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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".

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DIAGNOSTIC TROUBLE CODE INDEX

Alphabetical & P No. Index for DTC

ALPHABETICAL INDEX FOR DTC

Items (CONSULT screen terms)	DTC		Reference page
	ECM*1	CONSULT GST*2	
Unable to access ECCS	---	---	EC-75
*COOLANT TEMP SEN	0908	P0125	EC-121
ABSOL PRESS SEN- SOR	0803	P0105	EC-99
A/T 1ST SIGNAL	1103	P0731	AT-68
A/T 2ND SIGNAL	1104	P0732	AT-71
A/T 3RD SIGNAL	1105	P0733	AT-73
A/T 4TH SIG OR TCC	1106	P0734	AT-75
A/T COMM LINE	---	P0600	EC-226
A/T DIAG COMM LINE	0804	P1605	EC-278
A/T TCC SIGNAL	1107	P0744	AT-83
CAMSHAFT POSI SEN	0101	P0340	EC-168
CLOSED LOOP	0307	P0130	EC-131
CLOSED THRL POS SW	0203	P0510	EC-222
COOLANT TEMP SEN*3	0103	P0115	EC-111
CRANK P/S (OBD) COG	0905	P1336	EC-247
CRANK POS SEN (OBD)	0802	P0335	EC-164
CYL 1 MISFIRE	0608	P0301	EC-157
CYL 2 MISFIRE	0607	P0302	EC-157
CYL 3 MISFIRE	0606	P0303	EC-157
CYL 4 MISFIRE	0605	P0304	EC-157
ECM	0301	P0605	EC-229
EGR SYSTEM	0302	P0400	EC-172
EGR TEMP SENSOR	0305	P1401	EC-255
EGRC SOLENOID/V	1005	P1400	EC-251
EGRC-BPT VALVE	0306	P0402	EC-180
ENGINE SPEED SIG*4	1207	P0725	AT-66
EVAP PURG FLOW/ MON	0111	P1447	EC-271
EVAP SYS PRES SEN	0704	P0450	EC-209
EVAP (SMALL LEAK)	0705	P0440	EC-185
FLUID TEMP SENSOR	1208	P0710	AT-61
FRONT O2 SENSOR	0303	P0130	EC-126
FR O2 SEN HEATER	0901	P0135	EC-132

Items (CONSULT screen terms)	DTC		Reference page
	ECM*1	CONSULT GST*2	
FUEL SYS DIAG-LEAN	0115	P0171	EC-143
FUEL SYS DIAG-RICH	0114	P0172	EC-148
IACV-AAC VALVE	0205	P0505	EC-217
IGN SIGNAL-PRIMARY	0201	P1320	EC-242
INHIBITOR SWITCH	1101	P0705	AT-55
INT AIR TEMP SEN*3	0401	P0110	EC-106
KNOCK SENSOR	0304	P0325	EC-161
LINE PRESSURE S/V	1205	P0745	AT-88
MAP/BARO SW SOL/V	1302	P1105	EC-236
MASS AIR FLOW SEN*3	0102	P0100	EC-94
MULTI CYL MISFIRE	0701	P0300	EC-157
NO SELF-DIAGNOSTIC FAILURE INDICATED	Flashing	No DTC	EC-44
OVERHEAT	0208	P1900*5	EC-281
OVERRUN CLUTCH S/V	1203	P1760	AT-99
PARK/NEUT POSI SW	1003	P0705	EC-231
PURG CONT/V & S/V	0807	P0443	EC-195
PURG VOLUME CONT/V	1008	P1445	EC-265
REAR O2 SENSOR	0707	P0136	EC-135
REAR O2 SEN HEATER	0902	P0141	EC-139
SHIFT SOLENOID/V A*3	1108	P0750	AT-91
SHIFT SOLENOID/V B*3	1201	P0755	AT-94
TANK FUEL TEMP SEN	0402	P0180	EC-153
THROTTLE POSI SEN*3	0403	P0120	EC-116
THRTL POSI SEN A/T*3	1206	P1705	AT-97
TOR CONV CLUTCH SV	1204	P0740	AT-80
TW CATALYST SYSTEM	0702	P0420	EC-182
VC/V BYPASS/V	0801	P1441	EC-260
VEHICLE SPEED SEN	0104	P0500	EC-213
VENT CONTROL VALVE	0903	P0446	EC-203
VHCL SPEED SEN A/T*4	1102	P0720	AT-64

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

*2: These numbers are prescribed by SAE J2012.

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

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

*5: Since this diagnosis does not meet P1900 of SAEJ2012, it is indicated only by CONSULT.

DIAGNOSTIC TROUBLE CODE INDEX

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		
—	—	Unable to access ECCS	EC-75
P0000	0505	NO SELF-DIAGNOSTIC FAILURE INDICATED	—
No DTC	Flashing	NO SELF-DIAGNOSTIC FAILURE INDICATED	EC-44
P0100	0102	MASS AIR FLOW SEN*3	EC-94
P0105	0803	ABSOL PRESS SEN- SOR	EC-99
P0110	0401	INT AIR TEMP SEN*3	EC-106
P0115	0103	COOLANT TEMP SEN*3	EC-111
P0120	0403	THROTTLE POSI SEN*3	EC-116
P0125	0908	*COOLANT TEMP SEN	EC-121
P0130	0307	CLOSED LOOP	EC-131
P0130	0303	FRONT O2 SENSOR	EC-126
P0135	0901	FR O2 SEN HEATER	EC-132
P0136	0707	REAR O2 SENSOR	EC-135
P0141	0902	REAR O2 SEN HEATER	EC-139
P0171	0115	FUEL SYS DIAG-LEAN	EC-143
P0172	0114	FUEL SYS DIAG-RICH	EC-148
P0180	0402	TANK FUEL TEMP SEN	EC-153
P0300	0701	MULTI CYL MISFIRE	EC-157
P0301	0608	CYL 1 MISFIRE	EC-157
P0302	0607	CYL 2 MISFIRE	EC-157
P0303	0606	CYL 3 MISFIRE	EC-157
P0304	0605	CYL 4 MISFIRE	EC-157
P0325	0304	KNOCK SENSOR	EC-161
P0335	0802	CRANK POS SEN (OBD)	EC-164
P0340	0101	CAMSHAFT POSI SEN	EC-168
P0400	0302	EGR SYSTEM	EC-172
P0402	0306	EGRC-BPT VALVE	EC-180
P0420	0702	TW CATALYST SYSTEM	EC-182
P0440	0705	EVAP (SMALL LEAK)	EC-185
P0443	0807	PURG CONT/V & S/V	EC-195
P0446	0903	VENT CONTROL VALVE	EC-203
P0450	0704	EVAP SYS PRES SEN	EC-209

DTC		Items (CONSULT screen terms)	Reference page
CONSULT GST*2	ECM*1		
P0500	0104	VEHICLE SPEED SEN	EC-213
P0505	0205	IACV-AAC VALVE	EC-217
P0510	0203	CLOSED THRL POS SW	EC-222
P0600	—	A/T COMM LINE	EC-226
P0605	0301	ECM	EC-229
P0705	1003	PARK/NEUT POSI SW	EC-231
P0705	1101	INHIBITOR SWITCH	AT-55
P0710	1208	FLUID TEMP SENSOR	AT-61
P0720	1102	VHCL SPEED SEN A/T*4	AT-64
P0725	1207	ENGINE SPEED SIG*4	AT-66
P0731	1103	A/T 1ST SIGNAL	AT-68
P0732	1104	A/T 2ND SIGNAL	AT-71
P0733	1105	A/T 3RD SIGNAL	AT-73
P0734	1106	A/T 4TH SIG OR TCC	AT-75
P0740	1204	TOR CONV CLUTCH SV	AT-80
P0744	1107	A/T TCC SIGNAL	AT-83
P0745	1205	LINE PRESSURE S/V	AT-88
P0750	1108	SHIFT SOLENOID/V A*3	AT-91
P0755	1201	SHIFT SOLENOID/V B*3	AT-94
P1105	1302	MAP/BARO SW SOL/V	EC-236
P1320	0201	IGN SIGNAL-PRIMARY	EC-242
P1336	0905	CRANK P/S (OBD) COG	EC-247
P1400	1005	EGRC SOLENOID/V	EC-251
P1401	0305	EGR TEMP SENSOR	EC-255
P1441	0801	VC/V BYPASS/V	EC-260
P1445	1008	PURG VOLUME CONT/V	EC-265
P1447	0111	EVAP PURG FLOW/ MON	EC-271
P1605	0804	A/T DIAG COMM LINE	EC-278
P1705	1206	THRTL POSI SEN A/T*3	AT-97
P1760	1203	OVERRUN CLUTCH S/V	AT-99
P1900*5	0208	OVERHEAT	EC-281

*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 SAEJ2012, it is indicated only by CONSULT.

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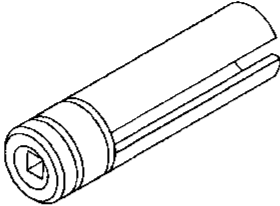
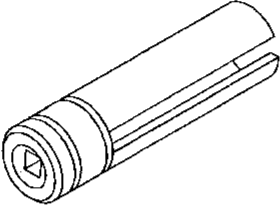
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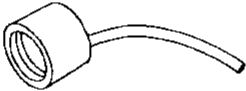
PRECAUTIONS AND PREPARATION

Special Service Tools

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

Tool number (Kent-Moore No.) Tool name	Description
(J36471-A) Front heated oxygen sensor wrench	 Loosening or tightening front heated oxygen sensor NT379
(J36470) Rear heated oxygen sensor wrench	 Loosening or tightening rear heated oxygen sensor NT379

Commercial Service Tool

Tool name	Description
Fuel filler cap adopter	 Checking fuel tank vacuum relief valve open- ing pressure NT653

PRECAUTIONS AND PREPARATION

Supplemental Restraint System (SRS) "AIR BAG"

The Supplemental Restraint System "Air Bag", used along with a seat belt, helps to reduce the risk or severity of injury to the driver and front passenger in a frontal collision. The Supplemental Restraint System consists of air bag modules (located in the center of the steering wheel and on the instrument panel on the passenger side), a diagnosis sensor unit, warning lamp, wiring harness and spiral cable. Information necessary to service the system safely is included in the **RS section** of this Service Manual.

WARNING:

- To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN dealer.
- Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system.
- Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses are covered with yellow insulation either just before the harness connectors or for the complete harness, for easy identification.

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

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

CAUTION:

- Be sure to turn the ignition switch "OFF" and disconnect the negative battery terminal before any repair or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will cause the MIL to light up.
- Be sure to connect and lock the connectors securely after work. A loose (unlocked) connector will cause the MIL to light up due to the open circuit. (Be sure the connector is free from water, grease, dirt, bent terminals, etc.)
- Be sure to route and secure the harnesses properly after work. The interference of the harness with a bracket, etc. may cause the MIL to light up due to the short circuit.
- Be sure to connect rubber tubes properly after work. A misconnected or disconnected rubber tube may cause the MIL to light up due to the malfunction of the EGR system or fuel injection system, etc.
- Be sure to erase the unnecessary malfunction information (repairs completed) from the ECM or A/T control unit before returning the vehicle to the customer.

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PRECAUTIONS AND PREPARATION

Engine Fuel & Emission Control System

ECM

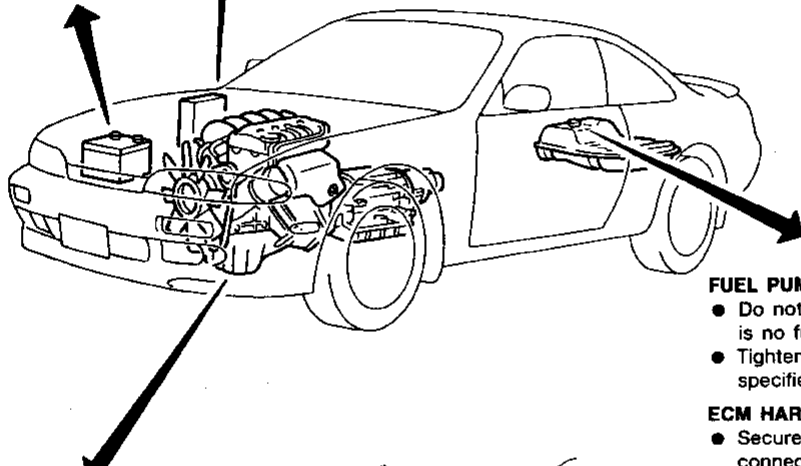
- Do not disassemble ECM (ECCS control module).
- Do not turn diagnosis mode selector forcibly.
- If a battery terminal is disconnected, the memory will return to the ECM value. The ECM will now start to

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.



BATTERY

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



ECCS PARTS HANDLING

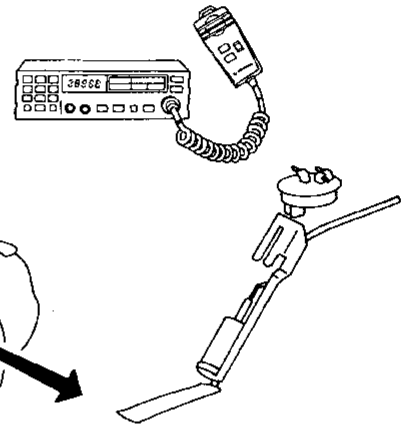
- Handle mass air flow sensor carefully to avoid damage.
- Do not disassemble mass air flow sensor.
- Do not clean mass air flow sensor with any type of detergent.
- Do not disassemble IACV-AAC valve.
- Even a slight leak in the air intake system can cause serious problems.
- Do not shock or jar the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

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.

WIRELESS EQUIPMENT

- When installing C.B. ham radio or a mobile phone, be sure to observe the following as it may adversely affect electronic control systems depending on its installation location.
 - 1) Keep the antenna as far as possible away from the 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.



FUEL PUMP

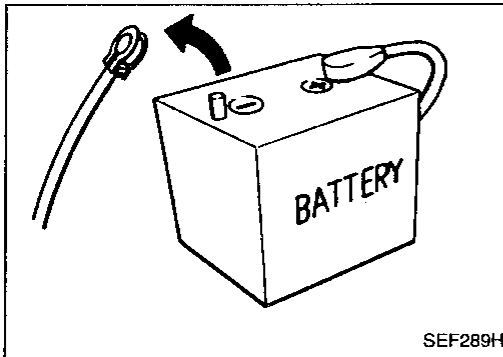
- Do not operate fuel pump when there is no fuel in lines.
- Tighten fuel hose clamps to the specified torque. (Refer to MA section.)

ECM HARNESS HANDLING

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

SEF181PA

PRECAUTIONS AND PREPARATION



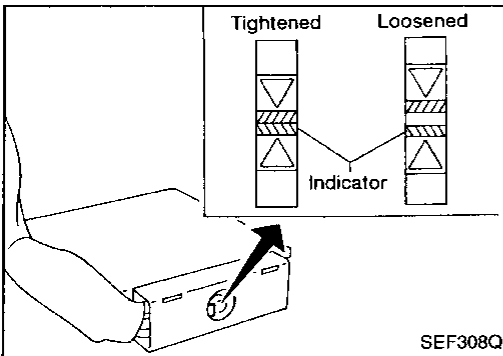
Precautions

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

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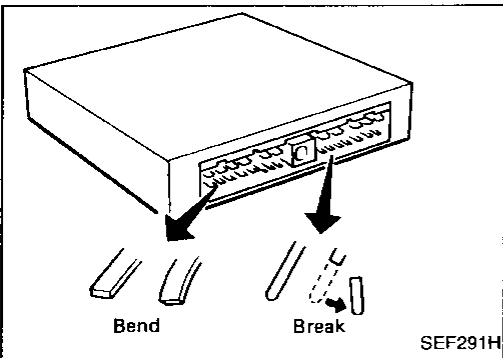


- When connecting ECM harness connector, tighten securing bolt until the gap between the orange indicators disappears.

LC

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

EC



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

FE

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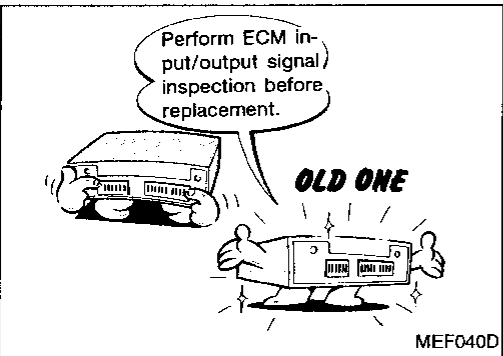
MT

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

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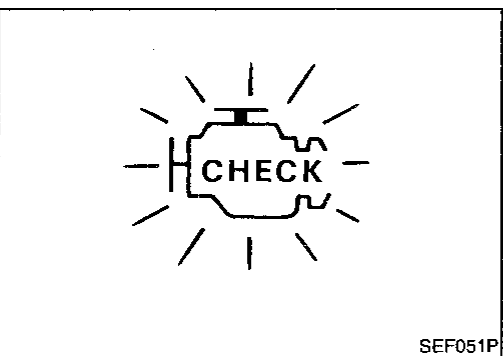
- Before replacing ECM, perform ECM input/output signal inspection and make sure whether ECM functions properly or not. (See page EC-84.)

RA

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

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The DTC or 1st trip 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.

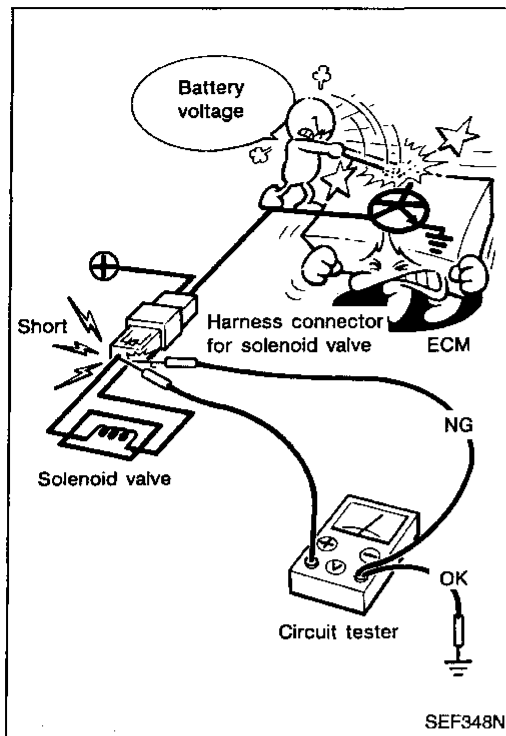
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PRECAUTIONS AND PREPARATION

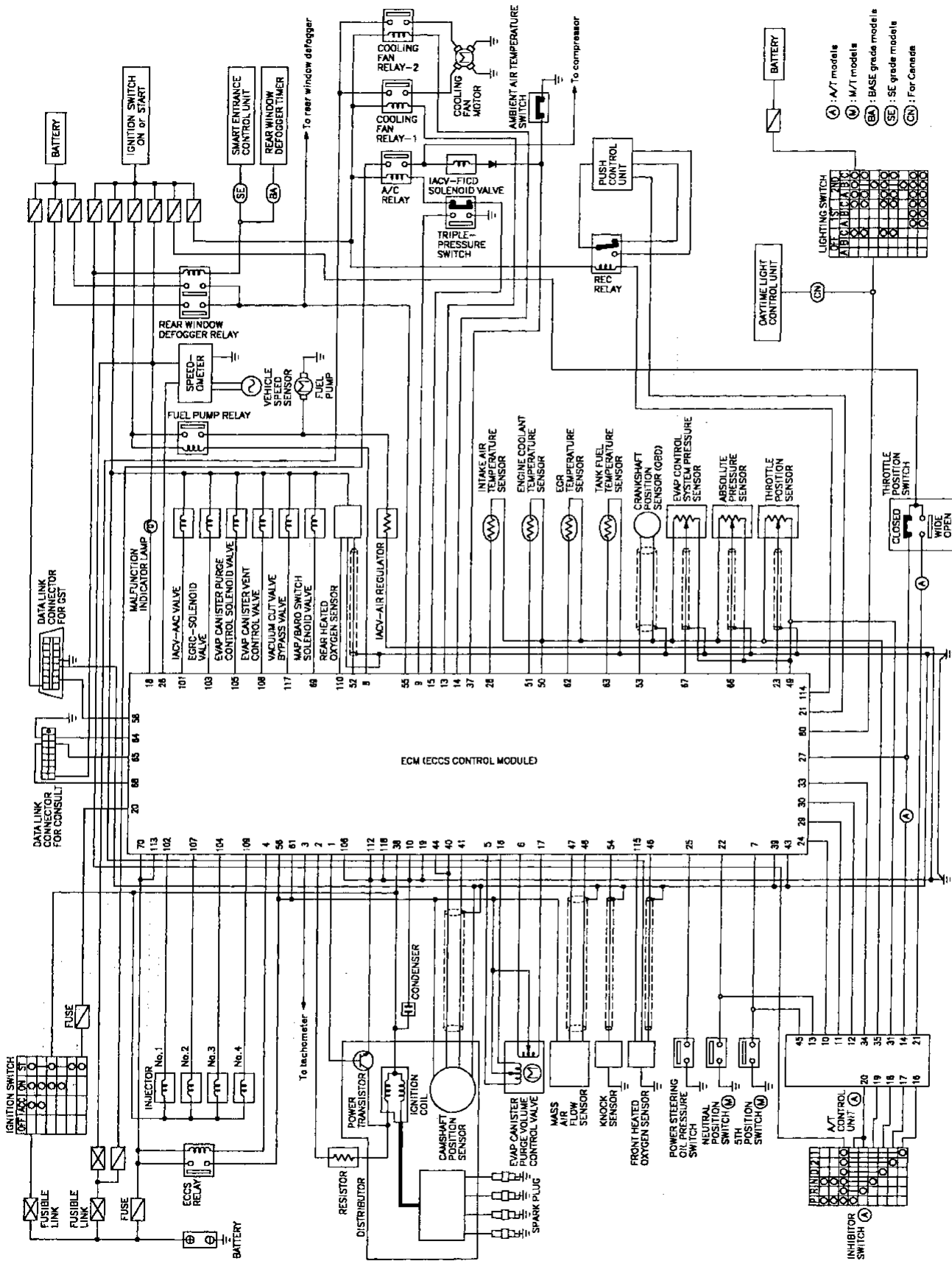
Precautions (Cont'd)

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



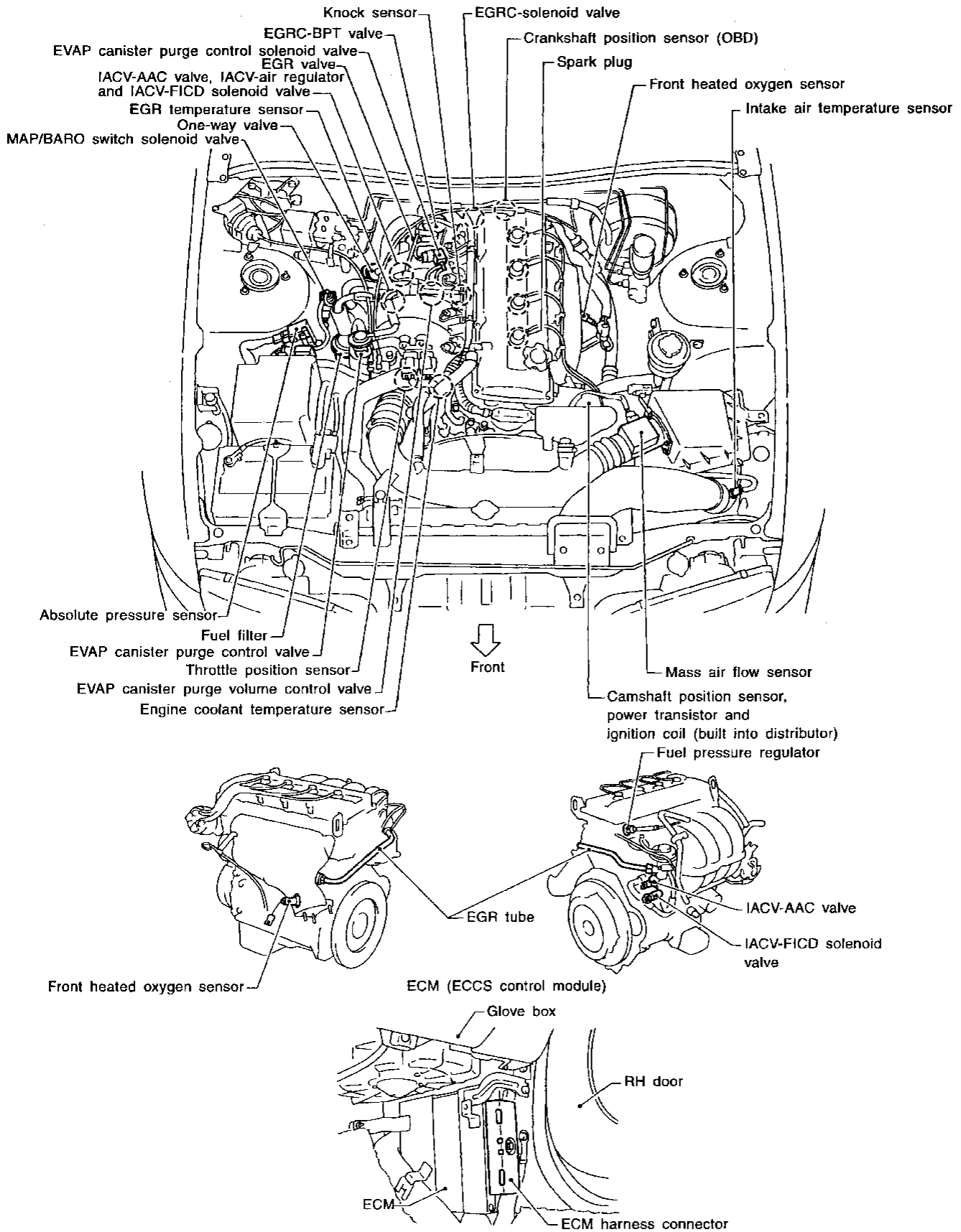
ENGINE AND EMISSION CONTROL OVERALL SYSTEM

Circuit Diagram



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

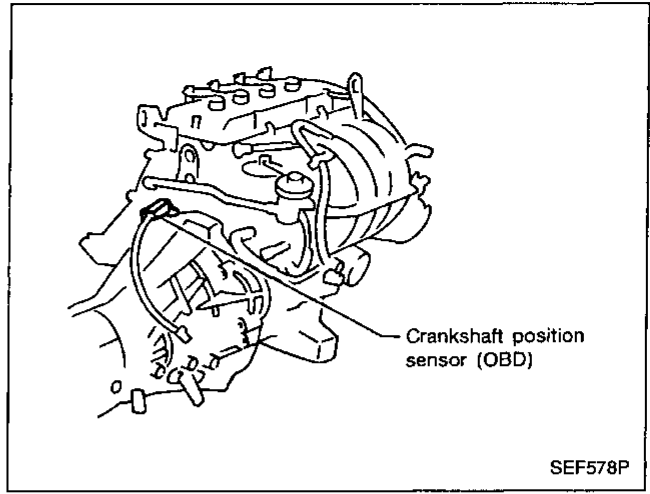
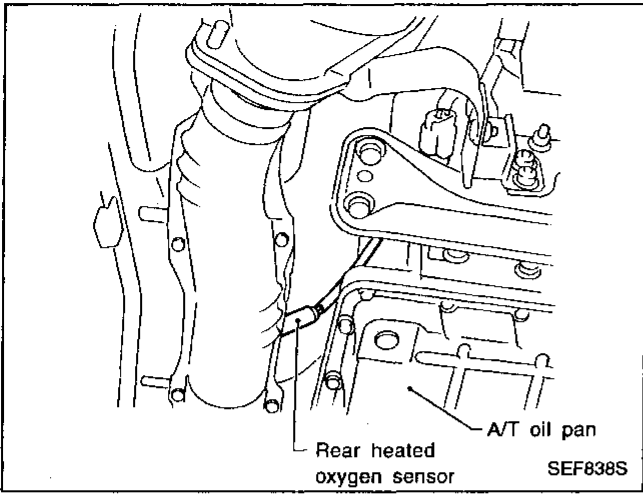
ECCS Component Parts Location



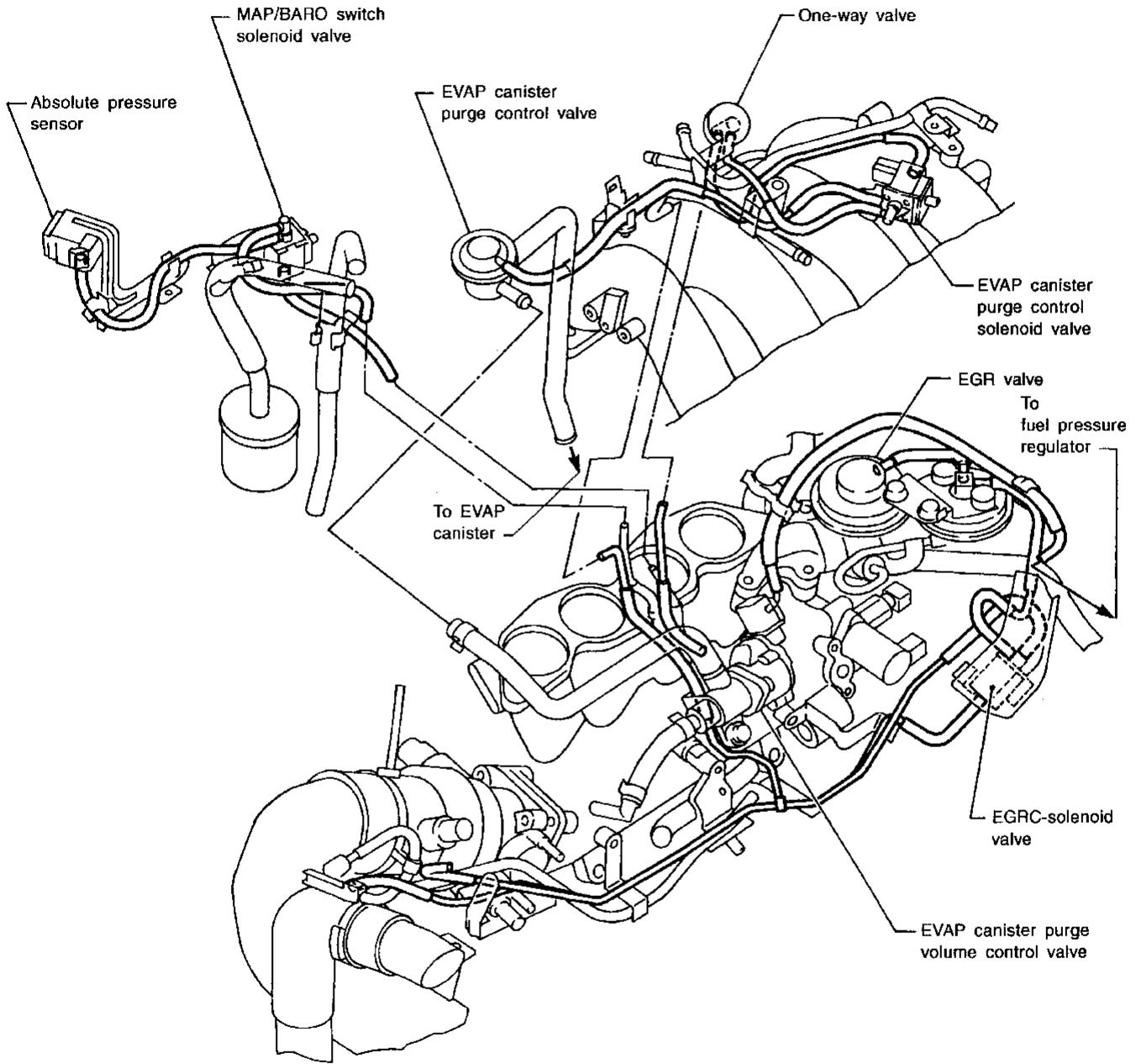
- GI
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- EM
- LC
- EC**
- FE
- CL
- MT
- AT
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- FA
- RA
- BR
- ST
- RS
- BT
- HA
- EL
- IDX

ENGINE AND EMISSION CONTROL OVERALL SYSTEM

ECCS Component Parts Location (Cont'd)



Vacuum Hose Drawing



GI

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LC

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RS

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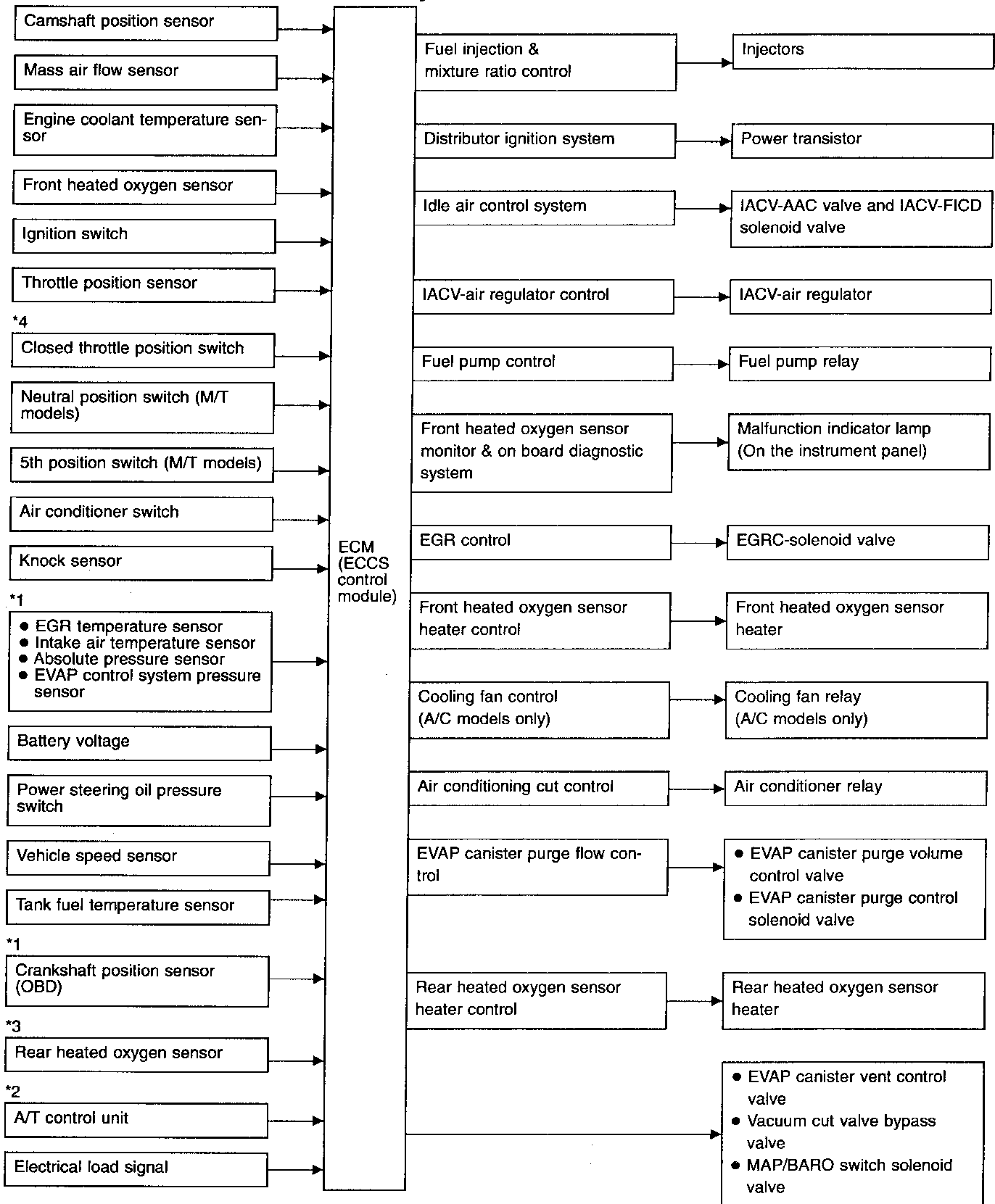
HA

EL

IDX

ENGINE AND EMISSION CONTROL OVERALL SYSTEM

System Chart



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

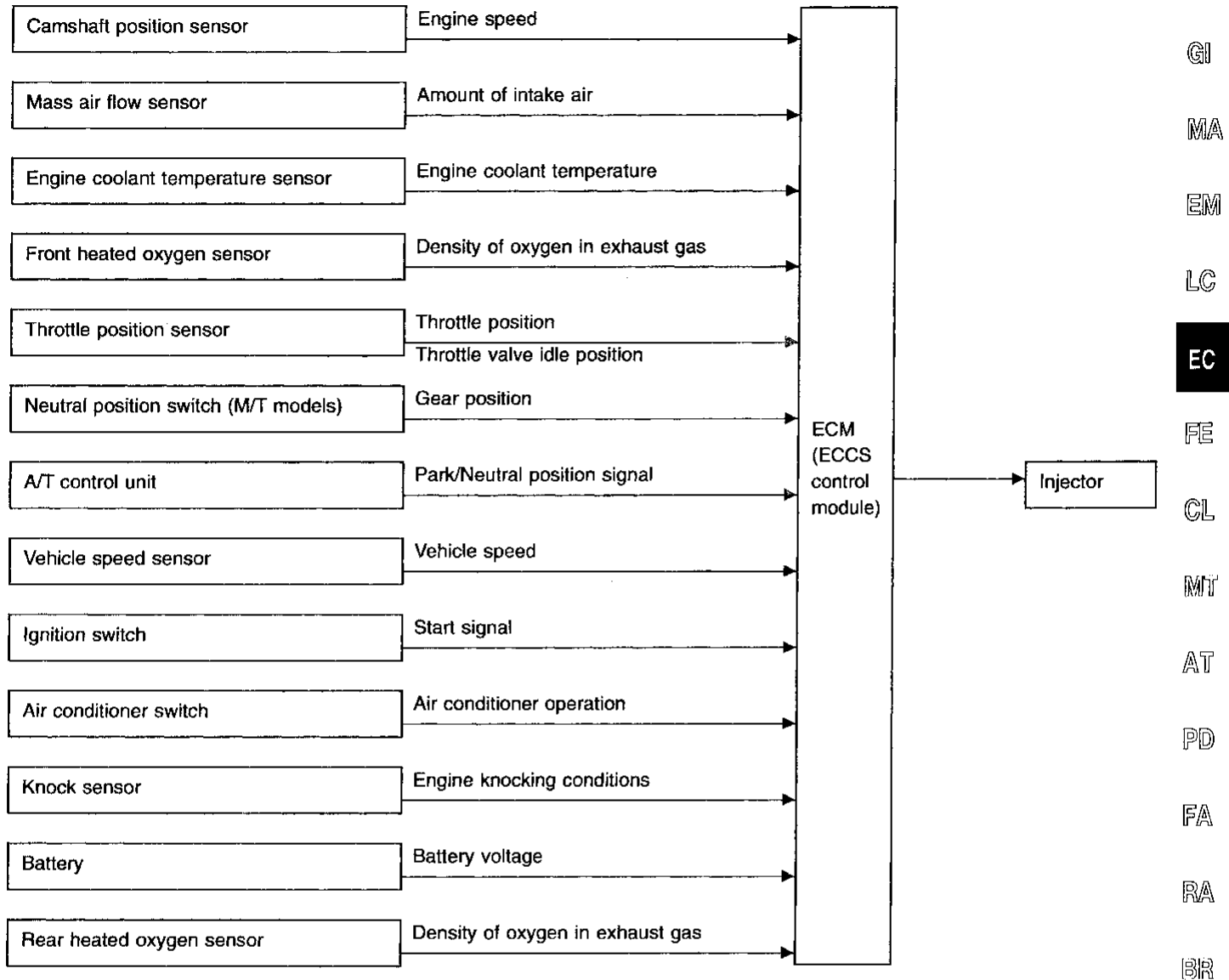
*2: The DTC related to A/T and park/neutral position signal will be sent to ECM.

*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



BASIC MULTIPOINT 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 air intake) from both the camshaft position sensor and the mass air flow sensor.

VARIOUS FUEL INJECTION INCREASE/DECREASE COMPENSATION

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

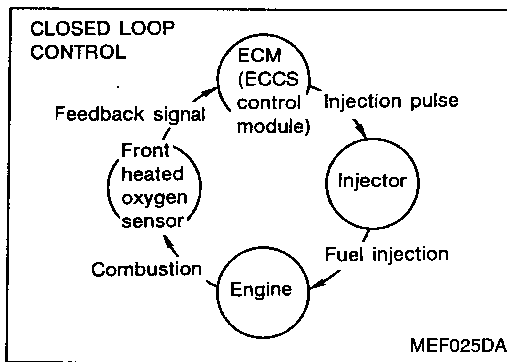
(Fuel increase)

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

(Fuel decrease)

- During deceleration
- During high speed operation

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION



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 warm-up 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 page EC-126. This maintains the mixture ratio within the range of stoichiometric (ideal air-fuel mixture).

This stage is referred to as the closed loop control condition.

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

OPEN LOOP CONTROL

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

- Deceleration and acceleration
- High-load, high-speed operation
- Engine idling
- Malfunction of front heated oxygen sensor or its circuit
- Insufficient activation of front heated oxygen sensor at low engine coolant temperature
- High-engine coolant temperature
- During warm-up
- 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 wire) and characteristic changes during operation (i.e. injector clogging) directly affect mixture ratio.

Accordingly, the difference between the basic and theoretical mixture ratios is monitored in this system. This is then computed in terms of "injection pulse duration" to automatically compensate for the difference between the two ratios.

"Fuel trim" refers to the feedback compensation value compared against the basic injection duration. Fuel trim includes short-term fuel trim and long term fuel trim.

"Short term fuel trim" is the short-term fuel compensation used to maintain the mixture ratio at its theoretical value. The signal from the front heated oxygen sensor indicates whether the mixture ratio is RICH or LEAN compared to the theoretical value. The signal then triggers a reduction in fuel volume if the mixture ratio is rich, and an increase in fuel volume if it is lean.

"Long term fuel trim" is overall fuel compensation carried out long-term to compensate for continual deviation of the short-term fuel trim from the central value. Such deviation will occur due to individual engine differences, wear over time and changes in the usage environment.

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

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

FUEL INJECTION TIMING

Two types of systems are used.

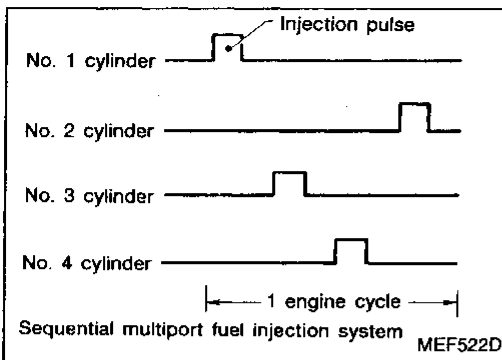
Sequential multiport fuel injection system

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

GI

MA

EM



Simultaneous multiport fuel injection system

Fuel is injected simultaneously into all four cylinders twice each engine cycle. In other words, pulse signals of the same width are simultaneously transmitted from the ECM.

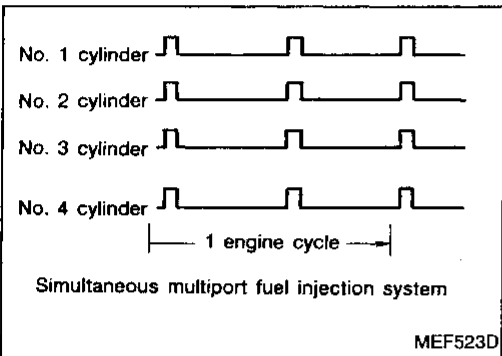
LC

The four injectors will then receive the signals two times for each engine cycle.

EC

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

FE



FUEL SHUT-OFF

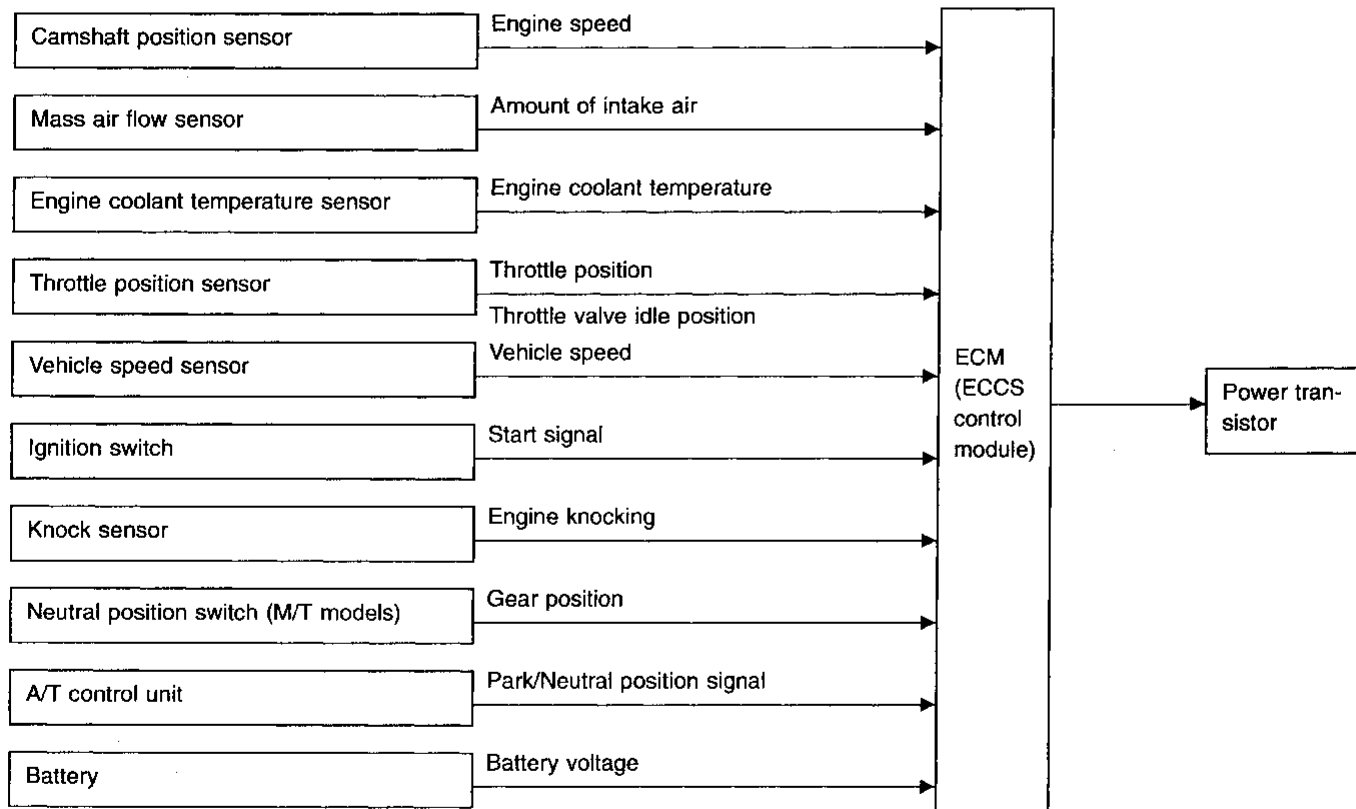
Fuel to each cylinder is cut off during deceleration or operation of the engine at excessively high speeds.

CL

MT

Distributor Ignition (DI) System

INPUT/OUTPUT SIGNAL LINE



AT

PD

FA

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ST

RS

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IDX

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

Distributor Ignition (DI) System (Cont'd)

SYSTEM DESCRIPTION

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

The ECM 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.

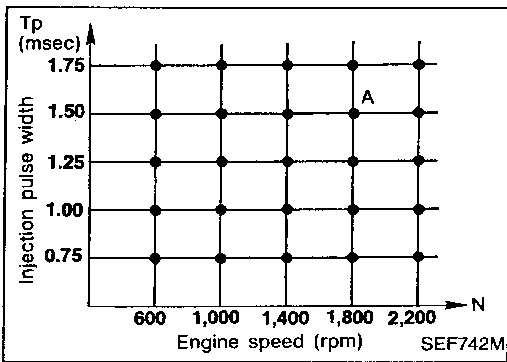
e.g. N: 1,800 rpm, Tp: 1.50 msec
A °BTDC

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

- At starting
- During warm-up
- At idle
- Hot engine operation
- During acceleration

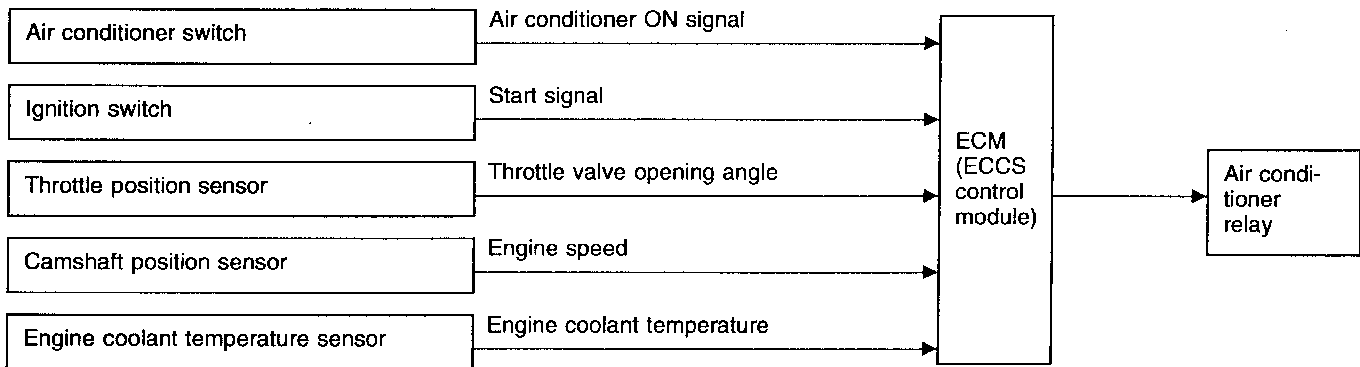
The knock sensor retard system is designed only for emergencies. The basic ignition timing is programmed within the anti-knocking zone, if recommended fuel is used under dry conditions. The retard system does not operate under normal driving conditions.

If engine knocking occurs, the knock sensor monitors the condition. The signal is transmitted to the ECM (ECCS control module). The ECM retards the ignition timing to eliminate the knocking condition.



Air Conditioning Cut Control

INPUT/OUTPUT SIGNAL LINE



SYSTEM DESCRIPTION

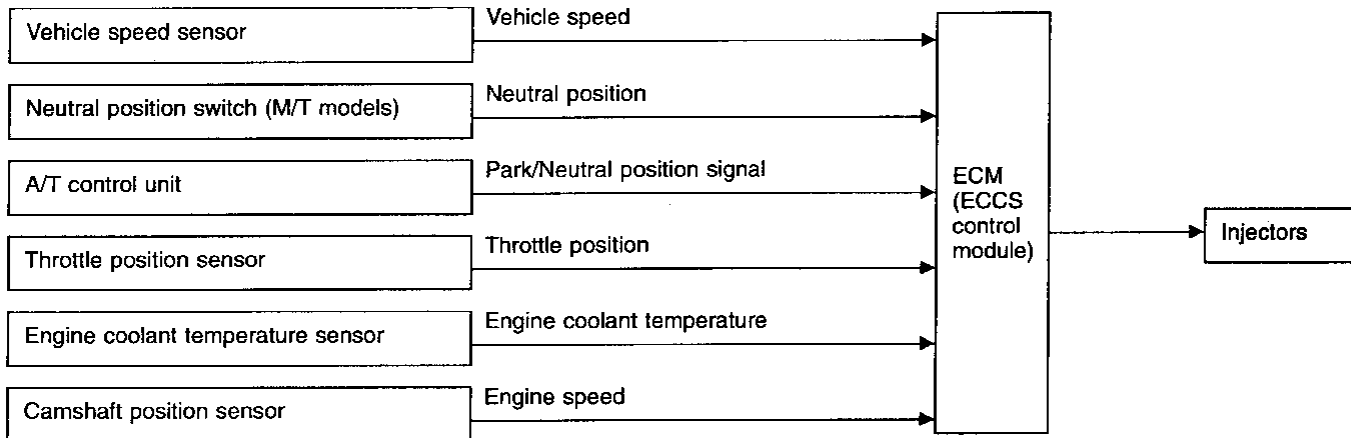
This system improves engine operation when the air conditioner is used.

Under the following conditions, the air conditioner is turned off.

- When the accelerator pedal is fully depressed.
- When cranking the engine.
- At high engine speeds.
- When the engine coolant temperature becomes excessively high.

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

INPUT/OUTPUT SIGNAL LINE



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If the engine speed is above 3,000 rpm with no load (for example, in neutral and engine speed over 3,000 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed.

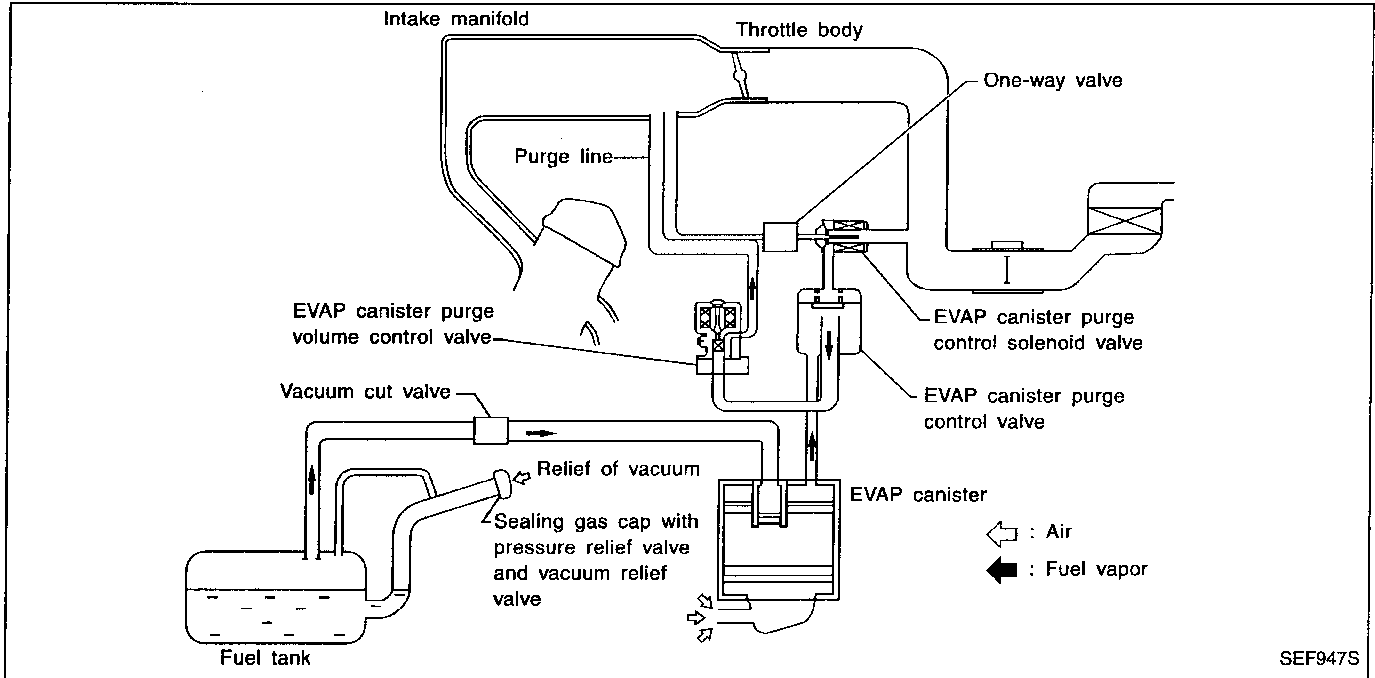
Fuel cut will operate until the engine speed reaches 1,500 rpm, then fuel cut is cancelled.

NOTE:

This function is different than deceleration control listed under multiport fuel injection on EC-15.

EVAPORATIVE EMISSION SYSTEM

Description



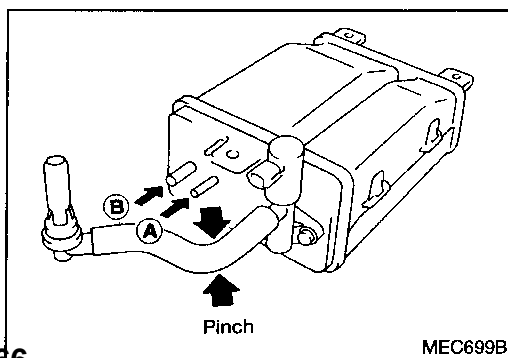
The evaporative emission system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the EVAP canister.

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

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.



Inspection

EVAP CANISTER

Check EVAP canister as follows:

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

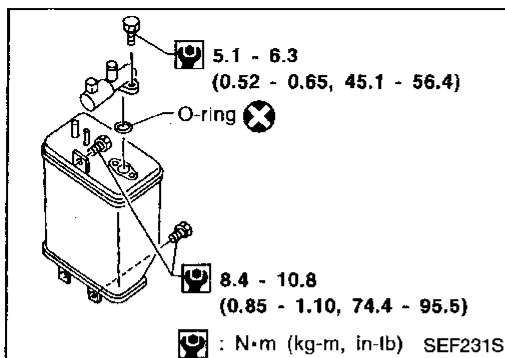
EVAPORATIVE EMISSION SYSTEM

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/cm², 2.22 - 2.90 psi)

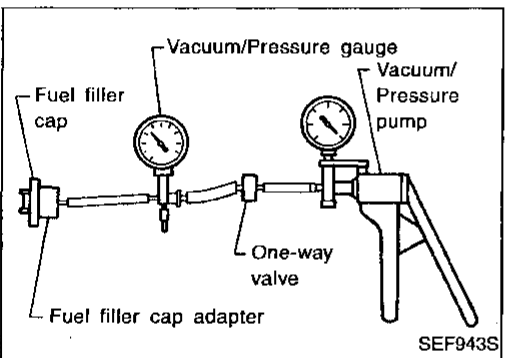
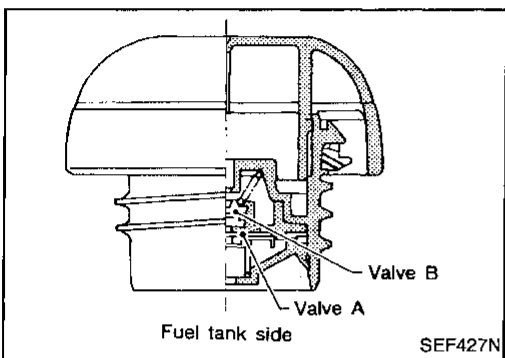
Vacuum:

-6.0 to -3.3 kPa (-0.061 to -0.034 kg/cm², -0.87 to -0.48 psi)

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

CAUTION:

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



EVAP CANISTER PURGE CONTROL VALVE

Refer to EC-195.

VACUUM CUT VALVE

Refer to EC-260.

EVAPORATIVE EMISSION (EVAP) CANISTER PURGE VOLUME CONTROL VALVE

Refer to EC-265.

EVAPORATIVE EMISSION (EVAP) CANISTER PURGE CONTROL SOLENOID VALVE

Refer to EC-195.

TANK FUEL TEMPERATURE SENSOR

Refer to EC-153.

GI

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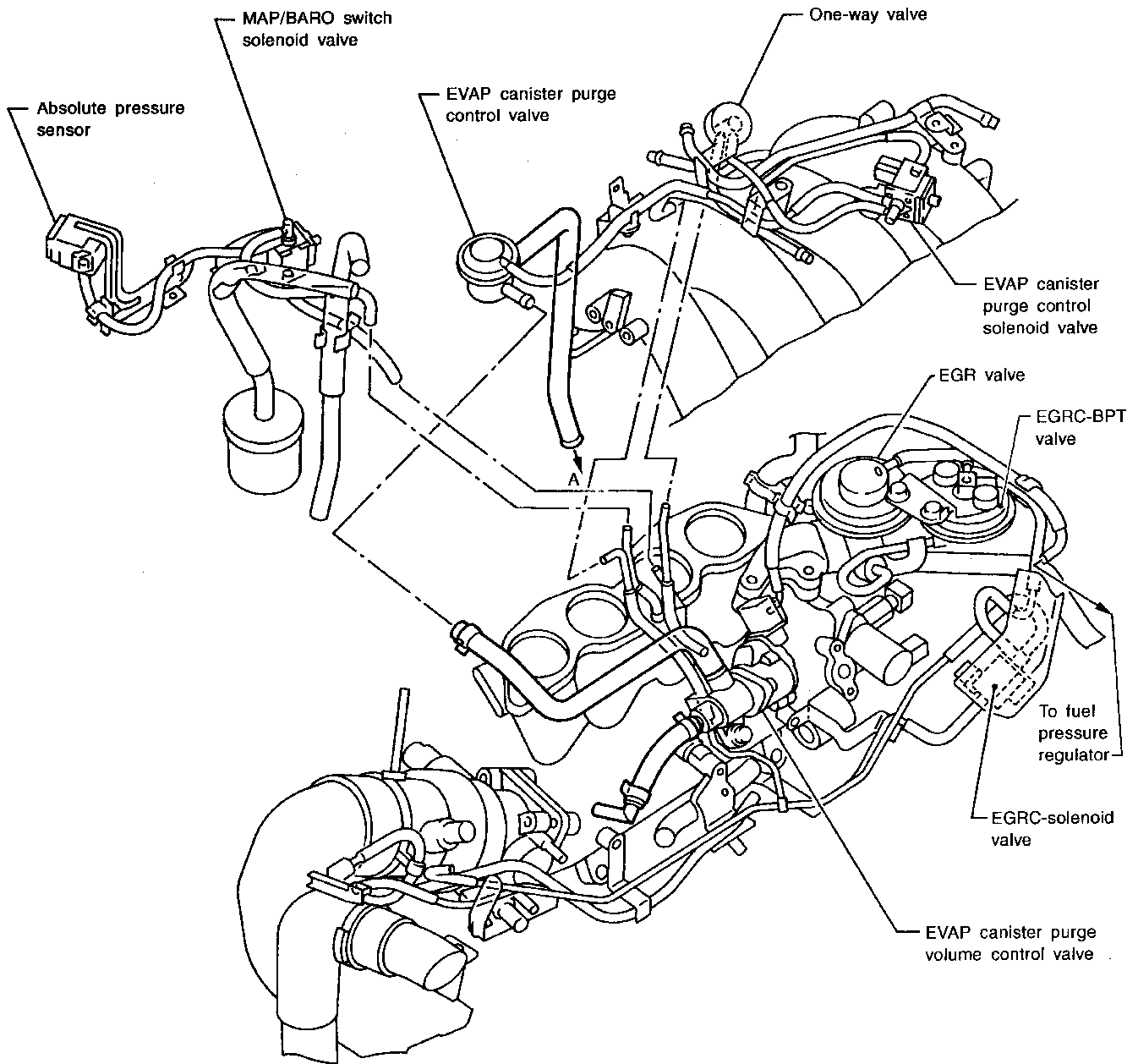
EL

IDX

167

EVAPORATIVE EMISSION SYSTEM

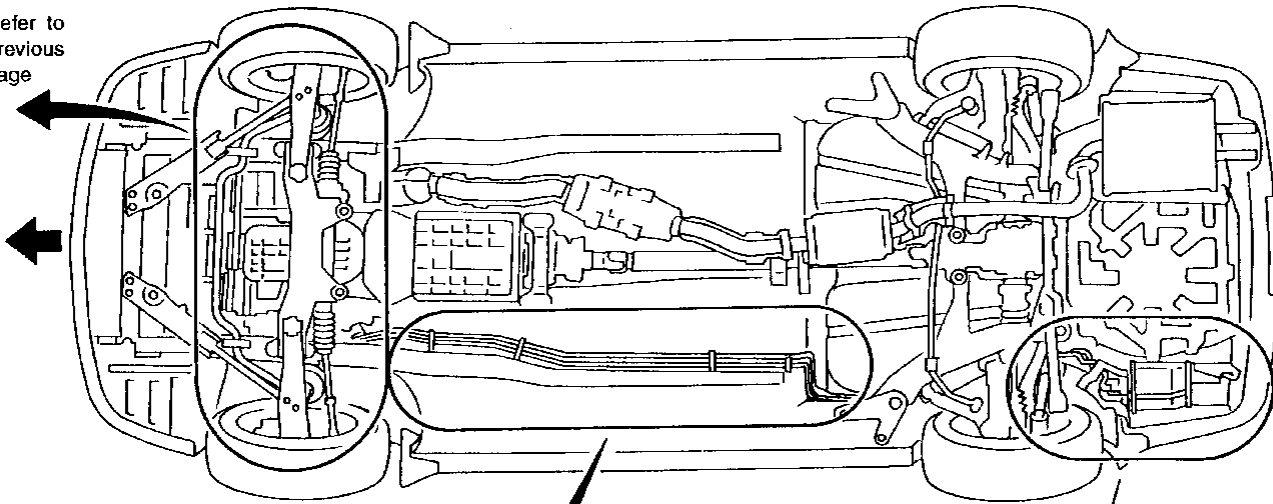
Evaporative Emission Line Drawing



EVAPORATIVE EMISSION SYSTEM

Evaporative Emission Line Drawing (Cont'd)

Refer to
previous
page



GI

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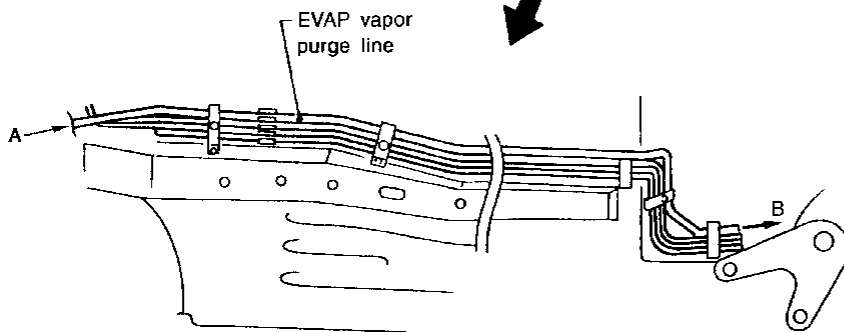
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EVAP vapor
purge line

EVAP canister vent control valve

Hose to breather
valve

Vacuum cut valve
bypass valve

EVAP canister

EVAP control
system pressure sensor

Vacuum cut valve

Fuel tank

POSITIVE CRANKCASE VENTILATION

Description

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

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

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

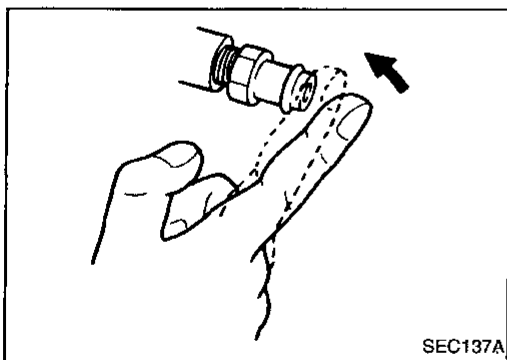
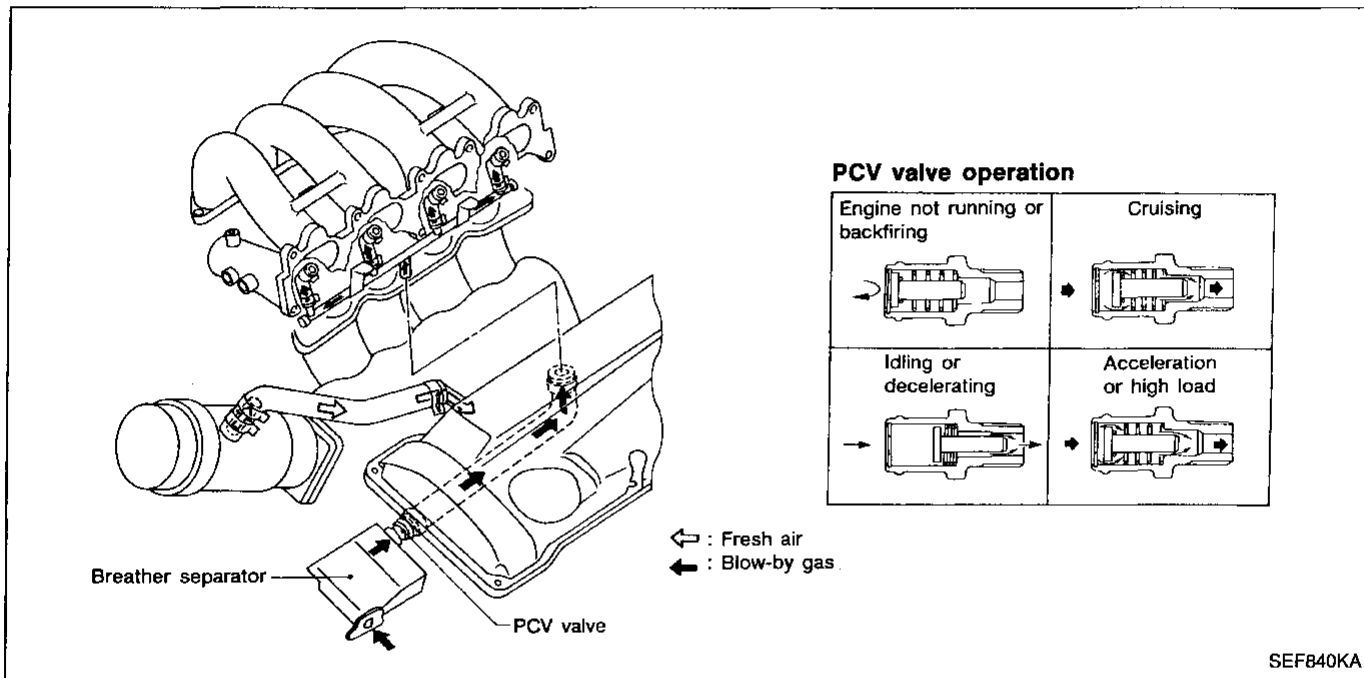
Normally, the capacity of the valve is sufficient to handle any blow-by and a small amount of ventilating air.

The ventilating air is then drawn from the air duct

into the crankcase. In this process the air passes through the hose connecting air inlet tubes to rocker cover.

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

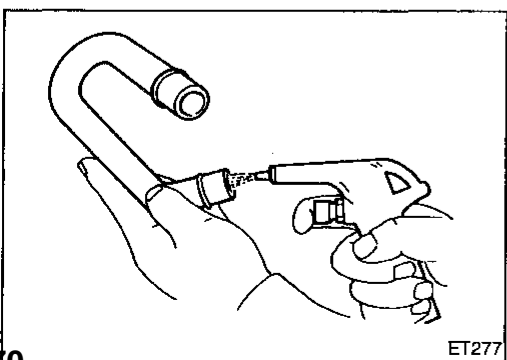
On vehicles with an excessively high blow-by, the valve does not meet the requirement. This is because some of the flow will go through the hose connection to the intake collector under all conditions.



Inspection

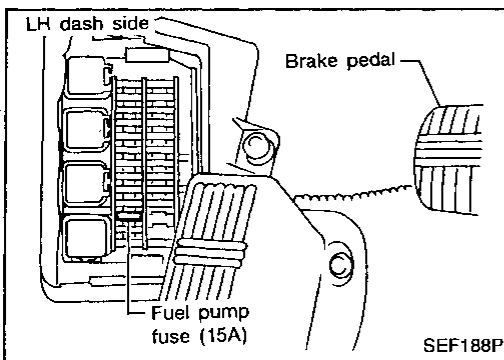
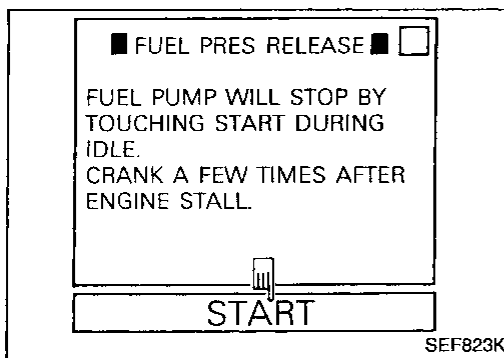
PCV (Positive Crankcase Ventilation)

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



PCV HOSE

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



Fuel Pressure Release

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

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.

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

- a. When reconnecting fuel line, always use new clamps.
- b. Make sure that clamp screw does not contact adjacent parts.
- c. Use a torque driver to tighten clamps.
- d. 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.
5. Read the indication of fuel pressure gauge.

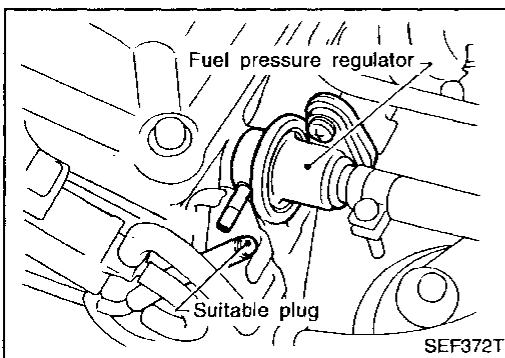
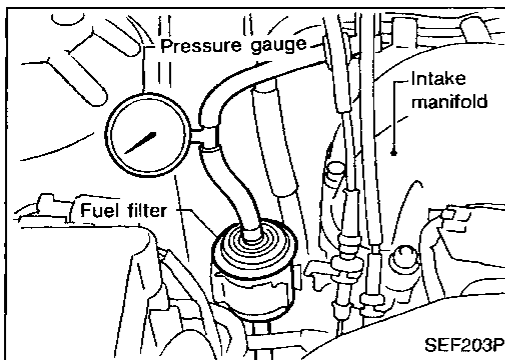
At idling:

Approximately 235 kPa (2.4 kg/cm², 34 psi)

A few seconds after ignition switch is turned OFF to ON:

Approximately 294 kPa (3.0 kg/cm², 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.

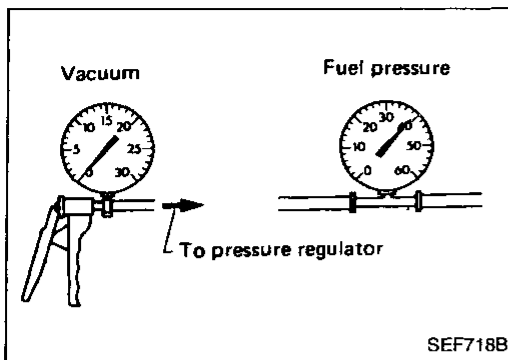


BASIC SERVICE PROCEDURE

Fuel Pressure Check (Cont'd)

- Start engine and read indication of fuel pressure gauge as vacuum is changed.

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



Injector Removal and Installation

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

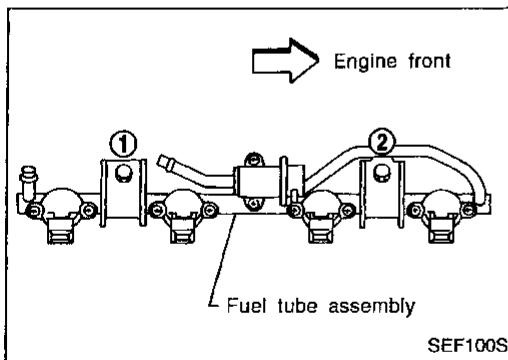
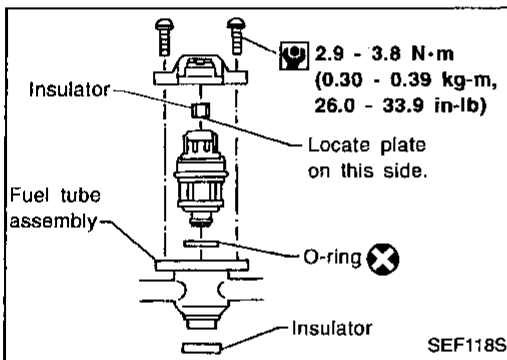
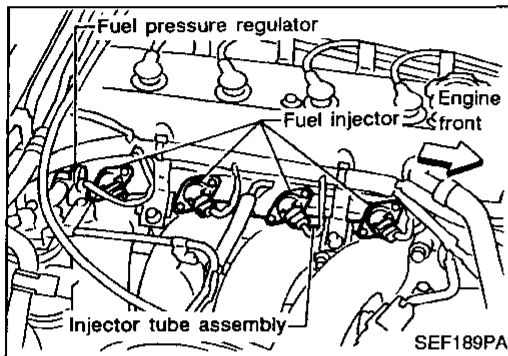
Always replace O-rings with new ones.

Lubricate O-rings with a smear of engine oil.

- Install injectors with fuel tube assembly to intake manifold. Tighten in numerical order shown in the figure.
 - 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).
 - Then, tighten all bolts to 21 to 26 N-m (2.1 to 2.7 kg-m, 15 to 20 ft-lb).
- Install fuel hoses to fuel tube assembly.
- Reinstall any parts removed in reverse order of removal.

CAUTION:

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



Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment

PREPARATION

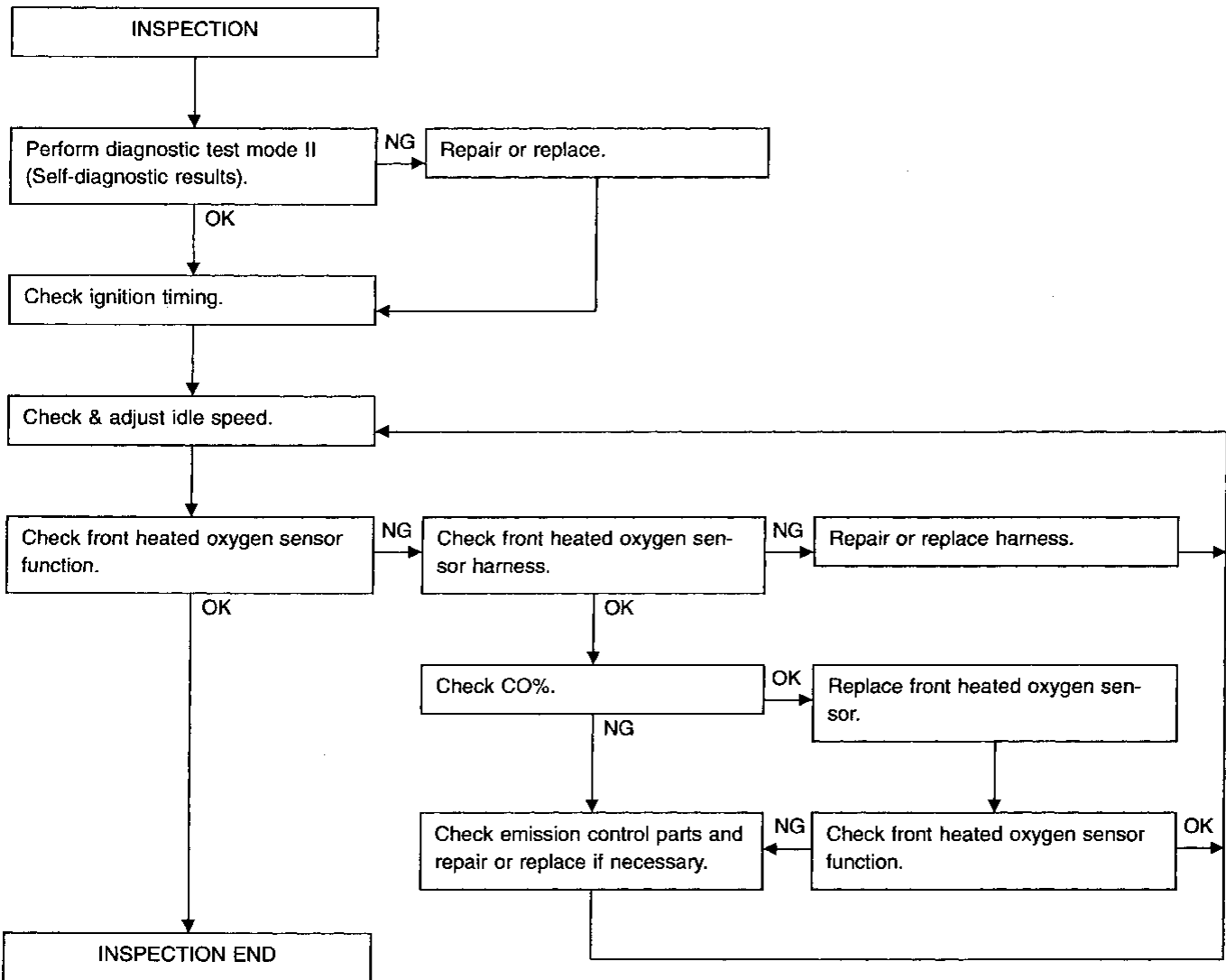
- Make sure that the following parts are in good order.
- (1) Battery
- (2) Ignition system
- (3) Engine oil and coolant levels
- (4) Fuses
- (5) ECM harness connector
- (6) Vacuum hoses
- (7) Air intake system
(Oil filler cap, oil level gauge, etc.)
- (8) Fuel pressure
- (9) Engine compression
- (10) 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 window defogger.
- Keep front wheels pointed straight ahead.
- Make the check after the cooling fan has stopped.

