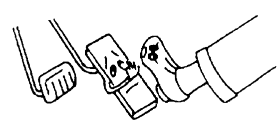
1) Keep the antenna as far as possible away from the electronic control units.
2) Keep the antenna feeder line more the 20 cm (7.9 in) away from the harness of electronic controls.
   Do not let them run parallel for a long distance.
3) Adjust the antenna and feeder line so that the standing-wave ratio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





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

ENGINE CONTROL SYSTEM PARTS HANDLING
- Handle mass air flow sensor carefully to avoid damage.
- Do not disassemble mass air flow sensor.
- Do not clean mass air flow sensor with any type of detergent.
- Do not disassemble IACV-AAC valve.
- Even a slight leak in the air intake system can cause serious problems.
- Do not shock or jar the camshaft position sensor.

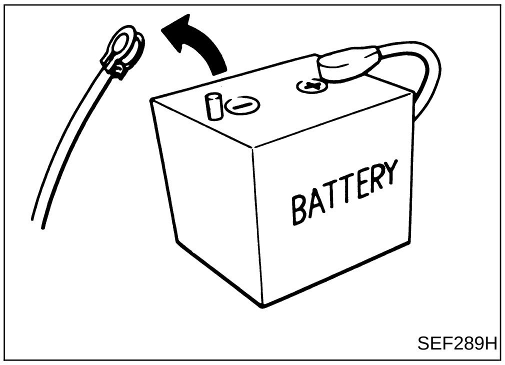


WHEN STARTING
- Do not depress accelerator pedal when starting.
- Immediately after starting, do not rev up engine unnecessarily.
- Do not rev up engine just prior to shutdown.

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

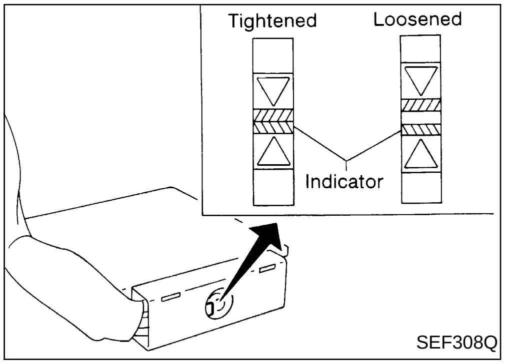
AEC878A

Precautions



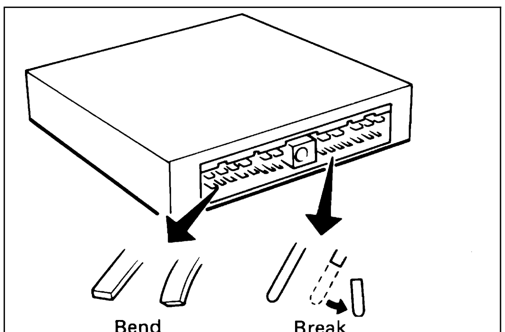
SEF289H

- **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.**



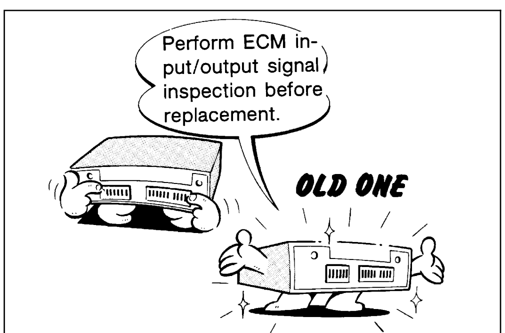
SEF308Q

- **When connecting ECM harness connector, tighten securing bolt until the gap between orange indicators disappears.**
  : 3.0 - 5.0 N·m(0.3 - 0.5 kg-m, 26 - 43 in-lb)



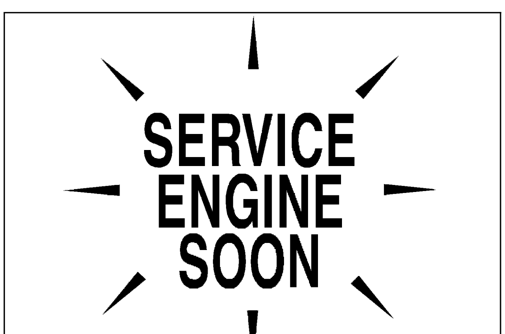
SEF291H

- **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.



MEF040D

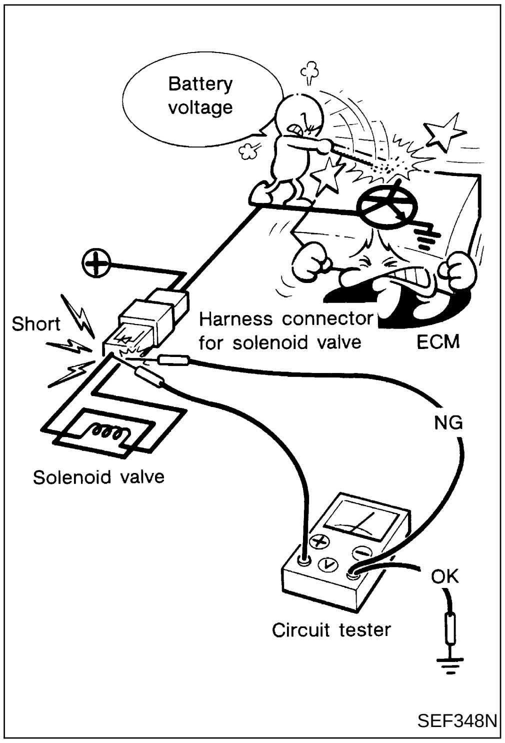
- **Before replacing ECM, perform Terminals and Reference Value inspection and make sure ECM functions properly. Refer to EC-98.**



SEF217U

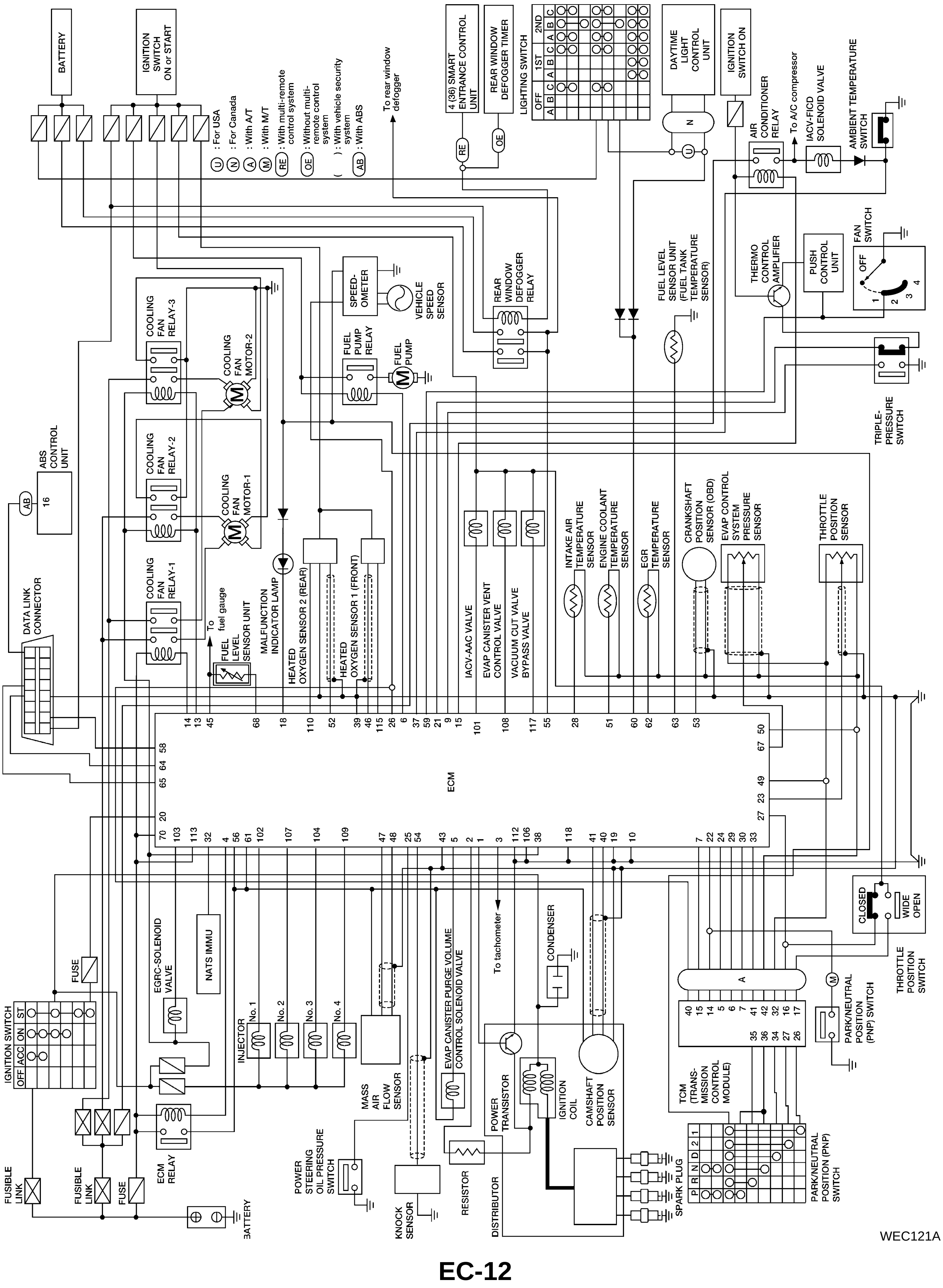
- **After performing each TROUBLE DIAGNOSIS, perform "OVERALL FUNCTION CHECK" or "DTC (Diagnostic Trouble Code) CONFIRMATION PROCEDURE".**
  The DTC should not be displayed in the "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" if the repair is completed. The "OVERALL FUNCTION CHECK" should be a good result if the repair is completed.

Precautions (Cont'd)



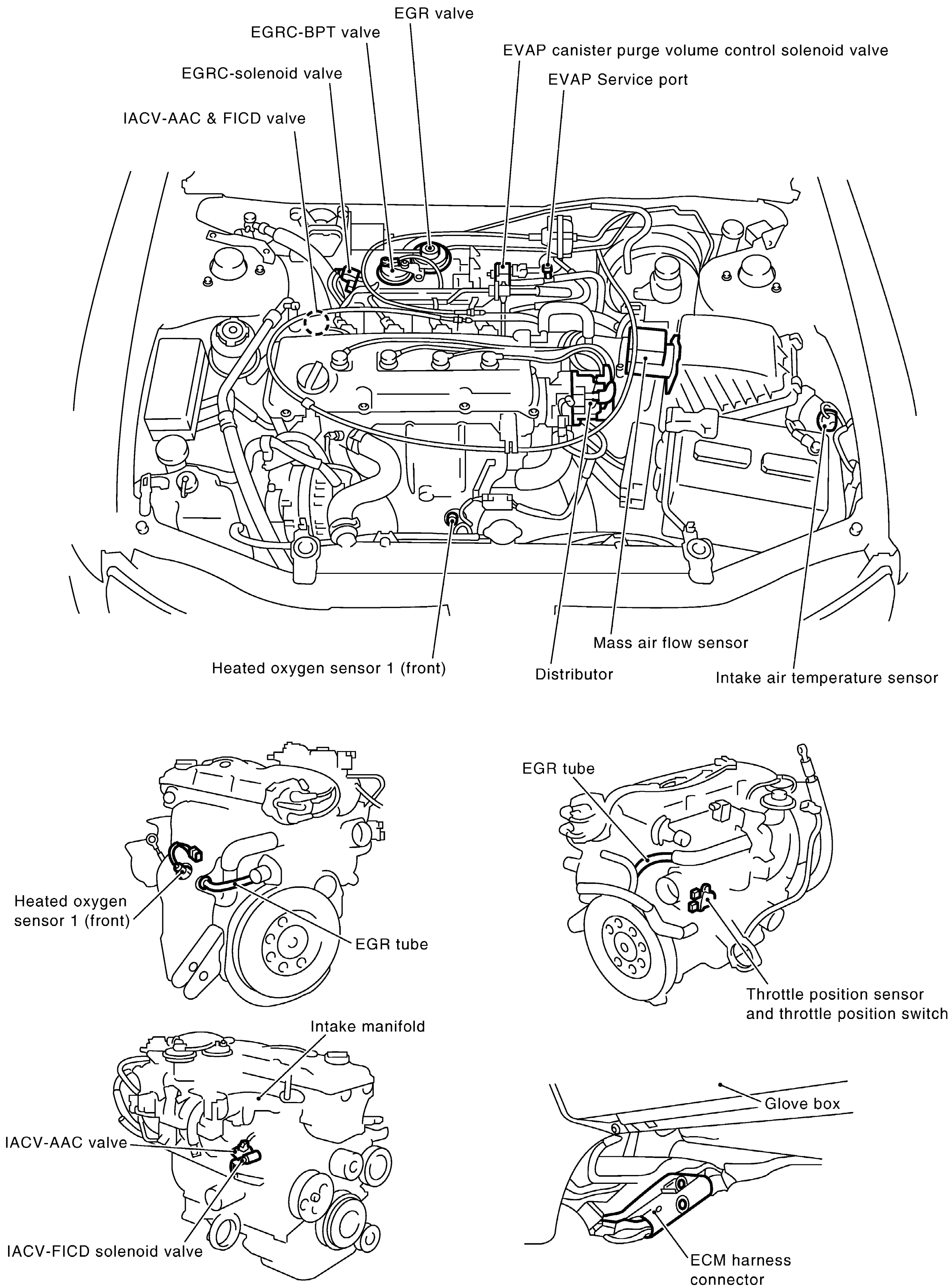
- **When measuring ECM signals with a circuit tester, never allow the two tester probes to contact. Accidental contact of probes will cause a short circuit and damage the ECM power transistor.**
- **Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to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

Circuit Diagram



WEC121A

Engine Control Component Parts Location



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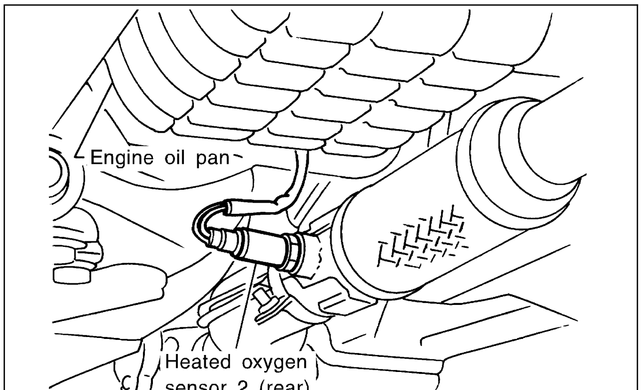
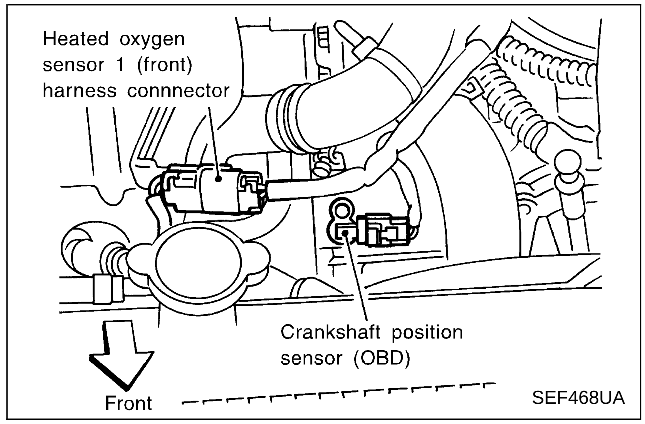
Engine Control Component Parts Location (Cont'd)



SEF469UA



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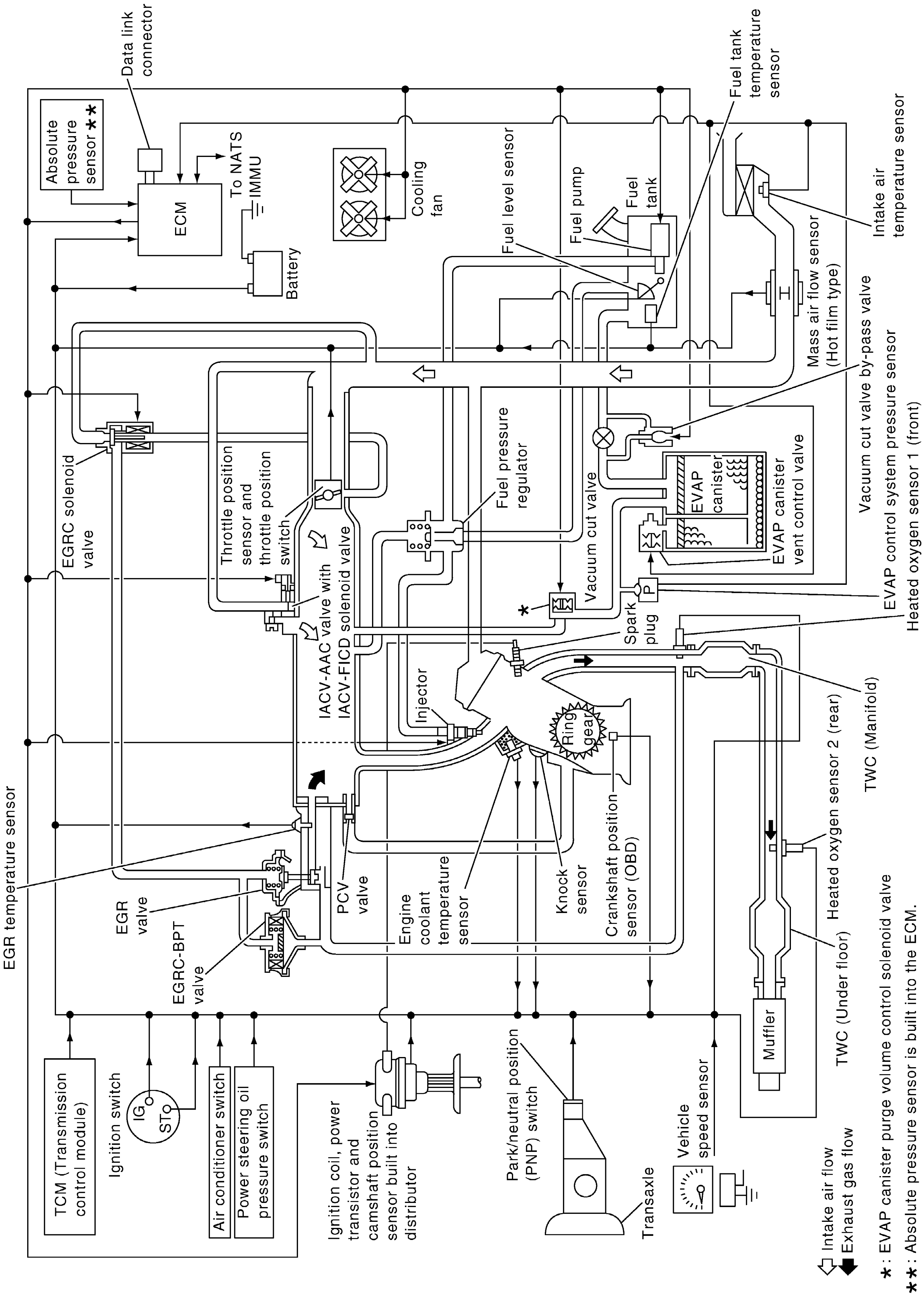
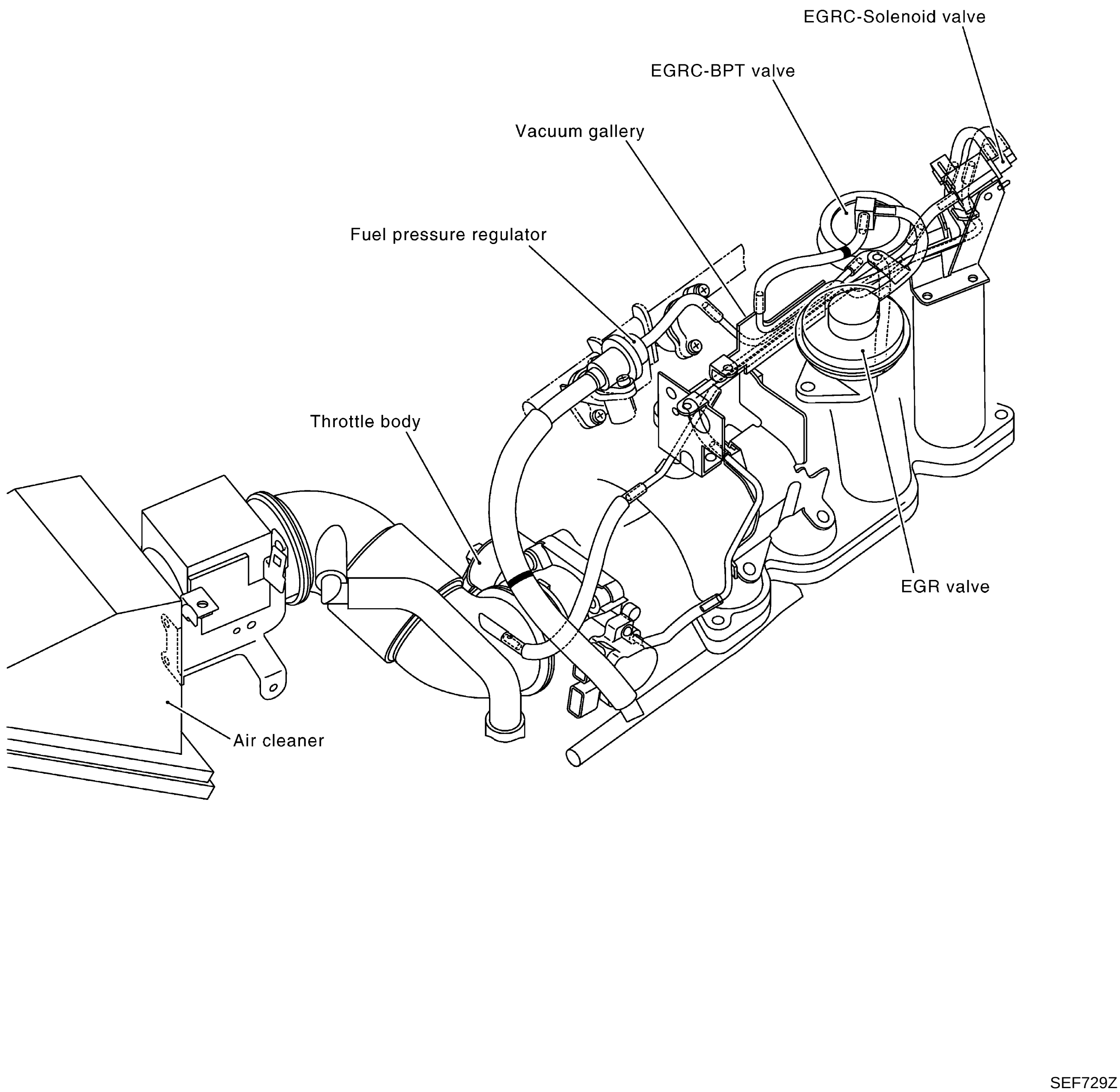
System Diagram



SEF849Z

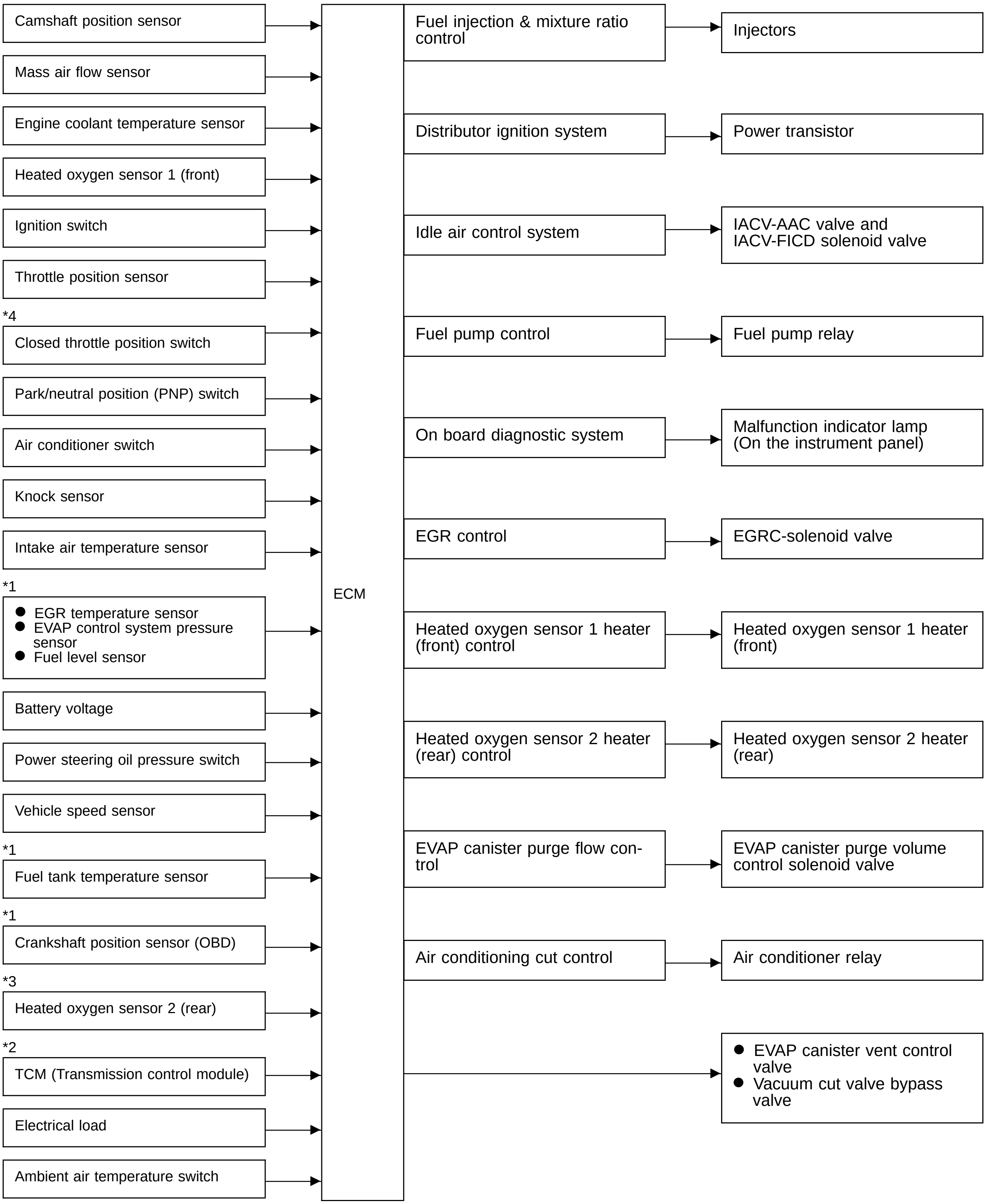
Vacuum Hose Drawing



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

Refer to “System Diagram”, EC-15, for vacuum control system.

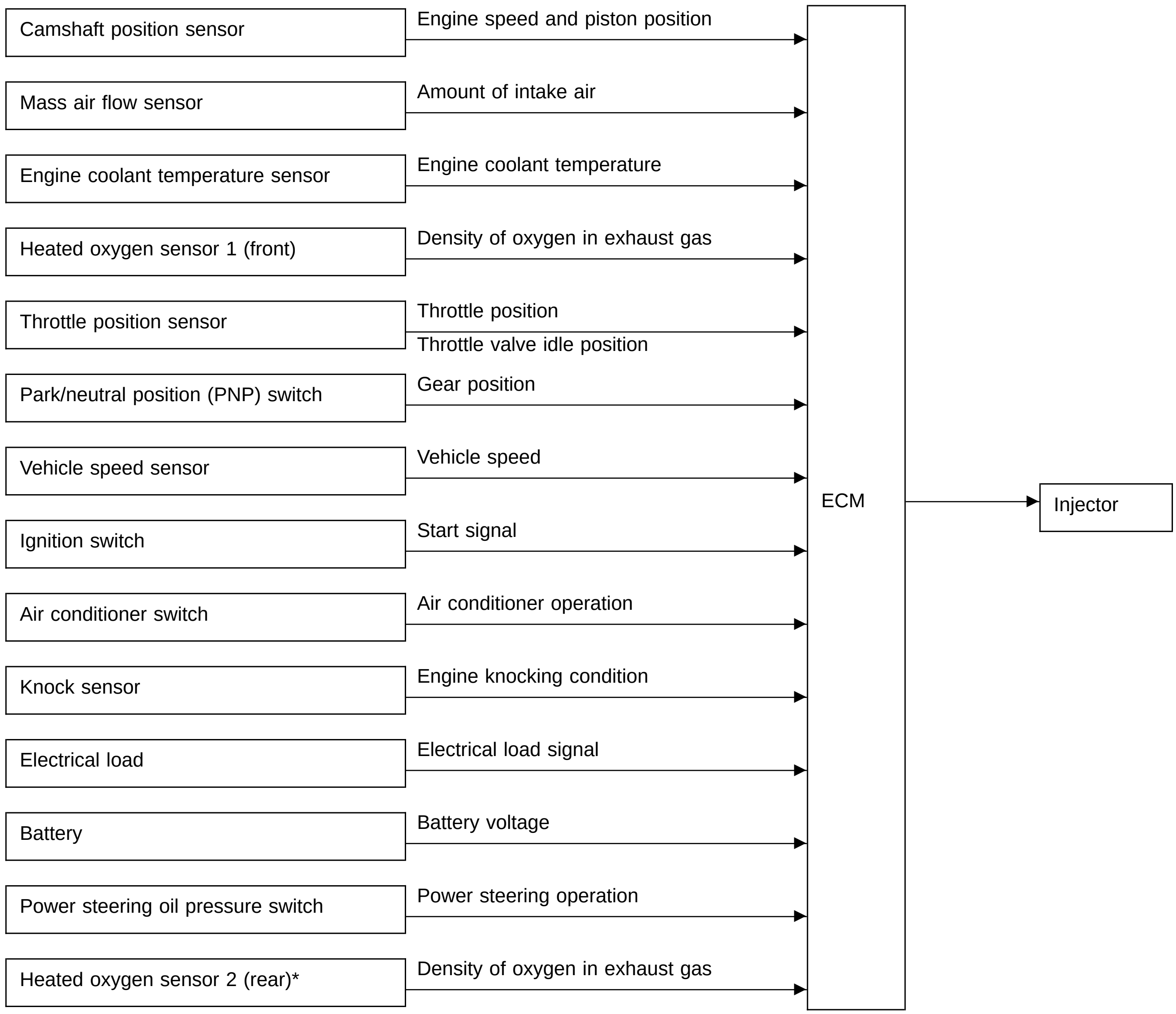
System Chart



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

Multiport Fuel Injection (MFI) System

INPUT/OUTPUT SIGNAL LINE



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

BASIC MULTIPORT FUEL INJECTION SYSTEM

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.

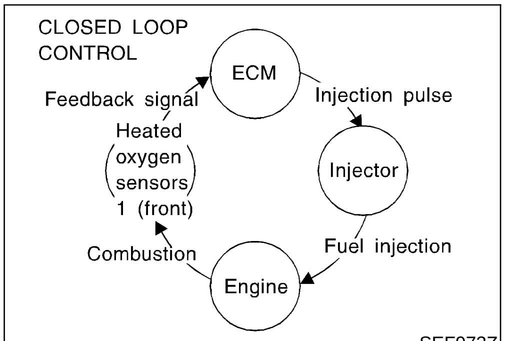
<Fuel increase>

- 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

Multiport Fuel Injection (MFI) System (Cont'd)



SEF973Z

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 (front) 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 (front), refer to EC-156, 163. 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 (rear) is located downstream of the three way catalyst. Even if the switching characteristics of the heated oxygen sensor 1 (front) shift, the air-fuel ratio is controlled to stoichiometric by the signal from the heated oxygen sensor 2 (rear).

OPEN LOOP CONTROL

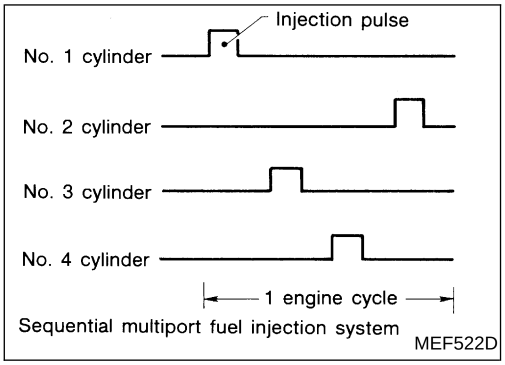
The open loop system condition refers to when the ECM detects any of the following conditions. Feedback control stops in order to maintain stabilized fuel combustion.

- Deceleration and acceleration
- High-load, high-speed operation
- Malfunction of heated oxygen sensor 1 (front) or its circuit
- Insufficient activation of heated oxygen sensor 1 (front) 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 (front). 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 (front) 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.

Multiport Fuel Injection (MFI) System (Cont'd)

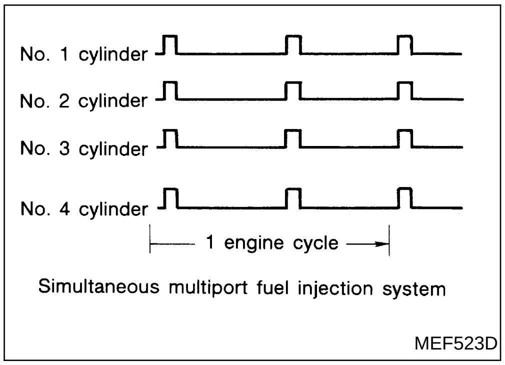


FUEL INJECTION TIMING

Two types of systems are used.

Sequential multiport fuel injection system

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



Simultaneous multiport fuel injection system

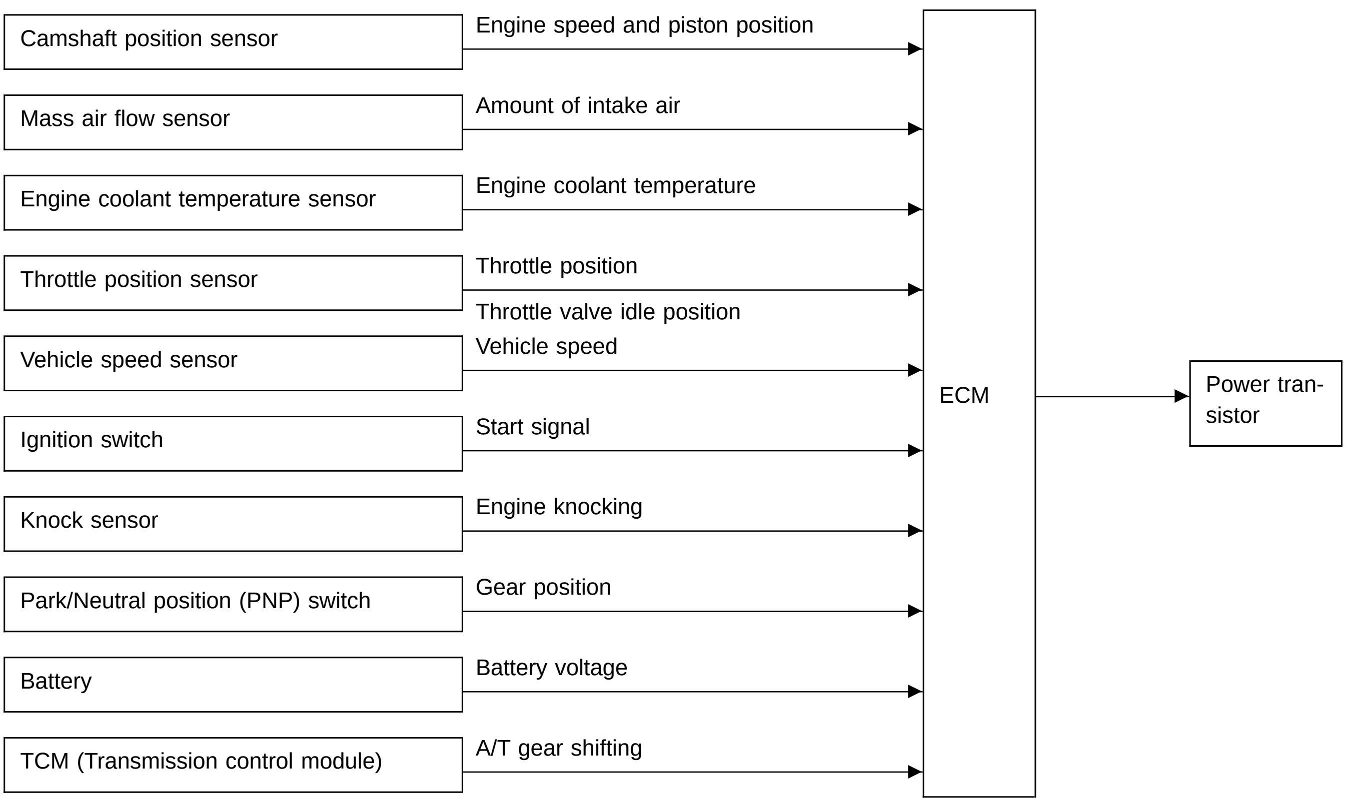
Fuel is injected simultaneously into all four cylinders twice each engine cycle. In other words, pulse signals of the same width are simultaneously transmitted from the ECM.
The four injectors will then receive the signals two times for each engine cycle.
This system is used when the engine is being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

FUEL SHUT-OFF

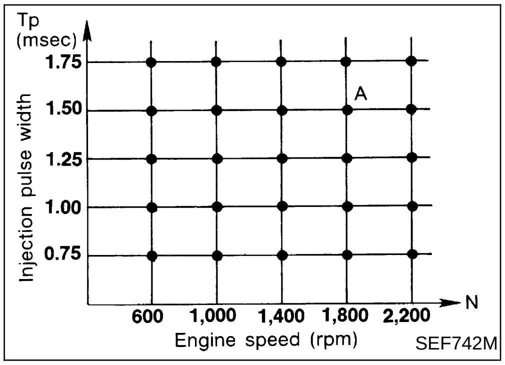
Fuel to each cylinder is cut off during deceleration or operation of the engine at excessively high speeds.

Distributor Ignition (DI) System

INPUT/OUTPUT SIGNAL LINE



Distributor Ignition (DI) System (Cont'd)



SEF742M

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

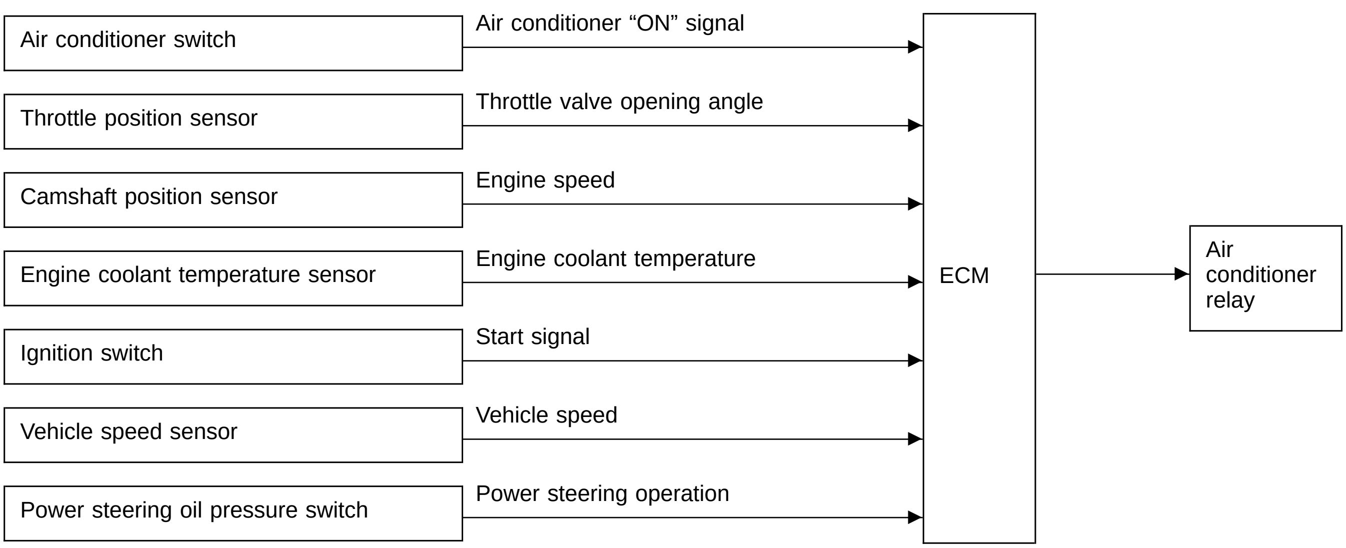
During the following conditions, the ignition timing is revised by the ECM according to the other data stored in the ECM.

- 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

INPUT/OUTPUT SIGNAL LINE



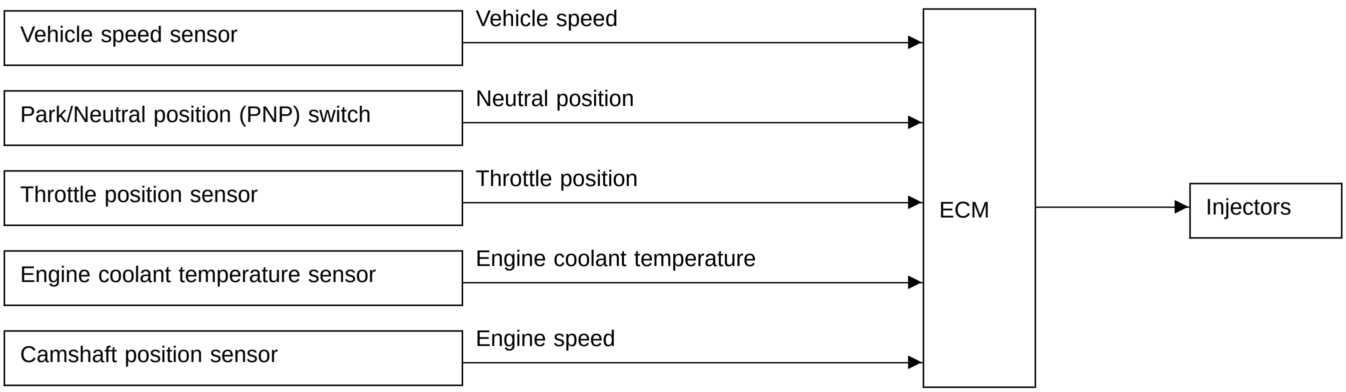
SYSTEM DESCRIPTION

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

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

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

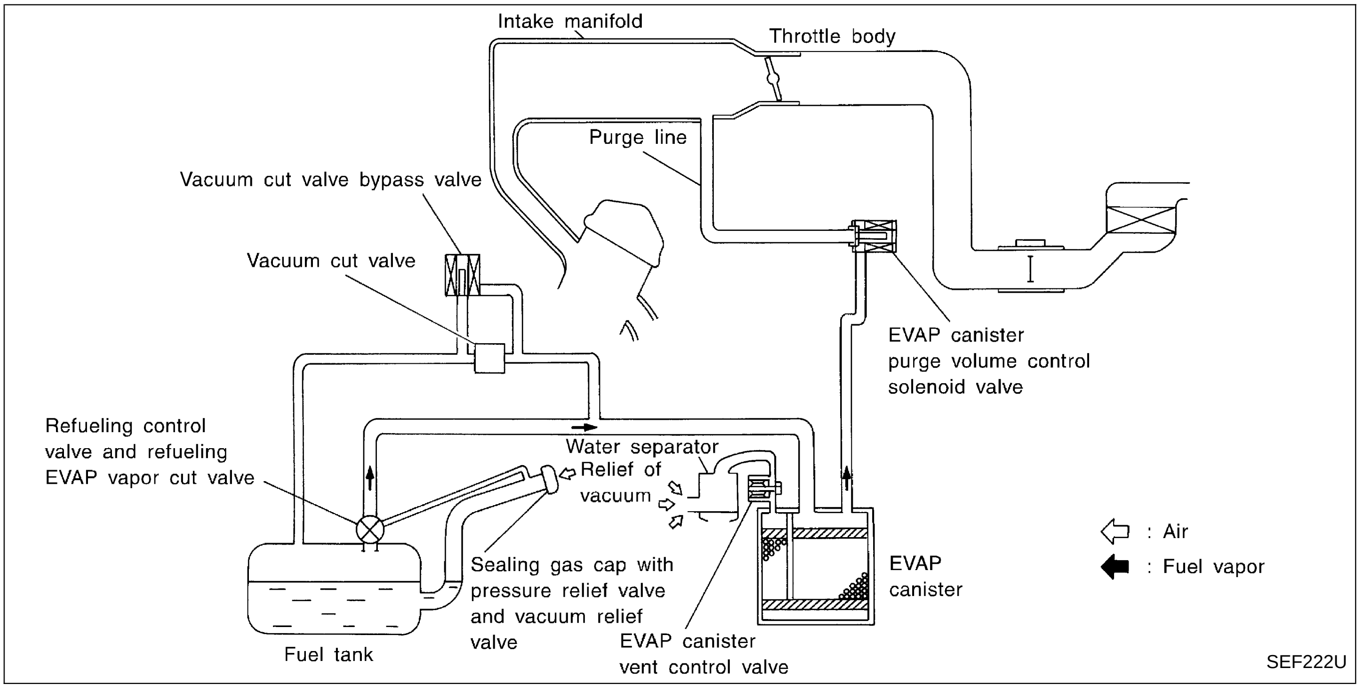
INPUT/OUTPUT SIGNAL LINE



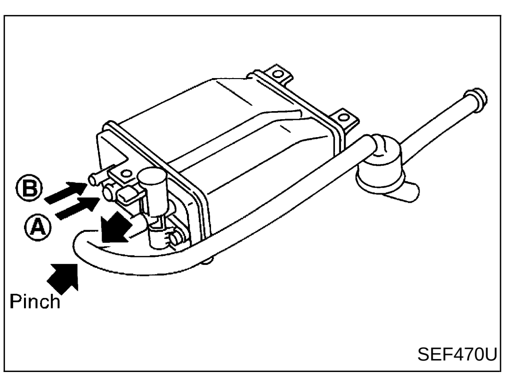
If the engine speed is above 4,000 rpm with no load, (for example, in neutral and engine speed over 4,000 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed.
Fuel cut will operate until the engine speed reaches 2,000 rpm, then fuel cut is cancelled.

NOTE:
This function is different from deceleration control listed under “Multiport Fuel Injection (MFI) System”, EC-18.

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 engine control module. 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.



Inspection

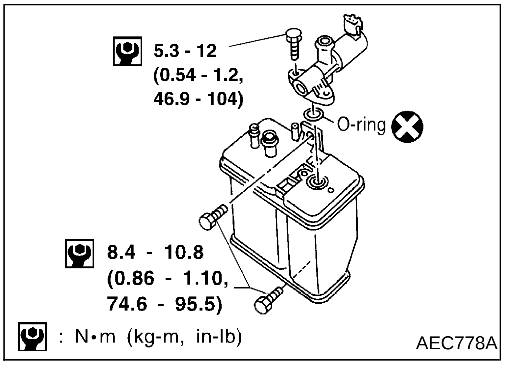
EVAP CANISTER

Check EVAP canister as follows:
1. Pinch the fresh air hose.
2. Blow air into port Ⓐ and check that air flows freely through port Ⓑ.

GI MA EM LC EC FE CL MT AT FA RA BR ST RS BT HA EL IDX

Inspection (Cont'd)

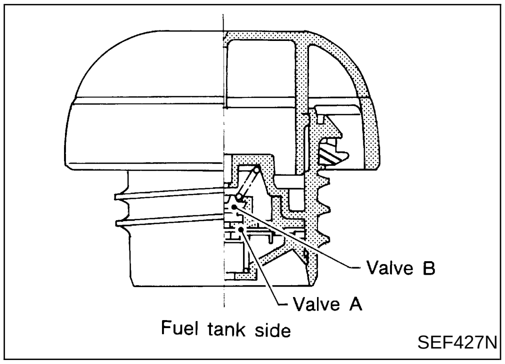
TIGHTENING TORQUE

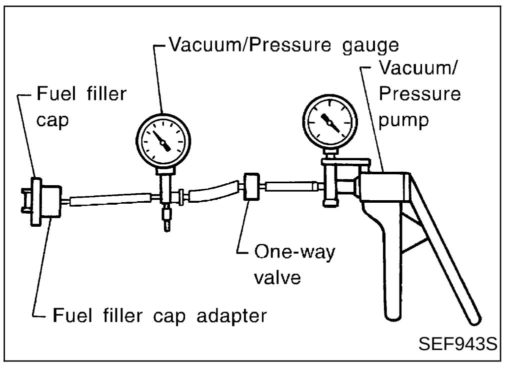


Tighten EVAP canister as shown in the figure.

Make sure new O-ring is installed properly between EVAP canister and EVAP vent control valve.

FUEL TANK VACUUM RELIEF VALVE (Built into fuel filler cap)





1. Wipe clean valve housing.
2. Check valve opening pressure and vacuum.

   Pressure:

   16.0 - 20.0 kPa (0.163 - 0.204 kg/cm^2, 2.32 - 2.90 psi)

   Vacuum:

   −6.0 to −3.3 kPa (−0.061 to −0.034 kg/cm^2, −0.87 to −0.48 psi)
3. If out of specification, replace fuel filler cap as an assembly.

CAUTION:

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

VACUUM CUT VALVE

Refer to EC-420.

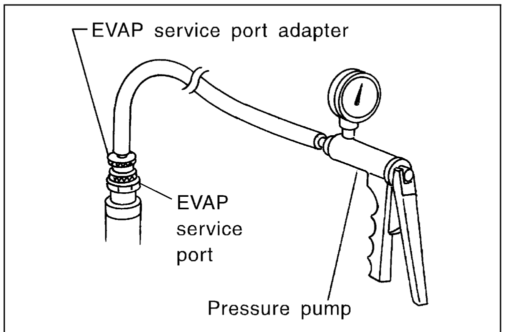
EVAPORATIVE EMISSION (EVAP) CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-386.

FUEL TANK TEMPERATURE SENSOR

Refer to EC-240.

Inspection (Cont’d)



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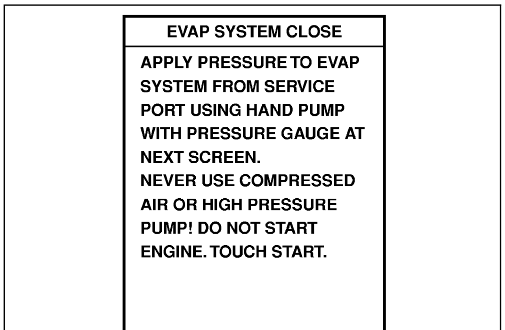
EVAP SERVICE PORT

Positive pressure is delivered to the evaporator system through the evaporator service port. If fuel vapor leakage in the evaporator system occurs, use a leak detector to locate the leak.



PEF658U

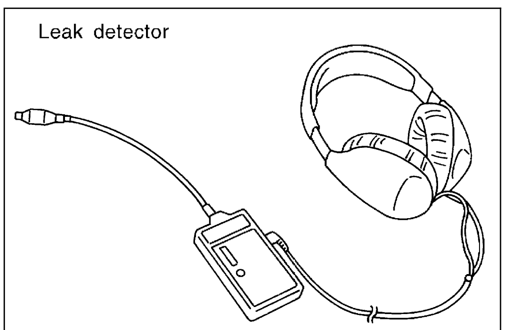
How to detect fuel vapor leakage

CAUTION:

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

NOTE:

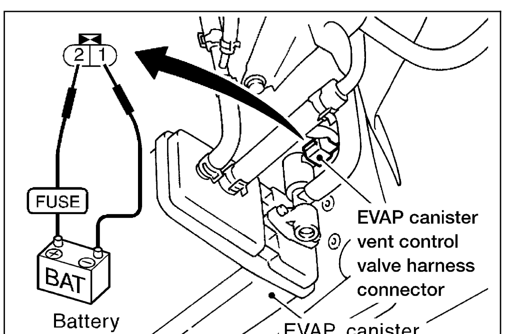
Improper installation of adapter to the service port may cause a leak.



SEF200U

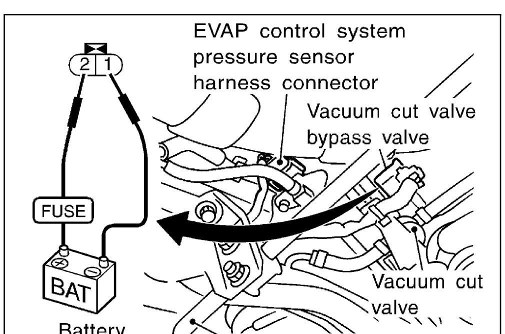
1. Attach the EVAP service port adapter securely to the EVAP service port.
2. Also attach the pressure pump and hose.
3. Turn ignition switch “ON”.
4. Select the “EVAP SYSTEM CLOSE” of “WORK SUPPORT MODE” with CONSULT-II.
5. Touch “START”. A bar graph (Pressure indicating display) will appear on the screen.
6. Apply positive pressure to the EVAP system until the pressure indicator reaches the middle of the bar graph.
7. Locate the leak using a leak detector. Refer to “Evaporative Emission Line Drawing”, EC-26.

OR



AEC779A

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. Locate the leak using a leak detector. Refer to “Evaporative Emission Line Drawing”, EC-26.



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GI
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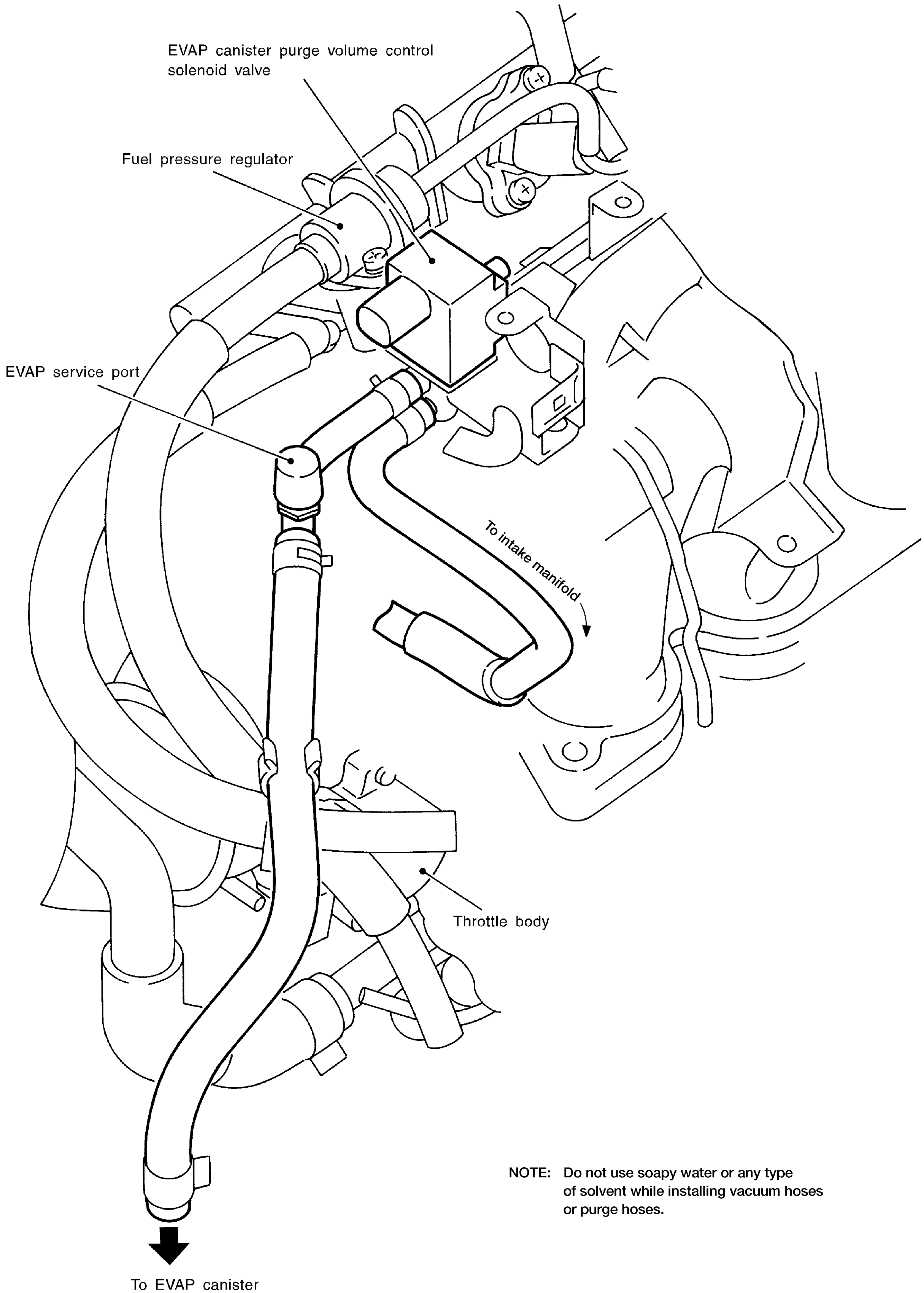
Evaporative Emission Line Drawing



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

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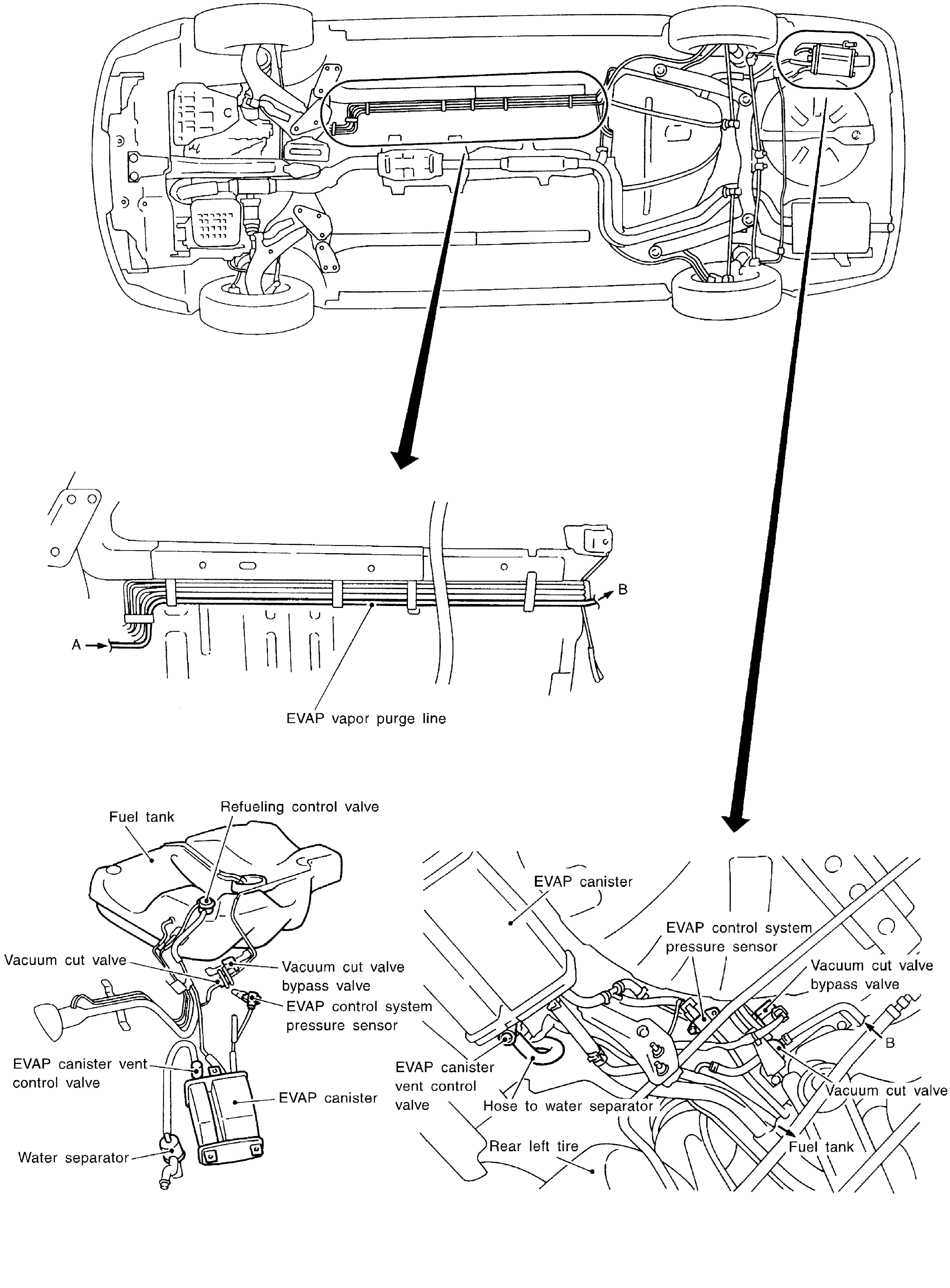
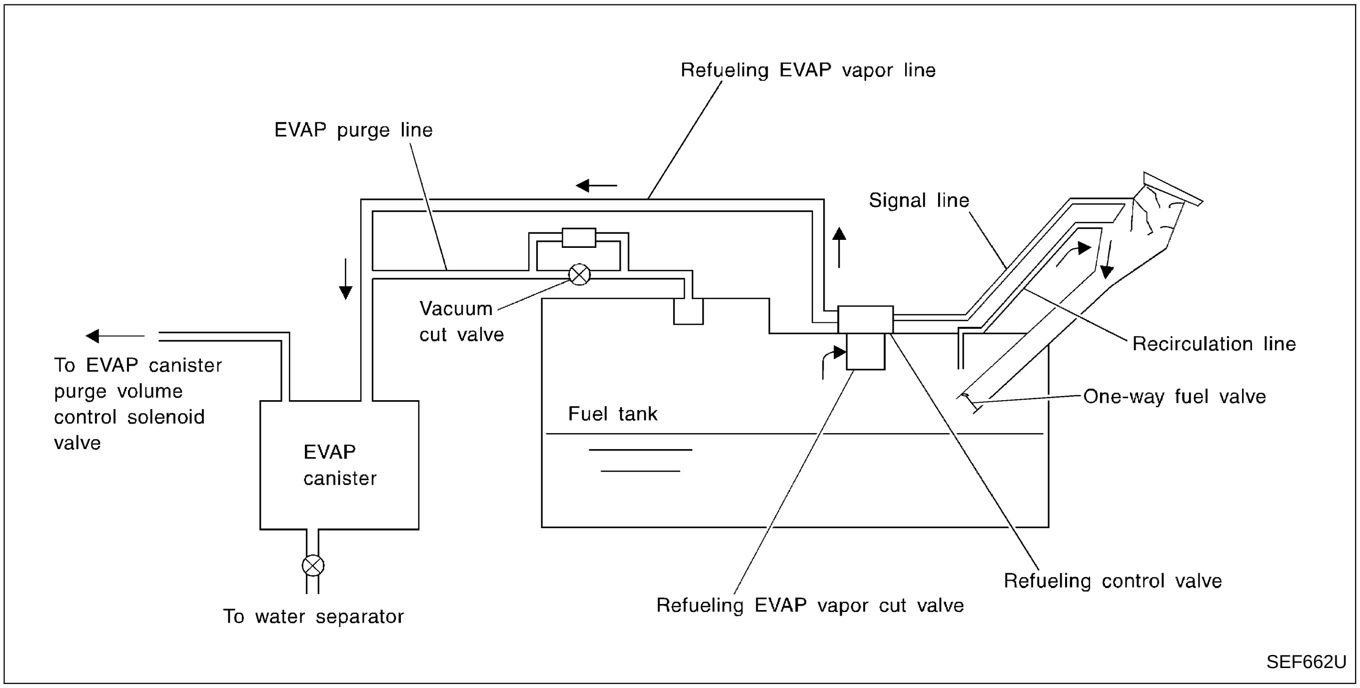
Evaporative Emission Line Drawing (Cont'd)



SEF472U

On Board Refueling Vapor Recovery (ORVR)

SYSTEM DESCRIPTION



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:**

a. **Put drained fuel in an explosion-proof container and put lid on securely.**
b. **Release fuel pressure from fuel line. Refer to "Fuel Pressure Release", EC-34.**
c. **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.**

On Board Refueling Vapor Recovery (ORVR) (Cont'd)

DIAGNOSTIC PROCEDURE

SYMPTOM: Fuel odor from EVAP canister is strong.

INSPECTION START

↓

CHECK COMPONENT
(EVAP canister).
Check EVAP canister for water.
Weigh the EVAP canister with vent control valve attached.
If the weight is:
More than 1.8 kg (4.0 lb) → NG
Less than 1.8 kg (4.0 lb) → OK
If OK, check if water drains from the canister.
Water should not drain from the EVAP canister.

NG → Replace EVAP canister and check the following.
1. Check hose connections to the EVAP canister and water separator for clogging and poor connection.
2. Check water separator. Refer to "COMPONENT INSPECTION", EC-292.
If NG, repair or replace hose or replace water separator.

↓ OK

CHECK COMPONENT
(Refueling EVAP vapor cut valve).
Check refueling EVAP vapor cut valve for open.
Refer to "COMPONENT INSPECTION", EC-31.

NG → Replace refueling EVAP vapor cut valve with fuel tank.

↓ OK

CHECK COMPONENT
(Refueling control valve).
Check refueling control valve diaphragm for damage. Blow air from port C, check that there is no air flow from the port C.
Refer to "COMPONENT INSPECTION", EC-31.

NG → Replace refueling control valve.

↓ OK

INSPECTION END

On Board Refueling Vapor Recovery (ORVR) (Cont'd)

SYMPTOM: Cannot refuel/Fuel odor from the fuel filler opening is strong while refueling.

INSPECTION START

↓

CHECK COMPONENT
(Water separator and EVAP canister).
1. Check water separator for insect nests or debris. Refer to "COMPONENT INSPECTION", EC-292.
2. Weigh the EVAP canister with vent control valve attached.
   If the weight is:
   More than 1.8 kg (4.0 lb) → NG
   Less than 1.8 kg (4.0 lb) → OK

If OK, check if water drains from the canister. Water should not drain from the EVAP canister.

NG → Replace water separator or EVAP canister and check hose connector to EVAP canister and water separator for clogging and poor connection. If NG, repair or replace hose.

↓ OK

CHECK COMPONENT
(Vent hoses and vent tubes).
Check hoses and tubes between EVAP canister and refueling control valve for clogging, kink, loosen and improper connection.

NG → Repair or replace hoses and tubes.

↓ OK

CHECK COMPONENT
(Filler neck tube).
Check signal line and recirculation line for clogging, dent and cracks.

NG → Replace filler neck tube.

↓ OK

CHECK COMPONENT
(Refueling control valve).
Refer to "COMPONENT INSPECTION" on next page.

NG → Replace refueling control valve.

↓ OK

CHECK COMPONENT
(Refueling EVAP vapor cut valve).
Refer to "COMPONENT INSPECTION" on next page.

NG → Replace fuel tank with refueling EVAP vapor cut valve.

↓ OK

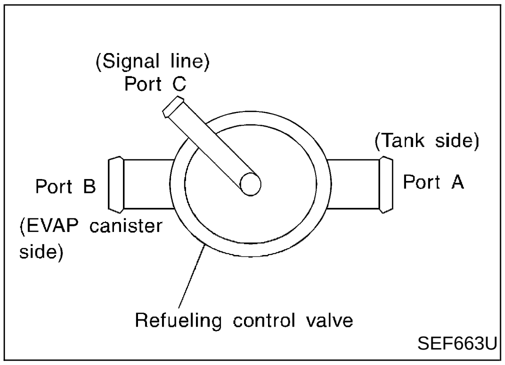
CHECK COMPONENT
(Fuel filler tube).
1. Check filler neck tube and hose connected to the fuel tank for clogging, dent and cracks.
2. Check one-way fuel valve for clogging. Refer to "COMPONENT INSPECTION", EC-32.

NG → Replace fuel filler tube or replace one-way fuel valve with fuel tank.

↓ OK

INSPECTION END

On Board Refueling Vapor Recovery (ORVR) (Cont'd)



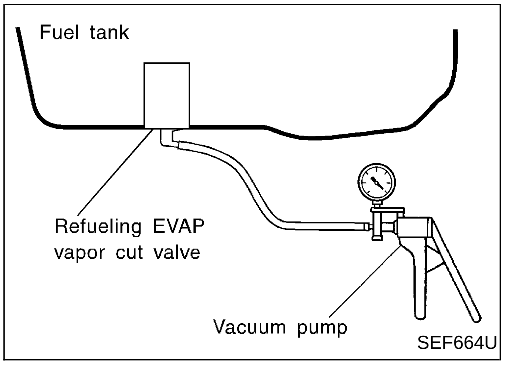
SEF663U

COMPONENT INSPECTION

Refueling control valve

Check refueling control valve as follows:
1. Check visually for cracks in the appearance.
2. Check air continuity between port A and B.
   Blow air into the port A. Air should flow freely through port B.
3. Blow air into port C and check there is no leakage.
4. Apply pressure to both port A and C [20 kPa (150 mmHg, 5.91 inHg)] and check there is no leakage from port B.

If NG, replace refueling control valve.



SEF664U

Refueling EVAP vapor cut valve

1. Remove fuel tank. Refer to "FUEL SYSTEM" in FE section.
   Drain fuel from the tank as follows:
   With CONSULT-II
   a. Remove fuel feed hose located on the fuel gauge retainer, and then connect a spare fuel hose to other side of the fuel container.
   b. Drain fuel using "FUEL PUMP RELAY" in "ACTIVE TEST" mode with CONSULT-II.

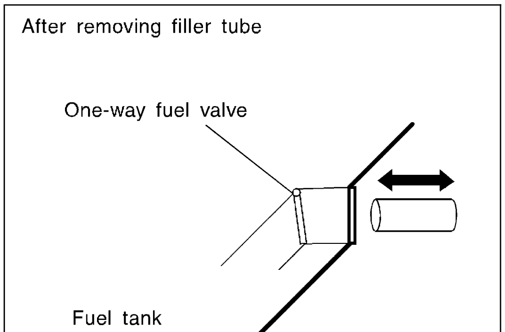
   Without CONSULT-II
   a. Remove fuel gauge retainer.
   b. Drain fuel from the tank using a hand pump into a fuel container.
2. Check valve head appearance visually for cracks.
3. Check refueling EVAP vapor cut valve for being stuck to close as follows.
   Blow air into the refueling EVAP vapor cut valve, 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 cut valve.
b. Remove fuel gauge retainer with fuel gauge unit.

Always replace O-ring with new one.

c. Put fuel filler tank upside down.
d. Apply negative pressure [−13.3 kPa (−100 mmHg, −3.94 inHg)] with fuel gauge retainer remaining open and check that the pressure is applicable.
   If NG, replace refueling EVAP vapor cut valve with fuel tank.

On Board Refueling Vapor Recovery (ORVR) (Cont'd)



SEF665U

One-way fuel valve

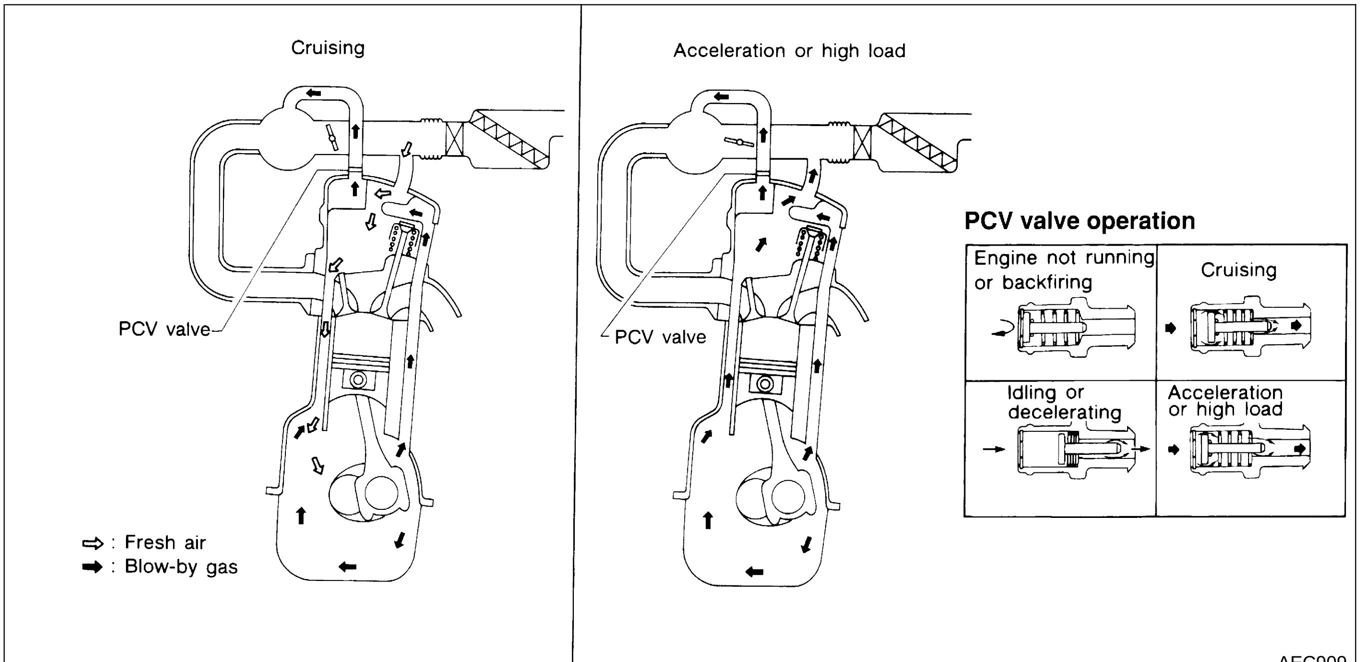
1. Drain fuel from the tank.
   Refer to "COMPONENT INSPECTION" of refueling EVAP vapor cut valve, EC-31.
2. Remove fuel filler tube and hose.
3. Check one-way fuel valve for operation.
   When a stick is inserted, the valve should open, when removing stick it should close.

Do not drop any material into the tank.

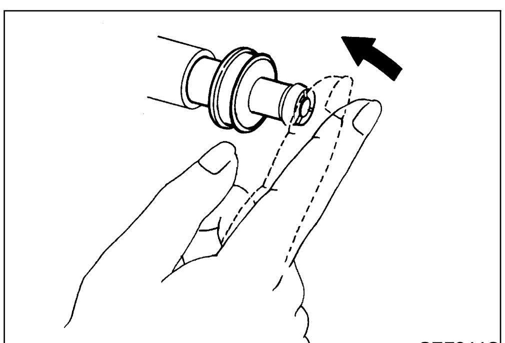
If NG, replace one-way fuel valve with fuel tank.

Description

This system returns blow-by gas to the intake collector.
The positive crankcase ventilation (PCV) valve is provided to conduct crankcase blow-by gas to the intake manifold.
During partial throttle operation of the engine, the intake manifold sucks the blow-by gas through the PCV valve.
Normally, the capacity of the valve is sufficient to handle any blow-by and a small amount of ventilating air.
The ventilating air is then drawn from the air duct into the crankcase. In this process the air passes through the hose connecting air inlet tubes to rocker cover.
Under full-throttle condition, the manifold vacuum is insufficient to draw the blow-by flow through the valve. The flow goes through the hose connection in the reverse direction.
On vehicles with an excessively high blow-by, the valve does not meet the requirement. This is because some of the flow will go through the hose connection to the intake collector under all conditions.



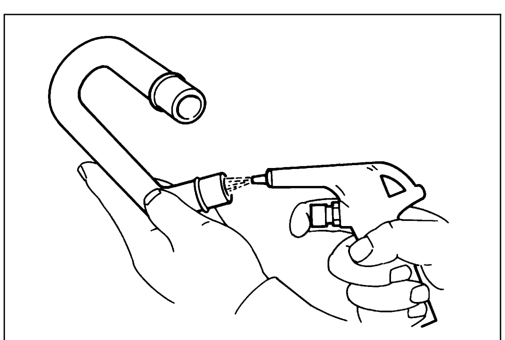
AEC909


SEF244Q

Inspection

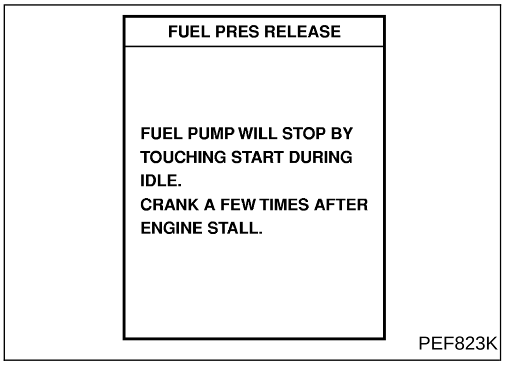
PCV (Positive Crankcase Ventilation) VALVE

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

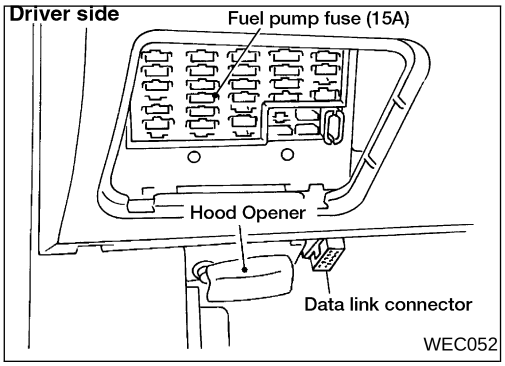

ET277

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.



PEF823K



WEC052

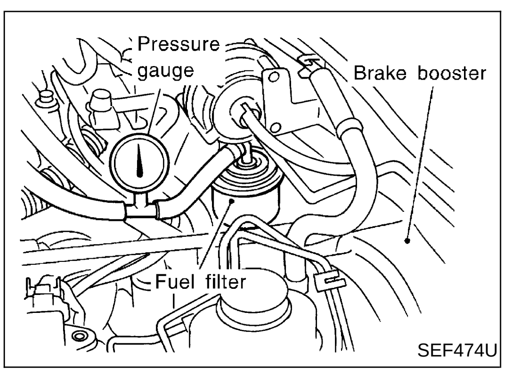
Fuel Pressure Release

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

1. Start engine.
2. Perform “FUEL PRESSURE RELEASE” in “WORK SUPPORT” mode to release fuel pressure to zero.
3. After engine stalls, crank it two or three times to make sure that fuel pressure is released.
4. Turn ignition switch OFF.

OR

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.



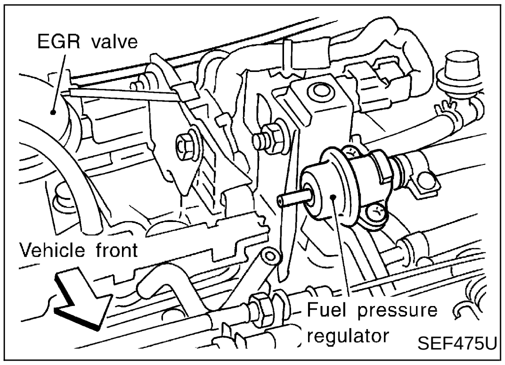
SEF474U

Fuel Pressure Check

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

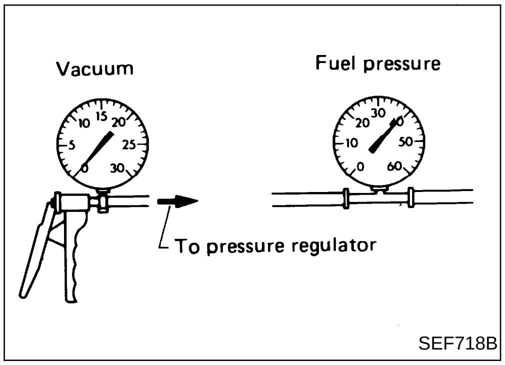
1. Release fuel pressure to zero.
2. Disconnect fuel hose between fuel filter and fuel tube (engine side).
3. Install pressure gauge between fuel filter and fuel tube.
4. Start engine and check for fuel leakage.

Fuel Pressure Check (Cont'd)



SEF475U

5. Read the indication of fuel pressure gauge.
   At idling:
   With vacuum hose connected
   Approximately 235 kPa (2.4 kg/cm^2, 34 psi)
   With vacuum hose disconnected
   Approximately 294 kPa (3.0 kg/cm^2, 43 psi)
   If results are unsatisfactory, perform Fuel Pressure Regulator Check.

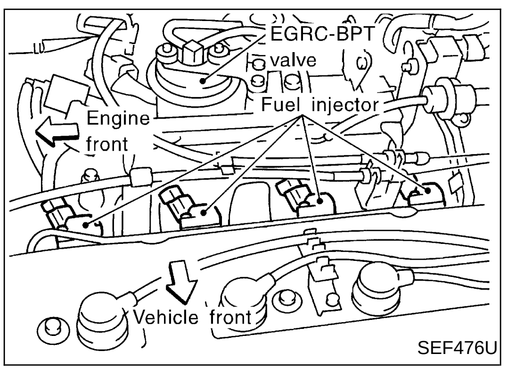


SEF718B

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.



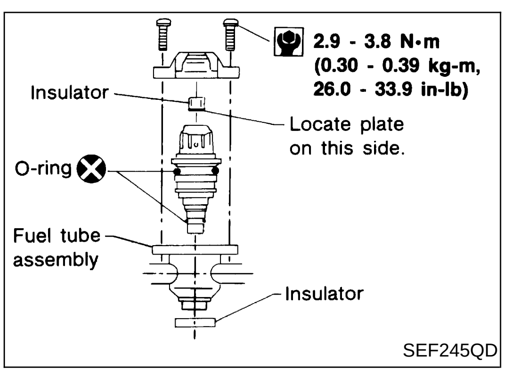
SEF476U

Injector Removal and Installation

1. Release fuel pressure to zero.
2. Remove injector tube assembly with injectors from intake manifold.
3. Remove injectors from injector tube assembly.
- Push injector tail piece.
- Do not pull on the connector.
4. Install injectors.
- Clean exterior of injector tail piece.
- Use new O-rings.

CAUTION:
After properly connecting injectors to fuel tube assembly, check connections for fuel leakage.

5. Assemble injectors to injector tube assembly.
6. Install injector tube assembly to intake manifold.

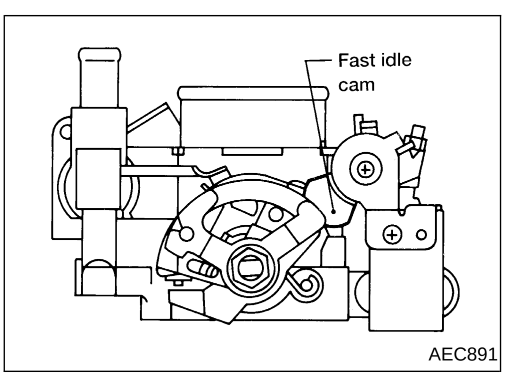


SEF245QD

Fast Idle Cam (FIC)

COMPONENT DESCRIPTION

The FIC is installed on the throttle body to maintain adequate engine speed while the engine is cold. It is operated by a volumetric change in wax located inside the thermo-element. The thermo-element is operated by engine coolant temperature.



AEC891

GI
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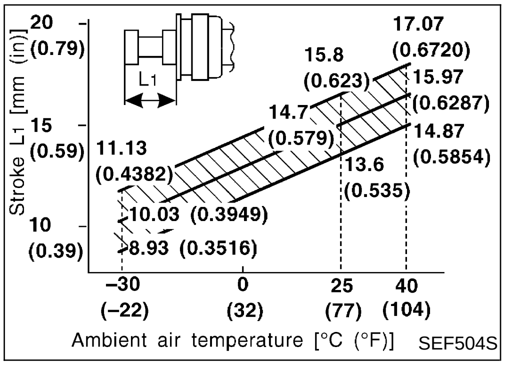
Fast Idle Cam (FIC) (Cont'd)



COMPONENT INSPECTION AND ADJUSTMENT

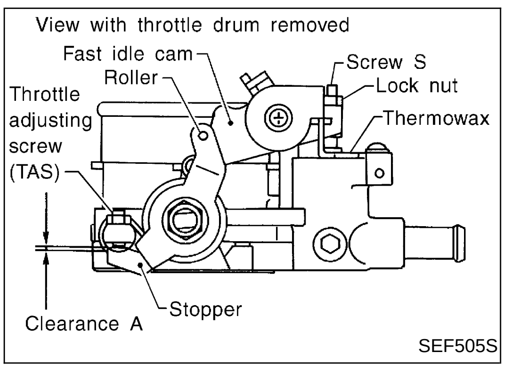
Perform inspection and adjustment as follows:

1. Make sure the engine has cooled down and remove the throttle body. Refer to "OUTER COMPONENT PARTS" in EM section.
2. Leave the throttle body for more than 3 hours so the temperature of the thermowax levels with the ambient air temperature.

Avoid direct sunlight or other heat source (heater, air conditioner, etc.).

3. Check dimension L_1 without removing thermowax from throttle body. Measure ambient air temperature with a thermometer.

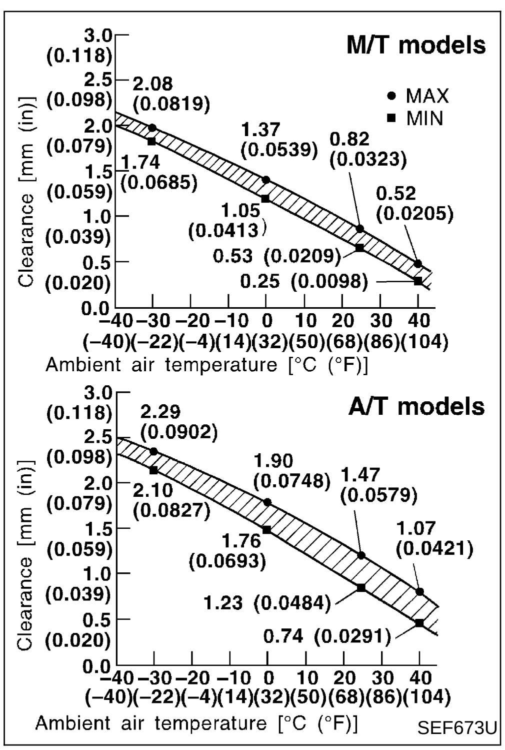
L_1 dimension	Judgement and remedy
Inside hatched area	The thermowax is normal. Perform FIC adjustment. Go to step 4.
Outside hatched area	Replace the thermowax and install the FIC. Perform adjustment from step 2.



4. Check the clearance A between the stopper and the throttle adjusting screw (TAS). If not within specifications (the hatched area as shown in the figure below), adjust clearance using screw S.

Do not adjust the clearance using the throttle adjusting screw (TAS).

5. After adjusting clearance A, tighten the lock nut of screw S.
6. Install the throttle body. Refer to "OUTER COMPONENT PARTS" in EM section.
7. Warm up engine to normal operating temperature. Confirm there is clearance between FIC and roller.



Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment

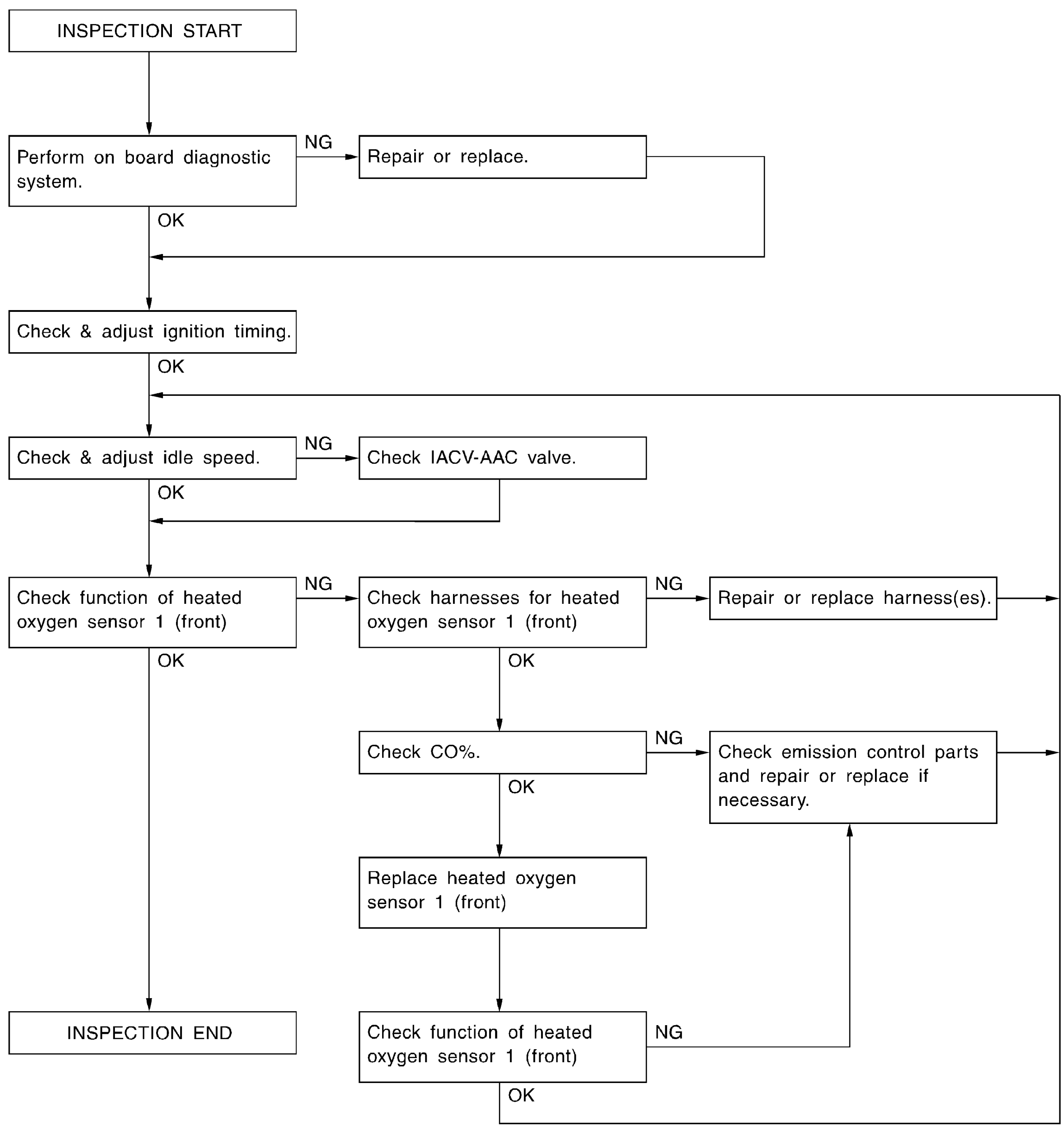
PREPARATION

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

(1) Battery
(2) Ignition system
(3) Engine oil and coolant levels
(4) Fuses
(5) ECM harness connector
(6) Vacuum hoses
(7) Air intake system
(Oil filler cap, oil level gauge, etc.)
(8) Fuel pressure
(9) Engine compression
(10) EGR valve operation
(11) Throttle valve
(12) EVAP system

- On models equipped with air conditioner, checks should be carried out while the air conditioner is “OFF”.
- 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 “N” position.
- When measuring “CO” percentage, insert probe more than 40 cm (15.7 in) into tail pipe.
- Turn off headlamps, heater blower, rear defogger.
- Keep front wheels pointed straight ahead.
- Make the check after the cooling fan has stopped.

Overall inspection sequence

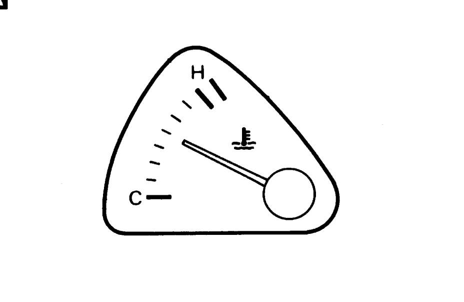


SEF554Y

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.

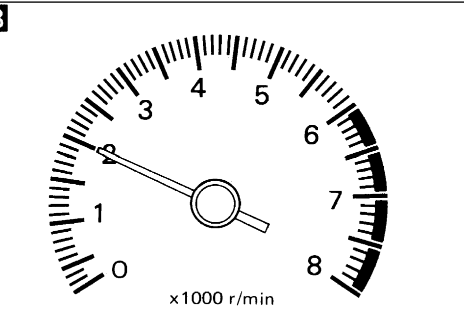
Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment (Cont'd)

A



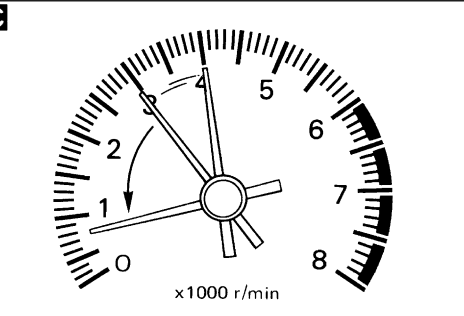
SEF810K

B



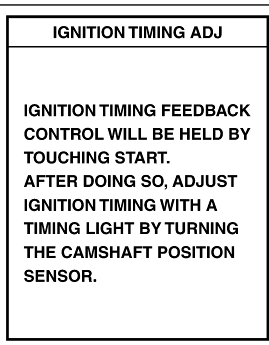
SEF247F

C



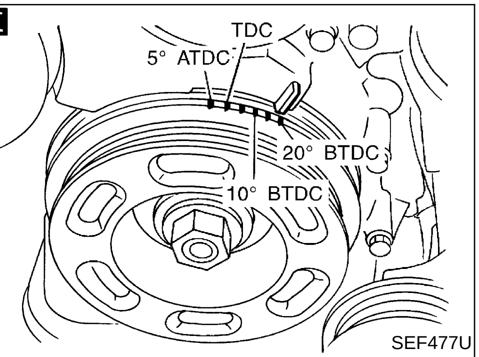
SEF248F

D



PEF546N

E



SEF477U

START

↓

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

↓

A

Start engine and warm it up until engine coolant temperature indicator points to the middle of gauge and ensure that engine speed is below 1,000 rpm.

↓

B

Open engine hood and run engine at about 2,000 rpm for about 2 minutes under no-load.

↓

Perform ECM Self-diagnosis.

OK → C

NG → Repair or replace components as necessary. → C

C

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

↓

D

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

OR

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

↓

Rev engine (2,000 - 3,000 rpm) 2 or 3 times under no-load and run engine at idle speed.

↓

E

Check ignition timing with a timing light.

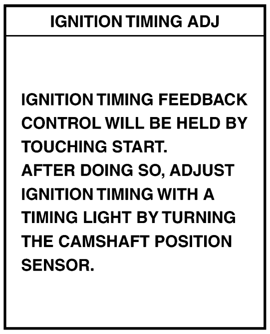
20°±2° BTDC (A/T in "N" position)

OK → A (Go to next page.)

NG → B (Go to next page.)

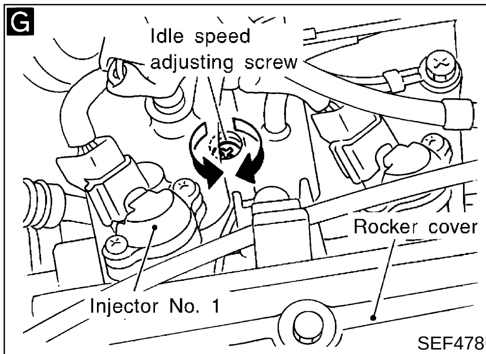
Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment (Cont'd)

F



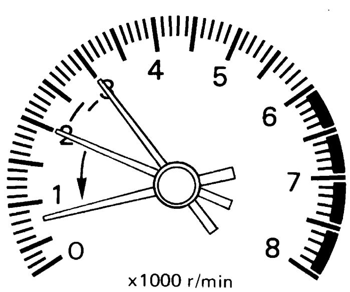
PEF546N

G



SEF478U

I



SEF602K

(A)

(B)

Adjust ignition timing to the specified value by turning distributor after loosening bolts which secure distributor. (→ A)

20°±2° BTDC (A/T in "N" position)

(G)

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

OR

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

F (A →)

Check base idle speed.

Read idle speed in "IGN TIMING ADJ" mode with CONSULT-II.

OR

Check idle speed.

650±50 rpm (A/T in "N" position)

OK → H; NG ↓

Rev engine (2,000 - 3,000 rpm) 2 or 3 times under no-load and run engine at idle speed.

G

Adjust idle speed by turning idle speed adjusting screw.

650±50 rpm (A/T in "N" position)

H

Touch "Back".

OR

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

I

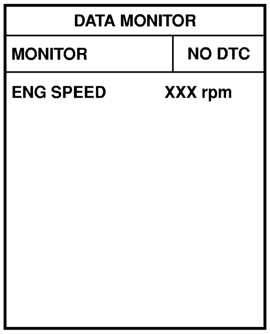
Rev engine (2,000 - 3,000 rpm) 2 or 3 times under no-load and run engine at idle speed.

(C)

(Go to next page.)

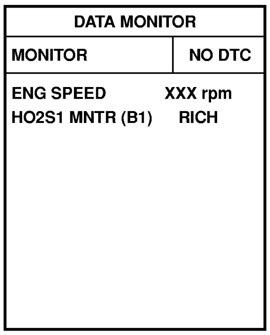
Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment (Cont'd)

J



SEF058Y

K



SEF820Y

C

J

Check target idle speed.

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

OR

Check idle speed.

700±50 rpm (A/T in "N" position)

OK → Run engine at about 2,000 rpm for about 2 minutes under no-load.

NG ↓

Check IACV-AAC valve and replace if necessary.

↓

Check IACV-AAC valve harness and repair if necessary.

↓

Check ECM function* by substituting another known good ECM.

↓

*: ECM may be the cause of a problem, but this is rarely the case.

Run engine at about 2,000 rpm for about 2 minutes under no-load.

↓

K

Check heated oxygen sensor 1 (front) signal.

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 cycle: RICH → LEAN → RICH
   2 cycles: RICH → LEAN → RICH → LEAN → RICH

OR

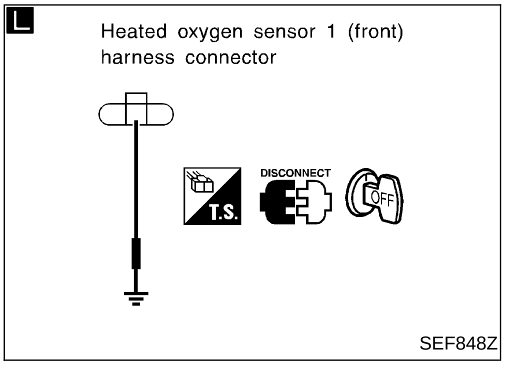
1. Run engine at about 2,000 rpm for about 2 minutes under no-load.
2. Set voltmeter probe between ECM terminal 46 and ground.
3. Make sure that the voltage fluctuates between 0 - 0.3V and 0.6 - 1.0V more than 5 times during 10 seconds at 2,000 rpm.
   1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
   2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

NG → D (Go to next page.)

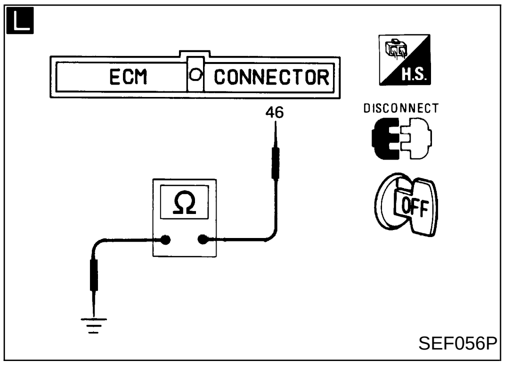
OK ↓

INSPECTION END

Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment (Cont'd)



SEF848Z



SEF056P

D

L

Check heated oxygen sensor 1 (front) harness:
1. Turn off engine and disconnect battery ground cable.
2. Disconnect ECM harness connector from ECM.
3. Disconnect heated oxygen sensor 1 (front) harness connector and connect terminal for heated oxygen sensor 1 (front) to ground with a jumper wire.
4. Check for continuity between terminal No. 46 of ECM harness connector and ground metal on vehicle body.

Continuity exists ... OK
Continuity does not exist ... NG

NG → Repair harness. → G (Go to EC-40.)

OK ↓

Connect ECM harness connector to ECM.

↓

1. Select "ENG COOLANT TEMP" in "ACTIVE TEST" mode.
2. Set "COOLANT TEMP" at 5°C (41°F).

OR

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

↓

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

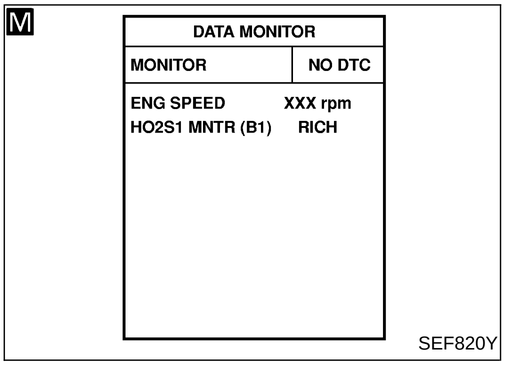
↓

Rev engine two or three times under no-load then run engine at idle speed.

↓

E
(Go to next page.)

Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment (Cont'd)



SEF820Y

E

Check "CO"%.

Idle CO: 1.8 - 10.5 % and engine runs smoothly.

After checking "CO"%
Touch "BACK".

OR

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

NG → Connect heated oxygen sensor 1 (front) harness connector to oxygen sensor 1 (front).

OK ↓

M

CHECK HEATED OXYGEN SENSOR 1 (front) SIGNAL.

1. Stop engine.
2. Replace heated oxygen sensor 1 (front).
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" 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

OR

1. Stop engine.
2. Replace heated oxygen sensor 1 (front).
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 46 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

NG → Connect heated oxygen sensor 1 (front) harness connector to oxygen sensor 1 (front).

OK → F (Go to EC-40.)

Connect heated oxygen sensor 1 (front) harness connector to oxygen sensor 1 (front).

↓

Check fuel pressure regulator.

↓

Check mass air flow sensor.

↓

Check injector and clean or replace if necessary.

↓

F
(Go to next page.)

Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment (Cont'd)

F

Check engine coolant temperature sensor.

Check ECM function* by substituting another known-good ECM.

G

(Go to EC-40.)

*: ECM may be the cause of a problem, but this is rarely the case.

- **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.**

Introduction

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

- 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.

	DTC	1st trip DTC	Freeze Frame data	1st trip Freeze Frame data	SRT code	Test value
Diagnostic test mode II (Self-diagnostic results)	X	X*1	—	—	—	—
CONSULT-II	X	X	X	X	X	—
GST	X	X*2	X	—	X	X

*1: When DTC and 1st trip DTC simultaneously appear on the display, they cannot be clearly distinguished from each other.
*2: 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-90).

Two Trip Detection Logic

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

X: Applicable —: Not applicable

Items	MIL				DTC		1st trip DTC	
	1st trip		2nd trip		1st trip displaying	2nd trip displaying	1st trip displaying	2nd trip displaying
	Blinking	Lighting up	Blinking	Lighting up				
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0304 is being detected	X	—	—	—	—	—	X	—
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0304 is being detected	—	—	X	—	—	X	—	—
Closed loop control — DTC: P1148	—	X	—	—	X	—	X	—
Fail-safe items (Refer to 90.)	—	X	—	—	X*1	—	X*1	—
Except above	—	—	—	X	—	X	X	—

*1: Except "ECM".

Emission-related Diagnostic Information

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”. Refer to EC-58.
For malfunctions in which 1st trip DTCs are displayed, refer to EC-56. 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 page EC-81. Then perform “Diagnostic trouble code confirmation procedure” or “Overall function check” to try to duplicate the problem. If the malfunction is duplicated, the item requires repair.

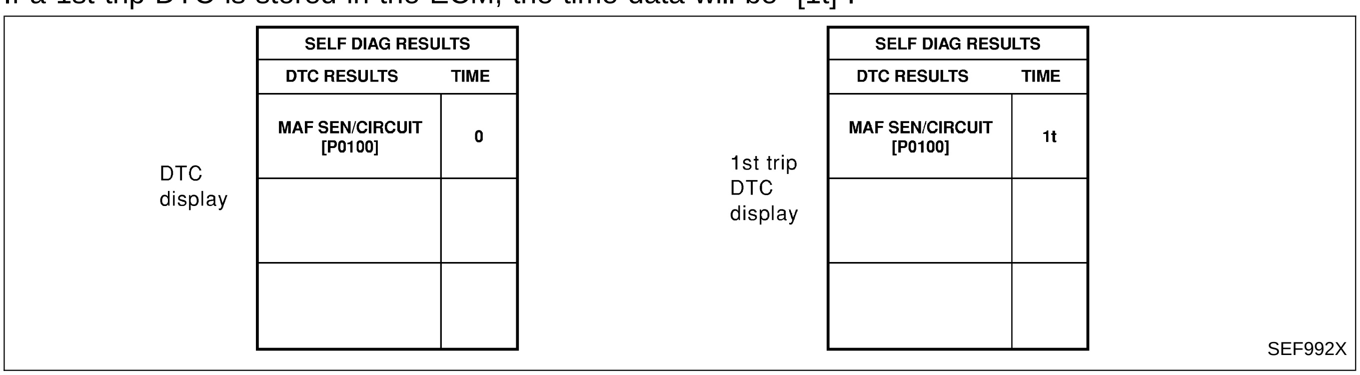
How to read DTC and 1st trip DTC

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

CONSULT-II or GST (Generic Scan Tool) Examples: P0340, P1320, P0705, P0750, etc.
These DTCs are prescribed by SAE J2012.
(CONSULT-II also displays the malfunctioning component or system.)

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

A sample of CONSULT-II display for DTC 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]”.



SEF992X

FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA

The ECM records the driving conditions such as fuel system status, calculated load value, engine coolant temperature, short term fuel trim, long term fuel trim, engine speed, vehicle speed and absolute pressure sensor 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-69.
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, first trip freeze data is no longer stored (because only one freeze frame data or first 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". Refer to EC-58.

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 engine control module (ECM) has completed self-diagnosis of major emission systems and components. Completion must be verified in order for the emissions inspection to proceed.
If a vehicle is rejected for a State emissions inspection due to one or more SRT items indicating "INCMP", use the information in this Service Manual to set the SRT to "CMPLT".
In most cases the ECM will automatically complete its self-diagnosis cycle during normal usage, and the SRT status will indicate "CMPLT" for each application system. Once set as "CMPLT" the SRT status remains "CMPLT" until the self-diagnosis memory is erased.
Occasionally, certain portions of the self-diagnostic test may not be completed as a result of the customer's normal driving pattern and the SRT will indicate "INCMP" for these items.

NOTE:
The SRT will also indicate "INCMP" if the self-diagnosis memory is erased for any reason or if the ECM memory power supply is interrupted for several hours.

If, during the state emissions inspection, the SRT indicates "CMPLT" for all test items, the inspector will continue with the emissions test. However, if the SRT indicates "INCMP" for one or more of the SRT items the vehicle is returned to the customer untested.

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

SRT item

The table on next page 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
EVAP SYSTEM	2	EVAP control system (small leak) (negative pressure)	P0440
	3	EVAP control system (very small leak) (negative pressure/ positive pressure)	P1441
		EVAP control system purge flow monitoring	P1447
O2 SENSOR	3	Heated oxygen sensor 1 (front) (circuit)	P0130
		Heated oxygen sensor 1 (front) (lean shift monitoring)	P0131
		Heated oxygen sensor 1 (front) (rich shift monitoring)	P0132
		Heated oxygen sensor 1 (front) (response monitoring)	P0133
		Heated oxygen sensor 1 (front) (high voltage)	P0134
		Heated oxygen sensor 2 (rear) (min. voltage monitoring)	P0137
		Heated oxygen sensor 2 (rear) (max. voltage monitoring)	P0138
		Heated oxygen sensor 2 (rear) (response monitoring)	P0139
		Heated oxygen sensor 2 (rear) (high voltage)	P0140
O2 SEN HEATER	3	Heated oxygen sensor 1 heater (front)	P0135
		Heated oxygen sensor 2 heater (rear)	P0141
EGR SYSTEM	3	EGR function (close)	P0400
		EGRC-BPT valve function	P0402
	1	EGR function (open)	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 OK.
—: Self-diagnosis is not carried out.

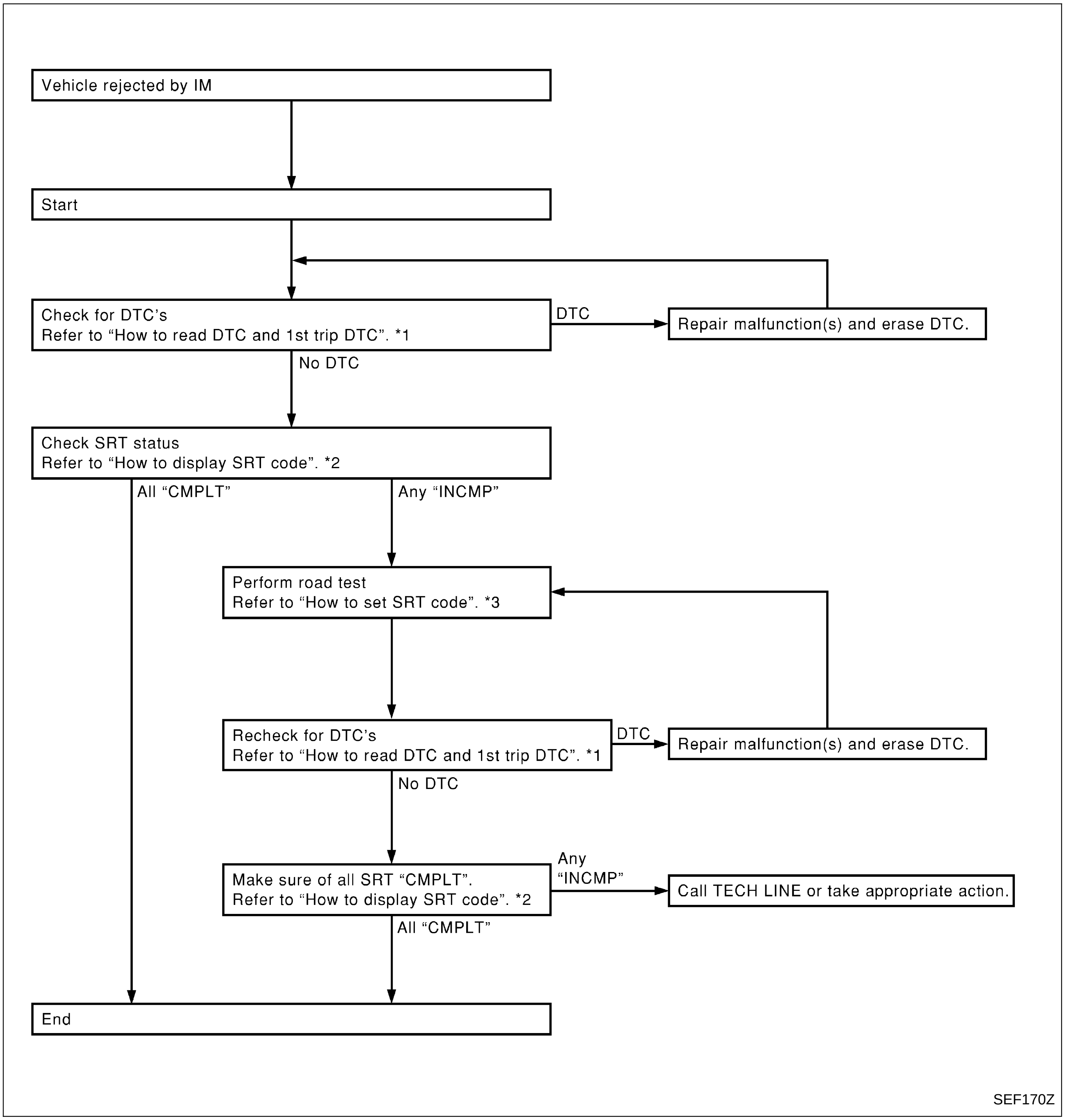
When all SRT related self-diagnoses show OK results in a single cycle (Ignition OFF-ON-OFF), the SRT will indicate “CMPLT”. → Case 1 above
When all SRT related self-diagnoses show OK results through several different cycles, the SRT will indicate “CMPLT” at the time the respective self-diagnoses have at least one OK result. → Case 2 above
In 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 cycle for setting SRT as “INCMP” is one (1) for each self-diagnosis (Case 1 & 2) or two (2) for one of self-diagnosis (Case 3). However, in preparation for the State emissions inspection, it is unnecessary of each self-diagnosis to be executed twice (Case 3) because of the following reasons;

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

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

SRT service procedure

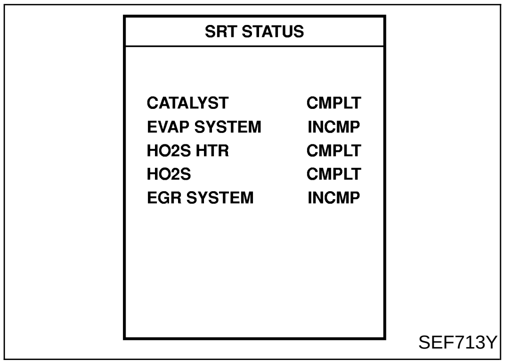
If a vehicle has been rejected for the State emissions inspection due to one or more SRT items indicating “INCMP”, review the flowchart diagnostic sequence on the next page.



*1 EC-46 *2 EC-51 *3 EC-51

How to display SRT code

1. Selecting "SRT STATUS" in "DTC CONFIRMATION" mode with CONSULT-II.
   For items whose SRT codes are set, a "CMPLT" is displayed on the CONSULT-II screen; for items whose SRT codes are not set, "INCMP" is displayed.
2. Selecting Mode 1 with GST (Generic Scan Tool)



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A sample of CONSULT-II display for SRT code is shown at left. "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

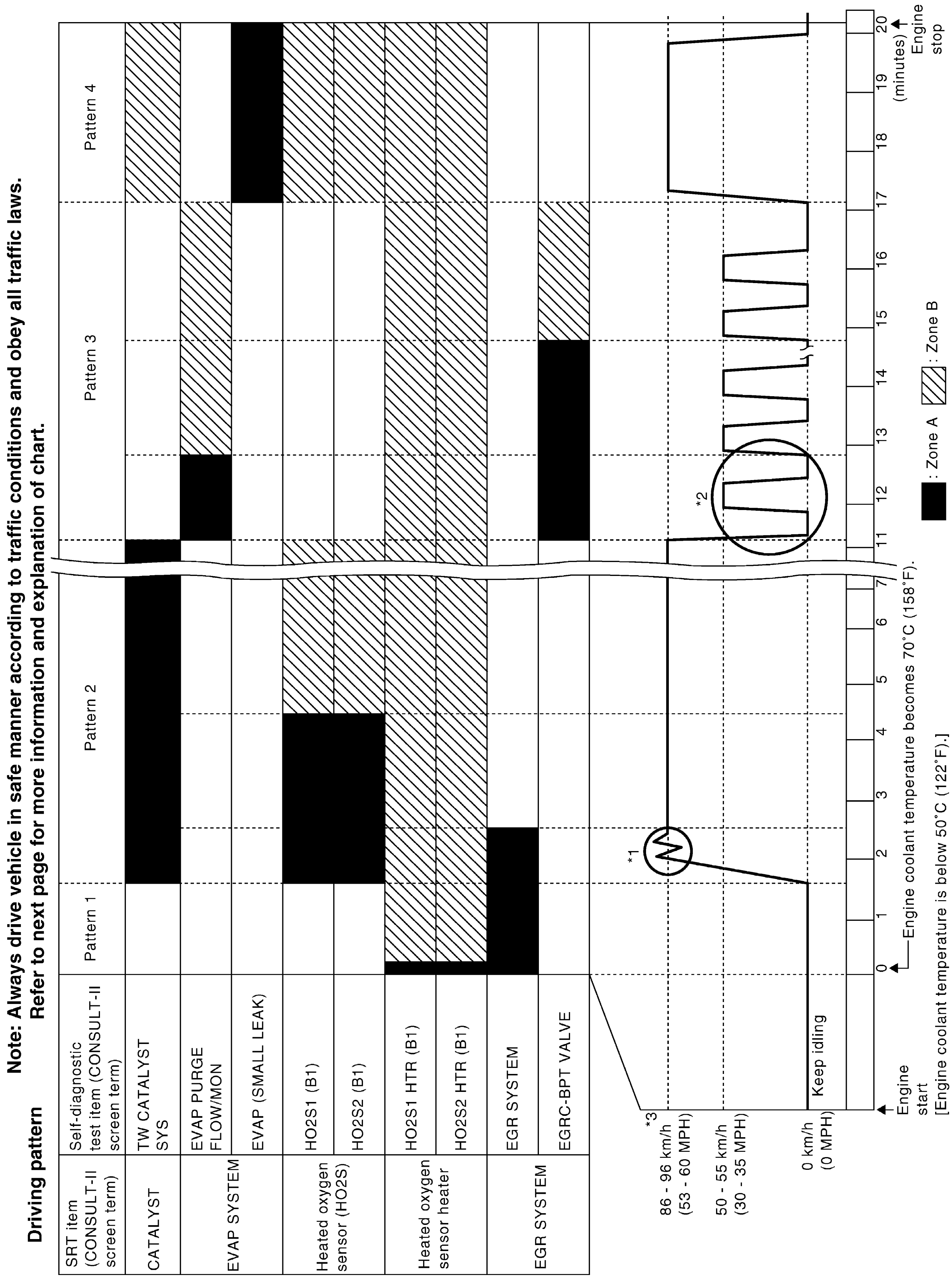
Perform corresponding DTC Confirmation Procedure one by one based on "Performance Priority" in the table on EC-89.

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.

Emission-related Diagnostic Information (Cont’d)

Driving pattern



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Emission-related Diagnostic Information (Cont'd)

- 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 0 to 35°C (32 to 95°F).**
- **The engine must be operated at idle speed until the engine coolant temperature is greater than 70°C (158°F).**
- **The engine is started at the fuel tank temperature of warmer than 0°C (32°F) (where the voltage between the ECM terminal 63 and ground is less than 4.1V).**

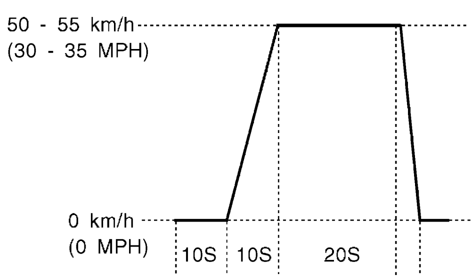
Pattern 2:
- When steady-state driving is performed again even after it is interrupted, each diagnosis can be conducted. In this case, the time required for diagnosis may be extended.

Pattern 3:
- The driving pattern outlined in *2 must be repeated at least 3 times.
  On M/T models, shift gears following "suggested upshift speeds" schedule at right.

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 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.



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*3: Checking the vehicle speed with CONSULT-II or GST is advised.

Suggested transmission gear position for A/T models

Set the selector lever in the "D" position with "OD" 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)]:

Gear change	ACCEL shift point km/h (MPH)	CRUISE shift point km/h (MPH)
1st to 2nd	24 (15)	24 (15)
2nd to 3rd	40 (25)	29 (18)
3rd to 4th	58 (36)	48 (30)
4th to 5th	64 (40)	63 (39)

For quick acceleration in low altitude areas and high altitude areas [over 1,219 m (4,000 ft)]:

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)

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	50 (31)
2nd	92 (57)

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

The following is the information specified in Mode 6 of SAE J1979.
The test value is a parameter used to determine whether a system/circuit diagnostic test is "OK" or "NG" while being monitored by the ECM during self-diagnosis. The test limit is a reference value which is specified as the maximum or minimum value and is compared with the test value being monitored.
Items for which these data (test value and test limit) are displayed are the same as SRT code items (9 test items).
These data (test value and test limit) are specified by Test ID (TID) and Component ID (CID) and can be displayed on the GST screen.

X: Applicable
—: Not applicable

SRT item	Self-diagnostic test item	Test value		Test limit	Application
		TID	CID		
CATALYST	Three way catalyst function	01H	01H	Max.	X
		02H	81H	Max.	X
EVAP SYSTEM	EVAP control system (Small leak)	05H	03H	Max.	X
	EVAP control system purge flow monitoring	06H	83H	Min.	X
HO2S	Heated oxygen sensor 1 (front)	09H	04H	Max.	X
		0AH	84H	Min.	X
		0BH	04H	Max.	X
		0CH	04H	Max.	X
		0DH	04H	Max.	X
	Heated oxygen sensor 2 (rear)	19H	86H	Min.	X
		1AH	86H	Min.	X
		1BH	06H	Max.	X
		1CH	06H	Max.	X
HO2S HTR	Heated oxygen sensor 1 heater (front)	29H	08H	Max.	X
		2AH	88H	Min.	X
	Heated oxygen sensor 2 heater (rear)	2DH	0AH	Max.	X
		2EH	8AH	Min.	X
EGR SYSTEM	EGR function	31H	8CH	Min.	X
		32H	8CH	Min.	X
		33H	8CH	Min.	X
		34H	8CH	Min.	X
		35H	0CH	Max.	X
	EGRC-BPT valve function	36H	0CH	Max.	X
		37H	8CH	Min.	X

EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS

X: Applicable
—: Not applicable

Items (CONSULT-II screen terms)	DTC*3	SRT code	Test value/ Test limit (GST only)	1st trip DTC*3	Reference page
	CONSULT-II GST*1				
NO SELF DIAGNOSTIC FAIL-URE INDICATED	**P0000**	—	—	—	—
MAF SEN/CIRCUIT	P0100	—	—	X	EC-118
ABSL PRES SEN/CIRC	P0105	—	—	X	EC-127
AIR TEMP SEN/CIRC	P0110	—	—	X	EC-129
COOLANT T SEN/CIRC	P0115	—	—	X	EC-134
THRTL POS SEN/CIRC	P0120	—	—	X	EC-139
*COOLAN T SEN/CIRC	P0125	—	—	X	EC-151
HO2S1 (B1)	P0130	X	X	X*2	EC-156
HO2S1 (B1)	P0131	X	X	X*2	EC-163
HO2S1 (B1)	P0132	X	X	X*2	EC-170
HO2S1 (B1)	P0133	X	X	X*2	EC-178
HO2S1 (B1)	P0134	X	X	X*2	EC-186
HO2S1 HTR (B1)	P0135	X	X	X*2	EC-192
HO2S2 (B1)	P0137	X	X	X*2	EC-196
HO2S2 (B1)	P0138	X	X	X*2	EC-204
HO2S2 (B1)	P0139	X	X	X*2	EC-212
HO2S2 (B1)	P0140	X	X	X*2	EC-219
HO2S2 HTR (B1)	P0141	X	X	X*2	EC-225
FUEL SYS-LEAN/BK1	P0171	—	—	X	EC-230
FUEL SYS-RICH/BK1	P0172	—	—	X	EC-235
FUEL TEMP SEN/CIRC	P0180	—	—	X	EC-240
MULTI CYL MISFIRE	P0300	—	—	X	EC-244
CYL 1 MISFIRE	P0301	—	—	X	EC-244
CYL 2 MISFIRE	P0302	—	—	X	EC-244
CYL 3 MISFIRE	P0303	—	—	X	EC-244
CYL 4 MISFIRE	P0304	—	—	X	EC-244
KNOCK SEN/CIRC-B1	P0325	—	—	X	EC-249
CKP SEN/CIRCUIT	P0335	—	—	X	EC-254
CMP SEN/CIRCUIT	P0340	—	—	X	EC-259
EGR SYSTEM	P0400	X	X	X*2	EC-266
EGRC-BPT VALVE	P0402	X	X	X*2	EC-275
TW CATALYST SYS-B1	P0420	X	X	X*2	EC-280
EVAP SMALL LEAK	P0440	X	X	X*2	EC-376
PURG VOLUME CONT/V	P0443	—	—	X	EC-293
EVAP GROSS LEAK	P0455	—	X	X*2	EC-310
VENT CONTROL VALVE	P0446	—	—	X	EC-299
EVAP SYS PRES SEN	P0450	—	—	X	EC-304

*1: These numbers are prescribed by SAE J2012.
*2: These are not displayed with GST.
*3: 1st trip DTC No. is the same as DTC No.

Emission-related Diagnostic Information (Cont'd)

X: Applicable
—: Not applicable

Items (CONSULT-II screen terms)	DTC*3 CONSULT-II GST*1	SRT code	Test value/ Test limit (GST only)	1st trip DTC*3	Reference page
FUEL LEV SEN SLOSH	P0460	—	—	X	EC-318
FUEL LEVEL SENSOR	P0461	—	—	X	EC-321
FUEL LEVL SEN/CIRC	P0464	—	—	X	EC-323
VEH SPEED SEN/CIRC	P0500	—	—	X	EC-326
IACV/AAC VLV/CIRC	P0505	—	—	X	EC-330
CLOSED TP SW/CIRC	P0510	—	—	X	EC-335
A/T COMM LINE	P0600	—	—	—	EC-341
ECM	P0605	—	—	X	EC-345
PNP SW/CIRC	P0705	—	—	X	AT-78
ATF TEMP SEN/CIRC	P0710	—	—	X	AT-83
VEH SPD SEN/CIR AT	P0720	—	—	X	AT-88
ENGINE SPEED SIG	P0725	—	—	X	AT-92
A/T 1ST GR FNCTN	P0731	—	—	X	AT-95
A/T 2ND GR FNCTN	P0732	—	—	X	AT-101
A/T 3RD GR FNCTN	P0733	—	—	X	AT-107
A/T 4TH GR FNCTN	P0734	—	—	X	AT-113
TCC SOLENOID/CIRC	P0740	—	—	X	AT-120
A/T TCC S/V FNCTN	P0744	—	—	X	AT-125
L/PRESS SOL/CIRC	P0745	—	—	X	AT-133
SFT SOL A/CIRC	P0750	—	—	X	AT-138
SFT SOL B/CIRC	P0755	—	—	X	AT-143
THERMSTAT FNCTN	P1126	—	—	X	EC-347
CLOSED LOOP-B1	P1148	—	—	X	EC-348
IGN SIGNAL-PRIMARY	P1320	—	—	X	EC-445
CKP SENSOR (COG)	P1336	—	—	X	EC-351
EGRC SOLENOID/V	P1400	—	—	X	EC-356
EGR TEMP SEN/CIRC	P1401	—	—	X	EC-361
EGR SYSTEM	P1402	X	X	X*2	EC-367
EVAP SMALL LEAK	P1440	X	X	X*2	EC-374
EVAP VERY SML LEAK	P1441	X*4	X	X*2	EC-51
PURG VOLUME CONT/V	P1444	—	—	X	EC-386
VENT CONTROL VALVE	P1446	—	—	X	EC-393
EVAP PURG FLOW/MON	P1447	X	X	X*2	EC-398
VENT CONTROL VALVE	P1448	—	—	X	EC-405
FUEL LEVEL SEN/CIRC	P1464	—	—	X	EC-412
VC/V BYPASS/V	P1490	—	—	X	EC-415
VC CUT/V BYPASS/V	P1491	—	—	X	EC-420
A/T DIAG COMM LINE	P1605	—	—	X	EC-425
TP SEN/CIRC A/T	P1705	—	—	X	AT-148
P-N POS SW/CIRCUIT	P1706	—	—	X	EC-428
O/R CLTCH SOL/CIRC	P1760	—	—	X	AT-154

*1: These numbers are prescribed by SAE J2012.
*2: These are not displayed with GST.
*3: 1st trip DTC No. is the same as DTC No.
*4: SRT code will not be set if the self-diag result is NG.

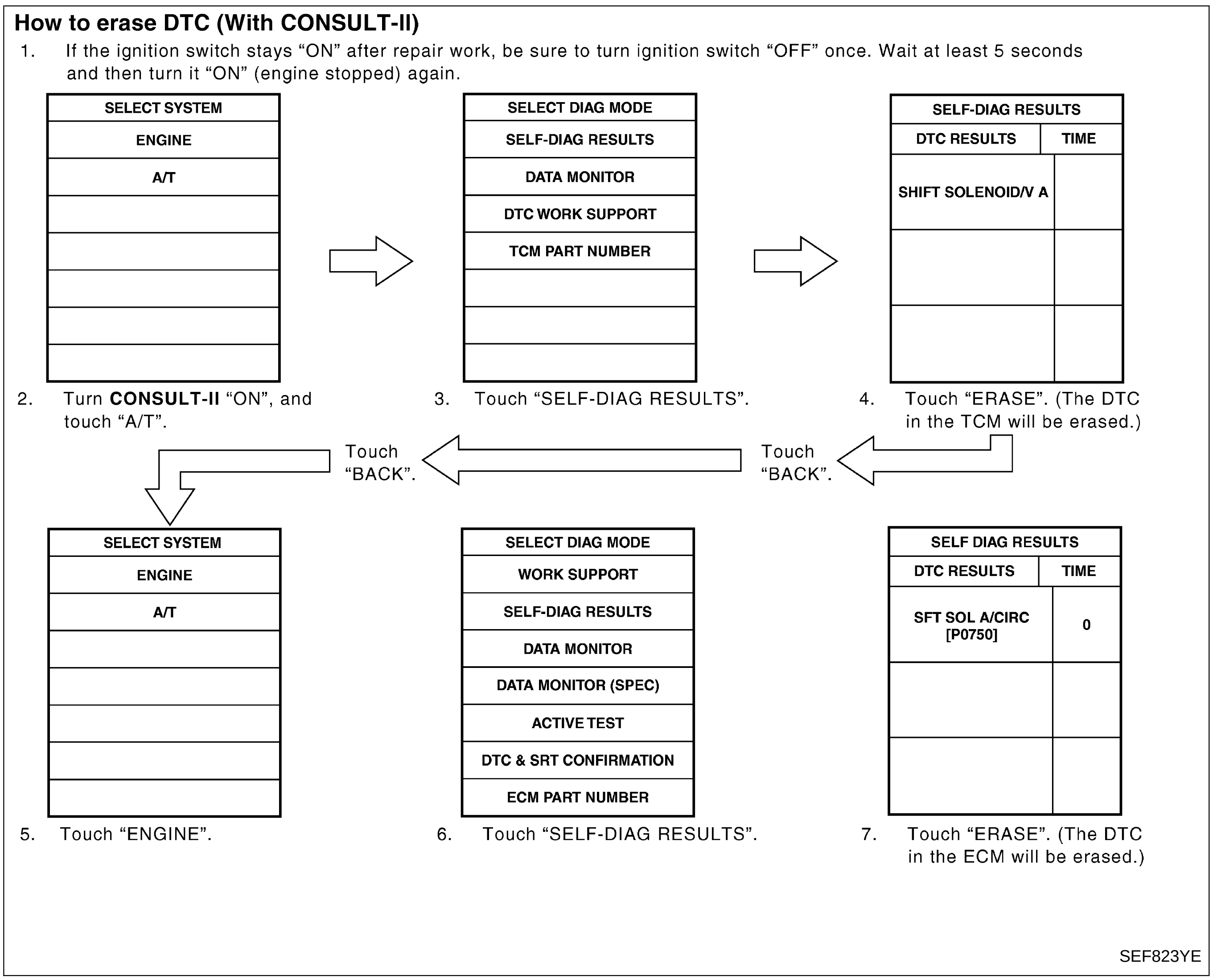
HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION

How to erase DTC (With CONSULT-II)

Note: If the diagnostic trouble code is not for A/T related items (see EC-4), skip steps 2 through 4.

1. If the ignition switch stays "ON" after repair work, be sure to turn ignition switch "OFF" once. Wait at least 5 seconds and then turn it "ON" (engine stopped) again.
2. Turn CONSULT-II "ON" and touch "A/T".
3. Touch "SELF-DIAG RESULTS".
4. Touch "ERASE". [The DTC in the TCM (Transmission control module) will be erased.] Then touch "BACK" twice.
5. Touch "ENGINE".
6. Touch "SELF-DIAG RESULTS".
7. Touch "ERASE". (The DTC in the ECM will be erased.)

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



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

Emission-related Diagnostic Information (Cont'd)

How to erase DTC (With GST)

Note: If the diagnostic trouble code is not for A/T related items (see EC-4), skip step 2.

1. If the ignition switch stays "ON" after repair work, be sure to turn ignition switch "OFF" once. Wait at least 5 seconds and then turn it "ON" (engine stopped) again.
2. Perform "SELF-DIAGNOSTIC PROCEDURE (Without CONSULT-II)" in AT-45 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).

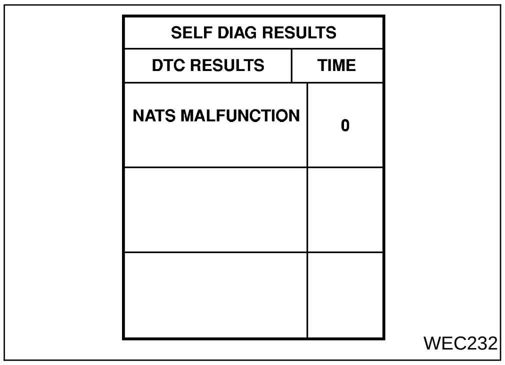
The emission-related diagnostic information can be erased by selecting Mode 4 with GST (Generic Scan Tool).

NOTE:

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

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

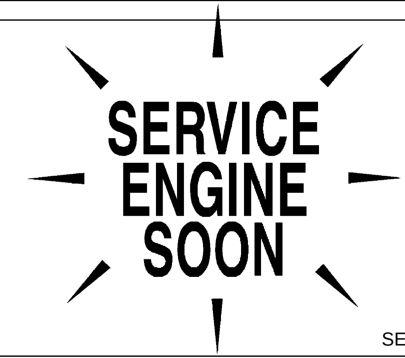
Actual work procedures are explained using a DTC as an example. Be careful so that not only the DTC, but all of the data listed above, are cleared from the ECM memory during work procedures.



NVIS (NISSAN VEHICLE IMMOBILIZER SYSTEM — NATS)

- If the security indicator lights up with 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 "NVIS (Nissan Vehicle Immobilizer System — NATS)" in EL section.
- 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".

GI MA EM LC EC FE CL MT AT FA RA BR ST RS BT HA EL IDX



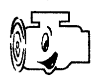
SEF217U

Malfunction Indicator Lamp (MIL)

1. The malfunction indicator lamp will light up when the ignition switch is turned ON without the engine running. This is a bulb check.
- If the malfunction indicator lamp does not light up, refer to EL section, “WARNING LAMPS” or see EC-474.
2. When the engine is started, the malfunction indicator lamp should go off.
If the lamp 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 EL section, “WARNING LAMPS” or see EC-474.

Diagnostic Test Mode I — Malfunction Warning

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

OBD System Operation Chart

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

- 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-45.
- 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.

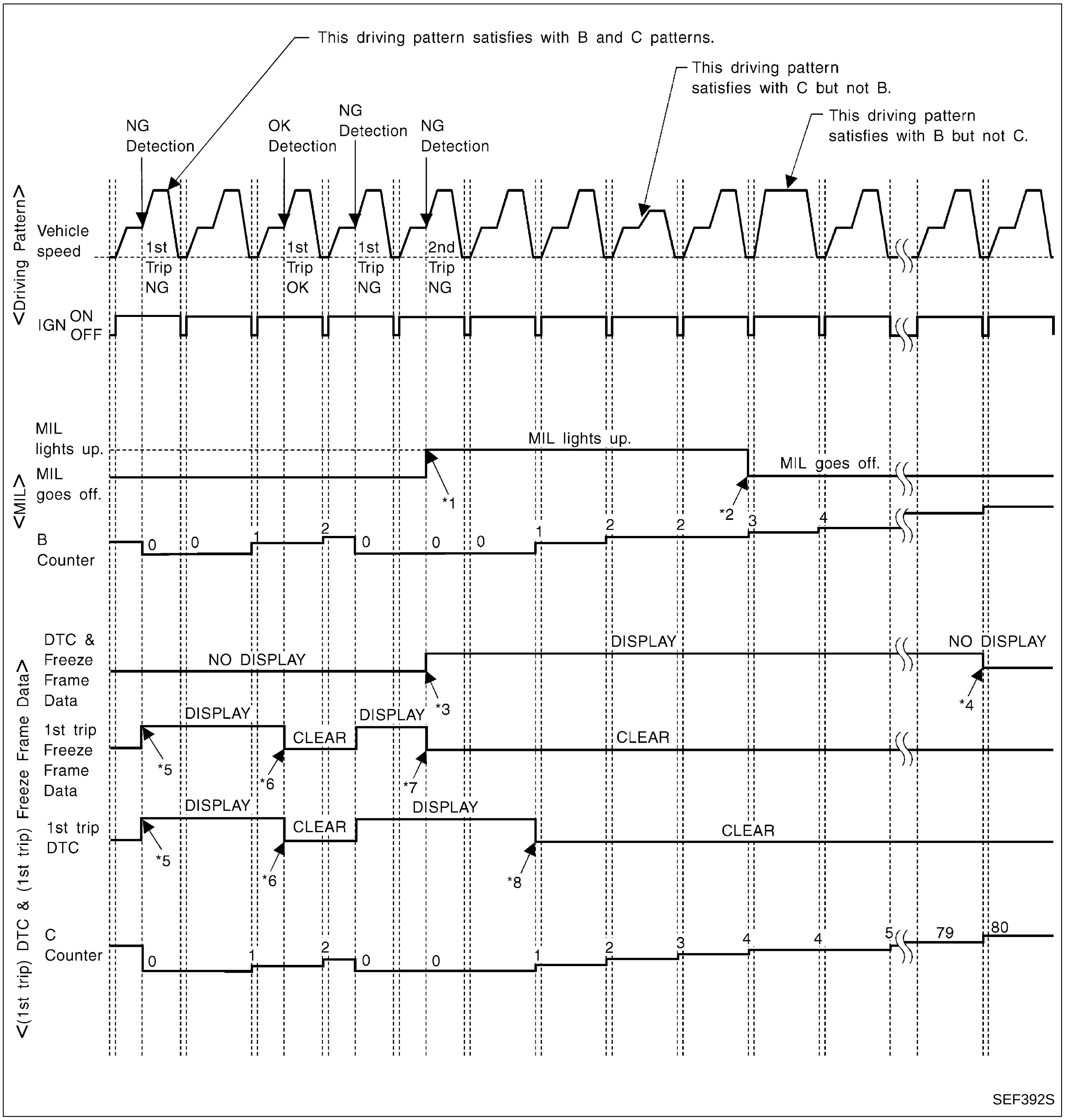
- The DTC and the freeze frame data will be stored until the vehicle is driven 40 times (driving pattern A) without the same malfunction recurring (except for Misfire and Fuel Injection System). For Misfire and Fuel Injection System, the DTC and freeze frame data will be stored until the vehicle is driven 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-63.
For details about patterns "A" and "B" under "Other" see, EC-65.
*1: Clear timing is at the moment OK is detected.
*2: Clear timing is when the same malfunction is detected in the 2nd trip.

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



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

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

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

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

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

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

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

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

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

<Driving pattern B>

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

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

<Driving pattern C>

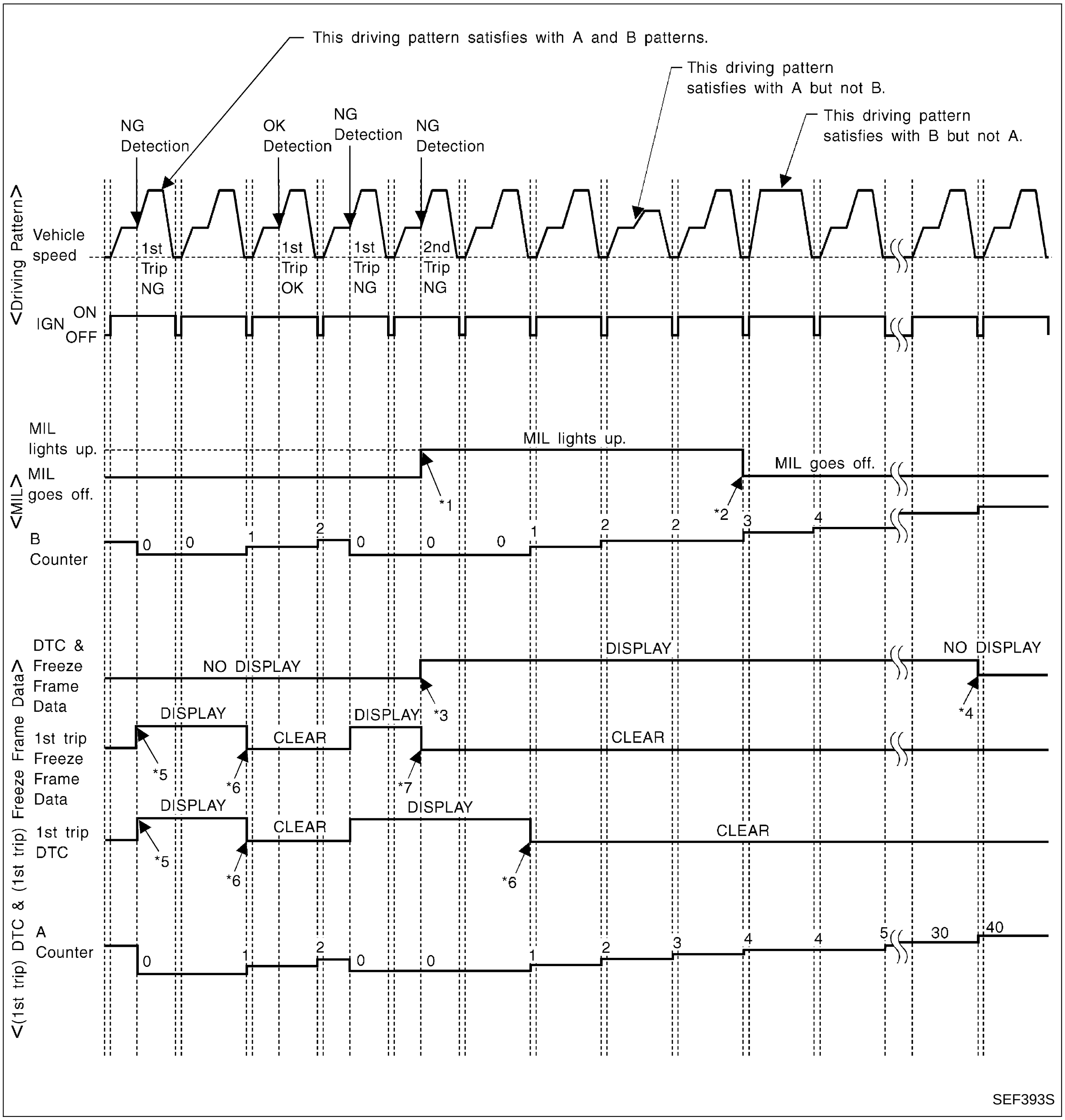
Driving pattern C means the vehicle operation as follows:
(1) The following conditions should be satisfied at the same time:
Engine speed: (Engine speed in the freeze frame data) ±375 rpm
Calculated load value: (Calculated load value in the freeze frame data) x (1±0.1) [%]
Engine coolant temperature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

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

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

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

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



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

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

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

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

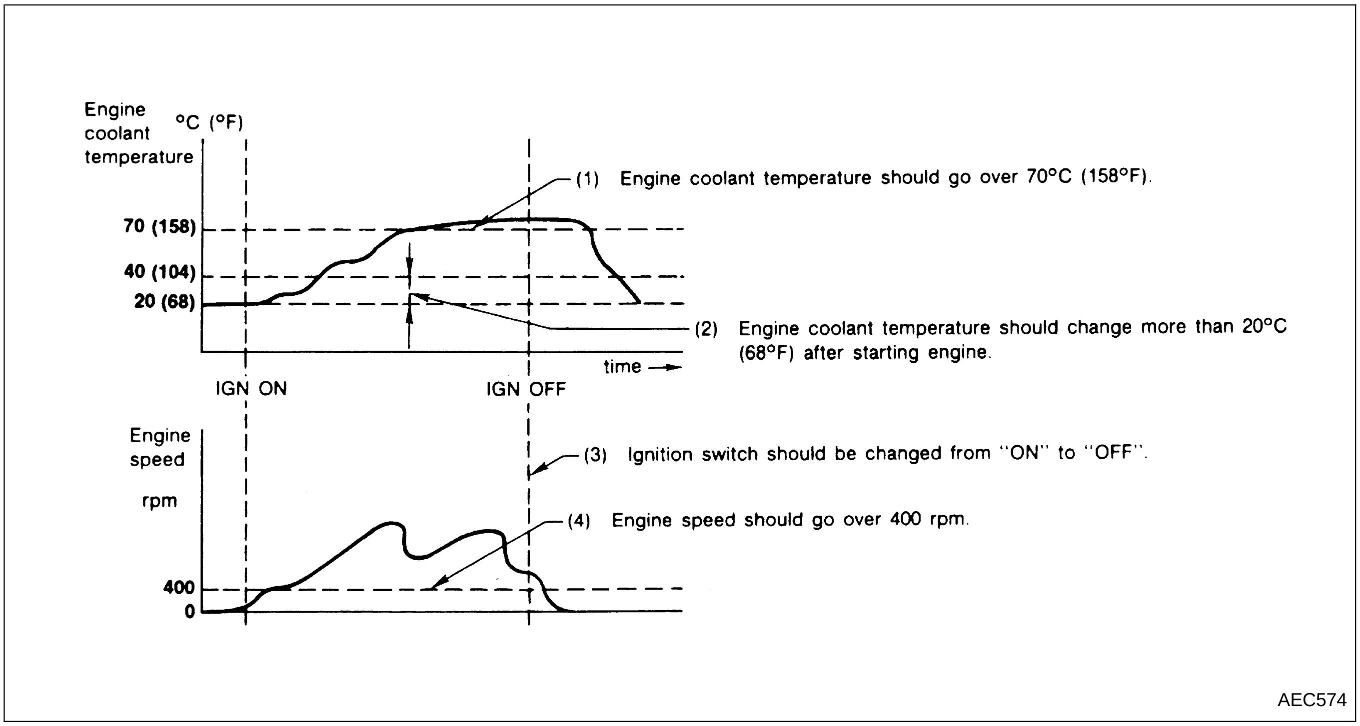
*5: When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM.

