ENGINE CONTROL SYSTEM

SECTION EC

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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 screen terms)	DTC		Reference page
	MIL*1	CONSULT GST*2	
Unable to access ECCS	—	—	EC-77
ABSOL PRESS SENSOR	0803	P0105	EC-105
A/T 1ST SIGNAL	1103	P0731	AT-68
A/T 2ND SIGNAL	1104	P0732	AT-71
A/T 3RD SIGNAL	1105	P0733	AT-73
A/T 4TH SIG OR TCC	1106	P0734	AT-75
A/T COMM LINE	0504	P0600	EC-261
A/T DIAG COMM LINE	0804	P1605	EC-318
A/T TCC SIGNAL	1107	P0744	AT-83
CAMSHAFT POSI SEN	0101	P0340	EC-203
CLOSED LOOP-B1	0307	P0130	EC-132
CLOSED LOOP-B2	0308	P0150*3	EC-132
CLOSED THRL POS SW	0203	P0510	EC-257
COOLANT TEMP SEN*3	0103	P0115	EC-116
*COOLANT TEMP SEN	0908	P0125	EC-127
CRANK P/S (OBD) COG	0905	P1336	EC-285
CRANK POS SEN (OBD)	0802	P0335	EC-198
CYL 1 MISFIRE	0608	P0301	EC-191
CYL 2 MISFIRE	0607	P0302	EC-191
CYL 3 MISFIRE	0606	P0303	EC-191
CYL 4 MISFIRE	0605	P0304	EC-191
CYL 5 MISFIRE	0604	P0305	EC-191
CYL 6 MISFIRE	0603	P0306	EC-191
ECM	0301	P0605	EC-264
EGR SYSTEM	0302	P0400	EC-209
EGR TEMP SENSOR	0305	P1401	EC-295
EGRC SOLENOID/V	1005	P1400	EC-290
EGRC-BPT VALVE	0306	P0402	EC-217
ENGINE SPEED SIG*4	1207	P0725	AT-66
EVAP PURG FLOW/MON	0111	P1447	EC-311
EVAP SYS PRES SEN	0704	P0450	EC-243
EVAP (SMALL LEAK)	0705	P0440	EC-222
FLUID TEMP SENSOR	1208	P0710	AT-61
FR O2 SEN HTR-B1	0901	P0135	EC-138
FR O2 SEN HTR-B2	1001	P0155	EC-156
FRONT O2 SENSOR-B1	0503	P0130	EC-133
FRONT O2 SENSOR-B2	0303	P0150	EC-151
FUEL SYS LEAN/BK1	0115	P0171	EC-168
FUEL SYS LEAN/BK2	0210	P0174	EC-178
FUEL SYS RICH/BK1	0114	P0172	EC-173
FUEL SYS RICH/BK2	0209	P0175	EC-183
IACV-AAC VALVE	0205	P0505	EC-252
IGN SIGNAL-PRIMARY	0201	P1320	EC-279
INHIBITOR SWITCH	1101	P0705	AT-55
INT AIR TEMP SEN	0401	P0110	EC-111
KNOCK SENSOR	0304	P0325	EC-195
LINE PRESSURE S/V	1205	P0745	AT-88
MAP/BARO SW SOL/V	1302	P1105	EC-273
MASS AIR FLOW SEN*3	0102	P0100	EC-99
MULTI CYL MISFIRE	0701	P0300	EC-191
NO SELF DIAGNOSTIC FAILURE INDICATED	Flash-ing*6	No DTC	EC-48
OVERHEAT	0208	P1900*5	LC-17
OVERRUN CLUTCH S/V	1203	P1760	AT-99
PARK/NEUT POSI SW	1003	P0705	EC-266
PURG CONT/V & S/V	0807	P0443	EC-230
PURG VOLUME CONT/V	1008	P1445	EC-304
REAR O2 SENSOR-B1	0707	P0136	EC-142
REAR O2 SENSOR-B2	0708	P0156	EC-160
RR O2 SEN HTR-B1	0902	P0141	EC-146
RR O2 SEN HTR-B2	1002	P0161	EC-164
SHIFT SOLENOID/V A*3	1108	P0750	AT-91
SHIFT SOLENOID/V B*3	1201	P0755	AT-94
TANK FUEL TEMP SEN	0402	P0180	EC-188
THROTTLE POSI SEN*3	0403	P0120	EC-121
THRTL POSI SEN A/T*3	1206	P1705	AT-97
TOR CONV CLUTCH SV	1204	P0740	AT-80
TW CATALYST SYSTEM	0702 0703	P0420 P0430	EC-219
VC/V BYPASS/V	0801	P1441	EC-299
VEHICLE SPEED SEN	0104	P0500	EC-248
VENT CONTROL VALVE	0903	P0446	EC-238
VHCL SPEED SEN A/T*4	1102	P0720	AT-64

*1: In Diagnostic Test Mode II (Self-diagnostic results). These numbers are controlled by NISSAN.

*2: These numbers are prescribed by SAE J2012.

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

*4: The MIL illuminates after A/T control unit enters the fail-safe mode in two consecutive trips, if both the "Revolution sensor" and the "Engine speed signal" meet the fail-safe condition at the same time.

*5: Since this diagnosis does not meet P1900 of SAE J2012, it is indicated only by CONSULT.

*6: While engine is running.

P NO. INDEX FOR DTC

DTC		Items (CONSULT screen terms)	Reference page
CONSULT GST*2	MIL*1		
—	—	Unable to access ECCS	EC-77
P0000	**0505**	**NO SELF DIAGNOSTIC FAILURE INDICATED**	—
No DTC	Flashing*6	NO SELF DIAGNOSTIC FAILURE INDICATED	EC-48
P0100	0102	MASS AIR FLOW SEN*3	EC-99
P0105	0803	ABSOL PRESS SENSOR	EC-105
P0110	0401	INT AIR TEMP SEN	EC-111
P0115	0103	COOLANT TEMP SEN	EC-116
P0120	0403	THROTTLE POSI SEN*3	EC-121
P0125	0908	*COOLANT TEMP SEN	EC-127
P0130	0307	CLOSED LOOP-B1	EC-132
P0130	0503	FRONT O2 SENSOR-B1	EC-133
P0135	0901	FR O2 SEN HTR-B1	EC-138
P0136	0707	REAR O2 SENSOR-B1	EC-142
P0141	0902	RR O2 SEN HTR-B1	EC-146
P0150	0308	CLOSED LOOP-B2	EC-132
P0150	0303	FRONT O2 SENSOR-B2	EC-151
P0155	1001	FR O2 SEN HTR-B2	EC-156
P0156	0708	REAR O2 SENSOR-B2	EC-160
P0161	1002	RR O2 SEN HTR-B2	EC-164
P0171	0115	FUEL SYS LEAN/BK1	EC-168
P0172	0114	FUEL SYS RICH/BK1	EC-173
P0174	0210	FUEL SYS LEAN/BK2	EC-178
P0175	0209	FUEL SYS RICH/BK2	EC-183
P0180	0402	TANK FUEL TEMP SEN	EC-188
P0300	0701	MULTI CYL MISFIRE	EC-191
P0301	0608	CYL 1 MISFIRE	EC-191
P0302	0607	CYL 2 MISFIRE	EC-191
P0303	0606	CYL 3 MISFIRE	EC-191
P0304	0605	CYL 4 MISFIRE	EC-191
P0305	0604	CYL 5 MISFIRE	EC-191
P0306	0603	CYL 6 MISFIRE	EC-191
P0325	0304	KNOCK SENSOR	EC-195
P0335	0802	CRANK POS SEN (OBD)	EC-198
P0340	0101	CAMSHAFT POSI SEN	EC-203
P0400	0302	EGR SYSTEM	EC-209
P0402	0306	EGRC-BPT VALVE	EC-217
P0420 P0430	0702 0703	TW CATALYST SYSTEM	EC-219
P0440	0705	EVAP (SMALL LEAK)	EC-222
P0443	0807	PURG CONT/V & S/V	EC-230
P0446	0903	VENT CONTROL VALVE	EC-238
P0450	0704	EVAP SYS PRES SEN	EC-243
P0500	0104	VEHICLE SPEED SEN	EC-248
P0505	0205	IACV-AAC VALVE	EC-252
P0510	0203	CLOSED THRL POS SW	EC-257
P0600	0504	A/T COMM LINE	EC-261
P0605	0301	ECM	EC-264
P0705	1003	PARK/NEUT POSI SW	EC-266
P0705	1101	INHIBITOR SWITCH	AT-55
P0710	1208	FLUID TEMP SENSOR	AT-61
P0720	1102	VHCL SPEED SEN A/T*4	AT-64
P0725	1207	ENGINE SPEED SIG*4	AT-66
P0731	1103	A/T 1ST SIGNAL	AT-68
P0732	1104	A/T 2ND SIGNAL	AT-71
P0733	1105	A/T 3RD SIGNAL	AT-73
P0734	1106	A/T 4TH SIG OR TCC	AT-75
P0740	1204	TOR CONV CLUTCH SV	AT-80
P0744	1107	A/T TCC SIGNAL	AT-83
P0745	1205	LINE PRESSURE S/V	AT-88
P0750	1108	SHIFT SOLENOID/V A*3	AT-91
P0755	1201	SHIFT SOLENOID/V B*3	AT-94
P1105	1302	MAP/BARO SW SOL/V	EC-273
P1320	0201	IGN SIGNAL-PRIMARY	EC-279
P1336	0905	CRANK P/S (OBD) COG	EC-285
P1400	1005	EGRC SOLENOID/V	EC-290
P1401	0305	EGR TEMP SENSOR	EC-295
P1441	0801	VC/V BYPASS/V	EC-299
P1445	1008	PURG VOLUME CONT/V	EC-304
P1447	0111	EVAP PURG FLOW/MON	EC-311
P1605	0804	A/T DIAG COMM LINE	EC-318
P1705	1206	THRTL POSI SEN A/T*3	AT-97
P1760	1203	OVERRUN CLUTCH S/V	AT-99
P1900	0208	OVER HEAT	LC-17

*1: In Diagnostic Test Mode II (Self-diagnostic results). These numbers are controlled by NISSAN.

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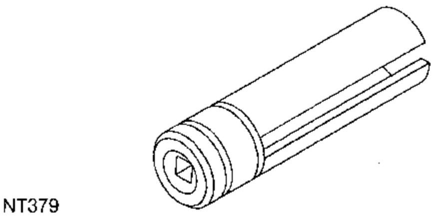
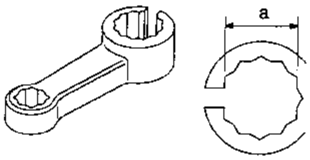
Special Service Tools

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)**

Commercial Service Tool

Tool name	Description	
Fuel filler cap adopter	 NT653	Checking fuel tank vacuum relief valve opening pressure

Supplemental Restraint System (SRS) "AIR BAG"

The Supplemental Restraint System "Air Bag", used along with a seat belt, helps to reduce the risk or severity of injury to the driver and front passenger in a frontal collision. The Supplemental Restraint System consists of air bag modules (located in the center of the steering wheel and on the instrument panel on the passenger side), a diagnosis sensor unit, warning lamp, wiring harness and spiral cable. 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.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses are covered with yellow insulation either just before the harness connectors or for the complete harness, for easy identification.**

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

The ECM (ECCS control module) 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.)**
- **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 or A/T control unit before returning the vehicle to the customer.**

Engine Fuel & Emission Control System

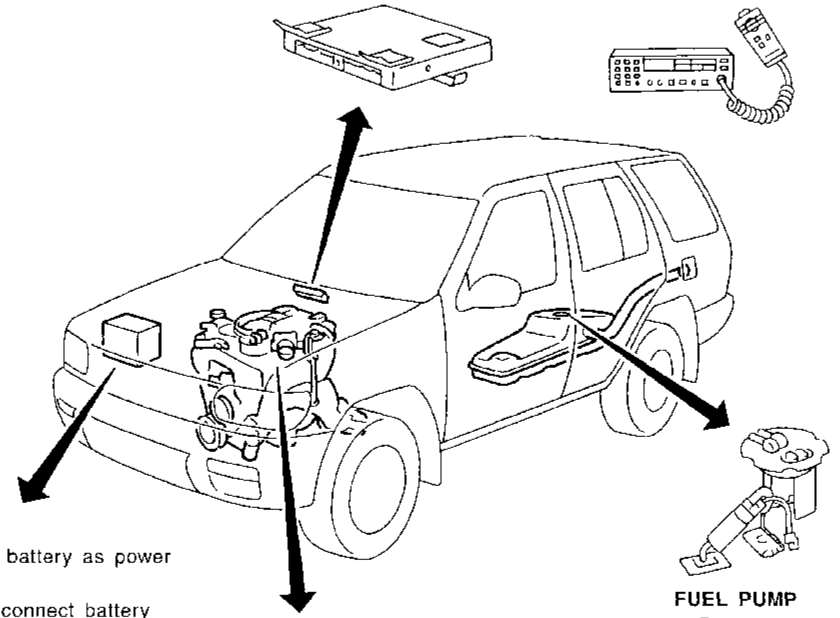
ECM (ECCS Control Module)

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

WIRELESS EQUIPMENT

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

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



BATTERY

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

WHEN STARTING

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

ECM PARTS HANDLING

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

FUEL PUMP

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

ECM HARNESS HANDLING

- Securely connect ECM harness connectors.
  A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to ICs.
- Keep ECM harness at least 10 cm (3.9 in.) away from adjacent harnesses to prevent an 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.

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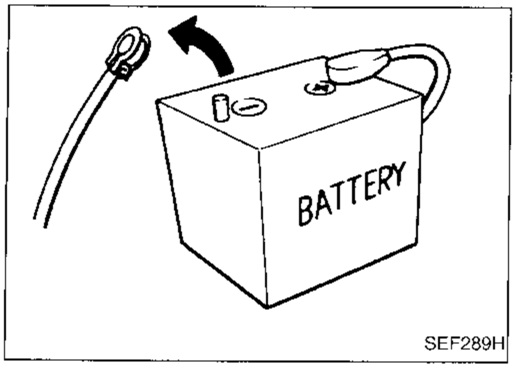
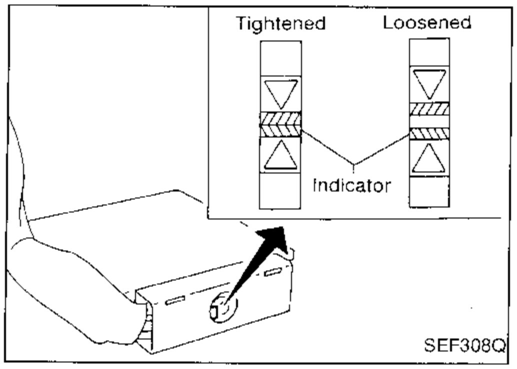
Precautions

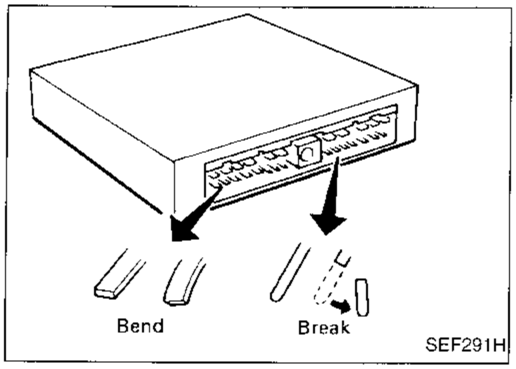


- **Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect negative battery terminal. Failure to do so may damage the ECM because battery voltage is applied to ECM even if ignition switch is turned off.**



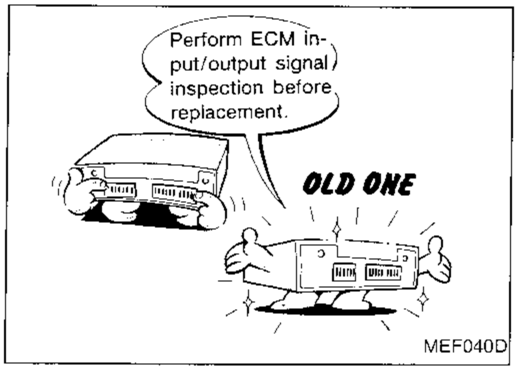
- **When connecting ECM harness connector, tighten securing bolt until the gap between orange indicators disappears.**

  🔧 : 3.0 - 5.0 N·m (0.3 - 0.5 kg-m, 26 - 43 in-lb)

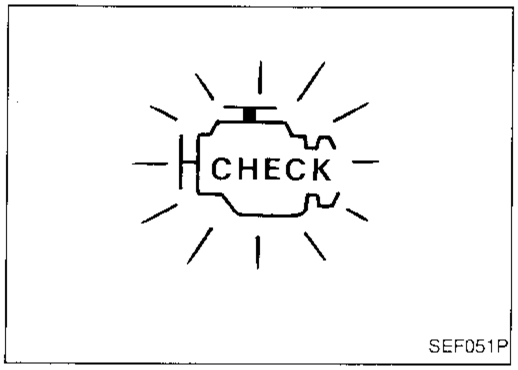


- **When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).**

  Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.



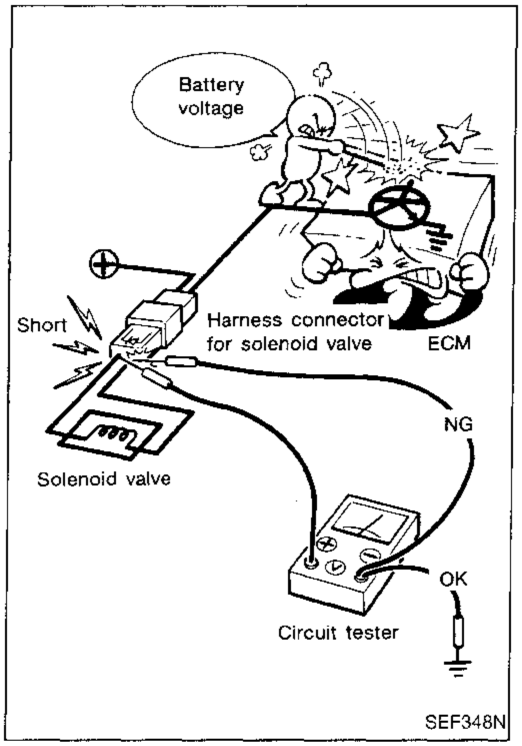
- **Before replacing ECM, perform Terminals and Reference Value inspection and make sure ECM functions properly. Refer to EC-85.**



- **After performing each TROUBLE DIAGNOSIS, perform "OVERALL FUNCTION CHECK" or "DTC (Diagnostic Trouble Code) CONFIRMATION PROCEDURE".**

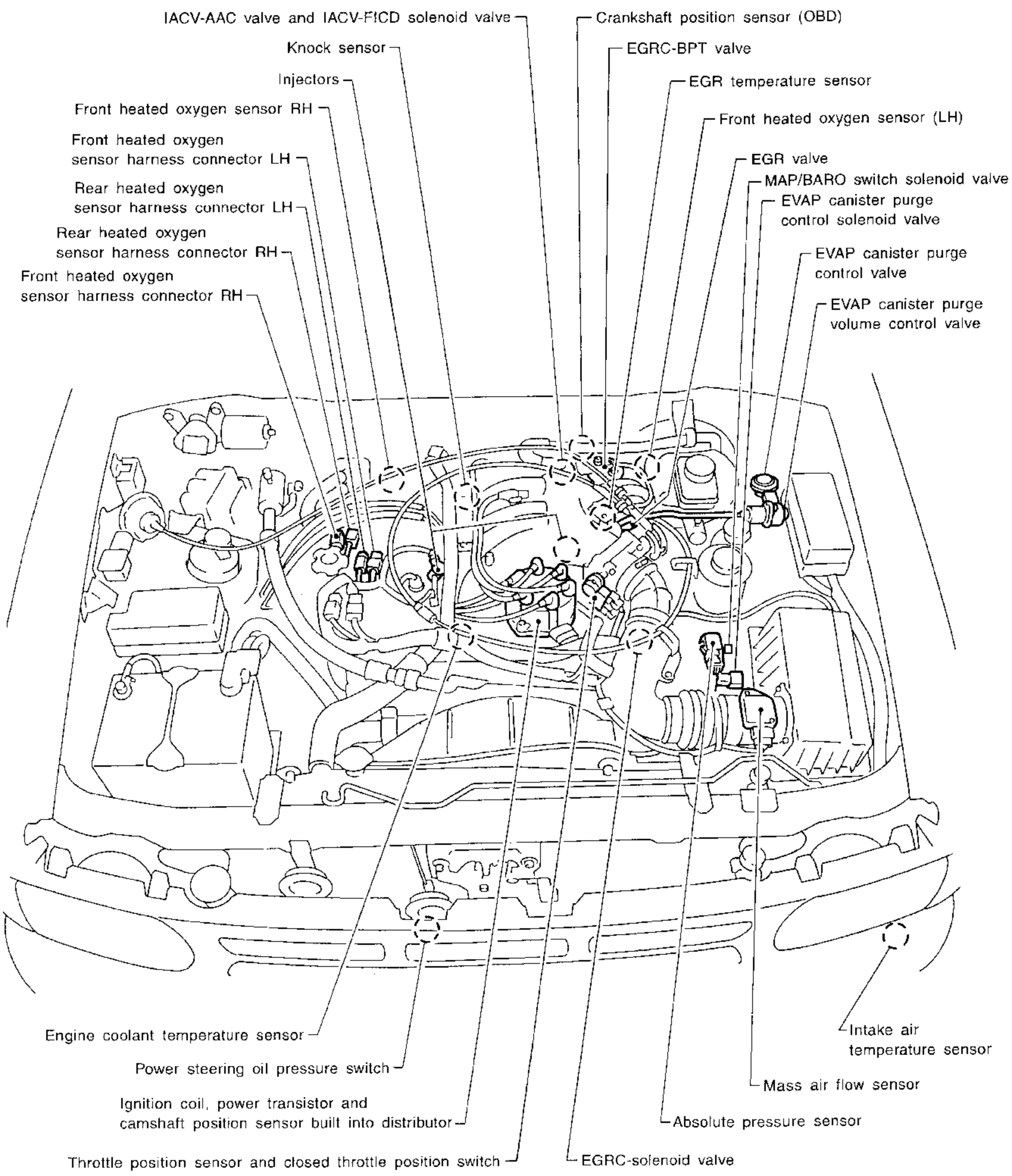
  The DTC should not be displayed in the "DTC CONFIRMATION PROCEDURE" if the repair is completed. The "OVERALL FUNCTION CHECK" should be a good result if the repair is completed.

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.

ECCS Component Parts Location



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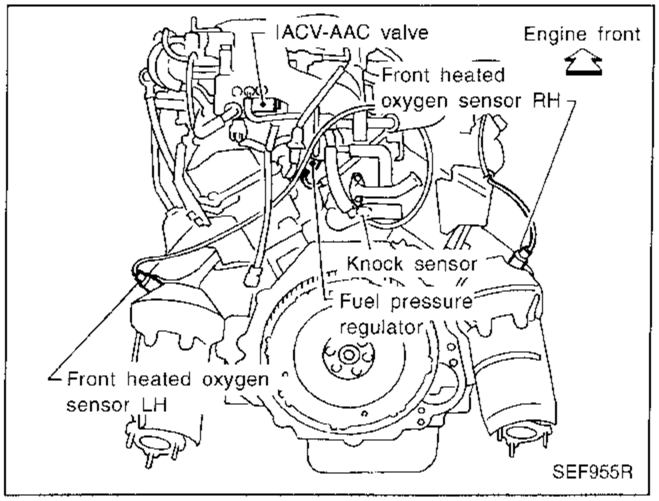
ECCS Component Parts Location (Cont'd)



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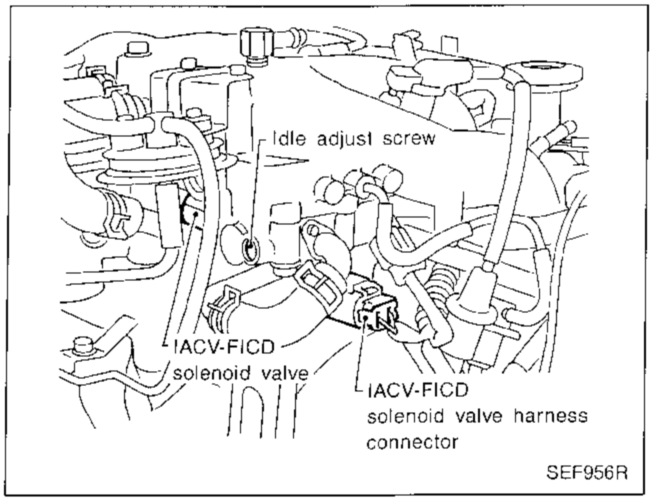

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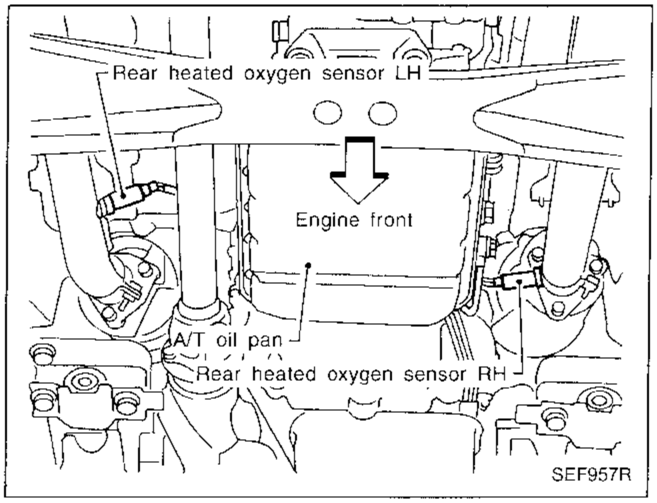

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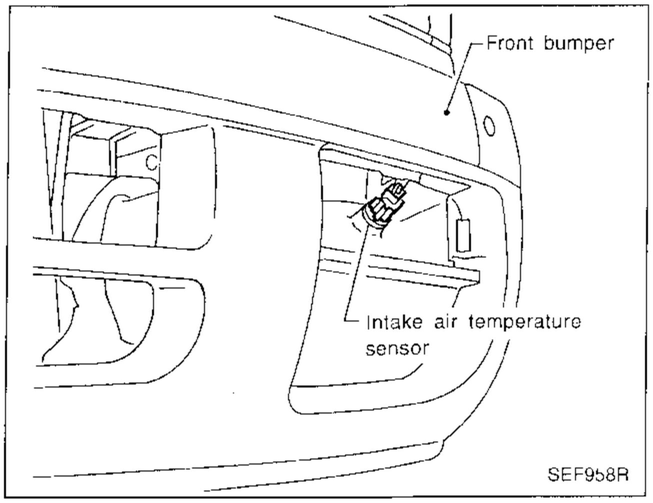

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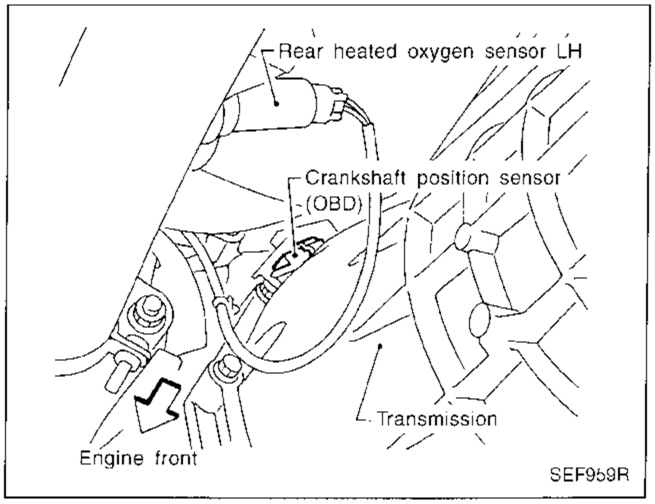

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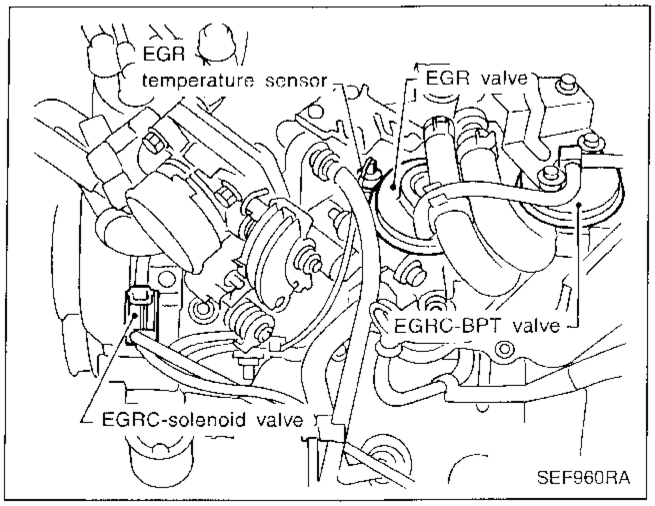

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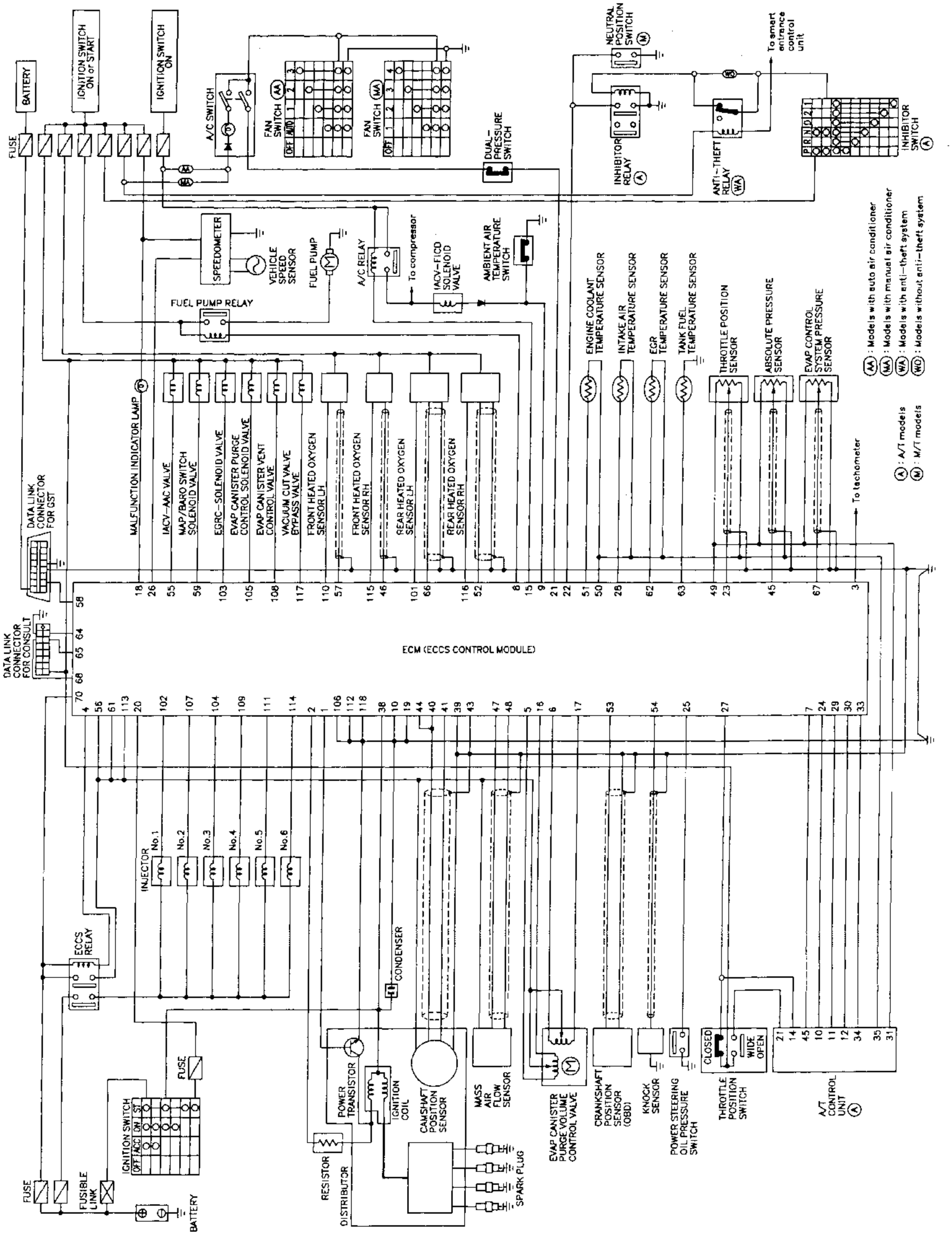
Circuit Diagram



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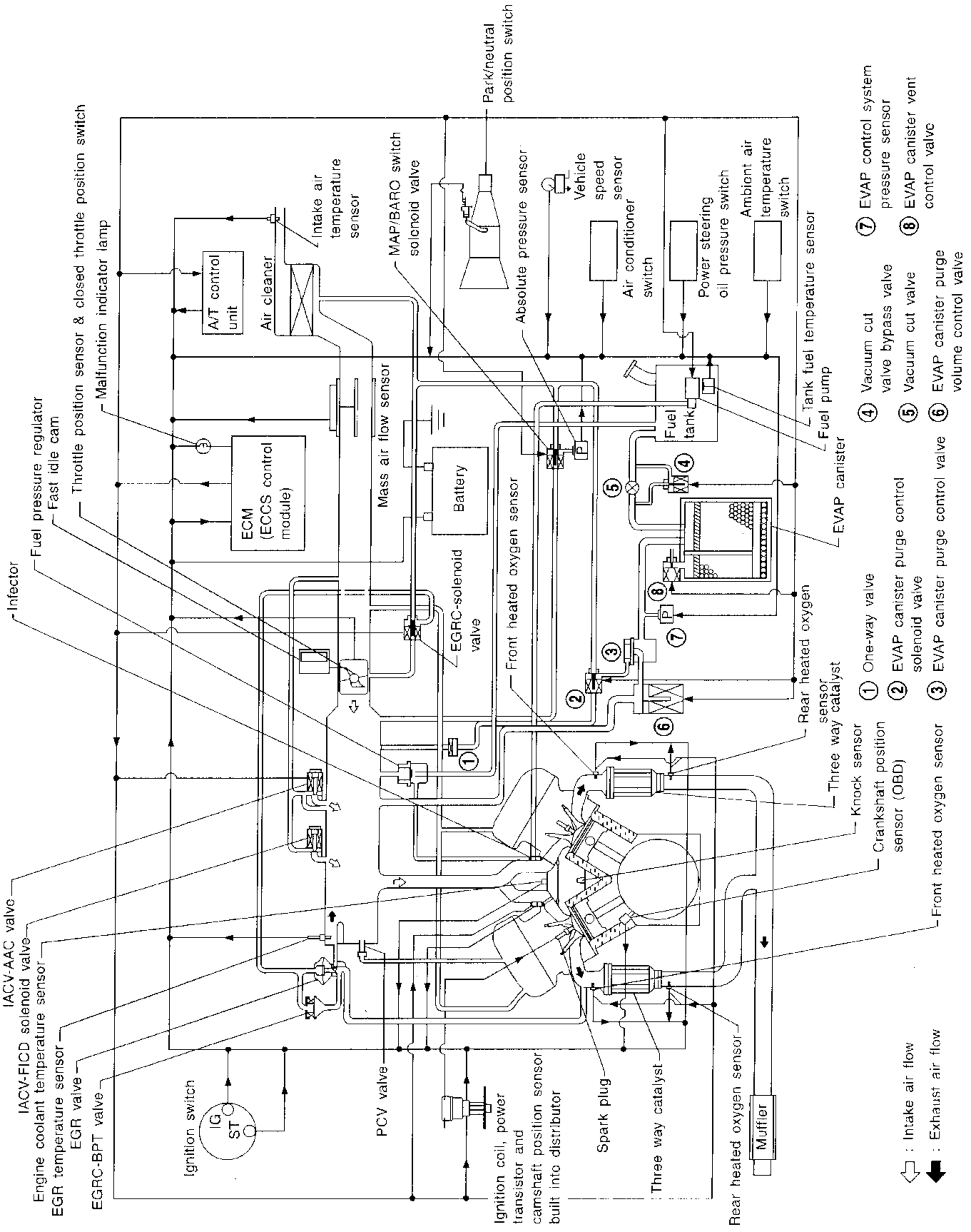
ENGINE AND EMISSION CONTROL OVERALL SYSTEM

System Diagram



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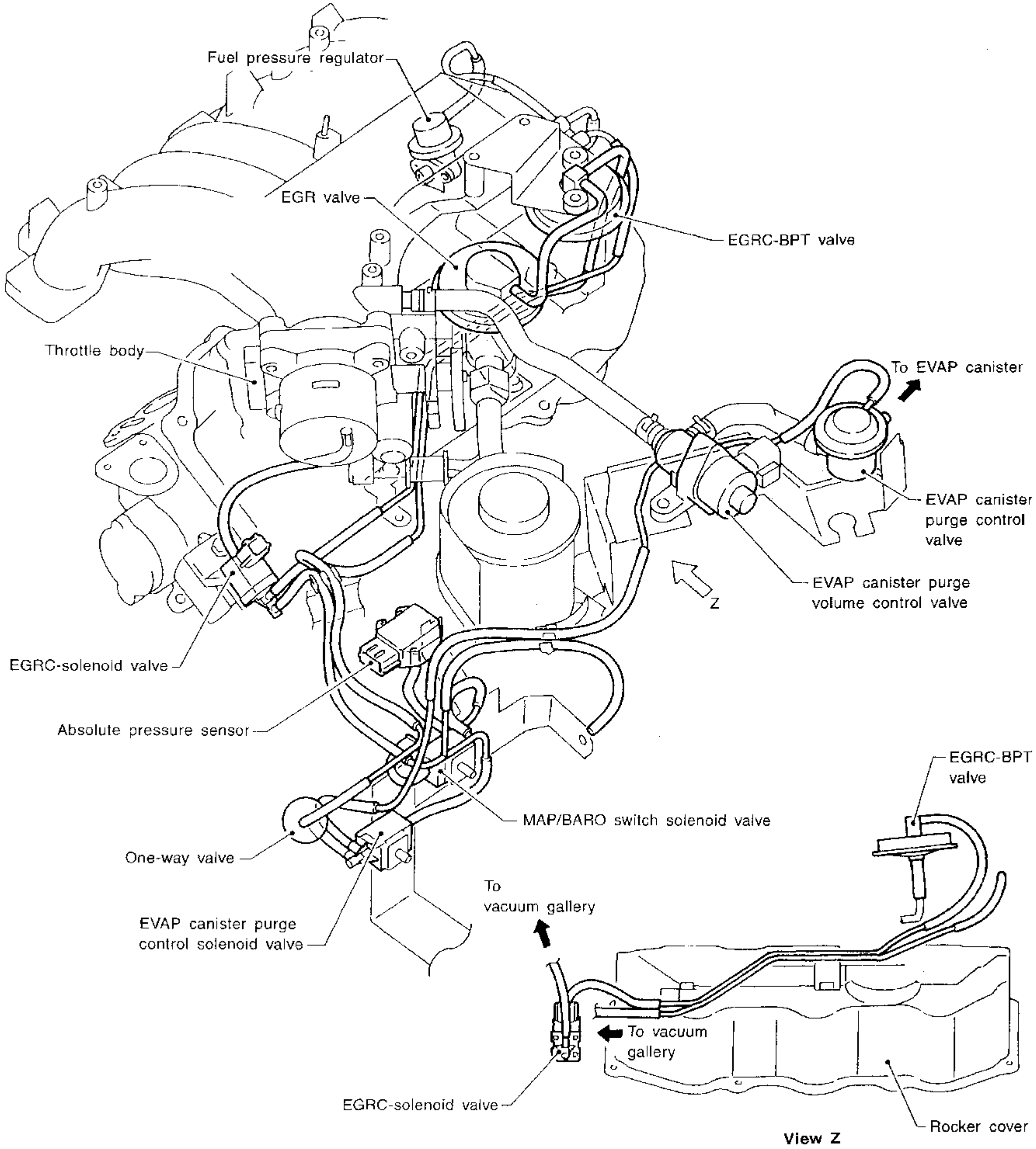
Vacuum Hose Drawing



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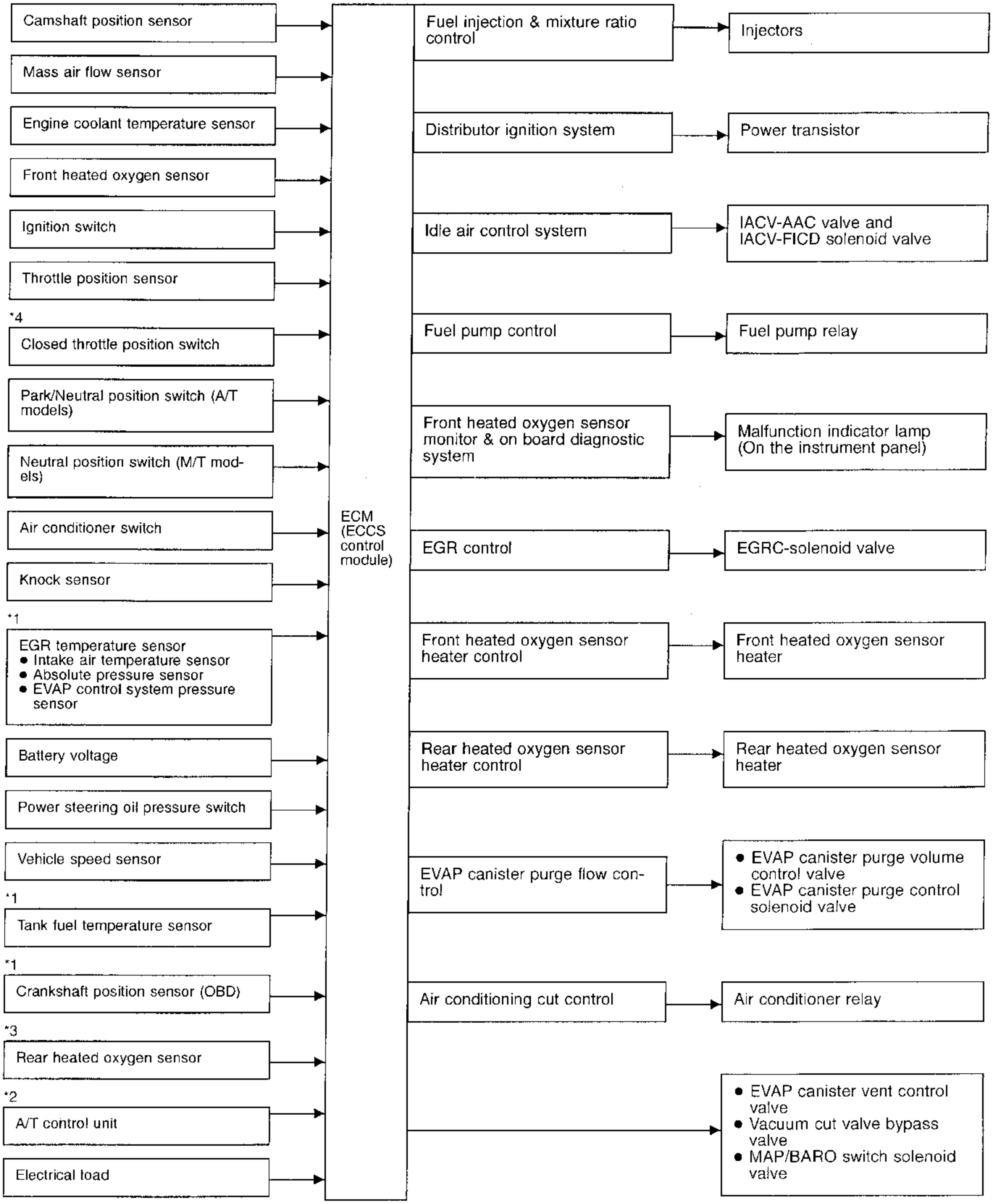
System Chart



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

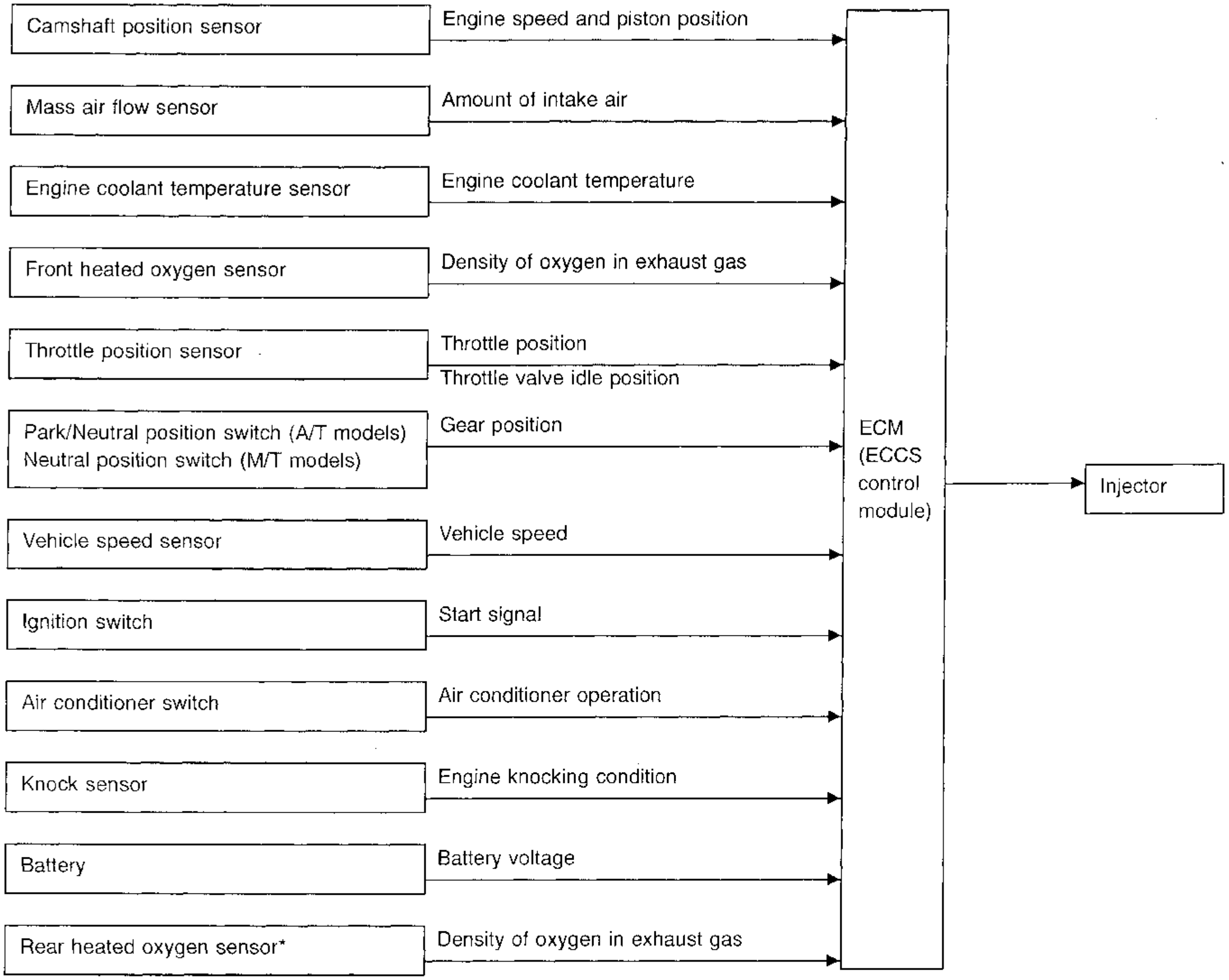
*2: The DTC related to A/T will be sent to ECM.

*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.

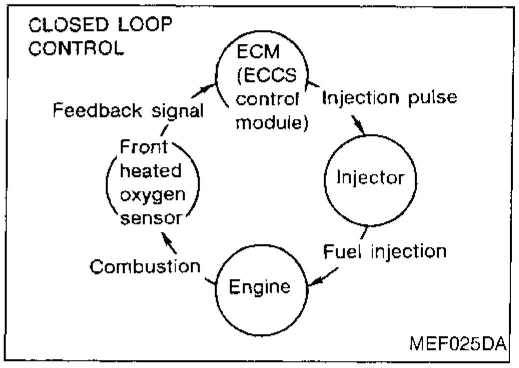
VARIOUS FUEL INJECTION INCREASE/DECREASE COMPENSATION

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)



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 front heated oxygen sensor 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 front heated oxygen sensor, refer to EC-133, 151. 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.
Rear heated oxygen sensor is located downstream of the three way catalyst. Even if the switching characteristics of the front heated oxygen sensor shift, the air-fuel ratio is controlled to stoichiometric by the signal from the rear heated oxygen sensor.

OPEN LOOP CONTROL

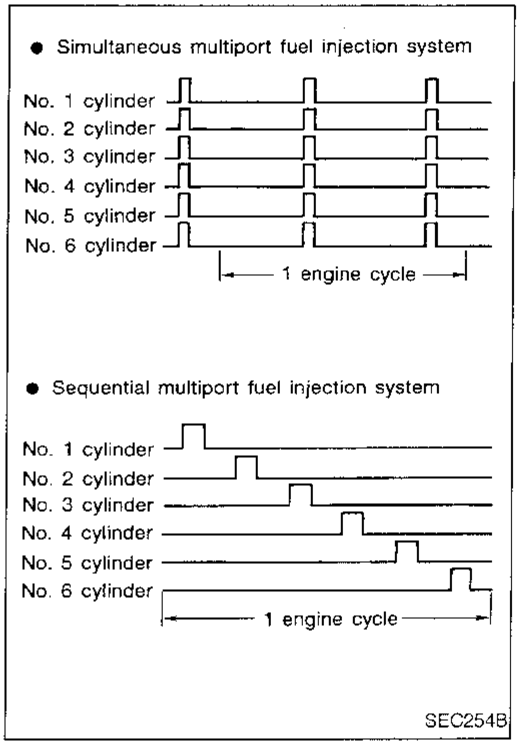
The open loop system condition refers to when the ECM detects any of the following conditions. Feedback control stops in order to maintain stabilized fuel combustion.

- Deceleration and acceleration
- High-load, high-speed operation
- Engine idling
- Malfunction of front heated oxygen sensor or its circuit
- Insufficient activation of front heated oxygen sensor 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 front heated oxygen sensor. This feedback signal is then sent to the ECM. The ECM controls the basic mixture ratio as close to the theoretical mixture ratio as possible. However, the basic mixture ratio is not necessarily controlled as originally designed. Both manufacturing differences (i.e., mass air flow sensor hot wire) and characteristic changes during operation (i.e., injector clogging) directly affect mixture ratio. Accordingly, the difference between the basic and theoretical mixture ratios is monitored in this system. This is then computed in terms of "injection pulse duration" to automatically compensate for the difference between the two ratios.
"Fuel trim" refers to the feedback compensation value compared against the basic injection duration. Fuel trim includes short term fuel trim and long term fuel trim.
"Short term fuel trim" is the short-term fuel compensation used to maintain the mixture ratio at its theoretical value. The signal from the front heated oxygen sensor 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

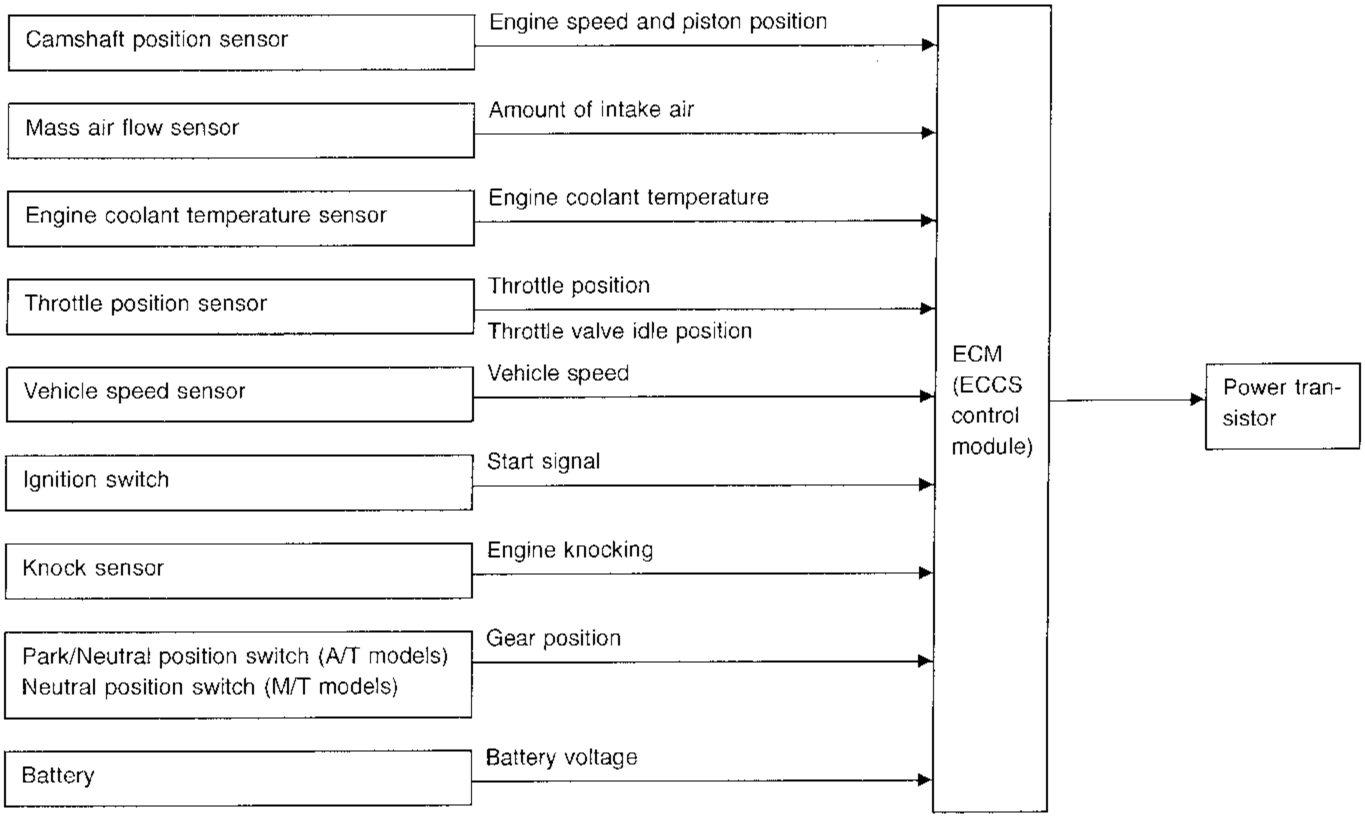
Fuel is injected simultaneously into all six cylinders twice each engine cycle. In other words, pulse signals of the same width are simultaneously transmitted from the ECM.
The six injectors will then receive the signals two times for each engine cycle.
This system is used when the engine is being started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

FUEL SHUT-OFF

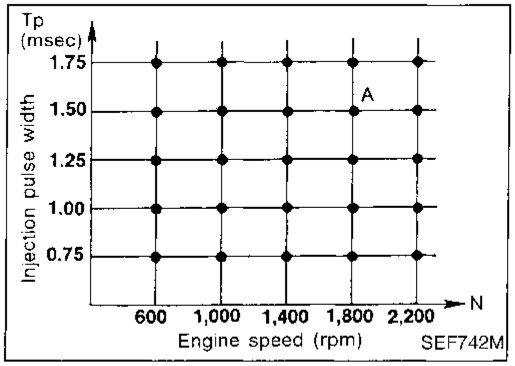
Fuel to each cylinder is cut off during deceleration or operation of the engine at excessively high speeds.

Distributor Ignition (DI) System

INPUT/OUTPUT SIGNAL LINE



Distributor Ignition (DI) System (Cont'd)



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.

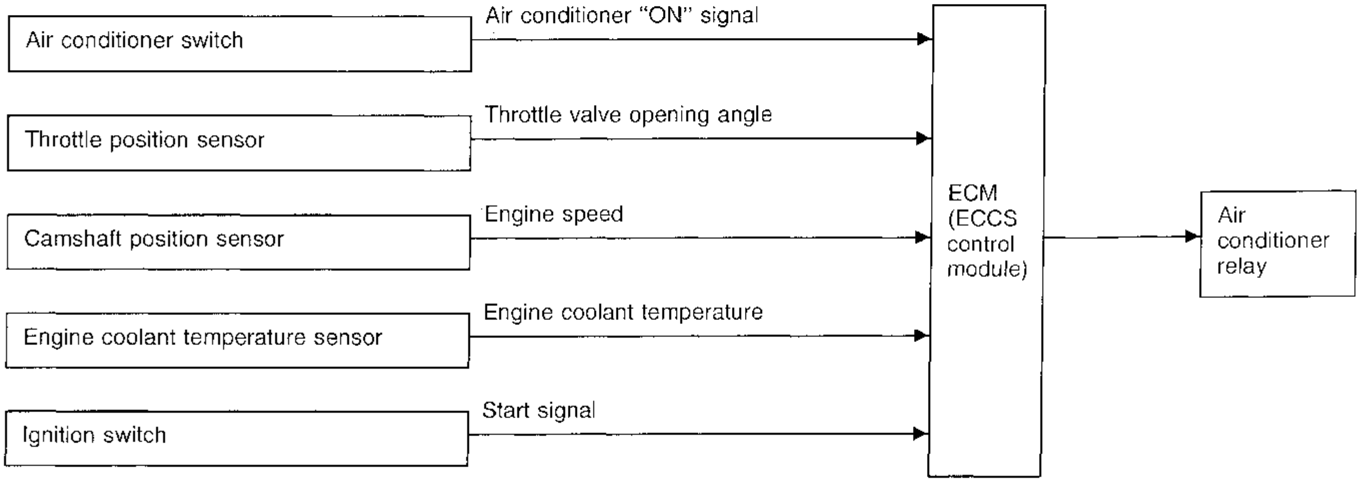
- At starting
- During warm-up
- At idle
- At low battery voltage
- During acceleration

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 (ECCS control module). The ECM retards the ignition timing to eliminate the knocking condition.

Air Conditioning Cut Control

INPUT/OUTPUT SIGNAL LINE



SYSTEM DESCRIPTION

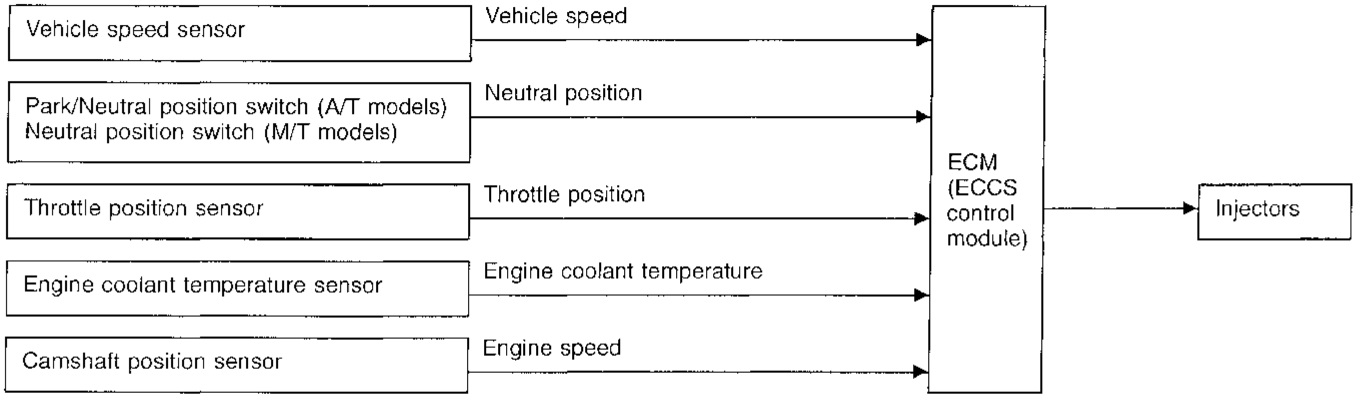
This system improves engine operation when the air conditioner is used.

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.

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

INPUT/OUTPUT SIGNAL LINE



If the engine speed is above 2,200 rpm with no load (for example, in neutral and engine speed over 2,500 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed.

Fuel cut will operate until the engine speed reaches 1,900 rpm, then fuel cut is cancelled.

NOTE:

This function is different from deceleration control listed under "Multiport Fuel Injection (MFI) System", EC-15.

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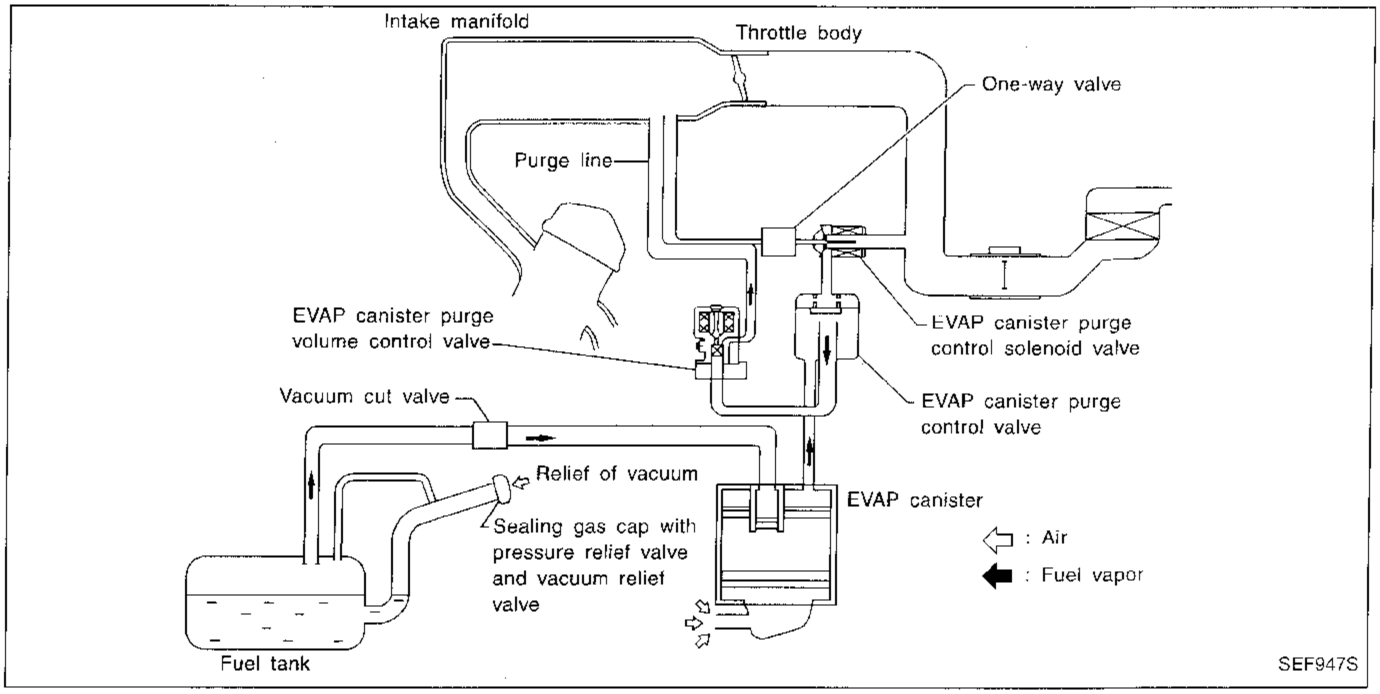


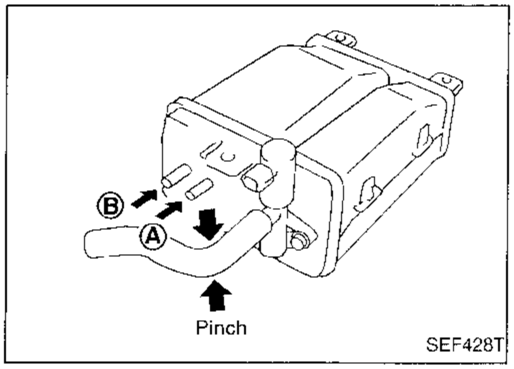
The evaporative emission system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the EVAP canister.

The fuel vapor from sealed fuel tank is led into the EVAP canister when the engine is off. The fuel vapor is then stored in the EVAP canister. The EVAP canister retains the fuel vapor until the EVAP canister is purged by air.

When the engine is running, the air is drawn through the bottom of the EVAP canister. The fuel vapor will then be led to the intake manifold.

When the engine runs at idle, the EVAP canister purge control valve is closed. Only a small amount of vapor flows into the intake manifold through the constant purge orifice.

As the engine speed increases and the throttle vacuum rises, the EVAP canister purge control valve opens. The vapor is sucked through both main purge and constant purge orifices.



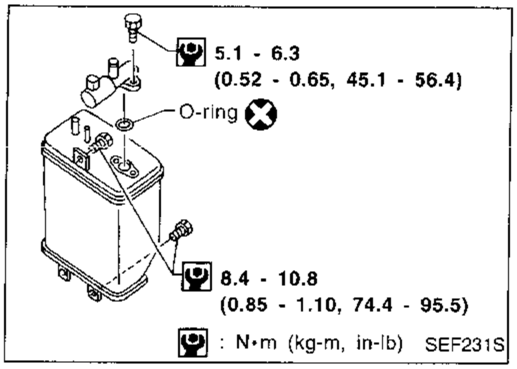
Inspection

EVAP CANISTER

Check EVAP canister as follows:

1. Pinch the fresh air hose.
2. Blow air port Ⓐ and check that it flows freely out of port Ⓑ.

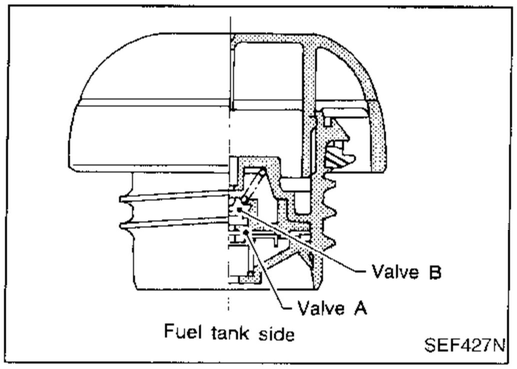
Inspection (Cont'd)

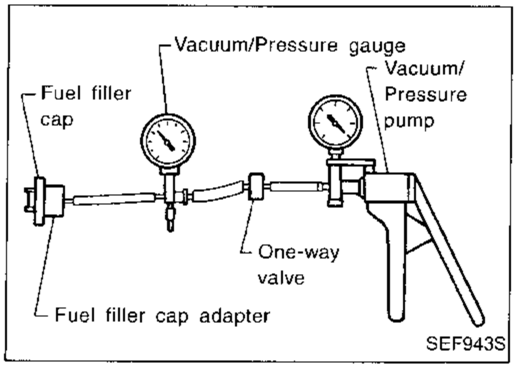


TIGHTENING TORQUE

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:

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

   Vacuum:

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

CAUTION:

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

EVAP CANISTER PURGE CONTROL VALVE

Refer to EC-230.

VACUUM CUT VALVE

Refer to EC-299.

EVAPORATIVE EMISSION (EVAP) CANISTER PURGE VOLUME CONTROL VALVE

Refer to EC-304.

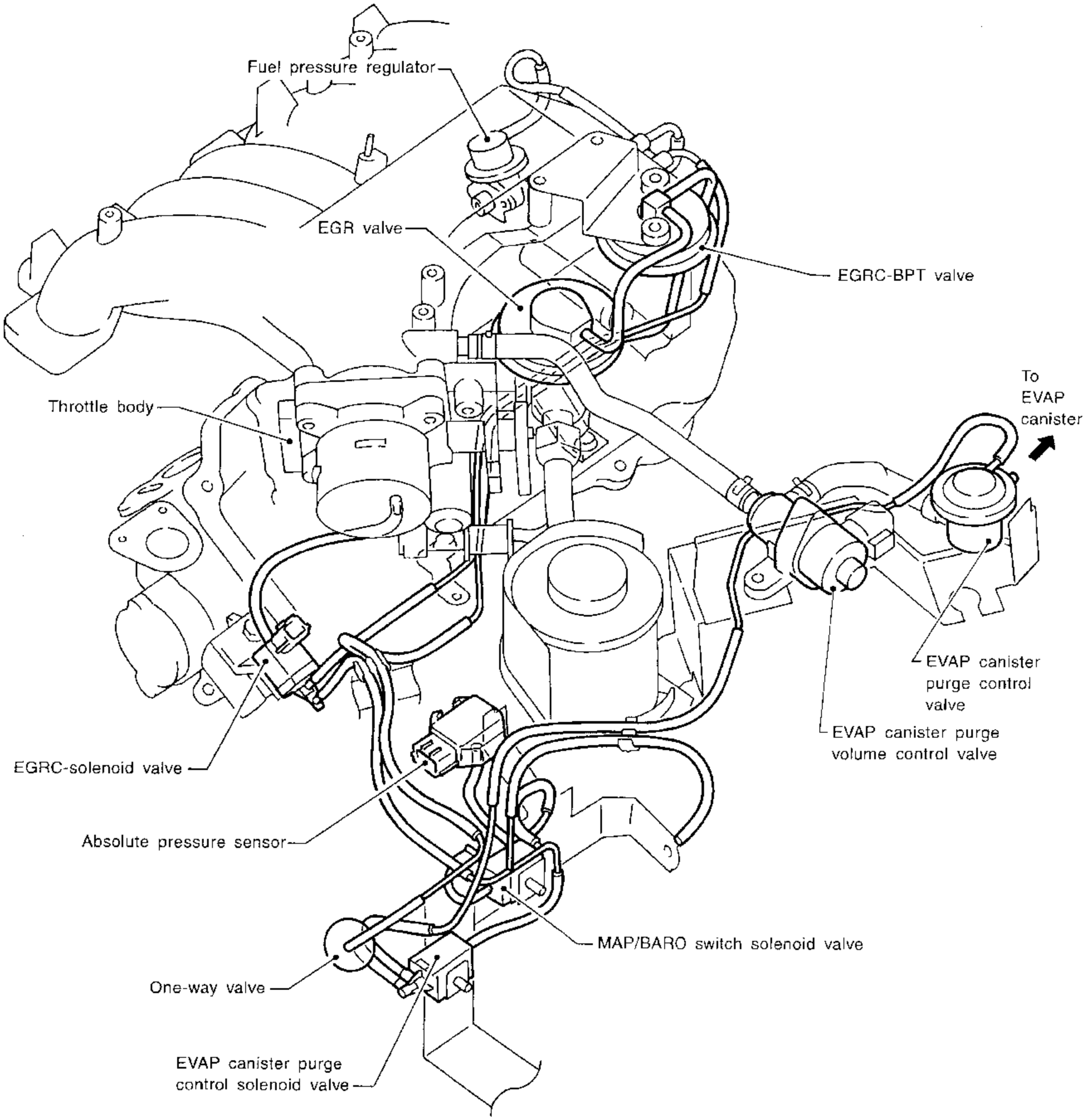
EVAPORATIVE EMISSION (EVAP) CANISTER PURGE CONTROL SOLENOID VALVE

Refer to EC-230.

TANK FUEL TEMPERATURE SENSOR

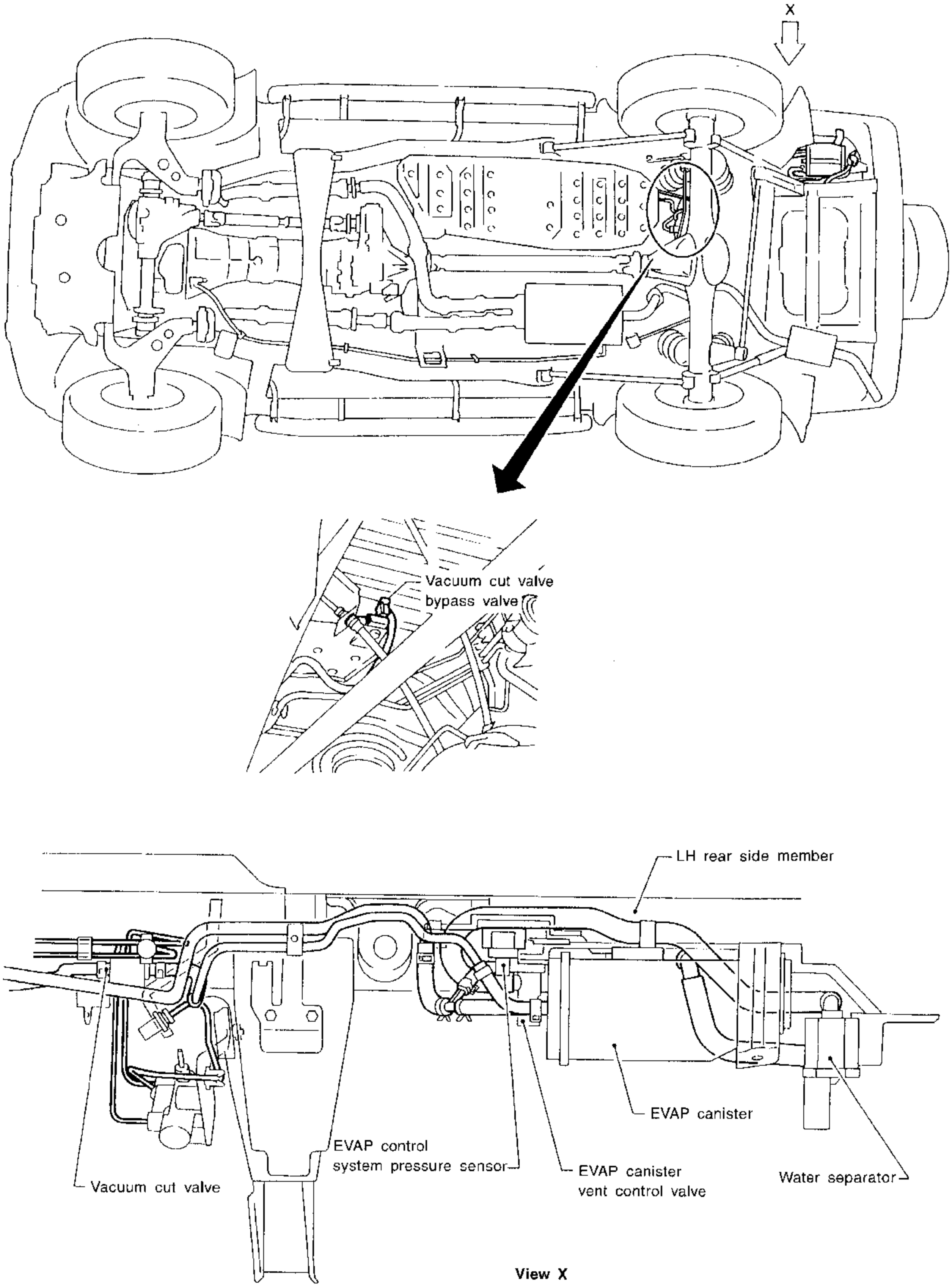
Refer to EC-188.

Evaporative Emission Line Drawing



SEF434T

Evaporative Emission Line Drawing (Cont'd)



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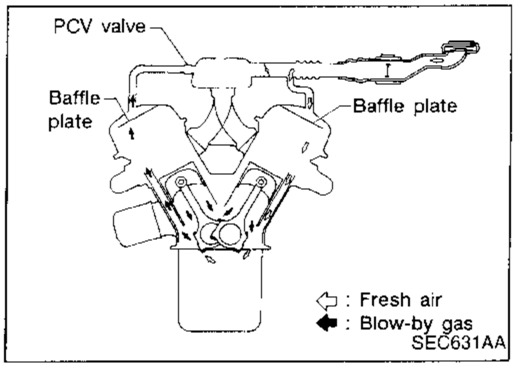
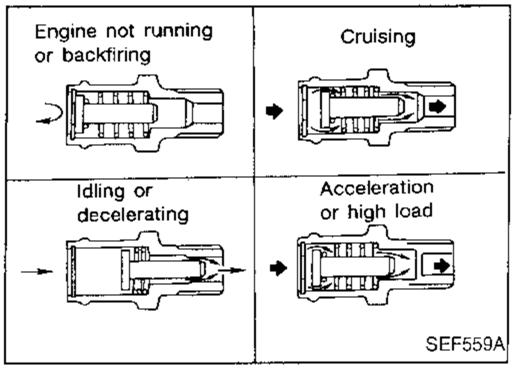




Description

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

The positive crankcase ventilation (PCV) valve is provided to conduct crankcase blow-by gas to the intake manifold.

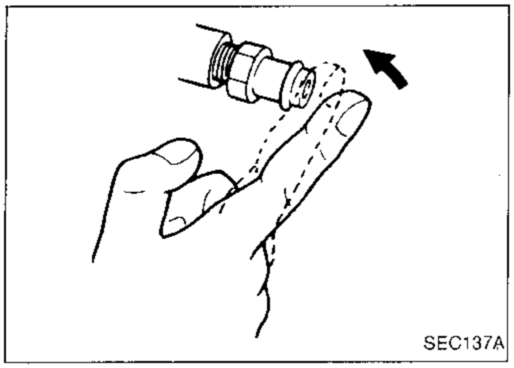
During partial throttle operation of the engine, the intake manifold sucks the blow-by gas through the PCV valve.

Normally, the capacity of the valve is sufficient to handle any blow-by and a small amount of ventilating air.

The ventilating air is then drawn from the air inlet tubes into the crankcase. In this process the air passes through the hose connecting air inlet tubes to rocker cover.

Under full-throttle condition, the manifold vacuum is insufficient to draw the blow-by flow through the valve. The flow goes through the hose connection in the reverse direction.

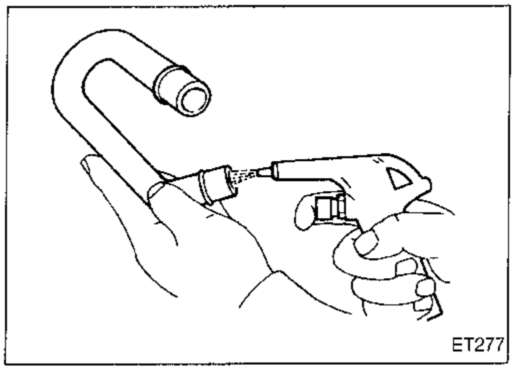
On vehicles with an excessively high blow-by, the valve does not meet the requirement. This is because some of the flow will go through the hose connection to the air inlet tubes under all conditions.



Inspection

PCV (Positive Crankcase Ventilation) VALVE

With engine running at idle, remove PCV hose from PCV valve; if the valve is working properly, a hissing noise will be heard as air passes through it and a strong vacuum should be felt immediately when a finger is placed over valve inlet.

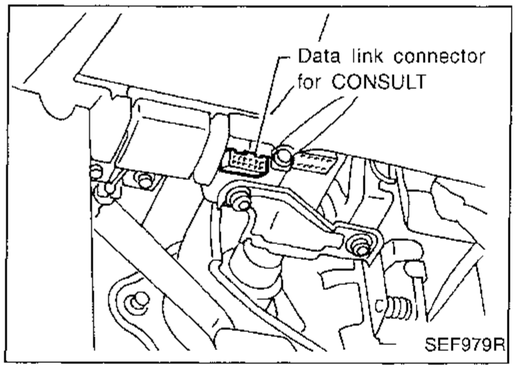


PCV HOSE

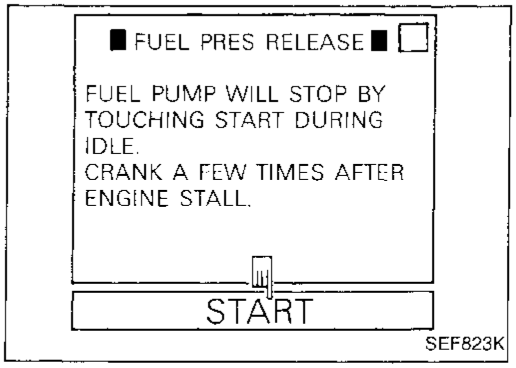
1. Check hoses and hose connections for leaks.
2. Disconnect all hoses and clean with compressed air. If any hose cannot be freed of obstructions, replace.

Fuel Pressure Release

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



SEF979R



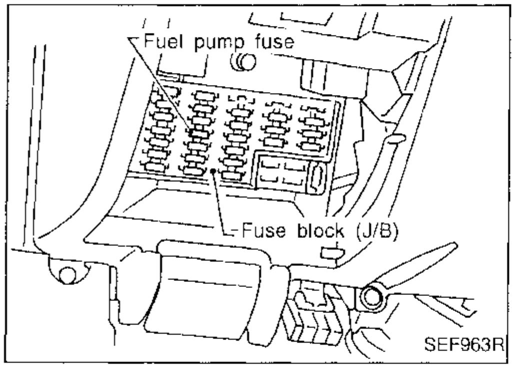
■ FUEL PRES RELEASE ■ ☐

FUEL PUMP WILL STOP BY TOUCHING START DURING IDLE.
CRANK A FEW TIMES AFTER ENGINE STALL.

START

SEF823K

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



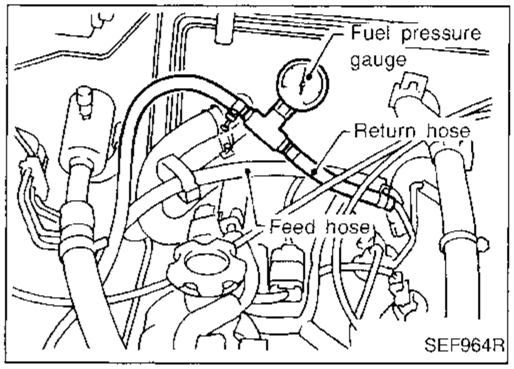
SEF963R

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

Fuel Pressure Check

- **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).



SEF964R

3. Install pressure gauge between fuel filter and fuel tube.
4. Start engine and check for fuel leakage.
5. Read the indication of fuel pressure gauge.
   At 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)
6. Stop engine and disconnect fuel pressure regulator vacuum hose from intake manifold.
7. Plug intake manifold with a rubber cap.
8. Connect variable vacuum source to fuel pressure regulator.

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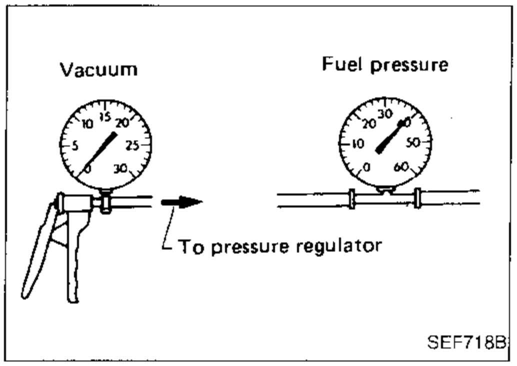
Fuel Pressure Check (Cont'd)

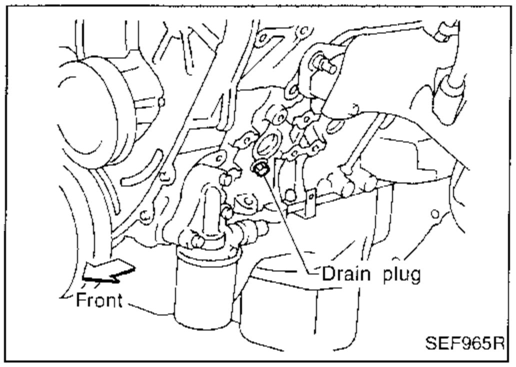


SEF718B

9. 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.

Injector Removal and Installation



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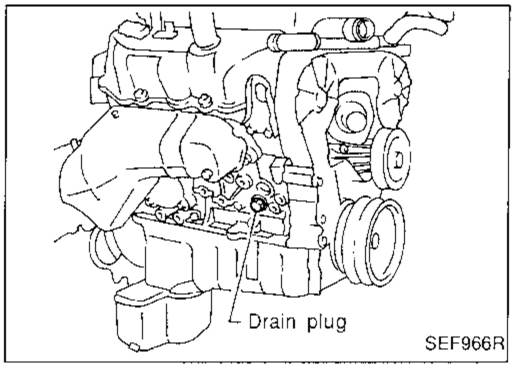
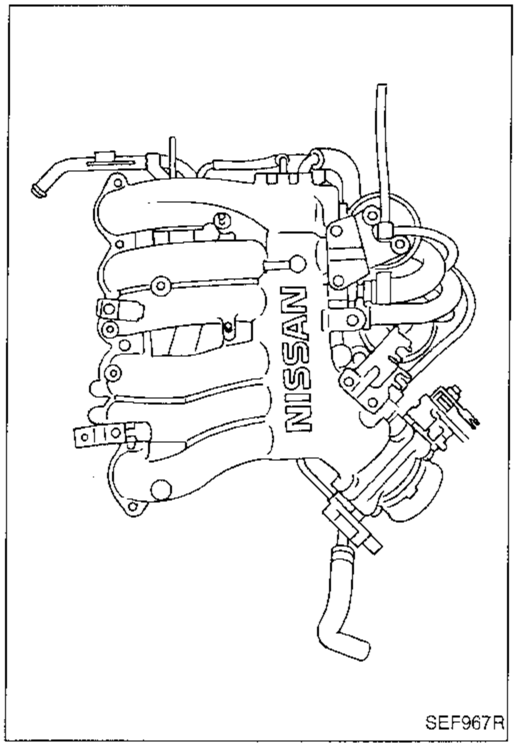


SEF966R



SEF967R

1. Release fuel pressure to zero. Refer to previous page.
2. Drain coolant by removing drain plugs from both sides of cylinder block.
3. Separate ASCD and accelerator control wire from intake manifold collector.
4. Remove intake manifold collector from engine.
   The following parts should be disconnected or removed.
   a. Harness connectors for
   - IACV-AAC valve
   - IACV-FICD solenoid valve
   - Throttle position sensor and closed throttle position switch assembly
   - EGR valve and EVAP canister purge control solenoid valve
   - EGR temperature sensor
   - Ground harness

   b. PCV hoses
   c. Vacuum hoses for
   - Brake booster
   - EGR valve and EVAP canister purge control solenoid valve
   - Fuel pressure regulator
   - EVAP canister
   - EGRC-BPT valve

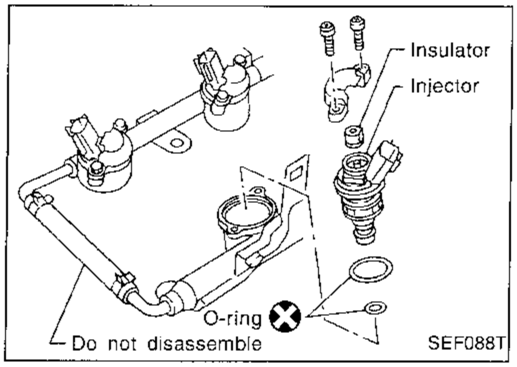
   d. Air hoses from
   - Air duct
   - IACV-AAC valve

   e. Water hoses for
   - Throttle body
   - Air relief plug

   f. EVAP canister purge hose
   g. EGR flare tube
5. Remove injector fuel tube assembly.
   The following parts should be disconnected or removed.
   - Vacuum hose for fuel pressure regulator
   - Fuel feed and return hose
   - All injectors harness connectors

- **Push injector tail piece.**
- **Do not pull on connector.**
- **Do not extract injector by pinching.**

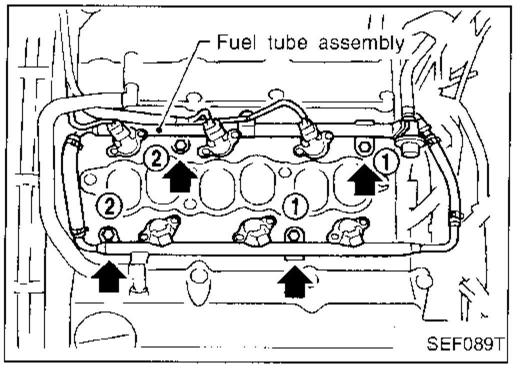
Injector Removal and Installation (Cont'd)



6. Push out any malfunctioning injector from injector fuel tube.
7. Replace or clean injector as necessary.

- **Always replace O-rings with new ones.**
- **Lubricate O-rings with engine oil.**

8. Install injector to injector fuel tube assembly.



9. Install injectors with fuel tube assembly to intake manifold.

Tighten in numerical order shown in the figure.

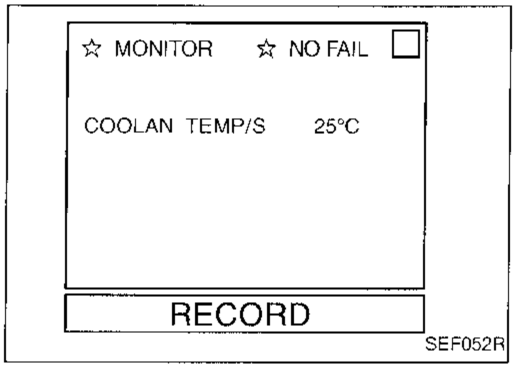
a) First, tighten all bolts to 6 to 7 N·m (0.6 to 0.7 kg-m, 4.3 to 5.1 ft-lb).
b) Then, tighten all bolts to 10.8 to 14.7 N·m (1.1 to 1.5 kg-m, 8 to 11 ft-lb).

10. Reinstall any part removed in reverse order of removal.

CAUTION:

After properly connecting fuel hose to injector and fuel tube, check connection for fuel leakage.

Fast Idle Cam (FIC) Inspection and Adjustment



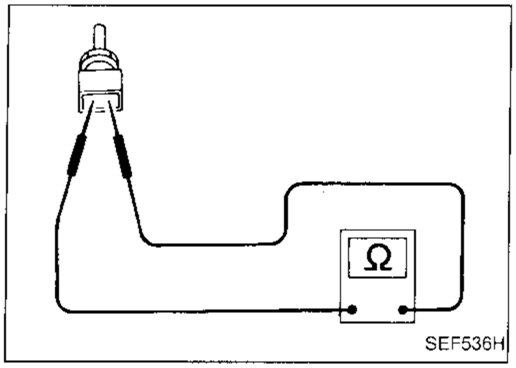
☆ MONITOR ☆ NO FAIL ☐

COOLAN TEMP/S 25°C

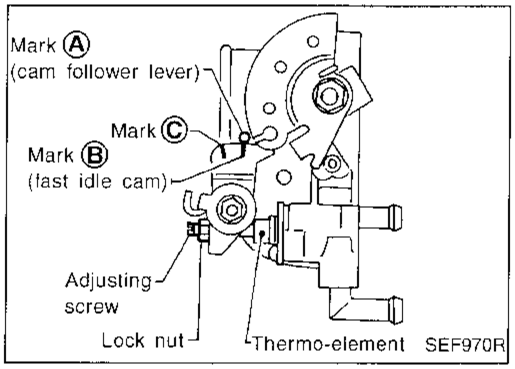
RECORD

SEF052R

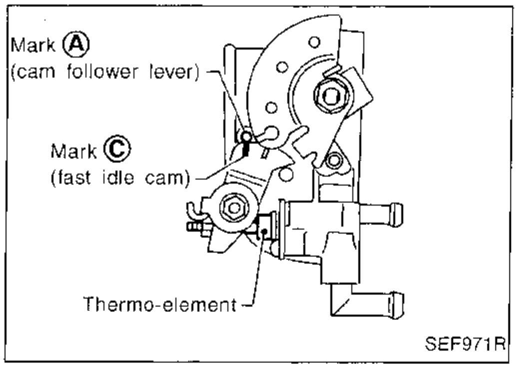
1. Turn ignition switch "ON".
2. See "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT.
3. When engine temperature is 25±5°C (77±9°F), make sure that the center of mark Ⓐ is aligned with mark Ⓑ as shown in the figure.



1. Turn ignition switch "OFF".
2. Disconnect engine temperature sensor harness connector and check resistance as shown in the figure.
3. Start engine and warm it up.
   When the resistance of engine temperature sensor is 1.65 to 2.4 kΩ, make sure that the center of mark Ⓐ is aligned with mark Ⓑ as shown in the figure.



- If NG, adjust by turning adjusting screw.
  Lock nut:
  : 0.98 - 1.96 N·m (10 - 20 kg-cm, 8.7 - 17.4 in-lb)



Fast Idle Cam (FIC) Inspection and Adjustment (Cont'd)

4. Start engine and warm it up.
5. When engine temperature is 80±5°C (176±9°F), check the following.
   - The center of mark Ⓐ is aligned with mark Ⓒ.
   - The cam follower lever's roller is not touching the fast idle cam.
5. When the resistance of engine temperature sensor is 0.26 to 0.39 kΩ, check the following.
   - The center of mark Ⓐ is aligned with mark Ⓒ.
   - The cam follower lever's roller is not touching the fast idle cam.

- If NG, replace thermo-element and perform the above inspection and adjustment again.

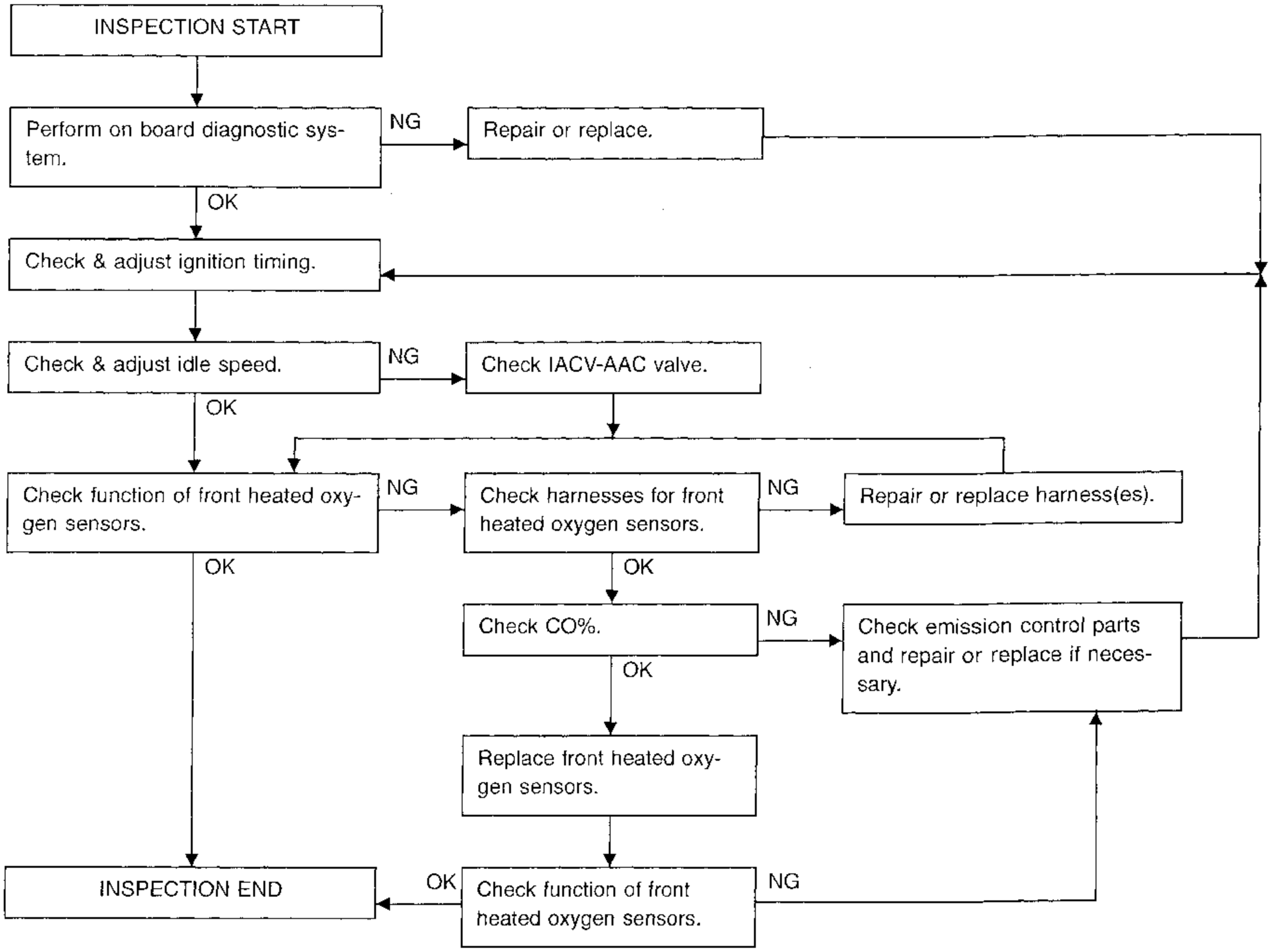
Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment

PREPARATION

1. Make sure that the following parts are in good order.
- Battery
- Ignition system
- Engine oil and coolant levels
- Fuses
- ECM harness connector
- Vacuum hoses
- Air intake system
  (Oil filler cap, oil level gauge, etc.)
- Fuel pressure
- Engine compression
- EGR valve operation
- Throttle valve
- EVAP canister purge control valve

2. On air conditioner equipped models, checks should be carried out while the air conditioner is "OFF".
3. On automatic transmission equipped models, when checking idle rpm, ignition timing and mixture ratio, checks should be carried out while shift lever is in "N" position.
4. When measuring "CO" percentage, insert probe more than 40 cm (15.7 in) into tail pipe.
5. Turn off headlamps, heater blower, rear defogger.
6. Keep front wheels pointed straight ahead.
7. Make the check after the cooling fan has stopped.

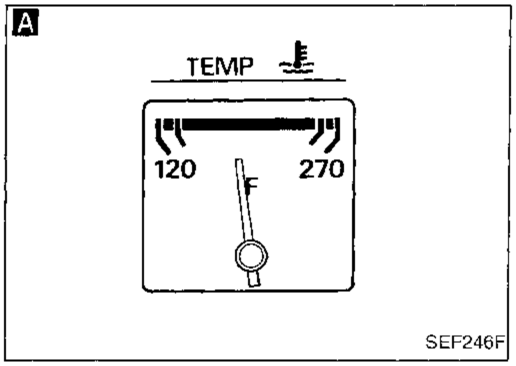
Overall inspection sequence



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

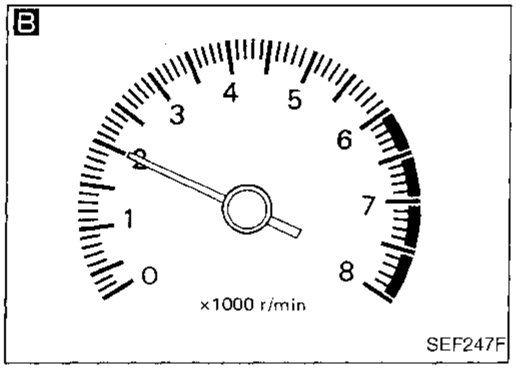
START

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



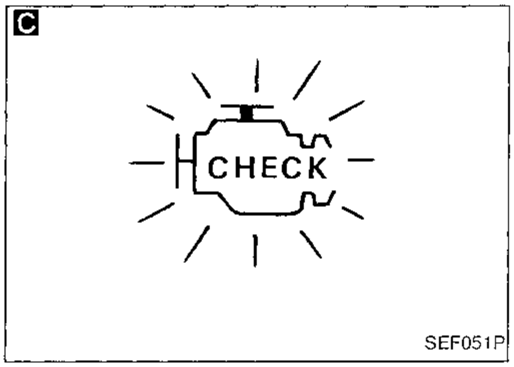
A

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



B

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

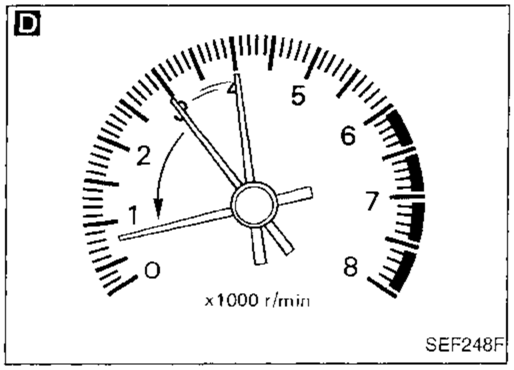


C

Perform diagnostic test mode II (Self-diagnostic results) (Diagnostic Test Mode II). Refer to EC-49.

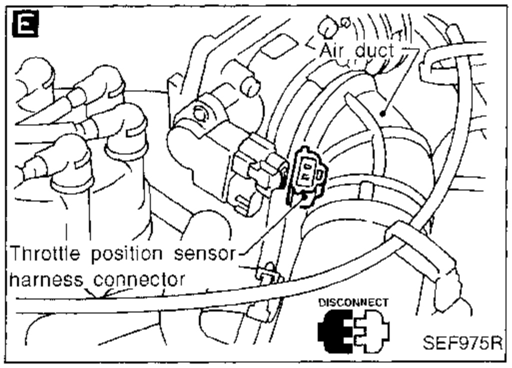
OK → D

NG → Repair or replace components as necessary. → D



D

Run engine at about 2,000 rpm for about 2 minutes under no-load.
Race engine (2,000 - 3,000 rpm) two or three times under no-load, then run engine at idle speed. ← Ⓗ



E

Turn off engine and disconnect throttle position sensor harness connector.

Start and race engine (2,000 - 3,000 rpm) two or three times under no-load, then run at idle speed.

F

Check ignition timing with a timing light.

15°±2° BTDC (in "N" position)

OK → Ⓐ

NG ↓

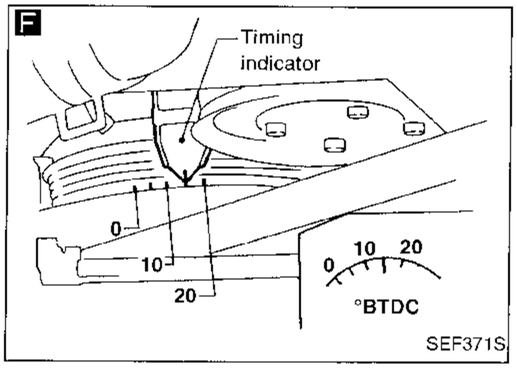
Adjust ignition timing by turning distributor after loosening securing bolts.

G

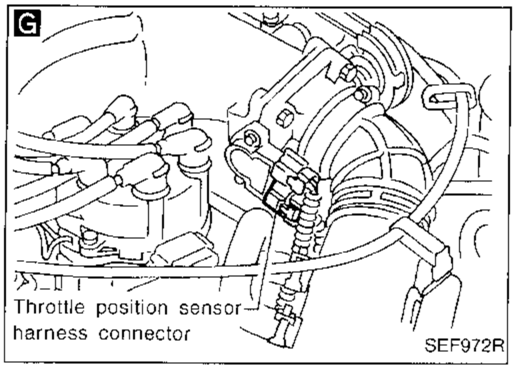
Turn off engine and connect throttle position sensor harness connector to throttle position sensor. → Ⓗ

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

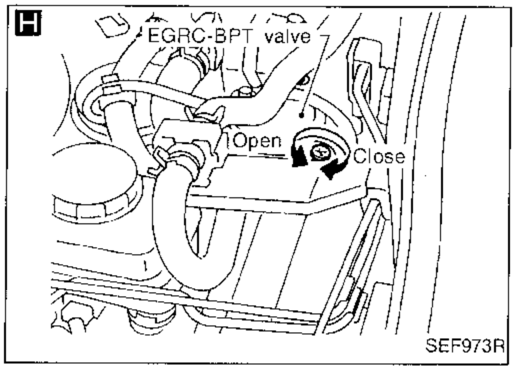
F



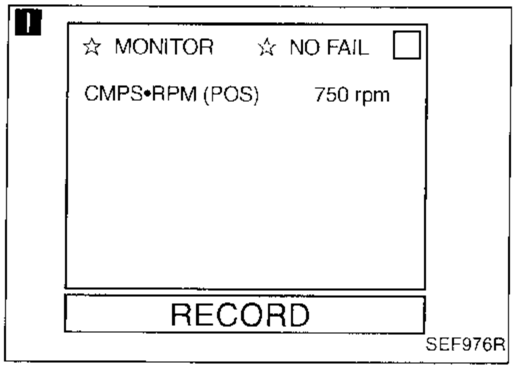
G



H



I

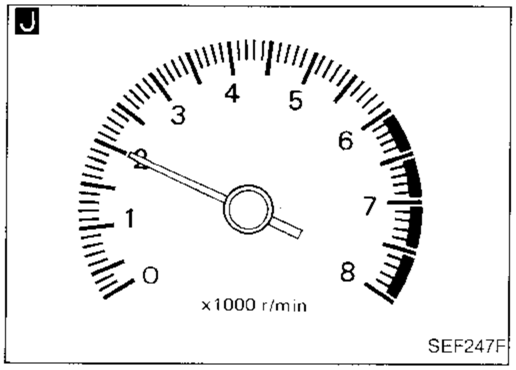


☆ MONITOR ☆ NO FAIL ☐

CMPS•RPM (POS) 750 rpm

RECORD

J



Ⓐ

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

700±50 rpm (in "N" position)

OK → go to "Turn off engine and connect throttle position sensor harness connector."

NG ↓

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

↓

H

Adjust idle speed by turning idle speed adjusting screw.
- Read idle speed in "DATA MONITOR" mode with CONSULT.
- Check idle speed.

700±50 rpm (in "N" position)

↓

Turn off engine and connect throttle position sensor harness connector.

↓

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

↓

I

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

OR

- Check idle speed.

750±50 rpm (in "N" position)

OK → go to **J**

NG ↓

Check IACV-AAC valve and replace if necessary. Refer to EC-252.

↓

Check IACV-AAC valve harness and repair if necessary. Refer to EC-252.

↓

Check ECM function* by substituting another known good ECM.

↓

J

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

↓

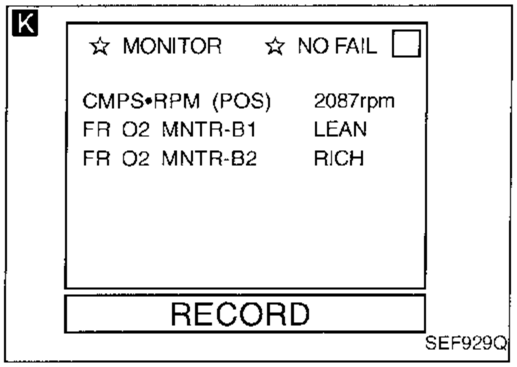
Ⓓ

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

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

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

K



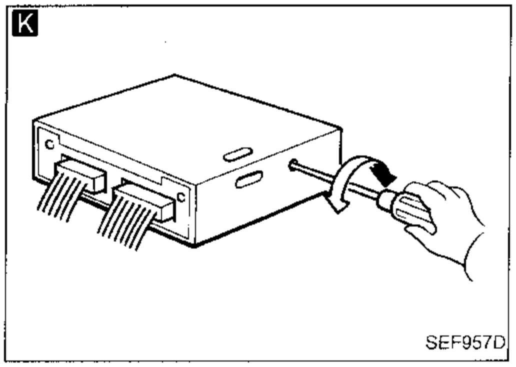
☆ MONITOR ☆ NO FAIL ☐

```
CMPS•RPM (POS)    2087rpm
FR O2 MNTR-B1     LEAN
FR O2 MNTR-B2     RICH
```

RECORD

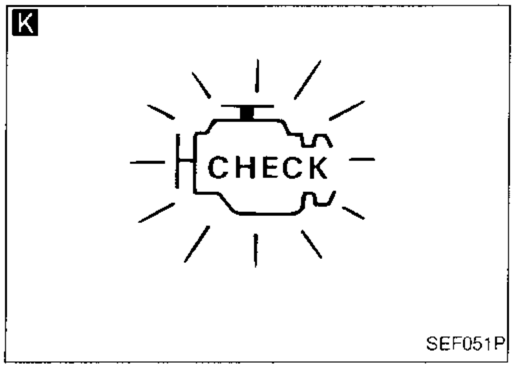
SEF929Q

K



SEF957D

K



SEF051P

Ⓓ

K

Check front heated oxygen sensor LH signal.

1. See "FR O2 MNTR-B2" in "DATA MONITOR" mode.
2. Running engine at 2,000 rpm under no-load (engine is warmed up sufficiently.), 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. Set "Left bank front heated oxygen sensor monitor" in the Diagnostic Test Mode II. Refer to EC-49.
2. Make sure that malfunction indicator lamp goes on more than 5 times during 10 seconds at 2,000 rpm.

Monitor does not fluctuate. Malfunction indicator lamp does not blink. → Ⓕ

OK → Ⓛ

Less than 5 times

Replace front heated oxygen sensor LH. ← Ⓙ

Check front heated oxygen sensor LH signal.

1. See "FR O2 MNTR-B2" in "DATA MONITOR" mode.
2. Running engine at 2,000 rpm under no-load (engine is warmed up sufficiently.), 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

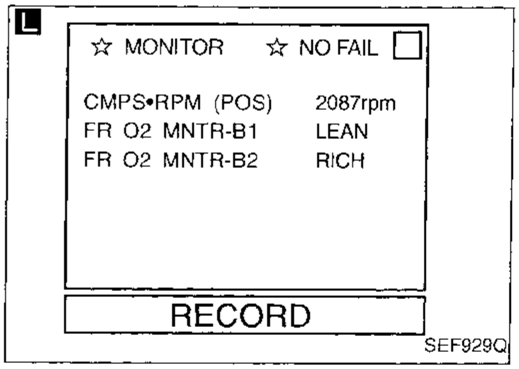
1. Set "Left bank front heated oxygen sensor monitor" in the Diagnostic Test Mode II. Refer to EC-49.
2. Make sure that malfunction indicator lamp goes on more than 5 times during 10 seconds at 2,000 rpm.

OK → Ⓛ

NG → Ⓚ

Ⓔ

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

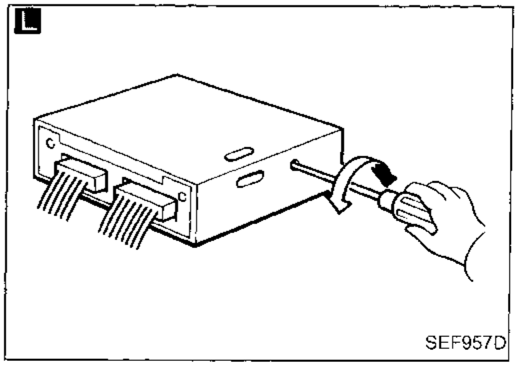


☆ MONITOR ☆ NO FAIL ☐

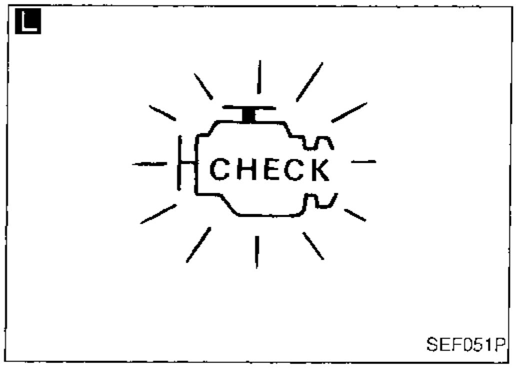
CMPS•RPM (POS)	2087rpm
FR O2 MNTR-B1	LEAN
FR O2 MNTR-B2	RICH

RECORD

SEF929Q



SEF957D



SEF051P

Ⓛ

Check front heated oxygen sensor RH signal.

1. See "FR O2 MNTR-B1" in "DATA MONITOR" mode.
2. Maintaining engine at 2,000 rpm under no-load (engine is warmed up sufficiently.), 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. Set "Right bank front heated oxygen sensor monitor" in the Diagnostic Test Mode II. Refer to EC-49.
2. Make sure that malfunction indicator lamp goes on more than 5 times during 10 seconds at 2,000 rpm.

Monitor does not fluctuate. Malfunction indicator lamp does not blink. → Ⓒ

OK → END

Less than 5 times ↓

Replace front heated oxygen sensor RH.

↓

Check front heated oxygen sensor RH signal.

1. See "FR O2 MNTR-B1" in "DATA MONITOR" mode.
2. Maintaining engine at 2,000 rpm under no-load (engine is warmed up sufficiently.), 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

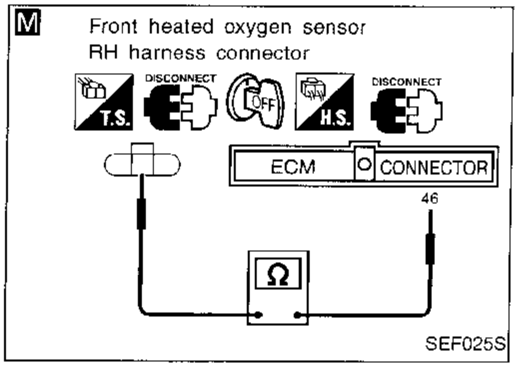
OR

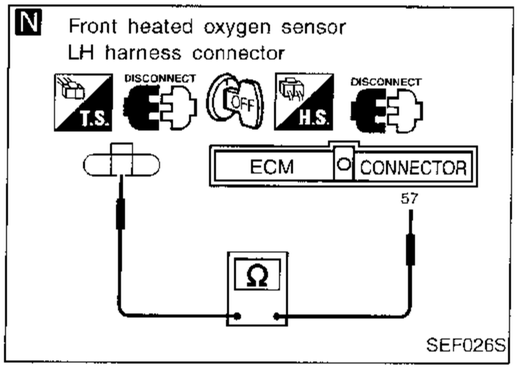
1. Set "Right bank front heated oxygen sensor monitor" in the Diagnostic Test Mode II. Refer to EC-49.
2. Make sure that malfunction indicator lamp goes on more than 5 times during 10 seconds at 2,000 rpm.

NG → Ⓔ

OK → END

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





M

Ⓒ

Check front heated oxygen sensor RH harness:
1. Turn off engine and disconnect battery ground cable.
2. Disconnect ECM SMJ harness connector from ECM.
3. Disconnect front heated oxygen sensor RH harness connector.
4. Check for continuity between terminal No. ㊻ of ECM SMJ harness connector and harness connector for front heated oxygen sensor RH.

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

OK

NG

Repair or replace harness. → Ⓘ

Connect ECM SMJ harness connector to ECM.

N

Ⓕ

Check front heated oxygen sensor LH harness:
1. Turn off engine and disconnect battery ground cable.
2. Disconnect ECM SMJ harness connector from ECM.
3. Disconnect front heated oxygen sensor LH harness connector.
4. Check for continuity between terminal No. (57) of ECM SMJ harness connector and harness connector for front heated oxygen sensor LH.

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

OK

NG

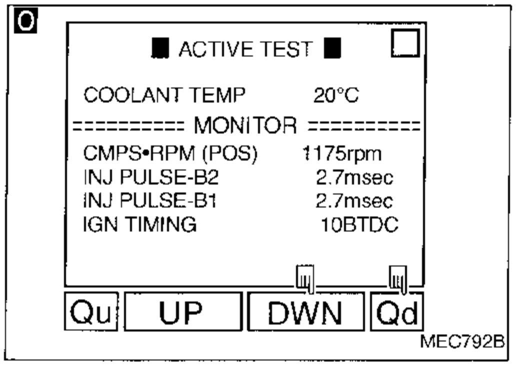
Repair or replace harness. → Ⓘ

Connect ECM SMJ harness connector to ECM.

Ⓖ

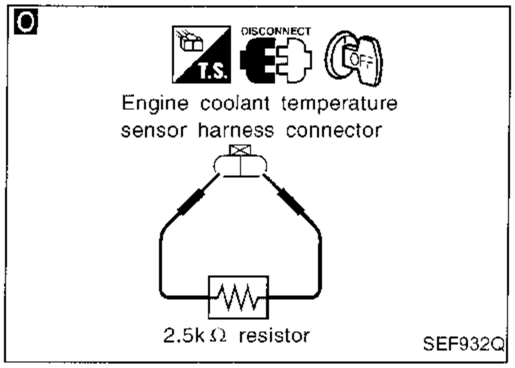
Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment (Cont'd)

O


■ ACTIVE TEST ■
COOLANT TEMP 20°C
========== MONITOR ==========
CMPS•RPM (POS) 1175rpm
INJ PULSE-B2 2.7msec
INJ PULSE-B1 2.7msec
IGN TIMING 10BTDC

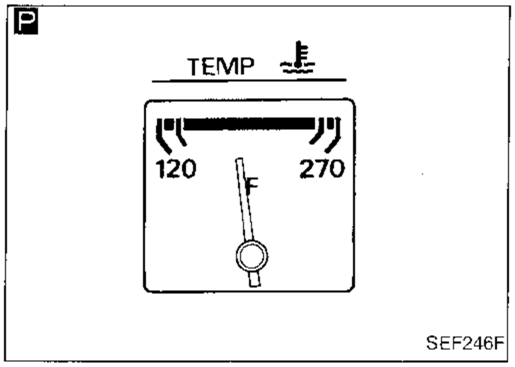
MEC792B

O



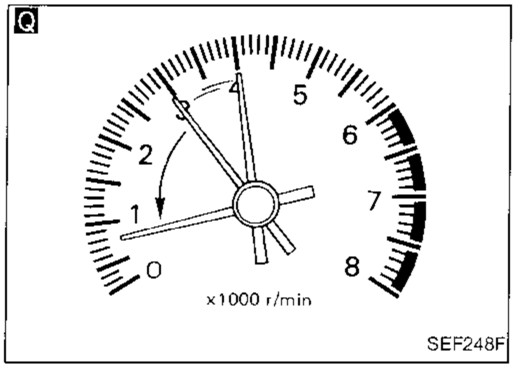
SEF932Q

P



SEF246F

Q



SEF248F

Ⓖ

O

1. Select "COOLANT TEMP" in "ACTIVE TEST" mode.
2. Set "COOLANT TEMP" to 20°C (68°F) by touching "DWN" and "Qd".

OR

1. Disconnect engine coolant temperature sensor harness connector.
2. Connect a resistor (2.5 kΩ) between terminals of engine coolant temperature sensor harness connector.

P

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

Q

Race engine (2,000 - 3,000 rpm) two or three times under no-load, then run engine at idle speed.

Check "CO" %.

Idle CO: 0.2 - 8%

After checking CO%,
1. Disconnect the resistor from terminals of engine coolant temperature sensor.
2. Connect engine coolant temperature sensor harness connector to engine coolant temperature sensor.

OK → Ⓙ

NG

Connect front heated oxygen sensor harness connectors to front heated oxygen sensor.

Check fuel pressure regulator. Refer to EC-25. ← Ⓚ

Check mass air flow sensor and its circuit. Refer to EC-99.

Check injector and its circuit. Refer to EC-321.
Clean or replace if necessary.

Check engine coolant temperature sensor and its circuit. Refer to EC-116.

Check ECM function* by substituting another known good ECM. → Ⓗ

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

Introduction

The ECM (ECCS control module) 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)	○	○*1				
CONSULT	○	○	○	○	○	○
GST	○	○*2	○		○	○

*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-77.).

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.

Items	MIL			DTC		1st trip DTC	
	1st trip		2nd trip lighting up	1st trip displaying	2nd trip displaying	1st trip displaying	2nd trip displaying
	Blinking	Lighting up					
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0306 (0701, 0603 - 0608) is being detected	X			X		X	
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0306 (0701, 0603 - 0608) has been detected		X		X		X	
Closed loop control — DTC: P0130 (0307), P0150 (0308)		X		X		X	
Fail-safe items (Refer to EC-77.)		X		X*1		X*1	
Except above			X		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 first trip DTC did not reoccur, the first 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 first 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 first 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-46.
For malfunctions in which 1st trip DTCs are displayed, refer to EC-44. 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.
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-72. Then perform "DTC confirmation procedure" or "Overall function check" to try to duplicate the problem. If the malfunction is duplicated, the item requires repair.

How to read DTC and 1st trip DTC

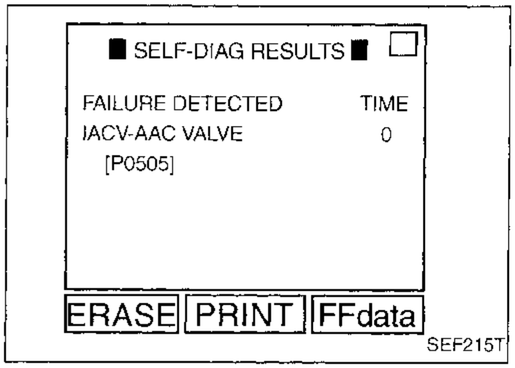
DTC and 1st trip DTC can be read by the following methods.

(NO TOOLS) 1. The number of blinks of the malfunction indicator lamp in the Diagnostic Test Mode II (Self-Diagnostic Results) Examples: 0101, 0201, 1003, 1104, etc.
These DTCs are controlled by NISSAN.

2. CONSULT or GST (Generic Scan Tool) Examples: P0340, P1320, P0705, P0750, etc.
These DTCs are prescribed by SAE J2012.

(GST) (CONSULT 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 can identify malfunction status as shown below. Therefore, using CONSULT (if available) is recommended.



■ SELF-DIAG RESULTS ■ ☐

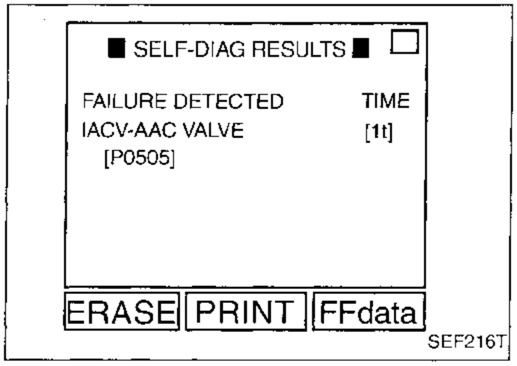
FAILURE DETECTED	TIME
IACV-AAC VALVE [P0505]	0

SEF215T

A sample of CONSULT display for DTC is shown at left. DTC or 1st trip DTC of a malfunction is displayed in SELF-DIAGNOSTIC RESULTS mode of CONSULT. 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".

Emission-related Diagnostic Information (Cont'd)

If a 1st trip DTC is stored in the ECM, the time data will be "[1t]".



FAILURE DETECTED TIME
IACV-AAC VALVE [1t]
[P0505]

SEF216T

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 and vehicle speed 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 or GST. The 1st trip freeze frame data can only be displayed on the CONSULT screen, not on the GST. For details, see EC-59.
Only one set of freeze frame data (either 1st trip freeze frame data of freeze frame data) can be stored in the ECM. 1st trip freeze frame data is stored in the ECM memory along with the 1st trip DTC. There is no priority for 1st trip freeze frame data and it is updated each time a different 1st trip DTC is detected. However, once freeze frame data (2nd trip detection/MIL on) is stored in the ECM memory, 1st trip freeze frame data is no longer stored. Remember, only one set of freeze frame data can be stored in the ECM. The ECM has the following priorities to update the data.

Priority	Items	
1	Freeze frame data	Misfire — DTC: P0300 - P0306 (0701, 0603 - 0608) Fuel Injection System Function — DTC: P0171 (0115), P0172 (0114), P0174 (0210), P0175 (0209)
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-46.

SYSTEM READINESS TEST (SRT) CODE

System Readiness Test (SRT) code is specified in Mode 1 of SAE J1979. It indicates whether the self-diagnostic tests for non-continuously monitored items have been completed or not.
Inspection/Maintenance (I/M) tests of the on board diagnostic (OBD) II system may become the legal requirements in some states/areas. All SRT codes must be set in this case. Unless all SRT codes are set, conducting the I/M test may not be allowed.
SRT codes are set after self-diagnosis has been performed two or more times. This occurs regardless of whether the diagnosis is in "OK" or "NG", and whether or not the diagnosis is performed in consecutive trips.
The following table lists the five SRT items (9 test items) for the ECCS used in R50 models.

Emission-related Diagnostic Information (Cont'd)

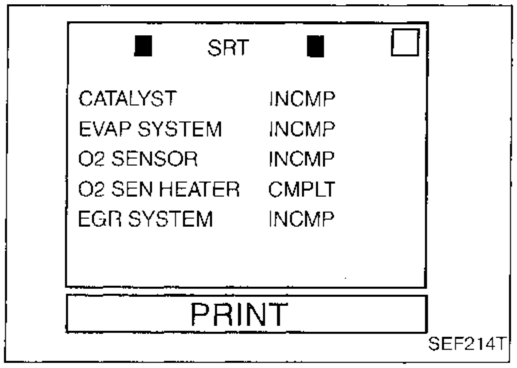
SRT items	Self-diagnostic test items
Catalyst monitoring	• Three way catalyst function (right bank) P0420 (0702) • Three way catalyst function (left bank) P0430 (0703)
EVAP system monitoring	• EVAP control system (Small Leak) P0440 (0705) • EVAP control system purge flow monitoring P1447 (0111)
Oxygen sensor monitoring	• Front heated oxygen sensor (right bank) P0130 (0503) • Rear heated oxygen sensor (right bank) P0136 (0707) • Front heated oxygen sensor (left bank) P0150 (0303) • Rear heated oxygen sensor (left bank) P0156 (0708)
Oxygen sensor heater monitoring	• Front heated oxygen sensor heater (right bank) P0135 (0901) • Rear heated oxygen sensor heater (right bank) P0141 (0902) • Front heated oxygen sensor heater (left bank) P0155 (1001) • Rear heated oxygen sensor heater (left bank) P0161 (1002)
EGR system monitoring	• EGR function P0400 (0302) • EGRC-BPT valve function P0402 (0306)

Together with the DTC, the SRT code is cleared from the ECM memory using the method described later (Refer to EC-46). In addition, after ECCS components/system are repaired or if the battery terminals remain disconnected for more than 24 hours, all SRT codes may be cleared from the ECM memory.

How to display SRT code

1. Selecting "SRT" in "SRT·OBD TEST VALUE" mode with CONSULT
   For items whose SRT codes are set, a "CMPLT" is displayed on the CONSULT screen; for items whose SRT codes are not set, "INCMP" is displayed.