GI
MA
EM
LC
EC

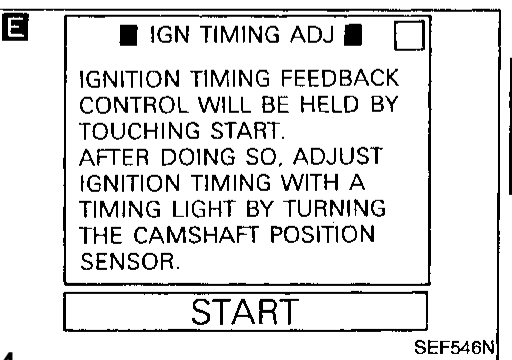
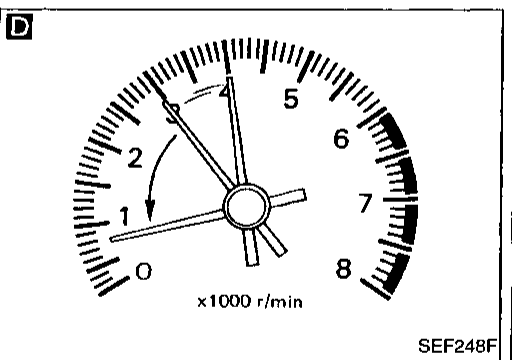
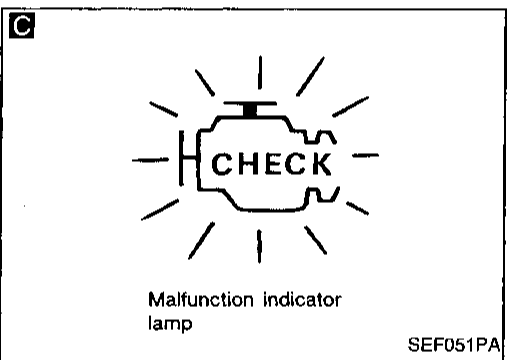
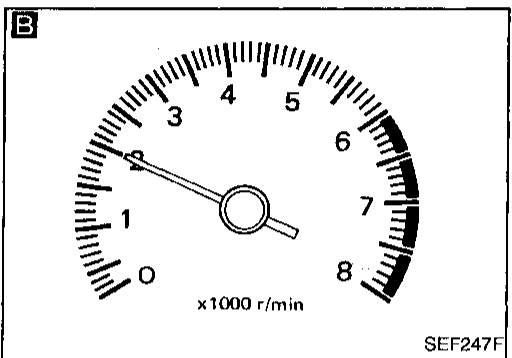
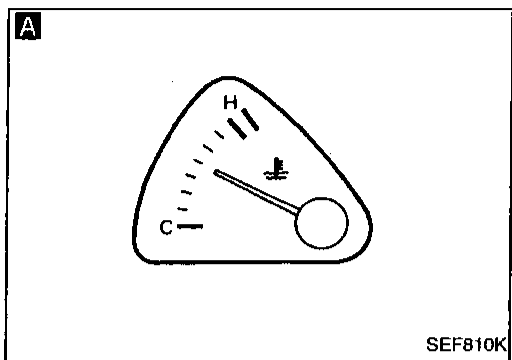
Overall inspection sequence



FE
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RA
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ST
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BT
HA
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IDX

BASIC SERVICE PROCEDURE

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 operations

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

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

C Perform the diagnostic test mode II (Self-diagnostic results).

OK

NG

Repair or replace components as necessary.

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

- E**
1. Select "IGNITION TIMING ADJ" in WORK SUPPORT mode.
 2. Touch "START".
1. Stop engine and disconnect throttle position sensor harness connector.
 2. Start engine.

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

F Check ignition timing with a timing light.

M/T: $20 \pm 2^\circ$ BTDC
A/T: $20 \pm 2^\circ$ BTDC (in "N" position)

OK

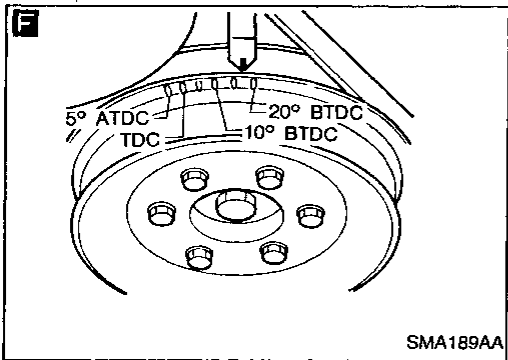
NG

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BASIC SERVICE PROCEDURE

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

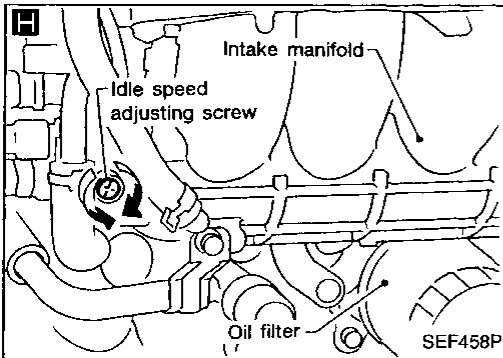


G ■ IGN TIMING ADJ ■ □

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

START

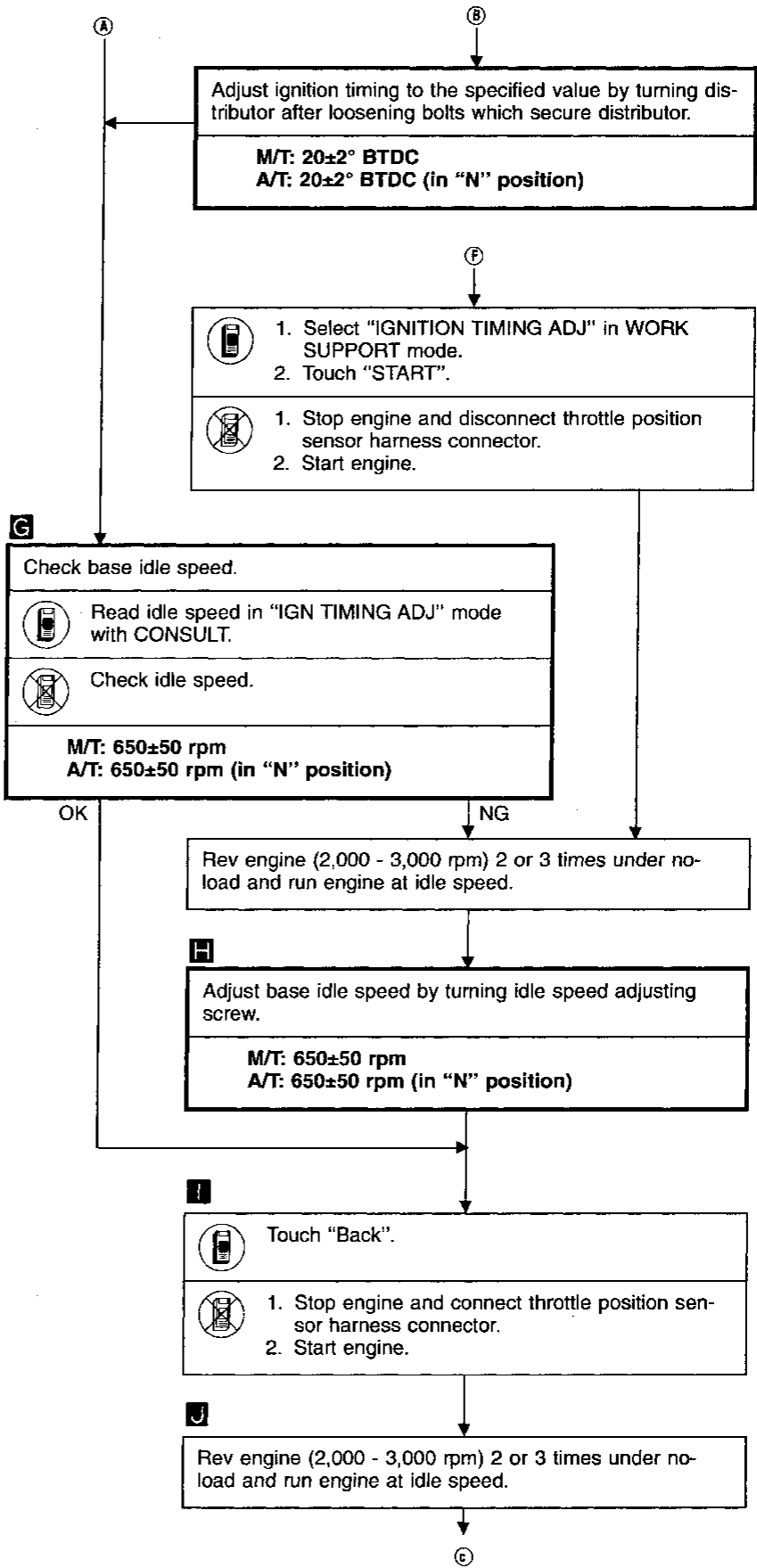
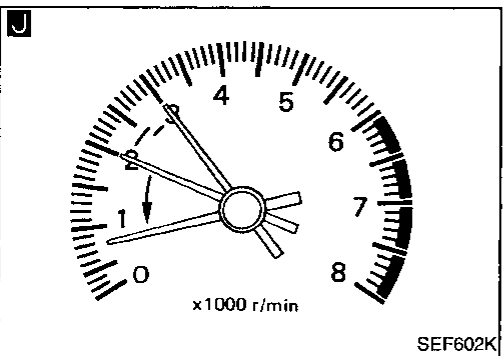
SEF546N



I

BACK	←	→	↑	↓	
MODE	LIGHT ON	LIGHT OFF	↑	↓	ENTER

SEF913J



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BASIC SERVICE PROCEDURE

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

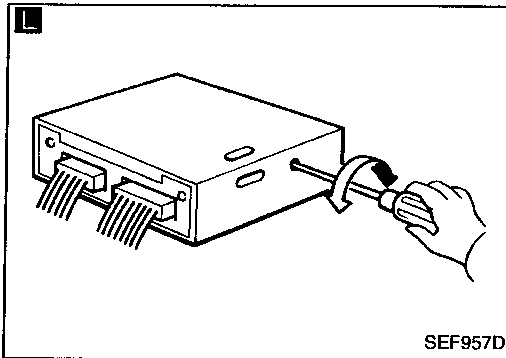
K

☆ MONITOR ☆ NO FAIL

CMPS•RPM(REF) 700rpm

RECORD

SEF190P



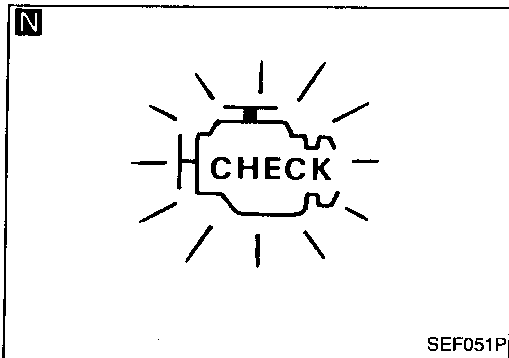
M

☆ MONITOR ☆ NO FAIL

CMPS•RPM (REF) 2000rpm
FR O2 MNTR RICH

RECORD

SEF054P



K

Check target idle speed.

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

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

OK

NG

Check IACV-AAC valve and replace if necessary.

Check IACV-AAC valve harness and repair if necessary.

Check ECM function*1 by substituting another known good ECM.

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

L

Set the diagnostic test mode II (front heated oxygen sensor monitor).

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

M N

Check front heated oxygen sensor signal.

1. See "FR O2 MNTR" in "DATA MONITOR" mode.
2. Maintaining engine at 2,000 rpm under no-load (engine is warmed up sufficiently.), check that the monitor fluctuates between "LEAN" and "RICH" more than 5 times during 10 seconds.
1 cycle: RICH → LEAN → RICH
2 cycles: RICH → LEAN → RICH → LEAN → RICH
OR
 Make sure that malfunction indicator lamp goes on and off more than 5 times during 10 seconds at 2,000 rpm.

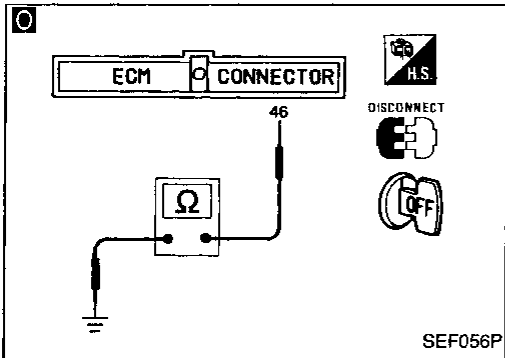
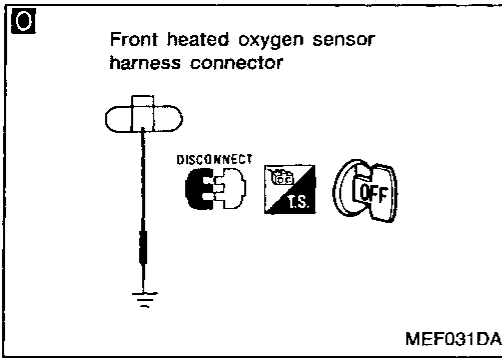
OK

INSPECTION END

NG → **①**

BASIC SERVICE PROCEDURE

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



Q

Check front heated oxygen sensor harness:

1. Turn off engine and disconnect battery ground cable.
2. Disconnect ECM harness connector from ECM.
3. Disconnect front heated oxygen sensor harness connector and connect terminal for front heated oxygen sensor to ground with a jumper wire.
4. Check for continuity between terminal ④ of ECM harness connector and ground metal on vehicle body.

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

OK → Connect ECM harness connector to ECM.

NG → Repair harness. → **E**

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

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

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

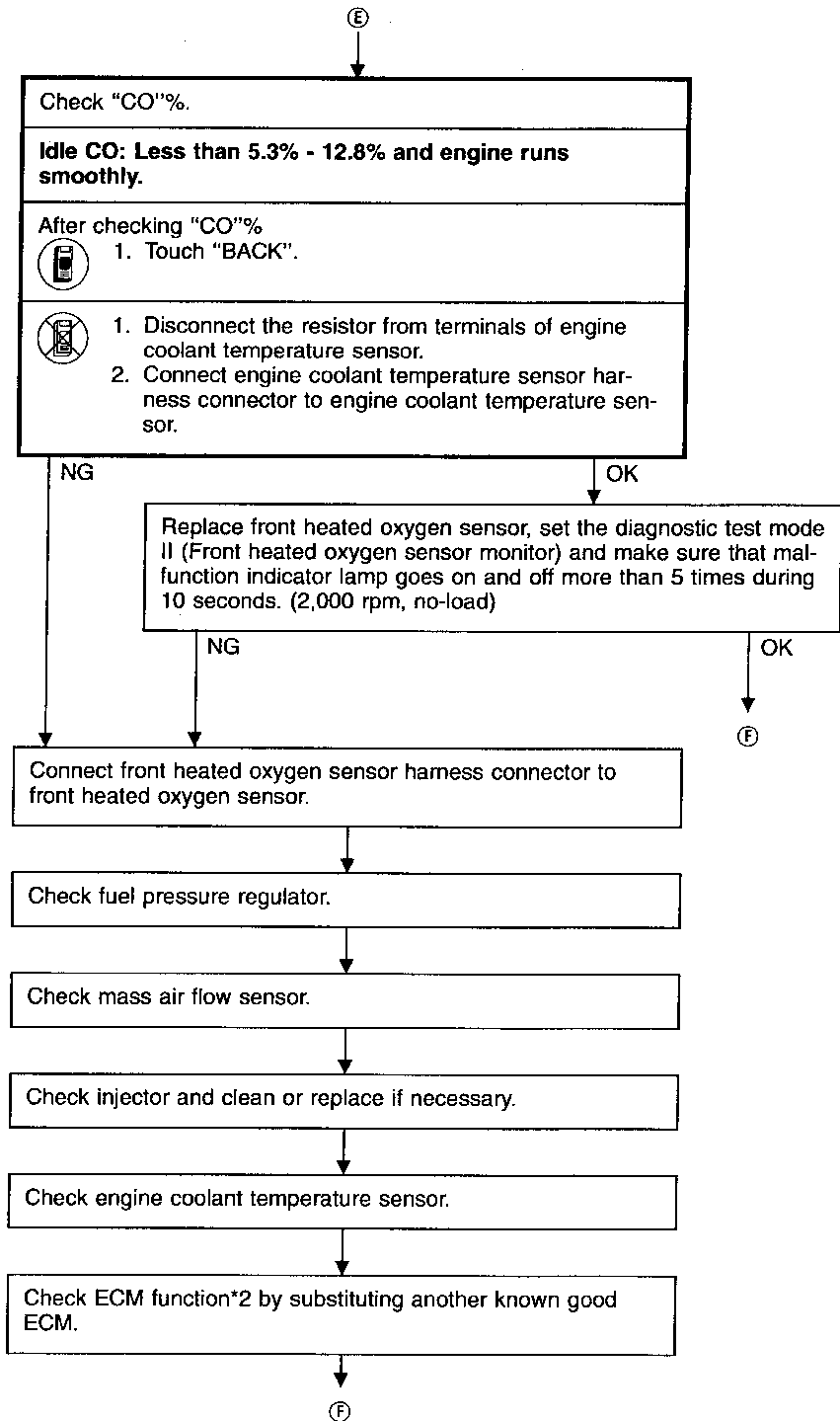
Rev engine two or three times under no-load then run engine at idle speed.

E

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BASIC SERVICE PROCEDURE

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



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

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

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Introduction

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

- Diagnostic Trouble Code (DTC)Mode 3 of SAE J1979
- Freeze Frame dataMode 2 of SAE J1979
- System Readiness Test (SRT) codeMode 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 limitsMode 6 of SAE J1979

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

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

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

*2: 1st trip DTCs for self-diagnoses concerning SRT items cannot be shown on the GST display.

The malfunction indicator lamp (MIL) on the instrument panel lights up when the same malfunction is detected in two consecutive trips (Two trip detection logic), or when the ECM enters fail-safe mode (Refer to EC-75).

Two Trip Detection Logic

When a malfunction is detected for the first time, 1st trip DTC and 1st trip Freeze Frame data are stored in the ECM memory. The MIL will not light up at this stage. (1st trip)

If the same malfunction is detected again during the next drive, the DTC and Freeze Frame data are stored in the ECM memory, and the MIL lights up. The MIL lights up at the same time when the DTC is stored. (2nd trip) The "trip" in the "Two Trip Detection Logic" means a driving mode in which self-diagnosis is performed during vehicle operation. Specific on board diagnostic items will cause the ECM to light up or blink the MIL and store DTC and Freeze Frame data, even in the 1st trip, as shown below.

Items	MIL			DTC		1st trip DTC	
	1st trip		2nd trip lighting up	1st trip displaying	2nd trip displaying	1st trip displaying	2nd trip displaying
	Blinking	Lighting up					
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0304 (0701, 0605 - 0608) is being detected	X			X		X	
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0304 (0701, 0605 - 0608) has been detected		X		X		X	
Closed loop control — DTC: P0130 (0307)		X		X		X	
Fail-safe items (Refer to EC-75.)		X		X*1		X*1	
Except above			X		X	X	X

*1: Except "ECM".

Emission-related Diagnostic Information

DTC AND 1ST TRIP DTC

The 1st trip DTC (whose number is the same as the DTC number) is displayed for the latest self-diagnostic result obtained. If the ECM memory was cleared previously, and the first trip DTC did not reoccur, the first trip DTC will not be displayed. If a malfunction is detected during the 1st trip, the 1st trip DTC is stored in the ECM memory. The MIL will not light up (two trip detection logic). If the same malfunction is not detected in the 2nd trip (meeting the required driving pattern), the 1st trip DTC is cleared from the ECM memory. If the same malfunction is detected in the 2nd trip, both the first trip DTC and DTC are stored in the ECM memory and the MIL lights up. In other words, the DTC is stored in the ECM memory and the MIL lights up when the same malfunction occurs in two consecutive trips. If a first trip DTC is stored and a non-diagnostic operation is performed between the 1st and 2nd trips, only the 1st trip DTC will continue to be stored. For malfunctions that blink or light up the MIL during the 1st trip, the DTC and 1st trip DTC are stored in the ECM memory. Procedures for clearing the DTC and the 1st trip DTC from the ECM memory are described in "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION". Refer to EC-42.


For malfunctions in which 1st trip DTCs are displayed, refer to EC-40. These items are required by legal regulations to continuously monitor the system/component. In addition, the items monitored non-continuously are also displayed on CONSULT.


1st trip DTC is specified in Mode 7 of SAE J1979. 1st trip DTC detection occurs without lighting up the MIL and therefore does not warn the driver of a problem. However, 1st trip DTC detection will not prevent the vehicle from being tested, for example during Inspection/Maintenance (I/M) tests.


When a 1st trip DTC is detected, check, print out or write down and erase (1st trip) DTC and Freeze Frame data as specified in "Work Flow" procedure Step II, refer to page EC-69. Then perform "DTC confirmation procedure" or "Overall function check" to try to duplicate the problem. If the malfunction is duplicated, the item requires repair.

How to read DTC and 1st trip DTC

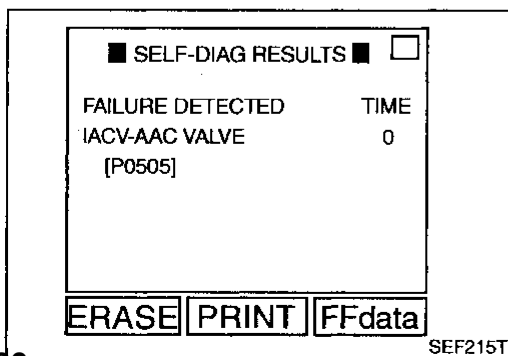
DTC and 1st trip DTC can be read by the following methods.

 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.)

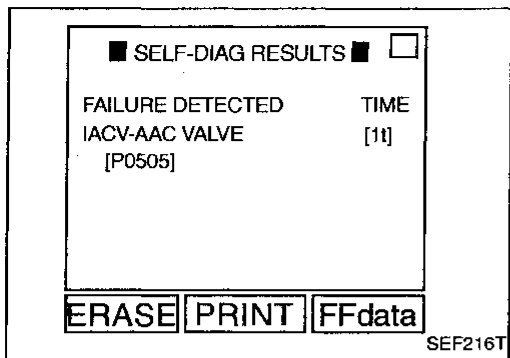
- 1st trip DTC No. is the same as DTC No.
- Output of a DTC indicates a malfunction. However, Mode II and GST do not indicate whether the malfunction is still occurring or has occurred in the past and has returned to normal. CONSULT can identify malfunction status as shown below. Therefore, using CONSULT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



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".

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Emission-related Diagnostic Information (Cont'd)



If 1st trip DTC is stored in the ECM, the time data will be "[11]".

FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA

The ECM records the driving conditions such as fuel system status, calculated load value, engine coolant temperature, short term fuel trim, long term fuel trim, engine speed and vehicle speed at the moment a malfunction is detected.

Data which are stored in the ECM memory, along with the 1st trip DTC, are called 1st trip freeze frame data. The data, stored together with the DTC data, are called freeze frame data and displayed on CONSULT or GST. The 1st trip freeze frame data can only be displayed on the CONSULT screen, not on the GST. For details, see EC-55.

Only one set of freeze frame data (either 1st trip freeze frame data or freeze frame data) can be stored in the ECM. 1st trip freeze frame data is stored in the ECM memory along with the 1st trip DTC. There is no priority for 1st trip freeze frame data and it is updated each time a different 1st trip DTC is detected. However, once freeze frame data (2nd trip detection/MIL on) is stored in the ECM memory, 1st trip freeze frame data is no longer stored. Remember, only one set of freeze frame data can be stored in the ECM. The ECM has the following priorities to update the data.

Priority	Items	
1	Freeze frame data	Misfire — DTC: P0300 - P0304 (0701, 0605 - 0608)
		Fuel Injection System Function — DTC: P0171 (0115), P0172 (0114)
2		Except the above items (Includes A/T related items)
3	1st trip freeze frame data	

For example, the EGR malfunction (Priority: 2) was detected and the freeze frame data was stored in the 2nd trip. After that when the misfire (Priority: 1) is detected in another trip, the freeze frame data will be updated from the EGR malfunction to the misfire. The 1st trip freeze frame data is updated each time a different malfunction is detected. There is no priority for 1st trip freeze frame data. However, once freeze frame data is stored in the ECM memory, 1st trip freeze data is no longer stored (because only one freeze frame data or first trip freeze frame data can be stored in the ECM). If freeze frame data is stored in the ECM memory and freeze frame data with the same priority occurs later, the first (original) freeze frame data remains unchanged in the ECM memory.

Both 1st trip freeze frame data and freeze frame data (along with the DTCs) are cleared when the ECM memory is erased. Procedures for clearing the ECM memory are described in "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION". Refer to EC-42.

SYSTEM READINESS TEST (SRT) CODE

System Readiness Test (SRT) code is specified in Mode 1 of SAE J1979. It indicates whether the self-diagnostic tests for non-continuously monitored items have been completed or not.

Inspection/Maintenance (I/M) tests of the on board diagnostic (OBD) II system may become the legal requirement in some states/areas. All SRT codes must be set in this case. Unless all SRT codes are set, conducting the I/M test may not be allowed.

SRT codes are set after self-diagnosis has been performed two or more times. This occurs regardless of whether the diagnosis is in "OK" or "NG", and whether or not the diagnosis is performed in consecutive trips. The following table lists the five SRT items (9 test items) for the ECCS used in S14 models.

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ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

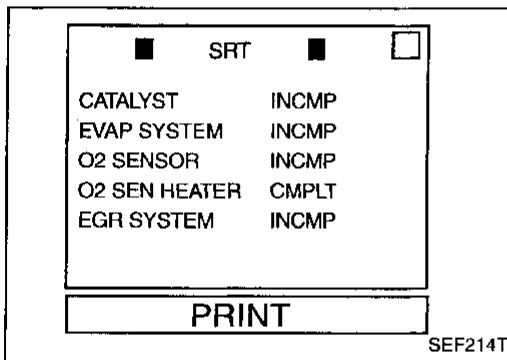
Emission-related Diagnostic Information (Cont'd)

SRT items	Self-diagnostic test items
Catalyst monitoring	<ul style="list-style-type: none"> ● Three way catalyst function P0420 (0720)
EVAP system monitoring	<ul style="list-style-type: none"> ● EVAP control system (Small Leak) P0440 (0705) ● EVAP control system purge flow monitoring P1447 (0111)
Oxygen sensor monitoring	<ul style="list-style-type: none"> ● Front heated oxygen sensor P0130 (0503) ● Rear heated oxygen sensor P0136 (0707)
Oxygen sensor heater monitoring	<ul style="list-style-type: none"> ● Front heated oxygen sensor heater P0135 (0901) ● Rear heated oxygen sensor heater P0141 (0902)
EGR system monitoring	<ul style="list-style-type: none"> ● 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-42). In addition, if the ECCS components/systems are repaired or if the battery terminals remain disconnected for more than 24 hours, all SRT codes may be cleared from the ECM memory.

How to display SRT code

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



A sample of CONSULT display for SRT code is shown at left. "INCMP" means the self-diagnosis is incomplete and SRT is not set. "CMPLT" means the self-diagnosis is complete and SRT is set.

How to set SRT code

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

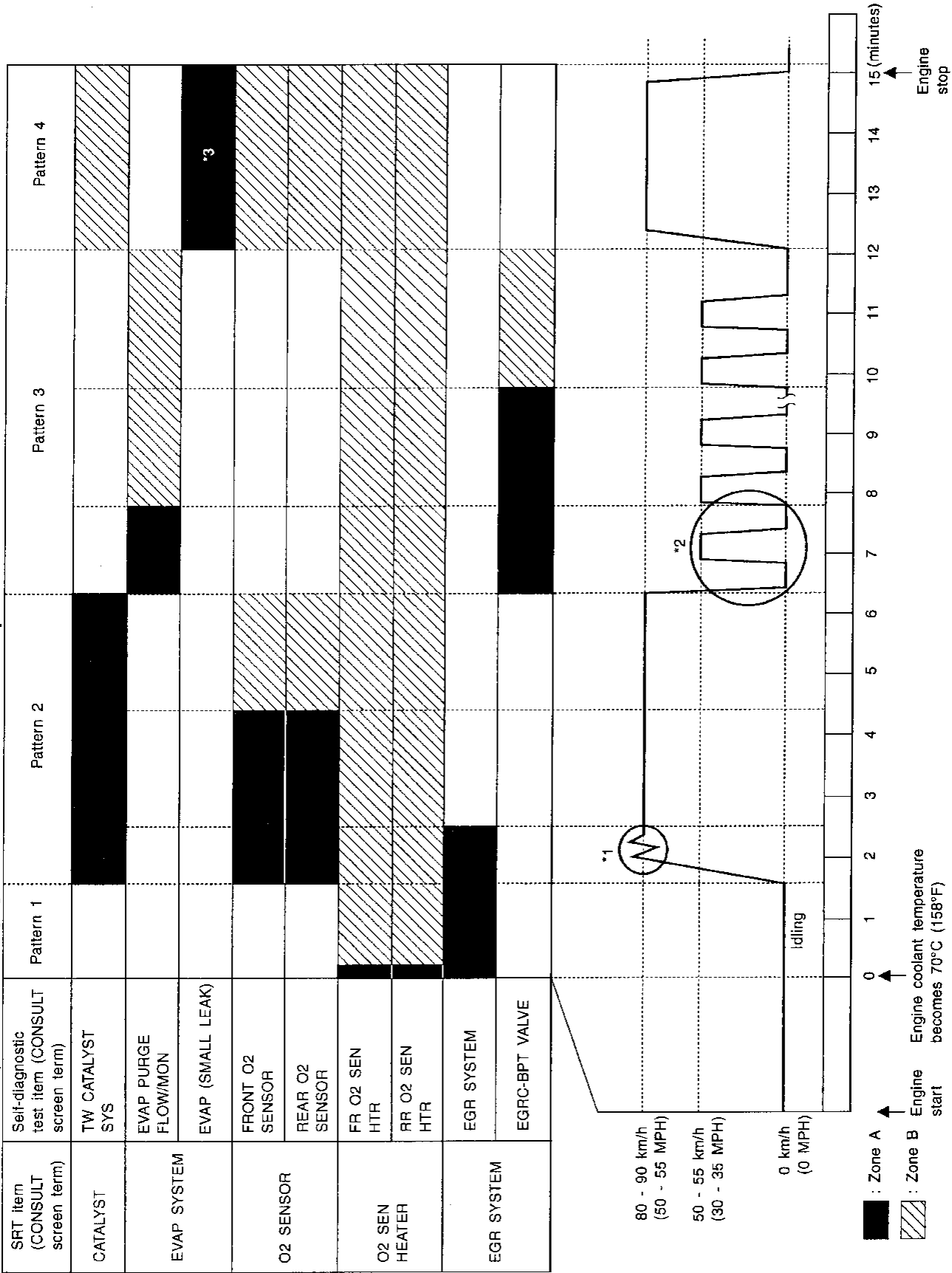
ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Emission-related Diagnostic Information (Cont'd)

Driving pattern

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

Driving pattern



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

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Emission-related Diagnostic Information (Cont'd)

- The time required for each diagnosis varies with road surface conditions, weather, altitude, individual driving habits, etc.

Zone A refers to the range where the time required, for the diagnosis under normal conditions*, is the shortest. Zone B refers to the range where the diagnosis can still be performed if the diagnosis is not completed within zone A.

*: Normal conditions refer to the following:

- Sea level
- Flat road
- Ambient air temperature: 20 - 30°C (68 - 86°F)
- Diagnosis is performed as quickly as possible under normal conditions.

Under different conditions [For example: ambient air temperature other than 20 - 30°C (68 - 86°F)], diagnosis may also be performed.

Pattern 1: • The engine is started at the engine coolant temperature of -10 to 35°C (14 to 95°F) (where the voltage between the ECM terminals ⑤ and ⑥ is 3.0 - 4.3V).

- The engine must be operated at idle speed until the engine coolant temperature is greater than 70°C (158°F) (where the voltage between the ECM terminals ⑤ and ⑥ is lower than 1.4V).

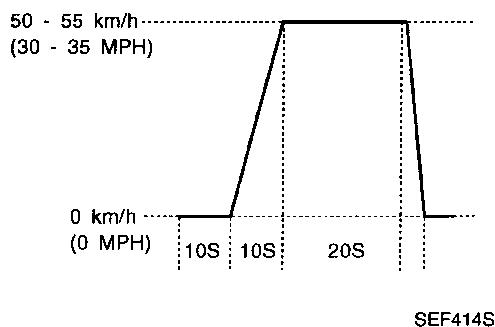
Pattern 2: • When steady-state driving is performed again even after it is interrupted, each diagnosis can be conducted. In this case, the time required for diagnosis may be extended.

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

Pattern 4: • Tests are performed after the engine has been operated for at least 12 minutes.
• The accelerator pedal must be held very steady during steady-state driving.
• If the accelerator pedal is moved, the test must be conducted all over again.

*1: Depress the accelerator pedal until vehicle speed is 80 km/h (50 MPH), then release the accelerator pedal. Depress the accelerator pedal until vehicle speed is 80 km/h (50 MPH) again.

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



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

Suggested transmission gear position for A/T models.

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

Suggested upshift speeds for M/T models

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

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

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

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

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

Suggested maximum speed in each gear

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

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

Gear	km/h (MPH)
1st	50 (30)
2nd	95 (60)
3rd	145 (90)
4th	—
5th	—

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Emission-related Diagnostic Information (Cont'd)

TEST VALUE AND TEST LIMIT

The following is the information specified in Mode 6 of SAE J1979.

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

Items for which these data (test value and test limit) are displayed are the same as SRT code items (9 test items).

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

X: Applicable
—: Not applicable

SRT item (CONSULT display)	Self-diagnostic test item	Test value			Test limit	Application
		GST display		CONSULT display		
		TID	CID			
CATALYST	Warm-up three way catalyst function	01H	01H	Parameter 1	Max.	X
EVAP SYSTEM	EVAP control system (Small leak)	05H	03H	Parameter 1	Max.	X
	EVAP control system purge flow monitoring	06H	83H	Parameter 2	Min.	X
O2 SENSOR	Front heated oxygen sensor	09H	04H	Parameter 1	Max.	X
		0AH	84H	Parameter 2	Min.	X
		0BH	04H	Parameter 3	Max.	X
		0CH	04H	Parameter 4	Max.	X
		0DH	04H	Parameter 5	Max.	X
	Rear heated oxygen sensor	19H	86H	Parameter 6	Min.	X
		1AH	86H	Parameter 7	Min.	X
		1BH	06H	Parameter 8	Max.	X
		1CH	06H	Parameter 9	Max.	X
O2 SENSOR HEATER	Front heated oxygen sensor heater	29H	08H	Parameter 1	Max.	X
		2AH	88H	Parameter 1	Min.	X
	Rear heated oxygen sensor heater	2DH	0AH	Parameter 1	Max.	X
		2EH	8AH	Parameter 1	Min.	X
EGR SYSTEM	EGR function	31H	8CH	Parameter 1	Min.	X
		32H	8CH	Parameter 2	Min.	X
		33H	8CH	Parameter 3	Min.	X
		34H	8CH	Parameter 4	Min.	X
		35H	0CH	Parameter 5	Max.	X
	EGRC-BPT valve function	36H	0CH	Parameter 6	Max.	X
		37H	8CH	Parameter 7	Min.	X

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ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Emission-related Diagnostic Information (Cont'd)

EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS

X: Applicable
—: Not applicable

Items (CONSULT screen terms)	DTC*4		SRT code	Test value/ Test limit	1st trip DTC	Reference page
	CONSULT GST*2	ECM*1				
NO SELF-DIAGNOSTIC FAILURE INDICATED	P0000	0505	—	—	—	—
MASS AIR FLOW SEN	P0100	0102	—	—	X	EC-94
ABSOL PRESS SENSOR	P0105	0803	—	—	X	EC-99
INT AIR TEMP SEN	P0110	0401	—	—	X	EC-106
COOLANT TEMP SEN	P0115	0103	—	—	X	EC-111
THROTTLE POSI SEN	P0120	0403	—	—	X	EC-116
*COOLANT TEMP SEN	P0125	0908	—	—	X	EC-121
FRONT O2 SENSOR	P0130	0503	X	X	X*3	EC-126
CLOSED LOOP	P0130	0307	—	—	X	EC-131
FR O2 SEN HTR	P0135	0901	X	X	X*3	EC-132
REAR O2 SENSOR	P0136	0707	X	X	X*3	EC-135
RR O2 SEN HTR	P0141	0902	X	X	X*3	EC-139
FUEL SYS LEAN	P0171	0115	—	—	X	EC-143
FUEL SYS RICH	P0172	0114	—	—	X	EC-148
TANK FUEL TEMP SEN	P0180	0402	—	—	X	EC-153
MULTI CYL MISFIRE	P0300	0701	—	—	X	EC-157
CYL 1 MISFIRE	P0301	0608	—	—	X	EC-157
CYL 2 MISFIRE	P0302	0607	—	—	X	EC-157
CYL 3 MISFIRE	P0303	0606	—	—	X	EC-157
CYL 4 MISFIRE	P0304	0605	—	—	X	EC-157
KNOCK SENSOR	P0325	0304	—	—	X	EC-161
CRANK POS SEN (OBD)	P0335	0802	—	—	X	EC-164
CAMSHAFT POSI SEN	P0340	0101	—	—	X	EC-168
EGR SYSTEM	P0400	0302	X	X	X*3	EC-172
EGRC-BPT valve	P0402	0306	X	X	X*3	EC-180
TW CATALYST SYS	P0420	0702	X	X	X*3	EC-182
EVAP (SMALL LEAK)	P0440	0705	X	X	X*3	EC-185

*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.

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Emission-related Diagnostic Information (Cont'd)

X: Applicable
—: Not applicable

Items (CONSULT screen terms)	DTC*4		SRT code	Test value/ Test limit	1st trip DTC	Reference page	
	CONSULT GST*2	ECM*1					
PURG CONT/V & S/V	P0443	0807	—	—	X	EC-195	GI
VENT CONTROL VALVE	P0446	0903	—	—	X	EC-203	MA
EVAP SYS PRES SEN	P0450	0704	—	—	X	EC-209	
VEHICLE SPEED SEN	P0500	0104	—	—	X	EC-213	EM
IACV-AAC VALVE	P0505	0205	—	—	X	EC-217	
CLOSED THRL POS SW	P0510	0203	—	—	X	EC-222	LC
A/T COMM LINE	P0600	—	—	—	—	EC-226	
ECM	P0605	0301	—	—	X	EC-229	EC
PARK/NEUT POSI SW	P0705	1003	—	—	X	EC-231	
INHIBITOR SWITCH	P0705	1101	—	—	X	AT-55	
FLUID TEMP SENSOR	P0710	1208	—	—	X	AT-61	FE
VHCL SPEED SEN A/T	P0720	1102	—	—	X	AT-64	
ENGINE SPEED SIG	P0725	1207	—	—	X	AT-66	CL
A/T 1ST SIGNAL	P0731	1103	—	—	X	AT-68	
A/T 2ND SIGNAL	P0732	1104	—	—	X	AT-71	MT
A/T 3RD SIGNAL	P0733	1105	—	—	X	AT-73	
A/T 4TH SIG OR TCC	P0734	1106	—	—	X	AT-75	AT
TOR CONV CLUTCH SV	P0740	1204	—	—	X	AT-80	
A/T TCC SIGNAL	P0744	1107	—	—	X	AT-83	PD
LINE PRESSURE S/V	P0745	1205	—	—	X	AT-88	
SHIFT SOLENOID/V A	P0750	1108	—	—	X	AT-91	
SHIFT SOLENOID/V B	P0755	1201	—	—	X	AT-94	FA
MAP/BARO SW SOL/V	P1105	1302	—	—	X	EC-236	
IGN SIGNAL-PRIMARY	P1320	0201	—	—	X	EC-242	RA
CRANK P/S (OBD) COG	P1336	0905	—	—	X	EC-247	
EGRC SOLENOID/V	P1400	1005	—	—	X	EC-251	BR
EGR TEMP SENSOR	P1401	0305	—	—	X	EC-255	
VC/V BYPASS/V	P1441	0801	—	—	X	EC-260	ST
PURG VOLUME CONT/V	P1445	1008	—	—	X	EC-265	
EVAP PURG FLOW/MON	P1447	0111	X	X	X*3	EC-271	
A/T DIAG COMM LINE	P1605	0804	—	—	X	EC-278	RS
THRTL POSI SEN A/T	P1705	1206	—	—	X	AT-97	
OVERRUN CLUTCH S/V	P1760	1203	—	—	X	AT-99	BT

*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.

HA

EL




IDX

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

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
 -  Selecting Mode 4 with GST (Generic Scan Tool)
 -  Changing the diagnostic test mode from Diagnostic Test Mode II to Mode I by turning the mode selector on the ECM (Refer to EC-45.)
- **If the battery is disconnected, the emission-related diagnostic information will be lost after approx. 24 hours.**
 - **Erasing the emission-related diagnostic information using CONSULT or GST is easier and quicker than switching the mode selector on the ECM.**

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

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

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

How to erase DTC (With CONSULT)

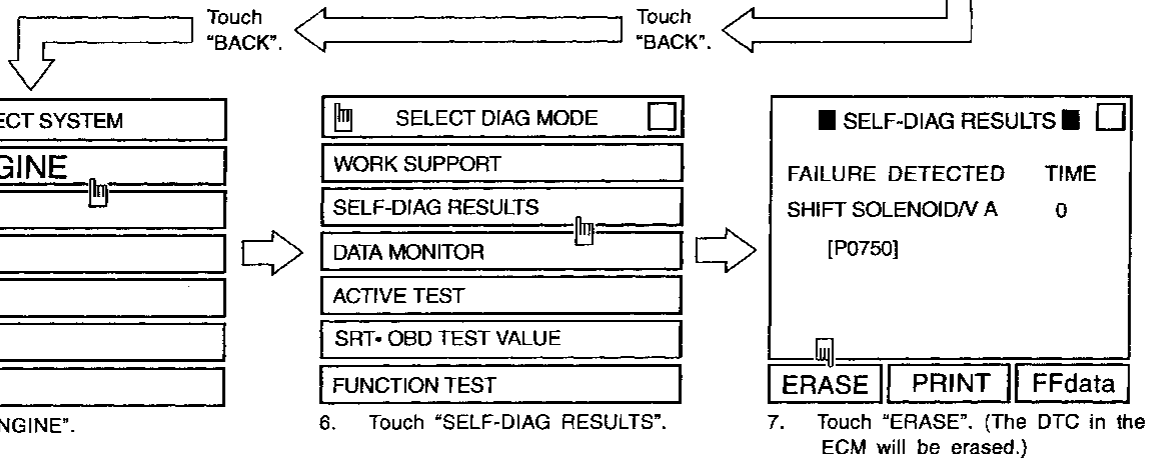
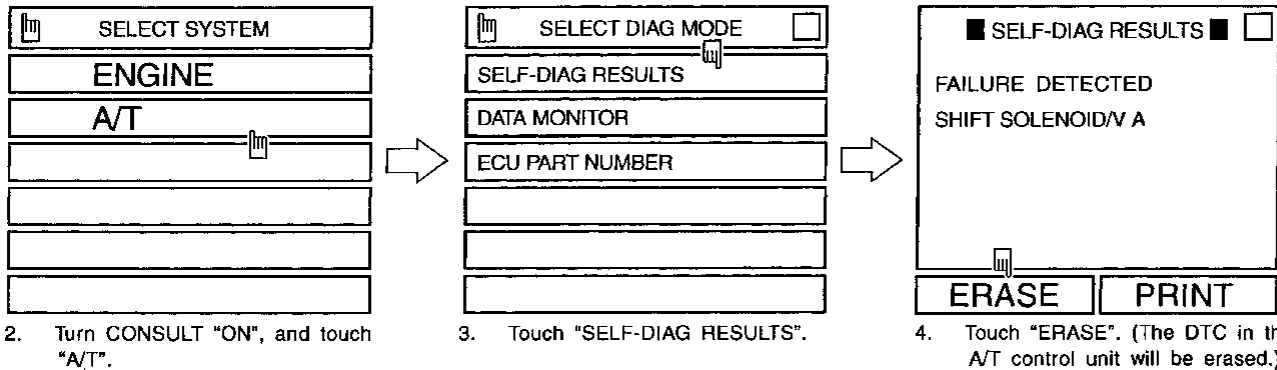
Note: If the diagnostic trouble code is not for A/T related items (see EC-2), skip steps 2 through 4.

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

Emission-related Diagnostic Information (Cont'd)

How to erase DTC (With CONSULT)

1. If the ignition switch stays "ON" after repair work, be sure to turn ignition switch "OFF" once. Wait at least 5 seconds and then turn it "ON" (engine stopped) again.



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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).

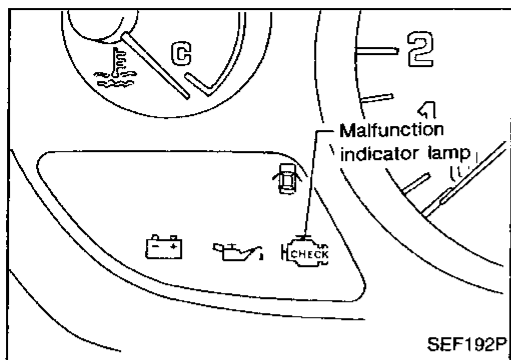
How to erase DTC (No Tools)

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-45.)

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ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION



Malfunction Indicator Lamp (MIL)

1. The malfunction indicator lamp will light up when the ignition switch is turned ON without the engine running. This is a bulb check.
 - If the malfunction indicator lamp does not light up, refer to **WARNING LAMPS AND CHIME** in EL section (or see EC-317).
2. When the engine is started, the malfunction indicator lamp should go off.
 - If the lamp remains on, the on board diagnostic system has detected an engine system malfunction.

ON BOARD DIAGNOSTIC SYSTEM FUNCTION

The on board diagnostic system has the following four functions.

Diagnostic Test Mode I




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

Diagnostic Test Mode II

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

MIL flashing without DTC

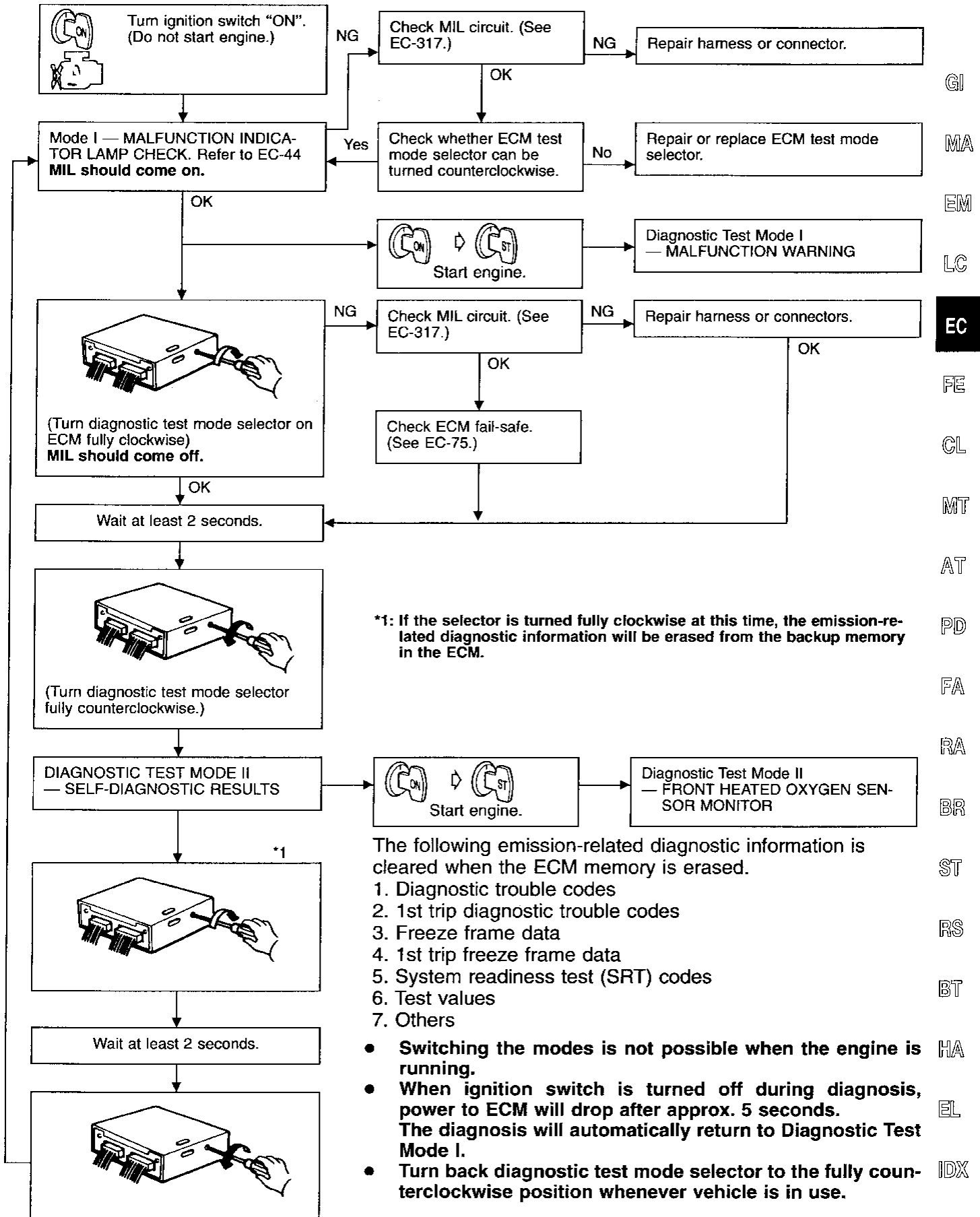
If the ECM is in Diagnostic Test Mode II, the MIL may flash when the engine is running. In this case, check ECM test mode selector following "HOW TO SWITCH DIAGNOSTIC TEST MODES" on next page. How to switch the diagnostic test (function) modes and details of the above functions are described later. (Refer to EC-45.)

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

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Malfunction Indicator Lamp (MIL) (Cont'd)

HOW TO SWITCH DIAGNOSTIC TEST MODES



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ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

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-317.)

DIAGNOSTIC TEST MODE I — MALFUNCTION WARNING

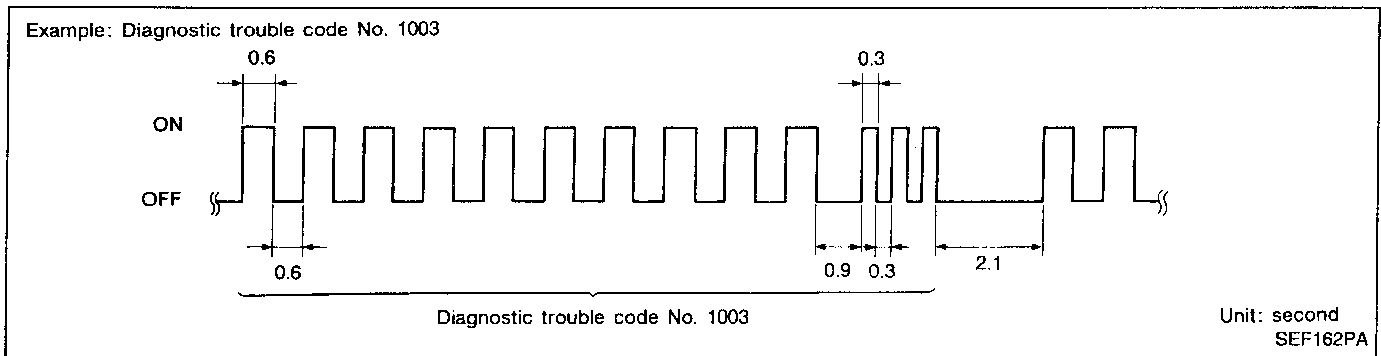
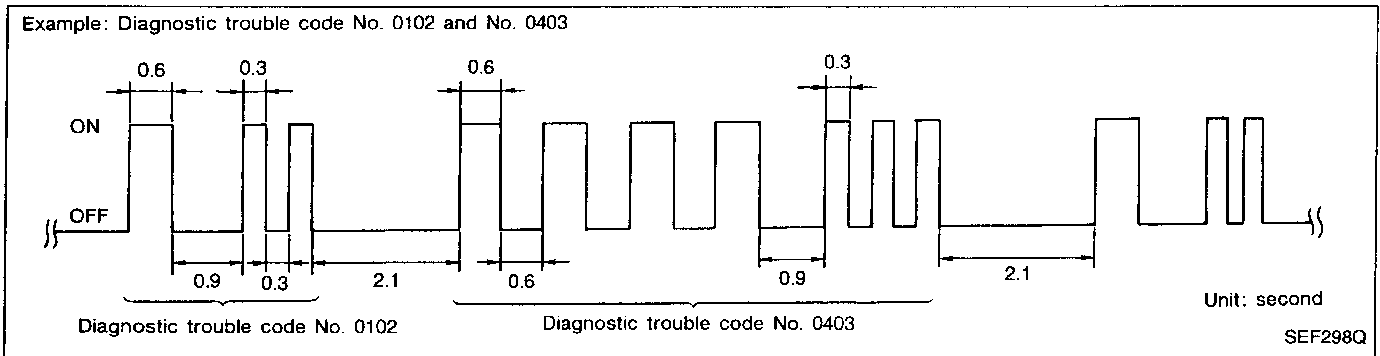
MALFUNCTION INDICATOR LAMP	Condition
ON	When the malfunction is detected or the ECM's CPU is malfunctioning.
OFF	No malfunction

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

DIAGNOSTIC TEST MODE II—SELF-DIAGNOSTIC RESULTS

In this mode, the DTC and 1st trip DTC are indicated by the number of blinks of the MALFUNCTION INDICATOR LAMP.

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



Long (0.6 second) blinking indicates the two LH digits of number and short (0.3 second) blinking indicates the two RH digits of number. For example, the malfunction indicator lamp blinks 10 times for 6 seconds (0.6 sec x 10 times) and then it blinks three times for about 1 second (0.3 sec x 3 times). This indicates the DTC "1003" and refers to the malfunction of the park/neutral position switch.

In this way, all the detected malfunctions are classified by their diagnostic trouble code numbers. The DTC "0505" refers to no malfunction. (See DIAGNOSTIC TROUBLE CODE (DTC) INDEX, EC-2.)

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Malfunction Indicator Lamp (MIL) (Cont'd)

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

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

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

DIAGNOSTIC TEST MODE II — FRONT HEATED OXYGEN SENSOR MONITOR

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

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

*: Maintains conditions just before switching to open loop.

To check the front heated oxygen sensor function, start engine in the Diagnostic Test Mode II and warm it up until engine coolant temperature indicator points to the middle of the gauge.

Next run engine at about 2,000 rpm for about 2 minutes under no-load conditions. Then make sure that the MALFUNCTION INDICATOR LAMP comes ON more than 5 times within 10 seconds with engine running at 2,000 rpm under no-load.

OBD System Operation Chart

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

- When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data are stored in the ECM memory.
- When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data are stored in the ECM memory, and the MIL will come on. For details, refer to "Two Trip Detection Logic" on EC-33.
- The MIL will go off after the vehicle is driven 3 times with no malfunction. The drive is counted only when the recorded driving pattern is met (as stored in the ECM). If another malfunction occurs while counting, the counter will reset.
- The DTC and the freeze frame data will be stored until the vehicle is driven 40 times (driving pattern A) without the same malfunction recurring (except for Misfire and Fuel Injection System). For Misfire and Fuel Injection System, the DTC and freeze frame data will be stored until the vehicle is driven 80 times (driving pattern C) without the same malfunction recurring. The "TIME" IN "SELF-DIAGNOSTIC RESULTS" mode of CONSULT will count the number of times the vehicle is driven.
- The 1st trip DTC is not displayed when the self-diagnosis results in "OK" for the 2nd trip.

SUMMARY CHART

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

Details about patterns "A", "B", and "C" are on EC-51.

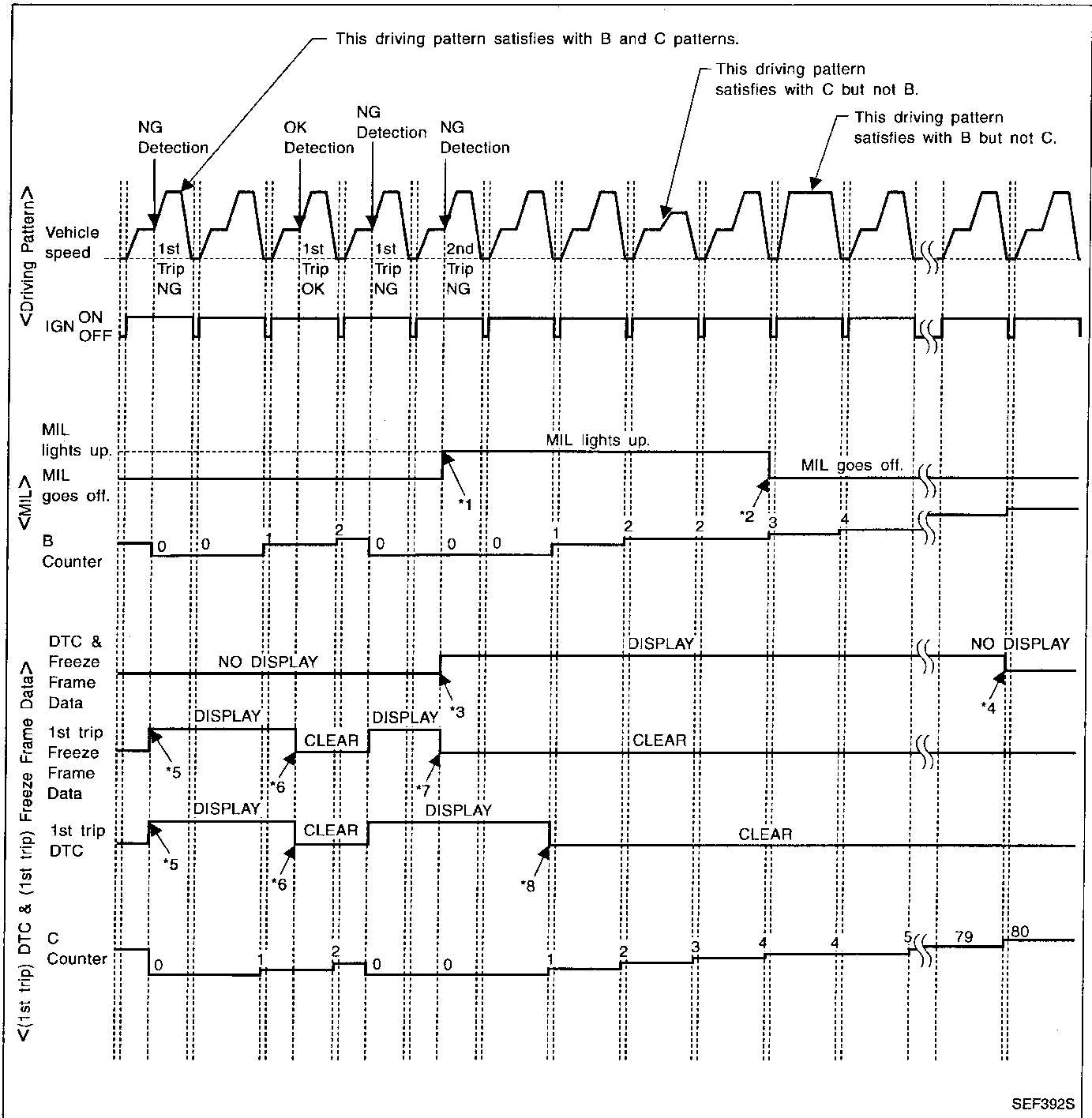
*1: Clear timing is at the moment OK is detected.

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

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

OBD System Operation Chart (Cont'd)

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



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- *1: When the same malfunction is detected in two consecutive trips, MIL will light up.
- *2: MIL will go off after vehicle is driven 3 times (pattern B) without any malfunctions.
- *3: When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data will be stored in ECM.
- *4: The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 80 times (pattern C) without the same malfunction. (The DTC and the freeze frame data still remain in ECM.)

- *5: When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM.
- *6: The 1st trip DTC and the 1st trip freeze frame data will be cleared at the moment OK is detected.
- *7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.
- *8: 1st trip DTC will be cleared when vehicle is driven once (pattern C) without the same malfunction after DTC is stored in ECM.

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

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 once 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) $\times (1 \pm 0.1)$ [%]

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 $\geq 70^\circ\text{C}$ (158°F)

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

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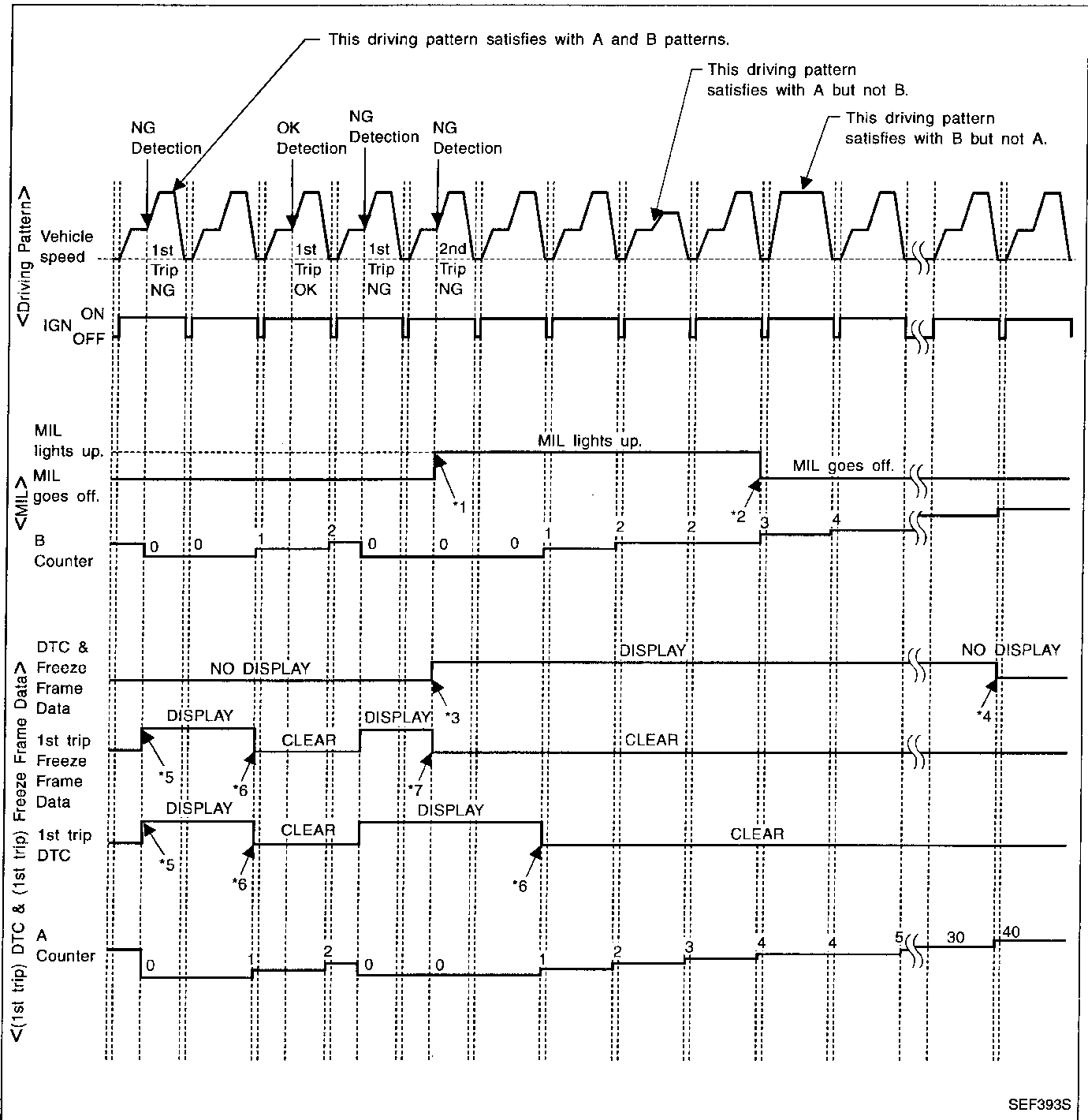
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ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

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.)

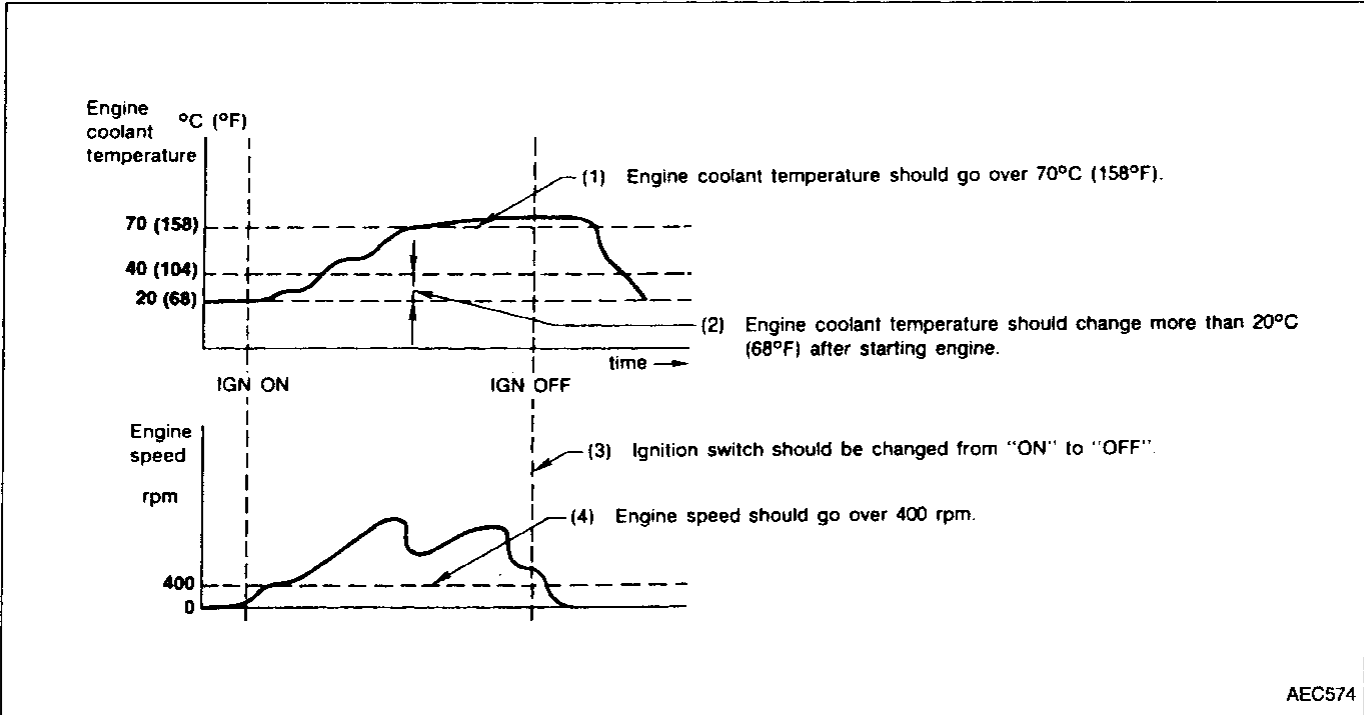
- *5: When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM.
- *6: 1st trip DTC will be cleared after vehicle is driven once (pattern B) without the same malfunction.
- *7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

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").

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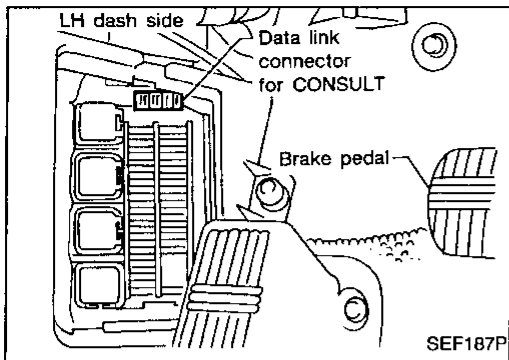
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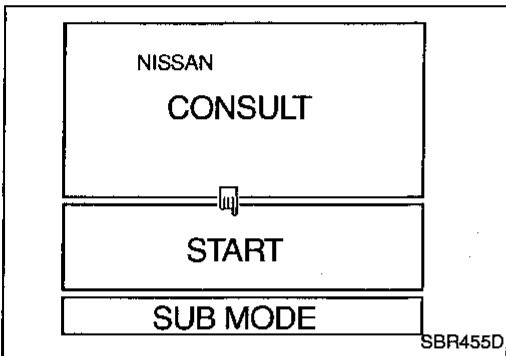
ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION



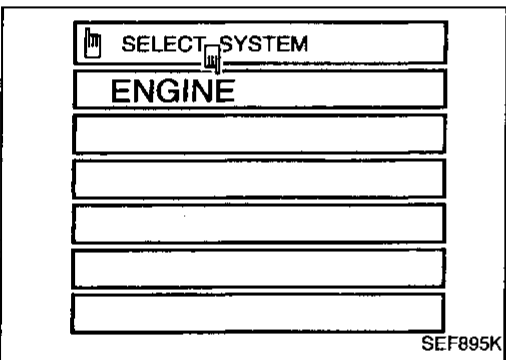
CONSULT

CONSULT INSPECTION PROCEDURE

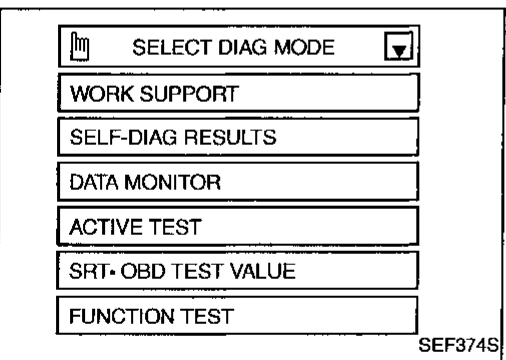
1. Turn off ignition switch.
2. Connect "CONSULT" to data link connector for CONSULT. (Data link connector for CONSULT is located behind the fuse box cover.)



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

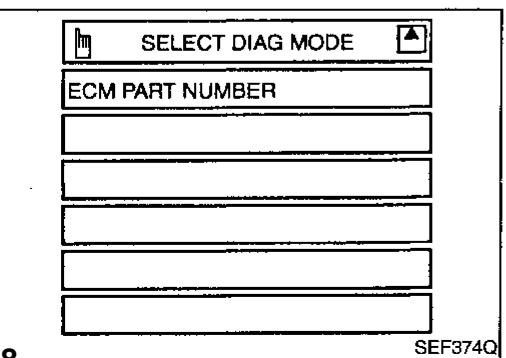


5. Touch "ENGINE".



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

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



ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT (Cont'd)

ECCS COMPONENT PARTS/CONTROL SYSTEMS APPLICATION

		Item	DIAGNOSTIC TEST MODE							
			WORK SUP-PORT	SELF-DIAGNOSTIC RESULTS*1		DATA MONITOR	ACTIVE TEST	FUNCTION TEST	SRT-OBD TEST VALUE	
					FREEZE FRAME DATA*2					
ECCS COMPONENT PARTS	INPUT	Camshaft position sensor		X	X	X				GI
		Mass air flow sensor		X		X				MA
		Engine coolant temperature sensor		X	X	X	X			EM
		Front heated oxygen sensor		X		X		X	X	EM
		Rear heated oxygen sensor		X		X			X	EM
		Vehicle speed sensor		X	X	X		X		LC
		Throttle position sensor	X	X		X		X		LC
		Tank fuel temperature sensor		X		X	X			EC
		EVAP control system pressure sensor		X		X				EC
		Absolute pressure sensor		X		X				FE
		EGR temperature sensor		X		X				FE
		Intake air temperature sensor		X		X				FE
		Crankshaft position sensor (OBD)		X						CL
		Knock sensor		X						CL
		Ignition switch (start signal)					X		X	MT
		Closed throttle position switch		X						MT
		Closed throttle position switch (throttle position sensor signal)					X		X	AT
		Air conditioner switch					X			AT
		Park/Neutral position switch		X		X			X	PD
		Power steering oil pressure switch					X		X	PD
	Air conditioner pressure switch					X			FA	
	Battery voltage					X			FA	
	Ambient air temperature switch					X			FA	
	Electrical load					X			FA	
	OUTPUT	Injectors				X	X	X		RA
		Power transistor (Ignition timing)	X	X (Ignition signal)		X	X	X		BR
		IACV-AAC valve	X	X		X	X	X		ST
		EVAP canister purge volume control valve		X		X	X			RS
		Air conditioner relay				X				BT
		Fuel pump relay	X			X	X	X		HA
		Cooling fan				X	X	X		EL
		EGRC-solenoid valve		X		X	X	X		EL
		Front heated oxygen sensor heater		X		X			X	IDX
Rear heated oxygen sensor heater			X		X			X	IDX	
EVAP canister purge control solenoid valve			X		X	X				
EVAP canister vent control valve			X		X					
Vacuum cut valve bypass valve			X		X					
MAP/BARO switch solenoid valve		X		X	X					
Calculated load value			X		X					

X: Applicable

*1: This item includes 1st trip DTCs.

*2: This mode includes 1st trip freeze frame data or freeze frame data. The items appear on CONSULT screen in freeze frame data mode only if a 1st trip DTC or DTC is detected. For details, refer to EC-35.

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT (Cont'd)

FUNCTION

Diagnostic test mode	Function
Work support	This mode enables a technician to adjust some devices faster and more accurately by following the indications on the CONSULT unit.
Self-diagnostic results	Self-diagnostic results such as 1st trip DTC, DTCs and 1st trip freeze frame data or freeze frame data can be read and erased quickly.*1
Data monitor	Input/Output data in the ECM can be read.
Active test	Diagnostic Test Mode in which CONSULT drives some actuators apart from the ECMs and also shifts some parameters in a specified range.
SRT-OBD test value	The status of system monitoring tests and the test values/test limits can be read.
Function test	Conducted by CONSULT instead of a technician to determine whether each system is "OK" or "NG".
ECM part numbers	ECM part numbers can be read.

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

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

WORK SUPPORT MODE

WORK ITEM	CONDITION	USAGE
THRTL POS SEN ADJ	CHECK THE THROTTLE POSITION SENSOR SIGNAL. ADJUST IT TO THE SPECIFIED VALUE BY ROTATING THE SENSOR BODY UNDER THE FOLLOWING CONDITIONS. <ul style="list-style-type: none"> ● IGN SW "ON" ● ENG NOT RUNNING ● ACC PEDAL NOT PRESSED 	When adjusting throttle position sensor initial position
IGNITION TIMING ADJ	<ul style="list-style-type: none"> ● IGNITION TIMING FEEDBACK CONTROL WILL BE HELD BY TOUCHING "START". AFTER DOING SO, ADJUST IGNITION TIMING WITH A TIMING LIGHT BY TURNING THE CRANKSHAFT POSITION SENSOR. 	When adjusting initial ignition timing
IACV-AAC VALVE ADJ	SET ENGINE SPEED AT THE SPECIFIED VALUE UNDER THE FOLLOWING CONDITIONS. <ul style="list-style-type: none"> ● ENGINE WARMED UP ● NO-LOAD 	When adjusting idle speed
FUEL PRESSURE RELEASE	<ul style="list-style-type: none"> ● FUEL PUMP WILL STOP BY TOUCHING "START" DURING IDLING. CRANK A FEW TIMES AFTER ENGINE STALLS. 	When releasing fuel pressure from fuel line

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT (Cont'd)

SELF-DIAGNOSTIC MODE

DTC and 1st trip DTC

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

Freeze frame data and 1st trip freeze frame data

Freeze frame data item*	Description	GI
DIAG TROUBLE CODE [PXXXX]	<ul style="list-style-type: none"> ECCS component part/control system has a trouble code, it is displayed as "PXXXX". [Refer to "Alphabetical & P No. Index for DTC (EC-2).] 	MA EM
FUEL SYS DATA	<ul style="list-style-type: none"> "Fuel injection system status" at the moment a malfunction is detected is displayed. One mode in the following is displayed. <ul style="list-style-type: none"> "MODE 2": Open loop due to detected system malfunction "MODE 3": Open loop due to driving conditions (power enrichment, deceleration enrichment) "MODE 4": Closed loop - using oxygen sensor(s) as feedback for fuel control "MODE 5": Open loop - has not yet satisfied condition to go to closed loop 	LC EC
CAL/LD VALUE [%]	<ul style="list-style-type: none"> The calculated load value at the moment a malfunction is detected is displayed. 	FE
COOLANT TEMP [°C] or [°F]	<ul style="list-style-type: none"> The engine coolant temperature at the moment a malfunction is detected is displayed. 	CL
S-FUEL TRIM [%]	<ul style="list-style-type: none"> "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. 	MT
L-FUEL TRIM [%]	<ul style="list-style-type: none"> "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. 	AT
ENGINE SPEED [rpm]	<ul style="list-style-type: none"> The engine speed at the moment a malfunction is detected is displayed. 	PD
VHCL SPEED [km/h] or [mph]	<ul style="list-style-type: none"> The vehicle speed at the moment a malfunction is detected is displayed. 	FA
ABSOL PRESS [kPa] or [kg/cm ²] or [psi]	<ul style="list-style-type: none"> The absolute pressure at the moment a malfunction is detected is displayed. 	RA

*: The items are same as those of 1st trip freeze frame data.

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ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT (Cont'd)

DATA MONITOR MODE

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
CMPS-RPM (REF) [rpm]	<input type="radio"/>	<input type="radio"/>	<ul style="list-style-type: none"> Indicates the engine speed computed from the REF signal (180° signal) of the camshaft position sensor. 	<ul style="list-style-type: none"> 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.
MAS AIR/FL SE [V]	<input type="radio"/>	<input type="radio"/>	<ul style="list-style-type: none"> The signal voltage of the mass air flow sensor is displayed. 	<ul style="list-style-type: none"> When the engine is stopped, a certain value is indicated.
COOLAN TEMP/S [°C] or [°F]	<input type="radio"/>	<input type="radio"/>	<ul style="list-style-type: none"> The engine coolant temperature (determined by the signal voltage of the engine coolant temperature sensor) is displayed. 	<ul style="list-style-type: none"> 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 SENSOR [V]	<input type="radio"/>	<input type="radio"/>	<ul style="list-style-type: none"> The signal voltage of the front heated oxygen sensor is displayed. 	
RR O2 SENSOR [V]	<input type="radio"/>	<input type="radio"/>	<ul style="list-style-type: none"> The signal voltage of the rear heated oxygen sensor is displayed. 	
FR O2 MNTR [RICH/LEAN]	<input type="radio"/>	<input type="radio"/>	<ul style="list-style-type: none"> Display of front 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. 	<ul style="list-style-type: none"> 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.
RR O2 MNTR [RICH/LEAN]	<input type="radio"/>	<input type="radio"/>	<ul style="list-style-type: none"> Display of rear heated oxygen sensor signal: RICH ... means the amount of oxygen downstream three way catalyst is relatively small. LEAN ... means the amount of oxygen downstream three way catalyst is relatively large. 	<ul style="list-style-type: none"> When the engine is stopped, a certain value is indicated.
VHCL SPEED SE [km/h] or [mph]	<input type="radio"/>	<input type="radio"/>	<ul style="list-style-type: none"> 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.