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

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

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

<Driving pattern A>



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

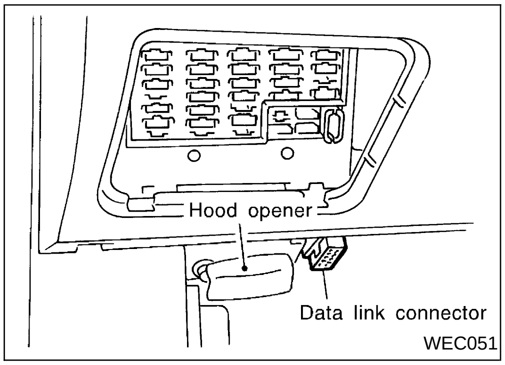
<Driving pattern B>

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

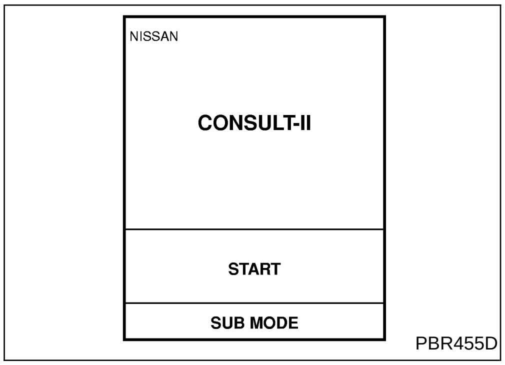
- The B counter will be cleared when the malfunction is detected once regardless of the driving pattern.
- The B counter will be counted up when driving pattern B is satisfied without any malfunctions.
- The MIL will go off when the B counter reaches 3 (*2 in "OBD SYSTEM OPERATION CHART").

CONSULT-II

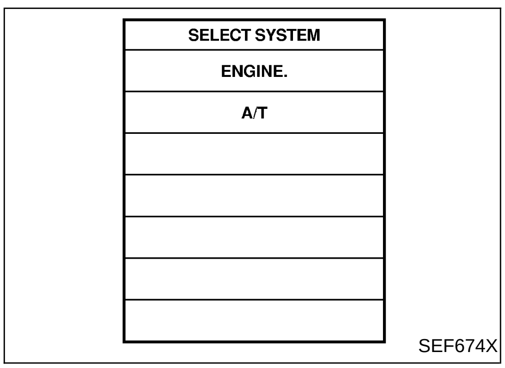
CONSULT-II INSPECTION PROCEDURE



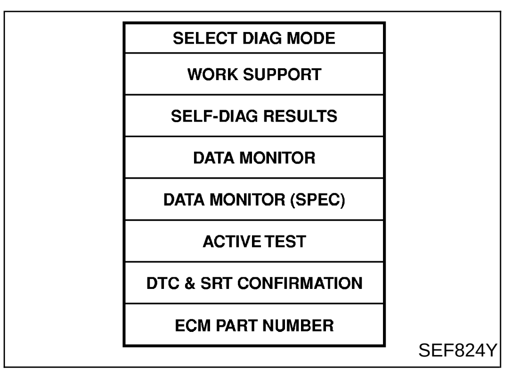
1. Turn ignition switch OFF.
2. Connect “CONSULT-II” to data link connector which is located under LH dash panel near the fuse box cover.



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.

CONSULT-II (Cont'd)

ENGINE CONTROL COMPONENT PARTS/SYSTEMS APPLICATION

		Item	DIAGNOSTIC TEST MODE							
			WORK SUP-PORT	SELF-DIAGNOSTIC RESULTS*1		DATA MONITOR	DATA MONI-TOR (SPEC)	ACTIVE TEST	DTC CONFIRMATION	
					FREEZE FRAME DATA*2				SRT STATUS	DTC WORK SUP-PORT
ENGINE CONTROL COMPONENT PARTS	INPUT	Camshaft position sensor		X	X	X	X			
		Mass air flow sensor		X		X	X			
		Engine coolant temperature sensor		X	X	X	X	X		
		Heated oxygen sensor 1 (front)		X	X		X		X	X
		Heated oxygen sensor 2 (rear)		X		X	X		X	X
		Vehicle speed sensor		X	X	X	X			
		Throttle position sensor	X	X		X	X			
		Fuel tank temperature sensor		X		X	X	X		
		EVAP control system pressure sensor		X		X	X			
		Absolute pressure sensor		X	X	X	X			
		EGR temperature sensor		X		X	X			
		Intake air temperature sensor		X		X	X			
		Crankshaft position sensor (OBD)		X						
		Knock sensor		X						
		Fuel level sensor		X		X	X			
		Ignition switch (start signal)				X	X			
		Closed throttle position switch		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			
		Air conditioner pressure switch				X	X			
		Battery voltage				X	X			
		Ambient air temperature switch				X	X			
	OUTPUT	Injectors				X	X	X		
		Power transistor (Ignition timing)		X (Ignition signal)		X	X	X		
		IACV-AAC valve	X	X		X	X	X		
		EVAP canister purge volume control solenoid valve		X		X	X	X		X
		Air conditioner relay				X	X			
		Fuel pump relay	X			X	X	X		
		EGRC-solenoid valve		X		X	X	X		
		Heated oxygen sensor 1 heater (front)		X		X	X		X	
		Heated oxygen sensor 2 heater (rear)		X		X	X		X	
		Cooling fan		X		X	X	X		
		EVAP canister vent control valve		X		X	X	X		
		Vacuum cut valve bypass valve		X		X	X	X		X
		Calculated load value			X	X	X			

X: Applicable
*1: This item includes 1st trip DTCs.
*2: This mode includes 1st trip freeze frame data or freeze frame data. The items appear on CONSULT-II screen in freeze frame data mode only if a 1st trip DTC or DTC is detected. For details, refer to EC-47.

FUNCTION

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

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

WORK SUPPORT MODE

WORK ITEM	CONDITION	USAGE
THRTL POS SEN ADJ	CHECK THE THROTTLE POSITION SENSOR SIGNAL. ADJUST IT TO THE SPECIFIED VALUE BY ROTATING THE SENSOR BODY UNDER THE FOLLOWING CONDITIONS. ● IGN SW "ON" ● ENG NOT RUNNING ● ACC PEDAL NOT PRESSED	When adjusting throttle position sensor initial position
IGNITION TIMING ADJ	● IGNITION TIMING FEEDBACK CONTROL WILL BE HELD BY TOUCHING "START". AFTER DOING SO, ADJUST IGNITION TIMING WITH A TIMING LIGHT BY TURNING THE CRANKSHAFT POSITION SENSOR.	When adjusting initial ignition timing
FUEL PRESSURE RELEASE	● FUEL PUMP WILL STOP BY TOUCHING "START" DURING IDLING. CRANK A FEW TIMES AFTER ENGINE STALLS.	When releasing fuel pressure from fuel line
SELF-LEARNING CONT	● THE COEFFICIENT OF SELF-LEARNING CONTROL MIXTURE RATIO RETURNS TO THE ORIGINAL COEFFICIENT.	When releasing fuel pressure from fuel line
EVAP SYSTEM CLOSE	OPEN THE VACUUM CUT VALVE BYPASS VALVE AND CLOSE THE EVAP CANISTER VENT CONTROL VALVE IN ORDER TO MAKE EVAP SYSTEM CLOSE UNDER THE FOLLOWING CONDITIONS. ● BATTERY VOLTAGE IS SUFFICIENT ● IGN SW "ON" ● ENGINE NOT RUNNING ● AMBIENT TEMPERATURE IS ABOVE 0°C (32°F). ● NO VACUUM AND NO HIGH PRESSURE IN EVAP SYSTEM ● TANK FUEL TEMP. IS MORE THAN 0°C (32°F). ● WITHIN 10 MINUTES AFTER STARTING "EVAP SYSTEM CLOSE" WHEN TRYING TO EXECUTE "EVAP SYSTEM CLOSE" UNDER THE 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

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

SELF-DIAGNOSTIC MODE

DTC and 1st trip DTC

Regarding items of "DTC and 1st trip DTC", refer to "DIAGNOSTIC TROUBLE CODE INDEX" (See EC-4.).

Freeze frame data and 1st trip freeze frame data

Freeze frame data item*	Description
DIAG TROUBLE CODE [PXXXX]	● Engine control component part/control system has a trouble code, it is displayed as "PXXXX". [Refer to "Alphabetical & P No. Index for DTC" (EC-4).]
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.
ABSOL PRESS [kPa] or [kg/cm^2] or [psi]	● The absolute pressure 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 [Unit]	ECM input signals	Main signals	Description	Remarks
ENG SPEED [rpm]	○	○	● Indicates the engine speed computed from the REF signal (180° signal) of the camshaft position sensor.	
MAS A/F SE-B1 [V]	○	○	● The signal voltage of the mass air flow sensor 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.	● When the 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 the engine is running, specification range 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 (front) is displayed.	
HO2S2 (B1) [V]	○	○	● The signal voltage of the heated oxygen sensor 2 (rear) is displayed.	
HO2S1 MNTR (B1) [RICH/LEAN]	○		● Display of heated oxygen sensor 1 (front) 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 (rear) signal: RICH ... means the amount of oxygen after three way catalyst is relatively small. LEAN ... means the amount of oxygen after three way catalyst is relatively large.	● When the engine is stopped, a certain value is indicated.
VHCL SPEED SE [km/h] or [mph]	○	○	● The vehicle speed computed from the vehicle speed sensor signal is displayed.	
BATTERY VOLT [V]	○	○	● The power supply voltage of ECM is displayed.	
THRTL POS SEN [V]	○	○	● The throttle position sensor signal voltage is displayed.	
FUEL T/TMP SE [°C] or [°F]	○		● The fuel temperature judged from the fuel tank temperature sensor signal voltage is displayed.	
INT/A TEMP SE [°C] or [°F]	○	○	● The intake air temperature determined by the signal voltage of the intake air temperature sensor is indicated.	
EGR TEMP SEN [V]	○	○	● The signal voltage of the EGR temperature sensor is displayed.	
EVAP SYS PRES [V]	○		● The signal voltage of EVAP control system pressure sensor is displayed.	
ABSOL PRES/SE [V]	○		● The signal voltage of the absolute pressure sensor is displayed.	
FUEL LEVEL SE [V]	○		● The signal voltage of the fuel level sensor is displayed.	
START SIGNAL [ON/OFF]	○	○	● Indicates [ON/OFF] condition from the starter signal.	● After starting the engine, [OFF] is displayed regardless of the starter signal.

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

CONSULT-II (Cont'd)

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.	
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 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	○	○	● Indicates [ON/OFF] condition from the rear defogger signal.	
AMB TEMP SW [ON/OFF]	○		● Indicates [ON/OFF] condition from the ambient air temperature switch signal.	
IGNITION SW [ON/OFF]	○		● Indicates [ON/OFF] condition from ignition switch.	
HEATER FAN SW	○		● Indicates [ON/OFF] condition from the heater fan switch.	
A/C PRESS SW [ON/OFF]	○		● Indicates [ON/OFF] condition of the air conditioner triple-pressure switch (medium-pressure side) determined by the pressure of the air conditioning high pressure side.	
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 [%]			● "Absolute throttle position sensor" indicates the throttle opening computed by ECM according to the signal voltage of the throttle position sensor.	
MASS AIRFLOW [g·m/s]			● Indicates the mass airflow computed by ECM according to the signal voltage of the mass airflow sensor.	
IACV-AAC/V [%]		○	● Indicates the IACV - AAC valve control value computed by ECM according to the input signals.	
PURG VOL C/V [%]			● Indicates the EVAP canister purge volume control solenoid valve computed by the ECM according to the input signals. ● The opening becomes larger as the value increases.	
EVAP SYS PRES [V]			● The signal voltage of EVAP control system pressure sensor is displayed.	
AIR COND RLY [ON/OFF]		○	● The air conditioner relay control condition (determined by ECM according to the input signal) is indicated.	
EGRC SOL/V [ON/OFF] (flow/cut)		○	● The control condition of the EGRC-solenoid valve (determined by ECM according to the input signal) is indicated. ● ON ... EGR is operational OFF ... EGR operation is cut-off	
FUEL PUMP RLY [ON/OFF]		○	● Indicates the fuel pump relay control condition determined by ECM according to the input signals.	

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
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 [HI/LOW/OFF]		○	● Indicates the control condition of the cooling fan (determined by ECM according to the input signal). 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 (front) determined by ECM according to the input signals.	
HO2S2 HTR (B1) [ON/OFF]			● Indicates [ON/OFF] condition of heated oxygen sensor 2 heater (rear) determined by ECM according to the input signals.	
TRVL AFTER MIL [km] or [Mile]			● Distance traveled while MIL is activated.	
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.

- Any monitored item that does not match the vehicle being diagnosed is detected 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 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.

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 ● Front heated oxygen sensor
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
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
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
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
FUEL PUMP RELAY	● Ignition switch: ON (Engine stopped) ● Turn the fuel pump relay "ON" and "OFF" using CONSULT-II and listen to operating sound.	Fuel pump relay makes the operating sound.	● Harness and connector ● Fuel pump relay
EGRC SOLENOID VALVE	● Ignition switch: ON ● Turn 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
PURG VOL CONT/V	● Engine: After warming up, run engine at 1,500 rpm. ● Change the EVAP canister purge volume control solenoid valve opening percent using CONSULT-II.	Engine speed changes according to the opening percent.	● Harness and connector ● EVAP canister purge volume control solenoid valve
FUEL T/TMP SE	● 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 CONFIRMATION MODE

SRT STATUS mode

For details, refer to "SYSTEM READINESS TEST (SRT) CODE", EC-47.

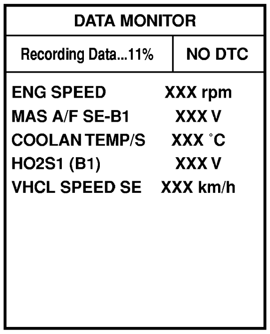
SRT WORK SUPPORT mode

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	PURGE FLOW P1447	Refer to corresponding trouble diagnosis for DTC.	EC-398
	VC CUT/V BP/V P1491		EC-420
	PURG VOL CN/V P1444		EC-386
	EVAP SML LEAK P0440		EC-284
	EVAP SML LEAK P1440		EC-374
	EVAP V/S LEAK P1441		EC-376
HEATED OXYGEN SENSOR 1 (FRONT)	HO2S1 (B1) P0130		EC-156
	HO2S1 (B1) P0131		EC-163
	HO2S1 (B1) P0132		EC-170
	HO2S1 (B1) P0133		EC-178
HEATED OXYGEN SENSOR 2 (REAR)	HO2S2 (B1) P0137		EC-196
	HO2S2 (B1) P0138		EC-204
	HO2S2 (B1) P0139		EC-212
EGR SYSTEM	EGR SYSTEM P0400		EC-266
	EGRC-BPT/VLV P0402		EC-275
	EGR SYSTEM P1402		EC-367

CONSULT-II (Cont'd)



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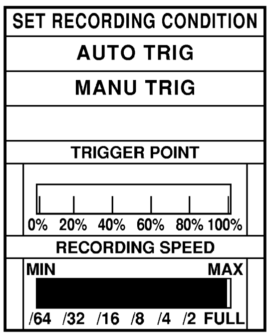

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REAL TIME DIAGNOSIS IN DATA MONITOR MODE (RECORDING VEHICLE DATA)

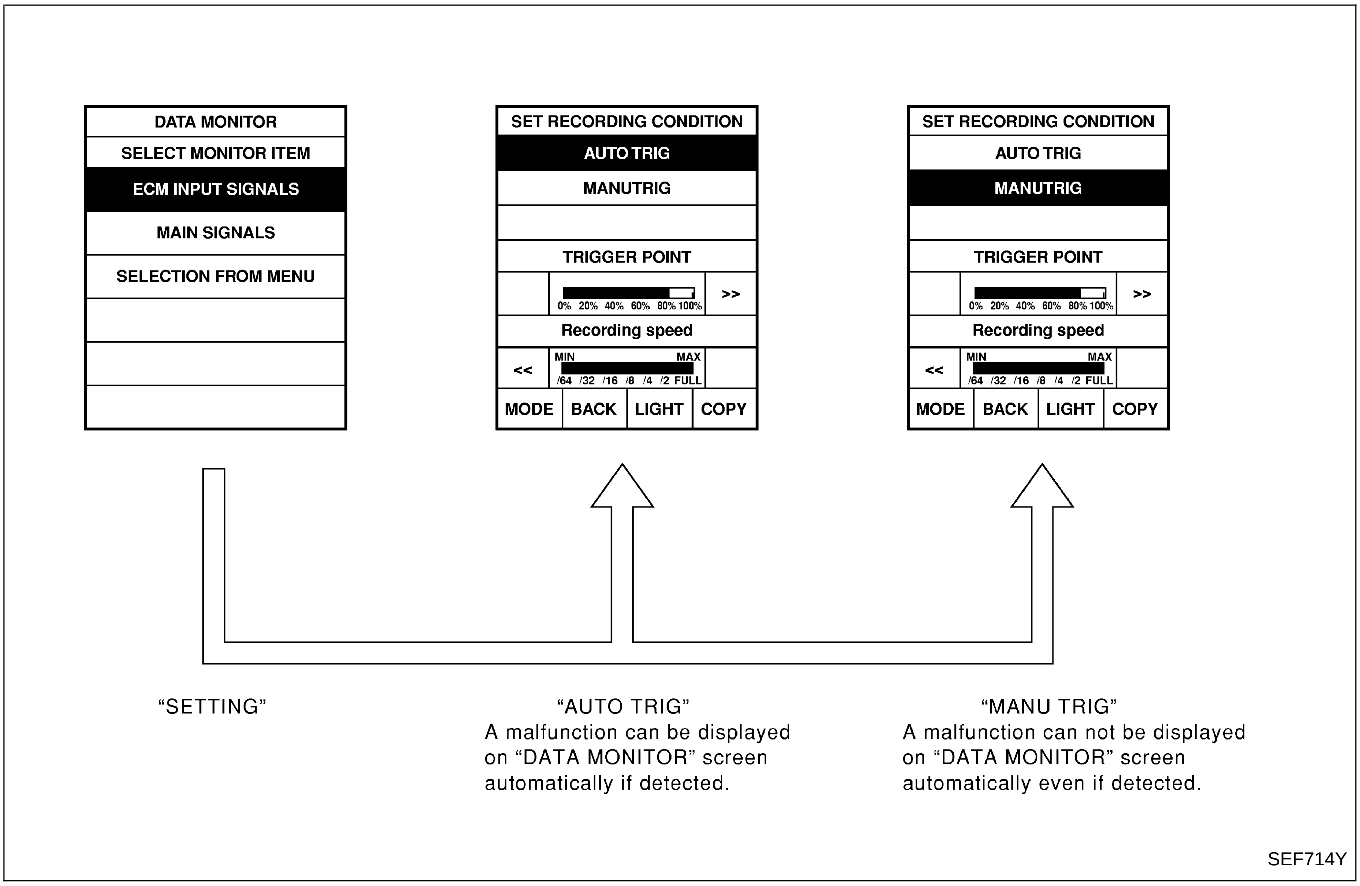
CONSULT-II has two kinds of triggers and they can be selected by touching “SETTING” in “DATA MONITOR” mode.

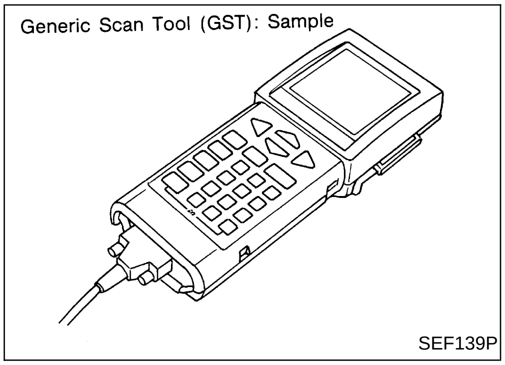
1. “AUTO TRIG” (Automatic trigger):
   - The malfunction will be identified on the CONSULT-II screen in real time.
     In other words, DTC/1st trip DTC and malfunction item will be displayed at the moment the malfunction is detected by ECM.
     At the moment a malfunction is detected by ECM, “MONITOR” 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 “DIAGNOSTIC TROUBLE CODE 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 “DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE”, the moment a malfunction is found the DTC/1st trip DTC will be displayed. (Refer to GI section, “Incident Simulation Tests” in “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.

CONSULT-II (Cont'd)

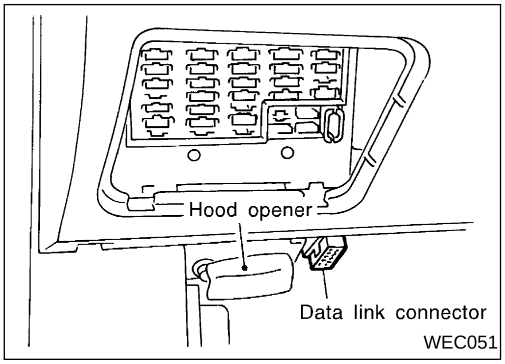




Generic Scan Tool (GST)

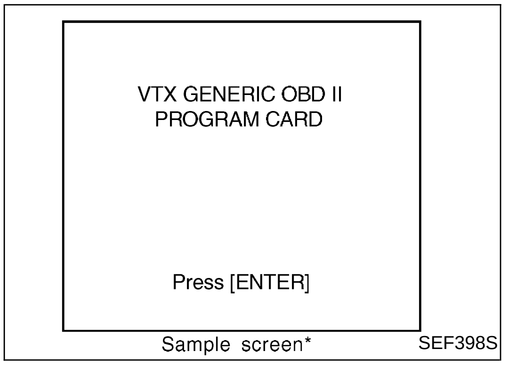
DESCRIPTION

Generic Scan Tool (OBDII scan tool) complying with SAE J1978 has 7 different functions explained on the next page.
ISO9141 is used as the protocol.
The name “GST” or “Generic Scan Tool” is used in this service manual.



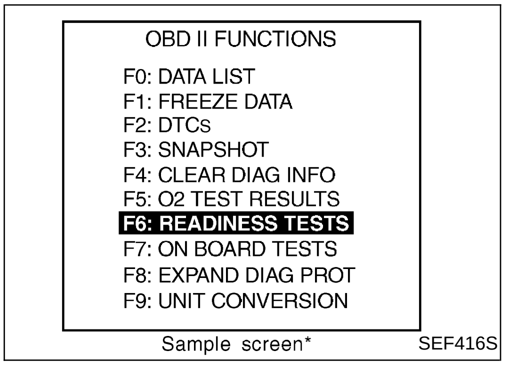
GST INSPECTION PROCEDURE

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.)

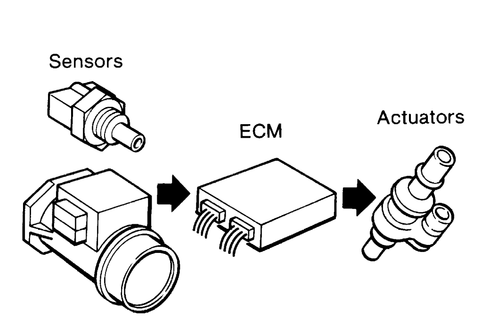


5. Perform each diagnostic mode according to each service procedure.

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

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-69).]
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 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 (External test equipment) to request specific vehicle information such as Vehicle Identification Number (VIN) and Calibration IDs.



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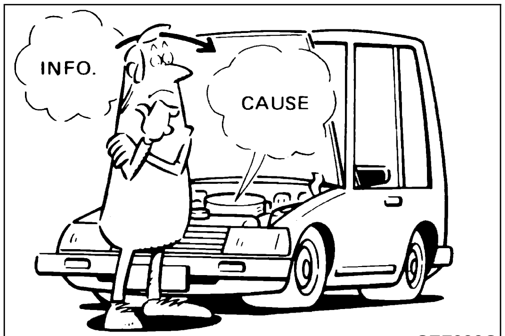

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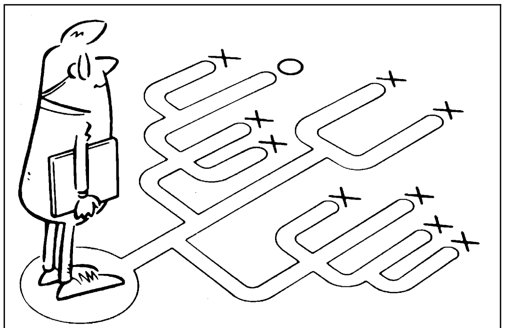
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Introduction

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-81.
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.

KEY POINTS

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

SEF907L

Diagnostic Worksheet

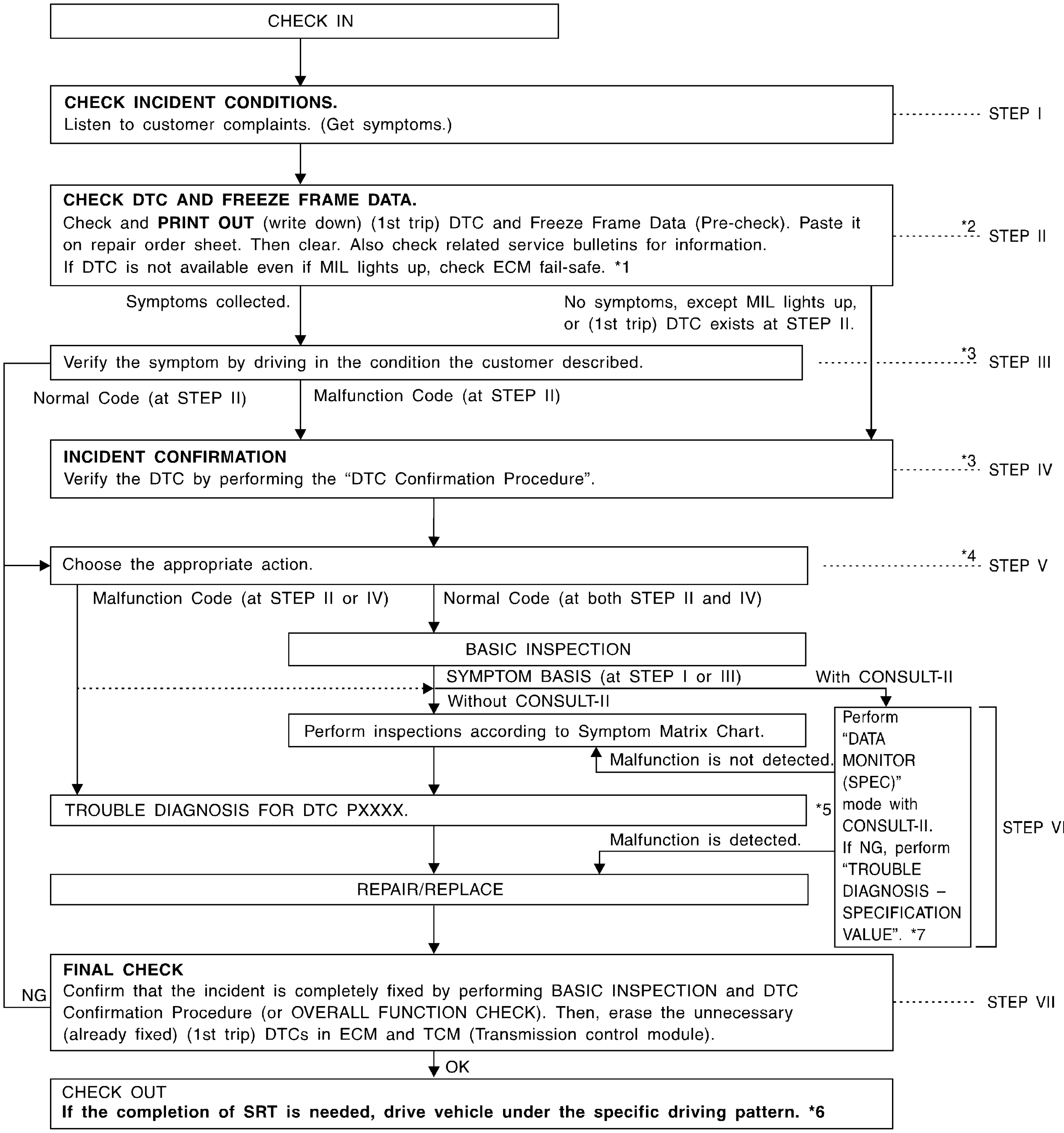
There are many operating conditions that lead to the malfunction of engine components. A good grasp of such conditions can make trouble-shooting faster and more accurate.
In general, each customer feels differently about a problem. It is important to fully understand the symptoms or conditions for a 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. 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.]

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	

Work Flow



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- *1: EC-90
- *2: If time data of “SELF-DIAG RESULTS” is other than “0” or “1t”, refer to “TROUBLE DIAGNOSIS FOR INTERMITTENT”, EC-112.
- *3: If the incident cannot be duplicated, refer to “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-112.
- *4: If the on board diagnostic system cannot be performed, check main power supply and ground circuit. Refer to “TROUBLE DIAGNOSIS FOR POWER SUPPLY”, EC-113.
- *5: If the malfunctioning part cannot be found, refer to “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-112.
- *6: EC-52
- *7: EC-108

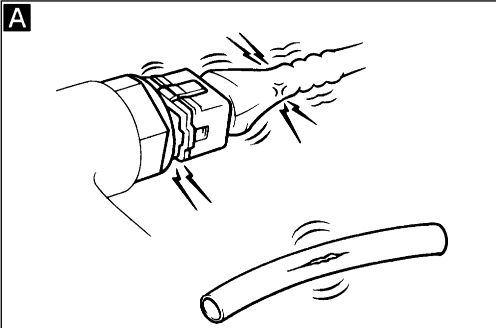
Description for Work Flow

STEP	DESCRIPTION
STEP I	Get detailed information about the conditions and the environment when the incident/symptom occurred using the “DIAGNOSTIC WORK SHEET”, EC-80.
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-58.) 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-91.) 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-24 section.) 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-24 section.) 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-83.) If CONSULT-II is available, perform “DATA MONITOR (SPEC)” mode with CONSULT-II and proceed to the “TROUBLE DIAGNOSIS-SPECIFICATION VALUE”, EC-108. (If malfunction is detected, proceed to “REPAIR REPLACE”. Then perform inspections according to the Symptom Matrix Chart. (Refer to EC-91.)
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-94. 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 section (“HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT”, “Circuit Inspection”). Repair or replace the malfunction parts.
STEP VII	Once you have repaired the circuit or replaced a component, you need to run the engine in the same conditions and circumstances which resulted in the customer’s initial complaint. Perform the “DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE” and confirm the normal code [Diagnostic trouble code 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-56.)

Basic Inspection

Precaution:
Perform Basic Inspection without electrical or mechanical loads applied;
- **Headlamp switch is OFF,**
- **Air conditioner switch is OFF,**
- **Rear window defogger switch is OFF,**
- **Steering wheel is in the straight-ahead position, etc.**

A



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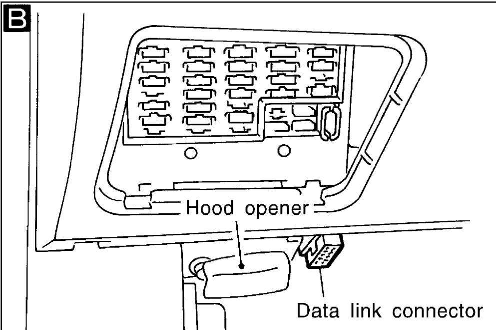
A

BEFORE STARTING
1. Check service records for any recent repairs that may indicate a related problem, or the current need for scheduled maintenance.
2. Open engine hood and check the following:
- Harness connectors for improper connections
- Vacuum hoses for splits, kinks, or improper connections
- Wiring for improper connections, pinches, or cuts

↓

B



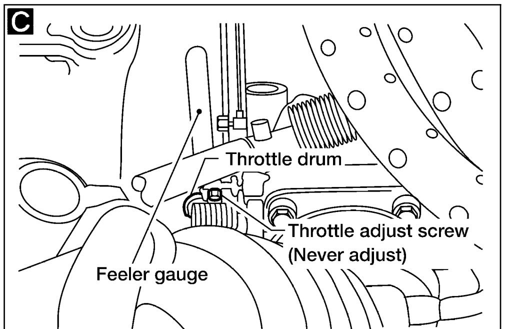
WEC051

B

CONNECT CONSULT-II TO THE VEHICLE.
Connect “CONSULT-II” to the data link connector for CONSULT-II and select “ENGINE” from the menu. Refer to EC-66.

↓

C



WEC053

C

CHECK FI CAM FUNCTION.
1. Turn ignition switch “ON”.
2. Select “COOLANT TEMP/S” in “DATA MONITOR MODE” with CONSULT-II.
3. Warm up engine until “COOLANT TEMP/S” reaches to 75°C (167°F).
4. Stop engine and wait at least 5 seconds then turn ignition switch “ON”.
5. When engine coolant temperature is between 75 to 85°C (167 to 185°F), check clearance between throttle drum and stopper. Refer to the left figure.
Clearance should be less than 0.05 mm (0.0020 in).

OR

GST
2. Select “MODE 1” WITH GST.
3. When engine coolant temperature is between 75 to 85°C (167 to 185°F), check clearance between throttle drum and stopper. Refer to the left figure.
Clearance should be less than 0.05 mm (0.0020 in).

NG → Check FI cam, refer to EC-36.

↓ OK

A
(Go to next page.)

GI MA EM LC EC FE CL MT AT FA RA BR ST RS BT HA EL IDX

Basic Inspection (Cont'd)

D

IGNITION TIMING ADJ

IGNITION TIMING FEEDBACK CONTROL WILL BE HELD BY TOUCHING START.
AFTER DOING SO, ADJUST IGNITION TIMING WITH A TIMING LIGHT BY TURNING THE CAMSHAFT POSITION SENSOR.

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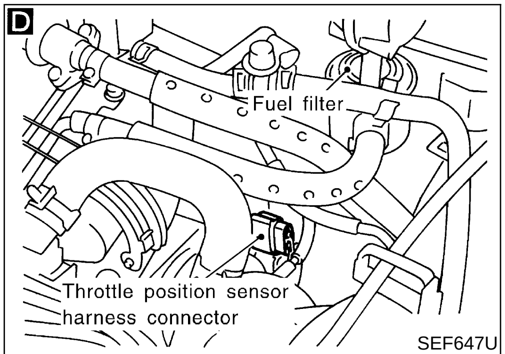
D



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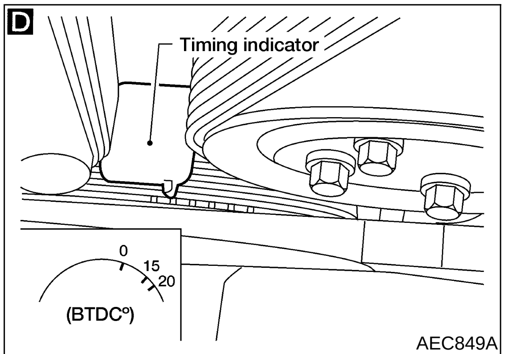

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E

IGNITION TIMING ADJ

IGNITION TIMING FEEDBACK CONTROL WILL BE HELD BY TOUCHING START.
AFTER DOING SO, ADJUST IGNITION TIMING WITH A TIMING LIGHT BY TURNING THE CAMSHAFT POSITION SENSOR.

PEF546N

Ⓐ

D

CHECK IGNITION TIMING.

1. Warm up engine to normal operating temperature.
2. Select "IGNITION TIMING ADJ" in "WORK SUPPORT" mode.
3. Touch "START".
4. Check ignition timing at idle using timing light.
   Ignition timing *:
   20°±2° BTDC

OR

1. Warm up engine to normal operating temperature.
2. Stop engine and disconnect throttle position sensor harness connector.*
3. Start engine.
4. Check ignition timing at idle using timing light.
   Ignition timing:
   20°±2° BTDC

NG → Check camshaft position sensor and adjust ignition timing by turning distributor.

*** DTC P1705 (DTC 1206) is stored in ECM and TCM in this step. Be sure to erase DTC after completing the procedure.**

OK ↓

E

CHECK BASE IDLE SPEED.

1. Select "IGNITION TIMING ADJ" in "WORK SUPPORT" mode.
2. When touching "START", does engine speed fall to
   M/T: 650±50 rpm
   A/T: 650±50 rpm
   (in "P" or "N" position)?

OR

Does engine run at
M/T: 650±50 rpm
A/T: 650±50 rpm
(in "P" or "N" position)?

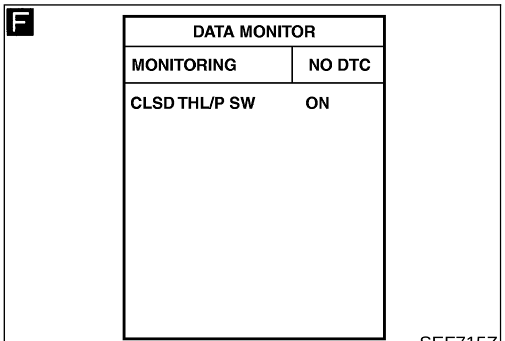
NG → Adjust base idle speed by turning idle speed adjusting screw.
Refer to "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment" in "BASIC SERVICE PROCEDURE".

OK ↓

Ⓑ

(Go to next page.)

Basic Inspection (Cont'd)



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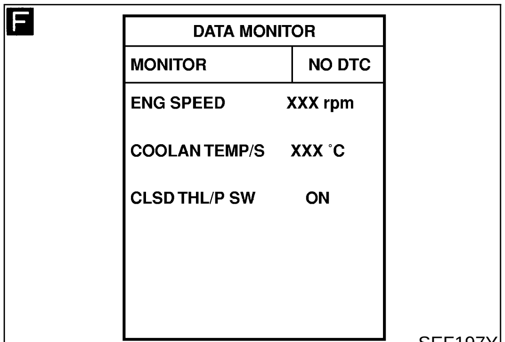
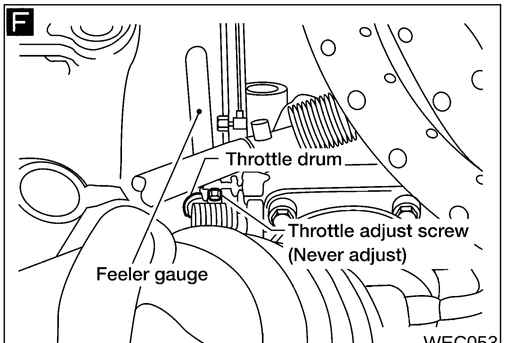
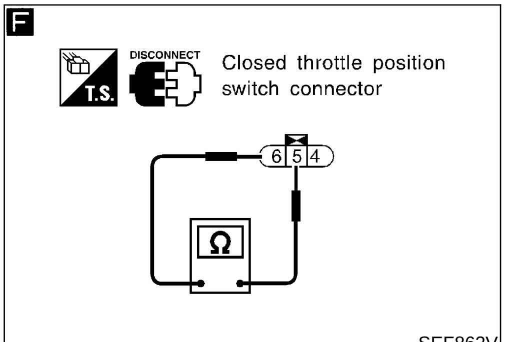


SEF197Y



WEC053



SEF862V

B

F

CHECK CLOSED THROTTLE POSITION SWITCH IDLE POSITION. (Check throttle position sensor idle position.)

- **Always check ignition timing and base idle speed before performing the followings.**

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

- Insert a 0.25 mm (0.010 in) and 0.35 mm (0.014 in) feeler gauge alternately between the throttle adjust screw (TAS) and stopper as shown in the figure and check the signal.

“CLSD THL/P SW” signal should remain “ON” while inserting 0.25 mm (0.010 in) feeler gauge.
“CLSD THL/P SW” signal should remain “OFF” while inserting 0.35 mm (0.014 in) feeler gauge.

OR

4. Disconnect closed throttle position switch harness connector.
5. Connect the tester probe to closed throttle position switch terminals 5 and 6.
6. Check harness continuity under the following conditions.

- Insert the 0.25 mm (0.010 in) and 0.35 mm (0.014 in) feeler gauge alternately between the throttle adjust screw (TAS) and stopper as shown in the figure and check continuity.

“Continuity should exist” while inserting 0.25 mm (0.010 in) feeler gauge.
“Continuity should not exist” while inserting 0.35 mm (0.014 in) feeler gauge.

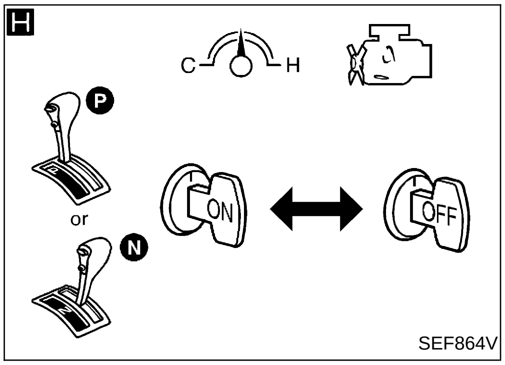
NG → **G**

ADJUSTMENT
Refer to “THROTTLE POSITION SENSOR IDLE POSITION ADJUSTMENT”.
Go to EC-87.

OK

C
(Go to next page.)

Basic Inspection (Cont'd)



SEF864V

C

- Reconnect throttle position sensor harness connector and closed throttle position switch harness connector.
- Rev engine (2,000 to 3,000 rpm) 2 or 3 times under no-load and then run engine at idle speed.

↓

H

RESET THROTTLE POSITION SENSOR IDLE POSITION MEMORY.
Note: Always warm up engine to normal operating temperature. If engine is cool, the throttle position sensor idle position memory will not be reset correctly.

1. Start engine.
2. Warm up engine to normal operating temperature.
3. Select "CLSD THL POS" in "DATA MONITOR" mode (Manual trigger) with CONSULT-II.
4. Stop engine. (Turn ignition switch "OFF".)
5. Turn ignition switch "ON" and wait at least 5 seconds.
6. Turn ignition switch "OFF" and wait at least 5 seconds.
7. Repeat steps 5 and 6 until "CLSD THL POS" in "DATA MONITOR" mode with CONSULT-II changes to "ON".

OR

7. Repeat steps 5 and 6, 20 times.

↓

CHECK TARGET IDLE SPEED.
Read the engine idle speed in "DATA MONITOR" mode with CONSULT-II.
700±50 rpm
(in "P" or "N" position)

OR

Check idle speed.
700±50 rpm
(in "P" or "N" position)

NG → Adjust idle speed. Refer to EC-37.

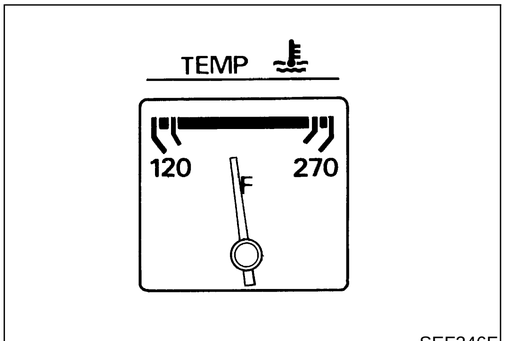
↓ OK

ERASE DTC MEMORY.
After this inspection, unnecessary diagnostic trouble code No. might be stored or displayed. Erase the stored memory in ECM and TCM. Refer to "How to erase DTC" in "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION" and A/T section ("Self-diagnosis", "TROUBLE DIAGNOSES").

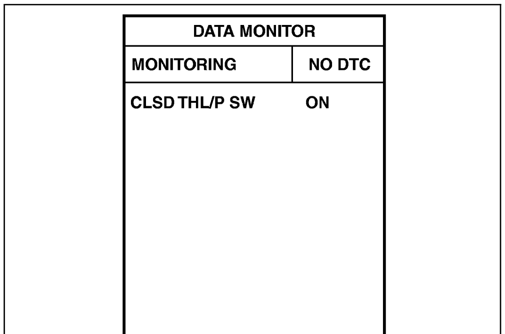
↓ OK

INSPECTION END

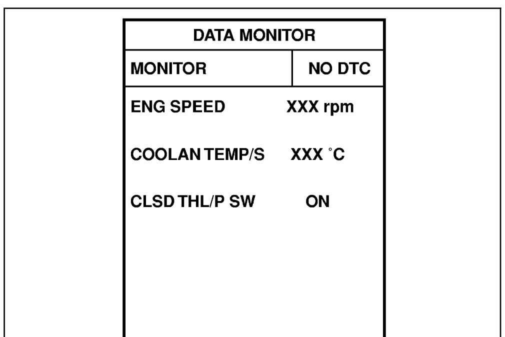
Basic Inspection (Cont'd)



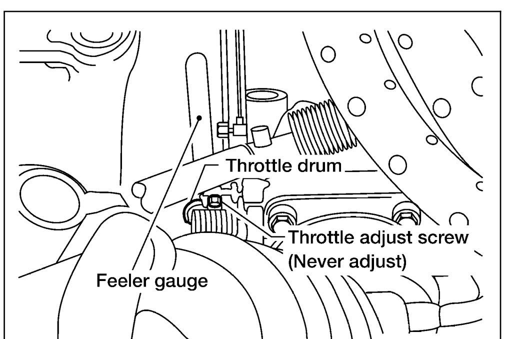
SEF246F



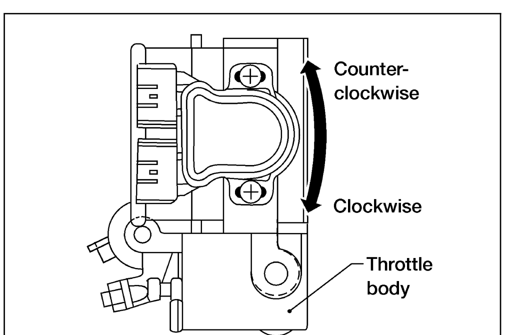
SEF715Z



SEF197Y



WEC053



AEC851A

G THROTTLE POSITION SENSOR IDLE POSITION ADJUSTMENT

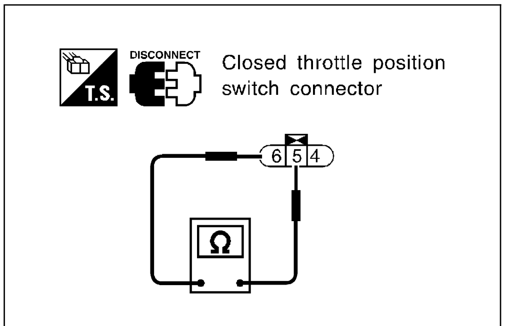
Note:

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

1. Warm engine up to normal operating temperature.
2. Check FI cam. Refer to procedure C .
3. Stop engine.
4. Loosen throttle position sensor fixing bolts.
5. Turn ignition switch "ON".
6. Select "DATA MONITOR" mode with CONSULT-II.
7. Select "CLSD THL/P SW" from the menu.
8. Read "CLSD THL/P SW" signal under the following conditions.
   - Insert 0.25 mm (0.010 in) feeler gauge between throttle adjust screw and stopper as shown in the figure and check the following.
   - **Open throttle valve and then close.**
   - **"CLSD THL/P SW" signal should remain "OFF" when the throttle valve is closed. (If signal is "ON", turn throttle position sensor body counter-clockwise until the signal switches to "OFF".)**
9. 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 tighten sensor body fixing bolts.**
10. Make sure the signal is "ON" when the throttle valve is closed and "OFF" when it is opened. Repeat it two or three times.
11. Remove 0.25 mm (0.010 in) feeler gauge then insert 0.35 mm (0.014 in) feeler gauge and check the following. Make sure the signal remains "OFF" when the throttle valve is closed. Repeat it two or three times.
12. Tighten throttle position sensor.
    Check that the "CLSD THL/P SW" signal remains "OFF" while closing throttle valve. If NG, repeat from the step 4.
    After this adjustment, go to procedure H RESET THROTTLE POSITION SENSOR IDLE POSITION MEMORY.

— OR —

Basic Inspection (Cont'd)



SEF862V

5. Disconnect closed throttle position sensor harness connector.
6. Connect tester probes to the closed throttle position switch terminals ⑤ and ⑥ and check continuity under the following conditions.
- Insert the 0.25 mm (0.010 in) feeler gauge between the throttle adjust screw and throttle drum as shown in the figure and check the following.
- **Open throttle valve then close.**
- **The continuity should not exist while closing the throttle valve. If the continuity exists, turn throttle position sensor body counterclockwise until the continuity does not exist.**
7. Temporarily tighten sensor body fixing bolts as follows.
- **Gradually move the sensor body clockwise and stop it when the continuity comes to exist, then tighten sensor body fixing bolts.**
8. Make sure the continuity exists when the throttle valve is closed and continuity does not exist when it is opened. Repeat it two or three times.
9. Remove 0.25 mm (0.010 in) feeler gauge, then insert 0.35 mm (0.014 in) feeler gauge and check the following.
   Make sure the continuity does not exist when the throttle valve is closed. Repeat it two or three times.
10. Tighten throttle position sensor.
   Check that the continuity does not exist while closing the throttle valve. If NG, repeat from the step 5.
   After this adjustment, go to procedure H RESET THROTTLE POSITION SENSOR IDLE POSITION MEMORY.

Diagnostic Trouble Code (DTC) Inspection Priority Chart

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

Priority	Detected items (DTC)
1	● P0100 Mass air flow sensor ● P0110 Intake air temperature sensor ● P0115 P0125 Engine coolant temperature sensor ● P0120 Throttle position sensor ● P0180 Fuel tank temperature sensor ● P0325 Knock sensor ● P0340 Camshaft position sensor ● P0460, P0461, P0464, P1464 Fuel level sensor ● P0500 Vehicle speed sensor ● P0605 ECM ● P1126 Thermostat function ● P1400 EGRC-solenoid valve ● P1605 A/T diagnosis communication line ● P1706 Park/neutral position (PNP) switch
2	● P0105 Absolute pressure sensor ● P0130-P0134 Heated oxygen sensor 1 (front) ● P0135 Heated oxygen sensor 1 heater (front) ● P0137-P0140 Heated oxygen sensor 2 (rear) ● P0141 Heated oxygen sensor 2 heater (rear) ● P0335, P1336 Crankshaft position sensor ● P0443, P1444 EVAP canister purge volume control solenoid valve ● P0446, P1446, P1448 EVAP canister vent control valve ● P0450 EVAP control system pressure sensor ● P0510 Closed throttle position switch ● P0705-P0725, P0740-P1760 A/T related sensors, solenoid valves and switches ● P1401 EGR temperature sensor ● P1447 EVAP control system purge flow monitoring ● P1490, P1491 Vacuum cut valve bypass valve
3	● P0171, P0172 Fuel injection system function ● P0304 - P0300 Misfire ● P0400, P1402 EGR function ● P0402 EGRC-BPT valve function ● P0420 Three way catalyst function ● P0440, P1440 EVAP control system (SMALL LEAK) ● P0455 EVAP control system (GROSS LEAK) ● P1441 EVAP control system (VERY SMALL LEAK) ● P0505 IACV-AAC valve ● P0600 Signal circuit from TCM to ECM ● P0731-P0734, P0744 A/T function ● P1148 Closed loop control

Fail-Safe Chart

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

<table>
<tr><th>DTC No.
CONSULT-II
GST</th><th>Detected items</th><th>Engine operating condition in fail-safe mode</th></tr>
<tr><td>P0100</td><td>Mass air flow sensor circuit</td><td>Engine speed will not rise more than 2,400 rpm due to the fuel cut.</td></tr>
<tr><td>P0115</td><td>Engine coolant temperature sensor circuit</td><td>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.
<table>
<tr><th>Condition</th><th>Engine coolant temperature decided (CONSULT-II display)</th></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>
</table>
With the ignition key in the OFF position, cooling fans will operate for 120 seconds when in fail-safe mode.</td></tr>
<tr><td>P0120</td><td>Throttle position sensor circuit</td><td>Throttle position will be determined based on the injected fuel amount and the engine speed.
Therefore, acceleration will be poor.
<table>
<tr><th>Condition</th><th>Driving condition</th></tr>
<tr><td>When engine is idling</td><td>Normal</td></tr>
<tr><td>When accelerating</td><td>Poor acceleration</td></tr>
</table></td></tr>
<tr><td>Unable to access ECM</td><td>ECM</td><td>ECM fail-safe activating condition
The computing function of the ECM was judged to be malfunctioning.
When the fail-safe system activates (i.e., if the ECM detects a malfunction condition in the CPU of ECM), the MALFUNCTION INDICATOR LAMP 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.
<table>
<tr><th></th><th>ECM fail-safe operation</th></tr>
<tr><td>Engine speed</td><td>Engine speed will not rise more than 3,000 rpm</td></tr>
<tr><td>Fuel injection</td><td>Simultaneous multiport fuel injection system</td></tr>
<tr><td>Ignition timing</td><td>Ignition timing is fixed at the preset value</td></tr>
<tr><td>Fuel pump</td><td>Fuel pump relay is “ON” when engine is running and “OFF” when engine stalls</td></tr>
<tr><td>Cooling fans</td><td>Cooling fan relay “ON” (High speed condition) when engine is running, and “OFF” when engine stalls.</td></tr>
<tr><td>IACV-AAC valve</td><td>Full open</td></tr>
</table>
Replace ECM, if ECM fail-safe condition is confirmed.</td></tr>
</table>

Symptom Matrix Chart

SYSTEM — Basic engine control system		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)	Reference page
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-457
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			EC-35
	Injector circuit	1	1	2	3	2		2	2			2			EC-451
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			EC-23
Air	Positive crankcase ventilation system	3	3	4	4	4	4	4	4	4		4	1		EC-33
	Incorrect idle speed adjustment	3	3				1	1	1	1		1			EC-83
	IACV-AAC valve circuit	1	1	2	3	3	2	2	2	2		2		2	EC-330
	IACV-FICD solenoid valve circuit	2	2	3	3	3	3	3	3	3		3			EC-467
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC-83
	Ignition circuit	1	1	2	2	2		2	2			2			EC-445
EGR	EGRC-solenoid valve circuit		2	2	3	3						3			EC-356
	EGR system	2	1	2	3	3	3	2	2	3		3			EC-266
Main power supply and ground circuit		2	2	3	3	3		3	3		2	3		2	EC-113
Air conditioner circuit		2	2	3	3	3	3	3	3	3		3		2	HA section

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

(continued on next page)

Symptom Matrix Chart (Cont'd)

SYSTEM — Engine control system		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)	Reference page
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Engine control	Camshaft position sensor circuit	2	2	3	3	3		3	3			3			EC-259
	Mass air flow sensor circuit	1	1	2	2	2		2	2			2			EC-118
	Heated oxygen sensor 1 (front) circuit		1	2	3	2		2	2			2			EC-156,163
	Engine coolant temperature sensor circuit	1	1	2	3	2	3	2	2	3		2			EC-134,151
	Throttle position sensor circuit		1	2		2	2	2	2	2		2			EC-139
	Incorrect throttle position sensor adjustment		3	1		1	1	1	1	1		1			EC-83
	Vehicle speed sensor circuit		2	3		3						3			EC-326
	Knock sensor circuit			2								3			EC-249
	ECM	2	2	3	3	3	3	3	3	3	3	3			EC-345,90
	Start signal circuit	2													EC-454
	Park/neutral position (PNP) switch circuit			3		3		3	3			3			EC-428
	Power steering oil pressure switch circuit		2					3	3						EC-463

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

(continued on next page)

Symptom Matrix Chart (Cont'd)

SYSTEM — Engine mechanical & other		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)	Reference page
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel tank	5													FE section
	Fuel piping			5	5	5		5	5			5			
	Vapor lock		5												
	Valve deposit														
	Poor fuel (Heavy weight gasoline, Low octane)	5		5	5	5		5	5			5			—
Air	Air duct														
	Air cleaner														
	Air leakage from air duct (Mass air flow sensor — throttle body)		5	5		5		5	5			5			
	Throttle body, Throttle wire	5			5		5			5					FE section
	Air leakage from intake manifold/ Collector/Gasket														—
Cranking	Battery	1	1	1		1		1	1			1		1	
	Generator circuit														EL section
	Starter circuit	3													
	Flywheel/Drive plate	6													EM section
	Park/neutral position (PNP) switch	4													AT section
Engine	Cylinder head	5	5	5	5	5		5	5			5			
	Cylinder head gasket										4		3		
	Cylinder block														
	Piston												4		
	Piston ring	6	6	6	6	6		6	6			6			
	Connecting rod														
	Bearing														EM section
	Crankshaft														
Valve mechanism	Timing chain														
	Camshaft	5	5	5	5	5		5	5			5			
	Intake valve												3		
	Exhaust valve														
Exhaust	Exhaust manifold/Tube/Muffler/Gasket														FE 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, LC section
	Oil level (Low)/Filthy oil														
Cooling	Radiator/Hose/Radiator filler cap														
	Thermostat									5					LC section
	Water pump	5	5	5	5	5		5	5		4	5			
	Water gallery														
	Cooling fan									5					EC-433
	Coolant level (low)/Contaminated coolant														MA section
NVIS (Nissan Vehicle Immobilizer System — NATS)		1	1												EC-59 or EL section.

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

CONSULT-II Reference Value in Data Monitor Mode

Remarks:

- Specification data are reference values.
- Specification data are output/input values which are detected or supplied by the ECM at the connector.
  - * Specification data may not be directly related to their components signals/values/operations.
  - i.e. Adjust ignition timing with a timing light before monitoring IGN TIMING, 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.
- 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	1.8 - 2.4V
B/FUEL SCHDL	ditto	Idle	0.6 - 1.0 msec
		2,000 rpm	0.7 - 1.1 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
HO2S1 MNTR (B1)			LEAN ↔ RICH Changes more than 5 times during 10 seconds.
HO2S2 (B1)	● Engine: After warming up	Revving engine from idle up to 3,000 rpm quickly	0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)			LEAN ↔ RICH
VHCL SPEED SE	● Turn drive wheels and compare 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	● After warming up ● Ignition switch: ON (Engine stopped)	Throttle valve: fully closed	0.15 - 0.85V
		Throttle valve: fully opened	Approx. 3.5 - 4.7V
FUEL T/TMP SE	● Ignition switch: ON		
EGR TEMP SEN	● Engine: After warming up		Less than 4.5V
ABSOL PRES/SE	● Ignition switch: ON		Approx. 4.4V
START SIGNAL	● Ignition switch: ON → START → ON		OFF → ON → OFF
CLSD THL POS	● Engine: After warming up ● Ignition switch: ON (Engine stopped)	Throttle valve: Idle position	ON
		Throttle valve: Slightly open	OFF
CLSD THL/P SW	● Engine: After warming up ● Ignition switch: ON (Engine stopped)	Throttle valve: Idle position	ON
		Throttle valve: Slightly open	OFF
AIR COND SIG	● Engine: After warming up, idle the engine	Air conditioner switch: “OFF”	OFF
		Air conditioner switch: “ON” (Compressor operates.)	ON
P/N POSI SW	● Ignition switch: ON	Shift lever: “P” or “N”	ON
		Except above	OFF
PW/ST SIGNAL	● Engine: After warming up, idle the engine	Steering wheel in neutral position (forward direction)	OFF
		The steering wheel is fully turned	ON
LOAD SIGNAL	● Ignition switch: ON	Rear window defogger is operating.	ON
		Rear window defogger is not operating.	OFF
AMB TEMP SW	● Ignition switch: ON ● Compare ambient temperature with the following:	Below 23.5°C (74°F)	OFF
		Above 23.5°C (74°F)	ON

CONSULT-II Reference Value in Data Monitor Mode (Cont'd)

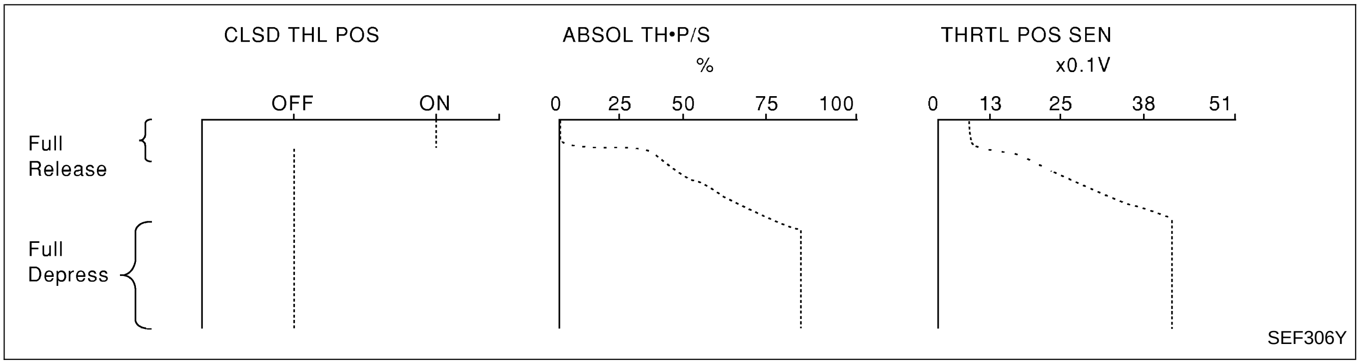
MONITOR ITEM	CONDITION		SPECIFICATION
IGNITION SW	● Ignition switch: ON → OFF → ON		ON → OFF → ON
HEATER FAN SW	● Ignition switch: ON	Fan control switch: ON	ON
		Fan control switch: OFF	OFF
A/C PRESS SW	● Air conditioner high pressure side: Increasing to 1,422 - 1,618 kPa (14.5 - 16.5 kg/cm^2, 206 - 235 psi)		ON
	● Air conditioner high pressure side: Except above		OFF
INJ PULSE-B1	● Engine: After warming up ● Air conditioner switch: "OFF" ● Shift lever: "N" ● No-load	Idle	2.5 - 3.3 msec
		2,000 rpm	2.4 - 3.2 msec
IGN TIMING	ditto	Idle	Approx. 20° BTDC
		2,000 rpm	More than 25° BTDC
IACV-AAC/V	ditto	Idle	Approx. 20%
		2,000 rpm	—
PURG VOL C/V	● Engine: After warming up ● Air conditioner switch "OFF" ● No-load	Idle	0%
		Vehicle running (Shift lever "1") 2,000 rpm (90 seconds after starting engine)	—
EVAP SYS PRES	● Ignition switch: ON		Approx. 3.4V
AIR COND RLY	● Air conditioner switch: OFF → ON		OFF → ON
EGRC SOL/V	● Engine: After warming up ● Air conditioner switch: "OFF" ● Shift lever: "N" ● No-load	Idle	OFF (CUT)
		Engine speed: Revving from 1,500 to 4,000 rpm quickly	ON (FLOW)
FUEL PUMP RLY	● Ignition switch is turned to ON (Operates for 5 seconds) ● Engine running and cranking		ON
	Except as shown above		OFF
VC/V BYPASS/V	● Ignition switch: ON		OFF
VENT CONT/V	● Ignition switch: ON		OFF
COOLING FAN	● Engine: Idling, after warming up ● Air conditioner switch "OFF" ● Vehicle speed	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 95°C (203°F) or more.	HI
HO2S1 HTR (B1)	● Engine speed: Idle		ON
	● Engine speed: Above 3,600 rpm		OFF
HO2S2 HTR (B1)	● Engine speed: Idle [After driving 2 minutes at 70 km/h (43 mph) or more]		ON
	● Engine speed: Above 3,000 rpm ● Ignition switch: ON (Engine stopped)		OFF
CAL/LD VALUE	● Engine: After warming up ● Air conditioner switch: "OFF" ● Shift lever: "N" ● No-load	Idle	Approx. 19%
		2,500 rpm	Approx. 18%
ABSOL TH·P/S	● Ignition switch: ON (Engine stopped)	Throttle valve: fully closed	0.0%
		Throttle valve: fully opened	Approx. 80%
MASS AIRFLOW	● Engine: After warming up ● Air conditioner switch: "OFF" ● Shift lever: "N" ● No-load	Idle	Approx. 3.24 g·m/s
		2,500 rpm	Approx. 12.2 g·m/s
FUEL LEVEL SE	● Ignition switch: ON		Approximately 0.2 - 2.3V (Varies by the fuel level)

Major Sensor Reference Graph in Data Monitor Mode

The following are the major sensor reference graphs in “DATA MONITOR” mode.
(Select “HI SPEED” in “DATA MONITOR” with CONSULT-II.)

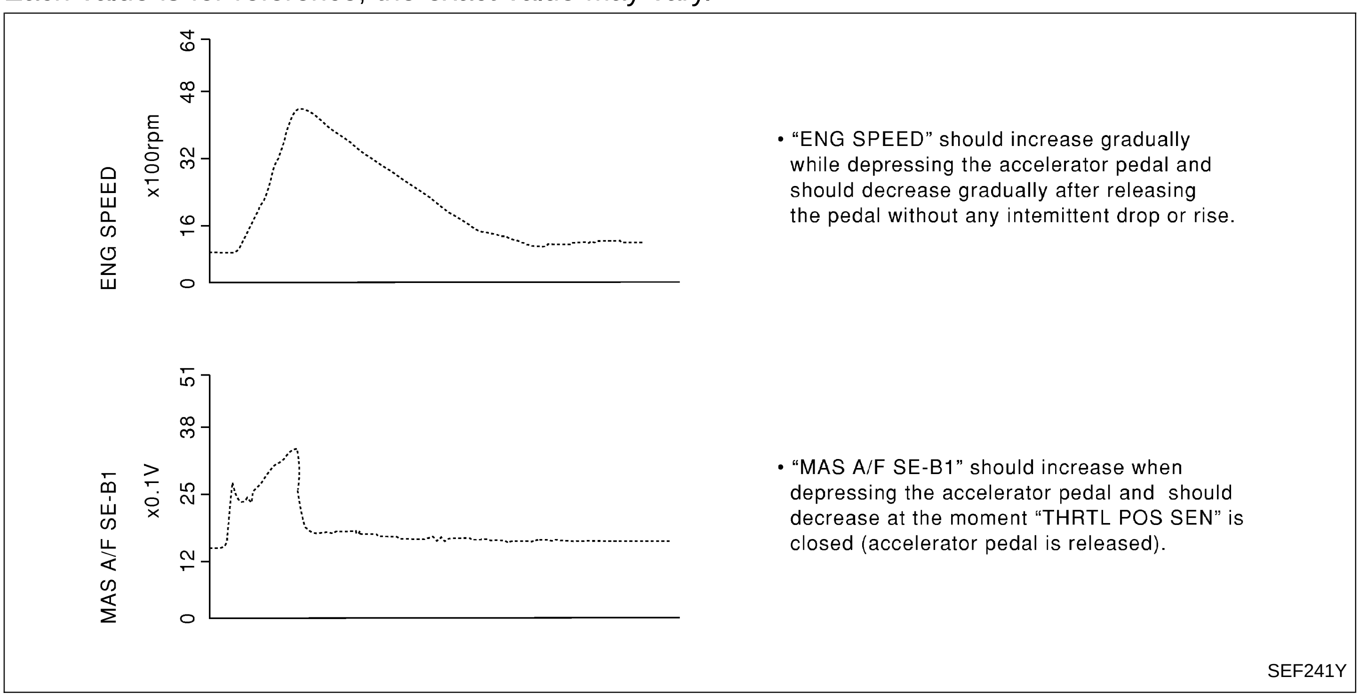
THRTL POS SEN, ABSOL TH·P/S, CLSD THL POS

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”.

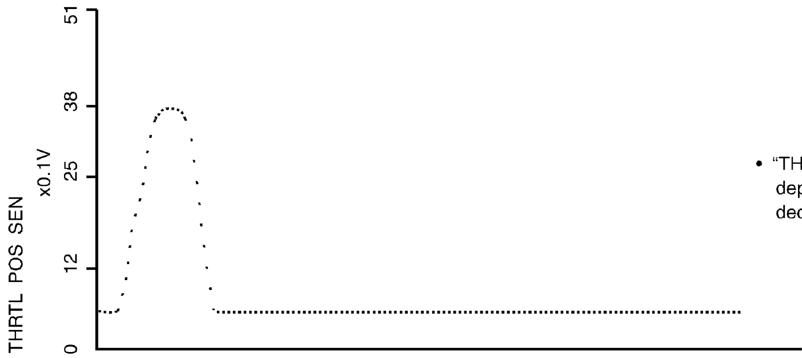


ENG SPEED, MAS A/F SE-B1, THRTL POS SEN, HO2S2 (B1), INJ PULSE-B1

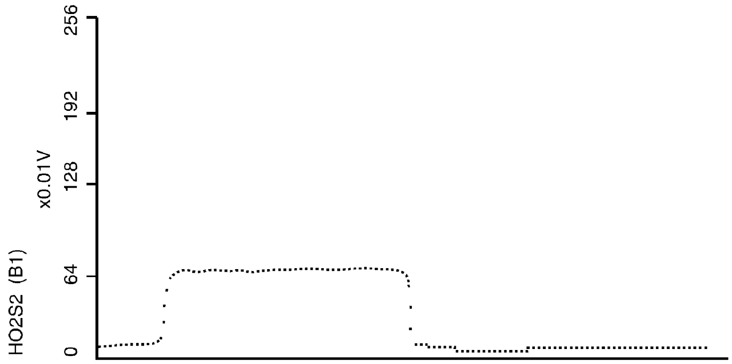
Below is the data for “ENG SPEED”, “MAS A/F SE-B1”, “THRTL POS SEN”, “HO2S1 (B1)”, “HO2S2 (B1)”,and “INJ PULSE-B1” when revving engine quickly up to 4,800 rpm under no load after warming up engine to normal operating temperature.
Each value is for reference, the exact value may vary.



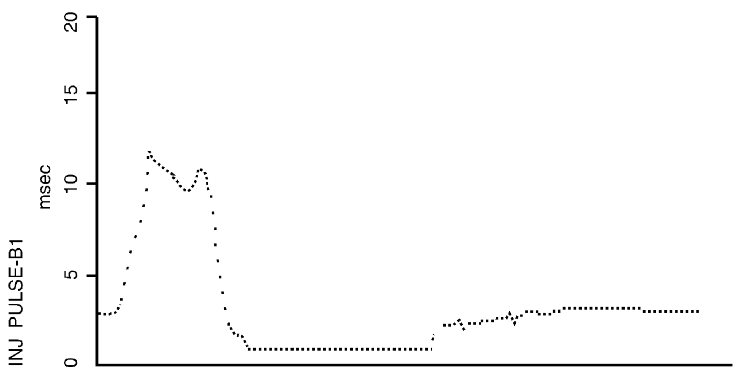
Major Sensor Reference Graph in Data Monitor Mode (Cont'd)



- "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

GI
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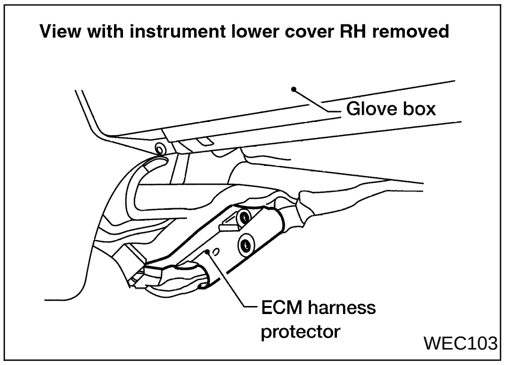
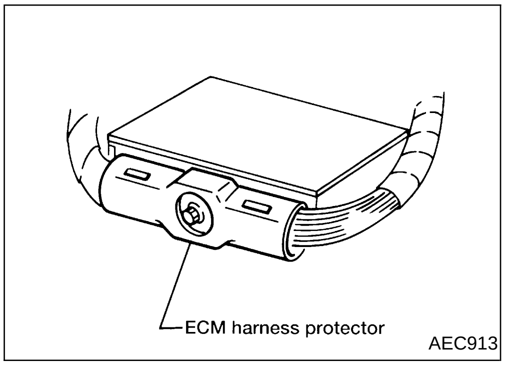
ECM Terminals and Reference Value

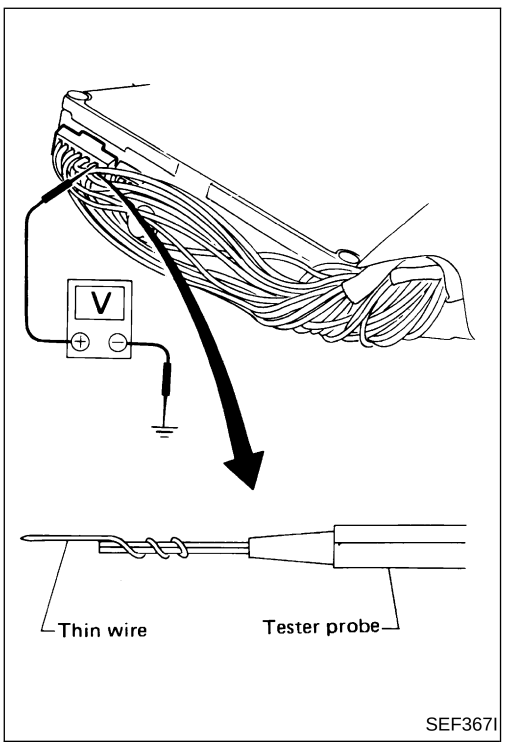
PREPARATION



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



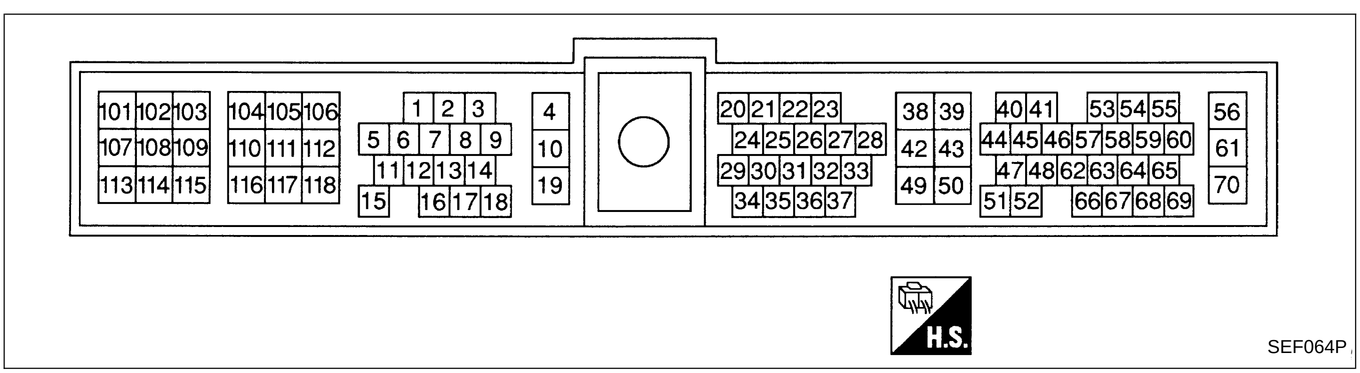
2. Remove ECM harness protector.



3. Perform all voltage measurements with the connector connected. Extend tester probe as shown to perform tests easily.
   - Open harness securing clip to make testing easier.
   - Use extreme care not to touch 2 pins at 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.

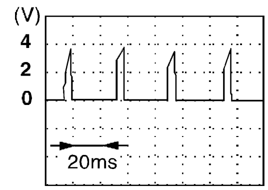
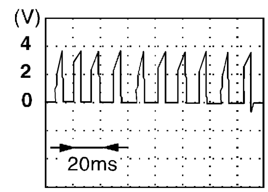
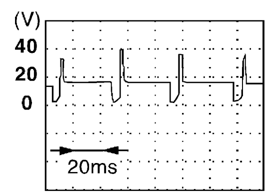
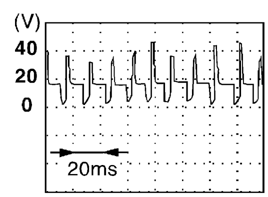
ECM HARNESS CONNECTOR TERMINAL LAYOUT



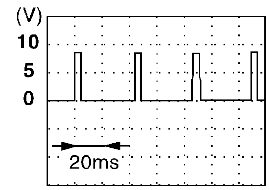
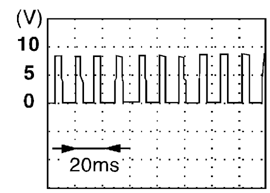
ECM Terminals and Reference Value (Cont'd)

ECM INSPECTION TABLE

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	W/B	Ignition signal	Engine is running. (Warm-up condition) — Idle speed	0.3 - 0.5V  SEF186T
			Engine is running. — Engine speed is 2,000 rpm	0.7 - 1.0V  SEF187T
2	OR/B	Ignition check	Engine is running. (Warm-up condition) — Idle speed	13 - 14V  SEF188T
			Engine is running. — Engine speed is 2,000 rpm.	12 - 13V  SEF189T

ECM Terminals and Reference Value (Cont'd)

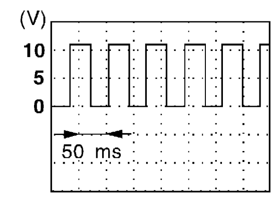
TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	L/OR	Tachometer	Engine is running. (Warm-up condition) └ Idle speed	0.5 - 1.5V  SEF190T
			Engine is running. └ Engine speed is 2,000 rpm	2 - 3V  SEF191T
4	W/G	ECM relay (Self-shutoff)	Engine is running. Ignition switch "OFF" └ For a few seconds after turning ignition switch "OFF"	0 - 1V
			Ignition switch "OFF" └ A few seconds passed after turning ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
5	L	EVAP canister purge volume control solenoid valve	Engine is running. └ Idle speed	BATTERY VOLTAGE (11 - 14V)
6	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)
7	PU	A/T check signal	Ignition switch "ON" Engine is running.	0 - 4.0V
9	GY/R	Air conditioner triple-pressure switch	Ignition switch "ON".	Approximately 6 - 10V
10	B	ECM ground	Engine is running. └ Idle speed	Engine ground
13	LG	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 - 0.4V

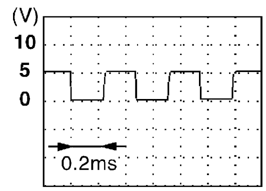
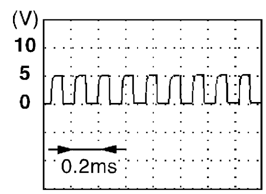
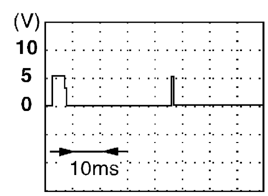
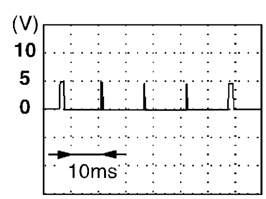
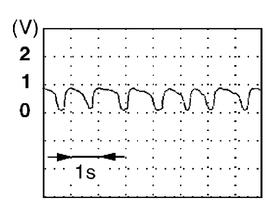
ECM Terminals and Reference Value (Cont'd)

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
14	LG/R	Cooling fan relay (Low)	Engine is running. Cooling fan is not operating.	BATTERY VOLTAGE (11 - 14V)
			Engine is running. Cooling fan (Low) is operating.	0 - 0.3V
15	R/Y	Air conditioner relay	Engine is running. Both A/C switch and blower switch are "ON"*	Approximately 0V
			Engine is running. A/C switch is "OFF"	BATTERY VOLTAGE (11 - 14V)
18	OR/L	Malfunction indicator lamp	Ignition switch "ON"	Approximately 0.1V
			Engine is running. Idle speed	BATTERY VOLTAGE (11 - 14V)
19	B	ECM ground	Engine is running. Idle speed	Engine ground
20	B/Y	Start signal	Ignition switch "ON"	Approximately 0V
			Ignition switch "START"	BATTERY VOLTAGE (11 - 14V)
21	L/OR	Air conditioner switch	Engine is running. Both air conditioner switch and blower switch are "ON" (Compressor operates)	Approximately 0V
			Engine is running. Air conditioner switch is "OFF"	BATTERY VOLTAGE (11 - 14V)
22	G/OR	Park/neutral position (PNP) switch	Ignition switch "ON" Gear position is "N" or "P"	Approximately 0V
			Ignition switch "ON" Except the above gear position	Approximately 5V
23	Y	Throttle position sensor	Ignition switch "ON" (Warm-up condition) Accelerator pedal fully released	0.3 - 0.7V
			Ignition switch "ON" Accelerator pedal fully depressed	Approximately 4V
24	Y/B	A/T signal No. 1	Ignition switch "ON" Engine is running. Idle speed	6 - 8V
25	LG/B	Power steering oil pressure switch	Engine is running. Steering wheel is fully being turned	Approximately 0V
			Engine is running. Steering wheel is not being turned	Approximately 5V

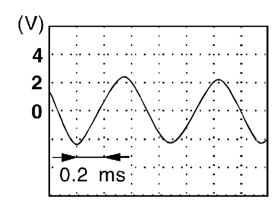
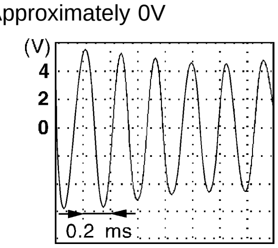
*: Any mode except "OFF", ambient air temperature above 10°C (50°F).

ECM Terminals and Reference Value (Cont'd)

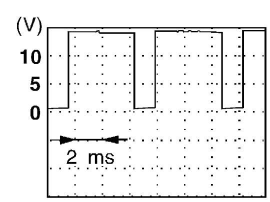
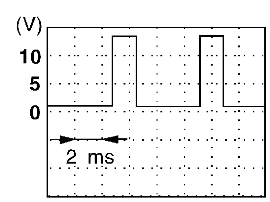
TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
26	PU/R	Vehicle speed sensor	Engine is running. — Lift up the vehicle. — In 2nd gear position — 40 km/h (25 MPH)	4 - 7V  SEF642U
27	Y	Throttle position switch (Closed position)	Ignition switch "ON" (Warm-up condition) — Accelerator pedal fully released	BATTERY VOLTAGE (11 - 14V)
			Ignition switch "ON" — Accelerator pedal depressed	Approximately 0V
28	R/Y	Intake air temperature sensor	Engine is running.	Approximately 0 - 4.8V Output voltage varies with intake air temperature.
29	Y/G	A/T signal No. 2	Ignition switch "ON" Engine is running. — Idle speed	6 - 8V
30	Y/R	A/T signal No. 3	Ignition switch "ON"	0V
33	GY	Throttle position sensor signal	Ignition switch "ON" (Warm-up condition) — Accelerator pedal fully released	Approximately 0.4V
			Ignition switch "ON" — Accelerator pedal fully depressed	Approximately 4V
37	Y/G	Ambient air temperature switch	Engine is running. — Idle speed	0V
			Engine is running. [Ambient air temperature is 20°C (68°F)] — Idle speed	Approximately 8V
38	R	Ignition switch	Ignition switch "OFF"	0V
			Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
39	B	ECM ground	Engine is running. — Idle speed	Engine ground

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
40	B/W	Camshaft position sensor (Position signal)	Engine is running. (Warm-up condition) Idle speed	Approximately 2.5V  SEF195T
			Engine is running. Engine speed is 2,000 rpm.	Approximately 2.3 - 2.5V  SEF196T
41	L	Camshaft position sensor (Reference signal)	Engine is running. (Warm-up condition) Idle speed	0.1 - 0.5V  SEF199T
			Engine is running. Engine speed is 2,000 rpm.	0.2 - 0.4V  SEF200T
43	B	ECM ground	Engine is running. Idle speed	Engine ground (Probe this terminal with ⊖ tester probe when measuring.)
45	G/L	Fuel level sensor	Engine is running. Idle speed	0 - Approximately 4.5V
46	W	Heated oxygen sensor 1 (front)	Engine is running. After warming up to normal operating temperature and engine speed is 2,000 rpm	0 - Approximately 1.0V  SEF201T

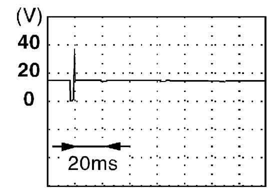
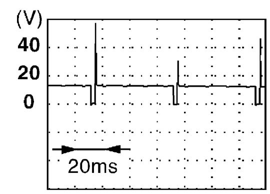
ECM Terminals and Reference Value (Cont'd)

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	BR	Mass air flow sensor	Engine is running. (Warm-up condition) Idle speed	1.2 - 1.5V
			Engine is running. (Warm-up condition) Engine speed is 2,500 rpm	1.9 - 2.3V
48	B/R	Mass air flow sensor ground	Engine is running. (Warm-up condition) Idle speed	Approximately 0V
49	W/R	Sensors' power supply	Ignition switch "ON"	Approximately 5V
50	B	Sensors' ground	Engine is running. (Warm-up condition) Idle speed	Approximately 0V
51	BR/Y	Engine coolant temperature sensor	Engine is running.	Approximately 0 - 4.8V Output voltage varies with engine coolant temperature.
52	W	Heated oxygen sensor 2 (rear)	Engine is running. After warming up to normal operating temperature and revving engine from idle to 3,000 rpm quickly	0 - Approximately 1.0V
53	BR	Crankshaft position sensor (OBD)	Engine is running. (Warm-up condition) Idle speed	Approximately 0.5V  SEF643U
			Engine is running. Engine speed is 2,000 rpm	Approximately 0V  SEF644U
54	W	Knock sensor	Engine is running. Idle speed	Approximately 2.5V
55	L/R	Rear window defogger relay	Ignition switch "ON" Rear window defogger is "OFF".	Approximately 0V
			Ignition switch "ON" Rear window defogger is "ON".	BATTERY VOLTAGE (11 - 14V)
56	W/R	Power supply for ECM	Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
61	W/R			

ECM Terminals and Reference Value (Cont'd)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
59	LG/R	Blower fan switch	Ignition switch "ON" └ Blower fan switch is "ON"	Approximately 0V
			Ignition switch "ON" └ Blower fan switch is "OFF"	BATTERY VOLTAGE (11 - 14V)
60	BR	Headlamp switch	Lighting switch "ON"	BATTERY VOLTAGE (11 - 14V)
			Lighting switch "OFF"	Approximately 0V
62	L/Y	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
63	LG/R	Fuel tank temperature sensor	Engine is running.	Approximately 0 - 4.8V Output voltage varies with fuel temperature.
58	L/B	Data link connector	Engine is running. └ Idle speed (CONSULT-II is connected and turned on.)	0 - 14V
64	G/B			
65	GY/L			3 - 9V
67	W	EVAP control system pressure sensor	Ignition switch "ON"	Approximately 3.4V
68	B	Fuel level sensor	Ignition switch "ON"	Approximately 0V
70	W/L	Power supply (Back-up)	Ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
101	SB	IACV-AAC valve	Engine is running. (Warm-up condition) └ Idle speed	Approximately 12V  SEF645U
			Engine is running. (Warm-up condition) └ Engine speed is 2,000 rpm	1 - 12V  SEF646U

ECM Terminals and Reference Value (Cont'd)

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
102	R/B	Injector No. 1	Engine is running. (Warm-up condition) └ Idle speed	BATTERY VOLTAGE (11 - 14V)  SEF204T
104	G/B	Injector No. 3		
107	Y/B	Injector No. 2	Engine is running. (Warm-up condition) └ Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14V)  SEF205T
109	L/B	Injector No. 4		
103	P	EGRC-solenoid valve	Engine is running. (Warm-up condition) └ Idle speed	BATTERY VOLTAGE (11 - 14V)
			Engine is running. (Warm-up condition) └ Revving engine from idle to 3,000 rpm quickly	0 - 0.7V
106	B	ECM ground	Engine is running. └ Idle speed	Engine ground
108	PU	EVAP canister vent control valve	Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
110	R/Y	Heated oxygen sensor 2 heater (rear)	Engine is running. └ Idle speed [After driving 2 minutes at 70 km/h (43 mph) or more]	Approximately 0.4V
			Ignition switch "ON" └ Engine stopped	BATTERY VOLTAGE (11 - 14V)
			Engine is running. └ Engine speed is above 3,000 rpm	
112	B	ECM ground	Engine is running. └ Idle speed	Engine ground
113	W/L	Current return	Engine is running. └ Idle speed	BATTERY VOLTAGE (11 - 14V)

ECM Terminals and Reference Value (Cont'd)

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
115	OR	Heated oxygen sensor 1 heater (front)	Engine is running. Engine speed is below 3,600 rpm	Approximately 0.4V
			Engine is running. Engine speed is above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)
117	PU/R	Vacuum cut valve bypass valve	Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
118	B	ECM ground	Engine is running. Idle speed	Engine ground

Description

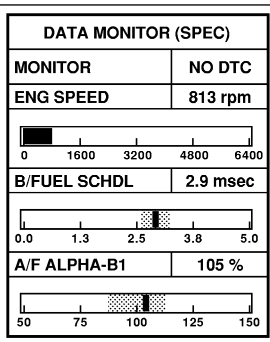
The specification (SP) value indicates the tolerance of the value that is displayed in “DATA MONITOR (SPEC)” mode of CONSULT-II during normal operation of the Engine Control System. When the value in “DATA MONITOR (SPEC)” mode is within the SP value, the Engine Control System is confirmed OK. When the value in “DATA MONITOR (SPEC)” mode is NOT within the SP value, the Engine Control System may have one or more malfunctions.
The SP value is used to detect malfunctions that may affect the Engine Control System, but will not light the MIL.
The SP value will be displayed for the following three items:

- B/FUEL SCHDL (The fuel injection pulse width programmed into ECM prior to any learned on board correction)
- A/F ALPHA-B1/B2 (The mean value of air-fuel ratio feedback correction factor per cycle)
- MAS A/F SE-B1 (The signal voltage of the mass air flow sensor)

Testing Condition

- 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)
- 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 less than 0.9V. For M/T models, drive vehicle for 5 minutes after the engine is warmed up to normal operating temperature.

*2: Rear window defogger switch, air conditioner switch, lighting switch are “OFF”. Cooling fans are not operating. Steering wheel is straight ahead.



SEF601Z

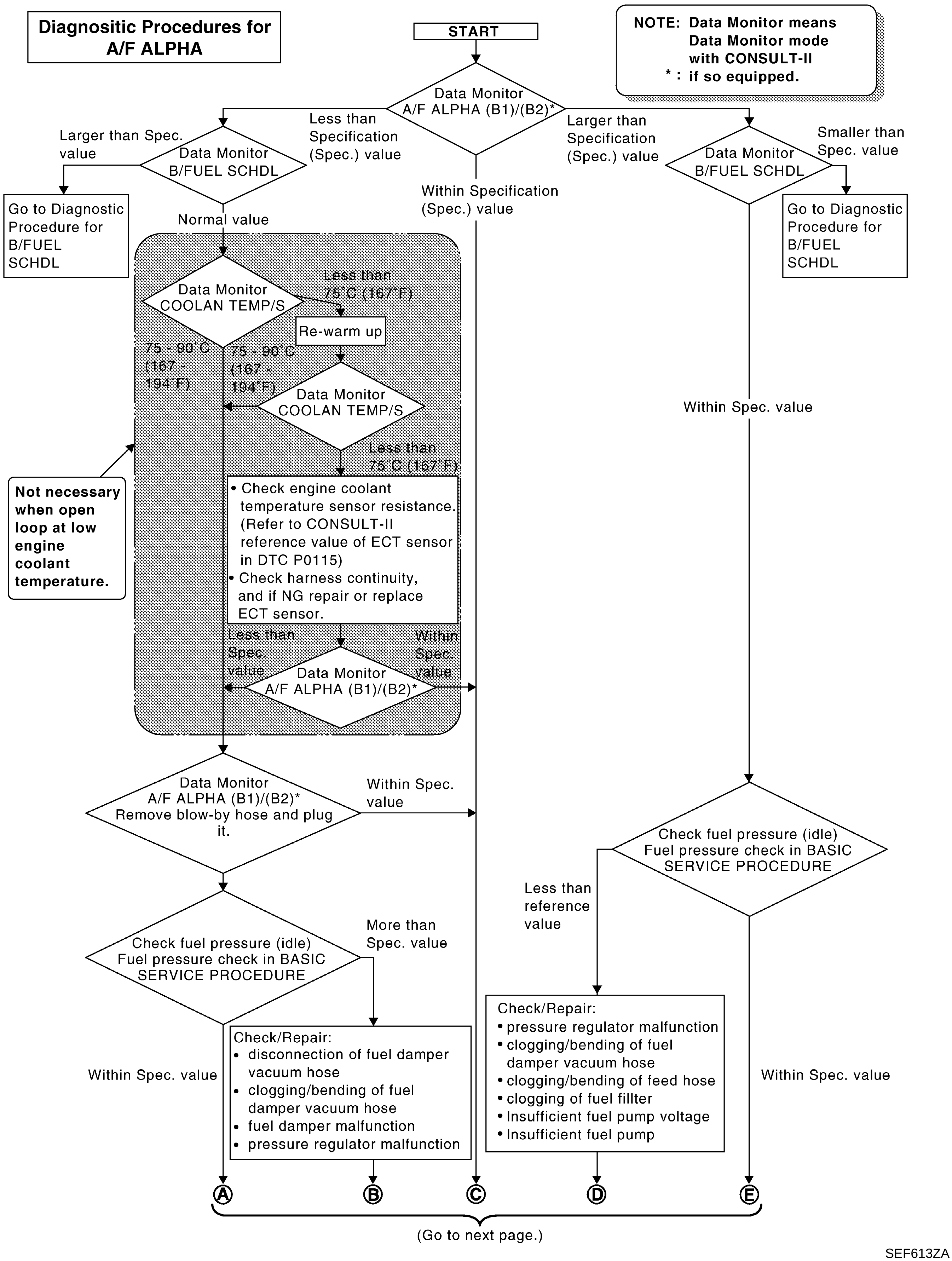
Inspection Procedure

NOTE:

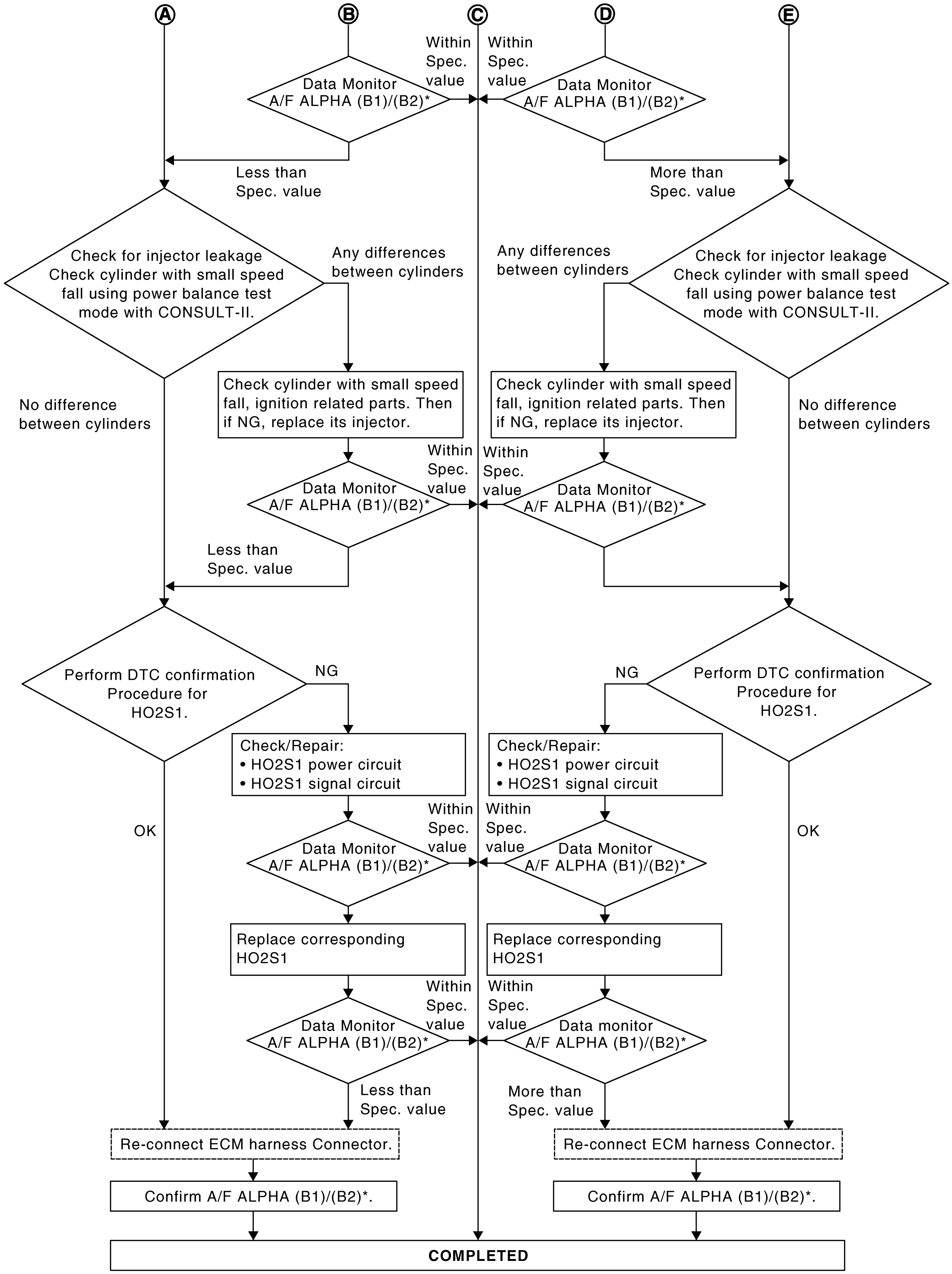
Perform “DATA MONITOR (SPEC)” mode in maximum scale display.

1. Perform “Basic Inspection”, EC-83.
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 “Diagnostic Procedure”, EC-109.

Diagnostic Procedure



Diagnostic Procedure (Cont’d)



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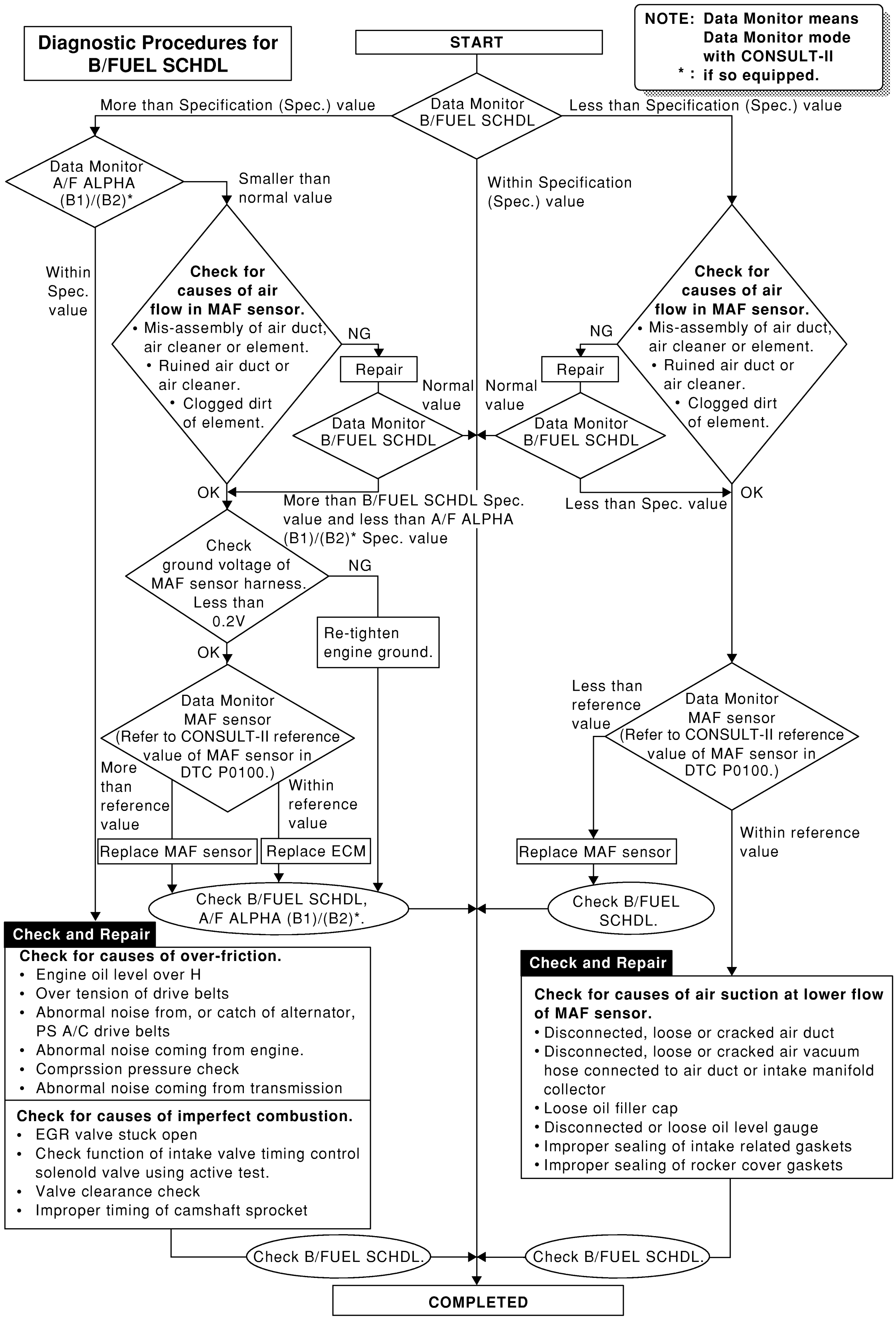
Diagnostic Procedure (Cont'd)



SEF615Z

Description

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

Erase (1st trip) DTCs. Refer to "HOW TO ERASE EMISSION-RELATED INFORMATION" (EC-58).

↓

Check ground terminals. Refer to "Circuit Inspection", "GROUND INSPECTION" (GI section).

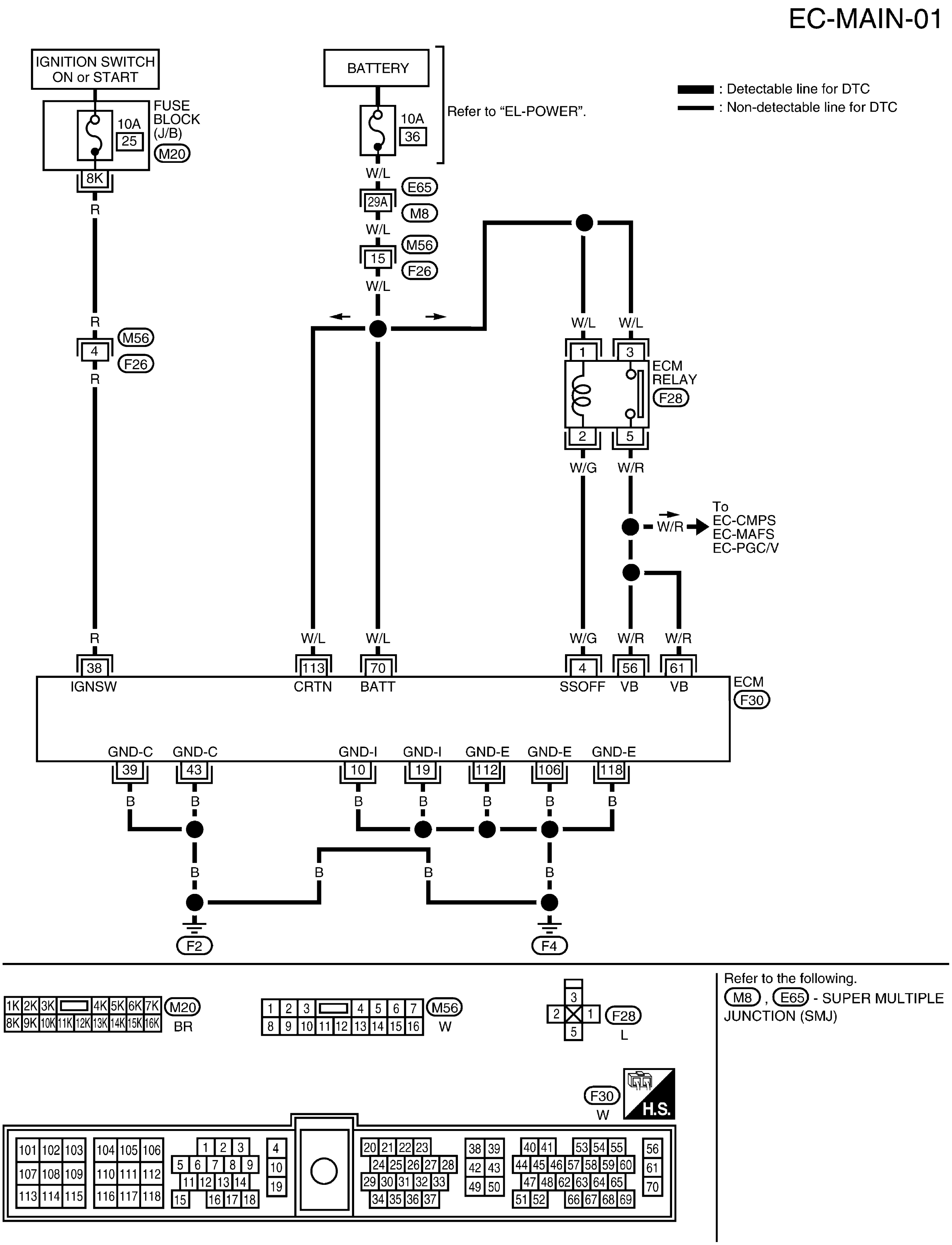
↓

Perform "Incident Simulation Tests" (GI section).

↓

Check connector terminals. Refer to "How to Check Enlarged Contact Spring of Terminal" (GI section).

Main Power Supply and Ground Circuit



WEC702

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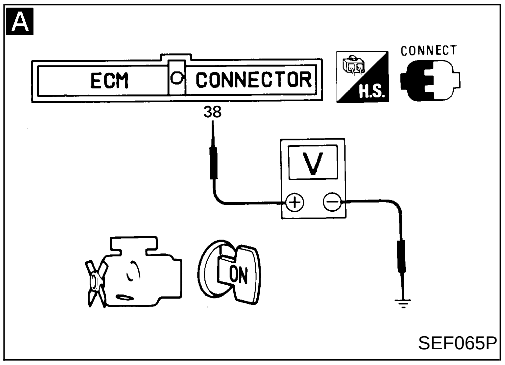
ECM TERMINALS AND REFERENCE VALUE

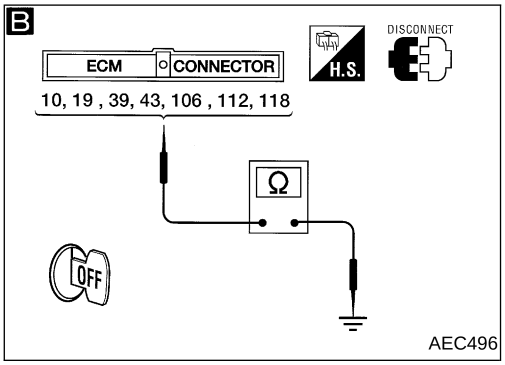
Specification data are reference values and are measured between each terminal and ground.

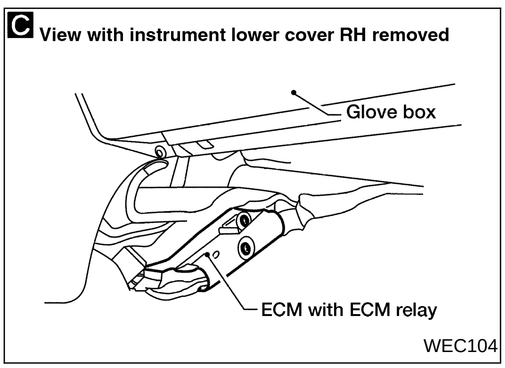
CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

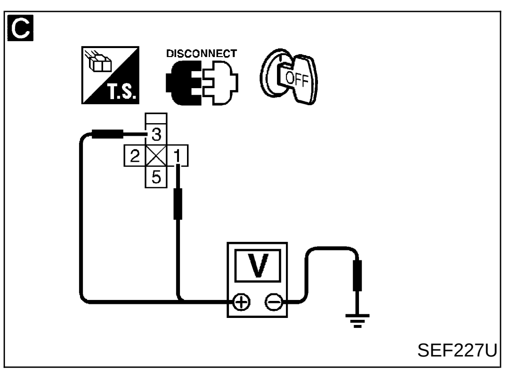
TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	W/G	ECM relay (Self-shutoff)	[Engine is running.] [Ignition switch "OFF"] For a few seconds after turning ignition switch "OFF"	0 - 1V
			[Ignition switch "OFF"] A few seconds passed after turning ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
10	B	ECM ground	[Engine is running.] Idle speed	Engine ground
19	B	ECM ground	[Engine is running.] Idle speed	Engine ground
38	R	Ignition switch	[Ignition switch "OFF"]	0V
			[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)
39	B	ECM ground	[Engine is running.] Idle speed	Engine ground
43	B	ECM ground	[Engine is running.] Idle speed	Engine ground (Probe this terminal with ⊖ tester probe when measuring.)
56	W/R	Power supply for ECM	[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)
61	W/R			
70	W/L	Power supply (Back-up)	[Ignition switch "OFF"]	BATTERY VOLTAGE (11 - 14V)
106	B	ECM ground	[Engine is running.] Idle speed	Engine ground
112	B	ECM ground	[Engine is running.] Idle speed	Engine ground
113	W/L	Current return	[Engine is running.] Idle speed	BATTERY VOLTAGE (11 - 14V)
118	B	ECM ground	[Engine is running.] Idle speed	Engine ground

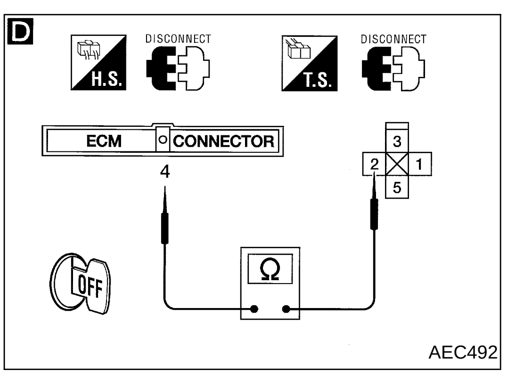
Main Power Supply and Ground Circuit (Cont'd)











DIAGNOSTIC PROCEDURE

INSPECTION START

↓

Start engine.
Is engine running?

- Yes → Go to "**CHECK POWER SUPPLY-III**" on next page.
- No ↓

A

CHECK POWER SUPPLY-I.
1. Turn ignition switch "ON".
2. Check voltage between ECM terminal 38 and ground with CONSULT-II or tester.
   Voltage: Battery voltage

- NG → Check the following.
  - 10A fuse
  - Harness connectors M56 , F26
  - Harness for open or short between ECM and fuse

  If NG, repair harness or connectors.
- OK ↓

B

CHECK GROUND CIRCUIT-I.
1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminals 10, 19, 39, 43, 106, 112, 118 and engine ground.
   Continuity should exist.
   If OK, check harness for short to power.

- NG → Repair harness or connectors.
- OK ↓

C

CHECK POWER SUPPLY-II.
1. Disconnect ECM relay.
2. Turn ignition switch "ON".
3. Check voltage between terminals 1, 3 and ground with CONSULT-II or tester.
   Voltage: Battery voltage

- NG → Check the following.
  - 10A fuse
  - Harness connectors F26 , M56
  - Harness connectors M8 , E65
  - Harness for open or short between ECM relay and battery

  If NG, repair open circuit or short to ground or short to power in harness or connectors.
- OK ↓

D

CHECK OUTPUT SIGNAL CIRCUIT.
1. Turn ignition switch "OFF".
2. Check harness continuity between ECM terminal 4 and terminal 2.
   Continuity should exist.
   If OK, check harness for short to ground and short to power.

- NG → Repair harness or connectors.
- OK ↓

Go to "TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEM (Injector)", EC-451.

↓ OK

A
(Go to next page.)

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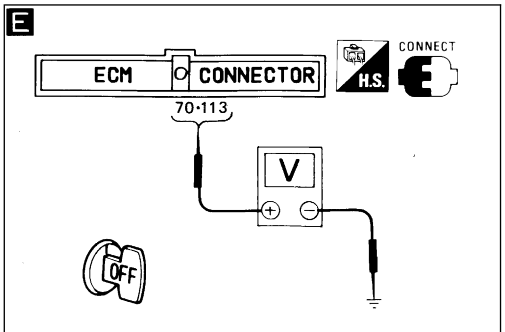
Main Power Supply and Ground Circuit (Cont'd)



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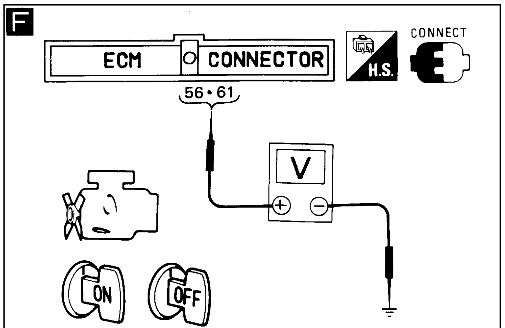

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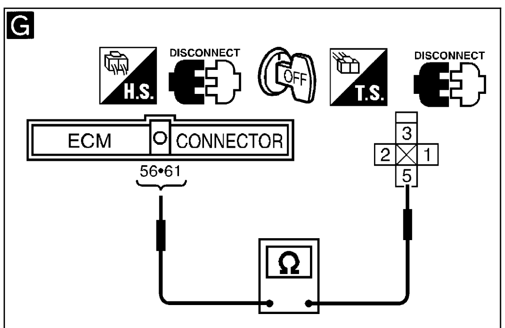

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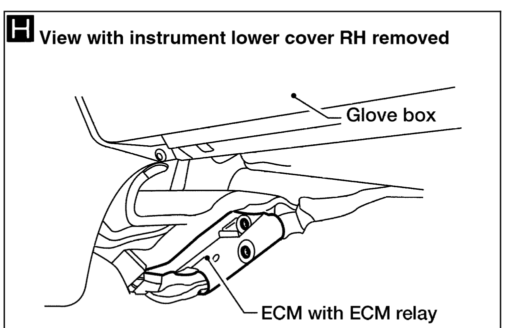
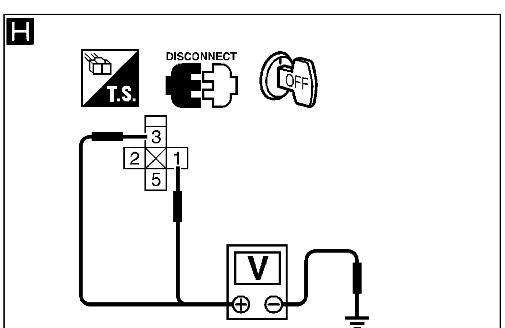


WEC104



SEF227U

Ⓐ

E

CHECK POWER SUPPLY-III.
Check voltage between ECM terminals 70, 113 and ground with CONSULT-II or tester.
Voltage: Battery voltage

NG → Check the following.
- Harness connectors F26, M56
- Harness connectors M8, E65
- Harness for open or short between ECM and fuse

If NG, repair harness or connectors.

OK ↓

F

CHECK POWER SUPPLY-IV.
1. Turn ignition switch "ON" and then "OFF".
2. Check voltage between ECM terminals 56, 61 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 → Go to **L** "CHECK GROUND CIRCUIT-II" on next page.

Case-1: Battery voltage does not exist.
Case-2: Battery voltage exists for more than a few seconds.

NG

Case-2 → Go to **K** "CHECK ECM RELAY" on next page.

Case-1 ↓

G

CHECK HARNESS CONTINUITY BETWEEN ECM RELAY AND ECM.
1. Disconnect ECM harness connector.
2. Disconnect ECM relay.
3. Check harness continuity between ECM terminals 56, 61 and relay terminal 5.
   Continuity should exist.
   If OK, check harness for short to ground and short to power.

NG → Repair harness or connectors.

OK ↓

H

CHECK VOLTAGE BETWEEN ECM RELAY AND GROUND.
Check voltage between relay terminals 1, 3 and ground with CONSULT-II or tester.
Voltage: Battery voltage

NG → Check the following.
- Harness for open or short between ECM relay and 10A fuse

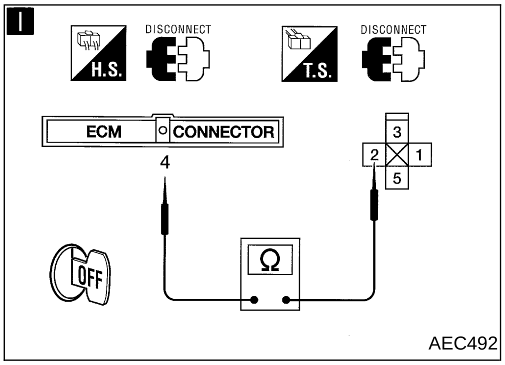
If NG, repair harness or connectors.

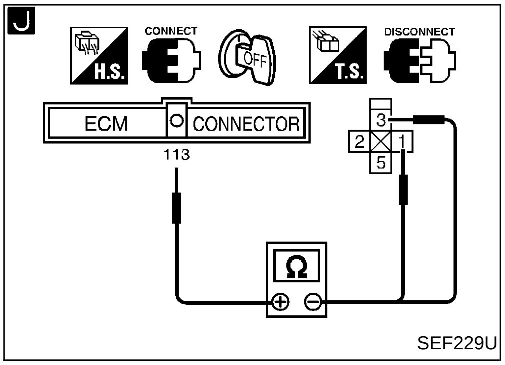
OK ↓

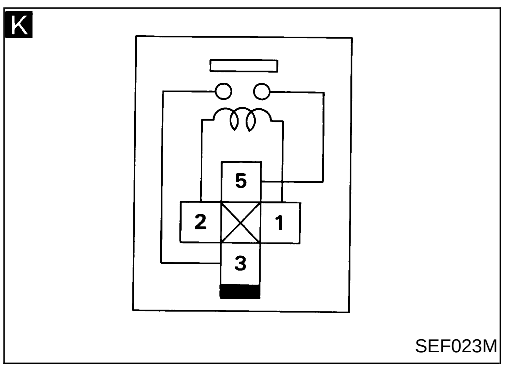
Ⓑ

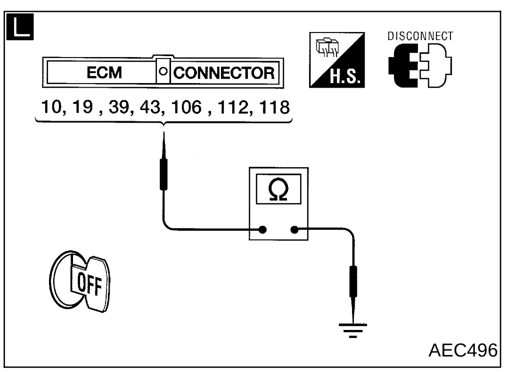
(Go to next page.)

Main Power Supply and Ground Circuit (Cont'd)









(B)

I

CHECK OUTPUT SIGNAL CIRCUIT.
Check harness continuity between ECM terminal 4 and ECM relay terminal 2.
Continuity should exist.
If OK, check harness for short to ground and short to power.

- NG → Repair harness or connectors.
- OK ↓

J

CHECK ECM RELAY TO ECM.
Check continuity between ECM terminal 113 and ECM relay terminals 1 and 3.
Continuity should exist.
If OK, check harness for short to ground and short to power.

- NG → Repair harness or connectors.
- OK ↓

K

CHECK ECM RELAY.
1. Apply 12V direct current between ECM relay terminals 1 and 2.
2. Check continuity between ECM relay terminals 3 and 5.
   12V (1 - 2) applied:
   Continuity exists.
   No voltage applied:
   No continuity

- NG → Replace ECM relay.
- OK ↓

L

CHECK GROUND CIRCUIT-II.
Check harness continuity between ECM terminals 10, 19, 39, 43, 106, 112, 118
and engine ground.
Continuity should exist.
If OK, check harness for short.

- NG → Repair harness or connectors.
- OK ↓

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-112.

↓

INSPECTION END

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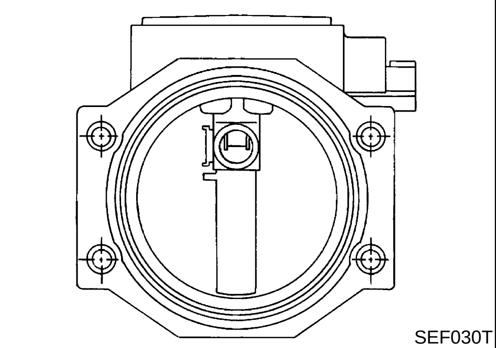


SEF030T

Mass Air Flow Sensor (MAFS)

COMPONENT DESCRIPTION

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

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

Specification data are reference values

MONITOR ITEM	CONDITION		SPECIFICATION
MAS AIR/FL SE	● Engine: After warming up ● Air conditioner switch: “OFF” ● Shift lever: “N” ● No-load	Idle	1.0 - 1.7V
		2,500 rpm	1.8 - 2.4V
CAL/LD VALUE	● Engine: After warming up ● Air conditioner switch: “OFF” ● Shift lever: “N” ● No-load	Idle	Approx. 19%
		2,500 rpm	Approx. 18%
MASS AIRFLOW	● Engine: After warming up ● Air conditioner switch: “OFF” ● Shift lever: “N” ● No-load	Idle	Approx. 3.24 g·m/s
		2,500 rpm	Approx. 12.2 g·m/s

ECM TERMINALS AND REFERENCE VALUE

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

CAUTION:
Do not use ECM ground terminals when measuring input/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)
47	BR	Mass air flow sensor	Engine is running. (Warm-up condition) └ Idle speed	1.2 - 1.5V
			Engine is running. (Warm-up condition) └ Engine speed is 2,500 rpm	1.9 - 2.3V
48	B/R	Mass air flow sensor ground	Engine is running. (Warm-up condition) └ Idle speed	Approximately 0V

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0100	A) An excessively high voltage from the sensor is sent to ECM when engine is not running. .... C) 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) An excessively low voltage from the sensor is sent to ECM* when engine is running. .... D) 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

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

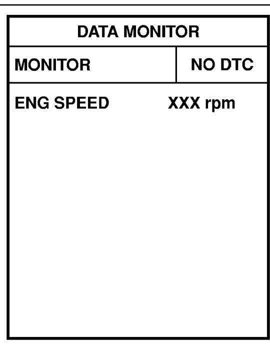
Detected items	Engine operating condition in fail-safe mode
Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

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". 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 "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.



SEF058Y

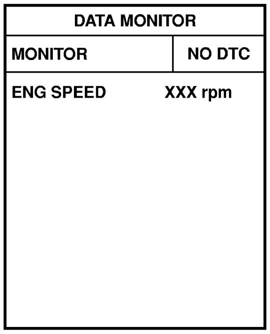
Procedure for malfunction A

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 "DIAGNOSTIC PROCEDURE", EC-123.

OR

1) Turn ignition switch "ON", and wait at least 6 seconds.
2) Select "MODE 7" with GST.
3) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-123.

Mass Air Flow Sensor (MAFS) (Cont'd)



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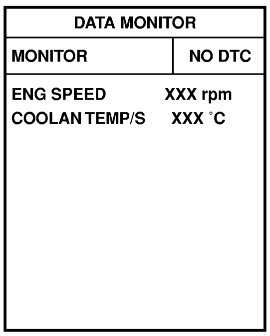


SEF174Y

Procedure for malfunction B

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 "DIAGNOSTIC PROCEDURE", EC-123.

OR

1) Turn ignition switch "ON".
2) Start engine and wait 5 seconds at most.
3) Select "MODE 7" with GST.
4) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-123.

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

Procedure for malfunction C

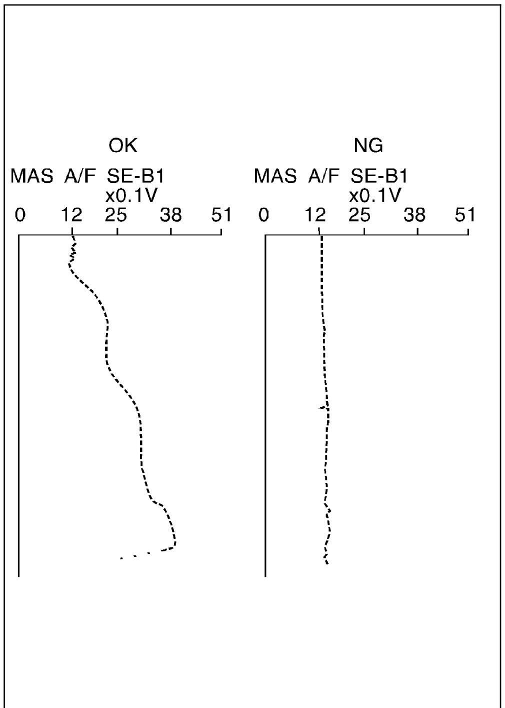
NOTE:
If engine will not start or stops soon, wait at least 10 seconds with engine stopped (Ignition switch "ON") instead of running engine at idle speed.

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 "DIAGNOSTIC PROCEDURE", EC-123.

OR

1) Start engine and warm it up to normal operating temperature.
2) Run engine for at least 10 seconds at idle speed.
3) Select "MODE 7" with GST.
4) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-123.

Mass Air Flow Sensor (MAFS) (Cont'd)

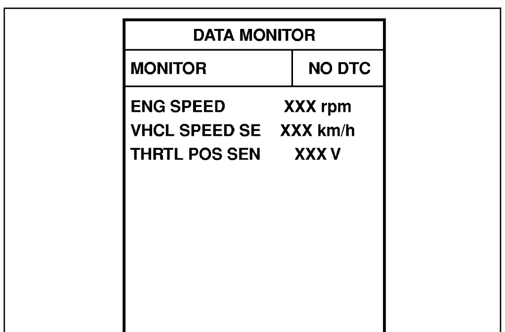


SEF243Y

Procedure for malfunction D

1) Turn ignition switch "ON".
2) Start engine and warm it up to normal operating temperature.
If engine cannot be started, go to "DIAGNOSTIC PROCEDURE", EC-123.
3) Select "DATA MONITOR" mode with CONSULT-II.
4) Check the voltage of MAS AIR/FL SE with "DATA MONITOR".
5) Increases engine speed to about 4,000 rpm.
6) Monitor the linear voltage rise in response to engine speed increases.
If NG, go to "DIAGNOSTIC PROCEDURE", EC-123.
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 "DIAGNOSTIC PROCEDURE", EC-123.

— OR —



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

SEF175Y

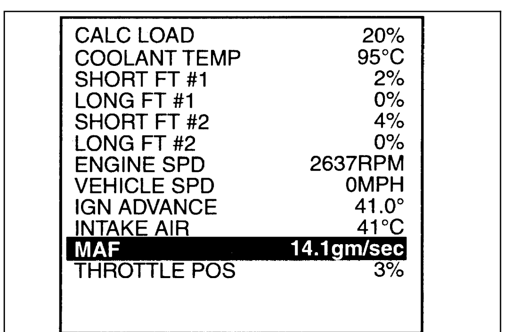
OVERALL FUNCTION CHECK

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

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 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 "DIAGNOSTIC PROCEDURE", EC-123.



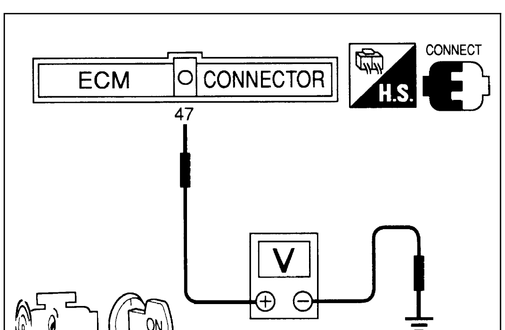
CALC LOAD	20%
COOLANT TEMP	95°C
SHORT FT #1	2%
LONG FT #1	0%
SHORT FT #2	4%
LONG FT #2	0%
ENGINE SPD	2637RPM
VEHICLE SPD	0MPH
IGN ADVANCE	41.0°
INTAKE AIR	41°C
MAF	14.1gm/sec
THROTTLE POS	3%

SEF534P

— OR —

NO TOOLS

1) Turn ignition switch "ON".
2) Start engine and warm it up to normal operating temperature.
3) Check the voltage between ECM terminal 47 and ground.
4) Check for linear voltage rise in response to increases to about 4,000 rpm in engine speed.
5) If NG, go to "DIAGNOSTIC PROCEDURE", EC-123.



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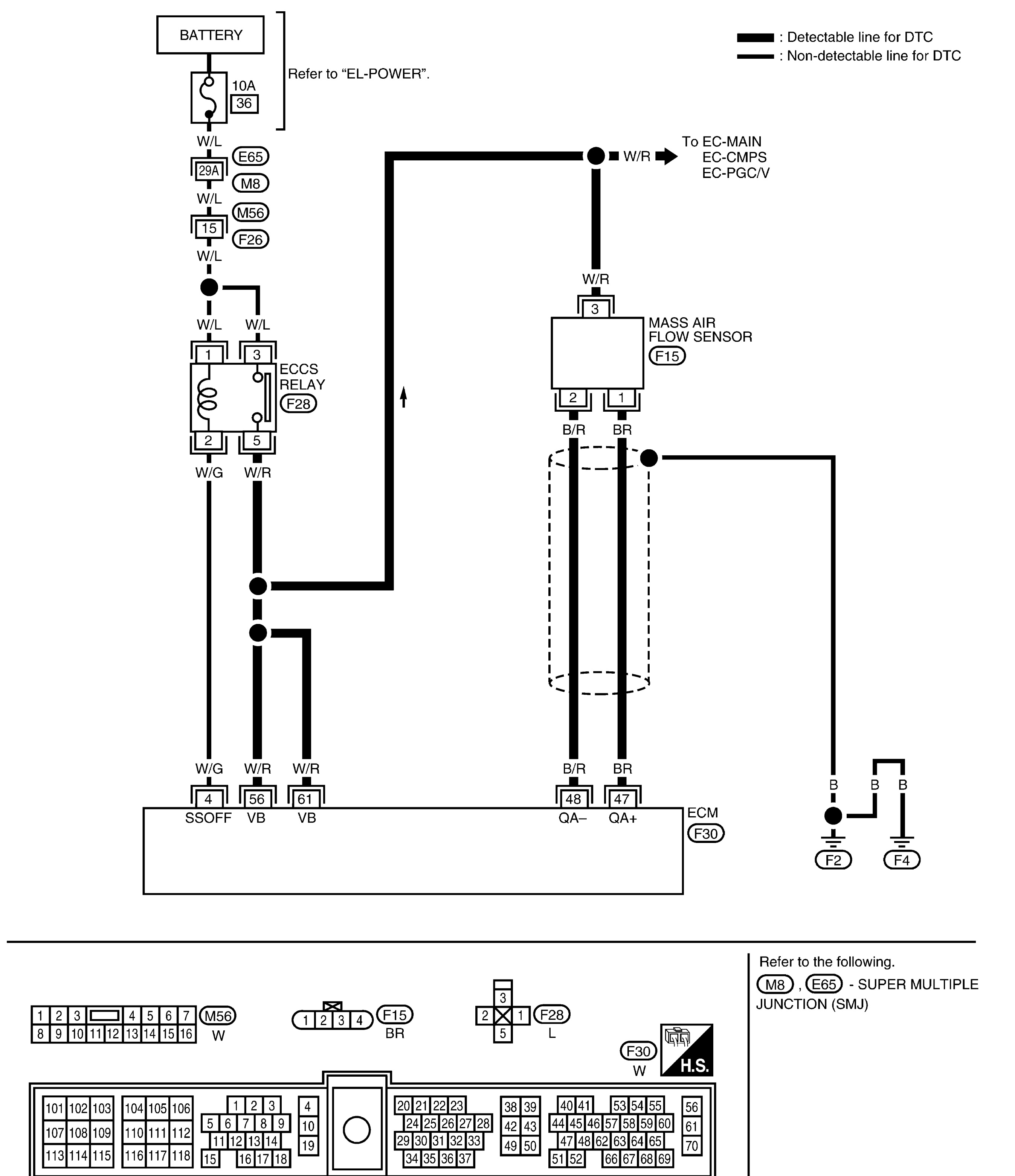
Mass Air Flow Sensor (MAFS) (Cont'd)

EC-MAFS-01



Refer to the following.
(M8), (E65) - SUPER MULTIPLE JUNCTION (SMJ)

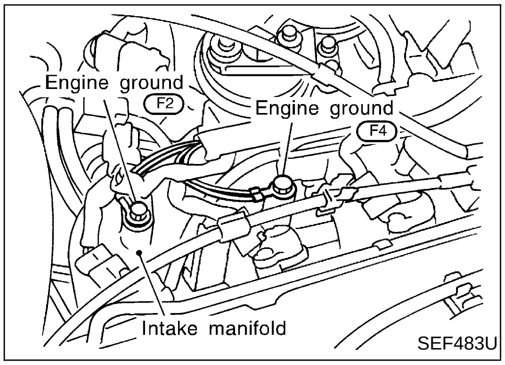
WEC556

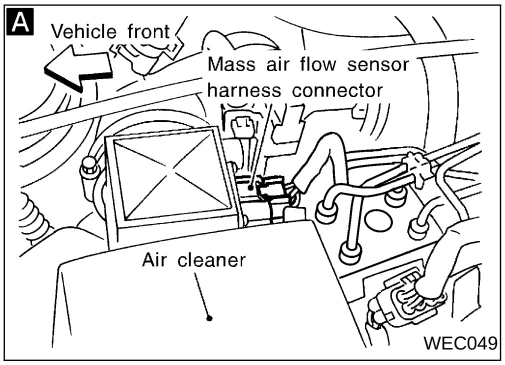
Mass Air Flow Sensor (MAFS) (Cont'd)

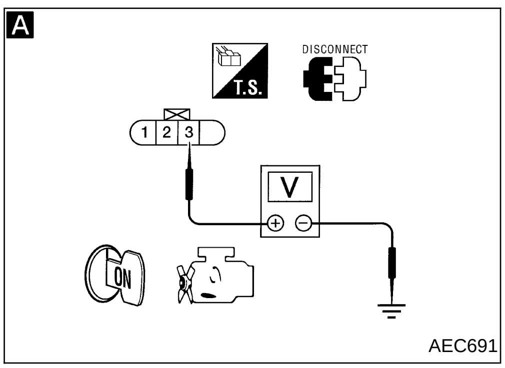
DIAGNOSTIC PROCEDURE

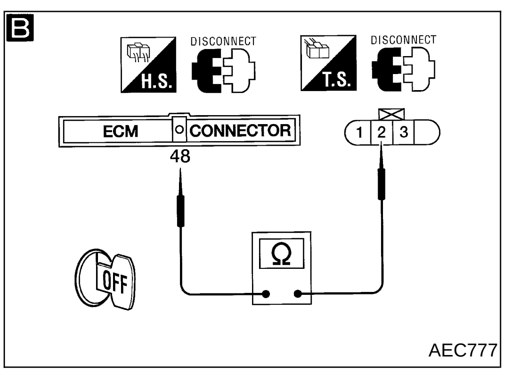
If the trouble is duplicated after "Procedure for malfunction A or C", perform "Procedure A" below. If the trouble is duplicated after "Procedure for malfunction B or D", perform "Procedure B" on next page.

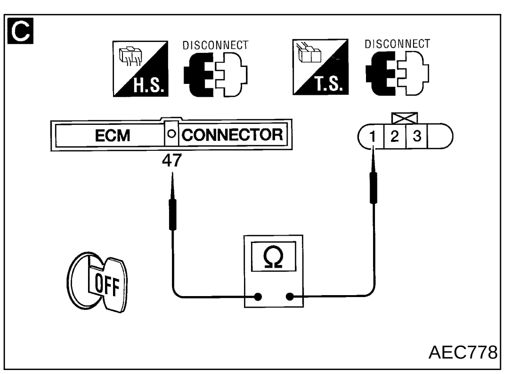
Procedure A











INSPECTION START

↓

Loosen and retighten engine ground screws.

↓

A

CHECK POWER SUPPLY.
1. Disconnect mass air flow sensor harness connector.
2. Turn ignition switch "ON".
3. Check voltage between terminal 3 and ground with CONSULT-II or tester.
   Voltage: Battery voltage

NG → 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

If NG, repair harness or connectors.

OK ↓

B

CHECK GROUND CIRCUIT.
1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between terminal 2 and ECM terminal 48.
   Continuity should exist.
   If OK, check harness for short to power.

NG → Repair harness or connectors.

OK ↓

C

CHECK INPUT SIGNAL CIRCUIT.
Check harness continuity between terminal 1 and ECM terminal 47.
Continuity should exist.
If OK, check harness for short.

NG → Repair harness or connectors.

OK ↓

A

(Go to next page.)

Mass Air Flow Sensor (MAFS) (Cont'd)

Ⓐ

CHECK COMPONENT
(Mass air flow sensor).
Refer to "COMPONENT INSPECTION", EC-126.

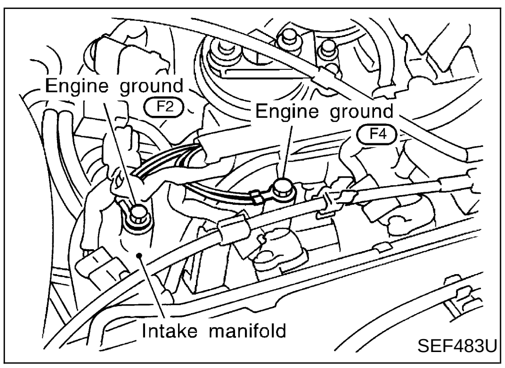
NG → Replace mass air flow sensor.

OK ↓

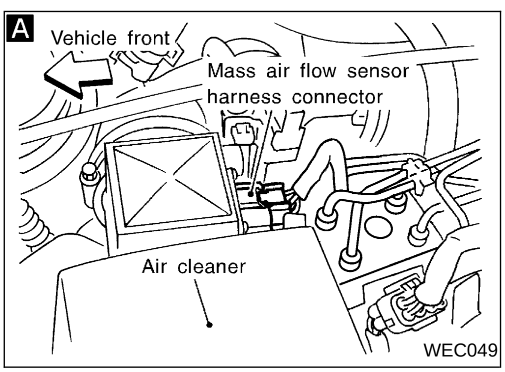
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-112.

↓

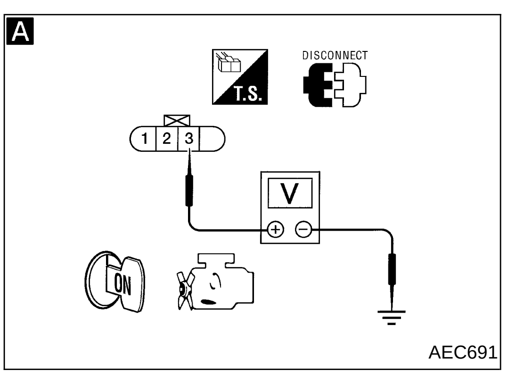
INSPECTION END



SEF483U



WEC049



AEC691

Procedure B

INSPECTION START

↓

CHECK INTAKE SYSTEM.
Check the followings for connection.
- Air duct
- Vacuum hoses
- Intake air passage between air duct to collector

If disconnected, reconnect the parts.

NG → Reconnect the parts.

OK ↓

Loosen and retighten engine ground screws.

↓

A

CHECK POWER SUPPLY.
1. Disconnect mass air flow sensor harness connector.
2. Turn ignition switch "ON".
3. Check voltage between terminal ③ and ground with CONSULT-II or tester.
   Voltage: Battery voltage

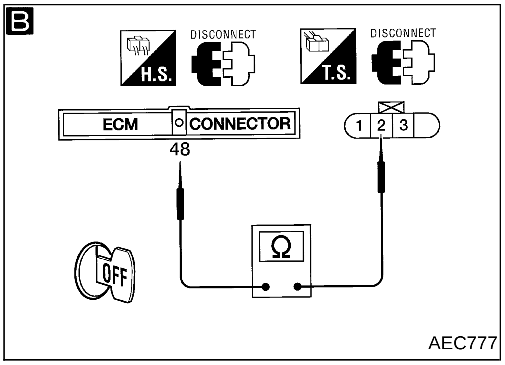
NG → Check the following.
- Harness for open or short between ECM relay and mass air flow sensor
- Harness for open or short between mass air flow sensor and ECM

If NG, repair harness or connectors.

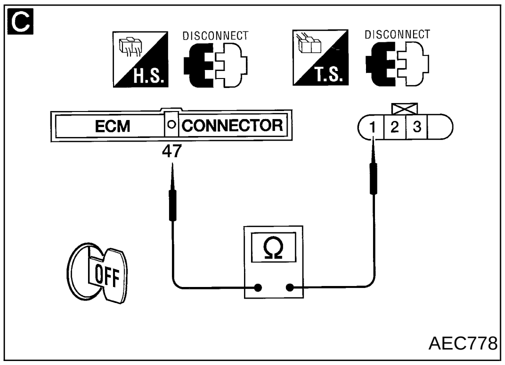
OK ↓

Ⓐ
(Go to next page.)

Mass Air Flow Sensor (MAFS) (Cont'd)



AEC777



AEC778

A

B

CHECK GROUND CIRCUIT.
1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between terminal 2 and ECM terminal 48.
   Continuity should exist.
   If OK, check harness for short to power.

NG → Repair harness or connectors.

OK

C

CHECK INPUT SIGNAL CIRCUIT.
Check harness continuity between terminal 1 and ECM terminal 47.
Continuity should exist.
If OK, check harness for short.

NG → Repair harness or connectors.

OK

CHECK COMPONENT
(Mass air flow sensor).
Refer to "COMPONENT INSPECTION", EC-126.

NG → Replace mass air flow sensor.

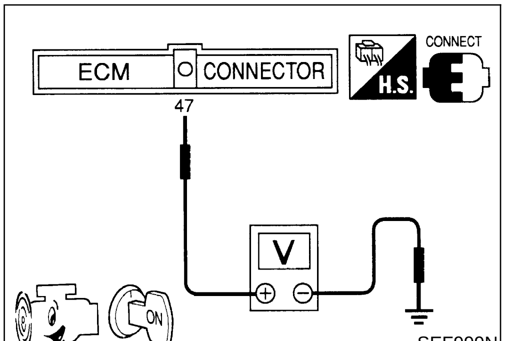
OK

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-112.

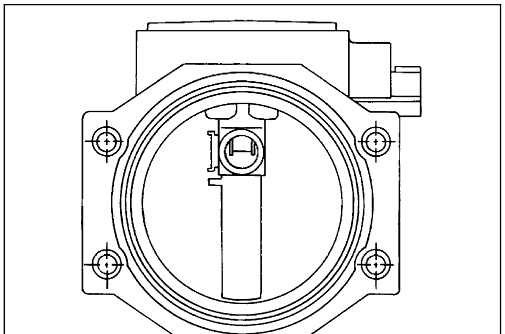
↓

INSPECTION END

Mass Air Flow Sensor (MAFS) (Cont'd)



SEF999N


SEF030T

COMPONENT INSPECTION

Mass air flow sensor

1. Turn ignition switch "ON".
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 47 and ground.

Conditions	Voltage V
Ignition switch "ON" (Engine stopped.)	Less than 1.0
Idle (Engine is warmed-up to normal operating temperature.)	1.2 - 1.5
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.9 - 2.3
Idle to about 4,000 rpm*	1.2 - 1.5 to Approx. 2.7

*: 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.

Absolute Pressure Sensor

COMPONENT DESCRIPTION

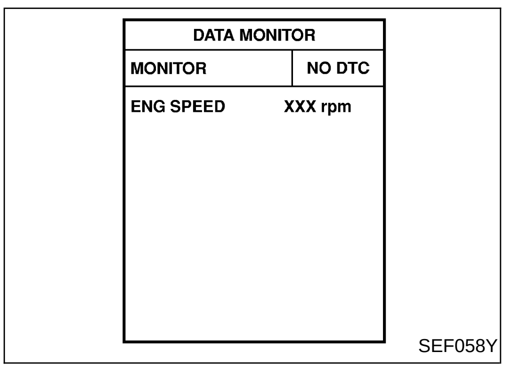
The sensor detects ambient barometric pressure and sends the voltage signal to the ECM. As the pressure increases, the voltage rises. The absolute pressure sensor is built into the ECM.

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when	Check Item (Possible Cause)
P0105	An excessively low or high voltage from the sensor is sent to micro computer.	ECM

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

NOTE:
If “DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch “OFF” and wait at least 5 seconds before conducting the next test.



SEF058Y

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 “DIAGNOSTIC PROCEDURE”, EC-128.

OR

1) Turn ignition switch “ON” and wait at least 6 seconds.
2) Select “MODE 7” with GST.
3) If 1st trip DTC is detected, go to “DIAGNOSTIC PROCEDURE”, EC-128.

Absolute Pressure Sensor (Cont'd)

DIAGNOSTIC PROCEDURE

INSPECTION START

↓

1) Turn ignition switch "ON".
2) Select "SELF DIAG RESULTS" mode with CONSULT-II.
3) Touch "ERASE".

OR

1) Turn ignition switch "ON".
2) Select MODE 4 with GST.
3) Touch "ERASE".

↓

PERFORM DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE.
See previous page.

↓

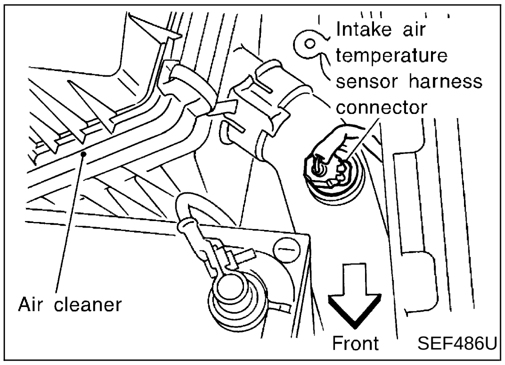
Is the 1st trip DTC P0105 displayed again?

Yes → Replace ECM.

No ↓

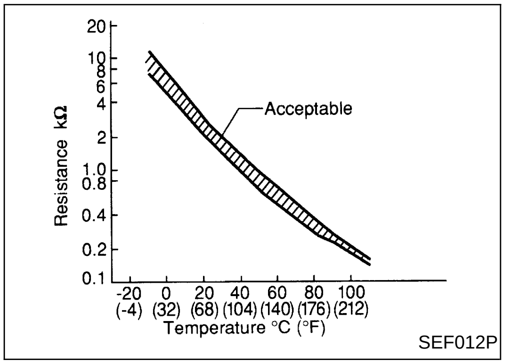
INSPECTION END

Intake Air Temperature Sensor



COMPONENT DESCRIPTION

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



<Reference data>

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

*: These data are reference values and are measured between ECM terminal 28 (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

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0110	A) An excessively low or high voltage from the sensor is sent to ECM. B) 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

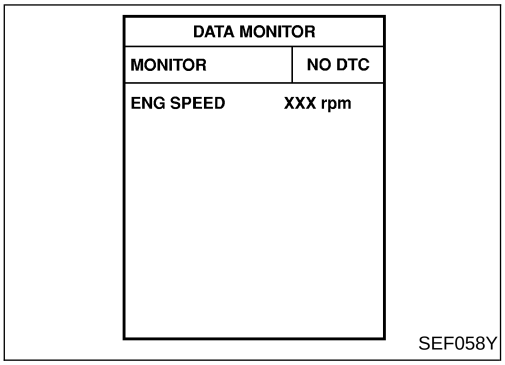
DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

Perform "Procedure for malfunction A" first. If DTC cannot be confirmed, perform "Procedure for malfunction B".