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



```
■    SRT    ■        ☐
CATALYST         INCMP
EVAP SYSTEM      INCMP
O2 SENSOR        INCMP
O2 SEN HEATER    CMPLT
EGR SYSTEM       INCMP
```

A sample of CONSULT 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

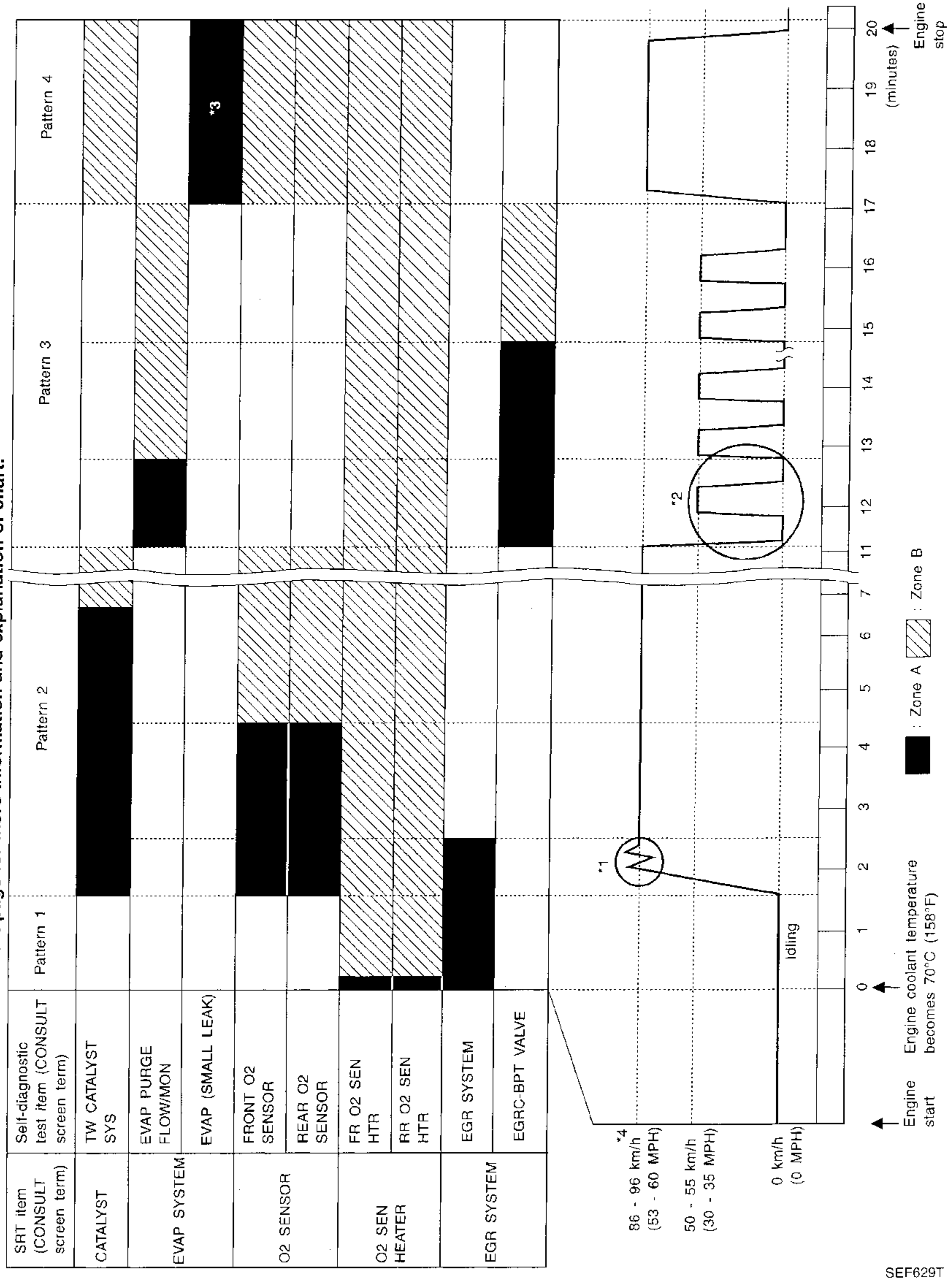
To set all SRT codes, self-diagnosis for the items indicated above must be performed two or more times. Each diagnosis may require a long period of actual driving under various conditions. The most efficient driving pattern in which SRT codes can be properly set is explained on the next page. The driving pattern should be performed two times or more to set all SRT codes.

Emission-related Diagnostic Information (Cont'd)

Driving pattern

Driving pattern

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



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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 −10 to 35°C (14 to 95°F) (where the voltage between the ECM terminals (51) and ㊿ is 3.0 - 4.3V).
- The engine must be operated at idle speed until the engine coolant temperature is greater than 70°C (158°F) (where the voltage between the ECM terminals (51) and ㊿ is lower than 1.4V).

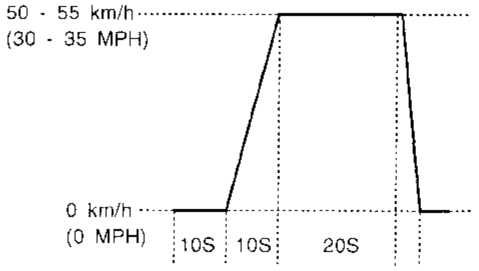
Pattern 2:
- When steady-state driving is performed again even after it is interrupted, each diagnosis can be conducted. In this case, the time required for diagnosis may be extended.

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 12 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.



SEF414S

*3: The driving pattern may be omitted when EVAP (SMALL LEAK) checks are performed using the FUNCTION TEST mode of CONSULT.

*4: Checking the vehicle speed with CONSULT or GST is advised.

Suggested transmission gear position for A/T models.

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

Suggested upshift speeds for M/T models

Shown below are suggested vehicle speeds for shifting into a higher gear. These suggestions relate to fuel economy and vehicle performance. Actual upshift speeds will vary according to road conditions, 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 high altitude areas [over 1,219 m (4,000 ft)] and quick acceleration in low altitude areas:

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 (30)
2nd	95 (60)
3rd	145 (90)
4th	—
5th	—

Emission-related Diagnostic Information (Cont'd)

TEST VALUE AND TEST LIMIT

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 CONSULT screen or GST.

SRT item (CONSULT display)	Self-diagnostic test item	TID*1	CID*1	Test value	Test limit	Display
CATALYST	Three way catalyst function (Right bank)	01H	01H	Parameter 1	Max.	○
	Three way catalyst function (Left bank)	03H	02H	Parameter 1	Max.	○
EVAP SYSTEM	EVAP control system (Small leak)	05H	03H	Parameter 1	Max.	—
	EVAP control system purge flow monitoring	06H	83H	Parameter 2	Min.	—
O2 SENSOR	Front heated oxygen sensor (Right bank)	09H	04H	Parameter 1	Max.	○
		0AH	84H	Parameter 2	Min.	○
		0BH	04H	Parameter 3	Max.	○
		0CH	04H	Parameter 4	Max.	○
		0DH	04H	Parameter 5	Max.	○
	Front heated oxygen sensor (Left bank)	11H	05H	Parameter 1	Max.	○
		12H	85H	Parameter 2	Min.	○
		13H	05H	Parameter 3	Max.	○
		14H	05H	Parameter 4	Max.	○
		15H	05H	Parameter 5	Max.	○
	Rear heated oxygen sensor (Right bank)	19H	86H	Parameter 6	Min.	○
		1AH	86H	Parameter 7	Min.	○
		1BH	06H	Parameter 8	Max.	○
		1CH	06H	Parameter 9	Max.	○
	Rear heated oxygen sensor (Left bank)	21H	87H	Parameter 6	Min.	○
		22H	87H	Parameter 7	Min.	○
		23H	07H	Parameter 8	Max.	○
		24H	07H	Parameter 9	Max.	○

Emission-related Diagnostic Information (Cont'd)

SRT item (CONSULT display)	Self-diagnostic test item	TID*1	CID*1	Test value	Test limit	Display
O2 SENSOR HEATER	Front heated oxygen sensor heater (Right bank)	29H	08H	Parameter 1	Max.	○
		2AH	88H	Parameter 1	Min.	○
	Front heated oxygen sensor heater (Left bank)	2BH	09H	Parameter 1	Max.	○
		2CH	89H	Parameter 1	Min.	○
	Rear heated oxygen sensor heater (Right bank)	2DH	0AH	Parameter 1	Max.	○
		2EH	8AH	Parameter 1	Min.	○
	Rear heated oxygen sensor heater (Left bank)	2FH	0BH	Parameter 1	Max.	○
		30H	8BH	Parameter 1	Min.	○
EGR SYSTEM	EGR function	31H	8CH	Parameter 1	Min.	○
		32H	8CH	Parameter 2	Min.	○
		33H	8CH	Parameter 3	Min.	○
		34H	8CH	Parameter 4	Min.	○
		35H	0CH	Parameter 5	Max.	○
	EGRC-BPT valve function	36H	0CH	Parameter 6	Max.	—
		37H	8CH	Parameter 7	Min.	—

*1: TID and CID are hexadecimals and are shown only on GST.

Emission-related Diagnostic Information (Cont'd)

EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS

X: Applicable
—: Not applicable

Items (CONSULT screen terms)	DTC*4		SRT code	Test value/ Test limit	1st trip DTC	Reference page
	CONSULT GST*2	ECM*1				
NO SELF DIAGNOSTIC FAILURE INDICATED	**P0000**	**0505**	—	—	—	—
MASS AIR FLOW SEN	P0100	0102	—	—	X	EC-99
ABSOL PRESS SENSOR	P0105	0803	—	—	X	EC-105
INT AIR TEMP SEN	P0110	0401	—	—	X	EC-111
COOLANT TEMP SEN	P0115	0103	—	—	X	EC-116
THROTTLE POSI SEN	P0120	0403	—	—	X	EC-121
*COOLANT TEMP SEN	P0125	0908	—	—	X	EC-127
CLOSED LOOP	P0130	0307	—	—	X	EC-132
FRONT O2 SENSOR-B1	P0130	0503	X	X	X*3	EC-133
FR O2 SEN HTR-B1	P0135	0901	X	X	X*3	EC-138
REAR O2 SENSOR-B	P0136	0707	X	X	X*3	EC-142
RR O2 SEN HTR-B1	P0141	0902	X	X	X*3	EC-146
FRONT O2 SENSOR-B2	P0150	0303	X	X	X*3	EC-151
FR O2 SEN HTR-B2	P0155	1001	X	X	X*3	EC-156
REAR O2 SENSOR-B2	P0156	0708	X	X	X*3	EC-160
RR O2 SEN HTR-B2	P0161	1002	X	X	X*3	EC-164
FUEL SYS LEAN/B1	P0171	0115	—	—	X	EC-168
FUEL SYS RICH/B1	P0172	0114	—	—	X	EC-173
FUEL SYS LEAN/B2	P0174	0210	—	—	X	EC-178
FUEL SYS RICH/B2	P0175	0209	—	—	X	EC-183
TANK FUEL TEMP SEN	P0180	0402	—	—	X	EC-188
MULTI CYL MISFIRE	P0300	0701	—	—	X	EC-191
CYL 1 MISFIRE	P0301	0608	—	—	X	EC-191
CYL 2 MISFIRE	P0302	0607	—	—	X	EC-191
CYL 3 MISFIRE	P0303	0606	—	—	X	EC-191
CYL 4 MISFIRE	P0304	0605	—	—	X	EC-191
CYL 5 MISFIRE	P0305	0604	—	—	X	EC-191
CYL 6 MISFIRE	P0306	0603	—	—	X	EC-191
KNOCK SENSOR	P0325	0304	—	—	X	EC-195
CRANK POS SEN (OBD)	P0335	0802	—	—	X	EC-198
CAMSHAFT POSI SEN	P0340	0101	—	—	X	EC-203
EGR SYSTEM	P0400	0302	X	X	X*3	EC-209
EGRC-BPT valve	P0402	0306	X	X	X*3	EC-217
TW CATALYST SYS	P0420	0702	X	X	X*3	EC-219
EVAP (SMALL LEAK)	P0440	0705	X	X	X*3	EC-222

*1: In Diagnostic Test Mode II (Self-diagnostic results). These numbers are controlled by NISSAN.
*2: These numbers are prescribed by SAE J2012.
*3: These are not displayed with GST.
*4: 1st trip DTC No. is the same as DTC No.

Emission-related Diagnostic Information (Cont'd)

X: Applicable
—: Not applicable

Items (CONSULT screen terms)	DTC*4		SRT code	Test value/ Test limit	1st trip DTC	Reference page
	CONSULT GST*2	ECM*1				
PURG CONT/V & S/V	P0443	0807	—	—	X	EC-230
VENT CONTROL VALVE	P0446	0903	—	—	X	EC-238
EVAP SYS PRES SEN	P0450	0704	—	—	X	EC-243
VEHICLE SPEED SEN	P0500	0104	—	—	X	EC-248
IACV-AAC VALVE	P0505	0205	—	—	X	EC-252
CLOSED THRL POS SW	P0510	0203	—	—	X	EC-257
A/T COMM LINE	P0600	—	—	—	—	EC-261
ECM	P0605	0301	—	—	X	EC-264
PARK/NEUT POSI SW	P0705	1003	—	—	X	EC-266
INHIBITOR SWITCH	P0705	1101	—	—	X	AT-55
FLUID TEMP SENSOR	P0710	1208	—	—	X	AT-61
VHCL SPEED SEN A/T	P0720	1102	—	—	X	AT-64
ENGINE SPEED SIG	P0725	1207	—	—	X	AT-66
A/T 1ST SIGNAL	P0731	1103	—	—	X	AT-68
A/T 2ND SIGNAL	P0732	1104	—	—	X	AT-71
A/T 3RD SIGNAL	P0733	1105	—	—	X	AT-73
A/T 4TH SIG OR TCC	P0734	1106	—	—	X	AT-75
TOR CONV CLUTCH SV	P0740	1204	—	—	X	AT-80
A/T TCC SIGNAL	P0744	1107	—	—	X	AT-83
LINE PRESSURE S/V	P0745	1205	—	—	X	AT-88
SHIFT SOLENOID/V A	P0750	1108	—	—	X	AT-91
SHIFT SOLENOID/V B	P0755	1201	—	—	X	AT-94
MAP/BARO SW SOL/V	P1105	1302	—	—	X	EC-273
IGN SIGNAL-PRIMARY	P1320	0201	—	—	X	EC-279
CRANK P/S (OBD) COG	P1336	0905	—	—	X	EC-285
EGRC SOLENOID/V	P1400	1005	—	—	X	EC-290
EGR TEMP SENSOR	P1401	0305	—	—	X	EC-295
VC/V BYPASS/V	P1441	0801	—	—	X	EC-299
PURG VOLUME CONT/V	P1445	1008	—	—	X	EC-304
EVAP PURG FLOW/MON	P1447	0111	X	X	X*3	EC-311
A/T DIAG COMM LINE	P1605	0804	—	—	X	EC-318
THRTL POSI SEN A/T	P1705	1206	—	—	X	AT-97
OVERRUN CLUTCH S/V	P1760	1203	—	—	X	AT-99

*1: In Diagnostic Test Mode II (Self-diagnostic results). These numbers are controlled by NISSAN.
*2: These numbers are prescribed by SAE J2012.
*3: These are not displayed with GST.
*4: 1st trip DTC No. is the same as DTC No.

Emission-related Diagnostic Information (Cont'd)

HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION

The emission-related diagnostic information can be erased by the following methods.

Selecting "ERASE" in the "SELF-DIAG RESULTS" mode with CONSULT

GST Selecting Mode 4 with GST (Generic Scan Tool)

NO TOOLS Changing the diagnostic test mode from Diagnostic Test Mode II to Mode I by turning the mode selector on the ECM (Refer to EC-49.)

- **If the battery is disconnected, the emission-related diagnostic information will be lost after approx. 24 hours.**
- **Erasing the emission-related diagnostic information using CONSULT or GST is easier and quicker than switching the mode selector on the ECM.**

The following data are cleared when the ECM memory is erased.

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

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

How to erase DTC (With CONSULT)

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

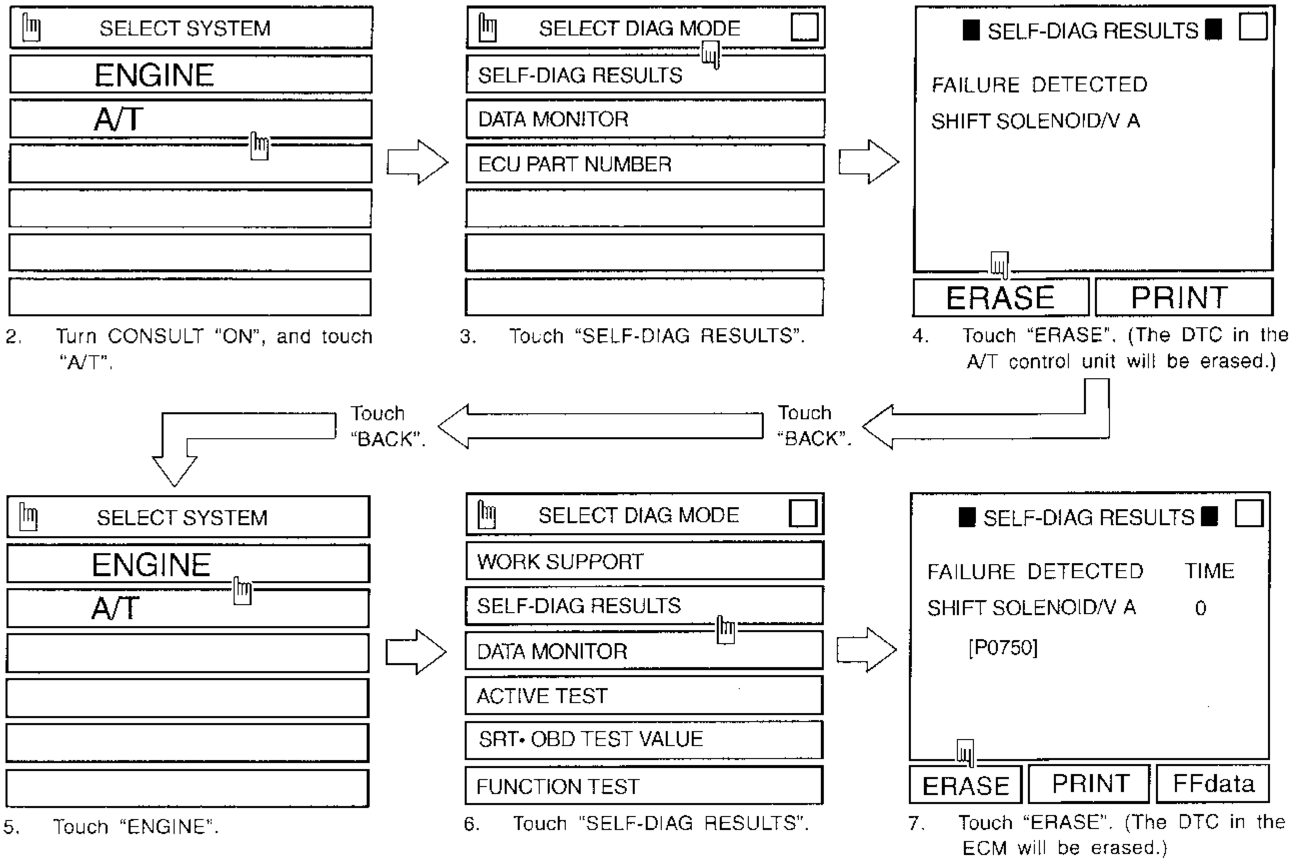
1. If the ignition switch stays "ON" after repair work, be sure to turn ignition switch "OFF" once. Wait at least 5 seconds and then turn it "ON" (engine stopped) again.
2. Turn CONSULT "ON" and touch "A/T".
3. Touch "SELF-DIAG RESULTS".
4. Touch "ERASE". (The DTC in the A/T control unit will be erased.) 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 A/T control unit, they need to be erased individually from the ECM and A/T control unit.

Emission-related Diagnostic Information (Cont'd)

How to erase DTC (With CONSULT)

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 "ON", and touch "A/T".
3. Touch "SELF-DIAG RESULTS".
4. Touch "ERASE". (The DTC in the A/T control unit will be erased.)
5. Touch "ENGINE".
6. Touch "SELF-DIAG RESULTS".
7. Touch "ERASE". (The DTC in the ECM will be erased.)

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How to erase DTC (With GST)

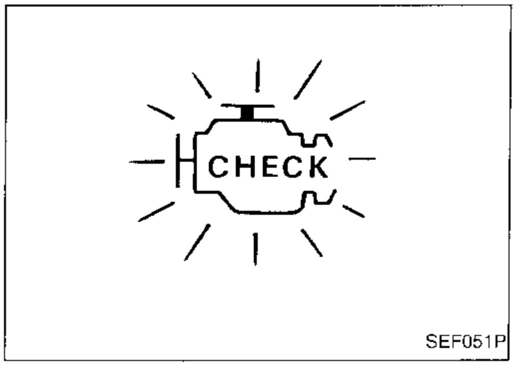
Note: If the diagnostic trouble code is not for A/T related items (see EC-2), skip step 2.

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)" in AT section titled "TROUBLE DIAGNOSIS", "Self-diagnosis". (The engine warm-up step can be skipped when performing the diagnosis only to erase the DTC.)
3. Select Mode 4 with GST (Generic Scan Tool).

How to erase DTC (No Tools)

Note: If the diagnostic trouble code is not for A/T related items (see EC-2), 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" again.
2. Perform "SELF-DIAGNOSTIC PROCEDURE (Without CONSULT)" in AT section titled "TROUBLE DIAGNOSIS", "Self-diagnosis". (The engine warm-up step can be skipped when performing the diagnosis only to erase the DTC.)
3. Change the diagnostic test mode from Mode II to Mode I by turning the mode selector on the ECM. (See EC-49.)



SEF051P

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 AND CHIME") or see EC-341.
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 four functions.

Diagnostic Test Mode I

1. BULB CHECK : This function checks the MIL bulb for damage (blown, open circuit, etc.).
   If the MIL does not come on, check MIL circuit and ECM test mode selector. (See next page.)
2. MALFUNCTION WARNING : This is a usual driving condition. When a malfunction is detected twice in two consecutive driving cycles (two trip detection logic), the MIL will light up to inform the driver that a malfunction has been detected.
   The following malfunctions will light up or blink the MIL in the 1st trip.
   - "Misfire (Possible three way catalyst damage)"
   - "Closed loop control"
   - Fail-safe mode

Diagnostic Test Mode II

3. SELF-DIAGNOSTIC RESULTS : This function allows DTCs and 1st trip DTCs to be read.
4. FRONT HEATED OXYGEN SENSOR MONITOR : This function allows the fuel mixture condition (lean or rich), monitored by front heated oxygen sensor, to be read.

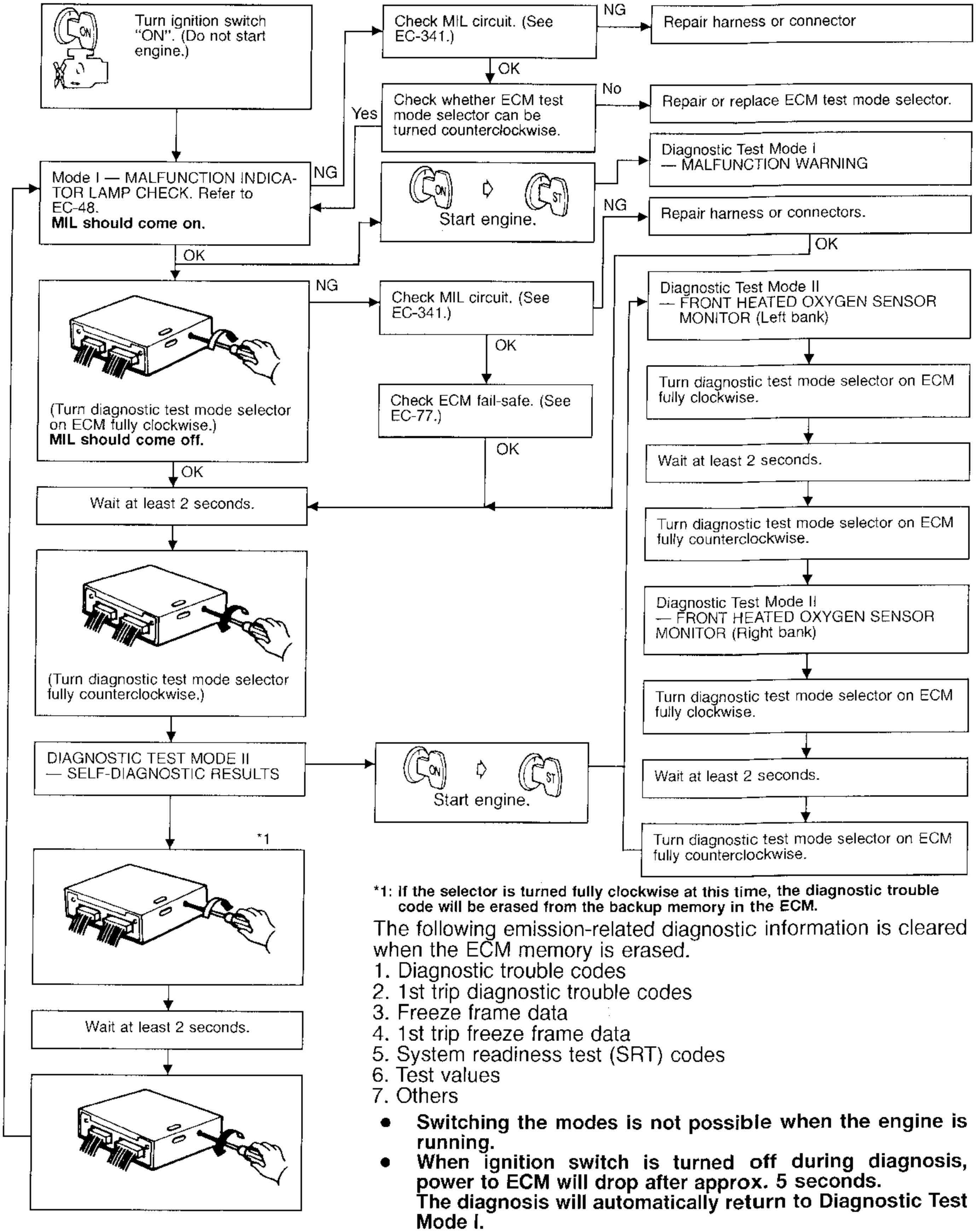
MIL flashing without DTC

If the ECM is in Diagnostic Test Mode II, MIL may flash when engine is running. In this case, check ECM test mode selector following "HOW TO SWITCH DIAGNOSTIC TEST MODES" on next page.

How to switch the diagnostic test (function) modes, and details of the above functions are described later. (Refer to EC-49.)

Condition		Diagnostic Test Mode I	Diagnostic Test Mode II
Ignition switch in "ON" position	Engine stopped	BULB CHECK	SELF-DIAGNOSTIC RESULTS
	Engine running	MALFUNCTION WARNING	FRONT HEATED OXYGEN SENSOR MONITOR

HOW TO SWITCH DIAGNOSTIC TEST MODES



***1: If the selector is turned fully clockwise at this time, the diagnostic trouble code will be erased from the backup memory in the ECM.**

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

- **Switching the modes is not possible when the engine is running.**
- **When ignition switch is turned off during diagnosis, power to ECM will drop after approx. 5 seconds.**
  The diagnosis will automatically return to Diagnostic Test Mode I.
- **Turn back diagnostic test mode selector to the fully counterclockwise position whenever vehicle is in use.**

DIAGNOSTIC TEST MODE I—BULB CHECK

In this mode, the MALFUNCTION INDICATOR LAMP on the instrument panel should stay ON. If it remains OFF, check the bulb. Refer to EL section ("WARNING LAMPS AND CHIME") or see EC-341.

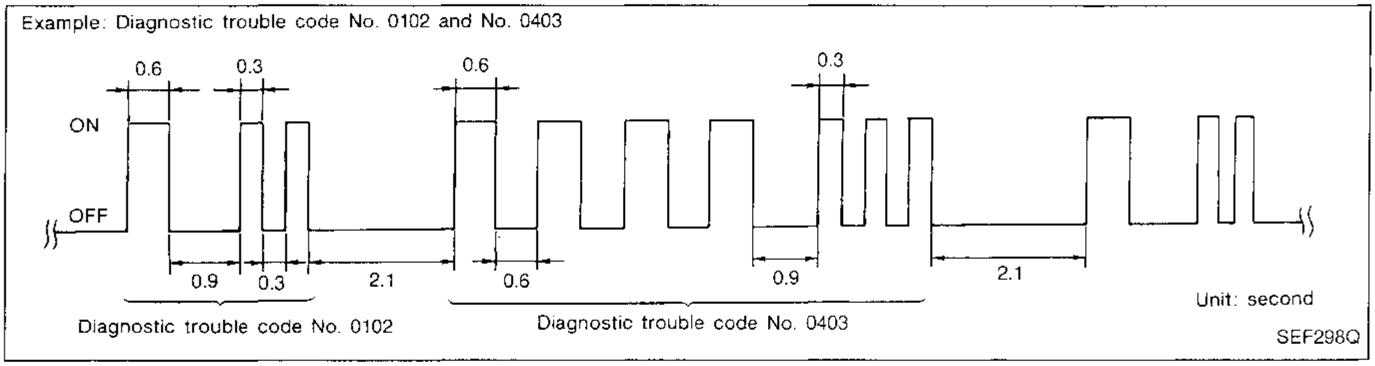
DIAGNOSTIC TEST MODE I—MALFUNCTION WARNING

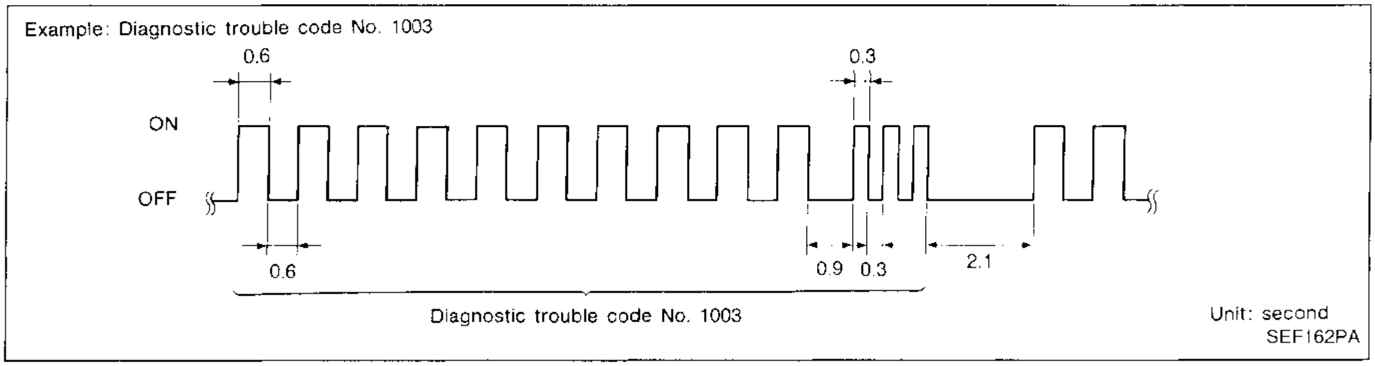
MALFUNCTION INDICATOR LAMP	Condition
ON	When the malfunction is detected or the ECM's CPU is malfunctioning.
OFF	No malfunction.

- These Diagnostic Trouble Code Numbers are clarified in Diagnostic Test Mode II (SELF-DIAGNOSTIC RESULTS).

DIAGNOSTIC TEST MODE II—SELF-DIAGNOSTIC RESULTS

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





Long (0.6 second) blinking indicates the two LH digits of number and short (0.3 second) blinking indicates the two RH digits of number. For example, the malfunction indicator lamp blinks 10 times for 6 seconds (0.6 sec x 10 times) and then it blinks three times for about 1 second (0.3 sec x 3 times). This indicates the DTC "1003" and refers to the malfunction of the park/neutral position switch.
In this way, all the detected malfunctions are classified by their diagnostic trouble code numbers. The DTC "0505" refers to no malfunction. (See DIAGNOSTIC TROUBLE CODE (DTC) INDEX, EC-2.)

Malfunction Indicator Lamp (MIL) (Cont'd)

HOW TO ERASE DIAGNOSTIC TEST MODE II (Self-diagnostic results)

The diagnostic trouble code can be erased from the backup memory in the ECM when the diagnostic test mode is changed from Diagnostic Test Mode II to Diagnostic Test Mode I. (Refer to "HOW TO SWITCH DIAGNOSTIC TEST MODES".)

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

DIAGNOSTIC TEST MODE II — FRONT HEATED OXYGEN SENSOR MONITOR

In this mode, the MALFUNCTION INDICATOR LAMP displays the condition of the fuel mixture (lean or rich) which is monitored by the front heated oxygen sensor.

MALFUNCTION INDICATOR LAMP	Fuel mixture condition in the exhaust gas	Air fuel ratio feedback control condition
ON	Lean	Closed loop system
OFF	Rich	
*Remains ON or OFF	Any condition	Open loop system

*: Maintains conditions just before switching to open loop.

To check the front heated oxygen sensor function, start engine in the Diagnostic Test Mode II and warm it up until engine coolant temperature indicator points to the middle of the gauge.
Next run engine at about 2,000 rpm for about 2 minutes under no-load conditions. Then make sure that the MALFUNCTION INDICATOR LAMP comes ON more than 5 times within 10 seconds with engine running at 2,000 rpm under no-load.

OBD System Operation Chart

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

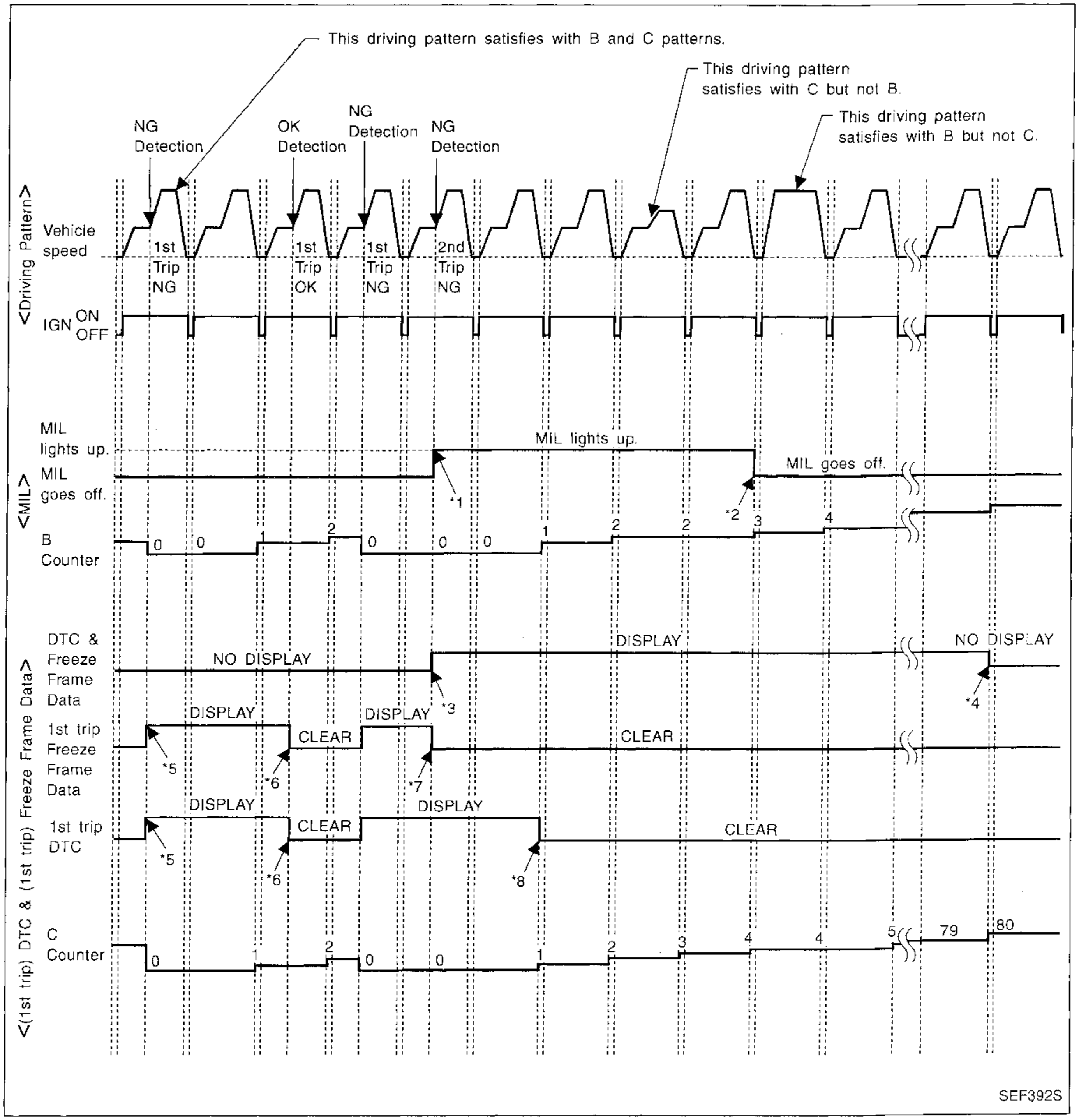
- When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data are stored in the ECM memory.
- When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data are stored in the ECM memory, and the MIL will come on. For details, refer to "Two Trip Detection Logic" on EC-36.
- 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 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	Except the lefts
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)

Details about patterns "A", "B", and "C" are on EC-55.
*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⟩

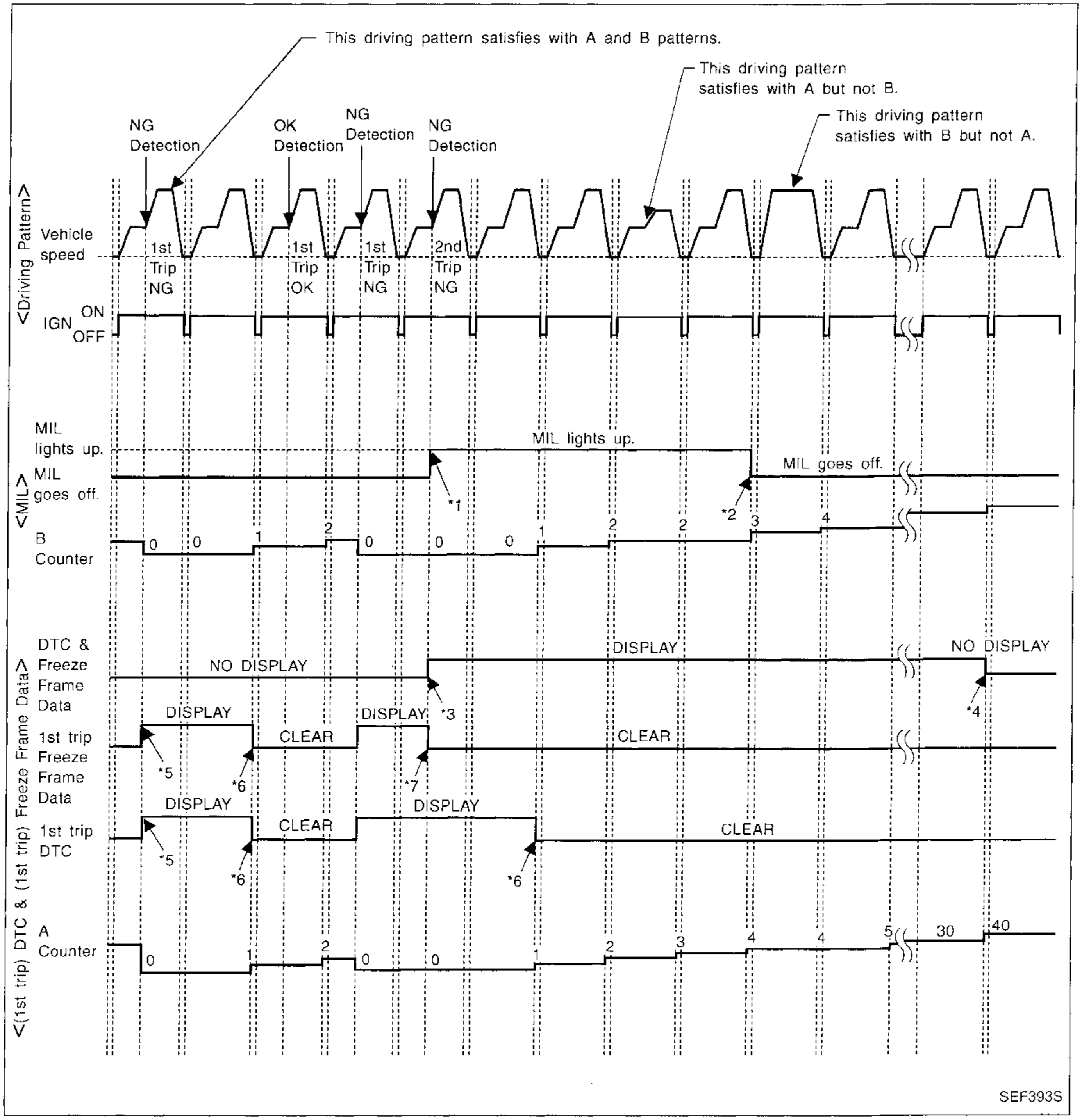
Driving pattern C means the vehicle operation as follows:
(1) The following conditions should be satisfied at the same time:
Engine speed: (Engine speed in the freeze frame data) ±375 rpm
Calculated load value: (Calculated load value in the freeze frame data) x (1±0.1) [%]
Engine coolant temperature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

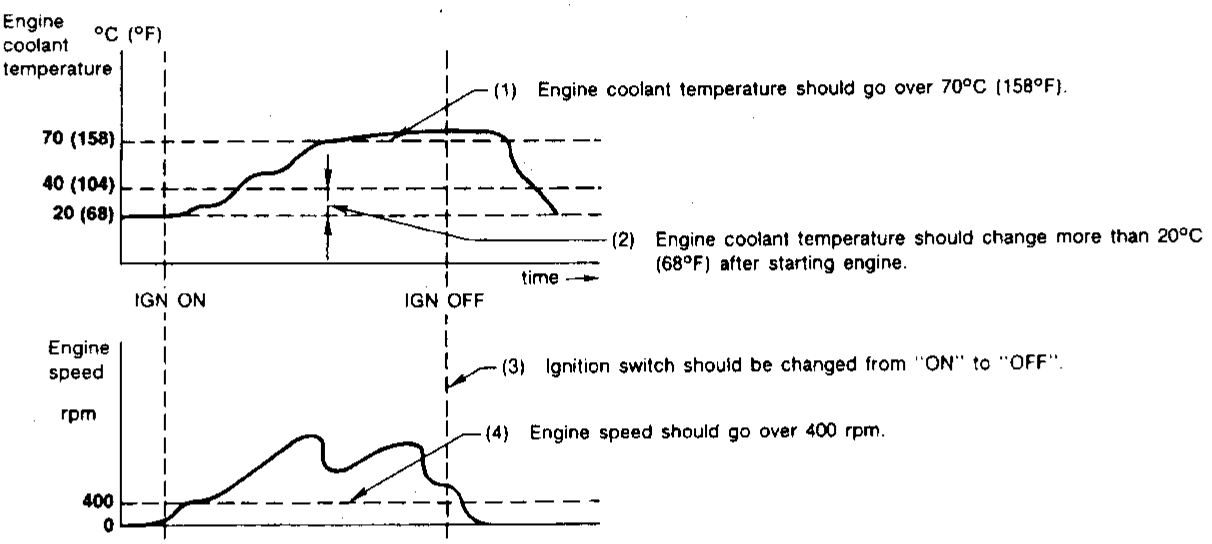
*6: 1st trip DTC will be cleared after vehicle is driven once (pattern B) without the same malfunction.

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

OBD System Operation Chart (Cont'd)

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

⟨Driving pattern A⟩



AEC574

- 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.

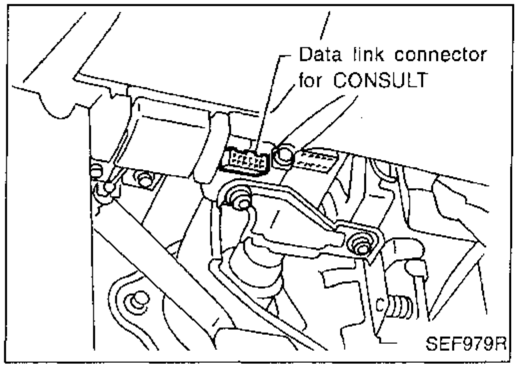
⟨Driving pattern B⟩

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

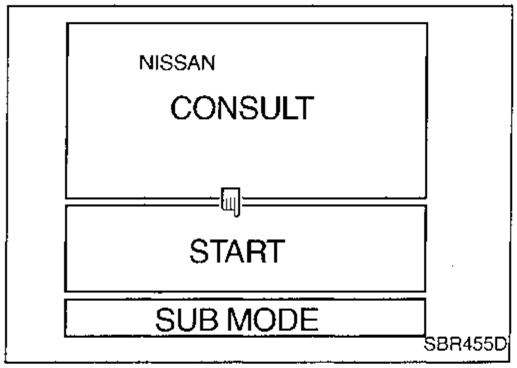
- The B counter will be cleared when the malfunction is detected once regardless of the driving pattern.
- The B counter will be counted up when driving pattern B is satisfied without any malfunctions.
- The MIL will go off when the B counter reaches 3 (*2 in "OBD SYSTEM OPERATION CHART").

CONSULT

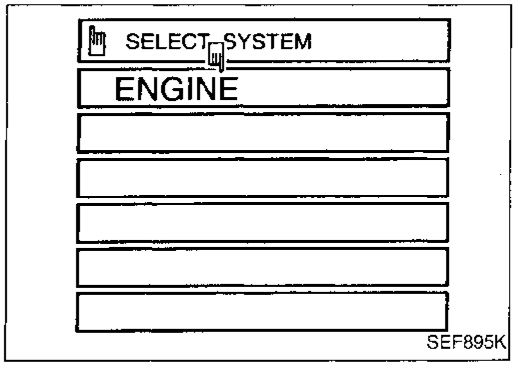
CONSULT INSPECTION PROCEDURE



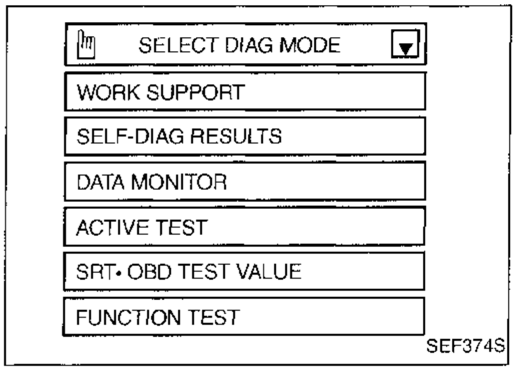
1. Turn off ignition switch.
2. Connect “CONSULT” to data link connector for CONSULT. (Data link connector for CONSULT is located behind the fuse box cover.)

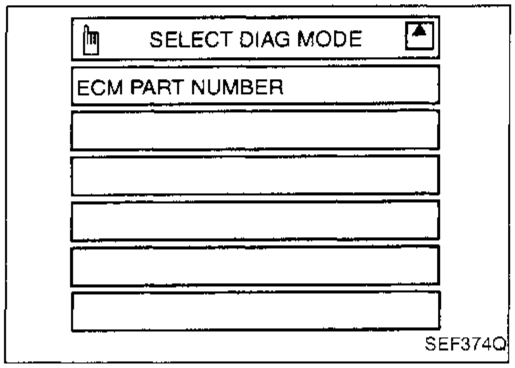


3. Turn on ignition switch.
4. Touch “START”.



5. Touch “ENGINE”.





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

For further information, see the CONSULT Operation Manual. This sample shows the display when using the UE951 program card. Screen differs in accordance with the program card used.

CONSULT (Cont'd)

ECCS COMPONENT PARTS/CONTROL SYSTEMS APPLICATION

Item			DIAGNOSTIC TEST MODE						
			WORK SUPPORT	SELF-DIAGNOSTIC RESULTS*1		DATA MONITOR	ACTIVE TEST	FUNCTION TEST	SRT·OBD TEST VALUE
					FREEZE FRAME DATA*2				
ECCS COMPONENT PARTS	INPUT	Camshaft position sensor		X	X	X			
		Mass air flow sensor		X		X			
		Engine coolant temperature sensor		X	X	X	X		
		Front heated oxygen sensor		X		X		X	X
		Rear heated oxygen sensor		X		X			X
		Vehicle speed sensor		X	X	X		X	
		Throttle position sensor	X	X		X		X	
		Tank fuel temperature sensor		X		X	X		
		EVAP control system pressure sensor		X		X			
		Absolute pressure sensor		X		X			
		EGR temperature sensor		X		X			
		Intake air temperature sensor		X		X			
		Crankshaft position sensor (OBD)		X					
		Knock sensor		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			
		Park/Neutral position switch		X		X		X	
		Power steering oil pressure switch				X		X	
		Air conditioner pressure switch				X			
		Battery voltage				X			
		Ambient air temperature switch				X			
		Electrical load				X			
	OUTPUT	Injectors				X	X	X	
		Power transistor (Ignition timing)	X	X (Ignition signal)		X	X	X	
		IACV-AAC valve	X	X		X	X	X	
		EVAP canister purge volume control valve		X		X	X		
		Air conditioner relay				X			
		Fuel pump relay	X			X	X	X	
		Cooling fan				X	X	X	
		EGRC-solenoid valve		X		X	X	X	
		Front heated oxygen sensor heater		X		X			X
		Rear heated oxygen sensor heater		X		X			X
		EVAP canister purge control solenoid valve		X		X	X		
		EVAP canister vent control valve		X		X			
		Vacuum cut valve bypass valve		X		X			
		MAP/BARO switch solenoid valve		X		X	X		
		Calculated load value			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 screen in freeze frame data mode only if a 1st trip DTC or DTC is detected. For details, refer to EC-38.

CONSULT (Cont'd)

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 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.
Active test	Diagnostic Test Mode in which CONSULT drives some actuators apart from the ECMs and also shifts some parameters in a specified range.
SRT·OBD test value	The status of system monitoring tests and the test values/test limits can be read.
Function test	Conducted by CONSULT instead of a technician to determine whether each system is "OK" or "NG".
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
IACV-AAC VALVE ADJ	SET ENGINE SPEED AT THE SPECIFIED VALUE UNDER THE FOLLOWING CONDITIONS. ● ENGINE WARMED UP ● NO-LOAD	When adjusting idle speed
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

CONSULT (Cont'd)

SELF-DIAGNOSTIC MODE

DTC and 1st trip DTC

Regarding items of "DTC and 1st trip DTC", refer to "DIAGNOSTIC TROUBLE CODE INDEX (See EC-2.)

Freeze frame data and 1st trip freeze frame data

Freeze frame data item*1	Description
DIAG TROUBLE CODE [PXXXX]	• ECCS component part/control system has a trouble code, it is displayed as "PXXXX". [Refer to "Alphabetical & P No. Index for DTC (EC-110).]
FUEL SYS-B1*2	• "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
FUEL SYS-B2*2	
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.
S-FUEL TRIM-B2 [%]	
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.
L-FUEL TRIM-B2 [%]	
ENGINE SPEED [rpm]	• The engine speed at the moment a malfunction is detected is displayed.
VHCL SPEED [km/h] or [mph]	• The vehicle speed at the moment a malfunction is detected is displayed.
ABSOL PRESS [kPa] or [kg/cm^2] or [psi]	• The absolute pressure at the moment a malfunction is detected is displayed.

*1: The items are the same as those of 1st trip freeze frame data.
*2: Regarding R50 model, "B1" indicates right bank and "B2" indicates left bank.

DATA MONITOR MODE

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
CMPS·RPM (POS) [rpm]	○	○	• Indicates the engine speed computed from the POS signal (1° signal) of the camshaft position sensor.	
MAS AIR/FL SE [V]	○	○	• The signal voltage of the mass air flow sensor is displayed.	• When the engine is stopped, a certain value is indicated.
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.
FR O2 SEN-B2 [V]	○	○	• The signal voltage of the front heated oxygen sensor is displayed.	
FR O2 SEN-B1 [V]	○			
RR O2 SEN-B1 [V]	○	○	• The signal voltage of the rear heated oxygen sensor is displayed.	
RR O2 SEN-B2 [V]	○			
FR O2 MNTR-B2 [RICH/LEAN]	○	○	• Display of front heated oxygen sensor 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.
FR O2 MNTR-B1 [RICH/LEAN]	○	○		
RR O2 MNTR-B1 [RICH/LEAN]	○		• Display of rear heated oxygen sensor 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.
RR O2 MNTR-B2 [RICH/LEAN]	○	○		
VHCL SPEED SE [km/h] or [mph]	○	○	• The vehicle speed computed from the vehicle speed sensor signal is displayed.	

NOTE:
Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.
Regarding R50 model, "B1" indicates right bank and "B2" indicates left bank.

CONSULT (Cont'd)

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
BATTERY VOLT [V]	○	○	• The power supply voltage of ECM is displayed.	
THRTL POS SEN [V]	○	○	• The throttle position sensor signal voltage is displayed.	
TANK F/TMP SE [°C] or [°F]	○		• The fuel temperature judged from the tank fuel temperature sensor signal voltage is displayed.	
EGR TEMP SEN [V]	○		• The signal voltage of the EGR temperature sensor is displayed.	
INT/A TEMP SE [°C] or [°F]	○		• The intake air temperature determined by the signal voltage of the intake air temperature sensor is indicated.	
START SIGNAL [ON/OFF]	○	○	• Indicates [ON/OFF] condition from the starter signal.	• After starting the engine, [OFF] is displayed regardless of the starter signal.
CLSD THL/P SW [ON/OFF]	○	○	• Indicates [ON/OFF] condition from the throttle position sensor signal.	
AIR COND SIG [ON/OFF]	○	○	• Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioner signal.	
P/N POSI SW [ON/OFF]	○	○	• Indicates [ON/OFF] condition from the park/neutral position switch signal.	
PW/ST SIGNAL [ON/OFF]	○	○	• [ON/OFF] condition of the power steering oil pressure switch determined by the power steering oil pressure signal is indicated.	
AMB TEMP SW [ON/OFF]	○	○	• Indicates [ON/OFF] condition from the ambient air temperature switch signal	
IGNITION SW [ON/OFF]	○		• Indicates [ON/OFF] condition from ignition switch.	
INJ PULSE-B2 [msec]		○	• Indicates the actual fuel injection pulse width compensated by ECM according to the input signals.	• When the engine is stopped, a certain computed value is indicated.
INJ PULSE-B1 [msec]				
B/FUEL SCHDL [msec]		○	• "Base fuel schedule" indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.	
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.
IACV-AAC/V [%]		○	• Indicates the idle air control valve (AAC valve) control value computed by ECM according to the input signals.	
PURG VOL C/V [step]			• Indicates the EVAP canister purge volume control valve computed by the ECM according to the input signals. • The opening becomes larger as the value increases.	
A/F ALPHA-B2 [%]			• The mean value of the air-fuel ratio feedback correction factor per cycle is indicated.	• When the engine is stopped, a certain value is indicated. • This data also includes the data for the air-fuel ratio learning control.
A/F ALPHA-B1 [%]				
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.	
FUEL PUMP RLY [ON/OFF]		○	• Indicates the fuel pump relay control condition determined by ECM according to the input signals.	

CONSULT (Cont'd)

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
EGRC SOL/V [ON/OFF]			• The control condition of the EGR valve & EVAP canister purge control solenoid valve (determined by ECM according to the input signal) is indicated. • ON ... EGR operation is cut-off OFF ... EGR is operational	
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	
FR O2 HTR-B1 [ON/OFF]			• Indicates [ON/OFF] condition of front heated oxygen sensor heater determined by ECM according to the input signals.	
FR O2 HTR-B2 [ON/OFF]				
RR O2 HTR-B1 [ON/OFF]			• Indicates [ON/OFF] condition of rear heated oxygen sensor heater determined by ECM according to the input signals.	
RR O2 HTR-B2 [ON/OFF]				
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	
PURG CONT S/V [ON/OFF]			• The control condition of the EVAP canister purge control solenoid valve (computed by the engine control module according to the input signals) is indicated. • ON ... Canister purge is operational OFF ... Canister purge operation is cut-off	
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.	
MAP/BARO SW/V [MAP/BARO]			• The control condition of the MAP/BARO switch solenoid valve (determined by ECM according to the input signal) is indicated. MAP ... Intake manifold absolute pressure BARO ... Barometric pressure	
ABSOL PRES/SE [V]			• The signal voltage of the absolute pressure sensor is displayed.	
VOLTAGE [V]			• Voltage measured by the voltage probe.	
PULSE [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.

CONSULT (Cont'd)

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.	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.	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.	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.	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.	Engine runs rough or dies.	• Harness and connector • Compression • Injectors • Power transistor • Spark plugs • Ignition coils
FUEL PUMP RELAY	• Ignition switch: ON (Engine stopped) • Turn the fuel pump relay "ON" and "OFF" using CONSULT 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 and listen to operating sound.	Solenoid valve makes an operating sound.	• Harness and connector • Solenoid valve
SELF-LEARNING CONT	• In this test, the coefficient of self-learning control mixture ratio returns to the original coefficient by touching "CLEAR" on the screen.		
PURG VOL CONT/V	• Engine: After warming up, run engine at 1,500 rpm. • Change the EVAP canister purge volume control valve opening step using CONSULT.	Engine speed changes according to the opening step.	• Harness and connector • EVAP canister purge volume control valve
TANK F/TEMP SEN	• Change the tank fuel temperature using CONSULT.		
MAP/BARO SW/V	• Ignition switch: ON (Engine stopped) • Turn the MAP/BARO switch solenoid valve between "MAP" and "BARO" using CONSULT and listen for operating sound.	MAP/BARO switch solenoid valve makes an operating sound.	• Harness and connector • MAP/BARO switch solenoid valve
PURG CONT S/V	• Engine: Run engine at 2,000 rpm. • Turn the EVAP canister purge control solenoid valve "ON" and "OFF" using CONSULT and listen for operating sound.	EVAP canister purge control solenoid valve makes an operating sound. Check vacuum signal for EVAP canister purge control valve. VC ON ... Vacuum exists. VC OFF ... Vacuum does not exist.	• Harness and connector • EVAP canister purge control solenoid valve • Vacuum hose

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

FUNCTION TEST MODE

FUNCTION TEST ITEM	CONDITION	JUDGEMENT		CHECK ITEM (REMEDY)
SELF-DIAG RESULTS	• Ignition switch: ON (Engine stopped) • Displays the results of on board diagnostic system.	—		Objective system
CLOSED THROTTLE POSI	• Ignition switch: ON (Engine stopped) • Throttle position sensor circuit is tested when throttle is opened and closed fully. ("IDLE POSITION" is the test item name for the vehicles in which idle is selected by throttle position sensor.)	Throttle valve: opened	OFF	• Harness and connector • Throttle position sensor (Closed throttle position) • Throttle position sensor (Closed throttle position) adjustment • Throttle linkage • Verify operation in DATA MONITOR mode.
		Throttle valve: closed	ON	
THROTTLE POSI SEN CKT	• Ignition switch: ON (Engine stopped) • Throttle position sensor circuit is tested when throttle is opened and closed fully.	Range (Throttle valve fully opened — Throttle valve fully closed)	More than 3.0V	• Harness and connector • Throttle position sensor • Throttle position sensor adjustment • Throttle linkage • Verify operation in DATA MONITOR mode.
PARK/NEUT POSI SW CKT	• Ignition switch: ON (Engine stopped) • Inhibitor position switch circuit is tested when shift lever is manipulated.	Out of N/P positions	OFF	• Harness and connector • Inhibitor switch • Linkage or Inhibitor switch adjustment
		In N/P positions	ON	
FUEL PUMP CIRCUIT	• Ignition switch: ON (Engine stopped) • Fuel pump circuit is tested by checking the pulsation in fuel pressure when fuel tube is pinched.	There is pressure pulsation on the fuel feed hose.		• Harness and connector • Fuel pump • Fuel pump relay • Fuel filter clogging • Fuel level
EGRC SOL/V CIRCUIT	• Ignition switch: ON (Engine stopped) • EGR valve and EVAP canister purge control solenoid valve circuit is tested by checking solenoid valve operating noise.	The solenoid valve makes an operating sound every 3 seconds.		• Harness and connector • EGR valve and EVAP canister purge control solenoid valve
START SIGNAL CIRCUIT	• Ignition switch: ON → START • Start signal circuit is tested when engine is started by operating the starter. Battery voltage and engine coolant temperature before cranking, and average battery voltage, mass air flow sensor output voltage and cranking speed during cranking are displayed.	Start signal: OFF → ON		• Harness and connector • Ignition switch

FUNCTION TEST ITEM	CONDITION	JUDGEMENT		CHECK ITEM (REMEDY)
PW/ST SIGNAL CIRCUIT	• Ignition switch: ON (Engine running) • Power steering circuit is tested when steering wheel is rotated fully and then set to a straight line running position.	Locked position	ON	• Harness and connector • Power steering oil pressure switch • Power steering oil pump
		Neutral position	OFF	
VEHICLE SPEED SEN CKT	• Vehicle speed sensor circuit is tested when vehicle is running at a speed of 10 km/h (6 MPH) or higher.	Vehicle speed sensor input signal is greater than 4 km/h (2 MPH)		• Harness and connector • Vehicle speed sensor • Speedometer
IGN TIMING ADJ	• After warming up, idle the engine. • Ignition timing is checked by reading ignition timing with a timing light and checking whether it agrees with specifications.	The timing light indicates the same value on the screen.		• Adjust ignition timing (by moving camshaft position sensor or distributor) • Camshaft position sensor drive mechanism
MIXTURE RATIO TEST	• Air-fuel ratio feedback circuit (injection system, ignition system, vacuum system, etc.) is tested by examining the front heated oxygen sensor output at 2,000 rpm under non-loaded state.	Front heated oxygen sensor COUNT: More than 5 times during 10 seconds		• INJECTION SYS (Injector, fuel pressure regulator, harness or connector) • IGNITION SYS (Spark plug, power transistor, ignition coil, harness or connector) • VACUUM SYS (Intake air leaks) • Front heated oxygen sensor circuit • Front heated oxygen sensor operation • Fuel pressure high or low • Mass air flow sensor
IACV-AAC/V SYSTEM	• After warming up, idle the engine. • IACV-AAC valve system is tested by detecting change in engine speed when IACV-AAC valve opening is changed to 0%, 20% and 80%.	Difference in engine speed is greater than 150 rpm between when valve opening is at 80% and 20%.		• Harness and connector • IACV-AAC valve • Air passage restriction between air inlet and IACV-AAC valve • IAS (Idle adjusting screw) adjustment
POWER BALANCE	• After warming up, idle the engine. • Injector operation of each cylinder is stopped one after another, and resultant change in engine rotation is examined to evaluate combustion of each cylinder. (This is only displayed for models where a sequential multiport fuel injection system is used.)	Difference in engine speed is greater than 25 rpm before and after cutting off the injector of each cylinder.		• Injector circuit (Injector, harness or connector) • Ignition circuit (Spark plug, ignition coil with power transistor harness or connector) • Compression • Valve timing

CONSULT (Cont'd)

FUNCTION TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
★EVAP (SMALL LEAK)	• After warming up, idle the engine etc. • EVAP system is tested by using the evaporative gas pressure in the fuel tank or engine intake manifold pressure.	• EVAP control system has no leak. • EVAP control system operates 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 control valve. • Foreign matter caught in EVAP canister vent control valve. • EVAP canister or fuel tank leaks • EVAP purge line tube leaks • EVAP purge line rubber tube bent. • Blocked or bent rubber tube to EVAP control system pressure sensor • EVAP canister purge control valve • EVAP canister purge volume control valve • EVAP canister purge control solenoid valve • Absolute pressure sensor • Tank fuel temperature sensor • MAP/BARO switch solenoid valve • Blocked or bent rubber tube to MAP/BARO switch solenoid valve

★: Always select "SINGLE TEST" with CONSULT when performing the "FUNCTION TEST".

CONSULT (Cont'd)

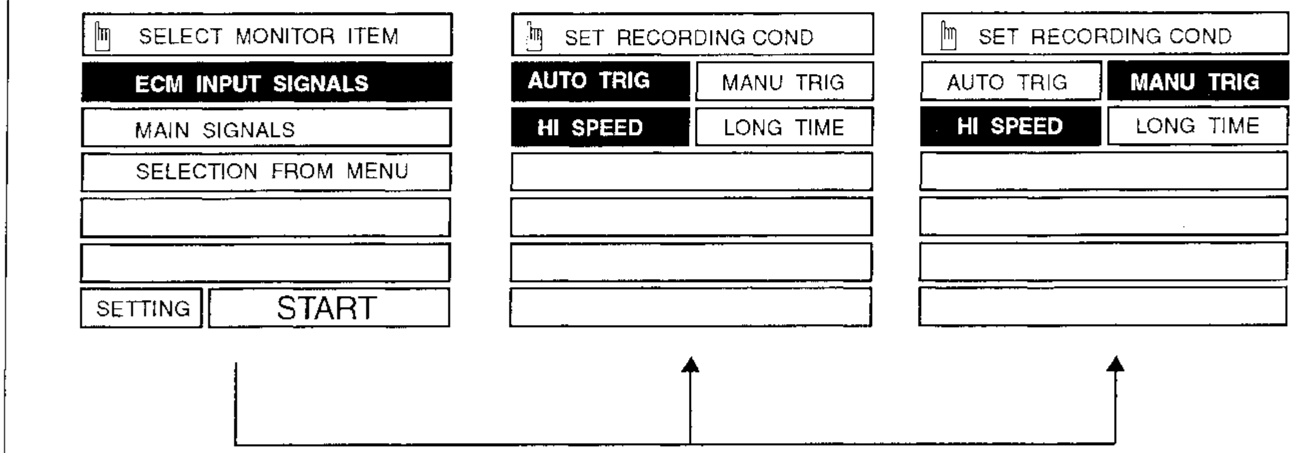
REAL TIME DIAGNOSIS IN DATA MONITOR MODE

CONSULT 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 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.
     DATA MONITOR can be performed continuously until a malfunction is detected. However, DATA MONITOR cannot continue any longer after the malfunction detection.
2. "MANU TRIG" (Manual trigger):
   - DTC/1st trip DTC and malfunction item will not be displayed automatically on CONSULT screen even though a malfunction is detected by ECM.
     DATA MONITOR can be performed continuously even though a malfunction is detected.

Use these triggers as follows:

1. "AUTO TRIG"
   - While trying to detect the DTC/1st trip DTC by performing the "DTC CONFIRMATION PROCEDURE", be sure to select to "DATA MONITOR (AUTO TRIG)" mode. You can confirm the malfunction at the moment it is detected.
   - While narrowing down the possible causes, CONSULT should be set in "DATA MONITOR (AUTO TRIG)" mode, especially in case the incident is intermittent.
     When you are inspecting the circuit by gently shaking (or twisting) the suspicious connectors, components and harness in the "DTC CONFIRMATION PROCEDURE", the moment a malfunction is found the DTC/1st trip DTC will be displayed. (Refer to GI 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 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.

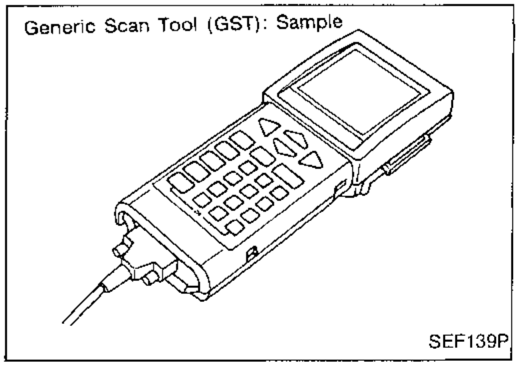


"SETTING"

"AUTO TRIG"
A malfunction can be displayed on "DATA MONITOR" screen automatically if detected.

"MANU TRIG"
A malfunction can not be displayed on "DATA MONITOR" screen automatically even if detected.

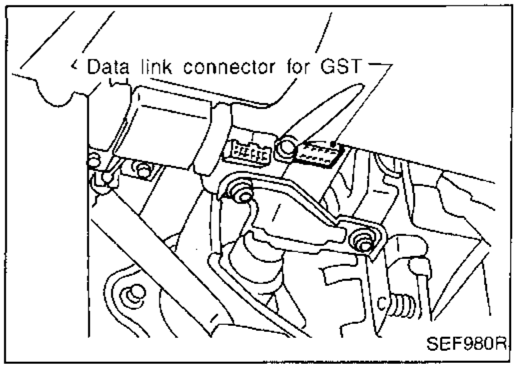
SEF529Q



Generic Scan Tool (GST)

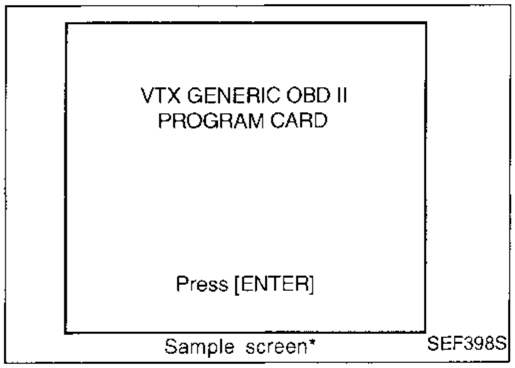
DESCRIPTION

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 off ignition switch.
2. Connect "GST" to data link connector for GST. (Data link connector for GST is located under LH dash panel near the fuse box cover.)



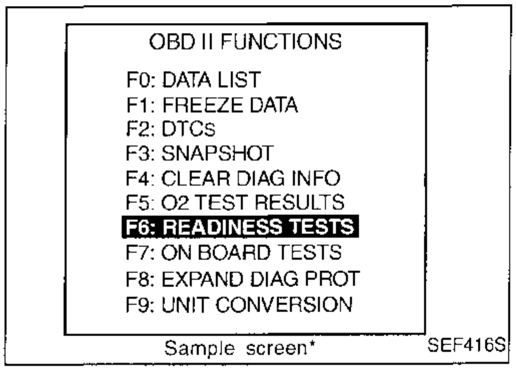
VTX GENERIC OBD II
PROGRAM CARD

Press [ENTER]

Sample screen*

3. Turn on ignition switch.
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.)



OBD II FUNCTIONS
F0: DATA LIST
F1: FREEZE DATA
F2: DTCs
F3: SNAPSHOT
F4: CLEAR DIAG INFO
F5: O2 TEST RESULTS
F6: READINESS TESTS
F7: ON BOARD TESTS
F8: EXPAND DIAG PROT
F9: UNIT CONVERSION

Sample screen*

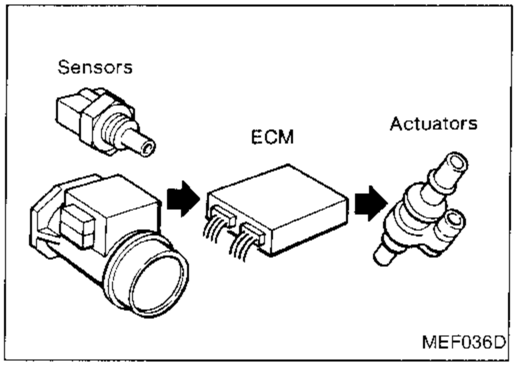
5. Perform each diagnostic mode according to each service procedure.

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

Generic Scan Tool (GST) (Cont'd)

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-59).]
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) ● Clear heated oxygen sensor test data (MODE 5) ● Reset status of system monitoring test (MODE 1) ● Clear on board monitoring test results (MODE 6 and 7)
MODE 5	(O2 TEST RESULTS)	This mode gains access to the on board heated oxygen sensor monitoring test results.
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.



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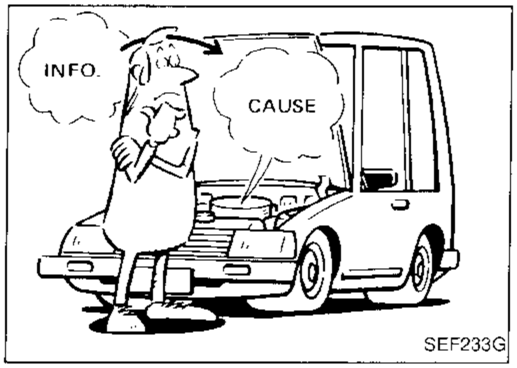

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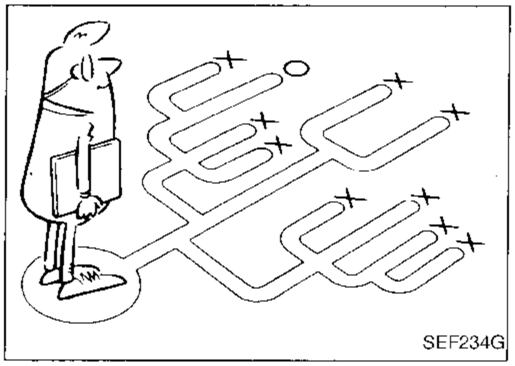


SEF234G

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 (or GST) or a circuit tester connected should be performed. Follow the "Work Flow" on EC-72.

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 shown below 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].

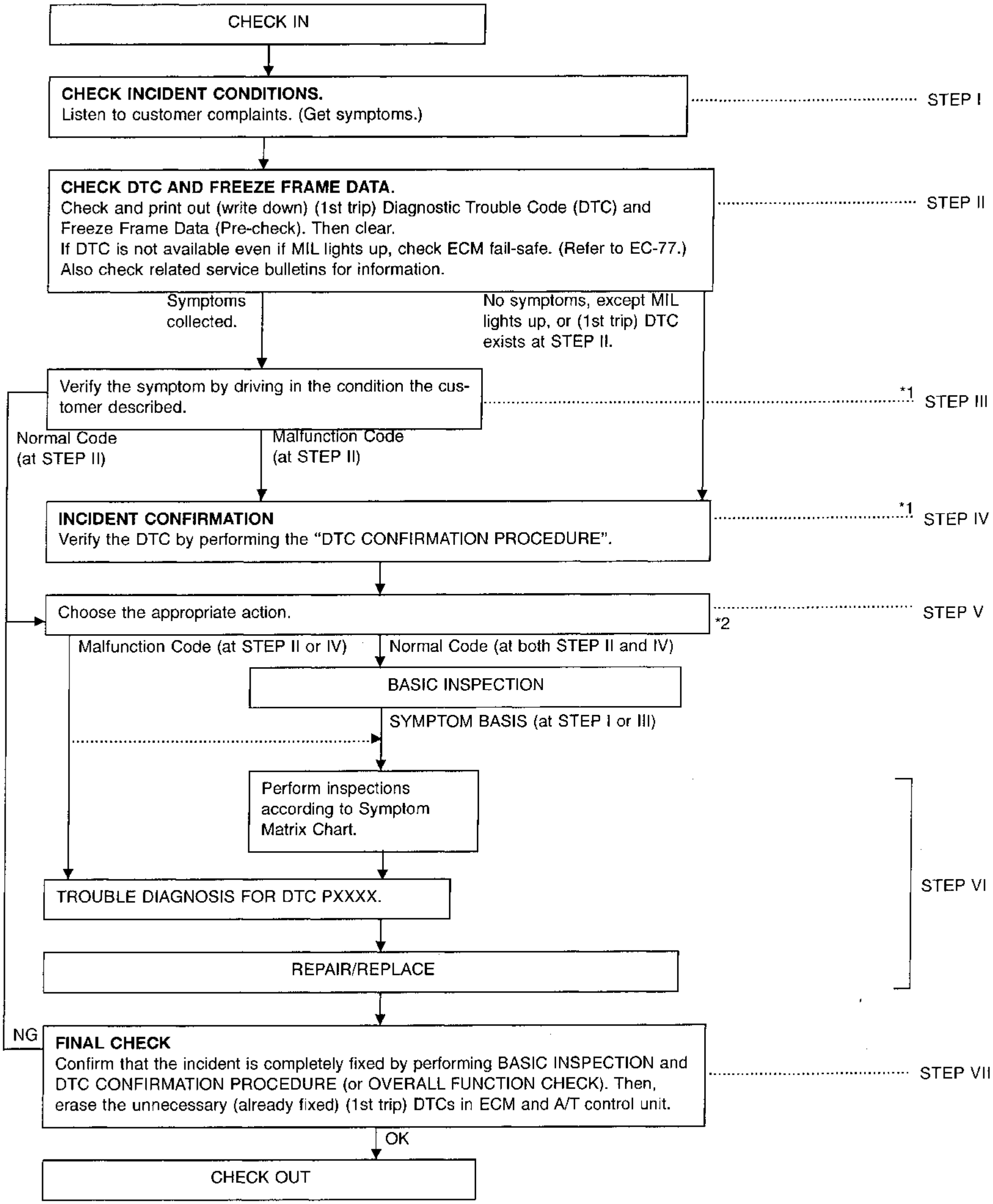
Diagnostic Worksheet (Cont'd)

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

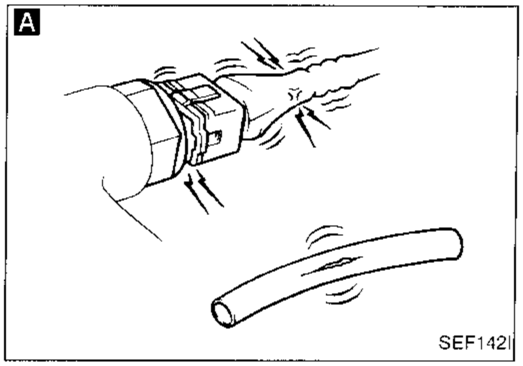


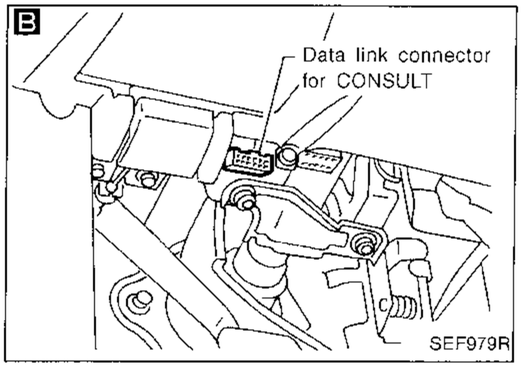
***1: If the incident cannot be duplicated, refer to GI section ("Incident Simulation Tests", "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT").**

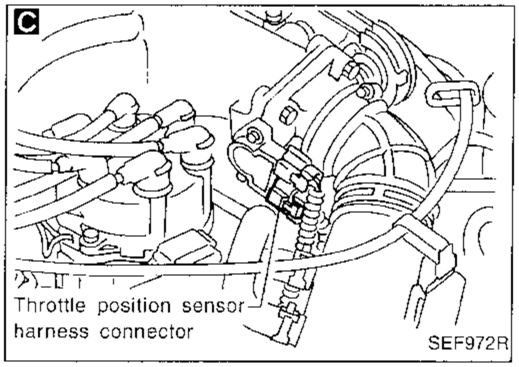
***2: If the on board diagnostic system cannot be performed, check main power supply and ground circuit. Refer to "TROUBLE DIAGNOSIS FOR POWER SUPPLY", EC-94.**

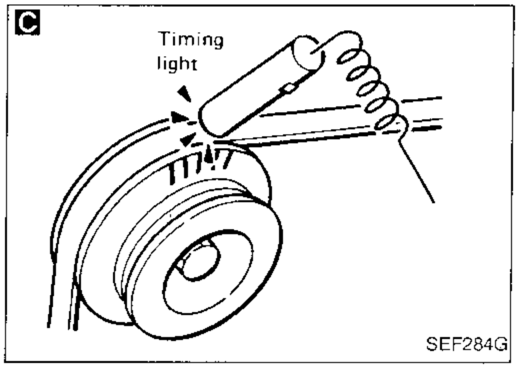
Description for Work Flow

STEP	DESCRIPTION
STEP I	Get detailed information about the conditions and the environment when the incident/symptom occurred using the "DIAGNOSTIC WORK SHEET", EC-71.
STEP II	Before confirming the concern, check and write down (print out using CONSULT 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-46.) 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-78.) 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 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 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 "DTC CONFIRMATION PROCEDURE". Check and read the (1st trip) DTC and (1st trip) freeze frame data by using CONSULT or Generic Scan Tool. During the (1st trip) DTC verification, be sure to connect CONSULT 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 section.) In case the "DTC CONFIRMATION PROCEDURE" is not available, perform the "OVERALL FUNCTION CHECK" instead. The (1st trip) DTC cannot be displayed by this check, however, this simplified "check" is an effective alternative. The "NG" result of the "OVERALL FUNCTION CHECK" is the same as the (1st trip) DTC detection.
STEP V	Take the appropriate action based on the results of STEP I through IV. If the malfunction code is indicated, proceed to TROUBLE DIAGNOSIS FOR DTC PXXXX. If the normal code is indicated, proceed to the BASIC INSPECTION. (Refer to EC-74.) Then perform inspections according to the Symptom Matrix Chart. (Refer to EC-78.)
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 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. Refer to EC-81. The "DIAGNOSTIC PROCEDURE" in EC section contains a description based on open circuit inspection. A short circuit inspection is also required for the circuit check in the DIAGNOSTIC PROCEDURE. For details, refer to GI section ("HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT", "Circuit Inspection"). Repair or replace the malfunction parts.
STEP VII	Once you have repaired the circuit or replaced a component, you need to run the engine in the same conditions and circumstances which resulted in the customer's initial complaint. Perform the "DTC CONFIRMATION PROCEDURE" and confirm the normal code [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 A/T control unit. (Refer to EC-44.)









Basic Inspection

Precaution:

Perform Basic Inspection without electrical or mechanical loads applied;

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

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

CONNECT CONSULT TO THE VEHICLE.
Connect "CONSULT" to the data link connector for CONSULT and select "ENGINE" from the menu. Refer to EC-56.

↓

DOES ENGINE START?

No → Go to **D**.

↓ Yes

C

CHECK IGNITION TIMING.
1. Warm up engine sufficiently.
2. Stop engine and disconnect throttle position sensor harness connector.
3. Start engine.
4. Check ignition timing at idle using timing light.
   Ignition timing:
   15°±2° BTDC

NG → Adjust ignition timing by turning distributor.

↓ OK

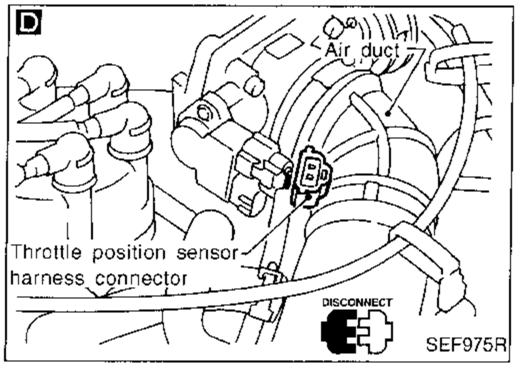
CHECK BASE IDLE SPEED.
Does engine speed fall to the following speed?
700±50 rpm (A/T in "N" position)

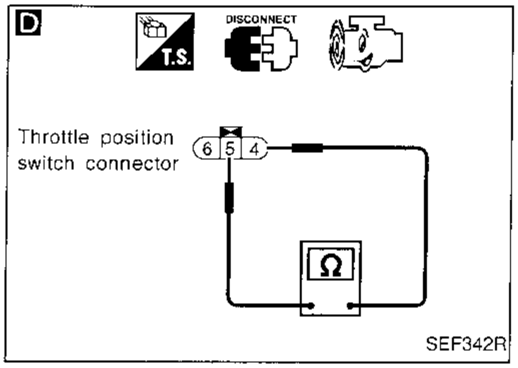
NG → Adjust engine speed by turning idle adjusting screw.

↓ OK

(Go to Ⓐ on next page.)

Basic Inspection (Cont'd)





Ⓐ

D

CHECK CLOSED THROTTLE POSITION SWITCH IDLE POSITION.

1. Select "A/T", then "DATA MONITOR".
2. Select "ENGINE SPEED" and "CLOSED THL/SW".
3. Read "CLOSED THL/SW" signal under the following condition:
   - Raise engine speed to 2,000 rpm.
   - Gradually lower engine speed.

"CLOSED THL/SW" should turn "ON" at 950±150 rpm with transmission in N position.

OR

1. Disconnect throttle position sensor harness connector and closed throttle position switch harness connector.
2. Check continuity between closed throttle position switch terminals ④ and ⑤ under the following condition.
   - Raise engine speed to 2,000 rpm.
   - Gradually lower engine speed.

Continuity should exist (Closed throttle position switch closed) at 950±150 rpm with transmission in N position.

NG → Adjust continuity signal by rotating throttle position sensor body.

↓

RESET IDLE POSITION MEMORY.

1. Warm up engine sufficiently and stop. Select "CLSD THL/P SW" in "DATA MONITOR" mode with CONSULT before stopping engine.
2. Reconnect throttle position sensor harness connector and closed throttle position switch harness connector.
3. Turn ignition switch "ON".
4. Turn ignition switch "OFF" and wait at least 5 seconds.
5. Repeat steps 3. and 4. until "CLSD THL/P SW" in "DATA MONITOR" mode with CONSULT changes to "ON".
   Repeat steps 3. and 4. 20 times.

OK ↓

Reconnect throttle position sensor harness connector and closed throttle position switch harness connector.

↓

CHECK TARGET IDLE SPEED

Read the engine idle speed in "DATA MONITOR" mode with CONSULT.
750±50 rpm
(in "N" position)

OR

Check idle speed.
750±50 rpm
(in "N" position)

NG → Adjust idle speed. Refer to EC-29.

OK ↓

After this inspection, unnecessary diagnostic trouble code No. might be displayed.
Erase the stored memory in ECM and A/T control unit.
Refer to "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION" (EC-36) and "HOW TO ERASE DTC" in AT section.

OK ↓

INSPECTION END

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	• ECM (P0605, 0301)	• Camshaft position sensor circuit (P0340, 0101)	• Engine coolant temperature sensor circuit (P0115, 0103) (P0125, 0908)
	• Mass air flow sensor circuit (P0100, 0102)	• Vehicle speed sensor circuit (P0500, 0104)	• Ignition signal circuit (P1320, 0201)
	• Throttle position sensor circuit (P0120, 0403)	• Intake air temperature sensor circuit (P0110, 0401)	• Park/Neutral position switch circuit (P0705, 1003)
	• EGRC-solenoid valve (P1400, 1005)	• Knock sensor circuit (P0325, 0304)	
	• A/T diagnosis communication line (P1605, 0804)	• Tank fuel temperature sensor circuit (P0180, 0402)	
2	• EGR temperature sensor circuit (P1401, 0305)	• Front heated oxygen sensor heater circuit (P0135, 0901) (P0155, 1001)	• Front heated oxygen sensor circuit (P0130, 0503) (P0150, 0303)
	• A/T related sensors, solenoid valves and switches (P0705-P0710, 1101-1208)	• Crankshaft position sensor (OBD) circuit (P0335, 0802) (P1336, 0905)	• Rear heated oxygen sensor circuit (P0136, 0707) (P0156, 0708)
	• Absolute pressure sensor circuit (P0105, 0803)	• EVAP canister purge control valve/solenoid valve circuit (P0443, 0807)	• Rear heated oxygen sensor heater circuit (P0141, 0902) (P0161, 1002)
	• MAP/BARO switch solenoid valve circuit (P1105, 1302)	• Vacuum cut valve bypass valve (P1441, 0801)	• EVAP control system pressure sensor circuit (P0450, 0704)
	• Closed throttle position switch circuit (P0510, 0203)		• EVAP canister vent control valve circuit (P0446, 0903)
			• EVAP canister purge volume control valve circuit (P1445, 1008)
			• EVAP control system purge flow monitoring (P1447, 0111)
3	• EGR function (P0400, 0302)	• Misfire (P0306 - P0300, 0603 - 0701)	• Fuel injection system function (P0172, 0114), (P0171, 0115), (P0175, 0209), (P0174, 0210)
	• EVAP control system (SMALL LEAK) (P0440, 0705)	• Closed loop control (P0130, 0307) (P0150, 0308)	• Three way catalyst function (P0420, 0702) (P0430, 0703)
	• EGRC-BPT valve function (P0402, 0306)	• Improper shifting (P0731 - P0734, 1103 - 1106)	• Signal circuit from A/T control unit to ECM (P0600)
	• IACV-AAC valve circuit (P0505, 0205)		

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 colspan="2">DTC No.</th><th rowspan="2">Detected items</th><th rowspan="2">Engine operating condition in fail-safe mode</th></tr>
<tr><th>CONSULT
GST</th><th>ECM*1</th></tr>
<tr><td>P0100</td><td>0102</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>0103</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 displays the engine coolant temperature decided by ECM.
<table>
<tr><th>Condition</th><th>Engine coolant temperature decided (CONSULT 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. 6 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></td></tr>
<tr><td>P0120</td><td>0403</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 ECCS</td><td>Unable to access Diagnostic Test Mode II</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 ECCS 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 valve</td></tr>
<tr><td>Fuel pump</td><td>Fuel pump relay is "ON" when engine is running and "OFF" when engine stalls</td></tr>
<tr><td>IACV-AAC valve</td><td>Full open</td></tr>
</table>
Replace ECM, if ECM fail-safe condition is confirmed.</td></tr>
</table>

*1: In Diagnostic Test Mode II (Self-diagnostic results)

Symptom Matrix Chart

SYSTEM — Basic engine control system		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel pump circuit	●	●	●	○	●		○	○			○		○	EC-328
	Fuel pressure regulator system	●	○	●	○	○	○	○	○	○		○			EC-25
	Injector circuit	●	●	●	○	●		●	○			○			EC-321
	Evaporative emission system	○	○	○	○	○	○	○	○	○		○			EC-20
Air	Positive crankcase ventilation system	○	●	○	○	○	○	●	○	○		○	○		EC-24
	Incorrect idle speed adjustment	●	●				●	●	○	○		○			EC-29
	IACV-AAC valve circuit	○	●	○	○	○	●	●	○	○		○		○	EC-252
	IACV-FICD solenoid valve circuit	○	○	○	○	○	○	○	○	○		○			EC-337
Ignition	Incorrect ignition timing adjustment	●	●	●	●	●		●	○			●			EC-29
	Ignition circuit	●	●	●	●	●		●	○			●			EC-279
EGR	EGR valve & EVAP canister purge control solenoid valve circuit		○	●	○	○						○			EC-290
	EGR system	○	●	●	●	●	○	●	○	○		○			EC-209
Main power supply and ground circuit		●	○	○	○	○		○	○		○	○		○	EC-94
Air conditioner circuit		○	○	○	○	○	○	○	○	○		○		○	HA section

● ; High Possibility Item
○ ; Low Possibility Item

(continued on next page)

Symptom Matrix Chart (Cont'd)

SYSTEM — ECCS system		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
ECCS	Camshaft position sensor circuit	●	●	●	●	●		●	○			●			EC-203
	Mass air flow sensor circuit	●	●	●	○	●		●	○			●			EC-99
	Front heated oxygen sensor circuit		●	●	○	●		●	○			●			EC-133, 151
	Engine coolant temperature sensor circuit	●	○	○	○	○	○	●	○	○		○			EC-116, 127
	Throttle position sensor circuit		●	●		●	●	●	○	○		●			EC-121
	Incorrect throttle position sensor adjustment		●	●		●	●	●	○	○		○			EC-74
	Vehicle speed sensor circuit		○	○		○						○			EC-248
	Knock sensor circuit			○	○	○						○			EC-195
	ECM	○	○	○	○	○	○	○	○	○	○	○			EC-264, 77
	Start signal circuit	○													EC-325
	Park/Neutral position switch circuit			○		○		○	○			○			EC-266
	Power steering oil pressure switch circuit		○					○	○						EC-333

● ; High Possibility Item
○ ; Low Possibility Item

(continued on next page)

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

Symptom Matrix Chart (Cont'd)

SYSTEM — Engine mechanical & other		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel tank	○	○												—
	Fuel piping	○	○	○	○	○		○	○			○			
	Vapor lock		○												
	Valve deposit	○	○	○	○	○		○	○			○			
	Poor fuel (Heavy weight gasoline, Low octane)	○	○	○	○	○		○	○			○			
Air	Air duct		○	○		○		○	○			○			
	Air cleaner		○	○		○		○	○			○			
	Air leakage from air duct (Mass air flow sensor — throttle body)	○	○	○	○	○	○	○	○	○		○			
	Throttle body, Throttle wire	●	●	●		●	●	●	○	●		○			FE section
	Air leakage from intake manifold/Collector/Gasket	○	●	●	○	○	○	●	○	○		○			—
Cranking	Battery	○	○	○		○		○	○			○		○	EL section
	Alternator circuit	○	○	○		○		○	○			○		○	
	Starter circuit	●													
	Flywheel	○													—
	Clutch interlock switch	○													CL section
	Inhibitor switch	○													AT section
Engine	Cylinder head	○	○	○	○	○		○	○			○			—
	Cylinder head gasket	○	○	○	○	○		○	○		●	○	○		
	Cylinder block	○	○	○	○	○		○	○			○	○		
	Piston	○	○	○	○	○		○	○			○	○		
	Piston ring	○	○	○	○	○		○	○			○	○		
	Connecting rod	○	○	○	○	○		○	○			○			
	Bearing	○	○	○	○	○		○	○			○			
	Crankshaft	●	●	●	○	●		○	○			○			
Valve mechanism	Timing belt	●	●	○	○	●		●	○			○			
	Camshaft	○	○	○	○	○		○	○			○			
	Intake valve	○	○	○	○	○		○	○			○	○		
	Exhaust valve	○	○	○	○	○		○	○			○	○		
	Hydraulic lash adjuster		○	○	○	○		○	○			○			
Exhaust	Exhaust manifold/Tube/Muffler/Gasket	○	○	○	○	○		○	○			○			
	Three way catalyst	○	○	○	○	●		○	○			○			
Lubrication	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery	●	●	○	○	○		●	●			○	●		
	Oil level (Low)/Filthy oil	○	○	○	○	○		○	○			○	○		
Cooling	Radiator/Hose/Radiator filler cap	○	○	○	○	○		○	○		●	○			
	Thermostat	○	○	○	○	○	○	○	○	○	○	○			
	Water pump	○	○	○	○	○		○	○		●	○			
	Water gallery	○	○	○	○	○		○	○		○	○			
	Cooling fan	○	○	○	○	○	○	○	○	○	○	○			
	Coolant level (low)/Contaminated coolant	○	○	○	○	○		○	○		○	○			

● ; High Possibility Item
○ ; Low Possibility Item

CONSULT 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
CMPS·RPM (POS)	• Tachometer: Connect • Run engine and compare tachometer indication with the CONSULT value.		Almost the same speed as the CONSULT value.
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	1.5 - 2.1V
COOLAN TEMP/S	• Engine: After warming up		More than 70°C (158°F)
FR O2 SEN-B2 FR O2 SEN-B1	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ↔ Approx. 0.6 - 1.0V
FR O2 MNTR-B2 FR O2 MNTR-B1			LEAN ↔ RICH Changes more than 5 times during 10 seconds.
RR O2 SEN-B1 RR O2 SEN-B2	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ↔ Approx. 0.6 - 1.0V
RR O2 MNTR-B1 RR O2 MNTR-B2			LEAN ↔ RICH
VHCL SPEED SE	• Turn drive wheels and compare speedometer indication with the CONSULT value		Almost the same speed as the CONSULT value
BATTERY VOLT	• Ignition switch: ON (Engine stopped)		11 - 14V
THRTL POS SEN	• Ignition switch: ON (Engine stopped)	Throttle valve: fully closed	0.3 - 0.7V
		Throttle valve: fully opened	Approx. 4.0V
EGR TEMP SEN	• Engine: After warming up		Less than 4.5V
START SIGNAL	• Ignition switch: ON → START → ON		OFF → ON → OFF
CLSD THL/P SW	• 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 turned	ON
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 Reference Value in Data Monitor Mode (Cont'd)

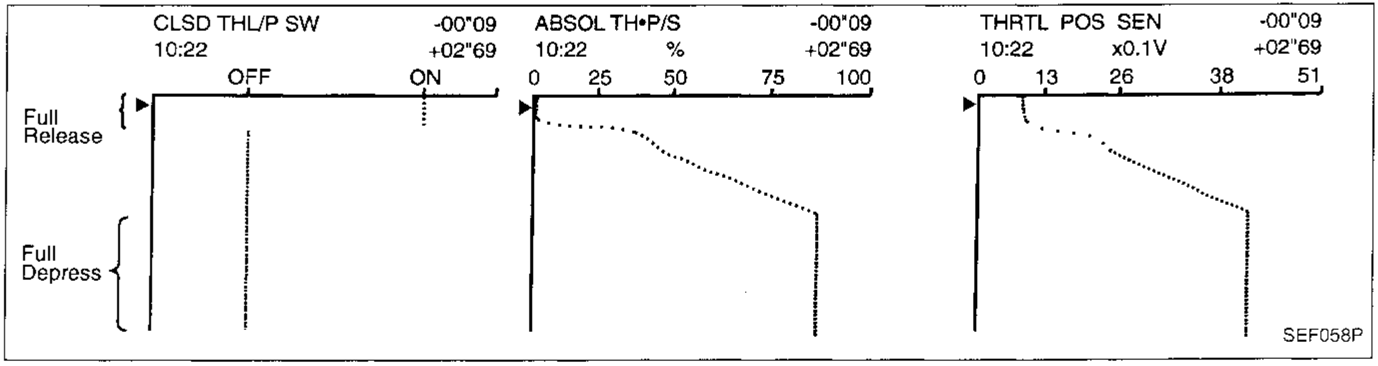
MONITOR ITEM	CONDITION		SPECIFICATION
IGNITION SW	• Ignition switch: ON → OFF → ON		ON → OFF → ON
INJ PULSE-B2 INJ PULSE-B1	• Engine: After warming up • Air conditioner switch: "OFF" • Shift lever: "N" • No-load	Idle	2.4 - 3.2 msec
		2,000 rpm	1.9 - 2.8 msec
B/FUEL SCHDL	ditto	Idle	1.0 - 1.6 msec
		2,000 rpm	0.7 - 1.3 msec
IGN TIMING	ditto	Idle	10° BTDC
		2,000 rpm	More than 25° BTDC
IACV-AAC/V	ditto	Idle	10 - 20%
		2,000 rpm	—
PURG VOL C/V	• Engine: After warming up • Air conditioner switch "OFF"	Idle	0 step
		Vehicle running (Shift lever "1")	—
A/F ALPHA-B2 A/F ALPHA-B1	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	54 - 155%
EVAP SYS PRES	• Ignition switch: ON		Approx. 3.4V
AIR COND RLY	• Air conditioner switch: OFF → ON		OFF → ON
FUEL PUMP RLY	• Ignition switch is turned to ON (Operates for 5 seconds) • Engine running and cranking		ON
	Except as shown above		OFF
EGRC SOL/V	• Engine: After warming up • Air conditioner switch: "OFF" • Shift lever: "N" • No-load	Idle	ON
		Engine speed: Revving from 1,500 to 4,000 rpm	OFF
VENT CONT/V	• Ignition switch: ON		OFF
FR O2 HTR-B1	• Engine speed: Idle		ON
FR O2 HTR-B2	• Engine speed: Above 3,200 rpm		OFF
RR O2 HTR-B1	• Engine speed: Idle		ON
RR O2 HTR-B2	• Engine speed: Above 3,200 rpm		OFF
VC/V BYPASS/V	• Ignition switch: ON		OFF
PURG CONT S/V	• Engine: After warming up	Idle	OFF
		2,000 rpm	ON
CAL/LD VALUE	• Engine: After warming up • Air conditioner switch: "OFF" • Shift lever: "N" • No-load	Idle	18.5 - 26.0%
		2,500 rpm	18.0 - 21.0%
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	3.3 - 4.8 g·m/s
		2,500 rpm	12.0 - 14.9 g·m/s
MAP/BARO SW/V	• Ignition switch: ON		BARO
ABSOL PRES/SE	• Engine: After warming up	Engine is not running	Approx. 4.4V
		Idle (5 seconds after starting engine)	Approx. 1.2V

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.)

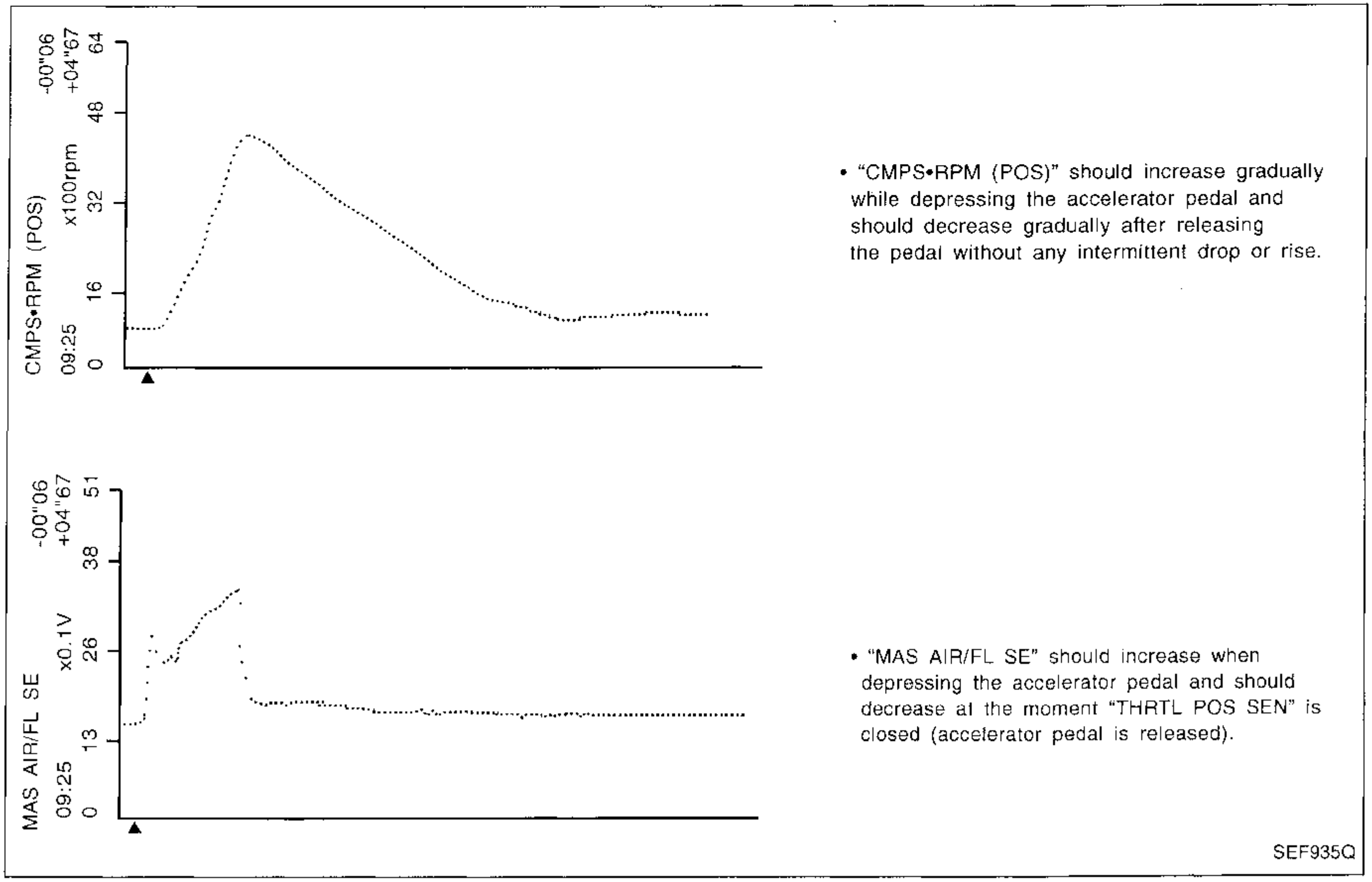
THRTL POS SEN, ABSOL TH·P/S, CLSD THL/P SW

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



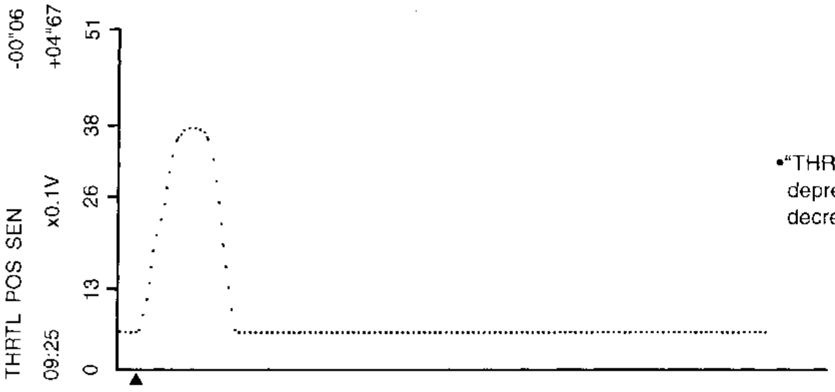
CMPS·RPM (POS), MAS AIR/FL SE, THRTL POS SEN, RR O2 SEN-B1, FR O2 SEN-B1, INJ PULSE-B1

Below is the data for “CMPS·RPM (POS)”, “MAS AIR/FL SE”, “THRTL POS SEN”, “RR O2 SEN-B1”, “FR O2 SEN-B1” and “INJ PULSE-B1” when revving engine quickly up to 4,800 rpm under no load after warming up engine sufficiently.
Each value is for reference, the exact value may vary.

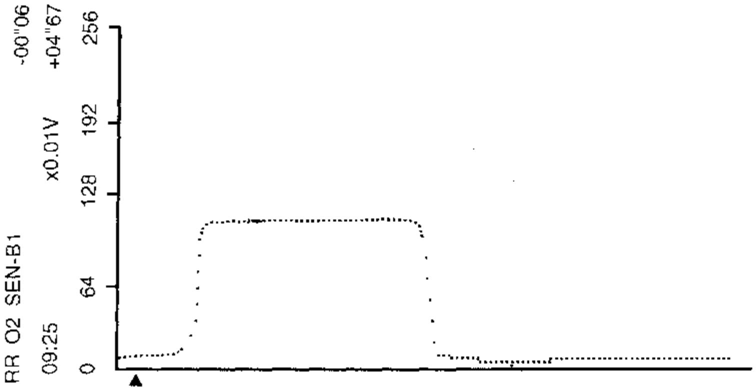


- “CMPS•RPM (POS)” should increase gradually while depressing the accelerator pedal and should decrease gradually after releasing the pedal without any intermittent drop or rise.
- “MAS AIR/FL SE” should increase when depressing the accelerator pedal and should decrease at the moment “THRTL POS SEN” is closed (accelerator pedal is released).

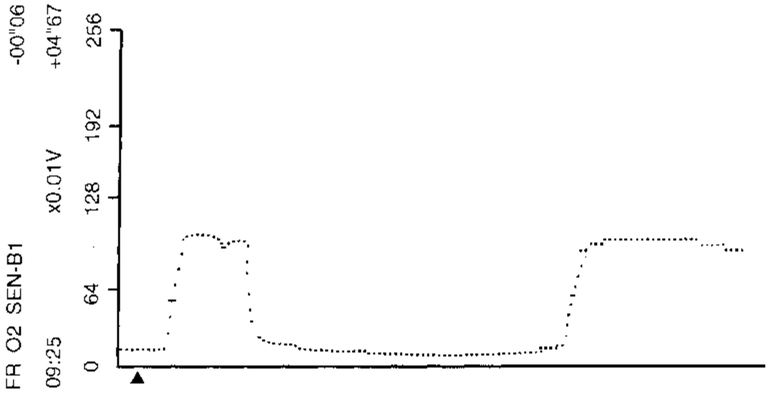
Major Sensor Reference Graph in Data Monitor Mode (Cont'd)



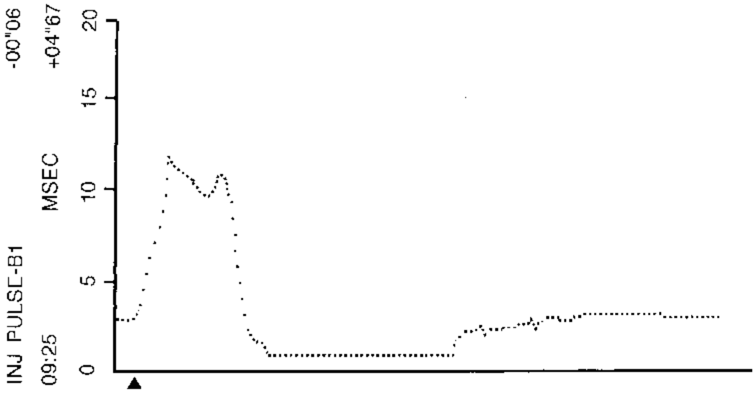
•"THRTL POS SEN" should increase while depressing the accelerator pedel and should decrease while releasing it.



•"RR O2 SEN-B1" may increase immediately after depressing the accelerator pedel and may decrease after releasing the pedal.



•"FR O2 SEN-B1" may increase immediately after depressing the accelerator pedel and may decrease after releasing the pedal.

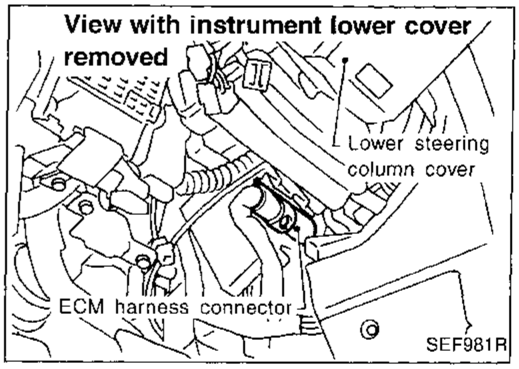


•"INJ PULSE-B1" should increase when depressing the accelerator pedal and should decrease when the pedal is released.

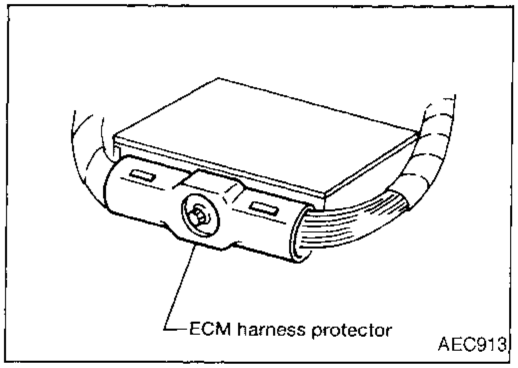
SEF936Q

ECM Terminals and Reference Value

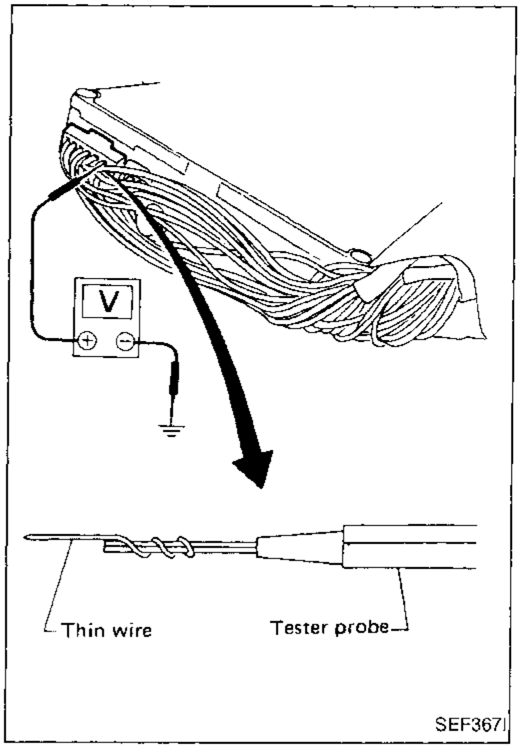
PREPARATION



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

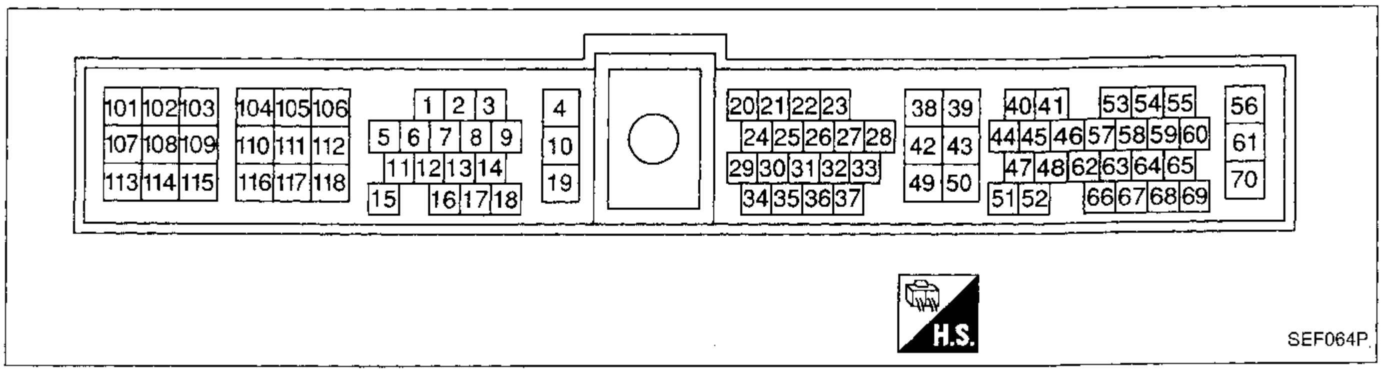


2. Remove ECM harness protector.



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.

ECM HARNESS CONNECTOR TERMINAL LAYOUT



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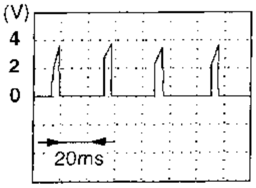
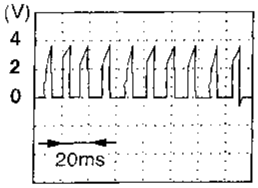
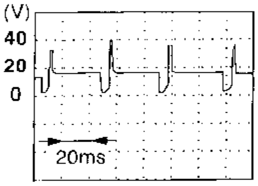
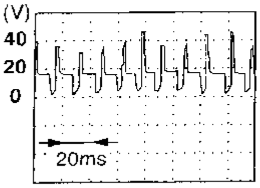
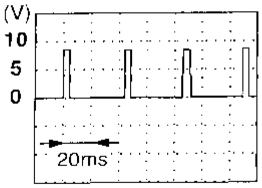
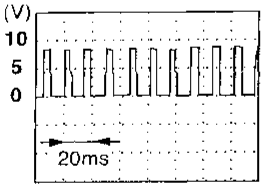
ECM INSPECTION TABLE

Specification data are reference values and are measured between each terminal and ㊸ (ECCS ground).

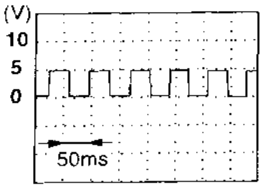
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	W/B	Ignition signal	Engine is running. └ Idle speed	0.9V  SEF186T
			Engine is running. └ Engine speed is 2,000 rpm	1.1 - 1.3V  SEF187T
2	W/G	Ignition check	Engine is running. (Warm-up condition) └ Idle speed	8.7V  SEF188T
			Engine is running. └ Engine speed is 2,000 rpm.	Approximately 13V  SEF189T
3	W	Tachometer	Engine is running. (Warm-up condition) └ Idle speed	3.7V  SEF190T
			Engine is running. └ Engine speed is 2,000 rpm	5V  SEF191T

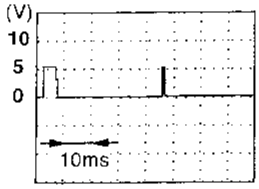
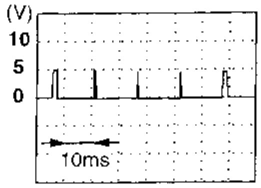
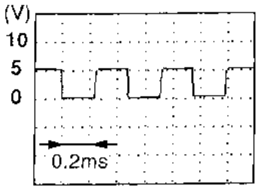
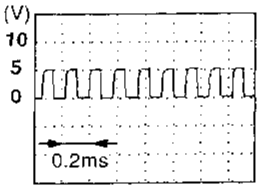
ECM Terminals and Reference Value (Cont'd)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	L/B	ECCS 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 valve	Engine is running. └ Idle speed	0 - 0.4V
6	YL			
7	Y/G	A/T check signal	Ignition switch "ON" Engine is running.	0 - 3.0V
8	R/L	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)
9	G/OR	Ambient air temperature switch	Ignition switch "ON" ├ Idle speed ├ Ambient air temperature is above 23.5°C (74°F) └ Air conditioner is operating	0V
			Ignition switch "ON" ├ Idle speed ├ Ambient air temperature is below 23.5°C (74°F) └ Air conditioner is operating	BATTERY VOLTAGE (11 - 14V)
10	B	ECCS ground	Engine is running. └ Idle speed	Engine ground
15	G/R	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)
16	W/B	EVAP canister purge volume control valve	Engine is running. └ Idle speed	BATTERY VOLTAGE (11 - 14V)
17	R/G			
18	G/R	Malfunction indicator lamp	Ignition switch "ON"	Approximately 0.1V
			Engine is running. └ Idle speed	BATTERY VOLTAGE (11 - 14V)
19	B	ECCS ground	Engine is running. └ Idle speed	Engine ground

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

ECM Terminals and Reference Value (Cont'd)

TERMINAL 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)
21	B/W	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	L/B	Neutral position switch (M/T models) Inhibitor switch (A/T models)	Ignition switch "ON" ├ Gear position is "Neutral" (M/T models) └ Gear position is "N" or "P" (A/T models)	Approximately 0V
			Ignition switch "ON" └ Except the above gear position	Approximately 5V
23	W	Throttle position sensor	Ignition switch "ON" └ Accelerator pedal released	0.3 - 0.7V
			Ignition switch "ON" └ Accelerator pedal fully depressed	Approximately 4V
24	PU/W	A/T signal No. 1	Ignition switch "ON" Engine is running. └ Idle speed	6 - 8V
25	R/B	Power steering oil pressure switch	Engine is running. └ Steering wheel is being turned	Approximately 0V
			Engine is running. └ Steering wheel is not being turned	Approximately 5V
26	W/L	Vehicle speed sensor	Engine is running. ├ Lift up the vehicle. └ In 1st gear position	1.9 - 2.1V  SEF194T
27	OR/W	Throttle position switch (Closed position)	Ignition switch "ON" (Warm-up condition) └ Accelerator pedal released	BATTERY VOLTAGE (11 - 14V)
			Ignition switch "ON" └ Accelerator pedal depressed	Approximately 0V
28	Y/L	Intake air temperature sensor	Engine is running.	Approximately 0 - 4.8V Output voltage varies with intake air temperature.

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
29	P/B	A/T signal No. 2	Ignition switch "ON" Engine is running. Idle speed	6 - 8V
30	P	A/T signal No. 3	Ignition switch "ON"	0V
33	P	Throttle position sensor signal	Ignition switch "ON" Accelerator pedal released	Approximately 0.4V
			Ignition switch "ON" Accelerator pedal fully depressed	Approximately 4V
38	B/W	Ignition switch	Ignition switch "OFF"	0V
			Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
39	B	ECCS ground	Engine is running. Idle speed	Engine ground
40	L	Camshaft position sensor (Reference signal)	Engine is running. Idle speed	1.1V  SEF199T
44	L		Engine is running. Engine speed is 2,000 rpm.	1.1V  SEF200T
41	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 2.5V  SEF196T

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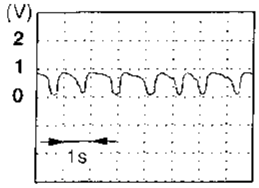
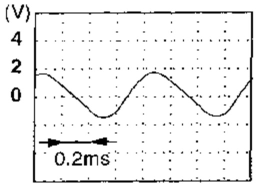
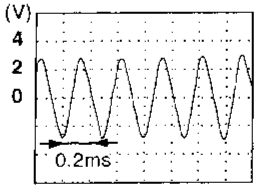
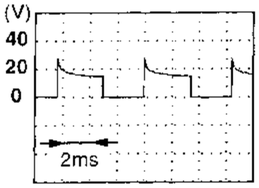
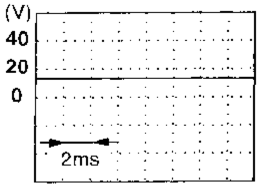
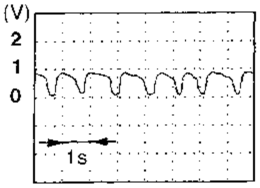
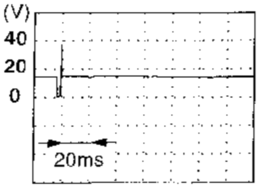
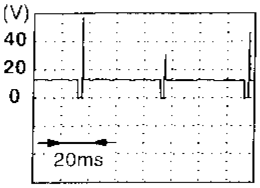
ECM Terminals and Reference Value (Cont'd)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
43	B	ECCS ground	Engine is running. └ Idle speed	Engine ground (Probe this terminal with ⊖ tester probe when measuring.)
45	W	Absolute pressure sensor	Ignition switch "ON" └ Engine is not running.	Approximately 4.4V
			Engine is running. (Warm-up condition) └ Idle speed (5 seconds after starting engine)	Approximately 1.2V
46	W	Front heated oxygen sensor (RH)	Engine is running. └ After warming up sufficiently and engine speed is 2,000 rpm	0 - Approximately 1.0V  SEF201T
47	W	Mass air flow sensor	Engine is running. (Warm-up condition) └ Idle speed	1.3 - 1.7V
			Engine is running. (Warm-up condition) └ Engine speed is 2,000 rpm	1.7 - 2.1V
48	B	Mass air flow sensor ground	Engine is running. (Warm-up condition) └ Idle speed	Approximately 0V
49	P/B	Throttle position sensor power supply	Ignition switch "ON"	Approximately 5V
50	B	Sensors' ground	Engine is running. (Warm-up condition) └ Idle speed	Approximately 0V
51	LG/R	Engine coolant temperature sensor	Engine is running.	Approximately 0 - 4.8V Output voltage varies with engine coolant temperature.
52	L/W	Rear heated oxygen sensor (RH)	Engine is running. └ After warming up sufficiently and engine speed is 2,000 rpm	0 - Approximately 1.0V

ECM Terminals and Reference Value (Cont'd)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
53	L	Crankshaft position sensor (OBD)	Engine is running. (Warm-up condition) Idle speed	Approximately 1.4V  SEF202T
			Engine is running. Engine speed is 2,000 rpm	Approximately 1.4V  SEF203T
54	W	Knock sensor	Engine is running. Idle speed	Approximately 2.5V
55	OR	IACV-AAC valve	Engine is running. (Warm-up condition) Idle speed	8 - 11V  SEF197T
			Engine is running. (Warm-up condition) Engine speed is 2,000 rpm	5 - 8V  SEF198T
56	B/W	Power supply for ECM	Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
61	B/W			
57	W	Front heated oxygen sensor (LH)	Engine is running. After warming up sufficiently and engine speed is 2,000 rpm	0 - Approximately 1.0V  SEF201T
58	LG/R	Data link connector for GST	Engine is running. Idle speed (GST is disconnected)	6 - 10V

ECM Terminals and Reference Value (Cont'd)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
59	Y/B	MAP/BARO switch solenoid valve	Ignition switch "ON" Engine is not running	BATTERY VOLTAGE (11 - 14V)
62	P/G	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	Y	Tank fuel temperature sensor	Engine is running.	Approximately 0 - 4.8V Output voltage varies with fuel temperature.
64	W	Data link connector for CONSULT	Engine is running. Idle speed (CONSULT is connected and turned on)	Approximately 0V
65	L			Approximately 4 - 9V
68	OR			Approximately 3.5V*
66	W	Rear heated oxygen sensor (LH)	Engine is running. After warming up sufficiently and engine speed is 2,000 rpm	0 - Approximately 1.0V
67	G	EVAP control system pressure sensor	Ignition switch "ON"	Approximately 3.4V
70	W/R	Power supply (Back-up)	Ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
102	W	Injector No. 1	Engine is running. (Warm-up condition) Idle speed	BATTERY VOLTAGE (11 - 14V)  SEF204T
104	Y/R	Injector No. 3		
107	Y	Injector No. 2		
109	W/L	Injector No. 4	Engine is running. (Warm-up condition) Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14V)  SEF205T
111	W/G	Injector No. 5		
114	W/B	Injector No. 6		
101	PU/R	Rear heated oxygen sensor heater (LH)	Engine is running. Engine speed is below 3,200 rpm	Approximately 0.4V
			Engine is running. Engine speed is above 3,200 rpm	BATTERY VOLTAGE (11 - 14V)

ECM Terminals and Reference Value (Cont'd)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
103	L/W	EGRC-solenoid valve	Engine is running. (Warm-up condition) └ Idle speed	0 - 0.7V
			Engine is running. (Warm-up condition) └ Engine speed is above 2,000 rpm	BATTERY VOLTAGE (11 - 14V)
105	Y/R	EVAP canister purge control solenoid valve	Engine is running. └ Idle speed	BATTERY VOLTAGE (11 - 14V)
106	B	ECCS ground	Engine is running. └ Idle speed	Engine ground
108	Y/G	EVAP canister vent control valve	Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
110	PU/W	Front heated oxygen sensor heater (LH)	Engine is running. └ Engine speed is below 3,200 rpm	Approximately 0.4V
			Engine is running. └ Engine speed is above 3,200 rpm	BATTERY VOLTAGE (11 - 14V)
112	B	ECCS ground	Engine is running. └ Idle speed	Engine ground
113	B/W	Current return	Engine is running. └ Idle speed	BATTERY VOLTAGE (11 - 14V)
115	PU	Front heated oxygen sensor heater (RH)	Engine is running. └ Engine speed is below 3,200 rpm	Approximately 0.4V
			Engine is running. └ Engine speed is above 3,200 rpm	BATTERY VOLTAGE (11 - 14V)
116	PU/G	Rear heated oxygen sensor heater (RH)	Engine is running. └ Engine speed is below 3,200 rpm	Approximately 0.4V
			Engine is running. └ Engine speed is above 3,200 rpm	BATTERY VOLTAGE (11 - 14V)
117	G/R	Vacuum cut valve bypass valve	Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
118	B	ECCS ground	Engine is running. └ Idle speed	Engine ground

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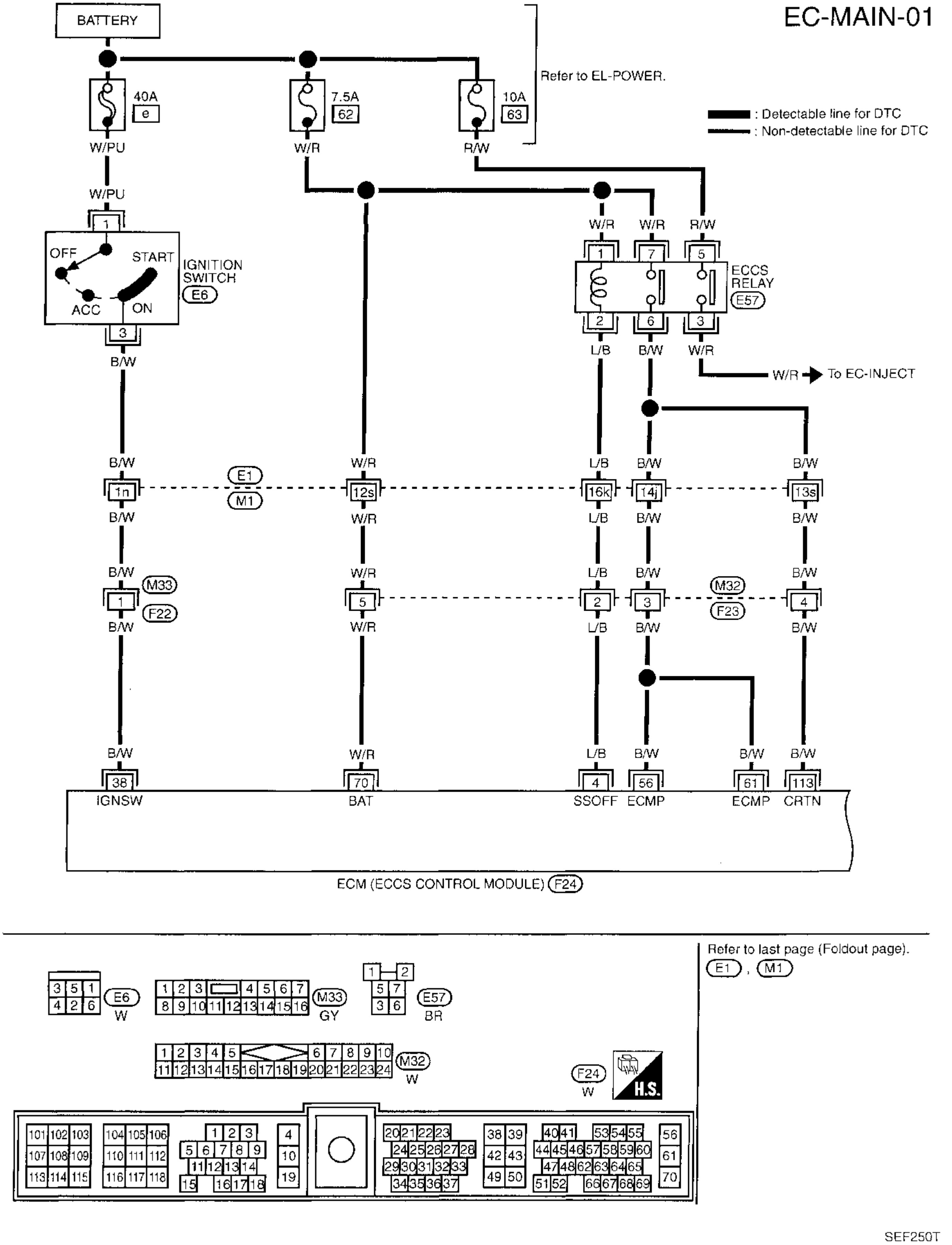
Main Power Supply and Ground Circuit



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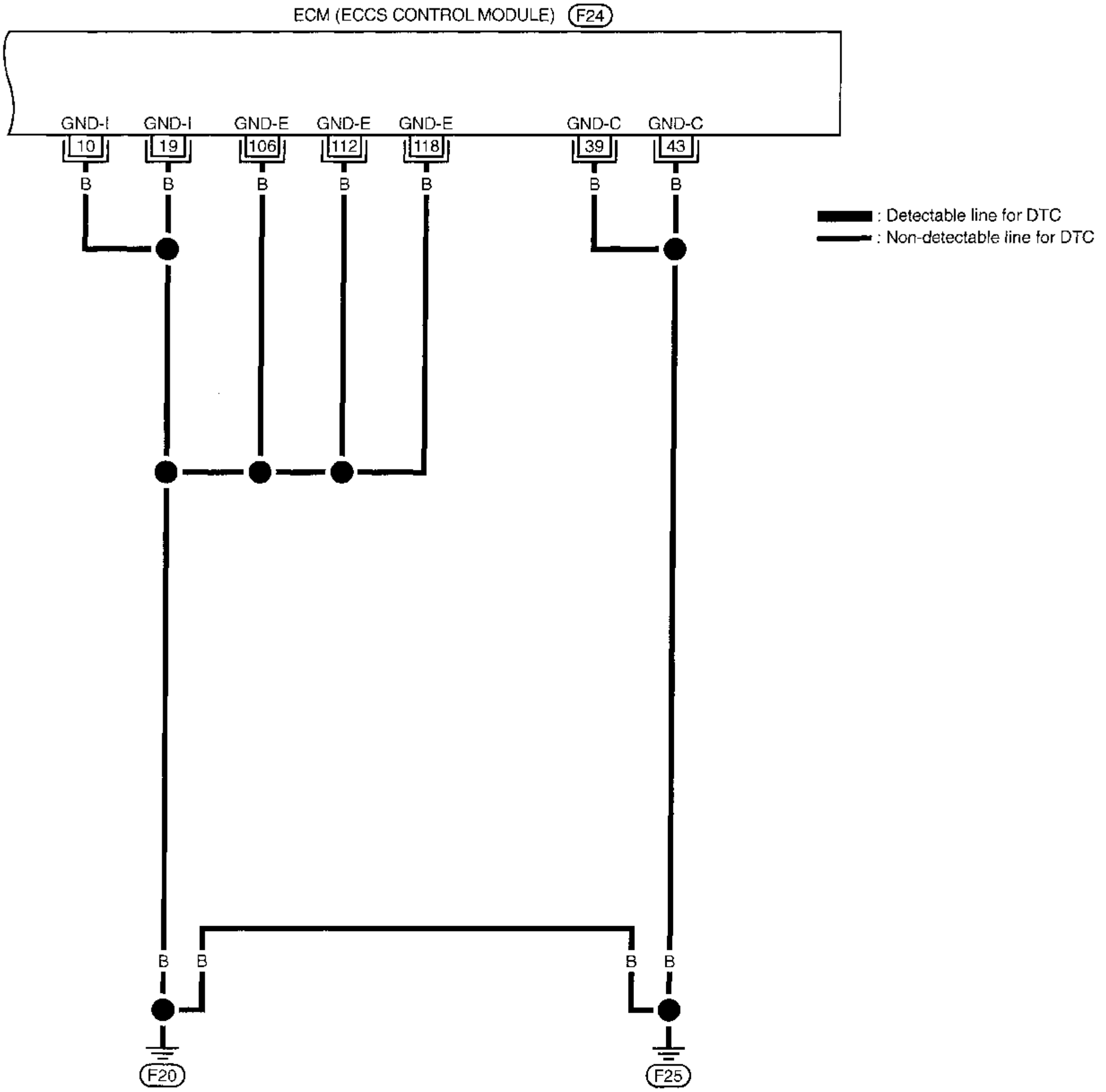
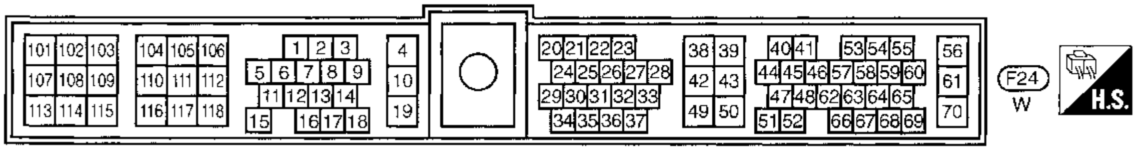
Main Power Supply and Ground Circuit (Cont'd)

EC-MAIN-02





SEF890R

TROUBLE DIAGNOSIS FOR POWER SUPPLY

Main Power Supply and Ground Circuit (Cont'd)

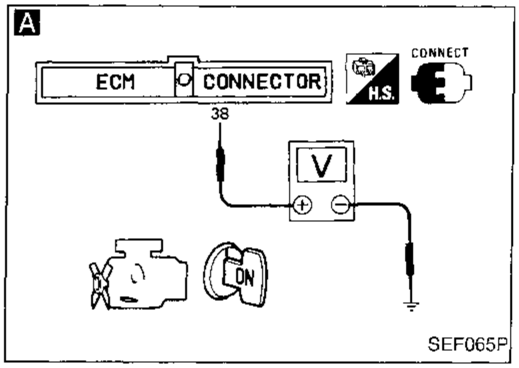
ECM TERMINALS AND REFERENCE VALUE

Specification data are reference values and are measured between each terminal and ㊸ (ECCS ground).

