ENGINE CONTROL SYSTEM

SECTION EC

CONTENTS

CONTENTS (Cont'd)

CONTENTS (Cont'd)

When you read wiring diagrams:

- **Read GI section, "HOW TO READ WIRING DIAGRAMS".**
- **See 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
	ECM*1	CONSULT GST*2	
*COOLANT TEMP SEN	0908	P0125	EC-132
ABSOL PRESS SENSOR	0803	P0105	EC-109
A/T 1ST SIGNAL	1103	P0731	AT-72
A/T 2ND SIGNAL	1104	P0732	AT-75
A/T 3RD SIGNAL	1105	P0733	AT-78
A/T 4TH SIG OR TCC	1106	P0734	AT-81
A/T COMM LINE	0504	P0600	EC-264
A/T DIAG COMM LINE	0804	P1605	EC-336
A/T TCC SIGNAL	1107	P0744	AT-89
CAM POS SEN (PHASE)	0101	P0340	EC-204
CLOSED LOOP-B1	0307	P0130	EC-137
CLOSED LOOP-B2	0308	P0150*3	EC-137
CLOSED THRL POS SW	0203	P0510	EC-260
COOLANT TEMP SEN*3	0103	P0115	EC-122
CRANK POS SEN (REF)*3	0407	P1335	EC-296
CRANK P/S (POS) COG	0905	P1336	EC-301
CRANK POS SEN (POS)	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-268
EGR SYSTEM	0302	P0400	EC-209
EGR TEMP SENSOR	0305	P1401	EC-312
EGRC SOLENOID/V	1005	P1400	EC-307
EGRC-BPT VALVE	0306	P0402	EC-219
ENGINE SPEED SIG*4	1207	P0725	AT-70
EVAP PURG FLOW/MON	0111	P1447	EC-329
EVAP SYS PRES SEN	0704	P0450	EC-245
EVAP (SMALL LEAK)	0705	P0440	EC-224
FLUID TEMP SENSOR	1208	P0710	AT-65
FPCM	1305	P1220	EC-281
FR O2 SE HEATER-B1	0901	P0135	EC-144
FR O2 SE HEATER-B2	1001	P0155	EC-164
FRONT O2 SENSOR-B1	0503	P0130	EC-139
FRONT O2 SENSOR-B2	0303	P0150	EC-158
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-254
IGN SIGNAL-PRIMARY	0201	P1320	EC-288
INHIBITOR SWITCH	1101	P0705	AT-59
INT AIR TEMP SEN	0401	P0110	EC-116
MAP/BARO SW SOL/V	1302	P1105	EC-275
KNOCK SENSOR	0304	P0325	EC-195
LINE PRESSURE S/V	1205	P0745	AT-94
MASS AIR FLOW SEN*3	0102	P0100	EC-103
NO SELF-DIAGNOSTIC FAILURE INDICATED	Flashing*6	No DTC	EC-50
OVERHEAT	0208	P1900*5	EC-339
OVERRUN CLUTCH S/V	1203	P1760	AT-105
PARK/NEUT POSI SW	1003	P0705	EC-270
PURG CONT/V & S/V	0807	P0443	EC-232
PURG VOLUME CONT/V	1008	P1445	EC-322
RANDOM MISFIRE	0701	P0300	EC-191
REAR O2 SENSOR	0707	P0136	EC-148
RR O2 SEN HEATER	0902	P0141	EC-153
SHIFT SOLENOID/V A*3	1108	P0750	AT-97
SHIFT SOLENOID/V B*3	1201	P0755	AT-100
TANK FUEL TEMP SEN	0402	P0180	EC-188
THROTTLE POSI SEN*3	0403	P0120	EC-126
THRTL POSI SEN A/T*3	1206	P1705	AT-103
TOR CONV CLUTCH SV	1204	P0740	AT-86
TW CATALYST SYS	0702	P0420	EC-221
VC/V BYPASS/V	0801	P1441	EC-224
VEHICLE SPEED SEN	0104	P0500	EC-250
VENT CONTROL VALVE	0903	P0446	EC-240
VHCL SPEED SEN A/T*4	1102	P0720	AT-68

*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: When engine is running.

Alphabetical & P No. Index for DTC (Cont'd)

P NO. INDEX FOR DTC

DTC		Items (CONSULT screen terms)	Reference page
CONSULT GST*2	ECM*1		
P0000	**0505**	**NO SELF-DIAGNOSTIC FAILURE INDICATED**	—
No DTC	Flashing*6	NO SELF-DIAGNOSTIC FAILURE INDICATED	EC-50
P0100	0102	MASS AIR FLOW SEN*3	EC-103
P0105	0803	ABSOL PRESS SENSOR	EC-109
P0110	0401	INT AIR TEMP SEN	EC-116
P0115	0103	COOLANT TEMP SEN*3	EC-122
P0120	0403	THROTTLE POSI SEN*3	EC-126
P0125	0908	*COOLANT TEMP SEN	EC-132
P0130	0307	CLOSED LOOP-B1	EC-137
P0130	0503	FRONT O2 SENSOR-B1	EC-139
P0135	0901	FR O2 SE HEATER-B1	EC-144
P0136	0707	REAR O2 SENSOR	EC-148
P0141	0902	RR O2 SEN HEATER	EC-153
P0150	0308	CLOSED LOOP-B2	EC-137
P0150	0303	FRONT O2 SENSOR-B2	EC-158
P0155	1001	FR O2 SE HEATER-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	RANDOM 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 (POS)	EC-198
P0340	0101	CAM POS SEN (PHASE)	EC-204
P0400	0302	EGR SYSTEM	EC-209
P0402	0306	EGRC-BPT VALVE	EC-219
P0420	0702	TW CATALYST SYS	EC-221
P0440	0705	EVAP (SMALL LEAK)	EC-224
P0443	0807	PURG CONT/V & S/V	EC-232
P0446	0903	VENT CONTROL VALVE	EC-240
P0450	0704	EVAP SYS PRES SEN	EC-245
P0500	0104	VEHICLE SPEED SEN	EC-250
P0505	0205	IACV-AAC VALVE	EC-254
P0510	0203	CLOSED THRL POS SW	EC-260
P0600	0504	A/T COMM LINE	EC-264
P0605	0301	ECM	EC-268
P0705	1003	PARK/NEUT POSI SW	EC-270
P0705	1101	INHIBITOR SWITCH	AT-59
P0710	1208	FLUID TEMP SENSOR	AT-65
P0720	1102	VHCL SPEED SEN A/T*4	AT-68
P0725	1207	ENGINE SPEED SIG*4	AT-70
P0731	1103	A/T 1ST SIGNAL	AT-72
P0732	1104	A/T 2ND SIGNAL	AT-75
P0733	1105	A/T 3RD SIGNAL	AT-78
P0734	1106	A/T 4TH SIG OR TCC	AT-81
P0740	1204	TOR CONV CLUTCH SV	AT-86
P0744	1107	A/T TCC SIGNAL	AT-89
P0745	1205	LINE PRESSURE S/V	AT-94
P0750	1108	SHIFT SOLENOID/V A*3	AT-97
P0755	1201	SHIFT SOLENOID/V B*3	AT-100
P1105	1302	MAP/BARO SW SOL/V	EC-275
P1220	1305	FPCM	EC-281
P1320	0201	IGN SIGNAL-PRIMARY	EC-288
P1335	0407	CRANK POS SEN (REF)*3	EC-296
P1336	0905	CRANK P/S (POS) COG	EC-301
P1400	1005	EGRC SOLENOID/V	EC-307
P1401	0305	EGR TEMP SENSOR	EC-312
P1441	0801	VC/V BYPASS/V	EC-224
P1445	1008	PURG VOLUME CONT/V	EC-322
P1447	0111	EVAP PURG FLOW/ MON	EC-329
P1605	0804	A/T DIAG COMM LINE	EC-336
P1705	1206	THRTL POSI SEN A/T*3	AT-103
P1760	1203	OVERRUN CLUTCH S/V	AT-105
P1900*5	0208	OVERHEAT	EC-339

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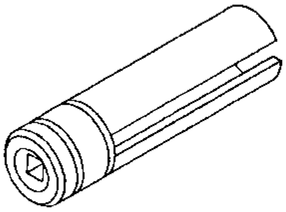
*6: When engine is running.

Special Service Tool

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	
(J36471-A) Front heated oxygen sensor wrench Rear heated oxygen sensor wrench	 NT379	Loosening or tightening front and rear heated oxygen sensors

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 INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system.**
- **All SRS electrical connectors are covered with yellow outer insulation. Do not use electrical test equipment on any circuit related to the SRS.**

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 the repair or inspection work. The open/short circuit of the related switches, sensors, solenoid valves, etc. will cause the MIL to light up.**
- **Be sure to connect and lock the connectors securely after the work. The loose (unlocked) connector will cause the MIL to light up due to the open circuit. (Be sure to connect the connector without water, grease, dirt, bent terminals, etc. in it.)**
- **Be sure to route and clamp 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 the work. The misconnected or disconnected rubber tube may cause the MIL to light up due to the malfunction of the EGR system or the fuel injection system, etc.**
- **Be sure to erase the unnecessary (already fixed) malfunction information in the ECM or A/T control unit before returning the vehicle to the customer.**

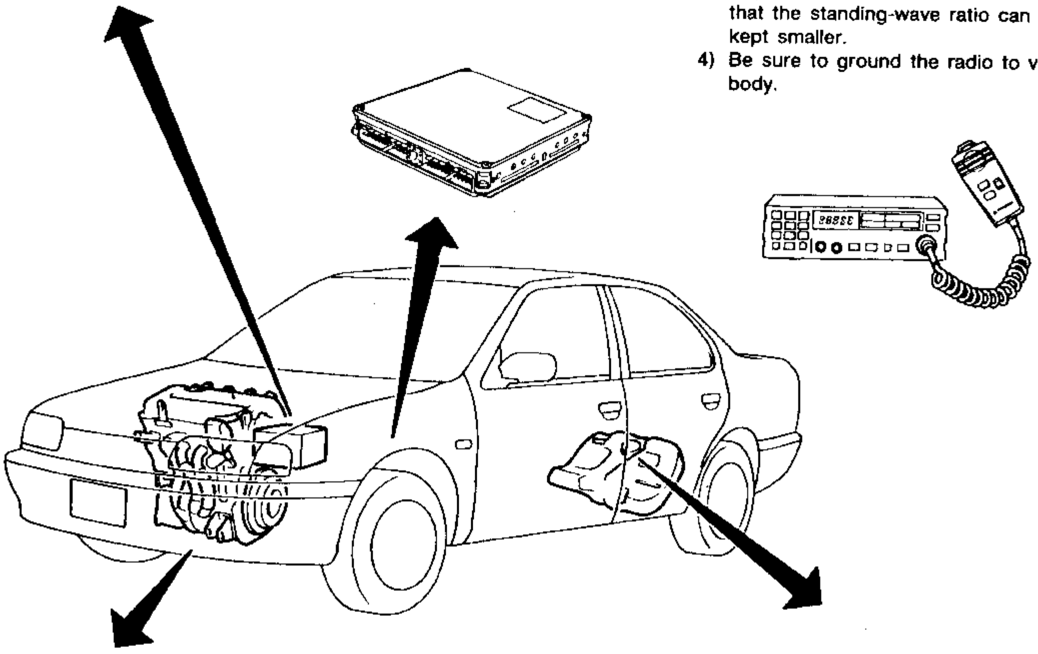
Engine Fuel & Emission Control System

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

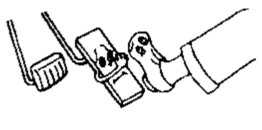
ECM
- Do not disassemble ECM (ECCS control module).
- Do not turn diagnosis mode selector forcibly.
- If a battery terminal is disconnected, the memory will return to the ECM value. The ECM will now start to self-control at its initial value. Engine operation can vary slightly when the terminal is disconnected.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

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

1) Keep the antenna as far away as possible from the ECM.
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.



ECCS 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.



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.

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

ECCS HARNESS HANDLING
- Securely connect ECCS 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 ECCS harness at least 10 cm (3.9 in) away from adjacent harnesses, to prevent an ECCS system malfunction due to receiving external noise, degraded operation of ICs, etc.
- Keep ECCS parts and harnesses dry.
- Before removing parts, turn off ignition switch and then disconnect battery ground cable.

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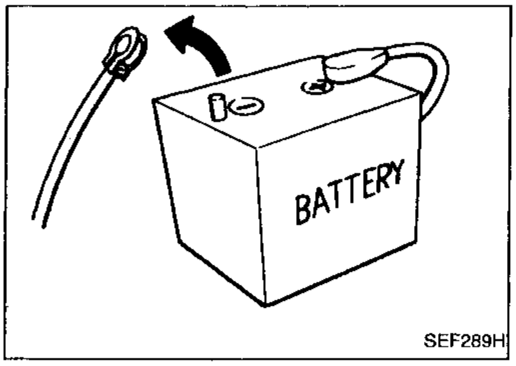
Precautions



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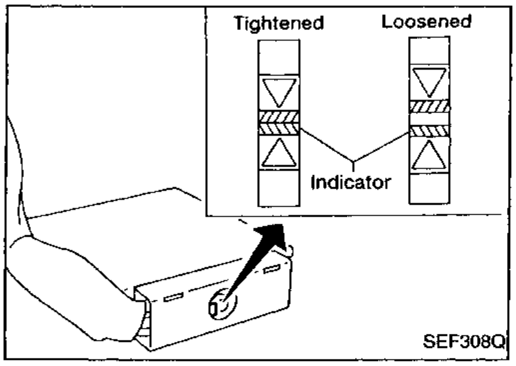
- **Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect negative battery terminal. Failure to do so may damage the ECM. Because battery voltage is applied to ECM even if ignition switch is turned off.**



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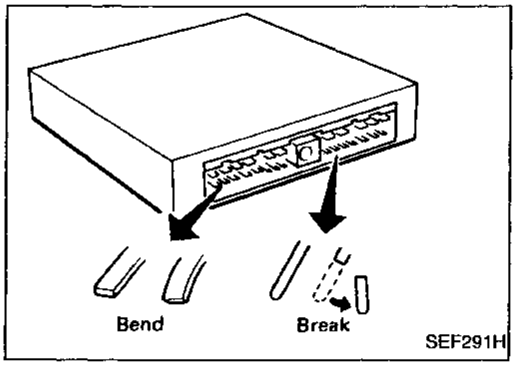
- **When connecting ECM harness connector, tighten securing bolt until the gap between the orange indicators disappears.**

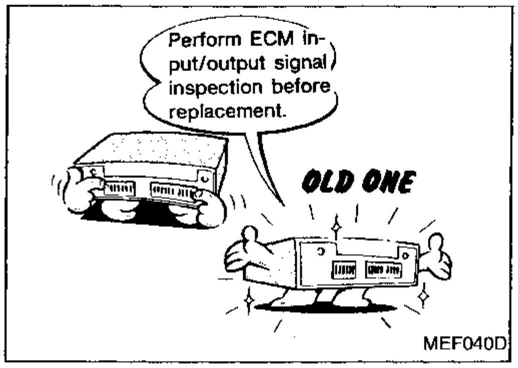
  : 3.0 - 5.0 N·m (0.3 - 0.5 kg-m, 26 - 43 in-lb)



SEF291H

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

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



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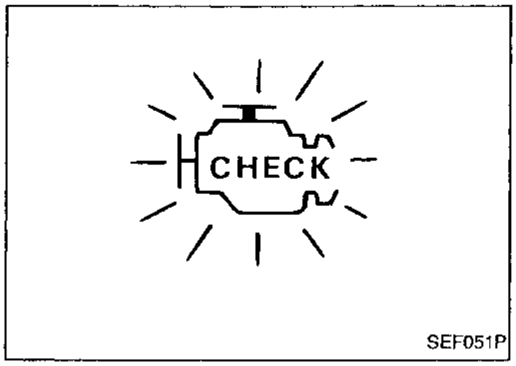
- **Before replacing ECM, perform ECM input/output signal inspection and make sure whether ECM functions properly or not. (See page EC-90.)**

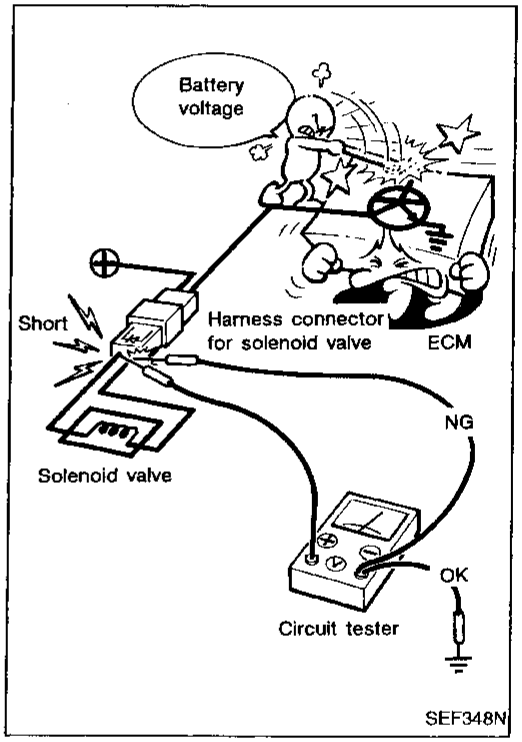


SEF051P

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

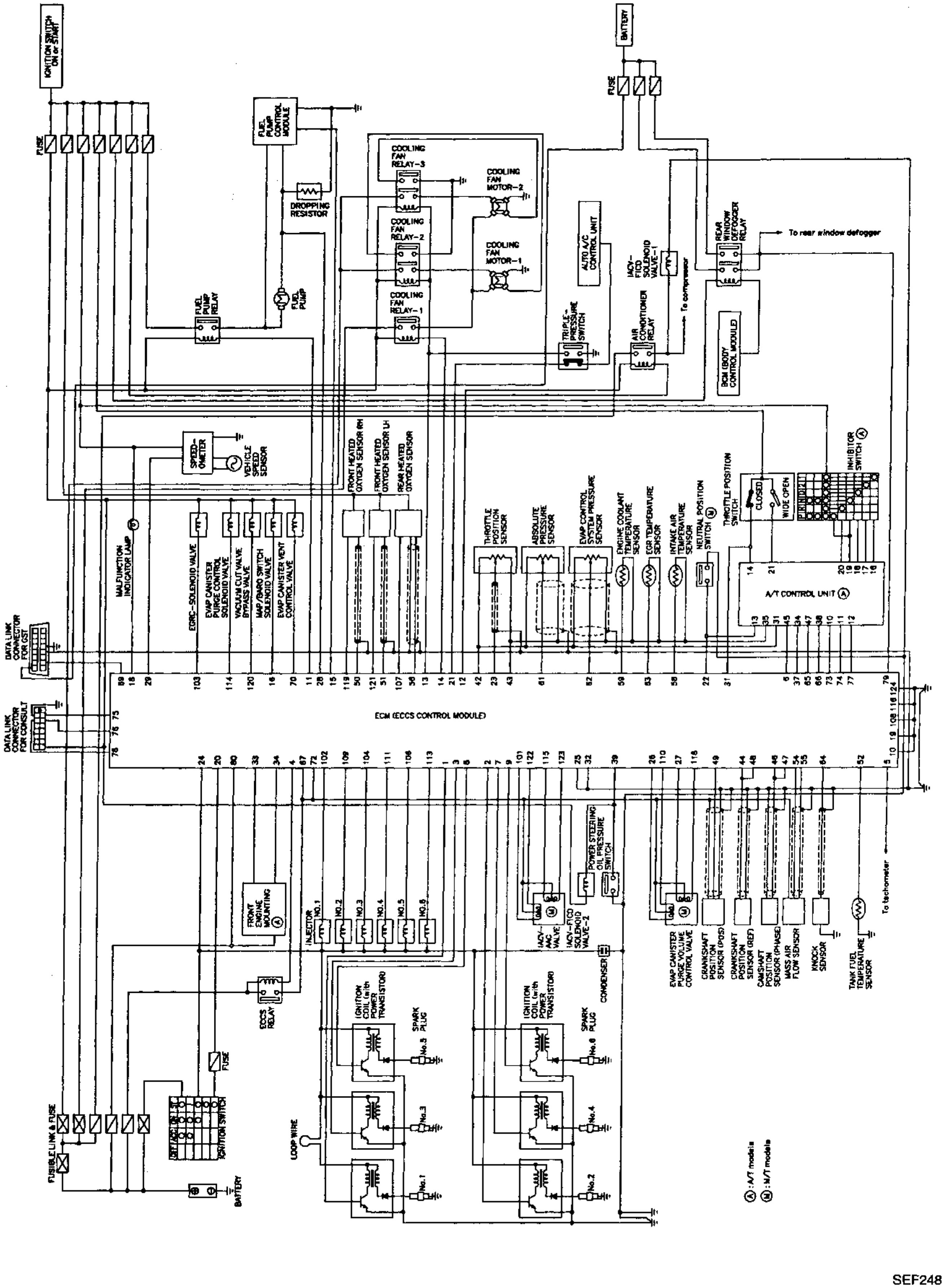
  The DTC should not be displayed in the "DTC CONFIRMATION PROCEDURE" if the repair is completed. The "OVERALL FUNCTION CHECK" should be a good result if the repair is completed.

Precautions (Cont'd)



- **When measuring ECM signals with a circuit tester, never bring the two tester probes into contact.**
  Accidental contact of probes will cause a short circuit and damage the ECM power transistor.

Circuit Diagram



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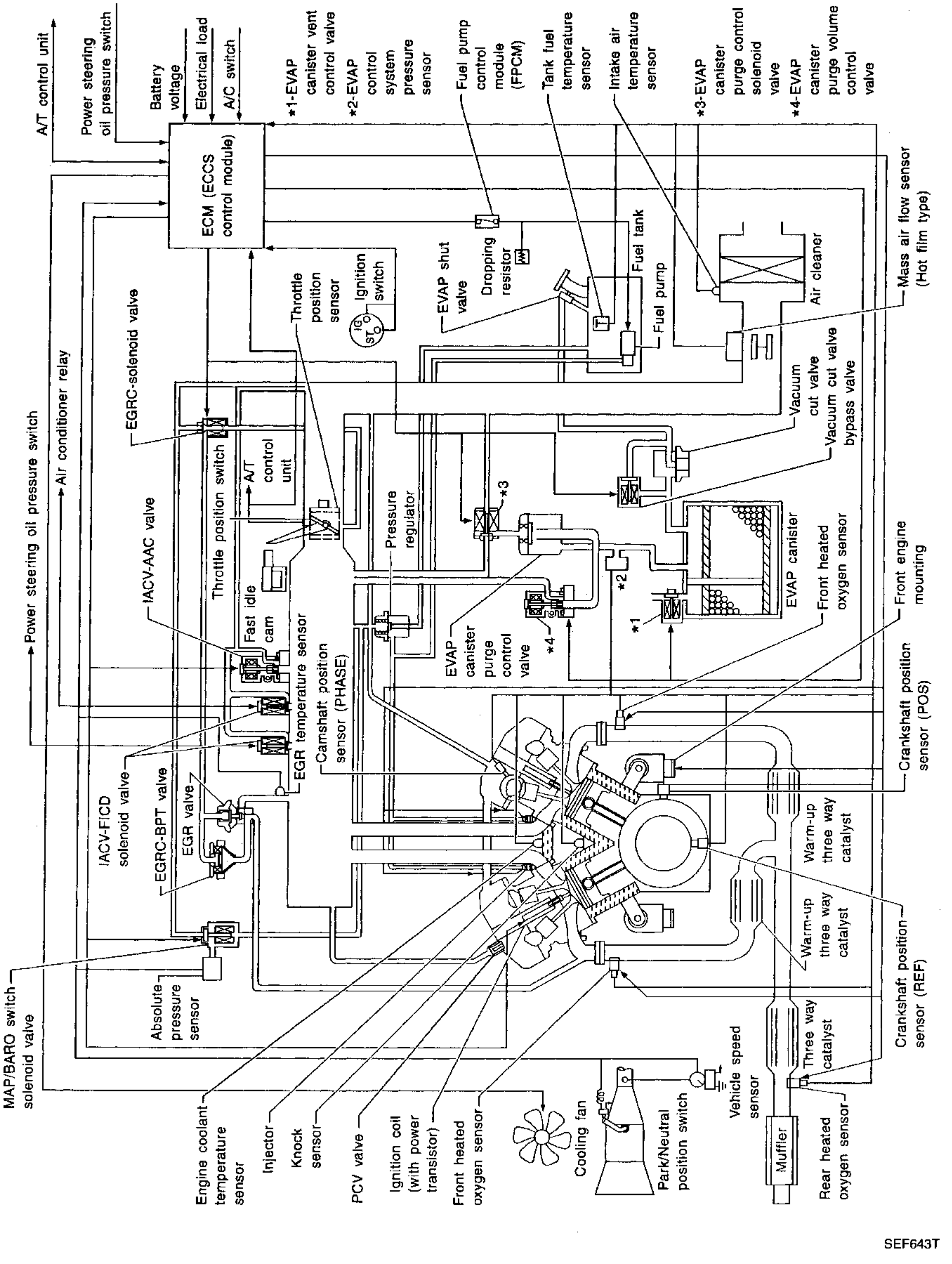
System Diagram



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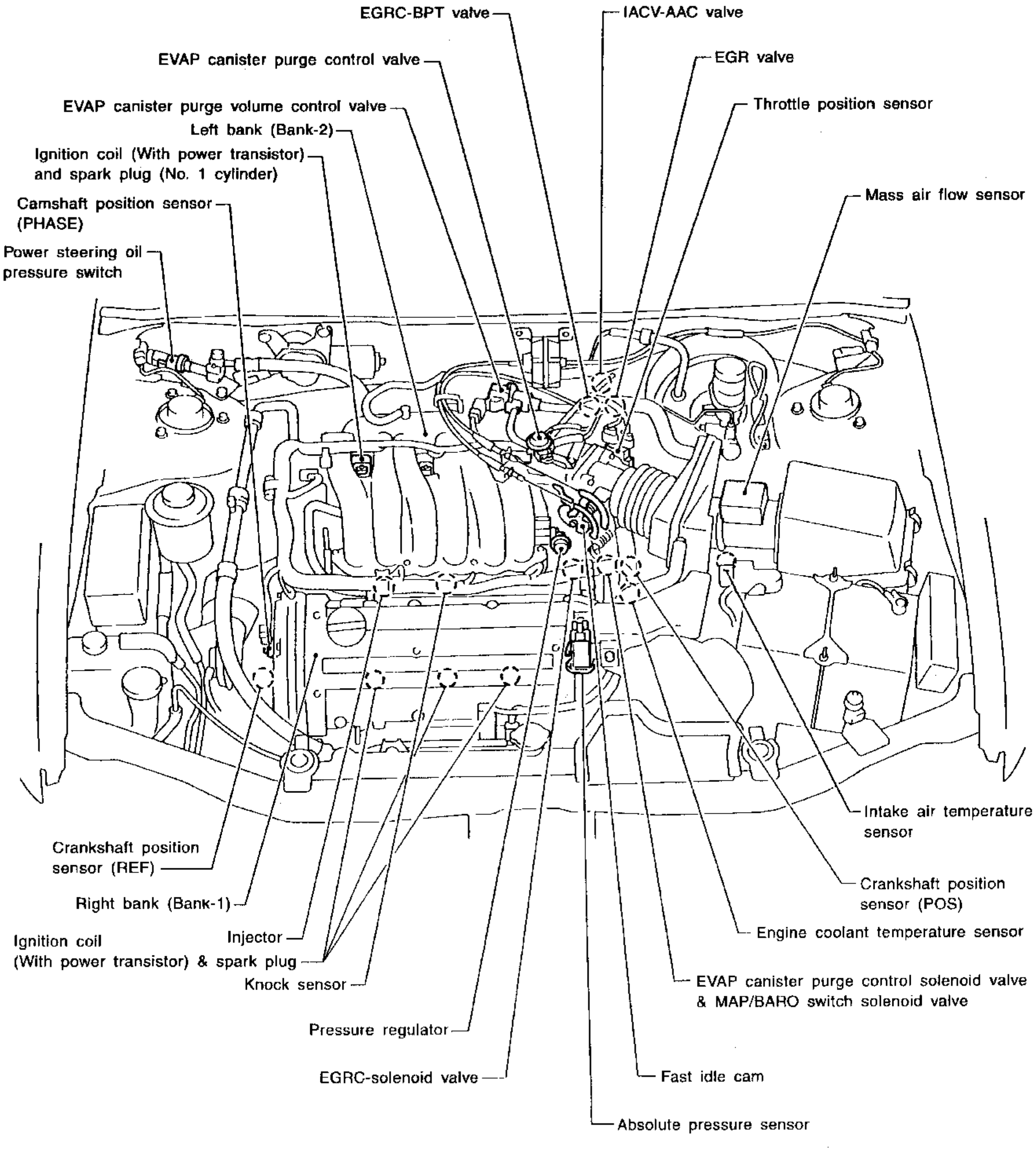
ECCS Component Parts Location



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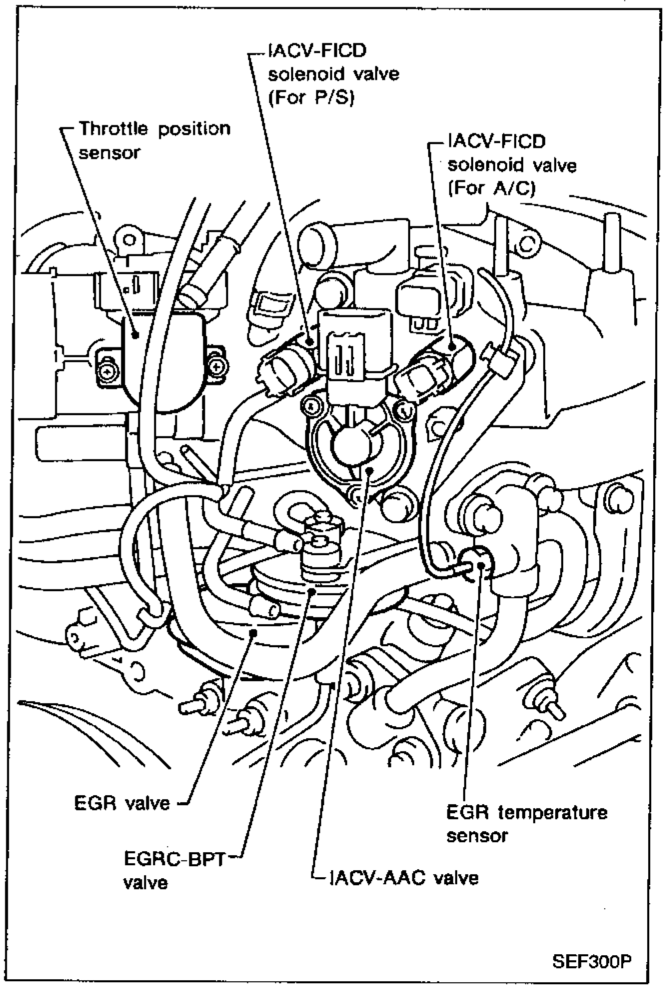
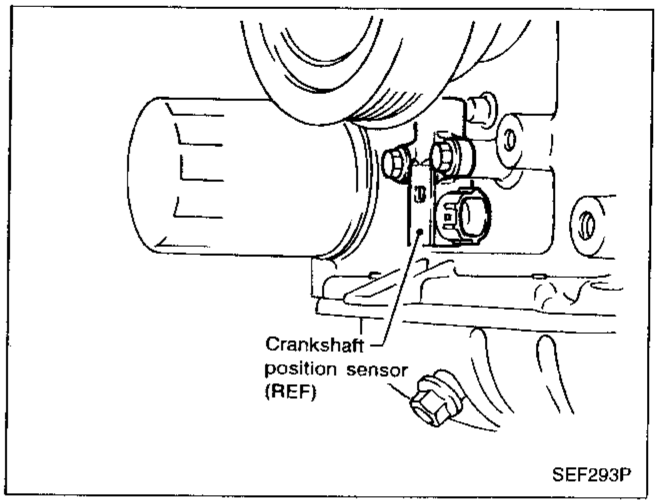
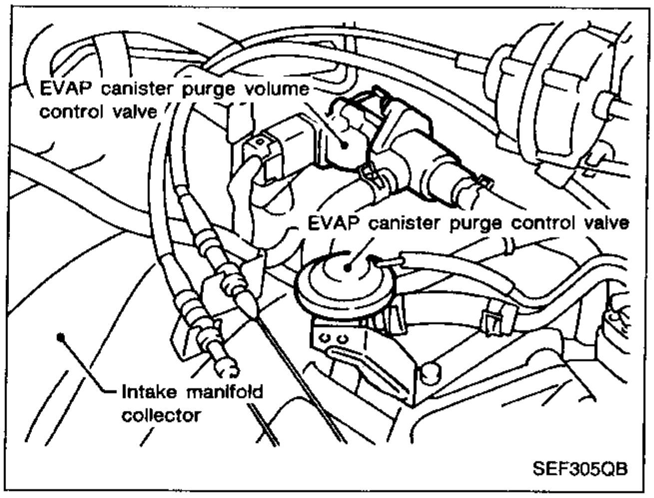
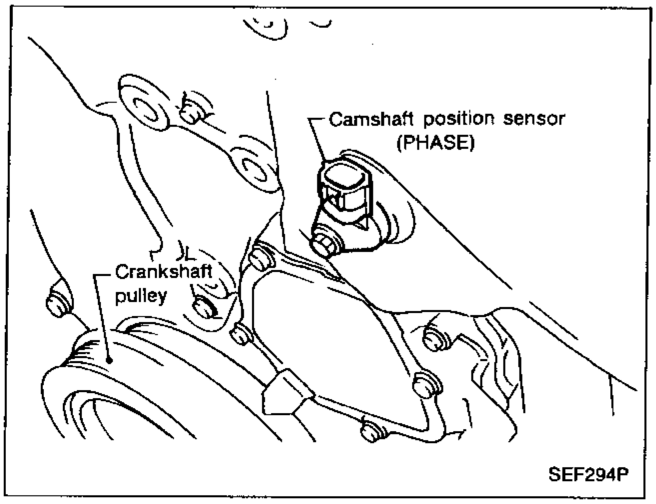
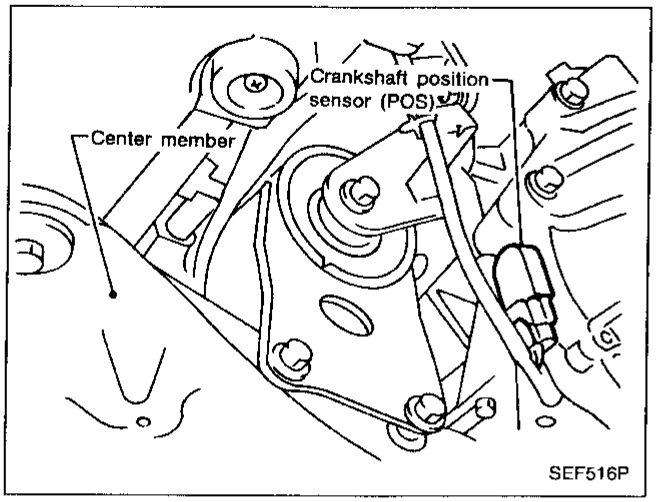
ECCS Component Parts Location (Cont'd)



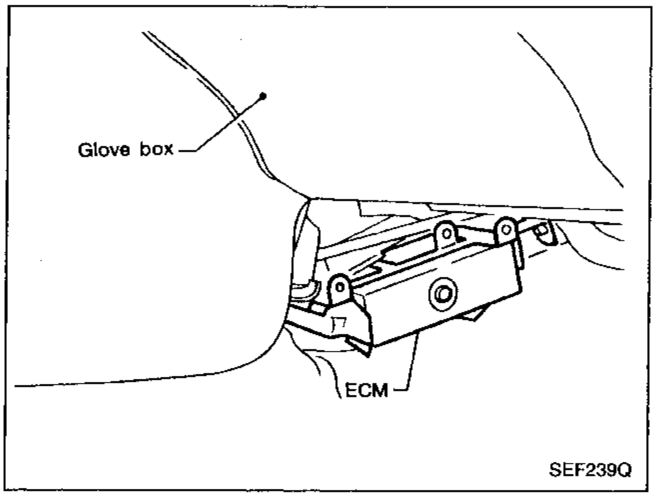


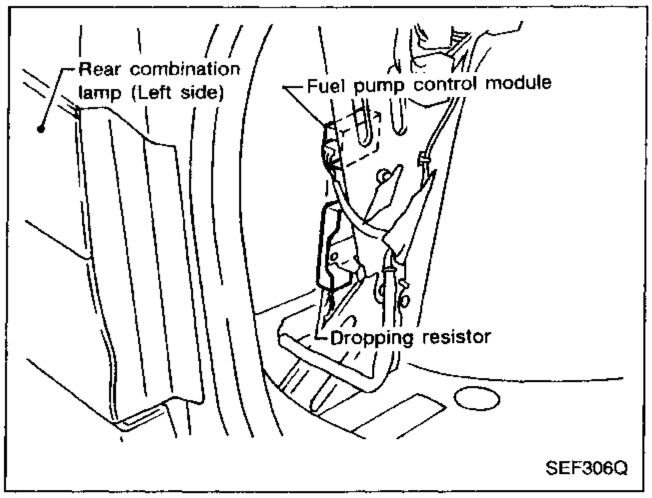


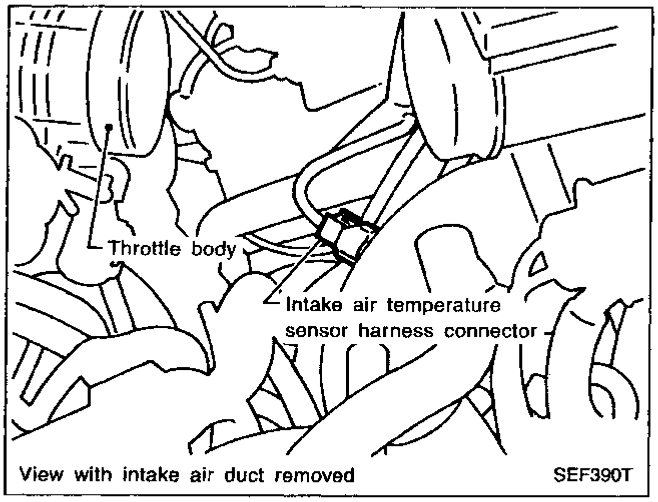


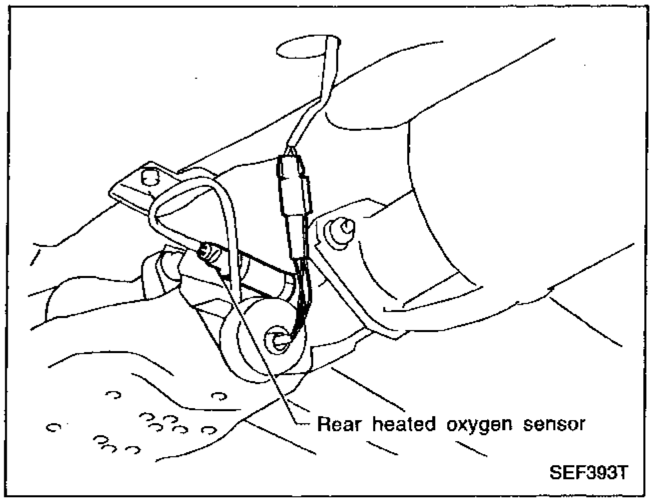


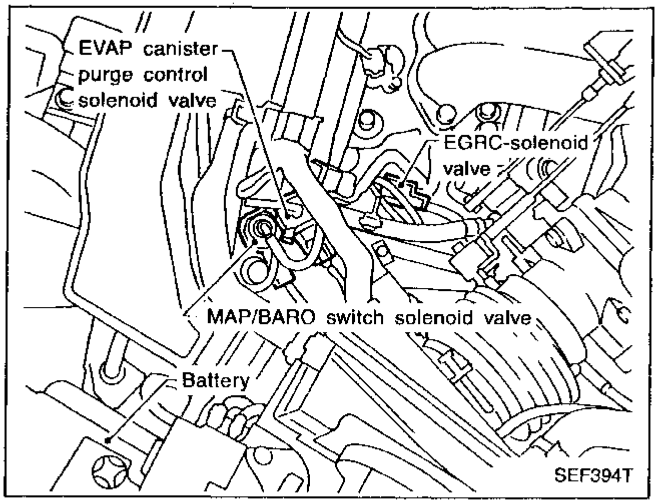
ECCS Component Parts Location (Cont'd)

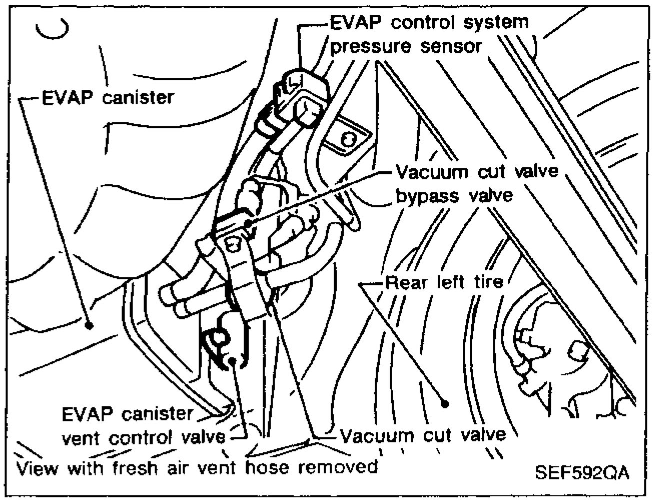




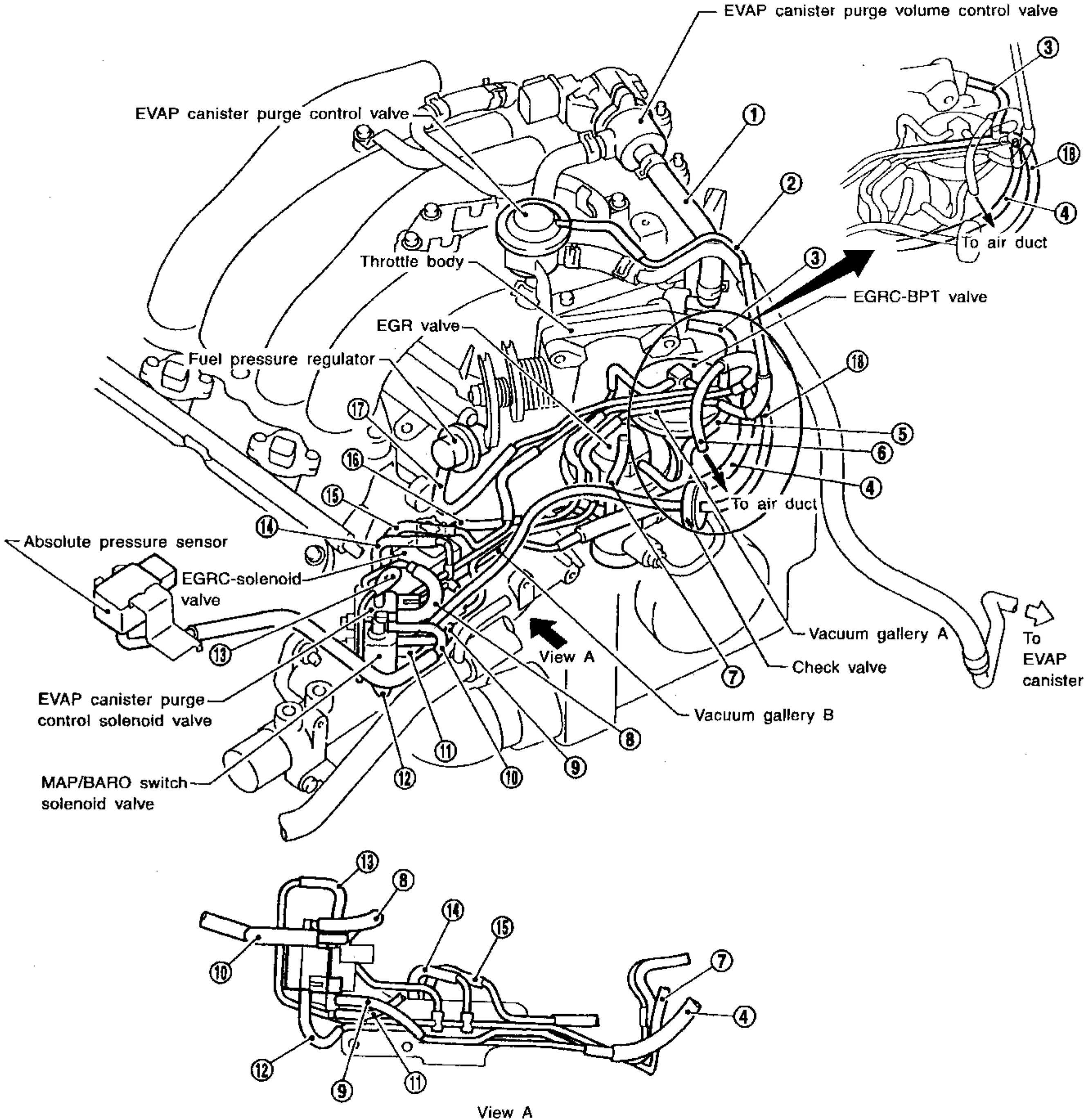








Vacuum Hose Drawing



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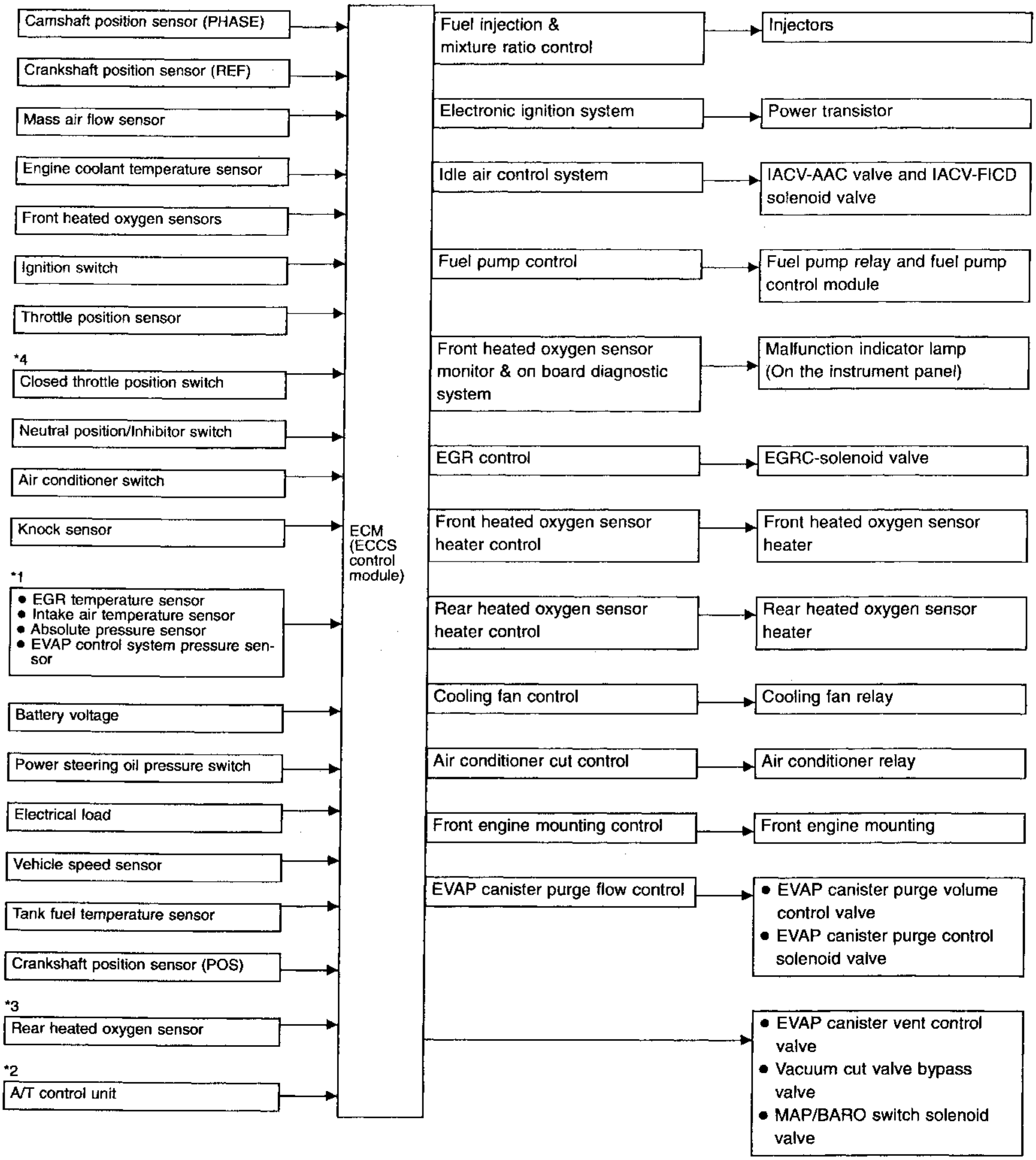
① EVAP canister purge volume control valve to Throttle body
② EVAP canister purge control valve to Vacuum gallery A
③ Throttle body to Vacuum gallery A
④ Vacuum gallery A to Vacuum gallery B
⑤ EGR valve to EGRC-BPT valve
⑥ Air duct to Vacuum gallery A
⑦ Throttle body to Vacuum gallery B
⑧ MAP/BARO switch solenoid valve to Vacuum gallery B
⑨ EVAP canister purge control solenoid valve to Vacuum gallery B
⑩ MAP/BARO switch solenoid valve to Absolute pressure sensor
⑪ EVAP canister purge control solenoid valve to Check valve
⑫ MAP/BARO switch solenoid valve to Vacuum gallery B
⑬ EVAP canister purge control solenoid valve to Vacuum gallery B
⑭ EGRC-solenoid valve to Vacuum gallery B
⑮ EGRC-solenoid valve to Vacuum gallery B
⑯ EGRC-solenoid valve to Vacuum gallery B
⑰ Fuel pressure regulator to Vacuum gallery A
⑱ Check valve to Vacuum gallery A

Refer to "System Diagram" in ENGINE AND EMISSION CONTROL SYSTEM for vacuum control system.

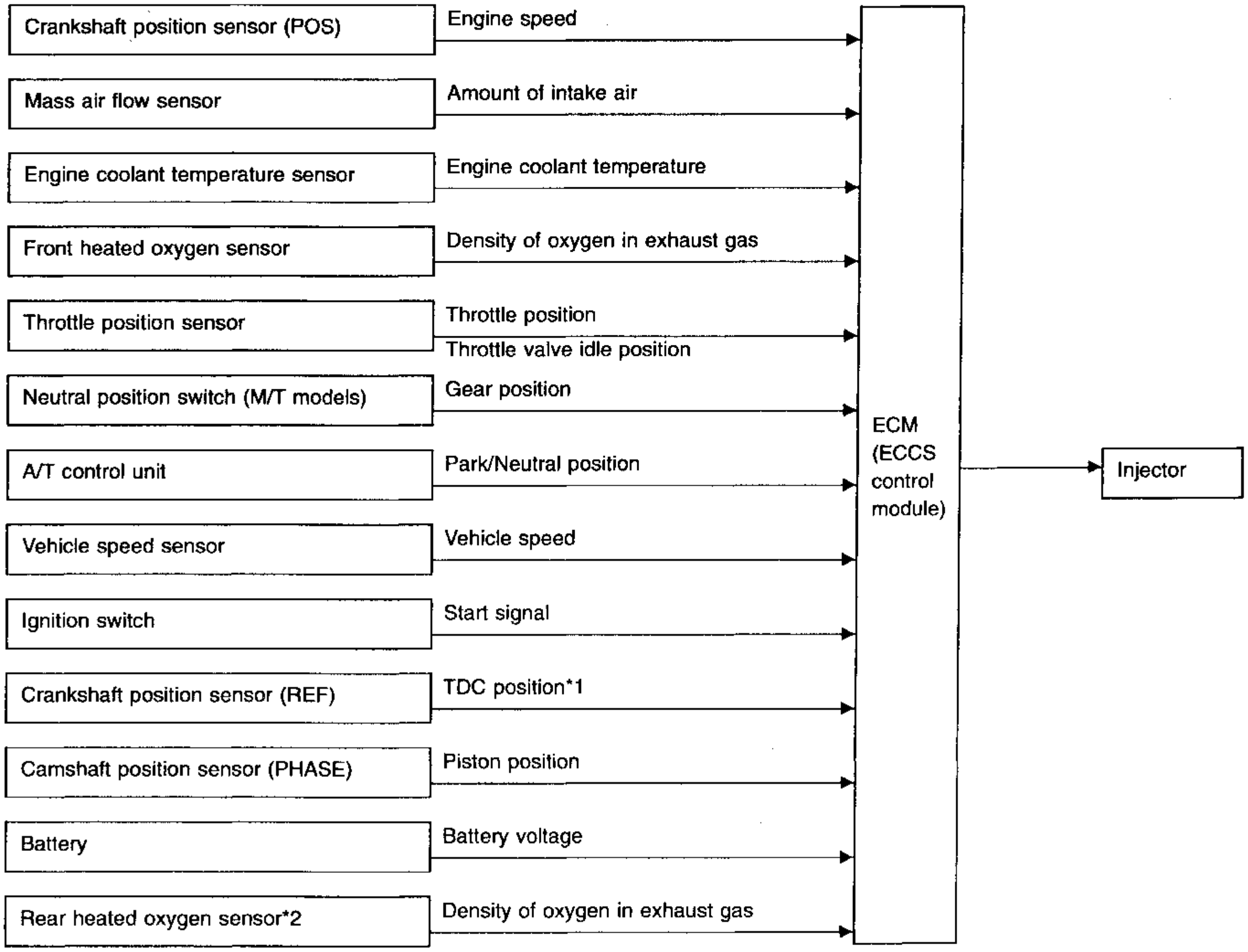
System Chart



*1: These sensors are not directly 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



*1: Top Dead Center
*2: This sensor is not used to control the engine system under normal conditions.

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

The amount of fuel injected is compensated for to improve engine performance. This will be made under various operating conditions as listed below.

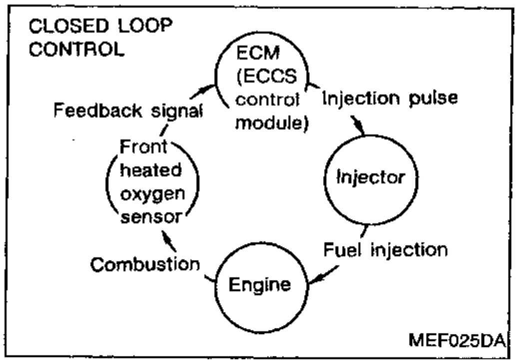
(Fuel increase)

- During warm-up
- When starting the engine
- During acceleration
- Hot-engine operation
- High-load, high-speed operation

(Fuel decrease)

- During deceleration
- During high speed operation

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



MIXTURE RATIO FEEDBACK 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 is rich or lean. The ECM adjusts the injection pulse width according to the sensor voltage signal. For more information about front heated oxygen sensor, refer to pages EC-158, 139. This maintains the mixture ratio within the range of stoichiometric (ideal air-fuel mixture).
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.
This stage is referred to as the closed loop control condition.

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
- After shifting from "N" to "D"
- 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 film) and characteristic changes during operation (i.e. injector clogging) directly affect mixture ratio.
Accordingly, the difference between the basic and theoretical mixture ratios is monitored in this system. This is then computed in terms of "injection pulse duration" to automatically compensate for the difference between the two ratios.
"Fuel trim" refers to the feedback compensation value compared against the basic injection duration. Fuel trim includes short-term fuel trim and long-term fuel trim.
"Short-term fuel trim" is the short-term fuel compensation used to maintain the mixture ratio at its theoretical value. The signal from the 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.

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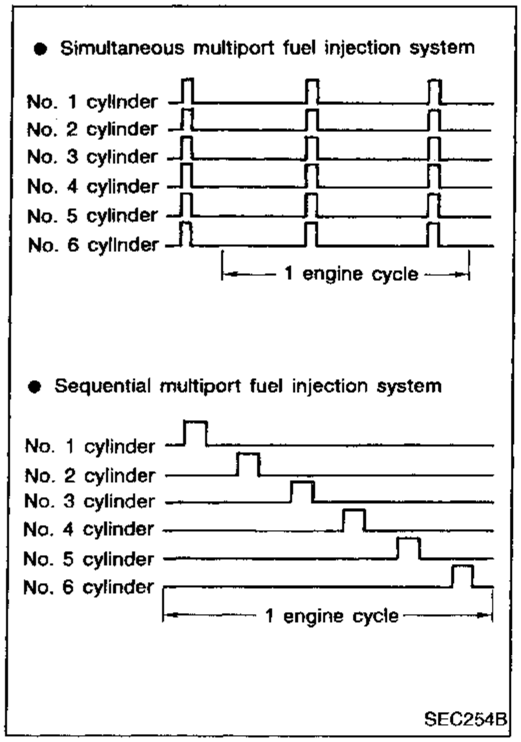
Multiport Fuel Injection (MFI) System (Cont'd)



FUEL INJECTION SYSTEM

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.

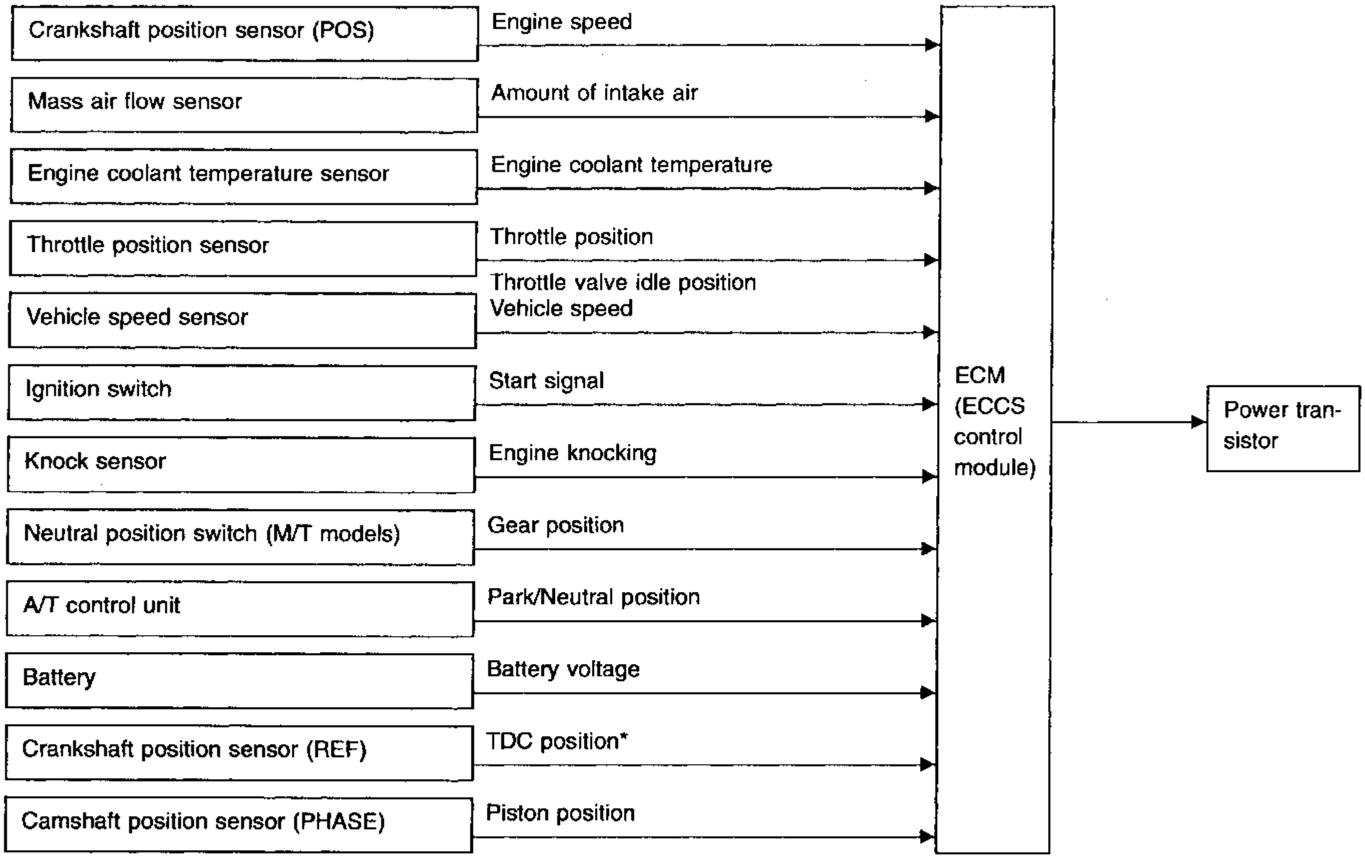
This system is used when the engine is being started and/or if the fail-safe mode (CPU) or crankshaft position sensor (REF) is operating.

FUEL SHUT-OFF

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

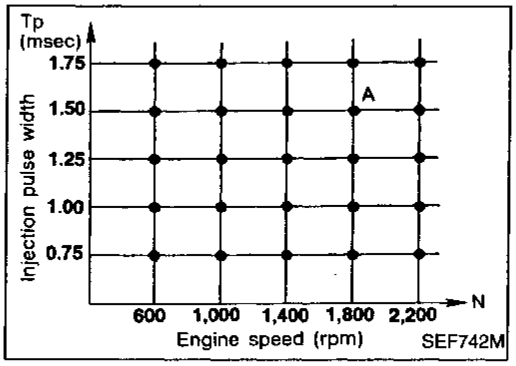
Electronic Ignition (EI) System

INPUT/OUTPUT SIGNAL LINE



*: Top Dead Center

Electronic Ignition (EI) 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 below.

The ECM detects information such as the injection pulse width and camshaft position sensor signal. Responding to 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.

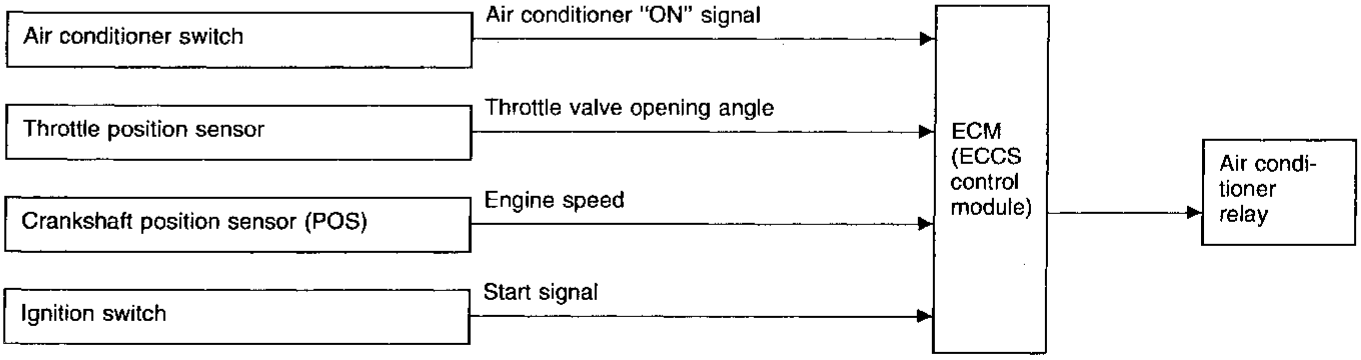
1 At starting
2 During warm-up
3 At idle
4 Hot engine operation
5 At acceleration

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.

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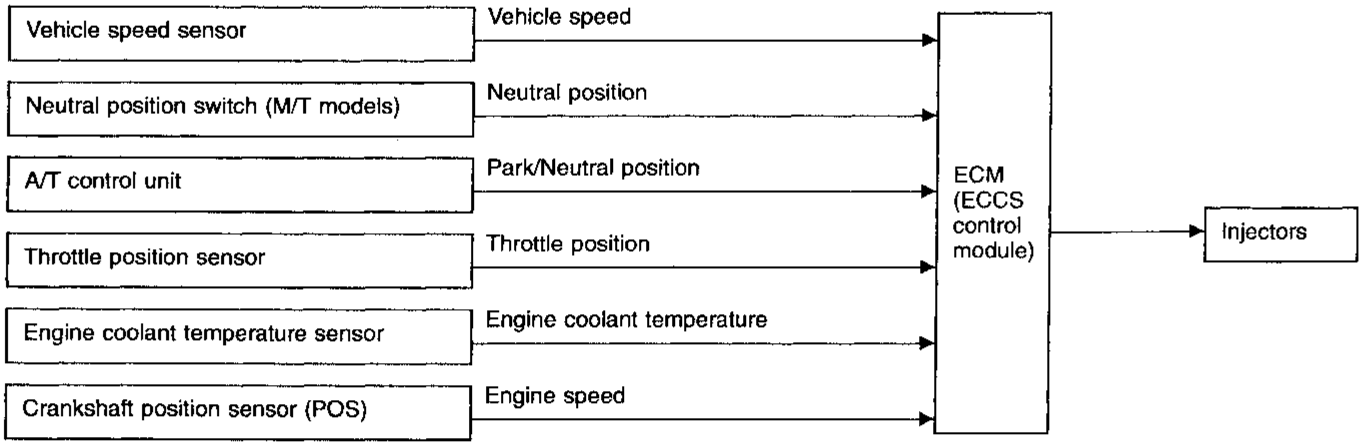
Fuel Cut Control (at no load & high engine speed)

INPUT/OUTPUT SIGNAL LINE



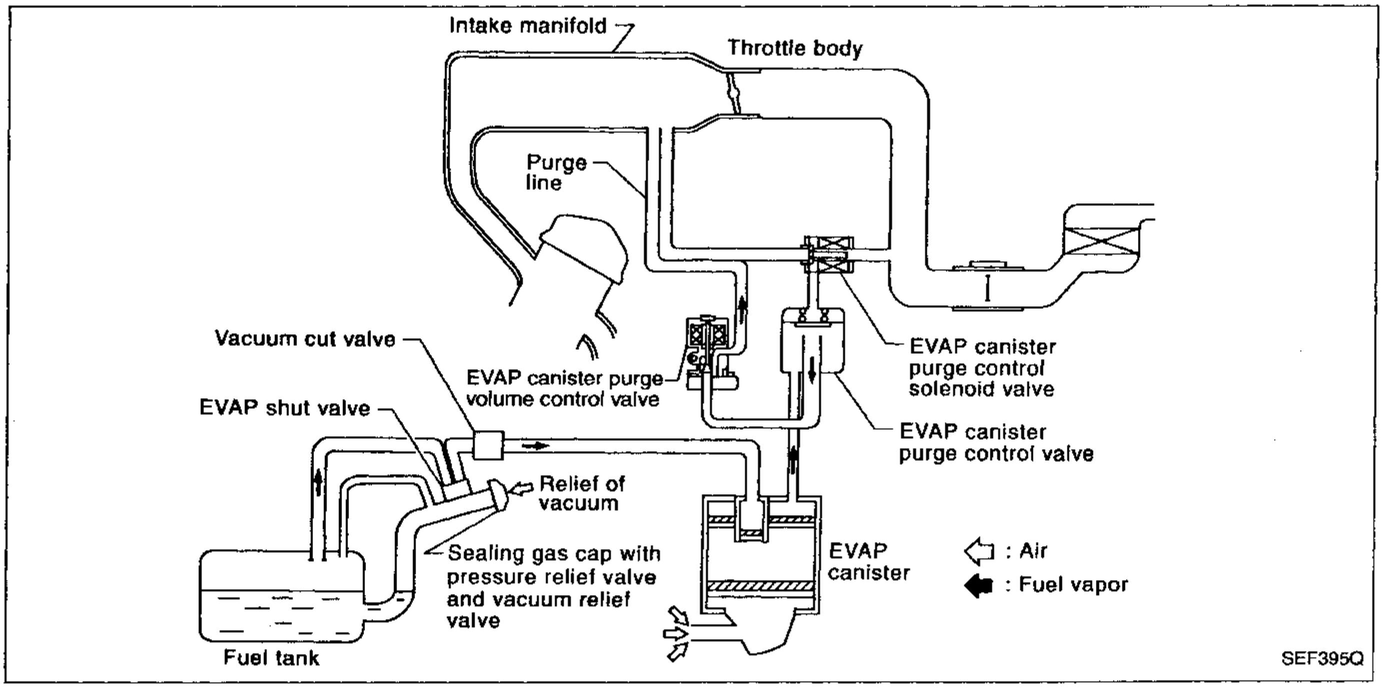
If the engine speed is above 2,700 rpm with no load (for example, in neutral and engine speed over 2,700 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed.

Fuel cut will operate until the engine speed reaches 2,200 rpm, then fuel cut is cancelled.

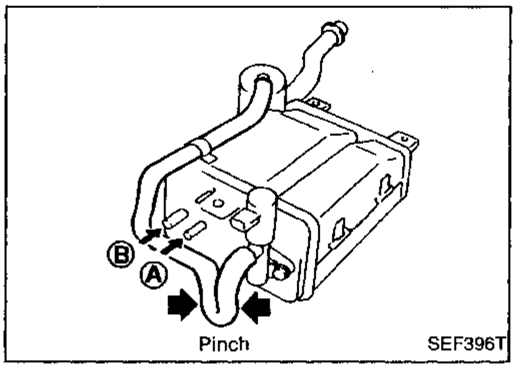
NOTE:

This function is different than deceleration control listed under multiport fuel injection on EC-16.

Description



The evaporative emission system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the EVAP canister.
The fuel vapor in the sealed fuel tank is led into the EVAP canister which contains activated carbon and the vapor is stored there when the engine is not operating.
The vapor in the EVAP canister is purged by the air through the purge line to the intake manifold when the engine is operating.
EVAP canister purge volume control valve is controlled by engine control module. When the engine operates, the flow rate of vapor controlled by EVAP canister purge volume control valve is proportionally regulated as the air flow increases.
EVAP canister purge control valve shuts off the vapor purge line during decelerating and idling, and under normal operating conditions the valve is usually open.
EVAP shut valve shuts off the vapor charge line when fuel is being supplied to the fuel tank.



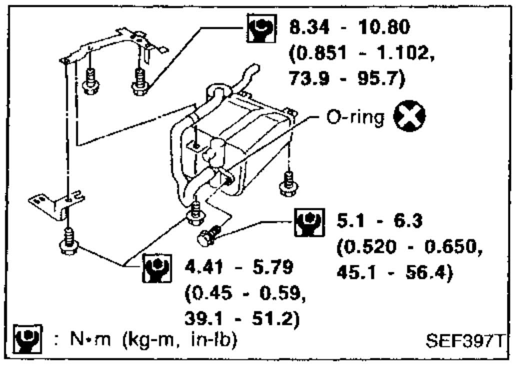
Inspection

EVAP CANISTER

Check EVAP canister as follows:

1. Pinch the fresh air vent hose.
2. Blow air in port Ⓐ and ensure free flow out of port Ⓑ.

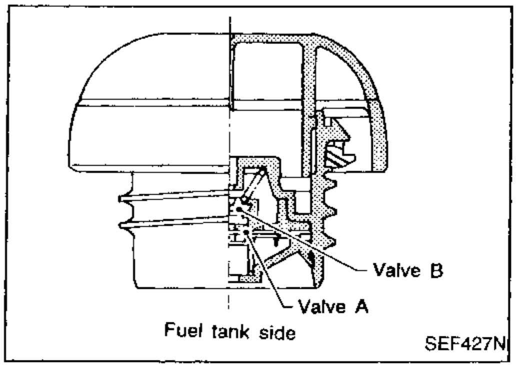
Inspection (Cont'd)



TIGHTENING TORQUE

Tighten EVAP canister as shown in the figure.

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



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

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

Pressure:

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

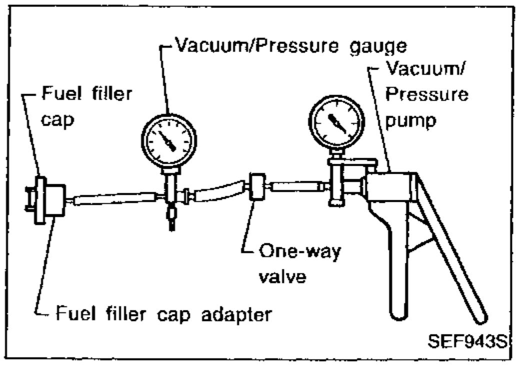
Vacuum:

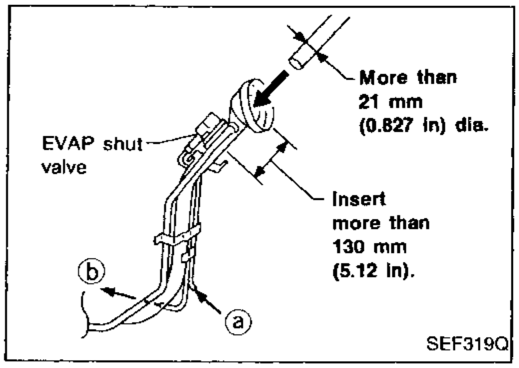
−6.0 to −3.3 kPa (−0.061 to −0.034 kg/cm^2, −0.87 to −0.48 psi)

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.





EVAPORATIVE EMISSION (EVAP) SHUT VALVE

- When pushing down the shutter inside the fuel filler opening, the EVAP shut valve is closed.
- When releasing the shutter, the valve is open.

1. Insert steel tube as shown in the figure.
2. Blow air from one side of the EVAP shut valve tube ⓐ or ⓑ and ensure that there is no air flow.

EVAP CANISTER PURGE CONTROL VALVE

Refer to EC-232.

VACUUM CUT VALVE

Refer to EC-321.

EVAPORATIVE EMISSION (EVAP) CANISTER PURGE VOLUME CONTROL VALVE

Refer to EC-322.

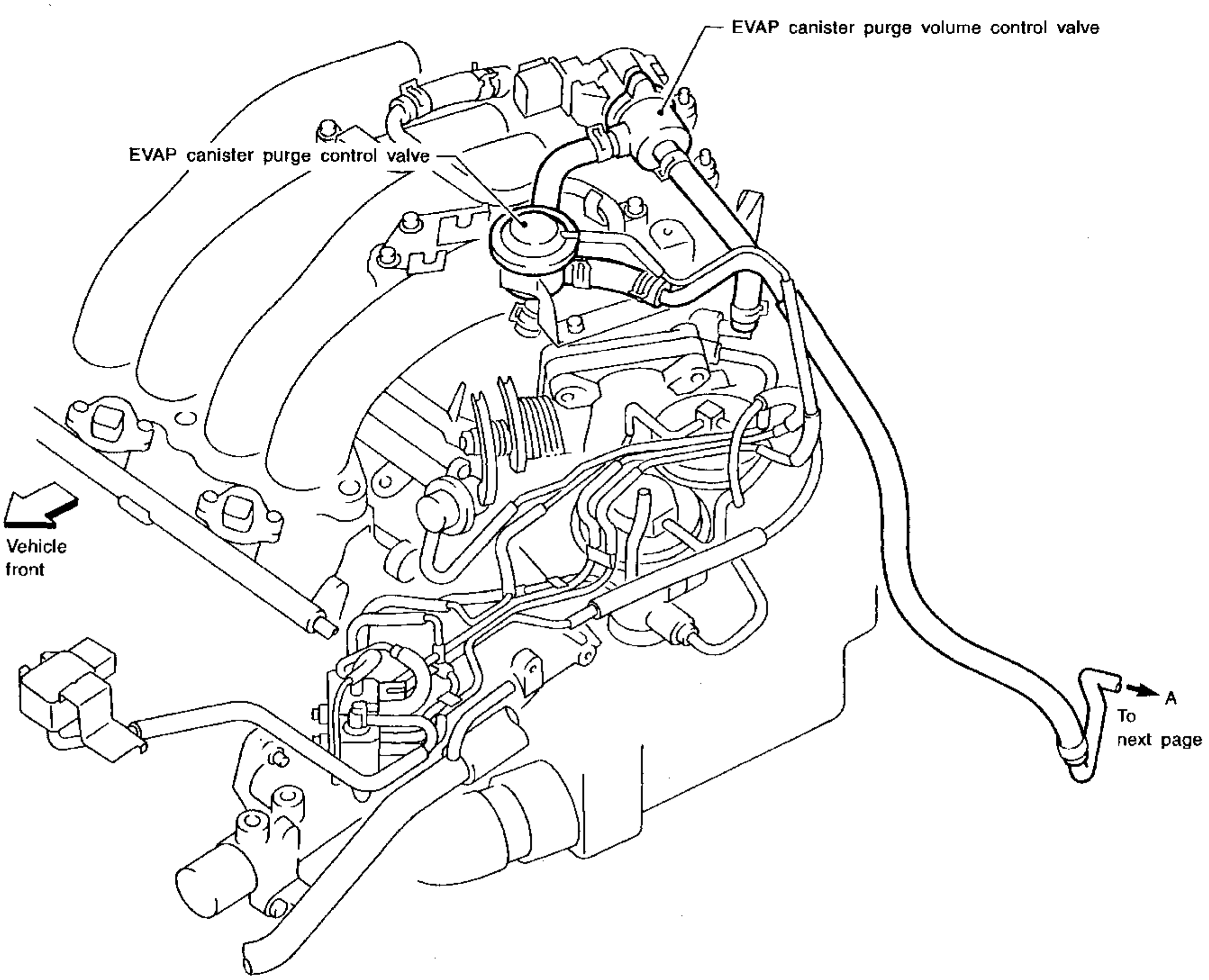
EVAPORATIVE EMISSION (EVAP) CANISTER PURGE CONTROL SOLENOID VALVE

Refer to EC-232.

TANK FUEL TEMPERATURE SENSOR

Refer to EC-188.

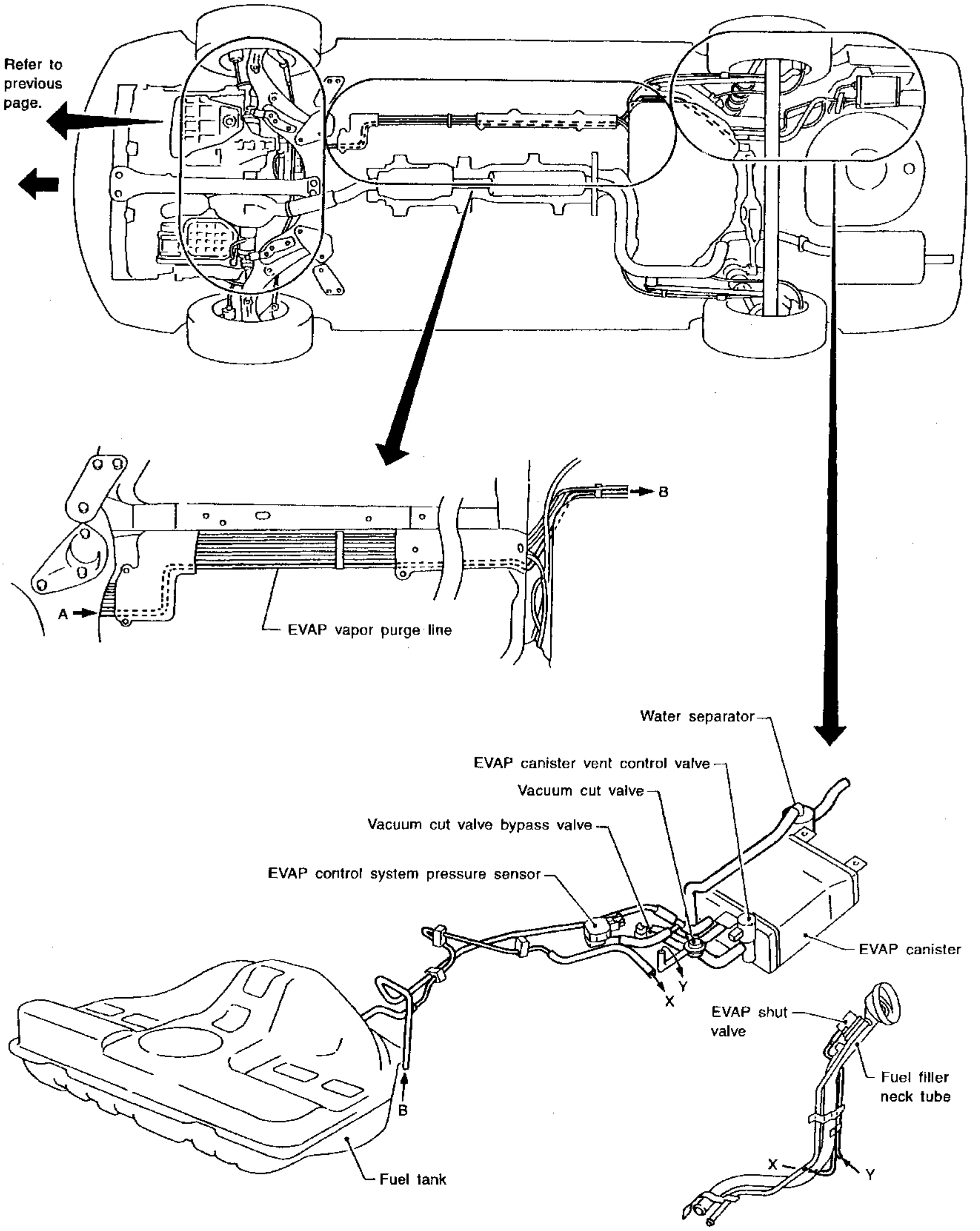
Evaporative Emission Line Drawing

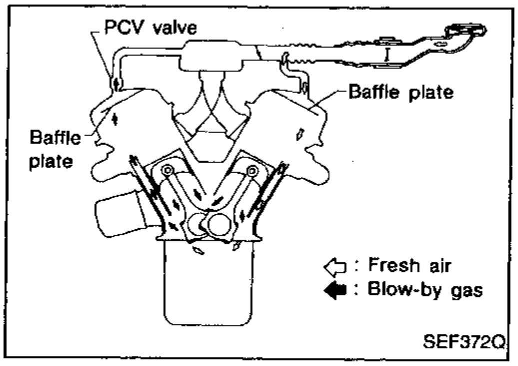


SEF626T

EVAPORATIVE EMISSION SYSTEM

Evaporative Emission Line Drawing (Cont'd)





Description

This system returns blow-by gas to both the intake manifold and air cleaner.

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

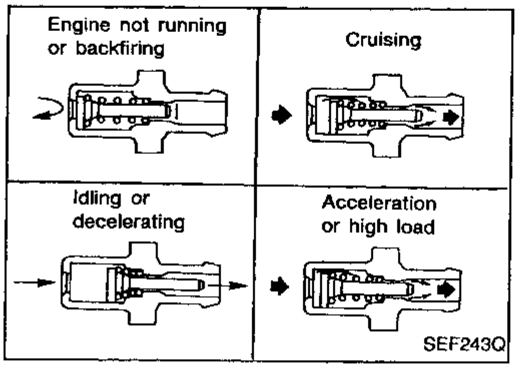
During partial throttle operation of the engine, the intake manifold sucks the blow-by gas through the PCV valve.

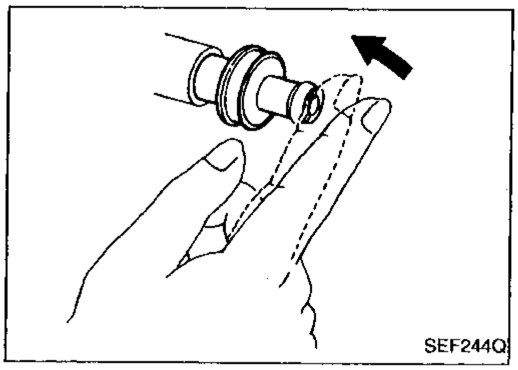
Normally, the capacity of the valve is sufficient to handle any blow-by and a small amount of ventilating air.

The ventilating air is then drawn from the air cleaner, through the hose connecting air cleaner to rocker cover, into the crankcase.

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

On vehicles with an excessively high blow-by some of the flow will go through the hose connection to the air cleaner under all conditions.

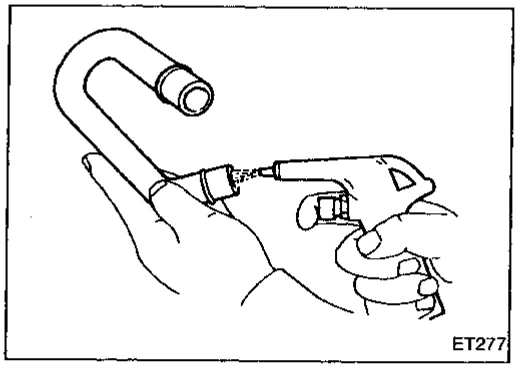




Inspection

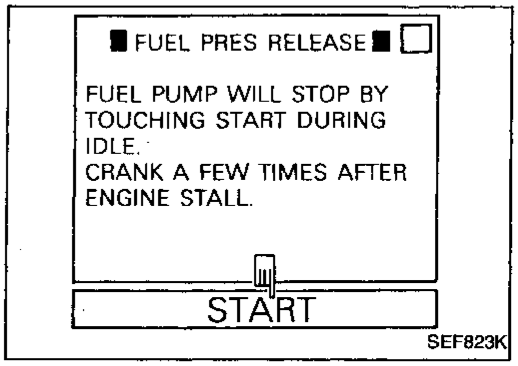
PCV (Positive Crankcase Ventilation)

With engine running at idle, remove ventilation hose from PCV valve; if 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.



VENTILATION HOSE

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



■ FUEL PRES RELEASE ■ ☐

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

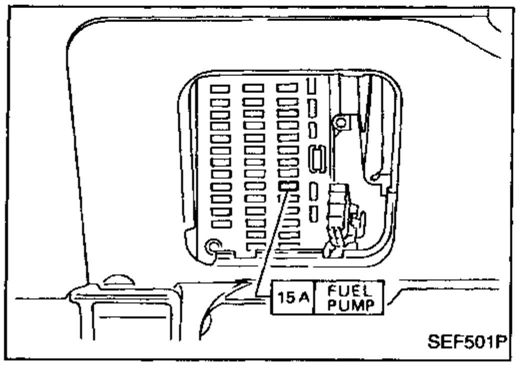
START

SEF823K

Fuel Pressure Release

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

1. Start engine.
2. Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode with CONSULT.
   (Touch "START" and after engine stalls, crank it two or three times to release all fuel pressure.)
3. Turn ignition switch off.



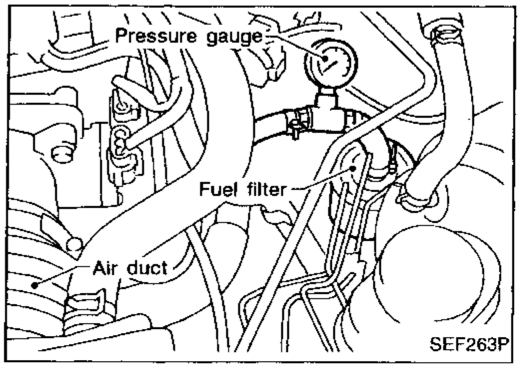
SEF501P

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

Fuel Pressure Check

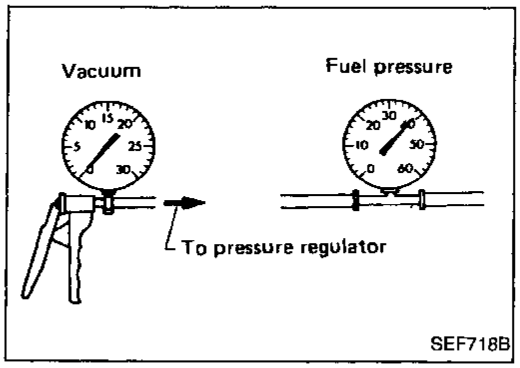
- **When reconnecting fuel line, always use new clamps.**
- **Make sure that clamp screw does not contact adjacent parts.**
- **Use a torque driver to tighten clamps.**
- **Use Pressure Gauge to check fuel pressure.**

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



SEF263P

5. Read the indication of fuel pressure gauge.
   At idling:
   Approximately 235 kPa (2.4 kg/cm^2, 34 psi)
   A few seconds after ignition switch is turned OFF to ON:
   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.



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.

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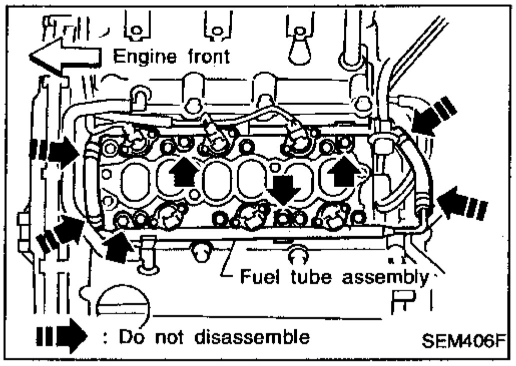
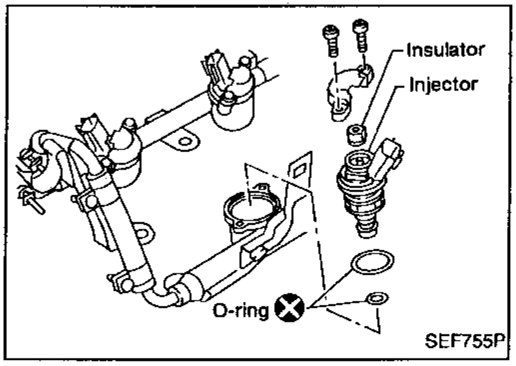
Injector Removal and Installation



1. Release fuel pressure to zero.
2. Remove intake manifold collector (Refer to TIMING CHAIN in EM section).
3. Disconnect vacuum hose from pressure regulator.
4. Disconnect injector harness connectors.
5. Remove injectors with fuel tube assembly.

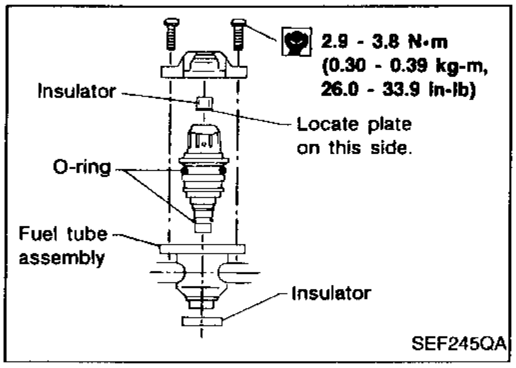
Do not disassemble fuel tube assembly.



6. Push out any malfunctioning injector from fuel tube assembly.

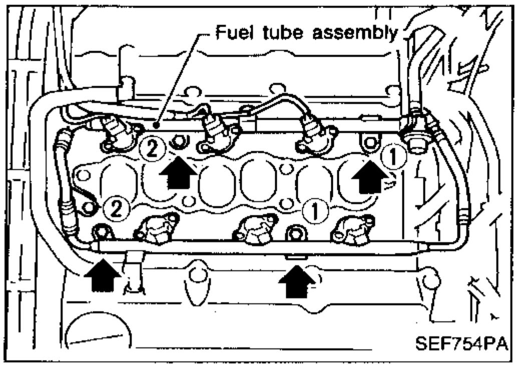
Do not extract injector by pinching connector.

7. Replace or clean injector as necessary.



8. Install injector to fuel tube assembly.

Always replace O-rings and insulators with new ones. Lubricate O-rings with a smear of engine oil.



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

Tighten in numerical order shown in the figure.

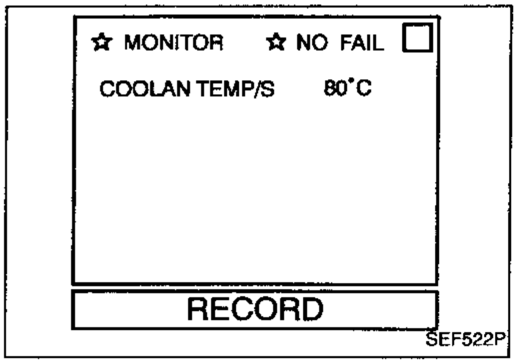
a) First, tighten all bolts to 9.3 to 10.8 N·m (0.95 to 1.1 kg-m, 6.9 to 8.0 ft-lb).
b) Then, tighten all bolts to 21 to 26 N·m (2.1 to 2.7 kg-m, 15 to 20 ft-lb).

Lubricate fuel hoses with a smear of engine oil.

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

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

Fast Idle Cam (FIC) Inspection and Adjustment



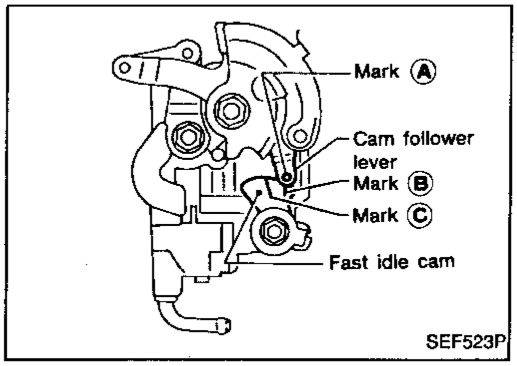
☆ MONITOR ☆ NO FAIL ☐

COOLAN TEMP/S 80°C

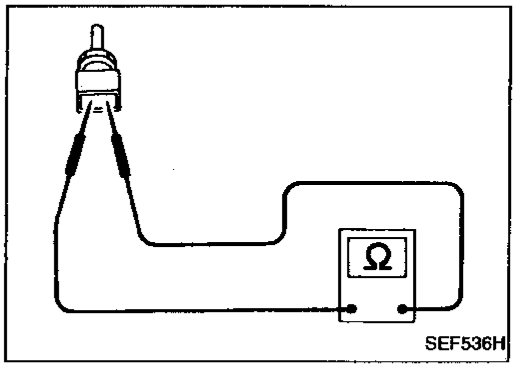
RECORD

SEF522P

1. Turn ignition switch "ON".
2. See "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT.
3. Start engine and warm it up.
   When engine temperature is 80±5°C (176±9°F), make sure that the center of mark Ⓐ is aligned with mark Ⓑ as shown in the figure.



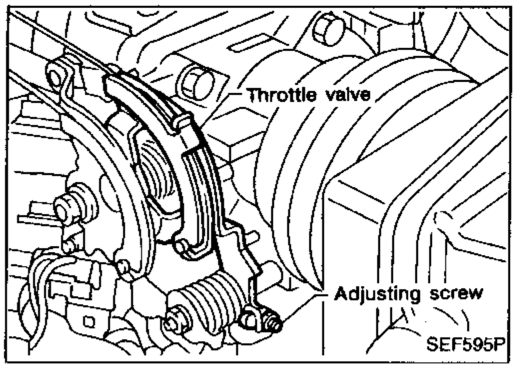
SEF523P



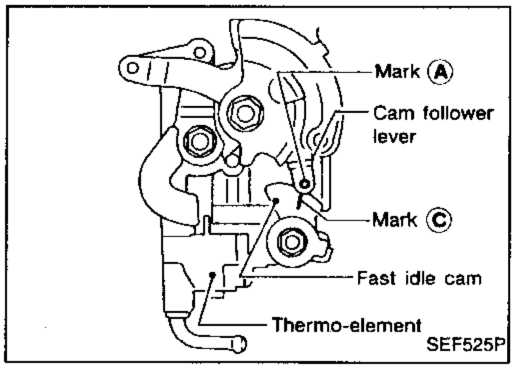
SEF536H

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 0.26 to 0.39 kΩ, make sure that the center of mark Ⓐ is aligned with mark Ⓑ as shown in the figure.

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



SEF595P

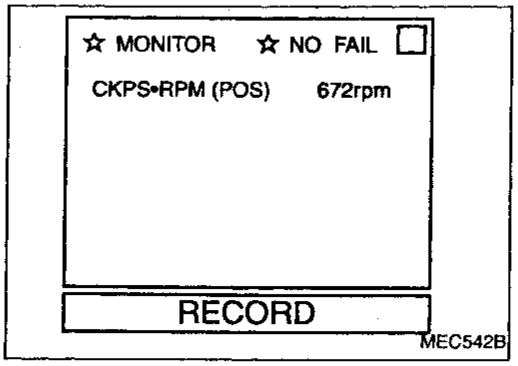


SEF525P

4. Stop engine.
5. Turn ignition switch "ON" and see "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT.
6. 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.
5. When the resistance of engine temperature sensor is 1.65 to 2.40 kΩ, make sure that the center of mark Ⓐ is aligned with mark Ⓒ as shown in the figure.

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

Direct Ignition System — How to Check Idle Speed and Ignition Timing



☆ MONITOR ☆ NO FAIL ☐

CKPS•RPM (POS) 672rpm

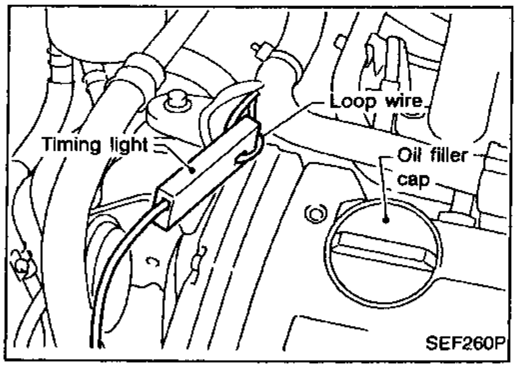
RECORD

MEC542B

IDLE SPEED

- **Using CONSULT**

Check idle speed in "DATA MONITOR" mode with CONSULT.

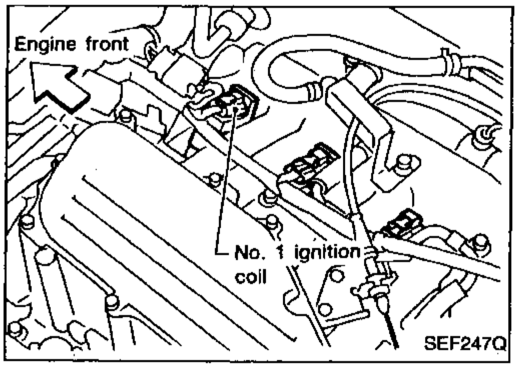


IGNITION TIMING

Any of following two methods may be used.

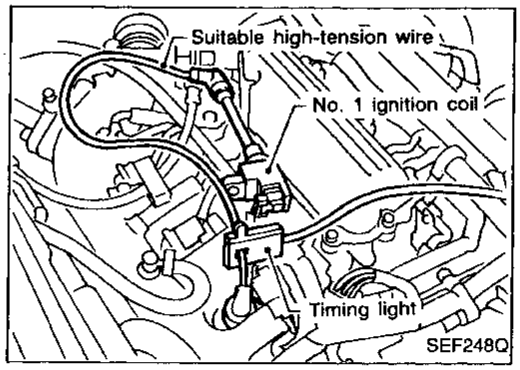
- **Method A**

1. Attach timing light to loop wire as shown.
2. Check ignition timing.



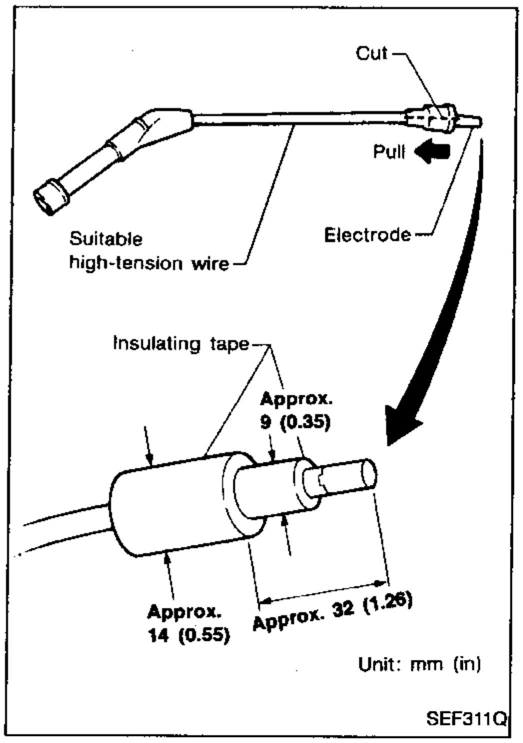
- **Method B**

1. Remove No. 1 ignition coil.



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

Direct Ignition System — How to Check Idle Speed and Ignition Timing (Cont'd)



Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment

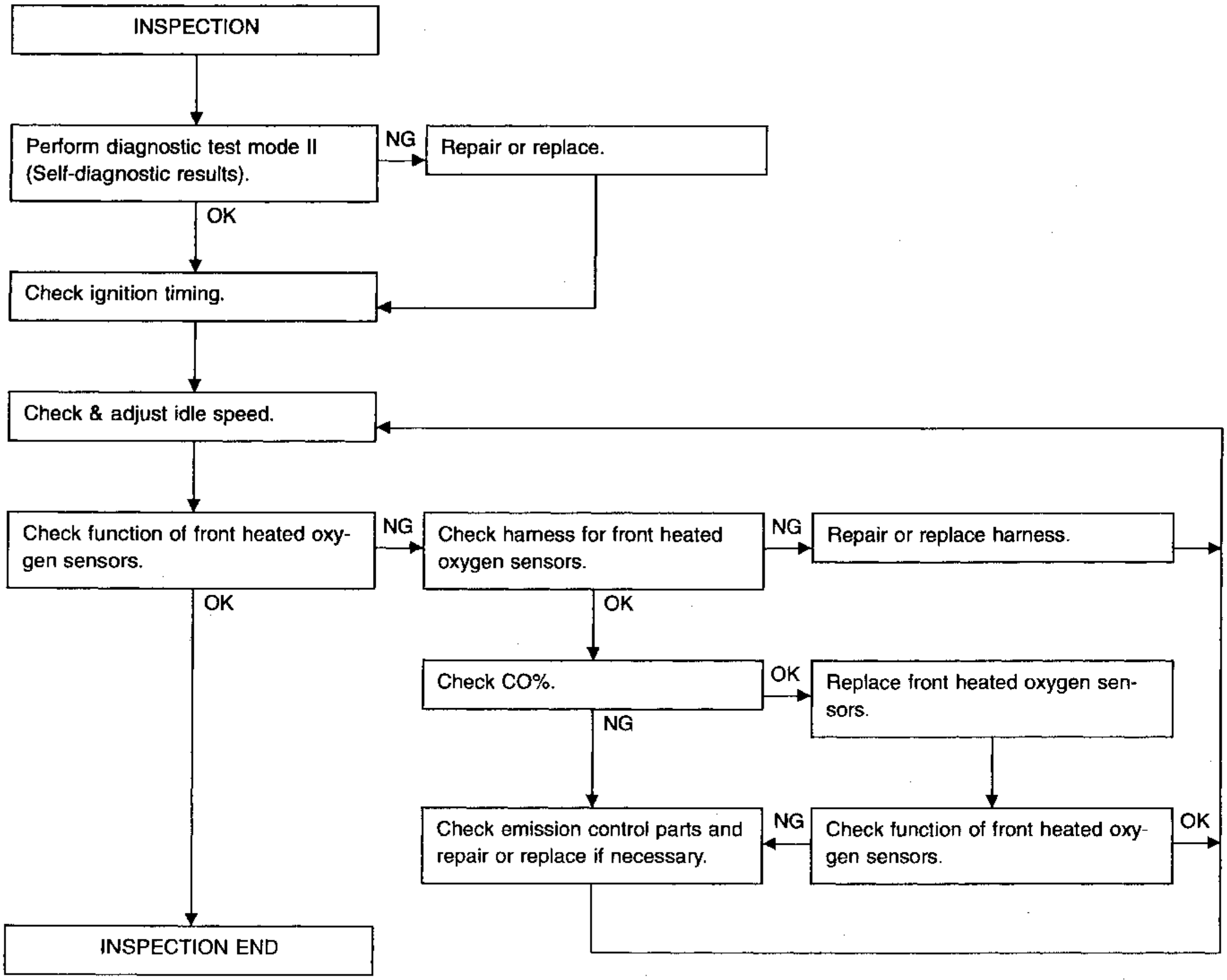
PREPARATION

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

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

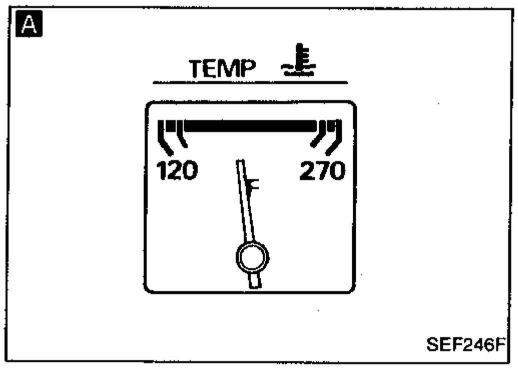
- On air conditioner equipped models, checks should be carried out while the air conditioner is “OFF”.
- When checking idle speed, ignition timing and mixture ratio of A/T models, shift lever to “N” position.
- When measuring “CO” percentage, insert probe more than 40 cm (15.7 in) into tail pipe.
- Turn off headlamps, heater blower, rear defogger.
- Keep front wheels pointed straight ahead.
- Make the check after the cooling fan has stopped.

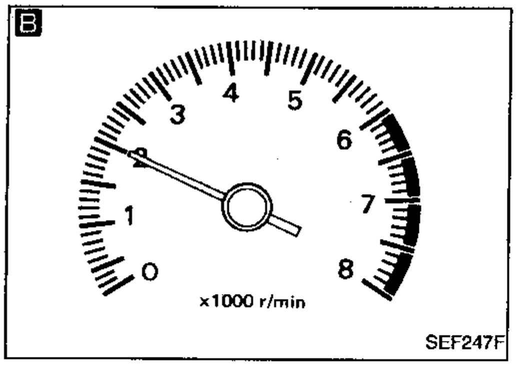
Overall inspection sequence

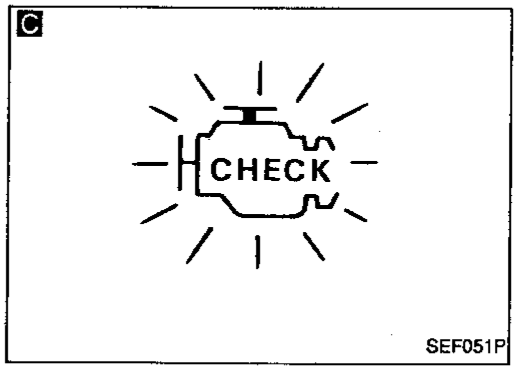


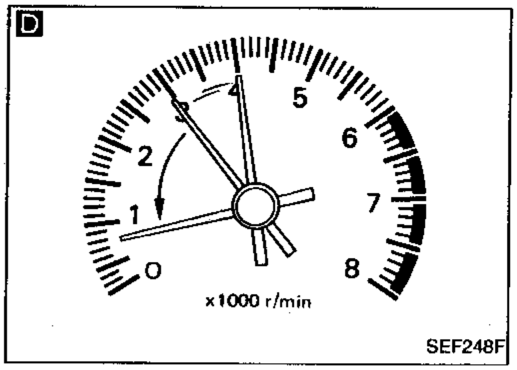
GI
MA
EM
LC
EC
FE
CL
MT
AT
FA
RA
BR
ST
RS
BT
HA
EL
IDX

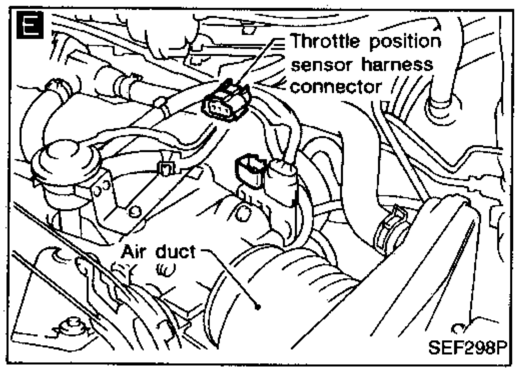
Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment (Cont'd)

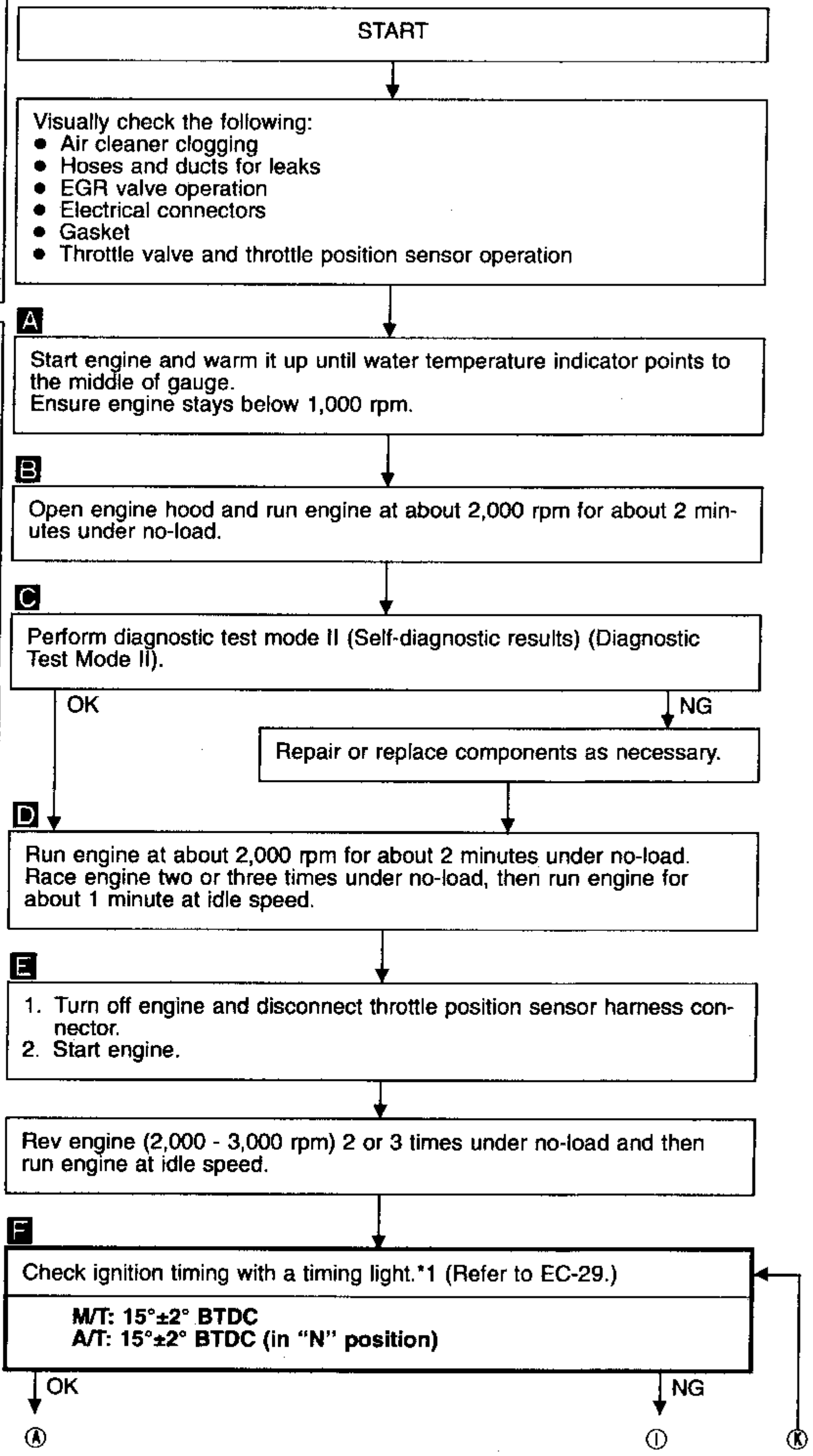












START

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 water 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).

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 two or three times under no-load, then run engine for about 1 minute at idle speed.

E

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

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

F

Check ignition timing with a timing light.*1 (Refer to EC-29.)

M/T: 15°±2° BTDC
A/T: 15°±2° BTDC (in "N" position)

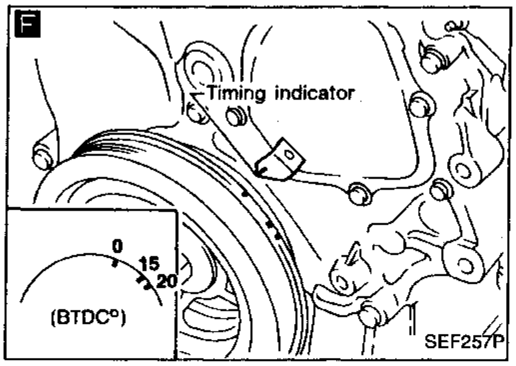
OK → Ⓐ

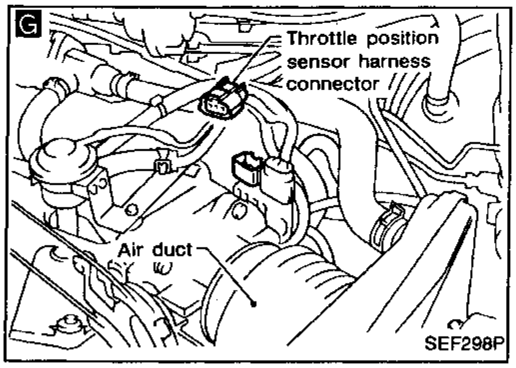
NG → Ⓛ

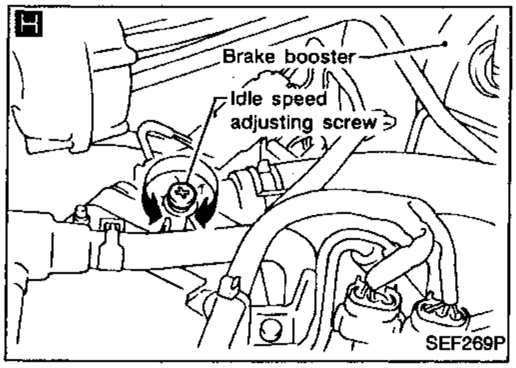
Ⓚ

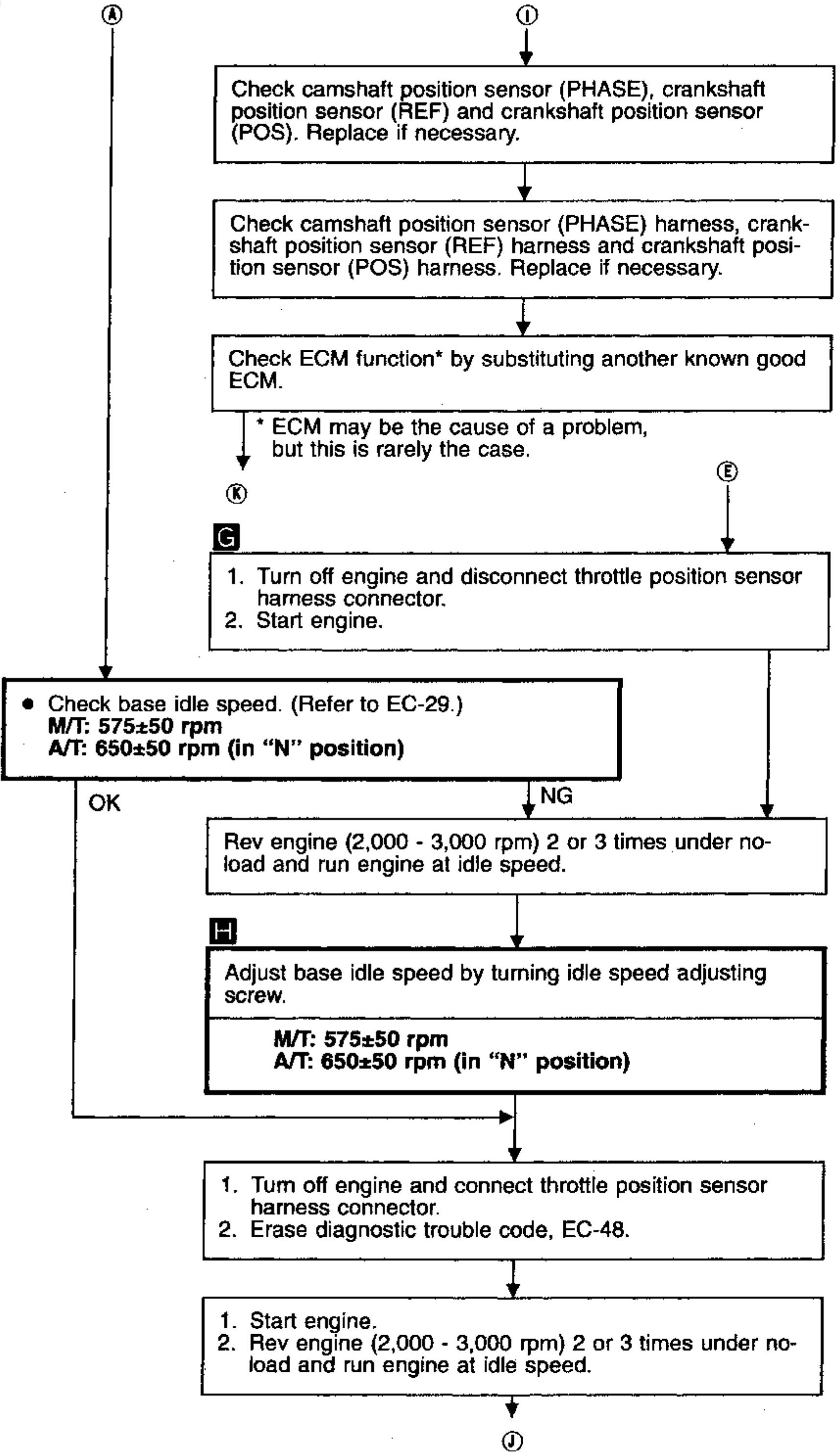
*1: Only check ignition timing as the timing is not adjustable.

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









Ⓐ

Ⓘ

Check camshaft position sensor (PHASE), crankshaft position sensor (REF) and crankshaft position sensor (POS). Replace if necessary.

Check camshaft position sensor (PHASE) harness, crankshaft position sensor (REF) harness and crankshaft position sensor (POS) harness. Replace if necessary.

Check ECM function* by substituting another known good ECM.

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

Ⓚ

Ⓔ

G

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

- Check base idle speed. (Refer to EC-29.)
  M/T: 575±50 rpm
  A/T: 650±50 rpm (in "N" position)

OK

NG

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

H

Adjust base idle speed by turning idle speed adjusting screw.

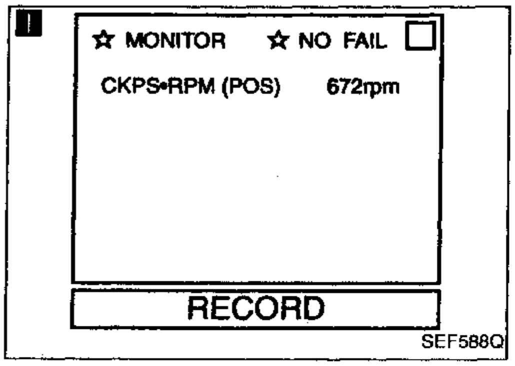
M/T: 575±50 rpm
A/T: 650±50 rpm (in "N" position)

1. Turn off engine and connect throttle position sensor harness connector.
2. Erase diagnostic trouble code, EC-48.

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

Ⓙ

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

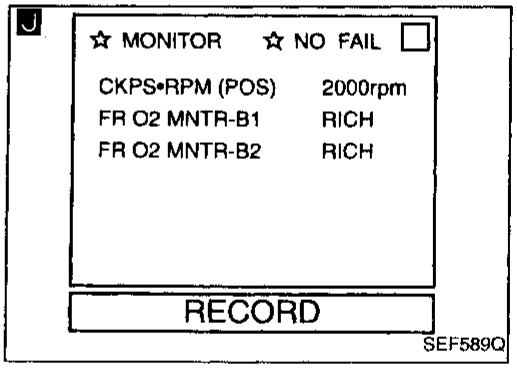


☆ MONITOR ☆ NO FAIL ☐

CKPS•RPM (POS) 672rpm

RECORD

SEF588Q

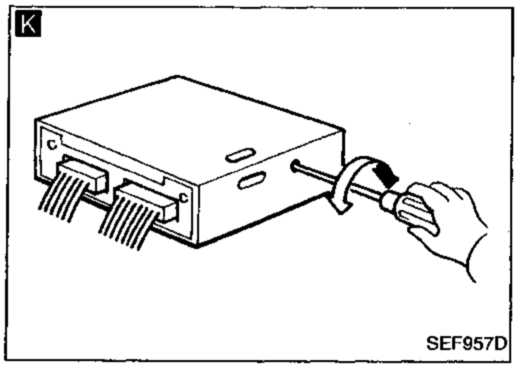


☆ MONITOR ☆ NO FAIL ☐

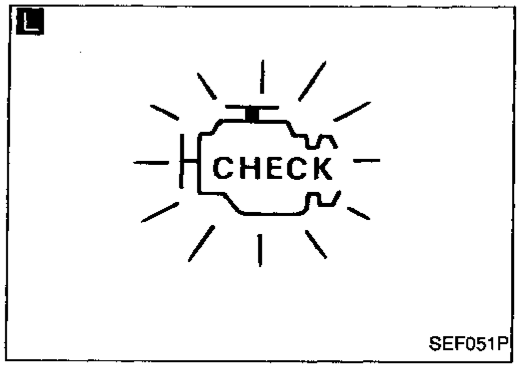
CKPS•RPM (POS)	2000rpm
FR O2 MNTR-B1	RICH
FR O2 MNTR-B2	RICH

RECORD

SEF589Q



SEF957D



SEF051P

Ⓙ

I

Check target idle speed.

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

OR

- Check idle speed.

M/T: 625±50 rpm
A/T: 700±50 rpm (in "N" position)

OK → J K L

NG ↓

Check IACV-AAC valve and replace if necessary.

↓

Check IACV-AAC valve harness and repair if necessary.

↓

Check ECM function* by substituting another known good ECM. → (back to I)

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

J K L

Check front heated oxygen sensor signal (right and left banks).

1. See "FR O2 MNTR-B1" and "FR O2 MNTR-B2" in "Data monitor" mode.
2. Run engine at about 2,000 rpm for about 2 minutes under no-load.
3. Maintain engine at 2,000 rpm under no-load (engine is warmed up sufficiently.). Check that the monitor fluctuates between "LEAN" and "RICH" more than 5 times during 10 seconds.
   1 cycle: RICH → LEAN → RICH
   2 cycles: RICH → LEAN → RICH →LEAN → RICH

OR

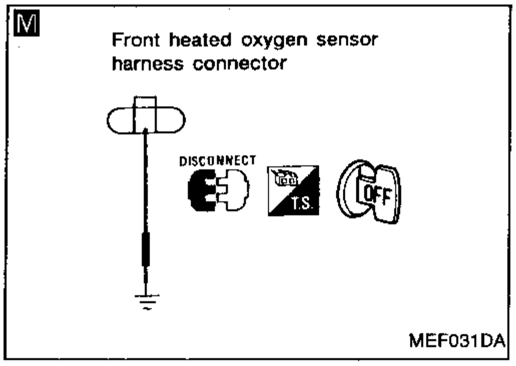
1. Set "Front heated oxygen sensor monitor" in the Diagnostic Test Mode II.
   (See page EC-51.)
2. Run engine at about 2,000 rpm for about 2 minutes under no-load.
3. Maintain engine at 2,000 rpm under no-load. Check that the malfunction indicator lamp comes ON more than 5 times during 10 seconds, for each bank.

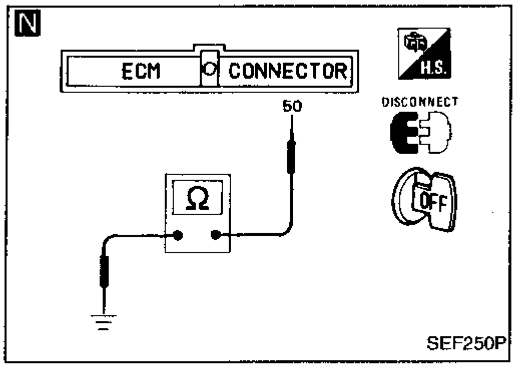
NG → Ⓒ

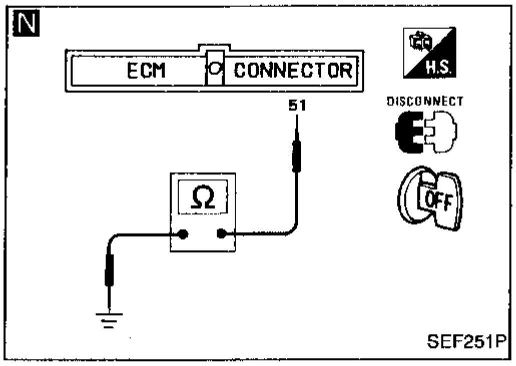
OK ↓

END

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







Ⓒ

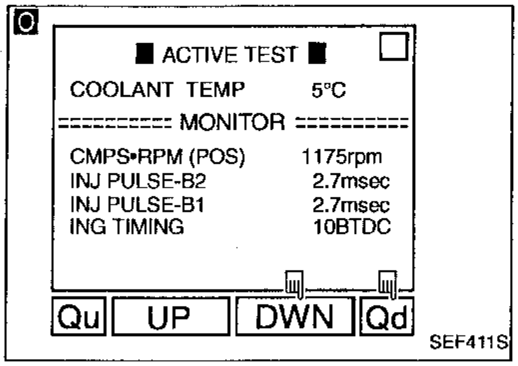
M N

Check front heated oxygen sensor harnesses:
1. Turn off engine and disconnect battery ground cable.
2. Disconnect ECM SMJ harness connector from ECM.
3. Disconnect front heated oxygen sensor harness connectors. Then connect harness side terminals for front heated oxygen sensor to ground with a jumper wire.
4. Check for continuity between terminal No. 50 of ECM SMJ harness connector and body ground.
5. Check for continuity between terminal No. 51 of ECM connector and body ground.

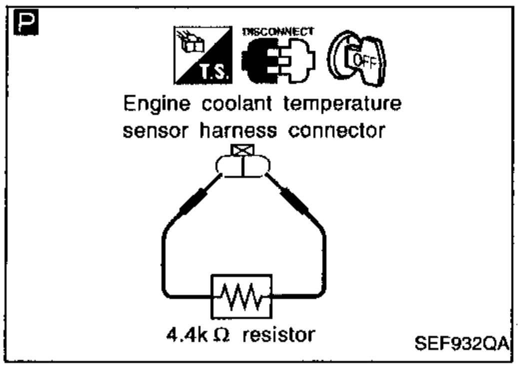
Continuity exists..OK
Continuity does not exist......................................NG

NG: Repair or replace harness. → Ⓔ

OK: Connect ECM SMJ harness connector to ECM.



```
■ ACTIVE TEST ■                ☐
COOLANT TEMP         5°C
========== MONITOR ==========
CMPS•RPM (POS)       1175rpm
INJ PULSE-B2           2.7msec
INJ PULSE-B1           2.7msec
ING TIMING             10BTDC
Qu |  UP  |  DWN  | Qd
```



O P

1. Connect battery ground cable.
2. Select "ENG COOLANT TEMP" in "ACTIVE TEST" mode.
3. Set "COOLANT TEMP" to 5°C (41°F) by touching "Qu" and "Qd" and "UP", "DWN".

OR

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

Q

Start engine and warm it up until water temperature indicator points to middle of gauge.
(Be sure to start engine after installing 4.4 kΩ resistor.)

Ⓓ

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

Ⓓ

R

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

S

Check "CO"%.

Idle CO: 2.2% - 10.8% (with engine running smoothly)

After checking CO%,
Touch "BACK".

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

NG → Ⓕ

OK

Replace front heated oxygen sensor.

T U V

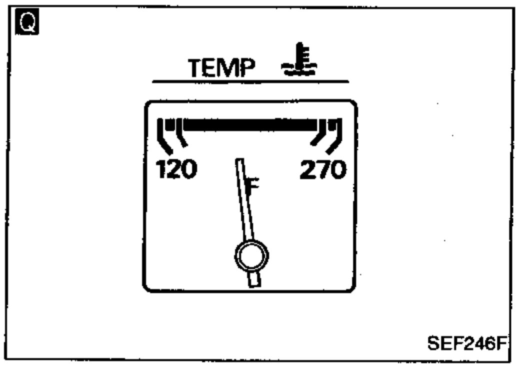
1. See "FR O2 MNTR-B1" and "FR O2 MNTR-B2" in "Data monitor" mode.
2. Maintain engine at 2,000 rpm under no-load (engine is warmed up sufficiently.). Check that the monitor fluctuates between "LEAN" and "RICH" more than 5 times during 10 seconds.
   1 cycle: RICH → LEAN → RICH
   2 cycles: RICH → LEAN → RICH →LEAN → RICH

OR

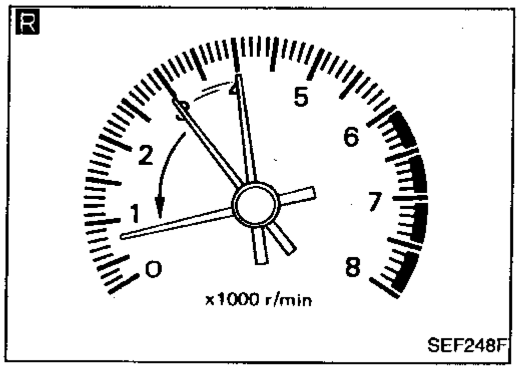
1. Set "Front heated oxygen sensor monitor" in the Diagnostic Test Mode II. (See page EC-51.)
2. Maintain engine at 2,000 rpm under no-load. Check that the malfunction indicator lamp comes ON more than 5 times during 10 seconds.

NG → Ⓕ

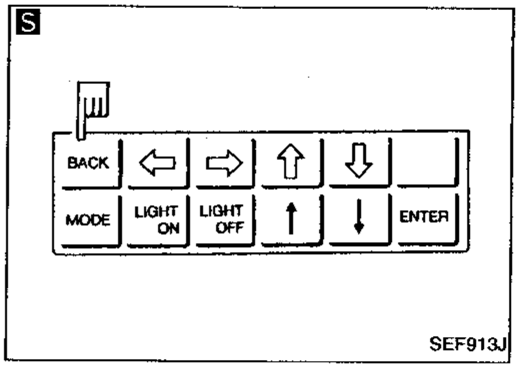
OK → Ⓔ



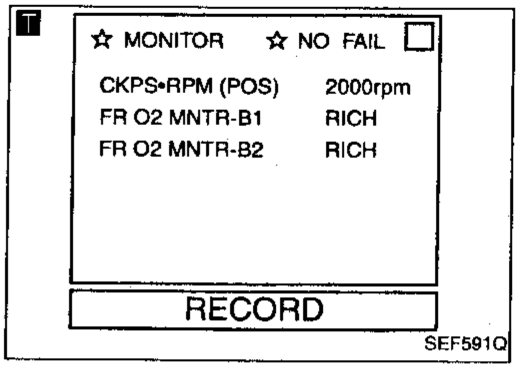
SEF246F



SEF248F



SEF913J

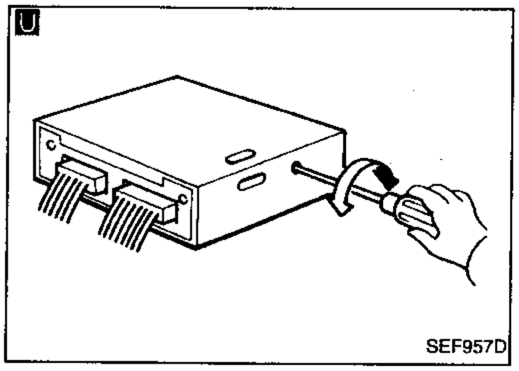


☆ MONITOR ☆ NO FAIL ☐

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

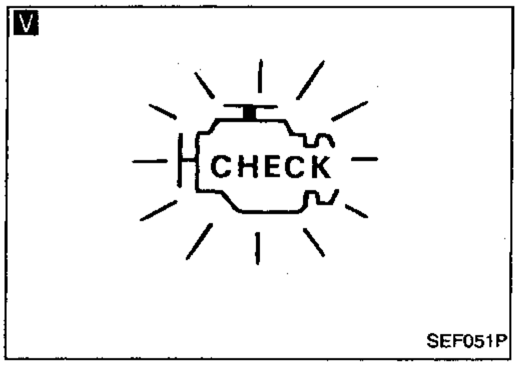
RECORD

SEF591Q



SEF957D

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



Ⓕ

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

↓

Check fuel pressure regulator.
(See page EC-26.)

↓

Check mass air flow sensor and its circuit.
Refer to TROUBLE DIAGNOSIS FOR DTC P0100.
(See page EC-103.)

↓

Check injector and its circuit.
Refer to TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS.
(See page EC-352.)
Clean or replace if necessary.

↓

Check engine coolant temperature sensor and its circuit. Refer to TROUBLE DIAGNOSIS FOR DTC P0115, P0125.
(See pages EC-122, 132.)

↓

Check ECM function*2 by substituting another known good ECM.

↓

Ⓔ

*2: 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 engine system malfunctions related to sensors or actuators. The ECM also has a memory function which detects various emission-related diagnostic information. This includes:

- 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

These data can be verified 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-81.).

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 simultaneously 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-81.)		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 after the ECM memory is cleared. When the self-diagnosis results in "NG" for the 1st trip, the 1st trip DTC is stored in the ECM memory. If the self-diagnosis results in "OK" for the 2nd trip, the 1st trip DTC will be cleared from the ECM memory. If, on the other hand, the self-diagnosis results in "NG" for the 2nd trip, both the DTC and the 1st trip DTC will be stored in the ECM memory and the MIL will illuminate. In other words, the DTC is stored in the ECM memory and the MIL illuminates when the self-diagnosis results in "NG" in two consecutive trips. If a non-diagnostic operation (For example: Driving pattern A. Refer to EC-54.) is performed between the 1st and 2nd trips, only the 1st trip DTC will continue to be stored in the ECM memory. For items whose diagnosis results in "NG" after only one trip (the MIL illuminates), both the DTC and the 1st trip DTC will be stored in the ECM memory.

The 1st trip DTC, along with the DTC, is cleared from the ECM memory in a method outlined later. (Refer to EC-48.) For items whose 1st trip DTCs are displayed, refer to EC-46. These items are prescribed by legal regulations to continuously monitored system/components. However, other items also can be displayed on the CONSULT screen or with the ECM set in Diagnostic Test Mode II (Self-diagnostic results).

1st trip DTC detection is performed without causing the MIL to light up. This does not warn the driver of a problem. Also, the result of the 1st trip DTC detection does not bring the vehicle owner any disadvantage when the vehicle is taken in for the I/M test. When the 1st trip DTC is detected, Nissan first clears it and then tries to perform "DTC confirmation procedure" or "Overall function check" to analyze the problem. If the problem is duplicated, Nissan determines the problem as a malfunctioning item, requiring repair.

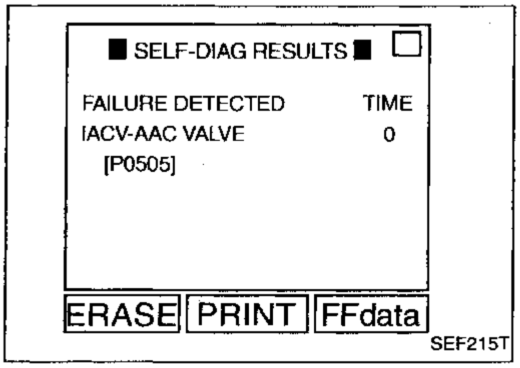
The 1st trip DTC is specified in Mode 7 of SAE J1979.