NOTE:
If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

Intake Air Temperature Sensor (Cont'd)

Procedure for malfunction A



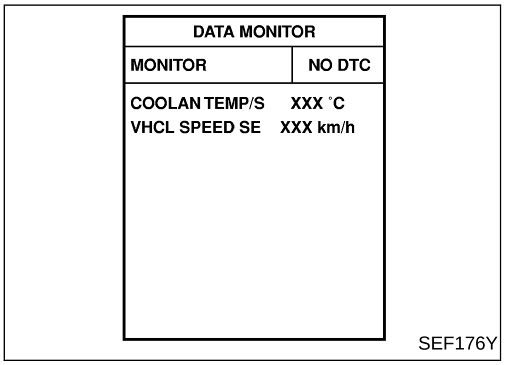
SEF058Y

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Wait at least 5 seconds.
4) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-132.

OR

1) Turn ignition switch "ON" and wait at least 5 seconds.
2) Select MODE 7 with GST.
3) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-132.

Procedure for malfunction B



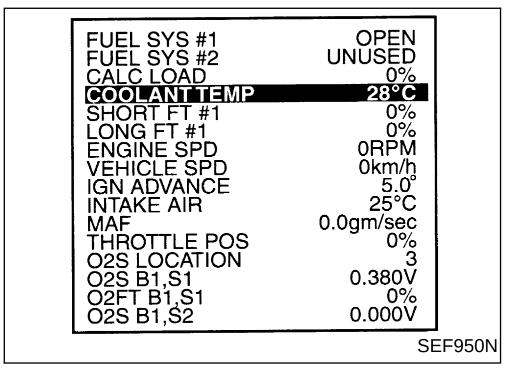
SEF176Y

CAUTION:

Always drive vehicle at a safe speed.

TESTING CONDITION:

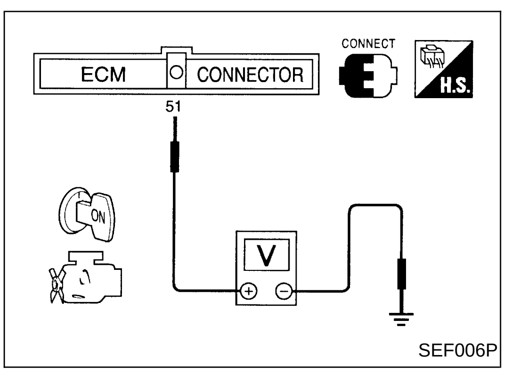
This test may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.



SEF950N

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 more than 70 km/h (43 MPH) for 100 consecutive seconds.
6) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-132.

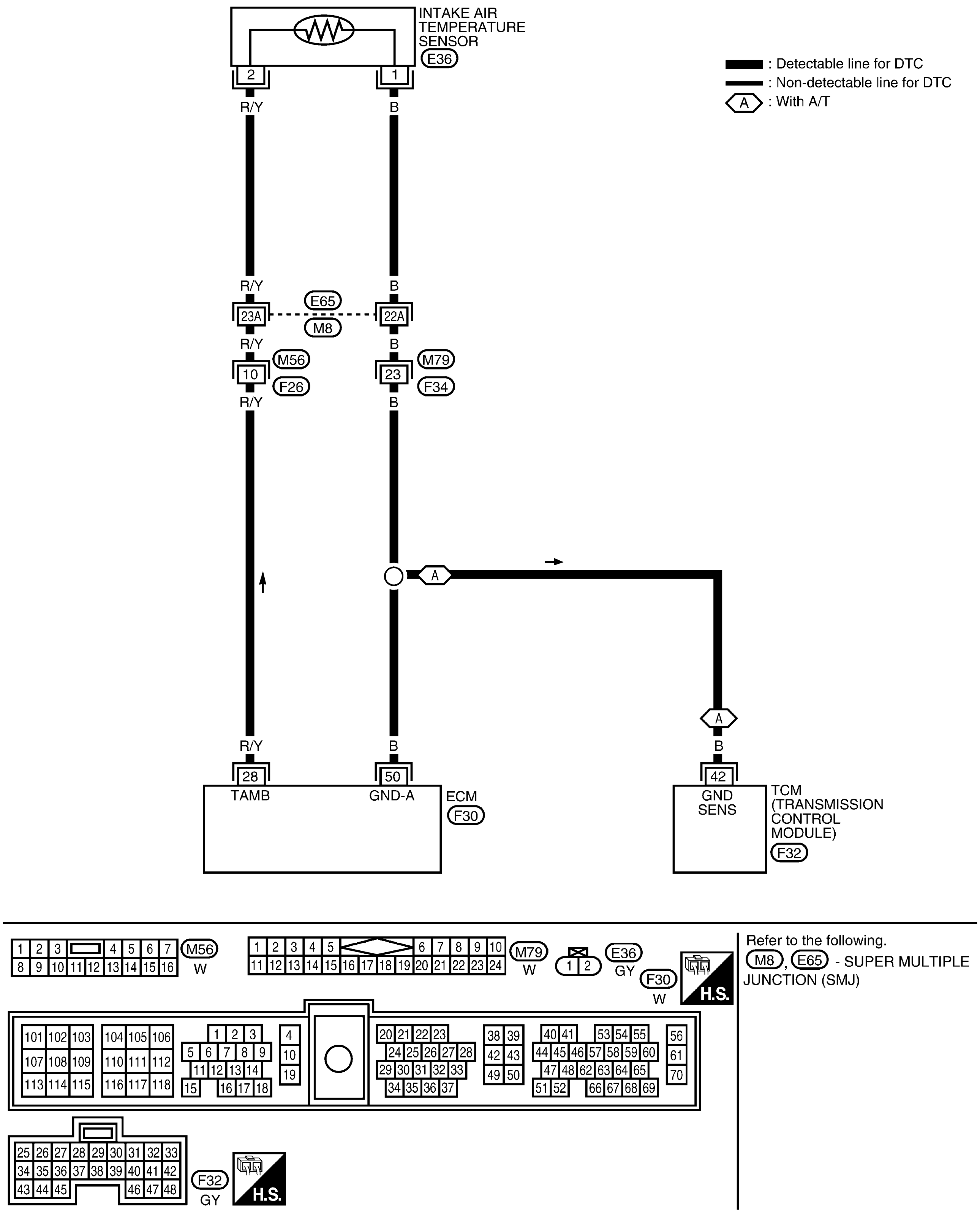
OR



SEF006P

1) Wait until engine coolant temperature is less than 90°C (194°F).
   (a) Turn ignition switch "ON".
   (b) Select MODE 1 with GST.
   (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) Start engine.
3) Hold vehicle speed more than 70 km/h (43 MPH) for 105 consecutive seconds.
4) Select MODE 7 with GST.
5) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-132.

EC-IATS-01

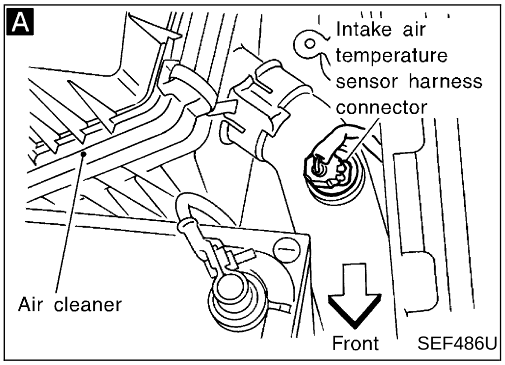


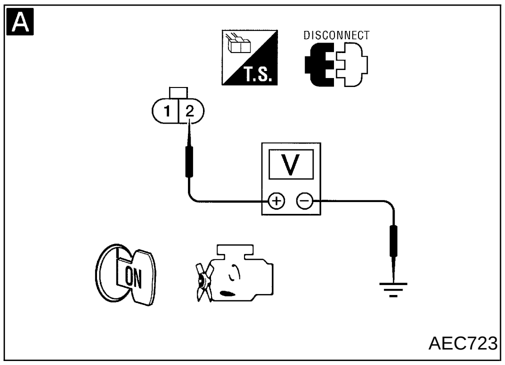
WEC703

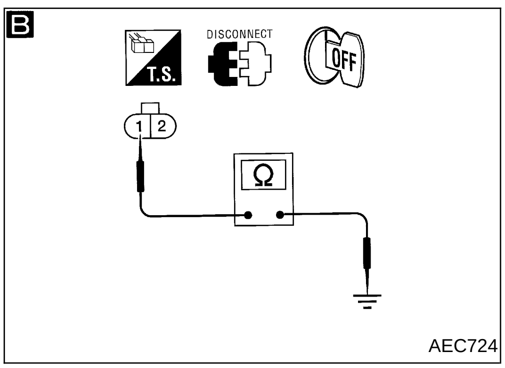
GI MA EM LC EC FE CL MT AT FA RA BR ST RS BT HA EL IDX

Intake Air Temperature Sensor (Cont'd)

DIAGNOSTIC PROCEDURE







INSPECTION START

↓

A

CHECK POWER SUPPLY.
1. Turn ignition switch "OFF".
2. Disconnect intake air temperature sensor harness connector.
3. Turn ignition switch "ON".
4. Check voltage between terminal 2 and ground.
   Voltage:
   Approximately 5V

NG → Check the following.
- Harness connectors F26, M56
- Harness connectors M8, E65
- Harness for open or short between ECM and intake air temperature sensor

If NG, repair harness or connectors.

OK ↓

B

CHECK GROUND CIRCUIT.
1. Turn ignition switch "OFF".
2. Check harness continuity between terminal 1 and engine ground.
   Continuity should exist.
   If OK, check harness for short to power.

NG → Check the following.
- Harness connectors E65, M8
- Harness connectors F34, M79
- Harness for open or short between ECM and intake air temperature sensor
- Harness for open or short between TCM and intake air temperature sensor

If NG, repair open circuit or short to power in harness or connectors.

OK ↓

CHECK COMPONENT
(Intake air temperature sensor).
Refer to "COMPONENT INSPECTION" on next page.

NG → Replace intake air temperature sensor.

OK ↓

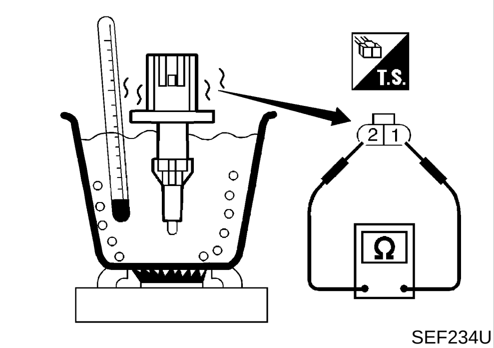
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-112.

↓

INSPECTION END

Intake Air Temperature Sensor (Cont'd)

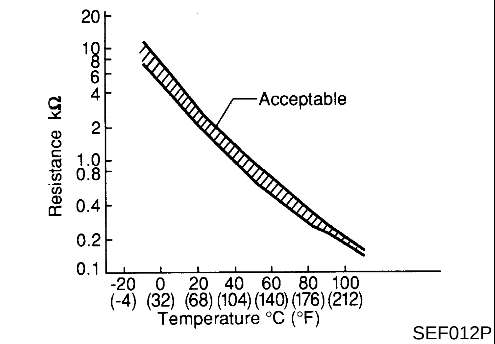
COMPONENT INSPECTION



SEF234U

Intake air temperature sensor

Check resistance as shown in the figure.

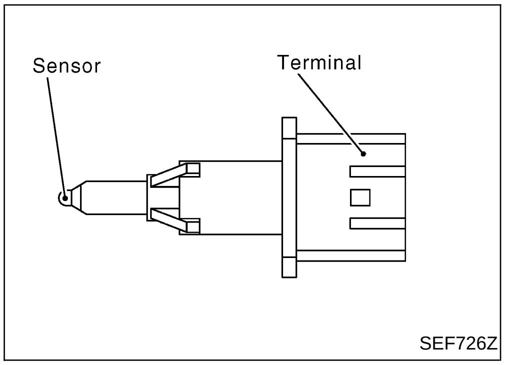


SEF012P

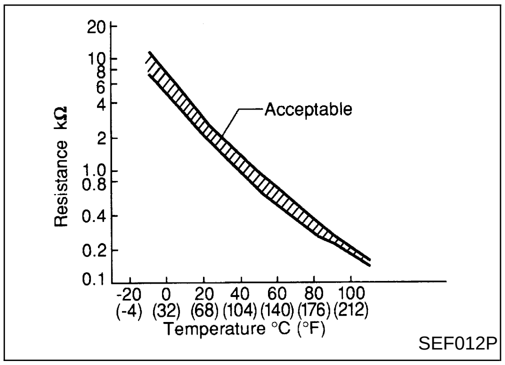
<Reference data>

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.



SEF726Z



SEF012P

Engine Coolant Temperature Sensor (ECTS)

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 51 (Engine coolant temperature sensor) and ground.

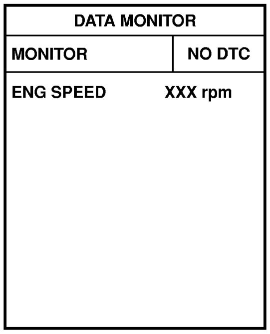
CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0115	• An excessively high or low 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.

<table>
<tr><th>Detected items</th><th>Engine operating condition in fail-safe mode</th></tr>
<tr><td>Engine coolant temperature sensor circuit</td><td>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.
<table>
<tr><th>Condition</th><th>Engine coolant temperature decided (CONSULT-II display)</th></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>
</table>
With the ignition key in the OFF position, cooling fans will operate for 120 seconds when in fail-safe mode.</td></tr>
</table>



SEF058Y

Engine Coolant Temperature Sensor (ECTS) (Cont'd)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

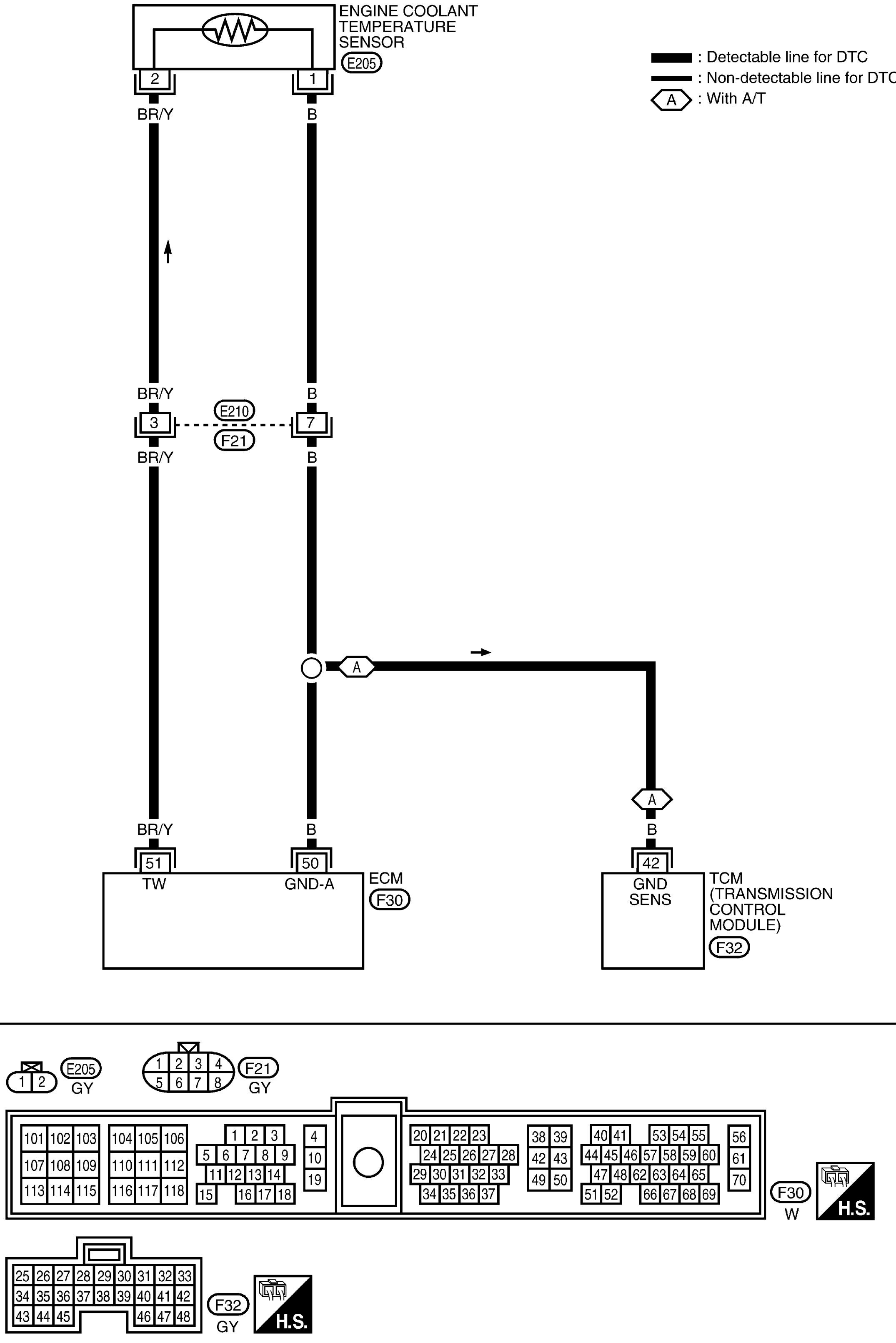
NOTE:
If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Wait at least 5 seconds.
4) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-137.

OR

1) Turn ignition switch "ON" and wait at least 5 seconds.
2) Select "MODE 7" with GST.
3) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-137.

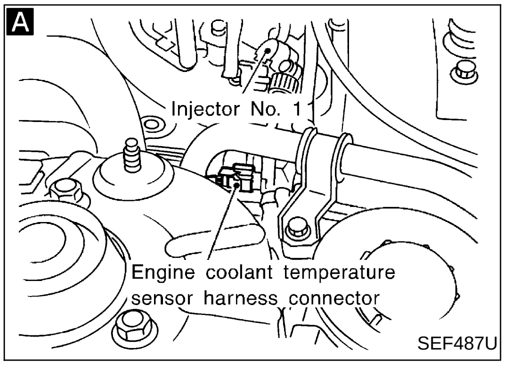
EC-ECTS-01

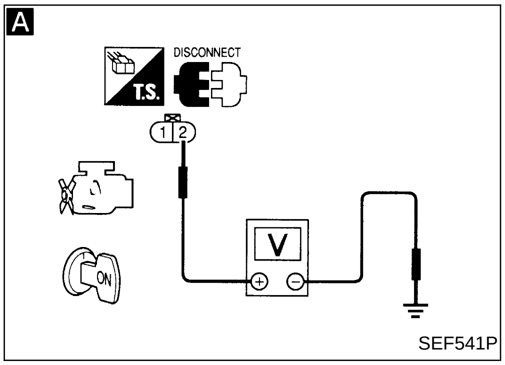


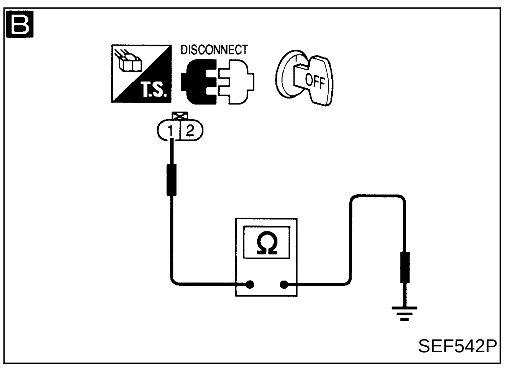
WEC004

Engine Coolant Temperature Sensor (ECTS) (Cont'd)

DIAGNOSTIC PROCEDURE







INSPECTION START

↓

A

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 terminal 2 and ground with CONSULT-II or tester.
   Voltage:
   Approximately 5V

NG → Check the following.
- Harness connectors E210 , F21
- Harness for open or short between ECM and engine coolant temperature sensor

If NG, repair open circuit or short to ground or short to power in harness or connectors.

OK ↓

B

CHECK GROUND CIRCUIT.
1. Turn ignition switch "OFF".
2. Check harness continuity between terminal 1 and engine ground.
   Continuity should exist.
   If OK, check harness for short to power.

NG → Check the following.
- Harness connectors E210 , F21
- Harness for open or short between ECM and engine coolant temperature sensor
- Harness for open or short between TCM and engine coolant temperature sensor

If NG, repair open circuit or short to power in harness or connectors.

OK ↓

CHECK COMPONENT
(Engine coolant temperature sensor).
Refer to "COMPONENT INSPECTION" on next page.

NG → Replace engine coolant temperature sensor.

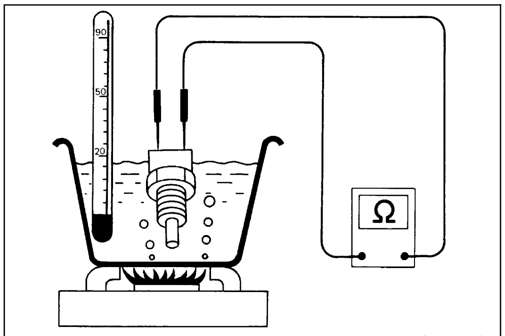
OK ↓

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-112.

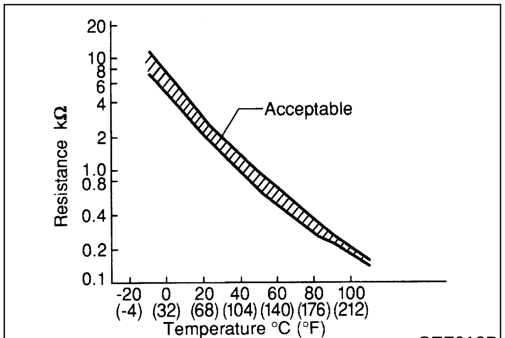
↓

INSPECTION END

Engine Coolant Temperature Sensor (ECTS) (Cont'd)



SEF152P



SEF012P

COMPONENT INSPECTION

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.

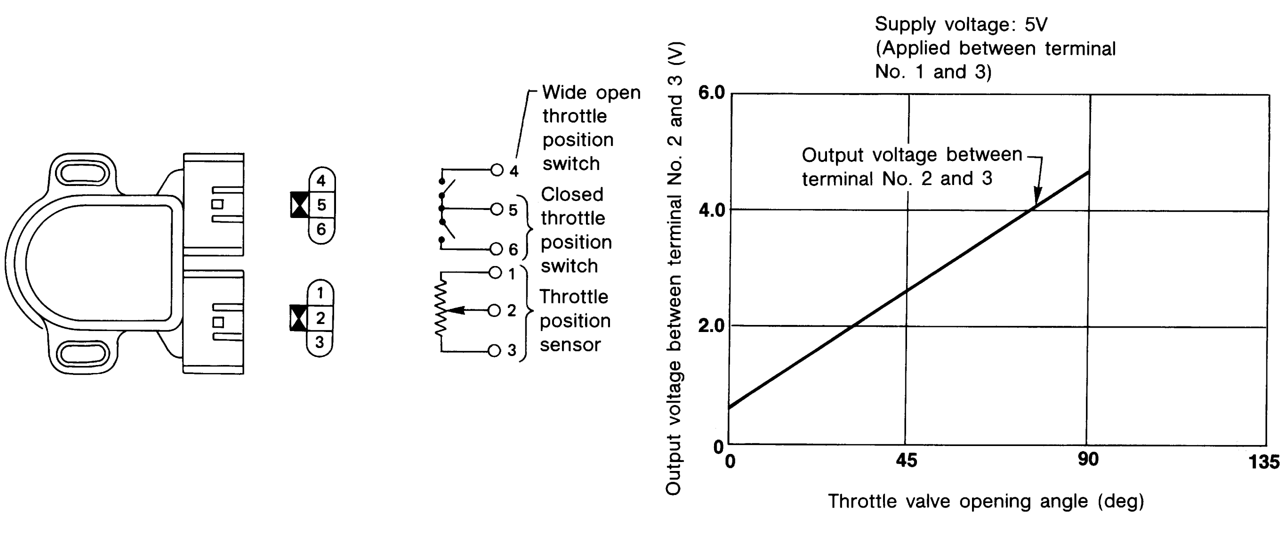
Throttle Position Sensor

Note: If both DTC P0120 and DTC P0510 are displayed, perform TROUBLE DIAGNOSIS FOR DTC P0510 first. (See EC-335.)

GI
MA
EM
LC
EC
FE
CL
MT
AT
FA
RA
BR
ST
RS
BT
HA
EL
IDX

COMPONENT DESCRIPTION

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.



AEC029A

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

Specification data are reference values

MONITOR ITEM	CONDITION		SPECIFICATION
THRTL POS SEN	● Engine: After warming up ● Ignition switch: ON (Engine stopped)	Throttle valve: fully closed	0.15 - 0.85V
		Throttle valve: fully opened	Approx. 3.5 - 4.7V
ABSOL TH·P/S	● Engine: After warming up ● Ignition switch: ON (Engine stopped)	Throttle valve: fully closed	0.0%
		Throttle valve: fully opened	Approx. 80%

ECM TERMINALS AND REFERENCE VALUE

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

CAUTION:
Do not use ECM ground terminals when measuring input/output 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	Y	Throttle position sensor	Ignition switch "ON" (Warm-up condition) Accelerator pedal fully released	0.15 - 0.85V
			Ignition switch "ON" Accelerator pedal fully depressed	Approximately 3.5 - 4.7V
33	GY	Throttle position sensor signal	Ignition switch "ON" (Warm-up condition) Accelerator pedal fully released	Approximately 0.4V
			Ignition switch "ON" Accelerator pedal fully depressed	Approximately 4V
49	R	Sensors' power supply	Ignition switch "ON"	Approximately 5V
50	B	Sensors' ground	Engine is running. (Warm-up condition) Idle speed	Approximately 0V

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0120	A) An excessively low or high voltage from the sensor is sent to ECM.*	• Harness or connectors (The throttle position sensor circuit is open or shorted.) • Throttle position sensor
	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

Throttle Position Sensor (Cont'd)

Perform "Procedure for malfunction A" first. If the DTC cannot be confirmed, perform "Procedure for malfunction B". If there is no problem on "Procedure for malfunction B", perform "Procedure for malfunction C".

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

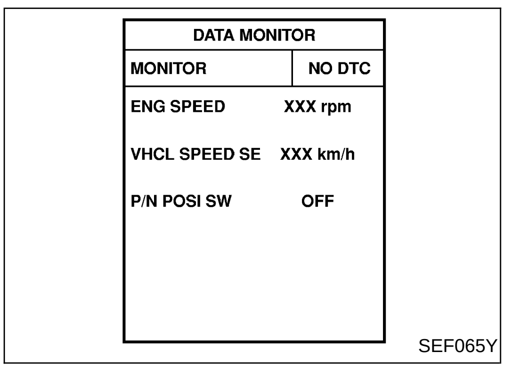
NOTE:
If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

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.**



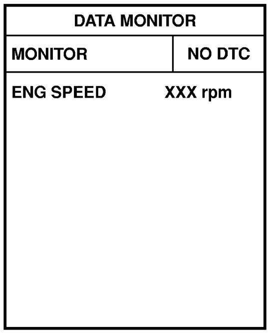
SEF065Y

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 "DIAGNOSTIC PROCEDURE", EC-145.

OR

1) Start engine and maintain the following conditions for at least 5 consecutive seconds.
   Vehicle speed: More than 4 km/h (2 MPH)
   Selector lever: Suitable position except "P" or "N" position
2) Select "MODE 7" with GST.
3) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-145.

Throttle Position Sensor (Cont'd)



SEF058Y

Procedure for malfunction B

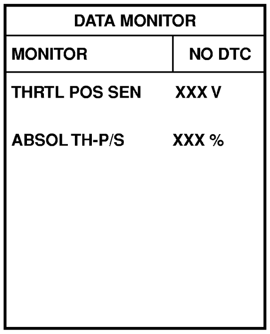
1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Start engine and let it idle for at least 10 seconds.
   If idle speed is over 1,100 rpm, maintain the following conditions for at least 10 seconds to keep engine speed below 1,100 rpm.
   A/T model
   Selector lever: Suitable position except "P" or "N"
   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 position is better to keep engine rpm low.)
   Accelerator pedal: Released
   Vehicle speed: As slow as possible
4) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-145.

OR

1) Start engine and let it idle for at least 10 seconds.
   If idle speed is over 1,100 rpm, maintain the following conditions for at least 10 seconds to keep engine speed below 1,100 rpm.
   A/T model
   Selector lever: Suitable position except "P" or "N"
   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 position is better to keep engine rpm low.)
   Accelerator pedal: Released
   Vehicle speed: As slow as possible
2) Select "MODE 7" with GST.
3) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-145.

Throttle Position Sensor (Cont'd)

Procedure for malfunction C



SEF177Y

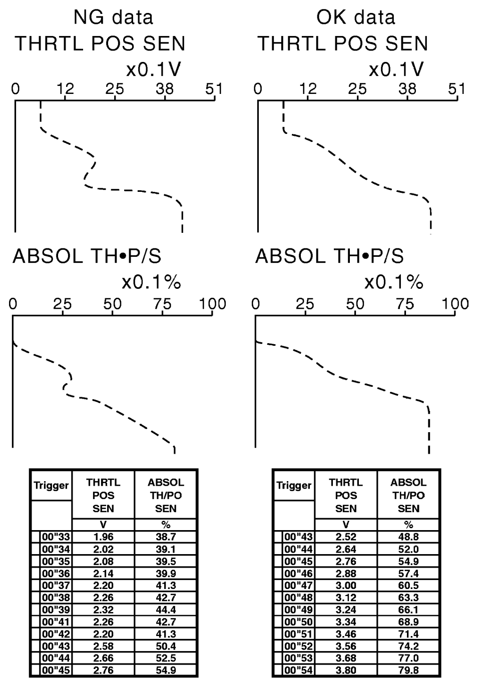
CAUTION:

Always drive vehicle at a safe speed.

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Turn ignition switch "ON".
4) Select "MANU TRIG" and "HI SPEED" 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 "DIAGNOSTIC PROCEDURE", EC-145.
   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.

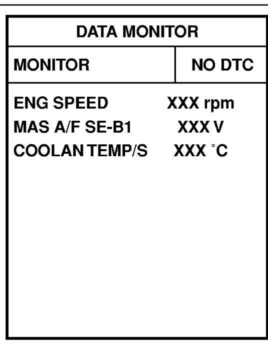
   ENG SPEED: More than 2,000 rpm
   MAS AIR/FL SE: More than 3V
   COOLAN TEMP/S: More than 70°C (158°F)
   Selector lever: Suitable position
   Driving location: Driving vehicle uphill (Increased engine load) will help maintain the driving conditions required for this test.
10) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-145.



Trigger	THRTL POS SEN (V)	ABSOL TH/PO SEN (%)
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

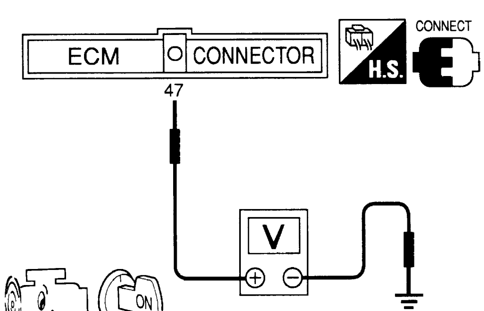
Trigger	THRTL POS SEN (V)	ABSOL TH/PO SEN (%)
00"43	2.52	48.8
00"44	2.64	52.0
00"45	2.76	54.9
00"46	2.88	57.4
00"47	3.00	60.5
00"48	3.12	63.3
00"49	3.24	66.1
00"50	3.34	68.9
00"51	3.46	71.4
00"52	3.56	74.2
00"53	3.68	77.0
00"54	3.80	79.8

SEF847Z



SEF178Y

OR



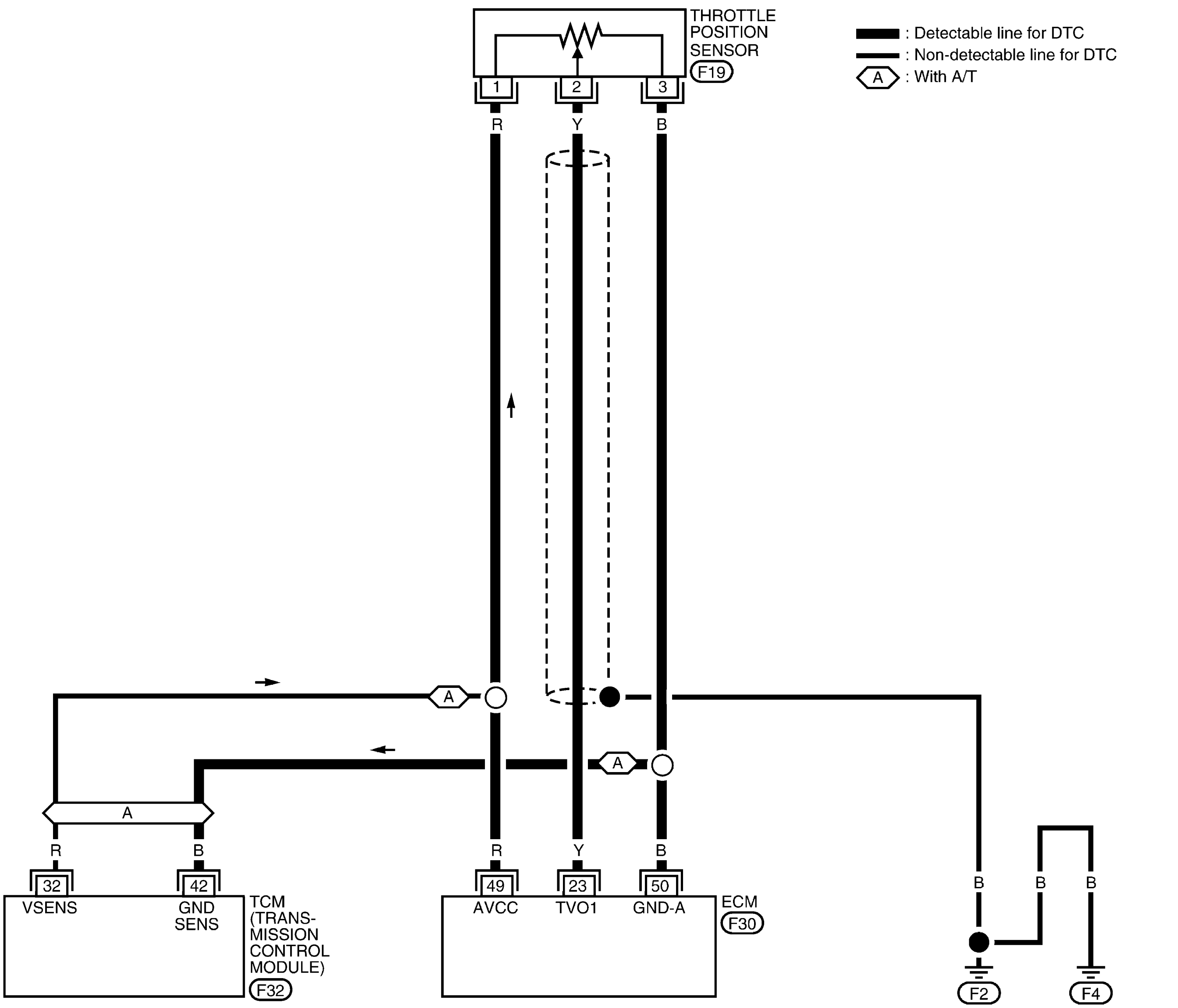
SEF999N

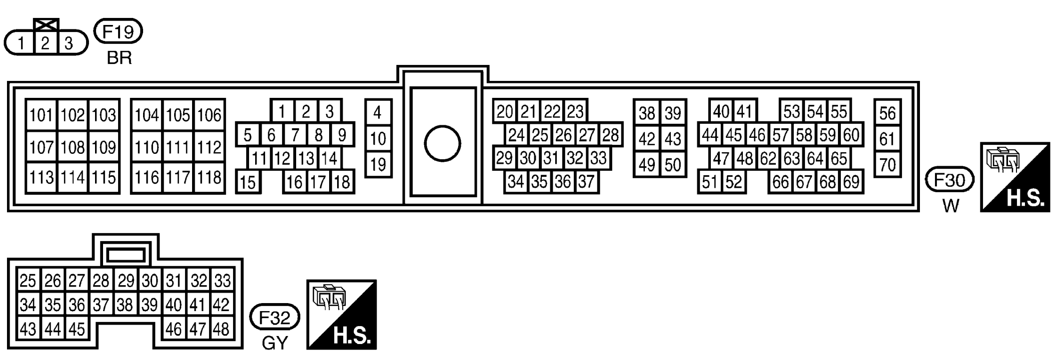
1) Maintain the following conditions for at least 10 consecutive seconds.

   Gear position: Suitable position
   Engine speed: More than 2,000 rpm
   Voltage between ECM terminal 47 and ground: More than 3V
   Engine coolant temperature: More than 70°C (158°F)
2) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-145.

Throttle Position Sensor (Cont'd)

EC-TPS-01



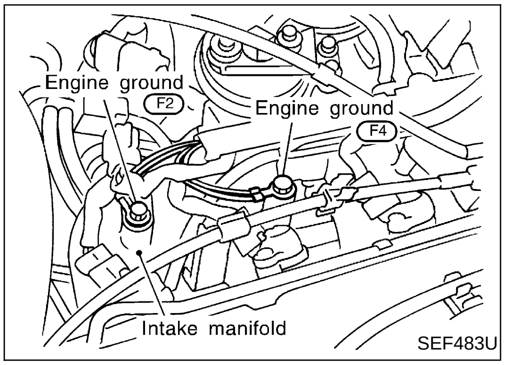


WEC005

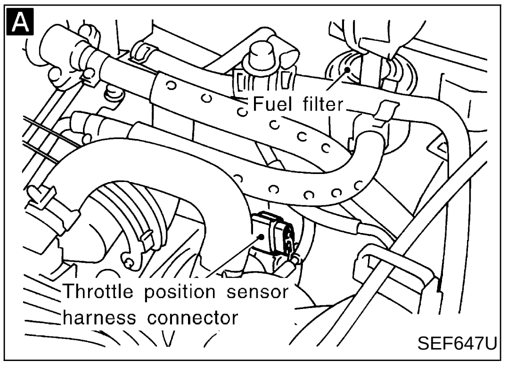
Throttle Position Sensor (Cont'd)

DIAGNOSTIC PROCEDURE

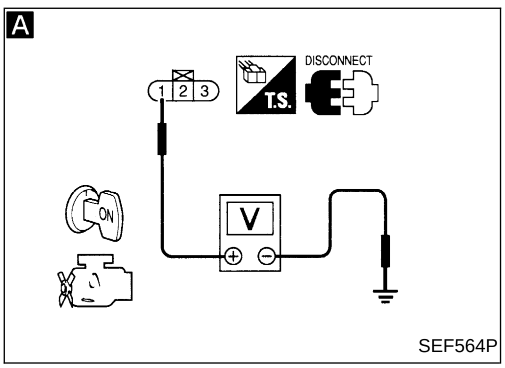
If the trouble is duplicated after "Procedure for malfunction A", perform "Procedure A" below. If the trouble is duplicated after "Procedure for malfunction B", perform "Procedure B" on next page. If the trouble is duplicated after "Procedure for malfunction C", perform "Procedure C" on EC-148.



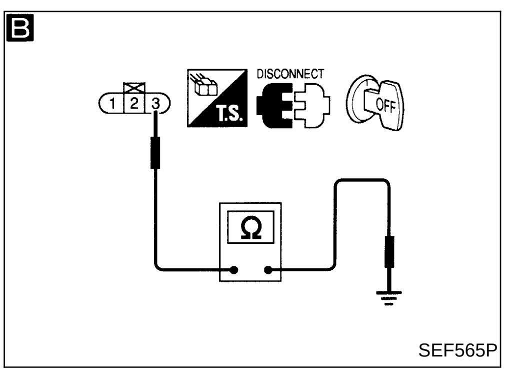
SEF483U



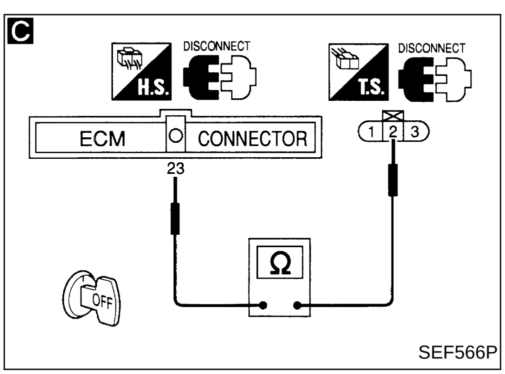
SEF647U



SEF564P



SEF565P



SEF566P

Procedure A

INSPECTION START

↓

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

↓

A

CHECK POWER SUPPLY.
1. Disconnect throttle position sensor harness connector.
2. Turn ignition switch "ON".
3. Check voltage between terminal ① and ground with CONSULT-II or tester.
   Voltage: Approximately 5V

NG → Repair harness or connectors.

OK ↓

B

CHECK GROUND CIRCUIT.
1. Turn ignition switch "OFF".
2. Check harness continuity between terminal ③ and engine ground.
   Continuity should exist.
   If OK, check harness for short to power.

NG → Check the following.
- Harness for open or short between ECM and throttle position sensor
- Harness for open or short between TCM and throttle position sensor

If NG, repair open circuit or short to power in harness or connectors.

OK ↓

C

CHECK INPUT SIGNAL CIRCUIT.
1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal ㉓ and terminal ②.
   Continuity should exist.
   If OK, check harness for short to ground and short to power.

NG → Repair harness or connectors.

OK ↓

Ⓐ

(Go to next page.)

Throttle Position Sensor (Cont'd)

(A)

CHECK COMPONENT
(Throttle position sensor).
Refer to "COMPONENT INSPECTION", EC-150.

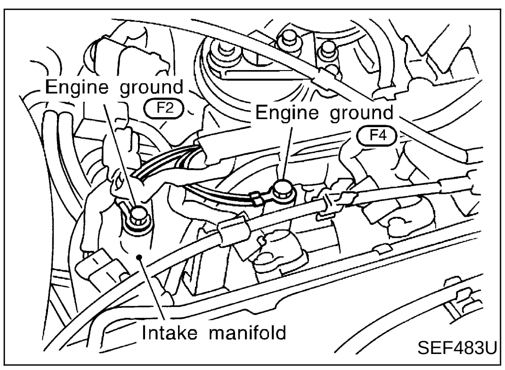
NG → Replace throttle position sensor. To adjust it, perform "Basic Inspection", EC-83.

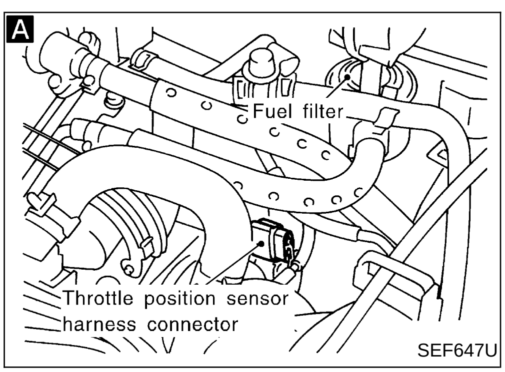
OK ↓

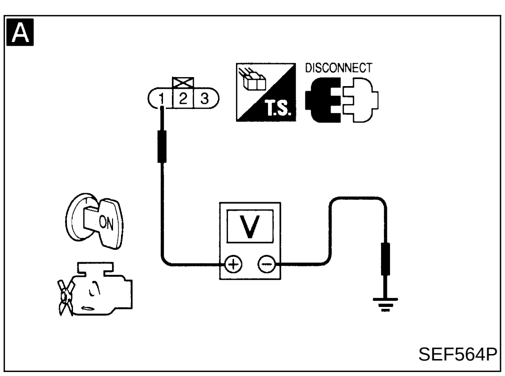
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-112.

↓

INSPECTION END







Procedure B

INSPECTION START

↓

Loosen and retighten engine ground screws.

↓

A

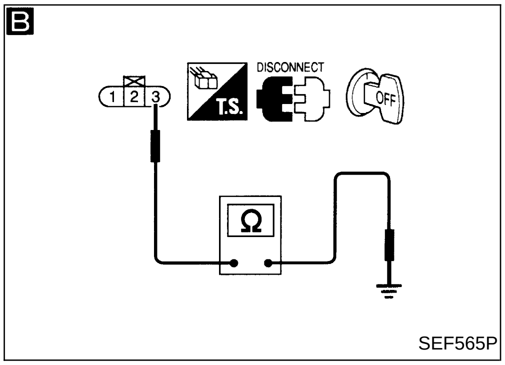
CHECK POWER SUPPLY.
1. Disconnect throttle position sensor harness connector.
2. Turn ignition switch "ON".
3. Check voltage between terminal 1 and ground with CONSULT-II or tester.
   Voltage: Approximately 5V

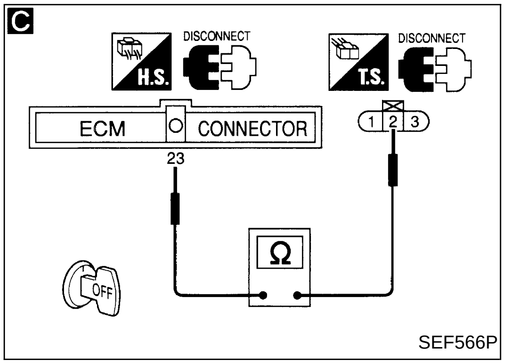
NG → Repair harness or connectors.

OK ↓

(A)

(Go to next page.)





A

B

CHECK GROUND CIRCUIT.
1. Turn ignition switch "OFF".
2. Check harness continuity between terminal 3 and engine ground.
   Continuity should exist.
   If OK, check harness for short to power.

NG → Check the following.
- Harness for open or short between ECM and throttle position sensor
- Harness for open or short between TCM and throttle position sensor

If NG, repair open circuit or short to power in harness or connectors.

OK ↓

C

CHECK INPUT SIGNAL CIRCUIT.
1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 23 and terminal 2.
   Continuity should exist.
   If OK, check harness for short to ground and short to power.

NG → Repair harness or connectors.

OK ↓

CHECK COMPONENT
(Throttle position sensor).
Refer to "COMPONENT INSPECTION", EC-150.

NG → Replace throttle position sensor. To adjust it, perform "Basic Inspection", EC-83.

OK ↓

CHECK COMPONENT
(Mass air flow sensor).
Refer to "COMPONENT INSPECTION", EC-126.

NG → Replace mass air flow sensor.

OK ↓

CHECK COMPONENT
(Camshaft position sensor).
Refer to "COMPONENT INSPECTION", EC-265.

NG → Replace camshaft position sensor.

OK ↓

CHECK COMPONENT
(Fuel injector).
Refer to "COMPONENT INSPECTION", EC-453.

NG → Replace fuel injector.

OK ↓

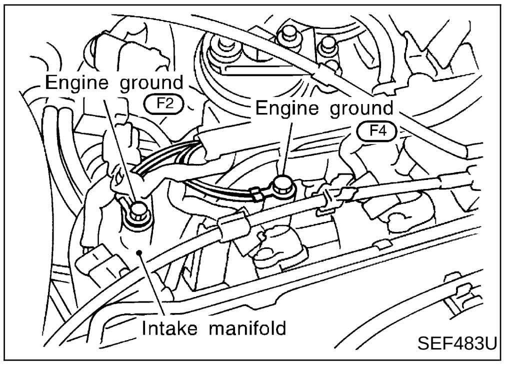
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-112.

↓

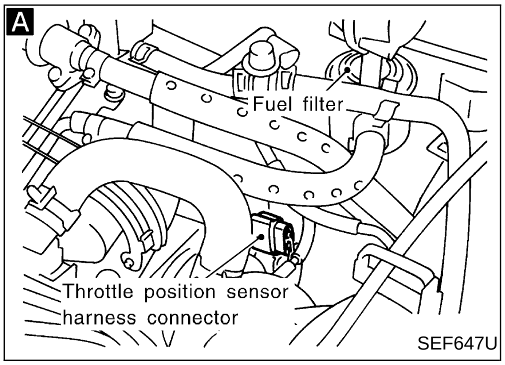
INSPECTION END

Throttle Position Sensor (Cont’d)

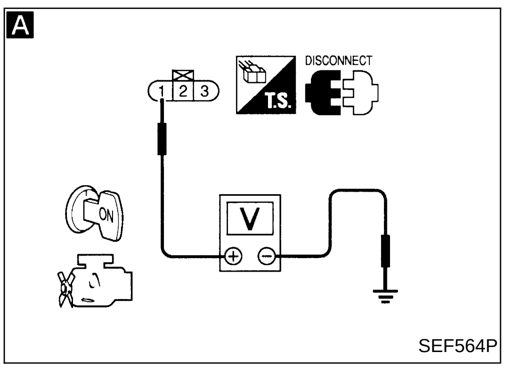
Procedure C



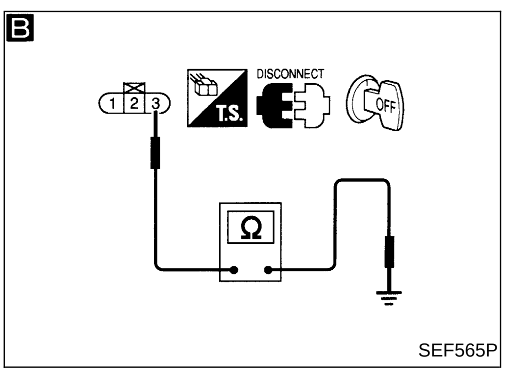
SEF483U



SEF647U



SEF564P



SEF565P

INSPECTION START

↓

ADJUST THROTTLE POSITION SENSOR.
Perform “Basic Inspection”, EC-83.

↓ OK

CHECK INTAKE SYSTEM.
Check the followings for connection.
- Air duct
- Vacuum hoses
- Intake air passage between air duct to collector

If disconnected, reconnect the parts.

→ NG: Reconnect the parts.

↓ OK

Loosen and retighten engine ground screws.

↓

A

CHECK POWER SUPPLY.
1. Disconnect throttle position sensor harness connector.
2. Turn ignition switch “ON”.
3. Check voltage between terminal 1 and ground with CONSULT-II or tester.
   Voltage: Approximately 5V

→ NG: Repair harness or connectors.

↓ OK

B

CHECK GROUND CIRCUIT.
1. Turn ignition switch “OFF”.
2. Check harness continuity between terminal 3 and engine ground.
   Continuity should exist.
   If OK, check harness for short to power.

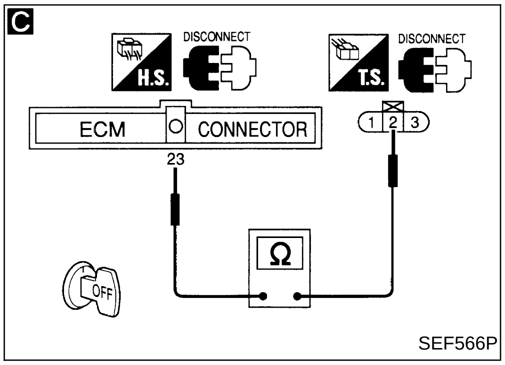
→ NG: Check the following.
- Harness for open or short between ECM and throttle position sensor
- Harness for open or short between TCM and throttle position sensor

If NG, repair open circuit or short to power in harness or connectors.

↓ OK

A

(Go to next page.)



A

C

CHECK INPUT SIGNAL CIRCUIT.
1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 23 and terminal 2.
   Continuity should exist.
   If OK, check harness for short to ground and short to power.

NG → Repair harness or connectors.

OK ↓

CHECK COMPONENT
(Throttle position sensor).
Refer to "COMPONENT INSPECTION" below.

NG → Replace throttle position sensor. To adjust it, perform "Basic Inspection", EC-83.

OK ↓

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-112.

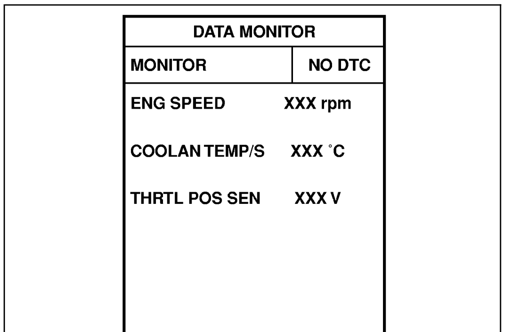
↓

INSPECTION END

Throttle Position Sensor (Cont'd)

COMPONENT INSPECTION

Throttle position sensor



SEF179Y

1. Start engine and warm it up to normal operating temperature.
2. Stop engine and turn ignition switch "ON".
3. Select "DATA MONITOR" mode with CONSULT-II.
4. Check voltage of "THRTL POS SEN".

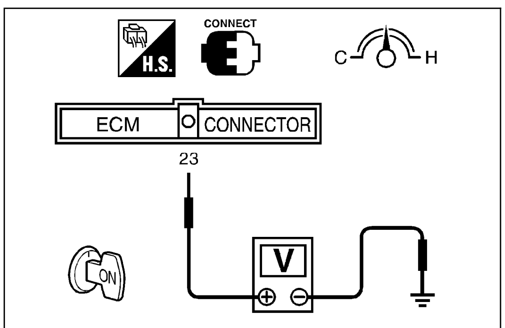
Voltage measurement must be made with throttle position sensor installed in vehicle.

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 "Basic Inspection", EC-83.

5. If it is impossible to adjust closed throttle position switch in "Basic Inspection", replace throttle position sensor.

OR



SEF884X

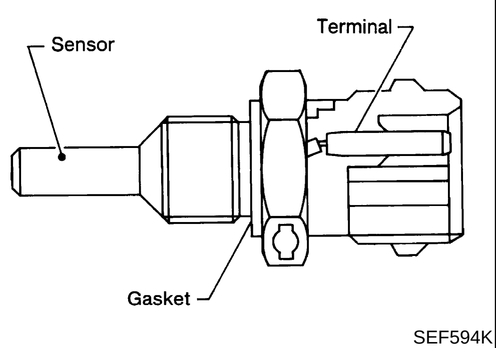
1. Start engine and warm it up to normal operating temperature.
2. Stop engine and turn ignition switch "ON".
3. Check voltage between ECM terminal 23 (Throttle position sensor signal) and ground.

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

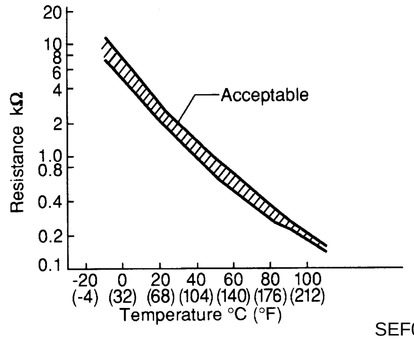
Throttle valve conditions	Voltage (V)
Completely closed	0.15 - 0.85 (a)
Partially open	Between (a) and (b)
Completely open	3.5 - 4.7 (b)

If NG, adjust closed throttle position switch. Refer to "Basic Inspection", EC-83.

4. If it is impossible to adjust closed throttle position switch in "Basic Inspection", replace throttle position sensor.



SEF594K



SEF012P

Engine Coolant Temperature (ECT) Sensor

COMPONENT DESCRIPTION

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

<Reference data>

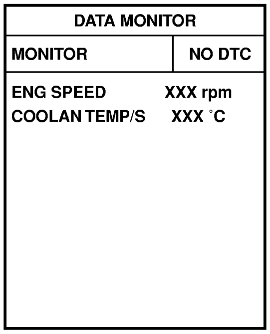
Engine coolant temperature °C (°F)	Voltage* V	Resistance kΩ
20 (68)	3.5	2.1 - 2.9
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

*: These data are reference values and are measured between ECM terminal 51 (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

Diagnostic Trouble Code 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



SEF174Y

Engine Coolant Temperature (ECT) Sensor (Cont’d)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

CAUTION:

Be careful not to overheat engine.

NOTE:

- **If both DTC P0115 (0103) and P0125 (0908) are displayed, first perform “TROUBLE DIAGNOSIS FOR DTC P0115”. Refer to EC-134.**
- **If “DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch “OFF” and wait at least 5 seconds before conducting the next test.**

1) Turn ignition switch “ON”.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) 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.

4) If 1st trip DTC is detected, go to “DIAGNOSTIC PROCEDURE”, EC-154.

OR

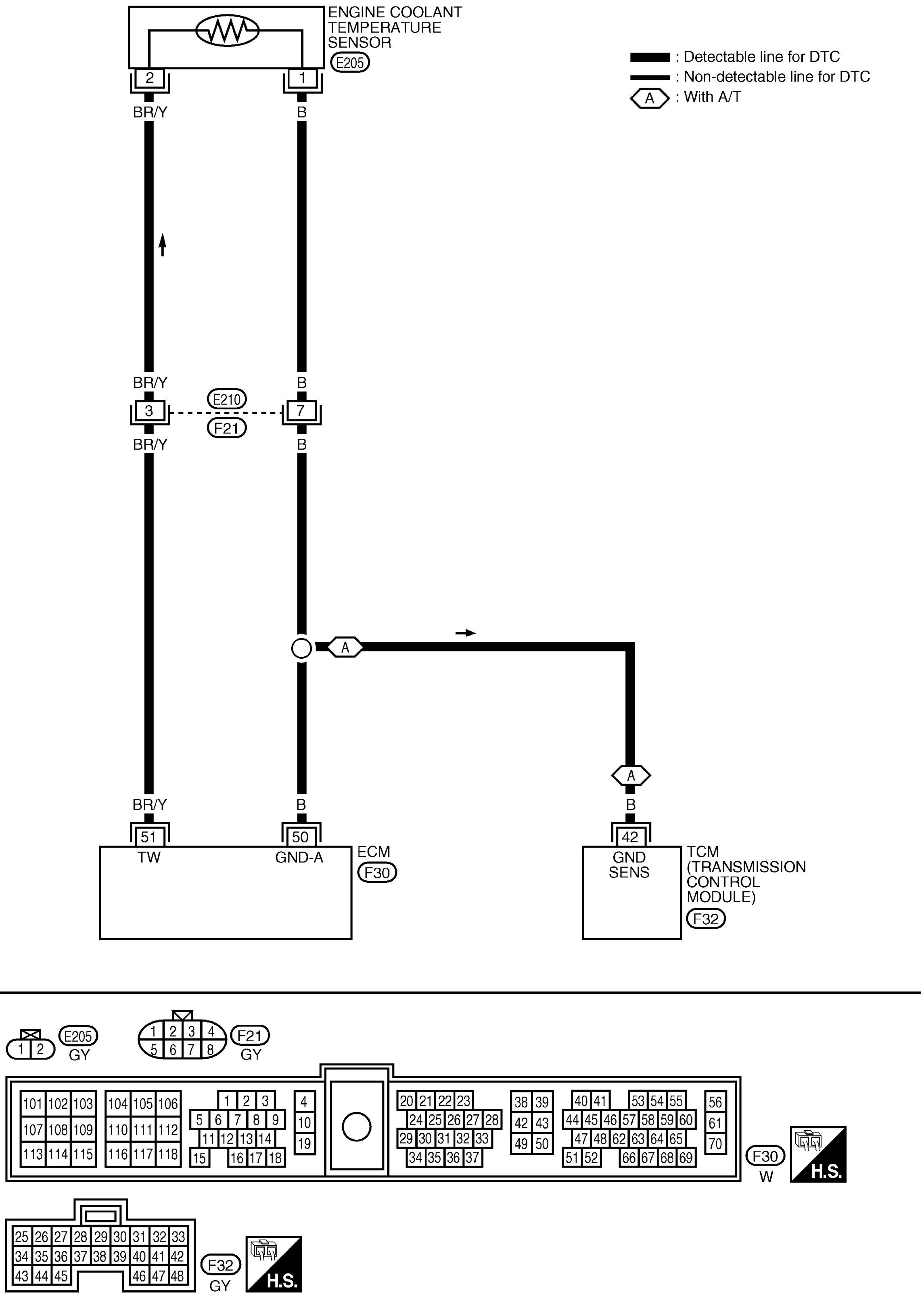
1) Start engine and run it for 65 minutes at idle speed.
2) Select “MODE 7” with GST.

If “COOLAN TEMP/S” increases to more than 10°C (50°F) within 65 minutes, stop engine because the test result will be OK.

3) If 1st trip DTC is detected, go to “DIAGNOSTIC PROCEDURE”, EC-154.

Engine Coolant Temperature (ECT) Sensor (Cont'd)

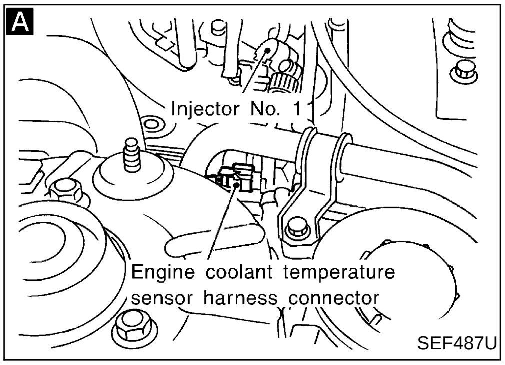
EC-ECTS-01



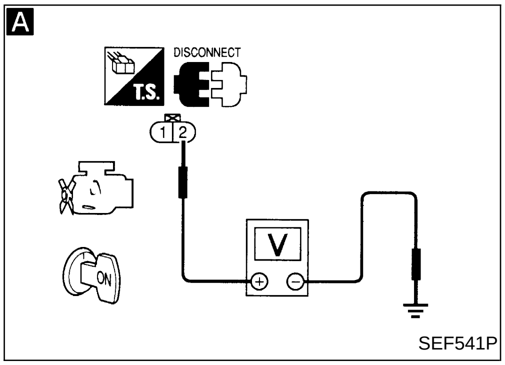
WEC651

Engine Coolant Temperature (ECT) Sensor (Cont'd)

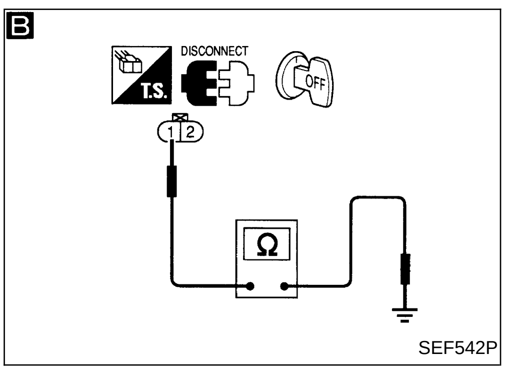
DIAGNOSTIC PROCEDURE



SEF487U



SEF541P



SEF542P

INSPECTION START

↓

A

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 terminal 2 and ground with CONSULT-II or tester.
   Voltage:
   Approximately 5V

NG → Check the following.
- Harness connectors E210 , F21
- Harness for open or short between ECM and engine coolant temperature sensor

If NG, repair open circuit or short to ground or short to power in harness or connectors.

OK ↓

B

CHECK GROUND CIRCUIT.
1. Turn ignition switch "OFF".
2. Check harness continuity between terminal 1 and engine ground.
   Continuity should exist.
   If OK, check harness for short to power.

NG → Check the following.
- Harness connectors E210 , F21
- Harness for open or short between ECM and engine coolant temperature sensor
- Harness for open or short between TCM and engine coolant temperature sensor

If NG, repair open circuit or short to power in harness or connectors.

OK ↓

CHECK COMPONENT
(Engine coolant temperature sensor).
Refer to "COMPONENT INSPECTION" on next page.

NG → Replace engine coolant temperature sensor.

OK ↓

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

NG → CHECK COMPONENT
(Thermostat).
Refer to LC-13 section ("Thermostat").
If NG, replace it.

OK ↓

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-97.

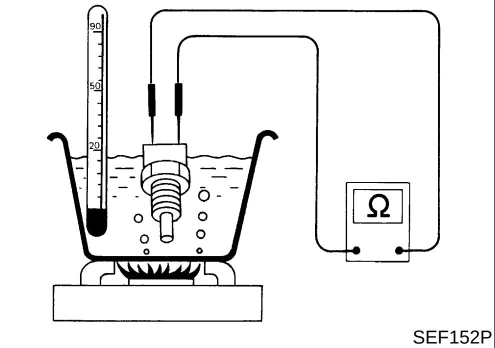
↓

INSPECTION END

Engine Coolant Temperature (ECT) Sensor (Cont'd)

COMPONENT INSPECTION

Engine coolant temperature sensor

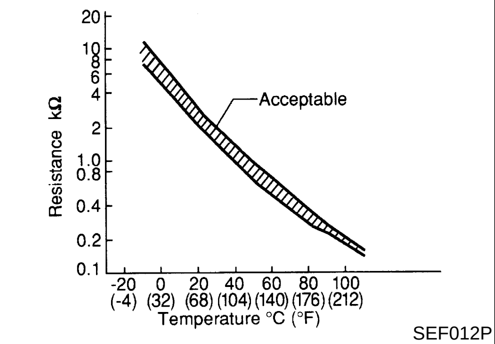


SEF152P

Check resistance as shown in the figure.

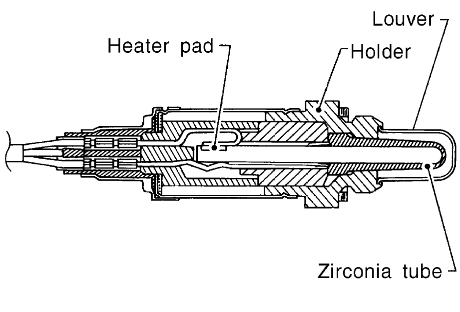
<Reference data>

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

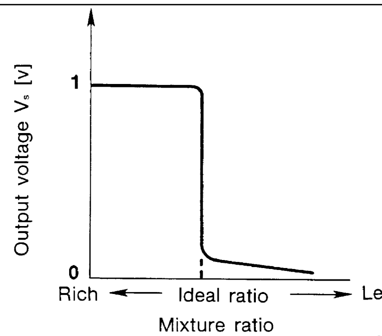


SEF012P

If NG, replace engine coolant temperature sensor.



SEF463R



SEF288D

Heated Oxygen Sensor 1 (Front) (Circuit)

COMPONENT DESCRIPTION

The heated oxygen sensor 1 (front) 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 (front) 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 (front) signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

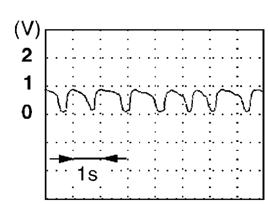
Specification data are reference values

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

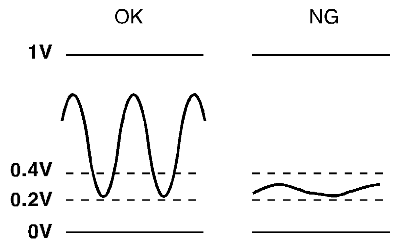
ECM TERMINALS AND REFERENCE VALUE

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

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

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
46	W	Heated oxygen sensor 1 (front)	Engine is running. After warming up to normal operating temperature and engine speed is 2,000 rpm	0 - Approximately 1.0V  SEF201T

Heated Oxygen Sensor 1 (Front) (Circuit) (Cont'd)

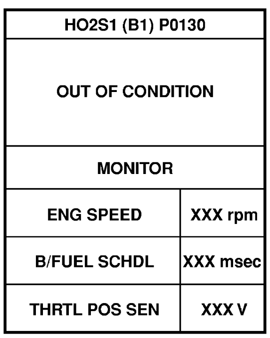


SEF237U

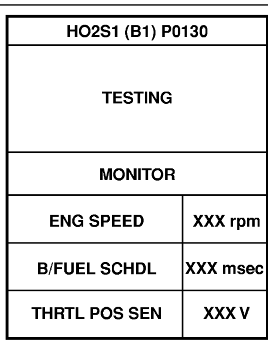
ON BOARD DIAGNOSIS LOGIC

Under the condition in which the heated oxygen sensor 1 (front) 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.

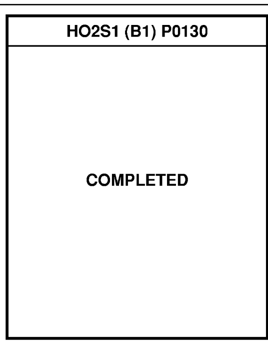
Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0130	● The voltage from the sensor is constantly approx. 0.3V.	● Harness or connectors (The sensor circuit is open or shorted.) ● Heated oxygen sensor 1 (front)



SEF643Y



SEF644Y



SEF645Y

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

CAUTION:
Always drive vehicle at a safe speed.
NOTE:
If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.
TESTING CONDITION:
- **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.**

1) Start engine and warm it up to normal operating temperature.
2) Stop engine and wait at least 5 seconds.
3) Select "HO2S1 (B1) P0130" 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 rev up engine above 3,600 rpm after this step. If the engine speed exceeds, 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 10 to 60 seconds.)
   ENG SPEED: 1,900 - 3,150 rpm
   Vehicle speed: More than 80 km/h (50 MPH)
   B/FUEL SCHDL: 3 - 12.5 msec
   Selector lever: Suitable position

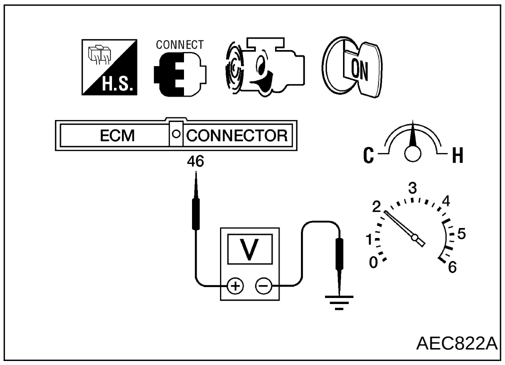
Heated Oxygen Sensor 1 (Front) (Circuit) (Cont'd)

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

7) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "DIAGNOSTIC PROCEDURE", EC-160.

During this test, P1148 may be stored in ECM.

OR



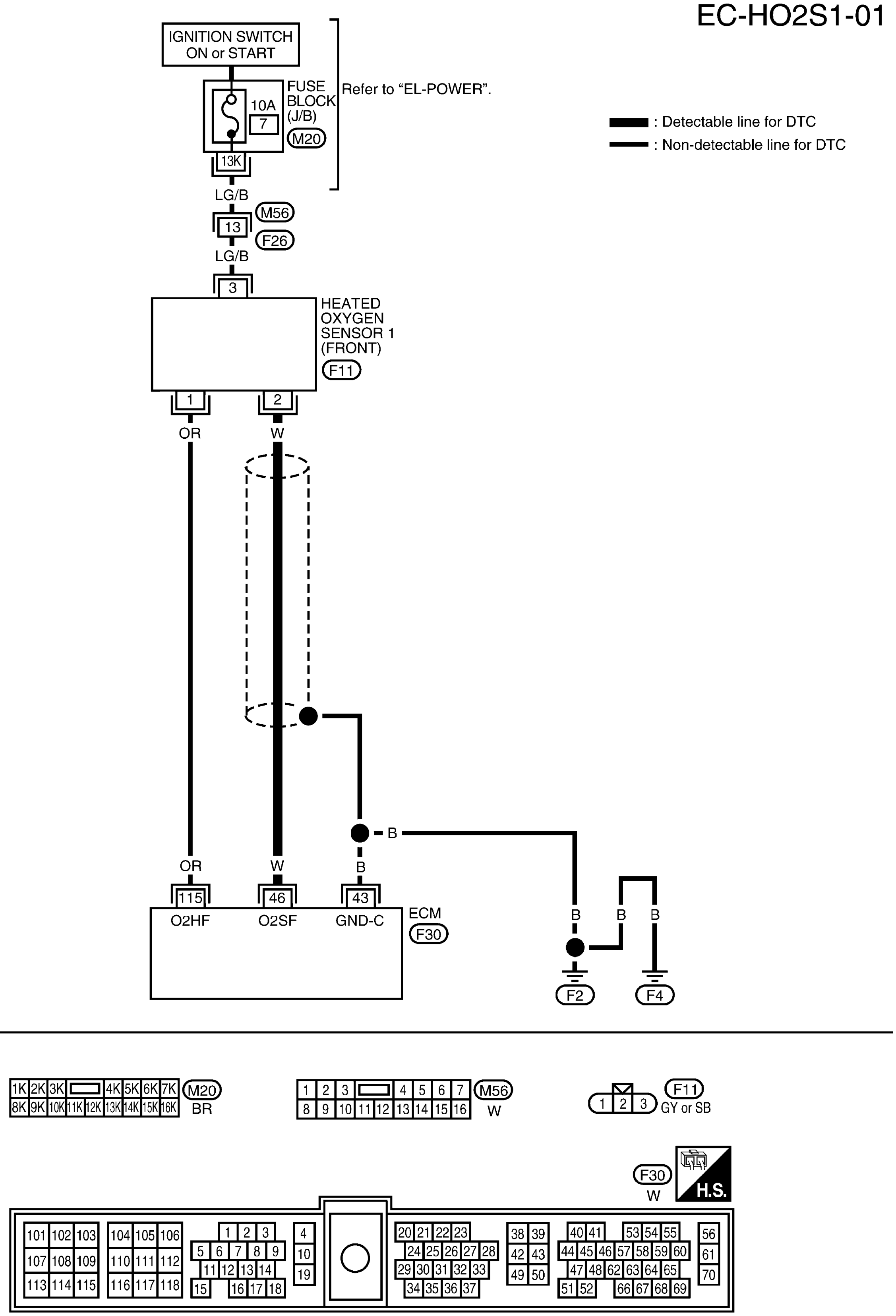
OVERALL FUNCTION CHECK

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

1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 46 (sensor 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 "DIAGNOSTIC PROCEDURE", EC-160.

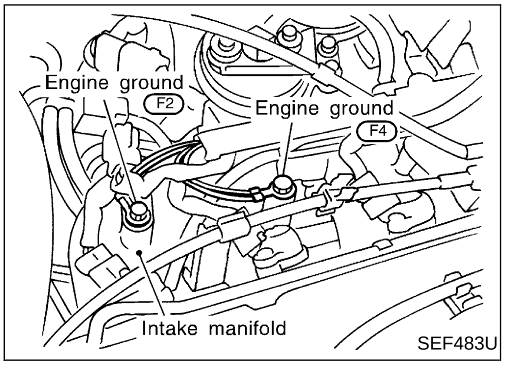
Heated Oxygen Sensor 1 (Front) (Circuit) (Cont'd)



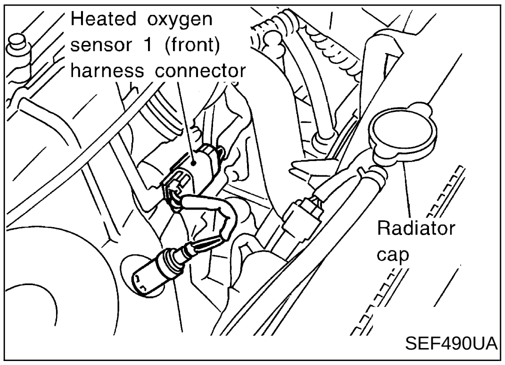
WEC927

Heated Oxygen Sensor 1 (Front) (Circuit) (Cont’d)

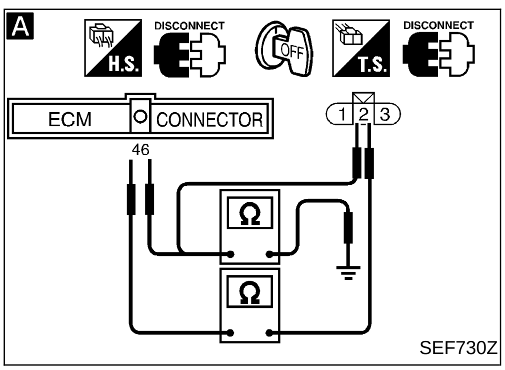
DIAGNOSTIC PROCEDURE



SEF483U



SEF490UA



SEF730Z

INSPECTION START

↓

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

↓

A

CHECK INPUT SIGNAL CIRCUIT.
1. Disconnect heated oxygen sensor 1 (front) harness connector and ECM harness connector.
2. Check harness continuity between ECM terminal 46 and terminal 2.
   Continuity should exist.
3. Check harness continuity between ECM terminal 46 (or terminal 2) and ground.
   Continuity should not exist.

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

NG → Repair harness or connectors.

↓ OK

CHECK COMPONENT
[Heated oxygen sensor 1 (front)].
Refer to “COMPONENT INSPECTION” on next page.

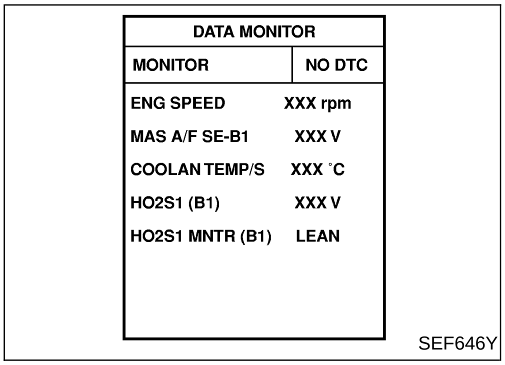
NG → Replace heated oxygen sensor 1 (front).

↓ OK

Perform “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-112.

↓

INSPECTION END



SEF646Y

Heated Oxygen Sensor 1 (Front) (Circuit) (Cont'd)

COMPONENT INSPECTION

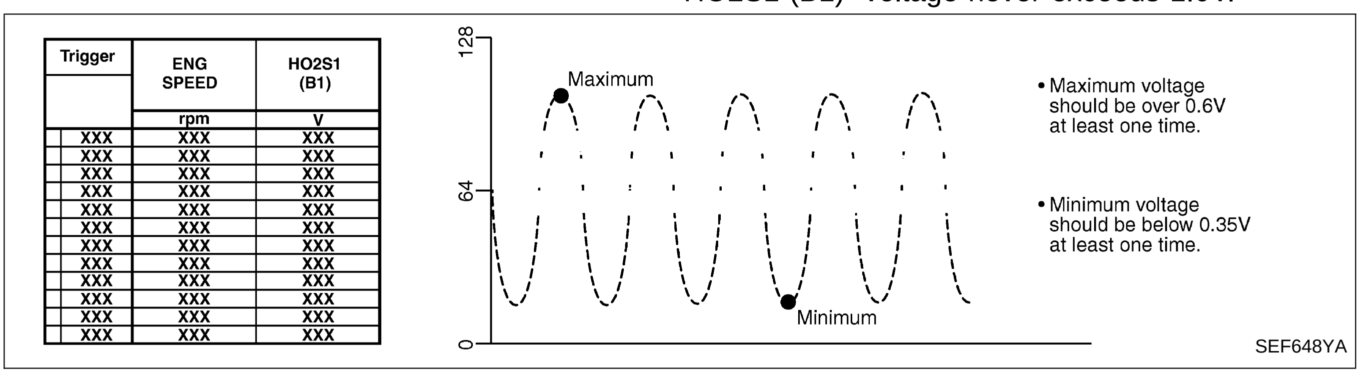
Heated oxygen sensor 1 (front)

1) Start engine and warm it up to normal operating temperature.
2) Select "MANU TRIG" and "HI SPEED" in "DATA MONITOR" mode with CONSULT-II, and select "HO2S1 (B1)" and "HO2S1 MNTR (B1)".
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)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds.
  5 times (cycles) are counted as shown below:

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

  R = "HO2S1 MNTR (B1)", "RICH"
  L = "HO2S1 MNTR (B1)", "LEAN"
- "HO2S1 (B1)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)" voltage goes below 0.35V at least once.
- "HO2S1 (B1)" voltage never exceeds 1.0V.

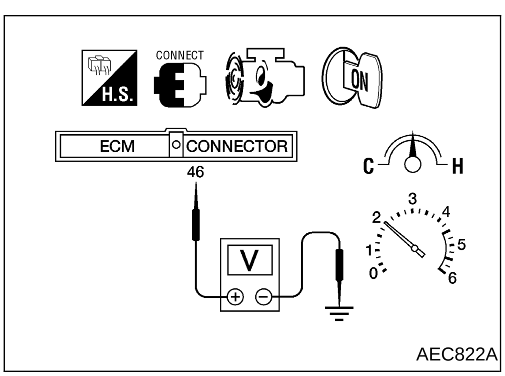


SEF648YA

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.**

OR



AEC822A

1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 46 (sensor signal) and engine ground.
3) Check the following with engine speed held at 2,000 rpm constant under no load.

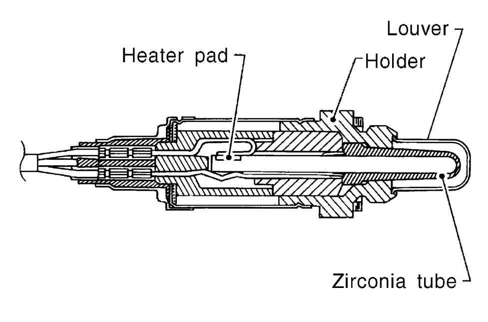
- The voltage fluctuates between 0 to 0.35V and 0.6 to 1.0V more than five times within 10 seconds.
  1 time: 0 - 0.35V → 0.6 - 1.0V → 0 - 0.35V
  2 times: 0 - 0.35V → 0.6 - 1.0V → 0 - 0.35V → 0.6 - 1.0V → 0 - 0.35V

Heated Oxygen Sensor 1 (Front) (Circuit) (Cont'd)

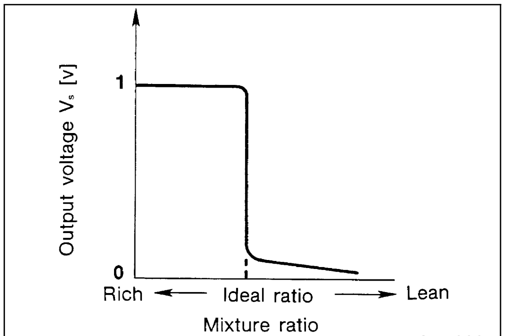
- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is below 0.35V at least one time.
- The voltage never exceeds 1.0V.

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.**



SEF463R



SEF288D

Heated Oxygen Sensor 1 (front) (Lean Shift Monitoring)

COMPONENT DESCRIPTION

The heated oxygen sensor 1 (front) 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 (front) 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 (front) signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

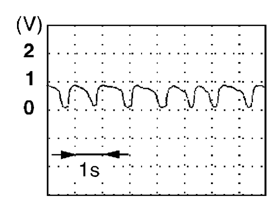
Specification data are reference values

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

ECM TERMINALS AND REFERENCE VALUE

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

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

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
46	W	Heated oxygen sensor 1 (front)	Engine is running. After warming up to normal operating temperature and engine speed is 2,000 rpm	0 - Approximately 1.0V  SEF201T

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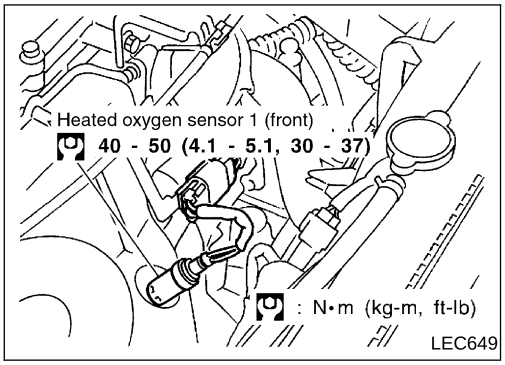


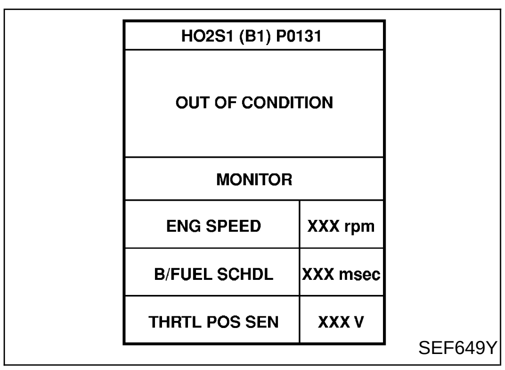
LEC649

Heated Oxygen Sensor 1 (front) (Lean Shift Monitoring) (Cont'd)

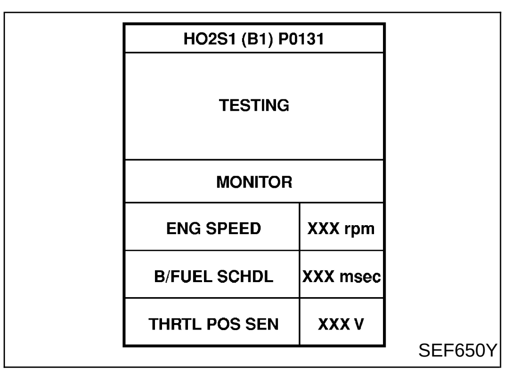
ON BOARD DIAGNOSIS LOGIC

To judge the malfunction, the output from the heated oxygen sensor 1 (front) 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.

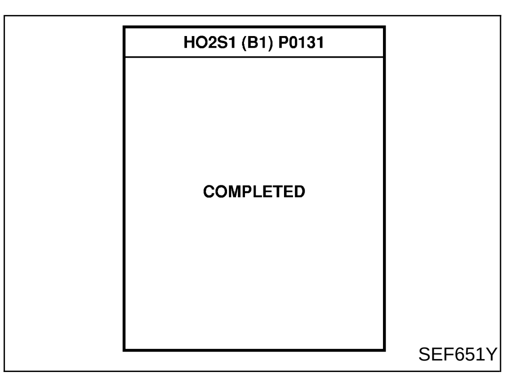
Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0131	● The maximum and minimum voltages from the sensor are not reached to the specified voltages.	● Heated oxygen sensor 1 (front) ● Heated oxygen sensor 1 heater (front) ● Fuel pressure ● Injectors ● Intake air leaks



SEF649Y



SEF650Y



SEF651Y

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

- **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.**

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) P0131" 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 rev up engine above 3,600 rpm after this step. If the engine speed exceeds, return to step 5).

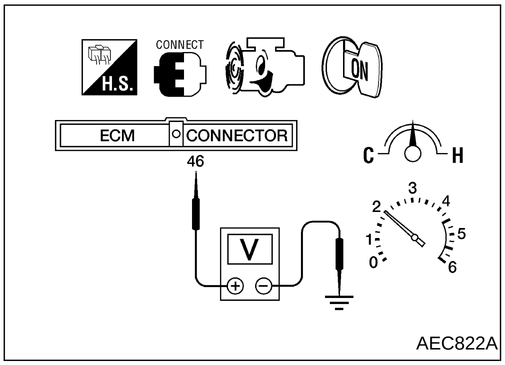
6) When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take approximately 50 seconds.)

   ENG SPEED: 1,150 - 2,600 rpm
   Vehicle speed: Less than 100 km/h (62 MPH)
   B/FUEL SCHDL: 3 - 12.5 msec
   Selector lever: Suitable position

Heated Oxygen Sensor 1 (front) (Lean Shift Monitoring) (Cont'd)

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

7) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "DIAGNOSTIC PROCEDURE", EC-167.



OR

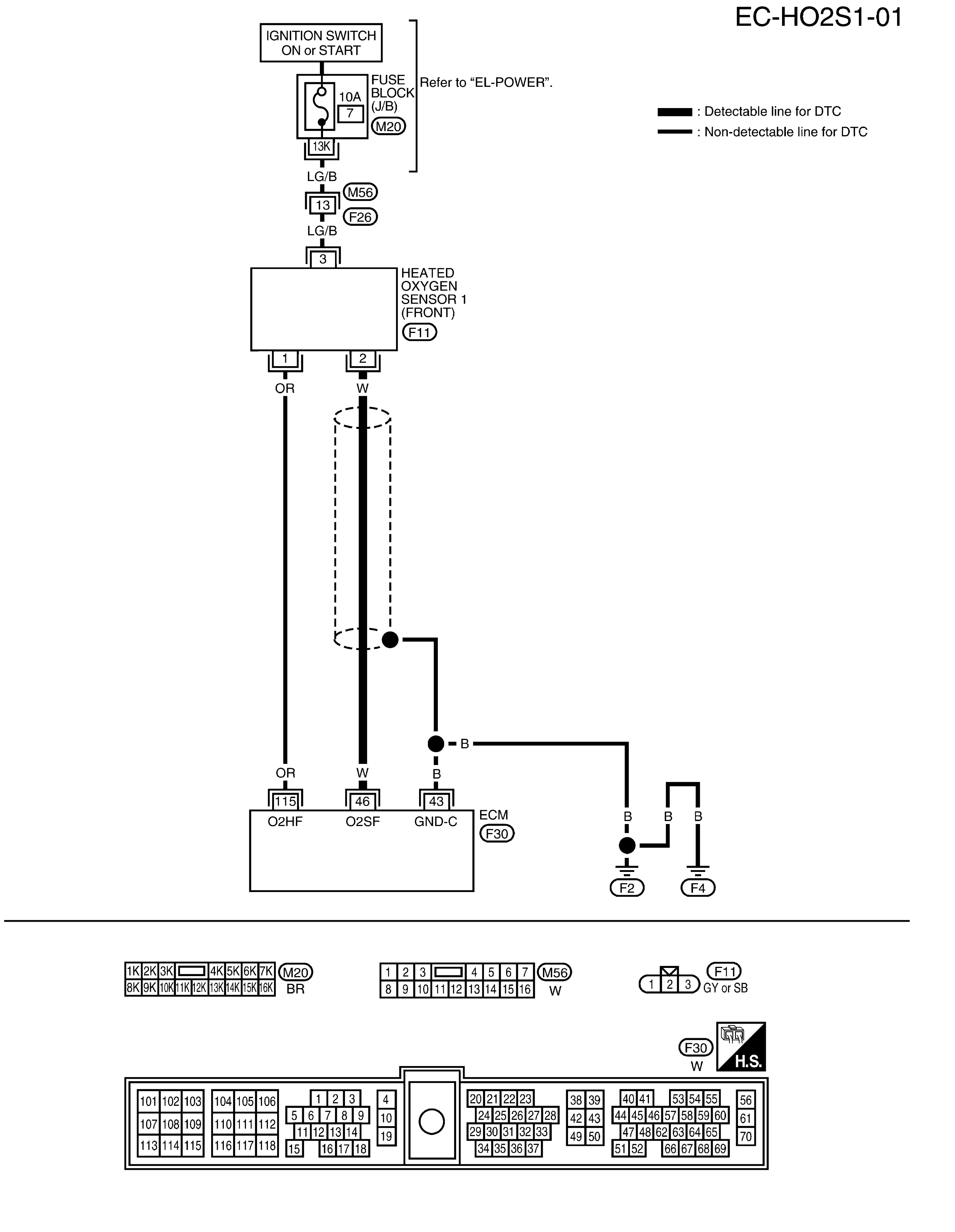
OVERALL FUNCTION CHECK

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

1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 46 (sensor signal) and engine ground.
3) Check the following with engine speed held at 2,000 rpm constant under no load.
- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is over 0.1V at least one time.

4) If NG, go to "DIAGNOSTIC PROCEDURE", EC-167.

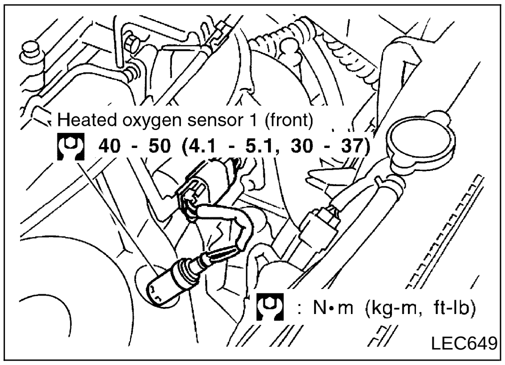
Heated Oxygen Sensor 1 (front) (Lean Shift Monitoring) (Cont'd)

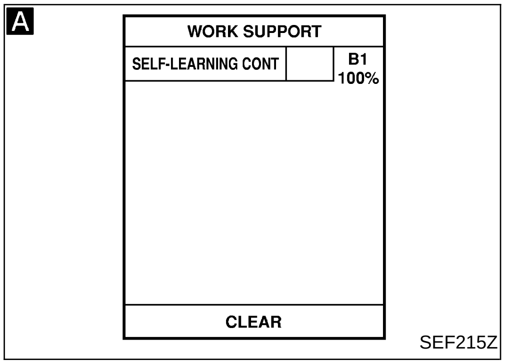


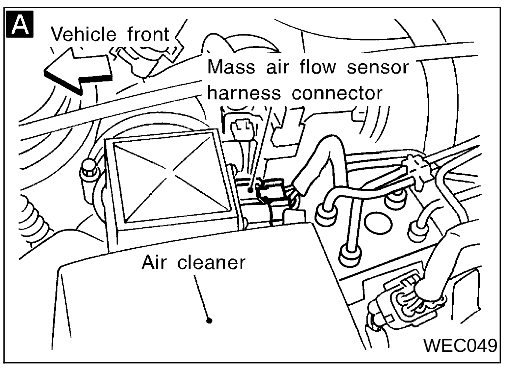
WEC927

Heated Oxygen Sensor 1 (front) (Lean Shift Monitoring) (Cont'd)

DIAGNOSTIC PROCEDURE







INSPECTION START

↓

Loosen and retighten front heated oxygen sensor.
Tightening torque:
40 - 50 N·m
(4.1 - 5.1 kg-m, 30 - 37 ft-lb)

↓

A

CLEAR THE SELF-LEARNING DATA.
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?

OR

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 P0100 is displayed.
6. Erase 1st trip DTC memory. Make sure DTC P0000 is displayed.
7. Run engine for at least 10 minutes at idle speed.
Is the 1st trip DTC P0171 detected? Is it difficult to start engine?

Yes → Go to "TROUBLE DIAGNOSIS FOR DTC P0171", EC-230.

No ↓

CHECK COMPONENT
[Heated oxygen sensor 1 heater (front)].
Refer to "COMPONENT INSPECTION" on next page.

NG → Replace heated oxygen sensor 1 (front).

OK ↓

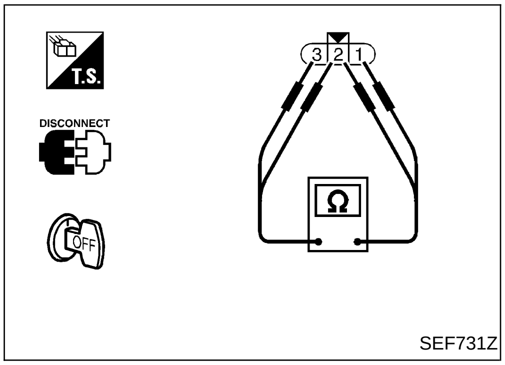
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-112.

↓

INSPECTION END

Heated Oxygen Sensor 1 (front) (Lean Shift Monitoring) (Cont'd)

COMPONENT INSPECTION



SEF731Z

Heated oxygen sensor 1 heater (front)

Check resistance between terminals ③ and ①.

Resistance: 2.3 - 4.3Ω at 25°C (77°F)

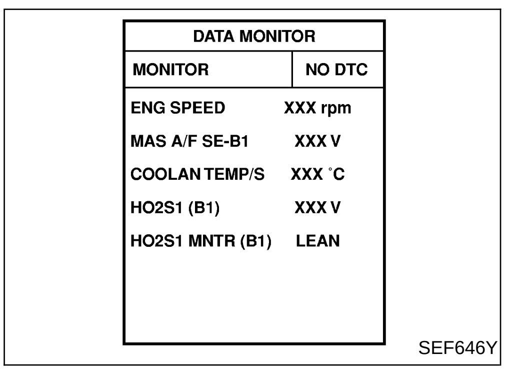
Check continuity between terminals ② and ①, ③ and ②.

Continuity should not exist.

If NG, replace the heated oxygen sensor 1 (front).

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.**



SEF646Y

Heated oxygen sensor 1 (front)

1) Start engine and warm it up to normal operating temperature.
2) Select "MANU TRIG" and "HI SPEED" in "DATA MONITOR" mode with CONSULT-II, and select "HO2S1 (B1)" and "HO2S1 MNTR (B1)".
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.

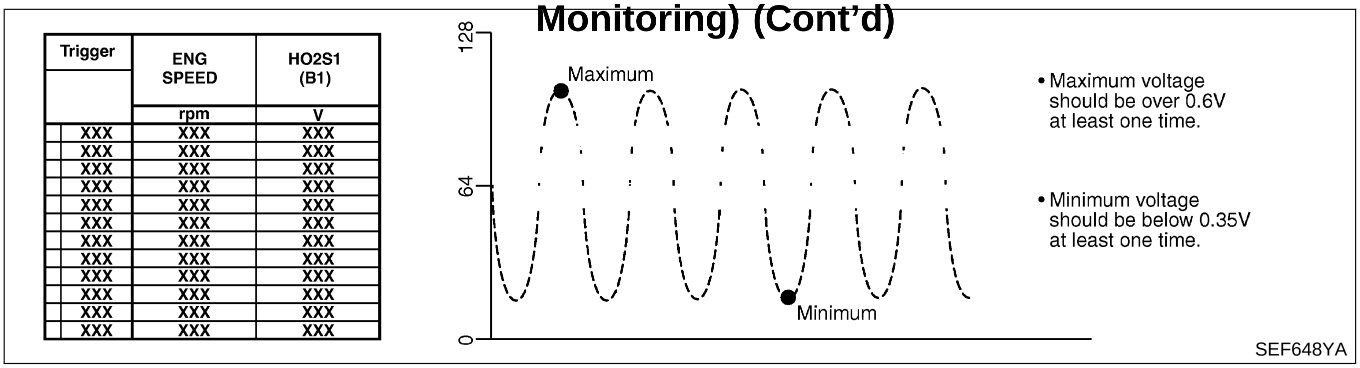
- "HO2S1 MNTR (B1)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds.

  5 times (cycles) are counted as shown below:

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

  R = "HO2S1 MNTR (B1)", "RICH"
  L = "HO2S1 MNTR (B1)", "LEAN"
- "HO2S1 (B1)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)" voltage goes below 0.35V at least once.
- "HO2S1 (B1)" voltage never exceeds 1.0V.

Heated Oxygen Sensor 1 (front) (Lean Shift Monitoring) (Cont'd)

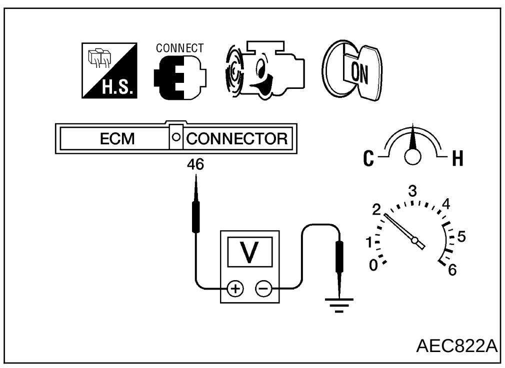


SEF648YA

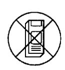
CAUTION:

- **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.**

OR



AEC822A

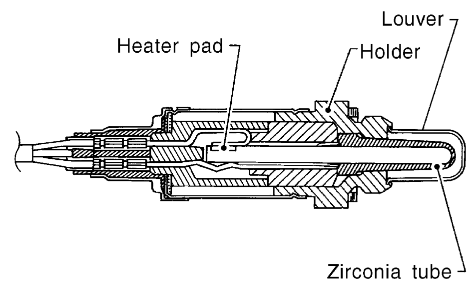


1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 46 (sensor signal) and engine ground.
3) Check the following with engine speed held at 2,000 rpm constant under no load.

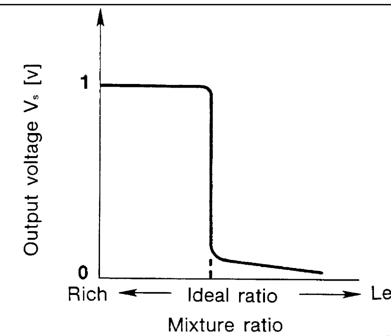
- The voltage fluctuates between 0 to 0.35V and 0.6 to 1.0V more than five times within 10 seconds.
  1 time: 0 - 0.35V → 0.6 - 1.0V → 0 - 0.35V
  2 times: 0 - 0.35V → 0.6 - 1.0V → 0 - 0.35V → 0.6 - 1.0V → 0 - 0.35V
- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is below 0.35V 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.**



SEF463R



SEF288D

Heated Oxygen Sensor 1 (Front) (Rich Shift Monitoring)

COMPONENT DESCRIPTION

The heated oxygen sensor 1 (front) 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 (front) 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 (front) signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

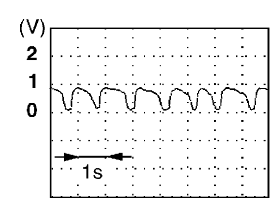
Specification data are reference values

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

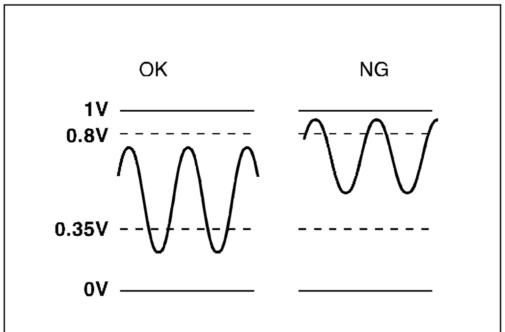
ECM TERMINALS AND REFERENCE VALUE

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

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

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
46	W	Heated oxygen sensor 1 (front)	Engine is running. After warming up to normal operating temperature and engine speed is 2,000 rpm	0 - Approximately 1.0V  SEF201T

Heated Oxygen Sensor 1 (Front) (Rich Shift Monitoring) (Cont'd)

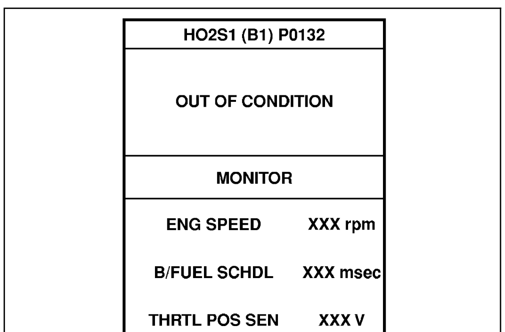


SEF299U

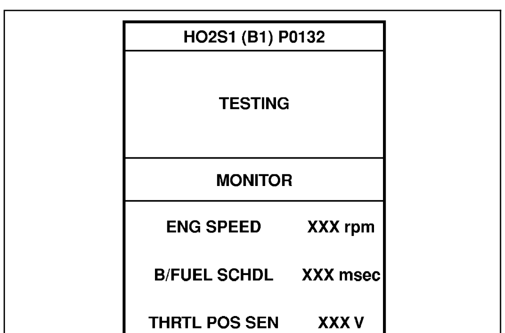
ON BOARD DIAGNOSIS LOGIC

To judge the malfunction, the output from the heated oxygen sensor 1 (front) 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.

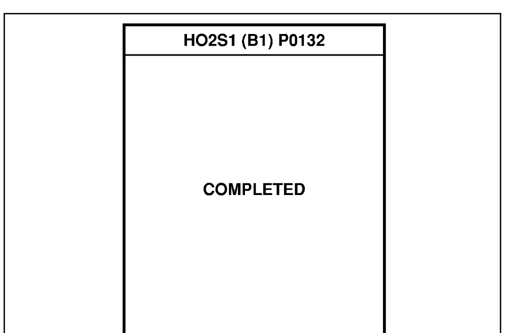
Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0132	● The maximum and minimum voltages from the sensor are beyond the specified voltages.	● Heated oxygen sensor 1 (front) ● Heated oxygen sensor 1 heater (front) ● Fuel pressure ● Injectors



SEF653Y



SEF654Y



SEF655Y

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

CAUTION:
Always drive vehicle at a safe speed.

NOTE:
If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:
- **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.**

1) Start engine and warm it up to normal operating temperature.
2) Stop engine and wait at least 5 seconds.
3) Turn ignition switch "ON" and select "HO2S1 (B1) P0132" 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 rev up engine above 3,600 rpm after this step. If the engine speed exceeds, 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.)
   ENG SPEED: 1,150 - 2,600 rpm
   Vehicle speed: Less than 100 km/h (62 MPH)
   B/FUEL SCHDL: 3 - 12.5 msec
   Selector lever: Suitable position

GI
MA
EM
LC
EC
FE
CL
MT
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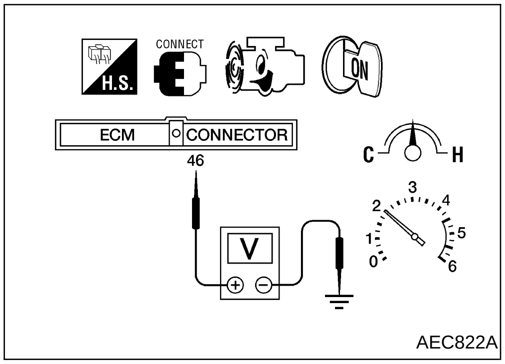
FA
RA
BR
ST
RS
BT
HA
EL
IDX

Heated Oxygen Sensor 1 (Front) (Rich Shift Monitoring) (Cont'd)

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

7) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "DIAGNOSTIC PROCEDURE", EC-174.



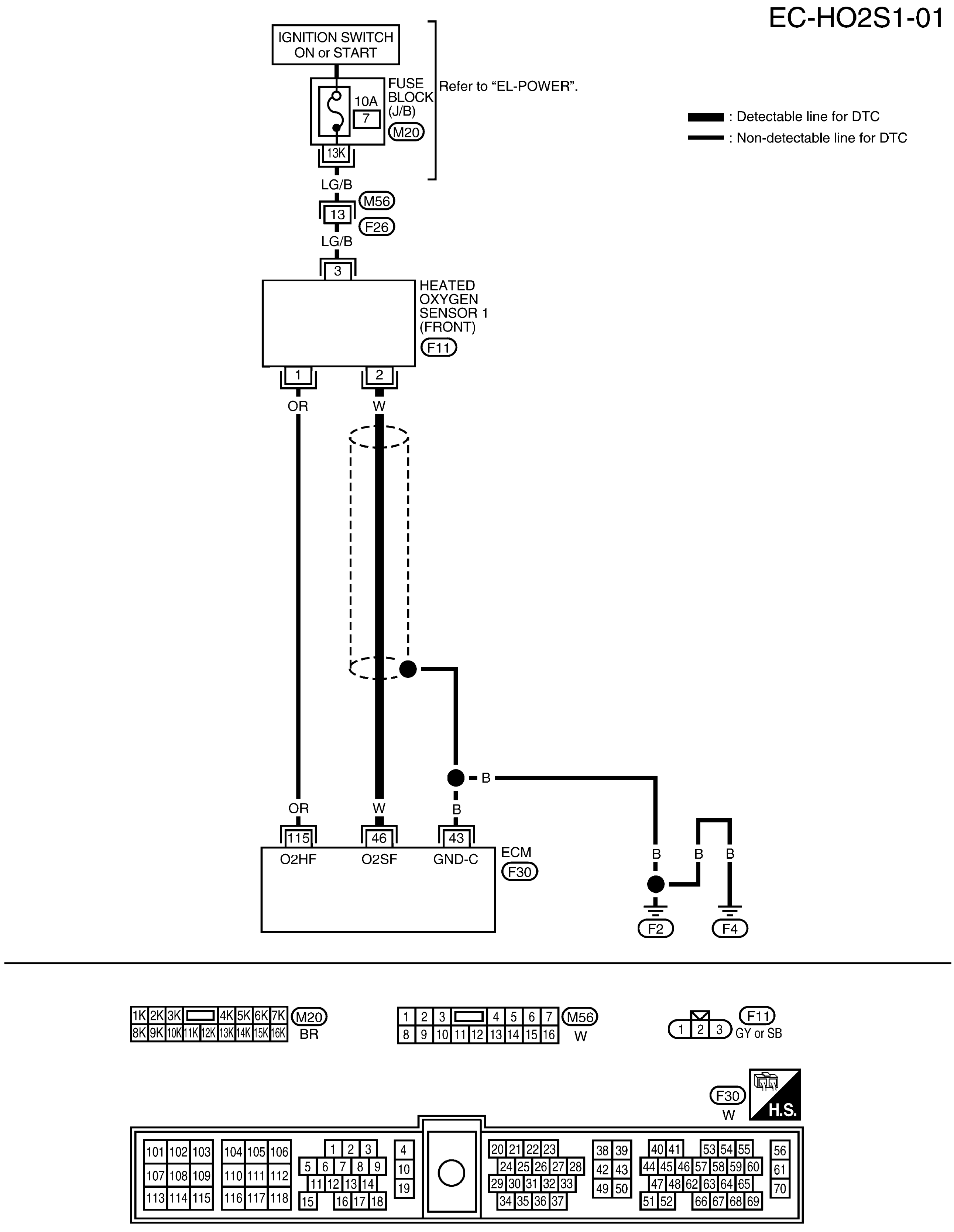
OR

OVERALL FUNCTION CHECK

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

1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 46 (sensor signal) 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.

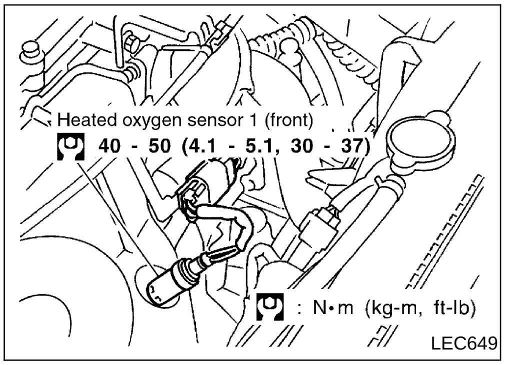
4) If NG, go to "DIAGNOSTIC PROCEDURE", EC-174.



WEC927

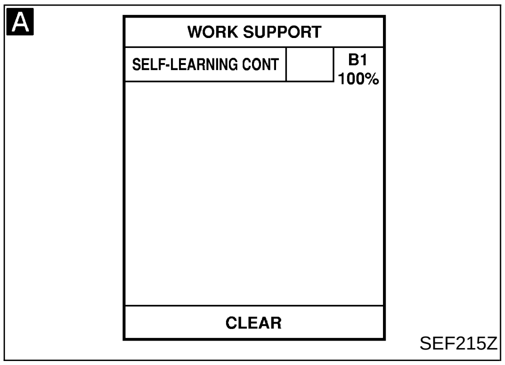
GI MA EM LC EC FE CL MT AT FA RA BR ST RS BT HA EL IDX

Heated Oxygen Sensor 1 (Front) (Rich Shift Monitoring) (Cont'd)

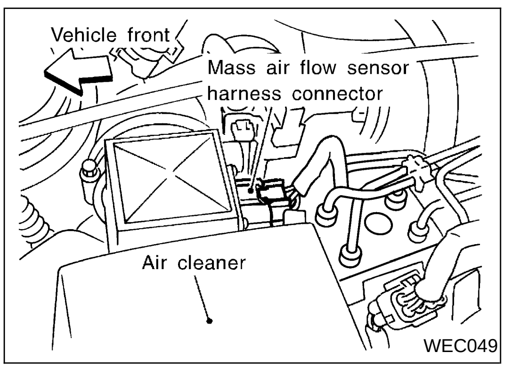


LEC649

A



SEF215Z



WEC049

DIAGNOSTIC PROCEDURE

INSPECTION START

↓

Loosen and retighten heated oxygen sensor 1 (front).
Tightening torque:
40 - 50 N·m
(4.1 - 5.1 kg-m, 30 - 37 ft-lb)

↓

A

CLEAR THE SELF-LEARNING DATA
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?

OR

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 P0100 is displayed.
6. Erase 1st trip DTC memory. Make sure DTC P0000 is displayed.
7. Run engine for at least 10 minutes at idle speed.
Is the 1st trip DTC P0171 detected? Is it difficult to start engine?

Yes → Go to "TROUBLE DIAGNOSIS FOR DTC P0172", EC-235.

No ↓

CHECK COMPONENT
[Heated oxygen sensor 1 heater (front)].
Refer to "COMPONENT INSPECTION" below.

NG → Replace heated oxygen sensor 1 (front).

OK ↓

A
(Go to next page.)

Heated Oxygen Sensor 1 (Front) (Rich Shift Monitoring) (Cont'd)

A

CHECK COMPONENT
[Heated oxygen sensor 1 (front)].
1. Turn ignition switch "OFF".
2. Disconnect sensor harness connector for water.
   Water should not exist.
   If OK, go to step 3.
3. Check heated oxygen sensor 1 (front).
Refer to "COMPONENT INSPECTION" on next page.

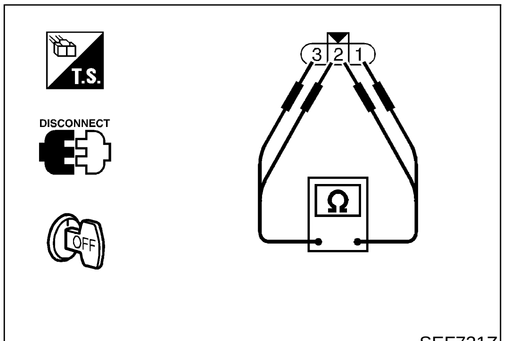
NG → Repair or replace harness and/or connectors or replace heated oxygen sensor 1 (front).

OK ↓

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-112.

↓

INSPECTION END



SEF731Z

Heated Oxygen Sensor 1 (Front) (Rich Shift Monitoring) (Cont'd)

COMPONENT INSPECTION

Heated oxygen sensor 1 heater (front)

Check resistance between terminals ③ and ①.

Resistance: 2.3 - 4.3Ω at 25°C (77°F)

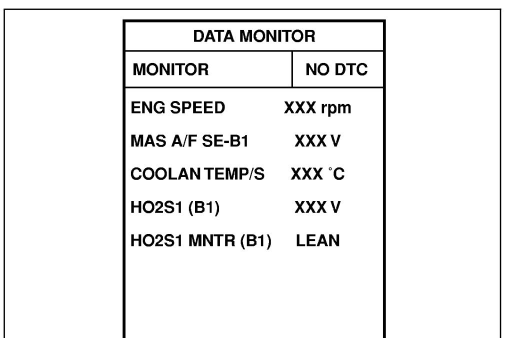
Check continuity between terminals ② and ①, ③ and ②.

Continuity should not exist.

If NG, replace the heated oxygen sensor 1 (front).

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.**



SEF646Y

Heated oxygen sensor 1 (front)

1) Start engine and warm it up to normal operating temperature.
2) Select "MANU TRIG" and "HI SPEED" in "DATA MONITOR" mode with CONSULT-II, and select "HO2S1 (B1)" and "HO2S1 MNTR (B1)".
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)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds.

  5 times (cycles) are counted as shown below:

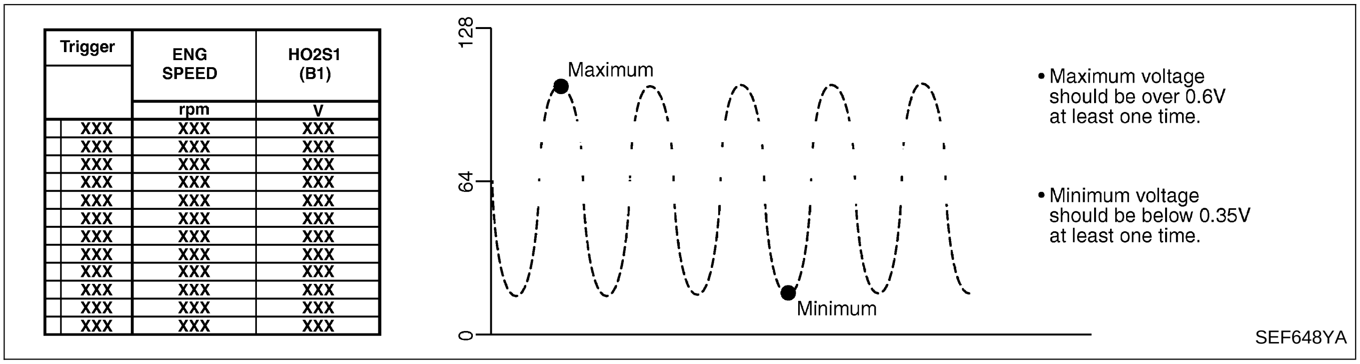
  cycle | 1 | 2 | 3 | 4 | 5 |

  HO2S1 MNTR (B1) R-L-R-L-R-L-R-L-R-L-R

  R = "HO2S1 MNTR (B1)", "RICH"

  L = "HO2S1 MNTR (B1)", "LEAN"
- "HO2S1 (B1)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)" voltage goes below 0.35V at least once.
- "HO2S1 (B1)" voltage never exceeds 1.0V.

Heated Oxygen Sensor 1 (Front) (Rich Shift Monitoring) (Cont'd)

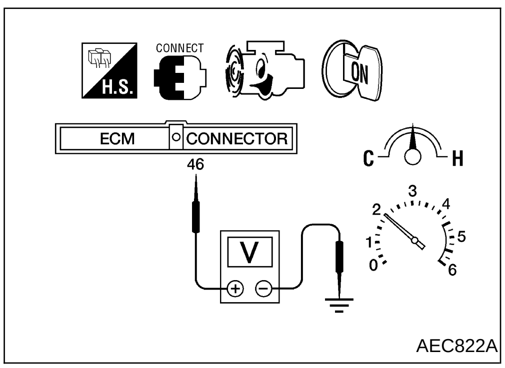


SEF648YA

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.**

OR



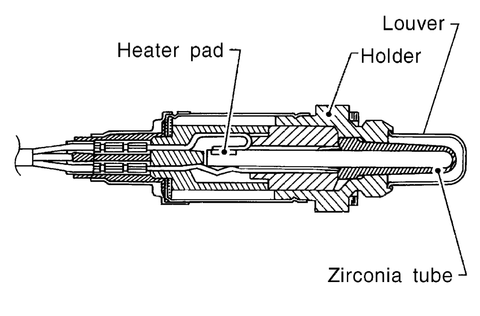
AEC822A

1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 46 (sensor signal) and engine ground.
3) Check the following with engine speed held at 2,000 rpm constant under no load.

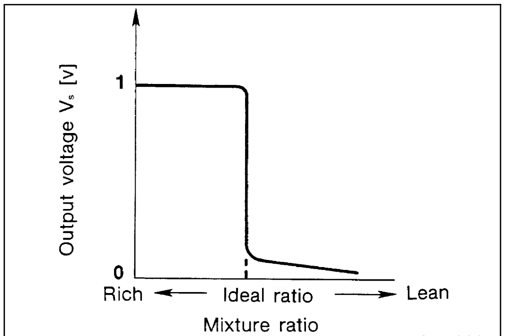
- The voltage fluctuates between 0 to 0.35V and 0.6 to 1.0V more than five times within 10 seconds.
  1 time: 0 - 0.35V → 0.6 - 1.0V → 0 - 0.35V
  2 times: 0 - 0.35V → 0.6 - 1.0V → 0 - 0.35V → 0.6 - 1.0V → 0 - 0.35V
- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is below 0.35V 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.**



SEF463R



SEF288D

Heated Oxygen Sensor 1 (Front) (Response Monitoring)

COMPONENT DESCRIPTION

The heated oxygen sensor 1 (front) 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 (front) 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 (front) signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

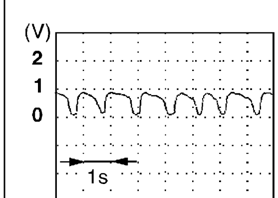
Specification data are reference values

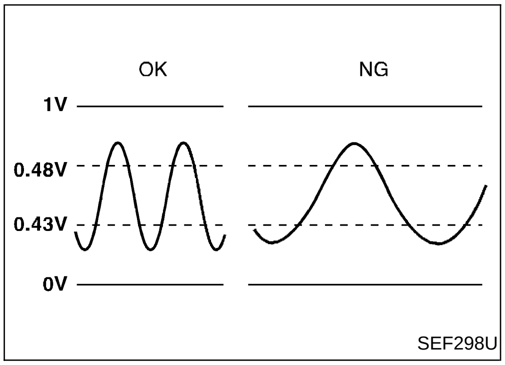
MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1)			LEAN ↔ RICH Changes more than 5 times during 10 seconds.

ECM TERMINALS AND REFERENCE VALUE

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

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

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
46	W	Heated oxygen sensor 1 (front)	Engine is running. After warming up to normal operating temperature and engine speed is 2,000 rpm	0 - Approximately 1.0V  SEF201T



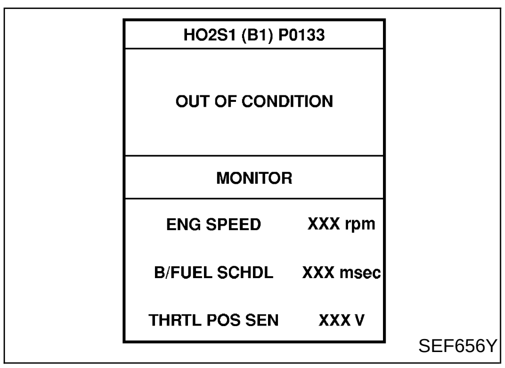
SEF298U

Heated Oxygen Sensor 1 (Front) (Response Monitoring) (Cont'd)

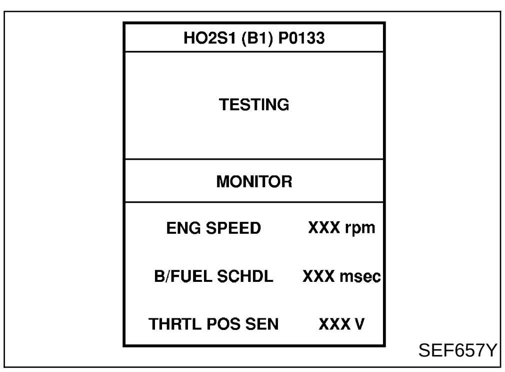
ON BOARD DIAGNOSIS LOGIC

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

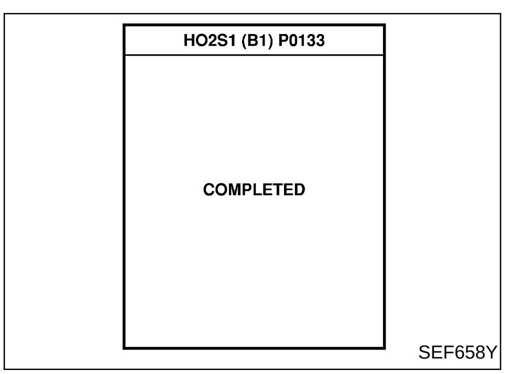
Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0133	● The response of the voltage signal from the sensor takes more than the specified time.	● Harness or connectors (The sensor circuit is open or shorted.) ● Heated oxygen sensor 1 (front) ● Heated oxygen sensor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



SEF656Y



SEF657Y



SEF658Y

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

- **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.**
- **Never raise engine speed above 3,600 rpm during the "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE". If the engine speed limit is exceeded, retry the procedure from step 2).**

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

NOTE:

Never rev up engine above 3,600 rpm after this step. If the engine speed exceeds, return to step 5).

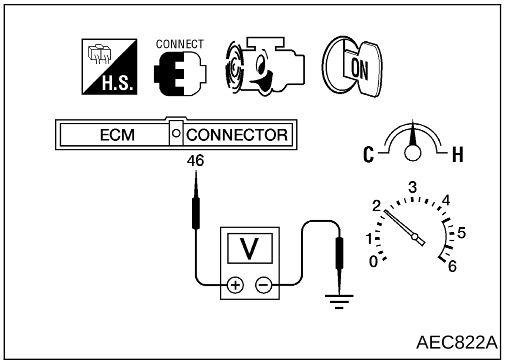
6) When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take approximately 20 seconds.)
   ENG SPEED: 1,900 - 3,150 rpm
   Vehicle speed: More than 80 km/h (50 MPH)
   B/FUEL SCHDL: 3 - 12.5 msec

Heated Oxygen Sensor 1 (Front) (Response Monitoring) (Cont'd)

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 "DIAGNOSTIC PROCEDURE", EC-182.



OR

OVERALL FUNCTION CHECK

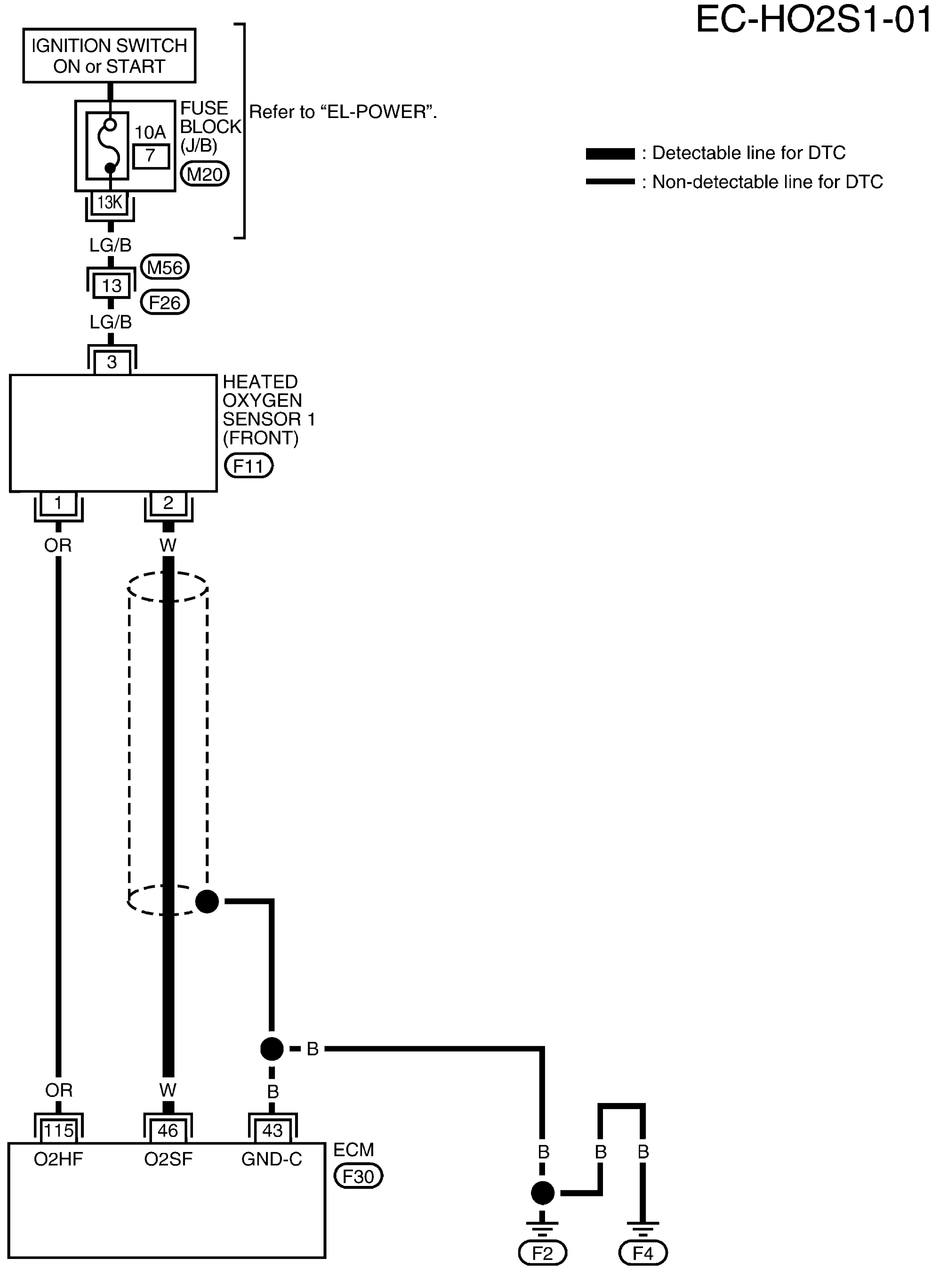
Use this procedure to check the overall function of the heated oxygen sensor 1 (front) circuit. During this check, a 1st trip DTC might not be confirmed.

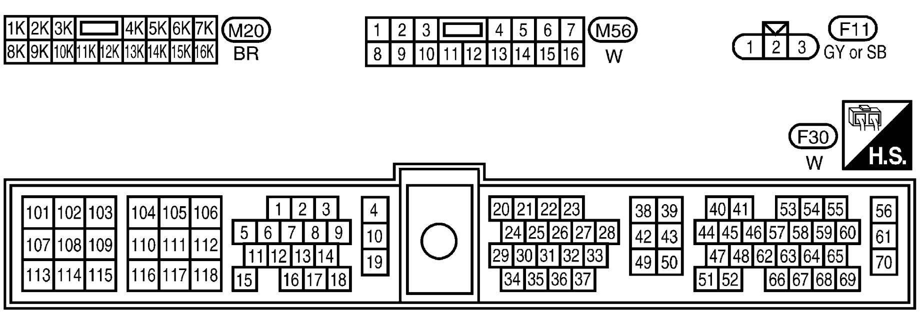
GST

1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 46 [Heated oxygen sensor 1 (front) 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 0.35 and 0.6 to 1.0V more than five times within 10 seconds.
  1 time: 0 - 0.35 → 0.6 - 1.0V → 0 - 0.35
  2 times: 0 - 0.35 → 0.6 - 1.0V → 0 - 0.35 → 0.6 - 1.0V → 0 - 0.35
4) If NG, go to "DIAGNOSTIC PROCEDURE", EC-182.

Heated Oxygen Sensor 1 (Front) (Response Monitoring) (Cont'd)

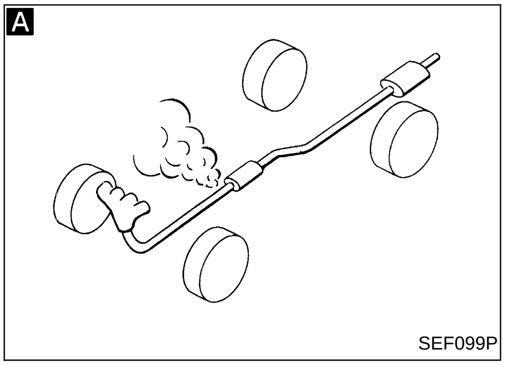
EC-HO2S1-01

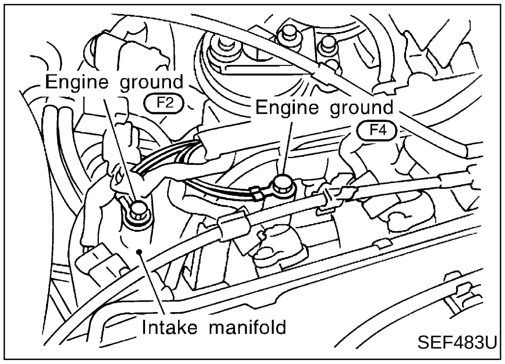


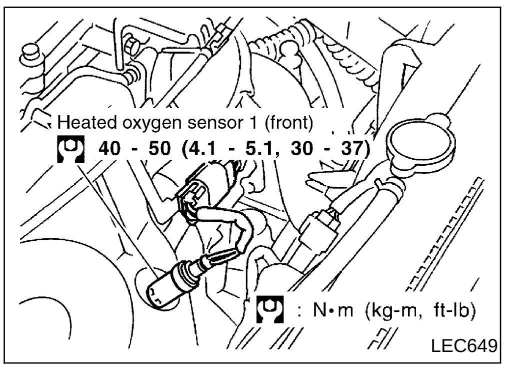


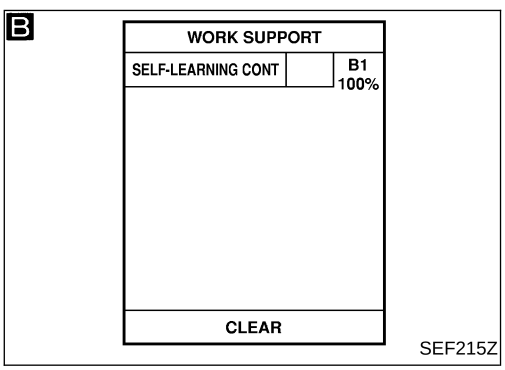
WEC927

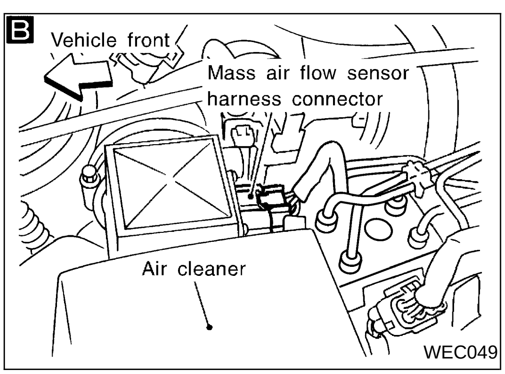
Heated Oxygen Sensor 1 (Front) (Response Monitoring) (Cont'd)











DIAGNOSTIC PROCEDURE

INSPECTION START

↓

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

↓

Loosen and retighten heated oxygen sensor 1 (front).
Tighting torque:
40 - 50 N·m
(4.1 - 5.1 kg-m, 30 - 37 ft-lb)

↓

A
CHECK EXHAUST AIR LEAK.
Start engine and run it at idle. Listen for an exhaust air leak before three way catalyst.

NG → Repair or replace.

↓ OK

CHECK FOR INTAKE AIR LEAK.
Start engine and run it at idle. Listen for an intake air leak between the mass air flow sensor and the intake manifold.

NG → Repair or replace.

↓ OK

B
CLEAR THE SELF-LEARNING DATA
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?

OR

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 P0100 is displayed.
6. Erase 1st trip DTC memory. Make sure DTC P0000 is displayed.
7. Run engine for at least 10 minutes at idle speed.
Is the 1st trip DTC P0171 detected? Is it difficult to start engine?

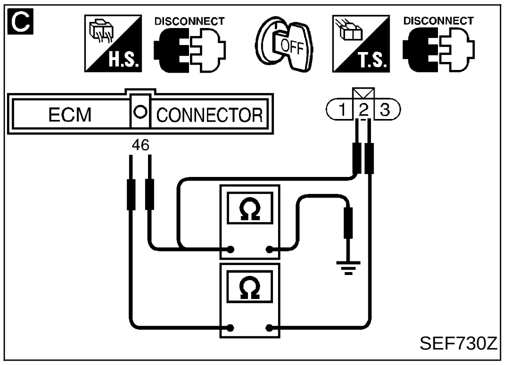
Yes → Go to "TROUBLE DIAGNOSIS FOR DTC P0171", EC-230 or "TROUBLE DIAGNOSIS FOR DTC P0172", EC-235.

↓ No

A

(Go to next page.)

Heated Oxygen Sensor 1 (Front) (Response Monitoring) (Cont'd)



A

C

CHECK INPUT SIGNAL CIRCUIT.
1. Disconnect heated oxygen sensor 1 (front) harness connector and ECM harness connector.
2. Check harness continuity between ECM terminal 46 and terminal 2.
   Continuity should exist.
3. Check harness continuity between ECM terminal 46 (or terminal 2) and ground.
   Continuity should not exist.

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

NG → Repair harness or connectors.

OK ↓

CHECK COMPONENT
[Heated oxygen sensor 1 heater (front)].
Refer to "COMPONENT INSPECTION" on next page.

NG → Replace heated oxygen sensor 1 (front).

OK ↓

CHECK COMPONENT
[Heated oxygen sensor 1 (front)].
Refer to "COMPONENT INSPECTION" on next page.

NG → Replace heated oxygen sensor 1 (front).

OK ↓

CHECK COMPONENT
(Mass air flow sensor).
Refer to "COMPONENT INSPECTION", EC-126.

NG → Replace mass air flow sensor.

OK ↓

CHECK COMPONENT
(PCV valve).
Refer to "COMPONENT INSPECTION" on EC-33.

NG → Repair or replace PCV valve.

OK ↓

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-112.

↓

INSPECTION END

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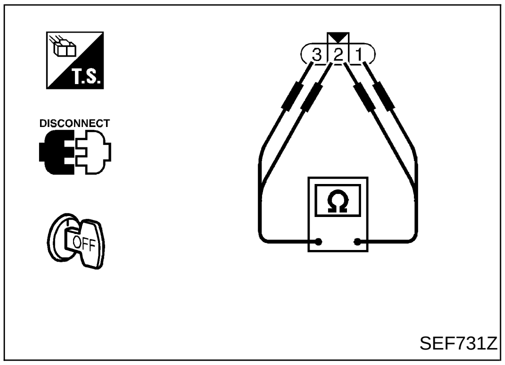
Heated Oxygen Sensor 1 (Front) (Response Monitoring) (Cont'd)



SEF731Z

COMPONENT INSPECTION

Heated oxygen sensor 1 heater (front)

Check resistance between terminals ③ and ①.

Resistance: 2.3 - 4.3Ω at 25°C (77°F)

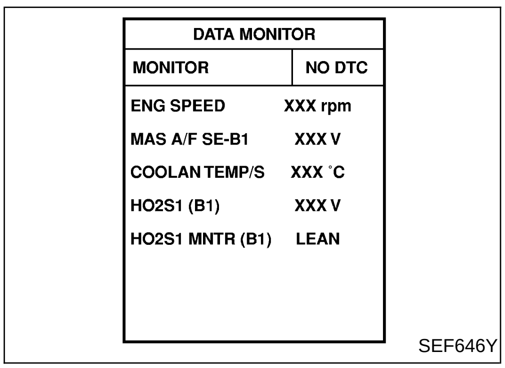
Check continuity between terminals ② and ①, ③ and ②.

Continuity should not exist.

If NG, replace the heated oxygen sensor 1 (front).

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.**



SEF646Y

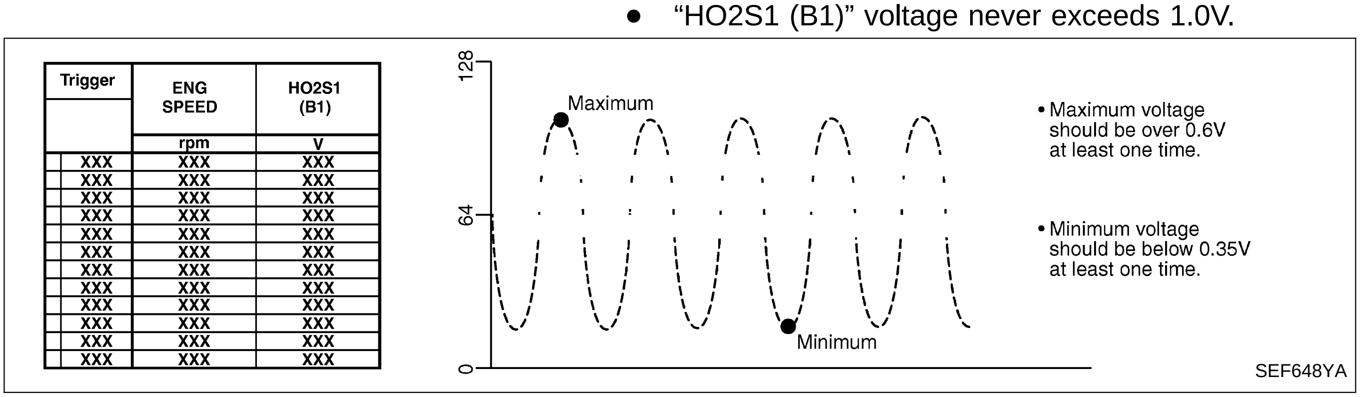
Heated oxygen sensor 1 (front)

1) Start engine and warm it up to normal operating temperature.
2) Select "MANU TRIG" and "HI SPEED" in "DATA MONITOR" mode with CONSULT-II, and select "HO2S1 (B1)" and "HO2S1 MNTR (B1)".
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)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds.
  5 times (cycles) are counted as shown below:

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

  R = "HO2S1 MNTR (B1)", "RICH"
  L = "HO2S1 MNTR (B1)", "LEAN"
- "HO2S1 (B1)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)" voltage goes below 0.35V at least once.
- "HO2S1 (B1)" voltage never exceeds 1.0V.



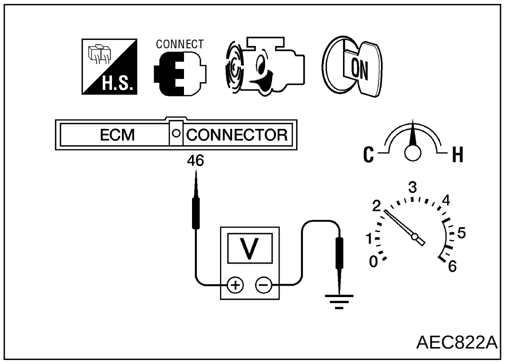
SEF648YA

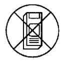
Heated Oxygen Sensor 1 (Front) (Response Monitoring) (Cont'd)

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.**

OR

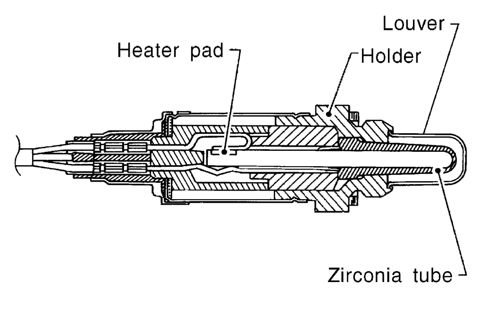




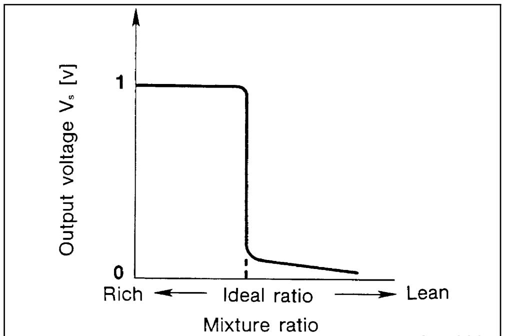
1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 46 (sensor signal) and engine ground.
3) Check the following with engine speed held at 2,000 rpm constant under no load.
- The voltage fluctuates between 0 to 0.35V and 0.6 to 1.0V more than five times within 10 seconds.
  1 time: 0 - 0.35V → 0.6 - 1.0V → 0 - 0.35V
  2 times: 0 - 0.35V → 0.6 - 1.0V → 0 - 0.35V → 0.6 - 1.0V → 0 - 0.35V
- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is below 0.35V 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.**



SEF463R



SEF288D

Heated Oxygen Sensor 1 (Front) (High Voltage)

COMPONENT DESCRIPTION

The heated oxygen sensor 1 (front) 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 (front) 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 (front) signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

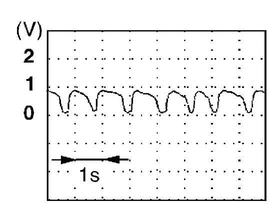
Specification data are reference values

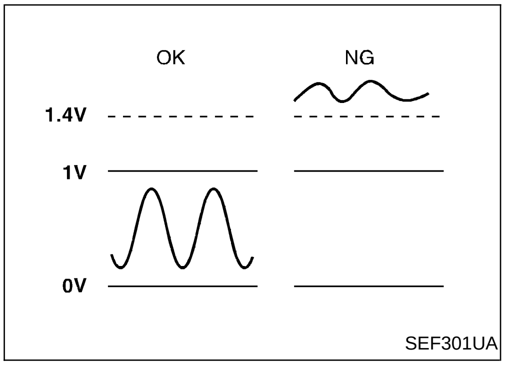
MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1)			LEAN ↔ RICH Changes more than 5 times during 10 seconds.

ECM TERMINALS AND REFERENCE VALUE

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

CAUTION:
Do not use ECM ground terminals when measuring input/output 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	W	Heated oxygen sensor 1 (front)	Engine is running. After warming up to normal operating temperature and engine speed is 2,000 rpm	0 - Approximately 1.0V  SEF201T



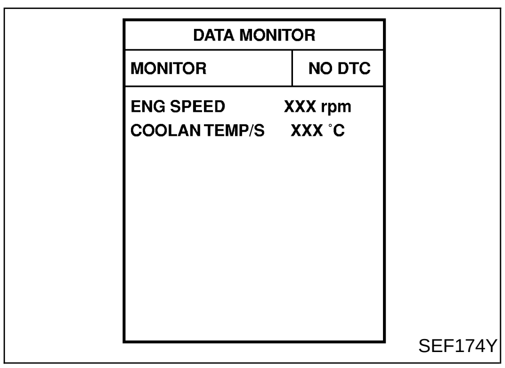
SEF301UA

Heated Oxygen Sensor 1 (Front) (High Voltage) (Cont'd)

ON BOARD DIAGNOSIS LOGIC

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

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0134	• 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 (front)



SEF174Y

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

NOTE:
If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Turn ignition switch "ON".
4) Select "DATA MONITOR" mode with CONSULT-II.
5) Restart engine and let it idle for 35 seconds.
6) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-189.

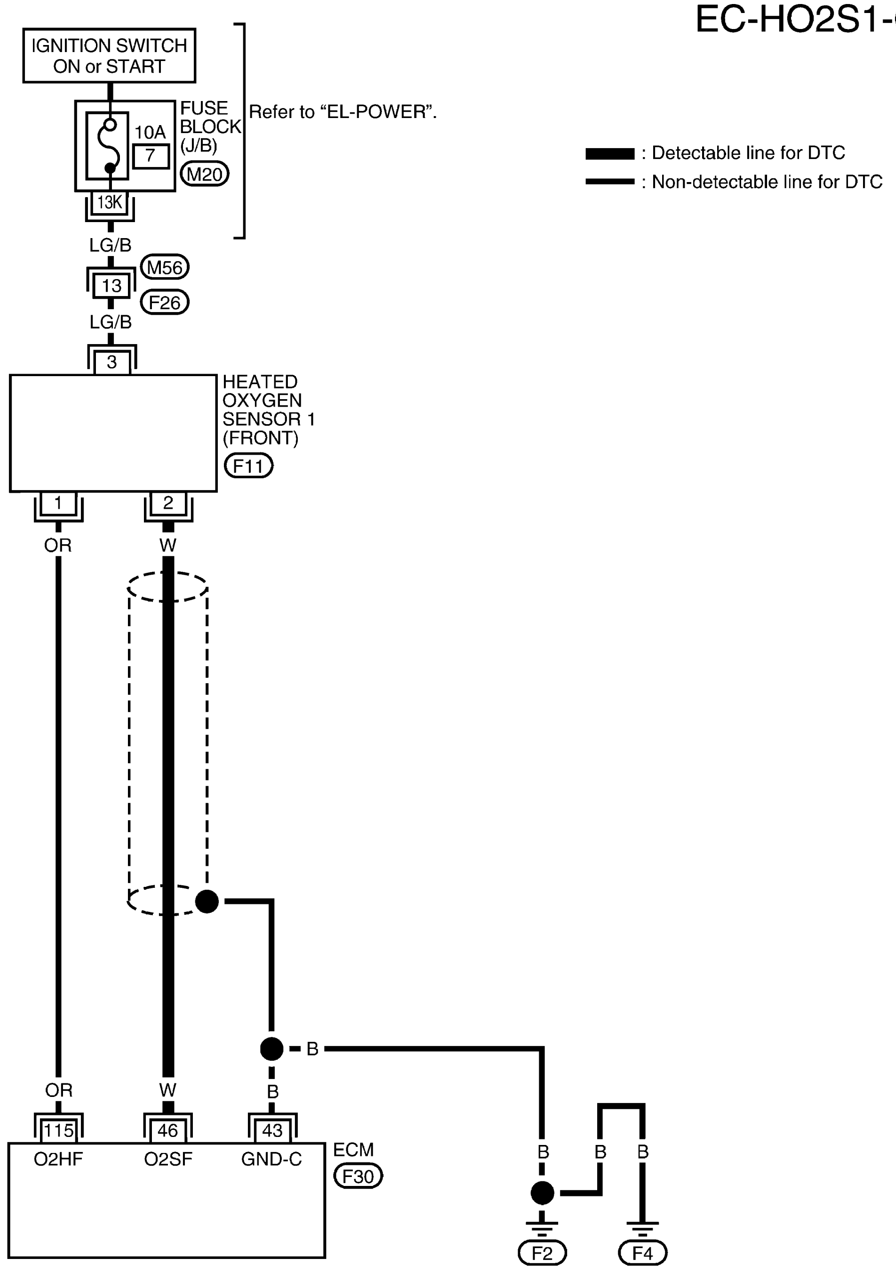
OR

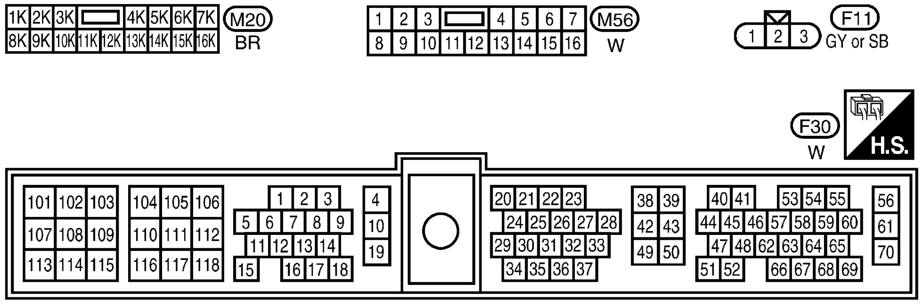
GST
1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Restart engine and let it idle for 35 seconds.
4) Turn ignition switch "OFF" and wait at least 5 seconds.
5) Restart engine and let it idle for 35 seconds.
6) Select "MODE 3" with GST.
7) If DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-189.