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	L/B	ECCS 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	ECCS ground	Engine is running. └ Idle speed	Engine ground
19	B	ECCS ground	Engine is running. └ Idle speed	Engine ground
38	B/W	Ignition switch	Ignition switch "OFF"	0V
			Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
39	B	ECCS ground	Engine is running. └ Idle speed	Engine ground
43	B	ECCS ground	Engine is running. └ Idle speed	Engine ground (Probe this terminal with ⊖ tester probe when measuring.)
56	B/W	Power supply for ECM	Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
61	B/W			
70	W/R	Power supply (Back-up)	Ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
106	B	ECCS ground	Engine is running. └ Idle speed	Engine ground
112	B	ECCS ground	Engine is running. └ Idle speed	Engine ground
113	B/W	Current return	Engine is running. └ Idle speed	BATTERY VOLTAGE (11 - 14V)
118	B	ECCS ground	Engine is running. └ Idle speed	Engine ground

Main Power Supply and Ground Circuit (Cont'd)

A



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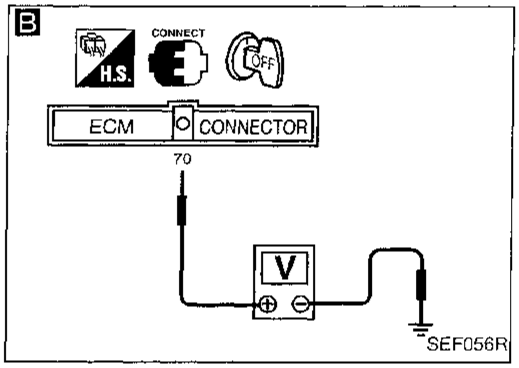

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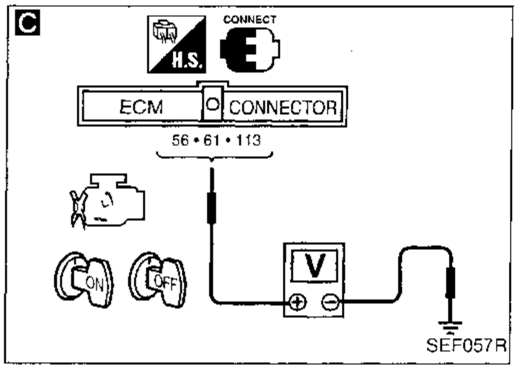

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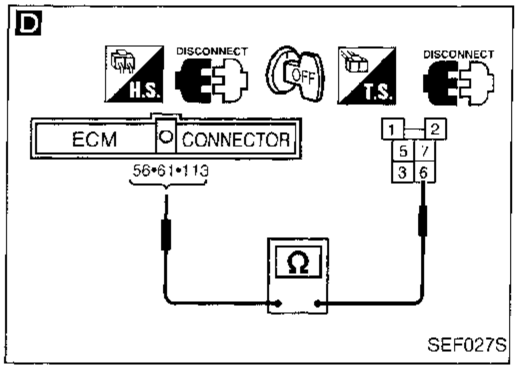

INSPECTION START

Start engine.
Is engine running?

No → **A**

CHECK POWER SUPPLY-I.

1. Turn ignition switch "ON".
2. Check voltage between ECM terminal ㊳ and ground with CONSULT or tester.
   Voltage: Battery voltage

If NG, check the following.

- Harness connectors F22, M33
- Harness connectors M1, E1
- Harness for open or short between ECM and ignition switch

If NG, repair harness or connectors.

OK → Go to **H** "CHECK GROUND CIRCUIT" on next page.

Yes → **B**

CHECK POWER SUPPLY-II.

1. Stop engine.
2. Check voltage between ECM terminal (70) and ground with CONSULT or tester.
   Voltage: Battery voltage

NG → Check the following.

- Harness connectors F23, M32
- Harness connectors M1, E1
- 7.5A fuse
- Harness for open or short between ECM and battery

If NG, repair harness or connectors.

OK → **C**

CHECK POWER SUPPLY-III.

1. Turn ignition switch "ON" and then "OFF".
2. Check voltage between ECM terminals (56), (61), (113) and ground with CONSULT or tester.
   Voltage:
   After turning ignition switch "OFF", battery voltage will exist for a few seconds, then drop to approximately 0V.

OK → Go to **H** "CHECK GROUND CIRCUIT" 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 **G** "CHECK ECCS RELAY" on next page.

Case-1 → Ⓐ

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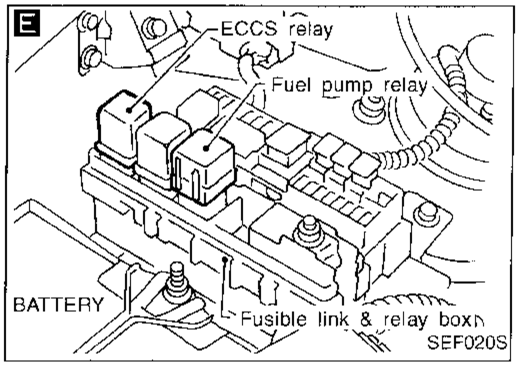
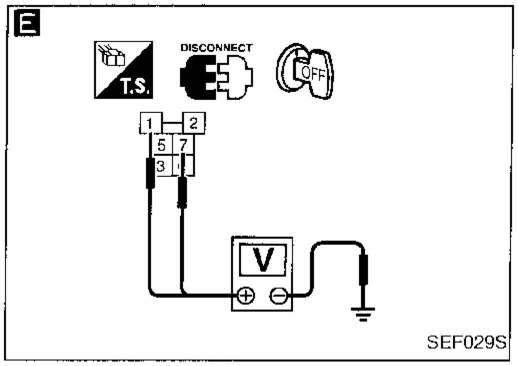
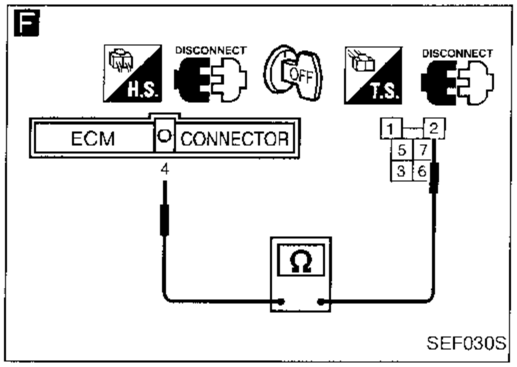
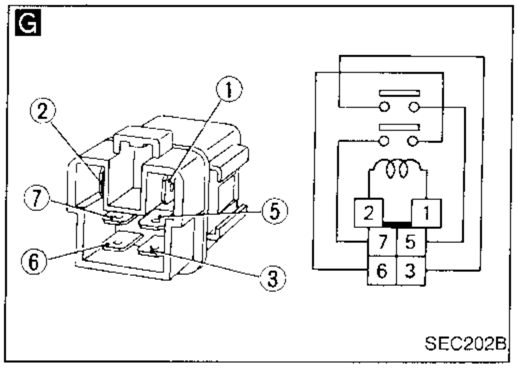
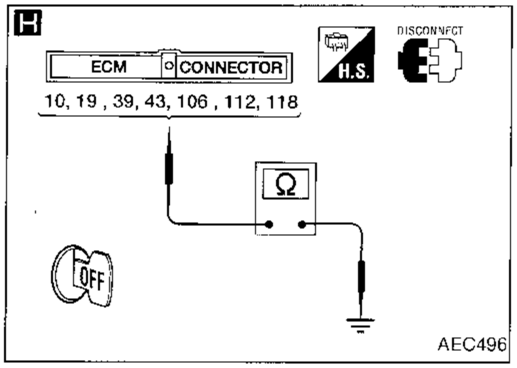
Main Power Supply and Ground Circuit (Cont'd)











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D

CHECK HARNESS CONTINUITY BETWEEN ECCS RELAY AND ECM

1. Disconnect ECM harness connector.
2. Disconnect ECCS relay harness connector.
3. Check harness continuity between ECM terminals (56), (61), (113) and relay terminal ⑥.

Continuity should exist.
If OK, check harness for short.

NG → Check the following.
- Harness connectors (F23), (M32)
- Harness connectors (E1), (M1)
- Harness for open or short between relay and ECM

If NG, repair harness or connectors.

OK

E

CHECK VOLTAGE BETWEEN ECCS RELAY AND GROUND.

Check voltage between relay terminals ①, ⑦ and ground with CONSULT or tester.
Voltage: Battery voltage

NG → Check the following.
- Harness connectors (E56), (F6)
- Harness for open or short between ECCS relay and battery

If NG, repair harness or connectors.

OK

F

CHECK OUTPUT SIGNAL CIRCUIT.

Check harness continuity between ECM terminal ④ and relay terminal ②.
Continuity should exist.
If OK, check harness for short.

NG → Repair harness or connectors.

OK

G

CHECK ECCS RELAY.

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

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

NG → Replace ECCS relay.

OK

H

CHECK GROUND CIRCUIT.

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.

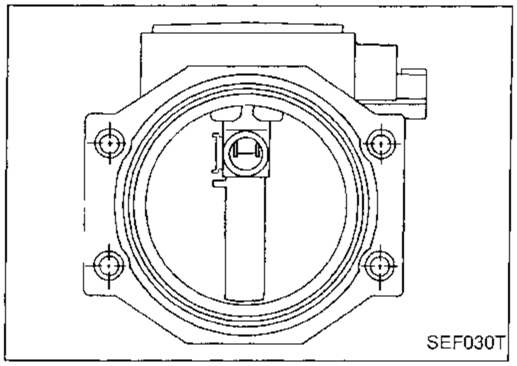
Continuity should exist.
If OK, check harness for short.

NG → Repair harness or connectors.

OK

Check ECM pin terminals for damage and check the connection of ECM harness connector.

INSPECTION END



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 wire that is supplied with electric current from the ECM. The temperature of the hot wire is controlled by the ECM a certain amount. The heat generated by the hot wire is reduced as the intake air flows around it. The more air, the greater the heat loss.

Therefore, the ECM must supply more electric current to maintain the temperature of the hot wire as air flow increases. The ECM detects the air flow by means of this current change.

CONSULT 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	1.5 - 2.1V
CAL/LD VALUE	• Engine: After warming up • Air conditioner switch: "OFF" • Shift lever: "N" • No-load	Idle	18.5 - 26.0%
		2,500 rpm	18.0 - 21.0%
MASS AIRFLOW	• Engine: After warming up • Air conditioner switch: "OFF" • Shift lever: "N" • No-load	Idle	3.3 - 4.8 g·m/s
		2,500 rpm	12.0 - 14.9 g·m/s

ECM TERMINALS AND REFERENCE VALUE

Specification data are reference values and are measured between each terminal and ㊸ (ECCS ground).

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	W	Mass air flow sensor	Engine is running. (Warm-up condition) └ Idle speed	1.3 - 1.7V
			Engine is running. (Warm-up condition) └ Engine speed is 2,000 rpm	1.7 - 2.1V
48	B	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 0102	A) An excessively high or low voltage from the sensor is sent to ECM.* B), C) Voltage sent to ECM is not practical when compared with the camshaft position sensor and throttle position sensor signals.	• Harness or connectors (The sensor circuit is open or shorted.) • Mass air flow sensor

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

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

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

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", "OVERALL FUNCTION CHECK".

Procedure for malfunction A

1) Turn ignition switch "ON", and wait at least 6 seconds.
2) Select "DATA MONITOR" mode with CONSULT.
3) Start engine and wait at least 3 seconds.

OR

GST

1) Turn ignition switch "ON", and wait at least 6 seconds.
2) Start engine and wait at least 3 seconds.
3) Select "MODE 7" with GST.

OR

NO TOOLS

1) Turn ignition switch "ON", and wait at least 6 seconds.
2) Start engine and wait at least 3 seconds.
3) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
4) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.

Procedure for malfunction B

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
3) Start engine and warm it up sufficiently.
4) Run engine for at least 10 seconds at idle speed.

OR

GST

1) Turn ignition switch "ON".
2) Start engine and warm it up sufficiently.
3) Run engine for at least 10 seconds at idle speed.
4) Select "MODE 7" with GST.

OR

NO TOOLS

1) Turn ignition switch "ON".
2) Start engine and warm it up sufficiently.
3) Run engine for at least 10 seconds at idle speed.
4) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
5) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.

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

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 C

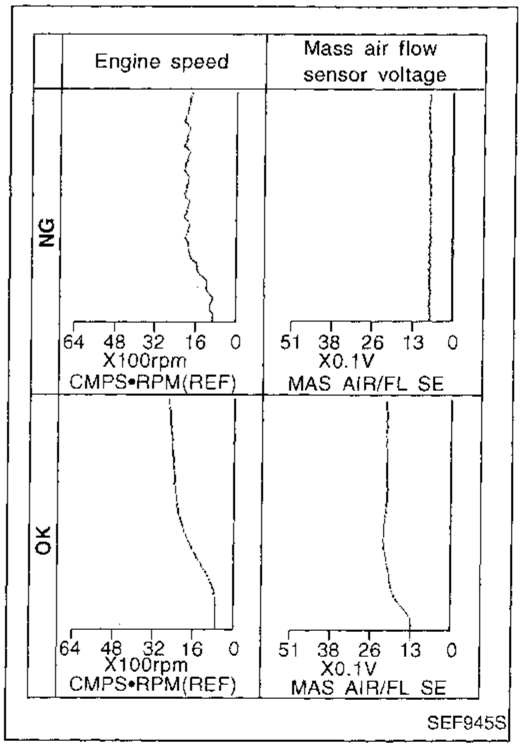
1) Turn ignition switch "ON".
2) Start engine and warm it up sufficiently.
3) Select "DATA MONITOR" mode with CONSULT.
4) Check the voltage of mass air flow sensor with "DATA MONITOR".
5) Check for linear voltage rise in response to increases to about 4,000 rpm in engine speed.

OR

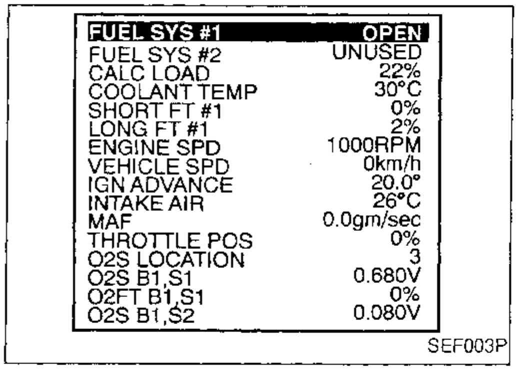
1) Turn ignition switch "ON".
2) Start engine and warm it up sufficiently.
3) Select "MODE 1" with GST.
4) Check the mass air flow with "MODE 1".
5) Check for linear mass air flow rise in response to increases to about 4,000 rpm in engine speed.

OR

1) Turn ignition switch "ON".
2) Start engine and warm it up sufficiently.
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.

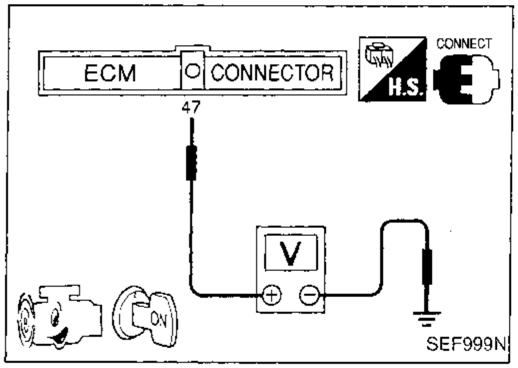


SEF945S



```
FUEL SYS #1          OPEN
FUEL SYS #2        UNUSED
CALC LOAD             22%
COOLANT TEMP         30°C
SHORT FT #1            0%
LONG FT #1             2%
ENGINE SPD        1000RPM
VEHICLE SPD        0km/h
IGN ADVANCE         20.0°
INTAKE AIR           26°C
MAF            0.0gm/sec
THROTTLE POS           0%
O2S LOCATION            3
O2S B1,S1          0.680V
O2FT B1,S1             0%
O2S B1,S2          0.080V
```

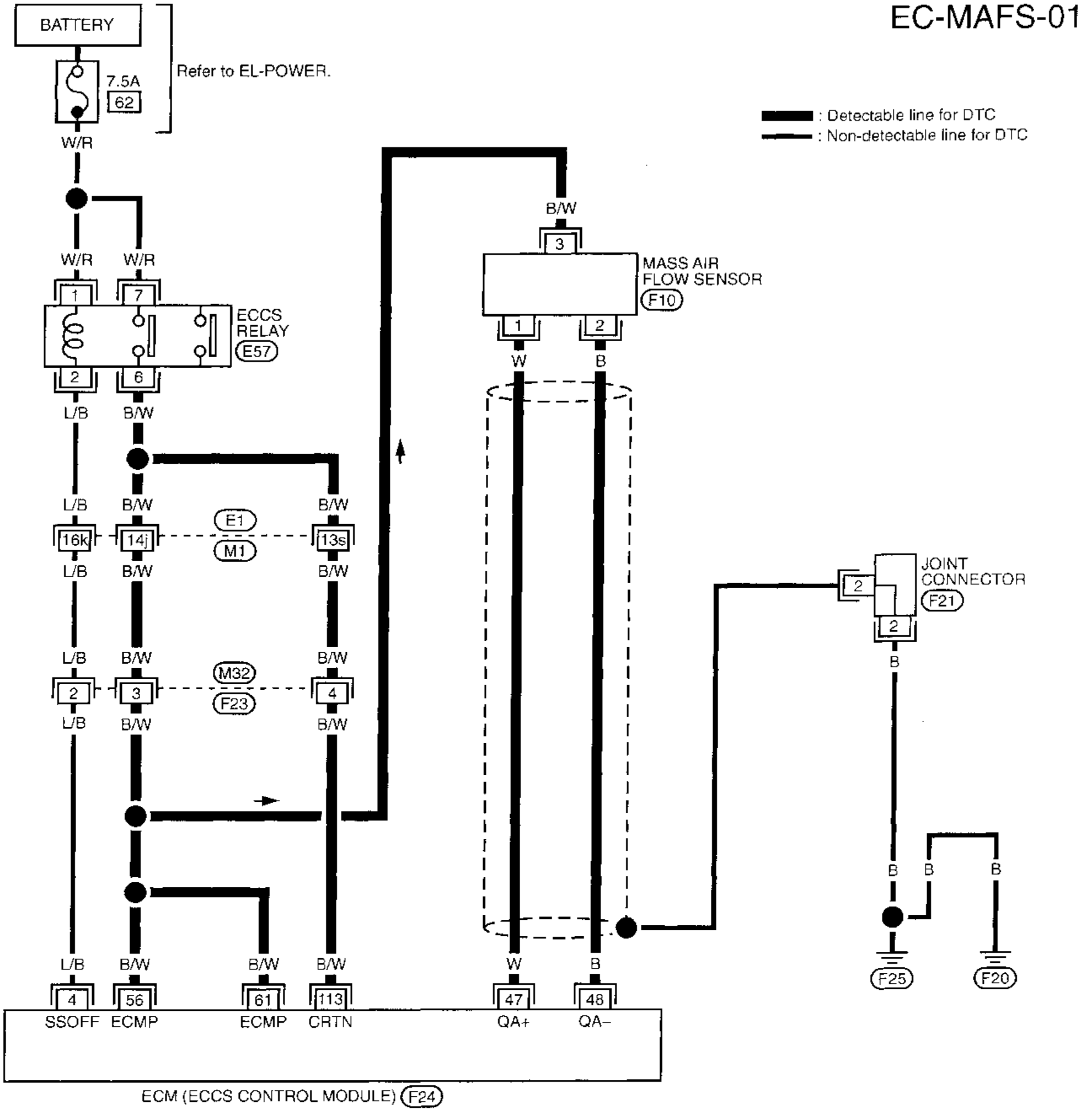
SEF003P



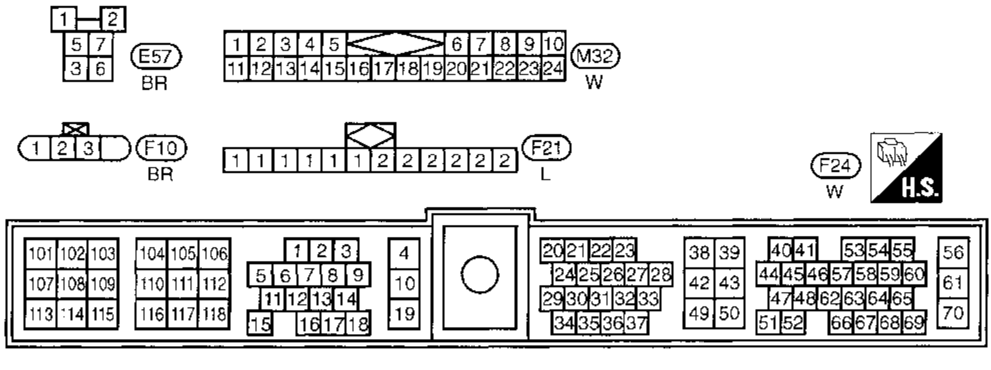
SEF999N

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

EC-MAFS-01



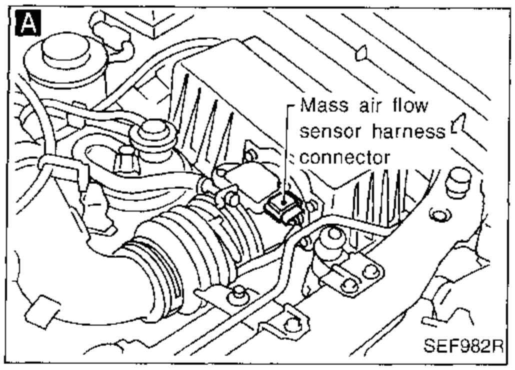
Refer to last page (Foldout page).
E1, M1

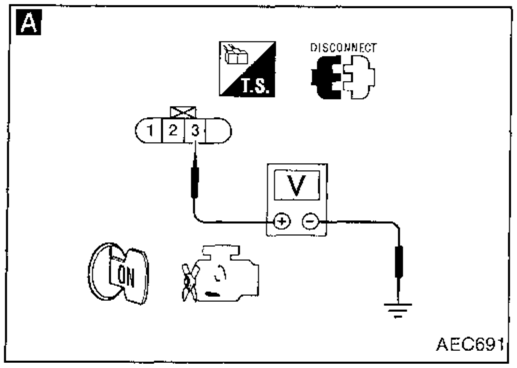


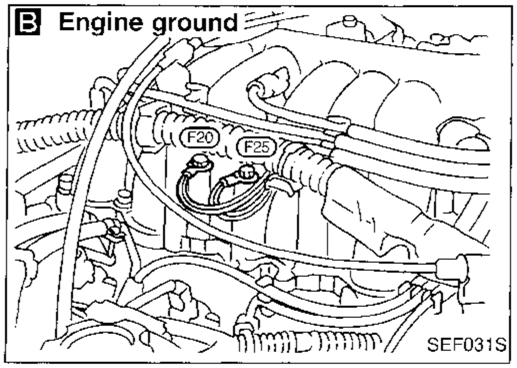
SEF251T

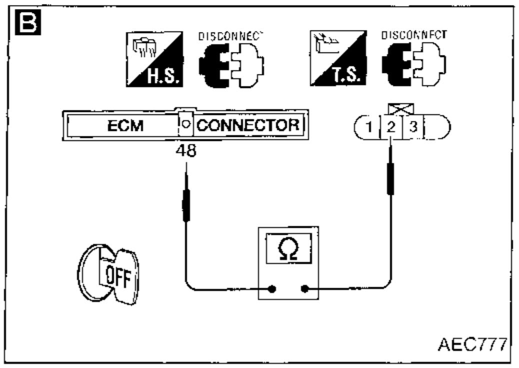
Mass Air Flow Sensor (MAFS) (Cont'd)

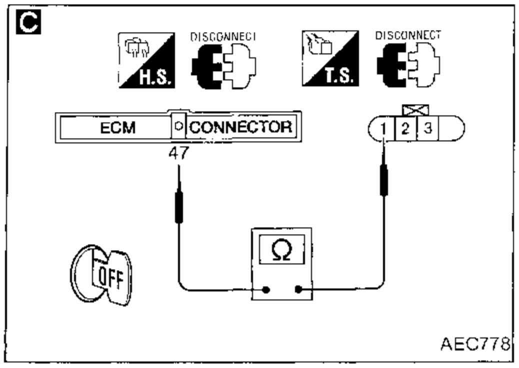
DIAGNOSTIC PROCEDURE

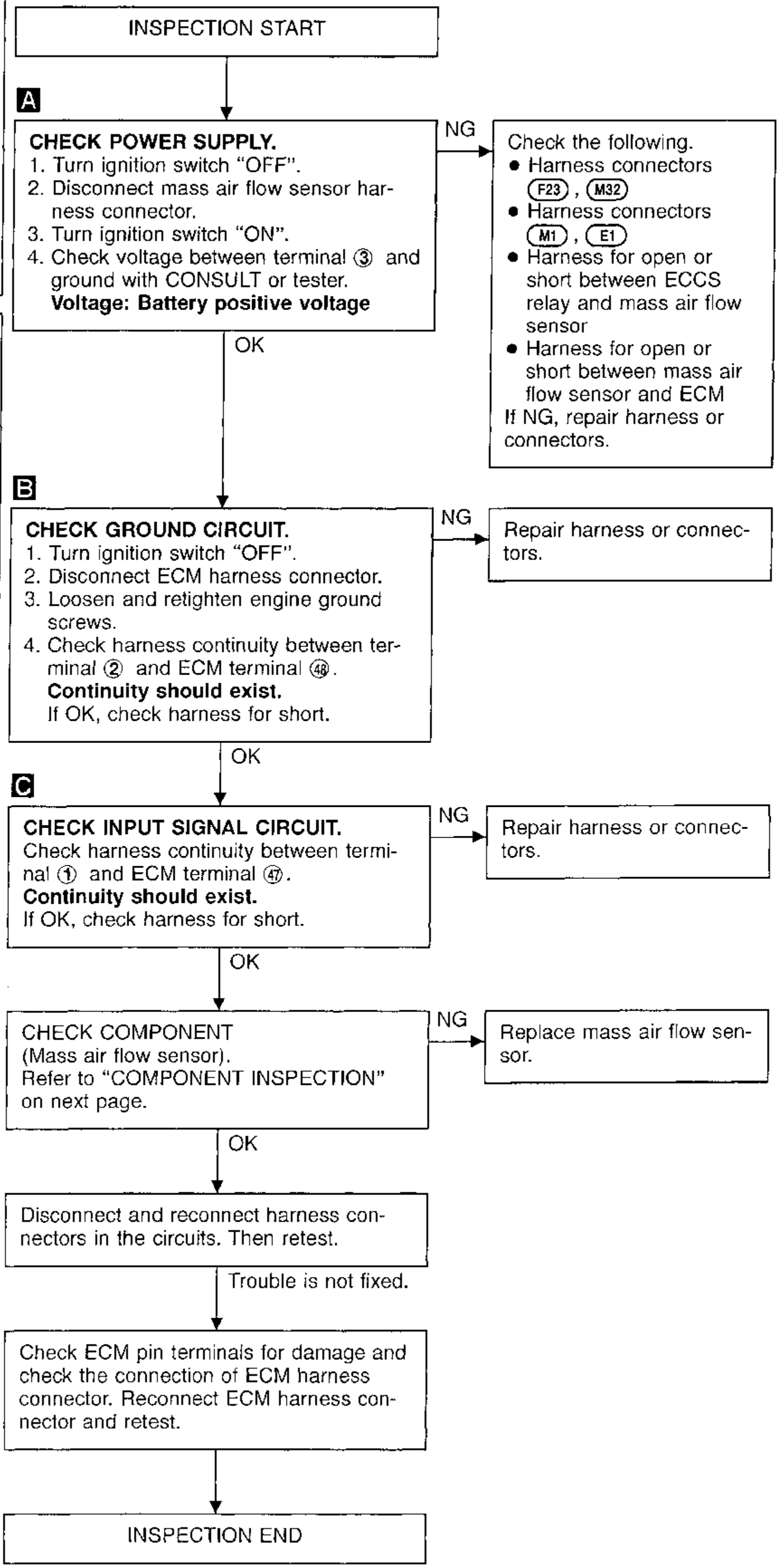












INSPECTION START

A

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

NG → Check the following.
- Harness connectors (F23), (M32)
- Harness connectors (M1), (E1)
- Harness for open or short between ECCS 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. Loosen and retighten engine ground screws.
4. Check harness continuity between terminal ② and ECM terminal ㊽.
   Continuity should exist.
   If OK, check harness for short.

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" on next page.

NG → Replace mass air flow sensor.

OK

Disconnect and reconnect harness connectors in the circuits. Then retest.

Trouble is not fixed.

Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

INSPECTION END

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

COMPONENT INSPECTION

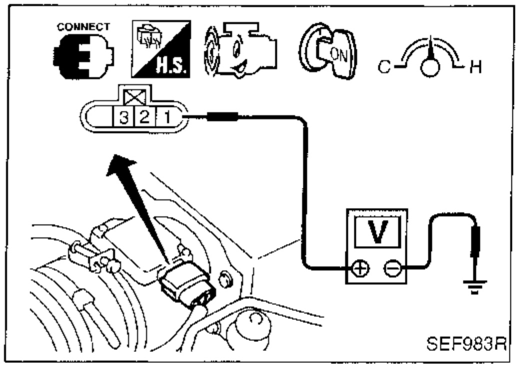
Mass air flow sensor

1. Turn ignition switch "ON".
2. Start engine and warm it up sufficiently.
3. Check voltage between terminal ① and ground.

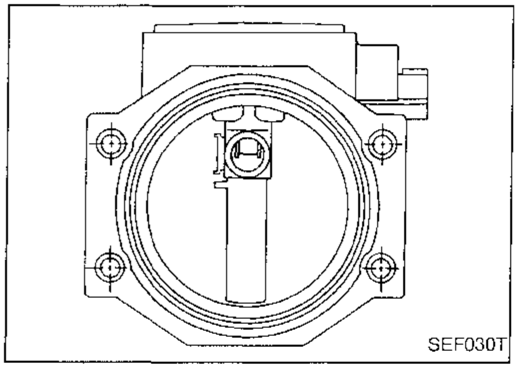
Conditions	Voltage V
Ignition switch "ON" (Engine stopped.)	Less than 1.0
Idle (Engine is warmed-up sufficiently.)	1.3 - 1.7
Idle to about 4,000 rpm*	1.3 - 1.7 to Approx. 4.0

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

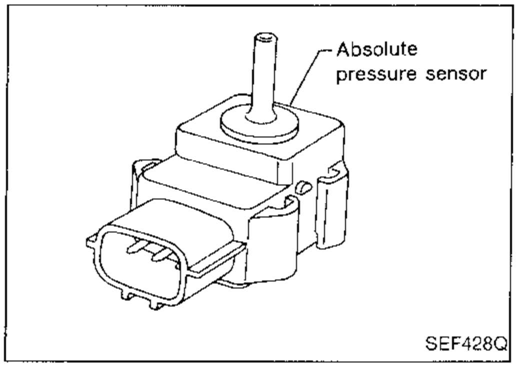
4. If NG, remove mass air flow sensor from air duct. Check hot wire for damage or dust.

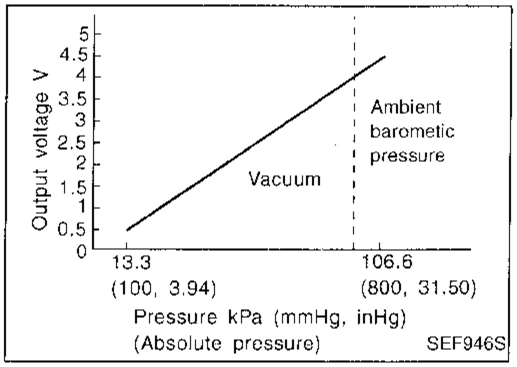


SEF983R



SEF030T





Absolute Pressure Sensor

COMPONENT DESCRIPTION

The absolute pressure sensor is connected to the MAP/BARO switch solenoid valve by a hose. The sensor detects ambient barometric pressure and intake manifold pressure and sends the voltage signal to the ECM. As the pressure increases, the voltage rises. The absolute pressure sensor is not used to control the engine system. It is used only for on board diagnosis.

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P0105 0803	A) An excessively low or high voltage from the sensor is sent to ECM.	• Harness or connectors (Absolute pressure sensor circuit is open or shorted.) • Absolute pressure sensor
	B) A low voltage from the sensor is sent to ECM under heavy load driving conditions.	• Absolute pressure sensor
	C) A high voltage from the sensor is sent to ECM under light load driving conditions.	• Hoses (Hoses between the intake manifold and absolute pressure sensor are disconnected or clogged.) • Intake air leaks • Absolute pressure sensor

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

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

Procedure for malfunction A

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
3) Wait at least 6 seconds.

OR

GST
1) Turn ignition switch "ON" and wait at least 6 seconds.
2) Select "MODE 7" with GST.

OR

NO TOOLS
1) Turn ignition switch "ON" and wait at least 6 seconds.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.

If the DTC cannot be confirmed, perform "Procedure for malfunction B", "OVERALL FUNCTION CHECK".

Procedure for malfunction C

1) Start engine and warm it up sufficiently.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT.
4) Start engine and let it idle.
5) Wait at least 15 seconds.

OR

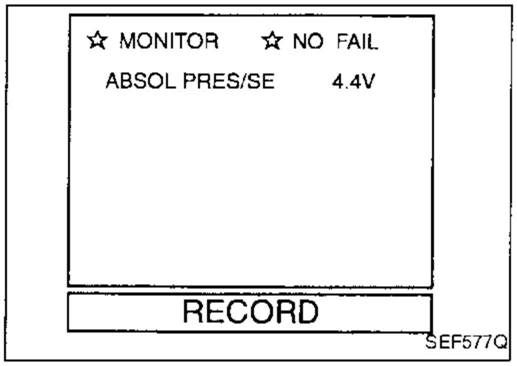
GST

1) Start engine and warm it up sufficiently.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Start engine.
4) Let engine idle and wait at least 15 seconds.
5) Select "MODE 7" with GST.

OR

NO TOOLS

1) Start engine and warm it up sufficiently.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Start engine.
4) Let engine idle and wait at least 15 seconds.
5) Turn ignition switch "OFF".
6) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.



```
☆ MONITOR     ☆ NO FAIL
  ABSOL PRES/SE      4.4V

          RECORD
```

SEF577Q

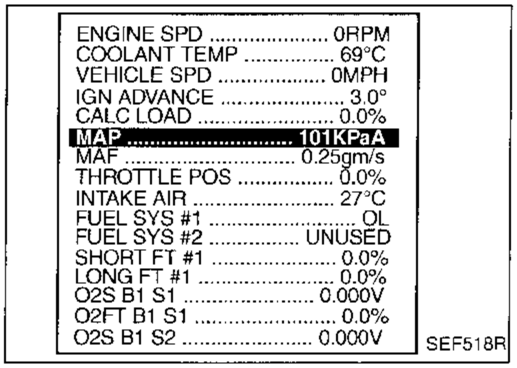
OVERALL FUNCTION CHECK

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

Procedure for malfunction B

1) Turn ignition switch "ON".
2) Select "ABSOL PRES/SE" in "DATA MONITOR" mode with CONSULT.
3) Make sure that the voltage of "ABSOL PRES/SE" is more than 1.74 [V].

OR



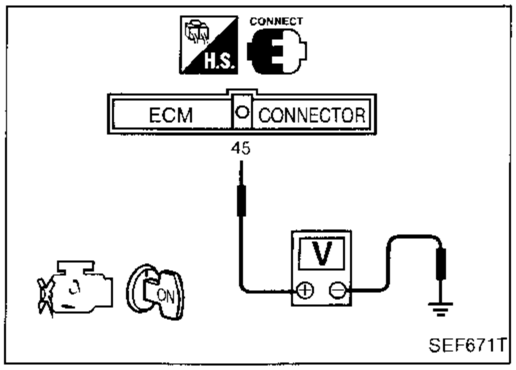
```
ENGINE SPD .................... 0RPM
COOLANT TEMP ................ 69°C
VEHICLE SPD ................... 0MPH
IGN ADVANCE ...................... 3.0°
CALC LOAD ........................ 0.0%
MAP ............................ 101KPaA
MAF ............................. 0.25gm/s
THROTTLE POS ................. 0.0%
INTAKE AIR ......................... 27°C
FUEL SYS #1 .......................... OL
FUEL SYS #2 ............... UNUSED
SHORT FT #1 ...................... 0.0%
LONG FT #1 ........................ 0.0%
O2S B1 S1 ....................... 0.000V
O2FT B1 S1 ......................... 0.0%
O2S B1 S2 ....................... 0.000V
```

SEF518R

GST

1) Turn ignition switch "ON".
2) Select "MAP" in "MODE 1" with GST.
3) Make sure that the pressure of "MAP" is more than 46 kPa (0.47 kg/cm^2, 6.7 psi).

OR



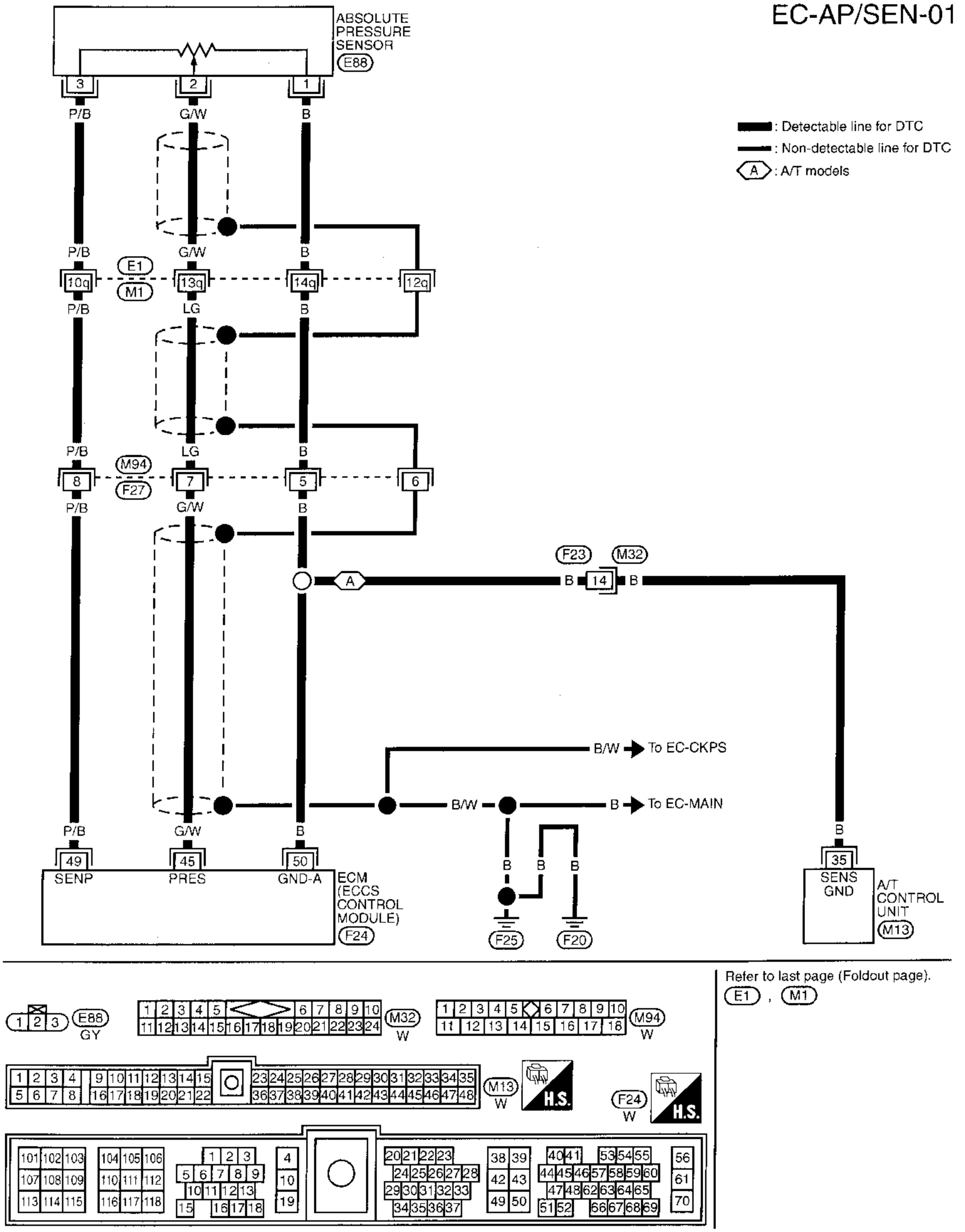
SEF671T

NO TOOLS

1) Turn ignition switch "ON".
2) Make sure that the voltage between ECM terminal ㊺ and ground is more than 1.74 [V].

If the DTC cannot be confirmed, perform "Procedure for malfunction C" on the previous page.

Absolute Pressure Sensor (Cont'd)



Refer to last page (Foldout page).
(E1) , (M1)

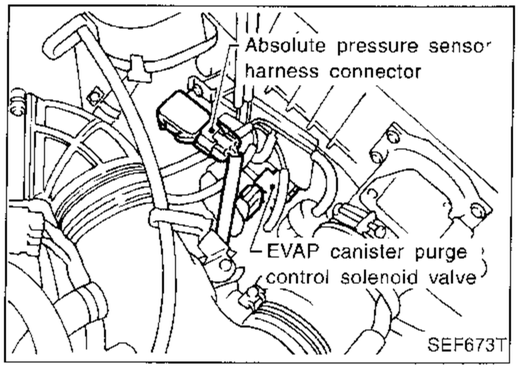
SEF282T

Absolute Pressure Sensor (Cont'd)

DIAGNOSTIC PROCEDURE

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

Procedure A



INSPECTION START

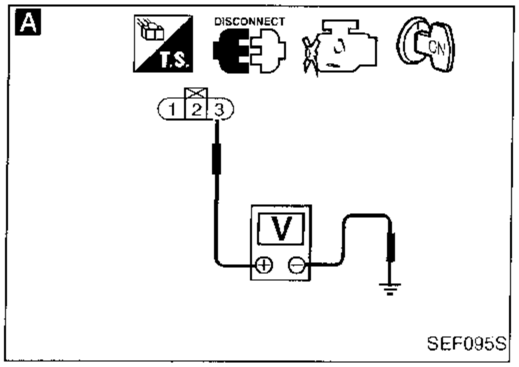
A

CHECK POWER SUPPLY.
1. Turn ignition switch "OFF".
2. Disconnect absolute pressure sensor harness connector.
3. Turn ignition switch "ON".
4. Check voltage between terminal ③ and engine ground with CONSULT or tester.
Voltage: Approximately 5V

NG → Check the following.
- Harness connectors (F27), (M94)
- Harness connectors (M1), (E1)
- Harness for open or short between ECM and absolute pressure sensor

If NG, repair harness or connectors.

OK ↓



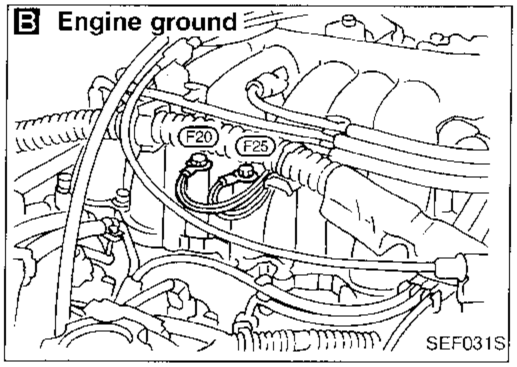
B

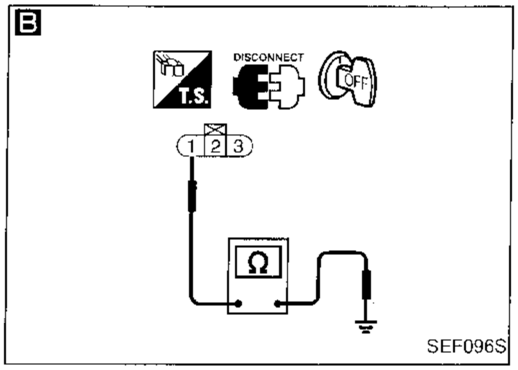
CHECK GROUND CIRCUIT.
1. Turn ignition switch "OFF".
2. Loosen and retighten ground screw.
3. Check harness continuity between terminal ① and engine ground.
Continuity should exist.
If OK, check harness for short.

NG → Check the following.
- Harness connectors (F27), (M94)
- Harness connectors (M1), (E1)
- Harness for open or short between ECM and absolute pressure sensor
- Harness connectors (F23), (M32)
- Harness for open or short between A/T control unit and absolute pressure sensor

If NG, repair harness or connectors.

OK ↓





C

CHECK INPUT SIGNAL CIRCUIT.
1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal ㊺ and terminal ②.
Continuity should exist.
If OK, check harness for short.

NG → Check the following.
- Harness connectors (F27), (M94)
- Harness connectors (M1), (E1)
- Harness for open or short between ECM and absolute pressure sensor

If NG, repair harness or connectors.

OK ↓

CHECK COMPONENT
(Absolute pressure sensor).
Refer to "COMPONENT INSPECTION", EC-110.

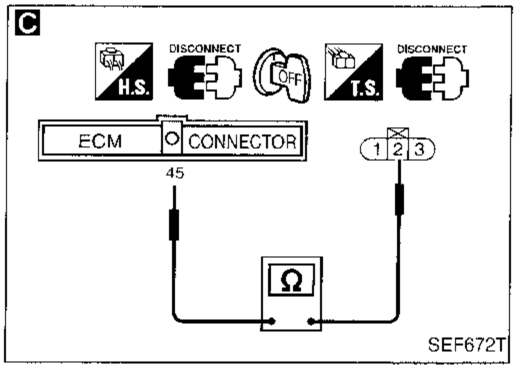
NG → Replace absolute pressure sensor.

OK ↓

Disconnect and reconnect harness connectors in the circuit. Then retest.

↓ Trouble is not fixed.

Ⓐ



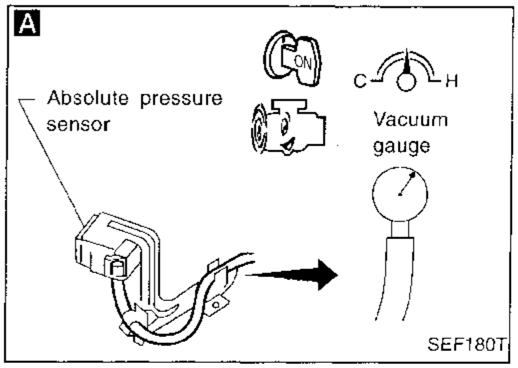
Absolute Pressure Sensor (Cont'd)

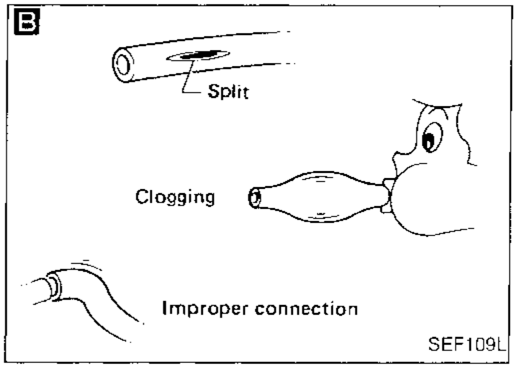
Ⓐ

Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

↓

INSPECTION END





Procedure B

INSPECTION START

↓

A

CHECK VACUUM SOURCE TO ABSOLUTE PRESSURE SENSOR.

1. Start engine and warm it up sufficiently.
2. Disconnect vacuum hose to absolute pressure sensor.
3. Check the vacuum pressure with vacuum gauge at idle.

Vacuum pressure:

Approx. −73.3 kPa

(−550 mmHg, −21.65 inHg, −10.63 psi)

NG → CHECK VACUUM HOSE.
Check vacuum hose for clogging, cracks or improper connection.
If NG, repair or replace the hose.

↓ OK

CHECK INTAKE SYSTEM.
Check intake system for air leaks.

↓ OK

B

CHECK HOSE BETWEEN ABSOLUTE PRESSURE SENSOR AND MAP/BARO SWITCH SOLENOID VALVE.

1. Turn ignition switch "OFF".
2. Check hose for clogging, cracks or improper connection.

NG → Repair or reconnect hose.

↓ OK

CHECK COMPONENT
(Absolute pressure sensor).
Refer to "COMPONENT INSPECTION" on next page.

NG → Replace absolute pressure sensor.

↓ OK

Disconnect and reconnect harness connectors in the circuit. Then retest.

↓ Trouble is not fixed.

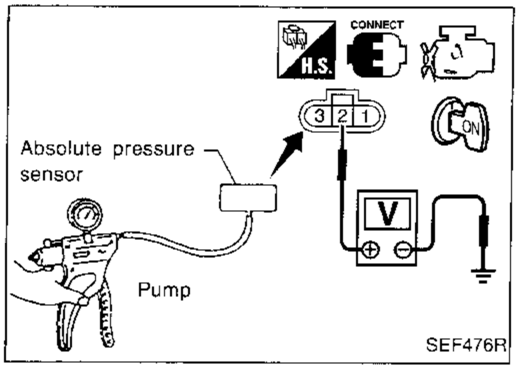
Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

↓

INSPECTION END

Absolute Pressure Sensor (Cont'd)

COMPONENT INSPECTION



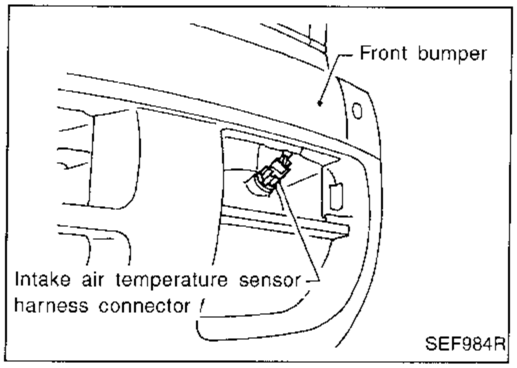
Absolute pressure sensor

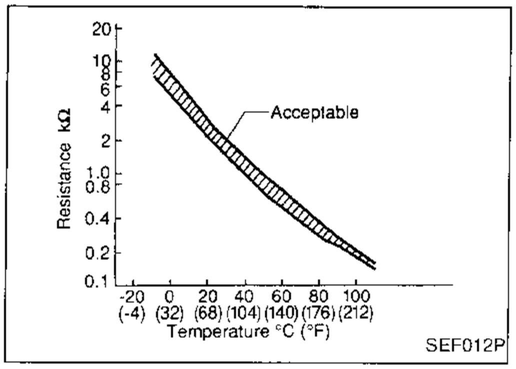
1. Remove absolute pressure sensor with its harness connector connected.
2. Remove hose from absolute pressure sensor.
3. Turn ignition switch "ON" and check output voltage between terminal ② and engine ground.
   The voltage should be 3.2 to 4.8 V.
4. Use pump to apply vacuum of −26.7 kPa (−200 mmHg, −7.87 inHg, −3.87 psi) to absolute pressure sensor as shown in figure and check the output voltage.
   The voltage should be 1.0 to 1.4 V lower than the value measured in step 3.

CAUTION:

Always calibrate the vacuum pump gauge when using it.

5. If NG, replace absolute pressure sensor.





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.
This sensor is not used to control the engine system. It is used only for the on board diagnosis.

〈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 ECM terminal ㊸ (ECCS ground).

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0110 0401	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 TRUBLE CODE CONFIRMATION PROCEDURE

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

Procedure for malfunction A

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
3) Wait at least 5 seconds.

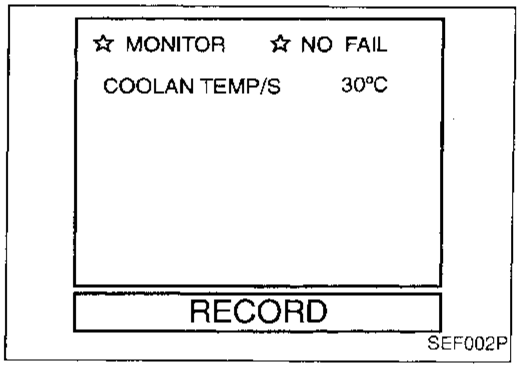
OR

1) Turn ignition switch "ON" and wait at least 5 seconds.
2) Select MODE 7 with GST.

OR

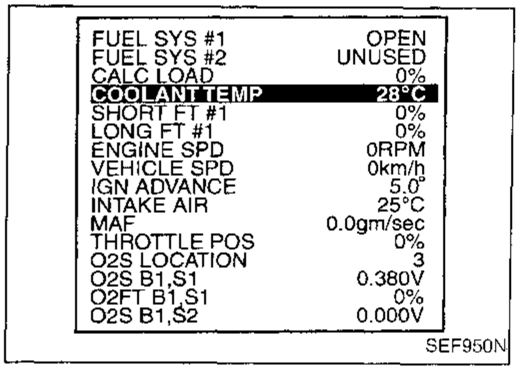
1) Turn ignition switch "ON" and wait at least 5 seconds.
2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
3) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.

Intake Air Temperature Sensor (Cont'd)



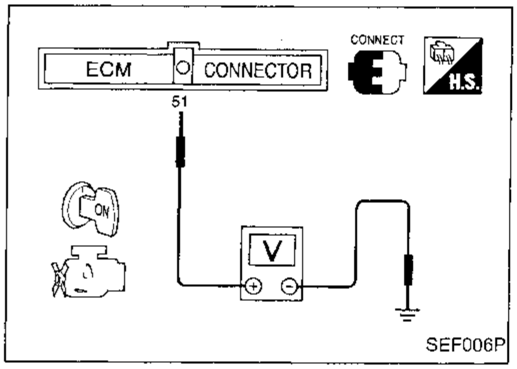
```
☆ MONITOR      ☆ NO FAIL
COOLAN TEMP/S      30°C

RECORD
```

SEF002P



```
FUEL SYS #1            OPEN
FUEL SYS #2          UNUSED
CALC LOAD                0%
COOLANT TEMP           28°C
SHORT FT #1              0%
LONG FT #1               0%
ENGINE SPD             0RPM
VEHICLE SPD           0km/h
IGN ADVANCE            5.0°
INTAKE AIR             25°C
MAF              0.0gm/sec
THROTTLE POS             0%
O2S LOCATION              3
O2S B1,S1            0.380V
O2FT B1,S1               0%
O2S B1,S2            0.000V
```

SEF950N



SEF006P

Procedure for malfunction B

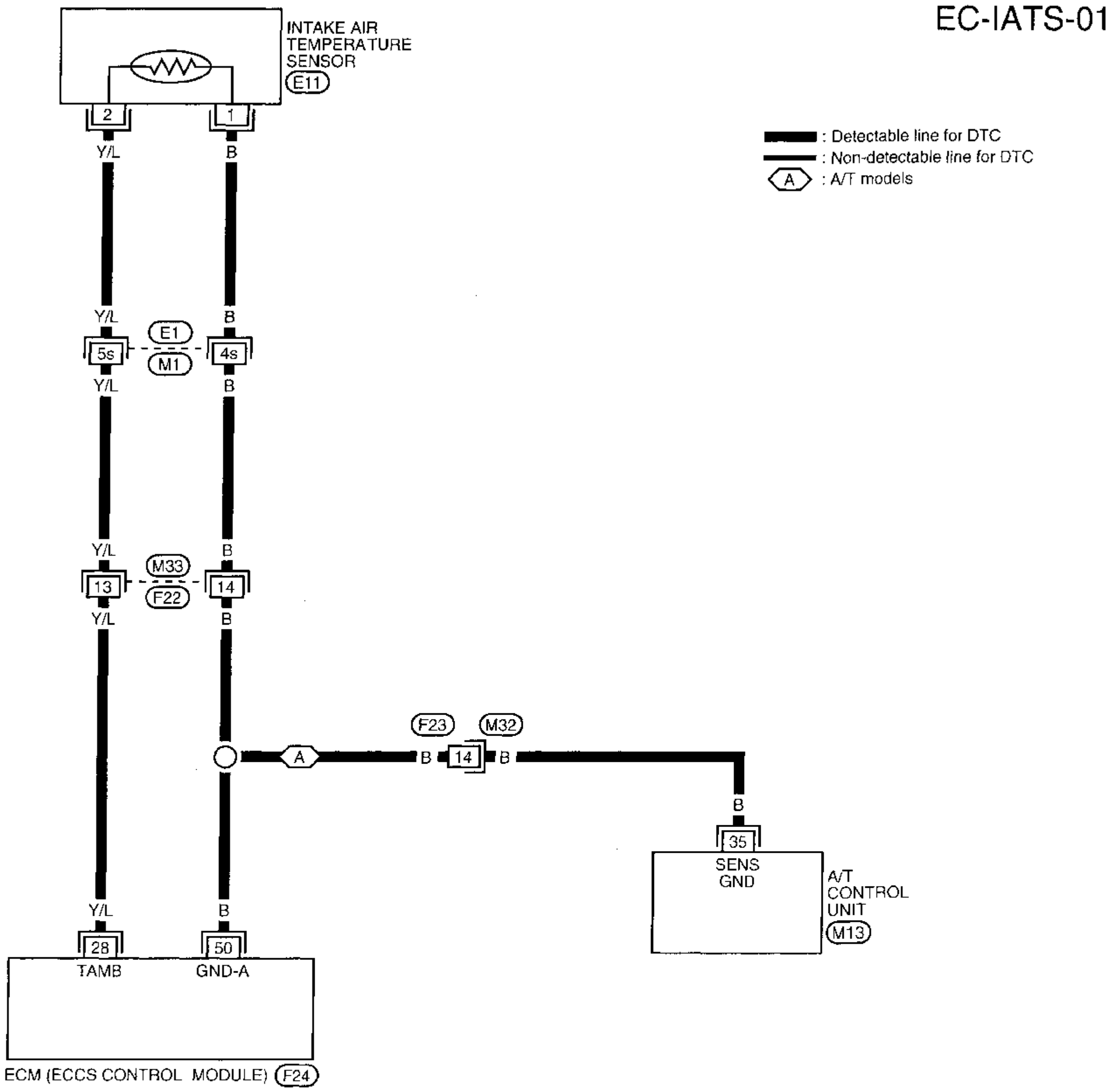
1) Lift up vehicle and open engine hood.
2) Wait until engine coolant temperature is less than 90°C (194°F).
   - (a) Turn ignition switch "ON".
   - (b) Select "DATA MONITOR" mode with CONSULT.
   - (c) Check the engine coolant temperature.
   - (d) If the engine coolant temperature is not less than 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).
3) Turn ignition switch "ON".
4) Select "DATA MONITOR" mode with CONSULT.
5) Start engine.
6) Shift selector lever to "D" position.
7) Hold vehicle speed at 70 to 80 km/h (43 to 50 MPH) for 2 minutes.

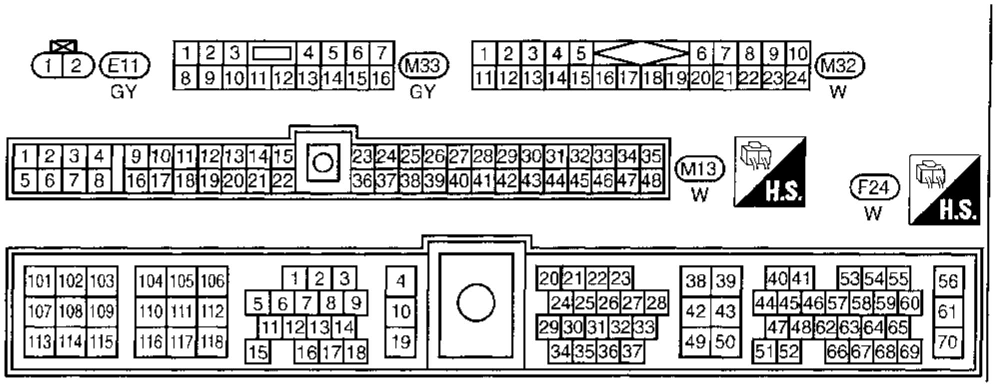
OR

1) Lift up vehicle and open engine hood.
2) 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).
3) Start engine.
4) Shift selector lever to "D" position.
5) Hold vehicle speed at 70 to 80 km/h (43 to 50 MPH) for 2 minutes.
6) Select MODE 7 with GST.

OR

1) Lift up vehicle and open engine hood.
2) Wait until engine coolant temperature is less than 90°C (194°F).
   - (a) Turn ignition switch "ON".
   - (b) Check voltage between ECM terminal (51) and ground.
     Voltage: More than 1.0 (V)
   - (c) If the voltage is not more than 1.0 (V), turn ignition switch "OFF" and cool down engine.
- Perform the following steps before the voltage is below 1.0V.
3) Start engine.
4) Shift selector lever to "D" position.
5) Hold vehicle speed at 70 to 80 km/h (43 to 50 MPH) for 2 minutes.
6) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
7) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.



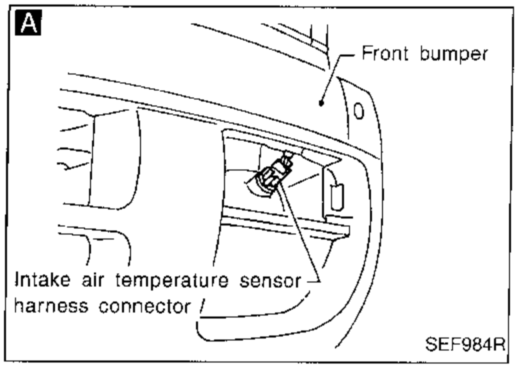


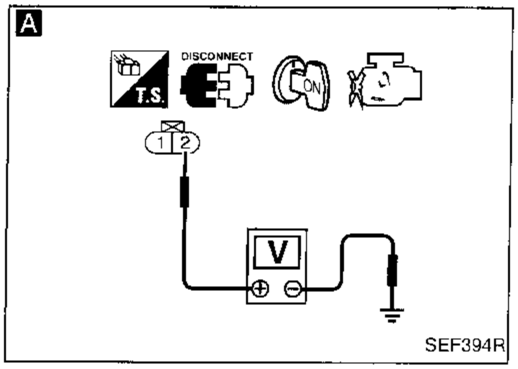
Refer to last page (Foldout page).
E1 , M1

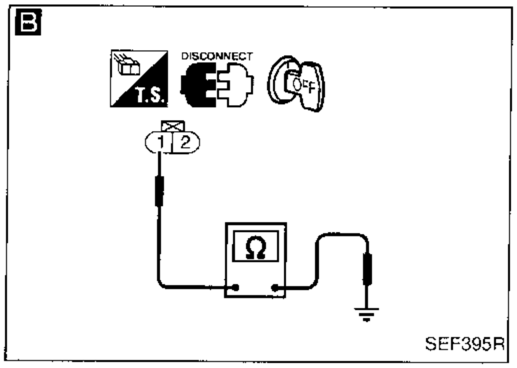
SEF252T

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 F22, M33
- Harness connectors M1, E1
- 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.

NG → Check the following.

- Harness connectors F22, M33
- Harness connectors F23, M32 (A/T models)
- Harness connectors M1, E1
- Harness for open or short between ECM and intake air temperature sensor
- Harness for open or short between A/T control unit and intake air temperature sensor

If NG, repair harness or connectors

OK

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

NG → Replace intake air temperature sensor.

OK

Disconnect and reconnect harness connectors in the circuit. Then retest.

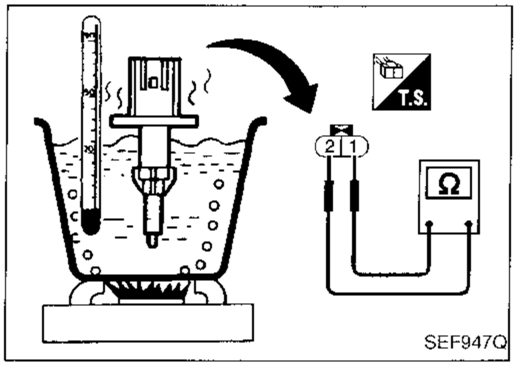
Trouble is not fixed.

Check ECM pin terminals for damage and check the connection of ECM harness connector.
Reconnect ECM harness connector and retest.

INSPECTION END

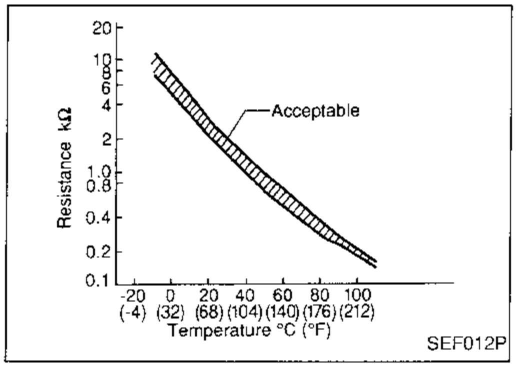
Intake Air Temperature Sensor (Cont'd)

COMPONENT INSPECTION



Intake air temperature sensor

Check resistance as shown in the figure.



⟨Reference data⟩

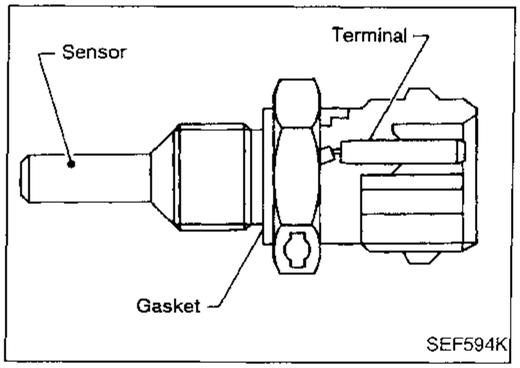
Intake air temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
80 (176)	0.27 - 0.38

If NG, replace intake air temperature sensor.

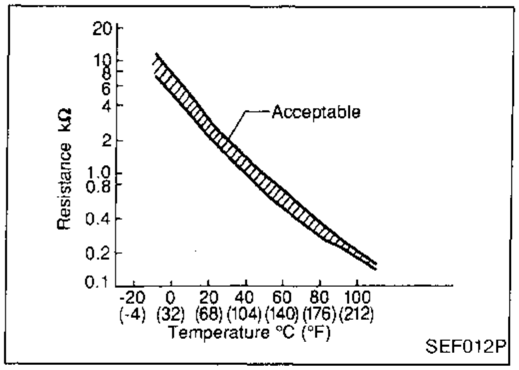
Engine Coolant Temperature Sensor (ECTS)

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.



SEF594K



SEF012P

⟨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 ECM terminal (43) (ECCS ground).

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0115 0103	• 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.

Detected items	Engine operating condition in fail-safe mode
Engine coolant temperature sensor circuit	Engine coolant temperature will be determined by ECM based on the time after turning ignition switch "ON" or "START". CONSULT displays the engine coolant temperature decided by ECM.

Condition	Engine coolant temperature decided (CONSULT display)
Just as ignition switch is turned ON or Start	40°C (104°F)
More than approx. 6 minutes after ignition ON or Start	80°C (176°F)
Except as shown above	40 - 80°C (104 - 176°F) (Depends on the time)

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

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
3) Wait at least 5 seconds.

OR

GST

1) Turn ignition switch "ON" and wait at least 5 seconds.
2) Select "MODE 7" with GST.

OR

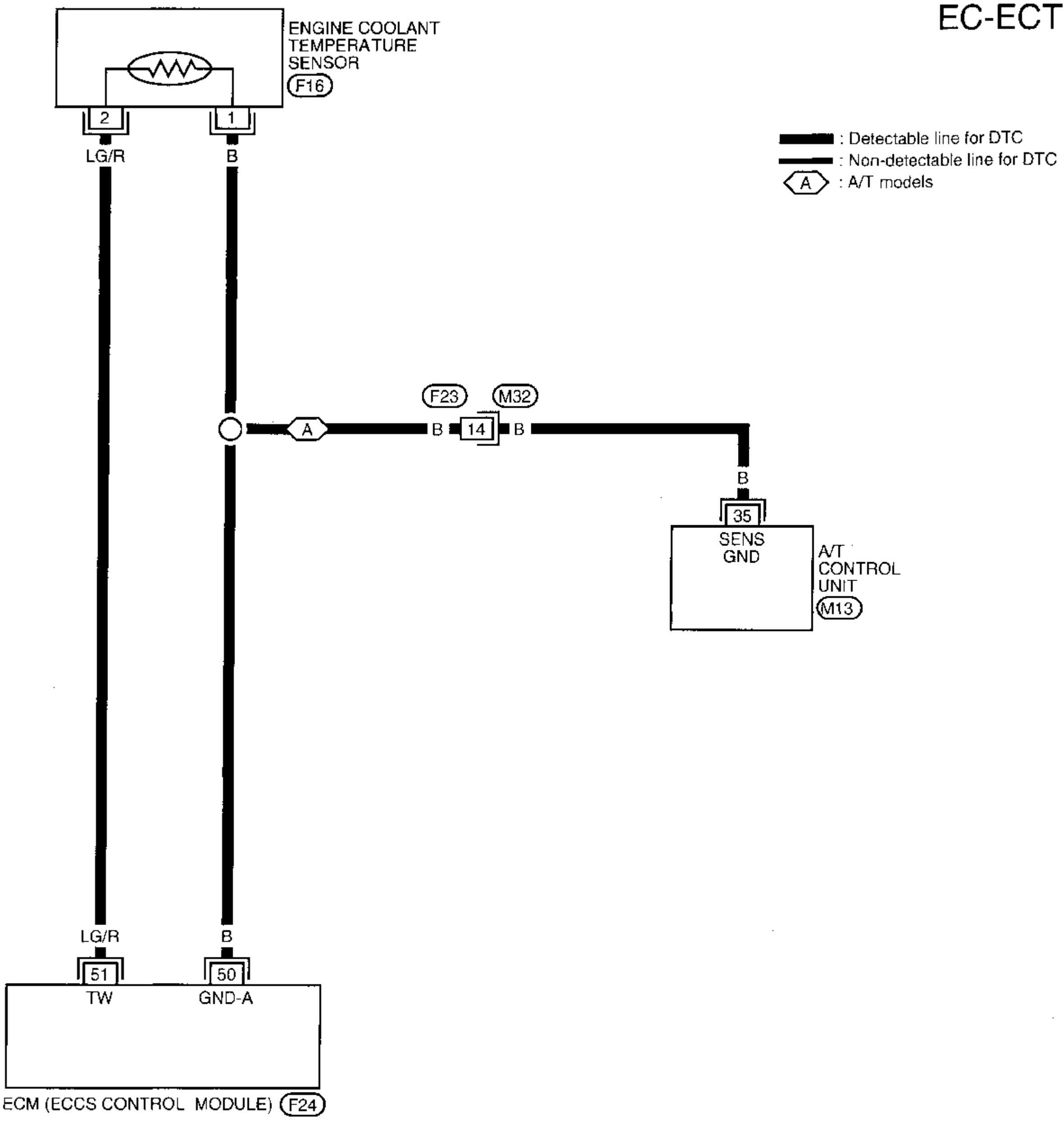
NO TOOLS

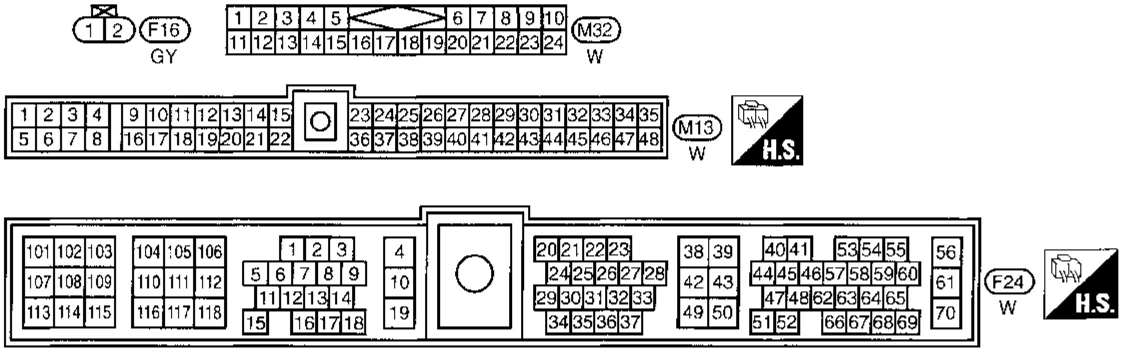
1) Turn ignition switch "ON" and wait at least 5 seconds.
2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
3) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.

TROUBLE DIAGNOSIS FOR DTC P0115

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

EC-ECTS-01

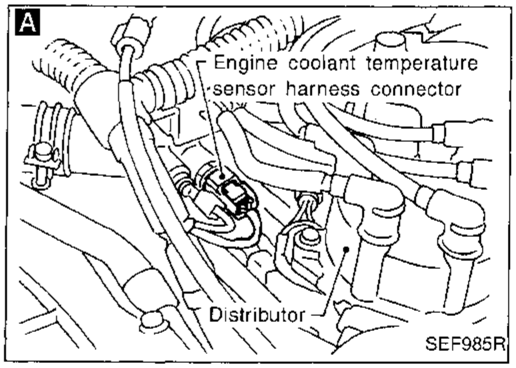


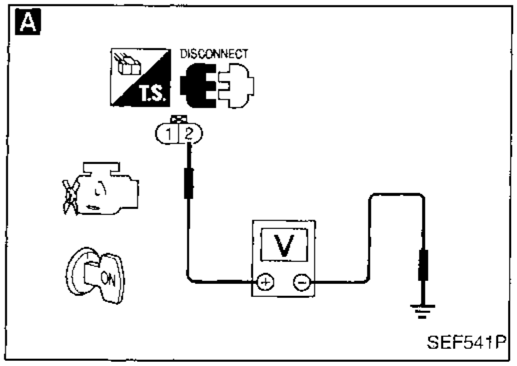


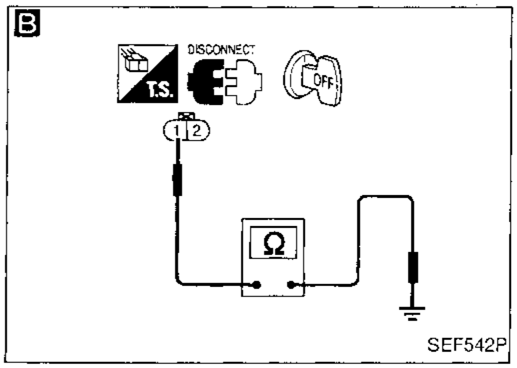
SEF253T

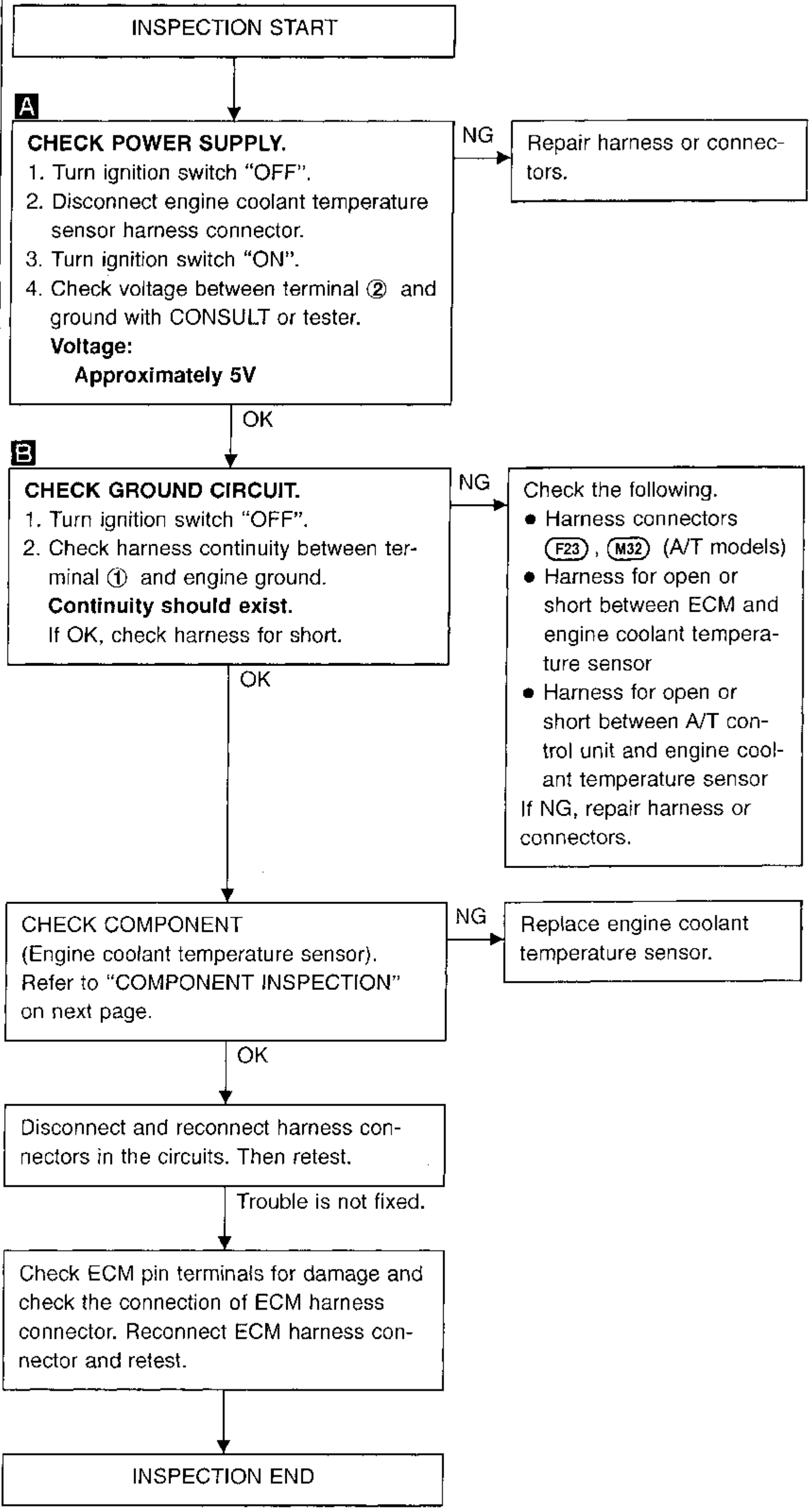
Engine Coolant Temperature Sensor (ECTS) (Cont'd)

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 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 ① and engine ground.

Continuity should exist.
If OK, check harness for short.

NG → Check the following.
- Harness connectors F23 , M32 (A/T models)
- Harness for open or short between ECM and engine coolant temperature sensor
- Harness for open or short between A/T control unit and engine coolant temperature sensor

If NG, repair harness or connectors.

OK ↓

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

NG → Replace engine coolant temperature sensor.

OK ↓

Disconnect and reconnect harness connectors in the circuits. Then retest.

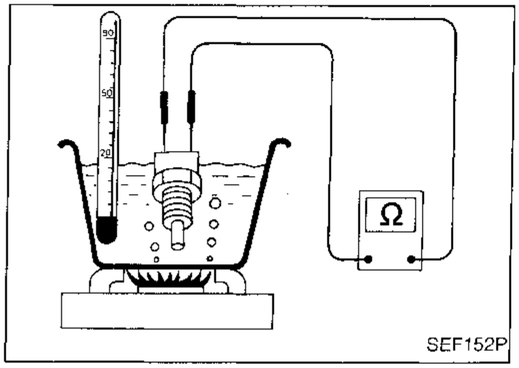
Trouble is not fixed. ↓

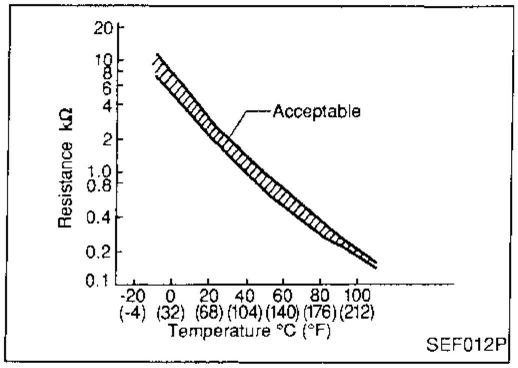
Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

↓

INSPECTION END

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





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

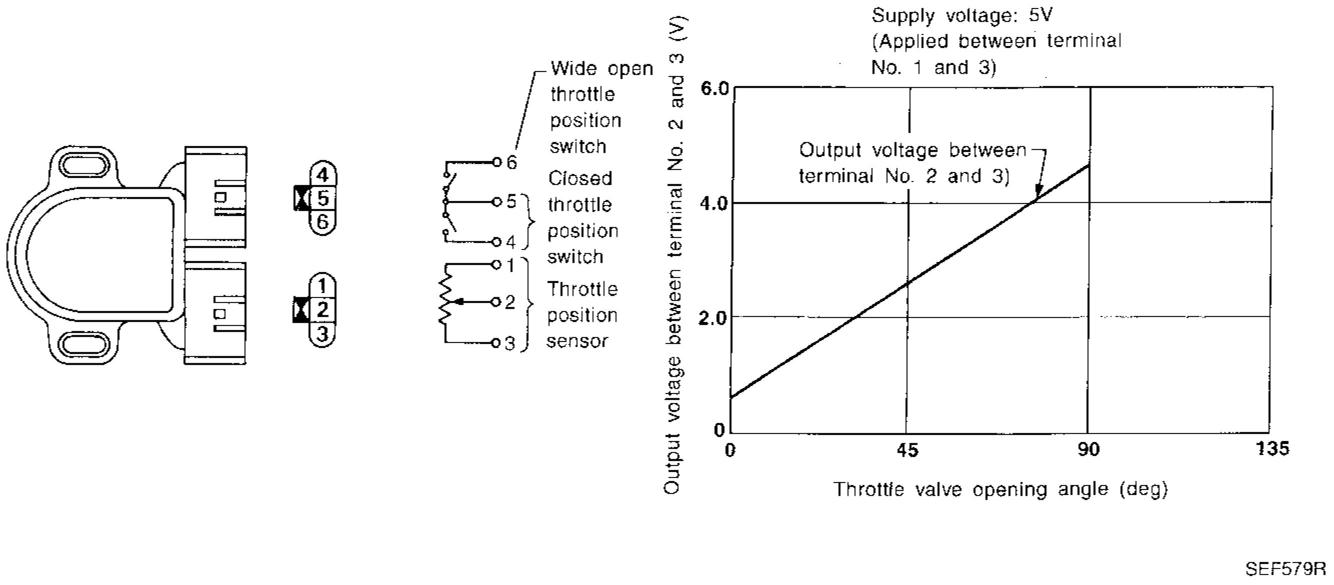
If NG, replace engine coolant temperature sensor.

Throttle Position Sensor

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.



CONSULT REFERENCE VALUE IN DATA MONITOR MODE

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
THRTL POS SEN	• Ignition switch: ON (Engine stopped)	Throttle valve: fully closed	0.3 - 0.7V
		Throttle valve: fully opened	Approx. 4.0V
ABSOL TH·P/S	• Ignition switch: ON (Engine stopped)	Throttle valve: fully closed	0.0%
		Throttle valve: fully opened	Approx. 80%

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

TROUBLE DIAGNOSIS FOR DTC P0120

Throttle Position Sensor (Cont'd)

ECM TERMINALS AND REFERENCE VALUE

Specification data are reference values and are measured between each terminal and ㊸ (ECCS ground).

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
23	W	Throttle position sensor	Ignition switch "ON" └ Accelerator pedal released	0.3 - 0.7V
			Ignition switch "ON" └ Accelerator pedal fully depressed	Approximately 4V
33	P	Throttle position sensor signal	Ignition switch "ON" └ Accelerator pedal released	Approximately 0.4V
			Ignition switch "ON" └ Accelerator pedal fully depressed	Approximately 4V
49	P/B	Throttle position sensor power supply	Ignition switch "ON"	Approximately 5V
50	B	Sensors' ground	Engine is running. (Warm-up condition) └ Idle speed	Approximately 0V

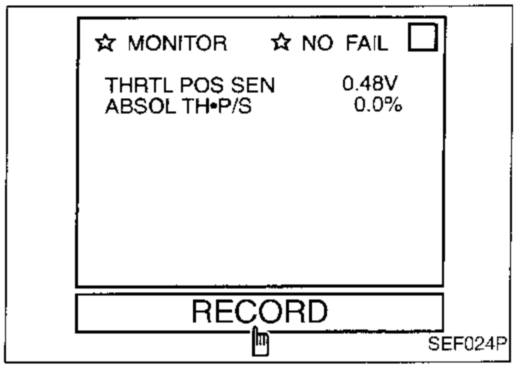
ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0120 0403	• An excessively low or high voltage from the sensor is sent to ECM.* • Voltage sent to ECM is not practical when compared with mass air flow sensor and camshaft position sensor signals.	• Harness or connectors (The sensor circuit is open or shorted.) • Throttle position 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>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>
</table>

Throttle Position Sensor (Cont'd)

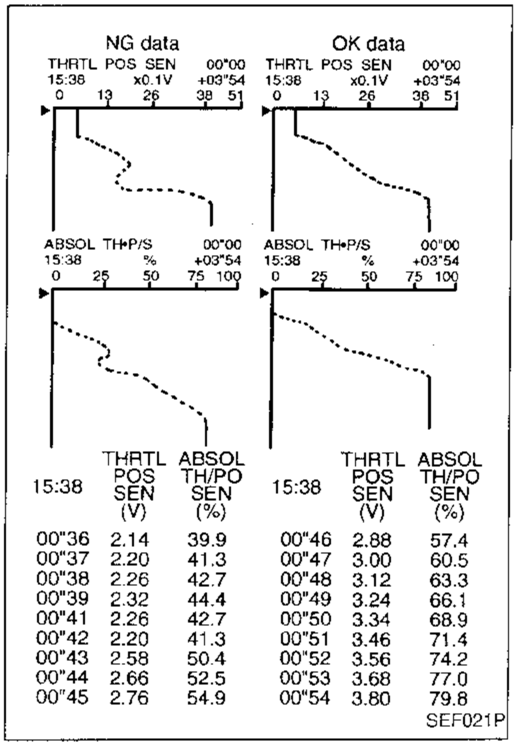


☆ MONITOR ☆ NO FAIL ☐

THRTL POS SEN 0.48V

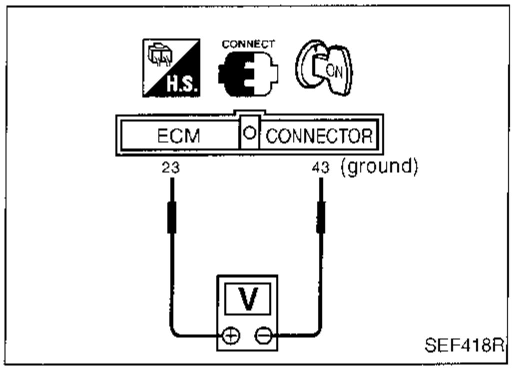
ABSOL TH•P/S 0.0%

SEF024P



15:38	THRTL POS SEN (V)	ABSOL TH/PO SEN (%)	15:38	THRTL POS SEN (V)	ABSOL TH/PO SEN (%)
00"36	2.14	39.9	00"46	2.88	57.4
00"37	2.20	41.3	00"47	3.00	60.5
00"38	2.26	42.7	00"48	3.12	63.3
00"39	2.32	44.4	00"49	3.24	66.1
00"41	2.26	42.7	00"50	3.34	68.9
00"42	2.20	41.3	00"51	3.46	71.4
00"43	2.58	50.4	00"52	3.56	74.2
00"44	2.66	52.5	00"53	3.68	77.0
00"45	2.76	54.9	00"54	3.80	79.8

SEF021P



SEF418R

OVERALL FUNCTION CHECK

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

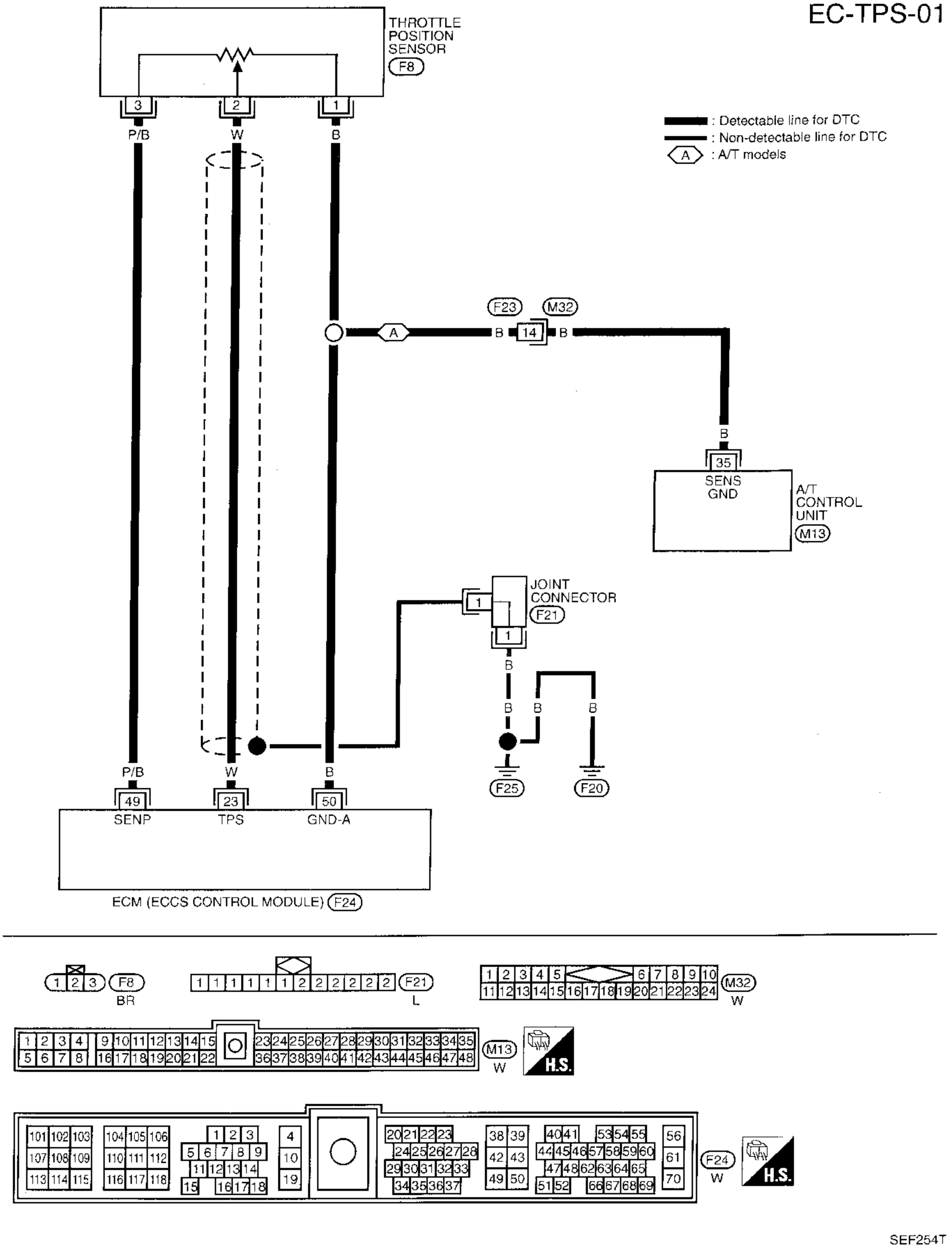
1) Turn ignition switch "ON".
2) Select "MANU TRIG" and "HI SPEED" in "DATA MONITOR" mode with CONSULT.
3) Select "THRTL POS SEN" and "ABSOL TH/PS" in "DATA MONITOR" mode with CONSULT.
4) Press RECORD on CONSULT SCREEN at the same time accelerator pedal is depressed.
5) Print out the recorded data and check the following:
   - The voltage when accelerator pedal fully released is approximately 0.3 - 0.7V.
   - The voltage rise is linear in response to accelerator pedal depression.
   - The voltage when accelerator pedal fully depressed is approximately 4V.

OR

1) Turn ignition switch "ON".
2) Check the voltage between ECM terminal ㉓ and ㊸ (ground) and check the following:
   - The voltage when accelerator pedal fully released is approximately 0.3 - 0.7V.
   - The voltage rise is linear in response to accelerator pedal depression.
   - The voltage when accelerator pedal fully depressed is approximately 4V.

TROUBLE DIAGNOSIS FOR DTC P0120

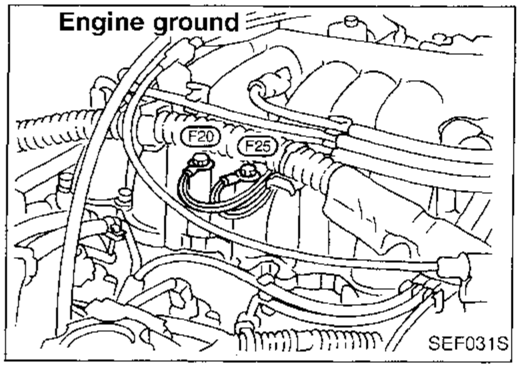
Throttle Position Sensor (Cont'd)



SEF254T

Throttle Position Sensor (Cont'd)

DIAGNOSTIC PROCEDURE



SEF031S

INSPECTION START

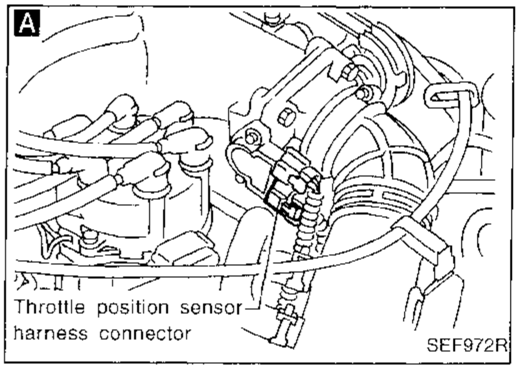
↓

Loosen and retighten engine ground screw.

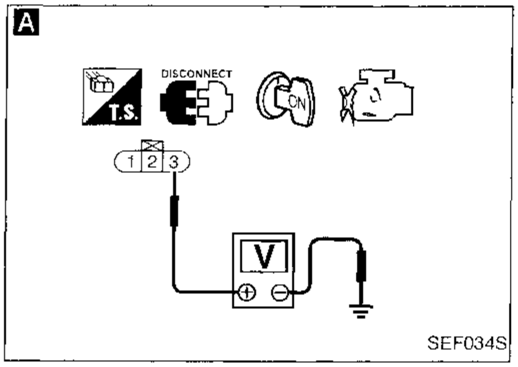
↓

ADJUST THROTTLE POSITION SENSOR.
Perform "Basic Inspection", EC-74.

↓ OK



SEF972R



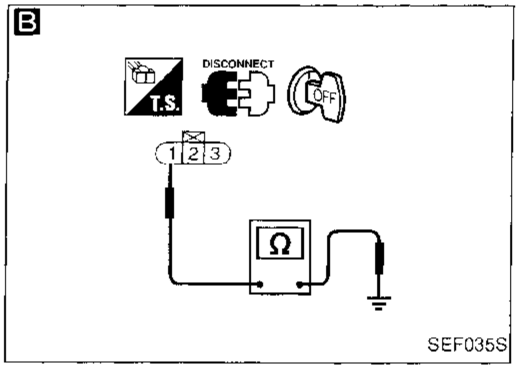
SEF034S

A

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

NG → Repair harness or connectors.

↓ OK



SEF035S

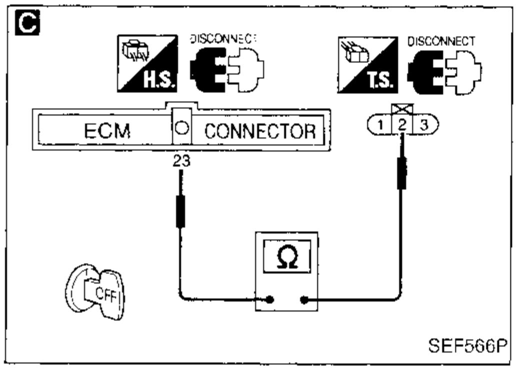
B

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.

NG → Check the following.
- Harness connectors F23, M32 (A/T models)
- Harness for open or short between ECM and throttle position sensor
- Harness continuity between A/T control unit and throttle position sensor

If NG, repair harness or connectors.

↓ OK



SEF566P

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.

NG → Repair harness or connectors.

↓ OK

CHECK COMPONENT
(Throttle position sensor).
Refer to "COMPONENT INSPECTION" on next page.

NG → Replace throttle position sensor. To adjust it, perform "Basic Inspection", EC-74.

↓ OK

Disconnect and reconnect harness connectors in the circuit. Then retest.

↓ Trouble is not fixed.

Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

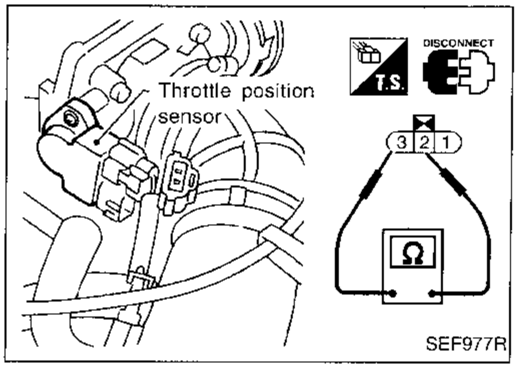
↓

INSPECTION END

Throttle Position Sensor (Cont'd)

COMPONENT INSPECTION

Throttle position sensor



SEF977R

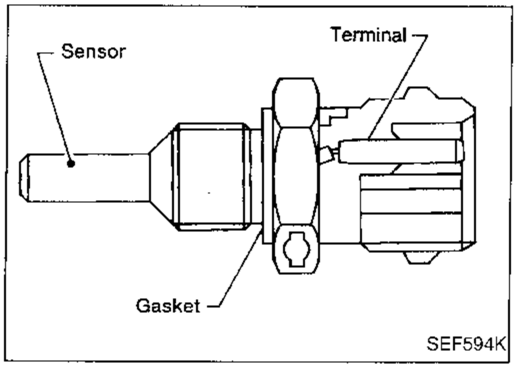
1. Disconnect throttle position sensor harness connector.
2. Make sure that resistance between terminals ② and ③ changes when opening throttle valve manually.

Throttle valve conditions	Resistance [at 25°C (77°F)]
Completely closed	Approximately 0.5 kΩ
Partially open	0.5 - 4 kΩ
Completely open	Approximately 4 kΩ

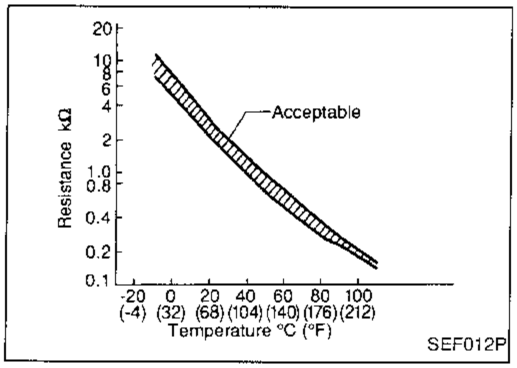
If NG, replace throttle position sensor.
To adjust it, perform "Basic Inspection", EC-74.

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)
−10 (14)	4.4	9.2
20 (68)	3.5	2.1 - 2.9
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

*: These data are reference values and are measured between ECM terminal (51) (Engine coolant temperature sensor) and ECM terminal ㊸ (ECCS ground).

ON BOARD DIAGNOSIS LOGIC

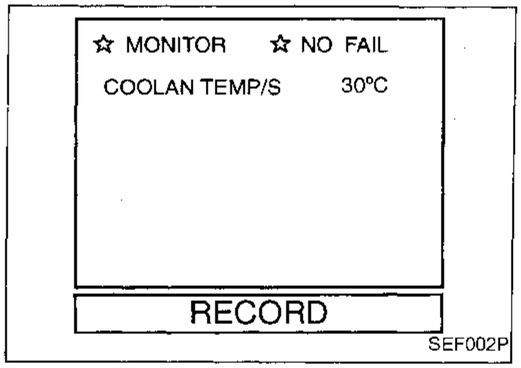
Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0125 0908	• Voltage sent to ECM from the sensor is not practical, even when some time has passed after starting the engine. • Engine coolant temperature is insufficient for closed loop fuel control.	• Harness or connectors (High resistance in the circuit) • Engine coolant temperature sensor • Thermostat

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

OVERALL FUNCTION CHECK

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

Note: If both DTC P0115 (0103) and P0125 (0908) are displayed, first perform TROUBLE DIAGNOSIS FOR DTC P0115. Refer to EC-116.



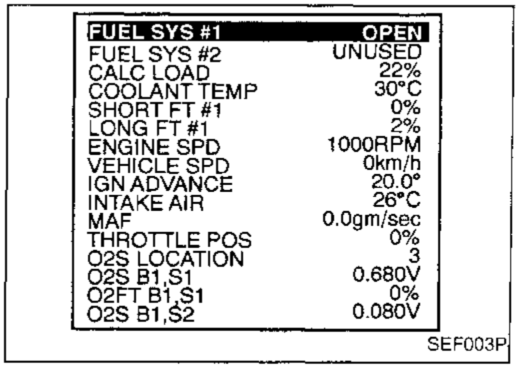
☆ MONITOR ☆ NO FAIL

COOLAN TEMP/S 30°C

SEF002P

1) Turn ignition switch "ON".
2) Select "COOLANT TEMP/S" in "DATA MONITOR" mode with CONSULT.
3) Start engine and run it at idle speed.
4) Check that the engine coolant temperature rises to 20°C (68°F) or more within 14 minutes. (Be careful not to overheat engine.)

OR



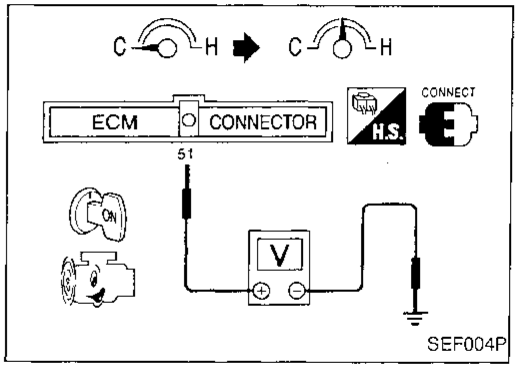
```
FUEL SYS #1          OPEN
FUEL SYS #2        UNUSED
CALC LOAD             22%
COOLANT TEMP         30°C
SHORT FT #1            0%
LONG FT #1             2%
ENGINE SPD        1000RPM
VEHICLE SPD        0km/h
IGN ADVANCE         20.0°
INTAKE AIR           26°C
MAF            0.0gm/sec
THROTTLE POS           0%
O2S LOCATION            3
O2S B1,S1          0.680V
O2FT B1,S1             0%
O2S B1,S2          0.080V
```

SEF003P

GST

1) Turn ignition switch "ON".
2) Select "MODE 1" with GST.
3) Start engine and run it at idle speed.
4) Check that the engine coolant temperature rises to 20°C (68°F) or more within 14 minutes. (Be careful not to overheat engine.)

OR

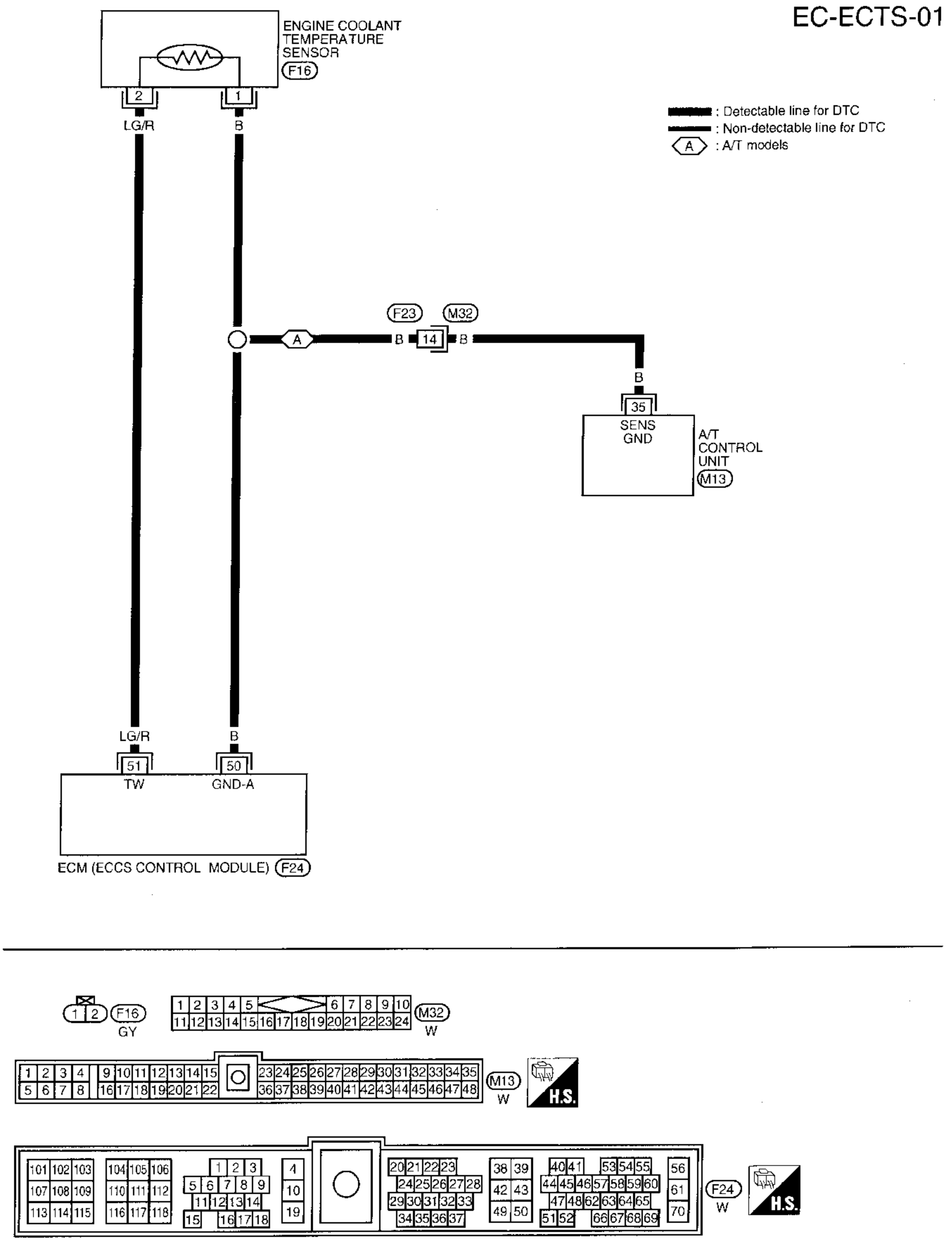


SEF004P

NO TOOLS

1) Turn ignition switch "ON".
2) Probe voltage meter between ECM terminal (51) and ground.
3) Start engine and run it at idle speed.
4) Check that voltage of engine coolant temperature changes to less than 3.5 (V) within 14 minutes. (Be careful not to overheat engine.)

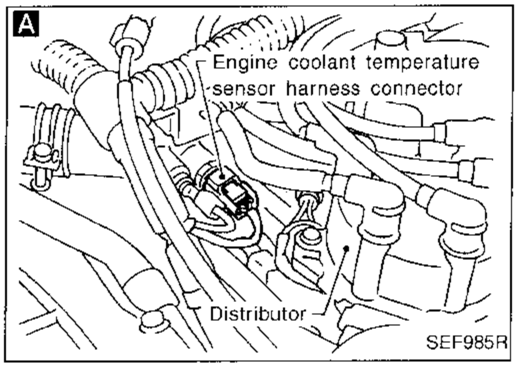
Engine Coolant Temperature (ECT) Sensor (Cont'd)

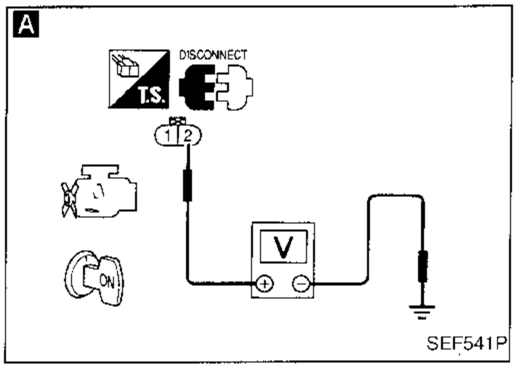


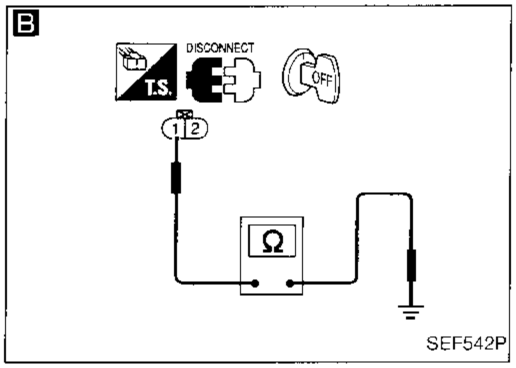
SEF253T

Engine Coolant Temperature (ECT) Sensor (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 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 ① and engine ground.

Continuity should exist.
If OK, check harness for short.

NG → Check the following.
- Harness connectors (F23), (M32) (A/T models)
- Harness for open or short between ECM and engine coolant temperature sensor
- Harness for open or short between A/T control unit and engine coolant temperature sensor

If NG, repair 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 cold [lower than 70°C (158°F)] condition, grasp lower radiator hose and confirm the engine coolant does not flow.

NG → CHECK COMPONENT
(Thermostat).
Refer to LC section ("Thermostat", "ENGINE COOLING SYSTEM").
If NG, replace it.

OK

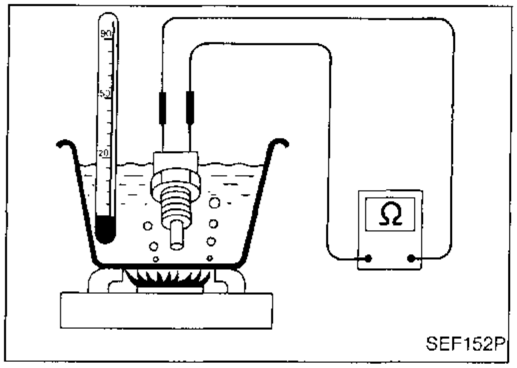
Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed.

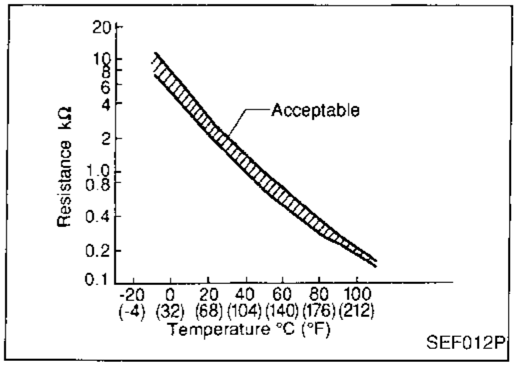
Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

INSPECTION END

Engine Coolant Temperature (ECT) Sensor (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 - 1.0
90 (194)	0.236 - 0.260

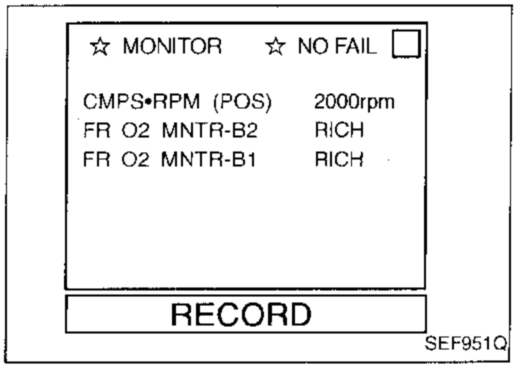
If NG, replace engine coolant temperature sensor.

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)
P0130 0307	• The closed loop control function for right bank does not operate even when vehicle is driving in the specified condition.	• The front heated oxygen sensor (Right bank) circuit is open or shorted. • Front heated oxygen sensor (Right bank) • Front heated oxygen sensor heater (Right bank)
P0150 0308	• The closed loop control function for left bank does not operate even when vehicle is driving in the specified condition.	• The front heated oxygen sensor (Left bank) circuit is open or shorted. • Front heated oxygen sensor (Left bank) • Front heated oxygen sensor heater (Left bank)



☆ MONITOR ☆ NO FAIL ☐

CMPS•RPM (POS) 2000rpm
FR O2 MNTR-B2 RICH
FR O2 MNTR-B1 RICH

SEF951Q

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 sufficiently.
2) Select "MANU TRIG" and "HI SPEED" in "DATA MONITOR" mode with CONSULT, and select "FRO2 MNTR-B1(B2)".
3) Hold engine speed at 2,000 rpm under no load during the following steps.
4) Touch "RECORD" on CONSULT screen.
5) Check the following.

- "FR O2 MNTR-B1(B2)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds.

  5 times (cycles) are counted as shown below:

```
                cycle  | 1 | 2 | 3 | 4 | 5 |
FR O2 MNTR-B1(B2)  R-L-R-L-R-L-R-L-R-L-R
```

R = "FR O2 MNTR-B1(B2)", "RICH"
L = "FR O2 MNTR-B1(B2)", "LEAN"

OR

1) Start engine and warm it up sufficiently.
2) Make sure that malfunction indicator lamp comes on more than 5 times within 10 seconds while keeping at 2,000 rpm in Diagnostic Test Mode II (Front heated oxygen sensor monitor).

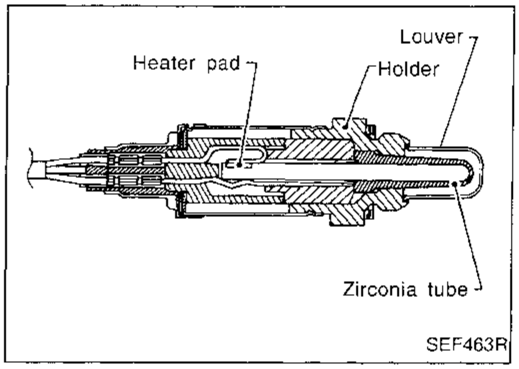
DIAGNOSTIC PROCEDURE

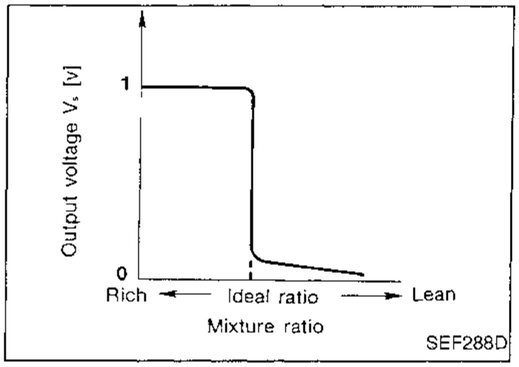
For right bank

Refer to TROUBLE DIAGNOSIS FOR DTC P0130, EC-133.
Refer to TROUBLE DIAGNOSIS FOR DTC P0135, EC-138.

For left bank

Refer to TROUBLE DIAGNOSIS FOR DTC P0150, EC-151.
Refer to TROUBLE DIAGNOSIS FOR DTC P0155, EC-156.





Front Heated Oxygen Sensor (Front HO2S) (Right bank)

COMPONENT DESCRIPTION

The front heated oxygen sensor (right bank) is placed into the front tube (right bank). It detects the amount of oxygen in the exhaust gas compared to the outside air. The front heated oxygen sensor (right bank) 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 front heated oxygen sensor (right bank) 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.

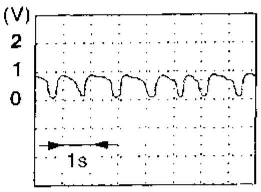
CONSULT REFERENCE VALUE IN DATA MONITOR MODE

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
FR O2 SEN-B1 FR O2 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

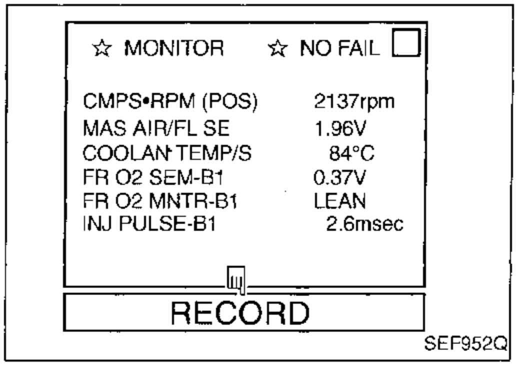
Specification data are reference values and are measured between each terminal and ㊸ (ECCS ground).

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
46	W	Front heated oxygen sensor (RH)	Engine is running. After warming up sufficiently and engine speed is 2,000 rpm	0 - Approximately 1.0V  SEF201T

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0130 0503	• An excessively high voltage from the sensor is sent to ECM. • The voltage from the sensor is constantly approx. 0.3V. • The maximum and minimum voltages from the sensor are not reached to the specified voltages. • 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.) • Front heated oxygen sensor (Right bank) • Fuel pressure • Injectors • Intake air leaks

Front Heated Oxygen Sensor (Front HO2S) (Right bank) (Cont'd)



☆ MONITOR ☆ NO FAIL ☐

CMPS•RPM (POS)	2137rpm
MAS AIR/FL SE	1.96V
COOLAN TEMP/S	84°C
FR O2 SEM-B1	0.37V
FR O2 MNTR-B1	LEAN
INJ PULSE-B1	2.6msec

SEF952Q

OVERALL FUNCTION CHECK

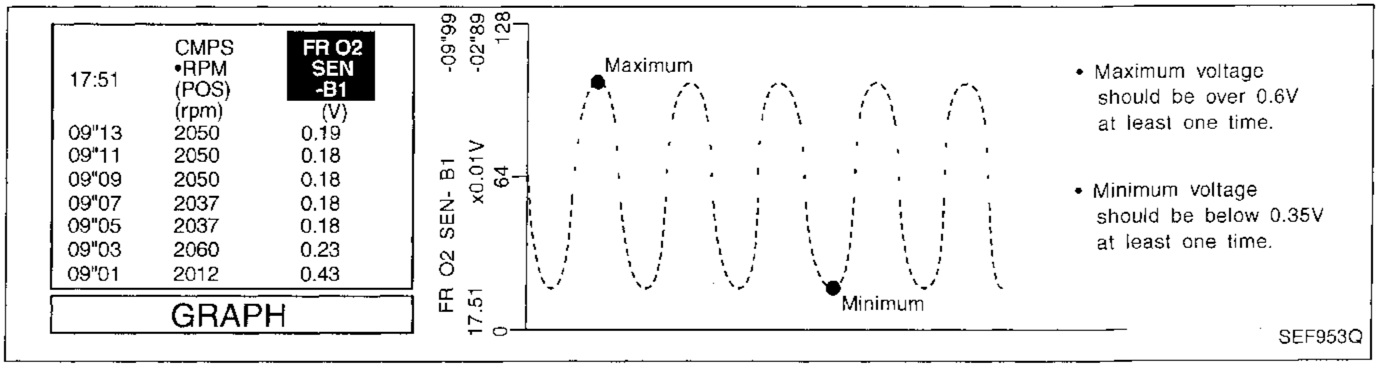
Use this procedure to check the overall function of the front heated oxygen sensor circuit. During this check, a 1st trip DTC might not be confirmed.

1) Start engine and warm it up sufficiently.
2) Select "MANU TRIG" and "HI SPEED" in "DATA MONITOR" mode with CONSULT, and select "FR O2 SEN-B1" and "FR O2 MNTR-B1".
3) Hold engine speed at 2,000 rpm under no load during the following steps.
4) Touch "RECORD" on CONSULT screen.
5) Check the following.

- "FR O2 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 |
  FR O2 MNTR-B1 R-L-R-L-R-L-R-L-R-L-R

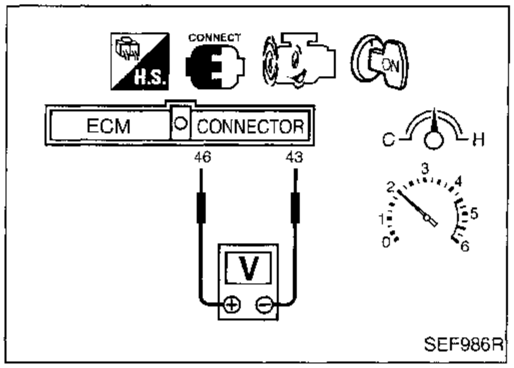
  R = "FR O2 MNTR-B1", "RICH"
  L = "FR O2 MNTR-B1", "LEAN"
- "FR O2 SEN-B1" voltage goes above 0.6V at least once.
- "FR O2 SEN-B1" voltage goes below 0.35V at least once.
- The voltage never exceeds 1.0V.



17:51	CMPS •RPM (POS) (rpm)	FR O2 SEN -B1 (V)
09"13	2050	0.19
09"11	2050	0.18
09"09	2050	0.18
09"07	2037	0.18
09"05	2037	0.18
09"03	2060	0.23
09"01	2012	0.43

- Maximum voltage should be over 0.6V at least one time.
- Minimum voltage should be below 0.35V at least one time.