How to read DTC and 1st trip DTC

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

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.
   (CONSULT also displays the malfunctioning component or system.)

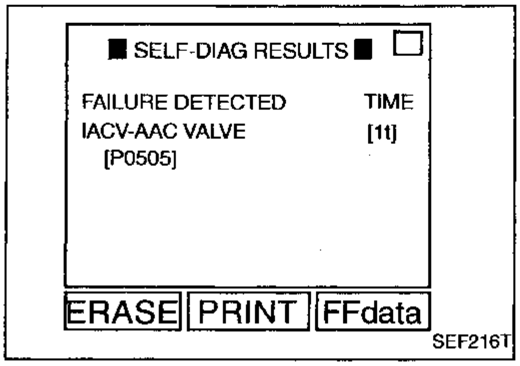
- **1st trip DTC No. is the same as DTC No.**
- **Output of the diagnostic trouble code indicates that the indicated circuit has a malfunction. However, in case of the Mode II and GST they do not indicate whether the malfunction is still occurring or occurred in the past and returned to normal.**
  CONSULT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



FAILURE DETECTED TIME
IACV-AAC VALVE 0
[P0505]

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".



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

SEF216T

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

FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA

The ECM has a memory function, which stores the driving condition 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 the ECM detects a malfunction.

Data which are stored in the ECM memory, along with the 1st trip DTC, are called 1st trip freeze frame data, and 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 detail, refer to EC-62.

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 (0209), P0175 (0210)
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 1st 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. If data already stored in the ECM memory and data which occurs later have the same priority, the preceding freeze frame data remains unchanged in the ECM memory. 1st trip freeze frame data is replaced by the most recent data. Both the freeze frame data and 1st trip freeze frame data are cleared from the ECM memory, along with DTC using procedures explained later. (Refer to EC-48.)

SYSTEM READINESS TEST (SRT) CODE

System Readiness Test (SRT) code 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 diagnosis has been performed two or more times. This occurs regardless of whether the diagnosis results in "OK" or "NG", and whether or not the diagnosis is performed in consecutive trips. The table below lists the five SRT items (9 diagnoses) for the ECCS used in A32 models.

SRT items	Self-diagnostic test items
Catalyst monitoring	• Three way catalyst function P0420 (0702)
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 P0130 (0503), P0150 (0303) • Rear heated oxygen sensor P0136 (0707), P0156 (0708)
Oxygen sensor heater monitoring	• Front heated oxygen sensor heater P0135 (0901), P0155 (1001) • Rear heated oxygen sensor heater P0141 (0902), P0161 (1002)
EGR system monitoring	• EGR function P0400 (0302) • EGRC-BPT valve function P0402 (0306)

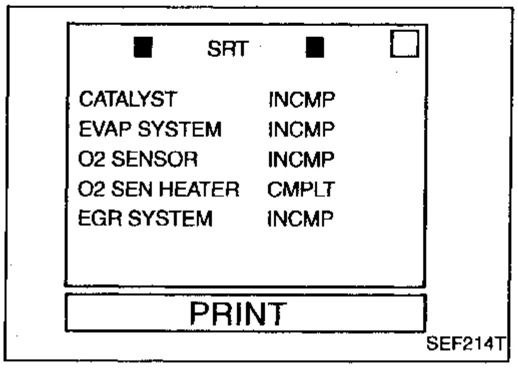
Together with the DTC, the SRT code is cleared from the ECM memory using the method described later (Refer to EC-48). This means that after ECCS components/system are repaired or after battery terminals remain disconnected for more than 24 hours, all SRT codes are possibly cleared from the ECM memory.

Emission-related Diagnostic Information (Cont'd)

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)



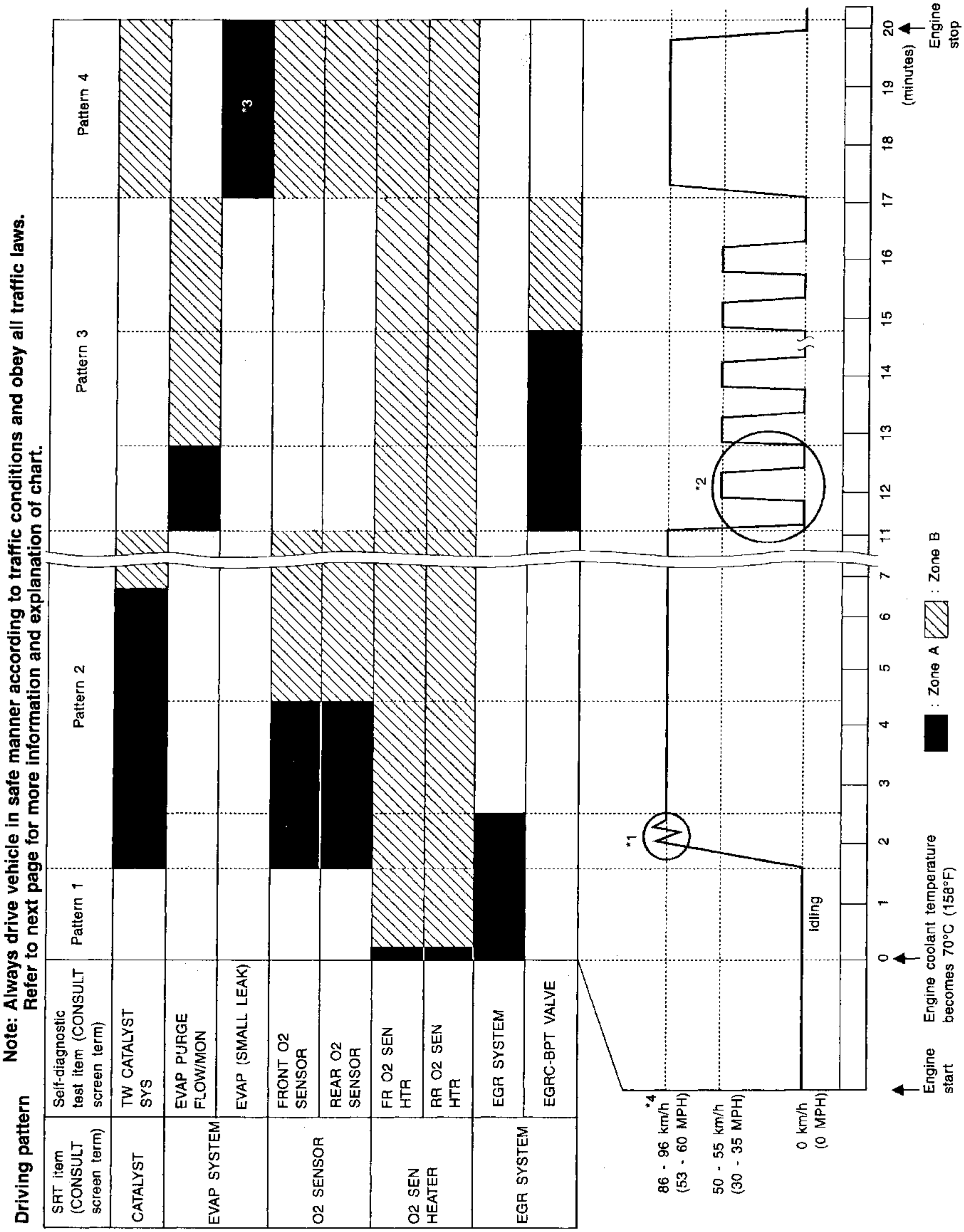
CATALYST	INCMP
EVAP SYSTEM	INCMP
O2 SENSOR	INCMP
O2 SEN HEATER	CMPLT
EGR SYSTEM	INCMP

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, all diagnoses 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. This type of driving pattern should be performed two times or more to set all SRT codes.

Emission-related Diagnostic Information (Cont'd)



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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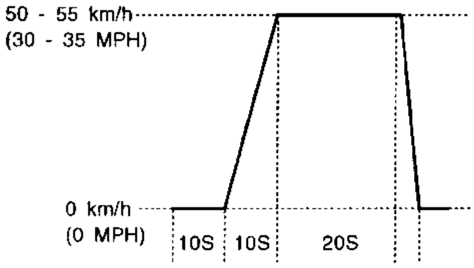
Emission-related Diagnostic Information (Cont'd)

*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.



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*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.

- 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 is 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 20°C (14 to 68°F) (where the voltage between the ECM terminals (59) and ㊸ is 3.5 - 4.4V).
- 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 (59) and ㊸ 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.

Suggested transmission gear position for A/T models.

Set the selector lever in the "D" position with the overdrive on-off switch turned on.

Suggested upshift speeds for M/T models

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

For normal acceleration in low altitude areas [less than 1,219 m (4,000 ft)]:

Gear change	ACCEL shift point km/h (MPH)	CRUISE shift point km/h (MPH)
1st to 2nd	21 (13)	21 (13)
2nd to 3rd	37 (23)	25 (16)
3rd to 4th	53 (33)	44 (27)
4th to 5th	63 (39)	58 (36)

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

Gear change	km/h (MPH)
1st to 2nd	24 (15)
2nd to 3rd	40 (25)
3rd to 4th	64 (40)
4th to 5th	72 (45)

Suggested maximum speed in each gear

Downshift to a lower gear if the engine is not running smoothly, or if you need to accelerate.

Do not exceed the maximum suggested speed (shown below) in any gear. For level road driving, use the highest gear suggested for that speed. Always observe posted speed limits, and drive according to the road conditions, which will 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 test value is a parameter used to determine whether diagnostic test is "OK" or "NG" while the ECM is monitored during self-diagnosis. The test limit is a reference value which is specified as the maximum or minimum value and is compared with the test value being monitored.
Items for which these data (test value and test limit) are displayed are the same as SRT code items (11 diagnoses).
These data (test value and test limit) are specified by Test ID (TID) and Component ID (CID). These data 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	01H	01H	Parameter 1	Max.	○
		03H	81H	Parameter 2	Min.	○
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	Min.	○
		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	Min.	○
		14H	05H	Parameter 4	Max.	○
		15H	05H	Parameter 5	Max.	○
	Rear heated oxygen sensor	19H	86H	Parameter 6	Min.	○
		1AH	86H	Parameter 7	Min.	○
		1BH	06H	Parameter 8	Max.	○
		1CH	06H	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	2DH	0AH	Parameter 1	Max.	○
		2EH	8AH	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	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-103
ABSOL PRESS SENSOR	P0105	0803	—	—	X	EC-109
INT AIR TEMP SEN	P0110	0401	—	—	X	EC-116
COOLANT TEMP SEN	P0115	0103	—	—	X	EC-122
THROTTLE POSI SEN	P0120	0403	—	—	X	EC-126
*COOLANT TEMP SEN	P0125	0908	—	—	X	EC-132
CLOSED LOOP-B1	P0130	0307	—	—	X	EC-137
FRONT O2 SENSOR-B1	P0130	0503	X	X	X*3	EC-139
FR O2 SEN HTR-B1	P0135	0901	X	X	X*3	EC-144
REAR O2 SENSOR	P0136	0707	X	X	X*3	EC-148
RR O2 SEN HTR	P0141	0902	X	X	X*3	EC-153
CLOSED LOOP-B2	P0150	0308	—	—	X	EC-137
FRONT O2 SENSOR-B2	P0150	0303	X	X	X*3	EC-158
FR O2 SEN HTR-B2	P0155	1001	X	X	X*3	EC-164
FUEL SYS LEAN/BK1	P0171	0115	—	—	X	EC-168
FUEL SYS RICH/BK1	P0172	0114	—	—	X	EC-173
FUEL SYS LEAN/BK2	P0174	0210	—	—	X	EC-178
FUEL SYS RICH/BK2	P0175	0209	—	—	X	EC-183
TANK FUEL TEMP SENSOR	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 (POS)	P0335	0802	—	—	X	EC-198
CAM POS SEN (PHASE)	P0340	0101	—	—	X	EC-204
EGR SYSTEM	P0400	0302	X	X	X*3	EC-209
EGRC-BPT VALVE	P0402	0306	X	X	X*3	EC-219
TW CATALYST SYS	P0420	0702	X	X	X*3	EC-221

*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	1st trip DTC	Reference page
	CONSULT GST*2	ECM*1				
EVAP (SMALL LEAK)	P0440	0705	X	X	X*3	EC-224
PURG CONT/V & S/V	P0443	0807	—	—	X	EC-232
VENT CONTROL VALVE	P0446	0903	—	—	X	EC-240
EVAP SYS PRES SEN	P0450	0704	—	—	X	EC-245
VEHICLE SPEED SEN	P0500	0104	—	—	X	EC-250
IACV-AAC VALVE	P0505	0205	—	—	X	EC-254
CLOSED THRL POS SW	P0510	0203	—	—	X	EC-260
A/T COMM LINE	P0600	—	—	—	—	EC-264
ECM	P0605	0301	—	—	X	EC-268
PARK/NEUT POSI SW	P0705	1003	—	—	X	EC-270
INHIBITOR SWITCH	P0705	1101	—	—	X	AT section
FLUID TEMP SENSOR	P0710	1208	—	—	X	AT section
VHCL SPEED SEN A/T	P0720	1102	—	—	X	AT section
ENGINE SPEED SIG	P0725	1207	—	—	X	AT section
A/T 1ST SIGNAL	P0731	1103	—	—	X	AT section
A/T 2ND SIGNAL	P0732	1104	—	—	X	AT section
A/T 3RD SIGNAL	P0733	1105	—	—	X	AT section
A/T 4TH SIG OR TCC	P0734	1106	—	—	X	AT section
TOR CONV CLUTCH SV	P0740	1204	—	—	X	AT section
A/T TCC SIGNAL	P0744	1107	—	—	X	AT section
LINE PRESSURE S/V	P0745	1205	—	—	X	AT section
SHIFT SOLENOID/V A	P0750	1108	—	—	X	AT section
SHIFT SOLENOID/V B	P0755	1201	—	—	X	AT section
MAP/BARO SW SOL/V	P1105	1302	—	—	X	EC-275
FPCM	P1220	1305	—	—	X	EC-281
IGN SIGNAL-PRIMARY	P1320	0201	—	—	X	EC-288
CRANK POS SEN (REF)	P1335	0407	—	—	X	EC-296
CRANK P/S (POS) COG	P1336	0905	—	—	X	EC-301
EGRC SOLENOID/V	P1400	1005	—	—	X	EC-307
EGR TEMP SENSOR	P1401	0305	—	—	X	EC-312
VC/V BYPASS/V	P1441	0801	—	—	X	EC-316
PURG VOLUME CONT/V	P1445	1008	—	—	X	EC-322
EVAP PURG FLOW/MON	P1447	0111	X	X	X*3	EC-329
A/T DIAG COMM LINE	P1605	0804	—	—	X	EC-336
THRTL POSI SEN A/T	P1705	1206	—	—	X	AT section
OVERRUN CLUTCH S/V	P1760	1203	—	—	X	AT section

*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-51.)

- **If the battery terminal is disconnected, the emission-related diagnostic information will be lost within 24 hours.**
- **When you erase 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 from the ECM memory in the mode obtained.

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.

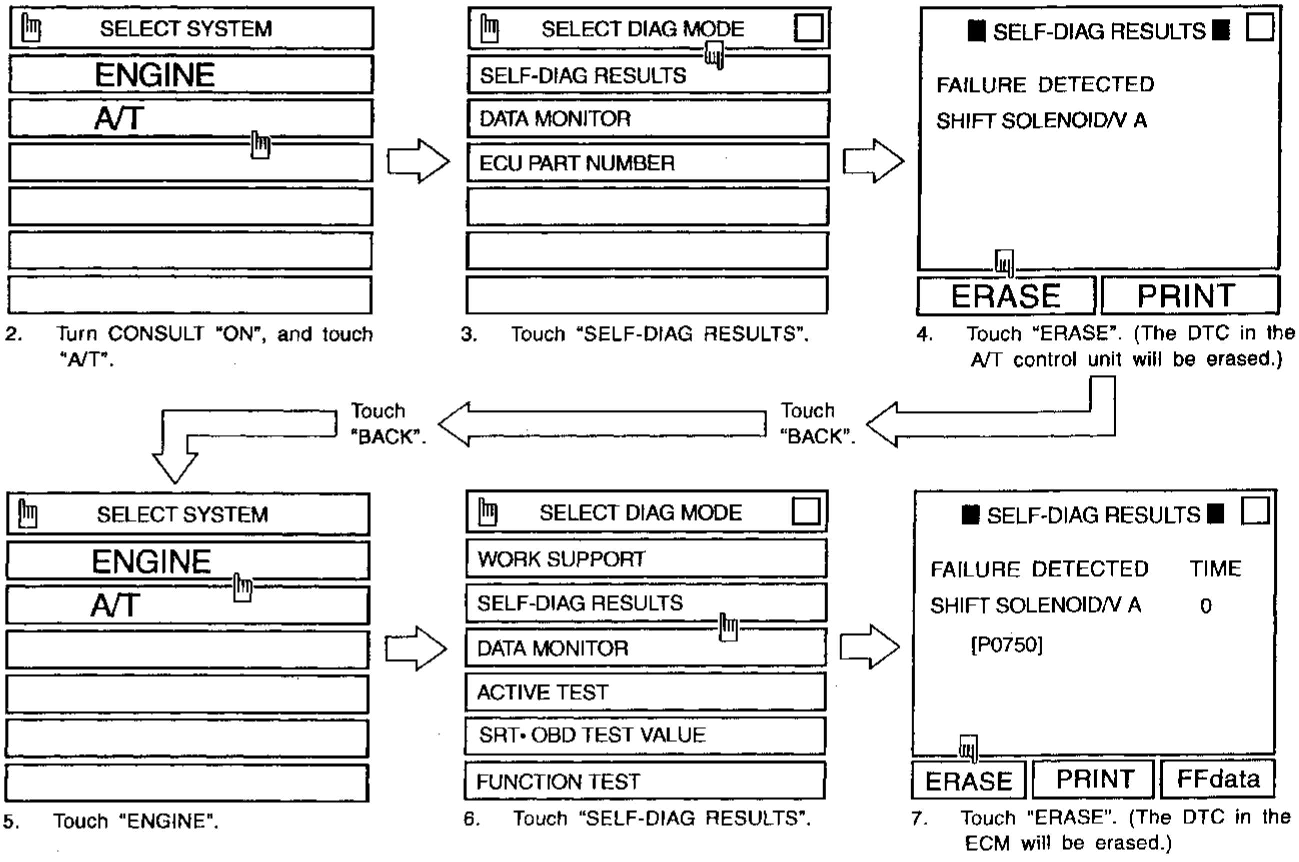
1. If the ignition switch stays "ON" after repair work, be sure to turn ignition switch "OFF" once. Wait at least 5 seconds and then turn it "ON" (engine stopped) again.
2. Turn CONSULT "ON" and touch "A/T".
3. Touch "SELF-DIAG RESULTS".
4. Touch "ERASE". (The DTC in the A/T control unit will be erased.)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



FAILURE DETECTED
SHIFT SOLENOID/V A

FAILURE DETECTED	TIME
SHIFT SOLENOID/V A [P0750]	0

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)

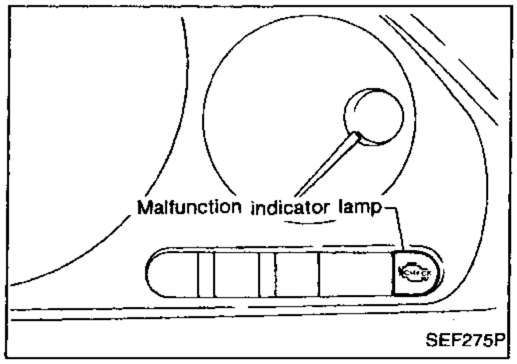
Note: If the diagnostic trouble code is not for A/T related items (see EC-2), skip step 2.

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-51.)



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 for checking the blown lamp.
- If the malfunction indicator lamp does not light up, see the WARNING LAMPS AND CHIME (BUZZER) in the EL section. (Or see EC-378.)
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 bulb for damage (blown, open circuit, etc.) of the malfunction indicator lamp.
   - **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 (2 trip detection logic), the malfunction indicator lamp will light up to inform the driver that a malfunction has been detected.
   Only the following malfunctions will light up or blink the MIL even in the 1st trip.
   - "Misfire (possible three way catalyst damage)"
   - "Closed loop control"
   - "Fail-safe mode" [except for crankshaft position sensor (REF) circuit]

Diagnostic Test Mode II

1. SELF-DIAGNOSTIC RESULTS : By using this function, the diagnostic trouble codes can be read.
2. FRONT HEATED OXYGEN SENSOR MONITOR : In this mode, the fuel mixture condition (lean or rich) monitored by front heated oxygen sensor can be read.

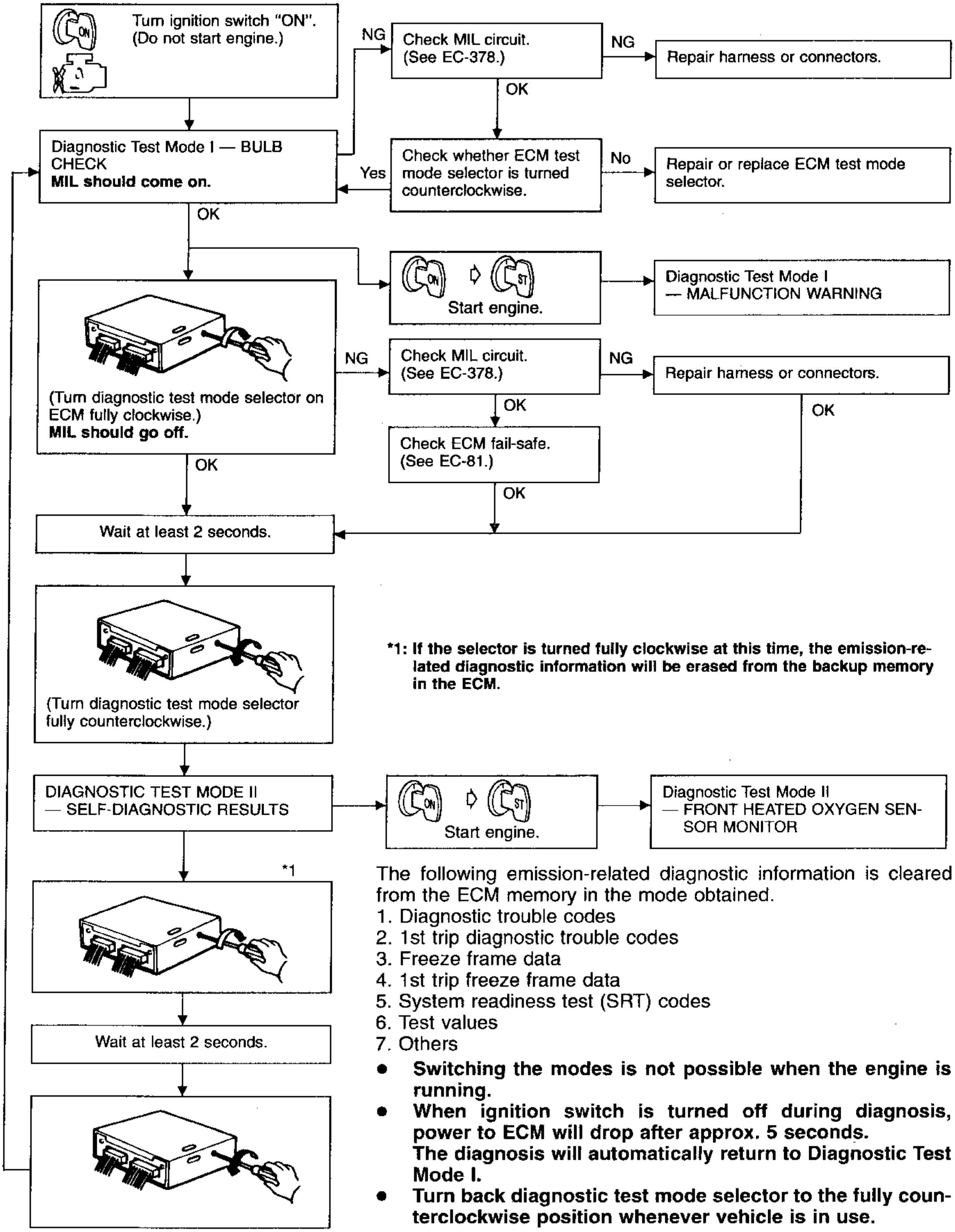
MIL flashing without DTC

If 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. (See next page.)

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 emission-related diagnostic information will be erased from the backup memory in the ECM.**

The following emission-related diagnostic information is cleared from the ECM memory in the mode obtained.

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.**

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

Malfunction Indicator Lamp (MIL) (Cont'd)

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 WARNING LAMPS AND CHIME in EL section or see EC-378.)

DIAGNOSTIC TEST MODE I—MALFUNCTION WARNING

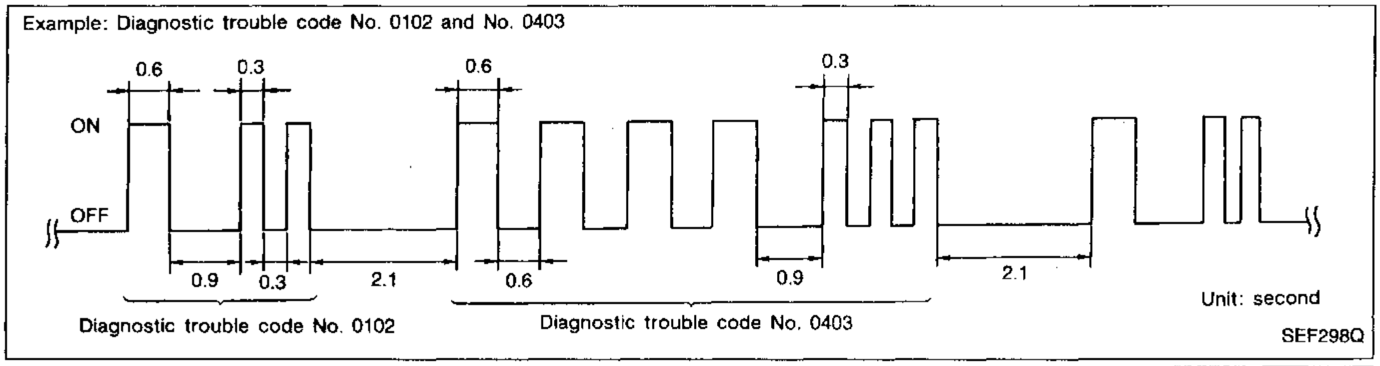
MALFUNCTION INDICATOR LAMP	Condition
ON	When the malfunction is detected or the ECM's CPU is malfunctioning.
OFF	No malfunction

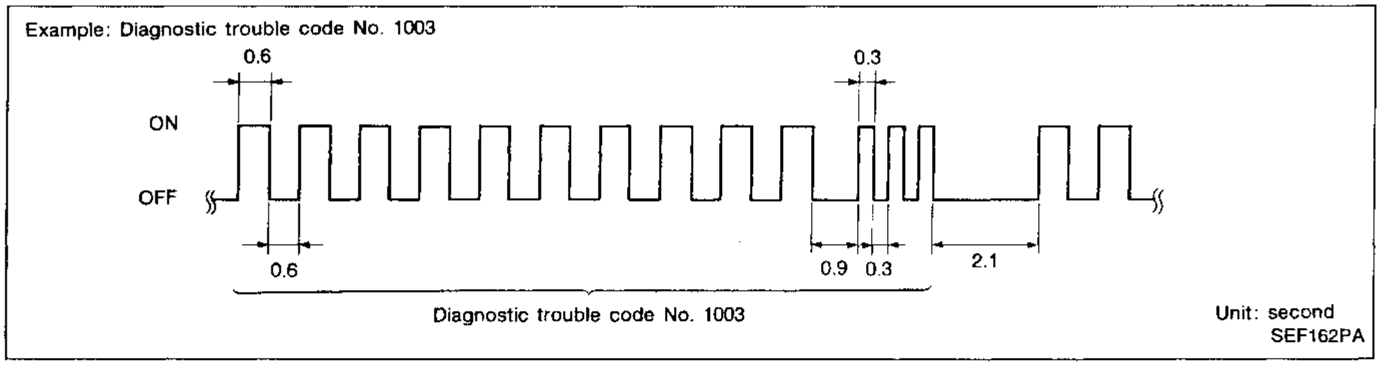
- These Diagnostic Trouble Code Numbers are clarified in Diagnostic Test Mode II (SELF-DIAGNOSTIC RESULTS).

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 × 10 times) and then it blinks three times for about 1 second (0.3 sec × 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 INDEX, refer to 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 terminal is disconnected, the diagnostic trouble code will be lost from the backup memory within 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

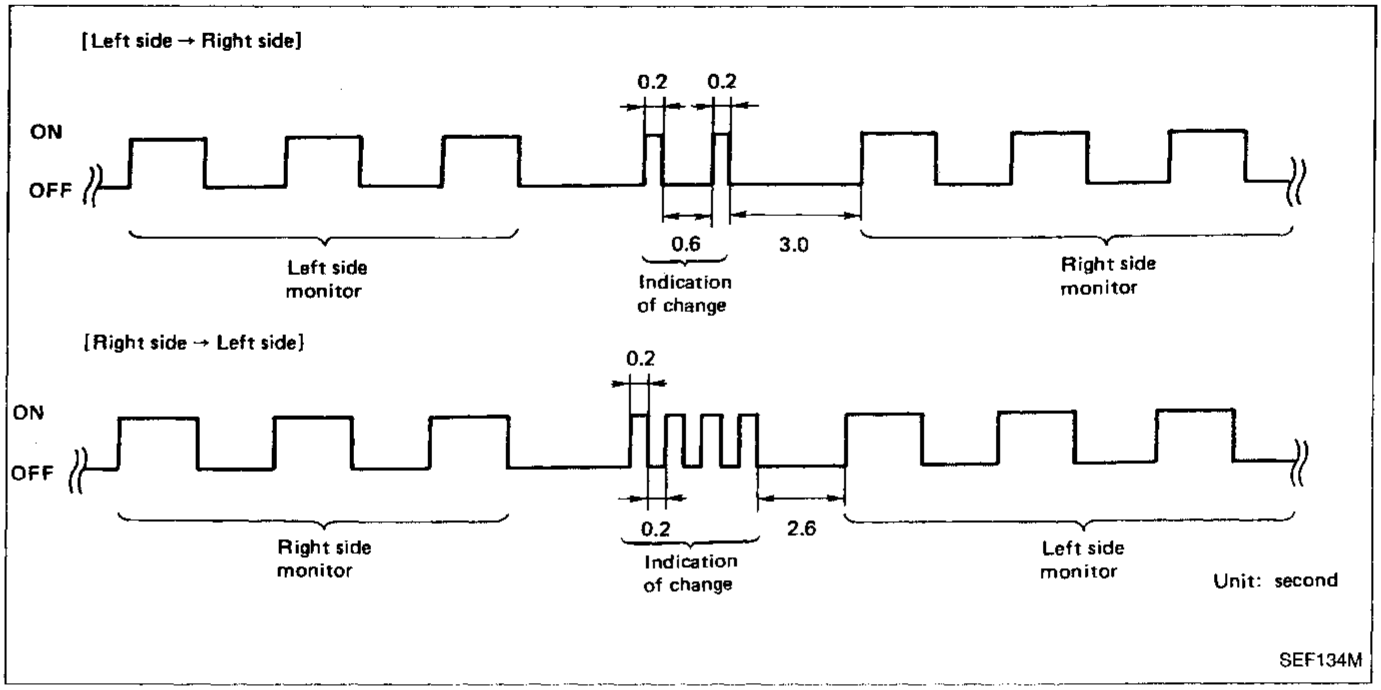
*: Maintains conditions just before switching to open loop.

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.

How to switch monitored sensor from left bank to right bank or vice versa

- **The following procedure should be performed while the engine is running.**

1. Turn diagnostic test mode selector on ECM fully clockwise.
2. Wait at least 2 seconds.
3. Turn diagnostic test mode selector on ECM fully counterclockwise.



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-38.
- 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 MIL will remain on until the vehicle is driven (in the recorded driving pattern) 3 times with no malfunction.
- The DTC and the freeze frame data can be displayed until the vehicle is driven 40 times (except for Misfire and Fuel Injection System). For Misfire and Fuel Injection System, the DTC and freeze frame data can be displayed until the vehicle is driven 80 times. The "TIME" IN "SELF-DIAGNOSTIC RESULTS" mode of CONSULT will count in response to the number of times the vehicle is driven.
- The 1st trip DTC is not displayed when the following conditions are met.

i) The self-diagnosis results in "OK" for the 2nd trip.

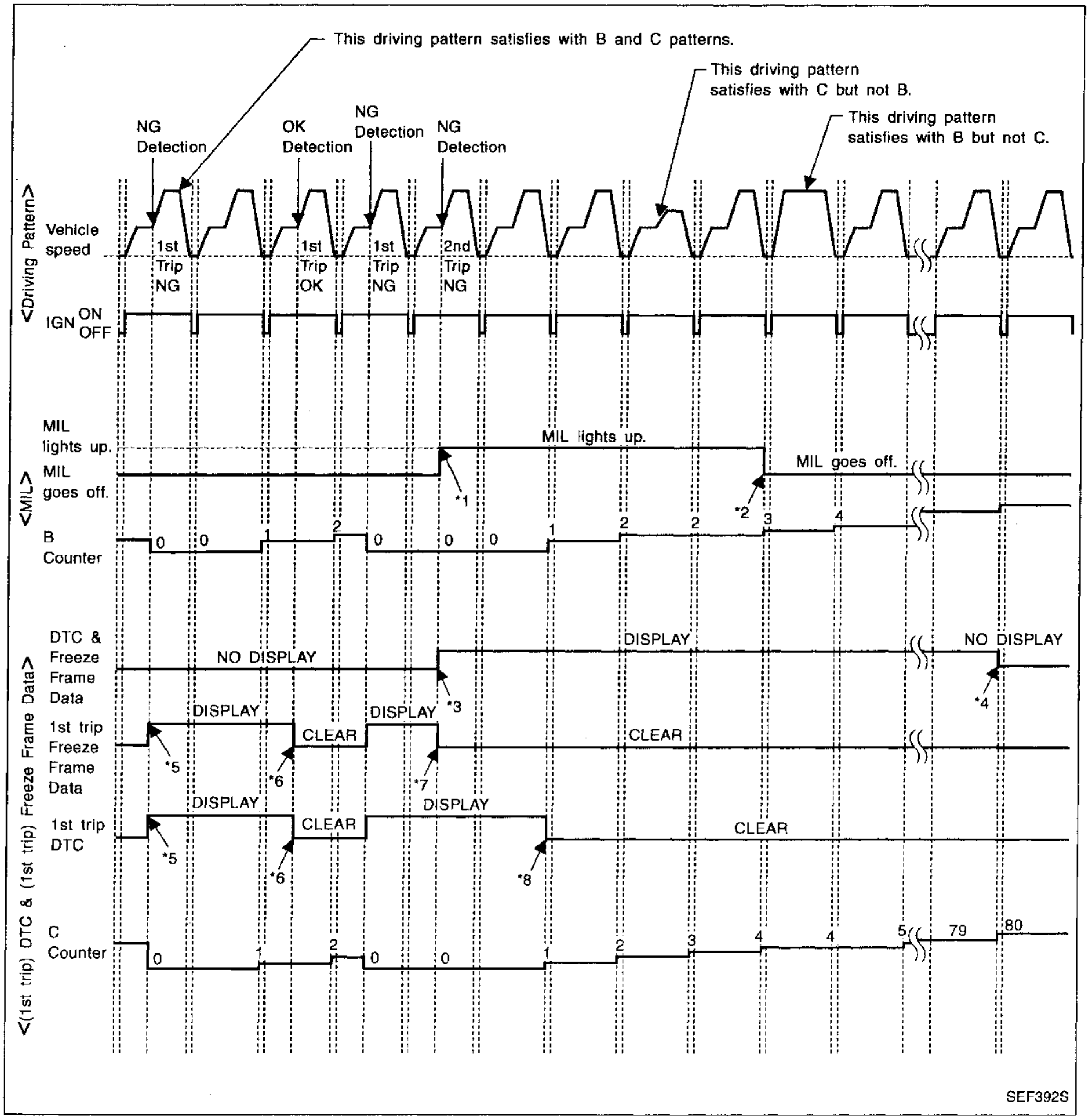
SUMMARY CHART

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-56.
*1: Clear timing is at the moment OK is detected.
*2: Clear timing is when the same malfunction is detected in the 2nd trip.

OBD System Operation Chart (Cont'd)

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



SEF392S

*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 a time (pattern C) without the same malfunction after DTC is stored in ECM.

OBD System Operation Chart (Cont'd)

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 reset when the malfunction is detected twice regardless of the driving pattern.
- The B counter will count up when driving pattern B is satisfied without the 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:

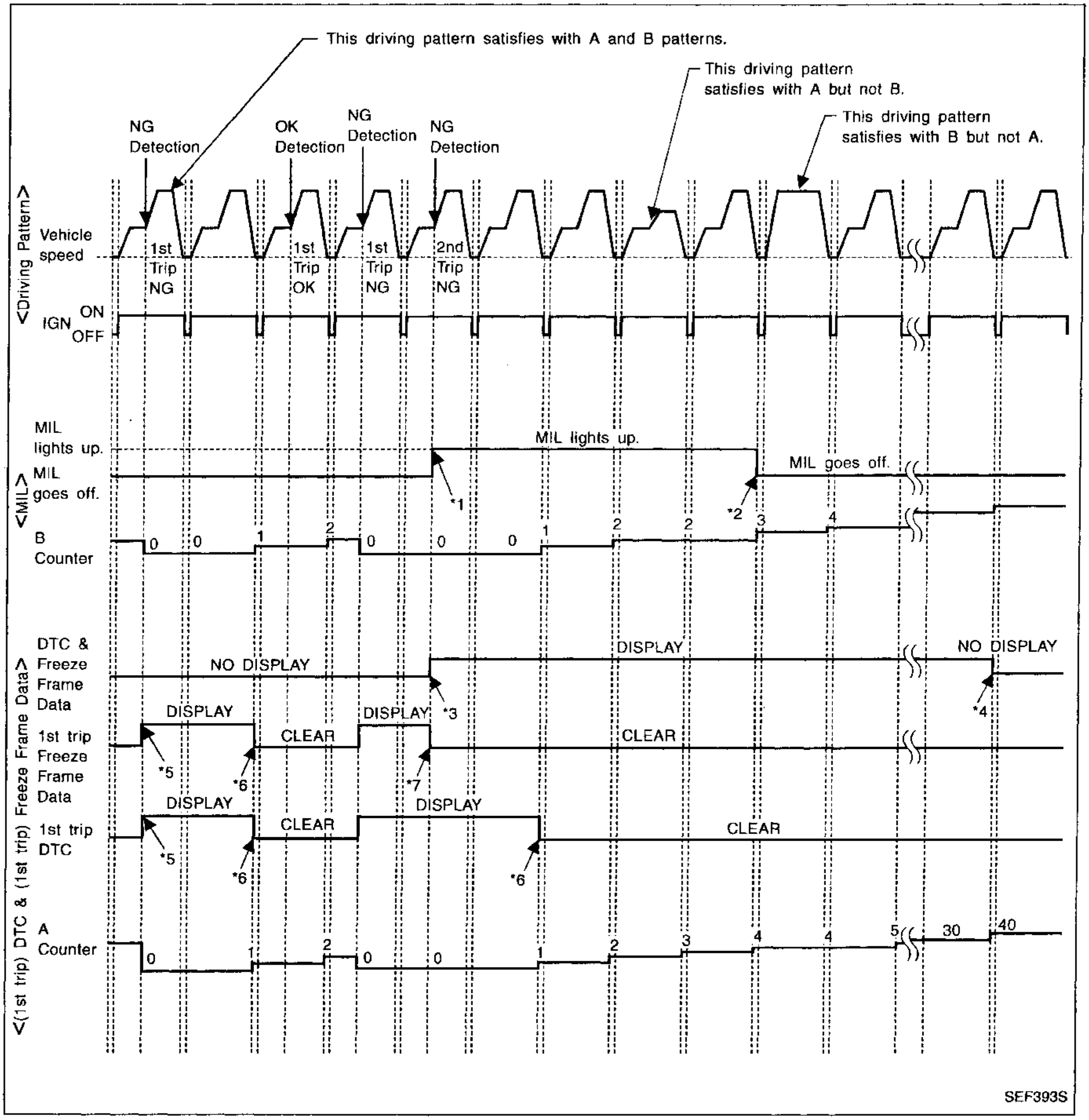
- When the freeze frame data shows lower than 70°C (158°F), "T" should be lower than 70°C (158°F).
- When the freeze frame data shows higher than or equal to 70°C (158°F), "T" should be higher than or equal to 70°C (158°F).

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 a time without the same malfunction after DTC is stored in ECM.

OBD System Operation Chart (Cont'd)

RELATIONSHIP BETWEEN MIL, DTC, CONSULT 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.

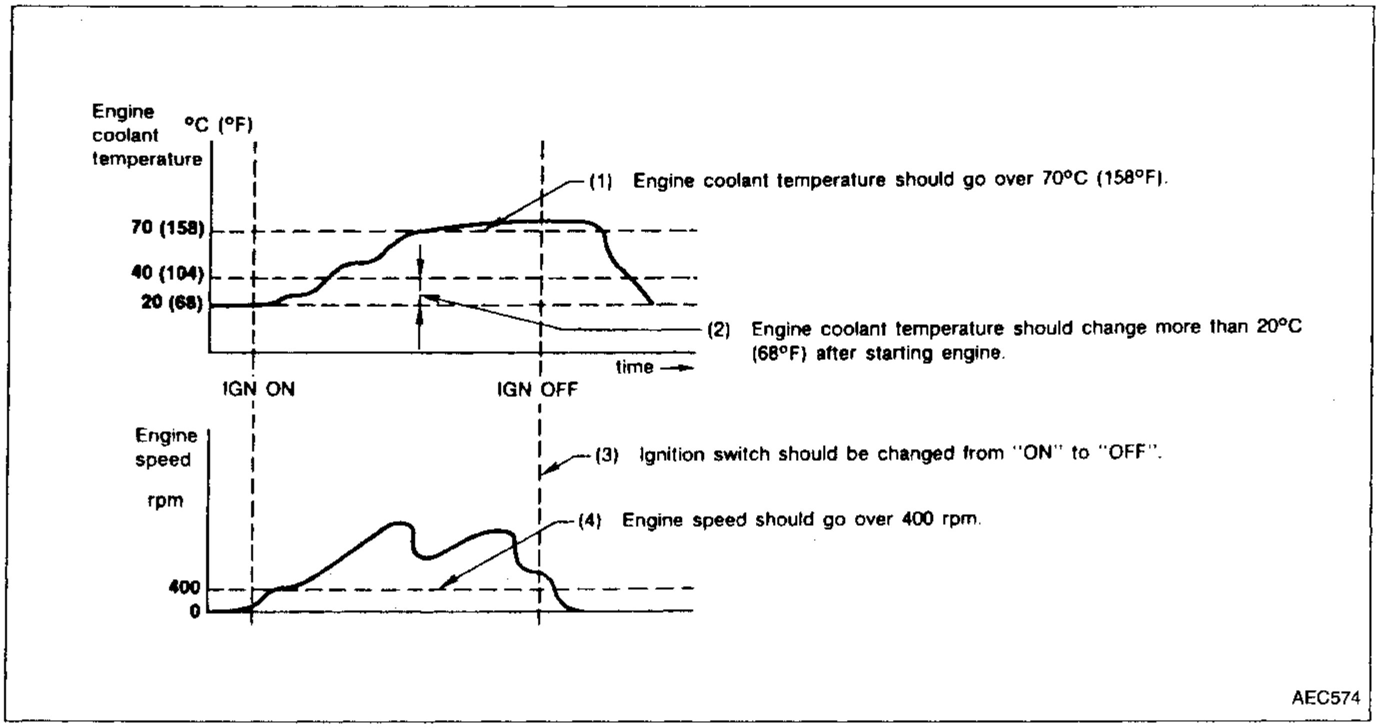
*6: 1st trip DTC will be cleared after vehicle is driven a time (pattern B) without the same malfunction.

*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⟩



- 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.

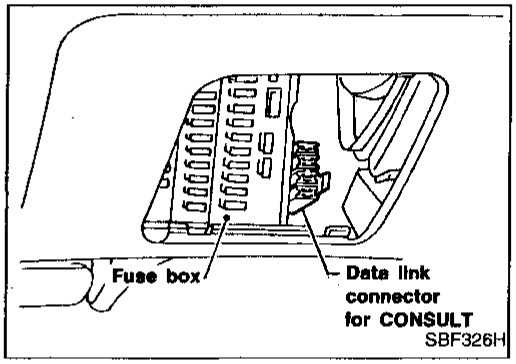
⟨Driving pattern B⟩

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").

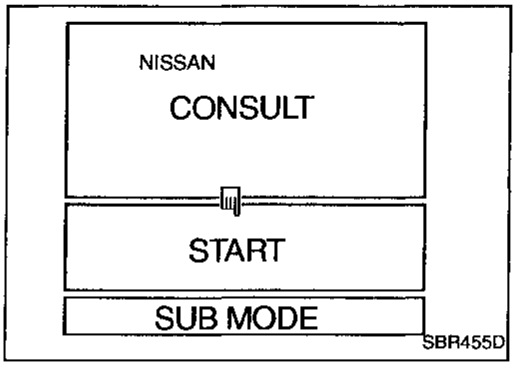
CONSULT

CONSULT INSPECTION PROCEDURE



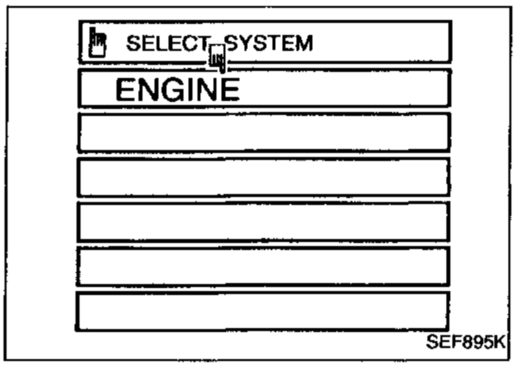
SBF326H

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.)



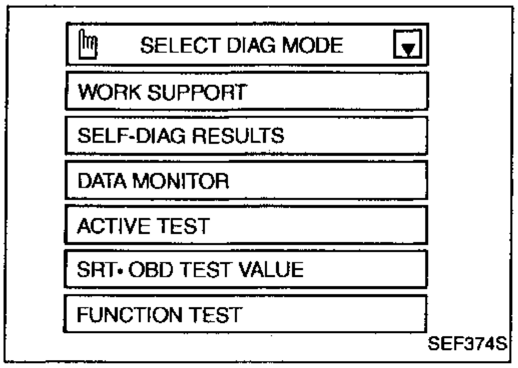
SBR455D

3. Turn on ignition switch.
4. Touch "START".



SEF895K

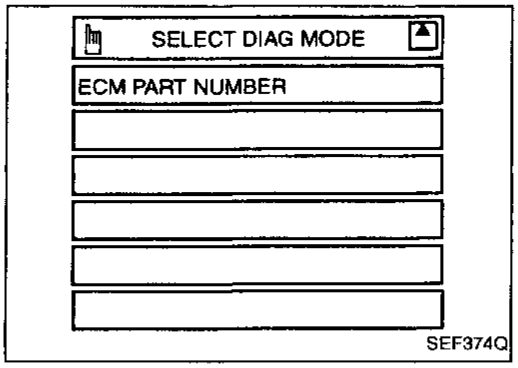
5. Touch "ENGINE".



SEF374S

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

For further information, see the CONSULT Operation Manual. This example shows the display when using the UE951 program card. The screen differs according to the program card used.



SEF374Q

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 (PHASE)		X					
		Crankshaft position sensor (REF)		X		X			
		Crankshaft position sensor (POS)		X	X	X			
		Mass air flow sensor		X		X			
		Engine coolant temperature sensor		X	X	X	X		
		Front heated oxygen sensors		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			
		Knock sensor		X					
		Ignition switch (start signal)				X		X	
		Closed throttle position switch		X					
		Closed throttle position (throttle position sensor signal)				X		X	
		Air conditioner switch				X			
		Park/Neutral position switch		X		X		X	
		Power steering oil pump switch				X		X	
		Electrical load				X			
		Air conditioner pressure switch				X			
		Battery voltage				X			
	OUTPUT	Injectors				X	X	X	
		Power transistor (Ignition timing)		X (Ignition signal)		X	X	X	
		IACV-AAC valve	X	X		X	X	X	
		Front engine mounting				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	X	
		EGRC-solenoid valve		X		X	X	X	
		Front heated oxygen sensor heaters		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		
		FPCM		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-62.

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 from the ECM memory in the mode obtained.

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/V 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

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*3	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-2).]
FUEL SYS-B1*1	• "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 heated 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*1	
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.
MAP*2 [kPa]	• The intake manifold absolute pressure at the moment a malfunction is detected is displayed.

*1: Regarding A32 model, "B1" indicates right bank and "B2" indicates left bank.
*2: This item is not displayed on CONSULT. Only for Generic Scan Tool (GST).
*3: The items are the same as those of 1st trip freeze frame data.

SELF-DIAGNOSTIC MODE

Regarding items detected in "SELF-DIAG RESULTS" mode, refer to "DIAGNOSTIC TROUBLE CODE INDEX" (See page EC-2).

DATA MONITOR MODE

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
CKPS·RPM (POS) [rpm]	○	○	• Indicates the engine speed computed from the POS signal (1° signal) of the crankshaft position sensor (POS).	
CKPS·RPM (REF) [rpm]	○		• Indicates the engine speed computed from the REF signal (120° signal) of the crankshaft position sensor (REF).	• The accuracy of detection becomes poor if engine speed drops below the idle rpm. • If the signal is interrupted while the engine is running, an abnormal value may be indicated.
POS COUNT	○	○	• Indicates the number of signal plate (flywheel) cogs (tooth) during engine 1 revolution.	
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 SENSOR [V]	○	○	• The signal voltage of the rear heated oxygen sensor is displayed.	
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 [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.
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 A32 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.	
LOAD SIGNAL [ON/OFF]	○	○	• Indicates [ON/OFF] condition from the electrical load signal and/or lighting switch. ON ... rear defogger is operating and/or lighting switch is on. OFF ... rear defogger is not operating and lighting switch is not on.	
IGNITION SW [ON/OFF]	○		• Indicates [ON/OFF] condition from ignition switch.	
INJ PULSE-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 [step]		○	• 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 engine control module according to the input signals. • The opening becomes larger as the value increases.	
ENGINE MOUNT [IDLE/TRVL]		○	• The control condition of the front engine mounting (computed by the engine control module according to the input signals) is indicated. • IDLE ... Idle condition • TRVL ... Driving condition	
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 [%]				

CONSULT (Cont'd)

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
EVAP SYS PRES [V]			• The signal voltage of EVAP control system pressure sensor is displayed.	
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.	
COOLING FAN [HI/LOW/OFF]			• The control condition of the cooling fan (determined by ECM according to the input signal) is indicated. HI ... High speed operation LOW ... Low speed operation OFF ... Stop	
EGRC SOL/V [ON/OFF]			• The control condition of the EGRC-solenoid valve (determined by ECM according to the input signal) is indicated. • ON ... EGR (and canister purge) operation is cut-off OFF ... EGR (and canister purge) 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 SEN HTR-B1 [ON/OFF]			• Indicates [ON/OFF] condition of heated oxygen sensor's heater determined by ECM according to the input signals.	
FR O2 SEN HTR-B2 [ON/OFF]				
RR O2 SEN HEATER [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 [gm/s]			• Indicates the mass airflow computed by ECM according to the signal voltage of the mass airflow sensor.	
FPCM DR VOLT [V]			• The voltage between fuel pump and dropping resistor is displayed.	

CONSULT (Cont'd)

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
FPCM [HI/LOW]			• The control condition of the fuel pump control module (FPCM) (determined by ECM according to the input signal) is indicated. HI ... High amount of fuel flow LOW ... Low amount of fuel flow	
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.

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 step using CONSULT.	Engine speed changes according to the opening step.	• 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.	• Camshaft position sensor (PHASE) • Crankshaft position sensor (REF) • Crankshaft position sensor (POS)
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
COOLING FAN	• Ignition switch: ON • Turn the cooling fan "ON" and "OFF" using CONSULT.	Cooling fan moves and stops.	• Harness and connector • Cooling fan motor
FUEL PUMP RELAY	• Ignition switch: ON (Engine stopped) • Turn the fuel pump relay "ON" and "OFF" using CONSULT 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.		
ENGINE MOUNTING	• Engine: After warming up, run engine at idle speed. • Gear position: "D" range (Vehicle stopped) • Turn front engine mounting "IDLE" and "TRAVEL" with the CONSULT.	Body vibration changes according to the front engine mounting condition.	• Harness and connector • Front engine mounting
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
PURG CONT S/V	• Start engine. • 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
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
FPCM	• Start engine. • Turn the FPCM between "LOW" and "HI" using CONSULT and check that "FPCM DR VOLT" of CONSULT changes.	"FPCM DR VOLT" of CONSULT changes as follows; HI ... Approx. 0V LOW ... Approx. 3.7V	• Harness and connector • FPCM • Dropping resistor
TANK F/TEMP SEN	• Change the tank fuel temperature using CONSULT.		

CONSULT (Cont'd)

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/Neutral position switch circuit is tested when shift lever is manipulated.	Out of N/P positions	OFF	• Harness and connector • Neutral position switch or 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) • EGRC-solenoid valve circuit is tested by checking solenoid valve operating noise.	The solenoid valve makes an operating sound every 3 seconds.		• Harness and connector • EGRC-solenoid valve
COOLING FAN CIRCUIT	• Ignition switch: ON (Engine stopped) • Cooling fan circuit is tested when cooling fan is rotated.	The cooling fan rotates and stops every 3 seconds.		• Harness and connector • Cooling fan motor • Cooling fan relay

CONSULT (Cont'd)

FUNCTION TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
START SIGNAL CIRCUIT	• Ignition switch: ON → START • Start signal circuit is tested when engine is started by operating the starter. Battery voltage and water 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
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 Neutral position OFF	• Harness and connector • Power steering oil pressure switch • Power steering oil pump
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 • Electric 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.	• Camshaft position sensor (PHASE) • Crankshaft position sensor (REF) • Crankshaft position sensor (POS)
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
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, power transistor, ignition coil, harness or connector) • Compression • Valve timing
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 1 step, 25 steps and 102 steps.	Difference in engine speed is greater than 150 rpm between when valve opening is at 102 steps and at 25 steps.	• Harness and connector • IACV-AAC valve • Air passage restriction between air inlet and IACV-AAC valve • IAS (Idle adjusting screw) adjustment

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. • Obstructed 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 • Obstructed or bent rubber tube to MAP/BARO switch solenoid valve

CONSULT (Cont'd)

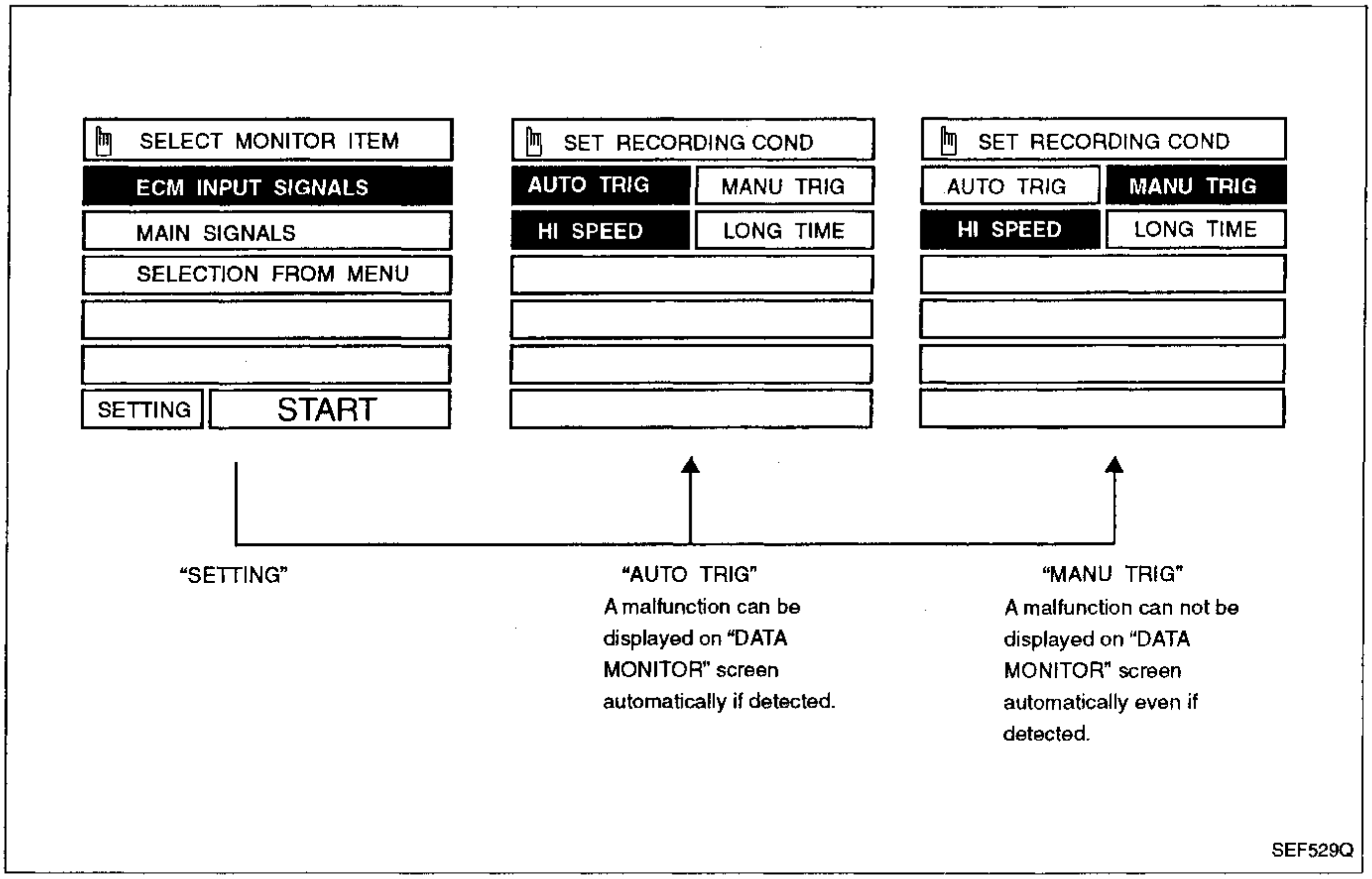
REAL TIME DIAGNOSIS IN DATA MONITOR MODE

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 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 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 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 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.

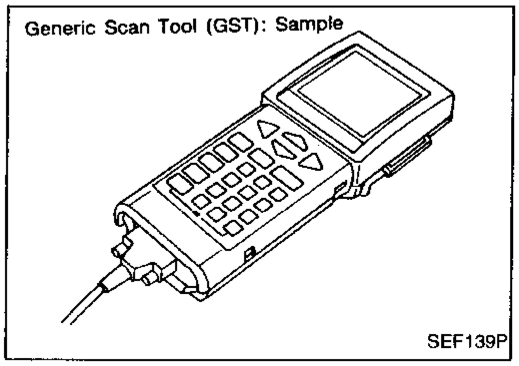


"SETTING"

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

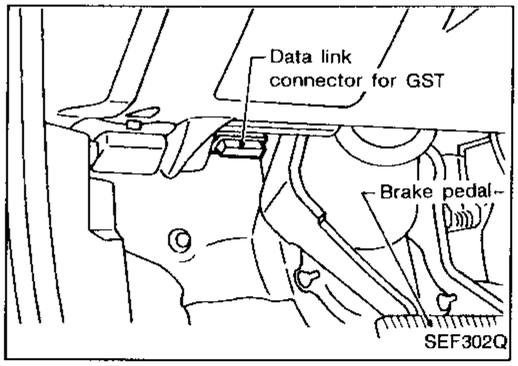
"MANU TRIG"
A malfunction can not be displayed on "DATA MONITOR" screen automatically even if detected.

Generic Scan Tool (GST)



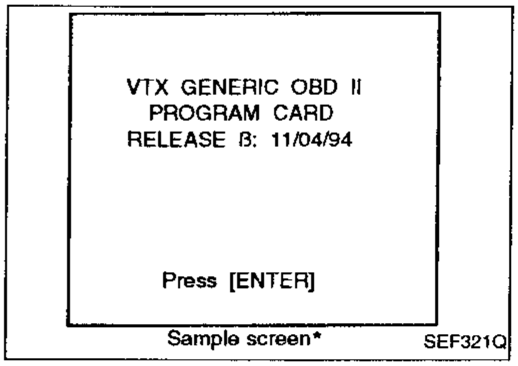
DESCRIPTION

Generic Scan Tool (OBDII scan tool) complying with SAE J1978 has five 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
RELEASE B: 11/04/94

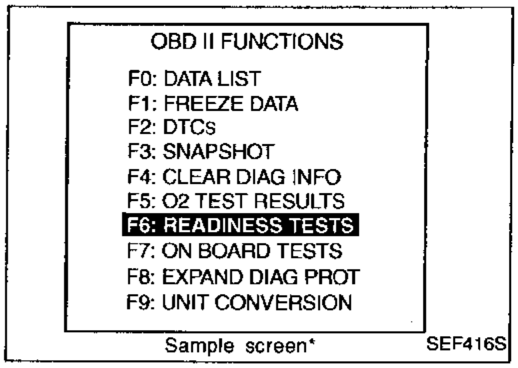
Press [ENTER]

Sample screen*

SEF321Q

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*

SEF416S

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

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

FUNCTION

Diagnostic test mode		Function
MODE 1	READINESS TESTS	This mode gains access to current emission-related data values, including analog inputs and outputs, digital inputs and outputs, and system status information.
MODE 2	(FREEZE DATA)	This mode gains access to emission-related data value which were stored by ECM during the freeze frame. [For details, refer to "Freeze Frame Data" (EC-62).]
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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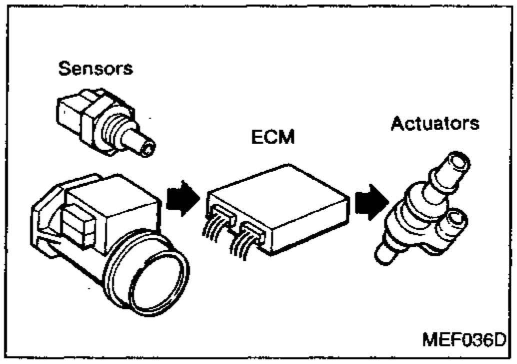

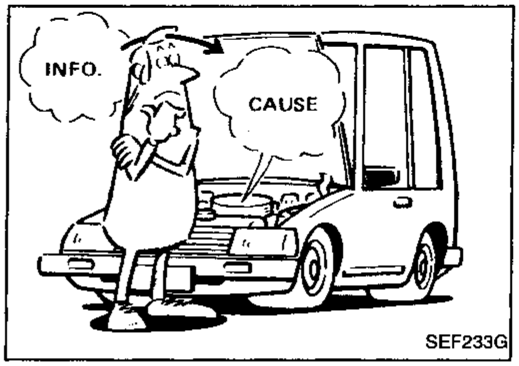

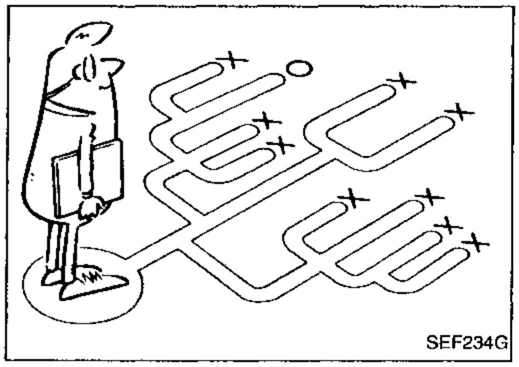

Introduction

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 the next page.

Before undertaking actual checks, take just a few minutes to talk with a customer who approaches with a driveability complaint. The customer can supply good information about such problems, especially intermittent ones. Find out what symptoms are present and under what conditions they occur. A "Diagnostic Worksheet" like the example on EC-75 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 malfunctions of engine components.
A good knowledge of such conditions can make trouble-shooting faster and more accurate.
In general, each customer may feel differently about a given 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.

WORKSHEET SAMPLE

Customer name MR/MS	Model & Year	VIN
Engine #	Trans.	Mileage
Incident Date	Manuf. Date	In Service Date

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

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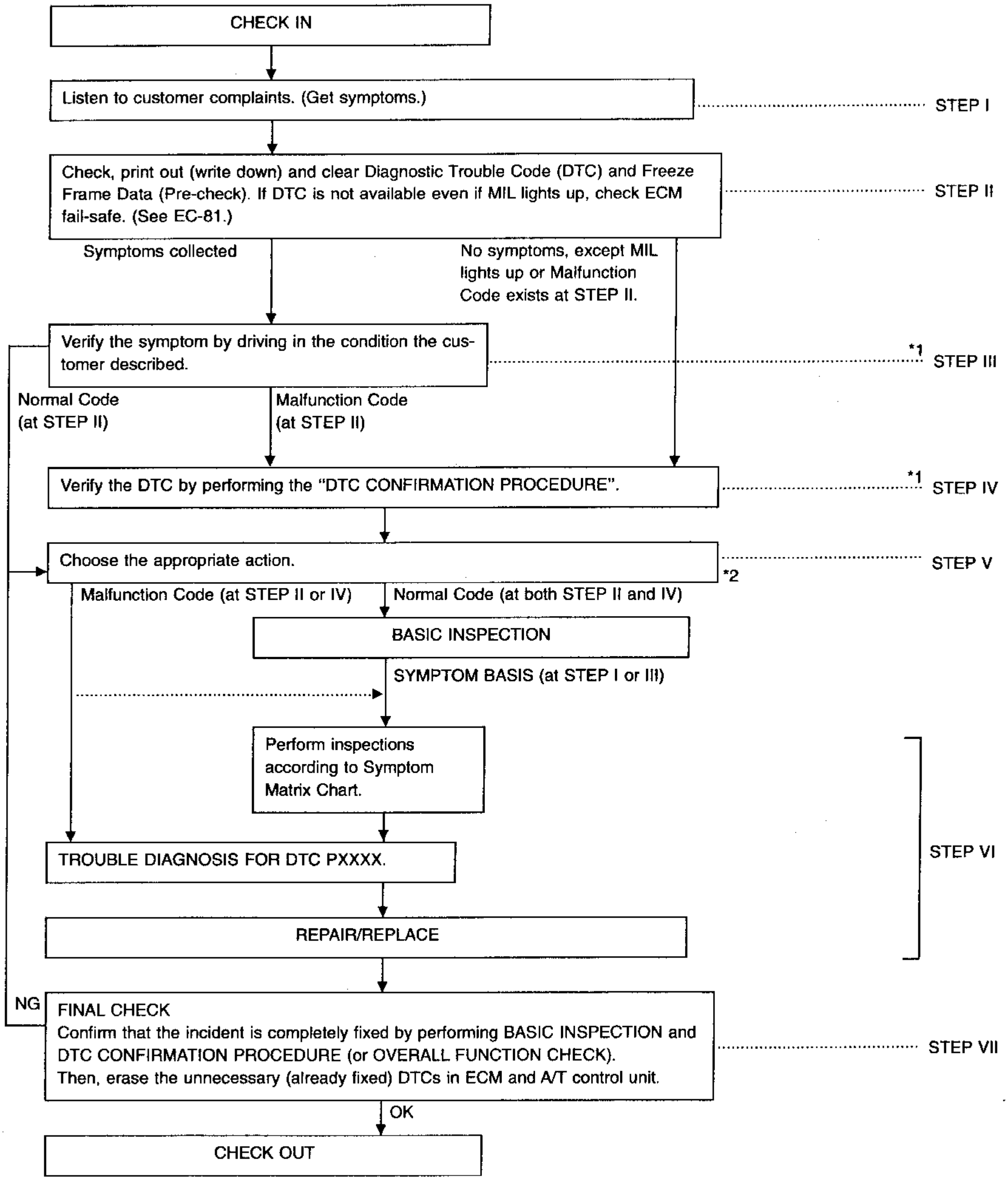
Work Flow



***1: If the incident cannot be duplicated, see "Incident Simulation Tests" of "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT" in GI section.**

***2: If the on board diagnostic system cannot be performed, check main power supply and ground circuit (See TROUBLE DIAGNOSIS FOR POWER SUPPLY, EC-98).**

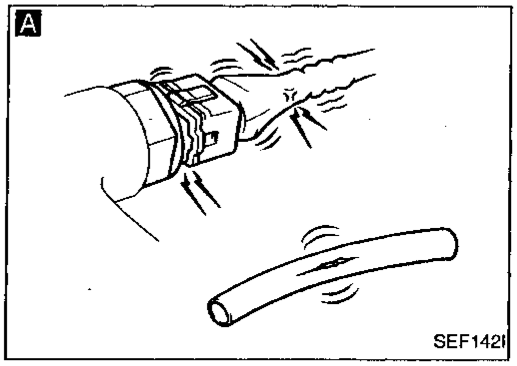
Description for Work Flow

STEP	DESCRIPTION
STEP I	Get detailed information about the conditions and the environment when the incident/symptom occurred using the "DIAGNOSTIC WORK SHEET" as shown on the next page.
STEP II	Before confirming the concern, check and write down (print out using CONSULT or Generic Scan Tool) the Diagnostic Trouble Code (DTC) and the freeze frame data, then erase the code and the data. (Refer to EC-48.) The DTC and the freeze frame data can be used when duplicating the incident at STEP III & IV. Study the relationship between the cause, specified by DTC, and the symptom described by the customer. (The "Symptom Matrix Chart" will be useful. See page EC-82.)
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 Diagnostic Trouble Code (DTC) by driving in (or performing) the "DTC CONFIRMATION PROCEDURE". Check and read the DTC and freeze frame data by using CONSULT or Generic Scan Tool. During the 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 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 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-78.) Then perform inspections according to the Symptom Matrix Chart. (Refer to EC-82.)
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-85. 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) DTC in ECM and A/T control unit. (Refer to EC-46.)

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.**

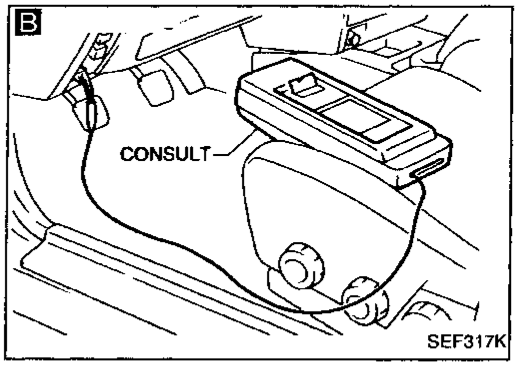


A

BEFORE STARTING

1. Check service records for recent repairs of related problems, or the current need for scheduled maintenance.
2. Open engine hood and check the following:
- Harness connectors for proper connections
- Vacuum hoses for splits, kinks, and proper connections
- Wiring for proper connections, pinches, and cuts

↓



B

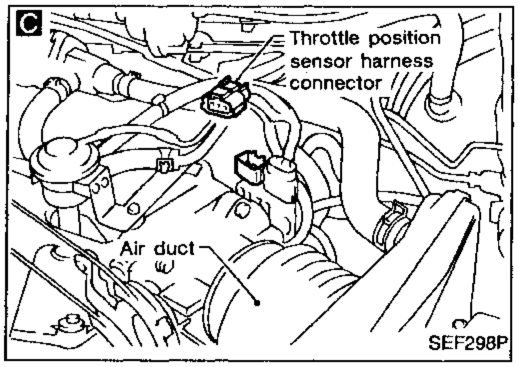
CONNECT CONSULT TO THE VEHICLE

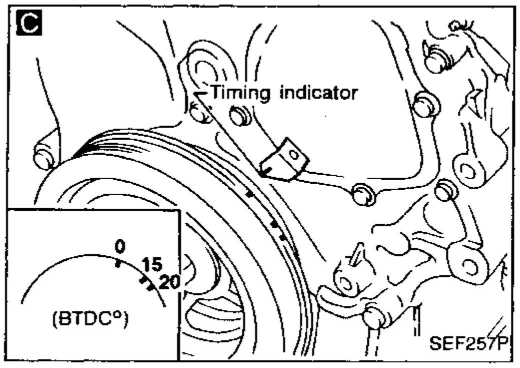
Connect "CONSULT" to the data link connector for CONSULT and select "ENGINE" from the menu. (Refer to page EC-59.)

↓

Warm up engine sufficiently.

↓





C

CHECK IGNITION TIMING.

1. Disconnect throttle position sensor harness connector.
2. Check ignition timing at idle using timing light. (Refer to EC-29.)
   Ignition timing*:
   15°±2° BTDC

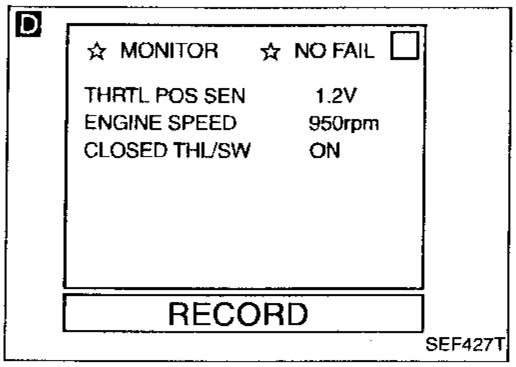
NG → Check camshaft position sensor (PHASE) (EC-204), crankshaft position sensor (REF) (EC-296), and crankshaft position sensor (POS) (EC-198).

↓ OK

(Go to Ⓐ on next page.)

* Only check ignition timing as the timing is not adjustable.

Basic Inspection (Cont'd)

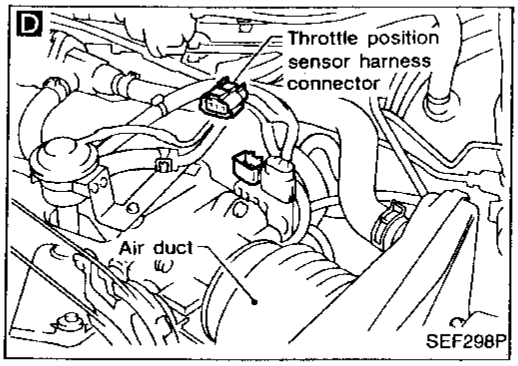


☆ MONITOR ☆ NO FAIL ☐

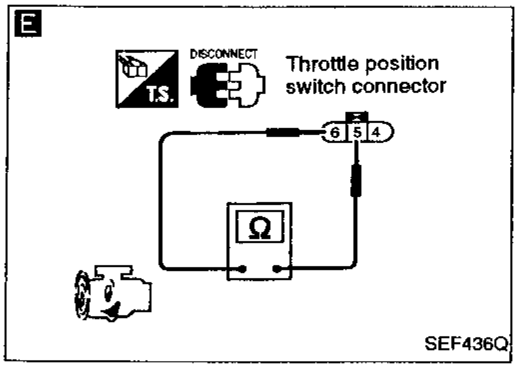
THRTL POS SEN	1.2V
ENGINE SPEED	950rpm
CLOSED THL/SW	ON

RECORD

SEF427T



SEF298P



SEF436Q

Ⓐ

D E

CHECK CLOSED THROTTLE POSITION SWITCH IDLE POSITION.

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

"CLOSED THL/SW" signal should turn "ON" at 800±150 rpm with transaxle in "N" position.

OR

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

- Raise engine speed to 2,000 rpm.
- Gradually lower engine speed.

Engine speed at the point throttle position switch switches from OFF (No continuity) → ON (continuity exists): 800±150 rpm

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 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 throttle position switch harness connector.

↓

Erase Diagnostic Trouble Code. (Refer to EC-48.)

↓

CHECK TARGET IDLE SPEED

Read the engine idle speed in "DATA MONITOR" mode with CONSULT.

M/T: 625±50 rpm
A/T: 700±50 rpm
(in "N" position)

OR

Check idle speed.

M/T: 625±50 rpm
A/T: 700±50 rpm
(in "N" position)

NG → Adjust idle speed. Refer to EC-31.

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-48) and "HOW TO ERASE DTC" in AT section.

OK ↓

INSPECTION END

Diagnostic Trouble Code (DTC) Chart

INSPECTION PRIORITY

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 (PHASE) 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 circuit (P1400, 1005)	• Knock sensor circuit (P0325, 0304)	
	• A/T diagnosis communication line (P1605, 0804)	• Crankshaft position sensor (REF) circuit (P1335, 0407)	
	• Tank fuel temperature sensor (P0180, 0402)	• Crankshaft position sensor (POS) circuit (P0335, 0802) (P1336, 0905)	
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)
	• Absolute pressure sensor circuit (P0105, 0803)	• EVAP control system pressure sensor circuit (P0450, 0704)	• Rear heated oxygen sensor circuit (P0136, 0707)
	• MAP/BARO switch solenoid valve circuit (P1105, 1302)	• EVAP canister vent control valve circuit (P0446, 0903)	• EVAP canister purge volume control valve circuit (P1445, 1008)
	• EVAP canister purge control valve/ solenoid valve circuit (P0443, 0807)	• Closed throttle position switch circuit (P0510, 0203)	• EVAP control system purge flow monitoring (P1447, 0111)
	• Vacuum cut valve bypass valve (P1441, 0801)	• Rear heated oxygen sensor heater circuit (P0141, 0902)	
	• A/T related sensors, solenoid valves and switches (P0705-P0710, 1101-1208)		
3	• EGR function (P0400, 0302)	• Misfire (P0306 - P0300, 0603 - 0701)	• Fuel injection system function (P0172, 0114), (P0171, 0115), (P0175, 0209), (P0174, 0210)
	• EGRC-BPT valve function (P0402, 0306)	• Closed loop control (P0130, 0307) (P0150, 0308)	• Three way catalyst function (P0420, 0702)
	• IACV-AAC valve circuit (P0505, 0205)	• Improper shifting (P0731 - P0734, 1103 - 1106)	• Signal circuit from A/T control unit to ECM (P0600, 0504)
	• EVAP control system (small leak) (P0440, 0705)	• Fuel pump control module (FPCM) circuit (P1220, 1305)	

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 4 minutes after ignition ON or Start</td><td>80°C (176°F)</td></tr>
<tr><td>Except as shown above</td><td>40 - 80°C (104 - 176°F) (Depends on the time)</td></tr>
</table></td></tr>
<tr><td>P0120</td><td>0403</td><td>Throttle position sensor circuit</td><td>Throttle position will be determined based on the amount of mass air flow and the engine speed.
Therefore, acceleration will be poor.
<table>
<tr><th></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>P1335</td><td>0407</td><td>Crankshaft position sensor (REF) circuit</td><td>Compression TDC signal (120° signal) is controlled by camshaft position sensor (PHASE) signal and crankshaft position sensor (POS) signal. Ignition timing will be delayed 0° to 2°.</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 ECM fail-safe
When ECM fail-safe is operating, fuel injection, ignition timing, fuel pump operation, IACV-AAC valve operation and cooling fan 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>
<tr><td>Cooling fans</td><td>Cooling fan relay "ON" (High speed condition) when engine is running, and "OFF" when engine stalls.</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	OVERCOOLS	OVERCHARGING	BATTERY DEAD (UNDER CHARGE)	
New CT/CS		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	1P	1X	HA	
Fuel	Fuel pump circuit	●	●	●	○	●		○	○			○					EC-359
	Fuel pressure regulator system	●	●	○	○	○	○	○	○	○		○					EC-26
	Injector circuit	●	●	●	○	●		●	●			●					EC-352
	Evaporative emission system	○	○	○	○	○	○	○	○	○		○					EC-21
Air	Positive crankcase ventilation system	○	○	○	○	○	○	○	○	○		○	○				EC-25
	Incorrect idle speed adjustment	○	○				●	○	○	●		○					EC-31
	IACV-AAC valve circuit	●	●				●	●	●	●							EC-254
	IACV-FICD solenoid valve circuit		○				●	○	○	●							EC-372
Ignition	Incorrect ignition timing adjustment	○	○	●	●	●		●	●			●					EC-31
	Ignition circuit	●	●	●	●	●		●	●			●					EC-288
EGR	EGR control solenoid valve circuit		○	●	○	○						○					EC-307
	EGR system	○	○	●	●	○	○	●	●	○		○					EC-209
Main power supply and ground circuit		●	○	○	○	○		●	●		○	○				○	EC-98
Cooling	Cooling fan circuit	○	○	○	○	○	○	○	○	○	●	○		●		○	EC-339
Air conditioner circuit		○	○	○	○	○	○	○	○	○		○				○	HA section

● ; High Possibility Item

○; Low Possibility Item

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	OVERCOOLS	OVERCHARGING	BATTERY DEAD (UNDER CHARGE)	
New CT/CS		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	1P	1X	HA	
ECCS	Crankshaft position sensor (REF) circuit	○	○														EC-296
	Crankshaft position sensor (POS) circuit	○	○														EC-198, 301
	Camshaft position sensor (PHASE) circuit	●															EC-204
	Mass air flow sensor circuit	●	●	●	○	●		●	●			●					EC-103
	Front heated oxygen sensor circuit		○	●	○	●		●	●			●					EC-158, 139
	Engine coolant temperature sensor circuit	●	○	○	○	○	○	●	●	○		○					EC-122, 132
	Throttle position sensor circuit		●	●		●	○	●	●	○		●					EC-126
	Incorrect throttle position sensor adjustment		●	○		○	●	○	○	●		○					EC-78
	Vehicle speed sensor circuit		○	○		○						○					EC-250
	Knock sensor circuit			●	○	○						○					EC-195
	ECM	○	○	○	○	○	○	○	○	○	○	○					EC-268, 81
	Start signal circuit	○															EC-357
	Park/Neutral position switch circuit			○		○		○	○			○					EC-270
	Power steering oil pressure switch circuit		○					○	○								EC-367
	Front engine mounting control circuit							○	○								EC-364
	Electrical load signal circuit							○	○								EC-375

● ; High Possibility Item
○; Low Possibility Item

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	OVERCOOLS	OVERCHARGING	BATTERY DEAD (UNDER CHARGE)	
New CT/CS		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	1P	1X	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/Drive plate	●															—
	Clutch interlock switch	●															CL section
	Inhibitor switch	●															AT section
	Theft warning circuit	○															EL section
Engine	Cylinder head	●	○	●	○	●		●	●			○					—
	Cylinder head gasket	○	○	●	●	●		●	●		○	○	○				
	Cylinder block	●	●	○	○	○		○	○			○	○				
	Piston	●	○	○	○	○		○	○			○	○				
	Piston ring	●	○	○	○	○		○	○			○	○				
	Connecting rod	○	○	○	○	○		○	○			○					
	Bearing	●	●	○	○	○		○	○			○					
	Crankshaft	●	●	○	○	●		●	●			○					
Valve mechanism	Timing chain	●	●	●	○	●		●	●			○					
	Camshaft	○	●	●	○	●		●	●			○					
	Intake valve	●	○	○	○	●		●	●			○	○				
	Exhaust valve	○	○	○	○	○		○	○			○	○				
Exhaust	Exhaust manifold/Tube/Muffler/Gasket	●	●	●	●	○		●	●			○					
	Three way catalytic converter	○	○	○	○	○		○	○			○					
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 crankshaft position sensor (POS) 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
CKPS·RPM (POS) CKPS·RPM (REF)	• Tachometer: Connect • Run engine and compare tachometer indication with the CONSULT value.		Almost the same speed as the CONSULT value.
POS COUNT	• Engine: Running		179 - 181
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 SENSOR	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 ↔ Approx. 1.0V
RR O2 MNTR			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	0.35 - 0.65V
		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
LOAD SIGNAL	• Engine: Running	Rear window defogger "ON"	ON
		Except the above	OFF

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

MONITOR ITEM	CONDITION		SPECIFICATION
IGNITION SW	• Ignition switch: ON → OFF		ON → OFF
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	15° BTDC
		2,000 rpm	More than 25° BTDC
IACV-AAC/V	ditto	Idle	2 - 10 step
		2,000 rpm	—
ENGINE MOUNT	• Engine: Running	Idle	"IDLE"
		2,000 rpm	"TRVL"
PURG VOL C/V	ditto	Vehicle stopped	0 step
		Vehicle running	—
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 1 second) • Engine running and cranking		ON
	Except as shown above		OFF
COOLING FAN	• After warming up engine, idle the engine. • Air conditioner switch: "OFF"	Engine coolant temperature is 94°C (201°F) or less	OFF
		Engine coolant temperature is between 95°C (203°F) and 104°C (219°F)	LOW
		Engine coolant temperature is 105°C (221°F) or more	HIGH
EGRC SOL/V	• Engine: After warming up • Air conditioner switch: "OFF" • Shift lever: "N" • No-load	Idle	ON
		Racing up to 1,500 - 2,000 rpm	OFF
VENT CONT/V	• Ignition switch: ON		OFF
FR O2 SEN HTR-B1 FR O2 SEN HTR-B2 RR O2 HEATER	• Engine speed: Idle		ON
	• Engine speed: Above 3,600 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	14.0 - 33.0%
		2,500 rpm	12.0 - 25.0%

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

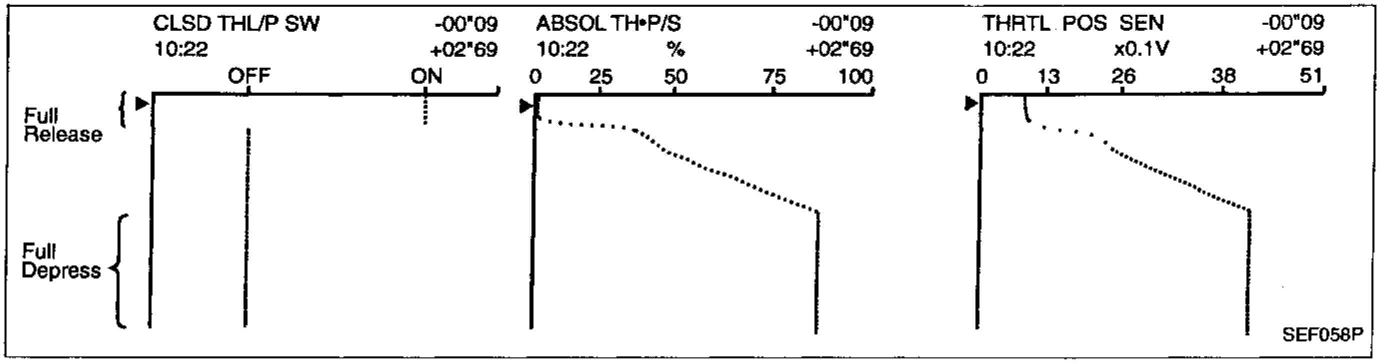
MONITOR ITEM	CONDITION		SPECIFICATION
ABSOL TH·P/S	• Ignition switch: ON (Engine stopped)	Throttle valve: fully closed	0.0%
		Throttle valve: fully opened	Approx. 88%
MASS AIRFLOW	• Engine: After warming up • Air conditioner switch: "OFF" • Shift lever: "N" • No-load	Idle	2.0 - 6.0 g·m/s
		2,500 rpm	7.0 - 20.0 g·m/s
FPCM DR VOLT	• Engine: After warming up	Within 30 seconds of starting engine	Approx. 0V
		More than 30 seconds after starting engine	Approx. 3.5V
FPCM	ditto	Within 30 seconds of starting engine	HI
		More than 30 seconds after starting engine	LOW
MAP/BARO SW/V	• Ignition switch: ON		MAP
ABSOL PRES/SE	• Engine: After warming up	Engine is not running	Approx. 4.4V
		Idle	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

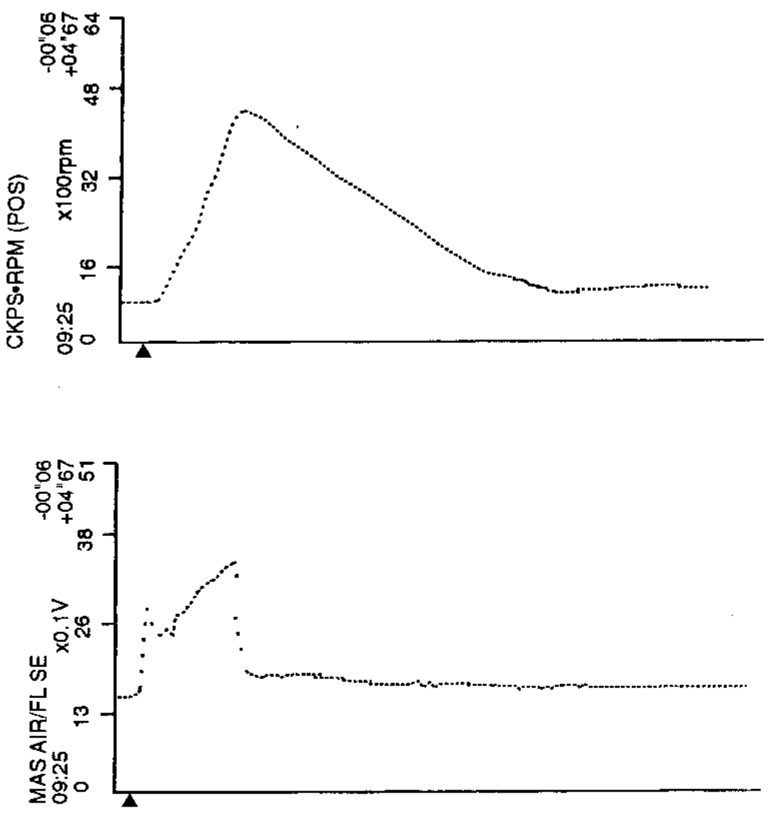
Below is the data for "THRTL POS SEN", "ABSOL TH·P/S" and "CLSD THL/P SW" when depressing the accelerator pedal with the ignition switch "ON".
The signal of "THRTL POS SEN" and "ABSOL TH·P/S" should rise gradually without any intermittent drop or rise after "CLSD THL/P SW" is changed from "ON" to "OFF".



SEF058P

CKPS·RPM (POS), MAS AIR/FL SE, THRTL POS SEN, RR O2 SENSOR, FR O2 SENSOR, INJ PULSE

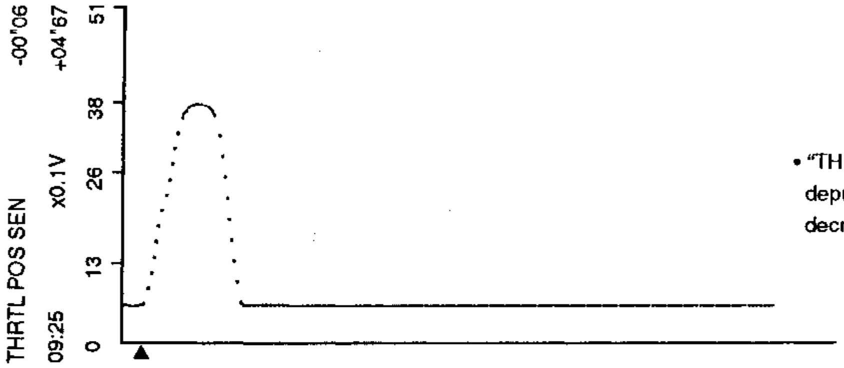
Below is the data for "CKPS·RPM (POS)", "MAS AIR/FL SE", "THRTL POS SEN", "RR O2 SENSOR", "FR O2 SENSOR" and "INJ PULSE" when revving engine quickly up to 4,800 rpm under no load after warming up engine sufficiently.
Each value is for reference, the exact value may vary.



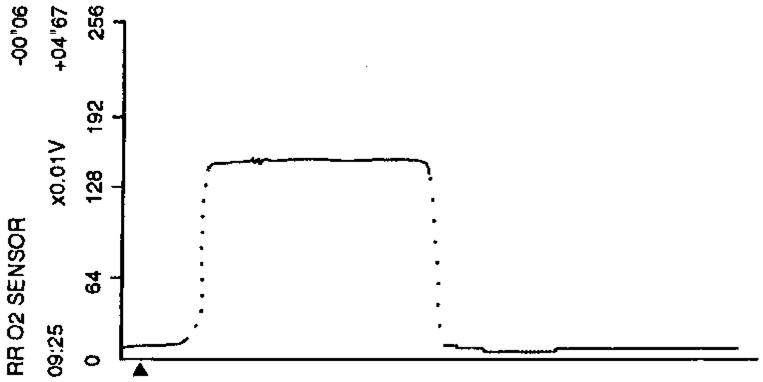
- "CKPS•RPM (POS) " should increase gradually while depressing the accelerator pedal and should decrease gradually after releasing the pedal without any intermittent drop or rise.
- "MAS AIR/FL SE" should increase when depressing the accelerator pedal and should decrease at the moment "THRTL POS SEN"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

SEF598P

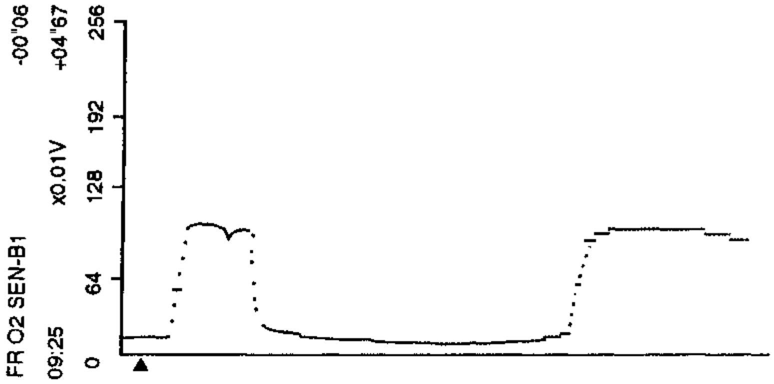
Major Sensor Reference Graph in Data Monitor Mode (Cont'd)



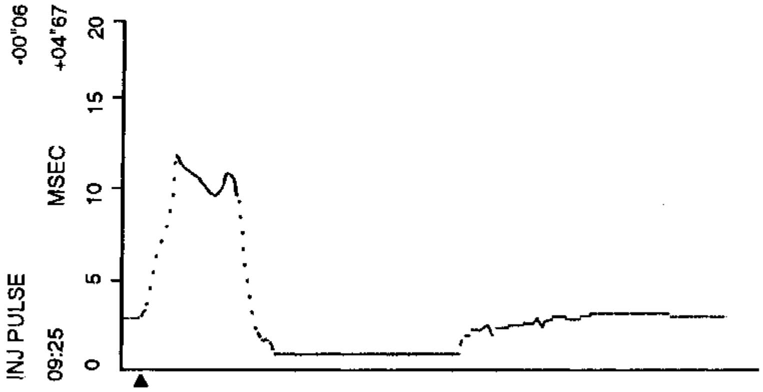
- "THRTL POS SEN" should increase while depressing the accelerator pedel and should decrease while releasing it.



- "RR O2 SENSOR" 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.

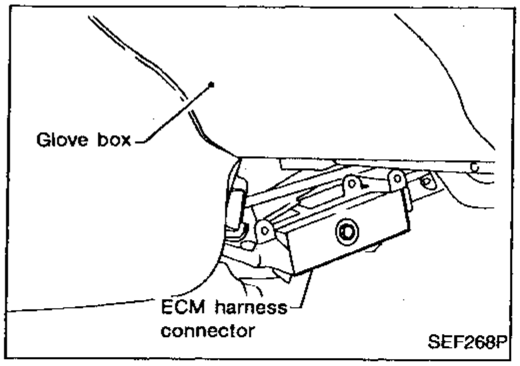


- "INJ PULSE" should increase when depressing the accelerator pedal and should decrease when the pedal is released.

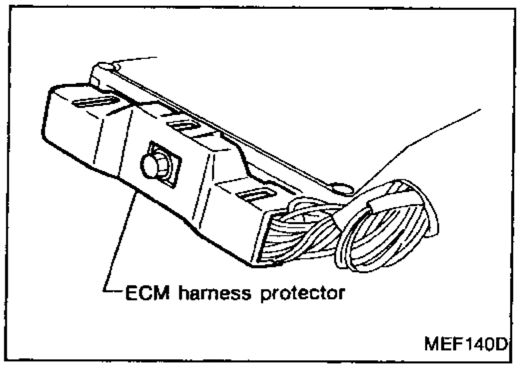
SEF599P

ECM Terminals and Reference Value

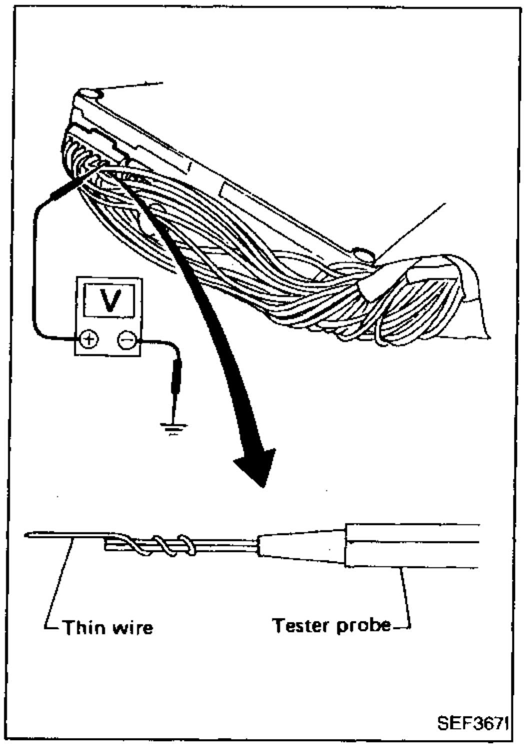
PREPARATION



1. ECM is located behind the center console panel. For this inspection, remove the center console under cover.

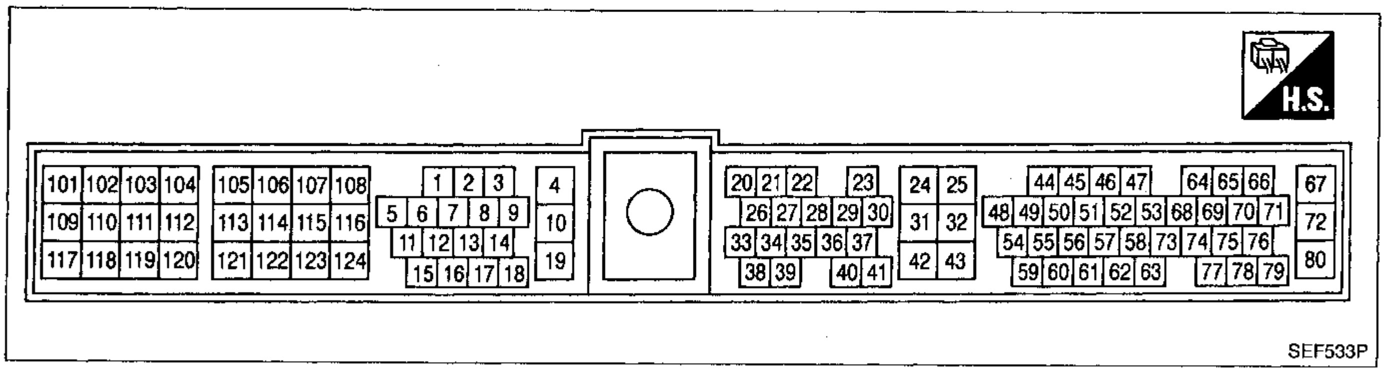


2. Remove ECM harness protector.



3. Perform all voltage measurements with the connectors connected. Extend tester probe as shown to perform tests easily.

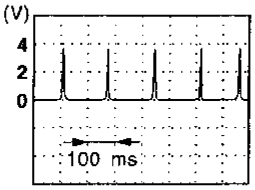
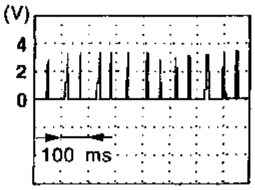
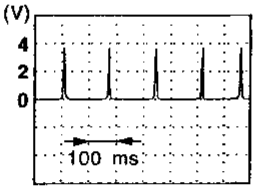
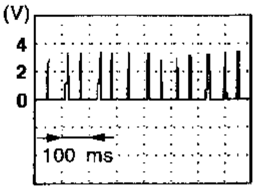
ECM HARNESS CONNECTOR TERMINAL LAYOUT



ECM Terminals and Reference Value (Cont'd)

ECM INSPECTION TABLE

Remarks: Specification data are reference values, and are measured between each terminal and ㉕ (ECCS ground) with a voltmeter.

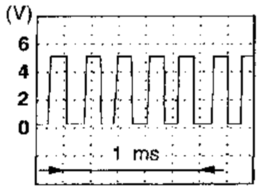
TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
1 2 3	Y/R G/R L/R	Ignition signal (No. 1) Ignition signal (No. 2) Ignition signal (No. 3)	Engine is running. └ Idle speed	Approximately 0.2V★  SEF399T
			Engine is running. └ Engine speed is 2,500 rpm.	Approximately 0.3V★  SEF645T
4	W/B	ECCS relay (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	W/G	Tachometer	Engine is running. └ Idle speed	Approximately 7V★
6	R	A/T diagnosis signal	Ignition switch "ON" Engine is running.	0.5 - 3.0V
7 8 9	GY PU/W GY/R	Ignition signal (No. 4) Ignition signal (No. 5) Ignition signal (No. 6)	Engine is running. └ Idle speed	Approximately 0.2V★  SEF399T
			Engine is running. └ Engine speed is 2,500 rpm	Approximately 0.3V★  SEF645T

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

ECM Terminals and Reference Value (Cont'd)

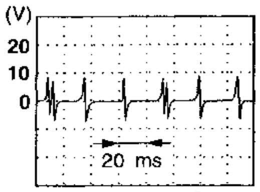
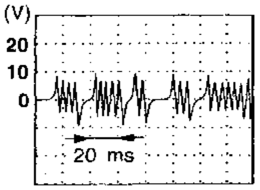
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
10	B	ECCS ground	Engine is running. └ Idle speed	Engine ground
11	B/P	Fuel pump relay	Ignition switch "ON" └ For 1 second after turning ignition switch "ON" Engine is running.	0 - 1V
			Ignition switch "ON" └ 1 second after turning ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
12	B/R	Air conditioner relay	Engine is running. └ Both air conditioner switch and blower switch are "ON".	0 - 1V
			Engine is running. └ Air conditioner switch is "OFF".	BATTERY VOLTAGE (11 - 14V)
13 14	LG LG/R	Cooling fan relay (High) Cooling fan relay (Low)	Engine is running. └ Cooling fan is not operating.	BATTERY VOLTAGE (11 - 14V)
			Engine is running. └ Cooling fan is operating.	0 - 1V
15	B/P	Fuel pump control module	Engine is running. (Warm-up condition) └ Idle speed (within 30 seconds after starting engine)	0 - 0.4V
			Engine is running. (Warm-up condition) └ Idle speed (30 seconds after starting engine and thereafter)	Approximately 10V
16	OR/Y	MAP/BARO switch solenoid valve	Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
18	LG/B	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
20	BR/W	Start signal	Ignition switch "ON"	Approximately 0V
			Ignition switch "START"	BATTERY VOLTAGE (11 - 14V)
21	G/B	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)

ECM Terminals and Reference Value (Cont'd)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
22	G/W (M/T models) G/OR (A/T models)	Neutral position switch (M/T models) Inhibitor switch (A/T models)	Ignition switch "ON" — Gear position is "Neutral position" (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" (Warm-up condition) — Accelerator pedal released	0.35 - 0.65V
			Ignition switch "ON" — Accelerator pedal fully depressed	Approximately 4V
24	R	Ignition switch	Ignition switch "OFF"	0V
			Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
25	B	ECCS ground	Engine is running. — Idle speed	Engine ground
26	Y	EVAP canister purge volume control valve	Engine is running. — Idle speed	0 - 0.4V
27	G			
28	G/R	Fuel pump control module check	Engine is running. (Warm-up condition) — Idle speed (within 30 seconds after starting engine)	0 - 0.4V
			Engine is running. — Idle speed (30 seconds after starting engine and thereafter)	3.3 - 3.8V
29	P/L	Vehicle speed sensor	Engine is running. — Jack up front wheels and run engine at idle in "1st" position (M/T models) or "1" position (A/T models).	Approximately 5.2V★  SEF648T
31	GY/L	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
32	B	ECCS ground	Engine is running. — Idle speed	Engine ground

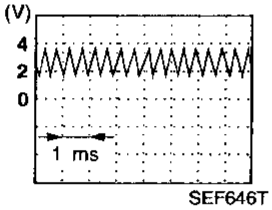
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

ECM Terminals and Reference Value (Cont'd)

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
33	W/L	Front engine mounting	Engine is running. └ For 2 seconds after engine speed changes from 2,000 rpm to idle speed	0 - 0.4V
			Engine is running. └ Except the above	BATTERY VOLTAGE (11 - 14V)
34	W/R	Front engine mounting	Engine is running. └ For 2 seconds after engine speed changes from idle speed to 2,000 rpm	0 - 0.4V
			Engine is running. └ Except the above	BATTERY VOLTAGE (11 - 14V)
37	L/W	Throttle position sensor signal	Ignition switch "ON" (Warm-up condition) └ Accelerator pedal released	Approximately 0.4V
			Ignition switch "ON" └ Accelerator pedal fully depressed	Approximately 3V
39	G	Power steering oil pressure switch	Engine is running. └ Steering wheel is being turned.	0 - 1.5V
			Engine is running. └ Steering wheel is not being turned.	BATTERY VOLTAGE (11 - 14V)
42	R	Sensor's power supply	Ignition switch "ON"	Approximately 5V
43	B	Sensor's ground	Engine is running. (Warm-up condition) └ Idle speed	0V
44 48	W W	Crankshaft position sensor (REF)	Engine is running. └ Idle speed	Approximately 2.3V★ (AC voltage)  SEF400T
46 47	W W	Camshaft position sensor (PHASE)	Engine is running. └ Idle speed	Approximately 4.2V★ (AC voltage)  SEF644T

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

ECM Terminals and Reference Value (Cont'd)

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
49	W	Crankshaft position sensor (POS)	Engine is running. └ Idle speed	Approximately 2.5V★ 
50 51	W W	Front heated oxygen sensor (Right bank) Front heated oxygen sensor (Left bank)	Engine is running. └ After warming up sufficiently and engine speed is 2,000 rpm.	0 - Approximately 1.0V (periodically change)
52	P/L	Tank fuel temperature sensor	Engine is running.	0 - 5.0V Output voltage varies with fuel temperature.
54	W	Mass air flow sensor	Engine is running. (Warm-up condition) └ Idle speed	1.0 - 1.7V
			Engine is running. (Warm-up condition) └ Engine speed is 2,000 rpm.	1.5 - 2.1V
55	B	Mass air flow sensor ground	Engine is running. (Warm-up condition) └ Idle speed	Approximately 0V
56	W	Rear heated oxygen sensor	Engine is running. └ After warming up sufficiently and engine speed is 2,000 rpm.	0 - Approximately 1.0V
58	SB	Intake air temperature sensor	Engine is running.	0 - 5.0V Output voltage varies with intake air temperature.
59	Y	Engine coolant temperature sensor	Engine is running.	0 - 5.0V Output voltage varies with engine coolant temperature.
61	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
62	W	EVAP control system pressure sensor	Ignition switch "ON"	Approximately 3.4V
63	L/OR	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 - 1.0V

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

ECM Terminals and Reference Value (Cont'd)

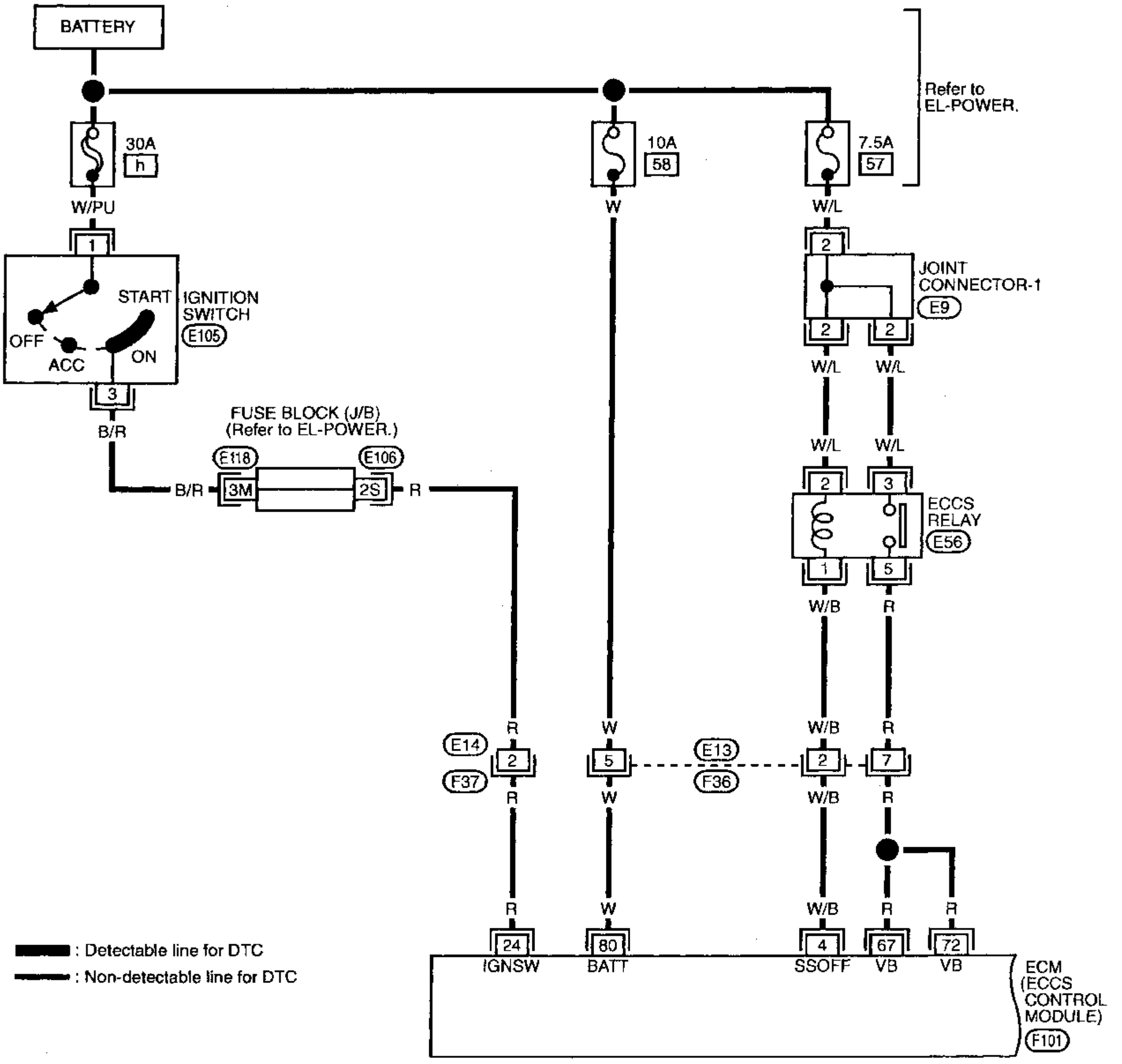
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
64	W	Knock sensor	Engine is running. └ Idle speed	2.0 - 3.0V
65	R/L	A/T signal No. 4	Ignition switch "ON"	6 - 8V
			Engine is running. └ Idle speed	0V
66	Y/B	A/T signal No. 5	Ignition switch "ON"	0V
			Engine is running. └ Idle speed	6 - 8V
67 72	R R	Power supply for ECM	Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
69	G/B	Data link connector for GST	Ignition switch "ON" └ GST is disconnected.	6 - 10V
70	OR/L	EVAP canister vent control valve	Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
73	W/L	A/T signal No. 1	Ignition switch "ON"	6 - 8V
			Engine is running. └ Idle speed	0V
74	W/PU	A/T signal No. 2	Ignition switch "ON"	6 - 8V
75	BR/Y	Data link connector for CONSULT	Engine is running. ├ Idle speed └ Connect CONSULT and select DATA MONITOR mode.	Approximately 0V
76	P			Approximately 4 - 9V
78	LG			Approximately 3.5V
77	R/W	A/T signal No. 3	Ignition switch "ON"	0V
			Engine is running. └ Idle speed	6 - 8V
79	R/W	Electrical load signal	Engine is running. └ Idle speed (Electrical load: "OFF")	0V
			Engine is running. └ Idle speed (Rear window defogger: "ON")	BATTERY VOLTAGE (11 - 14V)
80	W	Power supply (Back-up)	Ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
101 115 122 123	PU/G GY/G Y GY/L	IACV-AAC valve	Engine is running. └ Idle speed	0.1 - 14V

ECM Terminals and Reference Value (Cont'd)

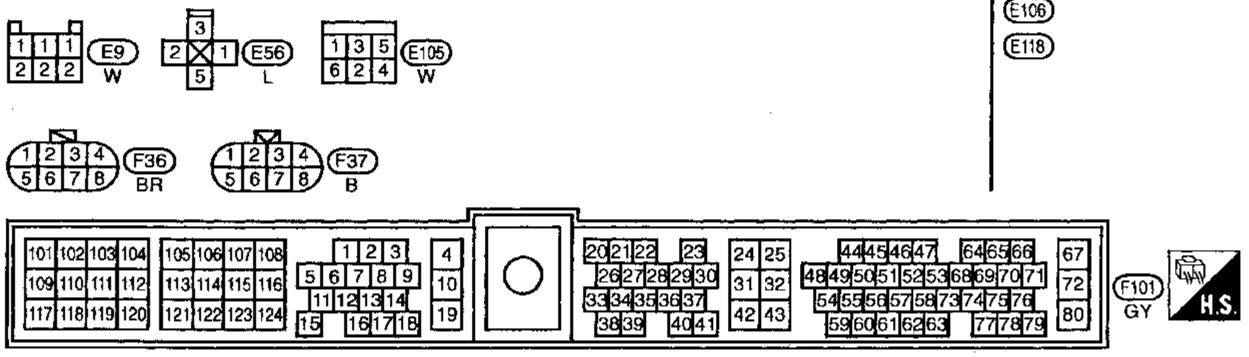
TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
102	R/B	Injector No. 1	Engine is running. └ Idle speed	BATTERY VOLTAGE (11 - 14V)
104	R/Y	Injector No. 3		
106	L/W	Injector No. 5		
109	R/G	Injector No. 2		
111	B/OR	Injector No. 4		
113	PU/R	Injector No. 6		
103	L/B	EGRC-solenoid valve	Engine is running. (Warm-up condition) └ Revving engine up to 2,000 rpm.	BATTERY VOLTAGE (11 - 14V)
			Engine is running. (Warm-up condition) └ Idle speed	0 - 0.7V
107	R	Rear heated oxygen sensor heater	Engine is running. └ Engine speed is below 3,600 rpm.	0 - 0.5V
			Engine is running. └ Engine speed is above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)
108	B	ECCS ground	Engine is running. └ Idle speed	Engine ground
110	G/B	EVAP canister purge volume control valve	Engine is running. └ Idle speed	BATTERY VOLTAGE (11 - 14V)
118	L/R			
114	L/Y	EVAP canister purge control solenoid valve	Engine is running. └ Idle speed	BATTERY VOLTAGE (11 - 14V)
116	B	ECCS ground	Engine is running. └ Idle speed	Engine ground
119	L/Y	Front heated oxygen sensor heater (right bank)	Engine is running. └ Engine speed is below 3,600 rpm (A/T models) or 4,000 rpm (M/T models).	0 - 0.5V
			Engine is running. └ Engine speed is above 3,600 rpm (A/T models) or 4,000 rpm (M/T models).	BATTERY VOLTAGE (11 - 14V)
120	OR/G	Vacuum cut valve bypass valve	Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
121	L	Front heated oxygen sensor heater (left bank)	Engine is running. └ Engine speed is below 3,600 rpm (A/T models) or 4,000 rpm (M/T models).	0 - 0.5V
			Engine is running. └ Engine speed is above 3,600 rpm (A/T models) or 4,000 rpm (M/T models).	BATTERY VOLTAGE (11 - 14V)
124	B	ECCS ground	Engine is running. └ Idle speed	Engine ground

Main Power Supply and Ground Circuit

EC-MAIN-01



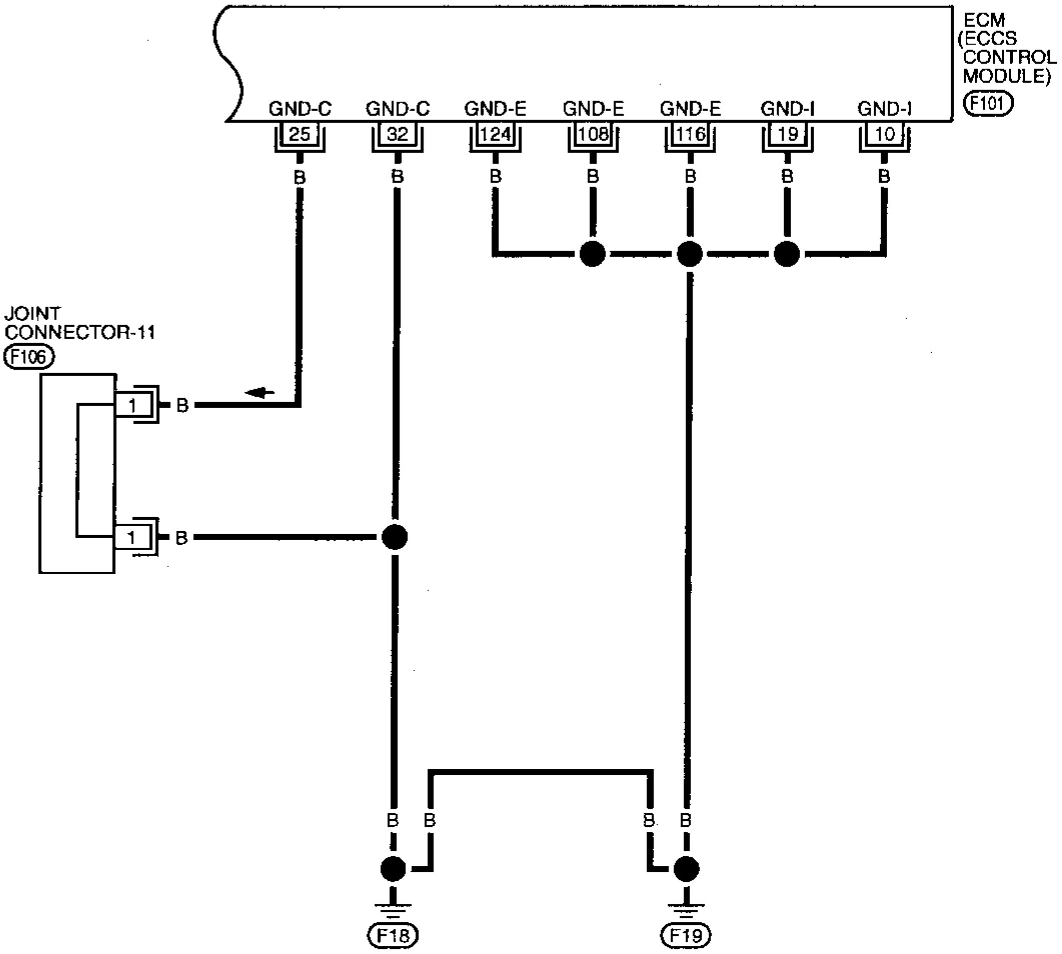
Refer to last page (Foldout page).
E106
E118



SEF219T

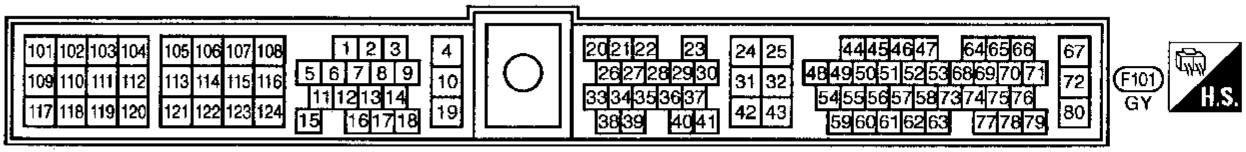
Main Power Supply and Ground Circuit (Cont'd)

EC-MAIN-02



▬ : Detectable line for DTC

— : Non-detectable line for DTC



SEF220T

CONSULT REFERENCE VALUE IN DATA MONITOR MODE

- Specification data are reference values.

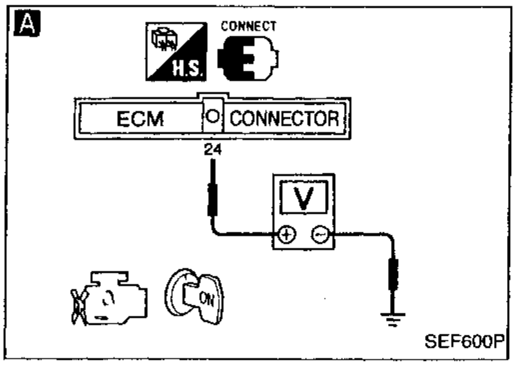
MONITOR ITEM	CONDITION	SPECIFICATION
BATTERY VOLT	• Ignition switch: ON (Engine stopped)	11 - 14V

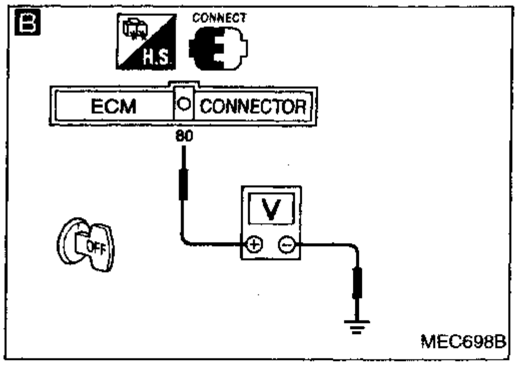
ECM TERMINALS AND REFERENCE VALUE

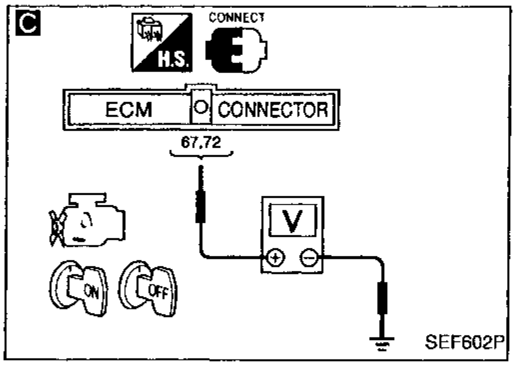
Remarks: Specification data are reference values, and are measured between each terminal and ㉕ (ECCS ground) with a voltmeter.

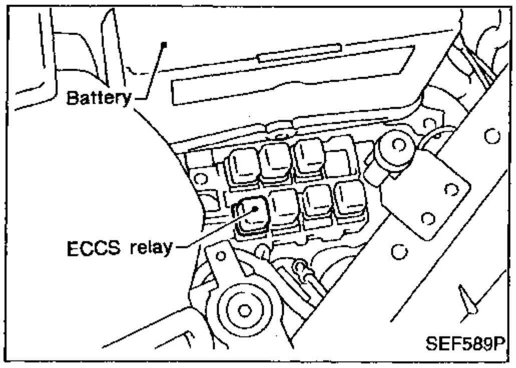
TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
4	W/B	ECCS relay (Self-shutoff)	Engine is running. Ignition switch "OFF" └ For a few seconds after turning ignition switch "OFF"	0 - 1V
			Ignition switch "OFF" └ A few seconds passed after turning ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
24	R	Ignition switch	Ignition switch "OFF"	0V
			Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
67 72	R R	Power supply for ECM	Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
80	W	Power supply (Back-up)	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
25	B	ECCS ground	Engine is running. └ Idle speed	Engine ground
32	B	ECCS ground	Engine is running. └ Idle speed	Engine ground
108	B	ECCS ground	Engine is running. └ Idle speed	Engine ground
116	B	ECCS ground	Engine is running. └ Idle speed	Engine ground
124	B	ECCS ground	Engine is running. └ Idle speed	Engine ground

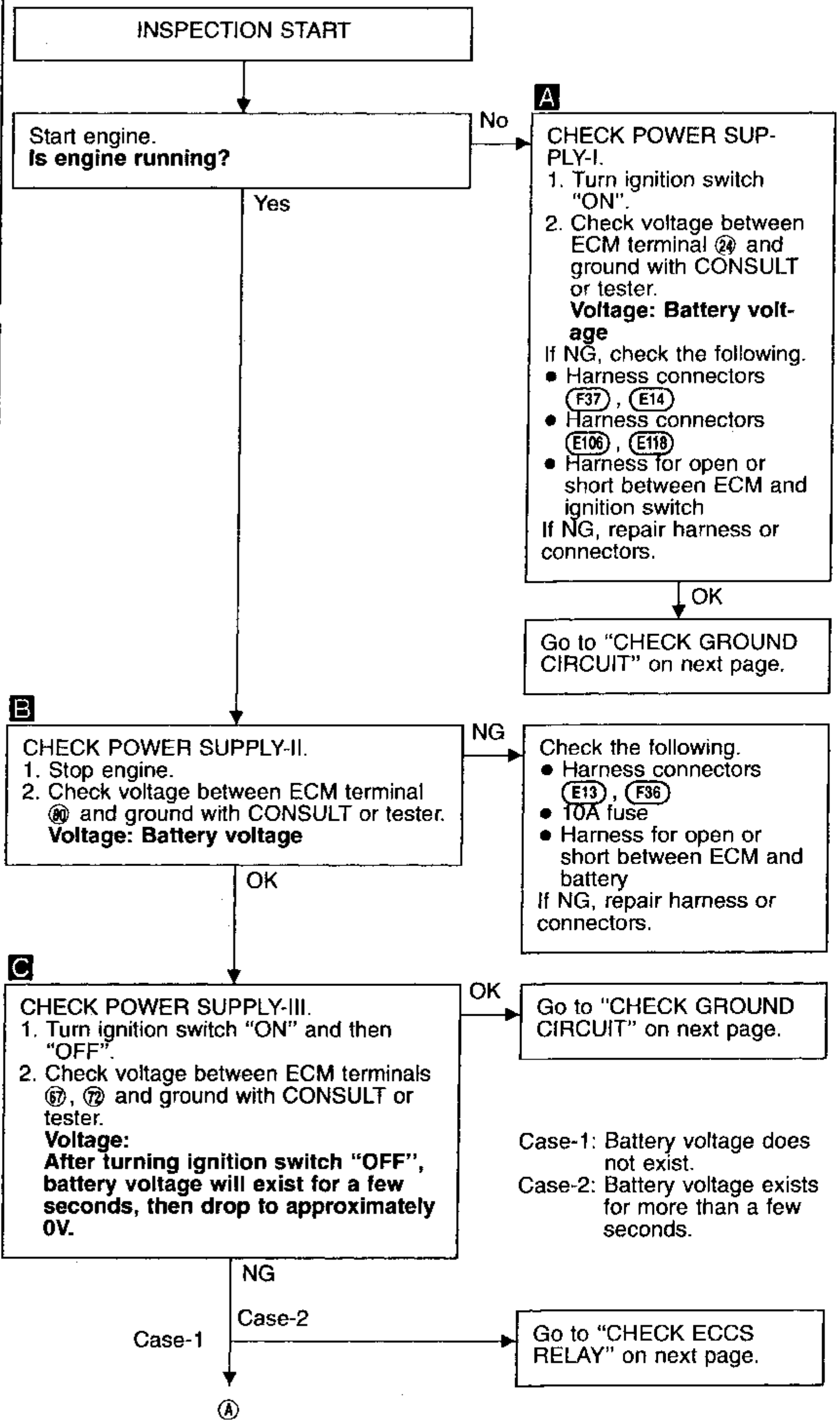
Main Power Supply and Ground Circuit (Cont'd)











INSPECTION START

Start engine.
Is engine running?

No →

A CHECK POWER SUPPLY-I.
1. Turn ignition switch "ON".
2. Check voltage between ECM terminal ㉔ and ground with CONSULT or tester.
   Voltage: Battery voltage

If NG, check the following.
- Harness connectors (F37), (E14)
- Harness connectors (E106), (E118)
- Harness for open or short between ECM and ignition switch

If NG, repair harness or connectors.

OK ↓

Go to "CHECK GROUND CIRCUIT" on next page.

Yes ↓

B CHECK POWER SUPPLY-II.
1. Stop engine.
2. Check voltage between ECM terminal (80) and ground with CONSULT or tester.
   Voltage: Battery voltage

NG →

Check the following.
- Harness connectors (E13), (F36)
- 10A 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 (67), (72) 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 "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 →

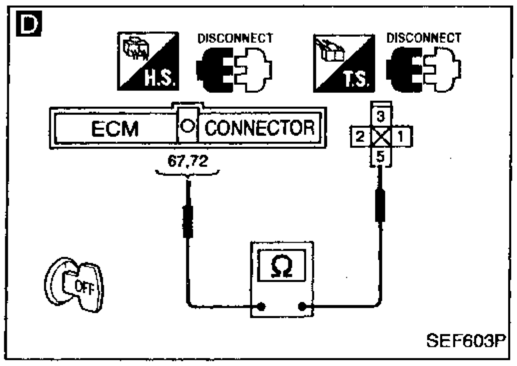
Go to "CHECK ECCS RELAY" on next page.

Case-1 ↓

Ⓐ

Main Power Supply and Ground Circuit (Cont'd)

Ⓐ



SEF603P

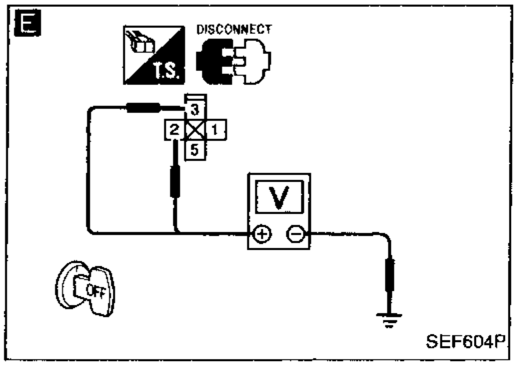
D

CHECK HARNESS CONTINUITY BETWEEN ECCS RELAY AND ECM.
1. Disconnect ECM harness connector.
2. Disconnect ECCS relay.
3. Check harness continuity between ECM terminals (67), (72) and terminal ⑤.
   Continuity should exist.
   If OK, check harness for short.

NG → Check the following.
- Harness for open or short between ECCS relay and ECM
- Harness connectors (F36), (E13)

If NG, repair harness or connectors.

OK ↓



SEF604P

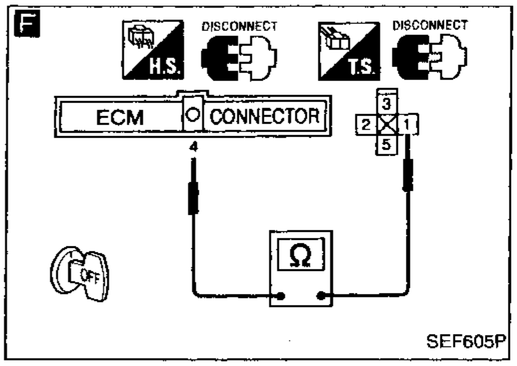
E

CHECK VOLTAGE BETWEEN ECCS RELAY AND GROUND.
1. Check voltage between terminals ②, ③ and ground with CONSULT or tester.
   Voltage: Battery voltage

NG → Check the following.
- 7.5A fuse
- Joint connector-1
- Harness for open or short between ECCS relay and battery

If NG, repair harness or connectors.

OK ↓



SEF605P

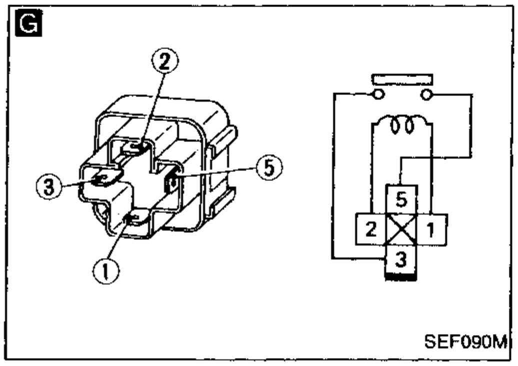
F

CHECK OUTPUT SIGNAL CIRCUIT.
1. Check harness continuity between ECM terminal ④ and terminal ①.
   Continuity should exist.
   If OK, check harness for short.

NG → Check the following.
- Harness for open or short between ECCS relay and ECM
- Harness connectors (F36), (E13)

If NG, repair harness or connectors.

OK ↓



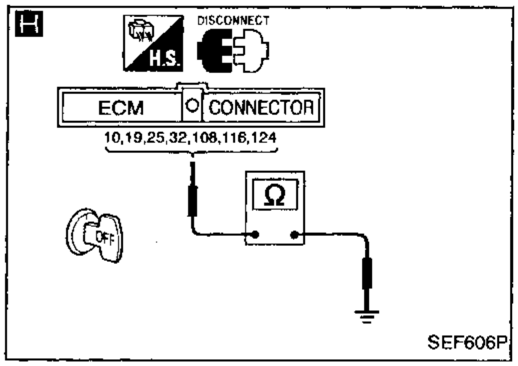
SEF090M

G

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

NG → Replace ECCS relay.

OK ↓



SEF606P

H

CHECK GROUND CIRCUIT.
1. Turn ignition switch "OFF".
2. Loosen and retighten engine ground screws.
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminals ⑩, ⑲, ㉕, ㉜, (108), (116), (124) and engine ground.
   Continuity should exist.
   If OK, check harness for short.

NG → Check the following.
- Joint connector-11
- Harness for open or short between ECM terminal ㉕ and engine ground

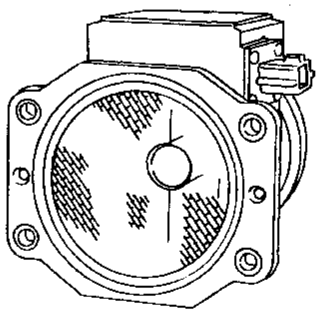
If NG, repair harness or connectors.

OK ↓

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

↓

INSPECTION END


SEF260Q

Mass Air Flow Sensor (MAFS)

COMPONENT DESCRIPTION

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

Therefore, the ECM must supply more electric current to the hot film as air flow increases. This maintains the temperature of the hot film. 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

ECM TERMINALS AND REFERENCE VALUE

Remarks: Specification data are reference values, and are measured between each terminal and ㉕ (ECCS ground) with a voltmeter.