- 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.

Heated Oxygen Sensor 1 (Front) (High Voltage) (Cont'd)

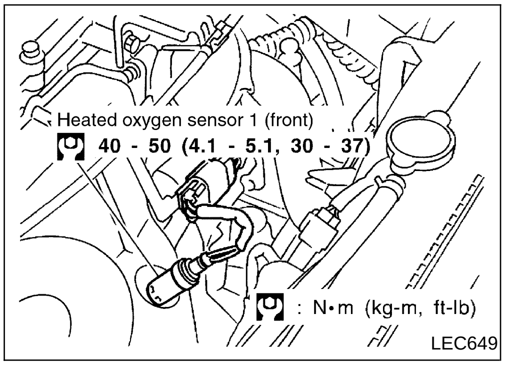
EC-HO2S1-01

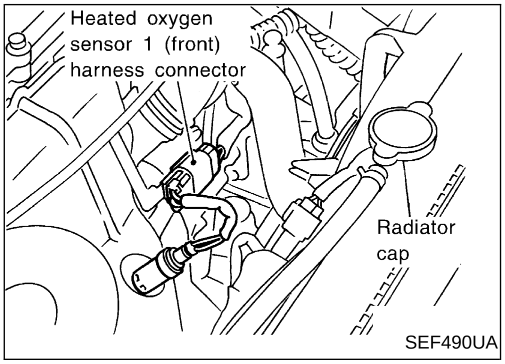


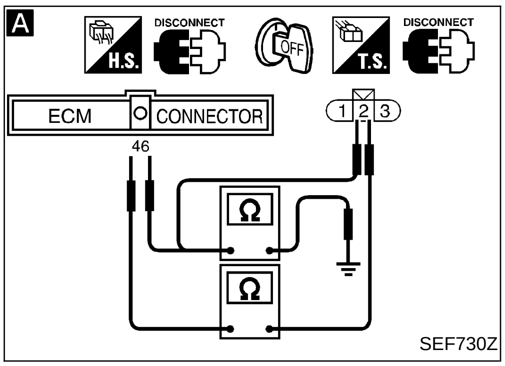


WEC927

Heated Oxygen Sensor 1 (Front) (High Voltage) (Cont'd)







DIAGNOSTIC PROCEDURE

INSPECTION START

↓

Loosen and retighten heated oxygen sensor 1 (front).
Tightening torque:
40 - 50 N·m
(4.1 - 5.1 kg-m, 30 - 37 ft-lb)

↓

A

CHECK INPUT SIGNAL CIRCUIT.
1. Disconnect heated oxygen sensor 1 (front) harness connector and ECM harness connector.
2. Check harness continuity between ECM terminal 46 and terminal 2.
   Continuity should exist.
3. Check harness continuity between ECM terminal 46 (or terminal 2) and ground.
   Continuity should not exist.

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

NG → Repair harness or connectors.

↓ OK

CHECK COMPONENT
[Heated oxygen sensor 1 (front)].
1. Turn ignition switch "OFF".
2. Disconnect sensor harness connector for water.
   Water should not exist.
   If OK, go to step 3.
3. Check heated oxygen sensor 1 (front).

Refer to "COMPONENT INSPECTION" on next page.

NG → Replace heated oxygen sensor 1 (front).

↓ OK

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-112.

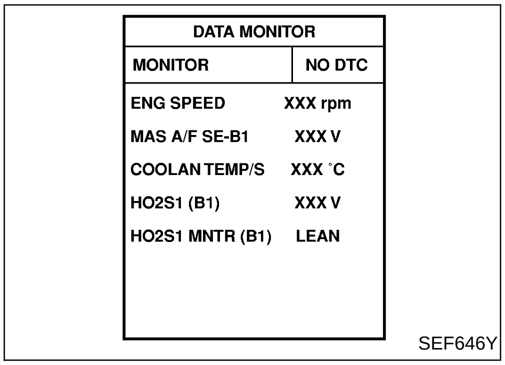
↓

INSPECTION END

Heated Oxygen Sensor 1 (Front) (High Voltage) (Cont'd)

COMPONENT INSPECTION

Heated oxygen sensor 1 (front)



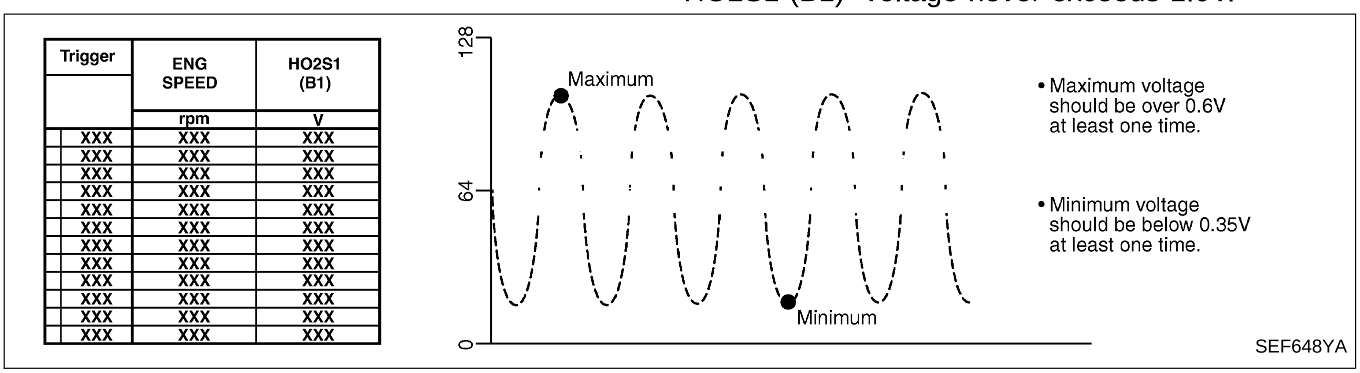
SEF646Y

1) Start engine and warm it up to normal operating temperature.
2) Select "MANU TRIG" and "HI SPEED" in "DATA MONITOR" mode with CONSULT-II, and select "HO2S1 (B1)" and "HO2S1 MNTR (B1)".
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)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds.
  5 times (cycles) are counted as shown below:

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

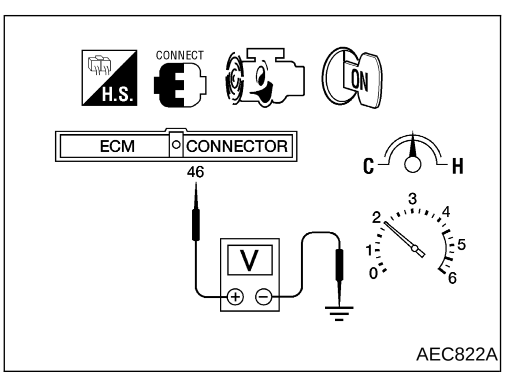
  R = "HO2S1 MNTR (B1)", "RICH"
  L = "HO2S1 MNTR (B1)", "LEAN"
- "HO2S1 (B1)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)" voltage goes below 0.35V at least once.
- "HO2S1 (B1)" voltage never exceeds 1.0V.



SEF648YA

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.**

OR



AEC822A

1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 46 (sensor signal) and engine ground.
3) Check the following with engine speed held at 2,000 rpm constant under no load.

- The voltage fluctuates between 0 to 0.35V and 0.6 to 1.0V more than five times within 10 seconds.
  1 time: 0 - 0.35V → 0.6 - 1.0V → 0 - 0.35V
  2 times: 0 - 0.35V → 0.6 - 1.0V → 0 - 0.35V → 0.6 - 1.0V → 0 - 0.35V

Heated Oxygen Sensor 1 (Front) (High Voltage) (Cont'd)

- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is below 0.35V 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.**

Heated Oxygen Sensor 1 Heater (Front)

SYSTEM DESCRIPTION

The ECM performs ON/OFF control of the heated oxygen sensor 1 heater (front) corresponding to the engine speed.

OPERATION

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

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

Specification data are reference values

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

ECM TERMINALS AND REFERENCE VALUE

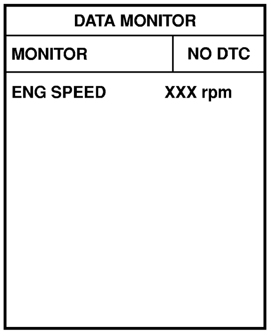
Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/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)
115	OR	Heated oxygen sensor 1 heater (front)	Engine is running. Engine speed is below 3,600 rpm	Approximately 0.4V
			Engine is running. Engine speed is above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P0135	● The current amperage in the heated oxygen sensor 1 heater (front) circuit is out of the normal range. [An improper voltage drop signal is sent to ECM through the heated oxygen sensor 1 heater (front).]	● Harness or connectors [The heated oxygen sensor 1 heater (front) circuit is open or shorted.] ● Heated oxygen sensor 1 heater (front)



SEF058Y

Heated Oxygen Sensor 1 Heater (Front) (Cont'd)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

NOTE:
If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

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

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 "DIAGNOSTIC PROCEDURE", EC-195.

OR

1) Start engine and run it for at least 5 seconds at idle speed.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Start engine and run it for at least 5 seconds at idle speed.
4) Select "MODE 3" with GST.
5) If DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-195.

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

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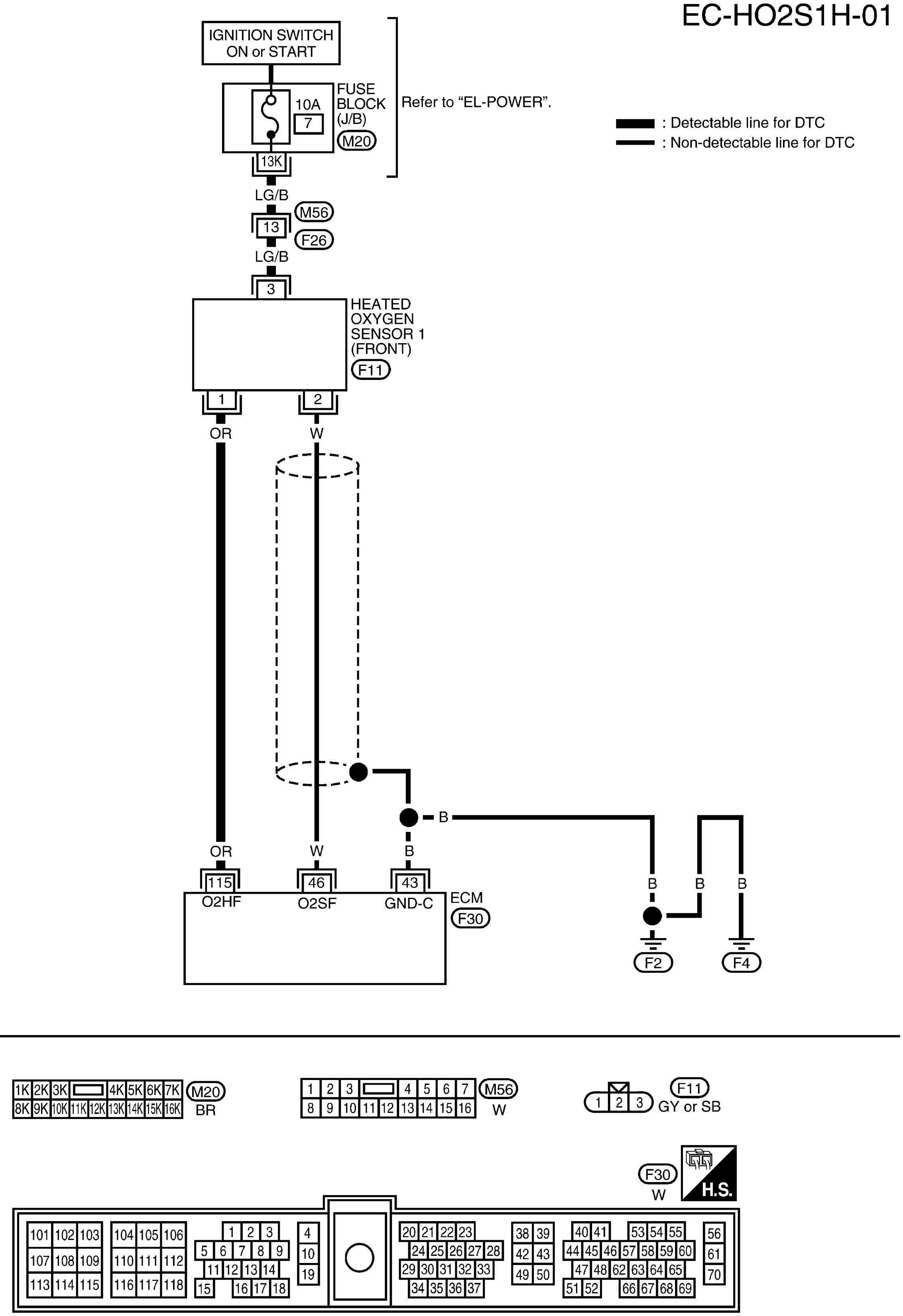
Heated Oxygen Sensor 1 Heater (Front) (Cont'd)

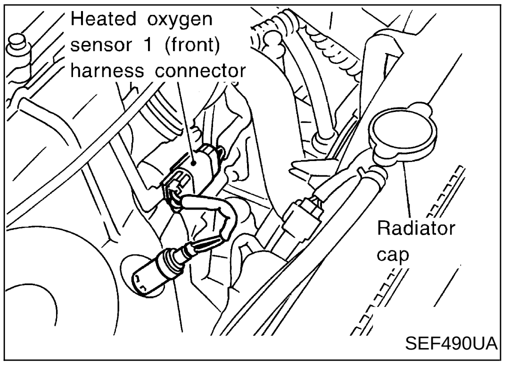
EC-HO2S1H-01



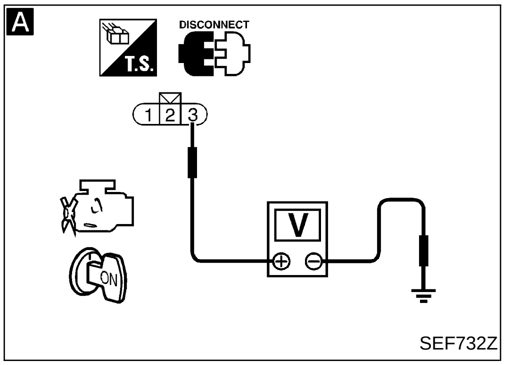
WEC928

Heated Oxygen Sensor 1 Heater (Front) (Cont'd)

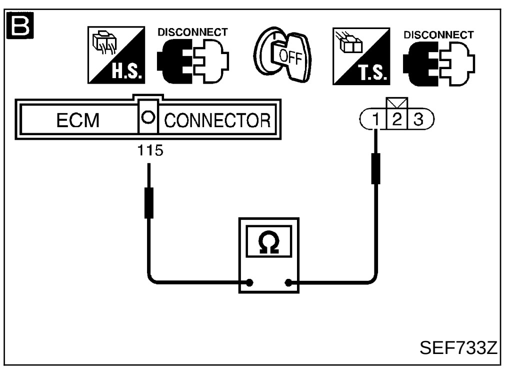
DIAGNOSTIC PROCEDURE



SEF490UA



SEF732Z



SEF733Z

INSPECTION START

↓

A

CHECK POWER SUPPLY.
1. Turn ignition switch "OFF".
2. Disconnect heated oxygen sensor 1 (front) harness connector.
3. Turn ignition switch "ON".
4. Check voltage between terminal ③ and ground with CONSULT-II or tester.
   Voltage: Battery voltage

NG → Repair harness or connectors.

OK ↓

B

CHECK HO2S1 HEATER (B1) OUTPUT CIRCUIT.
1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between terminal ① and ECM terminal (115).
   Continuity should exist.
   If OK, check harness for short to ground and short to power.

NG → Repair harness or connectors.

OK ↓

CHECK COMPONENT
[Heated oxygen sensor 1 heater (front)].
Refer to "COMPONENT INSPECTION" below.

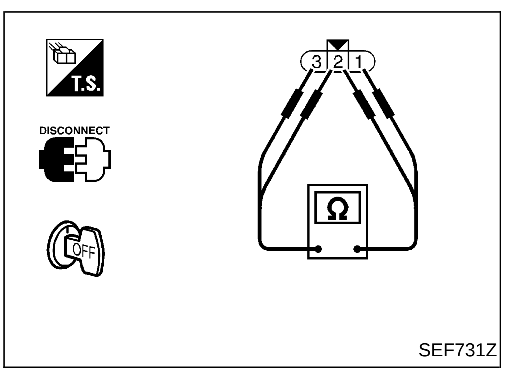
NG → Replace heated oxygen sensor 1 (front).

OK ↓

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-112.

↓

INSPECTION END



SEF731Z

COMPONENT INSPECTION

Heated oxygen sensor 1 heater (front)

Check resistance between terminals ③ and ①.

Resistance: 2.3 - 4.3Ω at 25°C (77°F)

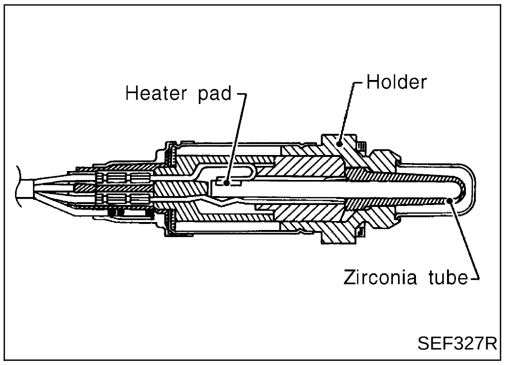
Check continuity between terminals ② and ①, ③ and ②.

Continuity should not exist.

If NG, replace the heated oxygen sensor 1 (front).

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.**



Heated Oxygen Sensor 2 (Rear) (Min. Voltage Monitoring)

COMPONENT DESCRIPTION

The heated oxygen sensor 2 (rear), after three way catalyst, monitors the oxygen level in the exhaust gas.
Even if switching characteristics of the heated oxygen sensor 1 (front) are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2 (rear).
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 (rear) is not used for engine control operation.

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

Specification data are reference values

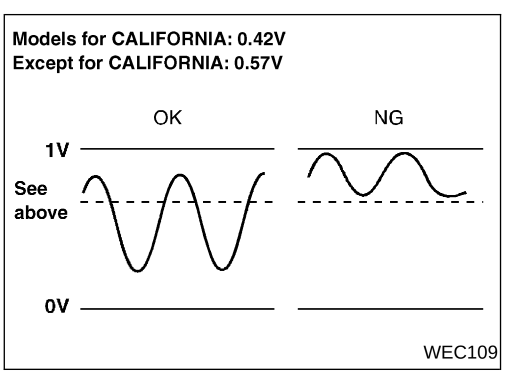
MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1)	● Engine: After warming up	Revving engine from idle to 3,000 rpm quickly	0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)			LEAN ↔ RICH

ECM TERMINALS AND REFERENCE VALUE

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

CAUTION:
Do not use ECM ground terminals when measuring input/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)
52	W	Heated oxygen sensor 2 (rear)	[Engine is running.] After warming up to normal operating temperature and revving engine from idle to 3,000 rpm quickly	0 - Approximately 1.0V

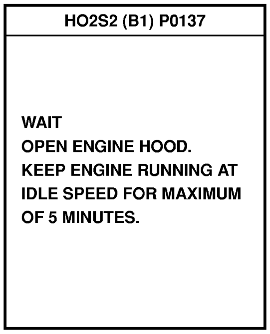


ON BOARD DIAGNOSIS LOGIC

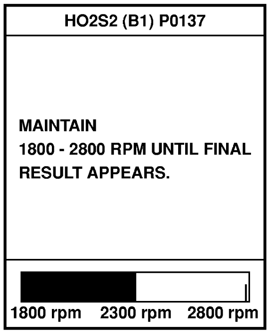
The heated oxygen sensor 2 (rear) has a much longer switching time between rich and lean than the heated oxygen sensor 1 (front). The oxygen storage capacity before the three way catalyst causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2 (rear), ECM monitors whether the minimum voltage of the sensor is sufficiently low during the various driving condition such as fuel-cut.

Heated Oxygen Sensor 2 (Rear) (Min. Voltage Monitoring) (Cont'd)

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0137	• 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 (rear) • Fuel pressure • Injectors



SEF545Z



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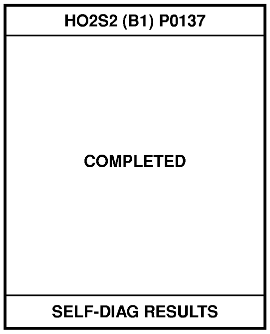


SEF547Z

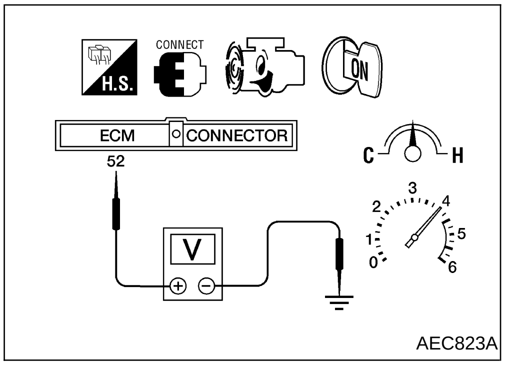
DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

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

TESTING CONDITION:
Open engine hood before conducting following procedure.

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Turn ignition switch "ON".
4) Select "DATA MONITOR" mode with CONSULT-II.
5) Make sure that "COOLANT TEMP/S" is more than 70°C (158°F).
6) Select "HO2S2 (B1) P0137" of "HO2S2 (B1)" 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 "DIAGNOSTIC PROCEDURE", EC-200. If "CANNOT BE DIAGNOSED" is displayed, perform the following.
   A) Stop engine and cool down "COOLAN TEMP/SE" to less than 70°C (158°F).
   B) Turn ignition switch "ON".
   C) Select "DATA MONITOR" mode with CONSULT-II.
   D) Start engine.
   E) Perform from step 6) again when the "COOLAN TEMP/S" reaches to 70°C (158°F).

Heated Oxygen Sensor 2 (Rear) (Min. Voltage Monitoring) (Cont’d)



AEC823A

OR

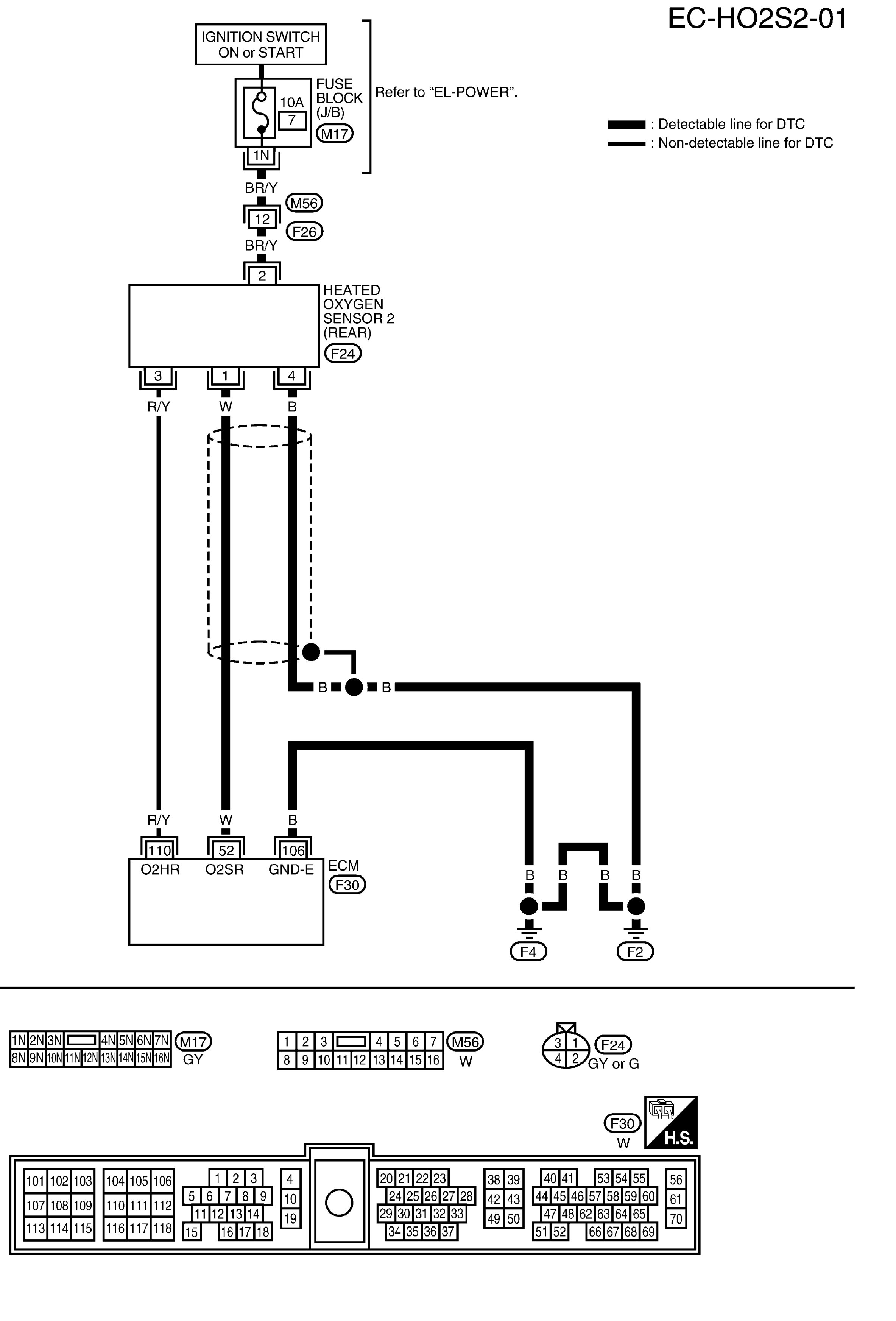
OVERALL FUNCTION CHECK

Use this procedure to check the overall function of the heated oxygen sensor 2 (rear) circuit. During this check, a 1st trip DTC might not be confirmed.

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 52 (sensor 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 0.54V at least once during this procedure.
   If the voltage can be confirmed in step 3, step 4 is not necessary.
5) Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80km/h (50 MPH) in 3rd gear position (M/T), D position with “OD” OFF (A/T).

   The voltage should be below 0.54V at least once during this procedure.
6) If NG, go to “DIAGNOSTIC PROCEDURE”, EC-200.

Heated Oxygen Sensor 2 (Rear) (Min. Voltage Monitoring) (Cont'd)



WEC929

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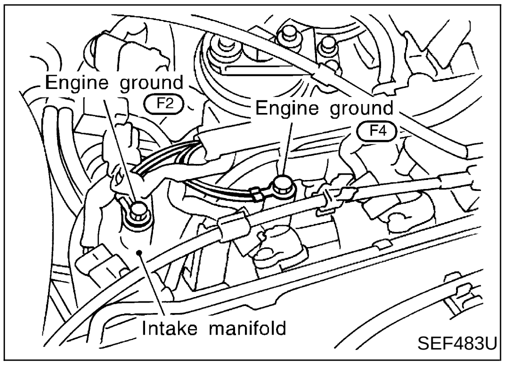
Heated Oxygen Sensor 2 (Rear) (Min. Voltage Monitoring) (Cont'd)

DIAGNOSTIC PROCEDURE



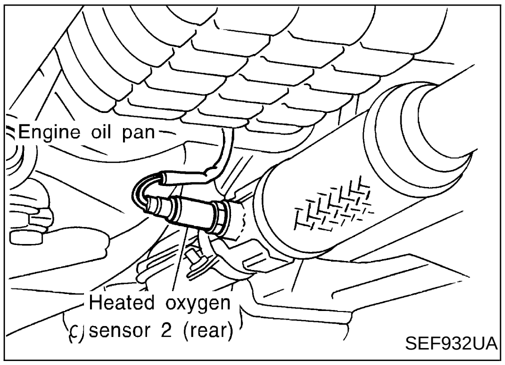
SEF483U

INSPECTION START

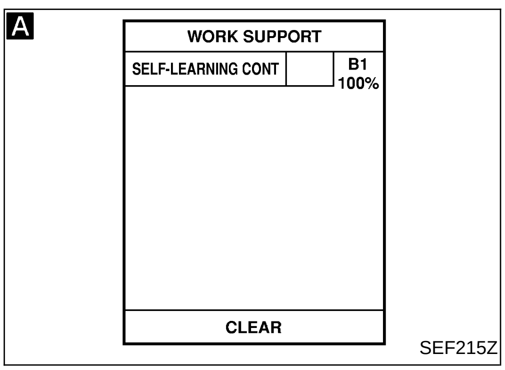
↓

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

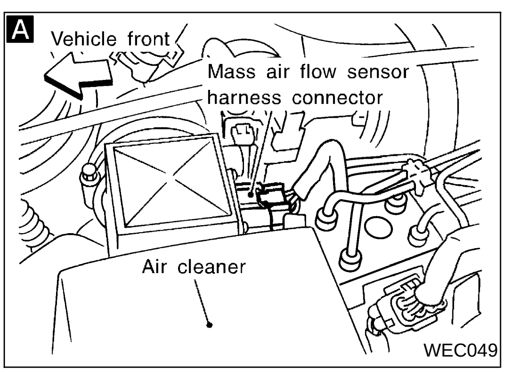
↓



SEF932UA



SEF215Z



WEC049

A

CLEAR THE SELF-LEARNING DATA

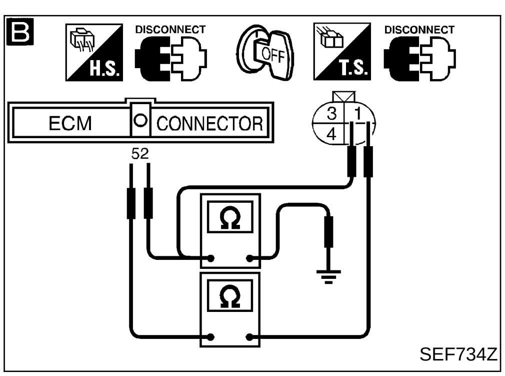
1. Start engine and warm it up to normal operating temperature.
2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching "CLEAR".
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 detected? Is it difficult to start engine?

OR

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 P0100 is displayed.
6. Erase 1st trip DTC memory. Make sure DTC P0000 is displayed.
7. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 detected? Is it difficult to start engine?

Yes → Go to "TROUBLE DIAGNOSIS FOR DTC P0172", EC-235.

No ↓



SEF734Z

B

CHECK INPUT SIGNAL CIRCUIT.

1. Disconnect heated oxygen sensor 2 (rear) harness connector and ECM harness connector.
2. Check harness continuity between ECM terminal 52 and terminal 1.
   Continuity should exist.
3. Check harness continuity between ECM terminal 52 (or terminal 1) and ground.
   Continuity should not exist.
   If OK, check harness for short to ground and short to power.

NG → Repair harness or connectors.

OK ↓

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(Go to next page.)

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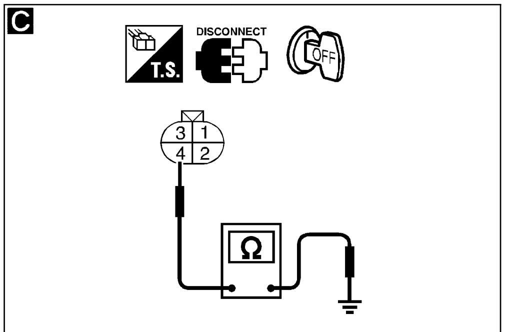


SEF735Z

(A)

C

CHECK GROUND CIRCUIT. Check harness continuity between terminal (4) and engine ground. **Continuity should exist.** If OK, check harness for short to power.	NG →	Repair harness or connectors.
↓ OK		
CHECK COMPONENT [Heated oxygen sensor 2 (rear)]. Refer to "COMPONENT INSPECTION" on next page.	NG →	Replace heated oxygen sensor 2 (rear).
↓ OK		
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-112.		
↓		
INSPECTION END		

Heated Oxygen Sensor 2 (Rear) (Min. Voltage Monitoring) (Cont'd)

COMPONENT INSPECTION

Heated oxygen sensor 2 (rear)

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

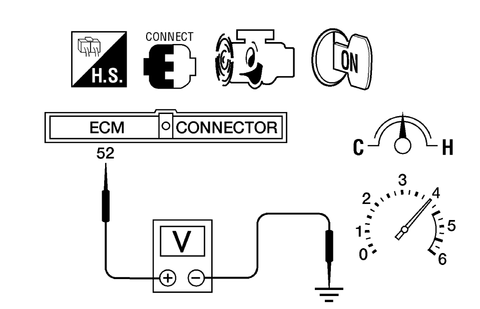
SEF662Y

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

CAUTION:

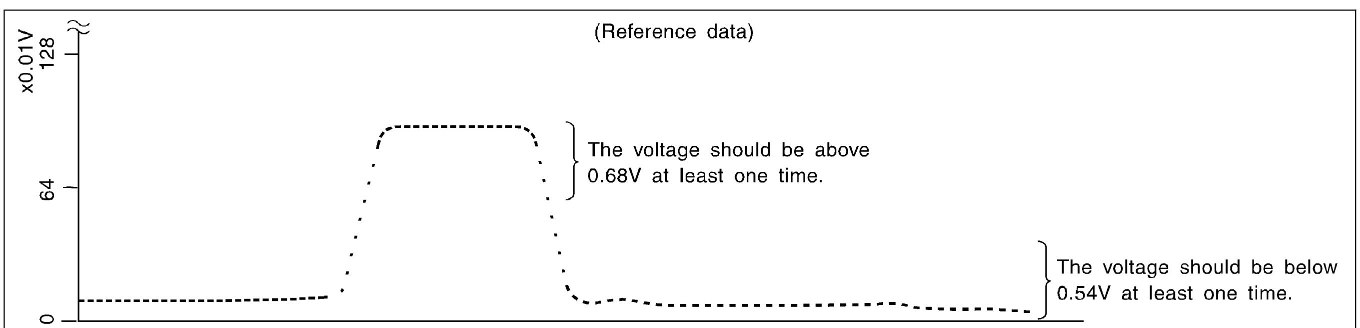
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12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

OR



AEC823A

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 52 (sensor 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 0.56V at least once.
   If the voltage is above 0.56V at step 4, step 5 is not necessary.
5) Check the voltage when racing 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 0.54V at least once.

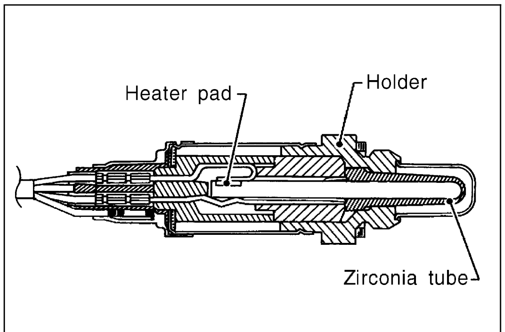


SEF244Y

Heated Oxygen Sensor 2 (Rear) (Min. Voltage Monitoring) (Cont'd)

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.**



SEF327R

Heated Oxygen Sensor 2 (Rear) (Max. Voltage Monitoring)

COMPONENT DESCRIPTION

The heated oxygen sensor 2 (rear), after three way catalyst, monitors the oxygen level in the exhaust gas.
Even if switching characteristics of the heated oxygen sensor 1 (front) are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2 (rear).
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 (rear) is not used for engine control operation.

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

Specification data are reference values

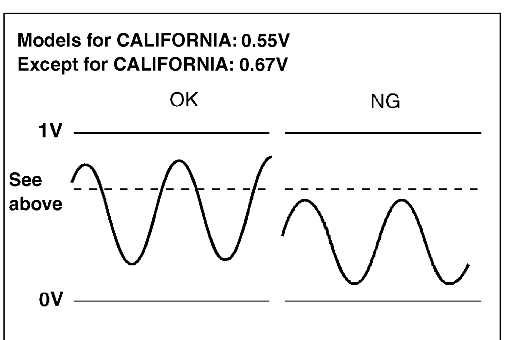
MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1) .... HO2S2 MNTR (B1)	● Engine: After warming up	Revving engine from idle to 3,000 rpm quickly	0 - 0.3V ↔ Approx. 0.6 - 1.0V
			LEAN ↔ RICH

ECM TERMINALS AND REFERENCE VALUE

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

CAUTION:
Do not use ECM ground terminals when measuring input/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)
52	W	Heated oxygen sensor 2 (rear)	Engine is running. After warming up to normal operating temperature and revving engine from idle to 3,000 rpm quickly	0 - Approximately 1.0V



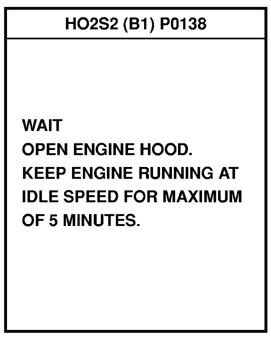
WEC110

ON BOARD DIAGNOSIS LOGIC

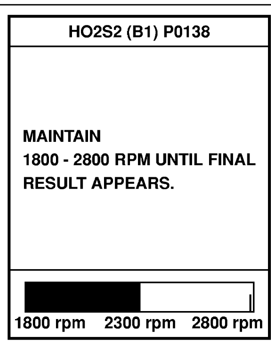
The heated oxygen sensor 2 (rear) has a much longer switching time between rich and lean than the heated oxygen sensor 1 (front). The oxygen storage capacity before the three way catalyst causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2 (rear), ECM monitors whether the maximum voltage of the sensor is sufficiently high during the various driving condition such as fuel-cut.

Heated Oxygen Sensor 2 (Rear) (Max. Voltage Monitoring) (Cont'd)

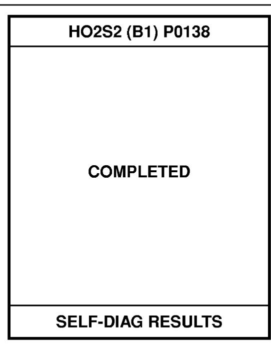
Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0138	● The maximum voltage from the sensor is not reached to the specified voltage.	● Harness or connectors (The sensor circuit is open or shorted.) ● Heated oxygen sensor 2 (rear) ● Fuel pressure ● Injectors ● Intake air leaks



SEF663Y



SEF664Y



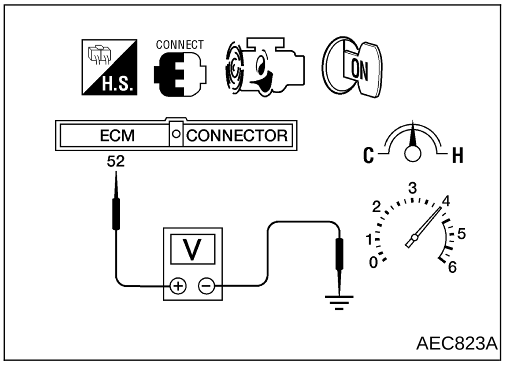
SEF665Y

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

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

TESTING CONDITION:
Open engine hood before conducting following procedure.

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Turn ignition switch "ON".
4) Select "DATA MONITOR" mode with CONSULT-II.
5) Make sure that "COOLANT TEMP/S" is more than 70°C (158°F).
6) Select "HO2S2 (B1) P0138" of "HO2S2 (B1)" 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 "DIAGNOSTIC PROCEDURE", EC-208.
   If "CAN NOT BE DIAGNOSED" is displayed, perform the following.
   A) Stop engine and cool down "COOLAN TEMP/SE" to less than 70°C (158°F).
   B) Turn ignition switch "ON".
   C) Select "DATA MONITOR" mode with CONSULT-II.
   D) Start engine.
   E) Perform from step 6) again when the "COOLAN TEMP/S" reaches to 70°C (158°F).



Heated Oxygen Sensor 2 (Rear) (Max. Voltage Monitoring) (Cont'd)

OR

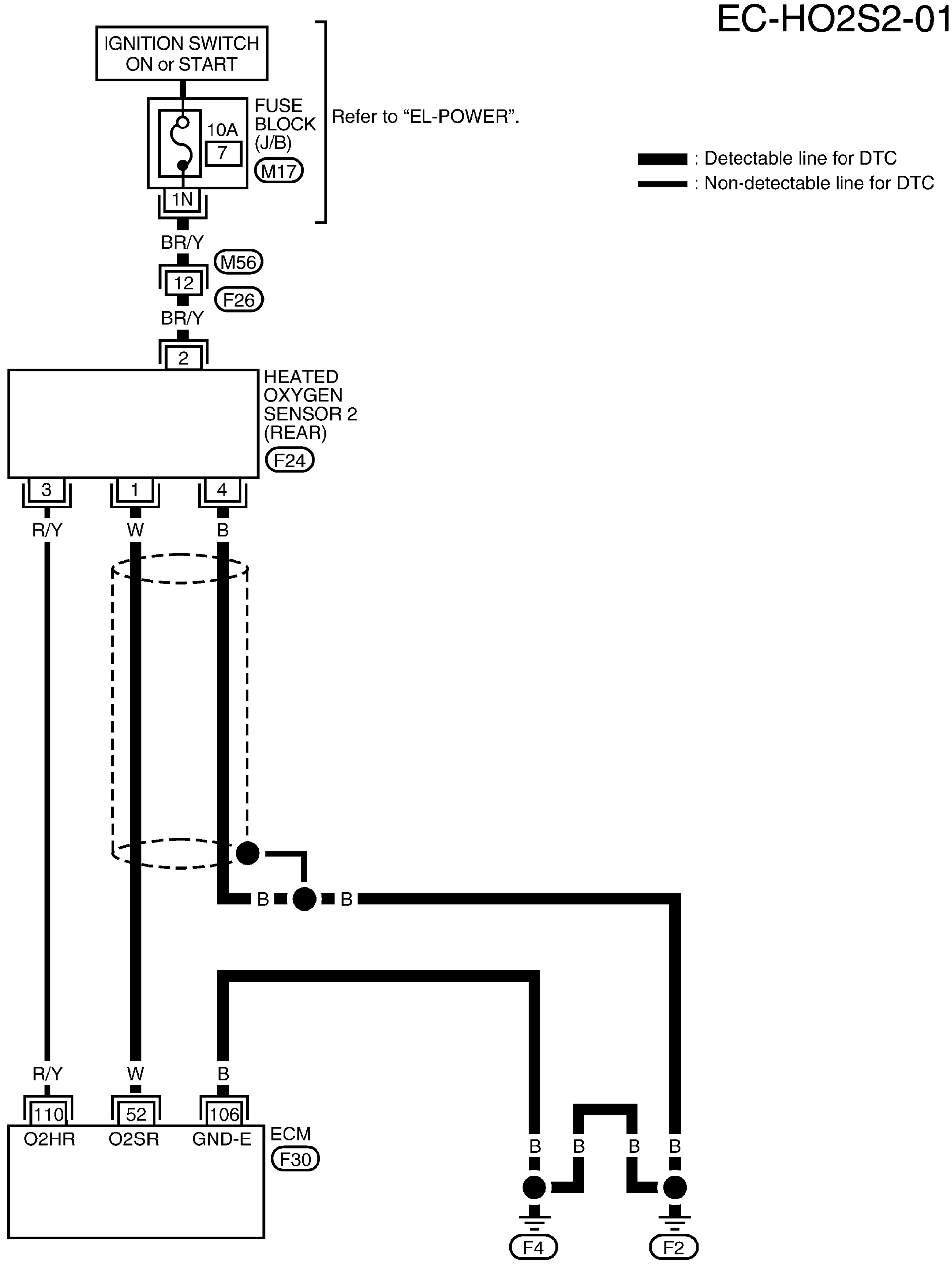
OVERALL FUNCTION CHECK

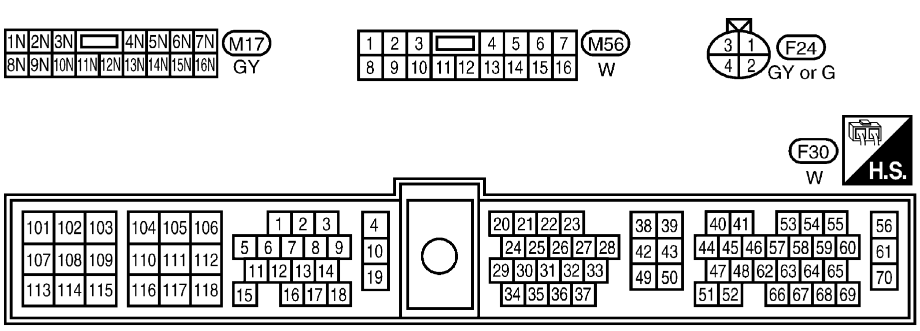
Use this procedure to check the overall function of the heated oxygen sensor 2 (rear) circuit. During this check, a 1st trip DTC might not be confirmed.

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 52 (sensor 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 0.56V 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 0.56V at least once during this procedure.
6) If NG, go to "DIAGNOSTIC PROCEDURE", EC-208.

Heated Oxygen Sensor 2 (Rear) (Max. Voltage Monitoring) (Cont'd)

EC-HO2S2-01

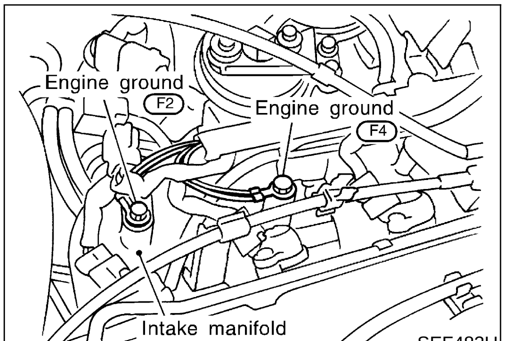




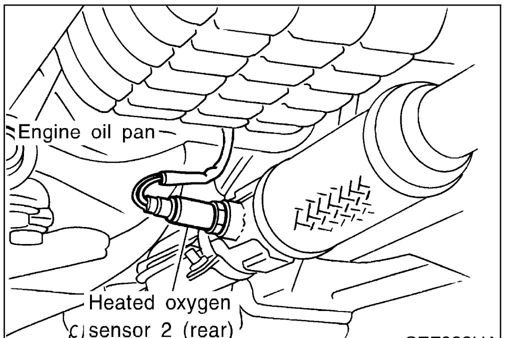
WEC929

Heated Oxygen Sensor 2 (Rear) (Max. Voltage Monitoring) (Cont'd)

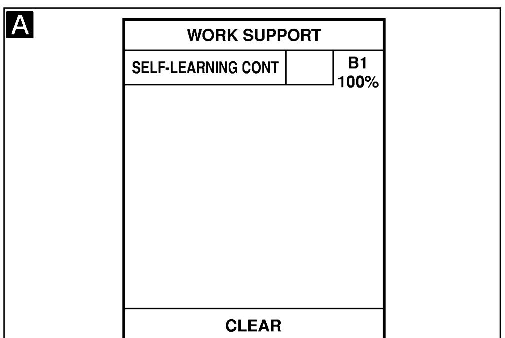
DIAGNOSTIC PROCEDURE



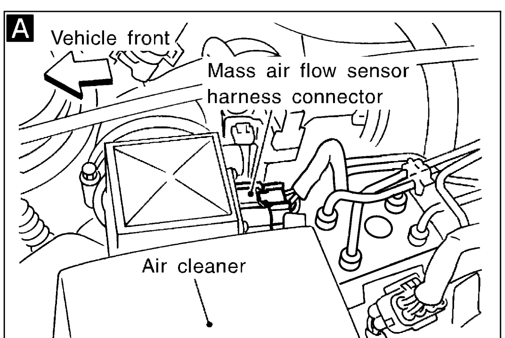
SEF483U



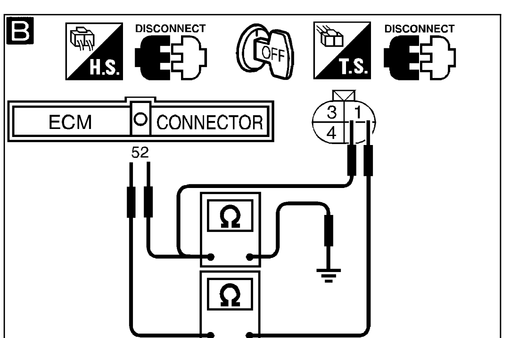
SEF932UA



SEF215Z



WEC049



SEF734Z

INSPECTION START

↓

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

↓

A

CLEAR THE SELF-LEARNING DATA

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?

OR

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 P0100 is displayed.
6. Erase 1st trip DTC memory. Make sure DTC P0000 is displayed.
7. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171 detected? Is it difficult to start engine?

Yes → Go to "TROUBLE DIAGNOSIS FOR DTC P0171", EC-230.

↓ No

B

CHECK INPUT SIGNAL CIRCUIT.

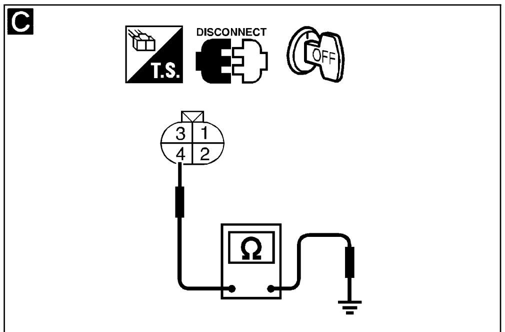
1. Disconnect heated oxygen sensor 2 (rear) harness connector and ECM harness connector.
2. Check harness continuity between ECM terminal 52 and terminal 1.
   Continuity should exist.
3. Check harness continuity between ECM terminal 52 (or terminal 1) and ground.
   Continuity should not exist.
   If OK, check harness for short to ground and short to power.

NG → Repair harness or connectors.

↓ OK

A
(Go to next page.)

Heated Oxygen Sensor 2 (Rear) (Max. Voltage Monitoring) (Cont'd)



SEF735Z

A

C

CHECK GROUND CIRCUIT.
Check harness continuity between terminal ④ and engine ground.
Continuity should exist.
If OK, check harness for short to power.

NG → Repair harness or connectors.

OK ↓

CHECK COMPONENT
[Heated oxygen sensor 2 (rear)].
Refer to "COMPONENT INSPECTION" on next page.

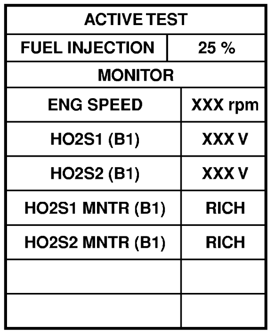
NG → Replace heated oxygen sensor 2 (rear).

OK ↓

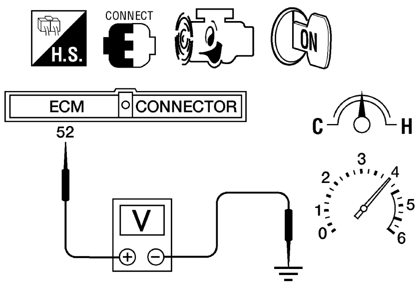
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-112.

↓

INSPECTION END



SEF662Y



AEC823A

Heated Oxygen Sensor 2 (Rear) (Max. Voltage Monitoring) (Cont'd)

COMPONENT INSPECTION

Heated oxygen sensor 2 (rear)

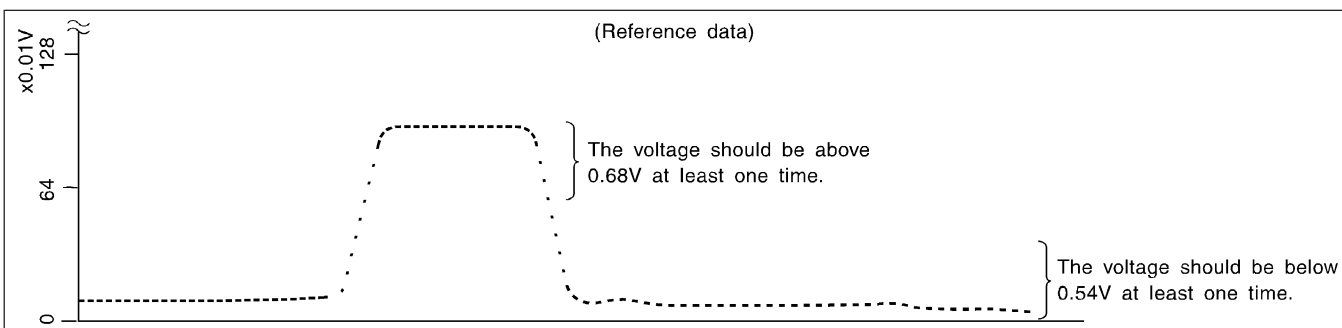
1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)" as the monitor item with CONSULT-II.
4) Check "HO2S2 (B1)" at idle speed when adjusting "FUEL INJECTION" to ±25%.
   "HO2S2 (B1)" should be above 0.56V at least once when the "FUEL INJECTION" is +25%.
   "HO2S2 (B1)" should be below 0.54V at least once when the "FUEL INJECTION" is −25%.

CAUTION:

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

OR

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 52 (sensor 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 0.56V at least once.
   If the voltage is above 0.56V at step 4, step 5 is not necessary.
5) Check the voltage when racing 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 0.54V at least once.

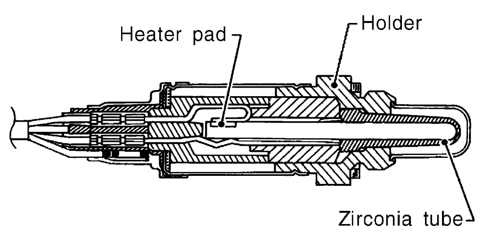


SEF244Y

Heated Oxygen Sensor 2 (Rear) (Max. Voltage Monitoring) (Cont'd)

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.**



SEF327R

Heated Oxygen Sensor 2 (Rear) (Response Monitoring)

COMPONENT DESCRIPTION

The heated oxygen sensor 2 (rear), after three way catalyst, monitors the oxygen level in the exhaust gas.
Even if switching characteristics of the heated oxygen sensor 1 (front) are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2 (rear).
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 (rear) is not used for engine control operation.

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

Specification data are reference values

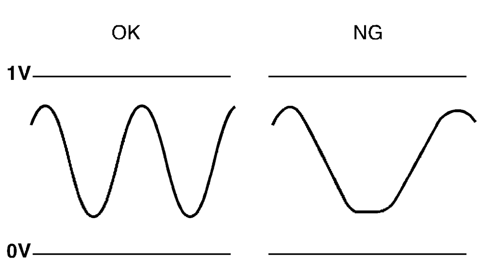
MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1)	● Engine: After warming up	Revving engine from idle to 3,000 rpm quickly	0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)			LEAN ↔ RICH

ECM TERMINALS AND REFERENCE VALUE

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

CAUTION:
Do not use ECM ground terminals when measuring input/output 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	W	Heated oxygen sensor 2 (rear)	Engine is running. — After warming up to normal operating temperature and revving engine from idle to 3,000 rpm quickly	0 - Approximately 1.0V



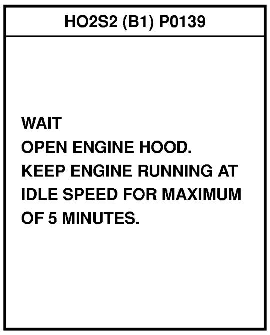
SEF302U

ON BOARD DIAGNOSIS LOGIC

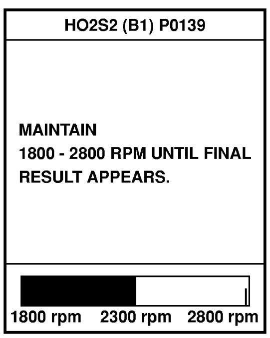
The heated oxygen sensor 2 (rear) has a much longer switching time between rich and lean than the heated oxygen sensor 1 (front). The oxygen storage capacity before the three way catalyst causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2 (rear), ECM monitors whether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

Heated Oxygen Sensor 2 (Rear) (Response Monitoring) (Cont'd)

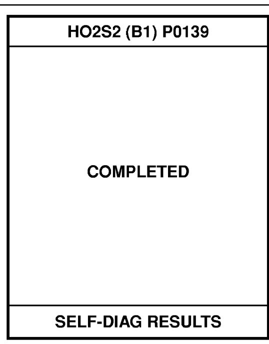
Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0139	● It takes more time for the sensor to respond between rich and lean than the specified time.	● Harness or connectors (The sensor circuit is open or shorted.) ● Heated oxygen sensor 2 (rear) ● Fuel pressure ● Injectors ● Intake air leaks



SEF666Y



SEF667Y



SEF668Y

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

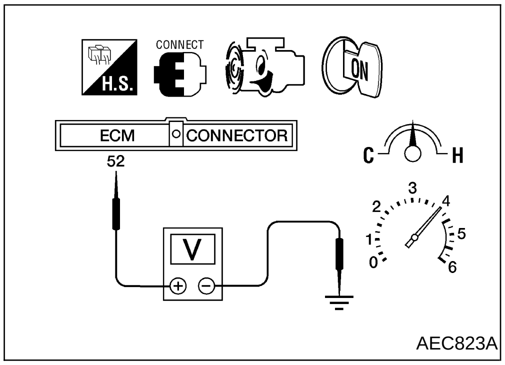
NOTE:

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

TESTING CONDITION:

Open engine hood before conducting following procedure.

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Turn ignition switch "ON".
4) Select "DATA MONITOR" mode with CONSULT-II.
5) Make sure that "COOLANT TEMP/S" is more than 70°C (158°F).
6) Select "HO2S2 (B1) P0139" of "HO2S2 (B1)" 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 "DIAGNOSTIC PROCEDURE", EC-216.
   If "CAN NOT BE DIAGNOSED" is displayed, perform the following.
   A) Stop engine and cool down "COOLAN TEMP/SE" to less than 70°C (158°F).
   B) Turn ignition switch "ON".
   C) Select "DATA MONITOR" mode with CONSULT-II.
   D) Start engine.
   E) Perform from step 6) again when the "COOLAN TEMP/S" reaches to 70°C (158°F).



Heated Oxygen Sensor 2 (Rear) (Response Monitoring) (Cont'd)

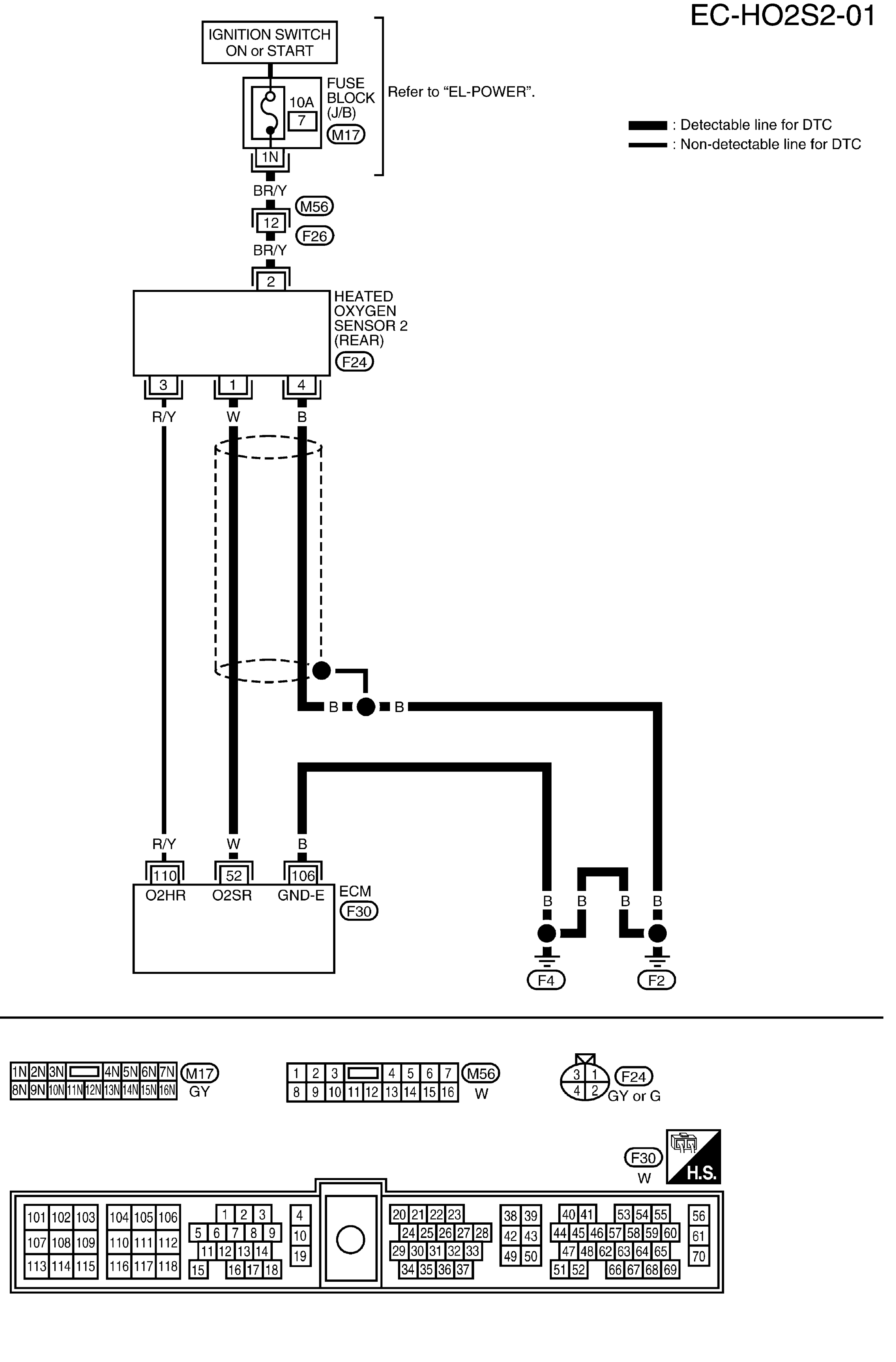
OR

OVERALL FUNCTION CHECK

Use this procedure to check the overall function of the heated oxygen sensor 2 (rear) circuit. During this check, a 1st trip DTC might not be confirmed.

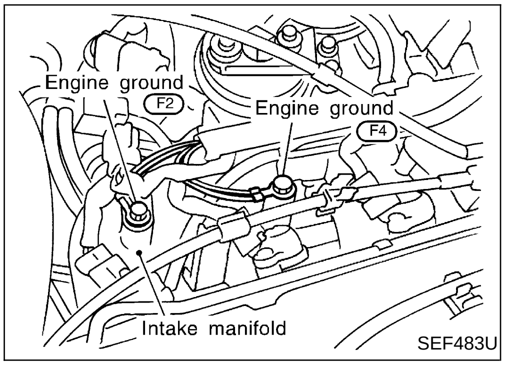
1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Set voltmeter probes between ECM terminals 52(sensor signal) and engine ground.
4) Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (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 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 "DIAGNOSTIC PROCEDURE", EC-216.

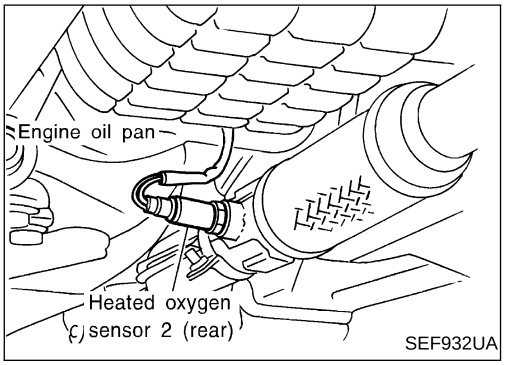
Heated Oxygen Sensor 2 (Rear) (Response Monitoring) (Cont'd)

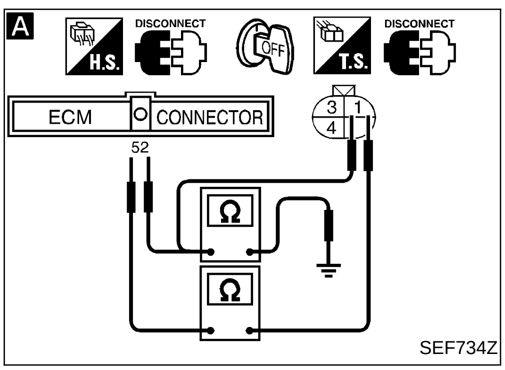


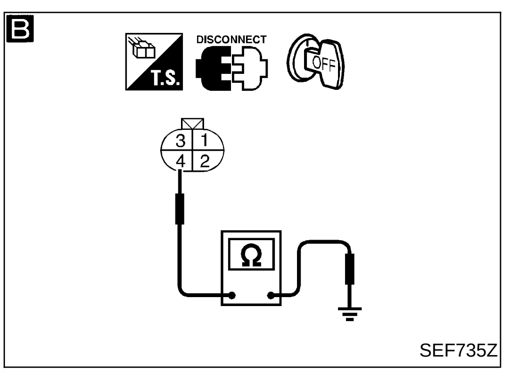
WEC929

Heated Oxygen Sensor 2 (Rear) (Response Monitoring) (Cont'd)









DIAGNOSTIC PROCEDURE

INSPECTION START

↓

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

↓

A

CHECK INPUT SIGNAL CIRCUIT.
1. Disconnect heated oxygen sensor 2 (rear) RH harness connector and ECM harness connector.
2. Check harness continuity between ECM terminal 52 and terminal 1.
   Continuity should exist.
3. Check harness continuity between ECM terminal 52 (or terminal 1) and ground.
   Continuity should not exist.
   If OK, check harness for short to ground and short to power.

NG → Repair harness or connectors.

OK ↓

B

CHECK GROUND CIRCUIT.
Check harness continuity between terminal 4 and engine ground.
Continuity should exist.
If OK, check harness for short to power.

NG → Repair harness or connectors.

OK ↓

CHECK COMPONENT
[Heated oxygen sensor 2 (rear)].
Refer to "COMPONENT INSPECTION" on next page.

NG → Replace heated oxygen sensor 2 (rear).

OK ↓

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-112.

↓

INSPECTION END

Heated Oxygen Sensor 2 (Rear) (Response Monitoring) (Cont'd)

COMPONENT INSPECTION

Heated oxygen sensor 2 (rear)

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

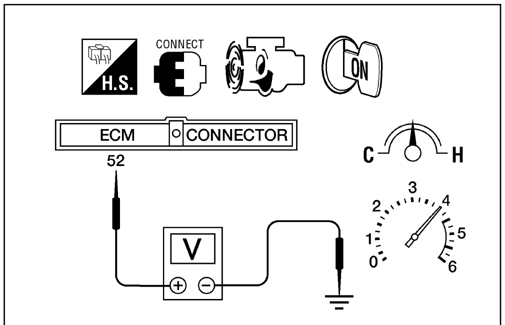
SEF662Y

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

CAUTION:

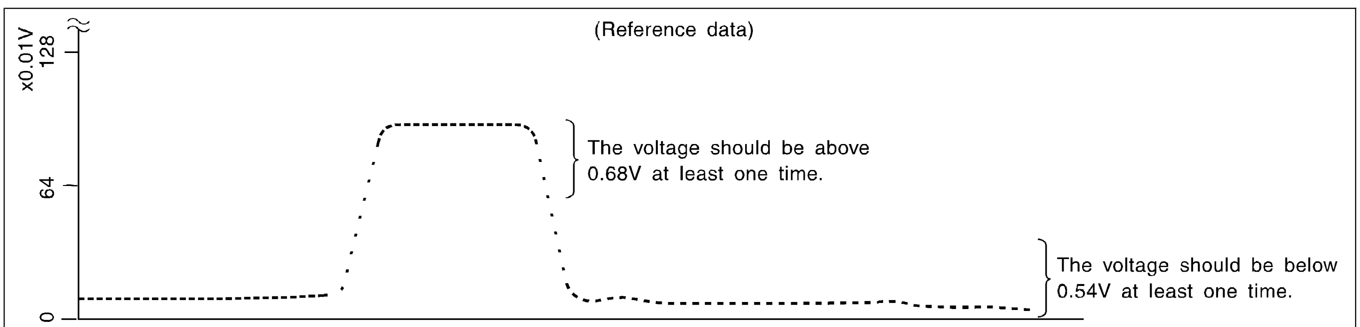
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12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

OR



AEC823A

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 52 (sensor signal) and 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 0.56V at least once.
   If the voltage is above 0.56V at step 4, step 5 is not necessary.
5) Check the voltage when racing 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 0.54V at least once.



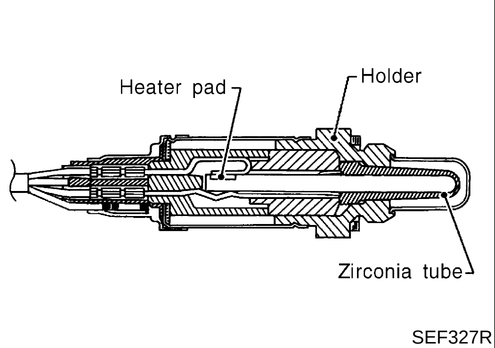
SEF244Y

GI MA EM LC EC FE CL MT AT FA RA BR ST RS BT HA EL IDX

Heated Oxygen Sensor 2 (Rear) (Response Monitoring) (Cont'd)

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.**



SEF327R

Heated Oxygen Sensor 2 (Rear) (High Voltage)

COMPONENT DESCRIPTION

The heated oxygen sensor 2 (rear), after three way catalyst, monitors the oxygen level in the exhaust gas.
Even if switching characteristics of the heated oxygen sensor 1 (front) are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2 (rear).
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 (rear) is not used for engine control operation.

GI MA EM LC EC FE CL MT AT FA RA BR ST RS BT HA EL IDX

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

Specification data are reference values

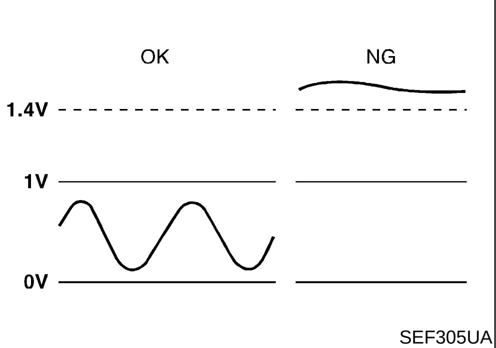
MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1)	● Engine: After warming up	Revving engine from idle to 3,000 rpm quickly	0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)			LEAN ↔ RICH

ECM TERMINALS AND REFERENCE VALUE

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

CAUTION:
Do not use ECM ground terminals when measuring input/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)
52	W	Heated oxygen sensor 2 (rear)	Engine is running. After warming up to normal operating temperature and revving engine from idle to 3,000 rpm quickly	0 - Approximately 1.0V



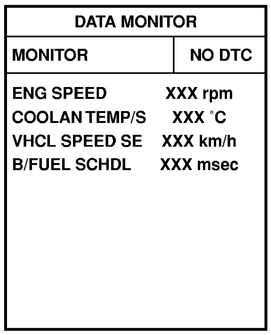
SEF305UA

ON BOARD DIAGNOSIS LOGIC

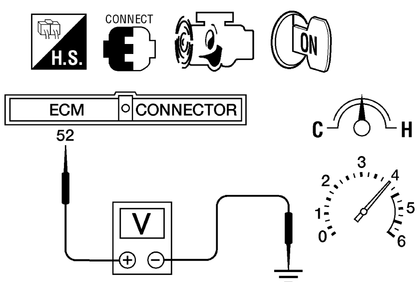
The heated oxygen sensor 2 (rear) has a much longer switching time between rich and lean than the heated oxygen sensor 1 (front). The oxygen storage capacity before the three way catalyst causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2 (rear), ECM monitors whether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

Heated Oxygen Sensor 2 (Rear) (High Voltage) (Cont'd)

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0140	● 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 (rear)



SEF189Y



AEC823A

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

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) Maintain the following conditions for at least 5 consecutive seconds.
   ENG SPEED: 1,000 - 3,000 rpm
   VHCL SPEED SE: 32 - 120 km/h (20 - 75 MPH)
   B/FUEL SCHDL: 3 - 12.5 msec
   COOLAN TEMP/S: More 70°C (158°F)
   Selector lever: Suitable position
4) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-222.

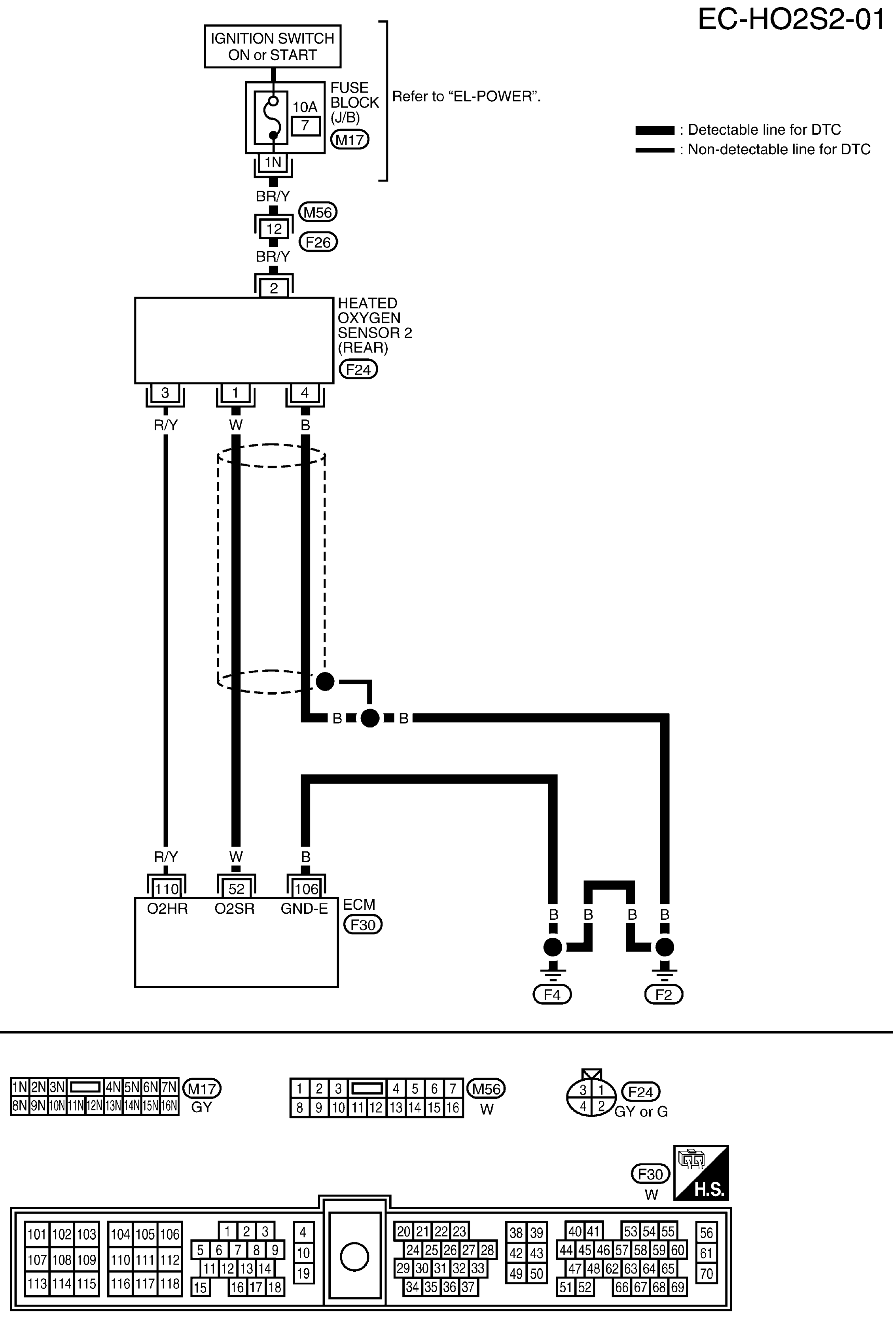
OR

OVERALL FUNCTION CHECK

Use this procedure to check the overall function of the heated oxygen sensor 2 (rear) circuit. During this check, a 1st trip DTC might not be confirmed.

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 52 (sensor signal) and 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 1.4V during this procedure.
5) If NG, go to "DIAGNOSTIC PROCEDURE", EC-222.

Heated Oxygen Sensor 2 (Rear) (High Voltage) (Cont'd)

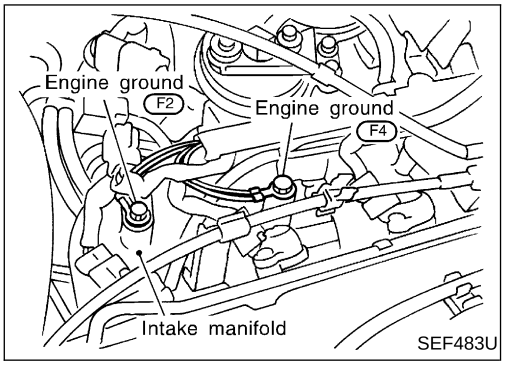


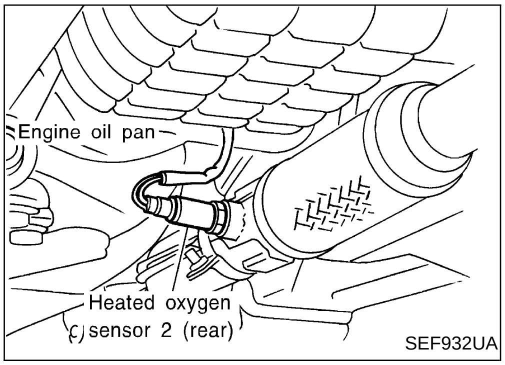
GI MA EM LC EC FE CL MT AT FA RA BR ST RS BT HA EL IDX

WEC929

Heated Oxygen Sensor 2 (Rear) (High Voltage) (Cont’d)

DIAGNOSTIC PROCEDURE





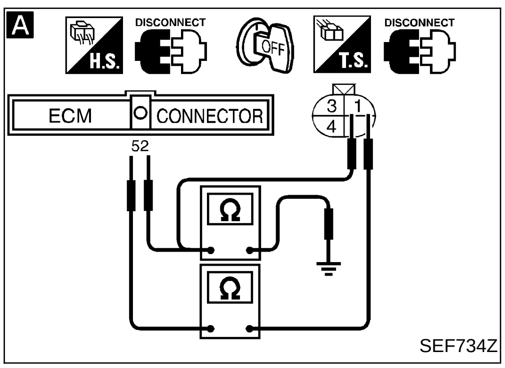
INSPECTION START

↓

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

↓

A

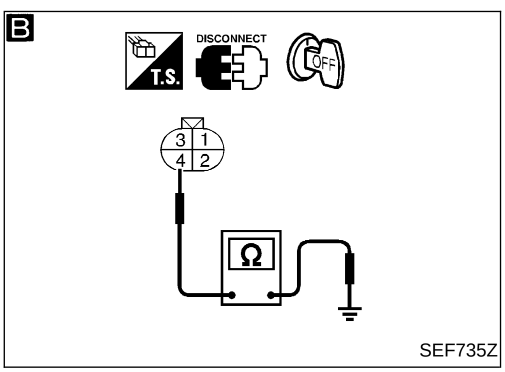


CHECK INPUT SIGNAL CIRCUIT.
1. Disconnect heated oxygen sensor 2 (rear) RH harness connector and ECM harness connector.
2. Check harness continuity between ECM terminal 52 and terminal 1.
   Continuity should exist.
3. Check harness continuity between ECM terminal 52 (or terminal 1) and ground.
   Continuity should not exist.
   If OK, check harness for short to ground and short to power.

NG → Repair harness or connectors.

OK ↓

B



CHECK GROUND CIRCUIT.
Check harness continuity between terminal 4 and engine ground.
Continuity should exist.
If OK, check harness for short to power.

NG → Repair harness or connectors.

OK ↓

CHECK COMPONENT
[Heated oxygen sensor 2 (rear)].
1. Turn ignition switch “OFF”.
2. Disconnect sensor harness connector for water.
   Water should not exist.
   If OK, go to step 3.
3. Check heated oxygen sensor 2 (rear).

Refer to “COMPONENT INSPECTION” on next page.

NG → Replace heated oxygen sensor 2 (rear).

OK ↓

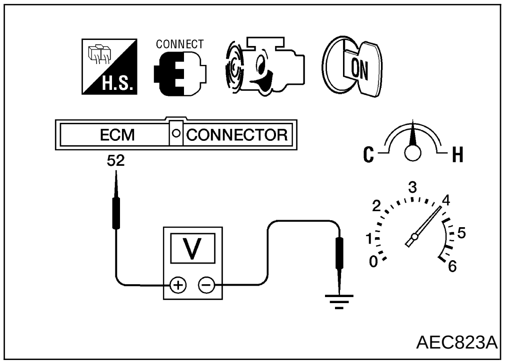
Perform “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-112.

OK ↓

INSPECTION END

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



AEC823A

Heated Oxygen Sensor 2 (Rear) (High Voltage) (Cont'd)

COMPONENT INSPECTION

Heated oxygen sensor 2 (rear)

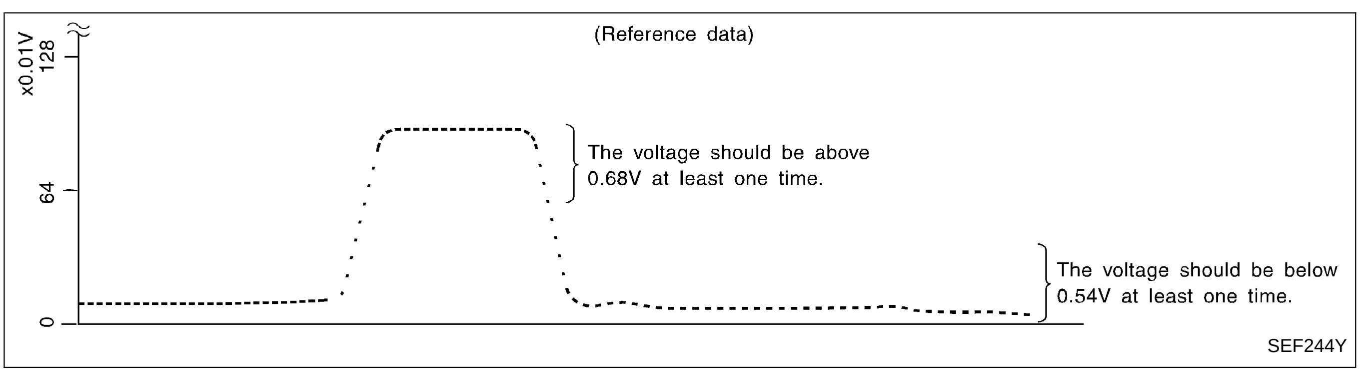
1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)" as the monitor item with CONSULT-II.
4) Check "HO2S2 (B1)" at idle speed when adjusting "FUEL INJECTION" to ±25%.
   "HO2S2 (B1)" should be above 0.56V at least once when the "FUEL INJECTION" is +25%.
   "HO2S2 (B1)" should be below 0.54V at least once when the "FUEL INJECTION" is −25%.

CAUTION:

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

OR

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 (52)(sensor signal) and 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 0.56V at least once.
   If the voltage is above 0.56V at step 4, step 5 is not necessary.
5) Check the voltage when racing 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 0.54V at least once.



SEF244Y

GI MA EM LC EC FE CL MT AT FA RA BR ST RS BT HA EL IDX

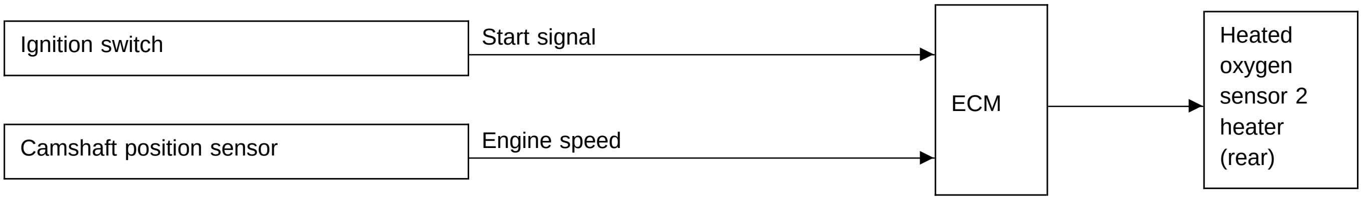
Heated Oxygen Sensor 2 (Rear) (High Voltage) (Cont'd)

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.**

Heated Oxygen Sensor 2 Heater (Rear)

SYSTEM DESCRIPTION



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

OPERATION

Engine speed rpm	Heated oxygen sensor 2 heater (rear)
Above 3,000	OFF
Below 3,000	ON

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

Specification data are reference values

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 HTR (B1)	● Engine speed: Idle [After driving 2 minutes at 70 km/h (43 mph) or more]	ON
	● Engine speed: Above 3,000 rpm ● Ignition switch: ON (Engine stopped)	OFF

ECM TERMINALS AND REFERENCE VALUE

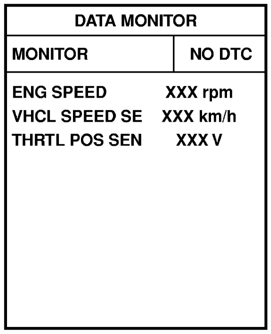
Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/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)
110	R/Y	Heated oxygen sensor 2 heater (rear)	$\boxed{\text{Engine is running.}}$ [After driving 2 minutes at 70 km/h (43 mph) or more] └ Engine speed is below 3,000 rpm	Approximately 0.4V
			$\boxed{\text{Ignition switch “ON”}}$ └ Engine stopped $\boxed{\text{Engine is running.}}$ └ Engine speed is above 3,000 rpm)	BATTERY VOLTAGE (11 - 14V

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P0141	● The current amperage in the heated oxygen sensor 2 heater (rear) circuit is out of the normal range. [An improper voltage drop signal is sent to ECM through the heated oxygen sensor 2 heater (rear).]	● Harness or connectors [The heated oxygen sensor 2 heater (rear) circuit is open or shorted.] ● Heated oxygen sensor 2 heater (rear)



SEF175Y

Heated Oxygen Sensor 2 Heater (Rear) (Cont’d)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

NOTE:

If “DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch “OFF” and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

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

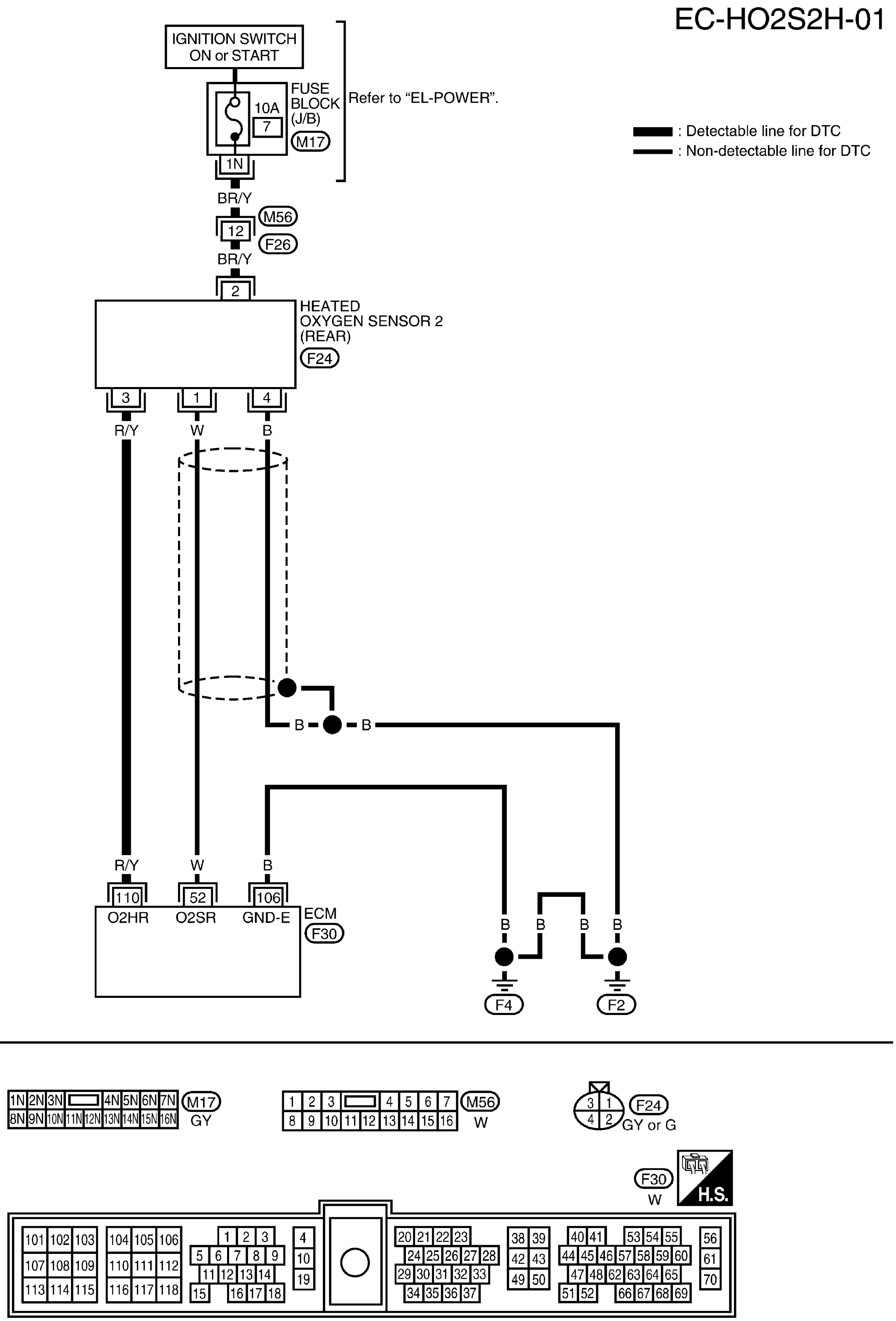
1) Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II.
2) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
3) If 1st trip DTC is detected, go to “DIAGNOSTIC PROCEDURE”, EC-228.

OR

1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Turn ignition switch “OFF” and wait at least 5 seconds.
3) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
4) Select “MODE 3” with GST.
5) If DTC is detected, go to “DIAGNOSTIC PROCEDURE”, EC-228.

- **When using GST, “DIAGNOSTIC TROUBLE CODE 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.**

Heated Oxygen Sensor 2 Heater (Rear) (Cont’d)



WEC930

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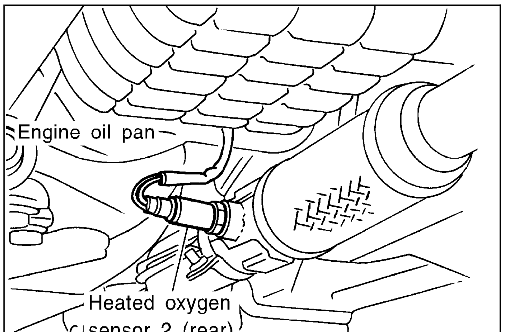
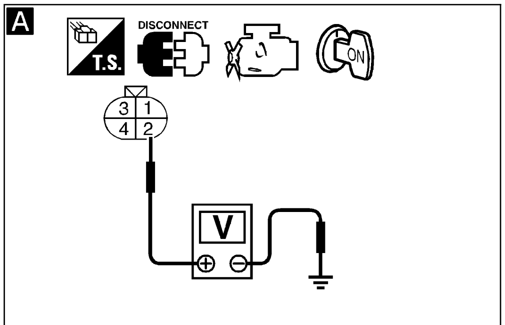
Heated Oxygen Sensor 2 Heater (Rear) (Cont'd)



SEF932UA



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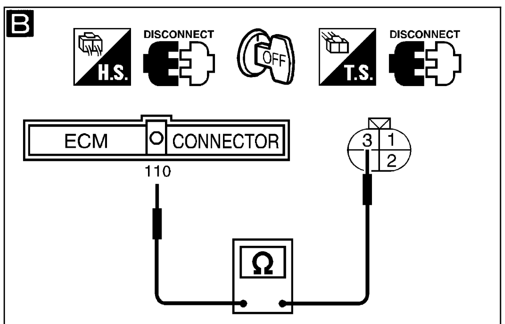


SEF737Z

DIAGNOSTIC PROCEDURE

INSPECTION START

↓

A

CHECK POWER SUPPLY.
1. Turn ignition switch "OFF".
2. Disconnect heated oxygen sensor 2 (rear) harness connector.
3. Turn ignition switch "ON".
4. Check voltage between terminal 2 and ground.
   Voltage: Battery voltage

NG → Repair harness or connectors.

↓ OK

B

CHECK HO2S2 HEATER (B1) OUTPUT CIRCUIT.
1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between terminal 3 and ECM terminal 110.
   Continuity should exist.
   If OK, check harness for short to ground and short to power.

NG → Repair harness or connectors.

↓ OK

CHECK COMPONENT
[Heated oxygen sensor 2 heater (rear)].
Refer to "COMPONENT INSPECTION" below.

NG → Replace heated oxygen sensor 2 (rear).

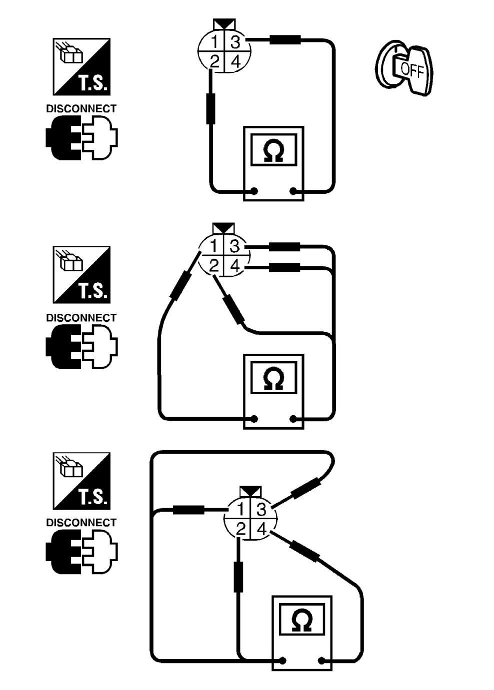
↓ OK

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-112.

↓

INSPECTION END

Heated Oxygen Sensor 2 Heater (Rear) (Cont'd)



SEF738Z

COMPONENT INSPECTION

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 (rear).

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.**

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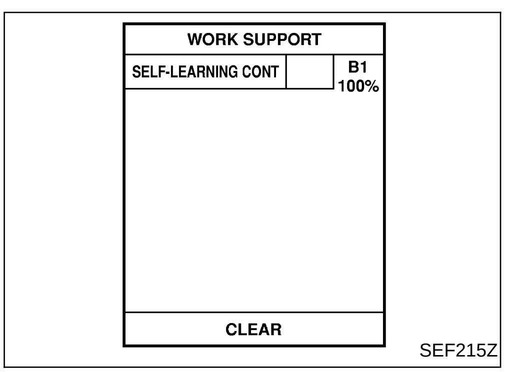
Fuel Injection System Function (Lean side)

ON BOARD DIAGNOSIS LOGIC

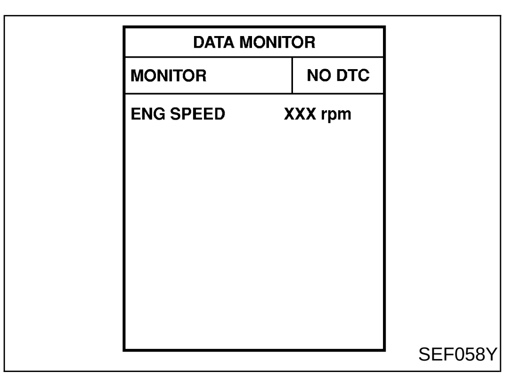
With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the heated oxygen sensor 1 (front). The ECM calculates the necessary compensation to correct the offset between the actual 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).

Heated oxygen sensor 1 (front) → Density of oxygen in exhaust gas (Mixture ratio feedback signal) → ECM → Injectors

Diagnostic Trouble Code 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 ● Heated oxygen sensor 1 (front) ● Injectors ● Exhaust gas leaks ● Incorrect fuel pressure ● Lack of fuel ● Mass air flow sensor



SEF215Z



SEF058Y

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

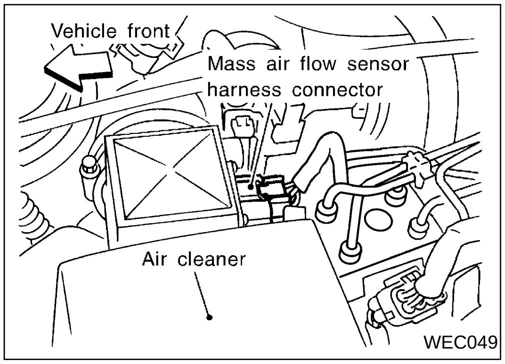
NOTE:
If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Turn ignition switch "ON" and select "SELF-LEARN CONTROL" 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.

Fuel Injection System Function (Lean side) (Cont'd)

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 1st trip DTC is detected and engine starts, go to "DIAGNOSTIC PROCEDURE", EC-233. If engine does not start, visually check for exhaust and intake air leak.

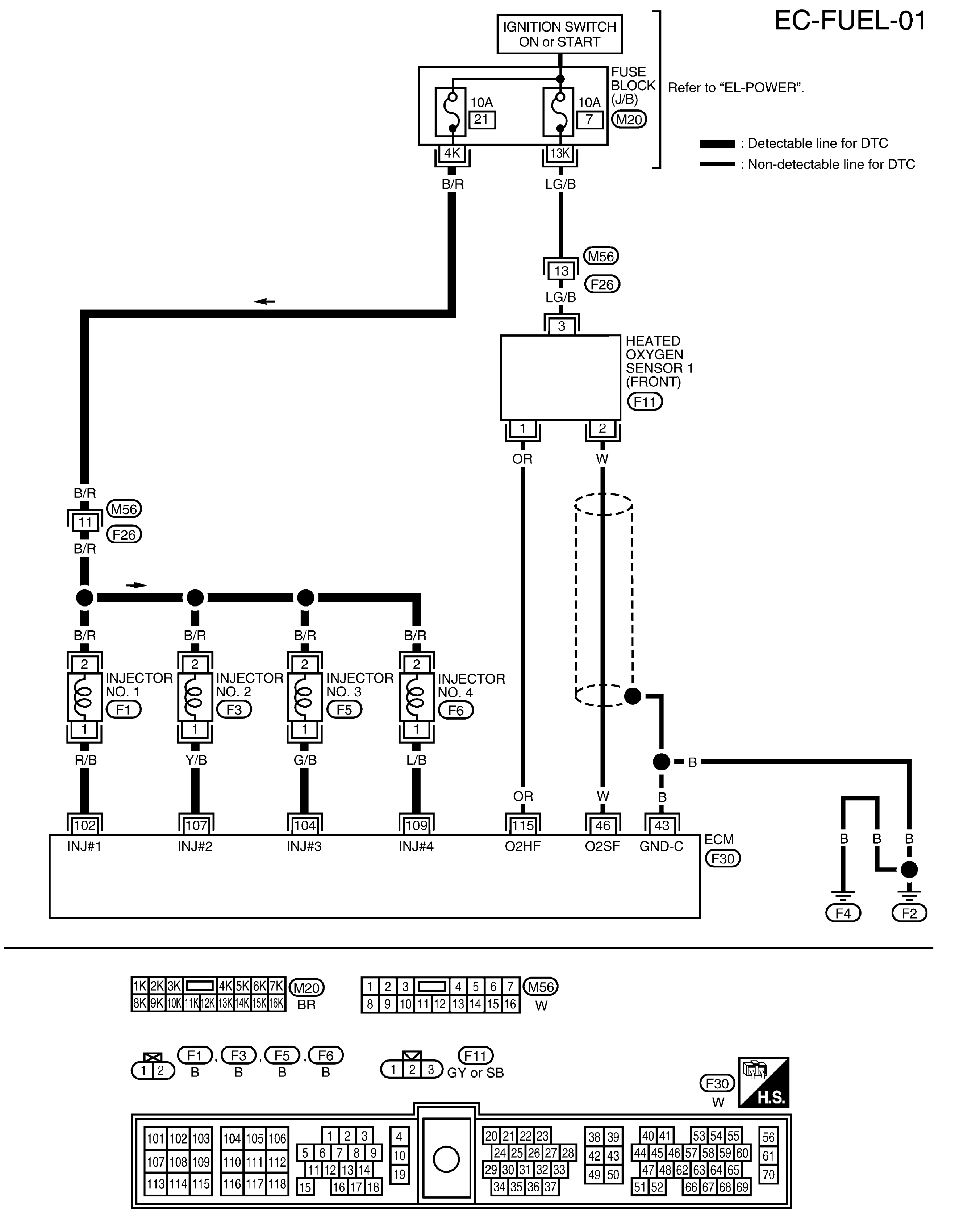
OR



GST

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Disconnect mass air flow sensor harness connector. Then restart and run engine for at least 3 seconds at idle speed.
4) Stop engine and reconnect mass air flow sensor harness connector.
5) Select "MODE 7" with GST. Make sure 1st trip DTC P0100 is detected.
6) Select "MODE 4" with GST and erase the 1st trip DTC P0100.
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.
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 "DIAGNOSTIC PROCEDURE", EC-233. If 1st trip DTC is detected and engine does not start, visually check for exhaust and intake air leak.

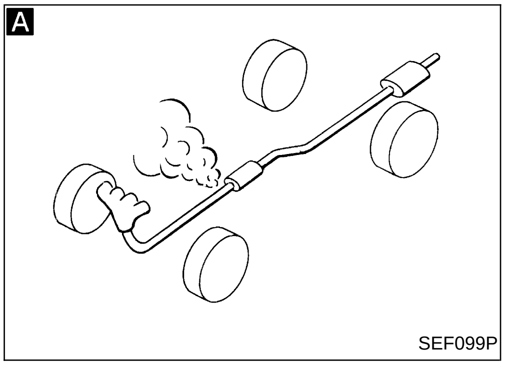
Fuel Injection System Function (Lean side) (Cont'd)



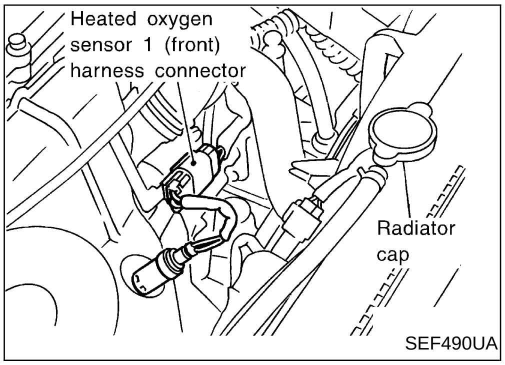
WEC931

Fuel Injection System Function (Lean side) (Cont'd)

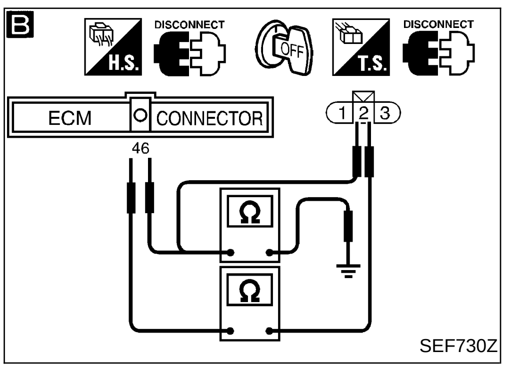
DIAGNOSTIC PROCEDURE



SEF099P



SEF490UA



SEF730Z

INSPECTION START

A

CHECK EXHAUST AIR LEAK.
Start engine and run it at idle. Listen for an exhaust air leak before three way catalyst.

NG → Repair or replace.

OK ↓

CHECK FOR INTAKE AIR LEAK.
Start engine and run it at idle. Listen for an intake air leak between the mass air flow sensor and the intake manifold.

NG → Repair or replace.

OK ↓

B

CHECK HEATED OXYGEN SENSOR 1 (FRONT).
1. Turn ignition switch "OFF".
2. Disconnect heated oxygen sensor 1 (front) harness connector and ECM harness connector.
3. Check harness continuity between ECM terminal 46 and terminal 2.
   Continuity should exist.
4. Check harness continuity between ECM terminal 46 (or terminal 2) and ground.
   Continuity should not exist.
   If OK, check harness for short to ground and short to power.

NG → Repair harness or connectors.

OK ↓

CHECK FUEL PRESSURE.
1. Release fuel pressure to zero.
   Refer to EC-35.
2. Install fuel pressure gauge and check fuel pressure.
   At idling:
   When fuel pressure regulator valve vacuum hose is connected.
   235 kPa
   (2.4 kg/cm^2, 34 psi)
   When fuel pressure regulator valve vacuum hose is disconnected.
   294 kPa
   (3.0 kg/cm^2, 43 psi)

NG → Check the following.
- Fuel pump and circuit
  Refer to EC-457.
- Fuel pressure regulator
  Refer to EC-35.
- Fuel lines
  Refer to "ENGINE MAINTENANCE" in MA section.
- Fuel filter for clogging

If NG, repair or replace.

OK ↓

CHECK MASS AIR FLOW SENSOR.
Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT-II.
Approximately 3.24 g·m/sec: at idling
Approximately 12.2 g·m/sec: at 2,500 rpm

OR

Check "MASS AIR FLOW" in MODE 1 with GST.
Approximately 3.24 g·m/sec: at idling
Approximately 12.2 g·m/sec: at 2,500 rpm

NG → Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds.
Refer to EC-118.

OK ↓

A

(Go to next page.)

Fuel Injection System Function (Lean side) (Cont'd)

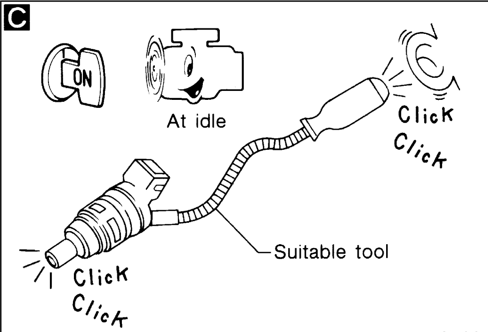
Ⓐ

C

ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS AIR/FL SE	XXX V
IACV-AAC/V	XXX %

SEF806Z

C



MEC703B

C

CHECK FUNCTION OF INJECTORS.
1. Install all parts removed.
2. Start engine.
3. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-II.
4. Make sure that each circuit produces a momentary engine speed drop.

OR

3. Listen to each injector operating sound.
Clicking noise should be heard.

NG → Perform TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS, "Injectors", EC-451. Repair harness or connectors.

OK ↓

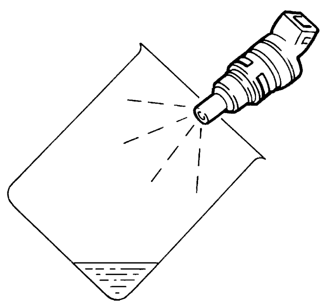
Confirm that the engine is cooled down and there are no fire hazards near the vehicle.

↓

1. Turn ignition switch "OFF".
2. Remove injector gallery.
   Refer to EC-35.
   Keep fuel hose and all injectors connected to injector gallery.
   The injector harness connectors should remain connected.

↓

D



SEF595Q

D

1. Disconnect all ignition coil harness connectors.
2. Place pans or saucers under each cylinder.
3. Crank engine for about 3 seconds.
   Make sure that fuel sprays out from injectors.
   Fuel should be sprayed evenly for each cylinder.

NG → Replace injectors from which fuel does not spray out. Always replace O-ring with new one.

OK ↓

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-112.

↓

INSPECTION END

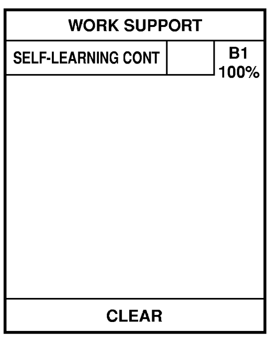
Fuel Injection System Function (Rich side)

ON BOARD DIAGNOSIS LOGIC

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 (front). 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).

Heated oxygen sensor 1 (front) $\xrightarrow[\text{(Mixture ratio feedback signal)}]{\text{Density of oxygen in exhaust gas}}$ ECM $\rightarrow$ Injectors

Diagnostic Trouble Code 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.)	● Heated oxygen sensor 1 (front) ● Injectors ● Exhaust gas leaks ● Incorrect fuel pressure ● Mass air flow sensor



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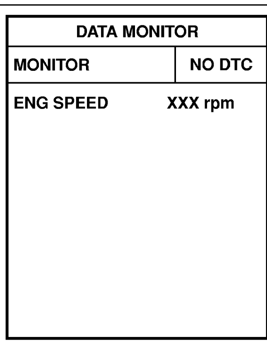


SEF058Y

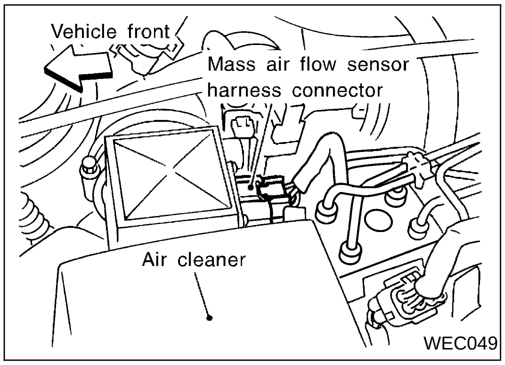
DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

NOTE:
If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Turn ignition switch "ON" and select "SELF-LEARN CONTROL" 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.
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 1st trip DTC is detected and engine starts, go to "DIAGNOSTIC PROCEDURE", EC-238. If engine does not start, remove ignition plugs and check for fouling, etc.

OR

Fuel Injection System Function (Rich side) (Cont'd)



GST

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Disconnect mass air flow sensor harness connector. Then restart and run engine for at least 3 seconds at idle speed.
4) Stop engine and reconnect mass air flow sensor harness connector.
5) Select "MODE 7" with GST. Make sure 1st trip DTC P0100 is detected.
6) Select "MODE 4" with GST and erase the 1st trip DTC P0100.
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.
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 1st trip DTC is detected and engine starts, go to "DIAGNOSTIC PROCEDURE", EC-233. If engine does not start, remove ignition plugs and check for fouling, etc.

Fuel Injection System Function (Rich side) (Cont'd)

GI
MA
EM
LC
EC
FE
CL
MT
AT
FA
RA
BR
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RS
BT
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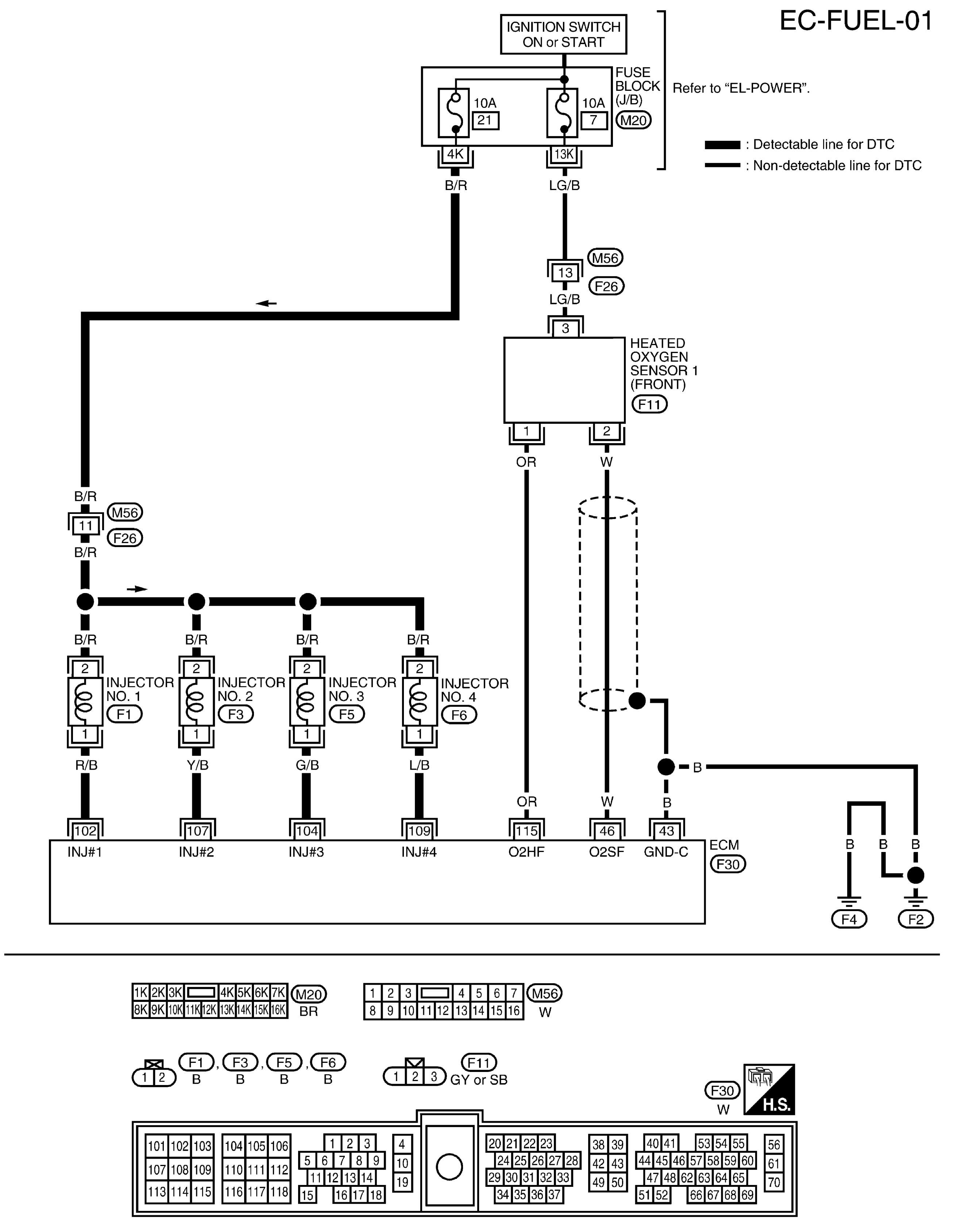
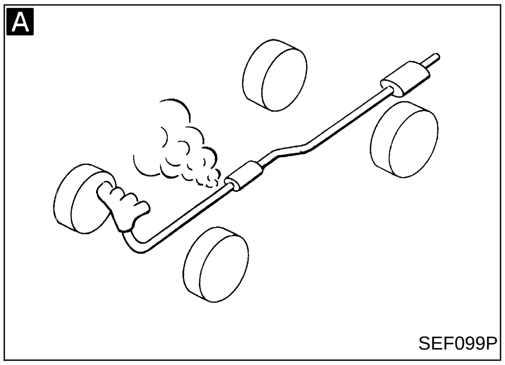
EL
IDX



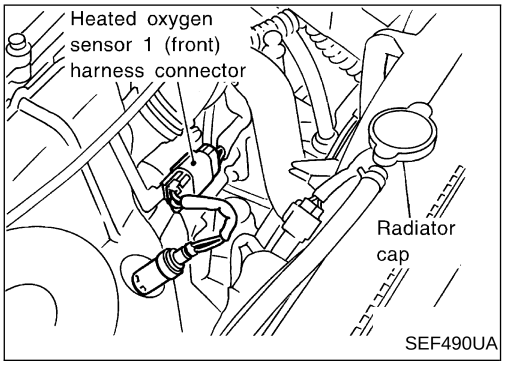
WEC931

Fuel Injection System Function (Rich side) (Cont'd)

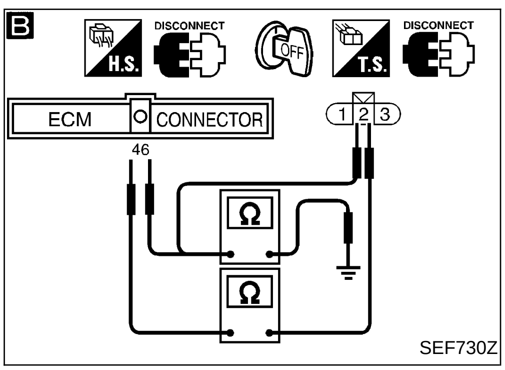
DIAGNOSTIC PROCEDURE



SEF099P



SEF490UA



SEF730Z

INSPECTION START

↓

A

CHECK FOR EXHAUST AIR LEAK.
Start engine and run it at idle. Listen for an exhaust air leak before the three way catalyst.

NG → Repair or replace.

↓ OK

B

CHECK HEATED OXYGEN SENSOR 1 (FRONT).
1. Turn ignition switch "OFF".
2. Disconnect heated oxygen sensor 1 (front) harness connector and ECM harness connector.
3. Check harness continuity between ECM terminal 46 and terminal 2.
   Continuity should exist.
4. Check harness continuity between ECM terminal 46 (or terminal 2) and ground.
   Continuity should not exist.
   If OK, check harness for short to ground and short to power.

NG → Repair harness or connectors.

↓ OK

CHECK FUEL PRESSURE.
1. Release fuel pressure to zero.
   Refer to EC-35.
2. Install fuel pressure gauge and check fuel pressure.
   At idling:
   When fuel pressure regulator valve vacuum hose is connected.
   Approximately 235 kPa ($2.4\ kg/cm^2$, 34 psi)
   When fuel pressure regulator valve vacuum hose is disconnected.
   Approximately 294 kPa ($3.0\ kg/cm^2$, 43 psi)

NG → Check the following.
- Fuel pump and circuit
  Refer to EC-457.
- Fuel pressure regulator
  Refer to EC-35.

If NG, repair or replace.

↓ OK

CHECK MASS AIR FLOW SENSOR.

Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT-II.
Approximately 3.24 g·m/sec: at idling
Approximately 12.2 g·m/sec: at 2,500 rpm

OR

GST: Check "MASS AIR FLOW" in MODE 1 with GST.
Approximately 3.24 g·m/sec: at idling
Approximately 12.2 g·m/sec: at 2,500 rpm

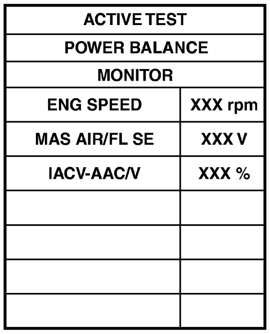
NG → Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds.
Refer to EC-118.

↓ OK

Ⓐ
(Go to next page.)

Fuel Injection System Function (Rich side) (Cont'd)

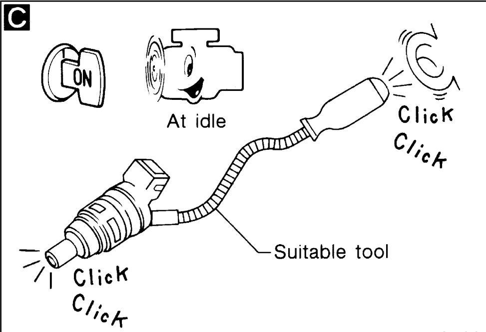
C



ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS AIR/FL SE	XXX V
IACV-AAC/V	XXX %

SEF806Z

C



MEC703B

Ⓐ

C

CHECK FUNCTION OF INJECTORS.
1. Install all parts removed.
2. Start engine.
3. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-II.
4. Make sure that each circuit produces a momentary engine speed drop.

OR

3. Listen to each injector operating sound.
Clicking noise should be heard.

NG → Perform TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS, "Injectors", EC-451. Repair harness or connectors.

OK ↓

Remove injector assembly.
Refer to EC-35.
Keep fuel hose and all injectors connected to injector gallery.

↓

Confirm that the engine is cooled down and there are no fire hazards near the vehicle.

↓

1. Disconnect all injector harness connectors.
2. Disconnect all ignition coil harness connectors.
3. Crank engine for about 3 seconds. Make sure fuel does not drip from injector.

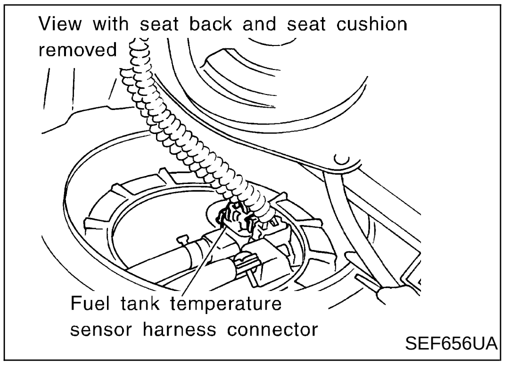
Drips → Replace the injectors from which fuel is dripping.

Does not drip. ↓

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-112.

↓

INSPECTION END

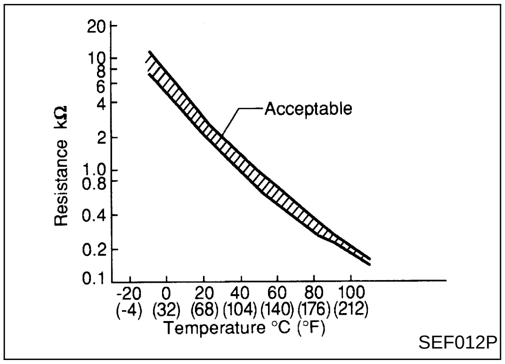


SEF656UA

Fuel Tank Temperature Sensor

COMPONENT DESCRIPTION

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



SEF012P

<Reference data>

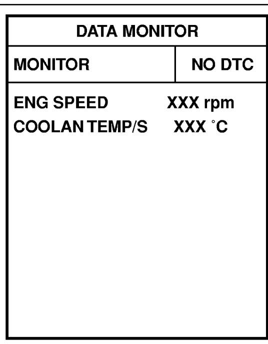
Fluid temperature °C (°F)	Voltage* V	Resistance kΩ
20 (68)	3.5	2.3 - 2.7
50 (122)	2.2	0.79 - 0.90

*: These data are reference values and are measured between ECM terminal 63 (Fuel tank temperature sensor) and ground.

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

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Causes)
P0180	● An excessively high or low voltage is sent to ECM. ● Rationally incorrect voltage is sent to ECM, compared with the voltage signals from engine coolant temperature sensor and intake air temperature sensor.	● Harness or connectors (The sensor circuit is open or shorted.) ● Fuel tank temperature sensor



SEF174Y

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

NOTE:
If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Wait at least 10 seconds.

Fuel Tank Temperature Sensor (Cont'd)

If the result is NG, go to "DIAGNOSTIC PROCEDURE", EC-243.
If the result is OK, go to following step.

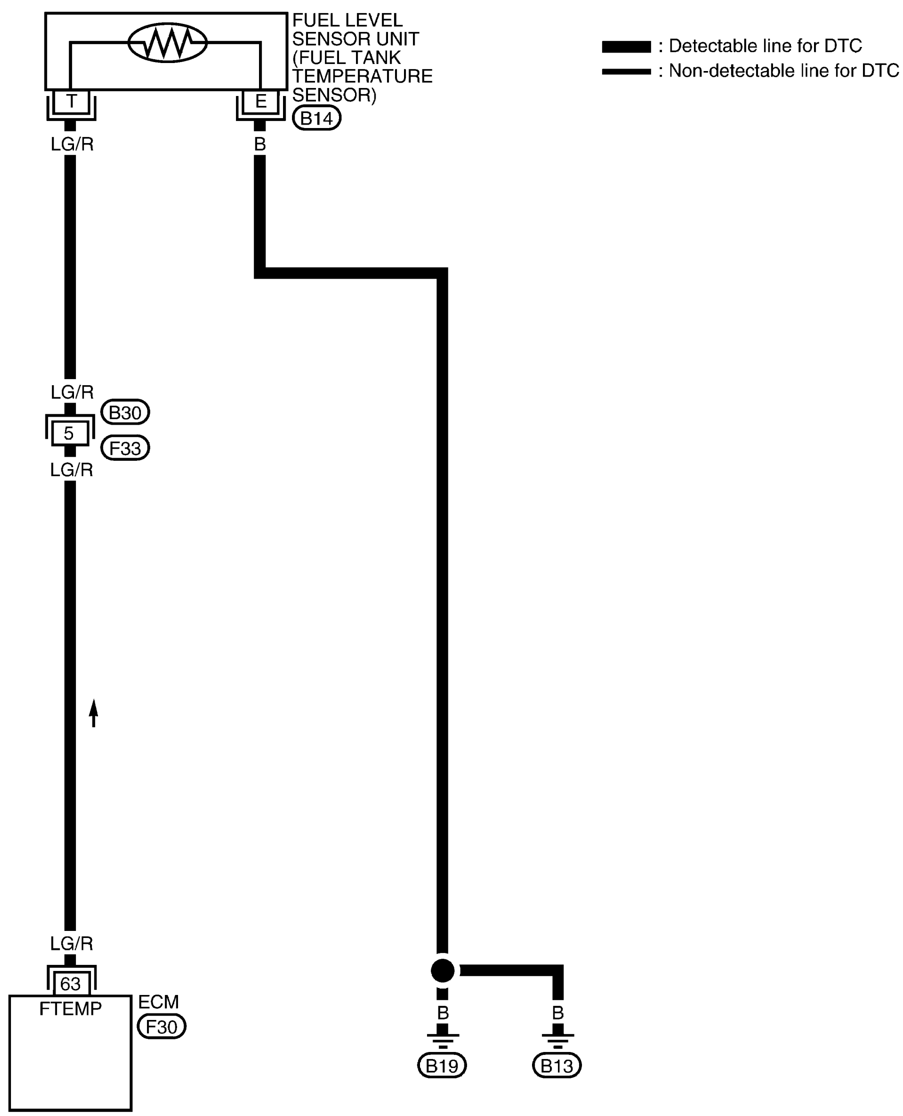
NOTE: If "COOLAN TEMP/S" is already less than 60°C (140°F) before step 4), the result will be OK.
If "COOLAN TEMP/S" is above 60°C (140°F), go to the following step.

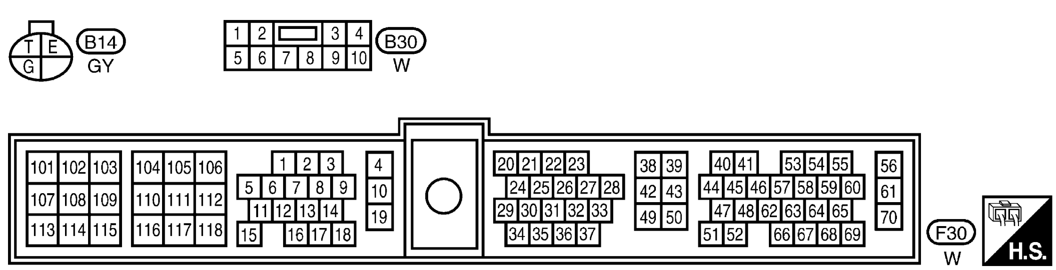
4) Cool engine down until "COOLAN TEMP/S" is less than 60°C (140°F).
5) Wait at least 10 seconds.
6) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-243.

OR

1) Turn ignition switch "ON" and wait at least 10 seconds.
2) Select "MODE 7" with GST.
   If the result is NG, go to "DIAGNOSTIC PROCEDURE", EC-243.
   If the result is OK, go to following step.
3) Select "MODE 1" with GST and check for the engine coolant temperature.
4) Cool engine down until the engine coolant temperature is less than 60°C (140°F). If the temperature is already less than 60°C (140°F) before step 4), the result will be OK.
5) Wait at least 10 seconds.
6) Select "MODE 7" with GST.
7) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-243.

EC-FTTS-01

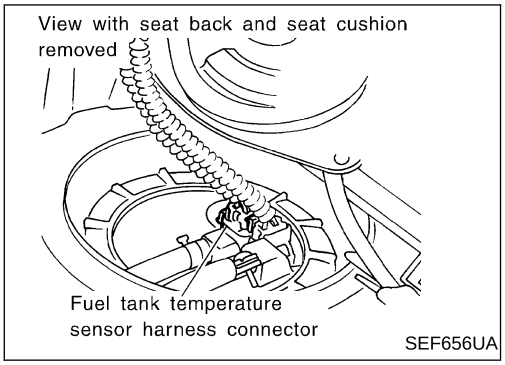




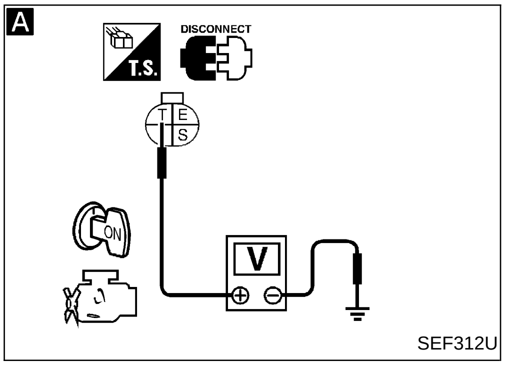
WEC006

Fuel Tank Temperature Sensor (Cont'd)

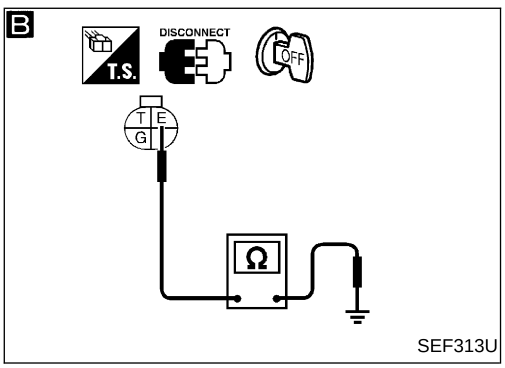
DIAGNOSTIC PROCEDURE



SEF656UA



SEF312U



SEF313U

INSPECTION START

A

CHECK POWER SUPPLY.
1. Turn ignition switch "OFF".
2. Disconnect fuel tank temperature sensor harness connector.
3. Turn ignition switch "ON".
4. Check voltage between terminal (T) and ground with CONSULT-II or tester.
   Voltage: Approximately 5V

NG → Check the following.
- Harness connectors (B30), (F33)
- Harness for open or short between ECM and fuel tank temperature sensor

If NG, repair harness or connector.

OK ↓

B

CHECK GROUND CIRCUIT.
1. Turn ignition switch "OFF".
2. Check harness continuity between terminal (E) and body ground.
   Continuity should exist.
   If OK, check harness for short to power.

NG → Repair harness or connectors.

OK ↓

CHECK COMPONENT
(Fuel tank temperature sensor).
Refer to "COMPONENT INSPECTION" below.

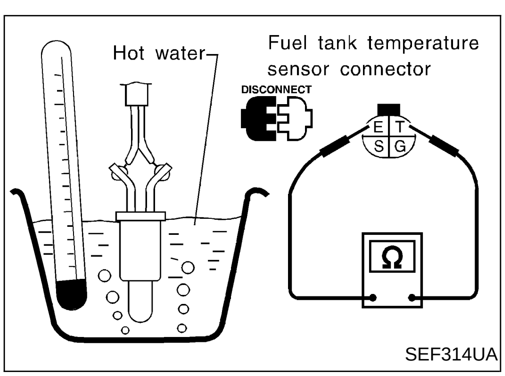
NG → Replace fuel tank temperature sensor.

OK ↓

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-112.

↓

INSPECTION END



SEF314UA

COMPONENT INSPECTION

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.

No. 4 - 1 Cylinder Misfire, Multiple Cylinder Misfire

ON BOARD DIAGNOSIS LOGIC

When a misfire occurs, engine speed will fluctuate (vary). If the engine speed fluctuates enough to cause the crankshaft position sensor (POS) to vary, ECM can determine that a misfire is occurring.

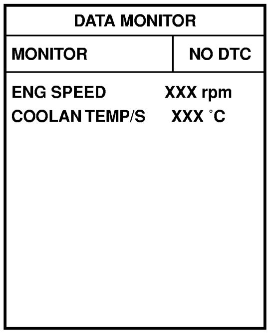
Sensor	Input Signal to ECM	ECM function
Crankshaft position sensor (OBD)	Engine speed	On board diagnosis of misfire

The misfire detection logic consists of the following two conditions.

1. One Trip Detection Logic (Three Way Catalyst Damage)
   On the first trip that a misfire condition occurs that can damage the three way catalyst (TWC) due to overheating, the MIL will blink.
   When a misfire condition occurs, the ECM monitors the crankshaft position sensor (POS) signal every 200 engine revolutions, for a change.
   When the misfire conditions decreases to a level that will not damage the TWC, the MIL will turn off.
   If another misfire conditions 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.

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0300	• Multiple cylinders misfire.	• Improper spark plug • Insufficient compression • Incorrect fuel pressure • EGR 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 (front) • Incorrect distributor rotor
P0301	• No. 1 cylinder misfires.	
P0302	• No. 2 cylinder misfires.	
P0303	• No. 3 cylinder misfires.	
P0304	• No. 4 cylinder misfires.	

No. 4 - 1 Cylinder Misfire, Multiple Cylinder Misfire (Cont’d)



SEF174Y

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE (Overall)

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If “DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch “OFF” and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

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

1) Turn ignition switch “ON”, and select “DATA MONITOR” mode with CONSULT-II.
2) Start engine and warm it up to normal operating temperature.
3) Turn ignition switch “OFF” and wait at least 5 seconds.
4) Start engine again and drive at 1,500 - 3,000 rpm for at least 3 minutes.
   Hold the accelerator pedal as steady as possible.
   Note: Refer to the freeze frame data for the test driving conditions.
5) If 1st trip DTC is detected, go to “DIAGNOSTIC PROCEDURE”, EC-246.

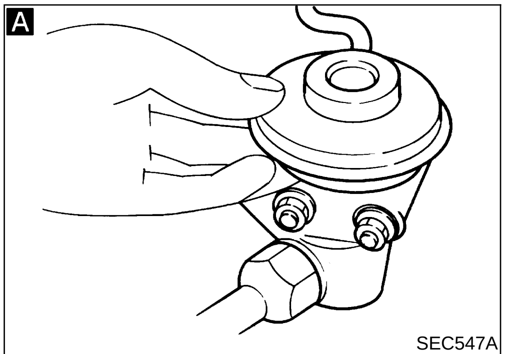
OR

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch “OFF” and wait at least 5 seconds.
3) Start engine again and drive at 1,500 - 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.
4) Select “MODE 7” with GST.
5) If 1st trip DTC is detected, go to “DIAGNOSTIC PROCEDURE”, EC-246.

No. 4 - 1 Cylinder Misfire, Multiple Cylinder Misfire (Cont'd)

DIAGNOSTIC PROCEDURE

A



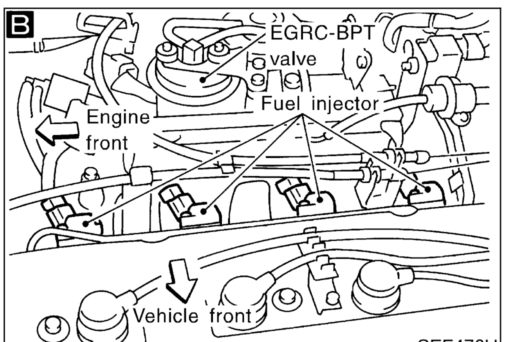
SEC547A

B

ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS AIR/FL SE	XXX V
IACV-AAC/V	XXX %

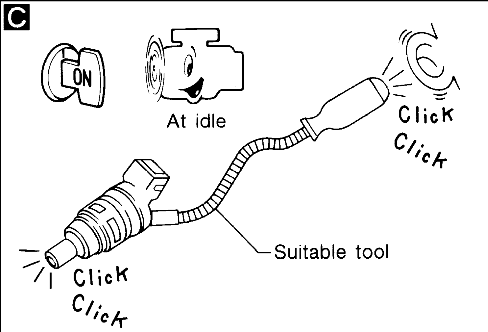
SEF806Z

B



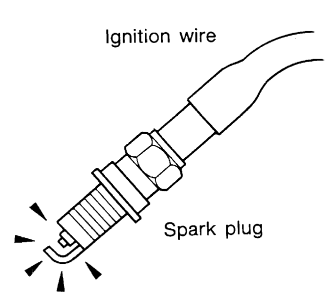
SEF476U

C



MEC703B

D



SEF282G

INSPECTION START

↓

CHECK FOR INTAKE AIR LEAK.
Start engine and run it at idle speed. Listen for the sound of the intake air leak.

- NG → Discover air leak location and repair.
- OK ↓

CHECK FOR EXHAUST SYSTEM CLOGGING.
Stop engine and visually check exhaust tube, three way catalyst and muffler for dents.

- NG → Repair or replace it.
- OK ↓

A

CHECK EGR FUNCTION.
Perform DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE for EGR Function.
Refer to EC-367.

- NG → Repair EGR system.
- OK ↓

B

PERFORM POWER BALANCE TEST.

1. Perform "POWER BALANCE" in "ACTIVE TEST" mode.
2. Is there any cylinder which does not produce a momentary engine speed drop?

OR

When disconnecting each injector harness connector one at a time, is there any cylinder which does not produce a momentary engine speed drop?

- No → Go to E on next page.
- Yes ↓

C

CHECK INJECTOR.
Does each injector make an operating sound at idle?

- No → Check injector(s) and circuit(s). Refer to EC-451.
- Yes ↓

D

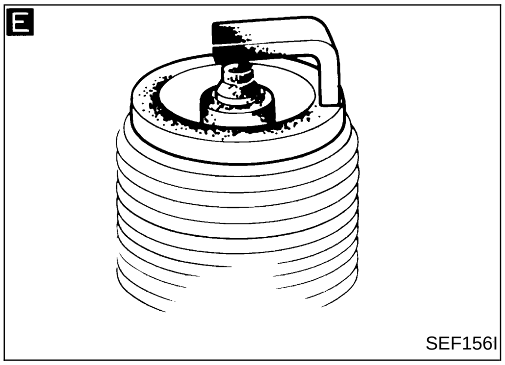
CHECK IGNITION SPARK.

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

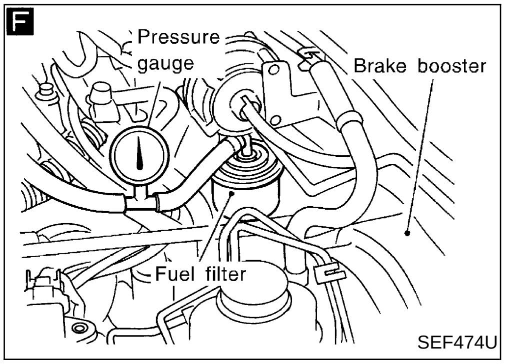
- NG → CHECK COMPONENT (Ignition wires).
  Refer to "COMPONENT INSPECTION", EC-248.
  - NG → Replace.
  - OK → Check distributor rotor head for incorrect parts.
    Check ignition coil, power transistor and their circuits.
    Refer to EC-445.
- OK ↓

A
(Go to next page.)

No. 4 - 1 Cylinder Misfire, Multiple Cylinder Misfire (Cont'd)



SEF156I



SEF474U

A

E

CHECK SPARK PLUGS.
Remove the spark plugs and check for fouling, etc.

- NG → Repair or replace spark plug(s) with standard type one(s).
  For spark plug type, refer to "ENGINE MAINTENANCE" in MA section.

↓ OK

CHECK COMPRESSION PRESSURE.
Refer to EM section.
- Check compression pressure.
  Standard:
  kPa (kg/cm^2, psi)/300 rpm
  1,226 (12.5, 178)
  Minimum:
  kPa (kg/cm^2, psi)/300 rpm
  1,030 (10.5, 149)
  Difference between each cylinder:
  kPa (kg/cm^2, psi)/300 rpm
  98 (1.0, 14)

- NG → Check pistons, piston rings, valves, valve seats and cylinder head gaskets.

↓ OK

F

CHECK FUEL PRESSURE.
1. Release fuel pressure to zero. Refer to EC-35.
2. Install fuel pressure gauge and check fuel pressure.
   At idle:
   Approx. 235 kPa
   (2.4 kg/cm^2, 34 psi)

- NG → Check the following.
  - Fuel pump and circuit
    Refer to EC-457.
  - Fuel pressure regulator
    Refer to EC-35.
  - Fuel lines
    Refer to "ENGINE MAINTENANCE" in MA section.
  - Fuel filter for clogging

  If NG, repair or replace.

↓ OK

CHECK IGNITION TIMING.
Perform "Basic Inspection", EC-83.

- NG → Adjust ignition timing.

↓ OK

CHECK COMPONENT
(Heated oxygen sensor 1 (front)).
Refer to "COMPONENT INSPECTION", EC-168.

- NG → Replace heated oxygen sensor 1 (front).

↓ OK

CHECK MASS AIR FLOW SENSOR.
Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT-II.
Approximately 3.24 g·m/sec: at idling
Approximately 12.2 g·m/sec: at 2,500 rpm

OR

GST
Check "MASS AIR FLOW" in MODE 1 with GST.
Approximately 3.24 g·m/sec: at idling
Approximately 12.2 g·m/sec: at 2,500 rpm

- NG → Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds.
  Refer to EC-118.
  If NG, repair or replace it.

↓ OK

B

(Go to next page.)

No. 4 - 1 Cylinder Misfire, Multiple Cylinder Misfire (Cont'd)

B

CHECK SYMPTOM MATRIX CHART.
Check items on the rough idle symptom in "Symptom Matrix Chart", EC-91.

NG → Repair or replace.

OK ↓

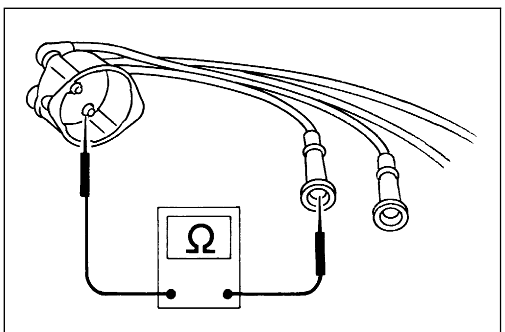
Some tests may cause a 1st trip Diagnostic Trouble Code to be set.
Erase the 1st trip DTC from the ECM memory after performing the tests. Refer to EC-58.

↓

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-112.

↓

INSPECTION END



SEF174P

COMPONENT INSPECTION

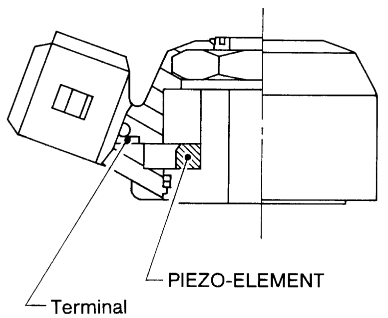
Ignition wires

1. Inspect wires for cracks, damage, burned terminals and for improper fit.
2. Measure the resistance of wires to their distributor cap terminal. Move each wire while testing to check for intermittent breaks.

   Resistance:

   13.6 - 18.4 kΩ/m (4.15 - 5.61 kΩ/ft) at 25°C (77°F)

   If the resistance exceeds the above specification, inspect ignition wire to distributor cap connection. Clean connection or replace the ignition wire with a new one.



SEF598K

Knock Sensor (KS)

COMPONENT DESCRIPTION

The knock sensor is attached to the cylinder block. It senses engine knocking using a piezoelectric element. A knocking vibration from the cylinder block is sensed as vibrational pressure. This pressure is converted into a voltage signal and sent to the ECM.

*** 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.**

ECM TERMINALS AND REFERENCE VALUE

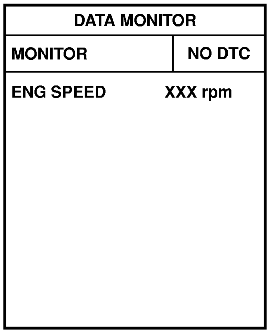
Specification data are reference values and are measured between each terminal and ground.

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

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
54	W	Knock sensor	Engine is running. Idle speed	Approximately 2.5V

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P0325	● An excessively low or high voltage from the knock sensor is sent to ECM.	● Harness or connectors (The knock sensor circuit is open or shorted.) ● Knock sensor



SEF058Y

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

CAUTION:
Always drive vehicle at a safe speed.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V.

1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.