SEF953Q



SEF986R

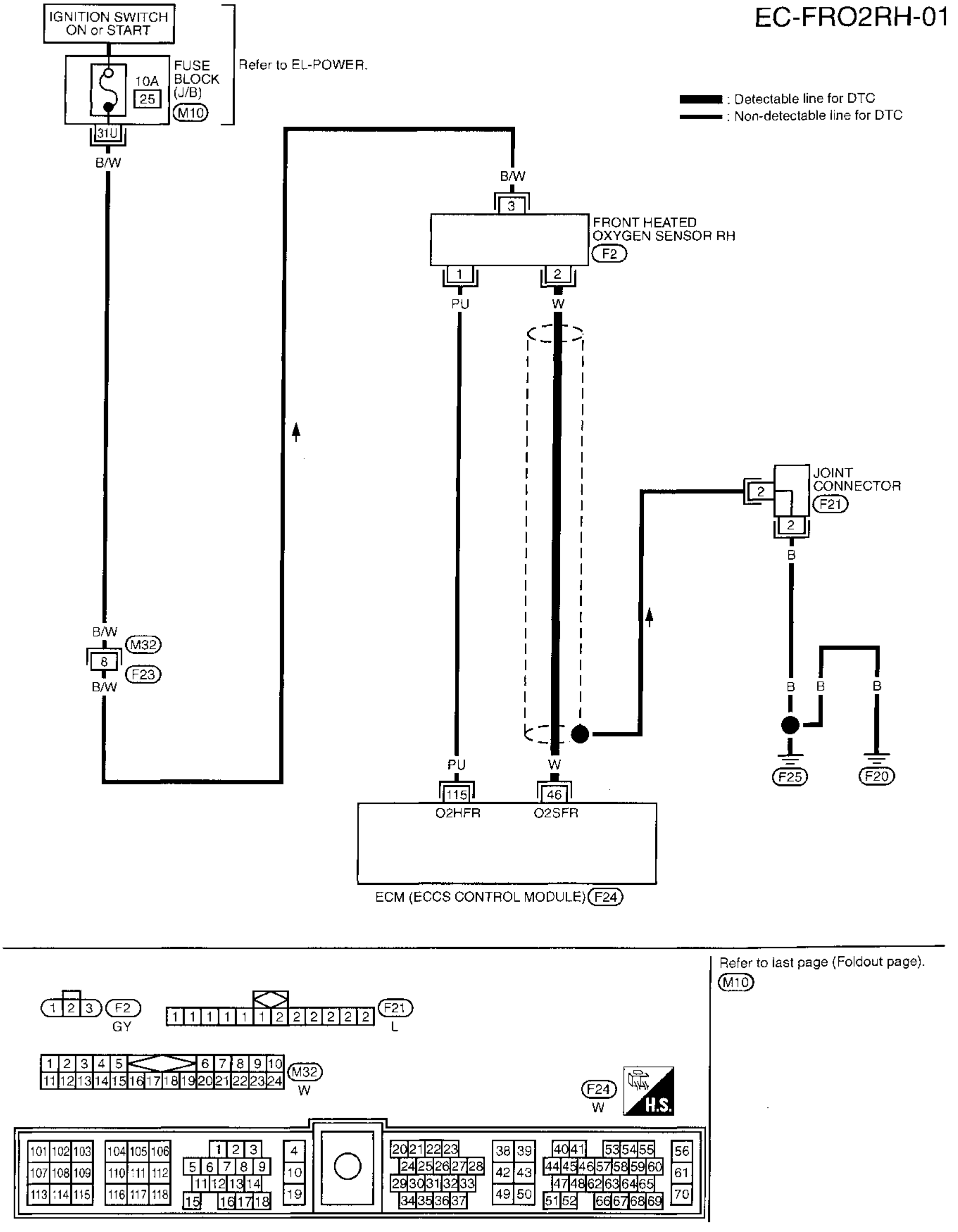
OR

1) Start engine and warm it up sufficiently.
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.

- Malfunction indicator lamp goes on more than 5 times within 10 seconds in Diagnostic Test Mode II (FRONT HEATED OXYGEN SENSOR MONITOR).
- 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.

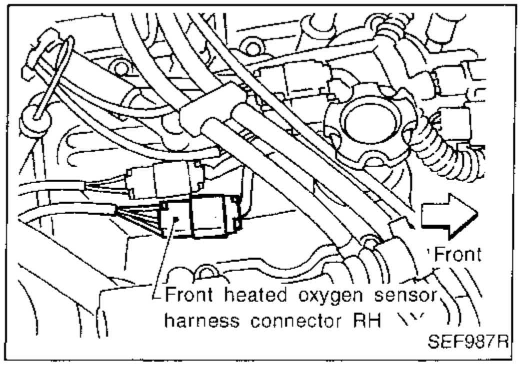
TROUBLE DIAGNOSIS FOR DTC P0130

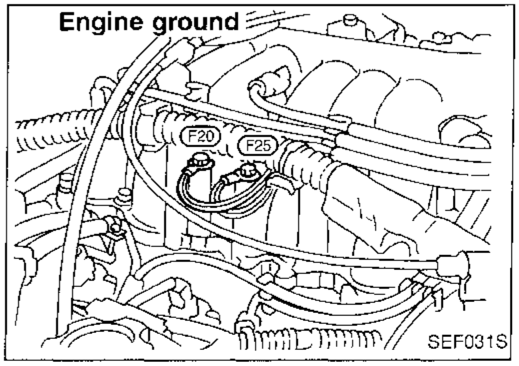
Front Heated Oxygen Sensor (Front HO2S) (Right bank) (Cont'd)

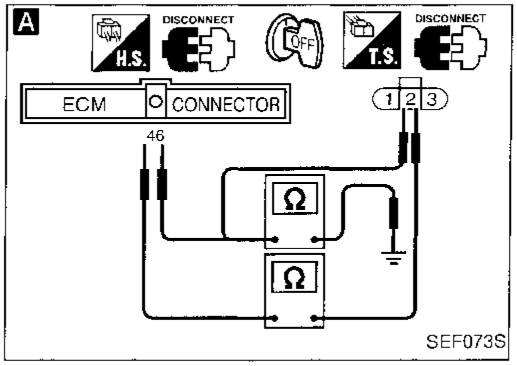


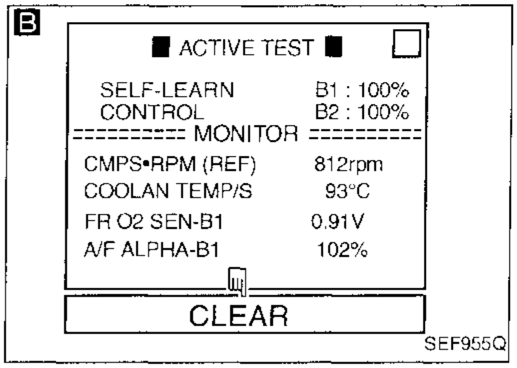
SEF255T

Front Heated Oxygen Sensor (Front HO2S) (Right bank) (Cont'd)









■ ACTIVE TEST ■ ☐

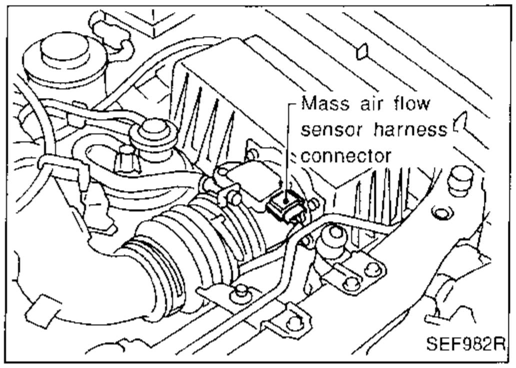
SELF-LEARN CONTROL	B1 : 100% B2 : 100%

========== MONITOR ==========

CMPS•RPM (REF)	812rpm
COOLAN TEMP/S	93°C
FR O2 SEN-B1	0.91V
A/F ALPHA-B1	102%

CLEAR

SEF955Q



DIAGNOSTIC PROCEDURE

INSPECTION START

↓

Loosen and retighten engine ground screws.

↓

A

CHECK INPUT SIGNAL CIRCUIT.
1. Turn ignition switch "OFF".
2. Disconnect front heated oxygen sensor RH 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.

NG → Repair harness or connectors.

↓ OK

B

CLEAR THE SELF-LEARNING DATA
1. Start engine and warm it up sufficiently.
2. Select "SELF-LEARNING CONT" in "ACTIVE TEST" mode with CONSULT.
3. Clear the self-learning control coefficient by touching "CLEAR".
4. Run engine for at least 10 minutes at idle speed.
   Are the 1st trip DTCs P0171, P0172 detected? Is it difficult to start engine?

OR

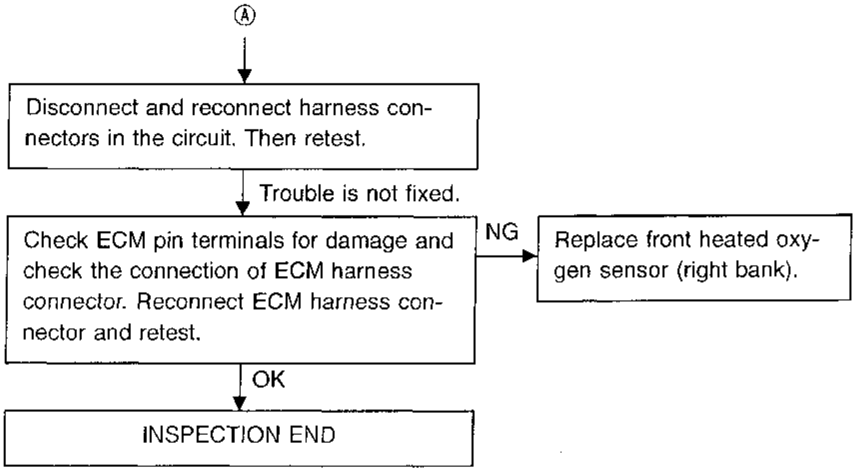
2. Turn ignition switch "OFF".
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 3 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure diagnostic trouble code No. 0102 is displayed in Diagnostic Test Mode II.
6. Erase the diagnostic test mode II (Self-diagnostic results) memory. Make sure diagnostic trouble code No. 0505 is displayed in Diagnostic Test Mode II.
7. Run engine for at least 10 minutes at idle speed.
   Are the 1st trip DTCs 0114, 0115 detected? Is it difficult to start engine?

Yes → Go to "TROUBLE DIAGNOSIS FOR DTC P0171, P0172", EC-168, 173.

↓ No

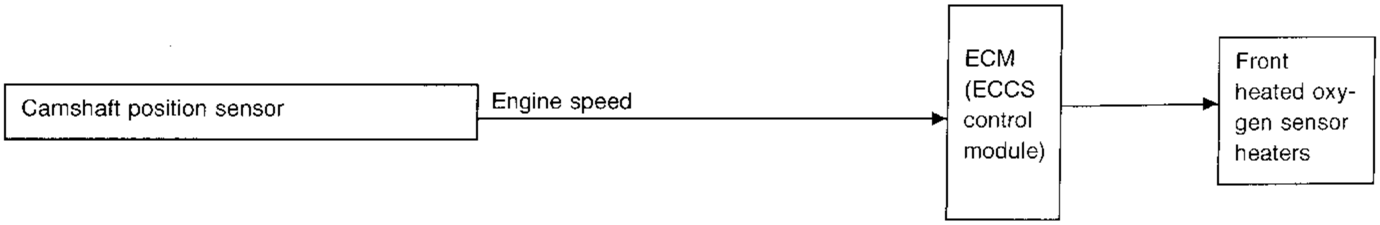
Ⓐ

Front Heated Oxygen Sensor (Front HO2S) (Right bank) (Cont'd)



Front Heated Oxygen Sensor Heater (Right bank)

SYSTEM DESCRIPTION



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

OPERATION

Engine speed rpm	Front heated oxygen sensor heaters
Above 3,200	OFF
Below 3,200	ON

CONSULT REFERENCE VALUE IN DATA MONITOR MODE

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
FR O2 HTR-B1	• Engine speed: Idle	ON
	• Engine speed: Above 3,200 rpm	OFF

ECM TERMINALS AND REFERENCE VALUE

Specification data are reference values and are measured between each terminal and ㊸ (ECCS ground).

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
115	PU	Front heated oxygen sensor heater (RH)	Engine is running. Engine speed is below 3,200 rpm	Approximately 0.4V
			Engine is running. Engine speed is above 3,200 rpm	BATTERY VOLTAGE (11 - 14V)

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P0135 0901	• The current amperage in the front heated oxygen sensor heater (Right bank) circuit is out of the normal range. (An improper voltage drop signal is sent to ECM through the front heated oxygen sensor heater.)	• Harness or connectors (The front heated oxygen sensor heater circuit is open or shorted.) • Front heated oxygen sensor heater (Right bank)

Front Heated Oxygen Sensor Heater (Right bank) (Cont'd)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT.
2) Start engine and run it for at least 5 seconds at idle speed.

OR

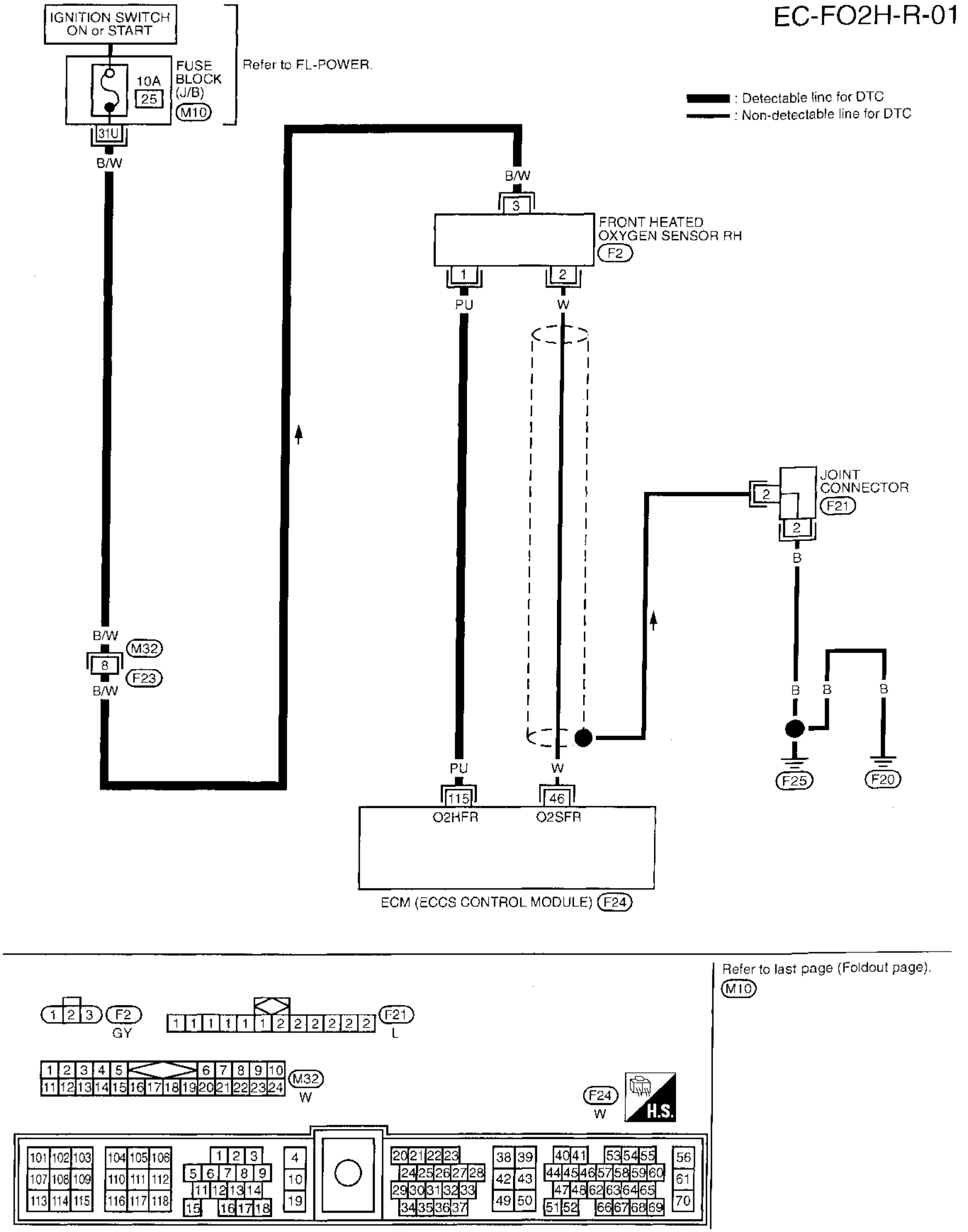
1) Start engine and run it for at least 5 seconds at idle speed.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Start engine and run it for at least 5 seconds at idle speed.
4) Select "MODE 3" with GST.

OR

1) Start engine and run it for at least 5 seconds at idle speed.
2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
3) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.

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

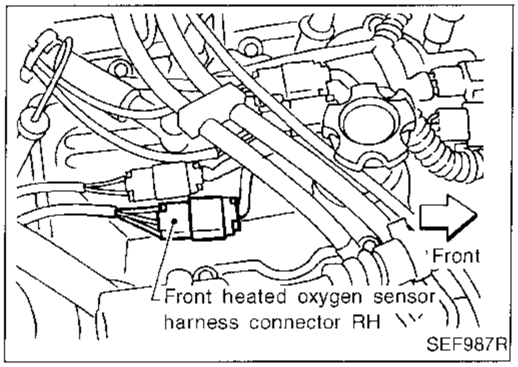
Front Heated Oxygen Sensor Heater (Right bank) (Cont'd)

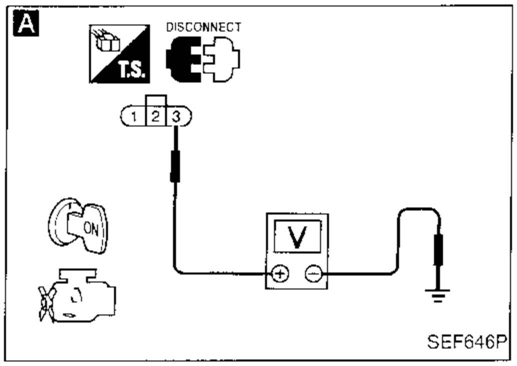


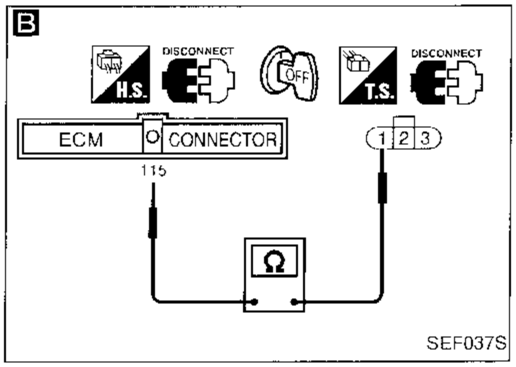
SEF256T

Front Heated Oxygen Sensor Heater (Right bank) (Cont'd)

DIAGNOSTIC PROCEDURE







INSPECTION START

↓

A

CHECK POWER SUPPLY.
1. Disconnect front heated oxygen sensor RH harness connector.
2. Turn ignition switch "ON".
3. Check voltage between terminal ③ and ground.
   Voltage: Battery voltage

NG → Check the following.
- Harness connectors (F23), (M32)
- Harness connector (M10)
- 10A fuse
- Harness for open or short between front heated oxygen sensor RH and fuse

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 ① and ECM terminal (115).
   Continuity should exist.
   If OK, check harness for short.

NG → Repair harness or connectors.

↓ OK

CHECK COMPONENT
(Front heated oxygen sensor heater).
Refer to "COMPONENT INSPECTION" below.

NG → Replace front heated oxygen sensor (right bank).

↓ OK

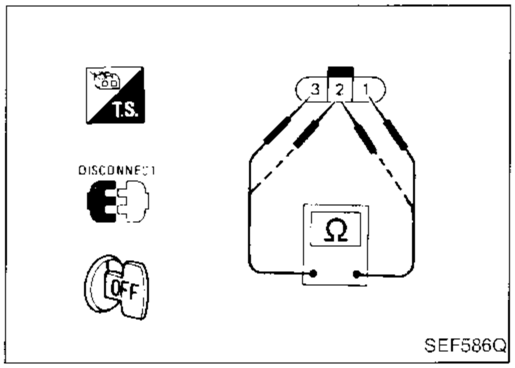
Disconnect and reconnect harness connectors in the circuit. Then retest.

↓ Trouble is not fixed.

Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

↓

INSPECTION END



COMPONENT INSPECTION

Front heated oxygen sensor heater

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 front heated oxygen sensor.

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.

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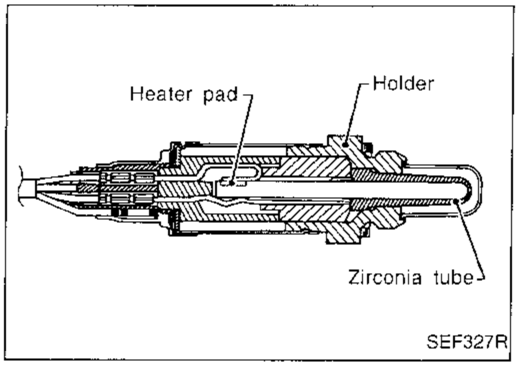


Rear Heated Oxygen Sensor (Rear HO2S) (Right bank)

COMPONENT DESCRIPTION

The rear heated oxygen sensor (Rear HO2S), after three way catalyst, monitors the oxygen level in the exhaust gas.

Even if switching characteristics of the front heated oxygen sensor are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the rear heated oxygen sensor.

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 rear heated oxygen sensor is not used for engine control operation.

CONSULT REFERENCE VALUE IN DATA MONITOR MODE

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
RR O2 SEN-B1	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ↔ Approx. 0.6 - 1.0V
RR O2 MNTR-B1			LEAN ↔ RICH

ECM TERMINALS AND REFERENCE VALUE

Specification data are reference values and are measured between each terminal and ㊸ (ECCS ground).

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
52	L/W	Rear heated oxygen sensor (RH)	Engine is running. After warming up sufficiently and engine speed is 2,000 rpm	0 - Approximately 1.0V

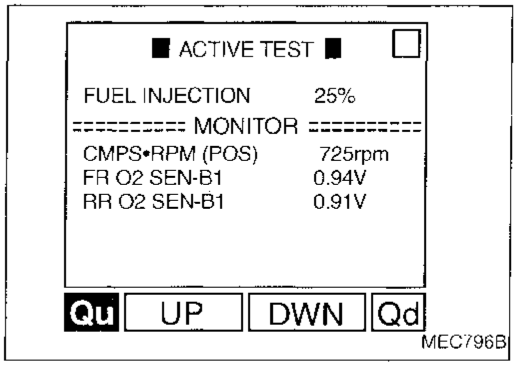
ON BOARD DIAGNOSIS LOGIC

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

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0136 0707	• An excessively high voltage from the sensor is sent to ECM. • The maximum and minimum voltages from the sensor are not reached to the specified voltages. • 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.) • Rear heated oxygen sensor (Right bank) • Fuel pressure • Injectors • Intake air leaks

Rear Heated Oxygen Sensor (Rear HO2S) (Right bank) (Cont'd)

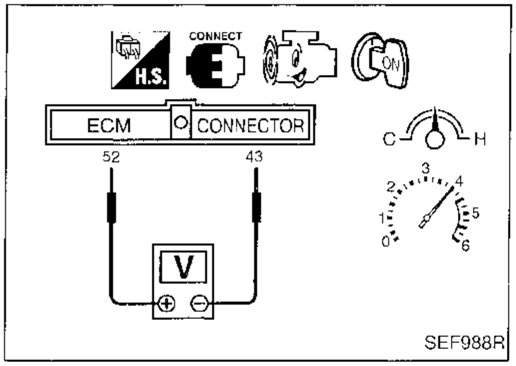
OVERALL FUNCTION CHECK



```
■ ACTIVE TEST ■        ☐
FUEL INJECTION        25%
========== MONITOR ==========
CMPS•RPM (POS)       725rpm
FR O2 SEN-B1          0.94V
RR O2 SEN-B1          0.91V

Qu   UP    DWN   Qd
```

MEC796B



SEF988R

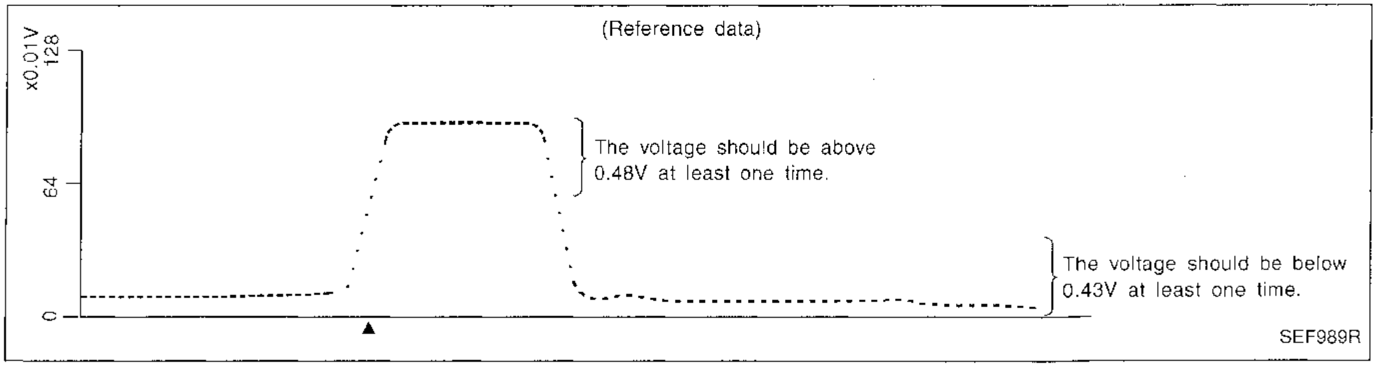
Use this procedure to check the overall function of the rear heated oxygen sensor circuit. During this check, a 1st trip DTC might not be confirmed.

1) Start engine and warm it up sufficiently.
2) Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "RR O2 SEN-B1" as the monitor item with CONSULT.
3) Check "RR O2 SEN-B1" at idle speed when adjusting "FUEL INJECTION" to ±25%.
   "RR O2 SEN-B1" should be above 0.48V at least once when the "FUEL INJECTION" is +25%.
   "RR O2 SEN-B1" should be below 0.43V at least once when the "FUEL INJECTION" is −25%.

OR

1) Start engine and warm it up sufficiently.
2) Set voltmeter probes between ECM terminals (52) (sensor signal) and ㊸ (engine ground).
3) Check the voltage when racing up to 4,000 rpm under no load at least 10 times.
   (depress and release accelerator pedal as soon as possible)
   The voltage should be above 0.48V and below 0.43V at least once during this procedure.
   If the voltage can be confirmed in step 3, step 4 is not necessary.

4) 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.
   The voltage should be above 0.48V and below 0.43V at least once during this procedure.



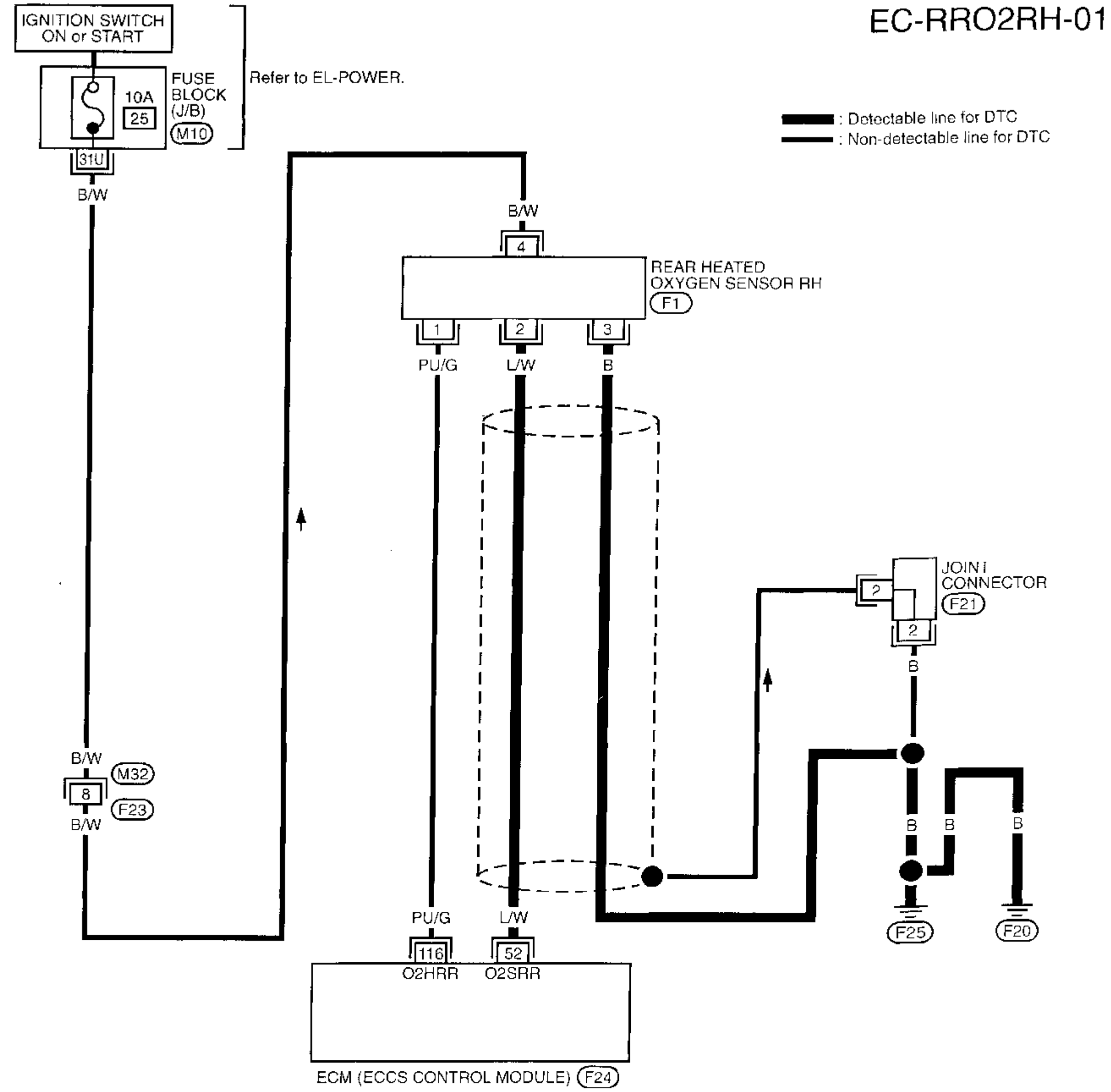
(Reference data)

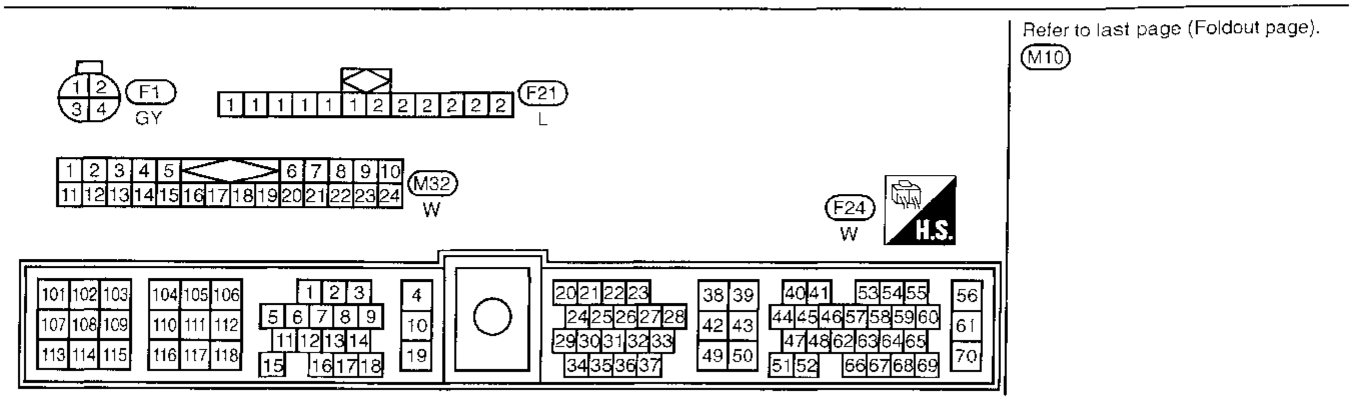
The voltage should be above 0.48V at least one time.

The voltage should be below 0.43V at least one time.

SEF989R

Rear Heated Oxygen Sensor (Rear HO2S) (Right bank) (Cont'd)

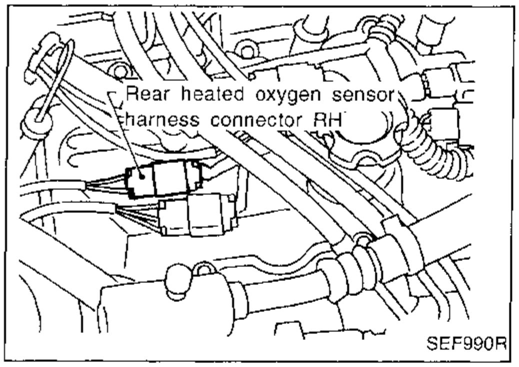


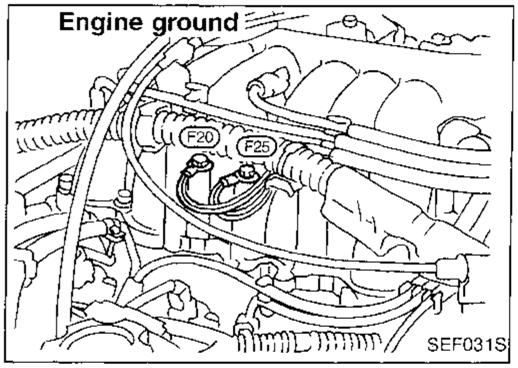


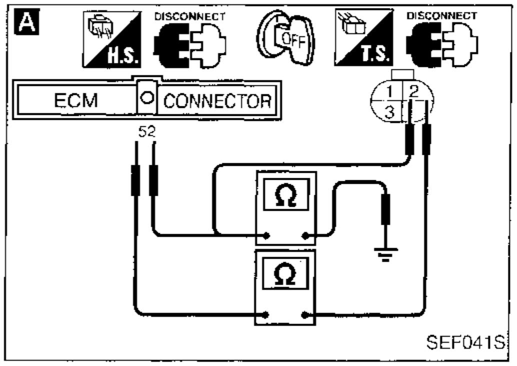
SEF257T

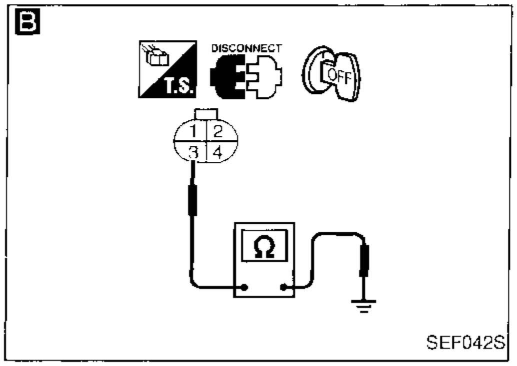
Rear Heated Oxygen Sensor (Rear HO2S) (Right bank) (Cont'd)

DIAGNOSTIC PROCEDURE









INSPECTION START

↓

Loosen and retighten engine ground screws.

↓

A

CHECK INPUT SIGNAL CIRCUIT.
1. Turn ignition switch "OFF".
2. Remove lower instrument center panel. Refer to BT section ("INSTRUMENT PANEL").
- Rear heated oxygen sensor harness connectors are located under the lower instrument center panel.
3. Disconnect rear heated oxygen sensor RH harness connector and ECM harness connector.
4. Check harness continuity between ECM terminal (52) and terminal ② .
Continuity should exist.
5. Check harness continuity between ECM terminal (52) (or terminal ②) and ground.
Continuity should not exist.
If OK, check harness for short.

NG → Check the following.
- Harness connectors (F23), (M32)
- Harness for open or short between ECM and rear heated oxygen sensor RH

If NG, repair harness or connectors.

OK ↓

B

CHECK GROUND CIRCUIT.
1. Check harness continuity between terminal ③ and engine ground.
Continuity should exist.
If OK, check harness for short.

NG → Repair harness or connectors.

OK ↓

Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed. ↓

Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

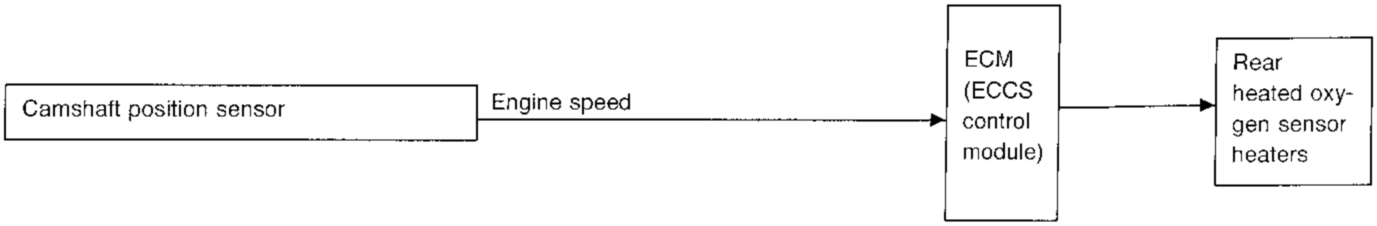
NG → Replace rear heated oxygen sensor (right bank).

OK ↓

INSPECTION END

Rear Heated Oxygen Sensor Heater (Right bank)

SYSTEM DESCRIPTION



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

OPERATION

Engine speed rpm	Rear heated oxygen sensor heaters
Above 3,200	OFF
Below 3,200	ON

CONSULT REFERENCE VALUE IN DATA MONITOR MODE

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
RR O2 HTR-B1	• Engine speed: Idle	ON
	• Engine speed: Above 3,200 rpm	OFF

ECM TERMINALS AND REFERENCE VALUE

Specification data are reference values and are measured between each terminal and ㊸ (ECCS ground).

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
116	PU/G	Rear heated oxygen sensor heater (RH)	Engine is running. Engine speed is below 3,200 rpm	Approximately 0.4V
			Engine is running. Engine speed is above 3,200 rpm	BATTERY VOLTAGE (11 - 14V)

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P0141 0902	• The current amperage in the rear heated oxygen sensor heater (Right bank) circuit is out of the normal range. (An improper voltage drop signal is sent to ECM through the rear heated oxygen sensor heater.)	• Harness or connectors (The rear heated oxygen sensor heater circuit is open or shorted.) • Rear heated oxygen sensor heater (Right bank)

Rear Heated Oxygen Sensor Heater (Right bank) (Cont'd)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT.
2) Start engine and run it for at least 5 seconds at idle speed.

OR

GST

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.

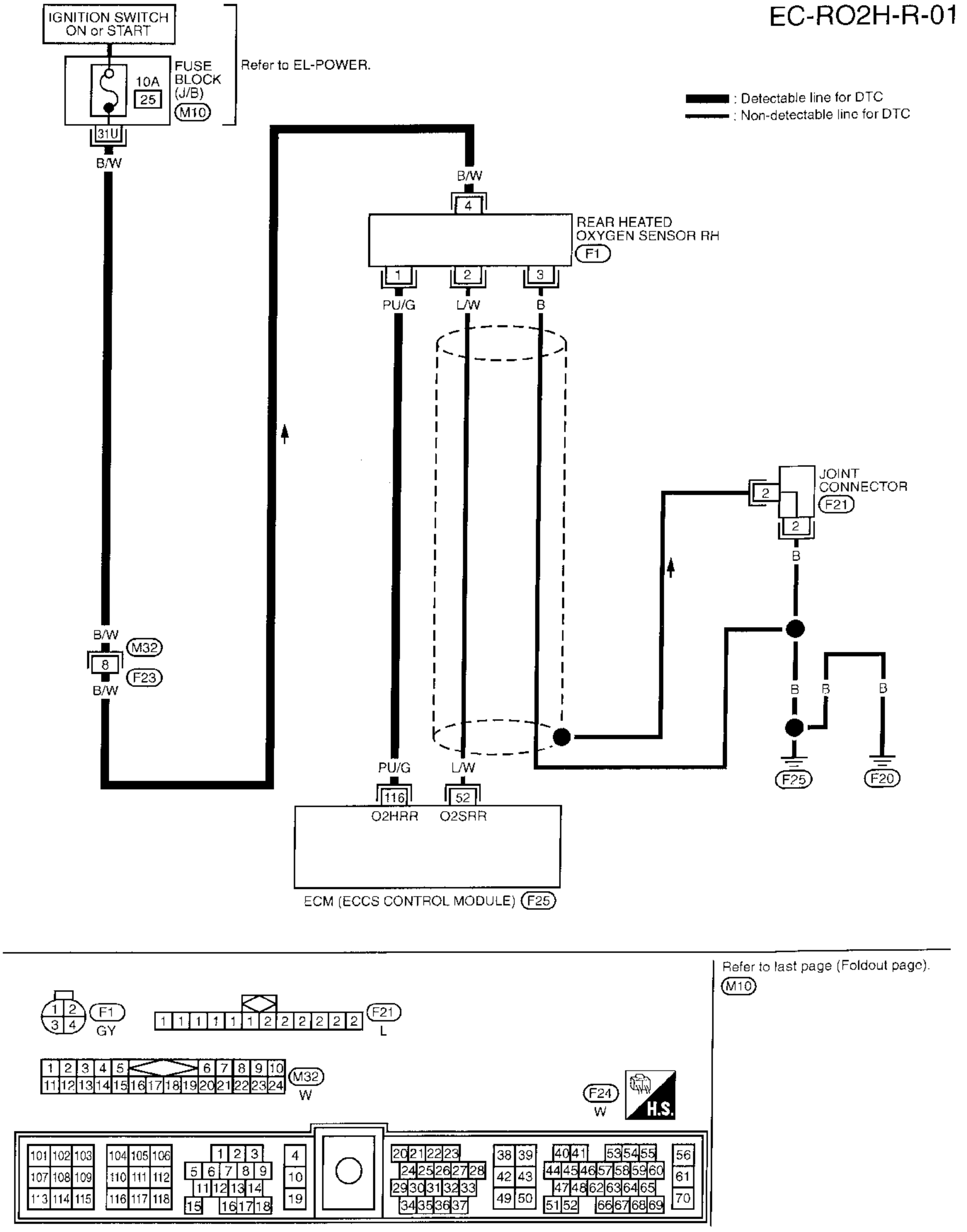
OR

NO TOOLS

1) Start engine and run it for at least 5 seconds at idle speed.
2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
3) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.

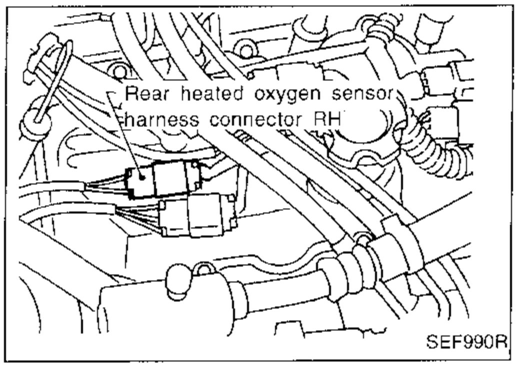
- **When using GST, "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" should be performed twice as much as when using CONSULT or ECM (Diagnostic Test Mode II) because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT or ECM (Diagnostic Test Mode II) is recommended.**

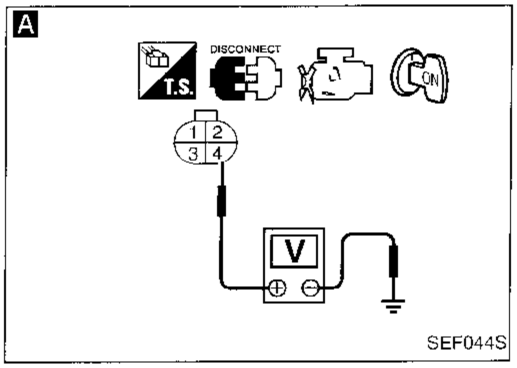
Rear Heated Oxygen Sensor Heater (Right bank) (Cont'd)

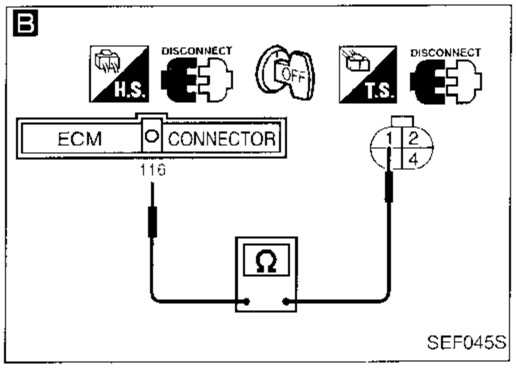


Rear Heated Oxygen Sensor Heater (Right bank) (Cont'd)

DIAGNOSTIC PROCEDURE







INSPECTION START

↓

A

CHECK POWER SUPPLY.
1. Disconnect rear heated oxygen sensor (right bank) harness connector.
2. Turn ignition switch "ON".
3. Check voltage between terminal ④ and ground.
   Voltage: Battery voltage

NG → Check the following.
- Harness connectors (F23), (M32)
- Harness connector (M10)
- 10A fuse
- Harness for open or short between rear heated oxygen sensor RH and fuse

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 ① and ECM terminal (116).
   Continuity should exist.
   If OK, check harness for short.

NG → Repair harness or connectors.

↓ OK

CHECK COMPONENT
(Rear heated oxygen sensor heater).
Refer to "COMPONENT INSPECTION" on next page.

NG → Replace rear heated oxygen sensor (right bank).

↓ OK

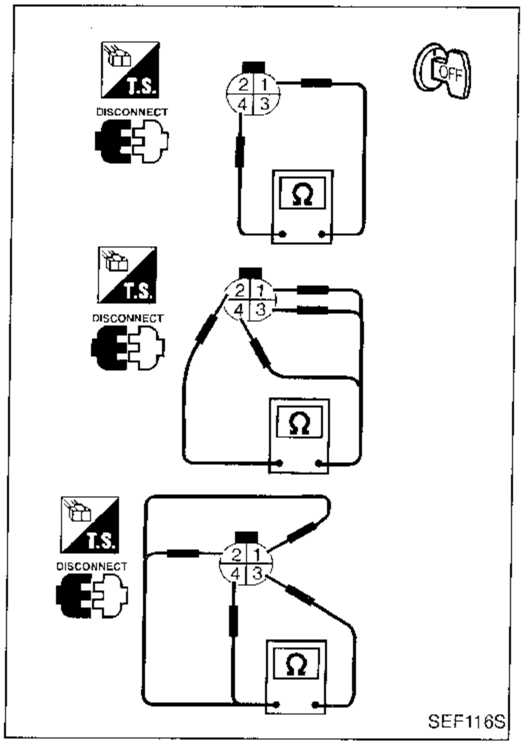
Disconnect and reconnect harness connectors in the circuit. Then retest.

↓ Trouble is not fixed.

Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

↓

INSPECTION END



Rear Heated Oxygen Sensor Heater (Right bank) (Cont'd)

COMPONENT INSPECTION

Rear heated oxygen sensor heater

Check the following.

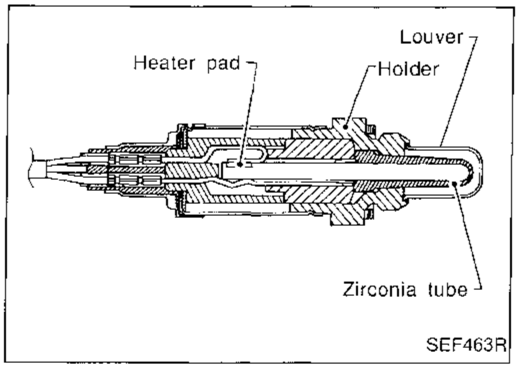
1. Check resistance between terminals ④ and ①.
   Resistance: 2.3 - 4.3Ω at 25°C (77°F)
2. Check continuity.

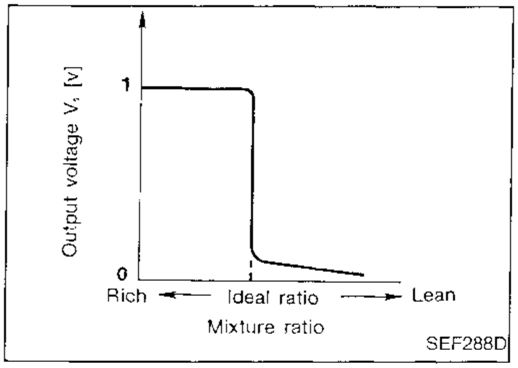
Terminal No.	Continuity
② and ①, ③, ④	No
③ and ①, ②, ④	

If NG, replace the rear heated oxygen sensor.

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.





Front Heated Oxygen Sensor (Front HO2S) (Left bank)

COMPONENT DESCRIPTION

The front heated oxygen sensor (left bank) is placed into the front tube (left bank). It detects the amount of oxygen in the exhaust gas compared to the outside air. The front heated oxygen sensor (left bank) 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 front heated oxygen sensor (left bank) 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.

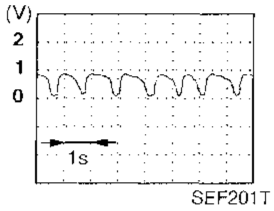
CONSULT REFERENCE VALUE IN DATA MONITOR MODE

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
FR O2 SEN-B2 .... FR O2 MNTR-B2	• 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 ㊸ (ECCS ground).

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
57	W	Front heated oxygen sensor (LH)	Engine is running. └ After warming up sufficiently and engine speed is 2,000 rpm	0 - Approximately 1.0V 

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0150 0303	• An excessively high voltage from the sensor is sent to ECM. • The voltage from the sensor is constantly approx. 0.3V. • The maximum and minimum voltages from the sensor are not reached to the specified voltages. • 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.) • Front heated oxygen sensor (Left bank) • Fuel pressure • Injectors • Intake air leaks

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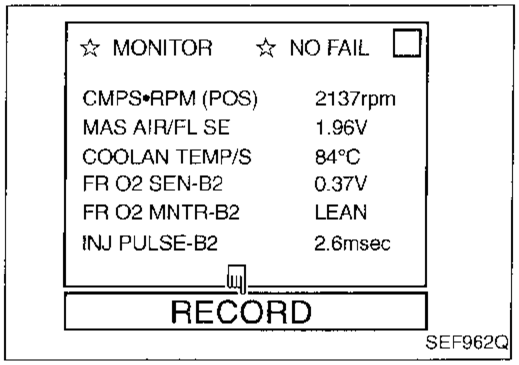
Front Heated Oxygen Sensor (Front HO2S) (Left bank) (Cont'd)



☆ MONITOR ☆ NO FAIL ☐

CMPS•RPM (POS)	2137rpm
MAS AIR/FL SE	1.96V
COOLAN TEMP/S	84°C
FR O2 SEN-B2	0.37V
FR O2 MNTR-B2	LEAN
INJ PULSE-B2	2.6msec

SEF962Q

OVERALL FUNCTION CHECK

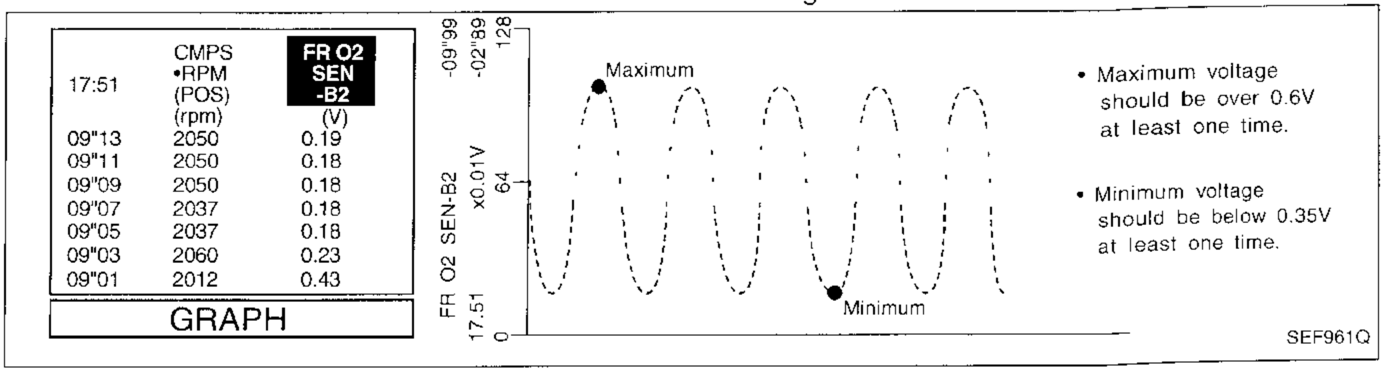
Use this procedure to check the overall function of the front heated oxygen sensor circuit. During this check, a 1st trip DTC might not be confirmed.

1) Start engine and warm it up sufficiently.
2) Select "MANU TRIG" and "HI SPEED" in "DATA MONITOR" mode with CONSULT, and select "FR O2 SEN-B2" and "FR O2 MNTR-B2".
3) Hold engine speed at 2,000 rpm under no load during the following steps.
4) Touch "RECORD" on CONSULT screen.
5) Check the following.

- "FR O2 MNTR-B2" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds.
  5 times (cycles) are counted as shown below:

  cycle | 1 | 2 | 3 | 4 | 5 |
  FR O2 MNTR-B2 R-L-R-L-R-L-R-L-R-L-R

  R = "FR O2 MNTR-B2", "RICH"
  L = "FR O2 MNTR-B2", "LEAN"
- "FR O2 SEN-B2" voltage goes above 0.6V at least once.
- "FR O2 SEN-B2" voltage goes below 0.35V at least once.
- The voltage never exceeds 1.0V.



17:51	CMPS •RPM (POS) (rpm)	FR O2 SEN -B2 (V)
09"13	2050	0.19
09"11	2050	0.18
09"09	2050	0.18
09"07	2037	0.18
09"05	2037	0.18
09"03	2060	0.23
09"01	2012	0.43

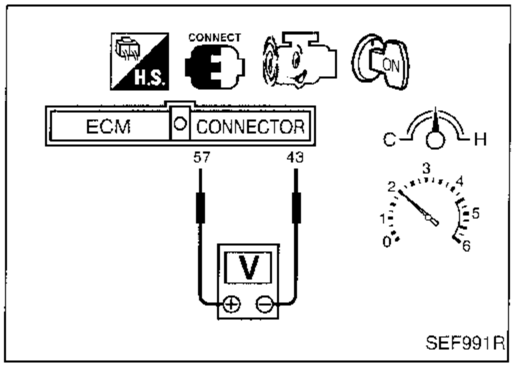
- Maximum voltage should be over 0.6V at least one time.
- Minimum voltage should be below 0.35V at least one time.

SEF961Q

OR

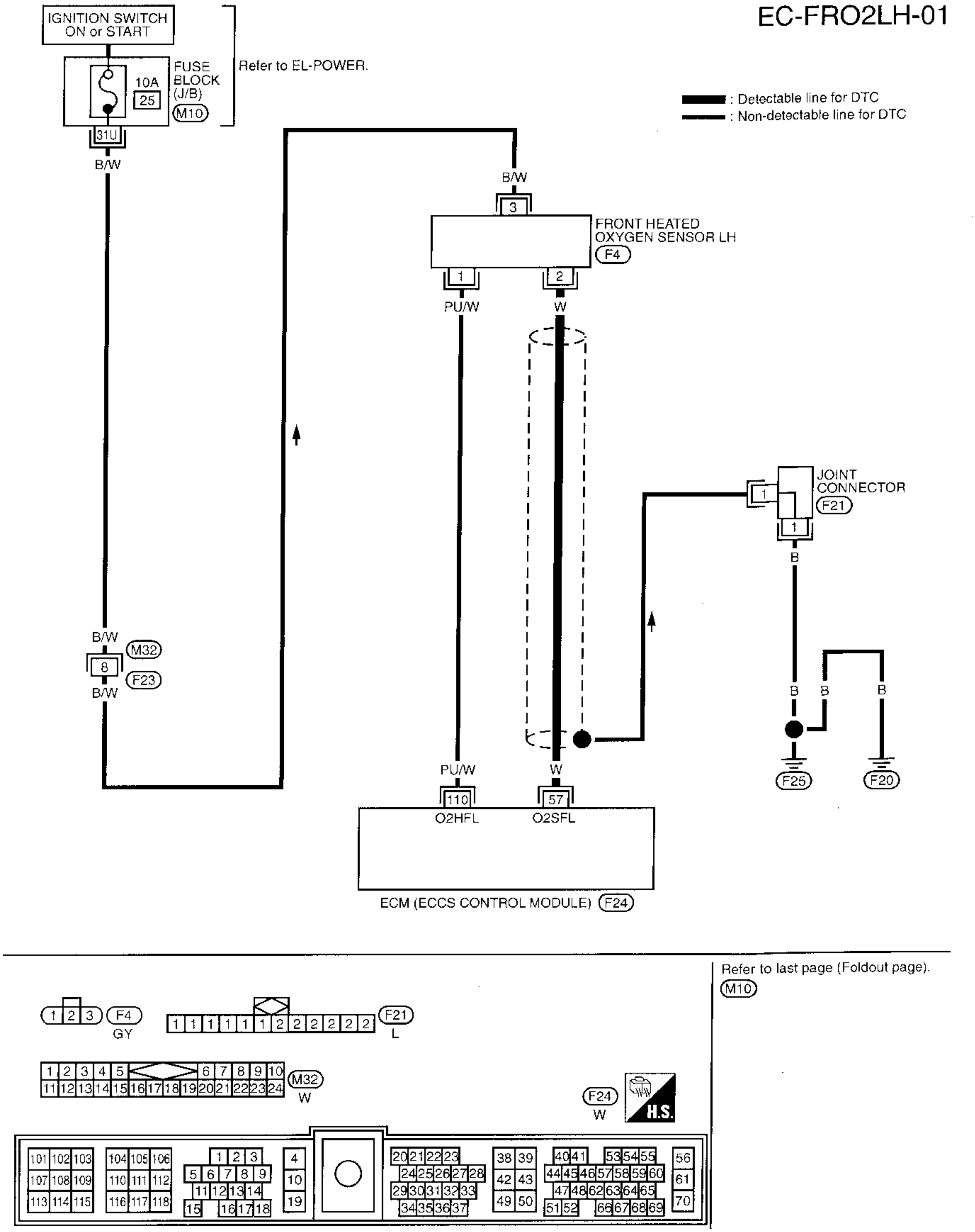
1) Start engine and warm it up sufficiently.
2) Set voltmeter probes between ECM terminal ㊼ (sensor signal) and ㊸ (engine ground).
3) Check the following with engine speed held at 2,000 rpm constant under no load.

- Malfunction indicator lamp goes on more than 5 times within 10 seconds in Diagnostic Test Mode II (FRONT HEATED OXYGEN SENSOR MONITOR).
- 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.



SEF991R

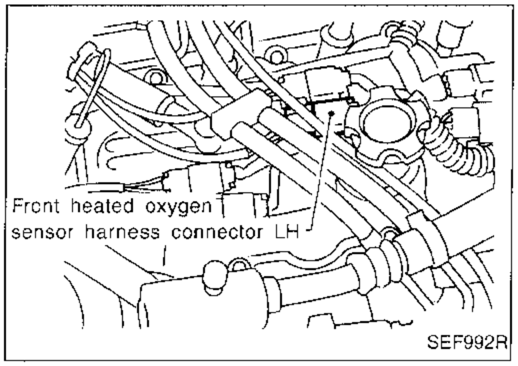
Front Heated Oxygen Sensor (Front HO2S) (Left bank) (Cont'd)

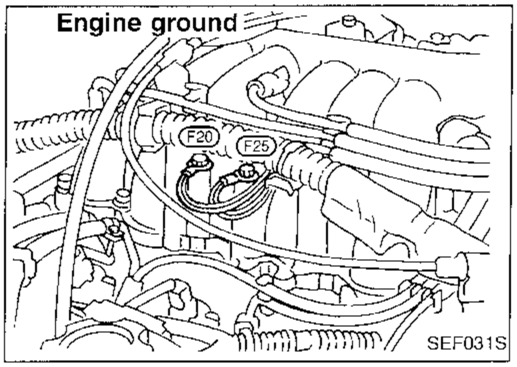


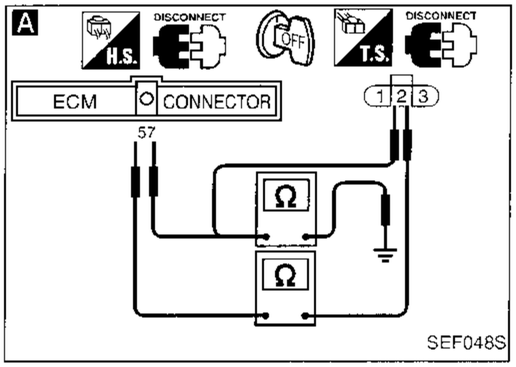
SEF259T

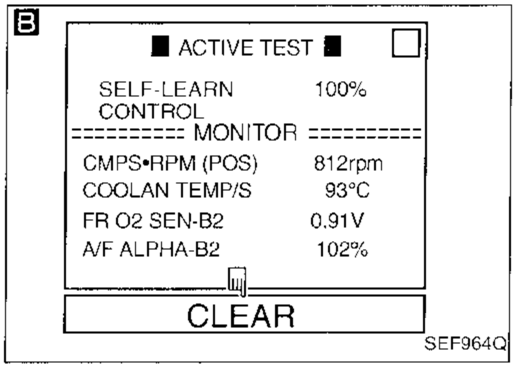
Front Heated Oxygen Sensor (Front HO2S) (Left bank) (Cont'd)

DIAGNOSTIC PROCEDURE









SELF-LEARN CONTROL 100%

========== MONITOR ==========

CMPS•RPM (POS)	812rpm
COOLAN TEMP/S	93°C
FR O2 SEN-B2	0.91V
A/F ALPHA-B2	102%

INSPECTION START

↓

Loosen and retighten engine ground screws.

↓

A

CHECK INPUT SIGNAL CIRCUIT.

1. Turn ignition switch "OFF".
2. Disconnect front heated oxygen sensor LH harness connector and ECM harness connector.
3. Check harness continuity between ECM terminal (57) and terminal ②.
   Continuity should exist.
4. Check harness continuity between ECM terminal (57) (or terminal ②) and ground.
   Continuity should not exist.
   If OK, check harness for short.

NG → Repair harness or connectors.

↓ OK

B

CLEAR THE SELF-LEARNING DATA.

1. Start engine and warm it up sufficiently.
2. Select "SELF-LEARNING CONT" in "ACTIVE TEST" mode with CONSULT.
3. Clear the self-learning control coefficient by touching "CLEAR".
4. Run engine for at least 10 minutes at idle speed.
   Are the 1st trip DTCs P0174, P0175 detected? Is it difficult to start engine?

OR

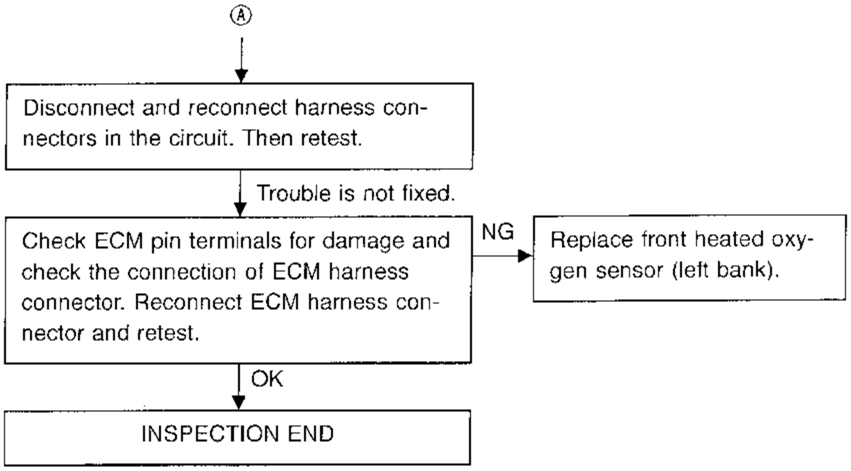
2. Turn ignition switch "OFF".
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 3 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure diagnostic trouble code No. 0102 is displayed in Diagnostic Test Mode II.
6. Erase the diagnostic test mode II (Self-diagnostic results) memory. Make sure diagnostic trouble code No. 0505 is displayed in Diagnostic Test Mode II.
7. Run engine for at least 10 minutes at idle speed.
   Are the 1st trip DTCs 0209, 0210 detected? Is it difficult to start engine?

Yes → Go to "TROUBLE DIAGNOSIS FOR DTC P0174, P0175", EC-178, 183.

↓ No

Ⓐ

Front Heated Oxygen Sensor (Front HO2S) (Left bank) (Cont'd)



Disconnect and reconnect harness connectors in the circuit. Then retest.

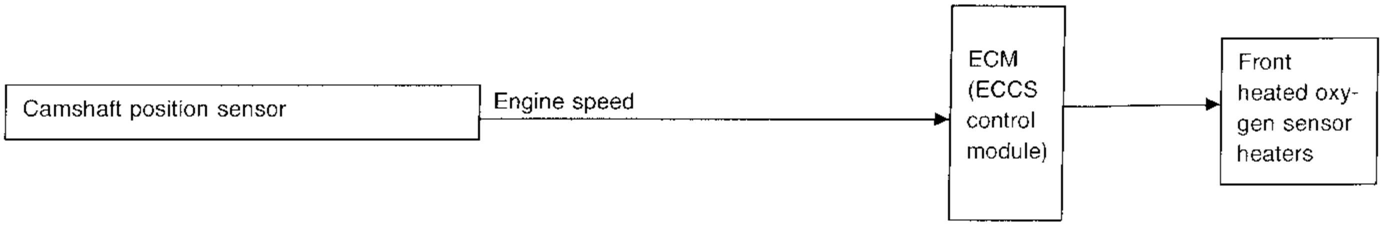
Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

Replace front heated oxygen sensor (left bank).

INSPECTION END

Front Heated Oxygen Sensor Heater (Left bank)

SYSTEM DESCRIPTION



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

OPERATION

Engine speed rpm	Front heated oxygen sensor heaters
Above 3,200	OFF
Below 3,200	ON

CONSULT REFERENCE VALUE IN DATA MONITOR MODE

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
FR O2 HTR-B2	• Engine speed: Idle	ON
	• Engine speed: Above 3,200 rpm	OFF

ECM TERMINALS AND REFERENCE VALUE

Specification data are reference values and are measured between each terminal and ㊸ (ECCS ground).

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
110	PU/W	Front heated oxygen sensor heater (LH)	Engine is running. └ Engine speed is below 3,200 rpm	Approximately 0.4V
			Engine is running. └ Engine speed is above 3,200 rpm	BATTERY VOLTAGE (11 - 14V)

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P0155 1001	• The current amperage in the front heated oxygen sensor heater (Left bank) circuit is out of the normal range. (An improper voltage drop signal is sent to ECM through the front heated oxygen sensor heater.)	• Harness or connectors (The front heated oxygen sensor heater circuit is open or shorted.) • Front heated oxygen sensor heater (Left bank)

Front Heated Oxygen Sensor Heater (Left bank) (Cont'd)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT.
2) Start engine and run it for at least 5 seconds at idle speed.

OR

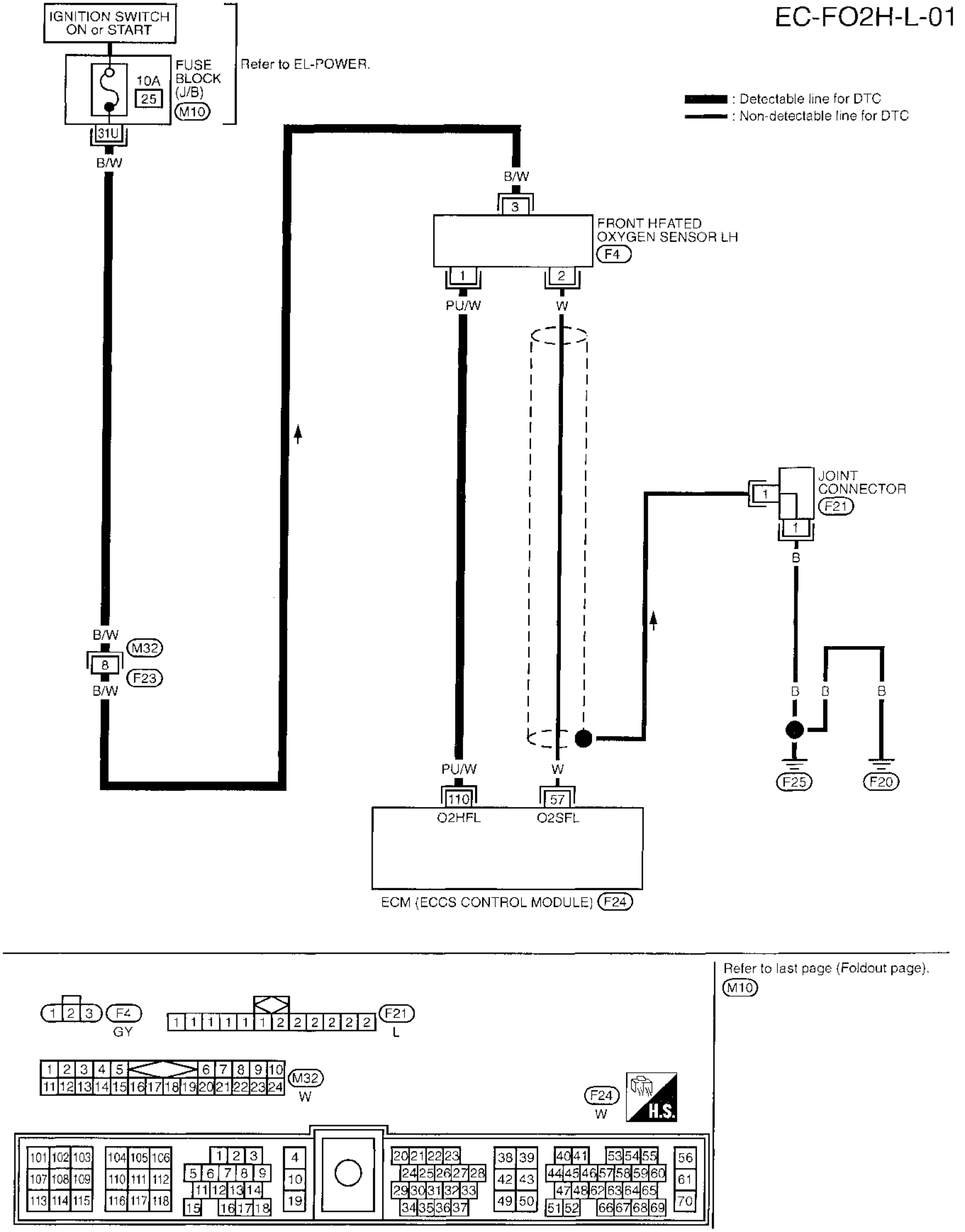
1) Start engine and run it for at least 5 seconds at idle speed.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Start engine and run it for at least 5 seconds at idle speed.
4) Select "MODE 3" with GST.

OR

1) Start engine and run it for at least 5 seconds at idle speed.
2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
3) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.

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

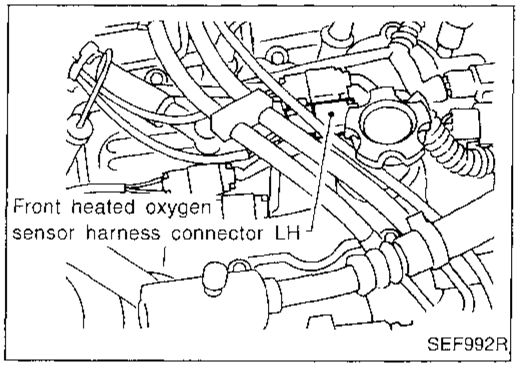
Front Heated Oxygen Sensor Heater (Left bank) (Cont'd)

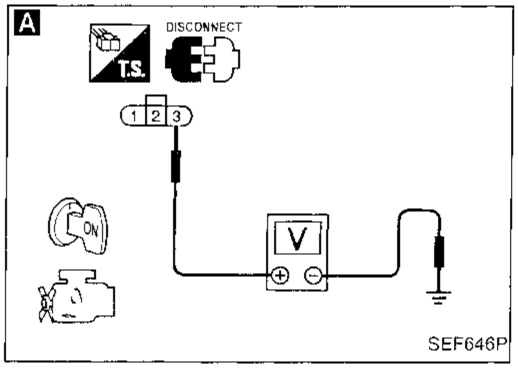


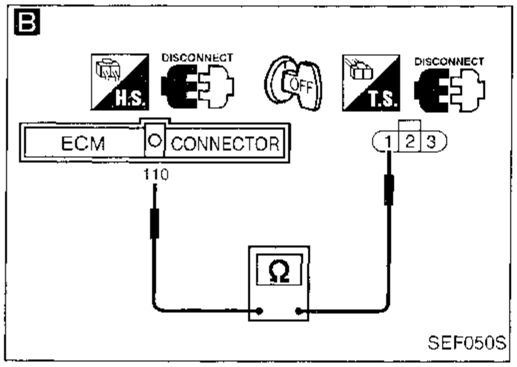
SEF260T

Front Heated Oxygen Sensor Heater (Left bank) (Cont'd)

DIAGNOSTIC PROCEDURE







INSPECTION START

↓

A

CHECK POWER SUPPLY.
1. Disconnect front heated oxygen sensor LH harness connector.
2. Turn ignition switch "ON".
3. Check voltage between terminal ③ and ground.
   Voltage: Battery voltage

NG → Check the following.
- Harness connectors (F23), (M32)
- Harness connector (M10)
- 10A fuse
- Harness for open or short between front heated oxygen sensor LH and fuse

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 ① and ECM terminal (110).
   Continuity should exist.
   If OK, check harness for short.

NG → Repair harness or connectors.

↓ OK

CHECK COMPONENT
(Front heated oxygen sensor heater).
Refer to "COMPONENT INSPECTION" below.

NG → Replace front heated oxygen sensor (left bank).

↓ OK

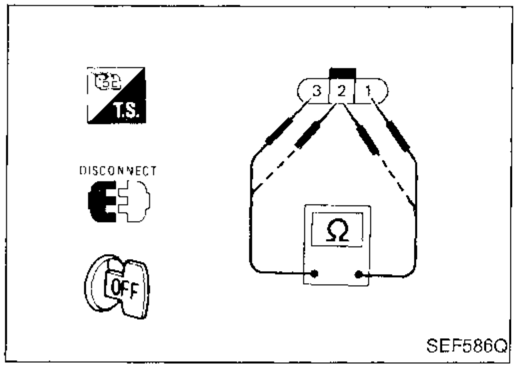
Disconnect and reconnect harness connectors in the circuit. Then retest.

↓ Trouble is not fixed.

Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

↓

INSPECTION END



COMPONENT INSPECTION

Front heated oxygen sensor heater

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 front heated oxygen sensor.

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.

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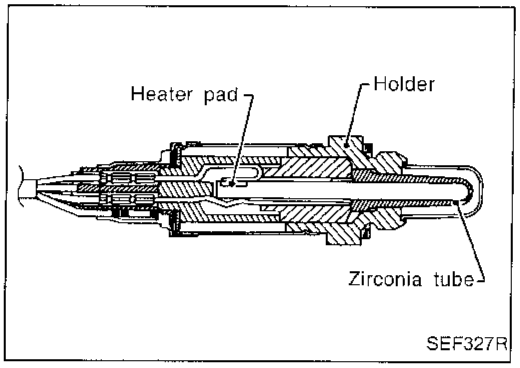


Rear Heated Oxygen Sensor (Rear HO2S) (Left bank)

COMPONENT DESCRIPTION

The rear heated oxygen sensor (Rear HO2S), after three way catalyst, monitors the oxygen level in the exhaust gas.
Even if switching characteristics of the front heated oxygen sensor are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the rear heated oxygen sensor.
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 rear heated oxygen sensor is not used for engine control operation.

CONSULT REFERENCE VALUE IN DATA MONITOR MODE

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
RR O2 SEN-B2	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ↔ Approx. 0.6 - 1.0V
RR O2 MNTR-B2			LEAN ↔ RICH

ECM TERMINALS AND REFERENCE VALUE

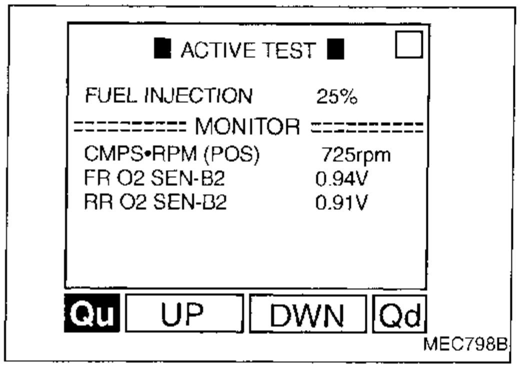
Specification data are reference values and are measured between each terminal and ㊸ (ECCS ground).

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
66	W	Rear heated oxygen sensor (LH)	Engine is running. After warming up sufficiently and engine speed is 2,000 rpm	0 - Approximately 1.0V

ON BOARD DIAGNOSIS LOGIC

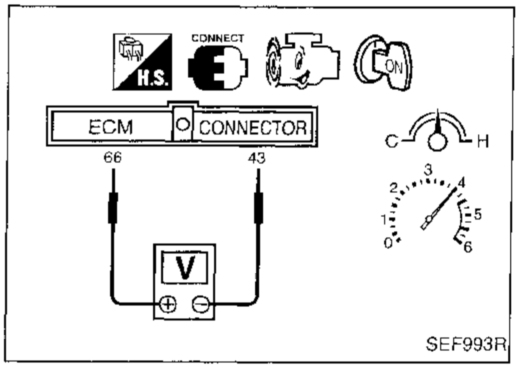
The rear heated oxygen sensor has a much longer switching time between rich and lean than the front heated oxygen sensor. The oxygen storage capacity before the three way catalyst causes the longer switching time. To judge the malfunctions of rear heated oxygen sensor, ECM monitors the sensor's voltage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

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0156 0708	• An excessively high voltage from the sensor is sent to ECM. • The maximum and minimum voltages from the sensor are not reached to the specified voltages. • 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.) • Rear heated oxygen sensor (Left bank) • Fuel pressure • Injectors • Intake air leaks



```
■ ACTIVE TEST ■  ☐
FUEL INJECTION        25%
========== MONITOR ==========
CMPS•RPM (POS)        725rpm
FR O2 SEN-B2          0.94V
RR O2 SEN-B2          0.91V
```

MEC798B



SEF993R

Rear Heated Oxygen Sensor (Rear HO2S) (Left bank) (Cont'd)

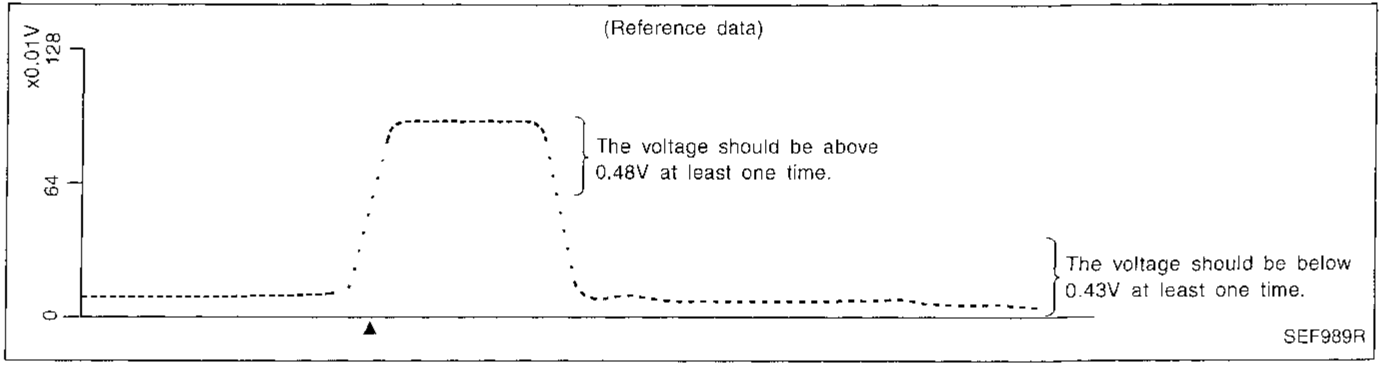
OVERALL FUNCTION CHECK

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

1) Start engine and warm it up sufficiently.
2) Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "RR O2 SEN-B2" as the monitor item with CONSULT.
3) Check "RR O2 SEN-B2" at idle speed when adjusting "FUEL INJECTION" to ±25%.
   "RR O2 SEN-B2" should be above 0.48V at least once when the "FUEL INJECTION" is +25%.
   "RR O2 SEN-B2" should be below 0.43V at least once when the "FUEL INJECTION" is −25%.

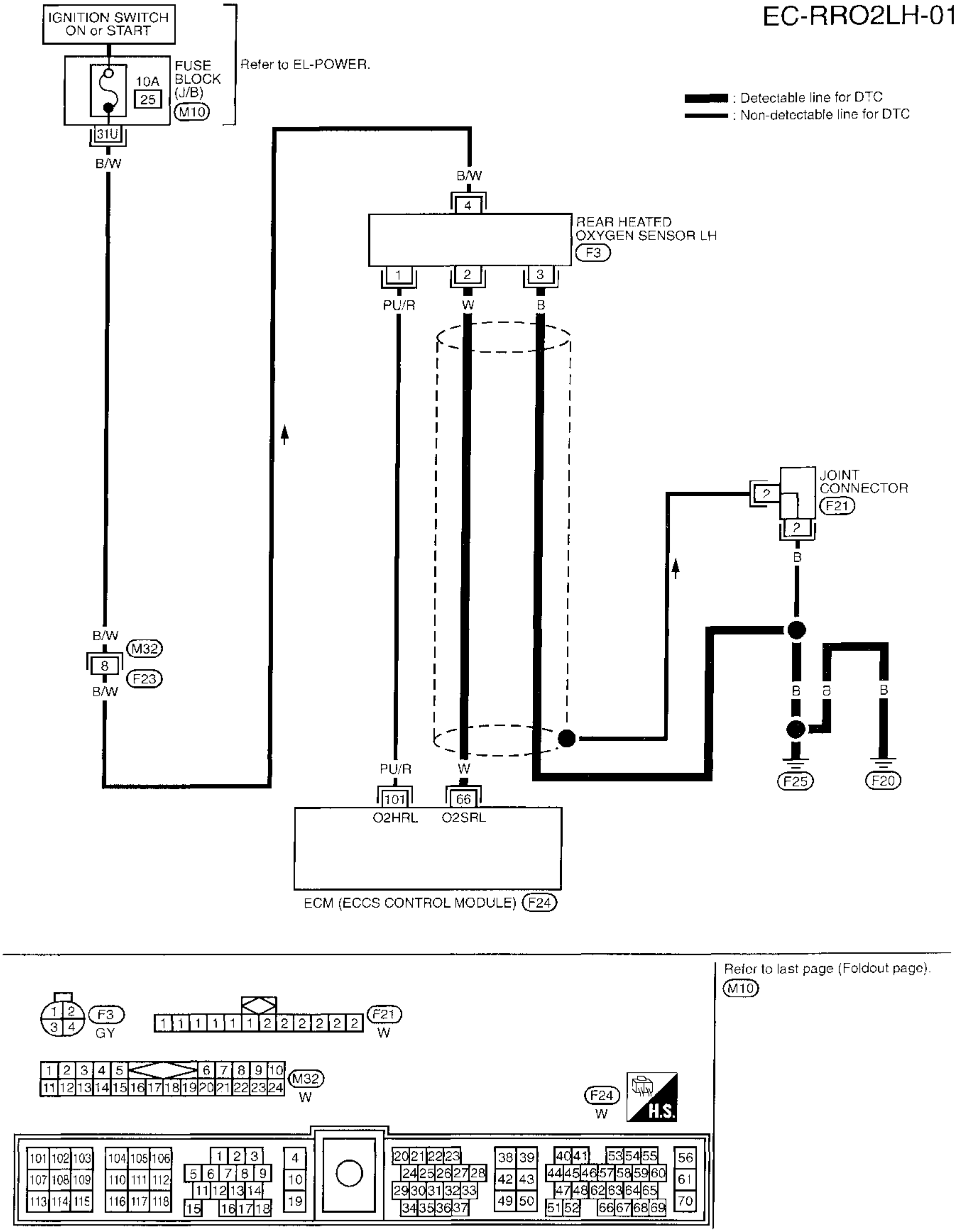
OR

1) Start engine and warm it up sufficiently.
2) Set voltmeter probes between ECM terminals ⑥⑥ (sensor signal) and ㊸ (engine ground).
3) Check the voltage when racing up to 4,000 rpm under no load at least 10 times.
   (depress and release accelerator pedal as soon as possible)
   The voltage should be above 0.48V and below 0.43V at least once during this procedure.
   If the voltage can be confirmed in step 3, step 4 is not necessary.
4) 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.
   The voltage should be above 0.48V and below 0.43V at least once during this procedure.



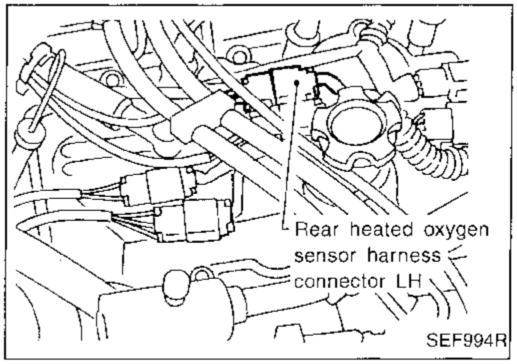
SEF989R

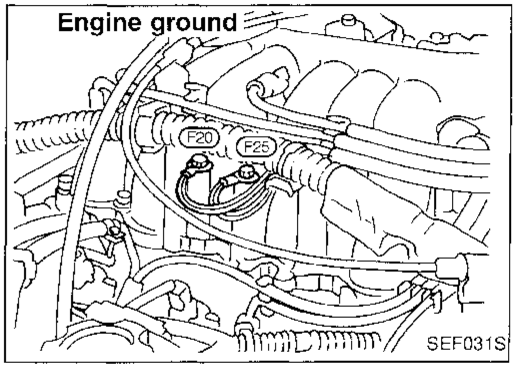
Rear Heated Oxygen Sensor (Rear HO2S) (Left bank) (Cont'd)

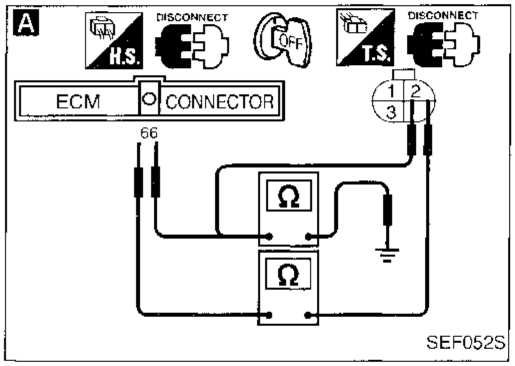


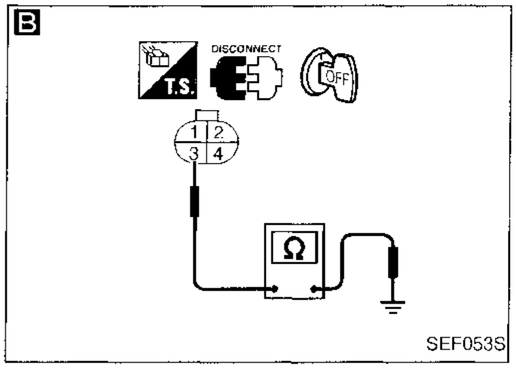
Rear Heated Oxygen Sensor (Rear HO2S) (Left bank) (Cont'd)

DIAGNOSTIC PROCEDURE









INSPECTION START

↓

Loosen and retighten engine ground.

↓

A

CHECK INPUT SIGNAL CIRCUIT.

1. Disconnect rear heated oxygen sensor (left bank) harness connector and ECM harness connector.
2. Check harness continuity between ECM terminal (66) and terminal ②. **Continuity should exist.**
3. Check harness continuity between ECM terminal (66) (or terminal ②) and ground. **Continuity should not exist.** If OK, check harness for short.

NG → Check the following.
- Harness for open or short between ECM and rear heated oxygen sensor LH

If NG, repair harness or connectors.

↓ OK

B

CHECK GROUND CIRCUIT.

Check harness continuity between terminal ③ and engine ground.

Continuity should exist.

If OK, check harness for short.

NG → Repair harness or connectors.

↓ OK

Disconnect and reconnect harness connectors in the circuit. Then retest.

↓ Trouble is not fixed.

Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

NG → Replace rear heated oxygen sensor.

↓ OK

INSPECTION END

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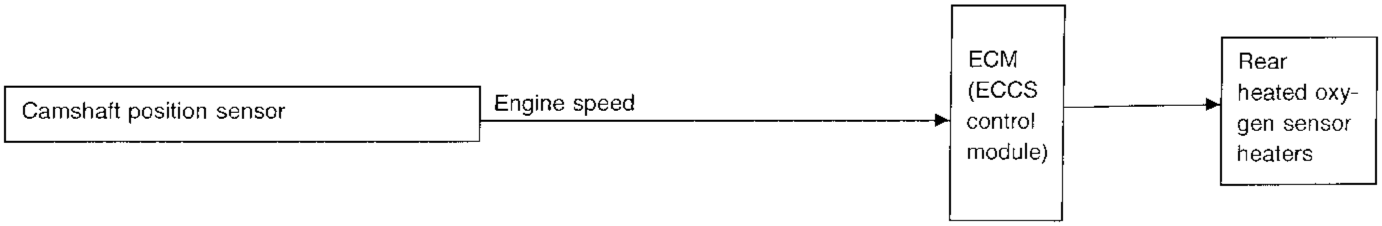
Rear Heated Oxygen Sensor Heater (Left bank)

SYSTEM DESCRIPTION



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

OPERATION

Engine speed rpm	Rear heated oxygen sensor heaters
Above 3,200	OFF
Below 3,200	ON

CONSULT REFERENCE VALUE IN DATA MONITOR MODE

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
RR O2 HTR-B2	• Engine speed: Idle	ON
	• Engine speed: Above 3,200 rpm	OFF

ECM TERMINALS AND REFERENCE VALUE

Specification data are reference values and are measured between each terminal and ㊸ (ECCS ground).

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	PU/R	Rear heated oxygen sensor heater (LH)	Engine is running. Engine speed is below 3,200 rpm	Approximately 0.4V
			Engine is running. Engine speed is above 3,200 rpm	BATTERY VOLTAGE (11 - 14V)

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P0161 1002	• The current amperage in the rear heated oxygen sensor heater (Left bank) circuit is out of the normal range. (An improper voltage drop signal is sent to ECM through the rear heated oxygen sensor heater.)	• Harness or connectors (The rear heated oxygen sensor heater circuit is open or shorted.) • Rear heated oxygen sensor heater (Left bank)

Rear Heated Oxygen Sensor Heater (Left bank) (Cont'd)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT.
2) Start engine and run it for at least 5 seconds at idle speed.

OR

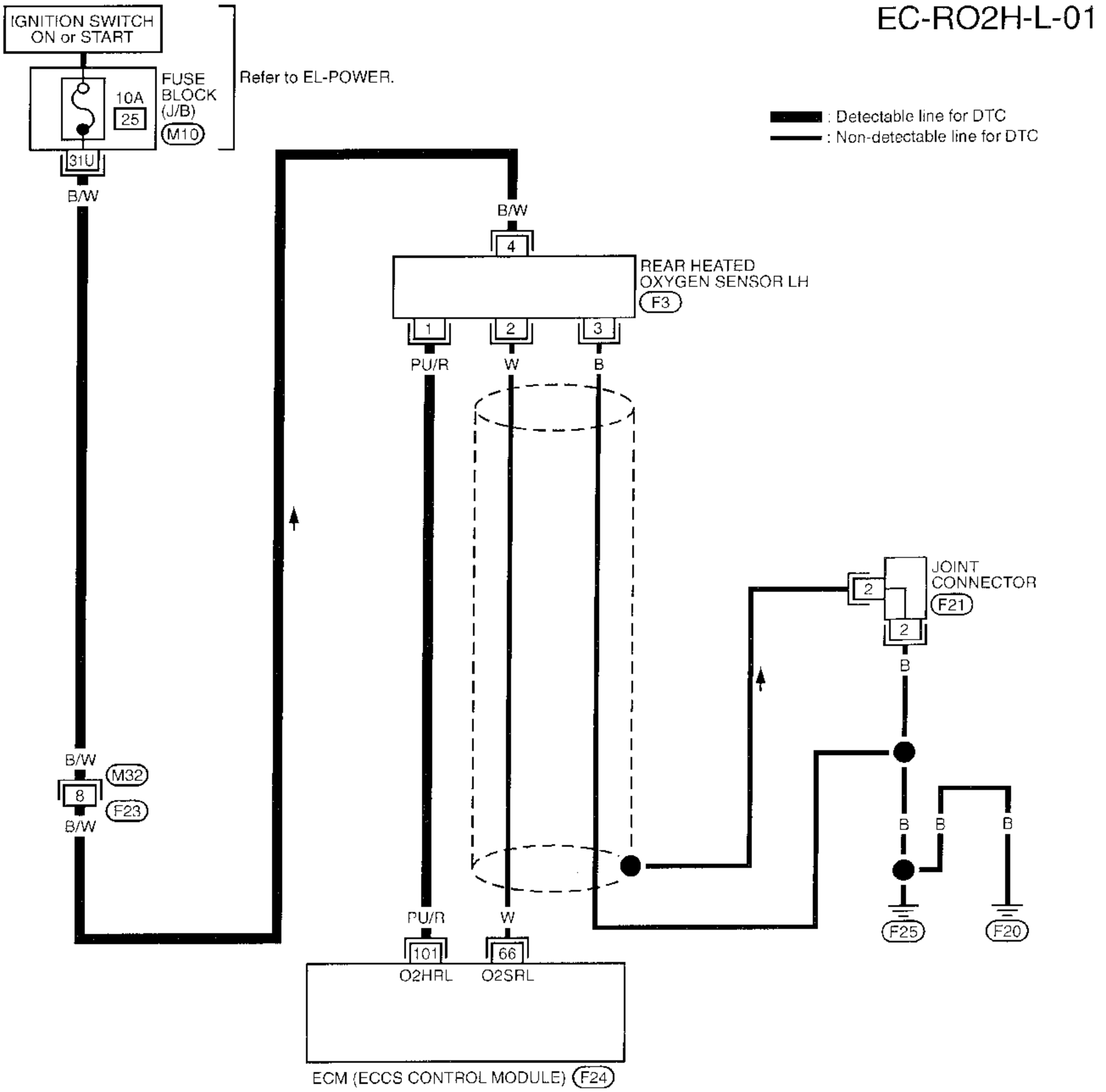
1) Start engine and run it for at least 5 seconds at idle speed.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Start engine and run it for at least 5 seconds at idle speed.
4) Select "MODE 3" with GST.

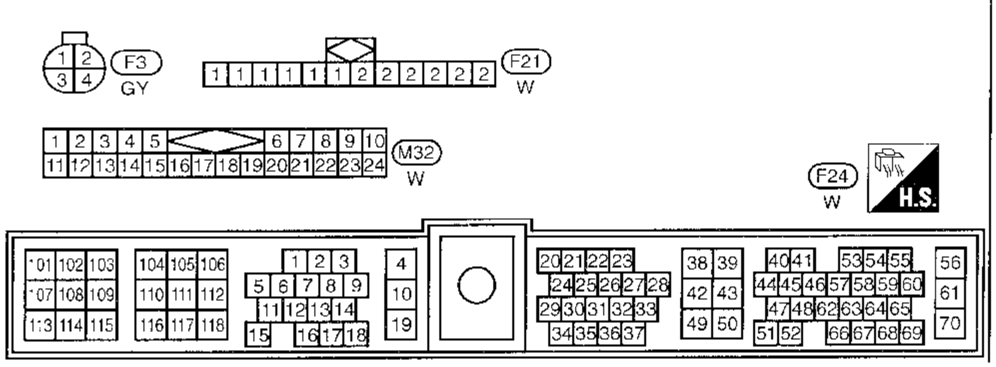
OR

1) Start engine and run it for at least 5 seconds at idle speed.
2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
3) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.

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

Rear Heated Oxygen Sensor Heater (Left bank) (Cont'd)



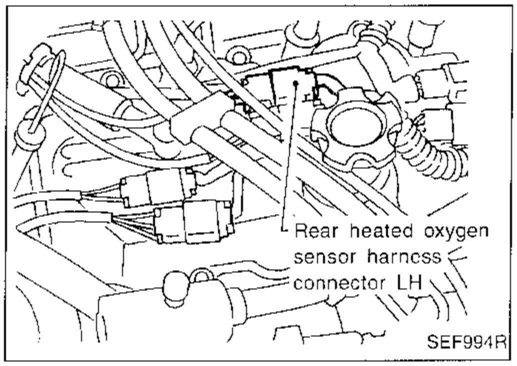


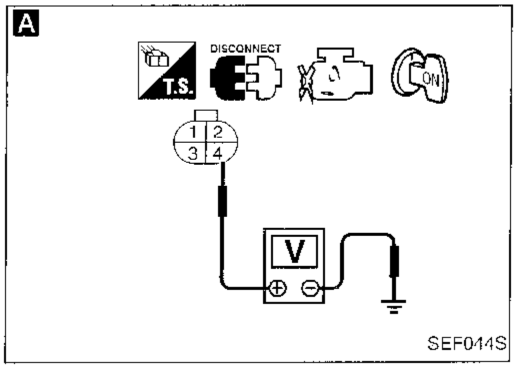
Refer to last page (Foldout page).
M10

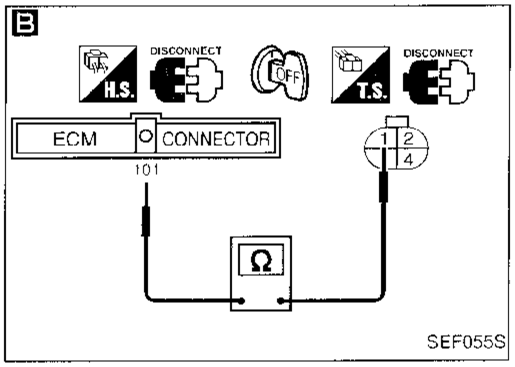
SEF262T

Rear Heated Oxygen Sensor Heater (Left bank) (Cont'd)

DIAGNOSTIC PROCEDURE







INSPECTION START

A

CHECK POWER SUPPLY.
1. Disconnect rear heated oxygen sensor LH harness connector.
2. Turn ignition switch "ON".
3. Check voltage between terminal ④ and ground.
Voltage: Battery voltage

NG → Check the following.
- Harness connectors (F23), (M32)
- Harness connector (M10)
- 10A fuse
- Harness for open or short between rear heated oxygen sensor LH and fuse

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 ① and ECM terminal (101).
Continuity should exist.
If OK, check harness for short.

NG → Repair harness or connectors.

OK ↓

CHECK COMPONENT
(Rear heated oxygen sensor heater).
Refer to "COMPONENT INSPECTION" below.

NG → Replace rear heated oxygen sensor (left bank).

OK ↓

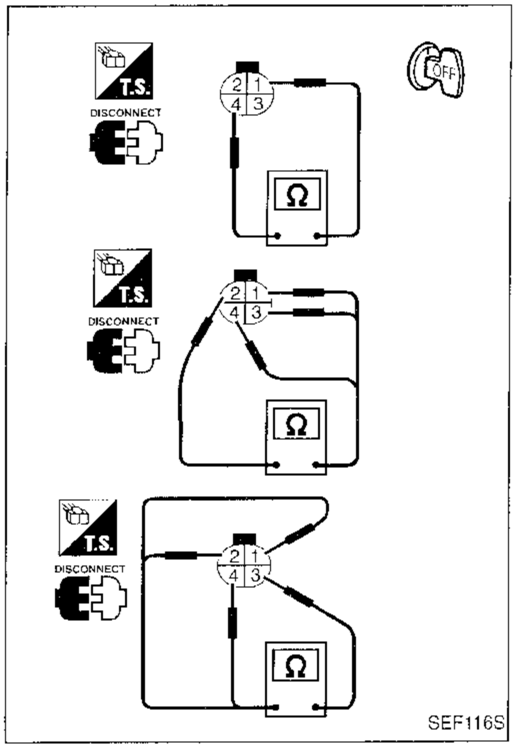
Disconnect and reconnect harness connectors in the circuit. Then retest.

↓ Trouble is not fixed.

Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

↓

INSPECTION END



COMPONENT INSPECTION

Rear heated oxygen sensor heater

Check the following.
1. Check resistance between terminals ④ and ①.
Resistance: 2.3 - 4.3Ω at 25°C (77°F)
2. Check continuity.

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

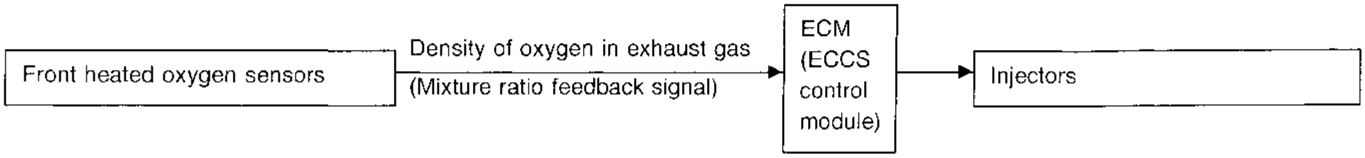
If NG, replace the rear heated oxygen sensor.

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.

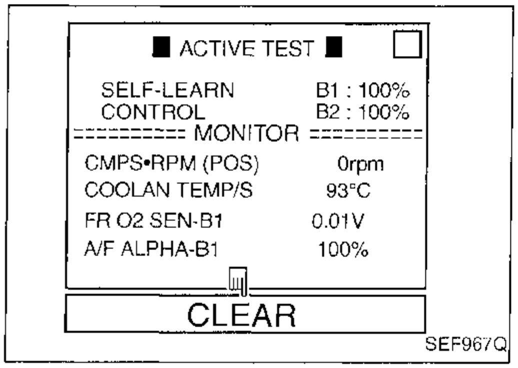
Fuel Injection System Function (Right bank) (Lean side)

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 front heated oxygen sensors. 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).



Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0171 0115	• 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 • Front heated oxygen sensor (Right bank) • Injectors (Right bank) • Exhaust gas leaks • Incorrect fuel pressure • Lack of fuel • Mass air flow sensor



SELF-LEARN CONTROL B1 : 100% B2 : 100%

========== MONITOR ==========

CMPS•RPM (POS) 0rpm

COOLAN TEMP/S 93°C

FR O2 SEN-B1 0.01V

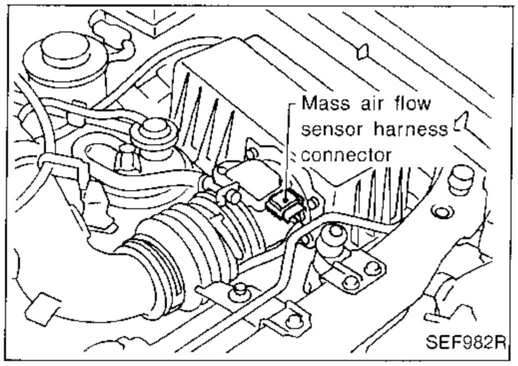
A/F ALPHA-B1 100%

SEF967Q

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE (Overall)

1) Start engine and warm it up sufficiently.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Turn ignition switch "ON" and select "SELF-LEARN CONTROL" in "ACTIVE TEST" mode with CONSULT.
4) Clear the self-learning control coefficient by touching "CLEAR".
5) Select "DATA MONITOR" mode with CONSULT.
6) Start engine again and run it for at least 10 minutes at idle speed.
   The 1st trip DTC P0171 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, too.
8) Crank engine while depressing accelerator pedal. If engine starts, go to "DIAGNOSTIC PROCEDURE". If engine does not start, check exhaust and intake air leak visually.

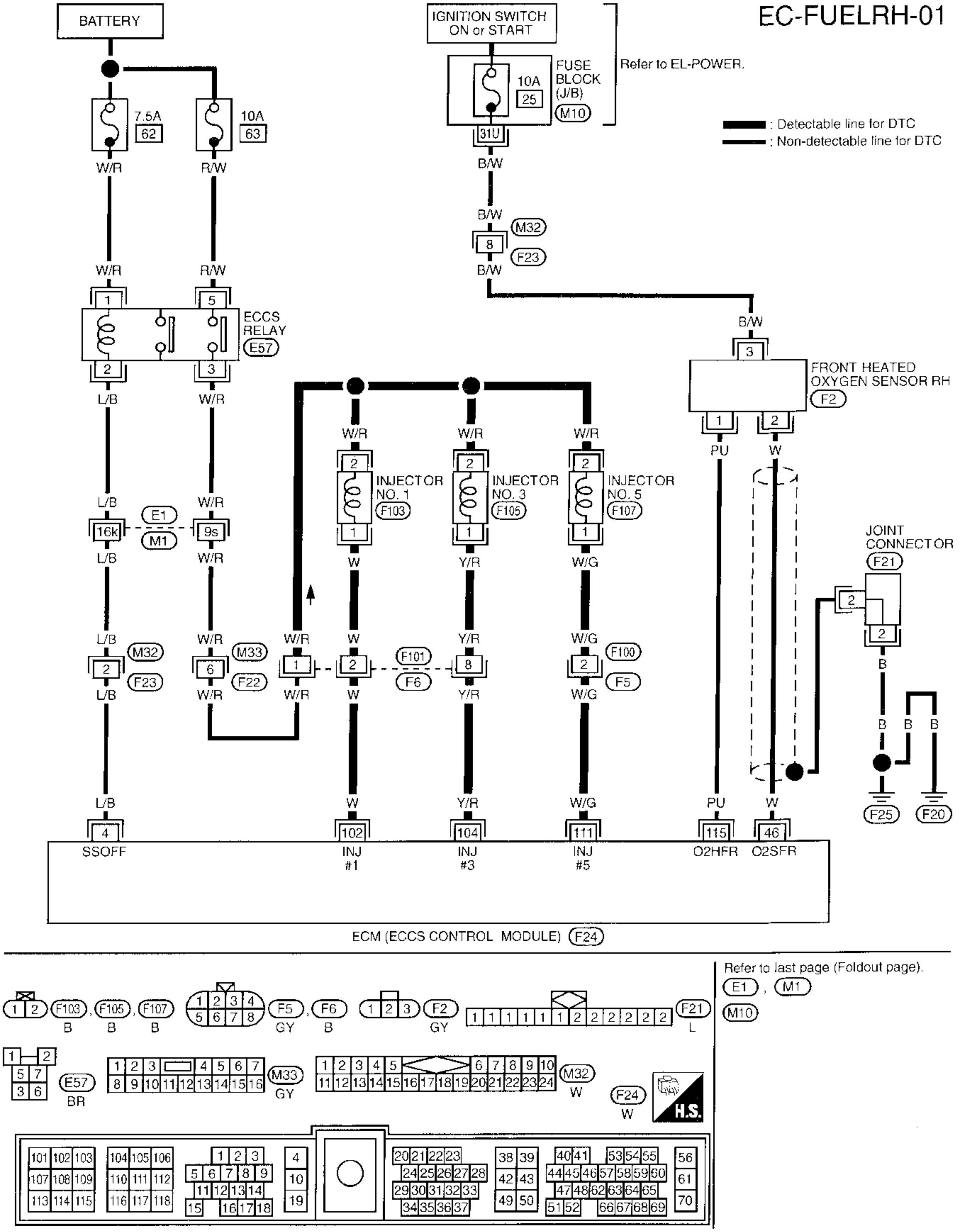
OR



Fuel Injection System Function (Right bank) (Lean side) (Cont'd)

1) Start engine and warm it up sufficiently.
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) Turn ignition switch "ON".
6) Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM. Make sure 1st trip DTC 0102 is detected.
7) Erase the 1st trip DTC 0102 by changing from Diagnostic Test Mode II to Diagnostic Test Mode I.
8) Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM. Make sure DTC 0505 is detected.
9) Start engine again and run it for at least 10 minutes at idle speed.
   The 1st trip DTC 0115 should be detected at this stage, if a malfunction exists.
10) If it is difficult to start engine at step 9, the fuel injection system also has a malfunction.
11) Crank engine while depressing accelerator pedal. If engine starts, go to "DIAGNOSTIC PROCEDURE". If engine does not start, check exhaust and intake air leak visually.

Fuel Injection System Function (Right bank) (Lean side) (Cont'd)



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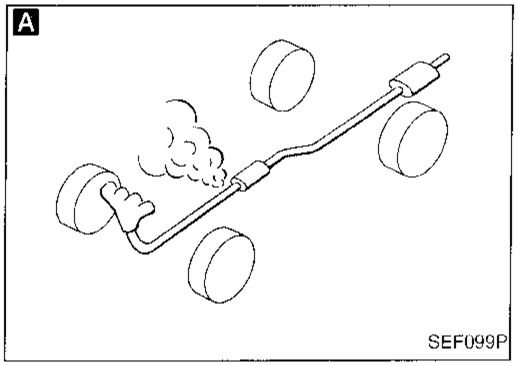
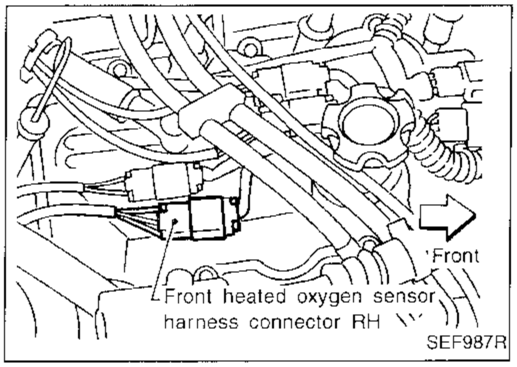
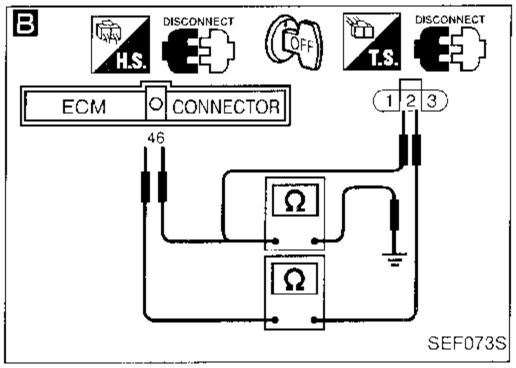
Fuel Injection System Function (Right bank) (Lean side) (Cont'd)

DIAGNOSTIC PROCEDURE







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 after the mass air flow sensor.

NG → Repair or replace.

↓ OK

B

CHECK FRONT HEATED OXYGEN SENSOR (RIGHT BANK).

1. Turn ignition switch "OFF".
2. Disconnect front heated oxygen sensor RH 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.

NG → Repair harness or connectors.

↓ OK

CHECK FUEL PRESSURE.

1. Release fuel pressure to zero.
   Refer to EC-25.
2. Install fuel pressure gauge and check fuel pressure.
   At idling:
   When fuel pressure regulator valve vacuum hose is connected.
   250.1 kPa
   (2.55 kg/cm^2, 36.3 psi)
   When fuel pressure regulator valve vacuum hose is disconnected.
   299.1 kPa
   (3.05 kg/cm^2, 43.4 psi)

NG → Check fuel pump and circuit. Refer to EC-328.

↓ OK

CHECK MASS AIR FLOW SENSOR.

Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT.
3.3 - 4.8 g·m/sec: at idling
12.0 - 14.9 g·m/sec: at 2,500 rpm

OR

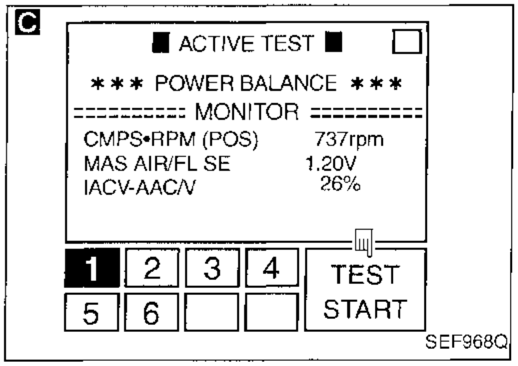
Check "mass air flow" in MODE 1 with GST.
3.3 - 4.8 g·m/sec: at idling
12.0 - 14.9 g·m/sec: at 2,500 rpm

NG → Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds.
Refer to EC-99.

↓ OK

Ⓐ

Fuel Injection System Function (Right bank) (Lean side) (Cont'd)


C

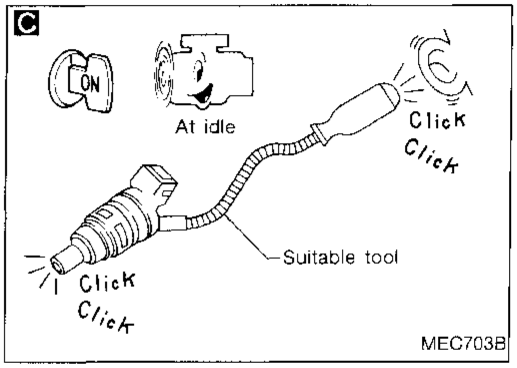
■ ACTIVE TEST ■ ☐

*** POWER BALANCE ***

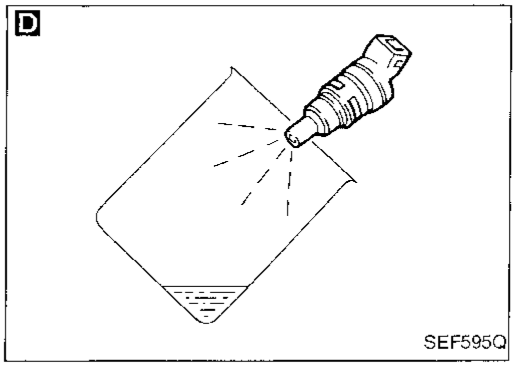
========== MONITOR ==========

CMPS•RPM (POS)	737rpm
MAS AIR/FL SE	1.20V
IACV-AAC/V	26%

SEF968Q


C

MEC703B


D

SEF595Q

Ⓐ

C

CHECK FUNCTION OF INJECTORS (RIGHT BANK).
1. Install all parts removed.
2. Start engine.
3. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.
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-321. 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. Disconnect injector harness connectors on left bank.
3. Remove injector gallery on right bank.
Refer to EC-26.
Keep fuel hose and all injectors connected to injector gallery.
The injector harness connectors on right bank should remain connected.

↓

D

1. Disconnect all ignition coil harness connectors.
2. Crank engine for about 3 seconds. Make sure that fuel sprays out from injectors.

NG → Replace injectors from which fuel does not spray out.

OK ↓

Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

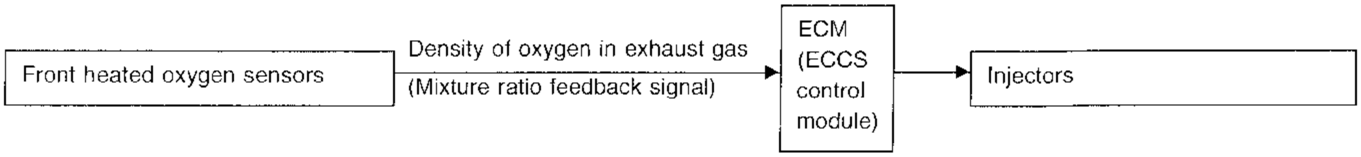
↓

INSPECTION END

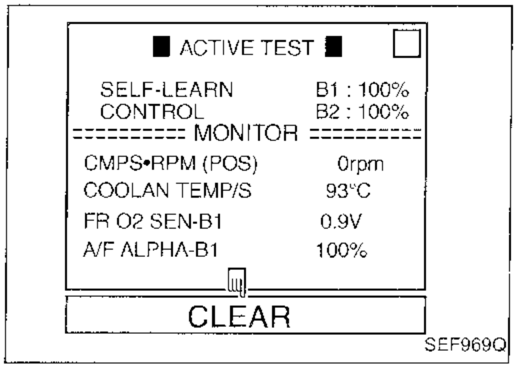
Fuel Injection System Function (Right bank) (Rich side)

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 front heated oxygen sensors. 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).



Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0172 0114	• Fuel injection system does not operate properly. • The amount of mixture ratio compensation is too large. (The mixture ratio is too rich.)	• Front heated oxygen sensor (Right bank) • Injectors (Right bank) • Exhaust gas leaks • Incorrect fuel pressure • Mass air flow sensor



```
SELF-LEARN              B1 : 100%
CONTROL                 B2 : 100%
========== MONITOR ==========
CMPS•RPM (POS)          0rpm
COOLAN TEMP/S           93°C
FR O2 SEN-B1            0.9V
A/F ALPHA-B1            100%
```

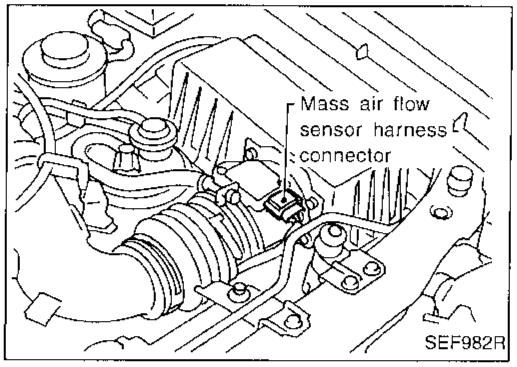
SEF969Q

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE (Overall)

1) Start engine and warm it up sufficiently.
2) Turn ignition switch “OFF” and wait at least 5 seconds.
3) Turn ignition switch “ON” and select “SELF-LEARN CONTROL” in “ACTIVE TEST” mode with CONSULT.
4) Clear the self-learning control coefficient by touching “CLEAR”.
5) Select “DATA MONITOR” mode with CONSULT.
6) Start engine again and run it for at least 10 minutes at idle speed.
   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, too.
8) Crank engine while depressing accelerator pedal.
   If engine starts, go to “DIAGNOSTIC PROCEDURE”, EC-171. If engine does not start, remove ignition plugs and check for fouling, etc.

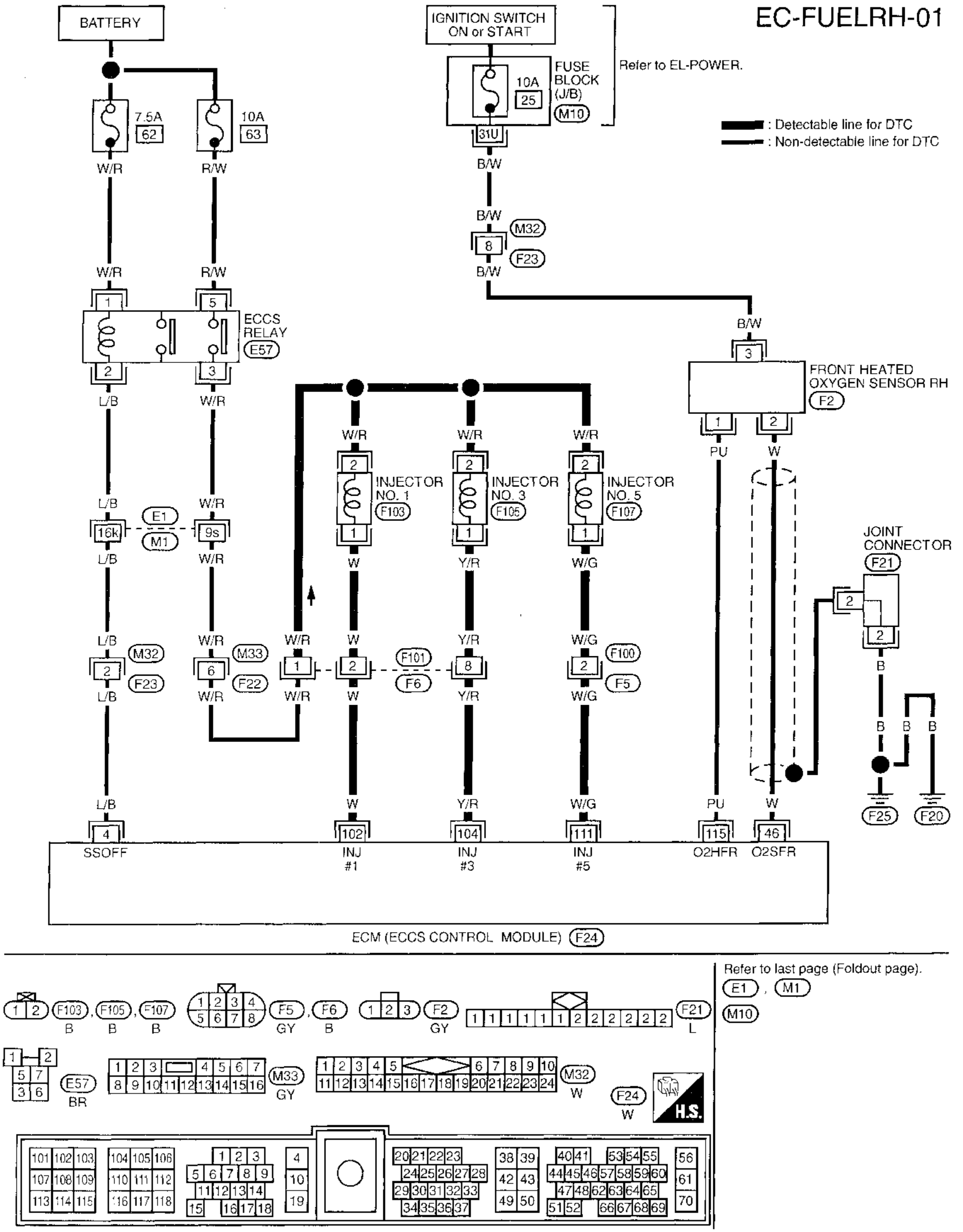
OR

Fuel Injection System Function (Right bank) (Rich side) (Cont'd)



1) Disconnect mass air flow sensor harness connector.
2) Start engine and run it for at least 3 seconds at idle speed.
3) Stop engine and reconnect mass air flow sensor harness connector.
4) Turn ignition switch "ON".
5) Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM. Make sure 1st trip DTC 0102 is detected.
6) Erase the 1st trip DTC 0102 by changing from Diagnostic Test Mode II to Diagnostic Test Mode I.
7) Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM. Make sure DTC 0505 is detected.
8) Start engine again and run it for at least 10 minutes at idle speed.
   The 1st trip DTC 0114 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 also has a malfunction.
10) Crank engine while depressing accelerator pedal.
   If engine starts, go to "DIAGNOSTIC PROCEDURE", EC-171. If engine does not start, remove ignition plugs and check for fouling, etc.

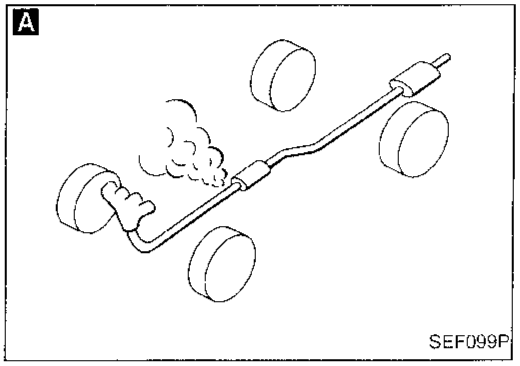
Fuel Injection System Function (Right bank) (Rich side) (Cont'd)

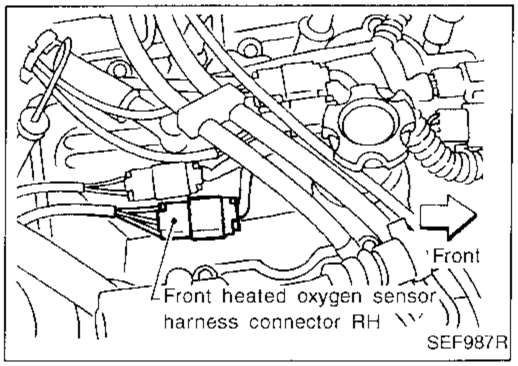


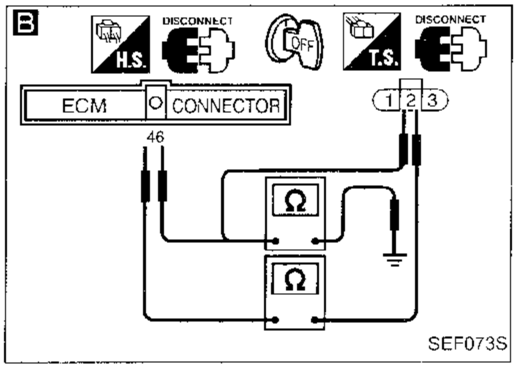
SEF263T

Fuel Injection System Function (Right bank) (Rich side) (Cont'd)

DIAGNOSTIC PROCEDURE







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 FRONT HEATED OXYGEN SENSOR (RIGHT BANK).
1. Turn ignition switch "OFF".
2. Disconnect front heated oxygen sensor RH 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.

NG → Repair harness or connectors.

↓ OK

CHECK FUEL PRESSURE.
1. Release fuel pressure to zero.
   Refer to EC-25.
2. Install fuel pressure gauge and check fuel pressure.
   At idling:
   When fuel pressure regulator valve vacuum hose is connected.
   Approximately 250.1 kPa ($2.55\ kg/cm^2$, 36.3 psi)
   When fuel pressure regulator valve vacuum hose is disconnected.
   Approximately 299.1 kPa ($3.05\ kg/cm^2$, 43.4 psi)

NG → Check fuel pump and circuit. Refer to EC-328.

↓ OK

CHECK MASS AIR FLOW SENSOR.
Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT.
3.3 - 4.8 g·m/sec: at idling
12.0 - 14.9 g·m/sec: at 2,500 rpm

OR

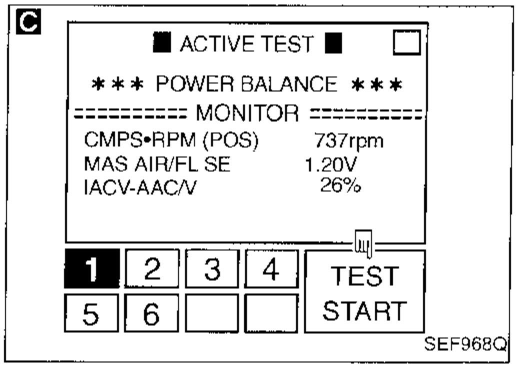
Check "mass air flow" in MODE 1 with GST.
3.3 - 4.8 g·m/sec: at idling
12.0 - 14.9 g·m/sec: at 2,500 rpm

NG → Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds.
Refer to EC-99.

↓ OK

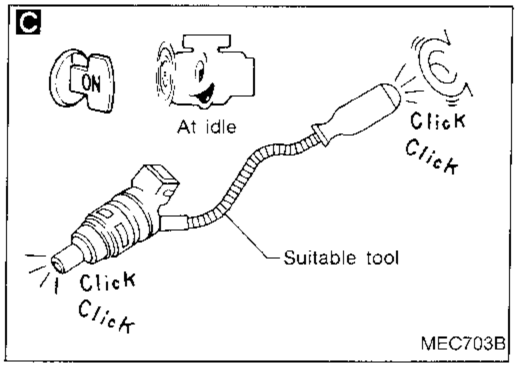
Ⓐ

Fuel Injection System Function (Right bank) (Rich side) (Cont'd)



```
■ ACTIVE TEST ■          ☐
*** POWER BALANCE ***
========== MONITOR ==========
CMPS•RPM (POS)      737rpm
MAS AIR/FL SE       1.20V
IACV-AAC/V          26%
```

SEF968Q



MEC703B

Ⓐ

CHECK FUNCTION OF INJECTORS (RIGHT BANK).