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
54	W	Mass air flow sensor	Engine is running. (Warm-up condition) └ Idle speed	1.0 - 1.7V
			Engine is running. (Warm-up condition) └ Engine speed is 2,000 rpm.	1.5 - 2.1V
55	B	Mass air flow sensor ground	Engine is running. (Warm-up condition) └ Idle speed	Approximately 0V
4	W/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)
67 72	R R	Power supply for ECM	Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)

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 entered to ECM.	• Harness or connectors (The sensor circuit is open or shorted.)
	B)C) Voltage sent to ECM is not practical when compared with the crankshaft position sensor (POS) and throttle position sensor signals.	• Mass air flow sensor

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

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

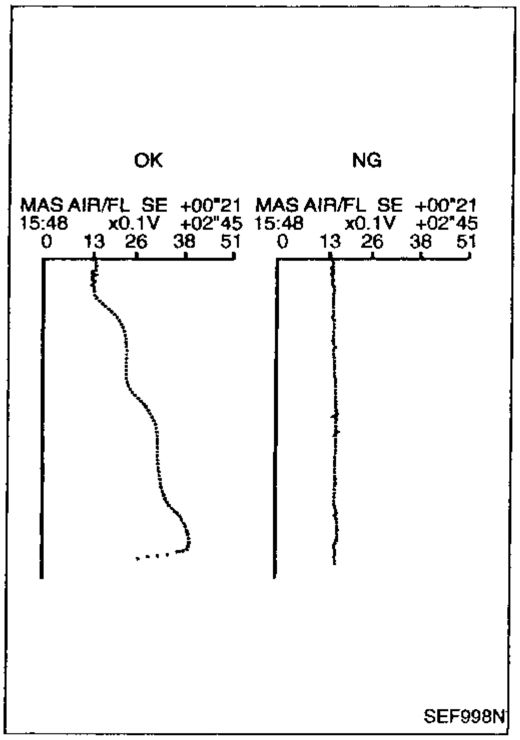
1) Turn ignition switch "ON", and wait at least 6 seconds.
2) Start engine and wait at least 3 seconds.
3) Select "MODE 7" with GST.

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.

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



SEF998N

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) Wait at least 10 seconds at idle speed.

OR

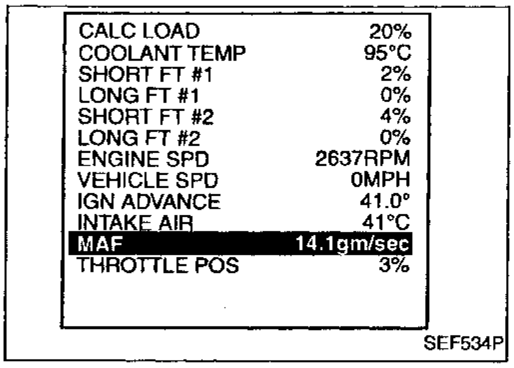
1) Turn ignition switch "ON".
2) Start engine and warm it up sufficiently.
3) Wait at least 10 seconds at idle speed.
4) Select "MODE 7" with GST.

OR

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

OVERALL FUNCTION CHECK

This procedure can be used for checking the overall function of the mass air flow sensor circuit. During this check, a DTC might not be confirmed.



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

SEF534P

Procedure for malfunction C

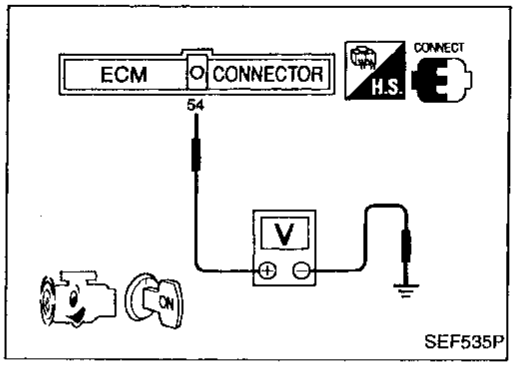
1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
3) Start engine and warm it up sufficiently.
4) Check the voltage of mass air flow sensor with "DATA MONITOR".
5) Check for linear voltage rise in response to increases to about 4,000 rpm in engine speed.

OR

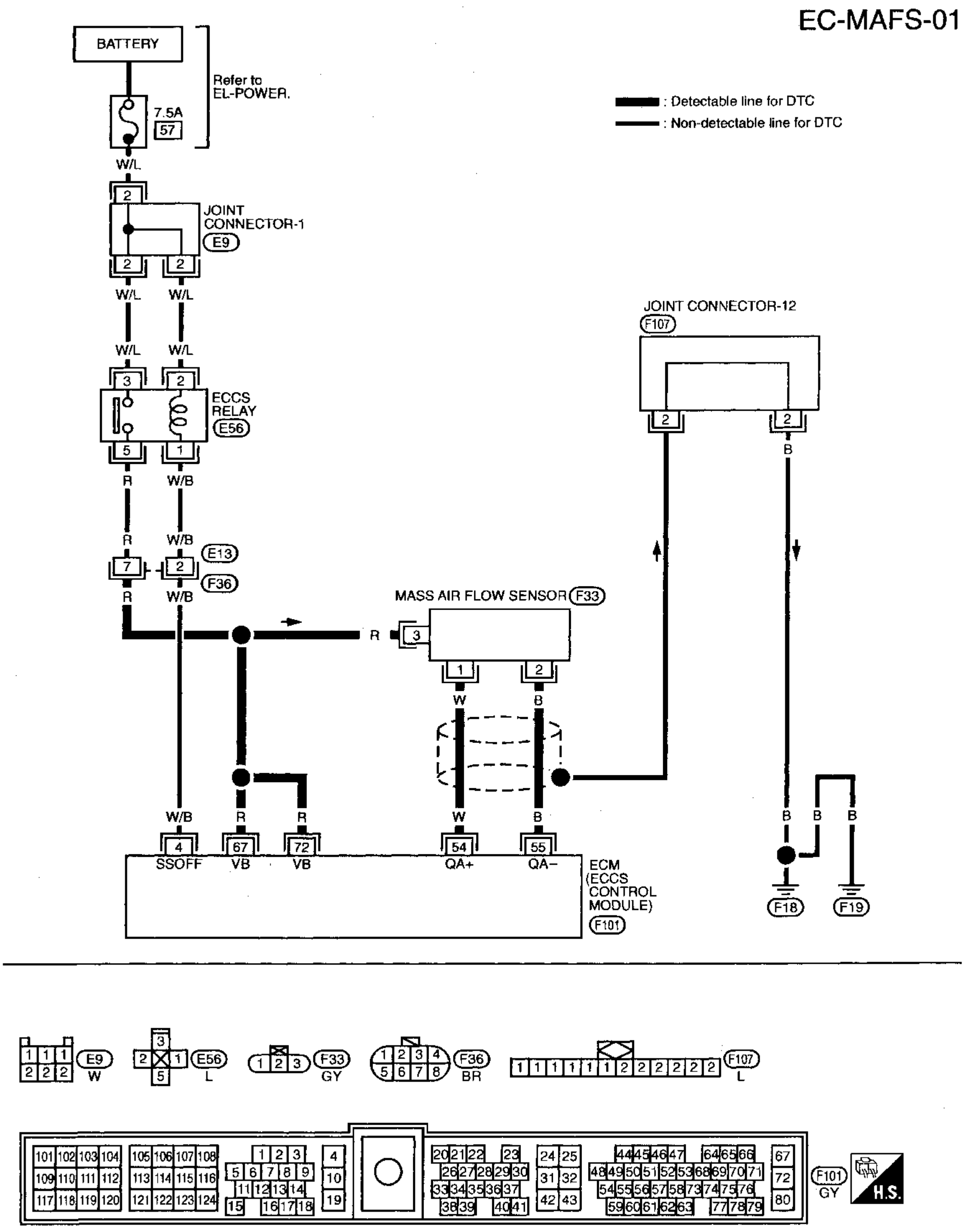
1) Turn ignition switch "ON".
2) Start engine and warm it up sufficiently.
3) Select "MODE 1" with GST.
4) Check the mass air flow with "MODE 1".
5) Check for linear mass air flow rise in response to increases to about 4,000 rpm in engine speed.

OR

1) Turn ignition switch "ON".
2) Start engine and warm it up sufficiently.
3) Check the voltage between ECM terminal (54) and ground.
4) Check for linear voltage rise in response to increases to about 4,000 rpm in engine speed.



SEF535P


EC-MAFS-01
BATTERY
7.5A
57
Refer to EL-POWER.
: Detectable line for DTC
: Non-detectable line for DTC
W/L
2
JOINT CONNECTOR-1
E9
W/L
W/L
3
2
ECCS RELAY
E56
5
1
R
W/B
7
2
E13
F36
JOINT CONNECTOR-12
F107
B
MASS AIR FLOW SENSOR
F33
R
3
1
2
W
B
W/B
R
R
W
B
4
67
72
54
55
SSOFF
VB
VB
QA+
QA−
ECM (ECCS CONTROL MODULE)
F101
F18
F19
E9
W
E56
L
F33
GY
F36
BR
F107
L
F101
GY
H.S.

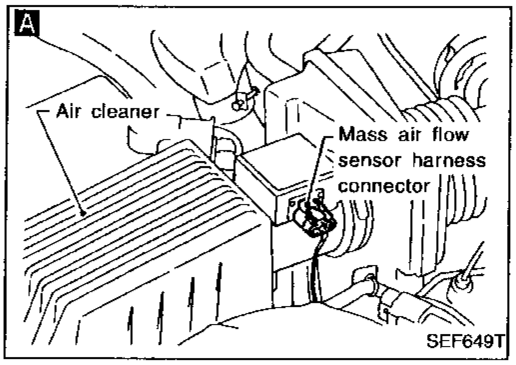
SEF221T

TROUBLE DIAGNOSIS FOR DTC P0100

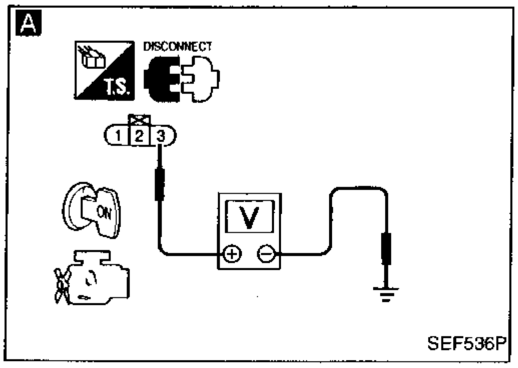
Mass Air Flow Sensor (MAFS) (Cont'd)

DIAGNOSTIC PROCEDURE

INSPECTION START



SEF649T



SEF536P

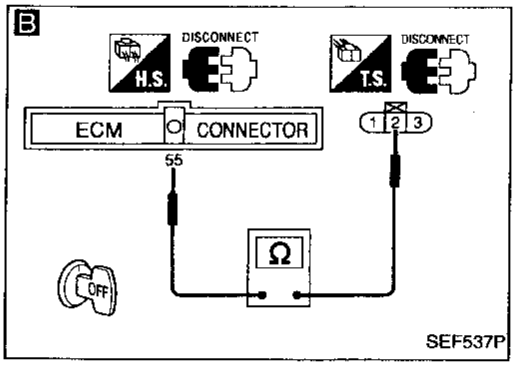
A

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

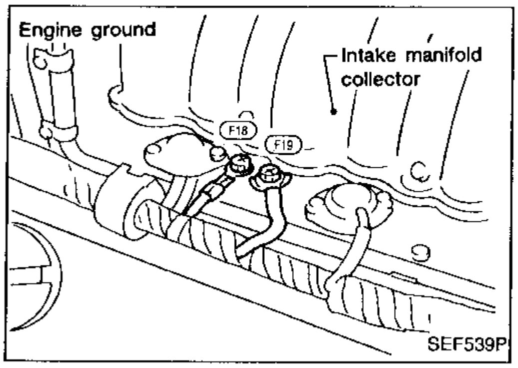
NG → Check the following.
- Harness for open or short between mass air flow sensor and ECM
- Harness for open or short between mass air flow sensor and harness connector (F36)

If NG, repair harness or connector.

OK ↓



SEF537P



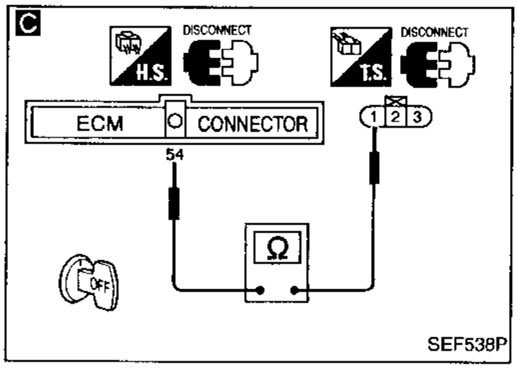
SEF539P

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 (55).
Continuity should exist.
If OK, check harness for short.

NG → Repair harness or connectors.

OK ↓



SEF538P

C

CHECK INPUT SIGNAL CIRCUIT.
1. Check harness continuity between terminal ① and ECM terminal (54).
Continuity should exist.
If OK, check harness for short.

NG → Repair harness or connectors.

OK ↓

CHECK COMPONENT
(Mass air flow sensor).
Refer to "COMPONENT INSPECTION", EC-108.

NG → Replace mass air flow sensor.

OK ↓

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

↓ Trouble is not fixed.

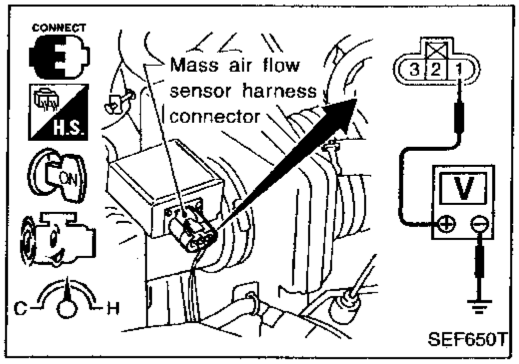
Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

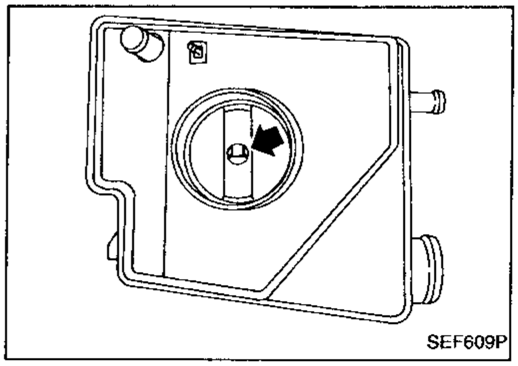
↓

INSPECTION END

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

COMPONENT INSPECTION





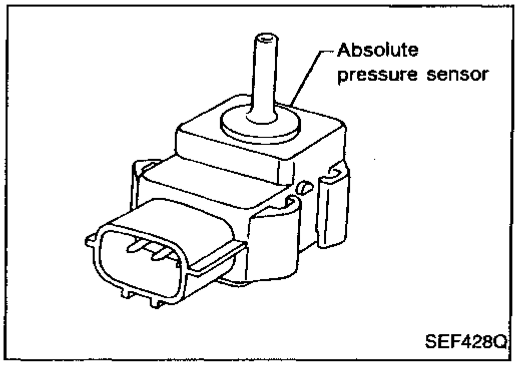
Mass air flow sensor

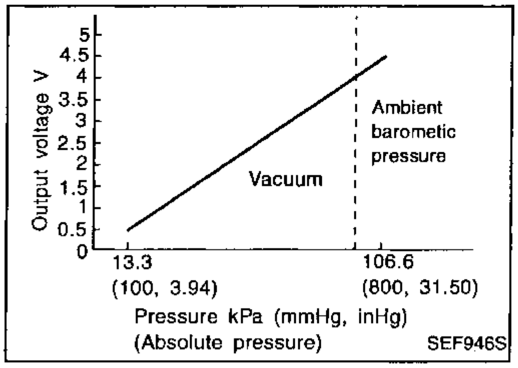
1. Turn ignition switch "ON".
2. Start engine and warm it up sufficiently.
3. Check voltage between terminal ① and ground.

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

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

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





Absolute Pressure Sensor

COMPONENT DESCRIPTION

The absolute pressure sensor is connected to the MAP/BARO switch solenoid valve with a duct. The sensor detects ambient barometric pressure and intake manifold pressure respectively, and modifies the voltage signal received from the ECM. The modified signal will then be returned to the ECM. As the pressure increases, the voltage rises. The absolute pressure sensor is not directly used to control the engine system. It is used only for on board diagnosis.

CONSULT REFERENCE VALUE IN DATA MONITOR MODE

- Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ABSOL PRES/SE	• Engine: After warming up	Engine is not running	Approx. 4.4V
		Idle	Approx. 1.2V

ECM TERMINALS AND REFERENCE VALUE

Remarks: Specification data are reference values, and are measured between each terminal and ㉕ (ECCS ground) with a voltmeter.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
61	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
42	R	Sensor's power supply	Ignition switch "ON"	Approximately 5V
43	B	Sensor's ground	Engine is running. (Warm-up condition) └ Idle speed	0V

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

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P0105 0803	A) An excessively low or high voltage from the sensor is entered into ECM.	• Harness or connectors (Absolute pressure sensor circuit is open or shorted.) • Absolute pressure sensor
	B) A low voltage from the sensor is entered into ECM under heavy load driving conditions.	• Absolute pressure sensor
	C) A high voltage from the sensor is entered into 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 "OVERALL FUNCTION CHECK", "Procedure for malfunction B". 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.

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

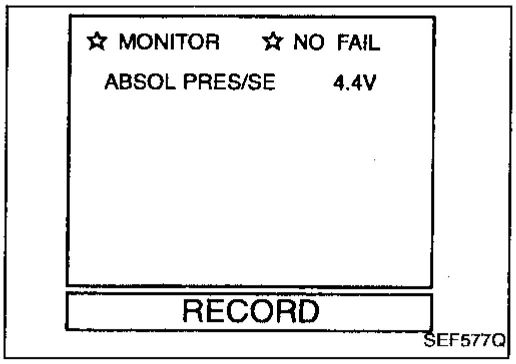
1) Start engine and warm it up sufficiently.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Start engine.
4) Let engine idle and wait at least 15 seconds.
5) Turn ignition switch "OFF".
6) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.

Absolute Pressure Sensor (Cont'd)

OVERALL FUNCTION CHECK

This procedure can be used for checking the overall function of absolute pressure sensor circuit. During this check, a DTC might not be confirmed.

Procedure for malfunction B



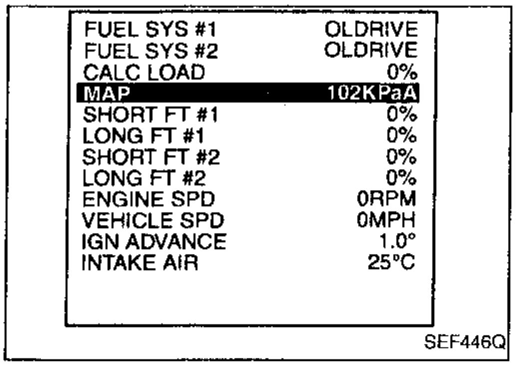
```
☆ MONITOR    ☆ NO FAIL
 ABSOL PRES/SE     4.4V

        RECORD
```

SEF577Q

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

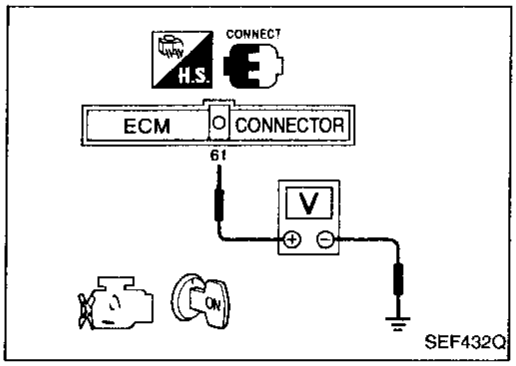


```
FUEL SYS #1       OLDRIVE
FUEL SYS #2       OLDRIVE
CALC LOAD              0%
MAP              102KPaA
SHORT FT #1            0%
LONG FT #1             0%
SHORT FT #2            0%
LONG FT #2             0%
ENGINE SPD          0RPM
VEHICLE SPD         0MPH
IGN ADVANCE          1.0°
INTAKE AIR           25°C
```

SEF446Q

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

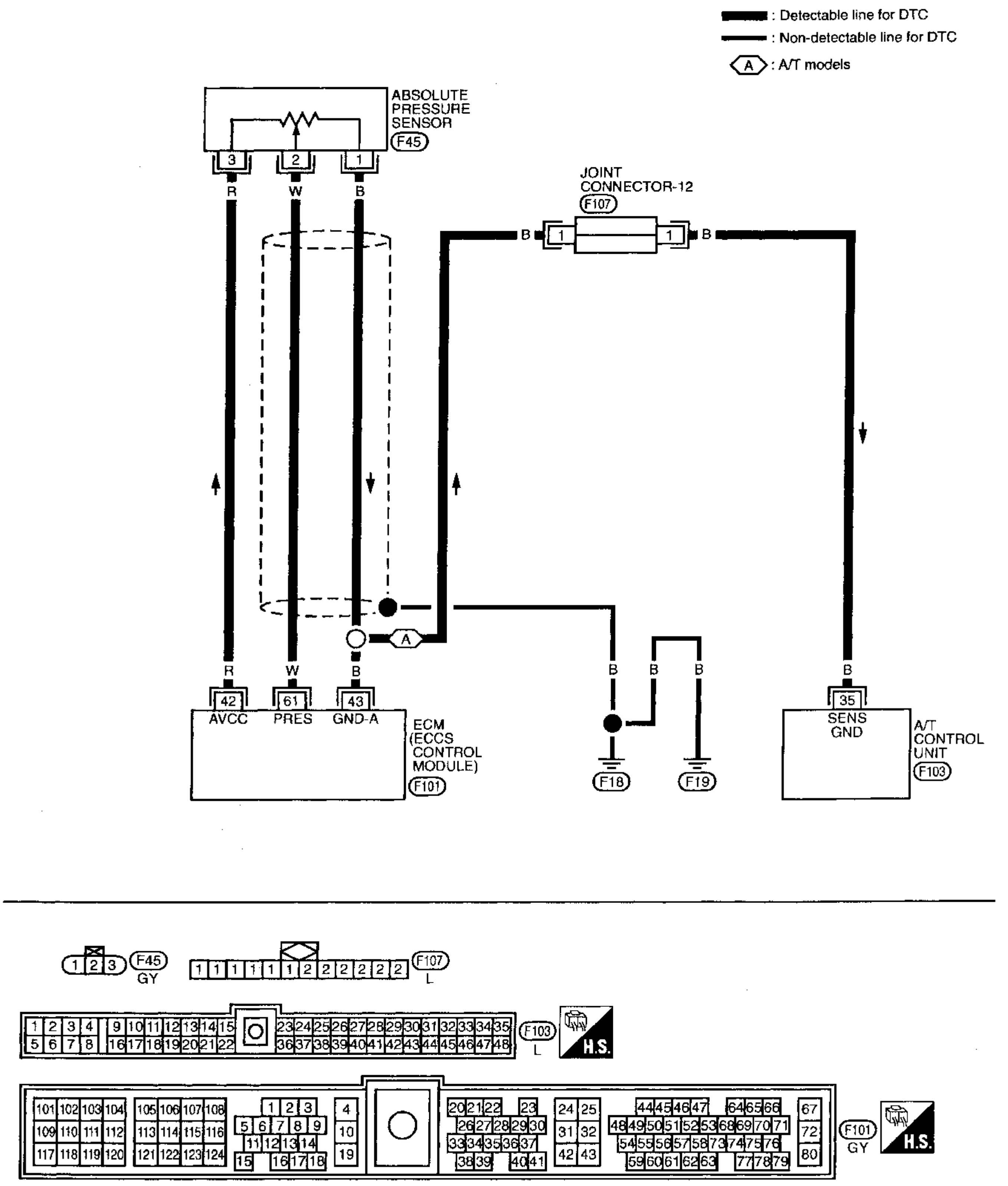


SEF432Q

NO TOOLS

1) Turn ignition switch "ON".
2) Make sure that the voltage between ECM terminal (61) and ground is more than 1.74 [V].

EC-AP/SEN-01



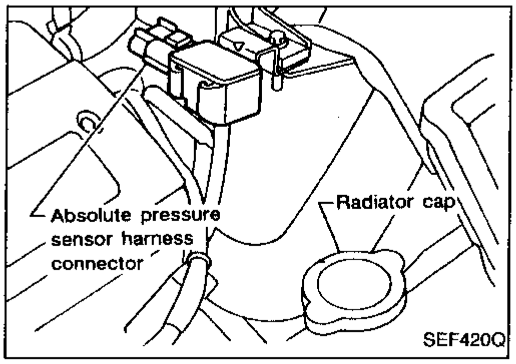
SEF234T

Absolute Pressure Sensor (Cont'd)

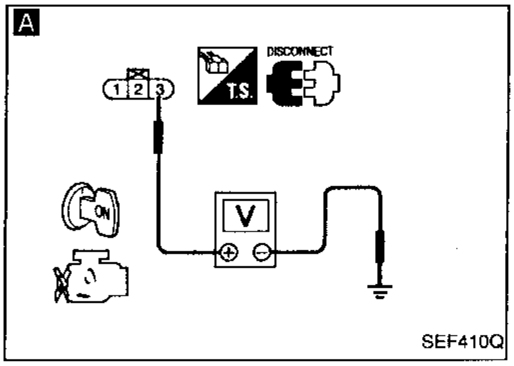
DIAGNOSTIC PROCEDURE

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

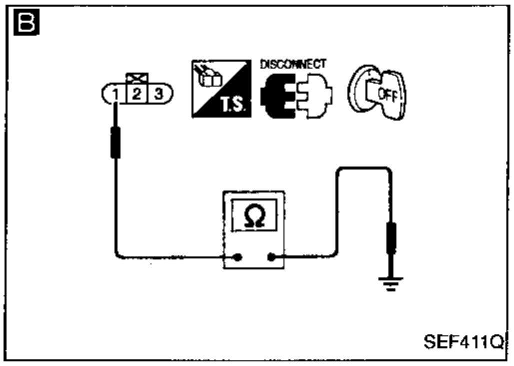
Procedure A



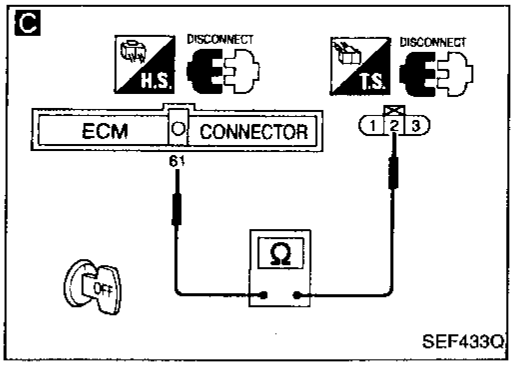
SEF420Q



SEF410Q



SEF411Q



SEF433Q

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 → 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 for open or short between ECM and absolute pressure sensor
- 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 ⑹ and terminal ② .
Continuity should exist.
If OK, check harness for short.

NG → Repair harness or connectors.

OK

CHECK COMPONENT
(Absolute pressure sensor).
Refer to "COMPONENT INSPECTION", EC-335.

NG → Replace absolute pressure sensor.

OK

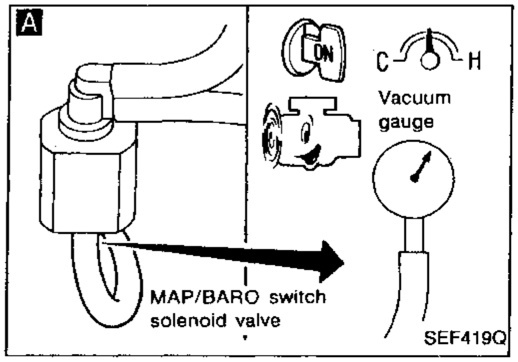
Disconnect and reconnect harness connectors in the circuit. Then retest.

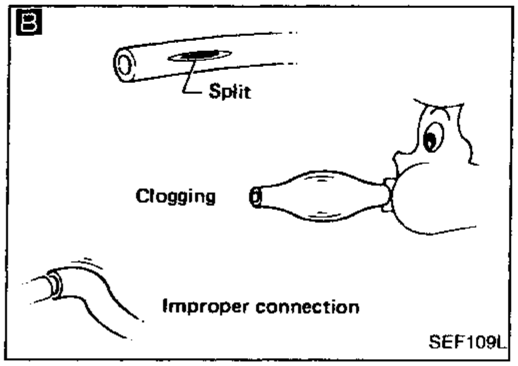
Trouble is not fixed.

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

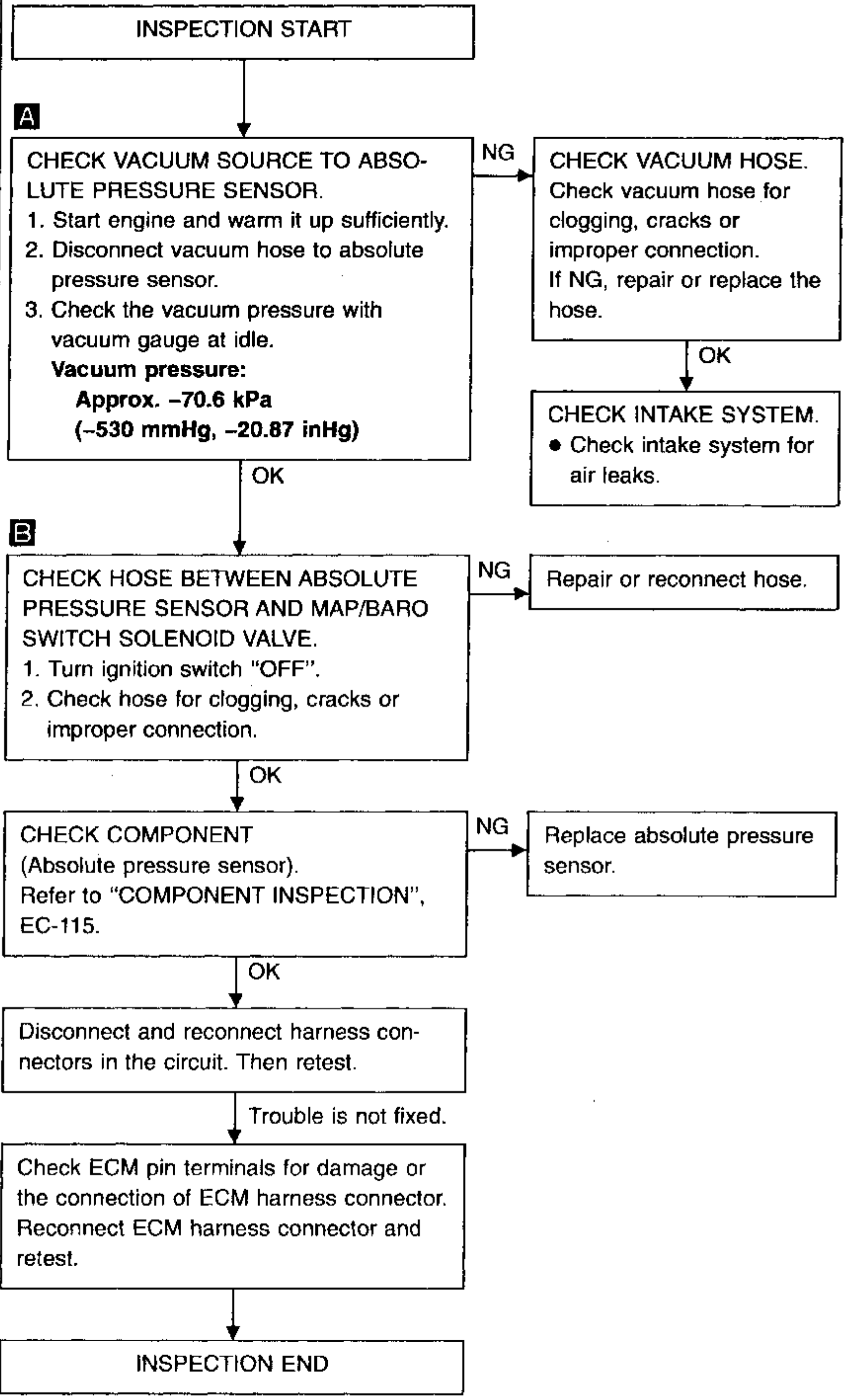
INSPECTION END

Absolute Pressure Sensor (Cont'd)





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. −70.6 kPa
   (−530 mmHg, −20.87 inHg)

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", EC-115.

NG → Replace absolute pressure sensor.

OK ↓

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

Trouble is not fixed. ↓

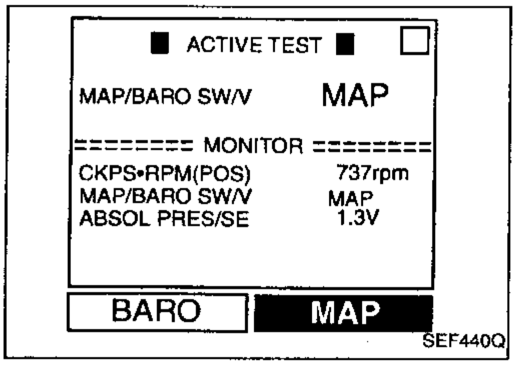
Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

↓

INSPECTION END

Absolute Pressure Sensor (Cont'd)

COMPONENT INSPECTION

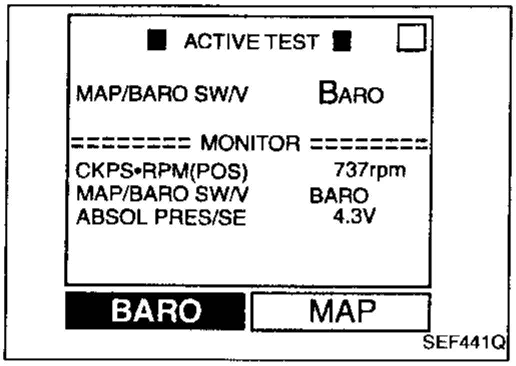

■ ACTIVE TEST ■ ☐

MAP/BARO SW/V MAP

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

CKPS•RPM(POS) 737rpm
MAP/BARO SW/V MAP
ABSOL PRES/SE 1.3V

SEF440Q


■ ACTIVE TEST ■ ☐

MAP/BARO SW/V BARO

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

CKPS•RPM(POS) 737rpm
MAP/BARO SW/V BARO
ABSOL PRES/SE 4.3V

SEF441Q

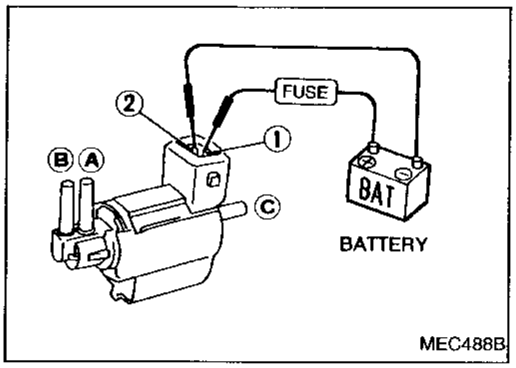
1. Start engine and warm it up sufficiently.
2. Perform "MAP/BARO SW/V" in "ACTIVE TEST" mode with CONSULT.
3. Make sure of the following.
   - When selecting "MAP", "ABSOL PRES/SE" indicates approximately 1.3V.
   - When selecting "BARO", "ABSOL PRES/SE" indicates approximately 4.3V.
4. If NG, check "Absolute pressure sensor" below.

OR

1. Remove MAP/BARO switch solenoid valve.
2. Check air passage continuity.

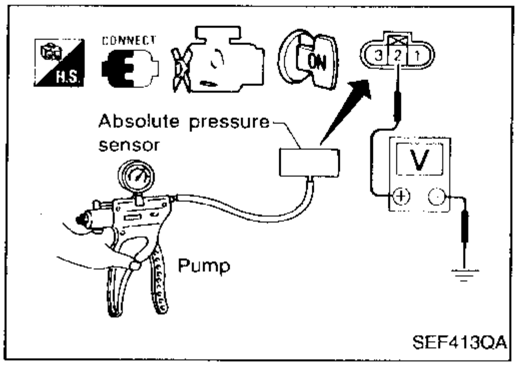
Condition	Air passage continuity between Ⓐ and Ⓑ	Air passage continuity between Ⓐ and Ⓒ
12V direct current supply between terminals ① and ②	Yes	No
No supply	No	Yes

3. If NG, check "Absolute pressure sensor" below.



MEC488B

Absolute pressure sensor

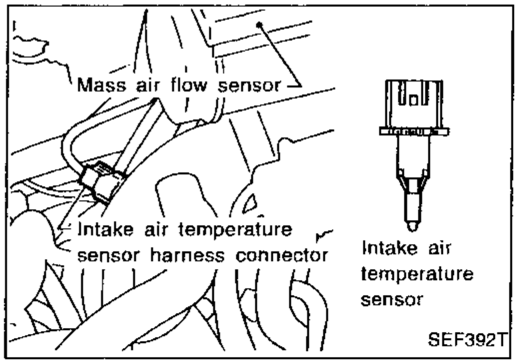


SEF413QA

1. Remove absolute pressure sensor from bracket with its harness connector connected.
2. Remove hose from absolute pressure sensor.
3. Apply vacuum and pressure to absolute pressure sensor as shown in figure.
4. Check output voltage between terminal ② and engine ground.

Pressure (Absolute pressure)	Voltage (V)
106.6 kPa (800 mmHg, 31.50 inHg)	Approximately 4.6
13.3 kPa (100 mmHg, 3.94 inHg)	Approximately 0.5

5. If NG, replace absolute pressure sensor.
   If OK, check MAP/BARO switch solenoid valve. Refer to "COMPONENT INSPECTION", EC-280.



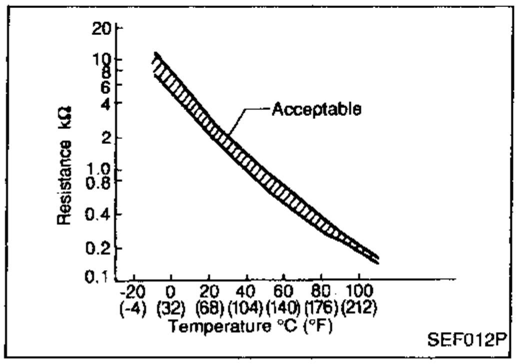
SEF392T

Intake Air Temperature Sensor

COMPONENT DESCRIPTION

The intake air temperature sensor is mounted to the air duct, 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 directly used to control the engine system. It is used only for the on board diagnosis.



SEF012P

⟨Reference data⟩

Intake air temperature °C (°F)	Resistance (kΩ)
−10 (14)	7.0 - 11.4
20 (68)	2.1 - 2.9
80 (176)	0.27 - 0.38

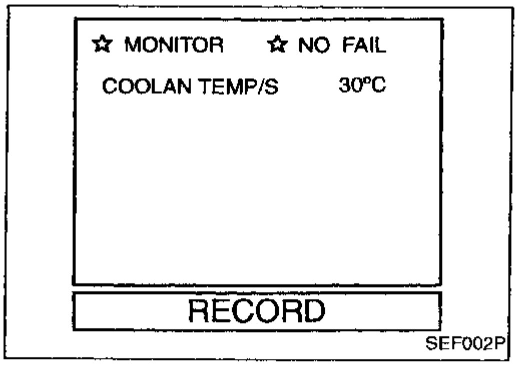
ECM TERMINALS AND REFERENCE VALUE

Remarks: Specification data are reference values, and are measured between each terminal and ㉕ (ECCS ground) with a voltmeter.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
43	B	Sensor's ground	Engine is running. (Warm-up condition) Idle speed	0V
58	SB	Intake air temperature sensor	Engine is running.	0 - 5.0V Output voltage varies with intake air temperature.

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 entered to ECM. B) Rationally incorrect voltage from the sensor is entered 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

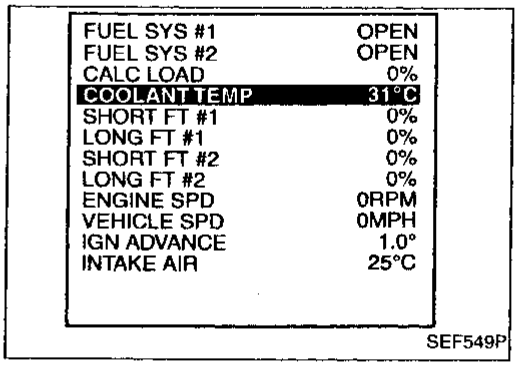


☆ MONITOR ☆ NO FAIL

COOLAN TEMP/S 30°C

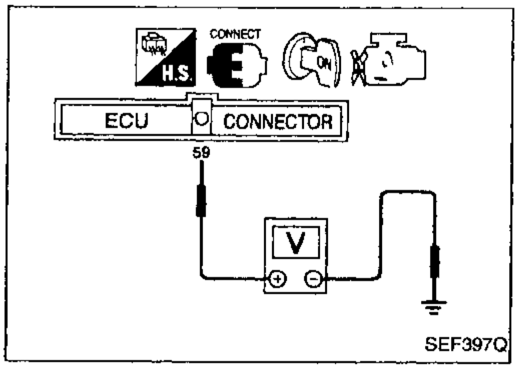
RECORD

SEF002P



FUEL SYS #1 OPEN
FUEL SYS #2 OPEN
CALC LOAD 0%
COOLANT TEMP 31°C
SHORT FT #1 0%
LONG FT #1 0%
SHORT FT #2 0%
LONG FT #2 0%
ENGINE SPD 0RPM
VEHICLE SPD 0MPH
IGN ADVANCE 1.0°
INTAKE AIR 25°C

SEF549P



SEF397Q

Intake Air Temperature Sensor (Cont'd)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

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.

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 (59) 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.

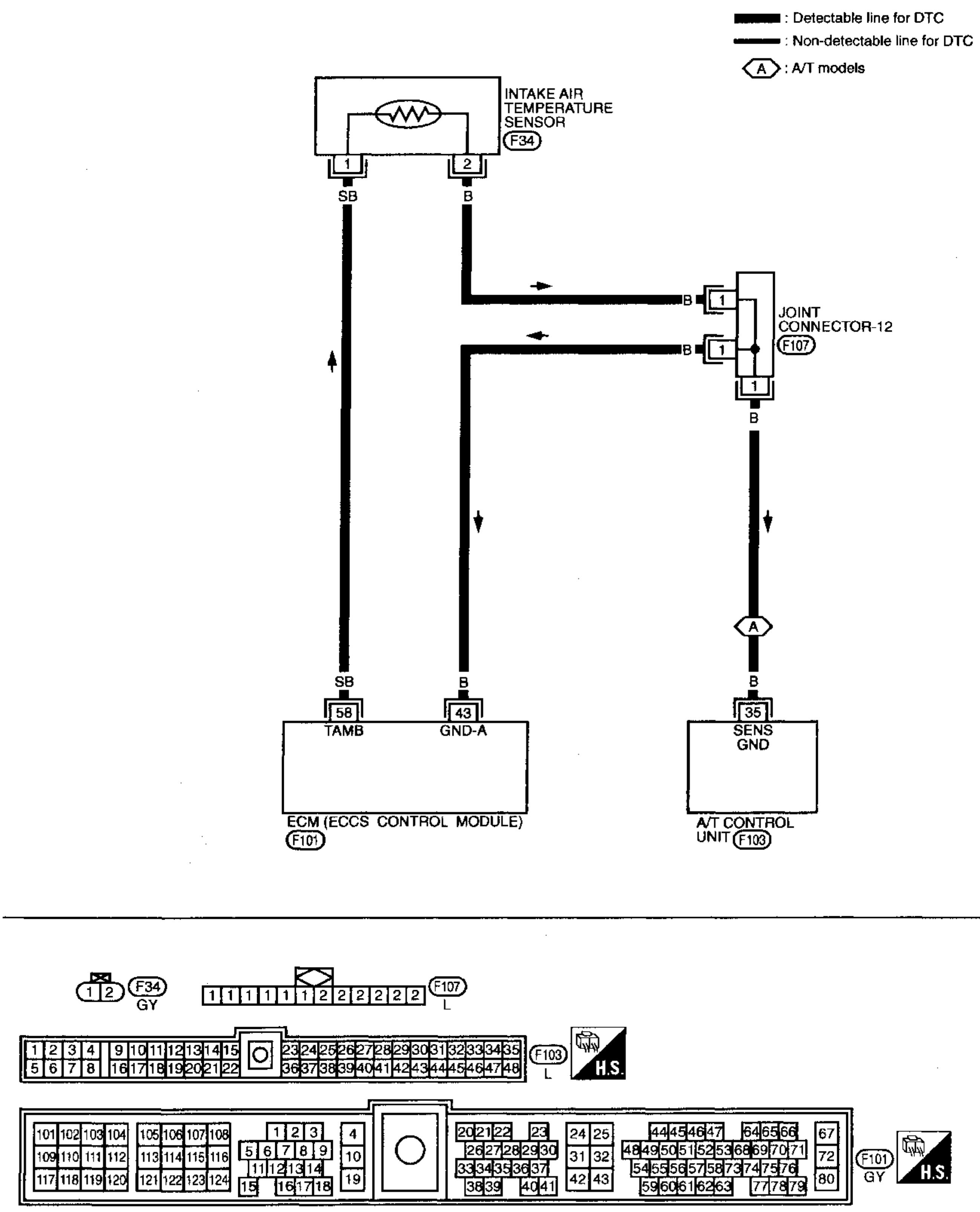
Intake Air Temperature Sensor (Cont'd)

- 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.

Intake Air Temperature Sensor (Cont'd)

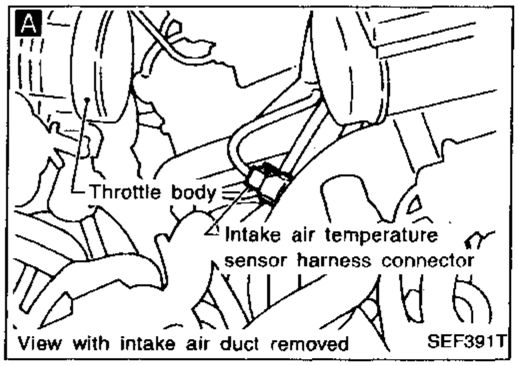
EC-IATS-01



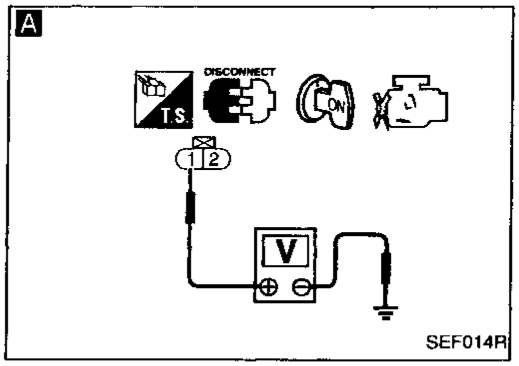
SEF229T

Intake Air Temperature Sensor (Cont'd)

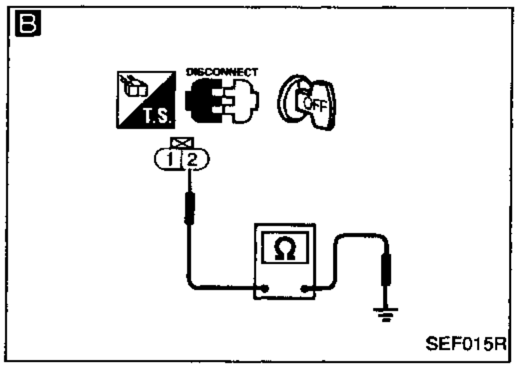
DIAGNOSTIC PROCEDURE



SEF391T



SEF014R



SEF015R

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 ① and ground.

Voltage:
Approximately 5V

NG → Check the following.
- 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 ② and engine ground.

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

NG → Check the following.
- 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", EC-121.

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 or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

↓

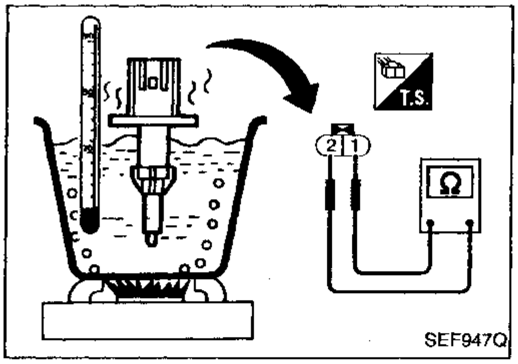
INSPECTION END

Intake Air Temperature Sensor (Cont'd)

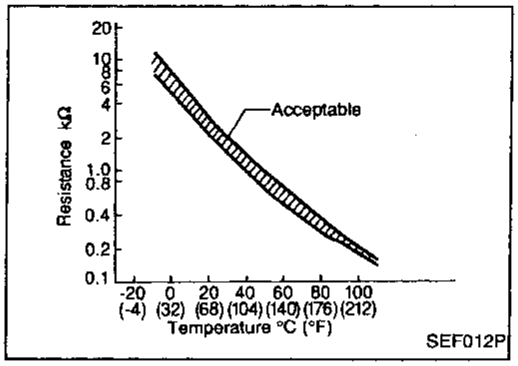
COMPONENT INSPECTION

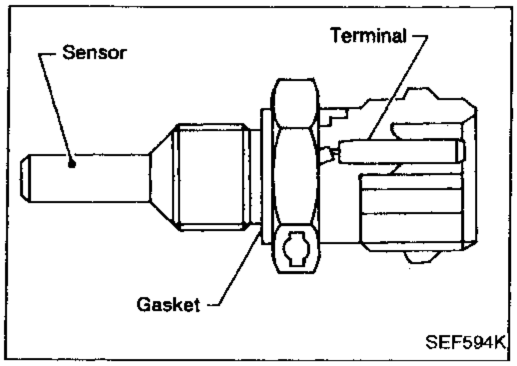
Intake air temperature sensor

Check resistance as shown in the figure.



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



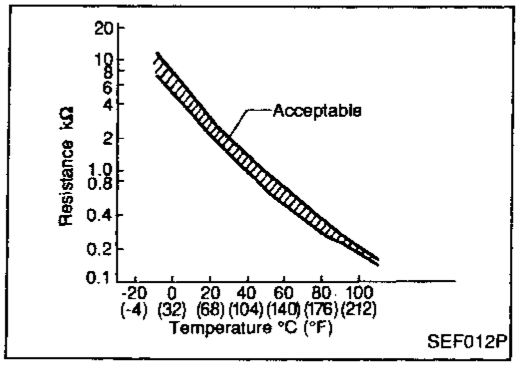


SEF594K

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.



SEF012P

⟨Reference data⟩

Engine coolant temperature °C (°F)	Voltage* (V)	Resistance (kΩ)
−10 (14)	4.4	9.2
20 (68)	3.5	2.5
50 (122)	2.2	0.84
90 (194)	1.0	0.25

*: These data are reference values and are measured between ECM terminal (59) (Engine coolant temperature sensor) and ECM terminal ㊸ (Sensor's ground).

CONSULT REFERENCE VALUE IN DATA MONITOR MODE

- Specification data are reference values.

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

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 entered to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Engine coolant temperature sensor

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

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

OR

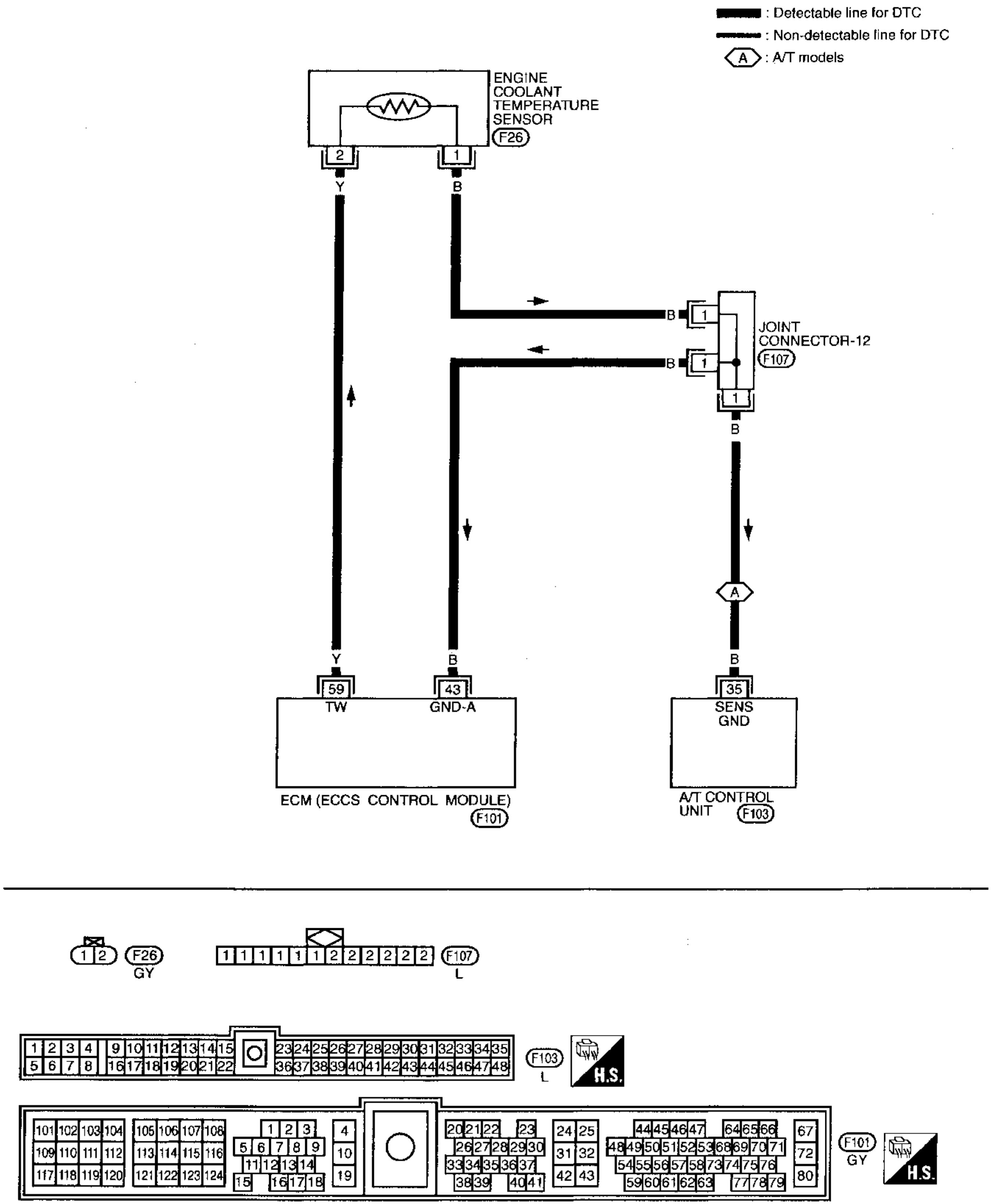
1) Turn ignition switch "ON" and wait at least 5 seconds.
2) Select "MODE 7" with GST.

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.

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

EC-ECTS-01



MEC649B

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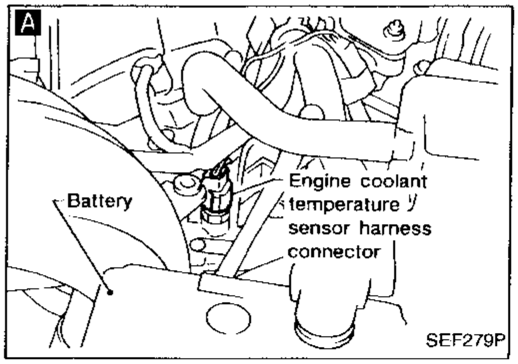
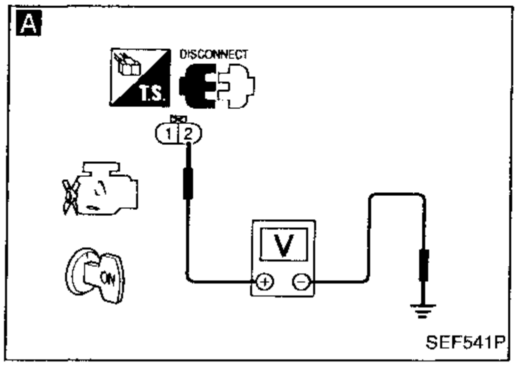
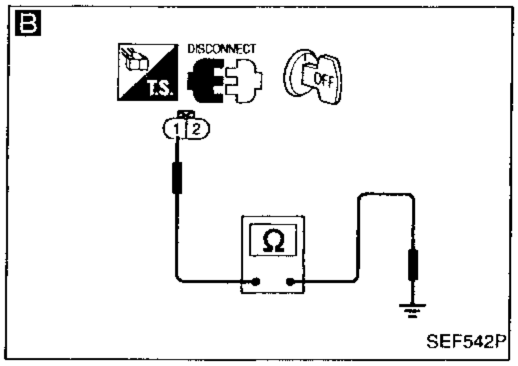
Engine Coolant Temperature Sensor (ECTS) (Cont'd)

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 → Check the following.
- Harness for open or short between ECM and engine coolant 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 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", EC-125.

NG → Replace engine coolant temperature sensor.

↓ 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.

↓

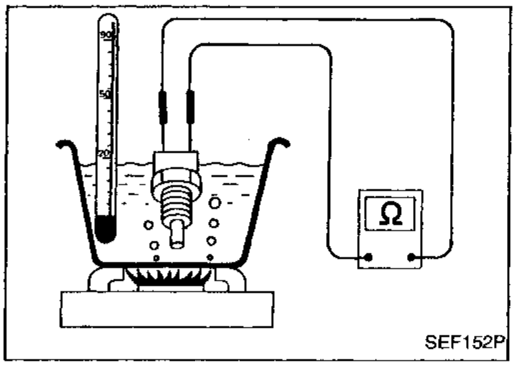
INSPECTION END

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

COMPONENT INSPECTION

Engine coolant temperature sensor

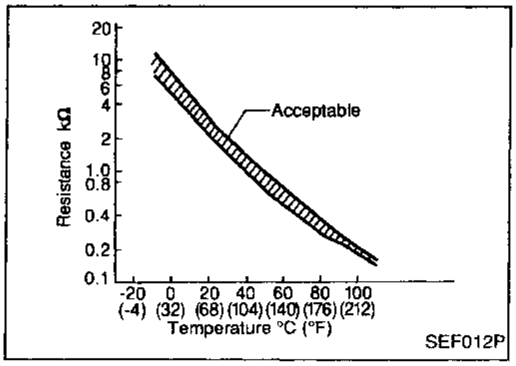
Check resistance as shown in the figure.



SEF152P

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.

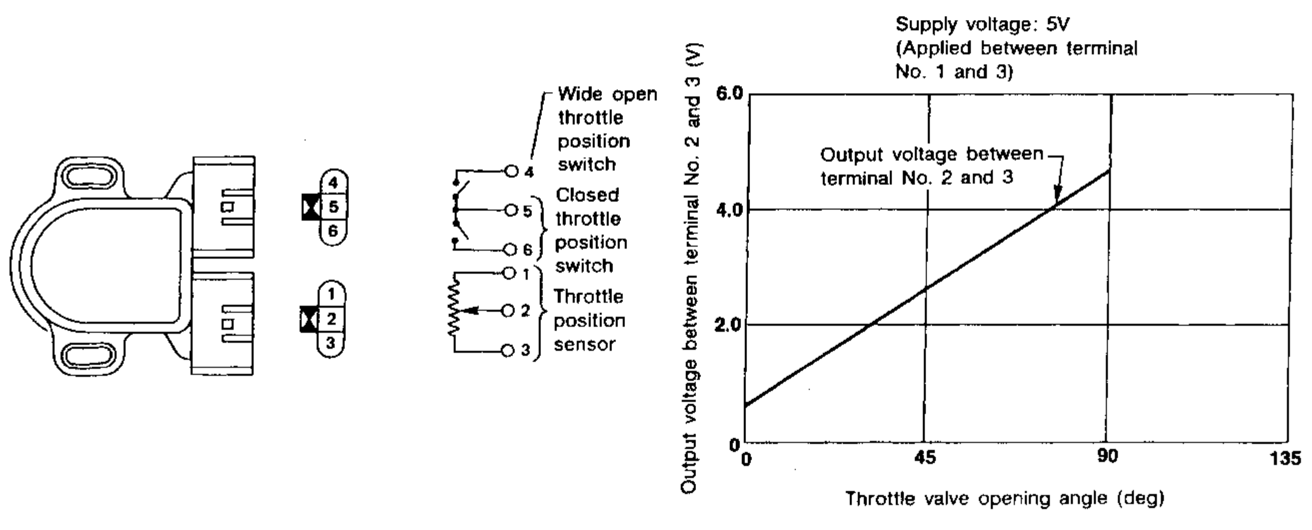


SEF012P

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 one 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	0.35 - 0.65V
		Throttle valve: fully opened	Approx. 4.0V

Throttle Position Sensor (Cont'd)

ECM TERMINALS AND REFERENCE VALUE

Remarks: Specification data are reference values, and are measured between each terminal and ㉕ (ECCS ground) with a voltmeter.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
23	W	Throttle position sensor	Ignition switch "ON" (Warm-up condition) └ Accelerator pedal released	0.35 - 0.65V
			Ignition switch "ON" └ Accelerator pedal fully depressed	Approximately 4V
42	R	Sensor's power supply	Ignition switch "ON"	Approximately 5V
43	B	Sensor's ground	Engine is running. (Warm-up condition) └ Idle speed	0V

ON BOARD DIAGNOSIS LOGIC

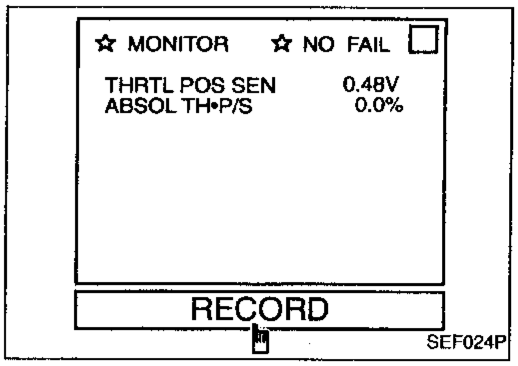
Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0120 0403	• An excessively low or high voltage from the sensor is entered to ECM. • Rationally incorrect voltage is entered to ECM compared with the signals from mass air flow sensor, crankshaft position sensor (POS) and IACV-AAC valve.	• Harness or connectors (The sensor circuit is open or shorted.) • Throttle position sensor

Throttle Position Sensor (Cont'd)

OVERALL FUNCTION CHECK

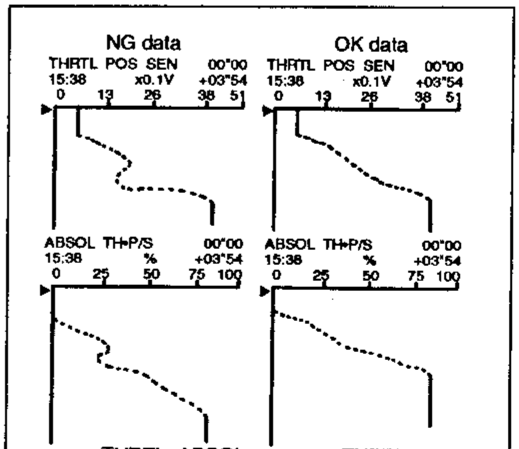
This procedure can be used for checking the overall function of the throttle position sensor circuit. During this check, a DTC might not be confirmed.

1) Start engine and warm it up sufficiently.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Turn ignition switch "ON".
4) Select "MANU TRIG" and "HI SPEED" in "DATA MONITOR" mode with CONSULT.
5) Select "THRTL POS SEN" and "ABSOL TH·P/S" in "DATA MONITOR" mode with CONSULT.
6) Press RECORD on CONSULT SCREEN at the same time accelerator pedal is depressed.
7) Print out the recorded data and make sure the followings:
    - The voltage when accelerator pedal fully released is approximately 0.35 - 0.65V.
    - The voltage rise is linear in response to accelerator pedal depression.
    - The voltage when accelerator pedal fully depressed is approximately 4V.


☆ MONITOR ☆ NO FAIL ☐

THRTL POS SEN 0.48V
ABSOL TH•P/S 0.0%

SEF024P



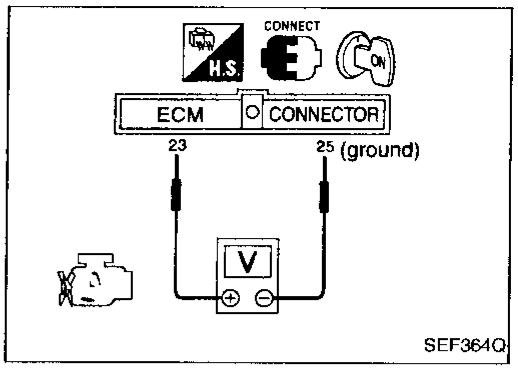
15:38	THRTL POS SEN (V)	ABSOL TH/PO SEN (%)
00"36	2.14	39.9
00"37	2.20	41.3
00"38	2.26	42.7
00"39	2.32	44.4
00"41	2.26	42.7
00"42	2.20	41.3
00"43	2.58	50.4
00"44	2.66	52.5
00"45	2.76	54.9

15:38	THRTL POS SEN (V)	ABSOL TH/PO SEN (%)
00"46	2.88	57.4
00"47	3.00	60.5
00"48	3.12	63.3
00"49	3.24	66.1
00"50	3.34	68.9
00"51	3.46	71.4
00"52	3.56	74.2
00"53	3.68	77.0
00"54	3.80	79.8

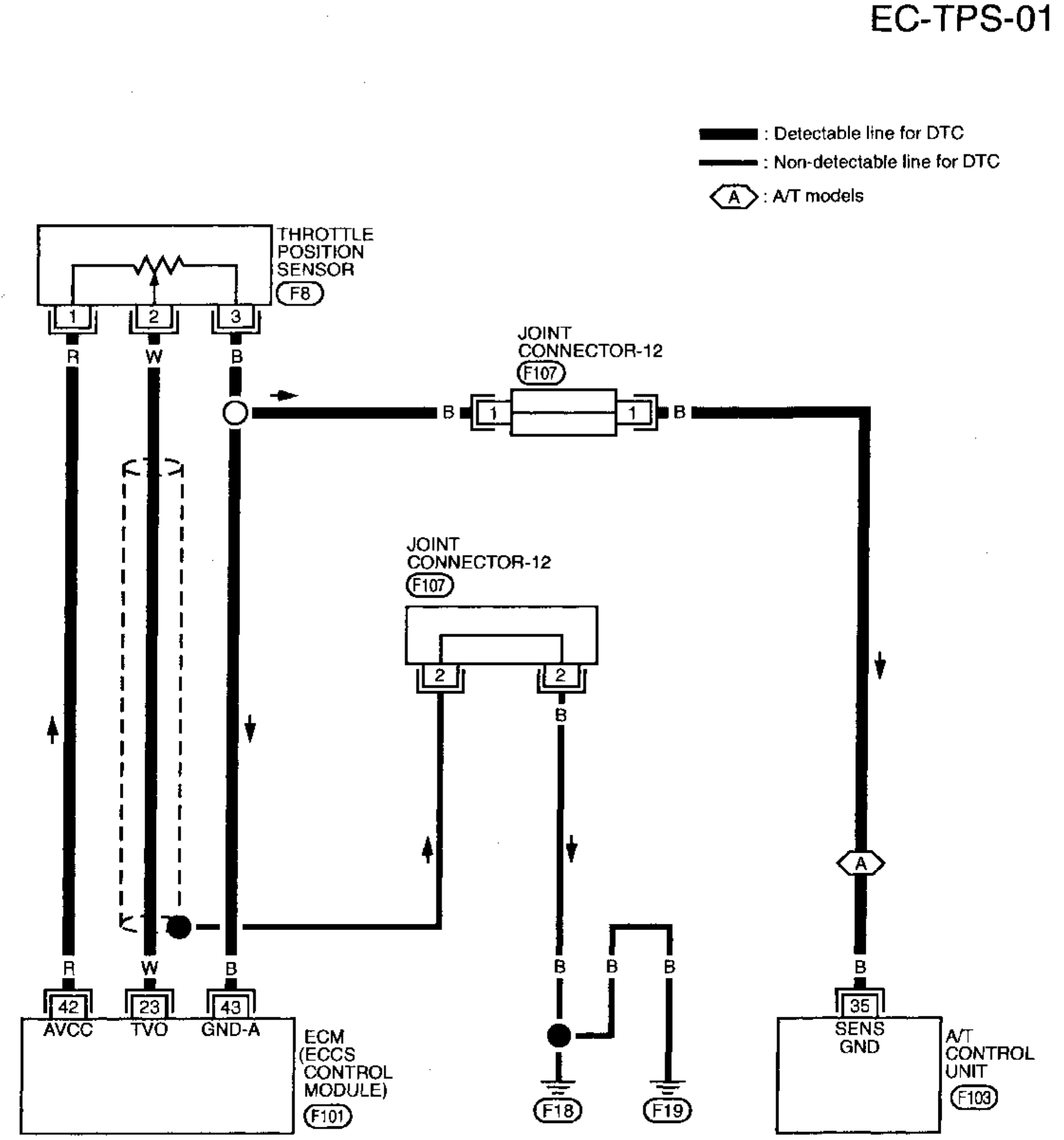
SEF021P

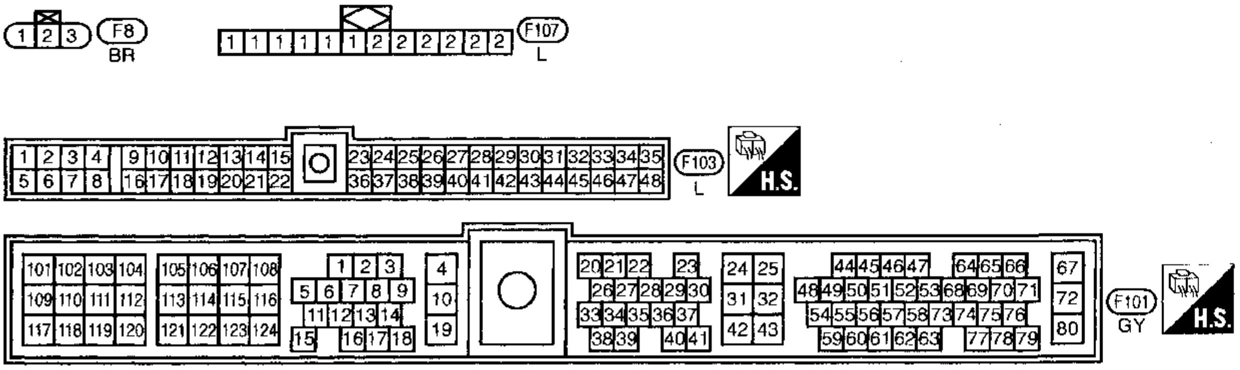
OR

1) Start engine and warm it up sufficiently.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Turn ignition switch "ON".
4) Check the voltage between ECM terminal ㉓ and ㉕ (ground) and make sure the followings:
    - The voltage when accelerator pedal fully released is approximately 0.35 - 0.65V.
    - The voltage rise is linear in response to accelerator pedal depression.
    - The voltage when accelerator pedal fully depressed is approximately 4V.



SEF364Q


EC-TPS-01
: Detectable line for DTC
: Non-detectable line for DTC
A : A/T models
THROTTLE POSITION SENSOR
F8
1
2
3
R
W
B
JOINT CONNECTOR-12
F107
B
1
1
B
JOINT CONNECTOR-12
F107
2
2
B
A
R
W
B
42
AVCC
23
TVO
43
GND-A
ECM (ECCS CONTROL MODULE)
F101
B
B
B
F18
F19
B
35
SENS GND
A/T CONTROL UNIT
F103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F8
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2
2
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2
F107
L
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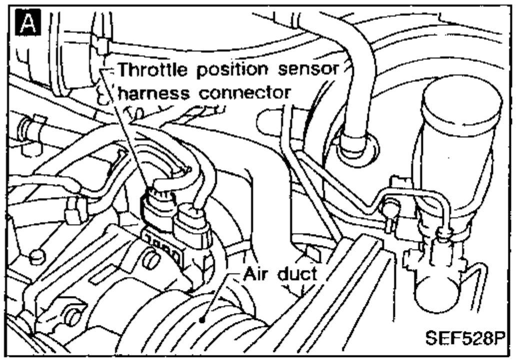
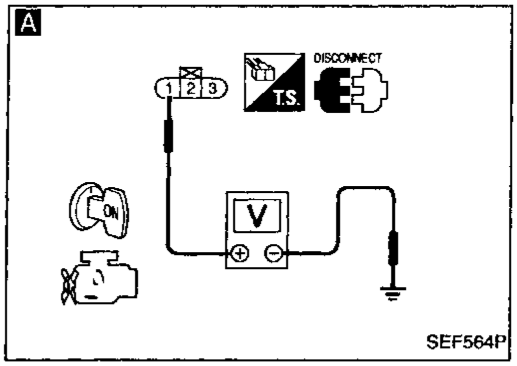
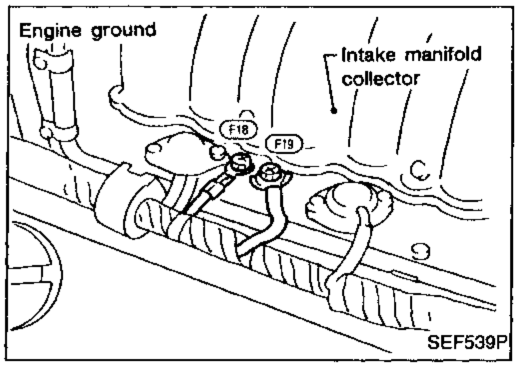
F101
GY
H.S.

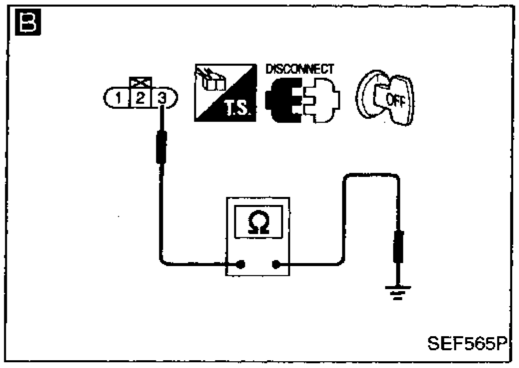
MEC661B

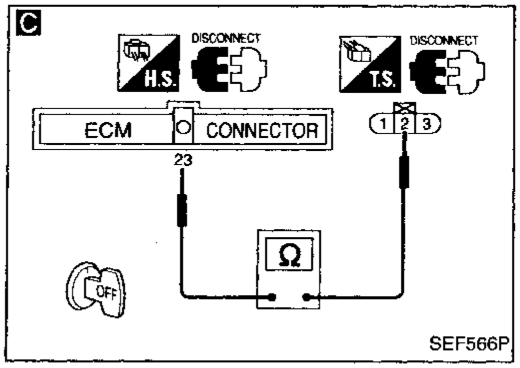
Throttle Position Sensor (Cont'd)











DIAGNOSTIC PROCEDURE

INSPECTION START

↓

ADJUST THROTTLE POSITION SENSOR.
Perform BASIC INSPECTION, EC-78.

↓ OK

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 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. Loosen and retighten ground screw.
3. Check harness continuity between terminal ③ and engine ground.
   Continuity should exist.
   If OK, check harness for short.

NG → Check the following.
- Joint connector-12 (F107)
- Harness for open or short between throttle position sensor and ECM
- Harness for open or short between throttle position sensor and A/T control unit

If NG, repair harness or connectors.

↓ OK

C

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

NG → Repair harness or connectors.

↓ OK

CHECK COMPONENT
(Throttle position sensor).
Refer to "COMPONENT INSPECTION", EC-131.

NG → Replace throttle position sensor. To adjust it, perform BASIC INSPECTION, EC-78.

↓ OK

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

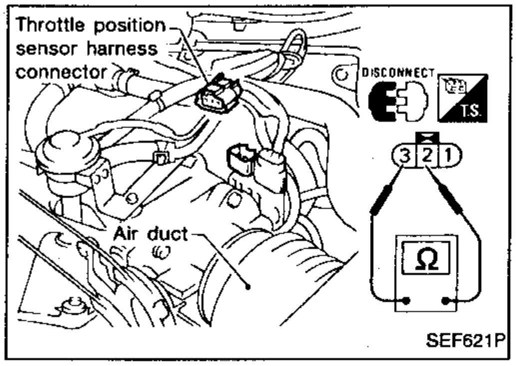
↓ Trouble is not fixed.

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

↓

INSPECTION END

Throttle Position Sensor (Cont'd)



SEF621P

COMPONENT INSPECTION

Throttle position sensor

1. Start engine and warm it up sufficiently.
2. Turn ignition switch "OFF".
3. Disconnect throttle position sensor harness connector.
4. Make sure that resistance between terminals ② and ③ changes when opening throttle valve manually.

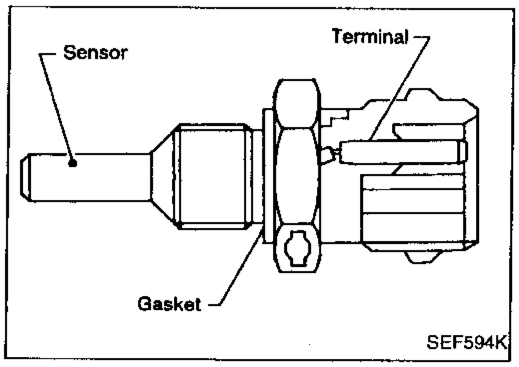
Throttle valve conditions	Resistance at 25°C (77°F)
Completely closed	Approximately 0.5 kΩ
Partially open	0.5 - 4.0 kΩ
Completely open	Approximately 4.0 kΩ

If NG, replace throttle position sensor.
To adjust throttle position sensor, perform "BASIC INSPECTION". (See page EC-78.)

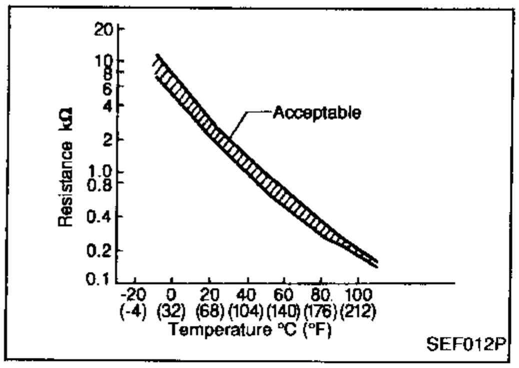
Engine Coolant Temperature Sensor (ECTS)

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	9.2
20 (68)	3.5	2.5
50 (122)	2.2	0.84
90 (194)	1.0	0.25

*: These data are reference values and are measured between ECM terminal (59) (Engine coolant temperature sensor) and ECM terminal ㊸ (Sensor's ground).

CONSULT REFERENCE VALUE IN DATA MONITOR MODE

- Specification data are reference values.

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

ON BOARD DIAGNOSIS LOGIC

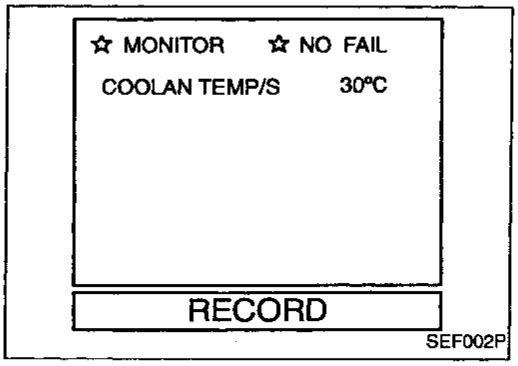
Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0125 0908	• Voltage sent to ECM from the sensor is not practical, even when some time has passed after starting the engine. • Engine coolant temperature is insufficient for closed loop fuel control.	• Harness or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

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

OVERALL FUNCTION CHECK

This procedure can be used for checking the overall function of the engine coolant temperature sensor circuit. During this check, a DTC might not be confirmed.

Note: If both DTC P0115 (0103) and P0125 (0908) are displayed, first perform TROUBLE DIAGNOSIS FOR DTC P0115 (0103). (See EC-122.)



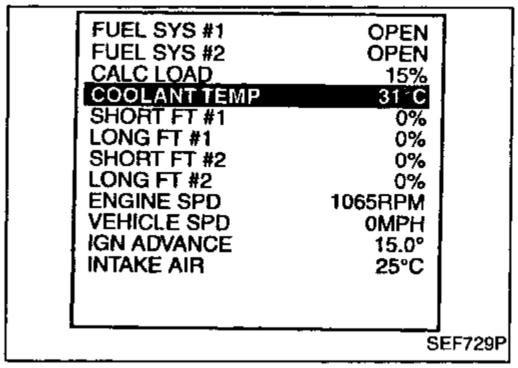
```
☆ MONITOR     ☆ NO FAIL
 COOLAN TEMP/S      30°C

         RECORD
```

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 25°C (77°F) or more within 20 minutes. (Be careful not to overheat engine.)

OR

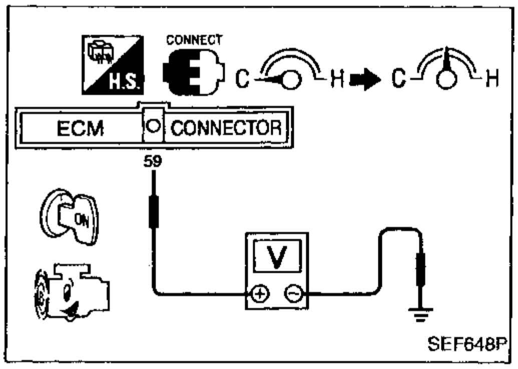


```
FUEL SYS #1          OPEN
FUEL SYS #2          OPEN
CALC LOAD             15%
COOLANT TEMP         31°C
SHORT FT #1            0%
LONG FT #1             0%
SHORT FT #2            0%
LONG FT #2             0%
ENGINE SPD        1065RPM
VEHICLE SPD          0MPH
IGN ADVANCE         15.0°
INTAKE AIR           25°C
```

SEF729P

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 25°C (77°F) or more. within 20 minutes. (Be careful not to overheat engine.)

OR

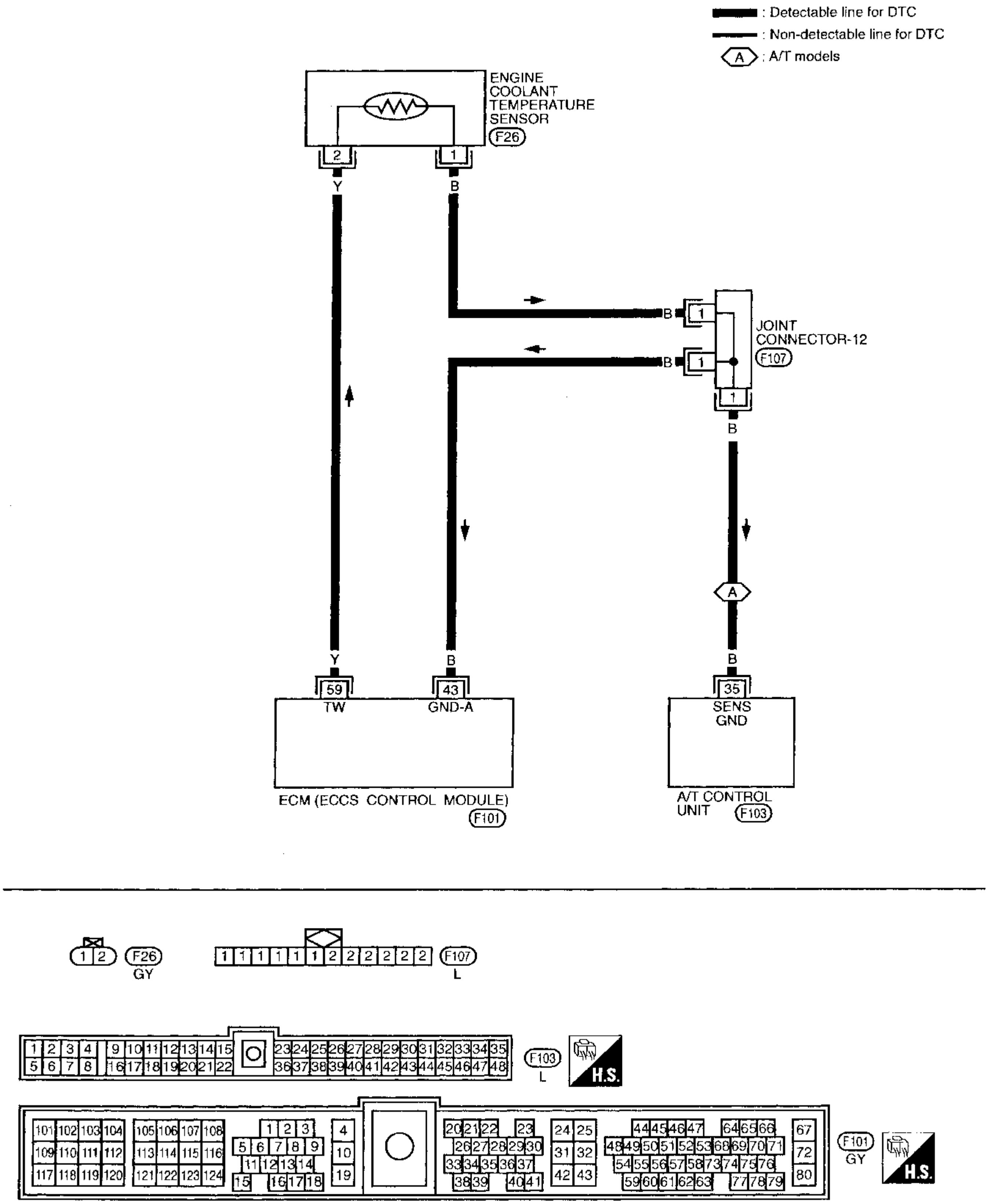


SEF648P

1) Turn ignition switch "ON".
2) Probe voltage meter between ECM terminal (59) and ground.
3) Start engine and run it at idle speed.
4) Check that voltage of engine coolant temperature changes to less than 3.3 (V) within 20 minutes. (Be careful not to overheat engine.)

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

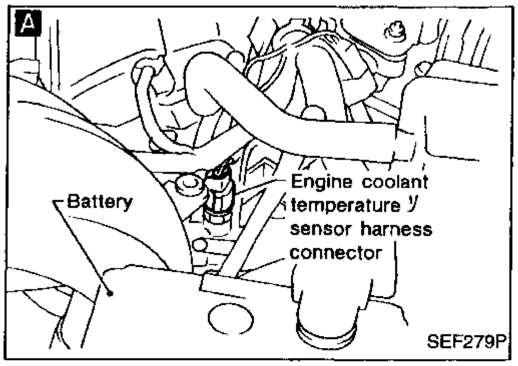
EC-ECTS-01



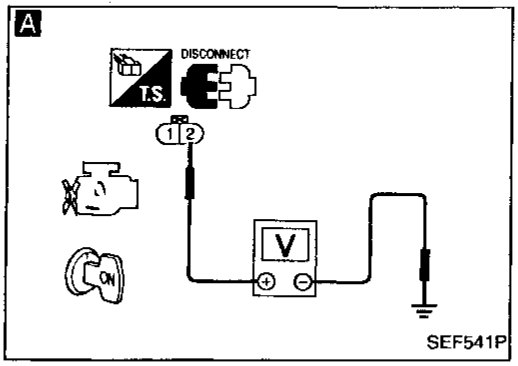
MEC649B

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

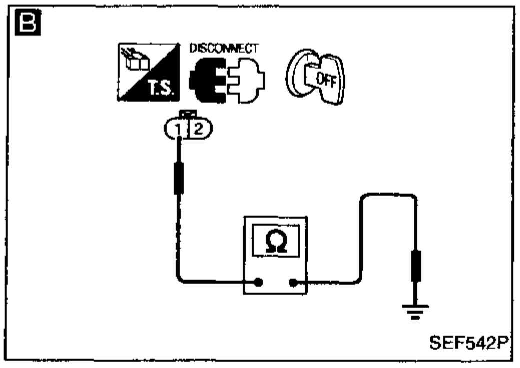
DIAGNOSTIC PROCEDURE



SEF279P



SEF541P



SEF542P

INSPECTION START

↓

A

CHECK POWER SUPPLY.
1. Turn ignition switch "OFF".
2. Disconnect engine coolant temperature sensor harness connector.
3. Turn ignition switch "ON".
4. Check voltage between terminal ② and ground with CONSULT or tester.

Voltage:
Approximately 5V

NG → Check the following.
- Harness for open or short between ECM and engine coolant 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 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", EC-136.

NG → Replace engine coolant temperature sensor.

OK ↓

CHECK THERMOSTAT OPERATION.
When the engine is cold [lower than 70°C (158°F)], grasp lower radiator hose and confirm the engine coolant does not flow.

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

OK ↓

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

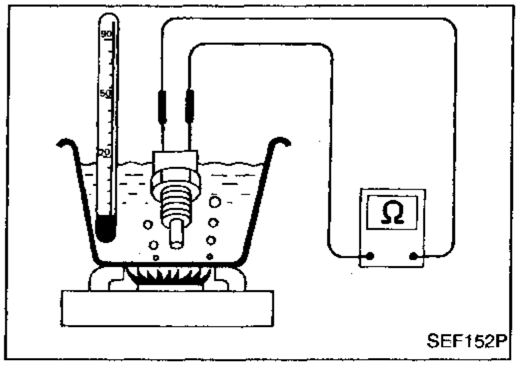
↓ Trouble is not fixed.

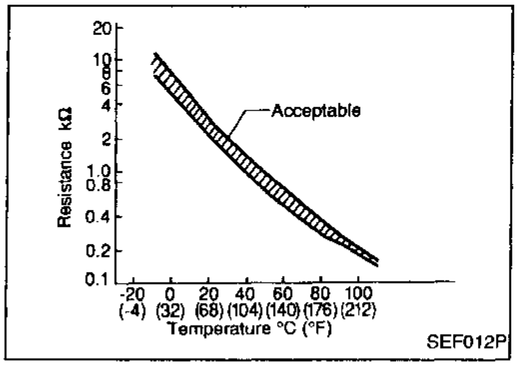
Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

↓

INSPECTION END

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





COMPONENT INSPECTION

Engine coolant temperature sensor

Check resistance as shown in the figure.

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

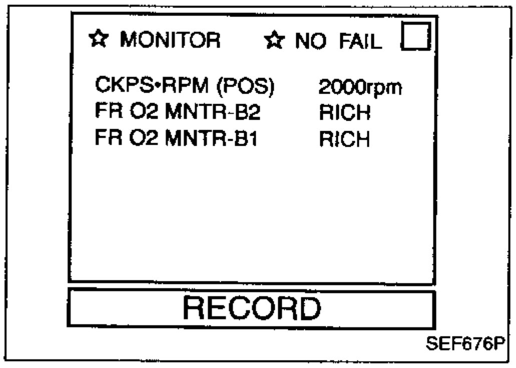
If NG, replace engine coolant temperature sensor.

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 ☐

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

OVERALL FUNCTION CHECK

This procedure can be used for checking the overall function of the closed loop control. During this check, a 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) Make sure of 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 goes on more than 5 times within 10 seconds while keeping at 2,000 rpm in Diagnostic Test Mode II (Front heated oxygen sensor monitor).

Closed Loop Control (Cont'd)

DIAGNOSTIC PROCEDURE

For right bank

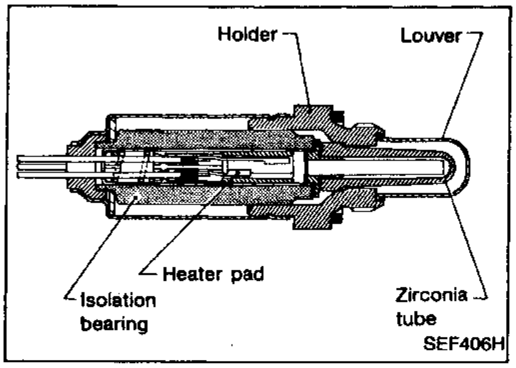
Refer to TROUBLE DIAGNOSIS FOR DTC P0130 (0503). (See page EC-139.)

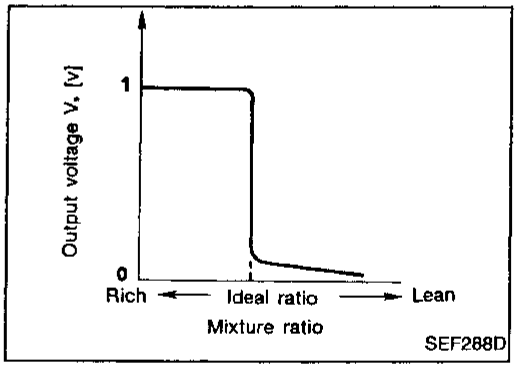
Refer to TROUBLE DIAGNOSIS FOR DTC P0135 (0901). (See page EC-144.)

For left bank

Refer to TROUBLE DIAGNOSIS FOR DTC P0150 (0303). (See page EC-158.)

Refer to TROUBLE DIAGNOSIS FOR DTC P0155 (1001). (See page EC-164.)





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-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.

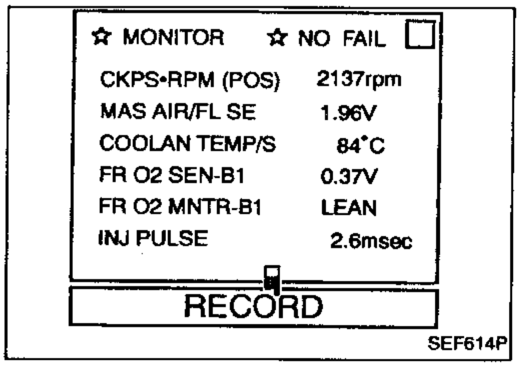
ECM TERMINALS AND REFERENCE VALUE

Remarks: Specification data are reference values, and are measured between each terminal and ㉕ (ECCS ground) with a voltmeter.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
50 51	W W	Front heated oxygen sensor (Right bank) Front heated oxygen sensor (Left bank)	Engine is running. After warming up sufficiently and engine speed is 2,000 rpm.	0 - Approximately 1.0V (periodically change)

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 entered 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



☆ MONITOR ☆ NO FAIL ☐

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

SEF614P

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

OVERALL FUNCTION CHECK

This procedure can be used for checking the overall function of the front heated oxygen sensor circuit. During this check, a 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) Make sure of the following.

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

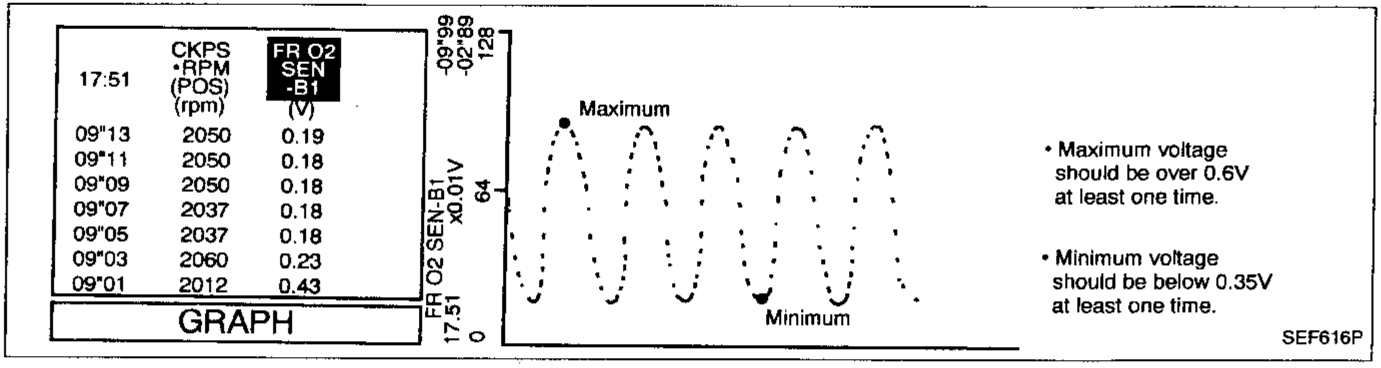
  5 times (cycles) are counted as shown below:

  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.

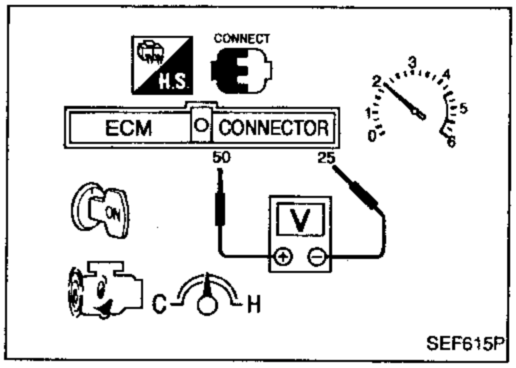


17:51	CKPS •RPM (POS) (rpm)	FR O2 SEN -B1 (V)
09"13	2050	0.19
09"11	2050	0.18
09"09	2050	0.18
09"07	2037	0.18
09"05	2037	0.18
09"03	2060	0.23
09"01	2012	0.43

• Maximum voltage should be over 0.6V at least one time.

• Minimum voltage should be below 0.35V at least one time.

SEF616P



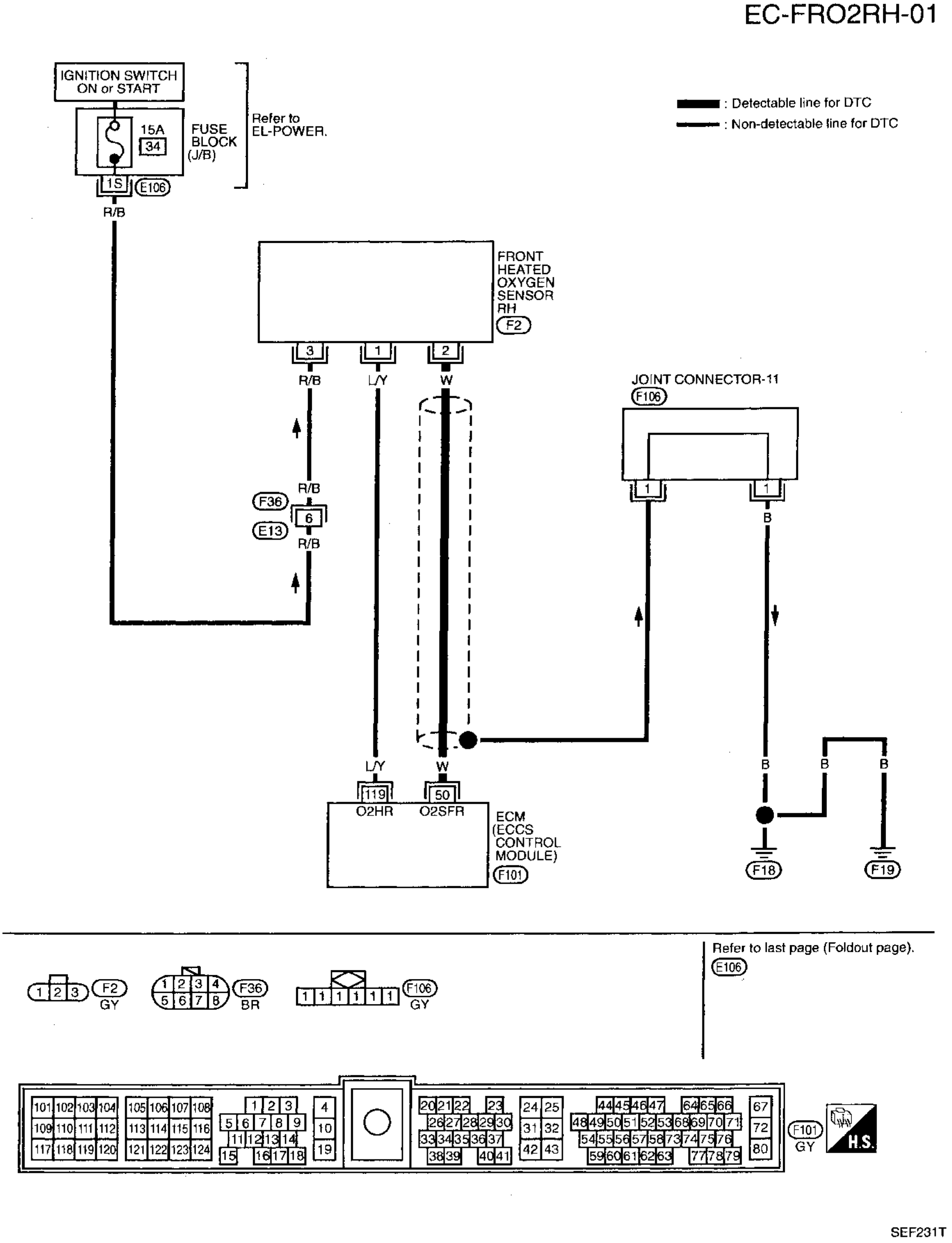
SEF615P

OR

1) Start engine and warm it up sufficiently.
2) Set voltmeter probes between ECM terminal ㊿ (sensor signal) and ㉕ (engine ground).
3) Make sure of the following with engine speed held at 2,000 rpm constant under no load.

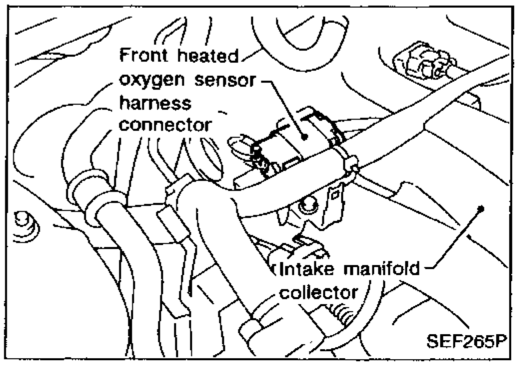
- Malfunction indicator lamp goes on more than 5 times within 10 seconds in Diagnostic Test Mode II (FRONT HEATED OXYGEN SENSOR MONITOR).
- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is below 0.35V at least one time.
- The voltage never exceeds 1.0V.

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



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

DIAGNOSTIC PROCEDURE



SEF265P

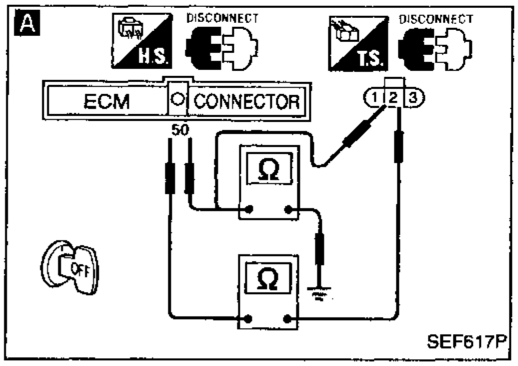
INSPECTION START

A

CHECK INPUT SIGNAL CIRCUIT.
1. Turn ignition switch "OFF".
2. Disconnect front heated oxygen sensor (right bank) harness connector and ECM harness connector.
3. Check harness continuity between ECM terminal ㊿ and terminal ② .
Continuity should exist.
4. Check harness continuity between ECM terminal ㊿ (or terminal ②) and ground.
Continuity should not exist.

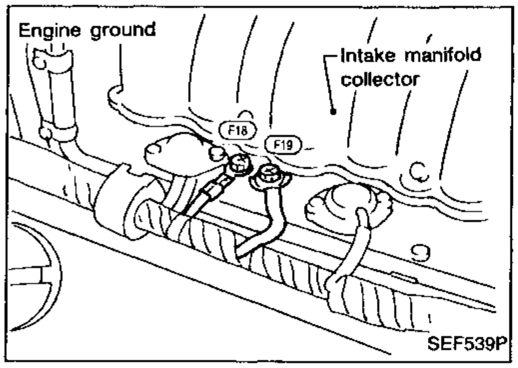
NG → Repair harness or connectors.

OK ↓



SEF617P

Loosen and retighten engine ground screws.



SEF539P

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. Wait at least 10 minutes at idle speed.
Are the DTCs P0171, P0172 detected? Is it difficult to start engine?

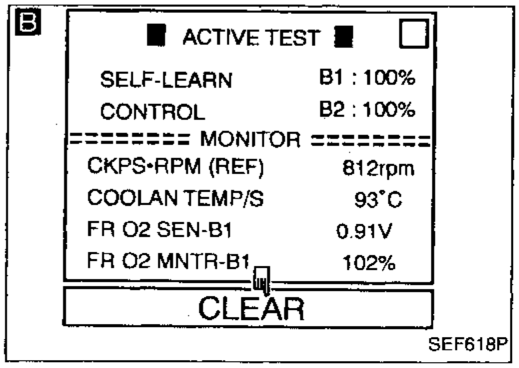
OR

2. Turn ignition switch "OFF".
3. Disconnect mass air flow sensor harness connector, and restart and run engine 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. Wait at least 10 minutes at idle speed.
Are the DTCs 0114, 0115 detected? Is it difficult to start engine?

Yes → Go to "TROUBLE DIAGNOSIS FOR DTC P0171 (0114), P0172 (0115)". (See page EC-173, 168.)

No ↓

Ⓐ



■ ACTIVE TEST ■ ☐

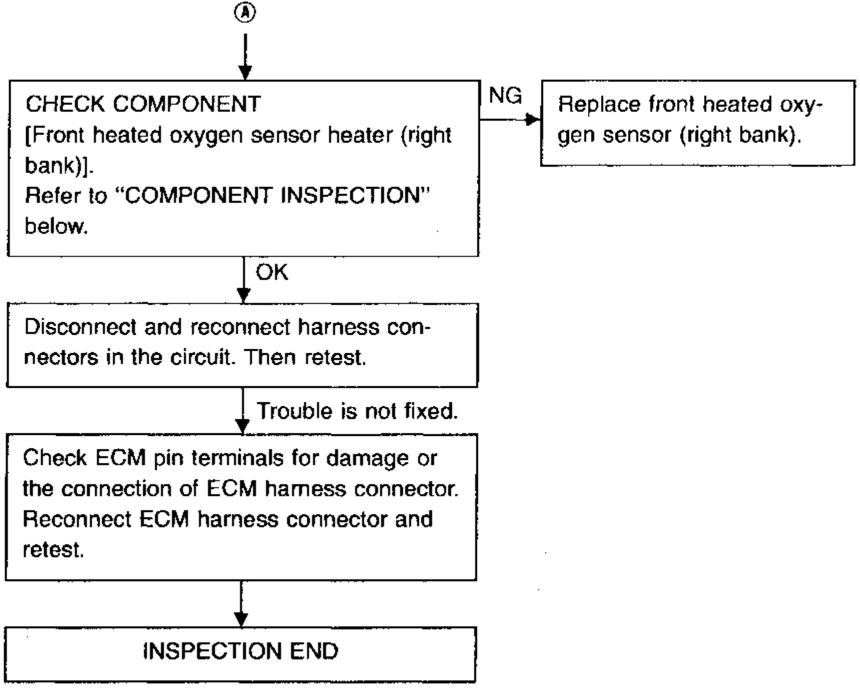
SELF-LEARN CONTROL B1 : 100% B2 : 100%

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

CKPS•RPM (REF)	812rpm
COOLAN TEMP/S	93°C
FR O2 SEN-B1	0.91V
FR O2 MNTR-B1	102%

SEF618P

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



Ⓐ

CHECK COMPONENT
[Front heated oxygen sensor heater (right bank)].
Refer to "COMPONENT INSPECTION" below.

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

OK ↓

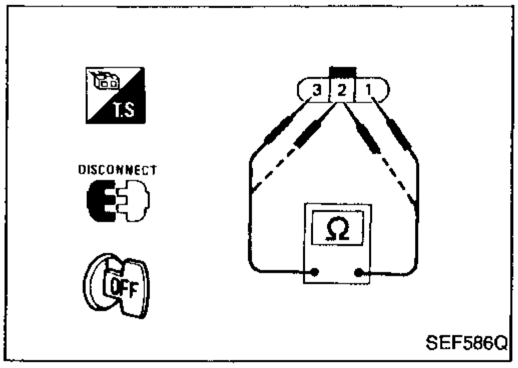
Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed. ↓

Check ECM pin terminals for damage or 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)

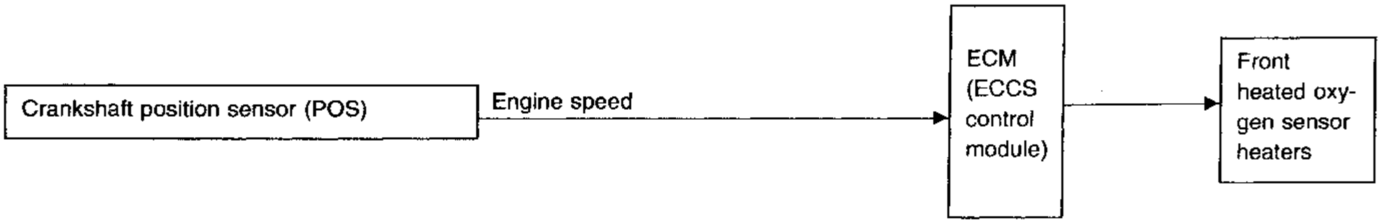
Check continuity between terminals ② and ①, ③ and ②.

Continuity should not exist.

If NG, replace the front heated oxygen sensor.

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 3,600 (A/T models) or 4,000 (M/T models)	OFF
Below 3,600 (A/T models) or 4,000 (M/T models)	ON

CONSULT REFERENCE VALUE IN DATA MONITOR MODE

- Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
FR O2 SEN HTR-B1 FR O2 SEN HTR-B2	• Engine speed: Idle	ON
	• Engine speed: Above 3,600 rpm	OFF

ECM TERMINALS AND REFERENCE VALUE

Remarks: Specification data are reference values, and are measured between each terminal and ㉕ (ECCS ground) with a voltmeter.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
119	L/Y	Front heated oxygen sensor heater (right bank)	Engine is running. └ Engine speed is below 3,600 rpm (A/T models) or 4,000 rpm (M/T models).	0 - 0.5V
			Engine is running. └ Engine speed is above 3,600 rpm (A/T models) or 4,000 rpm (M/T models).	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. (The improper voltage drop signal is entered 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 at least 5 seconds at idle speed.

OR

1) Start engine and run it 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.

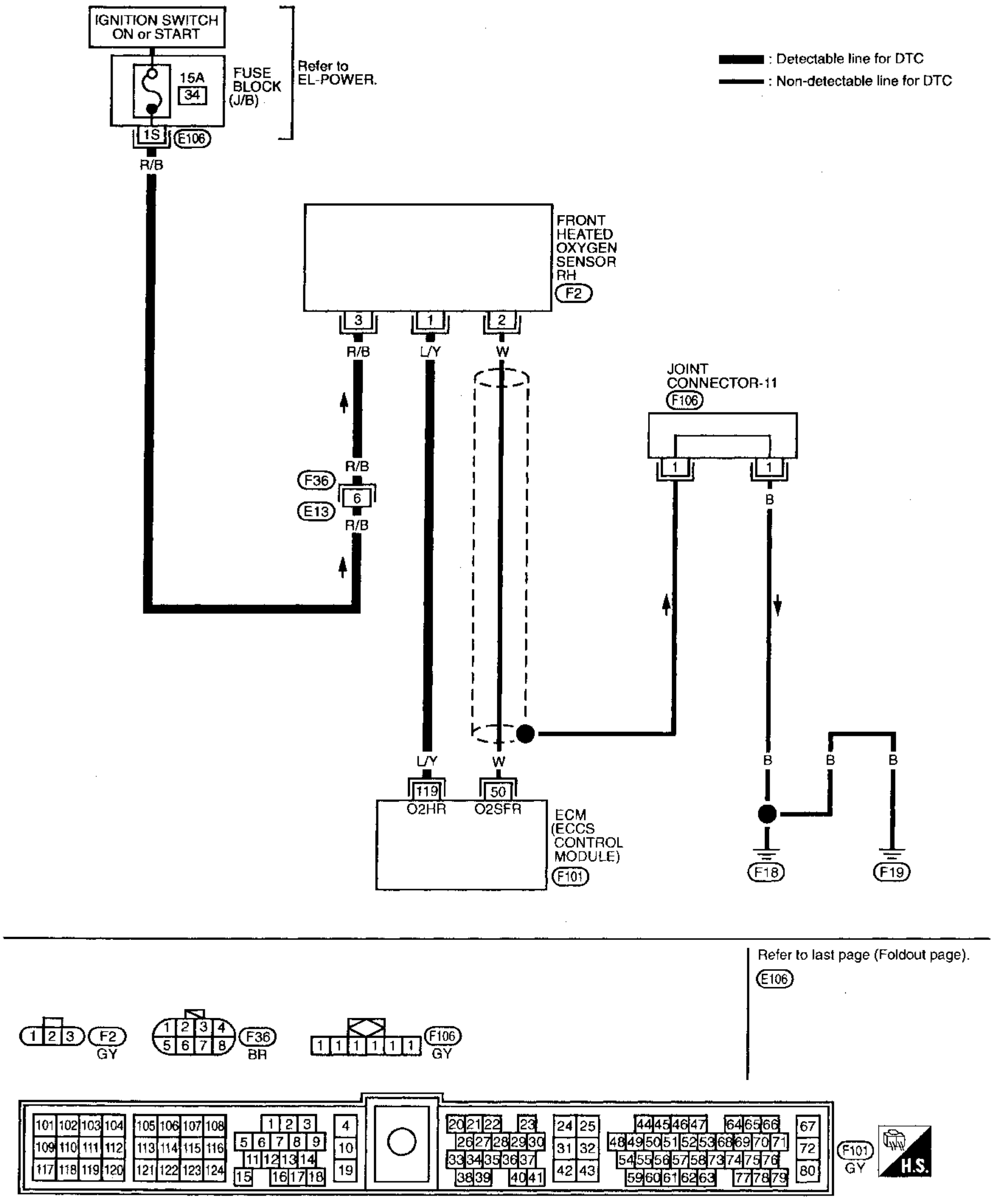
OR

1) Start engine and run it at least 5 seconds in idle condition.
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)

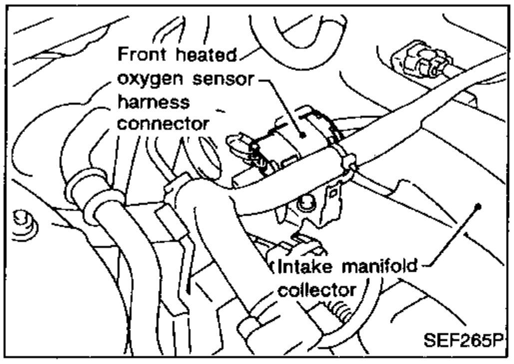
EC-FO2H-R-01

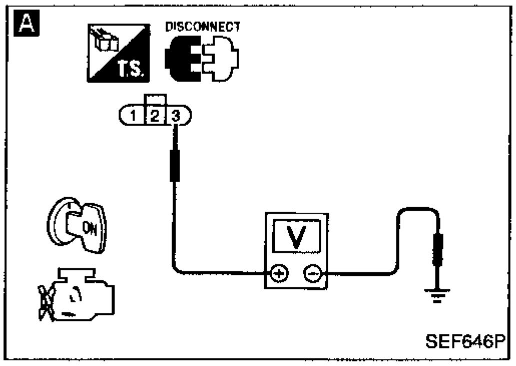


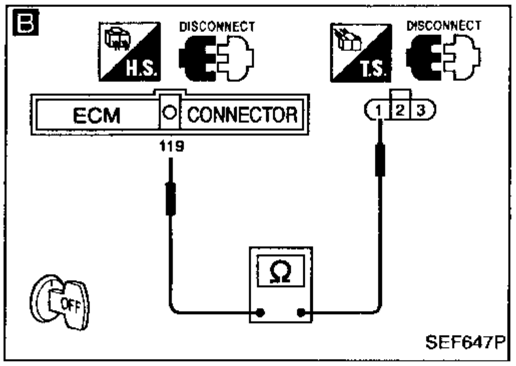
SEF235T

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

DIAGNOSTIC PROCEDURE







INSPECTION START

↓

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

NG → Check the following.
- Harness connectors (F36), (E13)
- 15A fuse
- Harness for open or short between front heated oxygen sensor 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 (119).
   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

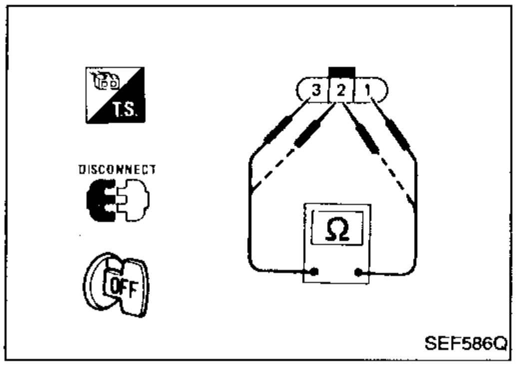
Disconnect and reconnect harness connectors in the circuit. Then retest.

↓ Trouble is not fixed.

Check ECM pin terminals for damage or 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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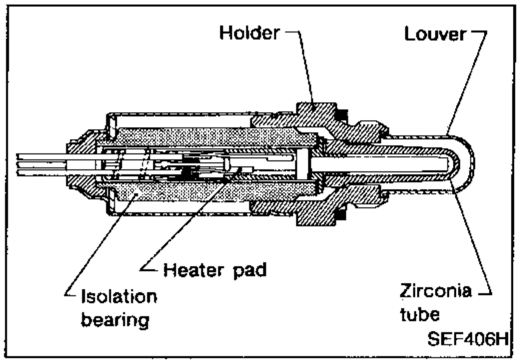


Rear Heated Oxygen Sensor (Rear HO2S)

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 electrical resistance of ceramic zirconia drastically changes at the ideal air-fuel ratio. The output voltage of the sensor, depending on its resistance, is approximately 0 to 1.0V.

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 SENSOR	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 ↔ Approx. 1.0V
RR O2 MNTR			LEAN ↔ RICH

ECM TERMINALS AND REFERENCE VALUE

Remarks: Specification data are reference values, and are measured between each terminal and ㉕ (ECCS ground) with a voltmeter.

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
56	W	Rear heated oxygen sensor	Engine is running. └ After warming up sufficiently and engine speed is 2,000 rpm.	0 - Approximately 1.0V
25	B	ECCS ground	Engine is running. └ Idle speed	Engine ground

ON BOARD DIAGNOSIS LOGIC

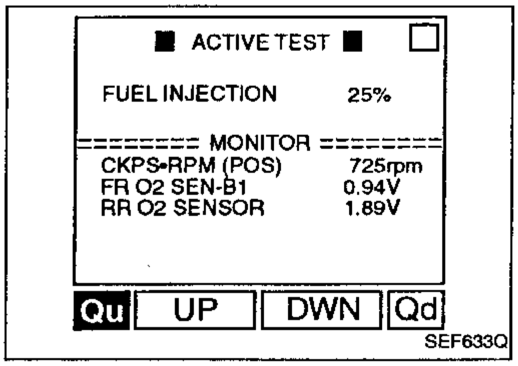
The rear heated oxygen sensor has a much longer switching time between rich and lean than the front heated oxygen sensor. The oxygen storage capacity before the three way catalyst causes the longer switching time. To judge the malfunctions of rear heated oxygen sensor, ECM monitors the sensor's voltage 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 entered to ECM.	• Harness or connectors (The sensor circuit is open.) • Rear heated oxygen sensor
	• 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 shorted.) • Rear heated oxygen sensor • Fuel pressure • Injectors • Intake air leaks

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

OVERALL FUNCTION CHECK

This procedure can be used for checking the overall function of the rear heated oxygen sensor circuit. During this check, a DTC might not be confirmed.



■ ACTIVE TEST ■ ☐

FUEL INJECTION 25%

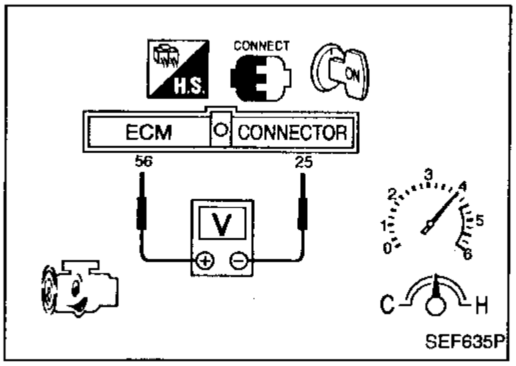
======== MONITOR ========

CKPS•RPM (POS) 725rpm
FR O2 SEN-B1 0.94V
RR O2 SENSOR 1.89V

SEF633Q

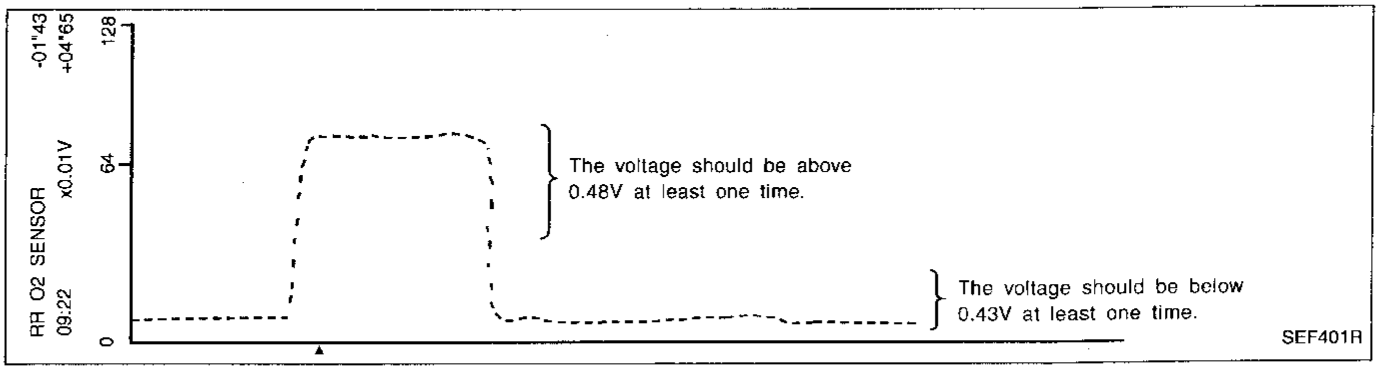
1) Start engine and warm it up sufficiently.
2) Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "RR O2 MNTR" as the monitor item with CONSULT.
3) Check "RR O2 SENSOR" at idle speed when adjusting "FUEL INJECTION" to ±25%.
   "RR O2 SENSOR" should be above 0.48V at least once when the "FUEL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

OR



SEF635P

1) Start engine and warm it up sufficiently.
2) Set voltmeter probes between ECM terminals (56) (sensor signal) and ㉕ (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 0.6V and below 0.55V at least once during this procedure.



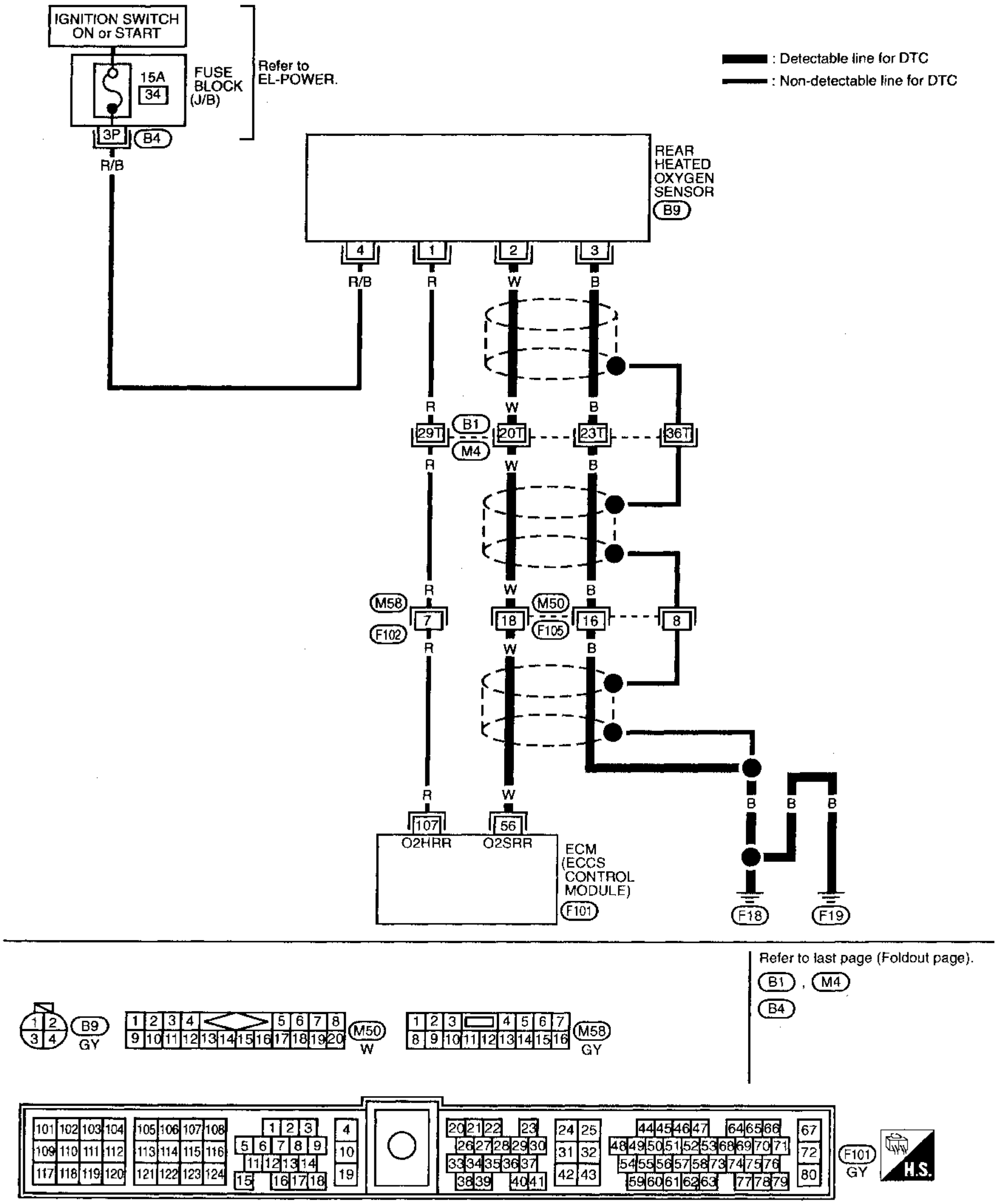
The voltage should be above 0.48V at least one time.

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

SEF401R

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

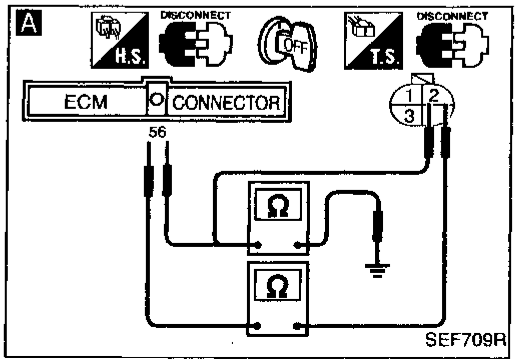
EC-RRO2-01

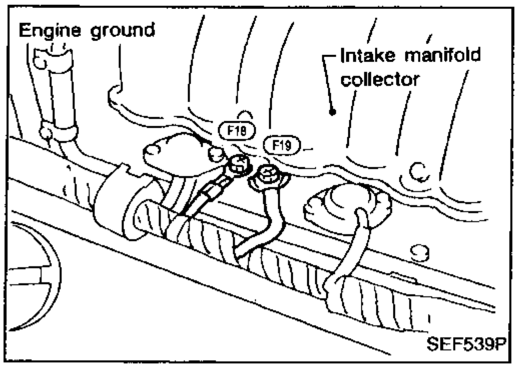


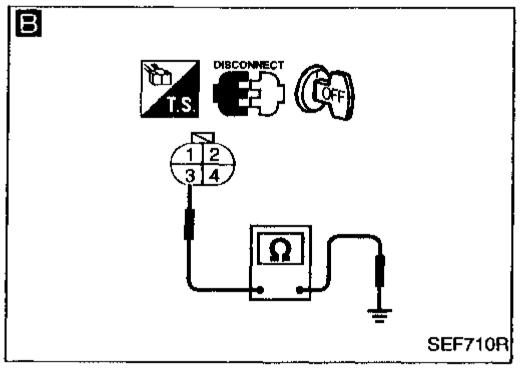
SEF232T

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

DIAGNOSTIC PROCEDURE







INSPECTION START

A

CHECK INPUT SIGNAL CIRCUIT.
1. Turn ignition switch "OFF".
2. Disconnect rear heated oxygen sensor harness connector and ECM harness connector.
3. Check harness continuity between ECM terminal (56) and terminal ②.
   Continuity should exist.
4. Check harness continuity between ECM terminal (56) (or terminal ②) and ground.
   Continuity should not exist.

If OK, check harness for short.

NG → Check the following.
- Harness connectors F105, M50
- Harness connectors M4, B1

If NG, repair harness or connectors.

OK ↓

Loosen and retighten engine ground screws.

B

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

NG → Check the following.
- Harness connectors F105, M50
- Harness connectors M4, B1
- Harness for open or short between rear heated oxygen sensor and ECM

If 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.

OK ↓

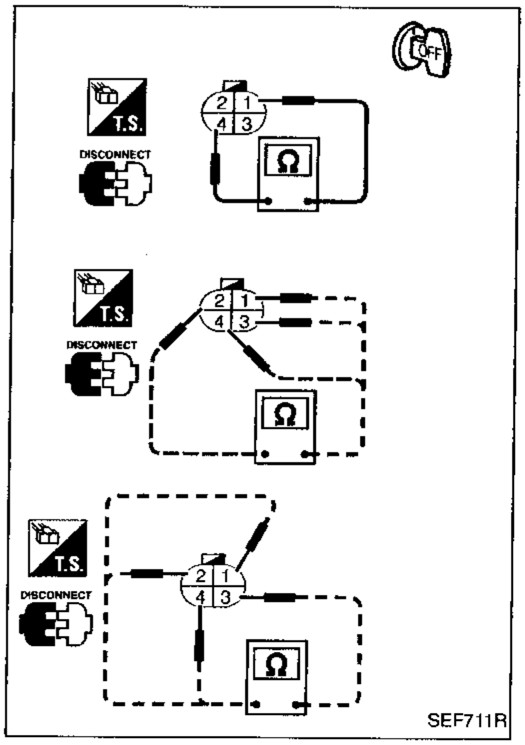
Disconnect and reconnect harness connectors in the circuit. Then retest.

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



Rear Heated Oxygen Sensor (Rear HO2S) (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	

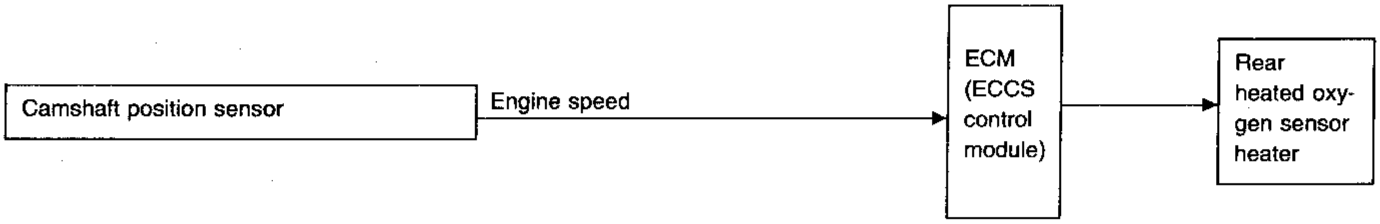
If NG, replace the rear heated oxygen sensor.

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.

Rear Heated Oxygen Sensor Heater

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 3,600	OFF
Below 3,600	ON

CONSULT REFERENCE VALUE IN DATA MONITOR MODE

- Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
RR O2 HEATER	• Engine speed: Idle	ON
	• Engine speed: Above 3,600 rpm	OFF

ECM TERMINALS AND REFERENCE VALUE

Remarks: Specification data are reference values, and are measured between each terminal and ㉕ (ECCS ground) with a voltmeter.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
107	R	Rear heated oxygen sensor heater	Engine is running. Engine speed is below 3,600 rpm.	0 - 0.5V
			Engine is running. Engine speed is above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P0141 0902	• The current amperage in the rear heated oxygen sensor heater 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

Rear Heated Oxygen Sensor Heater (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 at least 5 seconds at idle speed.

OR

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

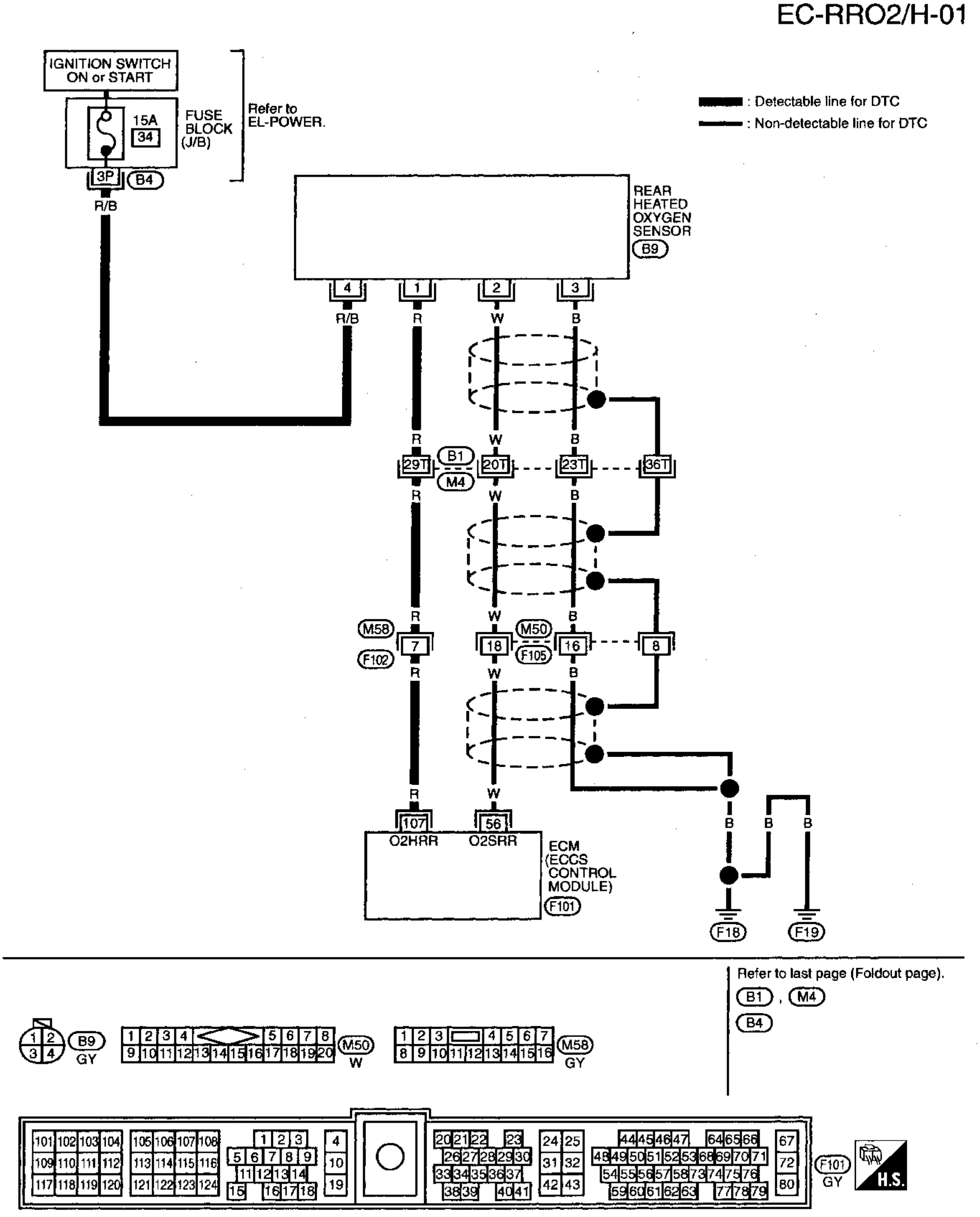
OR

1) Start engine and run it 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.**

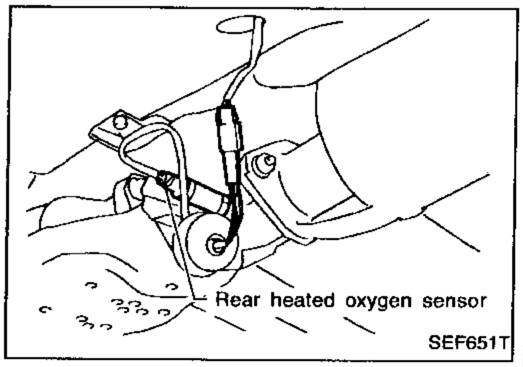
TROUBLE DIAGNOSIS FOR DTC P0141

Rear Heated Oxygen Sensor Heater (Cont'd)



SEF291T

Rear Heated Oxygen Sensor Heater (Cont'd)



DIAGNOSTIC PROCEDURE

INSPECTION START

↓

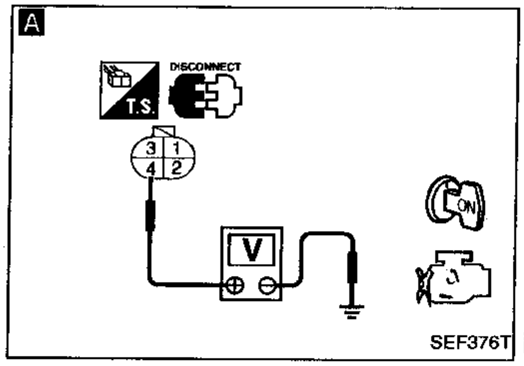
A

CHECK POWER SUPPLY.