Knock Sensor (KS) (Cont'd)

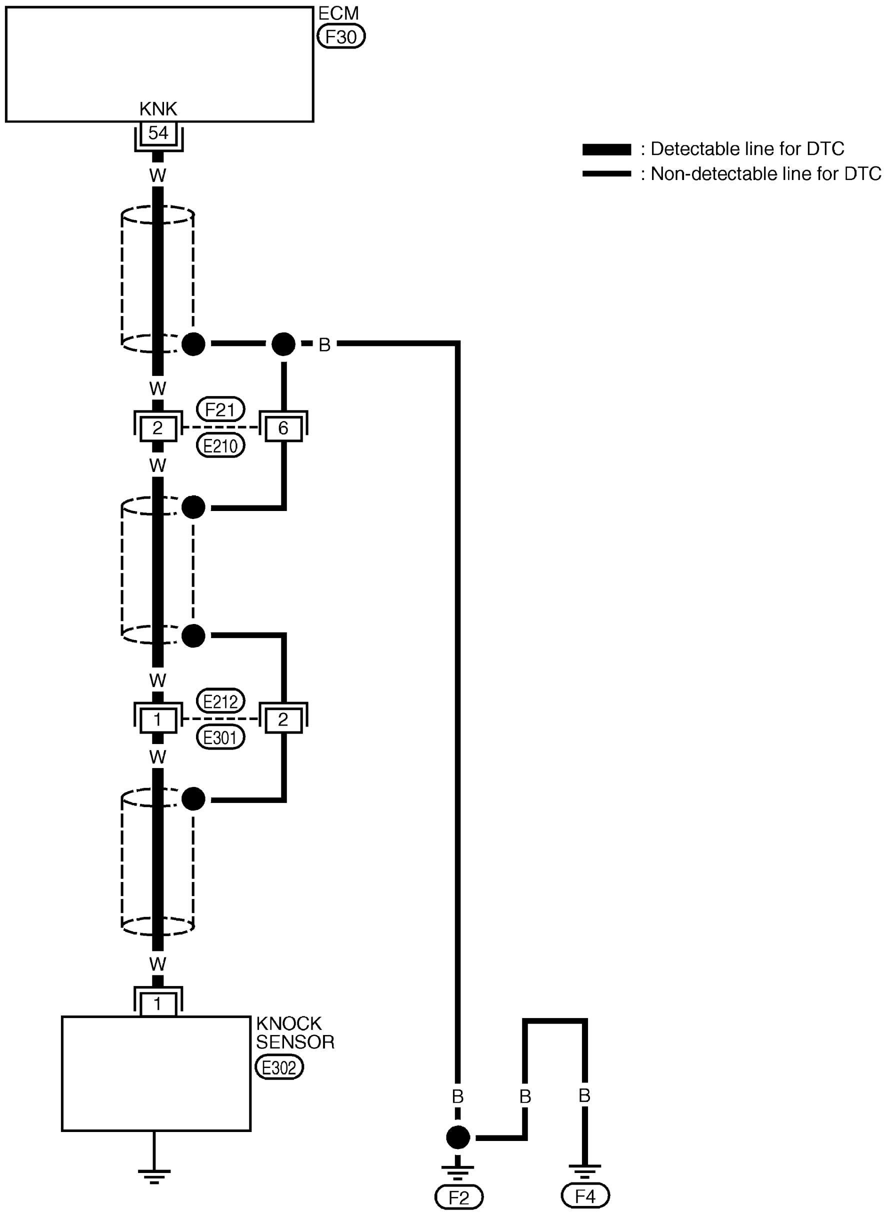
2) Start engine and run it for at least 5 seconds at idle speed.
3) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-252.

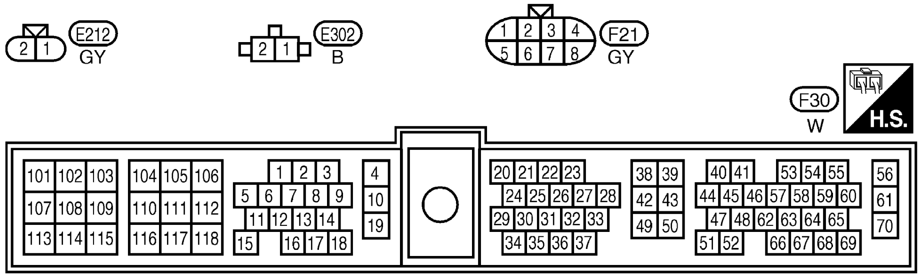
OR

GST

1) Start engine and run it for at least 5 seconds at idle speed.
2) Select "MODE 3" with GST.
3) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-252.

EC-KS-01

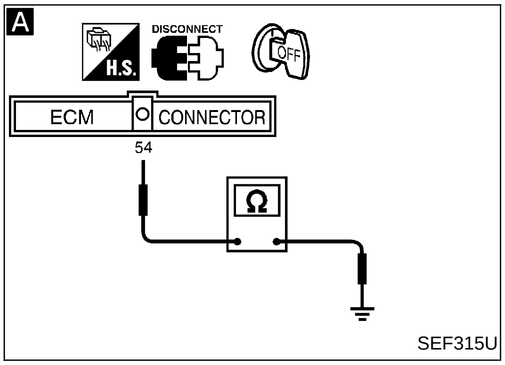


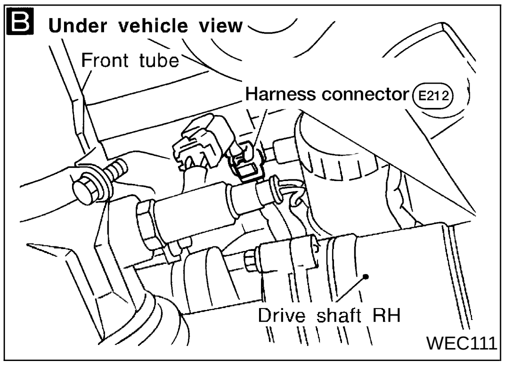


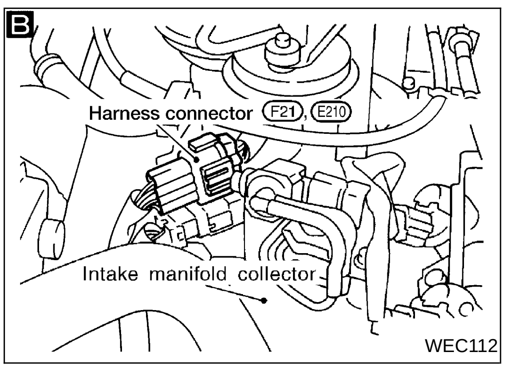
LEC652

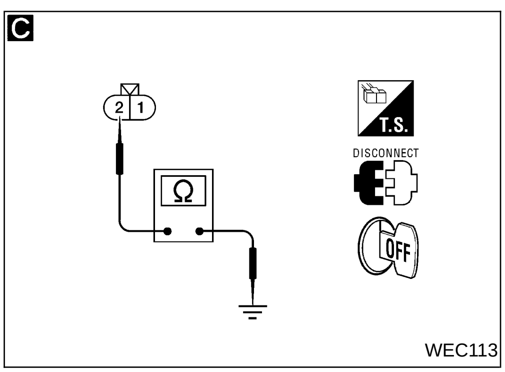
Knock Sensor (KS) (Cont'd)

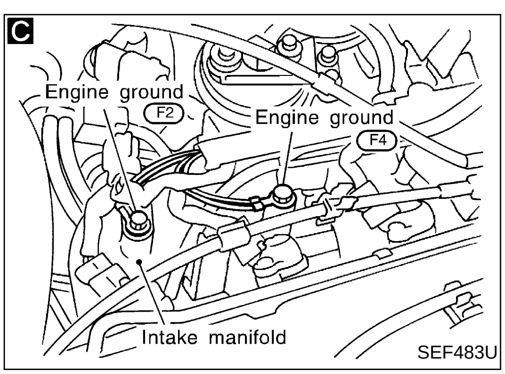
DIAGNOSTIC PROCEDURE











INSPECTION START

↓

A

CHECK INPUT SIGNAL CIRCUIT.
1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 54 and ground.

Resistance:
Approximately 500 - 620 kΩ
[at 25°C (77°F)]
If OK, check harness for short to ground and short to power.
It is necessary to use an ohmmeter which can measure more than 10 MΩ.

NG → **B**

Check the following.
- Harness connectors F21, E210
- Harness connectors E212, E301

If NG, repair open circuit or short to ground or short to power in harness or connectors.
- Knock sensor (Refer to "COMPONENT INSPECTION" below.)

If NG, replace knock sensor.

OK ↓

C

CHECK SHIELD CIRCUIT.
1. Turn ignition switch "OFF"
2. Loosen and retighten engine ground screws.
3. Disconnect harness connector E212 .
4. Check the following.
   - Continuity between harness connector E212 terminal 2 and ground

   Continuity should exist.
   If OK, check harness for short to power.
   Then reconnect harness connector E212 .

NG → **B**

Check the following.
- Harness connector E212
- Harness connectors F21, E210
- Harness for open or short between connectors E212 and E210
- Harness for open or short between connector F21 and ground

If NG, repair open circuit or short to power in harness or connectors.

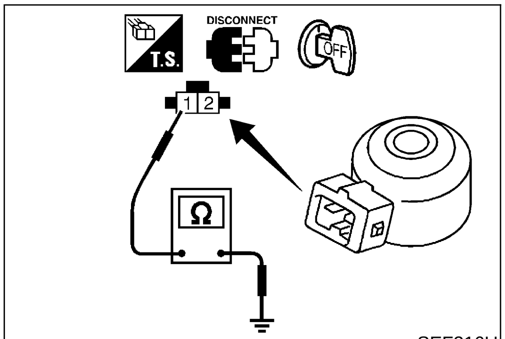
OK ↓

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-112.

↓

INSPECTION END

Knock Sensor (KS) (Cont'd)



SEF316U

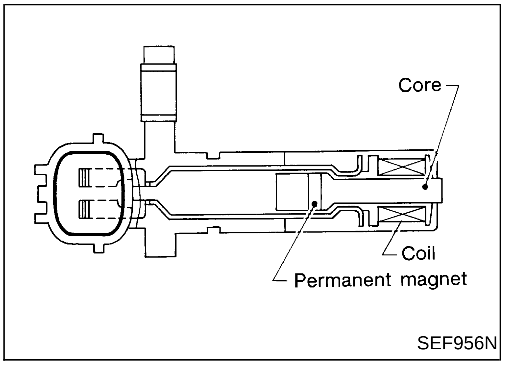
COMPONENT INSPECTION

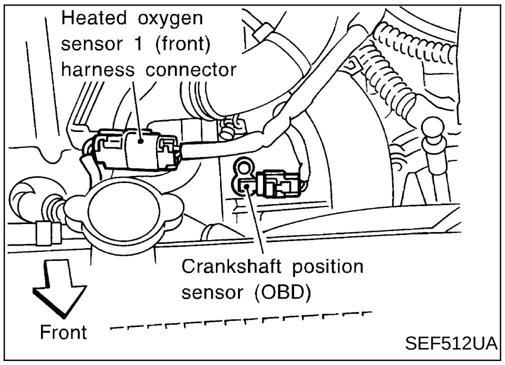
Knock sensor

- Use an ohmmeter which can measure more than 10 MΩ.

1. Disconnect knock sensor harness connector.
2. Check resistance between terminal 1 and ground.
   Resistance: 500 - 620 kΩ [at 25°C (77°F)]

CAUTION:
Do not use any knock sensors that have been dropped or physically damaged. Use only new ones.





Crankshaft Position Sensor (CKPS) (OBD)

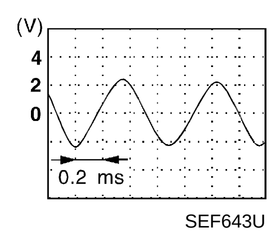
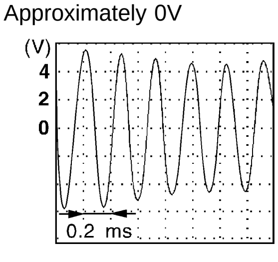
COMPONENT DESCRIPTION

The crankshaft position sensor (OBD) is located on the transaxle housing facing the gear teeth (cogs) of the flywheel or drive plate. It detects the fluctuation of the engine revolution.
The sensor consists of a permanent magnet, core and coil.
When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.
The changing gap causes the magnetic field near the sensor to change.
Due to the changing magnetic field, the voltage from the sensor changes.
The ECM receives the voltage signal and detects the fluctuation of the engine revolution.
This sensor is not directly used to control the engine system. It is used only for on board diagnosis.

ECM TERMINALS AND REFERENCE VALUE

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

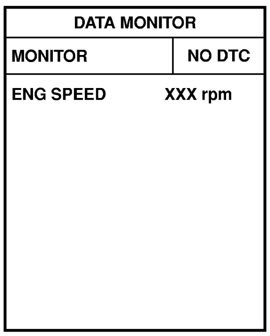
CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (AC Voltage)
53	BR	Crankshaft position sensor (OBD)	[Engine is running.] (Warm-up condition) └ Idle speed	Approximately 0.5V  SEF643U
			[Engine is running.] └ Engine speed is 2,000 rpm	Approximately 0V  SEF644U

Crankshaft Position Sensor (CKPS) (OBD) (Cont’d)

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P0335	● The proper pulse signal from the crankshaft position sensor (OBD) is not sent to ECM while the engine is running at the specified engine speed.	● Harness or connectors [The crankshaft position sensor (OBD) circuit is open.] ● Crankshaft position sensor (OBD)



SEF058Y

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

NOTE:

If “DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch “OFF” and wait at least 5 seconds before conducting the next test.

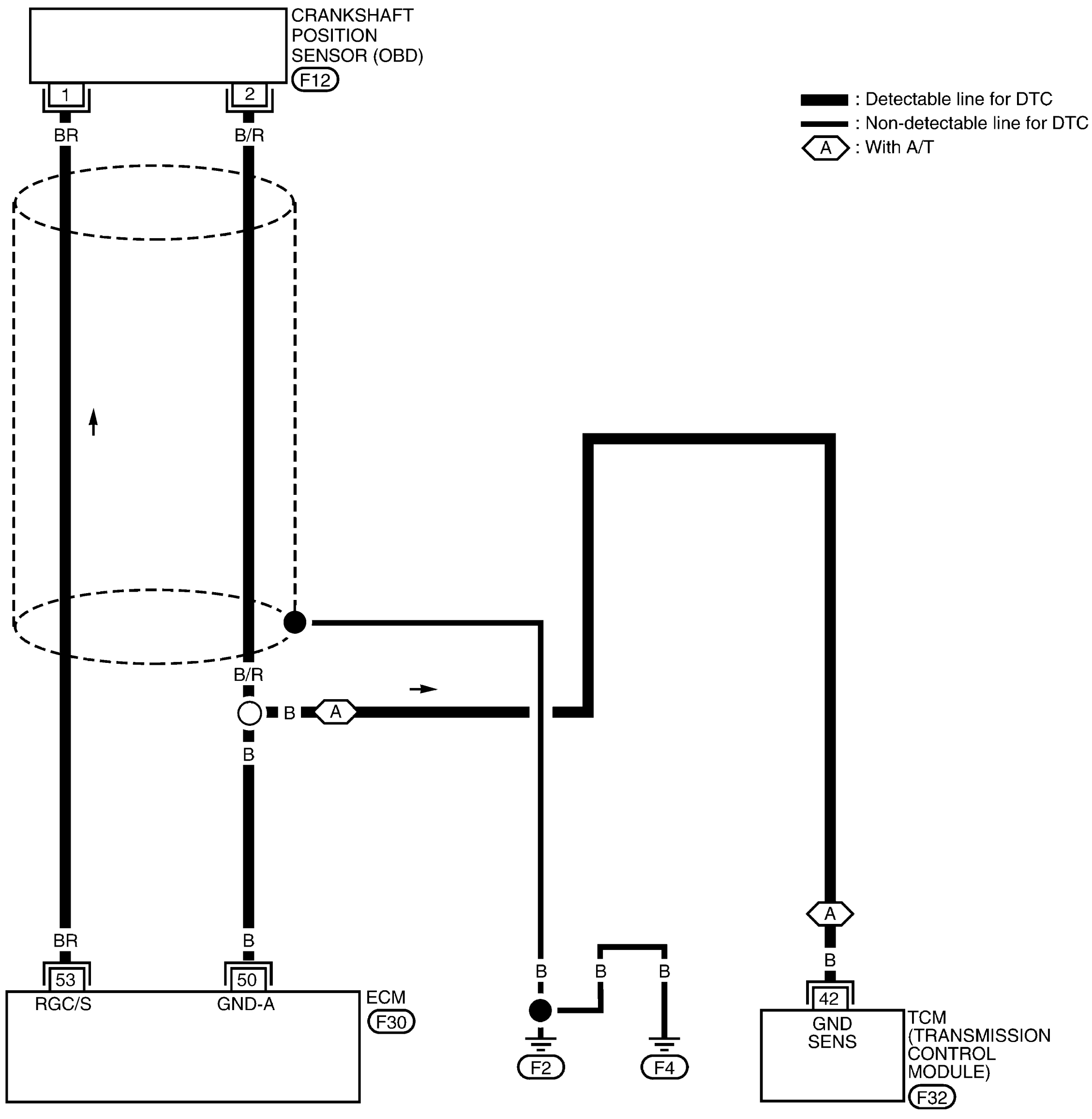
1) Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II.
2) Start engine and run it for at least 15 seconds at idle speed.
3) If 1st trip DTC is detected, go to “DIAGNOSTIC PROCEDURE”, EC-257.

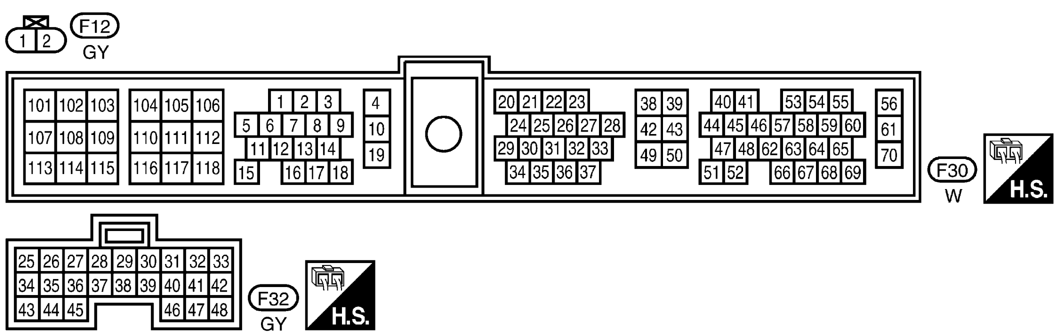
OR

1) Start engine and run it for at least 15 seconds at idle speed.
2) Select “MODE 7” with GST.
3) If 1st trip DTC is detected, go to “DIAGNOSTIC PROCEDURE”, EC-257.

Crankshaft Position Sensor (CKPS) (OBD) (Cont'd)

EC-CKPS-01

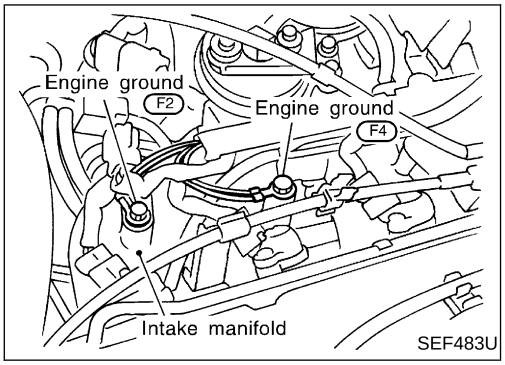




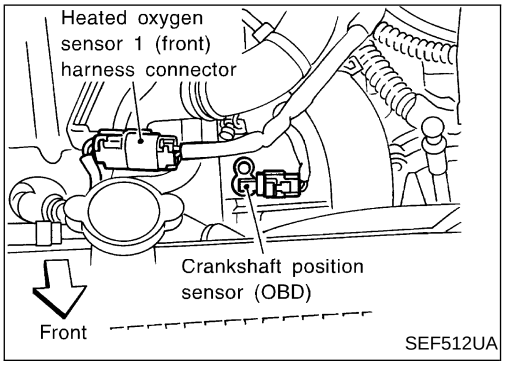
WEC008

Crankshaft Position Sensor (CKPS) (OBD) (Cont'd)

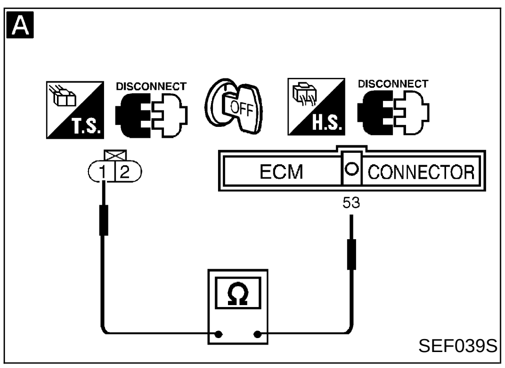
DIAGNOSTIC PROCEDURE



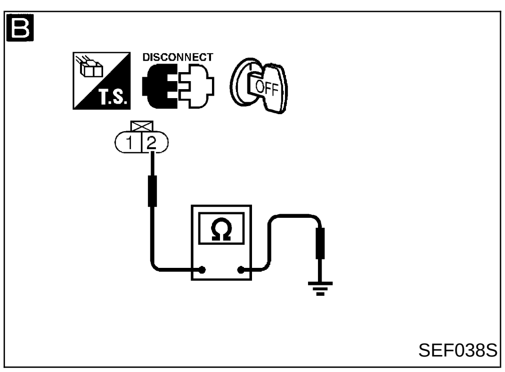
SEF483U



SEF512UA



SEF039S



SEF038S

INSPECTION START

↓

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

↓

A **CHECK INPUT SIGNAL CIRCUIT.**
1. Disconnect crankshaft position sensor (OBD) and ECM harness connectors.
2. Check continuity between ECM terminal 53 and terminal 1.
   Continuity should exist.
   If OK, check harness for short to ground and short to power.

NG → Check the following.
- Harness for open or short between ECM and crankshaft position sensor (OBD)

If NG, repair open circuit or short to ground or short to power in harness or connectors.

OK ↓

B **CHECK GROUND CIRCUIT.**
1. Reconnect ECM harness connector.
2. Check harness continuity between terminal 2 and engine ground.
   Continuity should exist.
   If OK, check harness for short to power.

NG → Check the following.
- Harness for open or short between ECM and TCM
- Harness for open or short between crankshaft position sensor (OBD) and ECM

If NG, repair open circuit or short to power in harness or connectors.

OK ↓

CHECK COMPONENT
[Crankshaft position sensor (OBD)].
Refer to "COMPONENT INSPECTION" on next page.

NG → Replace crankshaft position sensor (OBD).

OK ↓

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-112.

↓

INSPECTION END

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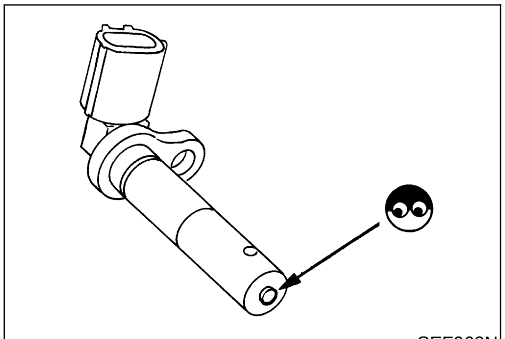
Crankshaft Position Sensor (CKPS) (OBD) (Cont'd)

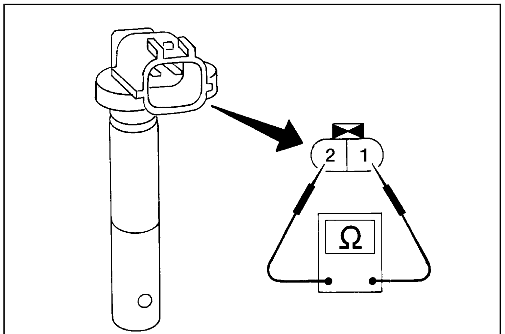


SEF960N

COMPONENT INSPECTION

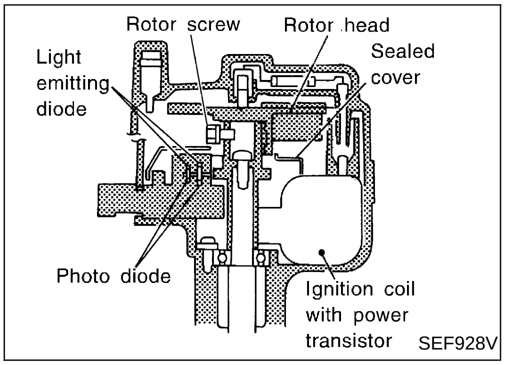
Crankshaft position sensor (OBD)

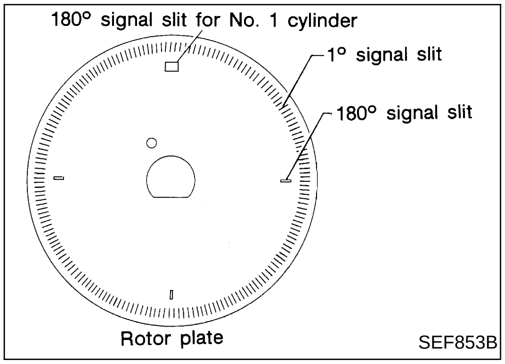
1. Disconnect crankshaft position sensor (OBD) harness connector.
2. Loosen the fixing bolt of the sensor.
3. Remove the sensor.
4. Visually check the sensor for chipping.



AEC782A

5. Check resistance as shown in the figure.
   Resistance: Approximately 512 - 632Ω
   [at 25°C (77°F)]
   If NG, replace crankshaft position sensor (OBD).





Camshaft Position Sensor (CMPS)

COMPONENT DESCRIPTION

The camshaft position sensor is a basic component of the engine control system. It monitors engine speed and piston position. These input signals to the ECM are used to control fuel injection, ignition timing and other functions.

The camshaft position sensor has a rotor plate and a wave-forming circuit. The rotor plate has 360 slits for a 1° (POS) signal and 4 slits for a 180° (REF) signal. The wave-forming circuit consists of Light Emitting Diodes (LED) and photo diodes.

The rotor plate is positioned between the LED and the photo diode. The LED transmits light to the photo diode. As the rotor plate turns, the slits cut the light to generate rough-shaped pulses. These pulses are converted into on-off signals by the wave-forming circuit and sent to the ECM.

The distributor is not repairable and must be replaced as an assembly except distributor cap and rotor head.

NOTE:

The rotor screw which secures distributor rotor head to the distributor shaft must be torqued properly.

: 3.3 - 3.9 N·m(0.34 - 0.40 kg-m, 29.5 - 34.7 in-lb)

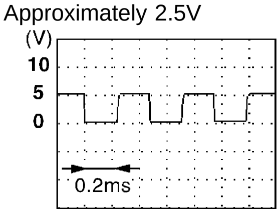
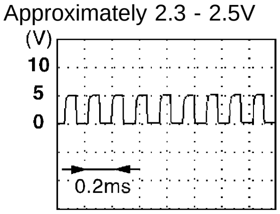
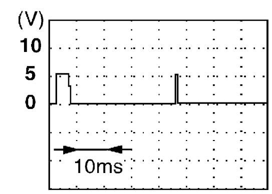
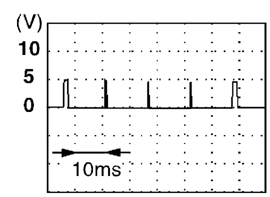
ECM TERMINALS AND REFERENCE VALUE

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

CAUTION:

Do not use ECM ground terminals when measuring input/output 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	W/G	ECM relay (Self-shutoff)	[Engine is running.] [Ignition switch "OFF"] For a few seconds after turning ignition switch "OFF"	0 - 1V
			[Ignition switch "OFF"] A few seconds passed after turning ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)

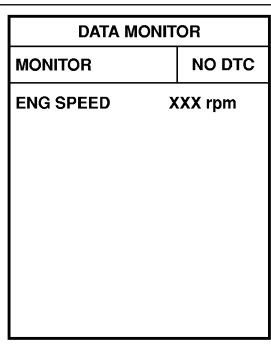
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
40	B/W	Camshaft position sensor (Position signal)	Engine is running. (Warm-up condition) Idle speed	Approximately 2.5V  SEF195T
			Engine is running. Engine speed is 2,000 rpm.	Approximately 2.3 - 2.5V  SEF196T
41	L	Camshaft position sensor (Reference signal)	Engine is running. (Warm-up condition) Idle speed	0.1 - 0.5V  SEF199T
			Engine is running. Engine speed is 2,000 rpm.	0.2 - 0.4V  SEF200T
56	W/R	Power supply for ECM	Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
61	W/R			

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P0340	A) Either 1° or 180° signal is not sent to ECM for the first few seconds during engine cranking. B) Either 1° or 180° signal is not sent to ECM often enough while the engine speed is higher than the specified engine speed. C) The relation between 1° and 180° signal is not in the normal range during the specified engine speed.	● Harness or connectors (The camshaft position sensor circuit is open or shorted.) ● Camshaft position sensor ● Starter motor (Refer to EL section.) ● Starting system circuit (Refer to EL section.) ● Dead (Weak) battery

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

Perform "Procedure for malfunction A" first. If DTC cannot be confirmed, perform "Procedure for malfunction B and C".



SEF058Y

Procedure for malfunction A

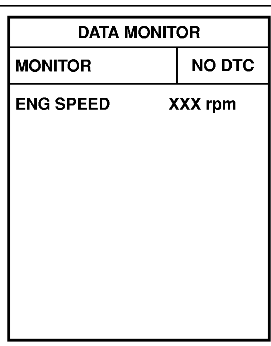
NOTE:
If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

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

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Crank engine for at least 2 seconds.
4) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-264.

OR

1) Crank engine for at least 2 seconds.
2) Select "MODE 7" with GST.
3) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-264.



SEF058Y

Procedure for malfunction B and C

NOTE:
If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

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

1) Turn ignition switch "ON".

GI MA EM LC EC FE CL MT AT FA RA BR ST RS BT HA EL IDX

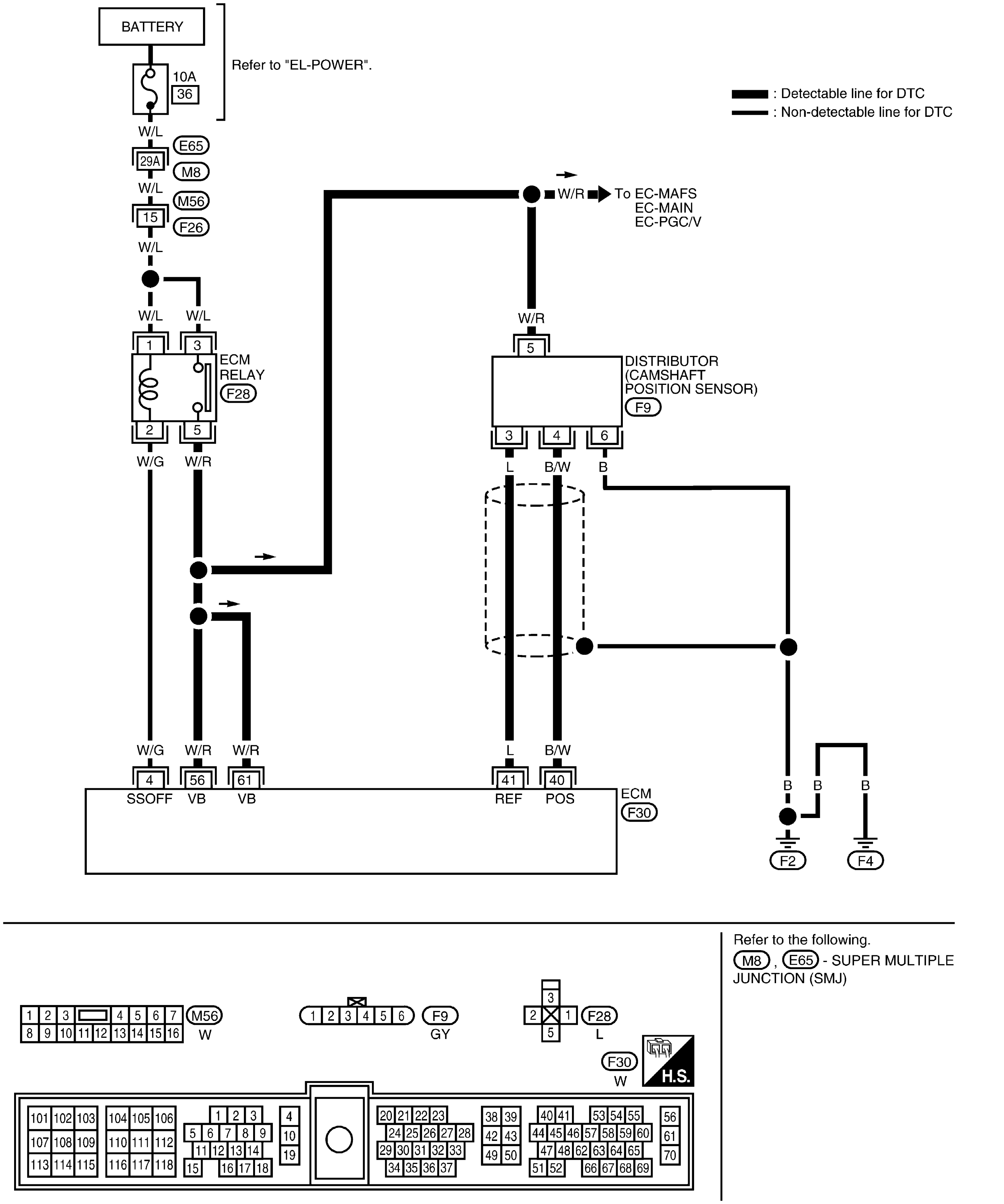
Camshaft Position Sensor (CMPS) (Cont'd)

2) Select “DATA MONITOR” mode with CONSULT-II.
3) Start engine and run it for at least 2 seconds at idle speed.
4) If 1st trip DTC is detected, go to “DIAGNOSTIC PROCEDURE”, EC-264.

OR

1) Start engine and run it for at least 2 seconds at idle speed.
2) Select “MODE 7” with GST.
3) If 1st trip DTC is detected, go to “DIAGNOSTIC PROCEDURE”, EC-264.

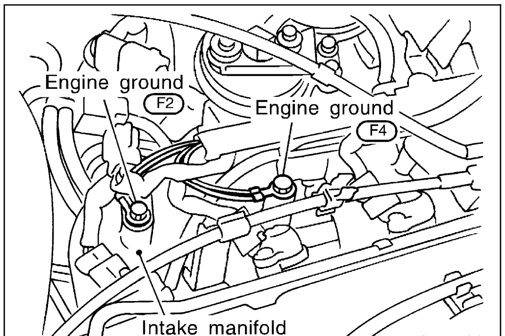
EC-CMPS-01



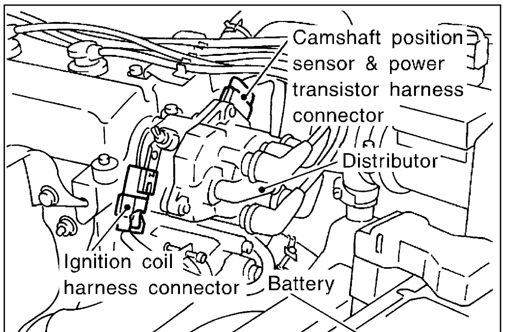
WEC871

Camshaft Position Sensor (CMPS) (Cont'd)

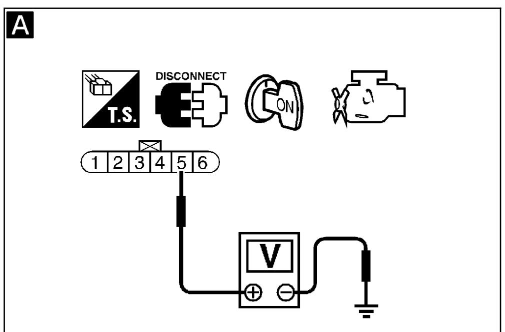
DIAGNOSTIC PROCEDURE (DETECTABLE CIRCUIT)



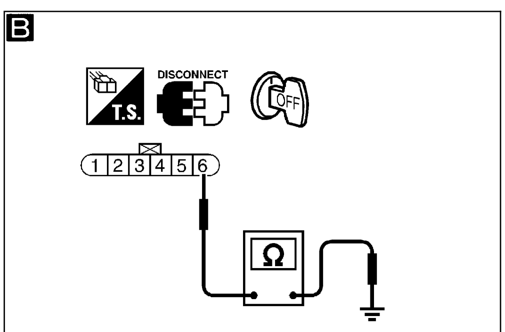
SEF483U



SEF493U



SEF040S



SEF046S

INSPECTION START

↓

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

↓

A

CHECK POWER SUPPLY.
1. Disconnect camshaft position sensor harness connector.
2. Turn ignition switch "ON".
3. Check voltage between terminal 5 and ground with CONSULT-II or tester.
   Voltage: Battery voltage

NG → Check the following.
- Harness for open or short between camshaft position sensor and ECM relay

If NG, repair harness or connectors.

↓ OK

CHECK INPUT SIGNAL CIRCUIT.
1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between sensor terminal 4 and ECM terminals 40, sensor terminal 3 and ECM terminal 41.
   Refer to the wiring diagram.
   Continuity should exist.
   If OK, check harness for short to ground and short to power.

NG → Repair harness or connectors.

↓ OK

B

CHECK GROUND CIRCUIT.
1. Turn ignition switch "OFF".
2. Disconnect camshaft position sensor harness connector.
3. Check harness continuity between sensor terminal 6 and engine ground.
   Continuity should exist.
   If OK, check harness for short to power.

NG → Repair harness or connectors.

↓ OK

CHECK COMPONENT
(Camshaft position sensor).
Refer to "COMPONENT INSPECTION" on next page.

NG → Replace camshaft position sensor.

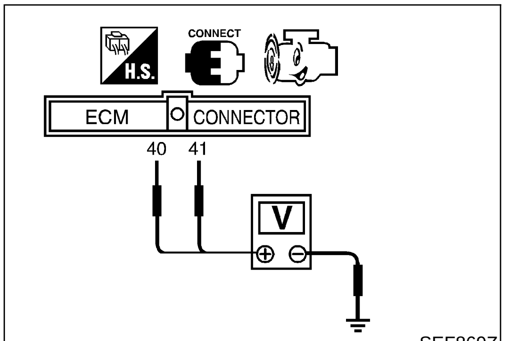
↓ OK

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-112.

↓

INSPECTION END

Camshaft Position Sensor (CMPS) (Cont'd)

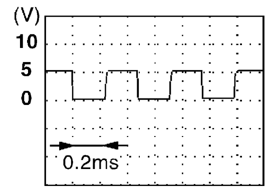
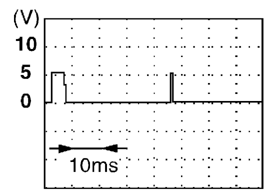
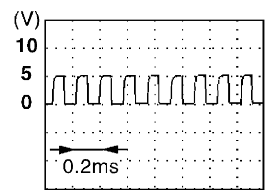
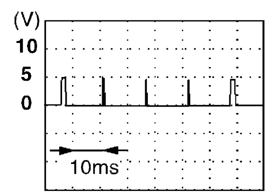


SEF869Z

COMPONENT INSPECTION

Camshaft position sensor

1. Start engine and warm it up to the normal operating temperature.
2. Check voltage between ECM terminals 41, 40 and ground.

Condition	Terminal	Voltage
Engine running at idle	40 and ground	Approximately 2.5V  SEF195T
	41 and ground	Approximately 0.1 - 0.5V  SEF199T
Engine speed is 2,000 rpm	40 and ground	Approximately 2.3 - 2.5V  SEF196T
	41 and ground	Approximately 0.2 - 0.4V  SEF200T

If NG, replace distributor assembly with camshaft position sensor.

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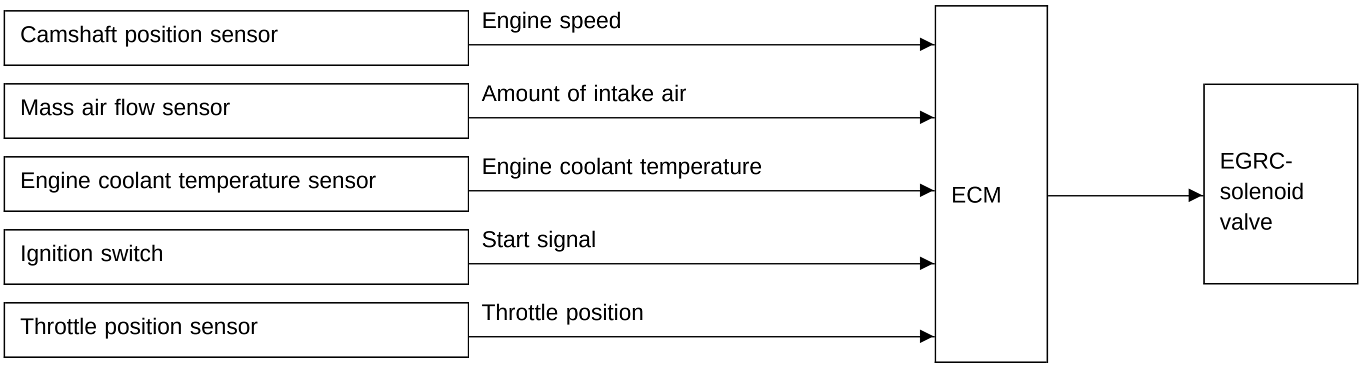
IDX

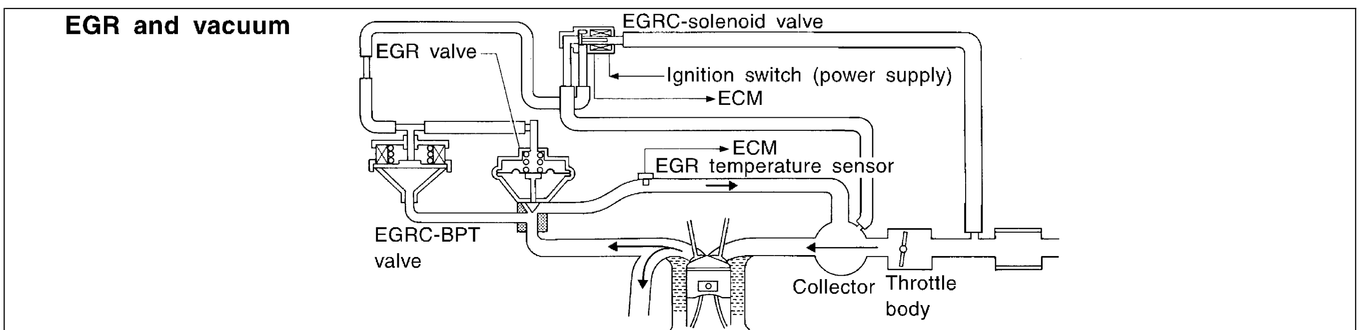
EGR Function (Close)

SYSTEM DESCRIPTION

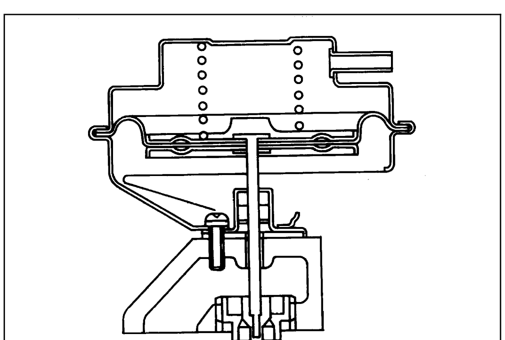


This system cuts and controls vacuum applied to the EGR valve to suit engine operating conditions. This cut-and-control operation is accomplished through the ECM and the EGRC-solenoid valve. When the ECM detects any of the following conditions, the ECM cuts the current for the solenoid valve. This causes the port vacuum to be discharged into the atmosphere. The EGR valve remains closed.

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



SEF317U

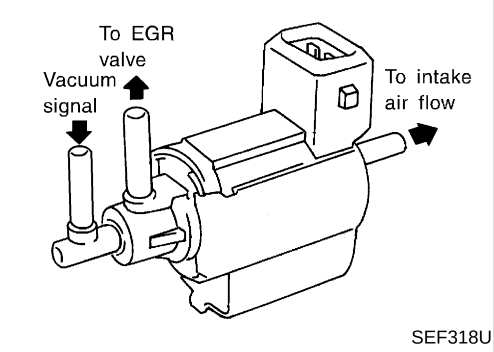

SEF783K

COMPONENT DESCRIPTION

Exhaust gas recirculation (EGR) valve

The EGR valve controls the amount of exhaust gas routed to the intake manifold. Vacuum is applied to the EGR valve in response to throttle valve opening. The vacuum controls the movement of a taper valve connected to the vacuum diaphragm in the EGR valve.

EGR Function (Close) (Cont'd)

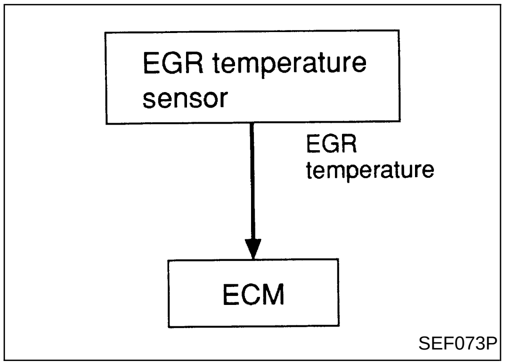


SEF318U

EGRC-solenoid valve

The EGRC-solenoid valve responds to signals from the ECM. When the ECM sends an ON (ground) signal, the coil in the solenoid valve is energized.

A plunger will then move to cut the vacuum signal from the intake manifold to the EGR valve. When the ECM sends an OFF signal, the vacuum signal passes through the solenoid valve. The signal then reaches the EGR valve.

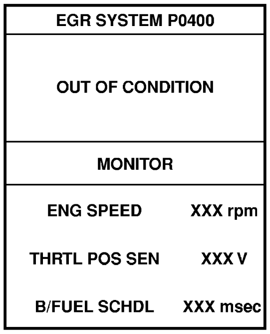


SEF073P

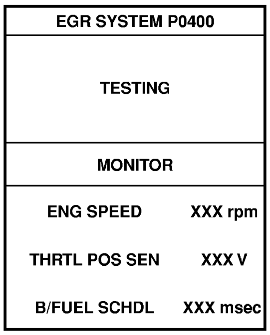
ON BOARD DIAGNOSIS LOGIC

If the absence of EGR flow is detected by EGR temperature sensor under the condition that calls for EGR, a low-flow malfunction is diagnosed.

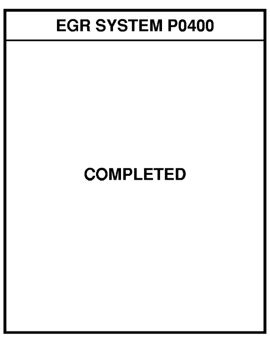
Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0400	● No EGR flow is detected under conditions that call for EGR.	● EGR valve stuck closed ● EGRC-BPT valve ● Vacuum hose ● EGRC-solenoid valve ● EGR passage ● EGR temperature sensor ● Exhaust gas leaks



SEF191Y



SEF192Y



SEF235Y

EGR Function (Close) (Cont'd)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

CAUTION:
Always drive vehicle at a safe speed.

NOTE:

- **If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.**
- **During the test, P0400 will not be stored in ECM even though "NG" is displayed on the CONSULT-II screen.**

TESTING CONDITION:
For best results, perform test at a temperature above 5°C (41°F) or higher.

1) Turn ignition switch "ON"
2) Check "COOLAN TEMP/S" in "DATA MONITOR" mode witch CONSULT-II.
   Confirm COOLAN TEMP/S value is within the range listed below.
   COOLANT TEMP/S: Less than 40°C (104°F)
   If the value is out of range, park the vehicle in a cool place and allow the engine temperature to stabilize. Do not attempt to lower the coolant temperature with a fan or means other than ambient air. Doing so may produce an inaccurate diagnostic result.
3) Turn ignition switch "ON" and select "EGR SYSTEM P0400" of "EGR SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
4) Touch "START".
5) Start engine and let it idle. When the engine coolant temperature reaches 70°C (158°F), immediately go to the next step.
6) Accelerate vehicle to a speed of 40 km/h (25 MPH) once and then stop vehicle.
   If "COMPLETED" with "OK" appears on CONSULT-II screen, go to step 9).
   If "COMPLETED" does not appear on CONSULT-II screen, go to the following step.
7) Check the output voltage of "THRTL POS SEN" (at closed throttle position) and note it.
8) When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions until "TESTING" changes to "COMPLETED". (It will take approximately 50 seconds or more.)
   ENG SPEED: 1,500 - 2,500 rpm (A/T)
   2,000 - 3,000 rpm (M/T)
   Vehicle speed: 10 km/h (6 MPH) or more
   B/FUEL SCHDL: 6.25 - 11.5 msec (A/T)
   5.25 - 8.75 msec (M/T)
   THRTL POS SEN: X − (X + 4.5) V
   X = Voltage value measured at step 7)
   Selector lever: Suitable position

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

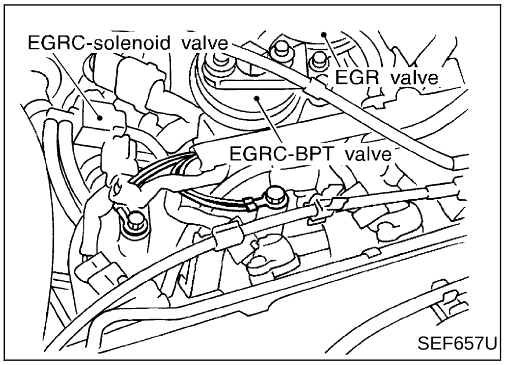
9) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "DIAGNOSTIC PROCEDURE", EC-271.

EGR Function (Close) (Cont'd)

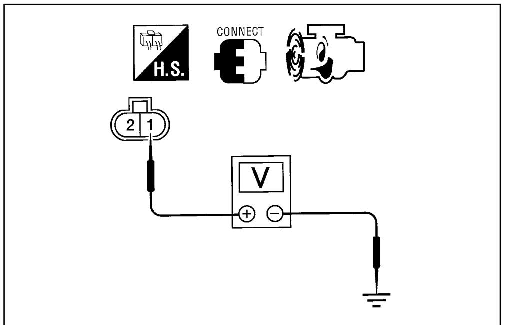
OVERALL FUNCTION CHECK

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

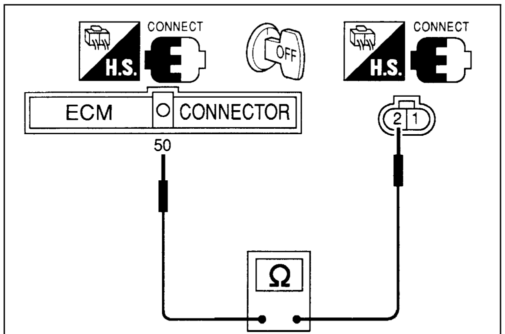
1) Start engine and warm it up to normal operating temperature.
2) Check the EGR valve lifting when revving from 2,000 rpm up to 4,000 rpm under no load using the following methods.
   EGR valve should lift up and down without sticking.
   If NG, go to A in DIAGNOSTIC PROCEDURE on EC-271.
3) Check voltage between EGR temperature sensor harness connector terminal ① and ground at idle speed.
   Less than 4.5V should exist.
4) Turn ignition switch "OFF".
5) Check harness continuity between EGR temperature sensor harness connector terminal ② and ECM terminal ㊿.
   Continuity should exist.
6) Perform "COMPONENT INSPECTION", "EGR temperature sensor". Refer to EC-273.



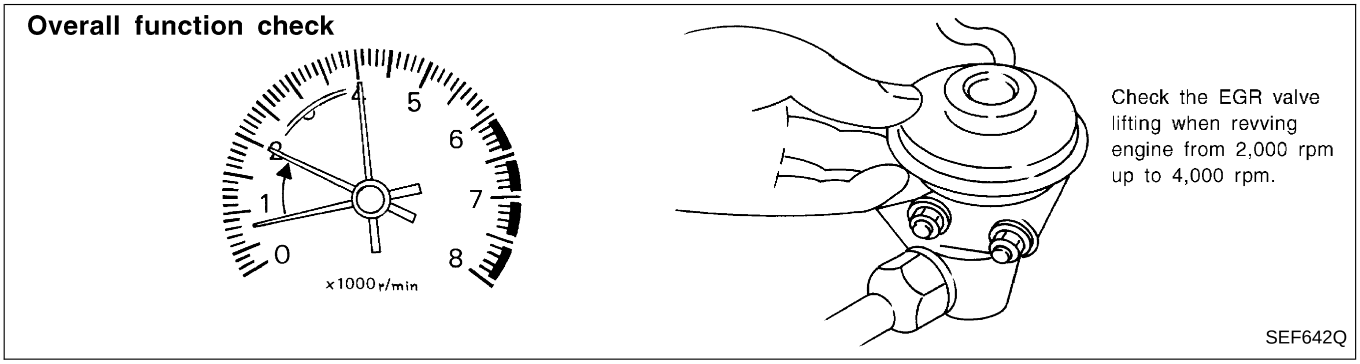
SEF657U



AEC783

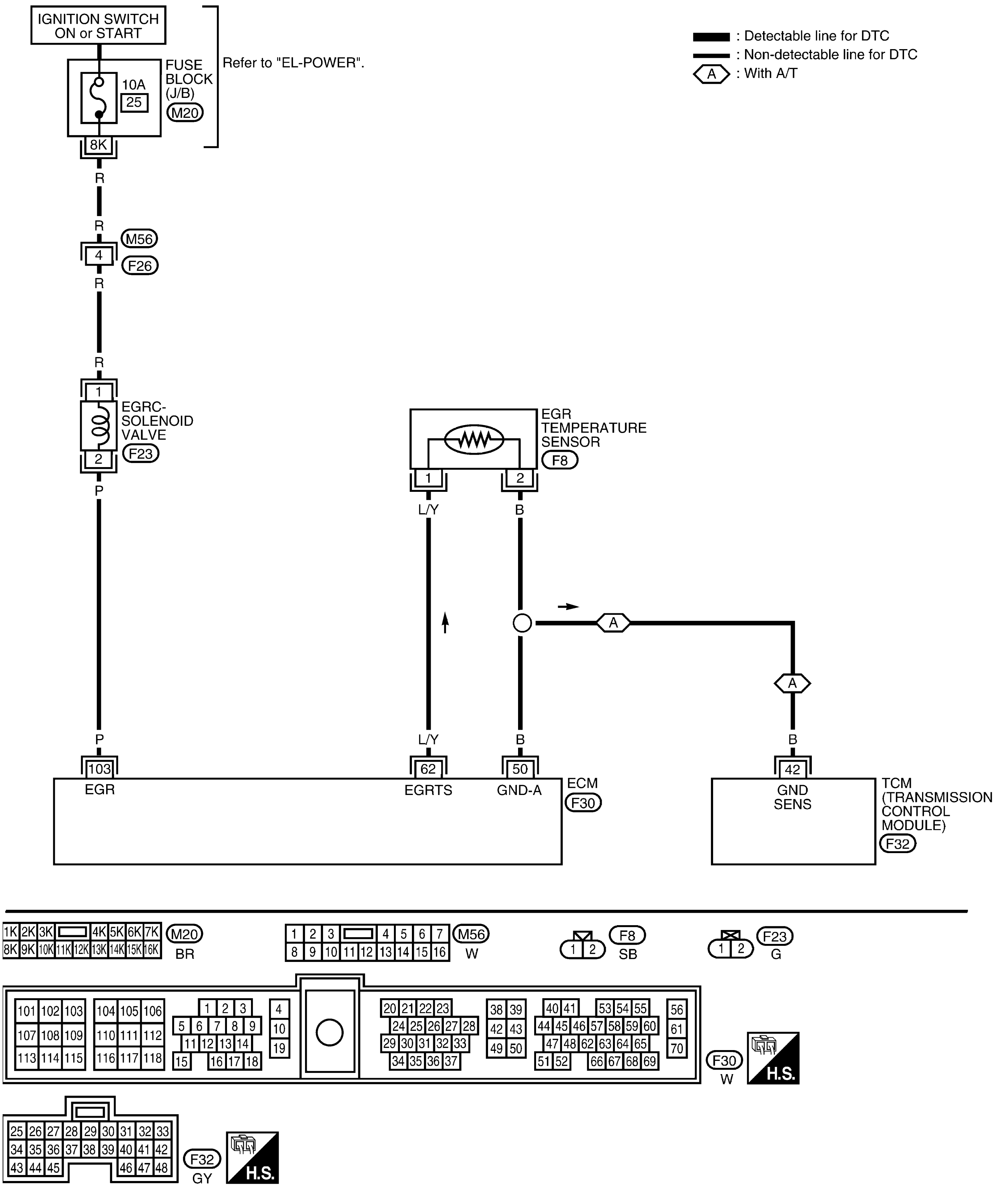


SEF170P



SEF642Q

EC-EGRC1-01

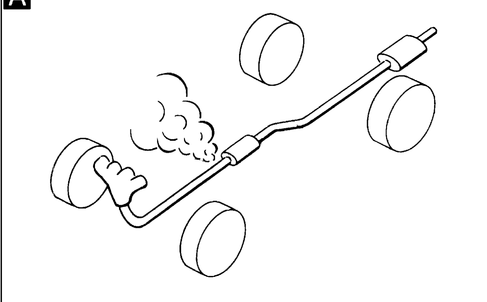


WEC705

EGR Function (Close) (Cont'd)

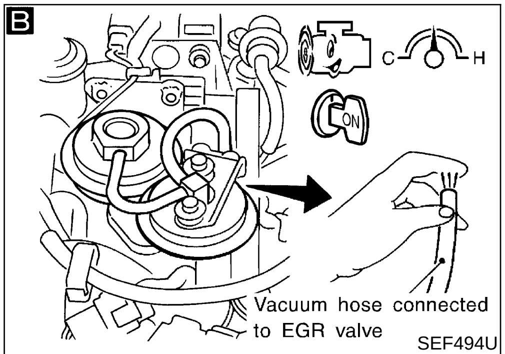
DIAGNOSTIC PROCEDURE

A



SEF099P

B



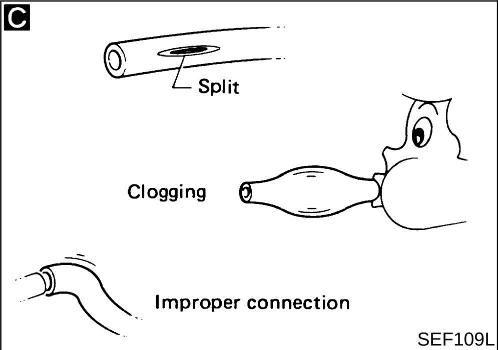
SEF494U

B

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

SEF716Z

C



SEF109L

D

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

SEF716Z

INSPECTION START

↓

A

CHECK EXHAUST SYSTEM.
Check exhaust pipes and muffler for leaks.

NG → Repair or replace exhaust system.

OK ↓

B

CHECK VACUUM SOURCE TO EGR VALVE.
1. Start engine and warm it up to normal operating temperature.
2. Disconnect vacuum hose to EGR valve.
3. Check for vacuum existence.
   Vacuum should not exist at idle.
4. Check for vacuum existence when revving from 2,000 rpm up to 4,000 rpm with the following methods.
   - Select "EGRC SOLENOID VALVE" in "ACTIVE TEST" mode with CONSULT-II and turn the solenoid valve "ON".

OR

4. Stop engine.
5. Jack up drive wheels.
6. Start engine and check for vacuum existence when revving from 2,000 to 4,000 rpm in 1st shift position.
   Vacuum should exist when revving engine.

OK → CHECK COMPONENT (EGR valve).
Refer to "COMPONENT INSPECTION", EC-372.

NG → Replace EGR valve.

NG ↓

C

CHECK VACUUM HOSE.
Check vacuum hose for clogging, cracks or improper connection.

NG → Repair or replace vacuum hose.

OK ↓

D

CHECK COMPONENT
(EGRC-solenoid valve).
1. Turn ignition switch "ON".
2. Turn EGRC-solenoid valve "ON" and "OFF" in "ACTIVE TEST" mode with CONSULT-II and check operating sound.

OR

1. Start engine and keep engine speed at 2,000 rpm in 1st shift position.
2. Check operating sound of the solenoid valve when disconnecting and reconnecting EGRC-solenoid valve harness connector. (The DTC or the 1st trip DTC for the EGRC-solenoid valve will be displayed, however, ignore it.)

NG → Check the following.
- Harness connectors M56, F26
- 10A fuse
- Harness for open or short between fuse block and EGRC-solenoid valve
- Harness for open or short between ECM and EGRC-solenoid valve

If NG, repair open circuit or short to power in harness or connectors.

OK ↓

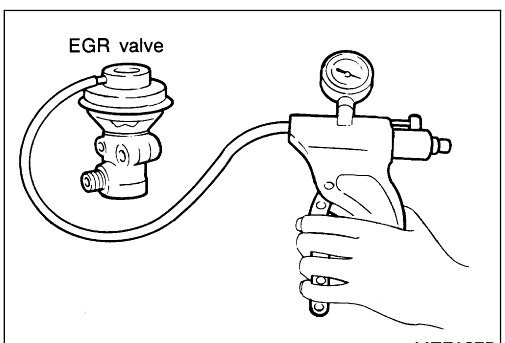
A

(Go to next page.)

EGR Function (Close) (Cont'd)

A

Step	Result	Action
CHECK COMPONENT (EGRC-solenoid valve). Refer to "COMPONENT INSPECTION" below.	NG	Replace EGRC-solenoid valve.
↓ OK		
CHECK COMPONENT (EGRC-BPT valve). Refer to "COMPONENT INSPECTION" on the next page.	NG	Replace EGRC-BPT valve.
↓ OK		
CHECK COMPONENT (EGR temperature sensor). Refer to "COMPONENT INSPECTION", EC-272.	NG	Replace EGR temperature sensor.
↓ OK		
Disconnect and reconnect harness connectors in the circuit. Then retest.		
↓ Trouble is not fixed.		
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-112.		
↓		
INSPECTION END		



MEF137D

COMPONENT INSPECTION

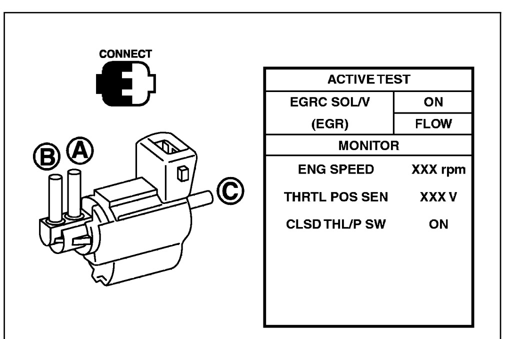
EGR valve

- Apply vacuum to EGR vacuum port with a hand vacuum pump.

EGR valve spring should lift.

- Check for sticking.

If NG, repair or replace EGR valve.



SEF840Z

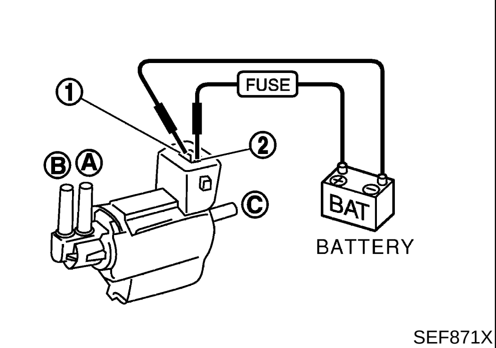
EGRC-solenoid valve

Check air passage continuity.

Perform "EGRC SOLENOID VALVE" in "ACTIVE TEST" mode.

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

EGR Function (Close) (Cont'd)

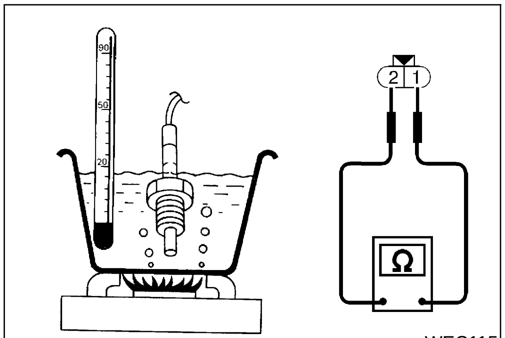


SEF871X

OR

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

If NG or operation takes more than 1 second, replace EGRC-solenoid valve.



WEC115

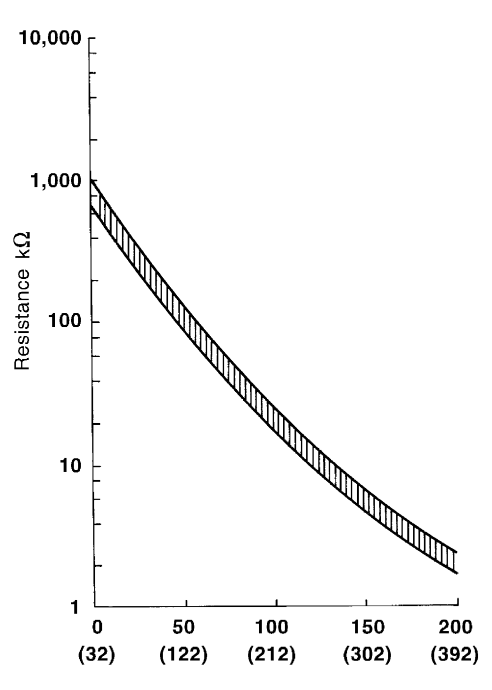
EGR temperature sensor

Check resistance change and resistance value.

<Reference data>

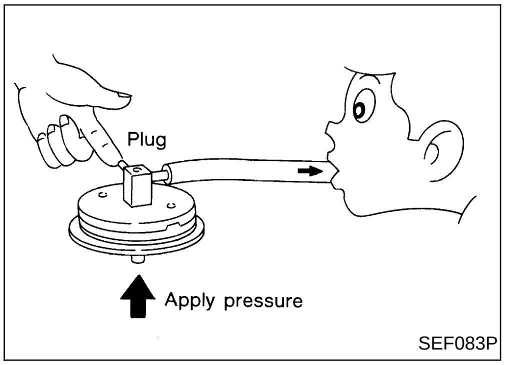
EGR temperature °C (°F)	Voltage V	Resistance MΩ
0 (32)	4.61	0.68 - 1.11
50 (122)	2.53	0.09 - 0.12
100 (212)	0.87	0.017 - 0.024

If NG, replace EGR temperature sensor.



SEF320U

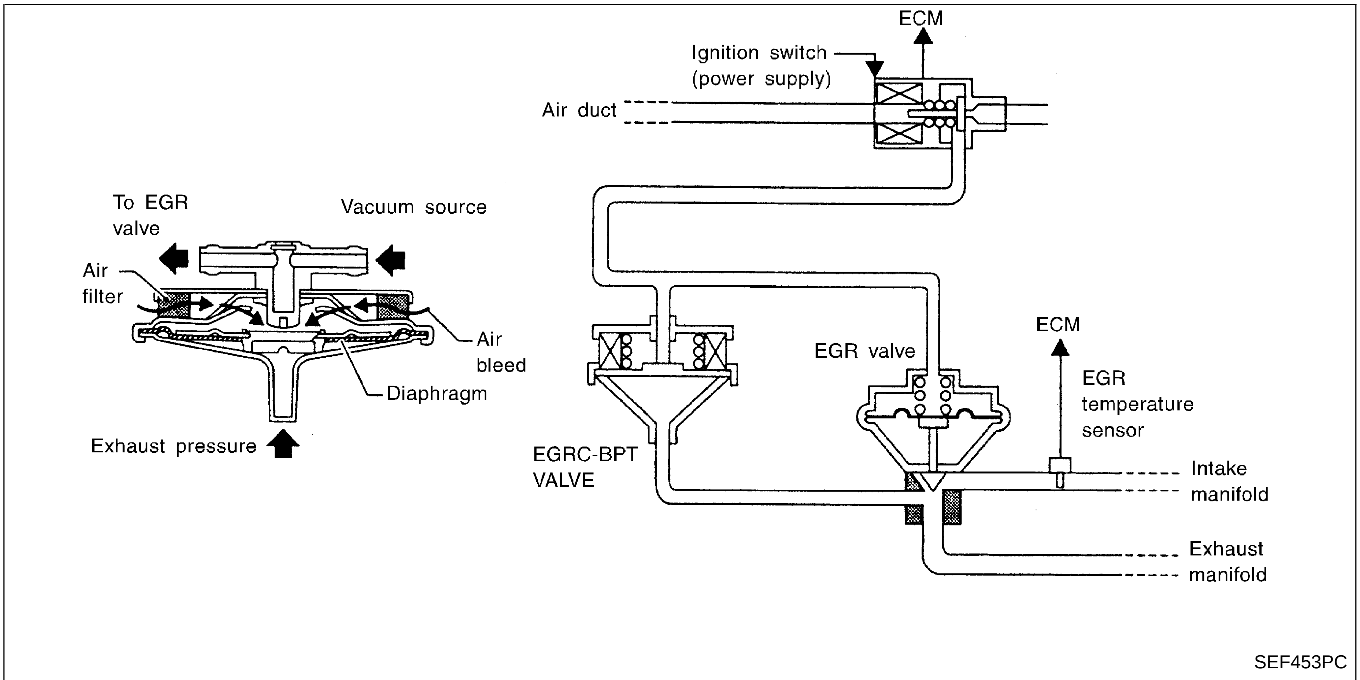
EGR Function (Close) (Cont'd)



EGRC-BPT valve

1. Plug one of two ports of EGRC-BPT valve.
2. Vacuum from the other port and check for leakage while applying a pressure above 0.981 kPa (100 mmH_2O, 3.94 inH_2O) from under EGRC-BPT valve.
3. If a leakage is noted, replace the valve.

EGRC-BPT Valve Function



SYSTEM DESCRIPTION

The EGRC-BPT valve monitors exhaust pressure to activate the diaphragm, controlling throttle body vacuum applied to the EGR valve. In other words, recirculated exhaust gas is controlled in response to positioning of the EGR valve or to engine operation.

ON BOARD DIAGNOSIS LOGIC

If too much EGR flow exists due to an EGRC-BPT valve malfunction, off idle engine roughness will increase. If the roughness is large, then the vacuum to the EGR valve is interrupted through the EGRC-solenoid valve. If the engine roughness is reduced at that time, the EGRC-BPT valve malfunction is indicated.

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0402	● The EGRC-BPT valve does not operate properly.	● EGRC-BPT valve ● EGR valve ● Misconnected rubber tube ● Blocked rubber tube ● Camshaft position sensor ● Blocked exhaust system ● Orifice ● Mass air flow sensor ● EGRC-solenoid valve

EGRC-BPT Valve Function (Cont'd)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

CAUTION:

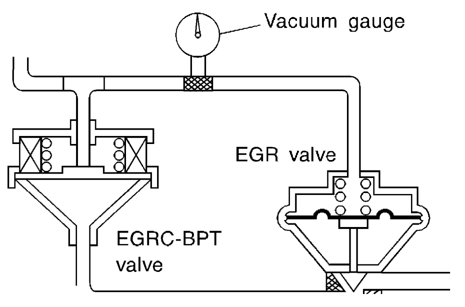
- **Always drive vehicle at a safe speed.**

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

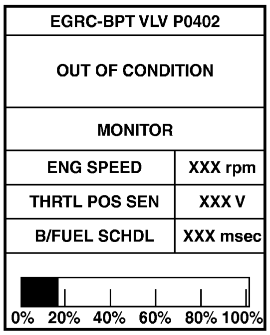
TESTING CONDITION:

- **For best results, perform test at a temperature above 5°C (41°F).**
- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**



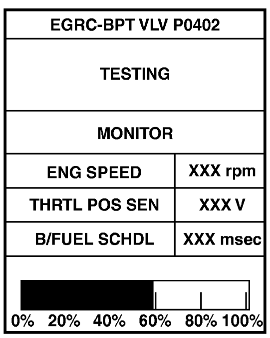
SEF930V

1) Install vacuum gauge between EGRC-BPT valve and EGR valve as shown in the illustration.
2) Start engine and warm it up to normal operating temperature.
3) Stop engine and wait at least 5 seconds.
4) Turn ignition switch "ON" and select "EGRC-BPT/VLV P0402" of "EGR SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.



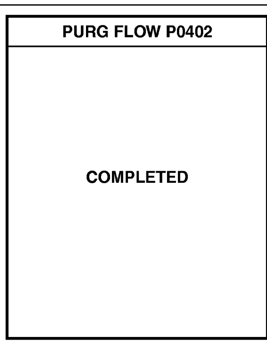
SEF718Z

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



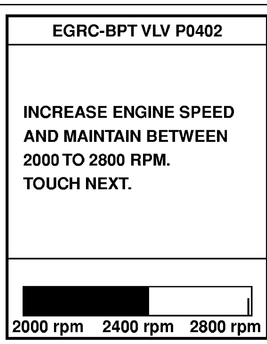
SEF719Z

8) When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen and the bar chart may increase. Maintain the conditions many times until "COMPLETED" appears.
   Selector lever: Suitable position
   ENG SPEED: 1,200 - 1,600 rpm (A/T)
   1,000 - 2,000 rpm (M/T)
   Vehicle speed: 30 - 54 km/h (19 - 34 MPH) (A/T)
   30 - 100 km/h (19 - 62 MPH) (M/T)
   B/FUEL SCHDL: 5 - 6.5 msec (A/T)
   4.5 - 6.0 msec (M/T)
   THRTL POS SEN: 0.7 - 1.1V
   - **The bar chart on CONSULT-II screen indicates the status of this test. However, the test may be finished before the bar chart becomes full scale.**
   - **If the bar chart indication does not continue to progress, completely release accelerator pedal once and try to meet the conditions again.**
   - **If "TESTING" does not appear on CONSULT-II screen, retry from step 2).**



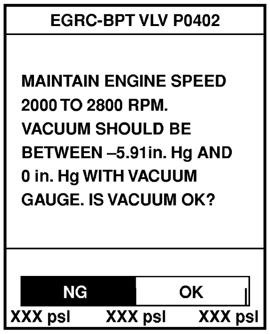
SEF720Z

9) If CONSULT-II instructs to carry out "OVERALL FUNCTION CHECK", go to next step. If "NG" is displayed, refer to "DIAGNOSTIC PROCEDURE", EC-278.
10) Open engine hood.
11) Raise engine speed to 2400 ± 400 rpm under no-load and hold it. Then touch "NEXT" on CONSULT-II screen.



PEF034W

EGRC-BPT Valve Function (Cont'd)

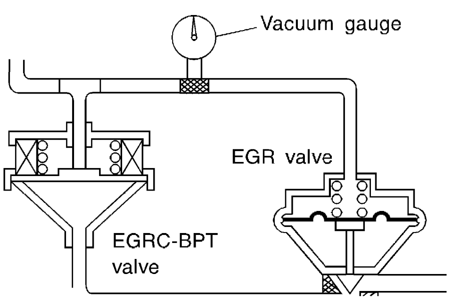


PEF035W

12) Check vacuum gauge while keeping engine speed 2400 ± 400 rpm.
    Vacuum should be 0 to −20.0 kPa (0 to −150 mmHg, 0 to −5.91 inHg).
    If NG, go to "DIAGNOSTIC PROCEDURE", EC-278.
    If OK, touch "YES" on the CONSULT-II screen.
13) Check the rubber tube between intake manifold collector, EGRC-solenoid valve, EGR valve and EGRC-BPT valve for cracks, blockages or twist.
    If NG, repair or replace.
    If OK, touch "YES" on the CONSULT-II screen.

OVERALL FUNCTION CHECK

Use this procedure to check the overall function of the EGRC-BPT valve. During this check, a 1st trip DTC might not be confirmed.



SEF930V

1) Install vacuum gauge between EGRC-BPT valve and EGR valve as shown in the illustration.
2) Lift up vehicle.
3) Start engine and shift to 1st gear or 1 position.
4) Check vacuum gauge while keeping engine speed 2400 ± 400 rpm.
   Vacuum should be 0 to −20.0 kPa (0 to −150 mmHg, 0 to −5.91 inHg).
   If NG, go to "DIAGNOSTIC PROCEDURE", EC-278.
   If OK, go to next step.
5) Check rubber tube between intake manifold collector, EGRC-solenoid valve, EGR valve and EGRC-BPT valve for misconnection, cracks or blockages.
   If NG, repair or replace.

EGRC-BPT Valve Function (Cont'd)

DIAGNOSTIC PROCEDURE

INSPECTION START

↓

CHECK HOSE.
Check vacuum hose for clogging and improper connection.

- NG → Repair or replace vacuum hose.
- OK ↓

CHECK EXHAUST SYSTEM.
Check exhaust system for collapse.

- NG → Repair or replace exhaust system.
- OK ↓

CHECK ORIFICE.
Check if orifice is installed in vacuum hose between EGRC-BPT valve and EGRC-solenoid valve.

- NG → Replace vacuum hose.
- OK ↓

CHECK COMPONENT
(EGRC-BPT valve).
Refer to "COMPONENT INSPECTION" on next page.

- NG → Replace EGRC-BPT valve.
- OK ↓

CHECK COMPONENT
(Camshaft position sensor).
Refer to "COMPONENT INSPECTION", EC-265.

- NG → Replace camshaft position sensor.
- OK ↓

CHECK COMPONENT
(Mass air flow sensor).
Refer to "COMPONENT INSPECTION", EC-126.

- NG → Replace mass air flow sen-sor.
- OK ↓

CHECK COMPONENT
(EGRC-solenoid valve).
Refer to "COMPONENT INSPECTION" on next page.

- NG → Replace EGRC-solenoid valve.
- OK ↓

CHECK COMPONENT
(EGR valve).
Refer to "COMPONENT INSPECTION" on the next page.

- NG → Replace EGR valve.
- OK ↓

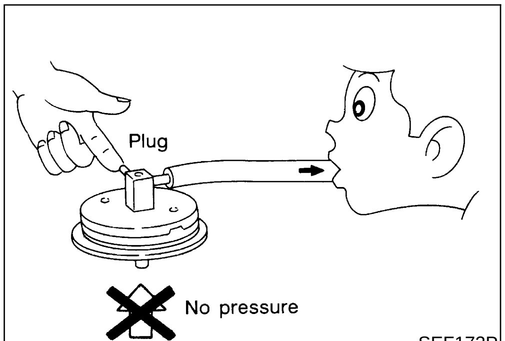
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-112.

↓

INSPECTION END

EGRC-BPT Valve Function (Cont’d)

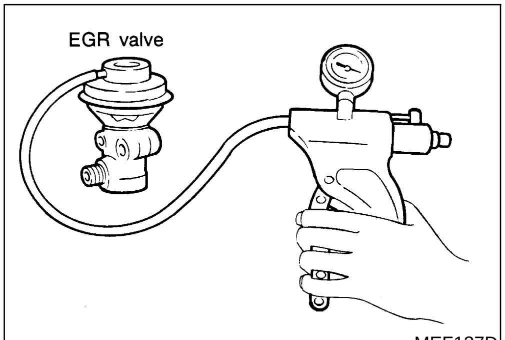
COMPONENT INSPECTION



SEF172P

EGRC-BPT valve

1. Plug one of two ports of EGRC-BPT valve.
2. Vacuum from the other port and check leakage without applying any pressure from under EGR-BPT valve.
   Leakage should exist.



MEF137D

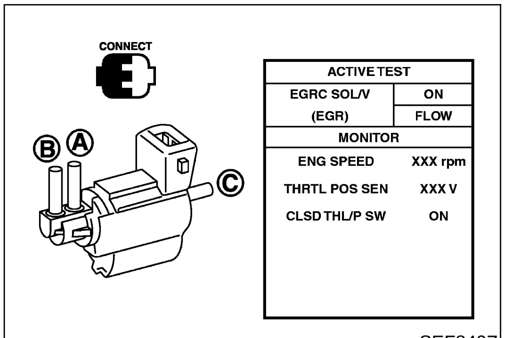
EGR valve

- Apply vacuum to EGR vacuum port with a hand vacuum pump.

EGR valve spring should lift.

- Check for sticking.

If NG, repair or replace EGR valve.



SEF840Z

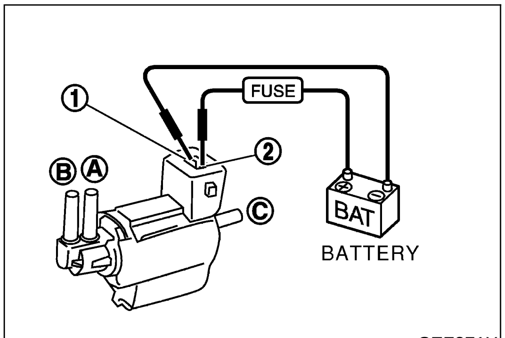
EGRC-solenoid valve

Check air passage continuity.

Perform “EGRC SOLENOID VALVE” in “ACTIVE TEST” mode.

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

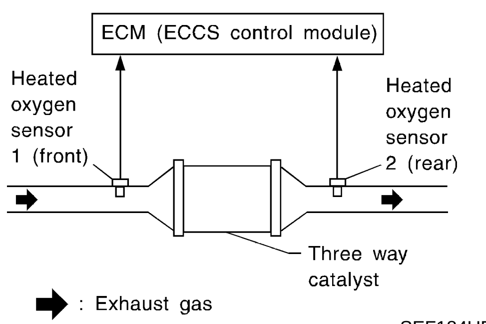
OR



SEF871X

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

If NG or operation takes more than 1 second, replace EGRC-solenoid valve.



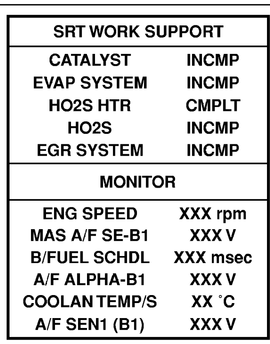
SEF184UF

Three Way Catalyst Function

ON BOARD DIAGNOSIS LOGIC

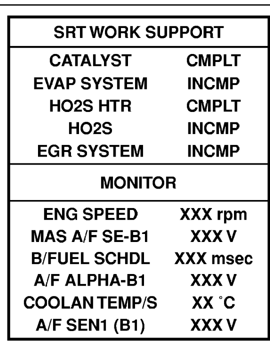
The ECM monitors the switching frequency ratio of heated oxygen sensors 1 (front) and 2 (rear).
Three way catalyst with high oxygen storage capacity will indicate a low switching frequency of heated oxygen sensor 2 (rear). As oxygen storage capacity decreases, the heated oxygen sensor 2 (rear) switching frequency will increase.
When the frequency ratio of heated oxygen sensors 1 (front) and 2 (rear) approaches a specified limit value, the three way catalyst malfunction is diagnosed.

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0420	● 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



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



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

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

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

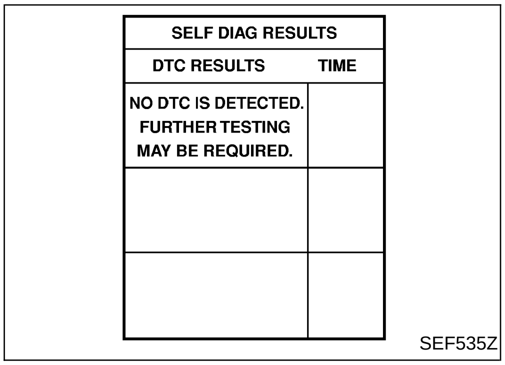
TESTING CONDITION:
- **Open engine hood before conducting following procedure.**
- **Do not hold engine speed more than specified minutes below.**

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 2,500 to 3,500 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 2,000 to 3,000 rpm and hold it until "INCMP" of "CATALYST" changes to "CMPLT" (It will take maximum of approximately 5 minutes.)

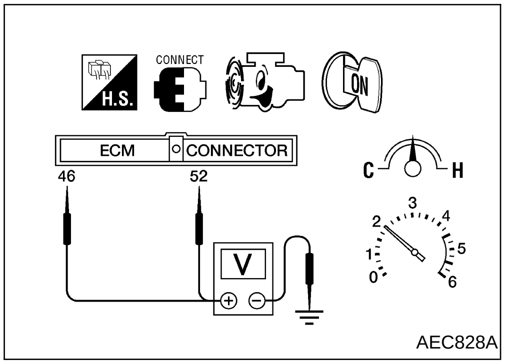
Three Way Catalyst Function (Cont'd)



SEF535Z

7) Select "SELF-DIAG RESULTS" mode with CONSULT-II.
   If the 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-282. If not "CMPLT", stop engine and cool down "COOLANT TEMP/SE" to less than 70°C (158°F) and then retest from step 1).

OR



AEC828A

OVERALL FUNCTION CHECK

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

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 46 [heated oxygen sensor 1 (front) signal] and engine ground, and ECM terminals 52 [heated oxygen sensor 2 (rear) signal] and ground.
4) Keep engine speed at 2,000 rpm constant under no load.
5) Make sure that the voltage switching frequency (high & low) between ECM terminals 52 and ground is much less than that of ECM terminals 46 and 43.
   Switching frequency ratio =

$$\frac{\textbf{Heated oxygen sensor 2 (rear) voltage switching frequency}}{\textbf{Heated oxygen sensor 1 (front) voltage switching frequency}}$$

   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 46 does not switch periodically more than 5 times within 10 seconds at step 4, perform TROUBLE DIAGNOSIS FOR DTC P0133 first. (See EC-156.)

6) If NG, go to "DIAGNOSTIC PROCEDURE", EC-282.

GI
MA
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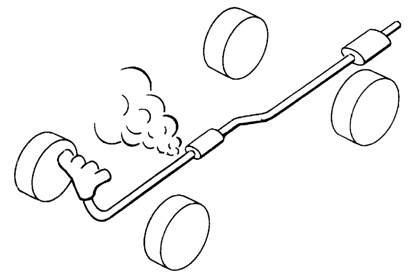
Three Way Catalyst Function (Cont'd)

DIAGNOSTIC PROCEDURE

A



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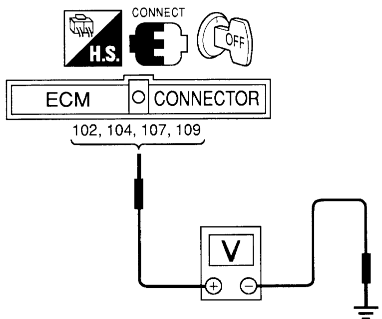
B



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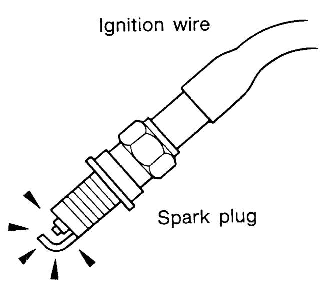
C



SEF282G

INSPECTION START

↓

CHECK EXHAUST SYSTEM.
Visually check exhaust tubes and muffler for dent.

NG → Repair or replace it.

OK ↓

A

CHECK EXHAUST AIR LEAK.
Start engine and run it at idle. Listen for an exhaust air leak before the three way catalyst.

NG → Repair or replace.

OK ↓

CHECK INTAKE AIR LEAK.
Start engine and run it at idle. Listen for an intake air leak after the mass air flow sensor.

NG → Repair or replace.

OK ↓

B

CHECK INJECTORS.
1. Refer to WIRING DIAGRAM for Injectors, EC-451.
2. Turn ignition switch "ON".
3. Check voltage between ECM terminals 102, 104, 107 and 109 and ground with CONSULT-II or tester.
   Battery voltage should exist.

NG → Perform TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS, "Injector", EC-451.
Repair harness or connectors.

OK ↓

C

CHECK IGNITION SPARK.
1. Disconnect ignition wire from spark plug.
2. Connect a known-good spark plug to the ignition wire.
3. Place end of spark plug against a suitable ground and crank engine.
4. Check for spark.

NG → CHECK COMPONENT (Ignition wires).
Refer to "COMPONENT INSPECTION", EC-248.

- NG → Replace.
- OK → Check ignition coil, power transistor and their circuits. Refer to EC-445.

OK ↓

1. Turn ignition switch "OFF".
2. Remove injector assembly.
   Refer to EC-35.
   Keep fuel hose and all injectors connected to injector gallery.

↓

Check ignition timing.
Refer to "Basic Inspection", EC-83.

NG → Adjust ignition timing.

OK ↓

A

(Go to next page.)

Three Way Catalyst Function (Cont'd)

A

1. Disconnect camshaft position sensor harness connector.
2. Turn ignition switch "ON".
   Make sure fuel does not drip from injector.

Drips → Replace the injector(s) from which fuel is dripping.

Does not drip ↓

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-112.

Trouble is not fixed → Replace warm-up three way catalyst.

Trouble is fixed ↓

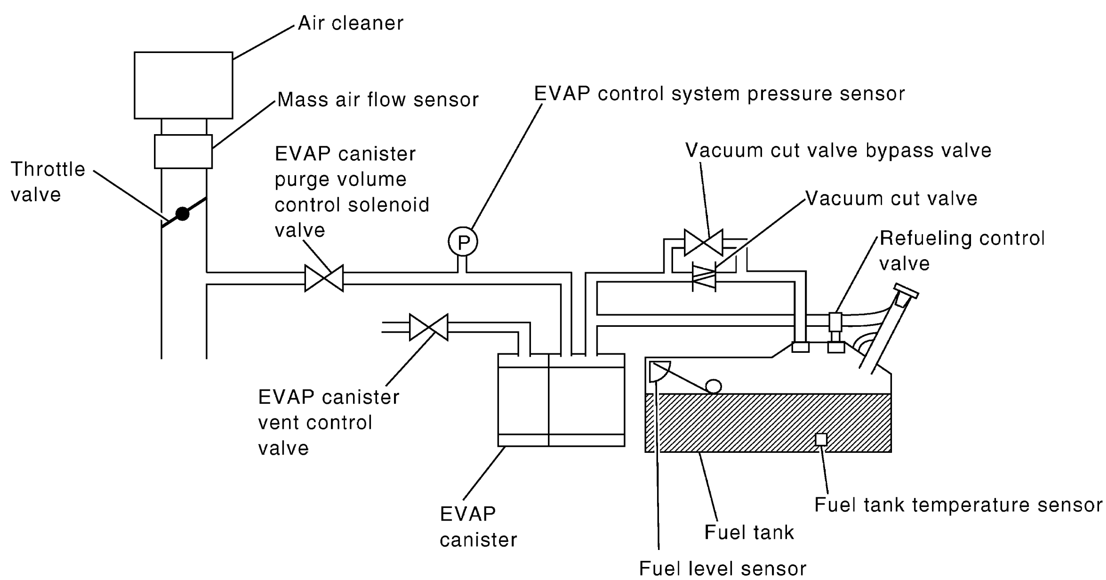
INSPECTION END

Evaporative Emission (EVAP) Control System (Small Leak) (Negative Pressure)

Note: If both DTC P0440 and P1448 are displayed, perform TROUBLE DIAGNOSIS FOR DTC P1448 first. (Refer to EC-405.)

ON BOARD DIAGNOSIS LOGIC

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 condition.
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 depressurization is implemented, the EVAP canister purge volume control solenoid valve will be closed.



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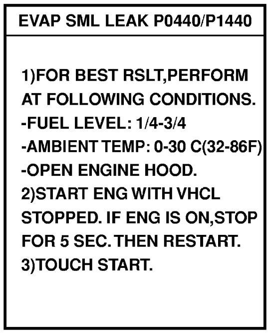
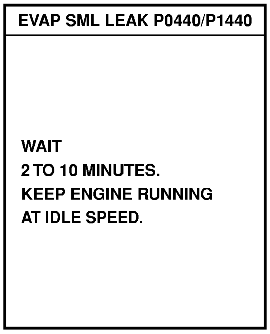
Evaporative Emission (EVAP) Control System (Small Leak) (Negative Pressure) (Cont'd)

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P0440	● 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 volume purge 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 ● 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

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.**



SEF565X



SEF566X

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

CAUTION:
Never remove fuel filler cap during the DTC confirmation procedure.

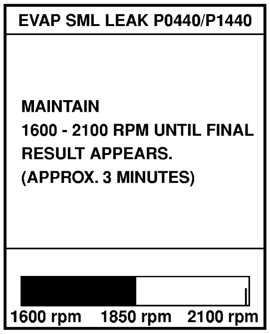
NOTE:
- **If DTC P0440 is displayed with P1448, perform TROUBLE DIAGNOSIS FOR DTC P1448 first. Refer to EC-405.**
- **If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.**

TESTING CONDITION:
- **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 5 seconds.
3) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.

GI MA EM LC EC FE CL MT AT FA RA BR ST RS BT HA EL IDX

Evaporative Emission (EVAP) Control System (Small Leak) (Negative Pressure) (Cont'd)



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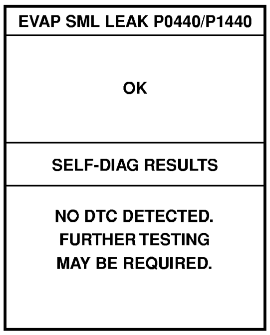


SEF567X

4) Check that the following conditions are met.
COOLAN TEMP/S: 0 - 70°C (32 - 158°F)
INT/A TEMP SE: 0 - 60°C (32 - 140°F)
5) Select "EVAP SML LEAK P0440" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
Follow the instruction displayed.

NOTE:
- **If the engine cannot be maintained within the range on CONSULT-II screen, go to "Basic Inspection", EC-83.**
- **Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.**

6) Make sure that "OK" is displayed.
If "NG" is displayed, refer to "DIAGNOSTIC PROCEDURE", EC-287.

OR

NOTE:
Be sure to read the explanation of "Driving pattern" on EC-52 before driving vehicle.

1) Start engine.
2) Drive vehicle according to "Driving pattern", EC-52.
3) Stop vehicle.
4) Select "MODE 1" with GST.
- If SRT of EVAP system is not set yet, go to the following step.
- If SRT of EVAP system is set, the result will be OK.

5) Turn ignition switch "OFF" and wait at least 5 seconds.
6) Start engine.

It is not necessary to cool engine down before driving.

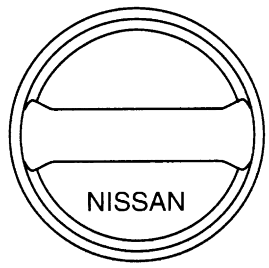
7) Drive vehicle again according to the "Driving pattern".
8) Stop vehicle.
9) Select "MODE 3" with GST.
- If P1447 is displayed on the screen, go to "TROUBLE DIAGNOSIS FOR DTC P1447", EC-398.
- If P0440 is displayed on the screen, go to "DIAGNOSTIC PROCEDURE", EC-287.
- If P1440 is displayed on the screen, go to "Diagnostic procedure", EC-374.
- If P0440, P1440 and P1447 are not displayed on the screen, go to the following step.

10) Select "MODE 1" with GST.
- If SRT of EVAP system is set, the result will be OK.
- If SRT of EVAP system is not set, go to step 5).

Evaporative Emission (EVAP) Control System (Small Leak) (Negative Pressure) (Cont'd)

DIAGNOSTIC PROCEDURE

A



SEF434Q

INSPECTION START

↓

A **CHECK FUEL FILLER CAP.**

1. Turn ignition switch "OFF".
2. Check for genuine NISSAN fuel filler cap design.
   If NG, replace with genuine NISSAN fuel filler cap.
   If OK, go to next step.
3. Check that the cap is tightened properly by rotating the cap clockwise.
   - Open fuel filler cap, then clean cap and fuel filler neck threads using air blower.
   - Retighten until ratcheting sound is heard.
   If OK, go to next step.
4. Check for air releasing sound while opening the fuel filler cap.

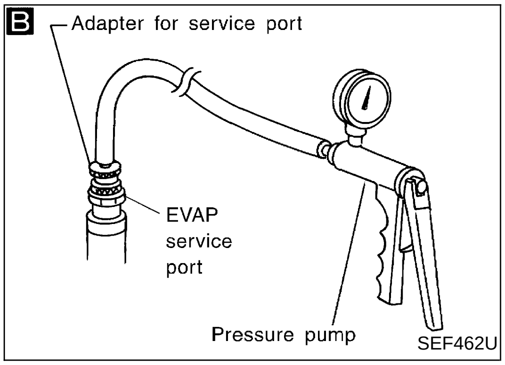
NG → Check fuel tank vacuum relief valve. (Refer to "FUEL TANK VACUUM RELIEF VALVE (Built into fuel filler cap)", EC-24.
If NG, replace with genuine NISSAN fuel filler cap.
If OK, go to **B** "CHECK FOR EVAP LEAK".

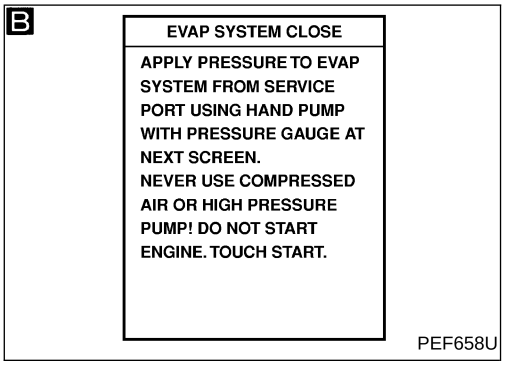
↓ OK

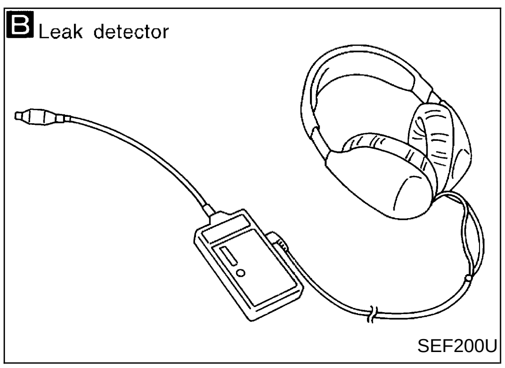
A

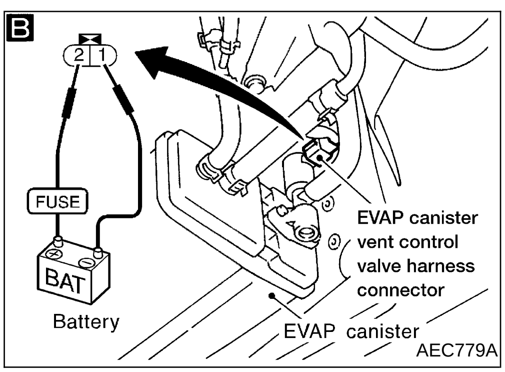
(Go to next page.)

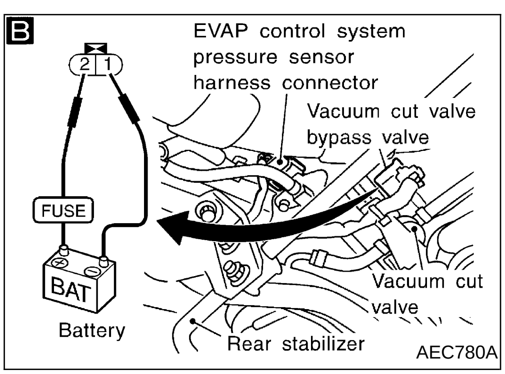
Evaporative Emission (EVAP) Control System (Small Leak) (Negative Pressure) (Cont'd)











Ⓐ

↓

B

CHECK FOR EVAP LEAK.

- **Never use compressed air or high pressure pump.**
- **Improper installation of service port may cause leaking.**
- **Do not exceed 4.12 kPa (0.042 kg/cm^2, 0.6 psi) of pressure in the system.**

To locate EVAP leak portion, proceed with the following steps.

1. Install the EVAP service port adapter and the pressure pump securely.

(With CONSULT-II)

2. Turn ignition switch "ON". Select "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-II.
3. Touch "START" and apply vacuum into the EVAP line until the pressure indicator reaches the middle of bar graph.
4. Using EVAP leak detector, locate the leak portion. For the leak detector, refer to instruction manual for more details. Refer to "Evaporative Emission Line Drawing", EC-26.

OR

(Without CONSULT-II)

2. Turn ignition switch "OFF".
3. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)
4. Apply 12 volts DC to vacuum cut valve bypass valve. The valve will open. (Continue to apply 12 volts until the end of test.)
5. Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg).
6. Locate the leak using a leak detector. Refer to the instruction manual for more details about the leak detector. Refer to "Evaporative Emission Line Drawing", EC-26.

NG → Repair or replace.

↓ OK

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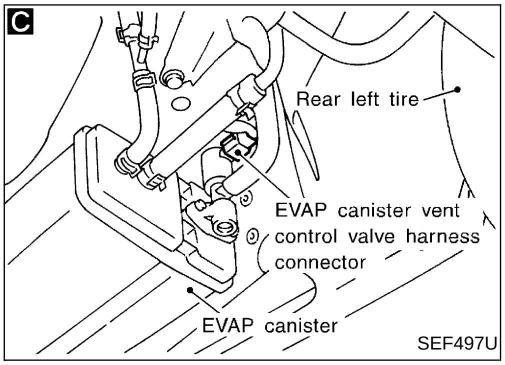
(Go to next page.)

Evaporative Emission (EVAP) Control System (Small Leak) (Negative Pressure) (Cont'd)

C



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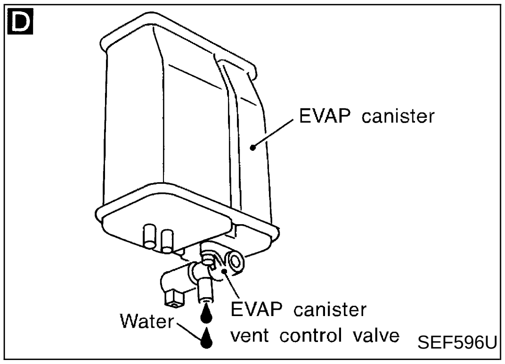
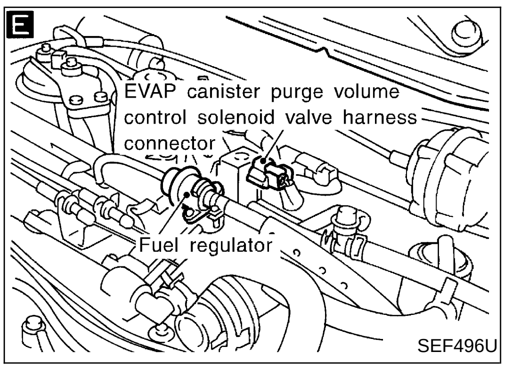


E

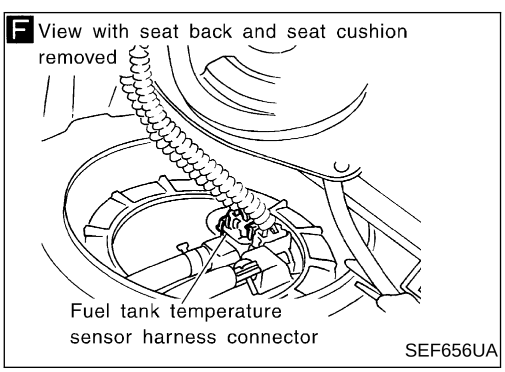


E

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
HO2S1 MNTR (B1)	LEAN
THRTL POS SEN	XXX V

SEF866Z

F



B

C

CHECK COMPONENT AND CIRCUIT
(EVAP canister vent control valve, O-ring and water separator).
Refer to "TROUBLE DIAGNOSIS FOR DTC P0446" for circuit, EC-299 and "COMPONENT INSPECTION", EC-304.

NG → Repair or replace EVAP canister vent control valve and O-ring or harness/ connector.

OK

D

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. If it will, weigh the EVAP canister with the vent control valve attached.
   If the weight is:

More than 1.8 kg (4.0 lb) → NG
Less than 1.8 kg (4.0 lb) → OK

NG → Replace EVAP canister and check the following.
1. Check hose connection between EVAP canister and water separator for clogging and poor connection.
2. Check water separator.
   Refer to "COMPONENT INSPECTION", EC-292.

If NG, repair hose or replace water separator.

OK

E

CHECK COMPONENT (EVAP canister purge volume control solenoid valve).
1. Disconnect EVAP 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 EVAP hose for vacuum.
   Vacuum should exist.

OR

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect EVAP hose to EVAP canister purge volume control solenoid valve.
4. Start engine and let it idle for at least 80 seconds.
5. Check EVAP hose for vacuum.
   Vacuum should exist.

NG → Check the following.
- EVAP canister purge volume control solenoid valve
  Refer to "COMPONENT INSPECTION", EC-291.
- Vacuum hoses for clogging or disconnection
  Refer to "Vacuum Hose Drawing", EC-16.

OK

F

CHECK COMPONENT
(Fuel tank temperature sensor).
Refer to "COMPONENT INSPECTION", EC-292.

NG → Replace fuel tank temperature sensor.

OK

C

(Go to next page.)

Evaporative Emission (EVAP) Control System (Small Leak) (Negative Pressure) (Cont'd)

C

CHECK COMPONENT
(EVAP control system pressure sensor).
Refer to "COMPONENT INSPECTION", EC-309.

NG → Replace EVAP control system pressure sensor.

OK ↓

CHECK COMPONENT.
Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection.
Refer to "EVAPORATIVE EMISSION SYSTEM", EC-26.

NG → Repair or reconnect the hose.

OK ↓

CHECK COMPONENT
(Refueling control valve).
Refer to "COMPONENT INSPECTION", EC-31.

NG → Replace refueling control valve.

OK ↓

Check hoses between EVAP canister and refueling control valve for disconnection.
For location, refer to "SYSTEM DESCRIPTION" in "On Board Refueling Vapor Recovery (ORVR)" on EC-28.

NG → Reconnect hoses properly.

OK ↓

Check signal line and recirculation line for disconnection. For location, refer to "SYSTEM DESCRIPTION" in "On Board Refueling Vapor Recovery (ORVR)" on EC-28.

NG → Reconnect lines properly.

OK ↓

Clean EVAP purge line (pipe and rubber tube) using air blower.

OK ↓

CHECK COMPONENT
(Fuel level sensor).
Refer to "METERS AND GAUGES" in EL section.

NG → Repair harness or connectors or replace fuel level sensor.

OK ↓

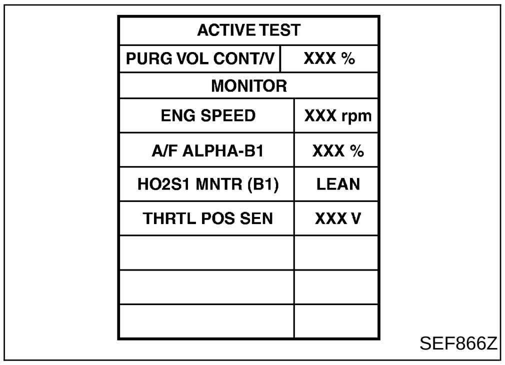
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-112.

↓

INSPECTION END

Evaporative Emission (EVAP) Control System (Small Leak) (Negative Pressure) (Cont’d)

COMPONENT INSPECTION

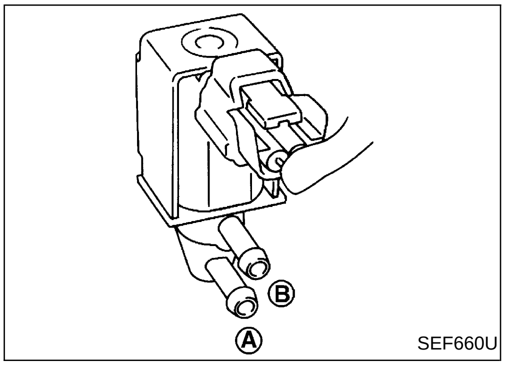


SEF866Z

EVAP canister purge volume control solenoid valve

1. Start engine.
2. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-II. Check that engine speed varies according to the valve opening.
   If OK, inspection end. If NG, go to following step.
3. Check air passage continuity.

Condition PURG VOL CONT/V value	Air passage continuity between Ⓐ and Ⓑ
100.0%	Yes
0.0%	No



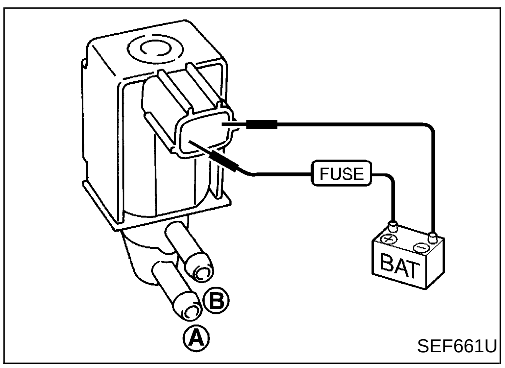
SEF660U

If NG, replace the EVAP canister purge volume control solenoid valve.

OR

Check air passage continuity.

Condition	Air passage continuity between Ⓐ and Ⓑ
12V direct current supply between terminals	Yes
No supply	No



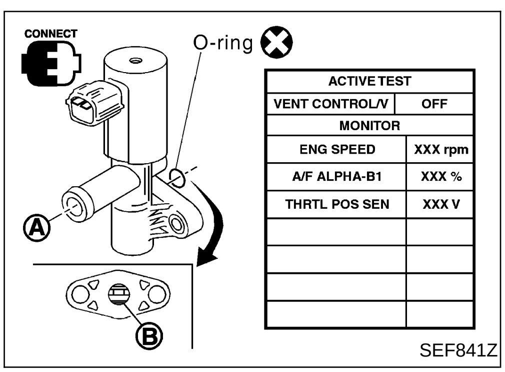
SEF661U

If NG or operation takes more than 1 second, replace solenoid valve.

EVAP canister vent control valve

Check air passage continuity.

Perform “VENT CONTROL/V” in “ACTIVE TEST” mode.

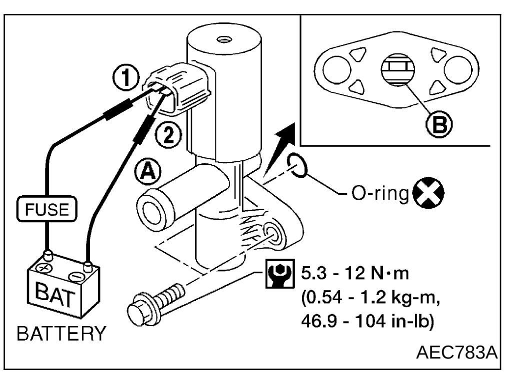


SEF841Z

Condition	Air passage continuity between Ⓐ and Ⓑ
ON	No
OFF	Yes

OR

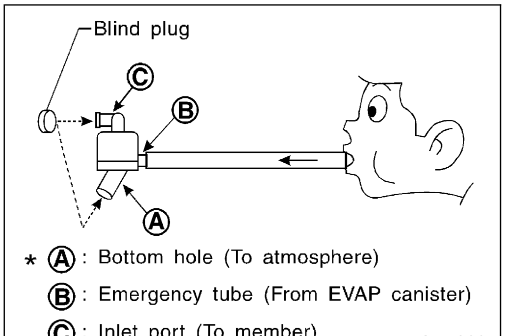
Condition	Air passage continuity between Ⓐ and Ⓑ
12V direct current supply between terminals ① and ②	No
No supply	Yes



AEC783A

If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.
If portion Ⓑ is rusted, replace control valve.
Make sure new O-ring is installed properly.

Evaporative Emission (EVAP) Control System (Small Leak) (Negative Pressure) (Cont'd)

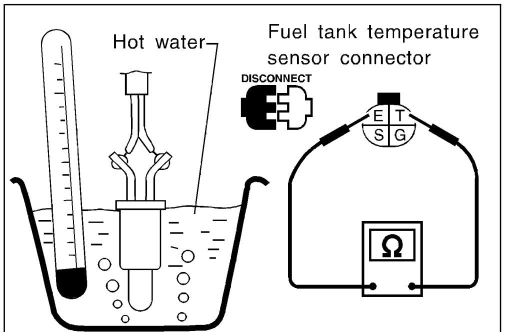


SEF829T

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 Ⓐ and Ⓒare not clogged by blowing air from Ⓑ with Ⓐ, and then Ⓒ plugged.
5. In case of NG in items 2 - 4, replace the parts.

- **Do not disassemble water separator.**



SEF314UA

Fuel tank temperature sensor

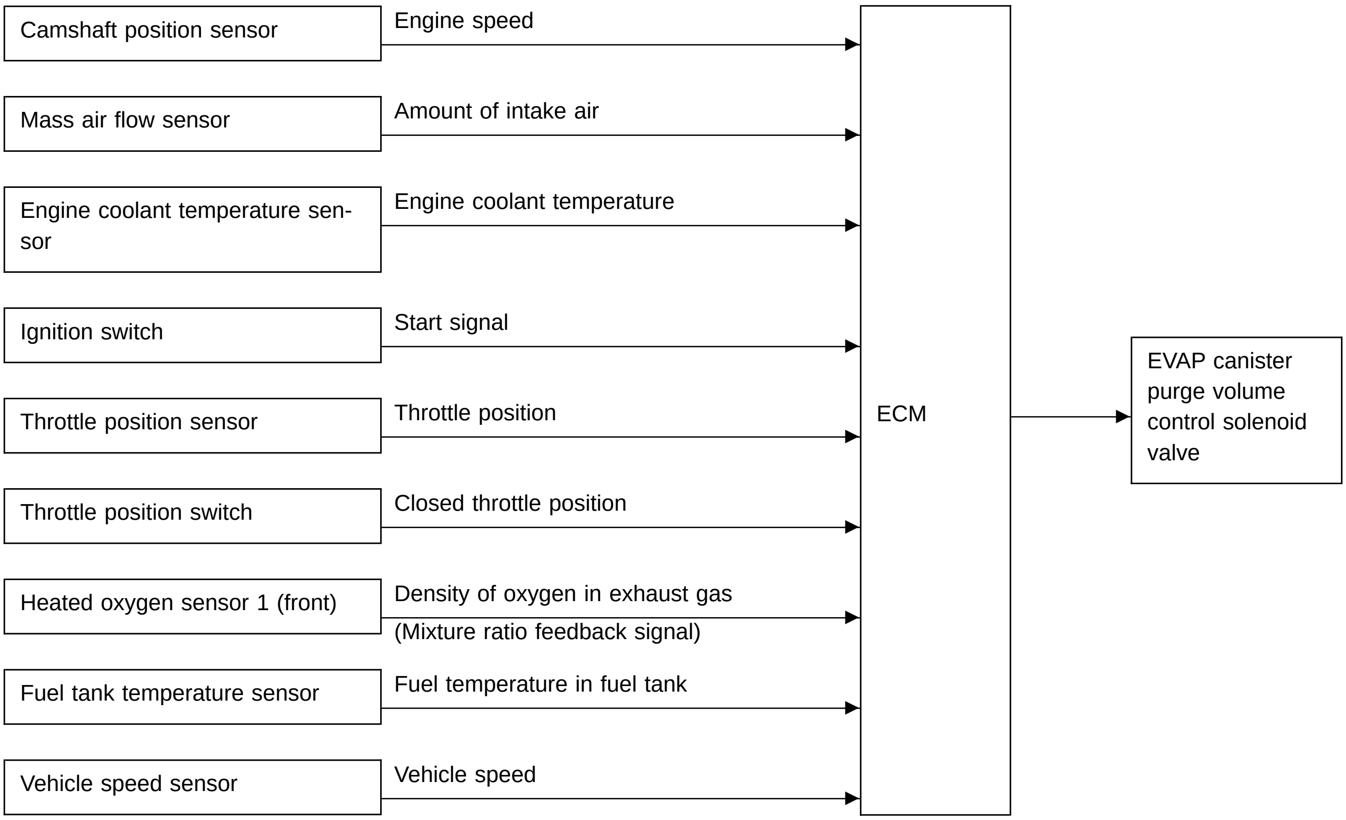
Check resistance by heating with hot water or heat gun as shown in the figure.

Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90

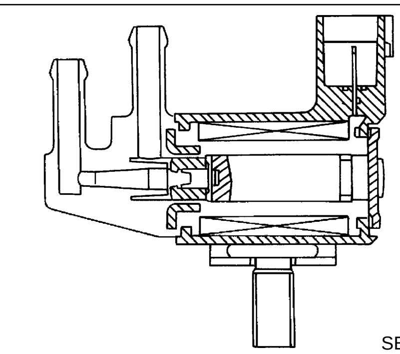
If NG, replace fuel tank temperature sensor.

Evaporative Emission (EVAP) Canister Purge Volume Control Solenoid Valve

SYSTEM DESCRIPTION



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.


SEF337U

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

Specification data are reference values

MONITOR ITEM	CONDITION		SPECIFICATION
PURG VOL C/V	● Engine: After warming up ● Air conditioner switch "OFF" ● No-load	Idle	0 %
		Vehicle running (Shift lever "1") 2,000 rpm (90 seconds after starting engine)	—

ECM TERMINALS AND REFERENCE VALUE

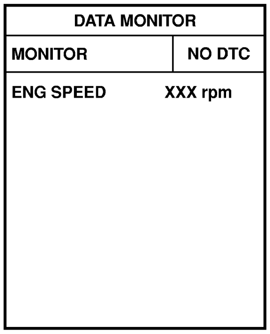
Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/output 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	W/G	ECM relay (Self-shutoff)	[Engine is running.] [Ignition switch "OFF"] For a few seconds after turning ignition switch "OFF"	0 - 1V
			[Ignition switch "OFF"] A few seconds passed after turning ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
5	L	EVAP canister purge volume control solenoid valve	[Engine is running.] Idle speed	BATTERY VOLTAGE (11 - 14V)
56	W/R	Power supply for ECM	[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)
61	W/R			

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P0443	● An improper voltage signal is sent to ECM through the valve.	● Harness or connectors (The valve circuit is open or shorted.) ● EVAP canister purge volume control solenoid valve



SEF058Y

Evaporative Emission (EVAP) Canister Purge Volume Control Solenoid Valve (Cont'd)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

NOTE:
If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm battery voltage is more than 11V.

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 "DIAGNOSTIC PROCEDURE", EC-297.

OR

1) Start engine and let it idle for at least 13 seconds.
2) Select "MODE 7" with GST.
3) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-297.

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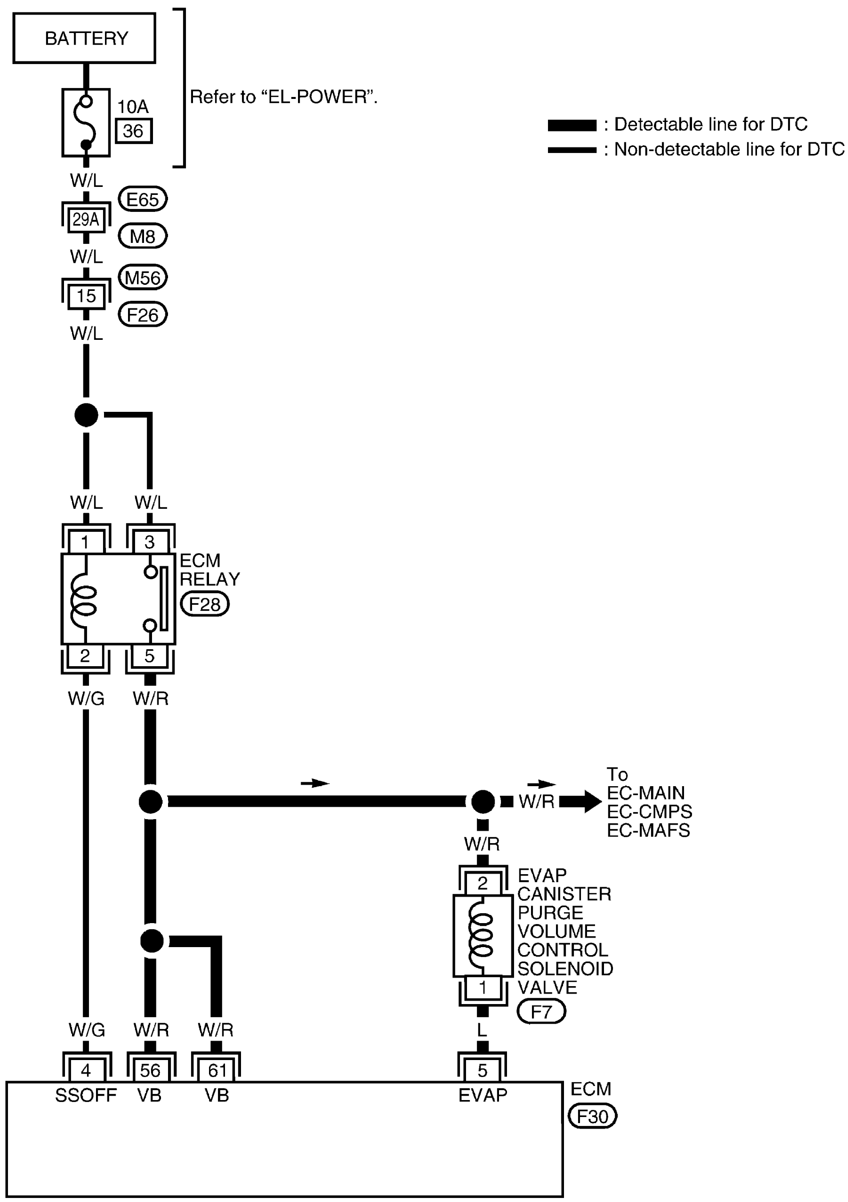
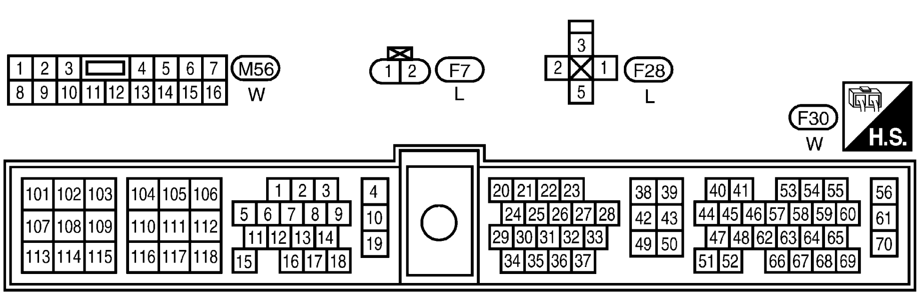
IDX

Evaporative Emission (EVAP) Canister Purge Volume Control Solenoid Valve (Cont'd)

EC-PGC/V-01





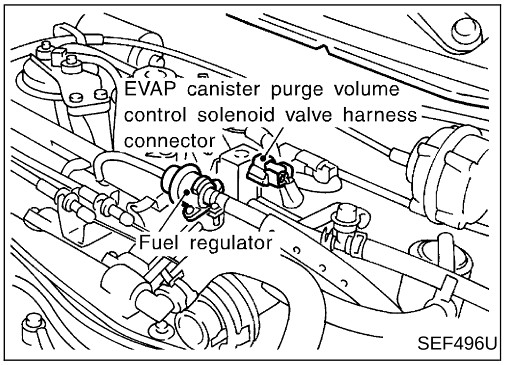
Refer to the following.

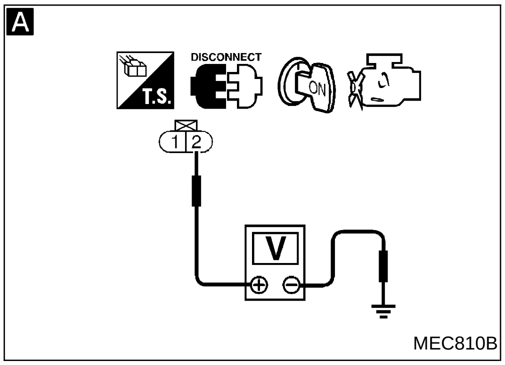
M8 , E65 - SUPER MULTIPLE JUNCTION (SMJ)

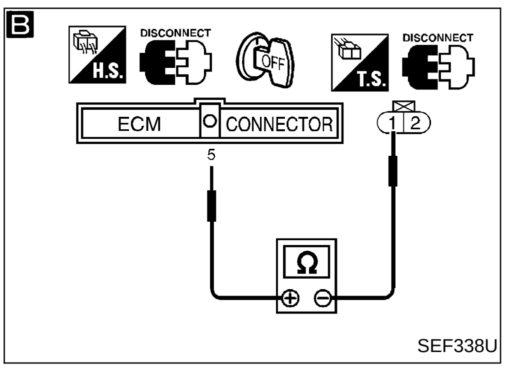
WEC706

Evaporative Emission (EVAP) Canister Purge Volume Control Solenoid Valve (Cont'd)

DIAGNOSTIC PROCEDURE







INSPECTION START

↓

A

CHECK POWER SUPPLY.
1. Turn ignition switch "OFF".
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
3. Turn ignition switch "ON".
4. Check voltage between terminal (2) and engine ground with CONSULT-II or tester.
   Voltage: Battery voltage

NG → Check the following.
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM relay
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM

If NG, repair harness or connectors.

↓ OK

B

CHECK OUTPUT SIGNAL CIRCUIT.
1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal (5) and terminal (1).
   Continuity should exist.
   If OK, check harness for short to ground and short to power.

NG → Check the following.
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM

If NG, repair open circuit or short to ground or short to power in harness or connectors.

↓ OK

CHECK COMPONENT
(EVAP canister purge volume control solenoid valve).
Refer to "COMPONENT INSPECTION" on next page.

NG → Replace EVAP canister purge volume control solenoid valve.

↓ OK

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-112.

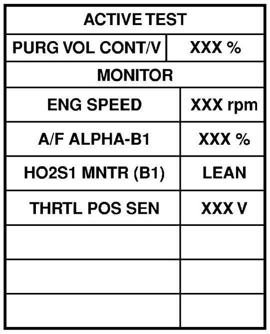
↓

INSPECTION END

Evaporative Emission (EVAP) Canister Purge Volume Control Solenoid Valve (Cont’d)

COMPONENT INSPECTION

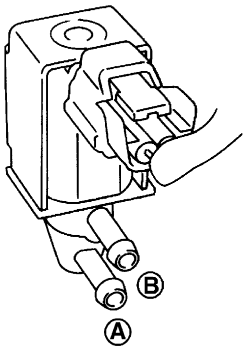
EVAP canister purge volume control solenoid valve



ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
HO2S1 MNTR (B1)	LEAN
THRTL POS SEN	XXX V

SEF801Y

1. Start engine.
2. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-II. Check that engine speed varies according to the valve opening.
   If OK, inspection end. If NG, go to following step.
3. Check air passage continuity.



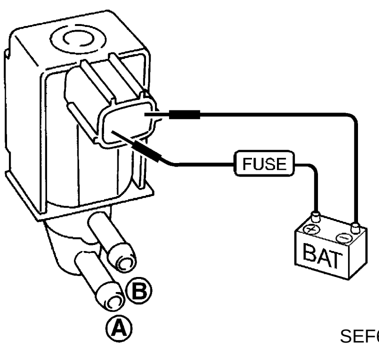
SEF660U

Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

If NG, replace the EVAP canister purge volume control solenoid valve.

OR

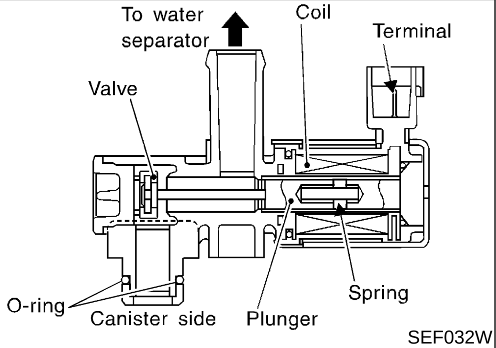
Check air passage continuity.



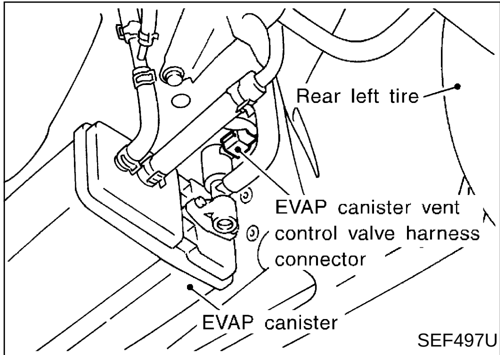
SEF661U

Condition	Air passage continuity between A and B
12V direct current supply between terminals	Yes
No supply	No

If NG or operation takes more than 1 second, replace solenoid valve.



SEF032W



SEF497U

Evaporative Emission (EVAP) Canister Vent Control Valve (Circuit)

COMPONENT DESCRIPTION

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent.
This solenoid (the EVAP canister vent control valve) responds to signals from the ECM.
When the ECM sends an ON signal, the coil in the solenoid valve is energized.
A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.
This solenoid valve is used only for diagnosis, and usually remains opened.
When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows "EVAP Control System (Small Leak)" diagnosis.

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

Specification data are reference values

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	● Ignition switch: ON	OFF

ECM TERMINALS AND REFERENCE VALUE

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

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

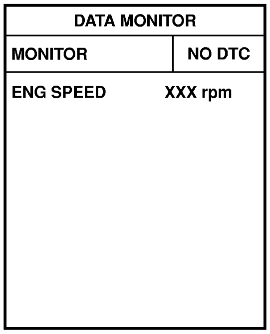
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
108	PU	EVAP canister vent control valve	Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P0446	● An improper voltage signal is sent to ECM through EVAP canister vent control valve.	● Harness or connectors (EVAP canister vent control valve circuit is open or shorted.) ● EVAP canister vent control valve

GI MA EM LC EC FE CL MT AT FA RA BR ST RS BT HA EL IDX

Evaporative Emission (EVAP) Canister Vent Control Valve (Circuit) (Cont’d)



SEF058Y

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If “DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch “OFF” and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

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

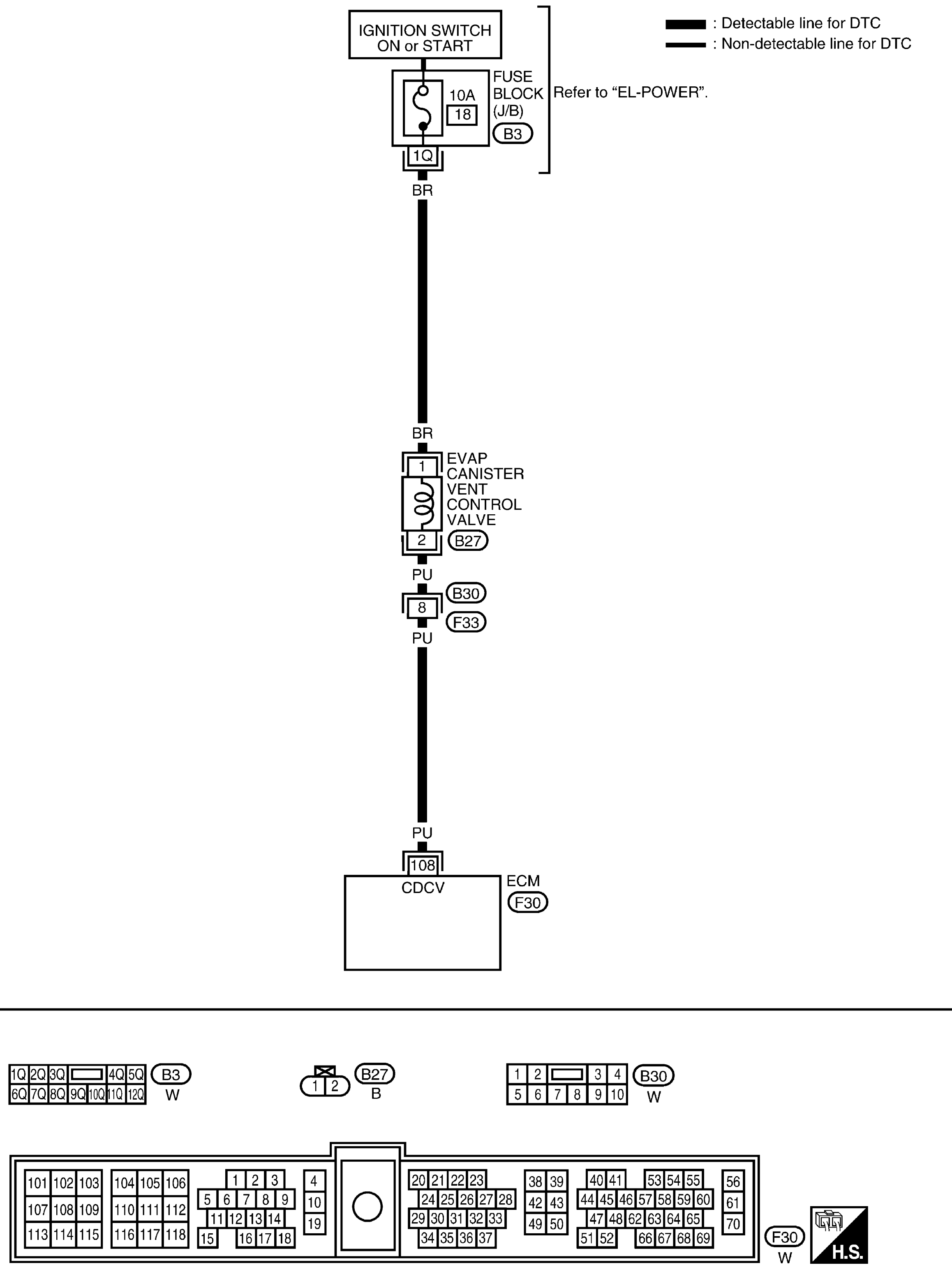
1) Turn ignition switch “ON”.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Start engine and wait at least 8 seconds.
4) If 1st trip DTC is detected, go to “DIAGNOSTIC PROCEDURE”, EC-302.

OR

1) Start engine and wait at least 8 seconds.
2) Select “MODE 7” with GST.
3) If 1st trip DTC is detected, go to “DIAGNOSTIC PROCEDURE”, EC-302.

Evaporative Emission (EVAP) Canister Vent Control Valve (Circuit) (Cont'd)

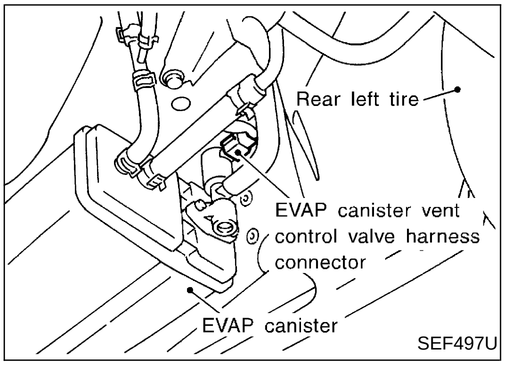
EC-VENT/V-01



WEC011

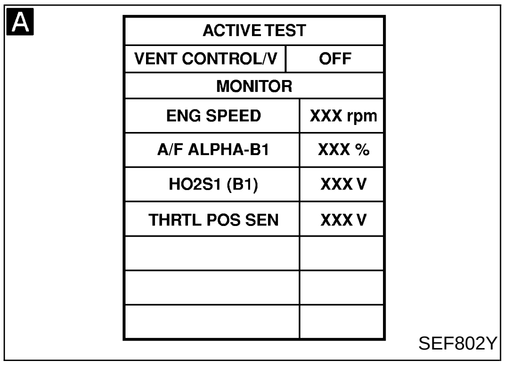
Evaporative Emission (EVAP) Canister Vent Control Valve (Circuit) (Cont'd)

DIAGNOSTIC PROCEDURE



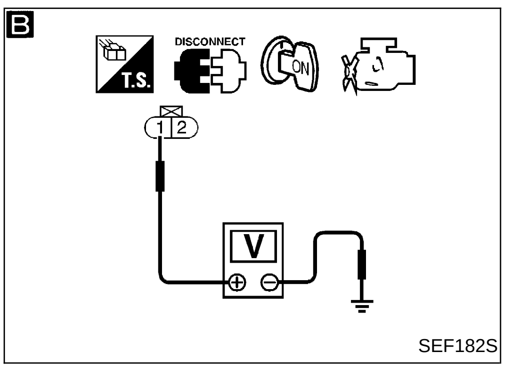
SEF497U

A



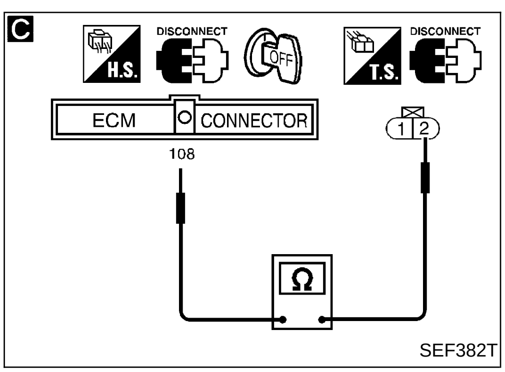
SEF802Y

B



SEF182S

C



SEF382T

INSPECTION START

- With CONSULT-II → **A**
- Without CONSULT-II → Go to CHECK POWER SUPPLY **B**.

A

CHECK CIRCUIT.
1. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
2. Make sure that ratching sound is heard from the vent control valve.

- OK → Go to "CHECK COMPONENT" after procedure **C**.
- NG ↓

B

CHECK POWER SUPPLY.
1. Disconnect EVAP canister vent control valve harness connector.
2. Turn ignition switch "ON".
3. Check voltage between terminal (1) and ground with CONSULT-II or tester.
   Voltage: Battery voltage

- NG → Repair harness or connectors.
- OK ↓

C

CHECK OUTPUT SIGNAL CIRCUIT.
1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal (108) and terminal (2).
   Continuity should exist.
   If OK, check harness for short to ground and short to power.

- NG → Check the following.
  - Harness connectors (B30), (F33)
  - Harness for open or short between EVAP canister vent control valve and ECM

  If NG, repair open circuit or short to ground or short to power in harness or connectors.
- OK ↓

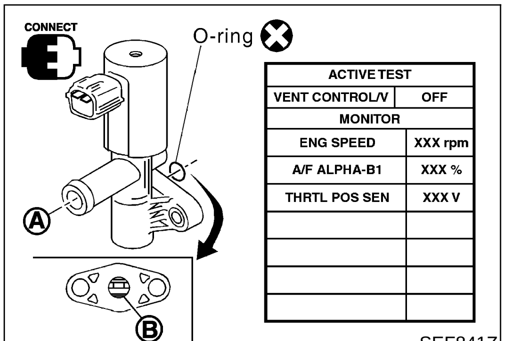
CHECK COMPONENT
(EVAP canister vent control valve and O-ring).
Refer to "COMPONENT INSPECTION" on next page.

- NG → Replace EVAP canister vent control valve and O-ring.
- OK ↓

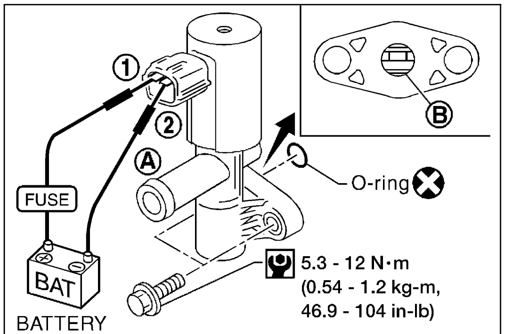
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-112.

↓

INSPECTION END



SEF841Z



AEC783A

Evaporative Emission (EVAP) Canister Vent Control Valve (Circuit) (Cont'd)

COMPONENT INSPECTION

EVAP canister vent control valve

Check air passage continuity.

Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.

Condition	Air passage continuity between Ⓐ and Ⓑ
ON	No
OFF	Yes

OR

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

If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.

If portion Ⓑ is rusted, replace control valve.

Make sure new O-ring is installed properly.

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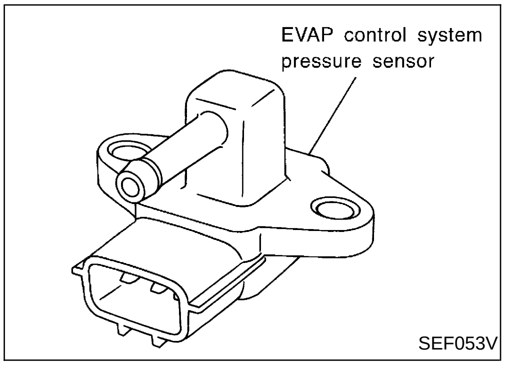
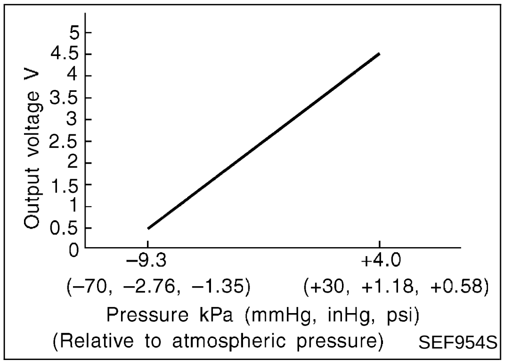




Evaporative Emission (EVAP) Control System Pressure Sensor

COMPONENT DESCRIPTION

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

Specification data are reference values

MONITOR ITEM	CONDITION	SPECIFICATION
EVAP SYS PRES	● Ignition switch: ON	Approx. 3.4V

ECM TERMINALS AND REFERENCE VALUE

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

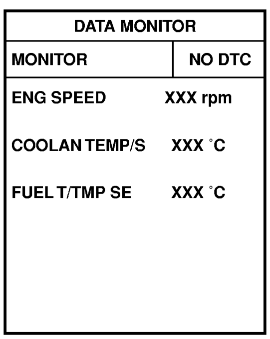
CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
49	R	Sensors' power supply	Ignition switch "ON"	Approximately 5V
50	B	Sensors' ground	Engine is running. (Warm-up condition) Idle speed	Approximately 0V
67	W	EVAP control system pressure sensor	Ignition switch "ON"	Approximately 3.4V

Evaporative Emission (EVAP) Control System Pressure Sensor (Cont’d)

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P0450	• An improper voltage signal from EVAP control system pressure sensor is sent to ECM.	• Harness or connectors (The EVAP control system pressure sensor circuit is open or shorted.) • Rubber hose to EVAP control system pressure 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



SEF194Y

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

NOTE:
If “DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch “OFF” and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:
Always perform at a temperature above 0°C (32°F).

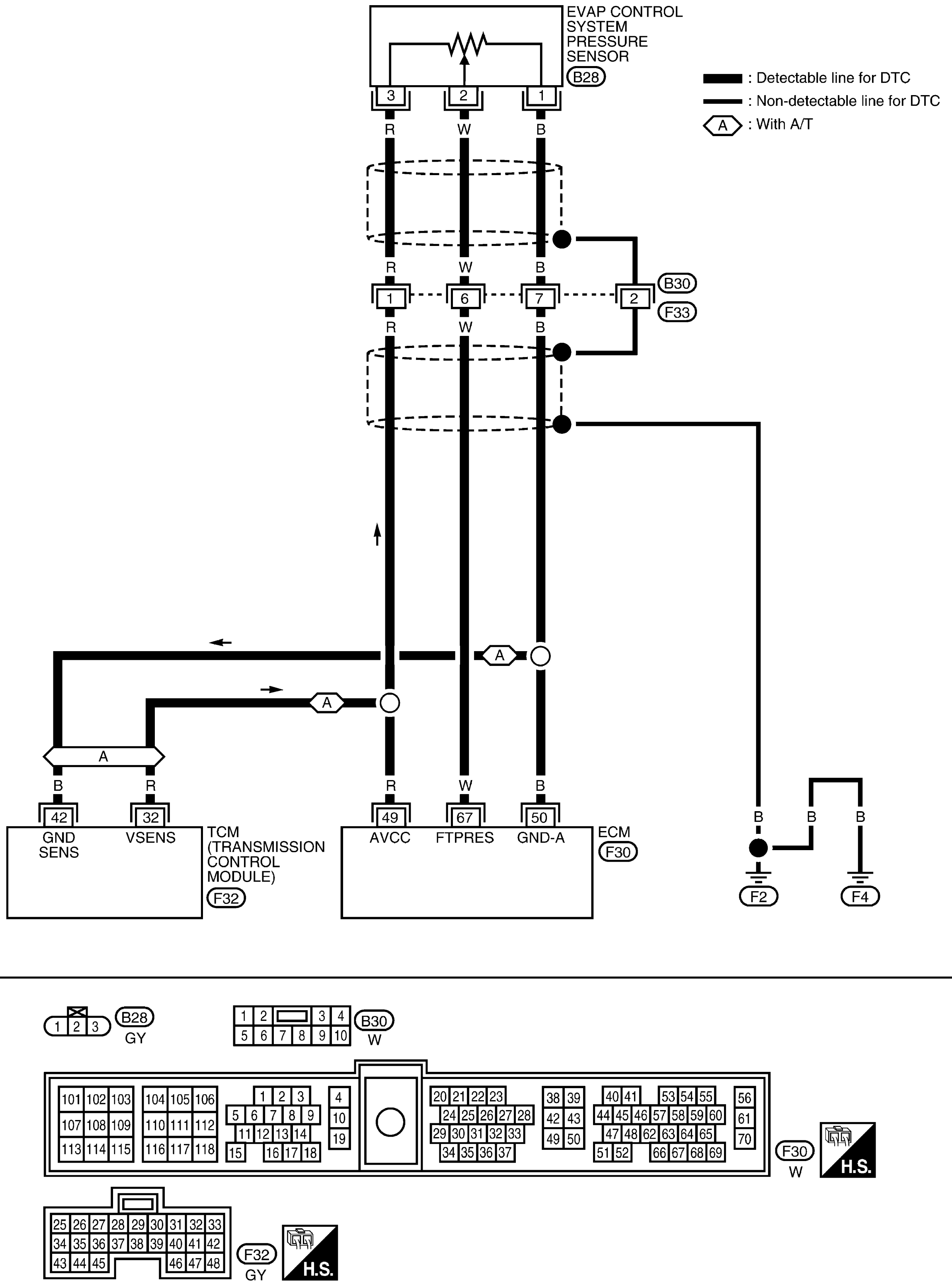
1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch “OFF” and wait at least 5 seconds.
3) Turn ignition switch “ON”.
4) Select “DATA MONITOR” mode with CONSULT-II.
5) Make sure that “FUEL T/TMP SE” is more than 0°C (32°F).
6) Start engine and wait at least 20 seconds.
7) If 1st trip DTC is detected, go to “DIAGNOSTIC PROCEDURE”, EC-307.

OR

1) Start engine and warm it up to normal operating temperature.
2) Check that voltage between ECM terminal 63 and ground is less than 4.2V.
3) Turn ignition switch “OFF” and wait at least 5 seconds.
4) Start engine and wait at least 20 seconds.
5) Select “MODE 7” with GST.
6) If 1st trip DTC is detected, go to “DIAGNOSTIC PROCEDURE”, EC-307.