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT (Cont'd)

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks	
BATTERY VOLT [V]	○	○	<ul style="list-style-type: none"> The power supply voltage of ECM is displayed. 		GI
THRTL POS SEN [V]	○	○	<ul style="list-style-type: none"> The throttle position sensor signal voltage is displayed. 		MA
TANK F/TMP SE [°C] or [°F]	○		<ul style="list-style-type: none"> The fuel temperature judged from the tank fuel temperature sensor signal voltage is displayed. 		EM
EGR TEMP SEN [V]	○		<ul style="list-style-type: none"> The signal voltage of the EGR temperature sensor is displayed. 		LC
INT/A TEMP SE [°C] or [°F]	○		<ul style="list-style-type: none"> The intake air temperature determined by the signal voltage of the intake air temperature sensor is indicated. 		EC
START SIGNAL [ON/OFF]	○	○	<ul style="list-style-type: none"> Indicates [ON/OFF] condition from the starter signal. 	<ul style="list-style-type: none"> After starting the engine, [OFF] is displayed regardless of the starter signal. 	FE
CLSD THL/P SW [ON/OFF]	○	○	<ul style="list-style-type: none"> Indicates [ON/OFF] condition from the closed throttle position switch signal. 		CL
AIR COND SIG [ON/OFF]	○	○	<ul style="list-style-type: none"> Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioner signal. 		MT
P/N POSI SW [ON/OFF]	○	○	<ul style="list-style-type: none"> Indicates [ON/OFF] condition from the park/neutral position switch signal. 		AT
PW/ST SIGNAL [ON/OFF]	○	○	<ul style="list-style-type: none"> [ON/OFF] condition of the power steering oil pressure switch determined by the power steering oil pressure signal is indicated. 		PD
LOAD SIGNAL [ON/OFF]	○	○	<ul style="list-style-type: none"> 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. 		FA RA
AMB TEMP SW	○	○	<ul style="list-style-type: none"> Indicates [ON/OFF] condition from the ambient air temperature switch signal. 		BR
IGNITION SW [ON/OFF]	○		<ul style="list-style-type: none"> Indicates [ON/OFF] condition from ignition switch. 		ST
A/C PRESS SW [ON/OFF]	○		<ul style="list-style-type: none"> Indicates [ON/OFF] condition of the air conditioning triple-pressure switch (medium-pressure side) determined by the pressure of the air conditioning high pressure side. 		RS BT
INJ PULSE [msec]		○	<ul style="list-style-type: none"> Indicates the actual fuel injection pulse width compensated by ECM according to the input signals. 	<ul style="list-style-type: none"> When the engine is stopped, a certain computed value is indicated. 	HA
B/FUEL SCHDL [msec]		○	<ul style="list-style-type: none"> "Base fuel schedule" indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction. 		EL
IGN TIMING [BTDC]		○	<ul style="list-style-type: none"> Indicates the ignition timing computed by ECM according to the input signals. 		IDX

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT (Cont'd)

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
IACV-AAC/V [%]		○	<ul style="list-style-type: none"> Indicates the idle air control valve (AAC valve) control value computed by ECM according to the input signals. 	
PURG VOL C/V [step]			<ul style="list-style-type: none"> Indicates the EVAP canister purge volume control valve computed by the ECM according to the input signals. The opening becomes larger as the value increases. 	
A/F ALPHA [%]		○	<ul style="list-style-type: none"> The mean value of the air-fuel ratio feedback correction factor per cycle is indicated. 	<ul style="list-style-type: none"> When the engine is stopped, a certain value is indicated. This data also includes the data for the air-fuel ratio learning control.
EVAP SYS PRES [V]			<ul style="list-style-type: none"> The signal voltage of EVAP control system pressure sensor is displayed. 	
AIR COND RLY [ON/OFF]			<ul style="list-style-type: none"> The air conditioner relay control condition (determined by ECM according to the input signal) is indicated. 	
FUEL PUMP RLY [ON/OFF]			<ul style="list-style-type: none"> Indicates the fuel pump relay control condition determined by ECM according to the input signals. 	
COOLING FAN [HI/LOW/OFF]			<ul style="list-style-type: none"> 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]			<ul style="list-style-type: none"> The control condition of the EGRC-solenoid valve (determined by ECM according to the input signal) is indicated. ON ... EGR operation is cut-off OFF ... EGR is operational 	
VENT CONT/V [ON/OFF]			<ul style="list-style-type: none"> 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 HEATER			<ul style="list-style-type: none"> Indicates [ON/OFF] condition of front heated oxygen sensor heater determined by ECM according to the input signals. 	
VC/V BYPASS/V [ON/OFF]			<ul style="list-style-type: none"> The control condition of the vacuum cut valve bypass valve (determined by ECM according to the input signal) is indicated. ON ... Open OFF ... Closed 	

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT (Cont'd)

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
PURG CONT S/V [ON/OFF]			<ul style="list-style-type: none"> 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 	GI MA EM
CAL/D VALUE [%]			<ul style="list-style-type: none"> "Calculated load value" indicates the value of the current airflow divided by peak airflow. 	LC
ABSOL TH-P/S [%]			<ul style="list-style-type: none"> "Absolute throttle position sensor" indicates the throttle opening computed by ECM according to the signal voltage of the throttle position sensor. 	EC FE
MASS AIRFLOW [g-m/s]			<ul style="list-style-type: none"> Indicates the mass airflow computed by ECM according to the signal voltage of the mass airflow sensor. 	CL
MAP/BARO SW/V [MAP/BARO]			<ul style="list-style-type: none"> 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 	MT AT
ABSOL PRES/SE [V]			<ul style="list-style-type: none"> The signal voltage of the absolute pressure sensor is displayed. 	PD
VOLTAGE [V]			<ul style="list-style-type: none"> Voltage measured by the voltage probe. 	FA
PULSE [msec] or [Hz] or [%]			<ul style="list-style-type: none"> Pulse width, frequency or duty cycle measured by the pulse probe. 	<ul style="list-style-type: none"> 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.

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ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT (Cont'd)

ACTIVE TEST MODE

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
FUEL INJECTION	<ul style="list-style-type: none"> ● Engine: Return to the original trouble condition ● Change the amount of fuel injection using CONSULT. 	If trouble symptom disappears, see CHECK ITEM.	<ul style="list-style-type: none"> ● Harness and connector ● Fuel injectors ● Front heated oxygen sensor
IACV-AAC/V OPENING	<ul style="list-style-type: none"> ● Engine: After warming up, idle the engine. ● Change the IACV-AAC valve opening percent using CONSULT. 	Engine speed changes according to the opening percent.	<ul style="list-style-type: none"> ● Harness and connector ● IACV-AAC valve
ENG COOLANT TEMP	<ul style="list-style-type: none"> ● Engine: Return to the original trouble condition ● Change the engine coolant temperature using CONSULT. 	If trouble symptom disappears, see CHECK ITEM.	<ul style="list-style-type: none"> ● Harness and connector ● Engine coolant temperature sensor ● Fuel injectors
IGNITION TIMING	<ul style="list-style-type: none"> ● Engine: Return to the original trouble condition ● Timing light: Set ● Retard the ignition timing using CONSULT. 	If trouble symptom disappears, see CHECK ITEM.	<ul style="list-style-type: none"> ● Adjust initial ignition timing
POWER BALANCE	<ul style="list-style-type: none"> ● Engine: After warming up, idle the engine. ● Air conditioner switch "OFF" ● Shift lever "N" ● Cut off each injector signal one at a time using CONSULT. 	Engine runs rough or dies.	<ul style="list-style-type: none"> ● Harness and connector ● Compression ● Injectors ● Power transistor ● Spark plugs ● Ignition coils
COOLING FAN	<ul style="list-style-type: none"> ● Ignition switch: ON ● Turn the cooling fan "ON" and "OFF" using CONSULT. 	Cooling fan moves and stops.	<ul style="list-style-type: none"> ● Harness and connector ● Cooling fan motor
FUEL PUMP RELAY	<ul style="list-style-type: none"> ● 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.	<ul style="list-style-type: none"> ● Harness and connector ● Fuel pump relay
EGHC SOLENOID VALVE	<ul style="list-style-type: none"> ● Ignition switch: ON ● Turn solenoid valve "ON" and "OFF" with the CONSULT and listen to operating sound. 	Solenoid valve makes an operating sound.	<ul style="list-style-type: none"> ● Harness and connector ● Solenoid valve
SELF-LEARNING CONT	<ul style="list-style-type: none"> ● In this test, the coefficient of self-learning control mixture ratio returns to the original coefficient by touching "CLEAR" on the screen. 		
PURG VOL CONT/V	<ul style="list-style-type: none"> ● 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.	<ul style="list-style-type: none"> ● Harness and connector ● EVAP canister purge volume control valve
PURG CONT S/V	<ul style="list-style-type: none"> ● Engine: Run engine at 2,000 rpm. ● Turn the EVAP canister purge control solenoid valve "ON" and "OFF" using CONSULT and listen for operating sound. 	EVAP canister purge control solenoid valve makes an operating sound. Check vacuum signal for EVAP canister purge control valve. VC ON ... Vacuum exists. VC OFF ... Vacuum does not exist.	<ul style="list-style-type: none"> ● Harness and connector ● EVAP canister purge control solenoid valve ● Vacuum hose
MAP/BARO SW/V	<ul style="list-style-type: none"> ● 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.	<ul style="list-style-type: none"> ● Harness and connector ● MAP/BARO switch solenoid valve
TANK F/TEMP SEN	<ul style="list-style-type: none"> ● Change the tank fuel temperature using CONSULT. 		

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT (Cont'd)

FUNCTION TEST MODE

FUNCTION TEST ITEM	CONDITION	JUDGEMENT		CHECK ITEM (REMEDY)	
SELF-DIAG RESULTS	<ul style="list-style-type: none"> Ignition switch: ON (Engine stopped) Displays the results of on board diagnostic system. 	—		Objective system	GI
CLOSED THROTTLE POSI (CLOSED THROTTLE POSITION SWITCH CIRCUIT)	<ul style="list-style-type: none"> Ignition switch: ON (Engine stopped) Closed throttle position switch 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	<ul style="list-style-type: none"> Harness and connector Throttle position sensor (Closed throttle position switch) Throttle position sensor (Closed throttle position switch) adjustment Throttle linkage Verify operation in DATA MONITOR mode. 	MA
		Throttle valve: closed	ON		EC
THROTTLE POSI SEN CKT	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Harness and connector Throttle position sensor Throttle position sensor adjustment Throttle linkage Verify operation in DATA MONITOR mode. 	FE CL MT
PARK/NEUT POSI SW CKT	<ul style="list-style-type: none"> Ignition switch: ON (Engine stopped) Inhibitor switch circuit is tested when shift lever is manipulated. 	OUT OF N/P-RANGE	OFF	<ul style="list-style-type: none"> Harness and connector Inhibitor switch Linkage + Inhibitor switch adjustment 	AT
		IN N/P-RANGE	ON		PD
FUEL PUMP CIRCUIT	<ul style="list-style-type: none"> 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.		<ul style="list-style-type: none"> Harness and connector Fuel pump Fuel pump relay Fuel filter clogging Fuel level 	FA RA
EGRC SOL/V CIRCUIT	<ul style="list-style-type: none"> 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.		<ul style="list-style-type: none"> Harness and connector EGRC-solenoid valve 	BR ST
COOLING FAN CIRCUIT	<ul style="list-style-type: none"> Ignition switch: ON (Engine stopped) Cooling fan circuit is tested when cooling fan is rotated. 	<ul style="list-style-type: none"> The cooling fan rotates and stops every 3 seconds. 		<ul style="list-style-type: none"> Harness and connector Cooling fan motor Cooling fan relay 	RS

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ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT (Cont'd)

FUNCTION TEST ITEM	CONDITION	JUDGEMENT		CHECK ITEM (REMEDY)
START SIGNAL CIRCUIT	<ul style="list-style-type: none"> 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		<ul style="list-style-type: none"> Harness and connector Ignition switch
PW/ST SIGNAL CIRCUIT	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Harness and connector Power steering oil pressure switch Power steering oil pump
		Neutral position	OFF	
VEHICLE SPEED SEN CKT	<ul style="list-style-type: none"> 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)		<ul style="list-style-type: none"> Harness and connector Vehicle speed sensor Speedometer
IGN TIMING ADJ	<ul style="list-style-type: none"> After warming up, idle the engine. Ignition timing adjustment 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.		<ul style="list-style-type: none"> Adjust ignition timing (by moving crankshaft position sensor or distributor) Camshaft position sensor drive mechanism
MIXTURE RATIO TEST	<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> Front heated oxygen sensor COUNT: More than 5 times during 10 seconds 		<ul style="list-style-type: none"> 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

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT (Cont'd)

FUNCTION TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)	
POWER BALANCE	<ul style="list-style-type: none"> 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.	<ul style="list-style-type: none"> Injector circuit (Injector, harness or connector) Ignition circuit (Spark plug, power transistor, ignition coil, harness or connector) Compression Valve timing 	GI MA EM LC
IACV-AAC/V SYSTEM	<ul style="list-style-type: none"> After warming up, idle the engine. IACV-AAC valve system is tested by detecting change in engine speed when IACV-AAC valve opening is changed to 0%, 20% and 80%. 	Difference in engine speed is greater than 150 rpm between when valve opening is at 80% and at 20%.	<ul style="list-style-type: none"> Harness and connector IACV-AAC valve Air passage restriction between air inlet and IACV-AAC valve IAS (Idle adjusting screw) adjustment 	<div style="background-color: black; color: white; padding: 2px; display: inline-block;">EC</div> FE CL
★EVAP (SMALL LEAK)	<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> EVAP control system has no leak. EVAP control system operates properly. 	<ul style="list-style-type: none"> Incorrect fuel tank vacuum relief valve Incorrect fuel filler cap used Fuel filler cap remains open or fails to close. Foreign matter caught in fuel filler cap. Leak is in line between intake manifold and EVAP canister purge control valve. Foreign matter caught in EVAP canister vent control valve. EVAP canister or fuel tank leaks EVAP purge line tube leaks EVAP purge line rubber tube bent. Blocked or bent rubber tube to EVAP control system pressure sensor EVAP canister purge control valve EVAP canister purge volume control valve EVAP canister purge control solenoid valve Absolute pressure sensor Tank fuel temperature sensor MAP/BARO switch solenoid valve Blocked or bent rubber tube to MAP/BARO switch solenoid valve 	MT AT PD FA RA BR ST RS BT HA EL IDX

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

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT (Cont'd)

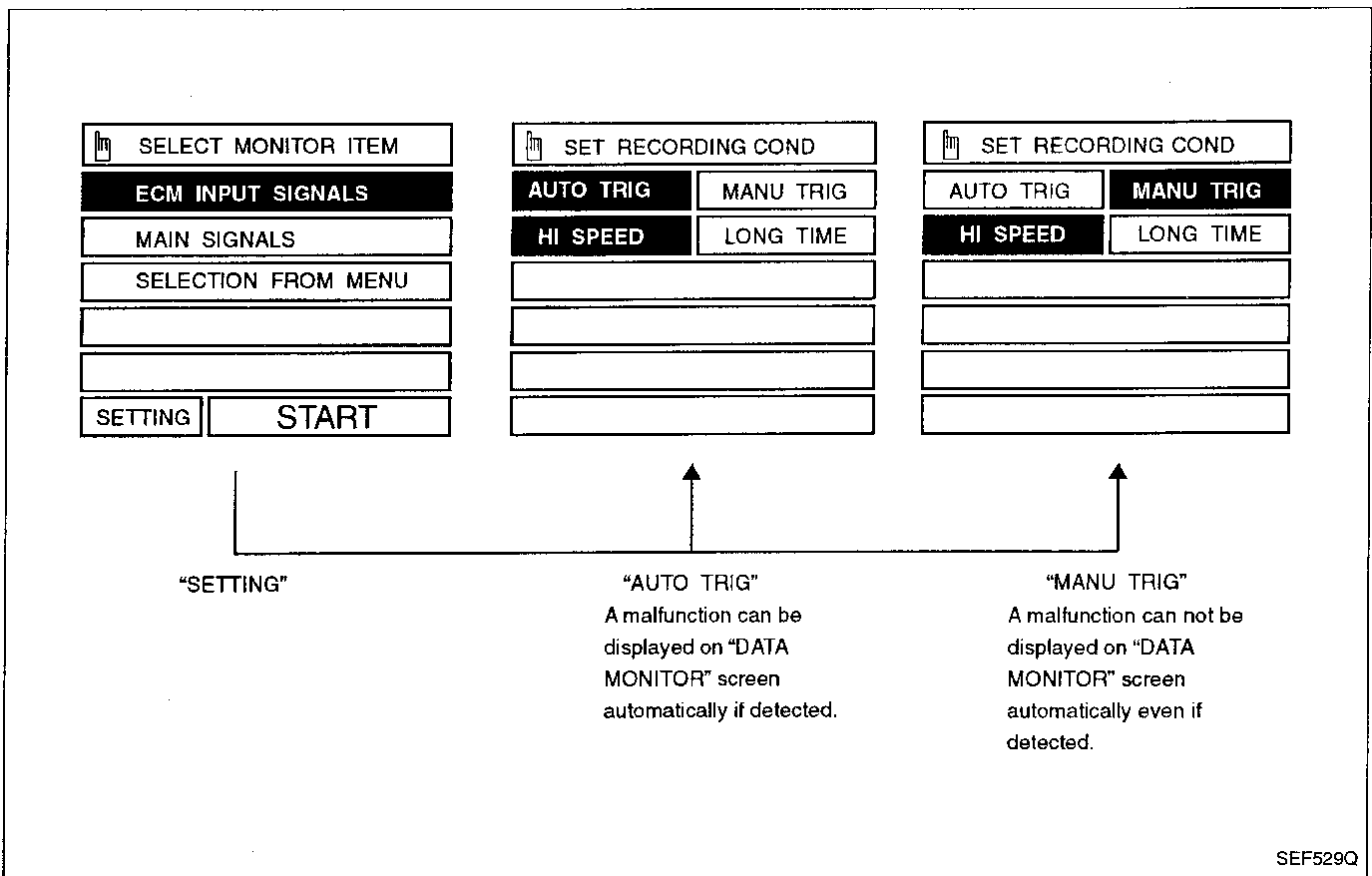
REAL TIME DIAGNOSIS IN DATA MONITOR MODE

CONSULT has two kinds of triggers and they can be selected by touching "SETTING" in "DATA MONITOR" mode.

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

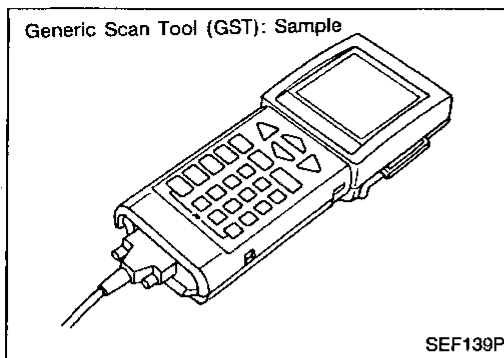
Use these triggers as follows:

1. "AUTO TRIG"
 - While trying to detect the DTC/1st trip DTC by performing the "DTC CONFIRMATION PROCEDURE", be sure to select to "DATA MONITOR (AUTO TRIG)" mode. You can confirm the malfunction at the moment it is detected.
 - While narrowing down the possible causes, CONSULT should be set in "DATA MONITOR (AUTO TRIG)" mode, especially in case the incident is intermittent.
When you are inspecting the circuit by gently shaking (or twisting) the suspicious connectors, components and harness in the "DTC CONFIRMATION PROCEDURE", the moment a malfunction is found the DTC/1st trip DTC will be displayed. (Refer to GI section, "Incident Simulation Tests" in "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT".)
2. "MANU TRIG"
 - If the malfunction is displayed as soon as "DATA MONITOR" is selected, reset CONSULT to "MANU TRIG". By selecting "MANU TRIG" you can monitor and store the data. The data can be utilized for further diagnosis, such as a comparison with the value for the normal operating condition.



SEF529Q

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION



Generic Scan Tool (GST)

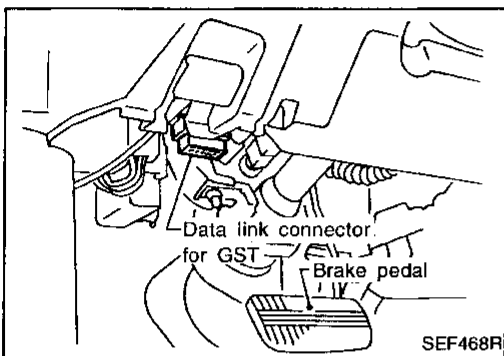
DESCRIPTION

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

GI

MA

EM



GST INSPECTION PROCEDURE

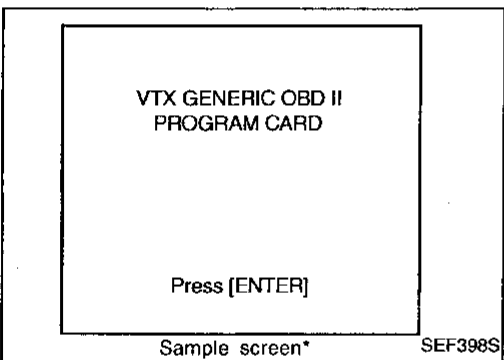
1. Turn off ignition switch.
2. Connect "GST" to data link connector for GST. (Data link connector for GST is located under LH dash panel near the fuse box cover.)

LC

EC

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

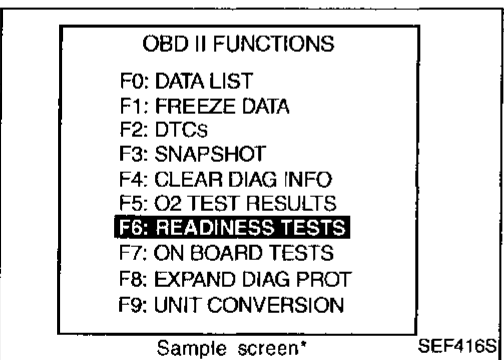
MT

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

AT

PD

FA



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

RA

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

BR

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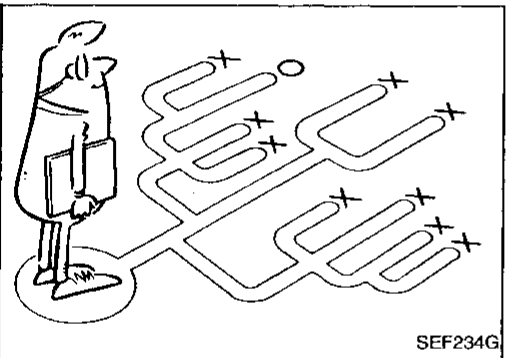
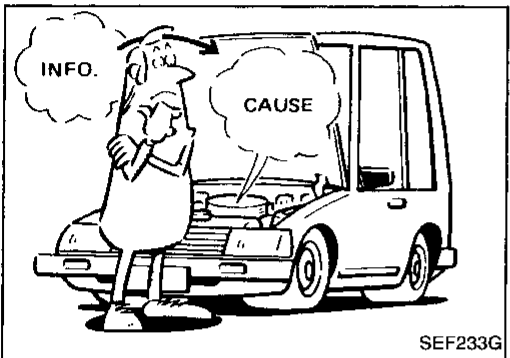
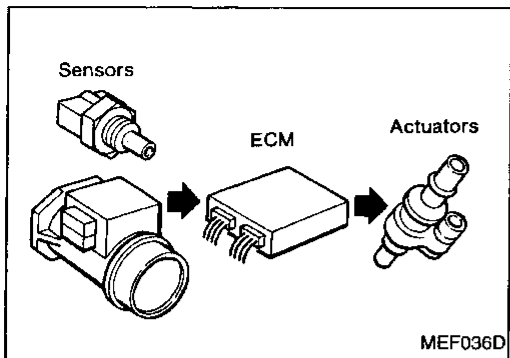
IOX

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Generic Scan Tool (GST) (Cont'd)

FUNCTION

Diagnostic test mode		Function
MODE 1	READINESS TESTS	This mode gains access to current emission-related data values, including analog inputs and outputs, digital inputs and outputs, and system status information.
MODE 2	(FREEZE DATA)	This mode gains access to emission-related data value which were stored by ECM during the freeze frame. [For details, refer to "Freeze Frame Data" (EC-55).]
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: <ul style="list-style-type: none"> ● 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.



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

SEF907L

Introduction

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

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

A visual check only may not find the cause of the problems. A road test with CONSULT (or GST) or a circuit tester connected should be performed. Follow the "Work Flow" on EC-69.

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

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

Diagnostic Worksheet

There are many operating conditions that lead to the malfunction of engine components. A good grasp of such conditions can make trouble-shooting faster and more accurate.

In general, each customer feels differently about a problem. It is important to fully understand the symptoms or conditions for a customer complaint.

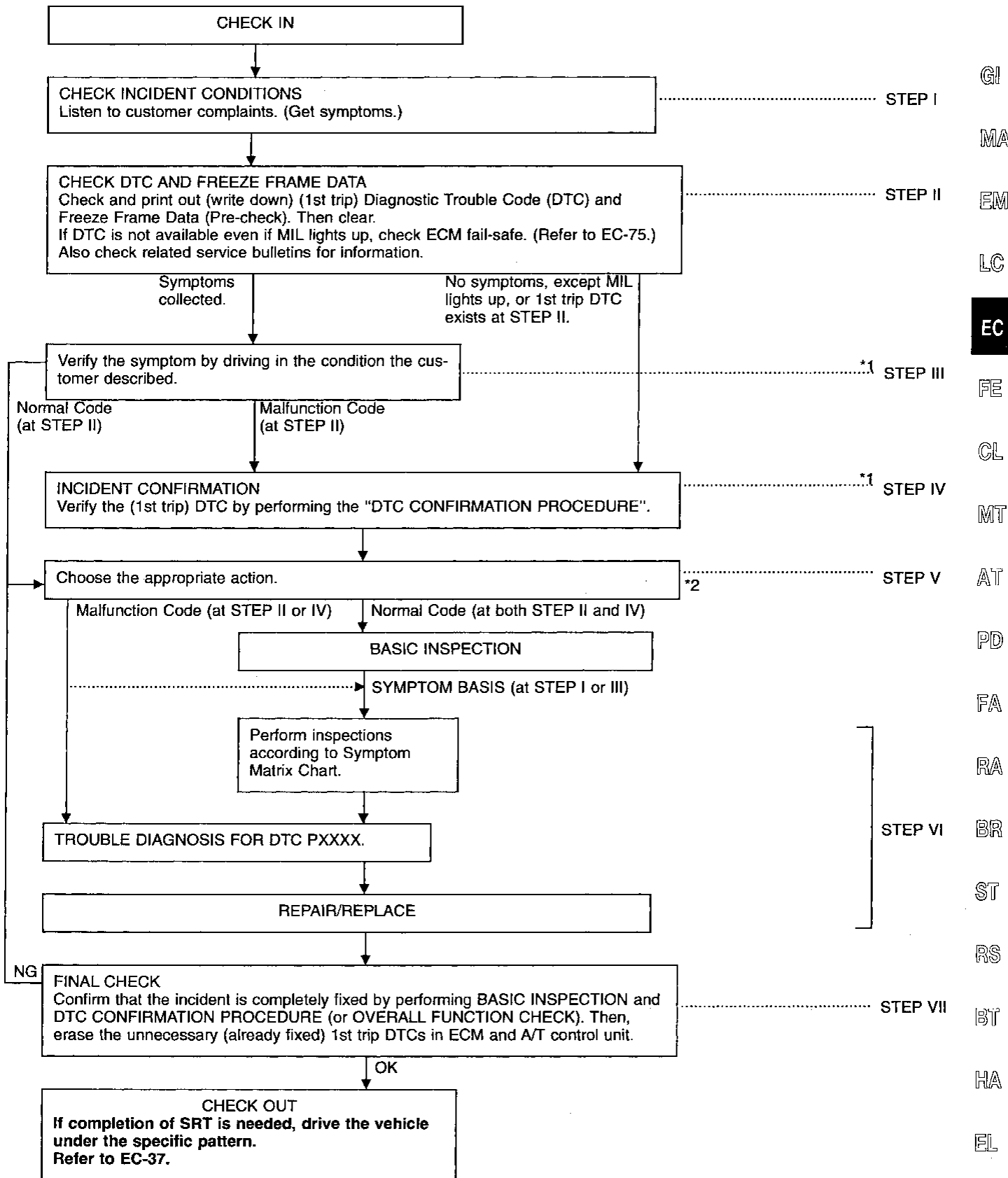
Utilize a diagnostic worksheet like the one shown below in order to organize all the information for troubleshooting.

Some conditions may cause the malfunction indicator lamp to come on steady or blink and DTC to be detected. Examples:

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

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Work Flow



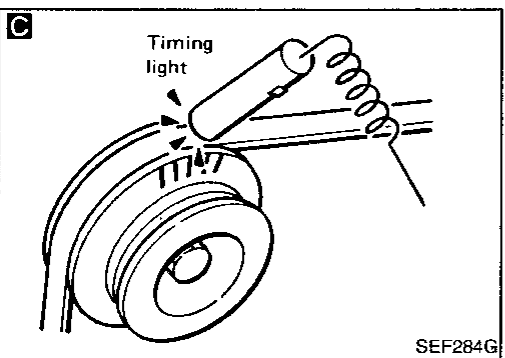
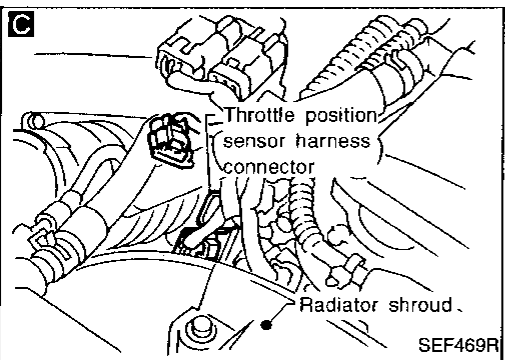
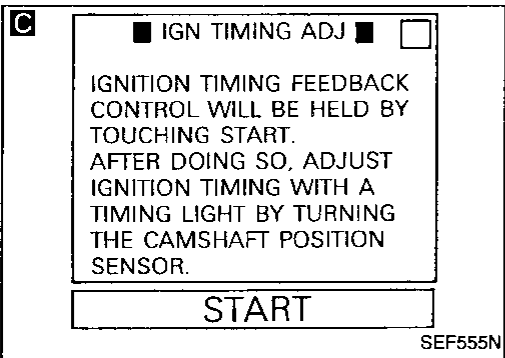
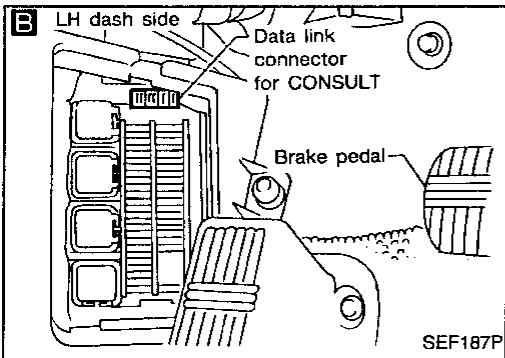
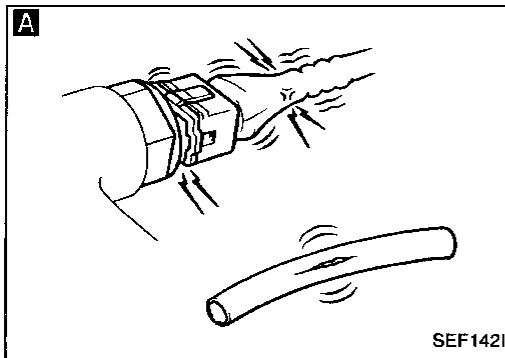
*1: If the incident cannot be duplicated, see "Incident Simulation Tests" of "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT" in GI section.

*2: If the on board diagnostic system cannot be performed, check main power supply and ground circuit (See TROUBLE DIAGNOSIS FOR POWER SUPPLY EC-91).

TROUBLE DIAGNOSIS — Work Flow

Description for Work Flow

STEP	DESCRIPTION
STEP I	Get detailed information about the conditions and the environment when the incident/symptom occurred using the "DIAGNOSTIC WORK SHEET", EC-67.
STEP II	<p>Before confirming the concern, check and write down (print out using CONSULT or Generic Scan Tool) the (1st trip) Diagnostic Trouble Code (DTC) and the (1st trip) freeze frame data, then erase the code and the data. (Refer to EC-42.) The (1st trip) DTC and the (1st trip) freeze frame data can be used when duplicating the incident at STEP III & IV.</p> <p>Study the relationship between the cause, specified by (1st trip) DTC, and the symptom described by the customer. (The "Symptom Matrix Chart" will be useful. See EC-76.)</p> <p>Also check related service bulletins for information.</p>
STEP III	<p>Try to confirm the symptom and under what conditions the incident occurs.</p> <p>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.</p> <p>If the incident cannot be verified, perform INCIDENT SIMULATION TESTS. (Refer to GI section.)</p> <p>If the malfunction code is detected, skip STEP IV and perform STEP V.</p>
STEP IV	<p>Try to detect the (1st trip) Diagnostic Trouble Code by driving in (or performing) the "DTC CONFIRMATION PROCEDURE". Check and read the (1st trip) DTC and (1st trip) freeze frame data by using CONSULT or Generic Scan Tool.</p> <p>During the (1st trip) DTC verification, be sure to connect CONSULT to the vehicle in DATA MONITOR (AUTO TRIG) mode and check real time diagnosis results.</p> <p>If the incident cannot be verified, perform INCIDENT SIMULATION TESTS. (Refer to GI section.)</p> <p>In case the "DTC CONFIRMATION PROCEDURE" is not available, perform the "OVERALL FUNCTION CHECK" instead. The (1st trip) DTC cannot be displayed by this check, however, this simplified "check" is an effective alternative.</p> <p>The "NG" result of the "OVERALL FUNCTION CHECK" is the same as the (1st trip) DTC detection.</p>
STEP V	<p>Take the appropriate action based on the results of STEP I through IV.</p> <p>If the malfunction code is indicated, proceed to TROUBLE DIAGNOSIS FOR DTC PXXXX.</p> <p>If the normal code is indicated, proceed to the BASIC INSPECTION. (Refer to EC-71.) Then perform inspections according to the Symptom Matrix Chart. (Refer to EC-76.)</p>
STEP VI	<p>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.</p> <p>Check the voltage of the related ECM terminals or monitor the output data from the related sensors with CONSULT. Refer to EC-79.</p> <p>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").</p> <p>Repair or replace the malfunction parts.</p>
STEP VII	<p>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.</p> <p>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.</p> <p>Before returning the vehicle to the customer, be sure to erase the unnecessary (already fixed) (1st trip) DTC in ECM and A/T control unit. (Refer to EC-40.)</p>



Basic Inspection

Precaution:

Perform Basic Inspection without electrical or mechanical loads applied;

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

A

BEFORE STARTING

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

B

CONNECT CONSULT TO THE VEHICLE.
Connect "CONSULT" to the data link connector for CONSULT and select "ENGINE" from the menu. (Refer to page EC-52.)

DOES ENGINE START?

No → Go to **E**

Yes ↓

C

CHECK IGNITION TIMING.

1. Warm up engine sufficiently.
2. Select "IGN TIMING ADJ" in "WORK SUPPORT" mode.
3. Touch "START".
4. Check ignition timing at idle using timing light.

Ignition timing:
 $20^{\circ} \pm 2^{\circ}$ BTDC

NG → Adjust ignition timing by turning camshaft position sensor.

1. Warm up engine sufficiently.
2. Stop engine and disconnect throttle position sensor harness connector.
3. Start engine.
4. Check ignition timing at idle using timing light.

Ignition timing:
 $20^{\circ} \pm 2^{\circ}$ BTDC

OK ↓

(Go to **A** on next page.)

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TROUBLE DIAGNOSIS — Basic Inspection

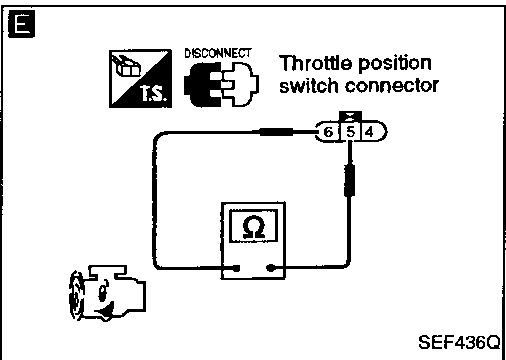
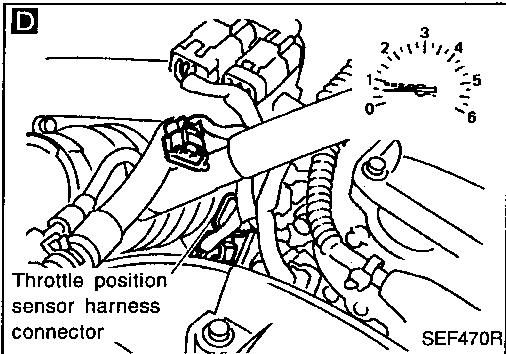
Basic Inspection (Cont'd)

D ■ IGN TIMING ADJ ■ □

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

START

SEF546N



D

CHECK BASE IDLE SPEED.

1. Select "IGN TIMING ADJ" in "WORK SUPPORT" mode.

2. When touching "START", does engine speed fall to 650 ± 50 rpm (A/T in "N" position)?

OR

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

NG → Adjust base idle speed by turning idle speed adjusting screw.

E

CHECK CLOSED THROTTLE POSITION SWITCH IDLE POSITION (A/T model only).

1. Select "A/T", then "DATA MONITOR".

2. Select "ENGINE SPEED" and "CLOSED THL/SW".

3. Read "CLOSED THL/SW" signal under the following condition:

- Raise engine speed to 2,000 rpm.
- Gradually lower engine speed. "CLOSED THL/SW" should be turned "ON" at 900 ± 150 rpm with transmission in N position.

OR

1. Disconnect throttle position sensor harness connector and closed throttle position switch harness connector.

2. Check continuity between closed throttle position switch terminals ⑤ and ⑥ under the following conditions.

- Raise engine speed to 2,000 rpm.
- Gradually lower engine speed. Continuity should exist (Closed throttle position switch closes) at 900 ± 150 rpm with transmission in N position.

NG → Adjust continuity signal by rotating throttle position sensor body. Then, go to ③.

OK

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

⑧

TROUBLE DIAGNOSIS — Basic Inspection

Basic Inspection (Cont'd)

F

■ THRTL POS SEN ADJ ■ □

*** ADJ MONITOR ***

THRTL POS SEN 0.52V

===== MONITOR =====

CMPS•RPM (REF) 0rpm

CLSD THL/P SW ON

SEF441R

F

SEF654R

F

CHECK THROTTLE POSITION SENSOR IDLE POSITION.

1. Perform "THRTL POS SEN. ADJ." in "WORK SUPPORT" mode.
2. Check that output voltage of throttle position sensor is approx. 0.3 to 0.7V (Throttle valve fully closes.) and "CLSD THL/P SW" stays "ON".

OR

⌚ Measure output voltage of throttle position sensor using voltmeter, and check that it is approx. 0.3 to 0.7V. (Throttle valve fully closed.)

NG

Adjust output voltage to 0.5V by rotating throttle position sensor body. Then, go to C.

C

RESET IDLE POSITION MEMORY.

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

OK

CHECK TARGET IDLE SPEED

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

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

OR

⌚ Check idle speed.

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

NG

Adjust idle speed. (See page EC-27.)

After this inspection, unnecessary (1st trip) DTC might be displayed. Erase the stored memory in ECM and A/T control unit. Refer to "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION" (EC-33) and "HOW TO ERASE DTC" in AT section.

INSPECTION END

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TROUBLE DIAGNOSIS — General Description

Diagnostic Trouble Code (DTC) Inspection Priority Chart

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

Priority	Detected items (DTC)		
1	<ul style="list-style-type: none"> ● ECM (P0605, 0301) ● Mass air flow sensor circuit (P0100, 0102) ● Throttle position sensor circuit (P0120, 0403) ● EGRC-solenoid valve circuit (P1400, 1005) ● A/T diagnosis communication line (P1605, 0804) 	<ul style="list-style-type: none"> ● Camshaft position sensor circuit (P0340, 0101) ● Vehicle speed sensor circuit (P0500, 0104) ● Intake air temperature sensor circuit (P0110, 0401) ● Knock sensor circuit (P0325, 0304) ● Tank fuel temperature sensor (P0180, 0402) 	<ul style="list-style-type: none"> ● Engine coolant temperature sensor circuit (P0115, 0103) (P0125, 0908) ● Ignition signal circuit (P1320, 0201) ● Park/Neutral position switch circuit (P0705, 1003)
2	<ul style="list-style-type: none"> ● EGR temperature sensor circuit (P1401, 0305) ● Absolute pressure sensor circuit (P0105, 0803) ● MAP/BARO switch solenoid valve circuit (P1105, 1302) ● EVAP canister purge control valve/solenoid valve circuit (P0443, 0807) ● Vacuum cut valve bypass valve (P1441, 0801) ● A/T related sensors, solenoid valves and switches (P0705-P0710, 1101-1208) 	<ul style="list-style-type: none"> ● Crankshaft position sensor circuit (P0335, 0802), (P1336, 0905) ● Front heated oxygen sensor heater circuit (P0135, 0901) ● Cooling fan circuit (P1900, 1308) ● EVAP control system pressure sensor circuit (P0450, 0704) ● EVAP canister vent control valve circuit (P0446, 0903) ● Rear heated oxygen sensor heater circuit (P0141, 0902) 	<ul style="list-style-type: none"> ● Front heated oxygen sensor circuit (P0130, 0303) ● Rear heated oxygen sensor circuit (P0136, 0707) ● EVAP canister purge volume control valve circuit (P1445, 1008) ● EVAP control system purge flow monitoring (P1447, 0111) ● Closed throttle position switch circuit (P0510, 0203)
3	<ul style="list-style-type: none"> ● EGR function (P0400, 0302) ● EGRC-BPT valve function (P0402, 0306) ● IACV-AAC valve circuit (P0505, 0205) 	<ul style="list-style-type: none"> ● Misfire (P0300 - P0304, 0701 - 0605) ● Closed loop control (P0130, 0307) ● Improper shifting (P0731 - P0734, 1103 - 1106) 	<ul style="list-style-type: none"> ● Fuel injection system function (P0172, 0114), (P0171, 0115) ● Three way catalyst function (P0420, 0702) ● EVAP control system (small leak) (P0440, 0705) ● Signal circuit from A/T control unit to ECM (P0600)

TROUBLE DIAGNOSIS — General Description

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.

DTC No.		Detected items	Engine operating condition in fail-safe mode															
CONSULT GST	ECM*1																	
P0100	0102	Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.															
P0110	0401	Intake air temperature sensor circuit	The ECM controls on the assumption that the intake air temperature is 25°C (77°F).															
P0115	0103	Engine coolant temperature sensor circuit	Engine coolant temperature will be determined by ECM based on the time after turning ignition switch "ON" or "START". CONSULT displays the engine coolant temperature decided by ECM. <table border="1" style="width: 100%; margin-top: 5px;"> <thead> <tr> <th style="text-align: center;">Condition</th> <th style="text-align: center;">Engine coolant temperature decided (CONSULT display)</th> </tr> </thead> <tbody> <tr> <td>Just as ignition switch is turned ON or Start</td> <td style="text-align: center;">40°C (104°F)</td> </tr> <tr> <td>More than 4 minutes after ignition ON or Start</td> <td style="text-align: center;">80°C (176°F)</td> </tr> <tr> <td>Except as shown above</td> <td style="text-align: center;">40 - 80°C (104 - 176°F) (Depends on the time)</td> </tr> </tbody> </table>		Condition	Engine coolant temperature decided (CONSULT display)	Just as ignition switch is turned ON or Start	40°C (104°F)	More than 4 minutes after ignition ON or Start	80°C (176°F)	Except as shown above	40 - 80°C (104 - 176°F) (Depends on the time)						
Condition	Engine coolant temperature decided (CONSULT display)																	
Just as ignition switch is turned ON or Start	40°C (104°F)																	
More than 4 minutes after ignition ON or Start	80°C (176°F)																	
Except as shown above	40 - 80°C (104 - 176°F) (Depends on the time)																	
P0120	0403	Throttle position sensor circuit	Throttle position will be determined based on the amount of mass air flow and the engine speed. Therefore, acceleration will be poor. <table border="1" style="width: 100%; margin-top: 5px;"> <thead> <tr> <th colspan="2" style="text-align: center;">Driving condition</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">When engine is idling</td> <td style="text-align: center;">Normal</td> </tr> <tr> <td style="text-align: center;">When accelerating</td> <td style="text-align: center;">Poor acceleration</td> </tr> </tbody> </table>		Driving condition		When engine is idling	Normal	When accelerating	Poor acceleration								
Driving condition																		
When engine is idling	Normal																	
When accelerating	Poor acceleration																	
Unable to access ECCS	Unable to access Diagnostic Test Mode II	ECM	ECM fail-safe activating condition The computing function of the ECM was judged to be malfunctioning. When the fail-safe system activates, i.e. if the ECM detects a malfunction condition in the CPU of ECM, the 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 border="1" style="width: 100%; margin-top: 5px;"> <thead> <tr> <th colspan="2" style="text-align: center;">ECM fail-safe operation</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Engine speed</td> <td style="text-align: center;">Engine speed will not rise more than 3,000 rpm.</td> </tr> <tr> <td style="text-align: center;">Fuel injection</td> <td style="text-align: center;">Simultaneous multiport fuel injection system</td> </tr> <tr> <td style="text-align: center;">Ignition timing</td> <td style="text-align: center;">Ignition timing is fixed at the preset value.</td> </tr> <tr> <td style="text-align: center;">Fuel pump</td> <td style="text-align: center;">Fuel pump relay is "ON" when engine is running and "OFF" when engine stalls.</td> </tr> <tr> <td style="text-align: center;">IACV-AAC valve</td> <td style="text-align: center;">Full open</td> </tr> <tr> <td style="text-align: center;">Cooling fans</td> <td style="text-align: center;">Cooling fan relay "ON" (High speed condition) when engine is running, and "OFF" when engine stalls.</td> </tr> </tbody> </table> Replace ECM, if ECM fail-safe condition is confirmed.		ECM fail-safe operation		Engine speed	Engine speed will not rise more than 3,000 rpm.	Fuel injection	Simultaneous multiport fuel injection system	Ignition timing	Ignition timing is fixed at the preset value.	Fuel pump	Fuel pump relay is "ON" when engine is running and "OFF" when engine stalls.	IACV-AAC valve	Full open	Cooling fans	Cooling fan relay "ON" (High speed condition) when engine is running, and "OFF" when engine stalls.
ECM fail-safe operation																		
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Ignition timing	Ignition timing is fixed at the preset value.																	
Fuel pump	Fuel pump relay is "ON" when engine is running and "OFF" when engine stalls.																	
IACV-AAC valve	Full open																	
Cooling fans	Cooling fan relay "ON" (High speed condition) when engine is running, and "OFF" when engine stalls.																	

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

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Symptom Matrix Chart

SYSTEM — Basic engine control system		SYMPTOM													Reference page		
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)		OVERCOOLS	OVERCHARGING
New CT/CS		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	1P	1X	
Fuel	Fuel pump circuit	●	●	●	○	●	○	●	●	○		○		○			EC-298
	Fuel pressure regulator system	●	●	●	○	○	○	●	●	○		●					EC-25
	Injector circuit	●	●	●	○	●		●	●			●					EC-293
	Evaporative emission system	○	○	○	○	○	○	○	○	○			○				EC-20
Air	Positive crankcase ventilation system	○	○	○	○	○	○	○	○	○		○	○				EC-24
	IACV-Air regulator circuit	●	○	●	○	●	●	●	●	○		○					EC-306
	Incorrect idle speed adjustment	○	○				○	○	○	○		○					EC-27
	IACV-AAC valve circuit	●	●	●	○	●	●	●	●	●		●		○			EC-217
	IACV-FICD solenoid valve circuit	○	○	○	○	○	○	○	○	○		○					EC-309
Ignition	Incorrect ignition timing adjustment	○	○	●	●	●		●	●			●					EC-27
	Ignition circuit	●	●	●	●	●		●	●			●					EC-242
EGR	EGRC-solenoid valve circuit		○	●	○	○						○					EC-251
	EGR system	●	●	●	○	○	○	●	●	○		○					EC-172
Main power supply and ground circuit		●	●	●	○	○		○	○		○	○		○			EC-91
Cooling	Cooling fan circuit	○	○	○	○	○	○	○	○	○	●	○		○	●		EC-281
Air conditioner circuit		○	○	○	○	○	○	○	○	○		○		○			HA section

● ; High Possibility Item
○ ; Low Possibility Item

(continued on next page)

TROUBLE DIAGNOSIS — General Description

Symptom Matrix Chart (Cont'd)

SYSTEM	SYMPTOM														Reference page	
	HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	OVERCOOLS		OVERCHARGING
New CT/CS	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	1P	1X	
ECCS																
Camshaft position sensor circuit	●	●	●	●	●		○	○			○					EC-168
Mass air flow sensor circuit	●	●	●	●	●		●	●			●					EC-94
Front heated oxygen sensor circuit		●	●	○	●		●	●			●					EC-126
Engine coolant temperature sensor circuit	●	●	●	○	●	○	●	●	○		●					EC-111, 121
Throttle position sensor circuit		●	●		●	●	●	●	●		●					EC-116
Incorrect throttle position sensor adjustment		●	○		○	●	○	○	●		○					EC-71
Vehicle speed sensor circuit		○	○		○						○					EC-213
Knock sensor circuit			●	●	○						○					EC-161
ECM	○	○	○	○	○	○	○	○	○	○	○					EC-75, 229
Start signal circuit	○															EC-296
Park/Neutral position switch circuit			○		○		○	○			○					EC-231
Power steering oil pressure switch circuit		○					○	○								EC-303

● ; High Possibility Item
○; Low Possibility Item

(continued on next page)

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 ST
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TROUBLE DIAGNOSIS — General Description

Symptom Matrix Chart (Cont'd)

SYSTEM		SYMPTOM														Reference page			
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	OVERCOOLS		OVERCHARGING		
New CT/CS		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	1P	1X			
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	○	○	○		○		○	○			○		○		○	—		
	Alternator circuit	○	○	○		○		○	○			○		○		○		EL section	
	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 catalyst	○	○	○	○	○		○	○			○							
Lubrication	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery	○	●	○	○	○		○	○			○	○				—		
	Oil level (Low)/Filthy oil	○	○	○	○	○		○	○			○	○						
Cooling	Radiator/Hose/Radiator filler cap	○	○	○	○	○		○	○		○	○					—		
	Thermostat	○	○	○	○	○	○	○	○	○		○			○				
	Water pump	○	○	○	○	○		○	○			○							
	Water gallery	○	○	○	○	○		○	○			○							
	Coolant fan	○	○	○	○	○	○	○	○			○			○				
	Coolant level (low)/Contaminated coolant	○	○	○	○	○		○	○			○							

● ; High Possibility Item
○ ; Low Possibility Item

CONSULT Reference Value in Data Monitor Mode

Remarks:

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

MONITOR ITEM	CONDITION		SPECIFICATION
CMPS-RPM (REF)	<ul style="list-style-type: none"> ● Tachometer: Connect ● Run engine and compare tachometer indication with the CONSULT value. 		Almost the same speed as the CONSULT value.
MAS AIR/FL SE	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch "OFF" ● Shift lever "N" ● No-load 	Idle	1.3 - 1.7V
		2,500 rpm	1.7 - 2.1V
COOLAN TEMP/S	<ul style="list-style-type: none"> ● Engine: After warming up 		More than 70°C (158°F)
FR O2 SENSOR	<ul style="list-style-type: none"> ● Engine: After warming up 	Maintaining engine speed at 2,000 rpm	0 - 0.3V ↔ Approx. 0.6 - 1.0V
FR O2 MNTR			LEAN ↔ RICH Changes more than 5 times during 10 seconds.
RR O2 SENSOR	<ul style="list-style-type: none"> ● Engine: After warming up 	Immediately after depressing the accelerator pedal.	0 - 0.3V ↔ Approx. 0.6 - 1.0V
RR O2 MNTR			LEAN ↔ RICH
VHCL SPEED SE	<ul style="list-style-type: none"> ● Turn drive wheels and compare speedometer indication with the CONSULT value 		Almost the same speed as the CONSULT value
BATTERY VOLT	<ul style="list-style-type: none"> ● Ignition switch: ON (Engine stopped) 		11 - 14V
THRTL POS SEN	<ul style="list-style-type: none"> ● Ignition switch: ON (Engine stopped) 	Throttle valve fully closed	0.3 - 0.7V
		Throttle valve fully opened	Approx. 4.0V
EGR TEMP SEN	<ul style="list-style-type: none"> ● Engine: After warming up 		Less than 4.5V
START SIGNAL	<ul style="list-style-type: none"> ● Ignition switch: ON → START → ON 		OFF → ON → OFF
CLSD THL/P SW	<ul style="list-style-type: none"> ● Ignition switch: ON (Engine stopped) 	Throttle valve: Idle position	ON
		Throttle valve: Slightly open	OFF
AIR COND SIG	<ul style="list-style-type: none"> ● Engine: After warming up, idle the engine 	Air conditioner switch "OFF"	OFF
		Air conditioner switch "ON" (Compressor operates.)	ON
P/N POSI SW	<ul style="list-style-type: none"> ● Ignition switch: ON 	Shift lever "P" or "N"	ON
		Except above	OFF

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TROUBLE DIAGNOSIS — General Description

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

MONITOR ITEM	CONDITION		SPECIFICATION
PW/ST SIGNAL	<ul style="list-style-type: none"> ● Engine: After warming up, idle the engine 	Steering wheel in neutral position (forward direction)	OFF
		The steering wheel is turned	ON
IGNITION SW	<ul style="list-style-type: none"> ● Ignition switch ON → OFF 		ON → OFF
A/C PRESS SW	<ul style="list-style-type: none"> ● Air conditioner high pressure side: Increasing to 1,422 - 1,618 kPa (14.5 - 16.5 kg/cm², 206 - 235 psi) 		ON
	<ul style="list-style-type: none"> ● Air conditioner high pressure side: Except above 		OFF
LOAD SIGNAL	<ul style="list-style-type: none"> ● Ignition switch: ON 	Rear window defogger is operating.	ON
		Rear window defogger is not operating.	OFF
AMB TEMP SW	<ul style="list-style-type: none"> ● Ignition switch: ON ● Compare ambient air temperature with the following: 	Below 19°C (66°F)	OFF
		19 - 25°C (66 - 77°F)	—
		Above 25°C (77°F)	ON
INJ PULSE	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch "OFF" ● Shift lever "N" ● No-load 	Idle	2.4 - 3.2 msec.
		2,000 rpm	1.9 - 3.2 msec.
B/FUEL SCHDL	ditto	Idle	1.0 - 1.6 msec
		2,000 rpm	0.7 - 1.3 msec
IGN TIMING	ditto	Idle	20° BTDC
		2,000 rpm	More than 25° BTDC
IACV-AAC/V	<ul style="list-style-type: none"> ● Engine: After warming up ● Idle speed ● Shift lever "N" 	<ul style="list-style-type: none"> ● No-load 	0 - 50%
		<ul style="list-style-type: none"> ● Air conditioner switch: ON ● Steering wheel: Fully turned ● Rear window defogger switch: ON ● Headlamp switch: ON 	70 - 100%
PURG VOL C/V	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch "OFF" ● Shift lever "N" 	Vehicle stopped	0 step
		Vehicle running	—
A/F ALPHA	<ul style="list-style-type: none"> ● Engine: After warming up 	Maintaining engine speed at 2,000 rpm	51 - 160%
EVAP SYS PRES	<ul style="list-style-type: none"> ● Ignition switch: ON 		Approx. 3.4V
AIR COND RLY	<ul style="list-style-type: none"> ● Air conditioner switch OFF → ON 		OFF → ON
FUEL PUMP RLY	<ul style="list-style-type: none"> ● Ignition switch is turned to ON (Operates for 5 seconds) ● Engine running and cranking ● When engine is stopped (stops in 1.0 seconds) 		ON
	Except as shown above		OFF
COOLING FAN	<ul style="list-style-type: none"> ● 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 99°C (210°F)	LOW
		Engine coolant temperature is 100°C (212°F) or more	HIGH

TROUBLE DIAGNOSIS — General Description

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

MONITOR ITEM	CONDITION	SPECIFICATION		
EGRC SOL/V	<ul style="list-style-type: none"> ● Engine: After warming up 	Idle	ON	GI MA
		<ul style="list-style-type: none"> ● Properly raise drive wheels off of the ground ● Set M/T or A/T selector lever in "1" position ● Engine speed: Revving from 1,500 - 4,000 rpm [Vehicle speed is over 8 km/h (5 MPH).] 	OFF	
VENT CONT/V	<ul style="list-style-type: none"> ● Ignition switch: ON 		OFF	EM
FR O2 HEATER	<ul style="list-style-type: none"> ● Engine speed: Idle ● Engine speed: Above 4,400 rpm 		ON	LC
			OFF	
RR O2 HEATER	<ul style="list-style-type: none"> ● Engine speed: Idle ● Engine speed: Above 2,800 rpm 		ON	EC
			OFF	
VC/V BYPASS/V	<ul style="list-style-type: none"> ● Ignition switch: ON 		OFF	
PURG CONT S/V	<ul style="list-style-type: none"> ● Engine: After warming up 	Idle	OFF	FE
		2,000 rpm	ON	
CAL/LD VALUE	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch "OFF" ● Shift lever "N" ● No-load 	Idle	10.0 - 24.0%	CL
		2,500 rpm	11.0 - 25.0%	
ABSOL TH-P/S	<ul style="list-style-type: none"> ● Ignition switch: ON (Engine stopped) 	Throttle valve fully closed	0.0%	MT
		Throttle valve fully opened	Approx. 84%	
MASS AIRFLOW	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch "OFF" ● Shift lever "N" ● No-load 	Idle	1.5 - 4.5 g·m/s	AT
		2,500 rpm	6.0 - 14.0 g·m/s	
MAP/BARO SW/V	<ul style="list-style-type: none"> ● Ignition switch: ON ● Engine speed: Idle (10 seconds after starting engine) 		BARO	PD
			MAP	
ABSOL PRES/SE	<ul style="list-style-type: none"> ● Engine: After warming up 	Engine is not running	Approx. 4.3V	FA
		Idle (10 seconds after starting engine)	Approx. 1.2V	

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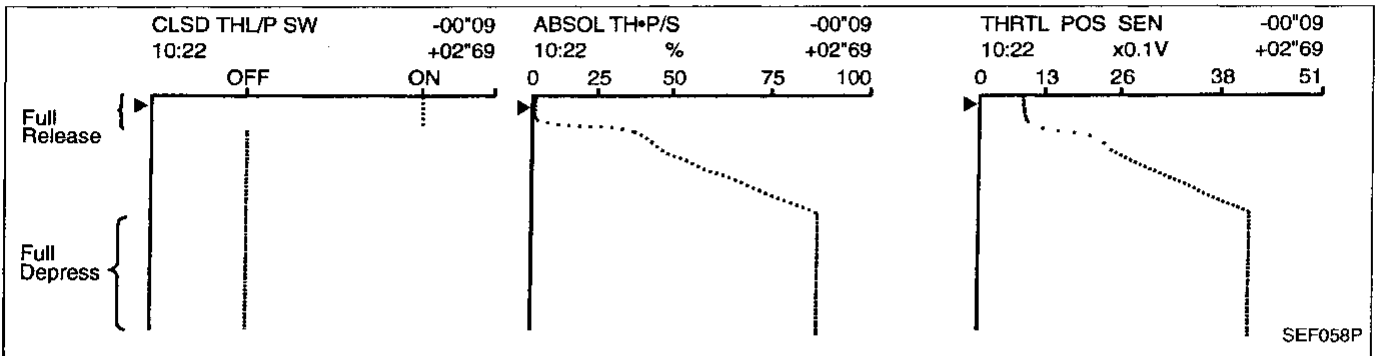
Major Sensor Reference Graph in Data Monitor Mode

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

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

Below is the data for "THRTL POS SEN", "ABSOL TH·P/S" and "CLSD THL/P SW" when depressing the accelerator pedal with the ignition switch "ON".

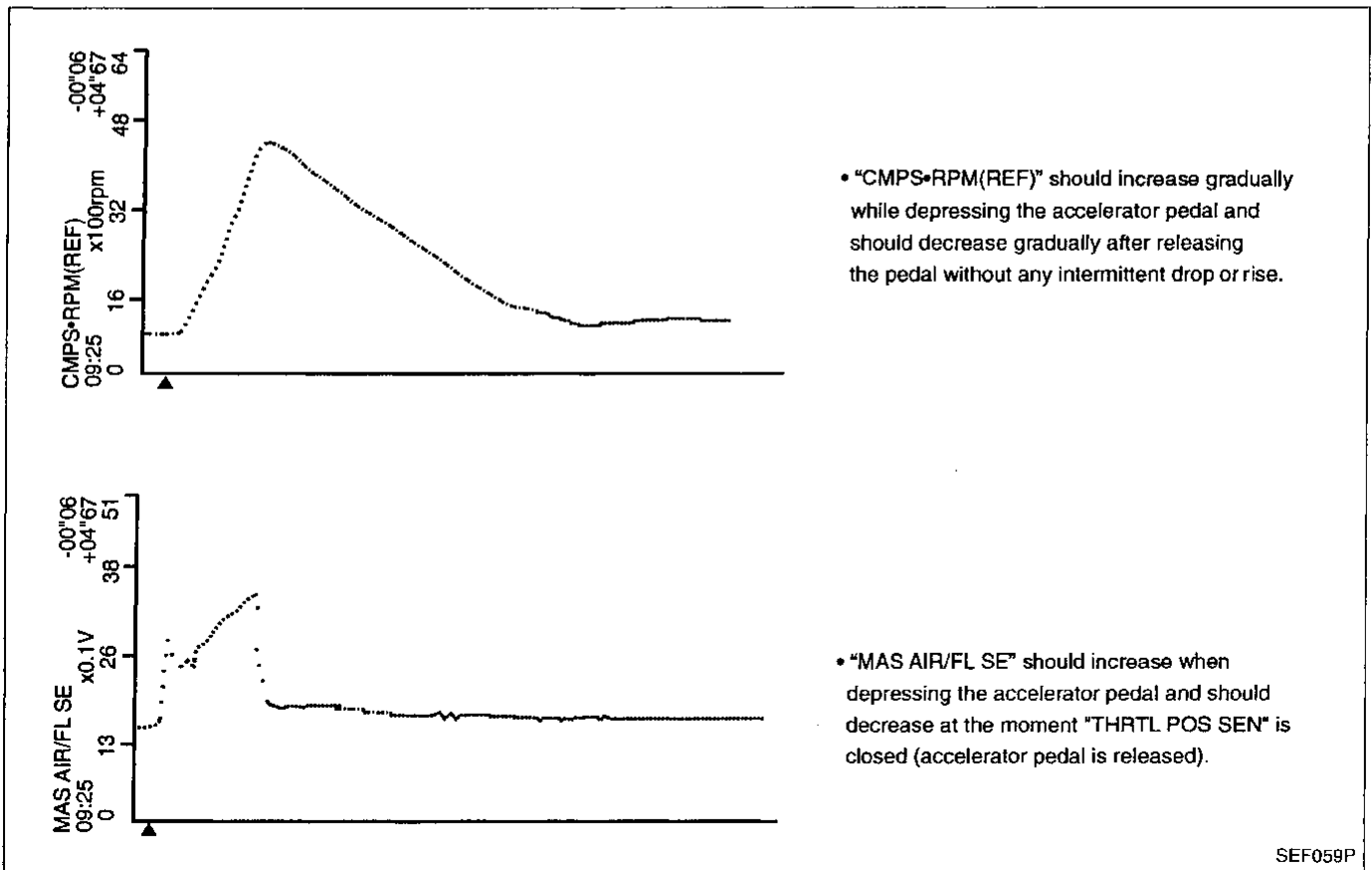
The signal of "THRTL POS SEN" and "ABSOL TH·P/S" should rise gradually without any intermittent drop or rise after "CLSD THL/P SW" is changed from "ON" to "OFF".



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

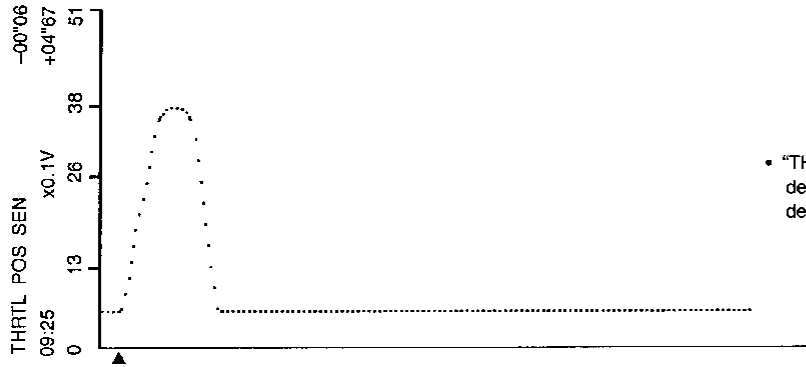
Below is the data for "CMPS-RPM (REF)", "MAS AIR/FL SE", "THRTL POS SEN", "RR O2 SENSOR", "FR O2 SENSOR" and "INJ PULSE" when revving quickly up to 4,800 rpm under no load after warming up engine sufficiently.

Each value is for reference, the exact value may vary.

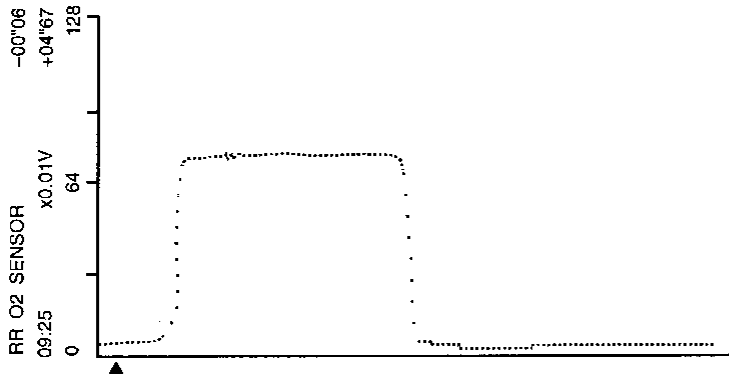


TROUBLE DIAGNOSIS — General Description

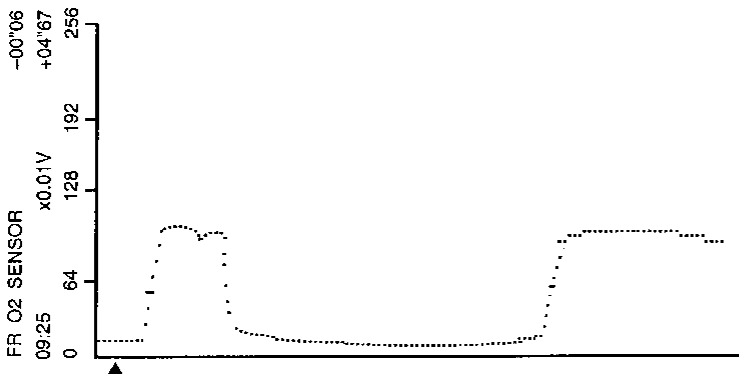
Major Sensor Reference Graph in Data Monitor Mode (Cont'd)



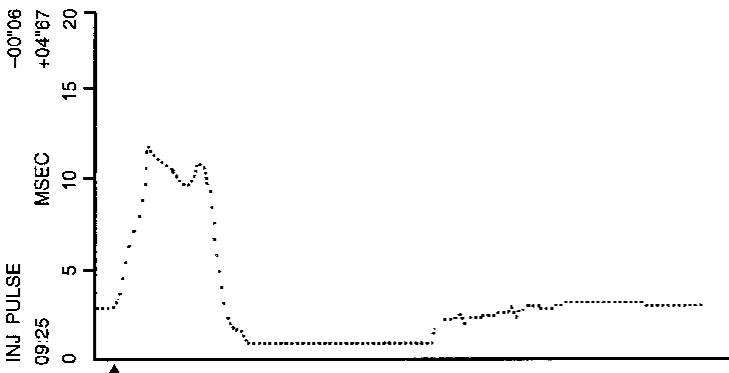
- "THRTL POS SEN" should increase while depressing the accelerator pedal and should decrease while releasing it.



- "RR O2 SENSOR" may increase immediately after depressing the accelerator pedal and may decrease after releasing the pedal.



- "FR O2 SENSOR" may increase immediately after depressing the accelerator pedal and may decrease after releasing the pedal.



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

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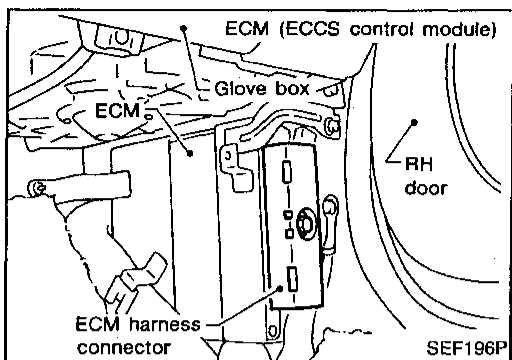
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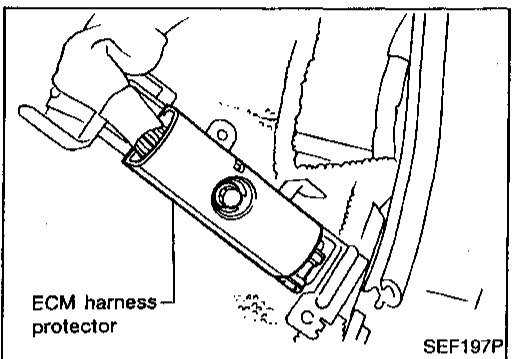
IDX



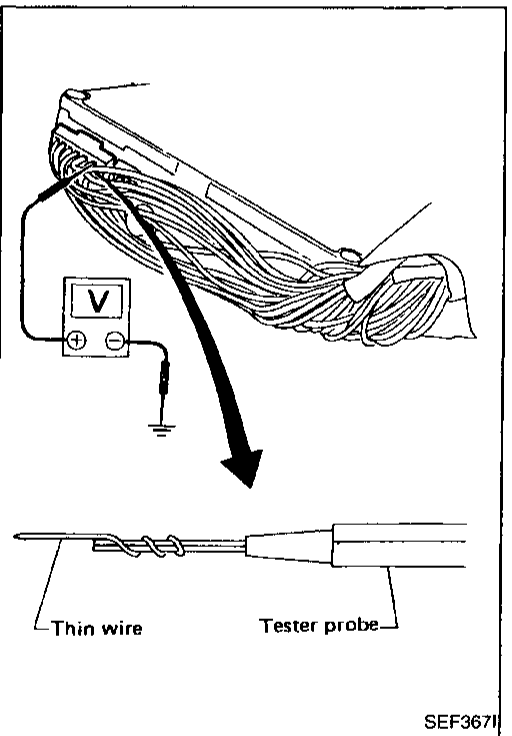
ECM Terminals and Reference Value

PREPARATION

1. ECM is located behind the RH dash side finisher. For this inspection, remove the RH dash side finisher.

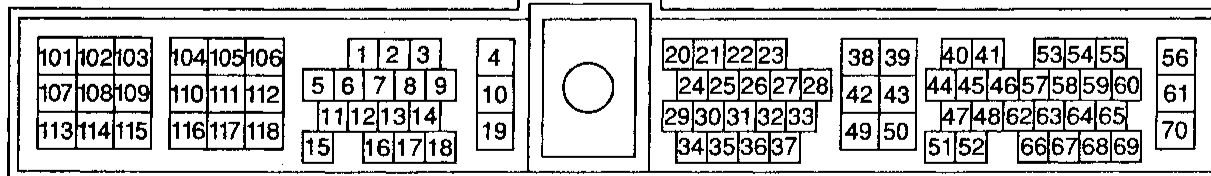


2. Remove ECM harness protector.



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

ECM HARNESS CONNECTOR TERMINAL LAYOUT



TROUBLE DIAGNOSIS — General Description

ECM Terminals and Reference Value (Cont'd)

ECM INSPECTION TABLE

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

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)	
1	W	Ignition signal	Engine is running. └ Idle speed	0.3 - 0.6V*	GI MA
			Engine is running. └ Engine speed is 2,000 rpm	Approximately 0.5V*	EM
2	Y/R	Ignition check	Engine is running. └ Idle speed	Approximately 12V*	LC
3	Y/R	Tachometer	Engine is running. └ Idle speed	Approximately 0.9V*	EC
4	R/B	ECCS relay (Self-shutoff)	Engine is running. └ Ignition switch "OFF" └ For a few seconds after turning ignition switch "OFF".	0 - 1V	FE CL
			Ignition switch "OFF" └ A few seconds passed after turning ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)	MT AT
5	L	EVAP canister purge volume control valve	Engine is running. └ Idle speed	0 - 0.4V	PD
6	YL				
7	Y/L (M/T models)	5th position switch	Ignition switch "ON"	Above 5.0V	
			Ignition switch "ON" └ Gear is in "5th position".	Approximately 0V	FA
	R/B (A/T models)	A/T check signal	Ignition switch "ON"	1.0 - 8.0V	RA
			Engine is running.		BR
8	B/P	Fuel pump relay	Ignition switch "ON" └ For 5 seconds after turning ignition switch "ON"	Approximately 0.9V	ST
			Engine is running. └ Ignition switch "ON" └ 1 second after turning ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)	RS
9	OR/B	Air conditioner triple-pressure switch	Ignition switch "ON".	Approximately 7V	BT
10	B	ECCS ground	Engine is running. └ Idle speed	Approximately 0V (Engine ground)	HA

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

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TROUBLE DIAGNOSIS — General Description

ECM Terminals and Reference Value (Cont'd)

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
13	OR/L	Cooling fan relay (High)	Engine is running. └ Cooling fan is not operating.	BATTERY VOLTAGE (11 - 14V)
			Engine is running. └ Cooling fan (High) is operating.	0.07 - 0.30V
14	L/G	Cooling fan relay (Low)	Engine is running. └ Cooling fan is not operating.	BATTERY VOLTAGE (11 - 14V)
			Engine is running. └ Cooling fan (Low) is operating.	0.07 - 0.30V
15	B/P	Air conditioner relay	Engine is running. └ Both air conditioner switch and blower switch are "ON".	0.08 - 0.3V
			Engine is running. └ Air conditioner switch is "OFF".	BATTERY VOLTAGE (11 - 14V)
16	W/B	EVAP canister purge volume control valve	Engine is running. └ Idle speed	BATTERY VOLTAGE (11 - 14V)
17	R/G			
18	OR	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	Approximately 0V (Engine ground)
20	OR	Start signal	Ignition switch "ON"	Approximately 0V
			Ignition switch "START"	BATTERY VOLTAGE (11 - 14V)
21	OR/L	Air conditioner switch	Engine is running. └ Both air conditioner switch and blower switch are "ON". (Compressor operates)	Approximately 0V
			Engine is running. └ Air conditioner switch is "OFF".	BATTERY VOLTAGE (11 - 14V)
22	G/OR (M/T models) R/G (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" └ Accelerator pedal released	0.3 - 0.7V
			Ignition switch "ON" └ Accelerator pedal fully depressed	Approximately 4V

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

TROUBLE DIAGNOSIS — General Description

ECM Terminals and Reference Value (Cont'd)

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)	
24	L/G	A/T signal No. 1	Ignition switch "ON" Engine is running. └ Idle speed	6 - 8V	GI MA
25	PU/W	Power steering oil pressure switch	Engine is running. └ Steering wheel is being turned.	0V	EM
			Engine is running. └ Steering wheel is not being turned.	Approximately 5V	LC
26	Y/G	Vehicle speed sensor	Engine is running. └ Slowly rotating front wheels	Approximately 1.8 - 2.4V* (AC voltage)	EC
27	L/G	Throttle position switch (Closed position)	Ignition switch "ON" (Warm-up condition) └ Accelerator pedal released	BATTERY VOLTAGE (11 - 14V)	FE
			Ignition switch "ON" └ Accelerator pedal depressed	Approximately 0V	CL
28	L/W	Intake air temperature sensor	Engine is running.	Approximately 0 - 4.8V Output voltage varies with intake air temperature.	MT
29	L/W	A/T signal No. 2	Ignition switch "ON" Engine is running. └ Idle speed	6 - 8V	AT PD
30	L/R	A/T signal No. 3	Ignition switch "ON"	0V	
33	R/Y	Throttle position sensor signal (To A/T control unit)	Ignition switch "ON" └ Accelerator pedal released	Approximately 0.4V	FA
			Ignition switch "ON" └ Accelerator pedal fully depressed	Approximately 3V	RA
37	L/W	Ambient air temperature switch	Engine is running. └ Idle speed	0V	BR
			Engine is running. [Ambient air temperature is above 25°C (77°F)] └ Idle speed └ Air conditioner is operating.	Approximately 0.2V	ST RS
38	B/R	Ignition switch	Ignition switch "OFF"	0V	
			Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)	BT
39	B	ECCS ground	Engine is running. └ Idle speed	Approximately 0V (Engine ground)	HA
40 44	W W	Camshaft position sensor (Reference signal)	Engine is running.	Approximately 0.3V*	EL
41	B	Camshaft position sensor (Position signal)	Engine is running.	Approximately 2.6V*	IDX

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

TROUBLE DIAGNOSIS — General Description

ECM Terminals and Reference Value (Cont'd)

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
43	B	ECCS ground	Engine is running. └ Idle speed	Engine ground (Probe this terminal with ⊖ tester probe when measuring.)
46	W	Front heated oxygen sensor	Engine is running. └ After warming up sufficiently and engine speed is 2,000 rpm.	0 - Approximately 1.0V (periodically change)
47	W	Mass air flow sensor	Engine is running. (Warm-up condition) └ Idle speed	1.3 - 1.7V
			Engine is running. (Warm-up condition) └ Engine speed is 2,500 rpm.	1.7 - 2.1V
48	B	Mass air flow sensor ground	Engine is running. (Warm-up condition) └ Idle speed	Approximately 0V (-0.1 to 0.1V) (Engine ground)
49	LG/R	Sensors' power supply	Ignition switch "ON"	Approximately 5.1V
50	B	Sensors' ground	Engine is running. (Warm-up condition) └ Idle speed	Approximately 0V (-0.1 to 0.1V) (Engine ground)
51	L/OR	Engine coolant temperature sensor	Engine is running.	Approximately 0 - 4.84V Output voltage varies with engine coolant temperature.
52	W	Rear heated oxygen sensor	Engine is running. └ After warming up sufficiently and immediately after depressing the accelerator pedal.	Approximately 0 - 1.0V
53	P	Crankshaft position sensor (OBD)	Engine is running. (A/T: N range, M/T: Neutral) └ Idle speed (Air conditioner switch "OFF".)	More than 0.2V* (AC range)
54	W	Knock sensor	Engine is running. └ Idle speed	2.0 - 3.0V
55	L/R	Rear window defogger relay	Ignition switch "ON" └ Rear window defogger is "OFF".	Approximately 0V
			Ignition switch "ON" └ Rear window defogger is "ON".	BATTERY VOLTAGE (11 - 14V)
56 61	B/W B/W	Power supply for ECM	Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
58	R	Data link connector for GST	Engine is running. └ Idle speed	Approximately 9V

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

TROUBLE DIAGNOSIS — General Description

ECM Terminals and Reference Value (Cont'd)

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)	
62	B/W	EGR temperature sensor	Engine is running. (Warm-up condition) └ Idle speed	Less than 4.5V	GI
			Engine is running. (Warm-up condition) └ EGR system is operating.	Approximately 0 - 3.0V	MA
63	Y	Tank fuel temperature sensor	Engine is running.	Approximately 0 - 4.8V Output voltage varies with fuel temperature.	EM
64	G/B	Data link connector for CONSULT	Engine is running.	Approximately 0.1V	LC
65	G		└ Idle speed └ Connect CONSULT and select DATA MONITOR mode	Approximately 4 - 9V	EC
68	G/W			Approximately 3.5V*	
66	W	Absolute pressure sensor	Ignition switch "ON" └ Engine is not running.	Approximately 4.4V	FE
			Engine is running. (Warm-up condition) └ Idle speed (10 seconds after starting engine)	Approximately 1.2V	CL
67	G	EVAP control system pressure sensor	Ignition switch "ON"	Approximately 3.4V	MT
69	Y/B	MAP/BARO switch solenoid valve	Ignition switch "ON" └ Engine is not running	Approximately 0.2V	AT
			Engine is running. (Warm-up condition) └ Idle speed (10 seconds after starting engine)	BATTERY VOLTAGE (11 - 14V)	PD
70	R	Power supply (Back-up)	Ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)	FA
101	BR	IACV-AAC valve (Open)	Engine is running. └ Idle speed	7V - BATTERY VOLTAGE	RA
			Engine is running. └ Rear window defogger switch: ON └ Steering wheel: Fully turned └ Air conditioner switch: ON └ Headlamp switch: ON	1 - 5V	BR
102	W/B	Injector No. 1	Engine is running	BATTERY VOLTAGE (11 - 14V)	RS
104	G/B	Injector No. 3			
107	Y/B	Injector No. 2			
109	L/B	Injector No. 4			
103	L/R	EGRC-solenoid valve	Engine is running. (Warm-up condition) └ Properly raise drive wheels off of the ground └ Set M/T or A/T selector lever in "1" position └ Engine speed: revving from 1,500 to 3,200 rpm [Vehicle speed is over 8 km/h (5 MPH)]	BATTERY VOLTAGE (11 - 14V)	HA
			Engine is running. (Warm-up condition) └ Idle speed	Approximately 0V	EL
					IDX