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

NG → Check the following.
- 15A fuse
- Harness for open or short between rear heated oxygen sensor and fuse

If NG, repair harness or connectors.



↓ OK

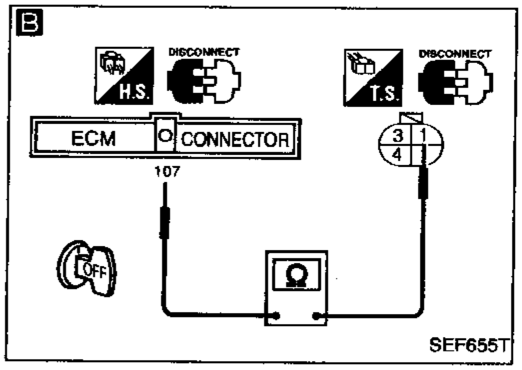
B

CHECK GROUND CIRCUIT.

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between terminal ① and ECM terminal (107).
   Continuity should exist.
   If OK, check harness for short.

NG → Check the following.
- Harness connectors (B1), (M4)
- Harness connectors (M50), (F105)
- Harness for open or short between ECM and rear heated oxygen sensor

If 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.

↓ OK

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

↓ Trouble is not fixed.

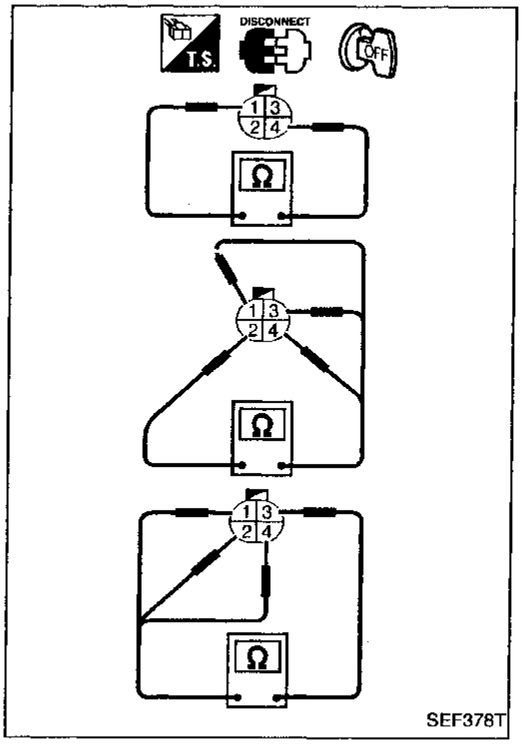
Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

↓

INSPECTION END

Rear Heated Oxygen Sensor Heater (Cont'd)

COMPONENT INSPECTION



Rear heated oxygen sensor heater

Check the following.

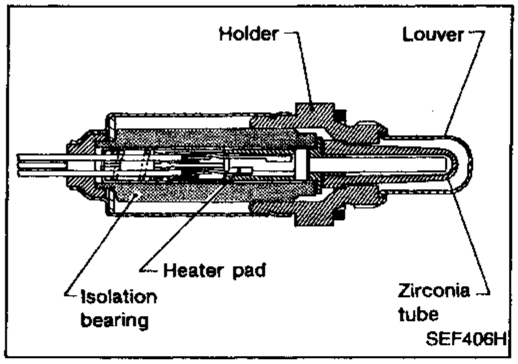
1. Check resistance between terminals ④ and ① .
   Resistance: 2.3 - 4.3Ω at 25°C (77°F)
2. Check continuity.

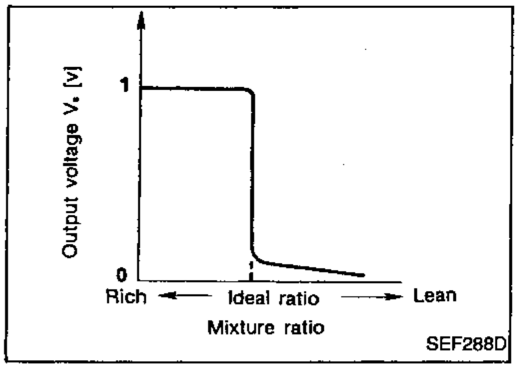
Terminal No.	Continuity
② and ① , ③ , ④	No
③ and ① , ② , ④	

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 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.

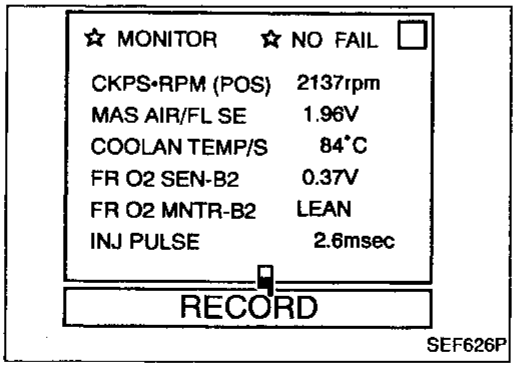
ECM TERMINALS AND REFERENCE VALUE

Remarks: Specification data are reference values, and are measured between each terminal and ㉕ (ECCS ground) with a voltmeter.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
50 51	W W	Front heated oxygen sensor (Right bank) Front heated oxygen sensor (Left bank)	Engine is running. After warming up sufficiently and engine speed is 2,000 rpm.	0 - Approximately 1.0V (periodically change)
25	B	ECCS ground	Engine is running. Idle speed	Engine ground

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 entered 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



☆ MONITOR ☆ NO FAIL ☐

CKPS•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	2.6msec

SEF626P

OVERALL FUNCTION CHECK

This procedure can be used for checking the overall function of the front heated oxygen sensor circuit. During this check, a 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) Make sure of 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.

GI
MA
EM
LC
EC
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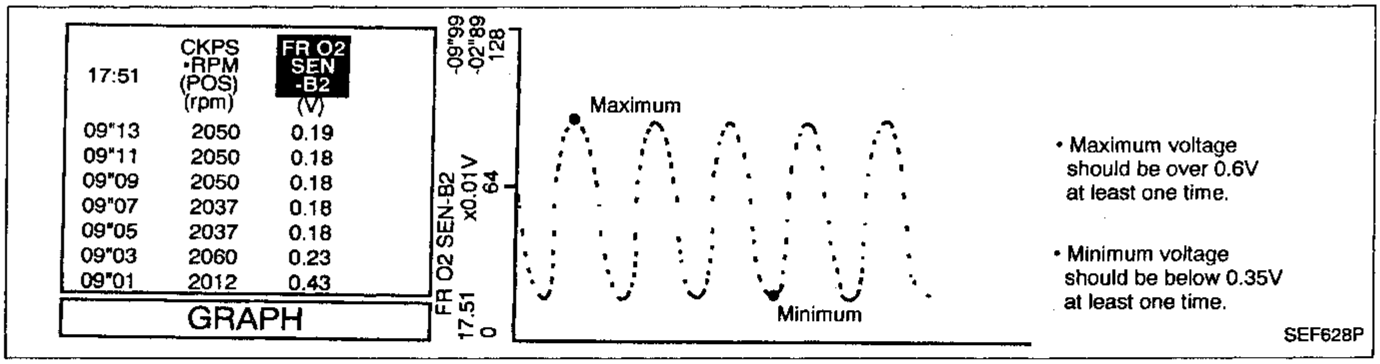
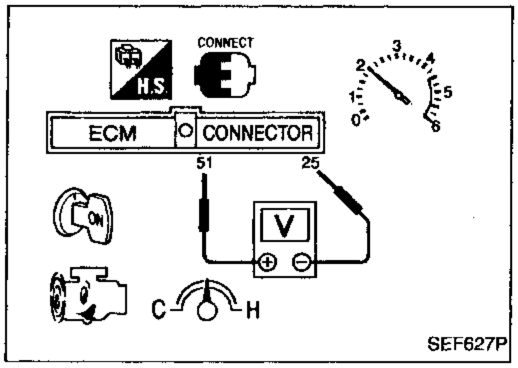
Front Heated Oxygen Sensor (Front HO2S) (Left bank) (Cont'd)



17:51	CKPS ·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.

SEF628P



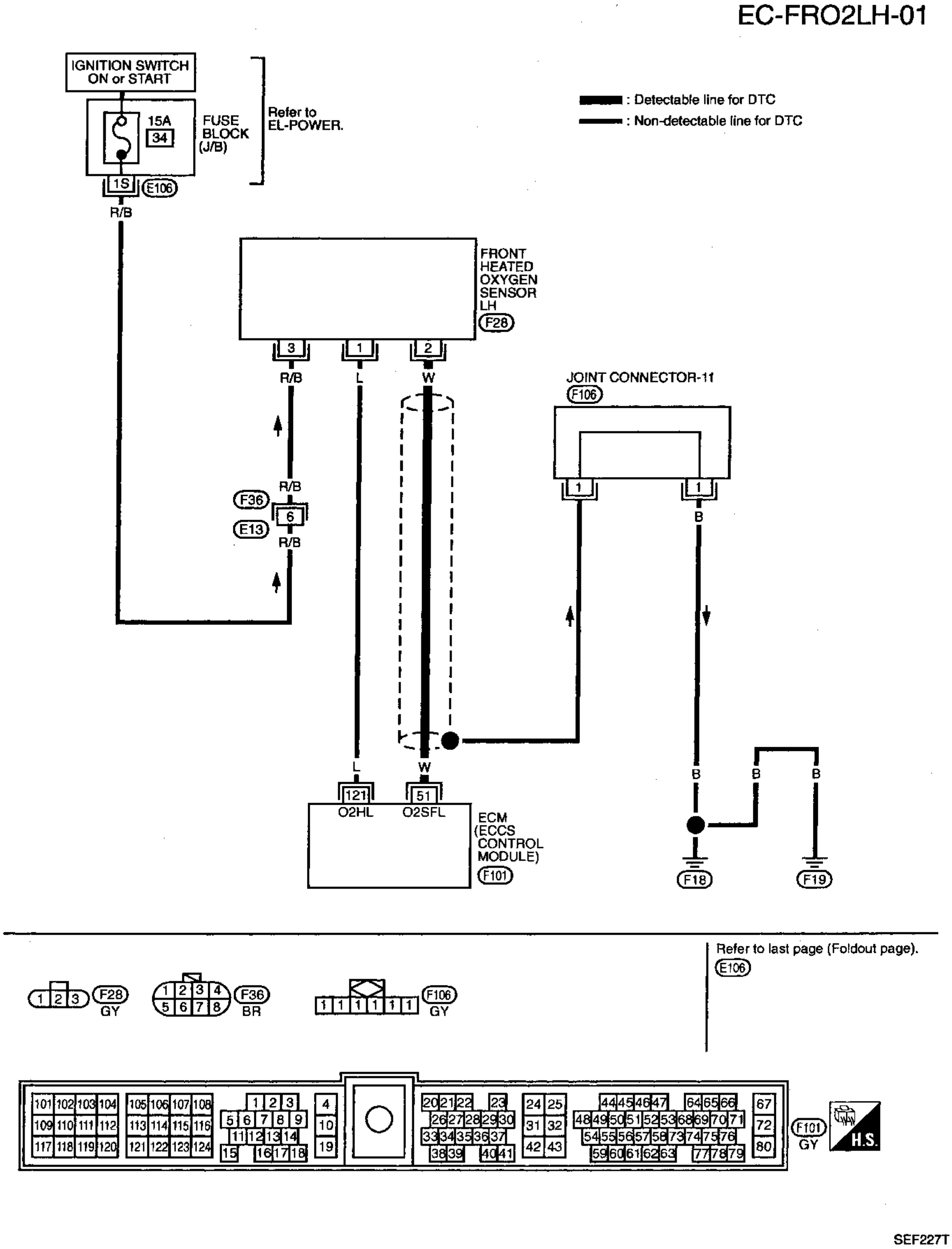
SEF627P

OR

1) Start engine and warm it up sufficiently.
2) Set voltmeter probes between ECM terminal (61) (sensor signal) and ㉕ (engine ground).
3) Make sure of 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.

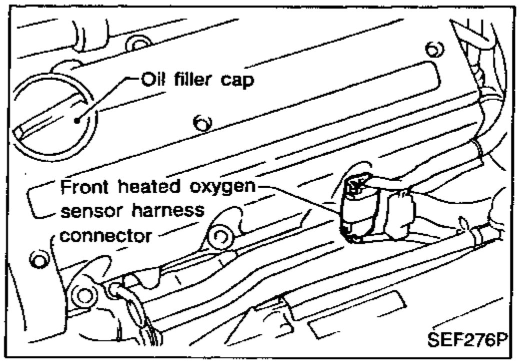
Front Heated Oxygen Sensor (Front HO2S) (Left bank) (Cont'd)

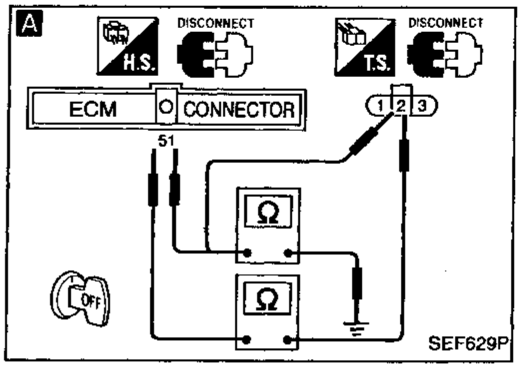


SEF227T

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

DIAGNOSTIC PROCEDURE





INSPECTION START

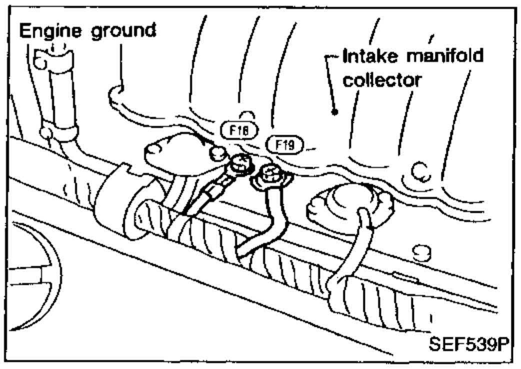
A

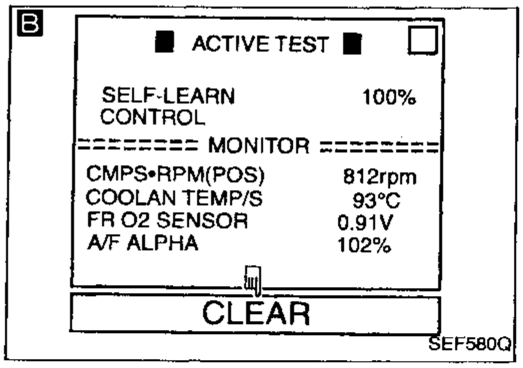
CHECK INPUT SIGNAL CIRCUIT.
1. Turn ignition switch "OFF".
2. Disconnect front heated oxygen sensor (left bank) harness connector and ECM harness connector.
3. Check harness continuity between ECM terminal (51) and terminal ②.
Continuity should exist.
4. Check harness continuity between ECM terminal (51) (or terminal ②) and ground.
Continuity should not exist.

NG → Repair harness or connectors.

OK

Loosen and retighten engine ground screws.





■ ACTIVE TEST ■ ☐

SELF-LEARN CONTROL 100%

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

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

CLEAR

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. Wait at least 10 minutes at idle speed.
Are the DTCs P0174, P0175 detected? Is it difficult to start engine?

OR

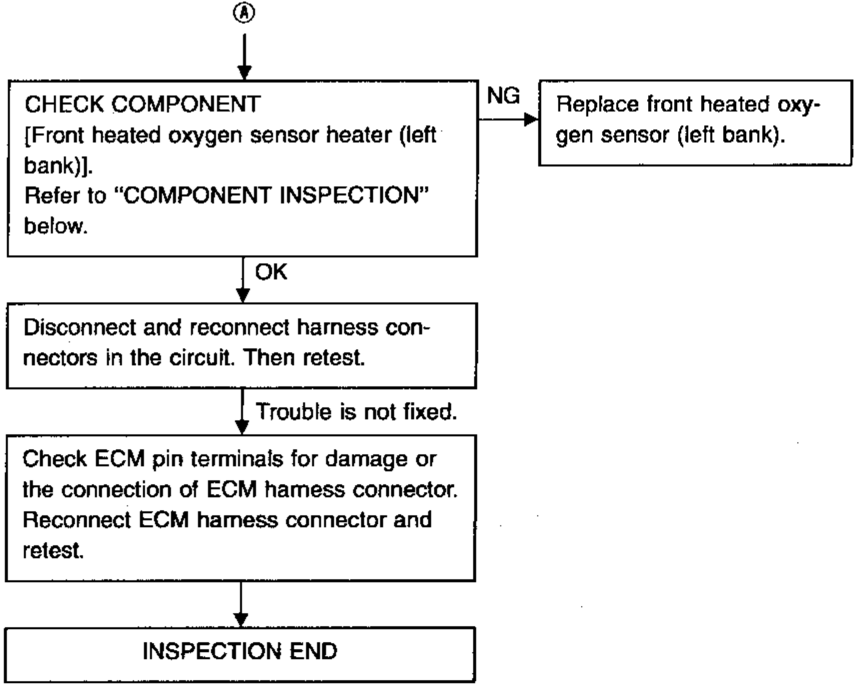
2. Turn ignition switch "OFF".
3. Disconnect mass air flow sensor harness connector, and restart and run engine at least 3 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure diagnostic trouble code No. 0102 is displayed in Diagnostic Test Mode II.
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. Wait at least 10 minutes at idle speed.
Are the DTCs 0209, 0210 detected? Is it difficult to start engine?

Yes → Go to "TROUBLE DIAGNOSIS FOR DTC P0174 (0209), P0175 (0210)". (See page EC-183, 178.)

No

Ⓐ

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


Ⓐ

CHECK COMPONENT
[Front heated oxygen sensor heater (left bank)].
Refer to "COMPONENT INSPECTION" below.

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

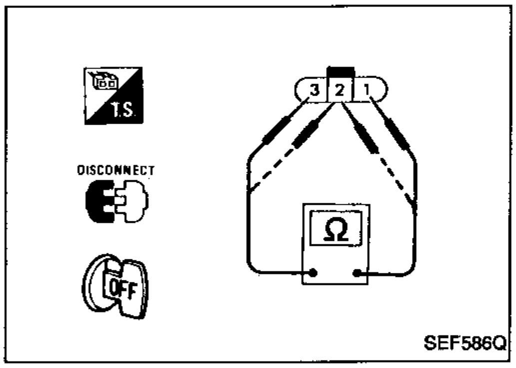
OK

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

Trouble is not fixed.

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

INSPECTION END



SEF586Q

COMPONENT INSPECTION

Front heated oxygen sensor heater

Check resistance between terminals ③ and ①.

Resistance: 2.3 - 4.3Ω at 25°C (77°F)

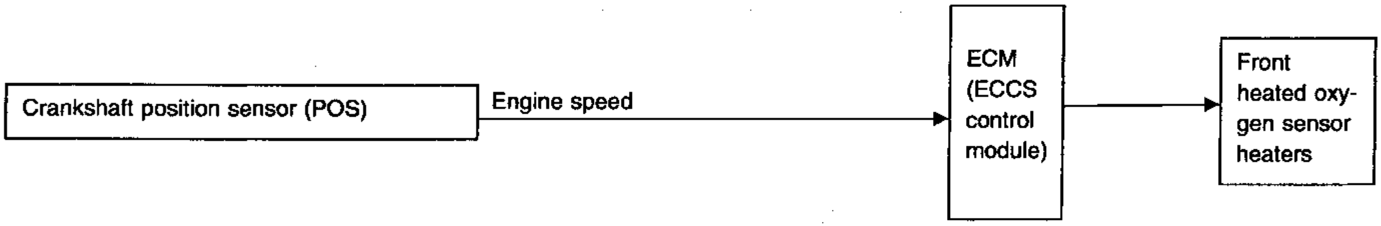
Check continuity between terminals ② and ①, ③ and ②.

Continuity should not exist.

If NG, replace the front heated oxygen sensor.

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 3,600 (A/T models) or 4,000 (M/T models)	OFF
Below 3,600 (A/T models) or 4,000 (M/T models)	ON

CONSULT REFERENCE VALUE IN DATA MONITOR MODE

- Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
FR O2 SEN HTR-B1 FR O2 SEN HTR-B2	• Engine speed: Idle	ON
	• Engine speed: Above 3,600 rpm	OFF

ECM TERMINALS AND REFERENCE VALUE

Remarks: Specification data are reference values, and are measured between each terminal and ㉕ (ECCS ground) with a voltmeter.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
121	L	Front heated oxygen sensor heater (left bank)	Engine is running. Engine speed is below 3,600 rpm (A/T models) or 4,000 rpm (M/T models).	0 - 0.5V
			Engine is running. Engine speed is above 3,600 rpm (A/T models) or 4,000 rpm (M/T models).	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. (The improper voltage drop signal is entered 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 at least 5 seconds at idle speed.

OR

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

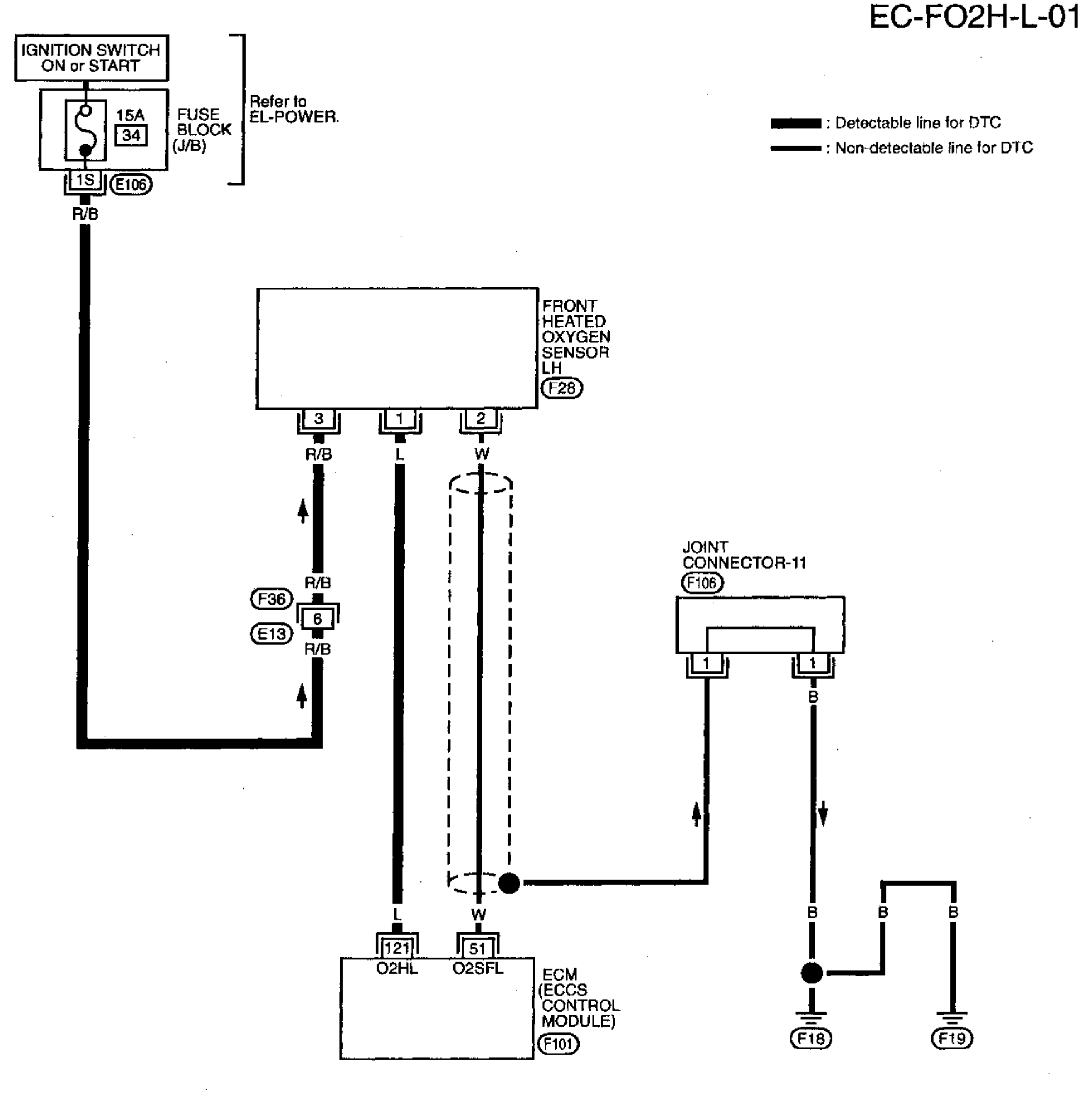
OR

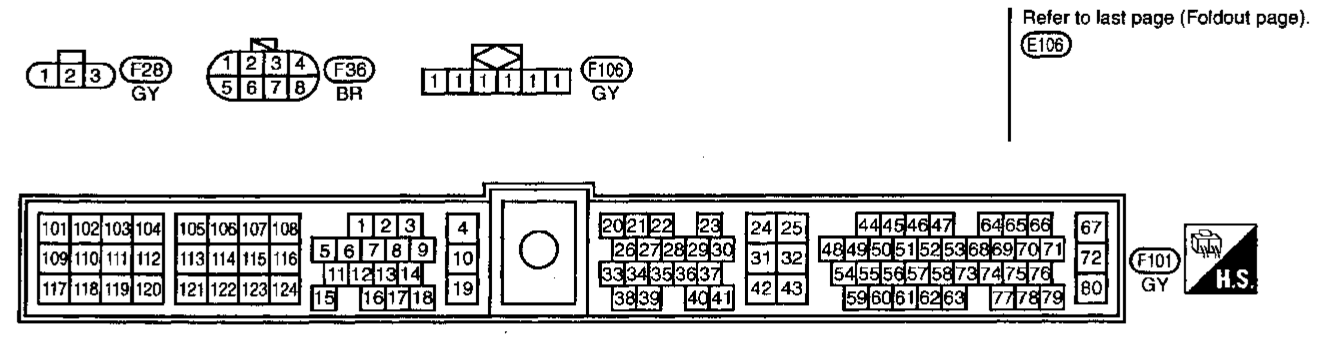
1) Start engine and run it at least 5 seconds in idle condition.
2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
3) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.

- **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.**

TROUBLE DIAGNOSIS FOR DTC P0155

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

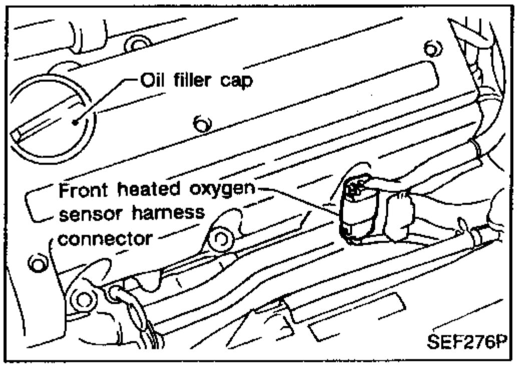


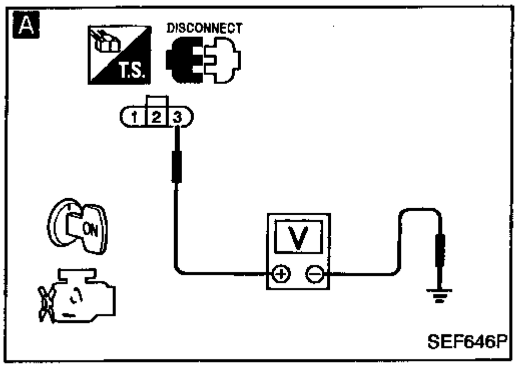


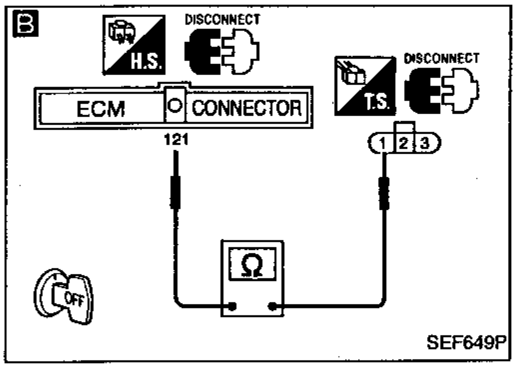
SEF236T

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

DIAGNOSTIC PROCEDURE







INSPECTION START

↓

A

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

NG → Check the following.
- Harness connectors F36, E13
- 15A fuse
- Harness for open or short between front heated oxygen sensor 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 121.
   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

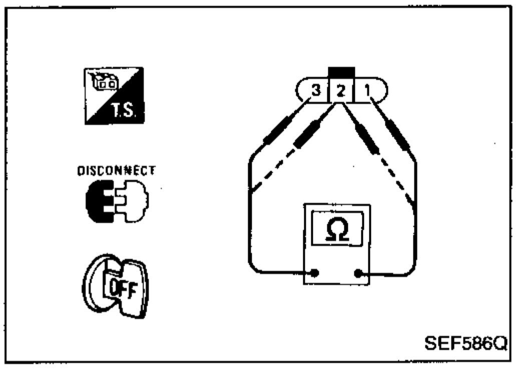
Disconnect and reconnect harness connectors in the circuit. Then retest.

↓ Trouble is not fixed.

Check ECM pin terminals for damage or 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.

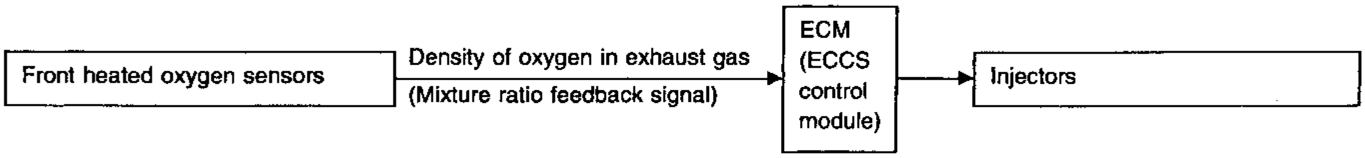
CAUTION:

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.

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).

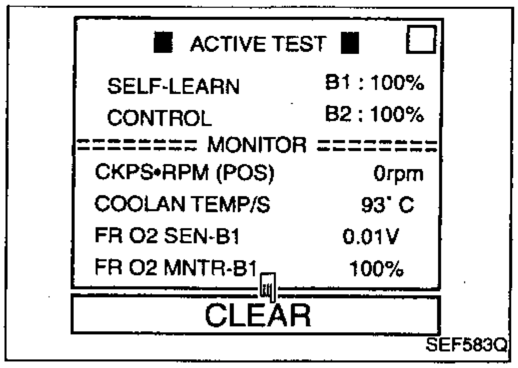


Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0171 0115	• Fuel injection system does not operate properly. • The amount of mixture ratio compensation is too large. (The mixture ratio is too lean.)	• Intake air leaks • Front heated oxygen sensor (right bank) • Injectors (right bank) • Exhaust gas leaks • Incorrect fuel pressure • Lack of fuel • Mass air flow sensor

CONSULT REFERENCE VALUE IN DATA MONITOR MODE

- Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
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.
A/F ALPHA-B2 .... A/F ALPHA-B1	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	54 - 155%



■ ACTIVE TEST ■ ☐

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

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

CKPS•RPM (POS)	0rpm
COOLAN TEMP/S	93° C
FR O2 SEN-B1	0.01V
FR O2 MNTR-B1	100%

CLEAR

SEF583Q

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE (Overall)

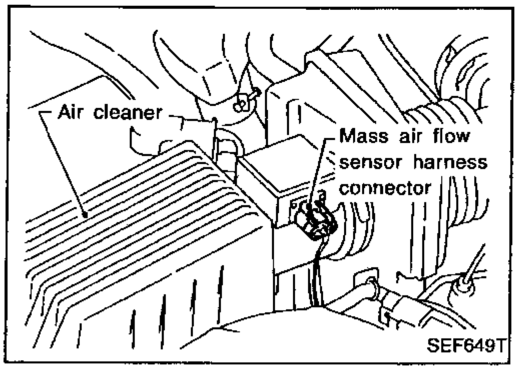
1) Start engine and warm it up sufficiently.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Turn ignition switch "ON" and select "SELF-LEARN CONTROL" in "ACTIVE TEST" mode with CONSULT.
4) Clear the self-learning control coefficient by touching "CLEAR".
5) Select "DATA MONITOR" mode with CONSULT.

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

6) Start engine again and wait at least 10 minutes at idle speed.
   The 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.

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 again.

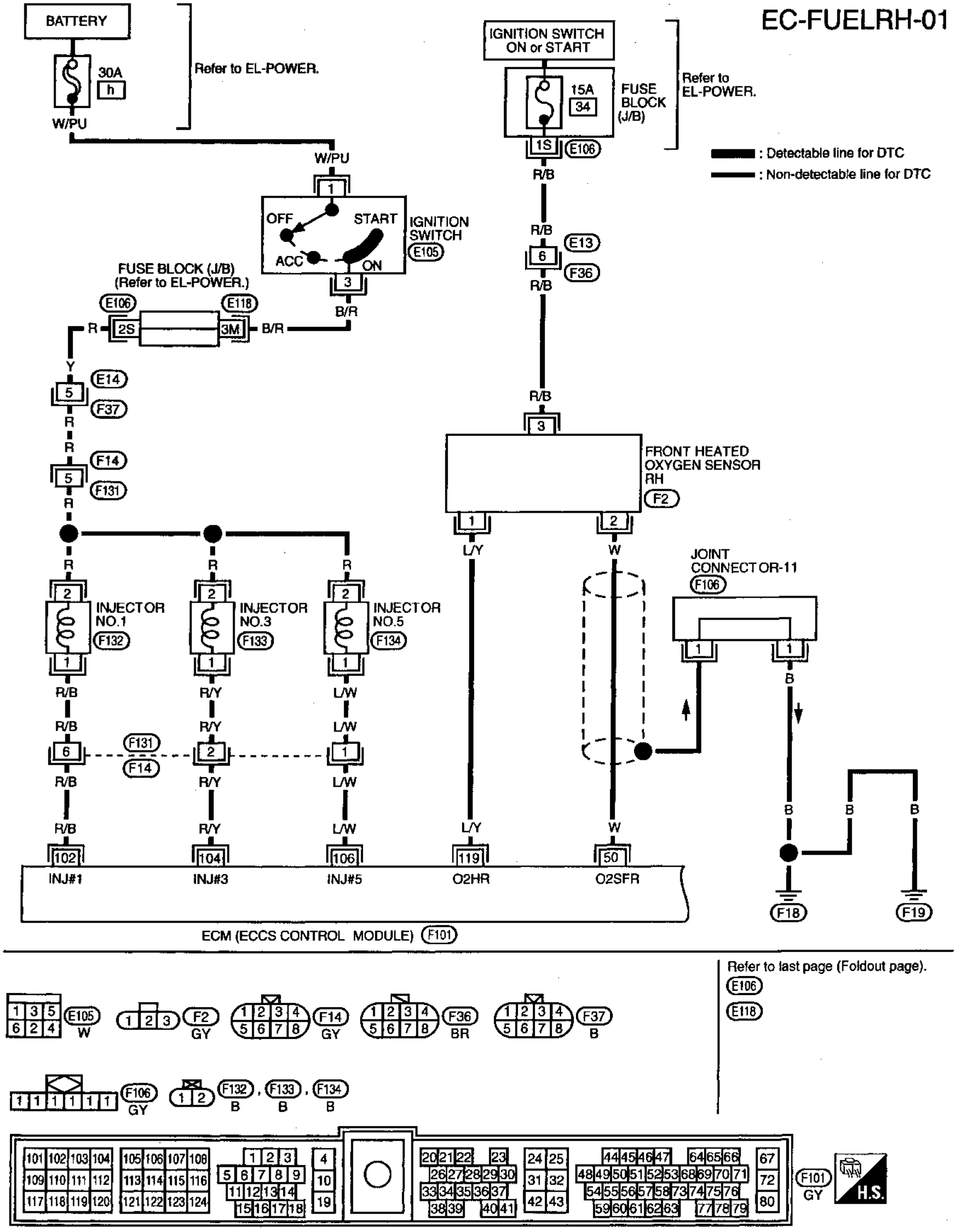
OR



1) Disconnect mass air flow sensor harness connector.
2) Start engine and run it 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 DTC 0102 is detected.
6) Erase the 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 wait at least 10 minutes at idle speed.
   The DTC 0115 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.

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 again.

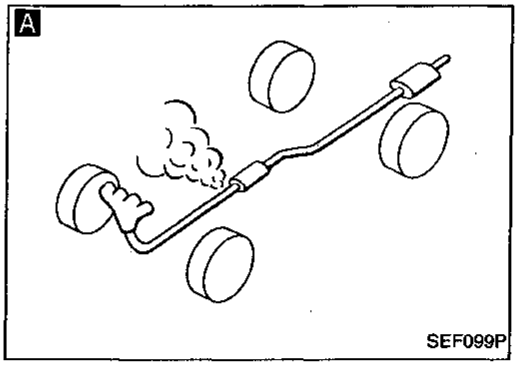
Fuel Injection System Function (Right bank) (Lean side) (Cont'd)

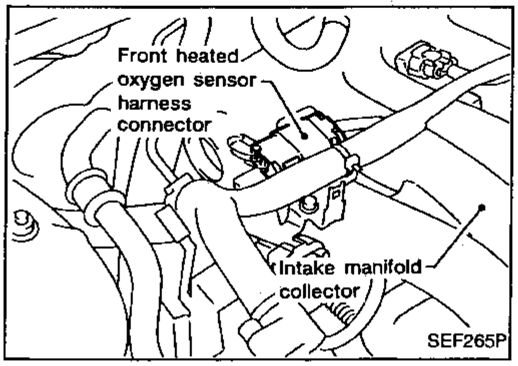


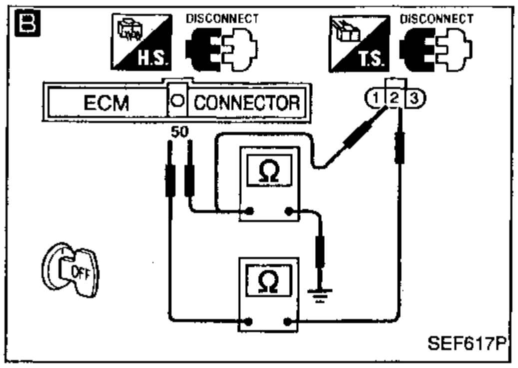
SEF223T

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 (right bank) harness connector and ECM harness connector.
3. Check harness continuity between ECM terminal ㊿ and terminal ②.
   Continuity should exist.
4. Check harness continuity between ECM terminal ㊿ (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 page EC-26.)
2. Install fuel pressure gauge and check fuel pressure.
   At idle:
   Approx. 235 kPa
   (2.4 kg/cm^2, 34 psi)
   A few seconds after ignition switch is turned OFF to ON:
   Approx. 294 kPa
   (3.0 kg/cm^2, 43 psi)

NG → Check fuel pump and circuit. (See page EC-359.)

↓ OK

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

OR

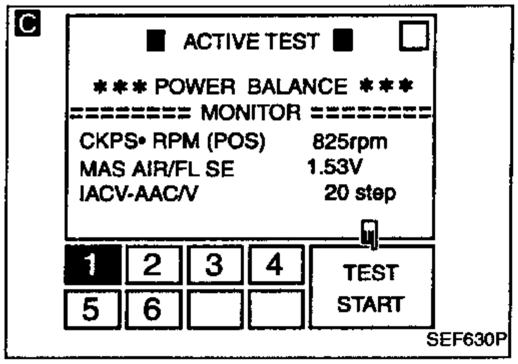
Check "mass air flow" in MODE 1 with GST.
2.0 - 6.0 g·m/sec: at idling
7.0 - 20.0 g·m/sec: at 2,500 rpm

NG → Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds.
(See page EC-103.)

↓ OK

Ⓐ

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



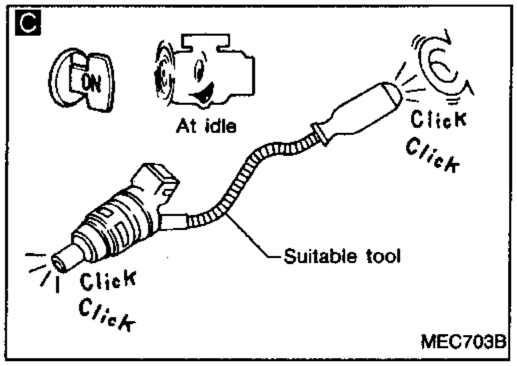
■ ACTIVE TEST ■ ☐

*** POWER BALANCE ***

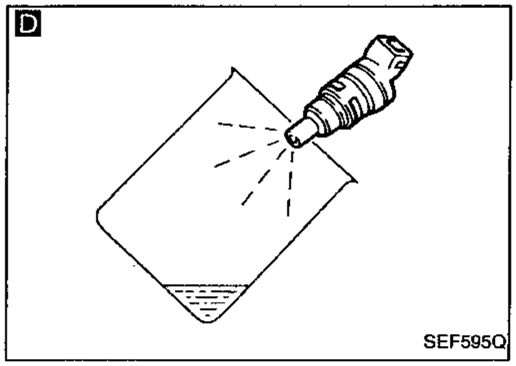
======== MONITOR ========

```
CKPS• RPM (POS)      825rpm
MAS AIR/FL SE        1.53V
IACV-AACN            20 step
```

SEF630P



MEC703B



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". (See page EC-352.) 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. (See page EC-27.)
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 or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

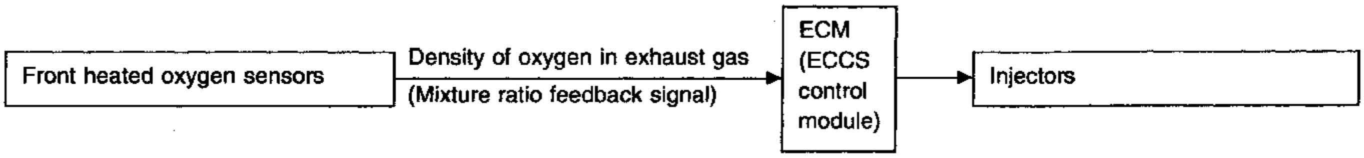
↓

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).

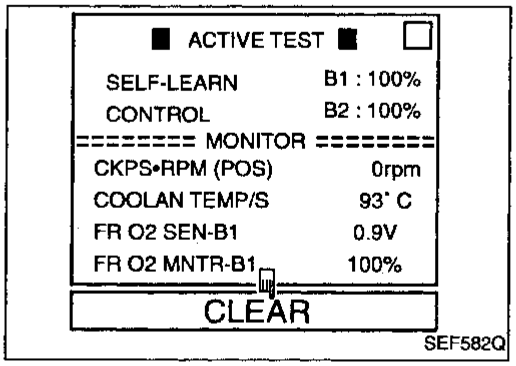


Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0172 0114	• Fuel injection system does not operate properly. • The amount of mixture ratio compensation is too large. (The mixture ratio is too rich.)	• Front heated oxygen sensor (right bank) • Injectors (right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

CONSULT REFERENCE VALUE IN DATA MONITOR MODE

- Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
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.
A/F ALPHA-B2 A/F ALPHA-B1	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	54 - 155%



SELF-LEARN CONTROL B1 : 100%
B2 : 100%
======== MONITOR ========
CKPS•RPM (POS) 0rpm
COOLAN TEMP/S 93˚ C
FR O2 SEN-B1 0.9V
FR O2 MNTR-B1 100%

SEF582Q

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.

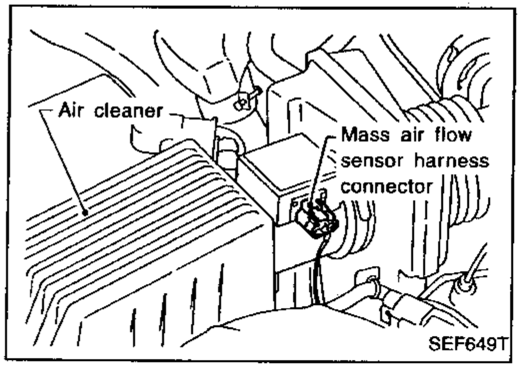
Fuel Injection System Function (Right bank) (Rich side) (Cont'd)

6) Start engine again and wait at least 10 minutes at idle speed.
The 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.

If engine does not start, remove ignition plugs and check for fouling, etc.

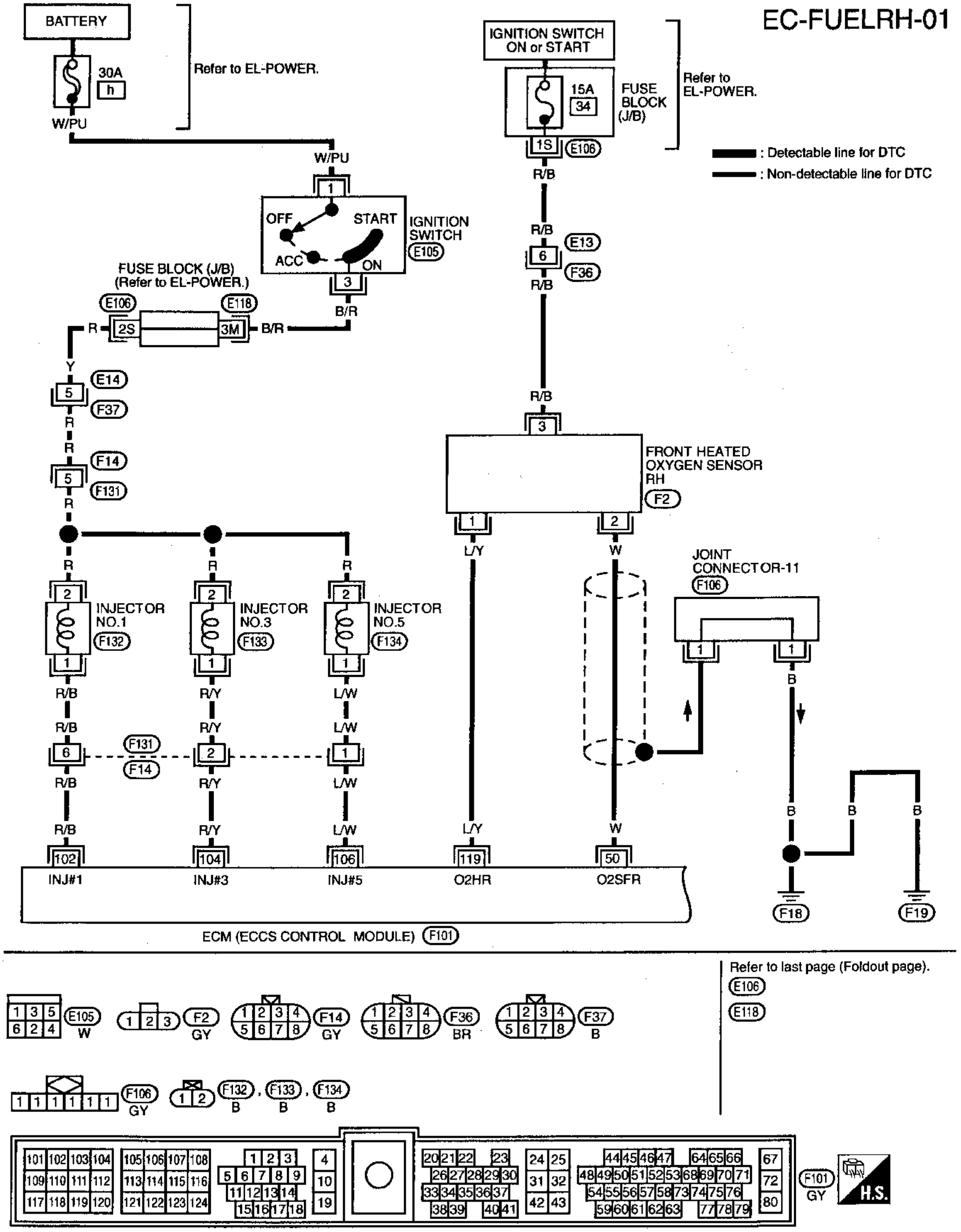
OR



1) Disconnect mass air flow sensor harness connector.
2) Start engine and run it 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 DTC 0102 is detected.
6) Erase the 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 wait at least 10 minutes at idle speed.
The 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.

If engine does not start, remove ignition plugs and check for fouling, etc.

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



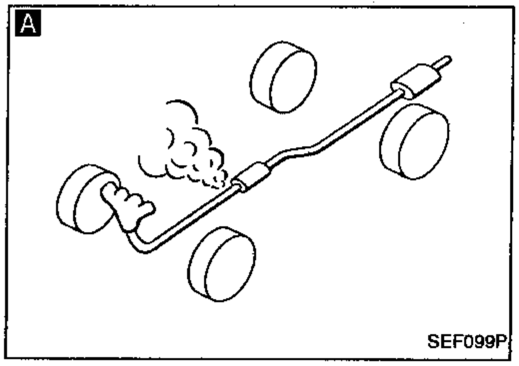
SEF223T

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

DIAGNOSTIC PROCEDURE

INSPECTION START

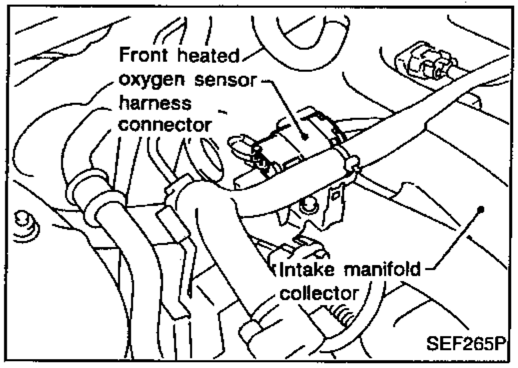
↓

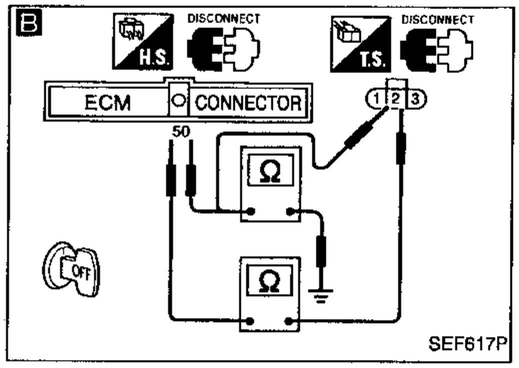


A CHECK FOR EXHAUST AIR LEAK.
Start engine and run it at idle. Listen for an exhaust air leak before the three way catalyst.

NG → Repair or replace.

↓ OK





B CHECK FRONT HEATED OXYGEN SENSOR (RIGHT BANK).

1. Turn ignition switch "OFF".
2. Disconnect front heated oxygen sensor (right bank) harness connector and ECM harness connector.
3. Check harness continuity between ECM terminal (50) and terminal ②.
   Continuity should exist.
4. Check harness continuity between ECM terminal (50) (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 page EC-26.)
2. Install fuel pressure gauge and check fuel pressure.
   At idle:
   Approx. 235 kPa
   (2.4 kg/cm^2, 34 psi)
   A few seconds after ignition switch is turned OFF to ON:
   Approx. 294 kPa
   (3.0 kg/cm^2, 43 psi)

NG → Check fuel pump and circuit. (See page EC-359.)

↓ OK

CHECK MASS AIR FLOW SENSOR.

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

OR

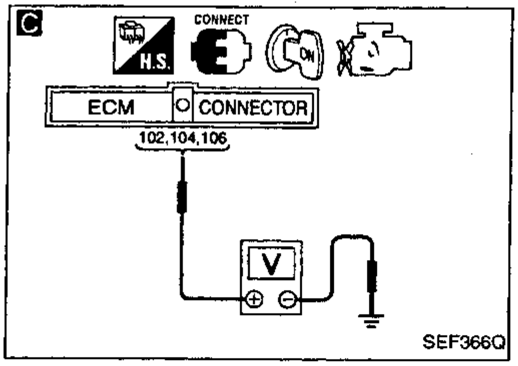
Check "mass air flow" in MODE 1 with GST.
2.0 - 6.0 g·m/sec: at idling
7.0 - 20.0 g·m/sec: at 2,500 rpm

NG → Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds.
(See page EC-103.)

↓ OK

Ⓐ

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



Ⓐ

C

CHECK INJECTORS (RIGHT BANK).
1. Turn ignition switch "ON".
2. Check voltage between ECM terminals (102), (104), (106) and ground with CONSULT or tester.
   Battery voltage should exist.
3. Turn ignition switch "OFF".

NG → Perform TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS, "Injectors". (See page EC-352.) Repair harness or connectors.

OK ↓

Remove injector assembly. (See page EC-27.) 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 or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

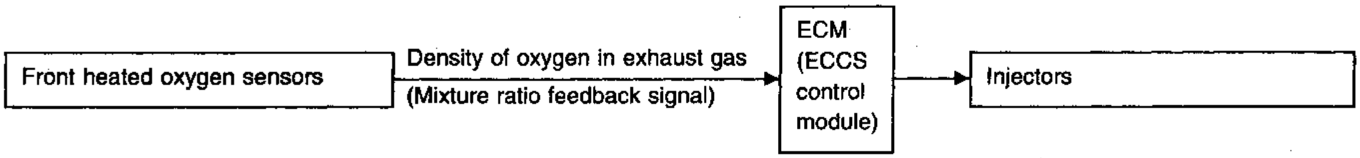
↓

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).

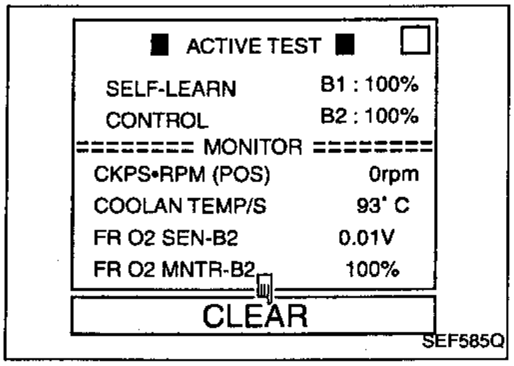


Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0174 0210	• Fuel injection system does not operate properly. • The amount of mixture ratio compensation is too large. (The mixture ratio is too lean.)	• Intake air leaks • Front heated oxygen sensor (left bank) • Injectors (left bank) • Exhaust gas leaks • Incorrect fuel pressure • Lack of fuel • Mass air flow sensor

CONSULT REFERENCE VALUE IN DATA MONITOR MODE

- Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
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.
A/F ALPHA-B2 A/F ALPHA-B1	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	54 - 155%



■ ACTIVE TEST ■ ☐

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

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

CKPS•RPM (POS) 0rpm

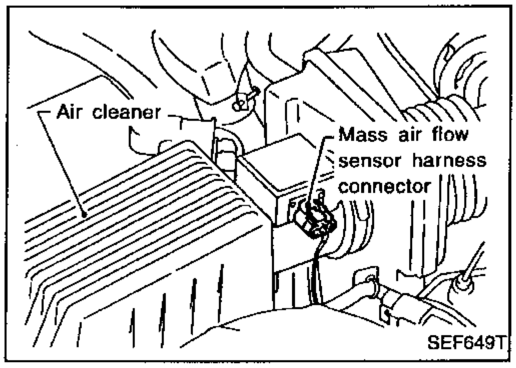
COOLAN TEMP/S 93° C

FR O2 SEN-B2 0.01V

FR O2 MNTR-B2 100%

CLEAR

SEF585Q



SEF649T

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

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 wait at least 10 minutes at idle speed.
   The 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.

OR

1) Disconnect mass air flow sensor harness connector.
2) Start engine and run it 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 DTC 0102 is detected.
6) Erase the 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 wait at least 10 minutes at idle speed.
   The DTC 0210 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.

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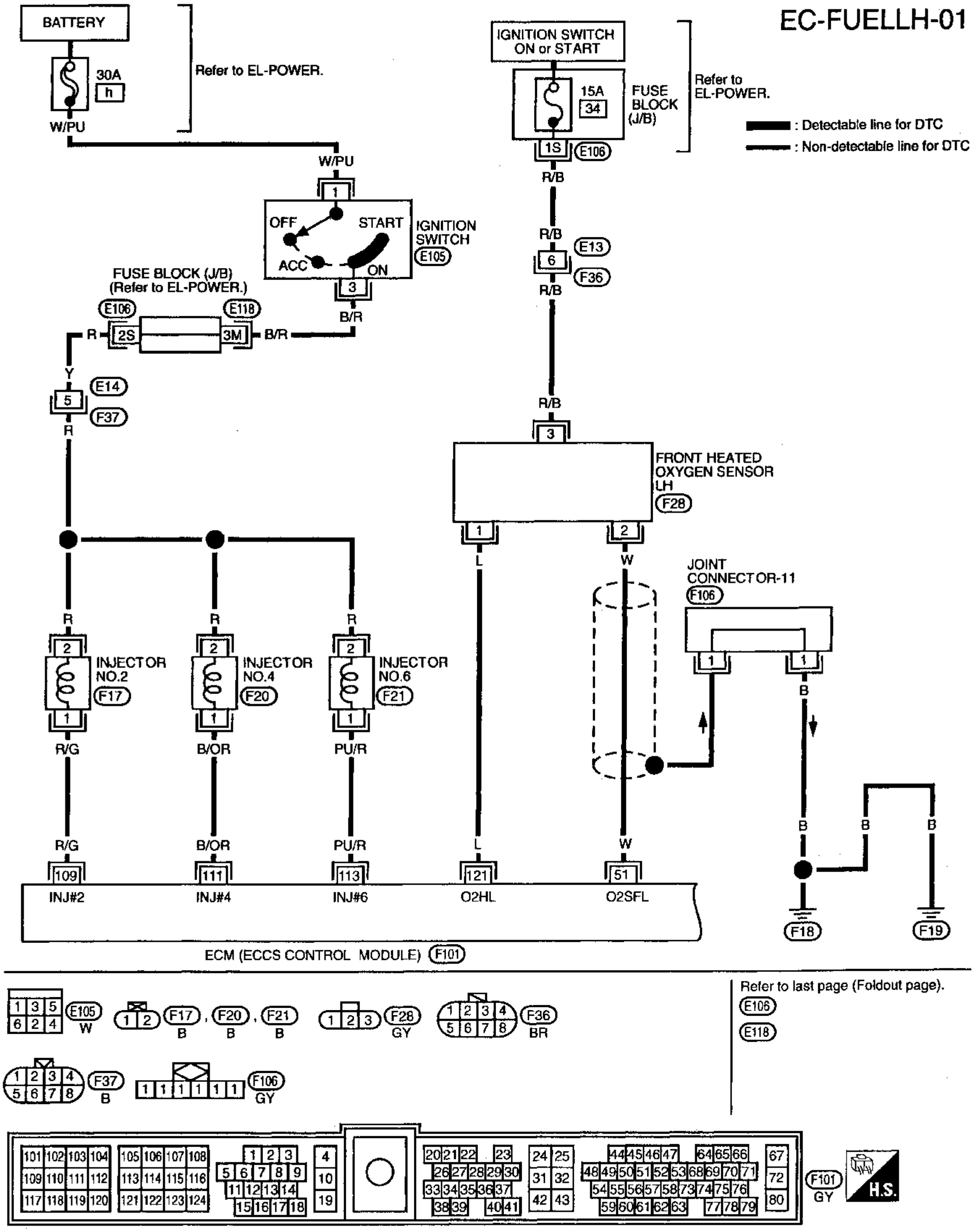
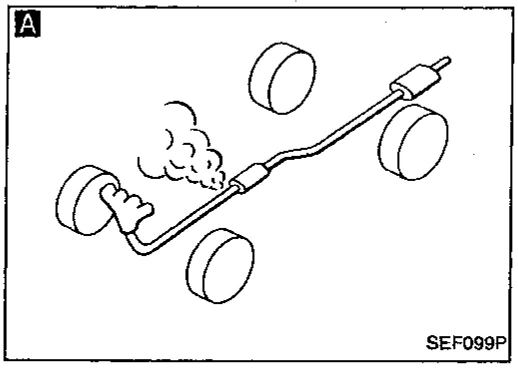
Fuel Injection System Function (Left bank) (Lean side) (Cont'd)

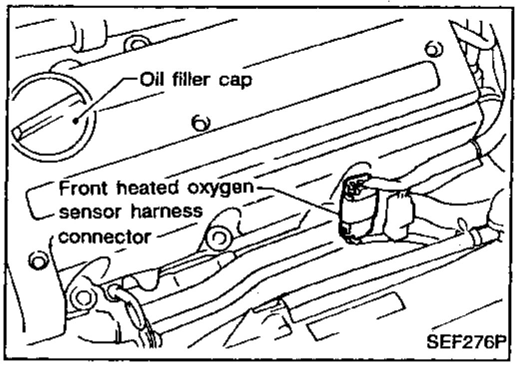


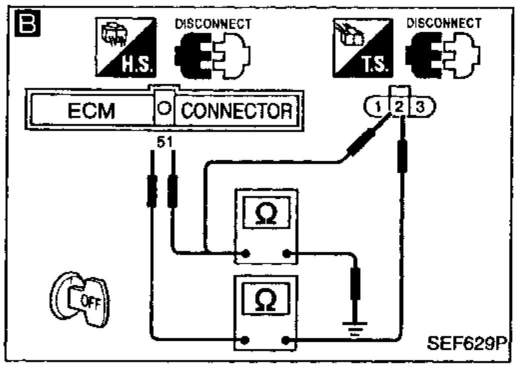
SEF225T

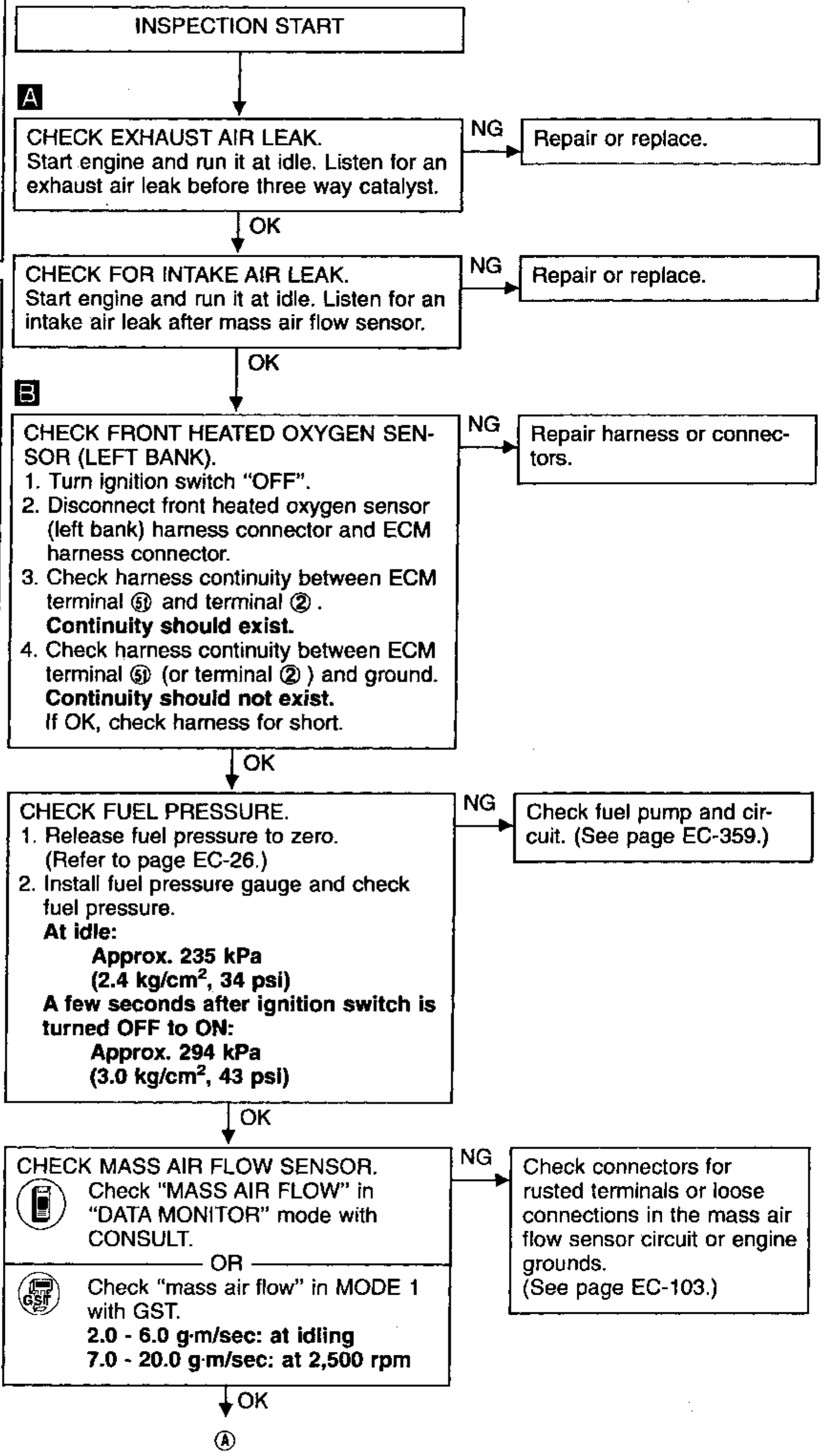
Fuel Injection System Function (Left bank) (Lean side) (Cont'd)

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 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 (left bank) harness connector and ECM harness connector.
3. Check harness continuity between ECM terminal (51) and terminal ②.
   Continuity should exist.
4. Check harness continuity between ECM terminal (51) (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 page EC-26.)
2. Install fuel pressure gauge and check fuel pressure.
   At idle:
   Approx. 235 kPa
   ($2.4 kg/cm^2$, 34 psi)
   A few seconds after ignition switch is turned OFF to ON:
   Approx. 294 kPa
   ($3.0 kg/cm^2$, 43 psi)

NG → Check fuel pump and circuit. (See page EC-359.)

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.
2.0 - 6.0 g·m/sec: at idling
7.0 - 20.0 g·m/sec: at 2,500 rpm

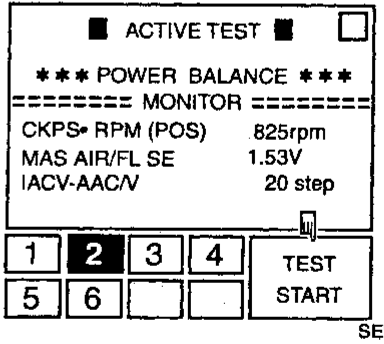
NG → Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds.
(See page EC-103.)

OK ↓

Ⓐ

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

C



■ ACTIVE TEST ■

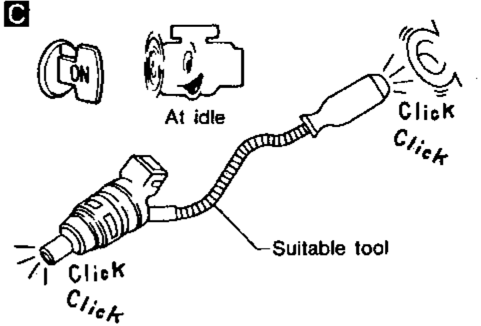
*** POWER BALANCE ***

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

CKPS• RPM (POS)	825rpm
MAS AIR/FL SE	1.53V
IACV-AAC/V	20 step

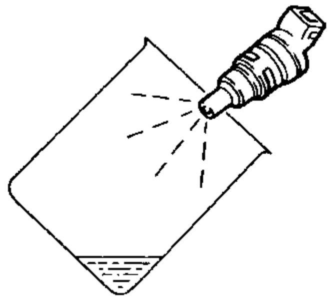
SEF594Q

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". (See page EC-352.) 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. (See page EC-27.) 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 or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

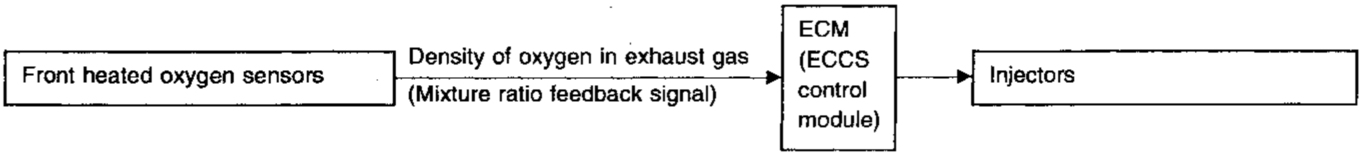
↓

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).



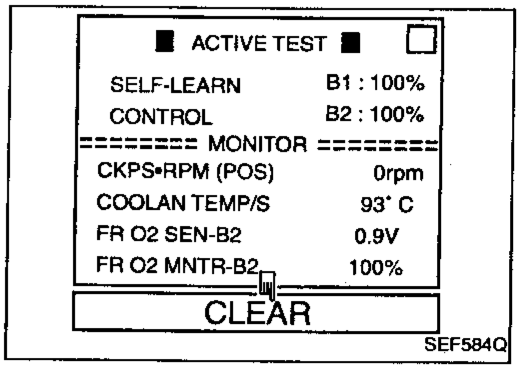
Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0175 0209	• Fuel injection system does not operate properly. • The amount of mixture ratio compensation is too large. (The mixture ratio is too rich.)	• Front heated oxygen sensor (left bank) • Injectors (left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

CONSULT REFERENCE VALUE IN DATA MONITOR MODE

- Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
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.
A/F ALPHA-B2 .... A/F ALPHA-B1	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	54 - 155%

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



```
■ ACTIVE TEST ■        ☐
 SELF-LEARN        B1 : 100%
 CONTROL           B2 : 100%
======== MONITOR ========
 CKPS•RPM (POS)        0rpm
 COOLAN TEMP/S         93' C
 FR O2 SEN-B2          0.9V
 FR O2 MNTR-B2         100%
          CLEAR
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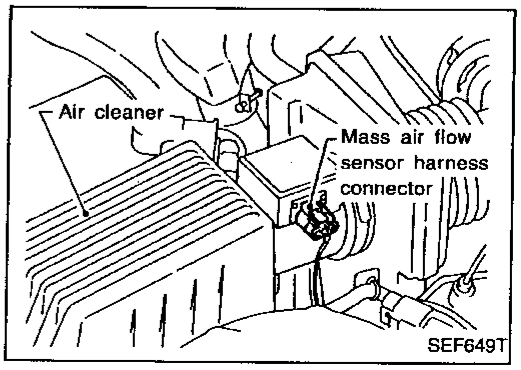


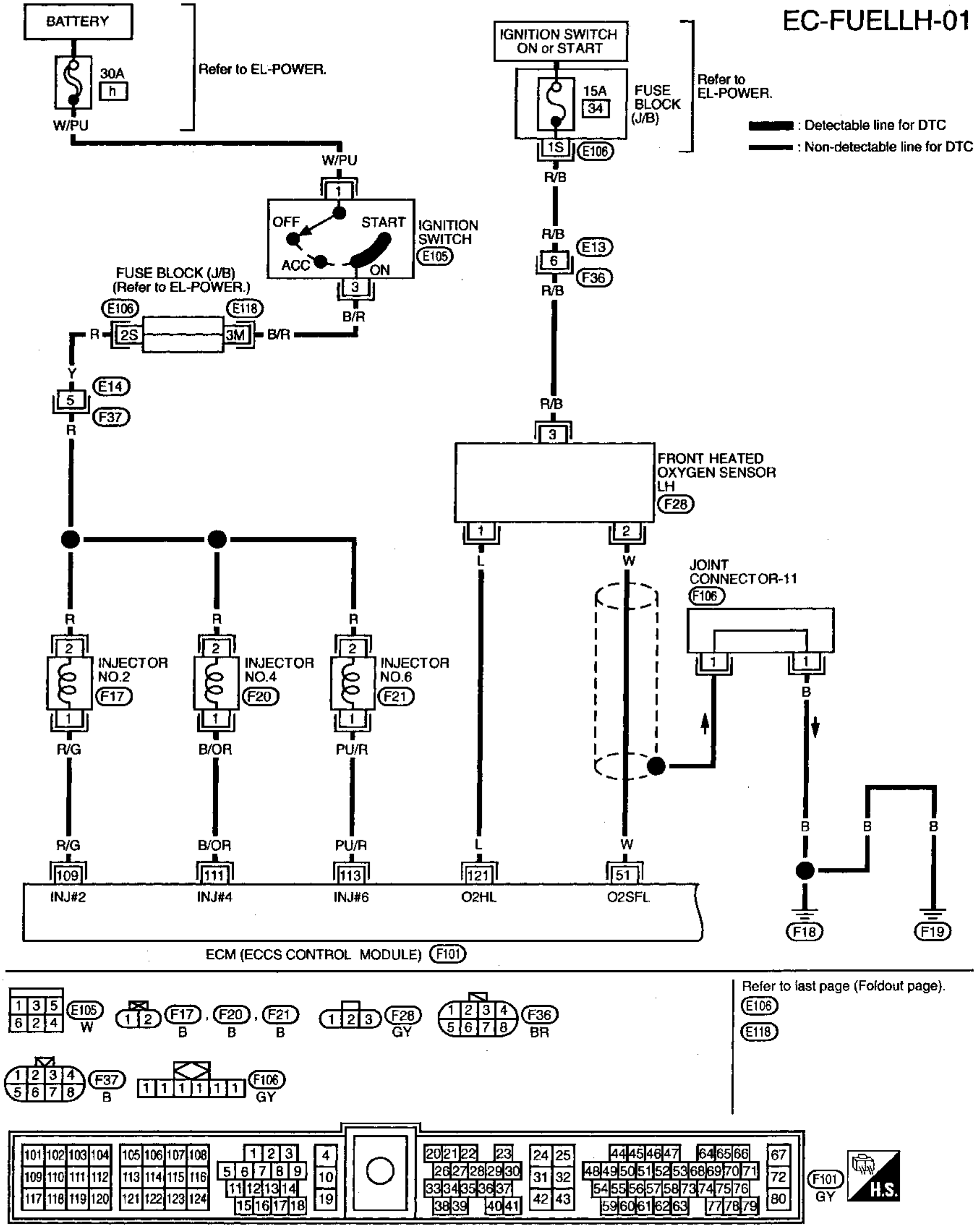
DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE (Overall)

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 wait at least 10 minutes at idle speed.
   The 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.

OR

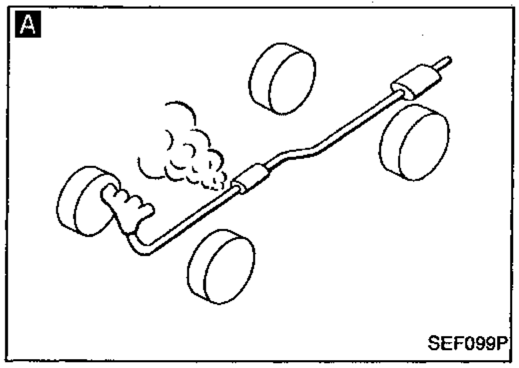
1) Disconnect mass air flow sensor harness connector.
2) Start engine and run it at least 3 seconds at idle speed.
3) Stop engine and reconnect mass air flow sensor harness connector.
4) Turn ignition switch "ON".
5) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM. Make sure DTC 0102 is detected.
6) Erase the 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 wait at least 10 minutes at idle speed.
   The 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.

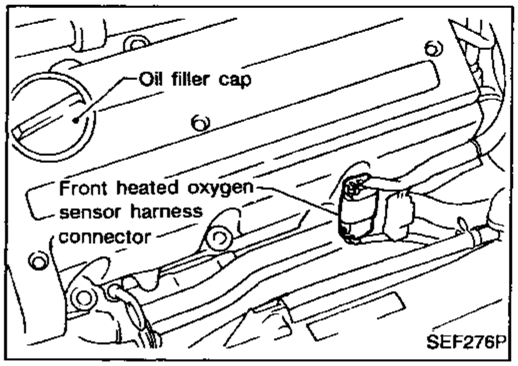
Fuel Injection System Function (Left bank) (Rich side) (Cont'd)

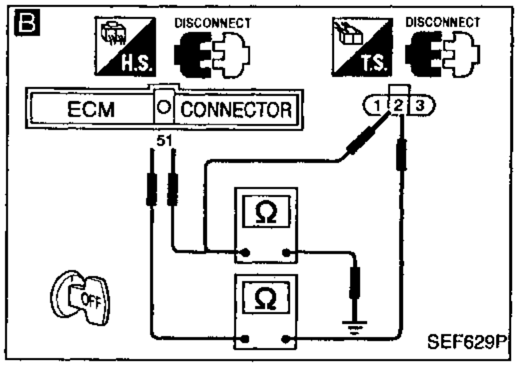


SEF225T

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 (left bank) harness connector and ECM harness connector.
3. Check harness continuity between ECM terminal (51) and terminal ②.
   Continuity should exist.
4. Check harness continuity between ECM terminal (51) (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 page EC-26.)
2. Install fuel pressure gauge and check fuel pressure.
   At idle:
   Approx. 235 kPa
   (2.4 kg/cm^2, 34 psi)
   A few seconds after ignition switch is turned OFF to ON:
   Approx. 294 kPa
   (3.0 kg/cm^2, 43 psi)

NG → Check fuel pump and circuit. (See page EC-359.)

↓ OK

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

OR

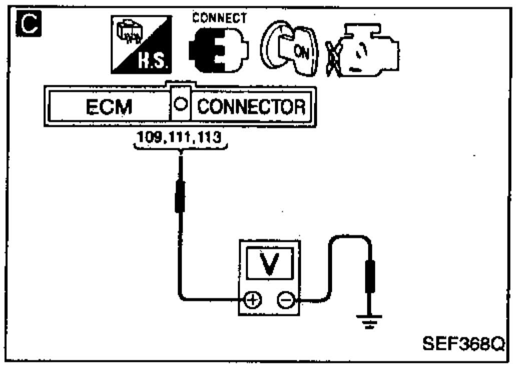
Check "mass air flow" in MODE 1 with GST.
2.0 - 6.0 g·m/sec: at idling
7.0 - 20.0 g·m/sec: at 2,500 rpm

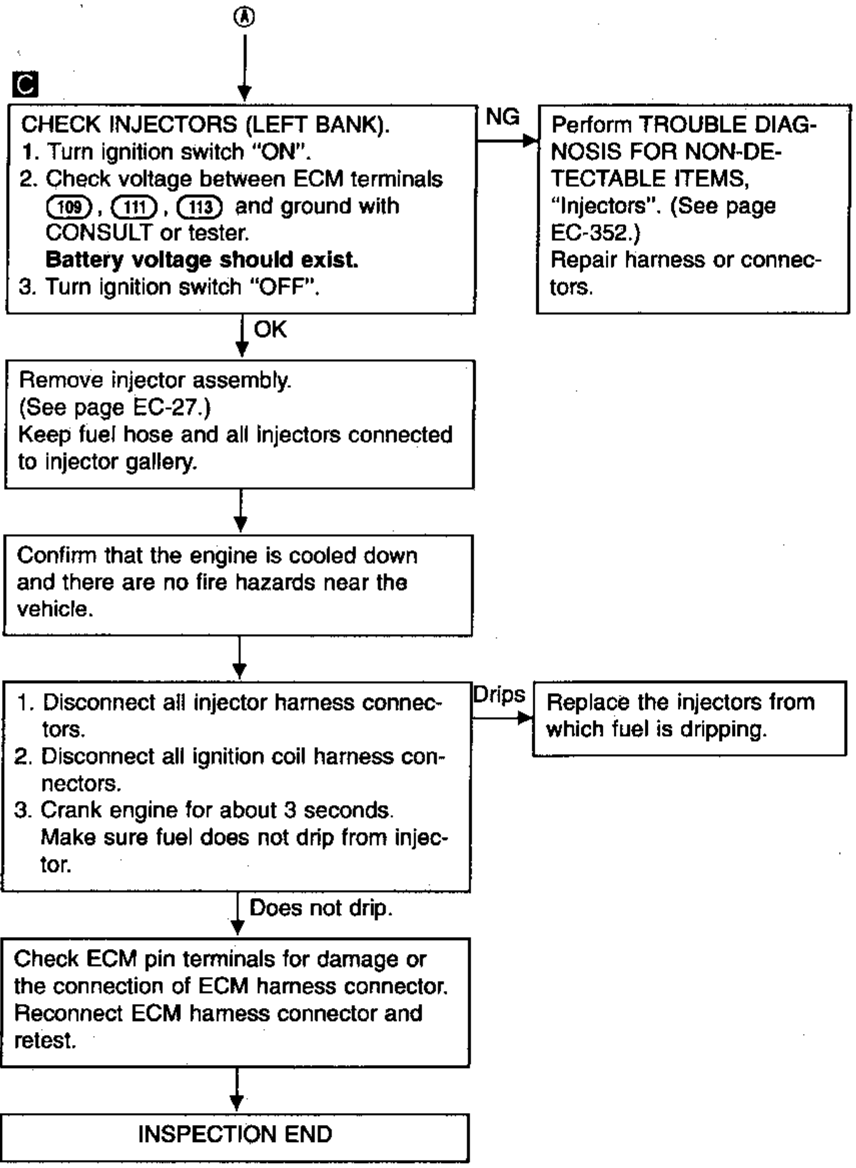
NG → Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds.
(See page EC-103.)

↓ OK

Ⓐ

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





Ⓐ

C

CHECK INJECTORS (LEFT BANK).
1. Turn ignition switch "ON".
2. Check voltage between ECM terminals (109), (111), (113) and ground with CONSULT or tester.
Battery voltage should exist.
3. Turn ignition switch "OFF".

NG → Perform TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS, "Injectors". (See page EC-352.) Repair harness or connectors.

OK ↓

Remove injector assembly.
(See page EC-27.)
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.

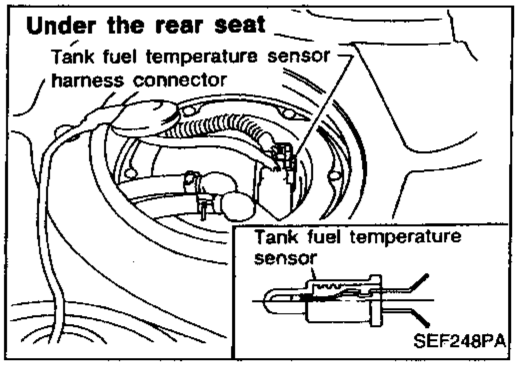
Drips → Replace the injectors from which fuel is dripping.

Does not drip. ↓

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

↓

INSPECTION END



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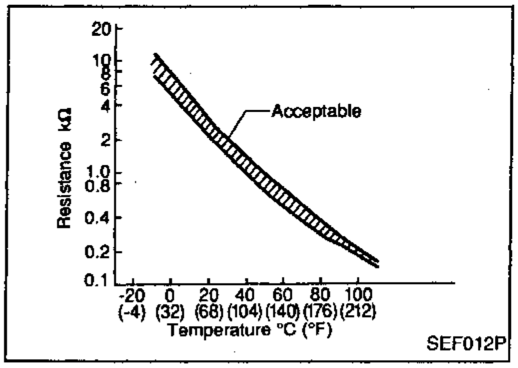


SEF012P

Tank Fuel Temperature Sensor

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.

⟨Reference data⟩

Fluid temperature °C (°F)	Voltage* (V)	Resistance (kΩ)
20 (68)	3.5	2.5
50 (122)	2.2	0.84

*: These data are reference values and are measured between ECM terminal (52) (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 entered to ECM. • Rationally incorrect voltage is entered 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

GST

1) Turn ignition switch "ON" and wait at least 12 seconds.
2) Select "MODE 7" with GST.

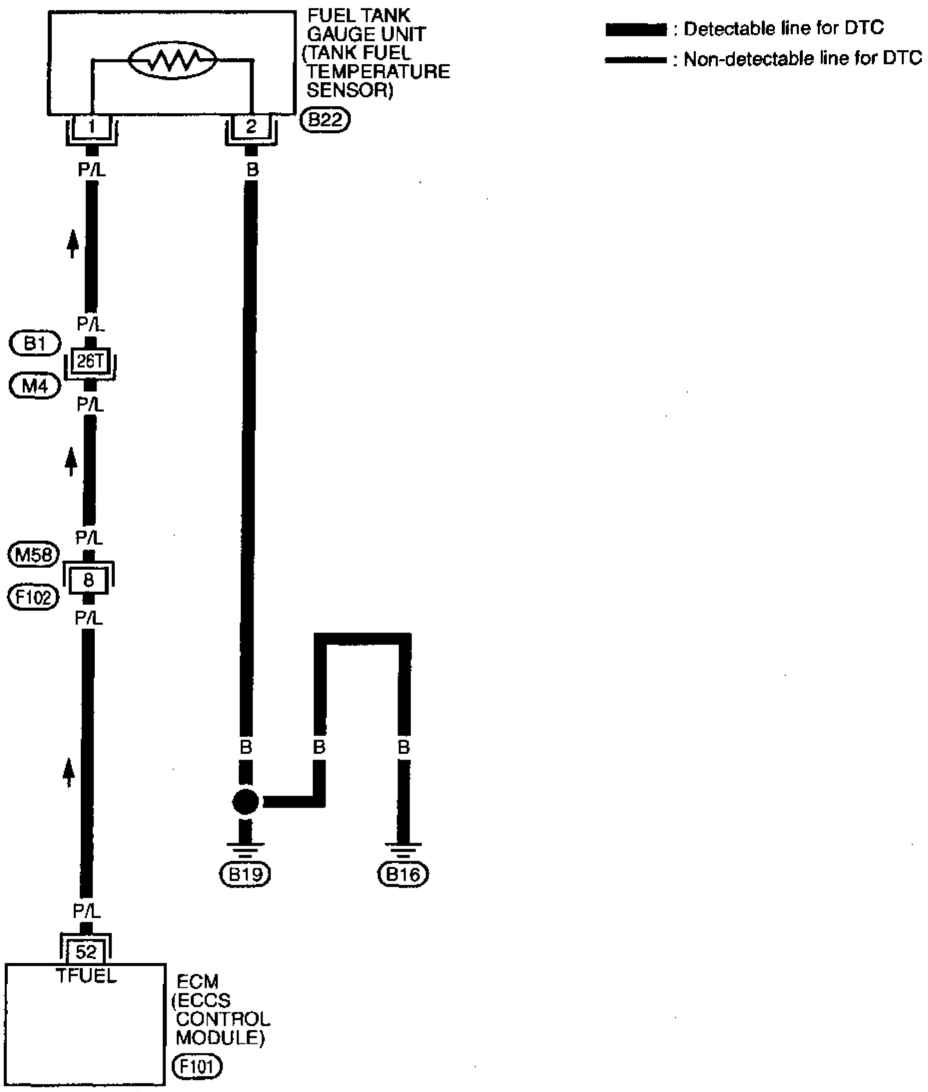
OR

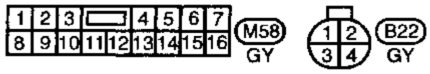
NO TOOLS

1) Turn ignition switch "ON" and wait at least 12 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.

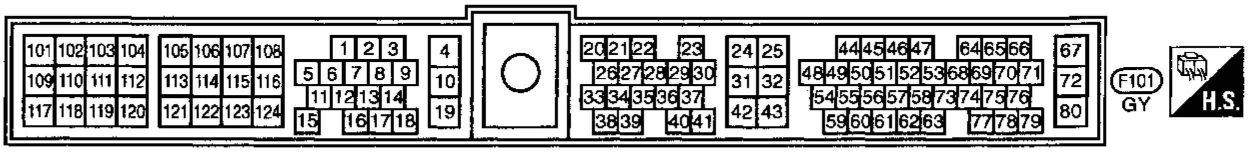
Tank Fuel Temperature Sensor (Cont'd)

EC-TFTS-01





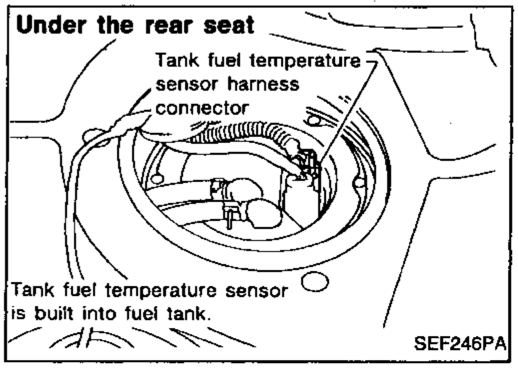
Refer to last page (Foldout page).
B1 , M4

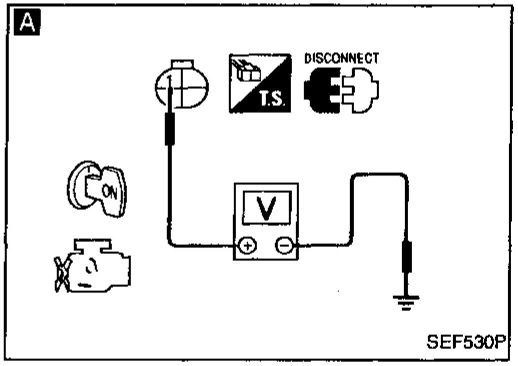


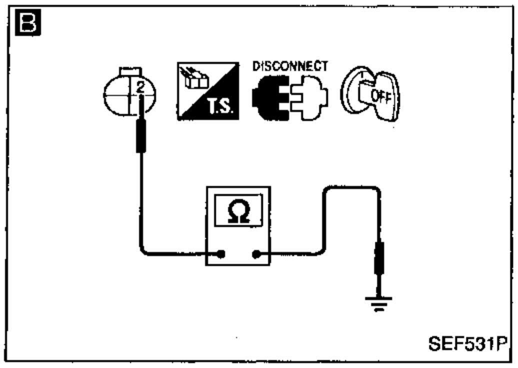
SEF230T

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, M4
- Harness connectors M58, F102
- 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 → Repair harness or connectors.

↓ OK

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

NG → Replace tank fuel temperature sensor.

↓ OK

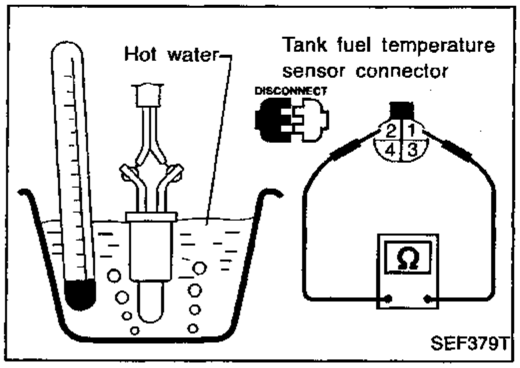
Disconnect and reconnect harness connectors in the circuit. Then retest.

↓ Trouble is not fixed.

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

↓

INSPECTION END



COMPONENT INSPECTION

Tank fuel temperature sensor

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

Crankshaft position sensor (POS) —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 engine 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 the second consecutive trip detection logic. In this condition, ECM monitors the misfire for each 1,000 revolutions of the engine.

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0306 (0603)	• No. 6 cylinder misfires.	• Improper spark plug • Insufficient compression • Incorrect fuel pressure • EGR valve • The injector circuit is open or shorted. • Injectors • Intake air leaks • The ignition secondary circuit is open or shorted. • Lack of fuel • Magnetized signal plate (flywheel)
P0305 (0604)	• No. 5 cylinder misfires.	
P0304 (0605)	• No. 4 cylinder misfires.	
P0303 (0606)	• No. 3 cylinder misfires.	
P0302 (0607)	• No. 2 cylinder misfires.	
P0301 (0608)	• No. 1 cylinder misfires.	
P0300 (0701)	• Multiple cylinders misfire.	

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 to 3,000 rpm at least 3 minutes.
   Hold the accelerator pedal as steady as possible during driving.

NOTE: Refer to the freeze frame data for the test driving condition.

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 drive at 1,500 to 3,000 rpm for at least 3 minutes.
   Hold the accelerator pedal as steady as possible during driving.

NOTE: Refer to the freeze frame data for the test driving condition.

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 drive at 1,500 to 3,000 rpm at least 3 minutes.
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.

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

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 dent.

NG → Repair or replace it.

↓ OK

A

CHECK EGR FUNCTION.
Perform OVERALL FUNCTION CHECK (malfunction b) for EGR Function.
(See page 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 .

↓ Yes

C

CHECK INJECTOR.
Does each injector make an operating sound at idle?

No → Check injector(s) and circuit(s). (See page EC-352.)

↓ Yes

D

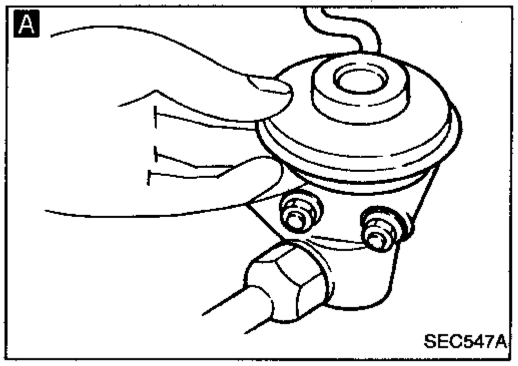
CHECK IGNITION SPARK.

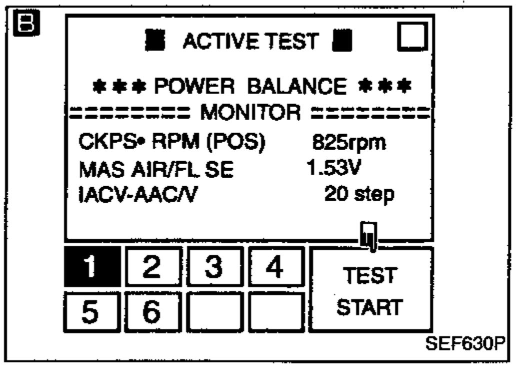
1. Disconnect ignition coil assembly from rocker cover.
2. Connect a known good spark plug to the ignition coil assembly.
3. Place end of spark plug against a suitable ground and crank engine.
4. Check for spark.

NG → Check ignition coil, power transistor and their circuits. (See page EC-288.)

↓ OK

(Go to Ⓐ on next page.)



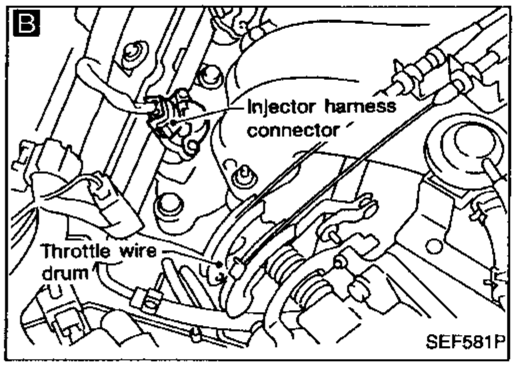


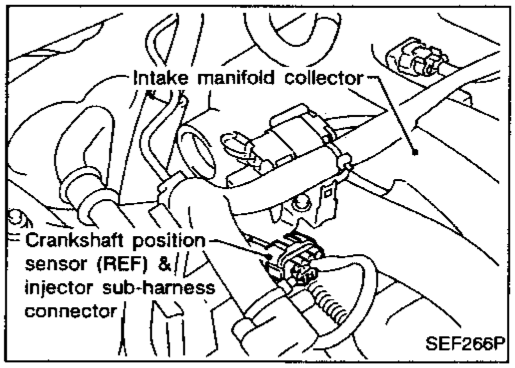
■ ACTIVE TEST ■ ☐

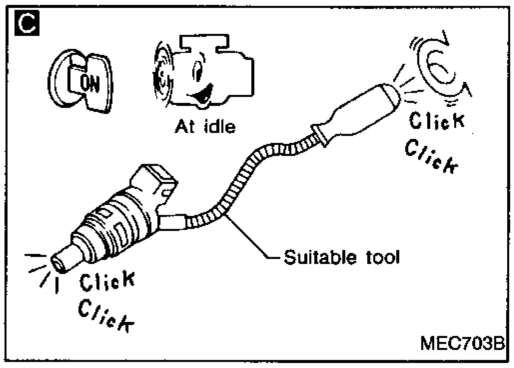
✱✱✱ POWER BALANCE ✱✱✱

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

CKPS• RPM (POS)	825rpm
MAS AIR/FL SE	1.53V
IACV-AAC/V	20 step

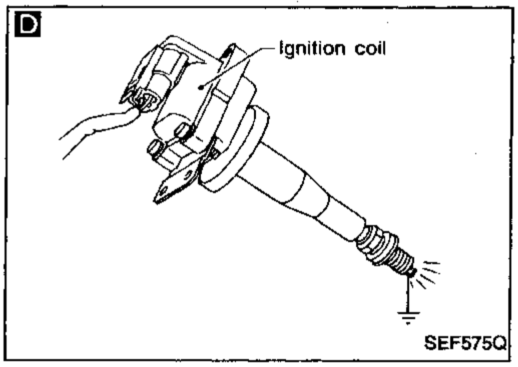






No. 6 - 1 Cylinder Misfire, Multiple Cylinder Misfire (Cont'd)

D



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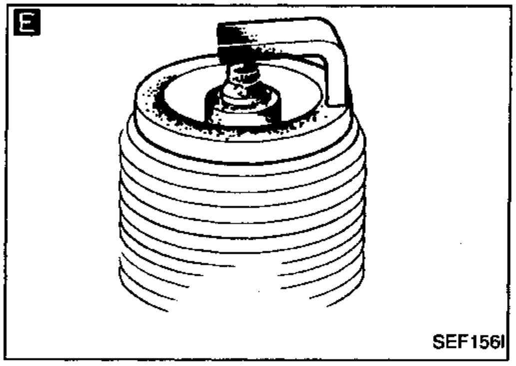
E



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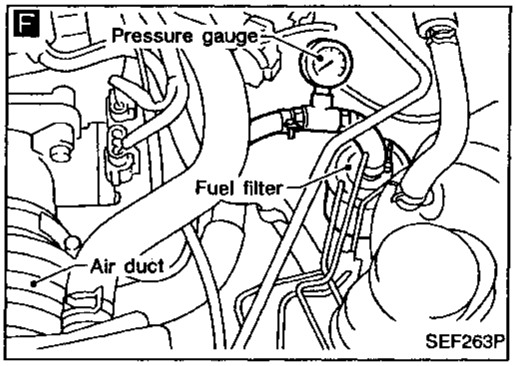
F



SEF263P

G

COMPRESSION PRESSURE

SEF309G

Ⓐ

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 page EC-26.)
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.

OK ↓

G

CHECK COMPRESSION PRESSURE.
- Check compression pressure.
  Standard:
  kPa (kg/cm^2, psi)/300 rpm
  1,275 (13.0, 185)
  Minimum:
  kPa (kg/cm^2, psi)/300 rpm
  981 (10.0, 142)
  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-78.

NG → Adjust ignition timing.

OK ↓

CHECK MASS AIR FLOW SENSOR.
Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT.
2.0 - 6.0 gm/sec: at idling
7.0 - 20.0 gm/sec: at 2,500 rpm

OR

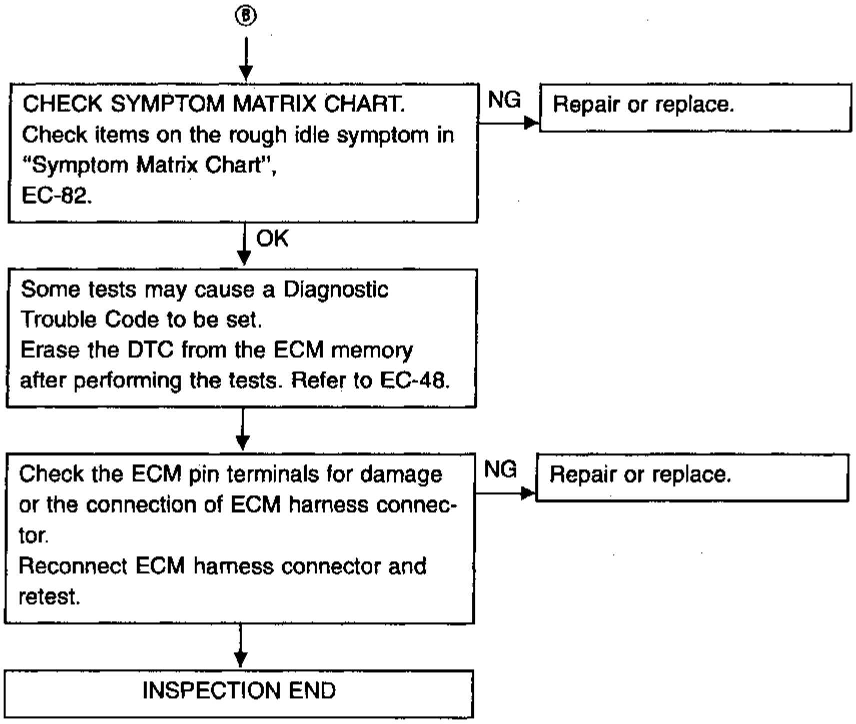
Check "mass air flow" in MODE 1 with GST.
2.0 - 6.0 gm/sec: at idling
7.0 - 20.0 gm/sec: at 2,500 rpm

NG → Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. (See page EC-103.) 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-82.

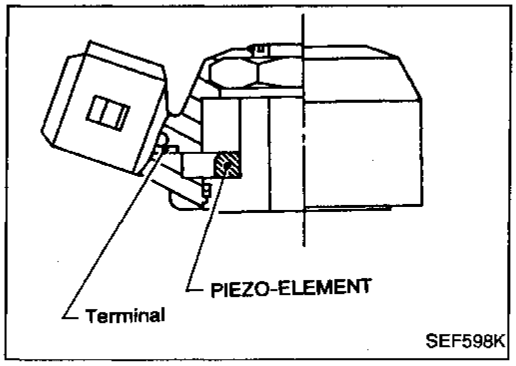
Repair or replace.

Some tests may cause a Diagnostic Trouble Code to be set.
Erase the DTC from the ECM memory after performing the tests. Refer to EC-48.

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

Repair or replace.

INSPECTION END



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.

ECM TERMINALS AND REFERENCE VALUE

Remarks: Specification data are reference values, and are measured between each terminal and ㉕ (ECCS ground) with a voltmeter.

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
64	W	Knock sensor	Engine is running. Idle speed	2.0 - 3.0V

ON BOARD DIAGNOSIS LOGIC

*** Freeze frame data is not stored in the ECM for the knock sensor.**
The MIL will not light for knock sensor malfunction.

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 entered to ECM.	• Harness or connectors (The knock sensor circuit is open or shorted.) • Knock sensor

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

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

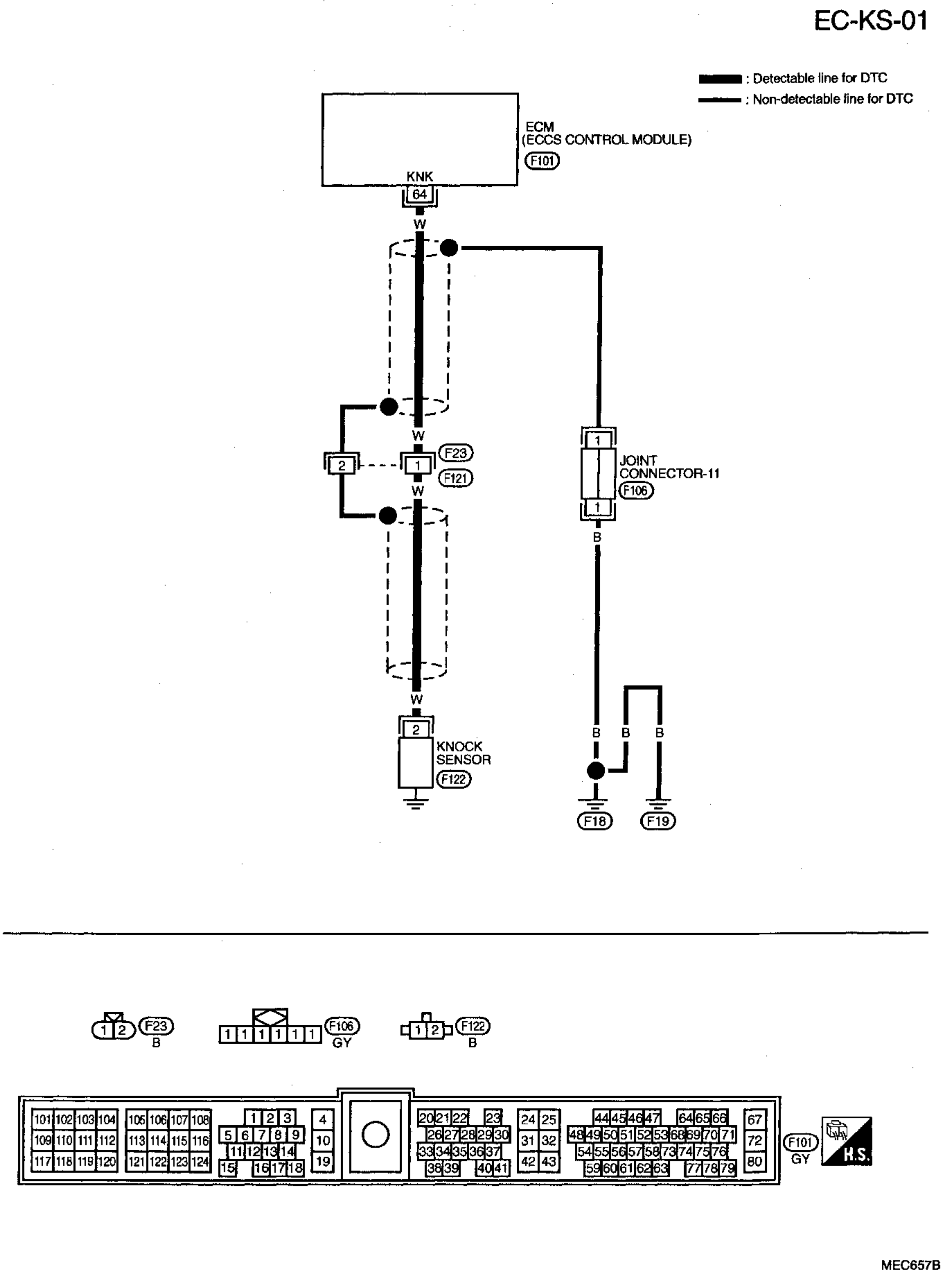
OR

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

OR

NO TOOLS
1) Start engine and run it 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.

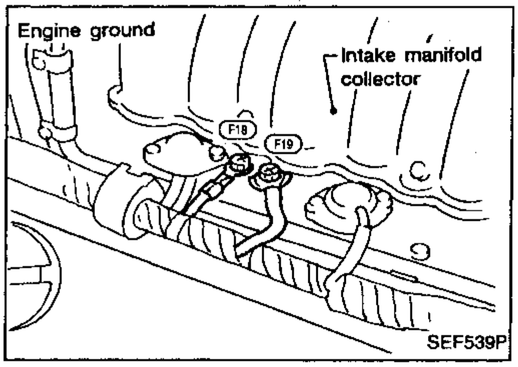
Knock Sensor (KS) (Cont'd)



MEC657B

Knock Sensor (KS) (Cont'd)

DIAGNOSTIC PROCEDURE



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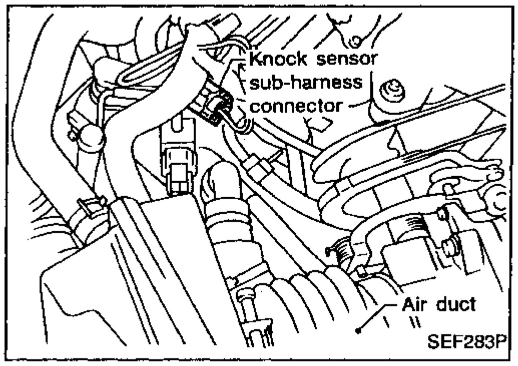


SEF283P

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 terminal ① and ECM terminal (64).
   Continuity should exist.
   If OK, check harness for short.

NG → Repair harness or connectors.

↓ OK

B

CHECK INPUT SIGNAL CIRCUIT-2.
Check harness continuity between terminal ① and engine ground.
Continuity should exist.
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 for open or short between knock sensor sub-harness connector and knock sensor

If NG, repair harness or connectors.
- For knock sensor, (Refer to "COMPONENT INSPECTION" below)

If NG, replace knock sensor.

↓ OK

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

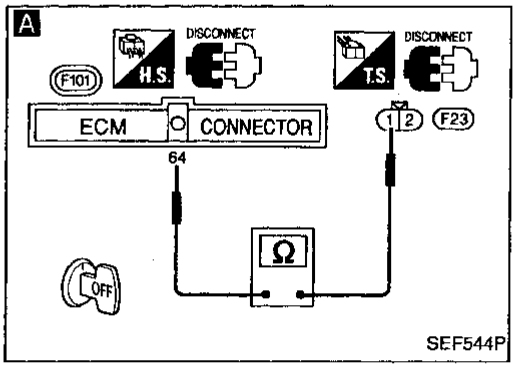
↓ Trouble is not fixed.

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

↓

INSPECTION END

A



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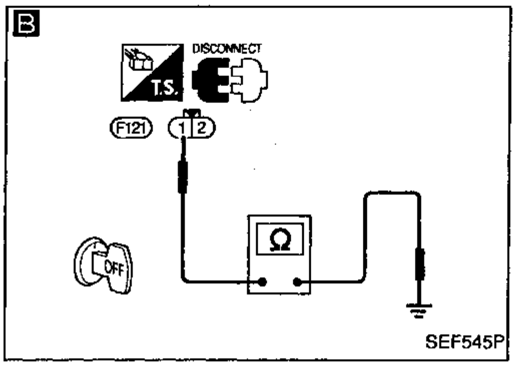

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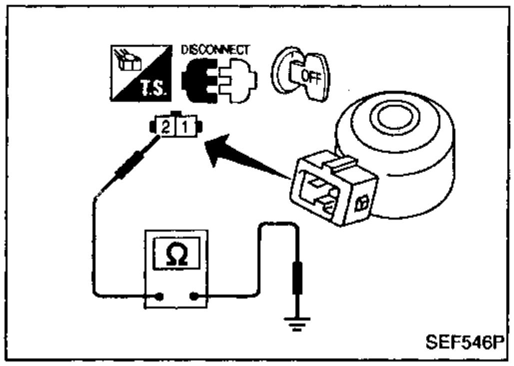

SEF546P

COMPONENT INSPECTION

Knock sensor

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

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

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

CAUTION:

Do not use any knock sensors that have been dropped or physically damaged. Use a new one.

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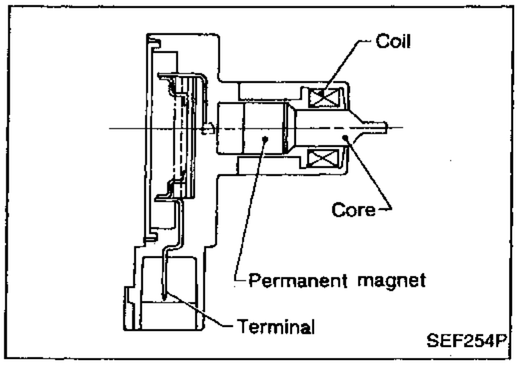


Crankshaft Position Sensor (CKPS) (POS)

COMPONENT DESCRIPTION

The crankshaft position sensor (POS) is located on the oil pan facing the gear teeth (cogs) of the signal plate (flywheel). It detects the crankshaft position signal (1° signal).
The sensor consists of a permanent magnet, core and coil.
When engine is running, the gap between the sensor and the gear teeth (cogs) will periodically change. Permeability near the sensor also changes.
Due to the permeability change, the magnetic flux near the core is changed. Therefore, the voltage signal generated in the coil is changed.
The ECM receives the voltage signal and detects the crankshaft position signal (1° signal).

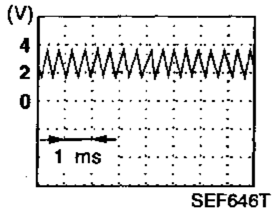
CONSULT REFERENCE VALUE IN DATA MONITOR MODE

- Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
CKPS·RPM (POS) CKPS·RPM (REF)	• Tachometer: Connect • Run engine and compare tachometer indication with the CONSULT value.	Almost the same speed as the CONSULT value.

ECM TERMINALS AND REFERENCE VALUE

Remarks: Specification data are reference values, and are measured between each terminal and ㉕ (ECCS ground) with a voltmeter.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
49	W	Crankshaft position sensor (POS)	Engine is running. Idle speed	Approximately 2.5V★  SEF646T
4	W/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)
67 72	R R	Power supply for ECM	Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)

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

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P0335 0802	• 1° signal is not entered to ECM for the first few seconds during engine cranking. • 1° signal is not entered to ECM during engine running.	• Harness or connectors (The crankshaft position sensor (POS) circuit is open or shorted.) • Crankshaft position sensor (POS) • Starter motor (Refer to EL section.) • Starting system circuit (Refer to EL section.)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

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

1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT.
2) Crank engine at least 2 seconds.

OR

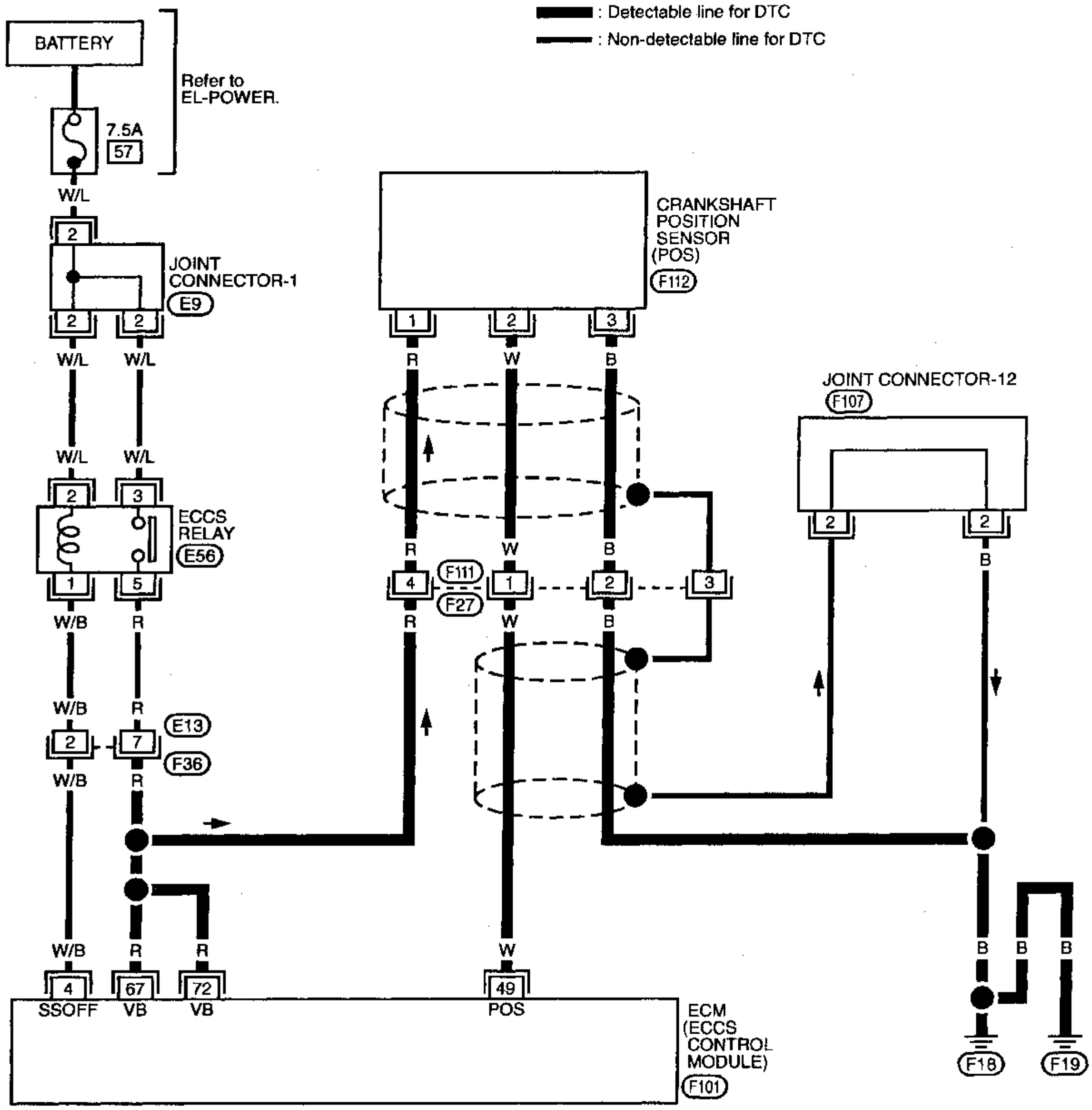
GST
1) Crank engine at least 2 seconds.
2) Select "MODE 7" with GST.

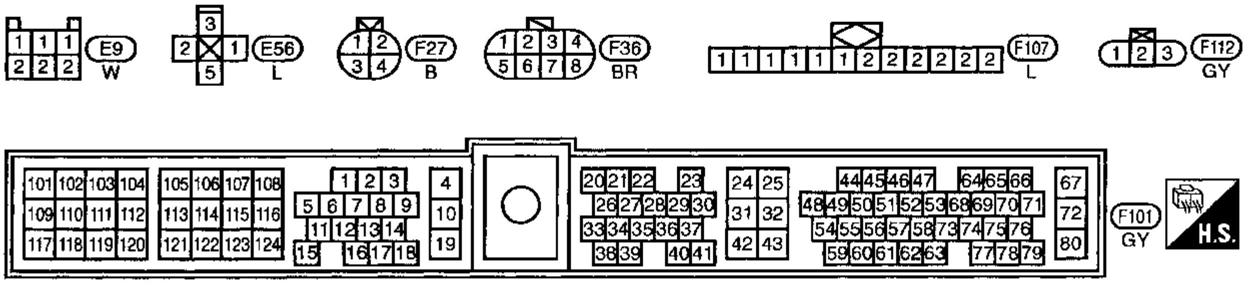
OR

NO TOOLS
1) Crank engine 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.

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

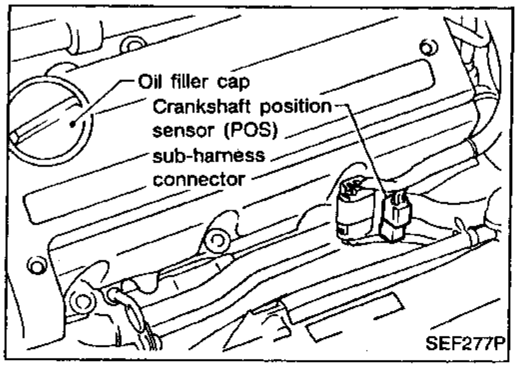
EC-POS-01





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

DIAGNOSTIC PROCEDURE



INSPECTION START

↓

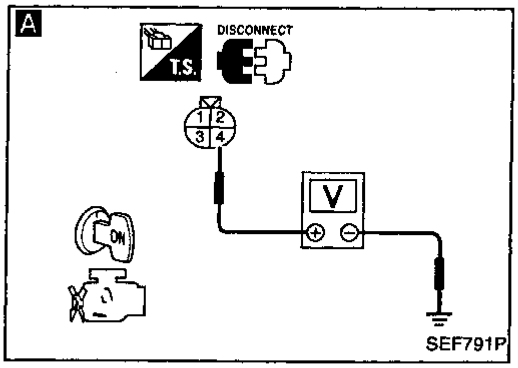
A

CHECK POWER SUPPLY-I.
1. Turn ignition switch "OFF".
2. Disconnect crankshaft position sensor (POS) sub-harness connector.
3. Turn ignition switch "ON".
4. Check voltage between terminal ④ and ground with CONSULT or tester.
   Voltage: Battery voltage

NG → Check the following.
- Harness connectors (F36), (E13)
- Harness for open or short between crankshaft position sensor (POS) sub-harness connector and ECCS relay
- Harness for open or short between crankshaft position sensor (POS) sub-harness connector and ECM

If NG, repair harness or connectors.

OK ↓

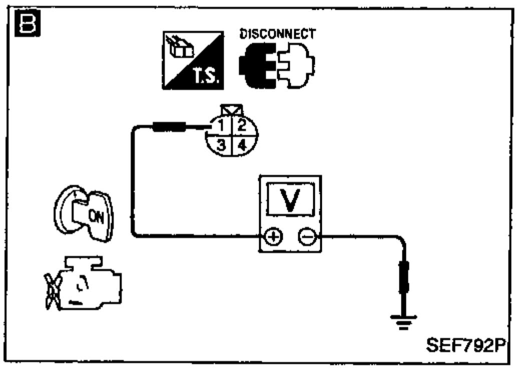


B

CHECK POWER SUPPLY-II.
Check voltage between terminal ① and ground with CONSULT or tester.
Voltage: Approximately 5V

NG → Repair harness or connectors.

OK ↓

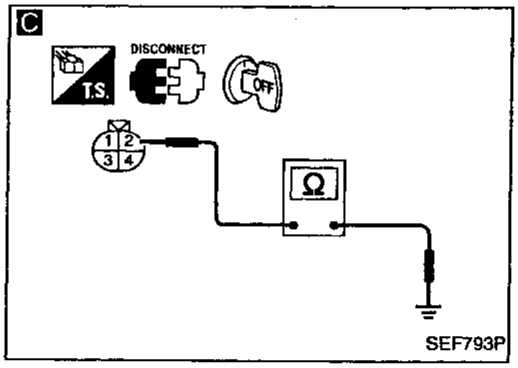


C

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

NG → Repair harness or connectors.

OK ↓

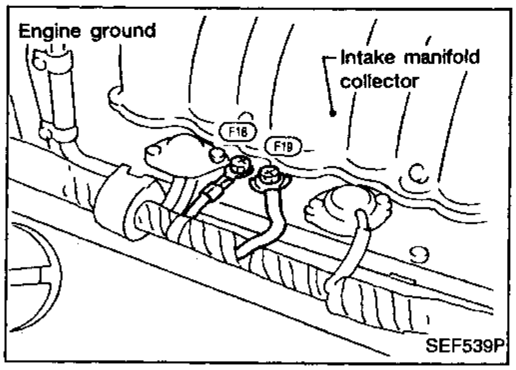


D

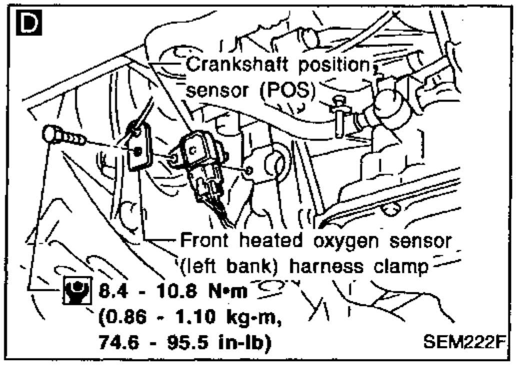
CHECK INSTALLATION.
Check that crankshaft position sensor (POS) and front heated oxygen sensor (left bank) harness clamp are installed correctly, as shown in figure.

↓

Ⓐ



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



SEM222F

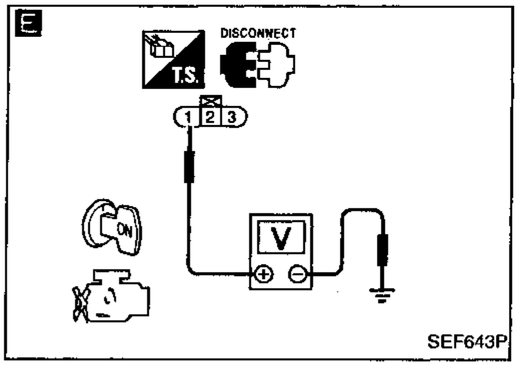
Ⓐ

E

CHECK POWER SUPPLY-III.
1. Reconnect crankshaft position sensor (POS) sub-harness connector.
2. Disconnect crankshaft position sensor (POS) 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 (F111), (F27)
- Harness for open or short between crankshaft position sensor (POS) and crankshaft position sensor (POS) sub-harness connector

If NG, repair harness or connectors.



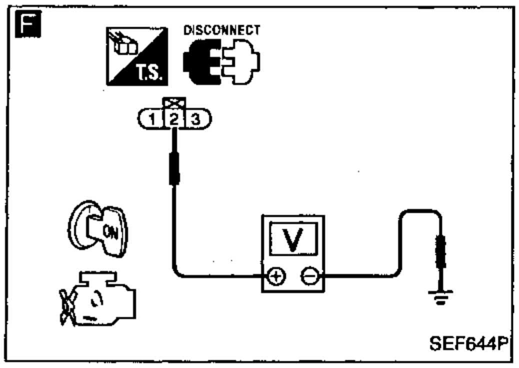
SEF643P

OK ↓

F

CHECK POWER SUPPLY-IV.
Check voltage between terminal ② and ground with CONSULT or tester.
Voltage: Approximately 5V

NG → Check the following. (see above)



SEF644P

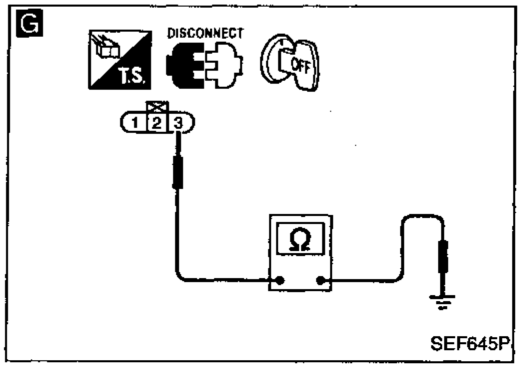
OK ↓

G

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

NG → Check the following.
- Harness connectors (F111), (F27)
- Harness for open or short between crankshaft position sensor (POS) and crankshaft position sensor (POS) sub-harness connector

If NG, repair harness or connectors.



SEF645P

OK ↓

CHECK COMPONENT
[Crankshaft position sensor (POS)].
Refer to "COMPONENT INSPECTION", EC-203.

NG → Replace crankshaft position sensor (POS).

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.

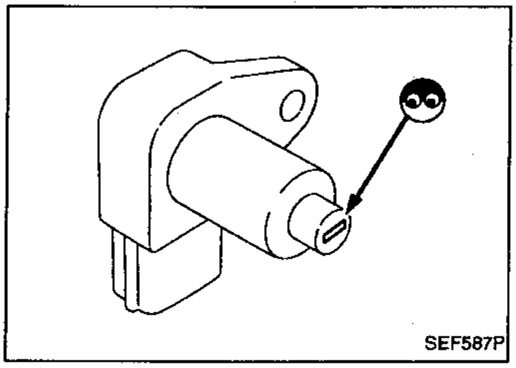
↓

INSPECTION END

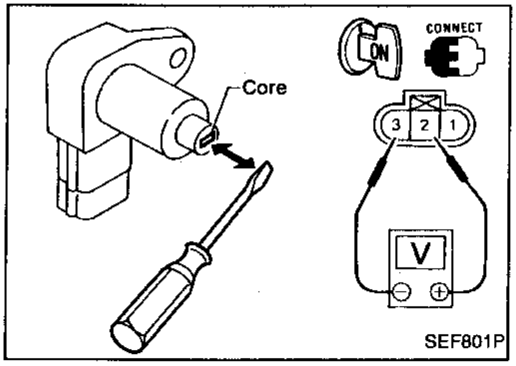
Crankshaft Position Sensor (CKPS) (POS) (Cont'd)

COMPONENT INSPECTION

Crankshaft position sensor (POS)



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



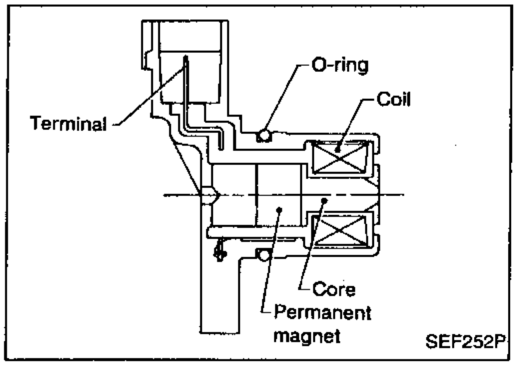
5. Reconnect crankshaft position sensor (POS) harness connector.
6. Turn ignition switch "ON".
7. Check voltage between terminals ② and ③ when bringing a screwdriver into contact with, and quickly pulling away from the sensor core.

Terminal	Condition	Voltage
②, ③	Contacted	Approximately 5V
	Pulled away	Approximately 0V

There should be a steady 5V as the screwdriver is drawn away slowly.
If NG, replace crankshaft position sensor (POS).

Camshaft Position Sensor (CMPS) (PHASE)

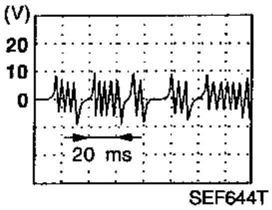
COMPONENT DESCRIPTION



The camshaft position sensor (PHASE) is located on the engine front cover facing the camshaft sprocket. It detects the cylinder No. signal.
The sensor consists of a permanent magnet, core and coil.
When engine is running, the gap between the sensor and the camshaft sprocket will periodically change. Permeability near the sensor also changes.
Due to the permeability change, the magnetic flux near the core is changed. Therefore, the voltage signal generated in the coil is changed.
The ECM receives the voltage signal and detects the cylinder No. signal.

ECM TERMINALS AND REFERENCE VALUE

Remarks: Specification data are reference values, and are measured between each terminal and ㉕ (ECCS ground) with a voltmeter.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
46 47	W W	Camshaft position sensor (PHASE)	Engine is running. Idle speed	Approximately 4.2V★ (AC voltage) 

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P0340 0101	• The cylinder No. signal is not entered to ECM for the first few seconds during engine cranking. • The cylinder No. signal is not entered to ECM during engine running. • The cylinder No. signal is not in the normal pattern during engine running.	• Harness or connectors (The camshaft position sensor (PHASE) circuit is open or shorted.) • Camshaft position sensor (PHASE) • Starter motor (Refer to EL section.) • Starting system circuit (Refer to EL section.)

Camshaft Position Sensor (CMPS) (PHASE) (Cont'd)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

Note: If both DTC P0340 (0101) and P1335 (0407), P0335 (0802) or P1336 (0905) are displayed, perform TROUBLE DIAGNOSIS FOR DTC P1335, P0335 or P1336 first. (See EC-296, 198 or EC-301.)

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

1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT.
2) Crank engine at least 2 seconds.

OR

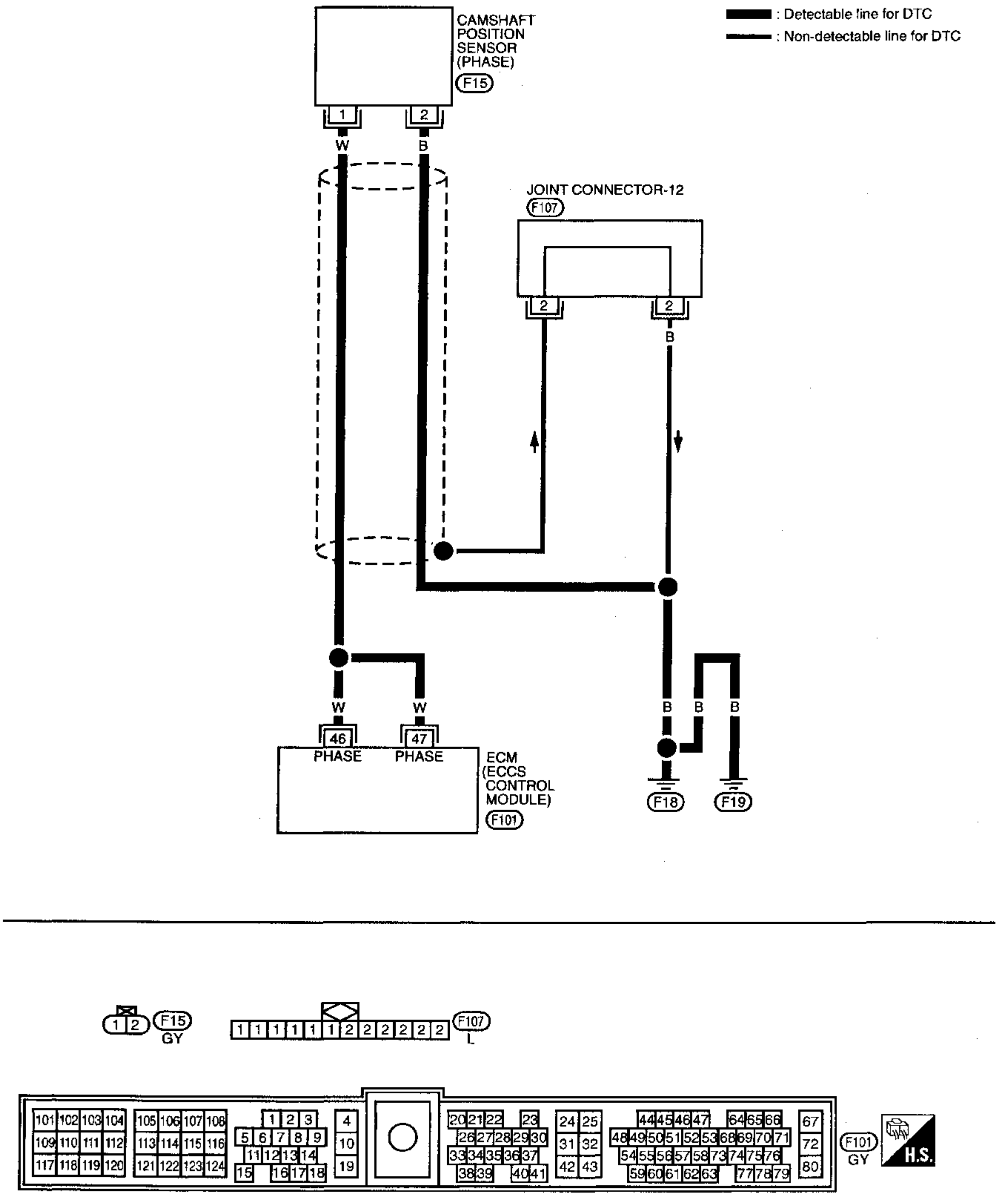
GST
1) Crank engine at least 2 seconds.
2) Select "MODE 7" with GST.

OR

NO TOOLS
1) Crank engine 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.

Camshaft Position Sensor (CMPS) (PHASE) (Cont'd)

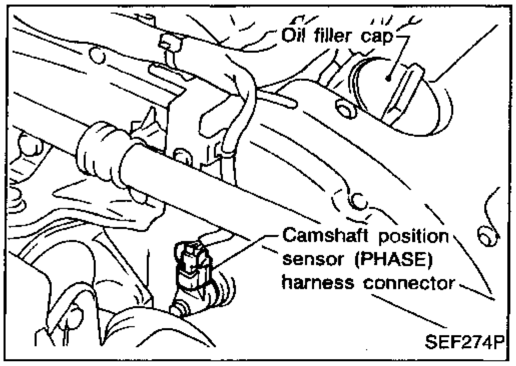
EC-PHASE-01



MEC647B

Camshaft Position Sensor (CMPS) (PHASE) (Cont'd)

DIAGNOSTIC PROCEDURE



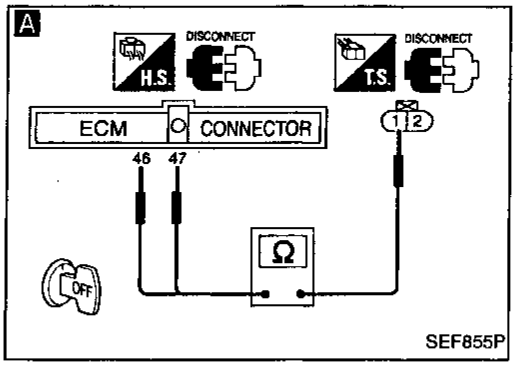
SEF274P

INSPECTION START

CHECK STARTING SYSTEM.
Does the engine turn over?
(Does the starter motor operate?)

No → Check starting system.
(Refer to EL section.)

Yes ↓



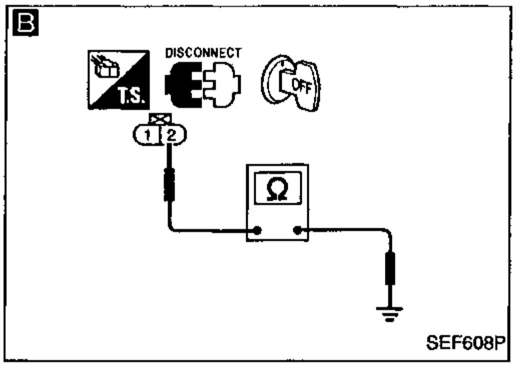
SEF855P

A

CHECK INPUT SIGNAL CIRCUIT.
1. Turn ignition switch "OFF".
2. Disconnect camshaft position sensor (PHASE) harness connector and ECM harness connector.
3. Check harness continuity between terminal ① and ECM terminals ㊻, ㊼.
Continuity should exist.
If OK, check harness for short.

NG → Repair harness or connectors.

OK ↓



SEF608P

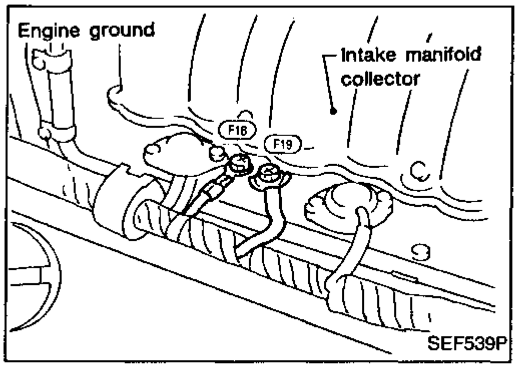
B

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.
- Engine ground screw (Loosen and retighten.)
- Harness or connectors

If NG, repair harness or connectors.

OK ↓



SEF539P

CHECK COMPONENT
[Camshaft position sensor (PHASE)].
Refer to "COMPONENT INSPECTION", EC-208.

NG → Replace camshaft position sensor (PHASE).

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.

↓ Trouble is not fixed.

Visually check the surface of camshaft sprocket for chipping.

NG → Replace camshaft sprocket.

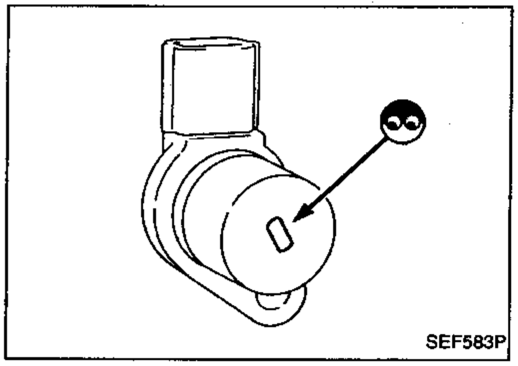
OK ↓

INSPECTION END

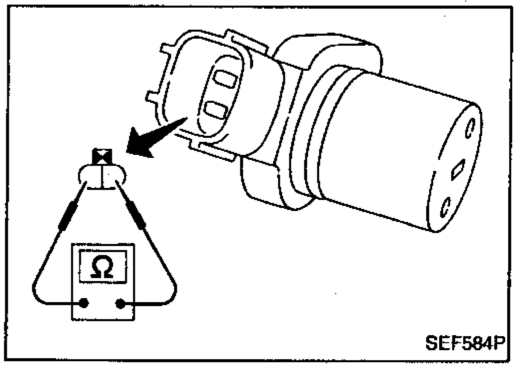
Camshaft Position Sensor (CMPS) (PHASE) (Cont'd)

COMPONENT INSPECTION

Camshaft position sensor (PHASE)


SEF583P

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



SEF584P

5. Check resistance as shown in the figure.

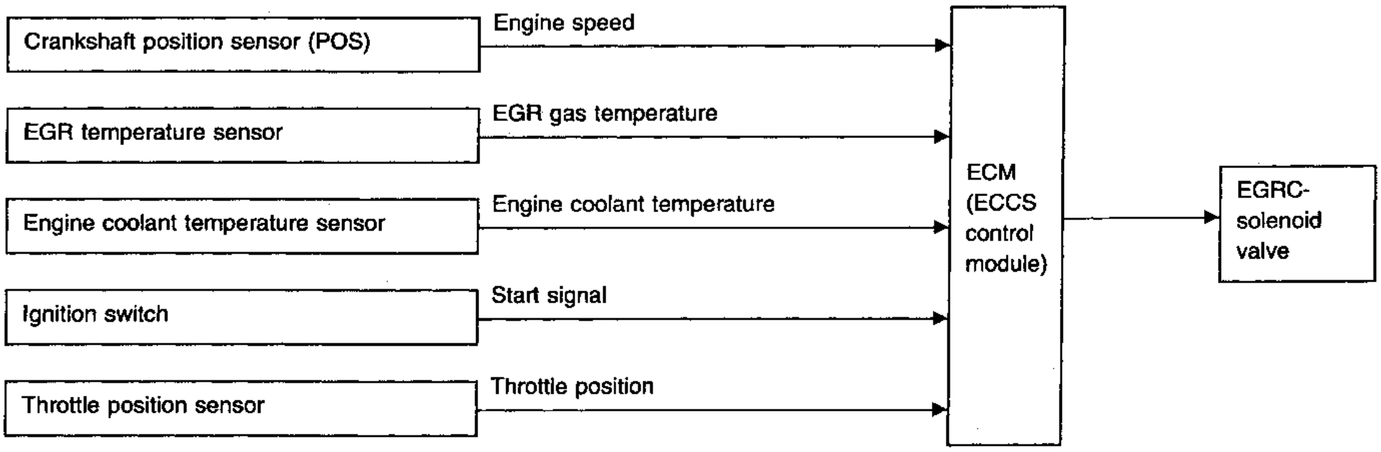
Resistance:

Approximately 1,440 - 1,760Ω at 20°C (68°F) (HITACHI make)

Approximately 2,090 - 2,550Ω at 20°C (68°F) (MITSUBISHI make)

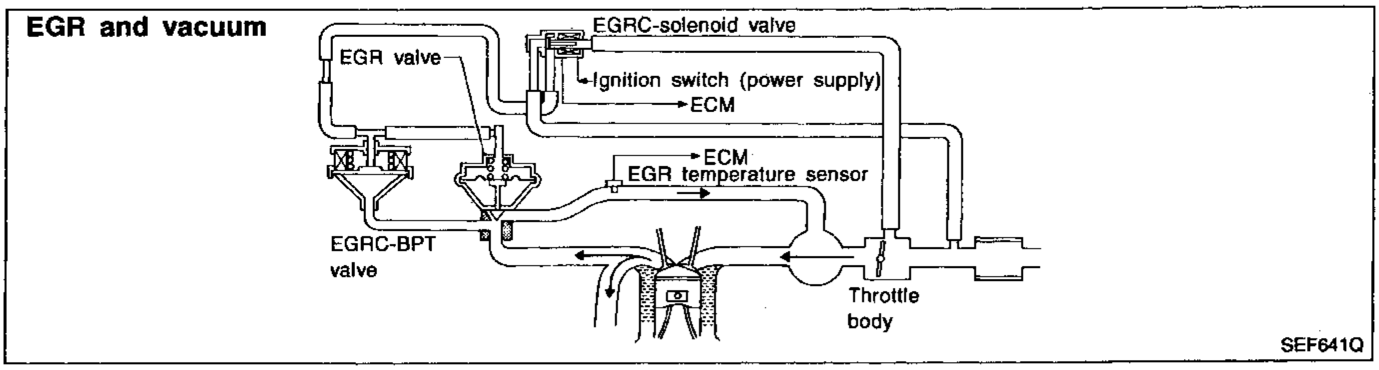
EGR Function

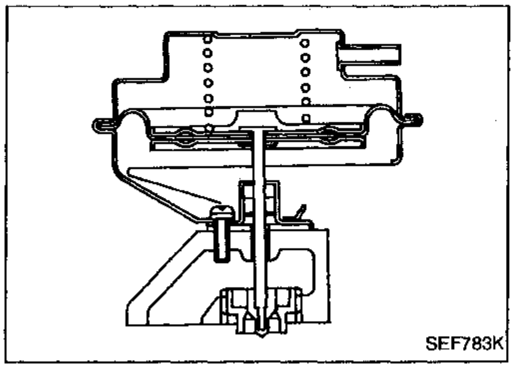
SYSTEM DESCRIPTION



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
- Engine stopped
- Engine idling
- Excessively high engine coolant temperature
- Mass air flow sensor malfunction

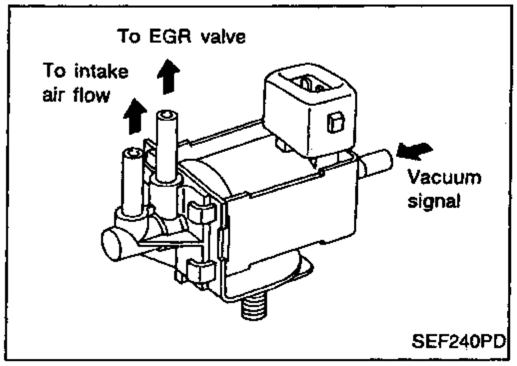




COMPONENT DESCRIPTION

Exhaust gas recirculation (EGR) valve

The EGR valve controls the amount of exhaust gas routed to the intake manifold. Vacuum is applied to the EGR valve in response to throttle valve opening. The vacuum controls the movement of a taper valve connected to the vacuum diaphragm in the EGR valve.



SEF240PD

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 and 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

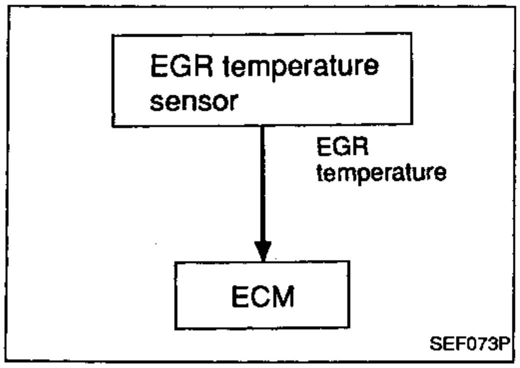
- Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
EGR TEMP SEN	• Engine: After warming up		Less than 4.5V
EGRC SOL/V	• Engine: After warming up • Air conditioner switch: "OFF" • Shift lever: "N" • No-load	Idle	ON
		Racing up to 1,500 - 2,000 rpm	OFF

ECM TERMINALS AND REFERENCE VALUE

Remarks: Specification data are reference values, and are measured between each terminal and ㉕ (ECCS ground) with a voltmeter.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
43	B	Sensor's ground	Engine is running. (Warm-up condition) Idle speed	0V
63	L/OR	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 - 1.0V
103	L/B	EGRC-solenoid valve	Engine is running. (Warm-up condition) Revving engine up to 2,000 rpm.	BATTERY VOLTAGE (11 - 14V)
			Engine is running. (Warm-up condition) Idle speed	0 - 0.7V



SEF073P

ON BOARD DIAGNOSIS LOGIC

If the absence of EGR flow is detected by EGR temperature sensor under the condition that calls for EGR, a low-flow malfunction is diagnosed.
If EGR temperature sensor detects EGR flow under the condition that does not call for EGR, a high-flow malfunction is diagnosed.

EGR Function (Cont'd)

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 leaks • Passage obstructed • 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

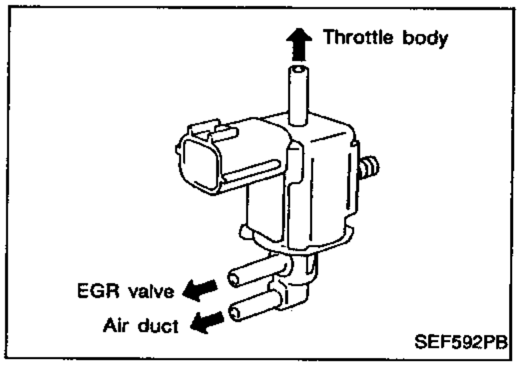
OVERALL FUNCTION CHECK

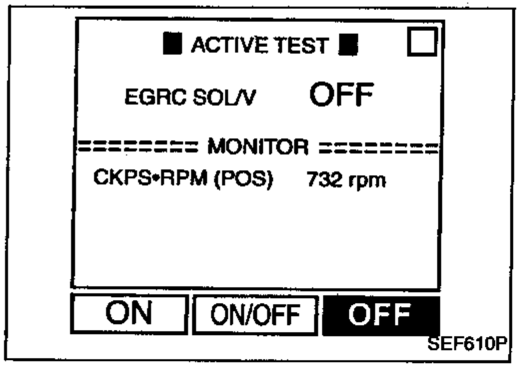
This procedure can be used for checking the overall function of the EGR function. During this check, a DTC might not be confirmed.

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 55°C (131°F), perform only "Procedure for malfunction A".
If the engine coolant temperature is lower than 55°C (131°F), perform both "Procedure for malfunction A" and "Procedure for malfunction B".
If 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 DTCs in the ECM and perform inspections one by one based on "INSPECTION PRIORITY", EC-80.

EGR Function (Cont'd)

Procedure for malfunction A




■ ACTIVE TEST ■ ☐

EGRC SOL/V OFF

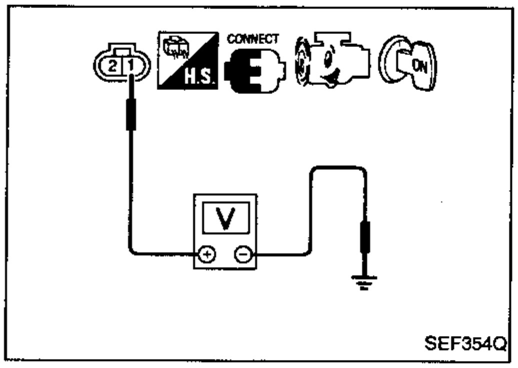
======== MONITOR ========

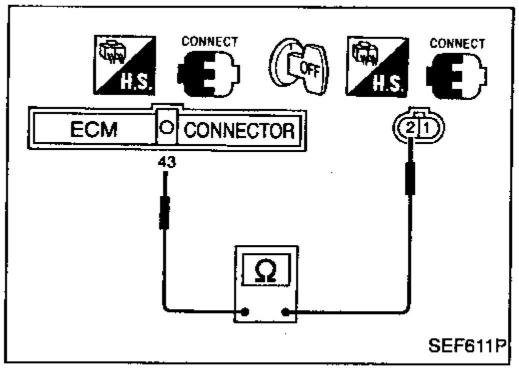
CKPS•RPM (POS) 732 rpm

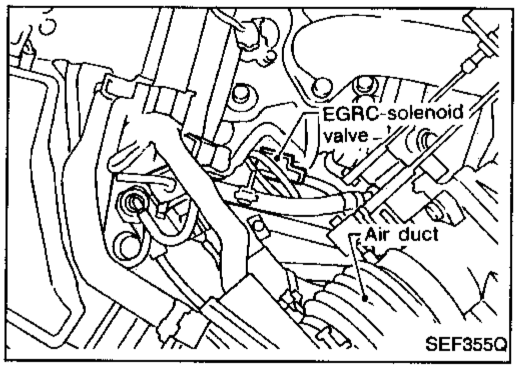
1) Start engine and warm it up sufficiently.
2) Select "EGRC SOLENOID VALVE" in "ACTIVE TEST" mode with CONSULT and turn the solenoid valve "OFF".
3) Check the EGR valve lifting when revving engine from 2,000 rpm up to 4,000 rpm under no load.
   EGR valve should lift up and down without sticking.
4) Check voltage between EGR temperature sensor harness connector terminal ① and ground at idle speed.
   Less than 4.5V should exist.
5) Turn ignition switch "OFF".
6) Check harness continuity between EGR temperature sensor harness connector terminal ② and ECM terminal ㊸.
   Continuity should exist.
7) Perform "COMPONENT CHECK", "EGR temperature sensor". (See page EC-218.)

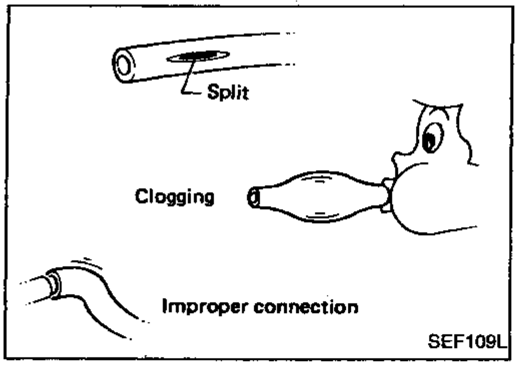
OR

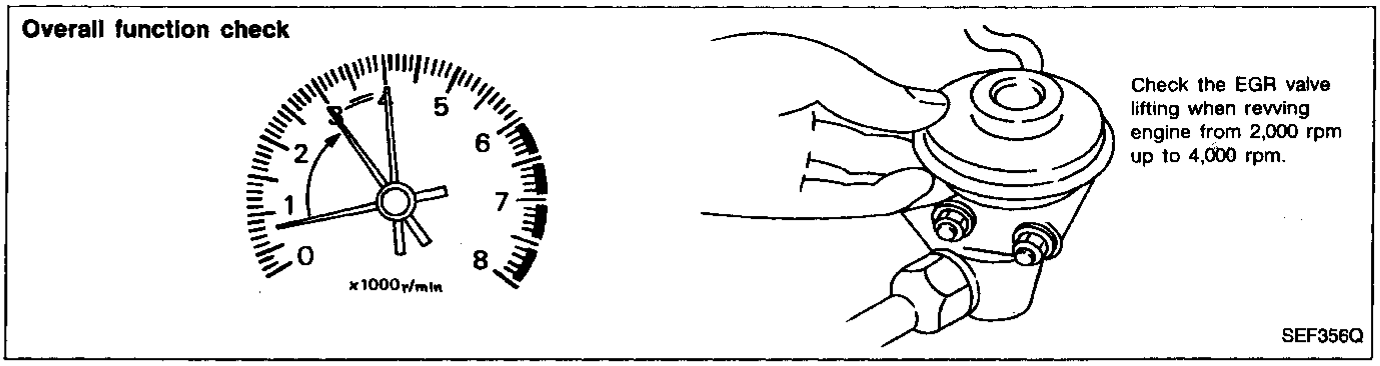
1) Disconnect EGRC-solenoid valve harness connector. (The DTC for EGRC-solenoid valve will be displayed, however, ignore it.)
2) Start engine and warm it up sufficiently.
3) Check the EGR valve lifting when revving engine from 2,000 rpm up to 4,000 rpm under no load.
   EGR valve should lift up and down without sticking.
4) Reconnect EGRC-solenoid valve harness connector.
5) Check voltage between EGR temperature sensor harness connector terminal ① and ground at idle speed.
   Less than 4.5V should exist.
6) Turn ignition switch "OFF".
7) Check harness continuity between EGR temperature sensor harness connector terminal ② and ECM terminal ㊸.
   Continuity should exist.
8) Perform "COMPONENT CHECK", "EGR temperature sensor". (See page EC-218.)





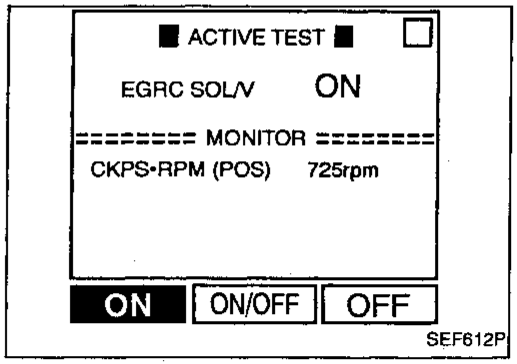






Check the EGR valve lifting when revving engine from 2,000 rpm up to 4,000 rpm.

EGR Function (Cont'd)



■ ACTIVE TEST ■ ☐

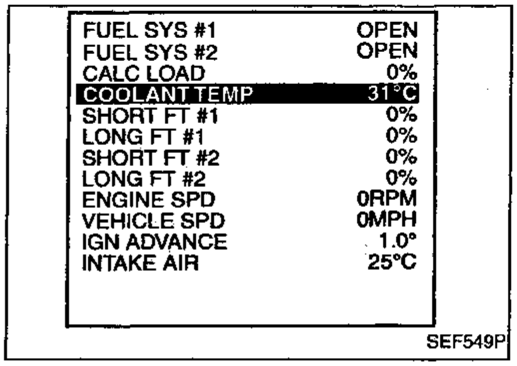
EGRC SOL/V ON

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

CKPS·RPM (POS) 725rpm

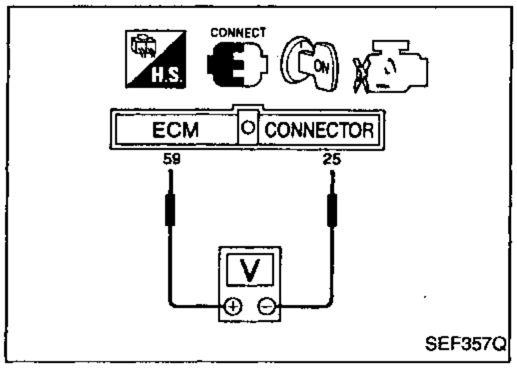
ON | ON/OFF | OFF

SEF612P