Evaporative Emission (EVAP) Control System Pressure Sensor (Cont'd)

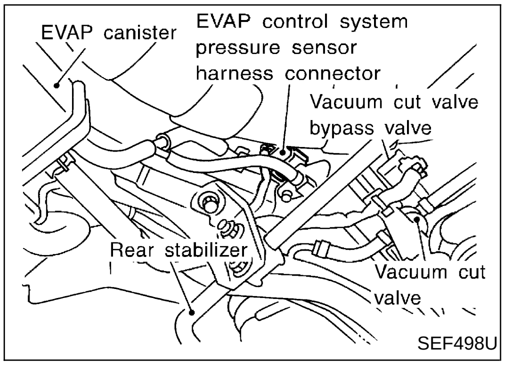
EC-PRE/SE-01



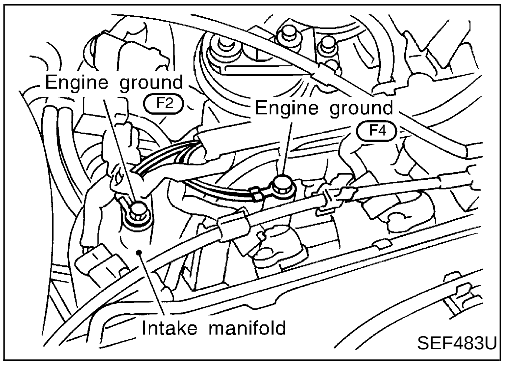
WEC012

Evaporative Emission (EVAP) Control System Pressure Sensor (Cont'd)

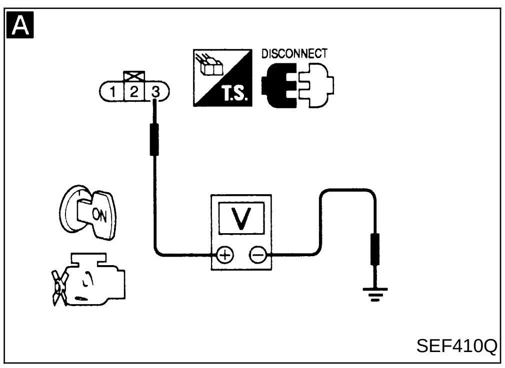
DIAGNOSTIC PROCEDURE



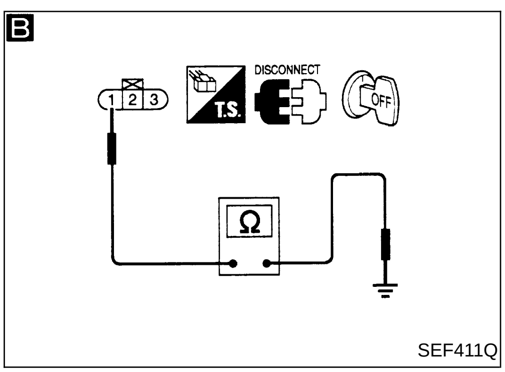
SEF498U



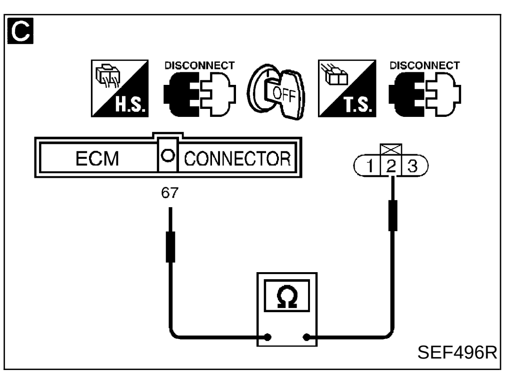
SEF483U



SEF410Q



SEF411Q



SEF496R

INSPECTION START

↓

CHECK RUBBER TUBE CONNECTED TO THE SENSOR.
Check rubber tube connected to the sensor for clogging, vent, kink, disconnection or improper connection.

- NG → Reconnect, repair or replace.

↓ OK

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

↓

A

CHECK POWER SUPPLY.
1. Disconnect EVAP control system pressure sensor harness connector.
2. Check sensor harness connector for water.
   Water should not exist.
   If OK, go to step 3. If NG, repair or replace harness connector.
3. Turn ignition switch "ON".
4. Check voltage between terminal 3 and engine ground with CONSULT-II or tester.
   Voltage: Approximately 5V

- NG → Check the following.
  - Harness connectors B30, F33
  - Harness for open or short between EVAP control system pressure sensor and ECM

  If NG, repair harness or connectors.

↓ OK

B

CHECK GROUND CIRCUIT.
1. Turn ignition switch "OFF".
2. Check harness continuity between terminal 1 and engine ground.
   Continuity should exist.
   If OK, check harness for short to power.

- NG → Check the following.
  - Harness connectors B30, F33
  - Harness for open or short between EVAP control system pressure sensor and ECM

  If NG, repair open circuit or short to power in harness or connectors.

↓ OK

C

CHECK INPUT SIGNAL CIRCUIT.
1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 67 and terminal 2.
   Continuity should exist.
   If OK, check harness for short to ground and short to power.

- NG → Check the following.
  - Harness connectors B30, F33
  - Harness for open or short between ECM and EVAP control system pressure sensor

  If NG, repair open circuit or short to ground or short to power in harness or connectors.

↓ OK

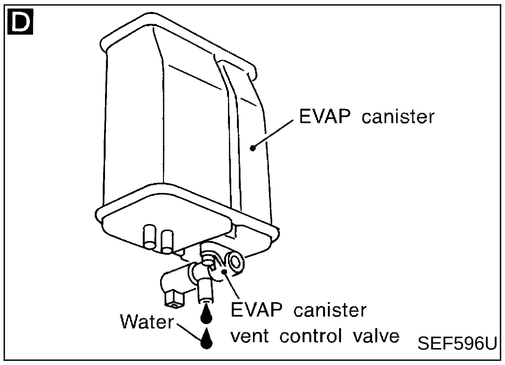
CHECK COMPONENT
(EVAP canister purge volume control solenoid valve).
Refer to "COMPONENT INSPECTION" on EC-298.

- NG → Replace EVAP canister purge volume control solenoid valve.

↓ OK

A
(Go to next page.)

Evaporative Emission (EVAP) Control System Pressure Sensor (Cont'd)



A

CHECK COMPONENT
(EVAP canister vent control valve).
Refer to "COMPONENT INSPECTION", EC-410.

↓ OK

CHECK COMPONENT
(EVAP control system pressure sensor).
Refer to "COMPONENT INSPECTION" below.

→ NG: Replace EVAP control system pressure sensor.

↓ OK

CHECK RUBBER TUBE FOR CLOGGING.
Check obstructed water separator and rubber tube to EVAP canister vent control valve and clean the rubber tube using air blower.
For water separator, refer to EC-397.

→ NG: Clean, repair or replace rubber tube and/or water separator.

↓ OK

D

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. If it will, weigh the EVAP canister with the vent control valve attached.

If the weight is:
More than 1.8 kg (4.0 lb) → NG
Less than 1.8 kg (4.0 lb) → OK

→ NG: Replace EVAP canister and check the following.
1. Check hose connection between EVAP canister and water separator for clogging and poor connection.
2. Check water separator. Refer to "COMPONENT INSPECTION", EC-396.

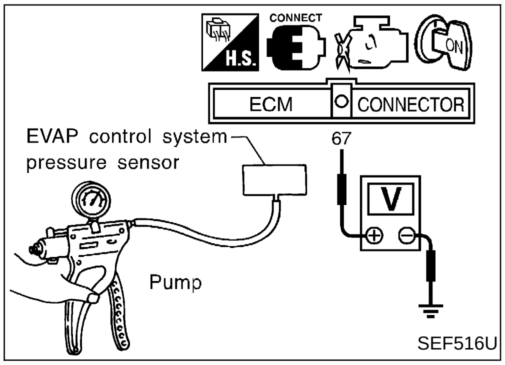
If NG, repair hose or replace water separator.

↓ OK

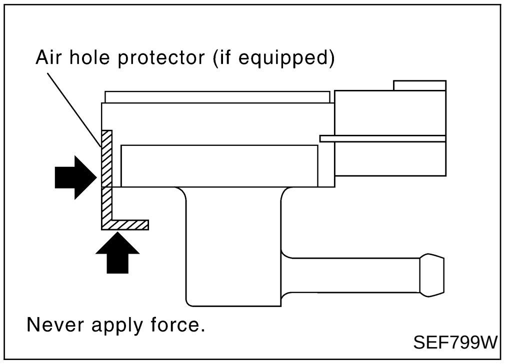
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-112.

↓

INSPECTION END



SEF516U



SEF799W

Evaporative Emission (EVAP) Control System Pressure Sensor (Cont'd)

COMPONENT INSPECTION

EVAP control system pressure sensor

1. Remove EVAP control system pressure sensor with its harness connector connected.
2. Remove hose from EVAP control system pressure sensor.
3. Turn ignition switch "ON".
4. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.
5. Check output voltage between ECM terminal 67 and engine 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:
- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply pressure over 20.0 kPa (150 mmHg, 5.91 in Hg) or vacuum below −20.0 kPa (−150 mmHg, −5.91 inHg).**

6. If NG, replace EVAP control system pressure sensor.

- **Never apply force to the air hole protector of the sensor, if equipped.**
- **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.**

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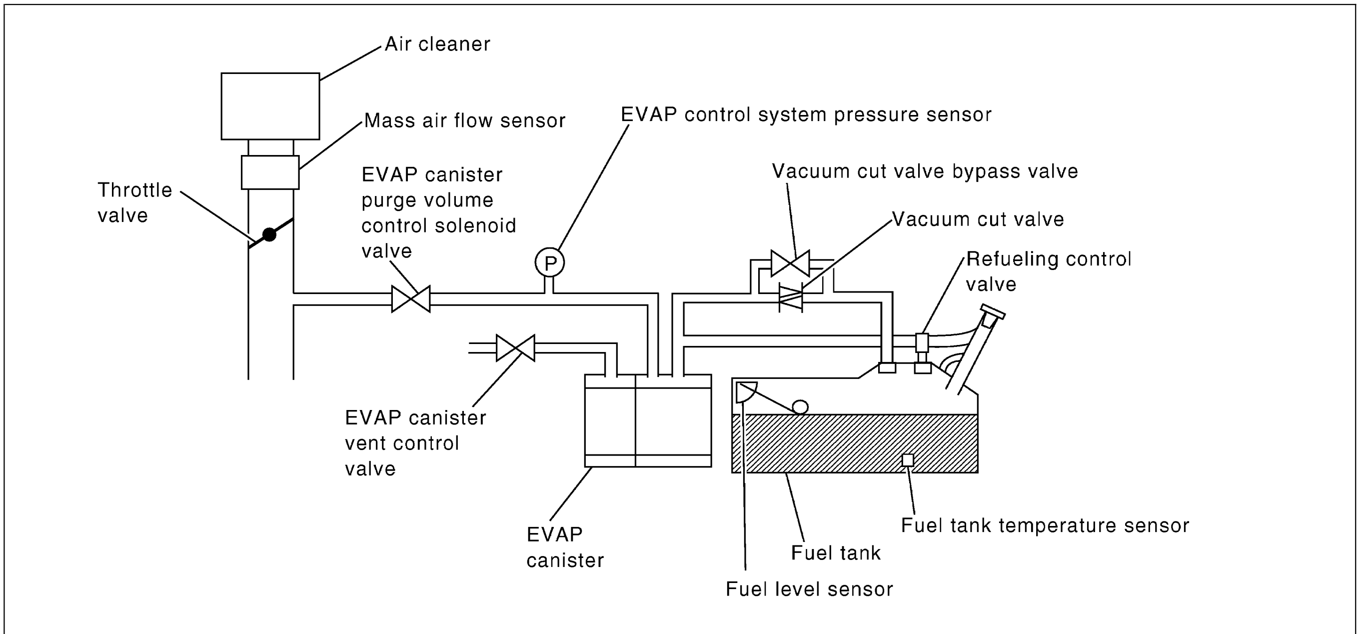
Evaporative Emission (EVAP) Control System (Large Leak)

ON BOARD DIAGNOSTIC LOGIC

This diagnosis detects a large leak (fuel filler cap fell off) in the EVAP system between the fuel tank and the EVAP canister purge volume control solenoid valve.

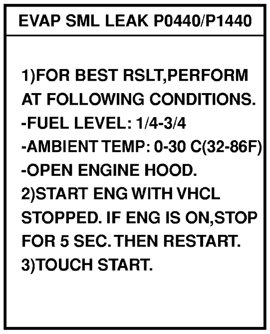


SEF865Z

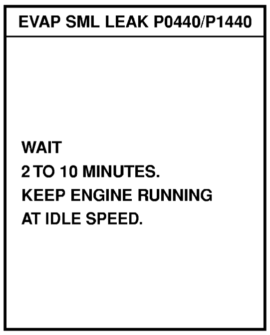
Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P0455	• EVAP system has a large leak such as fuel filter cap fell off. • EVAP system does not operate properly.	• Fuel cap remains open or fails to close. • Incorrect fuel tank vacuum relief valve. • Incorrect fuel 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 • EVAP canister purge volume control solenoid valve • 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.**

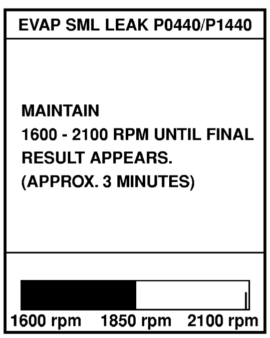
Evaporative Emission (EVAP) Control System (Large Leak) (Cont'd)



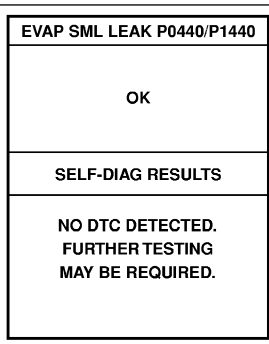
SEF565X



SEF566X



SEF874X



SEF567X

DTC CONFIRMATION PROCEDURE

CAUTION:

Never remove fuel filler cap during the DTC confirmation procedure.

NOTE:

- **If DTC P1448 is displayed with P0455, perform TROUBLE DIAGNOSIS FOR DTC P1448 first.**
- **If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.**

TESTING CONDITION:

- **Perform "DTC WORK SUPPORT" when the fuel level is between 1/4 to 3/4 full and vehicle placed on the flat level surface.**
- **Open engine hood before conducting following procedure.**

1) Tighten fuel filler cap securely until ratching sound is heard.
2) Turn ignition switch "ON".
3) Turn ignition switch "OFF" and wait at least 5 seconds.
4) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
5) Make sure the following conditions are met.
   COOLAN TEMP/S: 0 - 70°C (32 - 158°F)
   INT/A TEMP SE: 0 - 60°C (32 - 140°F)
6) Select "EVAP SML LEAK P0440" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
   Follow the instruction displayed.

   NOTE:
   - **If the engine cannot be maintained within the range on CONSULT-II screen, go to "Basic Inspection", EC-83.**
   - **Make sure that EVAP hoses are connected EVAP canister purge volume control solenoid valve properly.**
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 [P0445]" is displayed, refer to "DIAGNOSTIC PROCEDURE", EC-313.
   If P0440 is displayed, perform "DIAGNOSTIC PROCEDURE" for P0440, EC-287.

OR

NOTE:

Be sure to read the explanation of "Driving pattern" on EC-52 before driving vehicle.

1) Start engine.
2) Drive vehicle according to "Driving pattern", EC-52.
3) Stop vehicle.
4) Select "MODE 1" with GST.
- If SRT of EVAP system is not set yet, go to the following step.

Evaporative Emission (EVAP) Control System (Large Leak) (Cont'd)

- If SRT of EVAP system is set, the result will be OK.

5) Turn ignition switch "OFF" and wait at least 5 seconds.
6) Start engine.

It is not necessary to cool engine down before driving.

7) Drive vehicle again according to the "Driving pattern".
8) Stop vehicle.
9) Select "MODE 3" with GST.

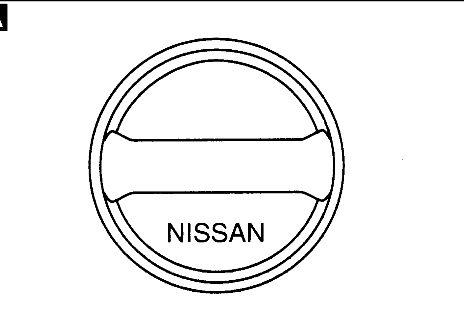
- If P1447 is displayed on the screen, go to "TROUBLE DIAGNOSIS FOR DTC P1447", EC-398.
- If P0440 is displayed on the screen, go to "DIAGNOSTIC PROCEDURE", EC-287.
- If P1440 is displayed on the screen, go to "Diagnostic Procedure", EC-374.
- If P0440, P0455, P1440 and P1447 are not displayed on the screen, go to the following step.

10) Select "MODE 1" with GST.

- If SRT of EVAP system is set, the result will be OK.
- If SRT of EVAP system is not set, go to step 5).

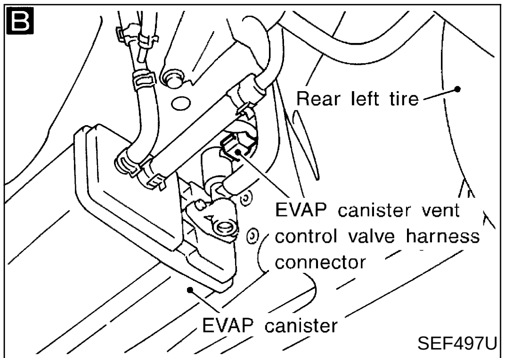
Evaporative Emission (EVAP) Control System (Large Leak) (Cont'd)

A



SEF434Q

B



SEF497U

DIAGNOSTIC PROCEDURE

INSPECTION START

↓

A

CHECK FUEL FILLER CAP.
1. Turn ignition switch "OFF".
2. Check for genuine NISSAN fuel filler cap design.
   If NG, replace with genuine NISSAN fuel filler cap.
   If OK, go to next step.
3. Check that the cap is tightened properly by rotating the cap clockwise.
   - Open fuel filler cap, then clean cap and fuel filler neck threads using air blower.
   - Retighten until ratcheting sound is heard.
   If OK, go to next step.
4. Check for air releasing sound while opening the fuel filler cap.

NG → Check fuel tank vacuum relief valve. (Refer to "FUEL TANK VACUUM RELIEF VALVE (Built into fuel filler cap)", EC-24.
If NG, replace with genuine NISSAN fuel filler cap.
If OK, go to **B** "CHECK FOR EVAP LEAK".

↓ OK

CHECK COMPONENT.
Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection or disconnection.
Refer to "EVAPORATIVE EMISSION SYSTEM", EC-26.

NG → Repair or reconnect the hose.

↓ OK

Check hoses between EVAP canister and refueling control valve for disconnection.
For location, refer to "SYSTEM DESCRIPTION" in "On Board Refueling Vapor Recovery (ORVR)" on EC-28.

NG → Reconnect hoses properly.

↓ OK

B

CHECK COMPONENT AND CIRCUIT
(EVAP canister vent control valve, O-ring and water separator).
Refer to "TROUBLE DIAGNOSIS FOR DTC P0446" for circuit, EC-299 and "COMPONENT INSPECTION", EC-316.

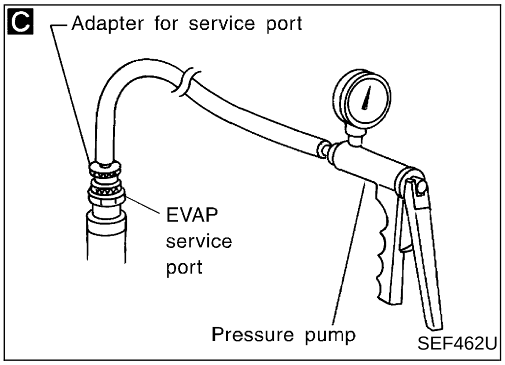
NG → Repair or replace EVAP canister vent control valve and O-ring or harness/connector.

↓ OK

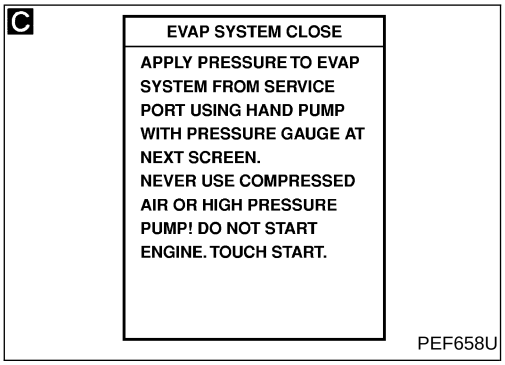
Ⓐ

(Go to next page.)

Evaporative Emission (EVAP) Control System (Large Leak) (Cont'd)

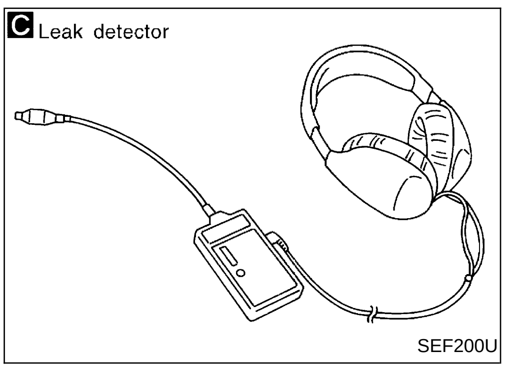


SEF462U

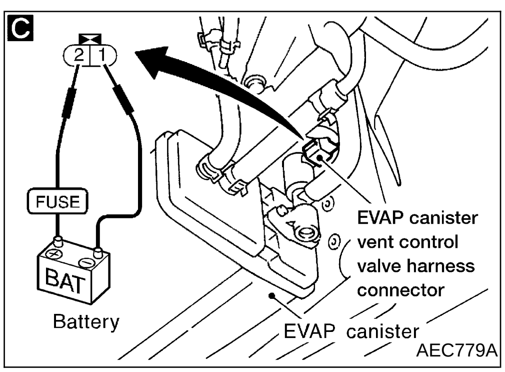

EVAP SYSTEM CLOSE

APPLY PRESSURE TO EVAP SYSTEM FROM SERVICE PORT USING HAND PUMP WITH PRESSURE GAUGE AT NEXT SCREEN.
NEVER USE COMPRESSED AIR OR HIGH PRESSURE PUMP! DO NOT START ENGINE. TOUCH START.

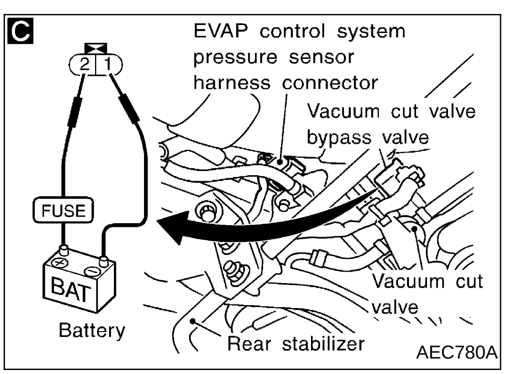
PEF658U



SEF200U



AEC779A



AEC780A

Ⓐ

CHECK FOR EVAP LEAK.

- **Never use compressed air or high pressure pump.**
- **Improper installation of service port may cause leaking.**
- **Do not exceed 4.12 kPa (0.042 kg/cm^2, 0.6 psi) of pressure in the system.**

To locate EVAP leak portion, proceed with the following steps.

1. Install the EVAP service port adapter and the pressure pump securely.
2. Turn ignition switch "ON". Select "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-II.
3. Touch "START" and apply vacuum into the EVAP line until the pressure indicator reaches the middle of bar graph.
4. Using EVAP leak detector, locate the leak portion. For the leak detector, refer to instruction manual for more details. Refer to "Evaporative Emission Line Drawing", EC-26.

OR

2. Turn ignition switch "OFF".
3. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)
4. Apply 12 volts DC to vacuum cut valve bypass valve. The valve will open. (Continue to apply 12 volts until the end of test.)
5. Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg).
6. Locate the leak using a leak detector. Refer to the instruction manual for more details about the leak detector. Refer to "Evaporative Emission Line Drawing", EC-26.

NG → Repair or replace.

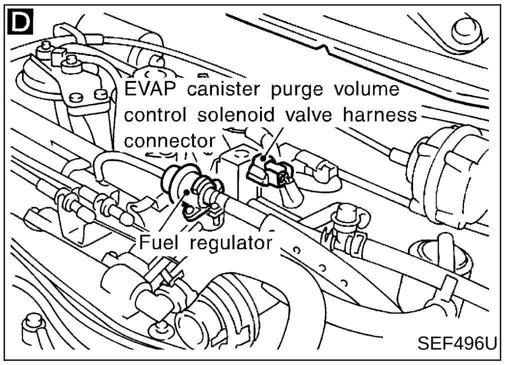
OK ↓

Ⓑ

(Go to next page.)

Evaporative Emission (EVAP) Control System (Large Leak) (Cont'd)

D



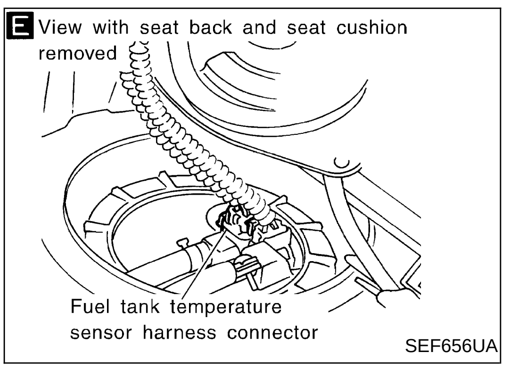
SEF496U

D

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
HO2S1 MNTR (B1)	LEAN
THRTL POS SEN	XXX V

SEF801Y

E



SEF656UA

(B)

D

CHECK COMPONENT (EVAP canister purge volume control solenoid valve).

1. Disconnect EVAP 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 EVAP hose for vacuum.
   Vacuum should exist.

OR

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect EVAP hose to EVAP canister purge volume control solenoid valve.
4. Start engine and let it idle for at least 80 seconds.
5. Check EVAP hose for vacuum.
   Vacuum should exist.

NG → Check the following.
- EVAP canister purge volume control solenoid valve
  Refer to "COMPONENT INSPECTION", EC-316.
- Vacuum hoses for clogging or disconnection
  Refer to "Vacuum Hose Drawing", EC-16.

OK ↓

E

CHECK COMPONENT
(Fuel tank temperature sensor).
Refer to "COMPONENT INSPECTION", EC-317.

NG → Replace fuel tank temperature sensor.

OK ↓

CHECK COMPONENT
(EVAP control system pressure sensor).
Refer to "COMPONENT INSPECTION", EC-309.

NG → Replace EVAP control system pressure sensor.

OK ↓

CHECK COMPONENT
(Refueling control valve).
Refer to "COMPONENT INSPECTION", EC-31.

NG → Replace refueling control valve.

OK ↓

Check signal line and recirculation line for disconnection. For location, refer to "SYSTEM DESCRIPTION" in "On Board Refueling Vapor Recovery (ORVR)" on EC-28.

NG → Reconnect lines properly.

OK ↓

Clean EVAP purge line (pipe and rubber tube) using air blower.

OK ↓

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-112.

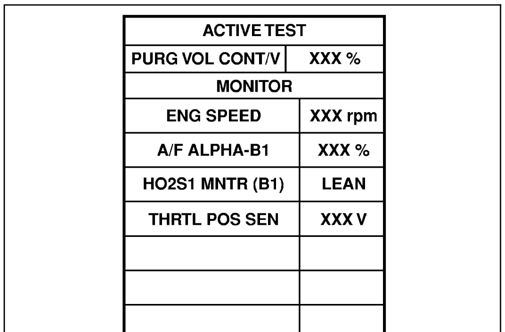
↓

INSPECTION END

Evaporative Emission (EVAP) Control System (Large Leak) (Cont'd)

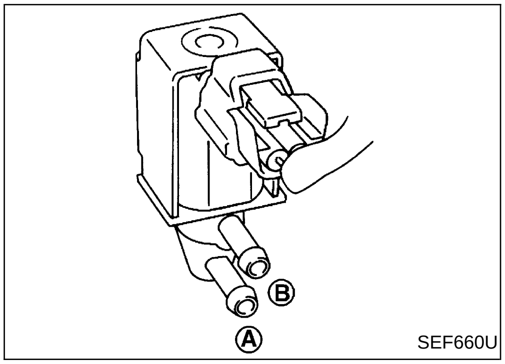
COMPONENT INSPECTION

EVAP canister purge volume control solenoid valve



SEF801Y

1. Start engine.
2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.
   If OK, inspection end. If NG, go to following step.
3. Check air passage continuity.



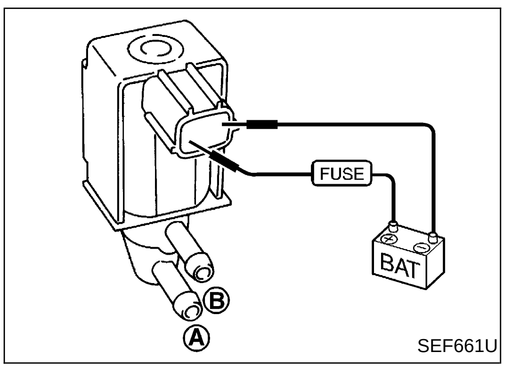
SEF660U

Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

If NG, replace the EVAP canister purge volume control solenoid valve.

OR

Check air passage continuity.



SEF661U

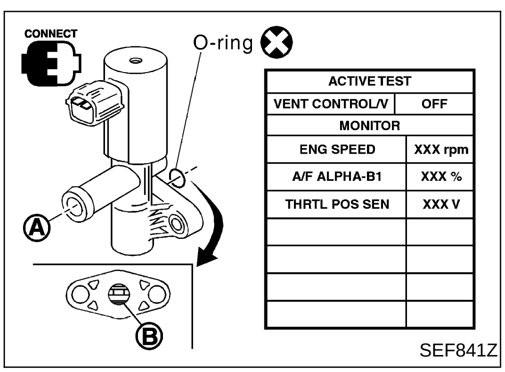
Condition	Air passage continuity between A and B
12V direct current supply between terminals	Yes
No supply	No

If NG or operation takes more than 1 second, replace solenoid valve.

EVAP canister vent control valve

Check air passage continuity.

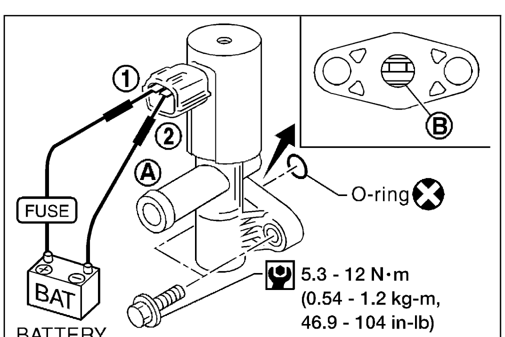
Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.



SEF841Z

Condition	Air passage continuity between A and B
ON	No
OFF	Yes

OR

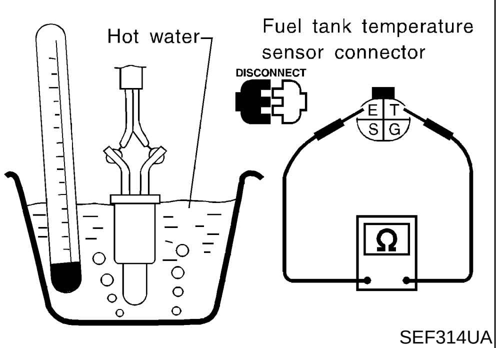


AEC783A

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

If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.
If portion B is rusted, replace control valve.
Make sure new O-ring is installed properly.

Evaporative Emission (EVAP) Control System (Large Leak) (Cont'd)



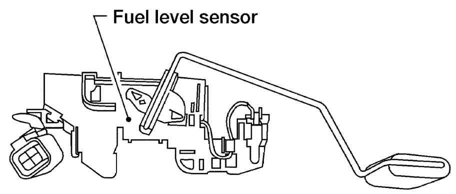
SEF314UA

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.



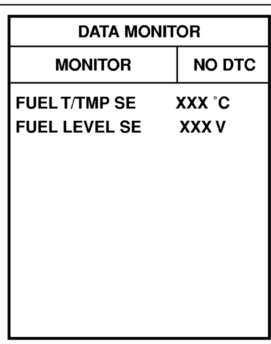
LEC059

Fuel Level Sensor Function (Slosh)

ON BOARD DIAGNOSTIC LOGIC

When the vehicle is parked, naturally the fuel level in the fuel tank is stable. It means that output signal of the fuel level sensor does not change. If ECM senses sloshing signal from the sensor, fuel level sensor malfunction is diagnosed.

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P0460	Even though the vehicle is parked, a signal being varied is sent from the fuel level sensor to ECM.	• Fuel level sensor circuit (The fuel level sensor circuit is open or shorted.) • Fuel level sensor



SEF563X

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

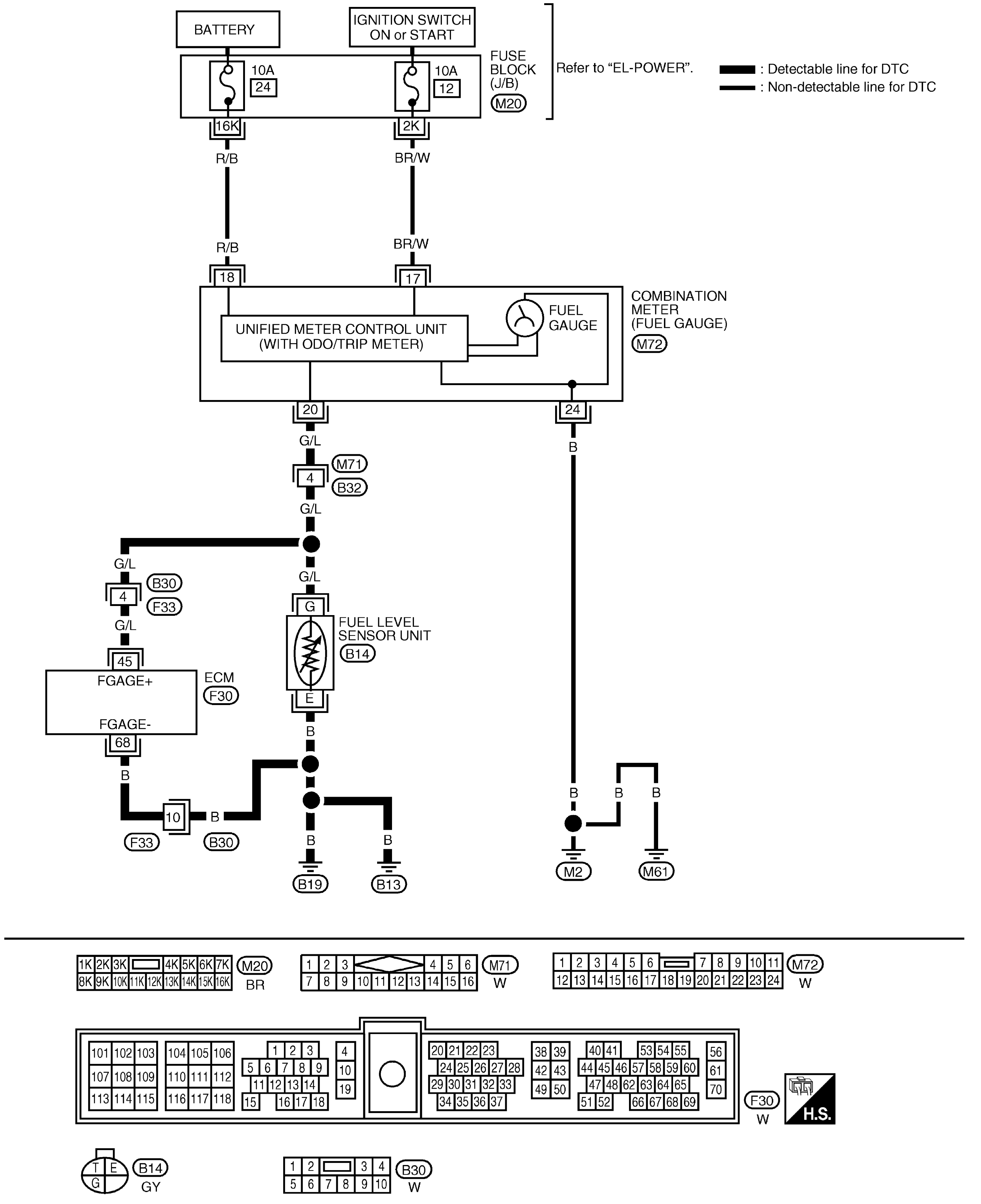
NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 5 seconds before conducting the next test.

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 “Diagnostic Procedure”, EC-320.

OR

Follow the above procedure “With CONSULT-II”.

EC-FLS-01

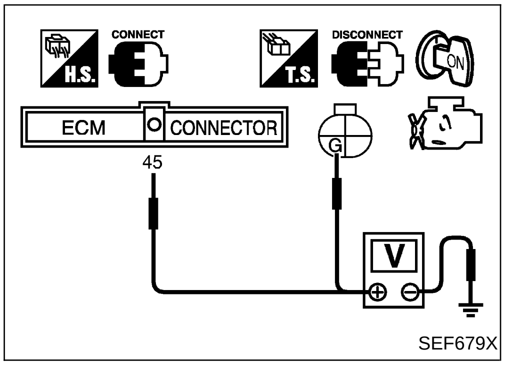


WEC563

GI MA EM LC EC FE CL MT AT FA RA BR ST RS BT HA EL IDX

Fuel Level Sensor Function (Slosh) (Cont'd)

DIAGNOSTIC PROCEDURE



INSPECTION START

↓

A

CHECK POWER SUPPLY CIRCUIT.
1. Turn ignition switch "OFF".
2. Disconnect fuel level sensor harness connector.
3. Turn ignition switch "ON".
4. Check voltage between fuel level sensor terminal G or ECM terminal 45 and ground.
   Voltage: Battery voltage

NG → Check the following.
- Harness connector M71, B32
- Harness connector F33, B30
- Harness for open or short between combination meter and fuel level sensor
- Harness for open or short between combination meter and ECM

If NG, repair harness or connector.

↓ OK

CHECK GROUND CIRCUIT.
Check harness continuity between fuel level sensor terminal and engine ground.
Refer to the wiring diagram.
Continuity should exist.
If OK, check harness for short to power.

NG → Repair harness or connector.

↓ OK

CHECK INPUT SIGNAL CIRCUIT-II.
Check harness continuity between ECM terminal 68 or fuel level sensor terminal E and engine ground.
Refer to the wiring diagram.
Continuity should exist.
If OK, check harness for short to ground and short to power.

NG → Repair harness or connector.

↓ OK

CHECK COMPONENT
(Fuel level sensor)
Refer to "METERS AND GAUGES" in EL section.

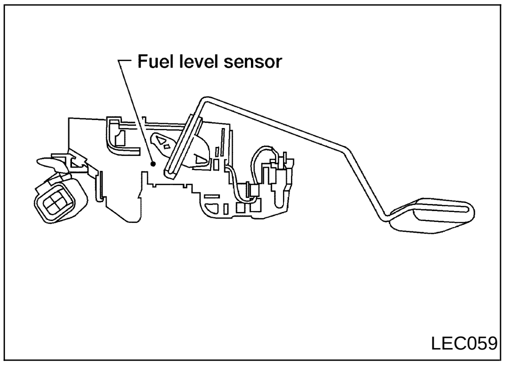
NG → Repair harness or connector or replace fuel level sensor unit.

↓ OK

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-112.

↓

INSPECTION END



Fuel Level Sensor Function

ON BOARD DIAGNOSTIC LOGIC

Driving long distances naturally affects the fuel gauge level. This diagnosis detects the fuel gauge malfunction of the gauge not moving even after a long distance has been driven.

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P0461	The output signal of the fuel level sensor does not change within the specified range.	● Harness or connectors (The fuel level sensor circuit is open or shorted) ● Fuel level sensor

OVERALL FUNCTION CHECK

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

WARNING:

When performing following procedure, be sure to observe the handling of the fuel. Refer to "WARNING" and "CAUTION", "Fuel Tank" in FE section.

TESTING CONDITION:

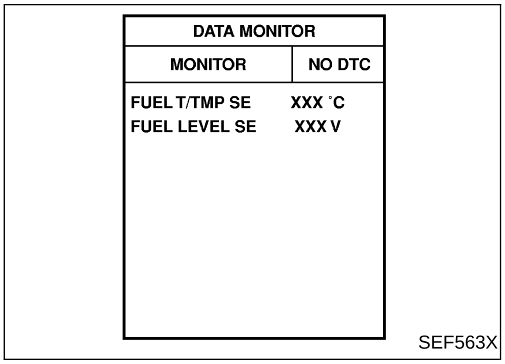
Before starting overall function check, preparation of draining fuel and refilling fuel is required.

NOTE:

- **Start from step 7) using CONSULT-II if it appears impossible to drain 30 (7-7/8 US gal, 6-5/8 Imp gal) or more.**
- **Be careful not to discharge battery when performing following procedure.**

PREPARATION:

1) Prepare a fuel container and a spare hose.
2) Release fuel pressure from fuel line, refer to "Fuel Pressure Release", EC-34.
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 and the other side into the fuel container.



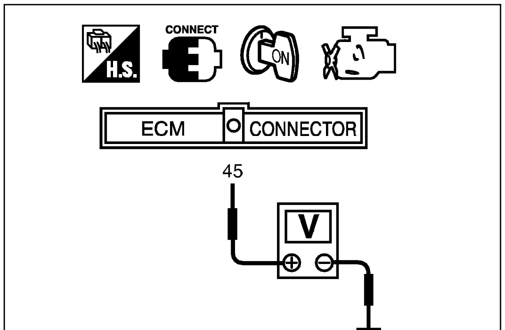
1) Turn ignition switch "OFF" and wait at least 5 seconds then turn "ON".
2) Select "FUEL LEVEL SE" in "DATA MONITOR" mode with CONSULT-II.
3) Check "FUEL LEVEL SE" output voltage and note it.
4) Select "FUEL PUMP" in "ACTIVE TEST" mode with CONSULT-II.

NOTE:

If "FUEL LEVEL SE" changes more than 0.03V which was noted at step 3), stop draining or refilling fuel because the test result will be OK.

Fuel Level Sensor Function (Cont'd)

5) Touch "ON" and drain approximately 30 liters (7-7/8 US gal, 6-5/8 Imp gal) of fuel, and then stop it.
6) Check "FUEL LEVEL SE" output voltage and note it.
7) Fill 30 liters (7-7/8 US gal, 6-5/8 Imp gal) of fuel into the fuel tank.
8) Check "FUEL LEVEL SE" output voltage and confirm whether the voltage changes more than 0.03V at step 5).
   If NG, check component of fuel level sensor. Refer to "METERS AND GAUGES" in EL section.



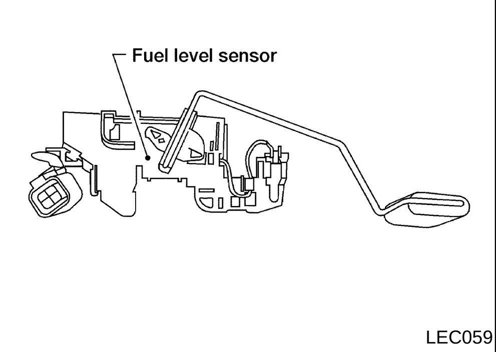
SEF680X

OR

1) Turn ignition switch "OFF".
2) Set voltmeters probe between ECM terminal 45 (fuel level sensor output signal) and ground.
3) Turn ignition switch "ON".
4) Check output voltage of fuel level sensor at ECM terminal 45 and note it.

NOTE:
If "FUEL LEVEL SE" changes more than 0.03V which was noted at step 4), stop draining or refilling fuel because the test result will be OK.

5) Drain fuel by 30 (7-7/8 US gal, 6-5/8 Imp gal) from the fuel tank using proper equipment.
6) Fill 30 liters (7-7/8 US gal, 6-5/8 Imp gal) of fuel into the fuel tank.
7) Check the output voltage of fuel level sensor at ECM terminal that whether the voltage changes more than 0.03V at the step 4).
   If NG, check component of fuel level sensor, refer to "METERS AND GAUGES" in EL section.



LEC059

Fuel Level Sensor Circuit

COMPONENT DESCRIPTION

The fuel level sensor is mounted in the fuel level sensor unit. The sensor detects a fuel level in the fuel tank and transmits a signal to the ECM.
It consists of two parts, one is mechanical float and the other side is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

ON BOARD DIAGNOSTIC LOGIC

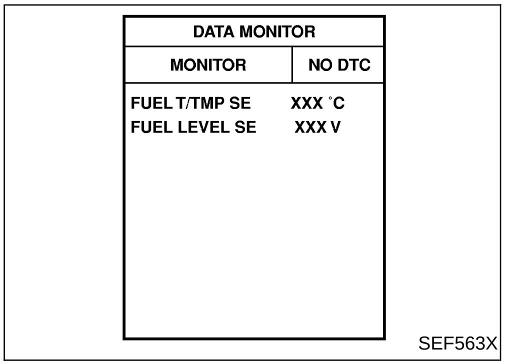
ECM receives two signals from the fuel level sensor.
One is between the level sensor and the combination meter, and the other is between the level sensor and the ground.
This diagnosis indicates the former to detect open or short circuit malfunction.

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P0464	An excessively low or high voltage is sent from the sensor to ECM.	● Fuel level sensor circuit (The fuel level sensor circuit is open or shorted.) ● Fuel level sensor

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

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

TESTING CONDITIONS:
Before performing the following procedure, confirm that battery voltage is more than 11V at ignition switch "ON".



SEF563X

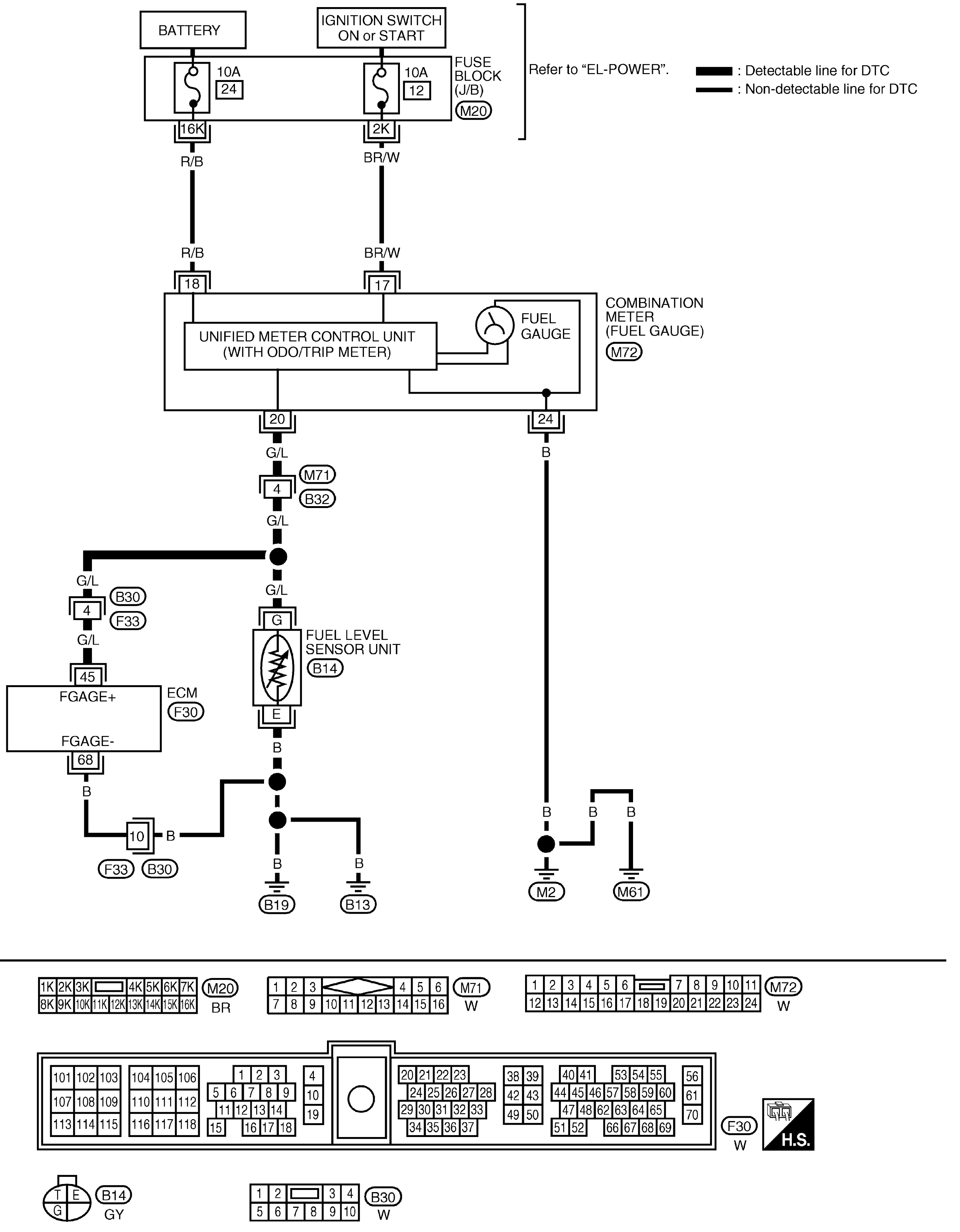
1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Wait at least 5 seconds.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-325.

OR

GST Follow the procedure "With CONSULT-II".

GI MA EM LC EC FE CL MT AT FA RA BR ST RS BT HA EL IDX

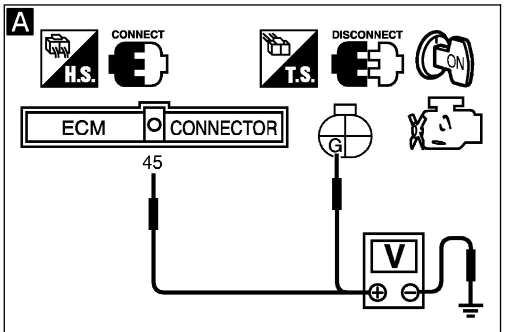
EC-FL2-01



WEC564

Fuel Level Sensor Circuit (Cont'd)

DIAGNOSTIC PROCEDURE



SEF679X

INSPECTION START

↓

A

CHECK POWER SUPPLY CIRCUIT.
1. Turn ignition switch "OFF".
2. Disconnect fuel level sensor harness connector.
3. Turn ignition switch "ON".
4. Check voltage between fuel level sensor terminal G or ECM terminal 45 and ground.
   Voltage: Battery voltage

NG → Check the following.
- Harness connector M71, B32
- Harness connector F33, B30
- Harness for open or short between combination meter and fuel level sensor
- Harness for open or short between combination meter and ECM

If NG, repair harness or connector.

↓ OK

CHECK GROUND CIRCUIT.
Check harness continuity between fuel level sensor terminal and engine ground.
Refer to the wiring diagram.
Continuity should exist.
If OK, check harness for short to power.

NG → Repair harness or connector.

↓ OK

CHECK INPUT SIGNAL CIRCUIT-II.
Check harness continuity between ECM terminal 68 or fuel level sensor terminal E and engine ground.
Refer to the wiring diagram.
Continuity should exist.
If OK, check harness for short to ground and short to power.

NG → Repair harness or connector.

↓ OK

CHECK COMPONENT
(Fuel level sensor)
Refer to "METERS AND GAUGES" in EL section.

NG → Repair harness or connector or replace fuel level sensor.

↓ OK

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-112.

↓

INSPECTION END

GI
MA
EM
LC
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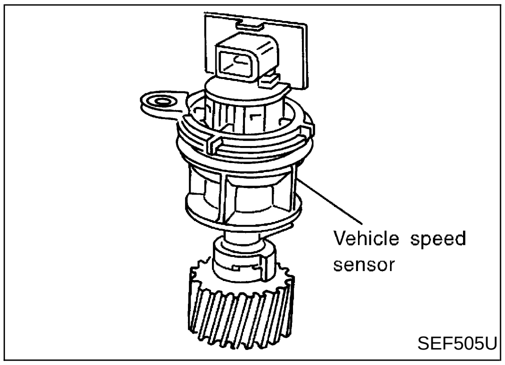
IDX



Vehicle Speed Sensor (VSS)

COMPONENT DESCRIPTION

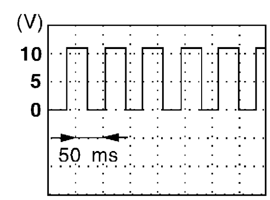
The vehicle speed sensor is installed in the transaxle. It contains a pulse generator which provides a vehicle speed signal to the speedometer. The speedometer then sends a signal to the ECM.

ECM TERMINALS AND REFERENCE VALUE

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

CAUTION:

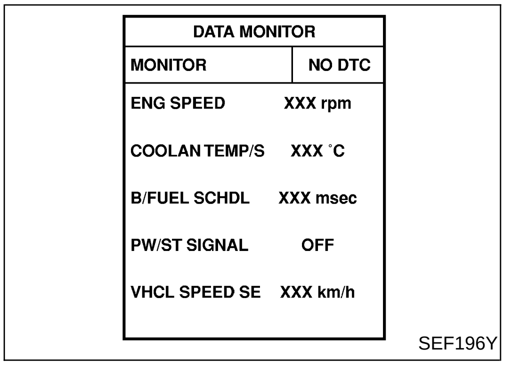
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
26	PU/R	Vehicle speed sensor	Engine is running. — Lift up the vehicle. — In 2nd gear position — 40 km/h (25 MPH)	4 - 7V  SEF642U

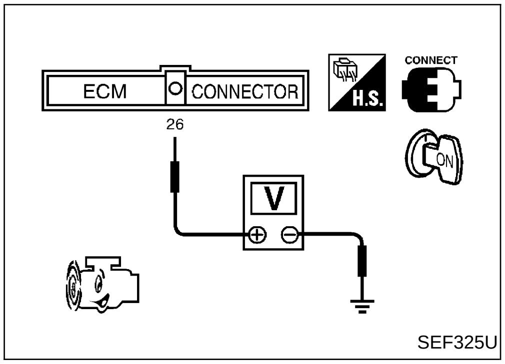
ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code 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

Vehicle Speed Sensor (VSS) (Cont'd)



SEF196Y



SEF325U

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

CAUTION:

- **Always drive vehicle at a safe speed.**
- **If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.**

TESTING CONDITION:
Step 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.

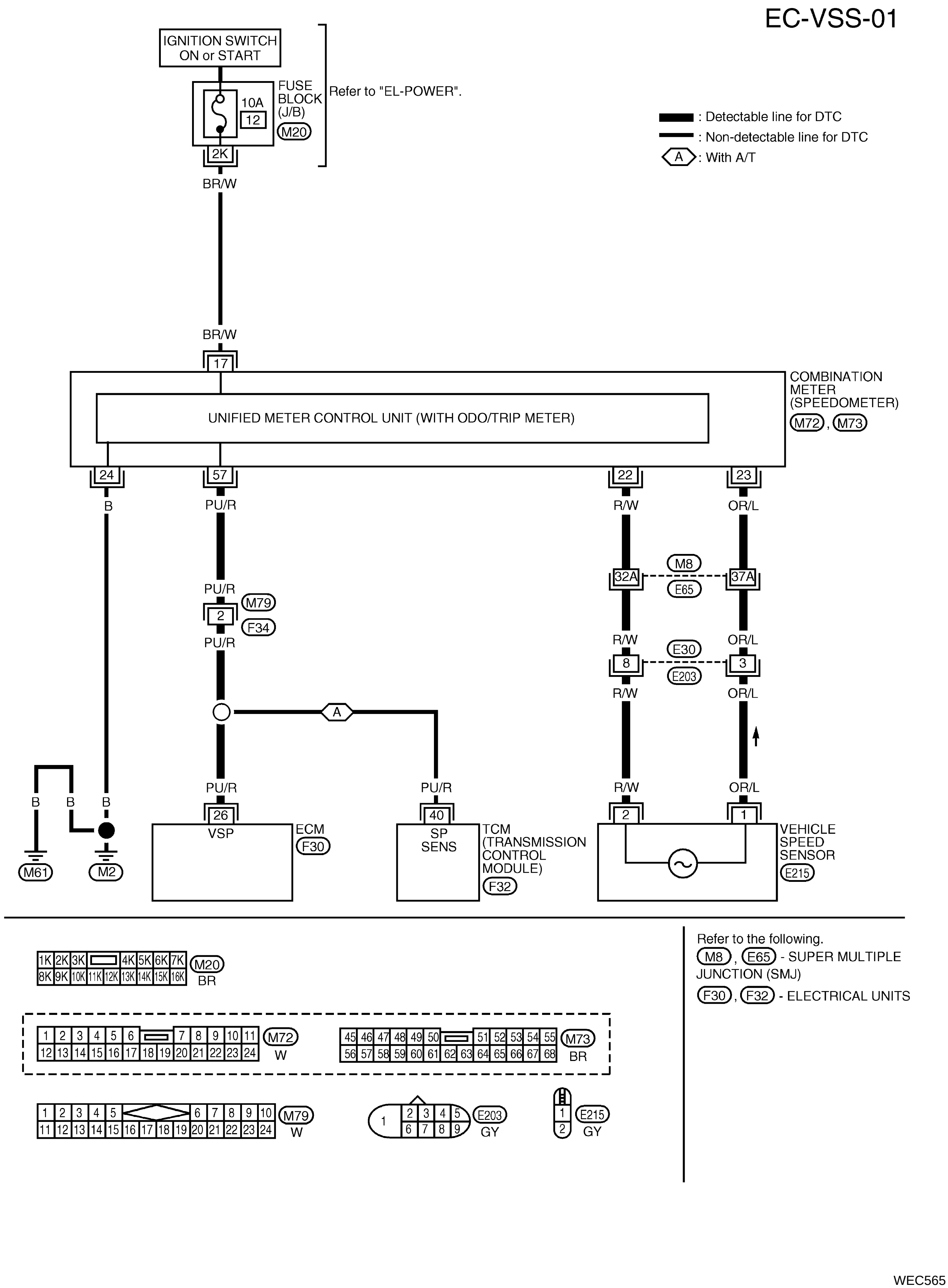
1) Start engine
2) Read vehicle speed sensor signal in "DATA MONITOR" mode with CONSULT-II. The vehicle speed on CONSULT-II should exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.
   If NG, go to "DIAGNOSTIC PROCEDURE", EC-329.
   If OK, go to following step.
3) Select "DATA MONITOR" mode with CONSULT-II.
4) Warm engine up to normal operating temperature.
5) Maintain the following conditions for at least 10 consecutive seconds.
   ENG SPEED: 2,100 - 6,000 rpm
   COOLAN TEMP/S: More than 70°C (158°F)
   B/FUEL SCHDL: 6 - 1.25 msec (A/T)
   5.5 - 14 msec (M/T)
   Selector lever: Suitable position
   PW/ST SIGNAL: OFF
6) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-329.

OVERALL FUNCTION CHECK

Use this procedure to check the overall function of the EVAP canister vent control valve circuit. During this check, a DTC might not be confirmed.

GST

1) Jack 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 "DIAGNOSTIC PROCEDURE", EC-329.


EC-VSS-01
IGNITION SWITCH ON or START
FUSE BLOCK (J/B)
10A
12
M20
2K
Refer to "EL-POWER".
: Detectable line for DTC
: Non-detectable line for DTC
A : With A/T
BR/W
17
COMBINATION METER (SPEEDOMETER)
M72, M73
UNIFIED METER CONTROL UNIT (WITH ODO/TRIP METER)
24
57
22
23
B
PU/R
R/W
OR/L
M8
32A
37A
E65
M79
2
F34
E30
8
3
E203
A
26
VSP
ECM
F30
40
SP SENS
TCM (TRANSMISSION CONTROL MODULE)
F32
VEHICLE SPEED SENSOR
E215
1
M61
M2
BR
W
GY
Refer to the following.
M8, E65 - SUPER MULTIPLE JUNCTION (SMJ)
F30, F32 - ELECTRICAL UNITS
WEC565

Vehicle Speed Sensor (VSS) (Cont'd)

DIAGNOSTIC PROCEDURE

INSPECTION START

↓

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 26 and meter terminal 57.
   Refer to the wiring diagram.
   Continuity should exist.
   If OK, check harness for short to ground and short to power.

NG → Check the following.
- Harness connectors M79, F34
- Harness for open or short between ECM and combination meter
- Harness for open or short between combination meter and TCM

If NG, repair open circuit or short to ground or short to power in harness or connectors.

OK ↓

CHECK SPEEDOMETER FUNCTION.
Make sure that speedometer functions properly.

NG → Check the following.
- Harness connectors M8, E65
- Harness connectors E30, E203
- Harness for open or short between combination meter and vehicle speed sensor

If NG, repair harness or connectors.
Check vehicle speed sensor and its circuit.
Refer to EL section.

OK ↓

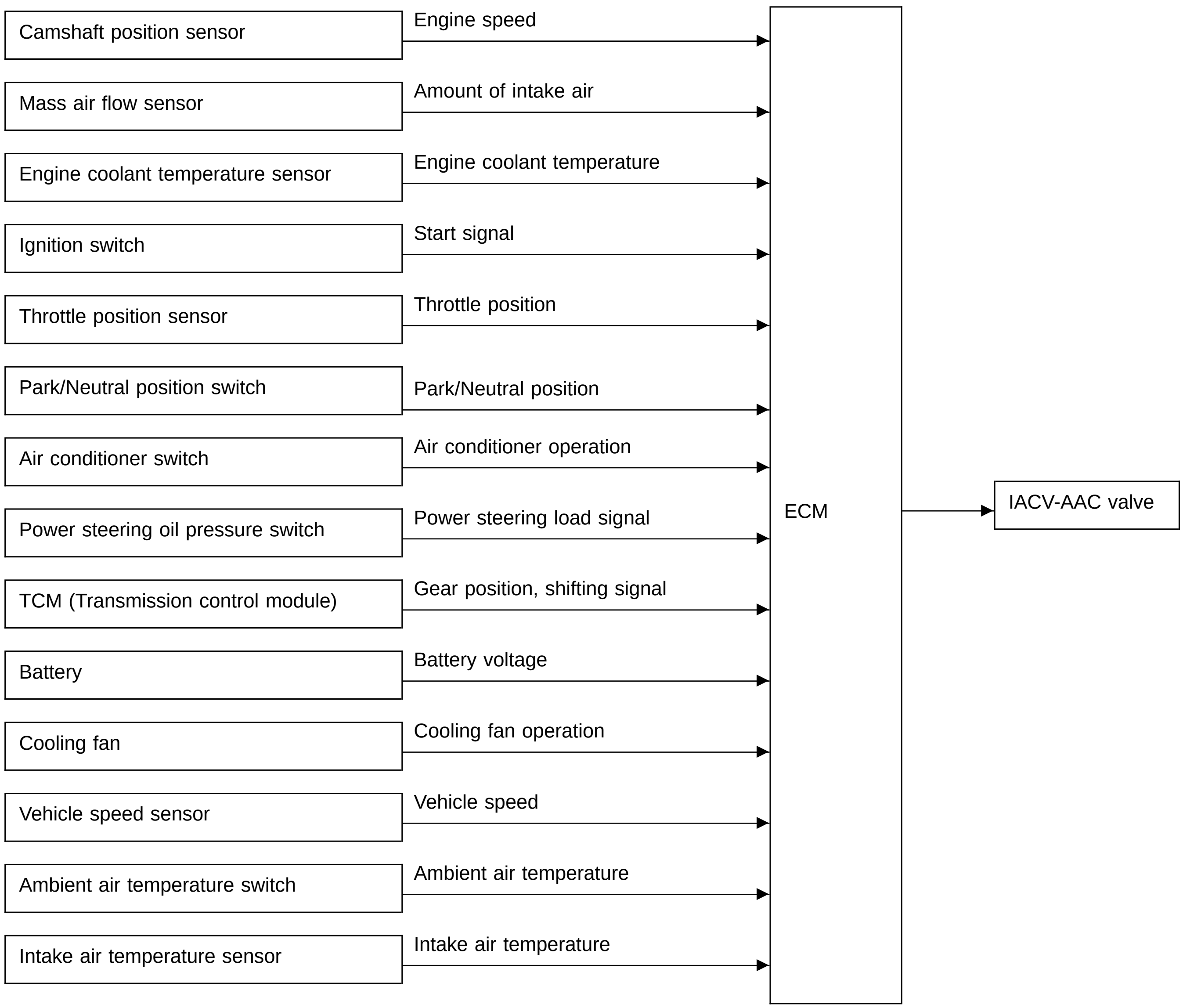
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-112.

↓

INSPECTION END

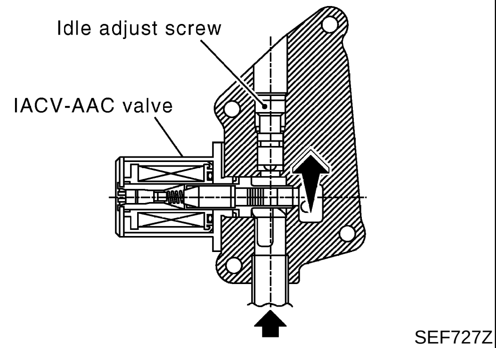
Idle Air Control Valve (IACV) — Auxiliary Air Control (AAC) Valve

SYSTEM DESCRIPTION



This system automatically controls engine idle speed to a specified level. Idle speed is controlled through fine adjustment of the amount of air which bypasses the throttle valve via IACV-AAC valve. The IACV-AAC valve repeats ON/OFF operation according to the signal sent from the ECM. The camshaft position sensor detects the actual engine speed and sends a signal to the ECM. The ECM then controls the ON/OFF time of the IACV-AAC valve so that engine speed coincides with the target value memorized in ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by taking into consideration various engine conditions, such as during warm up, deceleration, and engine load (air conditioner and power steering).

Idle Air Control Valve (IACV) — Auxiliary Air Control (AAC) Valve (Cont'd)



SEF727Z

COMPONENT DESCRIPTION

IACV-AAC valve

The IACV-AAC valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of air that will flow through the valve. The more air that flows through the valve, the higher the idle speed.

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

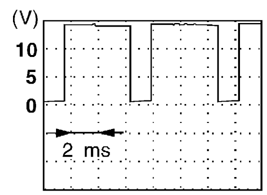
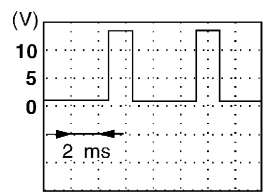
Specification data are reference values

MONITOR ITEM	CONDITION		SPECIFICATION
IACV-AAC/V	● Engine: After warming up ● Air conditioner switch: "OFF" ● Shift lever: "N" ● No-load	Idle	Approx. 20%
		2,000 rpm	—

ECM TERMINALS AND REFERENCE VALUE

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

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

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	SB	IACV-AAC valve	Engine is running. (Warm-up condition) └ Idle speed	Approximately 12V  SEF645U
			Engine is running. (Warm-up condition) └ Engine speed is 2,000 rpm	1 - 12V  SEF646U

Idle Air Control Valve (IACV) — Auxiliary Air Control (AAC) Valve (Cont'd)

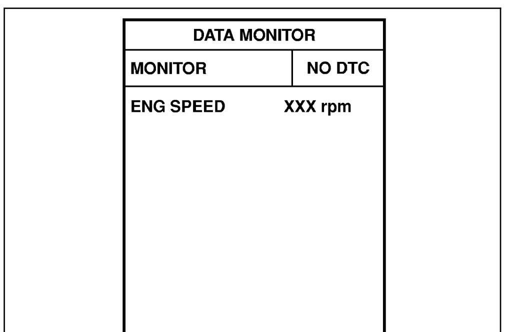
ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code 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
	B) The IACV-AAC valve does not operate properly.	● Harness or connectors (The IACV-AAC valve circuit is shorted.) ● IACV-AAC valve

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

NOTE:
If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

Perform "Procedure for malfunction A" first. If DTC cannot be confirmed, perform "Procedure for malfunction B".



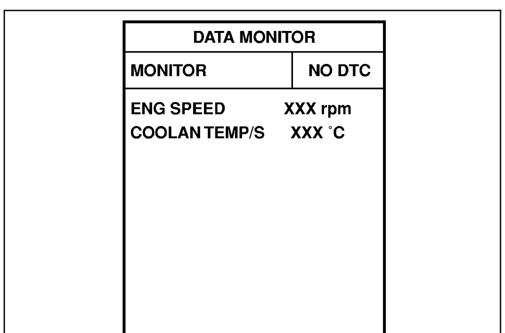
SEF058Y

Procedure for malfunction A

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Wait at least 2 seconds.
4) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-334.

OR

1) Turn ignition switch "ON" and wait at least 2 seconds.
2) Select "MODE 7" with GST.
3) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-334.



SEF174Y

Procedure for malfunction B

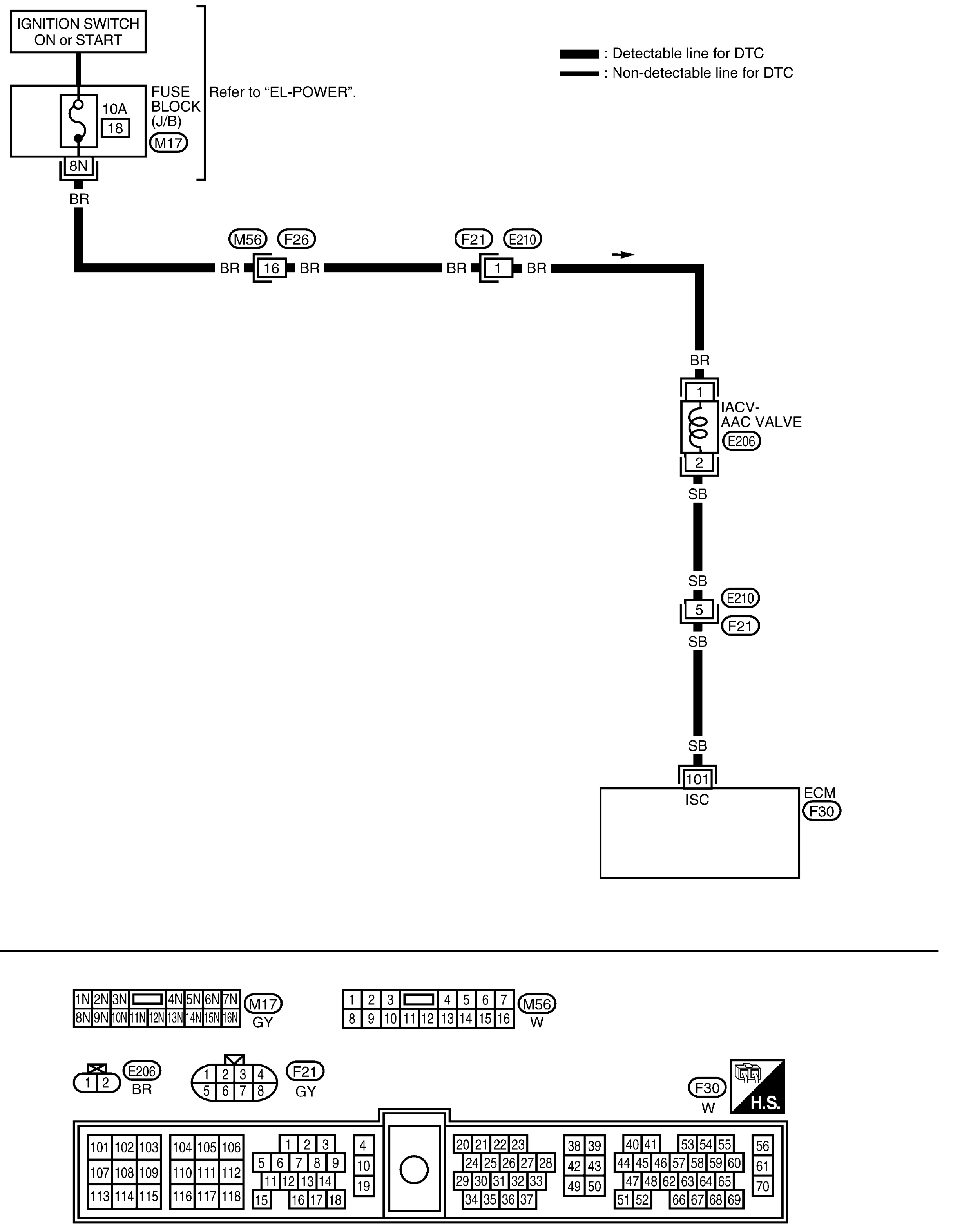
1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Turn ignition switch "ON" again and select "DATA MONITOR" mode with CONSULT-II.
4) Start engine and run it for at least 1 minute at idle speed.
5) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-334.

OR

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Start engine again and run it for at least 1 minute at idle speed.
4) Select "MODE 7" with GST.
5) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-334.

Idle Air Control Valve (IACV) — Auxiliary Air Control (AAC) Valve (Cont'd)

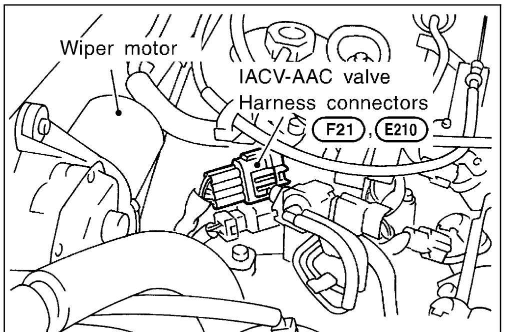
EC-AAC/V-01



LEC653

Idle Air Control Valve (IACV) — Auxiliary Air Control (AAC) Valve (Cont'd)

DIAGNOSTIC PROCEDURE



SEF506U

INSPECTION START

↓

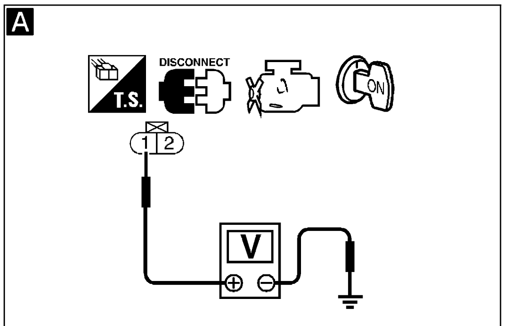
A

CHECK POWER SUPPLY.
1. Stop engine.
2. Disconnect IACV-AAC valve harness connector.
3. Turn ignition switch "ON".
4. Check voltage between terminal 1 and ground with CONSULT-II or tester.
   Voltage: Battery voltage

NG → Check the following.
- Harness connectors M56, F26
- Harness connectors F21, E210
- 10A fuse
- Harness for open or short between IACV-AAC valve harness connector and fuse

If NG, repair harness or connectors.

OK ↓



SEF054S

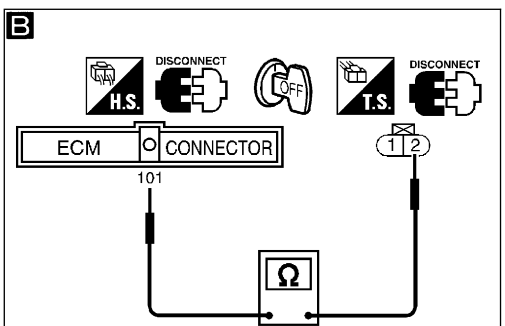
B

CHECK OUTPUT SIGNAL CIRCUIT.
1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 101 and terminal 2.
   Continuity should exist.
   If OK, check harness for short to ground and short to power.

NG → Check the following.
- Harness connectors E210, F21
- Harness for open or short between IACV-AAC valve and ECM

If NG, repair open circuit or short to ground or short to power in harness or connectors.

OK ↓



SEF328U

CHECK COMPONENT
(IACV-AAC valve).
Refer to "COMPONENT INSPECTION" below.

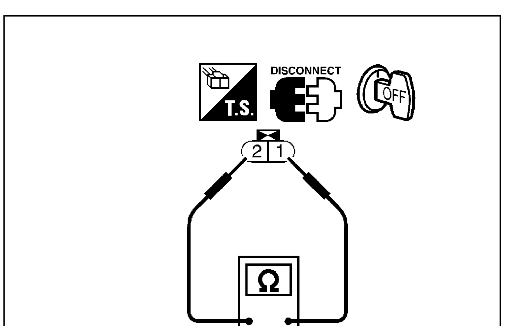
NG → Replace IACV-AAC valve.

OK ↓

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-112.

↓

INSPECTION END

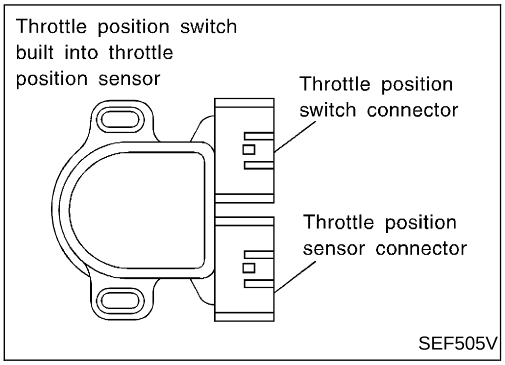


SEF057S

COMPONENT INSPECTION

IACV-AAC valve

Disconnect IACV-AAC valve harness connector.
- Check IACV-AAC valve resistance.
  Resistance:
  Approximately 10Ω [at 20°C (68°F)]
- Check plunger for seizing or sticking.
- Check for broken spring.



Closed Throttle Position Switch

COMPONENT DESCRIPTION

A closed throttle position switch and wide open throttle position switch are built into the throttle position sensor unit. The wide open throttle position switch is used only for A/T control.
When the throttle valve is in the closed position, the closed throttle position switch sends a voltage signal to the ECM. The ECM only uses this signal to open or close the EVAP canister purge volume control solenoid valve when the throttle position sensor is malfunctioning.

ECM TERMINALS AND REFERENCE VALUE

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

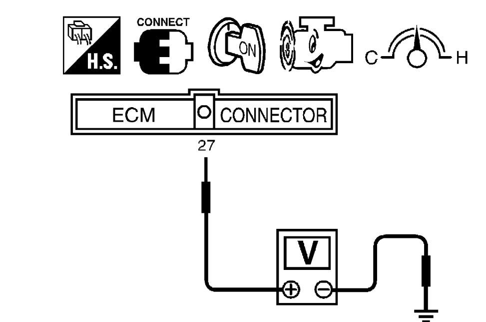
CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
27	Y	Throttle position switch (Closed position)	Ignition switch "ON" (Warm-up condition) Accelerator pedal fully released	BATTERY VOLTAGE (11 - 14V)
			Ignition switch "ON" Accelerator pedal depressed	Approximately 0V

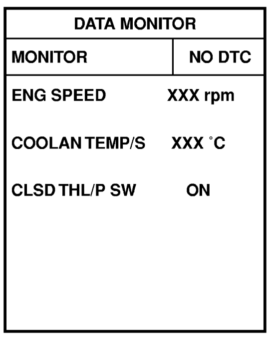
ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code 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

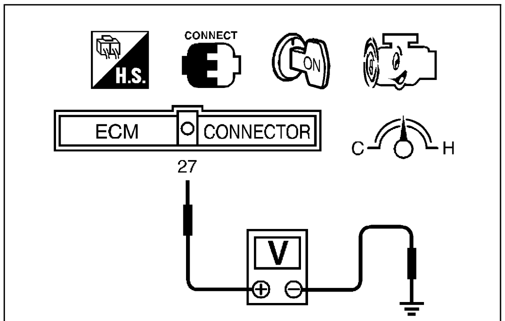
Closed Throttle Position Switch (Cont'd)



SEF366U



SEF197Y



SEF661R

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

1) Start engine and warm it up to normal operating temperature.
2) Check voltage between ECM terminal 27 and ground under the following conditions.
   At idle: Battery voltage
   At 2,000 rpm: 0 - 1V
   If the check result is NG, go to "DIAGNOSTIC PROCEDURE", EC-338.
   If OK, go to following step.
3) Select "DATA MONITOR" mode with CONSULT-II at the start of the test.
4) Drive the vehicle for at least 5 consecutive seconds under the following condition.
   THRTL POS SEN: More than 2.5V
   VHCL SPEED SE: More than 4 km/h (2 MPH)
   Selector lever: Suitable position
   Driving pattern: Driving vehicle uphill (Increased engine load) will help maintain the driving conditions required for this test.
5) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-338.

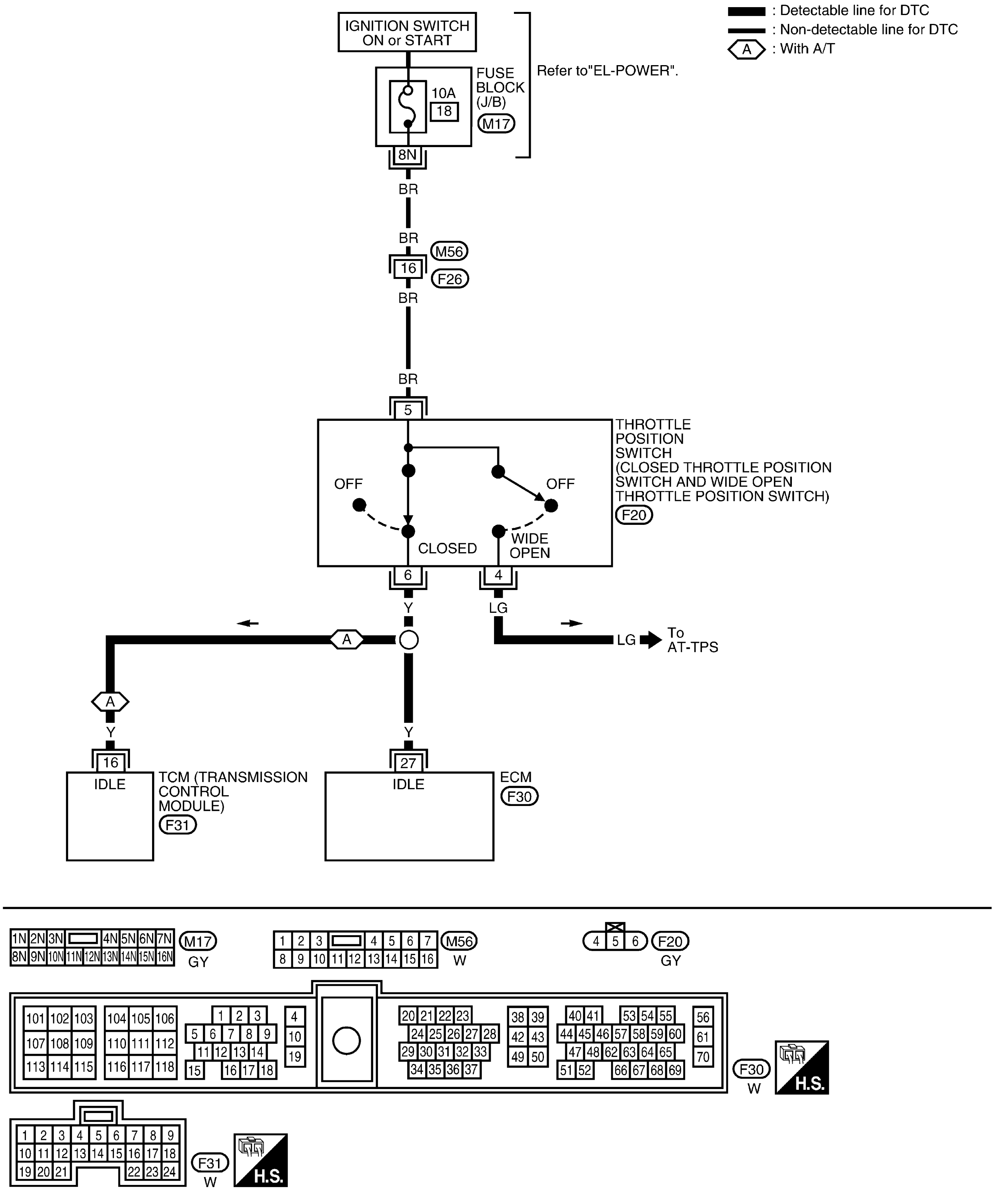
OR

OVERALL FUNCTION CHECK

Use this procedure to check the overall function of the closed throttle position switch circuit. During this check, a 1st trip DTC might not be confirmed.

1) Start engine and warm it up to normal operating temperature.
2) Check the voltage between ECM terminal 27 and ground under the following conditions.
   At idle: Battery voltage
   At 2,000 rpm: Approximately 0V
3) If NG, go to "DIAGNOSTIC PROCEDURE", EC-338.

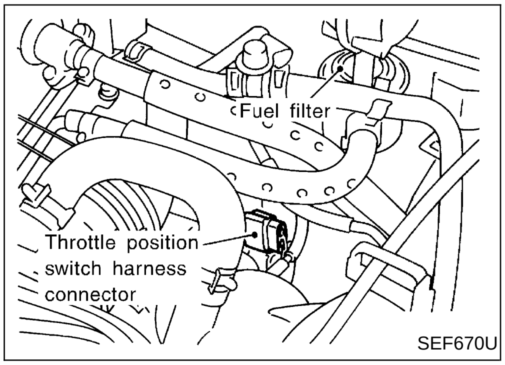
EC-TP/SW-01



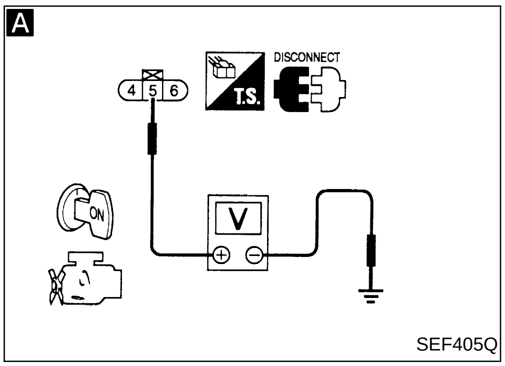
WEC707

Closed Throttle Position Switch (Cont'd)

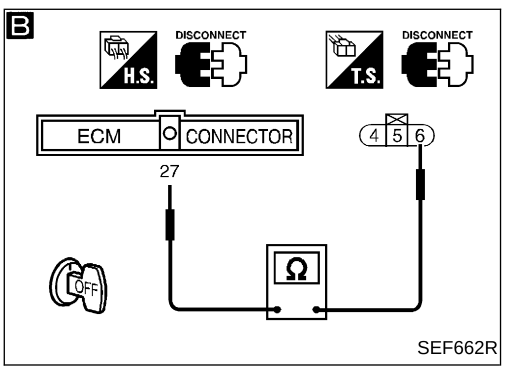
DIAGNOSTIC PROCEDURE



SEF670U



SEF405Q



SEF662R

INSPECTION START

↓

A

CHECK POWER SUPPLY.
1. Turn ignition switch "OFF".
2. Disconnect throttle position switch harness connector.
3. Turn ignition switch "ON".
4. Check voltage between terminal 5 and engine ground with CONSULT-II or tester.
   Voltage: Battery voltage

NG → Check the following.
- Harness connectors M56, F26
- 10A fuse
- Harness for open or short between throttle position switch and fuse

If NG, repair harness or connectors.

OK ↓

B

CHECK INPUT SIGNAL CIRCUIT.
1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 27 and terminal 6.
   Continuity should exist.
   If OK, check harness for short to ground and short to power.

NG → Check the following.
- Harness for open or short between throttle position switch and TCM

If NG, repair open circuit or short to ground or short to power in harness or connectors.

OK ↓

ADJUST THROTTLE POSITION SWITCH.
Perform BASIC INSPECTION, EC-77.

OK ↓

CHECK COMPONENT
(Closed throttle position switch).
Refer to "COMPONENT INSPECTION" on next page.

NG → Replace throttle position switch.

OK ↓

CHECK COMPONENT
(Throttle position sensor).
Refer to "COMPONENT INSPECTION" on next page.

NG → Replace throttle position sensor.

OK ↓

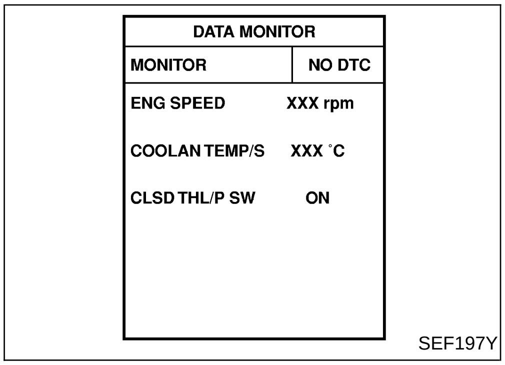
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-97.

↓

INSPECTION END

Closed Throttle Position Switch (Cont'd)

COMPONENT INSPECTION



SEF197Y

Closed throttle position switch

1. Start engine and warm it up to normal operating temperature.
2. Stop engine and turn ignition switch "ON".
3. Select "DATA MONITOR" mode with CONSULT-II.
4. Check indication of "CLSD THL/P SW".

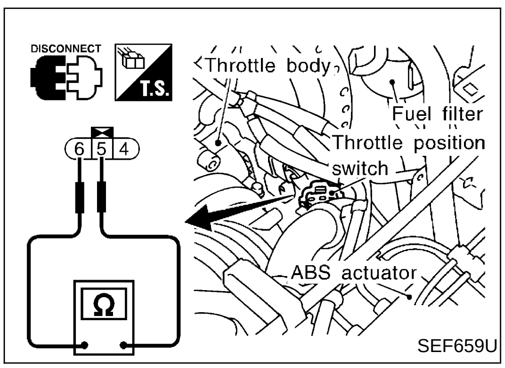
Measurement must be made with closed throttle position switch installed in vehicle.

Throttle valve conditions	CLSD THL/P SW
Completely closed	ON
Partially open or completely open	OFF

If NG, adjust closed throttle position switch. Refer to "Basic Inspection", EC-83.

5. If it is impossible to adjust closed throttle position switch in "Basic Inspection", replace closed throttle position switch.

OR



SEF659U

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch "OFF".
3. Disconnect closed throttle position switch harness connector.
4. Check continuity between terminals 5 and 6.

Resistance measurement must be made with closed throttle position switch installed in vehicle.

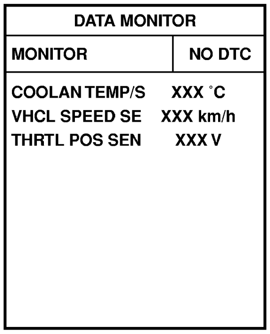
Throttle valve conditions	Continuity
Completely closed	Yes
Partially open or completely open	No

If NG, adjust closed throttle position switch. Refer to "Basic Inspection", EC-83.

5. If it is impossible to adjust closed throttle position switch in "Basic Inspection", replace closed throttle position switch.

Closed Throttle Position Switch (Cont'd)

Throttle position sensor



SEF198Y

1. Start engine and warm it up to normal operating temperature.
2. Stop engine and turn ignition switch "ON".
3. Select "DATA MONITOR" mode with CONSULT-II.
4. Check voltage of "THRTL POS SEN".

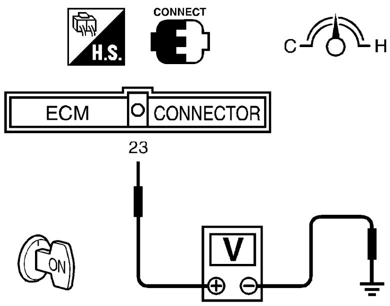
Voltage measurement must be made with throttle position sensor installed in vehicle.

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 "Basic Inspection", EC-83.

5. If it is impossible to adjust closed throttle position switch in "Basic Inspection", replace throttle position sensor.

OR



SEF884X

1. Start engine and warm it up to normal operating temperature.
2. Stop engine and turn ignition switch "ON".
3. Check voltage between ECM terminal ㉓ (Throttle position sensor signal) and ground.

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 "Basic Inspection", EC-83.

4. If it is impossible to adjust closed throttle position switch in "Basic Inspection", replace throttle position sensor.

A/T Control

COMPONENT DESCRIPTION

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).

ECM TERMINALS AND REFERENCE VALUE

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

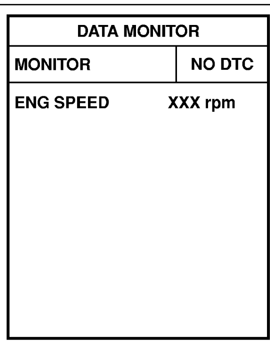
CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
24	Y/B	A/T signal No. 1	Ignition switch "ON" Engine is running. Idle speed	6 - 8V
29	Y/G	A/T signal No. 2	Ignition switch "ON" Engine is running. Idle speed	6 - 8V
30	Y/R	A/T signal No. 3	Ignition switch "ON"	0V

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Item (Possible Cause)
P0600*	● ECM receives incorrect voltage from TCM (Transmission control module) continuously.	● Harness or connectors (The circuit between ECM and TCM is open or shorted.)

*: This DTC can be detected only by "DATA MONITOR (AUTO TRIG)" with CONSULT-II.



SEF058Y

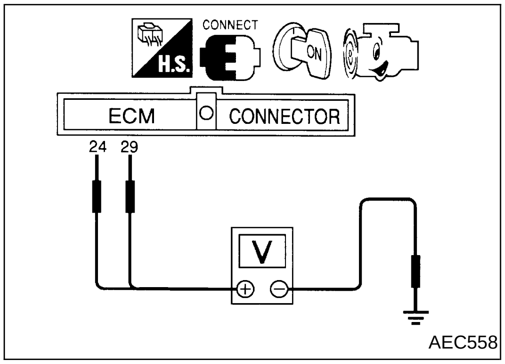
DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

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

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Start engine and race more than 1,000 rpm once, then let it idle for more than 40 seconds.

A/T Control (Cont'd)

4) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-344.



OR

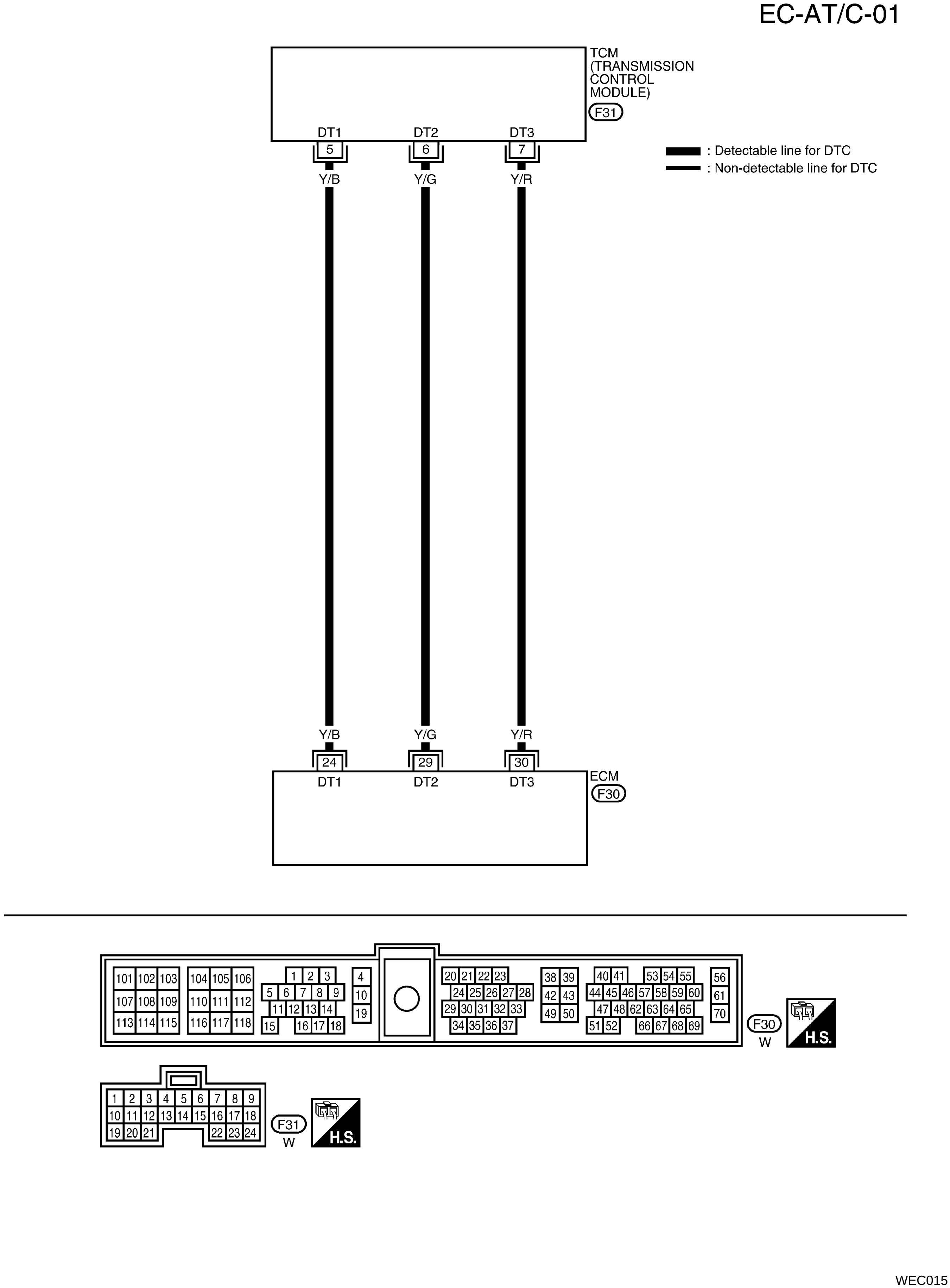
OVERALL FUNCTION CHECK

GST

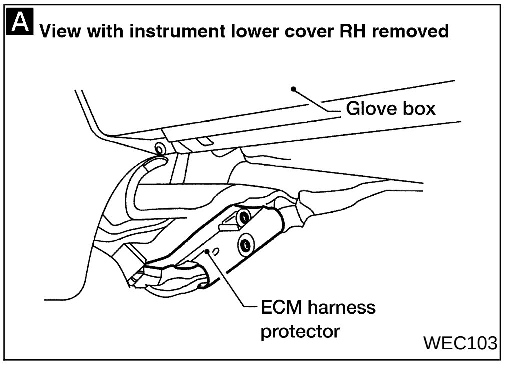
Use this procedure to check the overall function of the A/T control. During this check, a DTC might not be confirmed.

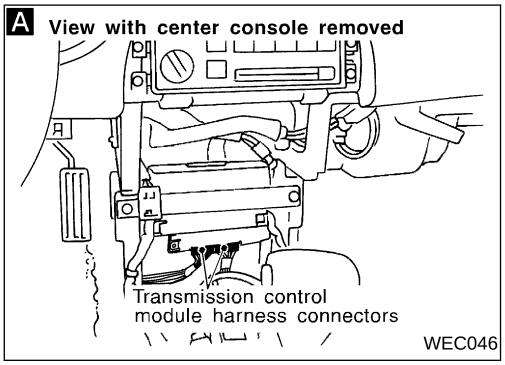
1) Turn ignition switch "ON".
2) Start engine.
3) Check voltage between
   ECM terminal ㉔ and ground.
   ECM terminal ㉙ and ground.
   Voltage: Approximately 7V
4) If NG, go to "DIAGNOSTIC PROCEDURE", EC-344.

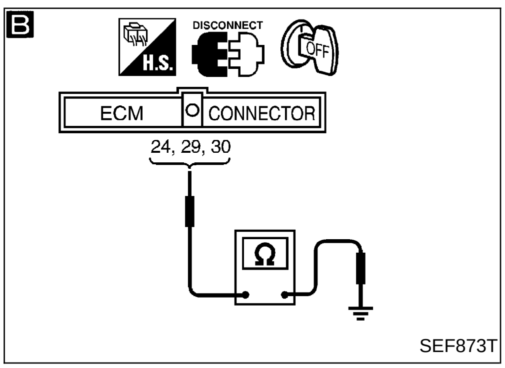
A/T Control (Cont'd)



A/T Control (Cont’d)







DIAGNOSTIC PROCEDURE

INSPECTION START

↓

A

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 24 and TCM terminal 5, ECM terminal 29 and terminal 6, ECM terminal 30 and terminal 7.
   Refer to the wiring diagram.
   Continuity should exist.

NG → Check the following.
- Harness for open or short between ECM and TCM

If NG, repair open circuit or short to ground or short to power in harness.

OK ↓

B

CHECK INPUT SIGNAL CIRCUIT.

Check harness continuity between ECM terminal 24 and ground, ECM terminal 29 and ground, ECM terminal 30 and ground.

Continuity should not exist.

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

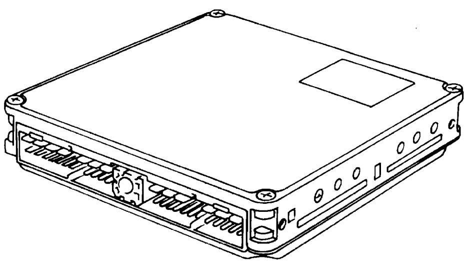
NG → Check the harness for open or short between ECM and TCM.
If NG, repair open circuit or short to ground or short to power in harness.

OK ↓

Perform “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-112.

↓

INSPECTION END


SEC220B

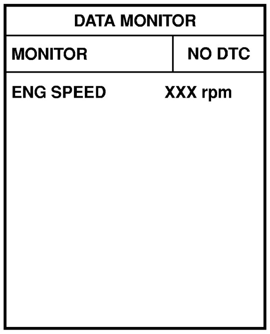
Engine Control Module (ECM)

COMPONENT DESCRIPTION

The ECM consists of a microcomputer, diagnostic test mode selector, and connectors for signal input and output and for power supply. The unit controls the engine.

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when	Check Item (Possible Cause)
P0605	• ECM calculation function is malfunctioning.	• ECM



SEF058Y

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

NOTE:
If “DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch “OFF” and wait at least 5 seconds before conducting the next test.

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 “DIAGNOSTIC PROCEDURE”, EC-346.

OR

1) Turn ignition switch “ON”.
2) Start engine.
3) Run engine for at least 30 seconds at idle speed.
4) Select “Mode 7” with GST.
5) If 1st trip DTC is detected, go to “DIAGNOSTIC PROCEDURE”, EC-346.

Engine Control Module (ECM) (Cont'd)

DIAGNOSTIC PROCEDURE

INSPECTION START

↓

1) Turn ignition switch "ON".
2) Select "SELF DIAG RESULTS" mode with CONSULT-II.
3) Touch "ERASE".

OR

1) Turn ignition switch "ON".
2) Select MODE 4 with GST.
3) Touch "ERASE".

↓

PERFORM DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE. See previous page.

↓

Is the 1st trip DTC P0605 displayed again?

- Yes → Replace ECM.
- No ↓

INSPECTION END

Thermostat Function

DIAGNOSTIC LOGIC

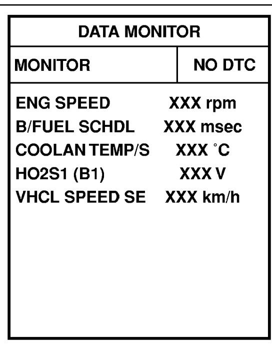
Even though the engine has been driven sufficiently to raise the engine coolant temperature, the engine coolant temperature is not raised to the specified temperature due to the thermostat having a leaking seal or being stuck open.

Diagnostic Trouble Code No.	Malfunction is detected when	Check Item (Possible Cause)
P1126	The engine coolant temperature does not reach to specified temperature.	● Thermostat function ● Leakage from sealing portion of thermostat ● Engine coolant temperature sensor

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

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

TESTING CONDITION:
- **For best results, perform at ambient temperature of −10°C (14°F) or higher.**
- **For best results, perform at engine coolant temperature of −10°C to 65°C (14 to 149°F).**



SEF682Y

1) Replace the thermostat with a new one. Refer to “Thermostat”, “ENGINE COOLING SYSTEM” in LC section. 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 “COOLANT TEMP/S” in data monitor mode with CONSULT-II.
4) Check that the “COOLANT TEMP/S” is above 64°C (149°F).
   If it is below 65°C (149°F), go to the following step.
   If it is above 65°C (149°F), stop engine and cool down the engine to less than 65°C (149°F), then retry from step 2).
5) Drive vehicle for 10 consecutive minutes in the following conditions.
   VHCL SPEED SE: 80 km/h to 120 km/h (75 MPH)
   If 1st trip DTC is detected, CHECK COMPONENT INSPECTION of ENGINE COOLANT TEMPERATURE SENSOR, EC-138.

OR

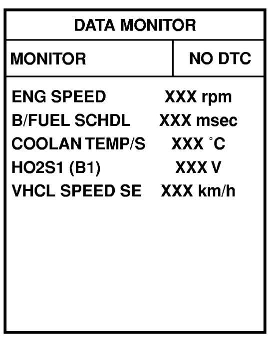
Follow the above procedure “With CONSULT-II”.

Closed Loop Control

ON BOARD DIAGNOSIS LOGIC

★ **The closed loop control has the one trip detection logic.**

Diagnostic Trouble Code 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 heated oxygen sensor 1 (front) circuit is open or shorted. ● Heated oxygen sensor 1 (front) ● Heated oxygen sensor 1 heater (front)



SEF682Y

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

CAUTION:
Always drive vehicle at a safe speed.

NOTE:
If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:
- **Never raise engine speed above 3,600 rpm during the "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE". If the engine speed limit is exceeded, retry the procedure from step 1).**
- **Before performing the following procedure, confirm that battery voltage is more than 11V.**

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.
4) While holding engine speed at 2,000 rpm, check the following.
   - "HO2S1 (B1)" voltage should go above 0.7V at least once.
   - "HO2S1 (B1)" voltage should go below 0.21V at least once.

   If the check result is NG, perform "DIAGNOSIS PROCEDURE", EC-182.
   If the check result is OK, perform the following step.
5) Let engine idle at least 3 minutes.
6) Maintain the following condition at least 50 consecutive seconds.
   B/FUEL SCHDL: 3.5 ms or more

Closed Loop Control (Cont'd)

ENG SPEED: 2,000 - 3,500 rpm
Selector lever: Suitable position
VHCL SPEED SE: More than 70 km/h (43 MPH)
During this test, P0130 may be displayed on CONSULT-II screen.

7) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-350.

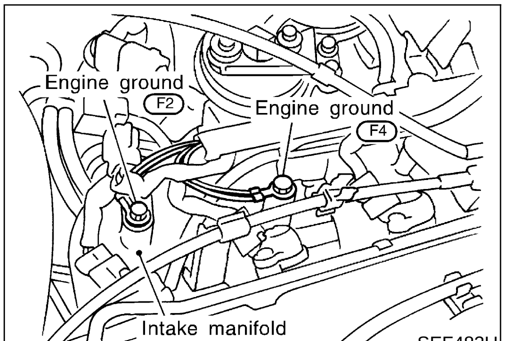
OR

OVERALL FUNCTION CHECK

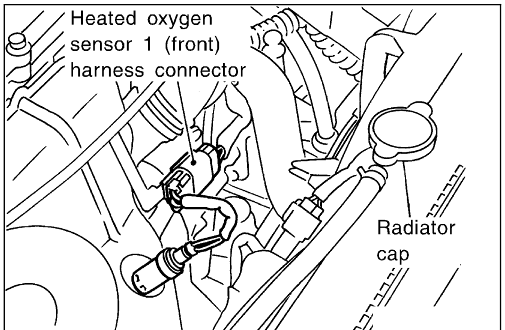
Use this procedure to check the overall function of the closed loop control. During this check, a 1st trip DTC might not be confirmed.

1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 46 (sensor signal) and 43 (engine ground).
3) Check the following with engine speed held at 2,000 rpm constant under no load.
   - The voltage should go above 0.7V at least once.
   - The voltage should go below 0.21V at least once.
4) If NG, go to "DIAGNOSTIC PROCEDURE", EC-350.

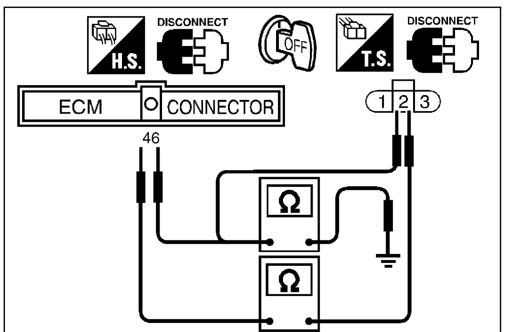
GI
MA
EM
LC
EC
FE
CL
MT
AT
FA
RA
BR
ST
RS
BT
HA
EL
IDX



SEF483U



SEF490UA



SEF073S

DIAGNOSTIC PROCEDURE

INSPECTION START

↓ OK

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

↓ OK

Loosen and retighten heated oxygen sensor 1 (front).
Tightening torque:
41 - 59 N·m
(4.1 - 6.1 kg-m, 30 - 44 ft-lb)

↓ OK

CHECK INPUT SIGNAL CIRCUIT.
1. Disconnect heated oxygen sensor 1 (front) harness connector and ECM harness connector.
2. Check harness continuity between ECM terminal 46 and terminal 2.
   Continuity should exist.
3. Check harness continuity between ECM terminal 46 (or terminal 2) and ground.
   Continuity should not exist.

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

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

↓ OK

CHECK COMPONENT
[Heated oxygen sensor 1 heater (front)].
Refer to "COMPONENT INSPECTION", EC-184.

NG → Replace heated oxygen sensor 1 (front).

↓ OK

CHECK COMPONENT
[Heated oxygen sensor 1 (front)].
Refer to "COMPONENT INSPECTION", EC-184.

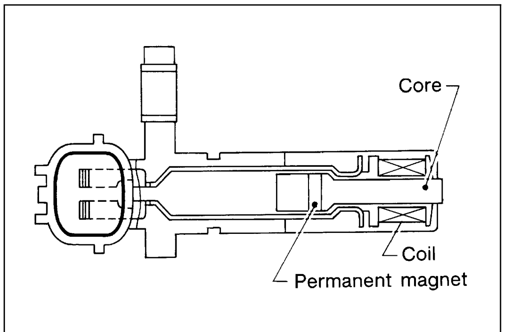
NG → Replace heated oxygen sensor 1 (front).

↓ OK

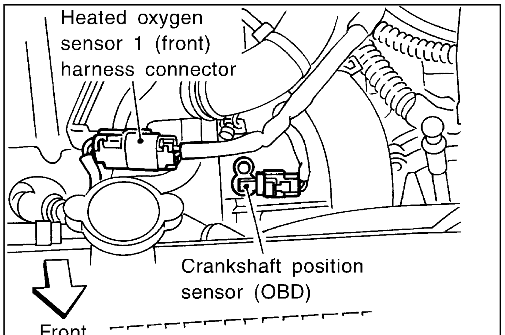
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-112.

↓ OK

INSPECTION END



SEF956N



SEF512UA

Crankshaft Position Sensor (CKPS) (OBD) (COG)

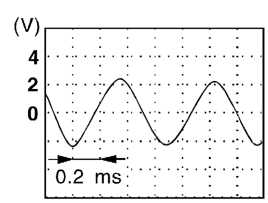
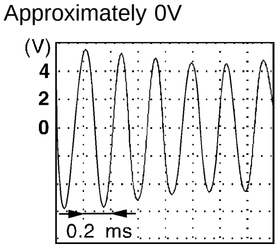
COMPONENT DESCRIPTION

The crankshaft position sensor (OBD) is located on the transmission housing facing the gear teeth (cogs) of the flywheel or drive plate. It detects the fluctuation of the engine revolution.
The sensor consists of a permanent magnet, core and coil.
When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.
The changing gap causes the magnetic field near the sensor to change.
Due to the changing magnetic field, the voltage from the sensor changes.
The ECM receives the voltage signal and detects the fluctuation of the engine revolution.
This sensor is not directly used to control the engine system.
It is used only for the on board diagnosis.

ECM TERMINALS AND REFERENCE VALUE

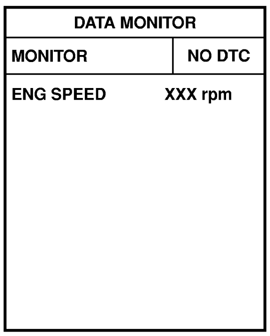
Specification data are reference values and are measured between each terminal and ground.

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
50	B	Sensors' ground	Engine is running. (Warm-up condition) └ Idle speed	Approximately 0V
53	BR	Crankshaft position sensor (OBD)	Engine is running. (Warm-up condition) └ Idle speed	Approximately 0V  SEF643U
			Engine is running. └ Engine speed is 2,000 rpm	Approximately 0V  SEF644U

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P1336	● A chipping of the flywheel or drive plate gear tooth (cog) is detected by the ECM.	● Harness or connectors ● Crankshaft position sensor (OBD) ● Drive plate/Flywheel



SEF058Y

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

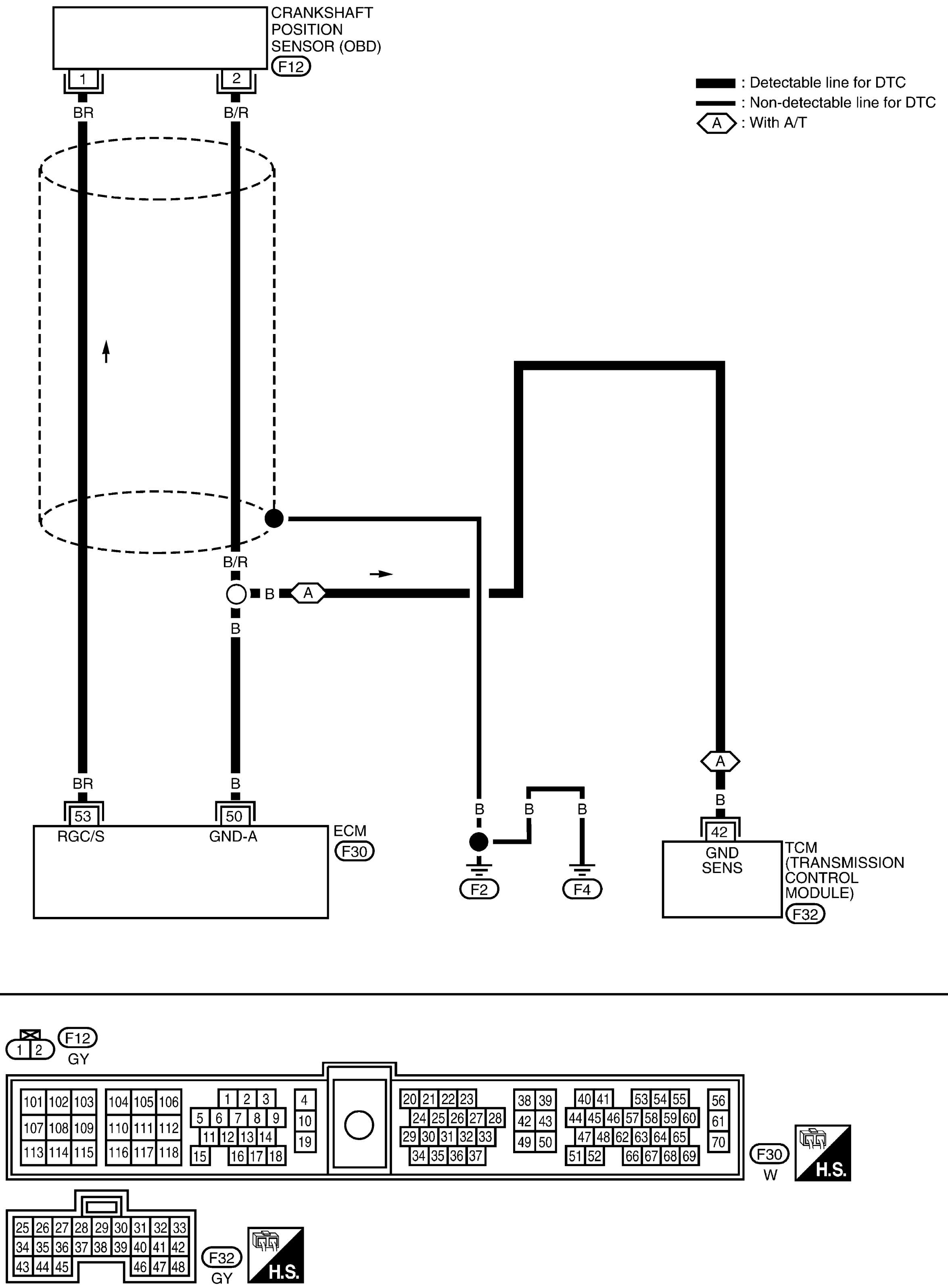
NOTE:
If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
2) Start engine and run it for at least 2 minutes at idle speed.
3) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-354.

OR

1) Start engine and run it for at least 2 minutes at idle speed.
2) Select "MODE 7" with GST.
3) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-354.

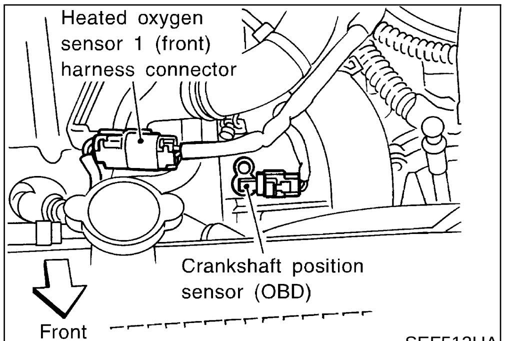
EC-CKPS-01



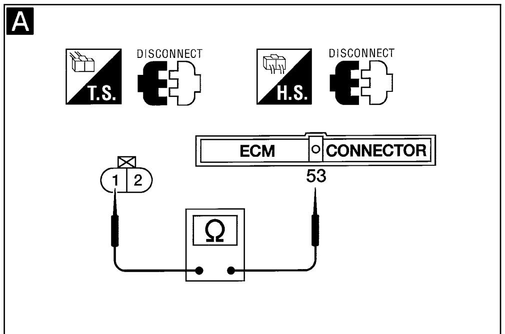
WEC008

Crankshaft Position Sensor (CKPS) (OBD) (COG) (Cont'd)

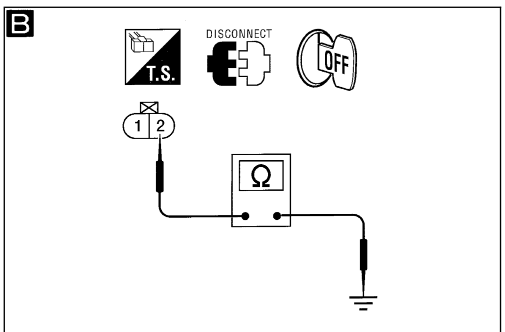
DIAGNOSTIC PROCEDURE



SEF512UA



AEC740



AEC747

INSPECTION START

↓

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

↓

A

CHECK INPUT SIGNAL CIRCUIT.
1. Disconnect crankshaft position sensor (OBD) and ECM harness connectors.
2. Check continuity between ECM terminal 53 and terminal 1.
   Continuity should exist.
   If OK, check harness for short to ground and short to power.

NG → Repair harness or connectors.

↓ OK

B

CHECK GROUND CIRCUIT.
1. Reconnect ECM harness connectors.
2. Check harness continuity between terminal 2 and engine ground.
   Continuity should exist.
   If OK, check harness for short to power.

NG → Check the following.
- Harness for open or short between crankshaft position sensor (OBD) and ECM
- Harness for open or short between crankshaft position sensor (OBD) and TCM

If NG, repair open circuit or short to power in harness or connectors.

↓ OK

Loosen and retighten the fixing bolt of the crankshaft position sensor (OBD). Then retest.

↓ Trouble is not fixed.

CHECK COMPONENT
[Crankshaft position sensor (OBD)].
Refer to "COMPONENT INSPECTION" on next page.

NG → Replace crankshaft position sensor (OBD).

↓ OK

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-112.

↓ Trouble is not fixed.

Visually check for chipping flywheel or drive plate gear tooth (cog).

NG → Replace the flywheel or drive plate.

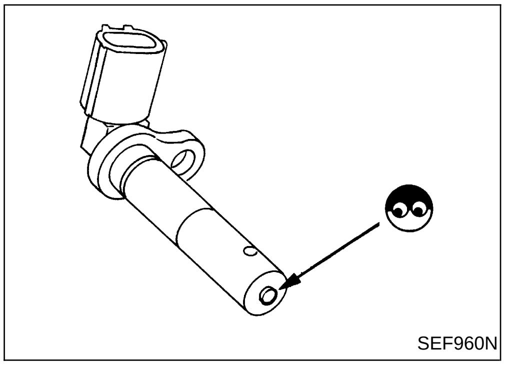
↓ OK

INSPECTION END

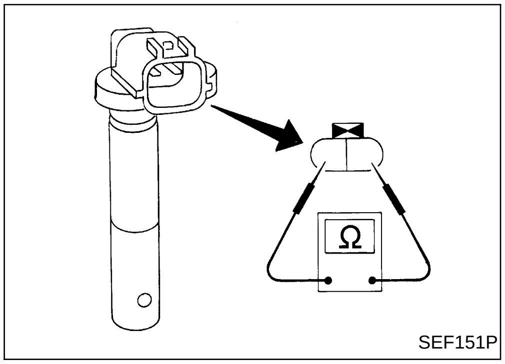
Crankshaft Position Sensor (CKPS) (OBD) (COG) (Cont'd)

COMPONENT INSPECTION

Crankshaft position sensor (OBD)

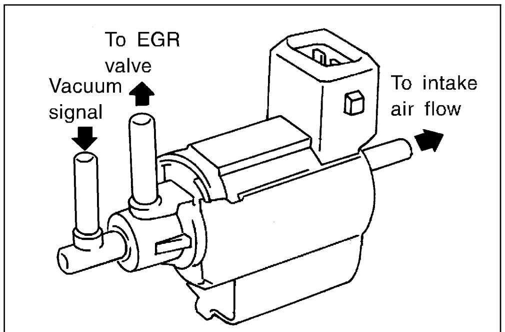

SEF960N

1. Disconnect crankshaft position sensor (OBD) harness connector.
2. Loosen the fixing bolt of the sensor.
3. Remove the sensor.
4. Visually check the sensor for chipping.



SEF151P

5. Check resistance as shown in the figure.
   Resistance: Approximately 512 - 632Ω [at 25°C (77°F)]



SEF318U

EGRC-Solenoid Valve

COMPONENT DESCRIPTION

The EGRC-solenoid valve responds to signals from the ECM. When the ECM sends an ON (ground) signal, the coil in the solenoid valve is energized. The vacuum signal passes through the solenoid valve. The signal then reaches the EGR valve. When the ECM sends an OFF signal, a plunger will then move to cut the vacuum signal from the throttle body to the EGR valve.

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

Specification data are reference values

MONITOR ITEM	CONDITION		SPECIFICATION
EGRC SOL/V	● Engine: After warming up ● Air conditioner switch: “OFF” ● Shift lever: “N” ● No-load	Idle	OFF
		Engine speed: Revving from 1,500 to 4,000 rpm quickly	ON

ECM TERMINALS AND REFERENCE VALUE

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

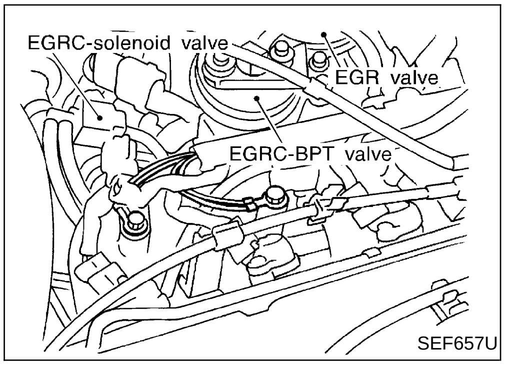
CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM’s transistor. Use a ground other than ECM terminals, such as the ground.

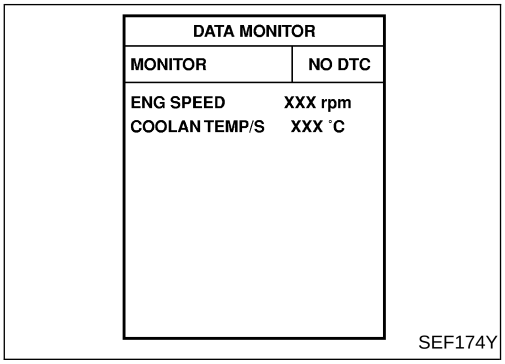
TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
103	P	EGRC-solenoid valve	Engine is running. (Warm-up condition) Idle speed	BATTERY VOLTAGE (11 - 14V)
			Engine is running. (Warm-up condition) Revving engine from idle to 3,000 rpm quickly	0 - 0.7V

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P1400	● The improper voltage signal is sent to ECM through EGRC-solenoid valve.	● Harness or connectors (The EGRC-solenoid valve circuit is open or shorted.) ● EGRC-solenoid valve

EGRC-Solenoid Valve (Cont'd)





DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

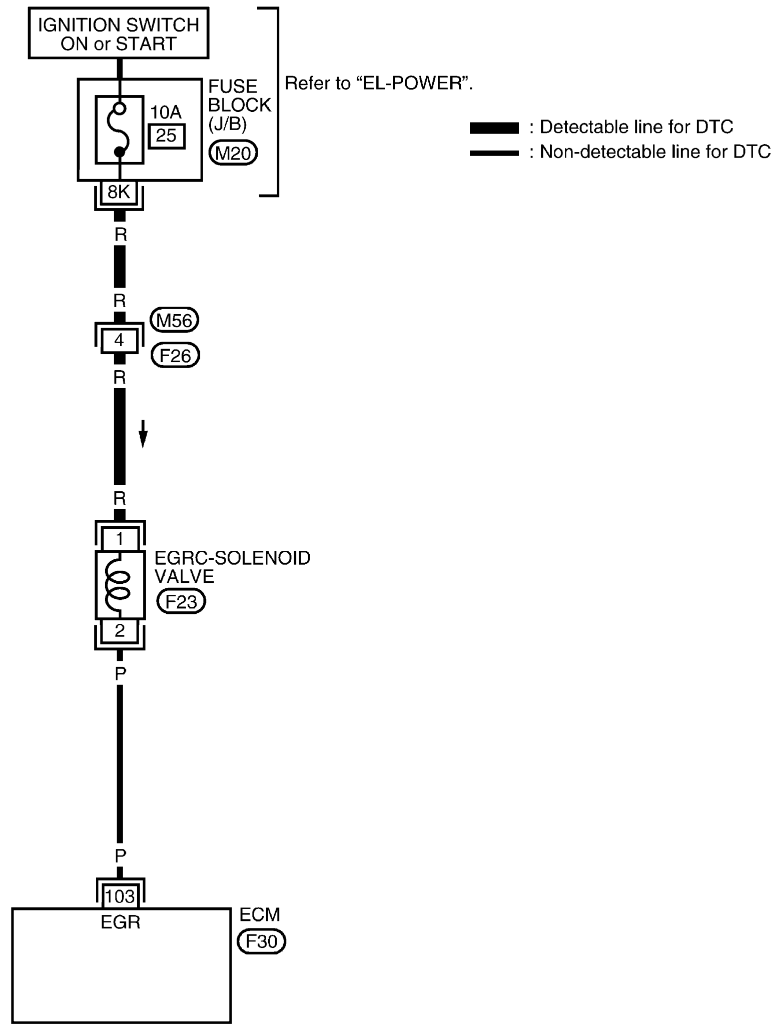
NOTE:
If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

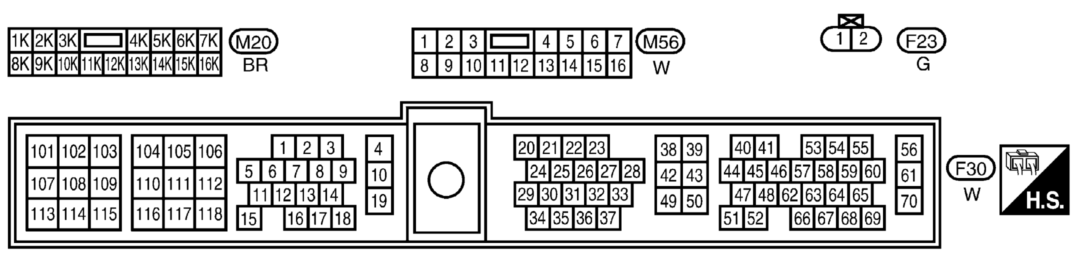
1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT-II and wait at least 5 seconds.
3) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-359.

OR

1) Turn ignition switch "ON" and wait at least 5 seconds.
2) Select "MODE 7" with GST.
3) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-359.

EC-EGRC/V-01

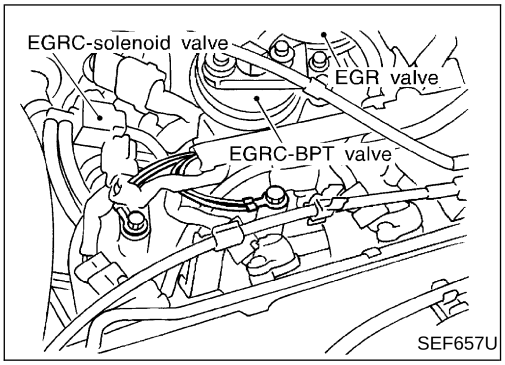


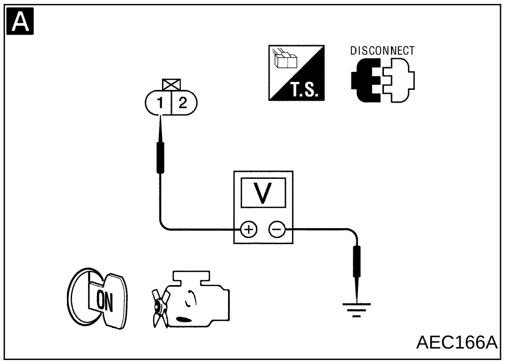


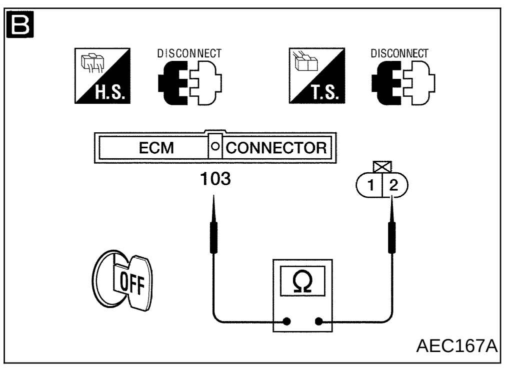
WEC872

EGRC-Solenoid Valve (Cont'd)

DIAGNOSTIC PROCEDURE







INSPECTION START

↓

A

CHECK POWER SUPPLY.
1. Turn ignition switch "OFF".
2. Disconnect EGRC-solenoid valve harness connector.
3. Turn ignition switch "ON".
4. Check voltage between terminal 1 and ground with CONSULT-II or tester.
   Voltage: Battery voltage

NG → Check the following.
- Harness connectors F26, M54
- 10A fuse
- Harness for open or short between EGRC-solenoid valve and fuse

If NG, repair harness or connectors.

OK ↓

B

CHECK OUTPUT SIGNAL CIRCUIT.
1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 103 and terminal 2.
   Continuity should exist.
   If OK, check harness for short to ground and short to power.

NG → Check the following.
- Harness for open or short between EGRC-solenoid valve and ECM

If NG, repair open circuit or short to ground or short to power in harness or connectors.

OK ↓

CHECK COMPONENT
(EGRC-solenoid valve).
Refer to "COMPONENT INSPECTION" on next page.

NG → Replace EGRC-solenoid valve.

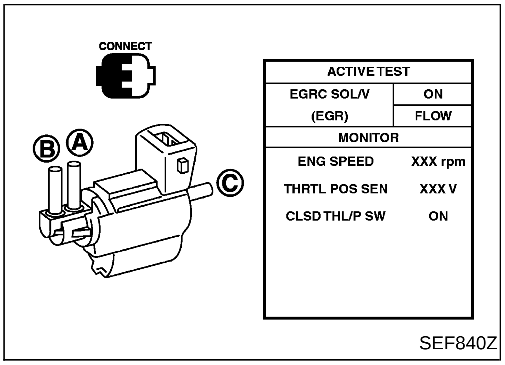
OK ↓

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-112.

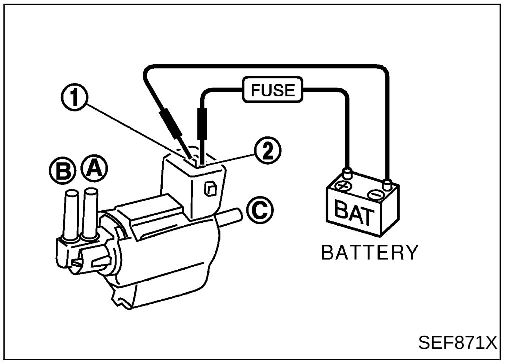
↓

INSPECTION END

EGRC-Solenoid Valve (Cont'd)



SEF840Z



SEF871X

COMPONENT INSPECTION

EGRC-solenoid valve

Check air passage continuity.

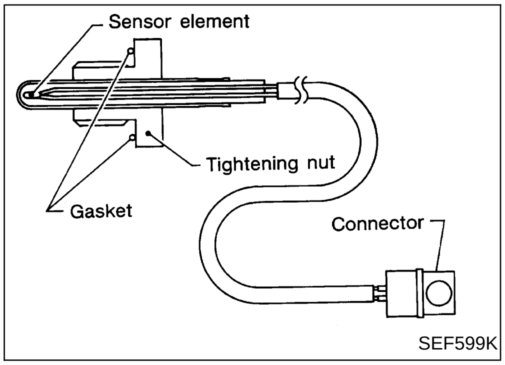
Perform "EGRC SOLENOID VALVE" in "ACTIVE TEST" mode.

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

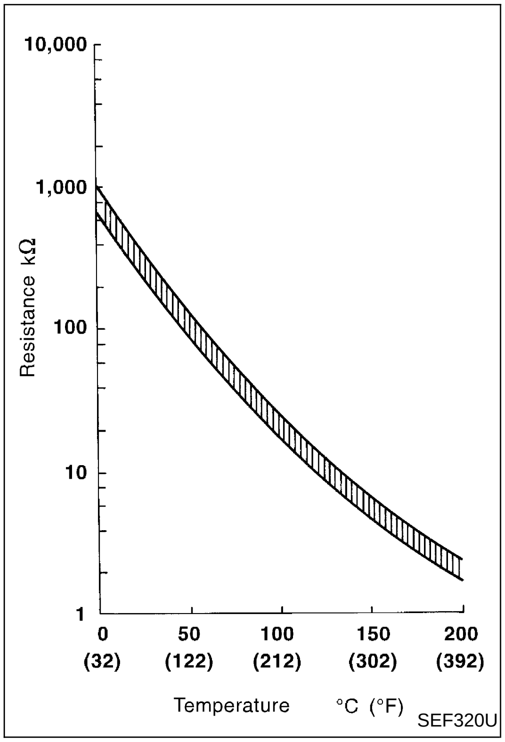
OR

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

If NG or operation takes more than 1 second, replace EGRC-solenoid valve.



SEF599K



SEF320U

EGR Temperature Sensor

COMPONENT DESCRIPTION

The EGR temperature sensor detects temperature changes in the EGR passage way. When the EGR valve opens, hot exhaust gases flow, and the temperature in the passage way changes. The EGR temperature sensor is a thermistor that modifies a voltage signal sent from the ECM. This modified signal then returns to the ECM as an input signal. As the temperature increases, EGR temperature sensor resistance decreases. This sensor is not used to control the engine system.
It is used only for the on board diagnosis.

<Reference data>

EGR temperature °C (°F)	Voltage* V	Resistance MΩ
0 (32)	4.61	0.68 - 1.11
50 (122)	2.53	0.09 - 0.12
100 (212)	0.87	0.017 - 0.024

*: These data are reference values and are measured between ECM terminal 62 (EGR temperature sensor) and ground.
When EGR system is operating.
Voltage: 0 - 1.5V

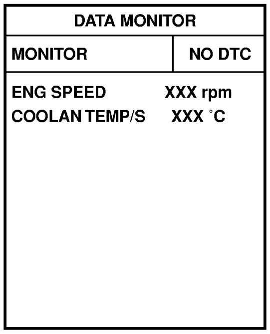
CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

GI
MA
EM
LC
EC
FE
CL
MT
AT
FA
RA
BR
ST
RS
BT
HA
EL
IDX

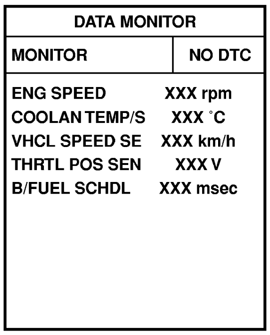
ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P1401	A) An excessively low voltage from the EGR temperature sensor is sent to ECM even when engine coolant temperature is low.	● Harness or connectors (The EGR temperature sensor circuit is shorted.) ● EGR temperature sensor ● Malfunction of EGR function, EGRC-BPT valve or EGRC-solenoid valve
	B) An excessively high voltage from the EGR temperature sensor is sent to ECM even when engine coolant temperature is high.	● Harness or connectors (The EGR temperature sensor circuit is open.) ● EGR temperature sensor ● Malfunction of EGR function, EGRC-BPT valve or EGRC-solenoid valve

EGR Temperature Sensor (Cont'd)



SEF174Y



SEF201Y

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

Perform "Procedure for malfunction A" first. If DTC cannot be confirmed, perform "Procedure for malfunction B".

NOTE:
If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

Procedure for malfunction A

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Verify that engine coolant temperature is less than 70°C (158°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 "DIAGNOSTIC PROCEDURE", EC-365.

OR

1) Turn ignition switch "ON".
2) Select "MODE 1" with GST.
3) Verify that engine coolant temperature is less than 40°C (104°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) Select "MODE 7" with GST.
6) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-365.

Procedure for malfunction B

CAUTION:
Always drive vehicle at a safe speed.

TESTING CONDITION:
Always perform the test at a temperature of −10°C (14°F) or higher.

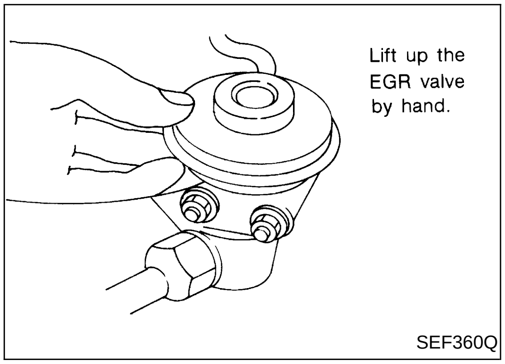
1) Start engine and warm it up to normal operating temperature.
2) Run engine at idle for at least 2 minutes.
3) Confirm that EGR valve is not lifting.
If the check result is NG, go to "TROUBLE DIAGNOSES FOR DTC P0400, P0402 and P1402". (See pages EC-266, 275 and 367.)
4) Select "DATA MONITOR" mode with CONSULT-II.
5) Read "EGR TEMP SEN" at about 1,500 rpm while holding the EGR valve in full open position by hand.
Voltage should decrease to less than 1.0V.
If the check result is NG, go to "DIAGNOSTIC PROCEDURE", EC-365.
If the check result is OK, go to following step.
6) Turn ignition switch "OFF" and wait at least 5 seconds.
7) Turn ignition switch "ON".
8) Check the output voltage of "THRTL POS SEN" at closed throttle position and note it.
9) Start engine.
10) Maintain the following conditions for at least 5 consecutive seconds.

EGR Temperature Sensor (Cont'd)

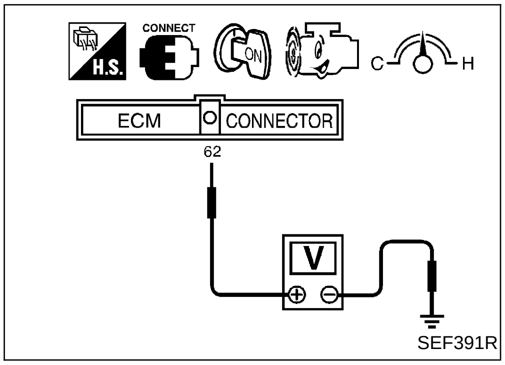
ENG SPEED: 1,500 - 2,500 rpm (A/T)
2,000 - 3,000 rpm (M/T)
VHCL SPEED SE: 10 km/h (6 MPH) or more
B/FUEL SCHDL: 6.25 - 10.5 ms (A/T)
5.5 - 8.75 ms (M/T)
THRTL POS SEN: X - (X + 0.45) V
X= Voltage value measured at step 8)
Selector lever: Suitable position

11) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-365.

— OR —



SEF360Q



SEF391R

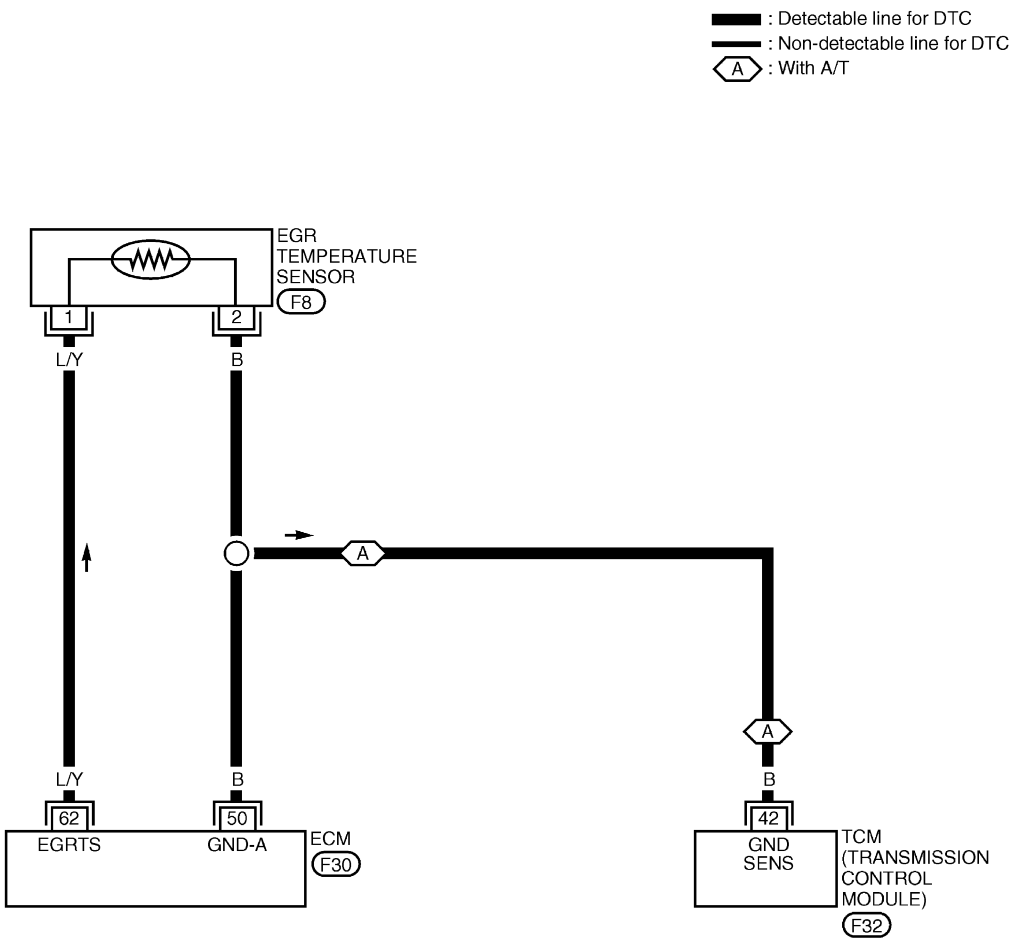
OVERALL FUNCTION CHECK

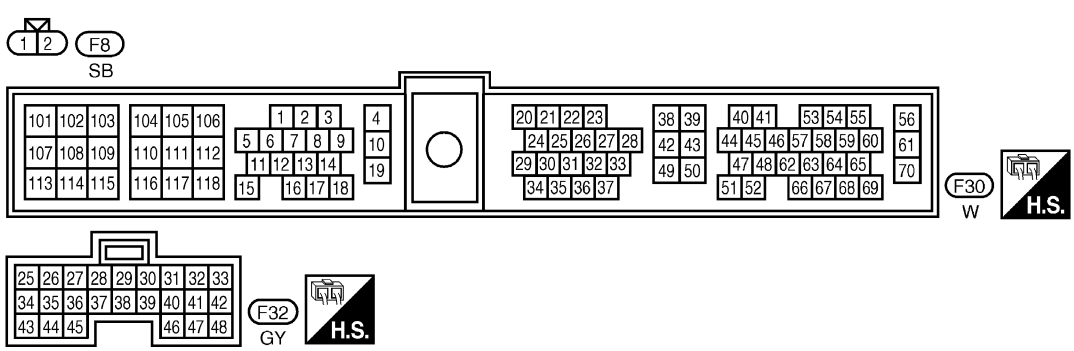
Use this procedure to check the overall function of the EGR temperature sensor. During this check, a 1st trip DTC might not be confirmed.

Procedure for malfunction B

1) Start engine and warm it up to normal operating temperature.
2) Run engine at idle for at least 2 minutes.
3) Confirm that EGR valve is not lifting. If NG, go to TROUBLE DIAGNOSIS FOR DTC P1402 (See page EC-367).
4) Check voltage between ECM terminal 62 and ground at about 1,500 rpm with EGR valve lifted up to the full position by hand.
   Voltage should decrease to less than 1.0V.
5) If step 4 is OK, perform TROUBLE DIAGNOSIS FOR DTC P0400 and P1400 (See pages EC-266 and 356).
   If step 4 is NG, go to "DIAGNOSTIC PROCEDURE", EC-365.

EC-EGR/TS-01

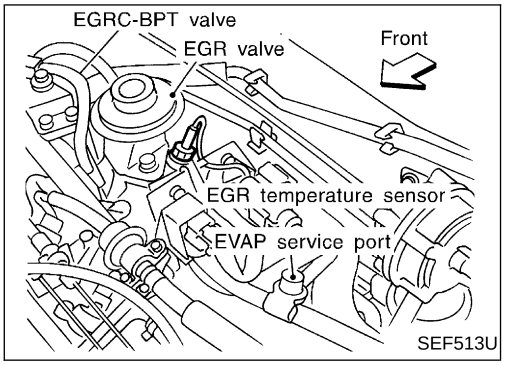


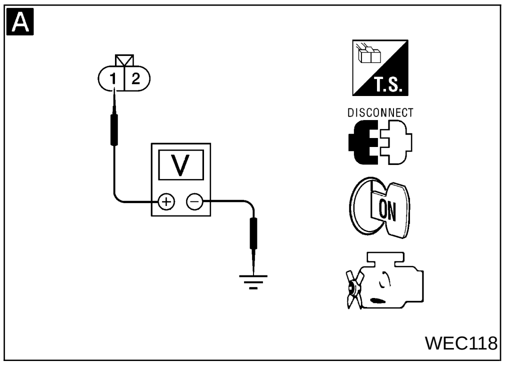


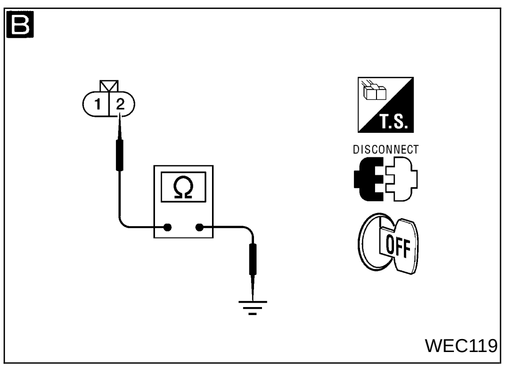
WEC566

EGR Temperature Sensor (Cont'd)

DIAGNOSTIC PROCEDURE







INSPECTION START

↓

A

CHECK POWER SUPPLY.
1. Disconnect EGR temperature sensor harness connector.
2. Turn ignition switch "ON".
3. Check voltage between terminal 1 and ground with CONSULT-II or tester.
   Voltage: Approximately 5V

NG → Repair harness or connectors.

OK ↓

B

CHECK GROUND CIRCUIT.
1. Turn ignition switch "OFF".
2. Check harness continuity between terminal 2 and engine ground.
   Continuity should exist.
   If OK, check harness for short to power.