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

TROUBLE DIAGNOSIS — General Description

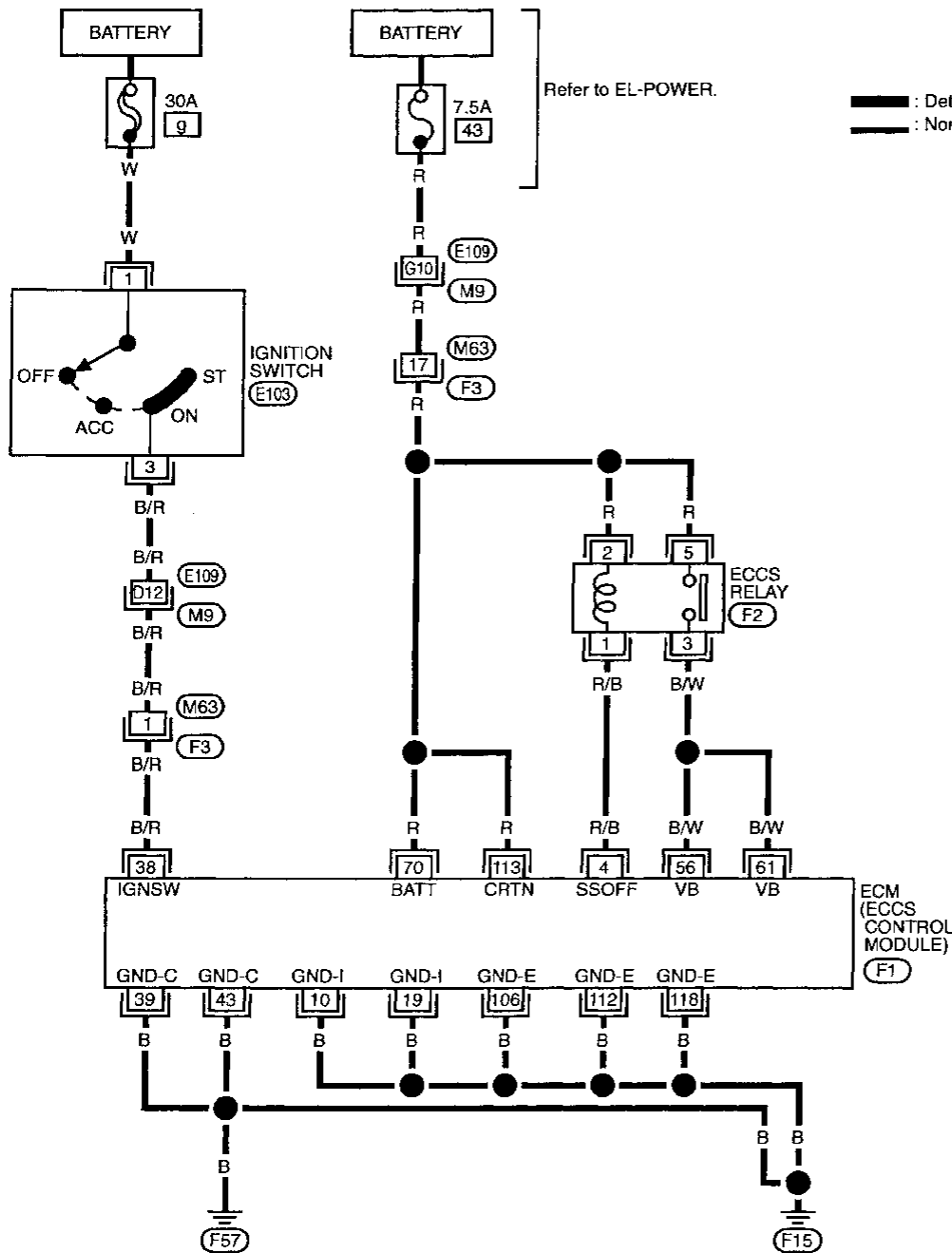
ECM Terminals and Reference Value (Cont'd)

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
105	Y/R	EVAP canister purge control solenoid valve	<div style="border: 1px solid black; padding: 2px;">Engine is running.</div> └ Idle speed	BATTERY VOLTAGE (11 - 14V)
106	B	ECCS ground	<div style="border: 1px solid black; padding: 2px;">Engine is running.</div> └ Idle speed	Approximately 0V (Engine ground)
108	Y/G	EVAP canister vent control valve	<div style="border: 1px solid black; padding: 2px;">Ignition switch "ON"</div>	BATTERY VOLTAGE (11 - 14V)
110	B	Rear heated oxygen sensor heater	<div style="border: 1px solid black; padding: 2px;">Engine is running.</div> (Warm-up condition) └ Engine speed is below 2,800 rpm	0 - Approximately 0.3V
			<div style="border: 1px solid black; padding: 2px;">Engine is running.</div> (Warm-up condition) └ Engine speed is above 2,800 rpm	BATTERY VOLTAGE (11 - 14V)
112	B	ECCS ground	<div style="border: 1px solid black; padding: 2px;">Engine is running.</div> └ Idle speed	Engine ground
113	R	Current return	<div style="border: 1px solid black; padding: 2px;">Engine is running.</div> └ Idle speed	BATTERY VOLTAGE (11 - 14V)
114	OR/L	REC relay	<div style="border: 1px solid black; padding: 2px;">Ignition switch "ON"</div> └ Relay is operating.	BATTERY VOLTAGE (11 - 14V)
115	L	Front heated oxygen sensor heater	<div style="border: 1px solid black; padding: 2px;">Engine is running.</div> └ Engine speed is below 4,400 rpm.	Approximately 0V
			<div style="border: 1px solid black; padding: 2px;">Engine is running.</div> └ Engine speed is above 4,400 rpm.	BATTERY VOLTAGE (11 - 14V)
117	G/R	Vacuum cut valve bypass valve	<div style="border: 1px solid black; padding: 2px;">Ignition switch "ON"</div>	BATTERY VOLTAGE (11 - 14V)
118	B	ECCS ground	<div style="border: 1px solid black; padding: 2px;">Engine is running.</div> └ Idle speed	Engine ground

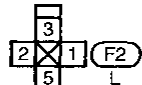
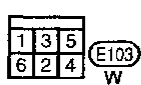
* Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Main Power Supply and Ground Circuit

EC-MAIN-01

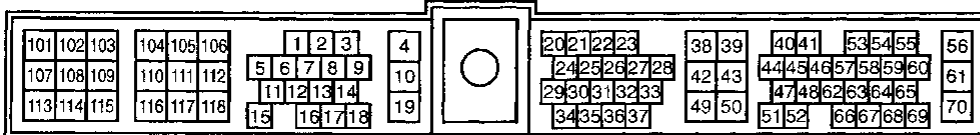


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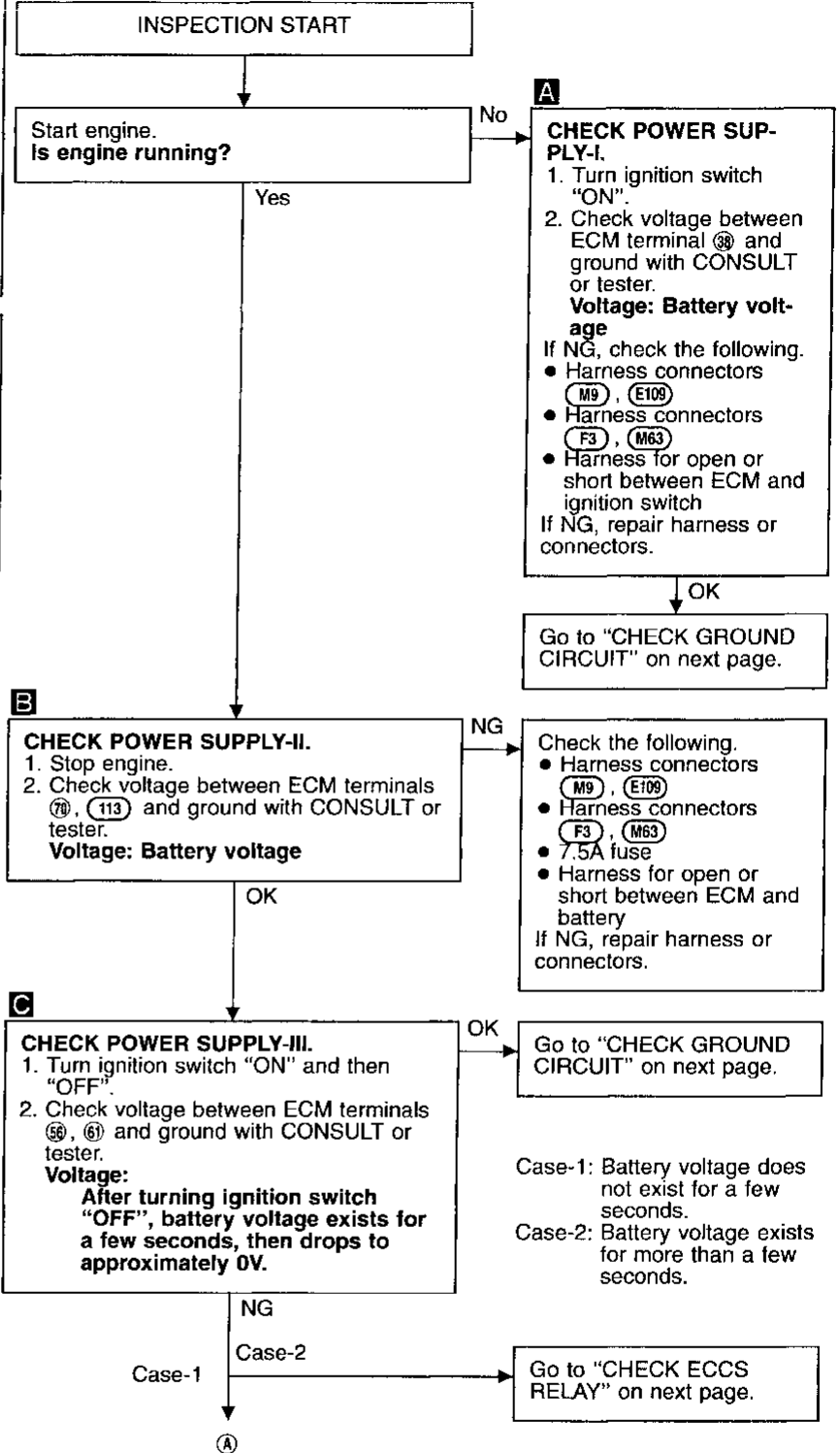
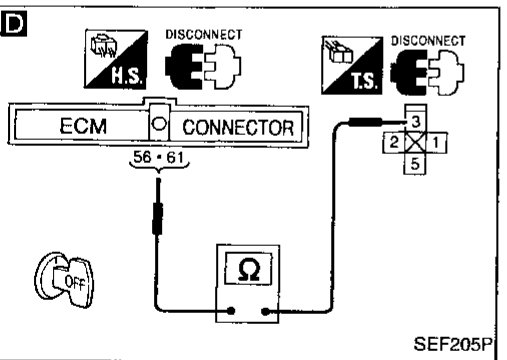
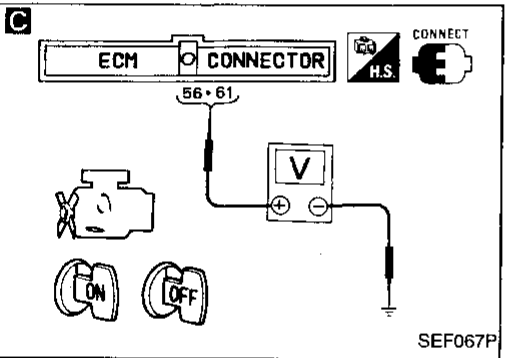
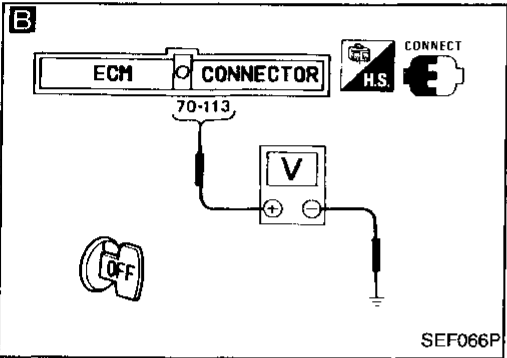
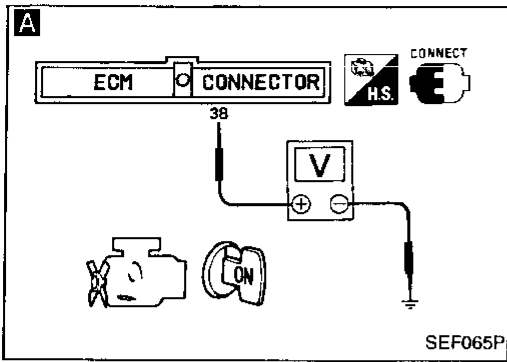
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E109, M9
M63, F3



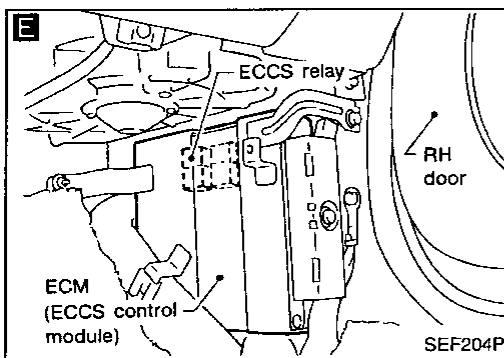
TROUBLE DIAGNOSIS FOR POWER SUPPLY

Main Power Supply and Ground Circuit (Cont'd)



TROUBLE DIAGNOSIS FOR POWER SUPPLY

Main Power Supply and Ground Circuit (Cont'd)



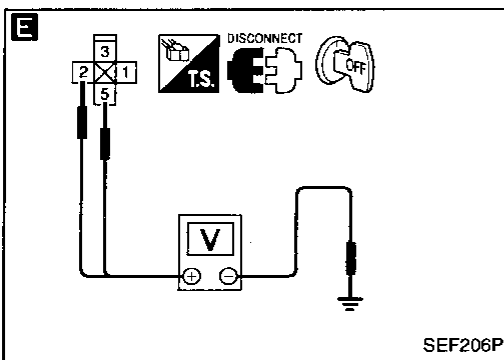
D

CHECK HARNESS CONTINUITY BETWEEN ECCS RELAY AND ECM.

1. Disconnect ECM harness connector.
2. Disconnect ECCS relay.
3. Check harness continuity between ECM terminals ⑤, ⑥ and terminal ③.

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

NG → Repair harness or connectors.



E

CHECK VOLTAGE BETWEEN ECCS RELAY AND GROUND.

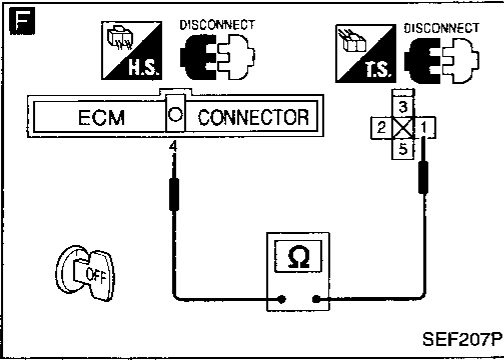
Check voltage between terminals ②, ⑤ and ground with CONSULT or tester.

Voltage: Battery voltage

NG → Check the following.

- Harness for open or short between ECCS relay and harness connector (F3)

If NG, repair harness or connectors.



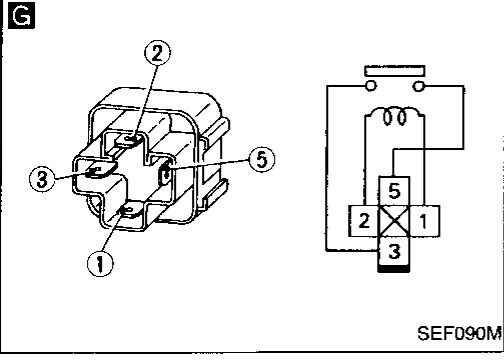
F

CHECK OUTPUT SIGNAL CIRCUIT.

Check harness continuity between ECM terminal ④ and terminal ①.

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

NG → Repair harness or connectors.



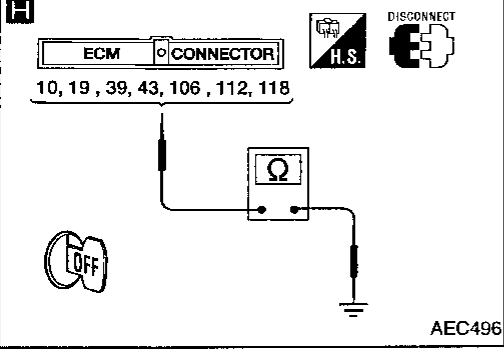
G

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.



H

CHECK GROUND CIRCUIT.

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminals ⑩, ⑱, ⑳, ㉓, ㉔, ㉖, ㉗, ㉙ and engine ground.

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

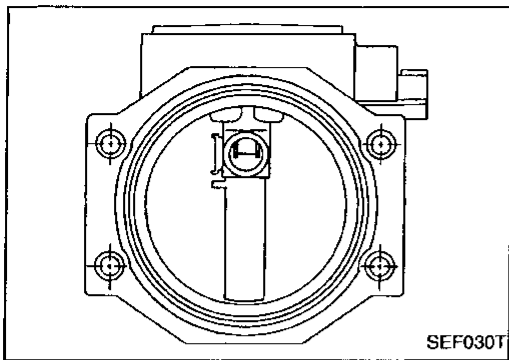
NG → Repair harness or connectors.

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

INSPECTION END

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TROUBLE DIAGNOSIS FOR DTC P0100



Mass Air Flow Sensor (MAFS)

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

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

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Item (Possible Cause)
P0100 0102	A) An excessively high or low voltage from the sensor is sent to ECM.* ----- B)C) Rationally incorrect voltage is sent to ECM, compared with the calculated value by camshaft position sensor signal and throttle position sensor signal.	<ul style="list-style-type: none"> ● Harness or connectors (The sensor circuit is open or shorted.) ● Mass air flow sensor

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

DTC No.		Detected items	Engine operating condition in fail-safe mode
CONSULT GST	ECM*1		
P0100	0102	Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

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

Procedure for malfunction A

- | | |
|----|---|
| | <ol style="list-style-type: none"> 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 | |
| | <ol style="list-style-type: none"> 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 | |
| | <ol style="list-style-type: none"> 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. |

TROUBLE DIAGNOSIS FOR DTC P0100

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

Procedure for malfunction B

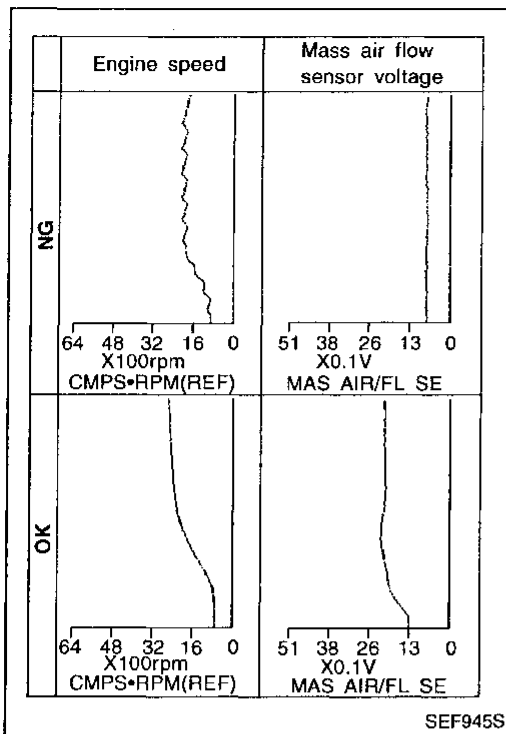
- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT.
- 3) Start engine and warm it up sufficiently.
- 4) Run engine for at least 10 seconds at idle speed.

OR

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

OR

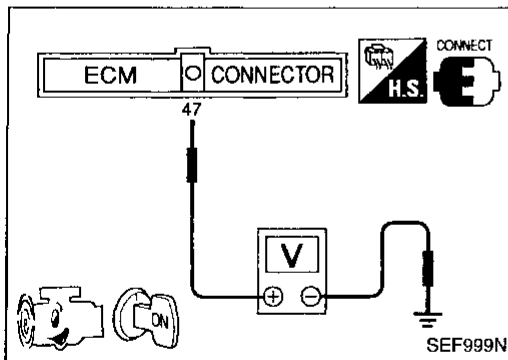
- 1) Turn ignition switch "ON".
- 2) Start engine and warm it up sufficiently.
- 3) Run engine for at least 10 seconds at idle speed.
- 4) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
- 5) Perform diagnostic test mode II (Self-diagnostic results) with ECM.



SEF945S

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

SEF003P



SEF999N

OVERALL FUNCTION CHECK

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

Procedure for malfunction C

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

OR

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

OR

- 1) Turn ignition switch "ON".
- 2) Start engine and warm it up sufficiently.
- 3) Check the voltage between ECM terminal ④7 and ground.
- 4) Check for linear voltage rise in response to increases to about 4,000 rpm in engine speed.

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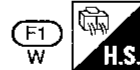
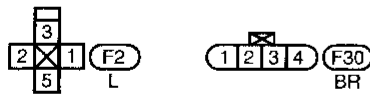
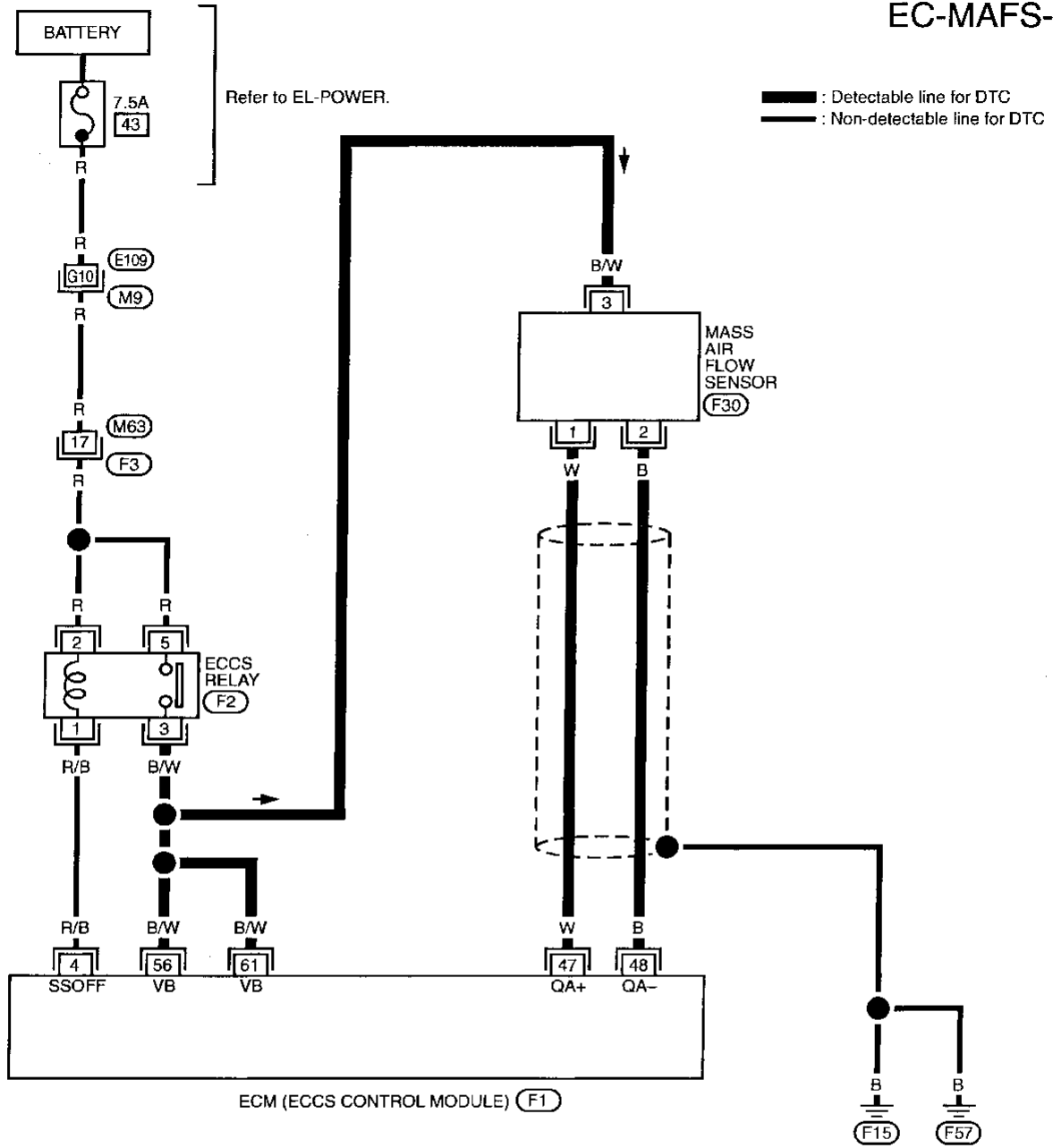
EL

IDX

TROUBLE DIAGNOSIS FOR DTC P0100

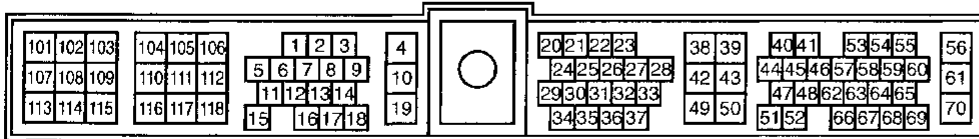
Mass Air Flow Sensor (MAFS) (Cont'd)

EC-MAFS-01



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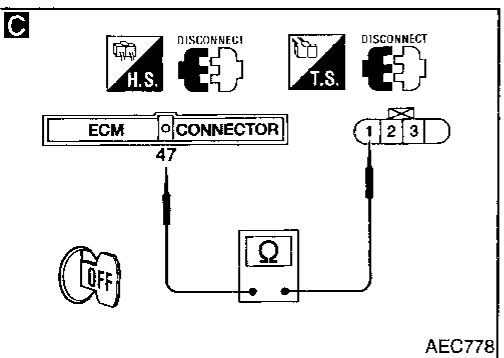
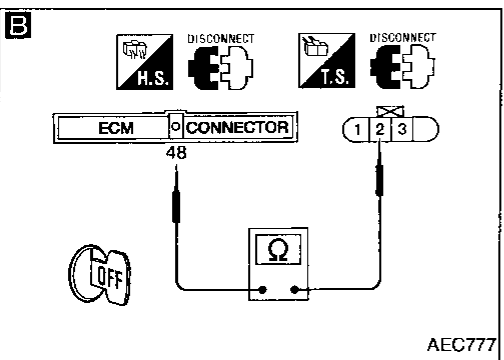
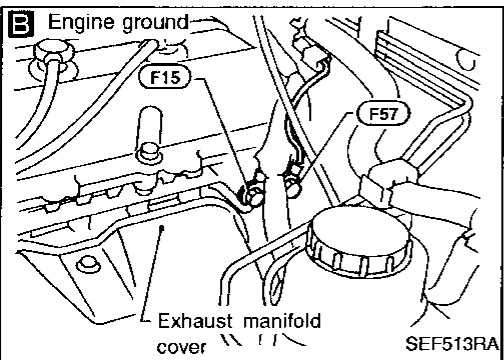
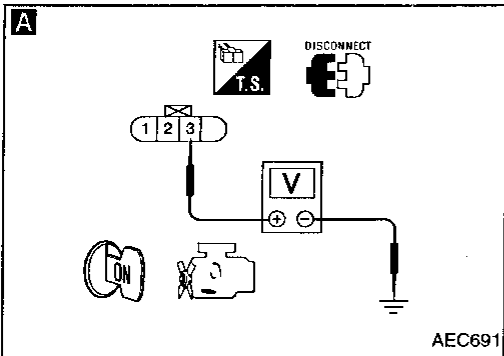
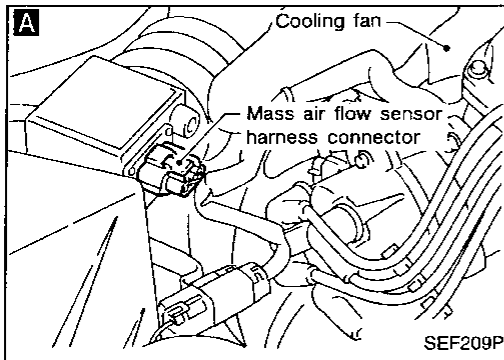
- (E109), (M9)
- (M63), (F3)



TROUBLE DIAGNOSIS FOR DTC P0100

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

DIAGNOSTIC PROCEDURE



INSPECTION START

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

NG → Check the following.
• Harness for open or short between mass air flow sensor and ECM
• Harness for open or short between mass air flow sensor and ECCS relay
If NG, repair harness or connectors.

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 ④.
Continuity should exist.
If OK, check harness for short.

NG → Repair harness or connectors.

C
CHECK INPUT SIGNAL CIRCUIT.
Check harness continuity between terminal ① and ECM terminal ⑦.
Continuity should exist.
If OK, check harness for short.

NG → Repair harness or connectors.

Loosen and retighten engine ground.

CHECK COMPONENT
(Mass air flow sensor).
Refer to "COMPONENT INSPECTION" on next page.

NG → Replace mass air flow sensor.

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

Trouble is not fixed.
Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

INSPECTION END

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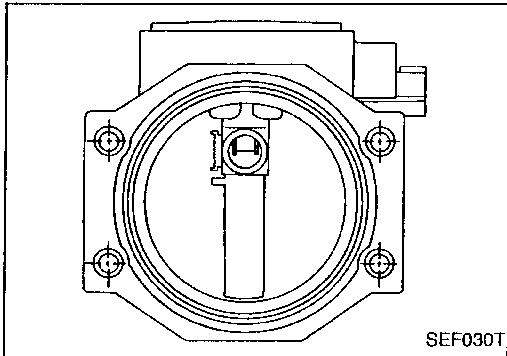
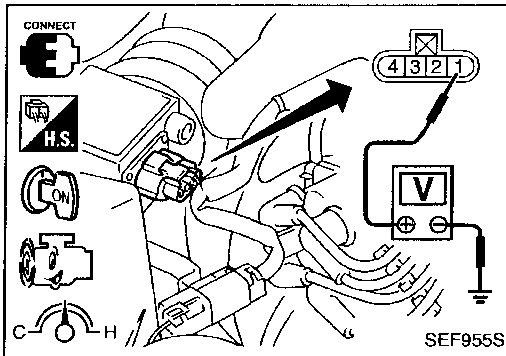
TROUBLE DIAGNOSIS FOR DTC P0100

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

COMPONENT INSPECTION

Mass air flow sensor

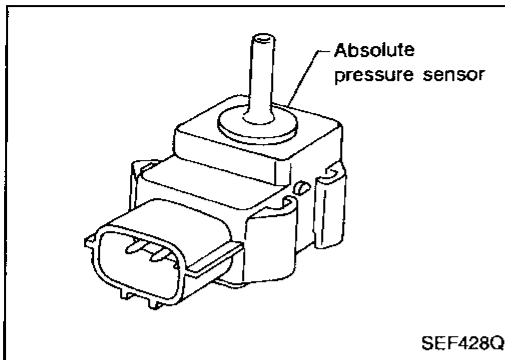
1. Turn ignition switch "ON".
2. Start engine and warm it up sufficiently.
3. Check voltage between terminal ① and ground.



Conditions	Voltage V
Ignition switch "ON" (Engine stopped.)	Less than 1.0
Idle (Engine is warmed-up sufficiently.)	1.3 - 1.7
2,500 rpm	1.7 - 2.1
Idle to about 4,000 rpm*	1.3 - 1.7 to Approx. 4.0

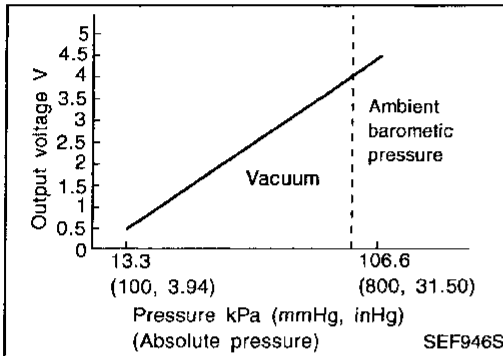
*: Check for linear voltage rise in response to increases to about 4,000 rpm in engine speed.

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



Absolute Pressure Sensor

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



Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P0105 0803	A) An excessively low or high voltage from the sensor is sent to ECM.	<ul style="list-style-type: none"> • Harness or connectors (Absolute pressure sensor circuit is open or shorted.) • Absolute pressure sensor
	B) A low voltage from the sensor is sent to ECM under heavy load driving conditions.	<ul style="list-style-type: none"> • Absolute pressure sensor
	C) A high voltage from the sensor is sent to ECM under light load driving conditions.	<ul style="list-style-type: none"> • Hoses (Hoses between the intake manifold and absolute pressure sensor are disconnected or clogged.) • Intake air leaks • Absolute pressure sensor

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

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

Procedure for malfunction A



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

OR



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

OR



- 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.

TROUBLE DIAGNOSIS FOR DTC P0105

Absolute Pressure Sensor (Cont'd)

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

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



- 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



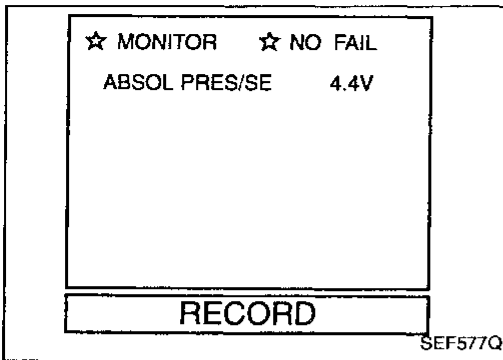
- 1) Start engine and warm it up sufficiently.
- 2) Turn ignition switch "OFF" and wait at least 5 seconds.
- 3) Start engine.
- 4) Let engine idle and wait at least 15 seconds.
- 5) Turn ignition switch "OFF".
- 6) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.

TROUBLE DIAGNOSIS FOR DTC P0105

Absolute Pressure Sensor (Cont'd)

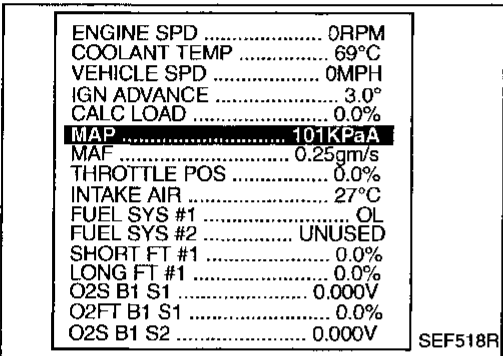
OVERALL FUNCTION CHECK

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



Procedure for malfunction B

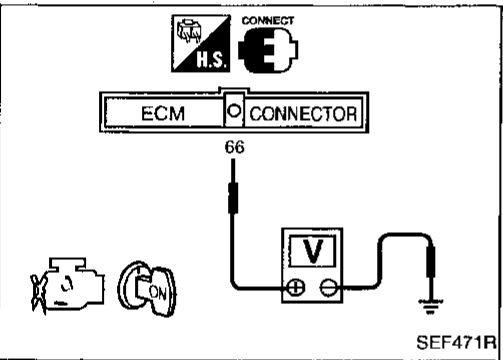
- 1) Turn ignition switch "ON".
- 2) Select "ABSOL PRES/SE" in "DATA MONITOR" mode with CONSULT.
- 3) Make sure that the voltage of "ABSOL PRES/SE" is more than 1.74 [V].



- OR
- 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/cm², 6.7 psi).

- OR
- 1) Turn ignition switch "ON".
 - 2) Make sure that the voltage between ECM terminal 66 and ground is more than 1.74 [V].

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

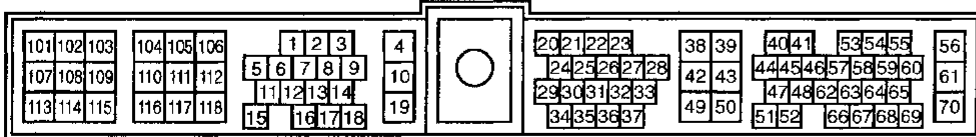
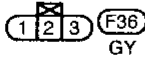
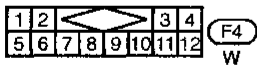
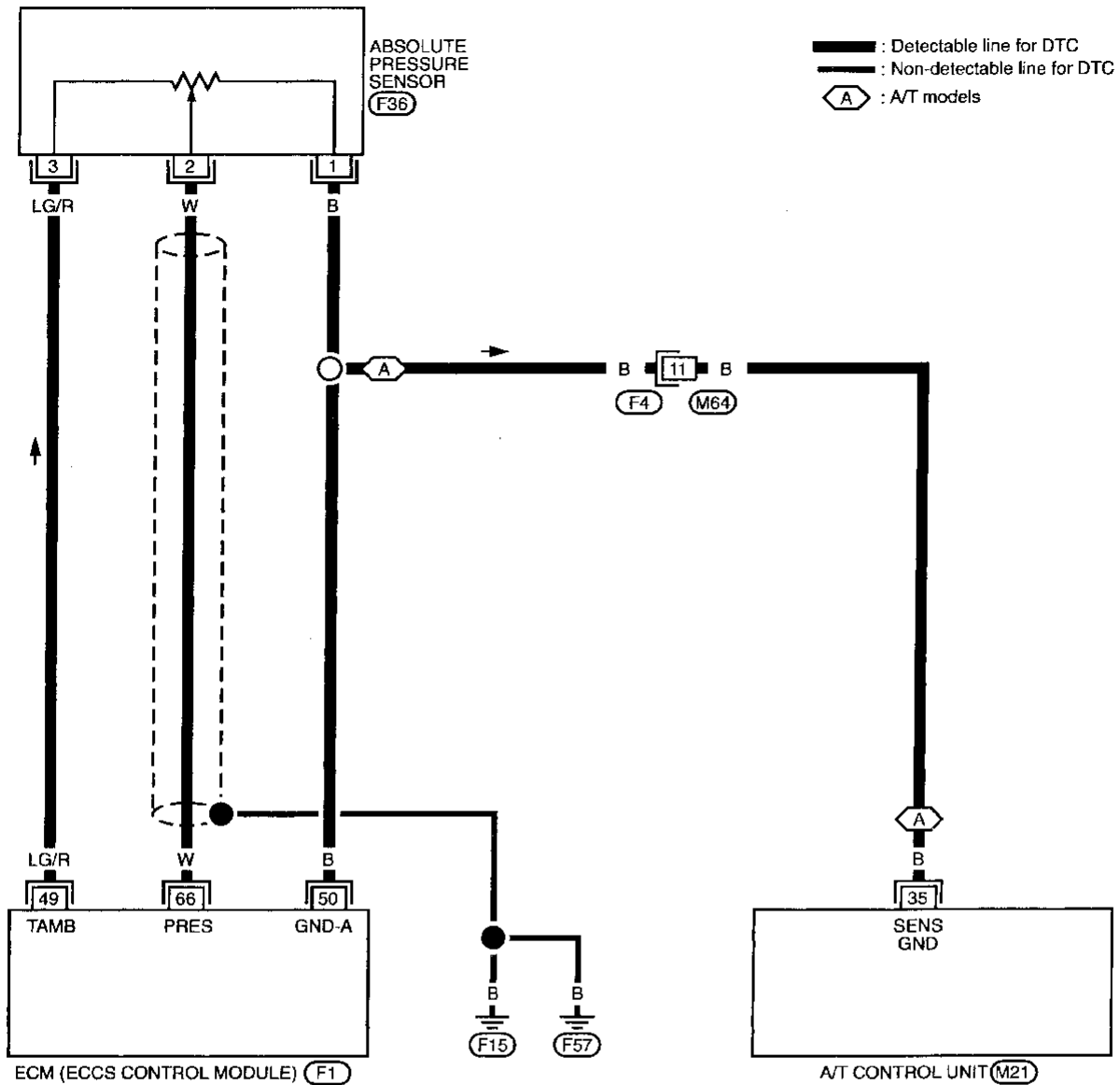


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TROUBLE DIAGNOSIS FOR DTC P0105

Absolute Pressure Sensor (Cont'd)

EC-AP/SEN-01



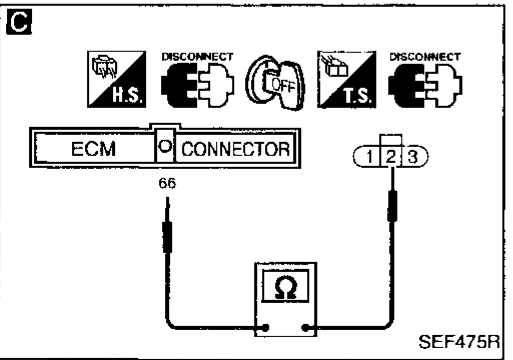
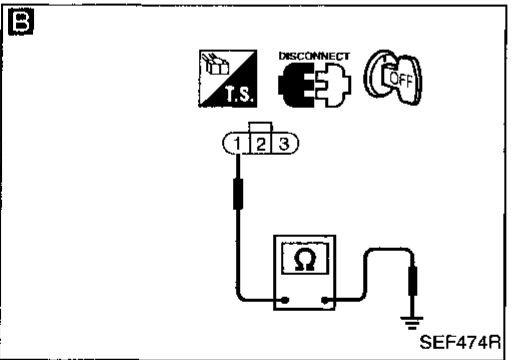
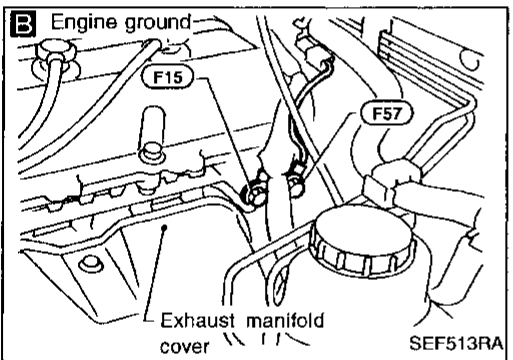
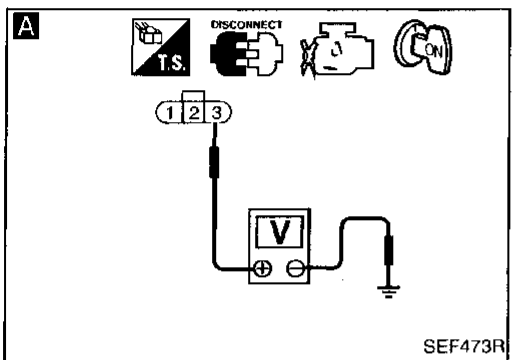
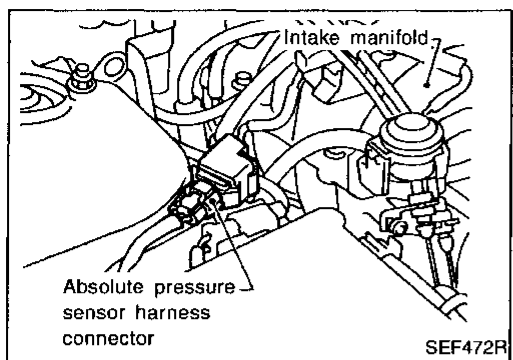
TROUBLE DIAGNOSIS FOR DTC P0105

Absolute Pressure Sensor (Cont'd)

DIAGNOSTIC PROCEDURE

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

Procedure A



INSPECTION START

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

NG → Repair harness or connectors.

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 connectors (F4, M64)
• Harness for open or short between A/T control unit and absolute pressure sensor
If NG, repair harness or connectors.

C
CHECK INPUT SIGNAL CIRCUIT.
1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal ⑥ and terminal ②.
Continuity should exist.
If OK, check harness for short.

NG → Repair harness or connectors.

Loosen and retighten engine ground.

CHECK COMPONENT (Absolute pressure sensor). Refer to "COMPONENT INSPECTION", EC-105.

NG → Replace absolute pressure sensor.

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

Trouble is not fixed.
Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

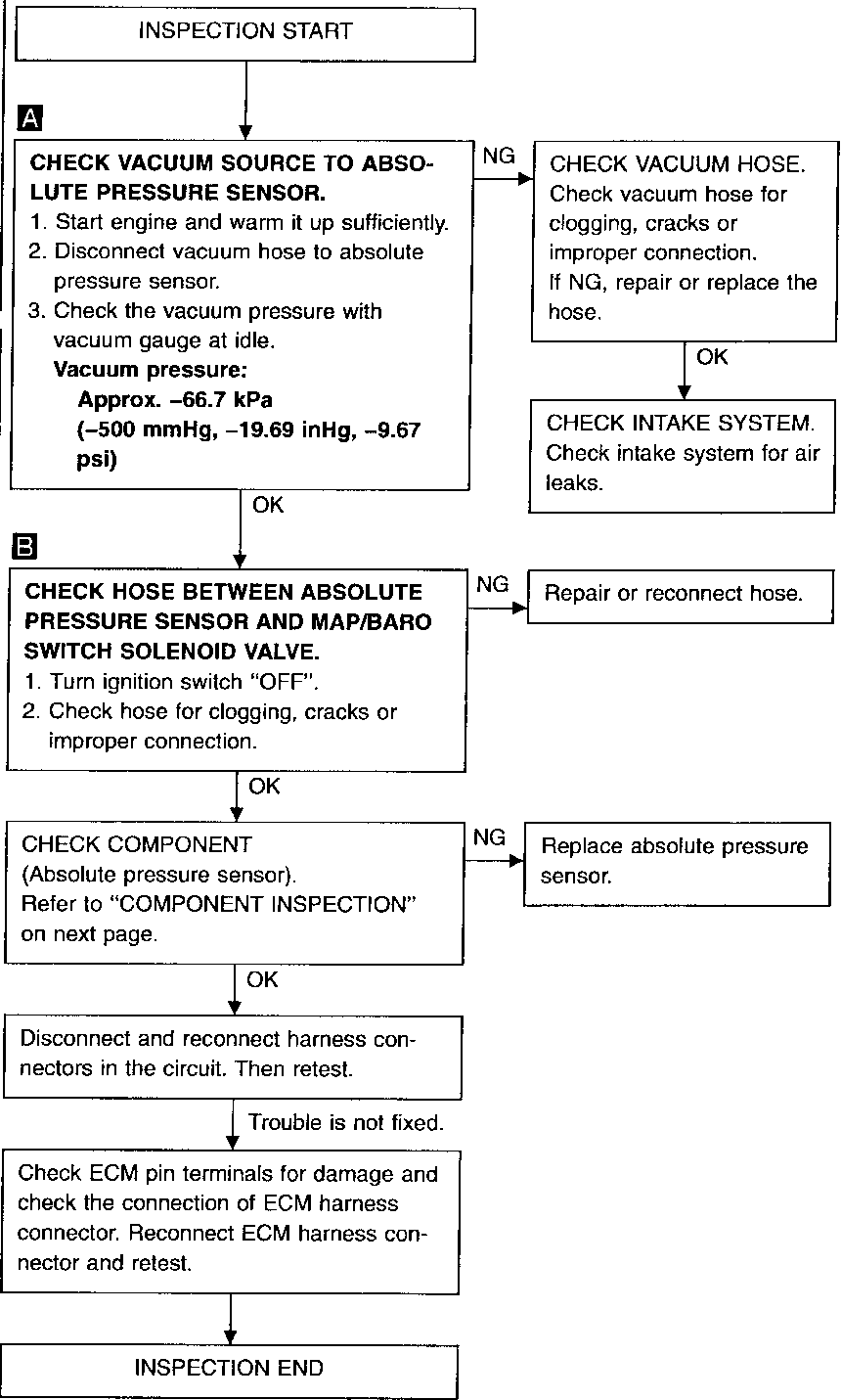
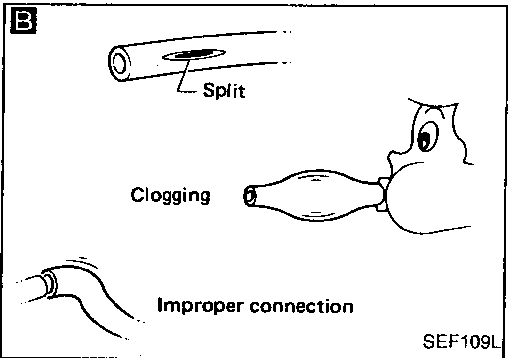
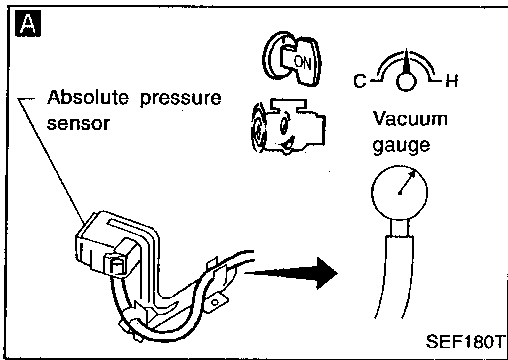
INSPECTION END

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TROUBLE DIAGNOSIS FOR DTC P0105

Absolute Pressure Sensor (Cont'd)

Procedure B



TROUBLE DIAGNOSIS FOR DTC P0105

Absolute Pressure Sensor (Cont'd)

COMPONENT INSPECTION

Absolute pressure sensor

1. Remove absolute pressure sensor with its harness connector connected.
2. Remove hose from absolute pressure sensor.
3. Turn ignition switch "ON" and check output voltage between terminal ② and engine ground.

The voltage should be 3.2 to 4.8 V.

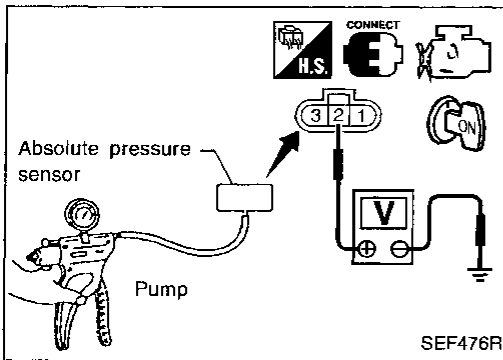
4. Use pump to apply vacuum of -26.7 kPa (-200 mmHg, -7.87 inHg, -3.87 psi) to absolute pressure sensor as shown in figure and check the output voltage.

The voltage should be 1.0 to 1.4 V lower than the value measured in step 3.

CAUTION:

Always calibrate the vacuum pump gauge when using it.

5. If NG, replace absolute pressure sensor.



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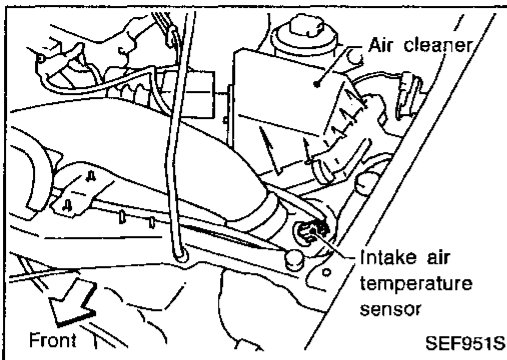
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TROUBLE DIAGNOSIS FOR DTC P0110

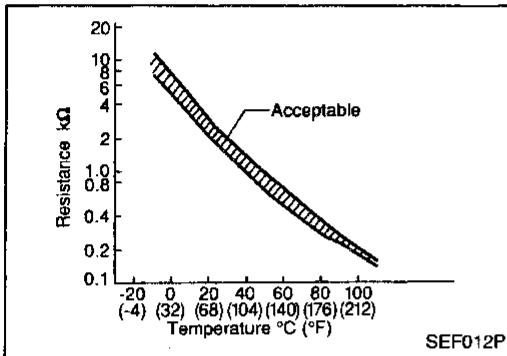


Intake Air Temperature Sensor

The intake air temperature sensor is built into the air cleaner. The sensor detects intake air temperature and transmits a signal to the ECM.

The temperature sensing unit employs a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decrease in response to the temperature rise.

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



(Reference data)

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

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Item (Possible Cause)
P0110 0401	A) An excessively low or high voltage from the sensor is sent to ECM.* B) Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signal from engine coolant temperature sensor.	<ul style="list-style-type: none"> ● Harness or connectors (The sensor circuit is open or shorted.) ● Intake air temperature sensor

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

DTC No.		Detected items	Engine operating condition in fail-safe mode
CONSULT GST	ECM*1		
P0110	0401	Intake air temperature sensor circuit	The ECM controls on the assumption that the intake air temperature is 25°C (77°F).

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

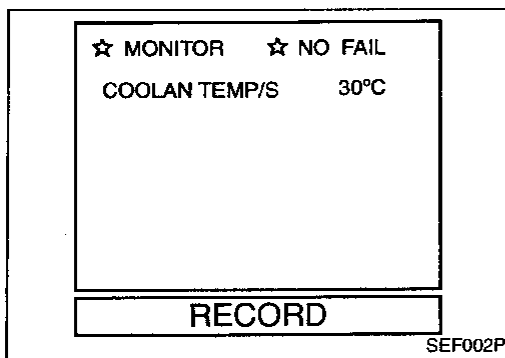
Procedure for malfunction A

- 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.

TROUBLE DIAGNOSIS FOR DTC P0110

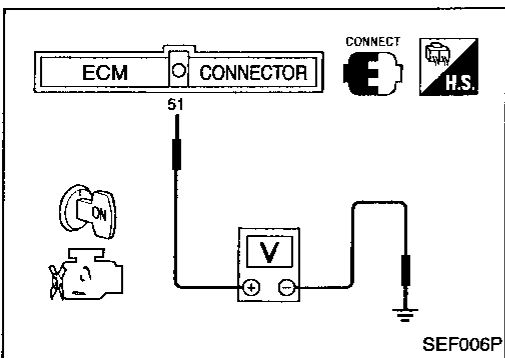
Intake Air Temperature Sensor (Cont'd)

Procedure for malfunction B



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



- 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.

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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.

FE

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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 ⑤ and ground.
Voltage: More than 1.0 (V)
 - (c) If the voltage is not more than 1.0 (V), turn ignition switch "OFF" and cool down engine.
- Perform the following steps before the voltage is below 1.0V.
- 3) Start engine.
- 4) Shift selector lever to "D" position.
- 5) Hold vehicle speed at 70 to 80 km/h (43 to 50 MPH) for 2 minutes.
- 6) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
- 7) Perform diagnostic test mode II (Self-diagnostic results) with ECM.

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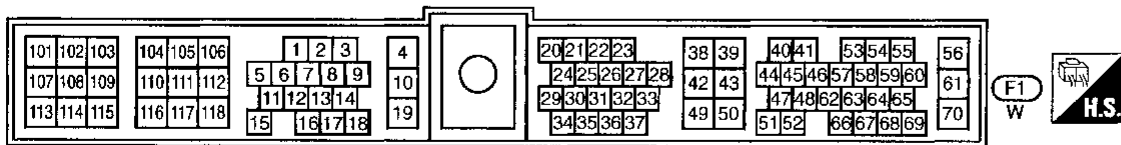
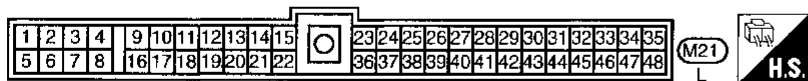
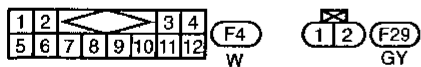
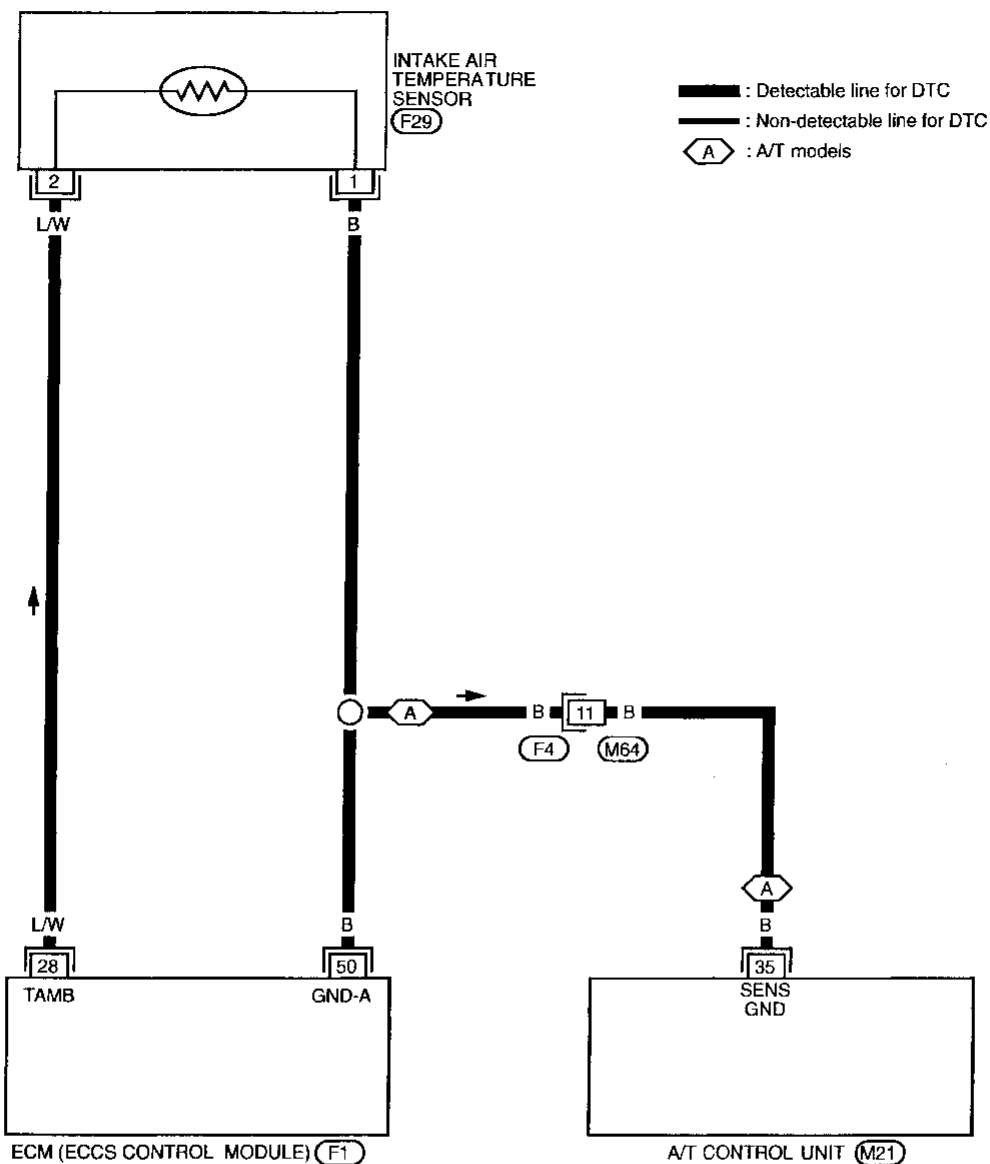
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TROUBLE DIAGNOSIS FOR DTC P0110

Intake Air Temperature Sensor (Cont'd)

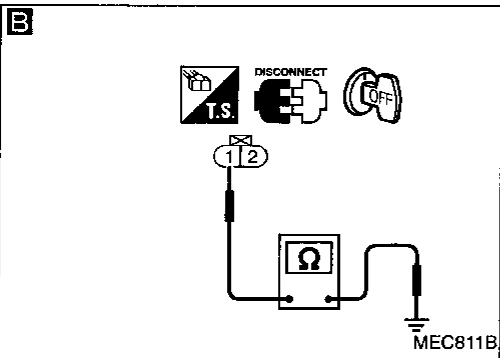
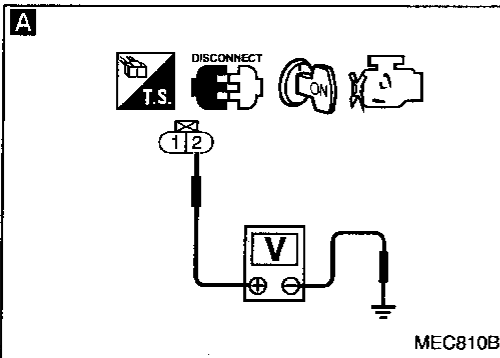
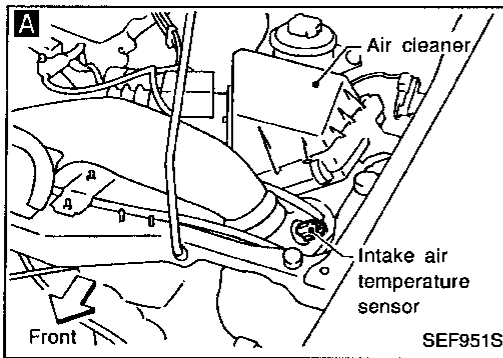
EC-IATS-01



TROUBLE DIAGNOSIS FOR DTC P0110

Intake Air Temperature Sensor (Cont'd)

DIAGNOSTIC PROCEDURE



INSPECTION START

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

NG
Check the following.
• Harness for open or short between ECM and intake air temperature sensor
If NG, repair harness or connectors.

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

NG
Check the following.
• Harness connectors (F4), (M64)
• 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

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

NG
Replace intake air temperature sensor.

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

Trouble is not fixed.
Check ECM pin terminals for damage and check the connection of ECM harness connector.
Reconnect ECM harness connector and retest.

INSPECTION END

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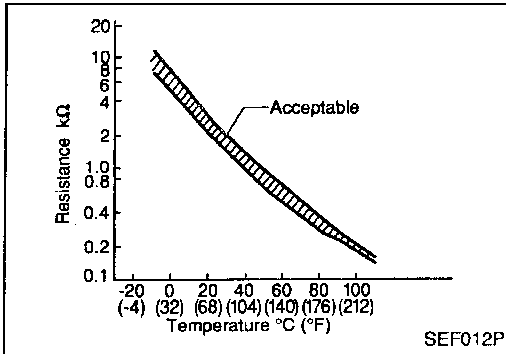
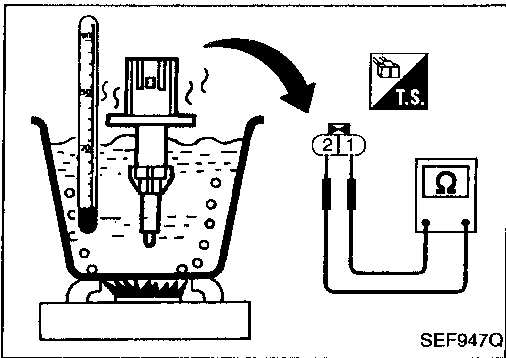
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TROUBLE DIAGNOSIS FOR DTC P0110

Intake Air Temperature Sensor (Cont'd) COMPONENT INSPECTION

Intake air temperature sensor

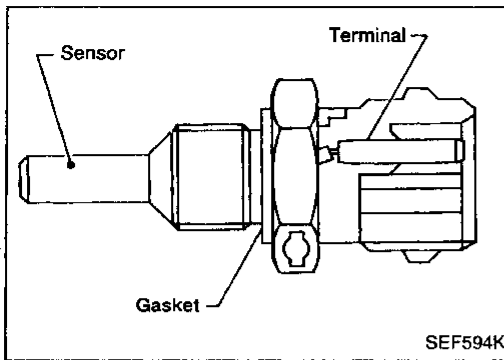
Check resistance as shown in the figure.



<Reference data>

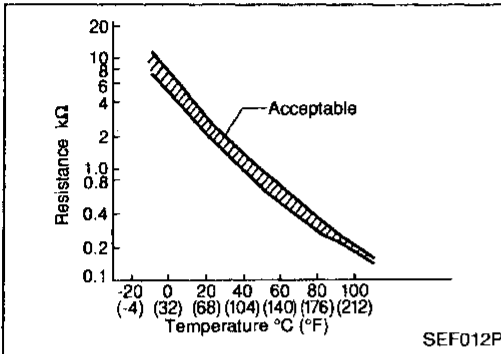
Intake air temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
80 (176)	0.27 - 0.38

TROUBLE DIAGNOSIS FOR DTC P0115



Engine Coolant Temperature Sensor (ECTS)

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



<Reference data>

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

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Item (Possible Cause)
P0115 0103	<ul style="list-style-type: none"> An excessively high or low voltage from the sensor is sent to ECM.* 	<ul style="list-style-type: none"> Harness or connectors (The sensor circuit is open or shorted.) Engine coolant temperature sensor

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

DTC No.		Detected items	Engine operating condition in fail-safe mode								
CONSULT GST	ECM*1										
P0115	0103	Engine coolant temperature sensor circuit	<p>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.</p> <table border="1"> <thead> <tr> <th>Condition</th> <th>Engine coolant temperature decided (CONSULT display)</th> </tr> </thead> <tbody> <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> </tbody> </table>	Condition	Engine coolant temperature decided (CONSULT display)	Just as ignition switch is turned ON or Start	40°C (104°F)	More than 4 minutes after ignition ON or Start	80°C (176°F)	Except as shown above	40 - 80°C (104 - 176°F) (Depends on the time)
Condition	Engine coolant temperature decided (CONSULT display)										
Just as ignition switch is turned ON or Start	40°C (104°F)										
More than 4 minutes after ignition ON or Start	80°C (176°F)										
Except as shown above	40 - 80°C (104 - 176°F) (Depends on the time)										

TROUBLE DIAGNOSIS FOR DTC P0115

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

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE



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

OR



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

OR

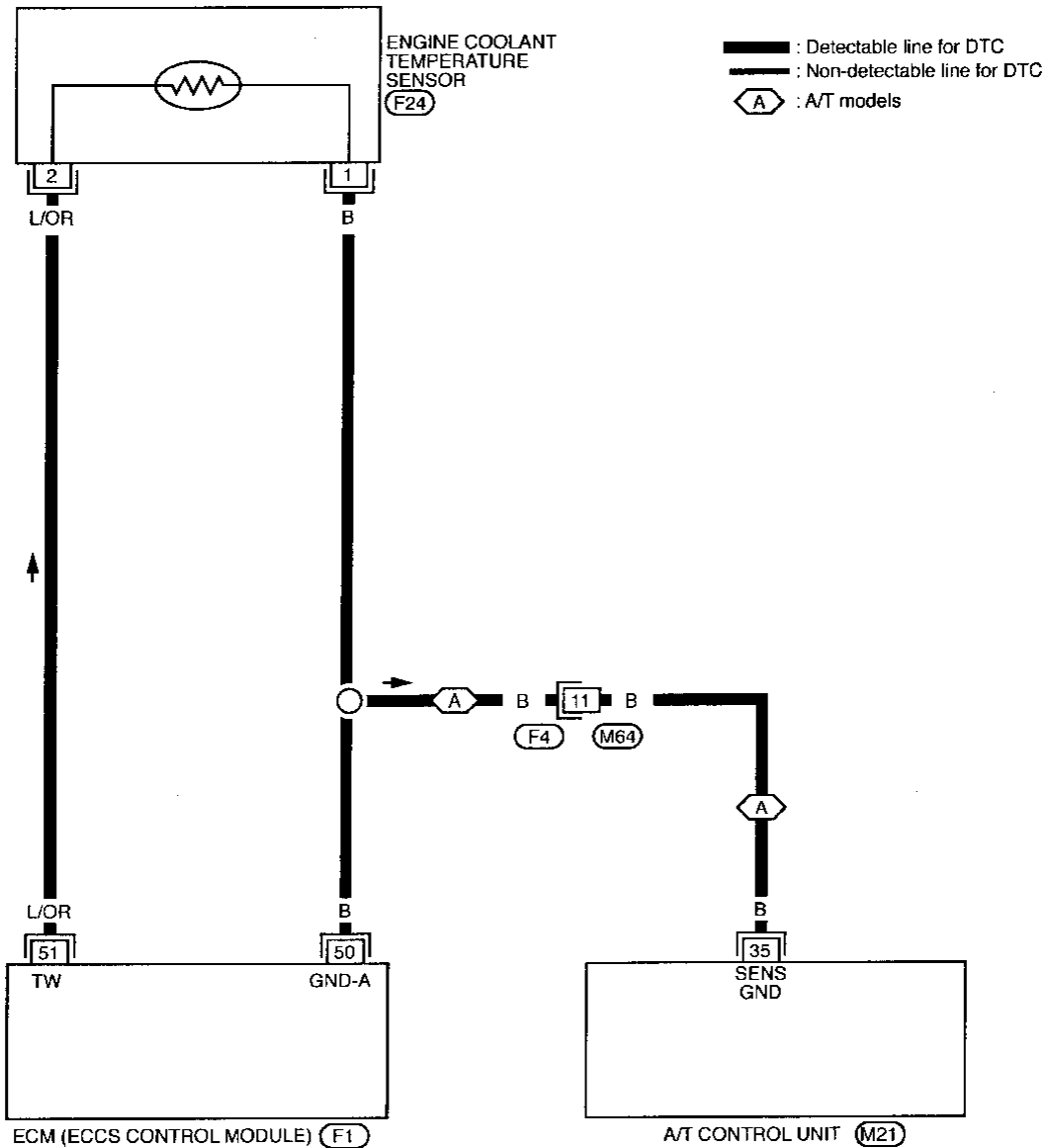


- 1) Turn ignition switch "ON" and wait at least 5 seconds.
- 2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
- 3) Perform diagnostic test mode II (Self-diagnostic results) with ECM.

TROUBLE DIAGNOSIS FOR DTC P0115

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

EC-ECTS-01



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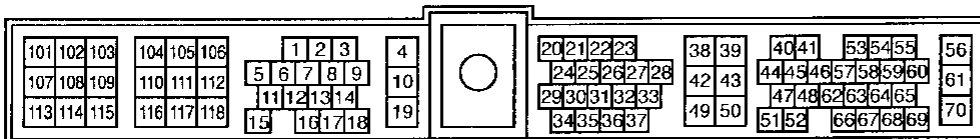
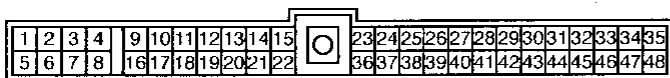
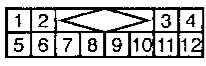
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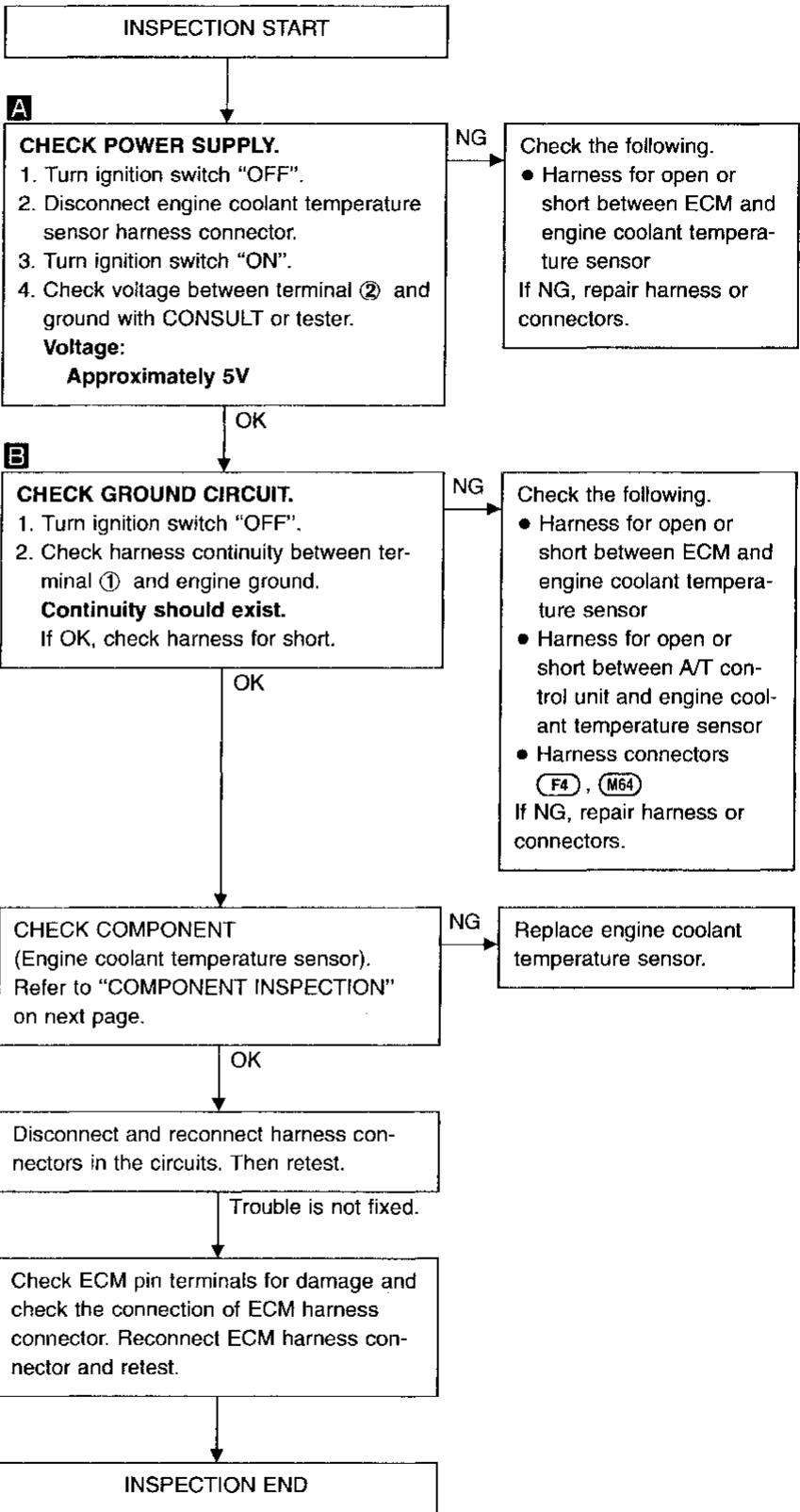
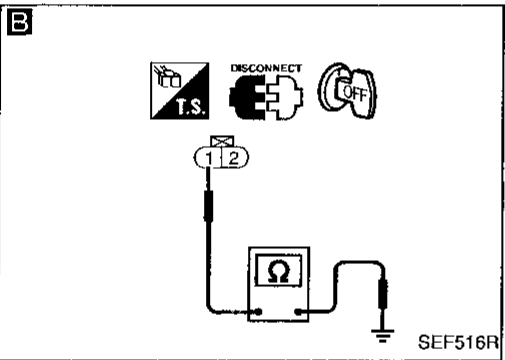
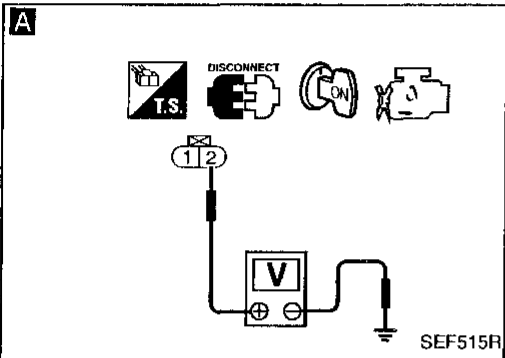
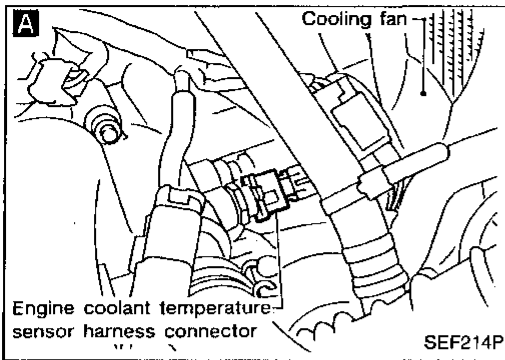
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TROUBLE DIAGNOSIS FOR DTC P0115

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

DIAGNOSTIC PROCEDURE



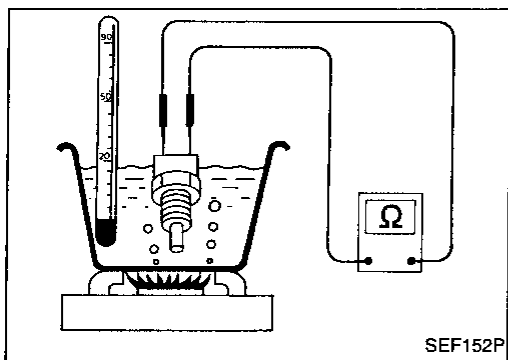
TROUBLE DIAGNOSIS FOR DTC P0115

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

COMPONENT INSPECTION

Engine coolant temperature sensor

Check resistance as shown in the figure.



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.

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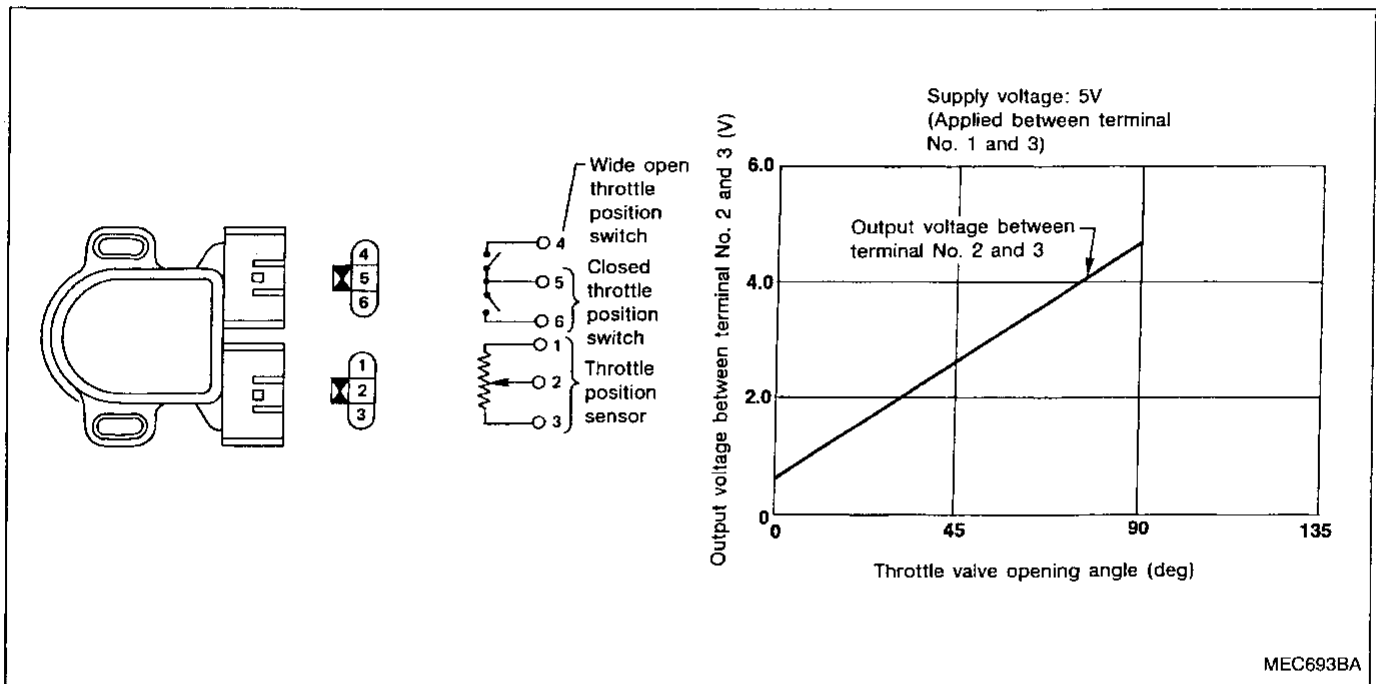
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261

Throttle Position Sensor

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 controls engine operation such as fuel cut. In addition, "a wide open & closed throttle position switch" is built into the throttle position sensor unit.



Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0120 0403	<ul style="list-style-type: none"> • An excessively low or high voltage from the sensor is sent to ECM.* • Voltage sent to ECM is not practical when compared with mass air flow sensor and camshaft position sensor signals. 	<ul style="list-style-type: none"> • Harness or connectors (The sensor circuit is open or shorted.) • Throttle position sensor

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

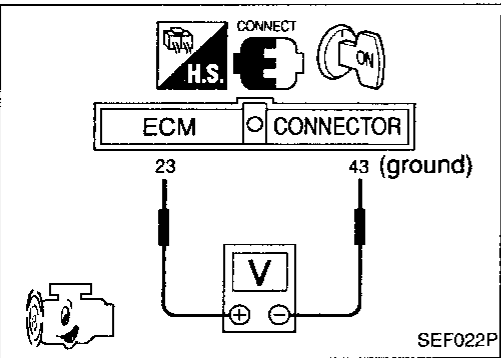
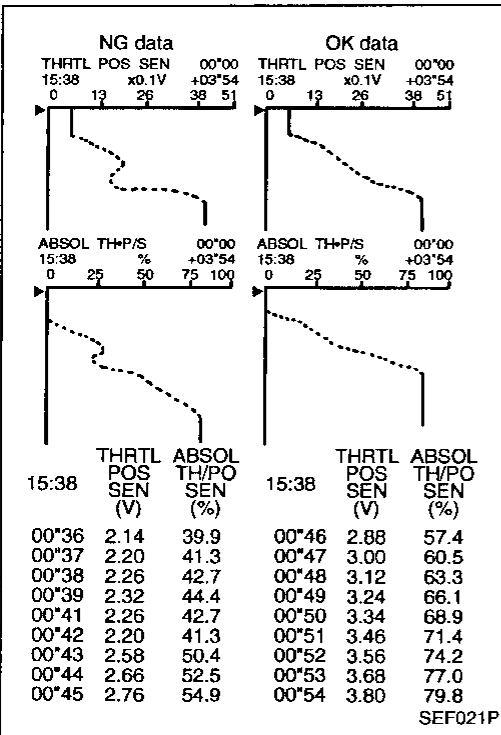
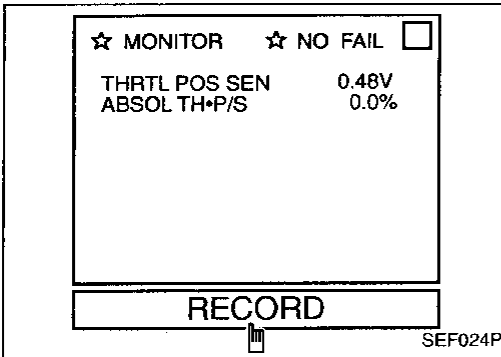
DTC No.		Detected items	Engine operating condition in fail-safe mode	
CONSULT GST	ECM*1			
P0120	0403	Throttle position sensor circuit	Throttle position will be determined based on the amount of mass air flow and the engine speed. Therefore, acceleration will be poor.	
			Driving condition	
			When engine is idling	Normal
			When accelerating	Poor acceleration

TROUBLE DIAGNOSIS FOR DTC P0120

Throttle Position Sensor (Cont'd)

OVERALL FUNCTION CHECK

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



- 1) 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 check the following:

- The voltage when accelerator pedal fully released is 0.3 - 0.7V.
- The voltage rise is linear in response to accelerator pedal depression.
- The voltage when accelerator pedal fully depressed is approximately 4V.



- OR
- 1) 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 ④③ (ground) and check the following:

- The voltage when accelerator pedal fully released is 0.3 - 0.7V.
- The voltage rise is linear in response to accelerator pedal depression.
- The voltage when accelerator pedal fully depressed is approximately 4V.

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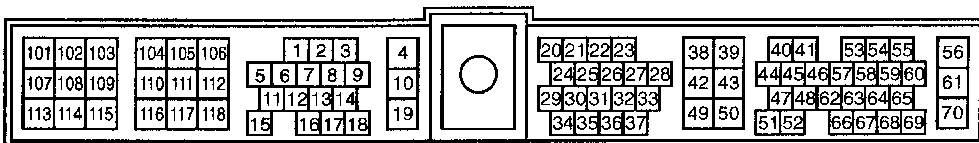
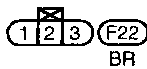
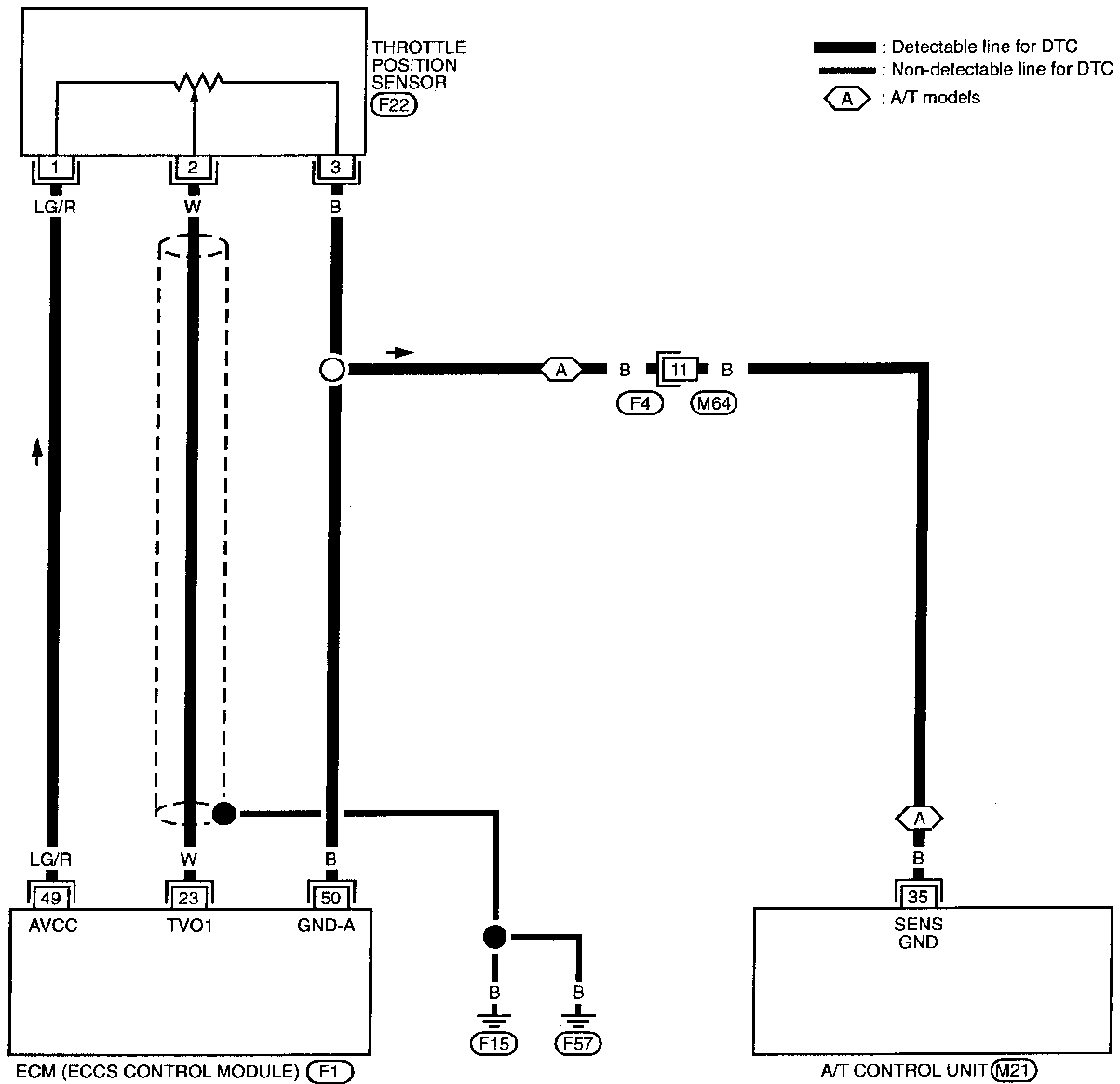
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TROUBLE DIAGNOSIS FOR DTC P0120

Throttle Position Sensor (Cont'd)

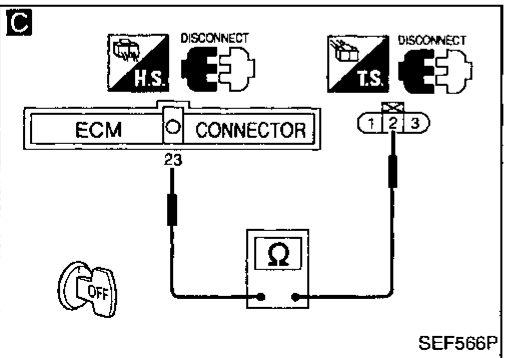
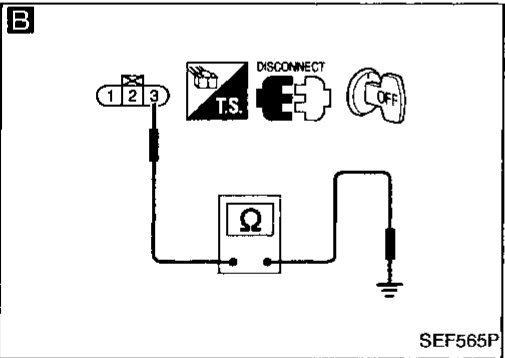
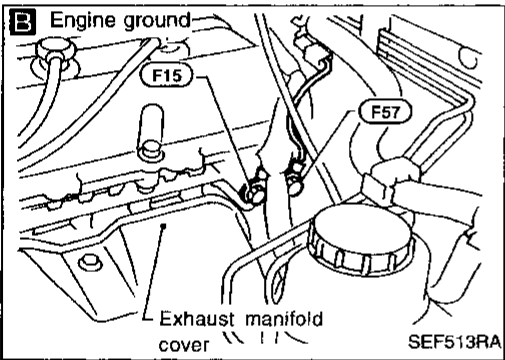
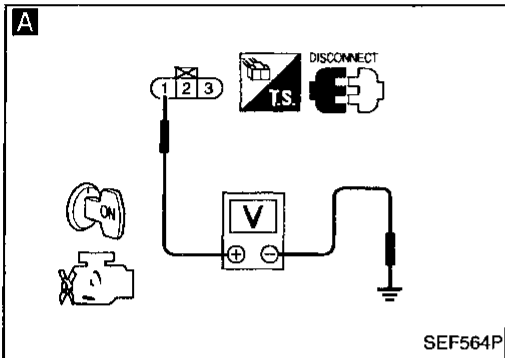
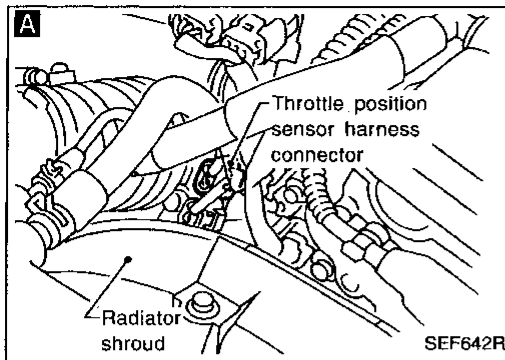
EC-TPS-01



TROUBLE DIAGNOSIS FOR DTC P0120

Throttle Position Sensor (Cont'd)

DIAGNOSTIC PROCEDURE



INSPECTION START

ADJUST THROTTLE POSITION SENSOR.
Perform BASIC INSPECTION, EC-71.

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.

B
CHECK GROUND CIRCUIT.
1. Turn ignition switch "OFF".
2. Loosen and retighten engine 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.
• Harness connectors
• **F4**, **M64**
• Harness for open or short between ECM and throttle position sensor
• Harness for open or short between A/T control unit and throttle position sensor
If NG, repair harness or connectors.

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

NG → Repair harness or connectors.

Loosen and retighten engine ground.

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

NG → Replace throttle position sensor. To adjust it, perform BASIC INSPECTION, EC-71.

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

Trouble is not fixed.

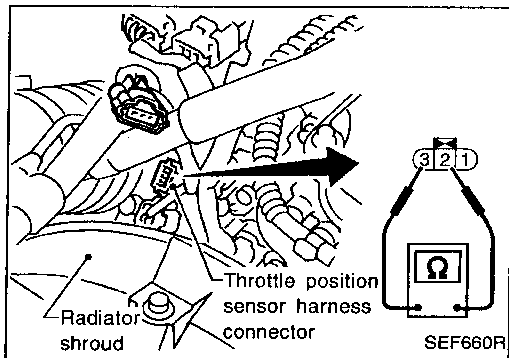
Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

INSPECTION END

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TROUBLE DIAGNOSIS FOR DTC P0120

Throttle Position Sensor (Cont'd) COMPONENT INSPECTION



Throttle position sensor

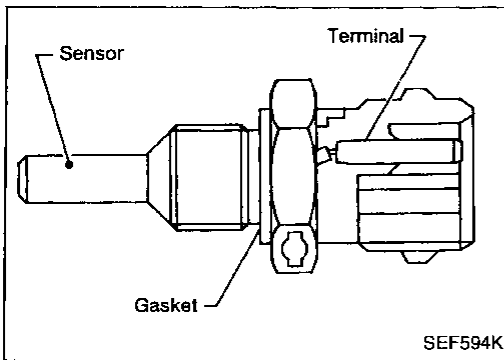
1. Start engine and warm it up sufficiently.
2. Turn ignition switch "OFF".
3. Disconnect throttle position sensor harness connector.
4. Check resistance between terminals ② and ③ while opening throttle valve manually.

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", EC-71.

TROUBLE DIAGNOSIS FOR DTC P0125



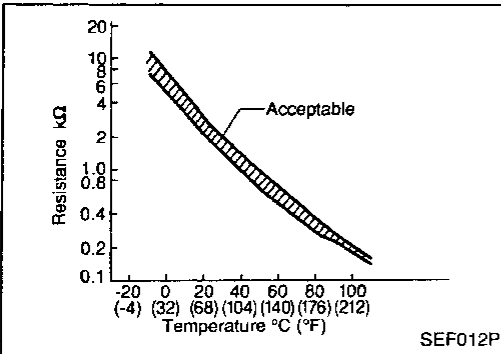
Engine Coolant Temperature (ECT) Sensor

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

GI

MA

EM



(Reference data)

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

LC

EC

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CL

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0125 0908	<ul style="list-style-type: none"> Rationally incorrect voltage from the sensor is sent to ECM, even when some time has passed after starting the engine. 	<ul style="list-style-type: none"> Harness or connectors (High resistance in the circuit) Engine coolant temperature sensor Thermostat

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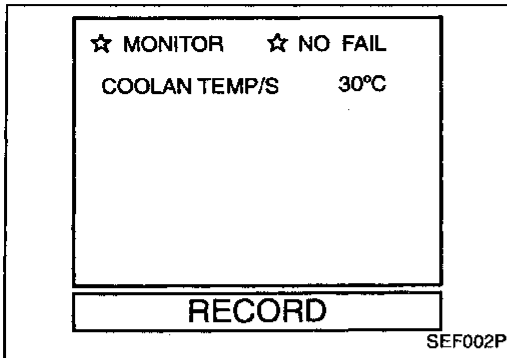
TROUBLE DIAGNOSIS FOR DTC P0125

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

OVERALL FUNCTION CHECK

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

Note: If both DTC P0115 (0103) and P0125 (0908) are displayed, first perform TROUBLE DIAGNOSIS FOR DTC P0115. (See EC-111.)



- 1) Turn ignition switch "ON".
- 2) Select "COOLANT TEMP/S" in "DATA MONITOR" mode with CONSULT.
- 3) Start engine and run it at idle speed.
- 4) Check that the engine coolant temperature rises to 20°C (68°F) or more within 10 minutes. (Be careful not to overheat engine.)

OR

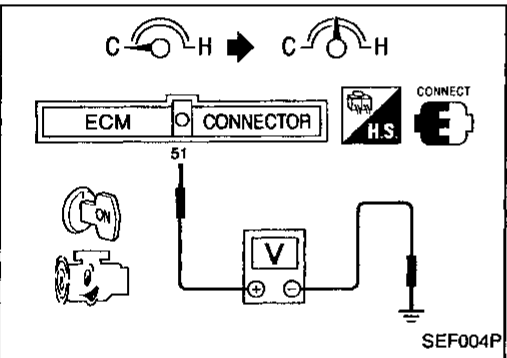
FUEL SYS #1	OPEN
FUEL SYS #2	UNUSED
CALC LOAD	22%
COOLANT TEMP	30°C
SHORT FT #1	0%
LONG FT #1	2%
ENGINE SPD	1000RPM
VEHICLE SPD	0km/h
IGN ADVANCE	20.0°
INTAKE AIR	26°C
MAF	0.0gm/sec
THROTTLE POS	0%
O2S LOCATION	3
O2S B1,S1	0.680V
O2FT B1,S1	0%
O2S B1,S2	0.080V

SEF003P



- 1) Turn ignition switch "ON".
- 2) Select "MODE 1" with GST.
- 3) Start engine and run it at idle speed.
- 4) Check that the engine coolant temperature rises to 20°C (68°F) or more. within 10 minutes. (Be careful not to overheat engine.)

OR

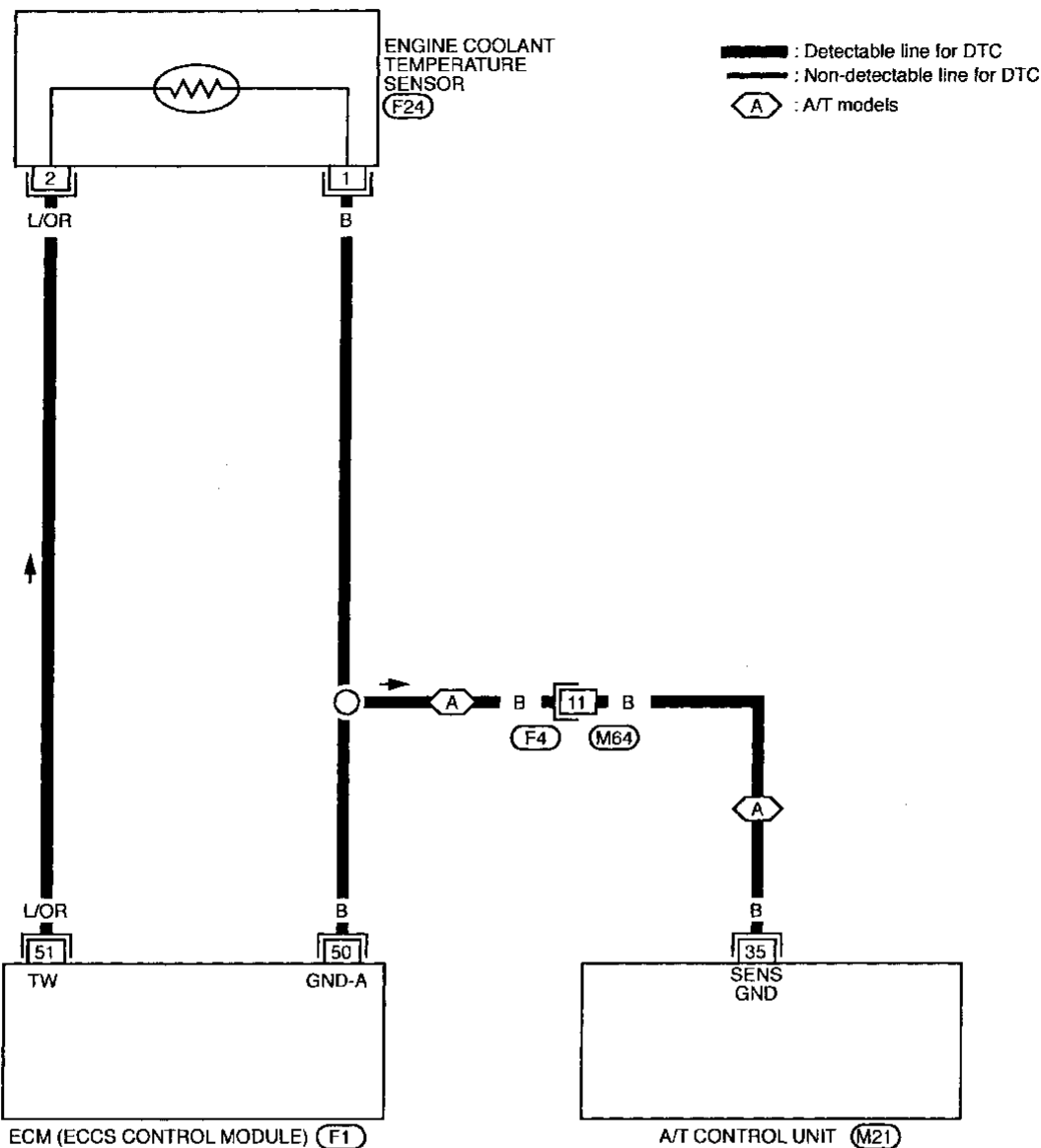


- 1) Turn ignition switch "ON".
- 2) Probe voltage meter between ECM terminal ⑤ and ground.
- 3) Start engine and run it at idle speed.
- 4) Check that voltage of engine coolant temperature changes to less than 3.5 (V) within 10 minutes. (Be careful not to overheat engine.)

TROUBLE DIAGNOSIS FOR DTC P0125

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

EC-ECTS-01



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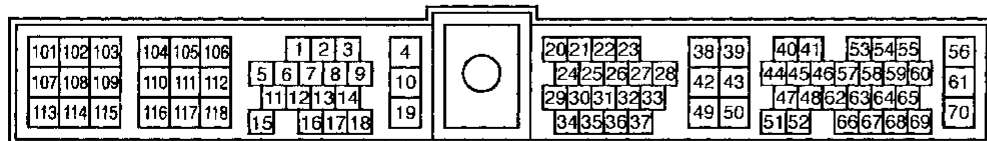
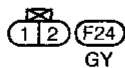
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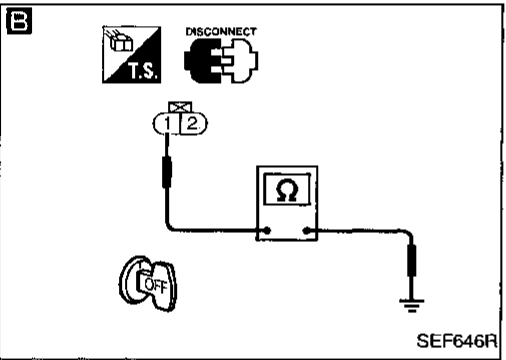
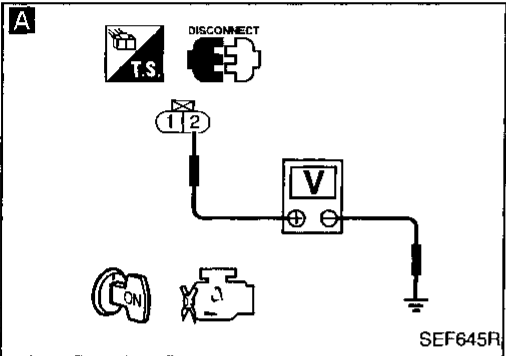
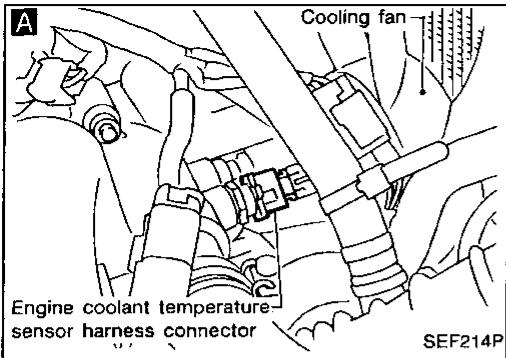
IDX



TROUBLE DIAGNOSIS FOR DTC P0125

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

DIAGNOSTIC PROCEDURE



INSPECTION START

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

NG → Check the following.
 • Harness for open or short between ECM and engine coolant temperature sensor
 If NG, repair harness or connectors.

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

NG → Check the following.
 • Harness connectors (F4), (M64)
 • 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.

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

NG → Replace engine coolant temperature sensor.

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

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

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

TROUBLE DIAGNOSIS FOR DTC P0125

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

COMPONENT INSPECTION

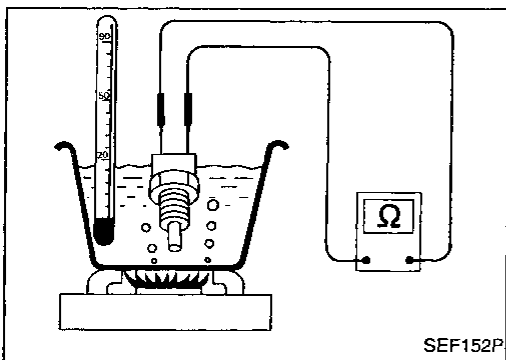
Engine coolant temperature sensor

Check resistance as shown in the figure.

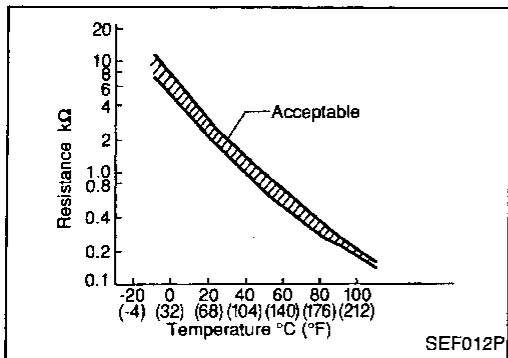
(Reference data)

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

If NG, replace engine coolant temperature sensor.



SEF152P



SEF012P

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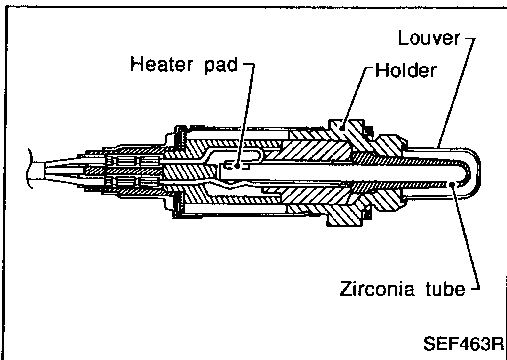
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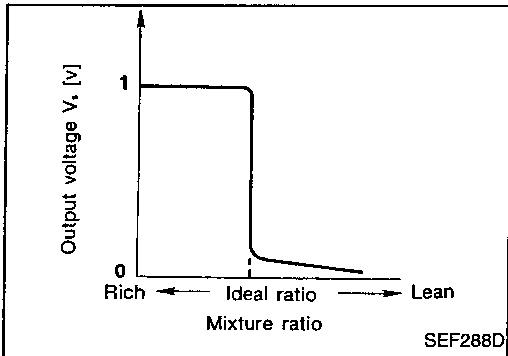
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271



Front Heated Oxygen Sensor (Front HO2S)

The front HO2S is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The sensor 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 sensor 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.



Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0130 0303	<ul style="list-style-type: none"> ● An excessively high voltage from the sensor is sent to ECM. ● The voltage from the sensor is constantly approx. 0.3V. ● The maximum and minimum voltages from the sensor do not reach the specified voltages. ● The sensor does not respond between rich and lean within the specified time. 	<ul style="list-style-type: none"> ● Harness or connectors (The sensor circuit is open or shorted.) ● Front heated oxygen sensor ● Fuel pressure ● Injectors ● Intake air leaks

TROUBLE DIAGNOSIS FOR DTC P0130

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

OVERALL FUNCTION CHECK

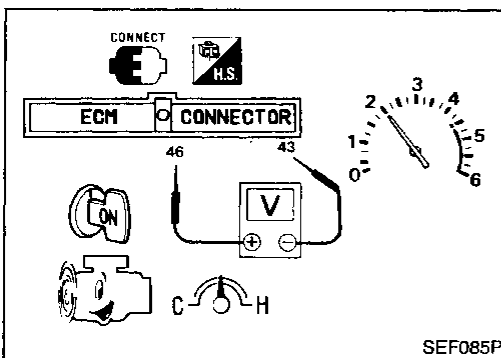
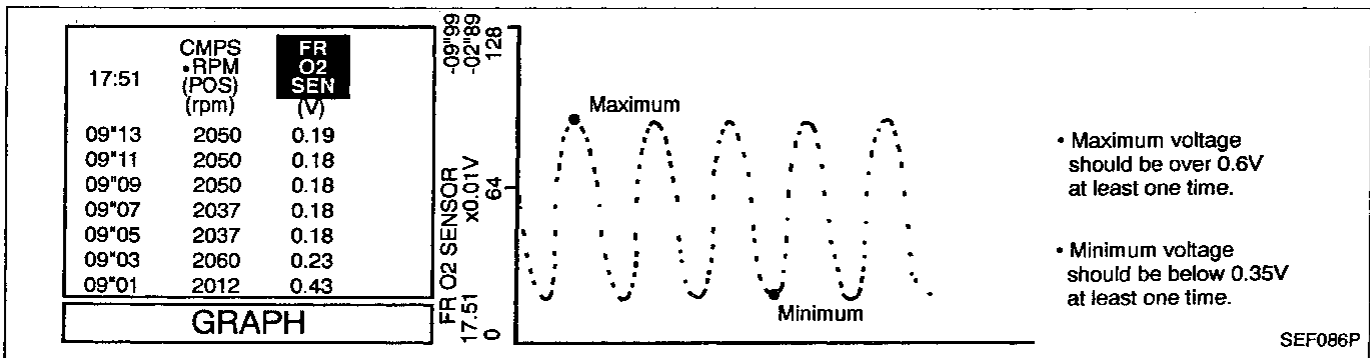
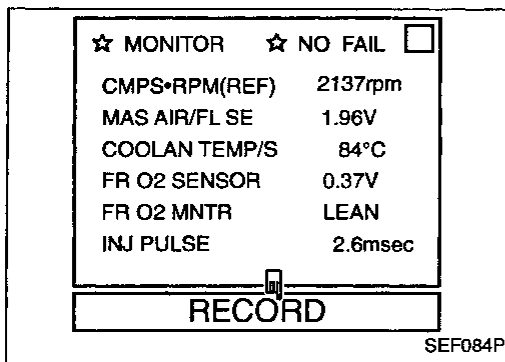
Use this procedure to check the overall function of the front heated oxygen sensor circuit. During this check, a 1st trip DTC might not be confirmed.

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

R = "FR O2 MNTR", "RICH"
L = "FR O2 MNTR", "LEAN"

- "FR O2 SENSOR" voltage goes above 0.6V at least once.
- "FR O2 SENSOR" voltage goes below 0.35V at least once.

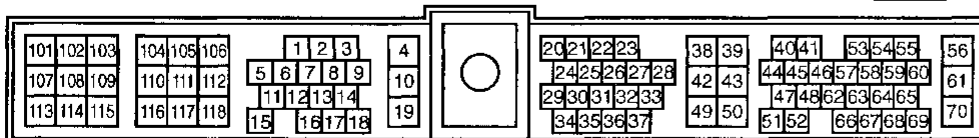
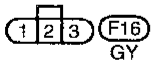
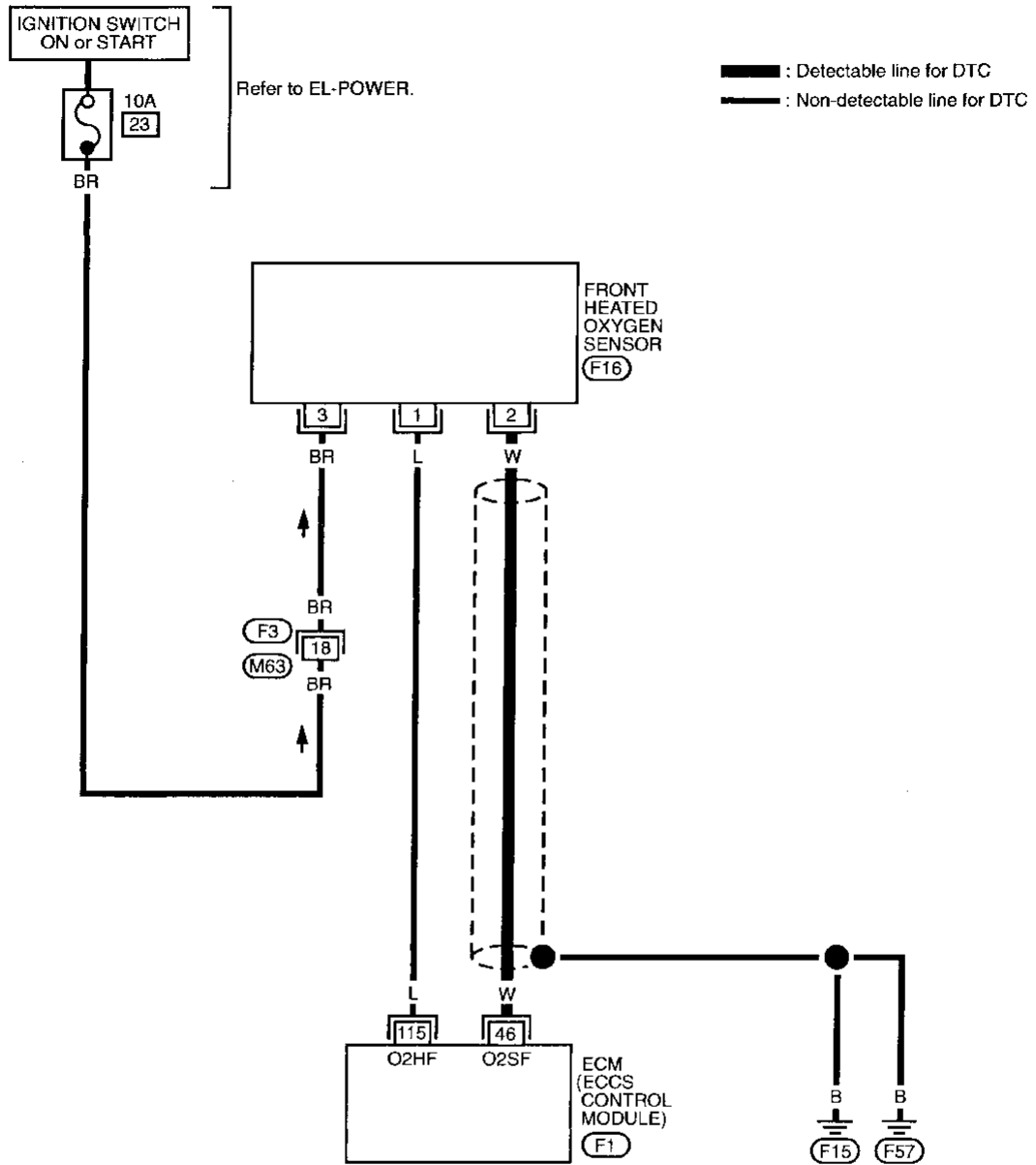


- OR
- 1) Start engine and warm it up sufficiently.
 - 2) Set voltmeter probes between ECM terminal ④⑥ (sensor signal) and ④③ (engine ground).
 - 3) Check the following with engine speed held at 2,000 rpm constant under no load.
 - Malfunction indicator lamp goes on more than 5 times within 10 seconds in Diagnostic Test Mode II (FRONT HEATED OXYGEN SENSOR MONITOR).
 - The maximum voltage is over 0.6V at least one time.
 - The minimum voltage is below 0.35V at least one time.

TROUBLE DIAGNOSIS FOR DTC P0130

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

EC-FRO2-01



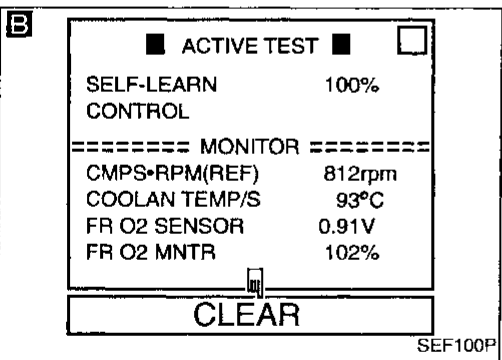
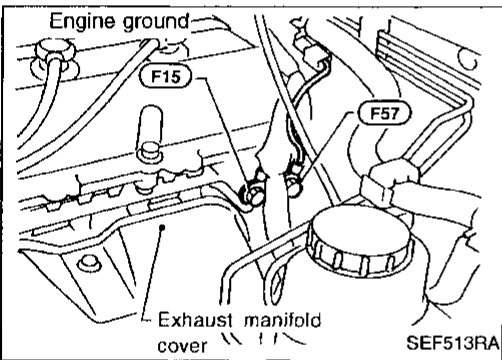
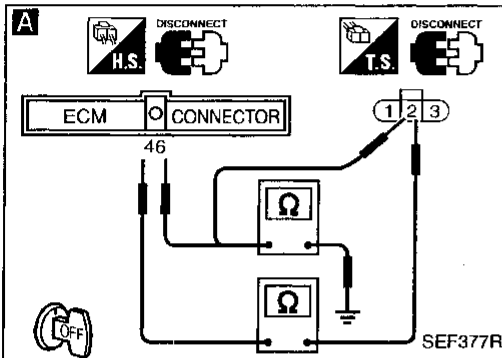
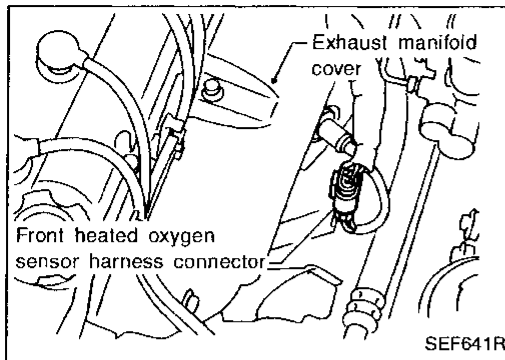
Refer to last page (Foldout page).

(M63), (F3)

TROUBLE DIAGNOSIS FOR DTC P0130

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

DIAGNOSTIC PROCEDURE



INSPECTION START

A

CHECK INPUT SIGNAL CIRCUIT.

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

NG → Repair harness or connectors.

OK

Loosen and retighten engine ground screws.

B

CLEAR THE SELF-LEARNING DATA.

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

Yes → Go to "TROUBLE DIAGNOSIS FOR DTC P0171, P0172", EC-143, 148.

OR

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

No

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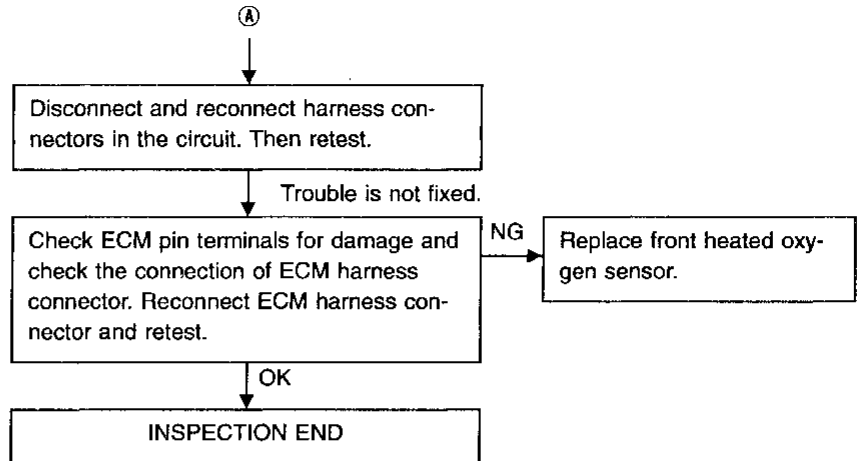
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TROUBLE DIAGNOSIS FOR DTC P0130

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

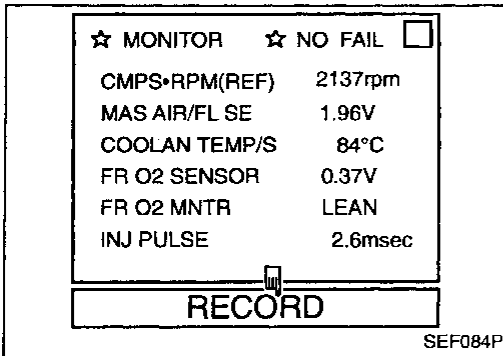


TROUBLE DIAGNOSIS FOR DTC P0130

Closed Loop Control

- The closed loop control has one trip detection logic.

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0130 0307	<ul style="list-style-type: none"> The closed loop control function does not operate even when vehicle is driving in the specified condition. 	<ul style="list-style-type: none"> The front heated oxygen sensor circuit is open or short. <ul style="list-style-type: none"> Front heated oxygen sensor Front heated oxygen sensor heater



OVERALL FUNCTION CHECK

Use this procedure to check the overall function of the closed loop control. During this check, a 1st trip DTC might not be confirmed.

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

R = "FR O2 MNTR", "RICH"
 L = "FR O2 MNTR", "LEAN"

OR

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

DIAGNOSTIC PROCEDURE

Refer to TROUBLE DIAGNOSIS FOR DTC P0130, EC-126.
 Refer to TROUBLE DIAGNOSIS FOR DTC P0135, EC-132.

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Front Heated Oxygen Sensor Heater

SYSTEM DESCRIPTION




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


Engine speed (rpm)	Front heated oxygen sensor heater
Above 4,400	OFF
Below 4,400	ON

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P0135 0901	<ul style="list-style-type: none"> The current amperage in the front heated oxygen sensor heater circuit is out of the normal range. (An improper voltage drop signal is sent to ECM through the front heated oxygen sensor heater.) 	<ul style="list-style-type: none"> Harness or connectors (The front heated oxygen sensor heater circuit is open or shorted.) Front heated oxygen sensor heater


DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

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

OR

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

OR

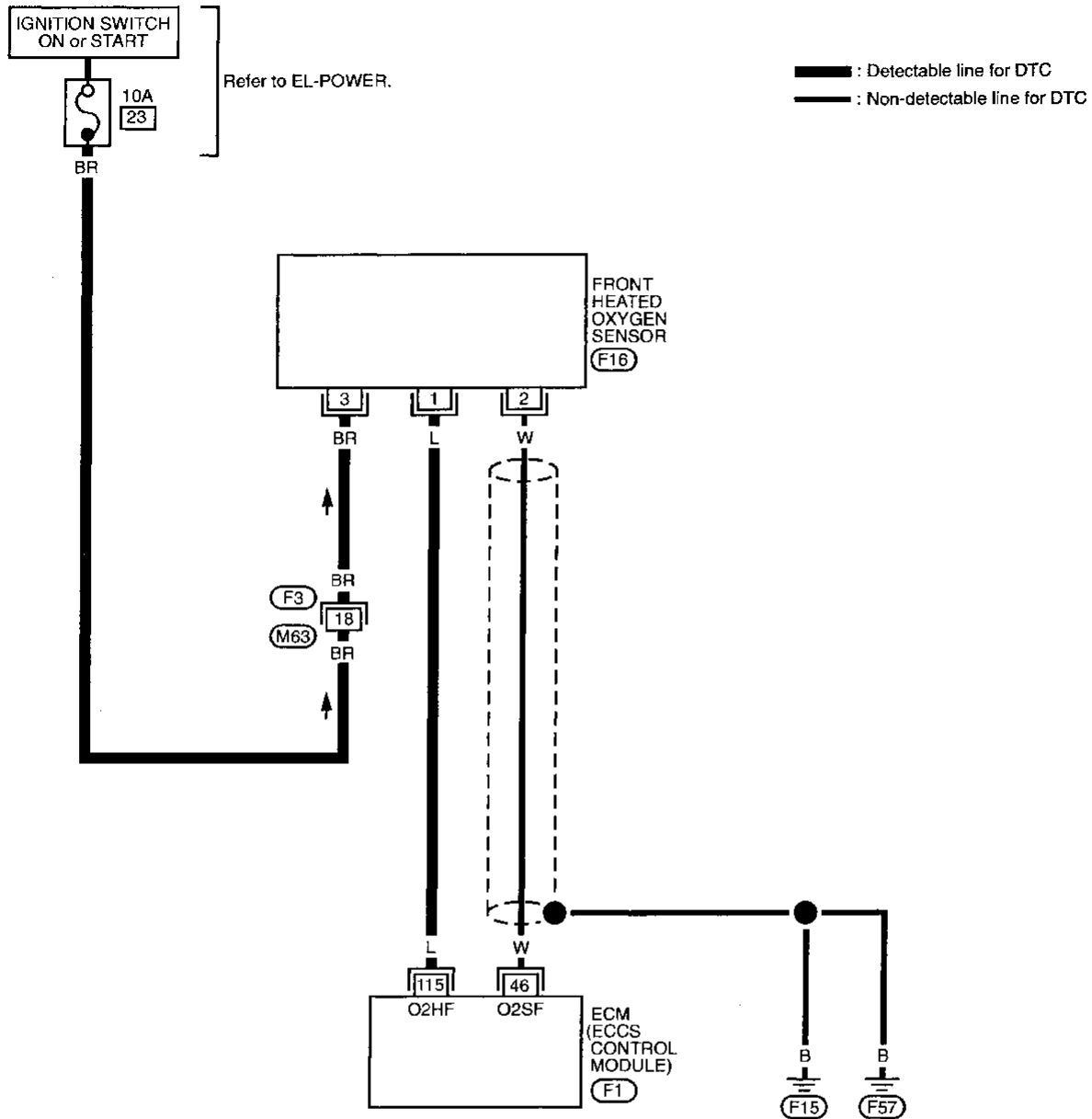
-  1) Start engine and run it for at least 5 seconds at idle speed.
2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
3) Perform "Diagnostic Test Mode II" (Self-diagnostic results) with ECM.

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

TROUBLE DIAGNOSIS FOR DTC P0135

Front Heated Oxygen Sensor Heater (Cont'd)

EC-FRO2/H-01



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Refer to last page (Foldout page).

M63, F3

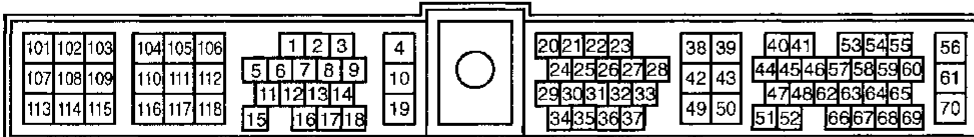
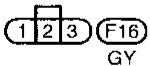
RS

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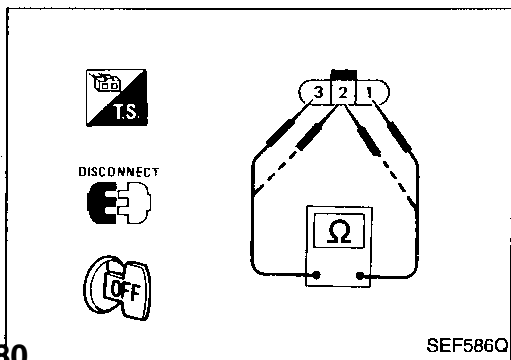
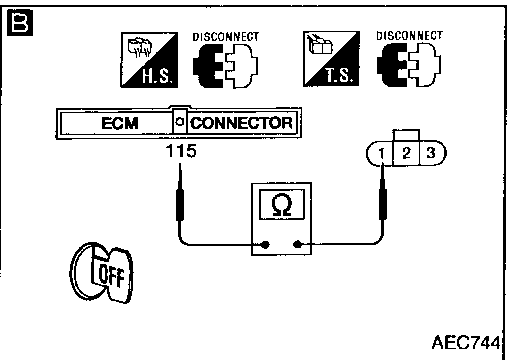
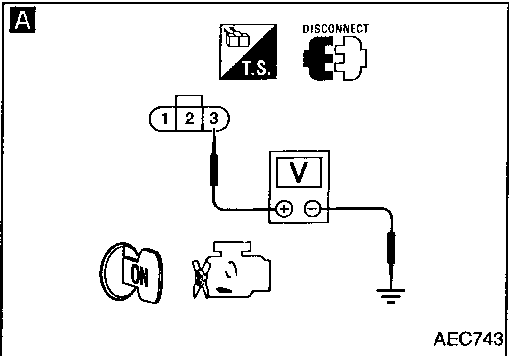
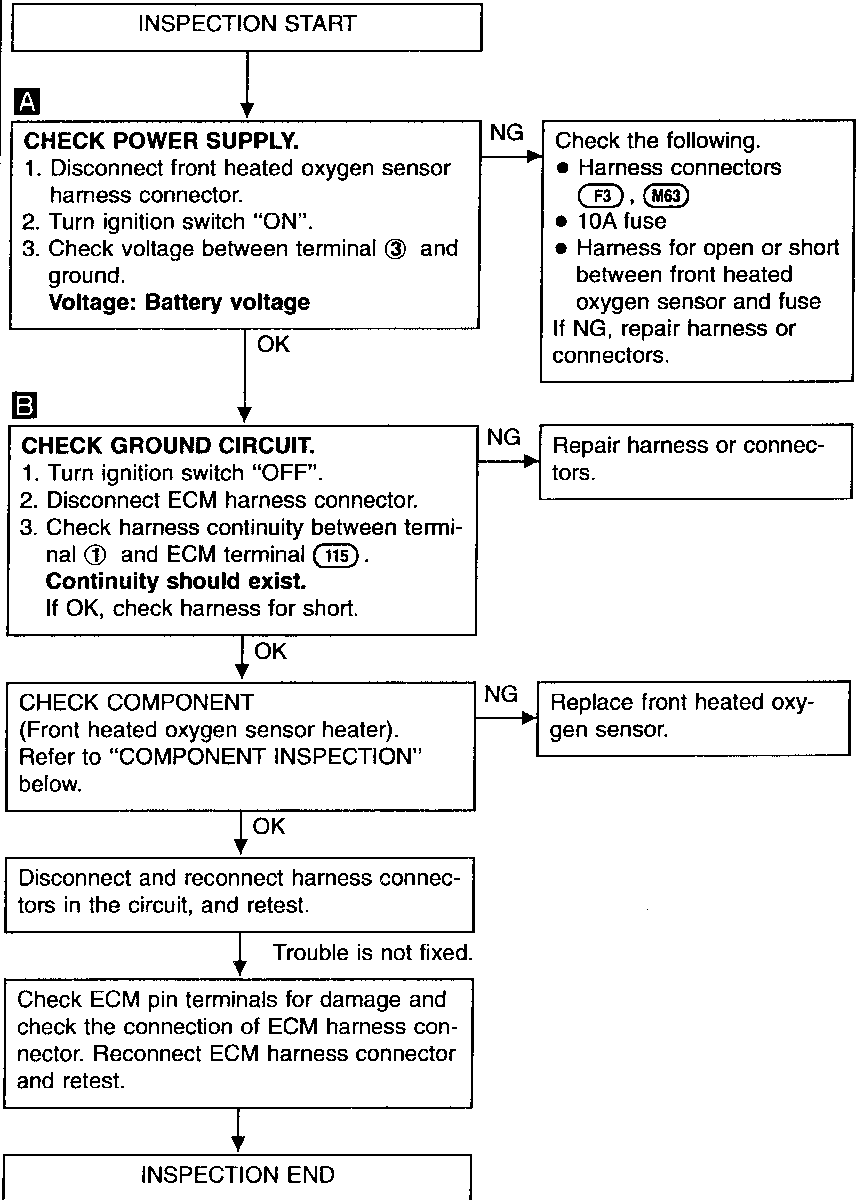
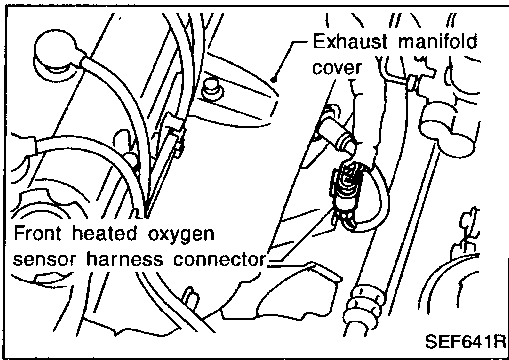
IOX



TROUBLE DIAGNOSIS FOR DTC P0135

Front Heated Oxygen Sensor Heater (Cont'd)

DIAGNOSTIC PROCEDURE



COMPONENT INSPECTION

Front heated oxygen sensor heater

Check resistance between terminals ③ and ①.

Resistance: 2.3 - 4.3Ω at 25°C (77°F)

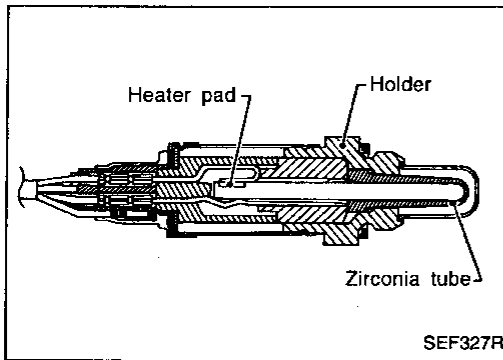
Check continuity between terminals ② and ①, ③ and ②.

Continuity should not exist.

If NG, replace the front heated oxygen sensor.

CAUTION:

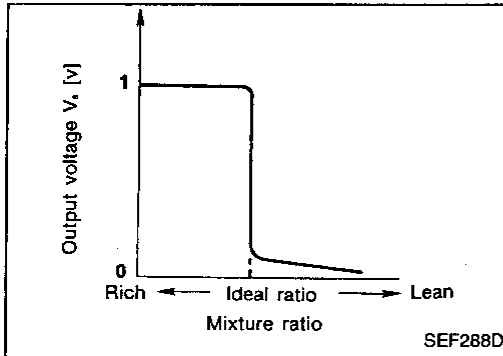
Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.



Rear Heated Oxygen Sensor (Rear HO2S)

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

Under normal conditions the rear heated oxygen sensor is not used for engine control operation.



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 of 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	<ul style="list-style-type: none"> An excessively high voltage from the sensor is sent to ECM. 	<ul style="list-style-type: none"> Harness or connectors (The sensor circuit is open.) Rear heated oxygen sensor
	<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> Harness or connectors (The sensor circuit is shorted.) Rear heated oxygen sensor Fuel pressure Injectors Intake air leaks

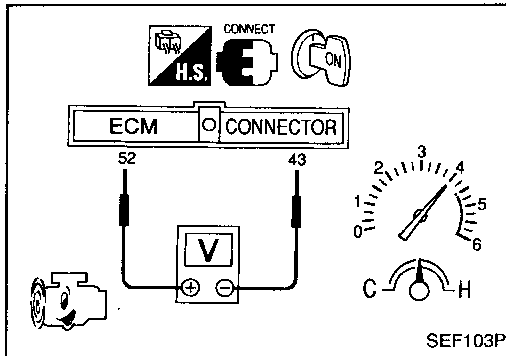
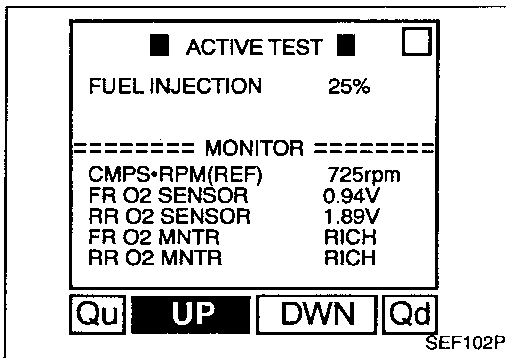
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TROUBLE DIAGNOSIS FOR DTC P0136

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

OVERALL FUNCTION CHECK

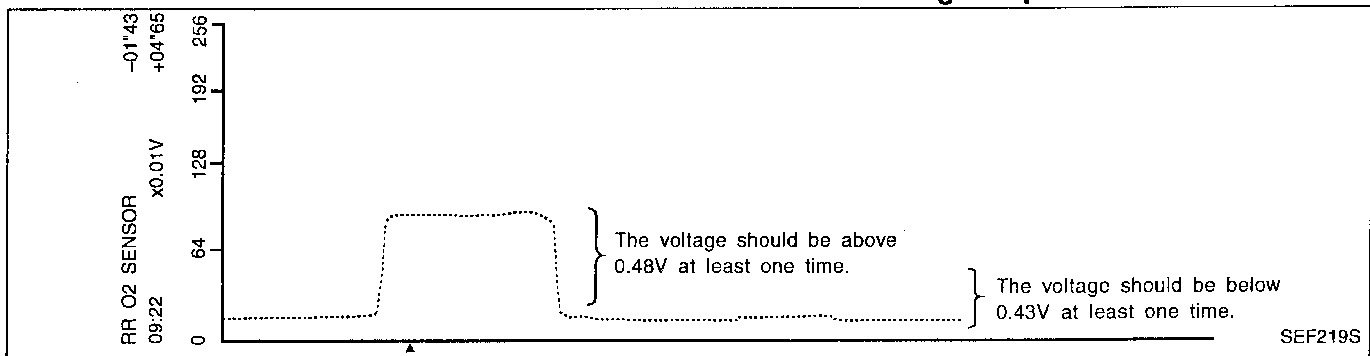
Use this procedure to check the overall function of the rear heated oxygen sensor circuit. During this check, a 1st trip DTC might not be confirmed.



- 1) Start engine and warm it up sufficiently.
- 2) Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "RR O2 SENSOR" as the monitor item with CONSULT.
- 3) Check "RR O2 SENSOR" at idle speed when adjusting "FUEL INJECTION" to $\pm 25\%$.
"RR O2 SENSOR" should be above 0.60V at least once when the "FUEL INJECTION" is +25%.
"RR O2 SENSOR" should be below 0.55V at least once when the "FUEL INJECTION" is -25%.

OR

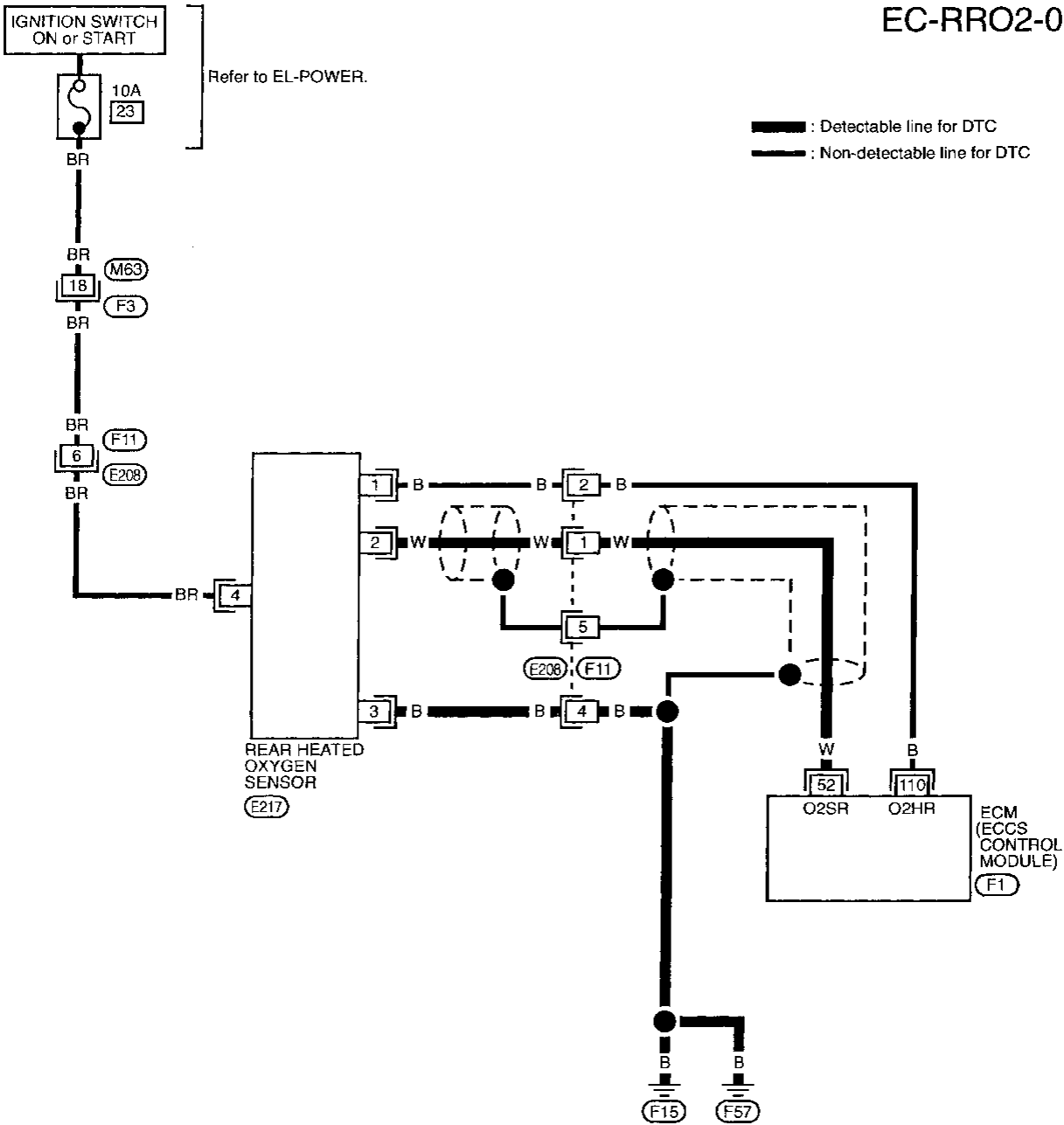
- 1) Start engine and warm it up sufficiently.
- 2) Set voltmeter probes between ECM terminals ⑤ (sensor signal) and ④ (engine ground).
- 3) Check the voltage when revving engine up to 4,000 rpm under no load at least 10 times.
(depress and release accelerator pedal as soon as possible)
The voltage should be above 0.6V at least once.
If the voltage is above 0.6V at step 3, step 4 is not necessary.
- 4) Check the voltage when revving engine up to 6,000 rpm under no load. Or keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position.
The voltage should be above 0.48V and below 0.43V at least once during this procedure.



TROUBLE DIAGNOSIS FOR DTC P0136

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

EC-RRO2-01



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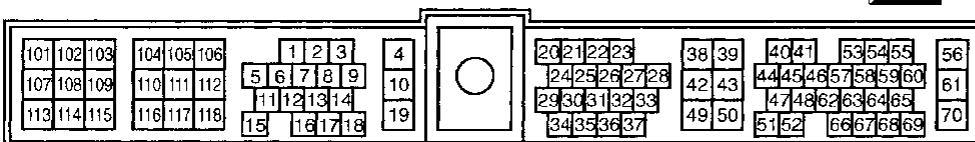
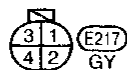
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Refer to last page (Foldout page).

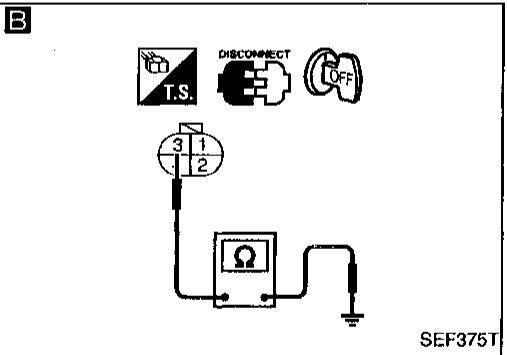
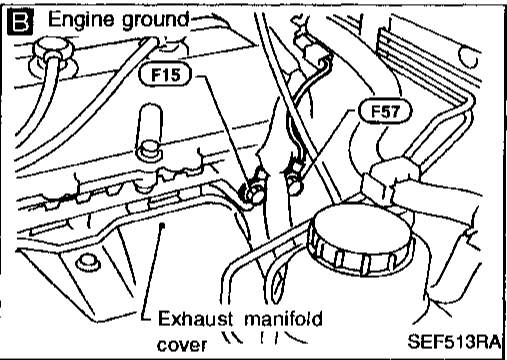
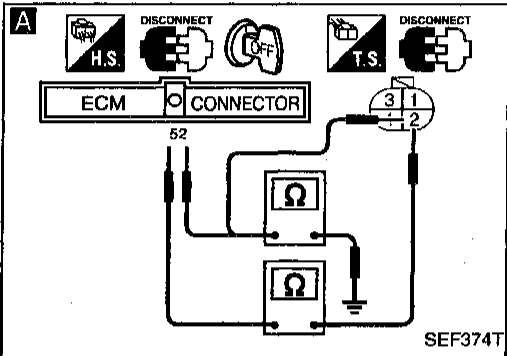
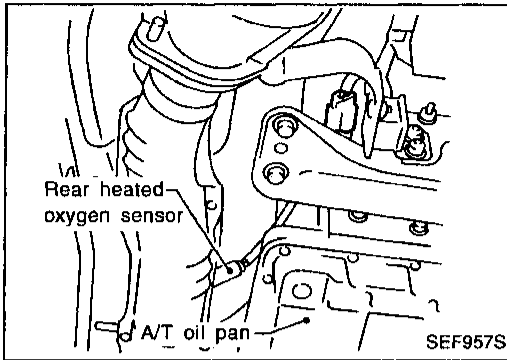
(M63) (F3)



TROUBLE DIAGNOSIS FOR DTC P0136

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 ⑤ and terminal ② .
Continuity should exist.
4. Check harness continuity between ECM terminal ③ (or terminal ②) and ground.
Continuity should not exist.
If OK, check harness for short.

NG

Check the following.

- Harness connectors (E208 , F11)
- Harness for open or short between rear heated oxygen sensor and ECM

If NG, repair harness or connectors.

OK

Loosen and retighten engine ground screws.

Note: If engine ground is loose, voltage between harness connector (F11) terminal ⑤ and engine body may be changed by retightening.

B

CHECK GROUND CIRCUIT.

1. Loosen and retighten engine ground screws.
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 (E208 , F11)
- Harness for open or short between rear heated oxygen sensor and engine ground

If NG, repair harness or connectors.

OK

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

Trouble is not fixed.

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

NG

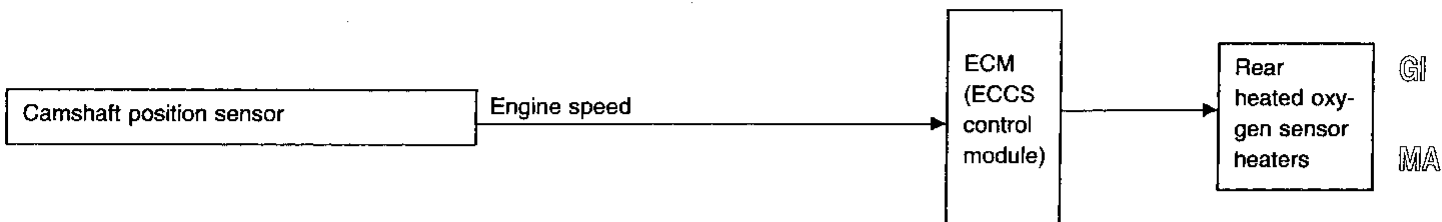
Replace rear heated oxygen sensor.

OK

INSPECTION END

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 2,800	OFF
Below 2,800	ON

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P0141 0902	<ul style="list-style-type: none"> 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.) 	<ul style="list-style-type: none"> Harness or connectors (The rear heated oxygen sensor heater circuit is open or shorted.) Rear heated oxygen sensor heater

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

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

OR

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

OR

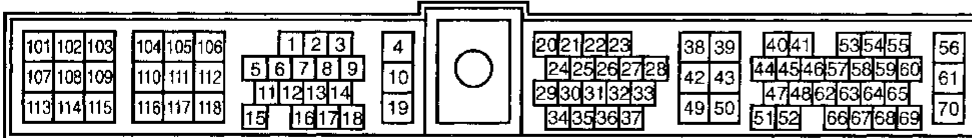
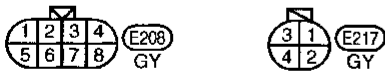
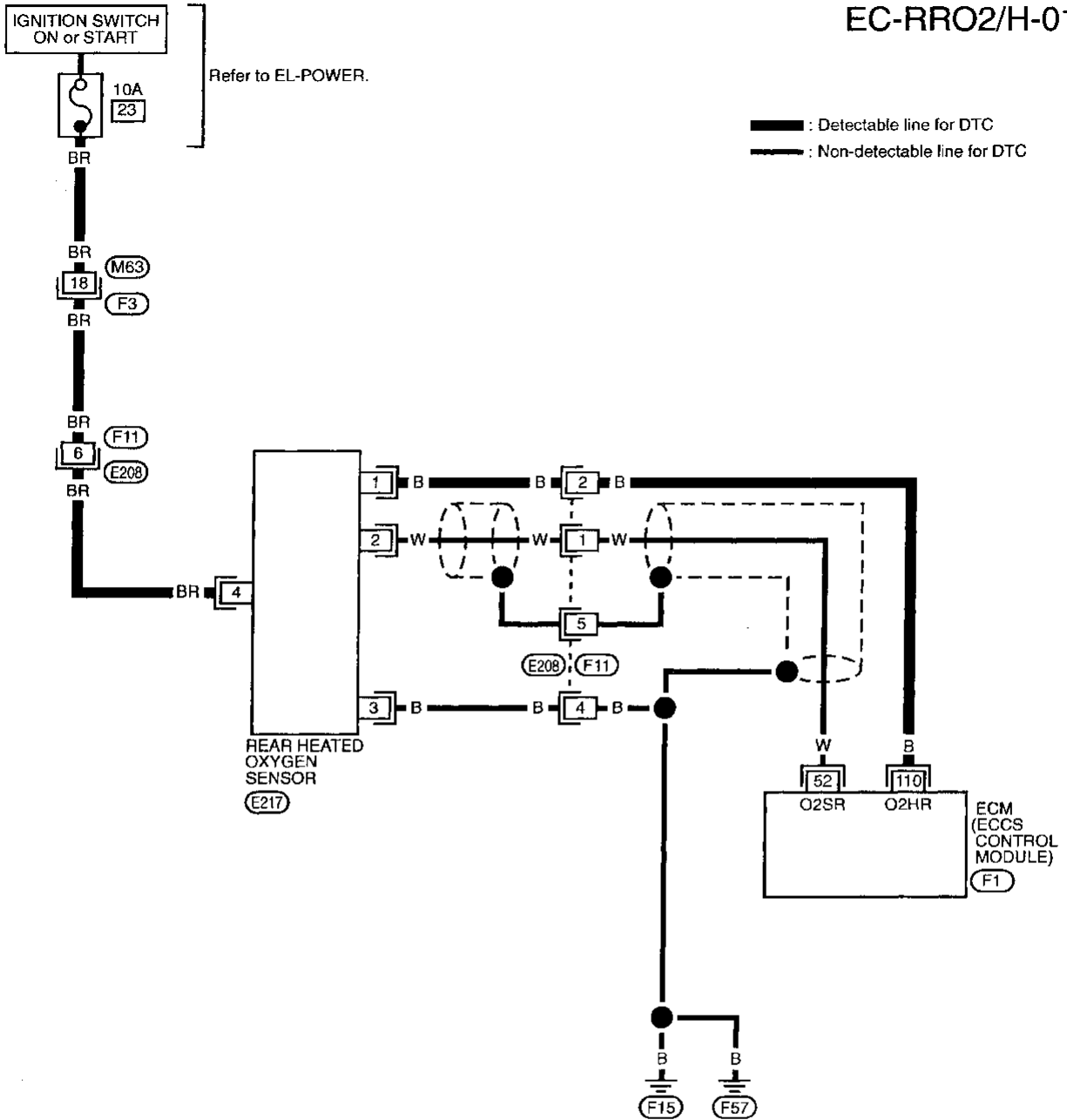
- 1) Start engine and run it for at least 5 seconds at idle speed.
- 2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
- 3) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.

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

TROUBLE DIAGNOSIS FOR DTC P0141

Rear Heated Oxygen Sensor Heater (Cont'd)

EC-RRO2/H-01



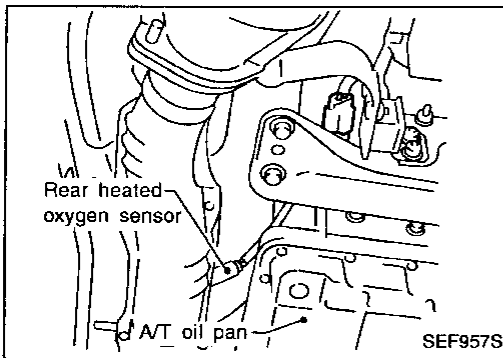
Refer to last page (Foldout page).

M63 F3

TROUBLE DIAGNOSIS FOR DTC P0141

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.

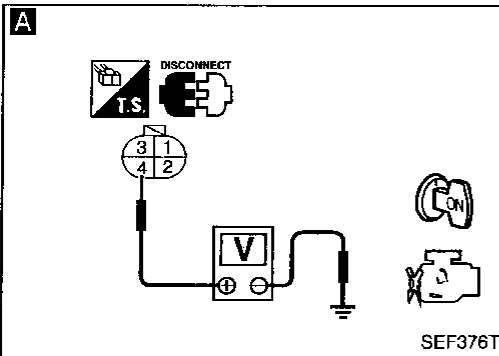
Voltage: Battery voltage

NG

Check the following.

- Harness connectors (E208), (F11)
- Harness connectors (M63), (F3)
- 15A fuse
- Harness for open or short between rear heated oxygen sensor and fuse

If NG, repair harness or connectors.



B

CHECK GROUND CIRCUIT.

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between terminal ① and ECM terminal (110).

Continuity should exist.

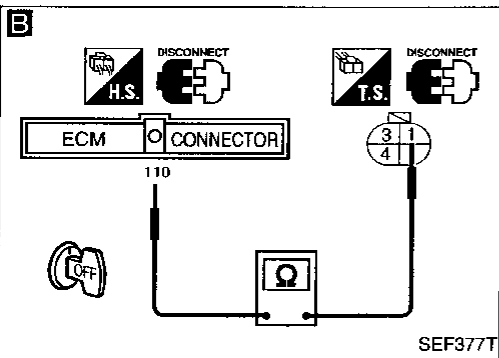
If OK, check harness for short.

NG

Check the following.

- Harness connectors (E208), (F11)
- Harness for open or short between ECM and rear heated oxygen sensor

If NG, repair harness or connectors.



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

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TROUBLE DIAGNOSIS FOR DTC P0141

Rear Heated Oxygen Sensor Heater (Cont'd) COMPONENT INSPECTION

Rear heated oxygen sensor heater

Check the following.

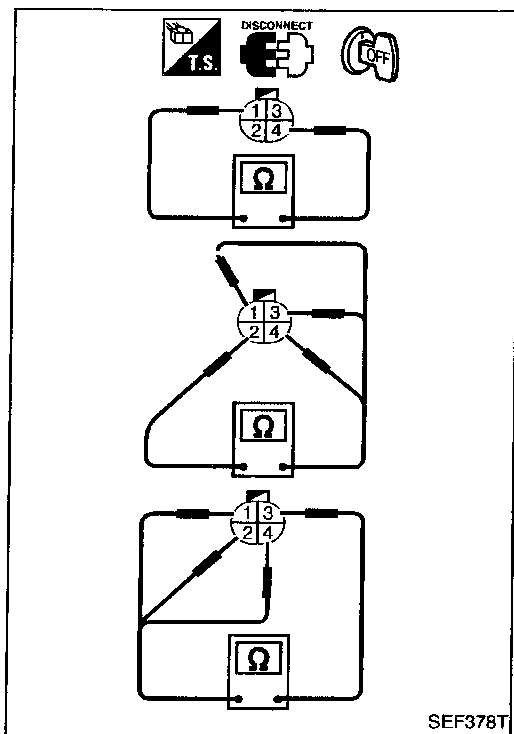
1. Check resistance between terminals ④ and ① .
Resistance: 2.3 - 4.3Ω at 25°C (77°F)
2. Check continuity.

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

If NG, replace the rear heated oxygen sensor.

CAUTION:

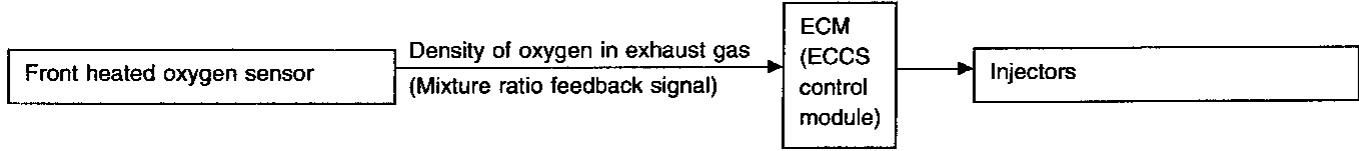
Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.



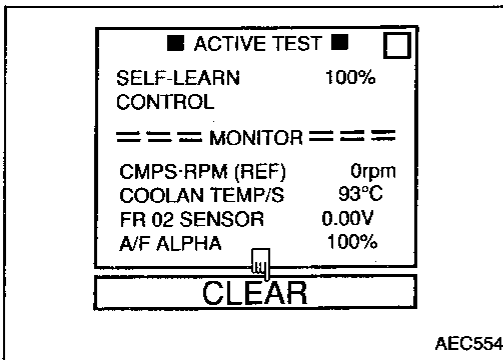
Fuel Injection System Function (Lean side)

ON BOARD DIAGNOSIS LOGIC

With 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 sensor. 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 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	<ul style="list-style-type: none"> Fuel injection system does not operate properly. The amount of mixture ratio compensation is too large. (The mixture ratio is too lean.) 	<ul style="list-style-type: none"> Intake air leak Front heated oxygen sensor Injectors Exhaust gas leak Incorrect fuel pressure Lack of fuel Mass air flow sensor



DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE (Overall)

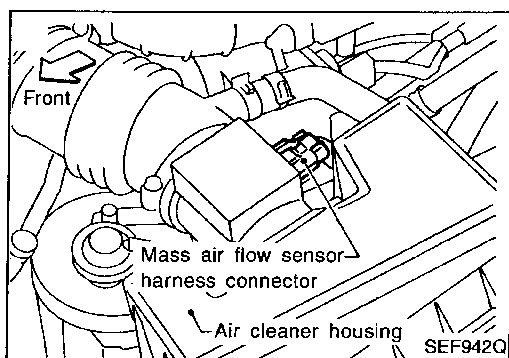
- 1) Start engine and warm it up sufficiently.
- 2) Turn ignition switch "OFF" and wait at least 5 seconds.
- 3) Turn ignition switch "ON" and select "SELF-LEARN CONTROL" in "ACTIVE TEST" mode with CONSULT.
- 4) Clear the self-learning control coefficient by touching "CLEAR".
- 5) Select "DATA MONITOR" mode with CONSULT.
- 6) Start engine again and run it for at least 10 minutes at idle speed.
The 1st trip DTC P0171 should be detected at this stage, if a malfunction exists.
- 7) If it is difficult to start engine at step 6, the fuel injection system has a malfunction, too.
Crank engine while depressing accelerator pedal. If engine starts, go to "DIAGNOSTIC PROCEDURE", EC-146. If engine does not start, visually check for exhaust and intake air leak again.

OR

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TROUBLE DIAGNOSIS FOR DTC P0171

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



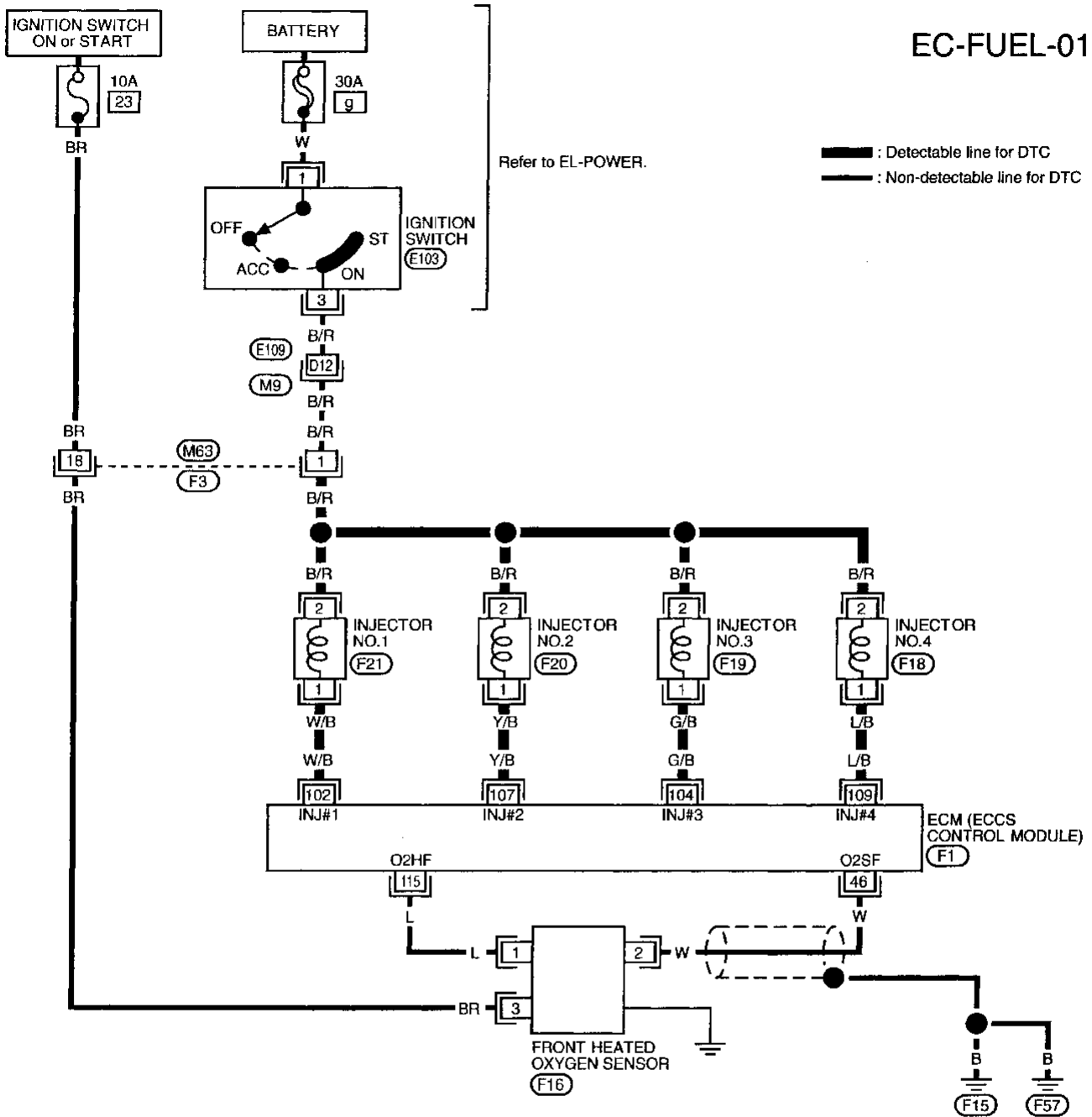
- 1) Start engine and warm it up sufficiently.
- 2) Turn ignition switch "OFF" and wait at least 5 seconds.
- 3) Disconnect mass air flow sensor harness connector. Then restart and run engine for at least 3 seconds at idle speed.
- 4) Stop engine and reconnect mass air flow sensor harness connector.
- 5) Turn ignition switch "ON".
- 6) Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM. Make sure 1st trip DTC 0102 is detected.
- 7) Erase the 1st trip DTC 0102 by changing from Diagnostic Test Mode II to Diagnostic Test Mode I.
- 8) Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM. Make sure DTC 0505 is detected.
- 9) Start engine again and run it for at least 10 minutes at idle speed.
The 1st trip DTC 0115 should be detected at this stage, if a malfunction exists.
- 10) If it is difficult to start engine at step 9, the fuel injection system has a malfunction.