1. Install all parts removed.
2. Start engine.
3. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.
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-321. Repair harness or connectors.

OK ↓

Remove injector assembly.
Refer to EC-26.
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. ↓

Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

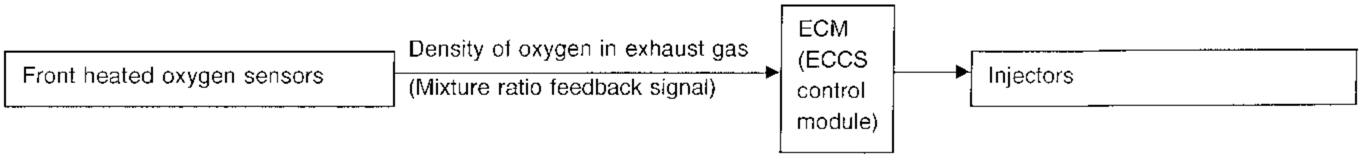
↓

INSPECTION END

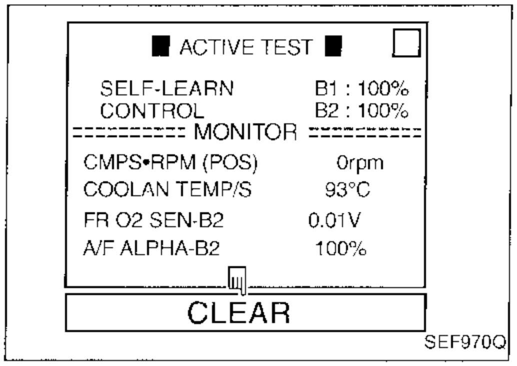
Fuel Injection System Function (Left bank) (Lean side)

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 front heated oxygen sensors. 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).



Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0174 0210	• 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 • Front heated oxygen sensor (Left bank) • Injectors (Left bank) • Exhaust gas leaks • Incorrect fuel pressure • Lack of fuel • Mass air flow sensor



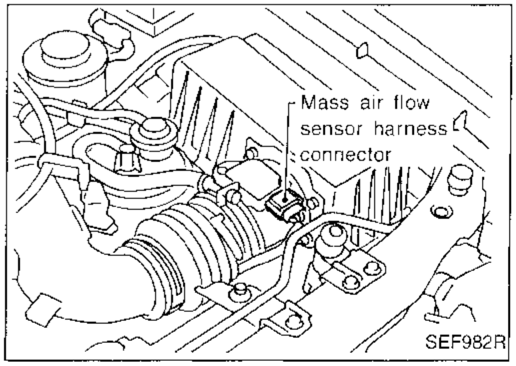
```
■ ACTIVE TEST ■          ☐
 SELF-LEARN        B1 : 100%
  CONTROL          B2 : 100%
========== MONITOR ==========
CMPS•RPM (POS)       0rpm
COOLAN TEMP/S        93°C
FR O2 SEN-B2        0.01V
A/F ALPHA-B2         100%
          CLEAR
```

SEF970Q

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE (Overall)

1) Start engine and warm it up sufficiently.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Turn ignition switch "ON" and select "SELF-LEARN CONTROL" in "ACTIVE TEST" mode with CONSULT.
4) Clear the self-learning control coefficient by touching "CLEAR".
5) Select "DATA MONITOR" mode with CONSULT.
6) Start engine again and run it for at least 10 minutes at idle speed.
   The 1st trip DTC P0174 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, too.
8) Crank engine while depressing accelerator pedal. If engine starts, go to "DIAGNOSTIC PROCEDURE". If engine does not start, check exhaust and intake air leak visually.

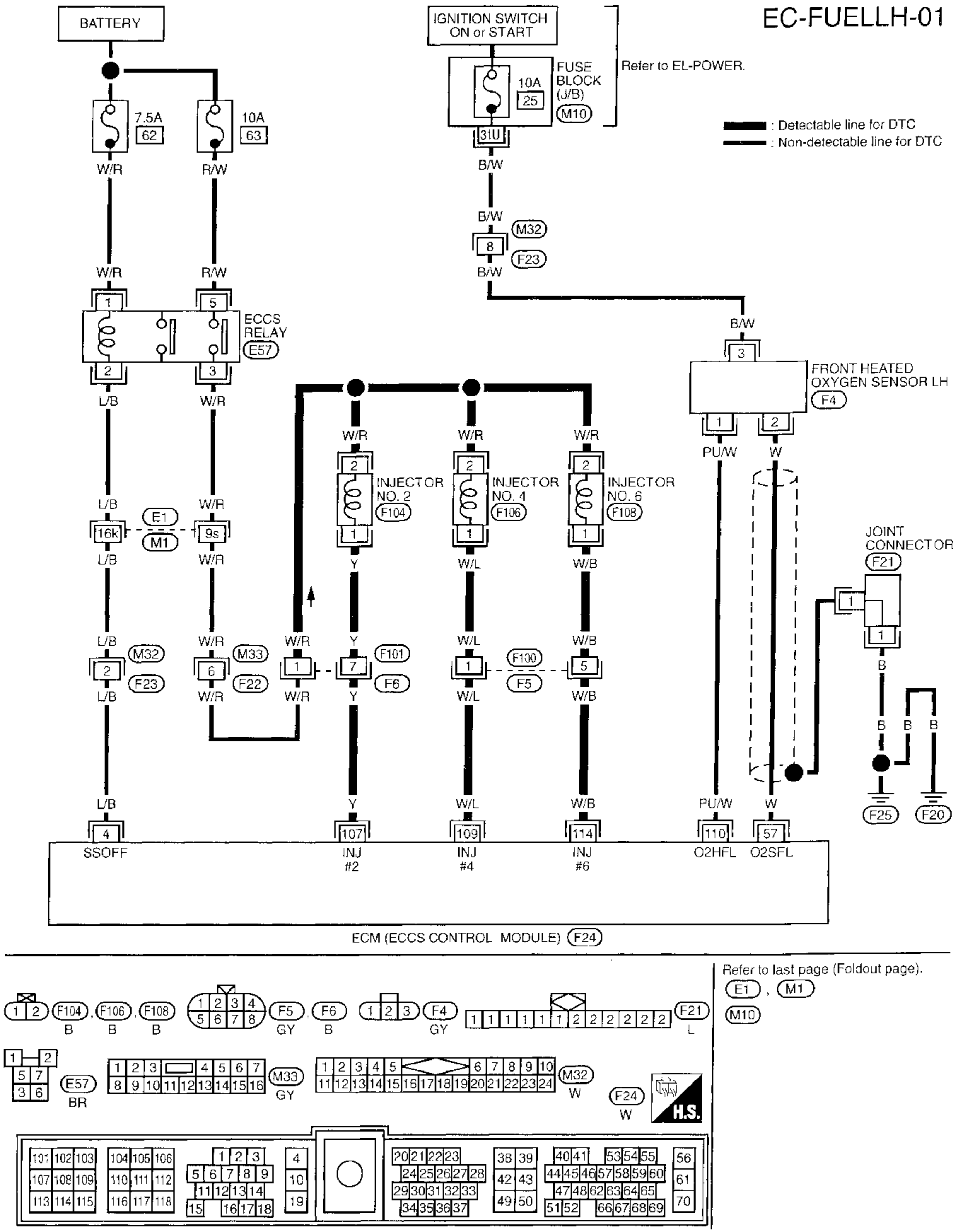
OR



Fuel Injection System Function (Left bank) (Lean side) (Cont'd)

1) Start engine and warm it up sufficiently.
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) Turn ignition switch "ON".
6) Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM. Make sure 1st trip DTC 0102 is detected.
7) Erase the 1st trip DTC 0102 by changing from Diagnostic Test Mode II to Diagnostic Test Mode I.
8) Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM. Make sure DTC 0505 is detected.
9) Start engine again and run it for at least 10 minutes at idle speed.
   The 1st trip DTC 0210 should be detected at this stage, if a malfunction exists.
10) If it is difficult to start engine at step 9, the fuel injection system also has a malfunction.
11) Crank engine while depressing accelerator pedal. If engine starts, go to "DIAGNOSTIC PROCEDURE". If engine does not start, check exhaust and intake air leak visually.

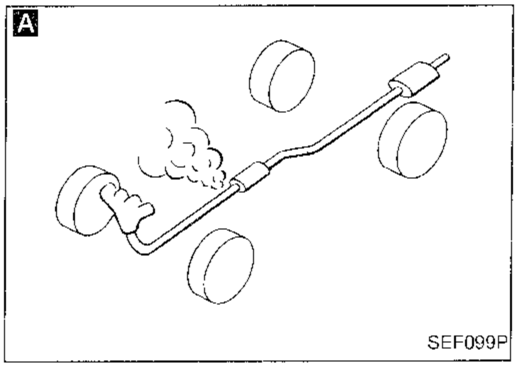
Fuel Injection System Function (Left bank) (Lean side) (Cont'd)

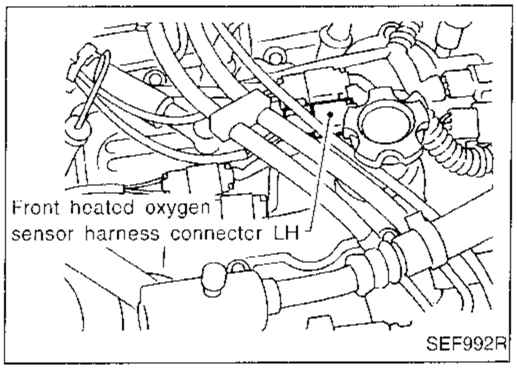


Fuel Injection System Function (Left bank) (Lean side) (Cont'd)

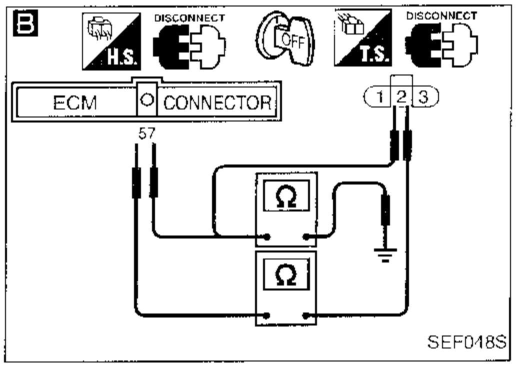
DIAGNOSTIC PROCEDURE

A





B



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 after mass air flow sensor.

NG → Repair or replace.

OK

B

CHECK FRONT HEATED OXYGEN SENSOR (LEFT BANK).

1. Turn ignition switch "OFF".
2. Disconnect front heated oxygen sensor LH harness connector and ECM harness connector.
3. Check harness continuity between ECM terminal (57) and terminal ②.
   Continuity should exist.
4. Check harness continuity between ECM terminal (57) (or terminal ②) and ground.
   Continuity should not exist.
   If OK, check harness for short.

NG → Repair harness or connectors.

OK

CHECK FUEL PRESSURE.

1. Release fuel pressure to zero.
   Refer to EC-25.
2. Install fuel pressure gauge and check fuel pressure.
   At idling:
   When fuel pressure regulator valve vacuum hose is connected.
   Approximately 250.1 kPa ($2.55 kg/cm^2$, 36.3 psi)
   When fuel pressure regulator valve vacuum hose is disconnected.
   Approximately 299.1 kPa ($3.05 kg/cm^2$, 43.4 psi)

NG → Check fuel pump and circuit. Refer to EC-328.

OK

CHECK MASS AIR FLOW SENSOR.

Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT.
2.5 - 6.0 g·m/sec: at idling
9.5 - 19.0 g·m/sec: at 2,500 rpm

OR

Check "mass air flow" in MODE 1 with GST.
2.5 - 6.0 g·m/sec: at idling
9.5 - 19.0 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-99.

OK

Ⓐ

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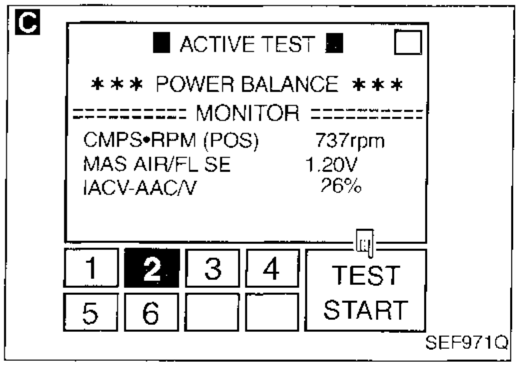
Fuel Injection System Function (Left bank) (Lean side) (Cont'd)

C



■ ACTIVE TEST ■ ☐

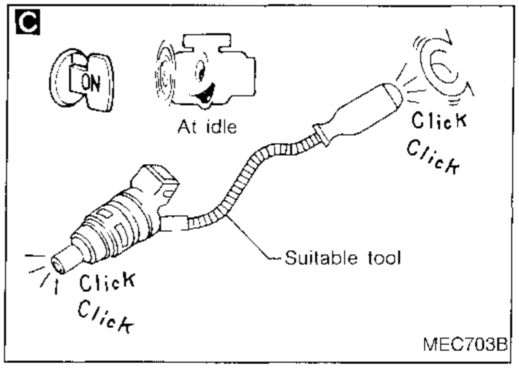
*** POWER BALANCE ***

========== MONITOR ==========

CMPS•RPM (POS)	737rpm
MAS AIR/FL SE	1.20V
IACV-AAC/V	26%

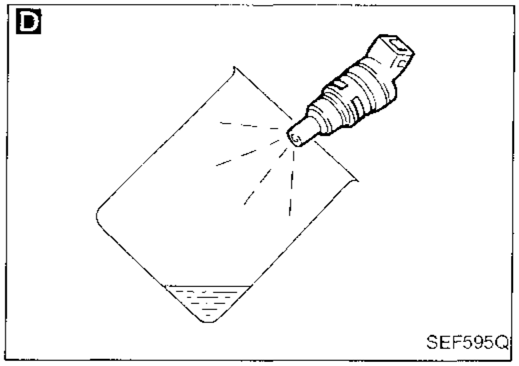
SEF971Q

C



MEC703B

D



SEF595Q

Ⓐ

C

CHECK FUNCTION OF INJECTORS (LEFT BANK).

1. Install all parts removed.
2. Start engine.
3. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.
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-321. 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. Disconnect injector harness connectors on right bank.
3. Remove injector gallery on left bank. Refer to EC-26. Keep fuel hose and all injectors connected to injector gallery. The injector harness connectors on left bank should remain connected.

↓

D

1. Disconnect all ignition coil harness connectors.
2. Crank engine for about 3 seconds. Make sure that fuel sprays out from injector.

NG → Replace injectors from which fuel does not spray out.

OK ↓

Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

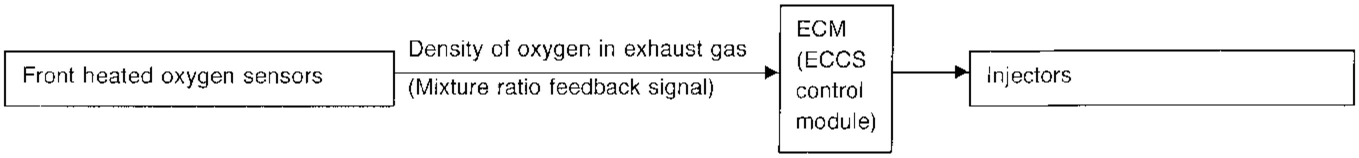
↓

INSPECTION END

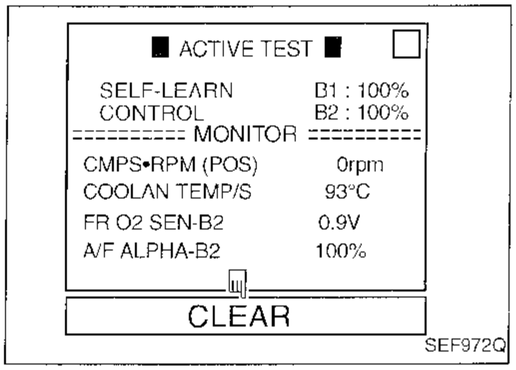
Fuel Injection System Function (Left bank) (Rich side)

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 front heated oxygen sensors. 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).



Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0175 0209	• Fuel injection system does not operate properly. • The amount of mixture ratio compensation is too large. (The mixture ratio is too rich.)	• Front heated oxygen sensor (Left bank) • Injectors (Left bank) • Exhaust gas leaks • Incorrect fuel pressure • Mass air flow sensor


■ ACTIVE TEST ■ ☐

SELF-LEARN CONTROL B1 : 100% B2 : 100%

========== MONITOR ==========

CMPS•RPM (POS) 0rpm

COOLAN TEMP/S 93°C

FR O2 SEN-B2 0.9V

A/F ALPHA-B2 100%

CLEAR

SEF972Q

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE (Overall)

1) Start engine and warm it up sufficiently.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Turn ignition switch "ON" and select "SELF-LEARN CONTROL" in "ACTIVE TEST" mode with CONSULT.
4) Clear the self-learning control coefficient by touching "CLEAR".
5) Select "DATA MONITOR" mode with CONSULT.
6) Start engine again and run it for at least 10 minutes at idle speed.
   The 1st trip DTC P0175 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, too.
8) Crank engine while depressing accelerator pedal.
   If engine starts, go to "DIAGNOSTIC PROCEDURE", EC-181. If engine does not start, remove ignition plugs and check for fouling, etc.

OR

GI
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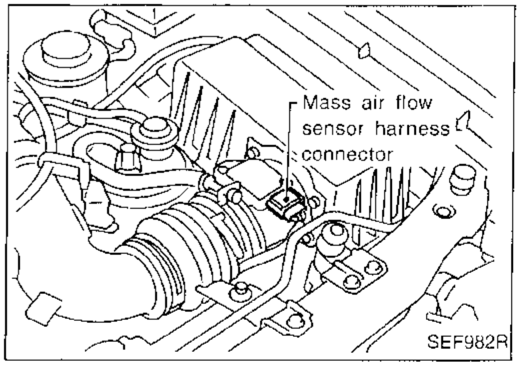
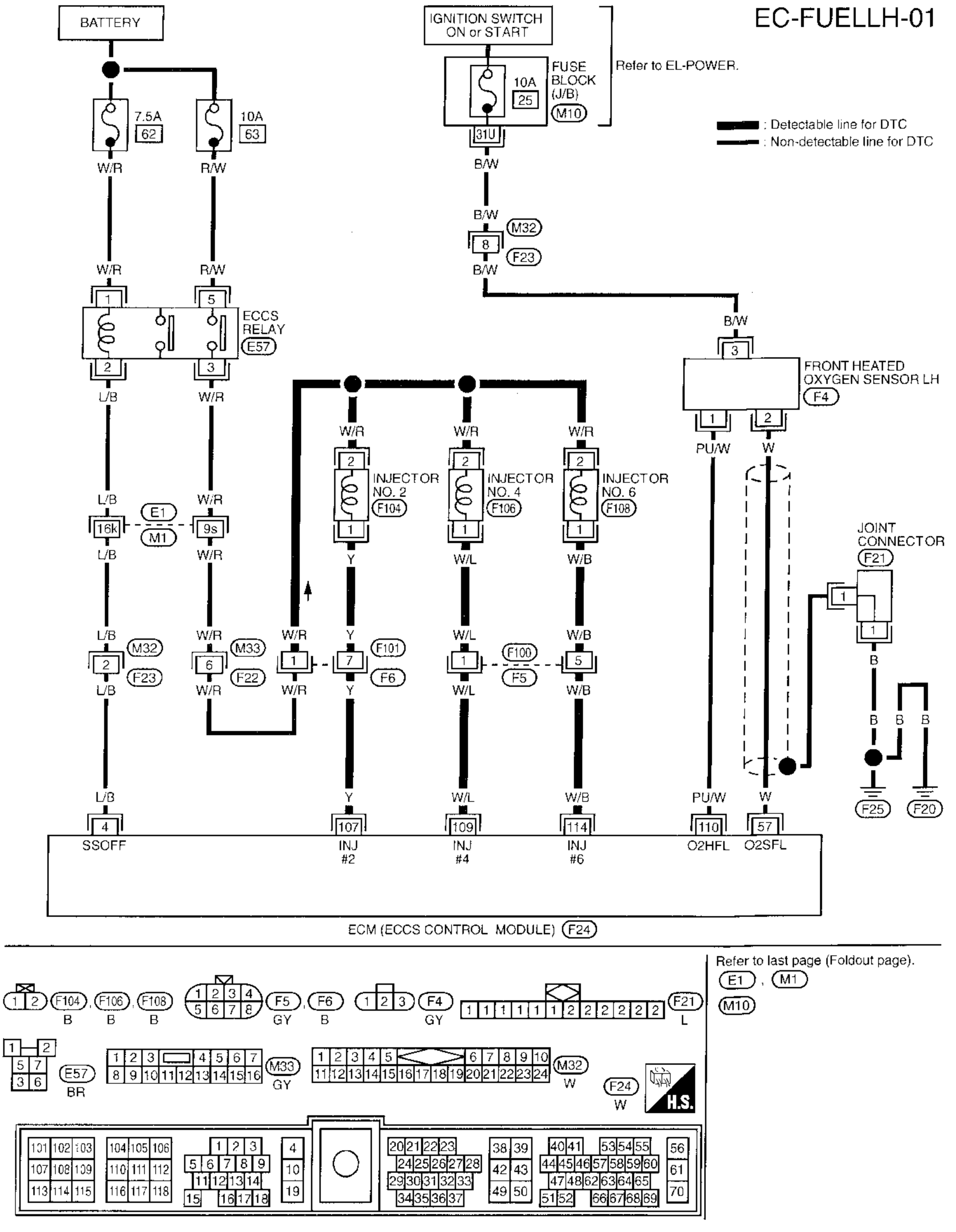


Fuel Injection System Function (Left bank) (Rich side) (Cont'd)

1) Disconnect mass air flow sensor harness connector.
2) Start engine and run it for at least 3 seconds at idle speed.
3) Stop engine and reconnect mass air flow sensor harness connector.
4) Turn ignition switch "ON".
5) Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM. Make sure 1st trip DTC 0102 is detected.
6) Erase the 1st trip DTC 0102 by changing from Diagnostic Test Mode II to Diagnostic Test Mode I.
7) Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM. Make sure DTC 0505 is detected.
8) Start engine again and run it for at least 10 minutes at idle speed.
   The 1st trip DTC 0209 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 also has a malfunction.
10) Crank engine while depressing accelerator pedal.
    If engine starts, go to "DIAGNOSTIC PROCEDURE", EC-181. If engine does not start, remove ignition plugs and check for fouling, etc.

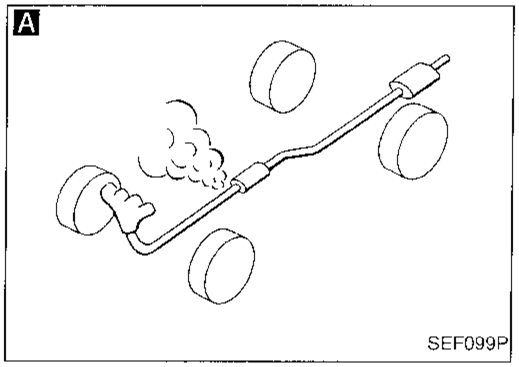
Fuel Injection System Function (Left bank) (Rich side) (Cont'd)

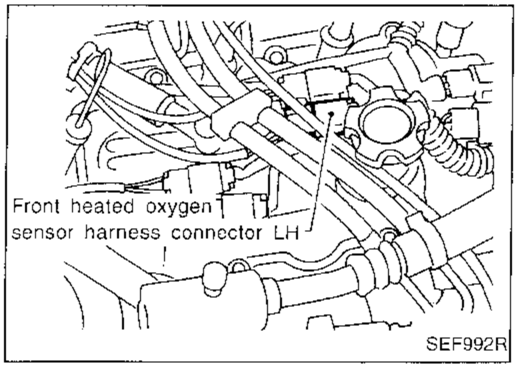


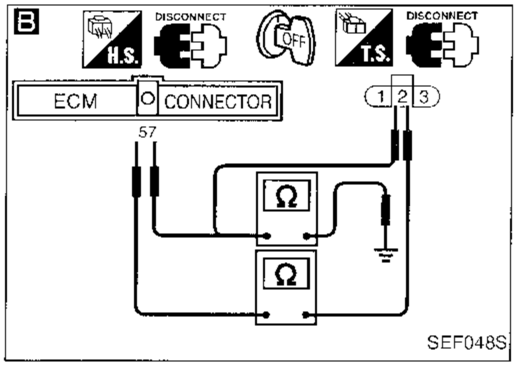
SEF264T

Fuel Injection System Function (Left bank) (Rich side) (Cont'd)

DIAGNOSTIC PROCEDURE







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 FRONT HEATED OXYGEN SENSOR (LEFT BANK).

1. Turn ignition switch "OFF".
2. Disconnect front heated oxygen sensor LH harness connector and ECM harness connector.
3. Check harness continuity between ECM terminal (57) and terminal ②.
   Continuity should exist.
4. Check harness continuity between ECM terminal (57) (or terminal ②) and ground.
   Continuity should not exist.
   If OK, check harness for short.

NG → Repair harness or connectors.

↓ OK

CHECK FUEL PRESSURE.

1. Release fuel pressure to zero.
   Refer to EC-25.
2. Install fuel pressure gauge and check fuel pressure.
   At idling:
   When fuel pressure regulator valve vacuum hose is connected.
   Approximately 250.1 kPa (2.55 kg/cm^2, 36.3 psi)
   When fuel pressure regulator valve vacuum hose is disconnected.
   Approximately 299.1 kPa (3.05 kg/cm^2, 43.4 psi)

NG → Check fuel pump and circuit. Refer to EC-328.

↓ OK

CHECK MASS AIR FLOW SENSOR.

Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT.
3.3 - 4.8 g·m/sec: at idling
12.0 - 14.9 g·m/sec: at 2,500 rpm

OR

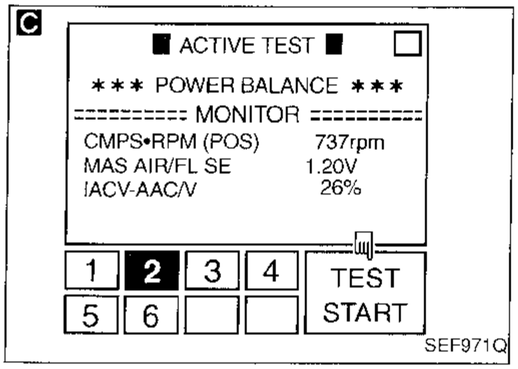
Check "mass air flow" in MODE 1 with GST.
3.3 - 4.8 g·m/sec: at idling
12.0 - 14.9 g·m/sec: at 2,500 rpm

NG → Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds.
Refer to EC-99.

↓ OK

Ⓐ

Fuel Injection System Function (Left bank) (Rich side) (Cont'd)



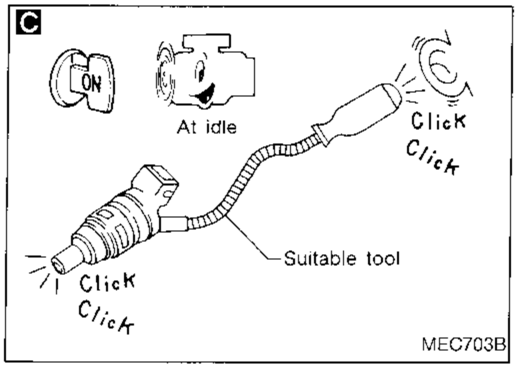
■ ACTIVE TEST ■ ☐

*** POWER BALANCE ***

========== MONITOR ==========

CMPS•RPM (POS)	737rpm
MAS AIR/FL SE	1.20V
IACV-AAC/V	26%

SEF971Q



MEC703B

Ⓐ

↓

CHECK FUNCTION OF INJECTORS (LEFT BANK).

1. Install all parts removed.
2. Start engine.
3. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.
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-321. Repair harness or connectors.

↓ OK

Remove injector assembly.
Refer to EC-26.
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.

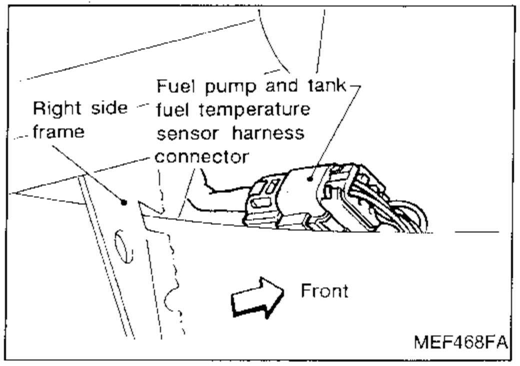
↓ Does not drip.

Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

↓

INSPECTION END

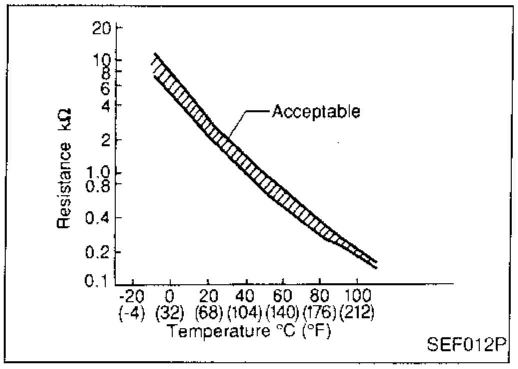
Tank Fuel Temperature Sensor



MEF468FA

COMPONENT DESCRIPTION

The tank fuel 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) (Tank fuel temperature sensor) and ECM terminal ㊸ (ECCS ground).

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Causes)
P0180 0402	• 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.) • Tank fuel temperature sensor

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
3) Wait at least 12 seconds.

OR

1) Turn ignition switch "ON" and wait at least 12 seconds.
2) Select "MODE 3" with GST.

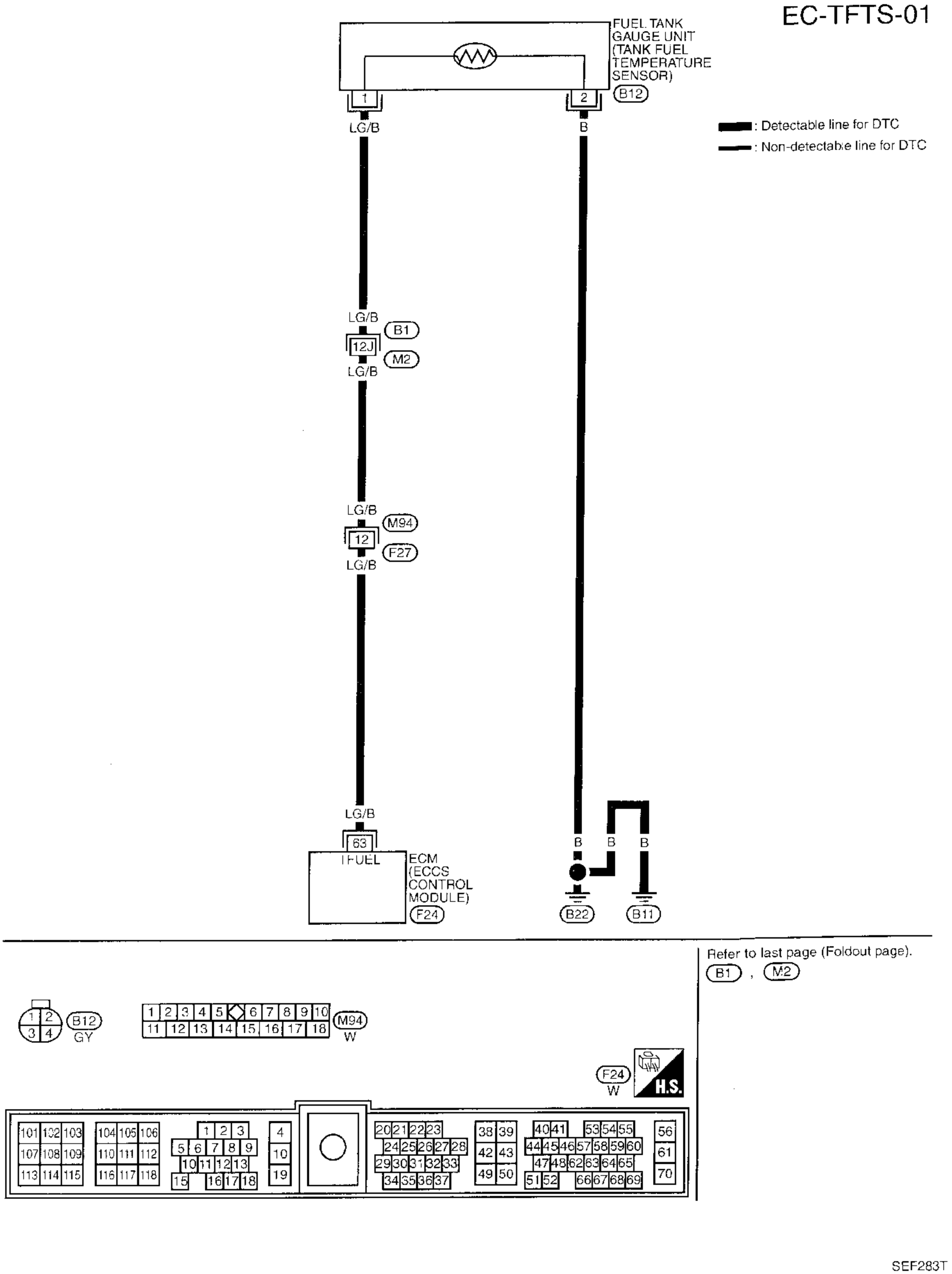
OR

1) Turn ignition switch "ON" and wait at least 12 seconds.
2) Turn ignition switch "OFF", wait at least 7 seconds and then turn "ON".
3) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.

TROUBLE DIAGNOSIS FOR DTC P0180

Tank Fuel Temperature Sensor (Cont'd)

EC-TFTS-01

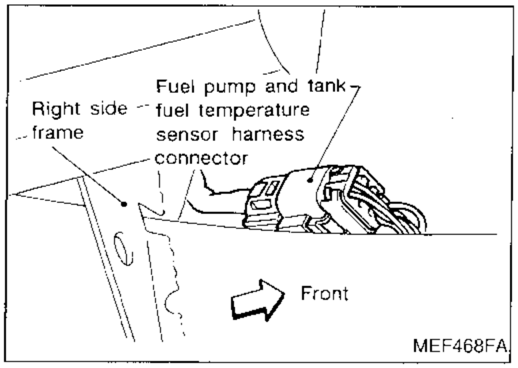


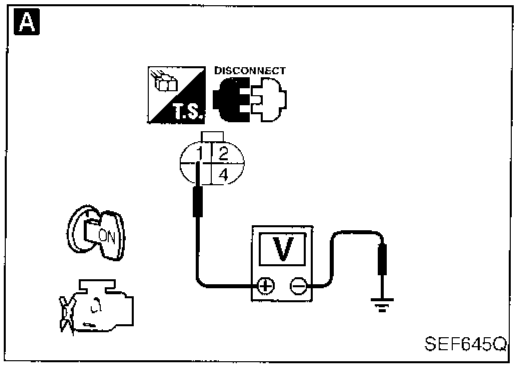
Refer to last page (Foldout page).

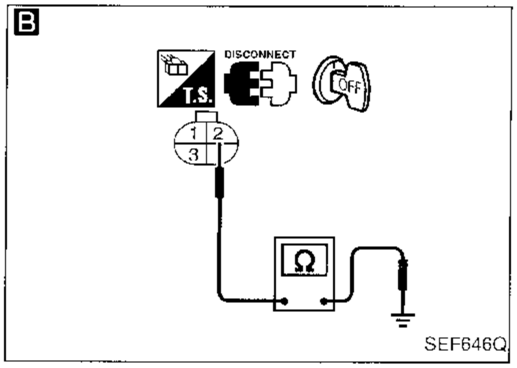
B1 , M2

Tank Fuel Temperature Sensor (Cont'd)

DIAGNOSTIC PROCEDURE







INSPECTION START

↓

A

CHECK POWER SUPPLY.

1. Disconnect tank fuel temperature sensor harness connector.
2. Turn ignition switch "ON".
3. Check voltage between terminal ① and ground with CONSULT or tester.
   Voltage: Approximately 5V

NG → Check the following.
- Harness connectors B1, M2
- Harness connectors M94, F27
- Harness for open or short between ECM and tank fuel temperature sensor

If NG, repair harness or connector.

↓ OK

B

CHECK GROUND CIRCUIT.

1. Turn ignition switch "OFF".
2. Check harness continuity between terminal ② and body ground.
   Continuity should exist.
   If OK, check harness for short.

NG → Check the following.
- Harness for open or short between ECM and tank fuel temperature sensor

If NG, repair harness or connectors.

↓ OK

CHECK COMPONENT (Tank fuel temperature sensor).
Refer to "COMPONENT INSPECTION" below.

NG → Replace tank fuel temperature sensor.

↓ OK

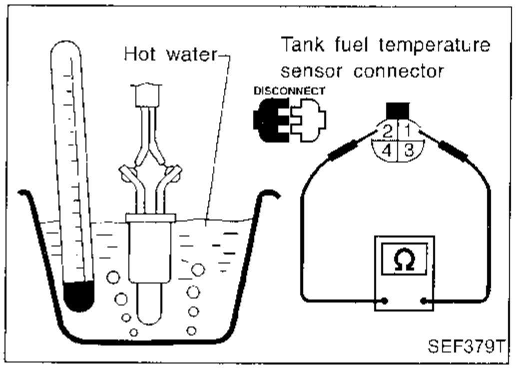
Disconnect and reconnect harness connectors in the circuit. Then retest.

↓ Trouble is not fixed.

Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

↓

INSPECTION END



COMPONENT INSPECTION

Tank fuel 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 tank fuel temperature sensor.

No. 6 - 1 Cylinder Misfire, Multiple Cylinder Misfire

ON BOARD DIAGNOSIS LOGIC

If a misfire occurs, the engine speed will fluctuate. If the fluctuation is detected by the crankshaft position sensor (OBD), the misfire is diagnosed.
The misfire detection logic consists of the following two conditions.

Crankshaft position sensor (OBD) → Engine speed → ECM

1. One Trip Detection Logic (Three Way Catalyst Damage)
   When a misfire is detected which will overheat and damage the three way catalyst, the malfunction indicator lamp (MIL) will start blinking; even during the first trip. In this condition, ECM monitors the misfire every 200 revolutions.
   If the misfire frequency decreases to a level that will not damage the three way catalyst, the MIL will change from blinking to lighting up.
   (After the first trip detection, the MIL will light up from engine starting. If a misfire is detected that will cause three way catalyst damage, the MIL will start blinking.)
2. Two Trip Detection Logic (Exhaust quality deterioration)
   When a misfire that will not damage the three way catalyst (but will affect exhaust emission) occurs, the malfunction indicator lamp will light up based on two trip detection logic. In this condition, ECM monitors the misfire for every 1,000 revolutions of the engine.

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0300 (0701)	• 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 • Magnetized flywheel (drive plate)
P0301 (0608)	• No. 1 cylinder misfires.	
P0302 (0607)	• No. 2 cylinder misfires.	
P0303 (0606)	• No. 3 cylinder misfires.	
P0304 (0605)	• No. 4 cylinder misfires.	
P0305 (0604)	• No. 5 cylinder misfires.	
P0306 (0603)	• No. 6 cylinder misfires.	

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE (Overall)

1) Turn ignition switch "ON", and select "DATA MONITOR" mode with CONSULT.
2) Start engine and warm it up sufficiently.
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.

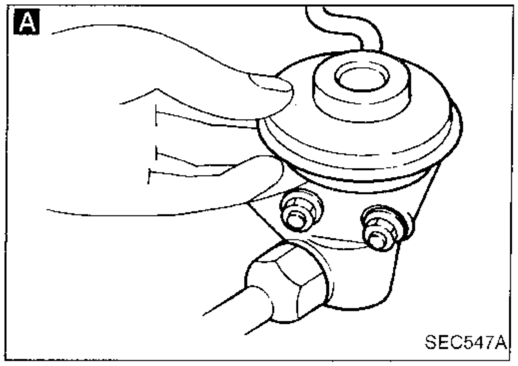
OR

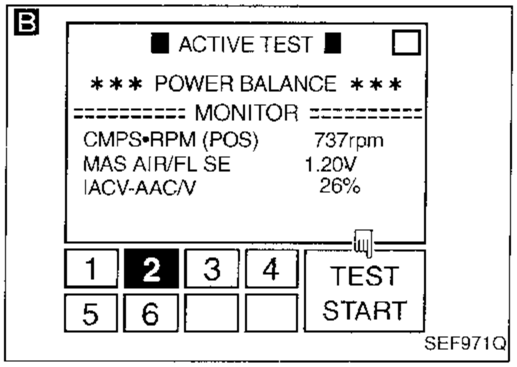
1) Start engine and warm it up sufficiently.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Start engine again and drive at 1,500 - 3,000 rpm for at least 3 minutes.
   Hold the accelerator pedal as steady as possible.
   Note: Refer to the freeze frame data for the test driving conditions.
4) Select "MODE 7" with GST.

OR

1) Start engine and warm it up sufficiently.
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.
4) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.

No. 6 - 1 Cylinder Misfire, Multiple Cylinder Misfire (Cont'd)





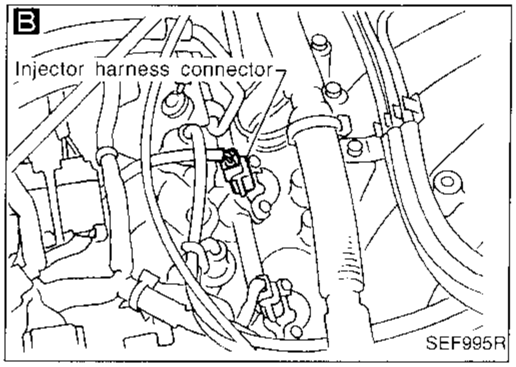
■ ACTIVE TEST ■ ☐

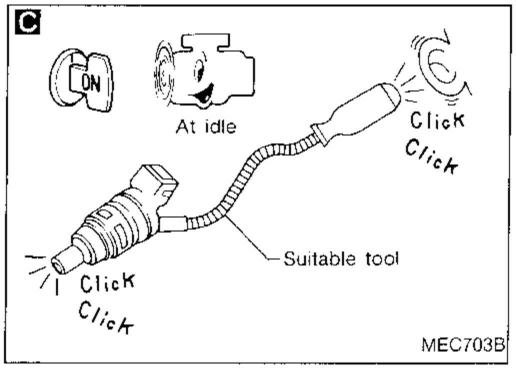
*** POWER BALANCE ***

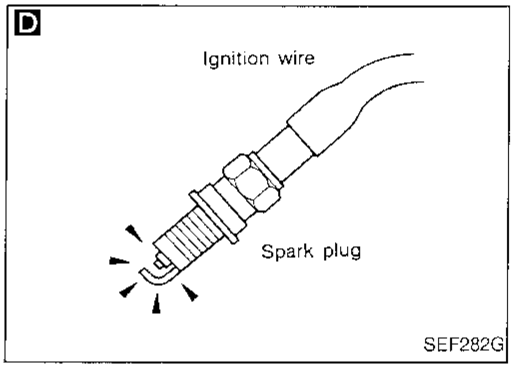
========== MONITOR ==========

CMPS•RPM (POS)	737rpm
MAS AIR/FL SE	1.20V
IACV-AAC/V	26%

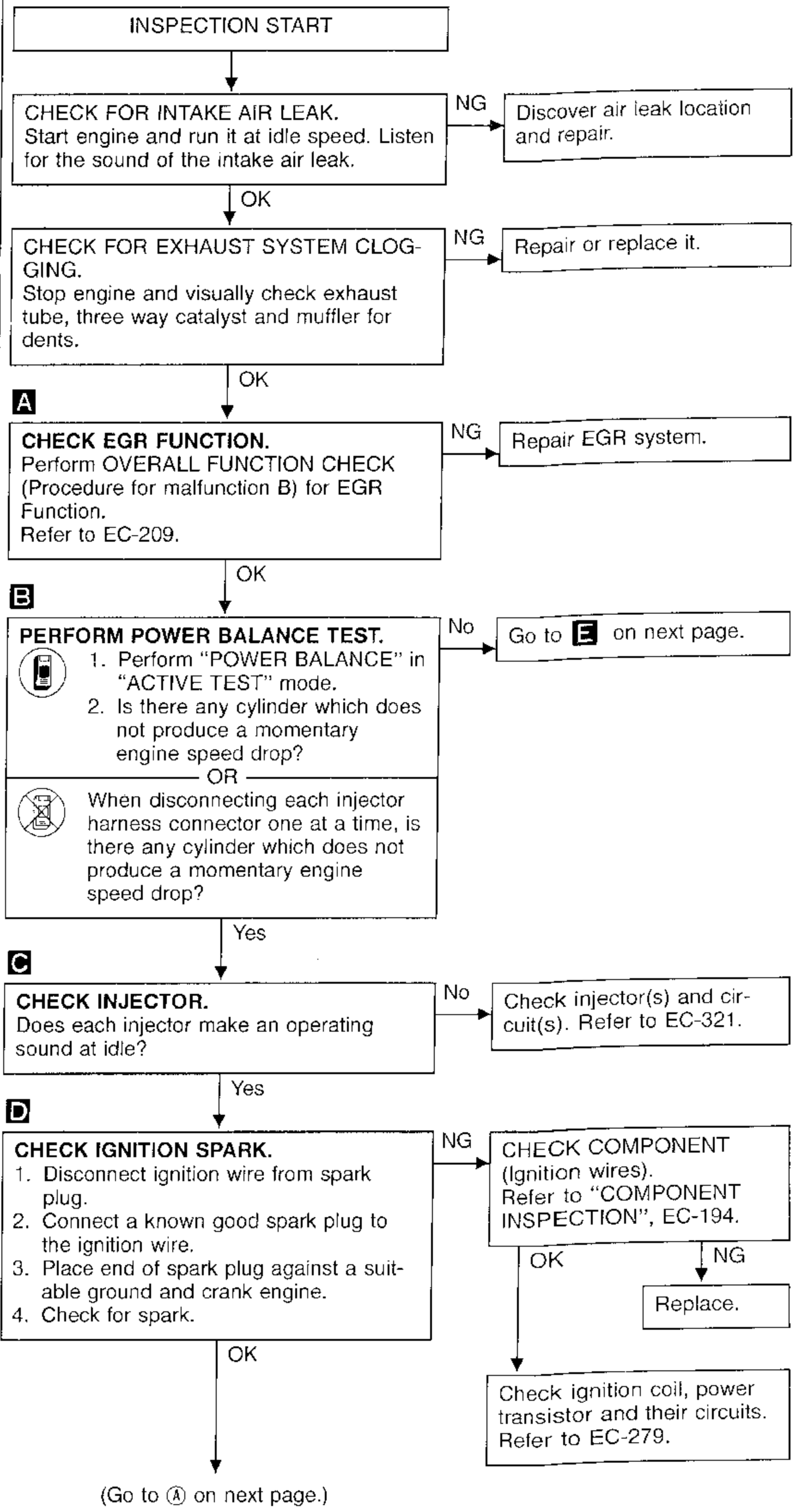
1 2 3 4 TEST START
5 6







DIAGNOSTIC PROCEDURE



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 OVERALL FUNCTION CHECK (Procedure for malfunction B) for EGR Function.
Refer to EC-209.
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-321.
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.

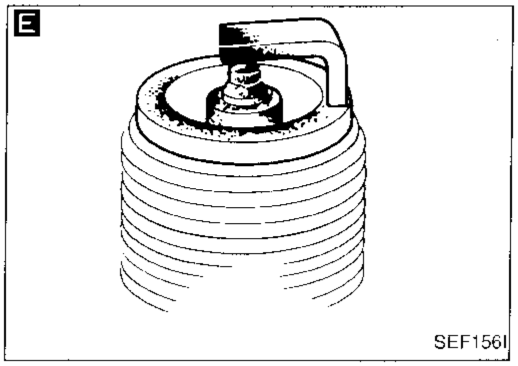
NG → CHECK COMPONENT (Ignition wires). Refer to "COMPONENT INSPECTION", EC-194.
- NG → Replace.
- OK → Check ignition coil, power transistor and their circuits. Refer to EC-279.

OK ↓

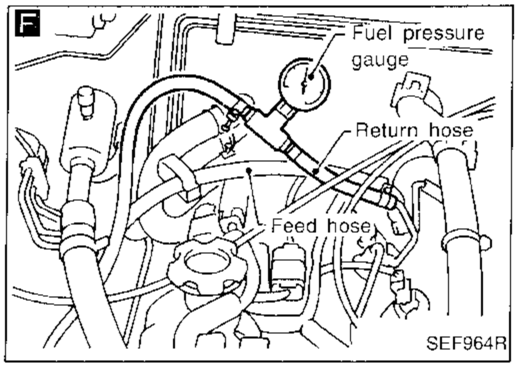
(Go to Ⓐ on next page.)

No. 6 - 1 Cylinder Misfire, Multiple Cylinder Misfire (Cont'd)

E



F



Ⓐ

E

CHECK SPARK PLUGS.
Remove the spark plugs and check for fouling, etc.

NG → Repair or replace spark plug(s).

OK

F

CHECK FUEL PRESSURE.
1. Release fuel pressure to zero. Refer to EC-25.
2. Install fuel pressure gauge and check fuel pressure.
   At idle:
   Approx. 235 kPa
   (2.4 kg/cm^2, 34 psi)

NG → Check fuel pump and circuit. (Refer to EC-328.)

OK

CHECK COMPRESSION PRESSURE.
Refer to EM section.
- Check compression pressure.
  Standard:
  kPa (kg/cm^2, psi)/300 rpm
  1,196 (12.2, 173)
  Minimum:
  kPa (kg/cm^2, psi)/300 rpm
  883 (9.0, 128)
  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

CHECK IGNITION TIMING.
Perform "Basic Inspection", EC-74.

NG → Adjust ignition timing.

OK

CHECK MASS AIR FLOW SENSOR.
Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT.

OR

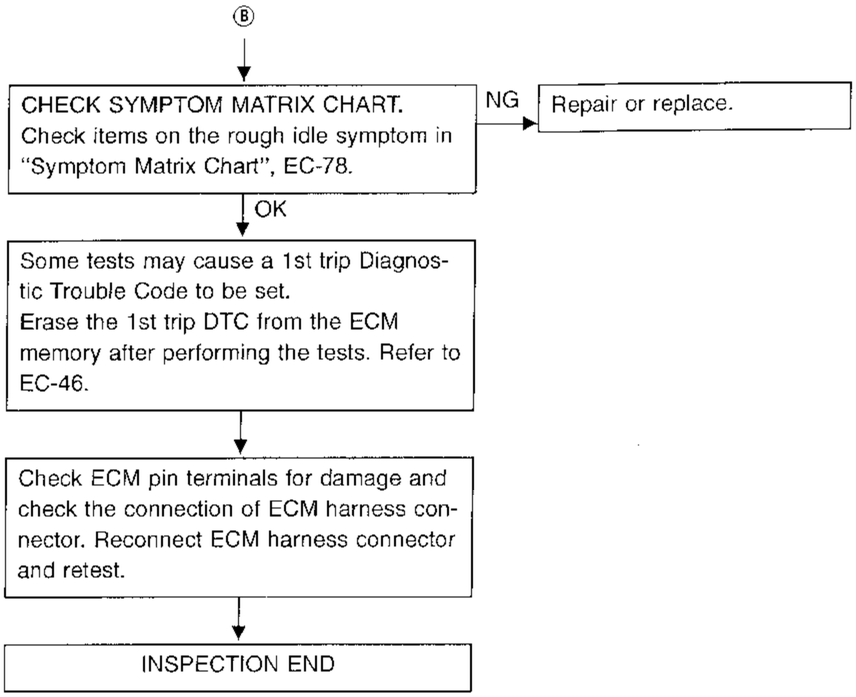
Check "MASS AIR FLOW" in MODE 1 with GST.
3.3 - 4.8 g·m/sec: at idling
12.0 - 14.9 g·m/sec: at 2,500 rpm

NG → Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds.
Refer to EC-99.
If NG, repair or replace it.

OK

(Go to Ⓑ on next page.)

No. 6 - 1 Cylinder Misfire, Multiple Cylinder Misfire (Cont'd)



Ⓑ

CHECK SYMPTOM MATRIX CHART.
Check items on the rough idle symptom in "Symptom Matrix Chart", EC-78.

NG → Repair or replace.

OK ↓

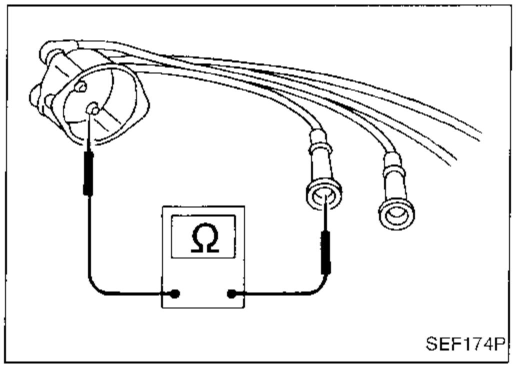
Some tests may cause a 1st trip Diagnostic Trouble Code to be set.
Erase the 1st trip DTC from the ECM memory after performing the tests. Refer to EC-46.

↓

Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

↓

INSPECTION END



COMPONENT INSPECTION

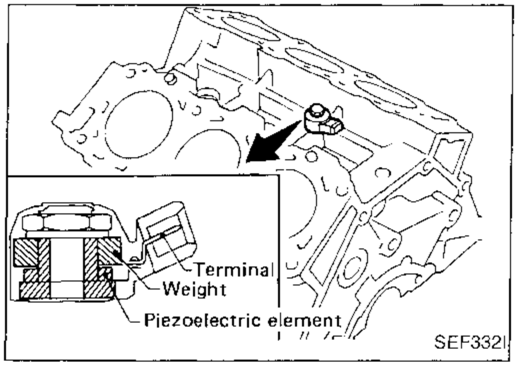
Ignition wires

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:

Cylinder No.	Resistance kΩ [at 25°C (77°F)]
1	Approximately 6.5
2	Approximately 10.0
3	Approximately 8.5
4	Approximately 12.5
5	Approximately 8.5
6	Approximately 11.0

If the resistance exceeds the above specification, inspect ignition wire to distributor cap connection. Clean connection or replace the ignition wire with a new one.



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 ㊸ (ECCS 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 0304	• 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

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

Note: 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.
2) Start engine and run it for at least 5 seconds at idle speed.

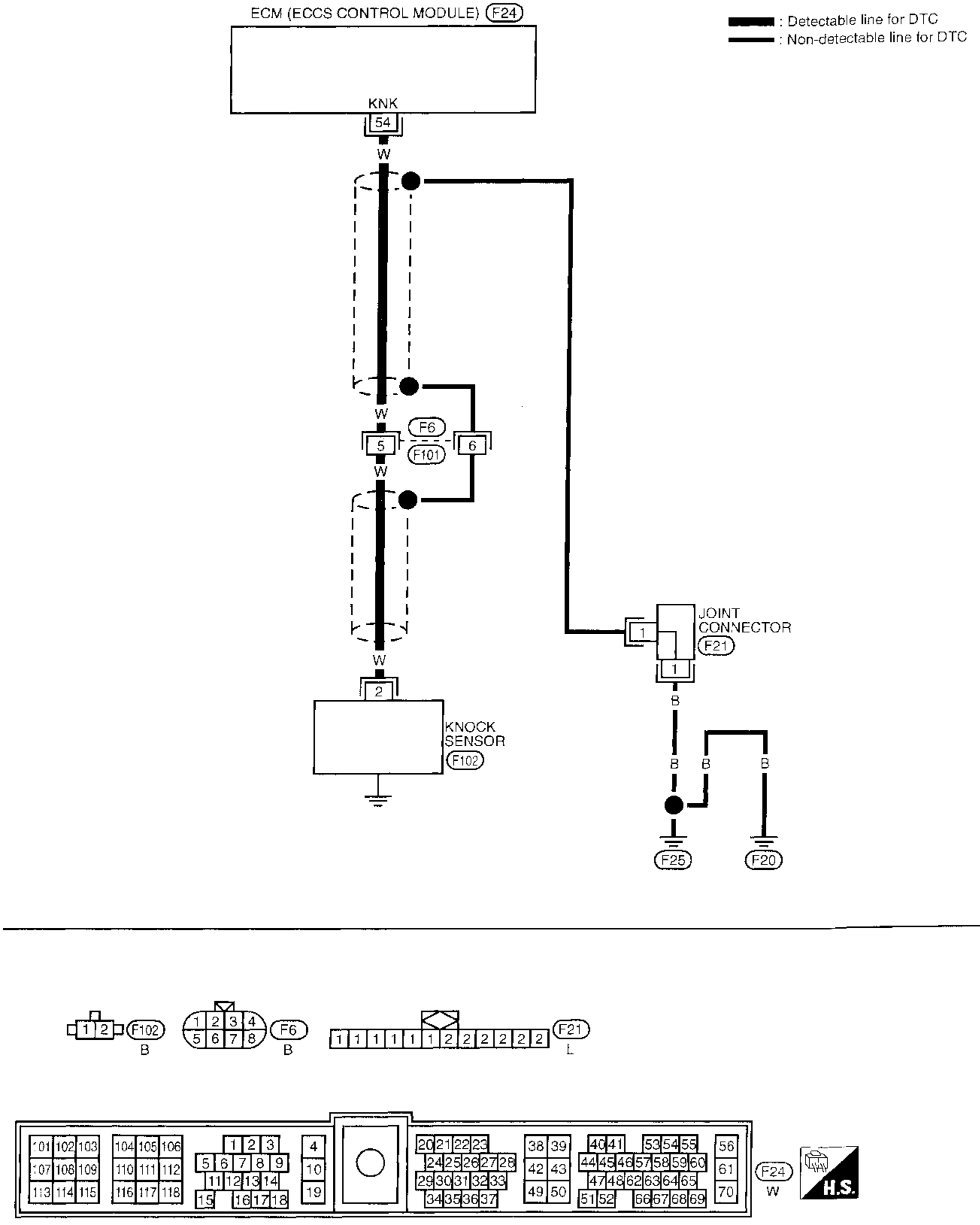
OR

GST
1) Start engine and run it for at least 5 seconds at idle speed.
2) Select "MODE 3" with GST.

OR

NO TOOLS
1) Start engine and run it for at least 5 seconds at idle speed.
2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
3) Perform "Diagnostic Test Mode II" (Self-diagnostic results) with ECM.

EC-KS-01



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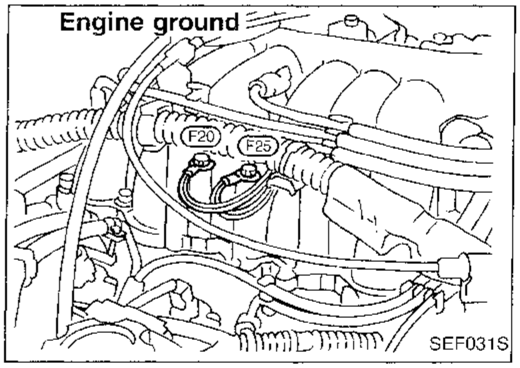
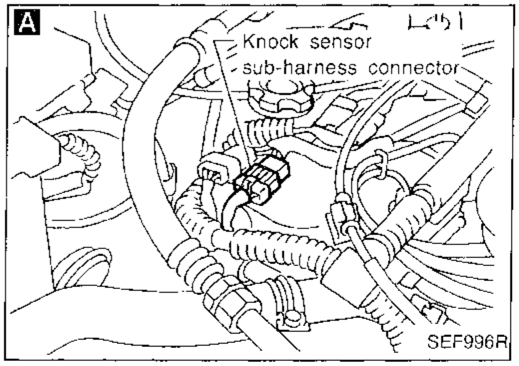
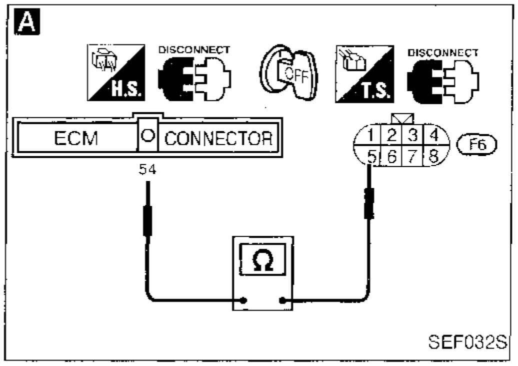
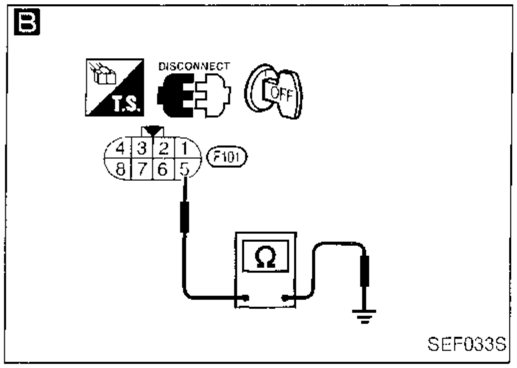
Knock Sensor (KS) (Cont'd)

DIAGNOSTIC PROCEDURE









INSPECTION START

↓

Loosen and retighten engine ground screws.

↓

A

CHECK INPUT SIGNAL CIRCUIT-1.

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector and knock sensor sub-harness connector.
3. Check harness continuity between sub-harness connector terminal ⑤ and ECM terminal (54) .

Continuity should exist.

If OK, check harness for short.

NG → Check the following.

- Harness connectors F6 , F101
- Harness for open or short between ECM and knock sensor

If NG, repair harness or connectors.

↓ OK

B

CHECK INPUT SIGNAL CIRCUIT-2.

Check resistance between harness connector terminal ⑤ and engine ground.

Resistance:

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

If OK, check harness for short.

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

NG → Check the following.

- Harness connectors F6 , F101
- Harness for open or short between knock sensor sub-harness connector and knock sensor

If NG, repair harness or connectors.

- Knock sensor (Refer to "COMPONENT INSPECTION" below.)

If NG, replace knock sensor.

↓ OK

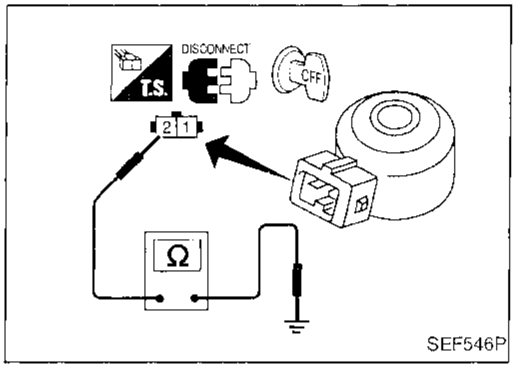
Disconnect and reconnect harness connectors in the circuit. Then retest.

↓ Trouble is not fixed.

Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

↓

INSPECTION END



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 ② 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.

GI
MA
EM
LC
EC
FE
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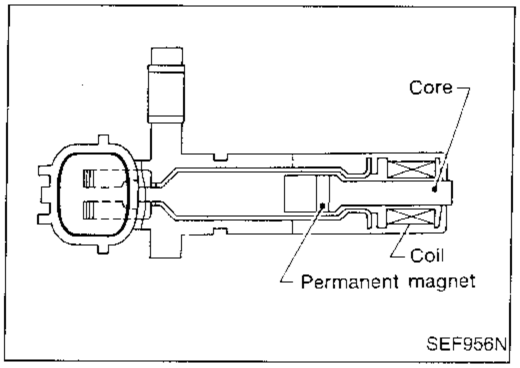
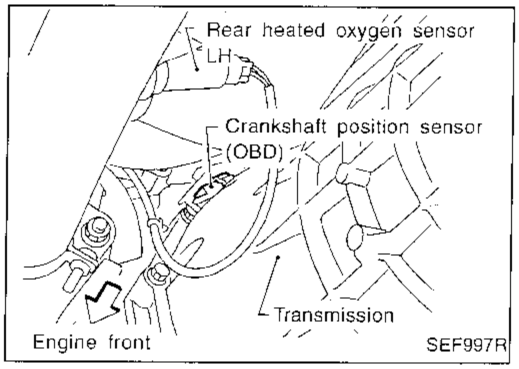
IDX

Crankshaft Position Sensor (CKPS) (OBD)

COMPONENT DESCRIPTION

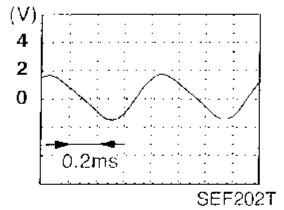
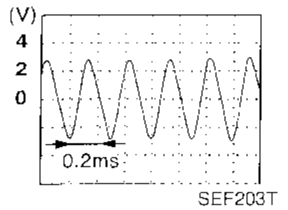
The crankshaft position sensor (OBD) is located on the transaxle housing facing the gear teeth (cogs) of the flywheel or drive plate. It detects the fluctuation of the engine revolution.
The sensor consists of a permanent magnet, core and coil.
When the engine is running, the high and low parts of the 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 the on board diagnosis of misfire.





ECM TERMINALS AND REFERENCE VALUE

Specification data are reference values and are measured between each terminal and ㊸ (ECCS ground).

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
53	L	Crankshaft position sensor (OBD)	Engine is running. (Warm-up condition) Idle speed	Approximately 1.4V 
			Engine is running. Engine speed is 2,000 rpm	Approximately 1.4V 

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P0335 0802	• 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)

Crankshaft Position Sensor (CKPS) (OBD) (Cont'd)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT.
2) Start engine and run it for at least 15 seconds at idle speed.

OR

GST

1) Start engine and run it for at least 15 seconds at idle speed.
2) Select "MODE 7" with GST.

OR

NO TOOLS

1) Start engine and run it for at least 15 seconds at idle speed.
2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
3) Perform "Diagnostic Test Mode II" (Self-diagnostic results) with ECM.

GI
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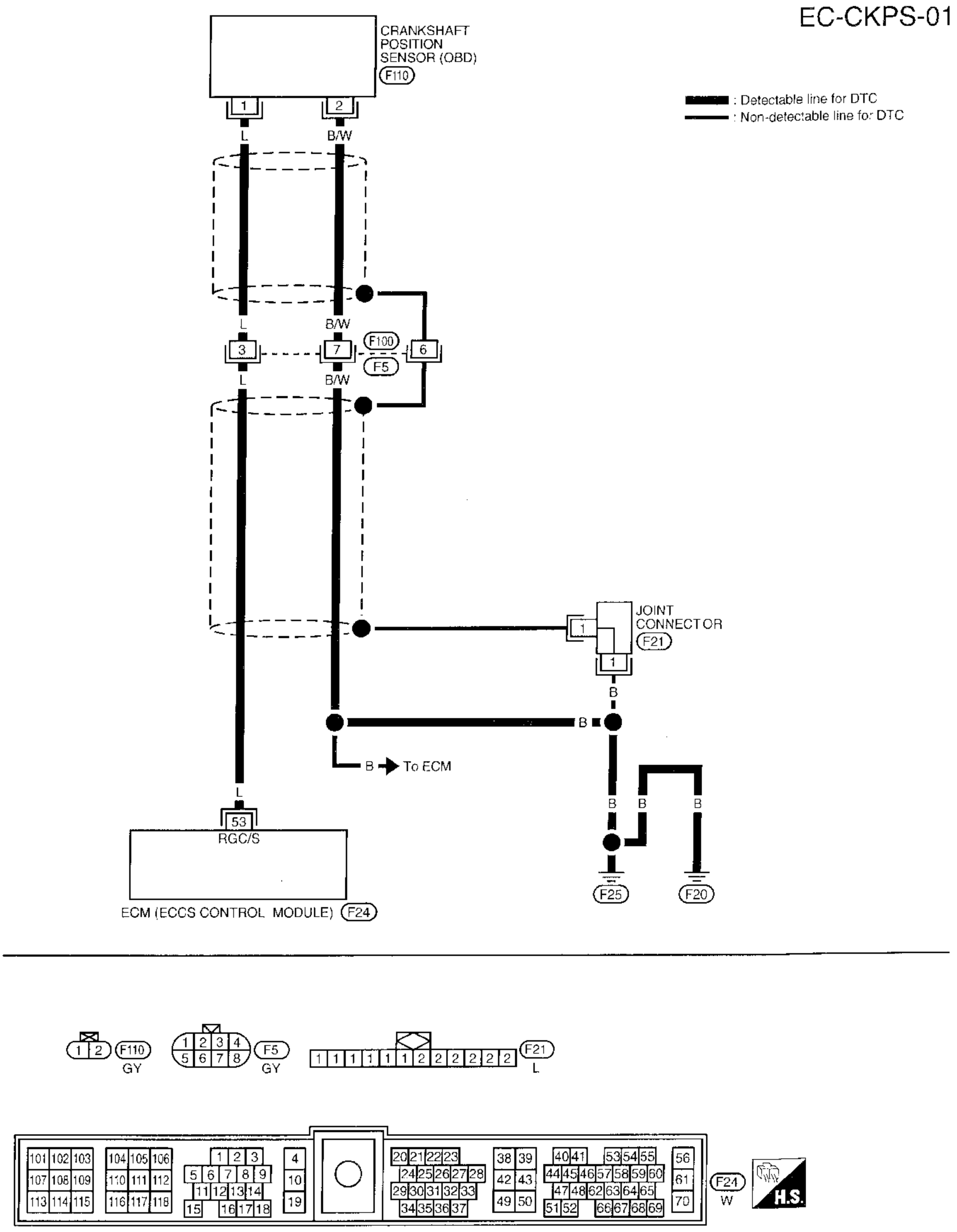
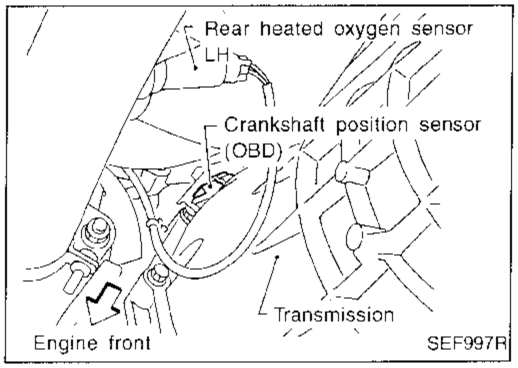
EL
IDX

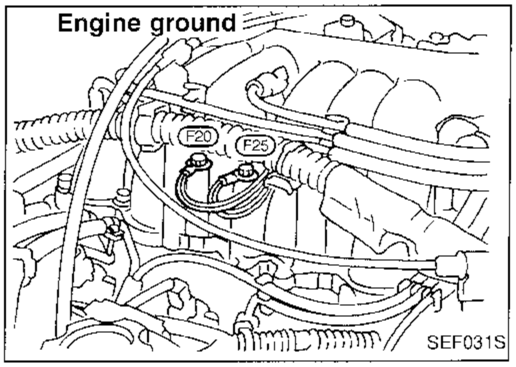

EC-CKPS-01
CRANKSHAFT POSITION SENSOR (OBD)
F110
1
2
L
B/W
: Detectable line for DTC
: Non-detectable line for DTC
L
B/W
3
7
6
F100
F5
L
B/W
JOINT CONNECTOR
F21
1
1
B
B
B
To ECM
L
B
B
B
53
RGC/S
ECM (ECCS CONTROL MODULE)
F24
F25
F20
1 2
F110
GY
1 2 3 4
5 6 7 8
F5
GY
1 1 1 1 1 1 1 2 2 2 2 2 2
F21
L
101 102 103 104 105 106 1 2 3 4 20 21 22 23 38 39 40 41 53 54 55 56
107 108 109 110 111 112 5 6 7 8 9 10 24 25 26 27 28 42 43 44 45 46 57 58 59 60 61
113 114 115 116 117 118 11 12 13 14 19 29 30 31 32 33 49 50 47 48 62 63 64 65 70
15 16 17 18 34 35 36 37 51 52 66 67 68 69
F24
W
H.S.

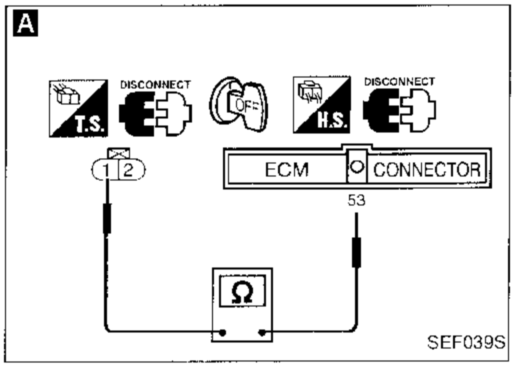
SEF266T

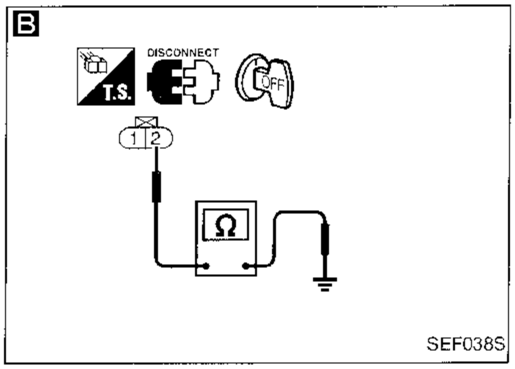
Crankshaft Position Sensor (CKPS) (OBD) (Cont'd)

DIAGNOSTIC PROCEDURE









INSPECTION START

↓

Loosen and retighten engine ground screws.

↓

A

CHECK INPUT SIGNAL CIRCUIT.

1. Turn ignition switch "OFF".
2. Disconnect crankshaft position sensor (OBD) and ECM harness connectors.
3. Check continuity between ECM terminal (53) and terminal ①.

Continuity should exist.

If OK, check harness for short.

NG → Check the following.

- Harness connectors F5, F100
- Harness for open or short between ECM and crankshaft position sensor (OBD)

If NG, repair harness or connectors.

↓ OK

B

CHECK GROUND CIRCUIT.

1. Loosen and retighten engine ground screws.
2. Reconnect ECM harness connector.
3. Check harness continuity between terminal ② and engine ground.

Continuity should exist.

If OK, check harness for short.

NG → Check the following.

- Harness connectors F5, F100
- Harness for open or short between crankshaft position sensor (OBD) harness connector and engine ground

If NG, repair harness or connectors.

↓ OK

CHECK COMPONENT [Crankshaft position sensor (OBD)]. Refer to "COMPONENT INSPECTION" on next page.

NG → Replace crankshaft position sensor (OBD).

↓ OK

Disconnect and reconnect harness connectors in the circuit. Then retest.

↓ Trouble is not fixed.

Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

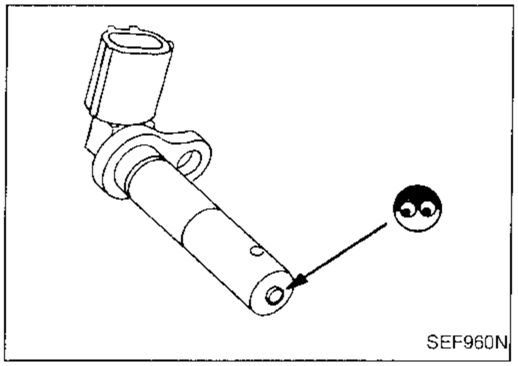
↓

INSPECTION END

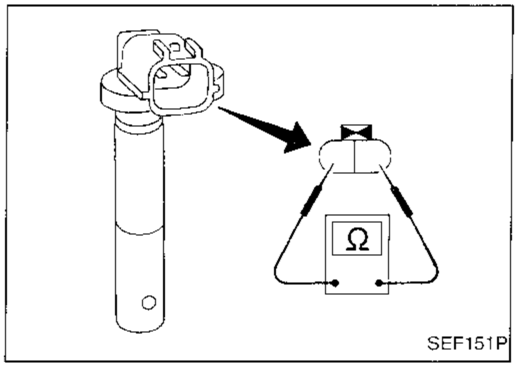
Crankshaft Position Sensor (CKPS) (OBD) (Cont'd)

COMPONENT INSPECTION

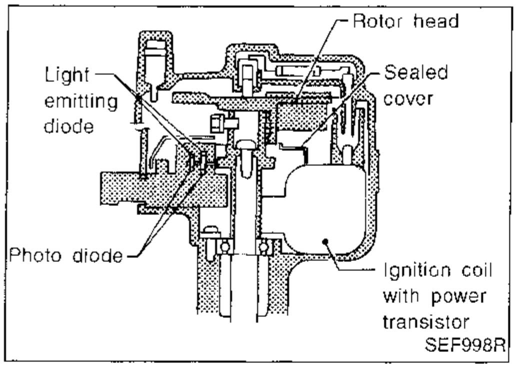
Crankshaft position sensor (OBD)



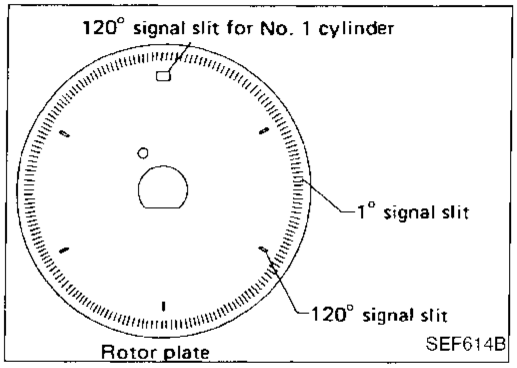
1. Disconnect crankshaft position sensor (OBD) harness connector.
2. Loosen the fixing bolt of the sensor.
3. Remove the sensor.
4. Visually check the sensor for chipping.



5. Check resistance as shown in the figure.
   Resistance: Approximately 432 - 528Ω
   [at 25°C (77°F)]
   If NG, replace crankshaft position sensor (OBD).



SEF998R



SEF614B

Camshaft Position Sensor (CMPS)

COMPONENT DESCRIPTION

The camshaft position sensor is a basic component of the ECCS. It monitors engine speed and piston position. These input signals to the ECM are used to control fuel injection, ignition timing and other functions.

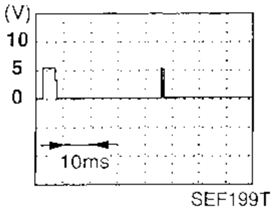
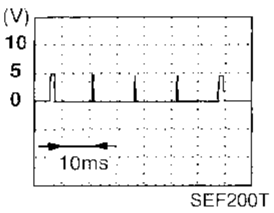
The camshaft position sensor has a rotor plate and a wave-forming circuit. The rotor plate has 360 slits for a 1° (POS) signal and 6 slits for a 120° (REF) signal. The wave-forming circuit consists of Light Emitting Diodes (LED) and photo diodes.

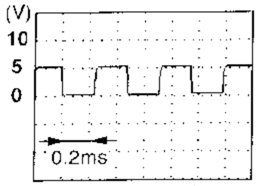
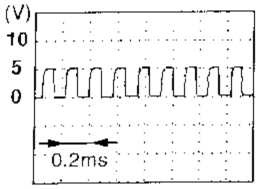
The rotor plate is positioned between the LED and the photo diode. The LED transmits light to the photo diode. As the rotor plate turns, the slits cut the light to generate rough-shaped pulses. These pulses are converted into on-off signals by the wave-forming circuit and sent to the ECM.

The distributor is not repairable and must be replaced as an assembly except distributor cap.

ECM TERMINALS AND REFERENCE VALUE

Specification data are reference values and are measured between each terminal and ㊸ (ECCS ground).

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	L/B	ECCS 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)
40	L	Camshaft position sensor (Reference signal)	Engine is running. Idle speed	1.1V  SEF199T
44	L		Engine is running. Engine speed is 2,000 rpm.	1.1V  SEF200T

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
41	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 2.5V  SEF196T
56	B/W	Power supply for ECM	Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
61	B/W			
113	B/W	Current return	Engine is running. └ Idle speed	BATTERY VOLTAGE (11 - 14V)

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P0340 0101	A) Either 1° or 120° signal is not sent to ECM for the first few seconds during engine cranking. B) Either 1° or 120° signal is not sent to ECM often enough while the engine speed is higher than the specified engine speed. C) The relation between 1° and 120° signal is not in the normal range during the specified engine speed.	• 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

Camshaft Position Sensor (CMPS) (Cont'd)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

Before performing the following procedure, confirm that battery voltage is more than 10.5V.

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

Procedure for malfunction A

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
3) Crank engine for at least 2 seconds.

OR

GST
1) Crank engine for at least 2 seconds.
2) Select "MODE 7" with GST.

OR

NO TOOLS
1) Crank engine for at least 2 seconds.
2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
3) Perform "Diagnostic Test Mode II" (Self-diagnostic results) with ECM.

Procedure for malfunction B and C

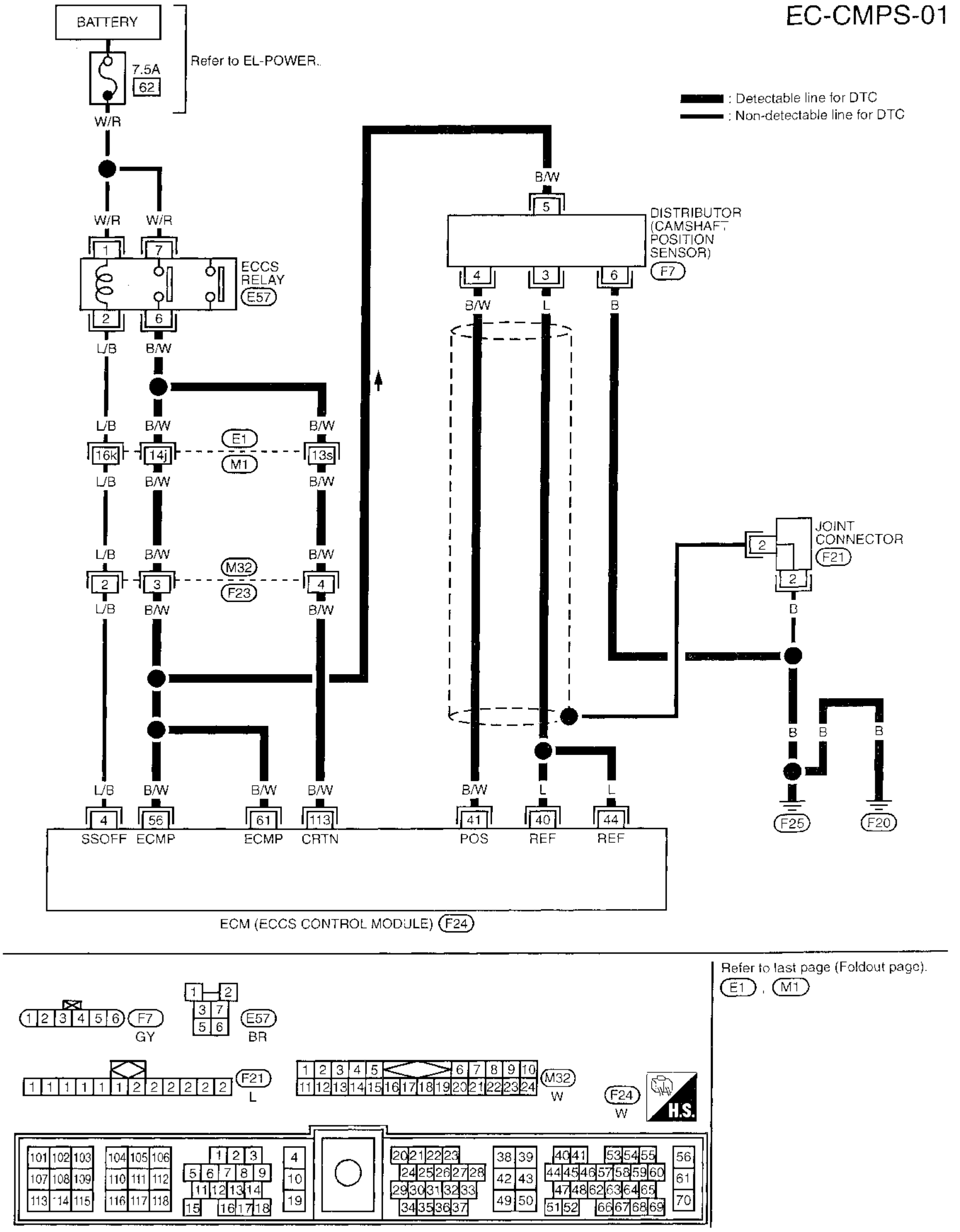
1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
3) Start engine and run it for at least 2 seconds at idle speed.

OR

GST
1) Start engine and run it for at least 2 seconds at idle speed.
2) Select "MODE 7" with GST.

OR

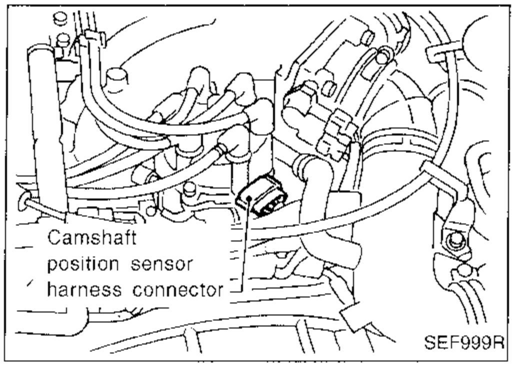
NO TOOLS
1) Start engine and run it for at least 2 seconds at idle speed.
2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
3) Perform "Diagnostic Test Mode II" (Self-diagnostic results) with ECM.

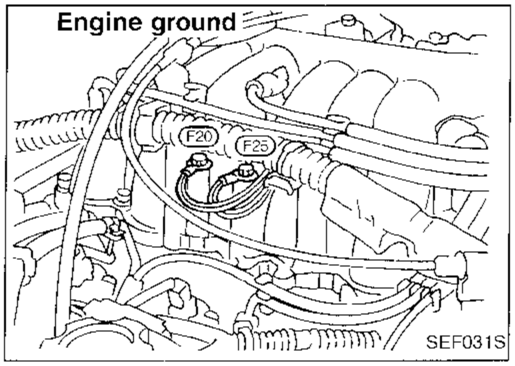

EC-CMPS-01
BATTERY
7.5A
62
Refer to EL-POWER.
W/R
▬ : Detectable line for DTC
— : Non-detectable line for DTC
W/R
W/R
1
7
ECCS RELAY
E57
2
6
L/B
B/W
B/W
5
DISTRIBUTOR (CAMSHAFT POSITION SENSOR)
F7
4
3
6
B/W
L
B
L/B
B/W
B/W
16k
14j
E1
M1
13s
L/B
B/W
B/W
L/B
B/W
B/W
2
3
M32
F23
4
L/B
B/W
B/W
JOINT CONNECTOR
F21
2
2
B
B
B
B
F25
F20
L/B
B/W
B/W
B/W
B/W
L
L
4
56
61
113
41
40
44
SSOFF
ECMP
ECMP
CRTN
POS
REF
REF
ECM (ECCS CONTROL MODULE)
F24
Refer to last page (Foldout page).
E1, M1
1 2 3 4 5 6
F7
GY
1 2
3 7
5 6
E57
BR
1 1 1 1 1 1 2 2 2 2 2 2
F21
L
1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16 17 18 19 20 21 22 23 24
M32
W
F24
W
H.S.
101 102 103 104 105 106 1 2 3 4 20 21 22 23 38 39 40 41 53 54 55 56
107 108 109 110 111 112 5 6 7 8 9 10 24 25 26 27 28 42 43 44 45 46 57 58 59 60 61
113 114 115 116 117 118 11 12 13 14 19 29 30 31 32 33 49 50 47 48 62 63 64 65 70
15 16 17 18 34 35 36 37 51 52 66 67 68 69

SEF267T

Camshaft Position Sensor (CMPS) (Cont'd)

DIAGNOSTIC PROCEDURE (DETECTABLE CIRCUIT)



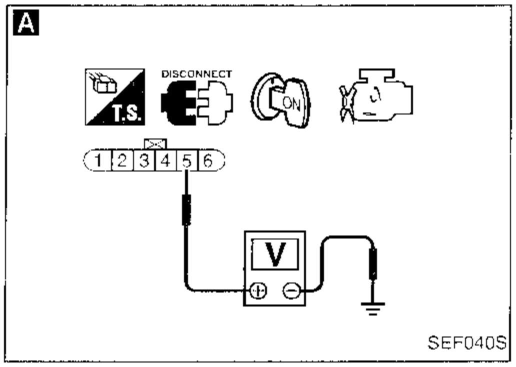


INSPECTION START

↓

Loosen and retighten engine ground screws.

↓



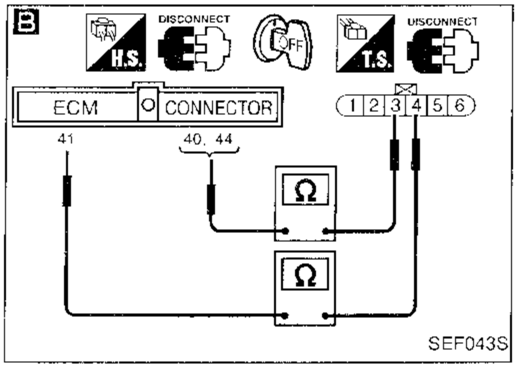
A

CHECK POWER SUPPLY.
1. Turn ignition switch "OFF".
2. Disconnect camshaft position sensor harness connector.
3. Turn ignition switch "ON".
4. Check voltage between terminal ⑤ and ground with CONSULT or tester.
Voltage: Battery voltage

NG → Check the following.
- Harness connectors F23, M32
- Harness connectors M1, E1
- Harness for open or short between camshaft position sensor and ECCS relay
- Harness for open or short between camshaft position sensor and ECM

If NG, repair harness or connectors.

OK ↓

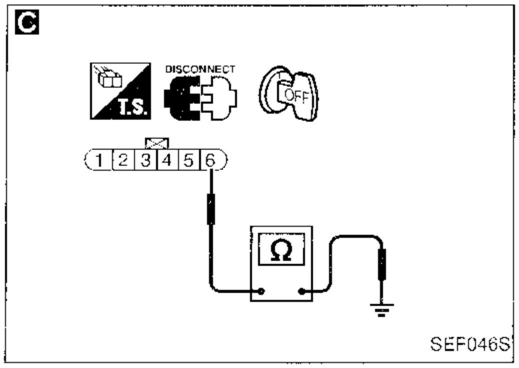


B

CHECK INPUT SIGNAL CIRCUIT.
1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between sensor terminal ④ and ECM terminals ㊶, sensor terminal ③ and ECM terminals ㊵, ㊹.
Continuity should exist.
If OK, check harness for short.

NG → Repair harness or connectors.

OK ↓



C

CHECK GROUND CIRCUIT.
1. Loosen and retighten engine ground screws.
2. Check harness continuity between sensor terminal ⑥ and engine ground.
Continuity should exist.
If OK, check harness for short.

NG → If NG, repair harness or connectors.

OK ↓

CHECK COMPONENT
(Camshaft position sensor).
Refer to "COMPONENT INSPECTION" on next page.

NG → Replace camshaft position sensor.

OK ↓

Disconnect and reconnect harness connectors in the circuit. Then retest.

↓ Trouble is not fixed.

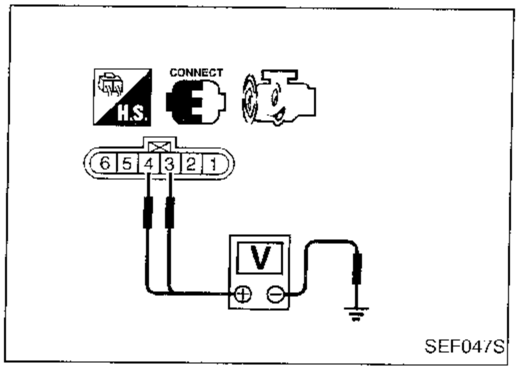
Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

↓

INSPECTION END

Camshaft Position Sensor (CMPS) (Cont'd)

COMPONENT INSPECTION



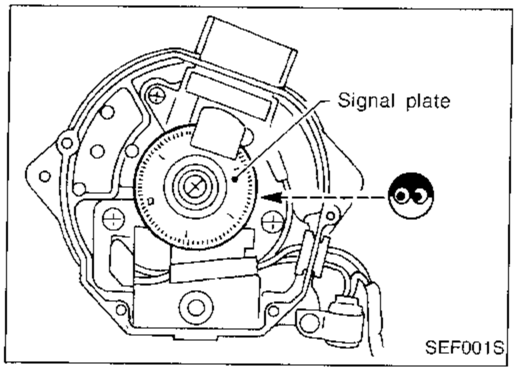
Camshaft position sensor

1. Start engine.
2. Check voltage between camshaft position sensor terminals ③, ④ and ground with AC range.

Condition	Terminal	Voltage
Engine running at idle	③ and ground	Approximately 1.0V* (AC)
	④ and ground	Approximately 2.4V* (AC)

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

If NG, replace distributor assembly with camshaft position sensor.

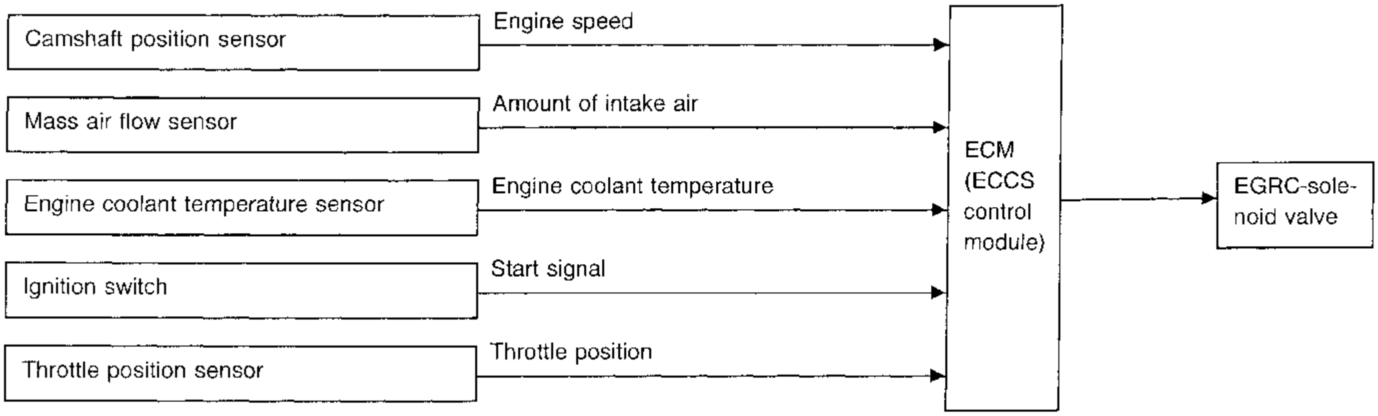


3. Remove distributor cap. Visually check signal plate for damage or dust.

After this inspection, DTC P0340 (0101) might be displayed with camshaft position sensor functioning properly. Erase the stored memory.

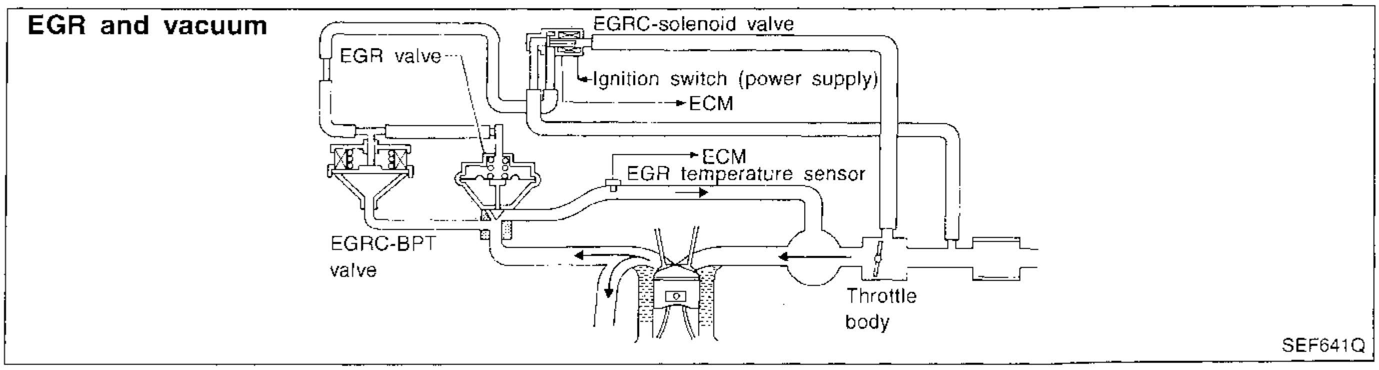
EGR Function

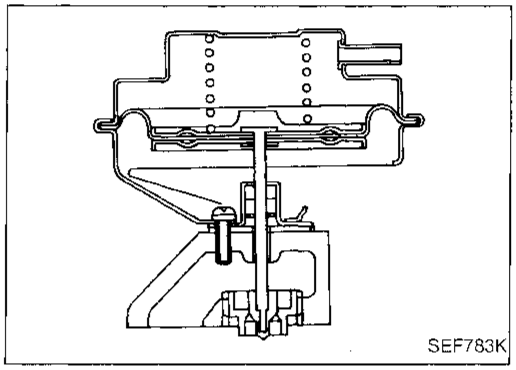
SYSTEM DESCRIPTION



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, current flows through 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


EGR and vacuum

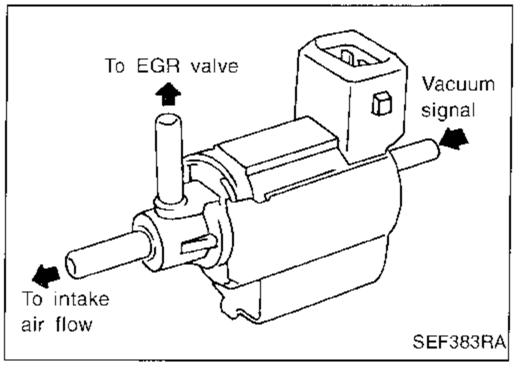


COMPONENT DESCRIPTION

Exhaust gas recirculation (EGR) valve

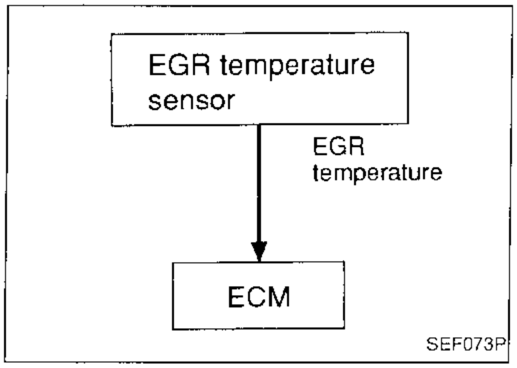
The EGR valve controls the amount of exhaust gas routed to the intake manifold. Vacuum is applied to the EGR valve in response to throttle valve opening. The vacuum controls the movement of a taper valve connected to the vacuum diaphragm in the EGR valve.

EGR Function (Cont'd)



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 throttle body 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.



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.
If EGR temperature sensor detects EGR flow under the condition that does not call for EGR, a high-flow malfunction is diagnosed.

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0400 0302	A) The exhaust gas recirculation (EGR) flow is excessively low during the specified driving condition.	• EGR valve stuck closed • EGRC-BPT valve leaking • Passage blocked • EGRC-solenoid valve • Tube leaking for EGR valve • EGR temperature sensor
	B) The exhaust gas recirculation (EGR) flow is excessively high during the specified driving condition.	• EGRC-solenoid valve • EGR valve leaking or stuck open • EGR temperature sensor

OVERALL FUNCTION CHECK

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

Before starting with the following procedure, check the engine coolant temperature of the freeze frame data with CONSULT or Generic Scan Tool.
If the engine coolant temperature is higher than or equal to 70°C (158°F), perform only "Procedure for malfunction A".
If the engine coolant temperature is lower than 70°C (158°F), perform both "Procedure for malfunction A" and "Procedure for malfunction B".
If the 1st trip freeze frame data or the freeze frame data for another malfunction is stored in the ECM, perform both "Procedure for malfunction A" and "Procedure for malfunction B". In this case, check 1st trip DTCs and/or DTCs in the ECM and inspections one by one based on "INSPECTION PRIORITY", EC-76.

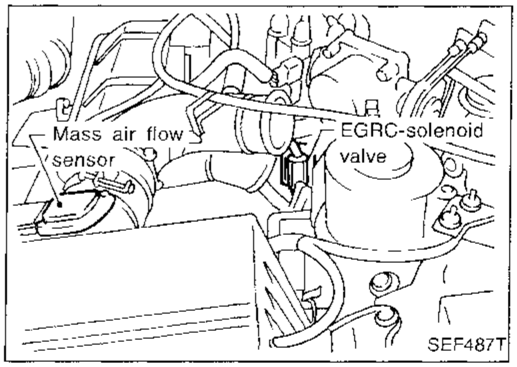
EGR Function (Cont'd)

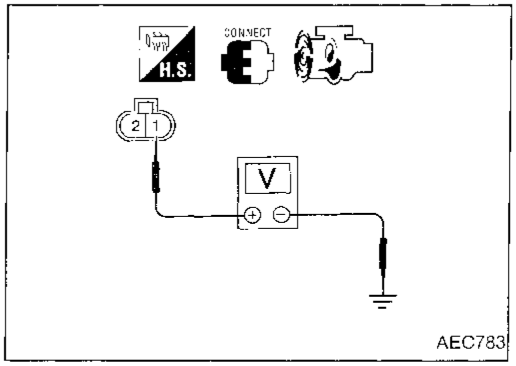
Procedure for malfunction A

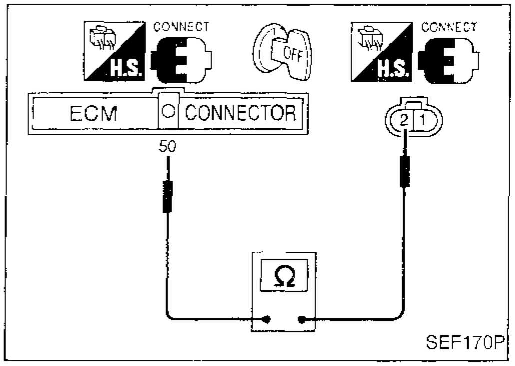
1) Start engine and warm it up sufficiently.
2) Check the EGR valve lifting when revving from 2,000 rpm up to 4,000 rpm under no load using the following methods.
   EGR valve should lift up and down without sticking.
   - Select "EGRC SOLENOID VALVE" in "ACTIVE TEST" mode with CONSULT and turn the solenoid valve "OFF".
   - Disconnect harness connectors (M32) and (F23).
     (The DTC for EGRC-solenoid valve will be displayed, however, ignore it.)

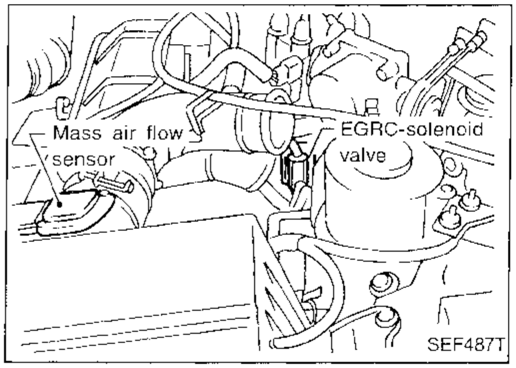
If NG, go to **A** in DIAGNOSTIC PROCEDURE on EC-214.

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 "COMPONENTS INSPECTION", "EGR temperature sensor". Refer to EC-216.

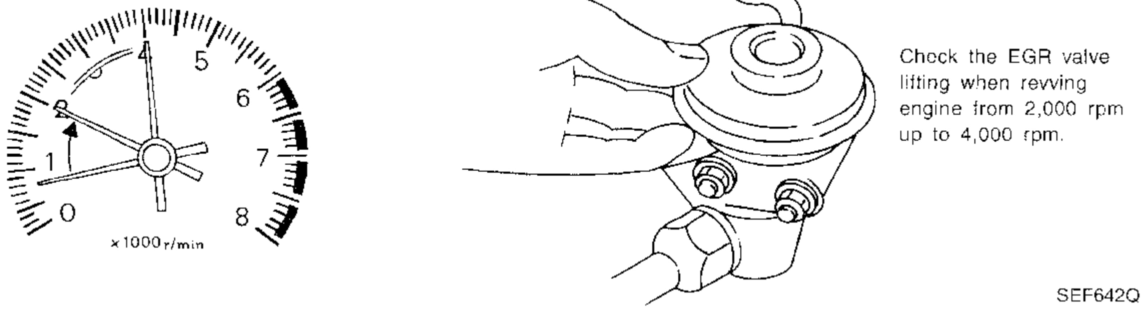






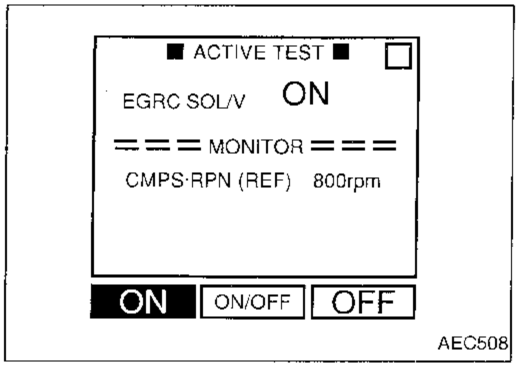


Overall function check



Check the EGR valve lifting when revving engine from 2,000 rpm up to 4,000 rpm.

EGR Function (Cont'd)



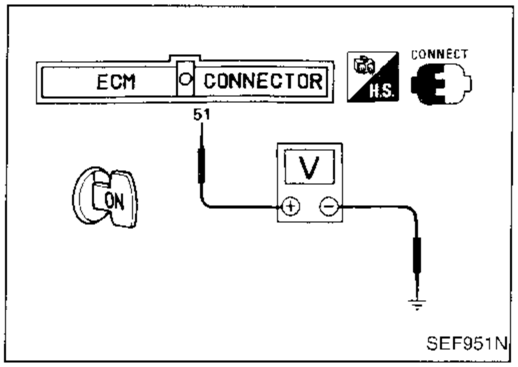
■ ACTIVE TEST ■ ☐

EGRC SOL/V ON

=== MONITOR ===

CMPS·RPN (REF) 800rpm

AEC508



SEF951N

Procedure for malfunction B

1) Start engine.
2) Select "EGRC SOLENOID VALVE" in "ACTIVE TEST" mode with CONSULT and turn the solenoid valve "ON".
3) Check for the EGR valve lifting when revving from 2,000 rpm up to 4,000 rpm under no load.

EGR valve should be closed and should not lift up.

OR

1) Turn ignition switch "ON".
2) Confirm the engine coolant temperature is lower than 70°C (158°F) in "Mode 1" with generic scan tool.
   Perform the following steps before its temperature becomes higher than 70°C (158°F).
3) Start engine.
4) Check for the EGR valve lifting when revving from 2,000 rpm up to 4,000 rpm under no load.

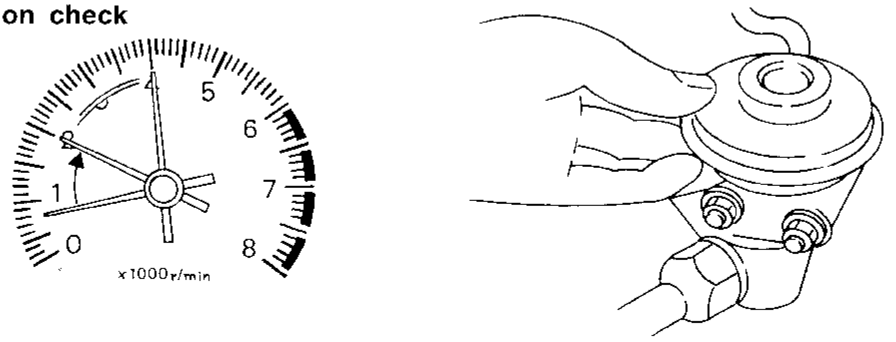
EGR valve should be closed and should not lift up.

OR

1) Turn ignition switch "ON".
2) Confirm the voltage between ECM terminal (51) and ground is higher than 1.6V.
   Perform the following steps before the voltage becomes lower than 1.6V.
3) Start engine.
4) Check for the EGR valve lifting when revving from 2,000 rpm up to 4,000 rpm under no load.

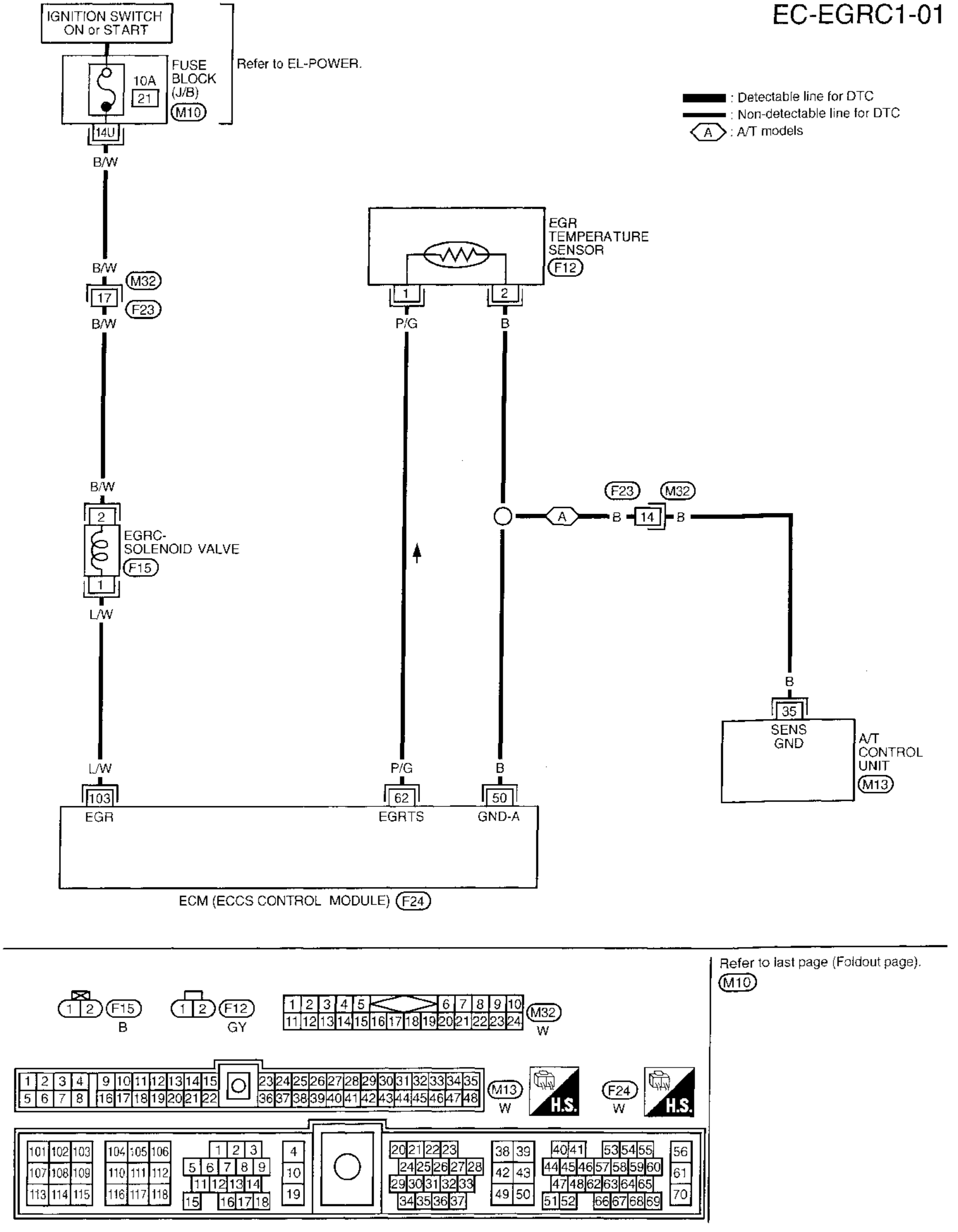
EGR valve should be closed and should not lift up.

Overall function check



Check the EGR valve lifting when revving engine from 2,000 rpm up to 4,000 rpm.

SEF642Q

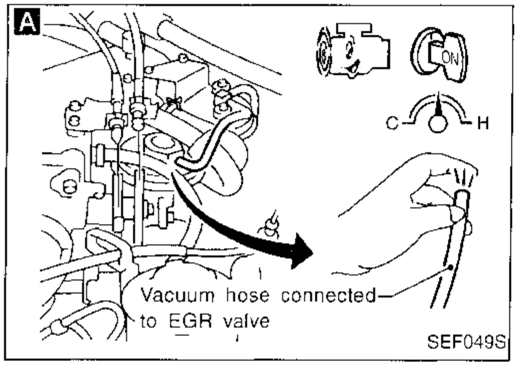

EC-EGRC1-01
IGNITION SWITCH ON or START
10A
21
FUSE BLOCK (J/B)
M10
Refer to EL-POWER.
14U
B/W
: Detectable line for DTC
: Non-detectable line for DTC
A : A/T models
EGR TEMPERATURE SENSOR
F12
1
2
P/G
B
M32
17
F23
2
EGRC-SOLENOID VALVE
F15
1
L/W
F23
M32
A
14
35
SENS GND
A/T CONTROL UNIT
M13
103
EGR
62
EGRTS
50
GND-A
ECM (ECCS CONTROL MODULE) F24
Refer to last page (Foldout page).
M10
F15
B
F12
GY
M32
W
M13
W
H.S.
F24
W
H.S.

SEF268T

EGR Function (Cont'd)

DIAGNOSTIC PROCEDURE

INSPECTION START



SEF049S

A

CHECK VACUUM SOURCE TO EGR VALVE.

1. Start engine and warm it up sufficiently.
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 and turn the solenoid valve "OFF".

   OR

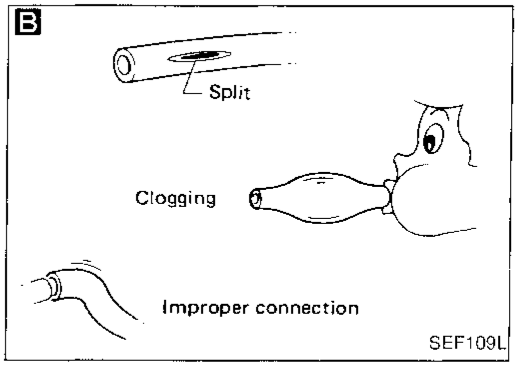
   - Disconnect EGRC-solenoid valve harness connector. (The DTC for EGRC-solenoid valve will be displayed, however, ignore it.)

   Vacuum should exist when revving engine.

OK → CHECK COMPONENTS (EGR valve). Refer to "COMPONENTS INSPECTION", EC-215.

NG → Replace EGR valve.

NG ↓



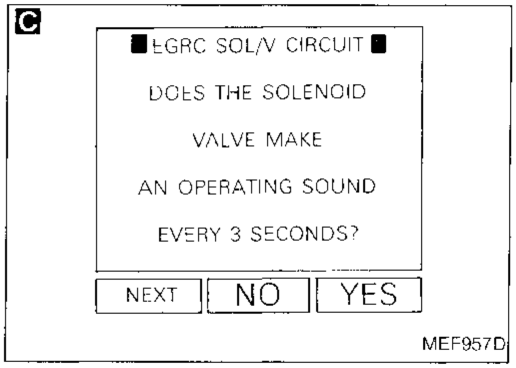
SEF109L

B

CHECK VACUUM HOSE.
Check vacuum hose for clogging, cracks or improper connection.

NG → Repair or replace vacuum hose.

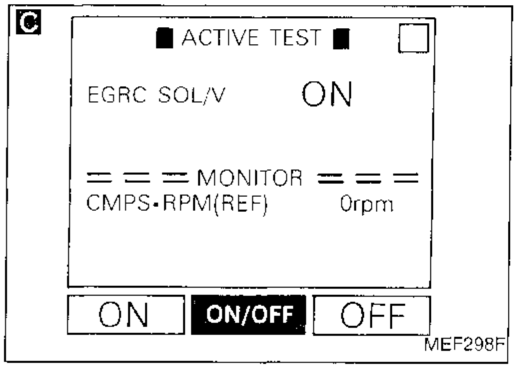
OK ↓



■EGRC SOL/V CIRCUIT■

DOES THE SOLENOID VALVE MAKE AN OPERATING SOUND EVERY 3 SECONDS?

MEF957D



■ ACTIVE TEST ■ ☐

EGRC SOL/V ON

=== MONITOR ===
CMPS•RPM(REF) 0rpm

MEF298F

C

CHECK COMPONENT
(EGRC-solenoid valve).

1. Turn ignition switch "ON".
2. Perform "EGRC SOL/V CIRCUIT" in "FUNCTION TEST" mode with CONSULT.

OR

1. Turn ignition switch "ON".
2. Turn EGRC-solenoid valve "ON" and "OFF" in "ACTIVE TEST" mode with CONSULT and check operating sound.

OR

1. Turn ignition switch "ON".
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 → Repair or replace EGRC-solenoid valve or repair circuit.

OK ↓

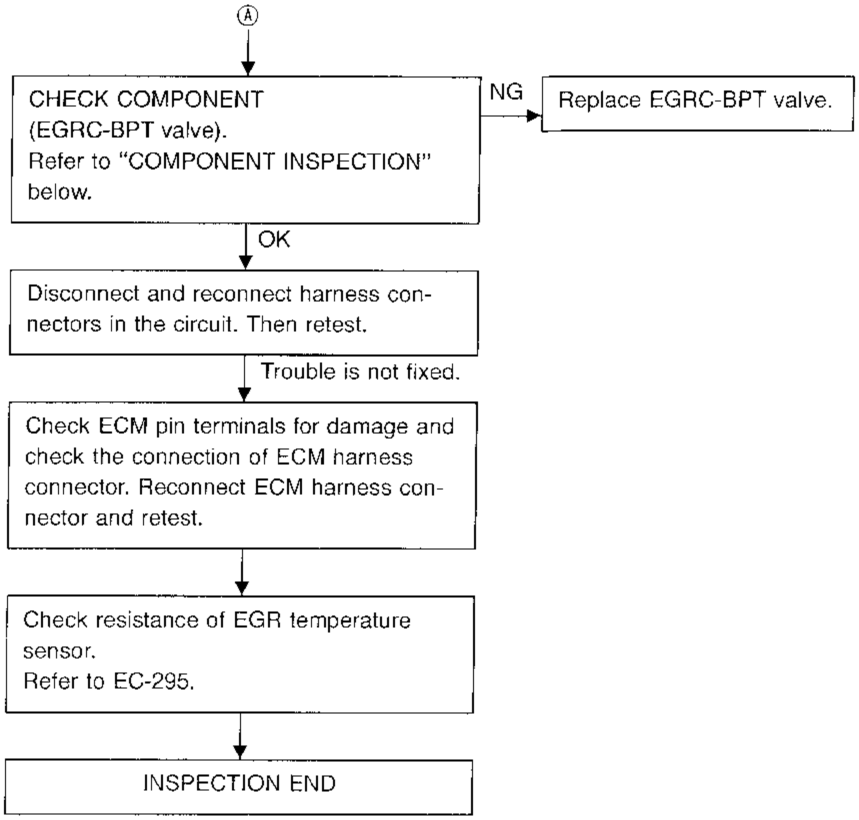
CHECK COMPONENT (EGRC-solenoid valve).
Refer to "COMPONENT INSPECTION" on next page.

NG → Replace EGRC-solenoid valve.

OK ↓

Ⓐ

EGR Function (Cont'd)



Ⓐ

CHECK COMPONENT (EGRC-BPT valve). Refer to "COMPONENT INSPECTION" below.

NG → Replace EGRC-BPT valve.

OK ↓

Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed. ↓

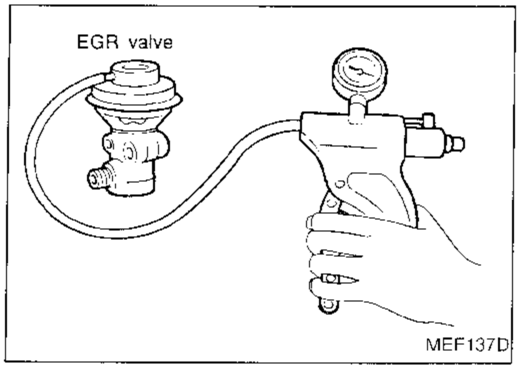
Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

↓

Check resistance of EGR temperature sensor. Refer to EC-295.

↓

INSPECTION END



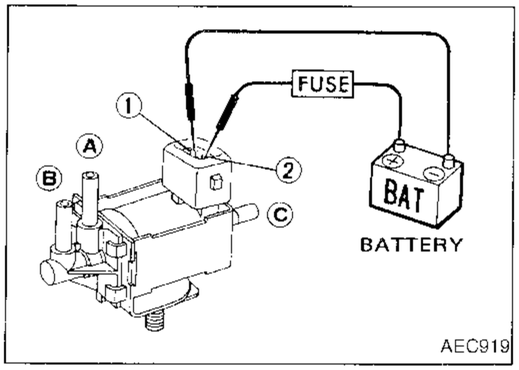
COMPONENT INSPECTION

EGR valve

Apply vacuum to EGR vacuum port with a hand vacuum pump.

EGR valve spring should lift.

If NG, replace EGR valve.



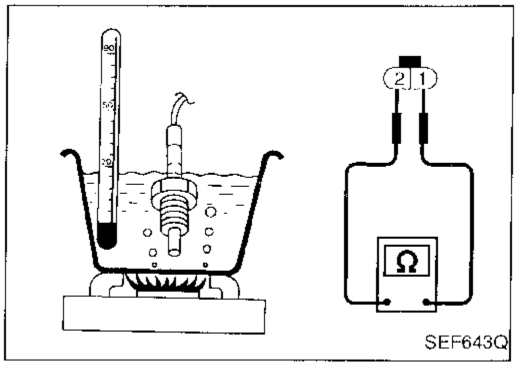
EGRC-solenoid valve

Check solenoid valve, following the table as shown below:

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

If NG, replace EGRC-solenoid valve.

EGR Function (Cont'd)

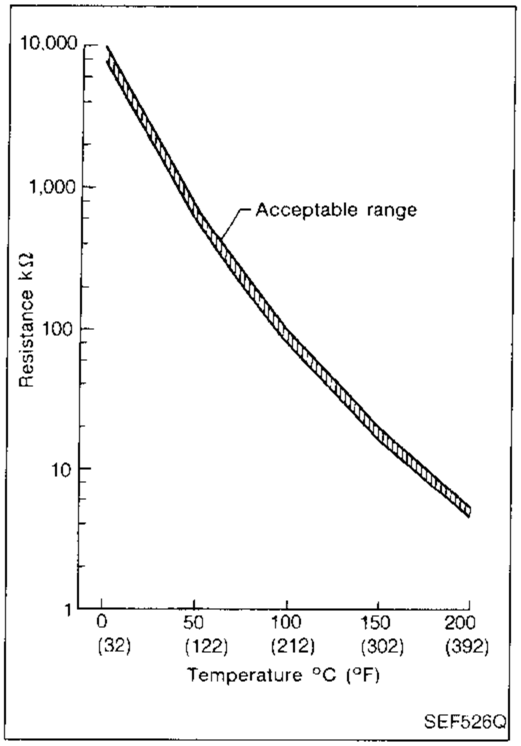


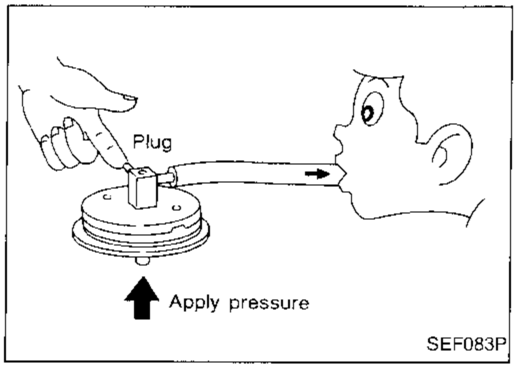
EGR temperature sensor

Check resistance change and resistance value.
⟨Reference data⟩

EGR temperature °C (°F)	Voltage (V)	Resistance (MΩ)
0 (32)	4.81	7.9 - 9.7
50 (122)	2.82	0.57 - 0.70
100 (212)	0.8	0.08 - 0.10

If NG, replace EGR temperature sensor.

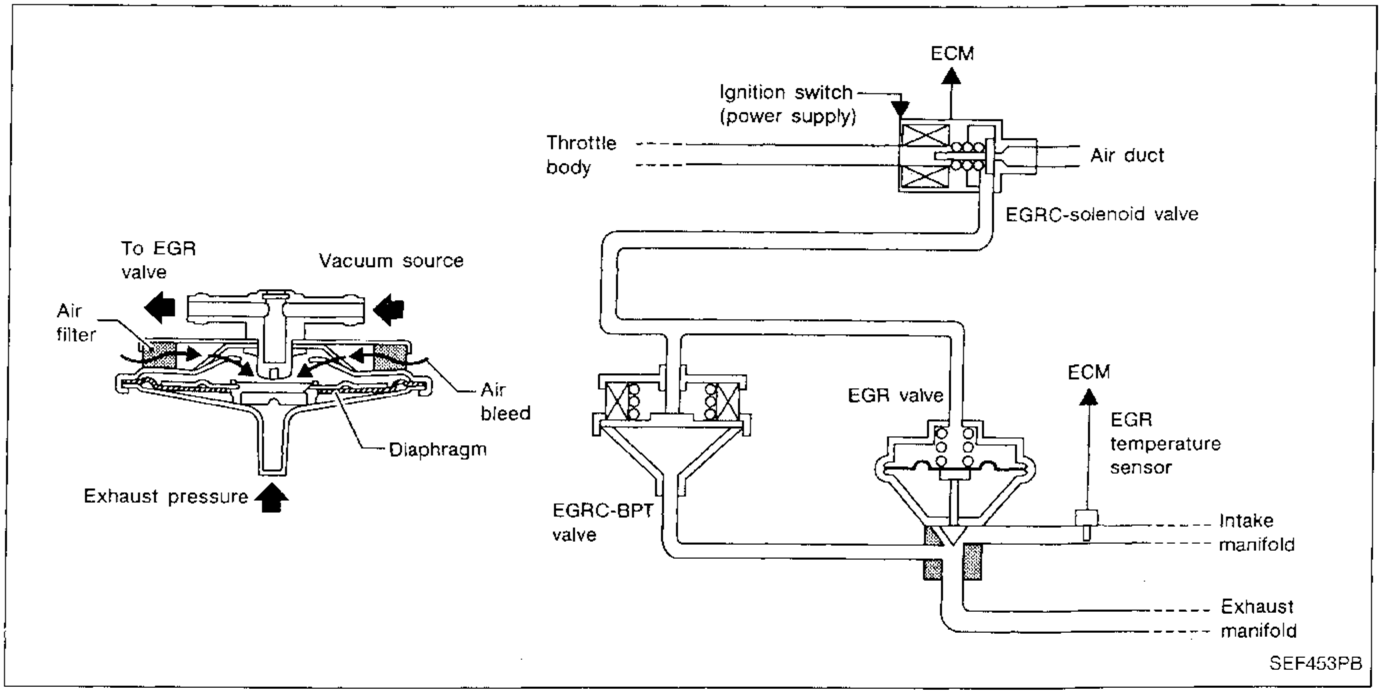




EGRC-BPT valve

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.