```
FUEL SYS #1      OPEN
FUEL SYS #2      OPEN
CALC LOAD          0%
COOLANT TEMP     31°C
SHORT FT #1        0%
LONG FT #1         0%
SHORT FT #2        0%
LONG FT #2         0%
ENGINE SPD       0RPM
VEHICLE SPD      0MPH
IGN ADVANCE      1.0°
INTAKE AIR       25°C
```

SEF549P



SEF357Q

Procedure for malfunction B

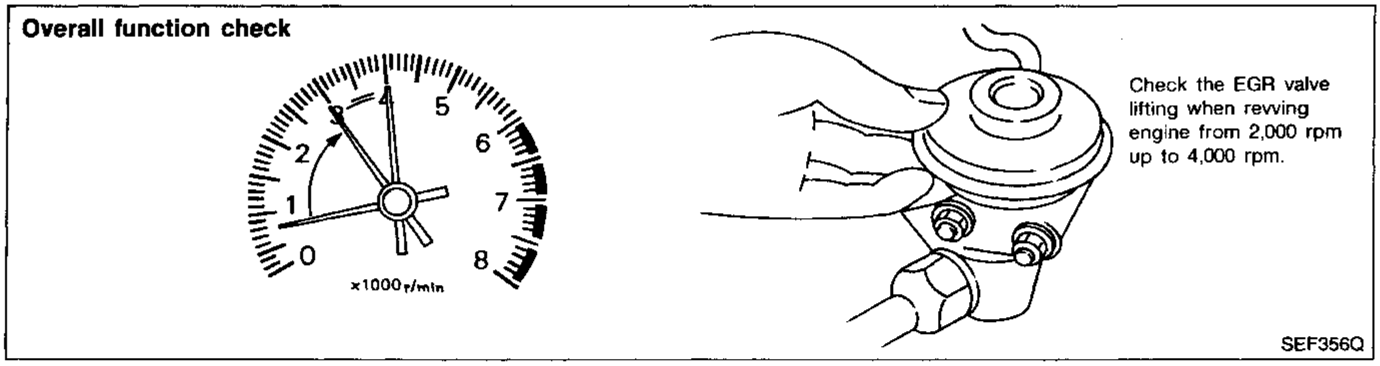
1) Start engine.
2) Select "EGRC SOLENOID VALVE" in "ACTIVE TEST" mode with CONSULT and turn the solenoid valve "ON".
3) Check for the EGR valve lifting when revving engine from 2,000 rpm up to 4,000 rpm under no load.
EGR valve should be closed and should not lift up.

OR

1) Turn ignition switch "ON".
2) Confirm the engine coolant temperature is lower than 52°C (126°F) in "Mode 1" with GST.
Perform the following steps before its temperature becomes higher than 52°C (126°F).
3) Start engine.
4) Check for the EGR valve lifting when revving engine 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 terminals (59) and ㉕ is higher than 2.24V.
Perform the following steps before the voltage becomes lower than 2.24V.
3) Start engine.
4) Check for the EGR valve lifting when revving engine from 2,000 rpm up to 4,000 rpm under no load.
EGR valve should be closed and should not lift up.



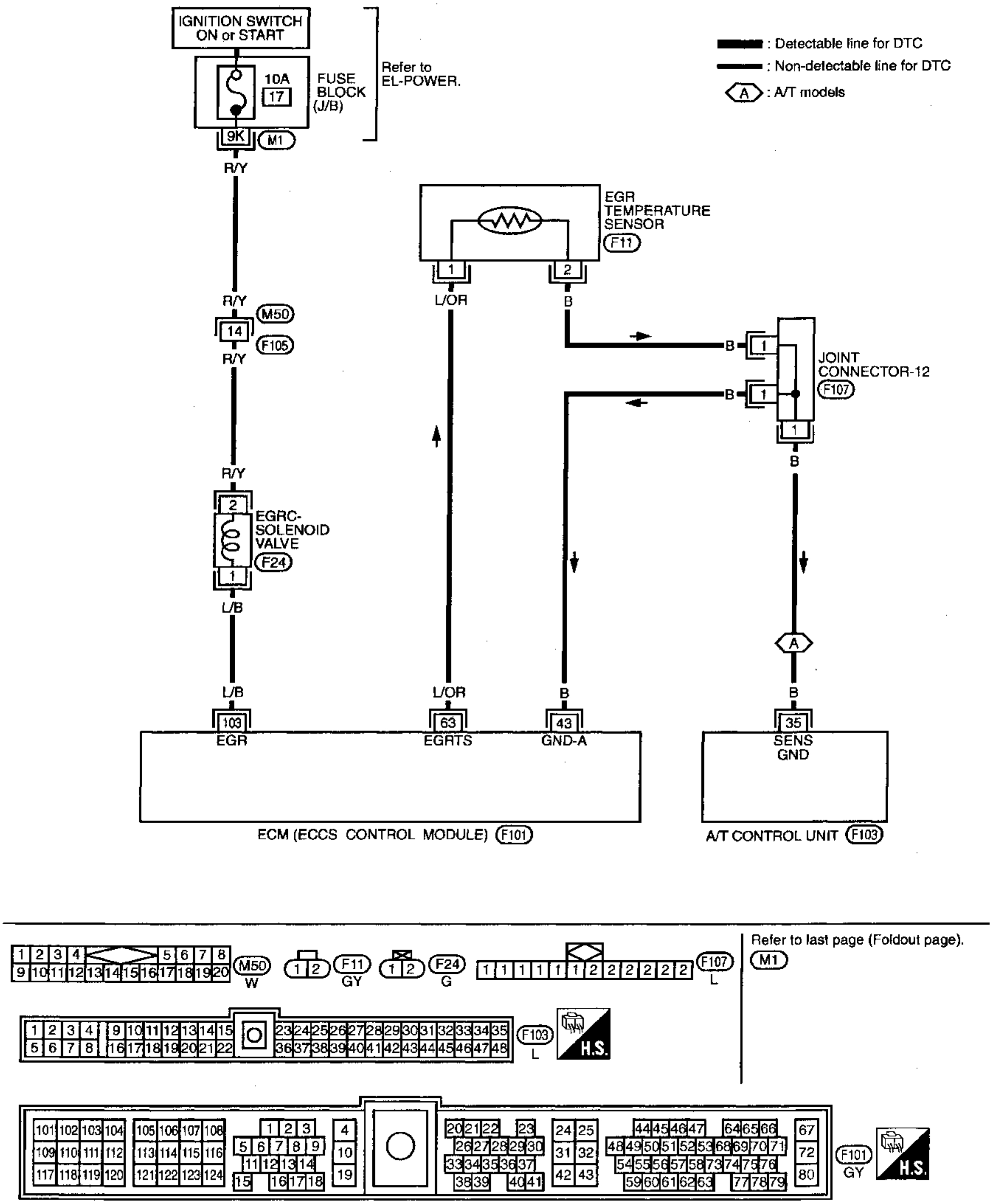
Overall function check

Check the EGR valve lifting when revving engine from 2,000 rpm up to 4,000 rpm.

SEF356Q

EGR Function (Cont'd)

EC-EGR-01



Refer to last page (Foldout page).
M1

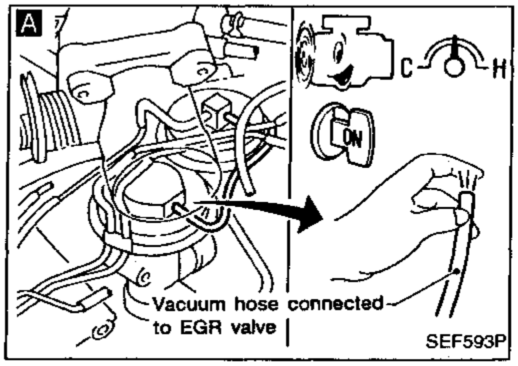
SEF226T

EGR Function (Cont'd)

DIAGNOSTIC PROCEDURE

INSPECTION START

A



CHECK VACUUM SOURCE TO EGR VALVE.

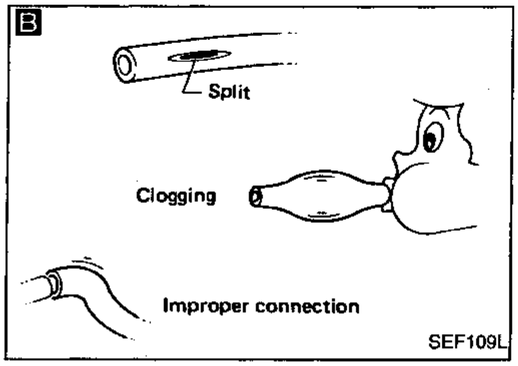
1. Start engine and warm it up sufficiently.
2. Rev engine to about 2,000 - 4,000 rpm.
3. Disconnect vacuum hose to EGR valve.
4. Make sure that vacuum exists.
   Vacuum should exist.

OK → CHECK COMPONENT (EGR valve). Refer to "COMPONENT INSPECTION". (See page EC-218.)

NG → Replace EGR valve.

NG ↓

B

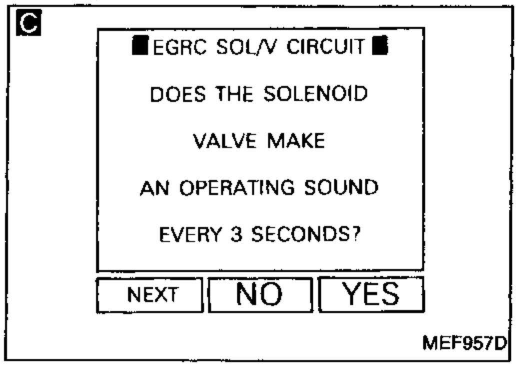


CHECK VACUUM HOSE.
Check vacuum hose for clogging, cracks and improper connection.

NG → Repair it.

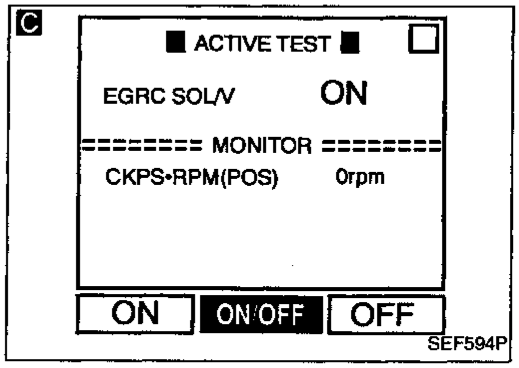
OK ↓

C



■EGRC SOL/V CIRCUIT■

DOES THE SOLENOID VALVE MAKE AN OPERATING SOUND EVERY 3 SECONDS?



■ ACTIVE TEST ■

EGRC SOL/V ON

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

CKPS•RPM(POS) 0rpm

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

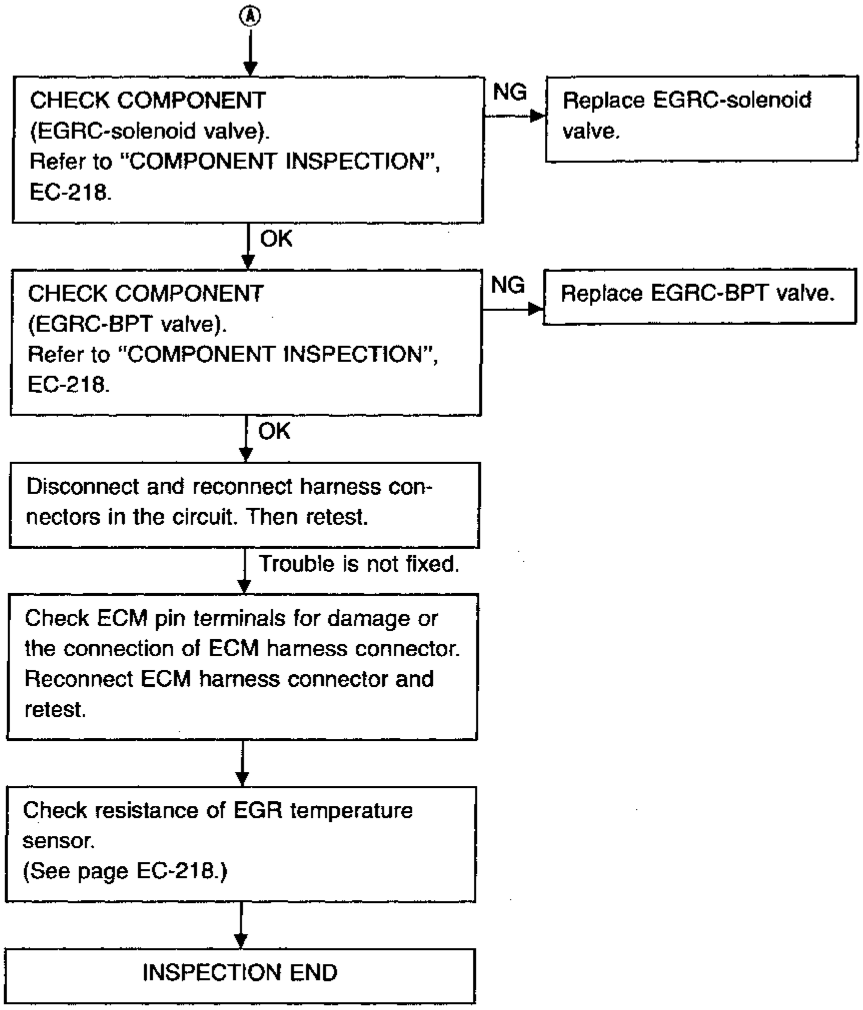
1. Turn ignition switch "ON".
2. When disconnecting and reconnecting the solenoid valve harness connector, make sure that the solenoid valve makes operating sound. (The DTC for the solenoid valve will be displayed, however, ignore it.)

NG → Repair or replace EGRC-solenoid valve or repair circuit.

OK ↓

Ⓐ

EGR Function (Cont'd)



CHECK COMPONENT (EGRC-solenoid valve). Refer to "COMPONENT INSPECTION", EC-218.

Replace EGRC-solenoid valve.

CHECK COMPONENT (EGRC-BPT valve). Refer to "COMPONENT INSPECTION", EC-218.

Replace EGRC-BPT valve.

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

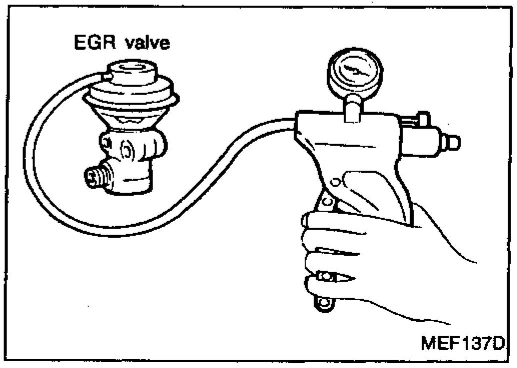
Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

Check resistance of EGR temperature sensor. (See page EC-218.)

INSPECTION END

EGR Function (Cont'd)

COMPONENT INSPECTION

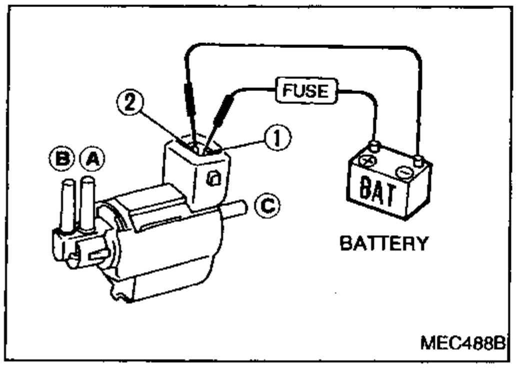


EGR valve

Apply vacuum to EGR valve vacuum port with a hand vacuum pump.

EGR valve spring should lift.

If NG, replace EGR valve.

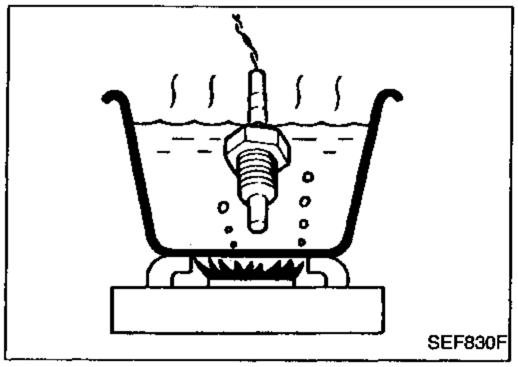


EGRC-solenoid valve

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 the solenoid valve.



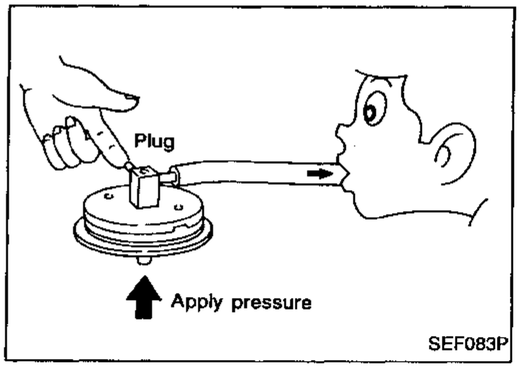
EGR temperature sensor

Check resistance change and resistance value at 100°C (212°F).

Resistance should decrease in response to temperature increase.

Resistance: 100°C (212°F)
76.8 - 93.8 kΩ

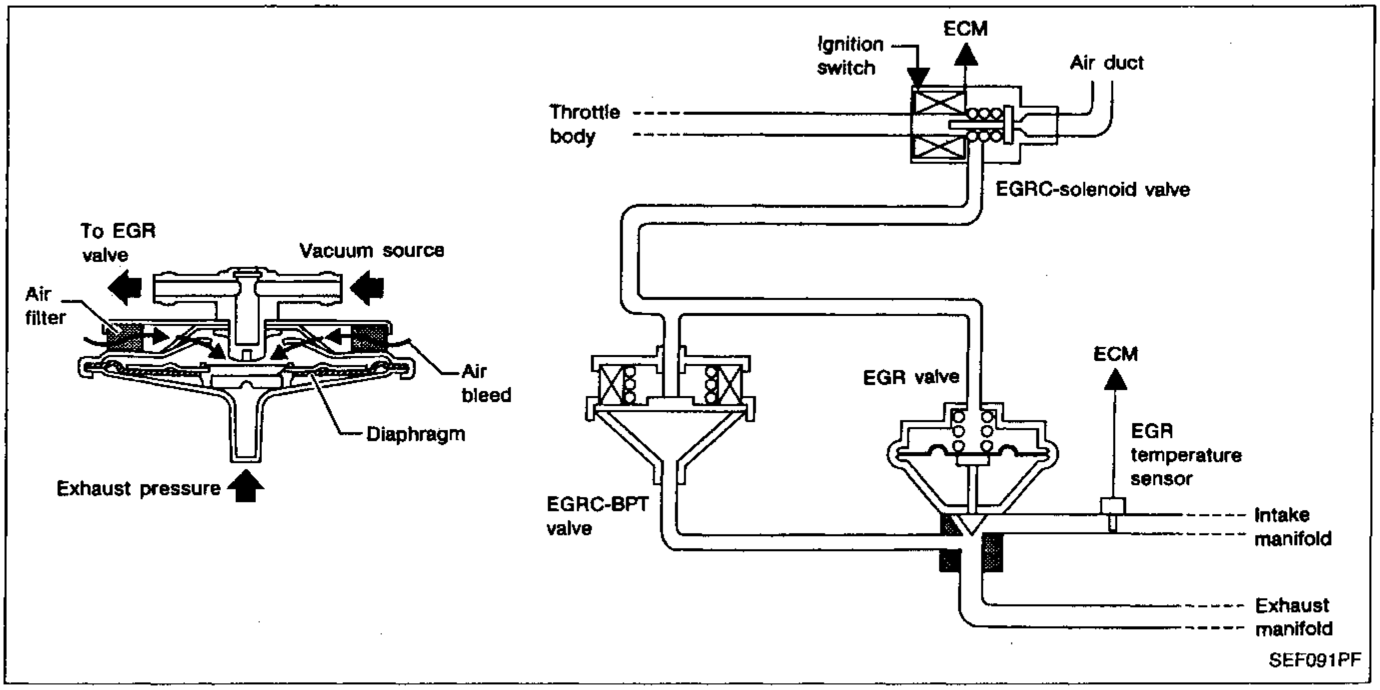
If NG, replace EGR temperature sensor.



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

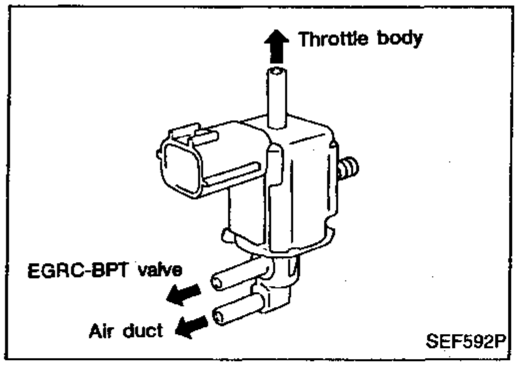
The EGRC-BPT valve monitors exhaust pressure to activate the diaphragm, controlling throttle body vacuum applied to the EGR valve. In other words, recirculated exhaust gas is controlled in response to positioning of the EGR valve or to engine operation.

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 excessive, 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 • Loose or disconnected rubber tube • Obstructed rubber tube • Intake manifold EGR passage

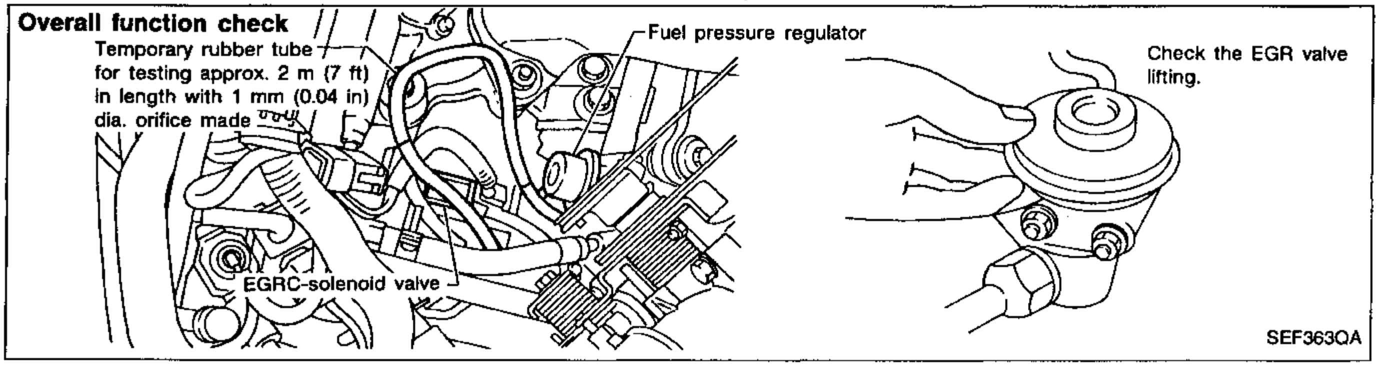
EGRC-BPT Valve Function (Cont'd)

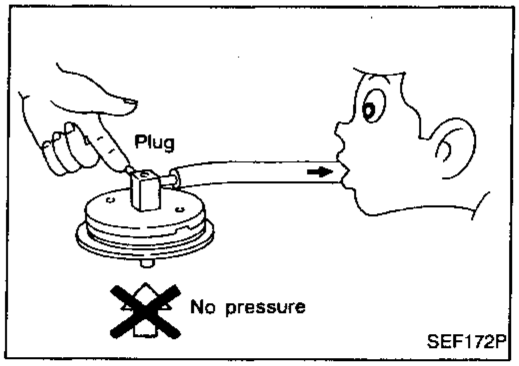


OVERALL FUNCTION CHECK

This procedure can be used for checking the overall function of the EGRC-BPT valve. During the check, a DTC might not be confirmed.

1) Disconnect the rubber tube to the fuel pressure regulator from the intake manifold at the fuel pressure regulator.
2) Disconnect the rubber tube to the EGRC-solenoid valve from the EGRC-BPT valve at the EGRC-solenoid valve.
3) Connect these two rubber tubes using a rubber tube that is approx. 2 meter in length and has 1 mm (0.04 in) dia. orifice made in it. (The intake manifold vacuum will be directly applied to the EGRC-BPT valve.)
4) Start engine.
5) Check for the EGR valve lifting with engine at less than 1,500 rpm under no load.
   EGR valve should remain closed or slightly lift up.
6) Keep engine speed at about 2,000 rpm, then check the EGR valve lifting when revving engine up to 4,000 rpm under no load.
   EGR valve should lift up to the full position, and go down without sticking when the engine is returned to idle.
7) Check rubber tube between the EGRC-solenoid valve and throttle body for misconnection, cracks or obstruction.





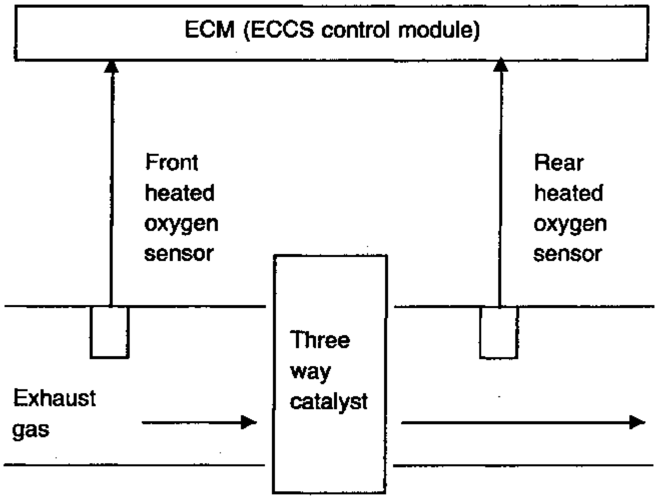
COMPONENT INSPECTION

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 EGRC-BPT valve.
   Leakage should exist.

Three Way Catalyst Function

ON BOARD DIAGNOSIS LOGIC



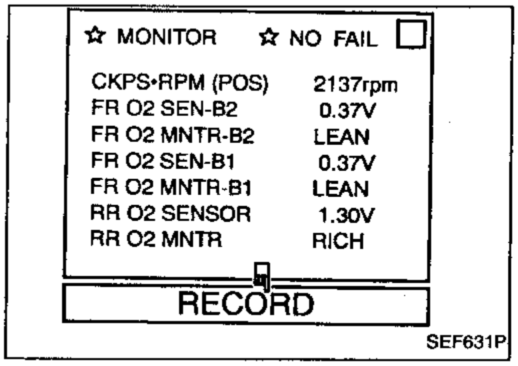
ECM monitors the switching frequency ratio of front and rear heated oxygen sensors.
A three way catalyst with high oxygen storage capacity will indicate a low switching frequency of rear heated oxygen sensor. As oxygen storage capacity decreases, the rear heated oxygen sensor switching frequency will increase.
When the frequency ratio of front and rear heated oxygen sensors approaches a specified limit value, the three way catalyst malfunction is diagnosed.

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0420 0702	• Three way catalyst does not operate properly. • Three way catalyst does not have enough oxygen storage capacity.	• Three way catalyst • Exhaust tube • Intake air leaks • Injectors • Injector leaks

OVERALL FUNCTION CHECK

This procedure can be used for checking the overall function of the three way catalyst.
During this check, a DTC might not be confirmed.

Three Way Catalyst Function (Cont'd)



☆ MONITOR ☆ NO FAIL ☐

CKPS•RPM (POS)	2137rpm
FR O2 SEN-B2	0.37V
FR O2 MNTR-B2	LEAN
FR O2 SEN-B1	0.37V
FR O2 MNTR-B1	LEAN
RR O2 SENSOR	1.30V
RR O2 MNTR	RICH

RECORD

SEF631P

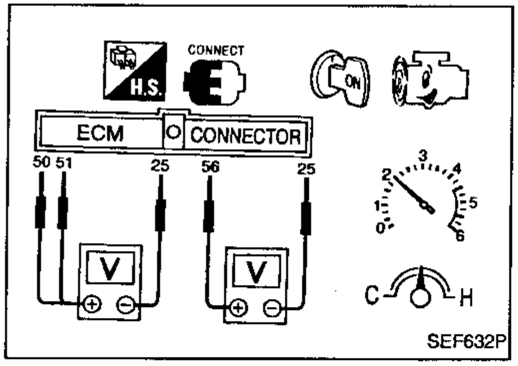
1) Start engine and warm it up sufficiently.
2) Set "MANU TRIG" and "HI SPEED", then select "FR O2 SEN-B1", "FR O2 SEN-B2", "RR O2 SENSOR", "FR O2 MNTR-B2", "FR O2 MNTR-B1", "RR O2 MNTR" in "DATA MONITOR" mode with CONSULT.
3) Touch "RECORD" on CONSULT screen with engine speed held at 2,000 rpm constant under no load.
4) Make sure that the switching frequency between "RICH" and "LEAN" of "RR O2 SENSOR" is very less than that of "FR O2 SEN-B1" or "FR O2 SEN-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 1/2.
If the ratio is greater than 0.5, 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 page EC-139 or EC-158.)

OR



SEF632P

1) Start engine and warm it up sufficiently.
2) Set voltmeters probes between ECM terminals ㊿ [front heated oxygen sensor (right bank) signal], (51) [front heated oxygen sensor (left bank) signal] and ㉕ (engine ground), and ECM terminals (56) (rear heated oxygen sensor signal) and ㉕ (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 (56) and ㉕ is very less than that of ECM terminals ㊿ and ㉕, or (51) and ㉕.
   Switching frequency ratio =

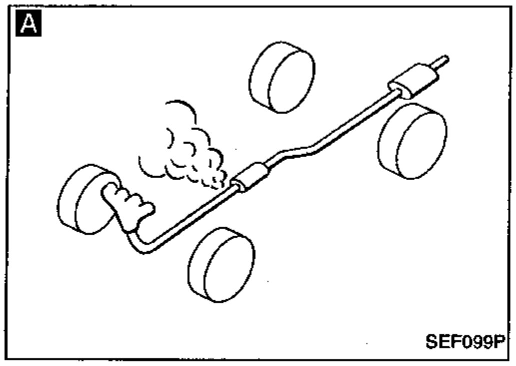
$$\frac{\textbf{Rear heated oxygen sensor voltage switching frequency}}{\textbf{Front heated oxygen sensor voltage switching frequency}}$$

This ratio should be less than 1/2.
If the ratio is greater than 0.5, it means three way catalyst does not operate properly.

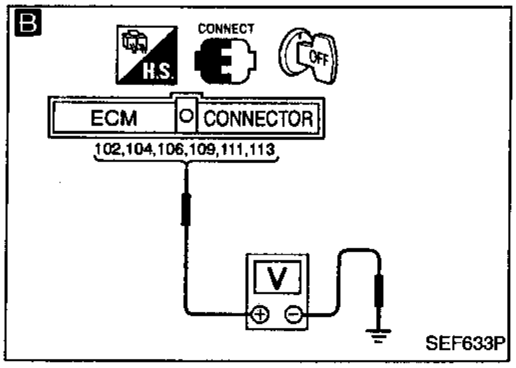
Note: If the voltage at terminal ㊿ or (51) does not switch periodically more than 5 times within 10 seconds at step 3, perform TROUBLE DIAGNOSIS FOR DTC 0503 or 0303 first. (See page EC-139 or EC-158.)

Three Way Catalyst Function (Cont'd)

DIAGNOSTIC PROCEDURE



SEF099P



SEF633P

INSPECTION START

↓

CHECK EXHAUST SYSTEM.
Visually check exhaust tubes and muffler for dent.

NG → Repair or replace it.

↓ OK

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

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 INJECTORS.

1. Refer to WIRING DIAGRAM for Injectors. (Refer to EC-352.)
2. Check voltage between ECM terminals ⑩②, ⑩④, ⑩⑥, ⑩⑨, ⑪① or ⑪③ and ground with CONSULT or tester.
   Battery voltage should exist.

NG → Perform TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS, "Injectors". (See page EC-352.)
Repair harness or connectors.

↓ OK

Remove injector assembly.
(See page EC-27.)
Keep fuel hose and all injectors connected to injector gallery.

↓

1. Turn ignition switch "OFF".
2. Disconnect camshaft position sensor (PHASE) harness connector.
3. Turn ignition switch "ON".
   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 or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

↓

Replace three way catalyst.

↓

INSPECTION END

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

Evaporative Emission (EVAP) Control System (Small Leak)

If both DTC P0440 and P0446 are displayed, perform TROUBLE DIAGNOSIS FOR DTC P0446 first. (See EC-240.)

ON BOARD DIAGNOSIS LOGIC

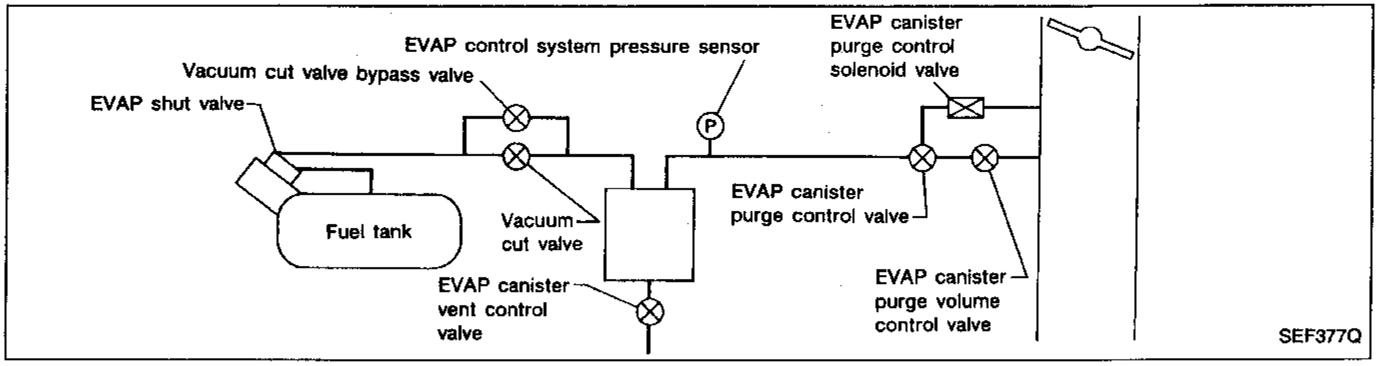
This diagnosis allows leak detection in the EVAP purge line to be accomplished using two methods.
One is the pressure test which utilizes vapor pressure in the fuel tank. The other is the vacuum test utilizing the engine intake manifold vacuum.

Pressure test

The EVAP canister vent control valve is closed to shut the EVAP purge line off. 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.
When no pressure rise is observed, carry out the vacuum test. If pressure rise is observed, conduct leak detection check on the line between the vacuum cut valve and EVAP canister purge control valve, under the "Pressure test" condition.

Vacuum test

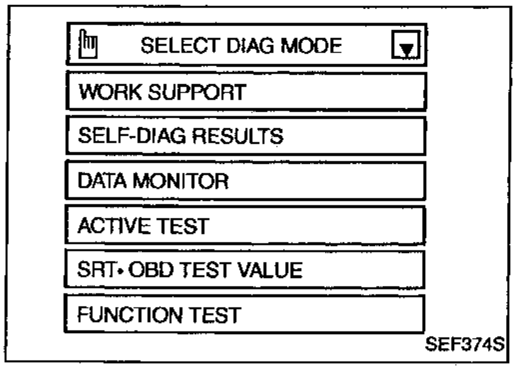
In the event of no pressure rise being observed in the "Pressure test", conduct the alternative leak detection check. This check, on the line between the fuel tank and EVAP canister purge control valve, is accomplished under the "Vacuum test" condition.
The vacuum cut valve bypass valve is opened to 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 depressurization is implemented, the EVAP canister purge control valve and EVAP canister purge volume control valve will be closed.



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

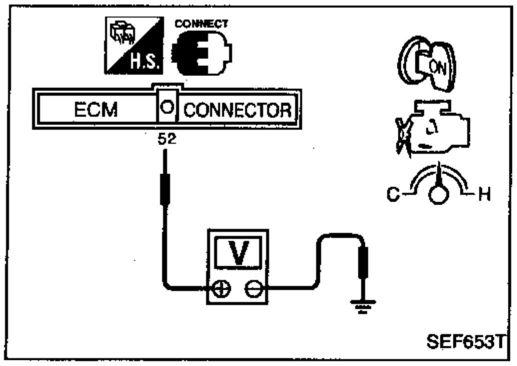
CAUTION:

- **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-227.**

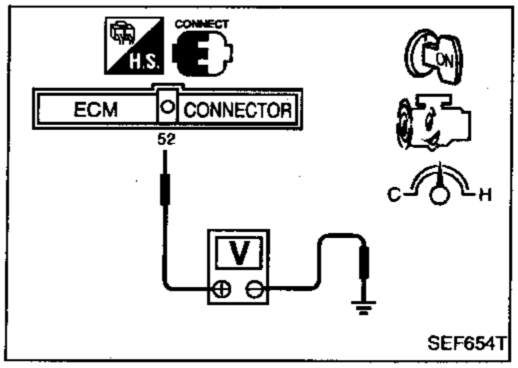
1) Select "EVAP (SMALL LEAK)" in "FUNCTION TEST" mode with CONSULT.
   Follow the instruction displayed.
2) Make sure that "OK" is displayed with "EVAP (SMALL LEAK)". (If "NG" is displayed, refer to "DIAGNOSTIC PROCEDURE".)
   Refer to "DIAGNOSTIC PROCEDURE", EC-227.

OR

Evaporative Emission (EVAP) Control System (Small Leak) (Cont'd)



SEF653T



SEF654T

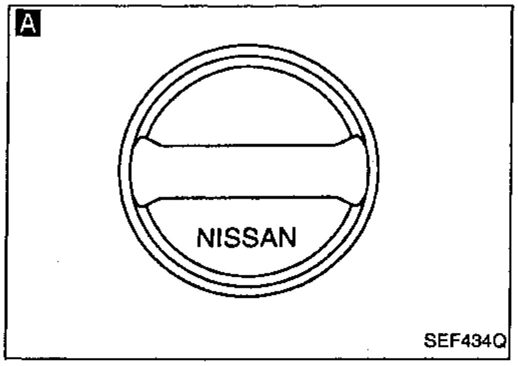
1) Start engine and warm it up sufficiently.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Turn ignition switch "ON" and wait at least 12 seconds.
4) Check voltage between ECM terminal (52) and ground (**Voltage1**).
   Voltage: 1.9 - 4.2V
5) Restart engine and let it idle for at least 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 (52) 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.

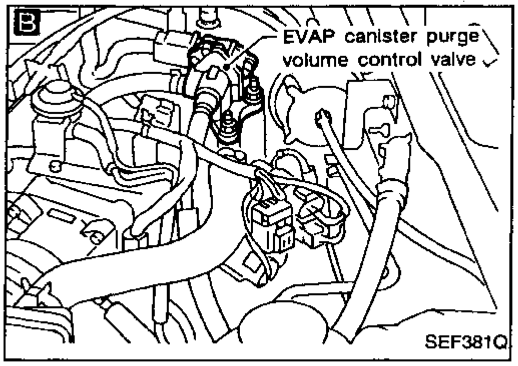
NOTE:

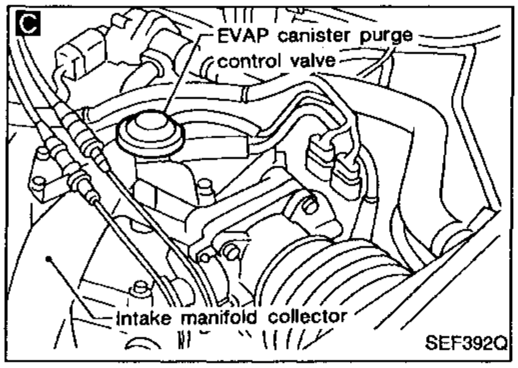
- **Hold the accelerator pedal as steady as possible during driving in steps 6, 8 and 13.**
- **It is better that the fuel level is low.**

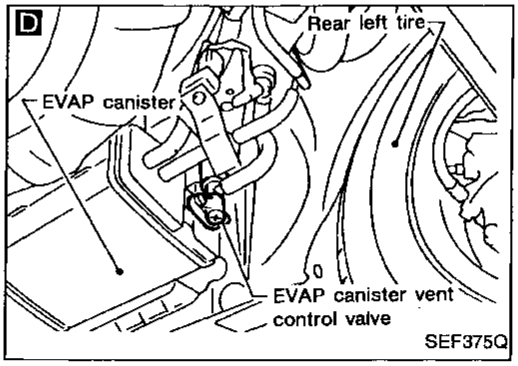
Evaporative Emission (EVAP) Control System (Small Leak) (Cont'd)

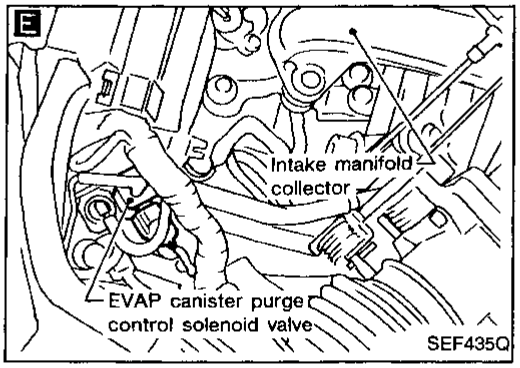
DIAGNOSTIC PROCEDURE











INSPECTION START

↓

A

CHECK FUEL FILLER CAP.
1. Check fuel filler cap remains open, fails to close or catches foreign matter.
2. Check for genuine fuel filler cap design.
3. Check fuel tank vacuum relief valve. Refer to "EVAPORATIVE EMISSION SYSTEM". (See page EC-22.)

NG → 1. Open fuel filler cap, then clean cap and fuel filler neck threads using air blower.
2. Replace with genuine fuel filler cap.
3. Replace fuel filler cap.

↓ OK

B

CHECK COMPONENT
(EVAP canister purge volume control valve).
Refer to "COMPONENT INSPECTION".
(See page EC-229.)

NG → Replace EVAP canister purge volume control valve.

↓ OK

C

CHECK COMPONENT
(EVAP canister purge control valve).
Refer to "COMPONENT INSPECTION".
(See page EC-230.)

NG → Replace EVAP canister purge control valve.

↓ OK

D

CHECK COMPONENT
(EVAP canister vent control valve).
Refer to "COMPONENT INSPECTION".
(See page EC-230.)

NG → Replace EVAP canister vent control valve.

↓ OK

E

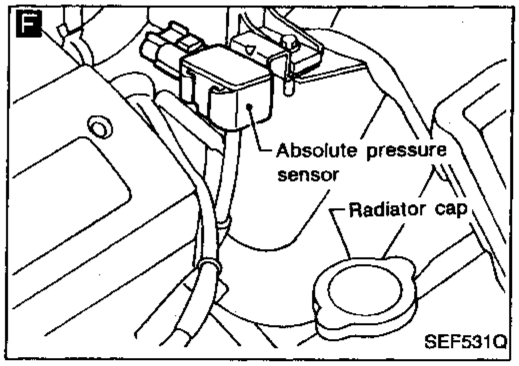
CHECK COMPONENT
(EVAP canister purge control solenoid valve).
Refer to "COMPONENT INSPECTION".
(See page EC-334.)

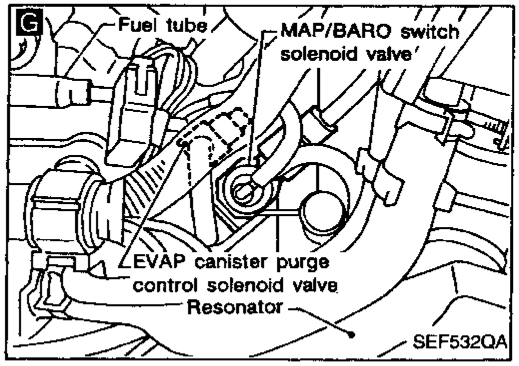
NG → Replace EVAP canister purge control solenoid valve.

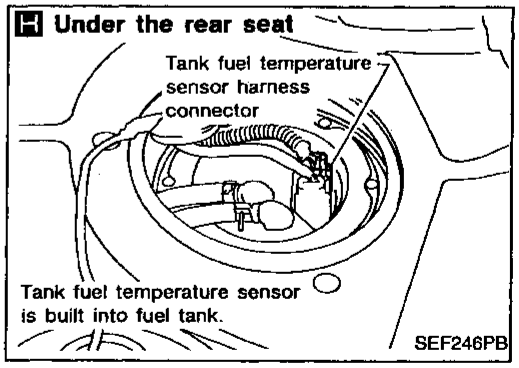
↓ OK

Ⓐ

Evaporative Emission (EVAP) Control System (Small Leak) (Cont'd)







Ⓐ

F CHECK COMPONENT
(Absolute pressure sensor).
Refer to "COMPONENT INSPECTION".
(See page EC-230.)

- NG → Replace absolute pressure sensor.
- OK ↓

G CHECK COMPONENT
(MAP/BARO switch solenoid valve).
Refer to "COMPONENT INSPECTION".
(See page EC-231.)

- NG → Replace MAP/BARO switch solenoid valve.
- OK ↓

H CHECK COMPONENT
(Tank fuel temperature sensor).
Refer to "COMPONENT INSPECTION".
(See page EC-231.)

- NG → Replace tank fuel temperature sensor.
- OK ↓

CHECK EVAP PURGE LINE.
Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection.
Refer to "EVAPORATIVE EMISSION SYSTEM", EC-23.

- 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.

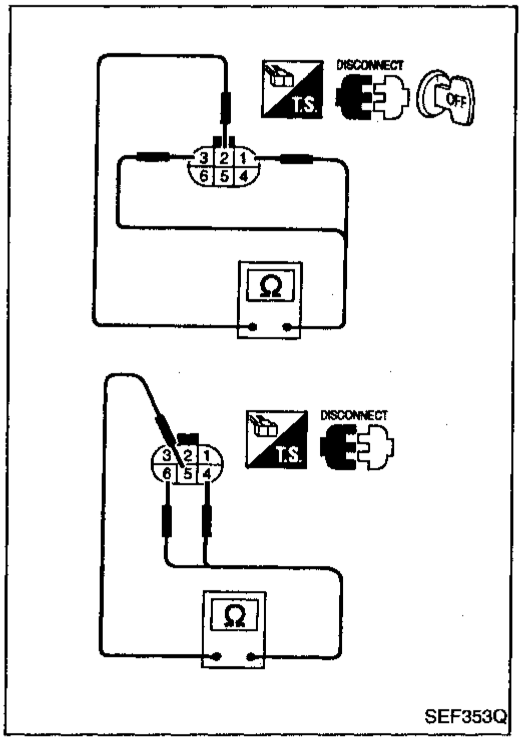
↓ Trouble is not fixed.

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

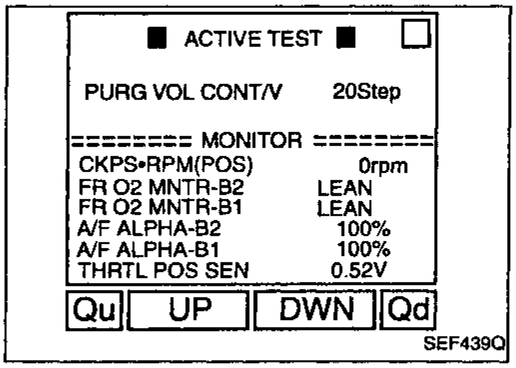
↓

INSPECTION END

Evaporative Emission (EVAP) Control System (Small Leak) (Cont'd)



SEF353Q

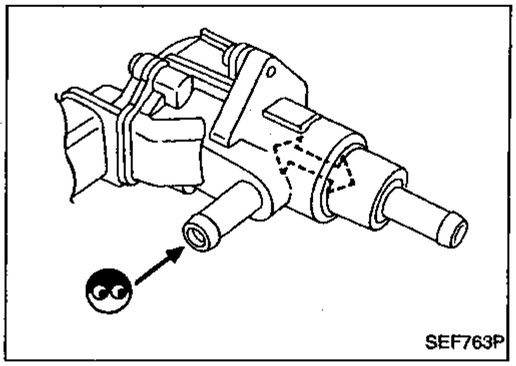


```
■ ACTIVE TEST ■          ☐

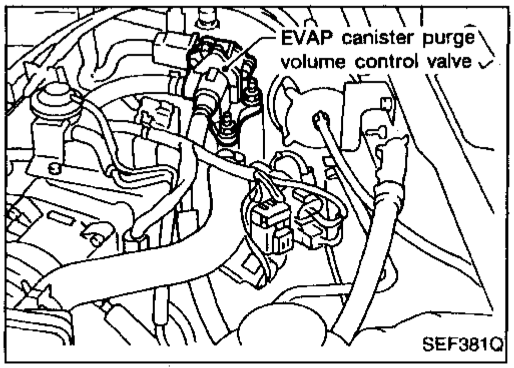
PURG VOL CONT/V     20Step

======== MONITOR ========
CKPS•RPM(POS)         0rpm
FR O2 MNTR-B2       LEAN
FR O2 MNTR-B1       LEAN
A/F ALPHA-B2          100%
A/F ALPHA-B1          100%
THRTL POS SEN        0.52V
```

SEF439Q



SEF763P



SEF381Q

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 and ensure the EVAP canister purge volume control valve shaft smoothly moves 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" and ensure the EVAP canister purge volume control valve shaft smoothly moves forward and backward according to the ignition switch position.
   If NG, replace the EVAP canister purge volume control valve.

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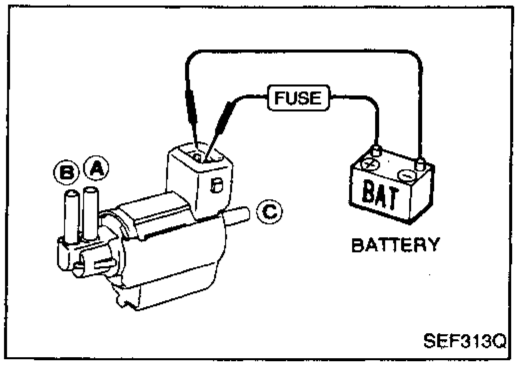
Evaporative Emission (EVAP) Control System (Small Leak) (Cont'd)

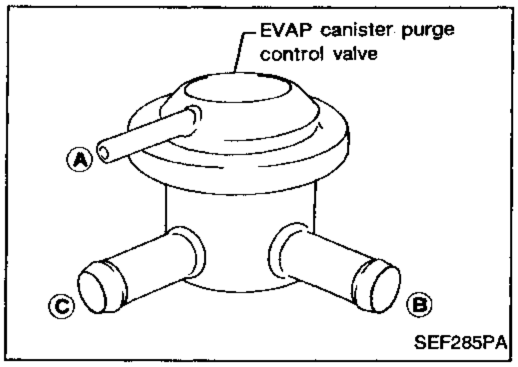


EVAP canister purge control solenoid valve

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

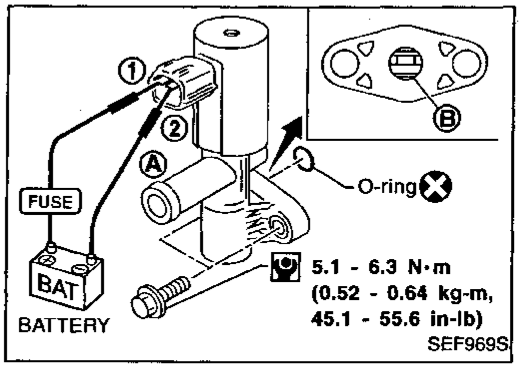
If NG, replace solenoid valve.



EVAP canister purge control valve

Check EVAP canister purge control valve as follows:

1. Blow air in port Ⓐ, Ⓑ and Ⓒ, then ensure that there is no leakage.
2. Apply vacuum to port Ⓐ. [Approximately −13.3 to −20.0 kPa (−100 to −150 mmHg, −3.94 to −5.91 inHg)]
   Blow air in port Ⓒ and ensure free flow out of port Ⓑ.



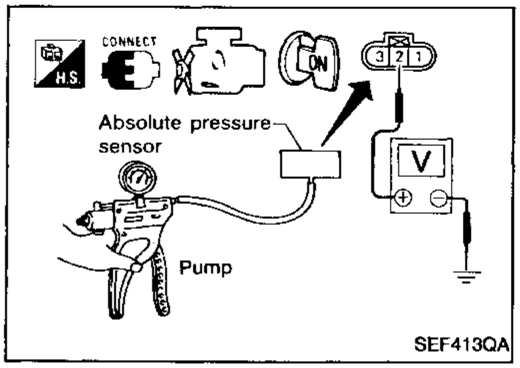
EVAP canister vent control valve

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.

Make sure new O-ring is installed properly.



Absolute pressure sensor

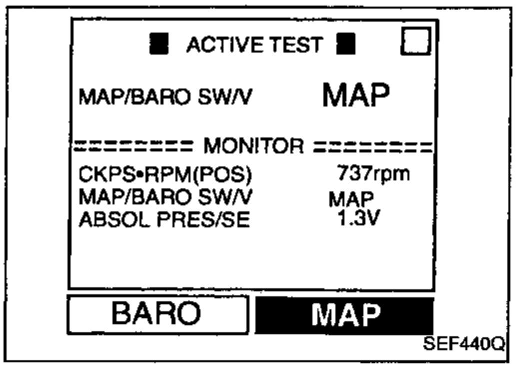
1. Remove absolute pressure sensor from bracket with its harness connector connected.
2. Remove hose from absolute pressure sensor.
3. Apply vacuum and pressure to absolute pressure sensor as shown in figure.
4. Check output voltage between terminal ② and engine ground.

Evaporative Emission (EVAP) Control System (Small Leak) (Cont'd)

Pressure (Absolute pressure)	Voltage (V)
106.6 kPa (800 mmHg, 31.50 inHg)	Approximately 4.6
13.3 kPa (100 mmHg, 3.94 inHg)	Approximately 0.5

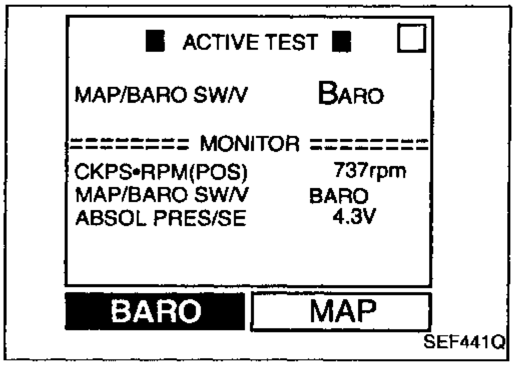
5. If NG, replace absolute pressure sensor.

MAP/BARO switch solenoid valve



```
■ ACTIVE TEST ■ ☐
MAP/BARO SW/V      MAP
======== MONITOR ========
CKPS•RPM(POS)      737rpm
MAP/BARO SW/V      MAP
ABSOL PRES/SE      1.3V
```

SEF440Q



```
■ ACTIVE TEST ■ ☐
MAP/BARO SW/V      BARO
======== MONITOR ========
CKPS•RPM(POS)      737rpm
MAP/BARO SW/V      BARO
ABSOL PRES/SE      4.3V
```

SEF441Q

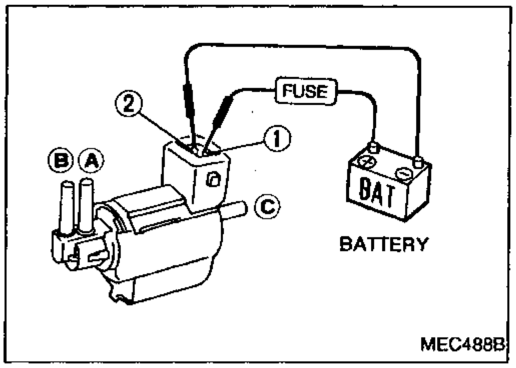
1. Start engine and warm it up sufficiently.
2. Perform "MAP/BARO SW/V" in "ACTIVE TEST" mode with CONSULT.
3. Make sure of the following.
   - When selecting "MAP", "ABSOL PRES/SE" indicates approximately 1.3V.
   - When selecting "BARO", "ABSOL PRES/SE" indicates approximately 4.3V.
4. If NG, replace solenoid valve.

OR

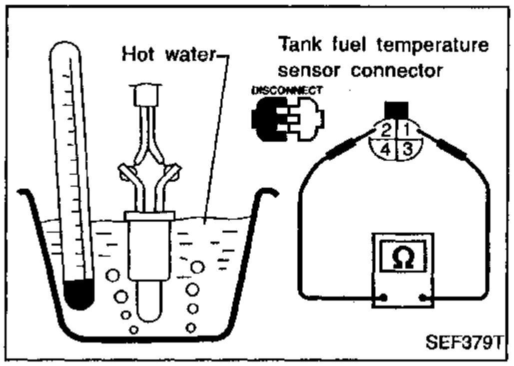
1. Remove MAP/BARO switch solenoid valve.
2. Check air passage continuity.

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



SEF379T

Tank fuel temperature sensor

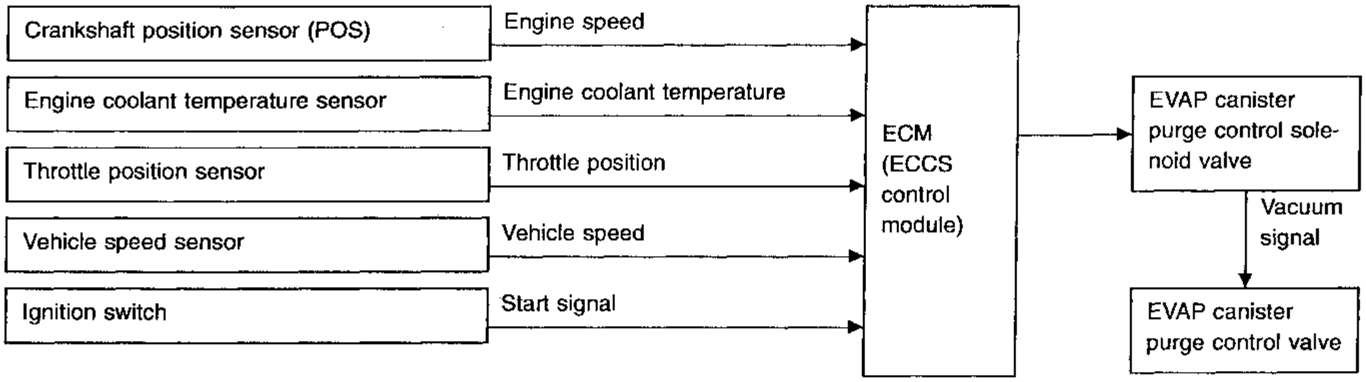
Check resistance as shown in the figure.

Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90

If NG, replace tank fuel temperature sensor.

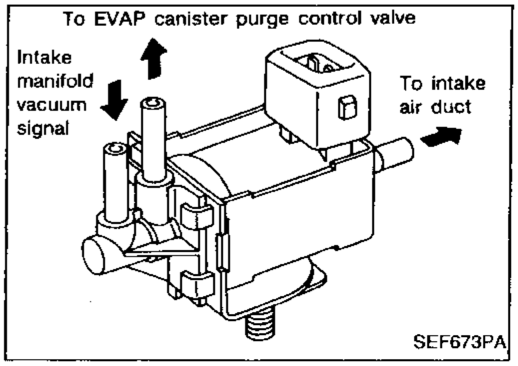
Evaporative Emission (EVAP) Canister Purge Control Valve/Solenoid Valve

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.

- Start switch "ON"
- Closed throttle position
- Low or high engine coolant temperature
- During deceleration
- Engine stopped
- Low vehicle speed (M/T models)

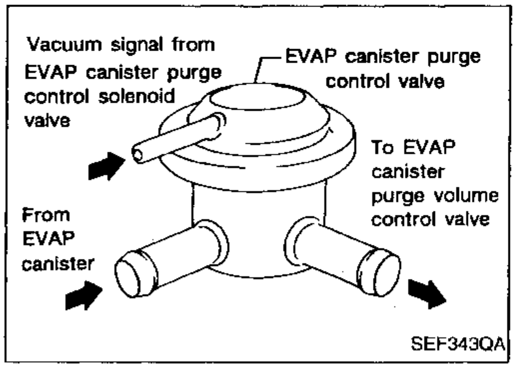


SEF673PA

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 reaches the EVAP canister purge control valve.



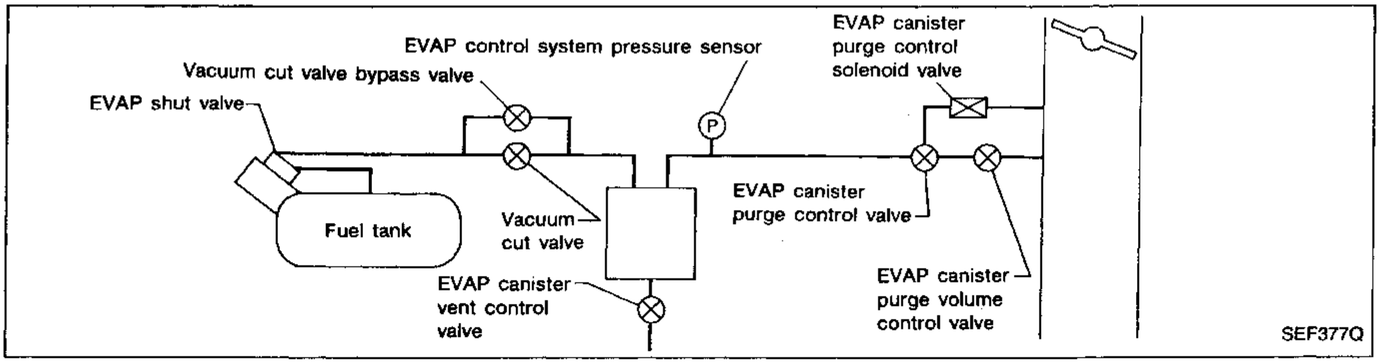
SEF343QA

EVAP canister purge control valve

When the vacuum signal is cut by EVAP canister purge control solenoid valve, EVAP canister purge control valve shuts off the EVAP purge line.

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

Remarks: Specification data are reference values, and are measured between each terminal and ㉕ (ECCS ground) with a voltmeter.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
114	L/Y	EVAP canister purge control solenoid valve	Engine is running. Idle speed	BATTERY VOLTAGE (11 - 14V)

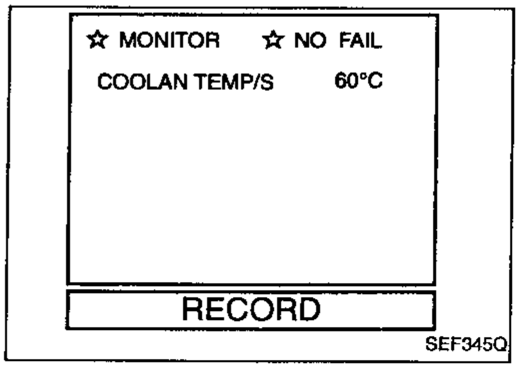
ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P0443 0807	A) The improper voltage signal is entered 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 DTC cannot be confirmed, perform "Procedure for malfunction B" on next page.



```
☆ MONITOR     ☆ NO FAIL
 COOLAN TEMP/S      60°C
```

SEF345Q

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

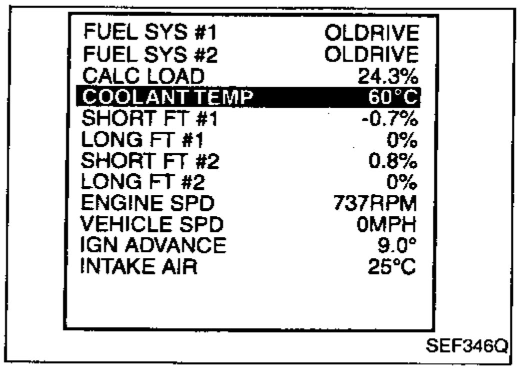
1) Turn ignition switch "ON" and wait at least 5 seconds.
2) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.

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 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 cools down to within this range.)
4) Start engine and let it idle at least 70 seconds.
5) Maintain the following conditions at least 5 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:
1,500 - 2,500 rpm
Coolant temperature:
Less than 100°C (212°F)

OR



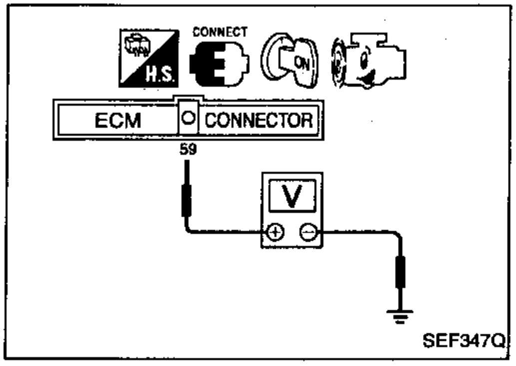
```
FUEL SYS #1       OLDRIVE
FUEL SYS #2       OLDRIVE
CALC LOAD           24.3%
COOLANT TEMP         60°C
SHORT FT #1         -0.7%
LONG FT #1             0%
SHORT FT #2          0.8%
LONG FT #2             0%
ENGINE SPD         737RPM
VEHICLE SPD          0MPH
IGN ADVANCE          9.0°
INTAKE AIR           25°C
```

SEF346Q

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 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 cools down to within this range.)
4) Start engine and let it idle at least 70 seconds.
5) Maintain the following conditions at least 5 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:
1,500 - 2,500 rpm
Coolant temperature:
Less than 100°C (212°F)

6) Select "MODE 7" mode with GST.



Evaporative Emission (EVAP) Canister Purge Control Valve/Solenoid Valve (Cont'd)

OR

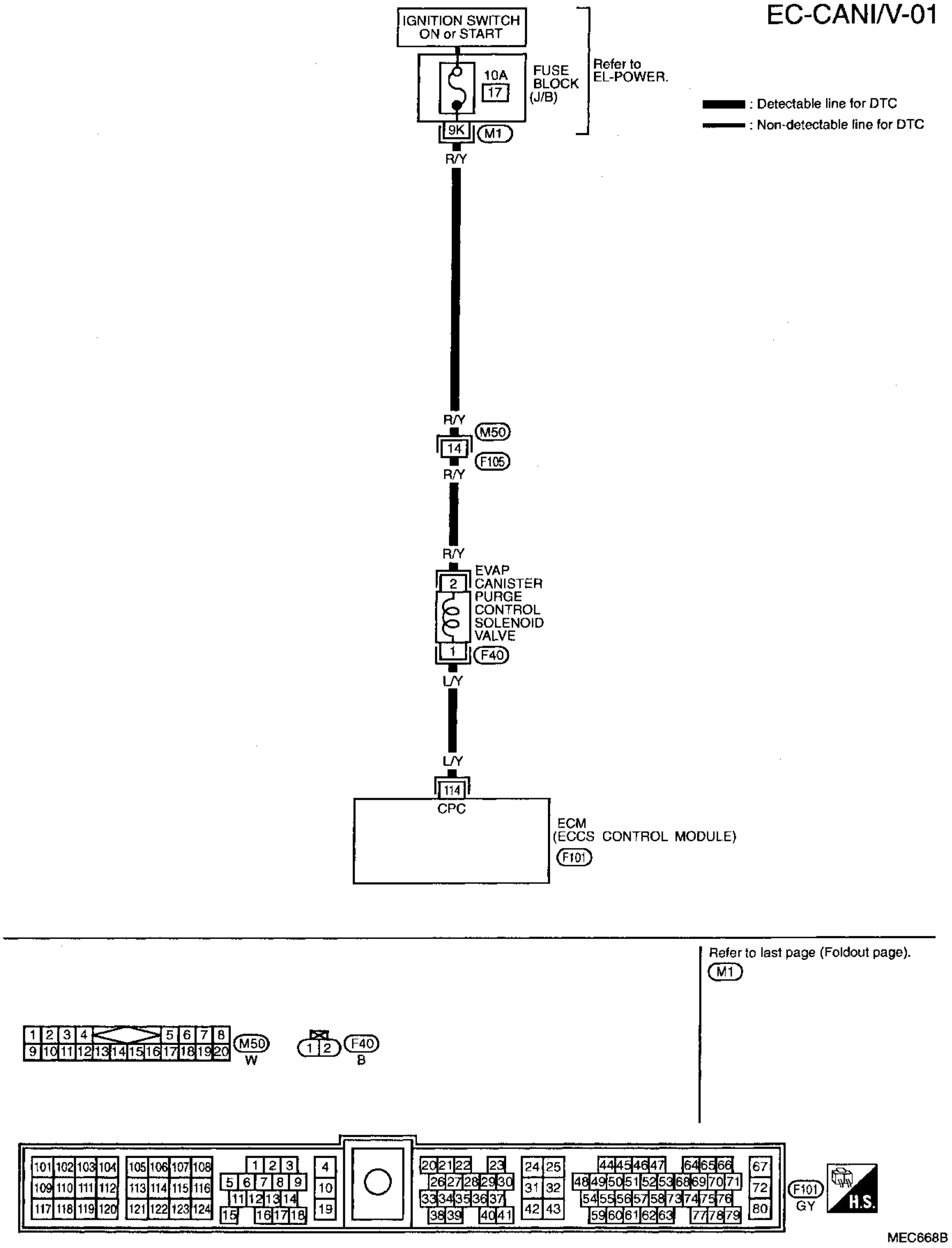
NO TOOLS

1) Jack up drive wheels.
2) Turn ignition switch "ON".
3) Start engine and warm it up until the voltage between ECM terminal (59) and ground drops to 1.2 to 1.9V. (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 at least 70 seconds.
5) Maintain the following conditions at least 5 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:
1,500 - 2,500 rpm
Voltage between ECM terminal (59) 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.

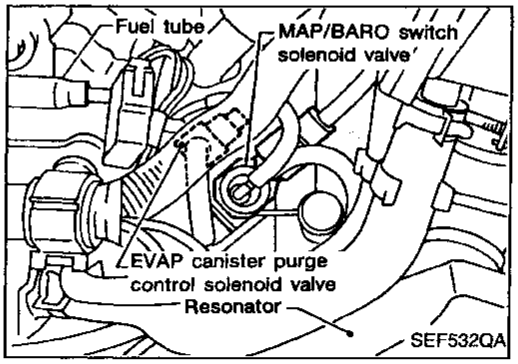
Evaporative Emission (EVAP) Canister Purge Control Valve/Solenoid Valve (Cont'd)

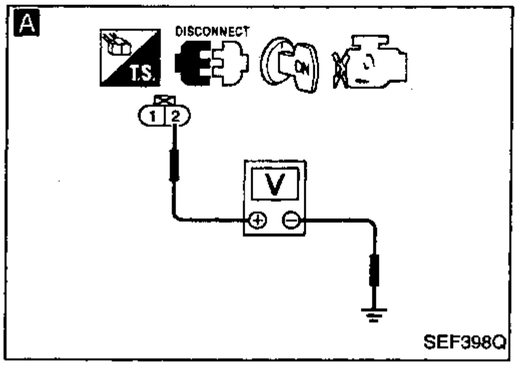


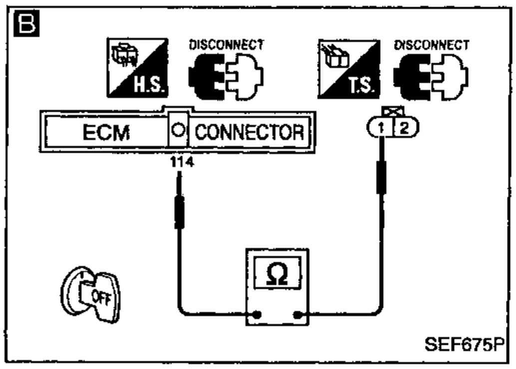
Evaporative Emission (EVAP) Canister Purge Control Valve/Solenoid Valve (Cont'd)

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 ② and ground with CONSULT or tester.
Voltage: Battery voltage

NG → Check the following.
- Harness connectors (F105), (M50)
- 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. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal (114) and terminal ①.
Continuity should exist.
If OK, check harness for short.

NG → Repair harness or connectors.

↓ OK

CHECK COMPONENT
(EVAP canister purge control solenoid valve).
Refer to "COMPONENT INSPECTION", EC-334.

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 or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

↓

INSPECTION END

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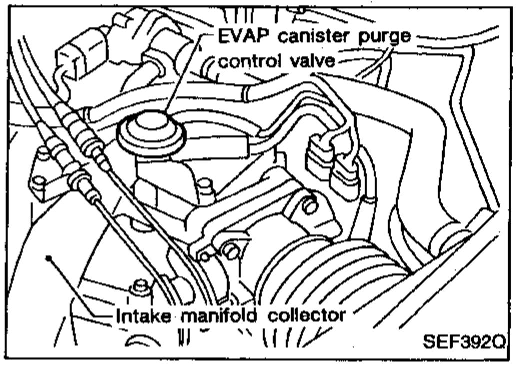
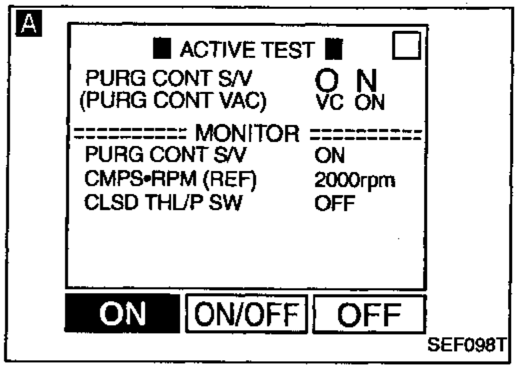
Evaporative Emission (EVAP) Canister Purge Control Valve/Solenoid Valve (Cont'd)

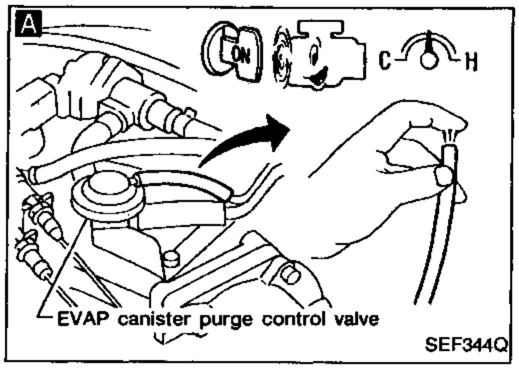
Procedure for malfunction B

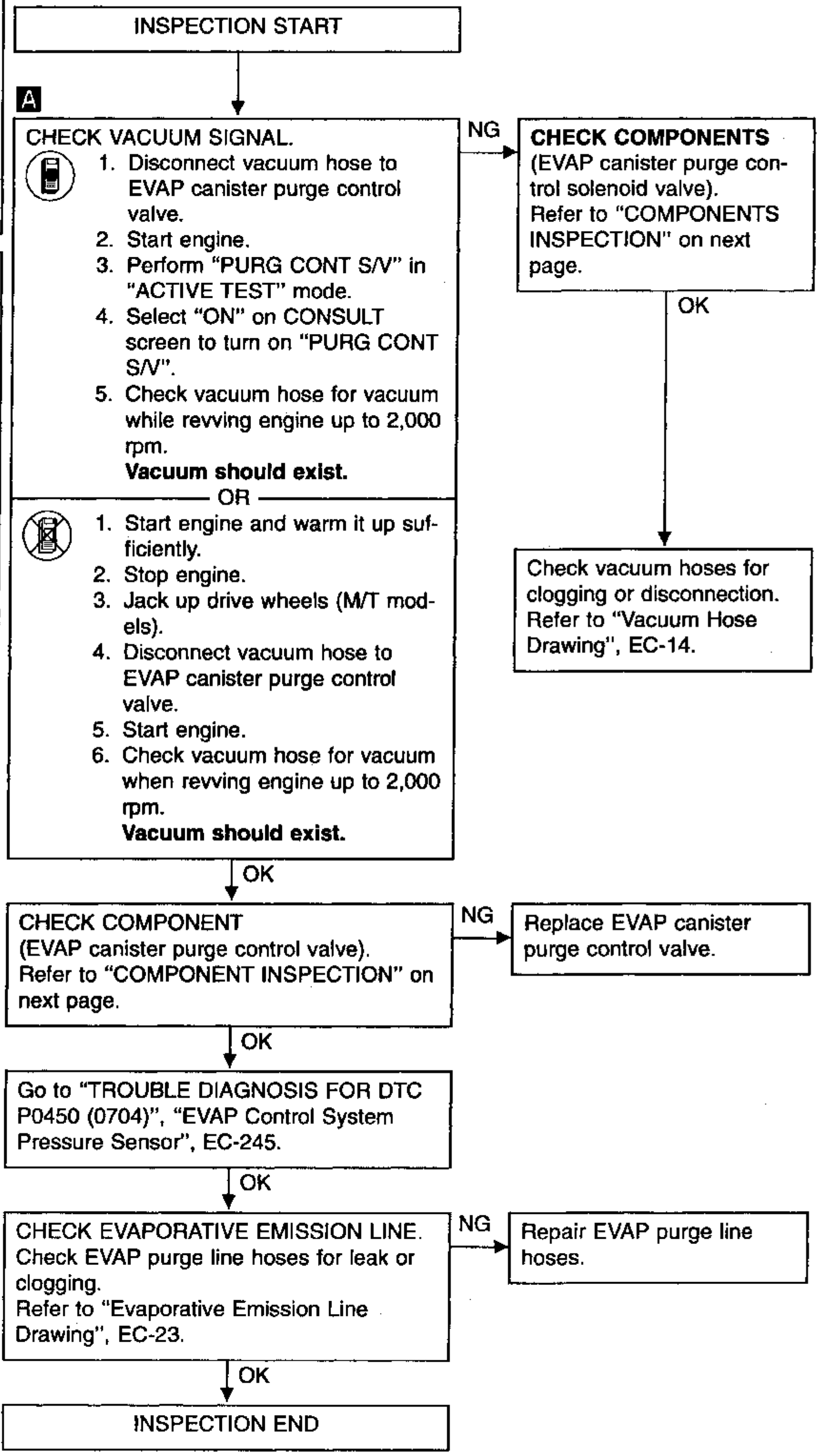




```
■ ACTIVE TEST ■                ☐
 PURG CONT S/V          O N
(PURG CONT VAC)         VC ON
========== MONITOR ==========
 PURG CONT S/V          ON
 CMPS•RPM (REF)         2000rpm
 CLSD THL/P SW          OFF

[ ON ] [ON/OFF] [ 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. Jack up drive wheels (M/T models).
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-14.

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 (0704)", "EVAP Control System Pressure Sensor", EC-245.

OK ↓

CHECK EVAPORATIVE EMISSION LINE.
Check EVAP purge line hoses for leak or clogging.
Refer to "Evaporative Emission Line Drawing", EC-23.

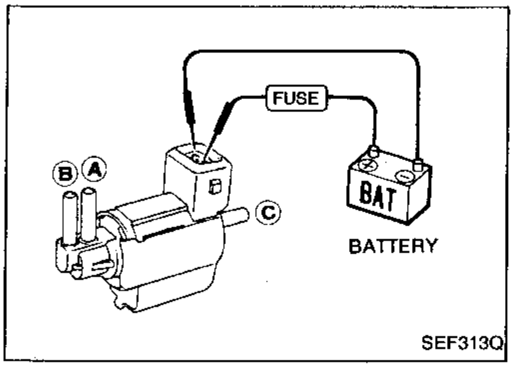
NG → Repair EVAP purge line hoses.

OK ↓

INSPECTION END

Evaporative Emission (EVAP) Canister Purge Control Valve/Solenoid Valve (Cont'd)

COMPONENT INSPECTION

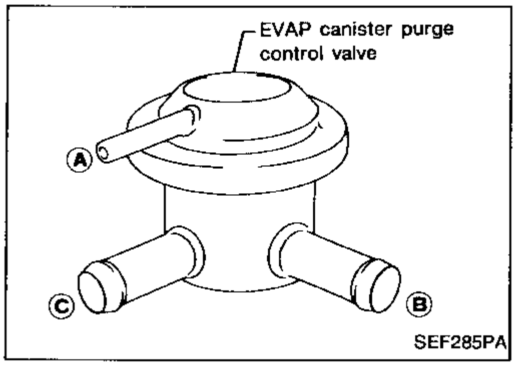


EVAP canister purge control solenoid valve

Check air passage continuity.

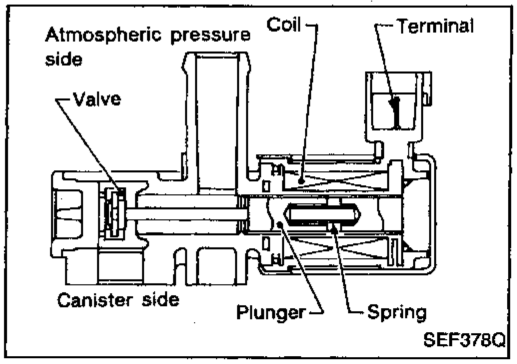
Condition	Air passage continuity between Ⓐ and Ⓑ	Air passage continuity between Ⓐ and Ⓒ
12V direct current supply between terminals	Yes	No
No supply	No	Yes

If NG, replace solenoid valve.

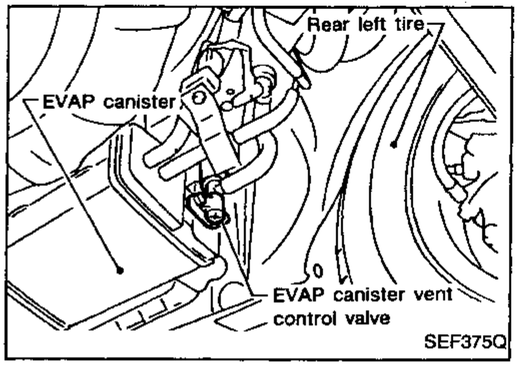


EVAP canister purge control valve

1. Blow air in ports Ⓐ, Ⓑ and Ⓒ and ensure that there is no leakage.
2. Apply vacuum to port Ⓐ. [Approximately −13.3 to −20.0 kPa (−100 to −150 mmHg, −3.94 to −5.91 inHg)]
   Then blow air in port Ⓒ and ensure free flow out of port Ⓑ.



SEF378Q



SEF375Q

Evaporative Emission (EVAP) Canister Vent Control Valve

COMPONENT DESCRIPTION

NOTE: If both DTC P0440 and P0446 are displayed, perform TROUBLE DIAGNOSIS FOR 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 a necessary part of the diagnosis algorithms for other evaporative loss 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 loss system is depressurized allowing "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

Remarks: Specification data are reference values, and are measured between each terminal and ㉕ (ECCS ground) with a voltmeter.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
70	OR/L	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 entered into 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 • Obstructed rubber tube to EVAP canister vent control valve

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, then perform "Procedure for malfunction B".

Procedure for malfunction A

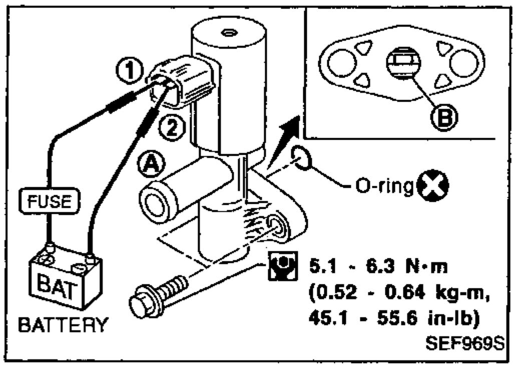
1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
3) Start engine and wait at least 5 seconds.

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 5 seconds and then turn "ON".
3) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.



OVERALL FUNCTION CHECK

This procedure can be used for checking 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

If removed, clean valve using air blower.

Make sure new O-ring is installed properly.

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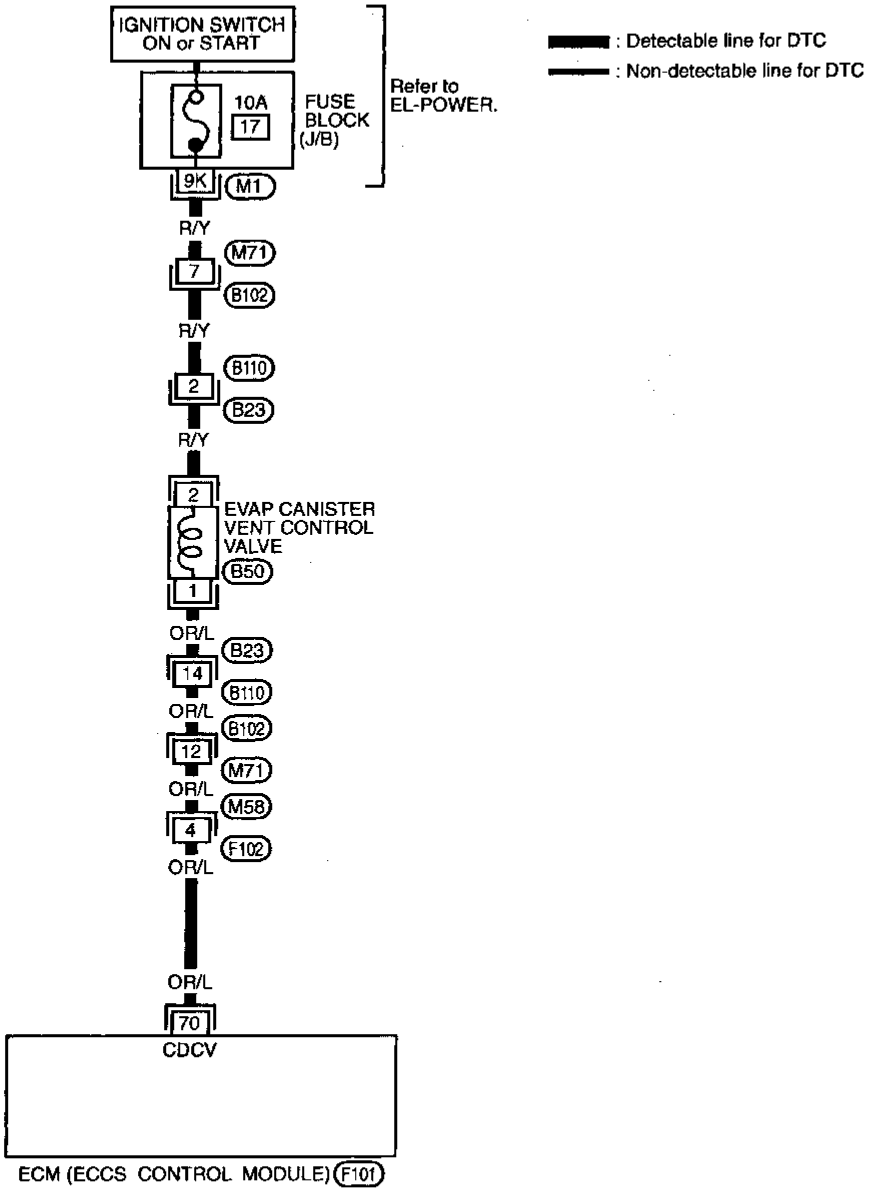
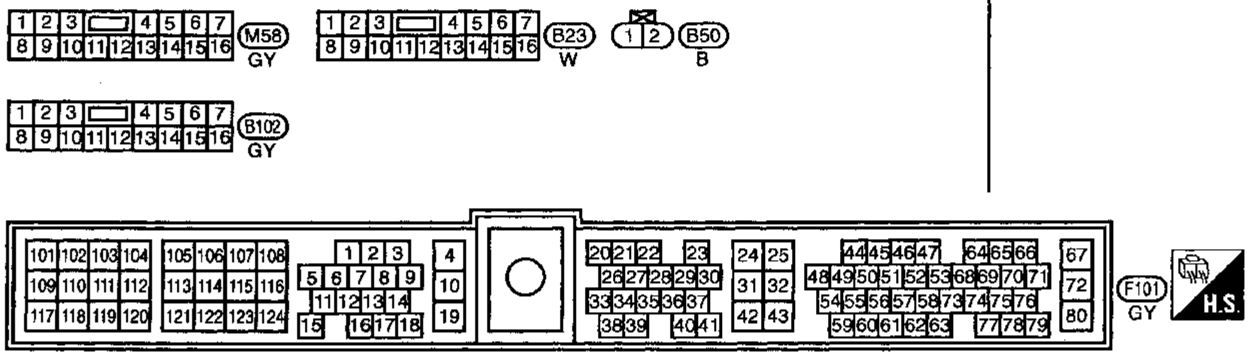
Evaporative Emission (EVAP) Canister Vent Control Valve (Cont'd)

EC-VENT/V-01



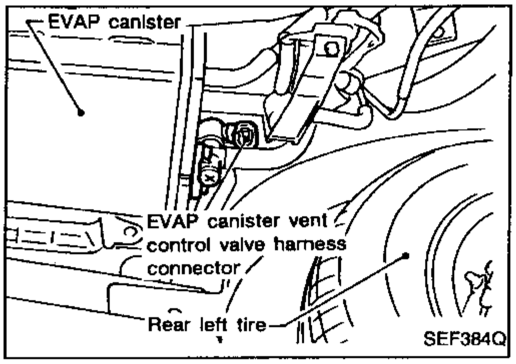
Refer to last page (Foldout page).
M1



MEC685B

Evaporative Emission (EVAP) Canister Vent Control Valve (Cont'd)

DIAGNOSTIC PROCEDURE



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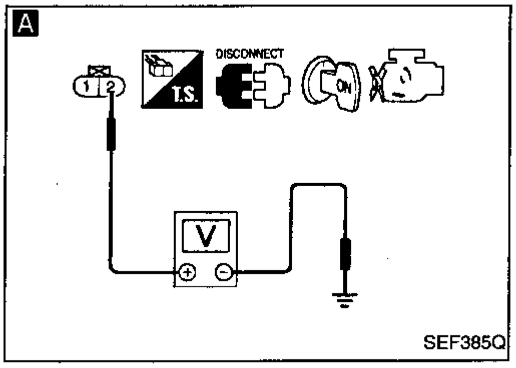
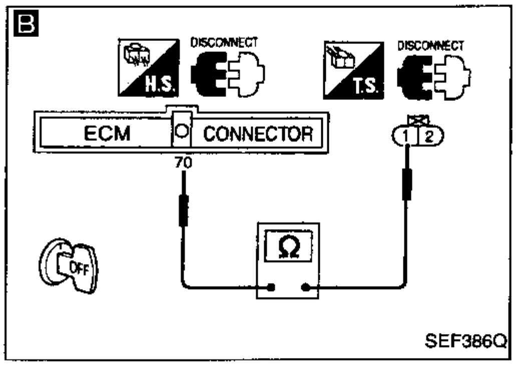
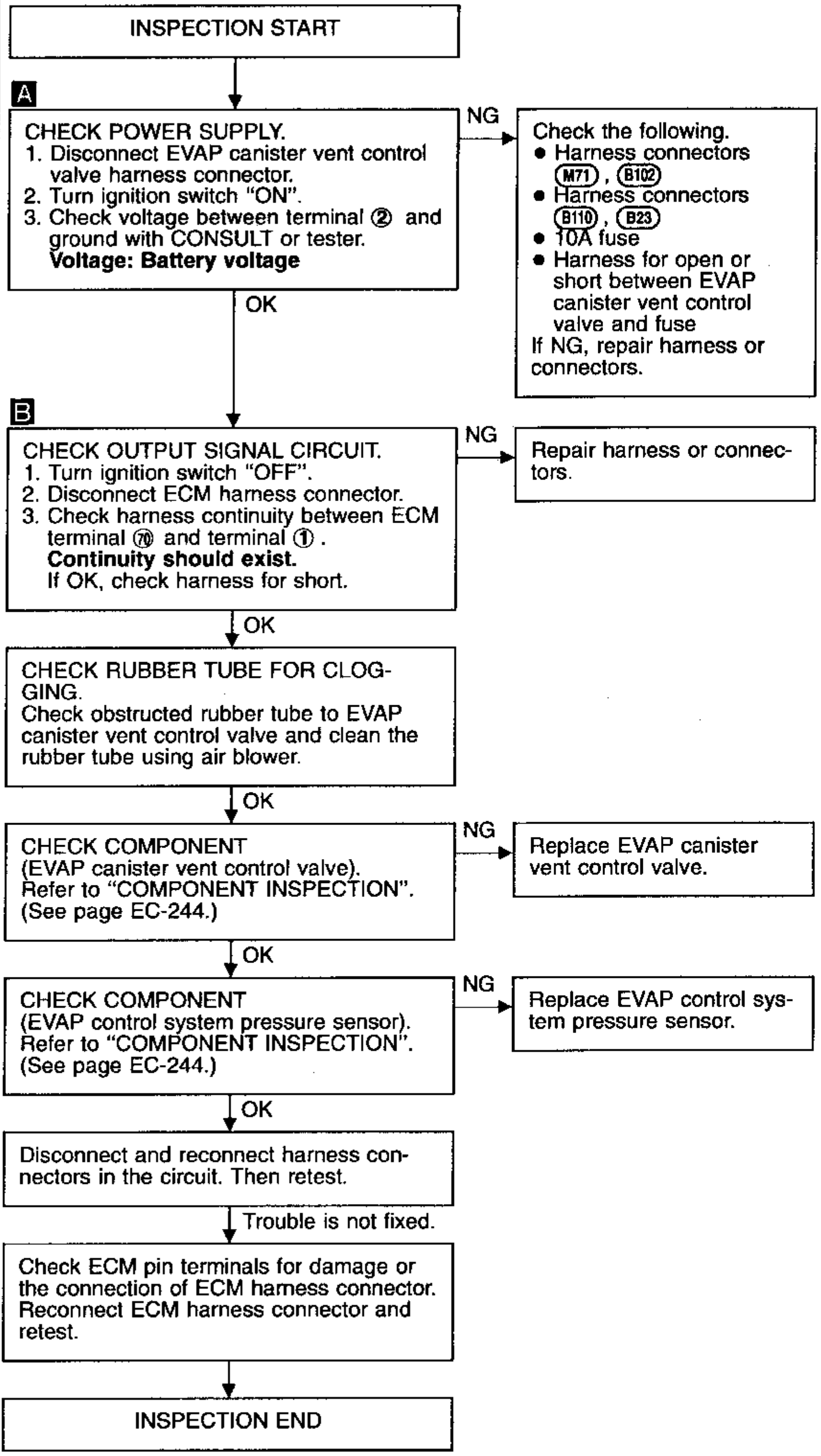


SEF385Q



SEF386Q



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 (M71), (B102)
- Harness connectors (B110), (B23)
- 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 ⑳ and terminal ① .

Continuity should exist.

If OK, check harness for short.

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".
(See page EC-244.)

NG → Replace EVAP canister vent control valve.

OK ↓

CHECK COMPONENT
(EVAP control system pressure sensor).
Refer to "COMPONENT INSPECTION".
(See page EC-244.)

NG → Replace EVAP control system pressure sensor.

OK ↓

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

Trouble is not fixed. ↓

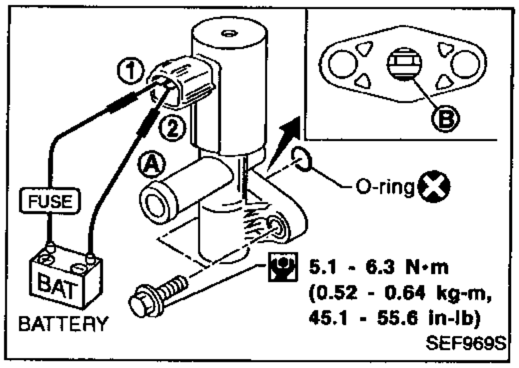
Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

↓

INSPECTION END

Evaporative Emission (EVAP) Canister Vent Control Valve (Cont'd)

COMPONENT INSPECTION

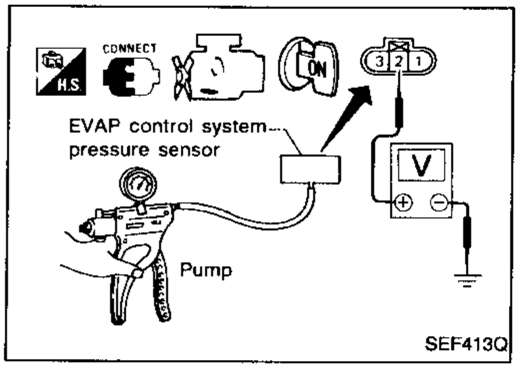


EVAP canister vent control valve

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.
Make sure new O-ring is installed properly.

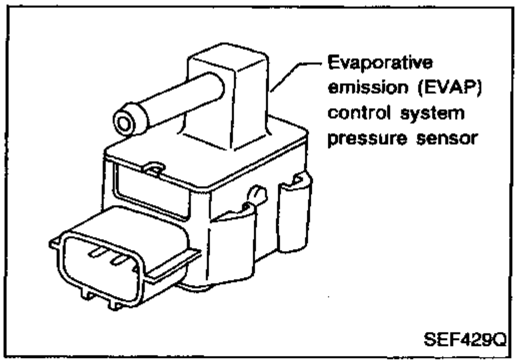


EVAP control system pressure sensor

1. Remove EVAP control system pressure sensor from bracket with its harness connector connected.
2. Remove hose from EVAP control system pressure sensor.
3. Apply vacuum and pressure to EVAP control system pressure sensor with pump as shown in figure.
4. Check output voltage between terminal ② and engine ground.

Pressure (Relative to atmospheric pressure)	Voltage (V)
+4.0 kPa (+30 mmHg, +1.18 inHg)	Approximately 4.6
-9.3 kPa (-70 mmHg, -2.76 inHg)	Approximately 0.5

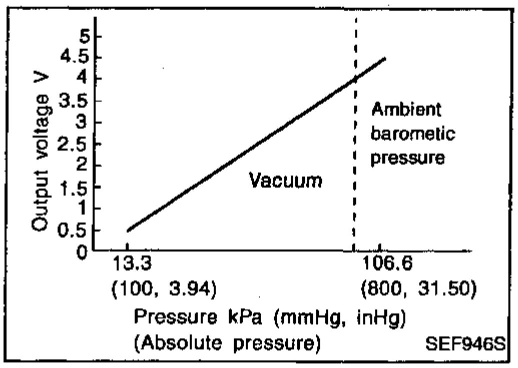
5. If NG, replace EVAP control system pressure sensor.



Evaporative Emission (EVAP) Control System Pressure Sensor

COMPONENT DESCRIPTION

The EVAP control system pressure sensor is installed in the purge line. The sensor detects the pressure inside the purge line and modifies the voltage signal sent from the ECM. The modified signal will then be returned to the ECM as an input voltage signal. As the pressure increases, the voltage rises. The EVAP control system pressure sensor is not directly used to control the engine system. It is used only for on board diagnosis.



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

Remarks: Specification data are reference values, and are measured between each terminal and ㉕ (ECCS ground) with a voltmeter.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
62	W	EVAP control system pressure sensor	Ignition switch "ON"	Approximately 3.4V
42	R	Sensor's power supply	Ignition switch "ON"	Approximately 5V
43	B	Sensor's ground	Engine is running. (Warm-up condition) └ Idle speed	0V

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 entered into 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.)

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Evaporative Emission (EVAP) Control System Pressure Sensor (Cont'd)

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".
4) Select "DATA MONITOR" mode with CONSULT.
5) Wait at least 12 seconds.

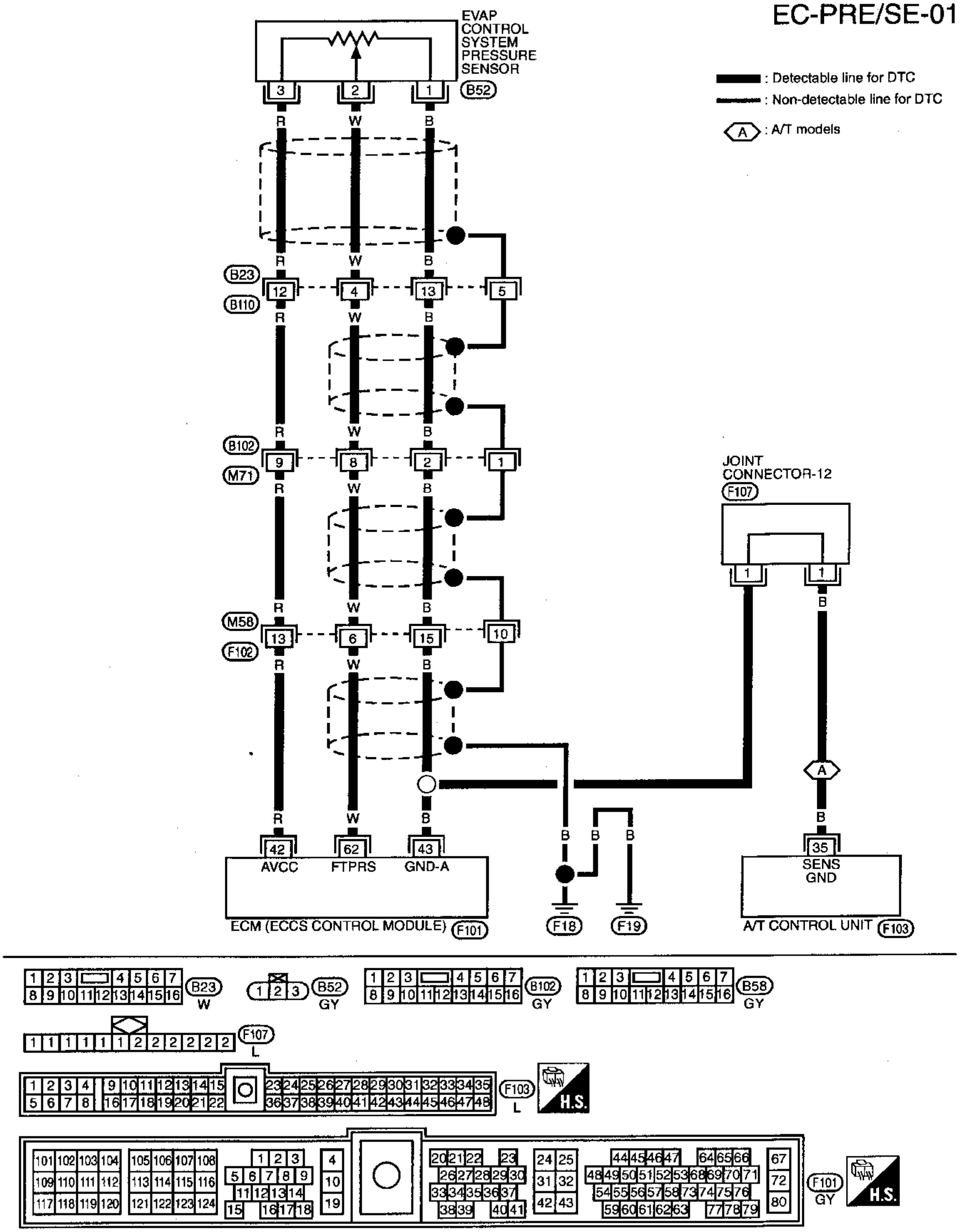
OR

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) 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) Turn ignition switch "ON" and wait at least 12 seconds.
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.

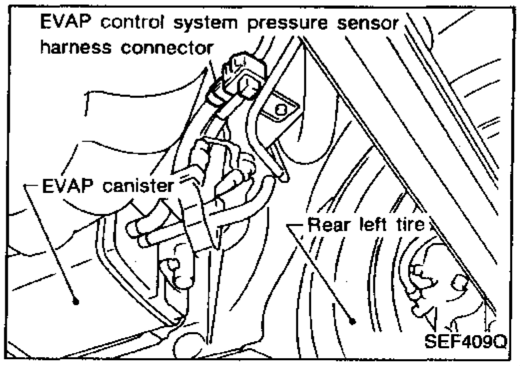
Evaporative Emission (EVAP) Control System Pressure Sensor (Cont'd)



MEC687B

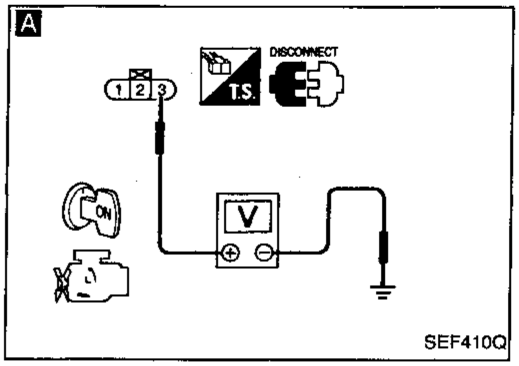
Evaporative Emission (EVAP) Control System Pressure Sensor (Cont'd)

DIAGNOSTIC PROCEDURE



INSPECTION START

A



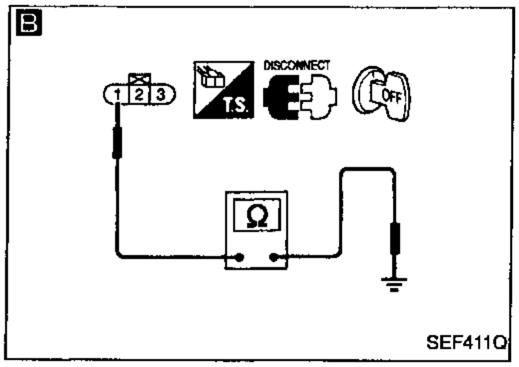
CHECK POWER SUPPLY.

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: 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.

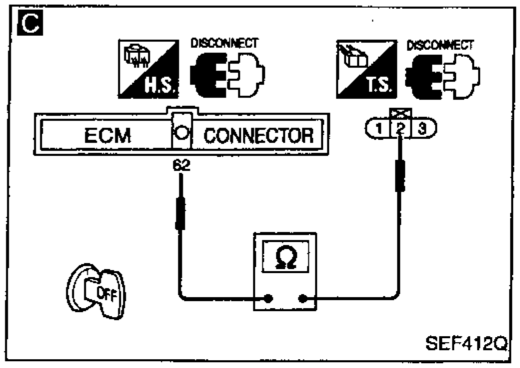
NG: Check the following.

- Harness connectors B23, B110
- Harness connectors B102, M71
- Harness connectors M58, F102
- Harness for open or short between ECM and EVAP control system pressure sensor
- Harness for open or short between A/T control unit 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 (62) and terminal ②.
   Continuity should exist.
   If OK, check harness for short.

NG: Repair harness or connectors.

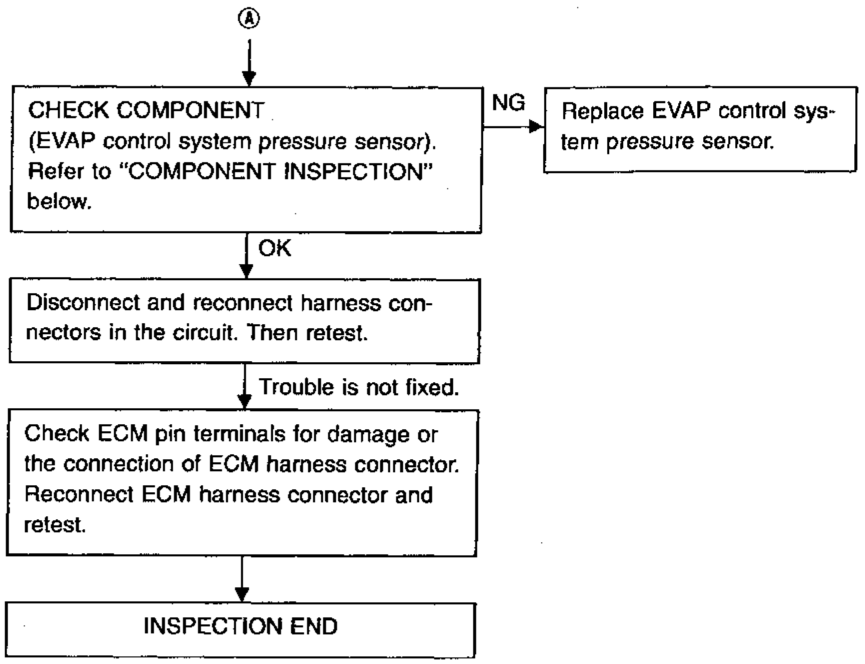
OK

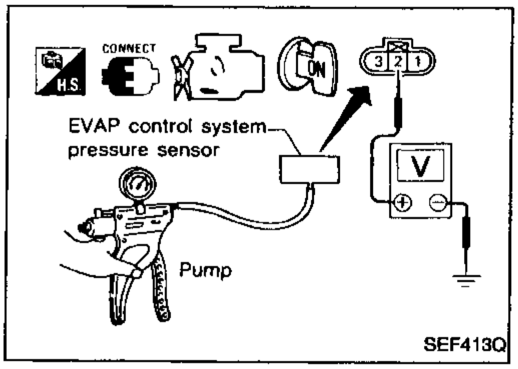
CHECK COMPONENT
(EVAP canister vent control valve).
Refer to "COMPONENT INSPECTION", EC-244.

OK

Ⓐ

Evaporative Emission (EVAP) Control System Pressure Sensor (Cont'd)





COMPONENT INSPECTION

EVAP control system pressure sensor

1. Remove EVAP control system pressure sensor from bracket with its harness connector connected.
2. Remove hose from EVAP control system pressure sensor.
3. Apply vacuum and pressure to EVAP control system pressure sensor with pump as shown in figure.
4. Check output voltage between terminal ② and engine ground.

Pressure (Relative to atmospheric pressure)	Voltage (V)
+4.0 kPa (+30 mmHg, +1.18 inHg)	Approximately 4.6
−9.3 kPa (−70 mmHg, −2.76 inHg)	Approximately 0.5

5. If NG, replace EVAP control system pressure sensor.

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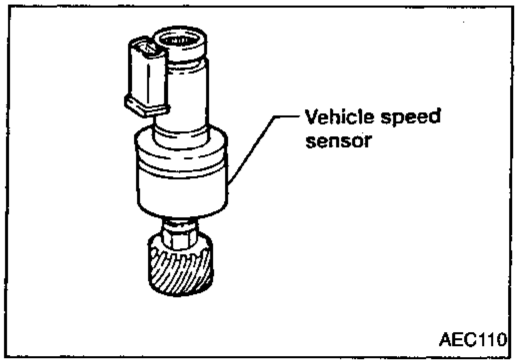


Vehicle Speed Sensor (VSS)

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.

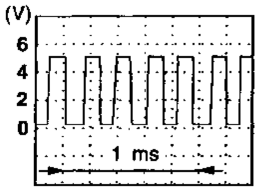
CONSULT REFERENCE VALUE IN DATA MONITOR MODE

- Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VHCL SPEED SE	• Turn drive wheels and compare speedometer indication with the CONSULT value	Almost the same speed as the CONSULT value

ECM TERMINALS AND REFERENCE VALUE

Remarks: Specification data are reference values, and are measured between each terminal and ㉕ (ECCS ground) with a voltmeter.

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
29	P/L	Vehicle speed sensor	Engine is running. └ Jack up front wheels and run engine in "1st" position (M/T models) or "1" position (A/T models).	Approximately 5.2V★  SEF648T

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

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 the vehicle speed sensor is entered to ECM even when the vehicle is driving.	• Harness or connector (The vehicle speed sensor circuit is open or shorted.) • Vehicle speed sensor

Vehicle Speed Sensor (VSS) (Cont'd)

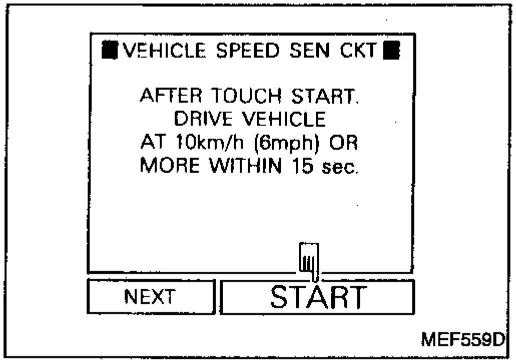
OVERALL FUNCTION CHECK

This procedure can be used for checking the overall function of the vehicle speed sensor circuit. During this check, a DTC might not be confirmed.

1) Jack up drive wheels.

2) Start engine.