Crank engine while depressing accelerator pedal. If engine starts, go to "DIAGNOSTIC PROCEDURE", EC-146. If engine does not start, visually check for exhaust and intake air leak again.

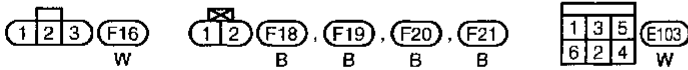
TROUBLE DIAGNOSIS FOR DTC P0171

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

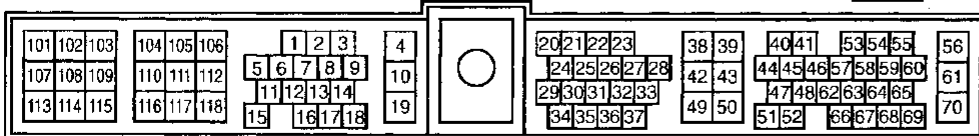
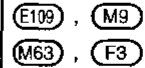
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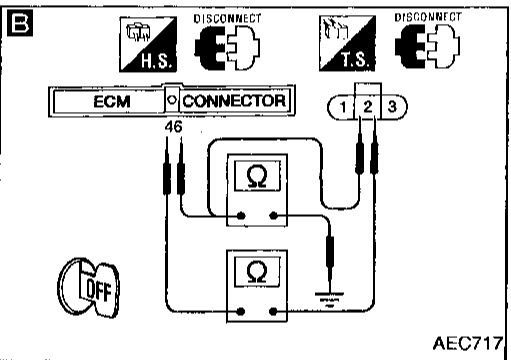
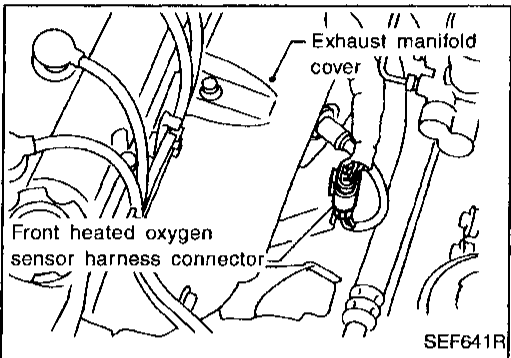
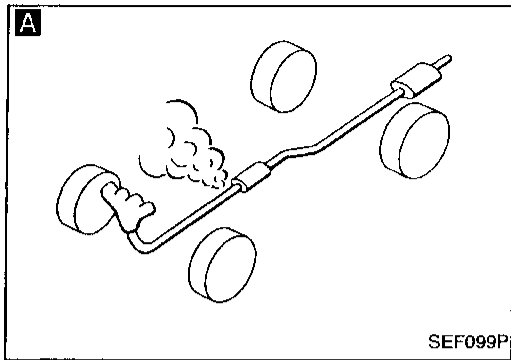
Refer to last page (Foldout page).



TROUBLE DIAGNOSIS FOR DTC P0171

Fuel Injection System Function (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 the three way catalyst.

NG → Repair or replace.

OK

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

NG → Repair or replace.

OK

B
CHECK FRONT HEATED OXYGEN SENSOR.
1. Turn ignition switch "OFF".
2. Disconnect front heated oxygen sensor harness connector and ECM harness connector.
3. Check harness continuity between ECM terminal ④ and terminal ②. **Continuity should exist.**
4. Check harness continuity between ECM terminal ④ (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-25.)
2. Install fuel pressure gauge and check fuel pressure.
At idle:
Approx. 235 kPa
(2.4 kg/cm², 34 psi)
A few seconds after ignition switch is turned OFF to ON:
Approx. 294 kPa
(3.0 kg/cm², 43 psi)

NG → Check fuel pump and circuit. Refer to EC-298.

OK

CHECK MASS AIR FLOW SENSOR.
Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT.
1.5 - 4.5 g-m/sec: at idling
6.0 - 14.0 g-m/sec: at 2,500 rpm
OR
Check "mass air flow" in MODE 1 with GST.
1.5 - 4.5 g-m/sec: at idling
6.0 - 14.0 g-m/sec: at 2,500 rpm

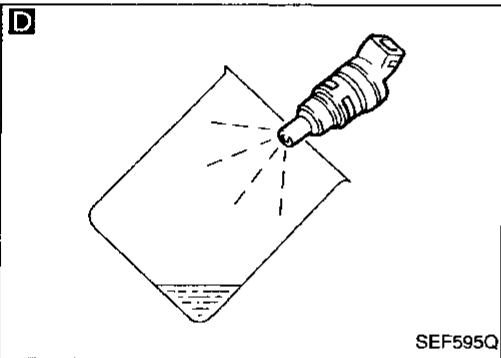
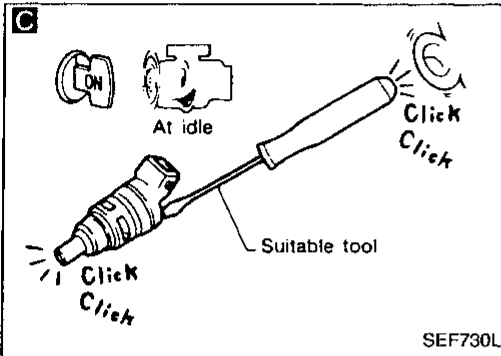
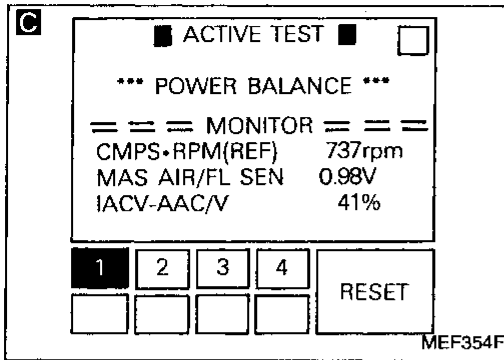
NG → Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-94.

OK

Ⓐ

TROUBLE DIAGNOSIS FOR DTC P0171

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



- C**
- CHECK FUNCTION OF INJECTORS.**
1. Install all parts removed.
 2. Start engine.
 3. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.
 4. Make sure that each circuit produces a momentary engine speed drop.
- OR
3. Listen to each injector operating sound. **Clicking noise should be heard.**

NG → Perform TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS, "Injectors", EC-293. Repair harness or connectors.

OK → Confirm that the engine is cooled down and there are no fire hazards near the vehicle.

- D**
1. Turn ignition switch "OFF".
 2. Remove injector assembly. Refer to EC-26. Keep fuel hose and all injectors connected to injector gallery.

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

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

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

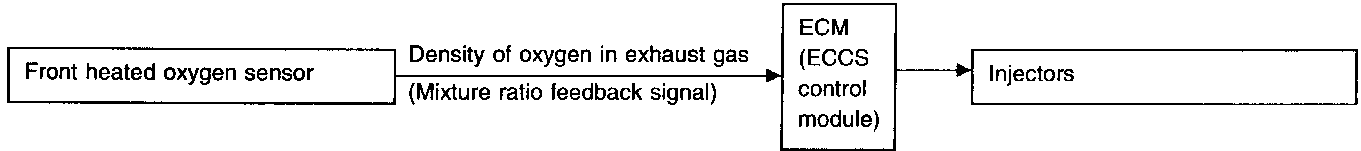
INSPECTION END

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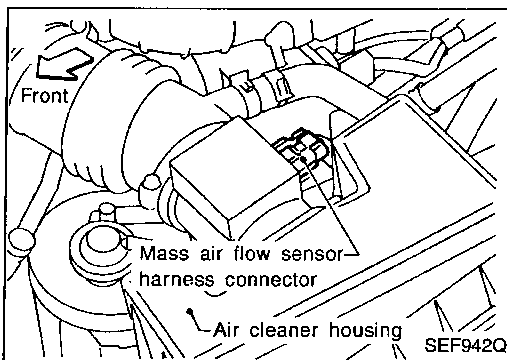
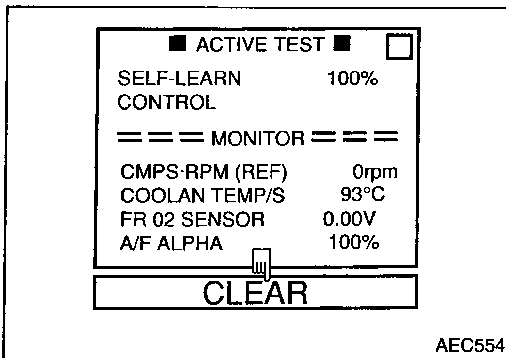
Fuel Injection System Function (Rich side)

ON BOARD DIAGNOSIS LOGIC

With 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 sensor. 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 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	<ul style="list-style-type: none"> ● Fuel injection system does not operate properly. ● The amount of mixture ratio compensation is too large. (The mixture ratio is too rich.) 	<ul style="list-style-type: none"> ● Front heated oxygen sensor ● Injectors ● Exhaust gas leak ● Incorrect fuel pressure ● Mass air flow sensor



DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE (Overall)

- 1) Start engine and warm it up sufficiently.
- 2) Turn ignition switch "OFF" and wait at least 5 seconds.
- 3) Turn ignition switch "ON" and select "SELF-LEARN CONTROL" in "ACTIVE TEST" mode with CONSULT.
- 4) Clear the self-learning control coefficient by touching "CLEAR".
- 5) Select "DATA MONITOR" mode with CONSULT.
- 6) Start engine again and run it for at least 10 minutes at idle speed.
The 1st trip DTC P0172 should be detected at this stage, if a malfunction exists.
- 7) If it is difficult to start engine at step 6, the fuel injection system has a malfunction, too.
Crank engine while depressing accelerator pedal. If engine starts, go to "DIAGNOSTIC PROCEDURE", EC-146. If engine does not start, remove ignition plugs and check for fouling, etc.

OR

- 1) Start engine and warm it up sufficiently.
- 2) Turn ignition switch "OFF" and wait at least 5 seconds.
- 3) Disconnect mass air flow sensor harness connector. Then restart and run engine for at least 3 seconds at idle speed.
- 4) Stop engine and reconnect mass air flow sensor harness connector.
- 5) Turn ignition switch "ON".
- 6) Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM. Make sure 1st trip DTC 0102 is detected.
- 7) Erase the 1st trip DTC 0102 by changing from Diagnostic Test Mode II to Diagnostic Test Mode I.
- 8) Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM. Make sure DTC 0505 is detected.

TROUBLE DIAGNOSIS FOR DTC P0172

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

9) Start engine again and run it for at least 10 minutes at idle speed.

The 1st trip DTC 0114 should be detected at this stage, if a malfunction exists.

10) If it is difficult to start engine at step 9, the fuel injection system has a malfunction.

Crank engine while depressing accelerator pedal. If engine starts, go to "DIAGNOSTIC PROCEDURE", EC-146. If engine does not start, remove ignition plugs and check for fouling etc.

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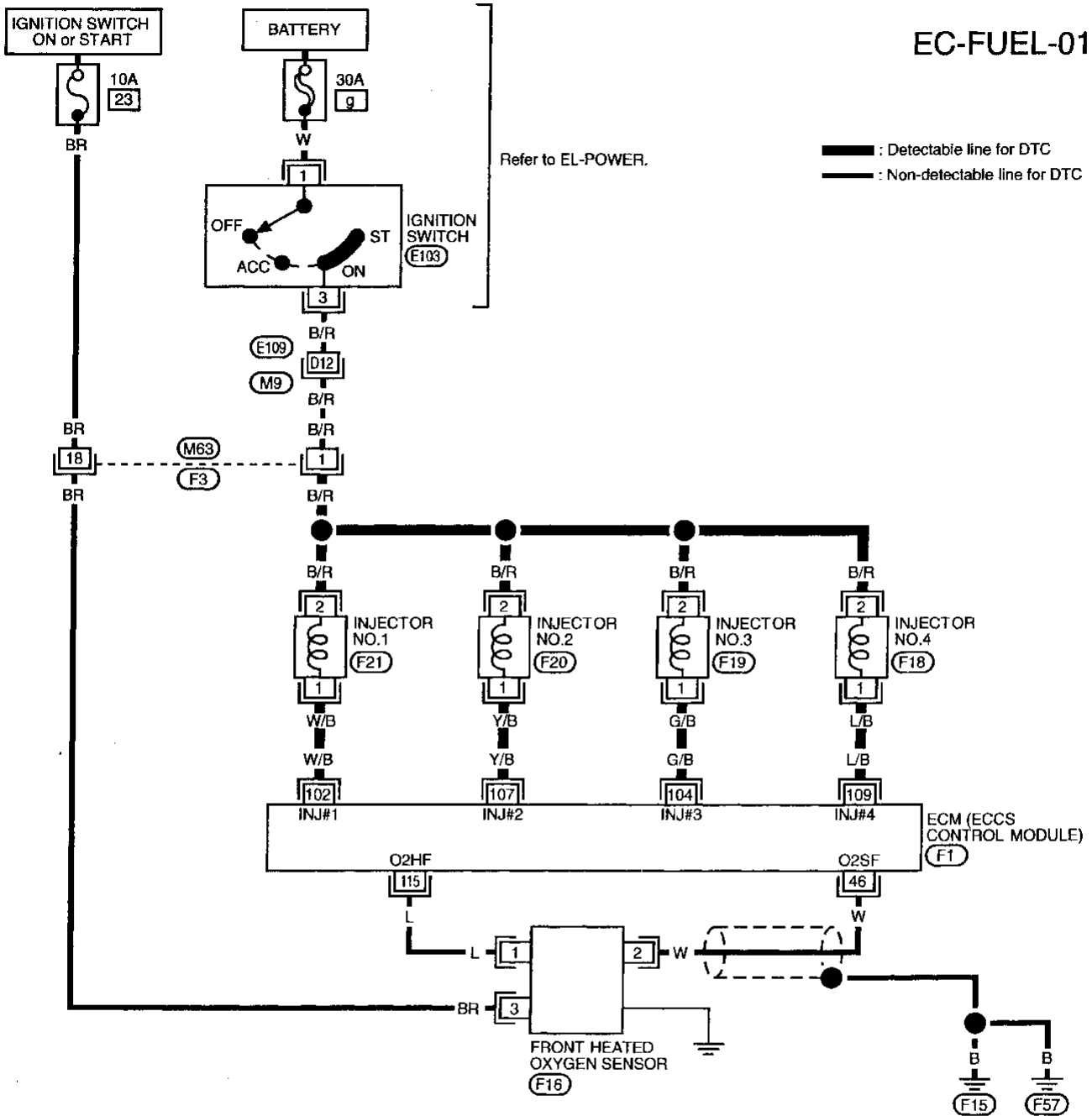
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TROUBLE DIAGNOSIS FOR DTC P0172

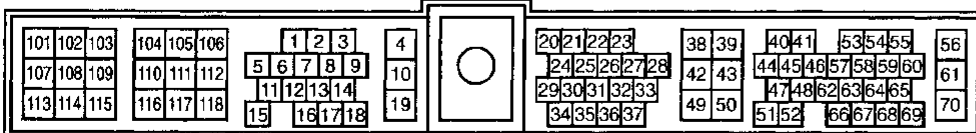
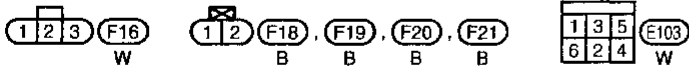
Fuel Injection System Function (Rich side) (Cont'd)

EC-FUEL-01



Refer to last page (Foldout page).

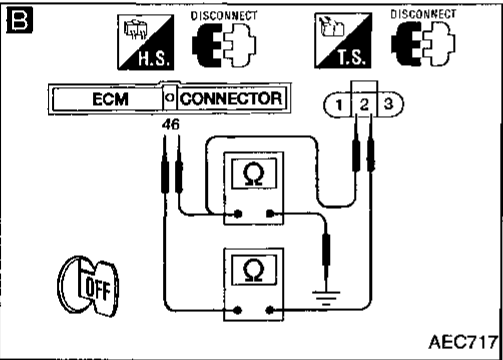
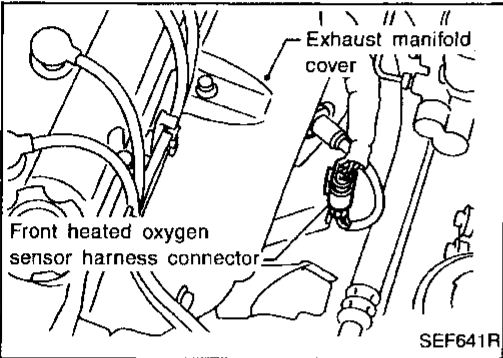
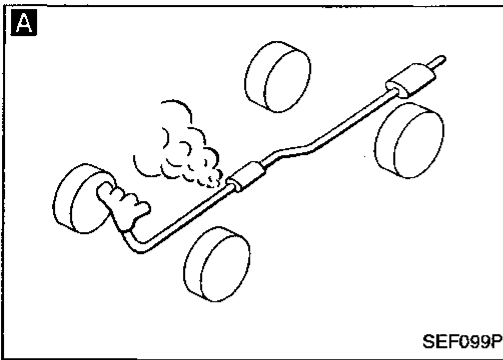
E109 , M9
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TROUBLE DIAGNOSIS FOR DTC P0172

Fuel Injection System Function (Rich 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 the three way catalyst.

NG → Repair or replace.

OK

B
CHECK FRONT HEATED OXYGEN SENSOR.
1. Turn ignition switch "OFF".
2. Disconnect front heated oxygen sensor harness connector and ECM harness connector.
3. Check harness continuity between ECM terminal ④ and terminal ②. **Continuity should exist.**
4. Check harness continuity between ECM terminal ④ (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-25.
2. Install fuel pressure gauge and check fuel pressure.
At idle:
Approx. 235 kPa (2.4 kg/cm², 34 psi)
A few seconds after ignition switch is turned OFF to ON:
Approx. 294 kPa (3.0 kg/cm², 43 psi)

NG → Check fuel pump and circuit. Refer to EC-298.

OK

CHECK MASS AIR FLOW SENSOR.
① Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT.
1.5 - 4.5 g/m/sec: at idling
6.0 - 14.0 g-m/sec: at 2,500 rpm
OR
② Check "mass air flow" in MODE 1 with GST.
1.5 - 4.5 g-m/sec: at idling
6.0 - 14.0 g-m/sec: at 2,500 rpm

NG → Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-94.

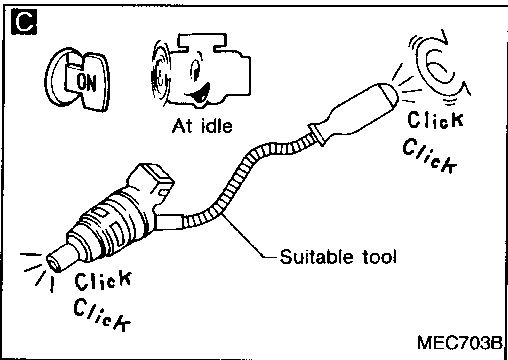
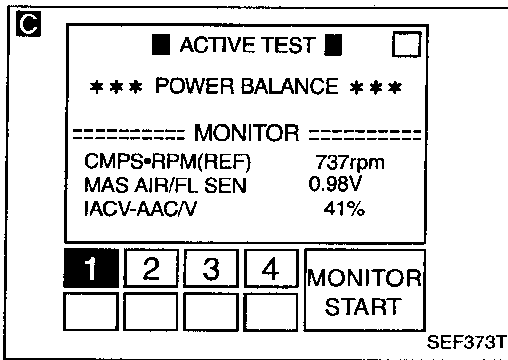
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TROUBLE DIAGNOSIS FOR DTC P0172

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



C

CHECK FUNCTION OF INJECTORS (RIGHT BANK).

1. Install all parts removed.
2. Start engine.
3. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.
4. Make sure that each circuit produces a momentary engine speed drop.

OR

3. Listen to each injector operating sound. **Clicking noise should be heard.**

NG → Perform TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS, "Injectors", EC-293. Repair harness or connectors.

OK

Remove injector assembly. Refer to EC-26. Keep fuel hose and all injectors connected to injector gallery.

Confirm that the engine is cooled down and there are no fire hazards near the vehicle.

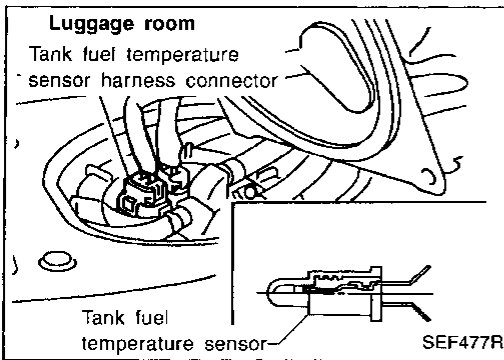
1. Disconnect all injector harness connectors.
2. Disconnect ignition coil harness connector.
3. Crank engine for about 3 seconds. Make sure fuel does not drip from injector.

Drips → Replace the injectors from which fuel is dripping.

Does not drip.

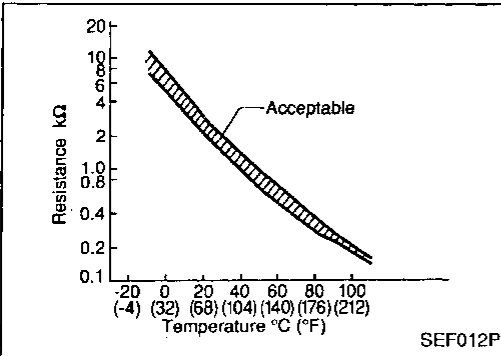
Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

INSPECTION END



Tank Fuel Temperature Sensor

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	2.3 - 2.7
50 (122)	2.2	0.79 - 0.90

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Causes)
P0180 0402	<ul style="list-style-type: none"> An excessively high or low voltage is sent to ECM. Rationally incorrect voltage is sent to ECM, compared with the voltage signals from engine coolant temperature sensor and intake air temperature sensor. 	<ul style="list-style-type: none"> Harness or connectors (the sensor circuit is open or shorted.) Tank fuel temperature sensor

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

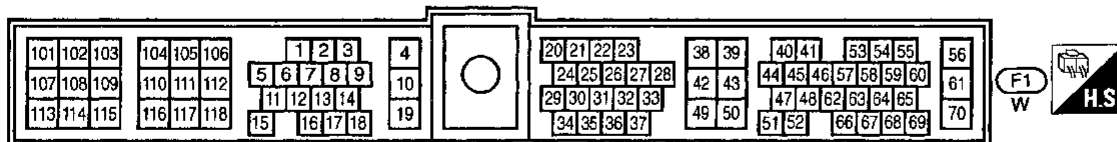
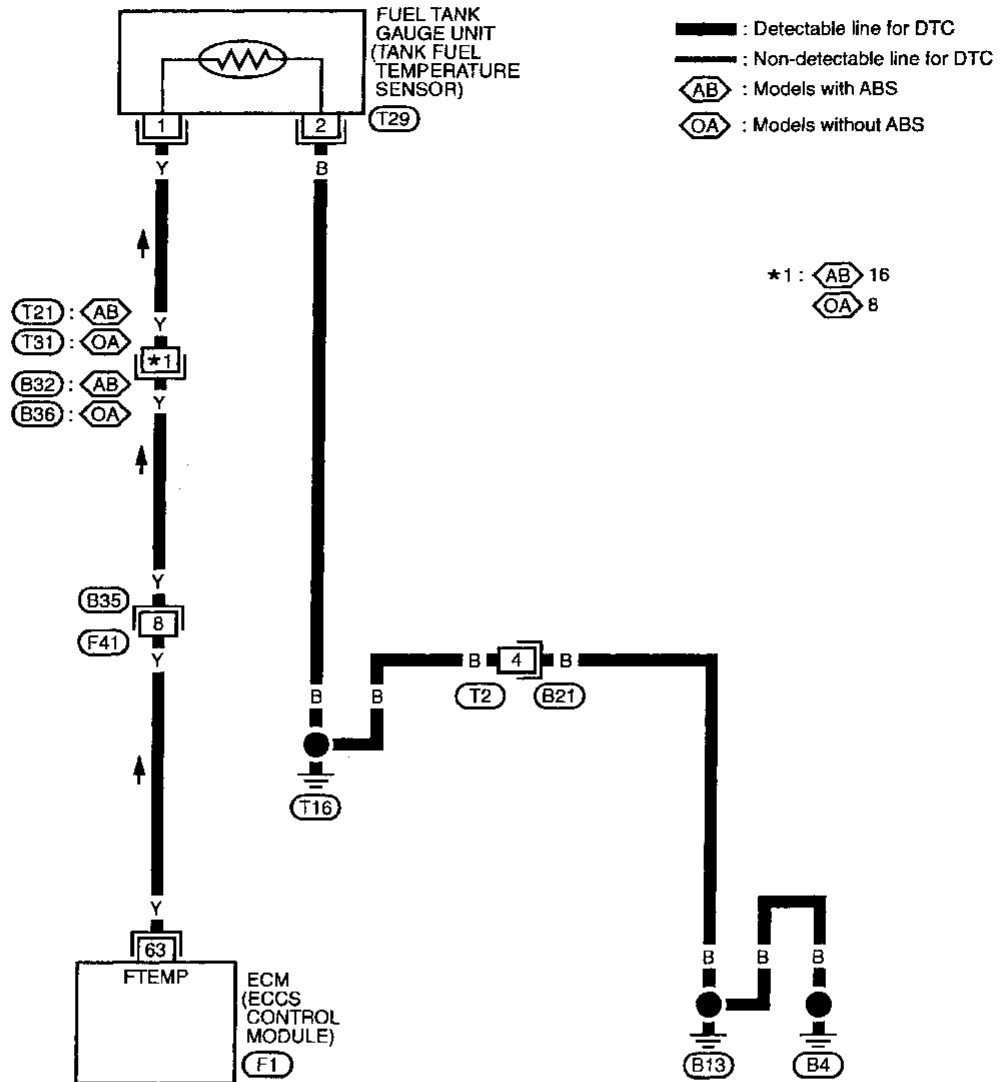
- 1) Turn ignition switch "ON".
 - 2) Select "DATA MONITOR" mode with CONSULT.
 - 3) Wait at least 12 seconds.
- OR
- 1) Turn ignition switch "ON" and wait at least 12 seconds.
 - 2) Select "MODE 7" with GST.
- OR
- 1) Turn ignition switch "ON" and wait at least 12 seconds.
 - 2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
 - 3) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.

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TROUBLE DIAGNOSIS FOR DTC P0180

Tank Fuel Temperature Sensor (Cont'd)

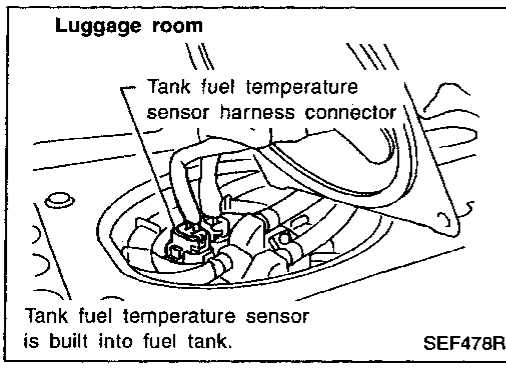
EC-TFTS-01



TROUBLE DIAGNOSIS FOR DTC P0180

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.

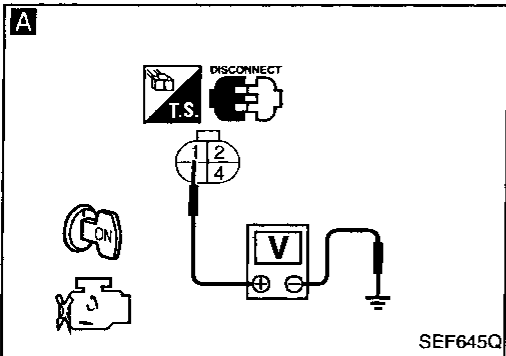
Voltage: Approximately 5V

NG

Check the following.

- Harness connectors (Models with ABS) (T21), (B32) (Models without ABS) (T31), (B36)
- Harness connectors (B35), (F41)
- Harness continuity between ECM and tank fuel temperature sensor

If NG, repair harness or connector.



OK

B

CHECK GROUND CIRCUIT.

1. Turn ignition switch "OFF".
2. Check harness continuity between terminal ② and body ground.

Continuity should exist.

If OK, check harness for short.

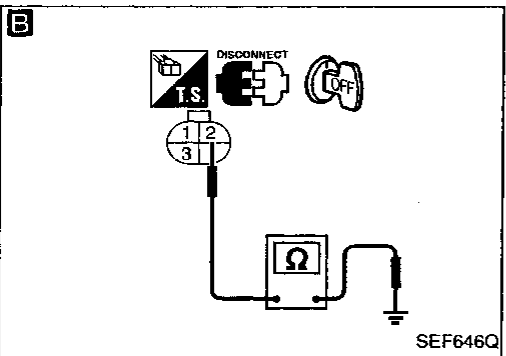
NG

Check the following.

- Harness connectors (T2), (B21)

• Harness for open or short between tank fuel temperature sensor and body ground

If NG, repair harness or connector.



OK

CHECK COMPONENT (Tank fuel temperature sensor). Refer to "COMPONENT INSPECTION" on next page.

NG

Replace tank fuel temperature sensor.

OK

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

Trouble is not fixed.

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

INSPECTION END

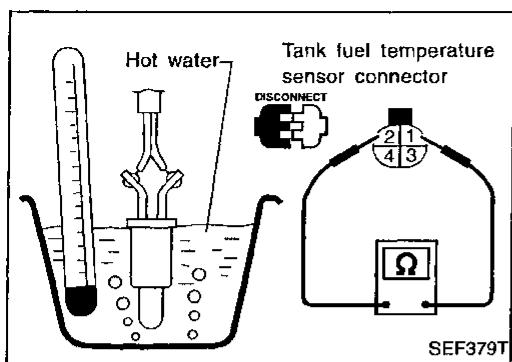
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TROUBLE DIAGNOSIS FOR DTC P0180

Tank Fuel Temperature Sensor (Cont'd) COMPONENT INSPECTION

Tank fuel temperature sensor

Check resistance while heating the sensor with hot water or heat gun as shown in the figure.



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

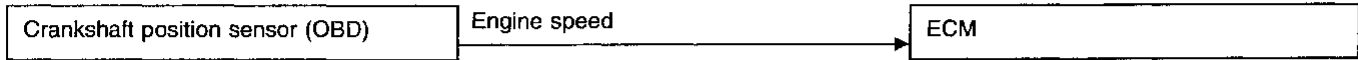
If NG, replace tank fuel temperature sensor.

No. 4 - 1 Cylinder Misfire, Multiple Cylinder Misfire

ON BOARD DIAGNOSIS LOGIC

If a misfire occurs, the engine speed will fluctuate. If the fluctuation is detected by the crankshaft position sensor (OBD), the misfire is diagnosed.

The misfire detection logic consists of the following two conditions.



1. One Trip Detection Logic (Three Way Catalyst Damage)

When a misfire is detected which will overheat and damage the three way catalyst, the malfunction indicator lamp (MIL) will start blinking; even during the first trip. In this condition, ECM monitors the misfire every 200 revolutions.

If the misfire frequency decreases to a level that will not damage the three way catalyst, the MIL will change from blinking to lighting up.

(After the first trip detection, the MIL will light up from engine starting. If a misfire is detected that will cause three way catalyst damage, the MIL will start blinking.)

2. Two Trip Detection Logic (Exhaust quality deterioration)

When a misfire that will not damage the three way catalyst (but will affect exhaust emission) occurs, the malfunction indicator lamp will light up based on two trip detection logic. In this condition, ECM monitors the misfire for every 1,000 revolutions of the engine.

Diagnostic Trouble Code Nos.	Malfunction is detected when ...	Check Items (Possible Cause)
P0300 (0701)	• Multiple cylinders misfire.	<ul style="list-style-type: none"> • Improper spark plug • Insufficient compression • Incorrect fuel pressure • EGR valve • The injector circuit is open or shorted. • Injectors • Intake air leak • The ignition secondary circuit is open or shorted. • Lack of fuel • Magnetized flywheel (drive plate)
P0301 (0608)	• No. 1 cylinder misfires.	
P0302 (0607)	• No. 2 cylinder misfires.	
P0303 (0606)	• No. 3 cylinder misfires.	
P0304 (0605)	• No. 4 cylinder misfires.	

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE (Overall)

- 1) Turn ignition switch "ON", and select "DATA MONITOR" mode with CONSULT.
- 2) Start engine and warm it up sufficiently.
- 3) Turn ignition switch "OFF" and wait at least 5 seconds.
- 4) Start engine again and drive at 1,500 - 3,000 rpm for at least 3 minutes.
Hold the accelerator pedal as steady as possible during driving.

Note: Refer to the freeze frame data for the test driving conditions.

OR

- 1) Start engine and warm it up sufficiently.
- 2) Turn ignition switch "OFF" and wait at least 5 seconds.
- 3) Start engine again and drive at 1,500 - 3,000 rpm for at least 3 minutes.
Hold the accelerator pedal as steady as possible during driving.

Note: Refer to the freeze frame data for the test driving conditions.

- 4) Select "MODE 7" with GST.

OR

- 1) Start engine and warm it up sufficiently.
- 2) Turn ignition switch "OFF" and wait at least 5 seconds.
- 3) Start engine again and drive at 1,500 - 3,000 rpm for at least 3 minutes.
Hold the accelerator pedal as steady as possible during driving.
- 4) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.

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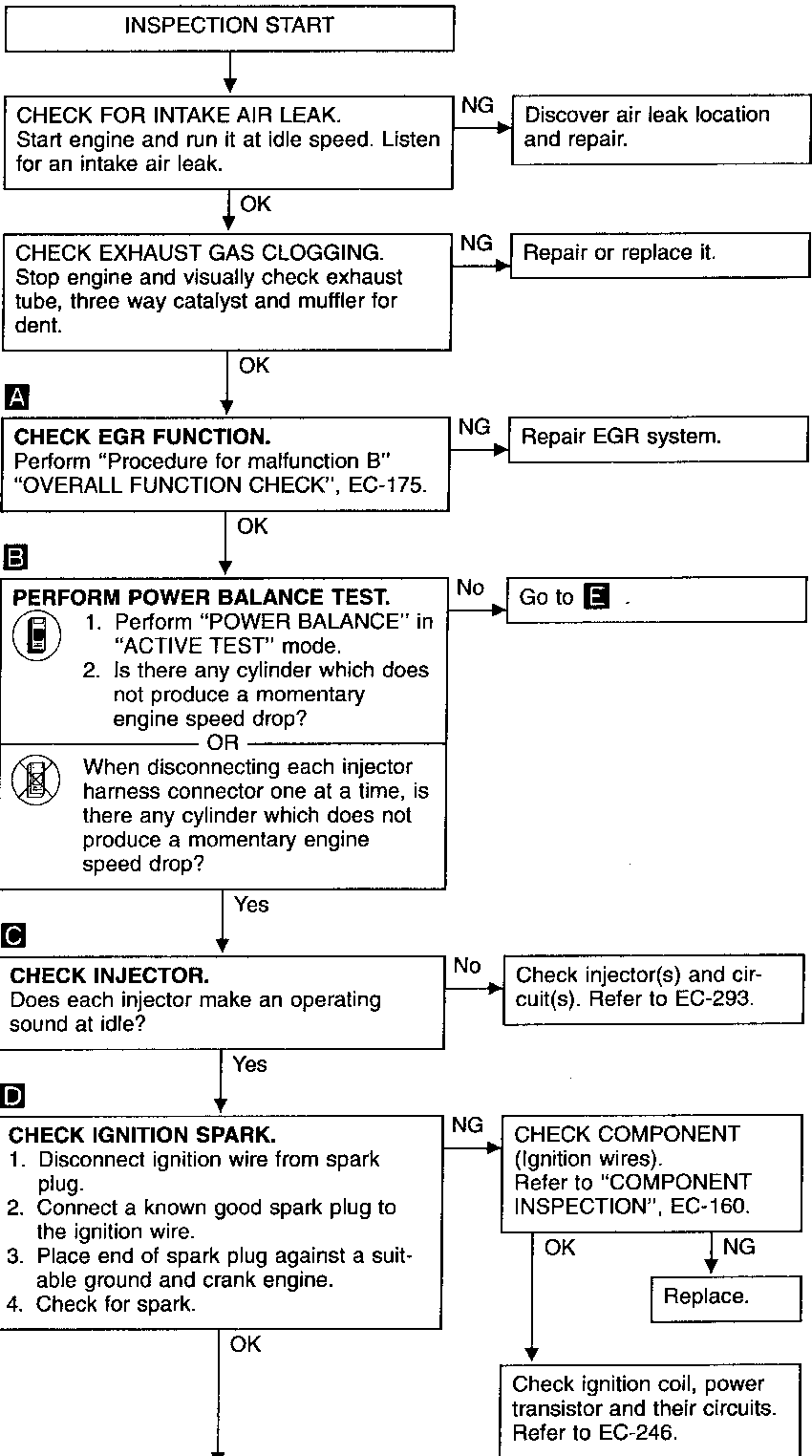
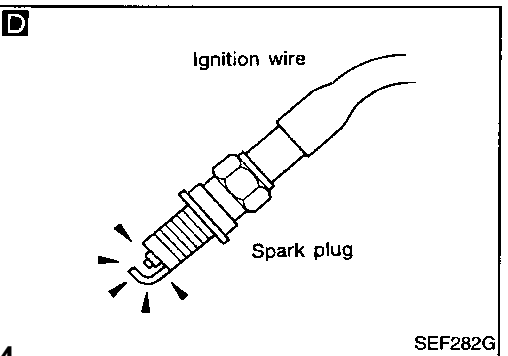
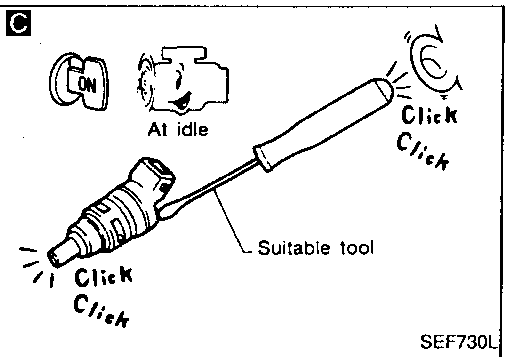
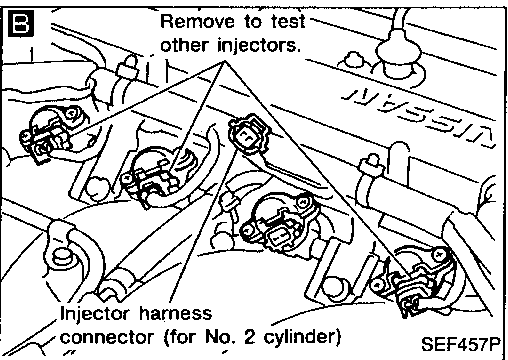
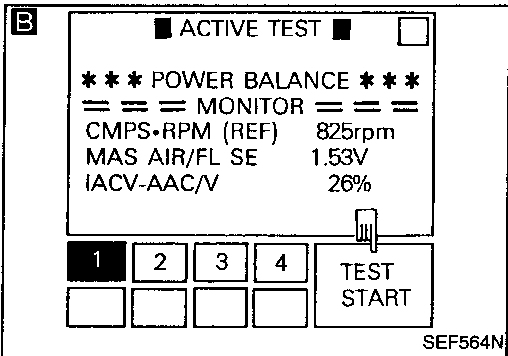
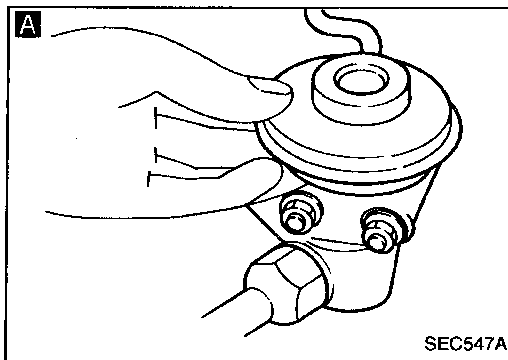
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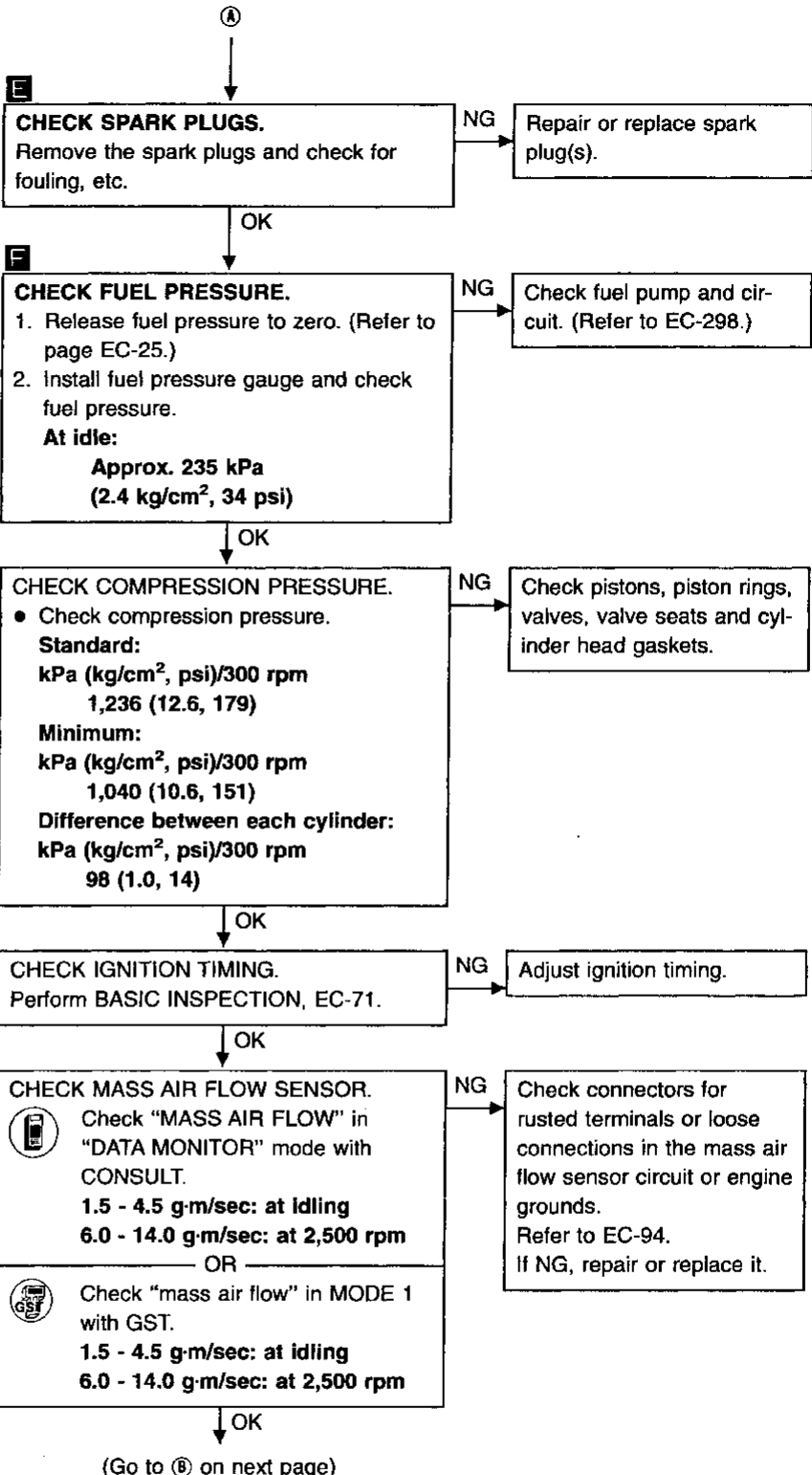
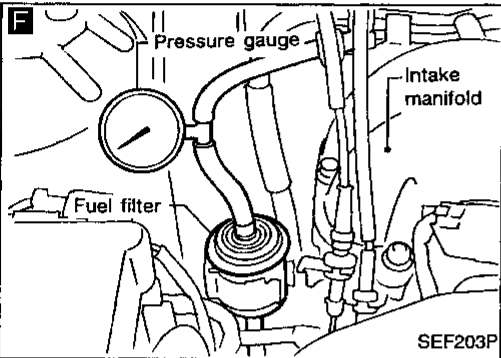
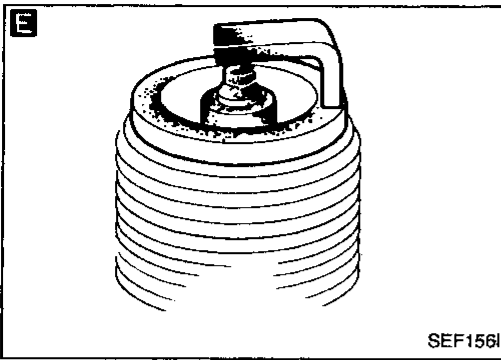
No. 4 - 1 Cylinder Misfire, Multiple Cylinder Misfire (Cont'd)

DIAGNOSTIC PROCEDURE



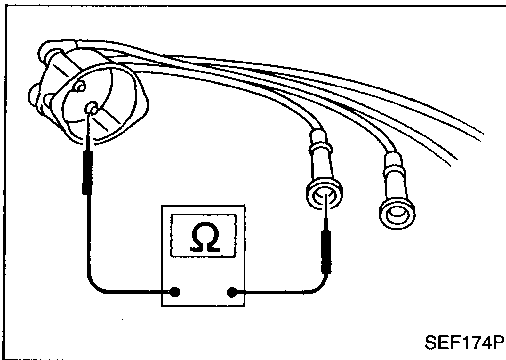
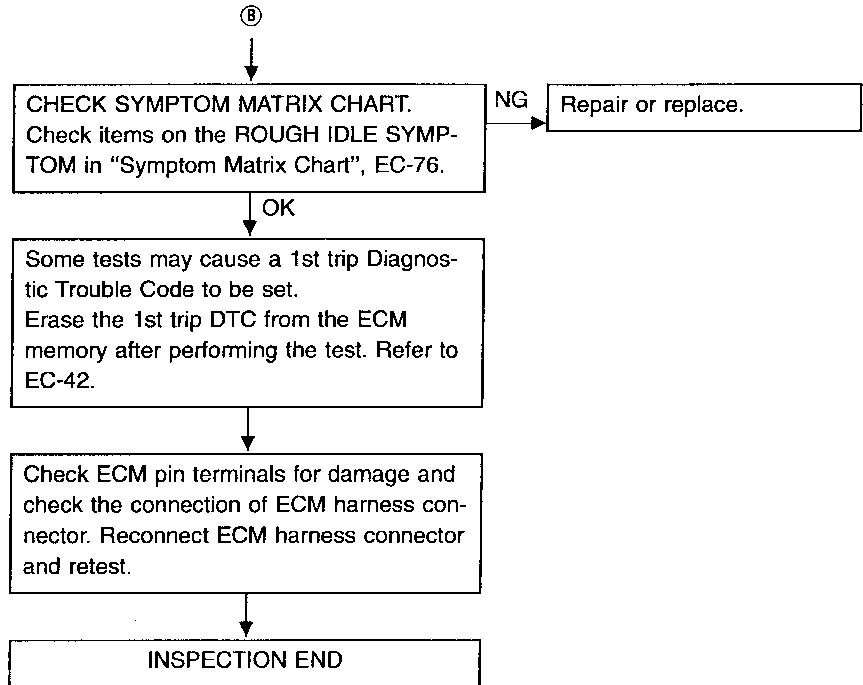
TROUBLE DIAGNOSIS FOR DTC P0300 - P0304

No. 4 - 1 Cylinder Misfire, Multiple Cylinder Misfire (Cont'd)



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No. 4 - 1 Cylinder Misfire, Multiple Cylinder Misfire (Cont'd)



COMPONENT INSPECTION

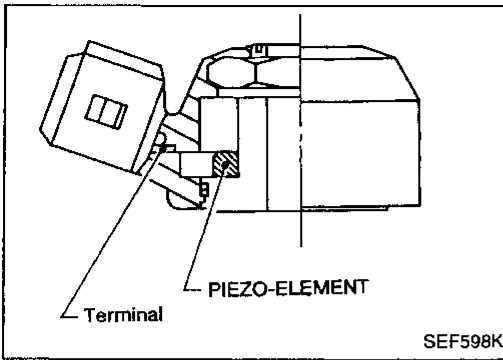
Ignition wires

1. Inspect wires for cracks, damage, burned terminals and for improper fit.
2. Measure the resistance of wires to their distributor cap terminal. Move each wire while testing to check for intermittent breaks.

Resistance:

13.6 - 18.4 kΩ/m (4.15 - 5.61 kΩ/ft) at 25°C (77°F)

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



Knock Sensor (KS)




The knock sensor is attached to the cylinder block. It senses engine knocking using a piezoelectric element. A knocking vibration from the cylinder block is sensed as vibrational pressure. This pressure is converted into a voltage signal and sent to the ECM.

* Freeze frame data will not be stored in the ECM for the knock sensor. The MIL will not light for knock sensor malfunction. The knock sensor has one trip detection logic.

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P0325 0304	<ul style="list-style-type: none"> An excessively low or high voltage from the knock sensor is sent to ECM. 	<ul style="list-style-type: none"> Harness or connectors (The knock sensor circuit is open or shorted.) Knock sensor

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

Note: Before performing the following procedure, confirm that battery voltage is more than 10V.

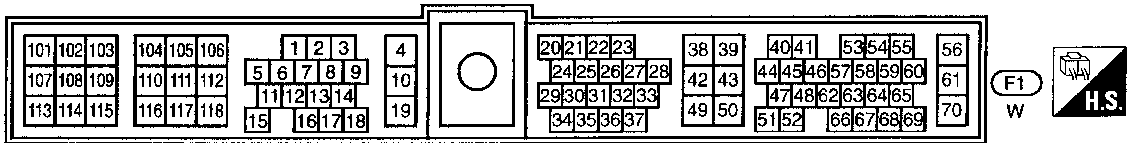
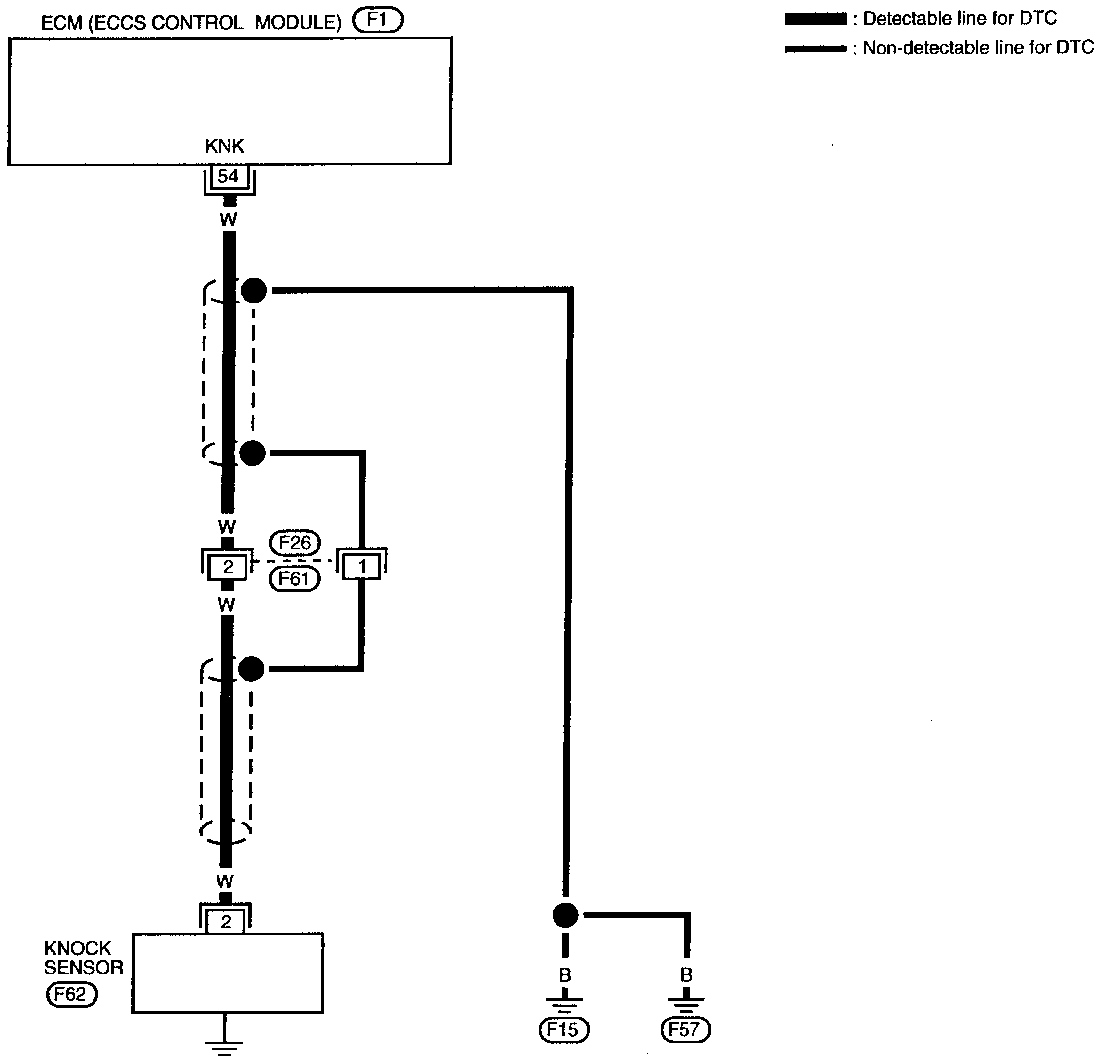
- 
 - Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT.
 - Start engine and run it for at least 5 seconds at idle speed.
- OR
- 
 - Start engine and run it for at least 5 seconds at idle speed.
 - Select "MODE 3" with GST.
- OR
- 
 - Start engine and run it for at least 5 seconds at idle speed.
 - Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
 - Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.

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TROUBLE DIAGNOSIS FOR DTC P0325

Knock Sensor (KS) (Cont'd)

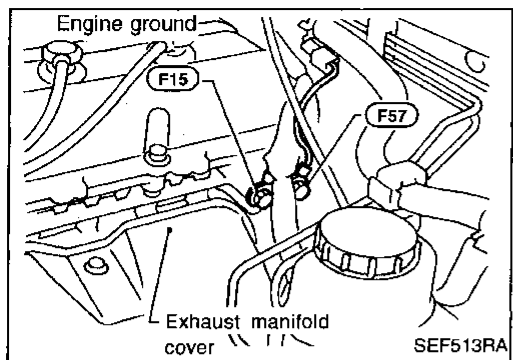
EC-KS-01



TROUBLE DIAGNOSIS FOR DTC P0325

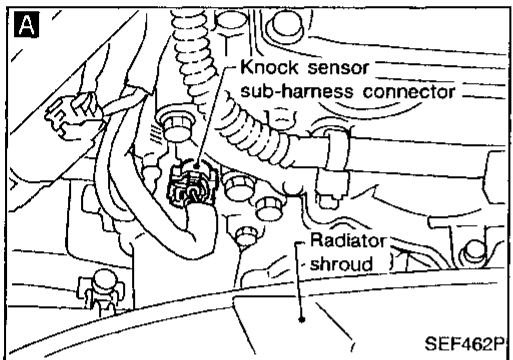
Knock Sensor (KS) (Cont'd)

DIAGNOSTIC PROCEDURE



INSPECTION START

Loosen and retighten engine ground screws.
Note: If engine ground is loose, voltage between harness connector (F26) terminal ① and engine body may be changed by retightening.

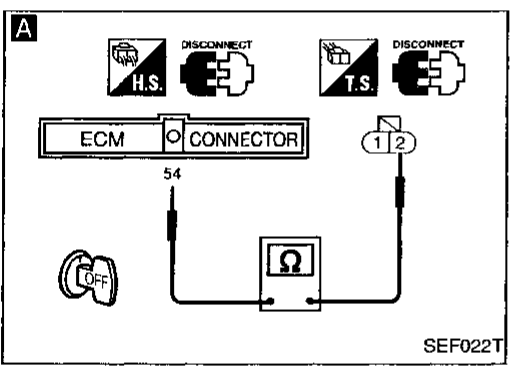


A
CHECK INPUT SIGNAL CIRCUIT.
 1. Turn ignition switch "OFF".
 2. Disconnect ECM harness connector and knock sensor sub-harness connector.
 3. Check harness continuity between terminal ② and ECM terminal ⑤.
Continuity should exist.
 If OK, check harness for short.

NG → Check the following.
 • Harness connectors (F28), (F61)
 • Harness for open or short between ECM and knock sensor
 If NG, repair harness or connectors.

OK → Check harness continuity between knock sensor and knock sensor sub-harness connector

NG → Repair harness or connectors.



OK → **CHECK COMPONENT** (Knock sensor). Refer to "COMPONENT INSPECTION" below.

NG → Replace knock sensor.

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

Trouble is not fixed.
 Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

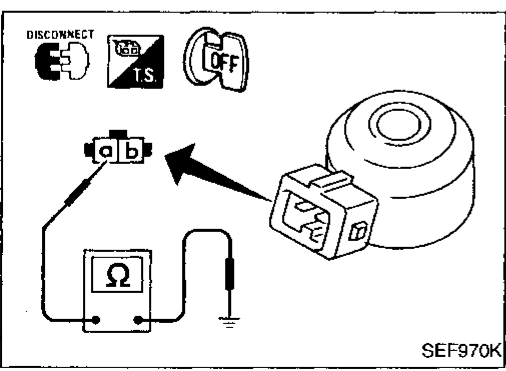
INSPECTION END

COMPONENT INSPECTION

Knock sensor

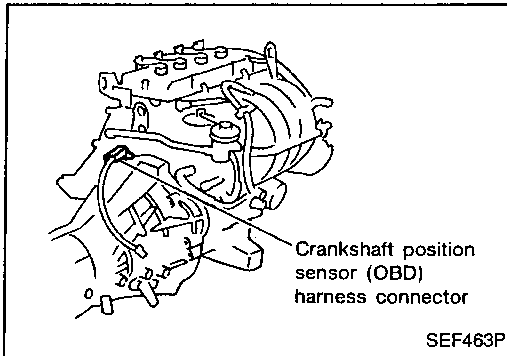
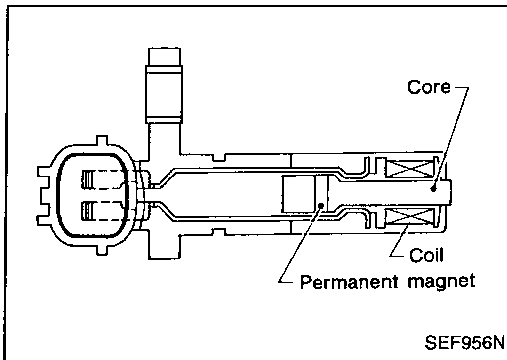
1. Disconnect knock sensor harness connector.
2. Check continuity between terminal (a) and ground.
Resistance: 500 - 620 kΩ [at 25°C (77°F)]
 - It is necessary to use an ohmmeter which can measure more than 10 MΩ.

CAUTION:
 Do not use any knock sensors that have been dropped or physically damaged. Use only new ones.



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TROUBLE DIAGNOSIS FOR DTC P0335



Crankshaft Position Sensor (CKPS) (OBD)

The crankshaft position sensor (OBD) is located on the transmission housing facing the gear teeth (cogs) of the flywheel or drive plate. It detects the fluctuation of the engine revolution.

The sensor consists of a permanent magnet, core and coil.

When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.

The changing gap causes the magnetic field near the sensor to change.

Due to the changing magnetic field, the voltage from the sensor changes.

The ECM receives the voltage signal and detects the fluctuation of the engine revolution.

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

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P0335 0802	<ul style="list-style-type: none"> ● The proper pulse signal from the crankshaft position sensor (OBD) is not sent to ECM while the engine is running at the specified engine speed. 	<ul style="list-style-type: none"> ● Harness or connectors (The crankshaft position sensor (OBD) circuit is open.) ● Crankshaft position sensor (OBD)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE



- 1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT.
- 2) Start engine and run it for at least 10 seconds at idle speed.

OR



- 1) Start engine and run it for at least 10 seconds at idle speed.
- 2) Select "MODE 7" with GST.

OR

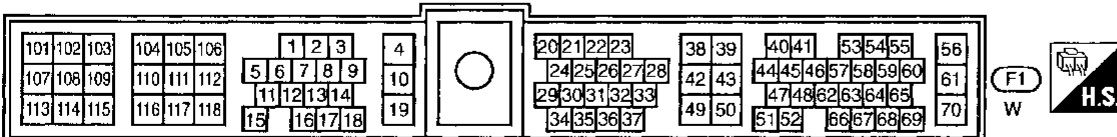
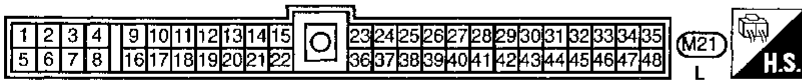
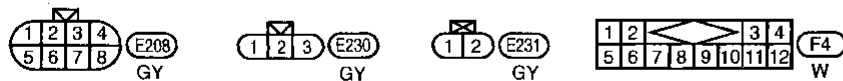
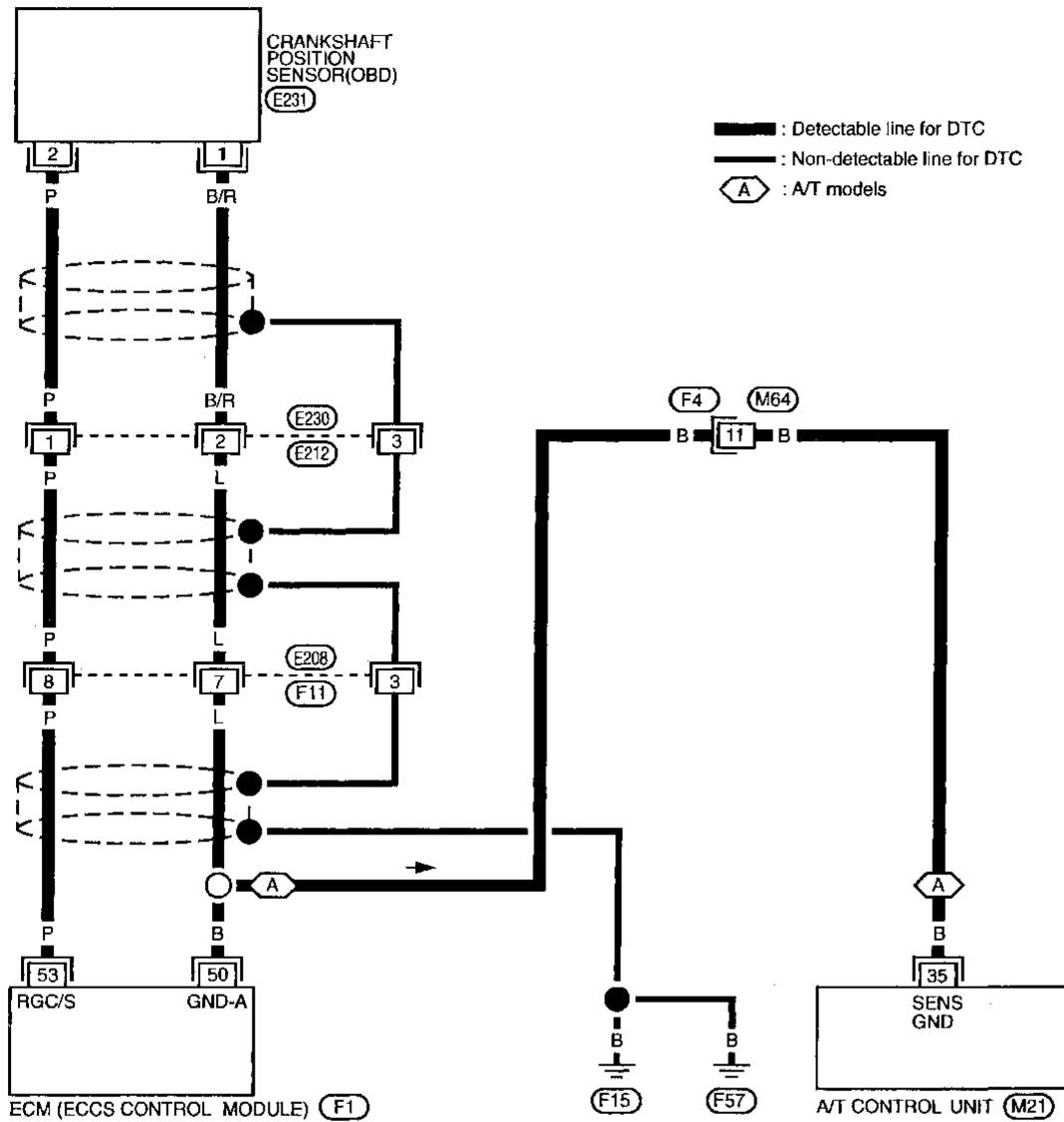


- 1) Start engine and run it for at least 10 seconds at idle speed.
- 2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
- 3) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.

TROUBLE DIAGNOSIS FOR DTC P0335

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

EC-CKPS-01



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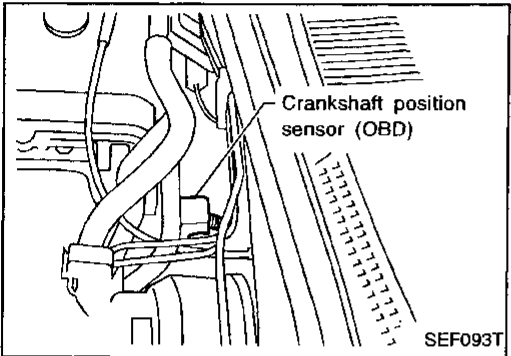
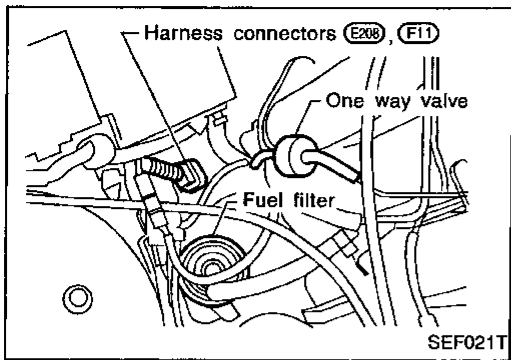
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TROUBLE DIAGNOSIS FOR DTC P0335

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

DIAGNOSTIC PROCEDURE



INSPECTION START

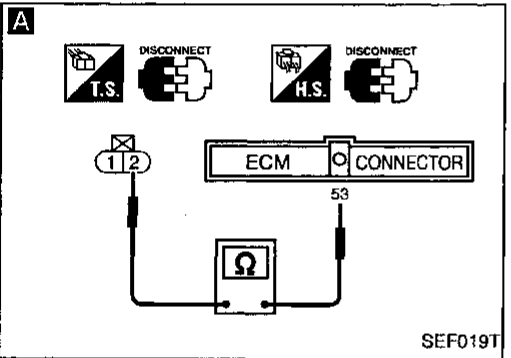
A
CHECK INPUT SIGNAL CIRCUIT.
1. Turn ignition switch "OFF".
2. Disconnect crankshaft position sensor (OBD) and ECM harness connectors.
3. Check continuity between ECM terminal ③ and terminal ②.
Continuity should exist.
If OK, check harness for short.

NG → Check the following.

- Harness connectors (E230, E212)
- Harness connectors (E208, F11)
- Harness for open or short between ECM and crankshaft position sensor (OBD)

 If NG, repair harness or connectors.

OK
 Loosen and retighten engine ground screws.
Note: If engine ground is loose, voltage between harness connector (F11) terminal ③ and engine body may be changed by retightening.



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

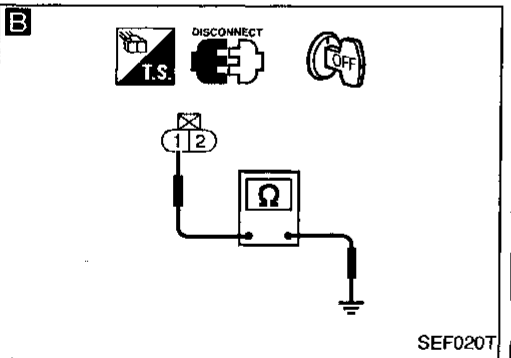
NG → Check the following.

- Harness connectors (E230, E212)
- Harness connectors (E208, F11)
- Harness connectors (F4, M54)
- Harness for open or short between ECM and crankshaft position sensor (OBD) harness connector
- Harness for open or short between A/T control unit and crankshaft position sensor (OBD)

 If NG, repair harness or connectors.

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

NG → Replace crankshaft position sensor (OBD).



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

Trouble is not fixed.
 Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

INSPECTION END

TROUBLE DIAGNOSIS FOR DTC P0335

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

COMPONENT INSPECTION

Crankshaft position sensor (OBD)

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

GI

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EM

5. Check resistance as shown in the figure.

Resistance: Approximately $166.5 - 203.5\Omega$ at 20°C (68°F)

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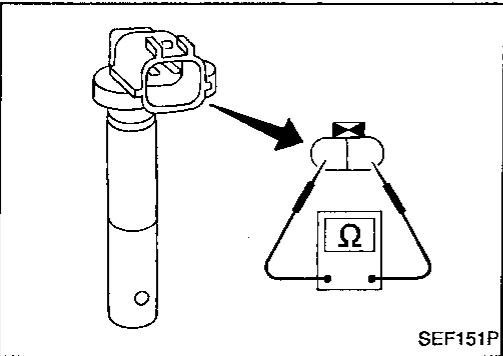
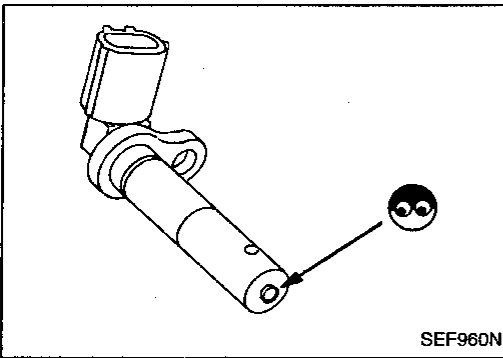
RS

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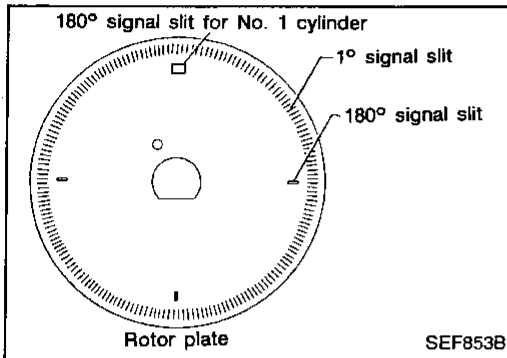
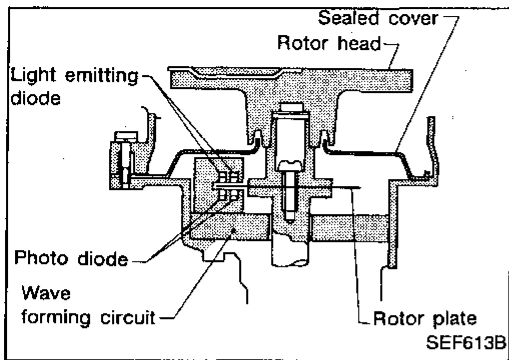
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TROUBLE DIAGNOSIS FOR DTC P0340



Camshaft Position Sensor (CMPS)

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

The camshaft position sensor has a rotor plate and a wave-forming circuit. The rotor plate has 360 slits for a 1° signal and 4 slits for a 180° signal. The wave-forming circuit consists of Light Emitting Diodes (LED) and photo diodes.




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

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

Diagnostic Trouble Code No.	Malfunction is detected when	Check items (Possible cause)
P0340 0101	<ul style="list-style-type: none"> ● Either 1° or 180° signal is not sent to ECM for the first few seconds during engine cranking. <hr style="border-top: 1px dotted black;"/> ● Either 1° or 180° signal is not sent to ECM often enough while the engine speed is higher than the specified engine speed. <hr style="border-top: 1px dotted black;"/> ● The relation between 1° and 180° signal is not in the normal range during the specified engine speed. 	<ul style="list-style-type: none"> ● Harness or connectors (The camshaft position sensor circuit is open or shorted.) ● Camshaft position sensor ● Starter motor (Refer to EL section.) ● Starting system circuit (Refer to EL section.) ● Dead (Weak) battery

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

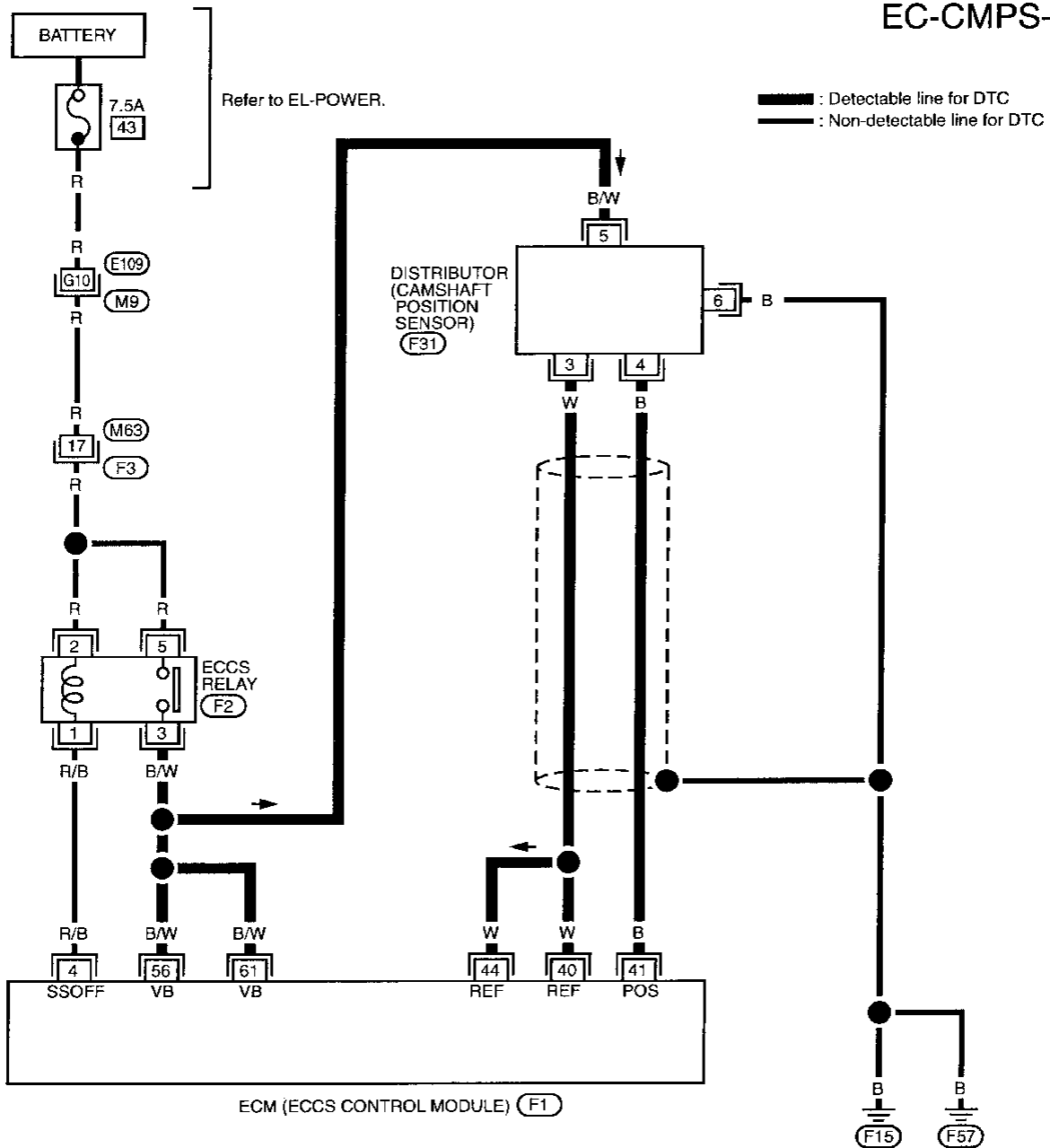
Note: Before performing the following procedure, confirm that battery voltage is more than 10.5V.

- | | |
|---|---|
|  | <ol style="list-style-type: none"> 1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT. 2) Crank engine for at least 2 seconds. |
| OR | |
|  | <ol style="list-style-type: none"> 1) Crank engine for at least 2 seconds. 2) Select "MODE 7" with GST. |
| OR | |
|  | <ol style="list-style-type: none"> 1) Crank engine for at least 2 seconds. 2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON". 3) Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM. |

TROUBLE DIAGNOSIS FOR DTC P0340

Camshaft Position Sensor (CMPS) (Cont'd)

EC-CMPS-01



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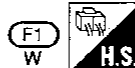
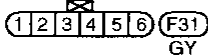
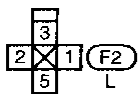
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Refer to last page (Foldout page).