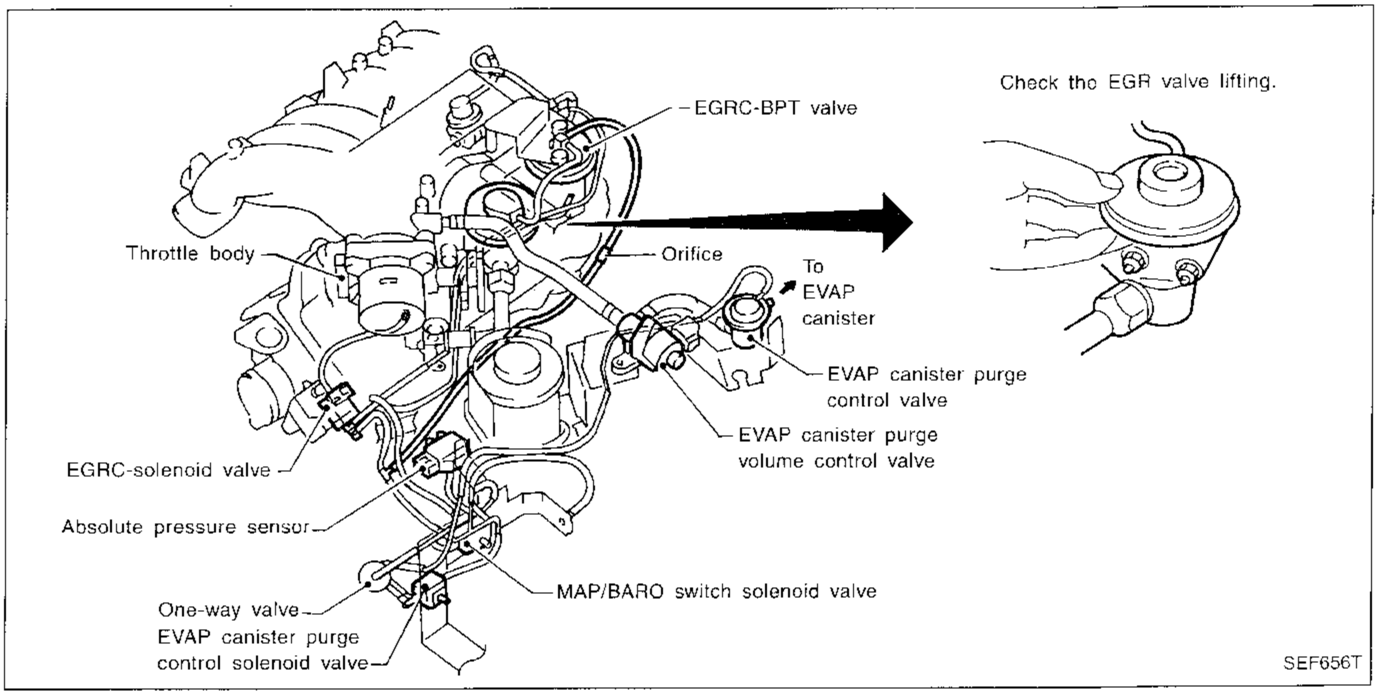
Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0402 0306	• The EGRC-BPT valve does not operate properly.	• EGRC-BPT valve • Misconnected rubber tube • Blocked rubber tube • Intake manifold EGR passage

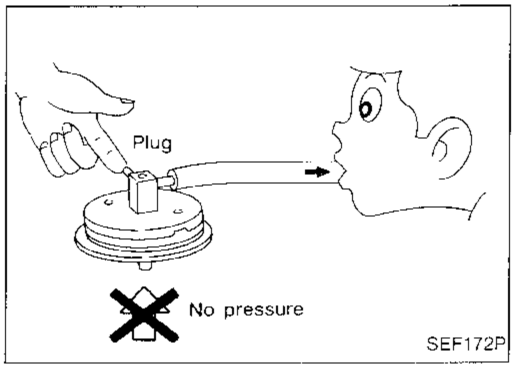
OVERALL FUNCTION CHECK

Use this procedure to check the overall function of the EGRC-BPT valve. During this check, a 1st trip DTC might not be confirmed.

1. Disconnect the rubber tube to the EVAP canister purge control solenoid valve at the intake manifold.
2. Disconnect the rubber tube to the EGRC-solenoid valve at the EGRC-BPT valve.
   Connect the intake manifold and the EGRC-BPT valve with a rubber tube that has 0.5 mm (0.020 in) dia. orifice. (The intake manifold vacuum will be directly applied to the EGRC-BPT valve.)
3. Start engine.
4. Check for the EGR valve lifting with engine at idle speed under no load.
   EGR valve should remain closed.
5. Check the EGR valve lifting when revving from 1,500 rpm up to 3,000 rpm under no load.
   EGR valve should lift up, and go down without sticking when the engine is returned to idle.
6. Check rubber tube between EGRC-solenoid valve and throttle body for misconnection, cracks or blockages.

EGRC-BPT Valve Function (Cont'd)





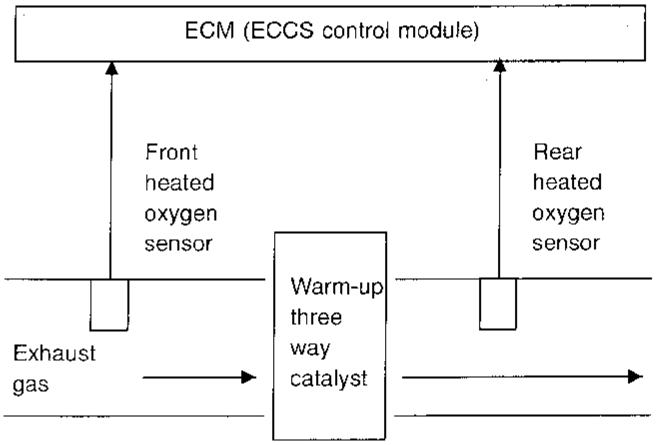
COMPONENT INSPECTION

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.

Three Way Catalyst Function

ON BOARD DIAGNOSIS LOGIC



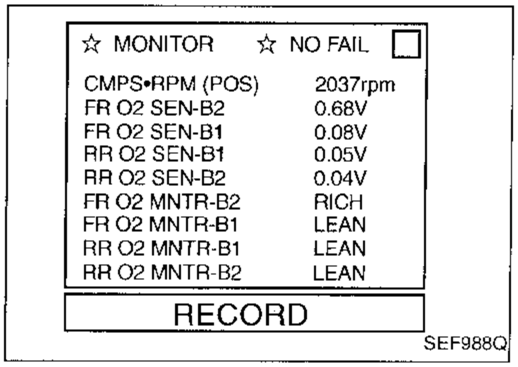
The ECM monitors the switching frequency ratio of front and rear heated oxygen sensors.
A warm-up three way catalyst with high oxygen storage capacity will indicate a low switching frequency of rear heated oxygen sensor. As oxygen storage capacity decreases, the rear heated oxygen sensor switching frequency will increase.
When the frequency ratio of front and rear heated oxygen sensors approaches a specified limit value, the warm-up three way catalyst malfunction is diagnosed.

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
For right bank P0420 0702	• Warm-up three way catalyst does not operate properly. • Warm-up three way catalyst does not have enough oxygen storage capacity.	• Warm-up three way catalyst • Exhaust tube • Intake air leaks • Injectors • Injector leaks
For left bank P0430 0703		

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.

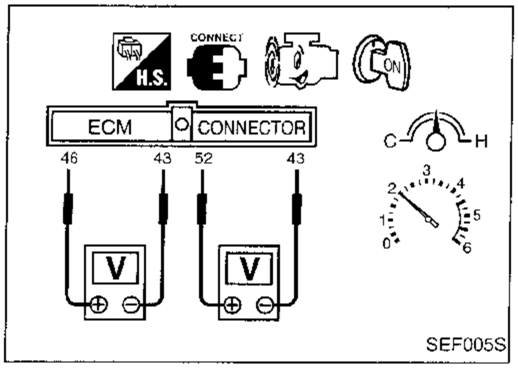
Three Way Catalyst Function (Cont'd)



☆ MONITOR ☆ NO FAIL ☐

CMPS•RPM (POS)	2037rpm
FR O2 SEN-B2	0.68V
FR O2 SEN-B1	0.08V
RR O2 SEN-B1	0.05V
RR O2 SEN-B2	0.04V
FR O2 MNTR-B2	RICH
FR O2 MNTR-B1	LEAN
RR O2 MNTR-B1	LEAN
RR O2 MNTR-B2	LEAN

SEF988Q



SEF005S

1) Start engine and warm it up sufficiently.
2) Set "MANU TRIG" and "HI SPEED", then select "FR O2 SEN-B1", "FR O2 SEN-B2", "RR O2 SEN-B1", "RR O2 SEN-B2", "FR O2 MNTR-B2", "FR O2 MNTR-B1", "RR O2 MNTR-B1", "RR O2 MNTR-B2" in "DATA MONITOR" mode with CONSULT.
3) Touch "RECORD" on CONSULT screen with engine speed held at 2,000 rpm constant under no load.
4) Make sure that the switching frequency between "RICH" and "LEAN" of "RR O2 MNTR-B1" or "RR O2 MNTR-B2" is very less than that of "FR O2 MNTR-B1" or "FR O2 MNTR-B2".

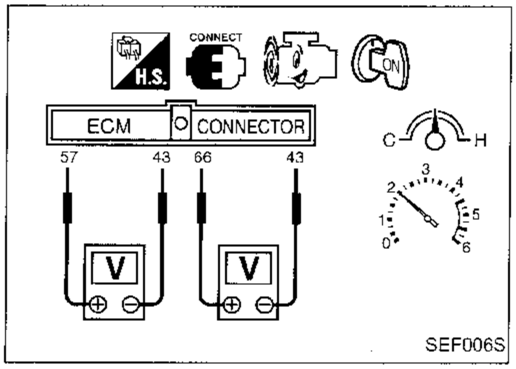
Switching frequency ratio =

$$\frac{\textbf{Rear heated oxygen sensor switching frequency}}{\textbf{Front heated oxygen sensor switching frequency}}$$

This ratio should be less than 0.75.
If the ratio is greater than above, the three way catalyst is not operating properly.

Note: **If the "FR O2 MNTR-B1" or "FR O2 MNTR-B2" does not indicate "RICH" and "LEAN" periodically more than 5 times within 10 seconds at step 3, perform TROUBLE DIAGNOSIS FOR DTC P0130 or P0150 first. (See EC-133 or EC-151.)**

OR



SEF006S

1) Start engine and warm it up sufficiently.
2) Set voltmeters probes between ECM terminals ㊻ [front heated oxygen sensor (right bank) signal], (57) [front heated oxygen sensor (left bank) signal] and ㊸ (engine ground), and ECM terminals (52) [rear heated oxygen sensor (right bank) signal], (66) [rear heated oxygen sensor (left bank) signal] and ㊸ (engine ground).
3) Keep engine speed at 2,000 rpm constant under no load.
4) Make sure that the voltage switching frequency (high & low) between ECM terminals (52) and ㊸, or (66) and ㊸ is very less than that of ECM terminals ㊻ and ㊸, or (57) and ㊸.

Switching frequency ratio =

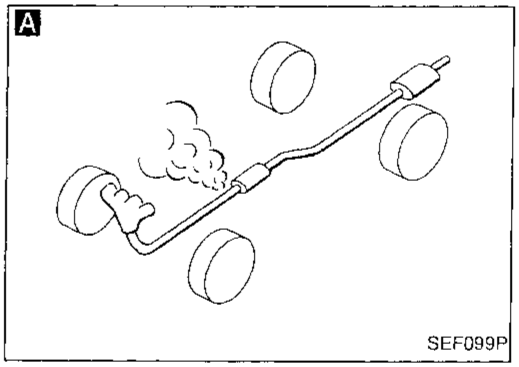
$$\frac{\textbf{Rear heated oxygen sensor voltage switching frequency}}{\textbf{Front heated oxygen sensor voltage switching frequency}}$$

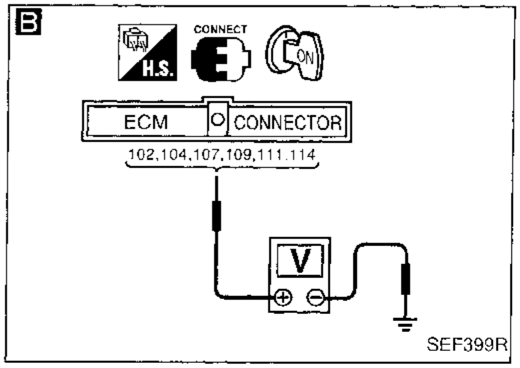
This ratio should be less than 0.75.
If the ratio is greater than above, it means three way catalyst does not operate properly.

Note: **If the voltage at terminal ㊻ or (57) does not switch periodically more than 5 times within 10 seconds at step 3, perform TROUBLE DIAGNOSIS FOR DTC P0130 or P0150 first. (See EC-133 or EC-151.)**

Three Way Catalyst Function (Cont'd)

DIAGNOSTIC PROCEDURE





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-321.
2. Turn ignition switch "ON".
3. Check voltage between ECM terminals (102), (104), (107), (109), (111) and (114) and ground with CONSULT or tester.
   Battery voltage should exist.

NG → Perform TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS, "Injector", EC-321.
Repair harness or connectors.

↓ OK

1. Turn ignition switch "OFF".
2. Remove injector assembly.
   Refer to EC-26.
   Keep fuel hose and all injectors connected to injector gallery.

↓

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

Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

Trouble is not fixed → Replace three way catalyst.

↓ Trouble is fixed

INSPECTION END

Evaporative Emission (EVAP) Control System (Small Leak)

Note: If both DTC P0440 and P0446 are displayed, perform TROUBLE DIAGNOSIS FOR DTC P0446 first. (See EC-238.)

ON BOARD DIAGNOSIS LOGIC

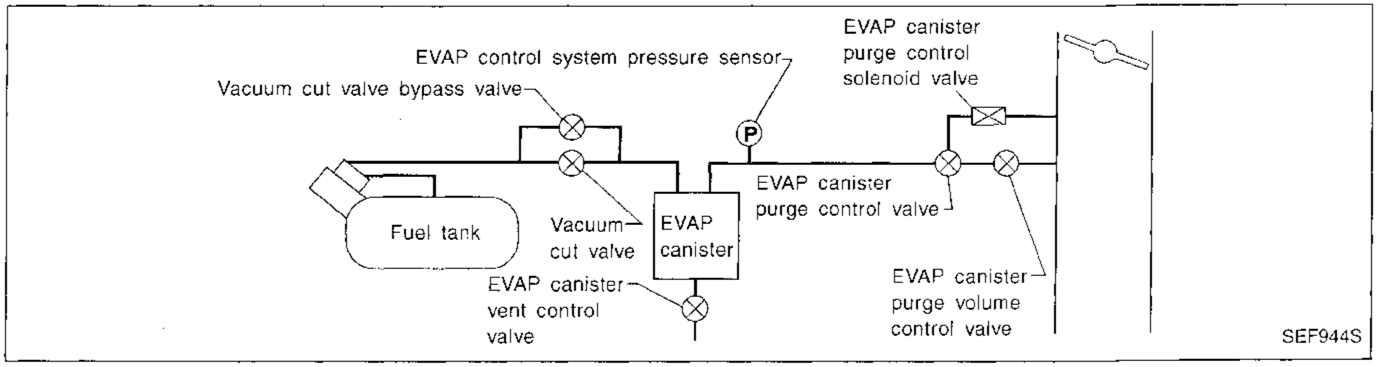
This diagnosis uses two methods to detect leaks in the EVAP purge line.
The first method, the pressure test, makes use of vapor pressure in the fuel tank. The second method, the vacuum test, makes use of engine intake manifold vacuum.

Pressure test

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 control valve. The EVAP control system pressure sensor can now monitor the pressure inside the fuel tank.
If pressure increases, the ECM will check for leaks in the line between the vacuum cut valve and EVAP canister purge control valve. If no pressure does not increase, the ECM will perform the "Vacuum test".

Vacuum test

If pressure does not increase in the "Pressure test", the ECM will check for leaks in the line between the fuel tank and EVAP canister purge control valve, under the following "Vacuum test" conditions.
The vacuum cut valve bypass valve is opened to clear the line between the fuel tank and the EVAP canister purge control valve. The EVAP canister vent control valve will then be closed to shut the EVAP purge line off. The EVAP canister purge volume control valve and EVAP canister purge control valve are opened to depressurize the EVAP purge line using intake manifold vacuum. After this occurs, the EVAP canister purge control valve and EVAP canister purge volume control valve will be closed.



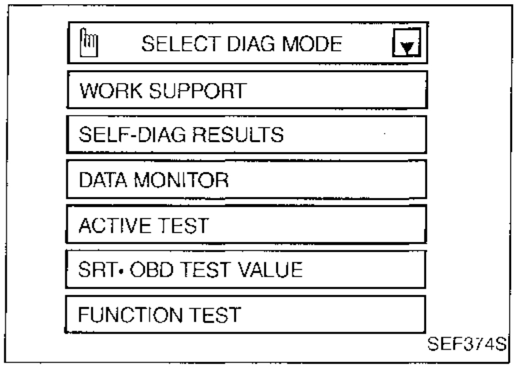
GI MA EM LC EC FE CL MT AT TF PD FA RA BR ST RS BT HA EL IDX

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P0440 0705	• EVAP control system has a leak. • EVAP control system does not operate properly.	• Incorrect fuel tank vacuum relief valve • Incorrect fuel filler cap used • Fuel filler cap remains open or fails to close. • Foreign matter caught in fuel filler cap. • Leak is in line between intake manifold and EVAP canister purge control 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 purge control valve • EVAP canister purge volume control valve • EVAP canister purge control solenoid valve • Absolute pressure sensor • Tank fuel temperature sensor • MAP/BARO switch solenoid valve • Blocked or bent rubber tube to MAP/BARO switch solenoid valve • O-ring of EVAP canister vent control valve is missing or damaged.

CAUTION:

- **Use only a genuine 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 rubber tube as a replacement.**



SEF374S

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

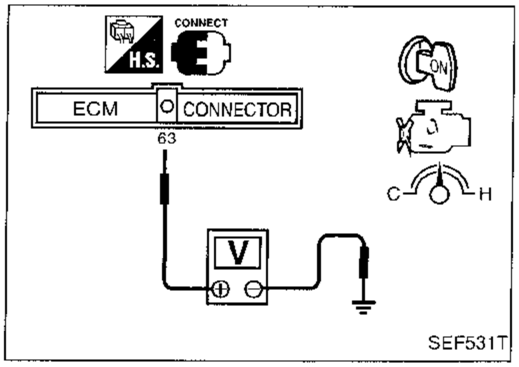
CAUTION:

- **Always select "SINGLE TEST" with CONSULT when performing the "FUNCTION TEST".**
- **Perform "FUNCTION TEST" when the fuel level is less than 3/4 full. If not, inspect fuel filler cap and fuel tank separately. Refer to EC-225.**

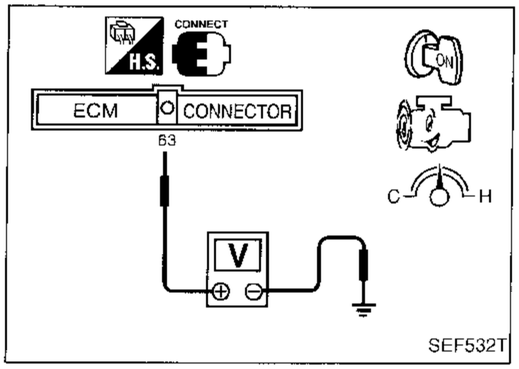
1) Select "EVAP (SMALL LEAK)" in "FUNCTION TEST" mode with CONSULT.
2) Make sure that "OK" is displayed with "EVAP (SMALL LEAK)". (If "NG" is displayed, refer to "DIAGNOSTIC PROCEDURE".)
   Refer to "DIAGNOSTIC PROCEDURE", EC-225.

OR

Evaporative Emission (EVAP) Control System (Small Leak) (Cont'd)



SEF531T



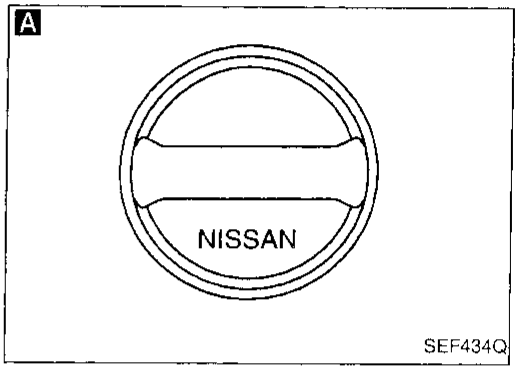
SEF532T

1) Start engine and warm it up sufficiently.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Turn ignition switch "ON" and wait at least 12 seconds.
4) Check voltage between ECM terminal (63) and ground (**Voltage1**).
   Voltage: 1.9 - 4.2V
5) Restart engine and let it idle for at least 70 seconds.
6) Maintain the following conditions for at least 80 seconds.
   Gear position: Suitable gear position
   Vehicle speed: 40 - 80 km/h (25 - 50 MPH)
   Engine speed: 1,500 - 2,500 rpm
   Engine coolant temperature: Less than 100°C (212°F)
7) Decelerate the vehicle to idle.
8) Maintain the following conditions for at least 2 seconds.
   Gear position: Suitable gear position
   Vehicle speed: 40 - 60 km/h (25 - 37 MPH)
   Engine speed: 1,500 - 2,500 rpm
   Engine coolant temperature: Less than 100°C (212°F)
9) Perform steps 7,8 more than 10 times.
10) Decelerate the vehicle to idle and wait at least 10 seconds.
11) Check voltage between ECM terminal (63) and ground (**Voltage 2**).
    Voltage: 1.9 - 4.2V
12) Check voltage decrease between **voltage 1 and 2**.
    Voltage 2 – Voltage 1 ≧ 0.01V
13) Maintain the following conditions for 9 minutes after 12 minutes have passed from restarting engine in step 5.
    Gear position: Suitable gear position
    Vehicle speed: 20 - 80 km/h (12 - 50 MPH)
    Engine speed: 800 - 3,500 rpm
    Engine coolant temperature: Less than 100°C (212°F)
14) Stop the vehicle, turn ignition switch "OFF", wait at least 5 seconds, and then turn "ON".
15) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.

NOTE:
- **Hold the accelerator pedal as steady as possible during driving in steps 6, 8 and 13.**
- **It is better that the fuel level is low.**

Evaporative Emission (EVAP) Control System (Small Leak) (Cont'd)

DIAGNOSTIC PROCEDURE



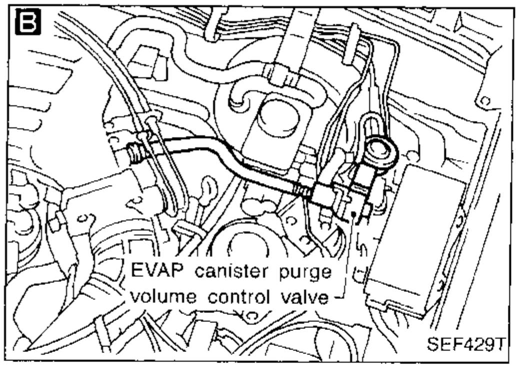
INSPECTION START

A

CHECK FUEL FILLER CAP.
1. Check that fuel filler cap does not remain open, closes properly and does not contain foreign matter.
2. Check for genuine fuel filler cap design.
3. Check fuel tank vacuum relief valve. Refer to "EVAPORATIVE EMISSION SYSTEM", EC-21.

NG →
1. Open fuel filler cap, then clean cap and fuel filler neck threads using air blower.
2. Replace with genuine fuel filler cap.

OK

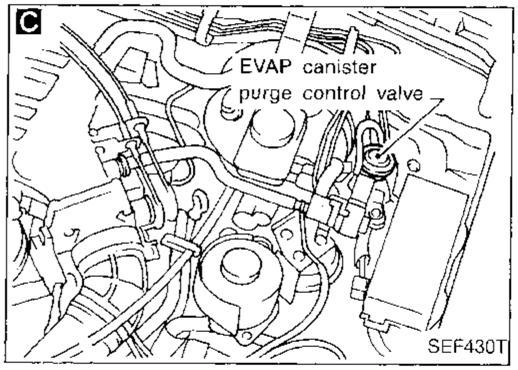


B

CHECK COMPONENT
(EVAP canister purge volume control valve).
Refer to "COMPONENT INSPECTION", EC-227.

NG → Replace EVAP canister purge volume control valve.

OK

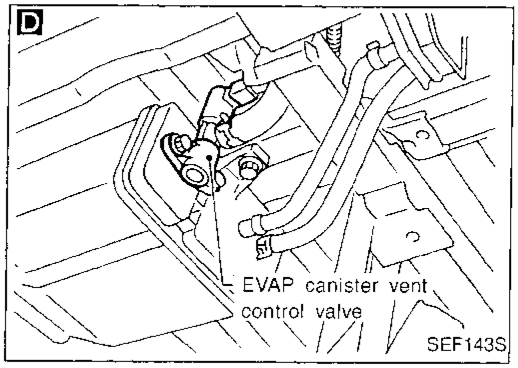


C

CHECK COMPONENT
(EVAP canister purge control valve).
Refer to "COMPONENT INSPECTION", EC-228.

NG → Replace EVAP canister purge control valve.

OK

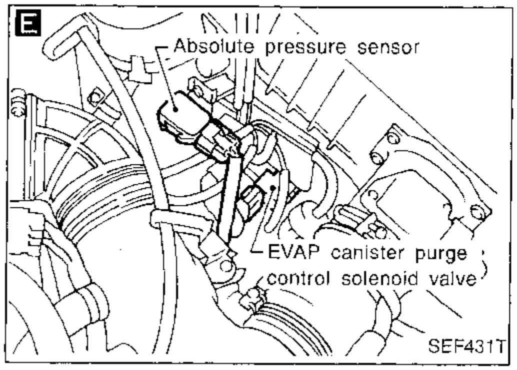


D

CHECK COMPONENT
(EVAP canister vent control valve).
Refer to "COMPONENT INSPECTION", EC-228.

NG → Replace EVAP canister vent control valve.

OK



E

CHECK COMPONENT (EVAP canister purge control solenoid valve).
1. Disconnect vacuum hose to EVAP canister purge control valve.
2. Start engine.
3. Perform "PURG CONT S/V" in "ACTIVE TEST" mode.
4. Select "ON" on CONSULT screen to turn on "PURG CONT S/V".
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

Vacuum should exist.

OR

1. Start engine and warm it up sufficiently.
2. Stop engine.
3. Jack up drive wheels.
4. Disconnect vacuum hose to EVAP canister purge control valve.
5. Start engine.
6. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

Vacuum should exist.

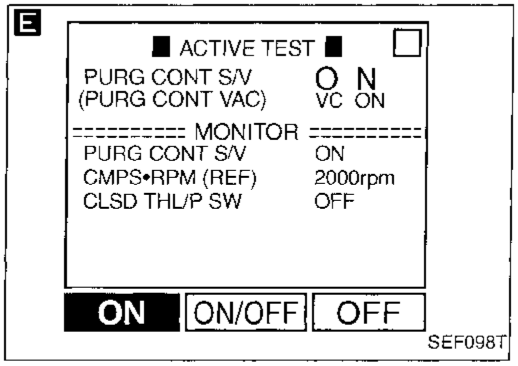
NG → Check the following.
- EVAP canister purge control solenoid valve. Refer to "COMPONENTS INSPECTION", EC-228.
- Vacuum hoses for clogging or disconnection. Refer to "Vacuum Hose Drawing", EC-228.

OK

Ⓐ

Evaporative Emission (EVAP) Control System (Small Leak) (Cont'd)

E



■ ACTIVE TEST ■ ☐

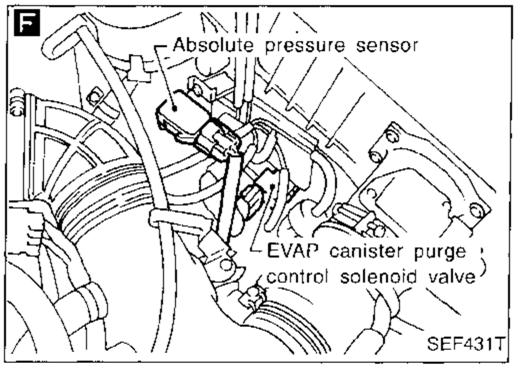
PURG CONT S/V O N
(PURG CONT VAC) VC ON

========== MONITOR ==========

PURG CONT S/V ON
CMPS•RPM (REF) 2000rpm
CLSD THL/P SW OFF

Ⓐ

F

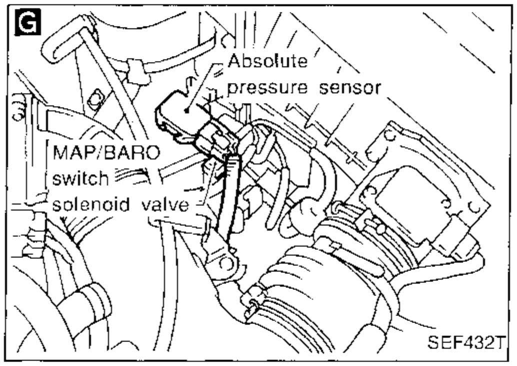


CHECK COMPONENT
(Absolute pressure sensor).
Refer to "COMPONENT INSPECTION", EC-228.

NG → Replace absolute pressure sensor.

OK

G

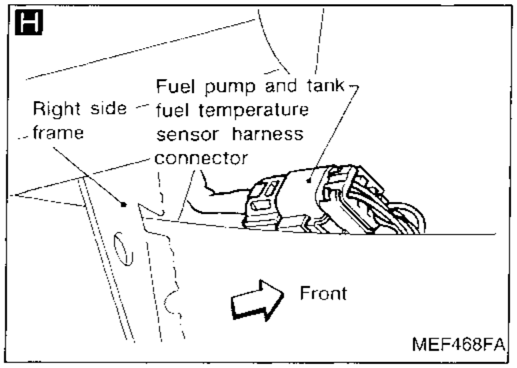


CHECK COMPONENT
(MAP/BARO switch solenoid valve).
Refer to "COMPONENT INSPECTION", EC-229.

NG → Replace MAP/BARO switch solenoid valve.

OK

H



CHECK COMPONENT
(Tank fuel temperature sensor).
Refer to "COMPONENT INSPECTION", EC-229.

NG → Replace tank fuel temperature 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-22.

NG → Repair or reconnect the hose.

OK

Clean EVAP purge line (pipe and rubber tube) using air blower.

↓

Disconnect and reconnect harness connectors in the circuit. Then retest.

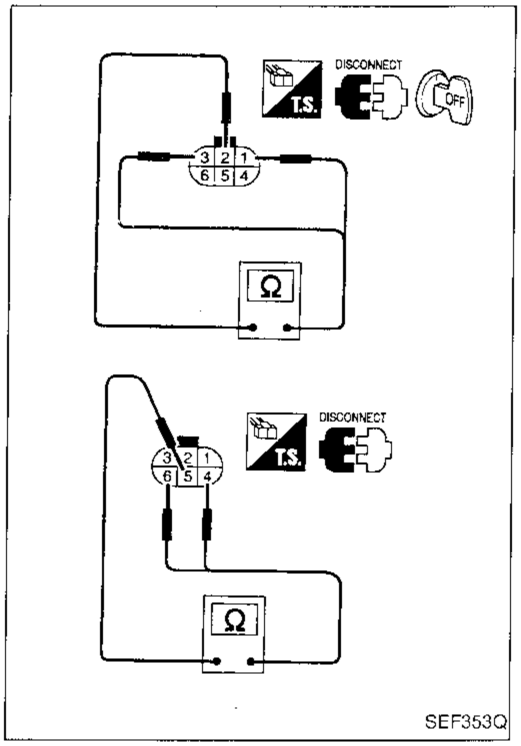
↓ Trouble is not fixed.

Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

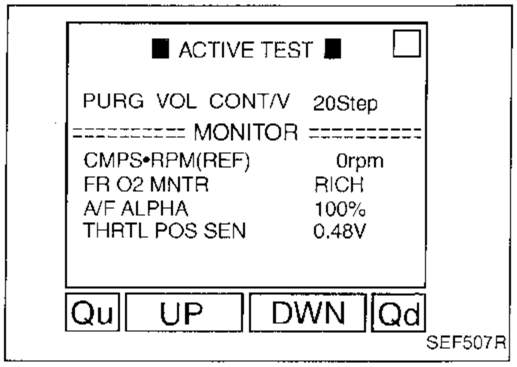
↓

INSPECTION END

Evaporative Emission (EVAP) Control System (Small Leak) (Cont'd)



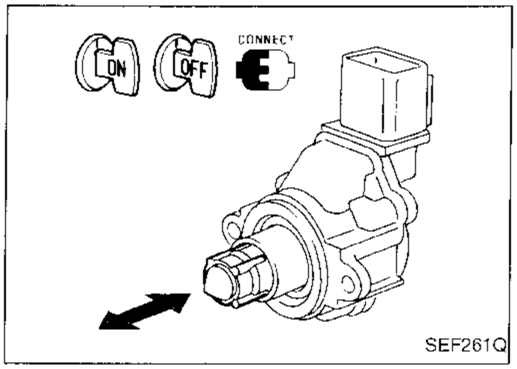
SEF353Q



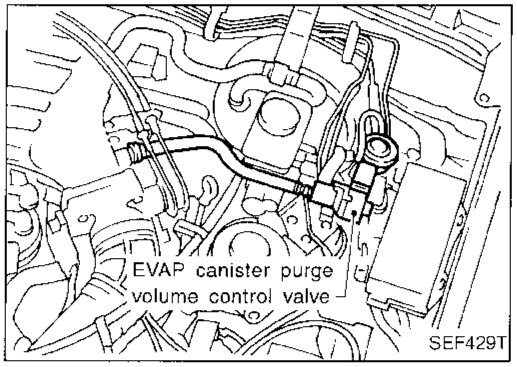
```
■ ACTIVE TEST ■          ☐

PURG VOL CONT/V    20Step
========== MONITOR ==========
CMPS•RPM(REF)        0rpm
FR O2 MNTR           RICH
A/F ALPHA            100%
THRTL POS SEN        0.48V
```

SEF507R



SEF261Q



SEF429T

COMPONENT INSPECTION

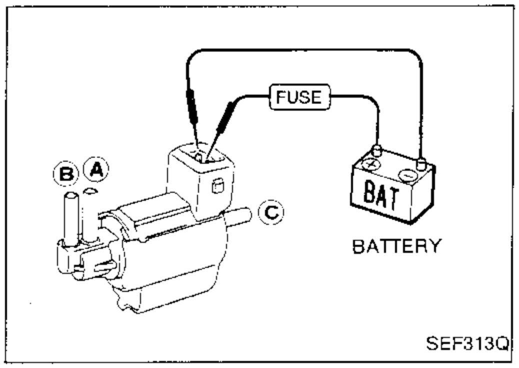
EVAP canister purge volume control valve

1. Disconnect EVAP canister purge volume control valve harness connector.
2. Check resistance between the following terminals.
   terminal ② and terminals ①, ③
   terminal ⑤ and terminals ④, ⑥
   Resistance:
   Approximately 30Ω [At 25°C (77°F)]
3. Reconnect EVAP canister purge volume control valve harness connector.
4. Remove EVAP canister purge volume control valve from intake manifold collector and disconnect hoses from the valve.
   (Plug the purge hoses. The EVAP canister purge volume control valve harness connector should remain connected.)
5. Turn ignition switch "ON".
6. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT. Check that EVAP canister purge volume control valve shaft moves smoothly forward and backward according to the valve opening.
   If NG, replace the EVAP canister purge volume control valve.

OR

1. Disconnect EVAP canister purge volume control valve harness connector.
2. Check resistance between the following terminals.
   terminal ② and terminals ①, ③
   terminal ⑤ and terminals ④, ⑥
   Resistance:
   Approximately 30Ω [At 25°C (77°F)]
3. Reconnect EVAP canister purge volume control valve harness connector.
4. Remove EVAP canister purge volume control valve from intake manifold collector and disconnect hoses from the valve.
   (Plug the purge hoses. The EVAP canister purge volume control valve harness connector should remain connected.)
5. Turn ignition switch "ON" and "OFF". Check that EVAP canister purge volume control valve shaft moves smoothly forward and backward according to the ignition switch position.
   If NG, replace the EVAP canister purge volume control valve.

Evaporative Emission (EVAP) Control System (Small Leak) (Cont'd)

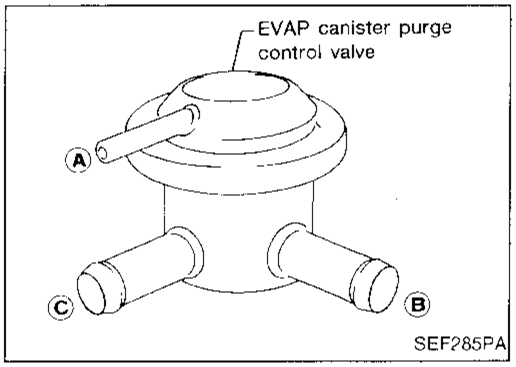


EVAP canister purge control solenoid valve

Check air passage continuity.

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

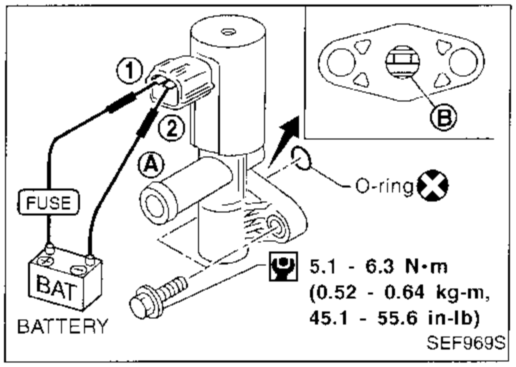
If NG, replace solenoid valve.



EVAP canister purge control valve

Check EVAP canister purge control valve as follows:

1. Plug the port Ⓑ.
2. Apply pressure [80.0 kPa (600 mmHg, 23.62 inHg)] to port Ⓐ. Then keep it for 15 seconds, and check there is no leakage.
3. Repeat step 2 for port Ⓒ.

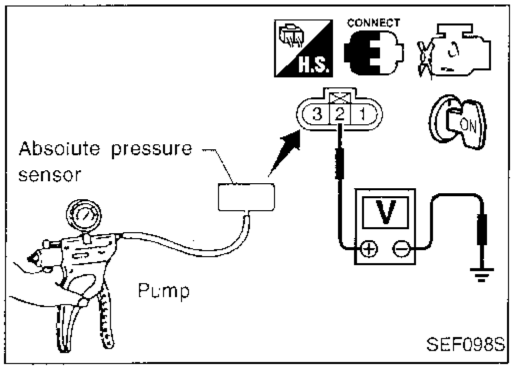


EVAP canister vent control valve

Check air passage continuity.

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

If NG, clean valve using air blower or replace as necessary.



Absolute pressure sensor

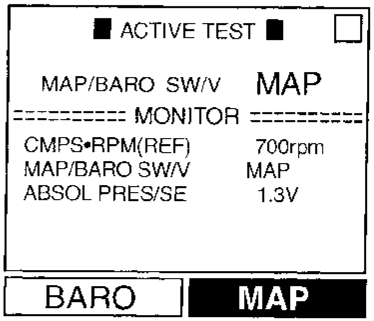
1. Remove absolute pressure sensor from bracket with its harness connector connected.
2. Remove hose from absolute pressure sensor.
3. Turn ignition switch "ON" and check output voltage between terminal ② and engine ground.
   The voltage should be 3.2 to 4.8 V.
4. Use pump to apply vacuum of –26.7 kPa (–200 mmHg, –7.87 inHg, –3.87 psi) to absolute pressure sensor as shown in figure and check the output voltage.
   The voltage should be 1.0 to 1.4 V lower than the value measured in step 3.

Evaporative Emission (EVAP) Control System (Small Leak) (Cont'd)

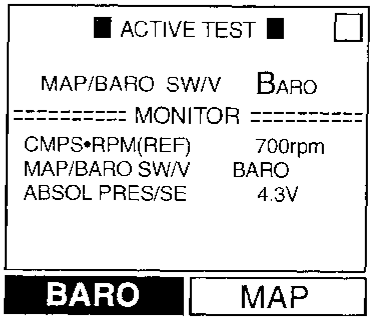
CAUTION:
Always calibrate the vacuum pump gauge when using it.

5. If NG, replace absolute pressure sensor.

MAP/BARO switch solenoid valve


■ ACTIVE TEST ■ ☐
MAP/BARO SW/V MAP
========== MONITOR ==========
CMPS•RPM(REF) 700rpm
MAP/BARO SW/V MAP
ABSOL PRES/SE 1.3V

SEF500R


■ ACTIVE TEST ■ ☐
MAP/BARO SW/V BARO
========== MONITOR ==========
CMPS•RPM(REF) 700rpm
MAP/BARO SW/V BARO
ABSOL PRES/SE 4.3V

SEF498R

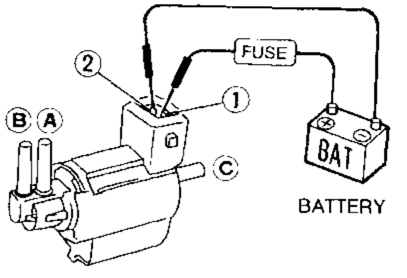
1. Start engine and warm it up sufficiently.
2. Perform "MAP/BARO SW/V" in "ACTIVE TEST" mode with CONSULT.
3. Check the following.
   - When "MAP" is selected, "ABSOL PRES/SE" indicates approximately 1.3V.
   - When "BARO" is selected, "ABSOL PRES/SE" indicates approximately 4.3V.
4. If NG, replace solenoid valve.

OR

1. Remove MAP/BARO switch solenoid valve.
2. Check air passage continuity.

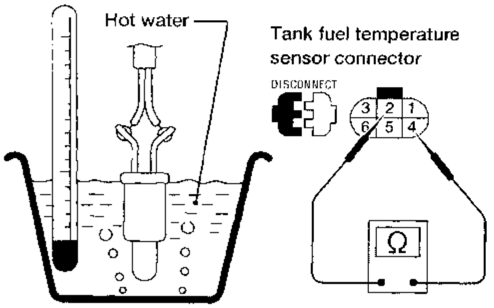
Condition	Air passage continuity between Ⓐ and Ⓑ	Air passage continuity between Ⓐ and Ⓒ
12V direct current supply between terminals ① and ②	Yes	No
No supply	No	Yes

3. If NG, replace solenoid valve.



MEC488B

Tank fuel temperature sensor



AEC145A

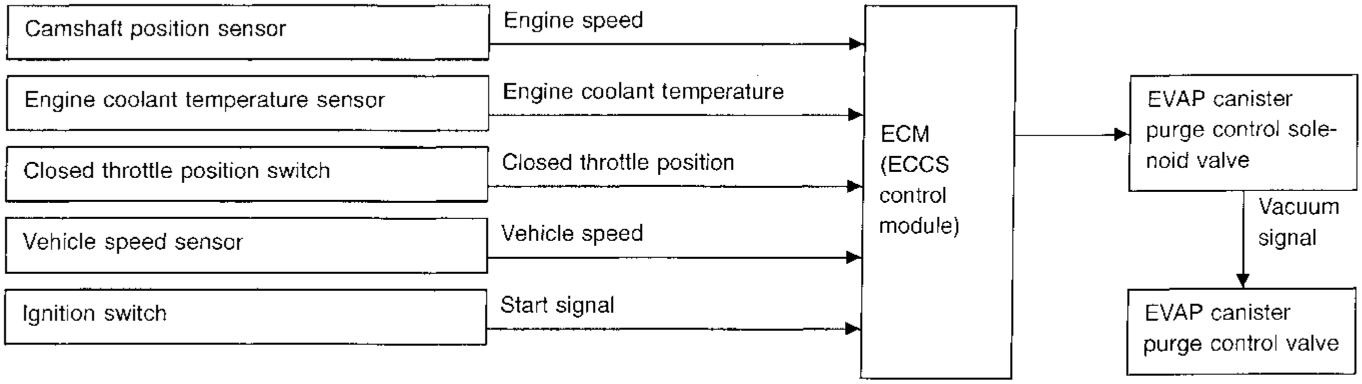
Check resistance by heating with hot water or heat gun as shown in the figure.

Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90

If NG, replace tank fuel temperature sensor.

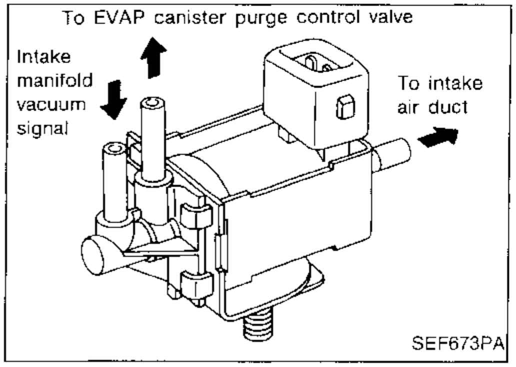
Evaporative Emission (EVAP) Canister Purge Control Valve/Solenoid Valve

SYSTEM DESCRIPTION



This system controls the vacuum signal applied to the EVAP canister purge control valve.
When the ECM detects any of the following conditions, current does not flow through the EVAP canister purge control solenoid valve.
The solenoid valve cuts the vacuum signal so that the EVAP canister purge control valve remains closed.

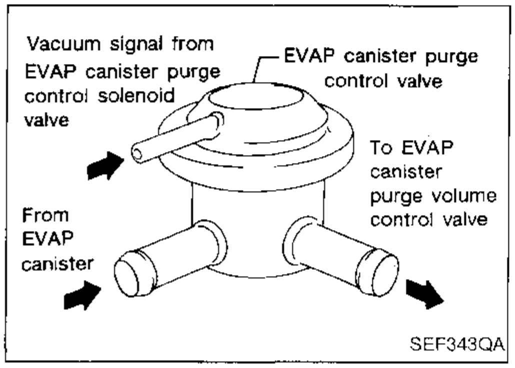
- Ignition switch "ON"
- Closed throttle position
- Low or high engine coolant temperature
- During deceleration
- Engine stopped
- Low vehicle speed



COMPONENT DESCRIPTION

EVAP canister purge control solenoid valve

The EVAP canister purge control solenoid valve responds to signals from the ECM. When the ECM sends an OFF signal, the vacuum signal (from the intake manifold to the EVAP canister purge control valve) is cut.
When the ECM sends an ON (ground) signal, the vacuum signal passes through the EVAP canister purge control solenoid valve. The signal then opens the EVAP canister purge control valve.

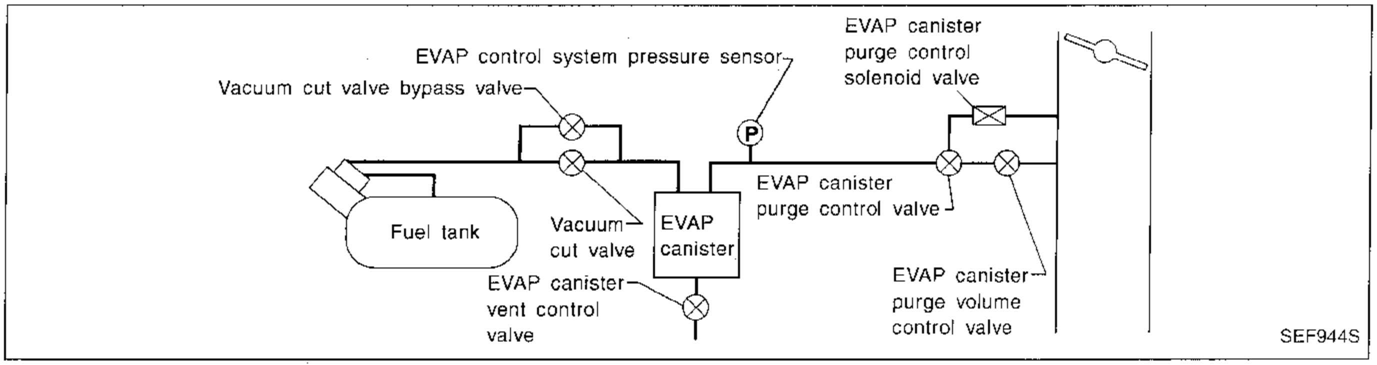


EVAP canister purge control valve

When the vacuum signal is cut by EVAP canister purge control solenoid valve, EVAP canister purge control valve closes.

Evaporative Emission (EVAP) Canister Purge Control Valve/Solenoid Valve (Cont'd)

EVAPORATIVE EMISSION SYSTEM DIAGRAM



CONSULT REFERENCE VALUE IN DATA MONITOR MODE

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PURG CONT S/V	• Engine: After warming up	Idle	OFF
		2,000 rpm	ON

ECM TERMINALS AND REFERENCE VALUE

Specification data are reference values and are measured between each terminal and ㊸ (ECCS ground).

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
105	Y/R	EVAP canister purge control solenoid valve	Engine is running. └ Idle speed	BATTERY VOLTAGE (11 - 14V)

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P0443 0807	A) The improper voltage signal is sent to ECM through EVAP canister purge control solenoid valve.	• Harness or connectors (The EVAP canister purge control solenoid valve circuit is open or shorted.) • EVAP canister purge control solenoid valve
	B) EVAP canister purge control valve does not operate properly (stuck open).	• EVAP canister purge control valve • EVAP canister purge control solenoid valve • Vacuum hoses for clogging or disconnection • EVAP control system pressure sensor

Evaporative Emission (EVAP) Canister Purge Control Valve/Solenoid Valve (Cont'd)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

Perform "Procedure for malfunction A" first. If the (1st trip) DTC cannot be confirmed, perform "Procedure for malfunction B".

Procedure for malfunction A

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
3) Wait at least 5 seconds.

OR

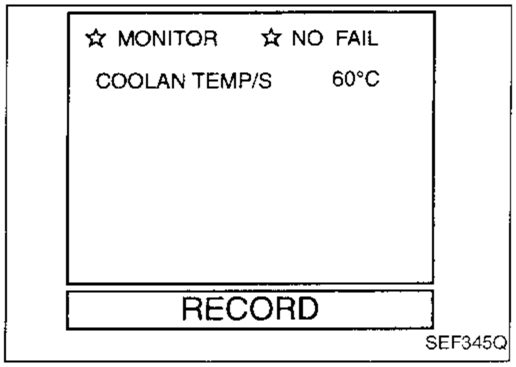
GST

1) Turn ignition switch "ON" and wait at least 5 seconds.
2) Select "MODE 7" with GST.

OR

NO TOOLS

1) Turn ignition switch "ON" and wait at least 5 seconds.
2) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.



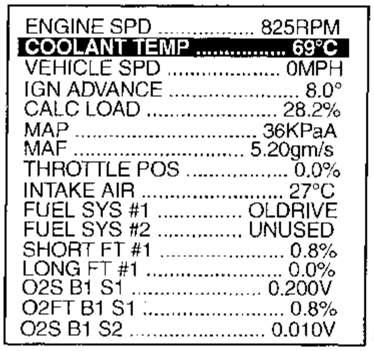
COOLAN TEMP/S 60°C

SEF345Q

Procedure for malfunction B

1) Jack up drive wheels.
2) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT.
3) Start engine and warm it up until the engine coolant temperature is higher than or equal to 75°C (167°F), then stop engine.
4) Start engine and let it idle for at least 70 seconds.
5) Maintain the following conditions for at least 30 seconds.
   Gear position:
   "2" or "D" range (A/T)
   "3rd" or "4th" gear (M/T)
   Vehicle speed:
   40 - 80 km/h (25 - 50 MPH)
   Engine speed:
   1,050 - 3,000 rpm
   Engine coolant temperature:
   Less than 100°C (212°F)

Evaporative Emission (EVAP) Canister Purge Control Valve/Solenoid Valve (Cont'd)



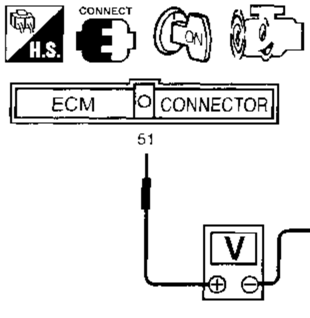
```
ENGINE SPD ................ 825RPM
COOLANT TEMP ............... 69°C
VEHICLE SPD ................ 0MPH
IGN ADVANCE ................. 8.0°
CALC LOAD ................. 28.2%
MAP ..................... 36KPaA
MAF .................... 5.20gm/s
THROTTLE POS ............... 0.0%
INTAKE AIR .................. 27°C
FUEL SYS #1 ............. OLDRIVE
FUEL SYS #2 .............. UNUSED
SHORT FT #1 ................. 0.8%
LONG FT #1 .................. 0.0%
O2S B1 S1 ................. 0.200V
O2FT B1 S1 .................. 0.8%
O2S B1 S2 ................. 0.010V
```

SEF519R

OR

1) Jack up drive wheels.
2) Turn ignition switch "ON" and select "MODE 1" mode with GST.
3) Start engine and warm it up until the engine coolant temperature is higher than or equal to 75°C (167°F), then stop engine.
4) Start engine and let it idle for at least 70 seconds.
5) Maintain the following conditions for at least 30 seconds.

   Gear position:
   "2" or "D" range (A/T)
   "3rd" or "4th" gear (M/T)
   Vehicle speed:
   40 - 80 km/h (25 - 50 MPH)
   Engine speed:
   1,050 - 3,000 rpm
   Engine coolant temperature:
   Less than 100°C (212°F)
6) Select "MODE 7" mode with GST.



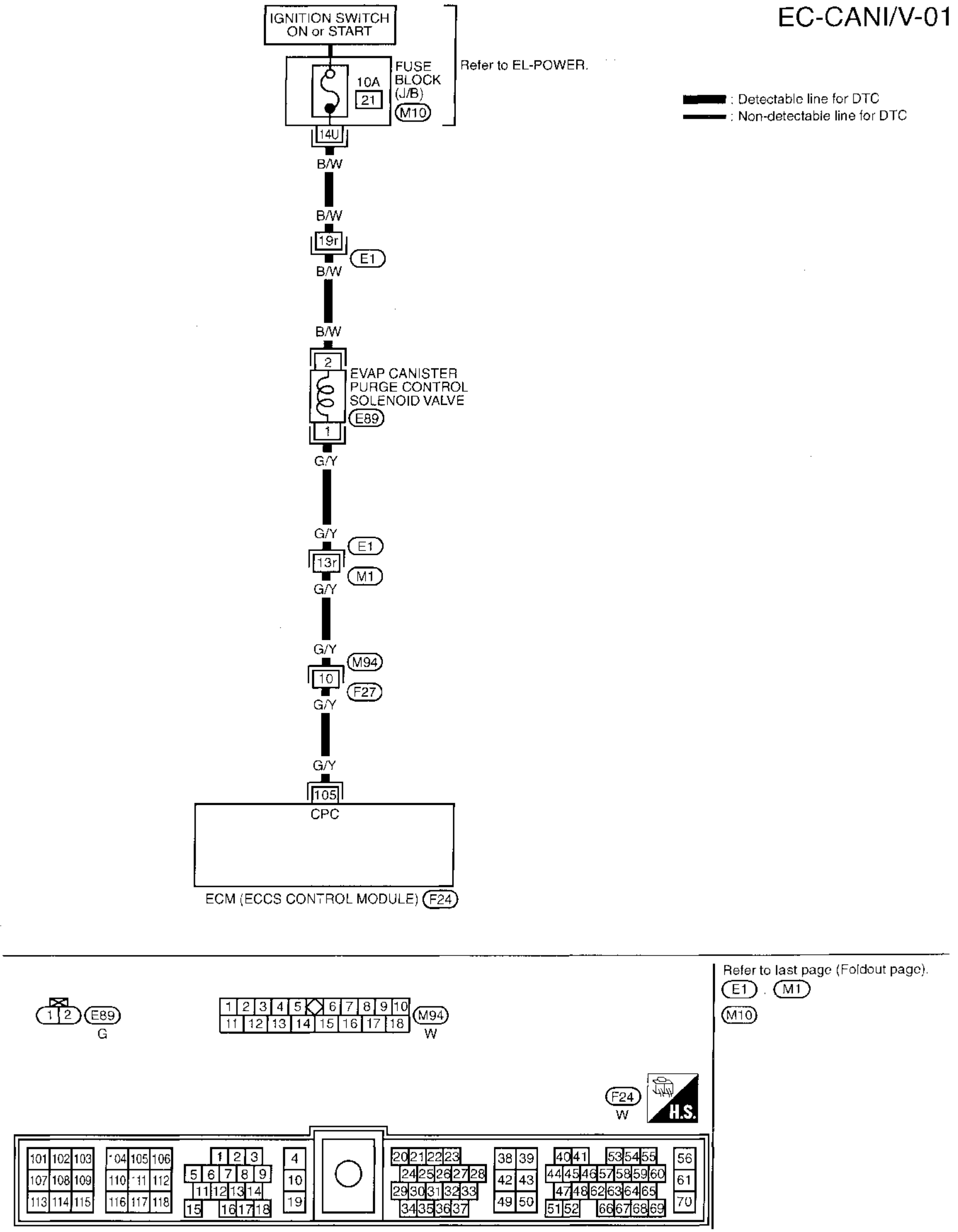
SEF487R

OR

1) Jack up drive wheels.
2) Turn ignition switch "ON".
3) Start engine and warm it up until the voltage between ECM terminal (51) and ground drops higher than or equal to 1.3V.
4) Start engine and let it idle for at least 70 seconds.
5) Maintain the following conditions for at least 30 seconds.

   Gear position:
   "2" or "D" range (A/T)
   "3rd" or "4th" gear (M/T)
   Vehicle speed:
   40 - 80 km/h (25 - 50 MPH)
   Engine speed:
   1,050 - 3,000 rpm
   Voltage between ECM terminal (51) and ground:
   More than 0.06V
6) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
7) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.

Evaporative Emission (EVAP) Canister Purge Control Valve/Solenoid Valve (Cont'd)

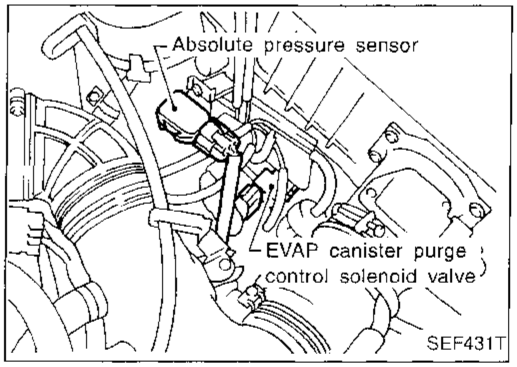


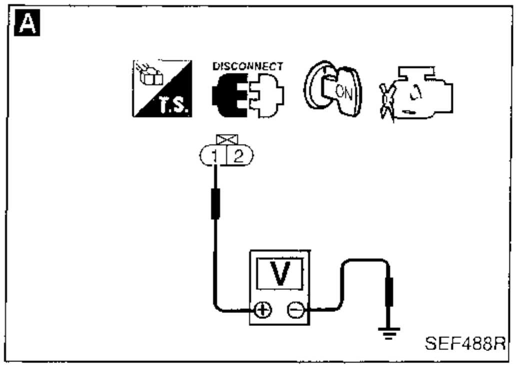
SEF284T

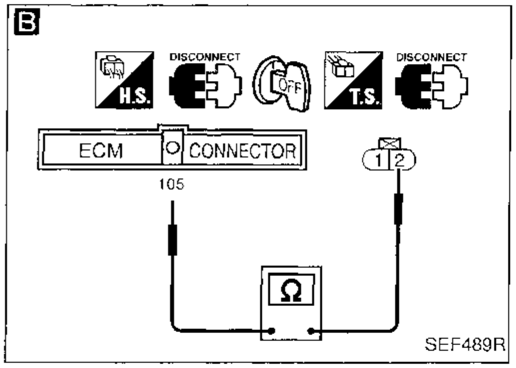
Evaporative Emission (EVAP) Canister Purge Control Valve/Solenoid Valve (Cont'd)

DIAGNOSTIC PROCEDURE

Procedure for malfunction A







INSPECTION START

↓

A

CHECK POWER SUPPLY.
1. Disconnect EVAP canister purge control solenoid valve harness connector.
2. Turn ignition switch "ON".
3. Check voltage between terminal ① and ground with CONSULT or tester.
   Voltage: Battery voltage

NG → Check the following.
- Harness connector E1
- 10A fuse
- Harness for open or short between EVAP canister purge control 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 105 and terminal ②.
   Continuity should exist.
   If OK, check harness for short.

NG → Check the following.
- Harness connectors E1, M1
- Harness connectors M94, F27
- Harness for open or short between EVAP canister purge control solenoid valve and ECM

If NG, repair harness or connectors.

OK ↓

CHECK COMPONENT (EVAP canister purge control solenoid valve).
Refer to "COMPONENT INSPECTION", EC-237.

NG → Replace EVAP canister purge control solenoid valve.

OK ↓

Disconnect and reconnect harness connectors in the circuit. Then retest.

↓ Trouble is not fixed.

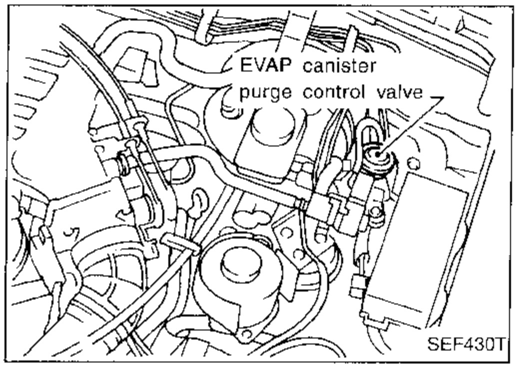
Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

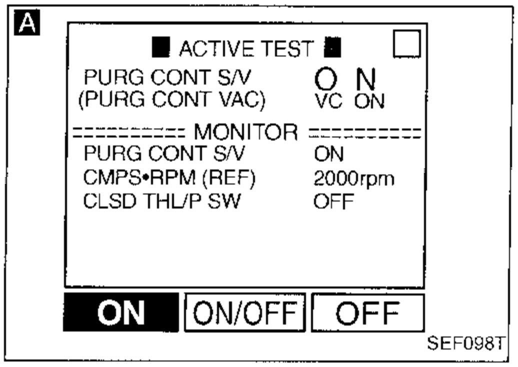
↓

INSPECTION END

Evaporative Emission (EVAP) Canister Purge Control Valve/Solenoid Valve (Cont'd)

Procedure for malfunction B





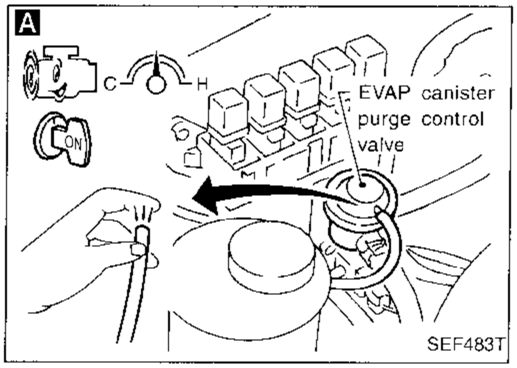
■ ACTIVE TEST ■ ☐

PURG CONT S/V O N

(PURG CONT VAC) VC ON

========== MONITOR ==========

PURG CONT S/V	ON
CMPS•RPM (REF)	2000rpm
CLSD THL/P SW	OFF



INSPECTION START

A

CHECK VACUUM SIGNAL.

1. Disconnect vacuum hose to EVAP canister purge control valve.
2. Start engine.
3. Perform "PURG CONT S/V" in "ACTIVE TEST" mode.
4. Select "ON" on CONSULT screen to turn on "PURG CONT S/V".
5. Check vacuum hose for vacuum while revving engine up to 2,000 rpm.

Vacuum should exist.

— OR —

1. Start engine and warm it up sufficiently.
2. Stop engine.
3. Lift up drive wheels.
4. Disconnect vacuum hose to EVAP canister purge control valve.
5. Start engine.
6. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

Vacuum should exist.

NG → CHECK COMPONENTS (EVAP canister purge control solenoid valve). Refer to "COMPONENTS INSPECTION" on next page.

OK → Check vacuum hoses for clogging or disconnection. Refer to "Vacuum Hose Drawing", EC-13.

OK ↓

CHECK COMPONENT (EVAP canister purge control valve). Refer to "COMPONENT INSPECTION" on next page.

NG → Replace EVAP canister purge control valve.

OK ↓

Go to "TROUBLE DIAGNOSIS FOR DTC P0450", "EVAP Control System Pressure Sensor", EC-243.

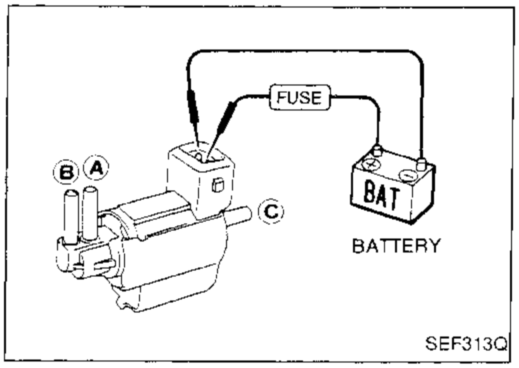
OK ↓

CHECK EVAPORATIVE EMISSION LINE. Check EVAP purge line hoses for leak or clogging. Refer to "Evaporative Emission Line Drawing", EC-22.

NG → Repair EVAP purge line hoses.

OK ↓

INSPECTION END



Evaporative Emission (EVAP) Canister Purge Control Valve/Solenoid Valve (Cont'd)

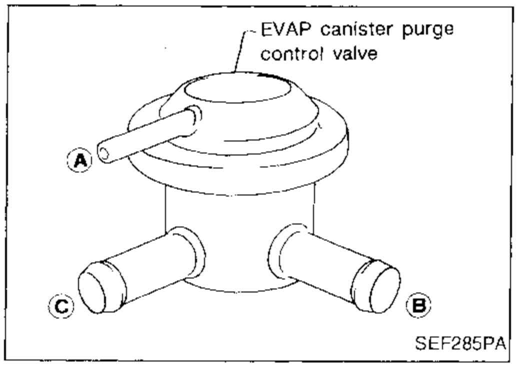
COMPONENT INSPECTION

EVAP canister purge control solenoid valve

Check air passage continuity.

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

If NG, replace solenoid valve.



EVAP canister purge control valve

Check EVAP canister purge control valve as follows.

1. Plug the port Ⓑ.
2. Apply pressure [80.0 kPa (600 mmHg, 23.62 inHg, 11.60 psi)] to port Ⓐ. Then keep it for 15 seconds, and check there is no leakage.
3. Repeat step 2 for port Ⓒ.

Evaporative Emission (EVAP) Canister Vent Control Valve

COMPONENT DESCRIPTION

Note:
If both DTC P0440 and P0446 are displayed, perform TROUBLE DIAGNOSIS FOR DTC P0446 first.

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent.

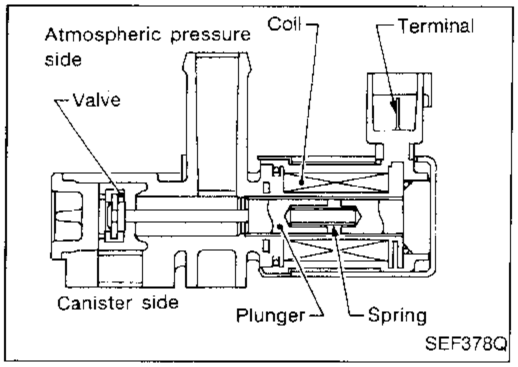
This solenoid (the EVAP canister vent control valve) responds to signals from the ECM.

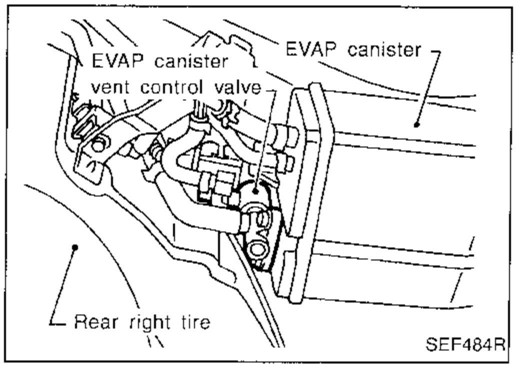
When the ECM sends an ON signal, the coil in the solenoid valve is energized.

A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.

This solenoid valve is used only for diagnosis, and usually remains opened.

When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows "EVAP Control System (Small Leak)" diagnosis.





CONSULT 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 ㊸ (ECCS ground).

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
108	Y/G	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 0903	A) 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.)
	B) EVAP canister vent control valve does not operate properly.	• EVAP canister vent control valve • EVAP control system pressure sensor • Blocked rubber tube to EVAP canister vent control valve

Note: If both DTC P0440 and P0446 are displayed, perform TROUBLE DIAGNOSIS FOR P0446 first.

Evaporative Emission (EVAP) Canister Vent Control Valve (Cont'd)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

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

Procedure for malfunction A

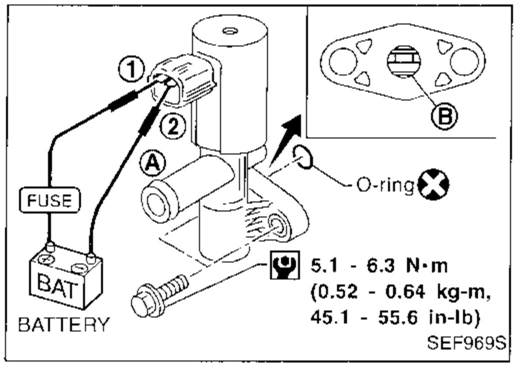
1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
3) Start engine and wait at least 8 seconds.

OR

GST
1) Start engine and wait at least 8 seconds.
2) Select "MODE 7" with GST.

OR

NO TOOLS
1) Start engine and wait at least 5 seconds.
2) Turn ignition switch "OFF", wait at least 8 seconds and then turn "ON".
3) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.



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.

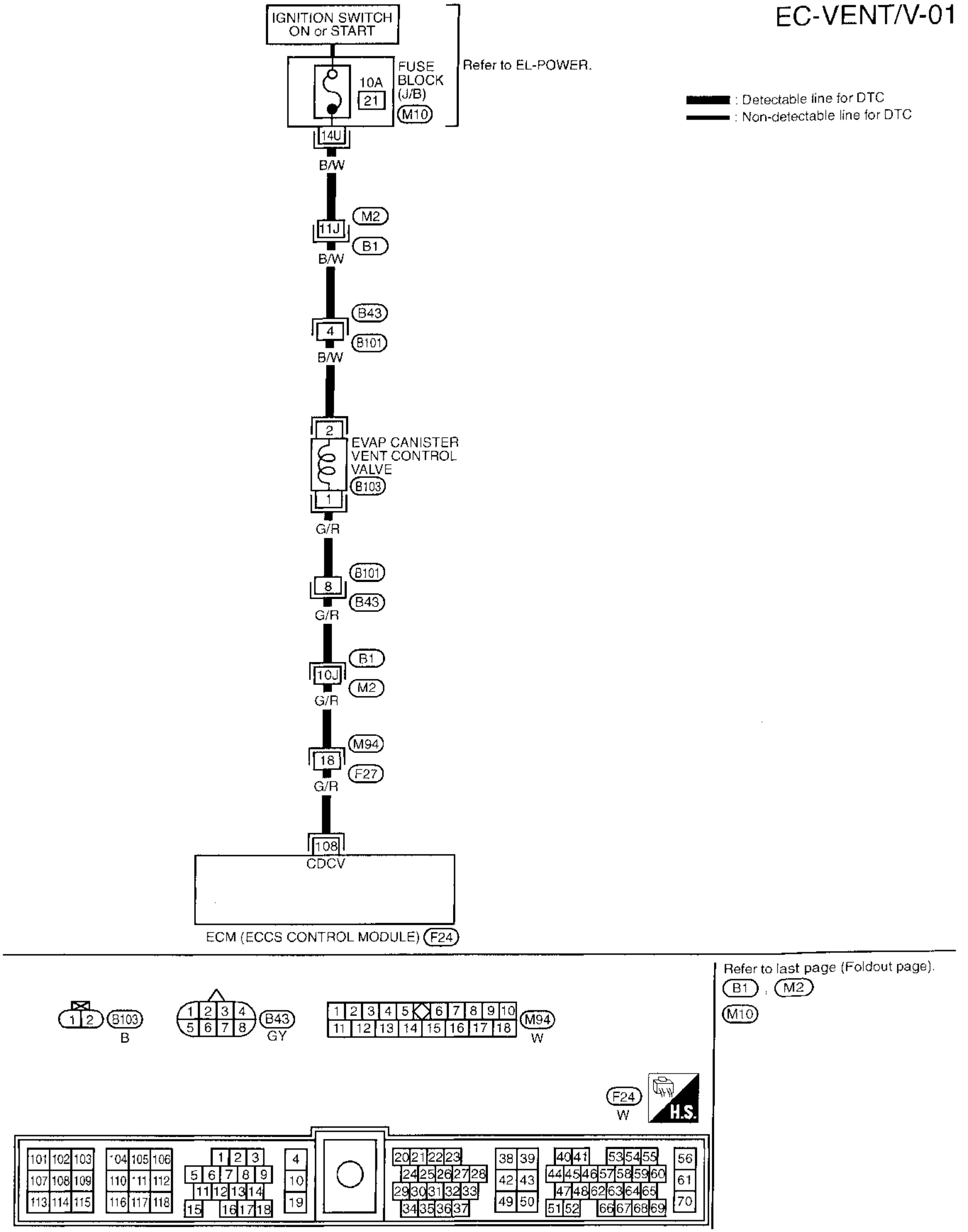
Procedure for malfunction B

1) Remove EVAP canister vent control valve from EVAP canister and disconnect hoses from the valve.
2) Check air passage continuity.

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

TROUBLE DIAGNOSIS FOR DTC P0446

Evaporative Emission (EVAP) Canister Vent Control Valve (Cont'd)



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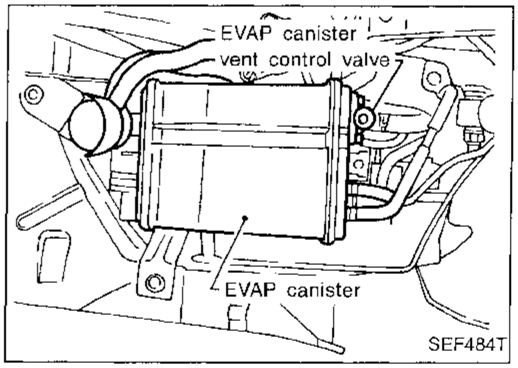
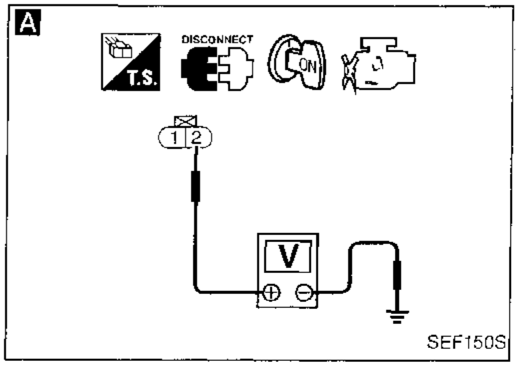
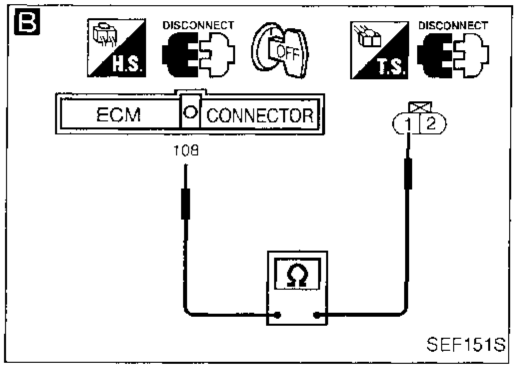
Evaporative Emission (EVAP) Canister Vent Control Valve (Cont'd)

DIAGNOSTIC PROCEDURE







INSPECTION START

↓

A

CHECK POWER SUPPLY.
1. Disconnect EVAP canister vent control valve harness connector.
2. Turn ignition switch "ON".
3. Check voltage between terminal ② and ground with CONSULT or tester.

Voltage: Battery voltage

NG → Check the following.
- Harness connectors (M2), (B1)
- Harness connectors (B43), (B101)
- 10A fuse
- Harness for open or short between EVAP canister vent control 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 (108) and terminal ① .

Continuity should exist.

If OK, check harness for short.

NG → Check the following.
- Harness connectors (B101), (B43)
- Harness connectors (B1), (M2)
- Harness connectors (M94), (F27)
- Harness for open or short between EVAP canister vent control valve and ECM

If NG, repair harness or connectors.

↓ OK

CHECK RUBBER TUBE FOR CLOGGING.
Check obstructed rubber tube to EVAP canister vent control valve and clean the rubber tube using air blower.

↓ OK

CHECK COMPONENT
(EVAP canister vent control valve).
Refer to "COMPONENT INSPECTION" on next page.

NG → Replace EVAP canister vent control valve.

↓ OK

CHECK COMPONENT
(EVAP control system pressure sensor).
Refer to "COMPONENT INSPECTION" on next page.

NG → Replace EVAP control system pressure sensor.

↓ OK

Disconnect and reconnect harness connectors in the circuit. Then retest.

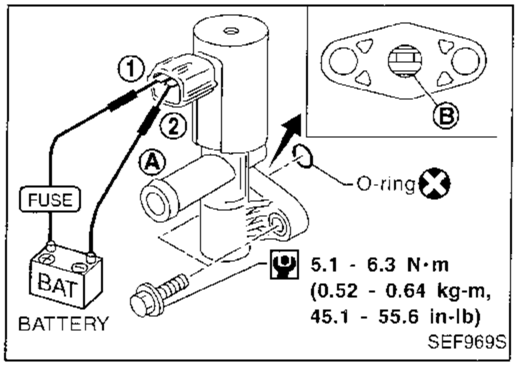
↓ Trouble is not fixed.

Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

↓

INSPECTION END

Evaporative Emission (EVAP) Canister Vent Control Valve (Cont'd)



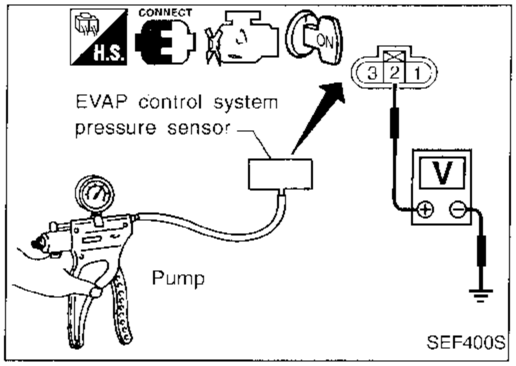
COMPONENT INSPECTION

EVAP canister vent control valve

Check air passage continuity.

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

If NG, clean valve using air blower or replace as necessary.



EVAP control system pressure sensor

1. Remove EVAP control system pressure sensor with its harness connector connected.
2. Remove hose from EVAP control system pressure sensor.
3. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.
4. Check output voltage between terminal ② and engine ground.

Pressure (Relative to atmospheric pressure)	Voltage (V)
0 kPa (0 mmHg, 0 inHg, 0 psi)	3.0 - 3.6
-9.3 kPa (-70 mmHg, -2.76 inHg, -1.35 psi)	0.4 - 0.6

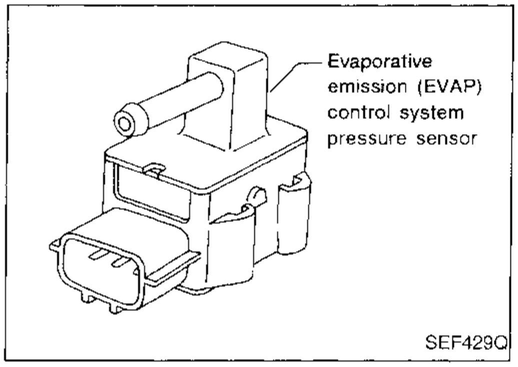
CAUTION:
Always calibrate the vacuum pump gauge when using it.

5. If NG, replace EVAP control system pressure sensor.

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.



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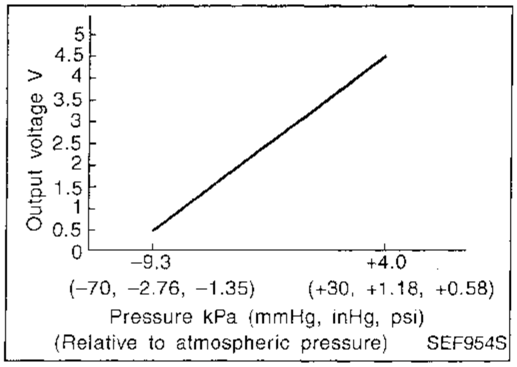


SEF954S

CONSULT 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 ㊸ (ECCS ground).

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
49	P/B	Throttle position sensor power supply	Ignition switch "ON"	Approximately 5V
67	G	EVAP control system pressure sensor	Ignition switch "ON"	Approximately 3.4V

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P0450 0704	• 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.) • EVAP control system pressure sensor • EVAP canister vent control valve (The valve is stuck open.)

Evaporative Emission (EVAP) Control System Pressure Sensor (Cont'd)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

1) Start engine and warm it up sufficiently.
2) Check that tank fuel temperature is above 0°C (32°F).
3) Turn ignition switch "OFF" and wait at least 5 seconds.
4) Turn ignition switch "ON".
5) Select "DATA MONITOR" mode with CONSULT.
6) Wait at least 12 seconds.

OR

GST

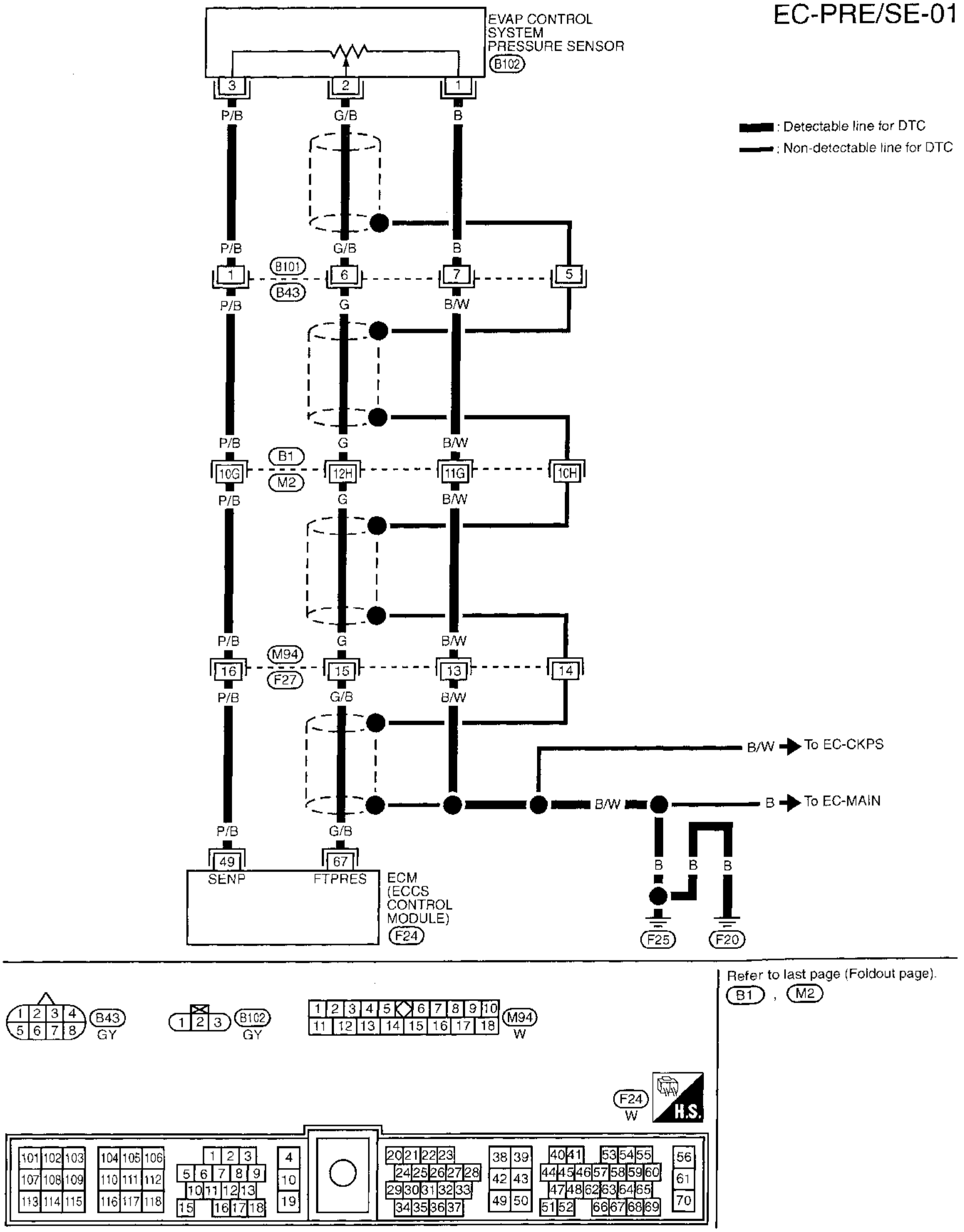
1) Start engine and warm it up sufficiently.
2) Check that voltage between ECM terminal (67) and ground is less than 4.2V.
3) Turn ignition switch "OFF" and wait at least 5 seconds.
4) Turn ignition switch "ON" and wait at least 12 seconds.
5) Select "MODE 7" with GST.

OR

NO TOOLS

1) Start engine and warm it up sufficiently.
2) Check that voltage between ECM terminal (67) and ground is less than 4.2V.
3) Turn ignition switch "OFF" and wait at least 5 seconds.
4) Turn ignition switch "ON" and wait at least 12 seconds.
5) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
6) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.

Evaporative Emission (EVAP) Control System Pressure Sensor (Cont'd)



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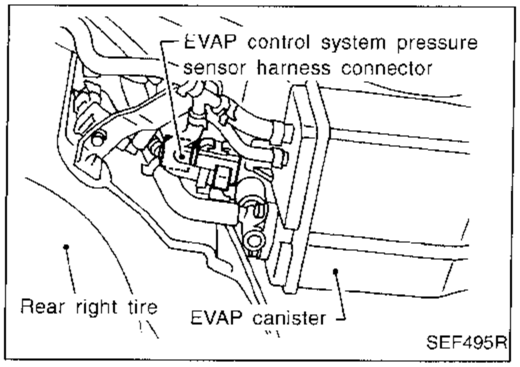
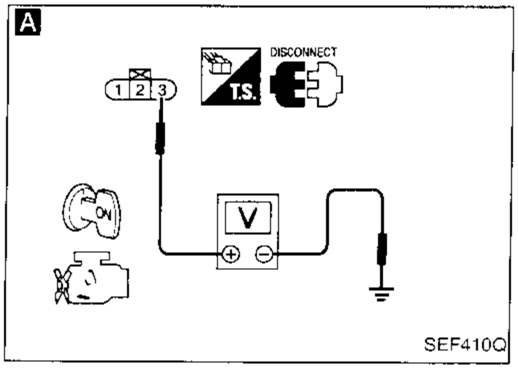
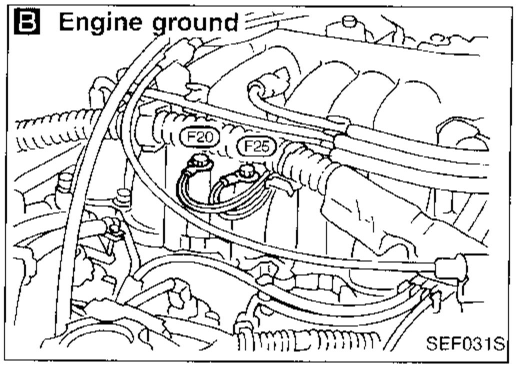
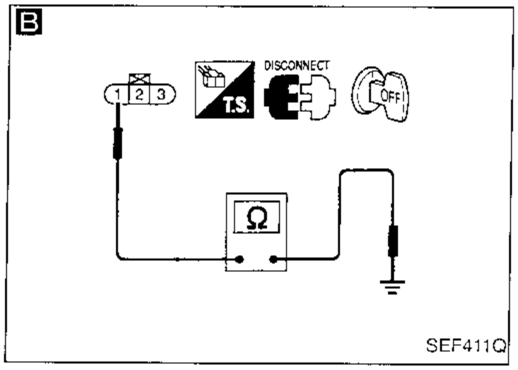
Evaporative Emission (EVAP) Control System Pressure Sensor (Cont'd)

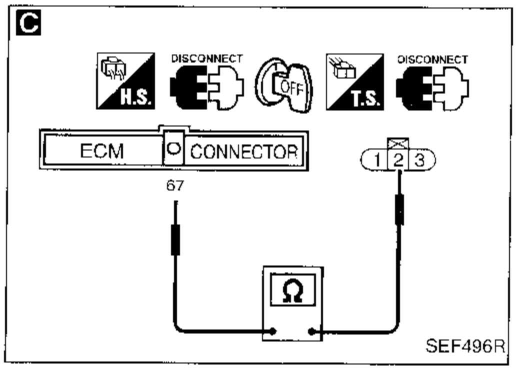
DIAGNOSTIC PROCEDURE











INSPECTION START

A

CHECK POWER SUPPLY.

1. Turn ignition switch "OFF".
2. Disconnect EVAP control system pressure sensor harness connector.
3. Turn ignition switch "ON".
4. Check voltage between terminal ③ and engine ground with CONSULT or tester.
Voltage: Approximately 5V

NG → Check the following.
- Harness connectors B101, B43
- Harness connectors B1, M2
- Harness connectors M94, F27
- 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. Loosen and retighten ground screw.
3. Check harness continuity between terminal ① and engine ground.
Continuity should exist.
If OK, check harness for short.

NG → Check the following.
- Harness connectors B101, B43
- Harness connectors B1, M2
- Harness connectors M94, F27
- Harness for open or short between ECM and EVAP control system pressure sensor

If NG, repair 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.

NG → Check the following.
- Harness connectors B101, B43
- Harness connectors B1, M2
- Harness connectors M94, F27
- Harness for open or short between ECM and EVAP control system pressure sensor

If NG, repair harness or connectors.

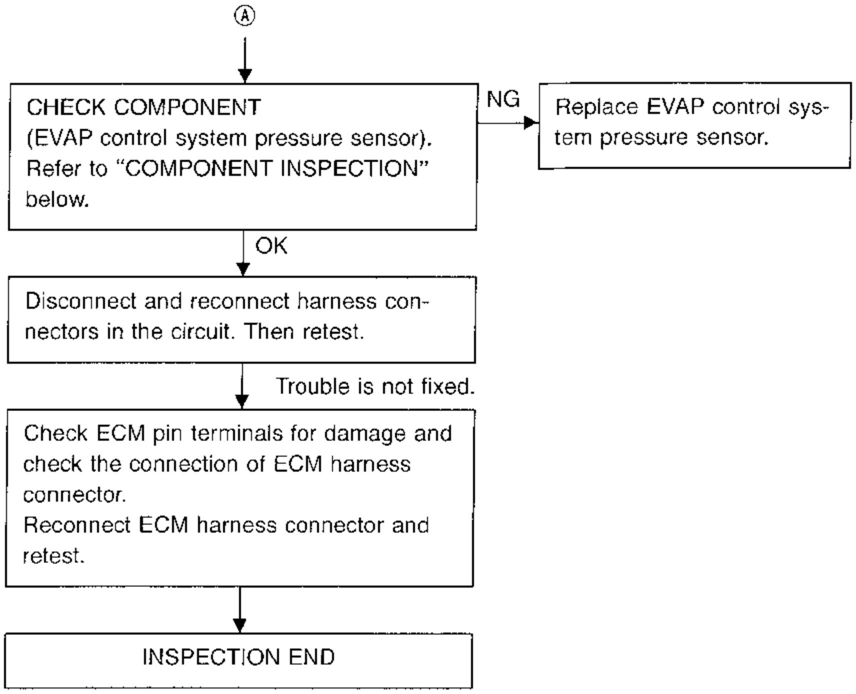
OK ↓

CHECK COMPONENT
(EVAP canister vent control valve).
Refer to "COMPONENT INSPECTION", EC-242.

OK ↓

Ⓐ

Evaporative Emission (EVAP) Control System Pressure Sensor (Cont'd)



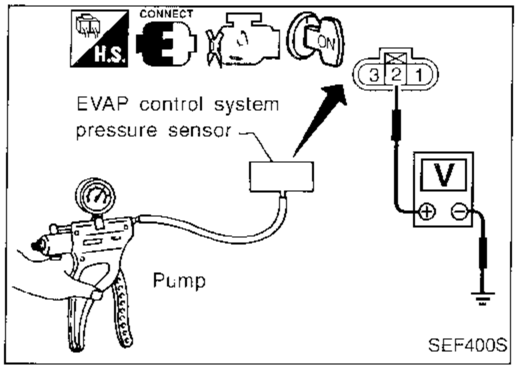
CHECK COMPONENT (EVAP control system pressure sensor). Refer to "COMPONENT INSPECTION" below.

Replace EVAP control system pressure sensor.

Disconnect and reconnect harness connectors in the circuit. Then retest.

Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

INSPECTION END



SEF400S

COMPONENT INSPECTION

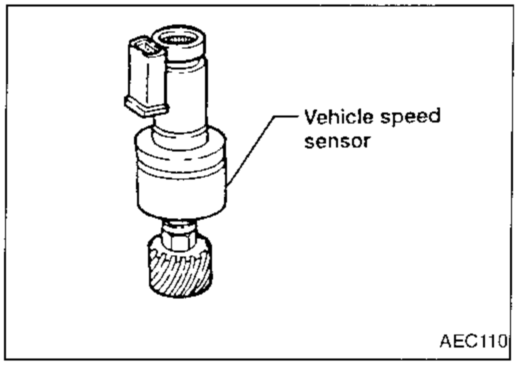
EVAP control system pressure sensor

1. Remove EVAP control system pressure sensor with its harness connector connected.
2. Remove hose from EVAP control system pressure sensor.
3. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.
4. Check output voltage between terminal ② and engine ground.

Pressure (Relative to atmospheric pressure)	Voltage (V)
0 kPa (0 mmHg, 0 inHg, 0 psi)	3.0 - 3.6
−9.3 kPa (−70 mmHg, −2.76 inHg, −1.35 psi)	0.4 - 0.6

CAUTION:
Always calibrate the vacuum pump gauge when using it.

5. If NG, replace EVAP control system pressure sensor.



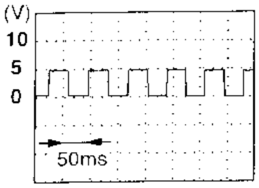
Vehicle Speed Sensor (VSS)

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

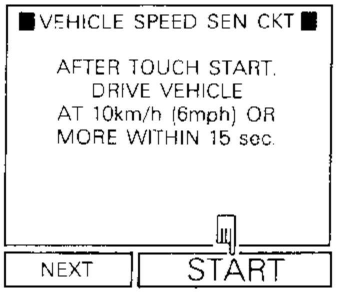
Specification data are reference values and are measured between each terminal and ㊸ (ECCS ground).

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
26	W/L	Vehicle speed sensor	Engine is running. — Lift up the vehicle. — In 1st gear position	1.9 - 2.1V 

ON BOARD DIAGNOSIS LOGIC

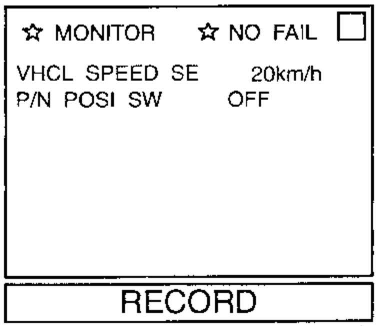
Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P0500 0104	• The almost 0 km/h (0 MPH) signal from vehicle speed sensor is sent to ECM even when vehicle is being driven.	• Harness or connector (The vehicle speed sensor circuit is open or shorted.) • Vehicle speed sensor

Vehicle Speed Sensor (VSS) (Cont'd)



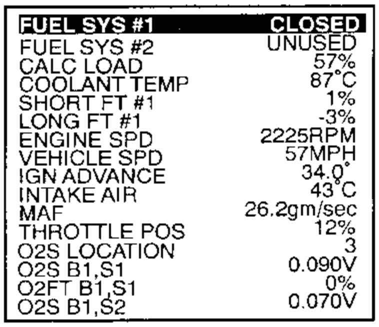
```
■VEHICLE SPEED SEN CKT■

AFTER TOUCH START.
DRIVE VEHICLE
AT 10km/h (6mph) OR
MORE WITHIN 15 sec.
```

MEF559D



```
☆ MONITOR   ☆ NO FAIL  ☐
VHCL SPEED SE    20km/h
P/N POSI SW      OFF
```

SEF941N



```
FUEL SYS #1        CLOSED
FUEL SYS #2        UNUSED
CALC LOAD             57%
COOLANT TEMP         87°C
SHORT FT #1            1%
LONG FT #1            -3%
ENGINE SPD        2225RPM
VEHICLE SPD         57MPH
IGN ADVANCE         34.0°
INTAKE AIR           43°C
MAF           26.2gm/sec
THROTTLE POS          12%
O2S LOCATION            3
O2S B1,S1          0.090V
O2FT B1,S1             0%
O2S B1,S2          0.070V
```

SEF942N

OVERALL FUNCTION CHECK

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

1) Lift up drive wheels.
2) Start engine.
3) Perform "VEHICLE SPEED SEN CKT" in "FUNCTION TEST" mode with CONSULT.

OR

1) Lift up drive wheels.
2) Start engine.
3) Read vehicle speed sensor signal in "DATA MONITOR" mode with CONSULT.

The vehicle speed on CONSULT should be able to exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.

OR

GST

1) Lift up drive wheels.
2) Start engine.
3) Read vehicle speed sensor signal in "MODE 1" with GST.

The vehicle speed on GST should be able to exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

NO TOOLS

1) Start engine and warm it up sufficiently.
2) Perform test drive for at least 10 seconds continuously under the following recommended condition.

Engine speed : 1,800 - 2,600 rpm (M/T models)
1,400 - 2,800 rpm (A/T models)

Intake manifold vacuum : M/T −53.3 to −40.0 kPa
(−400 to −300 mmHg,
−15.75 to −11.81 inHg)
A/T −53.3 to −33.3 kPa
(−400 to −250 mmHg,
−15.75 to −9.84 inHg)

Gear position : Suitable position (except "N" or "P" position)

3) Stop the vehicle, turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
4) Perform "Diagnostic Test Mode II" (Self-diagnostic results) with ECM.

Even though 1st trip DTC is not detected, perform the above test drive at least one more time.

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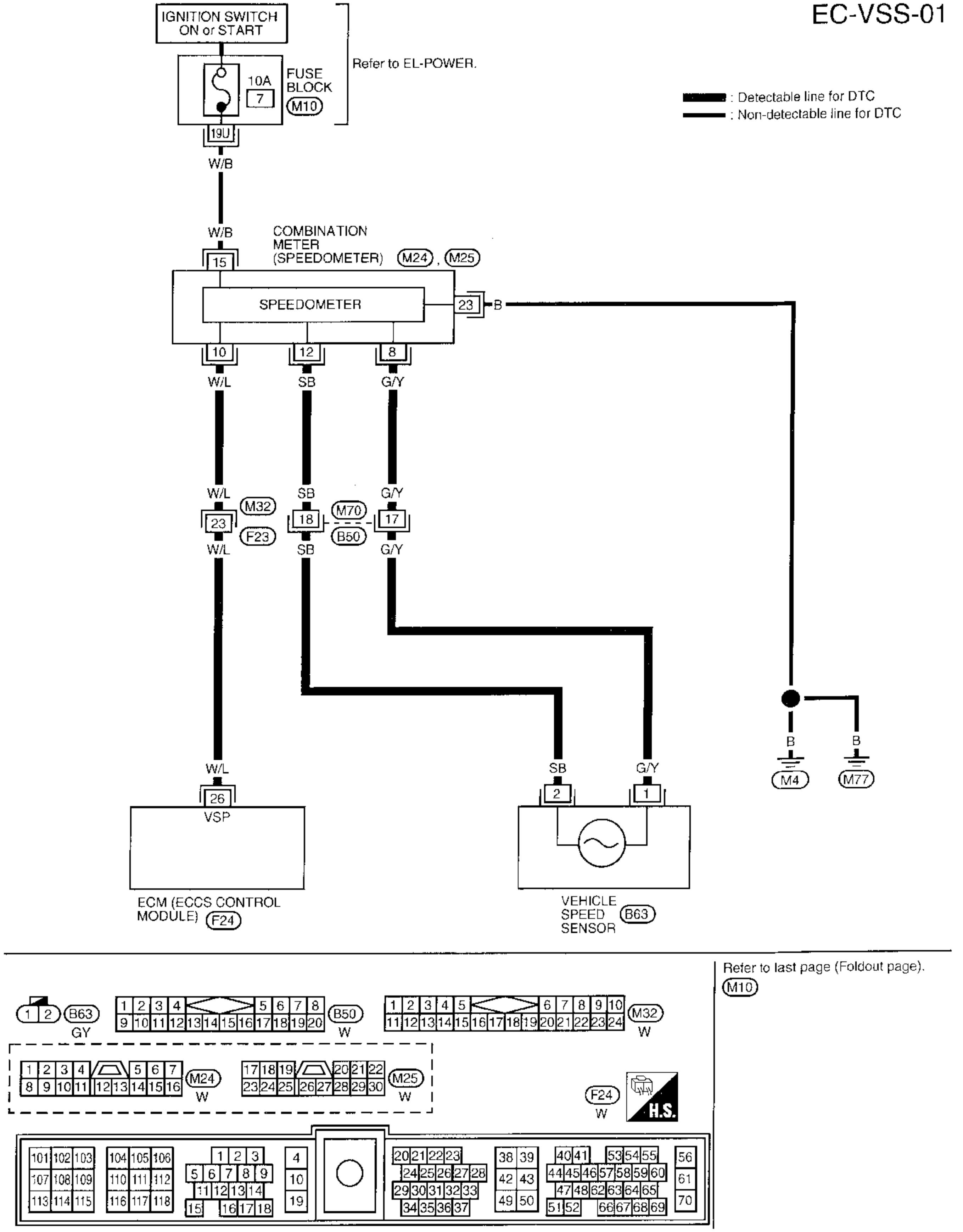
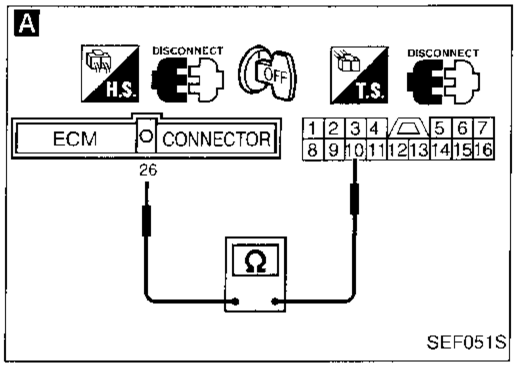
Vehicle Speed Sensor (VSS) (Cont'd)



SEF269T

Vehicle Speed Sensor (VSS) (Cont'd)

DIAGNOSTIC PROCEDURE



SEF051S

INSPECTION START

↓

A

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 ⑩.
   Continuity should exist.
   If OK, check harness for short.

NG → Check the following.

- Harness connectors M32, F23
- Harness for open or short between ECM and combination meter

If NG, repair harness or connectors.

OK ↓

CHECK SPEEDOMETER FUNCTION.
Make sure that speedometer functions properly.

NG → Check the following.

- Harness connectors M70, B50
- 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 ↓

Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed. ↓

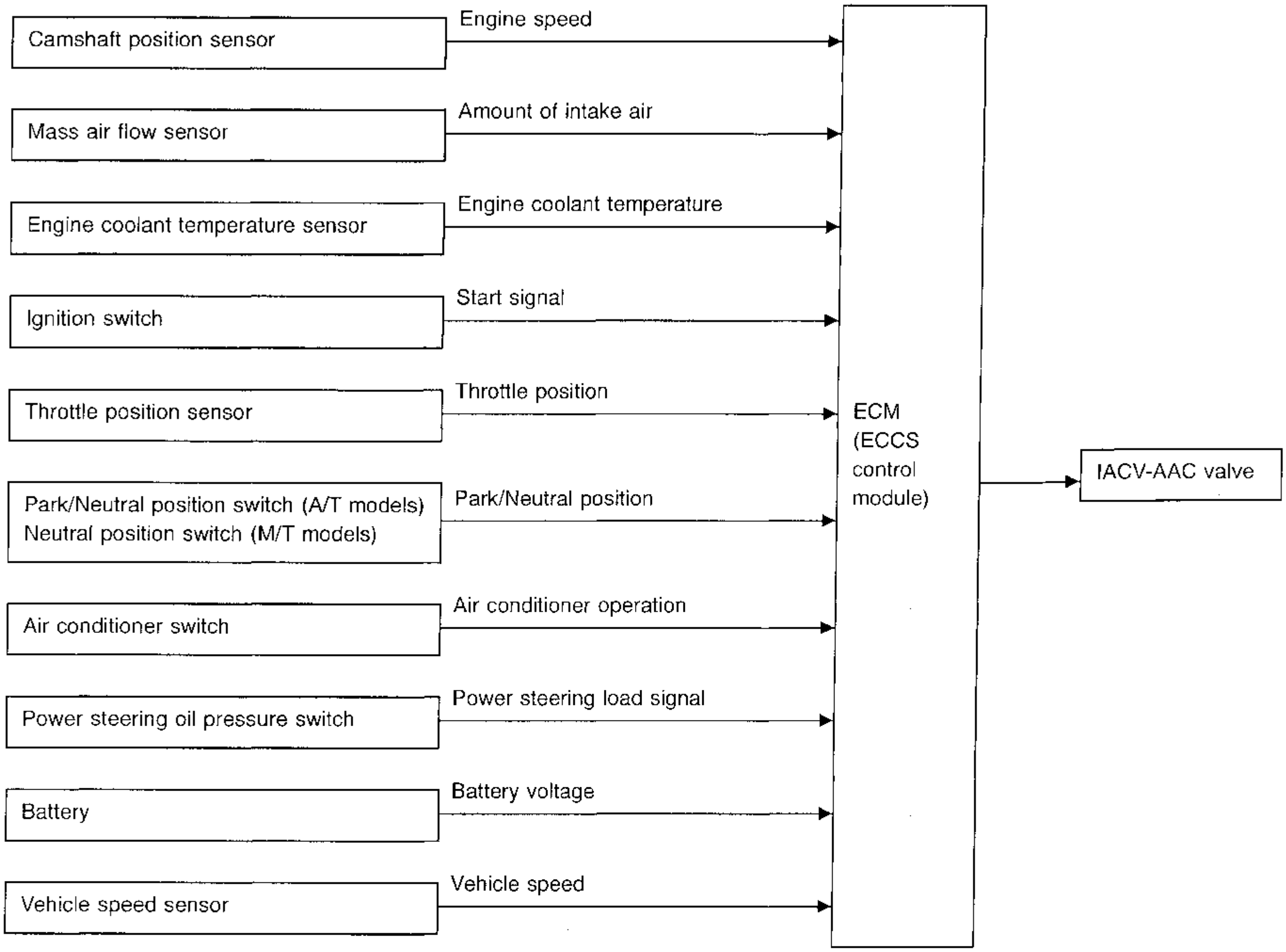
Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

↓

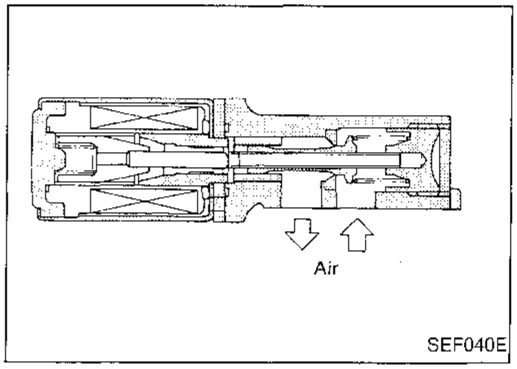
INSPECTION END

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).



SEF040E

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.

TROUBLE DIAGNOSIS FOR DTC P0505

Idle Air Control Valve (IACV) — Auxiliary Air Control (AAC) Valve (Cont'd)

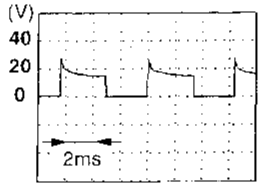
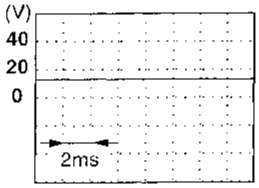
CONSULT REFERENCE VALUE IN DATA MONITOR MODE

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	10 - 20%
		2,000 rpm	—

ECM TERMINALS AND REFERENCE VALUE

Specification data are reference values and are measured between each terminal and ㊸ (ECCS ground).

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
55	OR	IACV-AAC valve	Engine is running. (Warm-up condition) └ Idle speed	8 - 11V  SEF197T
			Engine is running. (Warm-up condition) └ Engine speed is 2,000 rpm	5 - 8V  SEF198T

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P0505 0205	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

Idle Air Control Valve (IACV) — Auxiliary Air Control (AAC) Valve (Cont'd)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

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

Procedure for malfunction A

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
3) Wait at least 2 seconds.

OR

GST
1) Turn ignition switch "ON" and wait at least 2 seconds.
2) Select "MODE 7" with GST.

OR

NO TOOLS
1) Turn ignition switch "ON" and wait at least 2 seconds.
2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
3) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.

Procedure for malfunction B

1) Start engine and warm it up sufficiently.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Turn ignition switch "ON" again and select "DATA MONITOR" mode with CONSULT.
4) Start engine and run it for at least 1 minute at idle speed.

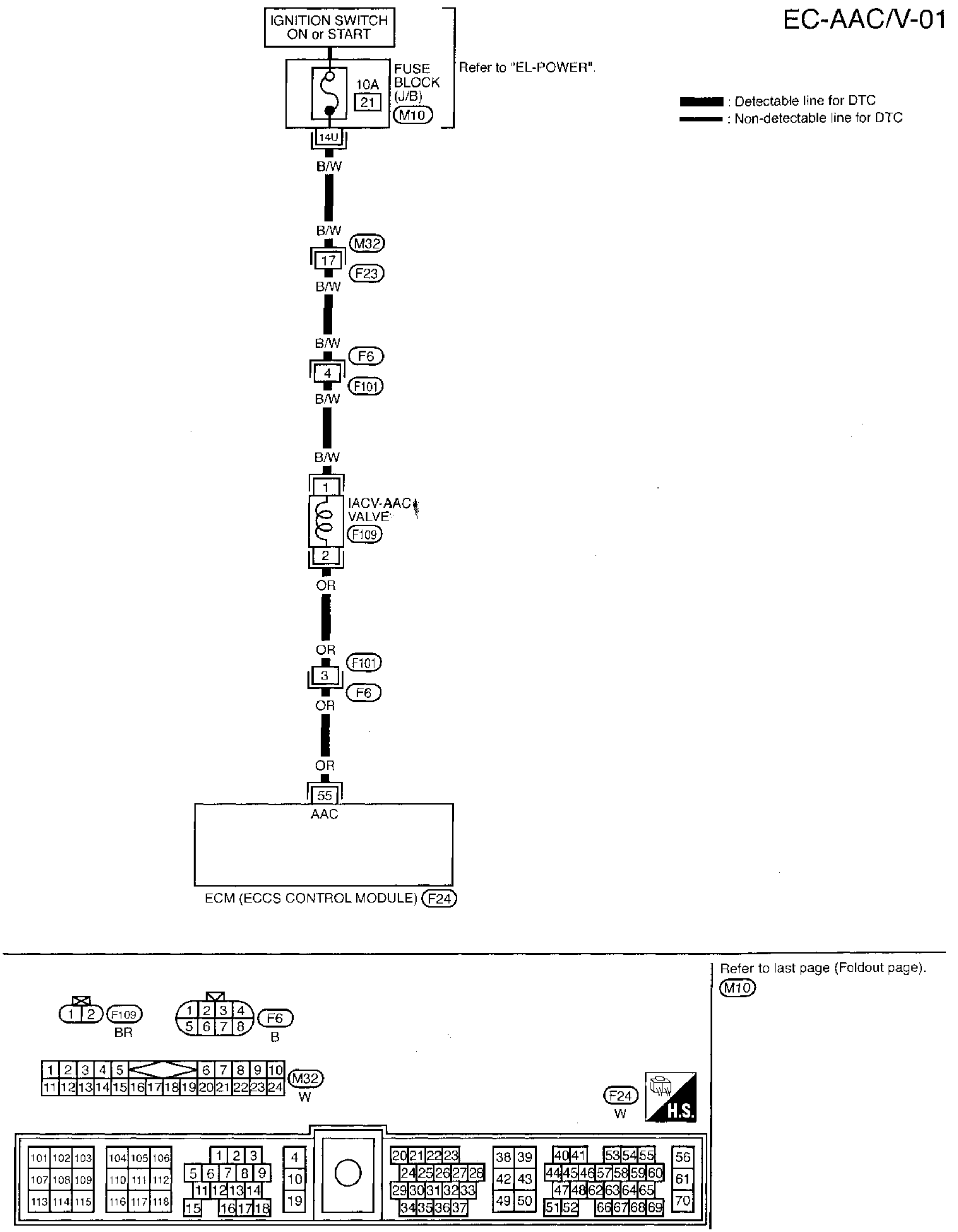
OR

GST
1) Start engine and warm it up sufficiently.
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.

OR

NO TOOLS
1) Start engine and warm it up sufficiently.
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) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
5) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.

Idle Air Control Valve (IACV) — Auxiliary Air Control (AAC) Valve (Cont'd)



SEF909R

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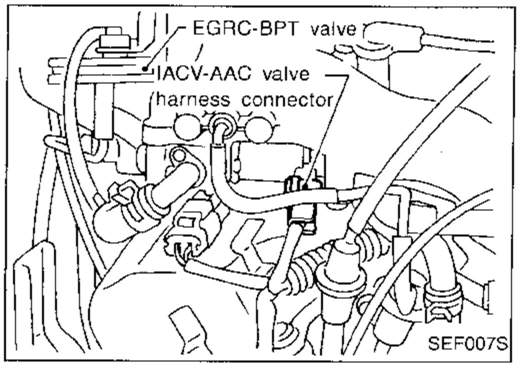
Idle Air Control Valve (IACV) — Auxiliary Air Control (AAC) Valve (Cont'd)



DIAGNOSTIC PROCEDURE

INSPECTION START

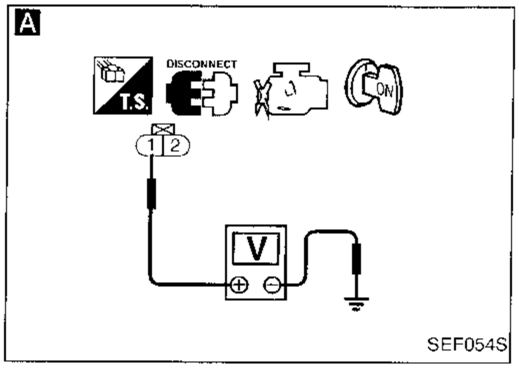
A

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 or tester.
   Voltage: Battery voltage

NG → Check the following.
- Harness connectors (F101), (F6)
- Harness connectors (F23), (M32)
- 10A fuse
- Harness for open or short between IACV-AAC valve harness connector and fuse

If NG, repair harness or connectors.

OK ↓



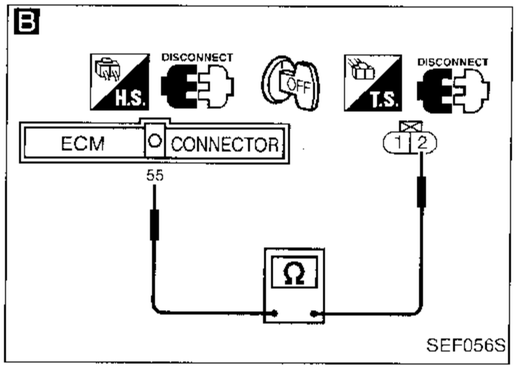
B

CHECK OUTPUT SIGNAL CIRCUIT.
1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal (55) and terminal ②.
   Continuity should exist.
   If OK, check harness for short.

NG → Check the following.
- Harness connectors (F6), (F101)
- Harness for open or short between IACV-AAC valve and ECM

If NG, repair harness or connectors.

OK ↓



CHECK COMPONENT (IACV-AAC valve).
Refer to "COMPONENT INSPECTION" below.

NG → Replace IACV-AAC valve.

OK ↓

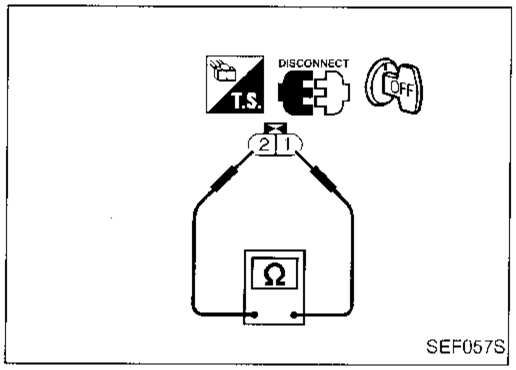
Disconnect and reconnect harness connectors in the circuit. Then retest.

↓ Trouble is not fixed.

Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

↓

INSPECTION END

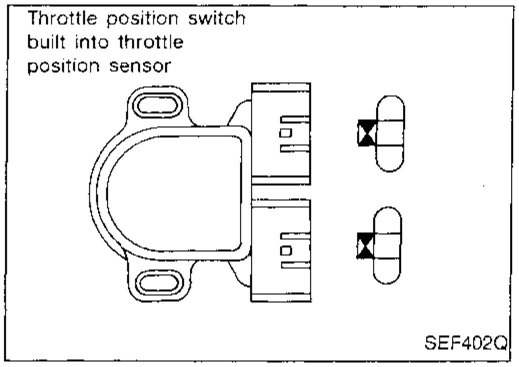


COMPONENT INSPECTION

IACV-AAC valve

Disconnect IACV-AAC valve harness connector.

- Check IACV-AAC valve resistance.
  Resistance:
  Approximately 10Ω [at 25°C (77°F)]
- Check plunger for seizing or sticking.
- Check for broken spring.



SEF402Q

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 control valve when the throttle position sensor is malfunctioning.

CONSULT REFERENCE VALUE IN DATA MONITOR MODE

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
CLSD THL/P SW	• Ignition switch: ON (Engine stopped)	Throttle valve: Idle position	ON
		Throttle valve: Slightly open	OFF

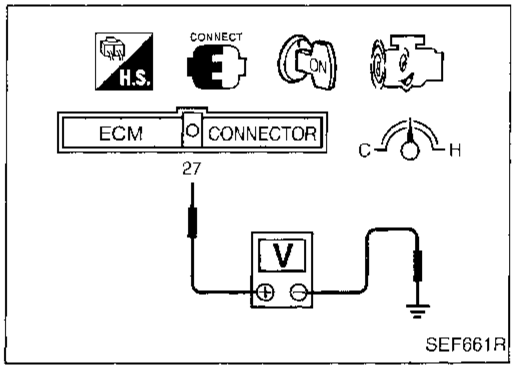
ECM TERMINALS AND REFERENCE VALUE

Specification data are reference values and are measured between each terminal and ㊸ (ECCS ground).

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
27	OR/W	Throttle position switch (Closed position)	Ignition switch "ON" (Warm-up condition) Accelerator pedal 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 0203	• 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



SEF661R

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 sufficiently.
2) Check the voltage between ECM terminal ㉗ and ground under the following conditions.
   At idle: Battery voltage
   At 2,000 rpm: Approximately 0V

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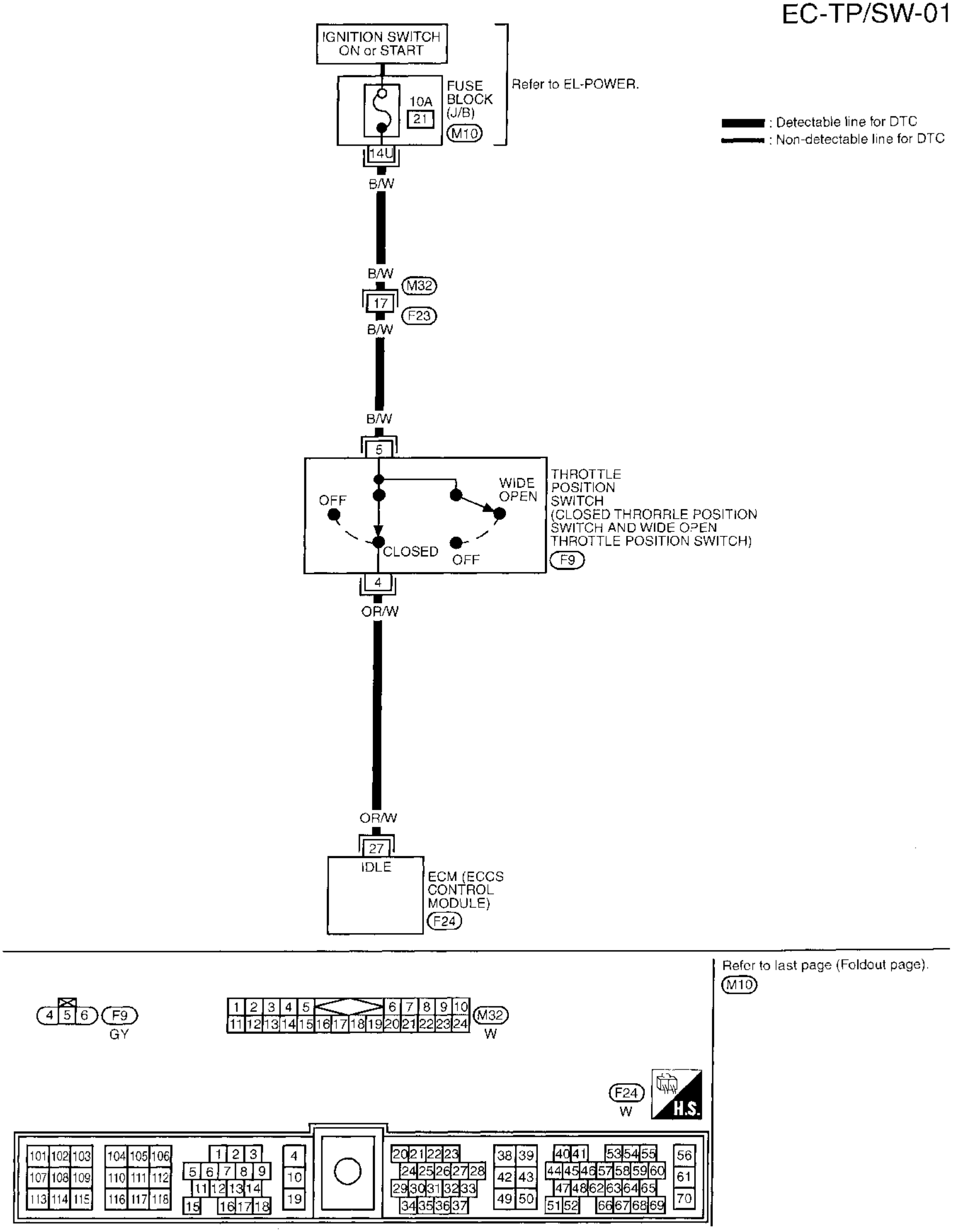
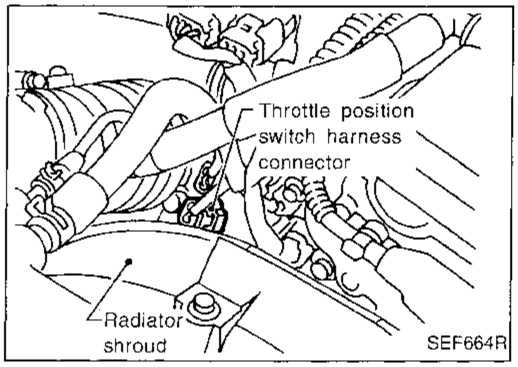
Closed Throttle Position Switch (Cont'd)



SEF289T

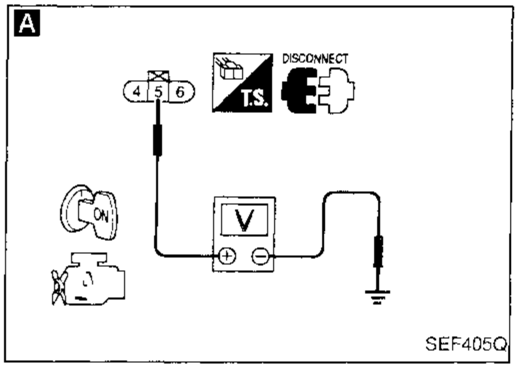
Closed Throttle Position Switch (Cont'd)

DIAGNOSTIC PROCEDURE



INSPECTION START

A



CHECK POWER SUPPLY.

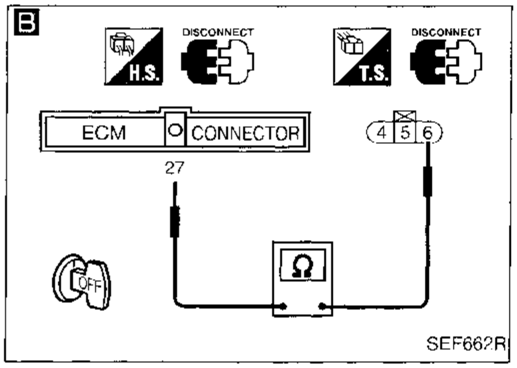
1. Turn ignition switch "OFF".
2. Disconnect throttle position switch harness connector.
3. Turn ignition switch "ON".
4. Check voltage between terminal ⑤ and engine ground with CONSULT or tester.
   Voltage: Battery voltage

NG → Check the following.
- Harness connectors (M32), (F23)
- 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.

NG → Repair harness or connectors.

OK ↓

ADJUST THROTTLE POSITION SWITCH.
Perform BASIC INSPECTION, EC-74.

OK ↓

CHECK COMPONENT
(Closed throttle position switch).
Refer to "COMPONENT INSPECTION" on next page.

NG → Replace throttle position switch.

OK ↓

Disconnect and reconnect harness connectors in the circuit. Then retest.

↓ Trouble is not fixed.

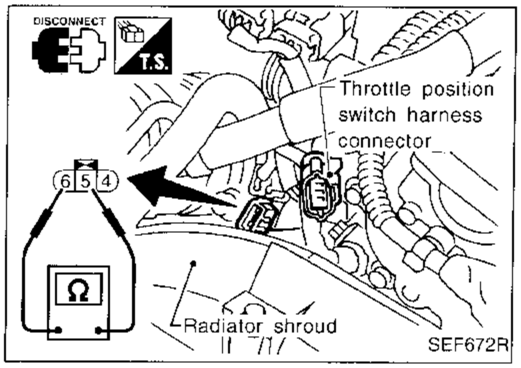
Check ECM pin terminals for damage and check the connection of ECM harness connector.
Reconnect ECM harness connector and retest.

↓

INSPECTION END

Closed Throttle Position Switch (Cont'd)

COMPONENT INSPECTION



Closed throttle position switch

1. Start engine and warm it up sufficiently.
2. Turn ignition switch "OFF".
3. Disconnect throttle position switch harness connector.
4. Check continuity between terminals ⑤ and ⑥ while opening throttle valve manually.

Throttle valve conditions	Continuity
Completely closed	Yes
Partially open or completely open	No

If NG, replace throttle position switch.

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 A/T control unit.