3) Perform "VEHICLE SPEED SEN CKT" in "FUNCTION TEST" mode with CONSULT.



```
■VEHICLE SPEED SEN CKT■

AFTER TOUCH START.
DRIVE VEHICLE
AT 10km/h (6mph) OR
MORE WITHIN 15 sec.
```

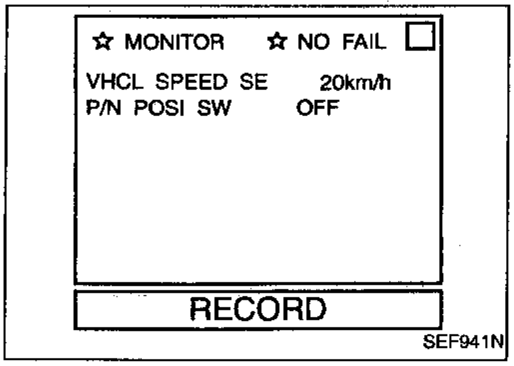
MEF559D

OR

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.



```
☆ MONITOR    ☆ NO FAIL ☐
VHCL SPEED SE    20km/h
P/N POSI SW      OFF
```

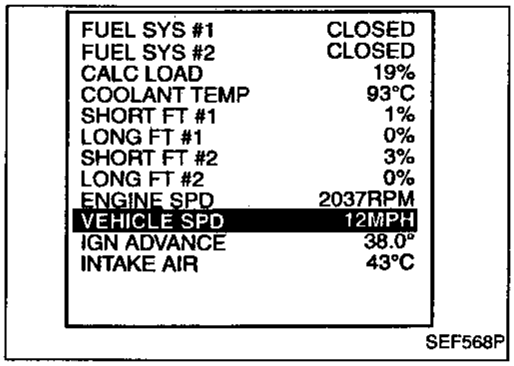
SEF941N

OR

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.



```
FUEL SYS #1        CLOSED
FUEL SYS #2        CLOSED
CALC LOAD             19%
COOLANT TEMP         93°C
SHORT FT #1            1%
LONG FT #1             0%
SHORT FT #2            3%
LONG FT #2             0%
ENGINE SPD        2037RPM
VEHICLE SPD         12MPH
IGN ADVANCE         38.0°
INTAKE AIR           43°C
```

SEF568P

OR

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

1) Start engine and warm it up sufficiently.

2) Perform test drive at least 10 seconds continuously in the following recommended condition.

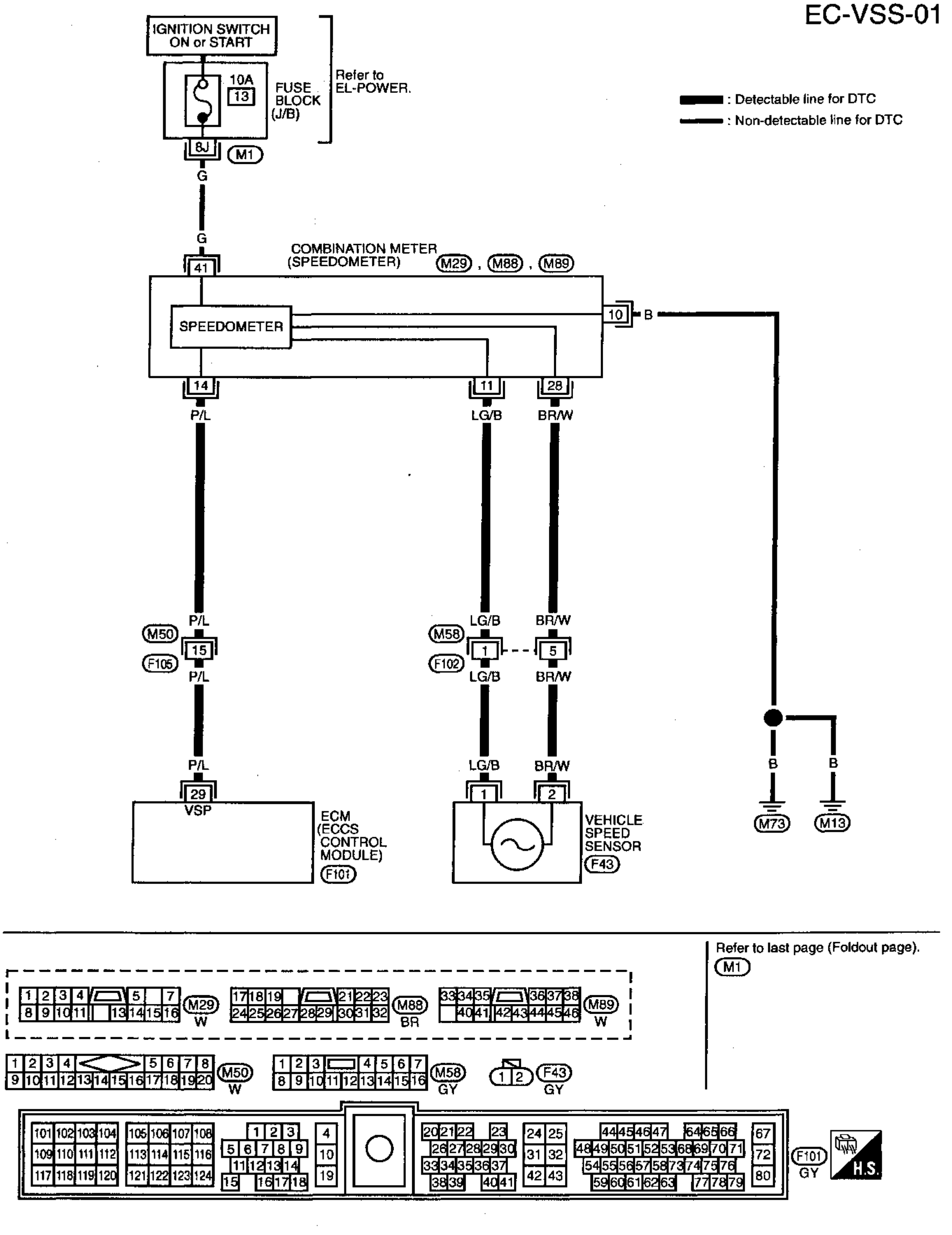
Engine speed	: 1,400 - 2,400 rpm (A/T models) 1,700 - 2,400 rpm (M/T models)
Intake manifold vacuum:	–53.3 to –40.0 kPa (–400 to –300 mmHg, –15.75 to –11.81 inHg) (A/T models) –53.3 to –26.7 kPa (–400 to –200 mmHg, –15.75 to –7.87 inHg) (M/T models)
Gear position	: Suitable position (except "N" or "P" 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 if a Diagnostic Trouble Code is not detected, perform the above test drive at least one more time.

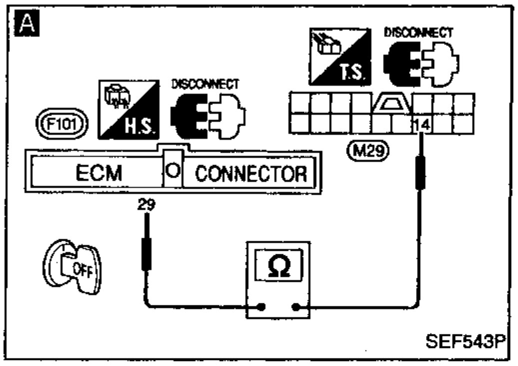
GI
MA
EM
LC
EC
FE
CL
MT
AT
FA
RA
BR
ST
RS
BT
HA
EL
IDX


EC-VSS-01
IGNITION SWITCH ON or START
10A
13
FUSE BLOCK (J/B)
Refer to EL-POWER.
: Detectable line for DTC
: Non-detectable line for DTC
8J
M1
G
G
41
COMBINATION METER (SPEEDOMETER)
M29 , M88 , M89
SPEEDOMETER
10
B
14
11
28
P/L
LG/B
BR/W
M50
15
F105
M58
1
5
F102
29
VSP
ECM (ECCS CONTROL MODULE)
F101
1
2
VEHICLE SPEED SENSOR
F43
B
B
M73
M13
Refer to last page (Foldout page).
M1
M29 W
M88 BR
M89 W
M50 W
M58 GY
F43 GY
F101 GY
H.S.

SEF222T

Vehicle Speed Sensor (VSS) (Cont'd)

DIAGNOSTIC PROCEDURE



SEF543P

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 ㉙ and terminal ⑭.
   Continuity should exist.
   If OK, check harness for short.

NG → Check the following.
- Harness connectors (F105), (M50)
- 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 (F102), (M58)
- Harness for open or short between combination meter and vehicle speed sensor

If NG, repair harness or connectors.
- 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. ↓

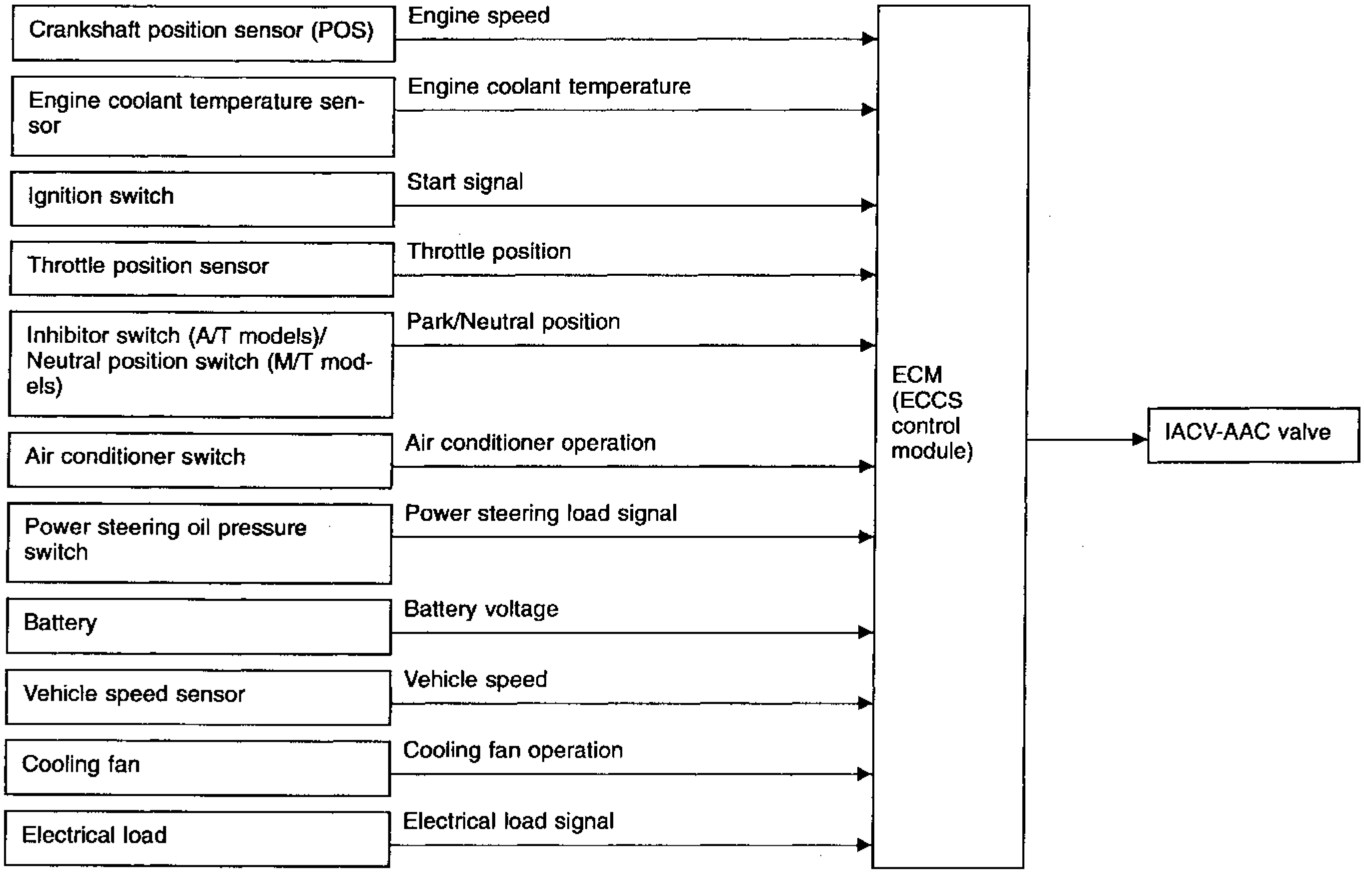
Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

↓

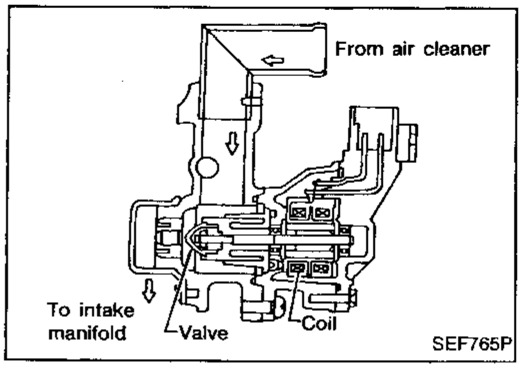
INSPECTION END

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 by-passes the throttle valve via IACV-AAC valve. The IACV-AAC valve changes the opening of the air by-pass passage to control the amount of auxiliary air. This valve is actuated by a step motor built into the valve, which moves the valve in the axial direction in steps corresponding to the ECM output signals. One step of IACV-AAC valve movement causes the respective opening of the air by-pass passage. (i.e. when the step advances, the opening is enlarged.) The opening of the valve is varied to allow for optimum control of the engine idling speed. The crankshaft position sensor (POS) detects the actual engine speed and sends a signal to the ECM. The ECM then controls the step position of the IACV-AAC valve so that engine speed coincides with the target value memorized in ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by taking into consideration various engine conditions, such as during warm up, deceleration, and engine load (air conditioner, power steering and cooling fan operation).



COMPONENT DESCRIPTION

The IACV-AAC valve is operated by a step motor for centralized control of auxiliary air supply. This motor has four winding phases and is actuated by the output signals of ECM which turns ON and OFF two windings each in sequence. Each time the IACV-AAC valve opens or closes to change the auxiliary air quantity, the ECM sends a pulse signal to the step motor. When no change in the auxiliary air quantity is needed, the ECM does not issue the pulse signal. A certain voltage signal is issued so that the valve remains at that particular opening.

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	2 - 10 step
		2,000 rpm	—

ECM TERMINALS AND REFERENCE VALUE

Remarks: Specification data are reference values, and are measured between each terminal and ㉕ (ECCS ground) with a voltmeter.

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
101 115 122 123	PU/G GY/G Y GY/L	IACV-AAC valve	Engine is running. └ Idle speed	0.1 - 14V
4	W/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)
67 72	R R	Power supply for ECM	Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)

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

Procedure for malfunction A

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
3) Start engine and let it idle.
4) Keep engine speed at 2,500 rpm for 3 seconds, then let it idle for 3 seconds.
   Do not rev engine up to speeds more than 3,000 rpm.
5) Perform step 4 once more.

OR

GST

1) Start engine and let it idle.
2) Keep engine speed at 2,500 rpm for 3 seconds, then let it idle for 3 seconds.
   Do not rev engine up to speeds more than 3,000 rpm.
3) Perform step 2 once more.
4) Select "MODE 7" with GST.

OR

NO TOOLS

1) Start engine and let it idle.
2) Keep engine speed at 2,500 rpm for 3 seconds, then let it idle for 3 seconds.
   Do not rev engine up to speeds more than 3,000 rpm.
3) Perform step 2 once more.
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.

Procedure for malfunction B

1) Open engine hood.
2) Start engine and warm it up sufficiently.
3) Turn ignition switch "OFF" and wait at least 5 seconds.
4) Turn ignition switch "ON" again and select "DATA MONITOR" mode with CONSULT.
5) Start engine and run it at least 1 minute at idle speed. (Headlamp switch, rear defogger switch: OFF)

OR

GST

1) Open engine hood.
2) Start engine and warm it up sufficiently.
3) Turn ignition switch "OFF" and wait at least 5 seconds.
4) Start engine again and run it at least 1 minute at idle speed. (Headlamp switch, rear defogger switch: OFF)
5) Select "MODE 3" with GST.

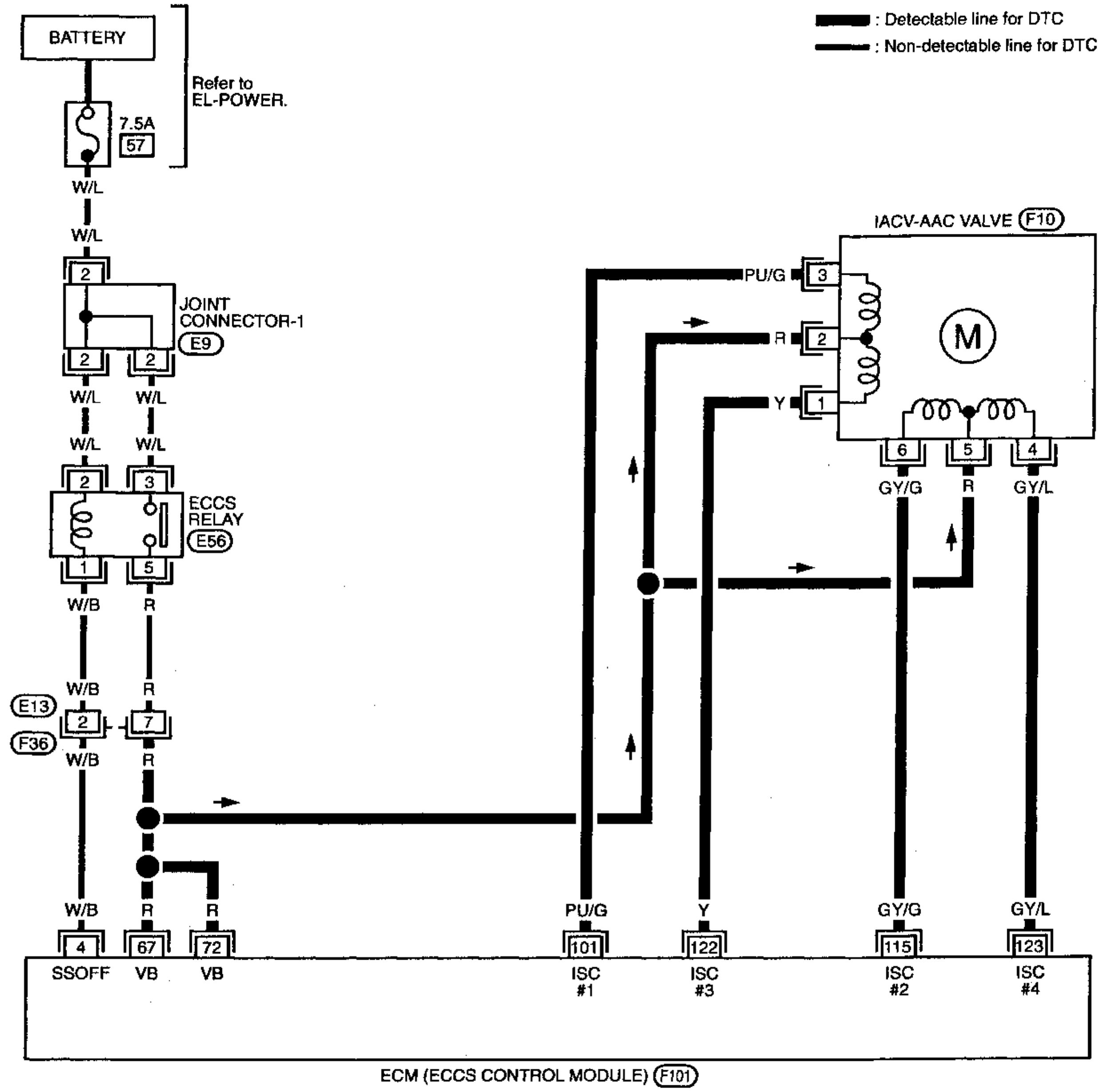
OR

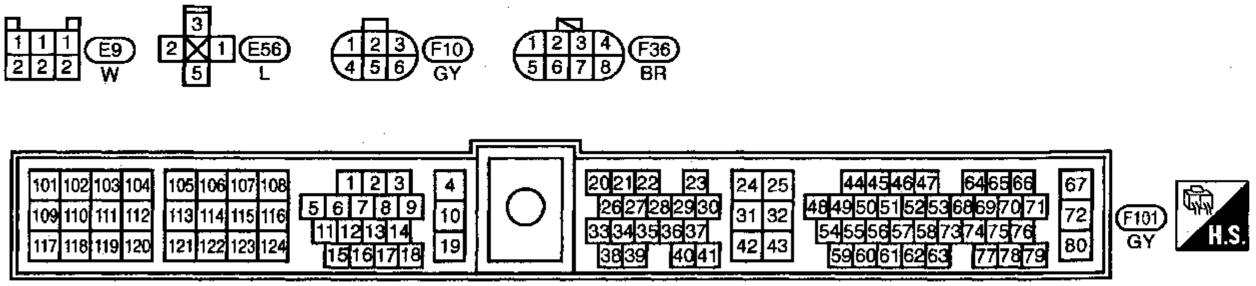
NO TOOLS

1) Open engine hood.
2) Start engine and warm it up sufficiently.
3) Turn ignition switch "OFF" and wait at least 5 seconds.
4) Start engine again and run it at least 1 minute at idle speed. (Headlamp switch, rear defogger switch: OFF)
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.

Idle Air Control Valve (IACV) — Auxiliary Air Control (AAC) Valve (Cont'd)

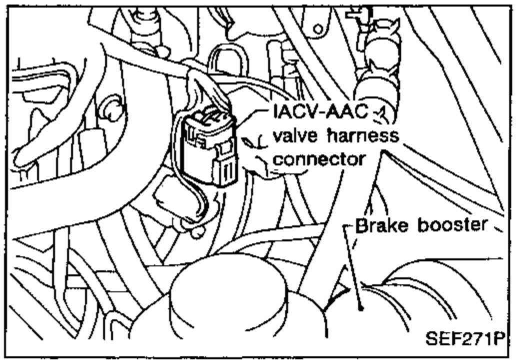
EC-AAC/V-01

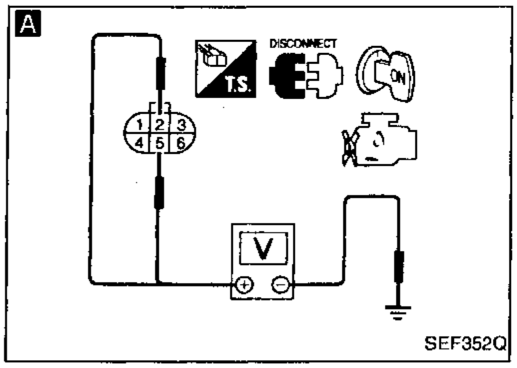


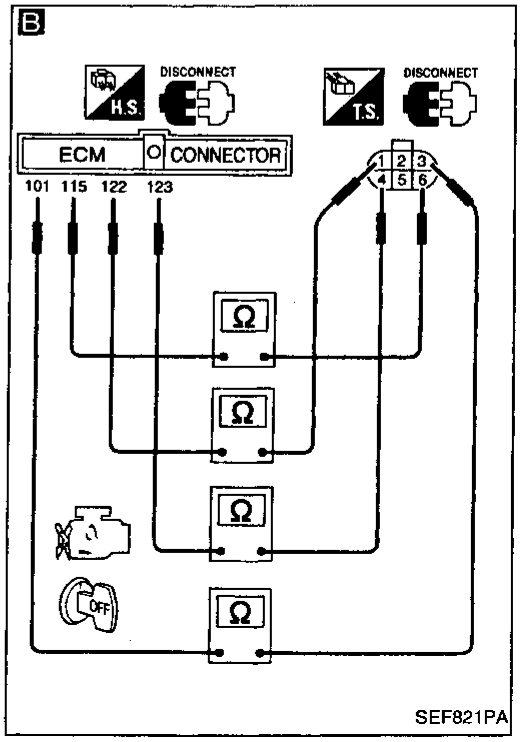


SEF224T

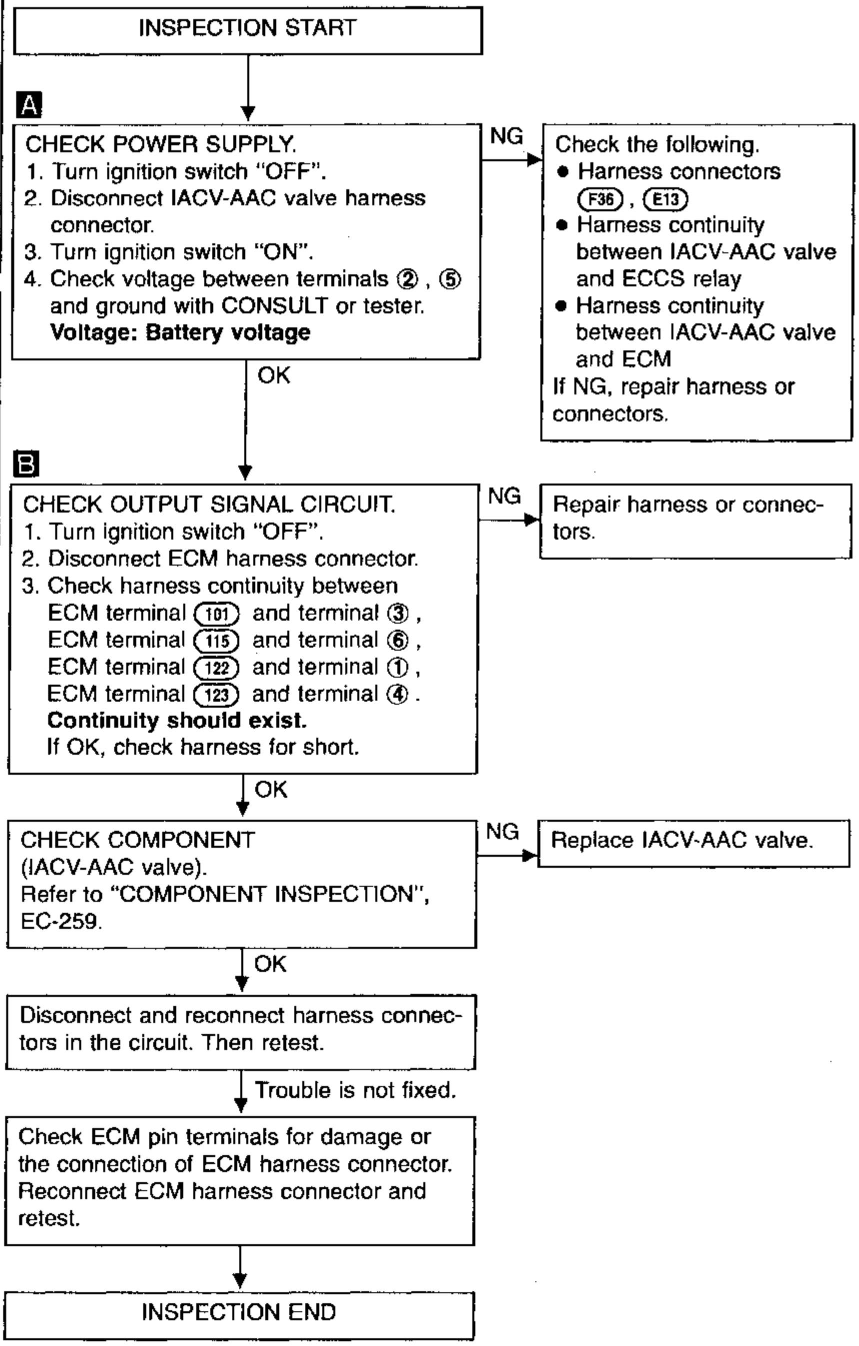
Idle Air Control Valve (IACV) — Auxiliary Air Control (AAC) Valve (Cont'd)







DIAGNOSTIC PROCEDURE



INSPECTION START

A

CHECK POWER SUPPLY.
1. Turn ignition switch "OFF".
2. Disconnect IACV-AAC valve harness connector.
3. Turn ignition switch "ON".
4. Check voltage between terminals ②, ⑤ and ground with CONSULT or tester.

Voltage: Battery voltage

NG → Check the following.
- Harness connectors (F36), (E13)
- Harness continuity between IACV-AAC valve and ECCS relay
- Harness continuity between IACV-AAC 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 (101) and terminal ③, ECM terminal (115) and terminal ⑥, ECM terminal (122) and terminal ①, ECM terminal (123) and terminal ④.

Continuity should exist.

If OK, check harness for short.

NG → Repair harness or connectors.

OK

CHECK COMPONENT (IACV-AAC valve).
Refer to "COMPONENT INSPECTION", EC-259.

NG → Replace IACV-AAC valve.

OK

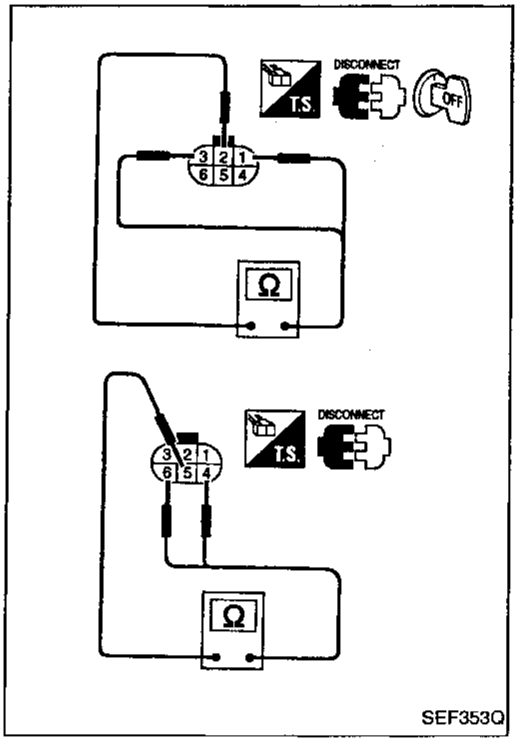
Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed.

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

INSPECTION END

Idle Air Control Valve (IACV) — Auxiliary Air Control (AAC) Valve (Cont'd)

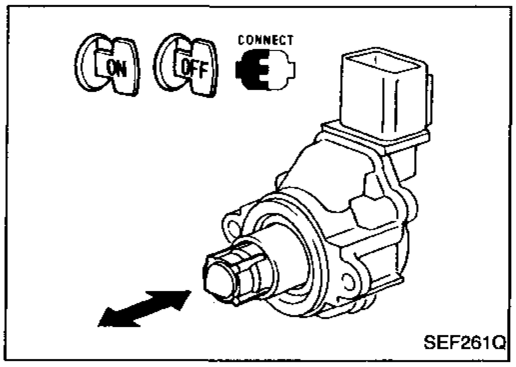


SEF353Q

COMPONENT INSPECTION

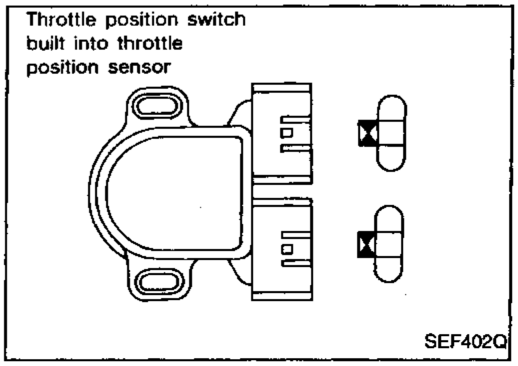
IACV-AAC valve

1. Disconnect IACV-AAC 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 20°C (68°F)]



SEF261Q

3. Reconnect IACV-AAC valve harness connector.
4. Remove idle air adjusting unit assembly (IACV-AAC valve is built-in) from engine.
   (The IACV-AAC valve harness connector should remain connected.)
5. Turn ignition switch "ON" and "OFF", and ensure the IACV-AAC valve shaft smoothly moves forward and backward, according to the ignition switch position.
   If NG, replace the IACV-AAC valve.



Closed Throttle Position Switch

COMPONENT DESCRIPTION

The throttle position switch, built into the throttle position sensor unit, consists of a closed throttle position switch and wide open throttle position switch. The closed throttle position switch detects the throttle valve position, i.e. whether it is in the idle position or not. The detected position will then be sent to the ECM as a voltage signal. The ECM 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

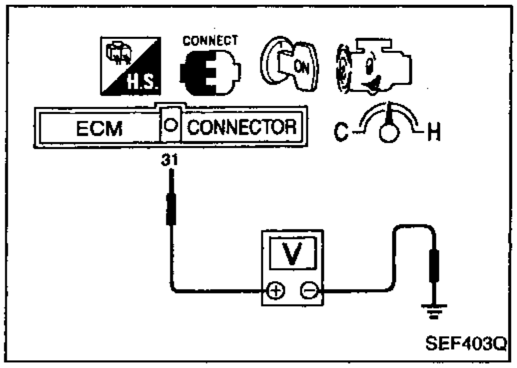
ECM TERMINALS AND REFERENCE VALUE

Remarks: Specification data are reference values, and are measured between each terminal and ㉕ (ECCS ground) with a voltmeter.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
31	GY/L	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 entered into ECM with the throttle valve opened.	• Harness or connectors (The closed throttle position switch circuit is shorted.) • Closed throttle position switch



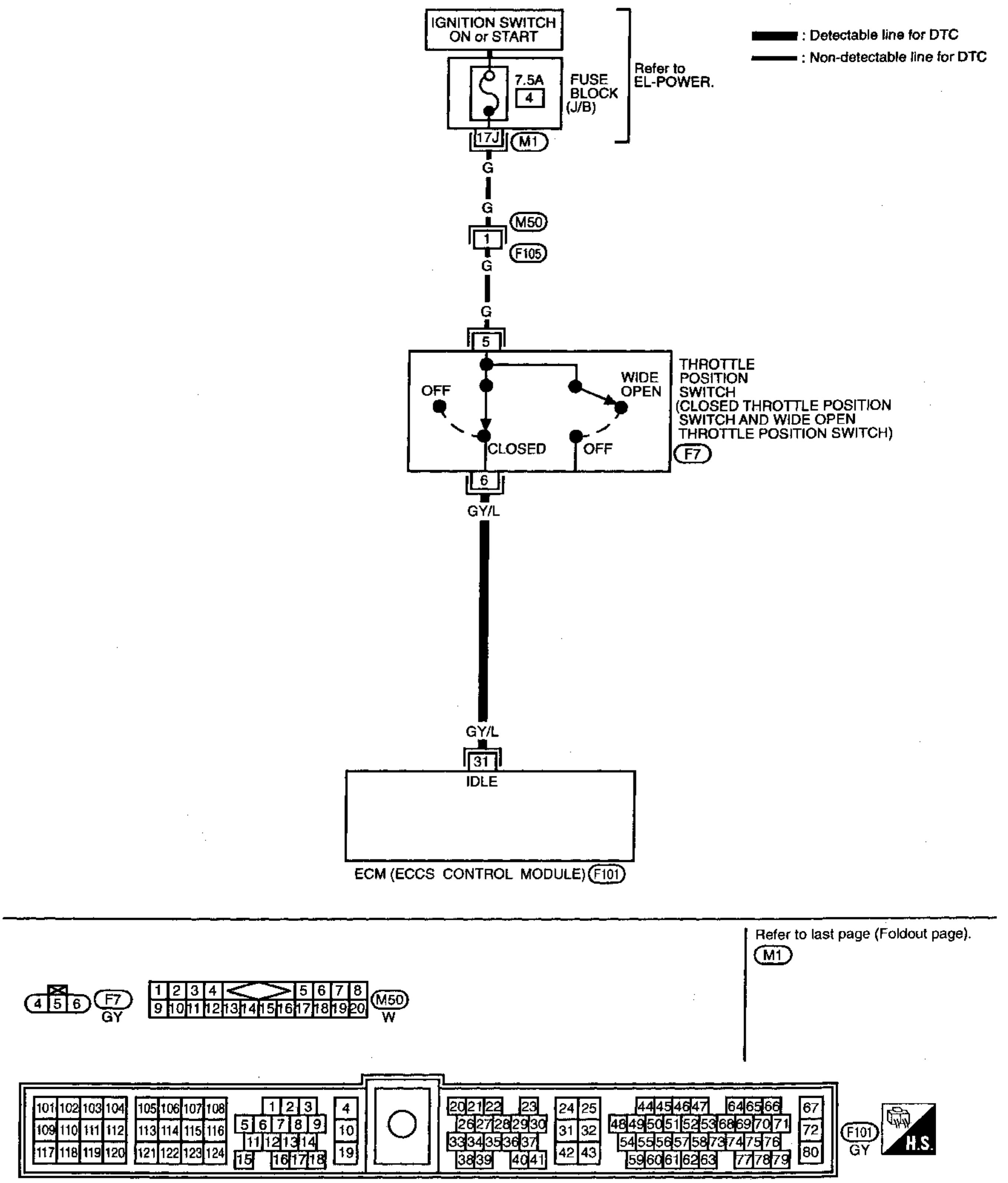
OVERALL FUNCTION CHECK

This procedure can be used for checking the overall function of the closed throttle position switch circuit. During this check, a DTC might not be confirmed.

1) Start engine and warm it up sufficiently.
2) Check the voltage between ECM terminal ㉛ and ground under the following conditions.
At idle: Battery voltage
At 2,000 rpm: Approximately 0V

Closed Throttle Position Switch (Cont'd)

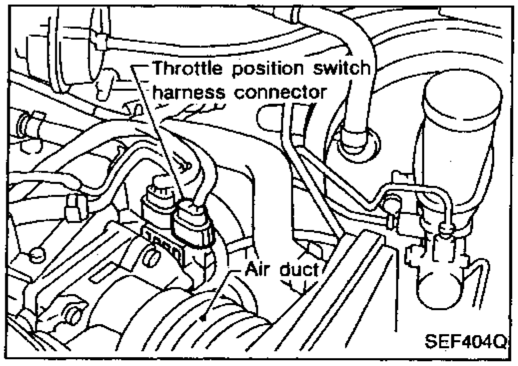
EC-TP/SW-01



MEC689B

Closed Throttle Position Switch (Cont'd)

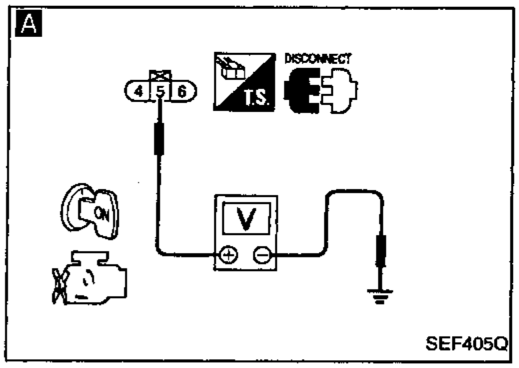
DIAGNOSTIC PROCEDURE



SEF404Q

INSPECTION START

CHECK FIC.
Perform "Fast Idle Cam (FIC) Inspection and Adjustment", EC-28.



SEF405Q

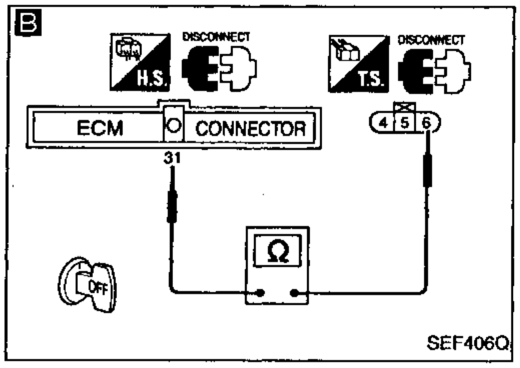
A

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 F105, M50
- 7.5A fuse
- Harness for open or short between throttle position switch and fuse

If NG, repair harness or connectors.

OK



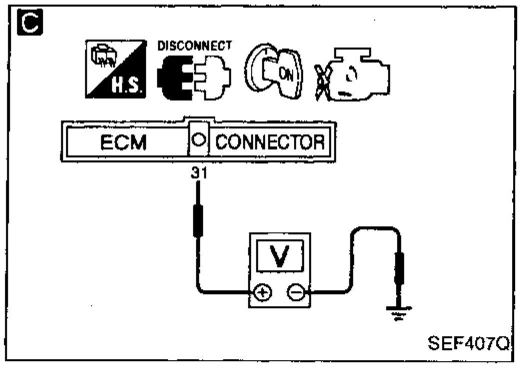
SEF406Q

B

CHECK INPUT SIGNAL CIRCUIT.
1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal ㉛ and terminal ⑥ .
Continuity should exist.
If OK, check harness for short.

NG → Repair harness or connectors.

OK



SEF407Q

C

CHECK INPUT SIGNAL CIRCUIT.
1. Turn ignition switch "ON".
2. Check voltage between ECM terminal ㉛ and engine ground.
Voltage: Approx. 0V

NG → Repair harness or connectors.

OK

ADJUST THROTTLE POSITION SWITCH.
Perform BASIC INSPECTION, EC-78.

OK

CHECK COMPONENT
(Closed throttle position switch).
Refer to "COMPONENT INSPECTION", EC-263.

NG → Replace throttle position switch.

OK

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

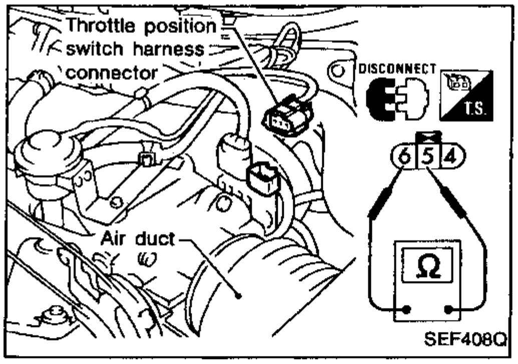
Trouble is not fixed.

Check ECM pin terminals for damage or 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.

Accelerator pedal conditions	Continuity
Completely released	Yes
Partially released or completely depressed	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

Remarks: Specification data are reference values, and are measured between each terminal and ㉕ (ECCS ground) with a voltmeter.

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
65	R/L	A/T signal No. 4	Ignition switch "ON"	6 - 8V
			Engine is running. └ Idle speed	0V
66	Y/B	A/T signal No. 5	Ignition switch "ON"	0V
			Engine is running. └ Idle speed	6 - 8V
73	W/L	A/T signal No. 1	Ignition switch "ON"	6 - 8V
			Engine is running. └ Idle speed	0V
74	W/PU	A/T signal No. 2	Ignition switch "ON"	6 - 8V
77	R/W	A/T signal No. 3	Ignition switch "ON"	0V
			Engine is running. └ Idle speed	6 - 8V

ON BOARD DIAGNOSIS LOGIC

*** Freeze frame data is not stored in the ECM for the "A/T control". The MIL will not light for "A/T control" malfunction.**

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (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.) • A/T control unit

A/T Control (Cont'd)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

Note: If any diagnostic trouble code is displayed performing self-diagnosis for A/T (Refer to AT section.), perform the trouble diagnosis for the DTC first (Refer to AT section.).

1) Jack up drive wheels.
2) Make sure that selector lever is set in "P" or "N" position.
3) Turn ignition switch "ON".

4) Select "DATA MONITOR" mode with CONSULT.
5) Start engine and rise engine speed to more than 1,000 rpm at once.
6) Run engine at least 10 seconds at idle speed.
7) Run engine at least 10 seconds at 2,000 rpm.
8) Set selector lever in "D" position and run engine at least 10 seconds at idle speed (with vehicle stopped).
9) Drive vehicle at 12 to 20 km/h (7 to 12 MPH) at least 10 seconds in "D" position.

OR

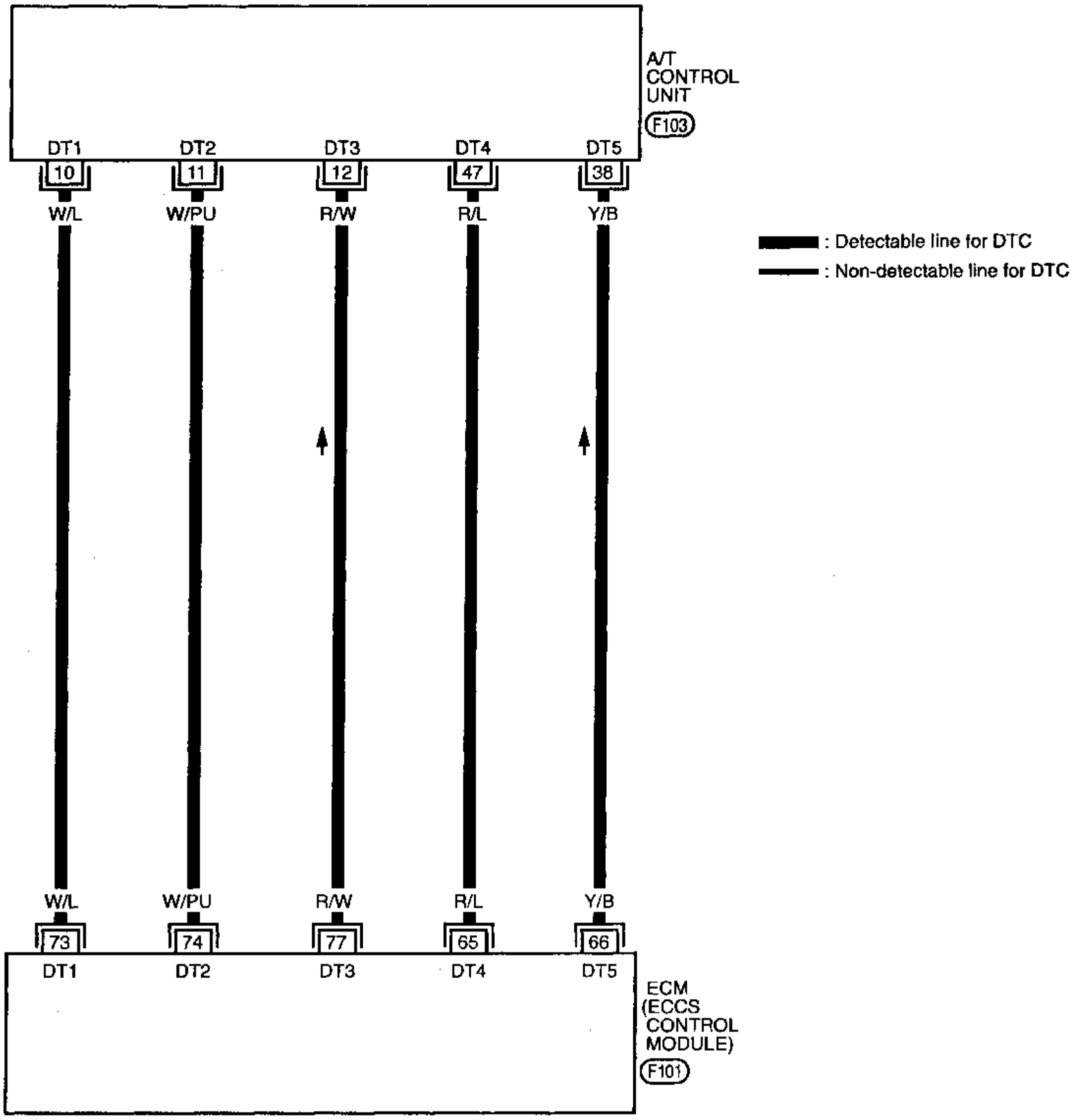
4) Start engine and rise engine speed to more than 1,000 rpm at once.
5) Run engine at least 10 seconds at idle speed.
6) Run engine at least 10 seconds at 2,000 rpm.
7) Set selector lever in "D" position and run engine at least 10 seconds at idle speed (with vehicle stopped).
8) Drive vehicle at 12 to 20 km/h (7 to 12 MPH) for at least 10 seconds in "D" position.
9) Select "Mode 3" with GST.

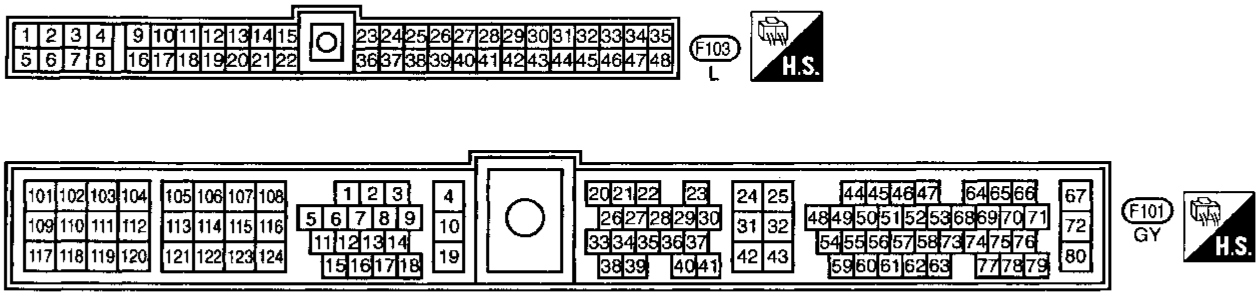
OR

4) Start engine and rise engine speed to more than 1,000 rpm at once.
5) Run engine at least 10 seconds at idle speed.
6) Run engine at least 10 seconds at 2,000 rpm.
7) Set selector lever in "D" position and run engine at least 10 seconds at idle speed (with vehicle stopped).
8) Drive vehicle at 12 to 20 km/h (7 to 12 MPH) at least 10 seconds in "D" position.
9) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
10) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.

A/T Control (Cont'd)

EC-AT/C-01

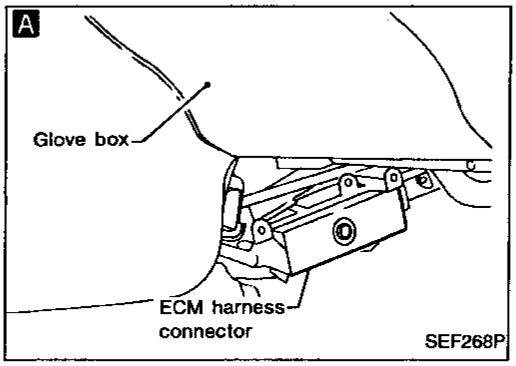




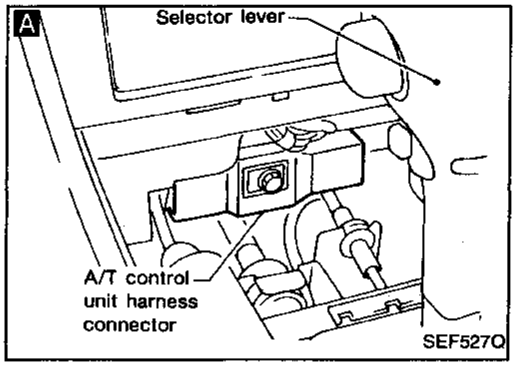
MEC092B

A/T Control (Cont'd)

DIAGNOSTIC PROCEDURE



SEF268P



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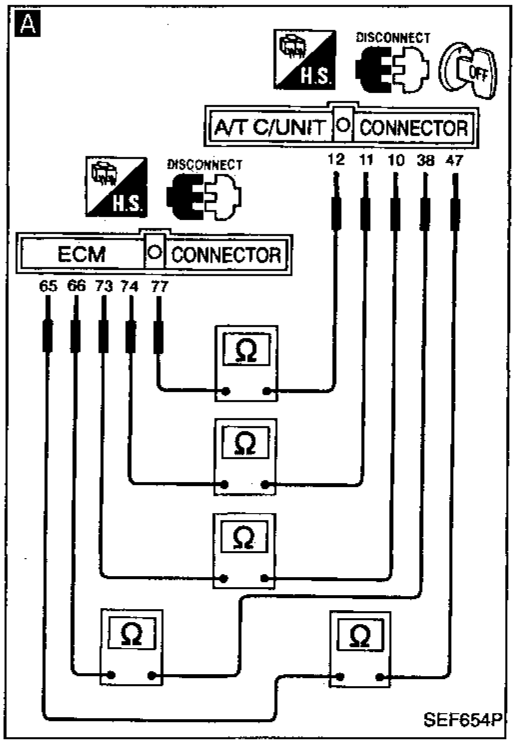
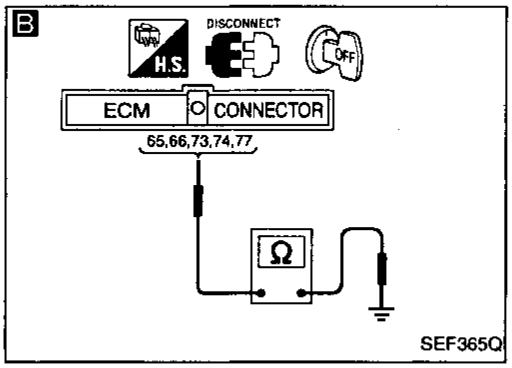


SEF654P



SEF365Q

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 (65) and terminal (47),
   ECM terminal (66) and terminal (38),
   ECM terminal (73) and terminal ⑩,
   ECM terminal (74) and terminal ⑪,
   ECM terminal (77) and terminal ⑫.

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

NG → Repair harness or connectors.

OK

B

CHECK INPUT SIGNAL CIRCUIT.
Check harness continuity between
ECM terminal (65) and ground,
ECM terminal (66) and ground,
ECM terminal (73) and ground,
ECM terminal (74) and ground,
ECM terminal (77) and ground.
Continuity should not exist.
If OK, check harness for short.

NG → Repair harness or connectors.

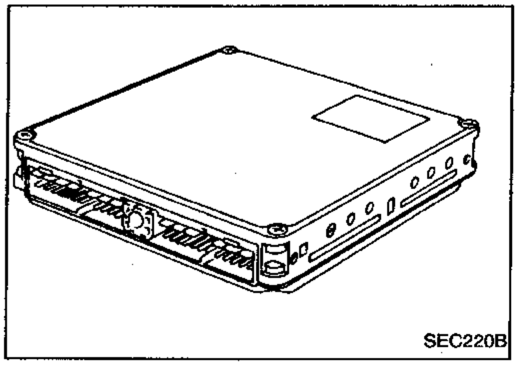
OK

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

Trouble is not fixed.

Check ECM and A/T control unit pin terminals for damage or the connection of ECM and A/T control unit harness connectors. Reconnect ECM and A/T control unit harness connectors and retest.

INSPECTION END


SEC220B

Engine Control Module (ECM)-ECCS Control Module

The ECM consists of a microcomputer, a diagnostic test mode selector, and connectors for signal input and output and for power supply. The unit controls the engine.

Diagnostic Trouble Code No.	Malfunction is detected when	Check Item (Possible Cause)
P0605 0301	• ECM calculation function is malfunctioning.	• ECM (ECCS control module)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
3) Start engine and wait at least 30 seconds.

OR

GST
1) Turn ignition switch "ON".
2) Select "Mode 7" with GST.
3) Start engine and wait at least 30 seconds.

OR

NO TOOLS
1) Turn ignition switch "ON".
2) Start engine and wait at least 30 seconds.
3) Turn ignition switch "OFF" and wait at least 5 seconds.
4) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.

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".

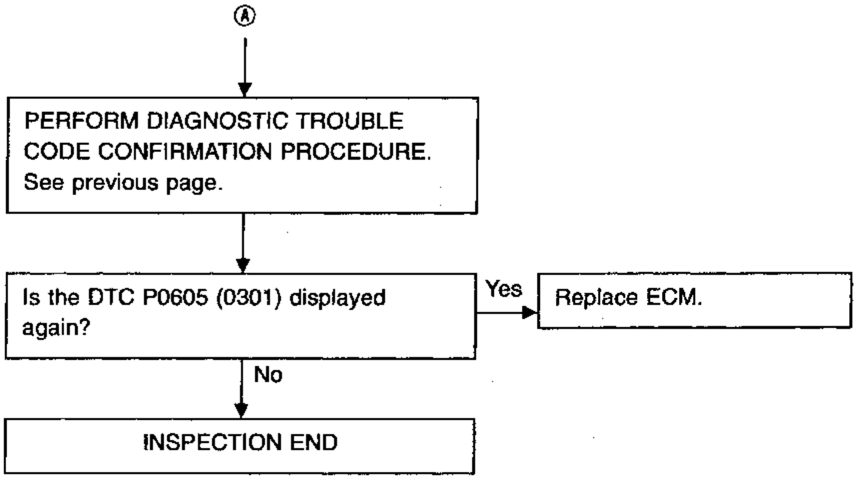
OR

NO TOOLS
1) Turn ignition switch "ON".
2) Erase the Diagnostic Test Mode II (Self-diagnostic results) memory.

↓

Ⓐ

Engine Control Module (ECM)-ECCS Control Module (Cont'd)



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Park/Neutral Position Switch

COMPONENT DESCRIPTION

When the gear position is in "P" (A/T models only) or "N", park/neutral position is "ON". ECM detects the position because the continuity of the line (the "ON" signal) exists.

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

Remarks: Specification data are reference values, and are measured between each terminal and ㉕ (ECCS ground) with a voltmeter.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
22	G/W (M/T models) G/OR (A/T models)	Neutral position switch (M/T models) Inhibitor switch (A/T models)	Ignition switch "ON" Gear position is "Neutral position" (M/T models). Gear position is "N" or "P" (A/T models).	Approximately 0V
			Ignition switch "ON" Except the above gear position	Approximately 5V

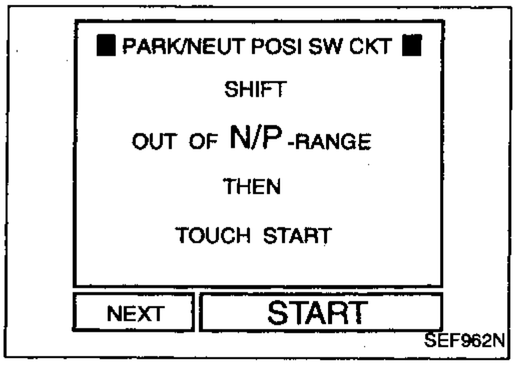
ON BOARD DIAGNOSIS LOGIC

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 (The neutral position switch or inhibitor switch circuit is open or shorted.) • Neutral position switch (M/T models) • Inhibitor switch (A/T models)

Park/Neutral Position Switch (Cont'd)

OVERALL FUNCTION CHECK

This procedure can be used for checking the overall function of the park/neutral position switch circuit. During this check, a DTC might not be confirmed.



■ PARK/NEUT POSI SW CKT ■

SHIFT

OUT OF N/P-RANGE

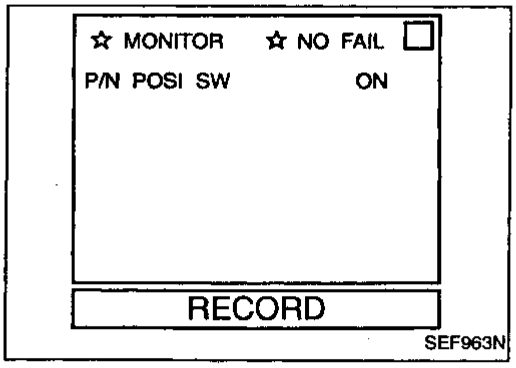
THEN

TOUCH START

SEF962N

1) Turn ignition switch "ON".
2) Perform "PARK/NEUT POSI SW CKT" in "FUNCTION TEST" mode with CONSULT.

OR



☆ MONITOR ☆ NO FAIL ☐

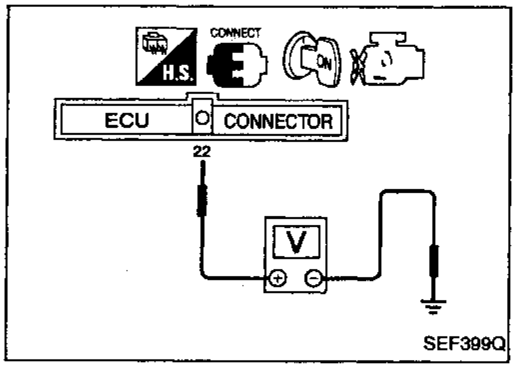
P/N POSI SW ON

SEF963N

2) Select "P/N POSI SW" in "DATA MONITOR" mode with CONSULT.
3) Check the "P/N POSI SW" signal in the following conditions.

Condition (Gear position)	Known good signal
"P" (A/T only) and "N" position	ON
Except the above position	OFF

OR



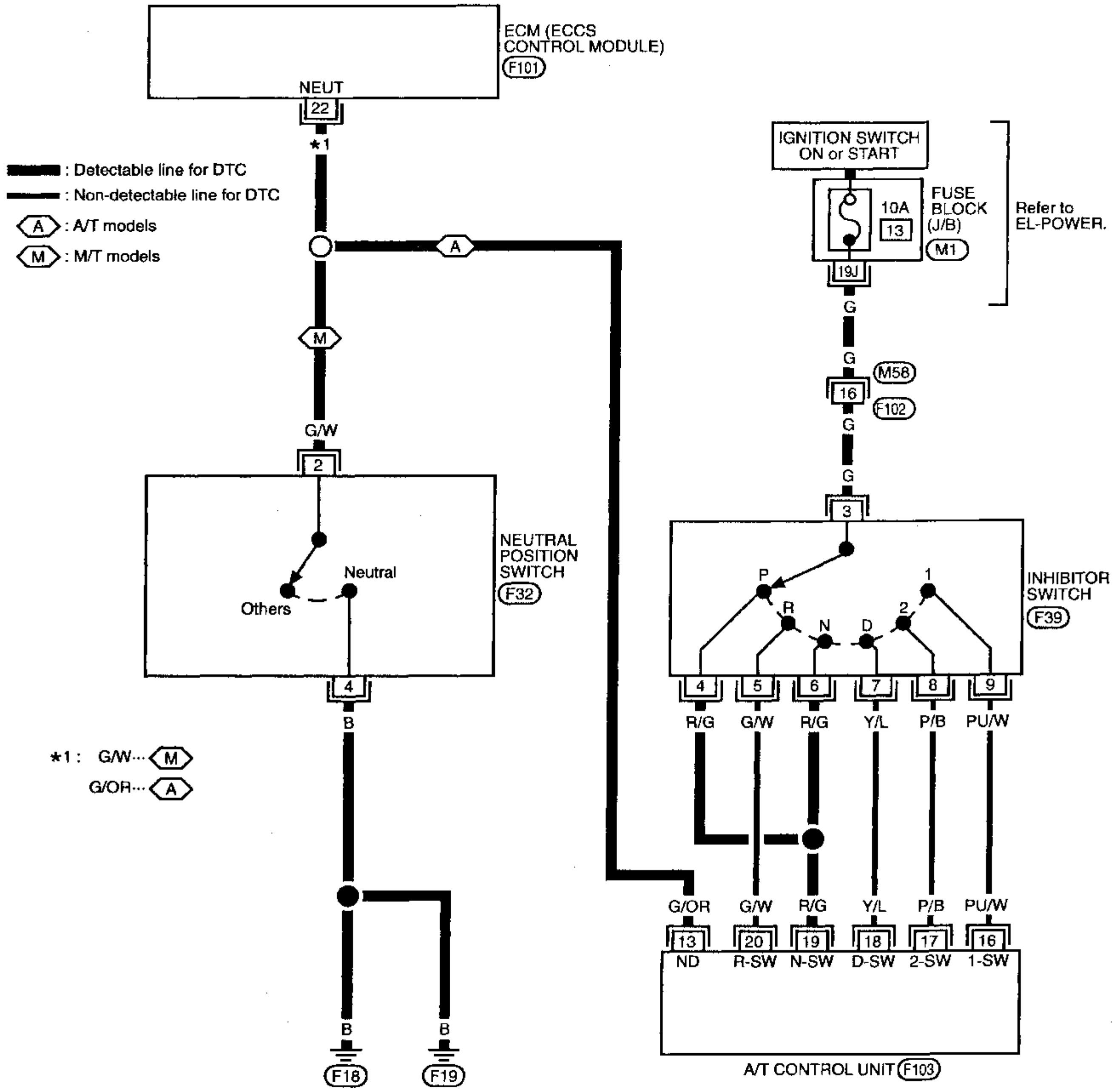
SEF399Q

1) Turn ignition switch "ON".
2) Check voltage between ECM terminal ㉒ and body ground in the following conditions.

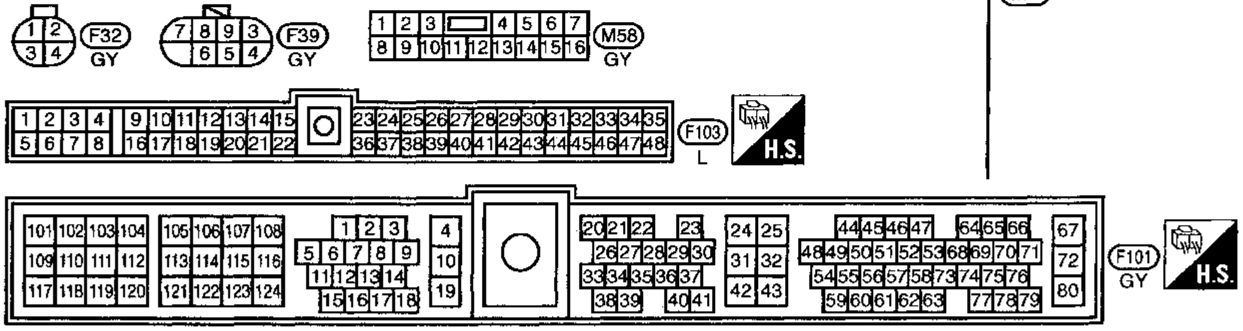
Condition (Gear position)	Voltage (V) (Known good data)
"P" (A/T only) and "N" position	Approx. 0
Except the above position	Approx. 5

Park/Neutral Position Switch (Cont'd)

EC-PNP/SW-01



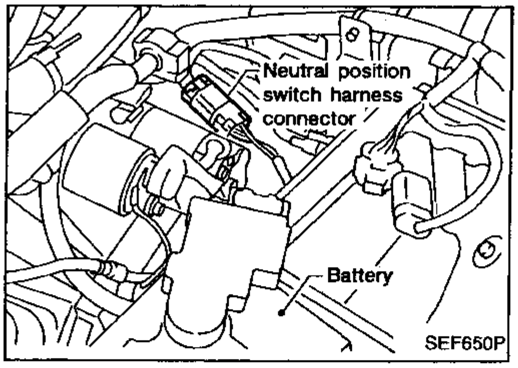
Refer to last page (Foldout page).
M1



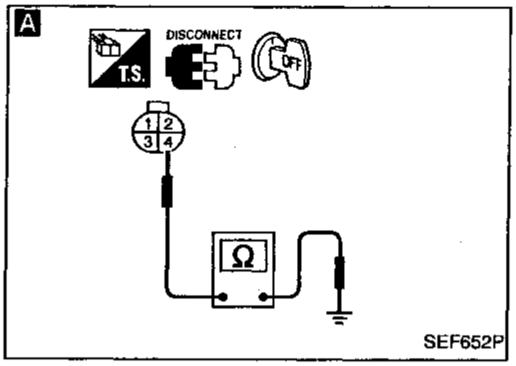
SEF237T

Park/Neutral Position Switch (Cont'd)

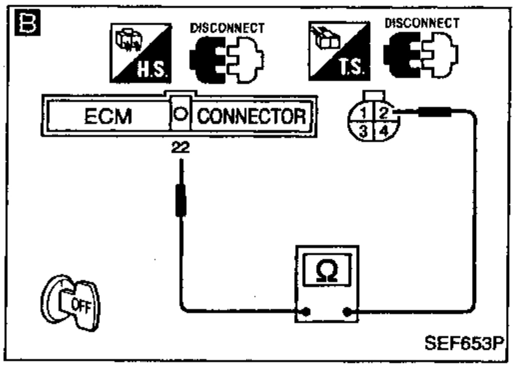
DIAGNOSTIC PROCEDURE



SEF650P

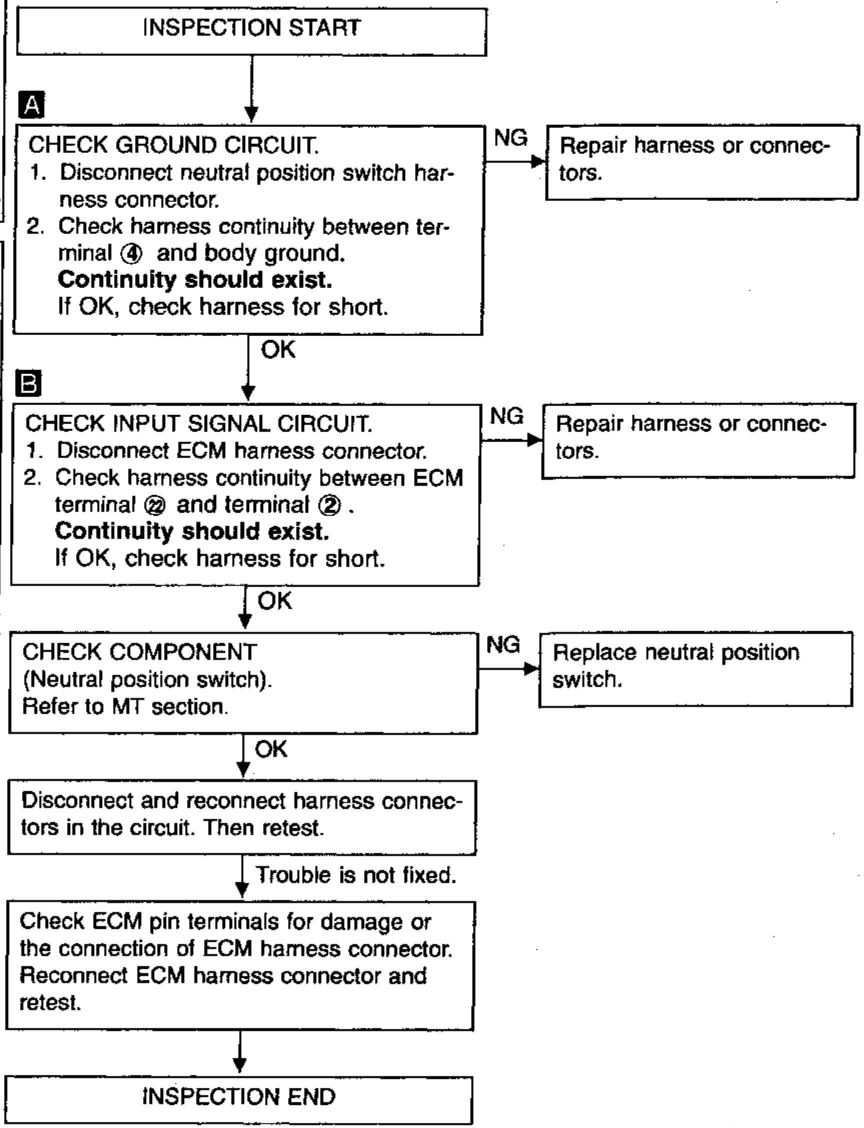


SEF652P



SEF653P

Neutral position switch (M/T models)



INSPECTION START

A CHECK GROUND CIRCUIT.
1. Disconnect neutral position switch harness connector.
2. Check harness continuity between terminal ④ and body ground.
Continuity should exist.
If OK, check harness for short.

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 ②.
Continuity should exist.
If OK, check harness for short.

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.

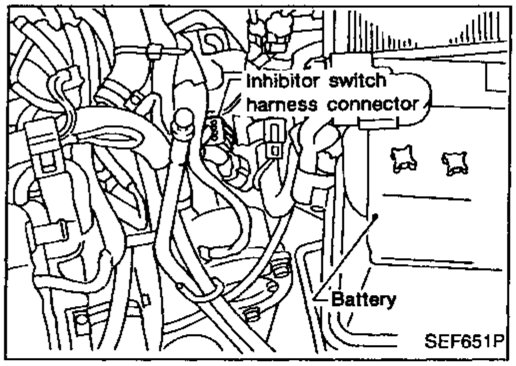
Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

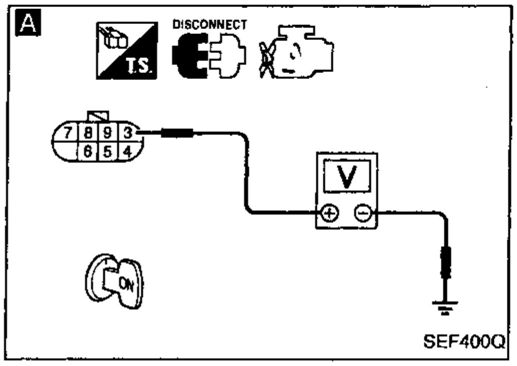
INSPECTION END

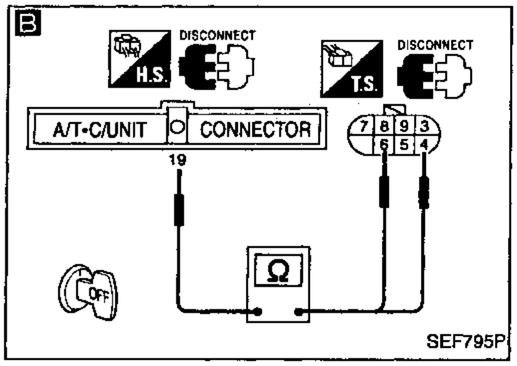
Park/Neutral Position Switch (Cont'd)

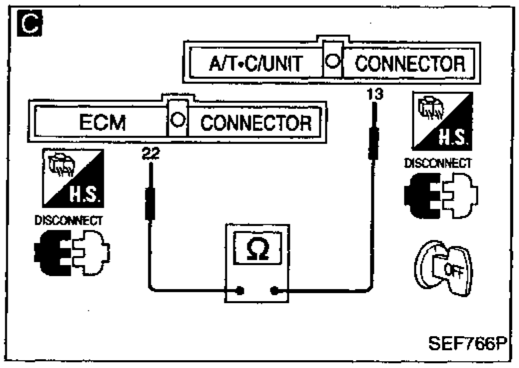
DIAGNOSTIC PROCEDURE

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 ③ and ground with CONSULT or tester.
   Voltage: Battery voltage

NG → Check the following.
- Harness connectors (F102), (M58)
- 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. Disconnect A/T control unit harness connector.
2. Check harness continuity between A/T control unit terminal ⑲ and terminals ④, ⑥.
   Continuity should exist.
   If OK, check harness for short.

NG → Repair harness or connectors.

↓ OK

C

CHECK OUTPUT SIGNAL CIRCUIT-II.
1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal ㉒ and terminal ⑬.
   Continuity should exist.
   If OK, check harness for short.

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.

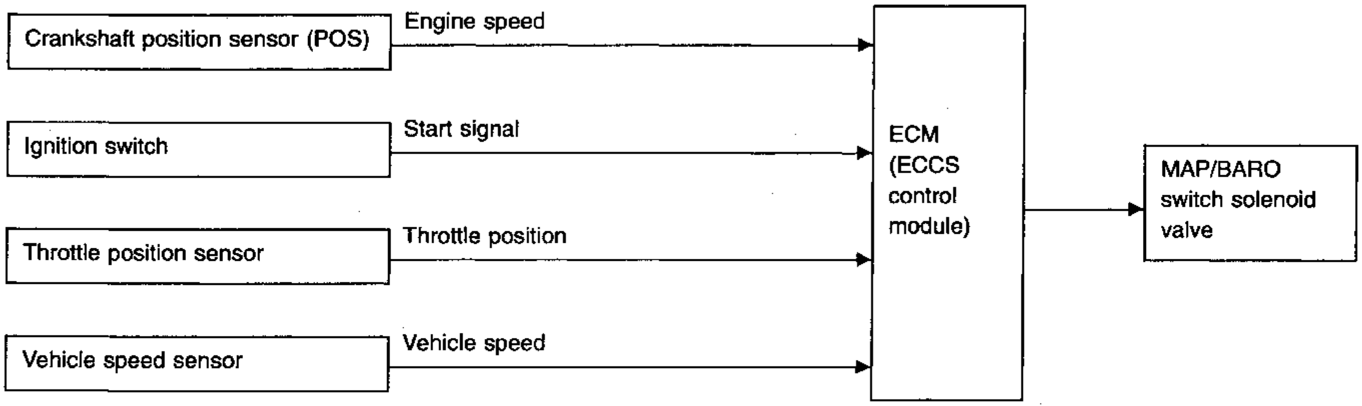
Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

↓

INSPECTION END

Manifold Absolute Pressure (MAP)/Barometric Pressure (BARO) Switch Solenoid Valve

SYSTEM DESCRIPTION

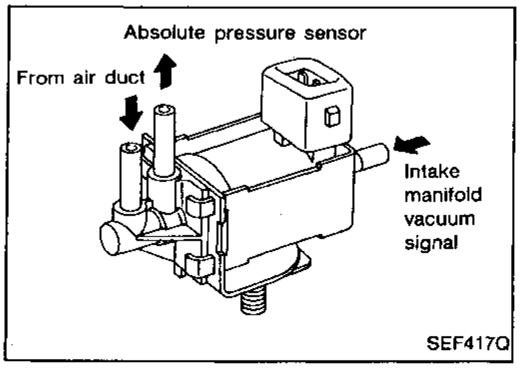


This system provides the absolute pressure sensor with either ambient barometric pressure or intake manifold pressure for monitoring.

The MAP/BARO switch solenoid valve switches between two passages (one is from the air duct, the other is from the intake manifold) by ON-OFF operation. When the MAP/BARO switch solenoid valve is activated ON or OFF by the ECM, either ambient barometric pressure or intake manifold pressure is applied to the absolute pressure sensor.

The solenoid valve is almost always OFF under normal conditions. When the following conditions are met, the solenoid valve is activated to switch ON for 1 second.

Solenoid	Conditions
ON	• Immediately after starting engine 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).



SEF417Q

COMPONENT DESCRIPTION

The MAP/BARO switch solenoid valve switches between ambient barometric pressure and intake manifold pressure according to the voltage signal sent from the ECM. When the MAP/BARO switch solenoid valve is supplied with a voltage by the ECM, it turns "ON" so that the MAP/BARO switch solenoid valve monitors the ambient barometric pressure. When the MAP/BARO switch solenoid valve is not supplied the voltage, it goes "OFF" and the sensor monitors the intake manifold pressure.

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CONSULT REFERENCE VALUE IN DATA MONITOR MODE

- Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
MAP/BARO SW/V	• Ignition switch: ON	MAP

ECM TERMINALS AND REFERENCE VALUE

Remarks: Specification data are reference values, and are measured between each terminal and ㉕ (ECCS ground) with a voltmeter.

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
16	OR/Y	MAP/BARO switch solenoid valve	Ignition switch "ON"	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 that 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 8 seconds.

OR

GST

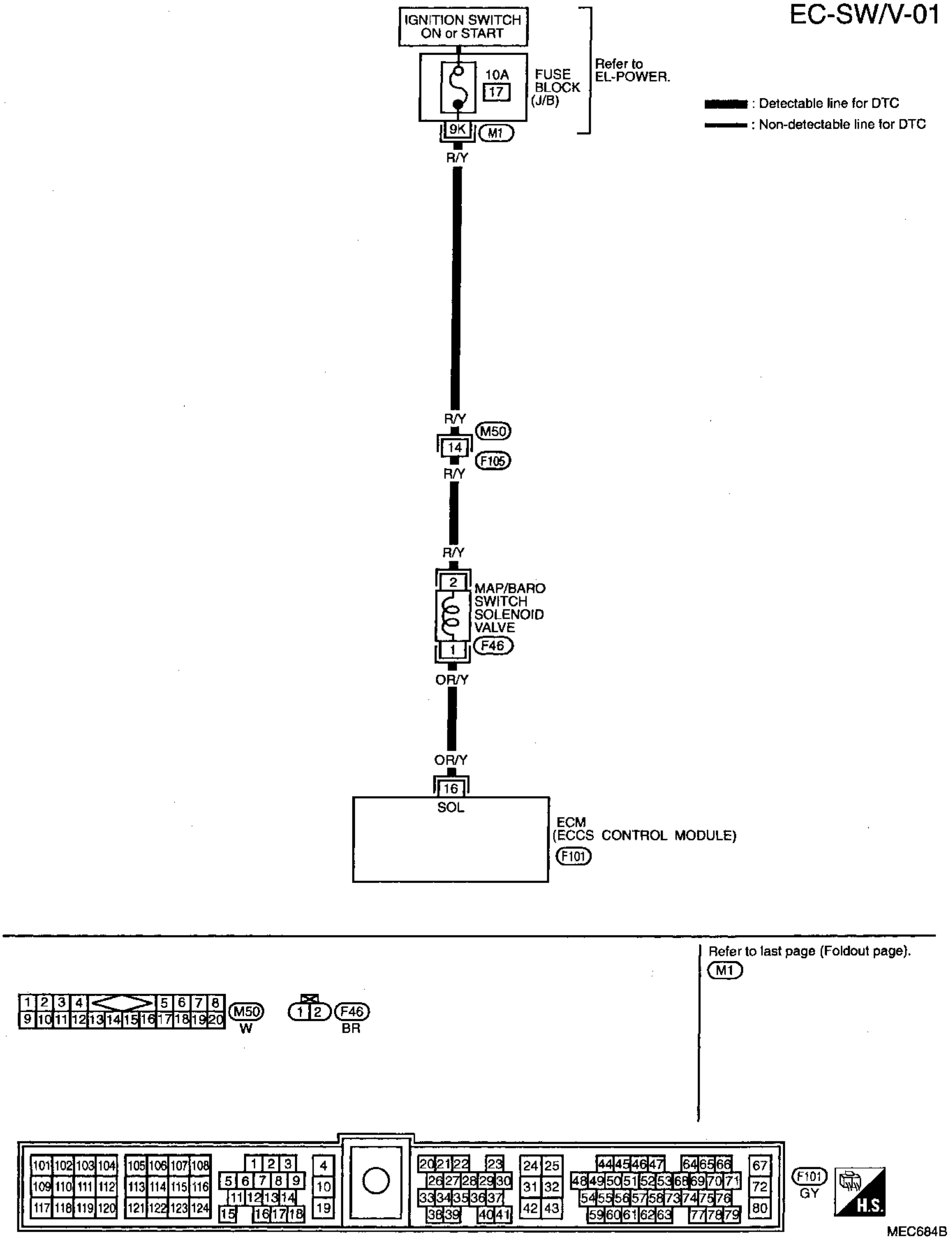
1) Start engine and warm it up sufficiently.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Start engine and let it idle.
4) Wait at least 8 seconds.
5) Select "MODE 7" with GST.

OR

NO TOOLS

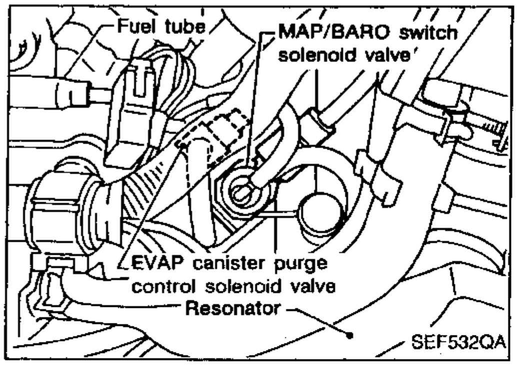
1) Start engine and warm it up sufficiently.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Start engine and let it idle.
4) Wait at least 8 seconds.
5) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
6) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.

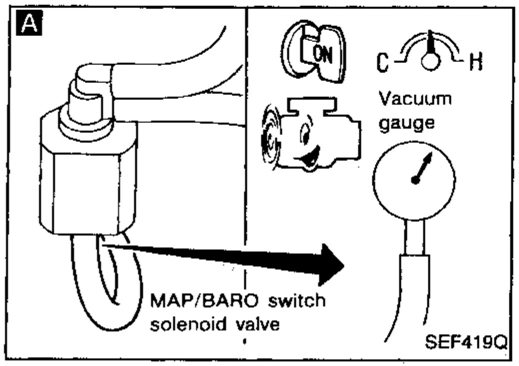
Manifold Absolute Pressure (MAP)/Barometric Pressure (BARO) Switch Solenoid Valve (Cont'd)

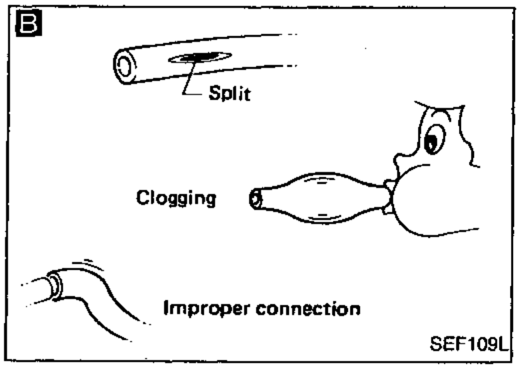


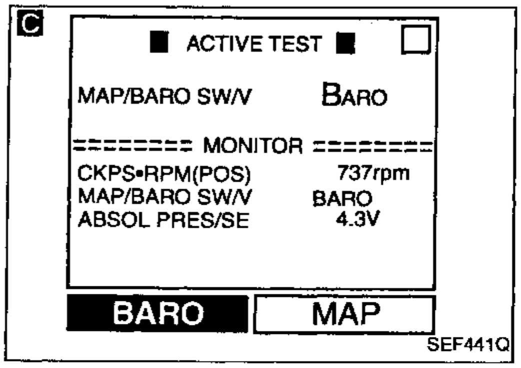
MEC684B

Manifold Absolute Pressure (MAP)/Barometric Pressure (BARO) Switch Solenoid Valve (Cont'd)



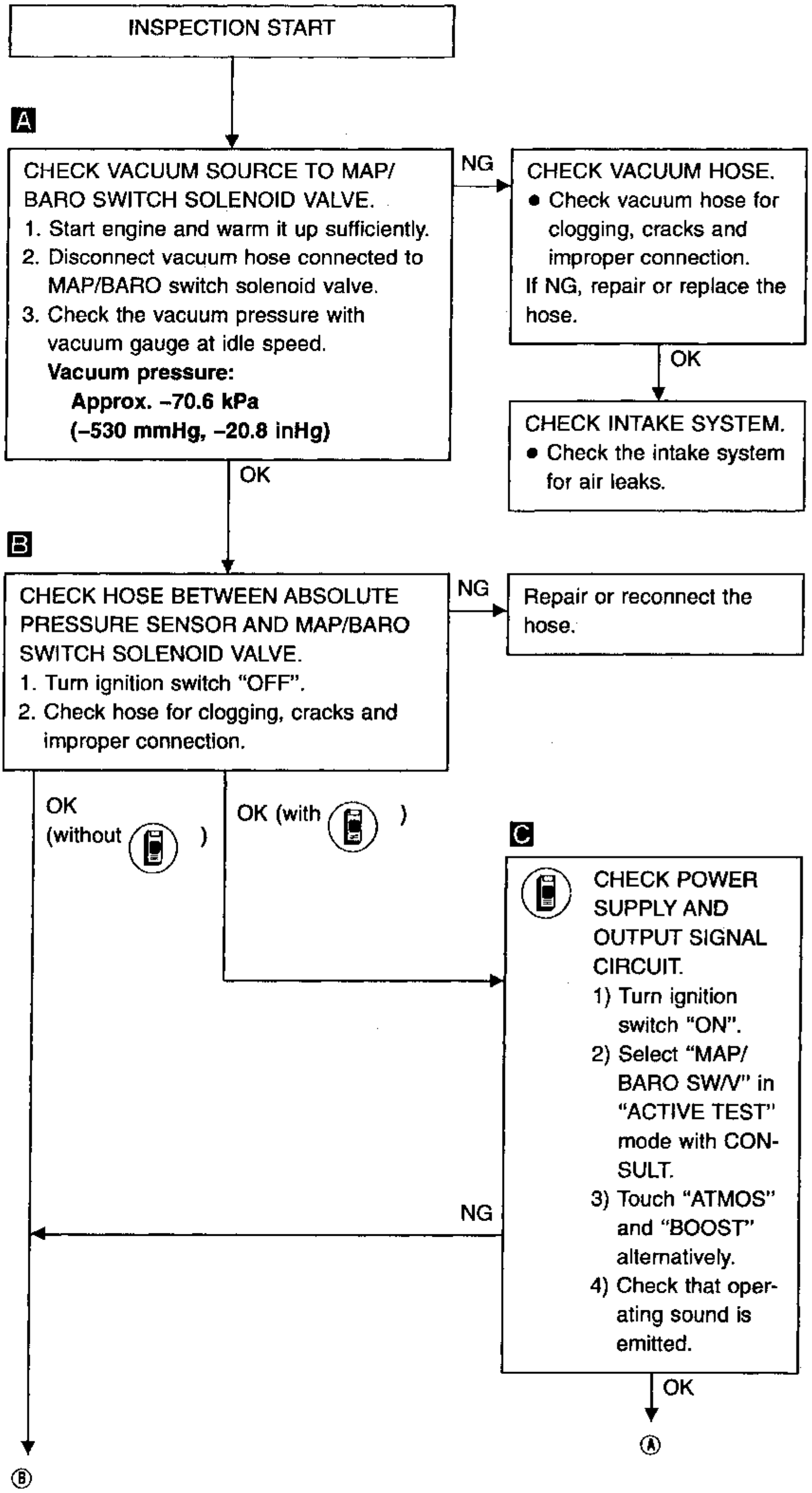






```
■ ACTIVE TEST ■  ☐
MAP/BARO SW/V      BARO
======== MONITOR ========
CKPS•RPM(POS)       737rpm
MAP/BARO SW/V      BARO
ABSOL PRES/SE        4.3V
BARO    MAP
```

DIAGNOSTIC PROCEDURE



INSPECTION START

A

CHECK VACUUM SOURCE TO MAP/BARO SWITCH SOLENOID VALVE.

1. Start engine and warm it up sufficiently.
2. Disconnect vacuum hose connected to MAP/BARO switch solenoid valve.
3. Check the vacuum pressure with vacuum gauge at idle speed.

Vacuum pressure:
Approx. −70.6 kPa
(−530 mmHg, −20.8 inHg)

NG → CHECK VACUUM HOSE.

- Check vacuum hose for clogging, cracks and 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 and improper connection.

NG → Repair or reconnect the hose.

OK (without ▯) ↓ Ⓑ

OK (with ▯) ↓

C

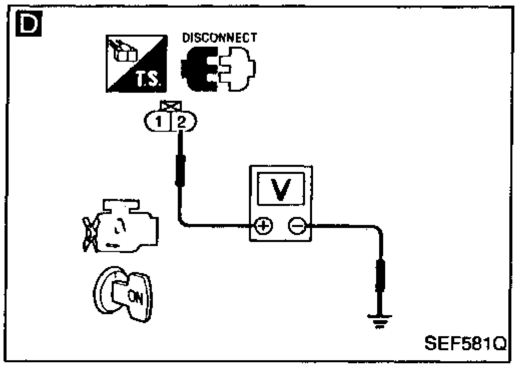
▯ CHECK POWER SUPPLY AND OUTPUT SIGNAL CIRCUIT.

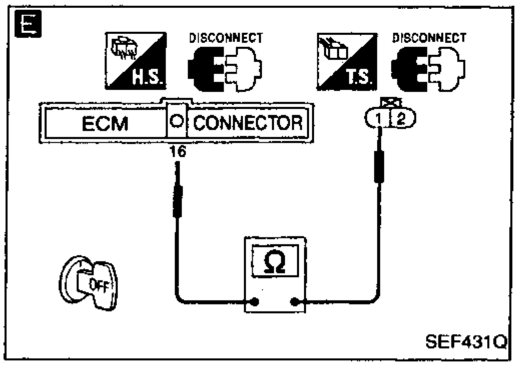
1) Turn ignition switch "ON".
2) Select "MAP/BARO SW/V" in "ACTIVE TEST" mode with CONSULT.
3) Touch "ATMOS" and "BOOST" alternatively.
4) Check that operating sound is emitted.

NG → Ⓑ

OK ↓ Ⓐ

Manifold Absolute Pressure (MAP)/Barometric Pressure (BARO) Switch Solenoid Valve (Cont'd)





Ⓑ

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 ② and engine ground with CONSULT or tester.

Voltage: Battery voltage

If OK, check harness for short.

NG → Check the following.
- Harness connectors (F105), (M50)
- 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 ⑯ and terminal ① with CONSULT or tester.

Continuity should exist.

If OK, check harness for short.

NG → Repair harness or connectors.

OK ↓ Ⓐ ↓

CHECK COMPONENT (Absolute pressure sensor).
Refer to "COMPONENT INSPECTION" of "TROUBLE DIAGNOSIS FOR DTC P0105", EC-115.

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 or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

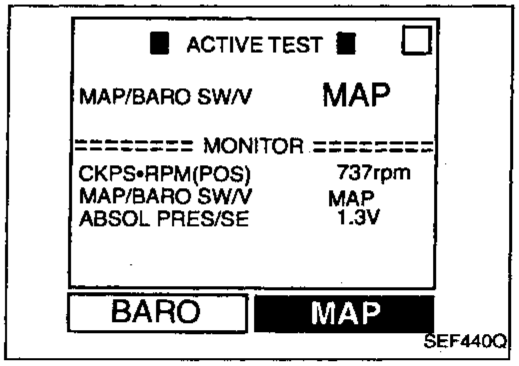
↓

INSPECTION END

Manifold Absolute Pressure (MAP)/Barometric Pressure (BARO) Switch Solenoid Valve (Cont'd)

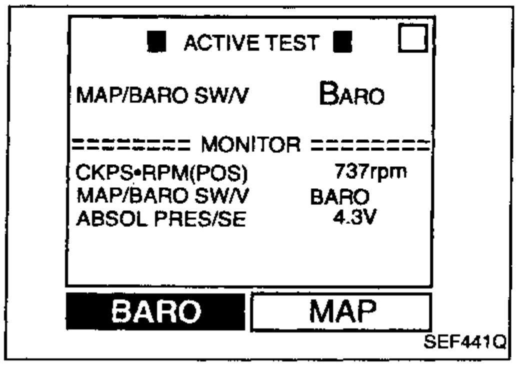
COMPONENT INSPECTION

MAP/BARO switch solenoid valve



```
■ ACTIVE TEST ■ ☐
MAP/BARO SW/V     MAP
======== MONITOR ========
CKPS•RPM(POS)      737rpm
MAP/BARO SW/V      MAP
ABSOL PRES/SE      1.3V
```

SEF440Q

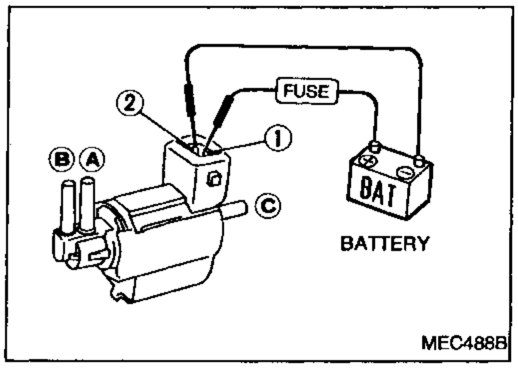


```
■ ACTIVE TEST ■ ☐
MAP/BARO SW/V     BARO
======== MONITOR ========
CKPS•RPM(POS)      737rpm
MAP/BARO SW/V      BARO
ABSOL PRES/SE      4.3V
```

SEF441Q

1. Start engine and warm it up sufficiently.
2. Perform "MAP/BARO SW/V" in "ACTIVE TEST" mode with CONSULT.
3. Make sure of the following.
   - When selecting "MAP", "ABSOL PRES/SE" indicates approximately 1.3V.
   - When selecting "BARO", "ABSOL PRES/SE" indicates approximately 4.3V.
4. If NG, replace solenoid valve.

OR



MEC488B

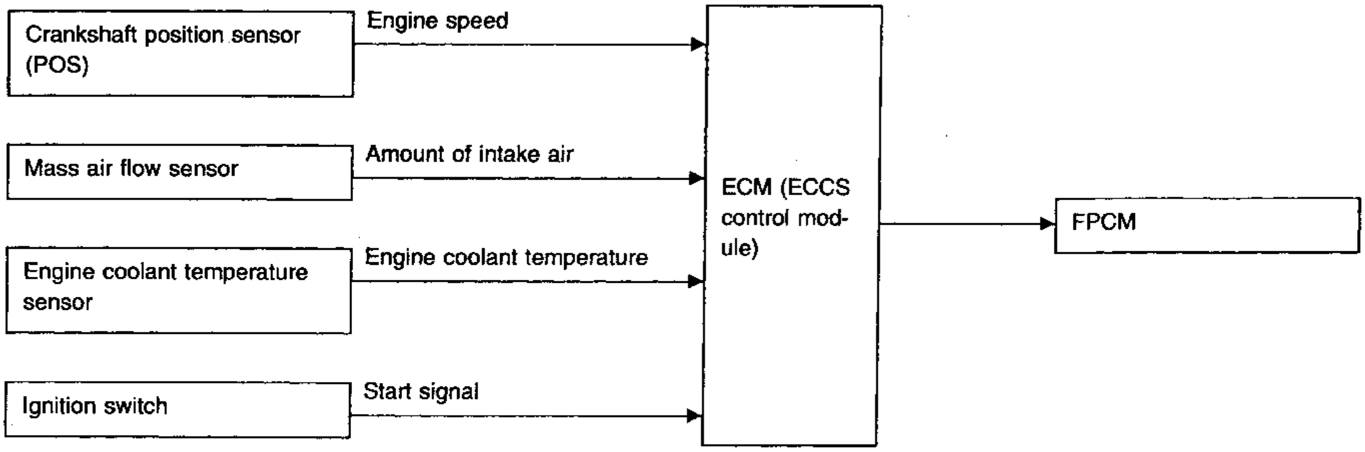
1. Remove MAP/BARO switch solenoid valve.
2. Check air passage continuity.

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.

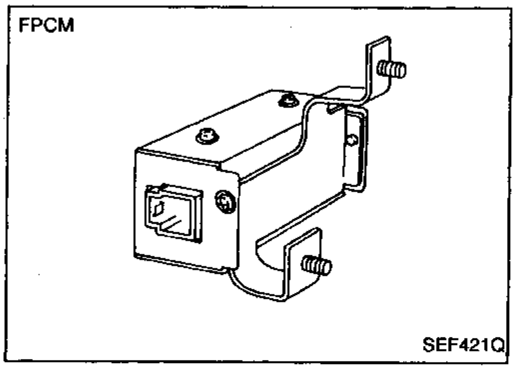
Fuel Pump Control Module (FPCM)

SYSTEM DESCRIPTION



This system controls the fuel pump operation. The amount of fuel flow delivered from the fuel pump is altered between two flow rates by the FPCM operation. The FPCM determines the voltage applied to the fuel pump (and therefore fuel flow) according to the following conditions.

Conditions	Amount of fuel flow	Supplied voltage
• Engine cranking • Engine coolant temperature below 7°C (45°F) • Within 30 seconds after starting engine [above 50°C (122°F)] • Engine is running under heavy load and high speed conditions	high	Battery voltage (11 - 14V)
Except the above	low	Approximately 9.5V



COMPONENT DESCRIPTION

The FPCM adjusts the voltage supplied to the fuel pump to control the amount of fuel flow. When the FPCM increases the voltage supplied to the fuel pump, the fuel flow is raised. When the FPCM decreases the voltage, the fuel flow is lowered.

Fuel Pump Control Module (FPCM) (Cont'd)

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 1 second) • Engine running and cranking		ON
	Except as shown above		OFF
FPCM DR VOLT	• Engine: After warming up	Within 30 seconds of starting engine	Approx. 0V
		More than 30 seconds after starting engine	Approx. 3.5V
FPCM	• Engine: After warming up	Within 30 seconds of starting engine	HI
		More than 30 seconds after starting engine	LOW

ECM TERMINALS AND REFERENCE VALUE

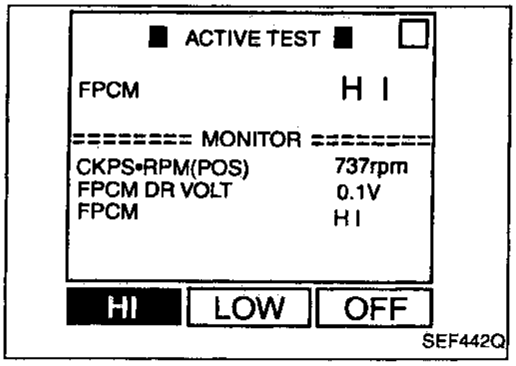
Remarks: Specification data are reference values, and are measured between each terminal and ㉕ (ECCS ground) with a voltmeter.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
11	B/P	Fuel pump relay	Ignition switch "ON" └ For 1 second after turning ignition switch "ON" Engine is running.	0 - 1V
			Ignition switch "ON" └ 1 second after turning ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
15	B/P	Fuel pump control module	Engine is running. (Warm-up condition) └ Idle speed (within 30 seconds after starting engine)	0 - 0.4V
			Engine is running. (Warm-up condition) └ Idle speed (30 seconds after starting engine and thereafter)	Approximately 10V
28	G/R	Fuel pump control module check	Engine is running. (Warm-up condition) └ Idle speed (within 30 seconds after starting engine)	0 - 0.4V
			Engine is running. └ Idle speed (30 seconds after starting engine and thereafter)	3.3 - 3.8V

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P1220 1305	• An improper voltage signal from the FPCM, which is supplied to a point between the fuel pump and the dropping resistor, is detected by ECM.	• Harness or connectors (FPCM circuit is open or shorted.) • Dropping resistor • FPCM

Fuel Pump Control Module (FPCM) (Cont'd)



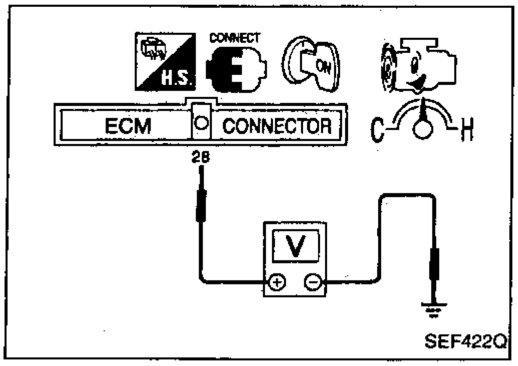
■ ACTIVE TEST ■

FPCM HI

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

CKPS•RPM(POS)	737rpm
FPCM DR VOLT	0.1V
FPCM	HI

SEF442Q



SEF422Q

OVERALL FUNCTION CHECK

This procedure can be used for checking the overall function of the FPCM circuit. During this check, a DTC might not be confirmed.

1) Start engine.
2) Select "FPCM" in "ACTIVE TEST" mode with CONSULT.
3) Touch "HI" then "LOW" respectively.
4) Check voltage between ECM terminal ㉘ and ground.
   HI: Approximately 0V
   LOW: Approximately 3.7V

OR

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) Check voltage between ECM terminal ㉘ and ground.
   Within 30 seconds of starting engine:
   Approximately 0V
   More than 30 seconds after starting engine:
   Approximately 3.7V

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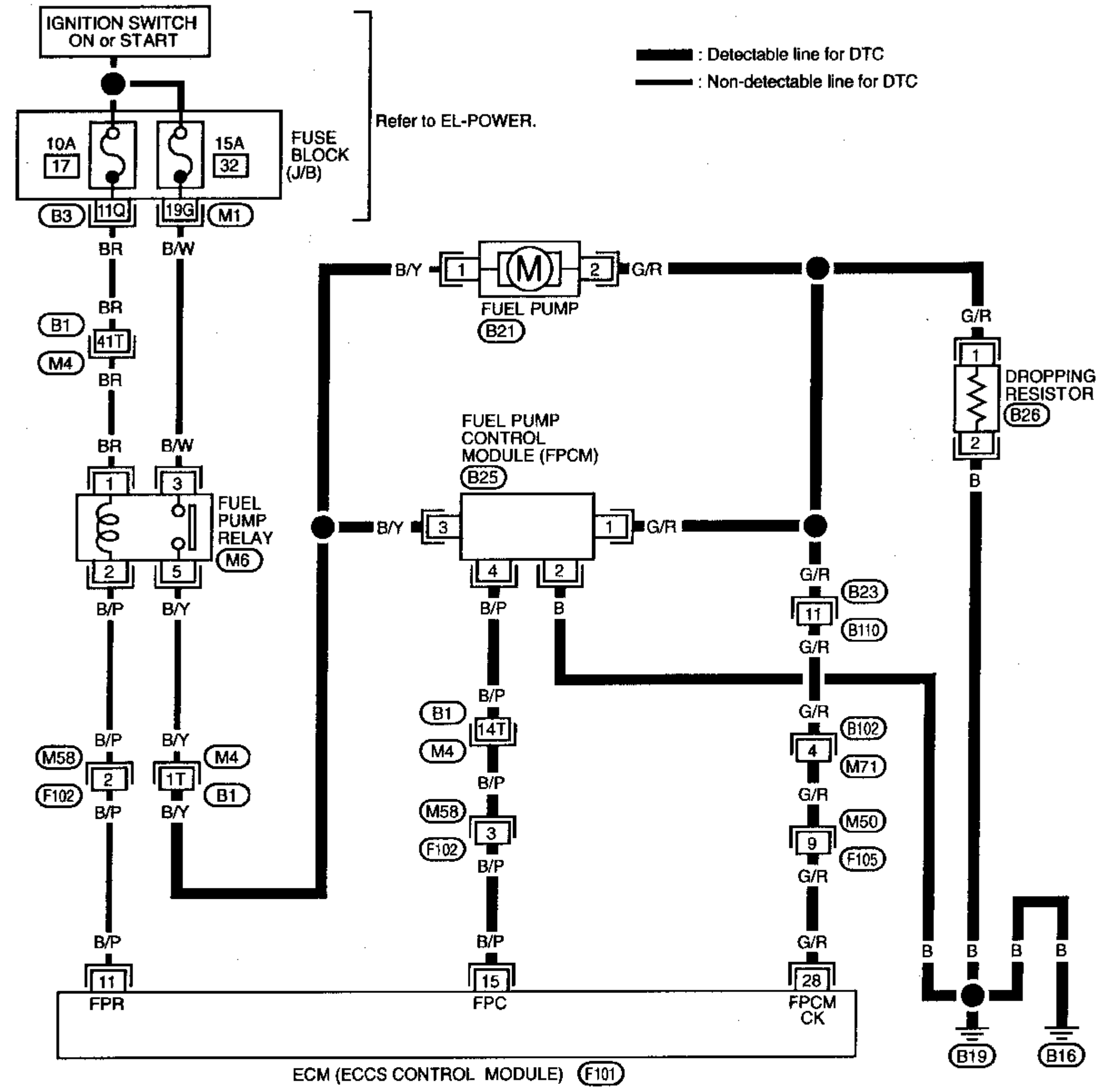
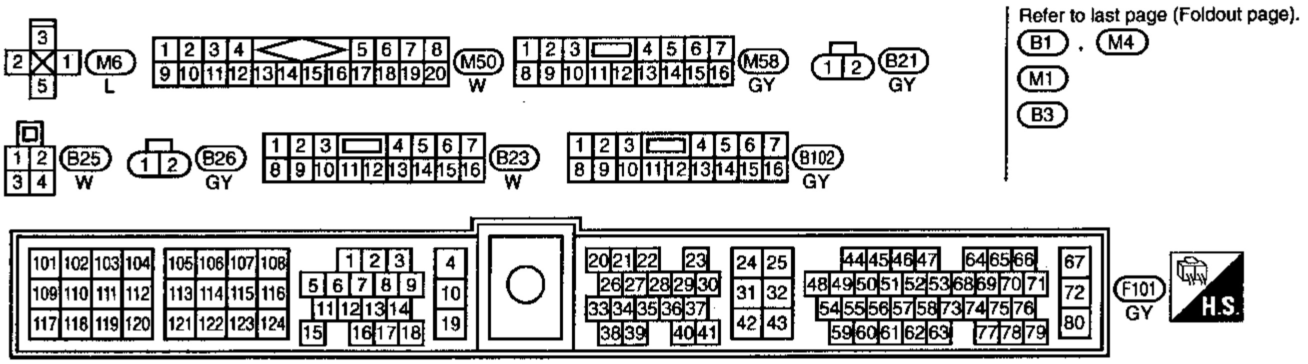
RA
BR
ST
RS
BT
HA
EL
IDX

Fuel Pump Control Module (FPCM) (Cont'd)

EC-FPCM-01

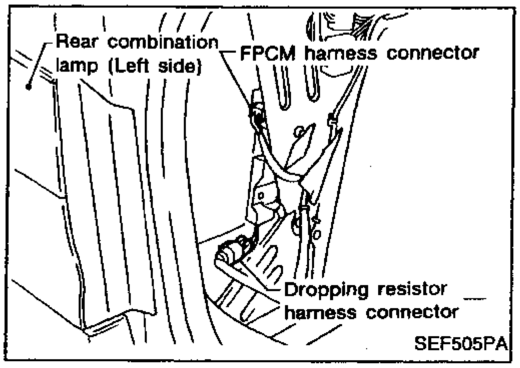




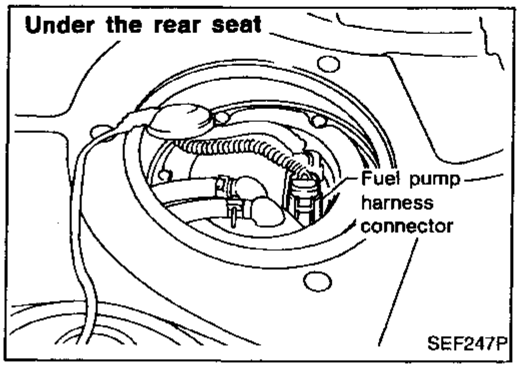
SEF239T

Fuel Pump Control Module (FPCM) (Cont'd)

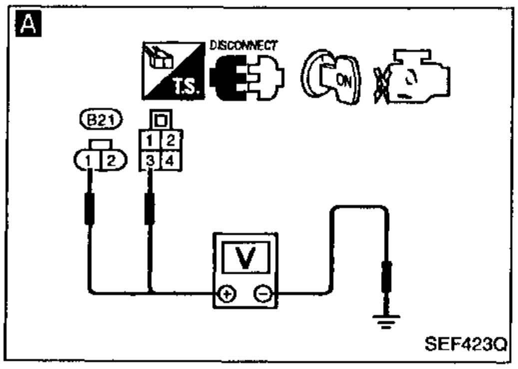
DIAGNOSTIC PROCEDURE



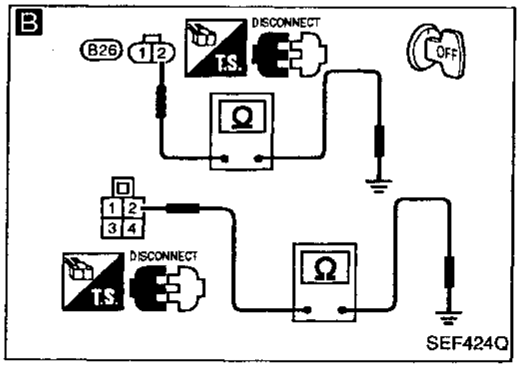
SEF505PA



SEF247P



SEF423Q



SEF424Q

INSPECTION START

A

CHECK POWER SUPPLY.
1. Turn ignition switch "OFF".
2. Disconnect FPCM harness connector and fuel pump harness connector.
3. Turn ignition switch "ON".
4. Check voltage between terminal ③ and engine ground, terminal ① and engine ground with CONSULT or tester.
   Voltage: Battery voltage

NG → Check the following.
- Harness connectors B1, M4
- Fuel pump relay
- 15A fuse
- Harness for open or short between FPCM and fuse

If NG, repair harness or connectors.

OK

B

CHECK GROUND CIRCUIT-I.
1. Turn ignition switch "OFF".
2. Disconnect dropping resistor harness connector.
3. Check harness continuity between terminal ② and engine ground, terminal ② and engine ground.
   Continuity should exist.
   If OK, check harness for short.

NG → Repair harness or connectors.

OK

C

CHECK GROUND CIRCUIT-II.
1. Check harness continuity between terminal ② and terminal ①, terminal ① and terminal ①.
   Continuity should exist.
2. Check harness continuity between terminal ①, terminal ② and engine ground.
   Continuity should not exist.

NG → Repair harness or connectors.

OK

D

CHECK OUTPUT SIGNAL CIRCUIT.
1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal ⑮ and terminal ④.
   Continuity should exist.
   If OK, check harness for short.

NG → Repair harness or connectors.

OK

E

CHECK INPUT SIGNAL CIRCUIT.
1. Check harness continuity between ECM terminal ㉘ and terminal ① (or terminal ②).
   Continuity should exist.
2. Check harness continuity between ECM terminal ㉘ and engine ground.
   Continuity should not exist.

NG → Repair harness or connectors.

OK

Ⓐ

Fuel Pump Control Module (FPCM) (Cont'd)

Ⓐ

CHECK COMPONENT
(Dropping resistor).
Refer to "COMPONENT INSPECTION", EC-287.

NG → Replace dropping resistor.

OK ↓

CHECK COMPONENT
(FPCM).
Refer to "COMPONENT INSPECTION", EC-287.

NG → Replace FPCM.

OK ↓

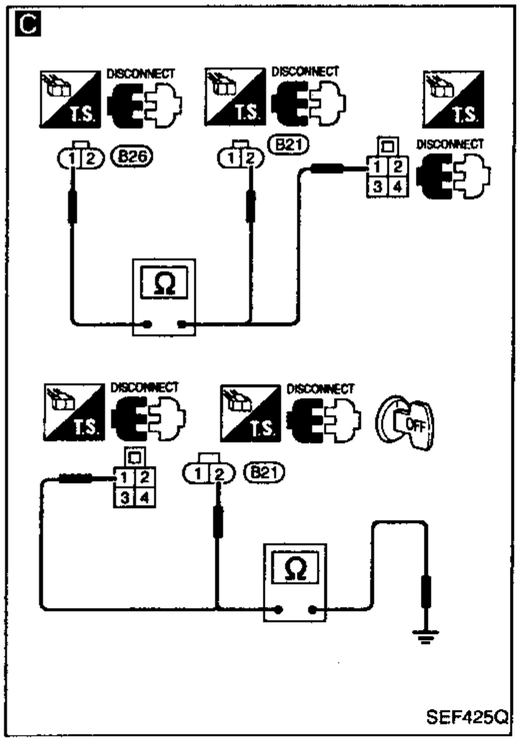
Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed. ↓

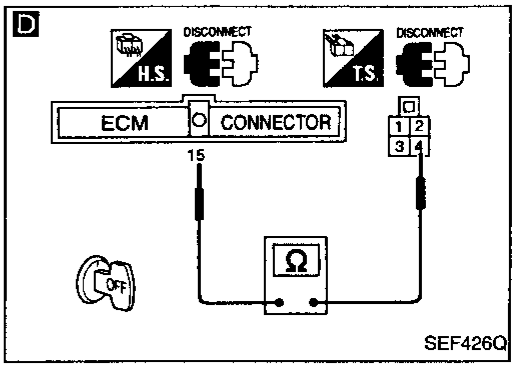
Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

↓

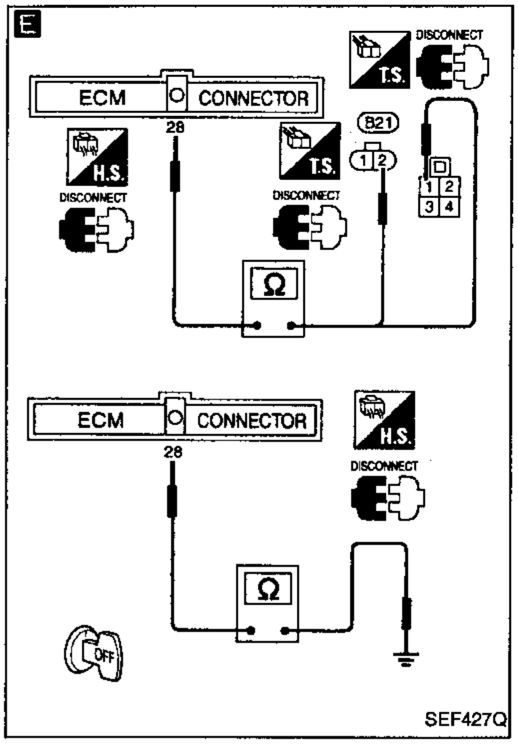
INSPECTION END



SEF425Q



SEF426Q

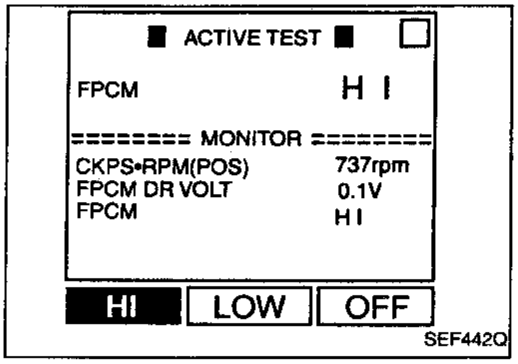


SEF427Q

Fuel Pump Control Module (FPCM) (Cont'd)

COMPONENT INSPECTION

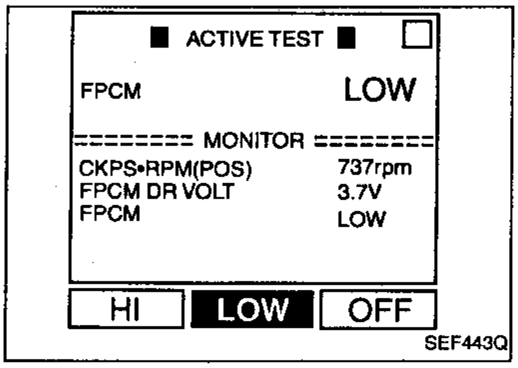
FPCM



```
■ ACTIVE TEST ■          ☐
FPCM                   H I
======== MONITOR ========
CKPS•RPM(POS)        737rpm
FPCM DR VOLT          0.1V
FPCM                   H I

[HI]  [LOW]  [OFF]
```

SEF442Q



```
■ ACTIVE TEST ■          ☐
FPCM                   LOW
======== MONITOR ========
CKPS•RPM(POS)        737rpm
FPCM DR VOLT          3.7V
FPCM                   LOW

[HI]  [LOW]  [OFF]
```

SEF443Q

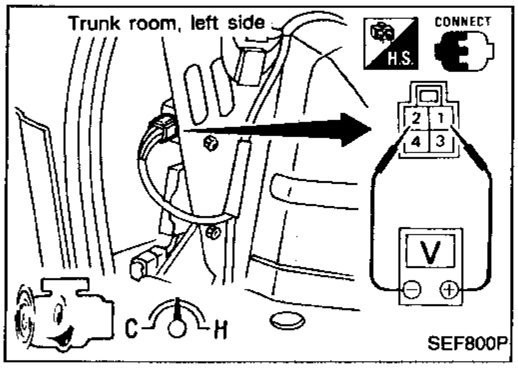
1. Start engine and let it idle.
2. Perform "FPCM" in "ACTIVE TEST" mode with CONSULT.
3. Make sure of the following.
   - When selecting "HI", "FPCM DR VOLT" indicates approximately 0V.
   - When selecting "LOW", "FPCM DR VOLT" indicates approximately 3.7V.
4. If NG, replace FPCM.

OR

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. Check voltage between terminals ① and ②.

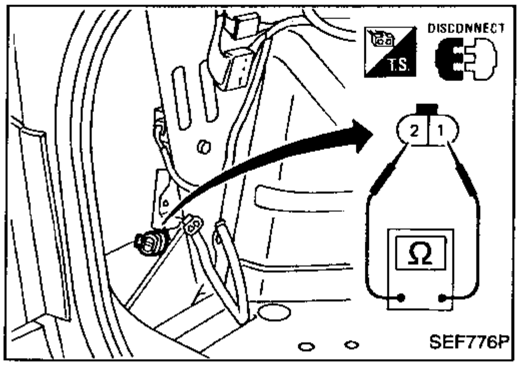
   Within 30 seconds of starting engine:
   Approximately 0V

   More than 30 seconds after starting engine:
   Approximately 3.7V
5. If NG, replace FPCM.



SEF800P

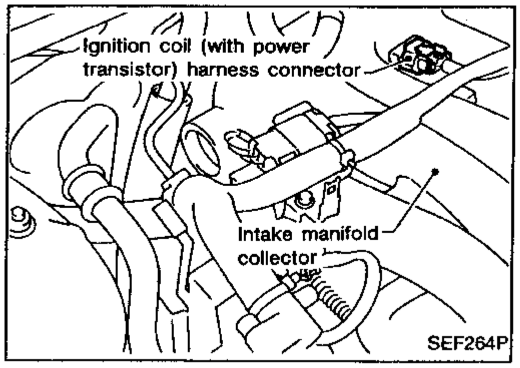
Dropping resistor



SEF776P

Check resistance between terminals ① and ②.

Resistance: Approximately 0.9Ω at 25°C (77°F)



Ignition Signal

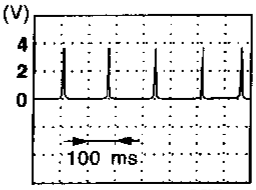
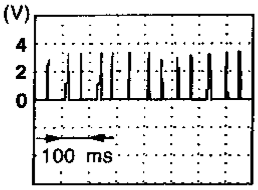
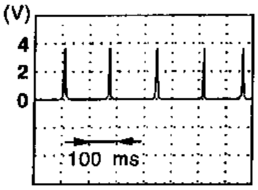
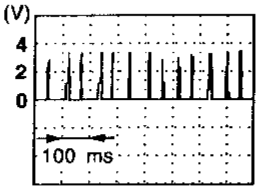
COMPONENT DESCRIPTION

Ignition coil & power transistor

The ignition signal from the ECM is sent to and amplified by the power transistor. The power transistor turns on and off the ignition coil primary circuit. This on-off operation induces the proper high voltage in the coil secondary circuit.

ECM TERMINALS AND REFERENCE VALUE

Remarks: Specification data are reference values, and are measured between each terminal and ㉕ (ECCS ground) with a voltmeter.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
1 2 3	Y/R G/R L/R	Ignition signal (No. 1) Ignition signal (No. 2) Ignition signal (No. 3)	Engine is running. └ Idle speed	Approximately 0.2V★  SEF399T
			Engine is running. └ Engine speed is 2,500 rpm.	Approximately 0.3V★  SEF645T
7 8 9	GY PU/W GY/R	Ignition signal (No. 4) Ignition signal (No. 5) Ignition signal (No. 6)	Engine is running. └ Idle speed	Approximately 0.2V★  SEF399T
			Engine is running. └ Engine speed is 2,500 rpm	Approximately 0.3V★  SEF645T

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

Ignition Signal (Cont'd)

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 entered during engine cranking or running.	• Harness or connectors (The ignition primary circuit is open or shorted.) • Power transistor unit built into ignition coil • Condenser • Crankshaft position sensor (REF) • Crankshaft position sensor (REF) circuit

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

Note: If both DTC P1320 (0201) and DTC P0340 (0101), P1335 (0407), P0335 (0802) or P1336 (0905) are displayed, perform TROUBLE DIAGNOSIS FOR DTC P0340, P1335, P0335 or P1336 first. (See EC-204, 296, 198, or 301.)

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" at least 5 seconds.)

OR

GST

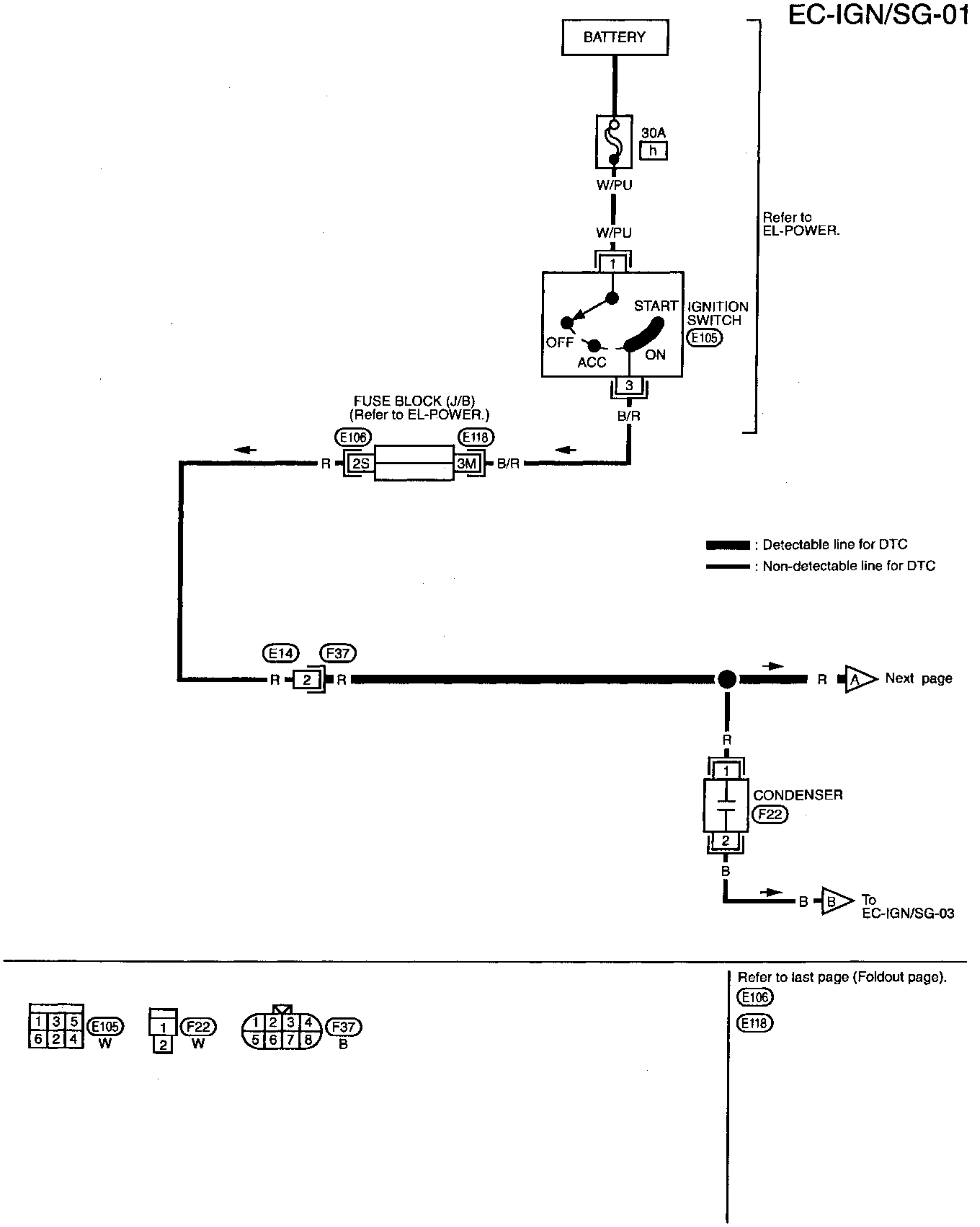
1) Turn ignition switch "ON".
2) Start engine. (If engine does not run, turn ignition switch to "START" at least 5 seconds.)
3) Select MODE 7 with GST.

OR

NO TOOLS

1) Turn ignition switch "ON".
2) Start engine. (If engine does not run, turn ignition switch to "START" at least 5 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.

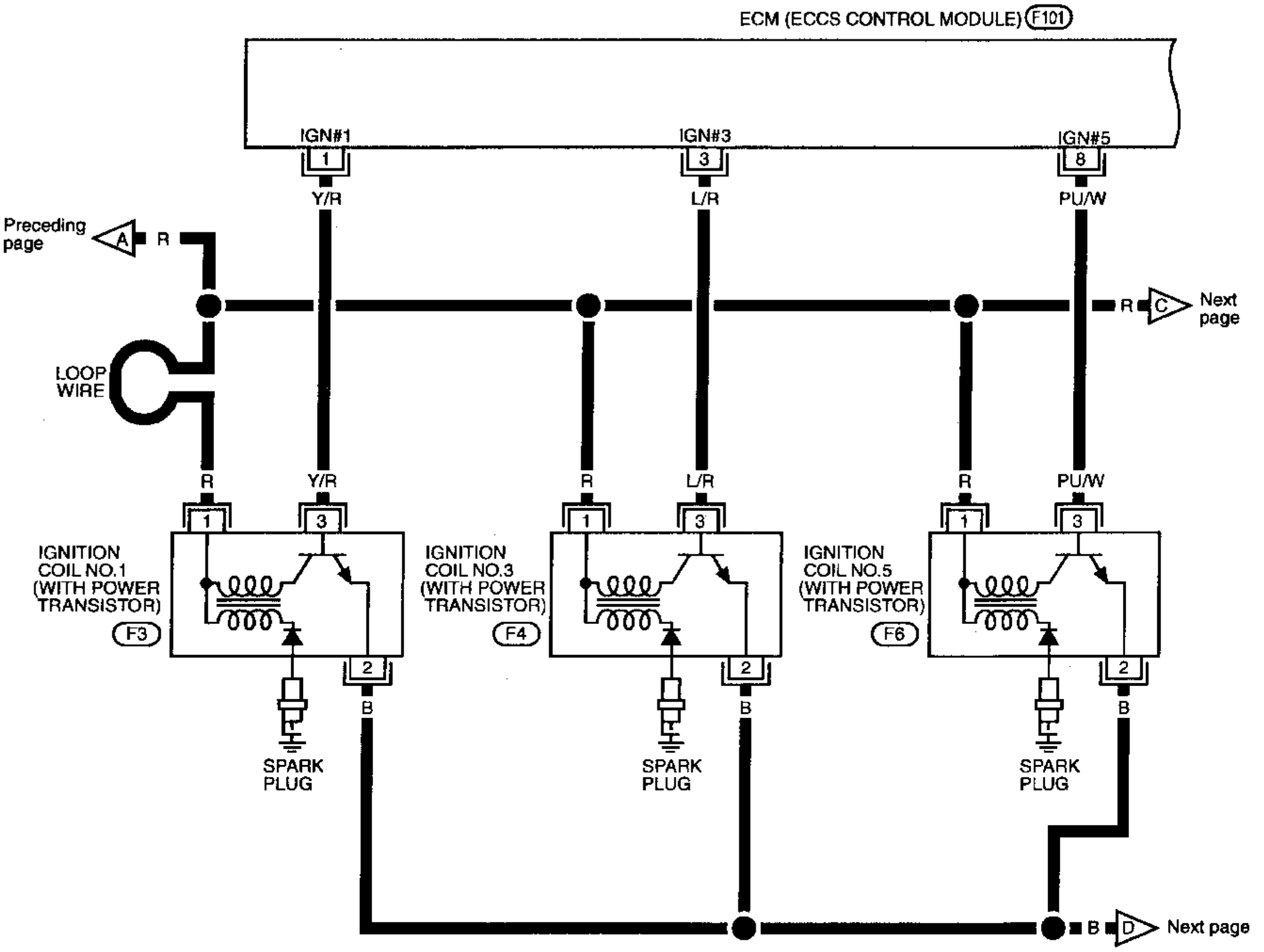
Ignition Signal (Cont'd)



MEC651B

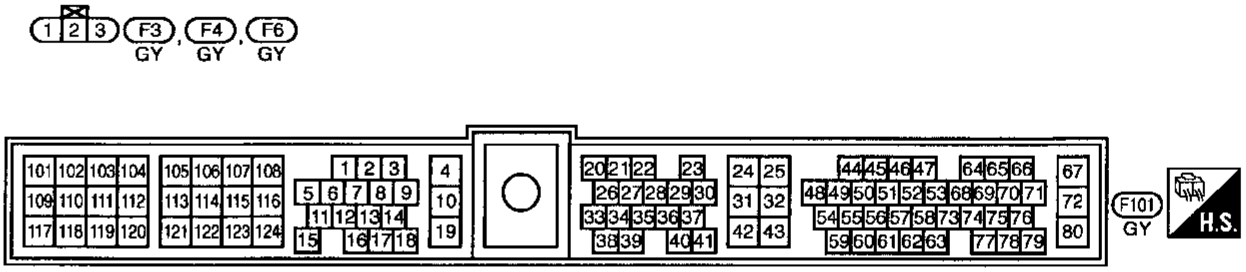
Ignition Signal (Cont'd)

EC-IGN/SG-02



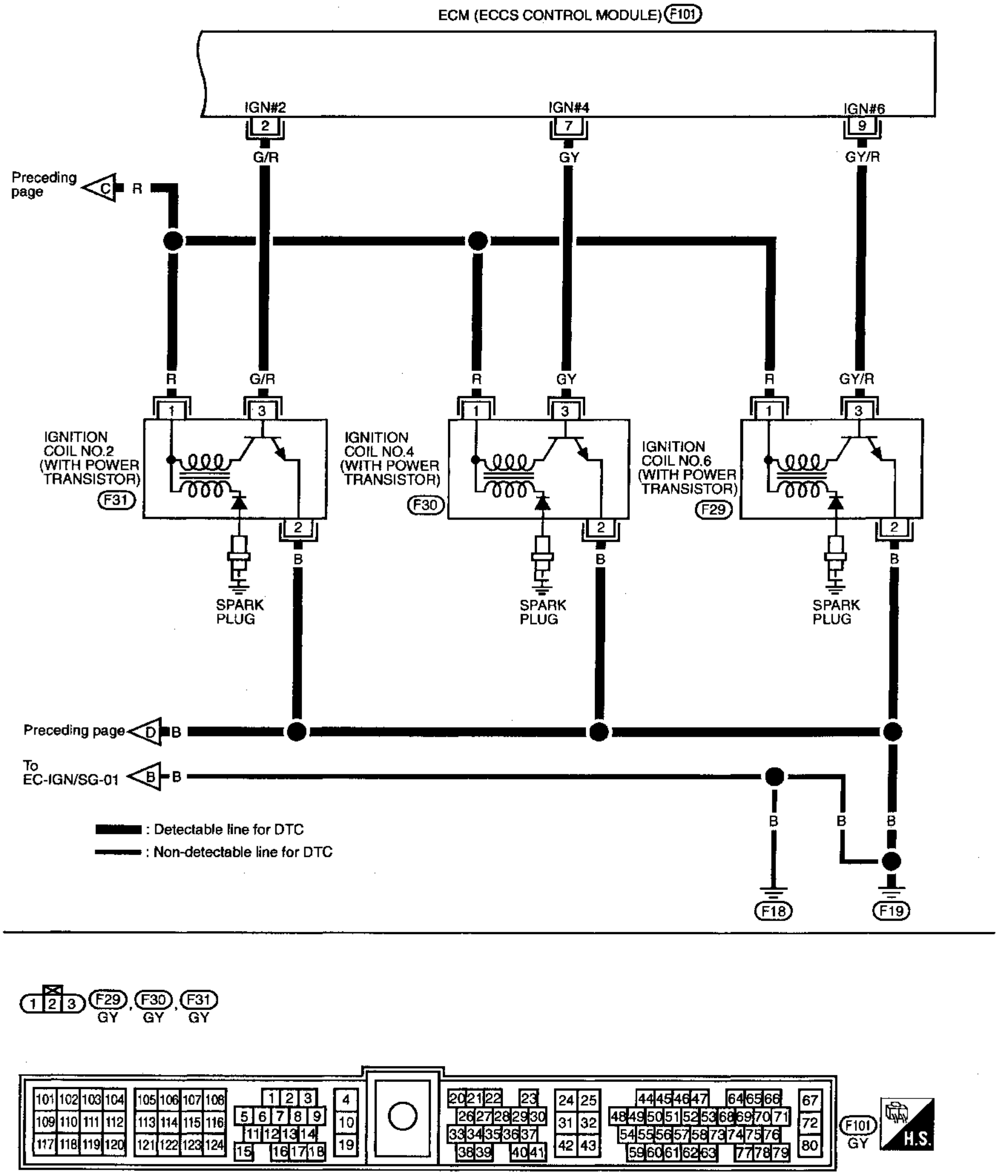
▬ : Detectable line for DTC

━ : Non-detectable line for DTC



MEC652B

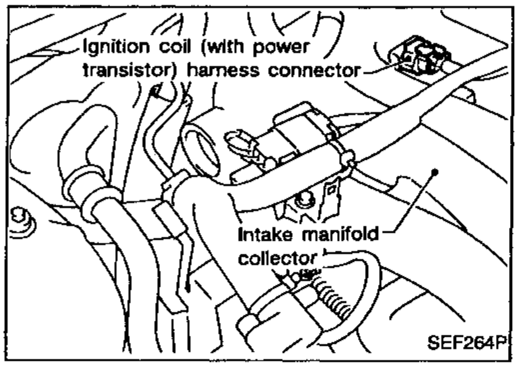
EC-IGN/SG-03



MEC653B

Ignition Signal (Cont'd)

DIAGNOSTIC PROCEDURE



INSPECTION START

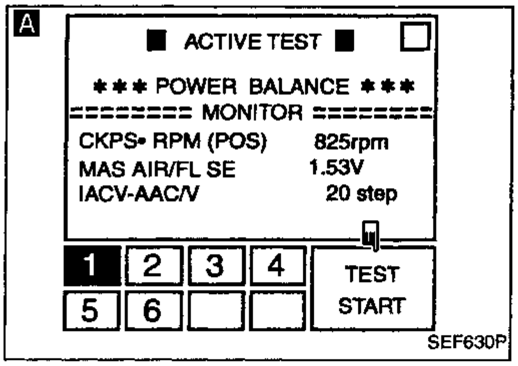
Does engine start?