E109, M9

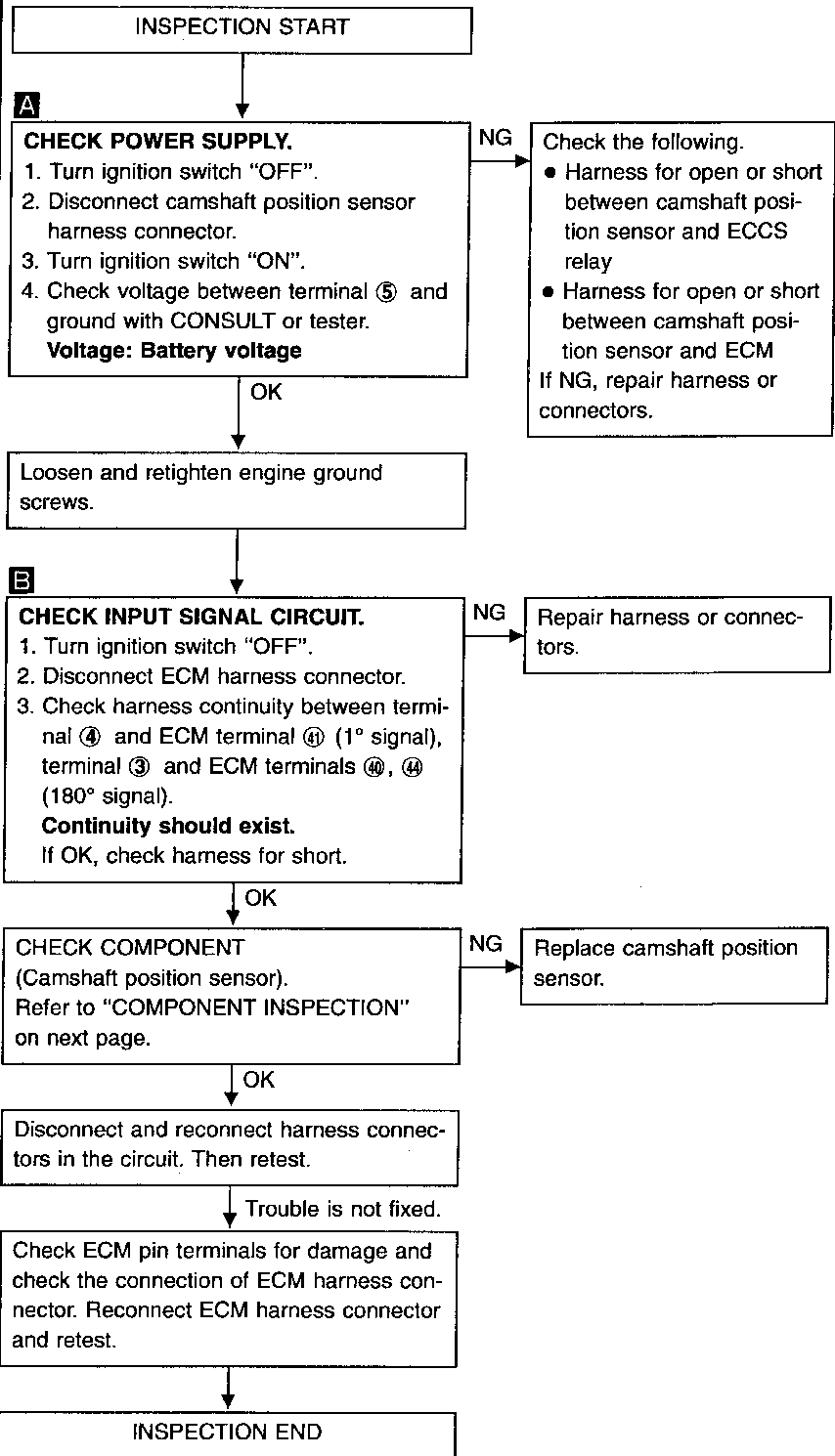
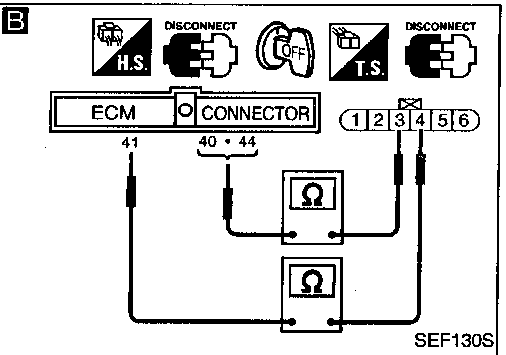
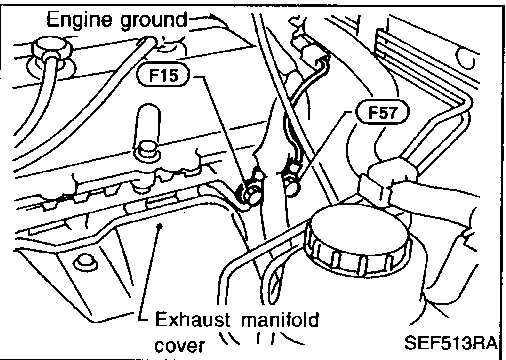
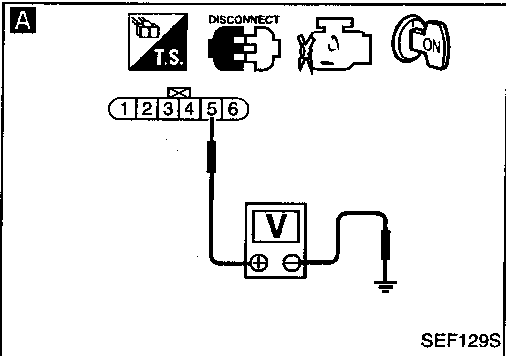
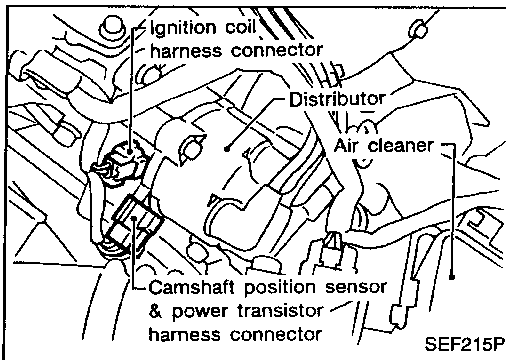
M63, F3



101	102	103	104	105	106	1	2	3	4	20	21	22	23	38	39	40	41	53	54	55	56				
107	108	109	110	111	112	5	6	7	8	9	10	24	25	26	27	28	42	43	44	45	46	57	58	59	60
113	114	115	116	117	118	11	12	13	14	19	29	30	31	32	33	47	48	49	50	47	48	62	63	64	65
						15	16	17	18		34	35	36	37	49	50	51	52	66	67	68	69	70		

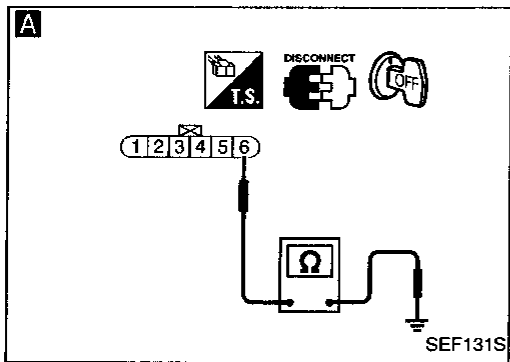
TROUBLE DIAGNOSIS FOR DTC P0340

Camshaft Position Sensor (CMPS) (Cont'd) DIAGNOSTIC PROCEDURE (DETECTABLE CIRCUIT)



TROUBLE DIAGNOSIS FOR DTC P0340

Camshaft Position Sensor (CMPS) (Cont'd) DIAGNOSTIC PROCEDURE (NON-DETECTABLE CIRCUIT)



INSPECTION START

A
CHECK GROUND CIRCUIT.
1. Turn ignition switch "OFF".
2. Disconnect camshaft position sensor harness connector.
3. Check harness continuity between terminal ⑥ and engine ground.
Continuity should exist.
If OK, check harness for short.

NG → Repair harness or connectors.

OK

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

NG → Replace camshaft position sensor.

OK

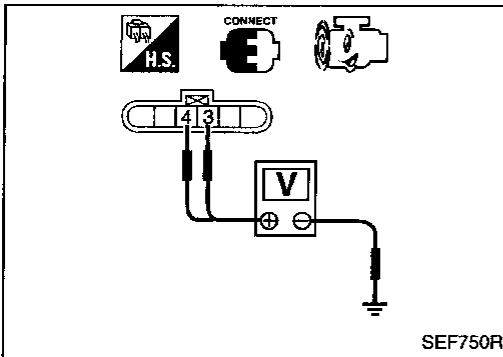
Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed.

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

INSPECTION END

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COMPONENT INSPECTION

Camshaft position sensor

1. Start engine.
2. Check voltage between terminals ③, ④ and ground with DC range.

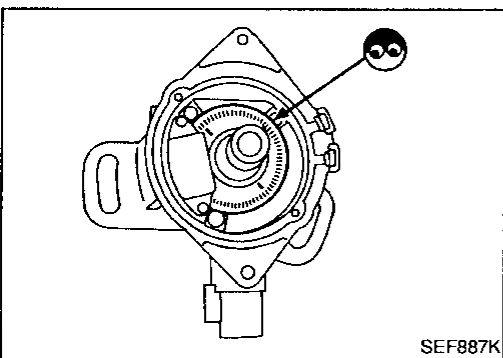
Condition	Terminals	Voltage
Engine running at idle	③ and ground	Approximately 0.3V
	④ and ground	Approximately 2.6V

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

If NG, replace distributor assembly with camshaft position sensor.

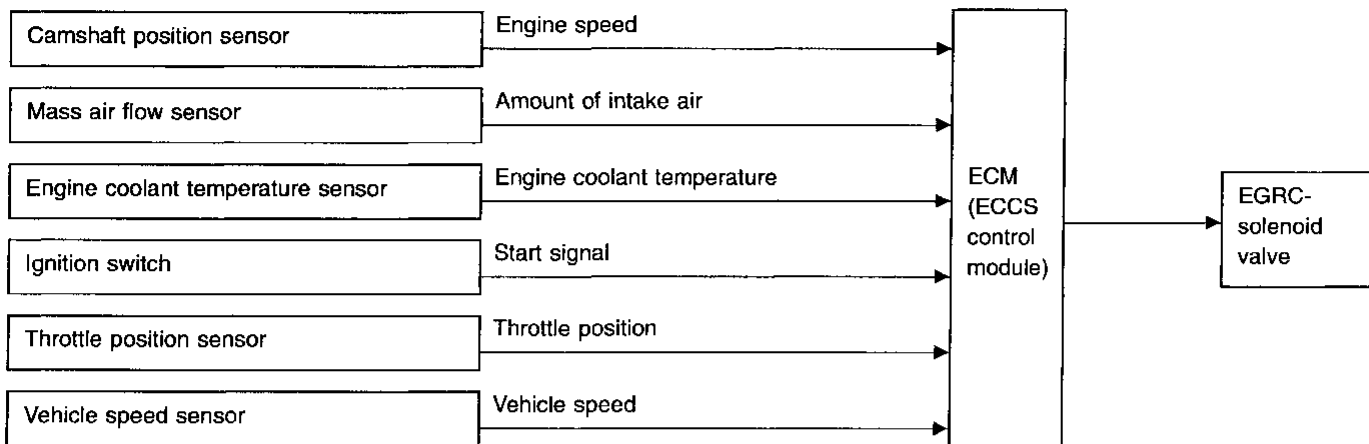
3. Visually check signal plate for damage or dust.

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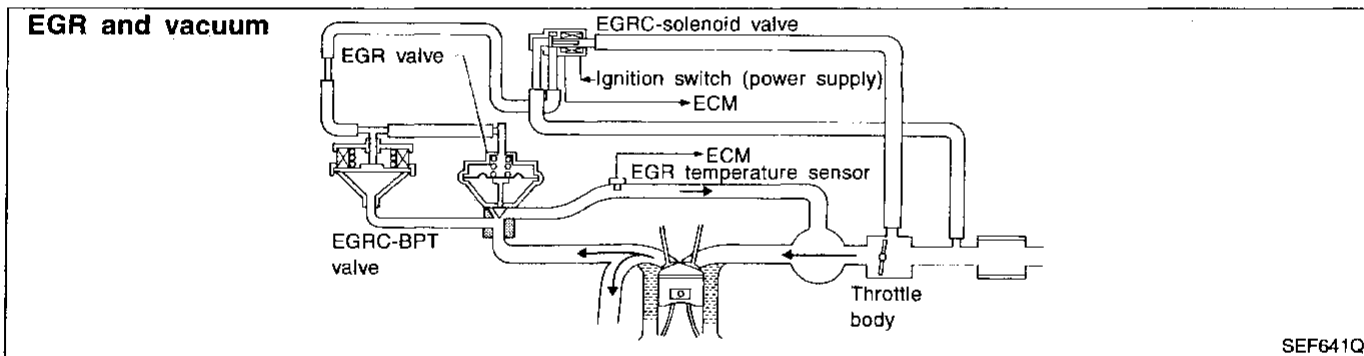
EGR Function

SYSTEM DESCRIPTION

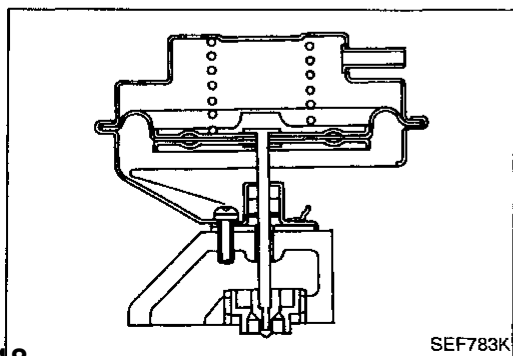


This system cuts and controls vacuum applied to the EGR valve to suit engine operating conditions. This cut-and-control operation is accomplished through the ECM and the EGRC-solenoid valve. When the ECM detects any of the following conditions, current flows through the solenoid valve. This causes the port vacuum to be discharged into the atmosphere and 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



SEF641Q



SEF783K

COMPONENT DESCRIPTION

Exhaust gas recirculation (EGR) valve

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

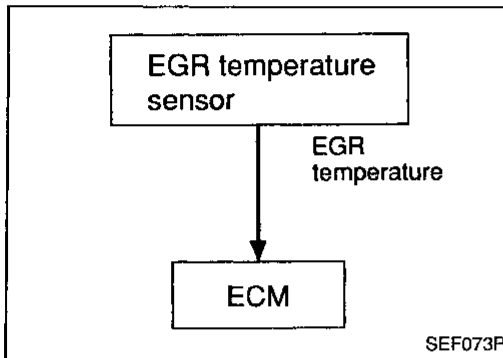
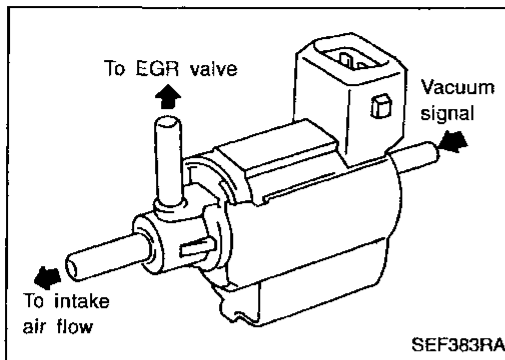
TROUBLE DIAGNOSIS FOR DTC P0400

EGR Function (Cont'd)

EGRC-solenoid valve

The EGRC-solenoid valve responds to signals from the ECM. When the ECM sends an ON (ground) signal, the coil in the solenoid valve is energized. A plunger will then move to cut the vacuum signal (from the throttle body to the EGR valve).

When the ECM sends an OFF signal, the vacuum signal passes through the solenoid valve. The signal then reaches the EGR valve.



ON BOARD DIAGNOSIS LOGIC

If the absence of EGR flow is detected by EGR temperature sensor under the condition that calls for EGR, a low-flow malfunction is diagnosed.

If EGR temperature sensor detects EGR flow under the condition that does not call for EGR, a high-flow malfunction is diagnosed.

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0400 0302	A) The exhaust gas recirculation (EGR) flow is excessively low during the specified driving condition.	<ul style="list-style-type: none"> ● EGR valve stuck closed ● EGRC-BPT valve leaking ● Passage blocked ● EGRC-solenoid valve ● Tube leaking for EGR valve ● EGR temperature sensor
	B) The exhaust gas recirculation (EGR) flow is excessively high during the specified driving condition.	<ul style="list-style-type: none"> ● EGRC-solenoid valve ● EGR valve leaking or stuck open ● EGR temperature sensor

OVERALL FUNCTION CHECK

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

Before starting with the following procedure, check the engine coolant temperature of the freeze frame data with CONSULT or Generic Scan Tool.

If the engine coolant temperature is higher than or equal to 60°C (140°F), perform only "Procedure for malfunction A".

If the engine coolant temperature is lower than 60°C (140°F), perform both "Procedure for malfunction A" and "Procedure for malfunction B".

If the 1st trip freeze frame data or the freeze frame data for another malfunction is stored in the ECM, perform both "Procedure for malfunction A" and "Procedure for malfunction B". In this case, check 1st trip DTCs and/or DTCs in the ECM and perform inspections one by one based on "INSPECTION PRIORITY", EC-74.

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TROUBLE DIAGNOSIS FOR DTC P0400

EGR Function (Cont'd)

Procedure for malfunction A

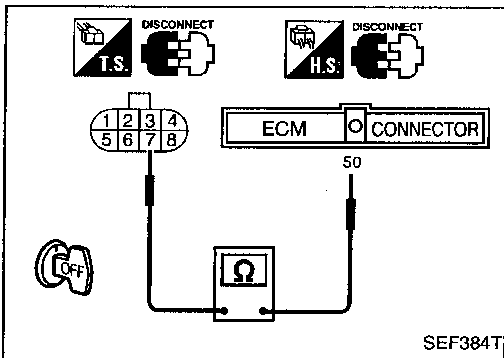
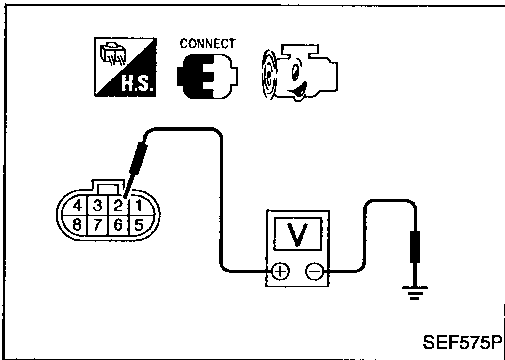
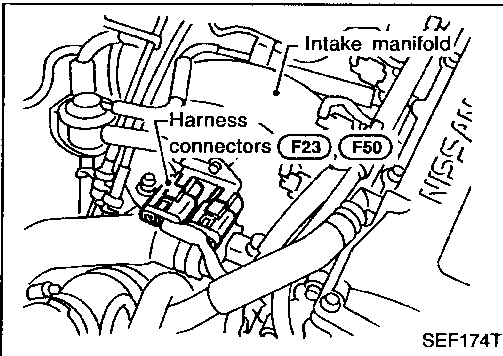
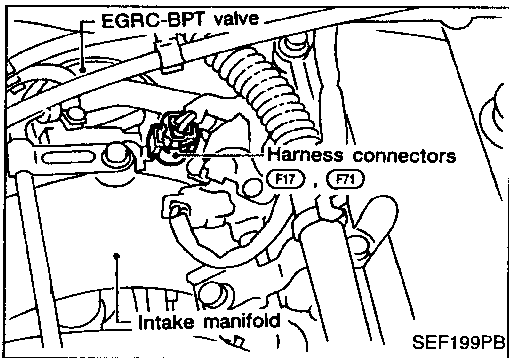
- 1) Start engine and warm it up sufficiently.
- 2) Check the EGR valve lifting when revving from 2,000 rpm up to 4,000 rpm under no load using the following methods.

-  • Select "EGRC SOLENOID VALVE" in "ACTIVE TEST" mode with CONSULT and turn the solenoid valve "OFF".
-  • Disconnect harness connectors (F17) and (F71).
(The DTC for EGRC-solenoid valve will be displayed, however, ignore it.)

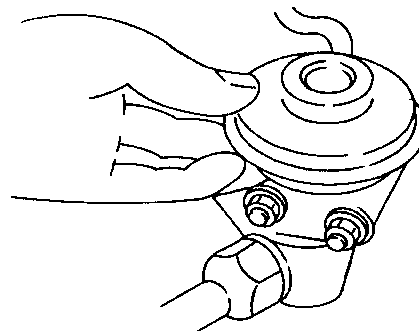
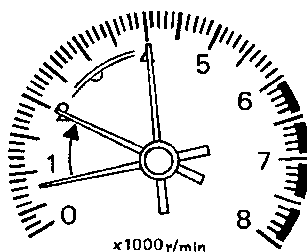
EGR valve should lift up and down without sticking.

If NG, go to **A** in DIAGNOSTIC PROCEDURE on EC-177.

- 3) Check voltage between harness connector (F23) terminal ② and ground at idle speed.
Less than 4.5V should exist.
- 4) Turn ignition switch "OFF".
- 5) Disconnect harness connectors (F23), (F50) and ECM harness connector.
- 6) Check harness continuity between harness connector (F23) terminal ⑦ and ECM terminal ⑤0.
Continuity should exist.
- 7) Perform "COMPONENT INSPECTION", "EGR temperature sensor". (See page EC-255.)



Overall function check



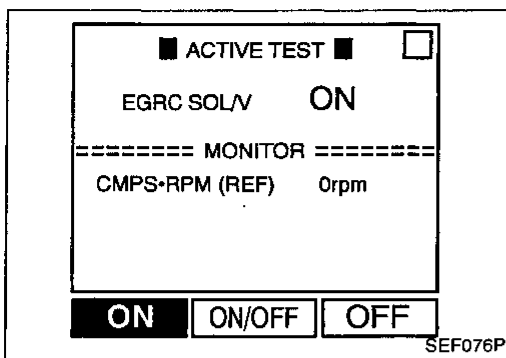
Check the EGR valve lifting when revving engine from 2,000 rpm up to 4,000 rpm.

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TROUBLE DIAGNOSIS FOR DTC P0400

EGR Function (Cont'd)

Procedure for malfunction B



- 1) Start engine.
- 2) Select "EGRC solenoid valve" in "ACTIVE TEST" mode with CONSULT and turn the solenoid valve "ON".
- 3) Check for the EGR valve lifting when revving from 2,000 rpm up to 4,000 rpm under no load.

EGR valve should be closed and should not lift up.

OR

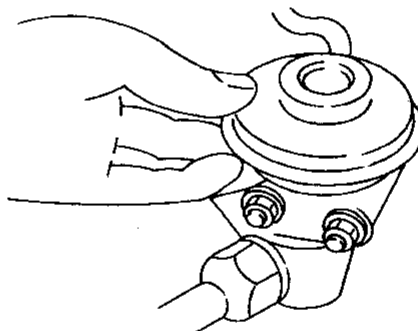
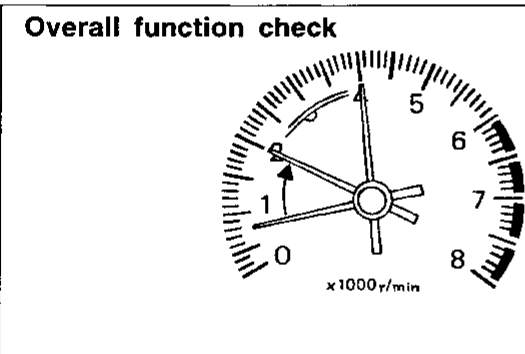
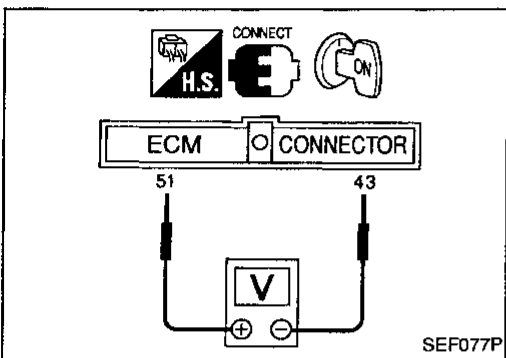
- 1) Turn ignition switch "ON".
- 2) Confirm the engine coolant temperature is lower than 55°C (131°F) in "Mode 1" with generic scan tool. Perform the following steps before its temperature becomes higher than 55°C (131°F).
- 3) Start engine.
- 4) Check for the EGR valve lifting when revving from 2,000 rpm up to 4,000 rpm under no load.

EGR valve should be closed and should not lift up.

OR

- 1) Turn ignition switch "ON".
- 2) Confirm the voltage between ECM terminals 51 and 43 is higher than 2.08V. Perform the following steps before the voltage becomes lower than 2.08V.
- 3) Start engine.
- 4) Check for the EGR valve lifting when revving from 2,000 rpm up to 4,000 rpm under no load.

EGR valve should be closed and should not lift up.



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

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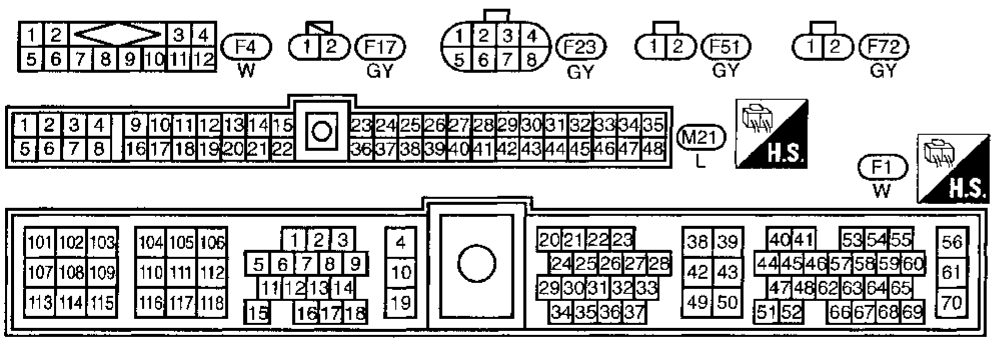
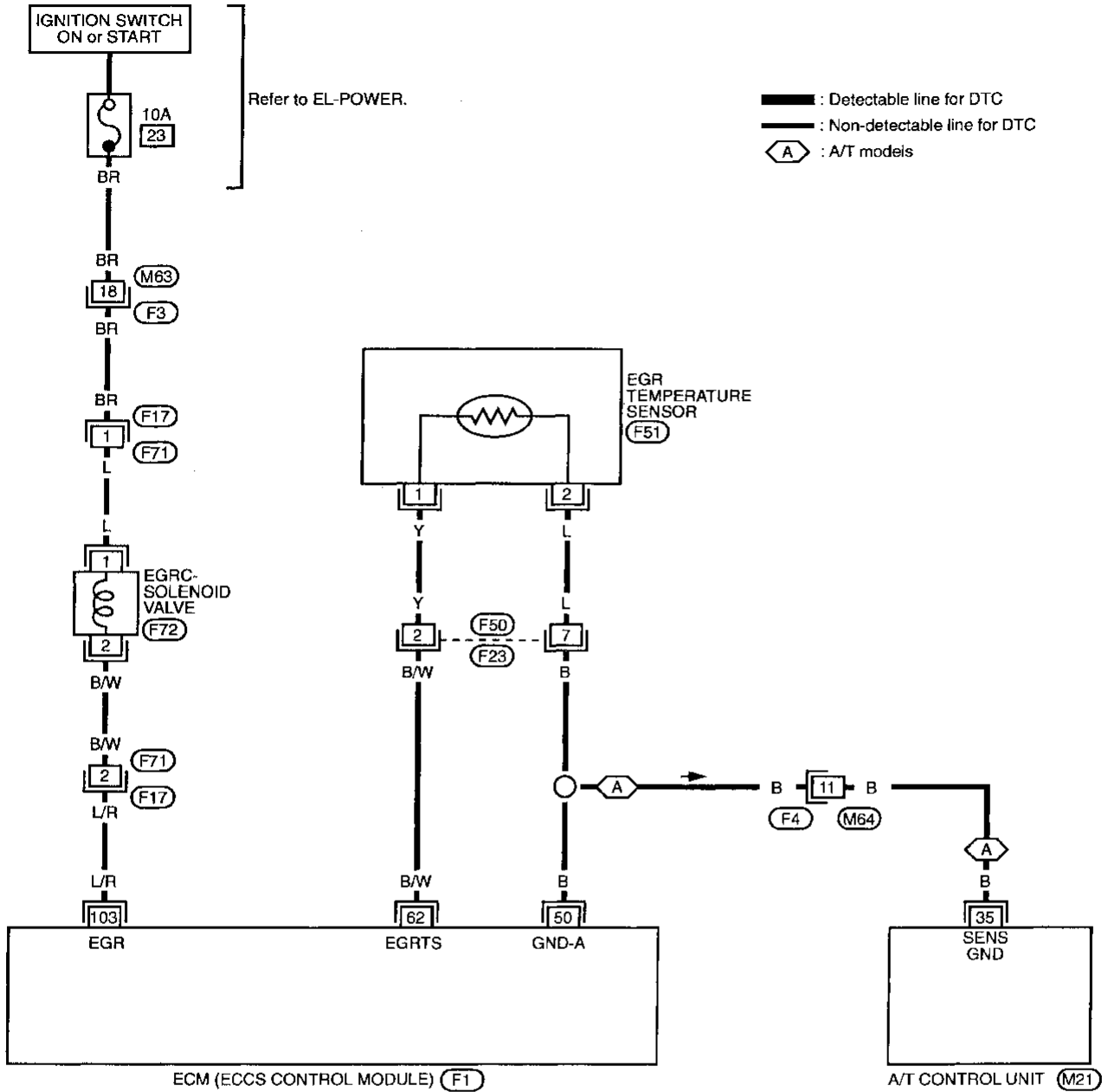
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TROUBLE DIAGNOSIS FOR DTC P0400

EGR Function (Cont'd)

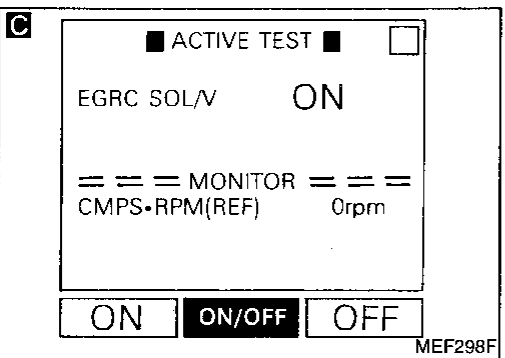
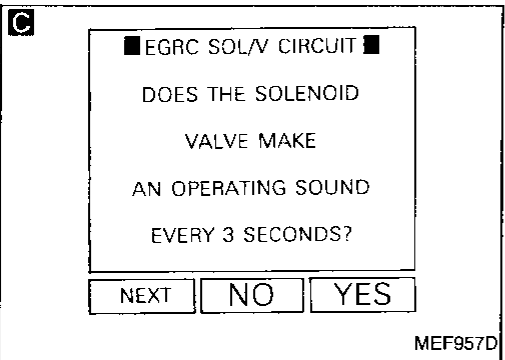
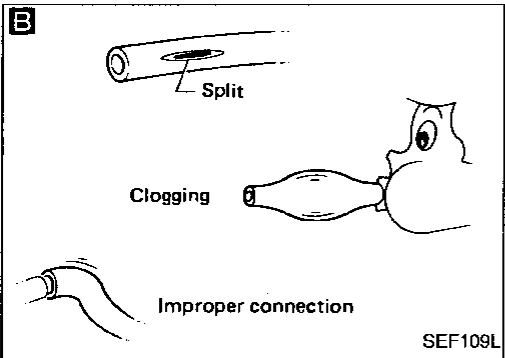
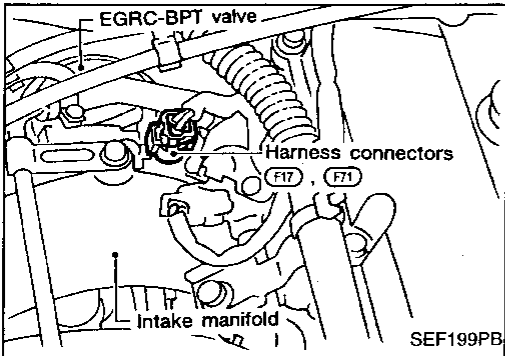
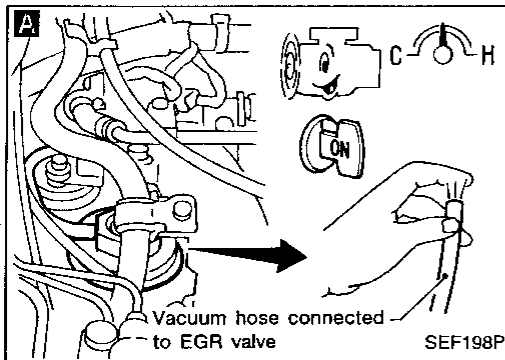
EC-EGRC1-01



Refer to last page (Foldout page).
 (M63), (F3)

TROUBLE DIAGNOSIS FOR DTC P0400

EGR Function (Cont'd) DIAGNOSTIC PROCEDURE



INSPECTION START

A

CHECK VACUUM SOURCE TO EGR VALVE.

1. Start engine and warm it up sufficiently.
2. Disconnect vacuum hose to EGR valve.
3. Check for vacuum existence.
4. Check for vacuum existence when revving from 2,000 rpm up to 4,000 rpm with the following methods.

Vacuum should not exist at idle.

- Select "EGRC SOLENOID VALVE" in "ACTIVE TEST" mode with CONSULT and turn the solenoid valve "OFF".

OR

- Disconnect harness connectors (F17), (F71). (The DTC for EGRC-solenoid valve will be displayed, however, ignore it.)

Vacuum should exist when revving engine.

OK → **CHECK COMPONENTS (EGR valve).**
Refer to "COMPONENT INSPECTION", EC-178.

NG ↓
Replace malfunctioning component(s).

NG ↓

B

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

NG → **Repair or replace vacuum hose, or correct routing.**

OK ↓

C

CHECK COMPONENT (EGRC-solenoid valve).

- 1. Turn ignition switch "ON".
2. Perform "EGRC SOL/V CIRCUIT" in "FUNCTION TEST" mode with CONSULT.

OR

- 1. Turn ignition switch "ON".
2. Turn EGRC-solenoid valve "ON" and "OFF" in "ACTIVE TEST" mode with CONSULT and check operating sound.

OR

- 1. Turn ignition switch "ON".
2. Check operating sound of the solenoid valve when disconnecting and reconnecting harness connectors (F17), (F71). (The DTC or the 1st trip DTC for the EGRC-solenoid valve will be displayed, however, ignore it.)

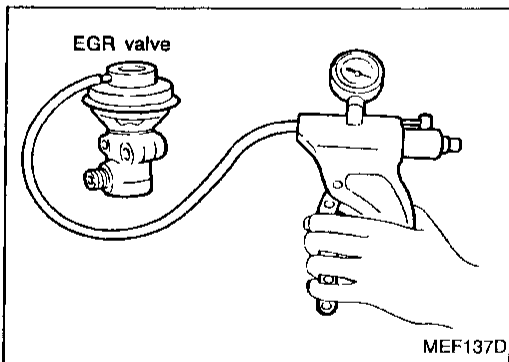
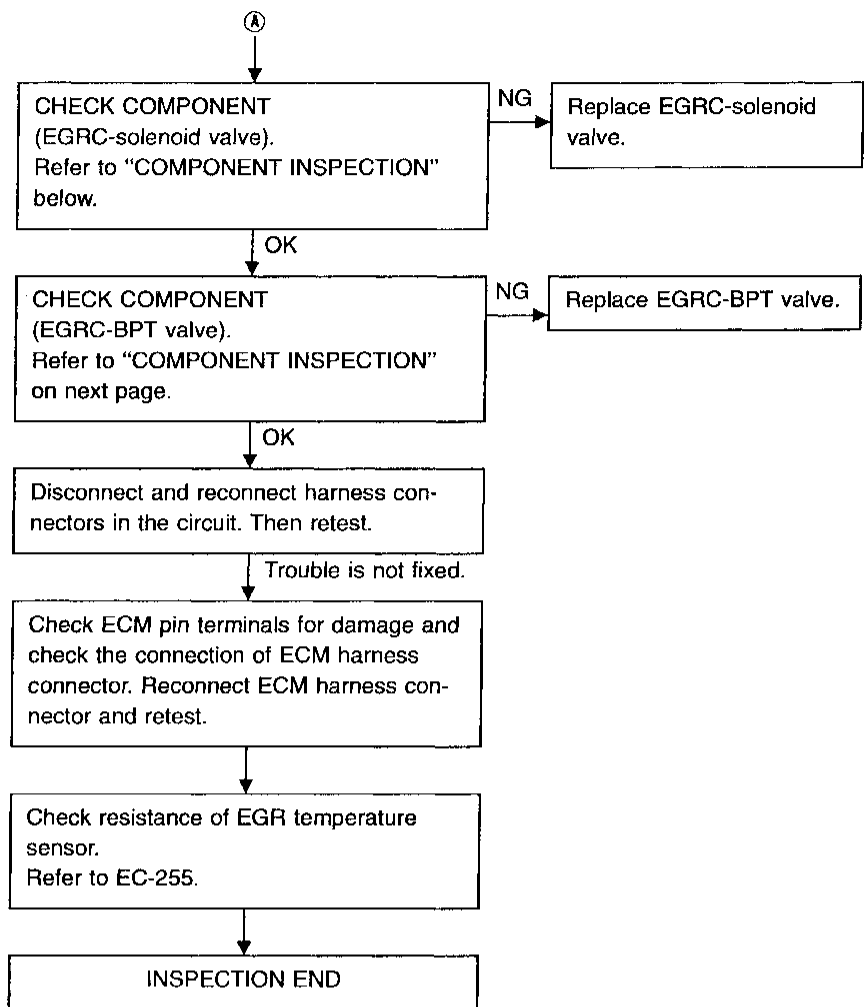
NG → **Repair or replace EGRC-solenoid valve or repair circuit.**

OK ↓
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TROUBLE DIAGNOSIS FOR DTC P0400

EGR Function (Cont'd)



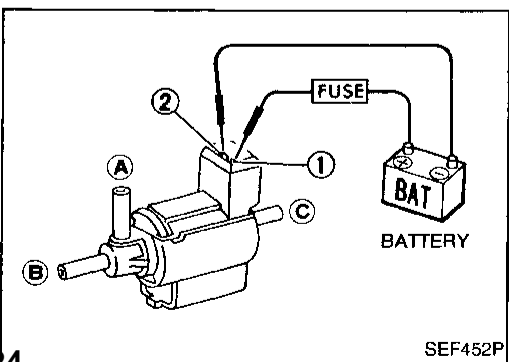
COMPONENT INSPECTION

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

If NG, replace the solenoid valve.

TROUBLE DIAGNOSIS FOR DTC P0400

EGR Function (Cont'd)

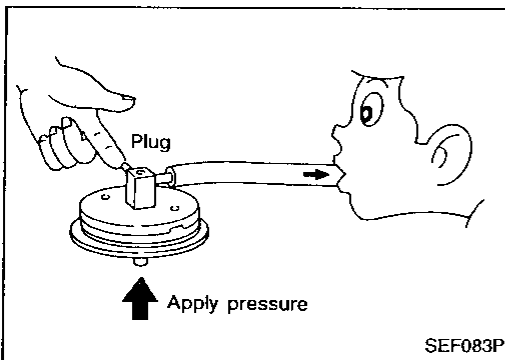
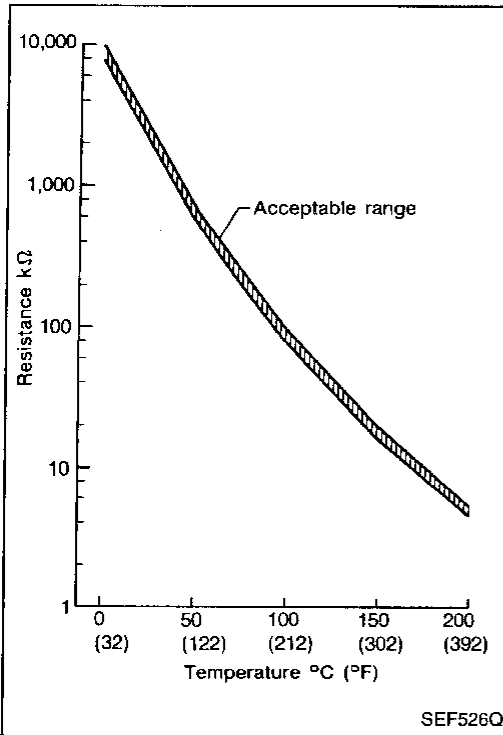
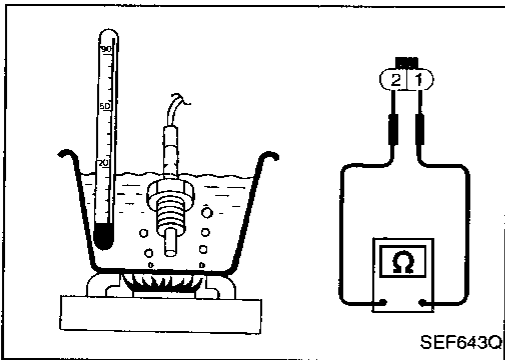
EGR temperature sensor

Check resistance change and resistance value.

(Reference data)

EGR temperature °C (°F)	Voltage (V)	Resistance (MΩ)
0 (32)	4.81	7.9 - 9.7
50 (122)	2.82	0.57 - 0.70
100 (212)	0.8	0.08 - 0.10

If NG, replace EGR temperature sensor.



EGRC-BPT valve

1. Plug one of two ports of EGRC-BPT valve.
2. Vacuum from the other port and check for leakage while applying a pressure above 0.981 kPa (100 mmH₂O, 3.94 inH₂O) from under EGRC-BPT valve.
3. If a leakage is noted, replace the valve.

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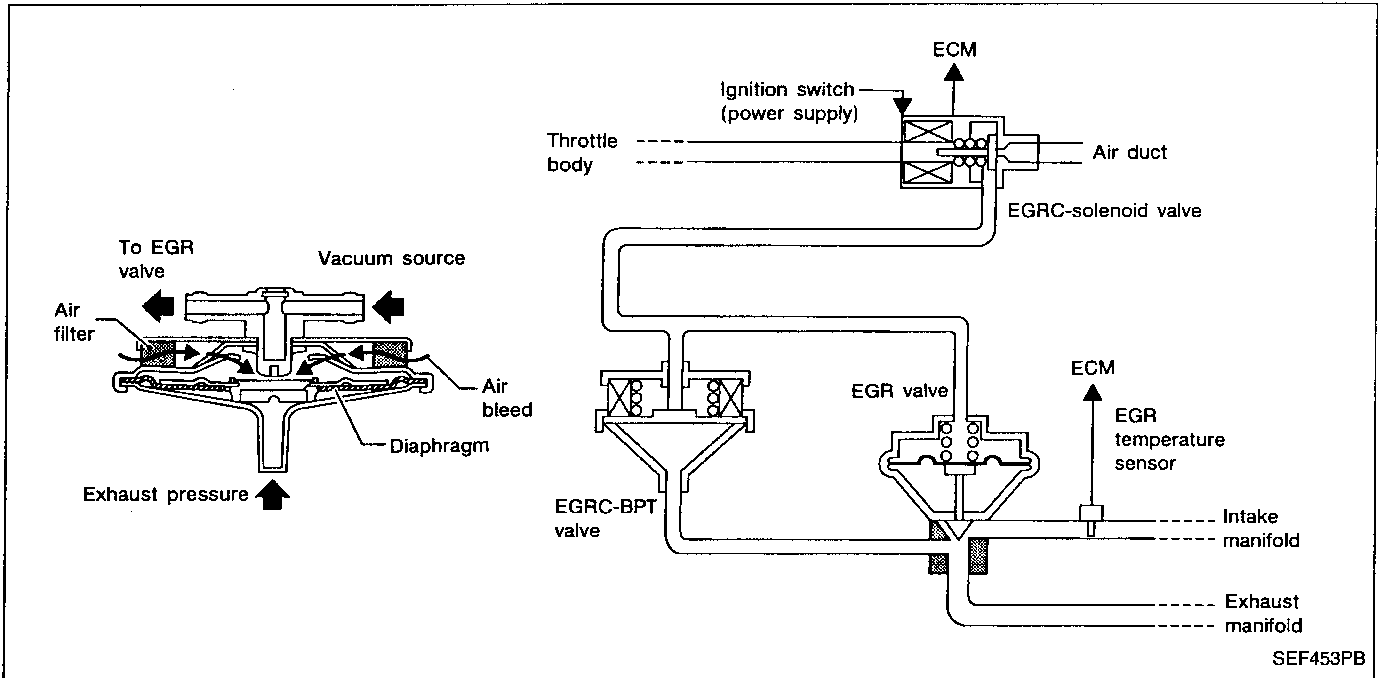
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EGRC-BPT Valve Function



SYSTEM DESCRIPTION

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

ON BOARD DIAGNOSIS LOGIC

If too much EGR flow exists due to an EGRC-BPT valve malfunction, off idle engine roughness will increase. If the roughness is large, then the vacuum to the EGR valve is interrupted through the EGRC-solenoid valve. If the engine roughness is reduced at that time, the EGRC-BPT valve malfunction is indicated.

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0402 0306	<ul style="list-style-type: none"> The EGRC-BPT valve does not operate properly. 	<ul style="list-style-type: none"> EGRC-BPT valve Misconnected rubber tube Blocked rubber tube Intake manifold EGR passage

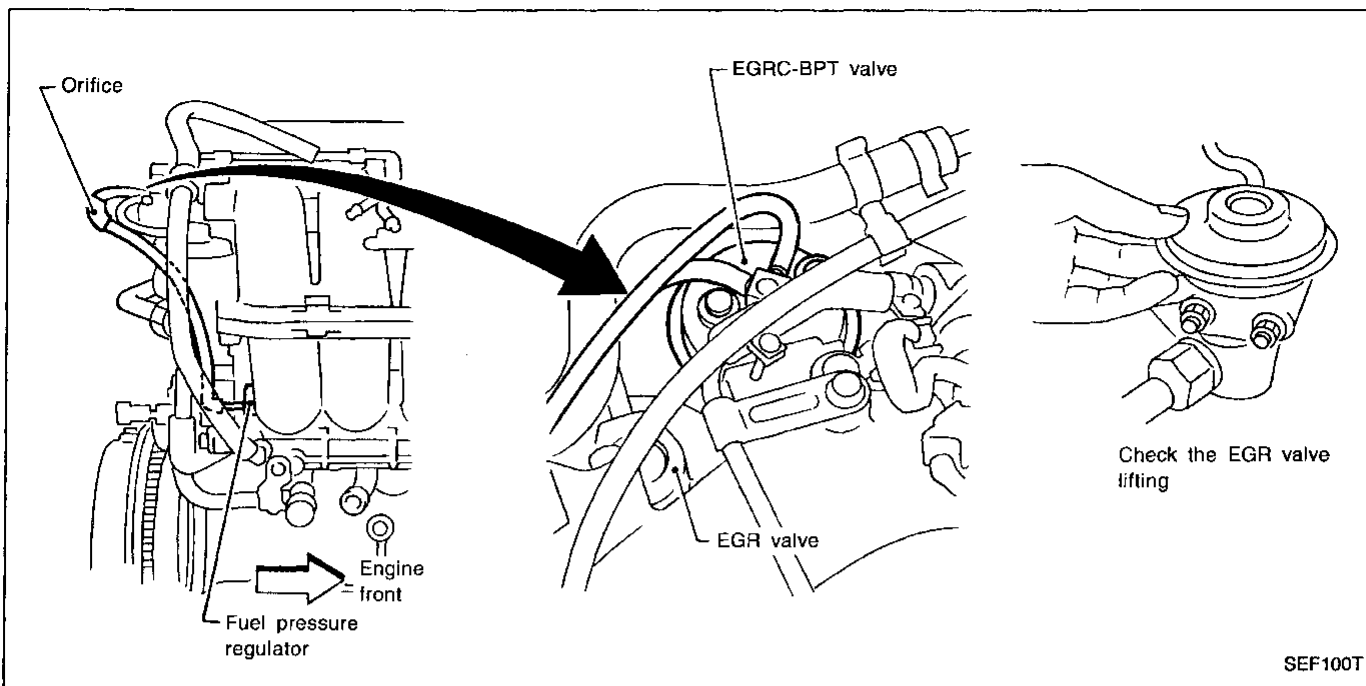
OVERALL FUNCTION CHECK

Use this procedure to check the overall function of the EGRC-BPT valve. During this check, a 1st trip DTC might not be confirmed.

1. Disconnect the rubber tube to the fuel pressure regulator at the intake manifold.
2. Disconnect the rubber tube to the EGRC-solenoid valve at the EGRC-BPT valve. Connect the intake manifold and the EGRC-BPT valve with a rubber tube that has 1 mm (0.04 in) dia. orifice installed. (The intake manifold vacuum will be directly applied to the EGRC-BPT valve.)
3. Start engine.
4. Check for the EGR valve lifting with engine at idle speed under no load.
EGR valve should remain closed.
5. Check the EGR valve lifting when revving from 1,500 rpm up to 3,000 rpm under no load.
EGR valve should lift up, and go down without sticking when the engine is returned to idle.
6. Check rubber tube between EGRC-solenoid valve and throttle body for misconnection, cracks or blockages.

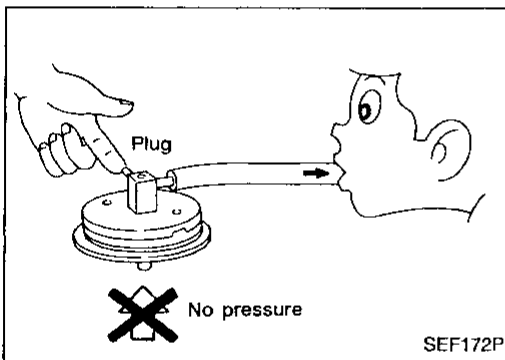
TROUBLE DIAGNOSIS FOR DTC P0402

EGRC-BPT Valve Function (Cont'd)



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COMPONENT INSPECTION

EGRC-BPT valve

- 1) Plug one of two ports of EGRC-BPT valve.
- 2) Vacuum from the other port and check leakage without applying any pressure from under EGR-BPT valve.
Leakage should exist.

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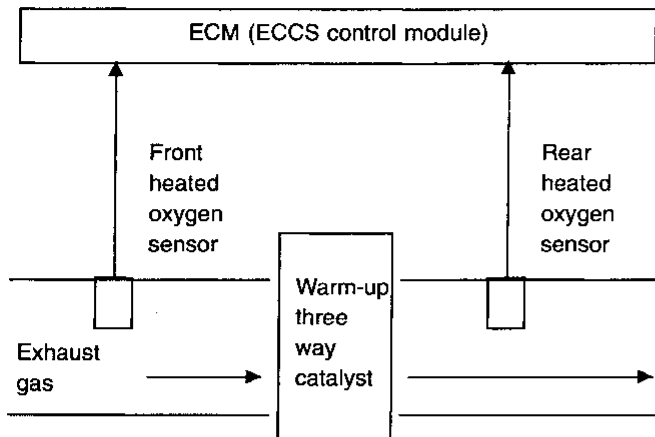
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Three Way Catalyst Function

ON BOARD DIAGNOSIS LOGIC



The ECM monitors the switching frequency ratio of front heated oxygen sensor and rear heated oxygen sensor.

A warm-up three way catalyst with high oxygen storage capacity will indicate a low switching frequency of rear heated oxygen sensor. As oxygen storage capacity decreases, the rear heated oxygen sensor switching frequency will increase.

When the frequency ratio of front heated oxygen sensor and rear heated oxygen sensor approaches a specified limit value, the warm-up three way catalyst malfunction is diagnosed.

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0420 0702	<ul style="list-style-type: none"> ● Warm-up three way catalyst does not operate properly. ● Warm-up three way catalyst does not have enough oxygen storage capacity. 	<ul style="list-style-type: none"> ● Warm-up three way catalyst ● Exhaust tube ● Intake air leak ● Injectors ● Injector leak

OVERALL FUNCTION CHECK

Use this procedure to check the overall function of the warm-up three way catalyst. During this check, a 1st trip DTC might not be confirmed.

☆ MONITOR
☆ NO FAIL

CMPS•RPM(REF)	2137rpm
MAS AIR/FL SE	1.96V
COOLAN TEMP/S	84°C
FR O2 SENSOR	0.37V
FR O2 MNTR	LEAN
RR O2 SENSOR	1.30V
RR O2 MNTR	RICH

RECORD

SEF097P



- 1) Start engine and warm it up sufficiently.
- 2) Set "MANU TRIG" and "HI SPEED", then select "FR O2 SENSOR", "RR O2 SENSOR", "FR O2 MNTR", "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 MNTR" is very less than that of "FR O2 MNTR".

Switching frequency ratio =

Rear heated oxygen sensor switching frequency

Front heated oxygen sensor switching frequency

This ratio should be less than 0.9.

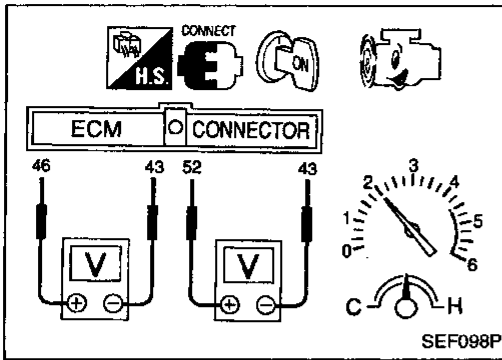
If the ratio is greater than above, the warm-up three way catalyst is not operating properly.

Note: If the "FR O2 MNTR" does not indicate "RICH" and "LEAN" periodically more than 5 times within 10 seconds at step 3, perform TROUBLE DIAGNOSIS FOR DTC P0130 first. (See EC-126.)

OR

TROUBLE DIAGNOSIS FOR DTC P0420

Three Way Catalyst Function (Cont'd)



- 1) Start engine and warm it up sufficiently.
- 2) Set voltmeter probes between ECM terminals ④⑥ (front heated oxygen sensor signal) and ④③ (engine ground), and ECM terminals ⑤② (rear heated oxygen sensor signal) and ④③ (engine ground).
- 3) Keep engine speed at 2,000 rpm constant under no load.
- 4) Make sure that the voltage switching frequency (high & low) between ECM terminals ⑤② and ④③ is very less than that of ECM terminals ④⑥ and ④③.

Switching frequency ratio =

Rear heated oxygen sensor voltage switching frequency

Front heated oxygen sensor voltage switching frequency

This ratio should be less than 0.9.

If the ratio is greater than above, it means warm-up three way catalyst does not operate properly.

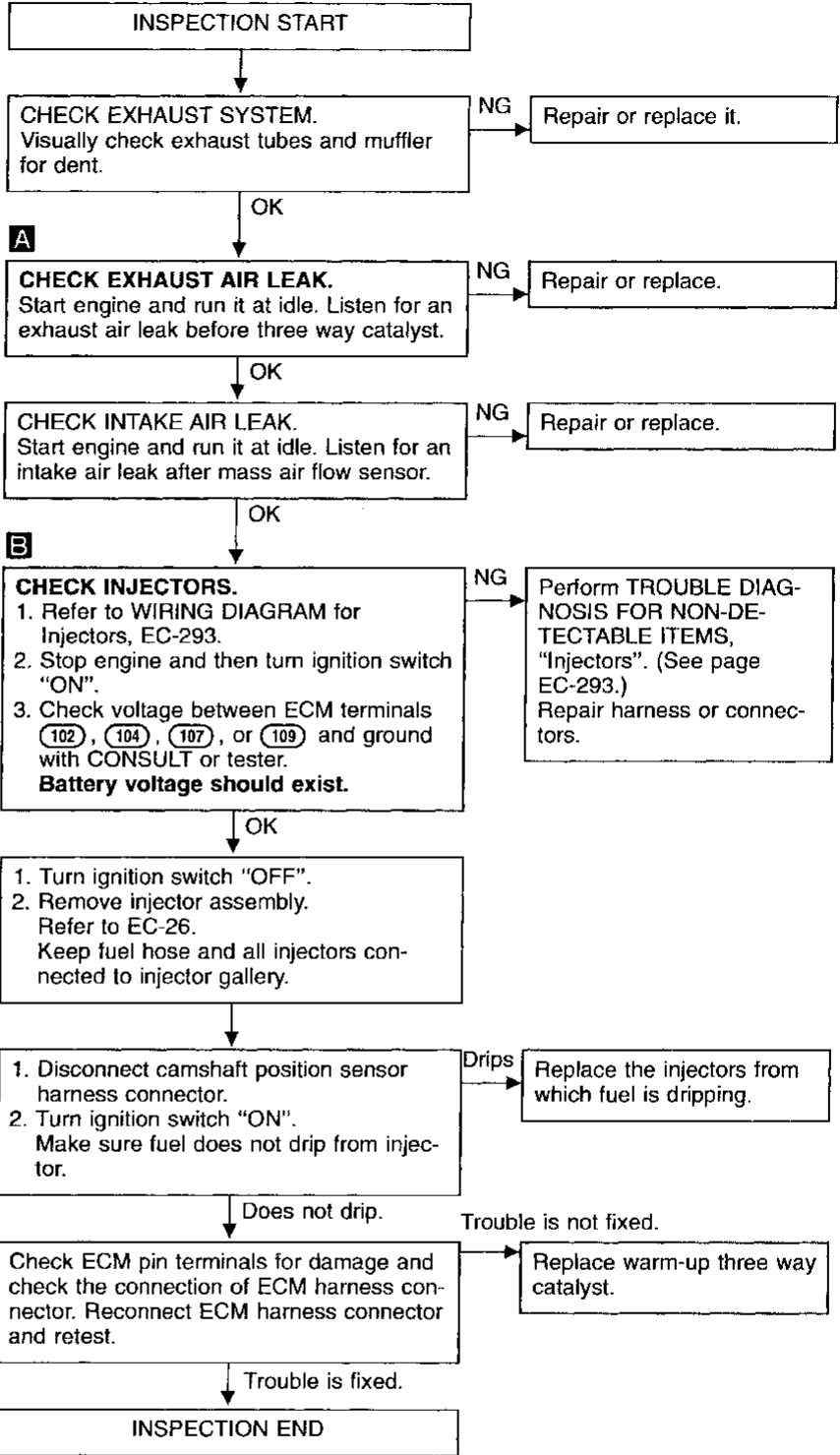
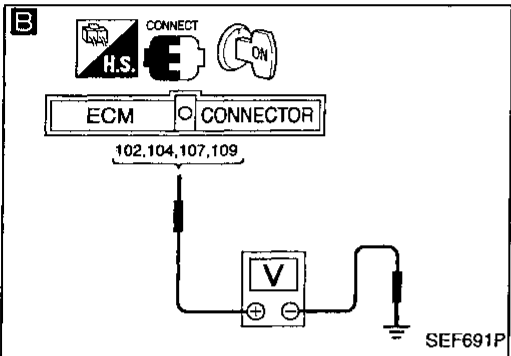
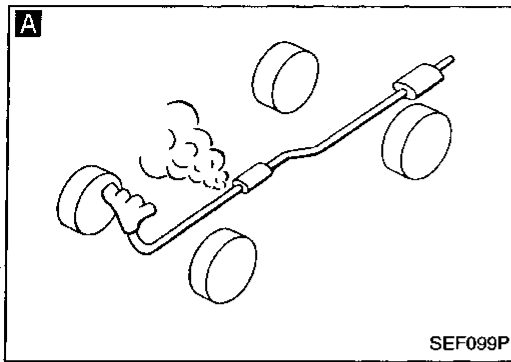
Note: If the voltage at terminal ④⑥ does not switch periodically more than 5 times within 10 seconds at step 3, perform TROUBLE DIAGNOSIS FOR DTC P0130 (Front heated oxygen sensor) first. (See page EC-126.)

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TROUBLE DIAGNOSIS FOR DTC P0420

Three Way Catalyst Function (Cont'd)

DIAGNOSTIC PROCEDURE



Evaporative Emission (EVAP) Control System
(Small Leak)

Note:

If both DTC P0440 and P0446 are displayed, perform TROUBLE DIAGNOSIS FOR DTC P0446 first. (See EC-203.)

ON BOARD DIAGNOSIS LOGIC

This diagnosis uses two methods to detect leaks in the EVAP purge line.

The first method, the pressure test, makes use of vapor pressure in the fuel tank. The second method, the vacuum test, makes use of engine intake manifold vacuum.

Pressure test

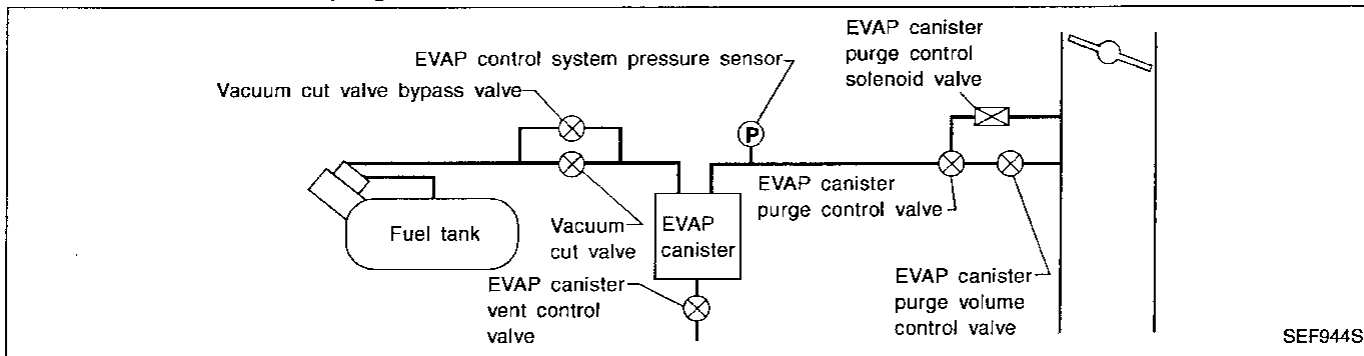
The EVAP canister vent control valve is closed to shut the EVAP purge line. The vacuum cut valve bypass valve will then be opened to clear the line between the fuel tank and the EVAP canister purge control valve. The EVAP control system pressure sensor can now monitor the pressure inside the fuel tank.

If pressure increases, the ECM will check for leaks in the line between the vacuum cut valve and EVAP canister purge control valve. If no pressure does not increase, the ECM will perform the "Vacuum test".

Vacuum test

If pressure does not increase in the "Pressure test", the ECM will check for leaks in the line between the fuel tank and EVAP canister purge control valve, under the following "Vacuum test" conditions.

The vacuum cut valve bypass valve is opened to clear the line between the fuel tank and the EVAP canister purge control valve. The EVAP canister vent control valve will then be closed to shut the EVAP purge line off. The EVAP canister purge volume control valve and EVAP canister purge control valve are opened to depressurize the EVAP purge line using intake manifold vacuum. After this occurs, the EVAP canister purge control valve and EVAP canister purge volume control valve will be closed.



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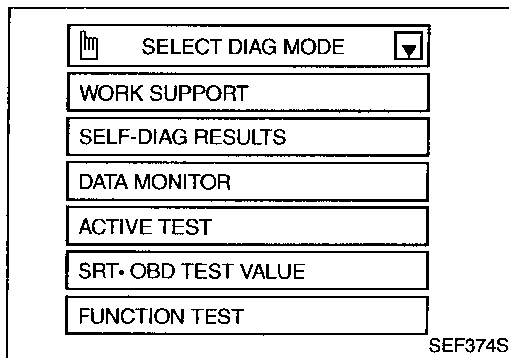
TROUBLE DIAGNOSIS FOR DTC P0440

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

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P0440 0705	<ul style="list-style-type: none"> ● EVAP control system has a leak. ● EVAP control system does not operate properly. 	<ul style="list-style-type: none"> ● 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.



DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE



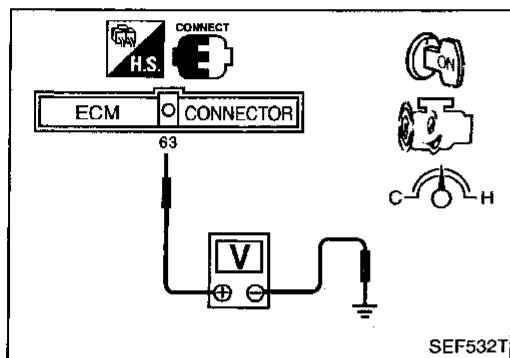
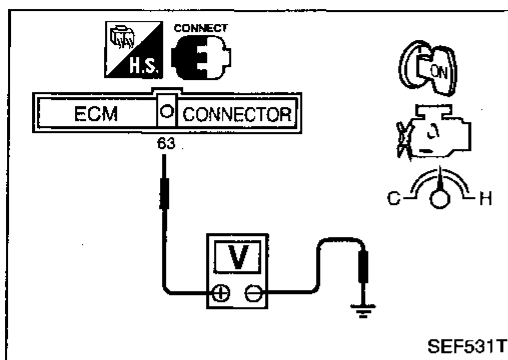
CAUTION:

- 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-188.
- 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-188.

OR

TROUBLE DIAGNOSIS FOR DTC P0440

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



- 1) Start engine and warm it up sufficiently.
- 2) Turn ignition switch "OFF" and wait at least 5 seconds.
- 3) Turn ignition switch "ON" and wait at least 12 seconds.
- 4) Check voltage between ECM terminal 63 and ground (**Voltage1**).

Voltage: 1.9 - 4.2V

- 5) Restart engine and let it idle for at least 70 seconds.
- 6) Maintain the following conditions for at least 80 seconds.

Gear position: Suitable gear position

Vehicle speed: 40 - 80 km/h (25 - 50 MPH)

Engine speed: 1,500 - 2,500 rpm

Engine coolant temperature: Less than 100°C (212°F)

- 7) Decelerate the vehicle to idle.
- 8) Maintain the following conditions for at least 2 seconds.

Gear position: Suitable gear position

Vehicle speed: 40 - 60 km/h (25 - 37 MPH)

Engine speed: 1,500 - 2,500 rpm

Engine coolant temperature: Less than 100°C (212°F)

- 9) Perform steps 7,8 more than 10 times.
- 10) Decelerate the vehicle to idle and wait at least 10 seconds.

- 11) Check voltage between ECM terminal 63 and ground (**Voltage 2**).

Voltage: 1.9 - 4.2V

- 12) Check voltage decrease between **voltage 1 and 2**.

Voltage 2 - Voltage 1 \geq 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.

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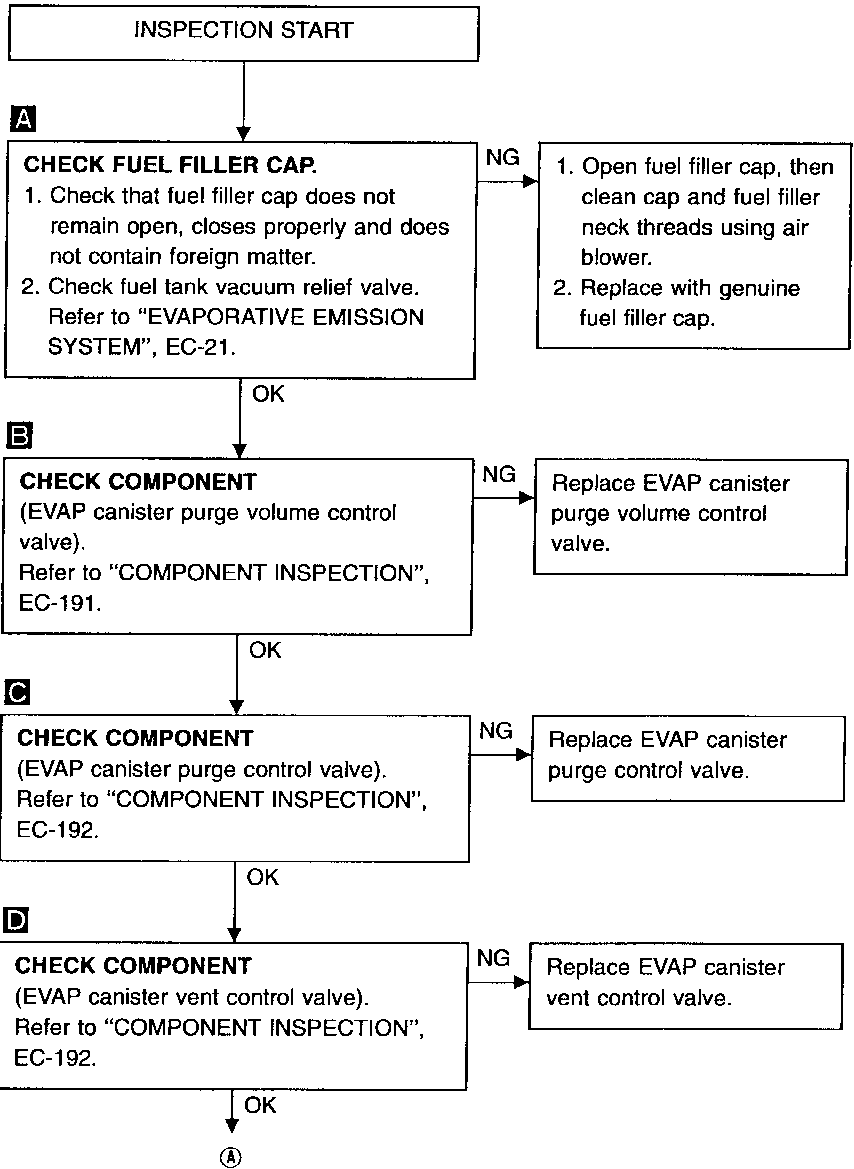
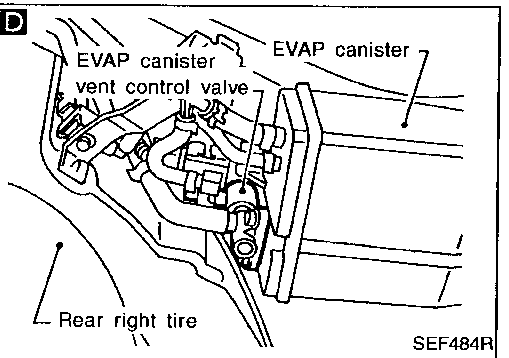
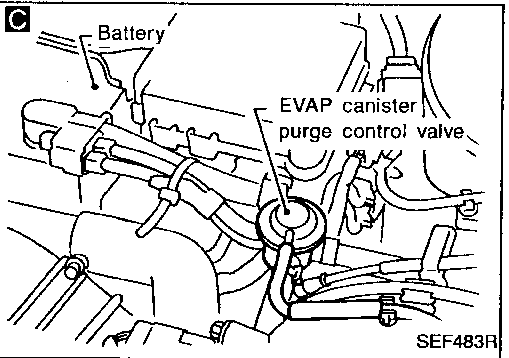
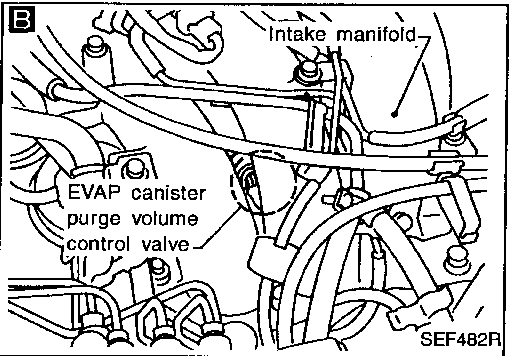
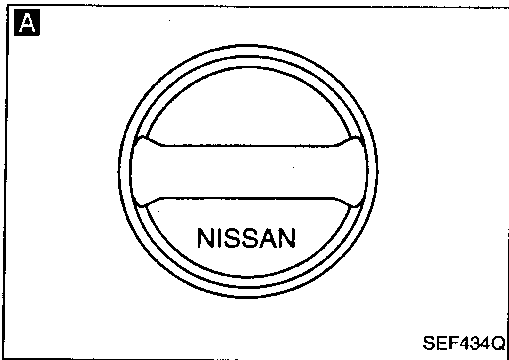
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TROUBLE DIAGNOSIS FOR DTC P0440

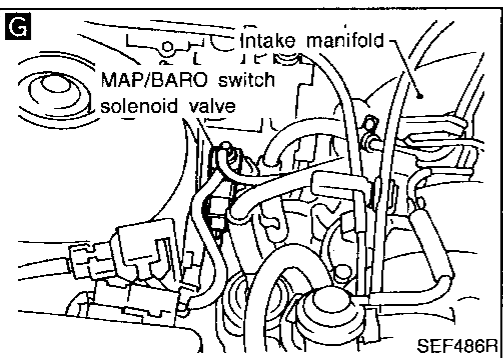
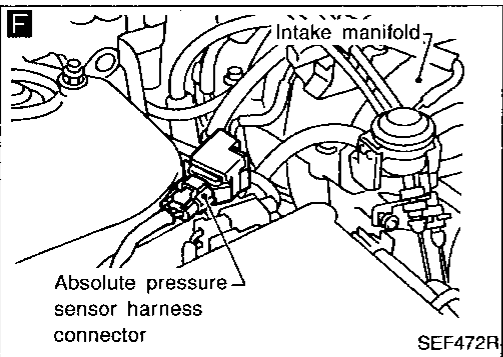
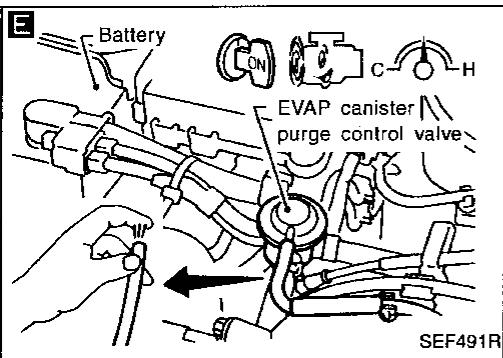
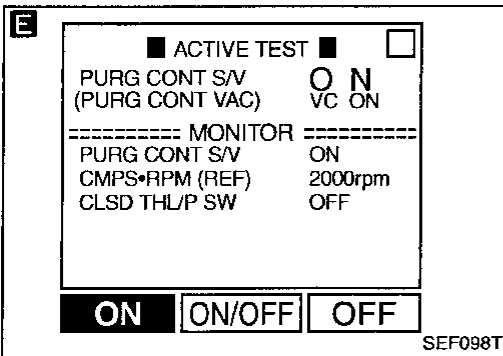
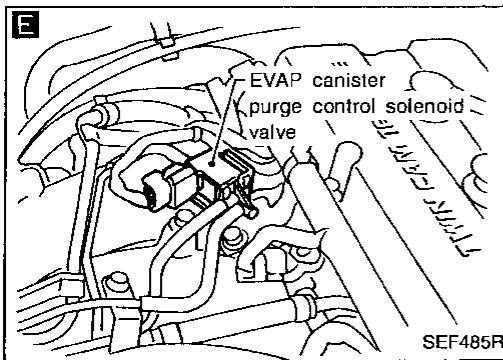
Evaporative Emission (EVAP) Control System (Small Leak) (Cont'd)

DIAGNOSTIC PROCEDURE



TROUBLE DIAGNOSIS FOR DTC P0440

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



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E

CHECK COMPONENT (EVAP canister purge control solenoid valve).

1. Disconnect vacuum hose to EVAP canister purge control valve.
2. Start engine.
3. Perform "PURG CONT S/V" in "ACTIVE TEST" mode.
4. Select "ON" on CONSULT screen to turn on "PURG CONT S/V".
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.
Vacuum should exist.

OR

1. Start engine and warm it up sufficiently.
2. Stop engine.
3. Jack up drive wheels.
4. Disconnect vacuum hose to EVAP canister purge control valve.
5. Start engine.
6. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.
Vacuum should exist.

NG

Check the following.

- EVAP canister purge control solenoid valve. Refer to "COMPONENTS INSPECTION", EC-192.
- Vacuum hoses for clogging or disconnection. Refer to "Vacuum Hose Drawing", EC-13.

OK

F

CHECK COMPONENT (Absolute pressure sensor). Refer to "COMPONENT INSPECTION", EC-193.

NG

Replace absolute pressure sensor.

OK

G

CHECK COMPONENT (MAP/BARO switch solenoid valve). Refer to "COMPONENT INSPECTION", EC-193.

NG

Replace MAP/BARO switch solenoid valve.

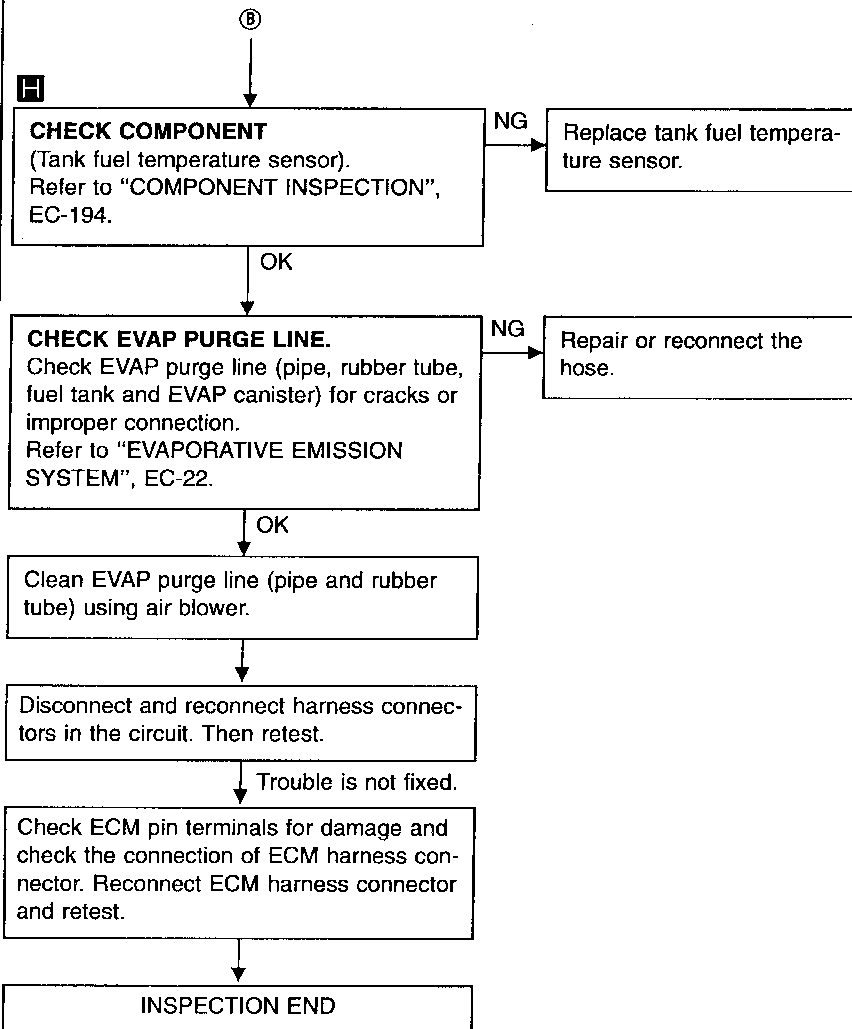
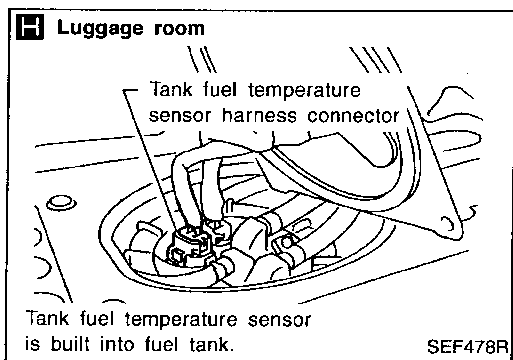
OK

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TROUBLE DIAGNOSIS FOR DTC P0440

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



TROUBLE DIAGNOSIS FOR DTC P0440

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

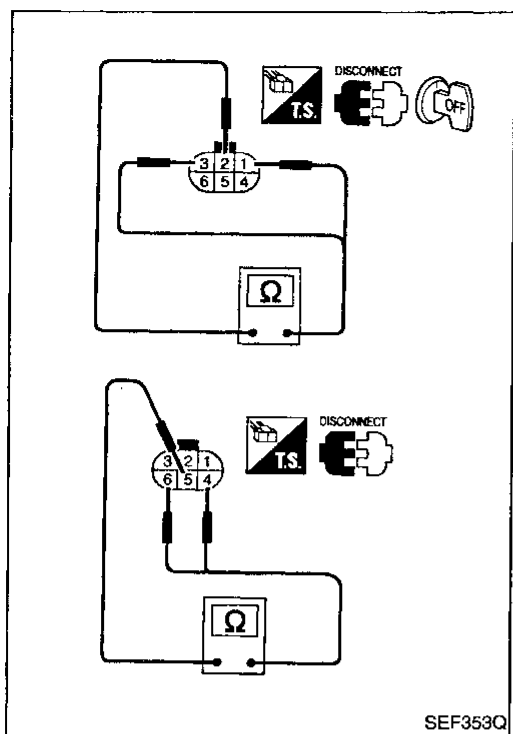
COMPONENT INSPECTION

EVAP canister purge volume control valve

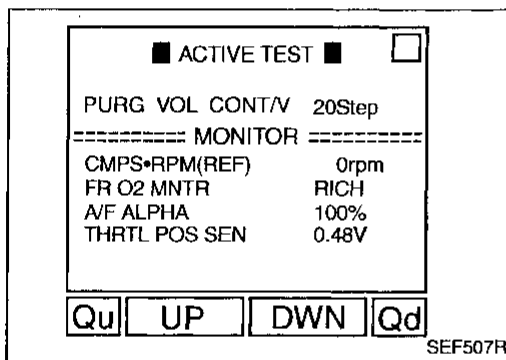
1. Disconnect EVAP canister purge volume control valve harness connector. GI
2. Check resistance between the following terminals. MA
 terminal ② and terminals ①, ③
 terminal ⑤ and terminals ④, ⑥
Resistance: EM
Approximately 30Ω [At 25°C (77°F)]
3. Reconnect EVAP canister purge volume control valve harness connector. LC
4. Remove EVAP canister purge volume control valve from intake manifold collector and disconnect hoses from the valve. EC
 (Plug the purge hoses. The EVAP canister purge volume control valve harness connector should remain connected.) FE
5. Turn ignition switch "ON". CL
6. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT. Check that EVAP canister purge volume control valve shaft moves smoothly forward and backward according to the valve opening. MT
 If NG, replace the EVAP canister purge volume control valve.