ECM TERMINALS AND REFERENCE VALUE

Specification data are reference values and are measured between each terminal and ㊸ (ECCS ground).

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
24	PU/W	A/T signal No. 1	Ignition switch "ON" Engine is running. └ Idle speed	6 - 8V
29	P/B	A/T signal No. 2	Ignition switch "ON" Engine is running. └ Idle speed	6 - 8V
30	P	A/T signal No. 3	Ignition switch "ON"	0V

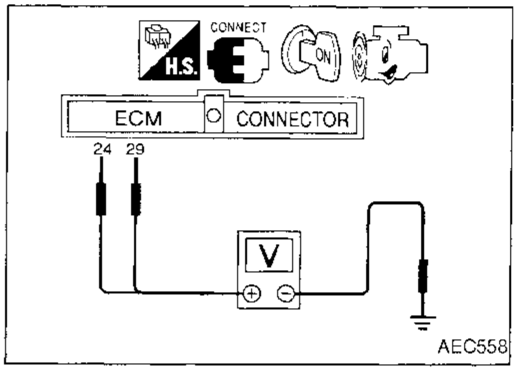
ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Item (Possible Cause)
P0600 0504	• ECM receives incorrect voltage from A/T control unit continuously.	• Harness or connectors (The circuit between ECM and A/T control unit is open or shorted.)

*: This DTC can be detected only by "DATA MONITOR (AUTO TRIG)" with CONSULT.

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
3) Start engine, and race more than 1,000 rpm once, then wait at least 40 seconds.

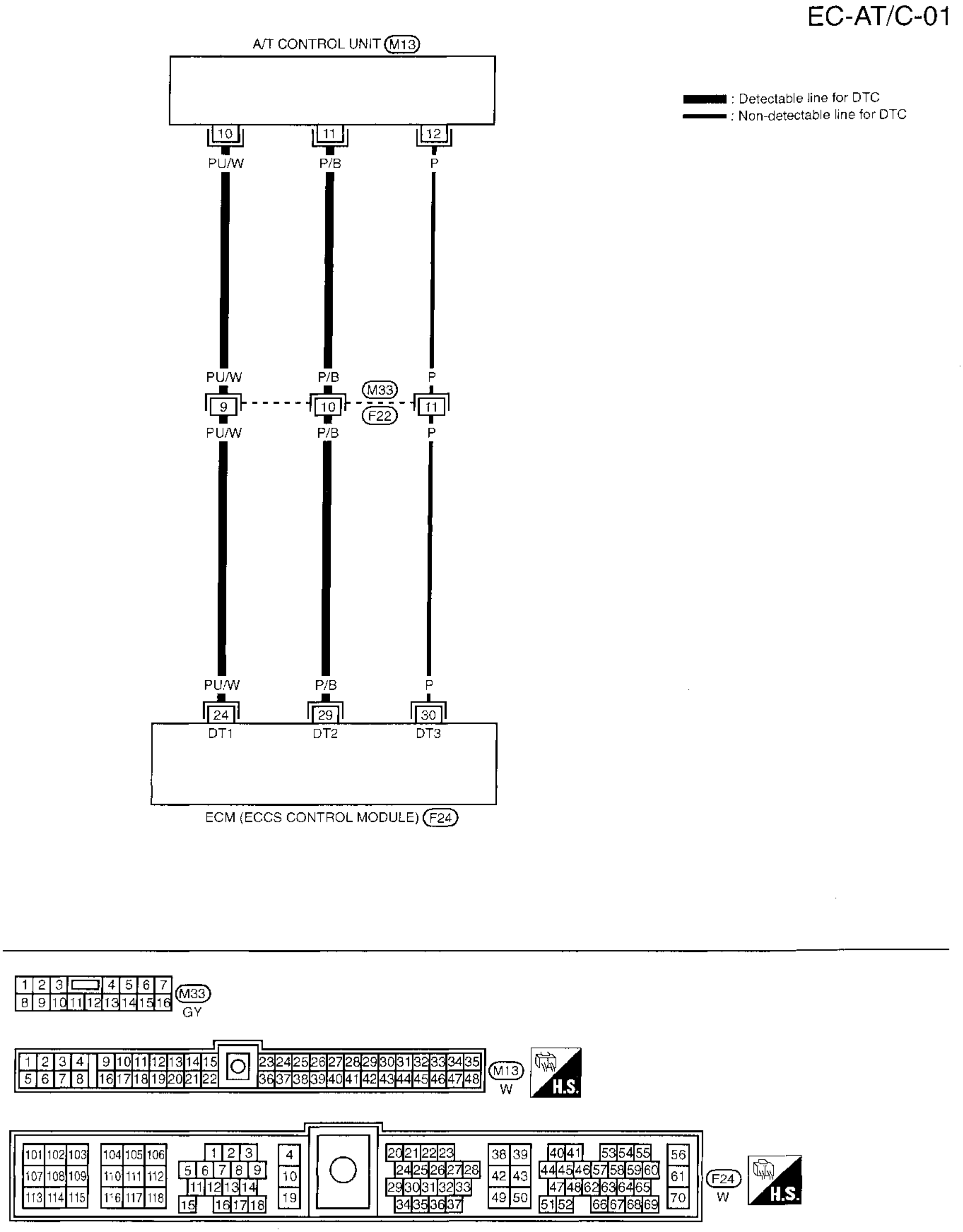


OVERALL FUNCTION CHECK

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

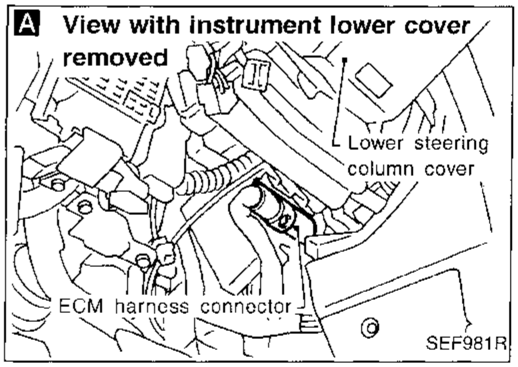
A/T Control (Cont'd)

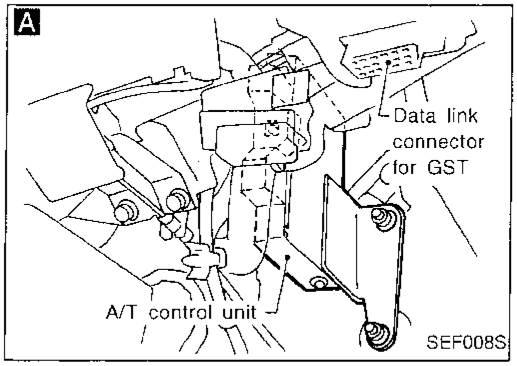


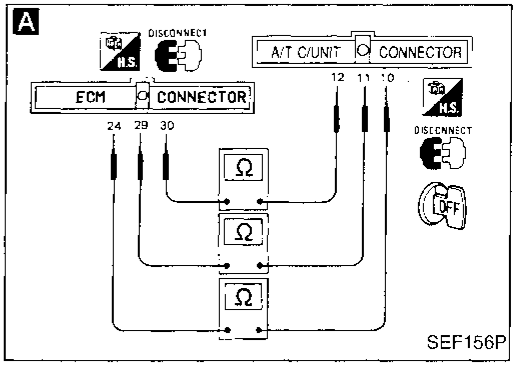
SEF270T

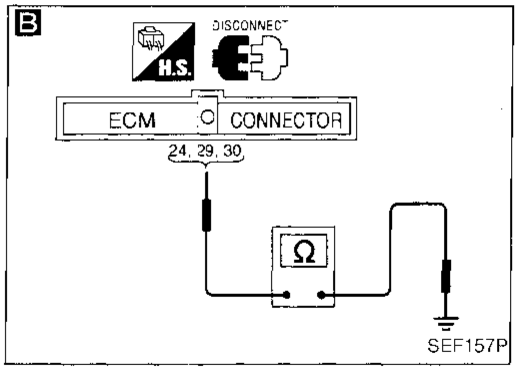
A/T Control (Cont'd)

DIAGNOSTIC PROCEDURE









INSPECTION START

↓

A

CHECK INPUT SIGNAL CIRCUIT.

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector and A/T control unit harness connector.
3. Check harness continuity between ECM terminal ㉔ and terminal ⑩, ECM terminal ㉙ and terminal ⑪, ECM terminal ㉚ and terminal ⑫.

Continuity should exist.

NG → Check the following.

- Harness connectors F22, M33
- Harness for open or short between ECM and A/T control unit

If NG, repair harness or connectors.

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.

NG → Check the harness for open or short between ECM and A/T control unit. If NG, repair harness.

OK ↓

Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed. ↓

Check ECM pin terminals and A/T control unit pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

↓

INSPECTION END

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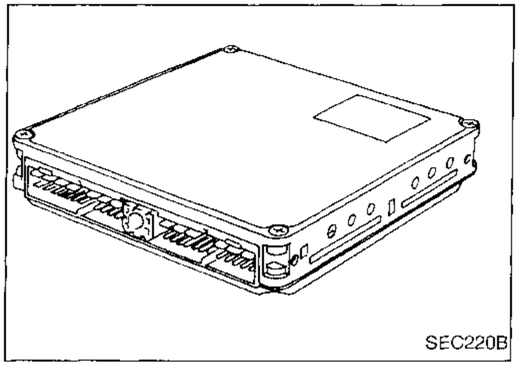

SEC220B

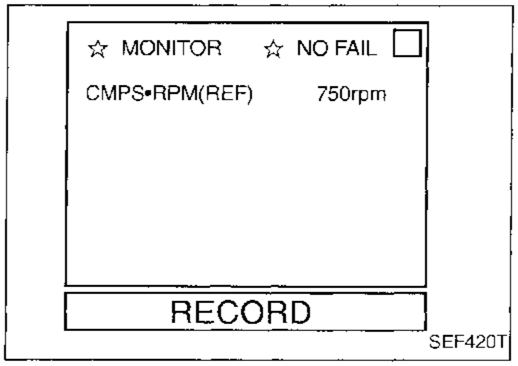
Engine Control Module (ECM)-ECCS Control Module

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 0301	• ECM calculation function is malfunctioning.	• ECM (ECCS control module)


☆ MONITOR ☆ NO FAIL ☐

CMPS•RPM(REF) 750rpm

RECORD

SEF420T

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
3) Start engine.
4) Run engine for at least 2 seconds at idle speed.

OR

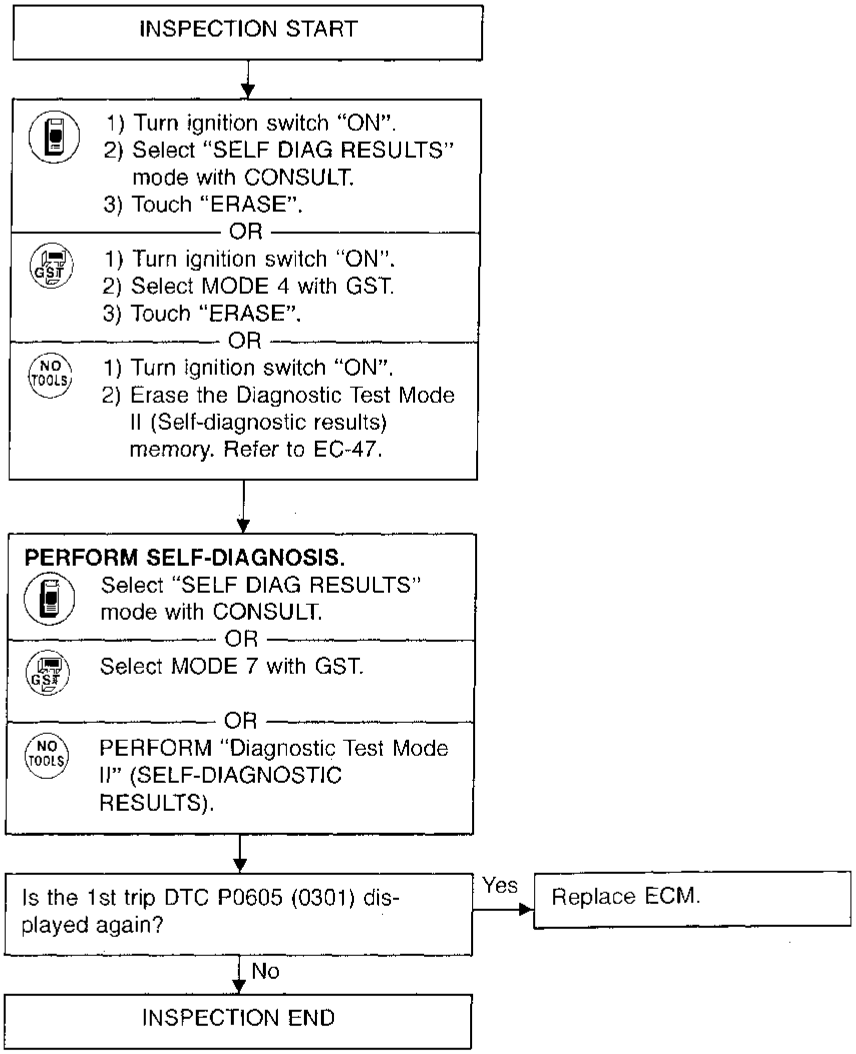
1) Turn ignition switch "ON".
2) Start engine.
3) Run engine for at least 2 seconds at idle speed.
4) Select "Mode 7" with GST.

OR

1) Turn ignition switch "ON".
2) Start engine and wait at least 2 seconds.
3) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
4) Perform "Diagnostic Test Mode II" (Self-diagnostic results) with ECM.

Engine Control Module (ECM)-ECCS Control Module (Cont'd)

DIAGNOSTIC PROCEDURE



INSPECTION START

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

OR

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

OR

NO TOOLS
1) Turn ignition switch "ON".
2) Erase the Diagnostic Test Mode II (Self-diagnostic results) memory. Refer to EC-47.

PERFORM SELF-DIAGNOSIS.

Select "SELF DIAG RESULTS" mode with CONSULT.

OR

GST
Select MODE 7 with GST.

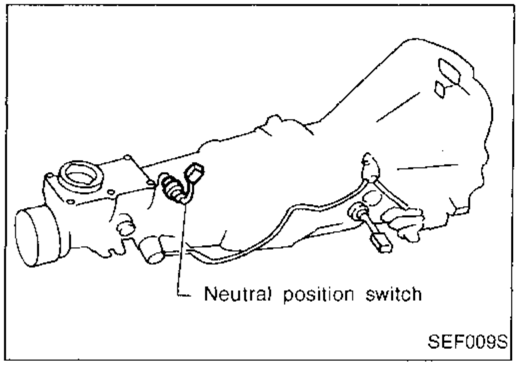
OR

NO TOOLS
PERFORM "Diagnostic Test Mode II" (SELF-DIAGNOSTIC RESULTS).

Is the 1st trip DTC P0605 (0301) displayed again?

Yes → Replace ECM.

No → INSPECTION END



Park/Neutral Position Switch

COMPONENT DESCRIPTION

When the gear position is "P" (A/T models only) or "N", park/neutral position switch is "ON".
ECM detects the position because the continuity of the line (the "ON" signal) exists.
ECM receives signals from park position switch.

CONSULT 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 ㊸ (ECCS ground).

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
22	L/B	Neutral position switch (M/T models) Inhibitor switch (A/T models)	Ignition switch "ON" — Gear position is "Neutral" (M/T models) — Gear position is "N" or "P" (A/T models)	Approximately 0V
			Ignition switch "ON" — Except the above gear position	Approximately 5V

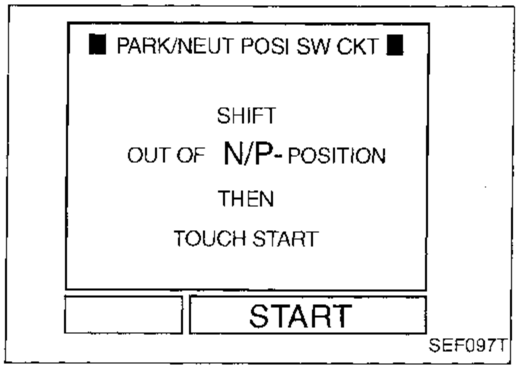
ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P0705 1003	• The signal of the park/neutral position switch is not changed in the process of engine starting and driving.	• Harness or connectors a. (The neutral position switch or inhibitor switch circuit is open or shorted.) b. (The circuit between ECM and A/T control unit is open or shorted.) • Neutral position switch (M/T models) • Inhibitor switch (A/T models) • A/T control unit (A/T models)

Park/Neutral Position Switch (Cont'd)

OVERALL FUNCTION CHECK

Use this procedure to check the overall function of the park/neutral position switch circuit. During this check, a 1st trip DTC might not be confirmed.



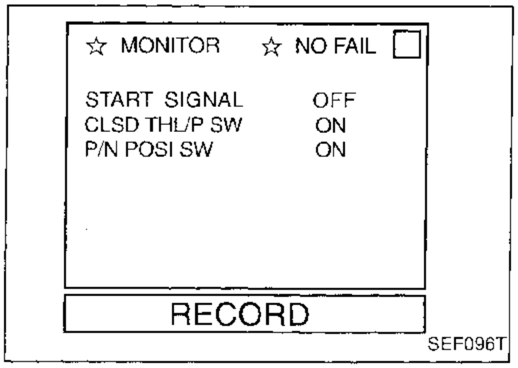
■ PARK/NEUT POSI SW CKT ■

SHIFT
OUT OF N/P-POSITION
THEN
TOUCH START

SEF097T

1) Turn ignition switch "ON".
2) Perform "PARK/NEUT POSI SW CKT" in "FUNCTION TEST" mode with CONSULT.

OR



☆ MONITOR ☆ NO FAIL ☐

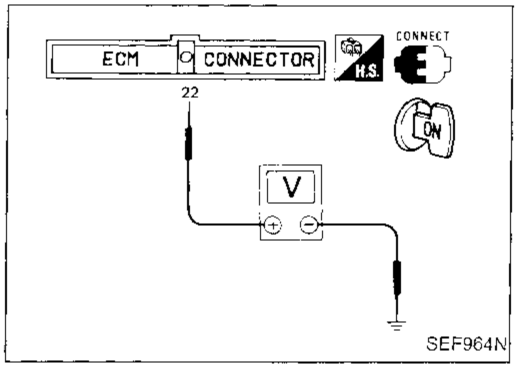
START SIGNAL	OFF
CLSD THL/P SW	ON
P/N POSI SW	ON

SEF096T

2) Select "P/N POSI SW" in "DATA MONITOR" mode with CONSULT.
3) Check the "P/N POSI SW" signal under the following conditions.

Condition (Gear position)	Signal
"P" and "N" position	ON
Except the above position	OFF

OR



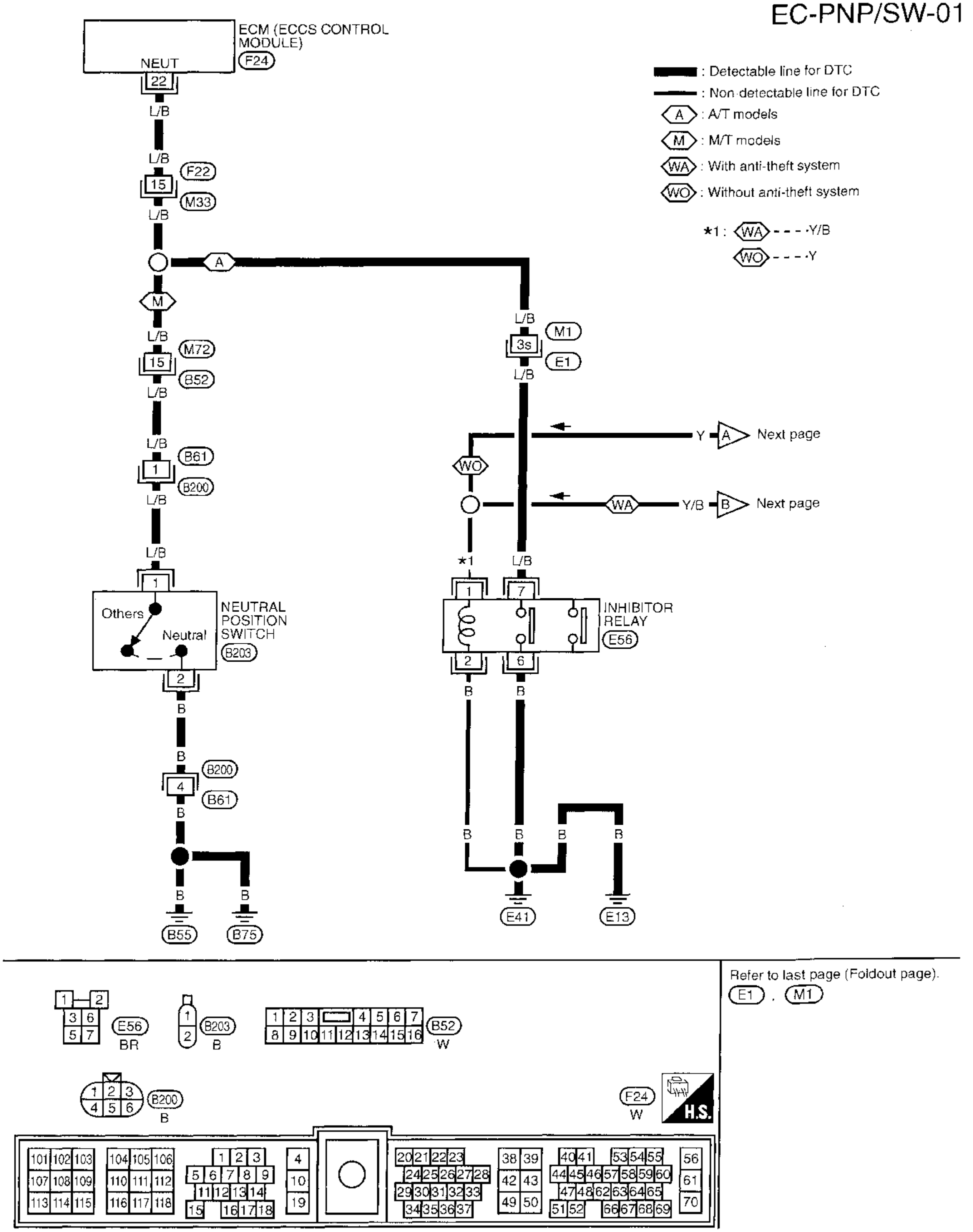
SEF964N

1) Turn ignition switch "ON".
2) Check voltage between ECM terminal ㉒ and body ground under the following conditions.

Condition (Gear position)	Voltage (V)
"P" and "N" position	Approximately 0
Except the above position	Approximately 5

Park/Neutral Position Switch (Cont'd)

EC-PNP/SW-01

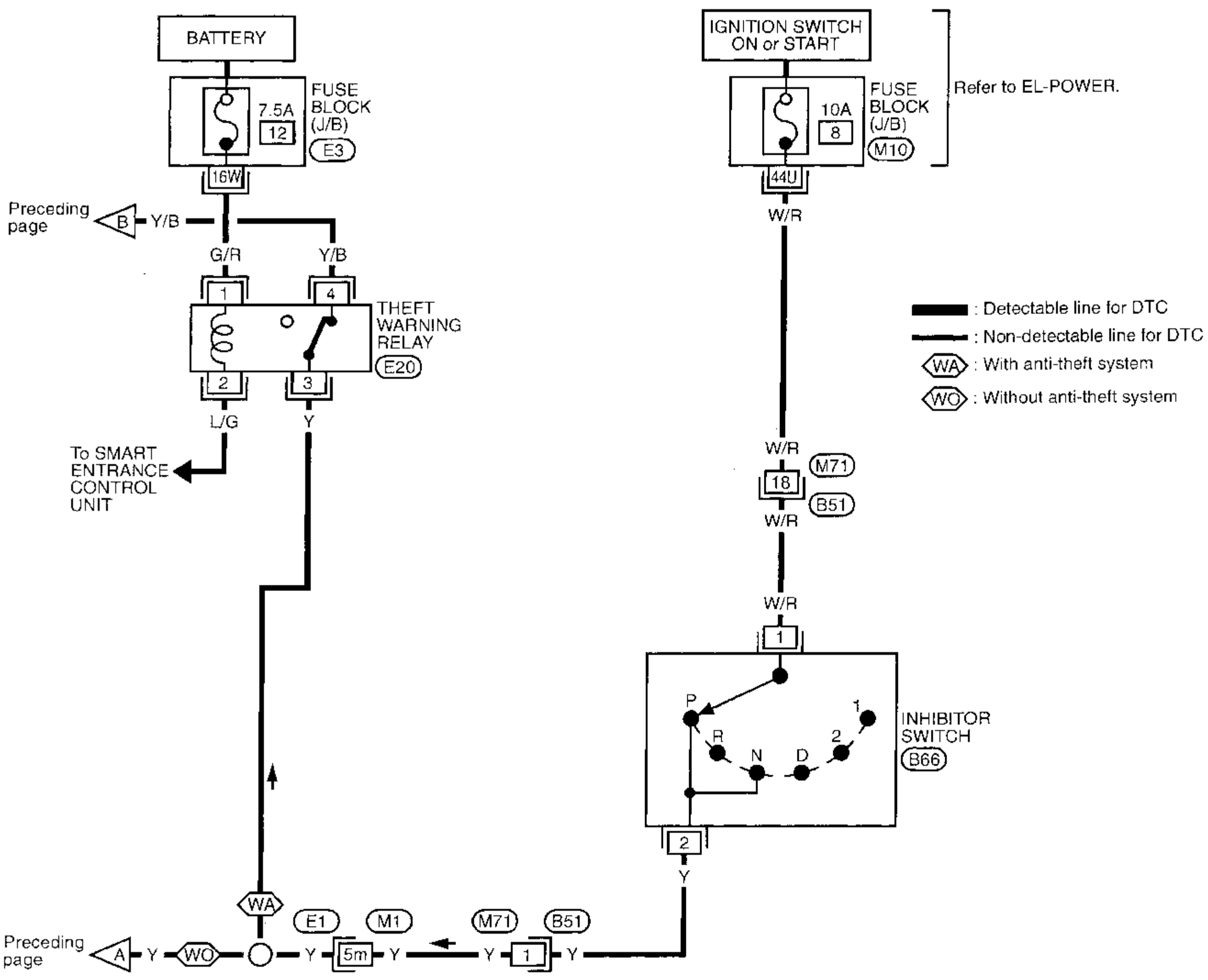


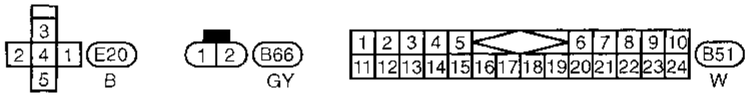
Refer to last page (Foldout page).
E1 , M1

SEF271T

Park/Neutral Position Switch (Cont'd)

EC-PNP/SW-02





Refer to last page (Foldout page).
M10, E3
M1, E1

SEF272T

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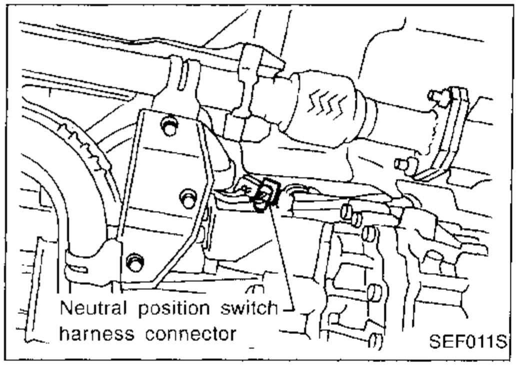
Park/Neutral Position Switch (Cont'd)

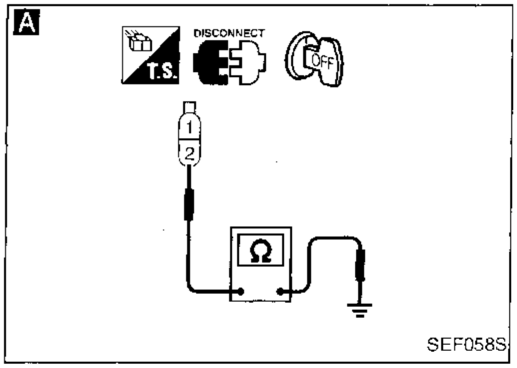
DIAGNOSTIC PROCEDURE



Neutral position switch (M/T models)

INSPECTION START

↓



A

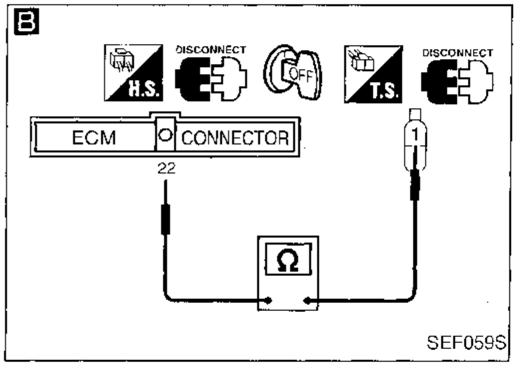
CHECK GROUND CIRCUIT.
1. Turn ignition switch "OFF".
2. Disconnect neutral position switch harness connector.
3. Check harness continuity between terminal ② and body ground.

Continuity should exist.
If OK, check harness for short.

NG → Check the following.
- Harness connectors (B200), (B61)
- Harness for open or short between neutral position switch and body ground

If NG, repair harness or connectors.

↓ OK



B

CHECK INPUT SIGNAL CIRCUIT.
1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal ㉒ and terminal ①.

Continuity should exist.
If OK, check harness for short.

NG → Check the following.
- Harness connectors (B61), (B200)
- Harness connectors (B52), (M72)
- Harness connectors (M33), (F22)
- Harness for open or short between ECM and neutral position switch

If NG, repair harness or connectors.

↓ OK

CHECK COMPONENT
(Neutral position switch).
Refer to MT section.

NG → Replace neutral position switch.

↓ OK

Disconnect and reconnect harness connectors in the circuit. Then retest.

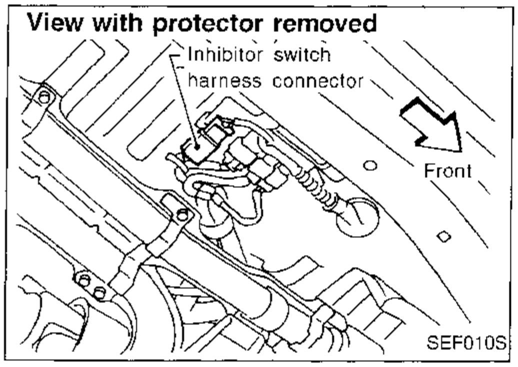
↓ Trouble is not fixed.

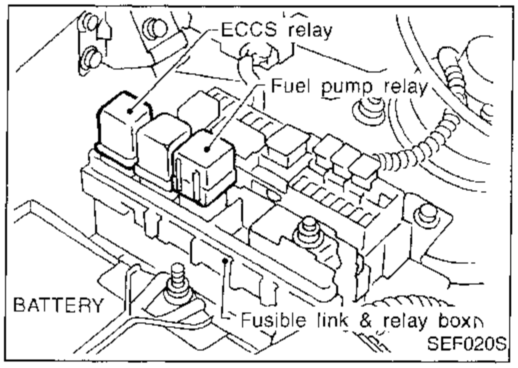
Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

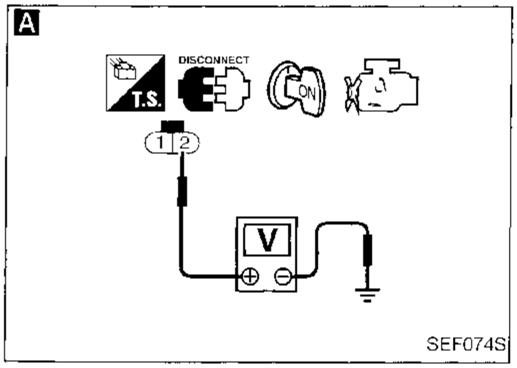
↓

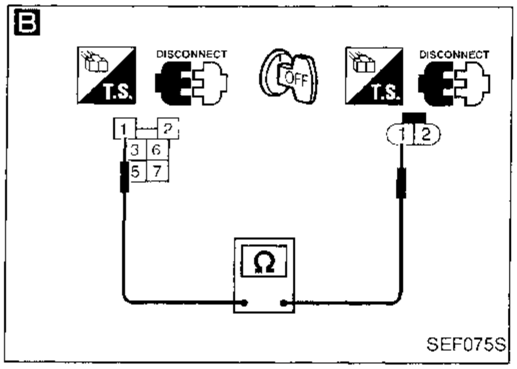
INSPECTION END

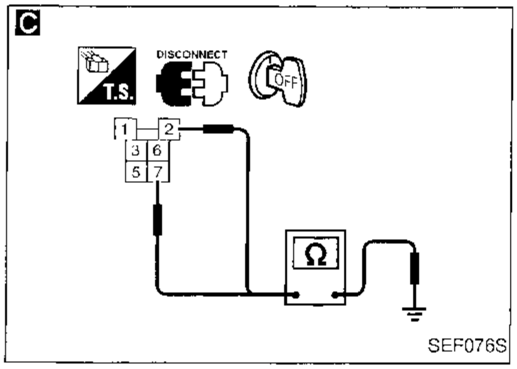
Park/Neutral Position Switch (Cont'd)











Inhibitor switch (A/T models)

INSPECTION START

A

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

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

If NG, repair harness or connectors.

OK

B

CHECK OUTPUT SIGNAL CIRCUIT-I.
1. Turn ignition switch "OFF".
2. Disconnect park/neutral position relay harness connector.
3. Check harness continuity between relay terminal ① and park/neutral position switch terminal ①.
Continuity should exist.
If OK, check harness for short.

NG → Check the following.
- Theft warning relay (With anti-theft system)
- Harness for open or short between position switch and relay

If NG, repair harness or connectors.

OK

C

CHECK GROUND CIRCUIT.
1. Turn ignition switch "OFF".
2. Disconnect inhibitor relay harness connector.
3. Check harness continuity between terminals ⑦, ② and body ground.
Continuity should exist.
If OK, check harness for short.

NG → Check the following.
- Harness for open or short between inhibitor relay and body ground

If NG, repair harness or connectors.

OK

D

CHECK INPUT SIGNAL CIRCUIT.
1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal ㉒ and terminal ⑥.
Continuity should exist.
If OK, check harness for short.

NG → Check the following.
- Harness connectors (M1), (E1)
- Harness for open or short between ECM and inhibitor relay

If NG, repair harness or connectors.

OK

CHECK COMPONENT
(Inhibitor switch).
Refer to AT section.

NG → Replace inhibitor switch.

OK

Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed.

Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

INSPECTION END

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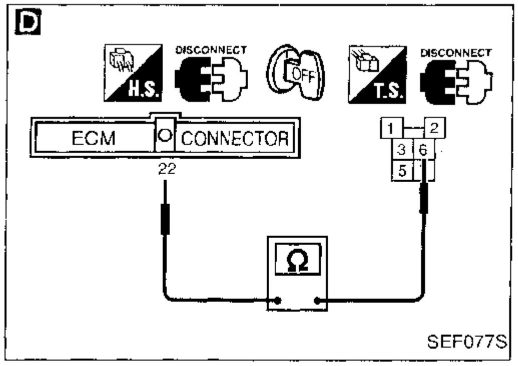
D
H.S.
DISCONNECT
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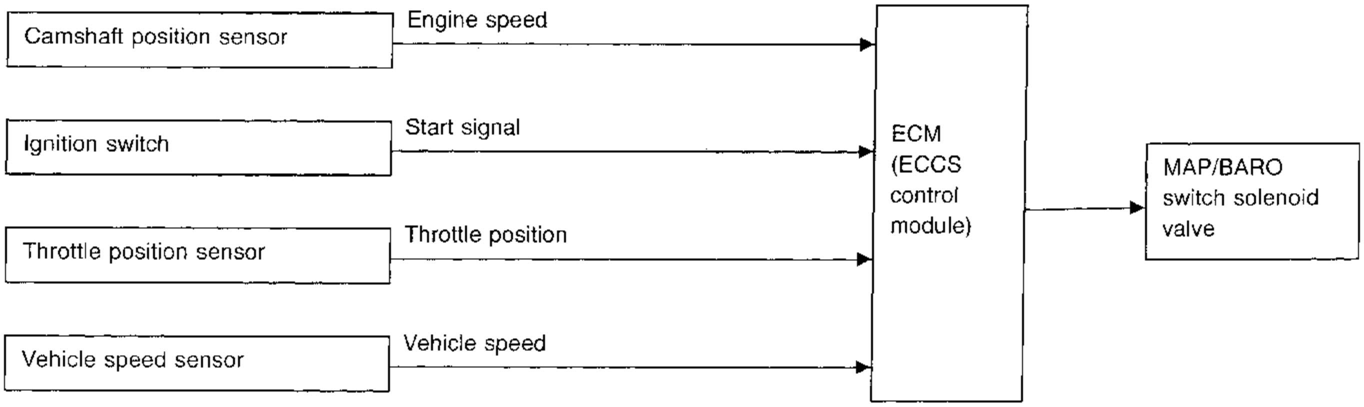
SEF077S

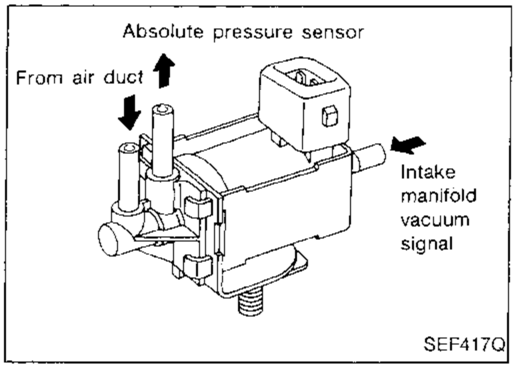
Manifold Absolute Pressure (MAP)/Barometric Pressure (BARO) Switch Solenoid Valve

SYSTEM DESCRIPTION



This system allows the absolute pressure sensor to monitor either ambient barometric pressure or intake manifold pressure. The MAP/BARO switch solenoid valve switches between two passages by ON-OFF pulse signals from the ECM. (One passage is from the intake air duct, the other is from the intake manifold.) Either ambient barometric pressure or intake manifold pressure is applied to the absolute pressure sensor.

Solenoid	Conditions
ON	• Immediately after turning ignition switch ON or • More than 5 minutes after the solenoid valve shuts OFF. and • Throttle valve is shut or almost fully shut for more than 1 second and • Vehicle speed is less than 100 km/h (62 MPH).



COMPONENT DESCRIPTION

The MAP/BARO switch solenoid valve switches its air flow passage according to the voltage signal sent from the ECM. When voltage is supplied from the ECM, the MAP/BARO switch solenoid turns "ON". Then, the absolute pressure sensor can monitor the ambient barometric pressure. When voltage is not supplied from the ECM, the MAP/BARO switch solenoid valve turns "OFF". Then, the sensor monitors intake manifold pressure.

CONSULT REFERENCE VALUE IN DATA MONITOR MODE

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
MAP/BARO SW/V	• Ignition switch: ON	BARO

GI
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EL
IDX

Manifold Absolute Pressure (MAP)/Barometric Pressure (BARO) Switch Solenoid Valve (Cont'd)

ECM TERMINALS AND REFERENCE VALUE

Specification data are reference values and are measured between each terminal and ㊸ (ECCS ground).

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
59	Y/B	MAP/BARO switch solenoid valve	Ignition switch "ON" Engine is not running.	BATTERY VOLTAGE (11 - 14V)

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P1105 1302	• MAP/BARO switch solenoid valve receives the voltage supplied though ECM does not supply the voltage to the valve. • There is little difference between MAP/BARO switch solenoid valve input voltage at ambient barometric pressure and voltage at intake manifold pressure.	• Harness or connectors (MAP/BARO switch solenoid valve circuit is open or shorted.) • Hoses (Hoses are clogged or disconnected.) • Absolute pressure sensor • MAP/BARO switch solenoid valve

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

1) Start engine and warm it up sufficiently.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT.
4) Start engine and let it idle.
5) Wait at least 20 seconds.

OR

GST

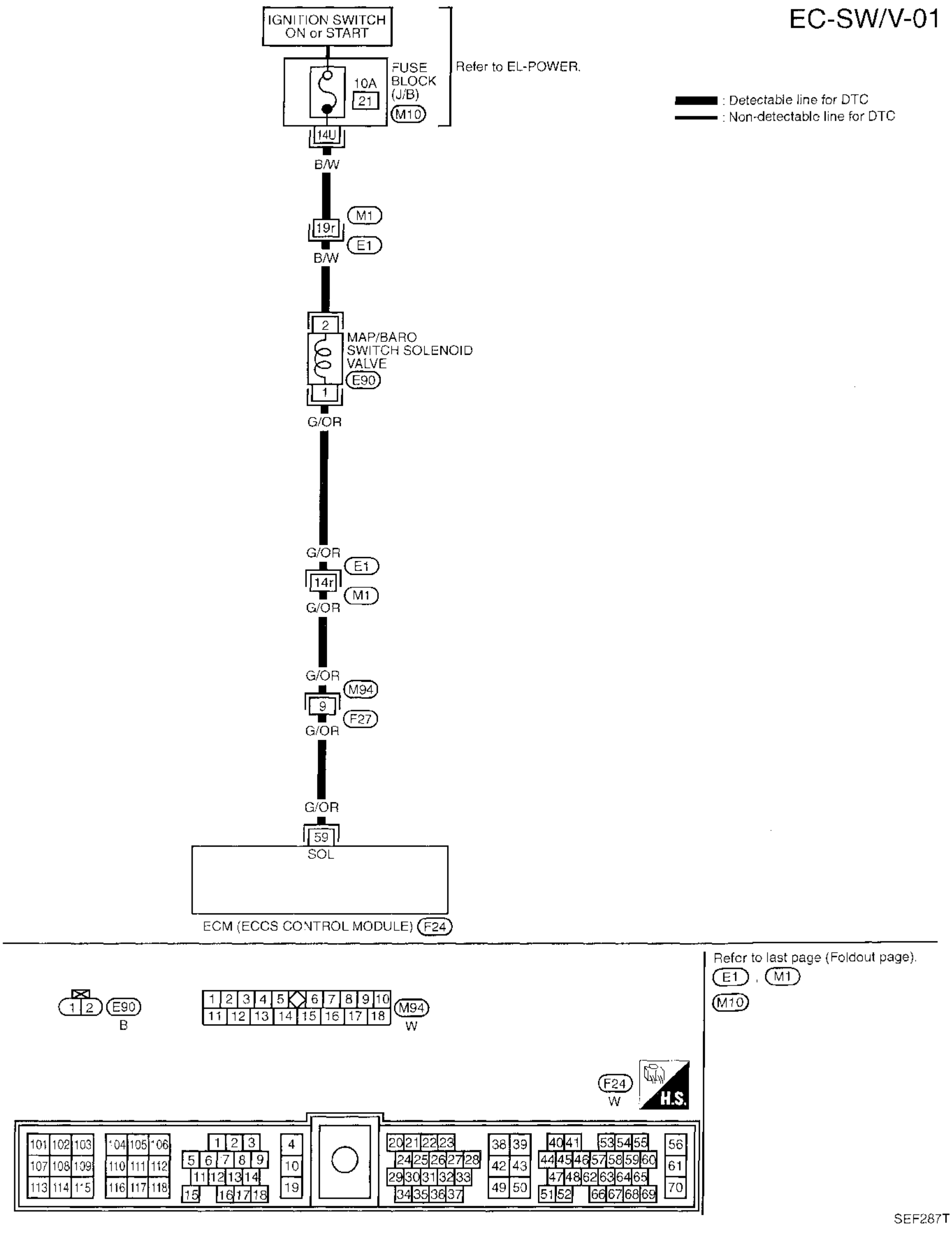
1) Start engine and warm it up sufficiently.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Start engine and let it idle.
4) Wait at least 20 seconds.
5) Select "MODE 7" with GST.

OR

NO TOOLS

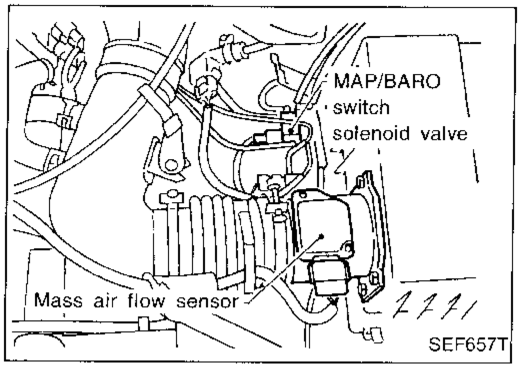
1) Start engine and warm it up sufficiently.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Start engine and let it idle.
4) Wait at least 20 seconds.
5) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
6) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.

Manifold Absolute Pressure (MAP)/Barometric Pressure (BARO) Switch Solenoid Valve (Cont'd)

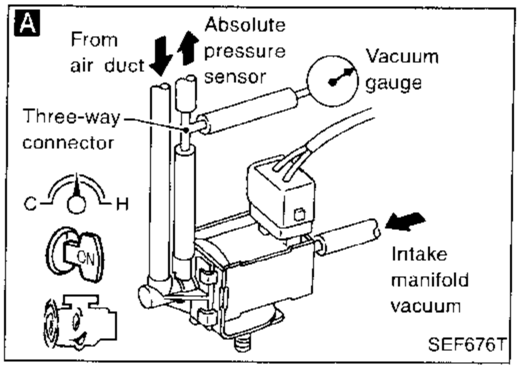


SEF287T

Manifold Absolute Pressure (MAP)/Barometric Pressure (BARO) Switch Solenoid Valve (Cont'd)



A



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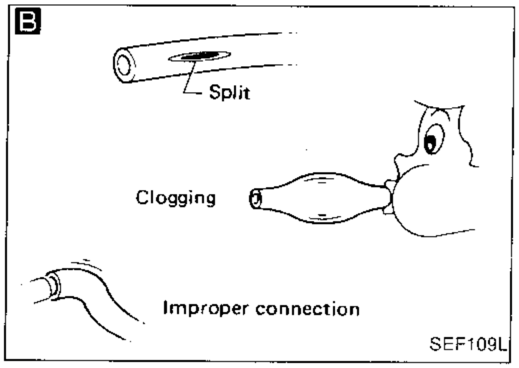
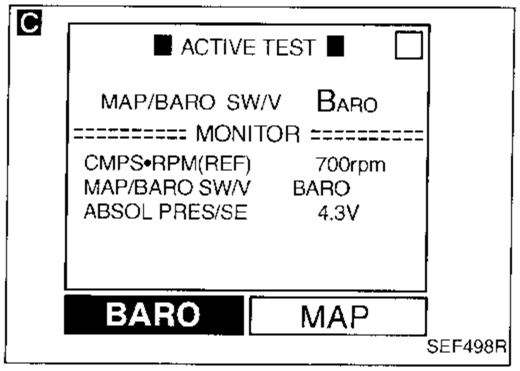


C



```
■ ACTIVE TEST ■          ☐

MAP/BARO SW/V     BARO
========== MONITOR ==========
CMPS•RPM(REF)       700rpm
MAP/BARO SW/V     BARO
ABSOL PRES/SE       4.3V
```

SEF498R

DIAGNOSTIC PROCEDURE

INSPECTION START

↓

A

CHECK VACUUM SOURCE TO MAP/BARO SWITCH SOLENOID VALVE.

1. Start engine and warm it up sufficiently.
2. Turn ignition switch "OFF".
3. Connect the MAP/BARO switch solenoid valve and absolute pressure sensor with a rubber tube that has vacuum gauge.
4. Start engine.
5. Check the vacuum pressure with vacuum gauge at idle speed.
   Vacuum pressure:
   Approx. −66.7 kPa
   (−500 mmHg, −19.69 inHg, −9.67 psi)

NG → CHECK VACUUM HOSE.
Check vacuum hose for clogging, cracks or improper connection.
If NG, repair or replace the hose.

↓ OK

CHECK INTAKE SYSTEM.
Check the intake system for air leaks.

↓ OK

B

CHECK HOSE BETWEEN ABSOLUTE PRESSURE SENSOR AND MAP/BARO SWITCH SOLENOID VALVE.

1. Turn ignition switch "OFF".
2. Check hose for clogging, cracks or improper connection.

NG → Repair or reconnect the hose.

OK (without ▯) → Ⓑ

OK (with ▯) ↓

C

▯ **CHECK POWER SUPPLY AND OUTPUT SIGNAL CIRCUIT.**

1. Turn ignition switch "ON".
2. Select "MAP/BARO SW/V" in "ACTIVE TEST" mode with CONSULT.
3. Touch "MAP" and "BARO" alternatively.
4. Check for operating sound.

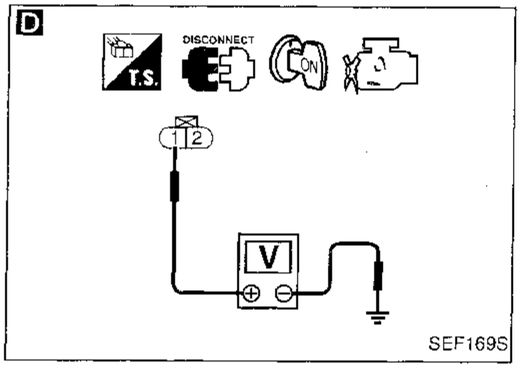
NG → Ⓑ

↓ OK

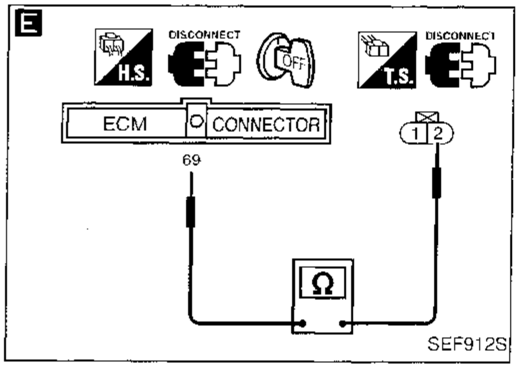
Ⓐ

Manifold Absolute Pressure (MAP)/Barometric Pressure (BARO) Switch Solenoid Valve (Cont'd)

D



E



Ⓑ

D

CHECK POWER SUPPLY.
1. Turn ignition switch "OFF".
2. Disconnect MAP/BARO switch solenoid valve harness connector.
3. Turn ignition switch "ON".
4. Check voltage between terminal ① and engine ground with CONSULT or tester.

Voltage: Battery voltage
If OK, check harness for short.

NG → Check the following.
- Harness connectors M1, E1
- 10A fuse
- Harness for open or short between MAP/BARO switch solenoid valve and fuse

If NG, repair harness or connectors.

OK ↓

E

CHECK OUTPUT SIGNAL CIRCUIT.
1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal (69) and terminal ② with CONSULT or tester.

Continuity should exist.
If OK, check harness for short.

NG → Check the following.
- Harness connectors E1, M1
- Harness connectors M94, F27
- Harness for open or short between MAP/BARO switch solenoid valve

If NG, repair harness or connectors.

OK ↓

Ⓐ

CHECK COMPONENT
(Absolute pressure sensor).
Refer to "COMPONENT INSPECTION" of "TROUBLE DIAGNOSIS FOR DTC P0105", EC-110.

NG → Replace absolute pressure sensor.

OK ↓

CHECK COMPONENT
(MAP/BARO switch solenoid valve).
Refer to "COMPONENT INSPECTION" on next page.

NG → Replace MAP/BARO switch solenoid valve.

OK ↓

Disconnect and reconnect harness connectors in the circuit. Then retest.

↓ Trouble is not fixed.

Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

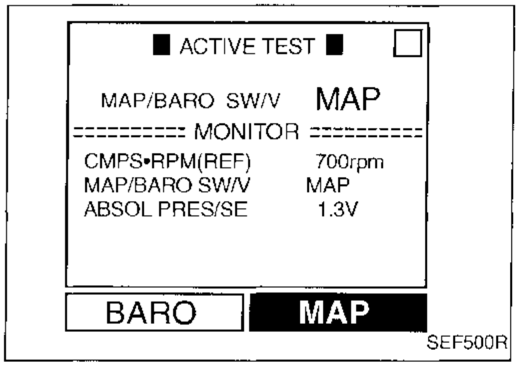
↓

INSPECTION END

Manifold Absolute Pressure (MAP)/Barometric Pressure (BARO) Switch Solenoid Valve (Cont'd)

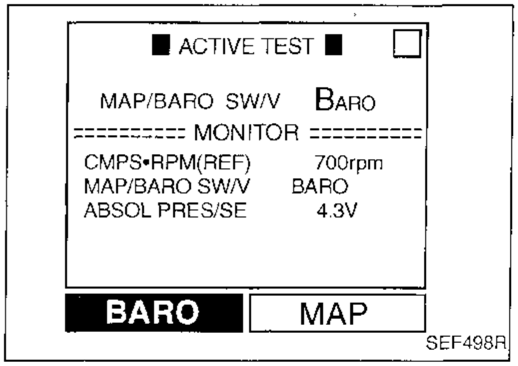
COMPONENT INSPECTION

MAP/BARO switch solenoid valve



```
■ ACTIVE TEST ■          ☐

 MAP/BARO SW/V    MAP
========== MONITOR ==========
 CMPS•RPM(REF)        700rpm
 MAP/BARO SW/V        MAP
 ABSOL PRES/SE        1.3V

[ BARO ]  [ MAP ]
```

SEF500R

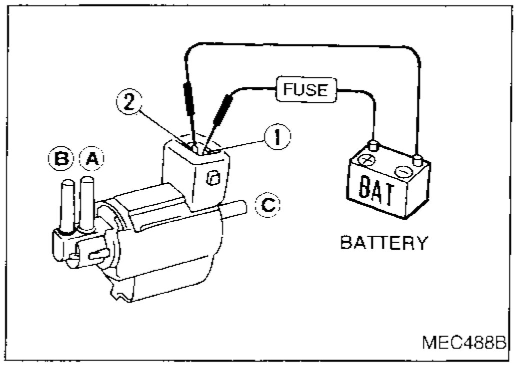


```
■ ACTIVE TEST ■          ☐

 MAP/BARO SW/V    BARO
========== MONITOR ==========
 CMPS•RPM(REF)        700rpm
 MAP/BARO SW/V        BARO
 ABSOL PRES/SE        4.3V

[ BARO ]  [ MAP ]
```

SEF498R

1. Start engine and warm it up sufficiently.
2. Perform "MAP/BARO SW/V" in "ACTIVE TEST" mode with CONSULT.
3. Check the following.
   - When "MAP" is selected, "ABSOL PRES/SE" indicates approximately 1.3V.
   - When "BARO" is selected, "ABSOL PRES/SE" indicates approximately 4.3V.
4. If NG, replace solenoid valve.

OR

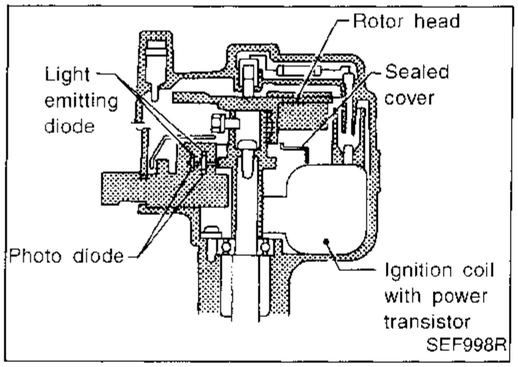


MEC488B

1. Remove MAP/BARO switch solenoid valve.
2. Check air passage continuity.

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

3. If NG, replace solenoid valve.



Ignition Signal

COMPONENT DESCRIPTION

Ignition coil & power transistor

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.

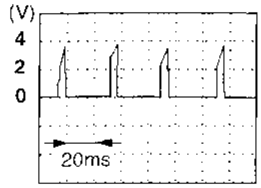
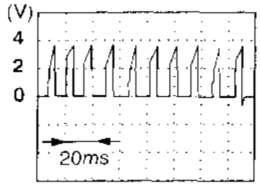
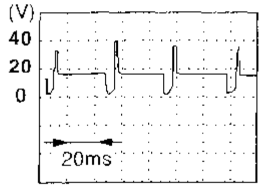
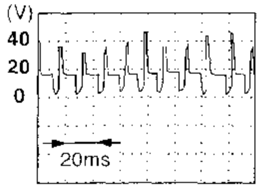
CONSULT REFERENCE VALUE IN DATA MONITOR MODE

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
IGNITION SW	• Ignition switch: ON → OFF → ON	ON → OFF → ON

ECM TERMINALS AND REFERENCE VALUE

Specification data are reference values and are measured between each terminal and ㊸ (ECCS ground).

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	W/B	Ignition signal	Engine is running. └ Idle speed	0.9V  SEF186T
			Engine is running. └ Engine speed is 2,000 rpm	1.1 - 1.3V  SEF187T
2	W/G	Ignition check	Engine is running. (Warm-up condition) └ Idle speed	8.7V  SEF188T
			Engine is running. └ Engine speed is 2,000 rpm.	Approximately 13V  SEF189T

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1320 0201	• The ignition signal in the primary circuit is not sent to ECM during engine cranking or running.	• Harness or connectors (The ignition primary circuit is open or shorted.) • Power transistor unit. • Resistor • Camshaft position sensor • Camshaft position sensor circuit

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

Note: If both DTC P0340 (0101) and P1320 (0201) are displayed, perform TROUBLE DIAGNOSIS FOR DTC P0340 first. Refer to EC-203.

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
3) Start engine. (If engine does not run, turn ignition switch to "START" for at least 5 seconds.)

OR

GST

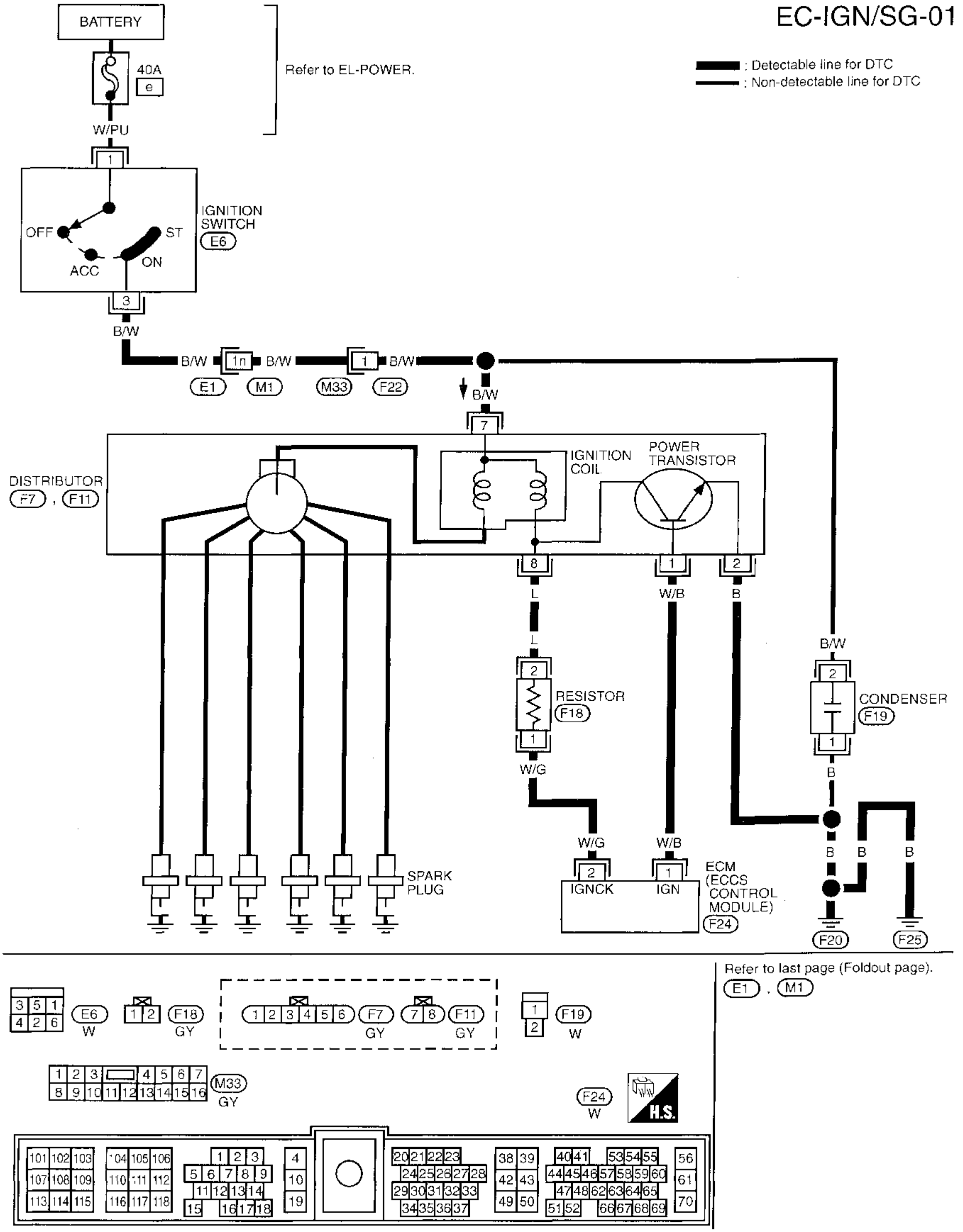
1) Turn ignition switch "ON".
2) Start engine. (If engine does not run, turn ignition switch to "START" for at least 5 seconds.)
3) Select MODE 7 with GST.

OR

NO TOOLS

1) Turn ignition switch "ON".
2) Start engine. (If engine does not run, turn ignition switch to "START" for at least 5 seconds.)
3) Turn ignition switch "OFF" and wait at least 5 seconds, then turn "ON".
4) Perform "Diagnostic Test Mode II" (Self-diagnostic results) with ECM.

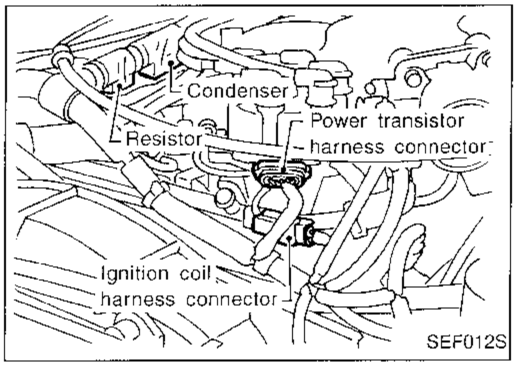
Ignition Signal (Cont'd)

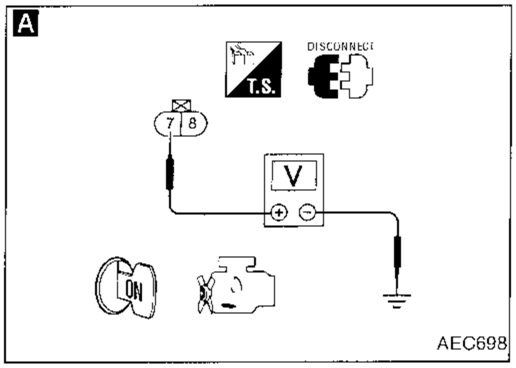


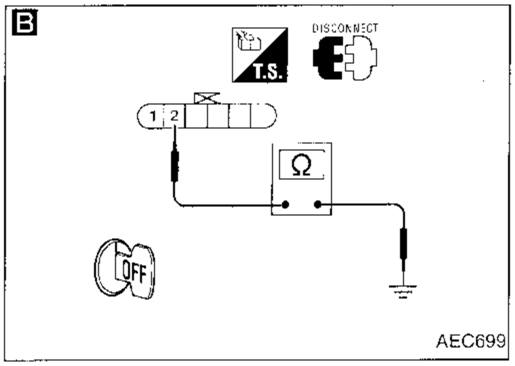
SEF273T

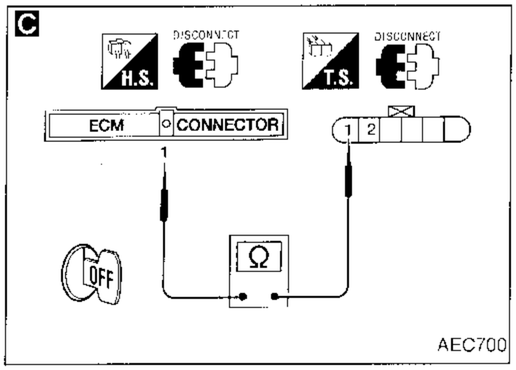
Ignition Signal (Cont'd)

DIAGNOSTIC PROCEDURE









INSPECTION START

Turn ignition switch "OFF", and restart engine.
Is engine running?

Yes → Ⓐ

No ↓

A

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 or tester.
   Voltage: Battery voltage

NG → Check the following.
- Harness connectors F22, M33
- Harness connectors M1, E1
- Harness continuity between ignition coil and ignition switch

If NG, repair harness or connectors.

OK ↓

B

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.

NG → Repair harness or connectors.

OK ↓

C

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.

NG → Repair harness or connectors.

OK ↓

CHECK COMPONENTS
(Ignition coil, power transistor).
Refer to "COMPONENT INSPECTION", EC-284.

NG → Replace malfunctioning component(s).

OK ↓

Disconnect and reconnect harness connectors in the circuit. Then retest.

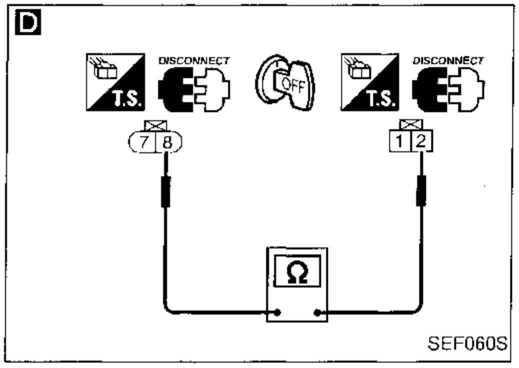
Trouble is not fixed. ↓

Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

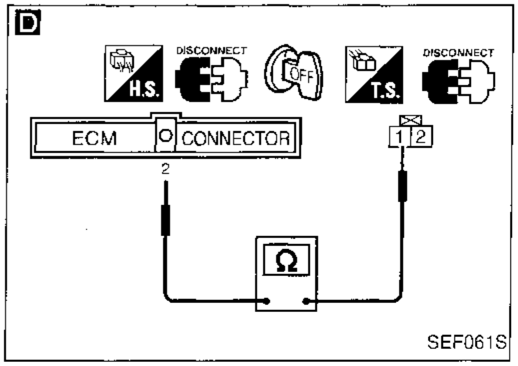
↓

INSPECTION END

Ignition Signal (Cont'd)



SEF060S



SEF061S

Ⓐ

D

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 ②, resistor terminal ① and ECM terminal ②.
   Continuity should exist.

NG → Repair harness or connectors.

OK

CHECK COMPONENTS (Resistor).
Refer to "COMPONENT INSPECTION" on next page.

NG → Replace resistor.

OK

Disconnect and reconnect harness connectors in the circuit. Then retest.

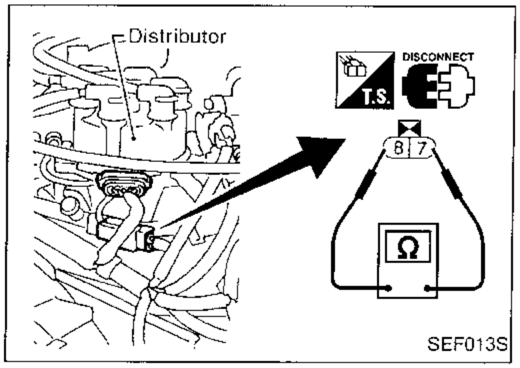
Trouble is not fixed.

Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

INSPECTION END

Ignition Signal (Cont'd)

COMPONENT INSPECTION



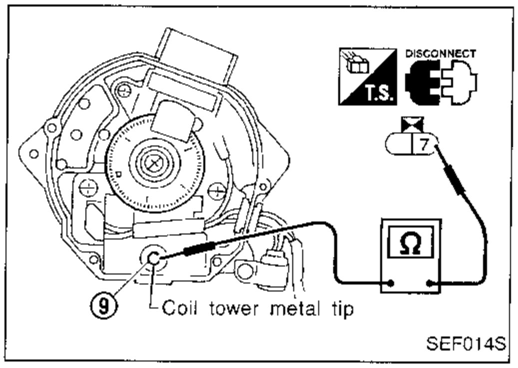
Ignition coil

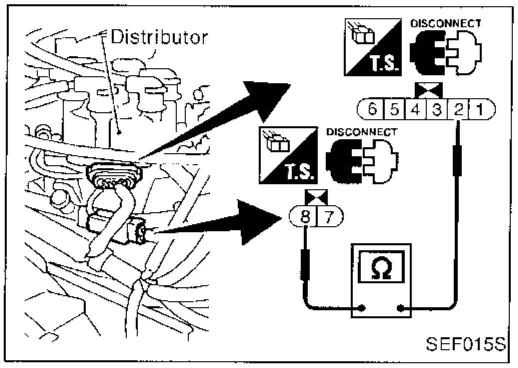
1. Disconnect ignition coil harness connector.
2. Check resistance as shown in the figure.

Terminal	Resistance [at 25°C (77°F)]
⑦ - ⑧ (Primary coil)	0.5 - 1.0 Ω
⑦ - ⑨ (Secondary coil)	Approximately 12 kΩ

For checking secondary coil, remove distributor cap and measure resistance between coil tower metal tip ⑨ and terminal ⑦.

If NG, replace distributor assembly as a unit.



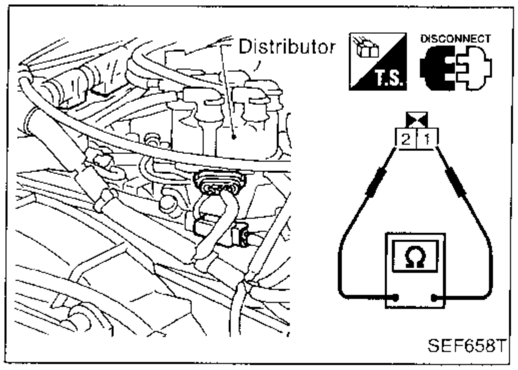


Power transistor

1. Disconnect camshaft position sensor & power transistor harness connector and ignition coil harness connector.
2. Check power transistor resistance between terminals ② and ⑧.

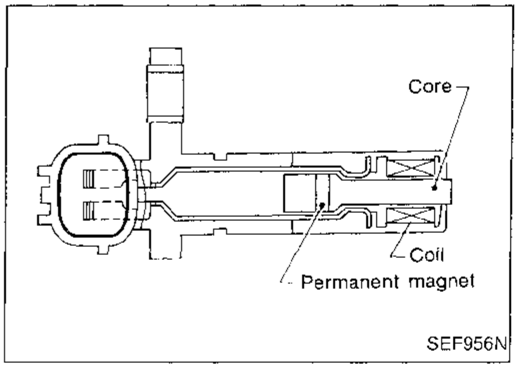
Terminals	Resistance	Result
② and ⑧	Except 0Ω	OK
	0Ω	NG

If NG, replace distributor assembly.

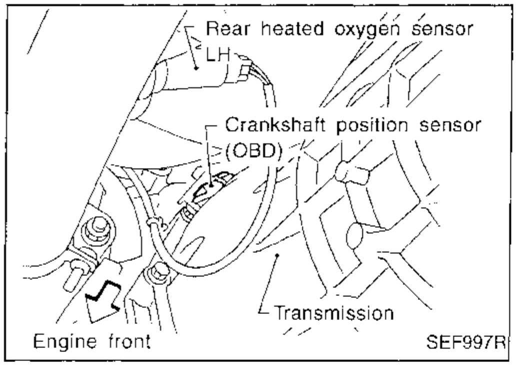


Resistor

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.



SEF956N



SEF997R

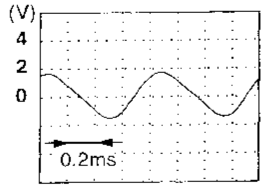
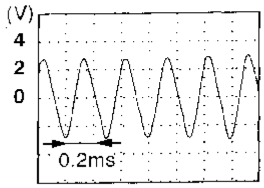
Crankshaft Position Sensor (CKPS) (OBD) (COG)

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 of misfire.

ECM TERMINALS AND REFERENCE VALUE

Specification data are reference values and are measured between each terminal and ㊸ (ECCS ground).

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
53	L	Crankshaft position sensor (OBD)	Engine is running. (Warm-up condition) Idle speed	Approximately 1.4V  SEF202T
			Engine is running. Engine speed is 2,000 rpm	Approximately 1.4V  SEF203T

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P1336 0905	• A chipping of the flywheel or drive plate gear tooth (cog) is detected by the ECM.	• Harness or connectors • Crankshaft position sensor (OBD) • Flywheel (Drive plate)

Crankshaft Position Sensor (CKPS) (OBD) (COG) (Cont'd)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT.
2) Start engine and run it for at least 2 minutes at idle speed.

OR

GST

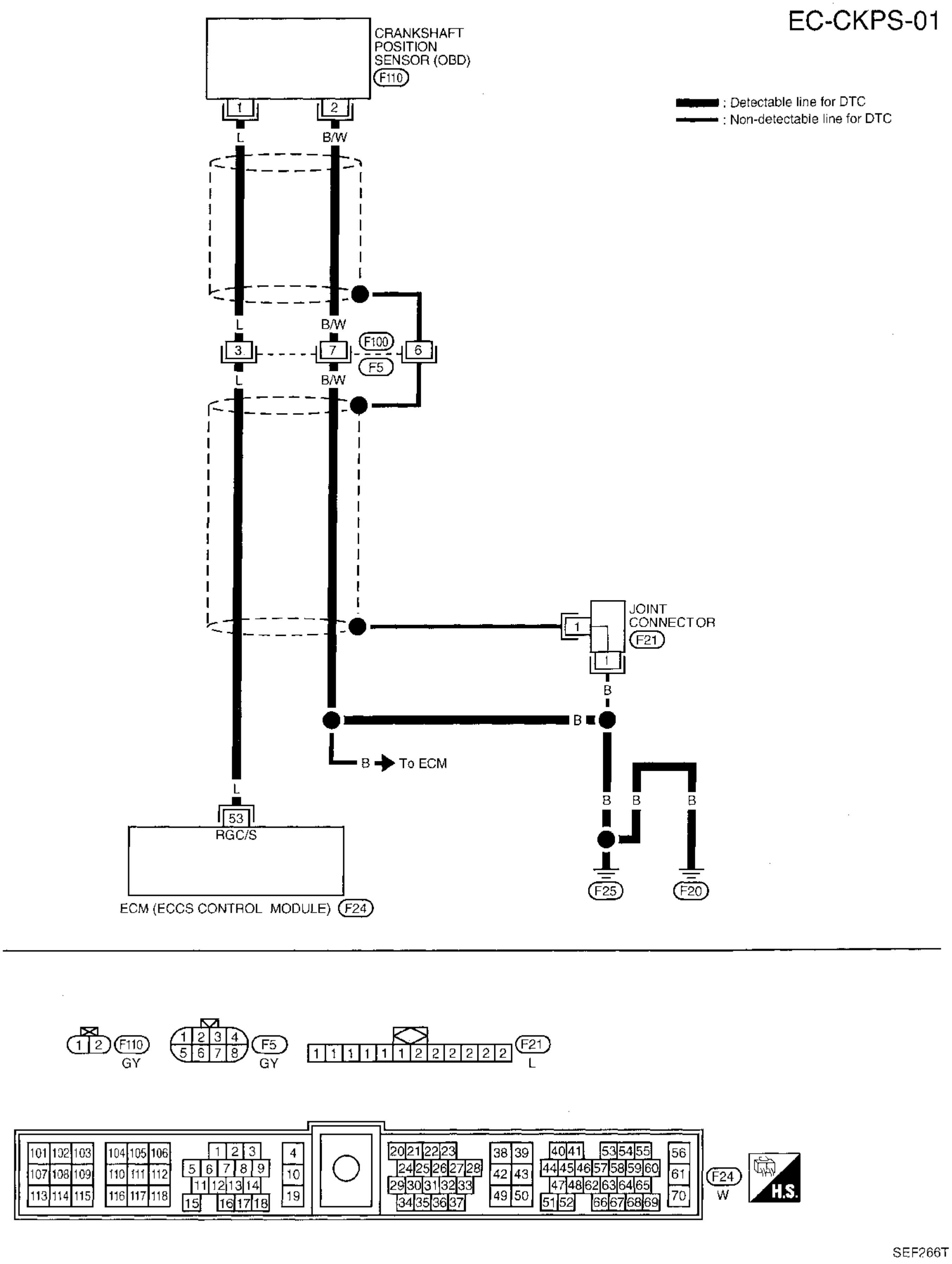
1) Start engine and run it for at least 2 minutes at idle speed.
2) Select "MODE 7" with GST.

OR

NO TOOLS

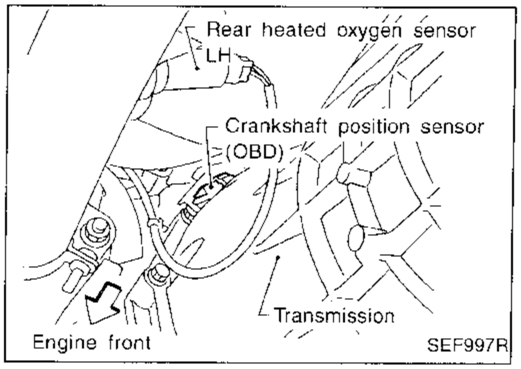
1) Start engine and run it for at least 2 minutes at idle speed.
2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
3) Perform "Diagnostic Test Mode II" (Self-diagnostic results) with ECM.

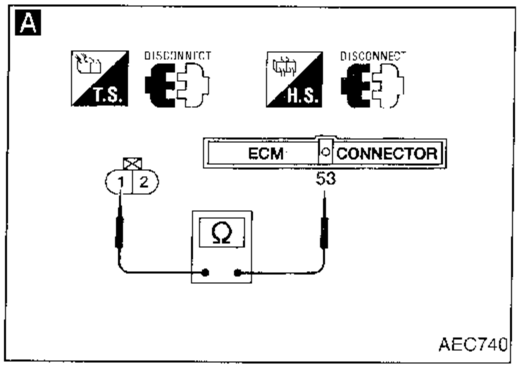
Crankshaft Position Sensor (CKPS) (OBD) (COG) (Cont'd)

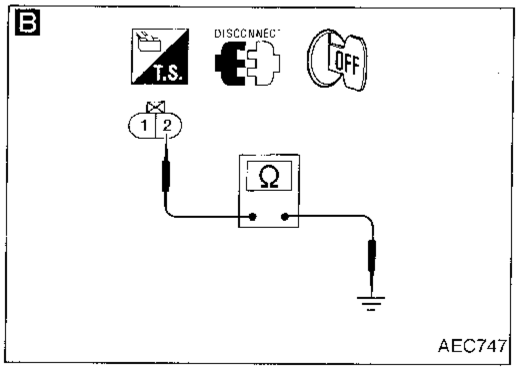


Crankshaft Position Sensor (CKPS) (OBD) (COG) (Cont'd)

DIAGNOSTIC PROCEDURE







INSPECTION START

↓

A

CHECK INPUT SIGNAL CIRCUIT.
1. Turn ignition switch "OFF".
2. Disconnect crankshaft position sensor (OBD) and ECM harness connectors.
3. Check continuity between ECM terminal (53) and terminal ①.

Continuity should exist.
If OK, check harness for short.

NG → Check the following.
- Harness connectors (F100), (F5)
- Harness for open or short between ECM and crankshaft position sensor (OBD) harness connector

If NG, repair harness or connectors.

OK ↓

B

CHECK GROUND CIRCUIT.
1. Turn ignition switch "OFF".
2. Reconnect ECM harness connector.
3. Check harness continuity between terminal ② and engine ground.

Continuity should exist.
If OK, check harness for short.

NG → Check the following.
- Harness connectors (F100), (F5)
- Harness for open or short between ECM and crankshaft position sensor (OBD) harness connector

If NG, repair 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 ↓

Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed. ↓

Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

Trouble is not fixed. ↓

Visually check for chipping flywheel or drive plate gear tooth (cog).

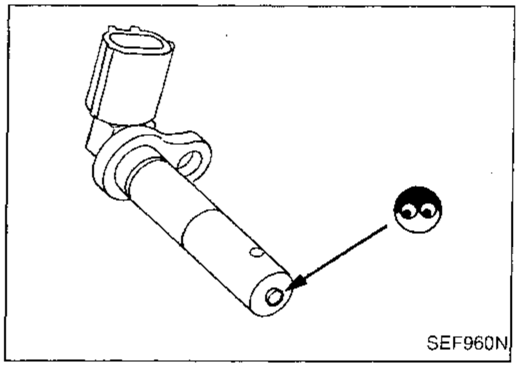
NG → Replace the flywheel or drive plate.

OK ↓

INSPECTION END

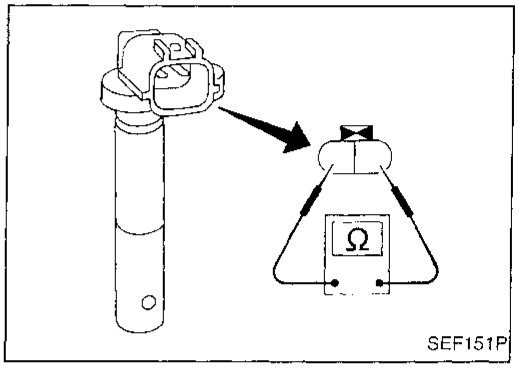
Crankshaft Position Sensor (CKPS) (OBD) (COG) (Cont'd)

COMPONENT INSPECTION

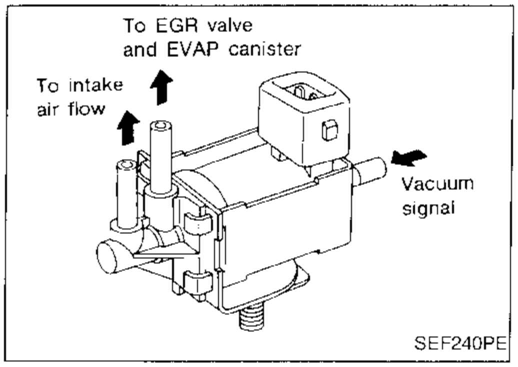


Crankshaft position sensor (OBD)

1. Disconnect crankshaft position sensor (OBD) harness connector.
2. Loosen the fixing bolt of the sensor.
3. Remove the sensor.
4. Visually check the sensor for chipping.



5. Check resistance as shown in the figure.
   Resistance: Approximately 166.5 - 203.5Ω
   [at 20°C (68°F)]



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. A plunger will then move to cut the vacuum signal from the throttle body 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.

CONSULT 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	ON
		Engine speed: Revving from 1,500 to 4,000 rpm	OFF

ECM TERMINALS AND REFERENCE VALUE

Specification data are reference values and are measured between each terminal and ㊸ (ECCS ground).

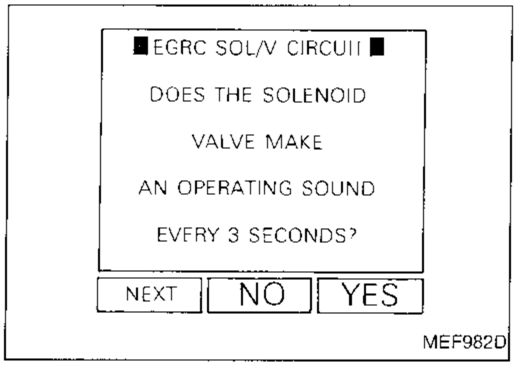
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
103	L/W	EGRC-solenoid valve	[Engine is running.] (Warm-up condition) └ Idle speed	0 - 0.7V
			[Engine is running.] (Warm-up condition) └ Engine speed is above 2,000 rpm	BATTERY VOLTAGE (11 - 14V)

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P1400 1005	• 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)

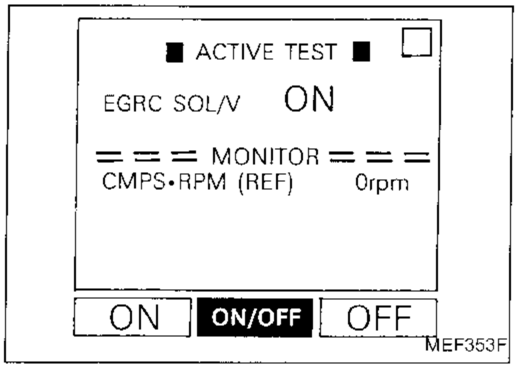
OVERALL FUNCTION CHECK



■EGRC SOL/V CIRCUIT■

DOES THE SOLENOID VALVE MAKE AN OPERATING SOUND EVERY 3 SECONDS?

MEF982D



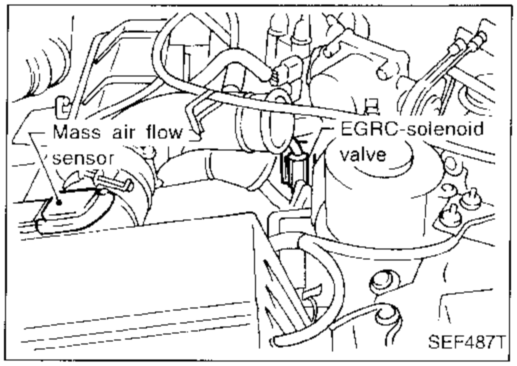
■ ACTIVE TEST ■

EGRC SOL/V ON

=== MONITOR ===

CMPS•RPM (REF) 0rpm

MEF353F



SEF487T

Use this procedure to check the overall function of the EGRC-solenoid valve circuit. During this check, a 1st trip DTC might not be confirmed.

1) Turn ignition switch "ON".
2) Perform "EGRC SOL/V CIRCUIT" in "FUNCTION TEST" mode with CONSULT.

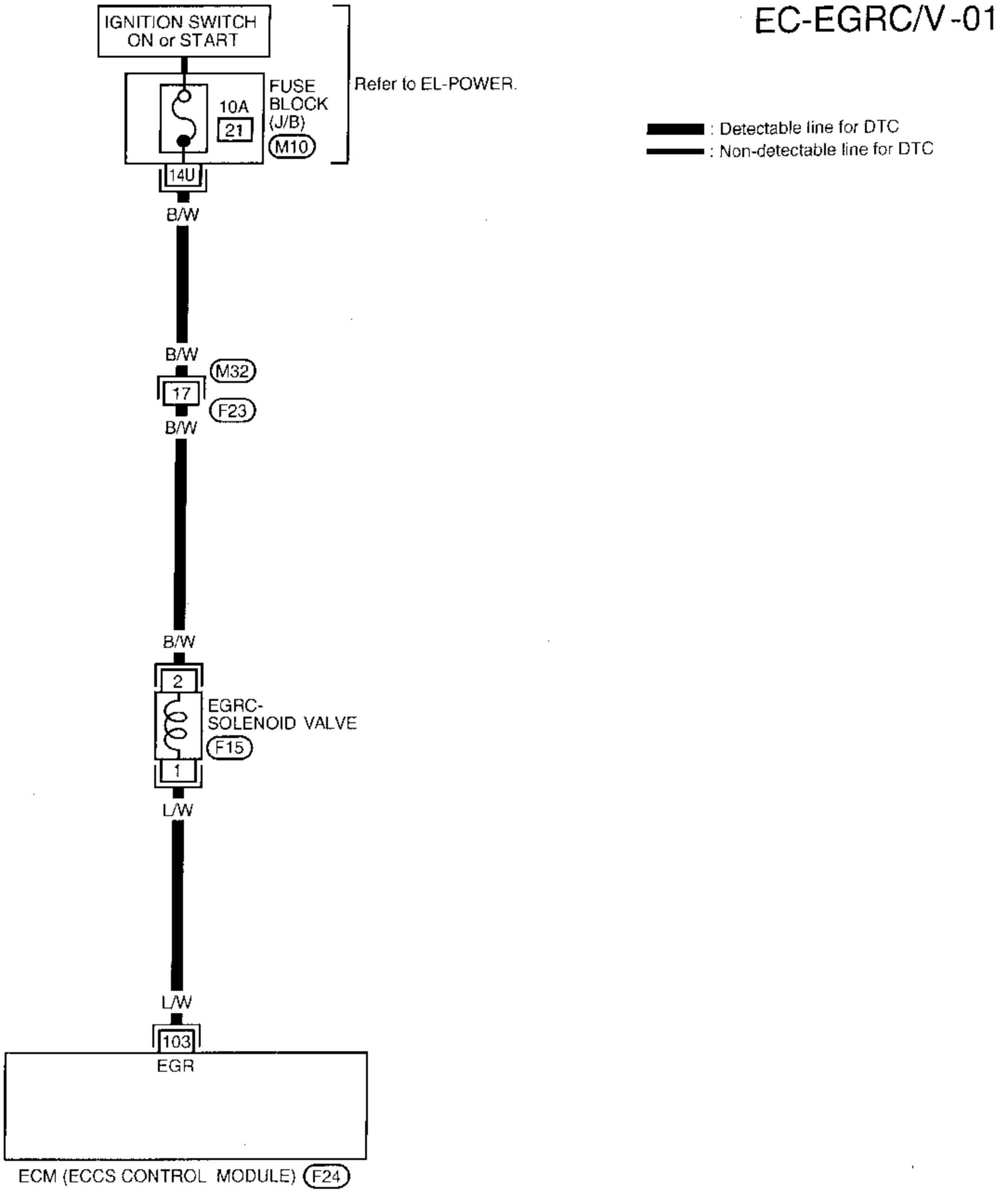
OR

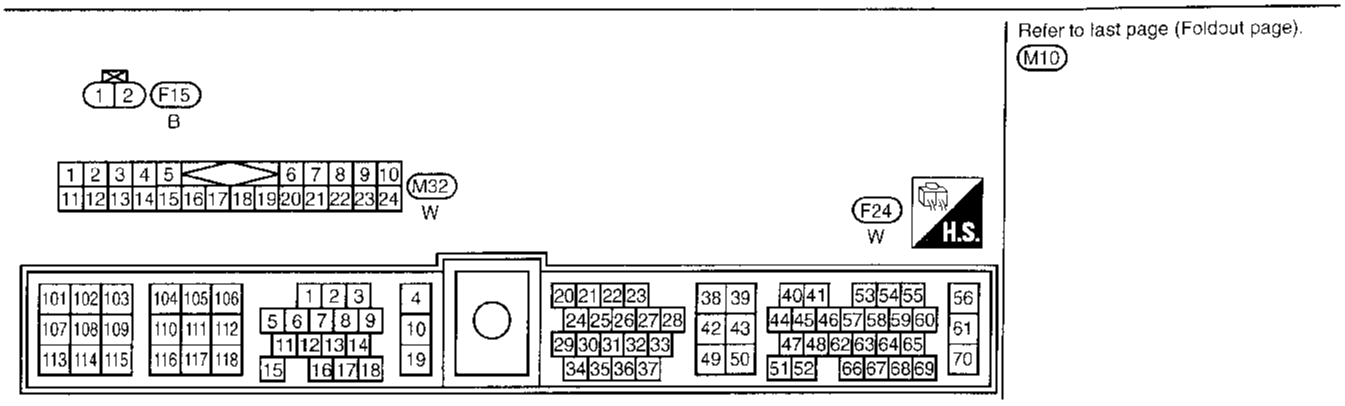
1) Turn ignition switch "ON".
2) Perform "EGRC SOLENOID VALVE" in "ACTIVE TEST" mode with CONSULT and check the operating sound, according to ON/OFF switching.

OR

NO TOOLS

1) Turn ignition switch "ON".
2) Check operating sound of the solenoid valve when disconnecting and reconnecting harness connector.

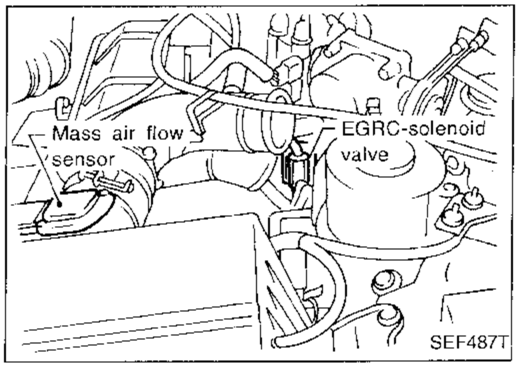

EC-EGRC/V-01
IGNITION SWITCH ON or START
FUSE BLOCK (J/B)
M10
10A
21
Refer to EL-POWER.
: Detectable line for DTC
: Non-detectable line for DTC
14U
B/W
B/W
M32
17
F23
B/W
B/W
2
EGRC-SOLENOID VALVE
F15
1
L/W
L/W
103
EGR
ECM (ECCS CONTROL MODULE)
F24

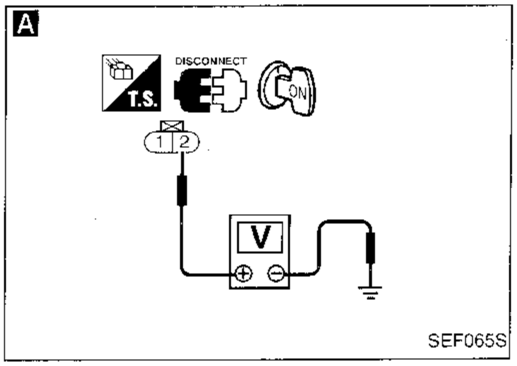

Refer to last page (Foldout page).
M10
1 2
F15
B
1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16 17 18 19 20 21 22 23 24
M32
W
F24
W
H.S.
101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118
1 2 3 5 6 7 8 9 11 12 13 14 15 16 17 18
4 10 19
20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37
38 39 42 43 49 50
40 41 53 54 55 44 45 46 57 58 59 60 47 48 62 63 64 65 51 52 66 67 68 69
56 61 70

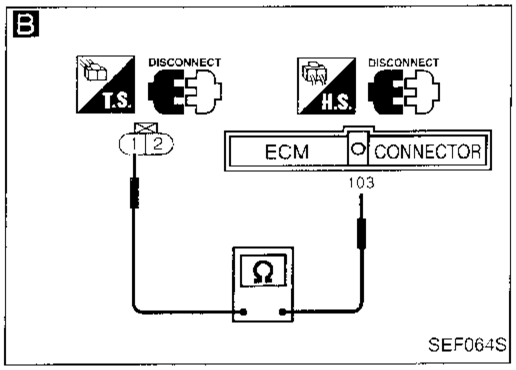
SEF274T

EGRC-Solenoid Valve (Cont'd)

DIAGNOSTIC PROCEDURE







INSPECTION START

↓

A

CHECK POWER SUPPLY.

1. Turn ignition switch "OFF".
2. Disconnect EGRC-solenoid valve.
3. Turn ignition switch "ON".
4. Check voltage between terminal ② and ground with CONSULT or tester.
   Voltage: Battery voltage

NG → Check the following.

- Harness connectors (F23), (M32)
- 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 ①.
   Continuity should exist.
   If OK, check harness for short.

NG → Check the following.

- Harness for open or short between EGRC-solenoid valve and ECM

If NG, repair harness or connectors.

↓ OK

CHECK COMPONENT
(EGRC-solenoid valve).
Refer to "COMPONENT INSPECTION" on next page.

NG → Replace EGRC-solenoid valve.

↓ OK

Disconnect and reconnect harness connectors in the circuit. Then retest.

↓ Trouble is not fixed.

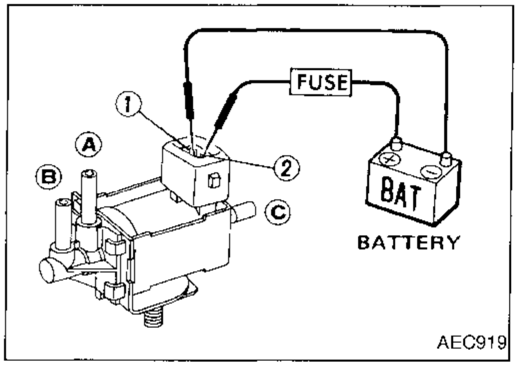
Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

↓

INSPECTION END

EGRC-Solenoid Valve (Cont'd)

COMPONENT INSPECTION

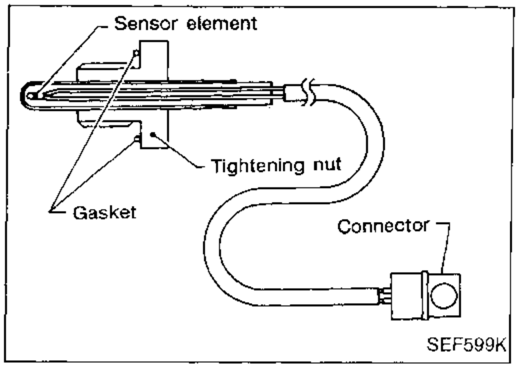


EGRC-solenoid valve

Check air passage continuity.

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

If NG, replace solenoid valve.



SEF599K

EGR Temperature Sensor

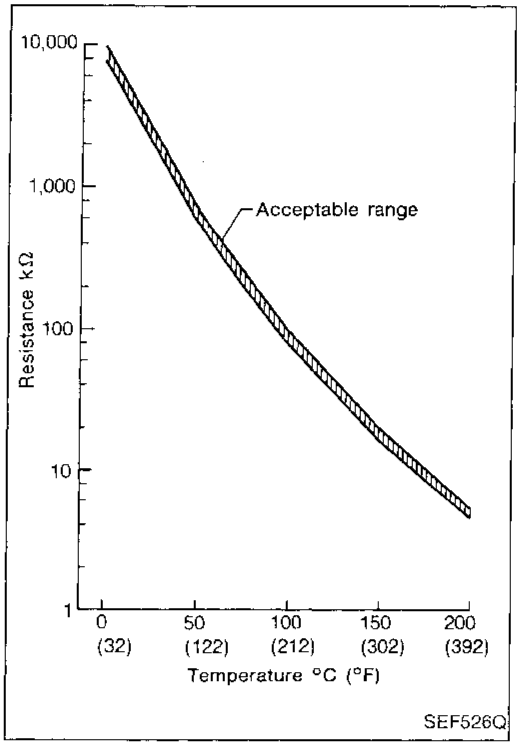
COMPONENT DESCRIPTION

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)	4.81	7.9 - 9.7
50 (122)	2.82	0.57 - 0.70
100 (212)	0.8	0.08 - 0.10

*: These data are reference values and are measured between ECM terminal (62) (EGR temperature sensor) and ECM terminal ㊸ (ECCS ground).
When EGR system is operating.
Voltage: 0 - 1.5V



SEF526Q

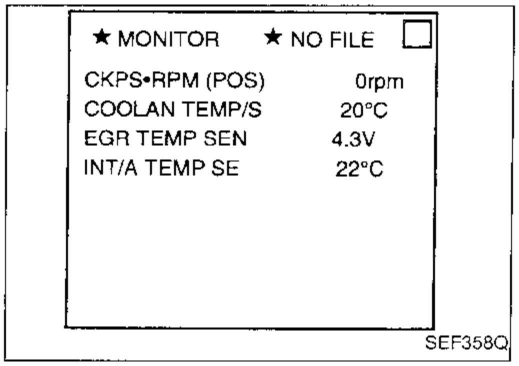
ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P1401 0305	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)

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.

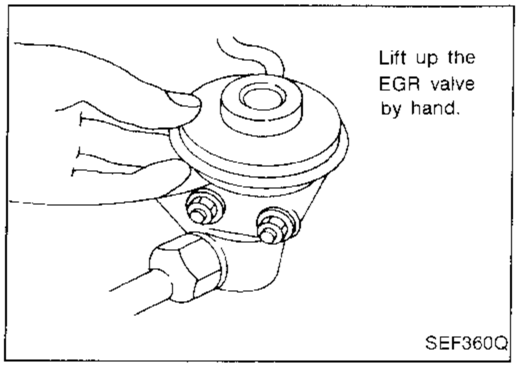


```
★ MONITOR      ★ NO FILE ☐
CKPS•RPM (POS)        0rpm
COOLAN TEMP/S         20°C
EGR TEMP SEN          4.3V
INT/A TEMP SE         22°C
```

SEF358Q

Procedure for malfunction A and B

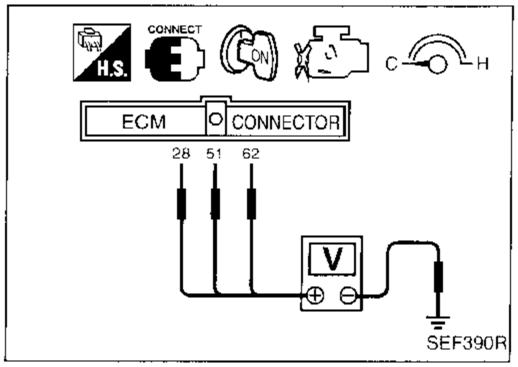
1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT.
2) Confirm that engine coolant temperature and intake air temperature are lower than 40°C (104°F). (If necessary, wait until the temperatures equal atmospheric temperature.)
3) Confirm that "EGR TEMP SEN" reading is between 3.45V and 5.0V.
4) Start engine and warm it up sufficiently.
5) Run engine at idle for at least 2 minutes.
6) Confirm that EGR valve is not lifting. If NG, go to TROUBLE DIAGNOSES FOR DTC P0400 and P0402, (See pages EC-209 and 217).
7) Read "EGR TEMP SEN" at about 1,500 rpm with EGR valve lifted up to the full position by hand.
Voltage should decrease to less than 1.0V.
8) If step 7 is OK, perform TROUBLE DIAGNOSES FOR DTC P0400, P0402 and P1400, EC-209, 217 and 290.



Lift up the EGR valve by hand.

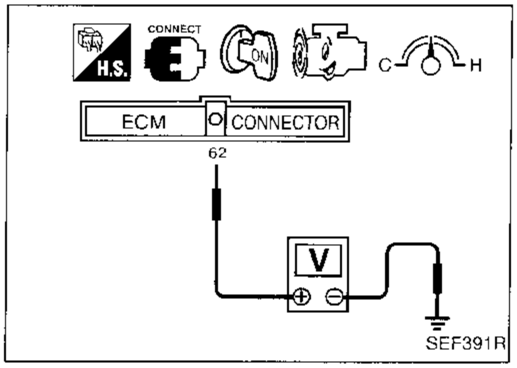
SEF360Q

OR



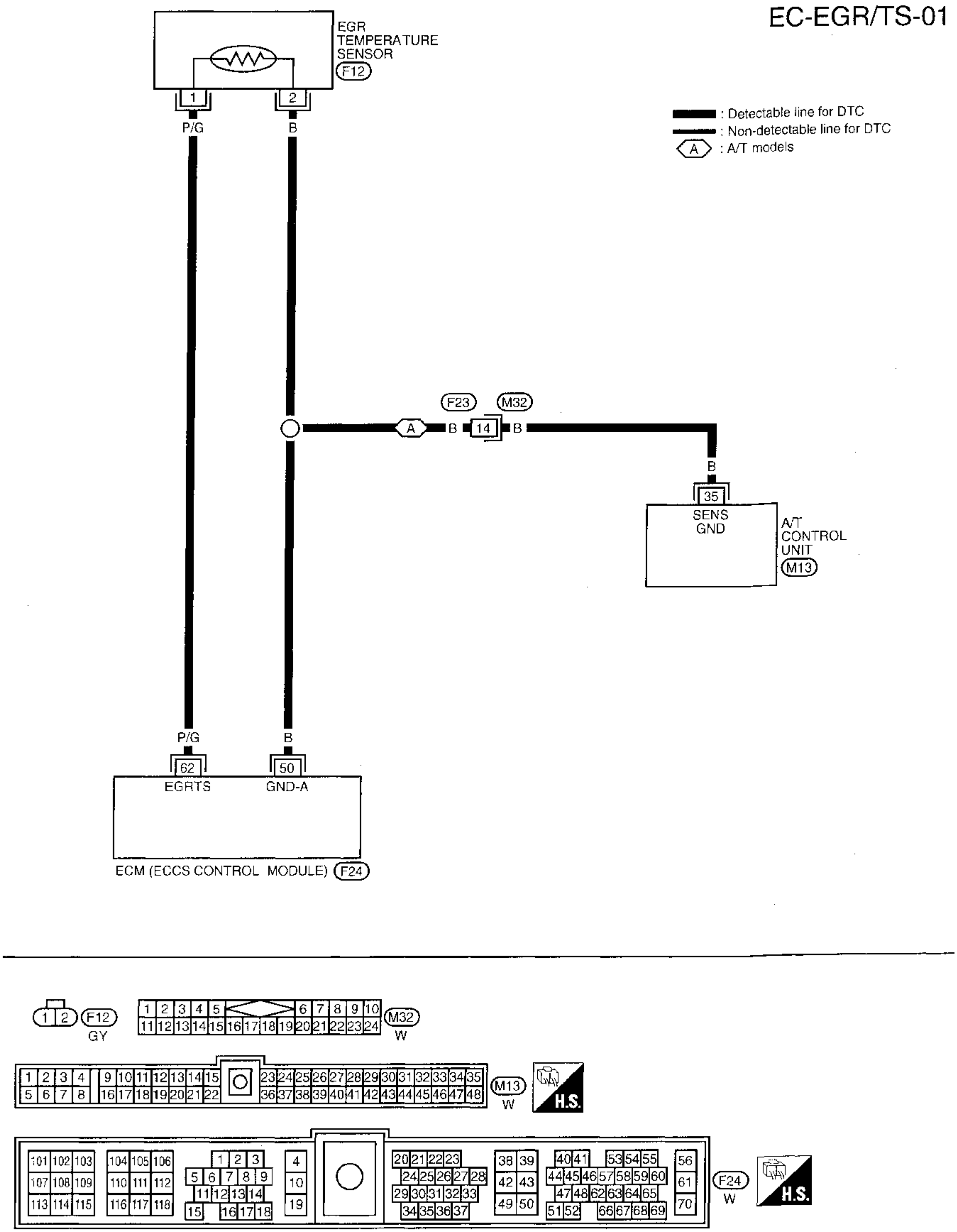
SEF390R

1) Turn ignition switch "ON".
2) Confirm that voltage between ECM terminals ㉘, (51) and ground are more than 2.72V. (If necessary, wait until engine coolant temperature and intake air temperature equal atmospheric temperature.)
3) Confirm that voltage between ECM terminal (62) and ground is between 3.45V and 5.0V.
4) Start engine and warm it up sufficiently.
5) Run engine at idle for at least 2 minutes.
6) Confirm that EGR valve is not lifting. If NG, go to TROUBLE DIAGNOSES FOR DTC P0400 and P0402, (See pages EC-209 and 217).
7) 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.
8) If step 7 is OK, perform TROUBLE DIAGNOSES FOR DTC P0400, P0402 and P1400, (See pages EC-209, 217 and 290).



SEF391R

EGR Temperature Sensor (Cont'd)



SEF275T

GI
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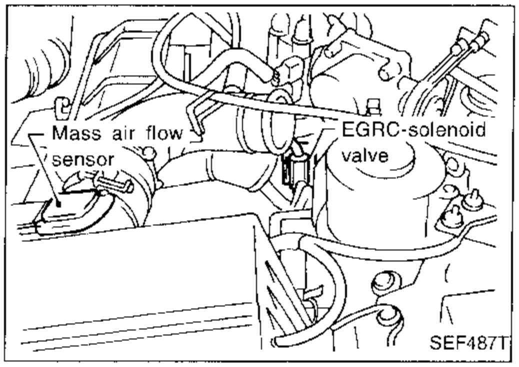
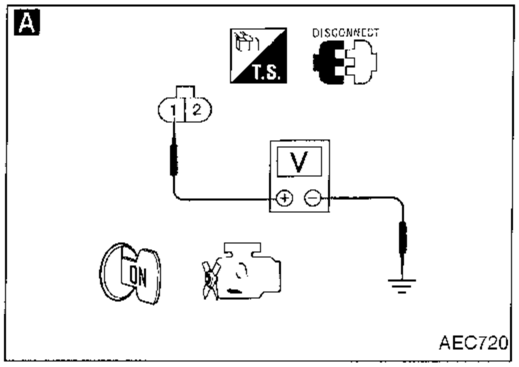
IDX

EGR Temperature Sensor (Cont'd)

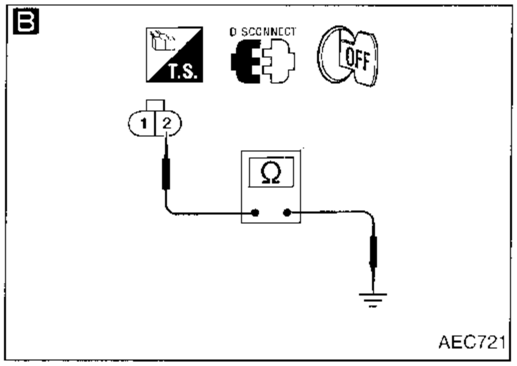
DIAGNOSTIC PROCEDURE



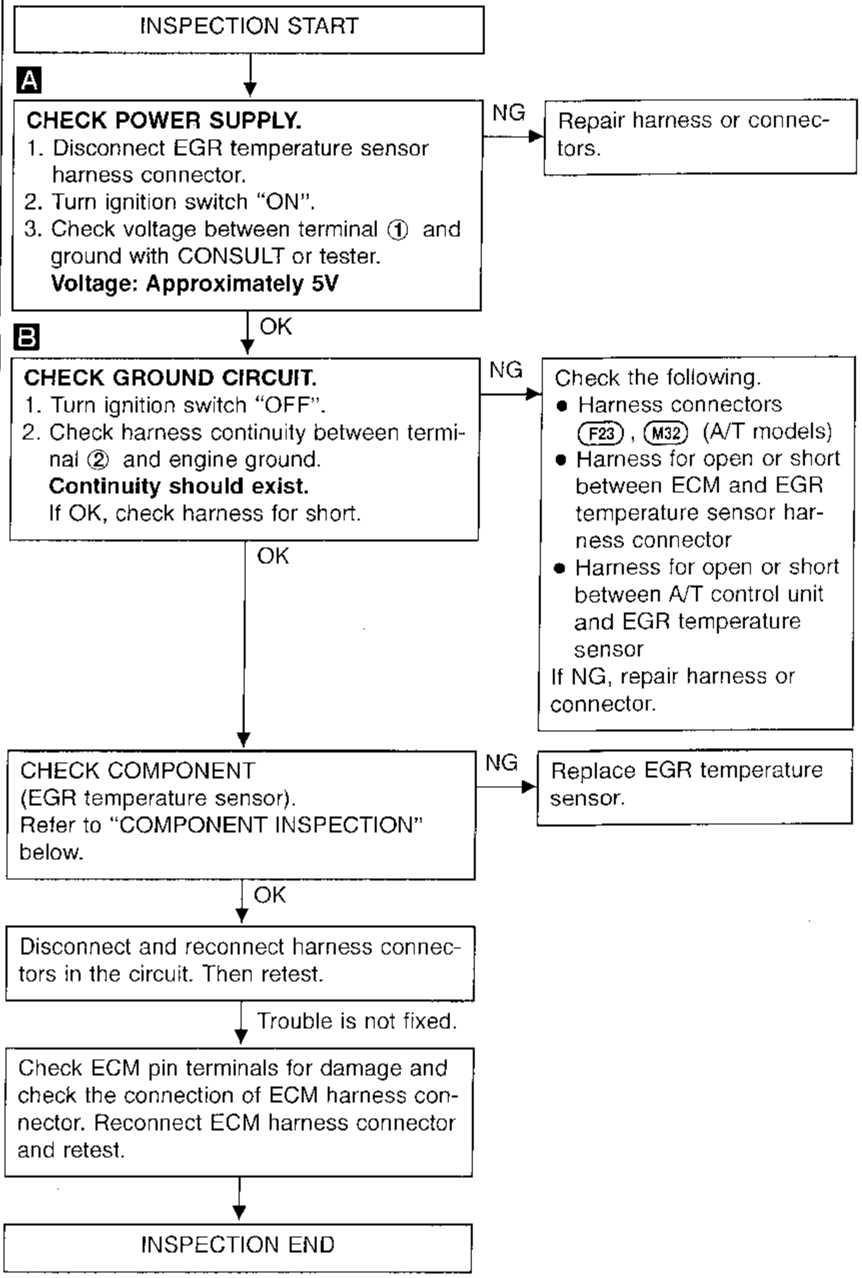
SEF487T



AEC720



AEC721



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 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.

NG → Check the following.

- Harness connectors (F23), (M32) (A/T models)
- Harness for open or short between ECM and EGR temperature sensor harness connector
- Harness for open or short between A/T control unit and EGR temperature sensor

If NG, repair harness or connector.

OK ↓

CHECK COMPONENT (EGR temperature sensor). Refer to "COMPONENT INSPECTION" below.

NG → Replace EGR temperature sensor.

OK ↓

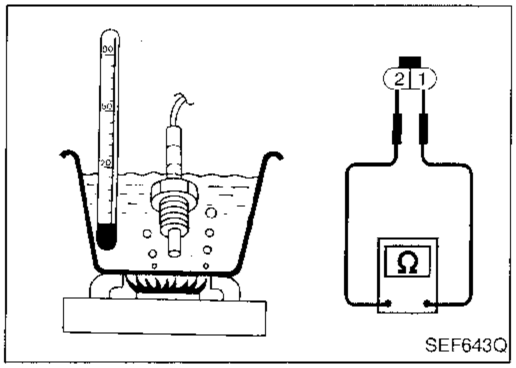
Disconnect and reconnect harness connectors in the circuit. Then retest.

↓ Trouble is not fixed.

Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

↓

INSPECTION END



SEF643Q

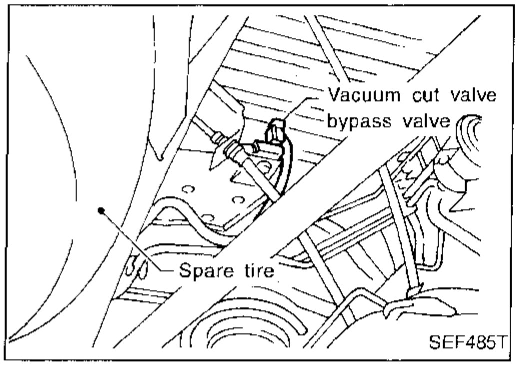
COMPONENT INSPECTION

EGR temperature sensor

Check resistance change and resistance value.
⟨Reference data⟩

EGR temperature °C (°F)	Voltage (V)	Resistance (MΩ)
0 (32)	4.81	7.9 - 9.7
50 (122)	2.82	0.57 - 0.70
100 (212)	0.8	0.08 - 0.10

If NG, replace EGR temperature sensor.

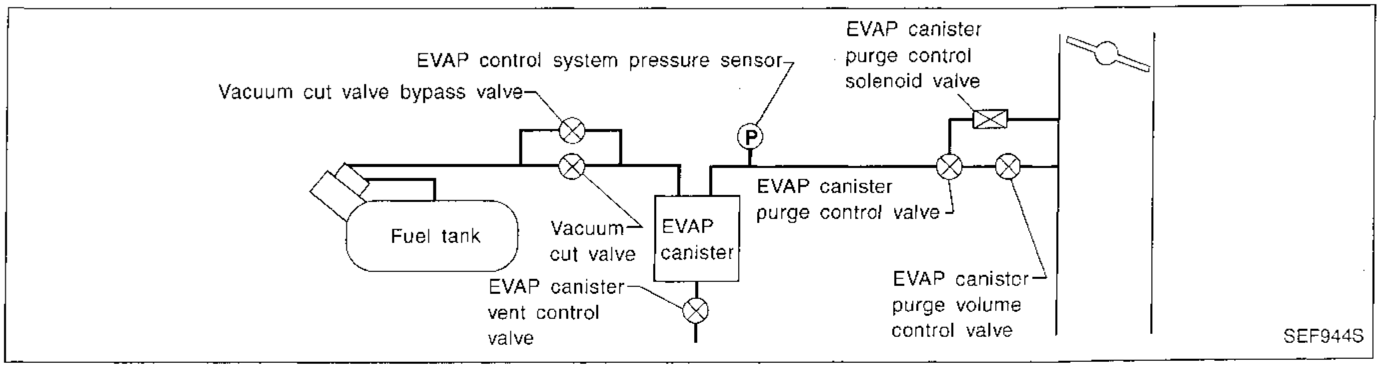


Vacuum Cut Valve Bypass Valve

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 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 ㊸ (ECCS ground).

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
117	G/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)
P1441 0801	A) 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
	B) 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

Vacuum Cut Valve Bypass Valve (Cont'd)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

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

Procedure for malfunction A

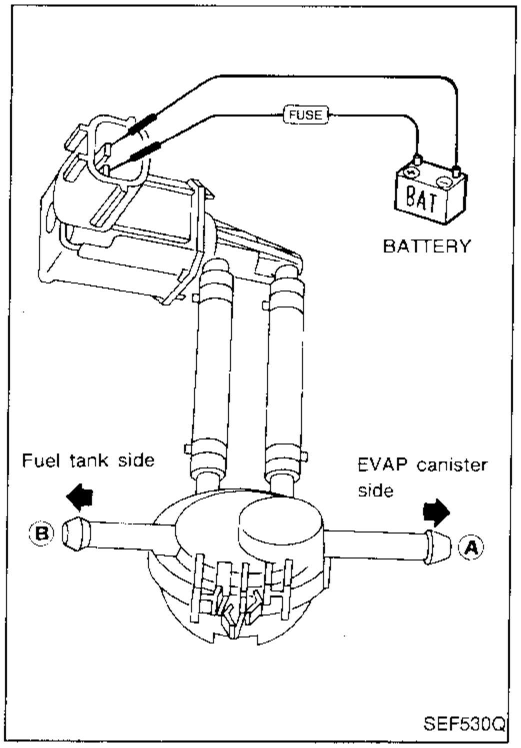
1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
3) Start engine and wait at least 5 seconds.

OR

GST
1) Start engine and wait at least 5 seconds.
2) Select "MODE 7" with GST.

OR

NO TOOLS
1) Start engine and wait at least 5 seconds.
2) Turn ignition switch "OFF", wait at least 7 seconds and then turn "ON".
3) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.

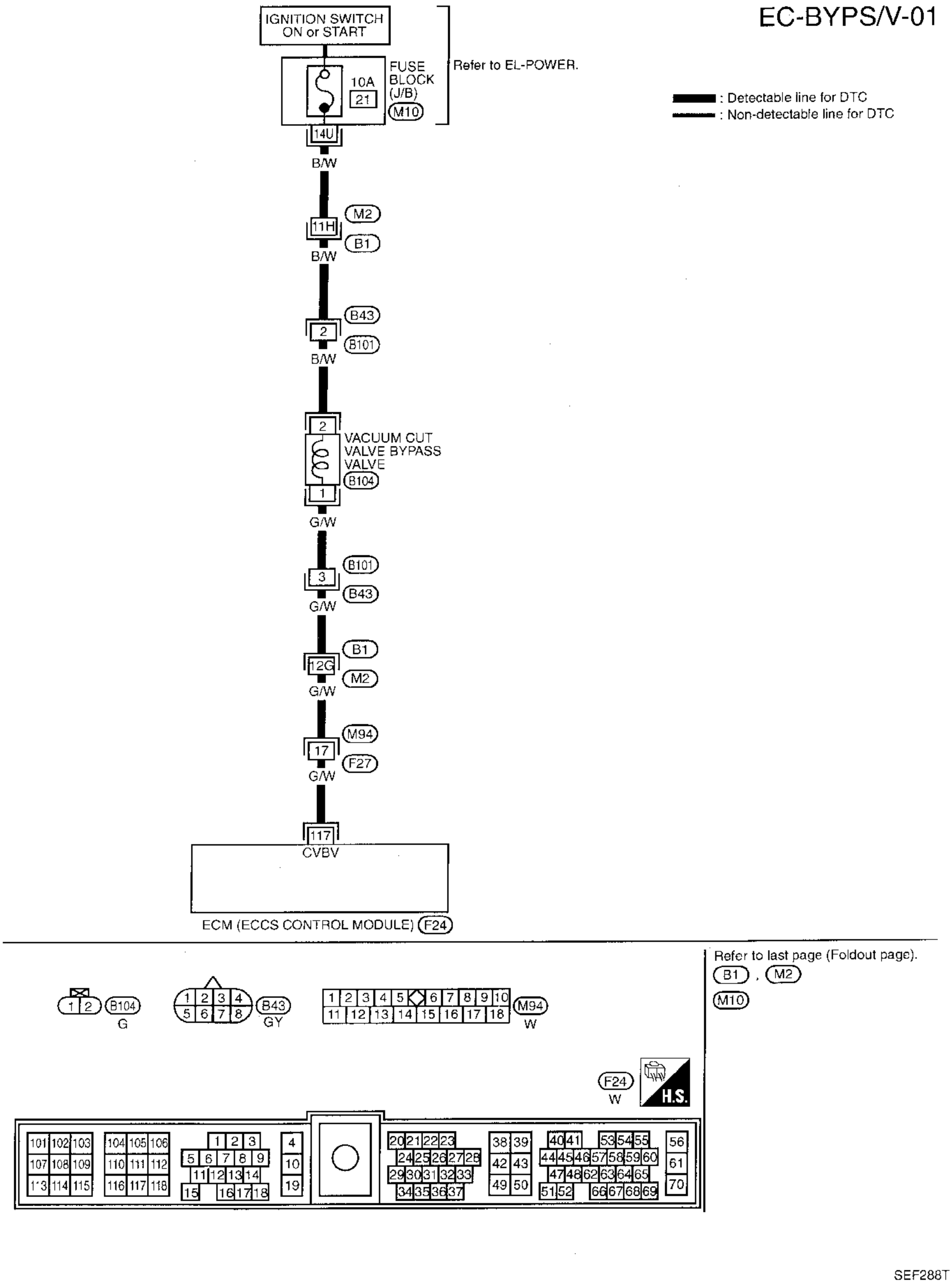


OVERALL FUNCTION CHECK

Procedure for malfunction B

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 Ⓐ.

Vacuum Cut Valve Bypass Valve (Cont'd)

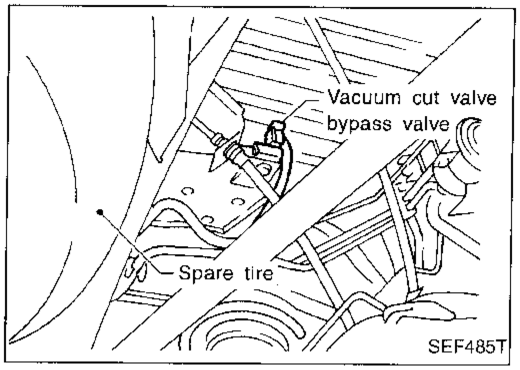


SEF288T

Vacuum Cut Valve Bypass Valve (Cont'd)

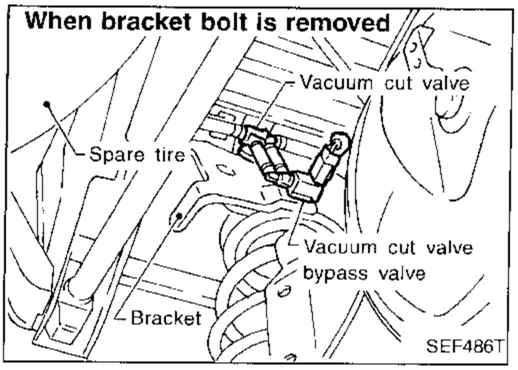
DIAGNOSTIC PROCEDURE

Procedure for malfunction A

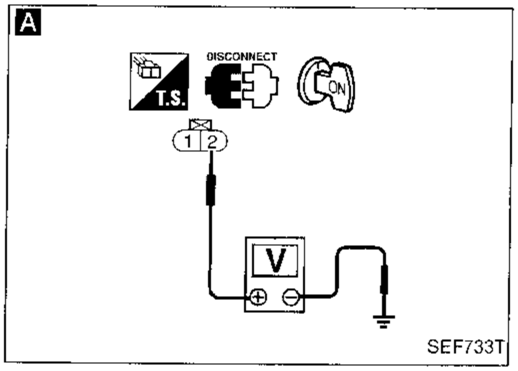


SEF485T

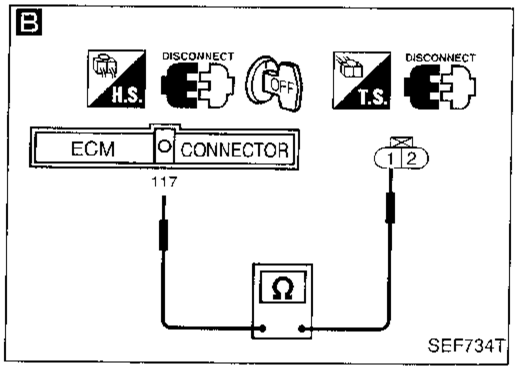
When bracket bolt is removed



SEF486T



SEF733T



SEF734T

INSPECTION START

↓

A

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 or tester.

Voltage: Battery voltage

NG → Check the following.
- Harness connectors M2, B1
- Harness connectors B43, B101
- 10A fuse
- Harness for open or short between vacuum cut valve bypass 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 117 and terminal ①.

Continuity should exist.

If OK, check harness for short.

NG → Check the following.
- Harness connectors B101, B43
- Harness connectors B1, M2
- Harness connectors M94, F27
- Harness for open or short between vacuum cut valve bypass valve and ECM

If NG, repair harness or connectors.

OK ↓

CHECK COMPONENT
(Vacuum cut valve bypass valve).
Refer to "COMPONENT INSPECTION" on next page.

NG → Replace vacuum cut valve bypass valve.

OK ↓

Disconnect and reconnect harness connectors in the circuit. Then retest.

↓ Trouble is not fixed.

Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

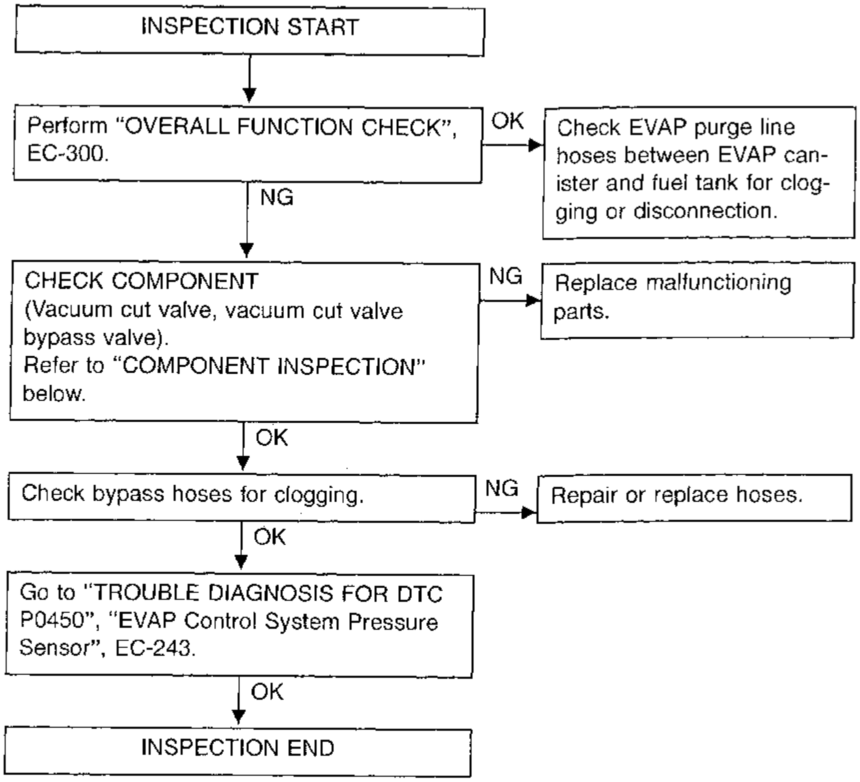
↓

INSPECTION END

Vacuum Cut Valve Bypass Valve (Cont'd)

DIAGNOSTIC PROCEDURE

Procedure for malfunction B



INSPECTION START

Perform "OVERALL FUNCTION CHECK", EC-300.