- No → B
- Yes (without ▯) → B
- Yes (with ▯) → A

A SEARCH FOR MALFUNCTIONING CIRCUIT.

1. Start engine.
2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.
3. Search for circuit which does not produce a momentary engine speed drop.

→ C



■ ACTIVE TEST ■ ☐

✱✱✱ POWER BALANCE ✱✱✱

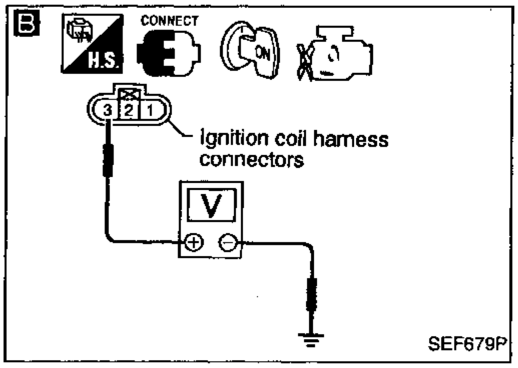
======== MONITOR ========

CKPS• RPM (POS)	825rpm
MAS AIR/FL SE	1.53V
IACV-AAC/V	20 step

B SEARCH FOR MALFUNCTIONING CIRCUIT.

1. Turn ignition switch "ON".
2. Check voltage between ignition coil terminals and ground.
   Voltage: 0.01 - 0.1V

→ C



C CHECK POWER SUPPLY.

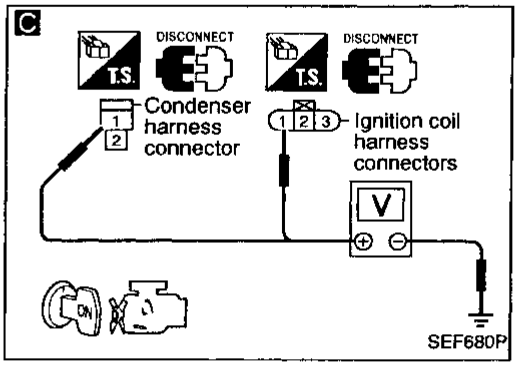
1. Disconnect ignition harness connectors and condenser harness connector.
2. Turn ignition switch "ON".
3. Check voltage between each ignition coil harness connector terminal ① and ground, condenser harness connector terminal ① and ground.
   Voltage: Battery voltage

NG → Check the following.

- Harness connectors (E106), (E118) (E14), (F37)
- Harness for open or short between ignition switch and ignition coils or condenser
- Condenser
  Refer to "COMPONENT INSPECTION". (See page EC-295.)

If NG, repair harness, connectors or component.

OK ↓



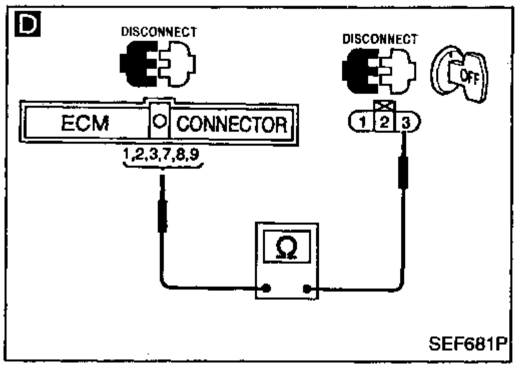
D CHECK GROUND CIRCUIT.

1. Disconnect each ignition coil harness connector and ECM harness connector.
2. Check harness continuity between each ignition coil harness connector terminal ③ and each ECM harness connector terminal.
   Continuity should exist.
   If OK, check harness for short.

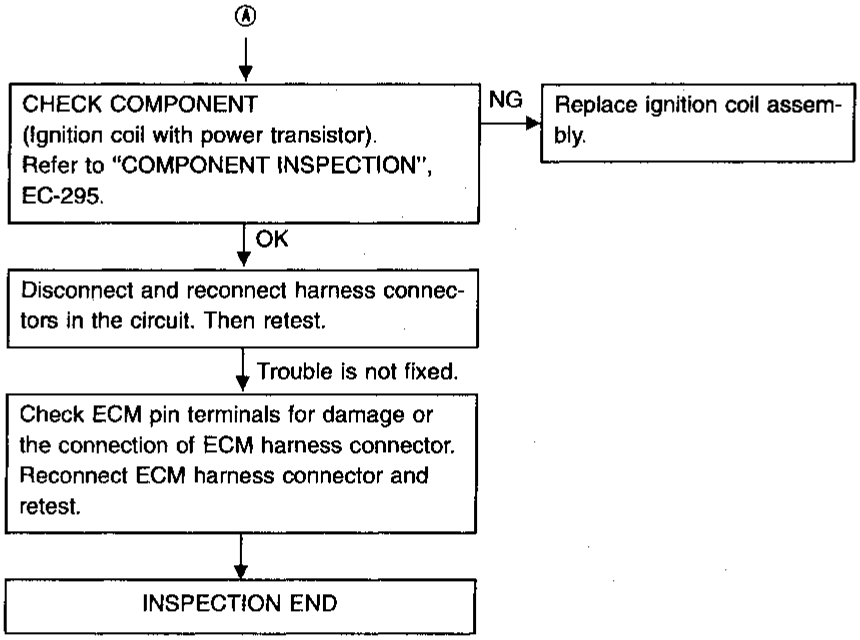
NG → Repair harness or connectors.

OK ↓

Ⓐ



Ignition Signal (Cont'd)



CHECK COMPONENT (Ignition coil with power transistor). Refer to "COMPONENT INSPECTION", EC-295.

Replace ignition coil assembly.

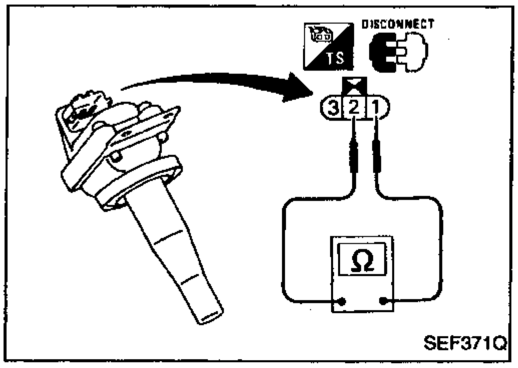
Disconnect and reconnect harness connectors in the circuit. Then retest.

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



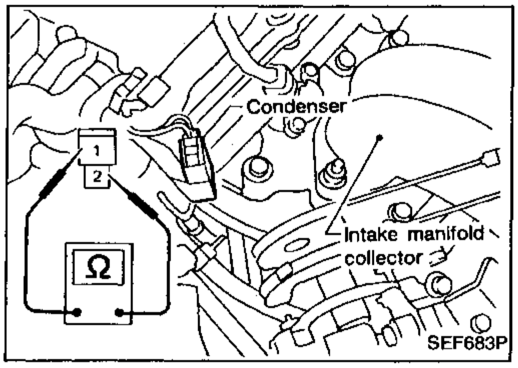
SEF371Q

Ignition coil with power transistor

1. Disconnect ignition coil with power transistor harness connector.
2. Check ignition coil with power transistor for resistance between terminals ① and ②.

Terminals	Resistance	Result
① and ②	Not 0Ω	OK
	0Ω	NG

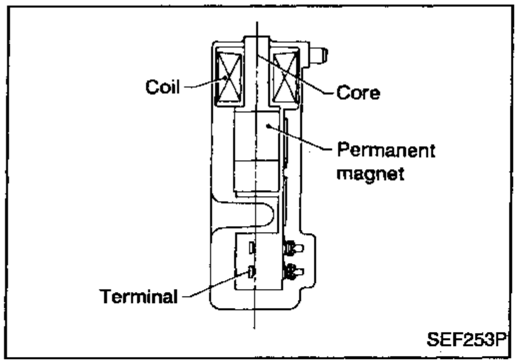
If NG, replace ignition coil with power transistor assembly.



SEF683P

Condenser

1. Disconnect condenser harness connector.
2. Check condenser continuity between terminals ① and ②.
   Resistance: Above 1 MΩ at 25°C (77°F)



Crankshaft Position Sensor (CKPS) (REF)

COMPONENT DESCRIPTION

The crankshaft position sensor (REF) is located on the oil pan (upper) facing the crankshaft pulley. It detects the TDC (Top Dead Center) signal (120° signal).
The sensor consists of a permanent magnet, core and coil.
When engine is running, the gap between the sensor and the crankshaft pulley will periodically change. Permeability near the sensor also changes.
Due to the permeability change, the magnetic flux near the core is changed. Therefore, the voltage signal generated in the coil is changed.
The ECM receives the voltage signal and detects the TDC signal (120° signal).

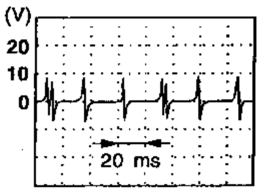
CONSULT REFERENCE VALUE IN DATA MONITOR MODE

- Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
CKPS·RPM (POS)	• Tachometer: Connect • Run engine and compare tachometer indication with the CONSULT value.	Almost the same speed as the CONSULT value.
CKPS·RPM (REF)		

ECM TERMINALS AND REFERENCE VALUE

Remarks: Specification data are reference values, and are measured between each terminal and ㉕ (ECCS ground) with a voltmeter.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
44 48	W W	Crankshaft position sensor (REF)	Engine is running. └ Idle speed	Approximately 2.3V★ (AC voltage)  SEF400T

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

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P1335 0407	• 120° signal is not entered to ECM for the first few seconds during engine cranking. • 120° signal is not entered to ECM during engine running. • 120° signal cycle excessively changes during engine running.	• Harness or connectors (The crankshaft position sensor (REF) circuit is open or shorted.) • Crankshaft position sensor (REF) • Starter motor (Refer to EL section.) • Starting system circuit (Refer to EL section.)

Crankshaft Position Sensor (CKPS) (REF) (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 at least 2 seconds at idle speed.

OR

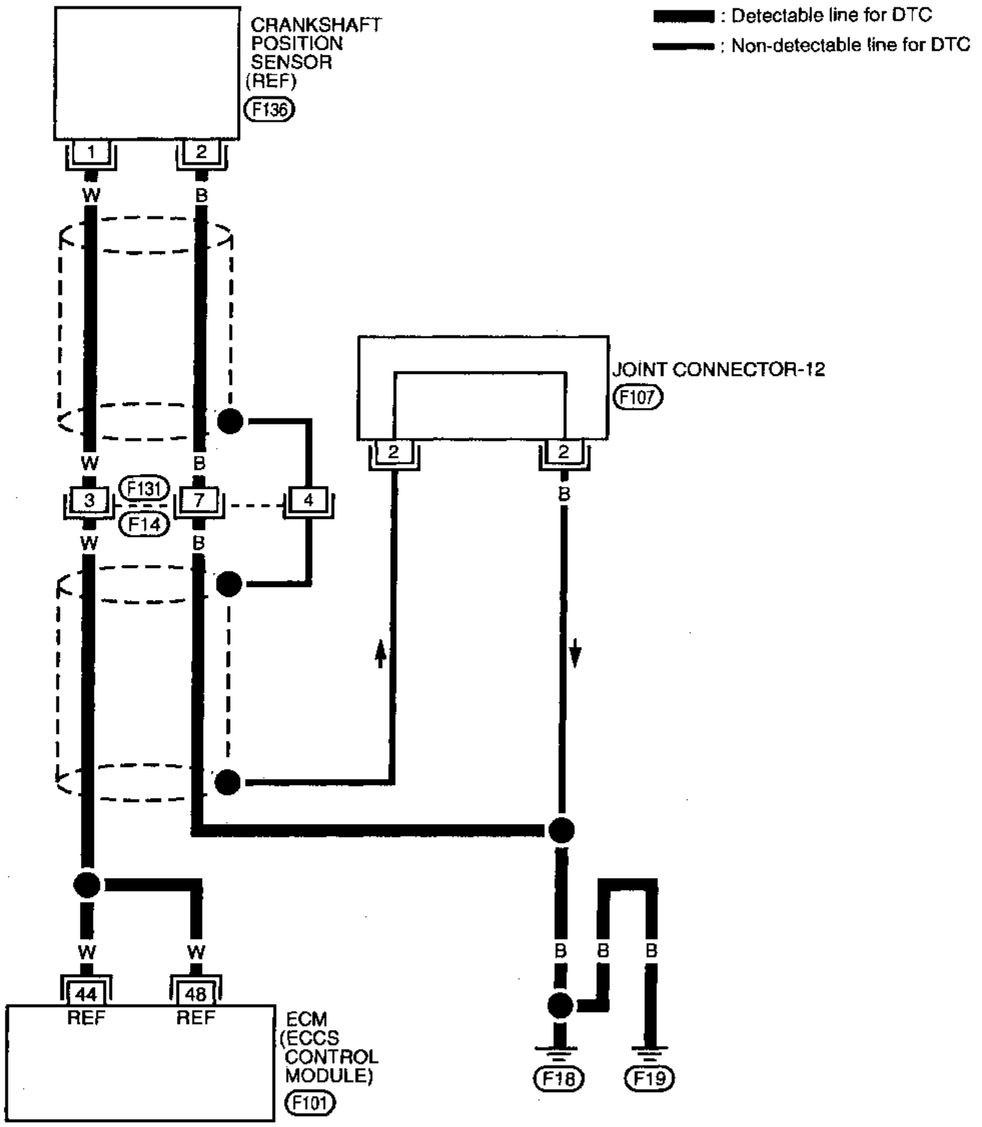
1) Start engine and run it at least 2 seconds at idle speed.
2) Select "MODE 7" with GST.

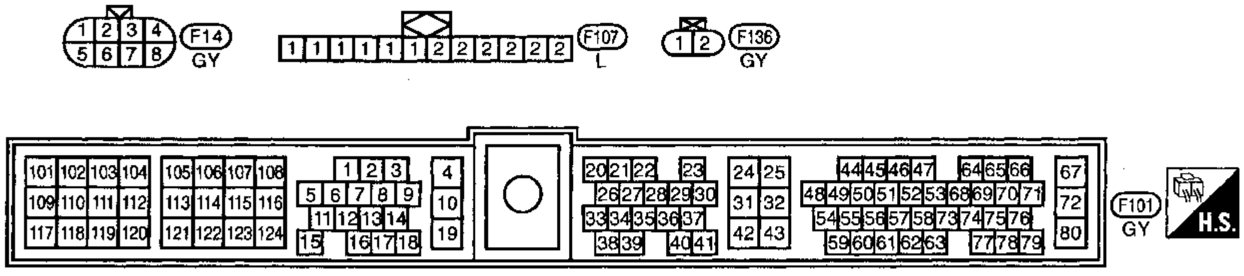
OR

1) Start engine and run it 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.

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

EC-REF-01

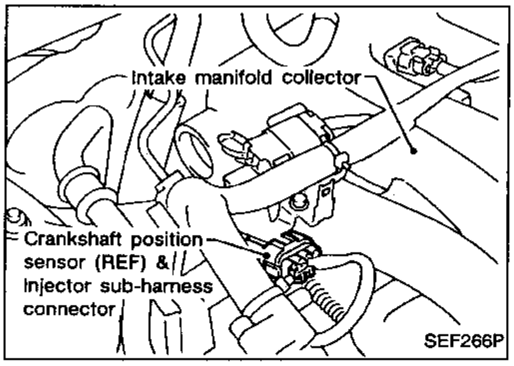




MEC662B

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

DIAGNOSTIC PROCEDURE



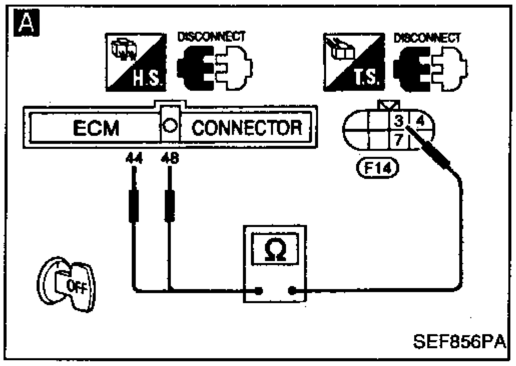
INSPECTION START

A

CHECK INPUT SIGNAL CIRCUIT-I.
1. Turn ignition switch "OFF".
2. Disconnect crankshaft position sensor (REF) sub-harness connector and ECM harness connector.
3. Check harness continuity between terminal ③ and ECM terminals ㊹, ㊽.
Continuity should exist.
If OK, check harness for short.

NG → Repair harness or connectors.

OK

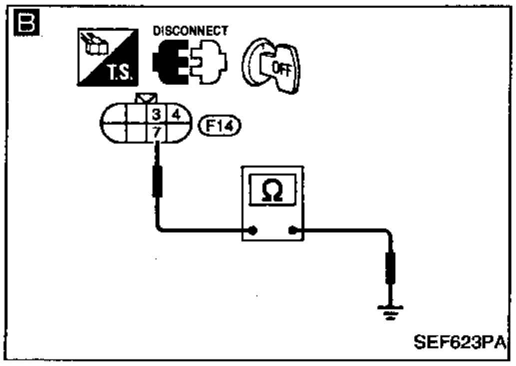


B

CHECK GROUND CIRCUIT-I.
1. Turn ignition switch "OFF".
2. Loosen and retighten engine ground screws.
3. Check harness continuity between terminal ⑦ and engine ground.
Continuity should exist.
If OK, check harness for short.

NG → Repair harness or connectors.

OK

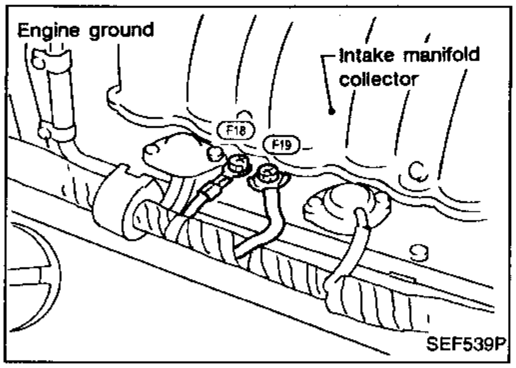


C

CHECK INPUT SIGNAL CIRCUIT-II.
1. Disconnect crankshaft position sensor (REF) harness connector.
2. Check harness continuity between terminal ③ and terminal ①.
Continuity should exist.
If OK, check harness for short.

NG → Repair harness or connectors.

OK

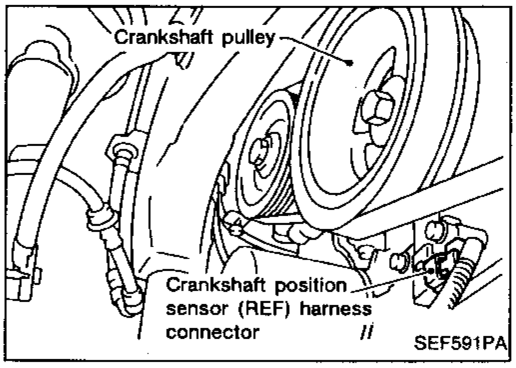


D

CHECK GROUND CIRCUIT-II.
1. Turn ignition switch "OFF".
2. Check harness continuity between terminal ② and terminal ⑦.
Continuity should exist.
If OK, check harness for short.

NG → Repair harness or connectors.

OK



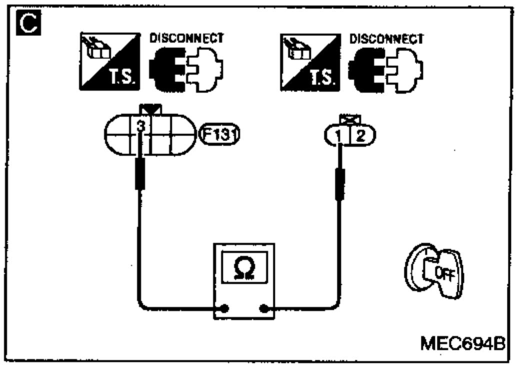
CHECK COMPONENT
[Crankshaft position sensor (REF)].
Refer to "COMPONENT INSPECTION", EC-300.

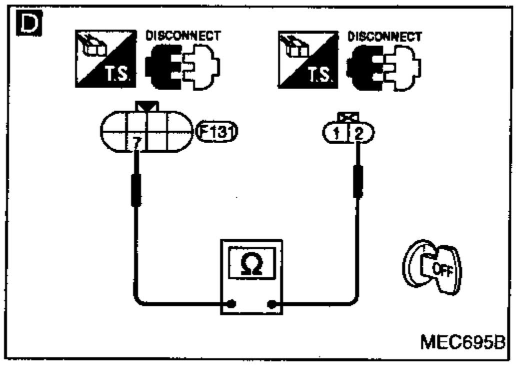
NG → Replace crankshaft position sensor (REF).

OK

Ⓐ

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





Ⓐ

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.

↓ Trouble is not fixed.

Visually check crankshaft pulley for chipping. — NG → Replace crankshaft pulley.

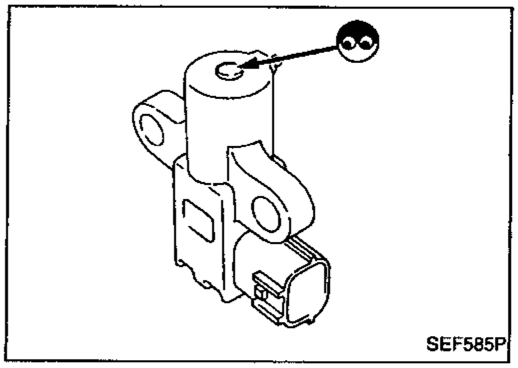
↓ OK

INSPECTION END

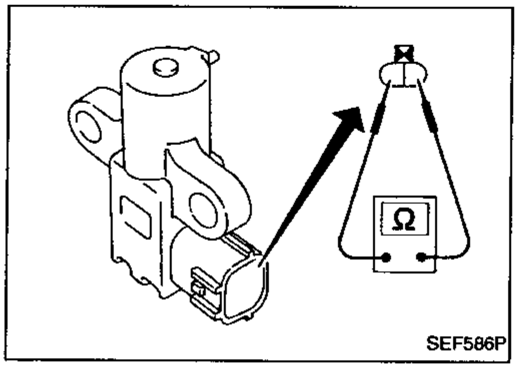
COMPONENT INSPECTION

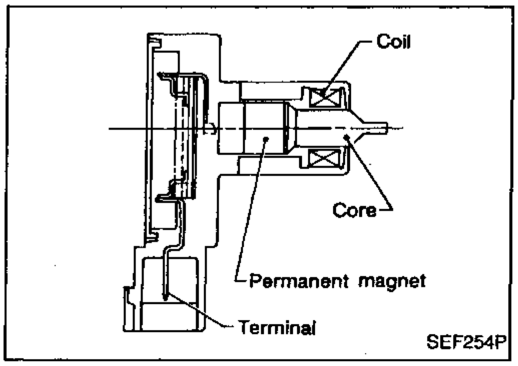
Crankshaft position sensor (REF)

1. Disconnect crankshaft position sensor (REF) 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 470 - 570Ω [At 20°C (68°F)]





Crankshaft Position Sensor (CKPS) (POS) (COG)

COMPONENT DESCRIPTION

The crankshaft position sensor (POS) is located on the oil pan facing the gear teeth (cogs) of the signal plate (flywheel). It detects the crankshaft position signal (1° signal).
The sensor consists of a permanent magnet, core and coil.
When engine is running, the gap between the sensor and the gear teeth (cogs) will periodically change. Permeability near the sensor also changes.
Due to the permeability change, the magnetic flux near the core is changed. Therefore, the voltage signal generated in the coil is changed.
The ECM receives the voltage signal and detects the crankshaft position signal (1° signal).

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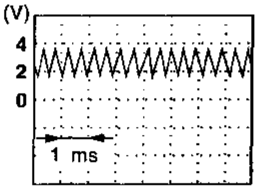
CONSULT REFERENCE VALUE IN DATA MONITOR MODE

- Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
CKPS·RPM (POS) CKPS·RPM (REF)	• Tachometer: Connect • Run engine and compare tachometer indication with the CONSULT value.	Almost the same speed as the CONSULT value.

ECM TERMINALS AND REFERENCE VALUE

Remarks: Specification data are reference values, and are measured between each terminal and ㉕ (ECCS ground) with a voltmeter.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
49	W	Crankshaft position sensor (POS)	Engine is running. └ Idle speed	Approximately 2.5V★  SEF646T
4	W/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)
67 72	R R	Power supply for ECM	Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)

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

Crankshaft Position Sensor (CKPS) (POS) (COG) (Cont'd)

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P1336 0905	• Chipping of the signal plate (on flywheel) gear teeth (cogs) is detected by the ECM.	• Harness or connectors • Crankshaft position sensor (POS) • Signal plate (flywheel)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

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

1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT.
2) Start engine and run it at least 1 minute and 10 seconds at idle speed.

OR

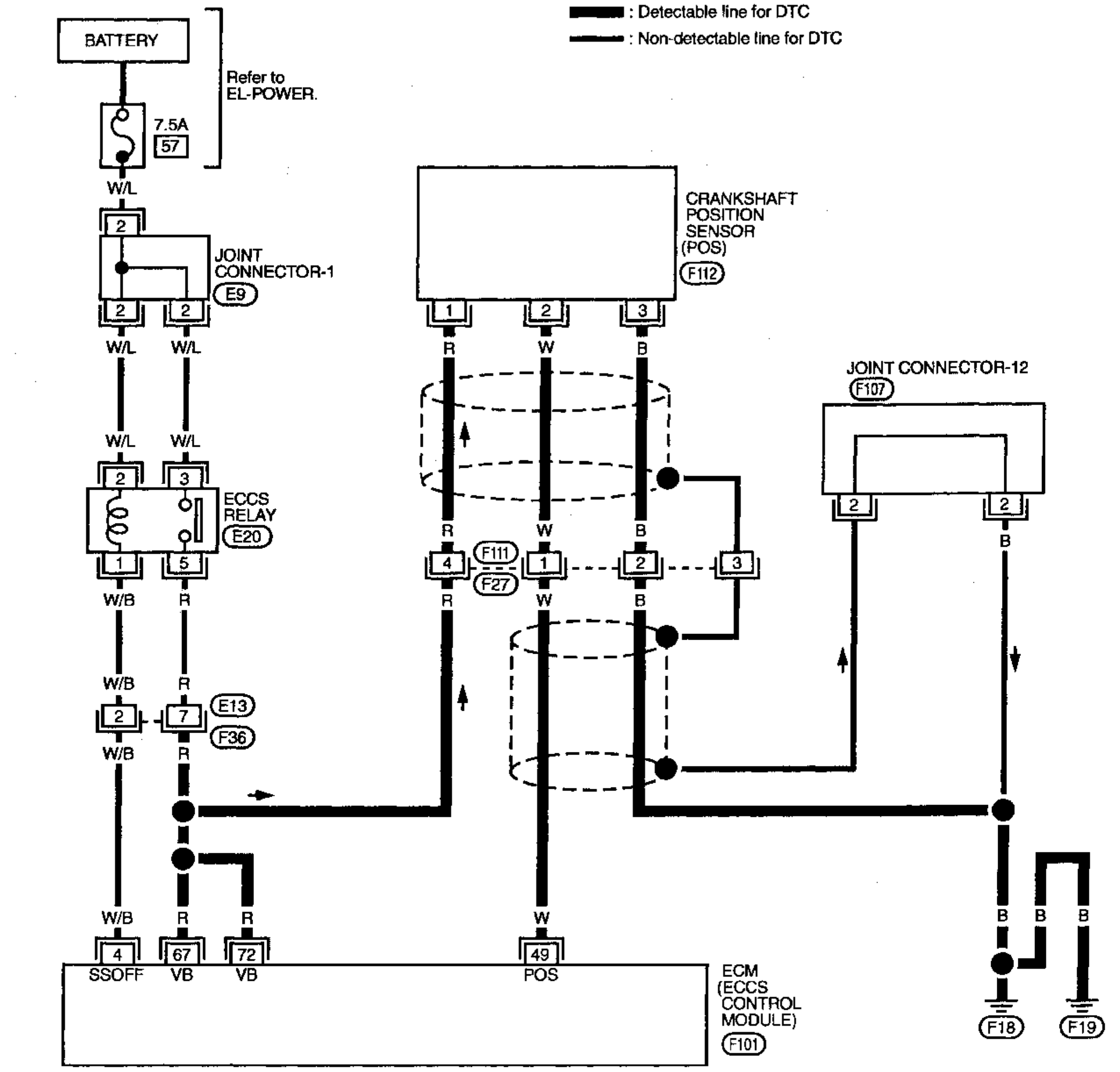
1) Start engine and run it at least 1 minute and 10 seconds at idle speed.
2) Select "MODE 7" with GST.

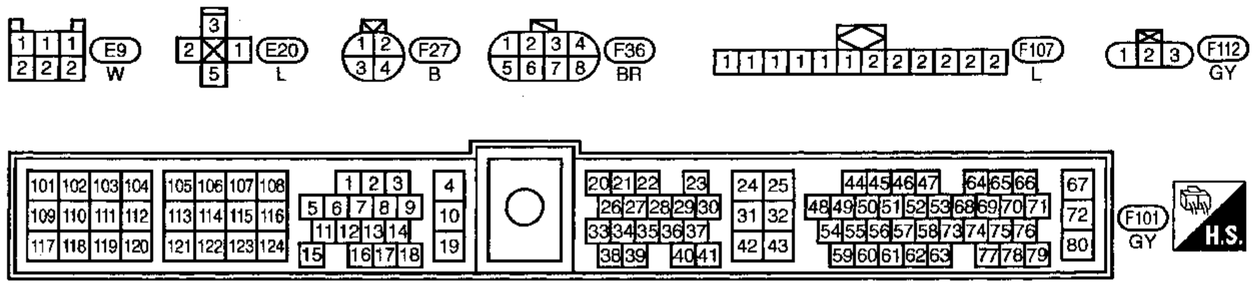
OR

1) Start engine and run it at least 1 minute and 10 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.

Crankshaft Position Sensor (CKPS) (POS) (COG) (Cont'd)

EC-POS-01





MEC666B

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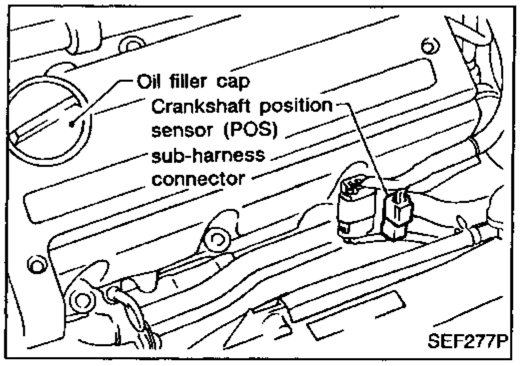
Crankshaft Position Sensor (CKPS) (POS) (COG) (Cont'd)



DIAGNOSTIC PROCEDURE

INSPECTION START

A

CHECK POWER SUPPLY-I.

1. Turn ignition switch "OFF".
2. Disconnect crankshaft position sensor (POS) sub-harness connector.
3. Turn ignition switch "ON".
4. Check voltage between terminal ④ and ground with CONSULT or tester.

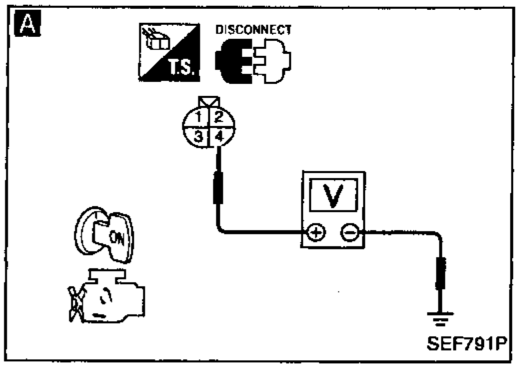
Voltage: Battery voltage

NG → Check the following.

- Harness connectors (F36), (E13)
- Harness for open or short between crankshaft position sensor (POS) sub-harness connector and ECCS relay
- Harness for open or short between crankshaft position sensor (POS) sub-harness connector and ECM

If NG, repair harness or connectors.

OK ↓

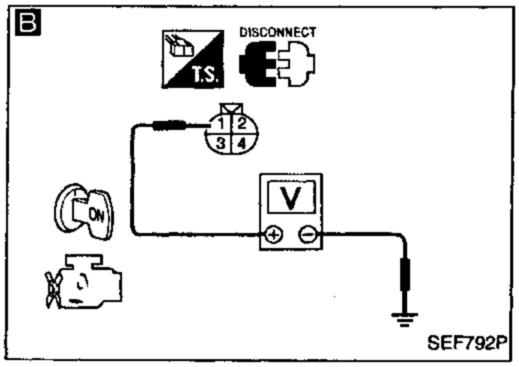


B

CHECK POWER SUPPLY-II.
Check voltage between terminal ① and ground with CONSULT or tester.
Voltage: Approximately 5V

NG → Repair harness or connectors.

OK ↓



C

CHECK GROUND CIRCUIT-I.

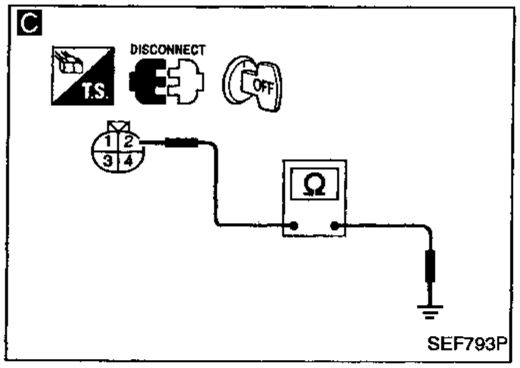
1. Turn ignition switch "OFF".
2. Loosen and retighten engine ground screws.
3. Check harness continuity between terminal ② and engine ground.

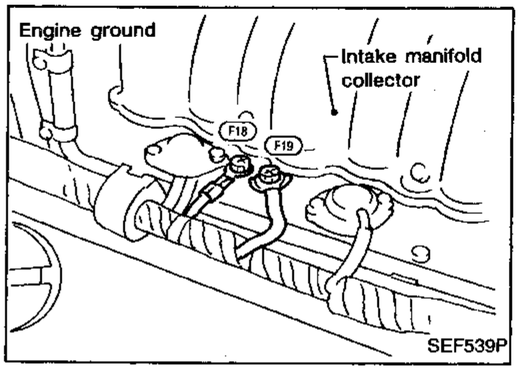
Continuity should exist.
If OK, check harness for short.

NG → Repair harness or connectors.

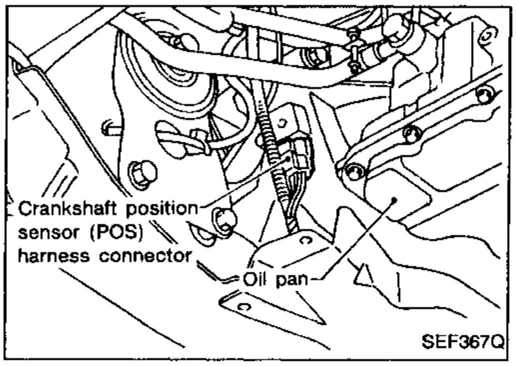
OK ↓

Ⓐ





Crankshaft Position Sensor (CKPS) (POS) (COG) (Cont'd)



Ⓐ

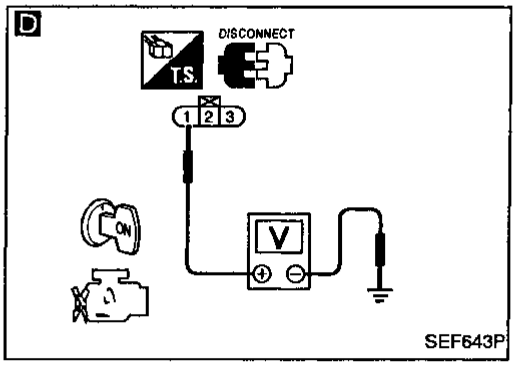
D

CHECK POWER SUPPLY-III.
1. Reconnect crankshaft position sensor (POS) sub-harness connector.
2. Disconnect crankshaft position sensor (POS) 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 (F111), (F27)
- Harness for open or short between crankshaft position sensor (POS) and crankshaft position sensor (POS) sub-harness connector

If NG, repair harness or connectors.

OK ↓

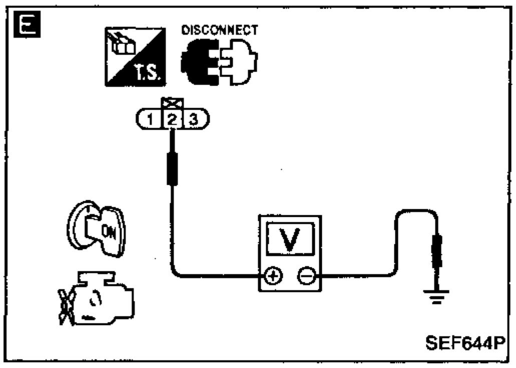


E

CHECK POWER SUPPLY-IV.
Check voltage between terminal ② and ground with CONSULT or tester.
Voltage: Approximately 5V

NG → (to "Check the following" above)

OK ↓



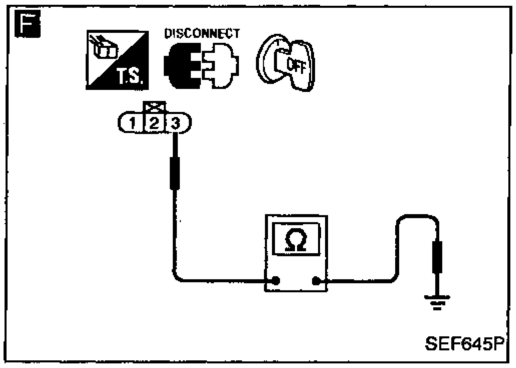
F

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

NG → Check the following.
- Harness connectors (F111), (F27)
- Harness for open or short between crankshaft position sensor (POS) and crankshaft position sensor (POS) sub-harness connector

If NG, repair harness or connectors.

OK ↓



Loosen and retighten the fixing bolt of the crankshaft position sensor (POS). Then retest.

↓ Trouble is not fixed.

CHECK COMPONENT
[Crankshaft position sensor (POS)].
Refer to "COMPONENT INSPECTION", EC-306.

NG → Replace crankshaft position sensor (POS).

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.

↓ Trouble is not fixed.

Visually check signal plate (flywheel) gear teeth (cogs) for chipping.

NG → Replace signal plate (flywheel).

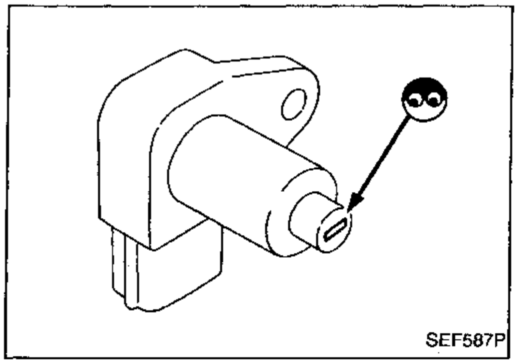
OK ↓

INSPECTION END

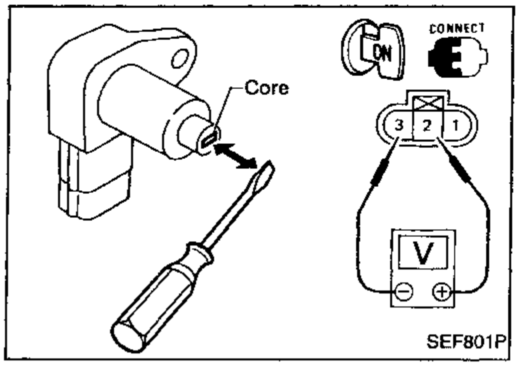
Crankshaft Position Sensor (CKPS) (POS) (COG) (Cont'd)

COMPONENT INSPECTION

Crankshaft position sensor (POS)



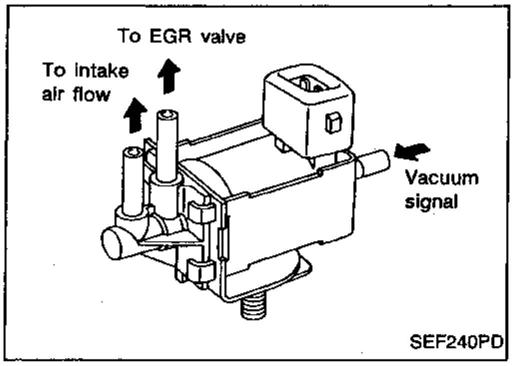
1. Disconnect crankshaft position sensor (POS) harness connector.
2. Loosen the fixing bolt of the sensor.
3. Remove the sensor.
4. Visually check the sensor for chipping.



5. Reconnect crankshaft position sensor (POS) harness connector.
6. Turn ignition switch "ON".
7. Check voltage between terminals ② and ③ when bringing a screwdriver into contact with, and quickly pulling away from the sensor core.

Terminal	Condition	Voltage
②, ③	Contacted	Approximately 5V
	Pulled away	Approximately 0V

There should be a steady 5V as the screwdriver is drawn away slowly.
If NG, replace crankshaft position sensor (POS).



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
		Racing up to 1,500 - 2,000 rpm	OFF

ECM TERMINALS AND REFERENCE VALUE

Remarks: Specification data are reference values, and are measured between each terminal and ㉕ (ECCS ground) with a voltmeter.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
103	L/B	EGRC-solenoid valve	Engine is running. (Warm-up condition) └ Revving engine up to 2,000 rpm.	BATTERY VOLTAGE (11 - 14V)
			Engine is running. (Warm-up condition) └ Idle speed	0 - 0.7V

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P1400 1005	• The improper voltage signal is entered to ECM through EGRC-solenoid valve.	• Harness or connectors (The EGRC-solenoid valve circuit is open or shorted.) • EGRC-solenoid valve

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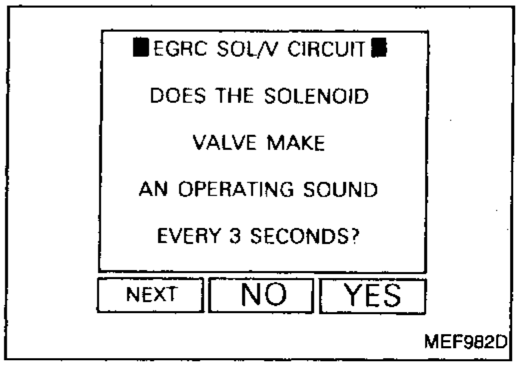
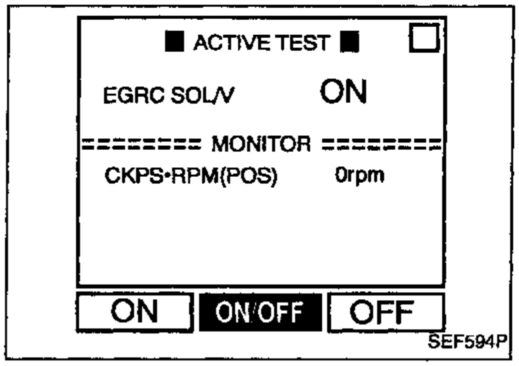
EGRC-Solenoid Valve (Cont'd)


■ EGRC SOL/V CIRCUIT ■

DOES THE SOLENOID VALVE MAKE AN OPERATING SOUND EVERY 3 SECONDS?

MEF982D


■ ACTIVE TEST ■ ☐

EGRC SOL/V ON

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

CKPS•RPM(POS) 0rpm

SEF594P

OVERALL FUNCTION CHECK

This procedure can be used for checking the overall function of the EGRC-solenoid valve circuit.

During this check, a DTC might not be confirmed.

1) Turn ignition switch "ON".
2) Perform "EGRC SOL/V CIRCUIT" in "FUNCTION TEST" mode with CONSULT.

OR

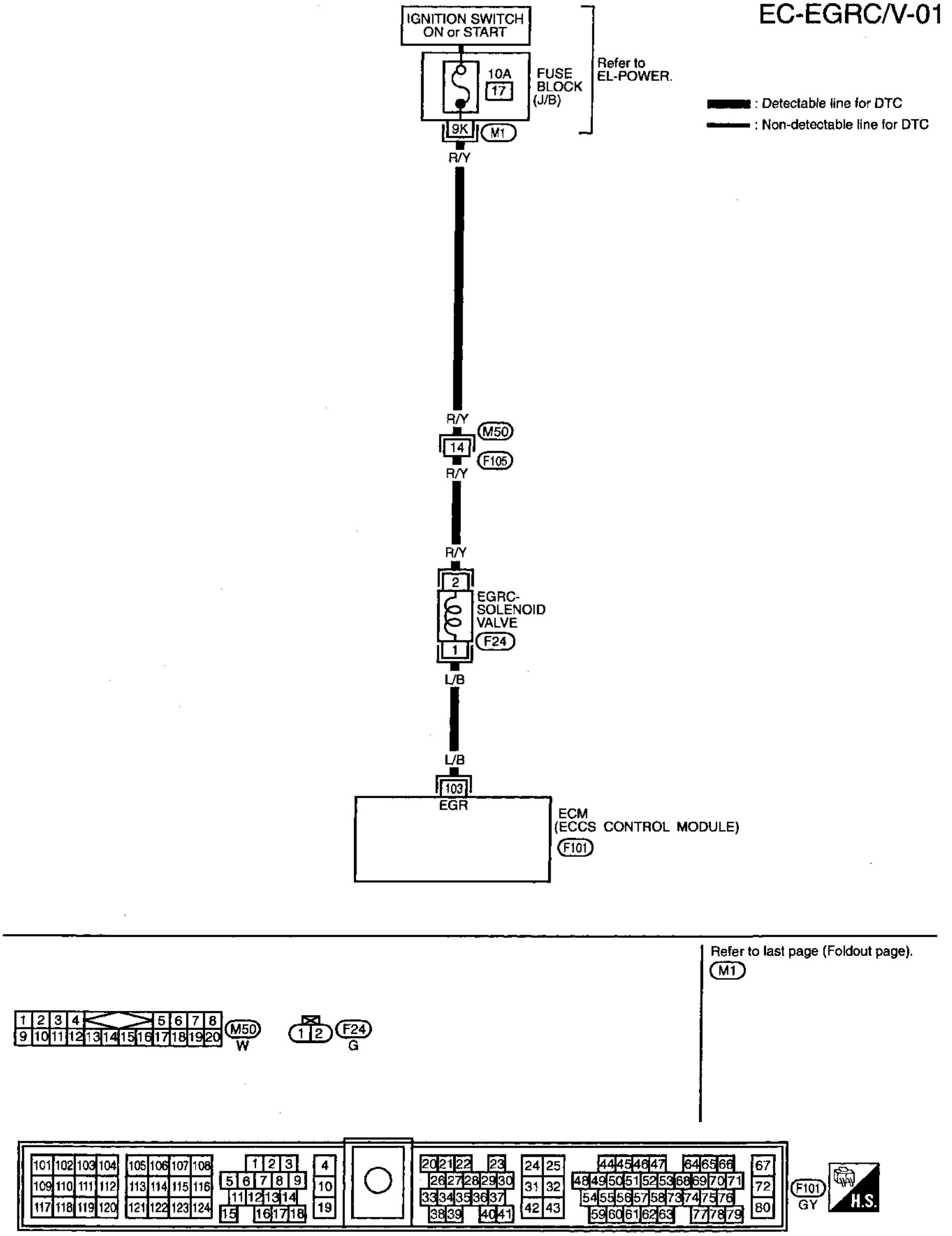
1) Turn ignition switch "ON".
2) Perform "EGRC SOLENOID VALVE" in "ACTIVE TEST" mode with CONSULT and check the operating sound, according to ON/OFF switching.

OR

1) Turn ignition switch "ON".
2) When disconnecting and reconnecting the EGRC-solenoid valve harness connector, make sure that the solenoid valve makes operating sound.

TROUBLE DIAGNOSIS FOR DTC P1400

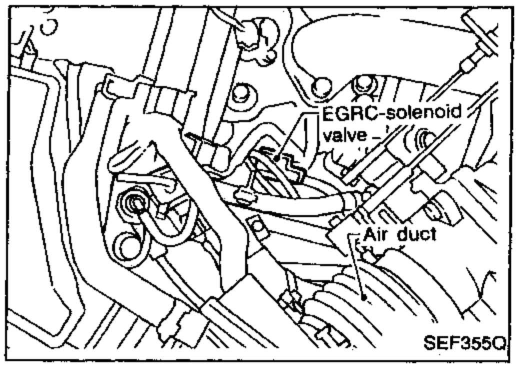
EGRC-Solenoid Valve (Cont'd)

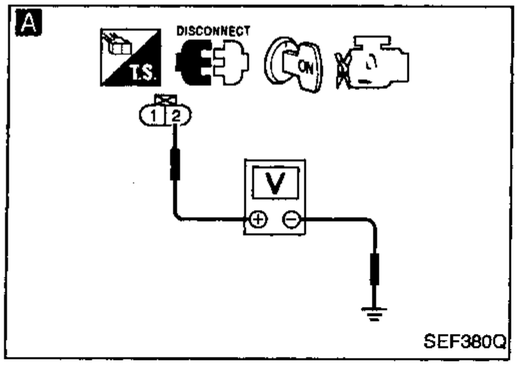


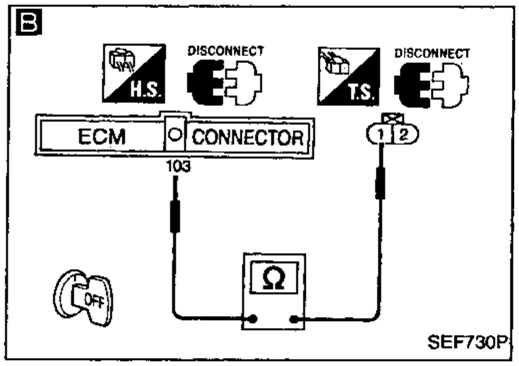
MEC672B

EGRC-Solenoid Valve (Cont'd)

DIAGNOSTIC PROCEDURE







INSPECTION START

↓

A

CHECK POWER SUPPLY.
1. Disconnect EGRC-solenoid 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 (M50), (F105)
- 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. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal (103) and terminal ①.
Continuity should exist.
If OK, check harness for short.

NG → Repair harness or connectors.

↓ OK

CHECK COMPONENT
(EGRC-solenoid valve).
Refer to "COMPONENT INSPECTION", EC-311.

NG → Replace EGRC-solenoid valve.

↓ OK

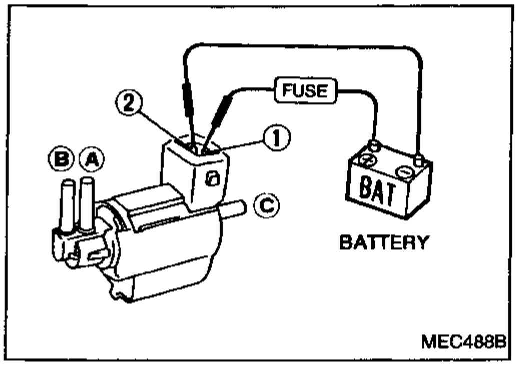
Disconnect and reconnect harness connectors in the circuit. Then retest.

↓ Trouble is not fixed.

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

↓

INSPECTION END



EGRC-Solenoid Valve (Cont'd)

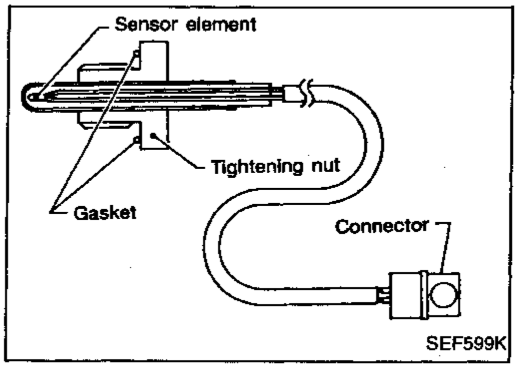
COMPONENT INSPECTION

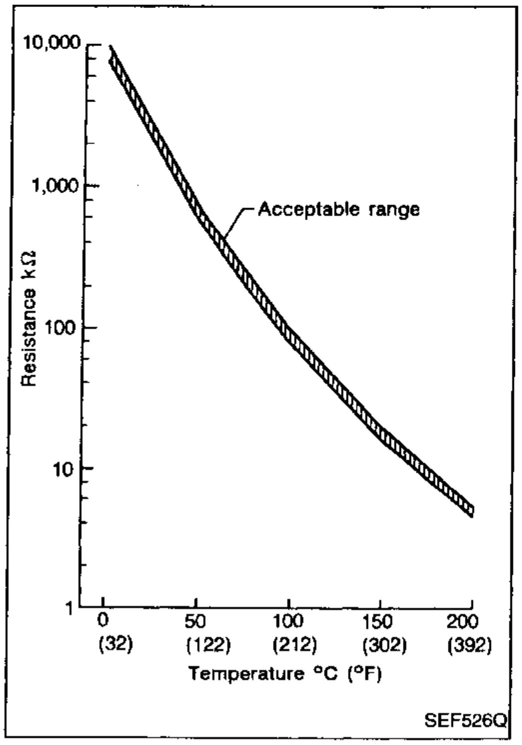
EGRC-solenoid valve

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.





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 directly used to control the engine system. It is used only for the on board diagnosis.

⟨Reference data⟩

EGR temperature °C (°F)	Voltage* (V)	Resistance (MΩ)
0 (32)	4.81	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 (63) (EGR temperature sensor) and ECM terminal ㊸ (ECCS ground).

CONSULT REFERENCE VALUE IN DATA MONITOR MODE

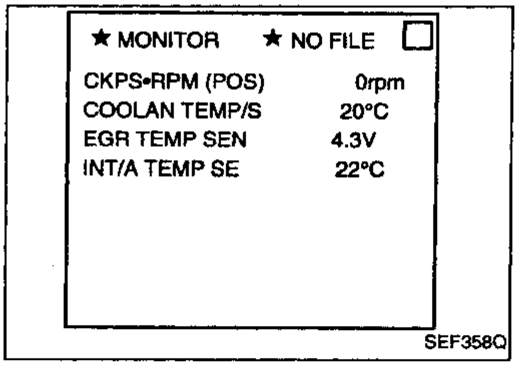
- Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
EGR TEMP SEN	• Engine: After warming up	Less than 4.5V

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 entered 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 entered 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)



★ MONITOR ★ NO FILE ☐

```
CKPS•RPM (POS)      0rpm
COOLAN TEMP/S       20°C
EGR TEMP SEN        4.3V
INT/A TEMP SE       22°C
```

SEF358Q

OVERALL FUNCTION CHECK

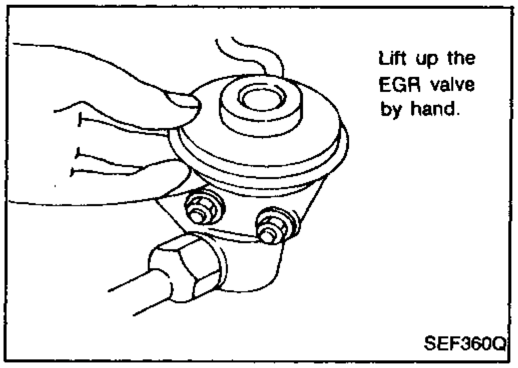
This procedure can be used for checking the overall function of the EGR temperature sensor. During this check, a DTC might not be confirmed.

Procedure for malfunctions A and B

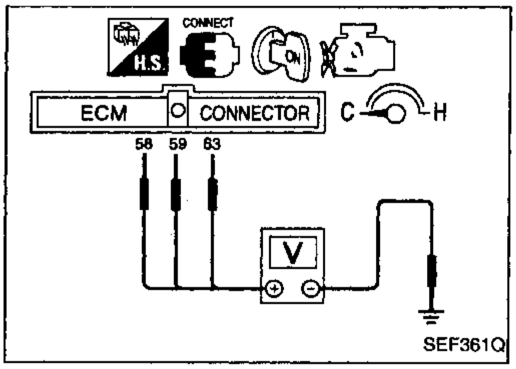
1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT.
2) Confirm that engine coolant temperature and intake air temperature are lower than 40°C (104°F). (If necessary, wait until the temperatures equal atmospheric temperature.)
3) Confirm that "EGR TEMP SEN" reading is between 3.45V 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 219.)
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. (See pages EC-209, 219 and 307.)

OR

1) Turn ignition switch "ON".
2) Confirm that voltage between ECM terminals (58), (59) 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 (63) 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 0302 and 0306. (See pages EC-209 and 219.)
7) Check voltage between ECM terminal (63) 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 0302, 0306 and 1005. (See pages EC-209, 219 and 307.)



SEF360Q



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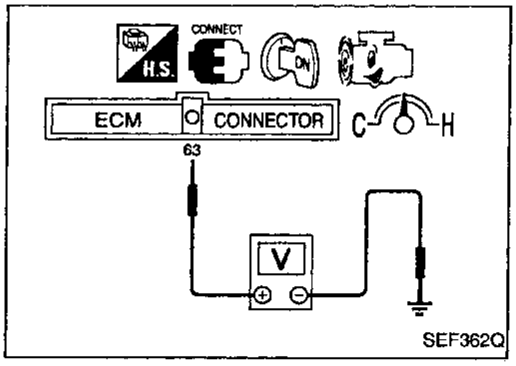
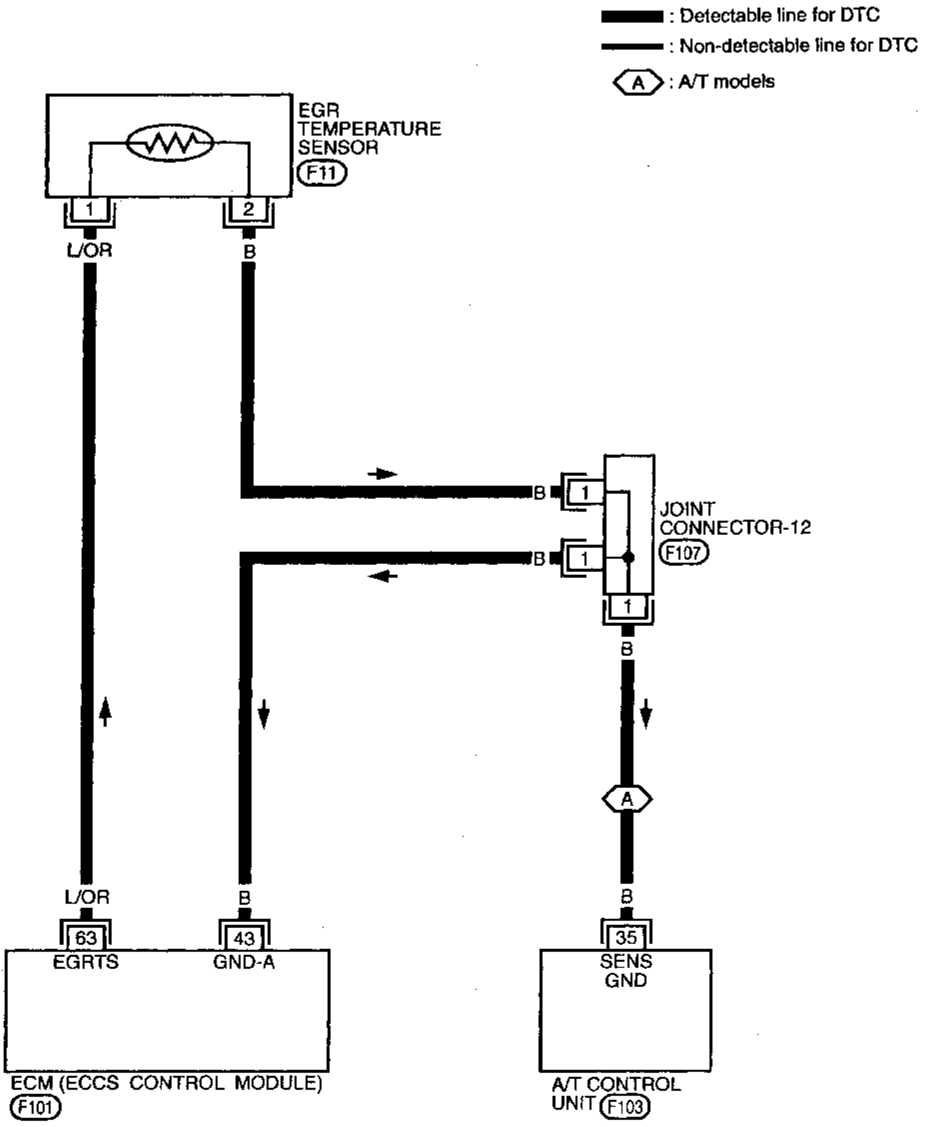
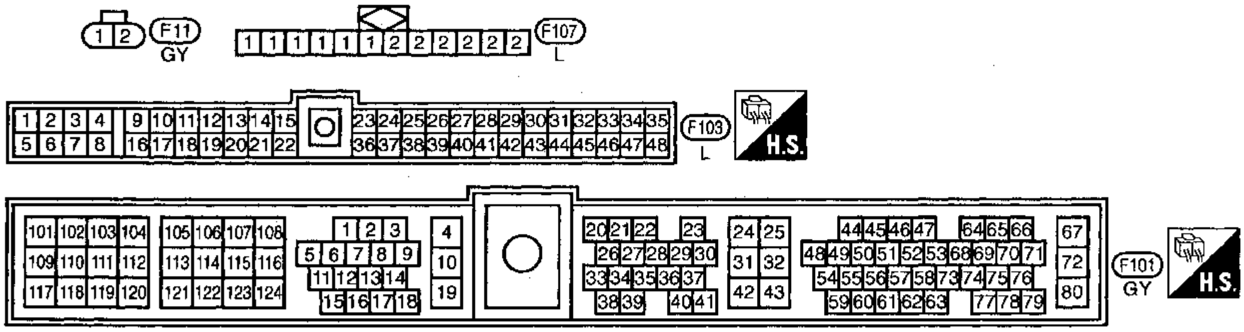


SEF362Q

EC-EGR/TS-01

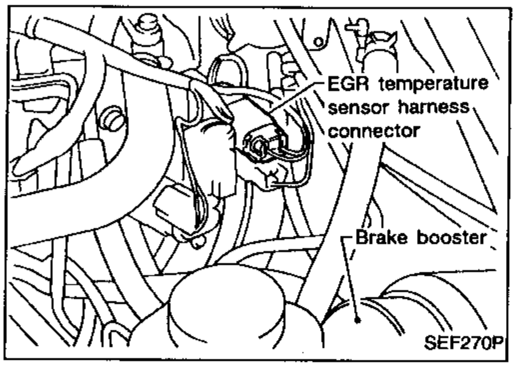




SEF228T

EGR Temperature Sensor (Cont'd)

DIAGNOSTIC PROCEDURE



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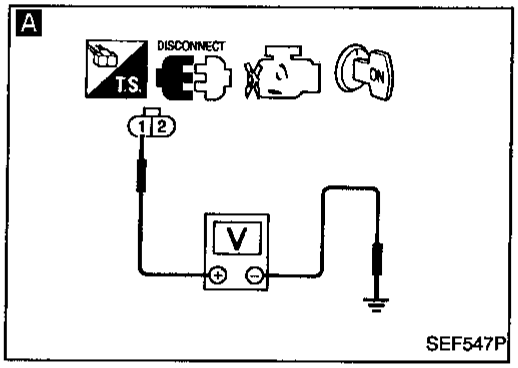
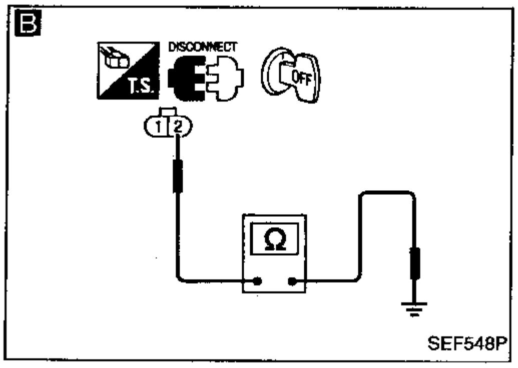


SEF547P



SEF548P

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.
- Joint connector-12 (F107)
- Harness for open or short between ECM and EGR temperature sensor
- 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

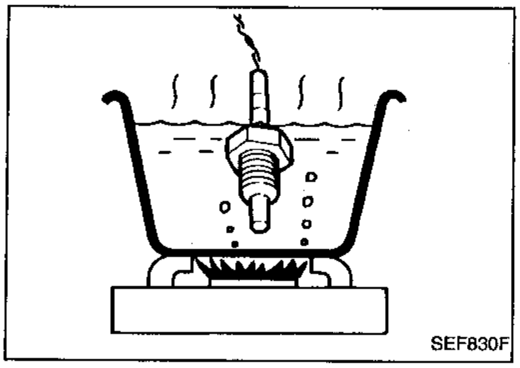
Disconnect and reconnect harness connectors in the circuit. Then retest.

↓ Trouble is not fixed.

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

↓

INSPECTION END


SEF830F

COMPONENT INSPECTION

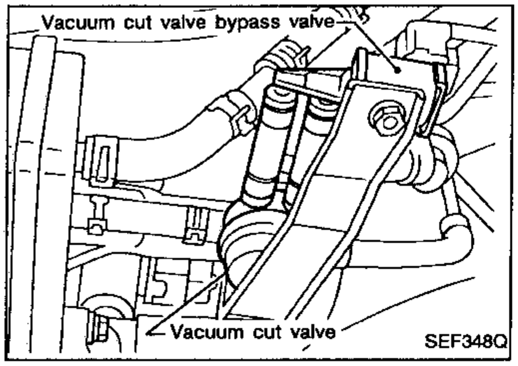
EGR temperature sensor

Check resistance change and resistance value at 100°C (212°F).

- **Resistance should decrease in response to temperature increase.**

  Resistance: 100°C (212°F)
  76.8 - 93.8 kΩ

  If NG, replace EGR temperature sensor.

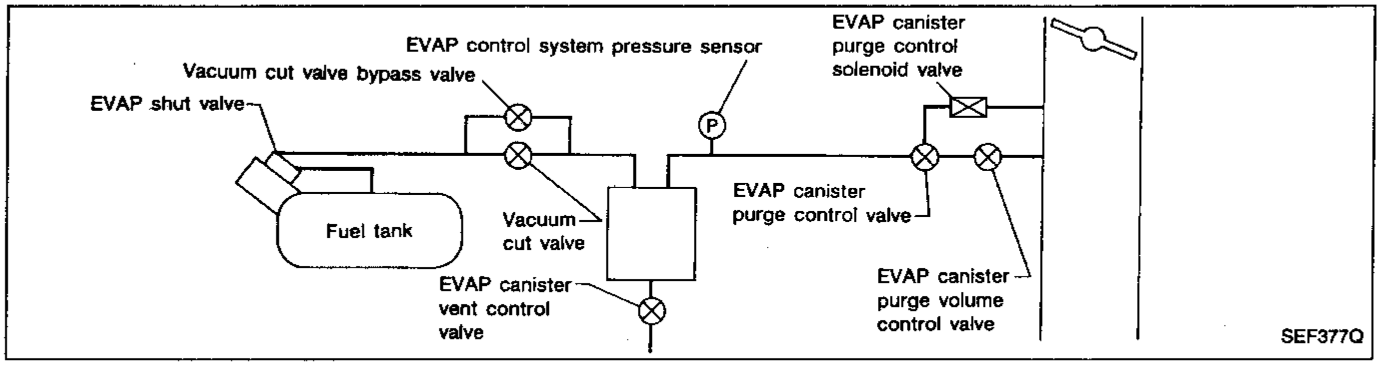


Vacuum Cut Valve Bypass Valve

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 OBD.
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



ECM TERMINALS AND REFERENCE VALUE

Remarks: Specification data are reference values, and are measured between each terminal and ㉘ (ECCS ground) with a voltmeter.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
120	OR/G	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 entered 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

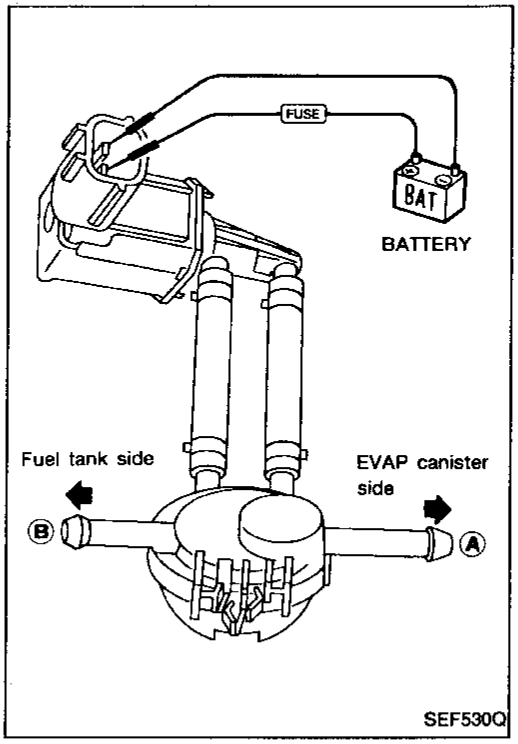
1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
3) Wait at least 5 seconds.

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.



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 ensure that there is no suction from port Ⓑ.
3) Apply vacuum to port Ⓑ and ensure that there is suction from port Ⓐ.
4) Blow air in port Ⓑ and ensure that there is a resistance to flow out of port Ⓐ.
5) Supply battery voltage to the terminal.
6) Blow air in port Ⓐ and ensure free flow out of port Ⓑ.
7) Blow air in port Ⓑ and ensure free flow out of port Ⓐ.

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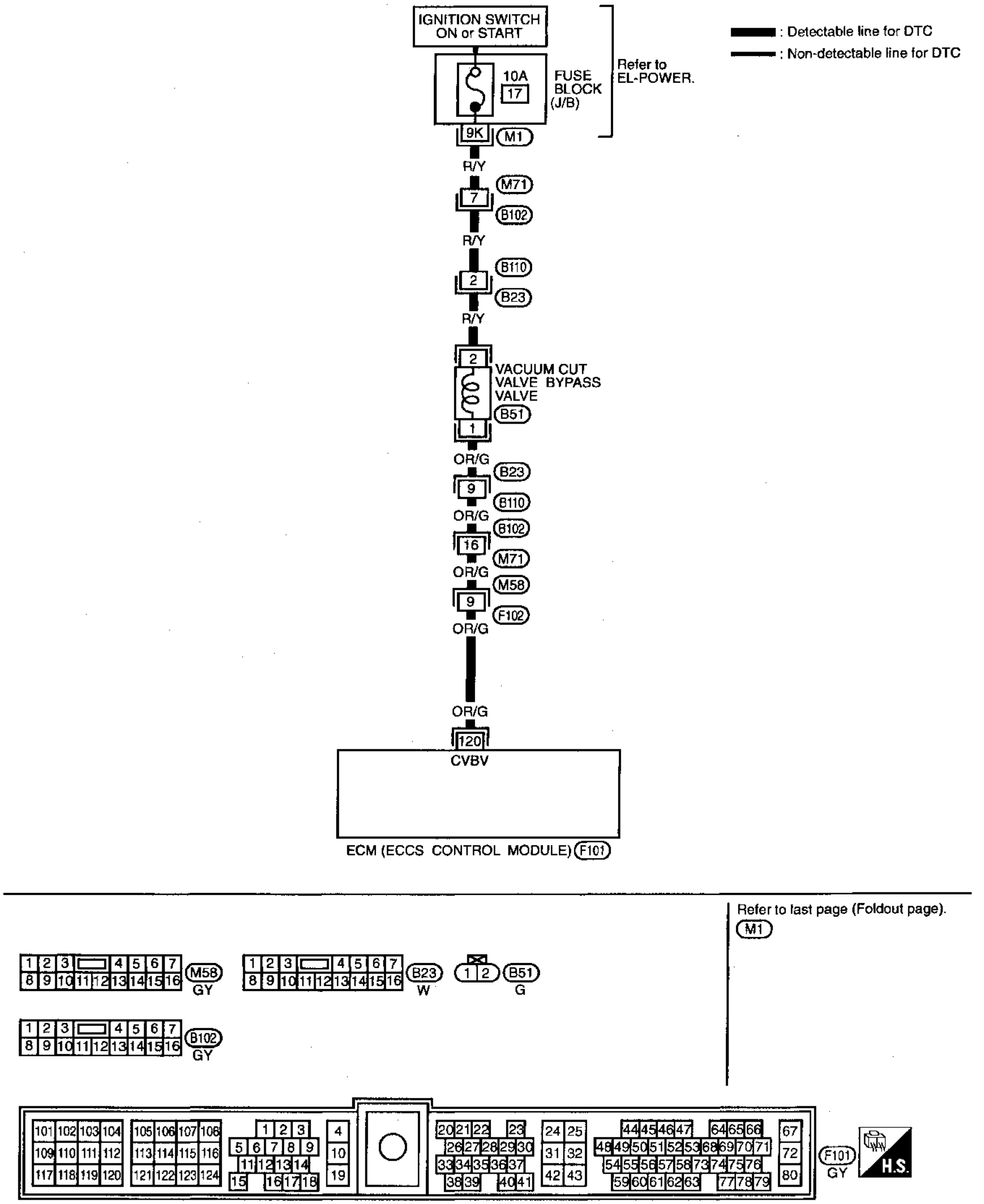
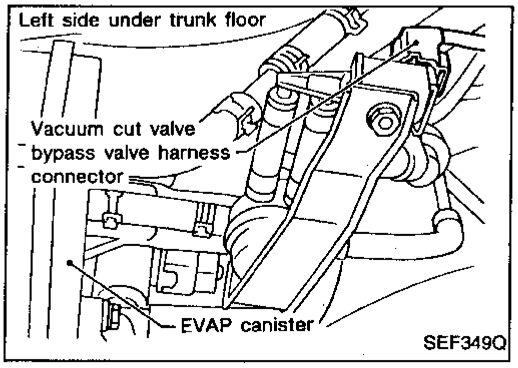


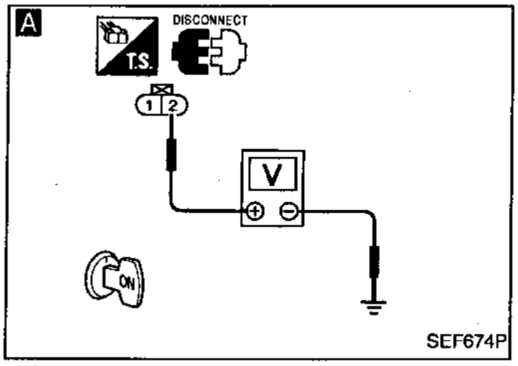
MEC686B

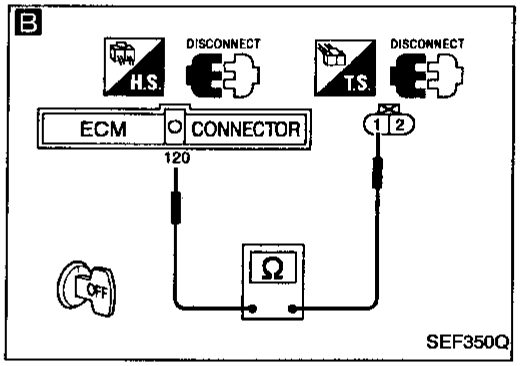
Vacuum Cut Valve Bypass Valve (Cont'd)

DIAGNOSTIC PROCEDURE

Procedure for malfunction A







INSPECTION START

↓

A

CHECK POWER SUPPLY.
1) Disconnect vacuum cut valve bypass 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 (M71), (B102), (B110), (B23)
- 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) Disconnect ECM harness connector.
2) Check harness continuity between ECM terminal (120) and terminal ①.
Continuity should exist.
If OK, check harness for short.

NG → Check the following.
- Harness connectors (B23), (B110), (B102), (M71), (M58), (F102)
- 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".
(See page EC-321.)

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 or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

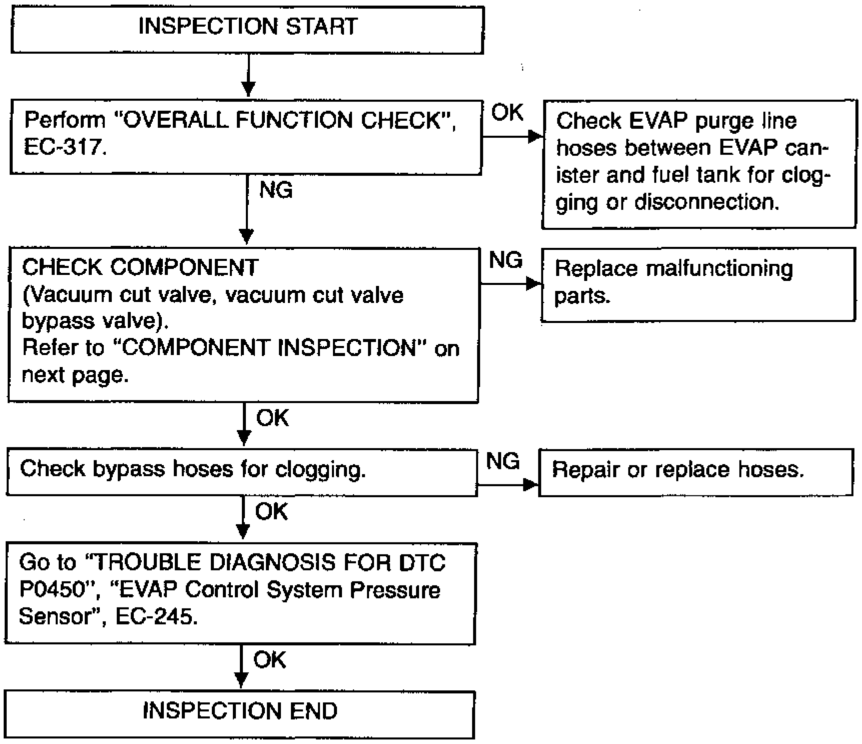
↓

INSPECTION END

Vacuum Cut Valve Bypass Valve (Cont'd)

DIAGNOSTIC PROCEDURE

Procedure for malfunction B



INSPECTION START

Perform "OVERALL FUNCTION CHECK", EC-317.

Check EVAP purge line hoses between EVAP canister and fuel tank for clogging or disconnection.

CHECK COMPONENT
(Vacuum cut valve, vacuum cut valve bypass valve).
Refer to "COMPONENT INSPECTION" on next page.

Replace malfunctioning parts.

Check bypass hoses for clogging.

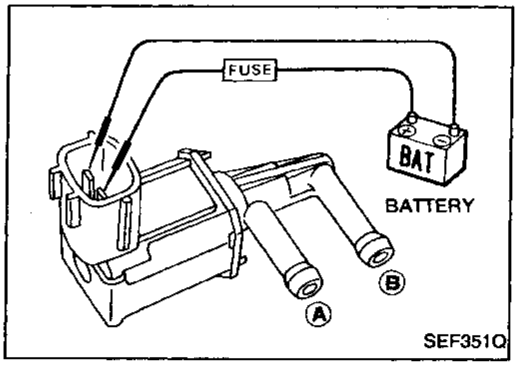
Repair or replace hoses.

Go to "TROUBLE DIAGNOSIS FOR DTC P0450", "EVAP Control System Pressure Sensor", EC-245.

INSPECTION END

Vacuum Cut Valve Bypass Valve (Cont'd)

COMPONENT INSPECTION

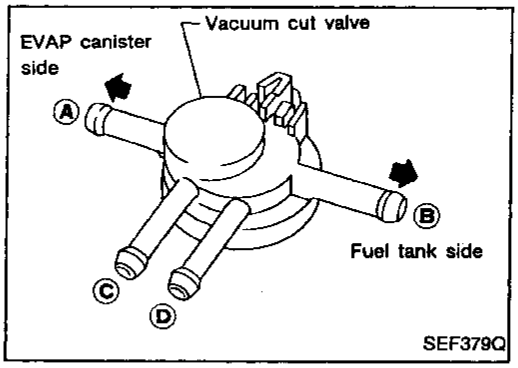


Vacuum cut valve bypass valve

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 ensure that there is no suction from port Ⓑ.
3. Apply vacuum to port Ⓑ and ensure that there is suction from port Ⓐ.
4. Blow air in port Ⓑ and ensure that there is a resistance to flow out of port Ⓐ.
5. Open port Ⓒ and Ⓓ.
6. Blow air in port Ⓐ and ensure free flow out of port Ⓒ.
7. Blow air in port Ⓑ and ensure free flow out of port Ⓓ.

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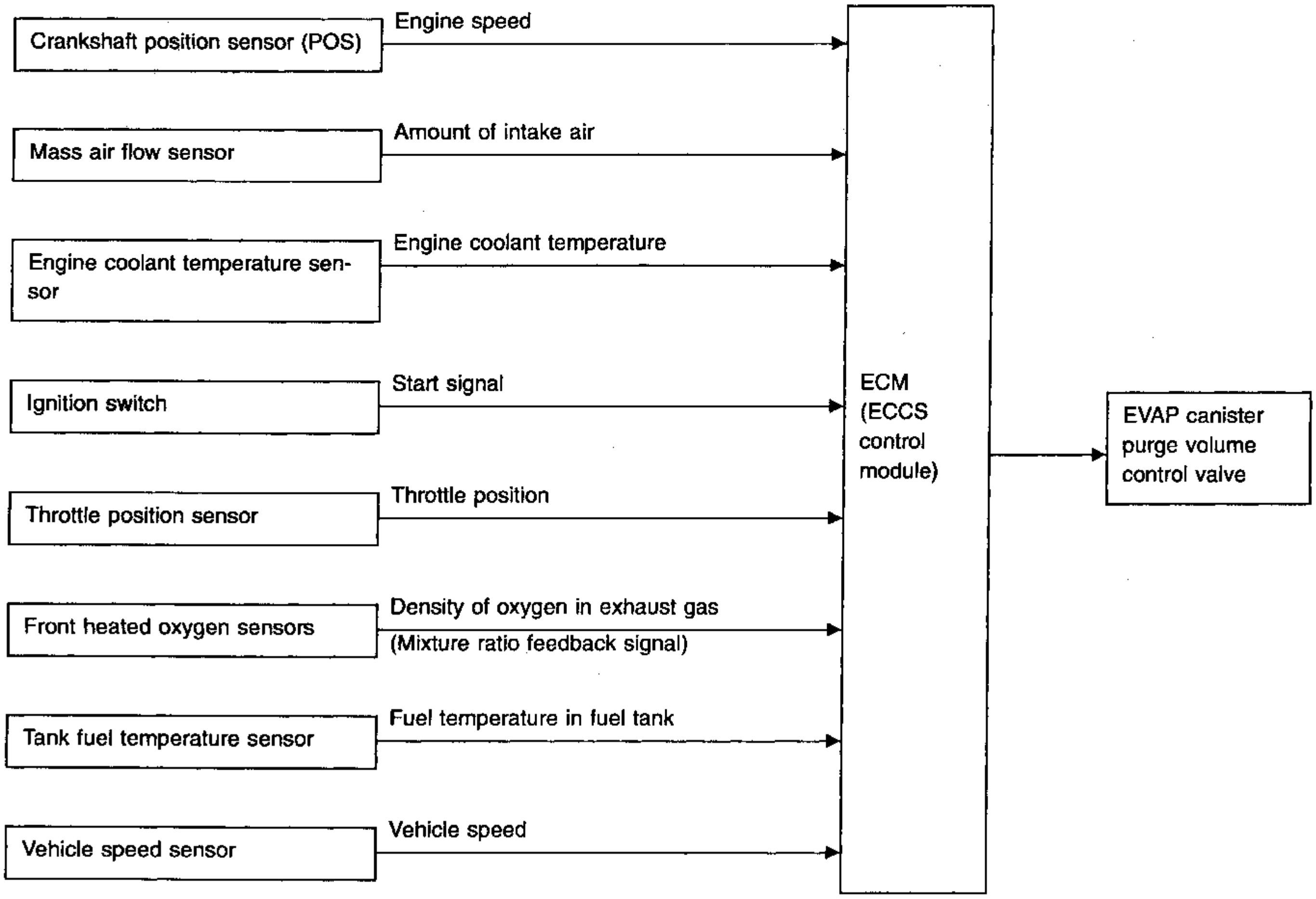
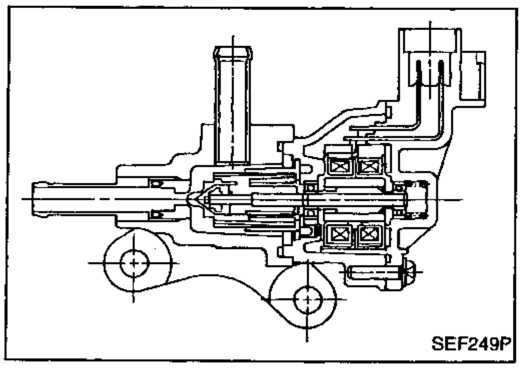
Evaporative Emission (EVAP) Canister Purge Volume Control Valve

SYSTEM DESCRIPTION



This system automatically controls flow rate of fuel vapor from EVAP canister. The EVAP canister purge volume control valve changes the opening of the vapor by-pass passage to control the flow rate. This valve is actuated by a step motor built into the valve, which moves the valve in the axial direction in steps corresponding to the ECM output pulses, the opening of the valve is varied to allow for optimum engine control. The optimum value stored in the ECM is determined by taking into consideration various engine conditions. When the engine operates, the flow rate is proportionally regulated as the air flow increases.



COMPONENT DESCRIPTION

The EVAP canister purge volume control valve is operated by a step motor for control of flow rate of fuel vapor from EVAP canister. This motor has four winding phases and is actuated by the output pulse signal of ECM which turns ON and OFF two windings each in sequence. Each time the valve opens or closes to change the flow rate, an ON pulse is issued. When no change in the flow rate is needed, the valve remains at a certain opening, hence no pulse signal output is issued.

TROUBLE DIAGNOSIS FOR DTC P1445

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: Running	Vehicle stopped	0 step
		Vehicle running	—

ECM TERMINALS AND REFERENCE VALUE

Remarks: Specification data are reference values, and are measured between each terminal and ㉕ (ECCS ground) with a voltmeter.

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
26 27	Y G	EVAP canister purge volume control valve	Engine is running. └ Idle speed	0 - 0.4V
110 118	G/B L/R	EVAP canister purge volume control valve	Engine is running. └ Idle speed	BATTERY VOLTAGE (11 - 14V)
4	W/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)
67 72	R R	Power supply for ECM	Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P1445 1008	A) An improper voltage signal is entered 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 shut off.	• 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.)

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

OR

1) Start engine and wait at least 3 seconds.
2) Select "MODE 7" with GST.

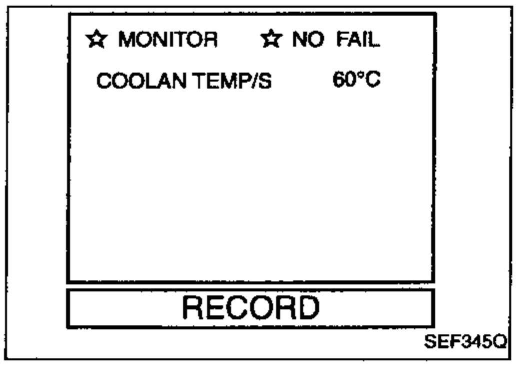
OR

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

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 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 at least 70 seconds.
5) Maintain the following conditions at least 10 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:
1,500 - 2,500 rpm
Coolant temperature:
Less than 100°C (212°F)



☆ MONITOR ☆ NO FAIL

COOLAN TEMP/S 60°C

RECORD

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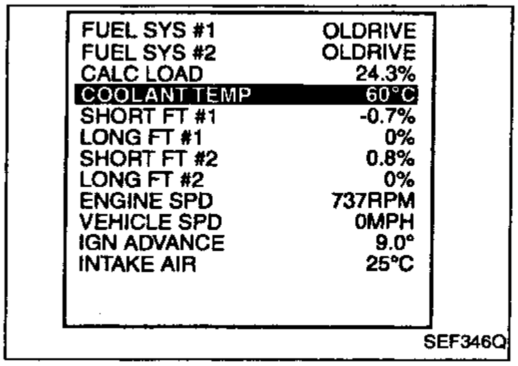
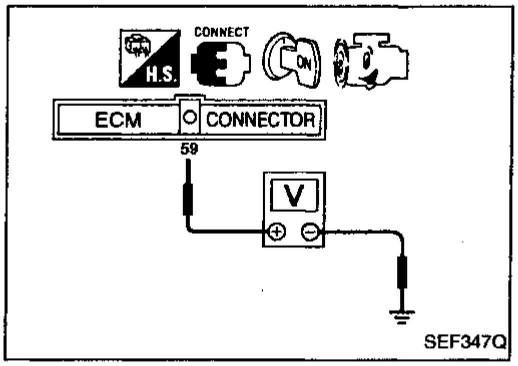
OR

Evaporative Emission (EVAP) Canister Purge Volume Control Valve (Cont'd)



```
FUEL SYS #1          OLDRIVE
FUEL SYS #2          OLDRIVE
CALC LOAD              24.3%
COOLANT TEMP            60°C
SHORT FT #1            -0.7%
LONG FT #1                0%
SHORT FT #2             0.8%
LONG FT #2                0%
ENGINE SPD            737RPM
VEHICLE SPD             0MPH
IGN ADVANCE             9.0°
INTAKE AIR              25°C
```

SEF346Q



SEF347Q

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 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 at least 70 seconds.
5) Maintain the following conditions at least 10 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:
   1,500 - 2,500 rpm
   Coolant temperature:
   Less than 100°C (212°F)
6) Select "MODE 3" with GST.

OR

1) Jack up drive wheels.
2) Turn ignition switch "ON".
3) Start engine and warm it up until the voltage between ECM terminal (59) 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 at least 70 seconds.
5) Maintain the following conditions at least 10 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:
   1,500 - 2,500 rpm
   Voltage between ECM terminal (59) 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.

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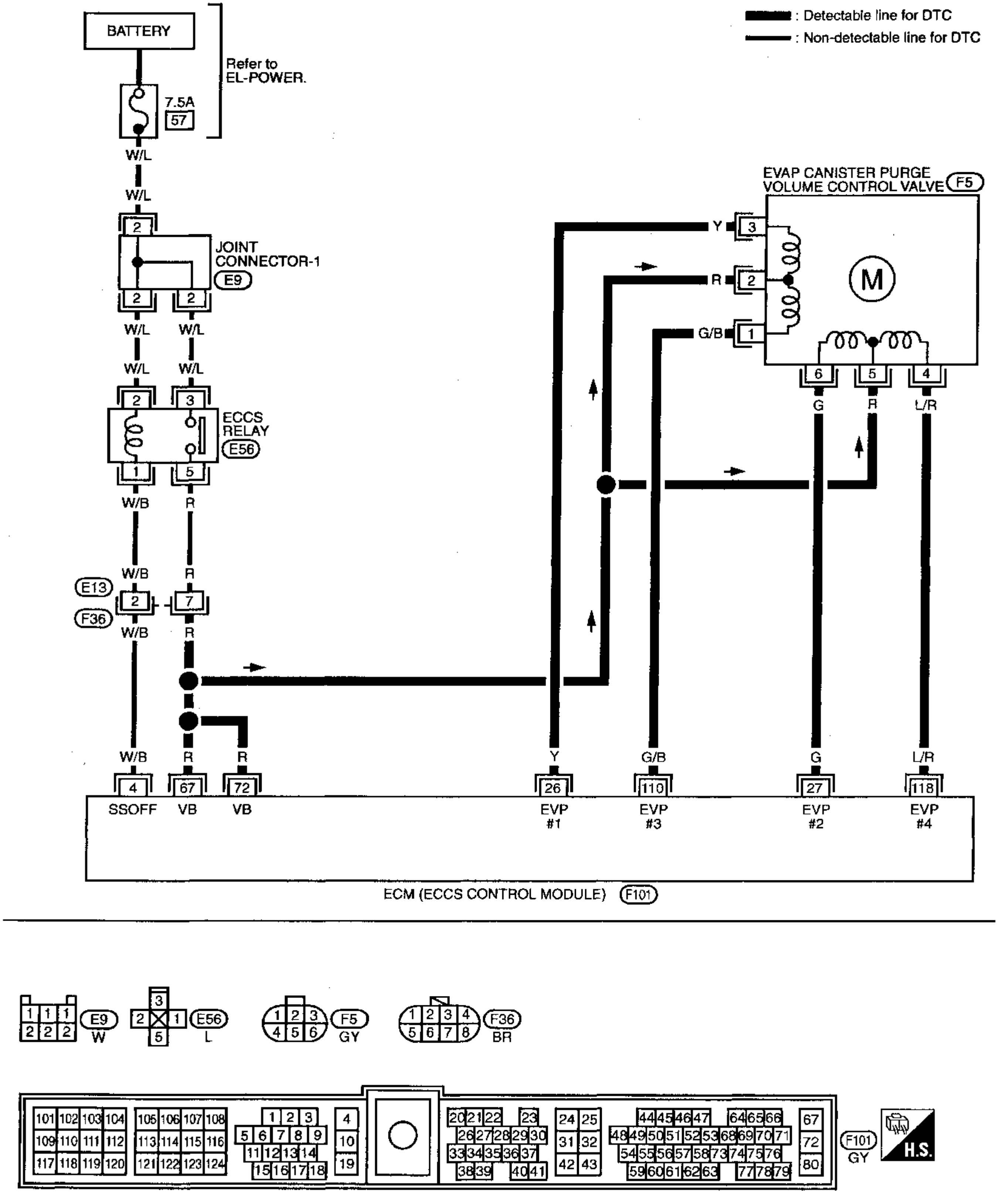
Evaporative Emission (EVAP) Canister Purge Volume Control Valve (Cont'd)

EC-PGC/V-01



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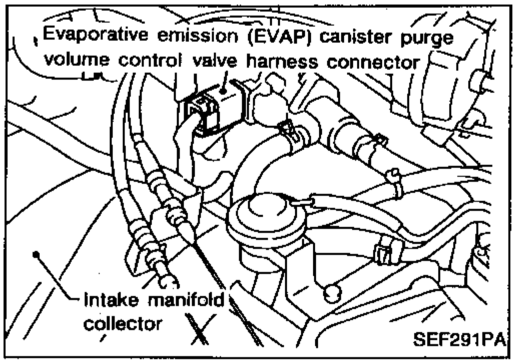
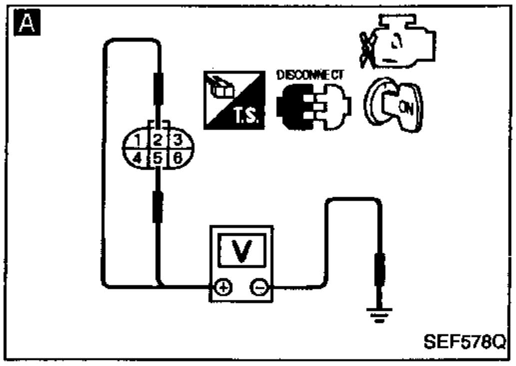
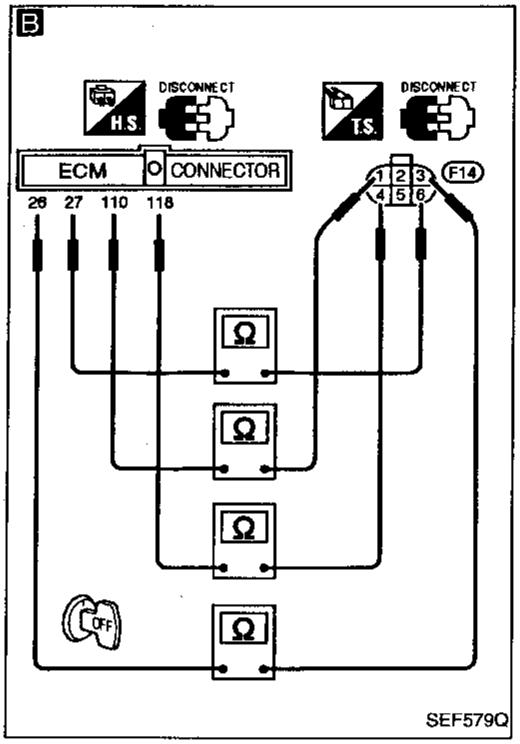
Evaporative Emission (EVAP) Canister Purge Volume Control Valve (Cont'd)

DIAGNOSTIC PROCEDURE







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.
- Harness or connectors (E13), (F36)
- ECCS relay (E20)
- JOINT CONNECTOR-1 (E9)
- 7.5A fuse
- Harness for open or short between EVAP canister purge volume 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 ㉖ and terminal ③, ECM terminal ㉗ and terminal ⑥, ECM terminal (110) and terminal ①, ECM terminal (118) and terminal ④.

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-249.

NG → Replace EVAP control system pressure sensor.

↓ OK

CHECK COMPONENT
(EVAP canister purge volume control valve).
Refer to "COMPONENT INSPECTION", EC-333.

NG → Replace EVAP canister purge volume control valve.

↓ OK

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

↓ Trouble is not fixed.

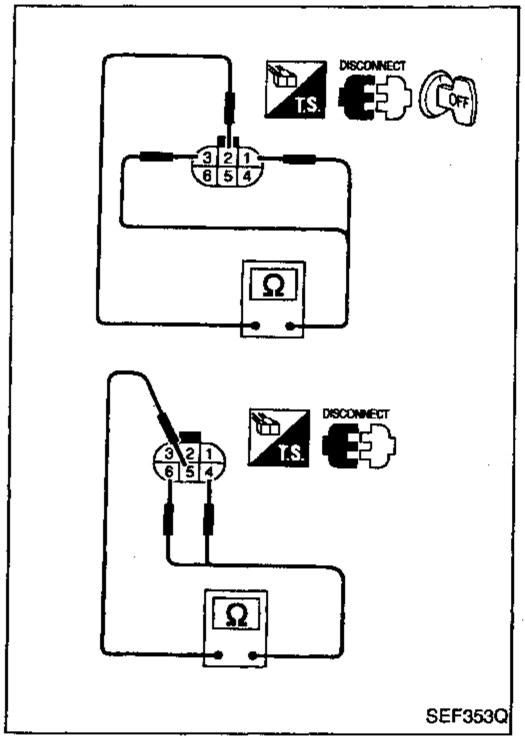
Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

↓

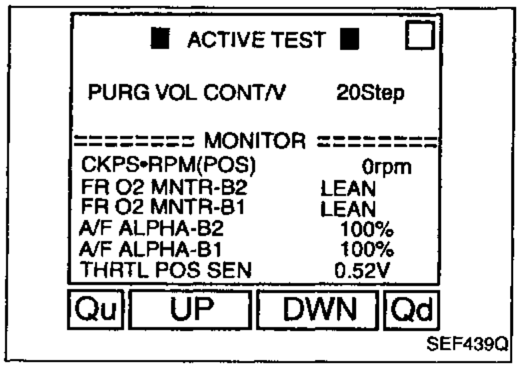
INSPECTION END

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

Evaporative Emission (EVAP) Canister Purge Volume Control Valve (Cont'd)



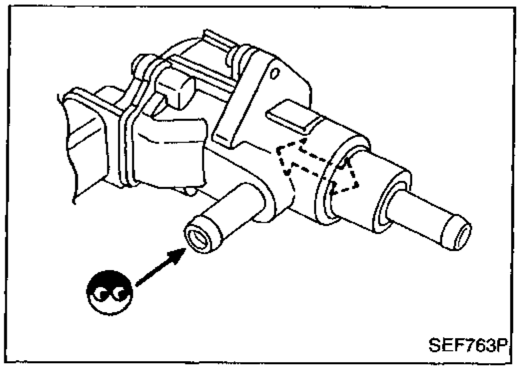
SEF353Q


■ ACTIVE TEST ■ ☐

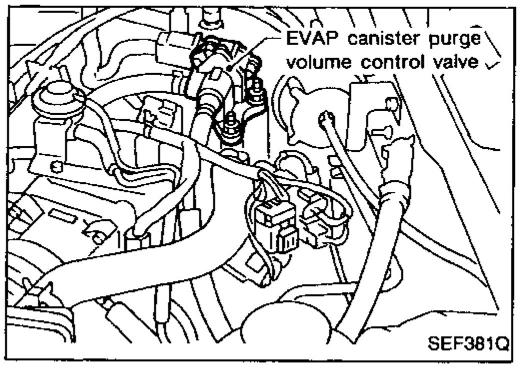
PURG VOL CONT/V 20Step

```
======== MONITOR ========
CKPS•RPM(POS)        0rpm
FR O2 MNTR-B2       LEAN
FR O2 MNTR-B1       LEAN
A/F ALPHA-B2        100%
A/F ALPHA-B1        100%
THRTL POS SEN      0.52V
```

SEF439Q



SEF763P



SEF381Q

COMPONENT INSPECTION

EVAP canister purge volume control valve

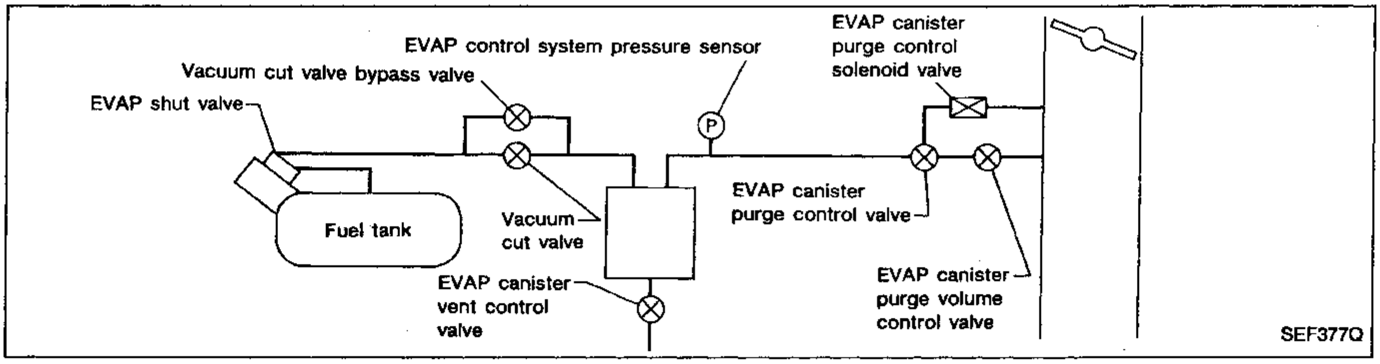
1. Disconnect EVAP canister purge volume control valve harness connector.
2. Check resistance between the following terminals.
   terminal ② and terminals ①, ③
   terminal ⑤ and terminals ④, ⑥
   Resistance:
   Approximately 30Ω [At 25°C (77°F)]
3. Reconnect EVAP canister purge volume control valve harness 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 and ensure the EVAP canister purge volume control valve shaft smoothly moves 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" and ensure the EVAP canister purge volume control valve shaft smoothly moves forward and backward according to the ignition switch position.
   If NG, replace the EVAP canister purge volume control valve.

Evaporative Emission (EVAP) Control System Purge Flow Monitoring

EVAPORATIVE EMISSION SYSTEM DIAGRAM



SYSTEM DESCRIPTION

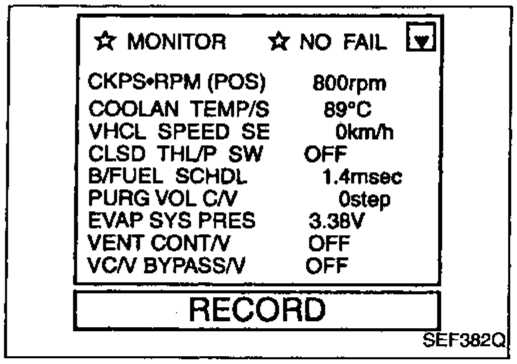
In this evaporative emission (EVAP) control system, purge volume is related to air intake volume and occurs during non-closed throttle conditions. In normal purge conditions (non-closed throttle), the EVAP canister purge volume control valve and EVAP canister purge control valve are open to admit purge flow. Purge flow exposes the EVAP control system pressure sensor to intake manifold vacuum.

ON BOARD DIAGNOSIS LOGIC

In normal conditions (non-closed throttle), if the sensor output does not show the appropriate pressure drop in the EVAP purge line, lack of purge flow is indicated, and a fault is determined.

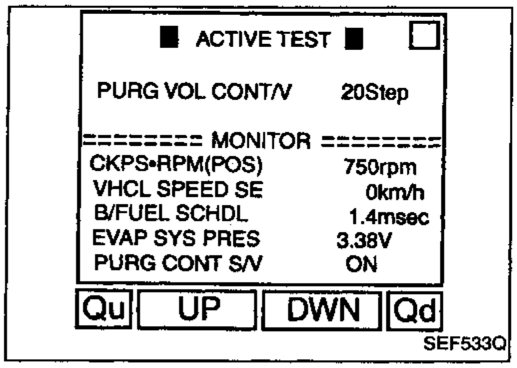
Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P1447 0111	• EVAP control system does not operate properly. • EVAP control system has a leak in line between intake manifold and EVAP control system pressure sensor.	• EVAP canister purge volume control valve stuck closed • EVAP canister purge control valve stuck closed • EVAP control system pressure sensor • Loose or disconnected rubber tube • Obstructed rubber tube • EVAP canister purge control solenoid valve • Obstructed 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  ▼
CKPS•RPM (POS)      800rpm
COOLAN TEMP/S        89°C
VHCL SPEED SE        0km/h
CLSD THL/P SW       OFF
B/FUEL SCHDL         1.4msec
PURG VOL C/V          0step
EVAP SYS PRES       3.38V
VENT CONT/V         OFF
VC/V BYPASS/V       OFF
         RECORD
```

SEF382Q



```
     ■ ACTIVE TEST ■        ☐
PURG VOL CONT/V       20Step
======== MONITOR ========
CKPS•RPM(POS)         750rpm
VHCL SPEED SE          0km/h
B/FUEL SCHDL          1.4msec
EVAP SYS PRES         3.38V
PURG CONT S/V         ON
[Qu] [ UP ] [ DWN ] [Qd]
```

SEF533Q

OVERALL FUNCTION CHECK

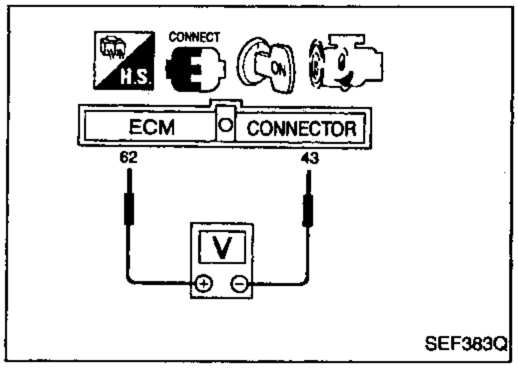
This procedure can be used for checking the overall function of the EVAP control system purge flow monitoring. During this check, a DTC might not be confirmed.

1) Jack up drive wheels (M/T models).
2) Start engine.
3) Select "EVAP SYS PRES" in "DATA MONITOR" mode with CONSULT.
4) Check EVAP control system pressure sensor valve at idle speed.
5) Select "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT and set "PURG VOL CONT/V" to 20 steps by touching "DWN" and "Qd".
6) Maintain the following conditions at least 30 seconds. Verify that EVAP control system pressure sensor value ("EVAP SYS PRES") stays 0.1V less than that at idle speed at least 2 seconds.

   Engine speed:
   Approx. 2,000 rpm
   Gear position (for M/T models):
   Any position other than "Neutral" or "Reverse"

CAUTION:
Do not run vehicle up to speeds greater than 80 km/h (50 MPH).

OR



SEF383Q

1) Jack up drive wheels (M/T models).
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 (62) (EVAP control system pressure sensor signal) and ㊸ (ground).
6) Check EVAP control system pressure sensor value at idle speed.
7) Establish the following conditions and maintain at least 30 seconds, then completely return to normal conditions. Repeat this procedure 5 or more times.

   Air conditioner switch: ON
   Steering wheel: Fully turned
   Headlamp switch: ON
   Rear window defogger switch: ON
   Engine speed: Approx. 3,500 rpm
   Intake manifold vacuum:
   −73.3 to −60.0 kPa (−550 to −450 mmHg, −21.65 to −17.72 inHg)
   Gear position (for M/T models):
   Any position other than "Neutral" or "Reverse"

   Verify that EVAP control system pressure sensor value stays 0.1V less than that at idle speed at least 2 seconds.

CAUTION:
Do not run vehicle up to 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.

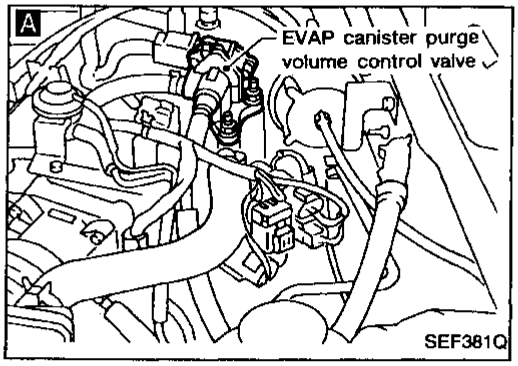
NG → Replace EVAP canister.

↓ OK

CHECK EVAP PURGE LINE.
Check EVAP purge line for improper connection.
Refer to "EVAPORATIVE EMISSION SYSTEM".
(See page EC-23.)

NG → Repair it.

↓ OK

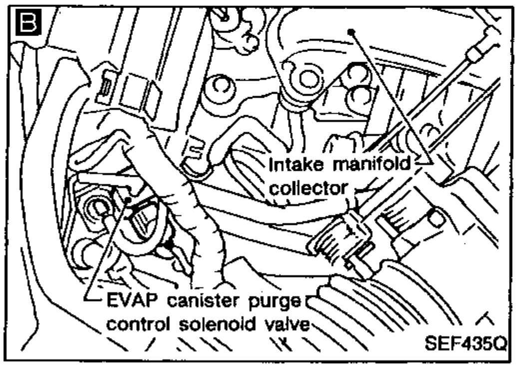


A

CHECK COMPONENT
(EVAP canister purge volume control valve).
Refer to "COMPONENT INSPECTION".
(See page EC-333.)

NG → Replace EVAP canister purge volume control valve.

↓ OK

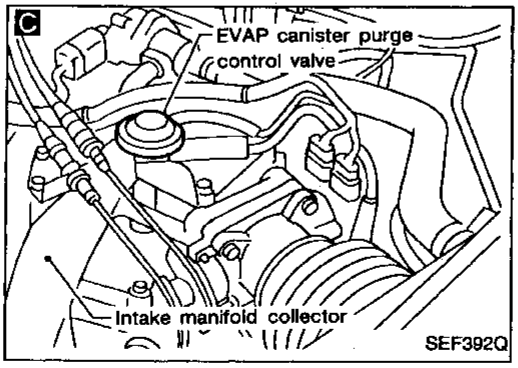


B

CHECK COMPONENT
(EVAP canister purge control solenoid valve).
Refer to "COMPONENT INSPECTION".
(See page EC-334.)

NG → Replace EVAP canister purge control solenoid valve.

↓ OK

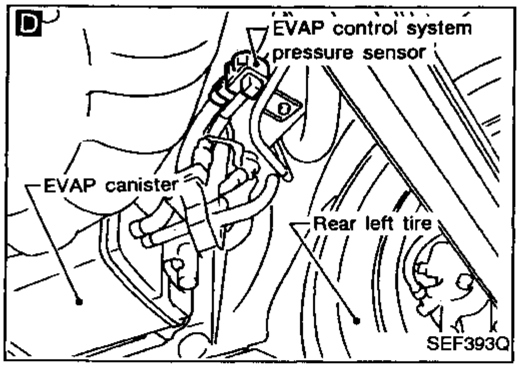


C

CHECK COMPONENT
(EVAP canister purge control valve).
Refer to "COMPONENT INSPECTION".
(See page EC-334.)

NG → Replace EVAP canister purge control valve.

↓ OK

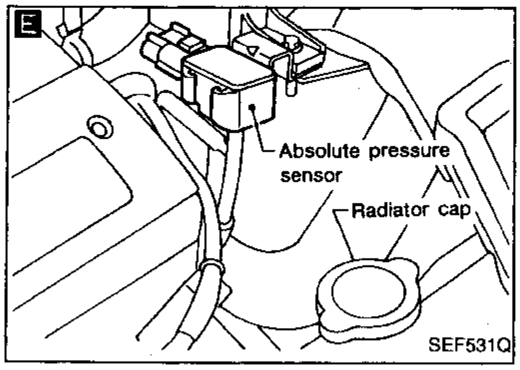


D

CHECK COMPONENT
(EVAP control system pressure sensor).
Refer to "COMPONENT INSPECTION".
(See page EC-334.)

NG → Replace EVAP control system pressure sensor.

↓ OK



E

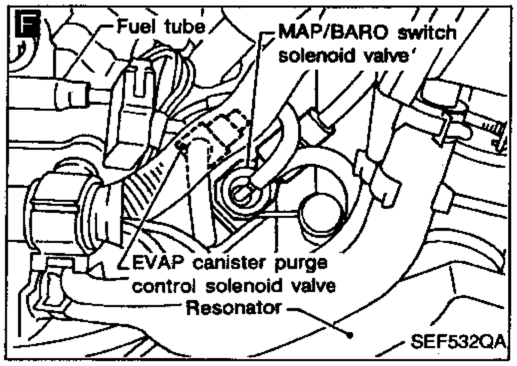
CHECK COMPONENT
(Absolute pressure sensor).
Refer to "COMPONENT INSPECTION".
(See page EC-335.)

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".
(See page EC-335.)

NG → Replace MAP/BARO switch solenoid valve.

OK ↓

CHECK EVAP PURGE LINE.
Visually check EVAP purge line (pipe and rubber tube) 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 or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

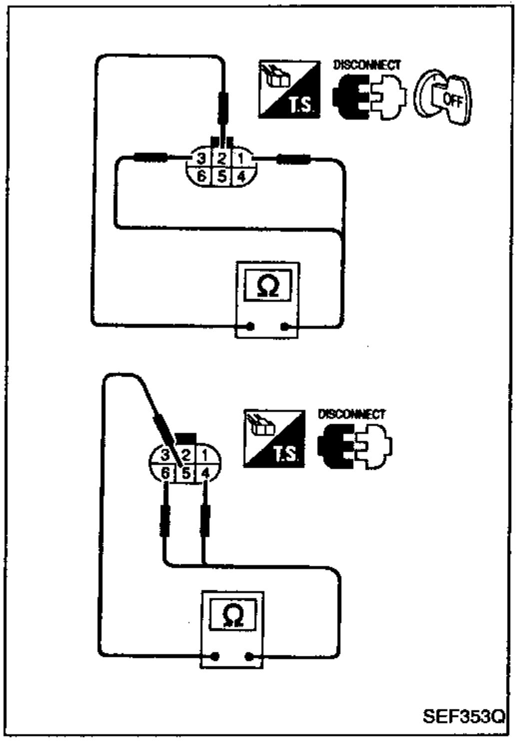
↓

INSPECTION END

Evaporative Emission (EVAP) Control System Purge Flow Monitoring (Cont'd)

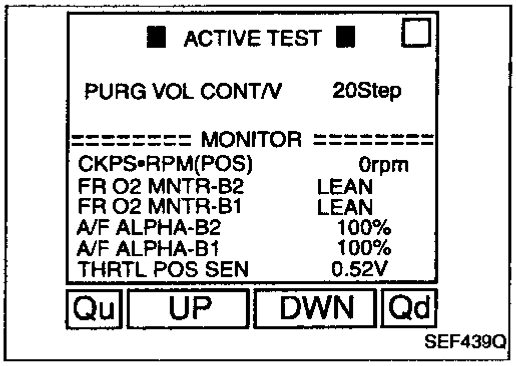
COMPONENT INSPECTION

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 and ensure the EVAP canister purge volume control valve shaft smoothly moves forward and backward according to the valve opening.
   If NG, replace the EVAP canister purge volume control valve.



```
■ ACTIVE TEST ■          ☐

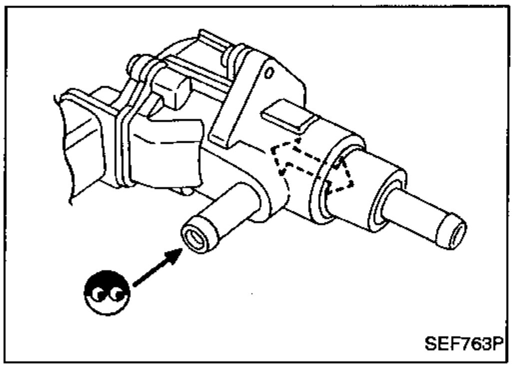
PURG VOL CONT/V     20Step

======== MONITOR ========
CKPS•RPM(POS)          0rpm
FR O2 MNTR-B2       LEAN
FR O2 MNTR-B1       LEAN
A/F ALPHA-B2          100%
A/F ALPHA-B1          100%
THRTL POS SEN        0.52V
```

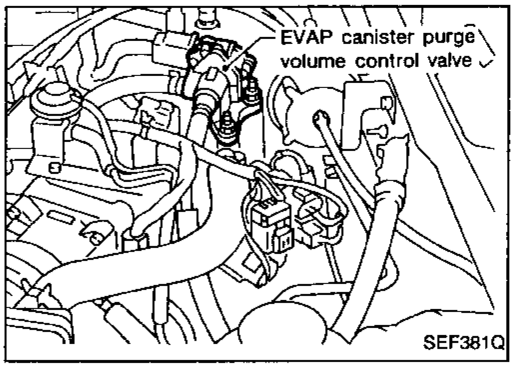
SEF439Q

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" and ensure the EVAP canister purge volume control valve shaft smoothly moves forward and backward according to the ignition switch position.
   If NG, replace the EVAP canister purge volume control valve.

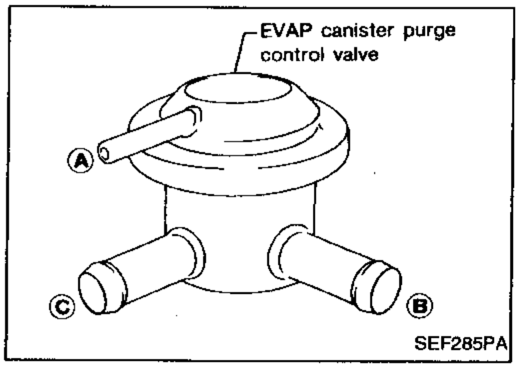


SEF763P



SEF381Q

Evaporative Emission (EVAP) Control System Purge Flow Monitoring (Cont'd)

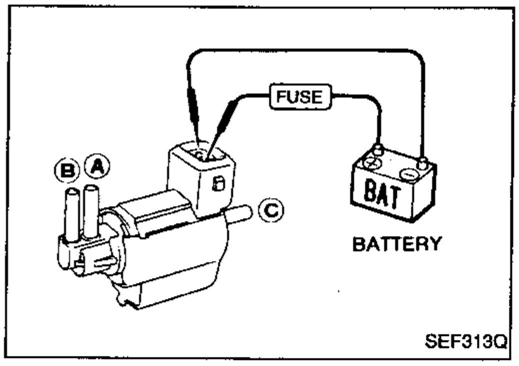


SEF285PA

EVAP canister purge control valve

Check EVAP canister purge control valve as follows:

1. Blow air in port Ⓐ, Ⓑ and Ⓒ, then ensure that there is no leakage.
2. Apply vacuum to port Ⓐ. [Approximately −13.3 to −20.0 kPa (−100 to −150 mmHg, −3.94 to −5.91 inHg)]
   Blow air in port Ⓒ and ensure free flow out of port Ⓑ.



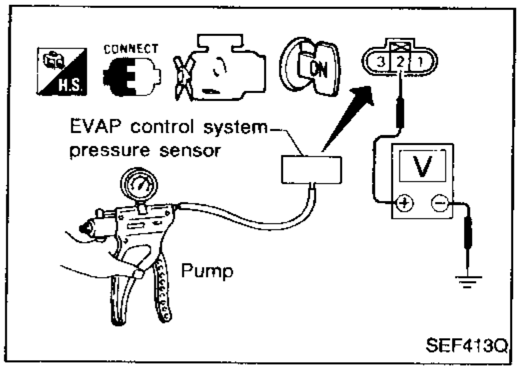
SEF313Q

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.



SEF413Q

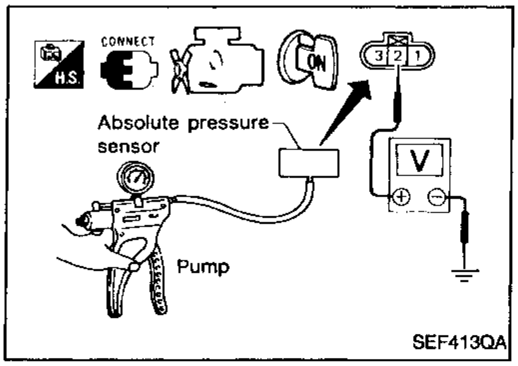
EVAP control system pressure sensor

1. Remove EVAP control system pressure sensor from bracket with its harness connector connected.
2. Remove hose from EVAP control system pressure sensor.
3. Apply vacuum and pressure to EVAP control system pressure sensor with pump as shown in figure.
4. Check output voltage between terminal ② and engine ground.

Pressure (Relative to atmospheric pressure)	Voltage (V)
+4.0 kPa (+30 mmHg, +1.18 inHg)	Approximately 4.6
-9.3 kPa (−70 mmHg, −2.76 inHg)	Approximately 0.5

5. If NG, replace EVAP control system pressure sensor.

Evaporative Emission (EVAP) Control System Purge Flow Monitoring (Cont'd)



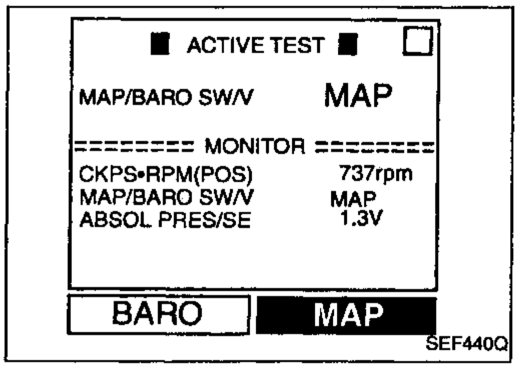
SEF413QA

Absolute pressure sensor

1. Remove absolute pressure sensor from bracket with its harness connector connected.
2. Remove hose from absolute pressure sensor.
3. Apply vacuum and pressure to absolute pressure sensor as shown in figure.
4. Check output voltage between terminal ② and engine ground.

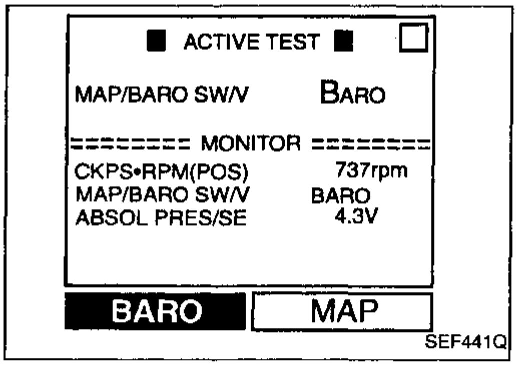
Pressure (Absolute pressure)	Voltage (V)
106.6 kPa (800 mmHg, 31.50 inHg)	Approximately 4.6
13.3 kPa (100 mmHg, 3.94 inHg)	Approximately 0.5

5. If NG, replace absolute pressure sensor.