NG → Check the following.
- Harness for open or short between ECM and EGR temperature sensor
- Harness for open or short between TCM and EGR temperature sensor

If NG, repair open circuit or short to power in harness or connector.

OK ↓

CHECK COMPONENT
(EGR temperature sensor).
Refer to "COMPONENT INSPECTION" on next page.

NG → Replace EGR temperature sensor.

OK ↓

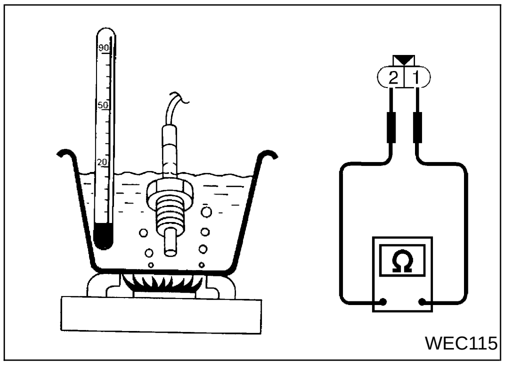
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-112.

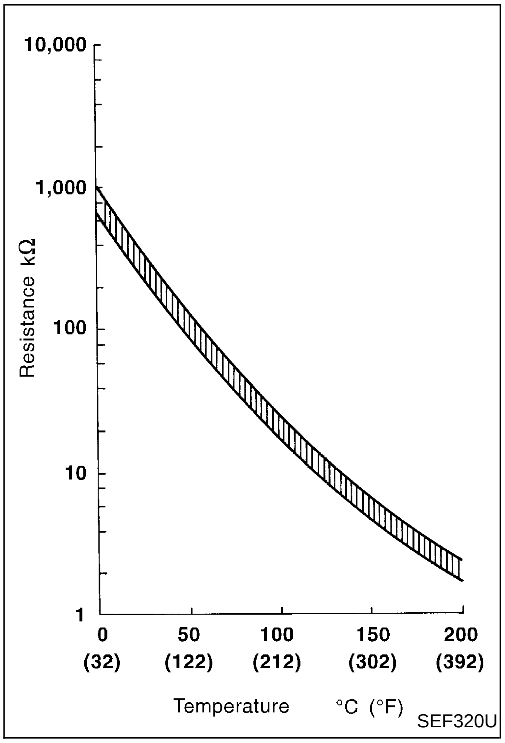
↓

INSPECTION END

GI
MA
EM
LC
EC
FE
CL
MT
AT
FA
RA
BR
ST
RS
BT
HA
EL
IDX

EGR Temperature Sensor (Cont'd)





COMPONENT INSPECTION

EGR temperature sensor

Check resistance change and resistance value.

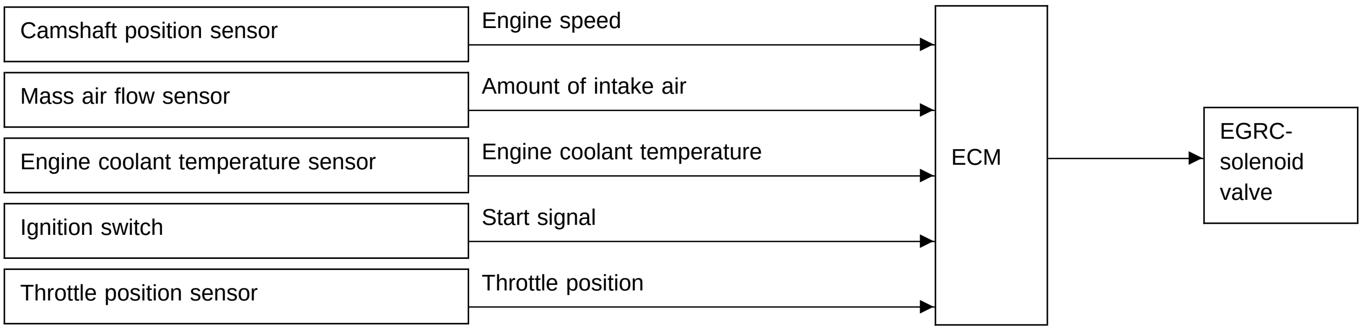
<Reference data>

EGR temperature °C (°F)	Voltage V	Resistance MΩ
0 (32)	4.61	0.68 - 1.11
50 (122)	2.53	0.09 - 0.12
100 (212)	0.87	0.017 - 0.024

If NG, replace EGR temperature sensor.

EGR Function (Open)

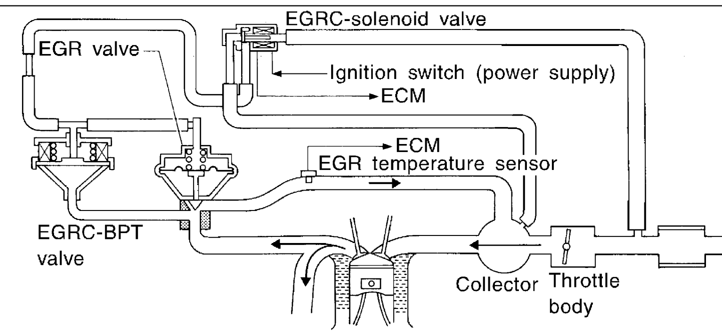
SYSTEM DESCRIPTION



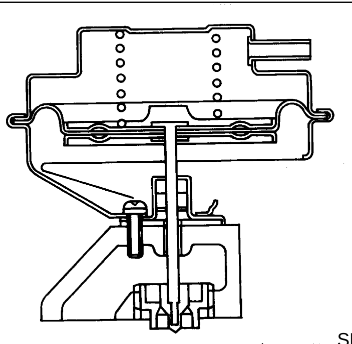
This system cuts and controls vacuum applied to the EGR valve to suit engine operating conditions. This cut-and-control operation is accomplished through the ECM and the EGRC-solenoid valve. When the ECM detects any of the following conditions, it cuts the current for the solenoid valve. This causes the port vacuum to be discharged into the atmosphere. The EGR valve remains closed.

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

EGR and vacuum



SEF317U

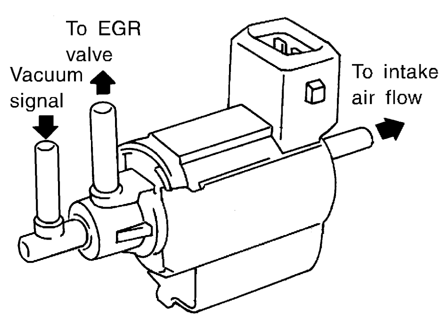


SEF783K

COMPONENT DESCRIPTION

Exhaust gas recirculation (EGR) valve

The EGR valve controls the amount of exhaust gas routed to the intake manifold. Vacuum is applied to the EGR valve in response to throttle valve opening. The vacuum controls the movement of a taper valve connected to the vacuum diaphragm in the EGR valve.

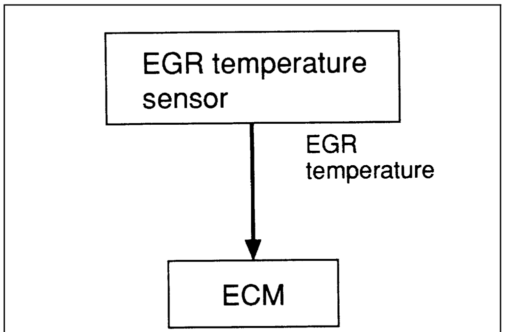


SEF318U

EGRC-solenoid valve

The EGRC-solenoid valve responds to signals from the ECM. When the ECM sends an ON (ground) signal, the coil in the solenoid valve is energized. The vacuum signal passes through the solenoid valve. The signal then reaches the EGR valve. When the ECM sends an OFF signal, a plunger will then move to cut the vacuum signal from the intake manifold to the EGR valve.

EGR Function (Open) (Cont'd)



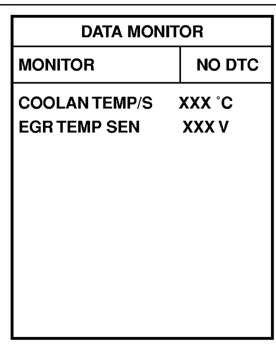
SEF073P

ON BOARD DIAGNOSIS LOGIC

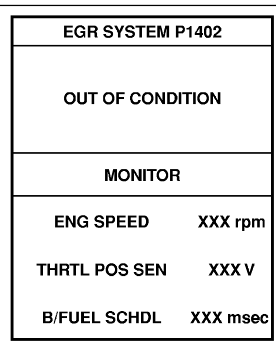
If EGR temperature sensor detects EGR flow under the condition that does not call for EGR, a high-flow malfunction is diagnosed.

NOTE:
Diagnosis for this DTC will end when engine coolant temperature is approx. 50 - 60°C (120 - 140°F). Ignition switch must be turned "ON" (engine running) with engine coolant temperature below 40°C (104°F) when starting DTC confirmation procedure.

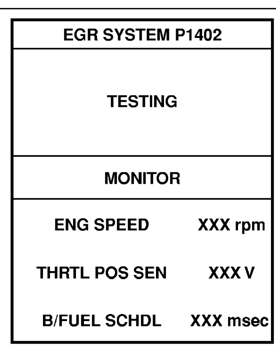
Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1402	• EGR flow is detected under conditions that do not call for EGR.	• EGRC-solenoid valve • EGR valve leaking or stuck open • EGR temperature sensor • EGRC-BPT valve



SEF202Y



SEF203Y



SEF204Y

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

NOTE:
If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

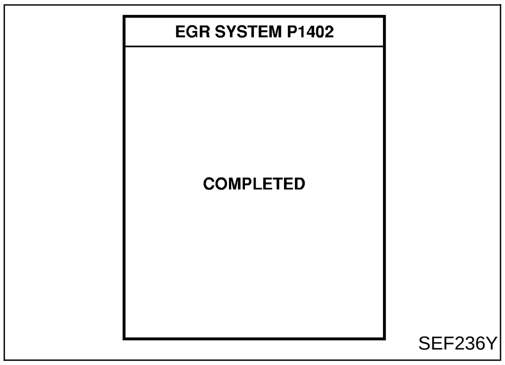
TESTING CONDITION:

- **Always perform the test at a temperature of 0°C (32°F) or higher.**
- **Engine coolant temperature and EGR temperature must be verified in "DATA MONITOR" mode with CONSULT-II before starting DTC WORK SUPPORT test. If it is out of range below, the test cannot be conducted.**
  COOLAN TEMP/S: −10 to 40°C (14 to 104°F)
  EGR TEMP SEN: Less than 4.6V

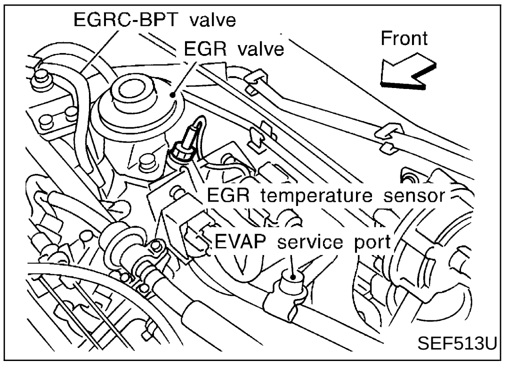
  If the values are out of the ranges indicated above, park the vehicle in a cool place and allow the engine temperature to stabilize. Do not attempt to reduce the coolant or EGR temperature with a fan or means other than ambient air. Doing so may produce an inaccurate diagnostic result.

1) Turn ignition switch OFF and wait at least 5 seconds. Then turn ignition switch "ON".
2) Select "EGR SYSTEM P1402" of "EGR SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
3) Follow the instruction of CONSULT-II.
4) Start engine and let it idle until "TESTING" on CONSULT-II screen is turned to "COMPLETED". (It will take 70 seconds or more.)

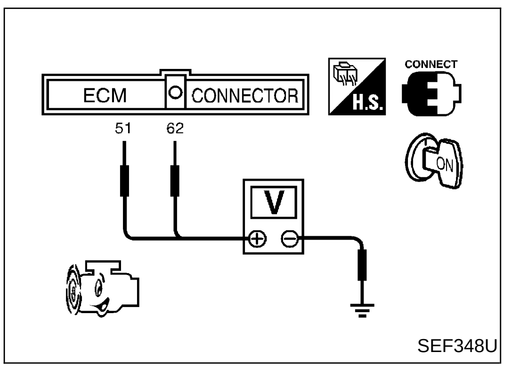
EGR Function (Open) (Cont'd)



SEF236Y



SEF513U



SEF348U

If "TESTING" is not displayed after 5 minutes, turn ignition "OFF" and cool the engine coolant temperature to the range of −10 to 40°C (14 to 104°F). Retry from step 1).

5) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "DIAGNOSTIC PROCEDURE", EC-371.

OR

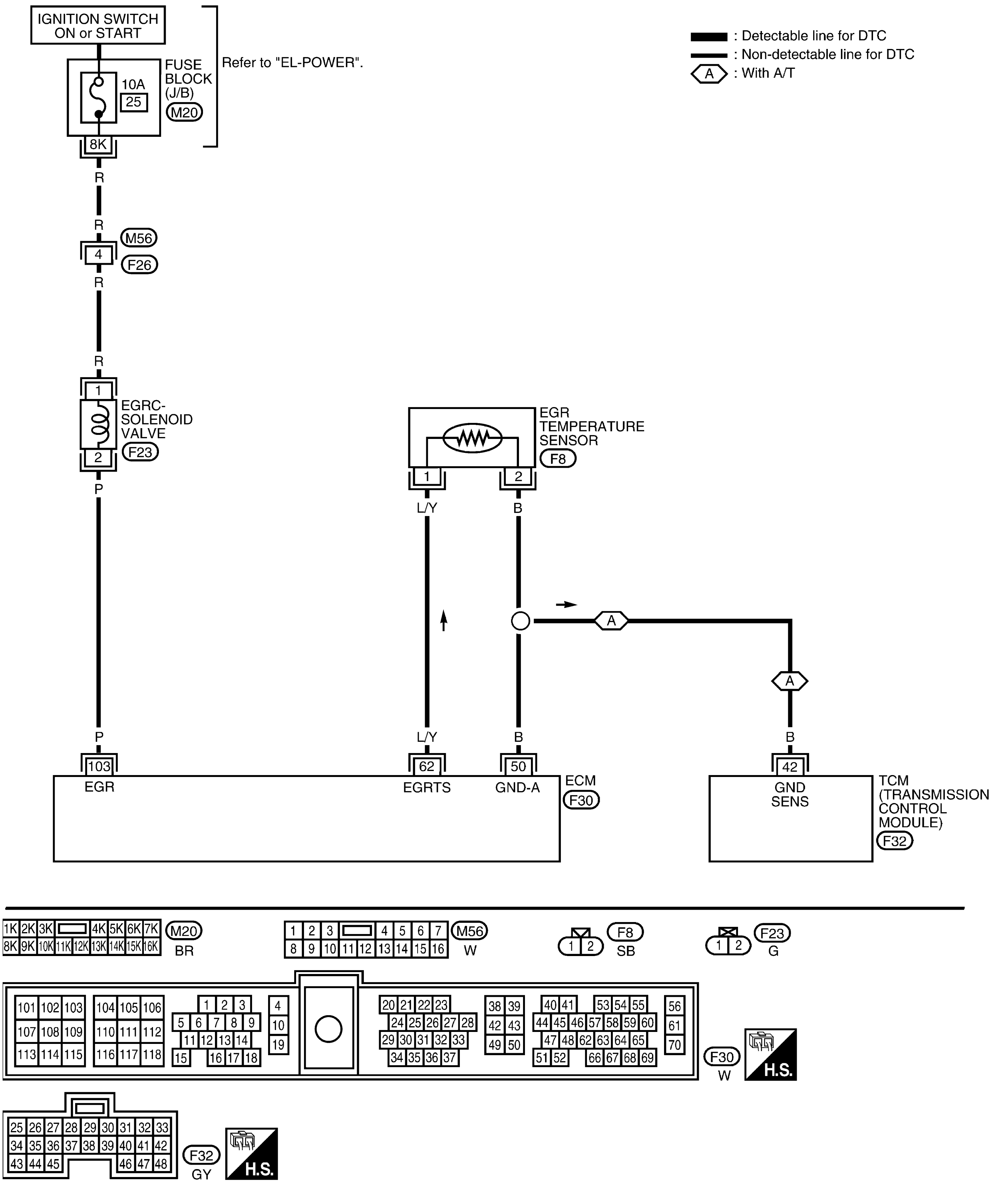
GST

1) Turn ignition switch "ON" and select "MODE 1" with GST.
2) Check that engine coolant temperature is within the range of −10 to 40°C (14 to 104°F).
3) Check that voltage between ECM terminal 62 (EGR temperature) and ground is less than 4.8V.
4) Start engine and let it idle for at least 70 seconds.
5) Stop engine.
6) Perform from step 1) to 4).
7) Select "MODE 3" with GST.
8) If DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-371.

- **When using GST, "DIAGNOSTIC TROUBLE CODE 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.**

EGR Function (Open) (Cont'd)

EC-EGRC1-01

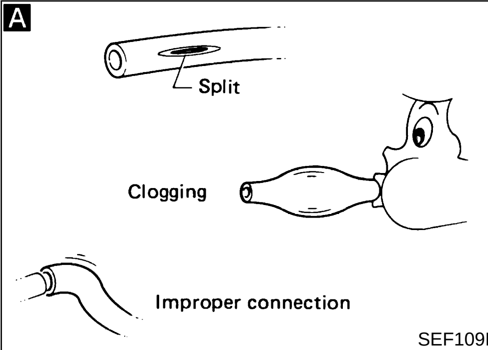


WEC705

EGR Function (Open) (Cont'd)

DIAGNOSTIC PROCEDURE

A

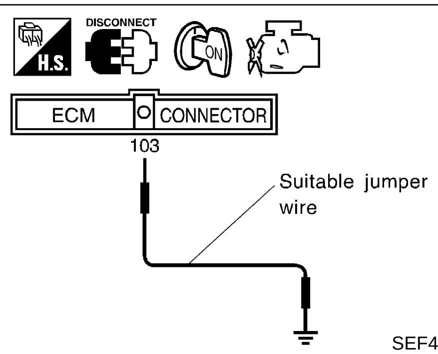


SEF109L

B

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

SEF716Z



SEF491V

INSPECTION START

↓

A

CHECK VACUUM HOSE.
Check vacuum hose for clogging, cracks or improper connection.

NG → Repair or replace vacuum hose.

↓ OK

B

CHECK COMPONENT
(EGRC-solenoid valve).
1. Turn ignition switch "ON".
2. Turn EGRC-solenoid valve "ON" and "OFF" in "ACTIVE TEST" mode with CONSULT-II and check operating sound.

OR

1. Turn ignition switch "'OFF".
2. Disconnect ECM harness connector.
3. Turn ignition switch "ON".
4. Connect a suitable jumper wire between ECM terminal 103 and engine ground.
5. Check operating sound of the solenoid valve when disconnecting and reconnecting the jumper wire.

NG → Check the following.
- Harness connectors M56, F26
- 10A fuse
- Harness for open or short between fuse block and EGRC-solenoid valve
- Harness for open or short between ECM and EGRC-solenoid valve

If NG, repair open circuit or short to power in harness or connectors.

↓ OK

CHECK COMPONENT
(EGRC-solenoid valve).
Refer to "COMPONENT INSPECTION" on next page.

NG → Replace EGRC-solenoid valve.

↓ OK

CHECK COMPONENT
(EGR valve).
Refer to "COMPONENT INSPECTION" on the next page.

NG → Replace EGR valve.

↓ OK

CHECK COMPONENT
(EGRC-BPT valve).
Refer to "COMPONENT INSPECTION" on EC-373.

NG → Replace EGRC-BPT valve.

↓ OK

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-112.

↓

Check resistance of EGR temperature sensor.
Refer to the next page.

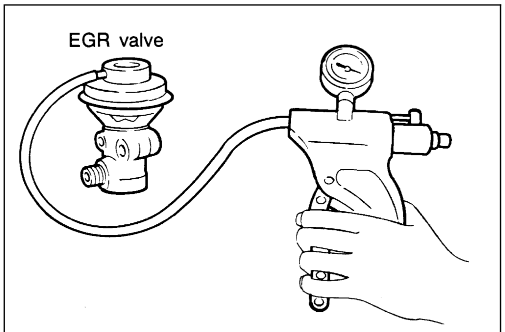
↓

INSPECTION END

GI MA EM LC EC FE CL MT AT FA RA BR ST RS BT HA EL IDX

EGR Function (Open) (Cont'd)

COMPONENT INSPECTION



MEF137D

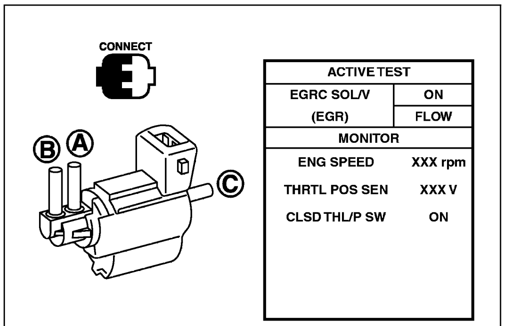
EGR valve

- Apply vacuum to EGR vacuum port with a hand vacuum pump.

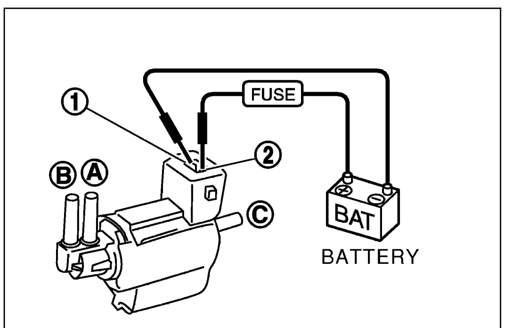
EGR valve spring should lift.

- Check for sticking

If NG, repair or replace EGR valve.



SEF840Z



SEF871X

EGRC-solenoid valve

Check air passage continuity.

Perform "EGRC SOLENOID VALVE" in "ACTIVE TEST" mode.

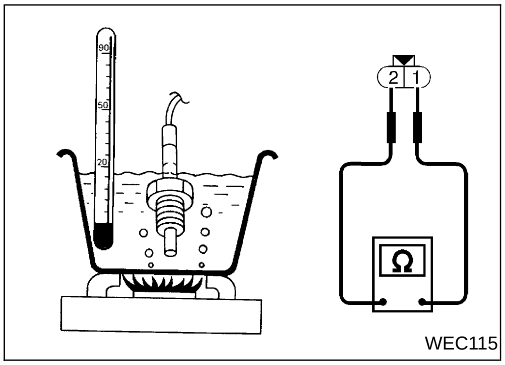
Condition EGRC SOLENOID VALVE	Air passage continuity between A and B	Air passage continuity between A and C
ON	Yes	No
OFF	No	Yes

OR

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

If NG or operation takes more than 1 second, replace EGRC-solenoid valve.

EGR Function (Open) (Cont’d)



WEC115

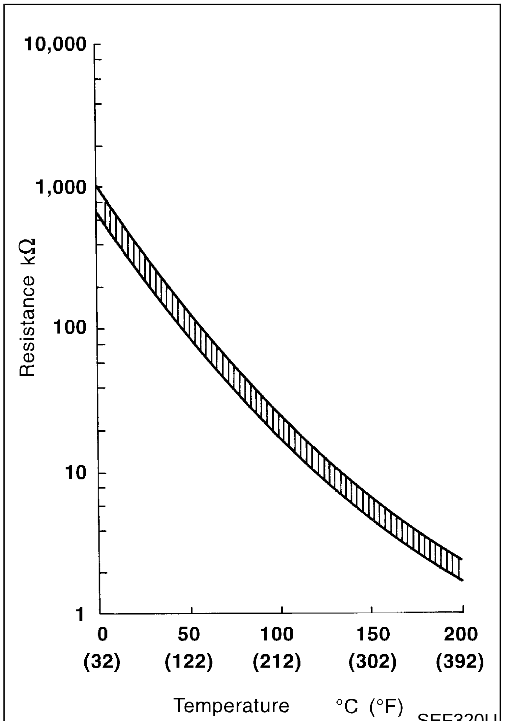
EGR temperature sensor

Check resistance change and resistance value.

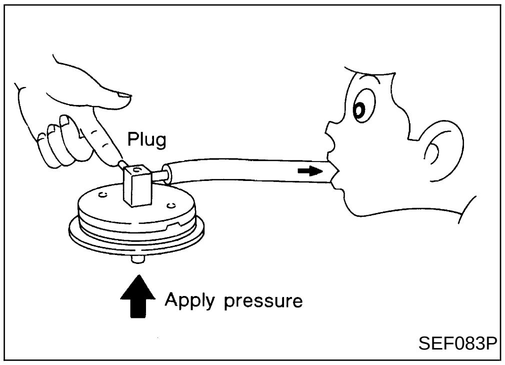
<Reference data>

EGR temperature °C (°F)	Voltage V	Resistance MΩ
0 (32)	4.61	0.68 - 1.11
50 (122)	2.53	0.09 - 0.12
100 (212)	0.87	0.017 - 0.024

If NG, replace EGR temperature sensor.



SEF320U



SEF083P

EGRC-BPT valve

1. Plug one of two ports of EGRC-BPT valve.
2. Vacuum from the other port and check for leakage while applying a pressure above 0.981 kPa (100 mmH_2O, 3.94 inH_2O) from under EGRC-BPT valve.
3. If a leakage is noted, replace the valve.

Evaporative Emission (EVAP) Control System (Small Leak) (Positive Pressure)

ON BOARD DIAGNOSIS LOGIC

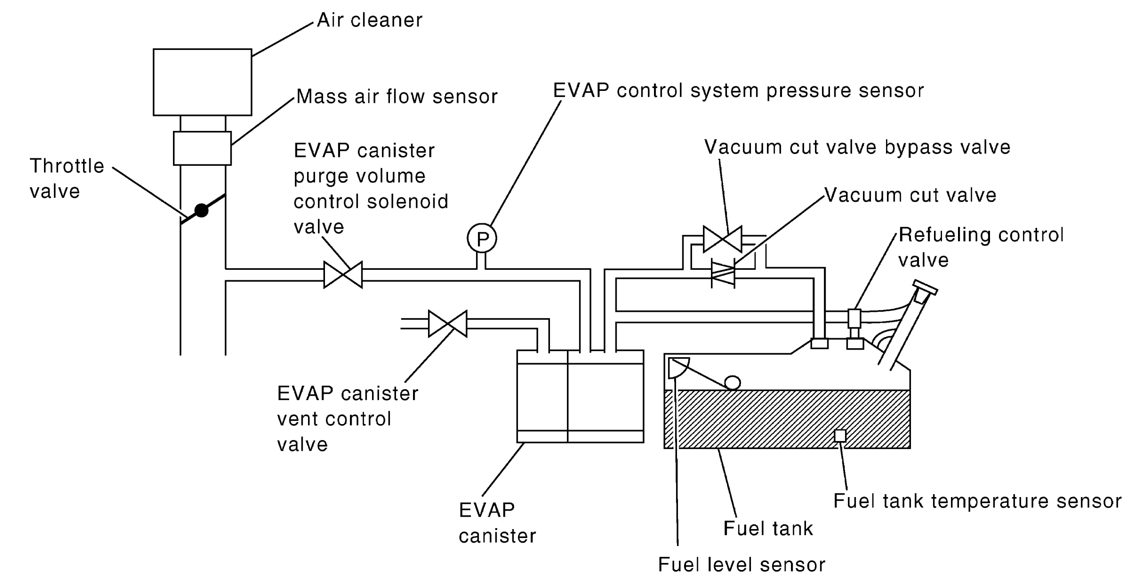
NOTE:

If DTC P1440 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-405.)

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 PCM will check for leaks in the line between the vacuum cut valve and EVAP canister purge volume control solenoid valve.



SEF865Z

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

- 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

Evaporative Emission (EVAP) Control System (Small Leak) (Positive Pressure) (Cont'd)

- 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
- Absolute pressure sensor
- Fuel tank temperature sensor
- O-ring of EVAP canister vent control valve is missing or damaged
- Water separator
- EVAP canister is saturated with water
- Fuel level sensor and the circuit
- EVAP control system pressure sensor
- Refueling control valve
- ORVR system leaks
- Foreign matter caught in EVAP canister purge volume control solenoid valve

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

Refer to "P1441 EVAP CONTROL SYSTEM (VERY SMALL LEAK) (NEGATIVE PRESSURE)", EC-378.

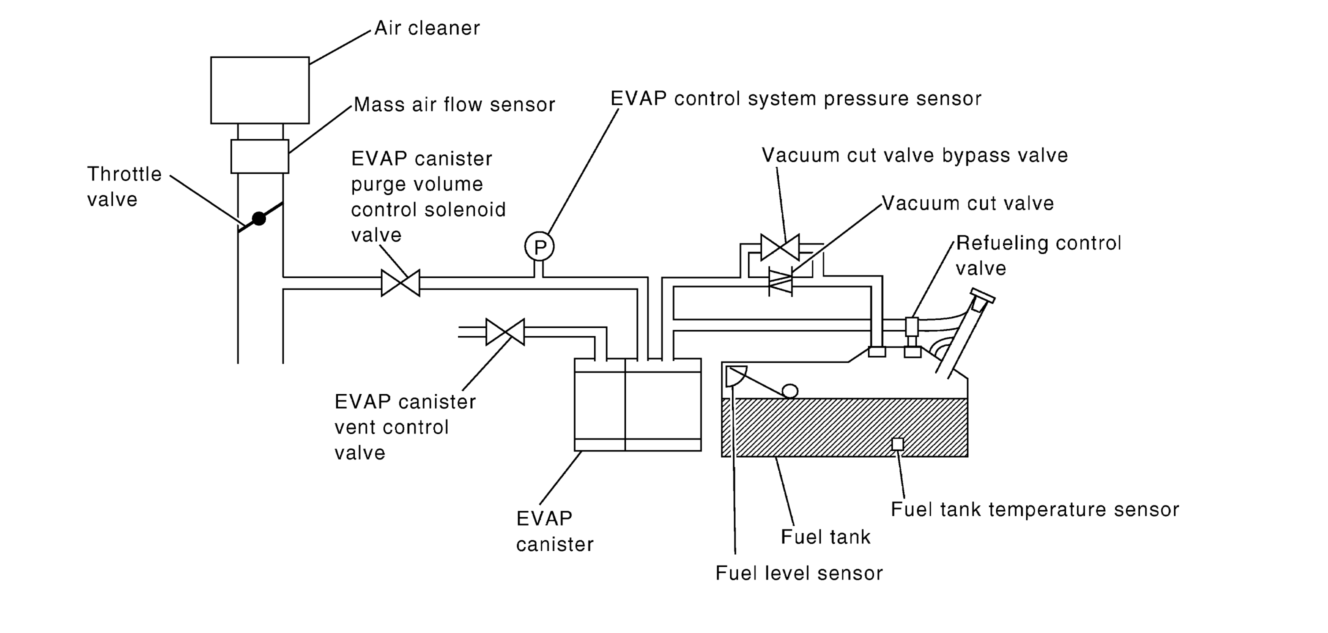
DIAGNOSTIC PROCEDURE

Refer to "P1441 EVAP CONTROL SYSTEM (VERY SMALL LEAK) (NEGATIVE PRESSURE)", EC-380.

Evaporative Emission (EVAP) Control System (Very Small Leak)

ON BOARD DIAGNOSTIC LOGIC

This diagnosis detects very small leaks in the EVAP line between the fuel tank and the EVAP canister purge volume control solenoid valve using intake manifold vacuum in the same way as conventional EVAP small leak diagnosis.
If the ECM judges a leak equivalent to a very small leak, the very small leak DTC P1441 will be detected. If the ECM judges a leak equivalent to a small leak, the EVAP small leak DTC P0440 will be detected. Correspondingly, if the ECM judges there is no leak, the diagnosis result is OK.

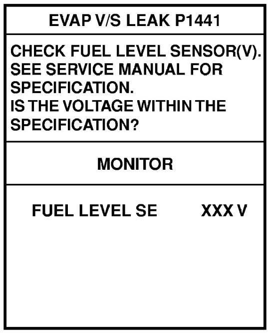


SEF865Z

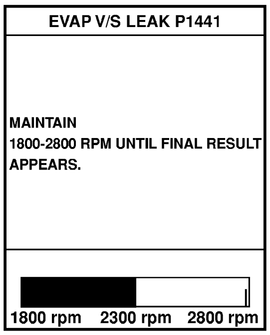
Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P1441	• EVAP system has a very small leak. • EVAP system does not operate properly.	• Incorrect fuel tank vacuum relief valve. • Incorrect fuel filler cap used. • Fuel filler cap remains open or fails to close • Foreign 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

CAUTION:

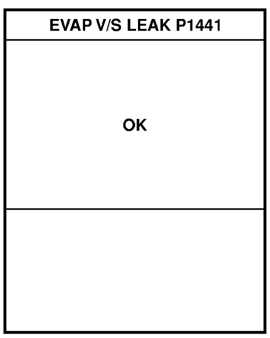
- **Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.**
- **If the fuel filler cap is not tightened properly, the MIL may come on.**
- **Use only a genuine NISSAN rubber tube as a replacement.**



SEF881X



SEF882X



SEF883X

Evaporative Emission (EVAP) Control System (Very Small Leak) (Cont'd)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

CAUTION:

Never remove fuel filler cap during the DTC confirmation procedure.

NOTE:

- **If DTC P1441 is displayed with P0440, perform TROUBLE DIAGNOSIS FOR DTC P1441 first.**
- **If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.**
- **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 condition is met just before the DTC confirmation procedure, leave the vehicle for more than 1 hour.**
  1) Fuel filler cap is removed.
  2) Refilled or drained the fuel.
  3) EVAP component parts is/are removed.
- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**

1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
2) Make sure the following conditions are met.
   FUEL LEVEL SE: 1.08 - 0.2V
   COOLAN TEMP/S: 0 - 32°C (32 - 90°F)
   FUEL T/TMP SE: 0 - 32°C (32 - 90°F)
   INT A/TEMP SE: More than 0°C (32°F)
   If NG, turn ignition switch "OFF" and leave the vehicle in a cool place (soak the vehicle) or refilling/draining fuel until the output voltage condition of the "FUEL LEVEL SE" meets within the range above and leave the vehicle for more than 1 hour. Then start from step 1).
3) Turn ignition switch "OFF" and wait at least 5 seconds.
4) Turn ignition switch "ON".
5) Select "EVAP V/S LEAK P1441" 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 "Diagnostic Procedure", EC-380.

NOTE:

- **If the engine speed cannot be maintained within the range displayed on CONSULT-II screen, go to "Basic inspection", EC-83.**
- **Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.**

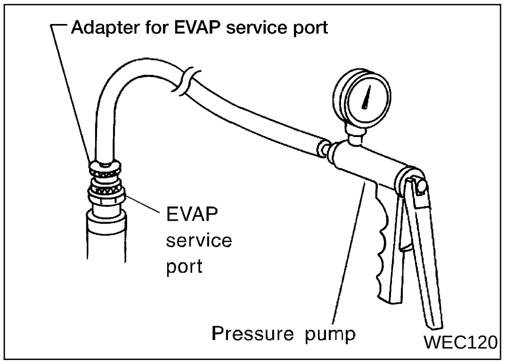
Evaporative Emission (EVAP) Control System (Very Small Leak) (Cont'd)

OR

OVERALL FUNCTION CHECK

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:

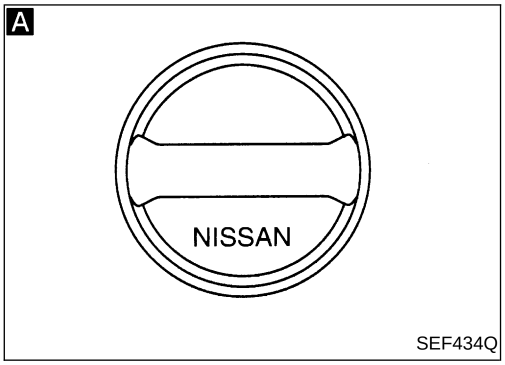
- **Never use compressed air, doing so may damage the EVAP system.**
- **Do not start engine.**
- **Do not exceeded 4.12 kPa (0.042 kg/cm^2, 0.6 psi).**

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 diagnostic procedure, EC-380.

NOTE:
For more information, refer to GST instruction manual.

Evaporative Emission (EVAP) Control System (Very Small Leak) (Cont'd)

DIAGNOSTIC PROCEDURE



SEF434Q

INSPECTION START

A

CHECK FUEL FILLER CAP.

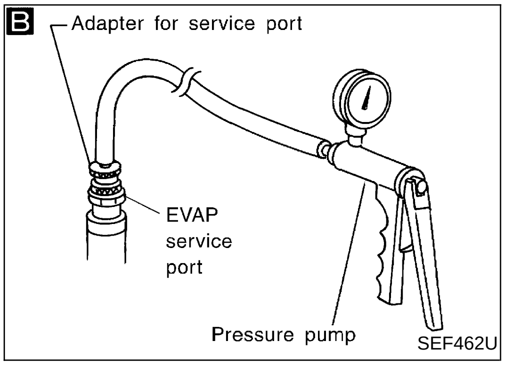
1. Turn ignition switch "OFF".
2. Check for genuine NISSAN fuel filler cap design.
   If NG, replace with genuine NISSAN fuel filler cap.
   If OK, go to next step.
3. Check that the cap is tightened properly by rotating the cap clockwise.
   - Open fuel filler cap, then clean cap and fuel filler neck threads using air blower.
   - Retighten until ratcheting sound is heard.
   If OK, go to next step.
4. Check for air releasing sound while opening the fuel filler cap.

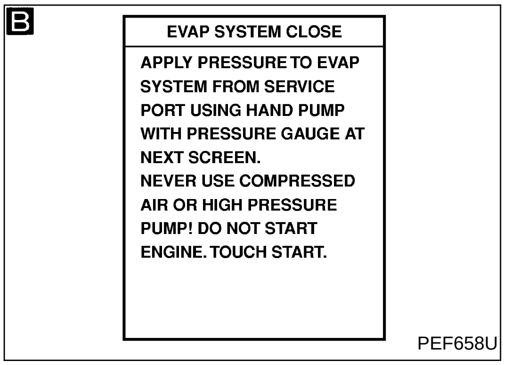
NG → Check fuel tank vacuum relief valve. (Refer to "FUEL TANK VACUUM RELIEF VALVE (Built into fuel filler cap)", EC-24.
If NG, replace with genuine NISSAN fuel filler cap.
If OK, go to B "CHECK FOR EVAP LEAK".

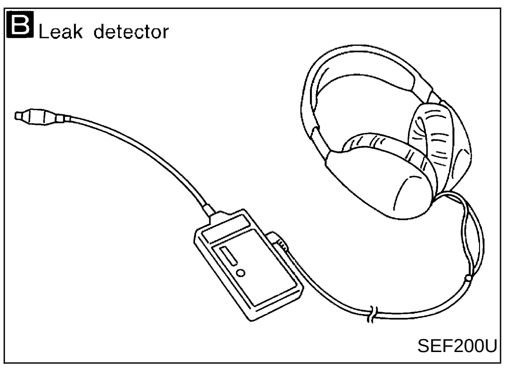
OK ↓

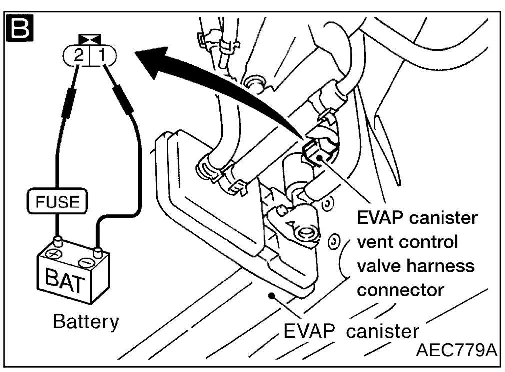
A
(Go to next page.)

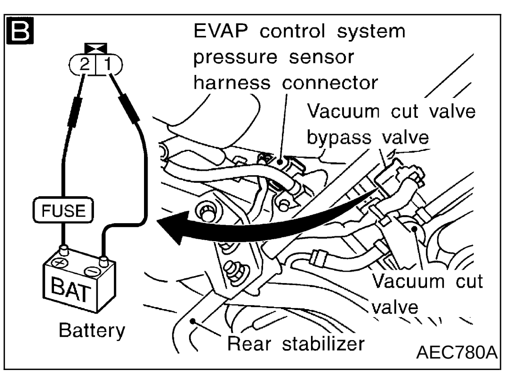
Evaporative Emission (EVAP) Control System (Very Small Leak) (Cont'd)











(A)

B

CHECK FOR EVAP LEAK.
- **Never use compressed air or high pressure pump.**
- **Improper installation of service port may cause leaking.**
- **Do not exceed 4.12 kPa (0.042 kg/cm^2, 0.6 psi) of pressure in the system.**

To locate EVAP leak portion, proceed with the following steps.

1. Install the EVAP service port adapter and the pressure pump securely.

With CONSULT-II:

2. Turn ignition switch "ON".
   Select "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-II.
3. Touch "START" and apply vacuum into the EVAP line until the pressure indicator reaches the middle of bar graph.
4. Using EVAP leak detector, locate the leak portion. For the leak detector, refer to instruction manual for more details.
   Refer to "Evaporative Emission Line Drawing", EC-26.

OR

Without CONSULT-II:

2. Turn ignition switch "OFF".
3. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)
4. Apply 12 volts DC to vacuum cut valve bypass valve. The valve will open. (Continue to apply 12 volts until the end of test.)
5. Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg).
6. Locate the leak using a leak detector. Refer to the instruction manual for more details about the leak detector. Refer to "Evaporative Emission Line Drawing", EC-26.

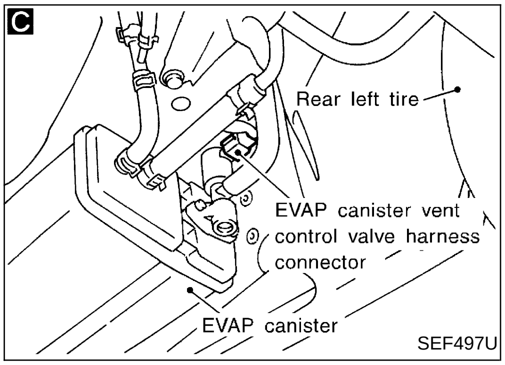
NG → Repair or replace.

OK ↓

(B)

(Go to next page.)

Evaporative Emission (EVAP) Control System (Very Small Leak) (Cont'd)



SEF497U

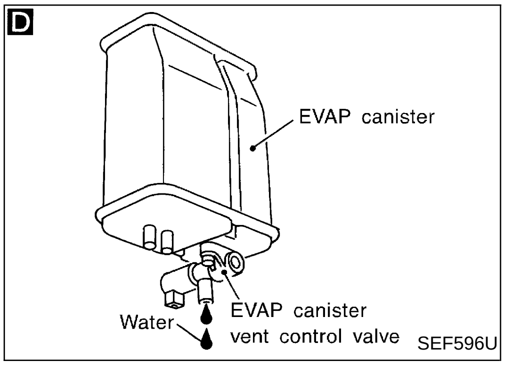
(B)

C

CHECK COMPONENT AND CIRCUIT
(EVAP canister vent control valve, O-ring and water separator).
Refer to "TROUBLE DIAGNOSIS FOR DTC P0446" for circuit, EC-299 and "COMPONENT INSPECTION", EC-384.

NG → Repair or replace EVAP canister vent control valve and O-ring or harness/connector.

OK



SEF596U

D

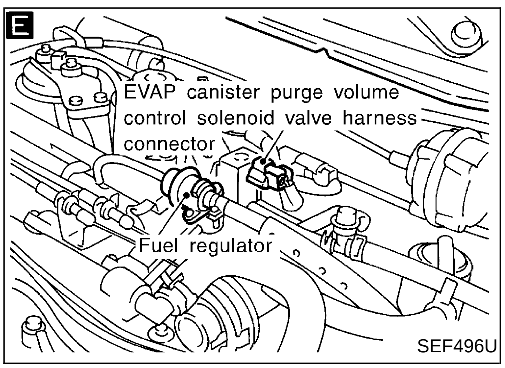
CHECK IF EVAP CANISTER SATURATED WITH WATER.
1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Check if water will drain from the EVAP canister. If it will, weigh the EVAP canister with the vent control valve attached.
   If the weight is:

More than 1.8 kg (4.0 lb) → NG
Less than 1.8 kg (4.0 lb) → OK

NG → Replace EVAP canister and check the following.
1. Check hose connection between EVAP canister and water separator for clogging and poor connection.
2. Check water separator.
   Refer to "COMPONENT INSPECTION", EC-385.

If NG, repair hose or replace water separator.

OK



SEF496U

E

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
HO2S1 MNTR (B1)	LEAN
THRTL POS SEN	XXX V

SEF866Z

E

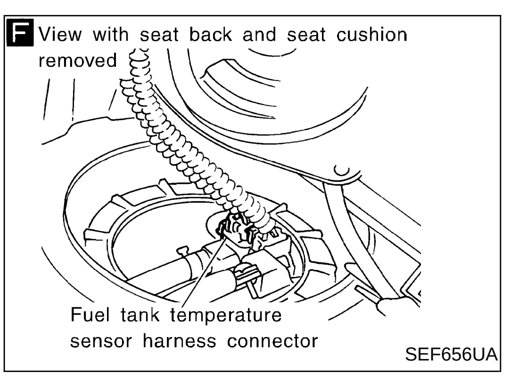
CHECK COMPONENT (EVAP canister purge volume control solenoid valve).
1. Disconnect EVAP hose to EVAP canister purge volume control solenoid valve at EVAP service port.
2. Start engine.
3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode.
4. Touch "Qu" on CONSULT-II screen to increase "PURG VOL CONT/V" opening to 100.0%.
5. Check EVAP hose for vacuum.
   Vacuum should exist.

OR

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect EVAP hose to EVAP canister purge volume control solenoid valve.
4. Start engine and let it idle for at least 80 seconds.
5. Check EVAP hose for vacuum.
   Vacuum should exist.

NG → Check the following.
- EVAP canister purge volume control solenoid valve
  Refer to "COMPONENT INSPECTION", EC-384.
- Vacuum hoses for clogging or disconnection
  Refer to "Vacuum Hose Drawing", EC-16.

OK



SEF656UA

F

CHECK COMPONENT
(Fuel tank temperature sensor).
Refer to "COMPONENT INSPECTION", EC-385.

NG → Replace fuel tank temperature sensor.

OK

(C)
(Go to next page.)

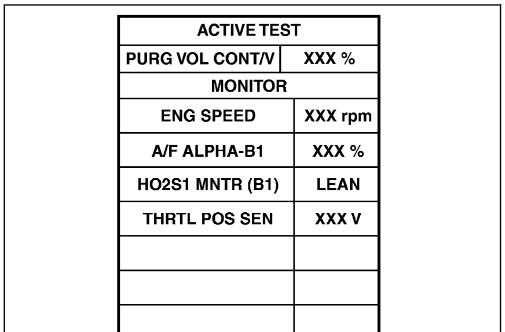
Evaporative Emission (EVAP) Control System (Very Small Leak) (Cont'd)

Ⓒ

Step	NG
CHECK COMPONENT (EVAP control system pressure sensor). Refer to "COMPONENT INSPECTION", EC-309.	Replace EVAP control system pressure sensor.
↓ OK	
CHECK COMPONENT. Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection. Refer to "EVAPORATIVE EMISSION SYSTEM", EC-26.	Repair or reconnect the hose.
↓ OK	
CHECK COMPONENT (Refueling control valve). Refer to "COMPONENT INSPECTION", EC-31.	Replace refueling control valve.
↓ OK	
Check hoses between EVAP canister and refueling control valve for disconnection. For location, refer to "SYSTEM DESCRIPTION" in "On Board Refueling Vapor Recovery (ORVR)" on EC-28.	Reconnect hoses properly.
↓ OK	
Check signal line and recirculation line for disconnection. For location, refer to "SYSTEM DESCRIPTION" in "On Board Refueling Vapor Recovery (ORVR)" on EC-28.	Reconnect lines properly.
↓ OK	
Clean EVAP purge line (pipe and rubber tube) using air blower.	
↓ OK	
CHECK COMPONENT (Fuel level sensor). Refer to "METERS AND GAUGES" in EL section.	Repair harness or connectors or replace fuel level sensor.
↓ OK	
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-112.	
↓	
INSPECTION END	

Evaporative Emission (EVAP) Control System (Very Small Leak) (Cont’d)

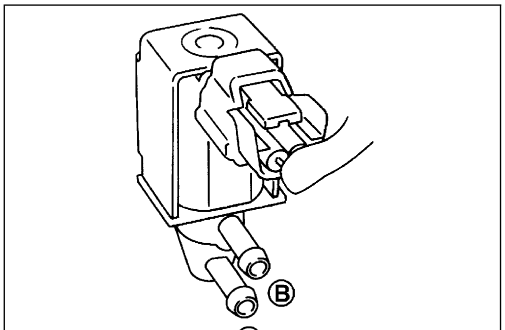
COMPONENT INSPECTION



SEF866Z

EVAP canister purge volume control solenoid valve

1. Start engine.
2. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-II. Check that engine speed varies according to the valve opening.
   If OK, inspection end. If NG, go to following step.
3. Check air passage continuity.



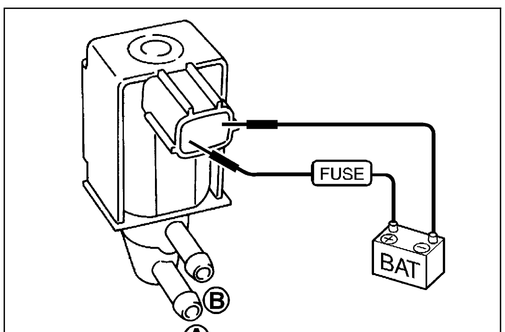
SEF660U

Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

If NG, replace the EVAP canister purge volume control solenoid valve.

OR

Check air passage continuity.

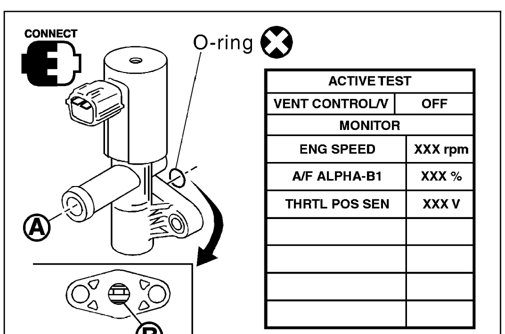


SEF661U

Condition	Air passage continuity between A and B
12V direct current supply between terminals	Yes
No supply	No

If NG or operation takes more than 1 second, replace solenoid valve.

EVAP canister vent control valve



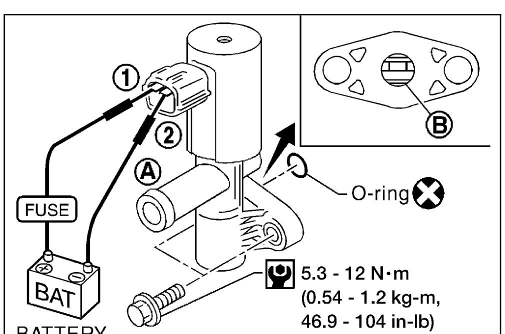
SEF841Z

Check air passage continuity.

Perform “VENT CONTROL/V” in “ACTIVE TEST” mode.

Condition	Air passage continuity between A and B
ON	No
OFF	Yes

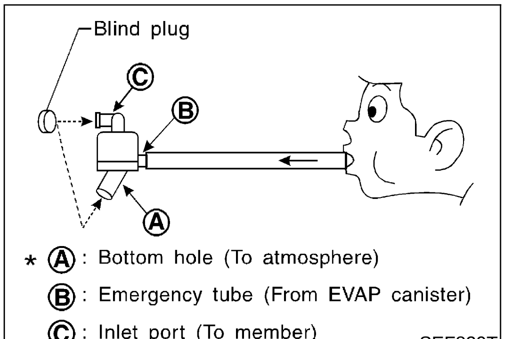
OR



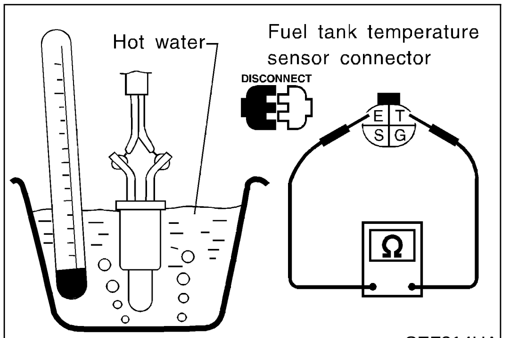
AEC783A

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

If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.
If portion B is rusted, replace control valve.
Make sure new O-ring is installed properly.



SEF829T



SEF314UA

Evaporative Emission (EVAP) Control System (Very Small Leak) (Cont'd)

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 Ⓐ and Ⓒare not clogged by blowing air from Ⓑ with Ⓐ, and then Ⓒ plugged.
5. In case of NG in items 2 - 4, replace the parts.

- **Do not disassemble water separator.**

Fuel tank temperature sensor

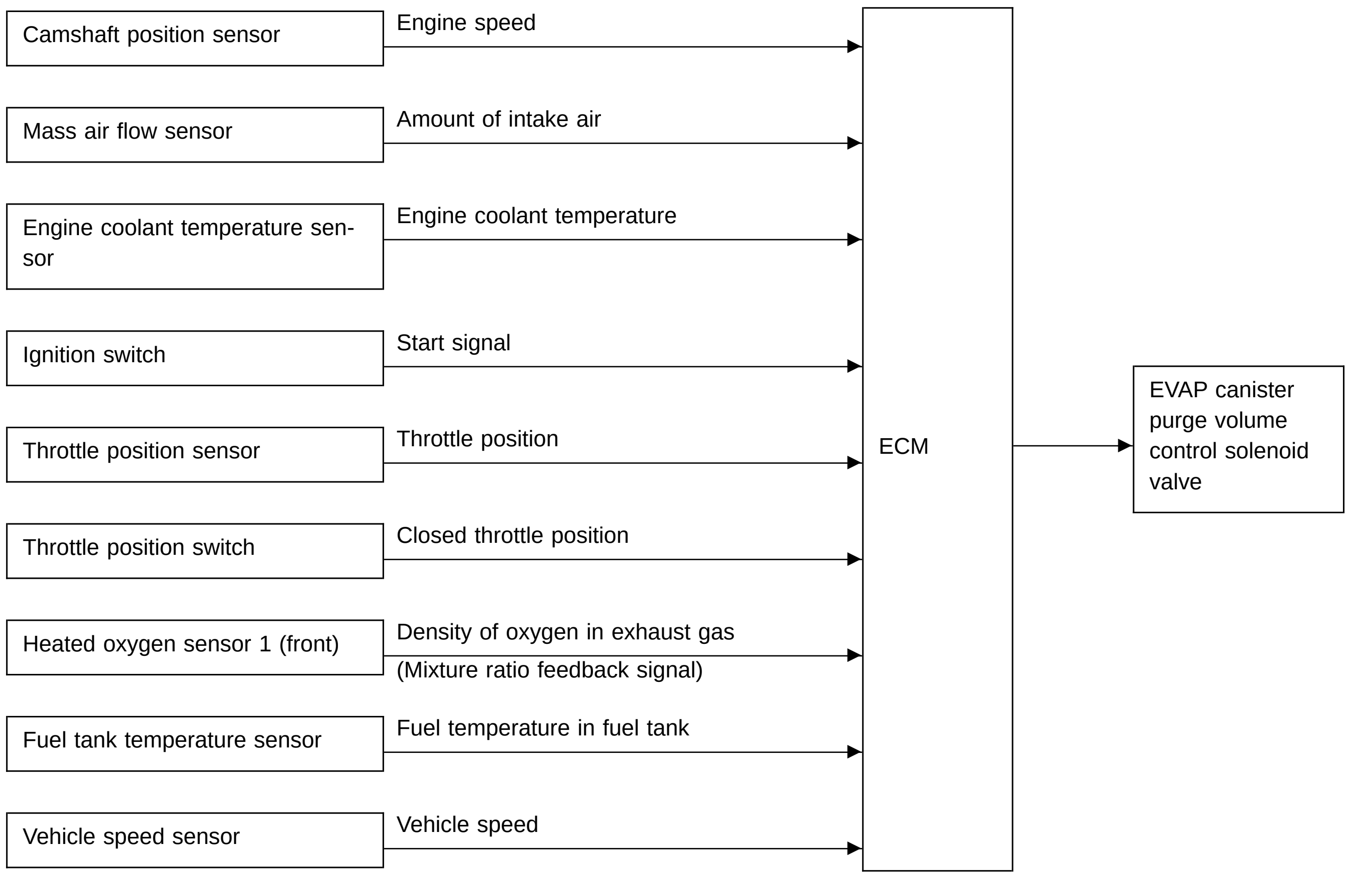
Check resistance by heating with hot water or heat gun as shown in the figure.

Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90

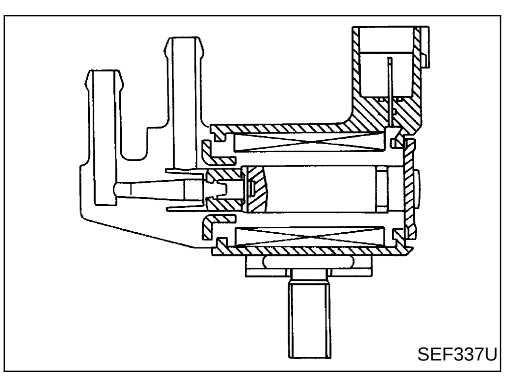
If NG, replace fuel tank temperature sensor.

Evaporative Emission (EVAP) Canister Purge Volume Control Solenoid Valve

SYSTEM DESCRIPTION



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 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.

Evaporative Emission (EVAP) Canister Purge Volume Control Solenoid Valve (Cont'd)

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

Specification data are reference values

MONITOR ITEM	CONDITION		SPECIFICATION
PURG VOL C/V	● Engine: After warming up ● Air conditioner switch "OFF" ● No-load	Idle	0%
		Vehicle running (Shift lever "1") 2,000 rpm (90 seconds after starting engine)	—

ECM TERMINALS AND REFERENCE VALUE

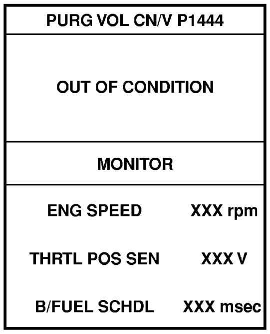
Specification data are reference values and are measured between each terminal and ground.

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

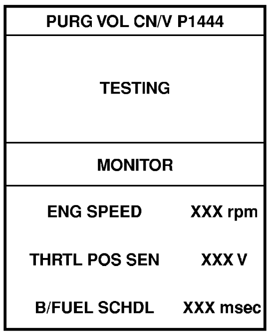
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	W/G	ECM relay (Self-shutoff)	[Engine is running.] [Ignition switch "OFF"] For a few seconds after turning ignition switch "OFF"	0 - 1V
			[Ignition switch "OFF"] A few seconds passed after turning ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
5	L	EVAP canister purge volume control solenoid valve	[Engine is running.] Idle speed	BATTERY VOLTAGE (11 - 14V)
56	W/R	Power supply for ECM	[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)
61	W/R			

ON BOARD DIAGNOSIS LOGIC

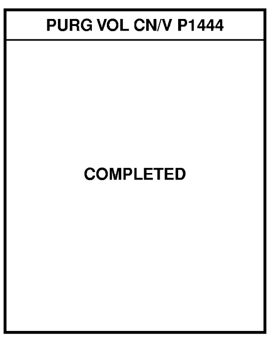
Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P1444	● The canister purge flow is detected during the specified driving conditions, even when EVAP canister purge volume control solenoid valve is completely closed.	● EVAP control system pressure sensor ● EVAP canister purge volume control solenoid valve (The valve is stuck open.) ● EVAP canister vent control valve ● EVAP canister ● Hoses (Hoses are connected incorrectly or clogged.)



SEF205Y



SEF206Y



SEF237Y

Evaporative Emission (EVAP) Canister Purge Volume Control Solenoid Valve (Cont'd)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

NOTE:
If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:
For best results, perform test at a temperature of 0°C (32°F) or more.

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Turn ignition switch "ON".
4) Select "PURG VOL C/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 at least 10 seconds.)

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

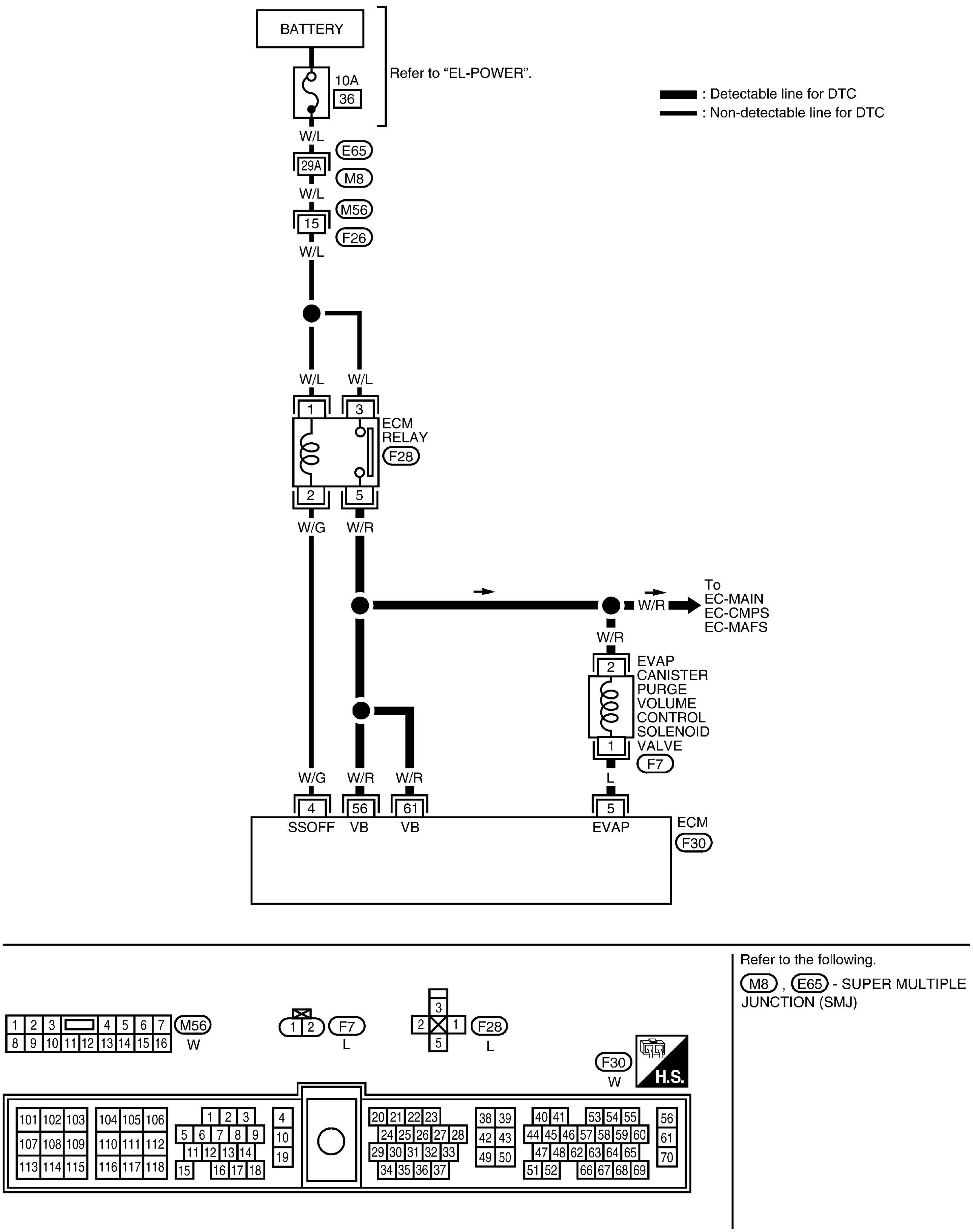
7) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". (If "NG" is displayed, refer to "DIAGNOSTIC PROCEDURE", EC-390.)

OR

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Start engine and let it idle for at least 10 seconds.
4) Select "MODE 7" with GST.
5) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-390.

Evaporative Emission (EVAP) Canister Purge Volume Control Solenoid Valve (Cont'd)

EC-PGC/V-01

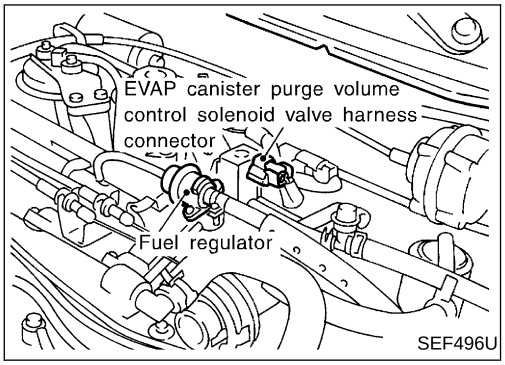


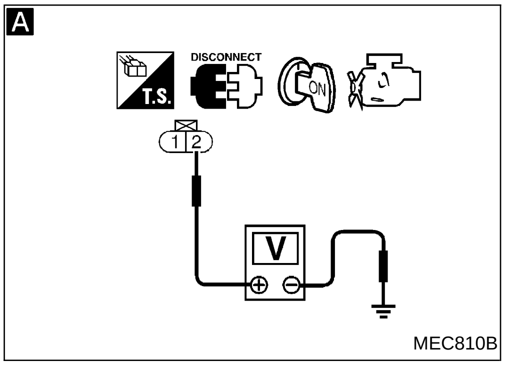
Refer to the following.

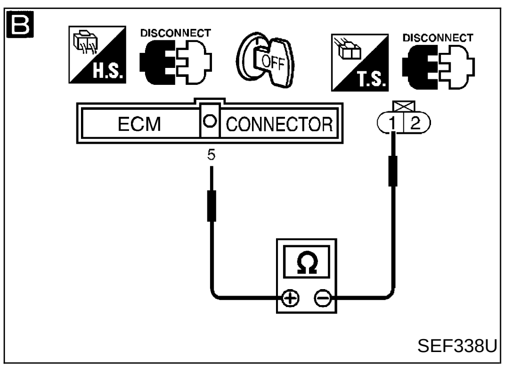
M8 , E65 - SUPER MULTIPLE JUNCTION (SMJ)

WEC706

Evaporative Emission (EVAP) Canister Purge Volume Control Solenoid Valve (Cont'd)







DIAGNOSTIC PROCEDURE

INSPECTION START

↓

A

CHECK POWER SUPPLY.
1. Turn ignition switch "OFF".
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
3. Turn ignition switch "ON".
4. Check voltage between terminal (2) and engine ground with CONSULT-II or tester.
   Voltage: Battery voltage

NG → Check the following.
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM relay
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM

If NG, repair harness or connectors.

OK ↓

B

CHECK OUTPUT SIGNAL CIRCUIT.
1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal (5) and terminal (1).
   Continuity should exist.
   If OK, check harness for short to ground and short to power.

NG → Check the following.
Repair open circuit or short to ground or short to power in harness or connectors.

OK ↓

CHECK COMPONENT AND CIRCUIT
(EVAP control system pressure sensor).
Refer to "TROUBLE DIAGNOSIS FOR DTC P0450", EC-304.

NG → Replace EVAP control system pressure sensor.

OK ↓

CHECK COMPONENT
(EVAP canister purge volume control solenoid valve).
Refer to "COMPONENT INSPECTION", EC-392.

NG → Replace EVAP canister purge volume control solenoid valve.

OK ↓

CHECK COMPONENT
(EVAP canister vent control valve).
Refer to "COMPONENT INSPECTION", EC-303.

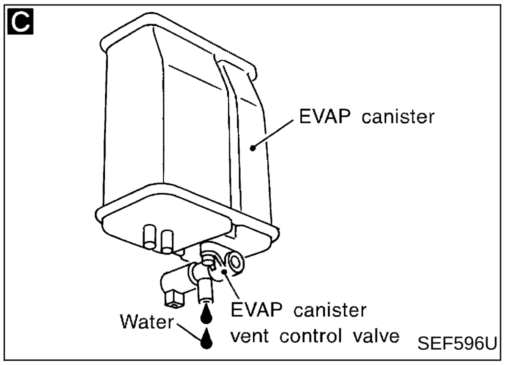
NG → Replace EVAP canister vent control valve.

OK ↓

(A)

(Go to next page.)

Evaporative Emission (EVAP) Canister Purge Volume Control Solenoid Valve (Cont'd)



A

CHECK RUBBER TUBE FOR CLOGGING.
Check obstructed water separator and rubber tube to EVAP canister vent control valve and clean the rubber tube using air blower.
For water separator, refer to EC-397.

- NG → Clean, repair or replace rubber tube and/or water separator.
- OK ↓

C

CHECK IF EVAP CANISTER IS SATURATED WITH WATER.
1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Check if water will drain from the EVAP canister.
   If it will, weigh the EVAP canister with the vent control valve attached.

If the weight is:
More than 1.8 kg (4.0 lb) → NG
Less than 1.8 kg (4.0 lb) → OK

- NG → Replace EVAP canister and check the following.
  1. Check hose connection between EVAP canister and water separator for clogging and poor connection.
  2. Check water separator. Refer to "COMPONENT INSPECTION", EC-396.

  If NG, repair hose or replace water separator.
- OK ↓

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-112.

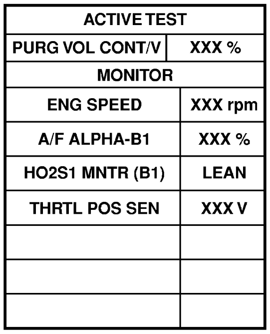
↓

INSPECTION END

Evaporative Emission (EVAP) Canister Purge Volume Control Solenoid Valve (Cont’d)

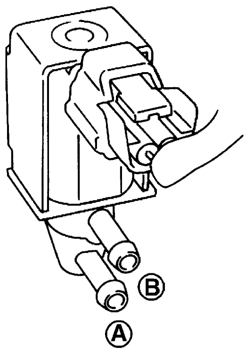
COMPONENT INSPECTION

EVAP canister purge volume control solenoid valve



SEF801Y

1. Start engine.
2. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-II. Check that engine speed varies according to the valve opening.
   If OK, inspection end. If NG, go to following step.
3. Check air passage continuity.



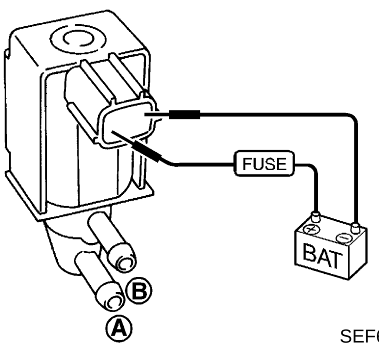
SEF660U

Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

If NG, replace the EVAP canister purge volume control solenoid valve.

OR

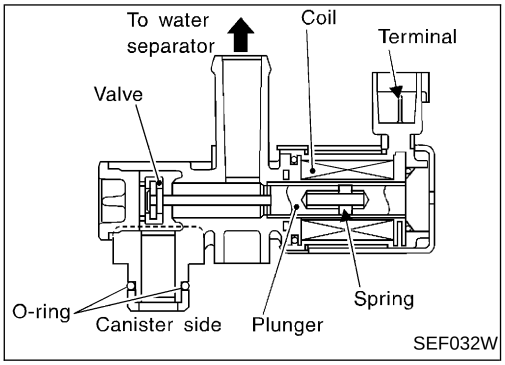
Check air passage continuity.



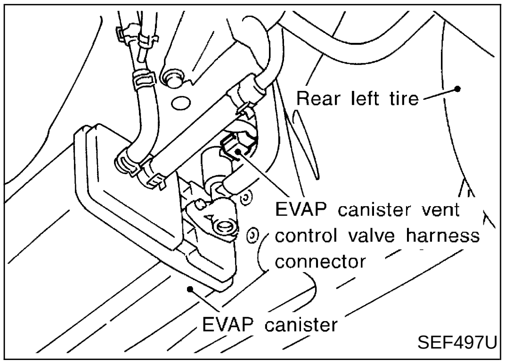
SEF661U

Condition	Air passage continuity between A and B
12V direct current supply between terminals	Yes
No supply	No

If NG or operation takes more than 1 second, replace solenoid valve.



SEF032W



SEF497U

Evaporative Emission (EVAP) Canister Vent Control Valve (Close)

COMPONENT DESCRIPTION

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent.
This solenoid (the EVAP canister vent control valve) responds to signals from the ECM.
When the ECM sends an ON signal, the coil in the solenoid valve is energized.
A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.
This solenoid valve is used only for diagnosis, and usually remains opened.
When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows "EVAP Control System (Small Leak)" diagnosis.

GI
MA
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IDX

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

Specification data are reference values

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	● Ignition switch: ON	OFF

ECM TERMINALS AND REFERENCE VALUE

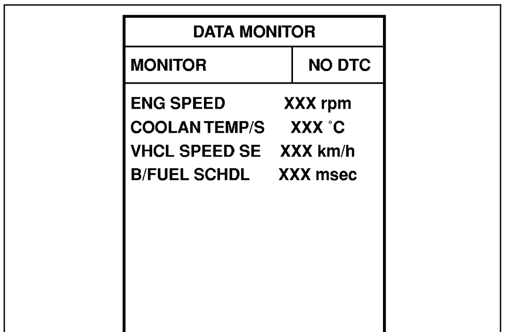
Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/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)
108	PU	EVAP canister vent control valve	Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P1446	● 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.



SEF189Y

Evaporative Emission (EVAP) Canister Vent Control Valve (Close) (Cont'd)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

CAUTION:
Always drive vehicle at a safe speed.

NOTE:
If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

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.
5) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-395.

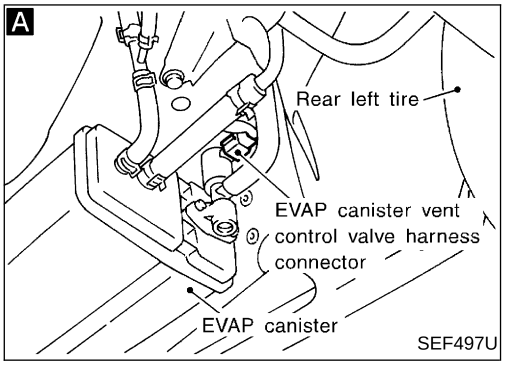
NOTE:
If a malfunction exists, NG result may be displayed quicker.

OR

1) Start engine.
2) Drive vehicle at a speed of approximately 80 km/h (50 MPH) for 15 minutes.
3) Select "MODE 7" with GST.
4) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-395.

Evaporative Emission (EVAP) Canister Vent Control Valve (Close) (Cont'd)

A



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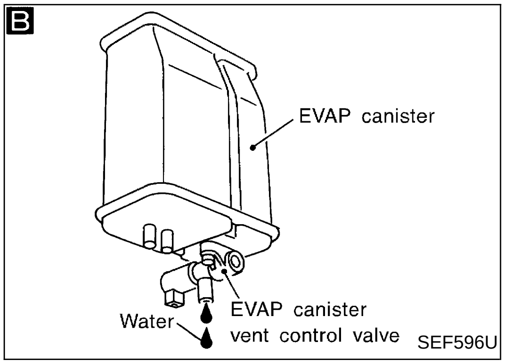

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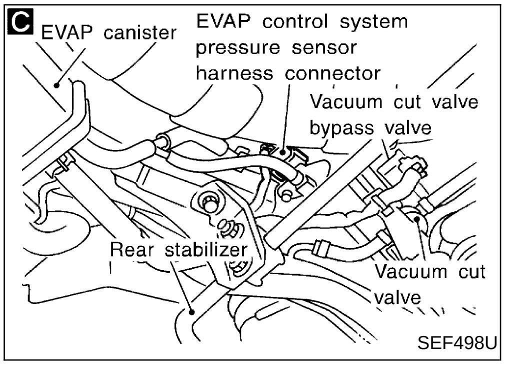


DIAGNOSTIC PROCEDURE

INSPECTION START

↓

CHECK RUBBER TUBE FOR CLOGGING.
Check obstructed water separator and rubber tube to EVAP canister vent control valve and clean the rubber tube using air blower.
For water separator, refer to EC-397.

NG → Clean, repair or replace rubber tube and/or water separator.

↓ OK

A

CHECK COMPONENT
(EVAP canister vent control valve and O-ring).
Refer to "COMPONENT INSPECTION" on next page.

NG → Replace EVAP canister vent control valve and O-ring.

↓ OK

B

CHECK IF EVAP CANISTER IS SATURATED WITH WATER.
1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Check if water will drain from the EVAP canister.
   If it will, weigh the EVAP canister with the vent control valve attached.

If the weight is:
More than 1.8 kg (4.0 lb) → NG
Less than 1.8 kg (4.0 lb) → OK

NG → Replace EVAP canister and check the following.
1. Check hose connection between EVAP canister and water separator for clogging and poor connection.
2. Check water separator. Refer to "COMPONENT INSPECTION", EC-396.

If NG, repair hose or replace water separator.

↓ OK

C

CHECK COMPONENT AND CIRCUIT
(EVAP control system pressure sensor).
1. Check for disconnection of hose connected to the sensor.
2. Check sensor harness connector for water.
   Water should not exist.
   If OK, go to step 3.
3. Check EVAP control system pressure sensor.

Refer to "DIAGNOSTIC PROCEDURE", EC-307.

NG → Repair or replace harness and/or connectors or replace EVAP control system pressure sensor.

↓ OK

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-112.

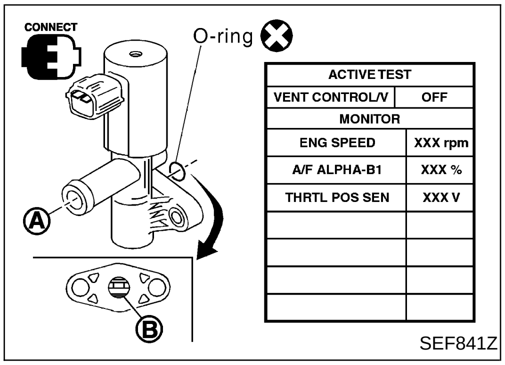
↓

INSPECTION END

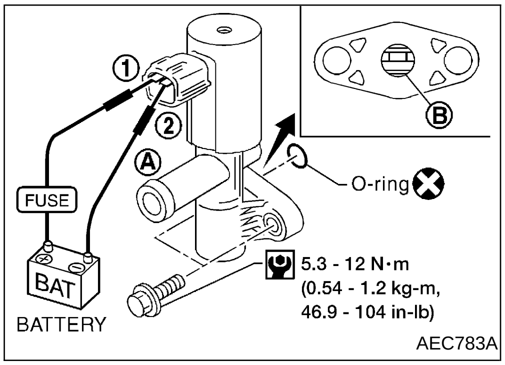
Evaporative Emission (EVAP) Canister Vent Control Valve (Close) (Cont'd)

COMPONENT INSPECTION

EVAP canister vent control valve



SEF841Z



AEC783A

Check air passage continuity.

Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.

Condition	Air passage continuity between A and B
ON	No
OFF	Yes

OR

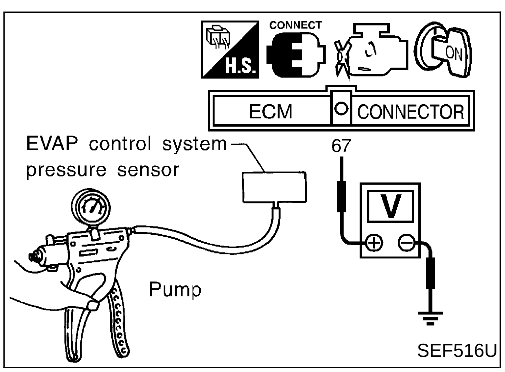
Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
No supply	Yes

If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.

If the portion B is rusted, replace EVAP canister vent control valve.

Make sure new O-ring is installed properly.

EVAP control system pressure sensor



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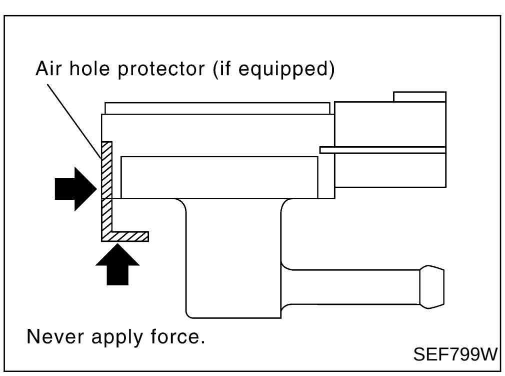


SEF799W

1. Remove EVAP control system pressure sensor with its harness connector connected.
2. Remove hose from EVAP control system pressure sensor.
3. Turn ignition switch "ON".
4. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.
5. Check output voltage between ECM terminal 67 and engine 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

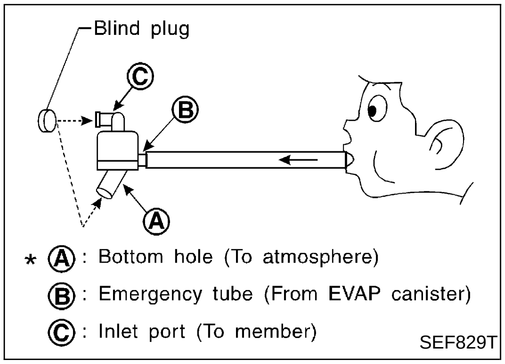
CAUTION:

- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply pressure over 20.0 kPa (150 mmHg, 5.91 inHg) or vacuum below −20.0 kPa (−150 mmHg, −5.91 inHg).**

6. If NG, replace EVAP control system pressure sensor.

Evaporative Emission (EVAP) Canister Vent Control Valve (Close) (Cont'd)

- **Never apply force to the air hole protector of the sensor, if equipped.**
- **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.**



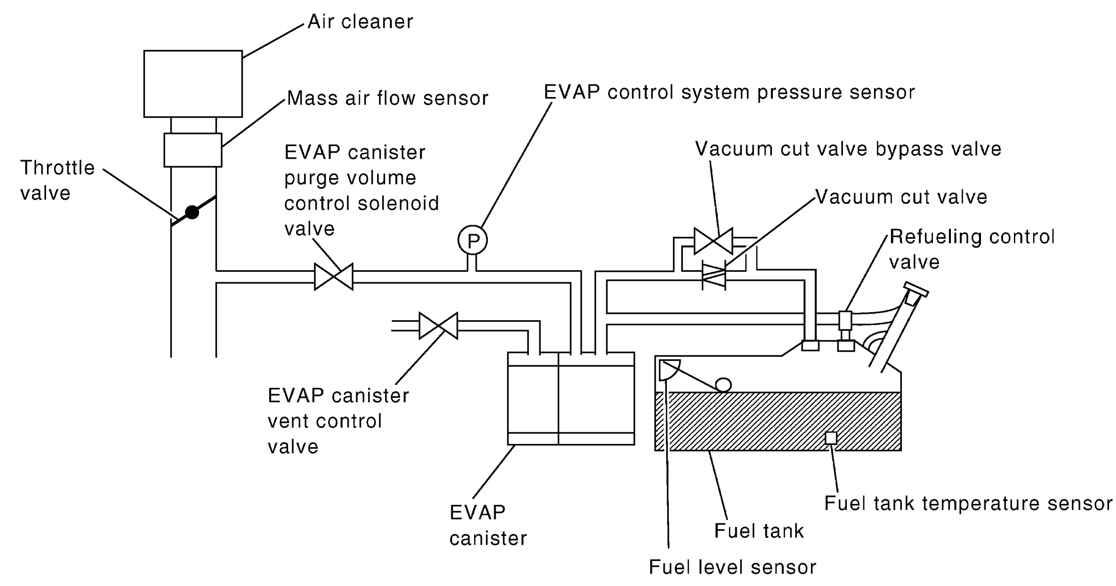
Water separator

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 Ⓐand Ⓒare not clogged by blowing air from Ⓑwith Ⓐ, and then Ⓒplugged.
5. In case of NG in items 2 - 4, replace the parts.

- **Do not disassemble water separator.**

Evaporative Emission (EVAP) Control System Purge Flow Monitoring

Note: If DTC P1447 is displayed with P0510, perform TROUBLE DIAGNOSIS FOR DTC P0510 first. (See EC-335.)



SEF865Z

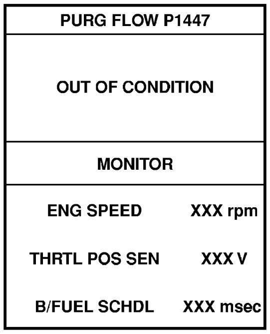
SYSTEM DESCRIPTION

In this evaporative emission (EVAP) control system, purge flow occurs during non-closed throttle conditions. Purge volume is related to air intake volume. Under normal purge conditions (non-closed throttle), the EVAP canister purge volume control solenoid valve is open. Purge flow exposes the EVAP control system pressure sensor to intake manifold vacuum.

ON BOARD DIAGNOSIS LOGIC

Under normal conditions (non-closed throttle), sensor output voltage indicates if pressure drop and purge flow are adequate. If not, a fault is determined.

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P1447	● EVAP control system does not operate properly. ● EVAP control system has a leak between intake manifold and EVAP control system pressure sensor.	● EVAP canister purge volume control solenoid valve stuck closed ● EVAP control system pressure sensor and the circuit ● Loose, disconnected or improper connection of rubber tube ● Blocked rubber tube ● Cracked EVAP canister ● EVAP canister purge volume control solenoid valve circuit ● Closed throttle position switch ● Blocked purge port ● EVAP canister vent control valve



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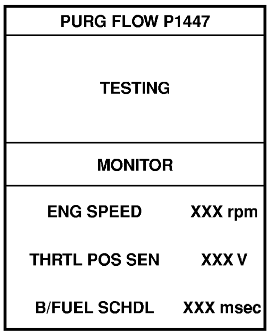

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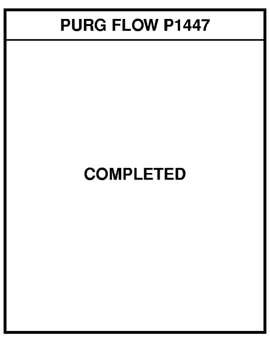

SEF238Y

Evaporative Emission (EVAP) Control System Purge Flow Monitoring (Cont'd)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

CAUTION:
Always drive vehicle at a safe speed.

NOTE:
If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:
- **Always perform test at a temperature of 0°C (32°F) or more.**
- **This test may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.**

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Start engine and let it idle for at least 1 minute.
4) Select "PURG FLOW P1447" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
5) Touch "START".
6) When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take at least 35 seconds.)
   Selector lever: Suitable position
   Vehicle speed: 32 - 120 km/h (20 - 75 MPH)
   ENG SPEED: 500 - 3,100 rpm
   Engine coolant temperature: More than 70°C (158°F)

If "TESTING" is not changed for a long time, retry from step 2).

7) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "DIAGNOSTIC PROCEDURE", EC-401.

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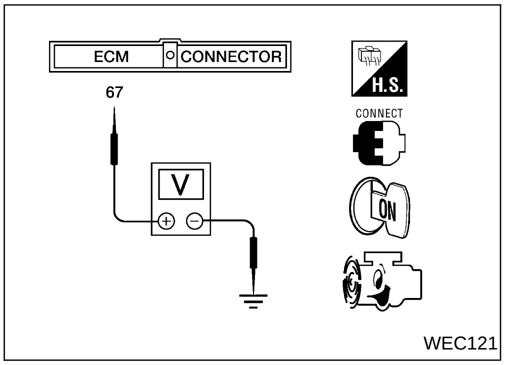
Evaporative Emission (EVAP) Control System Purge Flow Monitoring (Cont'd)



OR

OVERALL FUNCTION CHECK

Use this procedure to check the overall monitoring function of the EVAP control system purge flow. During this check, a 1st trip DTC might not be confirmed.

1) Lift up drive wheels.
2) Start engine and warm it up to normal operating temperature.
3) Turn ignition switch "OFF", wait at least 5 seconds.
4) Start engine and wait at least 70 seconds.
5) Set voltmeter probes to ECM terminals 67 (EVAP control system pressure sensor signal) and ground.
6) Check EVAP control system pressure sensor value at idle speed.
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:
   M/T models
   Any position other than "Neutral" or "Reverse"
   A/T models
   Any position other than "P", "N" or "R"
   Verify that EVAP control system pressure sensor value stays 0.1V less than the value at idle speed for at least 1 second.
8) If NG, go to "DIAGNOSTIC PROCEDURE", EC-401.

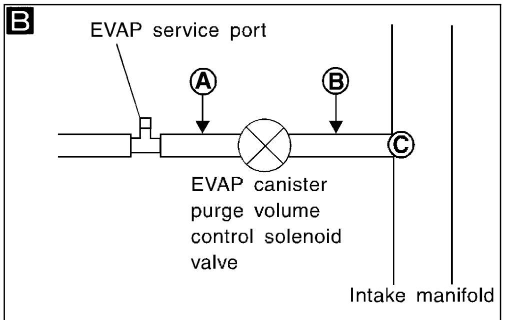
Evaporative Emission (EVAP) Control System Purge Flow Monitoring (Cont'd)

DIAGNOSTIC PROCEDURE

A

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
HO2S1 MNTR (B1)	LEAN
THRTL POS SEN	XXX V

SEF801Y



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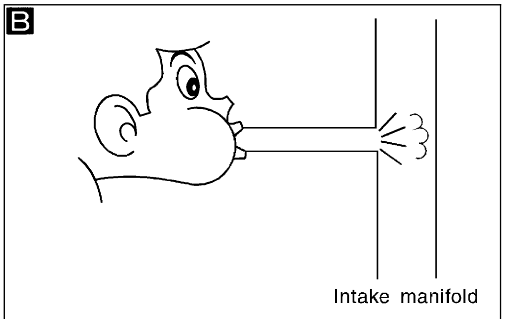

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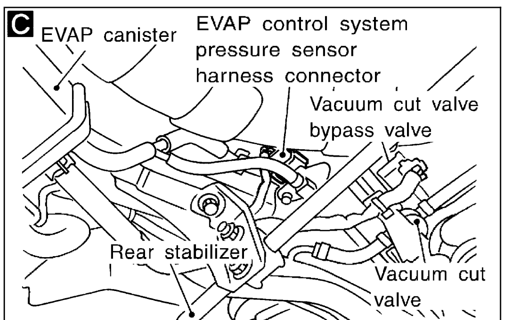


SEF498U

INSPECTION START

↓

CHECK EVAP CANISTER.
Check EVAP canister for cracks.

- NG → Replace EVAP canister.
- OK ↓

A

CHECK PURGE FLOW.

1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge.
2. Start engine and let it idle.
3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode.
4. Touch "Qd" and "Qu" on CONSULT-II screen to adjust "PURG VOL CONT/V" opening.
   100.0%: Vacuum should exist.
   0.0%: Vacuum should not exist.

OR

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 and install vacuum gauge.
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.
   While operating solenoid valve, vacuum should exist.
6. Release the accelerator pedal and let idle.
   Vacuum should not exist.

- NG → B

B

CHECK EVAP PURGE LINE.
Check EVAP purge line for improper connection, disconnection and blocked purge port.

1. Turn ignition switch "OFF".
2. Disconnect purge hoses connected to EVAP canister purge volume control solenoid valve (A) and EVAP service port (B).
3. Blow air into each hose and check that air flows freely.
4. Check EVAP purge port C.

If NG, repair or clean hoses and/or purge port.

- OK ↓

CHECK COMPONENT (EVAP canister purge volume control solenoid valve).
Refer to "COMPONENT INSPECTION", EC-378.

- OK (from CHECK PURGE FLOW) ↓

C

CHECK COMPONENT AND CIRCUIT
(EVAP control system pressure sensor).

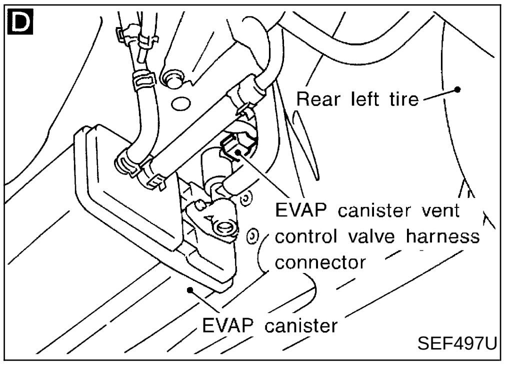
1. Check disconnection of hose connected to the sensor.
2. Check sensor harness connector for water.
   Water should not exist.
   If OK, go to step 3.
3. Check EVAP control system pressure sensor.

Refer to "DIAGNOSTIC PROCEDURE", EC-291.

- NG → Repair or replace EVAP control system pressure sensor or harness/connector.
- OK ↓

A

Evaporative Emission (EVAP) Control System Purge Flow Monitoring (Cont'd)



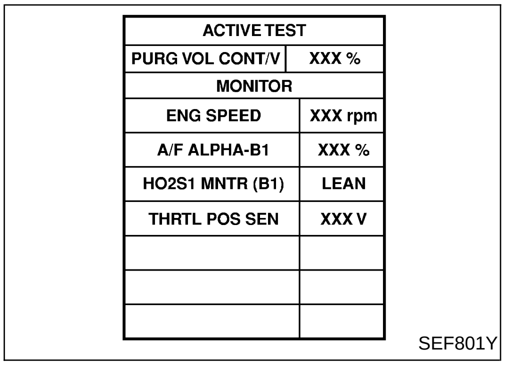
Ⓐ

D

CHECK COMPONENT (EVAP canister vent control valve and O-ring). Refer to "COMPONENT INSPECTION", EC-386.	NG →	Replace EVAP canister vent control valve and O-ring.
↓ OK		
CHECK COMPONENT (Closed throttle position switch). Refer to "COMPONENT INSPECTION", EC-339.	NG →	Replace throttle position sensor with throttle position switch.
↓ OK		
CHECK EVAP PURGE LINE. Inspect EVAP purge line (pipe and rubber tube). Check for evidence of leaks.	NG →	Replace it.
↓ OK		
Clean EVAP purge line (pipe and rubber tube) using air blower.		
↓		
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-97.		
↓		
INSPECTION END		

Evaporative Emission (EVAP) Control System Purge Flow Monitoring (Cont'd)

COMPONENT INSPECTION

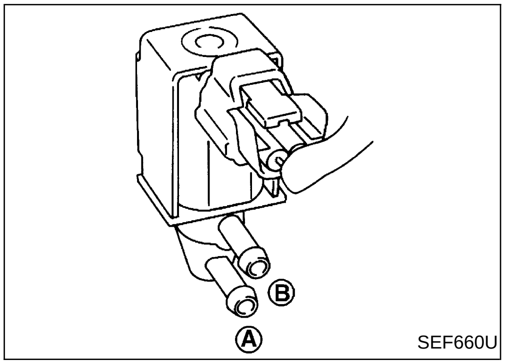


ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
HO2S1 MNTR (B1)	LEAN
THRTL POS SEN	XXX V

SEF801Y

EVAP canister purge volume control solenoid valve

1. Start engine.
2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.
   If OK, inspection end. If NG, go to following step.
3. Check air passage continuity.



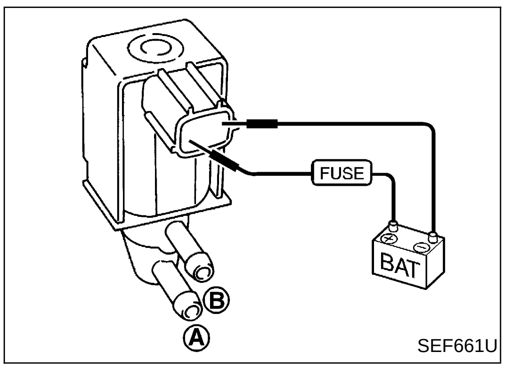
SEF660U

Condition PURG VOL CONT/V value	Air passage continuity between Ⓐ and Ⓑ
100.0%	Yes
0.0%	No

If NG, replace the EVAP canister purge volume control solenoid valve.

OR

Check air passage continuity.

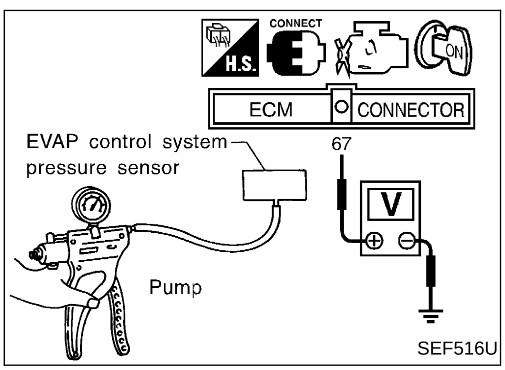


SEF661U

Condition	Air passage continuity between Ⓐ and Ⓑ
12V direct current supply between terminals	Yes
No supply	No

If NG or operation takes more than 1 second, replace solenoid valve.

EVAP control system pressure sensor



SEF516U

1. Remove EVAP control system pressure sensor with its harness connector connected.
2. Remove hose from EVAP control system pressure sensor.
3. Turn ignition switch "ON".
4. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.
5. Check output voltage between ECM terminal 67 and engine ground.

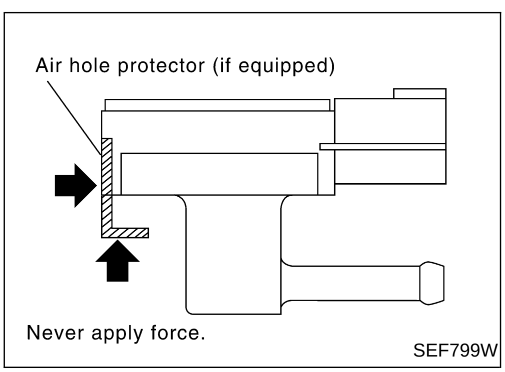
Pressure (Relative to atmospheric pressure)	Voltage V
0 kPa (0 mmHg, 0 inHg)	3.0 - 3.6
−9.3 kPa (−70 mmHg, −2.76 inHg)	0.4 - 0.6

CAUTION:

- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply pressure over 20.0 kPa (150 mmHg, 5.91 inHg) or vacuum below −20.0 kPa (−150 mmHg, −5.91 inHg).**

6. If NG, replace EVAP control system pressure sensor.

- **Never apply force to the air hole protector of the sensor, if equipped.**



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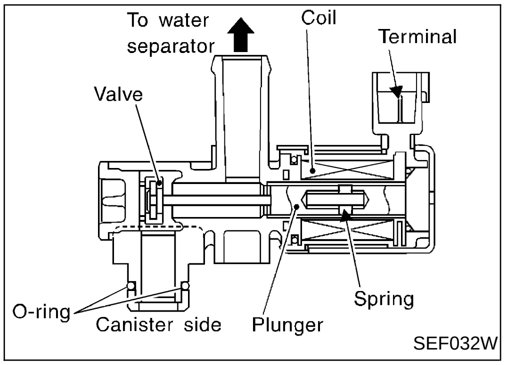
Evaporative Emission (EVAP) Control System Purge Flow Monitoring (Cont'd)

- 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.



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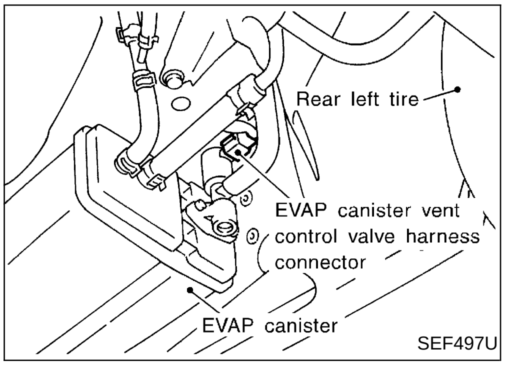

SEF497U

Evaporative Emission (EVAP) Canister Vent Control Valve (Open)

COMPONENT DESCRIPTION

NOTE:
If DTC P0440 is displayed with P1448, perform TROUBLE DIAGNOSIS FOR DTC P1448 first.

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent.
This solenoid (the EVAP canister vent control valve) responds to signals from the ECM.
When the ECM sends an ON signal, the coil in the solenoid valve is energized.
A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.
This solenoid valve is used only for diagnosis, and usually remains opened.
When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows “EVAP Control System (Small Leak)” diagnosis.

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CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

Specification data are reference values

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	● Ignition switch: ON	OFF

ECM TERMINALS AND REFERENCE VALUE

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

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

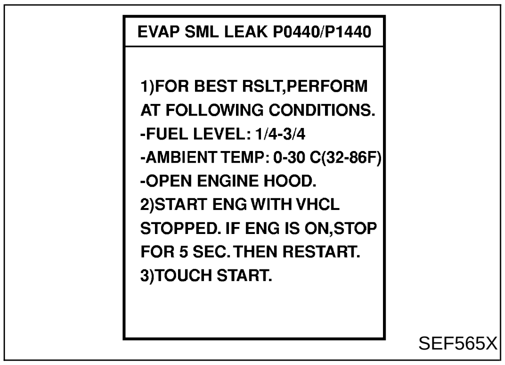
TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
108	PU	EVAP canister vent control valve	Ignition switch “ON”	BATTERY VOLTAGE (11 - 14V)

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P1448	● EVAP canister vent control valve remains opened under specified driving conditions.	● 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

Evaporative Emission (EVAP) Canister Vent Control Valve (Open) (Cont'd)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE



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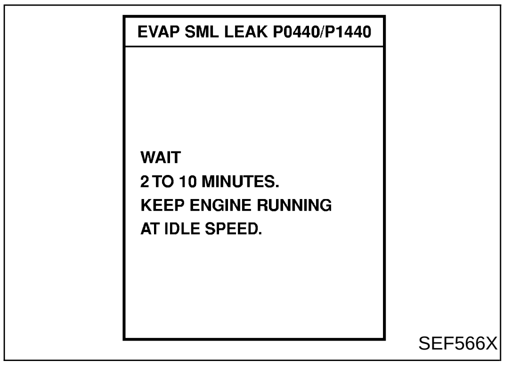

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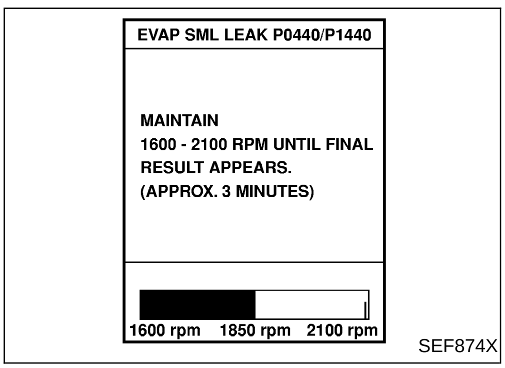

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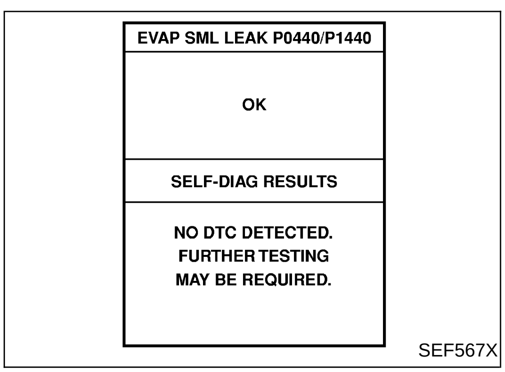

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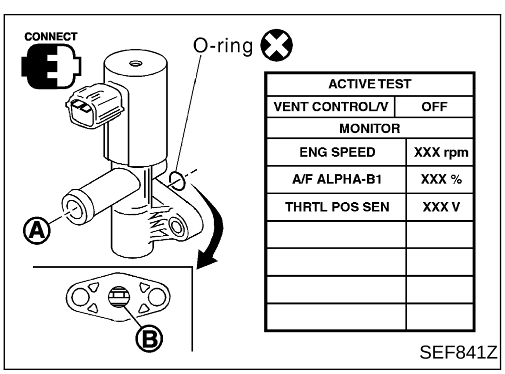

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CAUTION:

Never remove fuel filler cap during the DTC confirmation procedure.

NOTE:

- **If DTC P0440 is displayed with P1448, perform TROUBLE DIAGNOSIS FOR DTC P1448 first.**
- **If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.**

TESTING CONDITION:

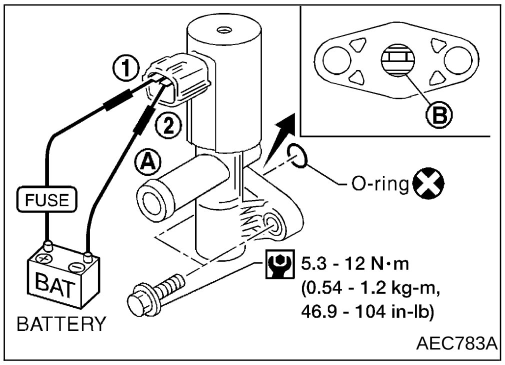
- **Perform "DTC WORK SUPPORT" when the fuel level is between 1/4 to 3/4 full and vehicle is placed on flat level surface.**
- **Open engine hood before conducting following procedure.**

1) Turn ignition switch "ON".
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
4) Make sure that the following conditions are met.
   COOLAN TEMP/S: 0 - 70°C (32 - 158°F)
   INT/A TEMP SE: 0 - 60°C (41 - 86°F)
5) Select "EVAP SML LEAK P0440" 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, 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 of the following.

Condition VENT CONTROL/V	Air passage continuity between Ⓐ and Ⓑ
ON	No
OFF	Yes

If the result is NG, go to "DIAGNOSTIC PROCEDURE", EC-409.
If the result is OK, go to "DIAGNOSTIC PROCEDURE" for "TROUBLE DIAGNOSIS FOR DTC P0440", EC-287.

Evaporative Emission (EVAP) Canister Vent Control Valve (Open) (Cont'd)



OR

OVERALL FUNCTION CHECK

Use this procedure to check the overall function of the EVAP canister vent control valve circuit. During this check, a DTC might not be confirmed.

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-409.
If the result is OK, go to "DIAGNOSTIC PROCEDURE" for "TROUBLE DIAGNOSIS FOR DTC P0440", EC-287.

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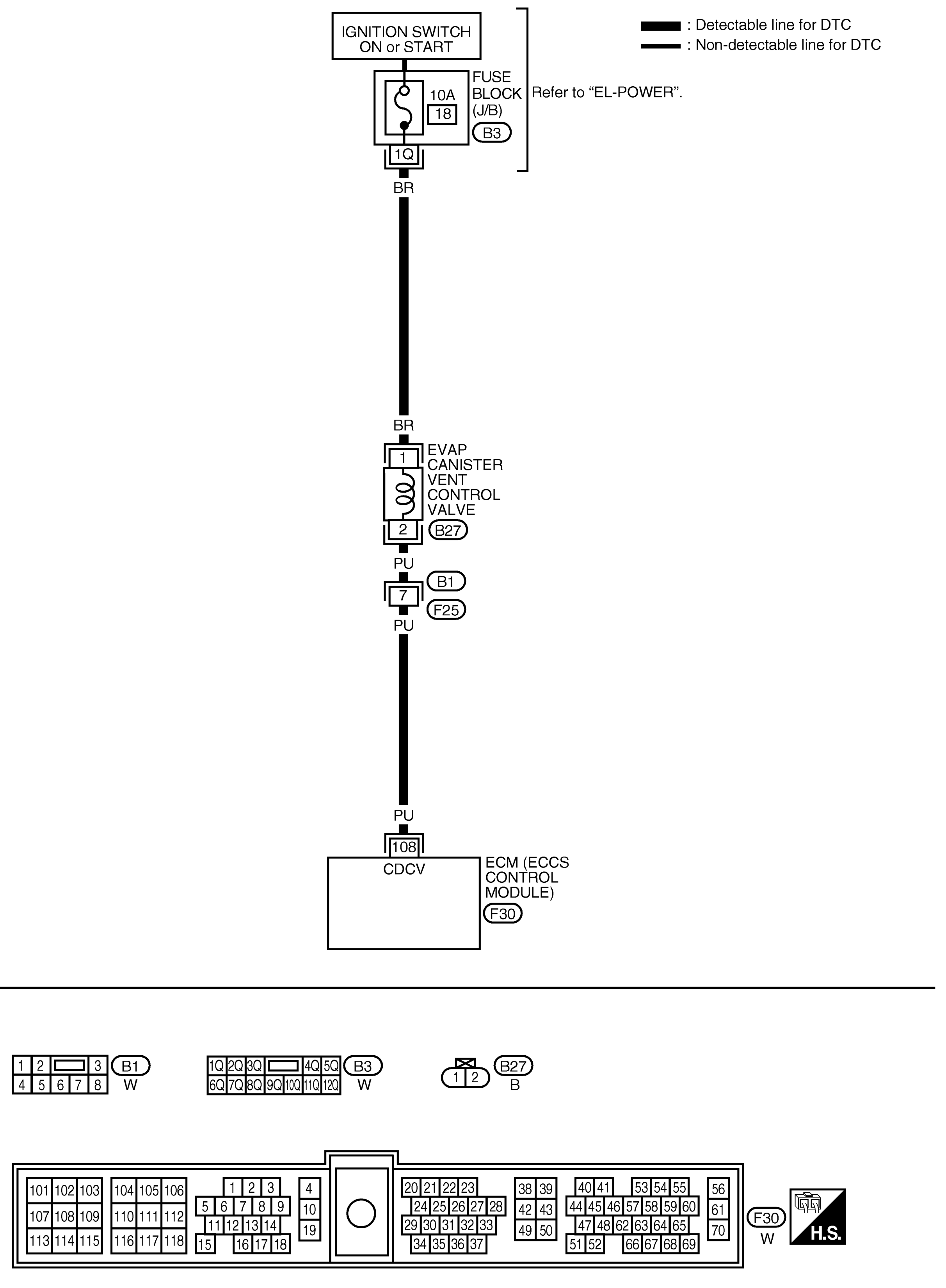
EC-VENT/V-01



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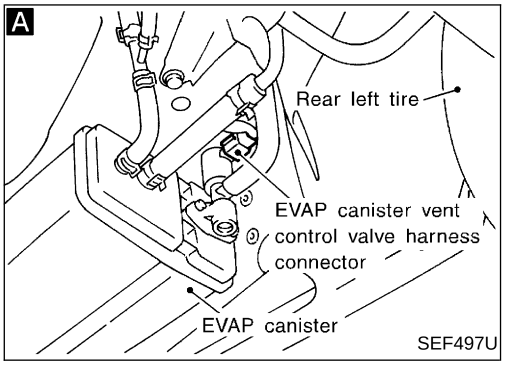
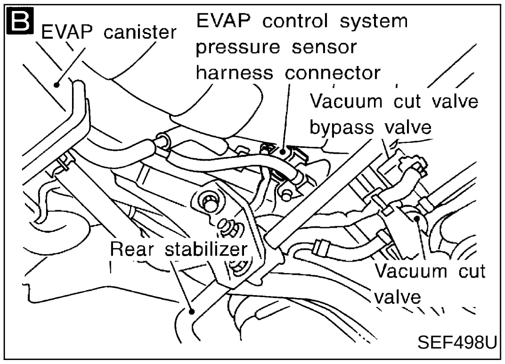
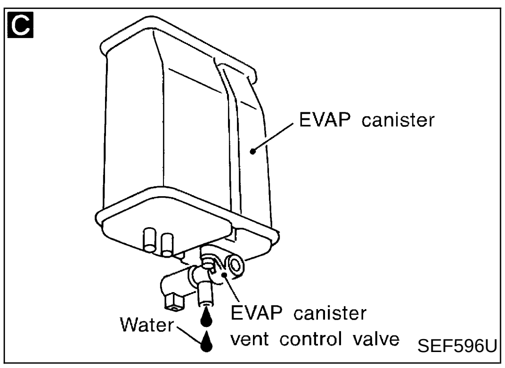
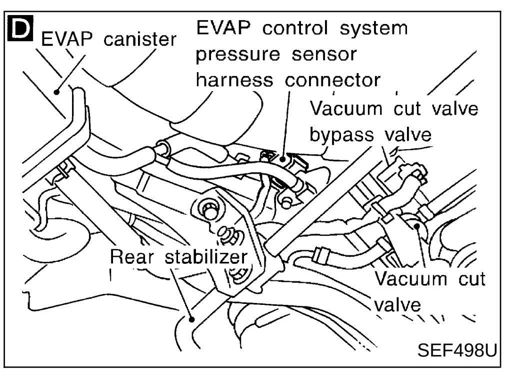
Evaporative Emission (EVAP) Canister Vent Control Valve (Open) (Cont'd)

DIAGNOSTIC PROCEDURE









INSPECTION START

↓

CHECK RUBBER TUBE FOR DISCONNECTION.
Check disconnection of rubber tube to EVAP canister vent control valve and clean the rubber hose and/or vent control valve then install properly.

↓ OK

A

CHECK COMPONENT
(EVAP canister vent control valve and O-ring).
Refer to "COMPONENT INSPECTION", EC-410.

NG → Replace EVAP canister vent control valve and O-ring.

↓ OK

B

CHECK COMPONENT
(Vacuum cut valve).
Refer to "COMPONENT INSPECTION", EC-424.

NG → Replace vacuum cut valve.

↓ OK

C

CHECK IF EVAP CANISTER IS SATURATED WITH WATER.
1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Check if water will drain from the EVAP canister.
   If it will, weigh the EVAP canister with the vent control valve attached.

If the weight is:
More than 1.8 kg (4.0 lb) → NG
Less than 1.8 kg (4.0 lb) → OK

NG → Replace EVAP canister and check the following.
1. Check hose connection between EVAP canister and water separator for clogging and poor connection.
2. Check water separator. Refer to "COMPONENT INSPECTION", EC-396.

If NG, repair hose or replace water separator.

↓ OK

D

CHECK COMPONENT AND CIRCUIT
(EVAP control system pressure sensor).
1. Check for disconnection of hose connected to the sensor.
2. Check harness connector for water in the sensor connectors.
   Water should not exist.
   If OK, go to step 3.
3. Check EVAP control system pressure sensor.
   Refer to "COMPONENT INSPECTION", EC-410.

NG → Repair or replace harness and/or connectors or replace EVAP control system pressure sensor.

↓ OK

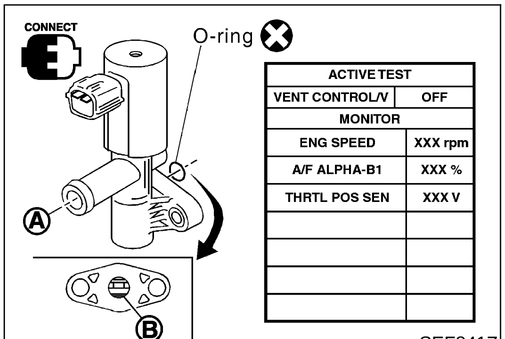
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-112.

↓

INSPECTION END

Evaporative Emission (EVAP) Canister Vent Control Valve (Open) (Cont'd)

COMPONENT INSPECTION



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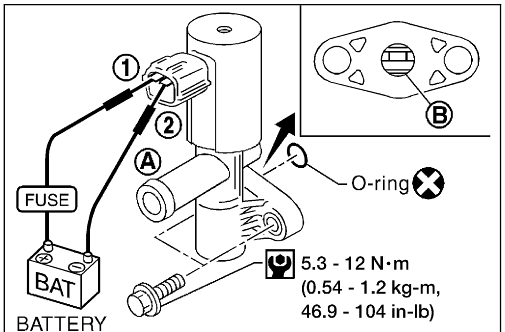


AEC783A

EVAP canister vent control valve

Check air passage continuity.

Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.

Condition	Air passage continuity between A and B
ON	No
OFF	Yes

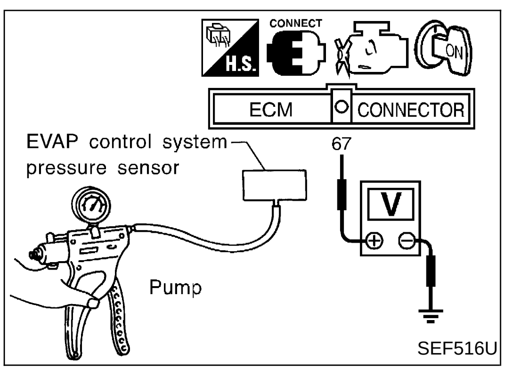
OR

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

If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.

If the portion B is rusted, replace EVAP canister vent control valve.

Make sure new O-ring is installed properly.



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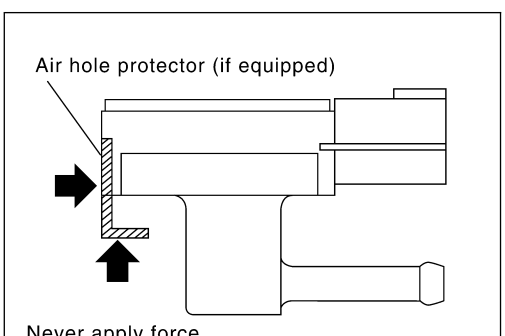

SEF799W

EVAP control system pressure sensor

1. Remove EVAP control system pressure sensor with its harness connector connected.
2. Remove hose from EVAP control system pressure sensor.
3. Turn ignition switch "ON".
4. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.
5. Check output voltage between ECM terminal 67 and engine 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:

- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply pressure over 20.0 kPa (150 mmHg, 5.91 inHg) or vacuum below −20.0 kPa (−150 mmHg, −5.91 inHg).**

6. If NG, replace EVAP control system pressure sensor.

- **Never apply force to the air hole protector of the sensor, if equipped.**

Evaporative Emission (EVAP) Canister Vent Control Valve (Open) (Cont'd)

- 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.

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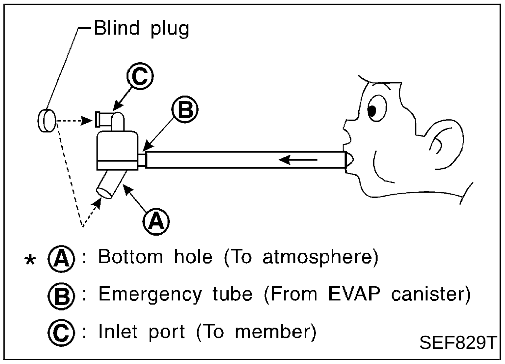
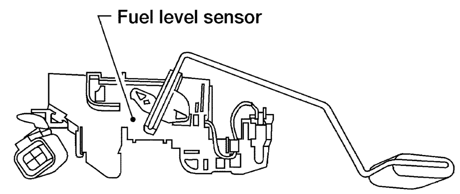


SEF829T

Water separator

1. Check visually for insect nests in 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 Ⓐ and Ⓒ are not clogged by blowing air from Ⓑ with Ⓐ, and then Ⓒ plugged.
5. In case of NG in items 2 - 4, replace the parts.

- **Do not disassemble water separator.**



LEC059

Fuel Level Sensor Circuit (Ground signal)

COMPONENT DESCRIPTION

The fuel level sensor is mounted in the fuel level sensor unit. The sensor detects a fuel level in the fuel tank and transmits a signal to the ECM.
It consists of two parts, one is mechanical float and the other side is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

ON BOARD DIAGNOSTIC LOGIC

ECM receives two signals from the fuel level sensor.
One is between the level sensor and the speedometer, and the other is between the level sensor and the ground.
This diagnosis indicates the latter to detect open circuit malfunction.

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P0464	A high voltage from the fuel level sensor is sent to ECM.	• Fuel level sensor circuit (The fuel level sensor circuit is open or shorted)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

NOTE:
If “DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch “OFF” and wait at least 5 seconds before conducting the next test.

DATA MONITOR	
MONITOR	NO DTC
FUEL T/TMP SE	XXX °C
FUEL LEVEL SE	XXX V

SEF563X

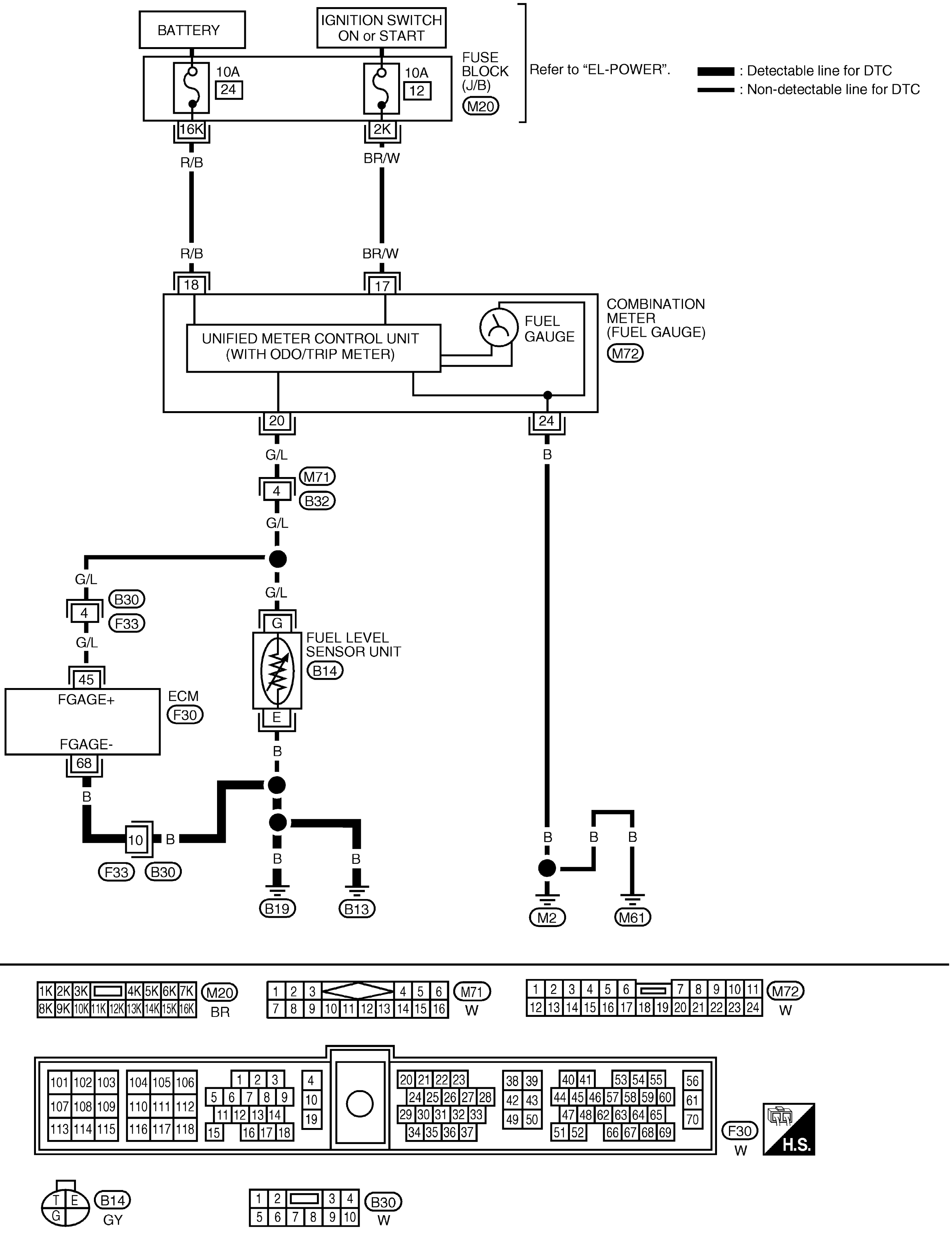
1) Turn ignition switch “ON”.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Wait at least 5 seconds.
4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-414.

— OR —

Follow the above procedure “With CONSULT-II”.

Fuel Level Sensor Circuit (Ground signal) (Cont'd)

EC-FL3-01



WEC567

Fuel Level Sensor Circuit (Ground signal) (Cont'd)

DIAGNOSTIC PROCEDURE

INSPECTION START

↓

CHECK INPUT SIGNAL CIRCUIT
Check harness continuity between ECM terminal 68 and ground.
Refer to the wiring diagram.
Continuity should exist.
Also, check harness for short to ground and short to power.

NG → Check the following.
- Harness connectors F33, B30
- Harness for open or short between ECM and ground

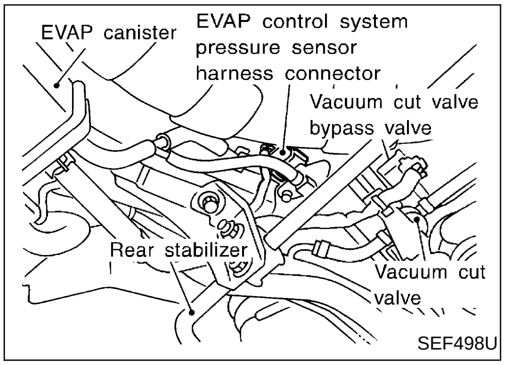
If NG, repair open circuit or short to power in harness or connectors.

OK ↓

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-112.

↓

INSPECTION END



Vacuum Cut Valve Bypass Valve (Circuit)

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

Specification data are reference values

MONITOR ITEM	CONDITION	SPECIFICATION
VC/V BYPASS/V	● Ignition switch: ON	OFF

ECM TERMINALS AND REFERENCE VALUE

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

CAUTION:
Do not use ECM ground terminals when measuring input/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)
117	PU/R	Vacuum cut valve bypass valve	Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)

ON BOARD DIAGNOSIS LOGIC

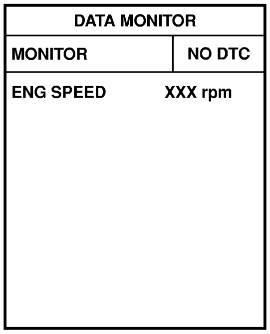
Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P1490	● An improper voltage signal is sent to ECM through vacuum cut valve bypass valve.	● Harness or connectors (The vacuum cut valve bypass valve circuit is open or shorted.) ● Vacuum cut valve bypass valve

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

NOTE:
If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

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

Vacuum Cut Valve Bypass Valve (Circuit) (Cont'd)



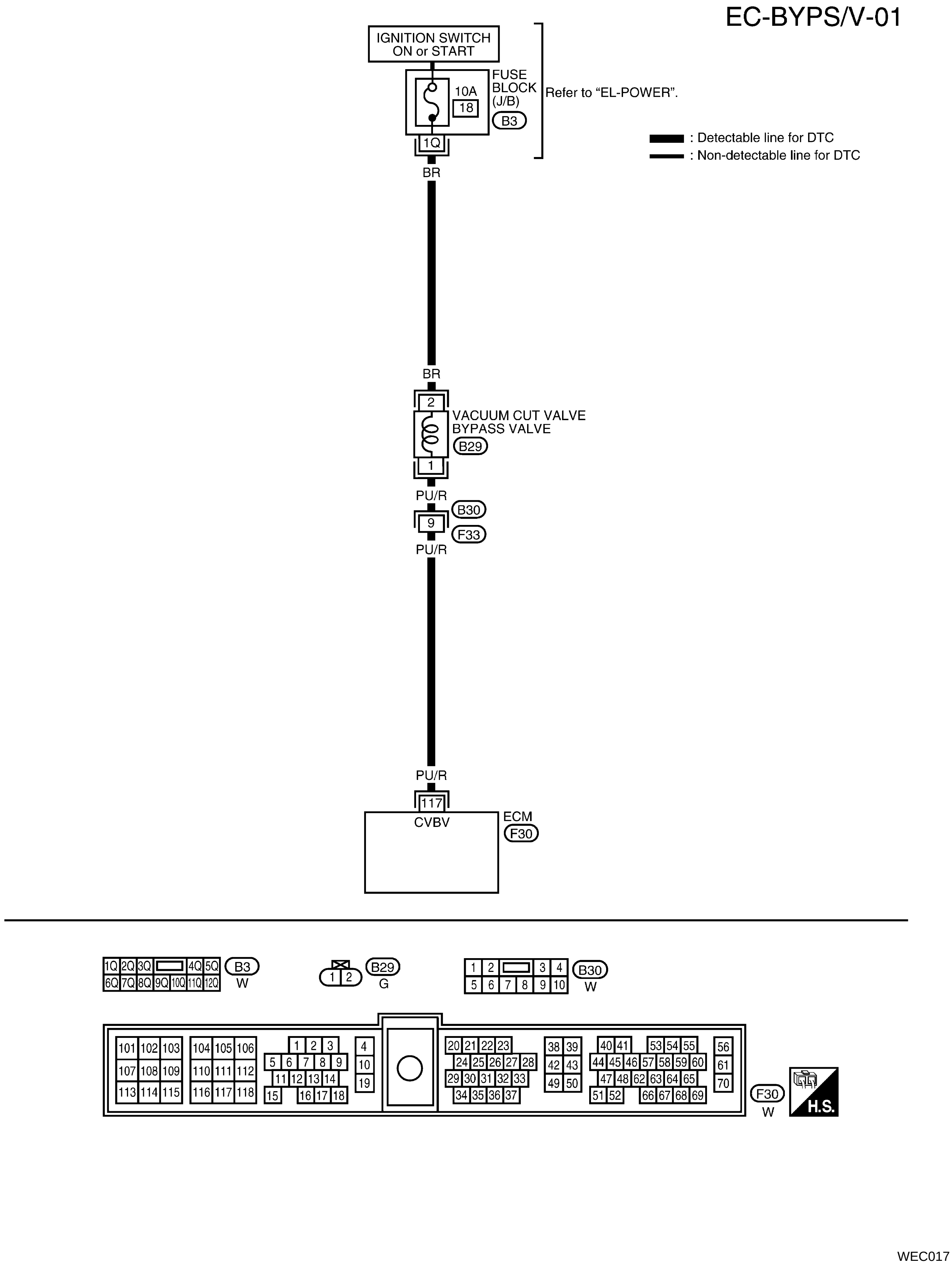
SEF058Y

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Start engine and wait at least 5 seconds.
4) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-423.

OR

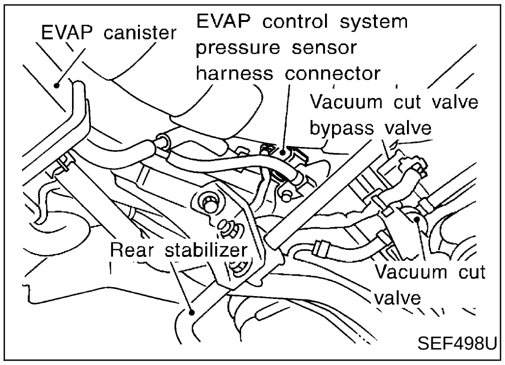
1) Start engine and wait at least 5 seconds.
2) Select "MODE 7" with GST.
3) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-423.

Vacuum Cut Valve Bypass Valve (Circuit) (Cont'd)



Vacuum Cut Valve Bypass Valve (Circuit) (Cont'd)

DIAGNOSTIC PROCEDURE



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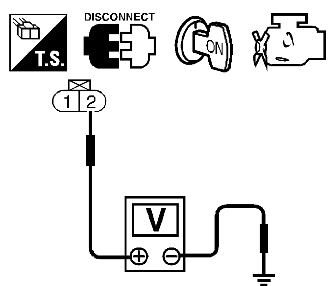
A

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

SEF564Z

B



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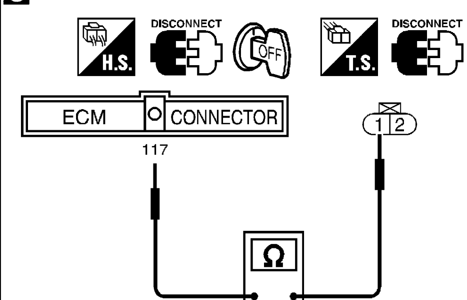


SEF734T

INSPECTION START

- With CONSULT-II → **A**
- Withut CONSULT-II → Go to CHECK POWER SUPPLY **B**.

A

CHECK CIRCUIT.
1. Perform "VC/V BYPASS/V" in "ACTIVE TEST" mode.
2. Make sure that clicking sound is heard from the vacuum cut bypass valve.

- OK → Go to "CHECK COMPONENT" after procedure **C**.
- NG ↓

B

CHECK POWER SUPPLY.
1. Turn ignition switch "OFF".
2. Disconnect vacuum cut valve bypass valve harness connector.
3. Turn ignition switch "ON".
4. Check voltage between terminal 2 and ground with CONSULT-II or tester.
   Voltage: Battery voltage

- NG → Repair harness or connectors.
- OK ↓

C

CHECK OUTPUT SIGNAL CIRCUIT.
1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 117 and terminal 1.
   Continuity should exist.
   If OK, check harness for short to ground and short to power.

- NG → Check the following.
  - Harness connectors B30, F33
  - Harness for open or short between vacuum cut valve bypass valve and ECM

  If NG, repair open circuit or short to ground or short to power in harness or connectors.
- OK ↓

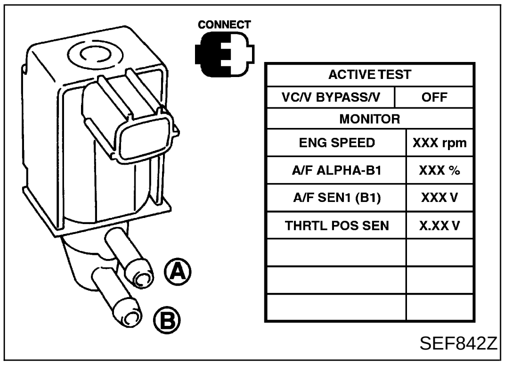
CHECK COMPONENT
(Vacuum cut valve bypass valve).
Refer to "COMPONENT INSPECTION", EC-419.

- NG → Replace vacuum cut valve bypass valve.
- OK ↓

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-112.

↓

INSPECTION END



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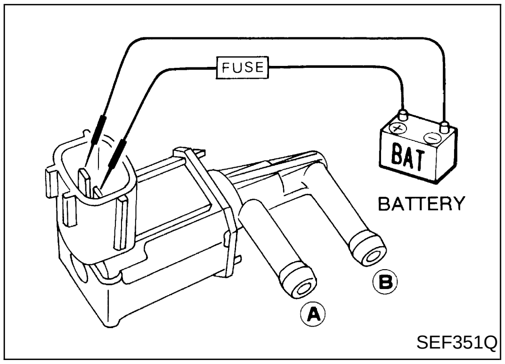


SEF351Q

Vacuum Cut Valve Bypass Valve (Circuit) (Cont'd)

COMPONENT INSPECTION

Vacuum cut valve bypass valve

Check air passage continuity.

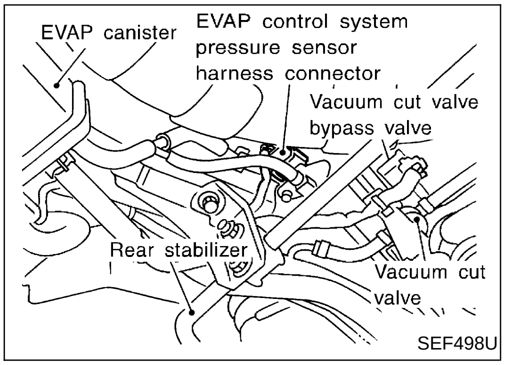
Perform “VC/V BYPASS/V” in “ACTIVE TEST” mode.

Condition	Air passage continuity between A and B
ON	Yes
OFF	No

OR

Condition	Air passage continuity between A and B
12V direct current supply between terminals	Yes
No supply	No

If NG or operation takes more than 1 second, replace vacuum cut valve bypass valve.

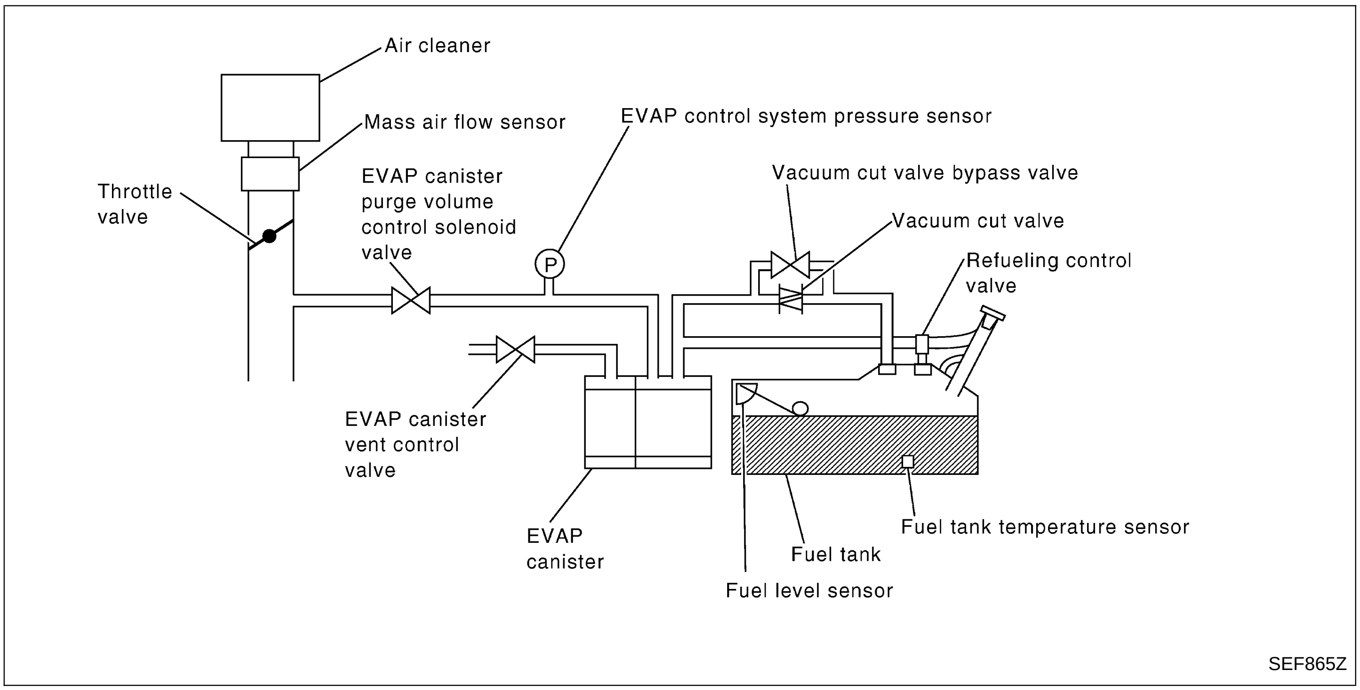


Vacuum Cut Valve Bypass Valve

COMPONENT DESCRIPTION

The vacuum cut valve and vacuum cut valve bypass valve are installed in parallel on the EVAP purge line between the fuel tank and the EVAP canister.
The vacuum cut valve prevents the intake manifold vacuum from being applied to the fuel tank.
The vacuum cut valve bypass valve is a solenoid type valve and generally remains closed. It opens only for on board diagnosis.
The vacuum cut valve bypass valve responds to signals from the ECM. When the ECM sends an ON (ground) signal, the valve is opened. The vacuum cut valve is then bypassed to apply intake manifold vacuum to the fuel tank.

EVAPORATIVE EMISSION SYSTEM DIAGRAM



CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

Specification data are reference values

MONITOR ITEM	CONDITION	SPECIFICATION
VC/V BYPASS/V	● Ignition switch: ON	OFF

ECM TERMINALS AND REFERENCE VALUE

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

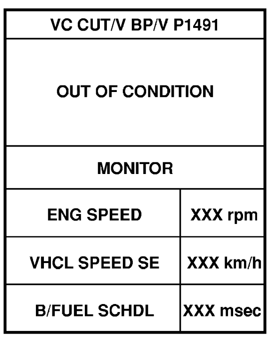
CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
117	PU/R	Vacuum cut valve bypass valve	Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)

Vacuum Cut Valve Bypass Valve (Cont’d)

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P1491	• 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



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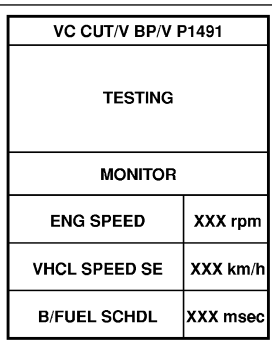

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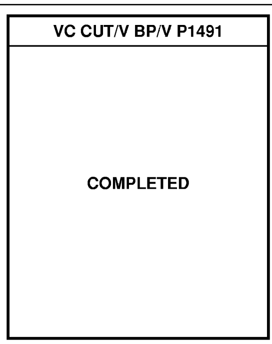


SEF239Y

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

CAUTION:
Always drive vehicle at a safe speed.

NOTE:
If “DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch “OFF” and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:
- **For best results, perform test at a temperature of 0°C (32°F) or more.**
- **This test may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.**

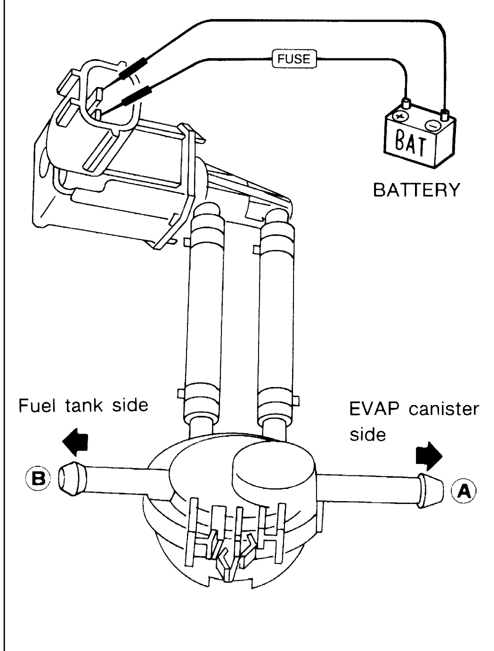
Before performing the following procedure, confirm that battery voltage is more than 11V.

1) Turn ignition switch “ON”.
2) Start engine and warm it up to normal operating temperature.
3) Turn ignition switch “OFF” and wait at least 5 seconds.
4) Start engine and let it idle for at least 1 minute.
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 - 3,000 rpm
   Selector lever: Suitable position
   Vehicle speed: 36 - 120 km/h (22 - 75 MPH)
   B/FUEL SCHDL: 0.5 - 3.1 msec

Vacuum Cut Valve Bypass Valve (Cont'd)

If "TESTING" is not displayed after 5 minutes, retry from step 3).

8) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "DIAGNOSTIC PROCEDURE", EC-423.



SEF530Q

OR

OVERALL FUNCTION CHECK

1) Remove vacuum cut valve and vacuum cut valve bypass valve as an assembly.
2) Apply vacuum to port Ⓐ and check that there is no suction from port Ⓑ.
3) Apply vacuum to port Ⓑ and check that there is suction from port Ⓐ.
4) Blow air in port Ⓑ and check that there is a resistance to flow out of port Ⓐ.
5) Supply battery voltage to the terminal.
6) Blow air in port Ⓐ and check that air flows freely out of port Ⓑ.
7) Blow air in port Ⓑ and check that air flows freely out of port Ⓐ.
8) If NG, go to "DIAGNOSTIC PROCEDURE", EC-423.

Vacuum Cut Valve Bypass Valve (Cont'd)

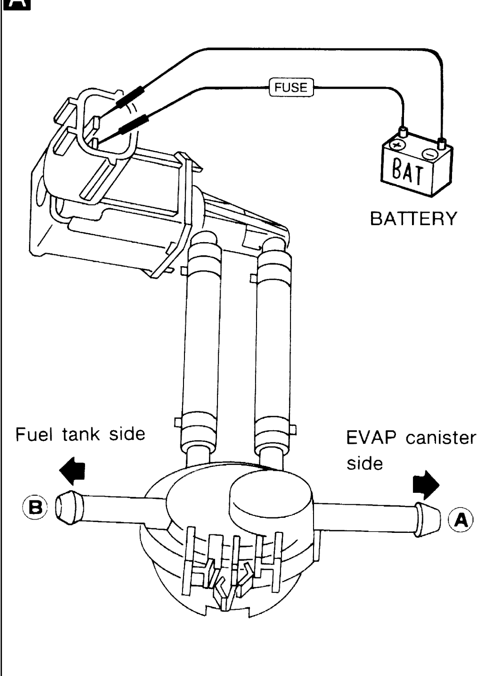
DIAGNOSTIC PROCEDURE

A

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

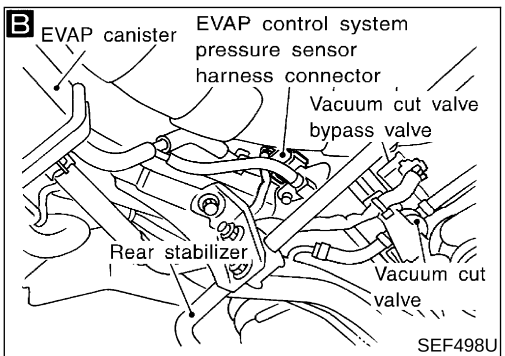
SEF843Z

A



SEF530Q

B



SEF498U

INSPECTION START

↓

A **CHECK COMPONENT.**
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. Select "VC/V BYPASS/V" in "ACTIVE TEST" mode with CONSULT-II and touch "ON".

— OR —

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.

OK → Check the following.
- EVAP purge line between EVAP canister and fuel tank for clogging or disconnection
- EVAP canister, refer to EC-23.
- EVAP purge port of fuel tank for clogging

If NG, repair or replace.

OK → Go to **B** "CHECK COMPONENT (EVAP control system pressure sensor)" below.

NG ↓

Check bypass hoses for clogging.

NG → Repair or replace hoses.

OK ↓

B **CHECK COMPONENT**
(Vacuum cut valve, vacuum cut valve bypass valve).
Refer to "COMPONENT INSPECTION", EC-424.

NG → Replace malfunctioning parts.

OK ↓

B **CHECK COMPONENT AND CIRCUIT**
(EVAP system control pressure sensor).
1. Check for disconnection of hose connected to the sensor.
2. Check sensor harness connector for water.
   Water should not exist.
   If OK, go to the following step.
3. Check EVAP control system pressure sensor.

Refer to "COMPONENT INSPECTION", EC-309.

NG → Repair or replace harness, connectors and/or replace EVAP control system pressure sensor.

OK ↓

CHECK COMPONENT
(EVAP canister vent control valve).
Refer to "COMPONENT INSPECTION", EC-410.

NG → Repair or replace EVAP canister vent control valve.