OK → Check EVAP purge line hoses between EVAP canister and fuel tank for clogging or disconnection.

NG ↓

CHECK COMPONENT (Vacuum cut valve, vacuum cut valve bypass valve). Refer to "COMPONENT INSPECTION" below.

NG → Replace malfunctioning parts.

OK ↓

Check bypass hoses for clogging.

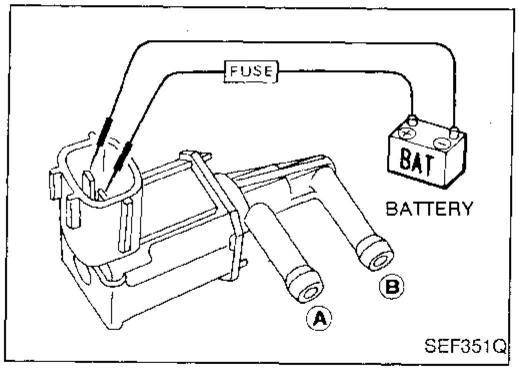
NG → Repair or replace hoses.

OK ↓

Go to "TROUBLE DIAGNOSIS FOR DTC P0450", "EVAP Control System Pressure Sensor", EC-243.

OK ↓

INSPECTION END



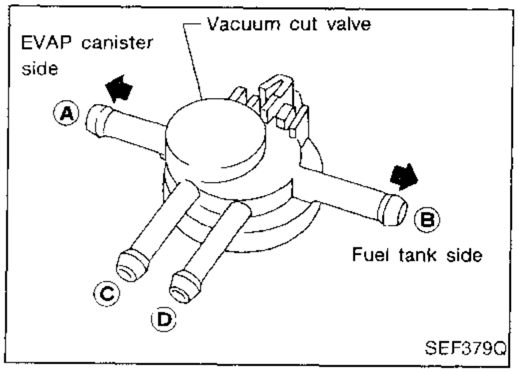
COMPONENT INSPECTION

Vacuum cut valve bypass valve

Check air passage continuity.

Condition	Air passage continuity between Ⓐ and Ⓑ
12V direct current supply between terminals	Yes
No supply	No

If NG, replace vacuum cut valve bypass valve.



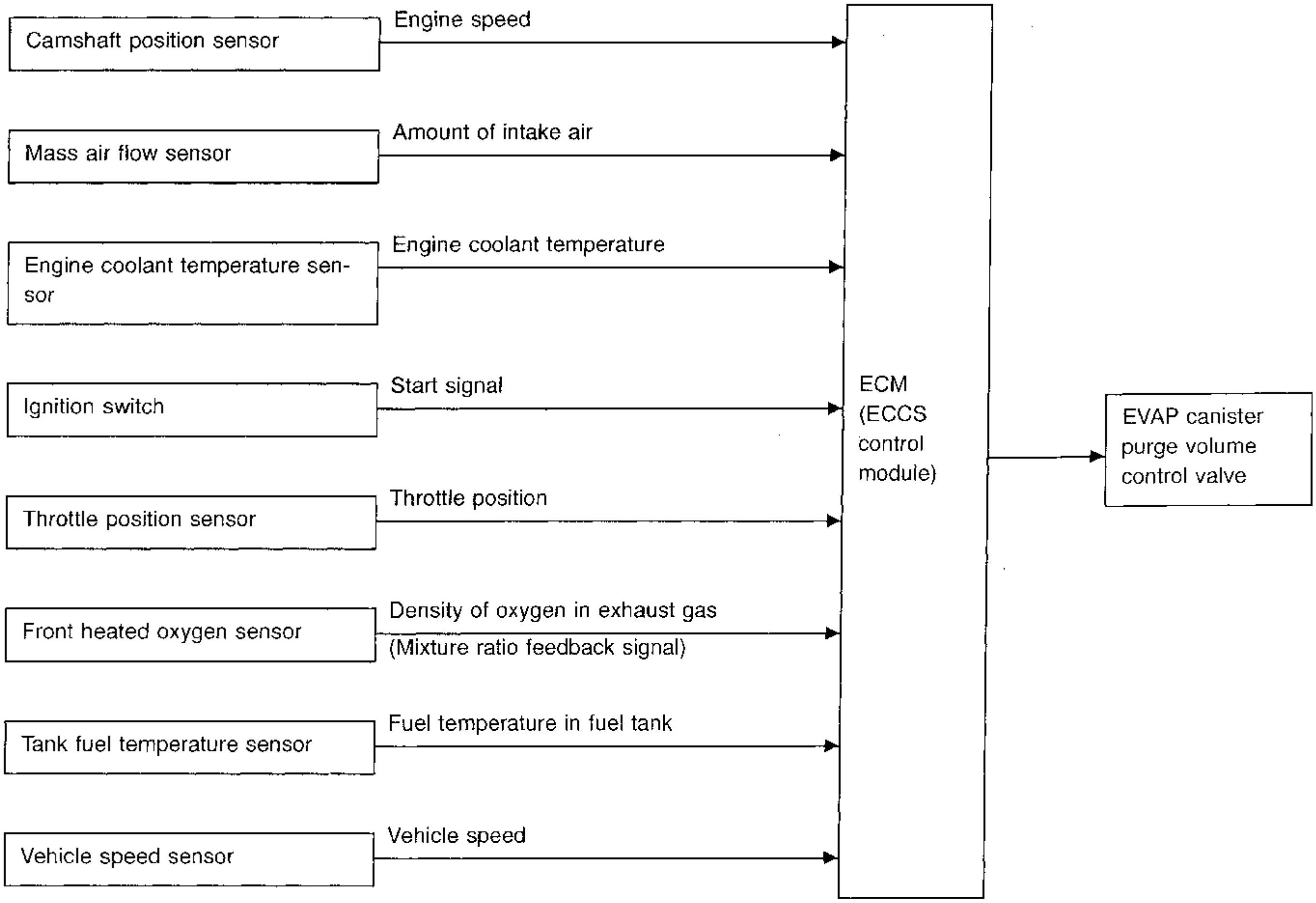
Vacuum cut valve

Check vacuum cut valve as follows:

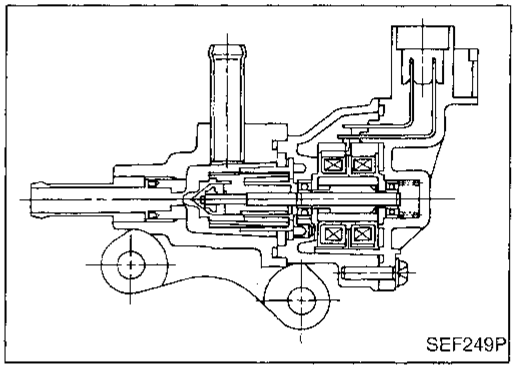
1. Plug port Ⓒ and Ⓓ with fingers.
2. Apply vacuum to port Ⓐ and check that there is no suction from port Ⓑ.
3. Apply vacuum to port Ⓑ and check that there is suction from port Ⓐ.
4. Blow air in port Ⓑ and check that there is a resistance to flow out of port Ⓐ.
5. Open port Ⓒ and Ⓓ.
6. Blow air in port Ⓐ check that air flows freely out of port Ⓒ.
7. Blow air in port Ⓑ check that air flows freely out of port Ⓓ.

Evaporative Emission (EVAP) Canister Purge Volume Control 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 valve changes to control the flow rate. A built-in step motor moves the valve in steps corresponding to the ECM output pulses. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions. 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 valve uses a step motor to control the flow rate of fuel vapor from the EVAP canister. This motor has four winding phases. It operates according to the output pulse signal of the ECM. Two windings are turned ON and OFF in sequence. Each time an ON pulse is issued, the valve opens or closes, changing the flow rate. When no change in the flow rate is needed, the ECM does not issue the pulse signal. A certain voltage signal is issued so that the valve remains at that particular opening.

Evaporative Emission (EVAP) Canister Purge Volume Control Valve (Cont'd)

CONSULT 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"	Idle	0 step
		Vehicle running (Shift lever "1")	—

ECM TERMINALS AND REFERENCE VALUE

Specification data are reference values and are measured between each terminal and ㊸ (ECCS ground).

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	L/B	ECCS 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)
56	B/W	Power supply for ECM	Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
61	B/W			
113	B/W	Current return	Engine is running. └ Idle speed	BATTERY VOLTAGE (11 - 14V)
5	L	EVAP canister purge volume control valve	Engine is running. └ Idle speed	0 - 0.4V
6	YL			
16	W/B	EVAP canister purge volume control valve	Engine is running. └ Idle speed	BATTERY VOLTAGE (11 - 14V)
17	R/G			

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P1445 1008	A) 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 valve
	B) The canister purge flow is detected during the specified driving conditions, even when EVAP canister purge volume control valve is completely closed.	• EVAP control system pressure sensor • EVAP canister purge volume control valve (The valve is stuck open.) • EVAP canister purge control valve • Hoses (Hoses are connected incorrectly.)

Evaporative Emission (EVAP) Canister Purge Volume Control Valve (Cont'd)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

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

Procedure for malfunction A

1) Lift up drive wheels.
2) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT.
3) Start engine and let it idle for at least 90 seconds.
4) Move selector/gearshift lever to "1" range (A/T) or "1st" gear (M/T).
5) Race engine from idle to 2,000 to 3,000 rpm more than 10 times.

OR

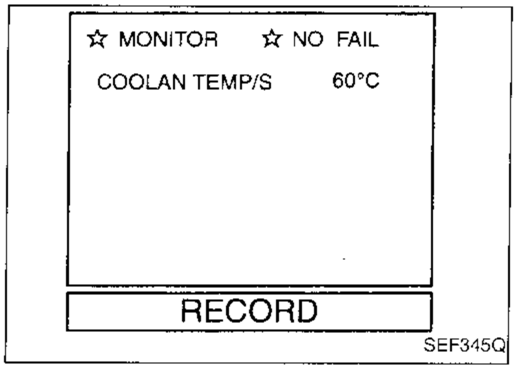
GST

1) Lift up drive wheels.
2) Start engine and let it idle for at least 90 seconds.
3) Move selector/gearshift lever to "1" range (A/T) or "1st" gear (M/T).
4) Race engine from idle to 2,000 to 3,000 rpm more than 10 times.
5) Select "MODE 7" with GST.

OR

NO TOOLS

1) Lift up drive wheels.
2) Start engine and let it idle for at least 90 seconds.
3) Move selector/gearshift lever to "1" range (A/T) or "1st" gear (M/T).
4) Race engine from idle to 2,000 to 3,000 rpm more than 10 times.
5) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
6) Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.



☆ MONITOR ☆ NO FAIL

COOLAN TEMP/S 60°C

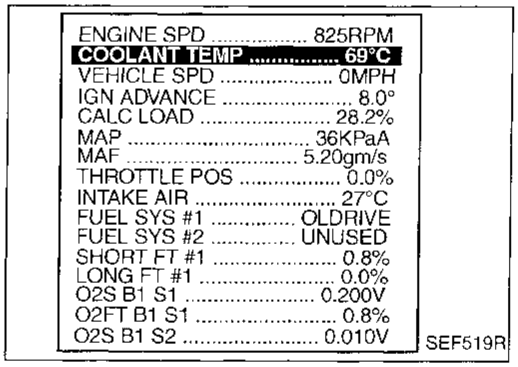
SEF345Q

Procedure for malfunction B

1) Lift up drive wheels.
2) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT.
3) Start engine and warm it up until the engine coolant temperature rises to 60 to 80°C (140 to 176°F), then stop engine. (If the engine coolant temperature exceeds the above range, stop engine and wait until the temperature falls to within this range.)
4) Start engine and let it idle for at least 70 seconds.
5) Maintain the following conditions for at least 50 seconds.

Gear position:
"2" or "D" range (A/T)
"3rd" or "4th" gear (M/T)
Vehicle speed:
45 - 70 km/h (28 - 43 MPH)
Engine speed:
1,500 - 2,500 rpm
Coolant temperature:
Less than 100°C (212°F)

Evaporative Emission (EVAP) Canister Purge Volume Control Valve (Cont'd)



```
ENGINE SPD ................ 825RPM
COOLANT TEMP ................ 69°C
VEHICLE SPD .................... 0MPH
IGN ADVANCE ....................... 8.0°
CALC LOAD ....................... 28.2%
MAP ............................... 36KPaA
MAF ............................. 5.20gm/s
THROTTLE POS ................. 0.0%
INTAKE AIR ........................ 27°C
FUEL SYS #1 .............. OLDRIVE
FUEL SYS #2 .............. UNUSED
SHORT FT #1 ..................... 0.8%
LONG FT #1 ....................... 0.0%
O2S B1 S1 ...................... 0.200V
O2FT B1 S1 ........................ 0.8%
O2S B1 S2 ....................... 0.010V
```

SEF519R

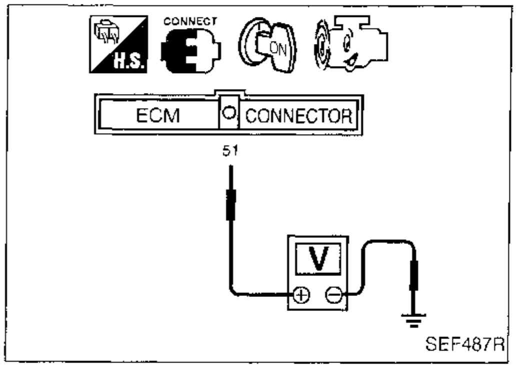
OR

GST

1) Lift up drive wheels.
2) Turn ignition switch "ON" and select "MODE 1" mode with GST.
3) Start engine and warm it up until the engine coolant temperature rises to 60 to 80°C (140 to 176°F), then stop engine. (If the engine coolant temperature exceeds the above range, stop engine and wait until the temperature falls to within this range.)
4) Start engine and let it idle for at least 70 seconds.
5) Maintain the following conditions for at least 50 seconds.

   Gear position:
   "2" or "D" range (A/T)
   "3rd" or "4th" gear (M/T)
   Vehicle speed:
   45 - 70 km/h (28 - 43 MPH)
   Engine speed:
   1,500 - 2,500 rpm
   Coolant temperature:
   Less than 100°C (212°F)
6) Select "MODE 7" with GST.

OR



SEF487R

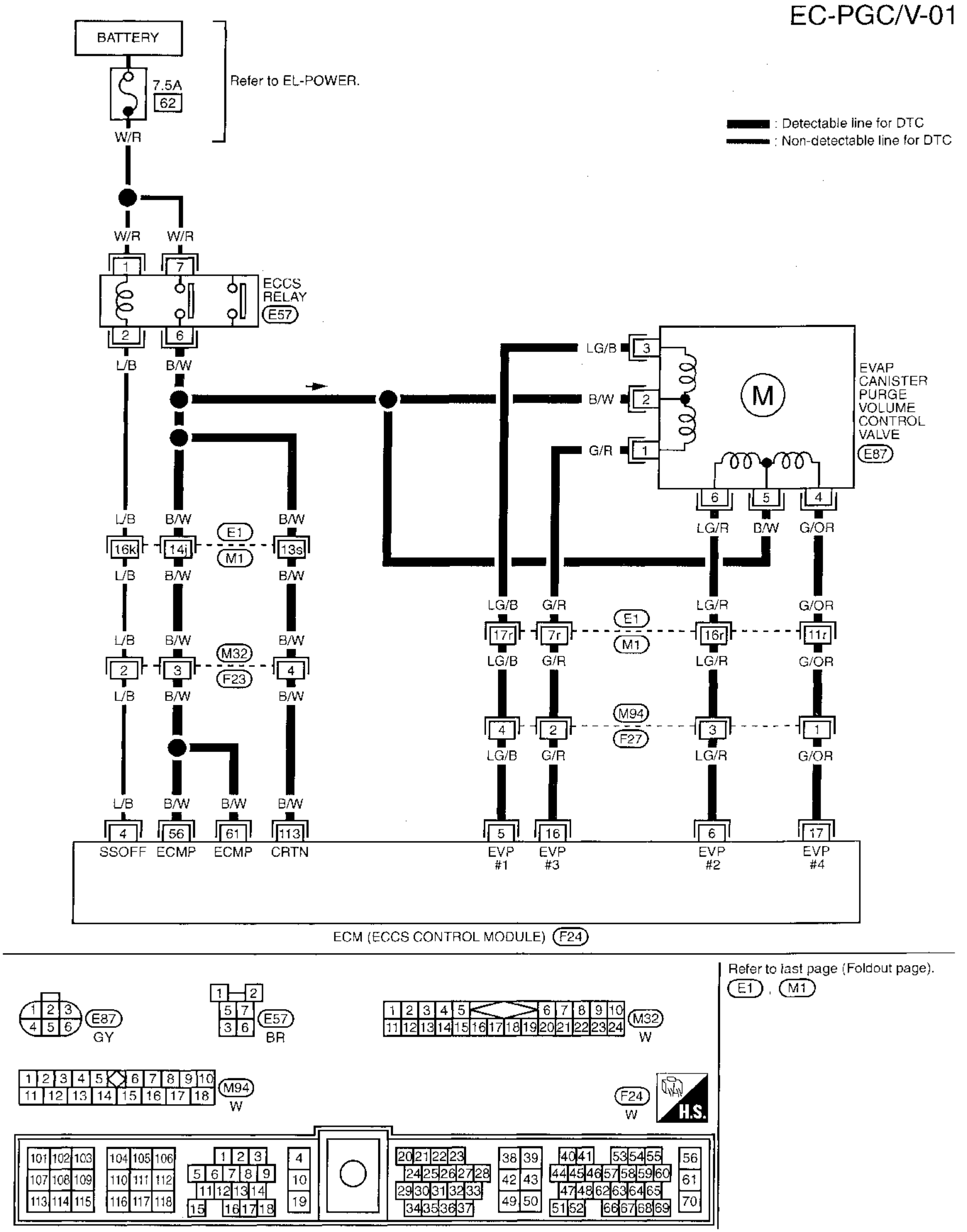
NO TOOLS

1) Lift up drive wheels.
2) Turn ignition switch "ON".
3) Start engine and warm it up until the voltage between ECM terminal (51) and ground drops to 1.2 - 1.9V, then stop engine. (If the voltage drops below the above range, stop engine and wait until the voltage rises to within this range.)
4) Start engine and let it idle for at least 70 seconds.
5) Maintain the following conditions for at least 50 seconds.

   Gear position:
   "2" or "D" range (A/T)
   "3rd" or "4th" gear (M/T)
   Vehicle speed:
   45 - 70 km/h (28 - 43 MPH)
   Engine speed:
   1,500 - 2,500 rpm
   Voltage between ECM terminal (51) and ground:
   More than 0.8V
6) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
7) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.

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

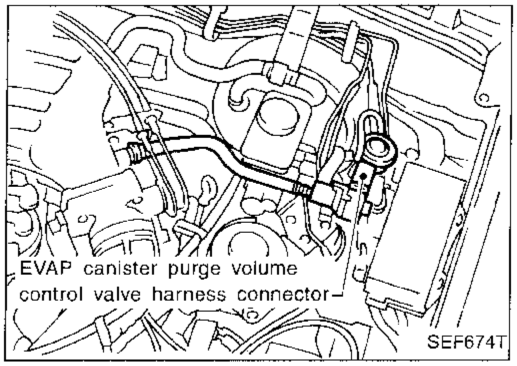
Evaporative Emission (EVAP) Canister Purge Volume Control Valve (Cont'd)



SEF290T

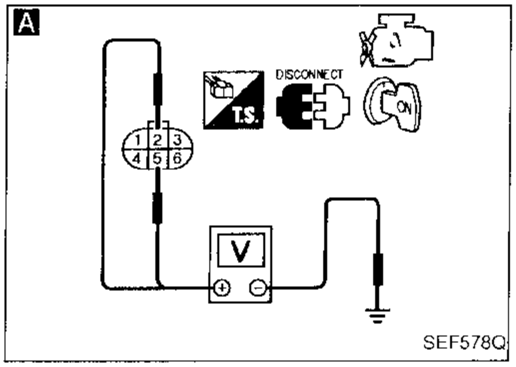
Evaporative Emission (EVAP) Canister Purge Volume Control Valve (Cont'd)

DIAGNOSTIC PROCEDURE



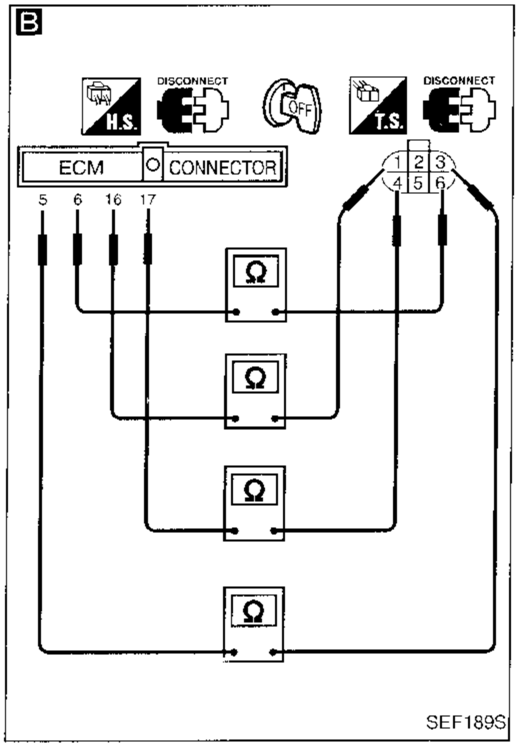
SEF674T

A



SEF578Q

B



SEF189S

INSPECTION START

A

CHECK POWER SUPPLY.
1. Turn ignition switch "OFF".
2. Disconnect EVAP canister purge volume control valve harness connector.
3. Turn ignition switch "ON".
4. Check voltage between terminals ② , ⑤ and engine ground with CONSULT or tester.

Voltage: Battery voltage

NG → Check the following.
- ECCS relay
- BR fusible link
- Harness for open or short between EVAP canister purge volume control valve and fusible link
- Harness for open or short between EVAP canister purge volume control 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 ⑯ and terminal ① , ECM terminal ⑰ and terminal ④ , ECM terminal ⑤ and terminal ③ , ECM terminal ⑥ and terminal ⑥ .

Continuity should exist.

If OK, check harness for short.

NG → Repair harness or connectors.

OK

CHECK COMPONENT (EVAP control system pressure sensor) (For malfunction B only).
Refer to "COMPONENT INSPECTION" in "TROUBLE DIAGNOSIS FOR DTC P0450", EC-243.

NG → Replace EVAP control system pressure sensor.

OK

CHECK COMPONENT (EVAP canister purge volume control valve).
Refer to "COMPONENT INSPECTION" on next page.

NG → Replace EVAP canister purge volume control valve.

OK

Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed.

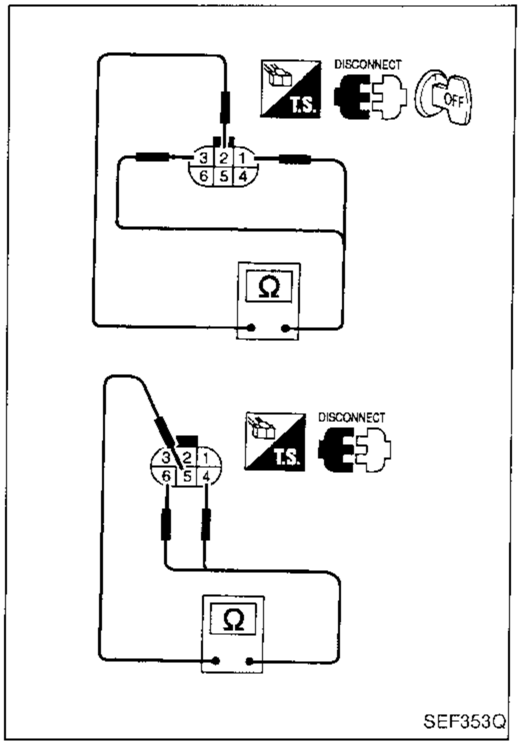
Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

INSPECTION END

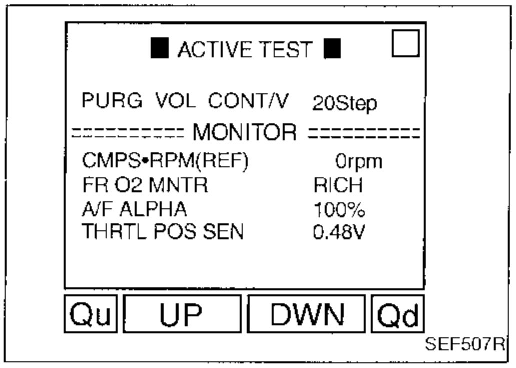
Evaporative Emission (EVAP) Canister Purge Volume Control Valve (Cont'd)

COMPONENT INSPECTION

EVAP canister purge volume control valve



SEF353Q



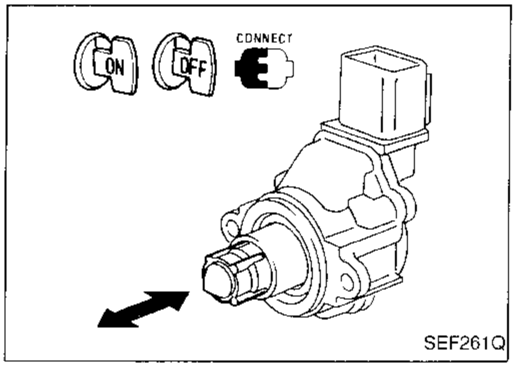
```
■ ACTIVE TEST ■          ☐
PURG VOL CONT/V    20Step
========== MONITOR ==========
CMPS•RPM(REF)        0rpm
FR O2 MNTR           RICH
A/F ALPHA            100%
THRTL POS SEN        0.48V
```

SEF507R

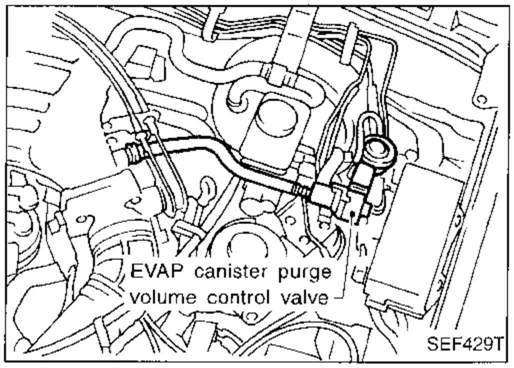
1. Disconnect EVAP canister purge volume control valve harness connector.
2. Check resistance between the following terminals.
   terminal ② and terminals ①, ③
   terminal ⑤ and terminals ④, ⑥
   Resistance:
   Approximately 30Ω [At 25°C (77°F)]
3. Reconnect EVAP canister purge volume control valve harness connector.
4. Remove EVAP canister purge volume control valve from intake manifold collector and disconnect hoses from the valve.
   (Plug the purge hoses. The EVAP canister purge volume control valve harness connector should remain connected.)
5. Turn ignition switch "ON".
6. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT. Check that EVAP canister purge volume control valve shaft moves smoothly forward and backward according to the valve opening.
   If NG, replace the EVAP canister purge volume control valve.

OR

1. Disconnect EVAP canister purge volume control valve harness connector.
2. Check resistance between the following terminals.
   terminal ② and terminals ①, ③
   terminal ⑤ and terminals ④, ⑥
   Resistance:
   Approximately 30Ω [At 25°C (77°F)]
3. Reconnect EVAP canister purge volume control valve harness connector.
4. Remove EVAP canister purge volume control valve from intake manifold collector and disconnect hoses from the valve.
   (Plug the purge hoses. The EVAP canister purge volume control valve harness connector should remain connected.)
5. Turn ignition switch "ON" and "OFF". Check that EVAP canister purge volume control valve shaft moves smoothly forward and backward according to the ignition switch position.
   If NG, replace the EVAP canister purge volume control valve.

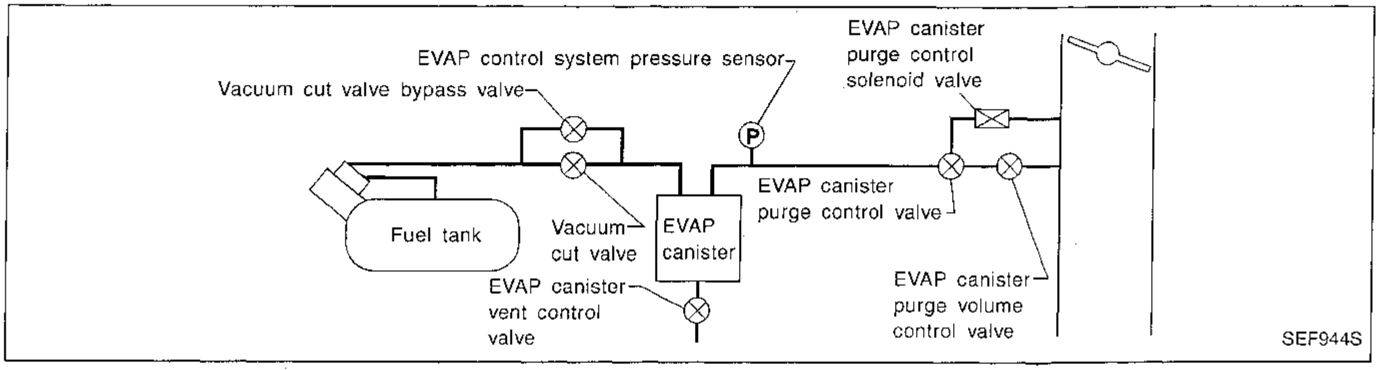


SEF261Q



SEF429T

Evaporative Emission (EVAP) Control System Purge Flow Monitoring



SYSTEM DESCRIPTION

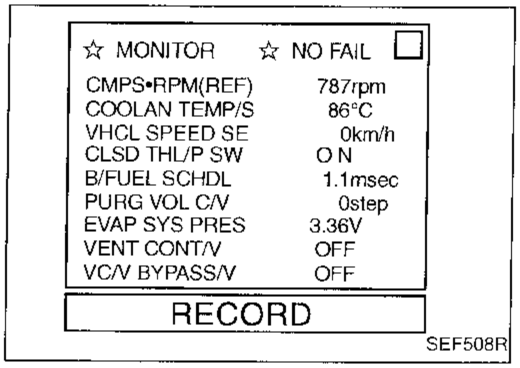
In this evaporative emission (EVAP) control system, purge flow occurs during non-closed throttle conditions. Purge volume is related to air intake volume. Under normal purge conditions (non-closed throttle), the EVAP canister purge volume control valve and EVAP canister purge control valve are open. 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.

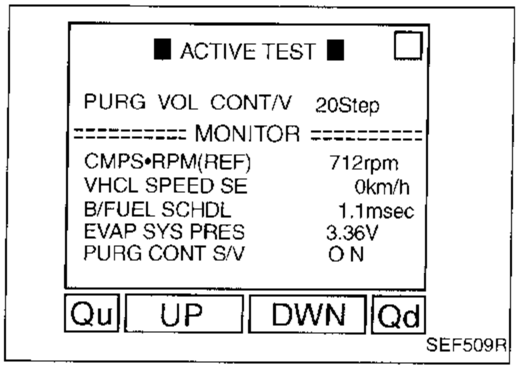
Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P1447 0111	• EVAP control system does not operate properly. • EVAP control system has a leak between intake manifold and EVAP control system pressure sensor.	• EVAP canister purge volume control valve stuck closed • EVAP canister purge control valve stuck closed • EVAP control system pressure sensor • Loose or disconnected rubber tube • Blocked rubber tube • EVAP canister purge control solenoid valve • Blocked or bent rubber tube to MAP/BARO switch solenoid valve • Cracked EVAP canister • Absolute pressure sensor • MAP/BARO switch solenoid valve

Evaporative Emission (EVAP) Control System Purge Flow Monitoring (Cont'd)



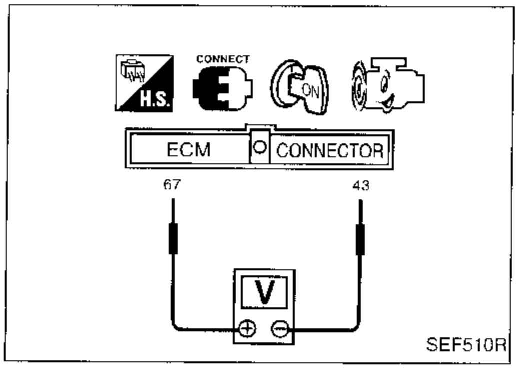
```
☆ MONITOR    ☆ NO FAIL  ☐
CMPS•RPM(REF)      787rpm
COOLAN TEMP/S        86°C
VHCL SPEED SE        0km/h
CLSD THL/P SW      O N
B/FUEL SCHDL        1.1msec
PURG VOL C/V         0step
EVAP SYS PRES      3.36V
VENT CONT/V        OFF
VC/V BYPASS/V      OFF
         RECORD
```

SEF508R



```
     ■ ACTIVE TEST ■      ☐
PURG VOL CONT/V   20Step
========== MONITOR ==========
CMPS•RPM(REF)       712rpm
VHCL SPEED SE         0km/h
B/FUEL SCHDL         1.1msec
EVAP SYS PRES       3.36V
PURG CONT S/V       O N
[Qu][  UP  ][  DWN  ][Qd]
```

SEF509R



SEF510R

OVERALL FUNCTION CHECK

Use this procedure to check the overall monitoring function of the EVAP control system purge flow. During this check, a DTC might not be confirmed.

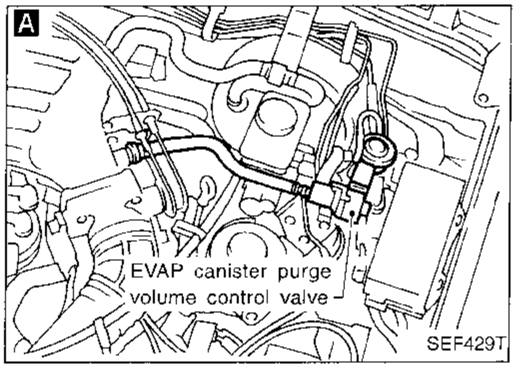
1) Start engine.
2) Select "EVAP SYS PRES" in "DATA MONITOR" mode with CONSULT.
3) Check EVAP control system pressure sensor value at idle speed.
4) Select "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT.
5) Touch "START" and set "PURG VOL CONT/V" to 20 steps by touching "UP" or "Qu".
6) Maintain the following conditions for at least 30 seconds. Verify that EVAP control system pressure sensor value ("EVAP SYS PRES") stays 0.1V less than the value at idle speed for at least 2 seconds.
   Engine speed:
   Approx. 2,000 rpm

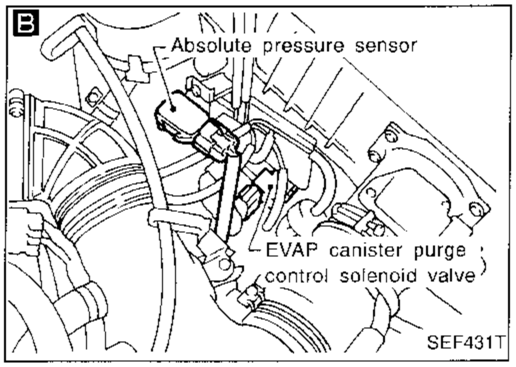
OR

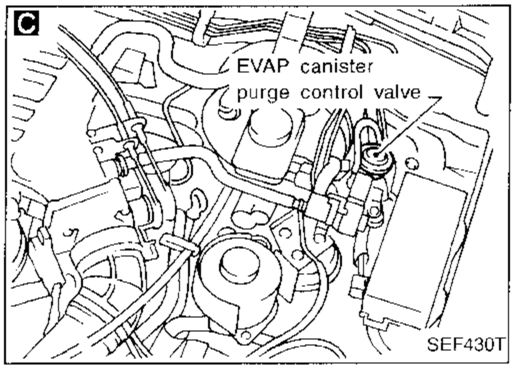
1) Lift up drive wheels.
2) Start engine and warm it up sufficiently.
3) Turn ignition switch "OFF", wait at least 5 seconds.
4) Start engine and wait at least 70 seconds.
5) Set voltmeter probes to ECM terminals (67) (EVAP control system pressure sensor signal) and ㊸ (ground).
6) Check EVAP control system pressure sensor value at idle speed.
7) Establish and maintain the following conditions for at least 30 seconds.
   Air conditioner switch: ON
   Steering wheel: Fully turned
   Headlamp switch: ON
   Rear window defogger switch: ON
   Engine speed: Approx. 3,200 rpm
   Intake manifold vacuum:
   −73.3 to −60.0 kPa (−550 to −450 mmHg, −21.65 to −17.72 inHg, −10.63 to −8.70 psi)
   Gear position:
   M/T models
   Any position other than "Neutral" or "Reverse"
   A/T models
   Any position other than "P", "N" or "R"
   Return all conditions to normal. Repeat this procedure at least 5 times.
   Verify that EVAP control system pressure sensor value stays 0.1V less than the value at idle speed for at least 2 seconds.

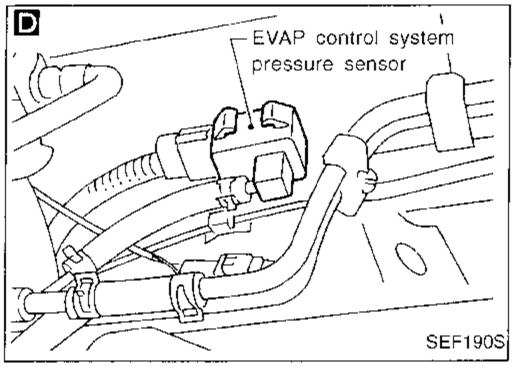
CAUTION:
Do not run vehicle at speeds greater than 80 km/h (50 MPH).

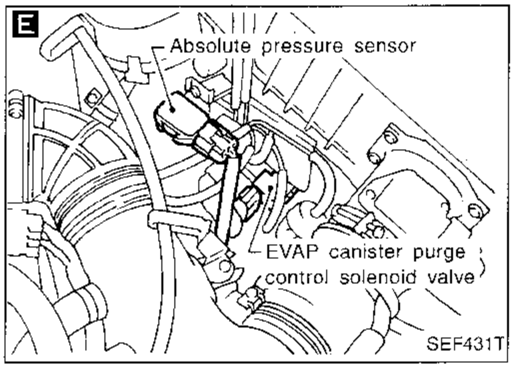
Evaporative Emission (EVAP) Control System Purge Flow Monitoring (Cont'd)











DIAGNOSTIC PROCEDURE

INSPECTION START

CHECK EVAP CANISTER.
Check EVAP canister for cracks.

NG → Replace EVAP canister.

OK

CHECK EVAP PURGE LINE.
Check EVAP purge line for improper connection.
Refer to "EVAPORATIVE EMISSION SYSTEM", EC-22.

NG → Repair it.

OK

A

CHECK COMPONENT
(EVAP canister purge volume control valve).
Refer to "COMPONENT INSPECTION", EC-315.

NG → Replace EVAP canister purge volume control valve.

OK

B

CHECK COMPONENT
(EVAP canister purge control solenoid valve).
Refer to "COMPONENT INSPECTION", EC-316.

NG → Replace EVAP canister purge control solenoid valve.

OK

C

CHECK COMPONENT
(EVAP canister purge control valve).
Refer to "COMPONENT INSPECTION", EC-316.

NG → Replace EVAP canister purge control valve.

OK

D

CHECK COMPONENT
(EVAP control system pressure sensor).
Refer to "COMPONENT INSPECTION", EC-316.

NG → Replace EVAP control system pressure sensor.

OK

E

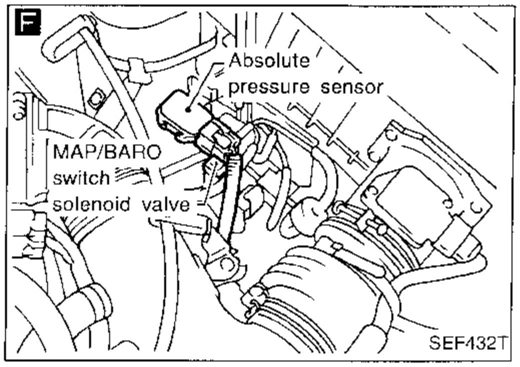
CHECK COMPONENT
(Absolute pressure sensor).
Refer to "COMPONENT INSPECTION", EC-317.

NG → Replace absolute pressure sensor.

OK

Ⓐ

Evaporative Emission (EVAP) Control System Purge Flow Monitoring (Cont'd)



Ⓐ

F

CHECK COMPONENT
(MAP/BARO switch solenoid valve).
Refer to "COMPONENT INSPECTION", EC-317.

NG → Replace MAP/BARO switch solenoid valve.

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.

↓

Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed. ↓

Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

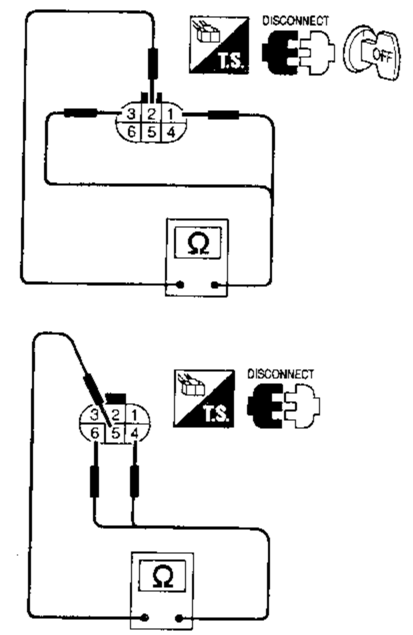
↓

INSPECTION END

Evaporative Emission (EVAP) Control System Purge Flow Monitoring (Cont'd)

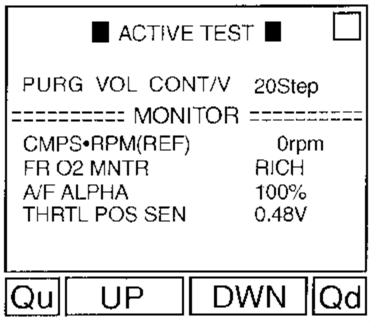
COMPONENT INSPECTION

EVAP canister purge volume control valve



SEF353Q

1) Disconnect EVAP canister purge volume control valve harness connector.
2) Check resistance between the following terminals.
   terminal ② and terminals ①, ③
   terminal ⑤ and terminals ④, ⑥
   Resistance:
   Approximately 30Ω [At 25°C (77°F)]
3) Reconnect EVAP canister purge volume control valve harness connector.
4) Remove EVAP canister purge volume control valve from intake manifold collector and disconnect hoses from the valve.
   (Plug the purge hoses. The EVAP canister purge volume control valve harness connector should remain connected.)
5) Turn ignition switch "ON".
6) Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT. Check that EVAP canister purge volume control valve shaft moves smoothly forward and backward according to the valve opening.
   If NG, replace the EVAP canister purge volume control valve.

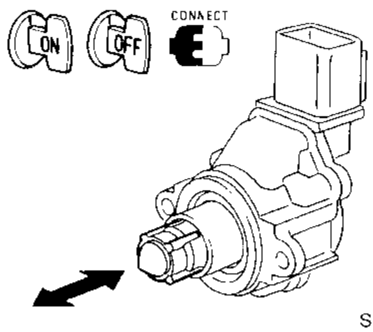


```
■ ACTIVE TEST ■                  ☐
PURG VOL CONT/V   20Step
========== MONITOR ==========
CMPS•RPM(REF)       0rpm
FR O2 MNTR          RICH
A/F ALPHA           100%
THRTL POS SEN       0.48V
```

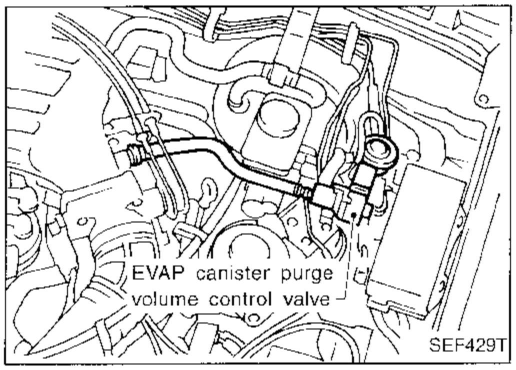
SEF507R

OR

1) Disconnect EVAP canister purge volume control valve harness connector.
2) Check resistance between the following terminals.
   terminal ② and terminals ①, ③
   terminal ⑤ and terminals ④, ⑥
   Resistance:
   Approximately 30Ω [At 25°C (77°F)]
3) Reconnect EVAP canister purge volume control valve harness connector.
4) Remove EVAP canister purge volume control valve from intake manifold collector and disconnect hoses from the valve.
   (Plug the purge hoses. The EVAP canister purge volume control valve harness connector should remain connected.)
5) Turn ignition switch "ON" and "OFF". Check that EVAP canister purge volume control valve shaft moves smoothly forward and backward according to the ignition switch position.
   If NG, replace the EVAP canister purge volume control valve.

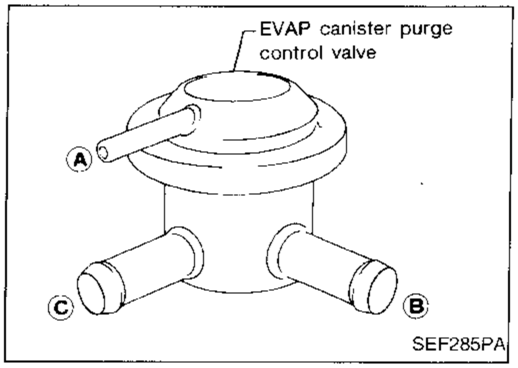


SEF261Q



SEF429T

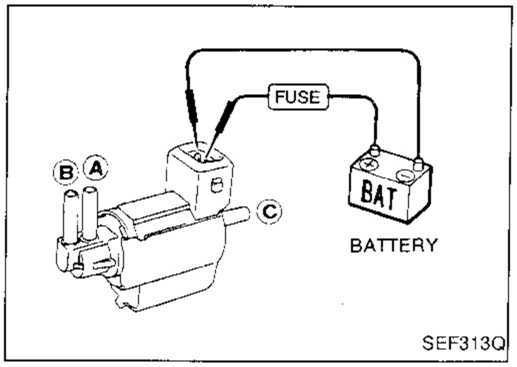
Evaporative Emission (EVAP) Control System Purge Flow Monitoring (Cont'd)



EVAP canister purge control valve

Check EVAP canister purge control valve as follows:

1. Plug the port Ⓑ.
2. Apply pressure [80.0 kPa (600 mmHg, 23.62 inHg, 11.60 psi)] to port Ⓐ. Then keep it for 15 seconds, and check there is no leakage.
3. Repeat step 2 for port Ⓒ.

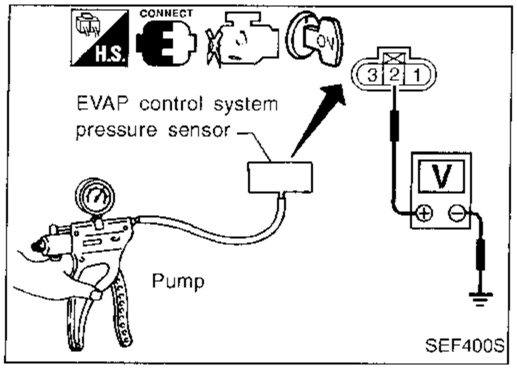


EVAP canister purge control solenoid valve

Check air passage continuity.

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

If NG, replace solenoid valve.



EVAP control system pressure sensor

1. Remove EVAP control system pressure sensor with its harness connector connected.
2. Remove hose from EVAP control system pressure sensor.
3. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.
4. Check output voltage between terminal ② and engine ground.

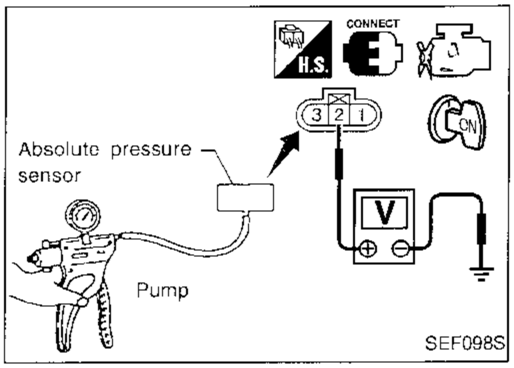
Pressure (Relative to atmospheric pressure)	Voltage (V)
0 kPa (0 mmHg, 0 inHg, 0 psi)	3.0 - 3.6
-9.3 kPa (-70 mmHg, -2.76 inHg, -1.35 psi)	0.4 - 0.6

CAUTION:

Always calibrate the vacuum pump gauge when using it.

5. If NG, replace EVAP control system pressure sensor.

Evaporative Emission (EVAP) Control System Purge Flow Monitoring (Cont'd)

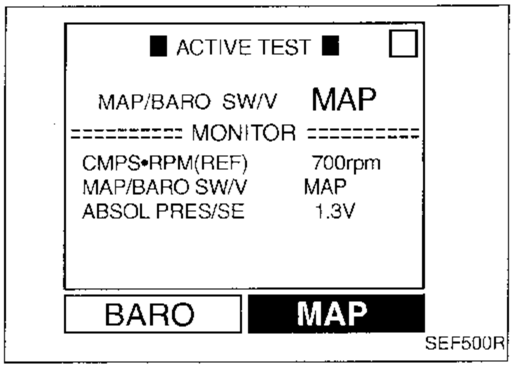


Absolute pressure sensor

1. Remove absolute pressure sensor with its harness connector connected.
2. Remove hose from absolute pressure sensor.
3. Turn ignition switch "ON" and check output voltage between terminal ② and engine ground.
   The voltage should be 3.2 to 4.8 V.
4. Use pump to apply vacuum of –26.7 kPa (–200 mmHg, –7.87 inHg, –3.87 psi) to absolute pressure sensor as shown in figure and check the output voltage.
   The voltage should be 1.0 to 1.4 V lower than the value measured in step 3.

CAUTION:
Always calibrate the vacuum pump gauge when using it.

5. If NG, replace absolute pressure sensor.



■ ACTIVE TEST ■ ☐

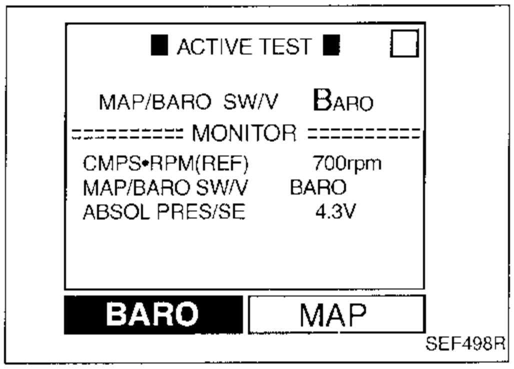
MAP/BARO SW/V MAP

========== MONITOR ==========

CMPS•RPM(REF)	700rpm
MAP/BARO SW/V	MAP
ABSOL PRES/SE	1.3V

BARO MAP

SEF500R



■ ACTIVE TEST ■ ☐

MAP/BARO SW/V BARO

========== MONITOR ==========

CMPS•RPM(REF)	700rpm
MAP/BARO SW/V	BARO
ABSOL PRES/SE	4.3V

BARO MAP

SEF498R

MAP/BARO switch solenoid valve

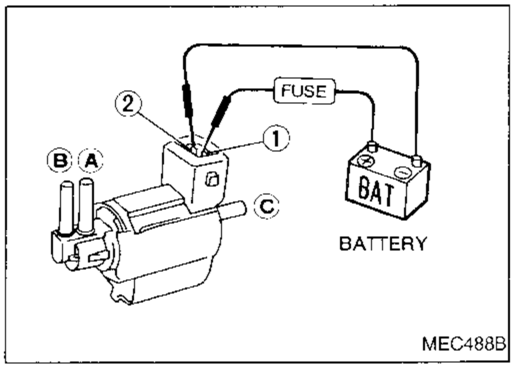
1. Start engine and warm it up sufficiently.
2. Perform "MAP/BARO SW/V" in "ACTIVE TEST" mode with CONSULT.
3. Check the following.
   - When "MAP" is selected, "ABSOL PRES/SE" indicates approximately 1.3V.
   - When "BARO" is selected, "ABSOL PRES/SE" indicates approximately 4.3V.
4. If NG, replace solenoid valve.

OR

1. Remove MAP/BARO switch solenoid valve.
2. Check air passage continuity.

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

3. If NG, replace solenoid valve.



A/T Diagnosis Communication Line

COMPONENT DESCRIPTION

The malfunction information related to A/T (Automatic Transmission) is transferred through the line (circuit) from A/T control unit to ECM. Therefore, be sure to erase the malfunction information such as DTC not only in A/T control unit 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 ㊸ (ECCS ground).

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
7	Y/G	A/T check signal	Ignition switch "ON" Engine is running.	0 - 3.0V

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1605 0804	• An incorrect signal from A/T control units is sent to ECM.	• Harness or connectors (The communication line circuit between ECM and A/T control unit is open or shorted.) • Dead (Weak) battery • A/T control unit

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

Note: Before performing the following procedure, confirm that battery voltage is more than 10.5V.

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
3) Start engine and wait at least 40 seconds.

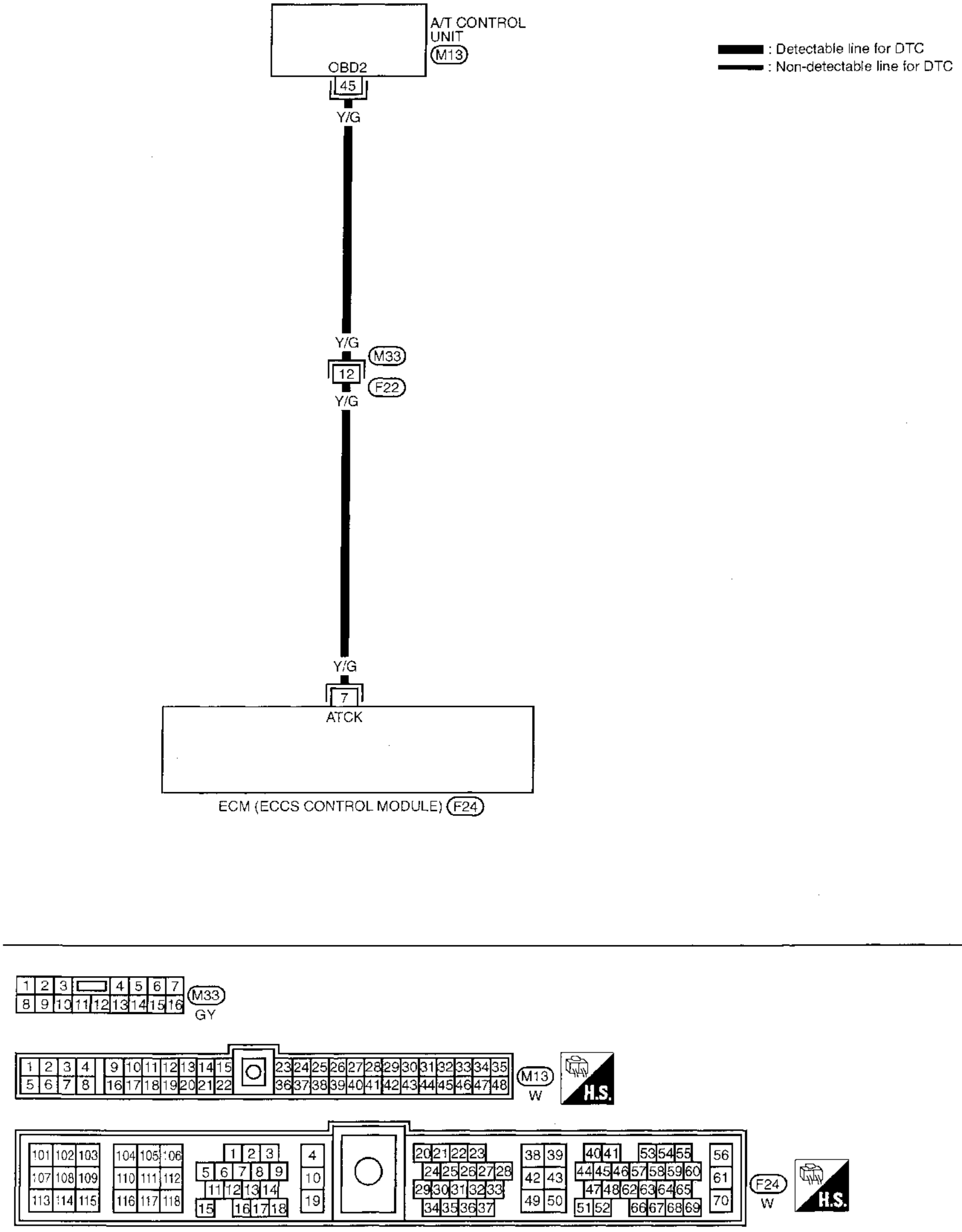
OR

GST
1) Turn ignition switch "ON".
2) Start engine and wait at least 40 seconds.
3) Select "MODE 7" with GST.

OR

NO TOOLS
1) Turn ignition switch "ON".
2) Start engine and wait at least 40 seconds.
3) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
4) Perform "Diagnostic Test Mode II" (Self-diagnostic results) with ECM.

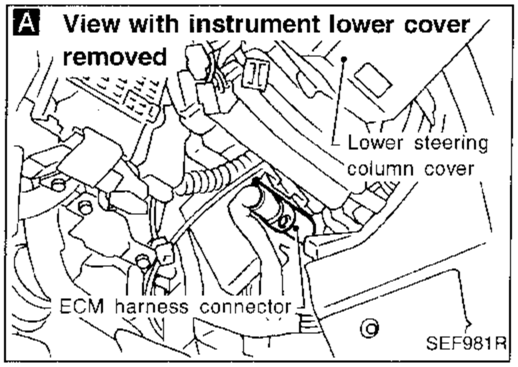
EC-ATDIAG-01

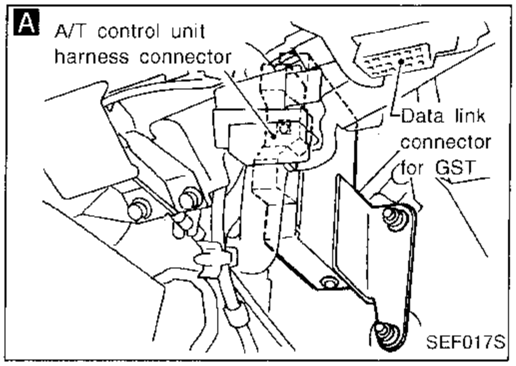


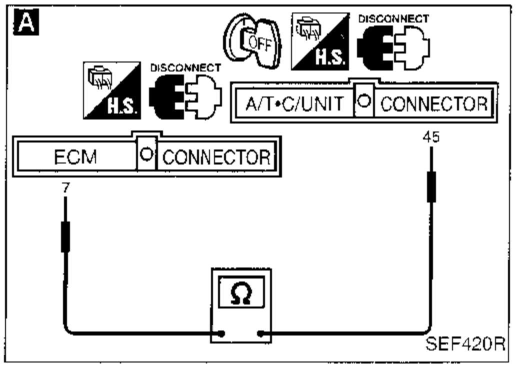
SEF276T

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 A/T control unit harness connector.
3. Check harness continuity between ECM terminal ⑦ and A/T control unit terminal ㊺.

Continuity should exist.

If OK, check harness for short.

NG → Check the following.

- Harness connectors (M33), (F22)
- Harness for open or short between ECM and A/T control unit

If NG, repair harness or connectors.

↓ OK

Disconnect and reconnect harness connectors in the circuit. Then retest.

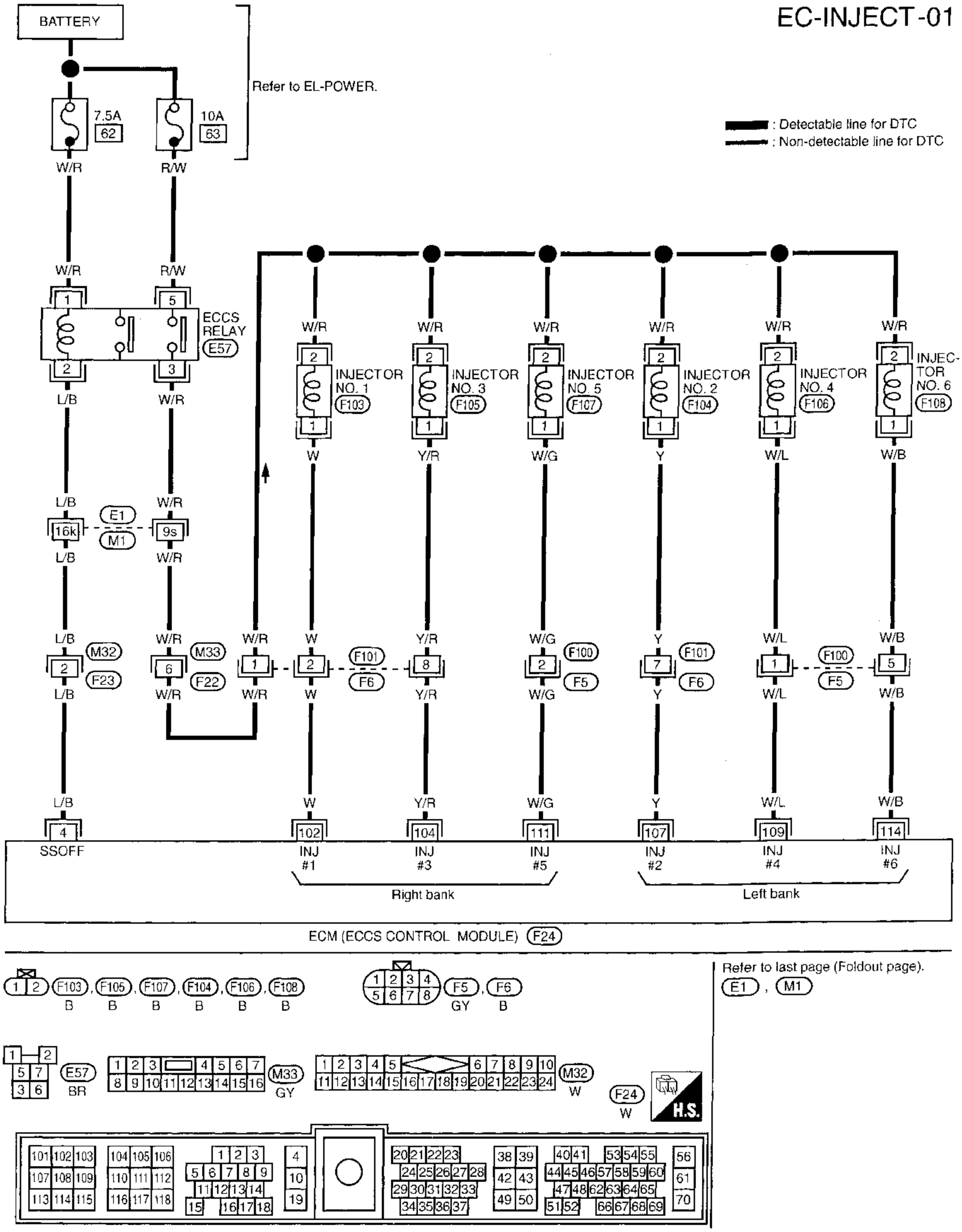
↓ Trouble is not fixed.

Check ECM pin terminals and A/T control unit pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

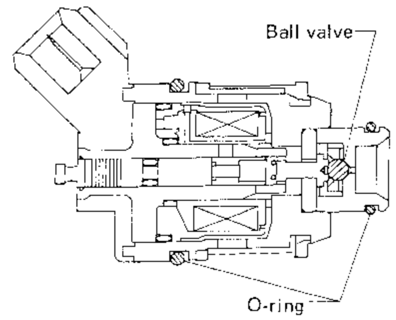
↓

INSPECTION END

Injector


EC-INJECT-01
BATTERY
Refer to EL-POWER.
7.5A
62
10A
63
W/R
R/W
: Detectable line for DTC
: Non-detectable line for DTC
ECCS RELAY
E57
1
5
2
3
L/B
W/R
INJECTOR NO. 1 F103
INJECTOR NO. 3 F105
INJECTOR NO. 5 F107
INJECTOR NO. 2 F104
INJECTOR NO. 4 F106
INJECTOR NO. 6 F108
W
Y/R
W/G
Y
W/L
W/B
16k
9s
E1
M1
M32
F23
M33
F22
F101
F6
F100
F5
4
SSOFF
102
INJ #1
104
INJ #3
111
INJ #5
107
INJ #2
109
INJ #4
114
INJ #6
Right bank
Left bank
ECM (ECCS CONTROL MODULE) F24
F103, F105, F107, F104, F106, F108
B B B B B B
F5, F6
GY B
Refer to last page (Foldout page).
E1, M1
E57
BR
M33
GY
M32
W
F24
W
H.S.
SEF277T

Injector (Cont'd)



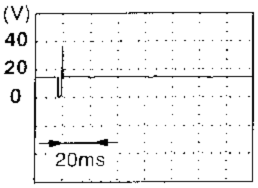
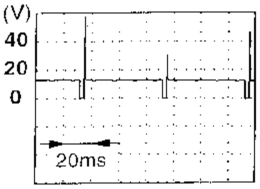
SEF812J

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 needle valve back and allows fuel to flow through the injector into the intake manifold. The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the injector remains open. The ECM controls the injection pulse duration based on engine fuel needs.

ECM TERMINALS AND REFERENCE VALUE

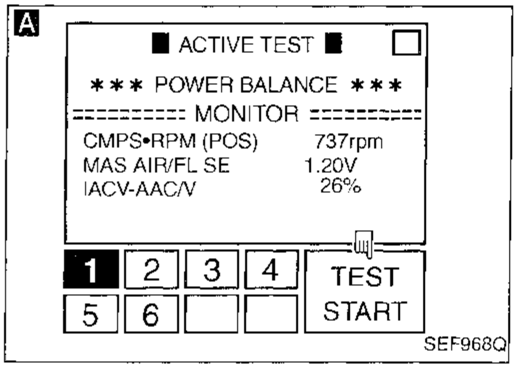
Specification data are reference values and are measured between each terminal and ㊸ (ECCS ground).

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	L/B	ECCS 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)
102	W	Injector No. 1	Engine is running. (Warm-up condition) Idle speed	BATTERY VOLTAGE (11 - 14V)  SEF204T
104	Y/R	Injector No. 3		
107	Y	Injector No. 2		
109	W/L	Injector No. 4	Engine is running. (Warm-up condition) Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14V)  SEF205T
111	W/G	Injector No. 5		
114	W/B	Injector No. 6		

Injector (Cont'd)

DIAGNOSTIC PROCEDURE

A



■ ACTIVE TEST ■ ☐

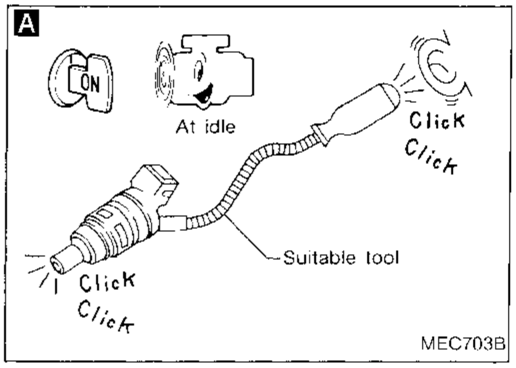
*** POWER BALANCE ***

========== MONITOR ==========

CMPS•RPM (POS)	737rpm
MAS AIR/FL SE	1.20V
IACV-AAC/V	26%

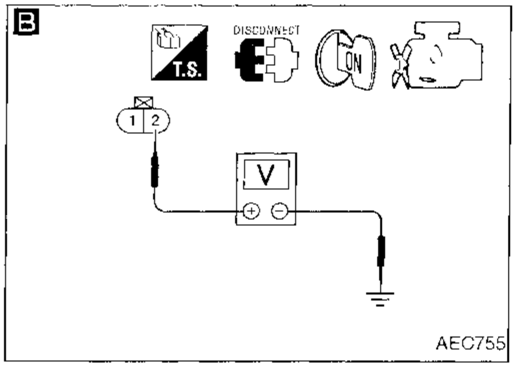
SEF968Q

A



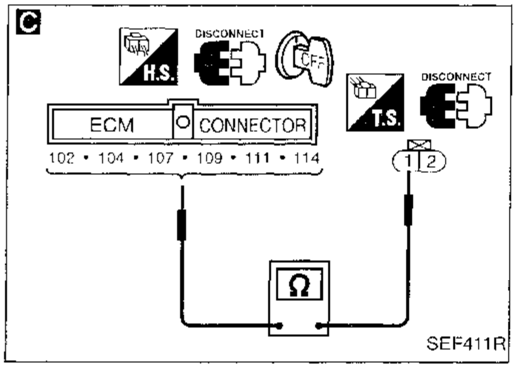
MEC703B

B



AEC755

C



SEF411R

INSPECTION START

A

CHECK OVERALL FUNCTION.

1. Start engine.
2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.
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 or tester.
Voltage: Battery voltage

NG → Check the following.
- Harness connectors (F22), (M33)
- Harness connectors (M1), (E1)
- ECCS relay (E57)
- 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), (111), (114).
Continuity should exist.
If OK, check harness for short.

NG → Check the following.
- Harness connectors (F100), (F5)
- Harness connectors (F101), (F6)
- Harness for open or short between ECM and injector

If NG, repair harness or connectors.

OK ↓

CHECK COMPONENT (Injector).
Refer to "COMPONENT INSPECTION" on next page.

NG → Replace injector.

OK ↓

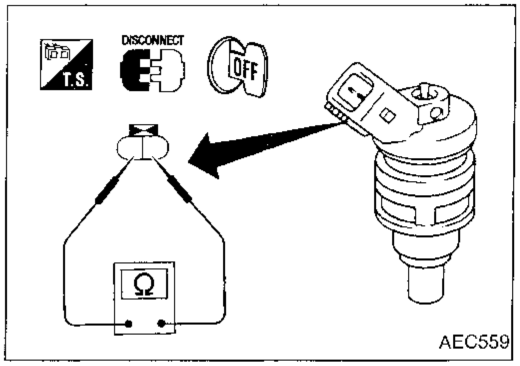
Disconnect and reconnect harness connectors in the circuit. Then retest.

↓ Trouble is not fixed.

Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

↓

INSPECTION END



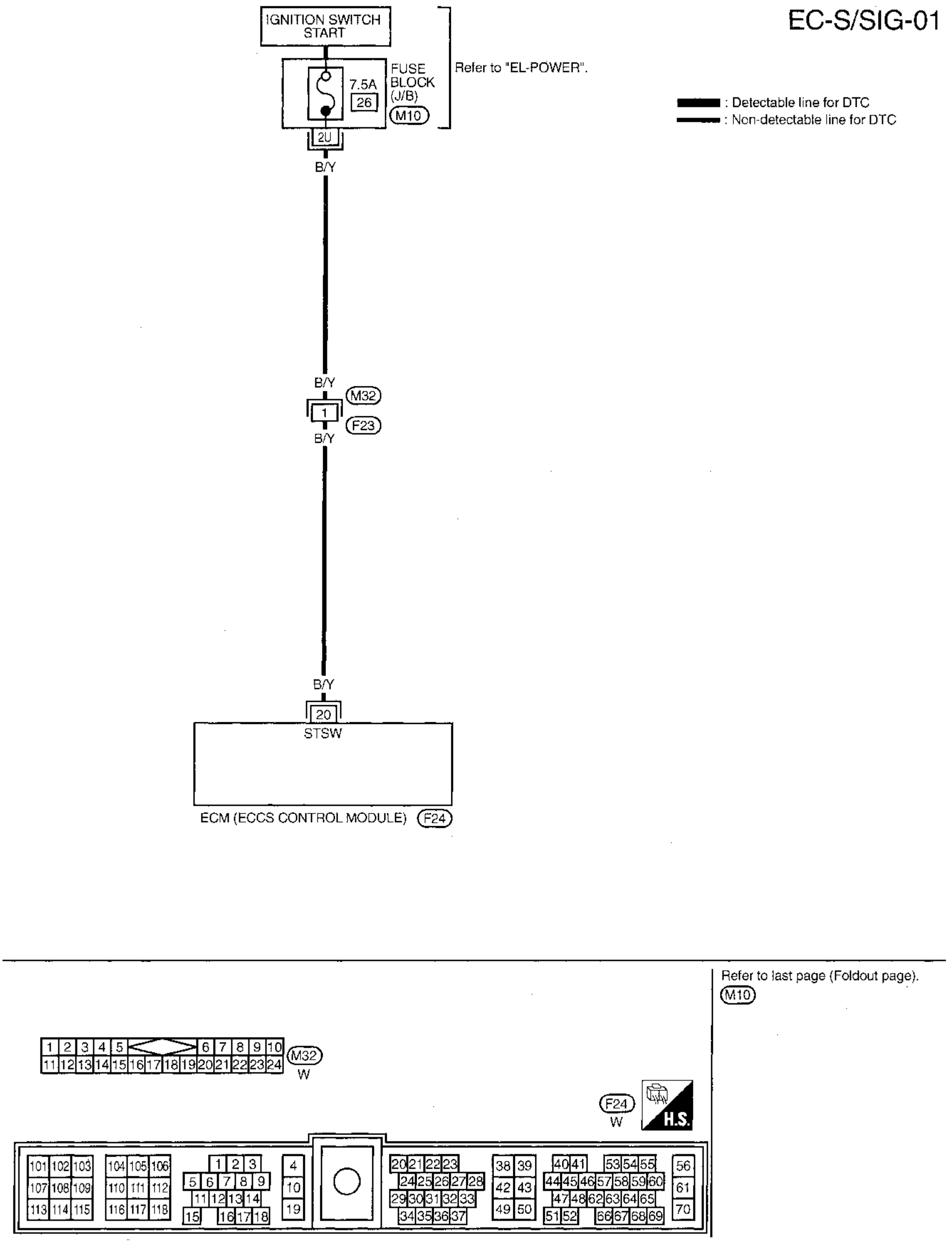
Injector (Cont'd)

COMPONENT INSPECTION

Injector

1. Disconnect injector harness connector.
2. Check resistance between terminals as shown in the figure.
   Resistance: 10 - 14Ω [at 25°C (77°F)]
   If NG, replace injector.

Start Signal



SEF919R

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

Start Signal (Cont'd)

CONSULT 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

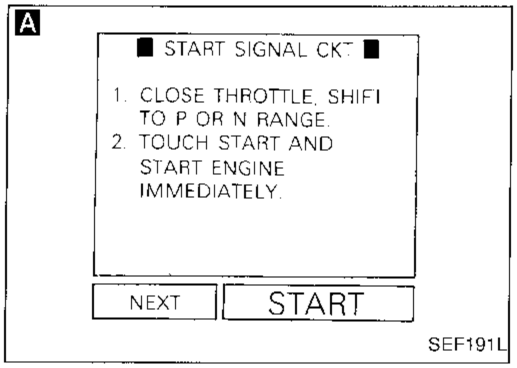
ECM TERMINALS AND REFERENCE VALUE

Specification data are reference values and are measured between each terminal and ㊸ (ECCS ground).

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
20	B/Y	Start signal	$\boxed{\text{Ignition switch “ON”}}$	Approximately 0V
			$\boxed{\text{Ignition switch “START”}}$	BATTERY VOLTAGE (11 - 14V)

Start Signal (Cont'd)

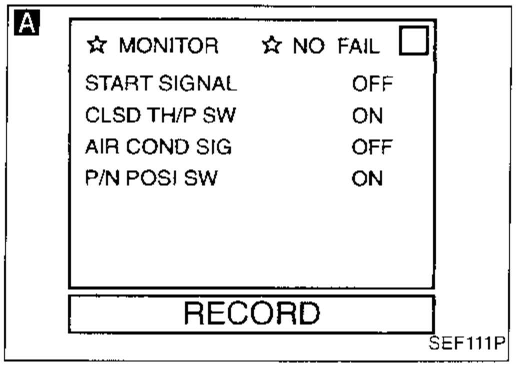
DIAGNOSTIC PROCEDURE



■ START SIGNAL CKT ■

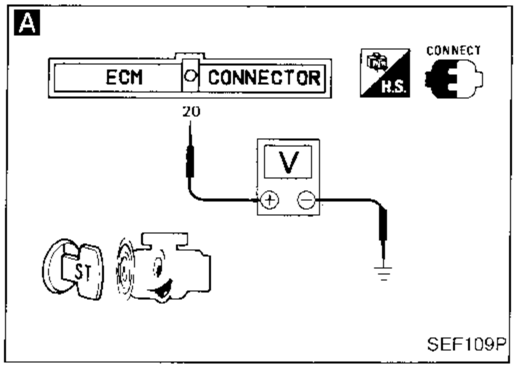
1. CLOSE THROTTLE, SHIFT TO P OR N RANGE.
2. TOUCH START AND START ENGINE IMMEDIATELY.

SEF191L

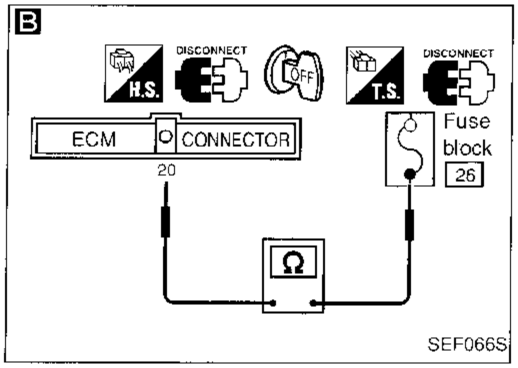


START SIGNAL	OFF
CLSD TH/P SW	ON
AIR COND SIG	OFF
P/N POSI SW	ON

SEF111P



SEF109P



SEF066S

INSPECTION START

↓

A **CHECK OVERALL FUNCTION.**

1. Turn ignition switch "ON".
2. Perform "START SIGNAL CKT" in "FUNCTION TEST" mode with CONSULT.

— OR —

1. Turn ignition switch "ON".
2. Check "START SIGNAL" in "DATA MONITOR" mode with CONSULT.

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 7.5A fuse is OK.

NG → Replace 7.5A fuse.

↓ OK

B **CHECK INPUT SIGNAL CIRCUIT.**

1) Turn ignition switch "OFF".
2) Disconnect ECM harness connector and 7.5A fuse.
3) Check harness continuity between ECM terminal ⑳ and fuse block.

Continuity should exist.
If OK, check harness for short.

NG → Check the following.
- Harness connectors (M32), (F23)
- Harness for open or short between ECM and fuse block

If NG, repair harness or connectors.

↓ OK

Disconnect and reconnect harness connectors in the circuit. Then retest.

↓ Trouble is not fixed.

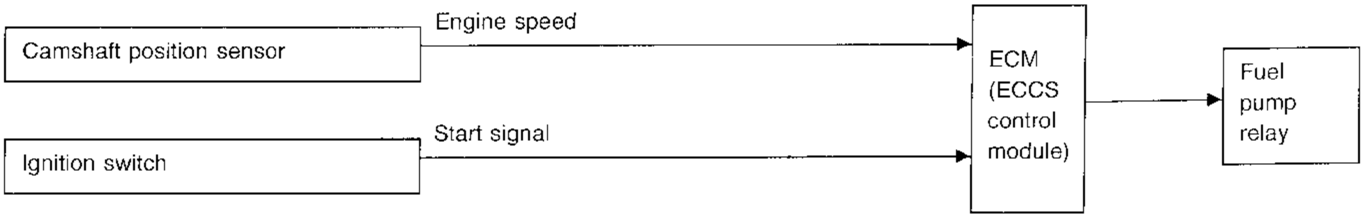
Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

↓

INSPECTION END

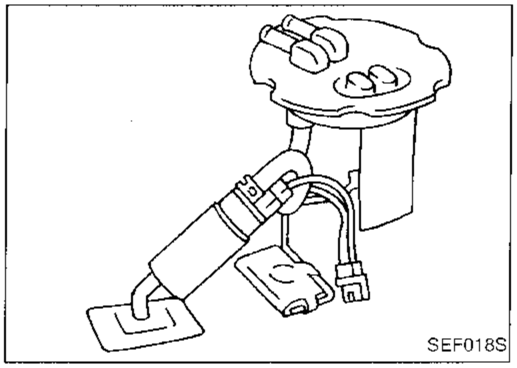
Fuel Pump

SYSTEM DESCRIPTION



The ECM activates the fuel pump for several seconds after the ignition switch is turned on to improve engine startability. If the ECM receives a 120° signal from the camshaft position sensor, it knows that the engine is rotating, and causes the pump to perform. If the 120° signal is not received when the ignition switch is on, the engine stalls. The ECM stops pump operation and prevents battery discharging, thereby improving safety. The ECM does not directly drive the fuel pump. It controls the ON/OFF fuel pump relay, which in turn controls the fuel pump.

Condition	Fuel pump operation
Ignition switch is turned to ON.	Operates for 5 seconds
Engine running and cranking	Operates
When engine is stopped	Stops in 1.5 seconds
Except as shown above	Stops



COMPONENT DESCRIPTION

The fuel pump with a fuel damper is an in-tank type (the pump and damper are located in the fuel tank).

CONSULT REFERENCE VALUE IN DATA MONITOR MODE

Specification data are reference values.

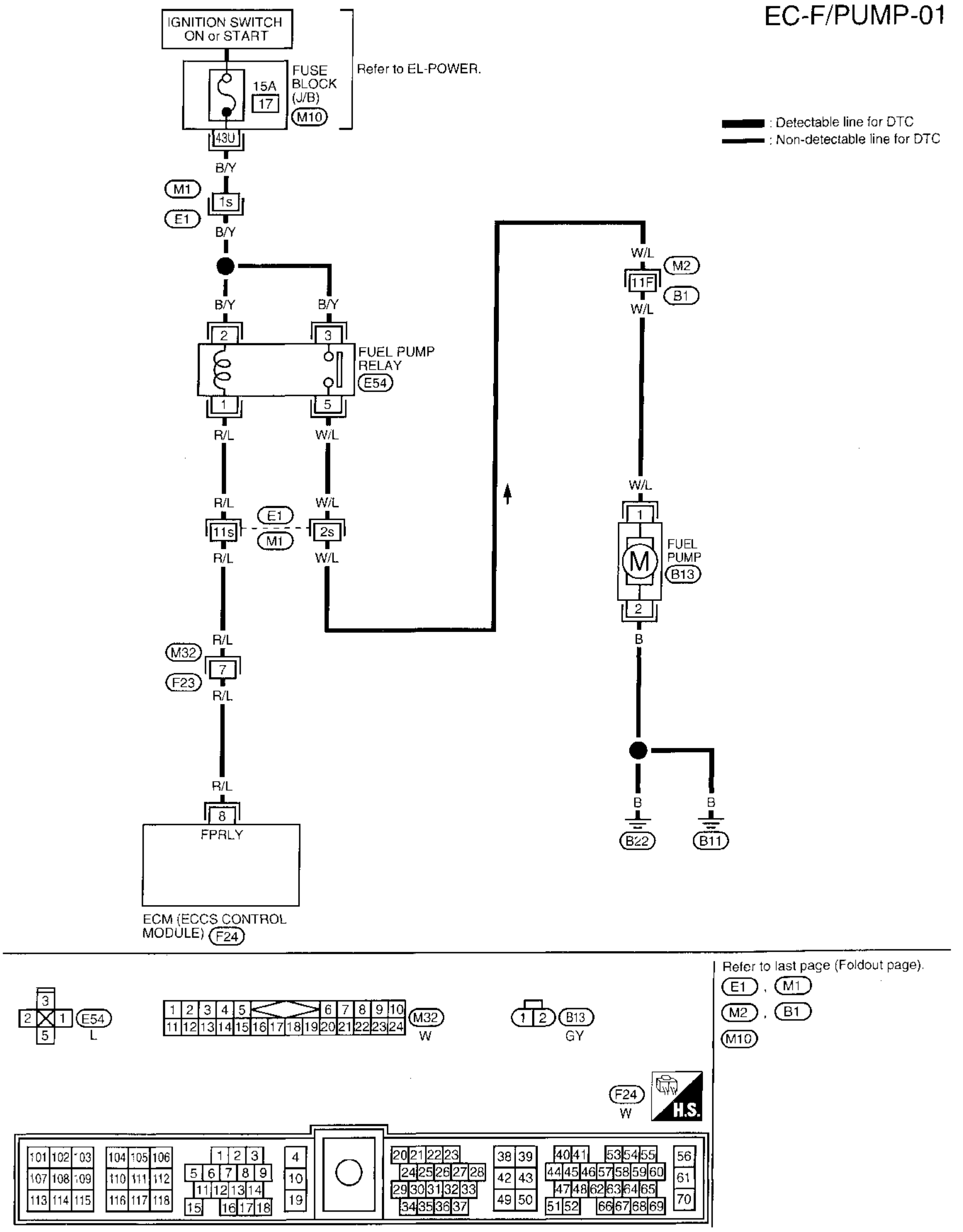
MONITOR ITEM	CONDITION	SPECIFICATION
FUEL PUMP RLY	• Ignition switch is turned to ON (Operates for 5 seconds) • Engine running and cranking	ON
	Except as shown above	OFF

ECM TERMINALS AND REFERENCE VALUE

Specification data are reference values and are measured between each terminal and ㊸ (ECCS ground).

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
8	R/L	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)

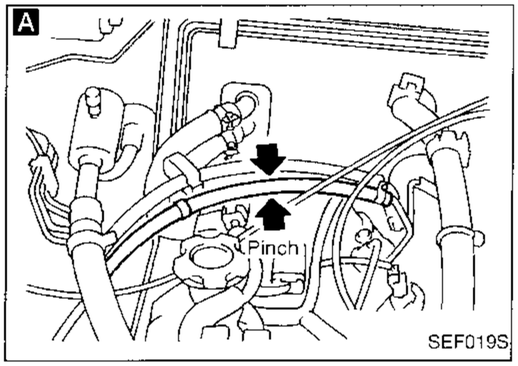


SEF278T

Fuel Pump (Cont'd)

DIAGNOSTIC PROCEDURE

INSPECTION START

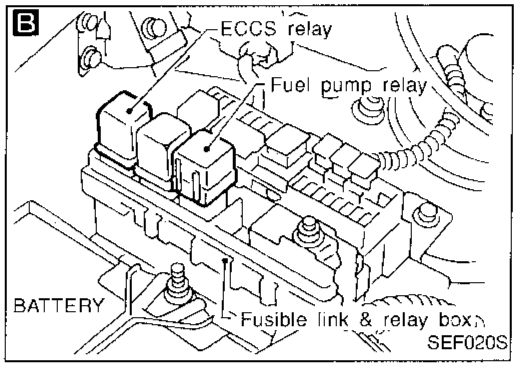


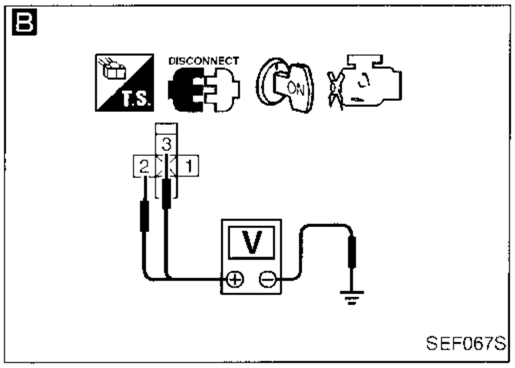
A

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 ②, ③ and ground with CONSULT or tester.
   Voltage: Battery voltage

NG → Check the following.
- Harness connectors (E1), (M1)
- 15A fuse
- Harness continuity between fuse and fuel pump relay

If NG, repair harness or connectors.

OK ↓

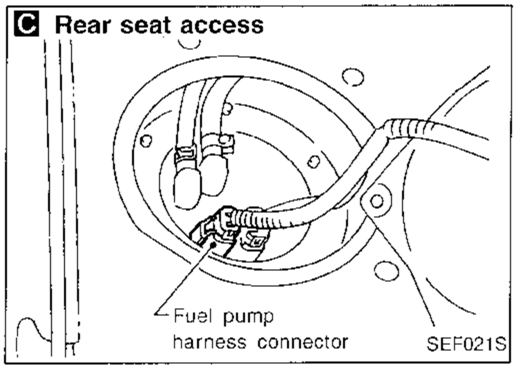
C

CHECK POWER AND GROUND CIRCUIT.
1. Turn ignition switch "OFF".
2. Disconnect fuel pump harness connector.
3. Check harness continuity between terminal ② and body ground, terminal ① and fuel pump relay connector terminal ⑤.
   Continuity should exist.

NG → Check the following.
- Harness connectors (M2), (B1)
- Harness continuity between fuel pump and body ground
- Harness continuity between fuel pump and fuel pump relay

If NG, repair harness or connectors.

OK ↓



D

CHECK OUTPUT SIGNAL CIRCUIT.
1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal ⑧ and fuel pump relay connector terminal ①.
   Continuity should exist.

NG → Check the following.
- Harness connectors (F23), (M32)
- Harness connectors (M1), (E1)
- Harness continuity between ECM and fuel pump relay

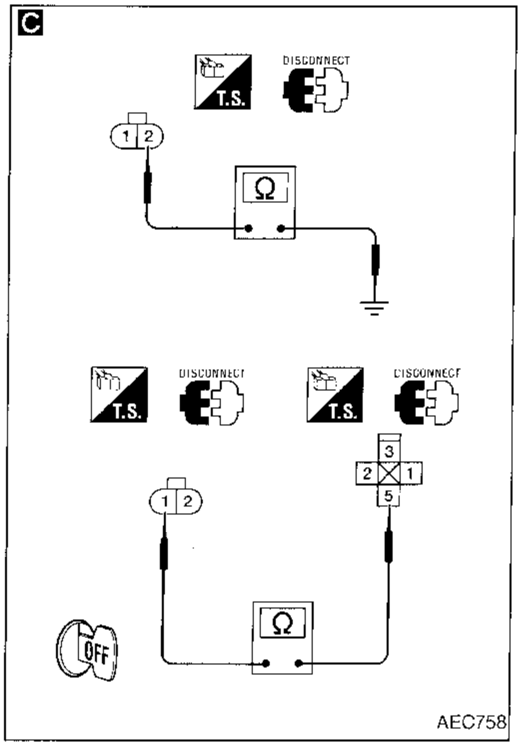
If NG, repair harness or connectors.

OK ↓

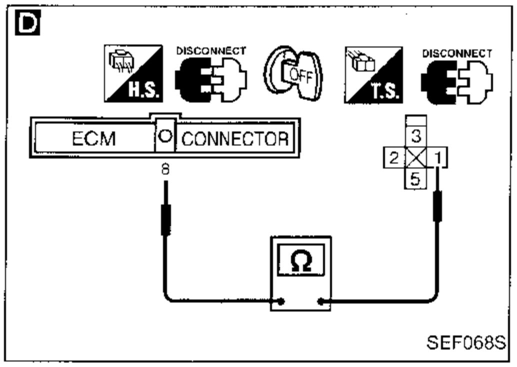
Ⓐ

Fuel Pump (Cont'd)

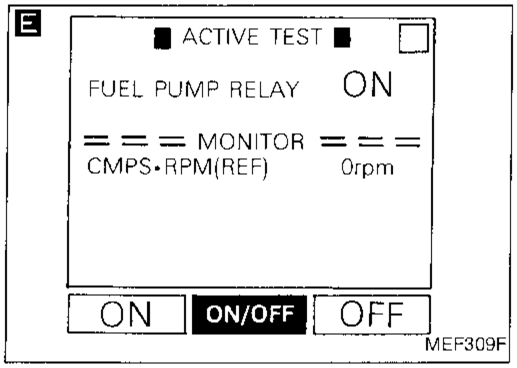
C



D



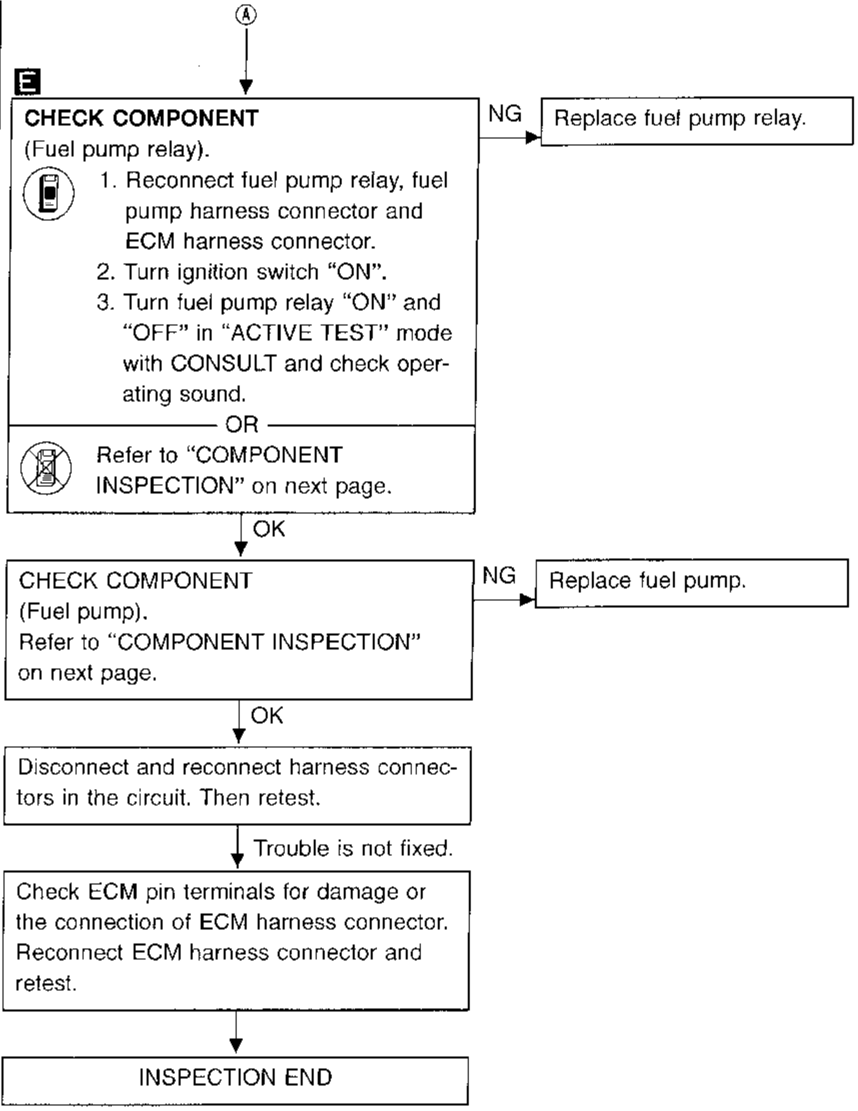
E


■ ACTIVE TEST ■ ☐

FUEL PUMP RELAY ON

=== MONITOR ===

CMPS•RPM(REF) 0rpm


Ⓐ

E

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 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 ↓

Disconnect and reconnect harness connectors in the circuit. Then retest.

↓ Trouble is not fixed.

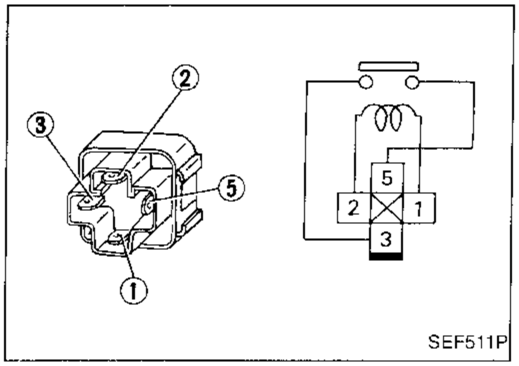
Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

↓

INSPECTION END

Fuel Pump (Cont'd)

COMPONENT INSPECTION

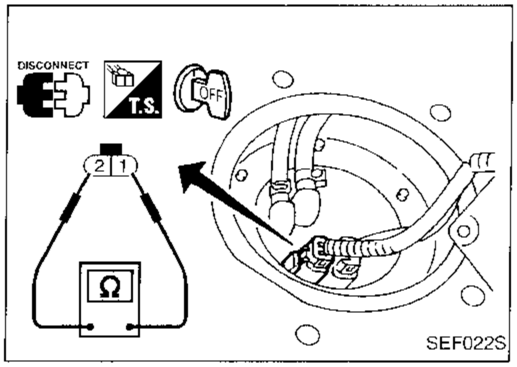


Fuel pump relay

Check continuity between terminals ③ and ⑤ .

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

If NG, replace relay.



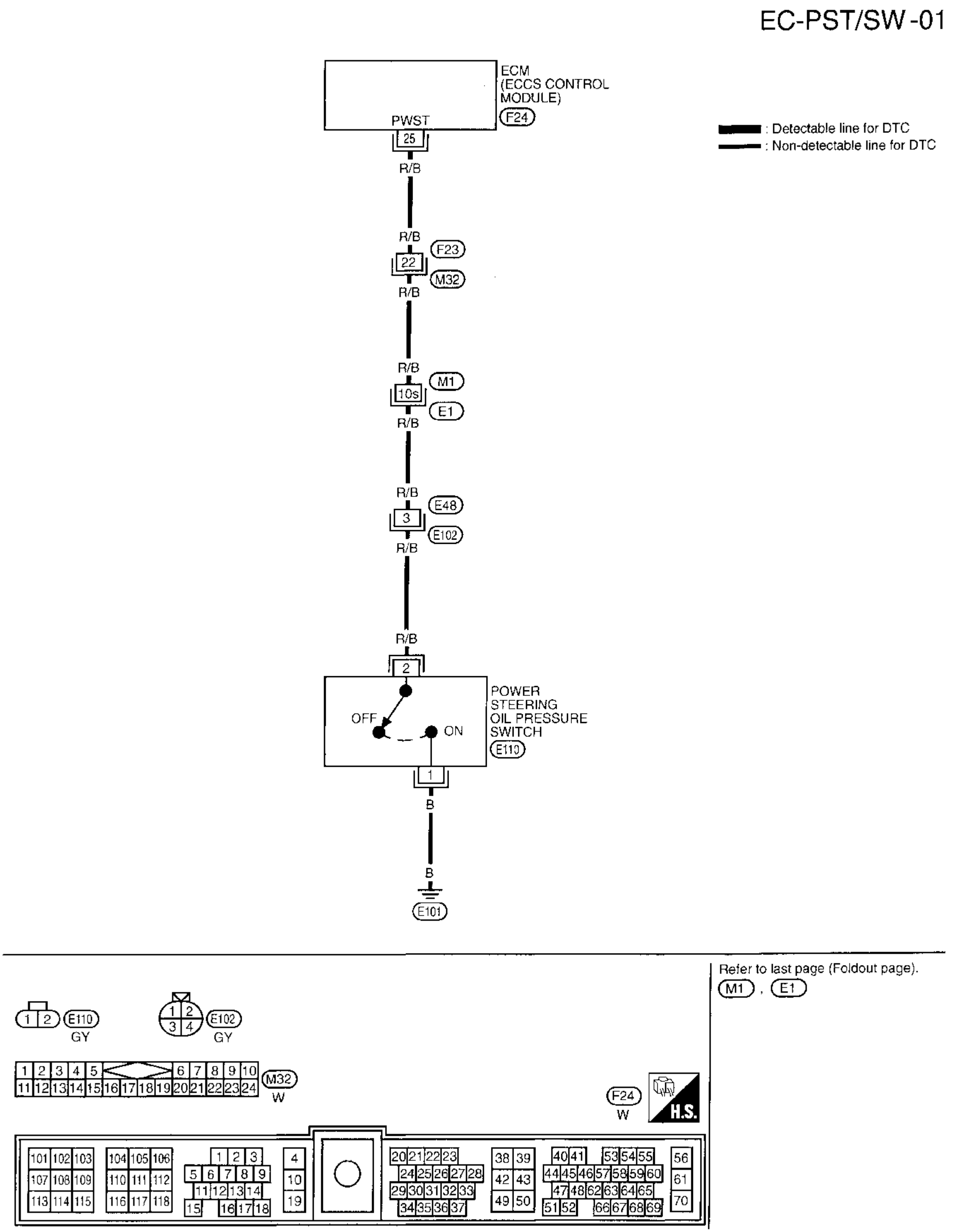
Fuel pump

1. Disconnect fuel pump harness connector.
2. Check resistance between terminals ① and ② .

   Resistance: 0.2 - 5.0Ω [at 25°C (77°F)]

   If NG, replace fuel pump.

Power Steering Oil Pressure Switch

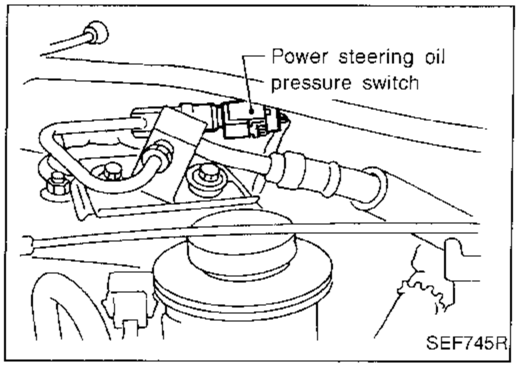


SEF279T

Power Steering Oil Pressure Switch (Cont'd)

COMPONENT DESCRIPTION

The power steering oil pressure switch is attached to the power steering high-pressure tube and detects a power steering load. When a power steering load is detected, it signals the ECM. The ECM adjusts the IACV-AAC valve to increase the idle speed and adjust for the increased load.



CONSULT 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 turned	ON

ECM TERMINALS AND REFERENCE VALUE

Specification data are reference values and are measured between each terminal and ㊸ (ECCS ground).

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
25	R/B	Power steering oil pressure switch	Engine is running. └ Steering wheel is being turned	Approximately 0V
			Engine is running. └ Steering wheel is not being turned	Approximately 5V

Power Steering Oil Pressure Switch (Cont'd)

DIAGNOSTIC PROCEDURE

INSPECTION START

↓

A

CHECK OVERALL FUNCTION.

1. Turn ignition switch "ON".
2. Perform "PW/ST SIGNAL CIRCUIT" in "FUNCTION TEST" mode with CONSULT.

OR

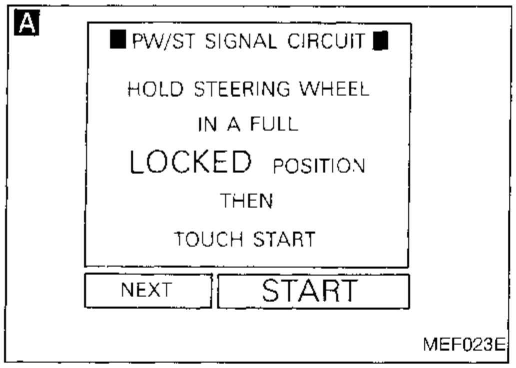
1. Start engine.
2. Check "PW/ST SIGNAL" in "DATA MONITOR" mode with CONSULT.
Steering is neutral position:
OFF
Steering is turned:
ON

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 ↓

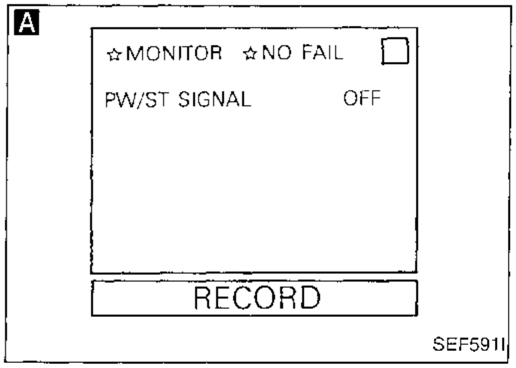


A

■PW/ST SIGNAL CIRCUIT■

HOLD STEERING WHEEL
IN A FULL
LOCKED POSITION
THEN
TOUCH START

MEF023E

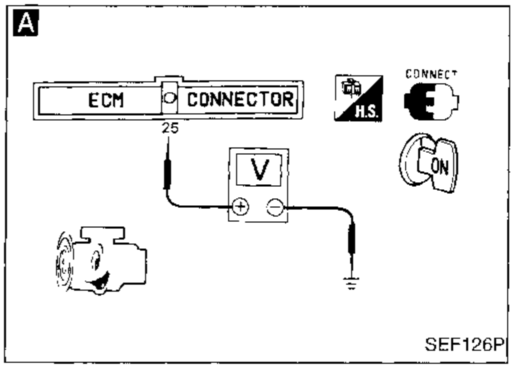


A

☆MONITOR ☆NO FAIL ☐

PW/ST SIGNAL	OFF

SEF591I



SEF126P

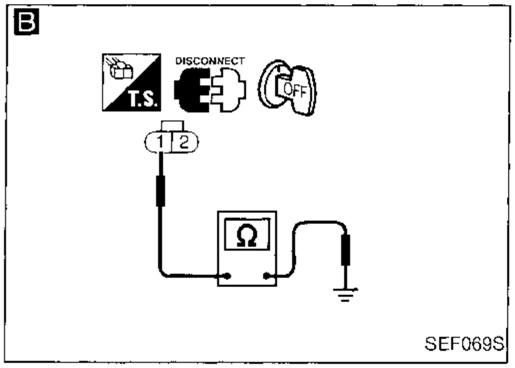
B

CHECK GROUND CIRCUIT.

1. Turn ignition switch "OFF".
2. Disconnect power steering oil pressure switch harness connector.
3. Check harness continuity between terminal ① and engine ground.
Continuity should exist.

NG → Repair harness or connectors.

OK ↓



SEF069S

C

CHECK INPUT SIGNAL CIRCUIT.

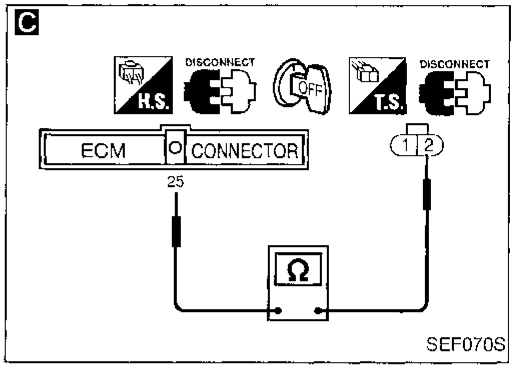
1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal ㉕ and terminal ②.
Continuity should exist.
If OK, check harness for short.

NG → Check the following.
- Harness connectors (F23), (M32)
- Harness connectors (M1), (E1)
- Harness connectors (E48), (E102)
- Harness for open or short between ECM and power steering oil pressure switch

If NG, repair harness or connectors.

OK ↓

Ⓐ



SEF070S

Ⓐ

↓

CHECK COMPONENT
(Power steering oil pressure switch).
Refer to "COMPONENT INSPECTION" below.

NG → Replace power steering oil pressure switch.

↓ OK

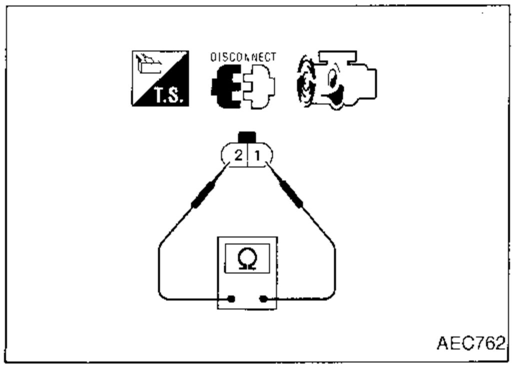
Disconnect and reconnect harness connectors in the circuit. Then retest.

↓ Trouble is not fixed.

Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

↓

INSPECTION END



COMPONENT INSPECTION

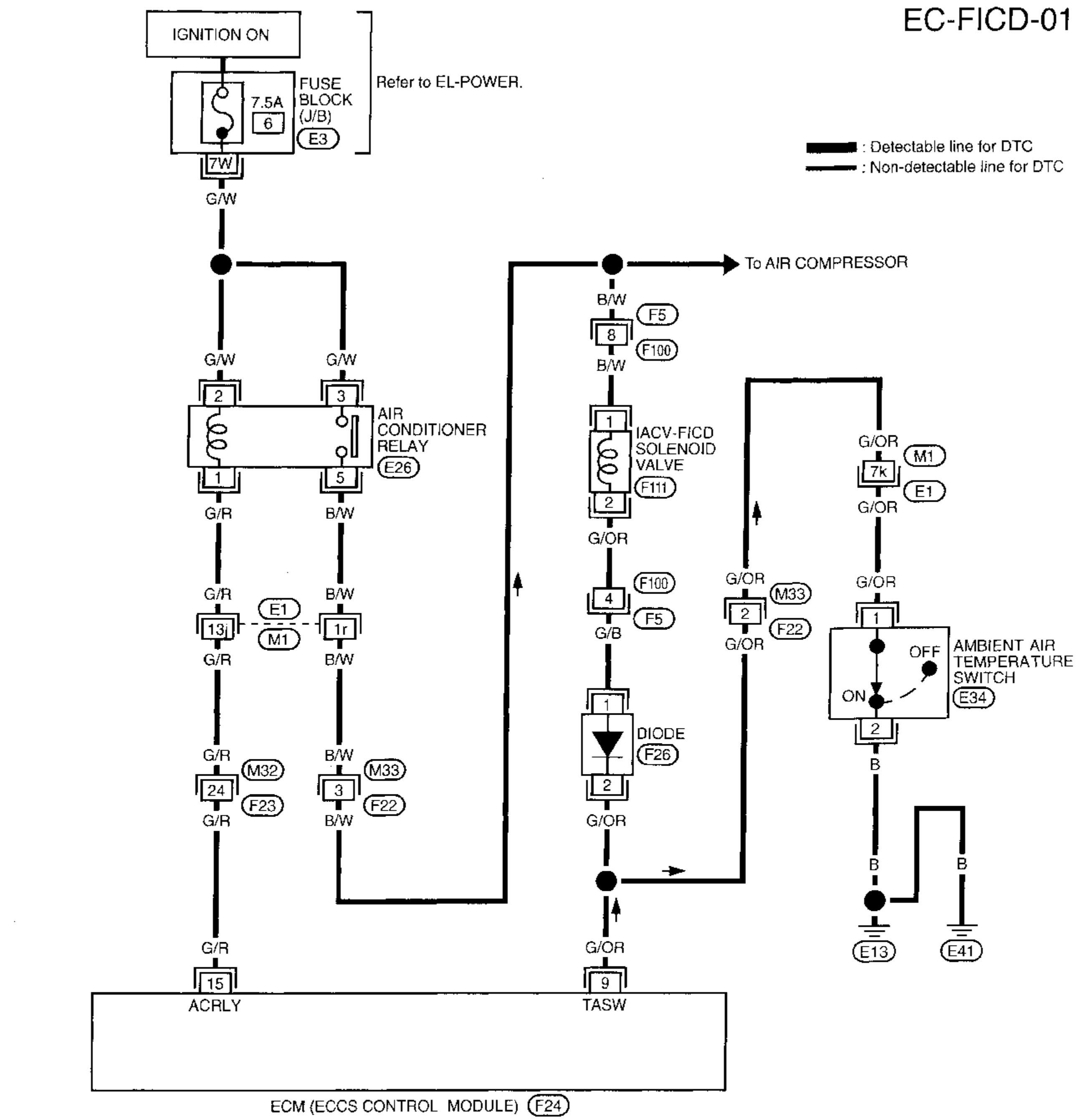
Power steering oil pressure switch

1. Disconnect power steering oil pressure switch harness connector then start engine.
2. Check continuity between terminals ① and ②.

Conditions	Continuity
Steering wheel is being turned	Yes
Steering wheel is not being turned	No

If NG, replace power steering oil pressure switch.

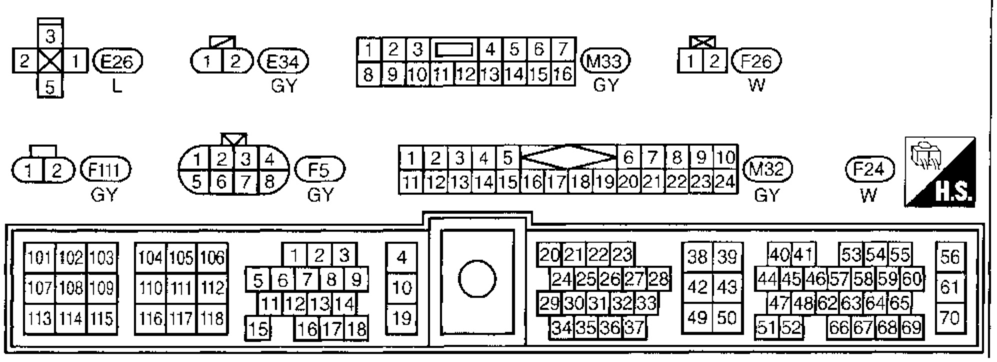
IACV-FICD Solenoid Valve



Refer to last page (Foldout page).

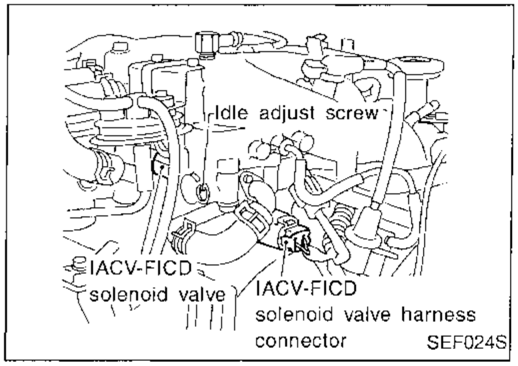
E1, M1

E3



SEF280T

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.

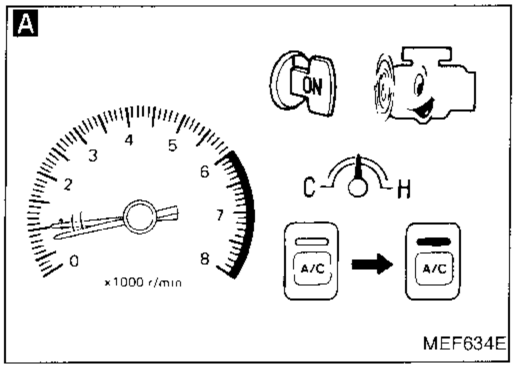
ECM TERMINALS AND REFERENCE VALUE

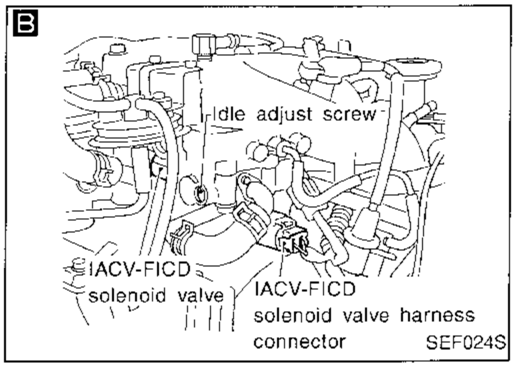
Specification data are reference values and are measured between each terminal and ㊸ (ECCS ground).

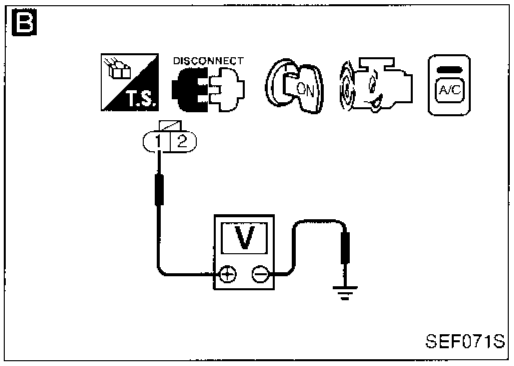
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
21	B/W	Air conditioner switch	Engine is running. Both air conditioner switch and blower switch are "ON" (Compressor operates)	Approximately 0V
			Engine is running. Air conditioner switch is "OFF"	BATTERY VOLTAGE (11 - 14V)
15	G/R	Air conditioner 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)
9	G/OR	Ambient air temperature switch	Ignition switch "ON" Idle speed Ambient air temperature is above 23.5°C (74°F) Air conditioner is operating	0V
			Ignition switch "ON" Idle speed Ambient air temperature is below 23.5°C (74°F) Air conditioner is operating	BATTERY VOLTAGE (11 - 14V)

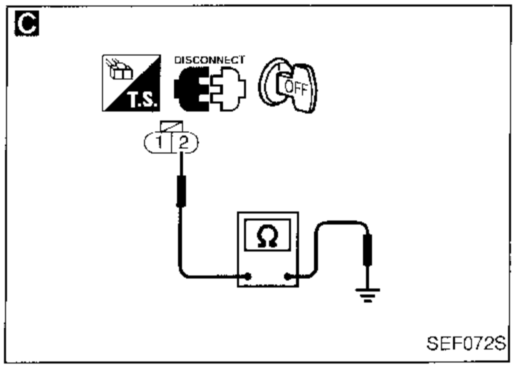
IACV-FICD Solenoid Valve (Cont'd)

DIAGNOSTIC PROCEDURE









INSPECTION START

A

CHECK OVERALL FUNCTION.

1. Start engine and warm it up sufficiently.
2. Check idle speed.
   750±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 or tester.
   Voltage: Battery voltage

NG → Check the following.
- 7.5A fuse
- Harness connectors (F5), (F100)
- Harness connectors (F22), (M33)
- Harness connectors (E1), (M1)
- Harness for open or short between IACV-FICD solenoid valve harness connector and air conditioner relay

If NG, repair harness or connectors.

OK ↓

C

CHECK GROUND CIRCUIT.

1. Turn ignition switch "OFF".
2. Check harness continuity between terminal ② and body ground.
   Continuity should exist.

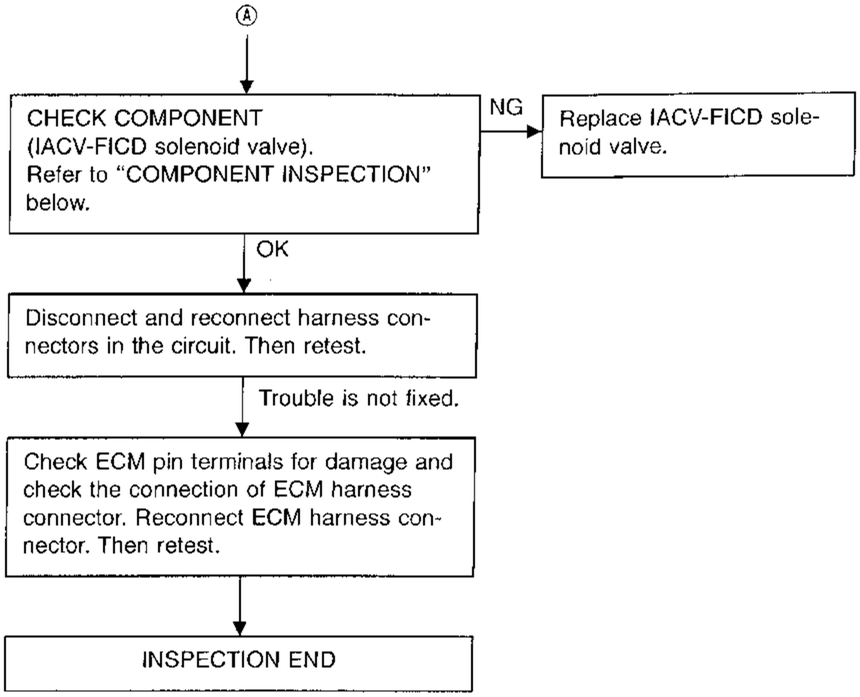
NG → Check the following.
- Harness connectors (F100), (F5)
- Harness connectors (F22), (M33)
- Harness connectors (M1), (E1)
- Ambient air temperature switch (E34)
- Diode (F26)
- Harness for open or short between IACV-FICD solenoid valve and ground

If NG, repair harness or connectors.

OK ↓

Ⓐ

IACV-FICD Solenoid Valve (Cont'd)



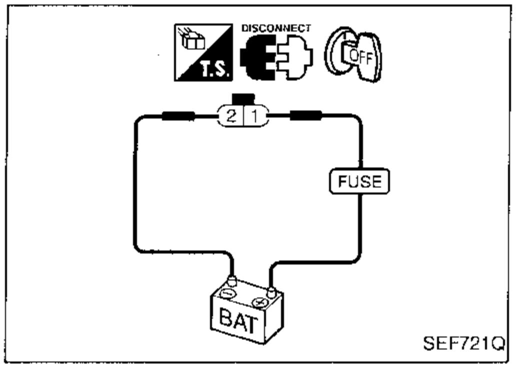
CHECK COMPONENT (IACV-FICD solenoid valve). Refer to "COMPONENT INSPECTION" below.

Replace IACV-FICD solenoid valve.

Disconnect and reconnect harness connectors in the circuit. Then retest.

Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector. Then retest.

INSPECTION END



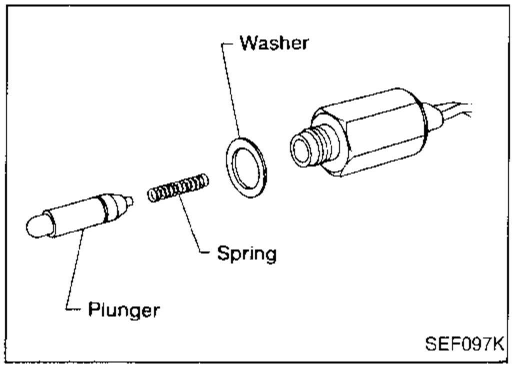
SEF721Q

COMPONENT INSPECTION

IACV-FICD solenoid valve

Disconnect IACV-FICD solenoid valve harness connector.

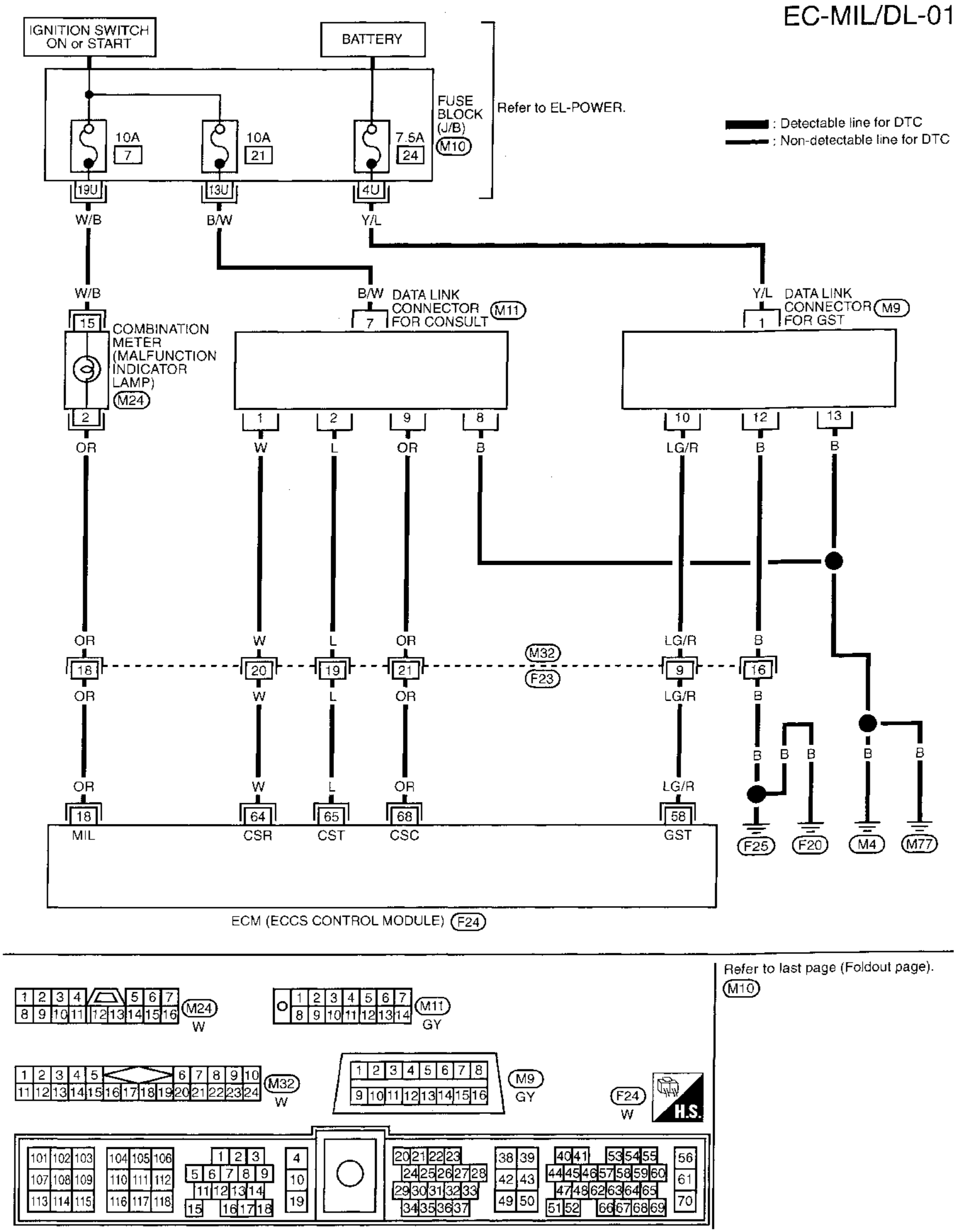
- Check for clicking sound when applying 12V direct current to terminals.



SEF097K

- Check plunger for seizing or sticking.
- Check for broken spring.

MIL & Data Link Connectors



SEF281T

General Specifications

FUEL PRESSURE REGULATOR Fuel pressure at idling kPa (kg/cm², psi)	
Vacuum hose is connected	Approximately 235 (2.4, 34)
Vacuum hose is disconnected	Approximately 294 (3.0, 43)

Inspection and Adjustment

Idle speed*1 rpm No-load*2 (in "N" position)	750±50 (700*3)
Air conditioner: ON (in "N" position)	800 or more
Ignition timing	15°±2° BTDC
Closed throttle position switch touch speed ("OFF" to "ON") (in "N" position) rpm	950±150

*1: Feedback controlled and needs no adjustments

*2: Under the following conditions:
- Air conditioner switch: OFF
- Electric load: OFF (Lights, heater fan & rear defogger)
- Steering wheel: Kept in straight-ahead position

*3: Disconnect throttle position sensor

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 or GST) g·m/sec	3.3 - 4.8 at idle* 12.0 - 14.9 at 2,500 rpm*

*: Engine is warmed up sufficiently 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)	4.81	7.9 - 9.7
50 (122)	2.82	0.57 - 0.70
100 (212)	0.8	0.08 - 0.10

FRONT HEATED OXYGEN SENSOR HEATER

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 25°C (77°F)] Ω	Approximately 10.0

INJECTOR

Resistance [at 25°C (77°F)] Ω	10 - 14

RESISTOR

Resistance [at 25°C (77°F)] kΩ	Approximately 2.2

THROTTLE POSITION SENSOR

Throttle valve conditions	Resistance kΩ [at 25°C (77°F)]
Completely closed	Approximately 0.5
Partially open	0.5 - 4.0
Completely open	Approximately 4.0

CALCULATED LOAD VALUE

	Calculated load value % (Using CONSULT or GST)
At idle	18.0 - 26.0
At 2,500 rpm	18.0 - 21.0

INTAKE AIR TEMPERATURE SENSOR

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

REAR HEATED OXYGEN SENSOR HEATER

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

CRANKSHAFT POSITION SENSOR (OBD)

Resistance [at 20°C (68°F)] Ω	166.5 - 203.5