```
■ ACTIVE TEST ■ ☐
MAP/BARO SW/V          MAP
======== MONITOR ========
CKPS•RPM(POS)          737rpm
MAP/BARO SW/V          MAP
ABSOL PRES/SE          1.3V
```

SEF440Q



```
■ ACTIVE TEST ■ ☐
MAP/BARO SW/V          BARO
======== MONITOR ========
CKPS•RPM(POS)          737rpm
MAP/BARO SW/V          BARO
ABSOL PRES/SE          4.3V
```

SEF441Q

MAP/BARO switch solenoid valve

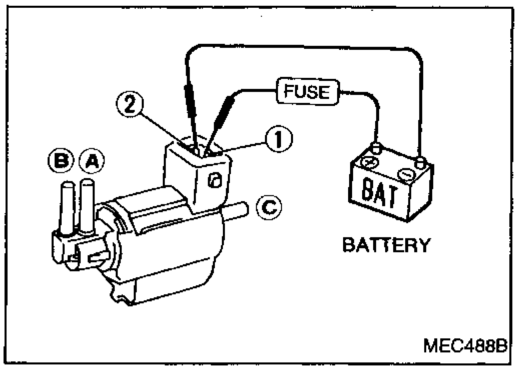
1. Start engine and warm it up sufficiently.
2. Perform "MAP/BARO SW/V" in "ACTIVE TEST" mode with CONSULT.
3. Make sure of the following.
   - When selecting "MAP", "ABSOL PRES/SE" indicates approximately 1.3V.
   - When selecting "BARO", "ABSOL PRES/SE" indicates approximately 4.3V.
4. If NG, replace 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

GI
MA
EM
LC
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RA
BR
ST
RS
BT
HA
EL
IDX

A/T Diagnosis Communication Line

COMPONENT DESCRIPTION

The malfunction information related to A/T (Automatic Transaxle) 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

Remarks: Specification data are reference values, and are measured between each terminal and ㉕ (ECCS ground) with a voltmeter.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
6	R	A/T diagnosis signal	Ignition switch "ON" Engine is running.	0.5 - 3.0V

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1605 0804	• Signal from A/T control units is not entered to ECM.	• Harness or connectors (The communication line circuit between ECM and A/T control unit is open or shorted.) • A/T control unit

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
3) Wait at least 40 seconds or start engine and wait at least 40 seconds.

OR

GST

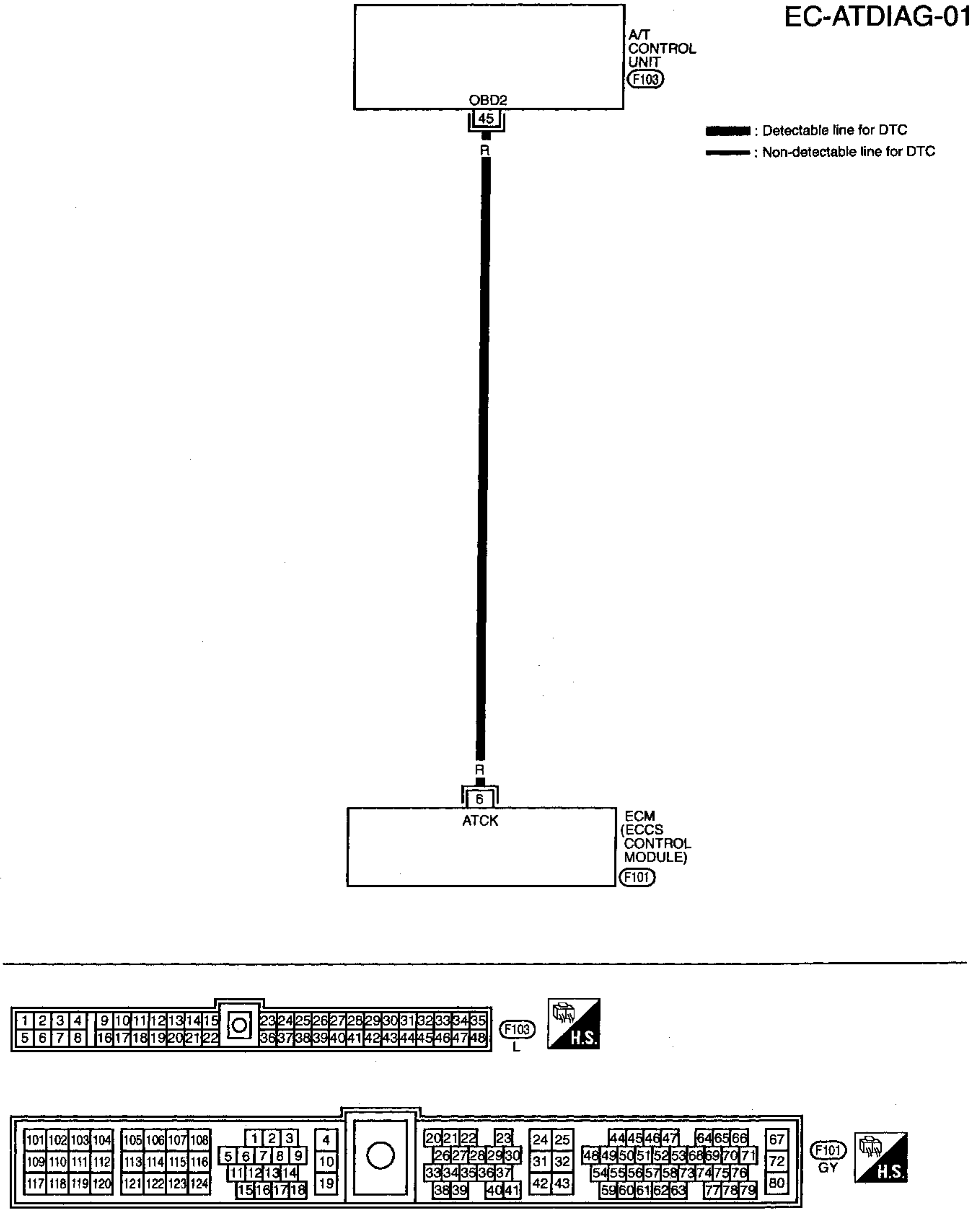
1) Turn ignition switch "ON".
2) Wait at least 40 seconds or start engine and wait at least 40 seconds.
3) Select "MODE 7" with GST.

OR

NO TOOLS

1) Turn ignition switch "ON".
2) Wait at least 40 seconds or 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.

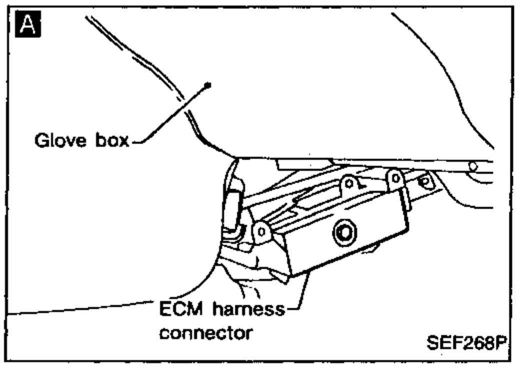
A/T Diagnosis Communication Line (Cont'd)

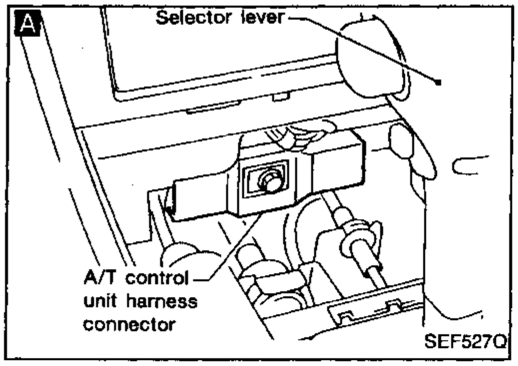


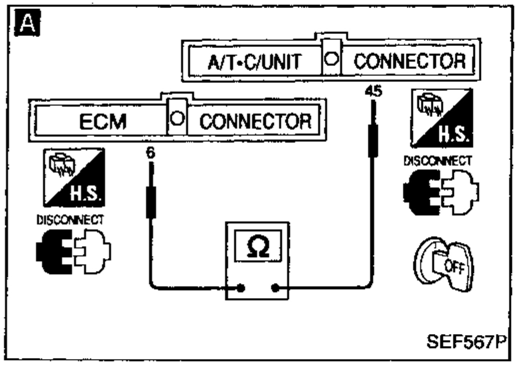
MEC093B

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 ⑥ and terminal ㊺.

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.

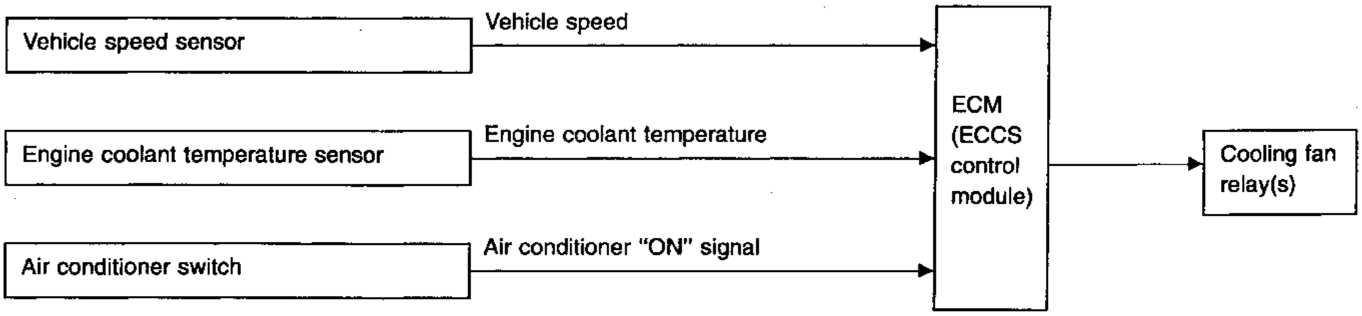
Check ECM and A/T control unit pin terminals for damage or the connection of ECM and A/T control unit harness connectors. Reconnect ECM and A/T control unit harness connectors and retest.

INSPECTION END

Overheat

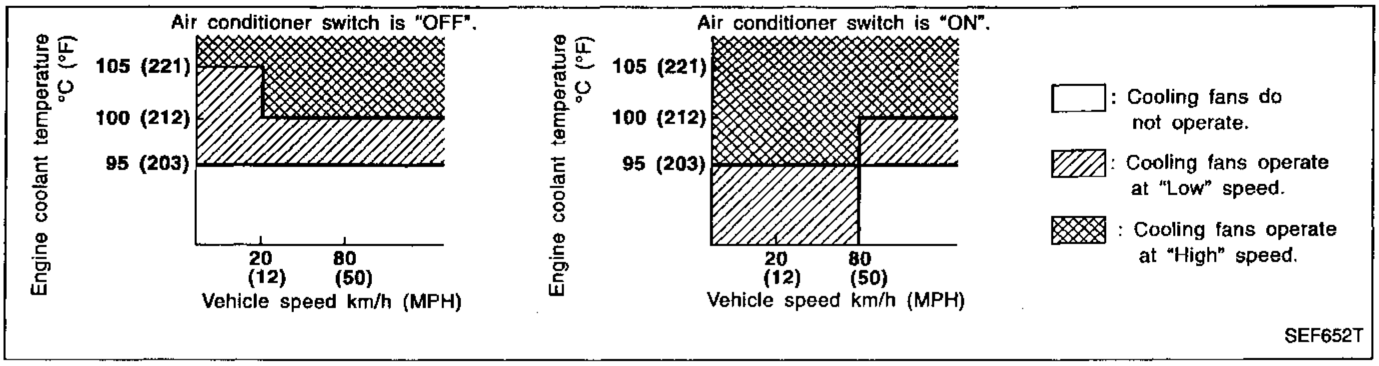
NOTE: Since this diagnosis does not meet P1900 of SAE J2012, it is indicated only by CONSULT.

SYSTEM DESCRIPTION



The ECM controls the cooling fan corresponding to the vehicle speed, engine coolant temperature and air conditioner ON signal. The control system has 3-step control [HIGH/LOW/OFF].

Operation



ECM TERMINALS AND REFERENCE VALUE

Remarks: Specification data are reference values, and are measured between each terminal and ㉕ (ECCS ground) with a voltmeter.

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
13 14	LG LG/R	Cooling fan relay (High) Cooling fan relay (Low)	Engine is running. └ Cooling fan is not operating.	BATTERY VOLTAGE (11 - 14V)
			Engine is running. └ Cooling fan is operating.	0 - 1V
59	Y	Engine coolant temperature sensor	Engine is running.	0 - 5.0V Output voltage varies with engine coolant temperature.

Overheat (Cont'd)

ON BOARD DIAGNOSIS LOGIC

If the cooling fan or another component in the cooling system malfunctions, the engine coolant temperature will rise.
When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is indicated.

Diagnostic trouble code No.	Malfunction is detected when ...	Check Items (Possible Cause)
OVERHEAT (P1900) 0208	• Engine coolant reaches an abnormally high temperature.	• Harness or connectors (The cooling fan circuit is open or shorted.) • Cooling fan • Radiator hose • Radiator • Radiator cap • Water pump • Thermostat For more information, refer to "MAIN 12 CAUSES OF OVERHEATING", (EC-350).

CAUTION:
When a malfunction is indicated, be sure to replace the coolant following the procedure in the MA section ("Changing Engine Coolant", "ENGINE MAINTENANCE"). Also, replace the engine oil.

a. Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute like pouring coolant by kettle. Be sure to use coolant with the proper mixture ratio. Refer to MA section ("Anti-freeze Coolant Mixture Ratio", "RECOMMENDED FLUIDS AND LUBRICANTS").

b. After refilling coolant, run engine to ensure that no water-flow noise is emitted.

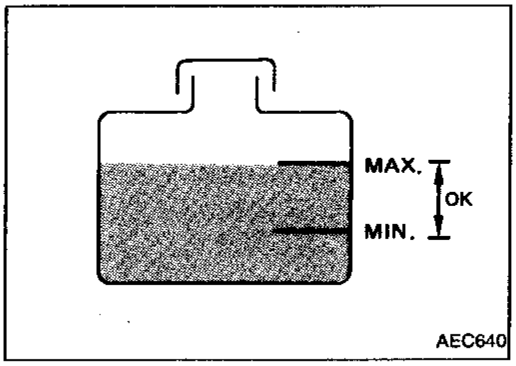
Overheat (Cont'd)

OVERALL FUNCTION CHECK

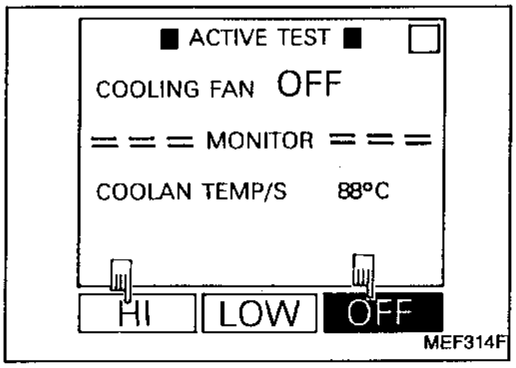
WARNING:

Never remove the radiator cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator.

Wrap a thick cloth around cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.



1) Check the coolant level in the reservoir tank and radiator.
   Allow engine to cool before checking coolant level.
   If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to "DIAGNOSTIC PROCEDURE", EC-344.
2) Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to "DIAGNOSTIC PROCEDURE", EC-344.



■ ACTIVE TEST ■

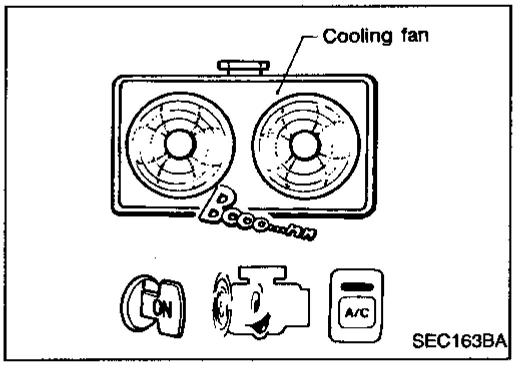
COOLING FAN OFF

=== MONITOR ===

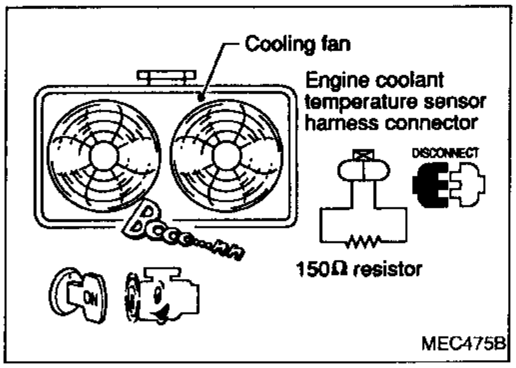
COOLAN TEMP/S 88°C

3) Turn ignition switch "ON".
4) Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT (LOW speed and HI speed).

OR



3) Start engine.
   Be careful not to overheat engine.
4) Set temperature control lever to full cold position.
5) Turn air conditioner switch "ON".
6) Turn blower fan switch "ON".
7) Run engine at idle for a few minutes with air conditioner operating.
   Be careful not to overheat engine.
8) Make sure that cooling fan operates at low speed.
9) Turn ignition switch "OFF".
10) Turn air conditioner switch and blower fan switch "OFF".



11) Disconnect engine coolant temperature sensor harness connector.
12) Connect 150Ω resistor to engine coolant temperature sensor harness connector.
13) Restart engine and make sure that cooling fan operates at higher speed than low speed.
    Be careful not to overheat engine.

GI
MA
EM
LC
EC
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CL
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RA
BR
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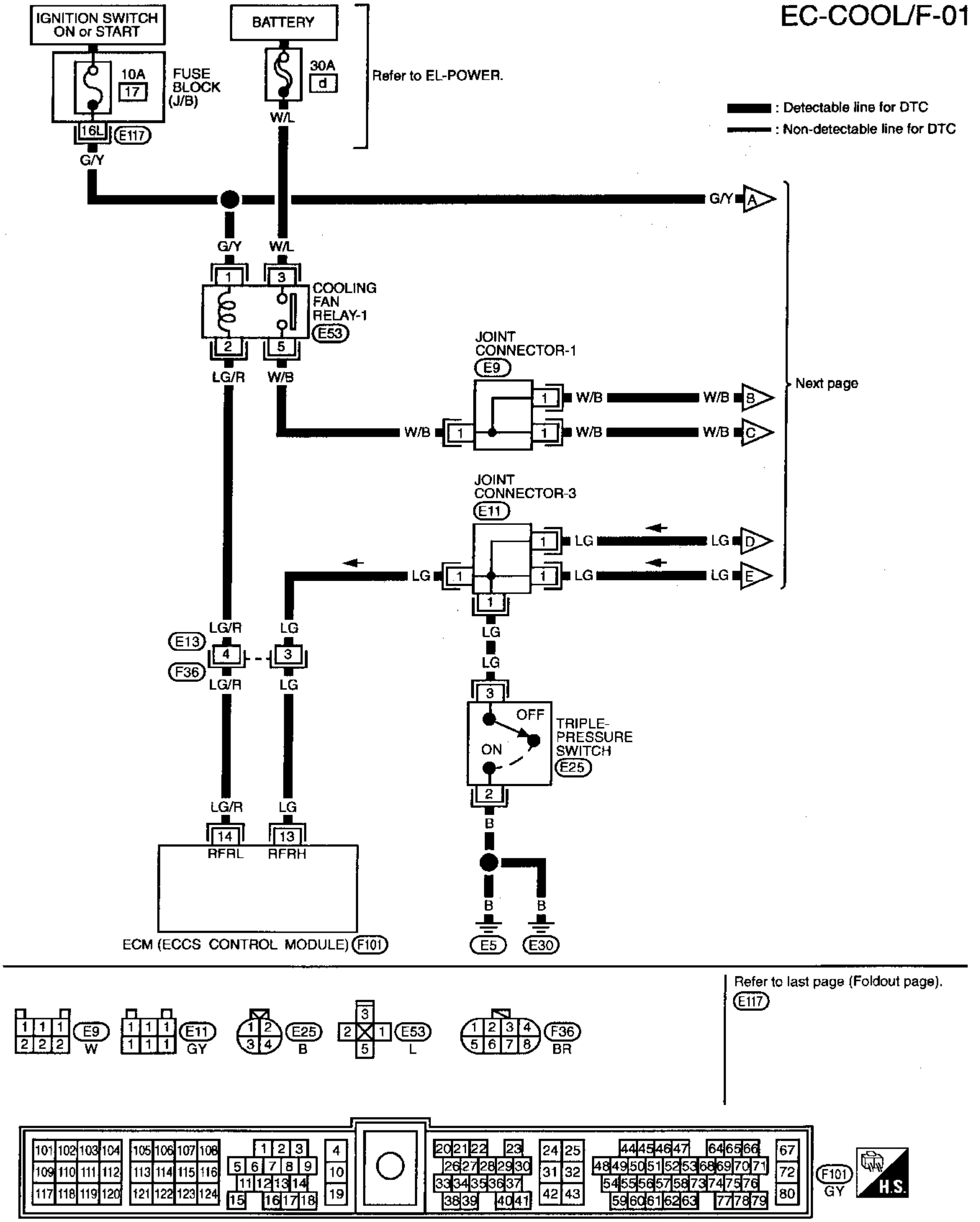
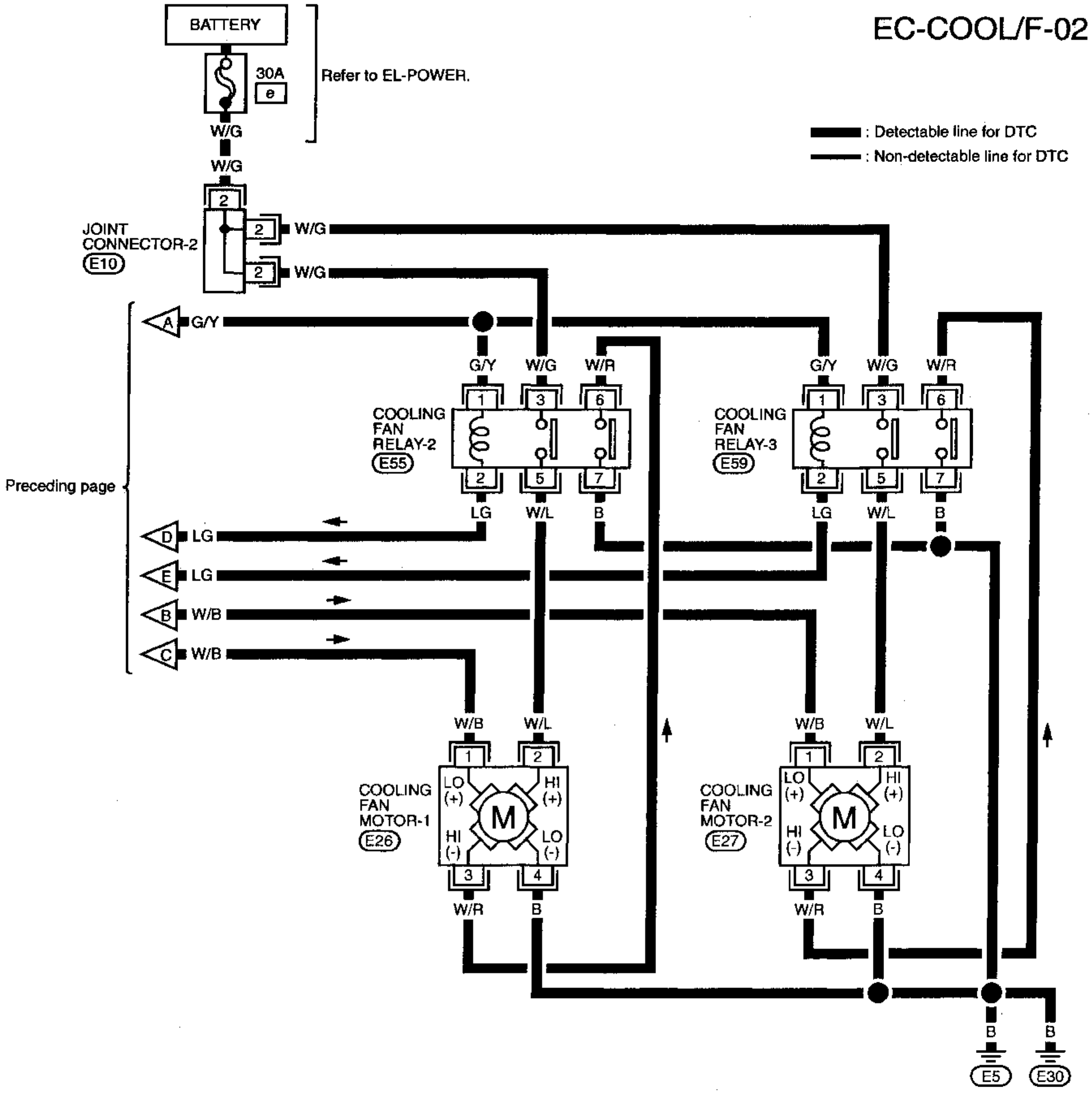
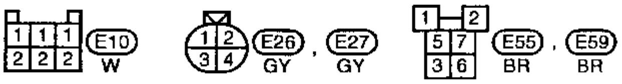
IDX


EC-COOL/F-01
IGNITION SWITCH ON or START
BATTERY
10A
17
FUSE BLOCK (J/B)
30A
d
Refer to EL-POWER.
16L
E117
G/Y
W/L
: Detectable line for DTC
: Non-detectable line for DTC
G/Y
A
G/Y
W/L
1
3
COOLING FAN RELAY-1
E53
2
5
LG/R
W/B
JOINT CONNECTOR-1
E9
1
W/B
W/B
B
W/B
1
1
W/B
W/B
C
Next page
JOINT CONNECTOR-3
E11
1
LG
LG
D
LG
1
1
LG
LG
E
1
LG
LG
3
OFF
ON
TRIPLE-PRESSURE SWITCH
E25
2
B
B
B
E5
E30
LG/R
LG
E13
4
3
F36
LG/R
LG
LG/R
LG
14
13
RFRL
RFRH
ECM (ECCS CONTROL MODULE)
F101
Refer to last page (Foldout page).
E117
E9
W
E11
GY
E25
B
E53
L
F36
BR
F101
GY
H.S.

SEF240T

Overheat (Cont'd)





SEF241T

Overheat (Cont'd)

DIAGNOSTIC PROCEDURE

INSPECTION START

A

CHECK COOLING FAN LOW SPEED OPERATION.

1. Disconnect cooling fan relay-2 and cooling fan relay-3.
2. Turn ignition switch "ON".
3. Perform "COOLING FAN CIRCUIT" in "FUNCTION TEST" mode with CONSULT.

OR

2. Turn ignition switch "ON".
3. Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT.

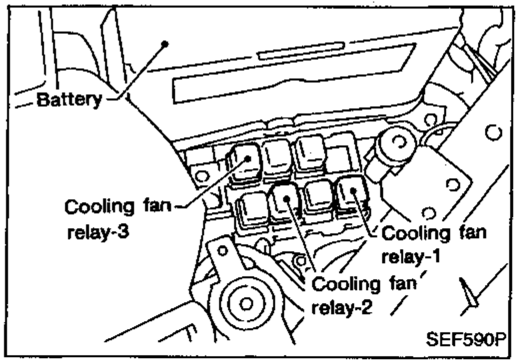
OR

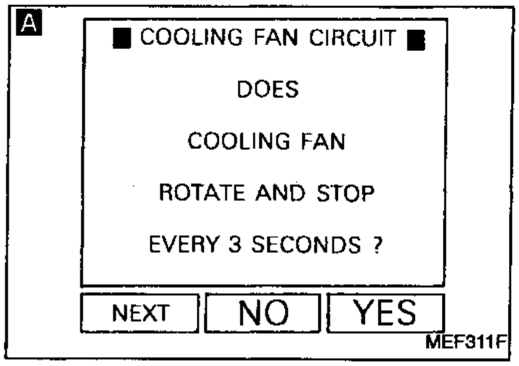
2. Start engine.
3. Set temperature lever at full cold position.
4. Turn air conditioner switch "ON".
5. Turn blower fan switch "ON".
6. Run engine at idle for a few minutes with air conditioner operating.
7. Make sure that cooling fan operates at low speed.

NG → Check cooling fan low speed control circuit. (Go to **PROCEDURE A**.)

OK ↓

Ⓐ





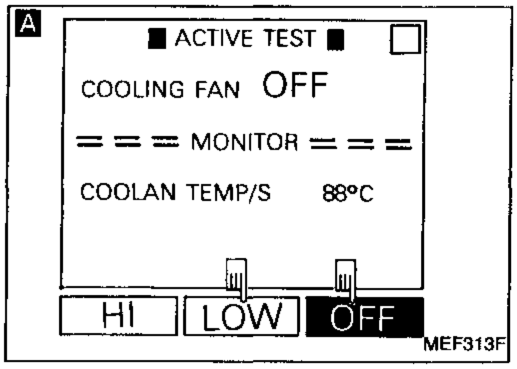
■ COOLING FAN CIRCUIT ■

DOES

COOLING FAN

ROTATE AND STOP

EVERY 3 SECONDS ?

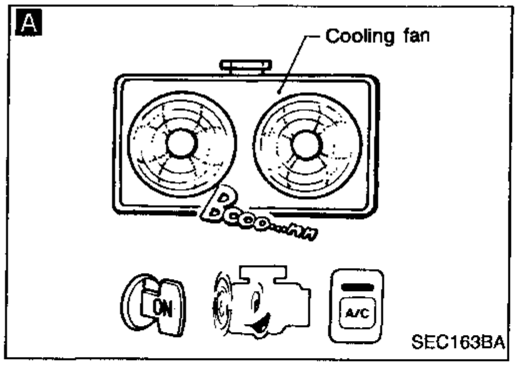


■ ACTIVE TEST ■ ☐

COOLING FAN OFF

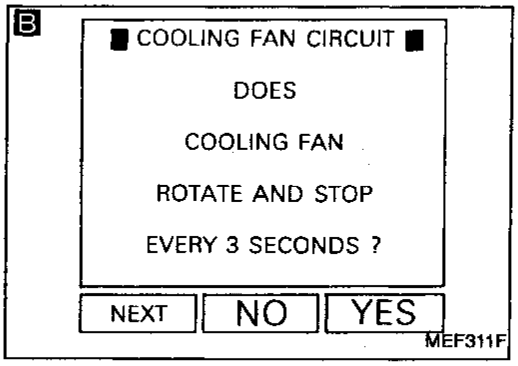
=== MONITOR ===

COOLAN TEMP/S 88°C



Overheat (Cont'd)

B


■ COOLING FAN CIRCUIT ■

DOES

COOLING FAN

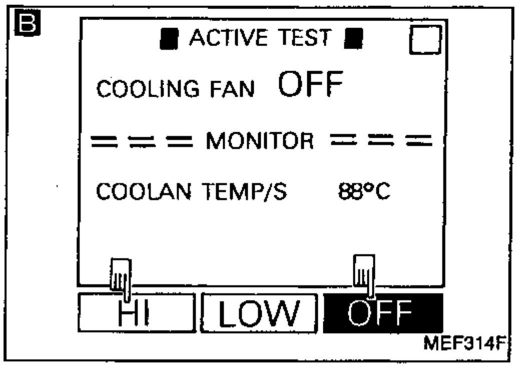
ROTATE AND STOP

EVERY 3 SECONDS ?

NEXT | NO | YES

MEF311F

B


■ ACTIVE TEST ■ ☐

COOLING FAN OFF

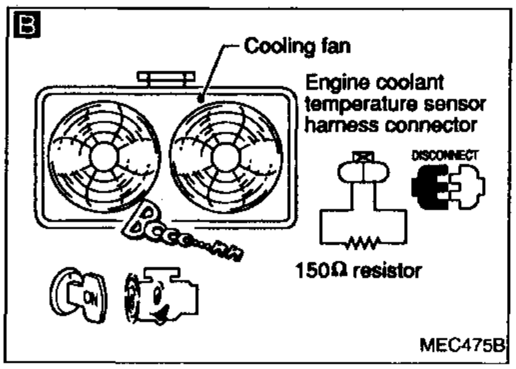
=== MONITOR ===

COOLAN TEMP/S 88°C

HI | LOW | OFF

MEF314F

B



MEC475B

Ⓐ

B

CHECK COOLING FAN HIGH SPEED OPERATION.
1. Turn ignition switch "OFF".
2. Reconnect cooling fan relay-2 and cooling fan relay-3.
3. Disconnect cooling fan relay-1.
4. Turn ignition switch "ON".
5. Perform "COOLING FAN CIRCUIT" in "FUNCTION TEST" mode with CONSULT.

OR

4. Turn ignition switch "ON".
5. Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT.

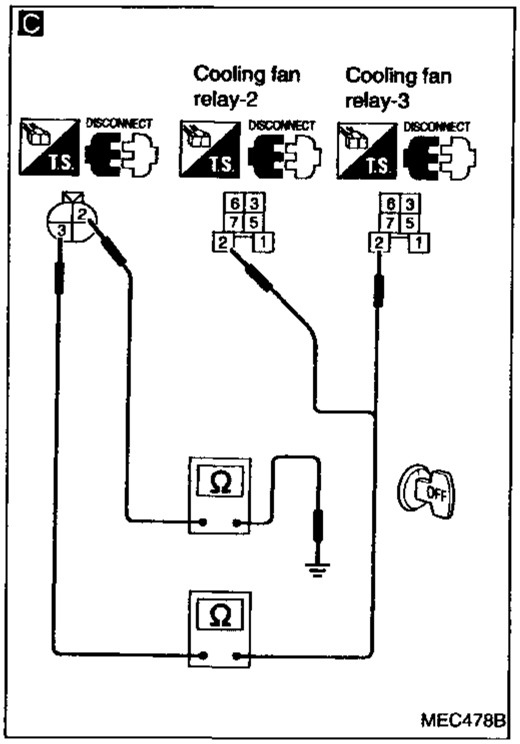
OR

4. Turn air conditioner switch and blower fan switch "OFF".
5. Disconnect engine coolant temperature sensor harness connector.
6. Connect 150Ω resistor to engine coolant temperature sensor harness connector.
7. Restart engine and make sure that cooling fan operates at higher speed than low speed.

NG → Check cooling fan high speed control circuit. (Go to **PROCEDURE B**.)

OK ↓

C



MEC478B

C

CHECK HARNESS CONTINUITY BETWEEN COOLING FAN RELAYS-2, 3 AND GROUND.
1. Turn ignition switch "OFF".
2. Disconnect cooling fan relays-2, 3.
3. Disconnect triple-pressure switch harness connector.
4. Check harness continuity between terminal ② and terminal ③, terminal ② and body ground.
Continuity should exist.
If OK, check harness for short.

NG → Check the following.
- Joint connector-3 (E17)
- Harness for open or short between cooling fan relays-2, 3 and triple-pressure switch
- Harness for open or short between triple-pressure switch and body ground

If NG, repair harness or connectors.

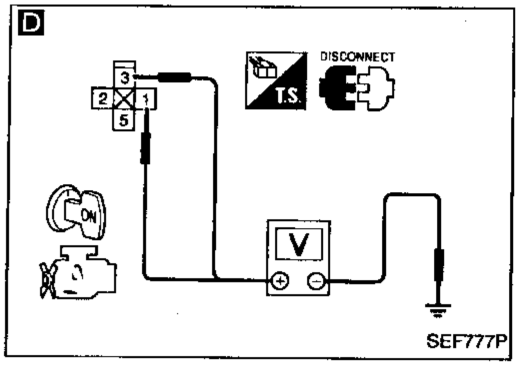
OK ↓

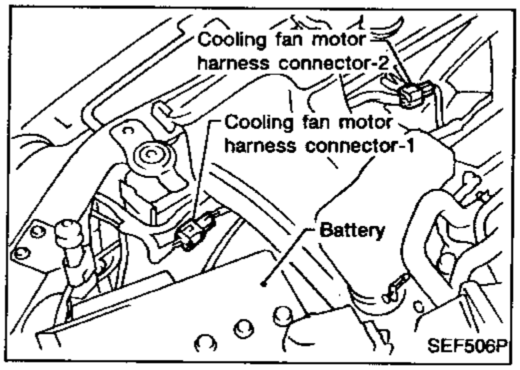
CHECK COMPONENT (Triple-pressure switch).
Refer to HA section ("Electrical Components Inspection", "TROUBLE DIAGNOSES").

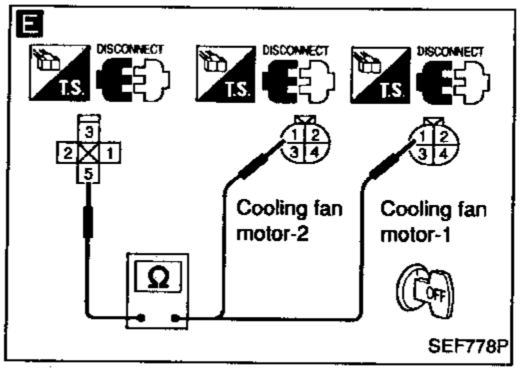
NG → Replace triple-pressure switch.

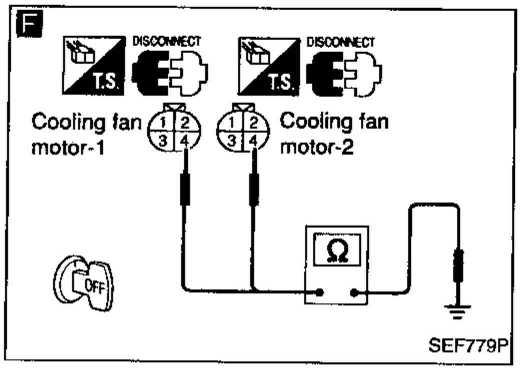
OK ↓

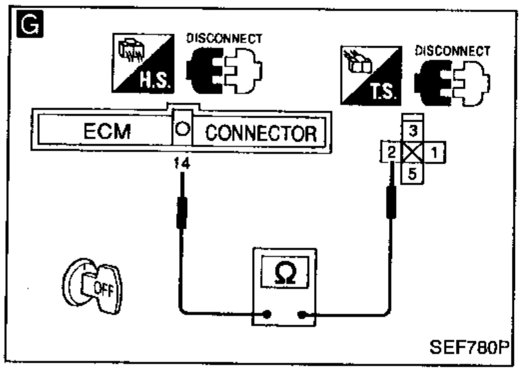
Ⓑ
(Go to EC-349.)











PROCEDURE A

INSPECTION START

↓

D

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

NG → Check the following.
- 10A fuse
- 30A fusible links
- Harness for open or short between cooling fan relay-1 and fuse
- Harness for open or short between cooling fan relay-1 and battery

If NG, repair harness or connectors.

OK ↓

CHECK GROUND CIRCUIT.
1. Turn ignition switch "OFF".
2. Disconnect cooling fan motor-1 harness connector and cooling fan motor-2 harness connector.
3. **E** Check harness continuity between terminal ⑤ and terminal ①, terminal ⑤ and terminal ①.
Continuity should exist.
If OK, check harness for short.
4. **F** Check harness continuity between terminal ④ and body ground.
Continuity should exist.
If OK, check harness for short.

NG → Check the following.
- Joint connector-1 (E9)
- Harness for open or short between cooling fan relay-1 and cooling fan motors

If NG, repair harness or connectors.

OK ↓

G

CHECK OUTPUT SIGNAL CIRCUIT.
1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal ⑭ and terminal ②.
Continuity should exist.
If OK, check harness for short.

NG → Check the following.
- Harness connectors (F36), (E13)
- Harness for open or short between cooling fan relay-1 and ECM

If NG, repair harness or connectors.

OK ↓

CHECK COMPONENT
(Cooling fan relay-1).
Refer to "COMPONENT INSPECTION", EC-351.

NG → Replace cooling fan relay.

OK ↓

Ⓒ

Overheat (Cont'd)

Ⓒ

CHECK COMPONENT
(Cooling fan motors).
Refer to "COMPONENT INSPECTION", EC-351.

NG → Replace cooling fan motors.

OK ↓

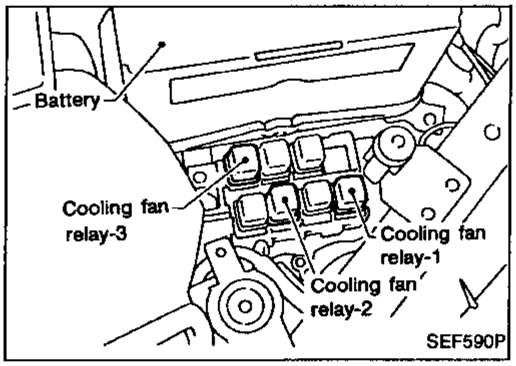
Disconnect and reconnect harness connectors in the circuit. Then retest.

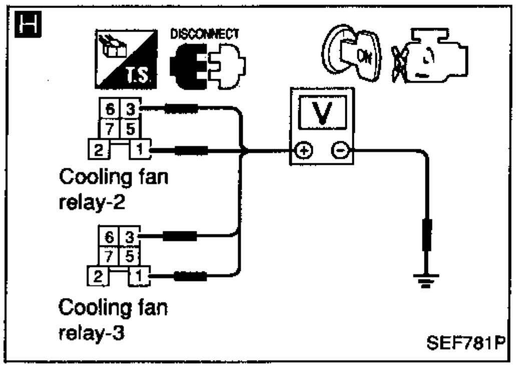
Trouble is not fixed. ↓

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

↓

INSPECTION END





PROCEDURE B

INSPECTION START

↓

H

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

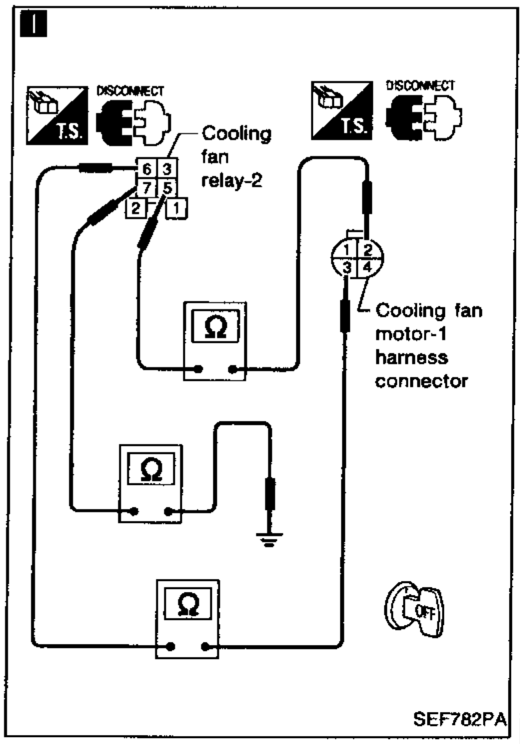
NG → Check the following.
- Joint connector-2 (E10)
- 30A fusible links
- Harness for open or short between cooling fan relay-2, 3 and fuse
- Harness for open or short between cooling fan relay-2, 3 and battery

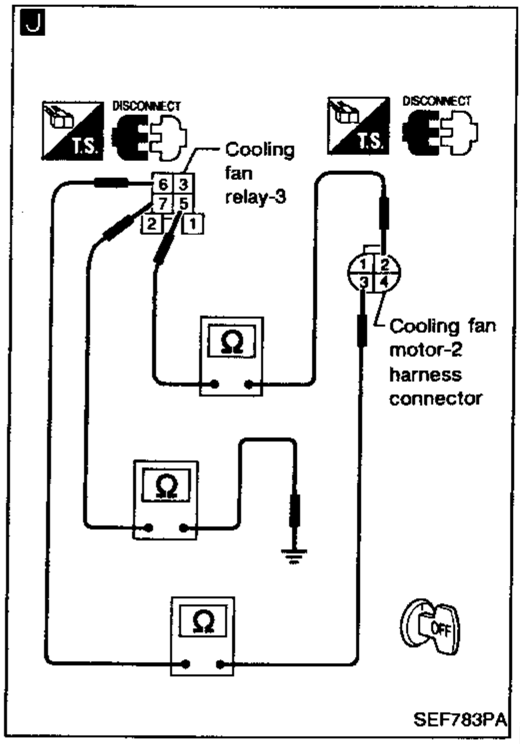
If NG, repair harness or connectors.

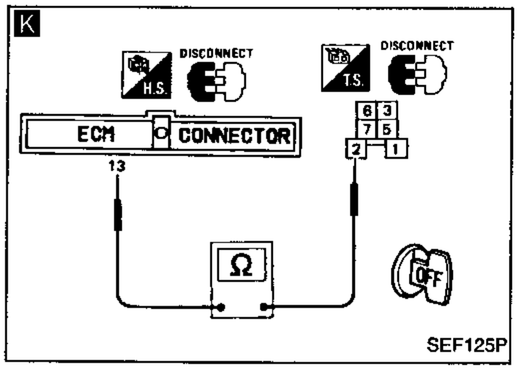
OK ↓

Ⓓ

Overheat (Cont'd)







Ⓓ

CHECK GROUND CIRCUIT.
1. Turn ignition switch "OFF".
2. Disconnect cooling fan motor-1 harness connector and cooling fan motor-2 harness connector.

I 3. Check harness continuity between terminal ⑤ and terminal ②, terminal ⑥ and terminal ③, terminal ⑦ and body ground.
Continuity should exist.
If OK, check harness for short.

J 4. Check harness continuity between terminal ⑤ and terminal ②, terminal ⑥ and terminal ③, terminal ⑦ and body ground.
Continuity should exist.
If OK, check harness for short.

NG → Repair harness or connectors.

OK

K

CHECK OUTPUT SIGNAL CIRCUIT.
1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal ⑬ and terminal ②.
Continuity should exist.
If OK, check harness for short.

NG → Check the following.
- Harness connectors (F36), (E13)
- Joint connector-3 (E11)
- Harness for open or short between cooling fan relay-2, 3 and ECM

If NG, repair harness or connectors.

OK

CHECK COMPONENT
(Cooling fan relay-2, 3).
Refer to "COMPONENT INSPECTION", EC-351.

NG → Replace cooling fan relays.

OK

CHECK COMPONENTS
(Cooling fan motors).
Refer to "COMPONENT INSPECTION", EC-351.

NG → Replace cooling fan motors.

OK

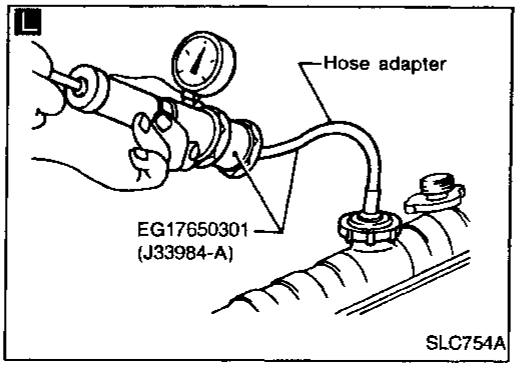
Disconnect and reconnect harness connectors in the circuit. Then retest.

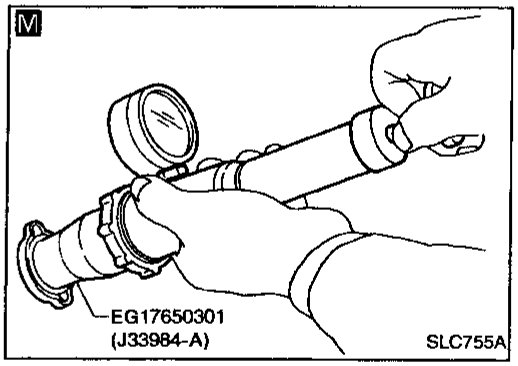
Trouble is not fixed.

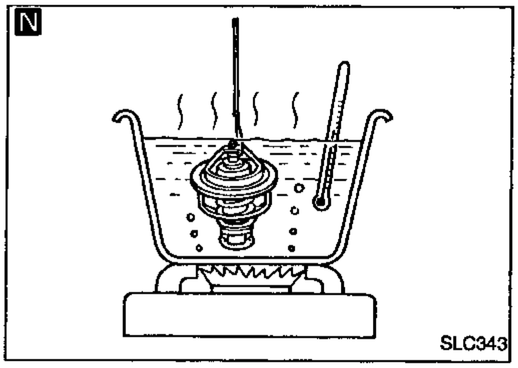
Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

INSPECTION END

Overheat (Cont'd)







Ⓑ

L

CHECK COOLING SYSTEM FOR LEAK.
Apply pressure to the cooling system with a tester, and check if the pressure drops.
Testing pressure:
157 kPa (1.6 kg/cm², 23 psi)
Pressure should not drop.
CAUTION:
Higher than the specified pressure may cause radiator damage.

NG → Check the following for leak.
- Hose
- Radiator
- Water pump

(Refer to "Water Pump" in LC section.)

OK

M

CHECK RADIATOR CAP.
Apply pressure to cap with a tester.
Radiator cap relief pressure:
78 - 98 kPa (0.8 - 1.0 kg/cm², 11 - 14 psi)

NG → Replace radiator cap.

OK

N

CHECK THERMOSTAT.
1. Check valve seating condition at normal room temperatures. It should seat tightly.
2. Check valve opening temperature and maximum valve lift.
   Valve opening temperature:
   76.5°C (170°F) [standard]
   Maximum valve lift:
   100 mm/90°C
   (3.94 in/194°F)
3. Check if valve is closed at 5°C (9°F) below valve opening temperature.

For details, refer to "Thermostat" in LC section.

NG → Replace thermostat

OK

Check engine coolant temperature sensor.
Refer to "COMPONENT INSPECTION", EC-125.

NG → Replace engine coolant temperature sensor.

OK

If the cause can not be isolated, go to "MAIN 12 CAUSES OF OVERHEATING", EC-350.

INSPECTION END

Perform FINAL CHECK by the following procedure after repair is completed.

1. Warm up engine. Run the vehicle at least 20 minutes. Pay attention to engine coolant temperature gauge on the instrument panel. If the reading shows an abnormally high temperature, another part may be malfunctioning.
2. Stop vehicle and let engine idle. Check the intake and exhaust systems for leaks by listening for noise or visually inspecting the components.
3. Allow engine to cool and visually check for oil and coolant leaks. Then, perform "OVERALL FUNCTION CHECK".

Overheat (Cont'd)

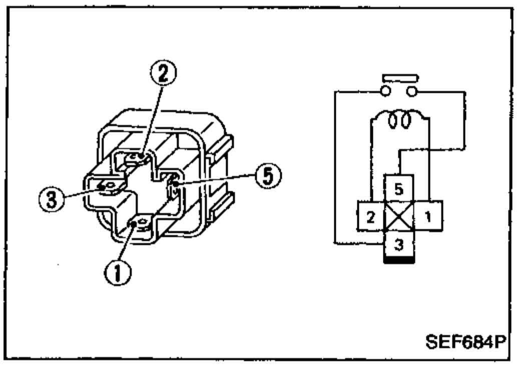
MAIN 12 CAUSES OF OVERHEATING

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	• Blocked radiator • Blocked condenser • Blocked radiator grille • Blocked bumper	• Visual	No blocking	—
	2	• Coolant mixture	• Coolant tester	50 - 50% coolant mixture	See "RECOMMENDED FLUIDS AND LUBRICANTS" in MA section
	3	• Coolant level	• Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	See "Changing Engine Coolant", "ENGINE MAINTENANCE" in MA section
	4	• Radiator cap	• Pressure tester	78 - 98 kPa ($0.8 - 1.0\ kg/cm^2$, 11 - 14 psi) 59 - 98 kPa ($0.6 - 1.0\ kg/cm^2$, 9 - 14 psi) (Limit)	See "System Check" "ENGINE COOLING SYSTEM" in LC section
ON*2	5	• Coolant leaks	• Visual	No leaks	See "System Check" "ENGINE COOLING SYSTEM" in LC section
ON*2	6	• Thermostat	• Touch the upper and lower radiator hoses	Both hoses should be hot	See "Thermostat" and "Radiator", "ENGINE COOLING SYSTEM" in LC section
ON*1	7	• Cooling fan	• CONSULT	Operating	See "TROUBLE DIAGNOSIS FOR DTC 1308" (EC-339)
OFF	8	• Combustion gas leak	• Color checker chemical tester 4 Gas analyzer	Negative	—
ON*3	9	• Coolant temperature gauge	• Visual	Gauge less than 3/4 when driving	—
		• Coolant overflow to reservoir tank	• Visual	No overflow during driving and idling	See "Changing Engine Coolant", "ENGINE MAINTENANCE" in MA section
OFF*4	10	• Coolant return from reservoir tank to radiator	• Visual	Should be initial level in reservoir tank	See "ENGINE MAINTENANCE" in MA section
OFF	11	• Cylinder head	• Straight gauge feeler gauge	0.1mm (0.004 in) Maximum distortion (warping)	See "Inspection", "CYLINDER HEAD" in EM section
	12	• Cylinder block and pistons	• Visual	No scuffing on cylinder walls or piston	See "Inspection", "CYLINDER BLOCK" in EM section

*1: Turn the ignition switch ON.
*2: Engine running at 3,000 rpm for 10 minutes.
*3: Drive at 90 km/h (55 MPH) for 30 minutes and then let idle for 10 minutes.
*4: After 60 minutes of cool down time.
For more information, refer to "OVERHEATING CAUSE ANALYSIS" in LC section.

Overheat (Cont'd)

COMPONENT INSPECTION

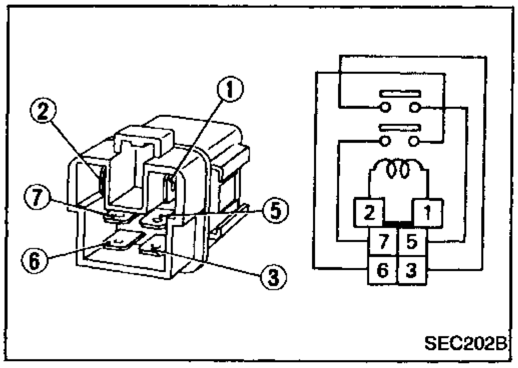


SEF684P

Cooling fan relay-1

Check continuity between terminals ③ and ⑤.

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



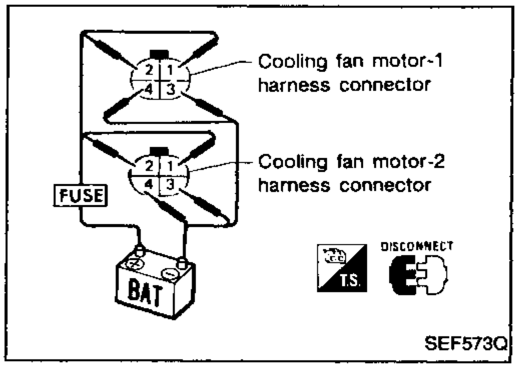
SEC202B

Cooling fan relays-2 and -3

Check continuity between terminals ③ and ⑤, ⑥ and ⑦.

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

If NG, replace relay.



SEF573Q

Cooling fan motors-1 and -2

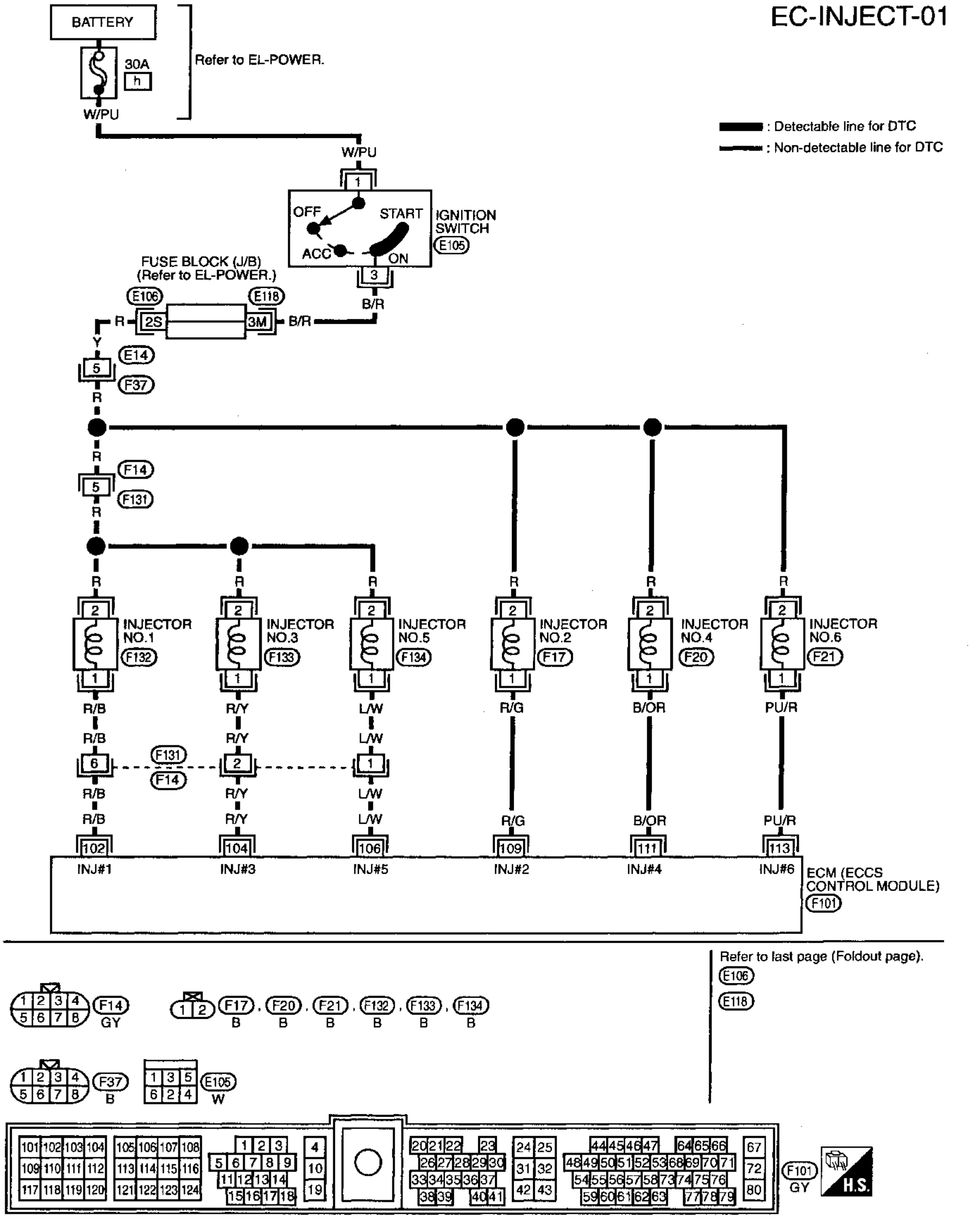
1. Disconnect cooling fan motor harness connectors.
2. Supply cooling fan motor terminals with battery voltage and check operation.

	Speed	Terminals	
		(⊕)	(⊖)
Cooling fan motor-1	Low	①	④
	High	①, ②	③, ④
Cooling fan motor-2	Low	①	④
	High	①, ②	③, ④

Cooling fan motor should operate.

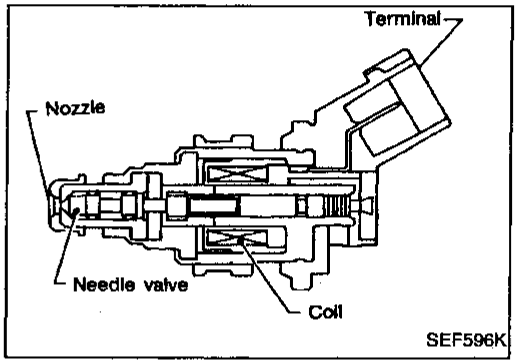
If NG, replace cooling fan motor.

Injector



SEF242T

Injector (Cont'd)



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.

CONSULT REFERENCE VALUE IN DATA MONITOR MODE

- Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
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.

ECM TERMINALS AND REFERENCE VALUE

Remarks: Specification data are reference values, and are measured between each terminal and ㉕ (ECCS ground) with a voltmeter.

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
102	R/B	Injector No. 1	Engine is running. Idle speed	BATTERY VOLTAGE (11 - 14V)
104	R/Y	Injector No. 3		
106	L/W	Injector No. 5		
109	R/G	Injector No. 2		
111	B/OR	Injector No. 4		
113	PU/R	Injector No. 6		

GI
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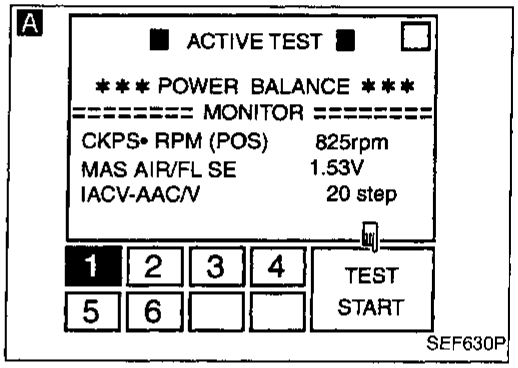
Injector (Cont'd)



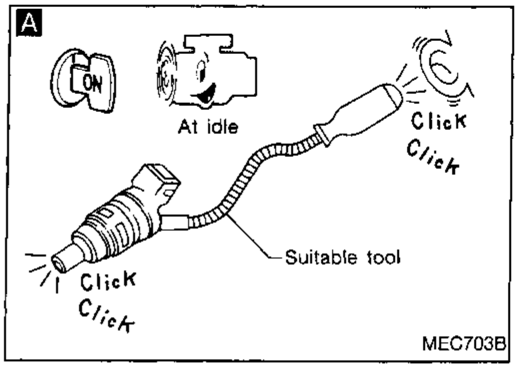
■ ACTIVE TEST ■ ☐

*** POWER BALANCE ***

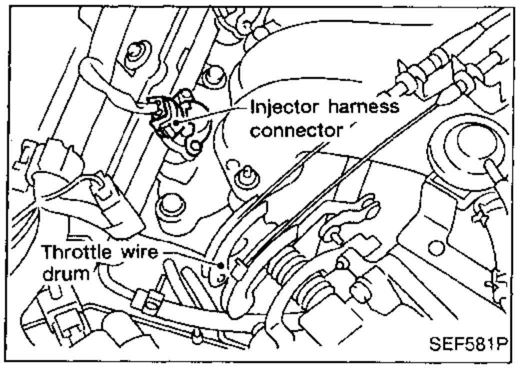
======== MONITOR ========

CKPS• RPM (POS)	825rpm
MAS AIR/FL SE	1.53V
IACV-AAC/V	20 step

SEF630P



MEC703B



SEF581P

INSPECTION START

↓

A

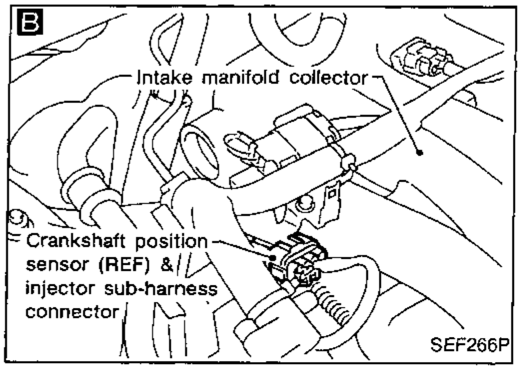
CHECK OVERALL FUNCTION.
1. Start engine.
2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.
3. Make sure that each circuit produces a momentary engine speed drop.

OR

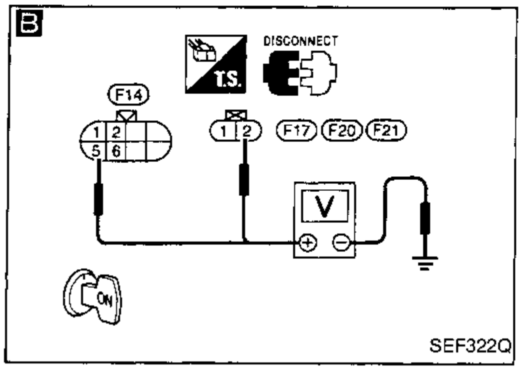
2. Listen to each injector operating sound.
Clicking noise should be heard.

OK → INSPECTION END

↓ NG



SEF266P



SEF322Q

B

CHECK POWER SUPPLY.
1. Stop engine.
2. Disconnect injector harness connectors (left bank) and injector sub-harness connector (right bank).
3. Turn ignition switch "ON".
4. Check voltage between terminal ② (left bank), ⑤ (right bank) and ground with CONSULT or tester.
Voltage: Battery voltage

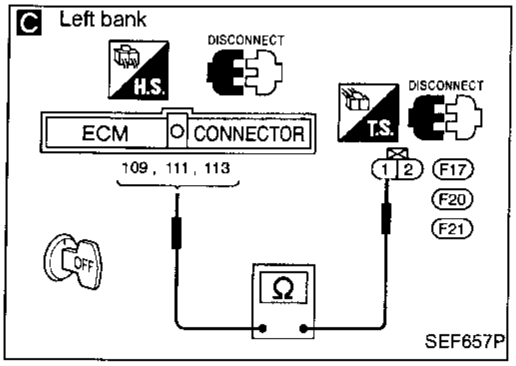
NG → Check the following.
- Harness connectors (F37), (E14)
- 10A fuse

If NG, repair harness or connectors.

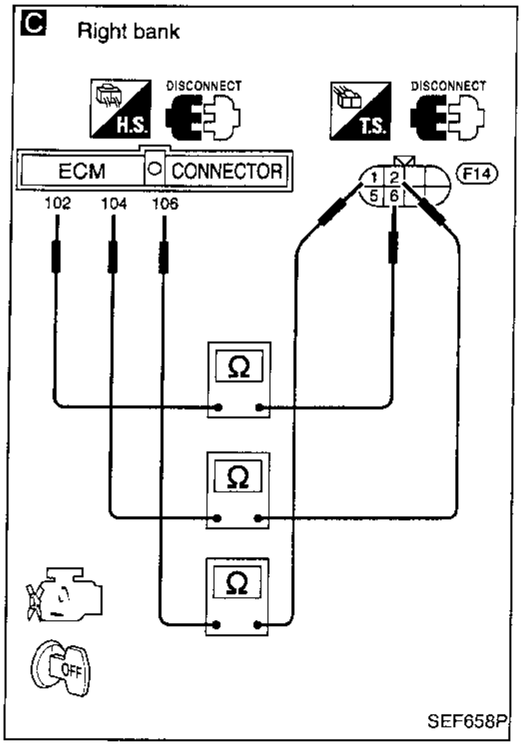
↓ OK

Ⓐ

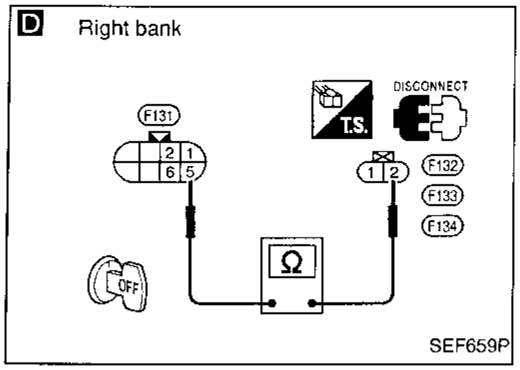
Injector (Cont'd)



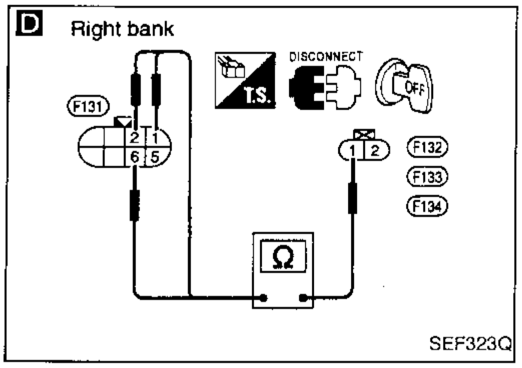
SEF657P



SEF658P



SEF659P



SEF323Q

Ⓐ

C

CHECK OUTPUT SIGNAL CIRCUIT.
1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between the following terminals and ECM terminals.
   Left bank:
   ① and (109), (111), (113)
   Right bank:
   ⑥ and (102),
   ② and (104),
   ① and (106)
   Continuity should exist.
   If OK, check harness for short.

NG → Repair harness or connectors.

OK

D

CHECK POWER SUPPLY CIRCUIT AND OUTPUT SIGNAL CIRCUIT (FOR RIGHT BANK).
1. Remove intake manifold collector.
2. Disconnect injector sub-harness connector.
3. Check harness continuity between terminal ⑤ and terminal ②.
   Continuity should exist.
   If OK, check harness for short.
4. Check harness continuity between terminal ① and terminals ①, ②, ⑥.
   Continuity should exist.
   If OK, check harness for short.

NG → Repair harness or connectors.

OK

Ⓑ

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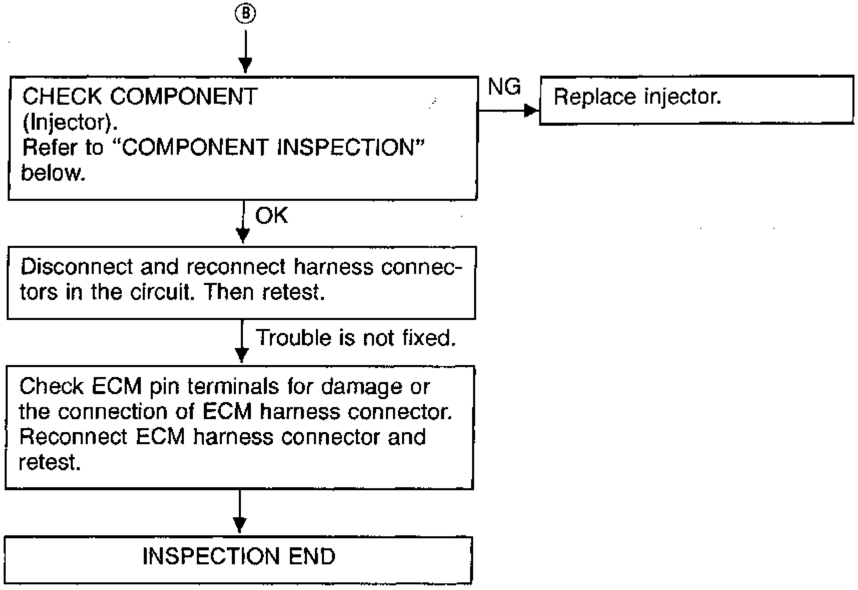
Injector (Cont'd)



Ⓑ

CHECK COMPONENT (Injector). Refer to "COMPONENT INSPECTION" below.

NG

Replace injector.

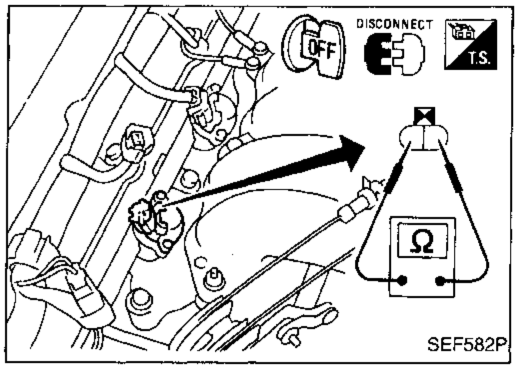
OK

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



SEF582P

COMPONENT INSPECTION

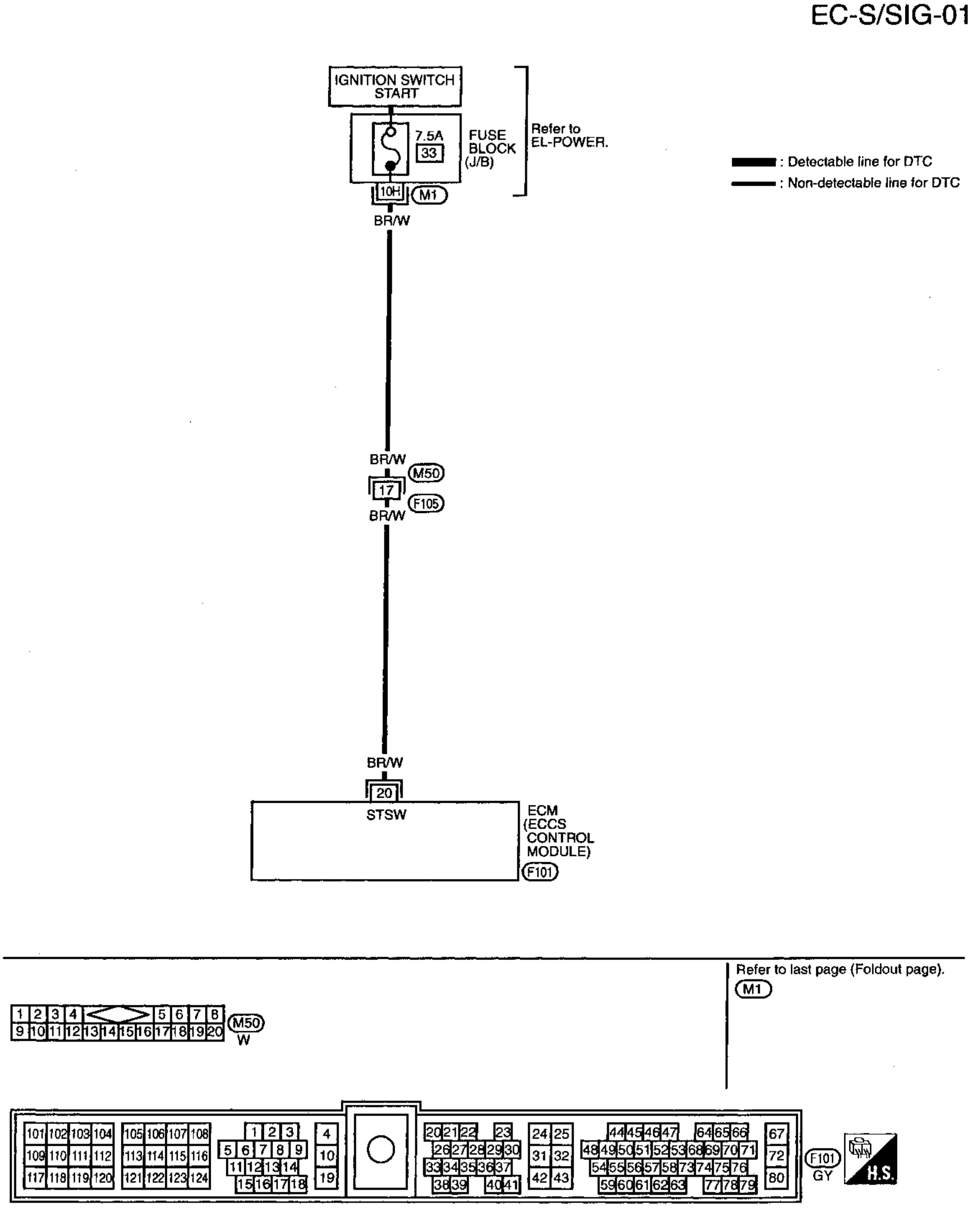
Injector

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

   Resistance: 10 - 14Ω at 25°C (77°F)

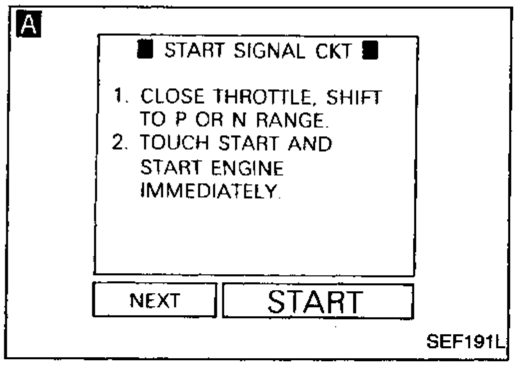
   If NG, replace injector.

Start Signal



MEC675B

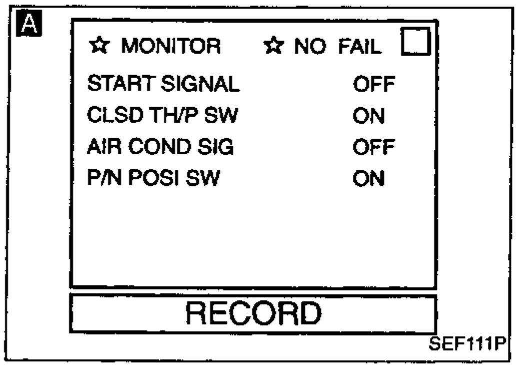
Start Signal (Cont'd)



■ START SIGNAL CKT ■

1. CLOSE THROTTLE, SHIFT TO P OR N RANGE.
2. TOUCH START AND START ENGINE IMMEDIATELY.

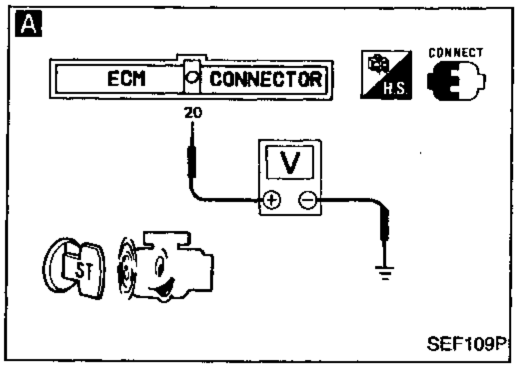
SEF191L



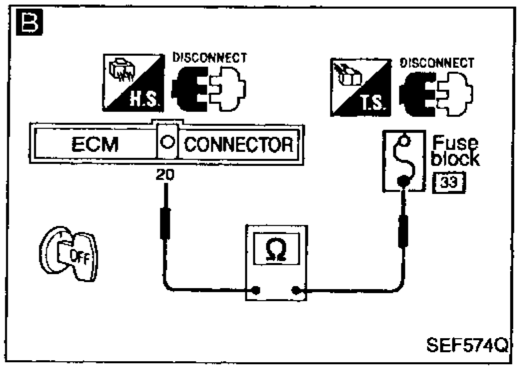
☆ MONITOR ☆ NO FAIL ☐

START SIGNAL	OFF
CLSD TH/P SW	ON
AIR COND SIG	OFF
P/N POSI SW	ON

SEF111P



SEF109P



SEF574Q

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 (M50), (F105)
- 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.

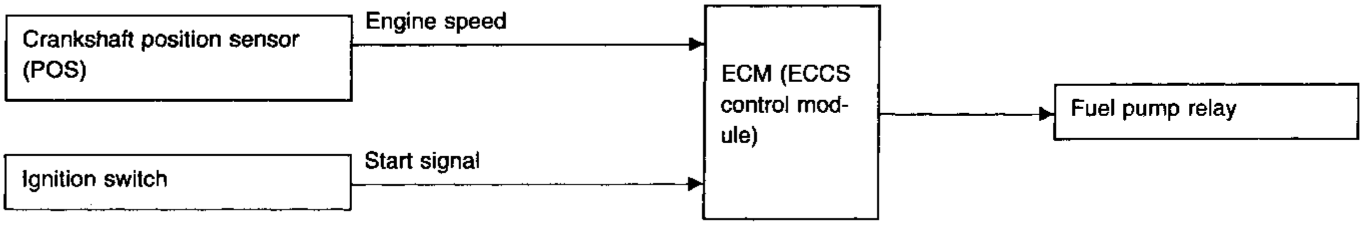
Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

↓

INSPECTION END

Fuel Pump Control

SYSTEM DESCRIPTION



Fuel pump ON-OFF control

The ECM activates the fuel pump for several seconds after the ignition switch is turned ON to improve engine start-up. If the ECM receives a 1° signal from the crankshaft position sensor (POS), it knows that the engine is rotating, and causes the pump to activate. If the 1° signal is not received when the ignition switch is ON, the engine stalls. The ECM stops pump operation and prevents the battery from discharging, thereby improving safety. The ECM does not directly drive the fuel pump. It controls the ON/OFF fuel pump relay, which in turn controls the fuel pump.

Condition	Fuel pump operation
Ignition switch is turned to ON.	Operates for 1 second
Engine running and cranking	Operates
Except as shown above	Stops

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 1 second) • Engine running and cranking		ON
	Except as shown above		OFF
FPCM DR VOLT	• Engine: After warming up	Within 30 seconds of starting engine	Approx. 0V
		More than 30 seconds after starting engine	Approx. 3.5V
FPCM	• Engine: After warming up	Within 30 seconds of starting engine	HI
		More than 30 seconds after starting engine	LOW

Fuel Pump Control (Cont'd)

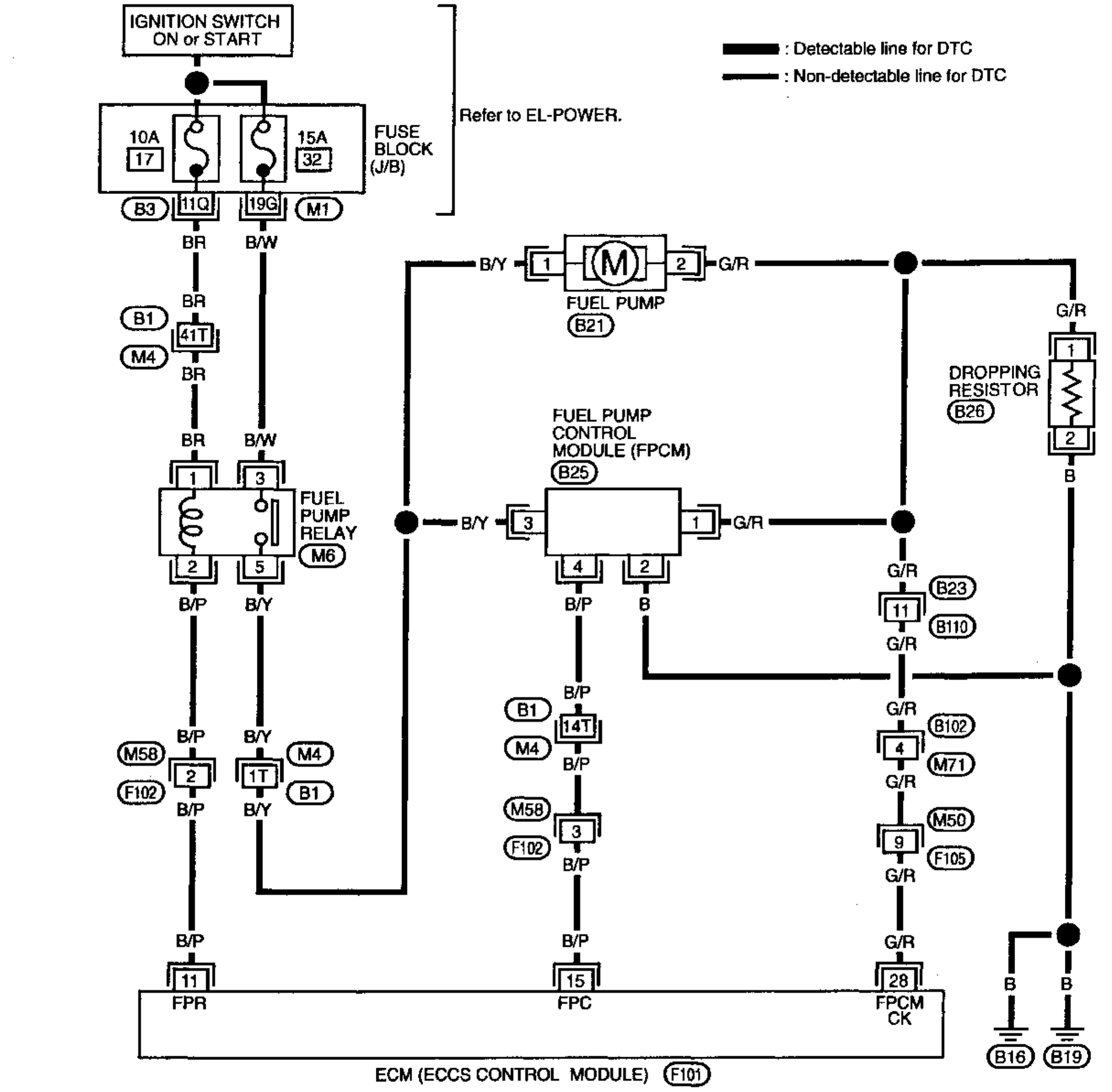
ECM TERMINALS AND REFERENCE VALUE

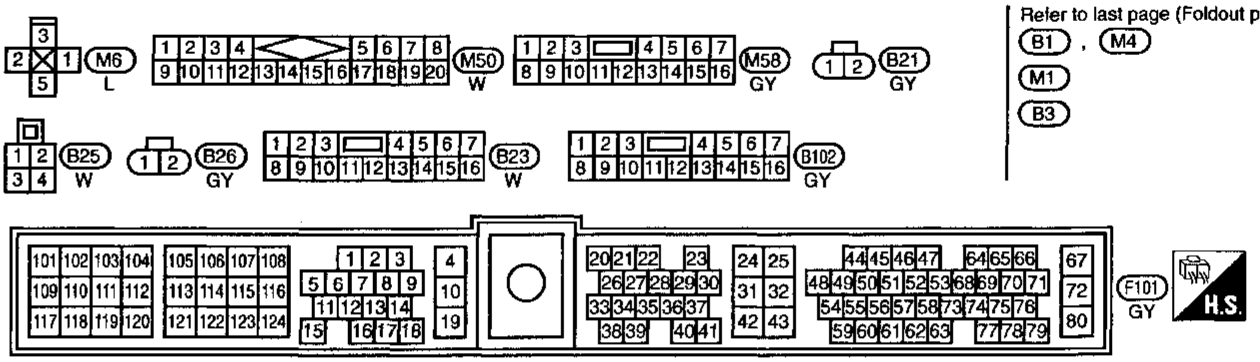
Remarks: Specification data are reference values, and are measured between each terminal and ㉕ (ECCS ground) with a voltmeter.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
11	B/P	Fuel pump relay	Ignition switch "ON" └ For 1 second after turning ignition switch "ON" Engine is running.	0 - 1V
			Ignition switch "ON" └ 1 second after turning ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
15	B/P	Fuel pump control module	Engine is running. (Warm-up condition) └ Idle speed (within 30 seconds after starting engine)	0 - 0.4V
			Engine is running. (Warm-up condition) └ Idle speed (30 seconds after starting engine and thereafter)	Approximately 10V
28	G/R	Fuel pump control module check	Engine is running. (Warm-up condition) └ Idle speed (within 30 seconds after starting engine)	0 - 0.4V
			Engine is running. └ Idle speed (30 seconds after starting engine and thereafter)	3.3 - 3.8V

Fuel Pump Control (Cont'd)

EC-F/PUMP-01

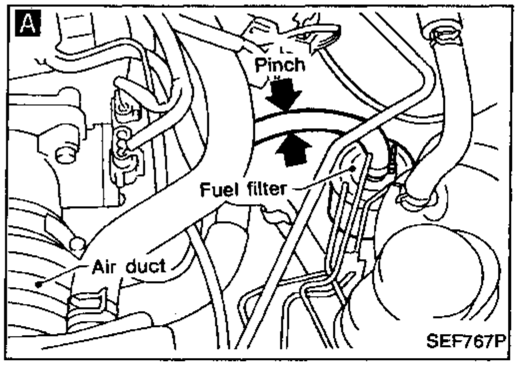


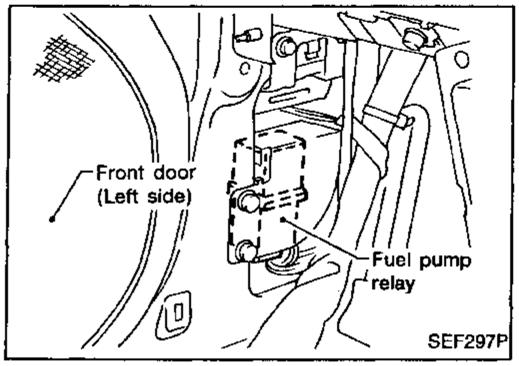


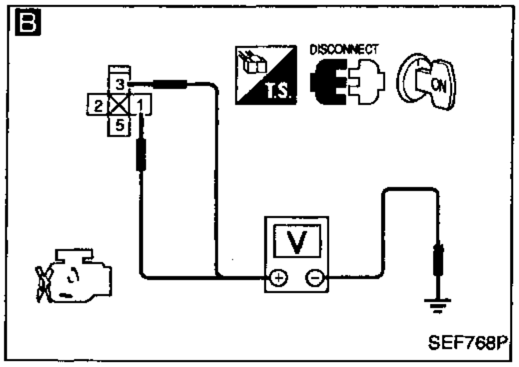
Refer to last page (Foldout page).
B1, M4
M1
B3

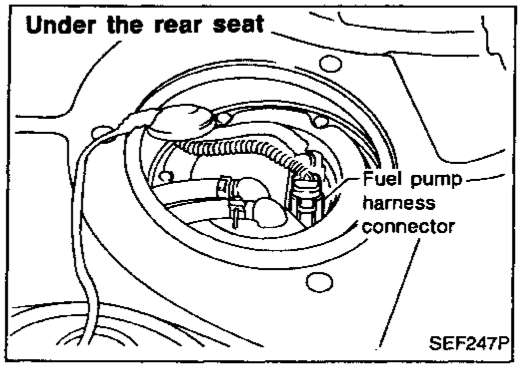
SEF243T

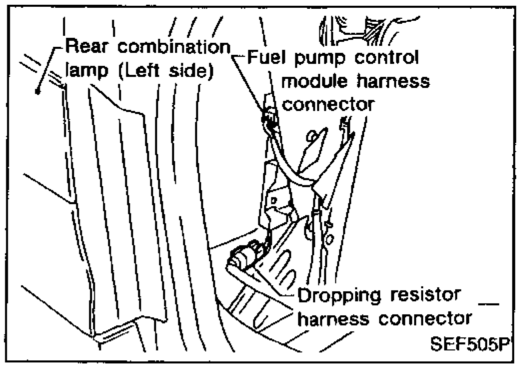
Fuel Pump Control (Cont'd)











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 1 second after ignition switch is turned "ON".

OK → INSPECTION END

NG ↓

B

CHECK POWER SUPPLY.
1) Turn ignition switch "OFF".
2) Disconnect fuel pump relay.
3) Turn ignition switch "ON".
4) Check voltage between terminals ①, ③ and ground with CONSULT or tester.
Voltage: Battery voltage

NG → Check the following.
- Harness connectors M4, B1
- 15A fuse
- 10A fuse
- Harness for open or short between fuse and fuel pump relay

If NG, repair harness or connectors.

OK ↓

C

CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect fuel pump harness connector and dropping resistor harness connector.
3) Check harness continuity between terminal ⑤ and terminal ①, terminal ② and terminal ①.
Continuity should exist.
If OK, check harness for short.

NG → Check the following.
- Harness connectors M4, B1
- Harness for open or short between fuel pump relay and fuel pump
- Harness for open or short between fuel pump and dropping resistor

If NG, repair harness or connectors.

OK ↓

D

CHECK OUTPUT SIGNAL CIRCUIT.
1) Disconnect ECM harness connector.
2) Check harness continuity between ECM terminal ⑪ and terminal ②.
Continuity should exist.
If OK, check harness for short.

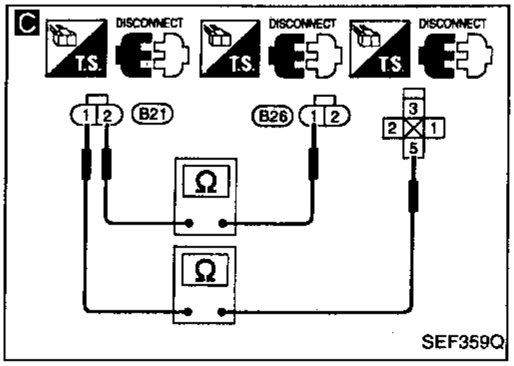
NG → Check the following.
- Harness connectors F102, M58
- Harness for open or short between fuel pump relay and ECM

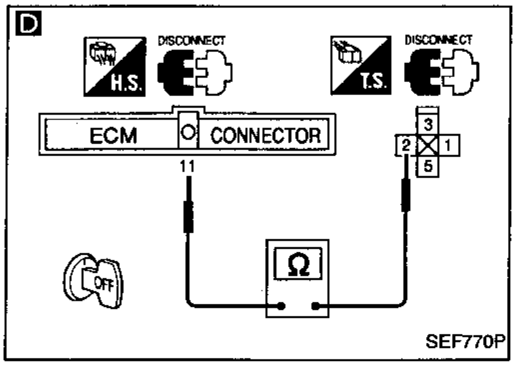
If NG, repair harness or connector.

OK ↓

Ⓐ

Fuel Pump Control (Cont'd)





Ⓐ

CHECK COMPONENT
(Fuel pump relay).
Refer to "COMPONENT INSPECTION" below.

NG → Replace fuel pump relay.

OK

CHECK COMPONENT
(Fuel pump).
Refer to "COMPONENT INSPECTION" below.

NG → Replace fuel pump.

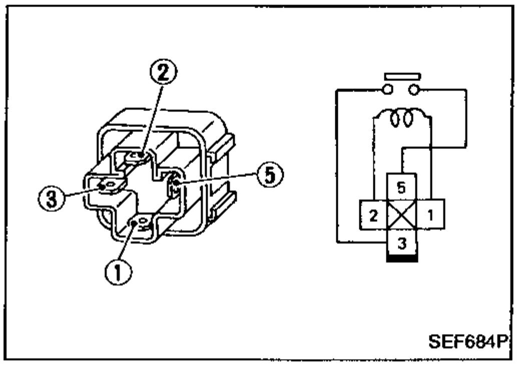
OK

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



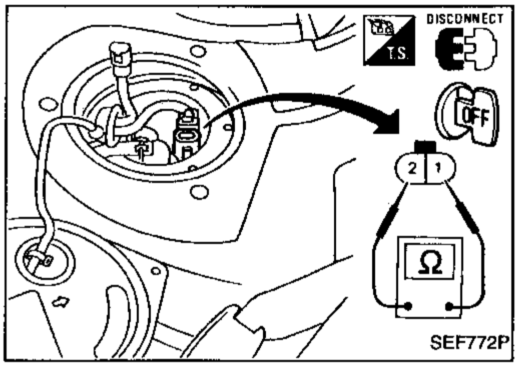
COMPONENT INSPECTION

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 20°C (68°F)
   If NG, replace fuel pump.

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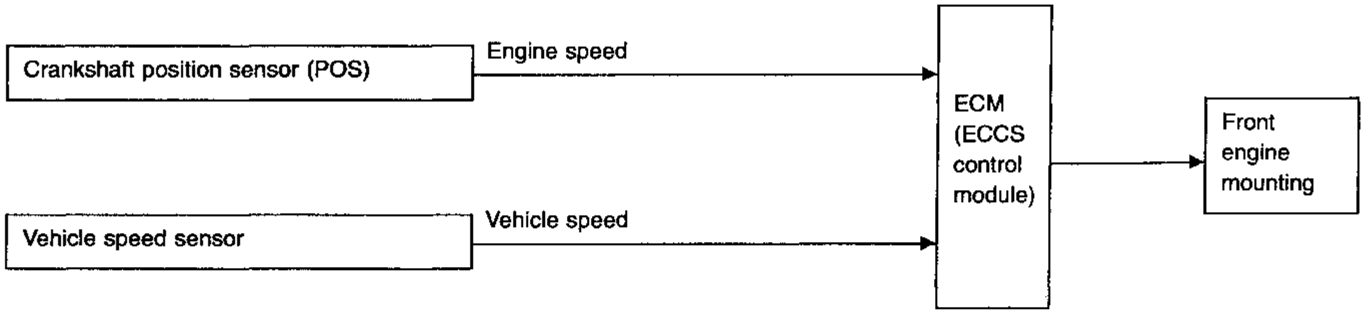
Front Engine Mounting Control

SYSTEM DESCRIPTION



The ECM controls the front engine mounting operation corresponding to the engine speed and the vehicle speed. The control system has 2-step control [soft/hard].

Front engine mounting control

Vehicle condition	Front engine mounting control
Idle (with vehicle stopped)	Soft
Driving	Hard

CONSULT REFERENCE VALUE IN DATA MONITOR MODE

- Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ENGINE MOUNT	• Engine: Running	Idle	"IDLE"
		2,000 rpm	"TRVL"

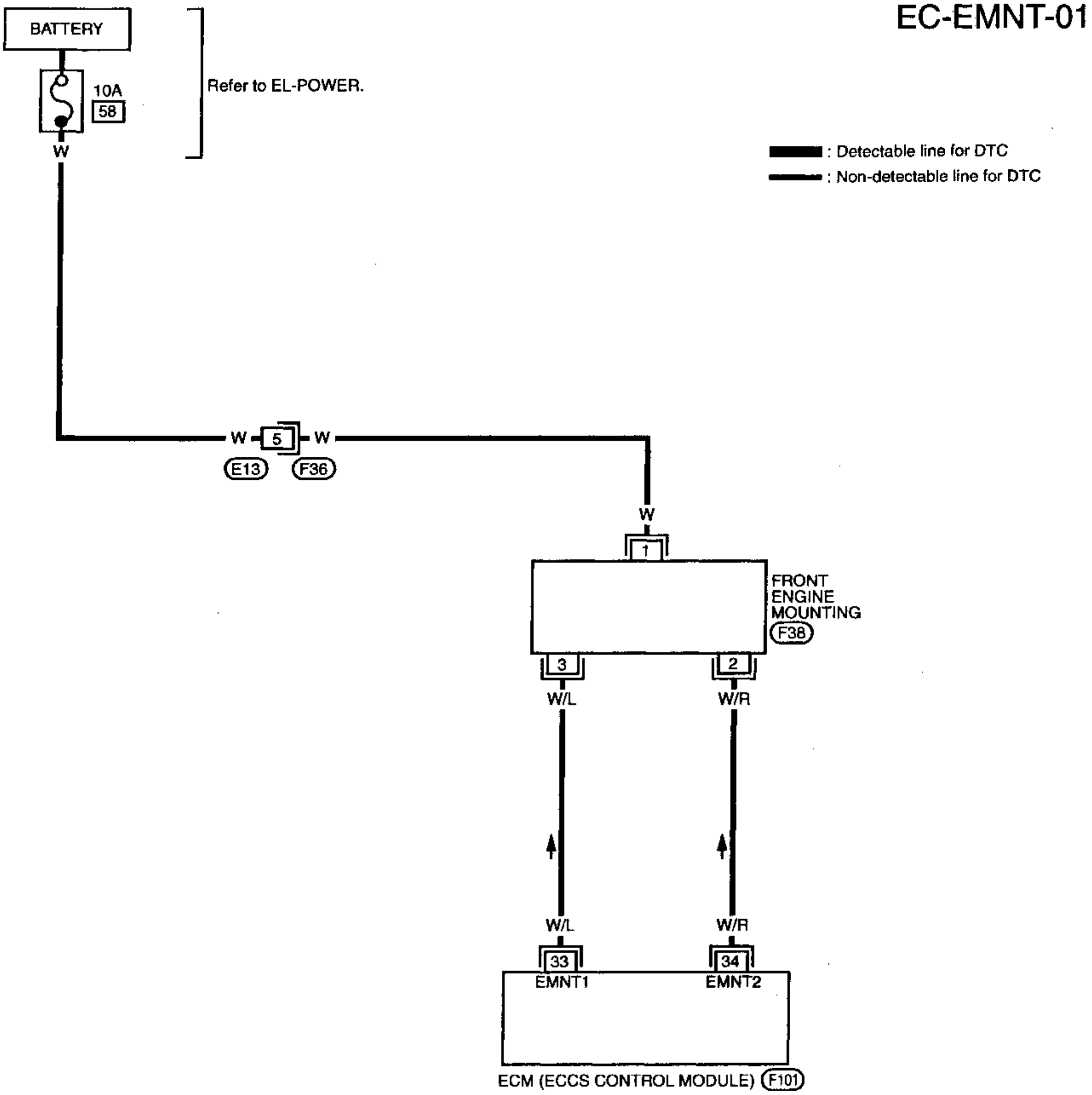
ECM TERMINALS AND REFERENCE VALUE

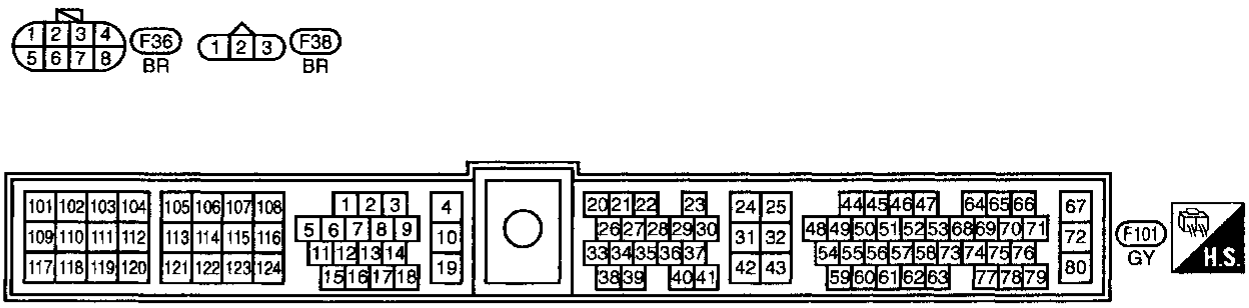
Remarks: Specification data are reference values, and are measured between each terminal and ㉕ (ECCS ground) with a voltmeter.

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
33	W/L	Front engine mounting	Engine is running. For 2 seconds after engine speed changes from 2,000 rpm to idle speed	0 - 0.4V
			Engine is running. Except the above	BATTERY VOLTAGE (11 - 14V)
34	W/R	Front engine mounting	Engine is running. For 2 seconds after engine speed changes from idle speed to 2,000 rpm	0 - 0.4V
			Engine is running. Except the above	BATTERY VOLTAGE (11 - 14V)

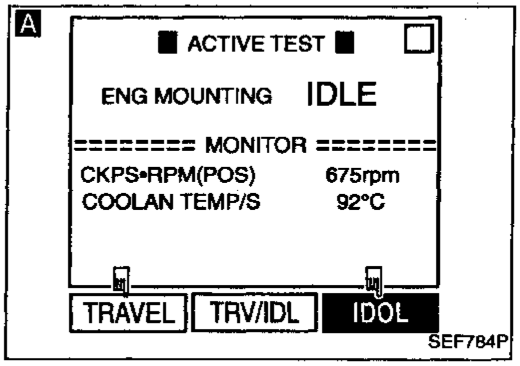
Front Engine Mounting Control (Cont'd)

EC-EMNT-01





MEC678B



■ ACTIVE TEST ■ ☐

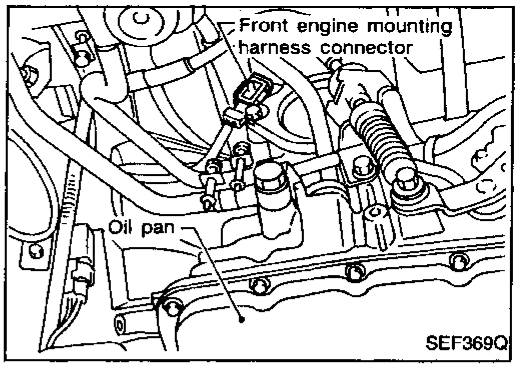
ENG MOUNTING IDLE

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

CKPS•RPM(POS) 675rpm

COOLAN TEMP/S 92°C

SEF784P



SEF369Q

INSPECTION START

A

CHECK THE OVERALL FUNCTION.

1. After warming up engine, run it at idle speed.
2. Shift selector lever to "D" range while depressing the brake pedal and pulling the parking brake control lever.
3. Perform "ENGINE MOUNTING" in "ACTIVE TEST" mode with CONSULT and check that the body vibration changes according to switching the condition (With vehicle stopped).

OR

3. Disconnect front engine mounting harness connector when engine speed is more than 1,000 rpm.
4. When returning engine speed to idle speed, check that the body vibration increases, compared with the condition of the above step 2 (With vehicle stopped).

OK → INSPECTION END

NG ↓

B

CHECK POWER SUPPLY.

1. Turn ignition switch "OFF".
2. Disconnect front engine mounting harness connector.
3. Check voltage between terminal ① and ground with CONSULT or tester.
   Voltage: Battery voltage

NG → Check the following.
- Harness connectors (F36), (E13)
- 10A fuse
- Harness for open or short between front engine mounting and battery

If NG, repair harness or connectors.

OK ↓

C

CHECK OUTPUT SIGNAL CIRCUIT.

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal ㉝ and terminal ③, ECM terminal ㉞ and terminal ②.
   Continuity should exist.
   If OK, check harness for short.

NG → Repair harness or connectors.

OK ↓

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

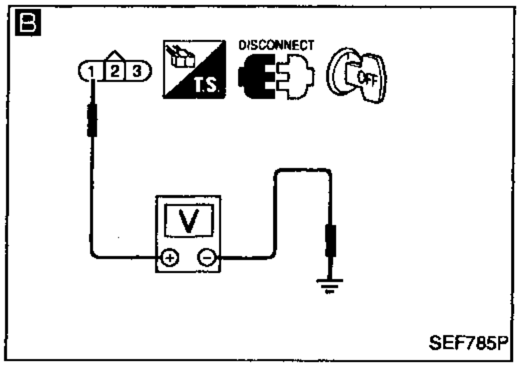
↓ Trouble is not fixed.

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

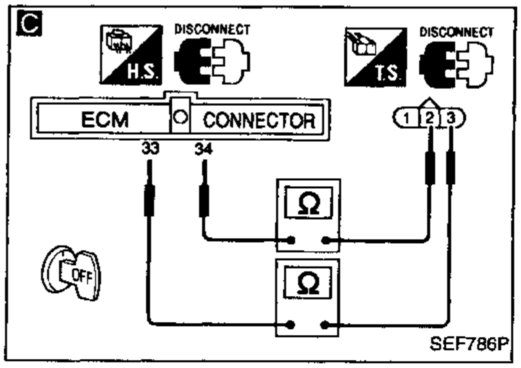
↓

Visually check front engine mounting.

NG → Replace front engine mounting assembly.

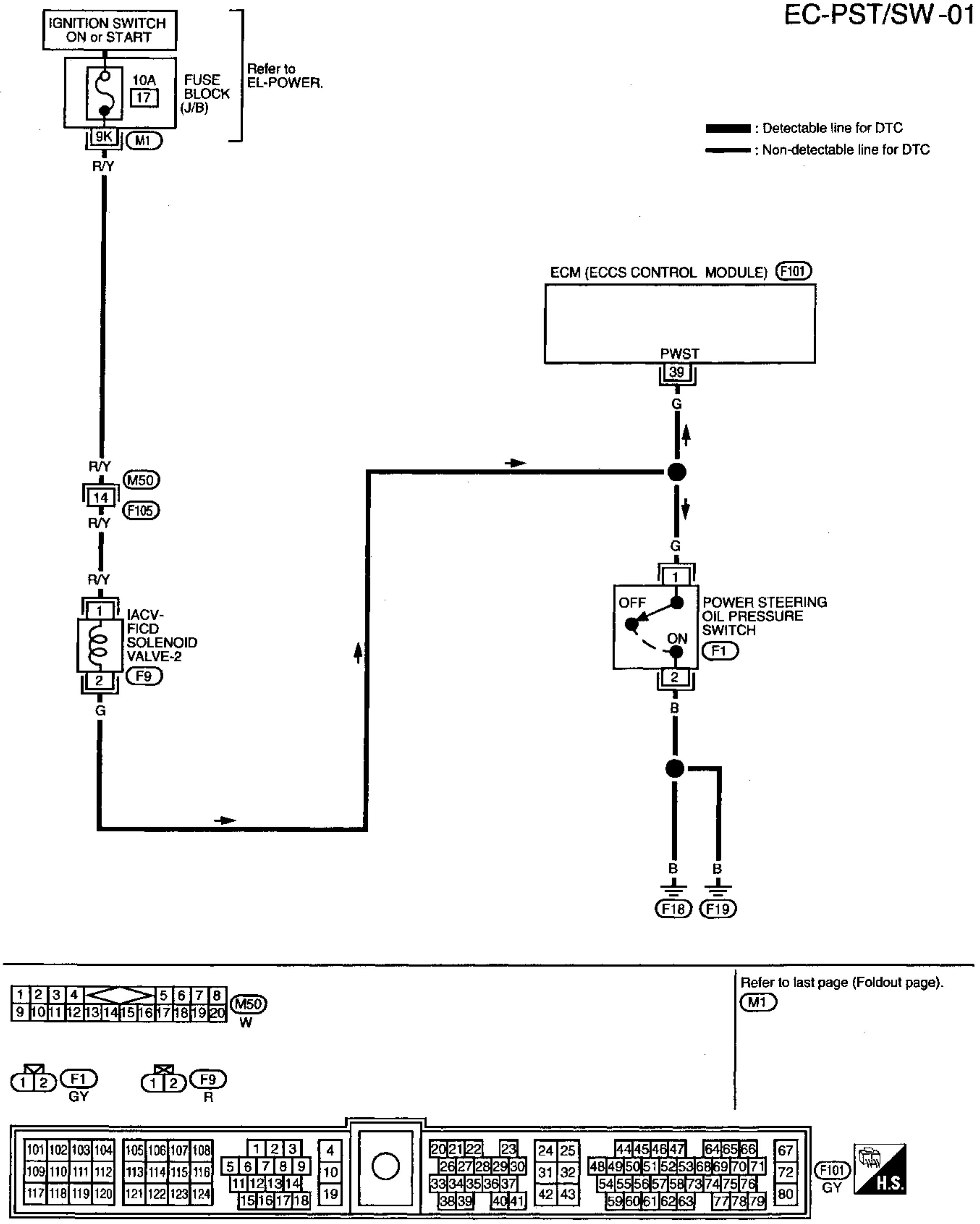


SEF785P



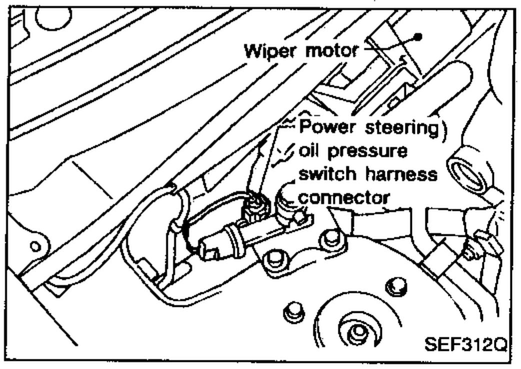
SEF786P

Power Steering Oil Pressure Switch



SEF244T

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.

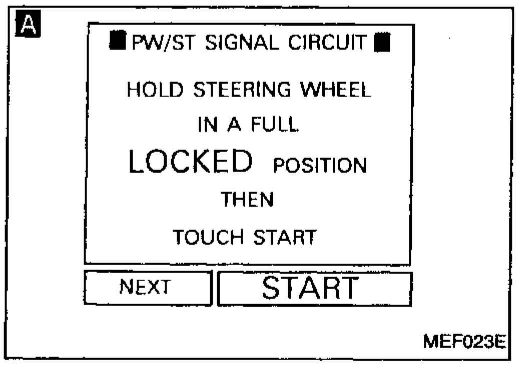
MONITOR ITEM	CONDITION		SPECIFICATION
PW/ST SIGNAL	• Engine: After warming up, idle the engine	Steering wheel in neutral position (forward direction)	OFF
		The steering wheel is turned	ON

ECM TERMINALS AND REFERENCE VALUE

Remarks: Specification data are reference values, and are measured between each terminal and ㉕ (ECCS ground) with a voltmeter.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
39	G	Power steering oil pressure switch	Engine is running. Steering wheel is being turned.	0 - 1.5V
			Engine is running. Steering wheel is not being turned.	BATTERY VOLTAGE (11 - 14V)

Power Steering Oil Pressure Switch (Cont'd)

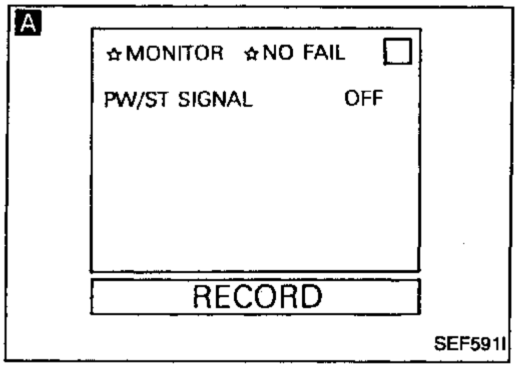


■ PW/ST SIGNAL CIRCUIT ■

HOLD STEERING WHEEL
IN A FULL
LOCKED POSITION
THEN
TOUCH START

NEXT | START

MEF023E

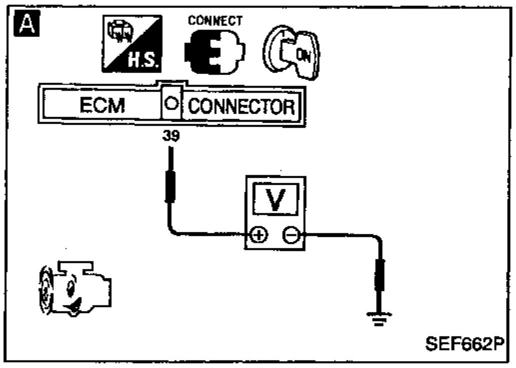


☆MONITOR ☆NO FAIL ☐

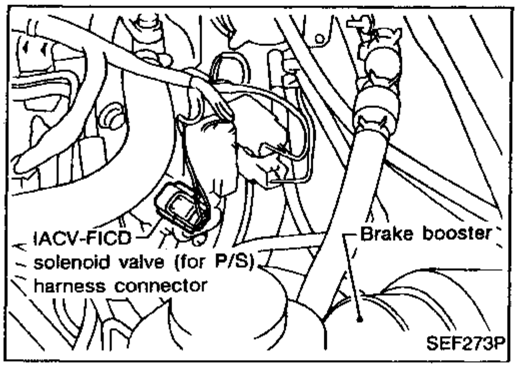
PW/ST SIGNAL OFF

RECORD

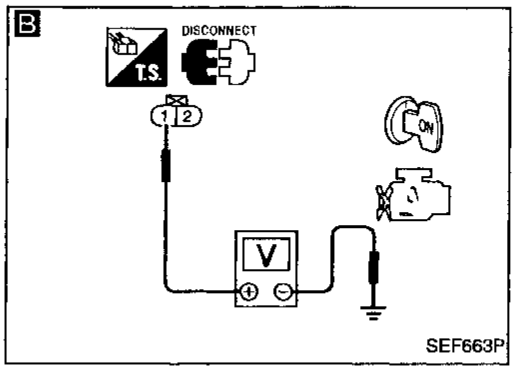
SEF591I



SEF662P



SEF273P



SEF663P

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 ㊴ and ground under the following conditions.

Voltage:
When steering wheel is turned quickly.
Approximately 0V
Except above
Battery voltage

OK → INSPECTION END

NG ↓

B

CHECK POWER SUPPLY-I.

1. Stop engine.
2. Disconnect IACV-FICD solenoid valve-2 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 (M50), (F105)
- 10A fuse
- Harness for open or short between IACV-FICD solenoid valve-2 and fuse

OK ↓

C

CHECK POWER SUPPLY-II.

1. Turn ignition switch "OFF".
2. Disconnect power steering oil pressure switch harness connector.
3. Check harness continuity between terminal ② and terminal ①.

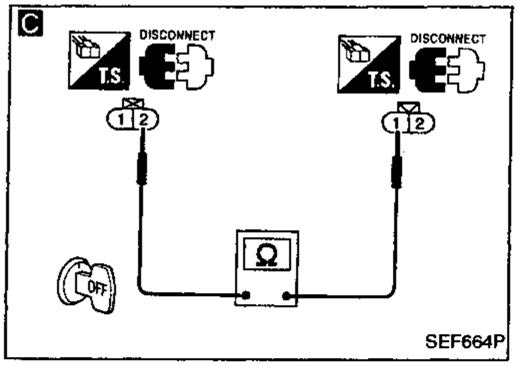
Continuity should exist.
If OK, check harness for short.

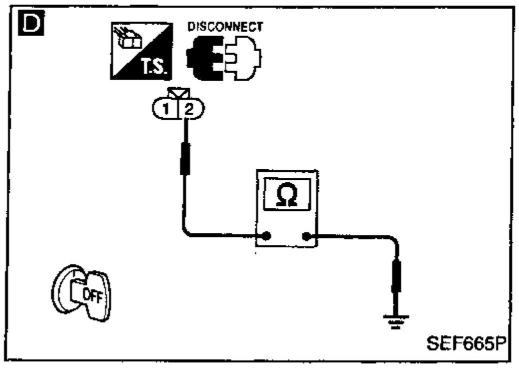
NG → Repair harness or connectors.

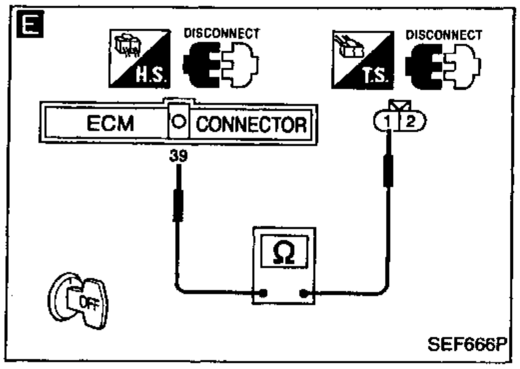
OK ↓

Ⓐ

Power Steering Oil Pressure Switch (Cont'd)







Ⓐ

D

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

NG → Repair harness or connectors.

OK

E

CHECK INPUT SIGNAL CIRCUIT.
1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal ㊴ and terminal ①.
   Continuity should exist.
   If OK, check harness for short.

NG → Repair harness or connectors.

OK

CHECK COMPONENTS
(Power steering oil pressure switch and IACV-FICD solenoid valve-2).
Refer to "COMPONENT INSPECTION", EC-371.

NG → Replace power steering oil pressure switch or IACV-FICD solenoid valve-2.

OK

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

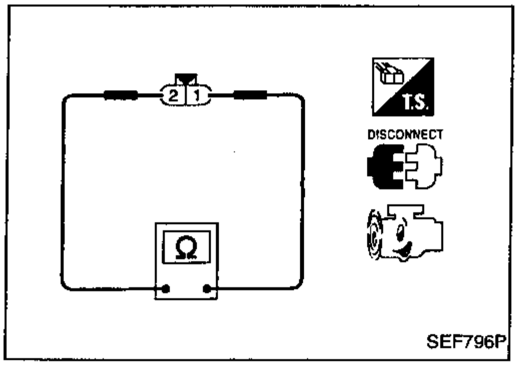
Trouble is not fixed.

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

INSPECTION END

Power Steering Oil Pressure Switch (Cont'd)

COMPONENT INSPECTION

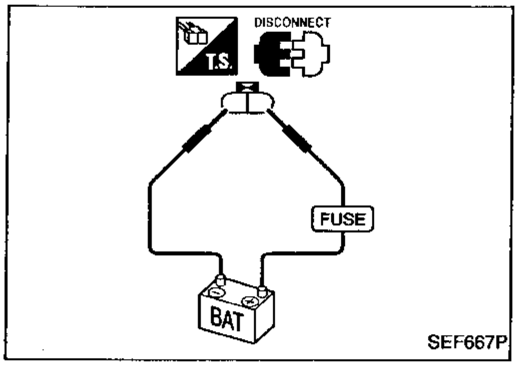


Power steering oil pressure switch

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

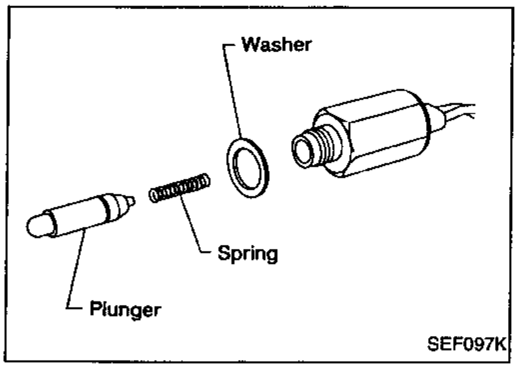
If NG, replace power steering oil pressure switch.



IACV-FICD solenoid valve-2

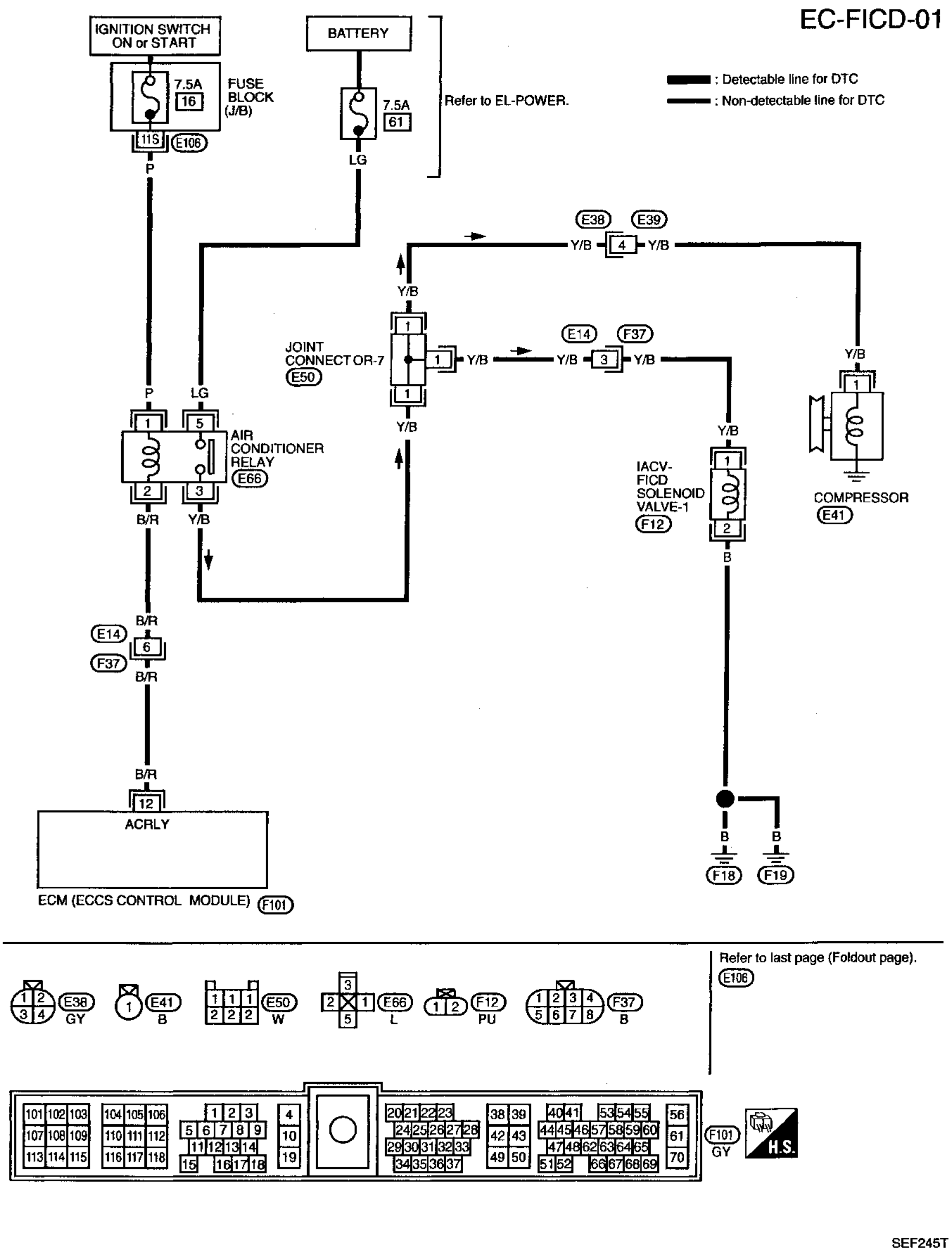
Disconnect IACV-FICD solenoid valve-2 harness connector.

- Check for clicking sound when applying 12V direct current to terminals.



- Check plunger for seizing or sticking.
- Check for broken spring.

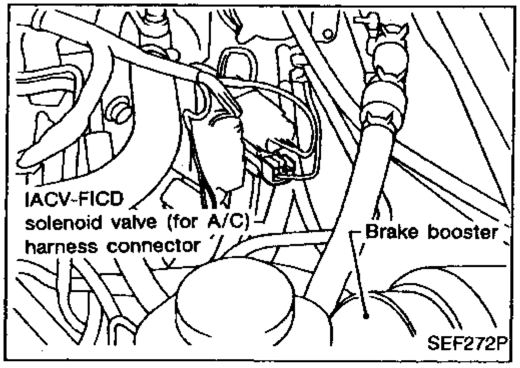
IACV-FICD Solenoid Valve

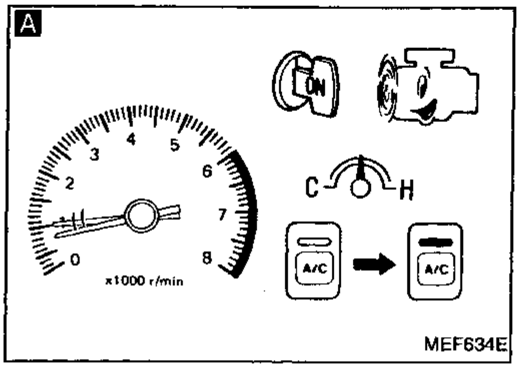


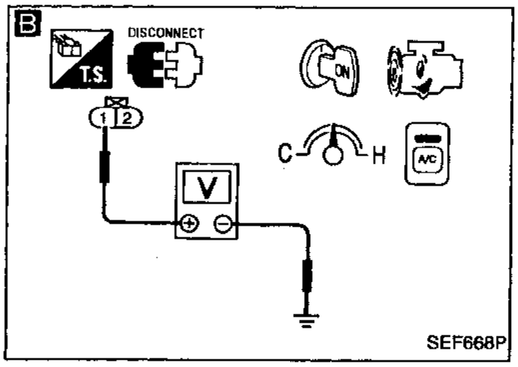
IACV-FICD Solenoid Valve (Cont'd)

DESCRIPTION

The idle air adjusting (IAA) unit is made up of the IACV-AAC valve, IACV-FICD solenoid valves and idle adjusting screw. It receives the signal from the ECM and controls the idle speed at the preset value.







INSPECTION START

A

CHECK OVERALL FUNCTION.
1. Start engine and warm it up sufficiently.
2. Check idle speed.
   M/T: 625±50 rpm
   A/T: 700±50 rpm (in "N" position)
   If NG, adjust idle speed.
3. Turn air conditioner switch and blower fan switch "ON".
4. Recheck idle speed.
   M/T: Approx. 850 rpm or more
   A/T: Approx. 850 rpm or more (in "N" position)

OK → INSPECTION END

NG ↓

Check if air conditioner compressor functions normally.

NG → Refer to HA section.

OK ↓

B

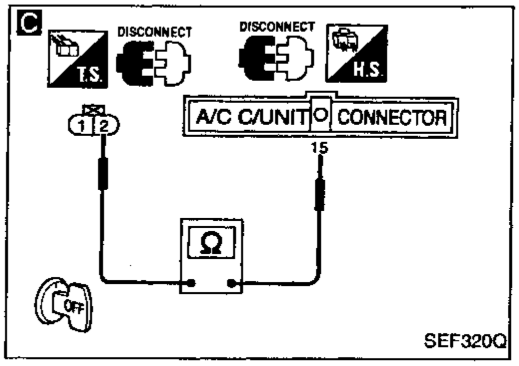
CHECK POWER SUPPLY.
1. Stop engine.
2. Disconnect IACV-FICD solenoid valve-1 harness connector.
3. Restart engine and let it idle.
4. Check voltage between terminal ① and ground with CONSULT or tester.
   Voltage: Battery voltage

NG → Check the following.
- Harness connectors (E14), (F37)
- Joint connector-7 (E50)
- Harness for open or short between IACV-FICD solenoid valve-1 and A/C relay

If NG, repair harness or connectors.

OK ↓

Ⓐ



SEF320Q

Ⓐ

C

CHECK GROUND CIRCUIT.
1. Stop engine.
2. Disconnect air conditions control unit harness connector
3. Check harness continuity between terminal ② and A/T control unit harness connector terminal ⑮.

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

NG → Check the following.
- Harness for open or short between IACV-FICD solenoid valve-1 and auto air conditioner control unit
- Auto air conditioner control unit (Refer to HA section.)

If NG, repair harness or connectors.

OK ↓

CHECK COMPONENT (IACV-FICD solenoid valve-1).
Refer to "COMPONENT INSPECTION" below.

NG → Replace IACV-FICD solenoid valve.

OK ↓

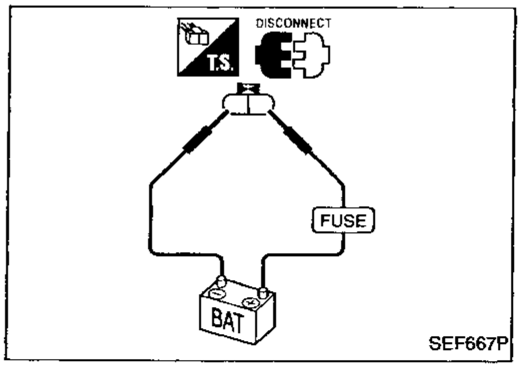
Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed. ↓

Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector. Then retest.

↓

INSPECTION END

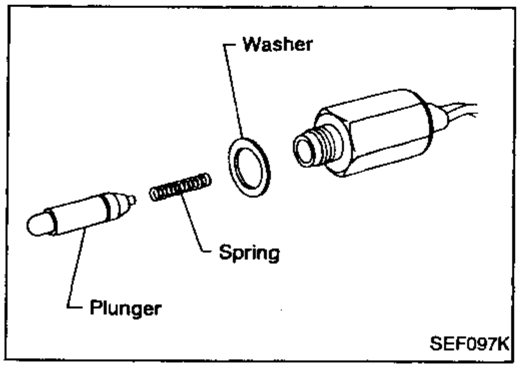


SEF667P

COMPONENT INSPECTION

IACV-FICD solenoid valve-1

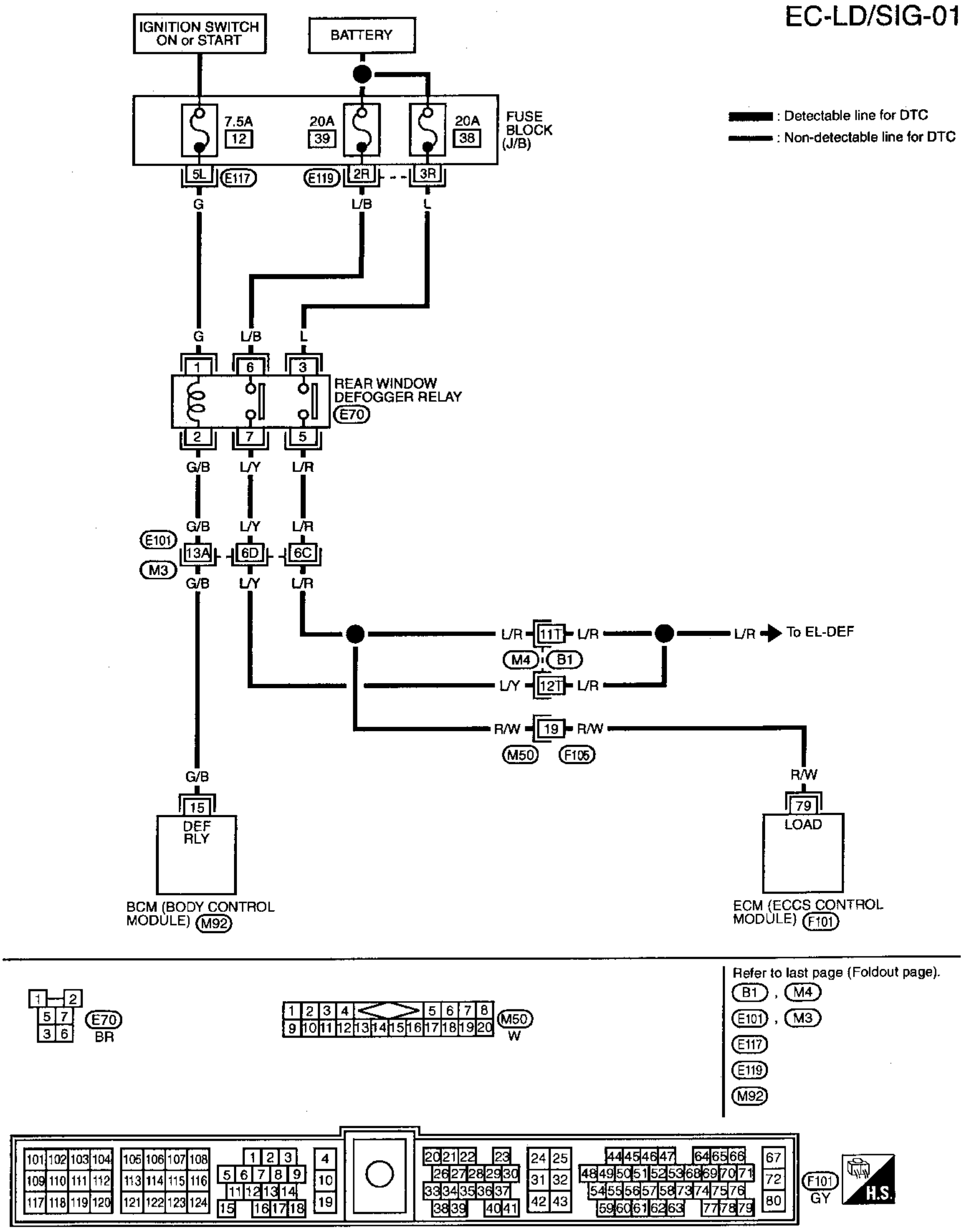
Disconnect IACV-FICD solenoid valve-1 harness connector.
- Check for clicking sound when applying 12V direct current to terminals.



SEF097K

- Check plunger for seizing or sticking.
- Check for broken spring.

Electrical Load Signal



Refer to last page (Foldout page).

B1 , M4

E101 , M3

E117

E119

M92

SEF246T

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

Electrical Load Signal (Cont'd)

CONSULT REFERENCE VALUE IN DATA MONITOR MODE

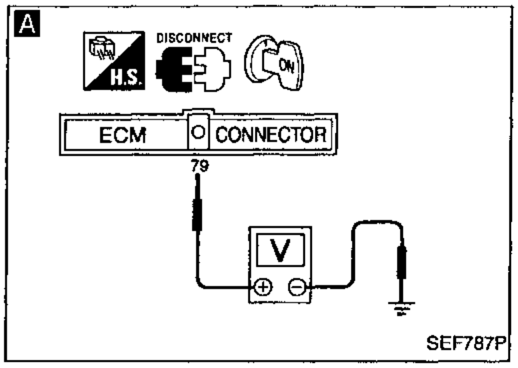
- Specification data are reference values.

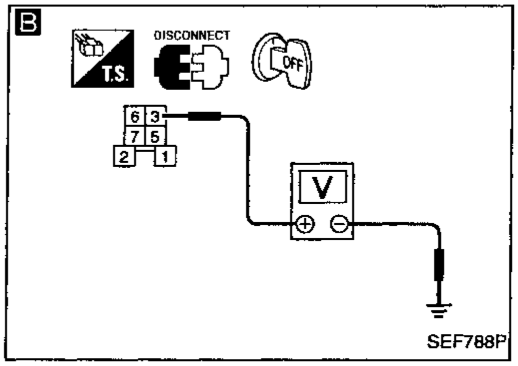
MONITOR ITEM	CONDITION		SPECIFICATION
LOAD SIGNAL	• Engine: Running	Rear window defogger or headlamp "ON"	ON
		Except the above	OFF

ECM TERMINALS AND REFERENCE VALUE

Remarks: Specification data are reference values, and are measured between each terminal and ㉕ (ECCS ground) with a voltmeter.

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
79	R/W	Electrical load signal	Engine is running. └ Idle speed (Electrical load: "OFF")	0V
			Engine is running. └ Idle speed (Headlamp, rear window defogger: "ON")	BATTERY VOLTAGE (11 - 14V)





INSPECTION START

A

CHECK THE OVERALL FUNCTION.
1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Turn ignition switch "ON".
4. Check voltage between ECM terminal (79) and ground in the following conditions.

Conditions		Voltage (V)
Rear window defogger	ON	Battery voltage
Except the above		0

OK → INSPECTION END

NG ↓

B

CHECK POWER SUPPLY FOR RR/DEF SIGNAL CIRCUIT.
1. Turn ignition switch "OFF".
2. Disconnect rear window defogger relay.
3. Check voltage between terminal ③ and ground.
Voltage: Battery voltage

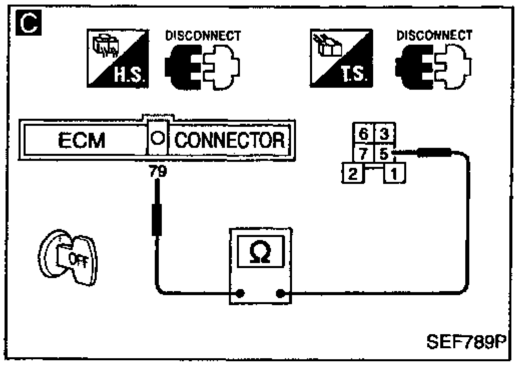
NG → Check the following.
- 20A fuse
- Harness for open or short between rear defogger relay and battery

If NG, repair harness or connectors.

OK ↓

Ⓐ

Electrical Load Signal (Cont'd)



SEF789P

Ⓐ

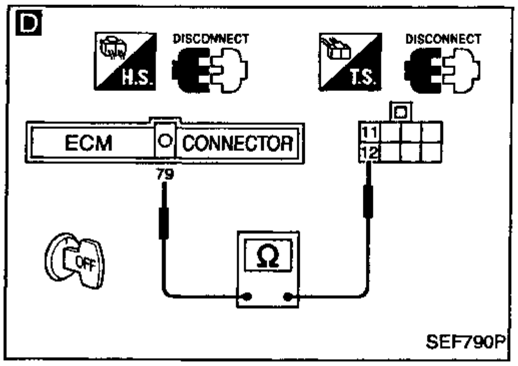
C

CHECK INPUT SIGNAL CIRCUIT FOR RR/DEF.
Check harness continuity between ECM terminal (79) and terminal ⑤.
Continuity should exist.
If OK, check harness for short.

NG → Check the following.
- Harness connectors F105, M50
- Joint connector-10 M80
- Harness connectors M3, E101

If NG, repair harness or connectors.

OK ↓



SEF790P

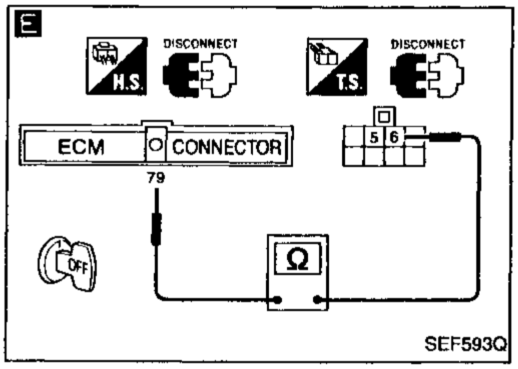
D

CHECK INPUT SIGNAL CIRCUIT FOR HEADLAMP (For California models).
1. Turn ignition switch "OFF".
2. Disconnect lighting switch harness connector.
3. Check harness continuity between ECM terminal (79) and terminal ⑫.
   Continuity should exist.
   If OK, check harness for short.

NG → Check the following.
- Harness connectors F105, M50
- Joint connector-10 M80
- Harness connectors M1, E119
- 7.5A fuse

If NG, repair harness or connectors.

OK ↓



SEF593Q

E

CHECK INPUT SIGNAL CIRCUIT FOR HEADLAMP (For Canada models).
1. Turn ignition switch "OFF".
2. Disconnect lighting switch harness connector.
3. Check harness continuity between ECM terminal (79) and terminal ⑥.
   Continuity should exist.
   If OK, check harness for short.

NG → Check the following.
- Harness connectors F105, M50
- Joint connector-10 M80
- Harness connectors M3, E101
- Diode E116

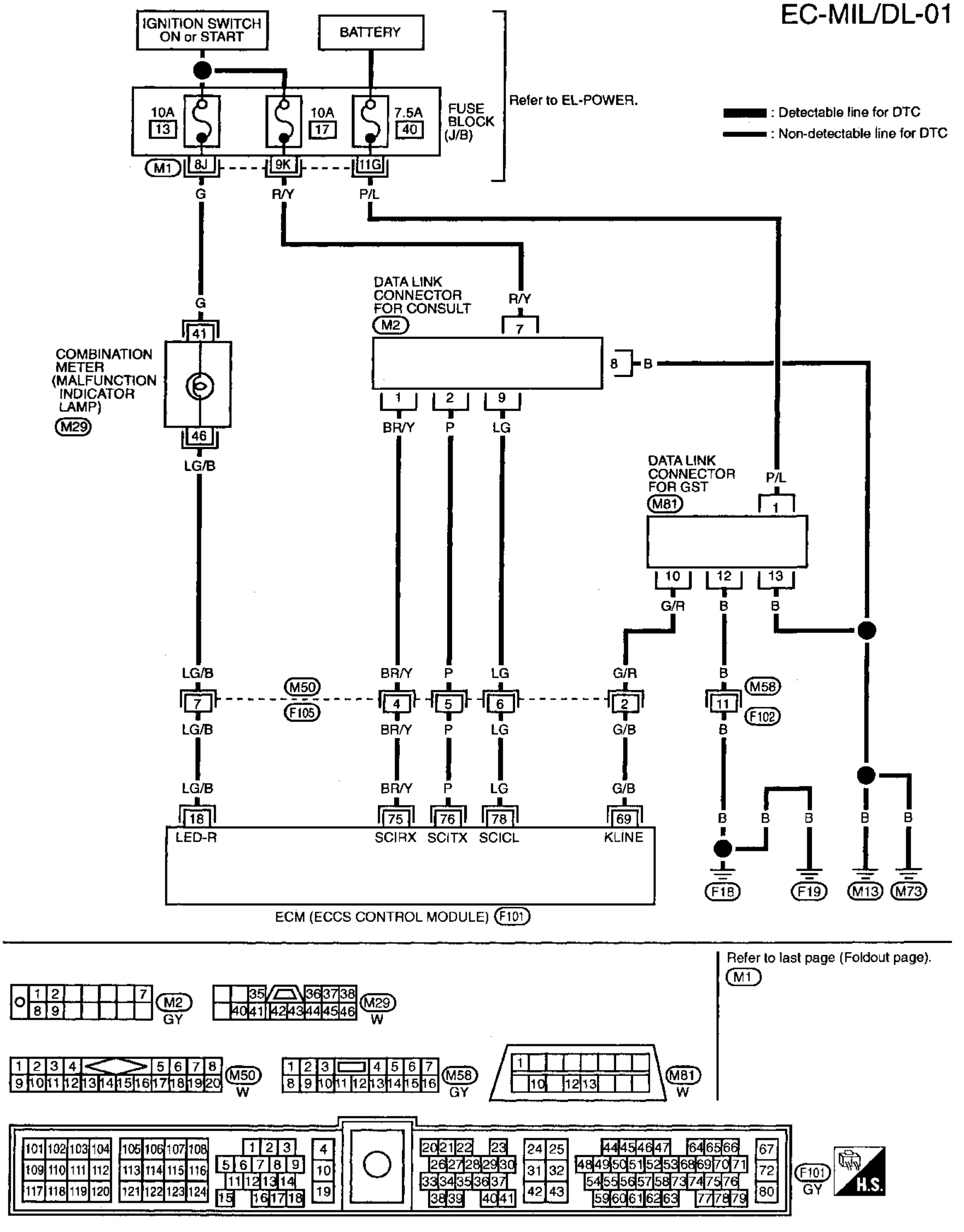
If NG, repair harness or connectors.

OK ↓

INSPECTION END

MIL & Data Link Connectors

EC-MIL/DL-01



SEF247T

General Specifications

PRESSURE REGULATOR Fuel pressure at idling kPa (kg/cm^2, psi)	
Vacuum hose is connected	Approximately 235 (2.4, 34)
Vacuum hose is disconnected	Approximately 294 (3.0, 43)

Inspection and Adjustment

Idle speed*1 rpm	
No-load*2 (in "N" position)	M/T: 625±50 A/T: 700±50
Air conditioner: ON (in "N" position)	850 or more
Ignition timing	15°±2° BTDC

*1: Feedback controlled and needs no adjustments
*2: Under the following conditions:
- Air conditioner switch: OFF
- Electric load: OFF (Heater, fan & rear defogger)

MASS AIR FLOW SENSOR

Supply voltage V	Battery voltage (11 - 14)
Output voltage V	1.0 - 1.7 at idle*
Mass air flow (Using CONSULT or GST) g·m/sec	2.0 - 6.0 at idle* 7.0 - 20.0 at 2,500 rpm*

*: Engine is warmed up sufficiently and idling under no-load.

ENGINE COOLANT TEMPERATURE SENSOR

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

EGR TEMPERATURE SENSOR

Resistance [at 100°C (212°F)] kΩ	76.8 - 93.8

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 (Step motor type)

Resistance [at 25°C (77°F)] Ω	Approximately 30

INJECTOR

Resistance [at 25°C (77°F)] Ω	10 - 14

THROTTLE POSITION SENSOR

Accelerator pedal conditions	Resistance [at 25°C (77°F)]
Completely released	Approximately 0.5 kΩ
Partially released	0.5 - 4.0 kΩ
Completely depressed	Approximately 4.0 kΩ

CALCULATED LOAD VALUE

	Calculated load value % (Using CONSULT or GST)
At idle	14.0 - 33.0
At 2,500 rpm	12.0 - 25.0

INTAKE AIR TEMPERATURE SENSOR

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

EVAP CANISTER PURGE VOLUME CONTROL VALVE

Resistance [at 25°C (77°F)] Ω	Approximately 30

REAR HEATED OXYGEN SENSOR HEATER

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

CAMSHAFT POSITION SENSOR (PHASE)

Resistance Ω	HITACHI make	1,440 - 1,760 [at 20°C (68°F)]
	MITSUBISHI make	2,090 - 2,550 [at 20°C (68°F)]

CRANKSHAFT POSITION SENSOR (REF)

Resistance [at 25°C (77°F)] Ω	470 - 570

DROPPING RESISTOR

Resistance [at 25°C (77°F)] Ω	Approximately 0.9