OK ↓

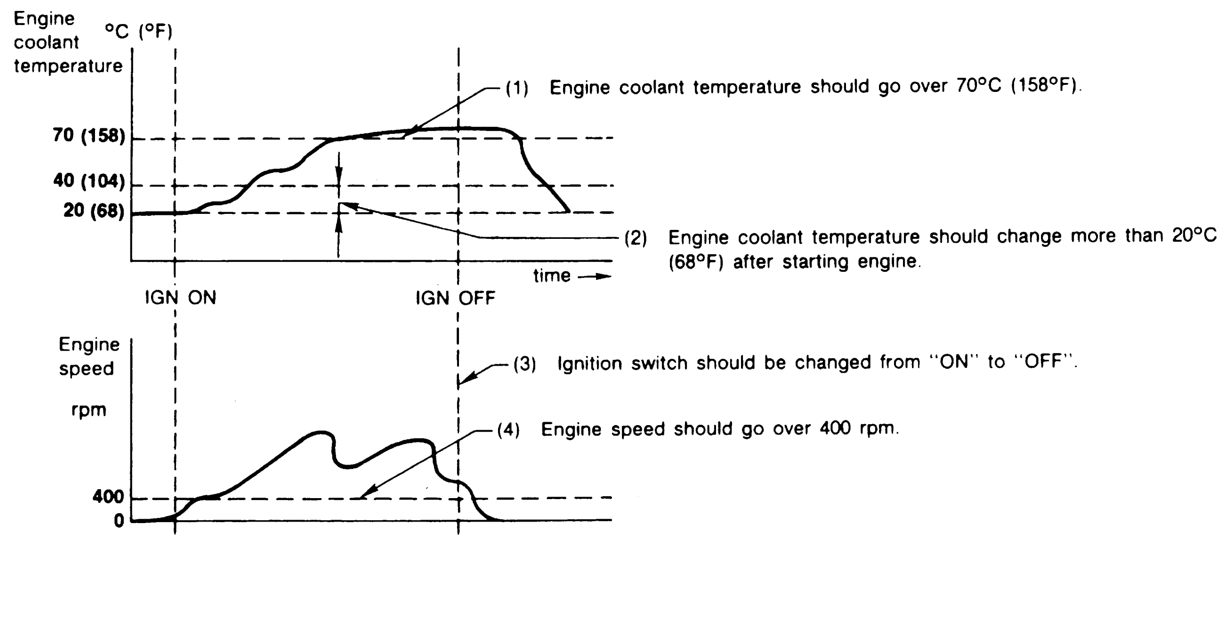
CHECK COMPONENT
(Refueling control valve).
Refer to "COMPONENT INSPECTION", EC-31.

NG → Replace refueling control valve.

OK ↓

INSPECTION END

GI
MA
EM
LC
EC
FE
CL
MT
AT
FA
RA
BR
ST
RS
BT
HA
EL
IDX



WEC123

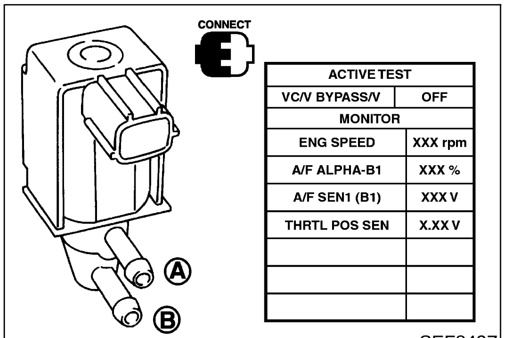
COMPONENT INSPECTION

Vacuum cut valve bypass valve

Check air passage continuity.

Perform "VC/V BYPASS/V" in "ACTIVE TEST" mode.

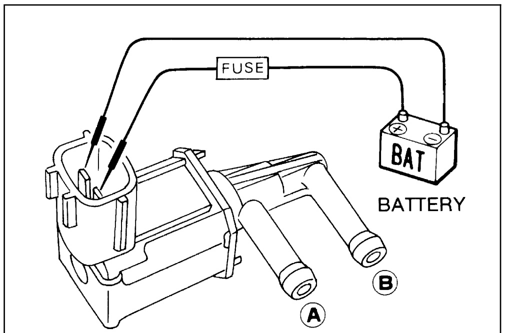
Condition	Air passage continuity between Ⓐ and Ⓑ
ON	Yes
OFF	No



SEF842Z

OR

Condition	Air passage continuity between Ⓐ and Ⓑ
12V direct current supply between terminals	Yes
No supply	No



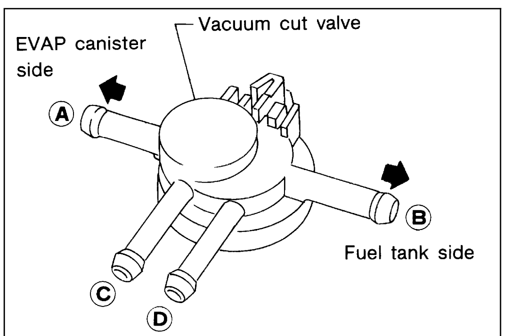
SEF351Q

If NG or operation takes more than 1 second, replace vacuum cut valve bypass valve.

Vacuum cut valve

Check vacuum cut valve as follows:

1. Plug port Ⓒ and Ⓓ with fingers.
2. Apply vacuum to port Ⓐ and check that there is no suction from port Ⓑ.
3. Apply vacuum to port Ⓑ and check that there is suction from port Ⓐ.
4. Blow air in port Ⓑ and check that there is a resistance to flow out of port Ⓐ.
5. Open port Ⓒ and Ⓓ.
6. Blow air in port Ⓐ check that air flows freely out of port Ⓒ.
7. Blow air in port Ⓑ check that air flows freely out of port Ⓓ.



SEF379Q

A/T Diagnosis Communication Line

COMPONENT DESCRIPTION

The malfunction information related to A/T (Automatic Transmission) is transferred through the line (circuit) from TCM (Transmission control module) to ECM. Therefore, be sure to erase the malfunction information such as DTC not only in TCM but also ECM after the A/T related repair.

ECM TERMINALS AND REFERENCE VALUE

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

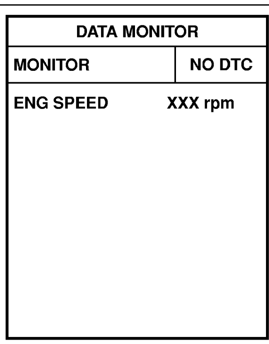
CAUTION:

Do not use ECM ground terminals when measuring input/output 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)
7	PU	A/T check signal	Ignition switch "ON" Engine is running.	0 - 4.0V

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code 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 is open or shorted.) • Dead (Weak) battery • TCM



SEF058Y

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

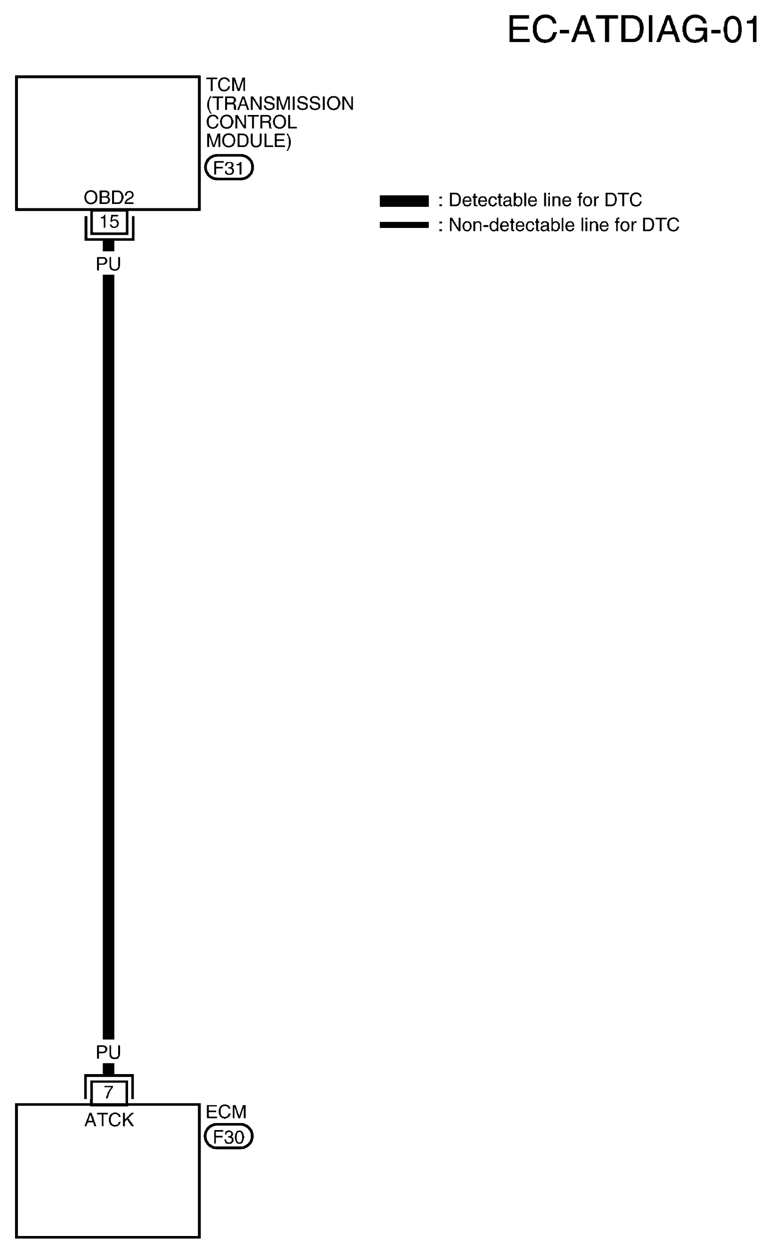
TESTING CONDITION:

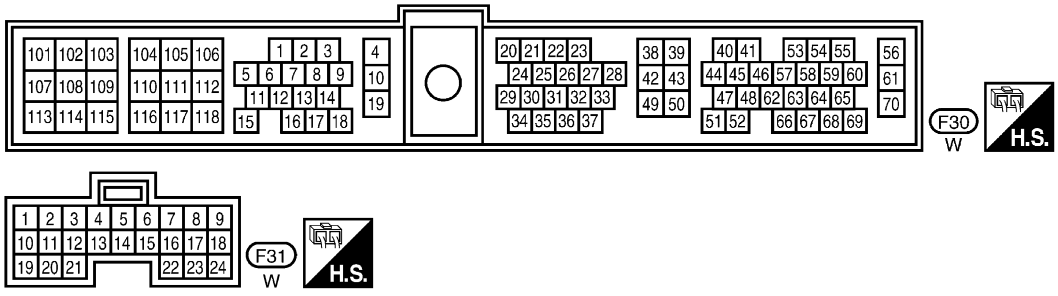
Before performing the following procedure, confirm that battery voltage is more than 11V.

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Start engine and wait at least 40 seconds.
4) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-427.

OR

1) Turn ignition switch "ON".
2) Start engine and wait at least 40 seconds.
3) Select "MODE 7" with GST.
4) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-427.

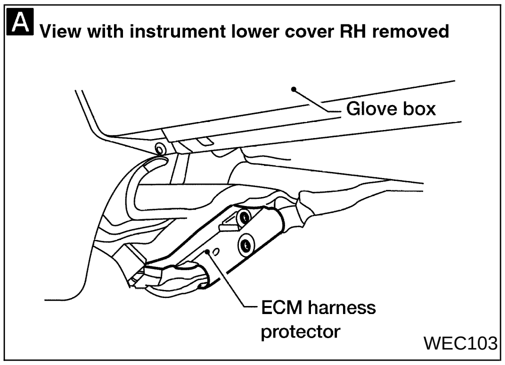

EC-ATDIAG-01
TCM
(TRANSMISSION
CONTROL
MODULE)
F31
OBD2
15
: Detectable line for DTC
: Non-detectable line for DTC
PU
PU
7
ATCK
ECM
F30

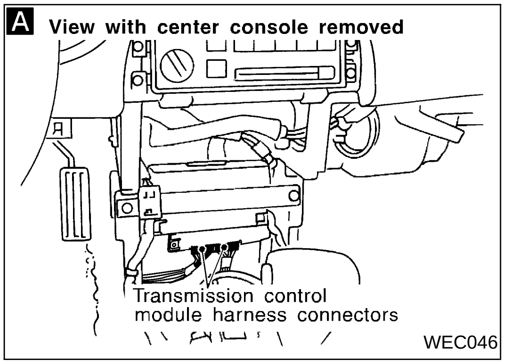

F30
W
H.S.
F31
W
H.S.

WEC018

A/T Diagnosis Communication Line (Cont'd)

DIAGNOSTIC PROCEDURE





INSPECTION START

↓

A

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 7 and TCM terminal 15.
   Refer to the wiring diagram.
   Continuity should exist.
   If OK, check harness for short to ground and short to power.

NG → Check the following.
- Harness for open or short between ECM and TCM

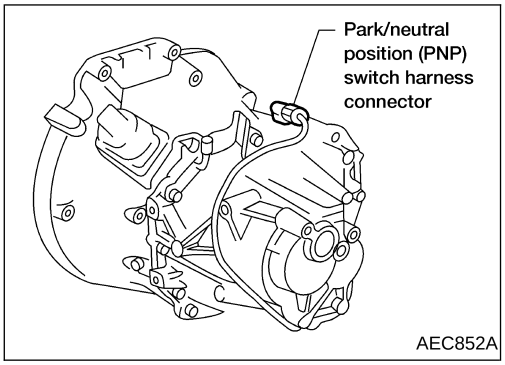
If NG, repair open circuit or short to ground or short to power in harness or connectors.

↓ OK

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-112.

↓

INSPECTION END



Park/Neutral Position (PNP) Switch

COMPONENT DESCRIPTION

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.
For A/T models, the PNP switch assembly also includes a transmission range switch to detect selector lever position.

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

Specification data are reference values

MONITOR ITEM	CONDITION		SPECIFICATION
P/N POSI SW	● Ignition switch: ON	Shift lever: “P” or “N”	ON
		Except above	OFF

ECM TERMINALS AND REFERENCE VALUE

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

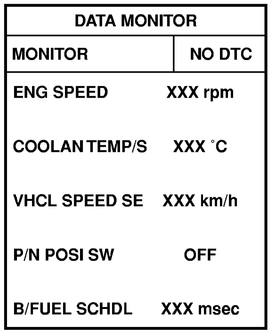
CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM’s transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
22	G/OR	Park/neutral position (PNP) switch	Ignition switch “ON” — Gear position is “N” or “P”	Approximately 0V
			Ignition switch “ON” — Except the above gear position	Approximately 5V

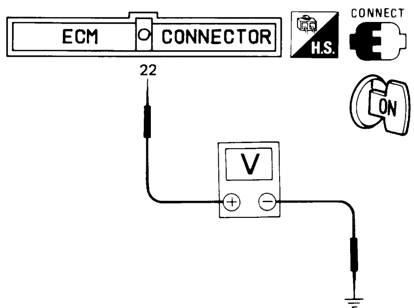
ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P1706	● The signal of the park/neutral position (PNP) switch is not changed in the process of engine starting and driving.	● Harness or connectors a. (The PNP switch or PNP switch circuit is open or shorted.) b. (The circuit between ECM and TCM is open or shorted.) ● PNP switch ● TCM (Transmission control module)

Park/Neutral Position (PNP) Switch (Cont'd)



SEF213Y



SEF964N

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

CAUTION:
Always drive vehicle at a safe speed.

NOTE:
If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

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 "DIAGNOSTIC PROCEDURE", EC-431.
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 - 3,400 rpm
   COOLAN TEMP/S: More than 70°C (158°F)
   B/FUEL SCHDL: 3 - 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 "DIAGNOSTIC PROCEDURE", EC-431.

OR

OVERALL FUNCTION CHECK

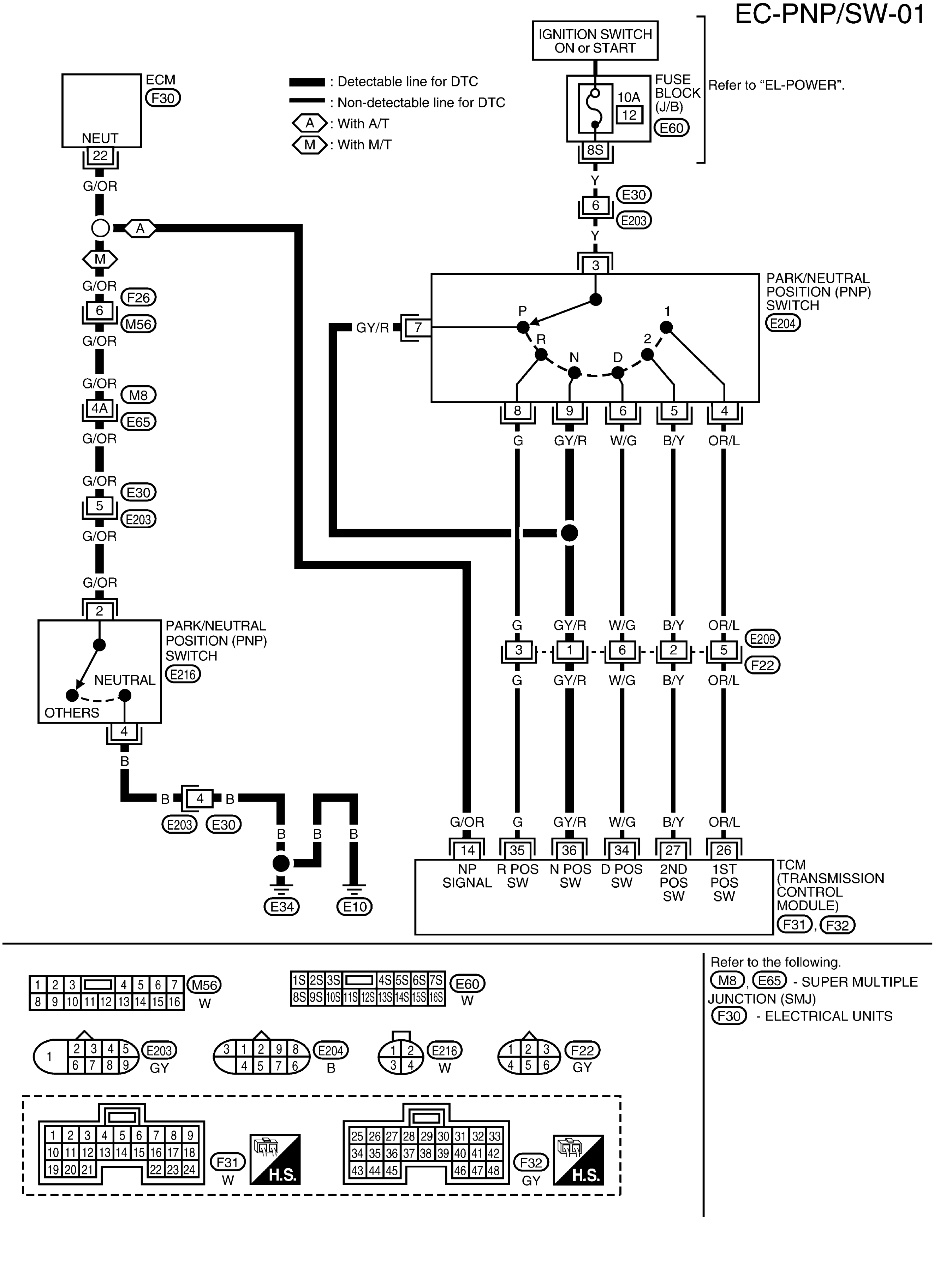
Use this procedure to check the overall function of the park/neutral position (PNP) switch circuit. During this check, a 1st trip DTC might not be confirmed.

1) Turn ignition switch "ON".
2) Check voltage between ECM terminal 22 and body ground under the following conditions.

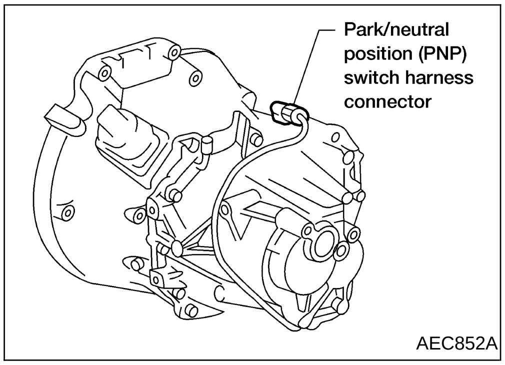
Condition (Gear position)	Voltage V (Known-good data)
"P" (A/T only) and "N" position	Approx. 0
Except the above position	Approx. 5

3) If NG, go to "DIAGNOSTIC PROCEDURE", EC-431.

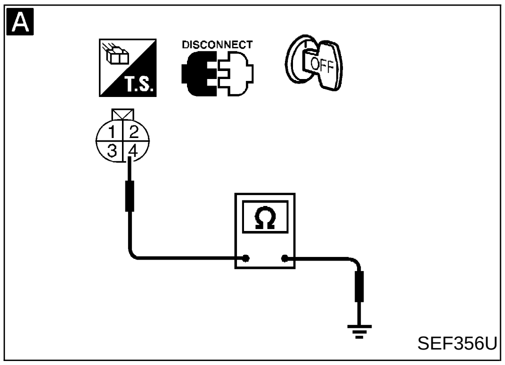
EC-PNP/SW-01


IGNITION SWITCH ON or START
FUSE BLOCK (J/B)
10A
12
E60
8S
Refer to "EL-POWER".
ECM
F30
NEUT
22
: Detectable line for DTC
: Non-detectable line for DTC
A : With A/T
M : With M/T
G/OR
Y
E30
6
E203
3
PARK/NEUTRAL POSITION (PNP) SWITCH
E204
GY/R
7
P
1
R
2
N
D
8
9
6
5
4
G
GY/R
W/G
B/Y
OR/L
F26
M56
M8
4A
E65
5
2
PARK/NEUTRAL POSITION (PNP) SWITCH
E216
NEUTRAL
OTHERS
E209
F22
B
E34
E10
14
35
36
34
27
26
NP SIGNAL
R POS SW
N POS SW
D POS SW
2ND POS SW
1ST POS SW
TCM (TRANSMISSION CONTROL MODULE)
F31
F32
W
GY
H.S.
Refer to the following.
M8, E65 - SUPER MULTIPLE JUNCTION (SMJ)
F30 - ELECTRICAL UNITS
WEC710

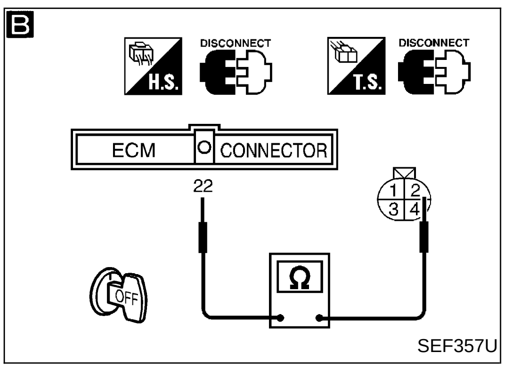
Park/Neutral Position (PNP) Switch (Cont’d)



AEC852A



SEF356U



SEF357U

DIAGNOSTIC PROCEDURE

Park/neutral position (PNP) switch (M/T models)

INSPECTION START

↓

A

CHECK GROUND CIRCUIT.
1. Disconnect (PNP) switch harness connector.
2. Check harness continuity between terminal 4 and body ground.
   Continuity should exist.
   If OK, check harness for short.

NG → Check the following.
- Harness connectors E30, E203
- Harness for open or short between PNP switch and body ground

If NG, repair open circuit or short to ground or short to power in harness or connectors.

OK ↓

B

CHECK INPUT SIGNAL CIRCUIT.
1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 22 and terminal 2.
   Continuity should exist.
   If OK, check harness for short.

NG → Check the following.
- Harness connectors F26, M56
- Harness connectors M8, E65
- Harness connectors E30, E203
- Harness for open or short between ECM and PNP switch

If NG, repair open circuit or short to ground or short to power in harness or connectors.

OK ↓

CHECK COMPONENT
(PNP switch).
Refer to MT section.

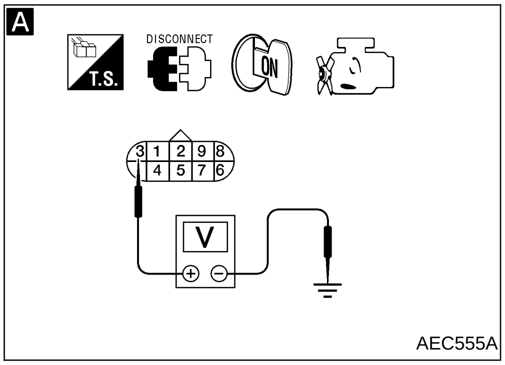
NG → Replace PNP switch.

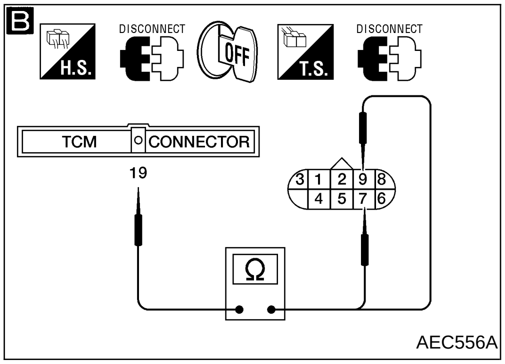
OK ↓

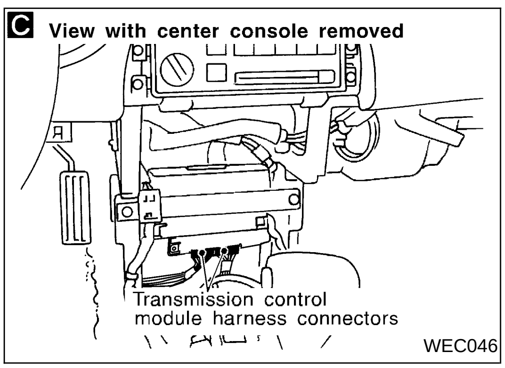
Perform “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-112.

↓

INSPECTION END







Park/neutral position (PNP) switch (A/T models)

INSPECTION START

A

CHECK POWER SUPPLY.
1. Disconnect PNP switch harness connector.
2. Turn ignition switch "ON".
3. Check voltage between terminal 3 and ground with CONSULT-II or tester.
   Voltage: Battery voltage

NG → Check the following.
- Harness connector E30, E203
- 10A fuse
- Harness for open or short between PNP switch and fuse

If NG, repair harness or connectors.

OK ↓

B

CHECK INPUT SIGNAL CIRCUIT-I.
1. Turn ignition switch "OFF".
2. Disconnect TCM harness connector.
3. Check harness continuity between TCM terminal 19 and terminals 7, 9.
   Continuity should exist.
   If OK, check harness for short.

NG → Check the following.
- Harness connectors F22, E209
- Harness for open or short between PNP switch and TCM

If NG, repair open circuit or short to ground or short to power in harness or connectors.

OK ↓

C

CHECK INPUT SIGNAL CIRCUIT-II.
1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 22 and TCM terminal 14.
   Refer to the wiring diagram.
   Continuity should exist.
   If OK, check harness for short.

NG → Check the following.
- Harness for open or short between ECM and TCM

If NG, repair open circuit or short to ground or short to power in harness or connectors.

OK ↓

CHECK COMPONENT (PNP switch).
Refer to AT section.

NG → Replace PNP switch.

OK ↓

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-112.

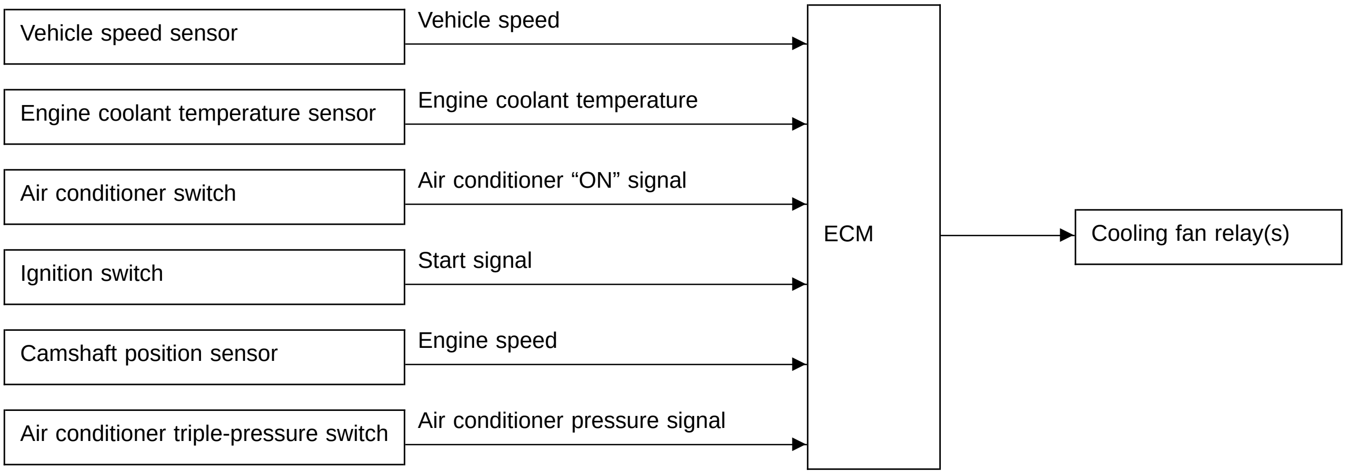
↓

INSPECTION END

Overheat

SYSTEM DESCRIPTION

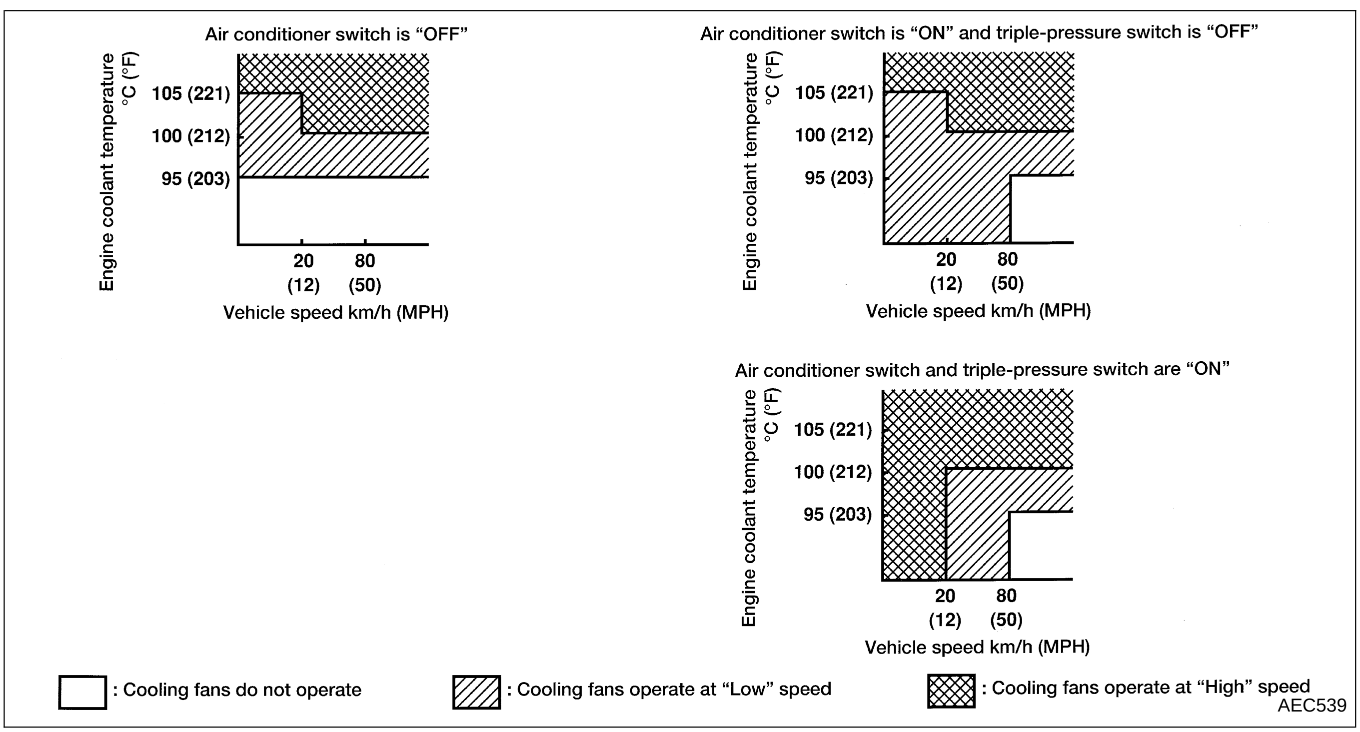
Cooling fan control



The ECM controls the cooling fan corresponding to the vehicle speed, engine coolant temperature, air conditioner system pressure and air conditioner ON signal. The control system has 3-step control [HIGH/LOW/OFF].

With the ignition key in the OFF position the cooling fans will operate for a maximum of 120 seconds if the engine coolant temperature reaches 96°C (205°F) or above.

Operation



Overheat (Cont'd)

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
COOLING FAN	● Engine: Idling, after warming up ● Air conditioner switch "OFF" ● Vehicle speed	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 95°C (203°F) or more.	HI

ECM TERMINALS AND REFERENCE VALUE

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

CAUTION:

Do not use ECM ground terminals when measuring input/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)
13	LG	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 - 0.4V
14	LG/R	Cooling fan relay (Low)	Engine is running. └ Cooling fan is not operating.	BATTERY VOLTAGE (11 - 14V)
			Engine is running. └ Cooling fan (Low) is operating.	0 - 0.3V

ON BOARD DIAGNOSIS LOGIC

If the cooling fan or another component in the cooling system malfunctions, the 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)
OVERHEAT	● Engine coolant temperature reaches an abnormally high temperature.	● 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 "MAIN 12 CAUSES OF OVERHEATING", EC-443.

CAUTION:

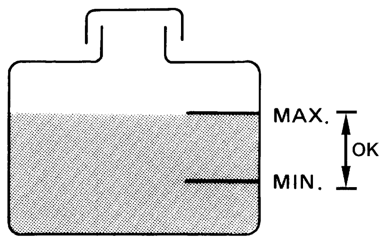
When a malfunction is indicated, be sure to replace the coolant following the procedure in the MA section ("Changing Engine Coolant", "ENGINE MAINTENANCE"). Also, replace the engine oil.

a. Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute like pouring coolant by kettle. Be sure to use coolant with the proper mixture ratio. Refer to MA section ("Anti-freeze Coolant Mixture Ratio", "RECOMMENDED FLUIDS AND LUBRICANTS").

b. After refilling coolant, run engine to ensure that no water-flow noise is emitted.

Overheat (Cont'd)

OVERALL FUNCTION CHECK



AEC640

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.

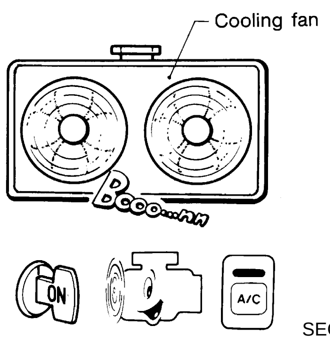
ACTIVE TEST	
COOLING FAN	OFF
MONITOR	
COOLAN TEMP/S	XXX °C

SEF111X

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 "DIAGNOSTIC PROCEDURE", EC-437.
2) Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to "DIAGNOSTIC PROCEDURE", EC-437.

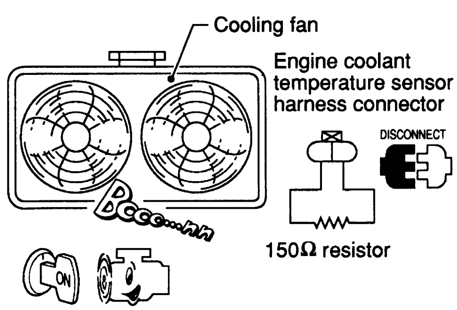
3) Turn ignition switch "ON".
4) Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT-II (LOW speed and HI speed).
5) If NG, go to "DIAGNOSTIC PROCEDURE", EC-437.

OR



SEC163BA

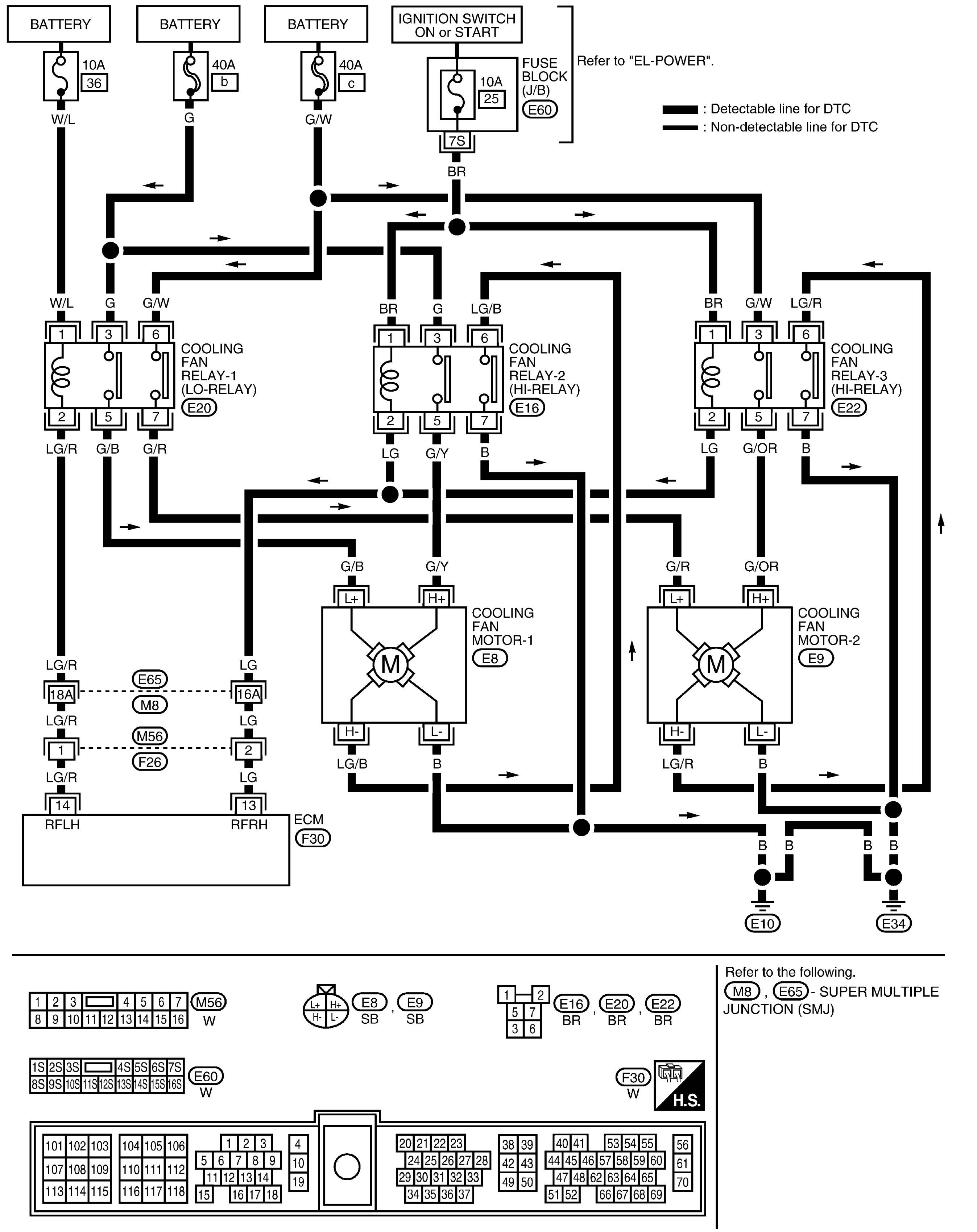
3) Start engine.
   Be careful not to overheat engine.
4) Set temperature control lever to full cold position.
5) Turn air conditioner switch "ON".
6) Turn blower fan switch "ON".
7) Run engine at idle for a few minutes with air conditioner operating.
   Be careful not to overheat engine.
8) Make sure that cooling fan operates at low speed.
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 "DIAGNOSTIC PROCEDURE", EC-437.



MEC475B

Overheat (Cont'd)

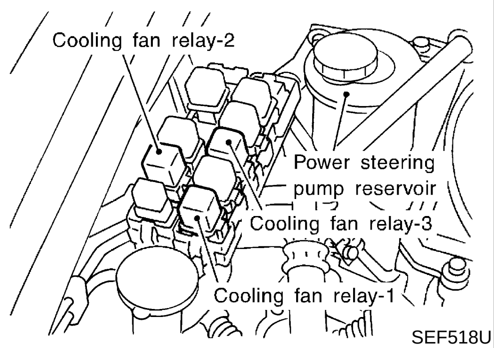
EC-COOL/F-01



WEC557

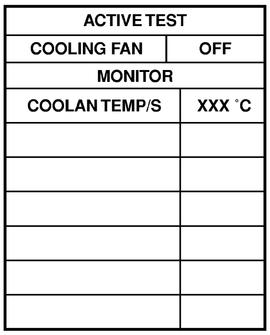
Overheat (Cont'd)

DIAGNOSTIC PROCEDURE



SEF518U

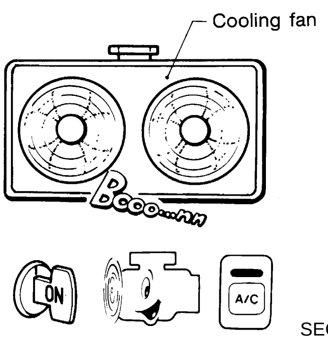
A



ACTIVE TEST	
COOLING FAN	OFF
MONITOR	
COOLAN TEMP/S	XXX °C

SEF700X

A



SEC163BA

INSPECTION START

↓

A

CHECK COOLING FAN LOW SPEED OPERATION.

1. Turn ignition switch "OFF".
2. Disconnect cooling fan relays-2 and -3.
3. Turn ignition switch "ON".
4. Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT-II.

OR

3. Start engine.
4. Set temperature lever at 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.
8. Make sure that cooling fan operates at low speed.

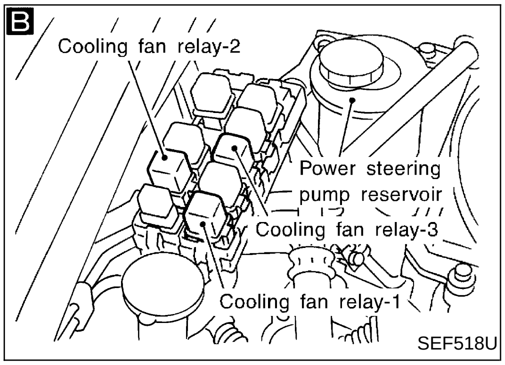
NG → Check cooling fan low speed control circuit. (Go to PROCEDURE A, EC-439.)

OK ↓

Ⓐ

(Go to next page.)

Overheat (Cont'd)

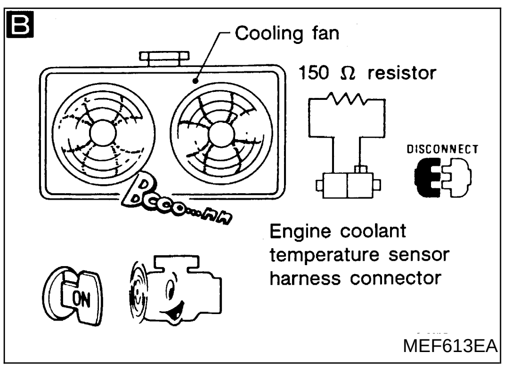


SEF518U

B

ACTIVE TEST	
COOLING FAN	OFF
MONITOR	
COOLAN TEMP/S	XXX ˚C

SEF111X



MEF613EA

A

B

CHECK COOLING FAN HIGH SPEED OPERATION.

1. Turn ignition switch "OFF".
2. Reconnect cooling fan relays-2 and -3.
3. Disconnect cooling fan relay-1.
4. Turn ignition switch "ON".
5. Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT-II.

OR

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 operates at higher speed than low speed.

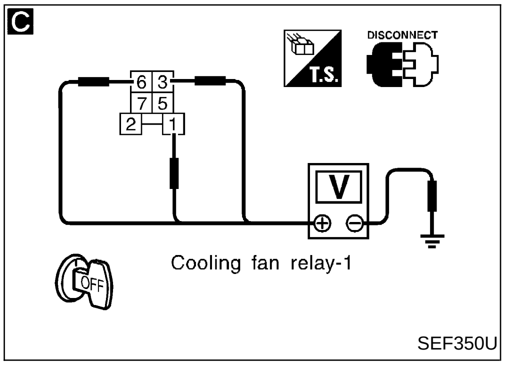
NG → Check cooling fan high speed control circuit. (Go to PROCEDURE B, EC-440.)

OK

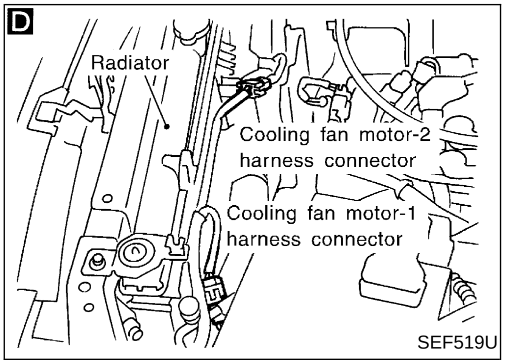
B

(Go to EC-442.)

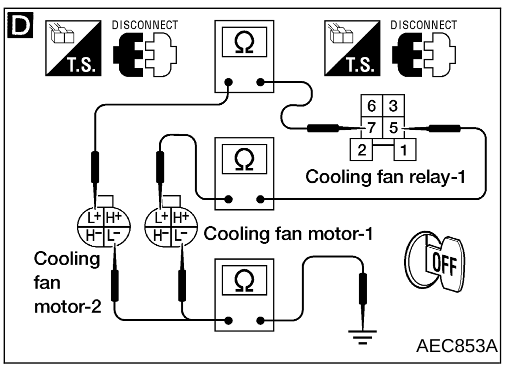
Overheat (Cont'd)



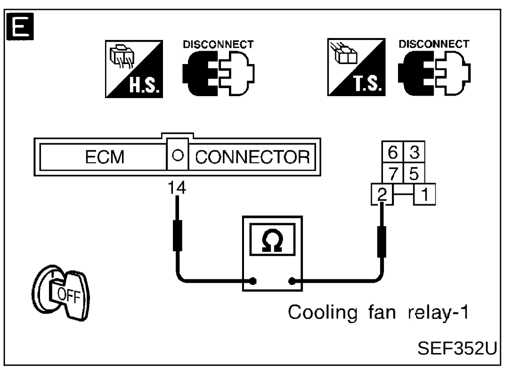
SEF350U



SEF519U



AEC853A



SEF352U

PROCEDURE A

INSPECTION START

↓

C

CHECK POWER SUPPLY.
1. Turn ignition switch "OFF".
2. Disconnect cooling fan relay-1.
3. Check voltage between terminals 1, 3, 6 and ground with CONSULT-II or tester.
   Voltage: Battery voltage

NG → Check the following.
- 40A fuses
- 10A fuse
- Harness for open or short between cooling fan relay-1 and fuse

If NG, repair open circuit or short to ground or short to power in harness or connectors.

OK ↓

D

CHECK GROUND 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 motor-1 terminal (L^+) and cooling fan relay-1 terminal 5, cooling fan relay-1 terminal 7 and cooling fan motor-2 terminal (L^+).
   Continuity should exist.
   If OK, check harness for short to ground and short to power.
4. Check harness continuity between cooling fan motor-1 terminal (L^-), cooling fan motor-2 terminal (L^-) and body ground.
   Continuity should exist.
   If OK, check harness for short to power.

NG → Repair harness or connectors.

OK ↓

E

CHECK OUTPUT SIGNAL CIRCUIT.
1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 14 and terminal 2.
   Continuity should exist.
   If OK, check harness for short to power.

NG → Check the following.
- Harness connectors M8, E65
- Harness connectors M56, F26
- Harness for open or short between cooling fan relay-1 and ECM

If NG, repair open circuit or short to ground or short to power in harness or connectors.

OK ↓

CHECK COMPONENT
(Cooling fan relay-1).
Refer to "COMPONENT INSPECTION", EC-444.

NG → Replace cooling fan relay.

OK ↓

C
(Go to next page.)

Overheat (Cont'd)

C

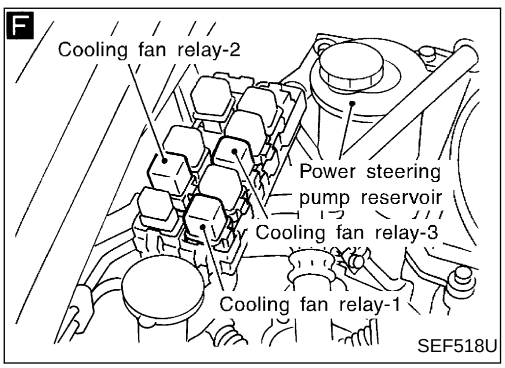
CHECK COMPONENTS
(Cooling fan motors-1 and -2).
Refer to "COMPONENT INSPECTION", EC-444.

NG → Replace cooling fan motors.

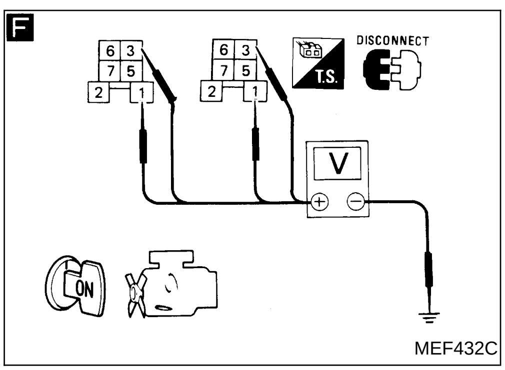
OK

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-112.

INSPECTION END



SEF518U



MEF432C

PROCEDURE B

INSPECTION START

F

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

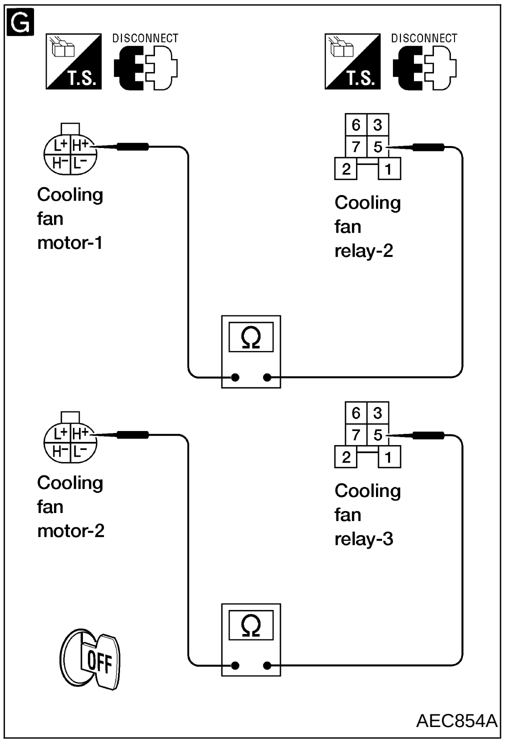
NG → Check the following.
- 10A fuse
- 40A fuses
- Harness for open or short between cooling fan relays-2 and -3 and fuses

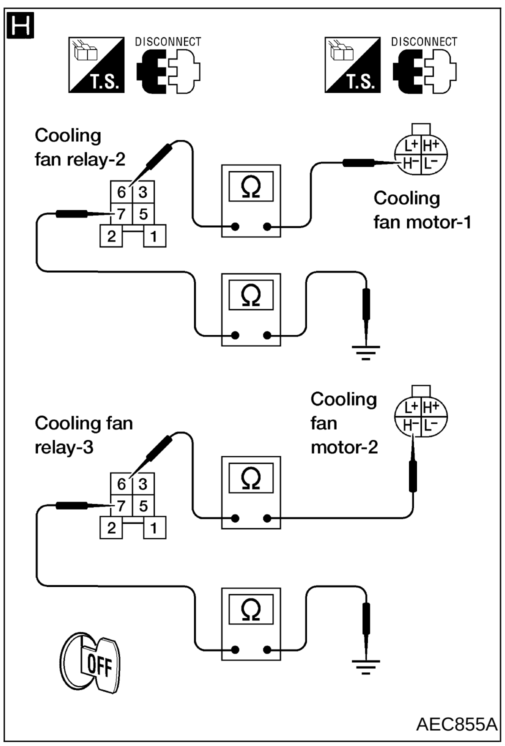
If NG, repair open circuit or short to ground or short to power in harness or connectors.

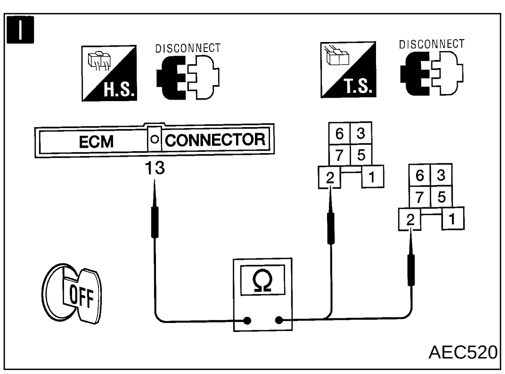
OK

D
(Go to next page.)

Overheat (Cont'd)







D

CHECK GROUND CIRCUIT.
1. Turn ignition switch "OFF".
2. Disconnect cooling fan motors-1 and -2 harness connectors.

G 3. Check harness continuity between terminals 5 and terminals (H^+).
Continuity should exist.
If OK, check harness for short.

H 4. Check harness continuity between terminals 6 and terminals (H^-), terminals 7 and body ground.
Continuity should exist.
If OK, check harness for short to power.

NG → Repair harness or connectors.

OK ↓

I

CHECK OUTPUT SIGNAL CIRCUIT.
1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 13 and terminals 2.
Continuity should exist.
If OK, check harness for short to ground and short to power.

NG → Check the following.
- Harness connectors M8, E65
- Harness connectors F26, M56
- Harness for open or short between cooling fan relays-2 and -3 and ECM

If NG, repair open circuit or short to ground or short to power in harness or connectors.

OK ↓

CHECK COMPONENTS
(Cooling fan relays-2 and -3).
Refer to "COMPONENT INSPECTION", EC-444.

NG → Replace cooling fan relays.

OK ↓

CHECK COMPONENTS
(Cooling fan motors).
Refer to "COMPONENT INSPECTION", EC-444.

NG → Replace cooling fan motors.

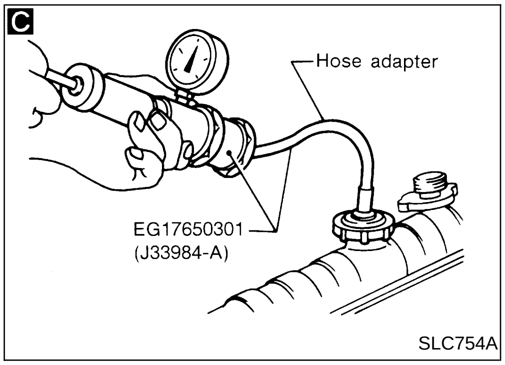
OK ↓

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-112.

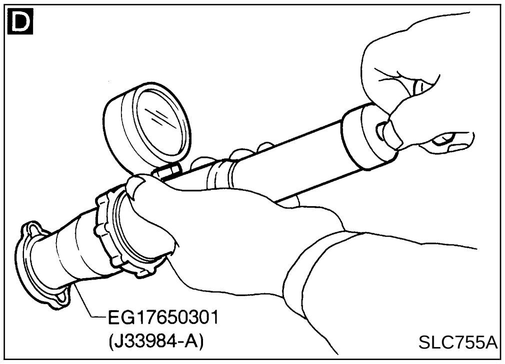
↓

INSPECTION END

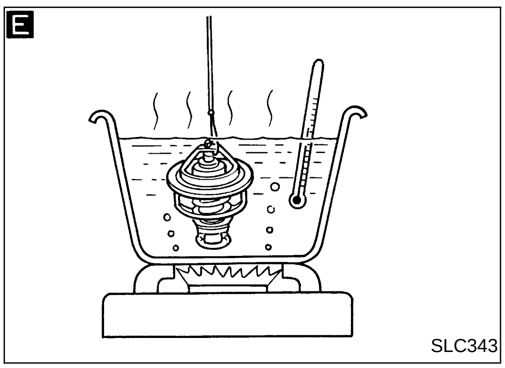
Overheat (Cont'd)



SLC754A



SLC755A



SLC343

(B)

C

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

NG → Check the following for leak.
- Hose
- Radiator
- Water pump

Refer to LC section ("Water Pump").

OK ↓

D

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)

NG → Replace radiator cap.

OK ↓

E

CHECK THERMOSTAT.
1. Check valve seating condition at normal room temperatures.
   It should seat tightly.
2. Check valve opening temperature and valve lift.
   Valve opening temperature:
   76.5°C (170°F) [standard]
   Valve lift:
   More than 10 mm/90°C (0.39 in/194°F)
3. Check if valve is closed at 5°C (9°F) below valve opening temperature.

For details, refer to LC section ("Thermostat").

NG → Replace thermostat

OK ↓

Check engine coolant temperature sensor.
Refer to "COMPONENT INSPECTION", EC-138.

NG → Replace engine coolant temperature sensor.

↓

If the cause can not be isolated, go to "MAIN 12 CAUSES OF OVERHEATING" on next page.

↓

INSPECTION END

Overheat (Cont'd)

MAIN 12 CAUSES OF OVERHEATING

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 "RECOMMENDED FLUIDS AND LUBRICANTS" in MA section.
	3	● Coolant level	● Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	See "Changing Engine Coolant", "ENGINE MAINTENANCE" in MA section.
	4	● Radiator cap	● Pressure tester	78 - 98 kPa ($0.8 - 1.0\ kg/cm^2$, 11 - 14 psi) 59 - 98 kPa ($0.6 - 1.0\ kg/cm^2$, 9 - 14 psi) (Limit)	See "System Check", "ENGINE COOLING SYSTEM" in LC section.
ON*2	5	● Coolant leaks	● Visual	No leaks	See "System Check", "ENGINE COOLING SYSTEM" in LC section.
ON*2	6	● Thermostat	● Touch the upper and lower radiator hoses	Both hoses should be hot	See "Thermostat" and "Radiator", "ENGINE COOLING SYSTEM" in LC section.
ON*1	7	● Cooling fan	● CONSULT-II	Operating	See "TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS (Overheat)" (EC-433).
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 "Changing Engine Coolant", "ENGINE MAINTENANCE" in MA section.
OFF*4	10	● Coolant return from reservoir tank to radiator	● Visual	Should be initial level in reservoir tank	See "ENGINE MAINTENANCE" in MA section.
OFF	11	● Cylinder head	● Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	See "Inspection", "CYLINDER HEAD" in EM section.
	12	● Cylinder block and pistons	● Visual	No scuffing on cylinder walls or piston	See "Inspection", "CYLINDER BLOCK" in EM section.

*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 "OVERHEATING CAUSE ANALYSIS" in LC section.

GI
MA
EM
LC
EC
FE
CL
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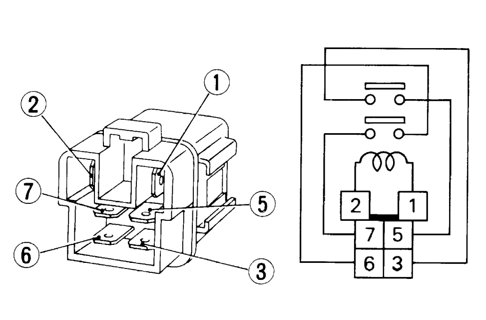
IDX

Overheat (Cont'd)

COMPONENT INSPECTION

Cooling fan relays-1, -2 and -3



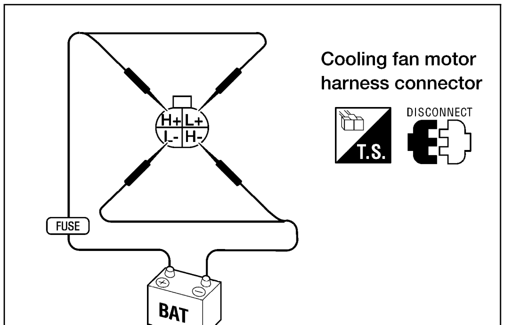
SEC202B

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



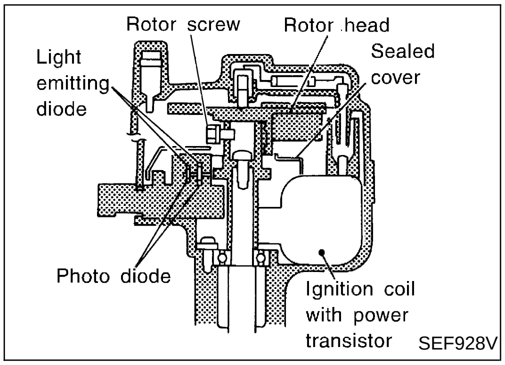
WEC233

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	L+	L-
	High	L+, H+	L-, H-

Cooling fan motor should operate.

If NG, replace cooling fan motor.



Ignition Signal

COMPONENT DESCRIPTION

Ignition coil & power transistor

The ignition coil is built into distributor. The ignition signal from the ECM is sent to the power transistor. The power transistor switches on and off the ignition coil primary circuit. As the primary circuit is turned on and off, the proper high voltage is induced in the coil secondary circuit.
The distributor is not repairable and must be replaced as an assembly except for the distributor cap and rotor head.

NOTE:
The rotor screw which secures distributor rotor head to the distributor shaft must be torqued properly.
: 3.3 - 3.9 N·m (0.34 - 0.40 kg-m, 29.5 - 34.7 in-lb)

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

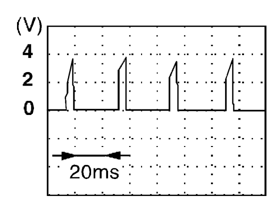
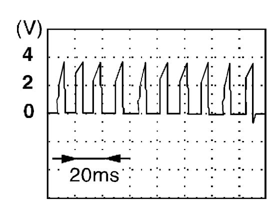
Specification data are reference values

MONITOR ITEM	CONDITION		SPECIFICATION
IGNITION SW	● Ignition switch: ON → OFF → ON		ON → OFF → ON
IGN TIMING	ditto	Idle	Approx. 20° BTDC
		2,000 rpm	More than 25° BTDC

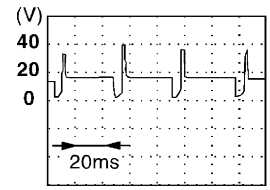
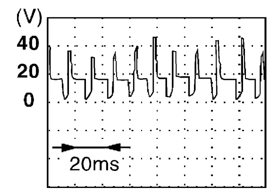
ECM TERMINALS AND REFERENCE VALUE

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

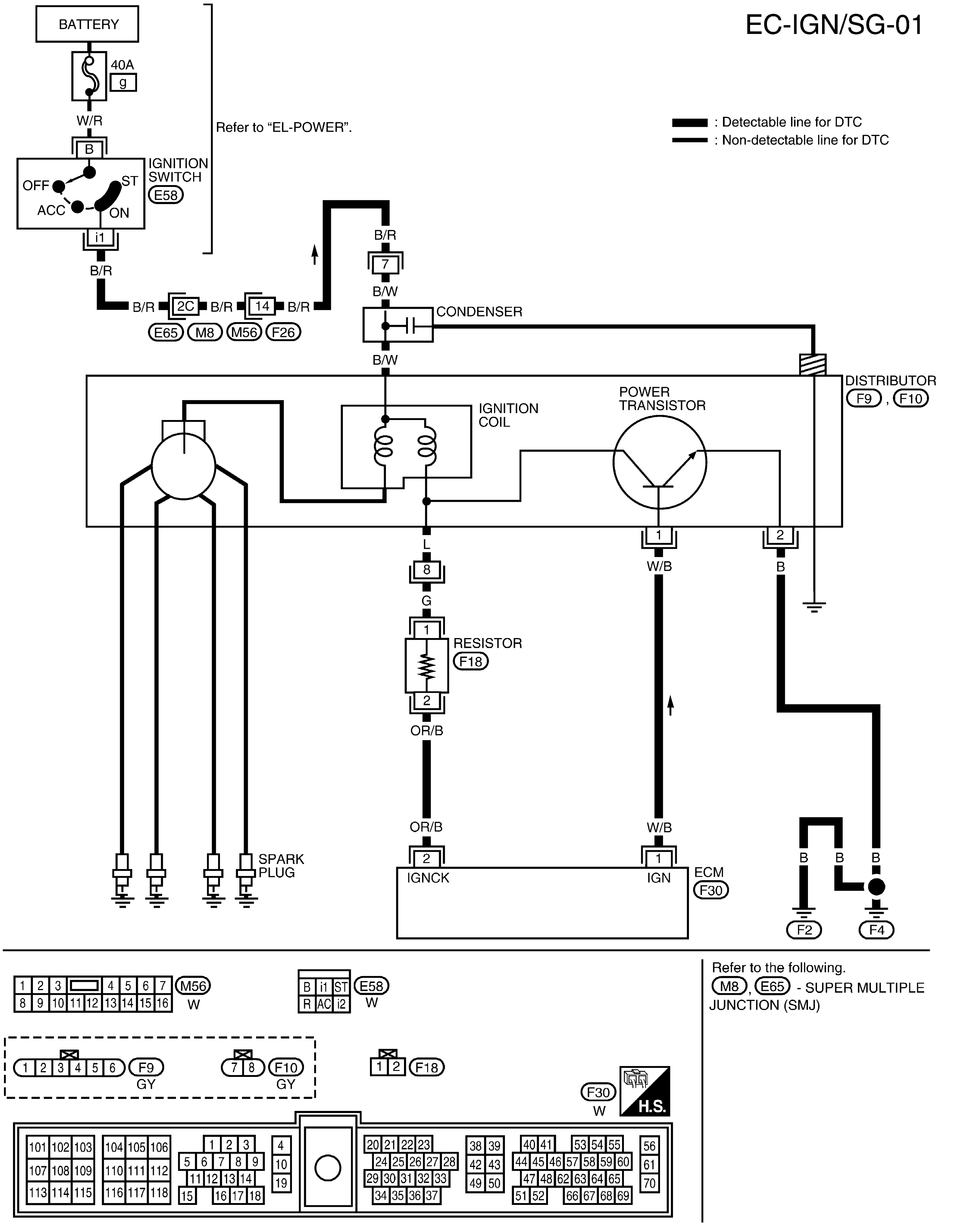
CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	W/B	Ignition signal	[Engine is running.] (Warm-up condition) └ Idle speed	0.3 - 0.5V  SEF186T
			[Engine is running.] └ Engine speed is 2,000 rpm	0.7 - 1.0V  SEF187T

Ignition Signal (Cont'd)

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
2	OR/B	Ignition check	Engine is running. (Warm-up condition) Idle speed	13 - 14V  SEF188T
			Engine is running. Engine speed is 2,000 rpm.	12 - 13V  SEF189T

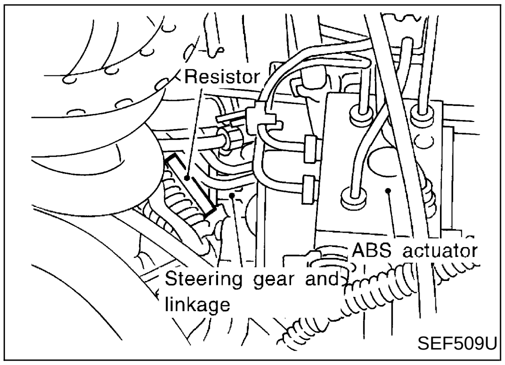
Ignition Signal (Cont'd)



WEC708

Ignition Signal (Cont'd)

DIAGNOSTIC PROCEDURE



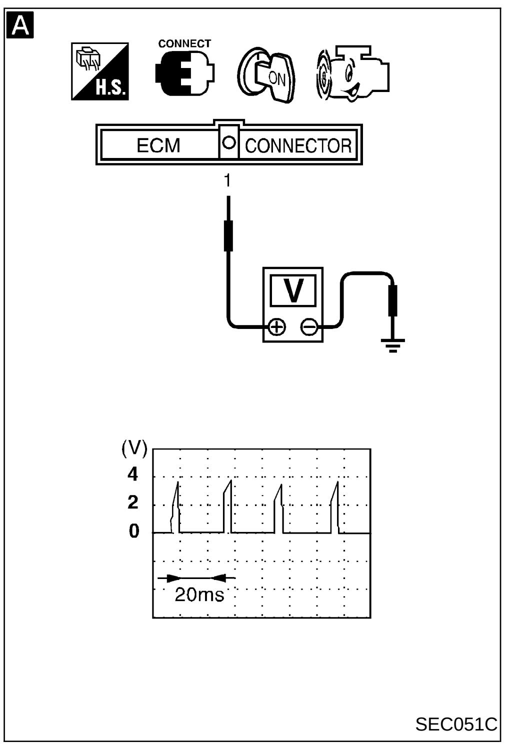
SEF509U

A

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

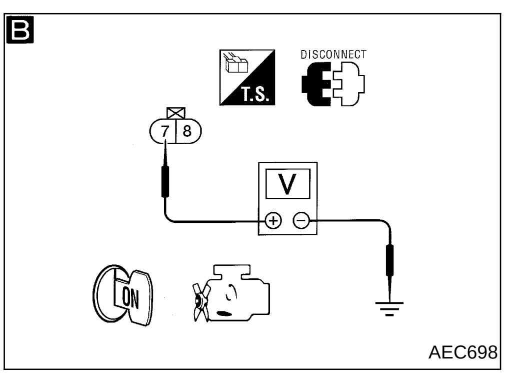
SEF981Z

A



SEC051C

B



AEC698

INSPECTION START

Turn ignition switch "OFF", and restart engine.
Is engine running?

Yes → A

No → B

A

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.

OR

Without CONSULT-II

1. Let engine idle.
2. Read the voltage signal between ECM terminal (1) and ground with an oscilloscope.
3. Verify that the oscilloscope screen shows the signal wave as shown in a figure.

OK: INSPECTION END.

NG → D

B

CHECK POWER SUPPLY.

1. Turn ignition switch "OFF".
2. Disconnect ignition coil harness connector.
3. Turn ignition switch "ON".
4. Check voltage between terminal (7) and ground with CONSULT-II or tester.
   Voltage: Battery voltage

NG → Check the following.

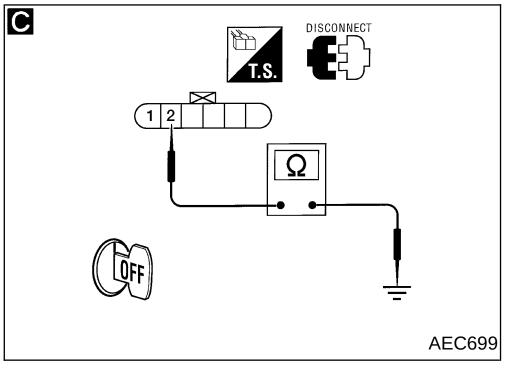
- Harness connectors (E65), (M8)
- Harness connectors (M56), (F26)
- Harness for open or short between ignition coil and ignition switch

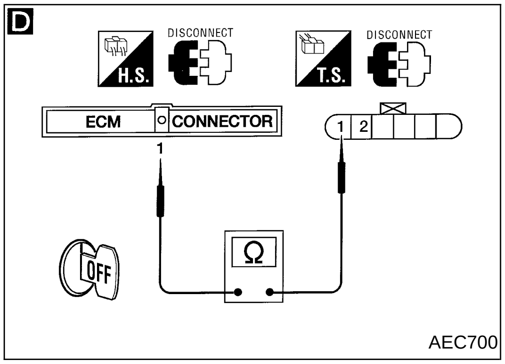
If NG, repair harness or connectors.

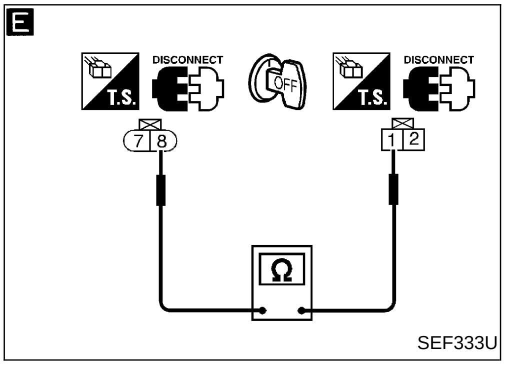
OK → (A)

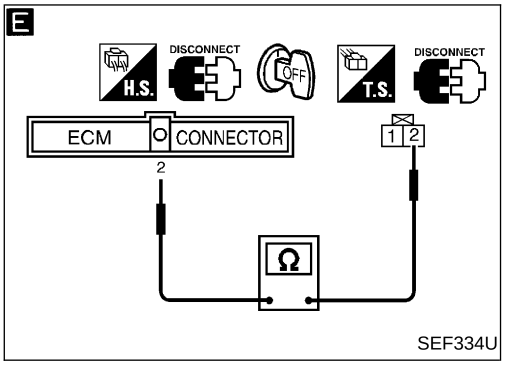
(Go to next page.)

Ignition Signal (Cont'd)









(A)

C

CHECK GROUND CIRCUIT.
1. Turn ignition switch "OFF".
2. Disconnect power transistor harness connector.
3. Check harness continuity between terminal (2) and engine ground.
   Continuity should exist.
   If OK, check harness for short to power.

NG → Repair harness or connectors.

OK ↓

D

CHECK INPUT SIGNAL CIRCUIT.
1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal (1) and power transistor terminal (1).
   Continuity should exist.
   If OK, check harness for short to ground and short to power.

NG → Repair harness or connectors.

OK ↓

CHECK COMPONENTS
(Ignition coil, power transistor).
Refer to "COMPONENT INSPECTION", EC-450.

NG → Replace malfunctioning component(s).

OK ↓

E

CHECK INPUT SIGNAL CIRCUIT.
1. Stop engine.
2. Disconnect ignition coil harness connector.
3. Strip tape covering resistor and condenser.
4. Disconnect resistor harness connector.
5. Disconnect ECM harness connector.
6. Check harness continuity between ignition coil terminal (8) and resistor terminal (1), resistor terminal (2) and ECM terminal (2).
   Continuity should exist.
   If OK, check harness for short to ground and short to power.

NG → Repair harness or connectors.

OK ↓

CHECK COMPONENTS
(Resistor).
Refer to "COMPONENT INSPECTION" on next page.

NG → Replace resistor.

OK ↓

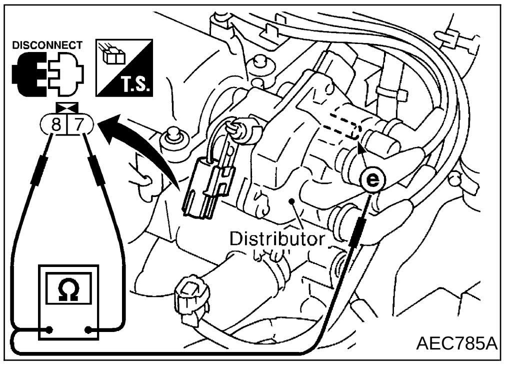
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-112.

↓

INSPECTION END

Ignition Signal (Cont'd)

COMPONENT INSPECTION

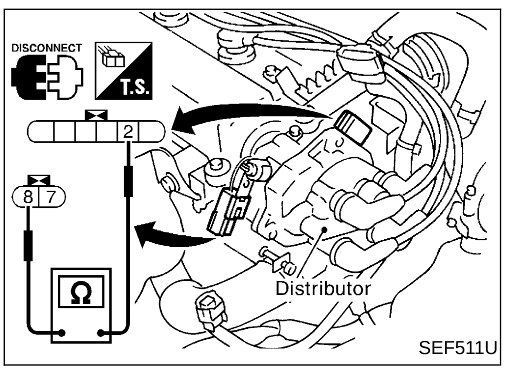


Ignition coil

1. Disconnect ignition coil harness connector.
2. Check resistance as shown in the figure.

Terminal	Resistance [at 20°C (68°F)]
7 - 8 (Primary coil)	Approximately 1Ω
7 - e (Secondary coil)	Approximately 10.0 kΩ

For checking secondary coil, remove distributor cap and measure resistance between coil tower metal tip e and terminal 7.
If NG, replace distributor assembly as a unit.

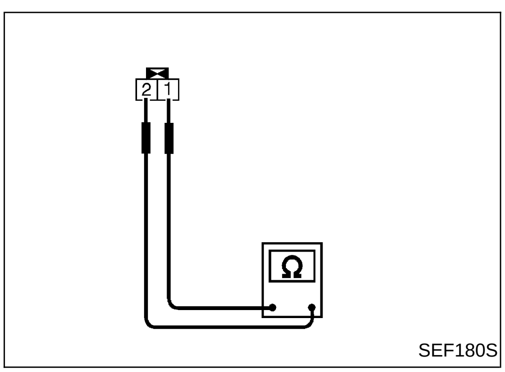


Power transistor

1. Disconnect camshaft position sensor & power transistor harness connector and ignition coil harness connector.
2. Check power transistor resistance between terminals 2 and 8.

Terminals	Resistance	Result
2 and 8	Except 0Ω	OK
	0Ω	NG

If NG, replace distributor assembly.

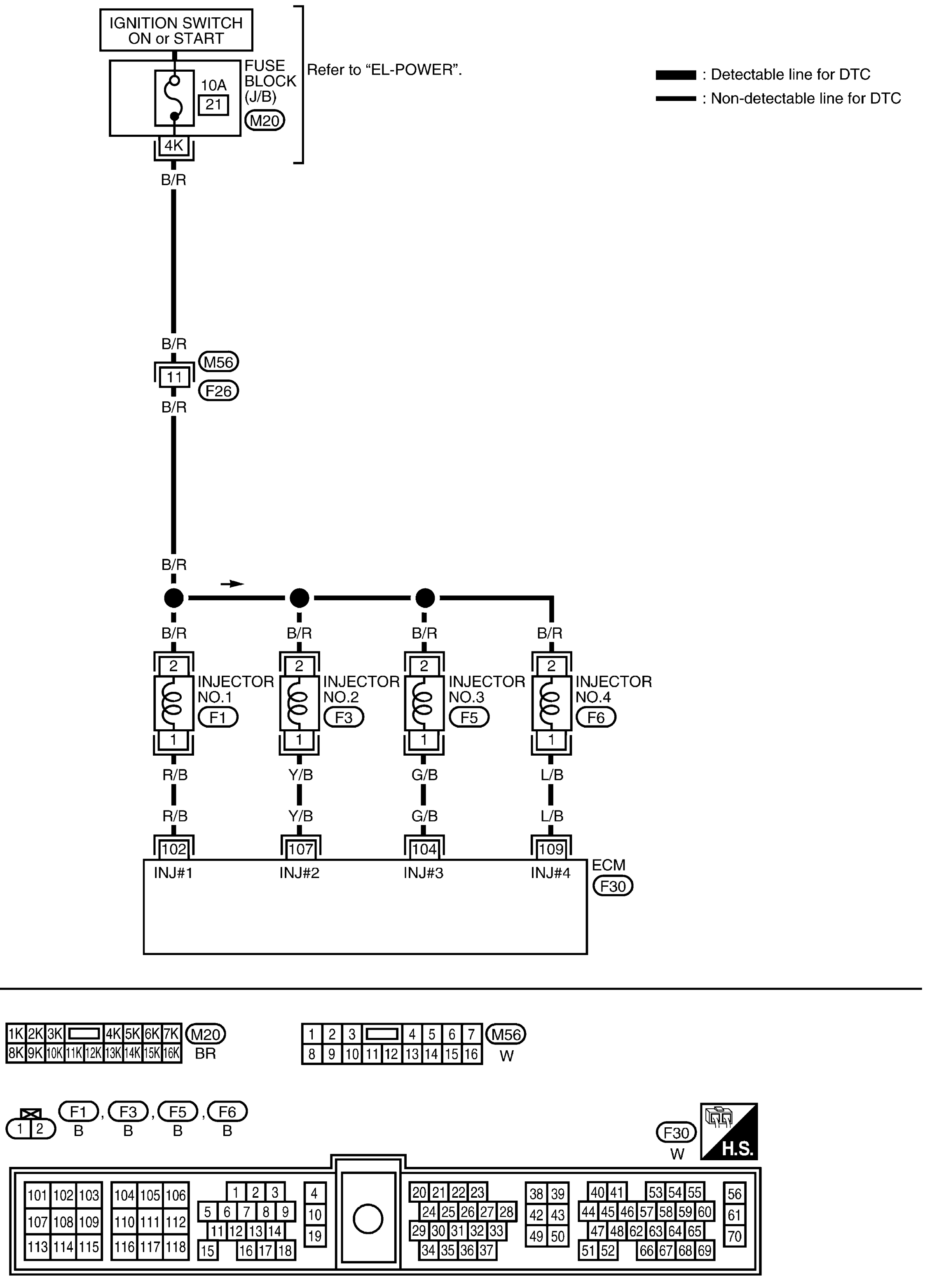


Resistor

1. Disconnect resistor harness connector.
2. Check resistance between terminals 1 and 2.
   Resistance: Approximately 2.2 kΩ [at 25°C (77°F)]
   If NG, replace resistor.

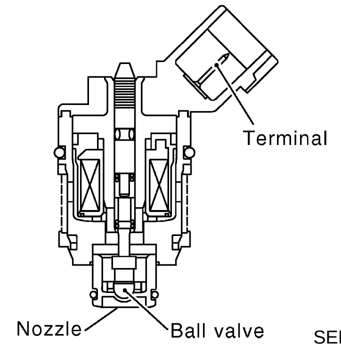
Injector

EC-INJECT-01



LEC711

Injector (Cont'd)



SEF728Z

COMPONENT DESCRIPTION

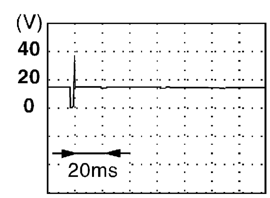
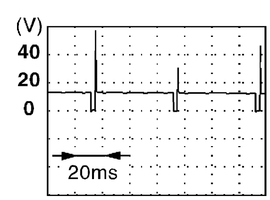
The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the injector circuit, the coil in the injector is energized. The energized coil pulls the ball valve back and allows fuel to flow through the injector into the intake manifold. The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the injector remains open. The ECM controls the injection pulse duration based on engine fuel needs.

ECM TERMINALS AND REFERENCE VALUE

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

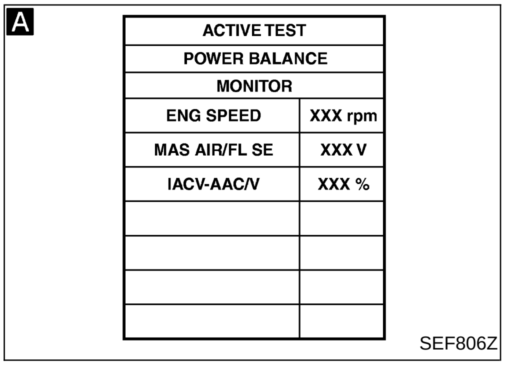
CAUTION:

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

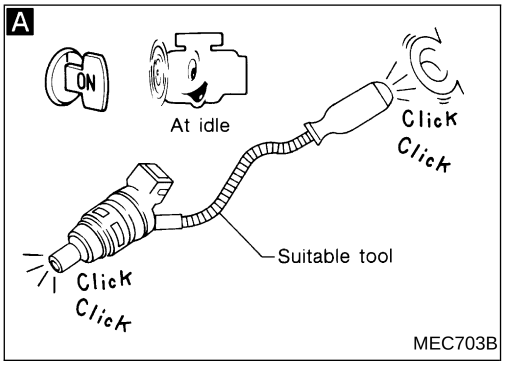
TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
102	R/B	Injector No. 1	Engine is running. (Warm-up condition) Idle speed	BATTERY VOLTAGE (11 - 14V)  SEF204T
104	G/B	Injector No. 3		
107	Y/B	Injector No. 2	Engine is running. (Warm-up condition) Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14V)  SEF205T
109	L/B	Injector No. 4		

Injector (Cont'd)

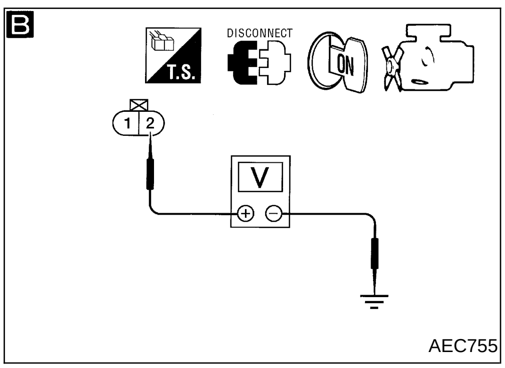
DIAGNOSTIC PROCEDURE



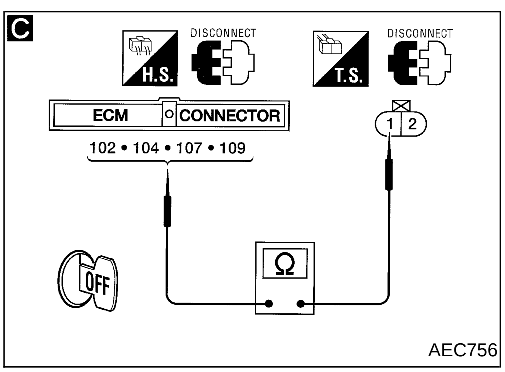
SEF806Z



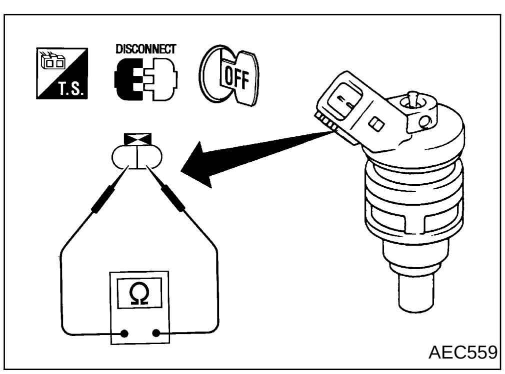
MEC703B



AEC755



AEC756



AEC559

INSPECTION START

↓

A

CHECK OVERALL FUNCTION.
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.

OR

1. Start engine.
2. Listen to each injector operating sound.
Clicking noise should be heard.

OK → INSPECTION END

NG ↓

B

CHECK POWER SUPPLY.
1. Stop engine.
2. Disconnect injector harness connector.
3. Turn ignition switch "ON".
4. Check voltage between terminal 2 and ground with CONSULT-II or tester.
Voltage: Battery voltage

NG → Check the following.
- Harness connectors F26 , M56
- 10A fuse
- Harness for open or short between injector and battery

If NG, repair harness or connectors.

OK ↓

C

CHECK OUTPUT SIGNAL CIRCUIT.
1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between injector harness connector terminal 1 and ECM terminals 102 , 104 , 107 , 109 .
Continuity should exist.
If OK, check harness for short to ground and short to power.

NG → Check the following.
- Harness for open or short between ECM and injector

If NG, repair open circuit or short to ground or short to power in harness or connectors.

OK ↓

CHECK COMPONENT (Injector).
Refer to "COMPONENT INSPECTION" below.

NG → Replace injector.

OK ↓

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-112.

↓

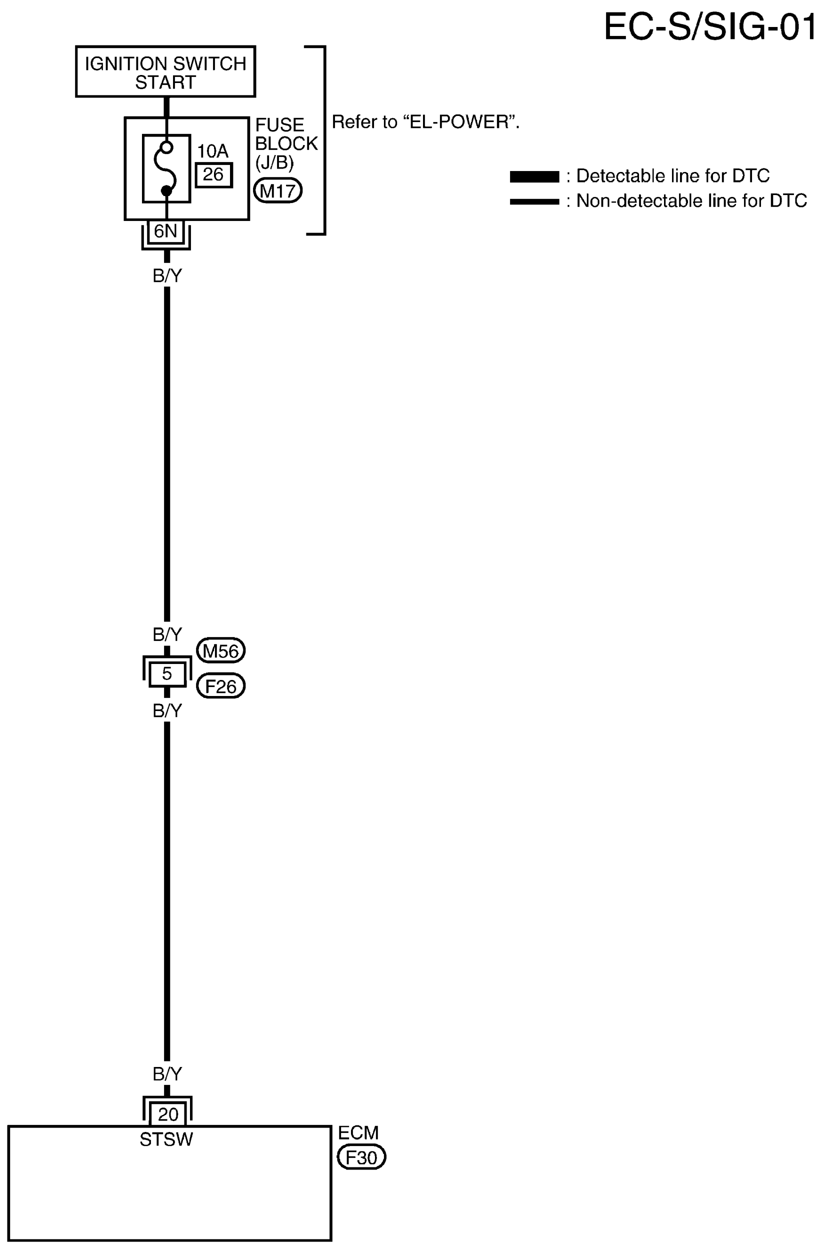
INSPECTION END

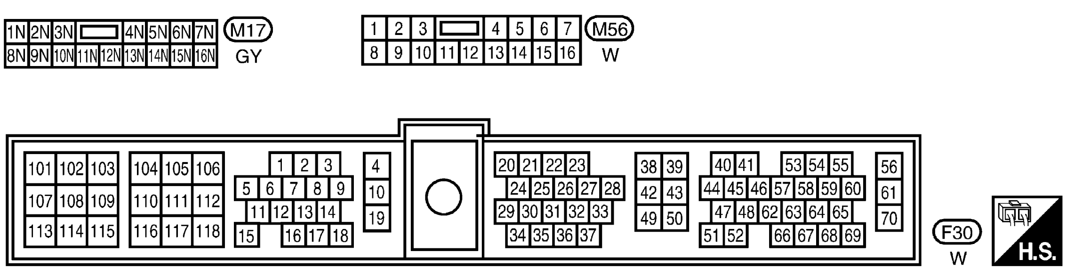
COMPONENT INSPECTION

Injector

1. Disconnect injector harness connector.
2. Check resistance between terminals as shown in the figure.
Resistance: 7.3 - 9.9Ω [at 25°C (77°F)]
If NG, replace injector.

Start Signal





WEC873

Start Signal (Cont'd)

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

Specification data are reference values

MONITOR ITEM	CONDITION	SPECIFICATION
START SIGNAL	● Ignition switch: ON → START → ON	OFF → ON → OFF

ECM TERMINALS AND REFERENCE VALUE

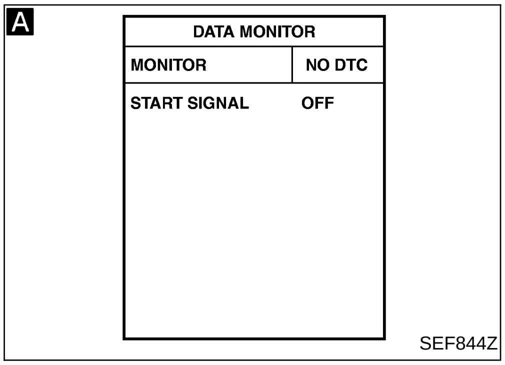
Specification data are reference values and are measured between each terminal and ground.

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

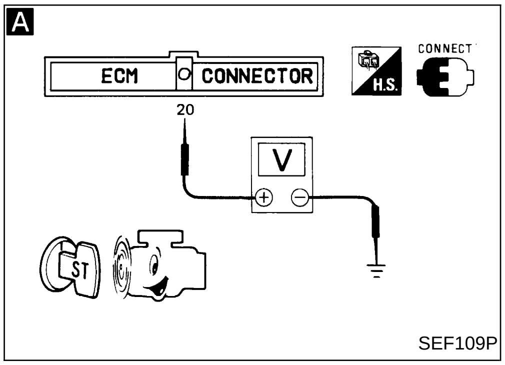
TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
20	B/Y	Start signal	Ignition switch "ON"	Approximately 0V
			Ignition switch "START"	BATTERY VOLTAGE (11 - 14V)

Start Signal (Cont'd)

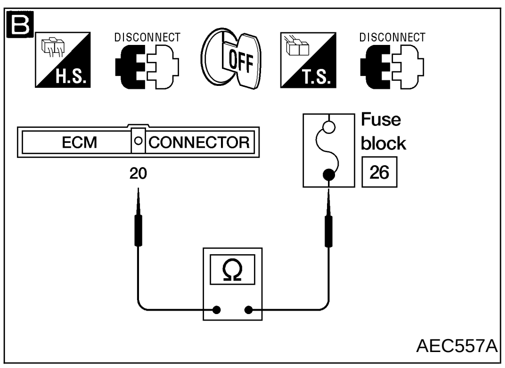
DIAGNOSTIC PROCEDURE



SEF844Z



SEF109P



AEC557A

INSPECTION START

↓

A **CHECK OVERALL FUNCTION.**

1. Turn ignition switch "ON".
2. Check "START SIGNAL" in "DATA MONITOR" mode with CONSULT-II.

IGN "ON"	OFF
IGN "START"	ON

OR

1. Turn ignition switch to "START".
2. Check voltage between ECM terminal 20 and ground.

Voltage:
Ignition switch "START"
Battery voltage
Except above
Approximately 0V

OK → INSPECTION END

↓ NG

Check if 10A fuse is OK.

NG → Replace 10A fuse.

↓ OK

B **CHECK INPUT SIGNAL CIRCUIT.**

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector and 10A fuse.
3. Check harness continuity between ECM terminal 20 and fuse block.
   Continuity should exist.
   If OK, check harness for short to ground and short to power.

NG → Check the following.
- Harness connectors M56, F26
- Harness for open or short between ECM and fuse block

If NG, repair open circuit or short to ground or short to power in harness or connectors.

↓ OK

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-112.

↓

INSPECTION END

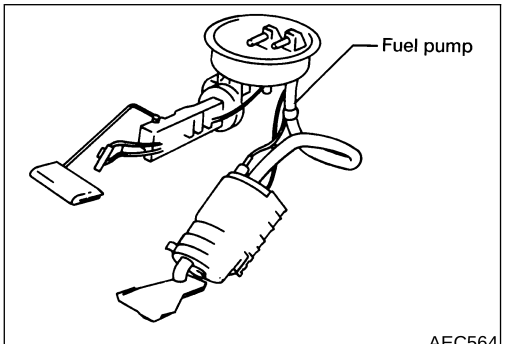
Fuel Pump

SYSTEM DESCRIPTION

Camshaft position sensor —Engine speed→ ECM
Ignition switch —Start signal→ ECM
ECM → Fuel pump relay

The ECM activates the fuel pump for several seconds after the ignition switch is turned on to improve engine startability. If the ECM receives a 180° signal from the camshaft position sensor, it knows that the engine is rotating, and causes the pump to perform. If the 180° signal is not received when the ignition switch is on, the engine stalls. The ECM stops pump operation and prevents battery discharging, thereby improving safety. The ECM does not directly drive the fuel pump. It controls the ON/OFF fuel pump relay, which in turn controls the fuel pump.

Condition	Fuel pump operation
Ignition switch is turned to ON.	Operates for 5 seconds
Engine running and cranking	Operates
Except as shown above	Stops



AEC564

COMPONENT DESCRIPTION

The fuel pump with a fuel damper is an in-tank type (the pump and damper are located in the fuel tank).

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

Specification data are reference values

MONITOR ITEM	CONDITION	SPECIFICATION
FUEL PUMP RLY	● Ignition switch is turned to ON (Operates for 5 seconds) ● Engine running and cranking	ON
	Except as shown above	OFF

ECM TERMINALS AND REFERENCE VALUE

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

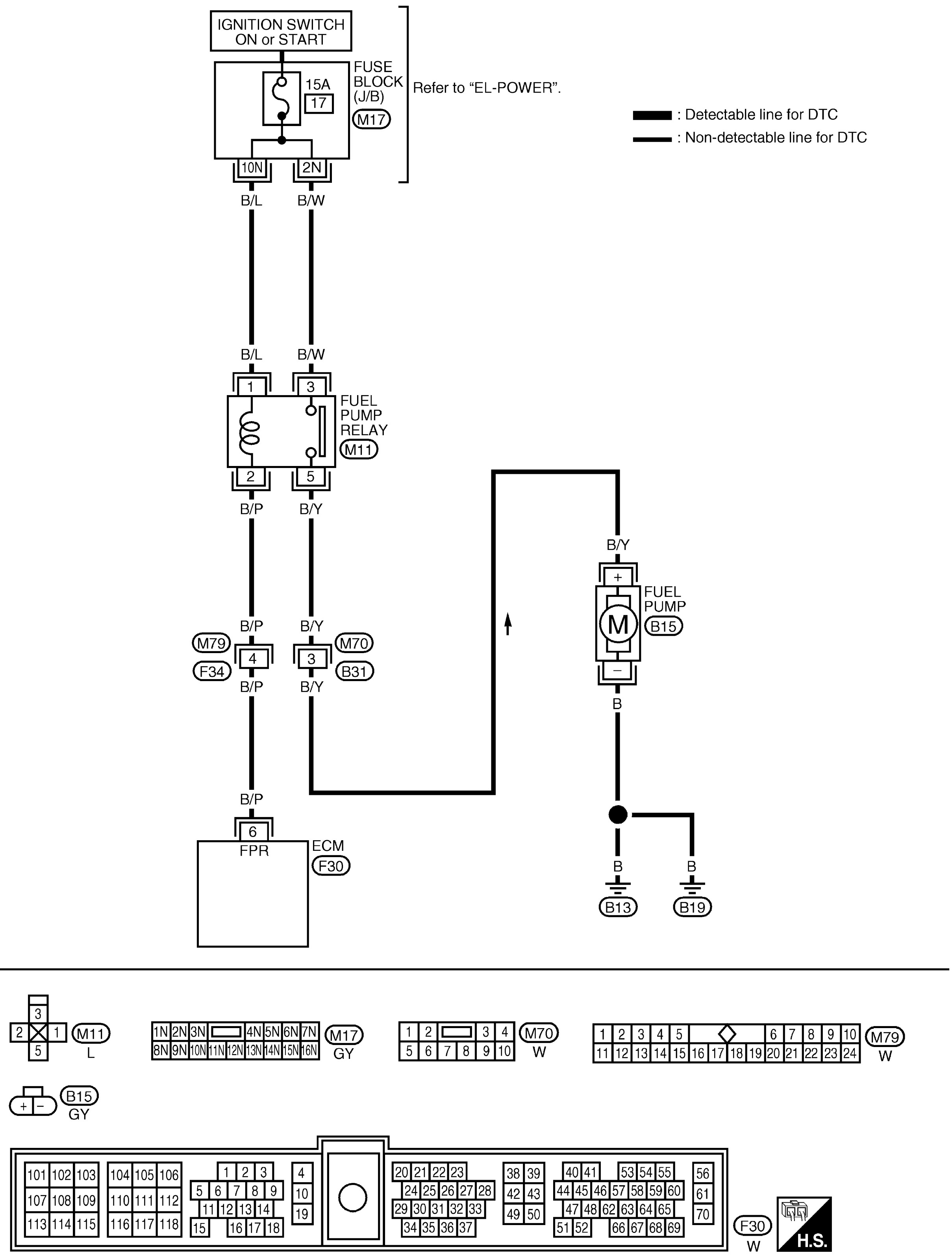
CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

Fuel Pump (Cont'd)

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
6	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)

Fuel Pump (Cont'd)

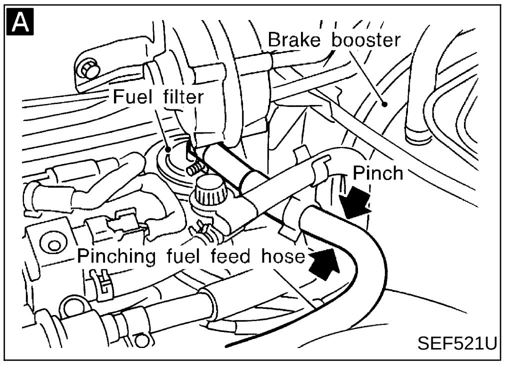
EC-F/PUMP-01

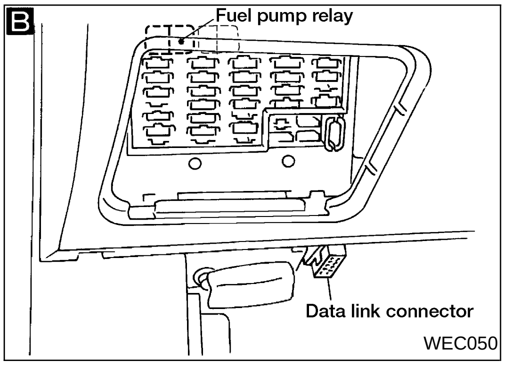


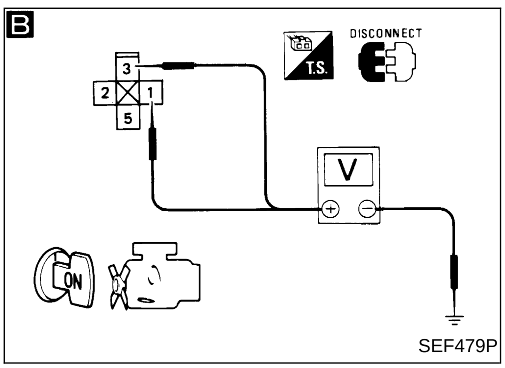
WEC568

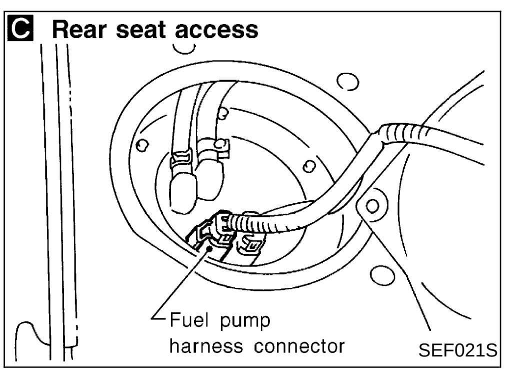
Fuel Pump (Cont'd)

DIAGNOSTIC PROCEDURE









INSPECTION START

↓

A

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 → INSPECTION END

NG ↓

B

CHECK POWER SUPPLY.
1. Turn ignition switch "OFF".
2. Disconnect fuel pump relay.
3. Turn ignition switch "ON".
4. Check voltage between terminals 1, 3 and ground with CONSULT-II or tester.
   Voltage: Battery voltage

NG → Check the following.
- 15A fuse
- Harness for open or short between fuse and fuel pump relay

If NG, repair harness or connectors.

OK ↓

C

CHECK POWER AND GROUND CIRCUIT.
1. Turn ignition switch "OFF".
2. Disconnect fuel pump harness connector.
3. Check harness continuity between terminal ⊖ and body ground, terminal ⊕ and fuel pump relay connector terminal 5.
   Continuity should exist.
   If OK, check harness for short to ground and short to power.

NG → Check the following.
- Harness connectors M70, B31
- Harness for open or short between fuel pump and body ground
- Harness for open or short between fuel pump and fuel pump relay

If NG, repair open circuit or short to ground or short to power in harness or connectors.

OK ↓

CHECK OUTPUT SIGNAL CIRCUIT.
1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 6 and fuel pump relay connector terminal 2.
   Refer to the wiring diagram.
   Continuity should exist.
   If OK, check harness for short to ground and short to power.

NG → Check the following.
- Harness connectors M79, F34
- Harness for open or short between ECM and fuel pump relay

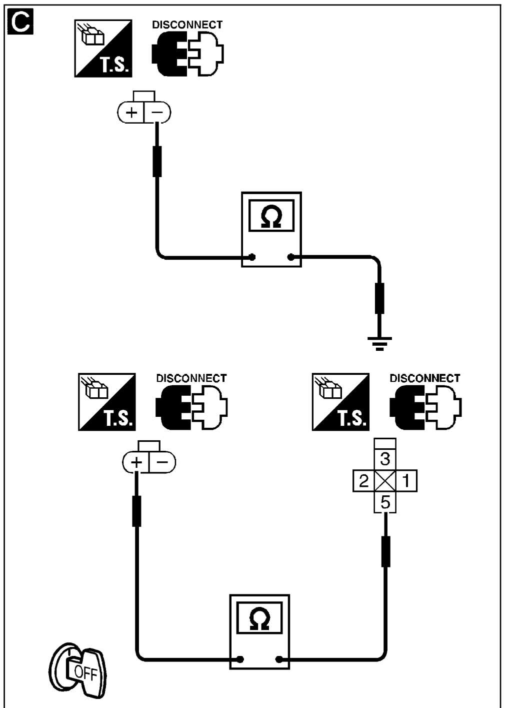
If NG, repair open circuit or short to ground or short to power in harness or connectors.

OK ↓

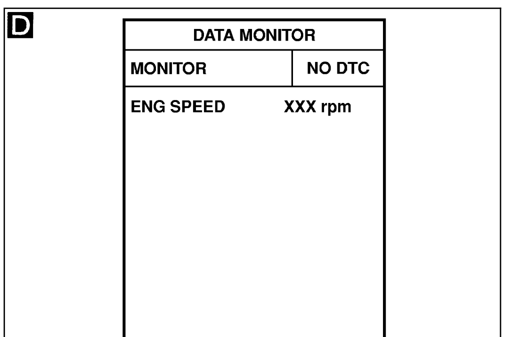
A

(Go to next page.)

Fuel Pump (Cont'd)



SEF342U



SEF058Y

A

D

CHECK COMPONENT
(Fuel pump relay).
1. Reconnect fuel pump relay, fuel pump harness connector and ECM harness connector.
2. Turn ignition switch "ON".
3. Turn fuel pump relay "ON" and "OFF" in "ACTIVE TEST" mode with CONSULT-II and check operating sound.

OR

Refer to "COMPONENT INSPECTION" on next page.

NG → Replace fuel pump relay.

OK ↓

CHECK COMPONENT
(Fuel pump).
Refer to "COMPONENT INSPECTION" on next page.

NG → Replace fuel pump.

OK ↓

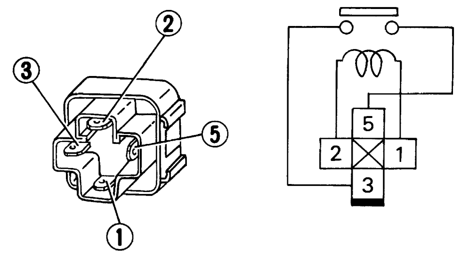
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-112.

↓

INSPECTION END

Fuel Pump (Cont'd)

COMPONENT INSPECTION



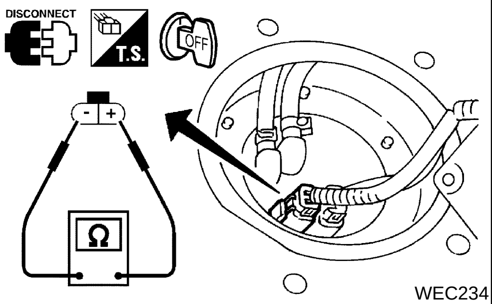
SEF511P

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.



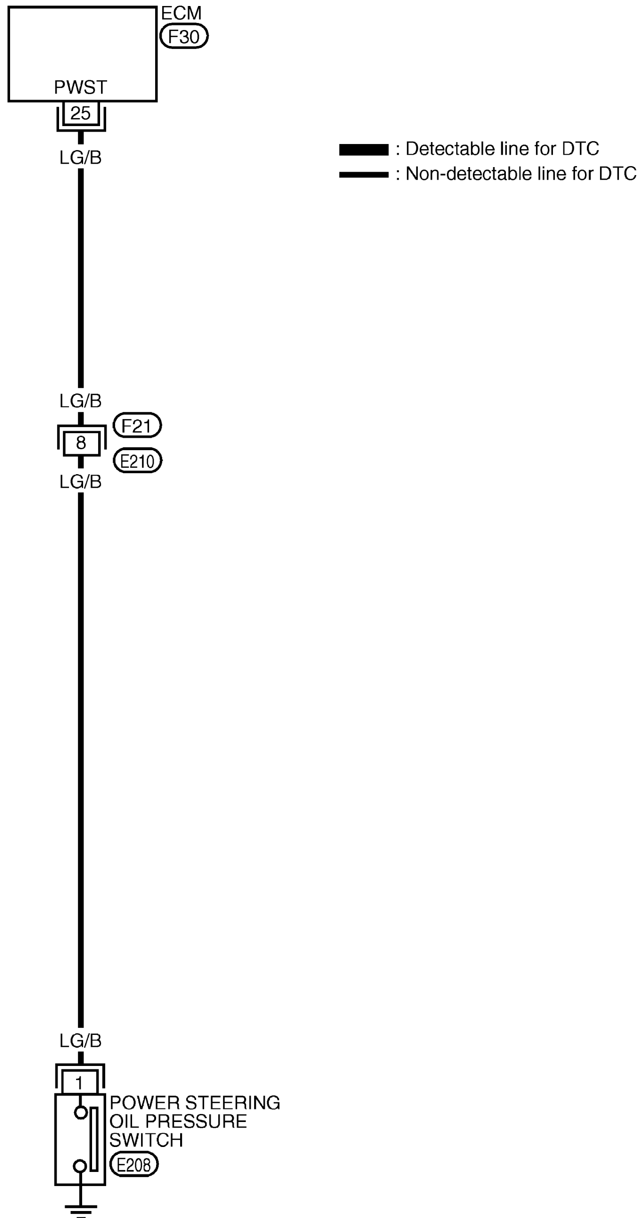
WEC234

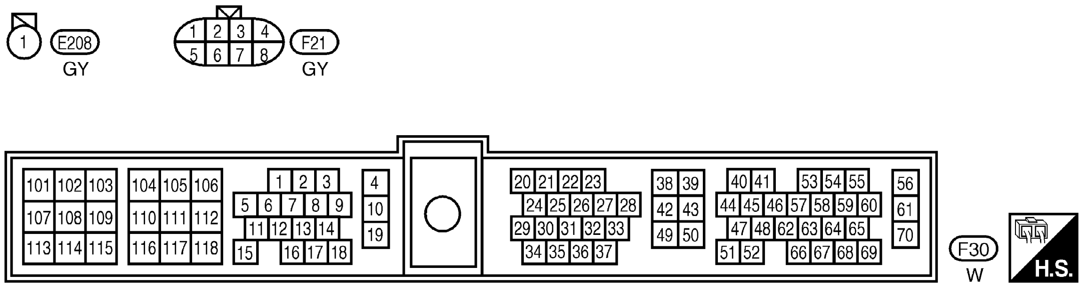
Fuel pump

1. Disconnect fuel pump harness connector.
2. Check resistance between terminals ⊕ and ⊖.
   Resistance: 0.2 - 5.0Ω [at 25°C (77°F)]
   If NG, replace fuel pump.

Power Steering Oil Pressure Switch

EC-PST/SW-01

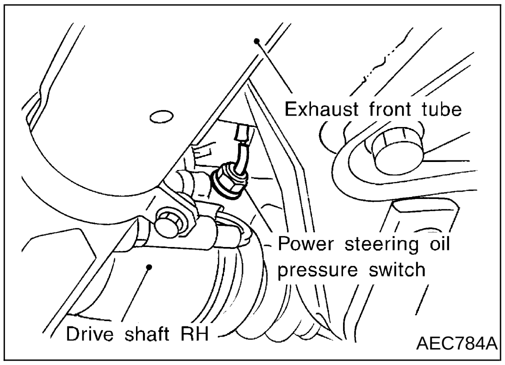




LEC654

GI MA EM LC EC FE CL MT AT FA RA BR ST RS BT HA EL IDX

Power Steering Oil Pressure Switch (Cont'd)



COMPONENT DESCRIPTION

The power steering oil pressure switch is attached to the power steering pump 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

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

ECM TERMINALS AND REFERENCE VALUE

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

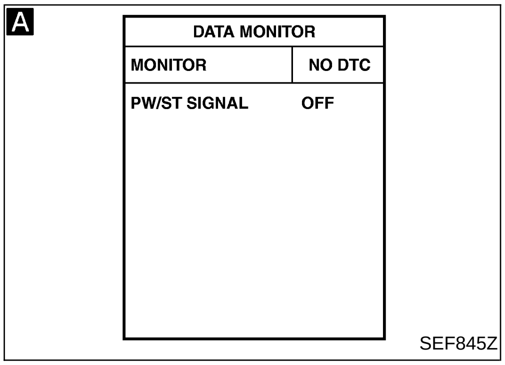
CAUTION:

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

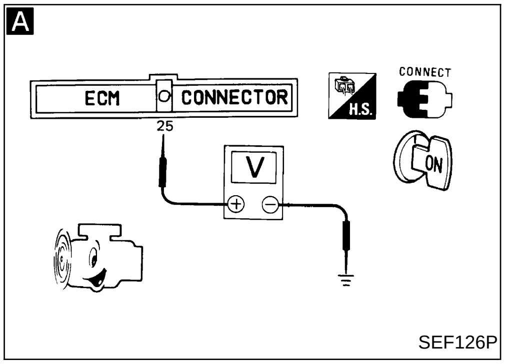
TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
25	LG/B	Power steering oil pressure switch	Engine is running. Steering wheel is fully being turned	Approximately 0V
			Engine is running. Steering wheel is not being turned	Approximately 5V

Power Steering Oil Pressure Switch (Cont'd)

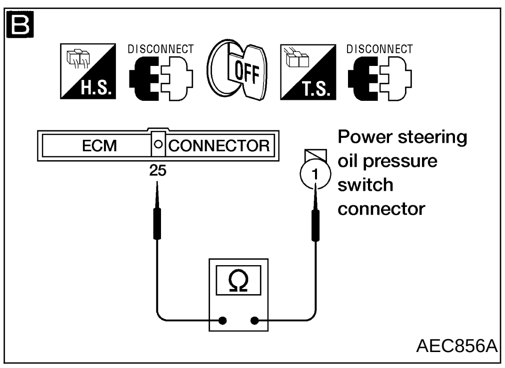
DIAGNOSTIC PROCEDURE



SEF845Z



SEF126P



AEC856A

INSPECTION START

↓

A

CHECK OVERALL FUNCTION.
1. Start engine.
2. Check "PW/ST SIGNAL" in "DATA MONITOR" mode with CONSULT-II.
   Steering is neutral position:
   OFF
   Steering is turned:
   ON

OR

1. Start engine.
2. Check voltage between ECM terminal 25 and ground.
   Voltage:
   When steering wheel is turned quickly.
   Approximately 0V
   Except above
   Approximately 5V

OK → INSPECTION END

NG ↓

B

CHECK INPUT SIGNAL CIRCUIT.
1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 25 and terminal 1.
   Continuity should exist.
   If OK, check harness for short to ground and short to power.

NG → Check the following.
- Harness connectors F21, E210
- Harness for open or short between ECM and power steering oil pressure switch

If NG, repair open circuit or short to ground or short to power in harness or connectors.

OK ↓

CHECK COMPONENT
(Power steering oil pressure switch).
Refer to "COMPONENT INSPECTION" on next page.

NG → Replace power steering oil pressure switch.

OK ↓

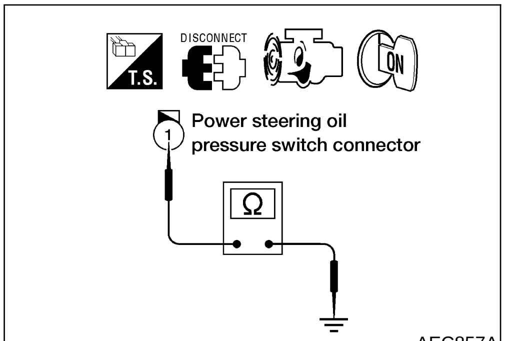
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-112.

↓

INSPECTION END

Power Steering Oil Pressure Switch (Cont'd)

COMPONENT INSPECTION



AEC857A

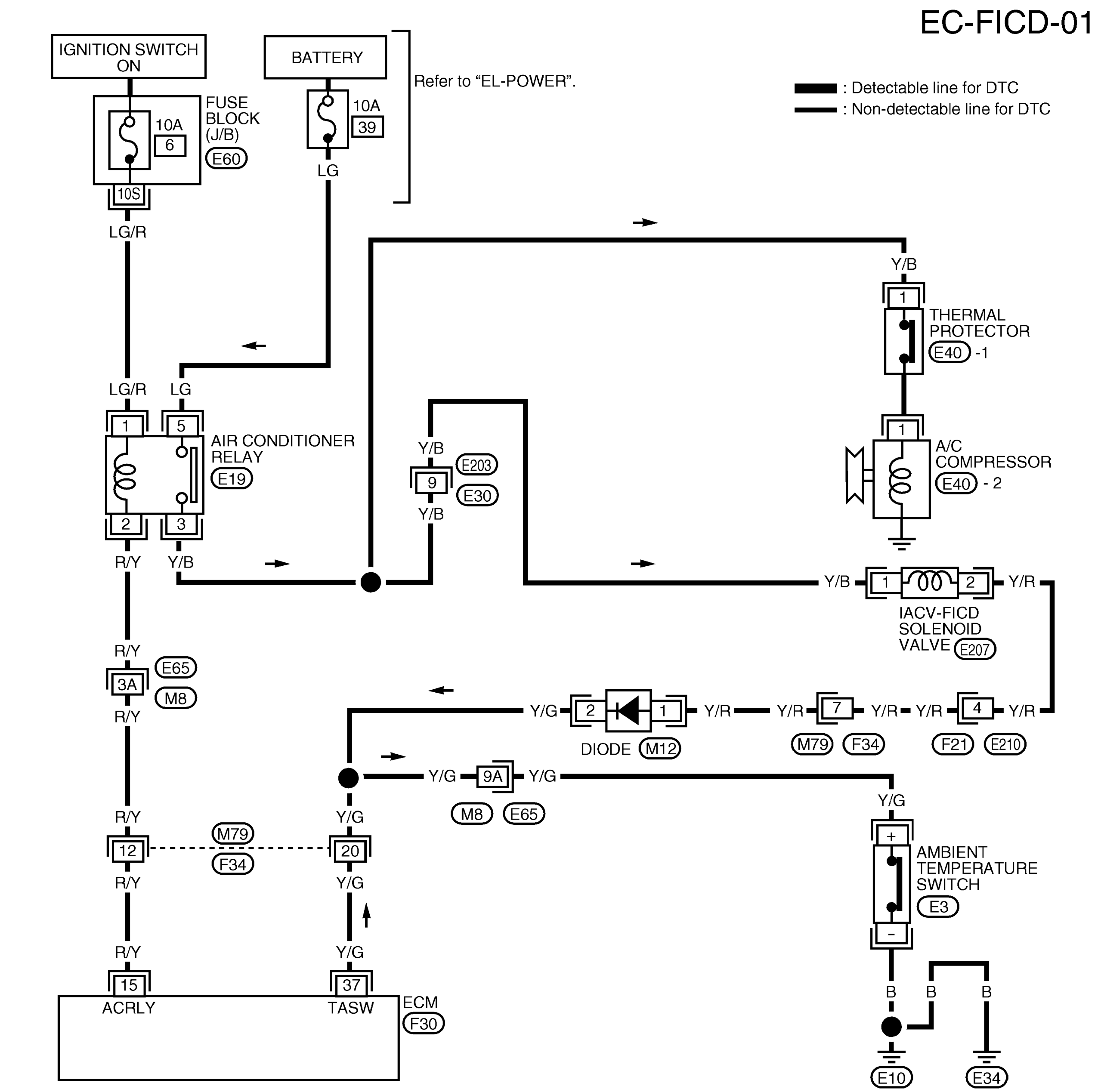
Power steering oil pressure switch

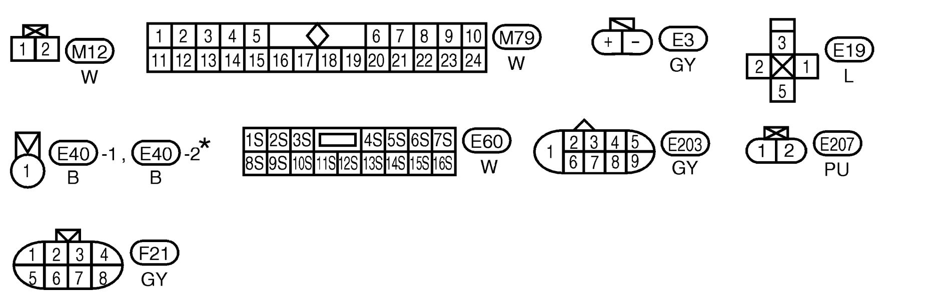
1. Disconnect power steering oil pressure switch harness connector then start engine.
2. Check continuity between terminal 1 and ground.

Conditions	Continuity
Steering wheel is fully being turned	Yes
Steering wheel is not being turned	No

If NG, replace power steering oil pressure switch.

IACV-FICD Solenoid Valve



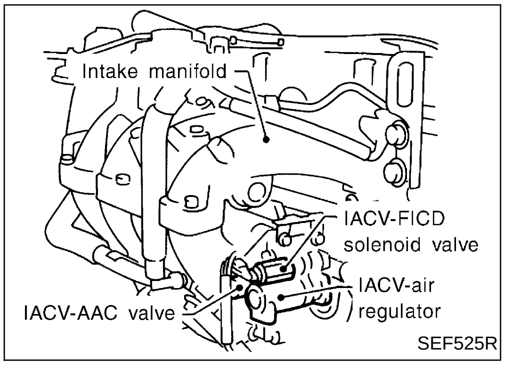


Refer to the following.
M8, E65 - SUPER MULTIPLE JUNCTION (SMJ)
F30 ELECTRICAL UNITS

*: This connector is not shown in “HARNESS LAYOUT” of EL section.

WEC655

IACV-FICD Solenoid Valve (Cont'd)



COMPONENT DESCRIPTION

When the air conditioner is on, the IACV-FICD solenoid valve supplies additional air to adjust to the increased load.

ECM TERMINALS AND REFERENCE VALUE

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

CAUTION:

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

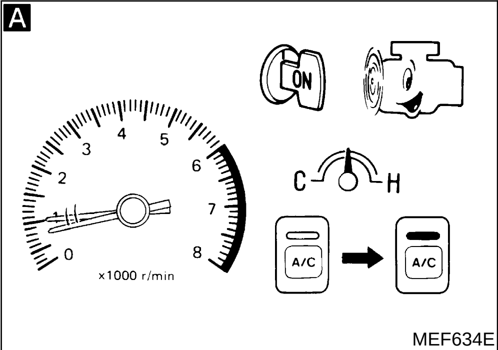
TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
15	R/Y	Air conditioner relay	Engine is running. └ Both A/C switch and blower switch are "ON"*	Approximately 0V
			Engine is running. └ A/C switch is "OFF"	BATTERY VOLTAGE (11 - 14V)
21	L/OR	Air conditioner switch	Engine is running. └ Both air conditioner switch and blower switch are "ON" (Compressor operates)	Approximately 0V
			Engine is running. └ Air conditioner switch is "OFF"	BATTERY VOLTAGE (11 - 14V)
37	Y/G	Ambient air temperature switch	Engine is running. └ Idle speed	0V
			Engine is running. [Ambient air temperature is 20°C (68°F)] └ Idle speed	Approximately 8V

*: Ambient air temperature above 10°C (50°F) and in any mode except "OFF".

IACV-FICD Solenoid Valve (Cont'd)

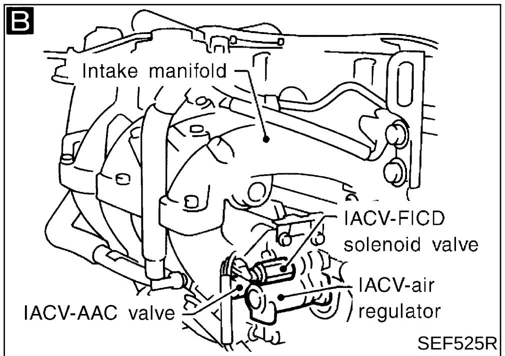
DIAGNOSTIC PROCEDURE

A



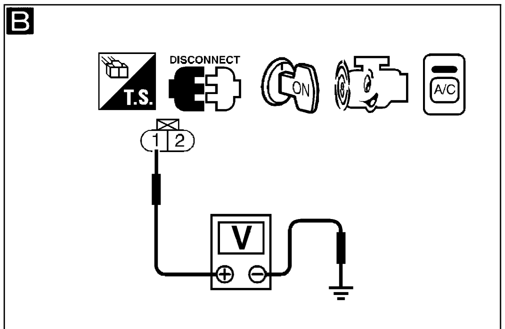
MEF634E

B



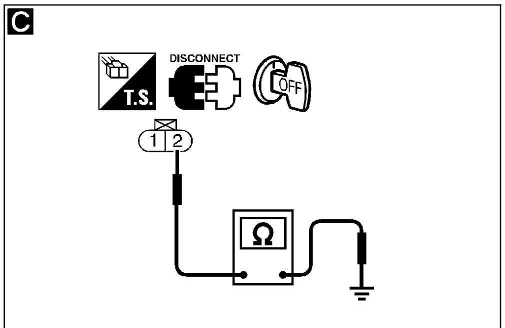
SEF525R

B



SEF671U

C



SEF672U

INSPECTION START

↓

A

CHECK OVERALL FUNCTION.
1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.
   700±50 rpm (in "N" position)
   If NG, adjust idle speed.
3. Turn air conditioner switch and blower fan switch "ON".
4. Recheck idle speed.
   800 rpm or more (in "N" position)

OK → INSPECTION END

NG ↓

Check if air conditioner compressor functions normally.

NG → Refer to HA section ("TROUBLE DIAGNOSES").

OK ↓

B

CHECK POWER SUPPLY.
1. Stop engine.
2. Disconnect IACV-FICD solenoid valve harness connector.
3. Start engine, then turn air conditioner switch and blower fan "ON".
4. Check voltage between terminal 1 and ground with CONSULT-II or tester.
   Voltage: Battery voltage

NG → Check the following.
- Harness connectors E203 , E30
- Harness for open or short between IACV-FICD solenoid valve harness connector and air conditioner relay

If NG, repair harness or connectors.

OK ↓

CHECK COMPONENTS.
(Ambient air temperature switch E3)
Refer to HA section.

NG → Replace Ambient air temperature switch.

OK ↓

C

CHECK GROUND CIRCUIT.
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch "OFF".
3. Check harness continuity between terminal 2 and body ground.
   Continuity should exist.
   If OK, check harness for short to power.

NG → Check the following.
- Harness connectors F21, E210
- Harness connectors M79, F34
- Harness connectors M8, E65
- Diode M12
- Harness for open or short between IACV-FICD solenoid valve and ground

If NG, repair open circuit or short to ground or short to power in harness or connectors.

OK ↓

A

(Go to next page.)

IACV-FICD Solenoid Valve (Cont'd)

A

↓

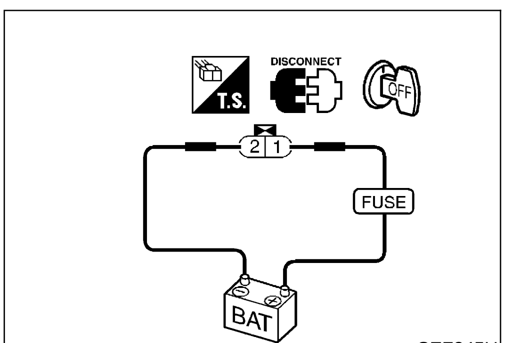
CHECK COMPONENT (IACV-FICD solenoid valve). Refer to "COMPONENT INSPECTION" below.	NG →	Replace IACV-FICD solenoid valve.

↓ OK

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-112.

↓

INSPECTION END



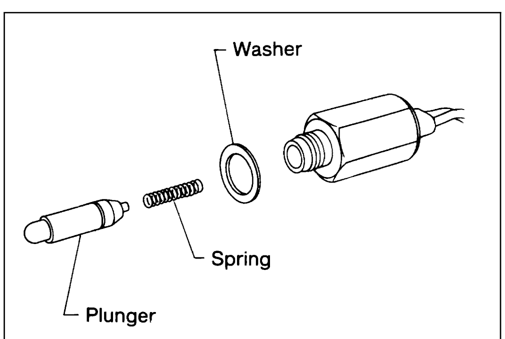
SEF345U

COMPONENT INSPECTION

IACV-FICD solenoid valve

Disconnect IACV-FICD solenoid valve harness connector.

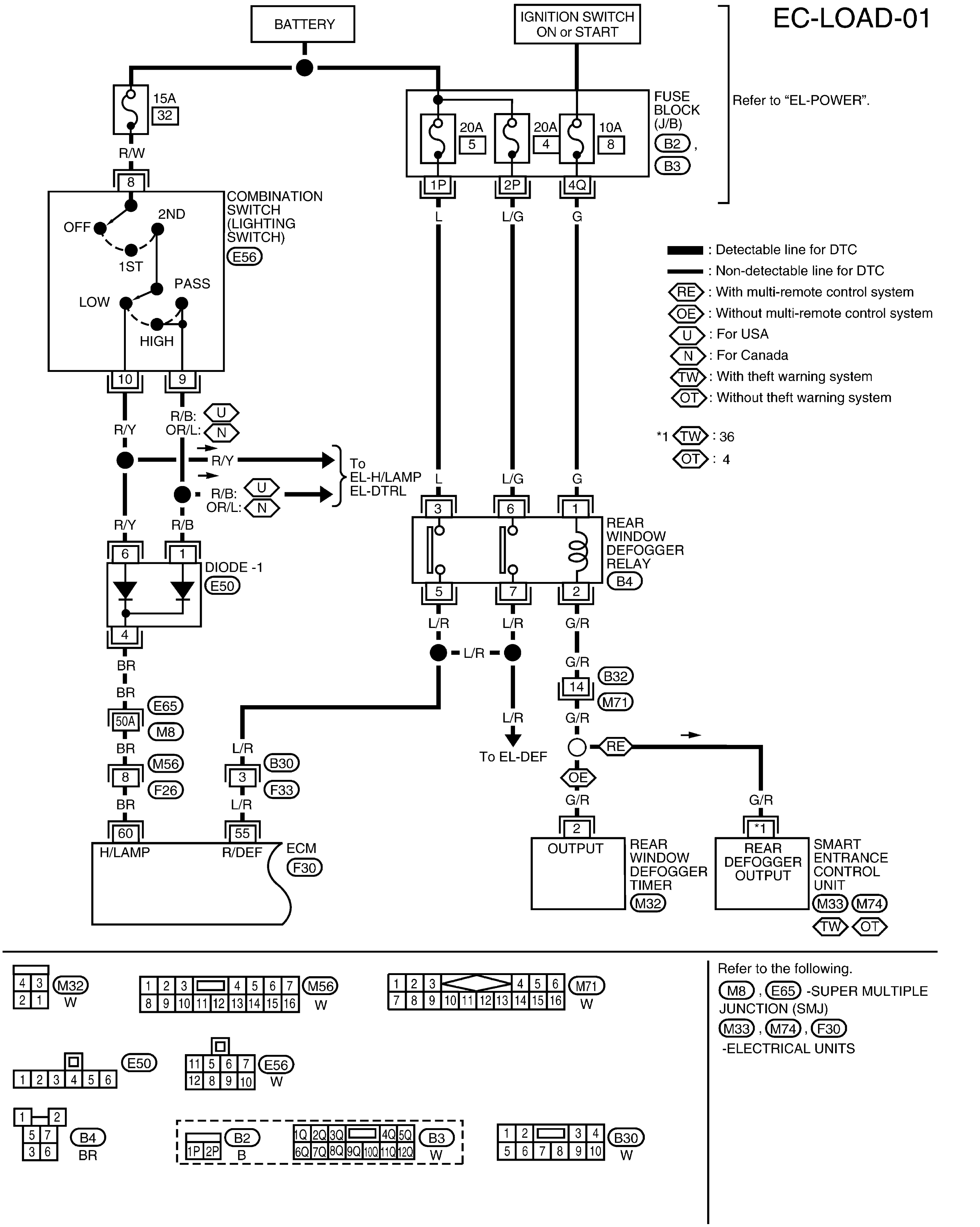
- Check for clicking sound when applying 12V direct current to terminals.



SEF097K

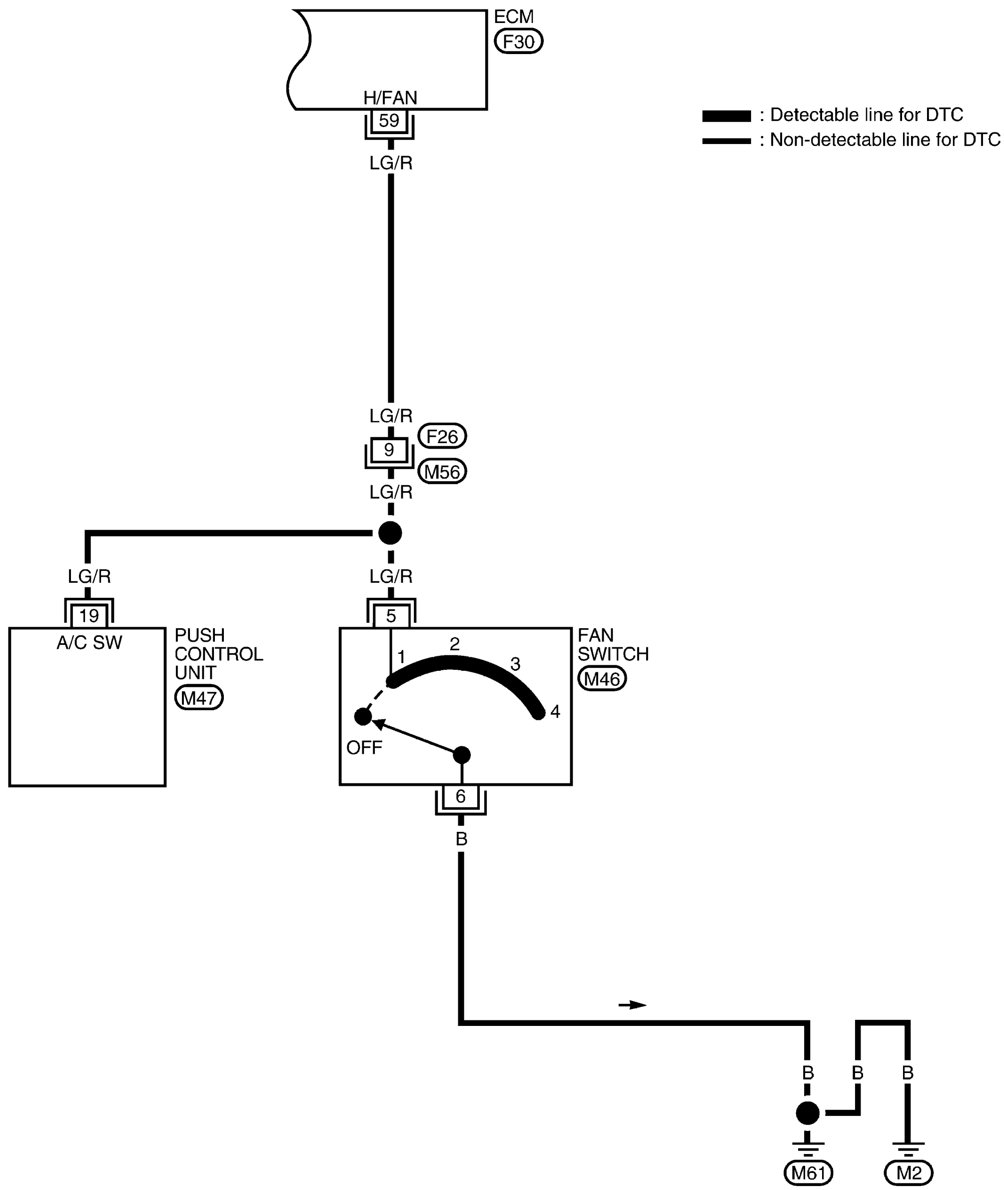
- Check plunger for seizing or sticking.
- Check for broken spring.

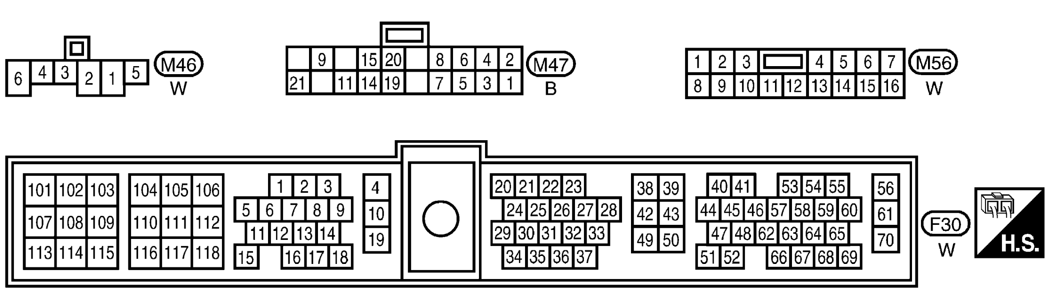
Electric Load Signal



WEC569

EC-LOAD-02



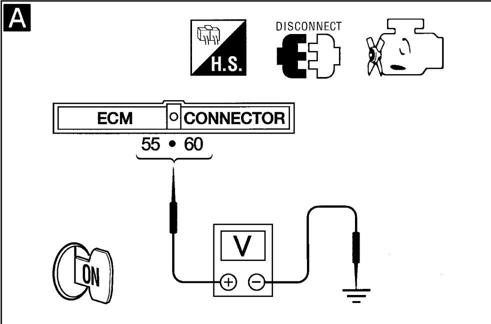


LEC570

Electric Load Signal (Cont'd)

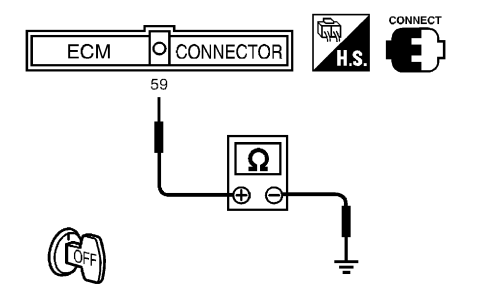
DIAGNOSTIC PROCEDURE

A



AEC897

B



SEF355U

INSPECTION START

↓

A

CHECK OVERALL FUNCTION.
1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Turn ignition switch "ON".
4. Check voltage between ECM terminal 55, 60 and ground with CONSULT-II or tester.

Voltage between 55 and ground:
Rear window defogger "ON"
Battery positive voltage
Rear window defogger "OFF"
0V
Voltage between 60 and ground:
Lighting switch "ON" or daytime running light "ON"
Battery positive voltage
Lighting switch "OFF" or daytime running light "OFF"
0V

NG → Check the following.
For terminal 55
- Harness connectors F33, B30
- Harness for open or short between ECM and rear window defogger relay
- Harness for open or short between rear window defogger timer or smart entrance control unit and rear window defogger relay
Refer to EL section ("REAR WINDOW DEFOGGER").

For terminal 60
- Harness connectors M8, E65
- Harness connectors M56, F26
- Harness continuity between ECM and lighting switch
- Diode-1 E50

If NG, repair open circuit short to ground or short to power in harness or connectors.

OK ↓

B

CHECK POWER AND GROUND CIRCUIT.
1. Turn ignition switch "OFF".
2. Check continuity between ECM terminal 59 and ground.

Blower fan switch "ON"
Continuity should exist.
Blower fan switch "OFF"
Continuity should not exist.

NG → Check the following.
- Harness connectors M56, F26
- Harness for open or short between ECM and fan switch, fan switch and ground
- Harness for open or short between fan switch and push control unit

If NG, repair open circuit short to ground or short to power in harness or connectors.

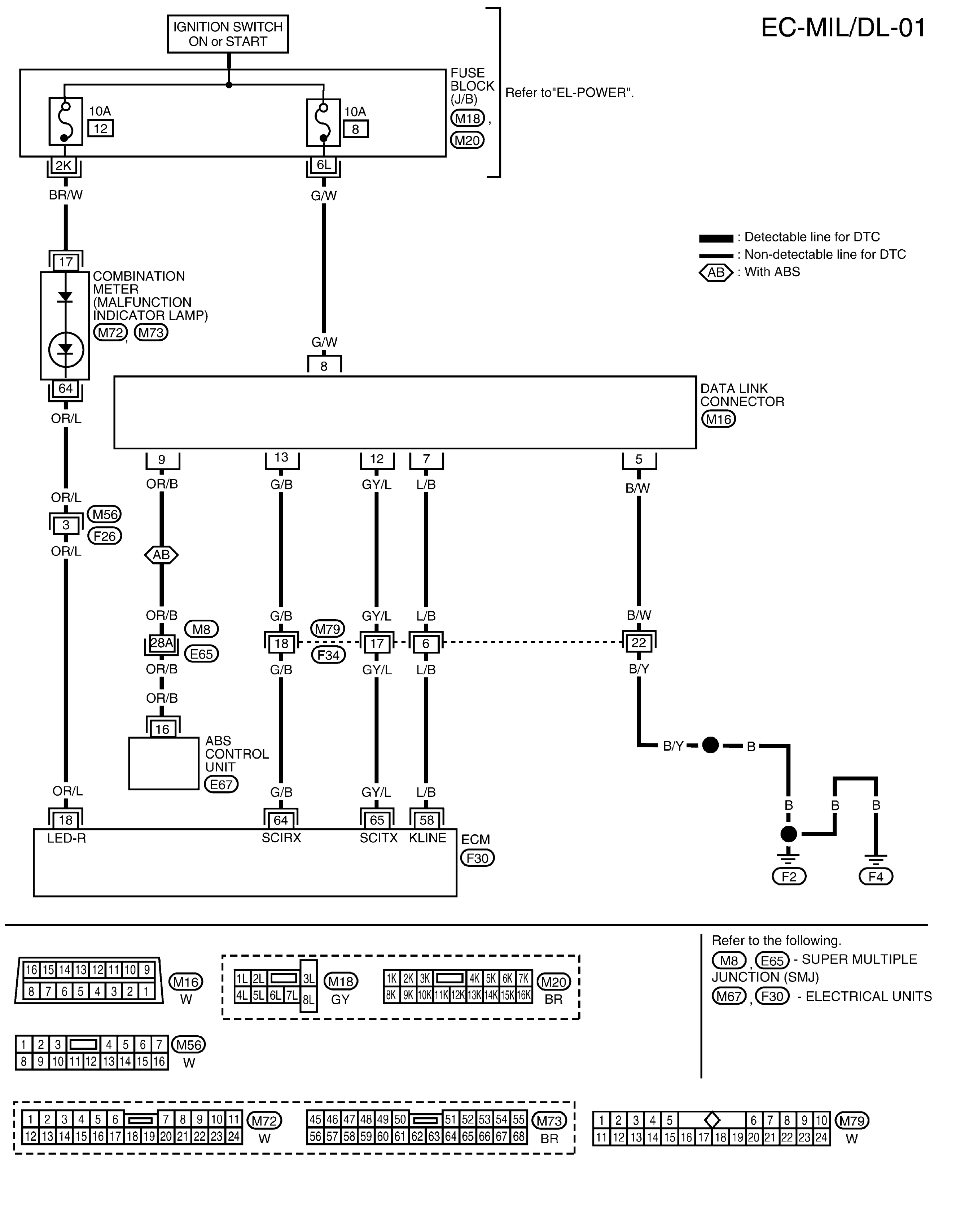
OK ↓

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-112.

↓

INSPECTION END

MIL & Data Link Connectors



WEC122A

General Specifications

FUEL PRESSURE REGULATOR 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)

Inspection and Adjustment

Target idle speed*1 rpm No-load*2 (in "N" position)	700±50
Base idle speed*3 rpm No-load*2 (in "N" position)	650±50
Air conditioner: ON (in "N" position)	800 or more
Ignition timing	20°±2° BTDC*3

*1: Throttle position sensor harness connector connected
*2: Throttle position sensor harness connector disconnected or using CONSULT-II "WORK SUPPORT"
*3: Under the following conditions:
- Air conditioner switch: OFF
- Electric load: OFF (Lights, heater fan & rear defogger)
- Steering wheel: Kept in straight-ahead position

IGNITION COIL

Primary voltage V	12
Primary resistance [at 20°C (68°F)] Ω	Approximately 1.0
Secondary resistance [at 20°C (68°F)] kΩ	Approximately 10

MASS AIR FLOW SENSOR

Supply voltage V	Battery voltage (11 - 14)
Output voltage at idle V	1.3 - 1.7*
Mass air flow (Using CONSULT-II or GST) g·m/sec	Approximately 3.24 at idle* Approximately 12.2 at 2,500 rpm*

*: Engine is warmed up to normal operating temperature and running under no-load.

ENGINE COOLANT TEMPERATURE SENSOR

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

EGR temperature °C (°F)	Voltage V	Resistance MΩ
0 (32)	4.61	0.68 - 1.11
50 (122)	2.53	0.09 - 0.12
100 (212)	0.87	0.017 - 0.024

HEATED OXYGEN SENSOR 1 HEATER (FRONT)

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

FUEL PUMP

Resistance [at 25°C (77°F)] Ω	0.2 - 5.0

IACV-AAC VALVE

Resistance [at 20°C (68°F)] Ω	Approximately 10

INJECTOR

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

RESISTOR

Resistance [at 25°C (77°F)] kΩ	Approximately 2.2

THROTTLE POSITION SENSOR

Throttle valve conditions	Voltage* (at normal operating temp., engine off, ignition switch "ON")
Completely closed (a)	0.15 - 0.85V
Partially open	Between (a) and (b)
Completely open (b)	3.5 - 4.7

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

Inspection and Adjustment (Cont'd)

CALCULATED LOAD VALUE

	Calculated load value % (Using CONSULT-II or GST)
At idle	Approx. 19%
At 2,500 rpm	Approx. 18%

INTAKE AIR TEMPERATURE SENSOR

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

HEATED OXYGEN SENSOR 2 HEATER (REAR)

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

CRANKSHAFT POSITION SENSOR (OBD)

Resistance [at 25°C (77°F)]	Ω	512 - 632