OR

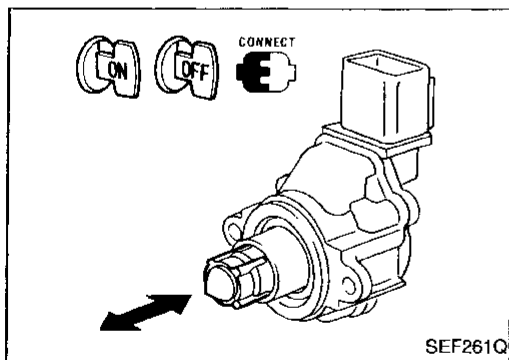
1. Disconnect EVAP canister purge volume control valve harness connector. AT
2. Check resistance between the following terminals. PD
 terminal ② and terminals ①, ③
 terminal ⑤ and terminals ④, ⑥
Resistance: FA
Approximately 30Ω [At 25°C (77°F)]
3. Reconnect EVAP canister purge volume control valve harness connector. RA
4. Remove EVAP canister purge volume control valve from intake manifold collector and disconnect hoses from the valve. BR
 (Plug the purge hoses. The EVAP canister purge volume control valve harness connector should remain connected.) ST
5. Turn ignition switch "ON" and "OFF". Check that EVAP canister purge volume control valve shaft moves smoothly forward and backward according to the ignition switch position. RS
 If NG, replace the EVAP canister purge volume control valve. BT



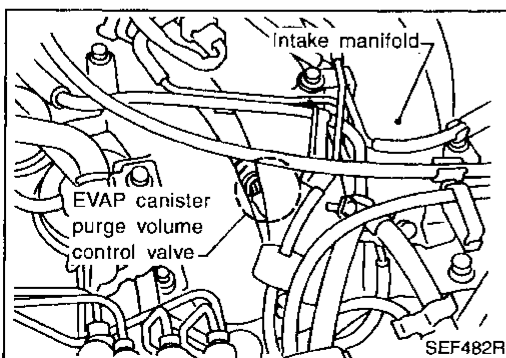
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SEF507R



SEF261Q



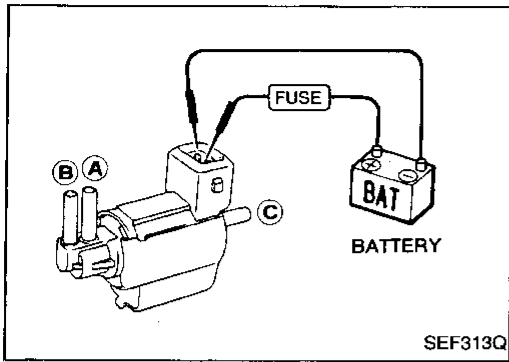
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TROUBLE DIAGNOSIS FOR DTC P0440

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

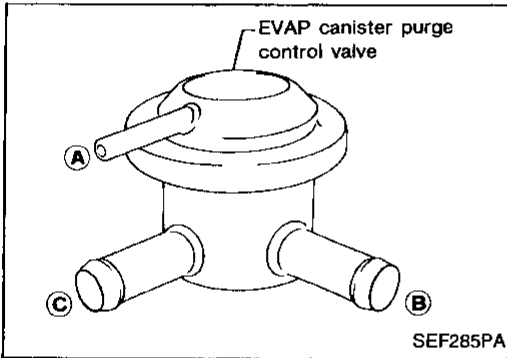
EVAP canister purge control solenoid valve

Check air passage continuity.



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

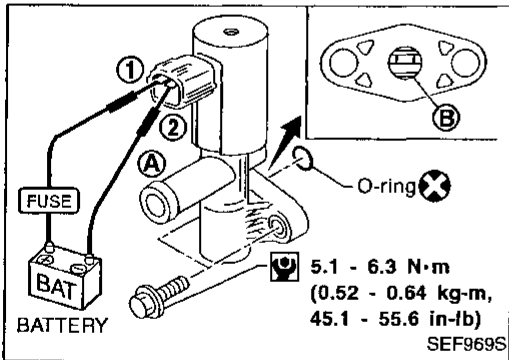
If NG, replace solenoid valve.



EVAP canister purge control valve

Check EVAP canister purge control valve as follows:

1. Plug the port (B).
2. Apply pressure [80.0 kPa (600 mmHg, 23.62 inHg, 11.60 psi)] to port (A). Then keep it for 15 seconds, and check there is no leakage.
3. Repeat step 2 for port (C).



EVAP canister vent control valve

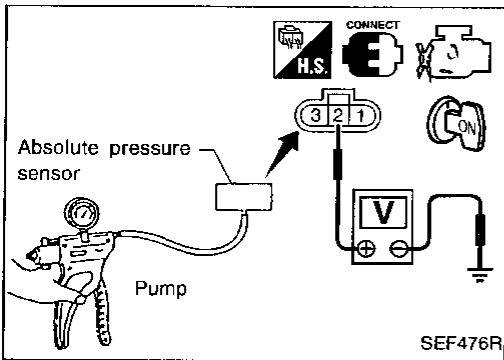
Check air passage continuity.

Condition	Air passage continuity between (A) and (B)
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.

TROUBLE DIAGNOSIS FOR DTC P0440

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



Absolute pressure sensor

1. Remove absolute pressure sensor from bracket with its harness connector connected.
2. Remove hose from absolute pressure sensor.
3. Turn ignition switch "ON" and check output voltage between terminal ② and engine ground.

The voltage should be 3.2 to 4.8 V.

4. Use pump to apply vacuum of -26.7 kPa (-200 mmHg , -7.87 inHg , -3.87 psi) to absolute pressure sensor as shown in figure and check the output voltage.

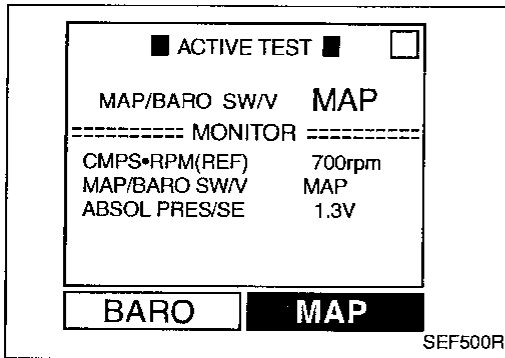
The voltage should be 1.0 to 1.4 V lower than the value measured in step 3.

CAUTION:

Always calibrate the vacuum pump gauge when using it.

5. If NG, replace absolute pressure sensor.

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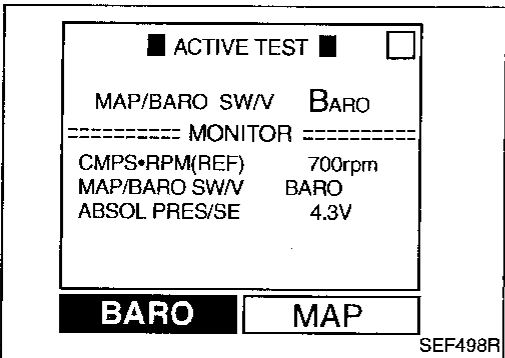


MAP/BARO switch solenoid valve

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

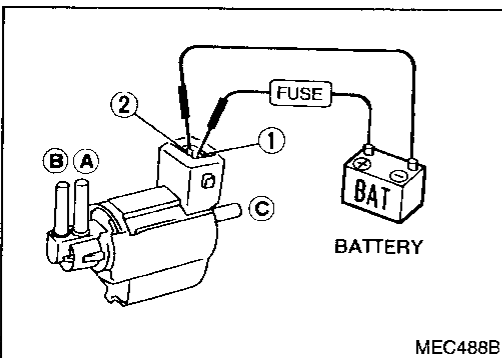
OR

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



Condition	Air passage continuity between ① and ②	Air passage continuity between ① and ③
12V direct current supply between terminals ① and ②	Yes	No
No supply	No	Yes

3. If NG, replace solenoid valve.



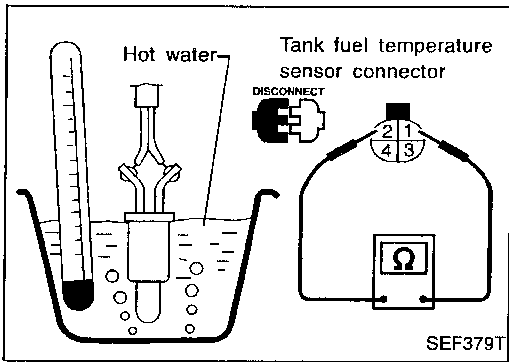
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TROUBLE DIAGNOSIS FOR DTC P0440

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

Tank fuel temperature sensor

Check resistance as shown in the figure.

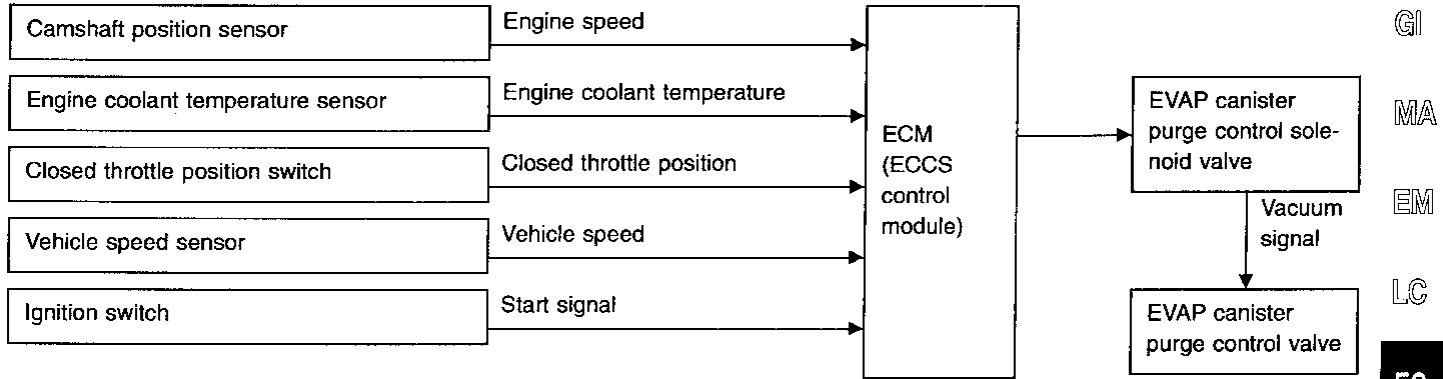


Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90

If NG, replace tank fuel temperature sensor.

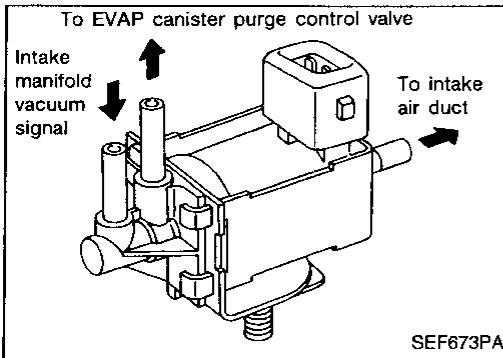
Evaporative Emission (EVAP) Canister Purge Control Valve/Solenoid Valve

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.

- Ignition switch "OFF"
- Closed throttle position
- Low or high engine coolant temperature
- During deceleration
- Engine stopped
- Low vehicle speed

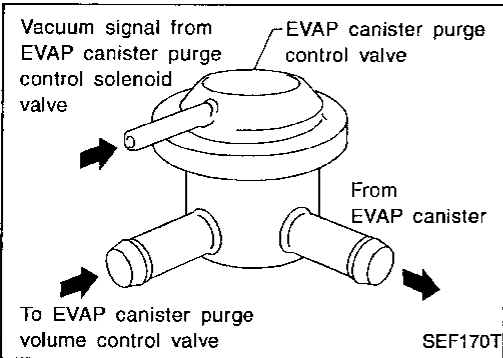


COMPONENT DESCRIPTION

EVAP canister purge control solenoid valve

The EVAP canister purge control solenoid valve responds to signals from the ECM. When the ECM sends an OFF signal, the vacuum signal (from the intake manifold to the EVAP canister purge control valve) is cut.

When the ECM sends an ON (ground) signal, the vacuum signal passes through the EVAP canister purge control solenoid valve. The signal then opens the EVAP canister purge control valve.



EVAP canister purge control valve

When the vacuum signal is cut by EVAP canister purge control solenoid valve, EVAP canister purge control valve closes.

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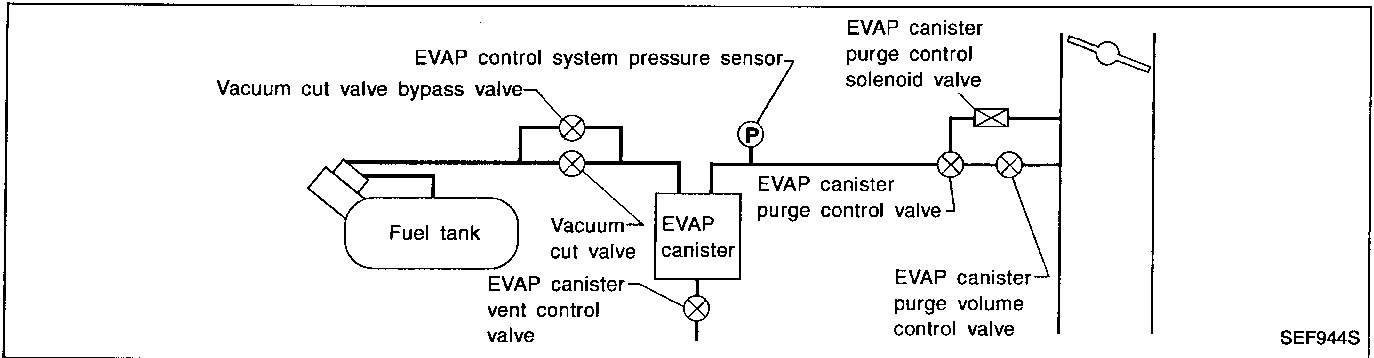
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TROUBLE DIAGNOSIS FOR DTC P0443

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

EVAPORATIVE EMISSION SYSTEM DIAGRAM



Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P0443 0807	A) The improper voltage signal is sent to ECM through EVAP canister purge control solenoid valve.	<ul style="list-style-type: none"> ● 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).	<ul style="list-style-type: none"> ● EVAP canister purge control valve ● EVAP canister purge control solenoid valve ● Vacuum hoses for clogging or disconnection ● EVAP control system pressure sensor

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

Perform "Procedure for malfunction A" first. If the (1st trip) DTC cannot be confirmed, perform "Procedure for malfunction B" on next page.

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

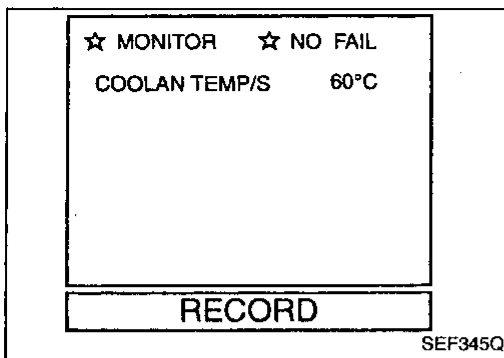


- 1) Turn ignition switch "ON" and wait at least 5 seconds.
- 2) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.

TROUBLE DIAGNOSIS FOR DTC P0443

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

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 for at least 70 seconds.
- 5) Maintain the following conditions for at least 30 seconds.

Gear position:

- "2" or "D" range (A/T)
- "3rd" or "4th" gear (M/T)

Vehicle speed:

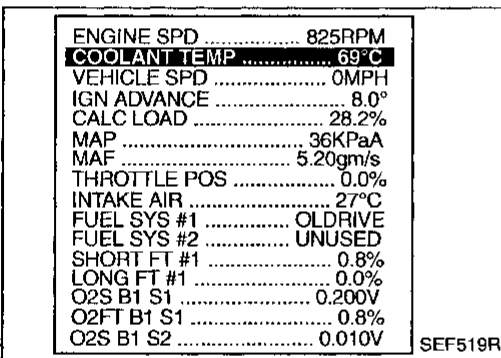
40 - 80 km/h (25 - 50 MPH)

Engine speed:

1,500 - 2,500 rpm

Engine coolant temperature:

Less than 100°C (212°F)



- OR
- 1) Jack up drive wheels.
 - 2) Turn ignition switch "ON" and select "MODE 1" mode with GST.
 - 3) Start engine and warm it up until the engine coolant temperature 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 for at least 70 seconds.
 - 5) Maintain the following conditions for at least 30 seconds.

Gear position:

- "2" or "D" range (A/T)
- "3rd" or "4th" gear (M/T)

Vehicle speed:

40 - 80 km/h (25 - 50 MPH)

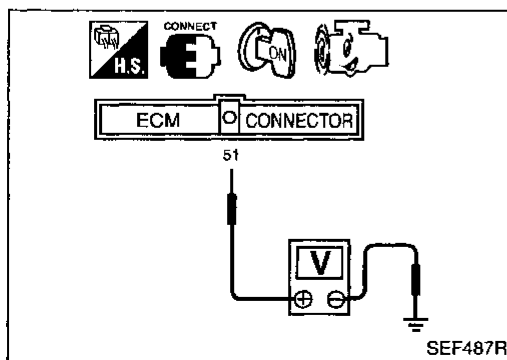
Engine speed:

1,500 - 2,500 rpm

Engine coolant temperature:

Less than 100°C (212°F)

- 6) Select "MODE 7" mode with GST.



- 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 51 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 for at least 70 seconds.

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TROUBLE DIAGNOSIS FOR DTC P0443

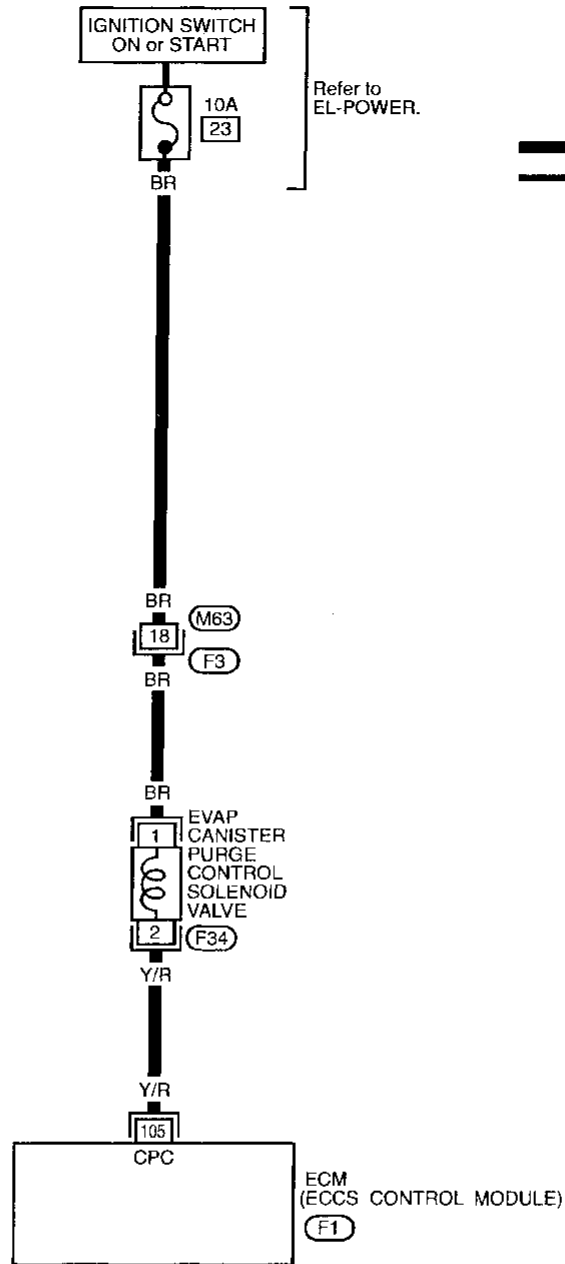
Evaporative Emission (EVAP) Canister Purge Control Valve/Solenoid Valve (Cont'd)

- 5) Maintain the following conditions for at least 30 seconds.
 - Gear position:**
 - "2" or "D" range (A/T)
 - "3rd" or "4th" gear (M/T)
 - Vehicle speed:**
 - 40 - 80 km/h (25 - 50 MPH)
 - Engine speed:**
 - 1,500 - 2,500 rpm
 - Voltage between ECM terminal ⑤ 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.

TROUBLE DIAGNOSIS FOR DTC P0443

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

EC-CANI/V-01

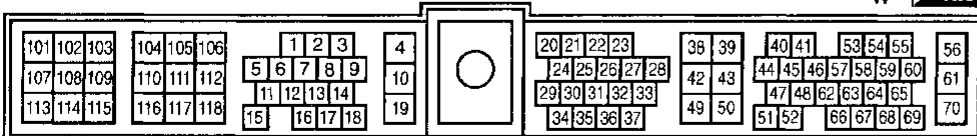
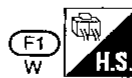


— : Detectable line for DTC
 — : Non-detectable line for DTC

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Refer to last page (Foldout page).

(M63) . (F3)

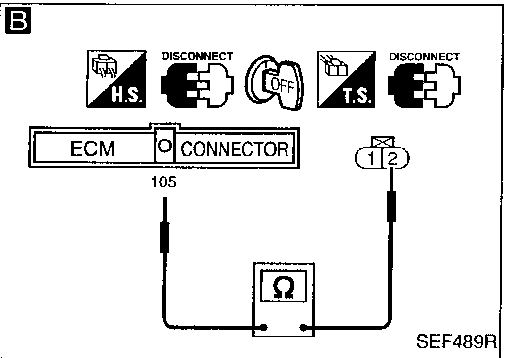
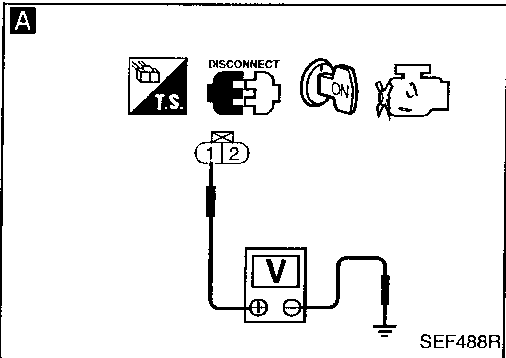
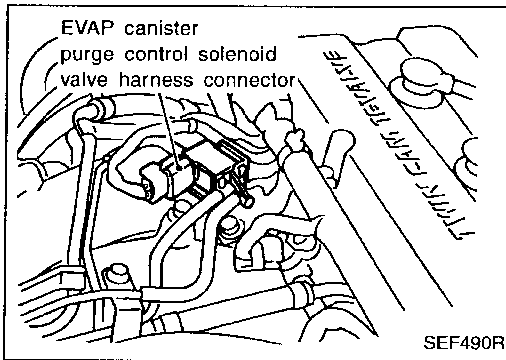


TROUBLE DIAGNOSIS FOR DTC P0443

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

DIAGNOSTIC PROCEDURE

Procedure for malfunction A



INSPECTION START

A
CHECK POWER SUPPLY.
 1. Disconnect EVAP canister purge control solenoid valve harness connector.
 2. Turn ignition switch "ON".
 3. Check voltage between terminal ① and ground with CONSULT or tester.
Voltage: Battery voltage

NG → Check the following.
 • Harness connectors
 • F3, M63
 • 10A fuse
 • Harness for open or short between EVAP canister purge control solenoid valve and fuse
 If NG, repair harness or connectors.

B
CHECK OUTPUT SIGNAL CIRCUIT.
 1. Turn ignition switch "OFF".
 2. Disconnect ECM harness connector.
 3. Check harness continuity between ECM terminal ⑩ and terminal ②.
Continuity should exist.
 If OK, check harness for short.

NG → Repair harness or connectors.

CHECK COMPONENT
 (EVAP canister purge control solenoid valve).
 Refer to "COMPONENT INSPECTION", EC-202.

NG → Replace EVAP canister purge control solenoid valve.

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

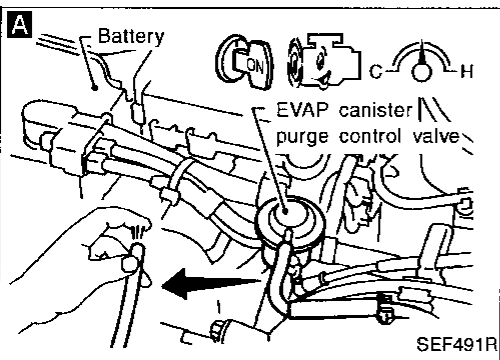
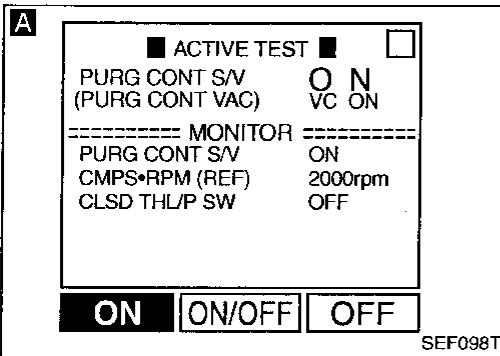
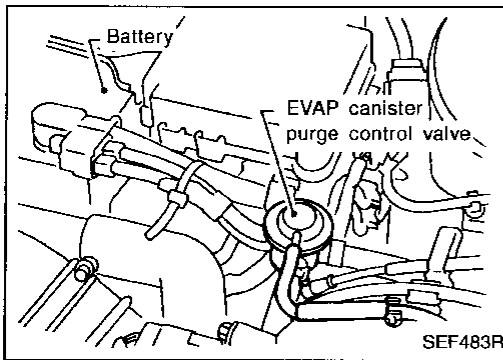
Trouble is not fixed.
 Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

INSPECTION END

TROUBLE DIAGNOSIS FOR DTC P0443

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

Procedure for malfunction B



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 when revving engine up to 2,000 rpm.
Vacuum should exist.

OR

1. Start engine and warm it up sufficiently.
2. Stop engine.
3. Jack up drive wheels.
4. Disconnect vacuum hose to EVAP canister purge control valve.
5. Start engine.
6. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.
Vacuum should exist.

NG → **CHECK COMPONENTS** (EVAP canister purge control solenoid valve). Refer to "COMPONENTS INSPECTION" on next page.

OK ↓

Check vacuum hoses for clogging or disconnection. Refer to "Vacuum Hose Drawing", EC-13.

OK ↓

CHECK COMPONENT (EVAP canister purge control valve). Refer to "COMPONENT INSPECTION" on next page.

NG → Replace EVAP canister purge control valve.

OK ↓

Go to "TROUBLE DIAGNOSIS FOR DTC P0450", "EVAP Control System Pressure Sensor", EC-209.

OK ↓

CHECK EVAPORATIVE EMISSION LINE. Check EVAP purge line hoses for leak or clogging. Refer to "Evaporative Emission Line Drawing", EC-22.

NG → Repair EVAP purge line hoses.

OK ↓

INSPECTION END

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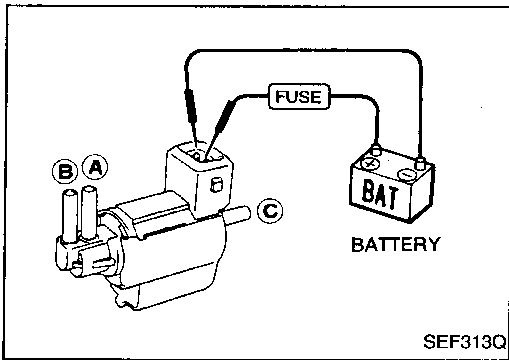
TROUBLE DIAGNOSIS FOR DTC P0443

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

COMPONENT INSPECTION

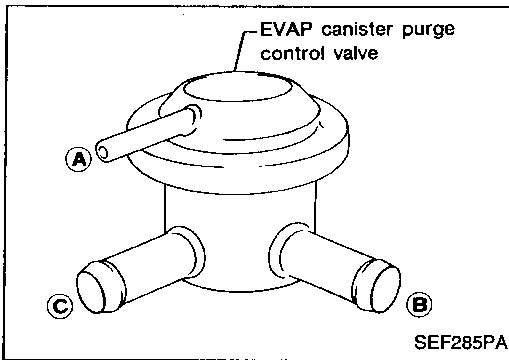
EVAP canister purge control solenoid valve

Check air passage continuity.



Condition	Air passage continuity between ① and ②	Air passage continuity between ① and ③
12V direct current supply between terminals	Yes	No
No supply	No	Yes

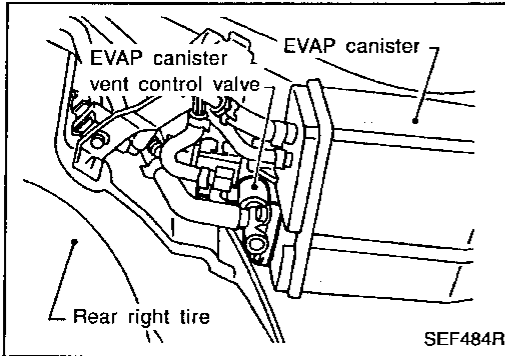
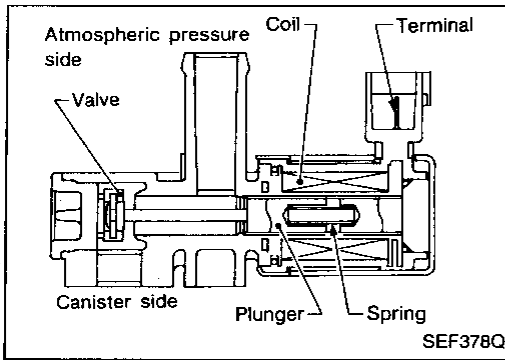
If NG, replace solenoid valve.



EVAP canister purge control valve

Check EVAP canister purge control valve as follows.

1. Plug the port ②.
2. Apply pressure [80.0 kPa (600 mmHg, 23.62 inHg, 11.60 psi)] to port ①. Then keep it for 15 seconds, and check there is no leakage.
3. Repeat step 2 for port ③.



Evaporative Emission (EVAP) Canister Vent Control Valve

Note: If both DTC P0440 and P0446 are displayed, perform TROUBLE DIAGNOSIS FOR DTC P0446 first.

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent.

This solenoid (the EVAP canister vent control valve) responds to signals from the ECM.

When the ECM sends an ON signal, the coil in the solenoid valve is energized.

A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.

This solenoid valve is used only for diagnosis, and usually remains opened.

When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows "EVAP Control System (Small Leak)" diagnosis.

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P0446 0903	A) An improper voltage signal is sent to ECM through EVAP canister vent control valve.	<ul style="list-style-type: none"> • Harness or connectors [EVAP canister vent control valve circuit is open or shorted.]
	B) EVAP canister vent control valve does not operate properly.	<ul style="list-style-type: none"> • EVAP canister vent control valve • EVAP control system pressure sensor • Blocked rubber tube to EVAP canister vent control valve • EVAP canister breather valve

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

Perform "Procedure for malfunction A". If the DTC cannot be confirmed, perform "Procedure for malfunction B" on next page.

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

- 1) Start engine and wait at least 5 seconds.
- 2) Select "MODE 7" with GST.

OR

- 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.

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TROUBLE DIAGNOSIS FOR DTC P0446

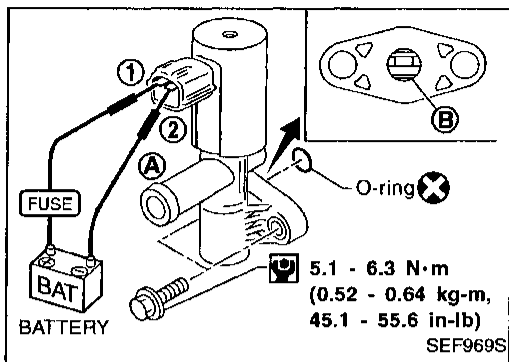
Evaporative Emission (EVAP) Canister Vent Control Valve (Cont'd)

OVERALL FUNCTION CHECK

Use this procedure to check the overall function of the EVAP canister vent control valve circuit. During this check, a DTC might not be confirmed.

Procedure for malfunction B

- 1) Remove EVAP canister vent control valve from EVAP canister and disconnect hoses from the valve.
- 2) Check air passage continuity.

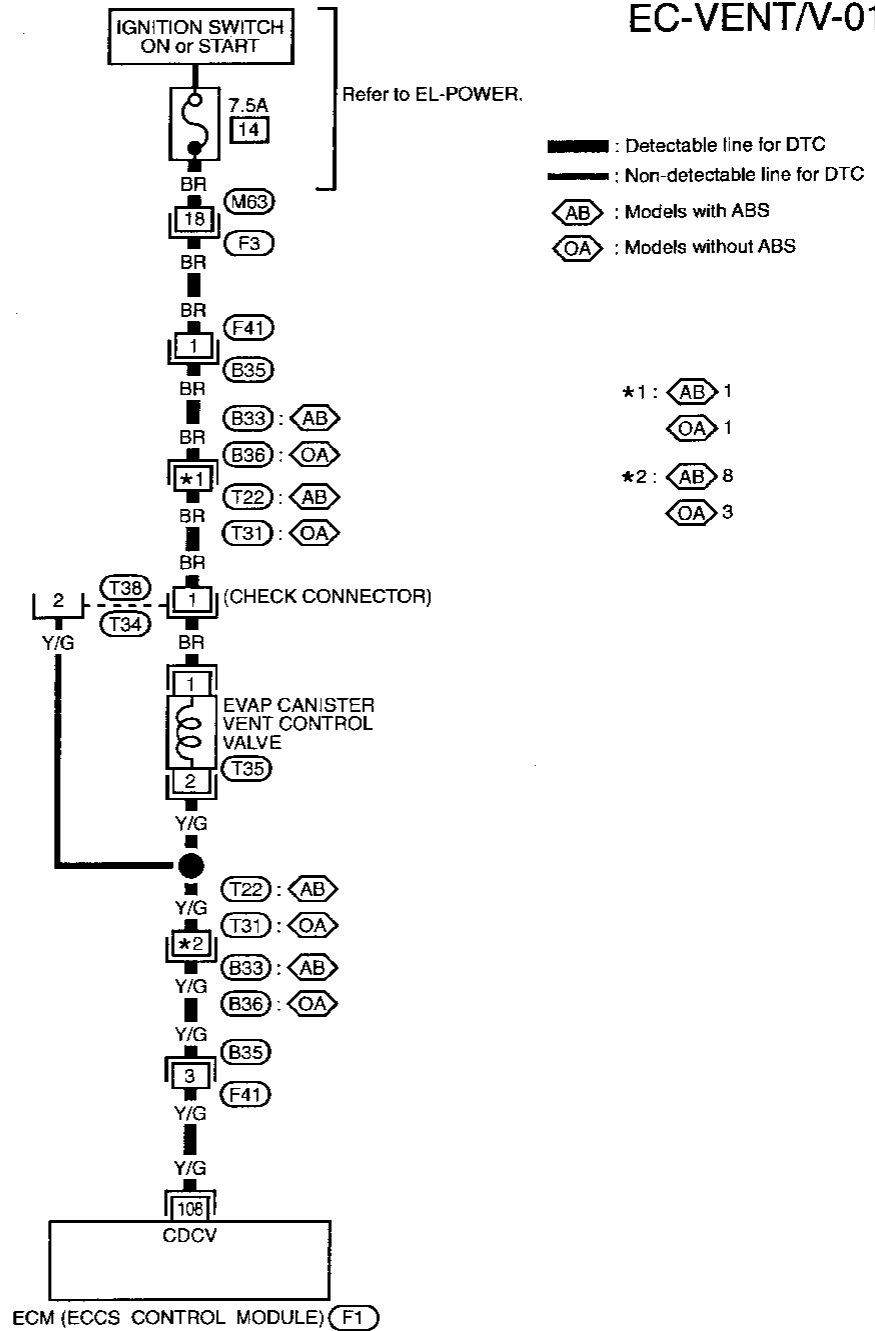


Condition	Air passage continuity between ① and ②
12V direct current supply between terminals ① and ②	No
No supply	Yes

TROUBLE DIAGNOSIS FOR DTC P0446

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

EC-VENT/V-01



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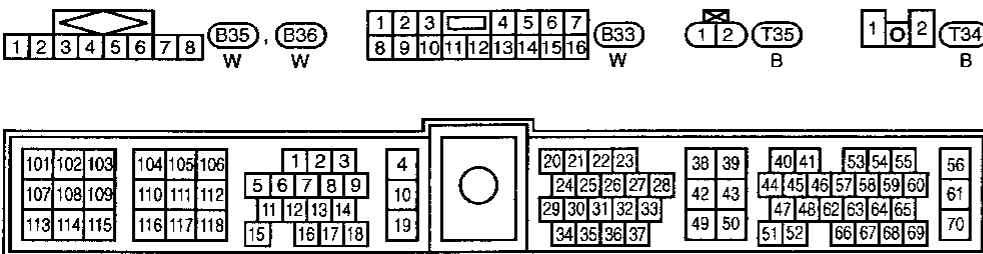
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Refer to last page (Foldout page).

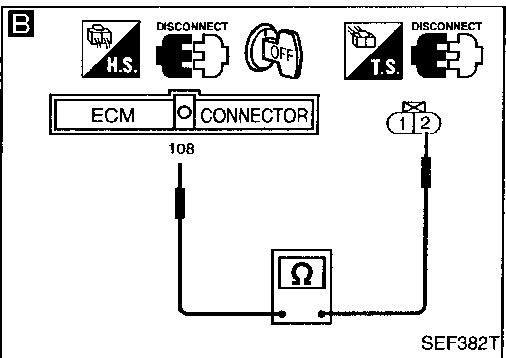
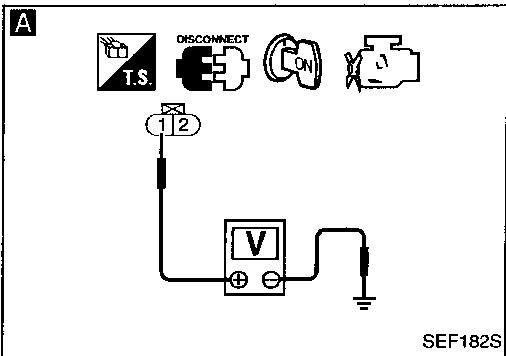
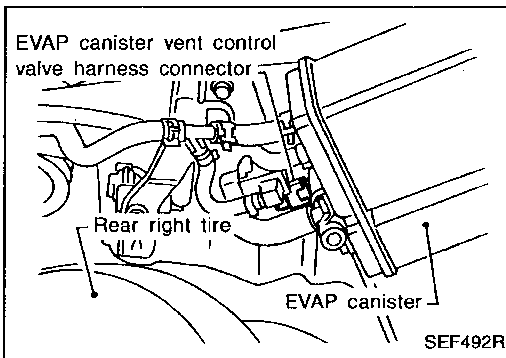
(M63), (F3)



TROUBLE DIAGNOSIS FOR DTC P0446

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

DIAGNOSTIC PROCEDURE



INSPECTION START

A
CHECK POWER SUPPLY.
 1. Disconnect EVAP canister vent control valve harness connector.
 2. Turn ignition switch "ON".
 3. Check voltage between terminal ① and ground with CONSULT or tester.
Voltage: Battery voltage

NG → Check the following.

- Harness connectors (M63, F3)
- Harness connectors (F41, B35)
- Harness connectors (Models with ABS) (B33, T22) (Models without ABS) (B36, T31)
- Harness connectors (T38, T34)
- 7.5A fuse
- Harness for open or short between EVAP canister vent control valve and fuse

If NG, repair harness or connectors.

OK ↓

B
CHECK OUTPUT SIGNAL CIRCUIT.
 1. Turn ignition switch "OFF".
 2. Disconnect ECM harness connector.
 3. Check harness continuity between ECM terminal (108) and terminal ②.
Continuity should exist.
 If OK, check harness for short.

NG → Check the following.

- Harness connectors (Models with ABS) (T22, B33) (Models without ABS) (T31, B36)
- Harness connectors (B35, F41)

• Harness for open or short between EVAP canister vent control valve and ECM

If NG, repair harness or connector.

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 breather valve).
 Refer to "COMPONENT INSPECTION".
 (See page EC-208.)

OK ↓

CHECK COMPONENT
 (EVAP canister vent control valve).
 Refer to "COMPONENT INSPECTION" on next page.

NG → Replace EVAP canister vent control valve.

OK ↓

CHECK COMPONENT
 (EVAP control system pressure sensor).
 Refer to "COMPONENT INSPECTION" on next page.

NG → Replace EVAP control system pressure sensor.

OK ↓

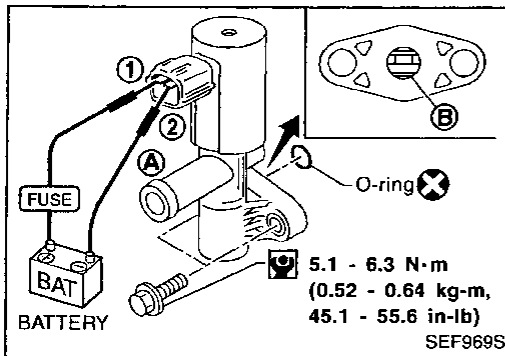
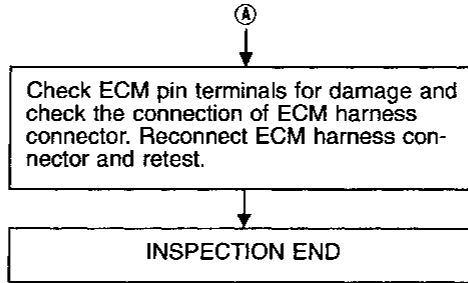
Disconnect and reconnect harness connectors in the circuit. Then retest.

↓ Trouble is not fixed.

Ⓐ

TROUBLE DIAGNOSIS FOR DTC P0446

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



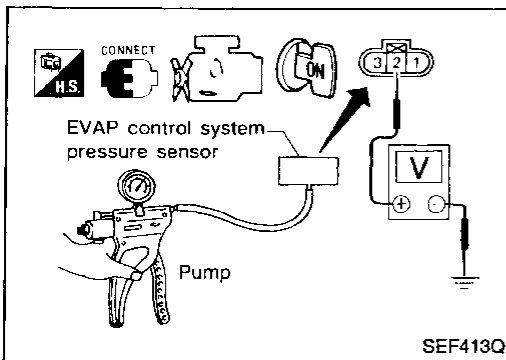
COMPONENT INSPECTION

EVAP canister vent control valve

Check air passage continuity.

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

Pressure (Relative to atmospheric pressure)	Voltage (V)
0 kPa (0 mmHg, 0 inHg, 0 psi)	3.0 - 3.6
-9.3 kPa (-70 mmHg, -2.76 inHg, -1.35 psi)	0.4 - 0.6

CAUTION:

Always calibrate the vacuum pump gauge when using it.

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

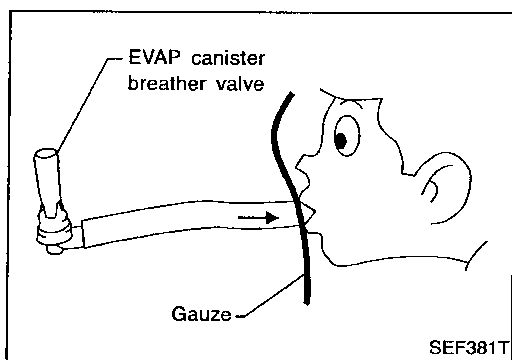
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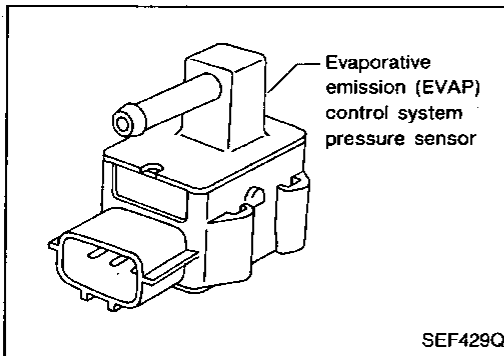
TROUBLE DIAGNOSIS FOR DTC P0446

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

EVAP canister breather valve

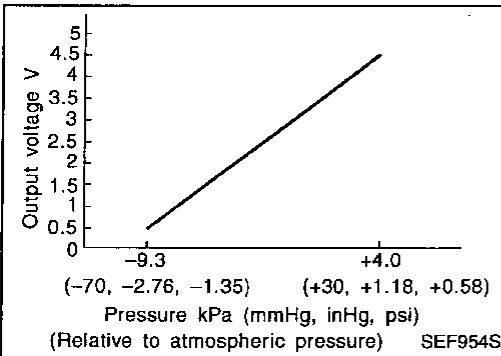
1. Remove rubber tube from EVAP canister vent control valve.
2. Apply gauze to rubber tube end.
3. Check air passage continuity as shown in figure.
4. If NG, clean valve using air blower or replace as necessary.





Evaporative Emission (EVAP) Control System Pressure Sensor

The EVAP control system pressure sensor detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases. The EVAP control system pressure sensor is not used to control the engine system. It is used only for on board diagnosis.



Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P0450 0704	<ul style="list-style-type: none"> An improper voltage signal from EVAP control system pressure sensor is sent to ECM. 	<ul style="list-style-type: none"> 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.)

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.

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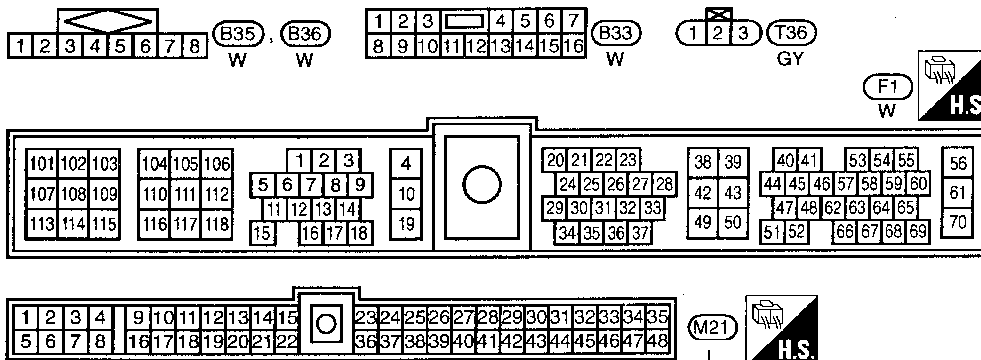
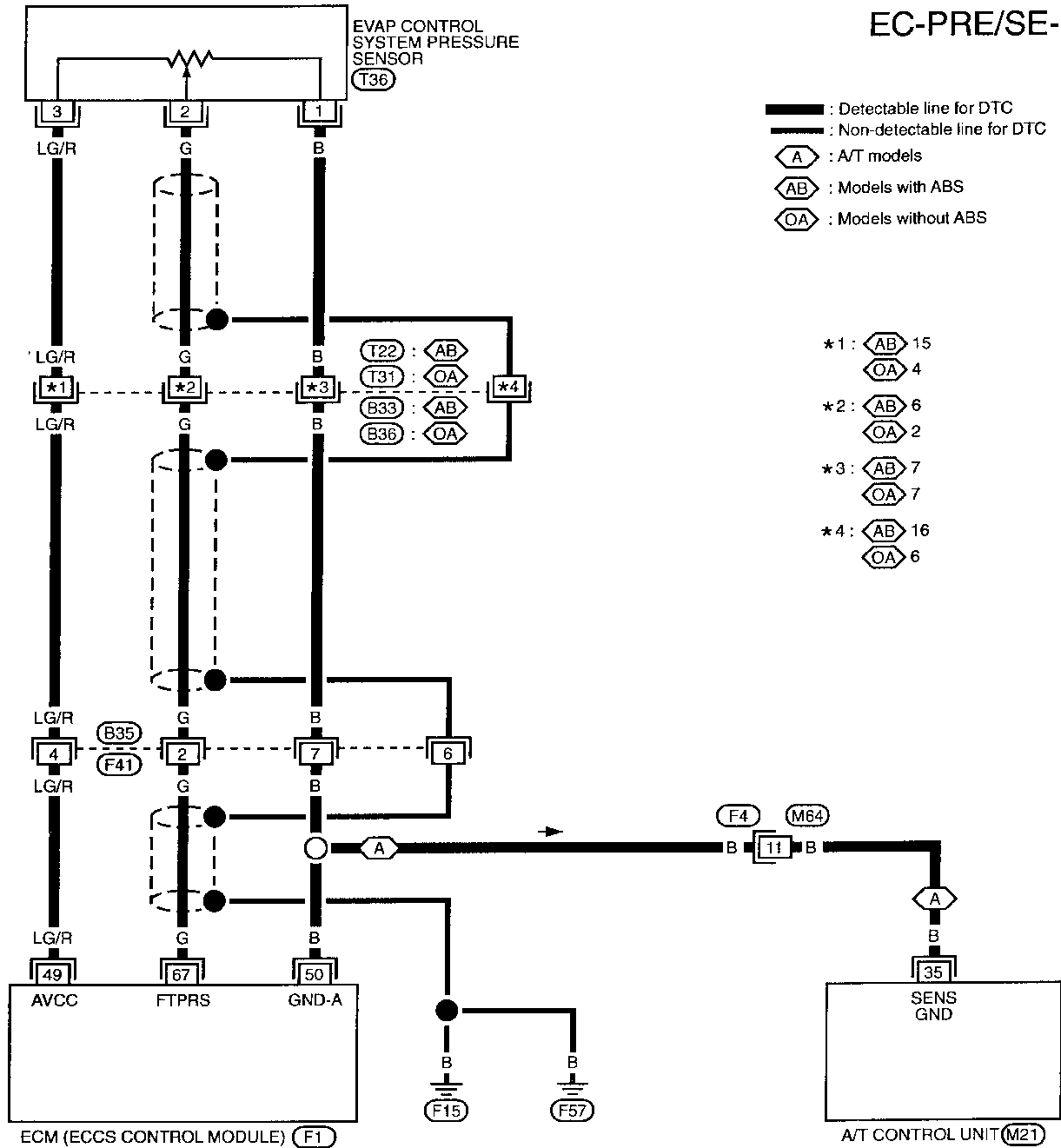
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TROUBLE DIAGNOSIS FOR DTC P0450

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

EC-PRE/SE-01

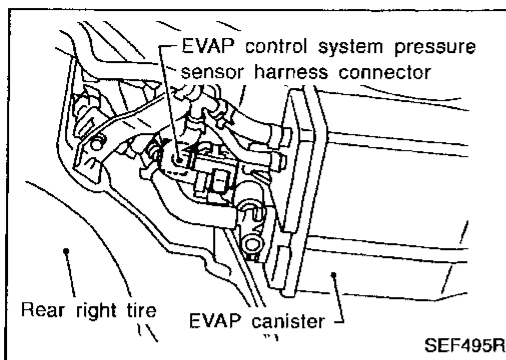


TROUBLE DIAGNOSIS FOR DTC P0450

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

DIAGNOSTIC PROCEDURE

INSPECTION START



A

CHECK POWER SUPPLY.

1. Turn ignition switch "OFF".
2. Disconnect EVAP control system pressure sensor harness connector.
3. Turn ignition switch "ON".
4. Check voltage between terminal ③ and engine ground with CONSULT or tester.

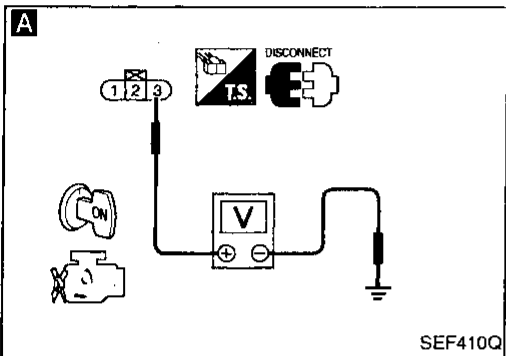
Voltage: Approximately 5V

NG

Check the following.

- Harness connectors (Models with ABS) (T22), (B33) (Models without ABS) (T31), (B36)
- Harness for open or short between EVAP control system pressure sensor and ECM

If NG, repair harness or connectors.



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.

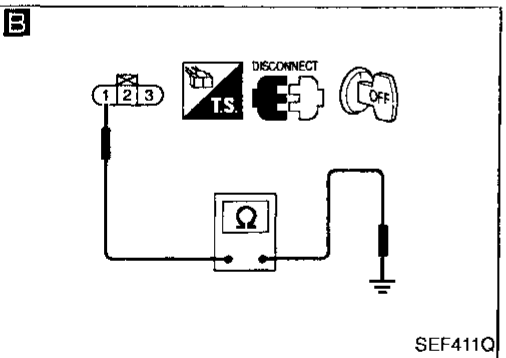
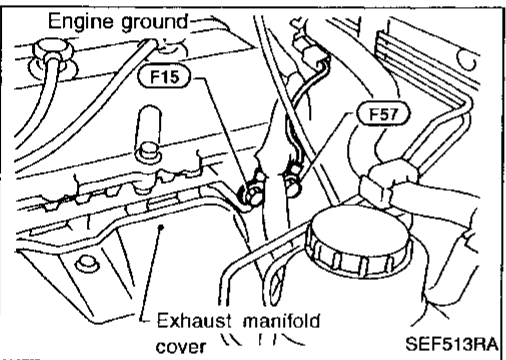
If OK, check harness for short.

NG

Check the following.

- Harness connectors (Models with ABS) (T22), (B33) (Models without ABS) (T31), (B36)
- Harness connectors (B35), (F41)
- Harness connectors (F4), (M64)
- 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.



C

CHECK INPUT SIGNAL CIRCUIT.

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal ⑦ and terminal ②.

Continuity should exist.

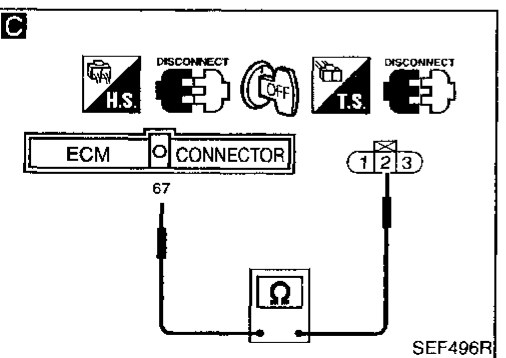
If OK, check harness for short.

NG

Check the following.

- Harness connectors (Models with ABS) (T22), (B33) (Models without ABS) (T31), (B36)
- Harness for open or short between ECM and EVAP control system pressure sensor

If NG, repair harness or connectors.



OK

Loosen and retighten engine ground screws.

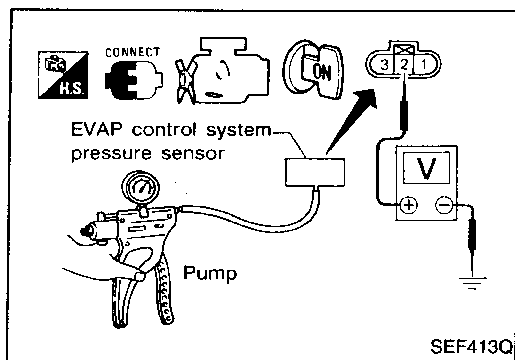
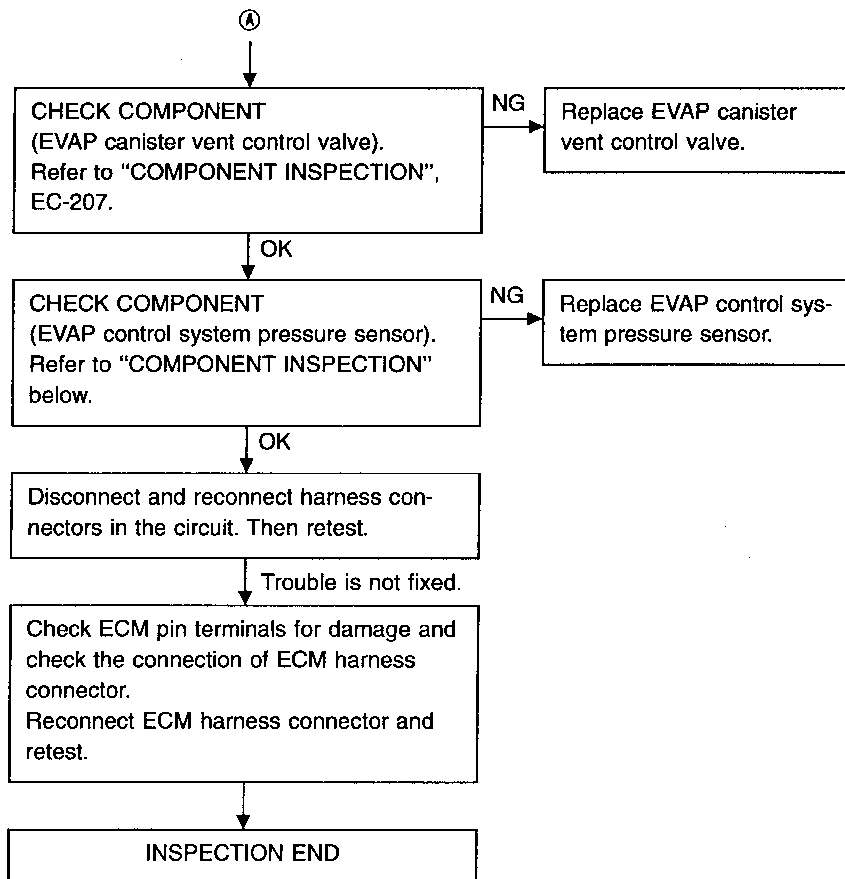
Note: If engine ground is loose, voltage between harness connector (F41) terminal ⑥ and engine body may be changed by retightening.

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TROUBLE DIAGNOSIS FOR DTC P0450

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



COMPONENT INSPECTION

EVAP control system pressure sensor

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

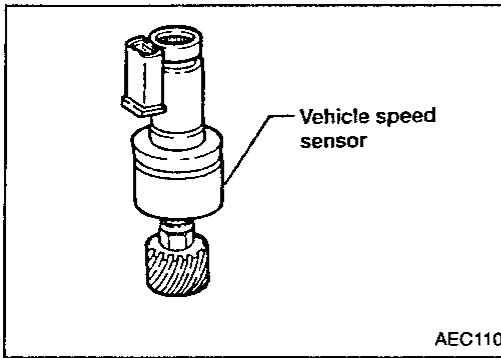
Pressure (Relative to atmospheric pressure)	Voltage (V)
0 kPa (0 mmHg, 0 inHg, 0 psi)	3.0 - 3.6
-9.3 kPa (-70 mmHg, -2.76 inHg, -1.35 psi)	0.4 - 0.6

CAUTION:

Always calibrate the vacuum pump gauge when using it.

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

TROUBLE DIAGNOSIS FOR DTC P0500



Vehicle Speed Sensor (VSS)

The vehicle speed sensor is installed in the transmission. It contains a pulse generator which provides a vehicle speed signal to the speedometer. The speedometer then sends a signal to the ECM.

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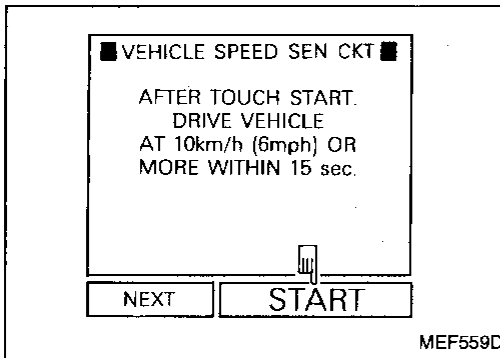
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Diagnostic Trouble Code No.	Malfunction is detected when	Check items (Possible cause)
P0500 0104	<ul style="list-style-type: none"> • The almost 0 km/h (0 MPH) signal from the vehicle speed sensor is sent to ECM even when the vehicle is driving. 	<ul style="list-style-type: none"> • Harness or connector (The vehicle speed sensor circuit is open or shorted.) • Vehicle speed sensor



OVERALL FUNCTION CHECK

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

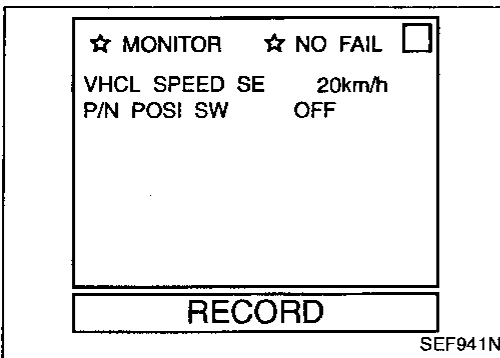
- 1) Jack up drive wheels.
- 2) Start engine.
- 3) Perform "VEHICLE SPEED SEN CIRCUIT" in "FUNCTION TEST" mode with CONSULT.

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.

OR



TROUBLE DIAGNOSIS FOR DTC P0500

Vehicle Speed Sensor (VSS) (Cont'd)

FUEL SYS #1	CLOSED
FUEL SYS #2	UNUSED
CALC LOAD	57%
COOLANT TEMP	87°C
SHORT FT #1	1%
LONG FT #1	-3%
ENGINE SPD	2225RPM
VEHICLE SPD	57MPH
IGN ADVANCE	34.0°
INTAKE AIR	43°C
MAF	26.2gm/sec
THROTTLE POS	12%
O2S LOCATION	3
O2S B1,S1	0.090V
O2FT B1,S1	0%
O2S B1,S2	0.070V

SEF942N



- 1) Jack up drive wheels.
- 2) Start engine.
- 3) Read vehicle speed sensor signal in "MODE 1" with GST.

The vehicle speed on GST should be able to exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.

OR

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE



- 1) Start engine and warm it up sufficiently.
- 2) Perform test drive for at least 10 seconds continuously in the following recommended condition.
 - Engine speed : 1,800 - 2,600 rpm
 - Intake manifold vacuum : -53.3 to -26.7 kPa (-400 to -200 mmHg, -15.75 to -7.87 inHg, -7.73 to -3.87 psi)
 - Gear position : Suitable position (except "N" or "P" position)
- 3) Stop the vehicle, turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
- 4) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.

Even though 1st trip DTC is not detected, perform the above test drive at least one more time.

TROUBLE DIAGNOSIS FOR DTC P0500

Vehicle Speed Sensor (VSS) (Cont'd)

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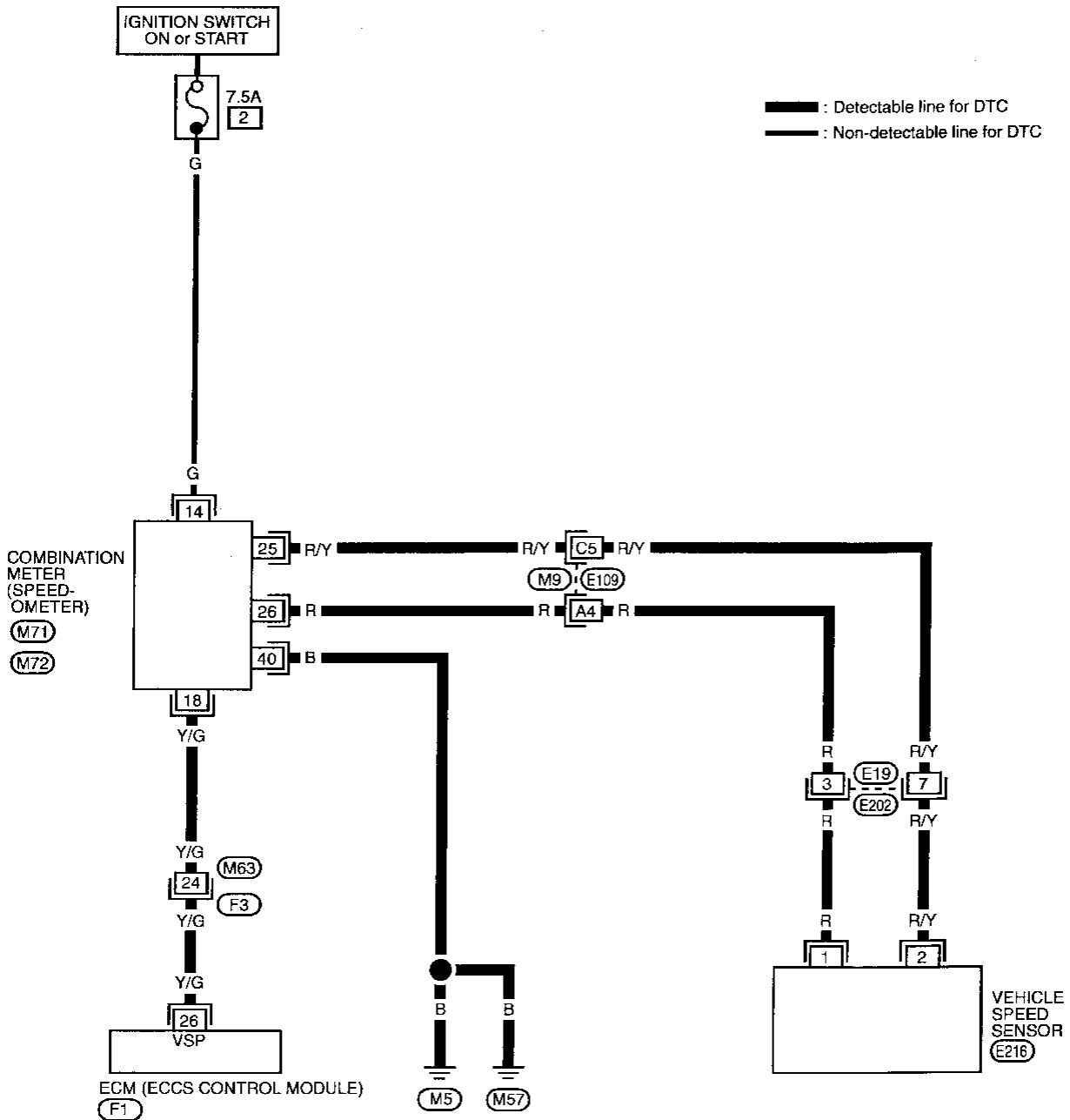
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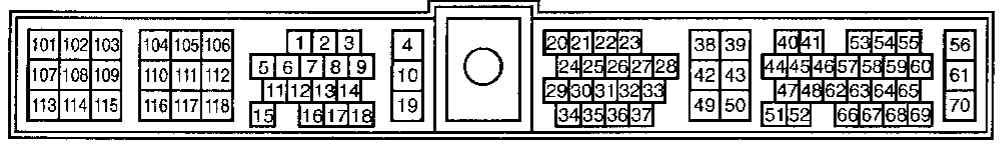
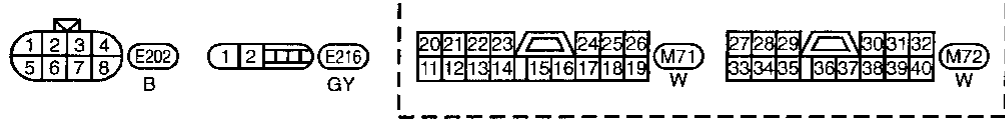
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— : Detectable line for DTC
 — : Non-detectable line for DTC



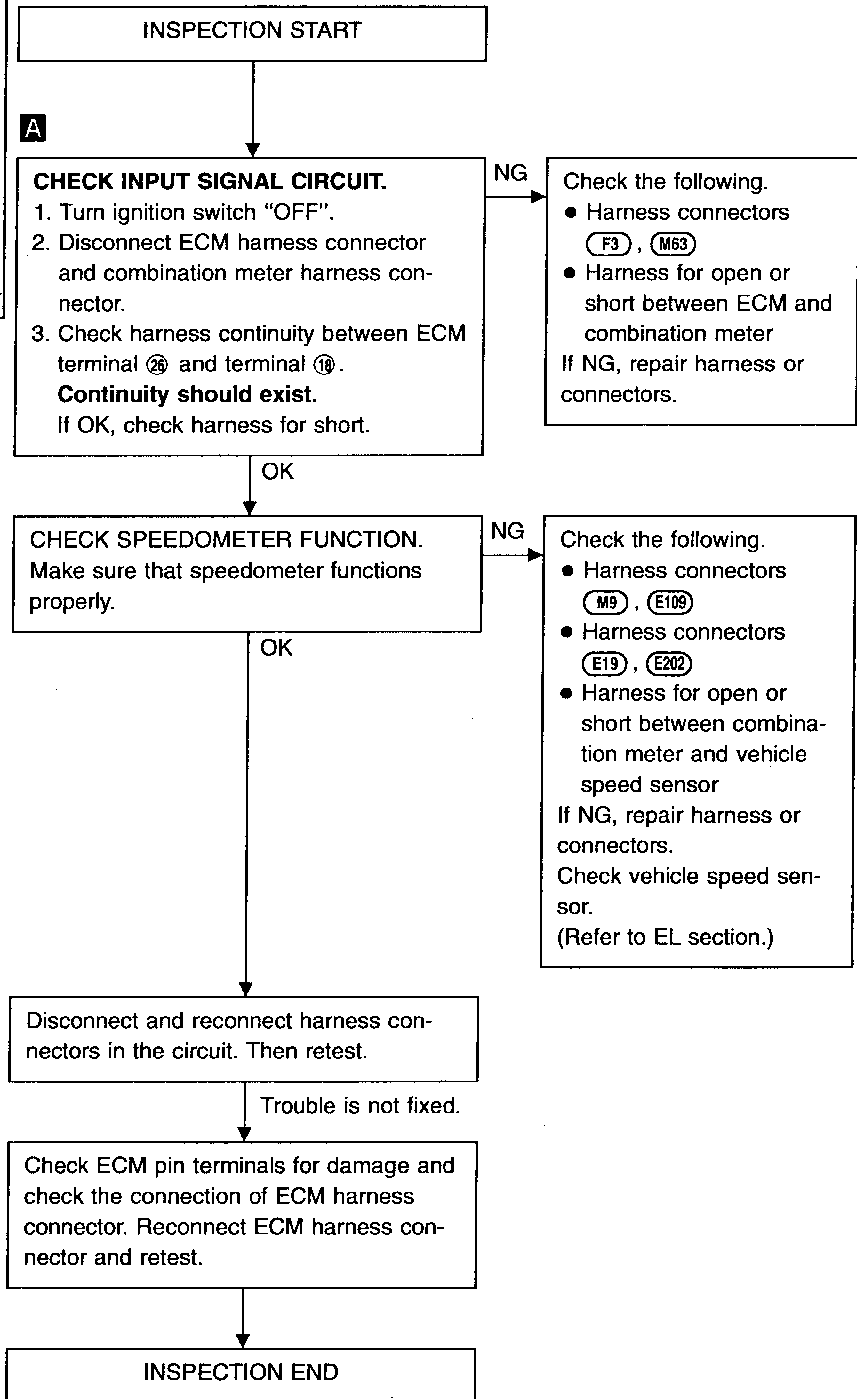
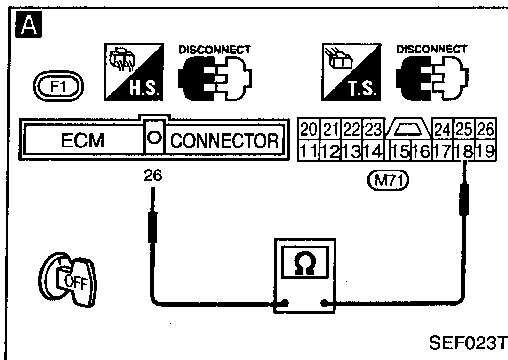
Refer to last page (Foldout page).

E109, M9
 M63, F3



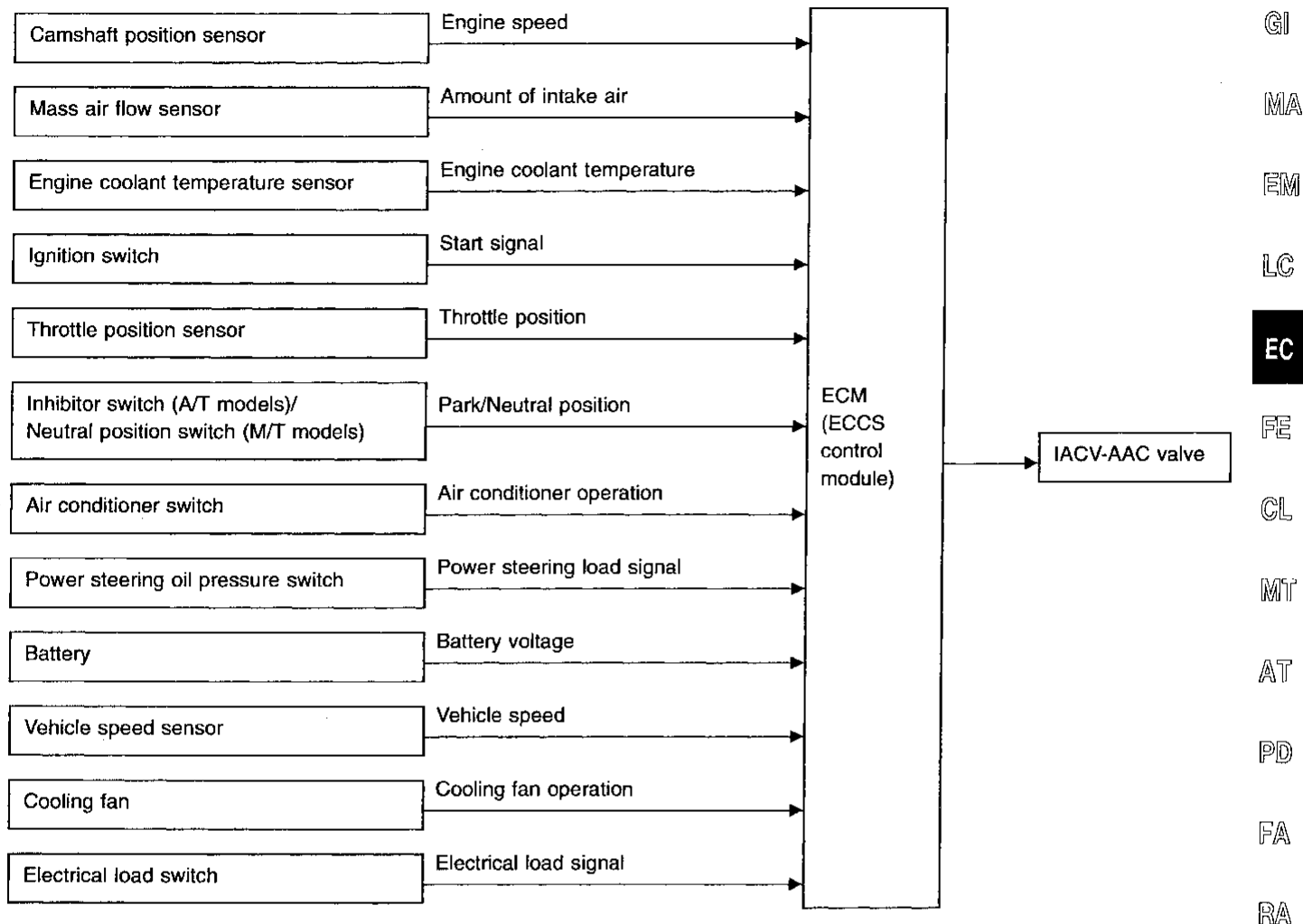
TROUBLE DIAGNOSIS FOR DTC P0500

Vehicle Speed Sensor (VSS) (Cont'd) DIAGNOSTIC PROCEDURE

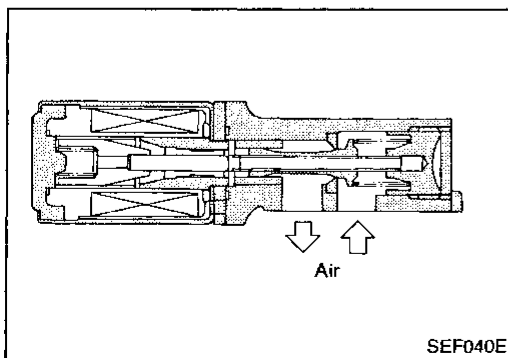


Idle Air Control Valve (IACV) — Auxiliary Air Control (AAC) Valve

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 repeats ON/OFF operation according to the signal sent from the ECM. The camshaft position sensor detects the actual engine speed and sends a signal to the ECM. The ECM then controls the ON/OFF time of the IACV-AAC valve so that engine speed coincides with the target value memorized in ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by taking into consideration various engine conditions, such as during warm up, deceleration, and engine load (air conditioner, power steering and cooling fan operation).



COMPONENT DESCRIPTION

IACV-ACC valve

The IACV-AAC valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of air that will flow through the valve. The more air that flows through the valve, the higher the idle speed.

TROUBLE DIAGNOSIS FOR DTC P0505

Idle Air Control Valve (IACV) — Auxiliary Air Control (AAC) Valve (Cont'd)

Diagnostic Trouble Code No.	Malfunction is detected when	Check items (Possible cause)
P0505 0205	A) The IACV-AAC valve does not operate properly.	<ul style="list-style-type: none"> ● Harness or connectors (The IACV-AAC valve circuit is open.) ● IACV-AAC valve
	B) The IACV-AAC valve does not operate properly.	<ul style="list-style-type: none"> ● Harness or connectors (The IACV-AAC valve circuit is shorted.) ● IACV-AAC valve

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) Wait at least 2 seconds.

OR



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

OR



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

Procedure for malfunction B



- 1) Start engine and warm it up sufficiently.
- 2) Turn ignition switch "OFF" and wait at least 5 seconds.
- 3) Turn ignition switch "ON" again and select "DATA MONITOR" mode with CONSULT.
- 4) Start engine and run it for at least 1 minute at idle speed.

OR



- 1) Start engine and warm it up sufficiently.
- 2) Turn ignition switch "OFF" and wait at least 5 seconds.
- 3) Start engine again and run it for at least 1 minute at idle speed.
- 4) Select "MODE 7" with GST.

OR

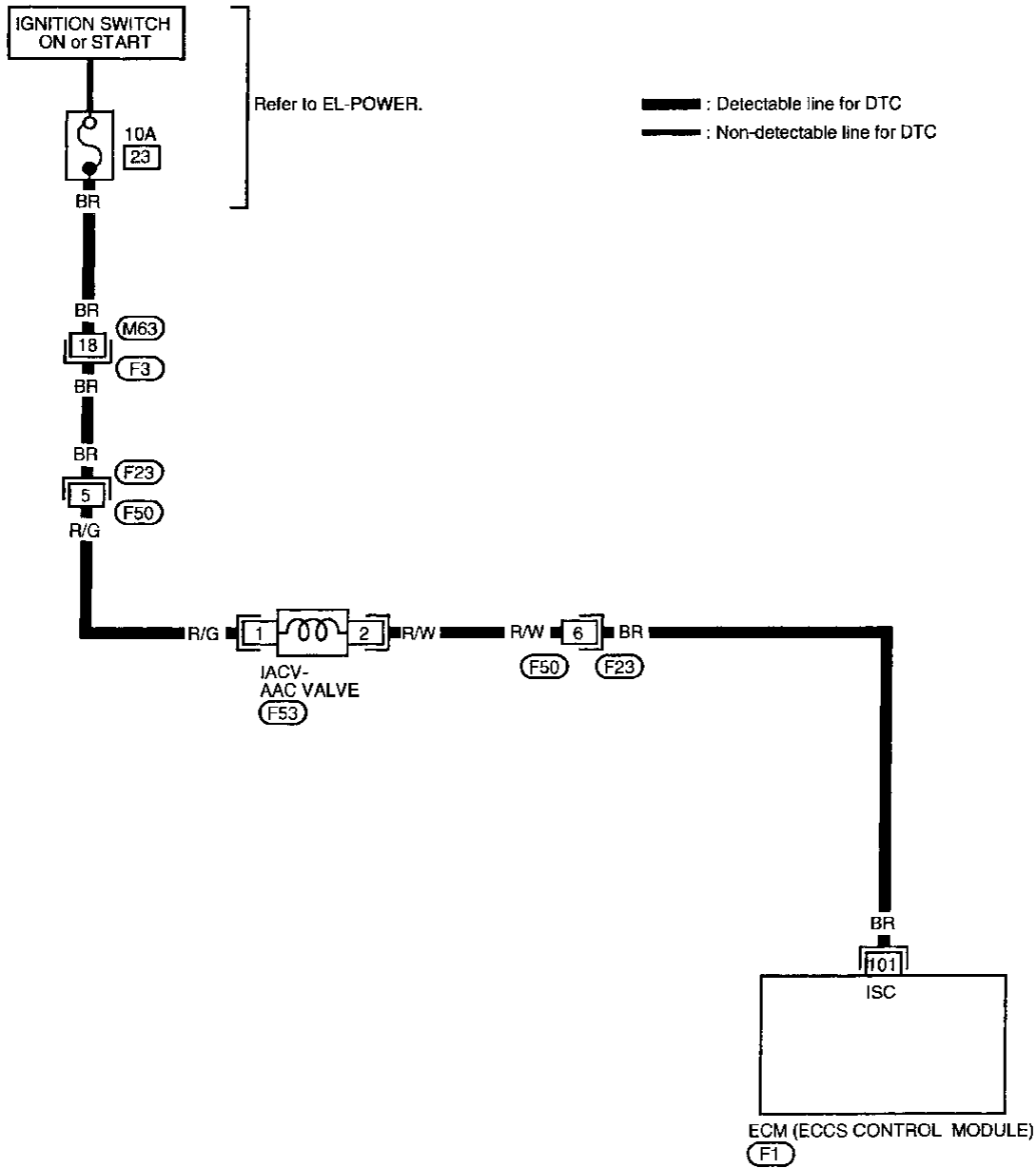


- 1) Start engine and warm it up sufficiently.
- 2) Turn ignition switch "OFF" and wait at least 5 seconds.
- 3) Start engine again and run it for at least 1 minute at idle speed.
- 4) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
- 5) Perform "Diagnostic Test Mode II (Self-diagnostic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

TROUBLE DIAGNOSIS FOR DTC P0505

Idle Air Control Valve (IACV) — Auxiliary Air Control (AAC) Valve (Cont'd)

EC-AAC/V-01

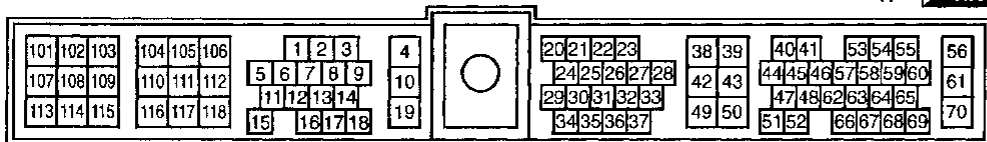


- GI
- MA
- EM
- LC
- EC**
- FE
- CL
- MT
- AT
- PD
- FA
- RA
- BR
- ST



Refer to last page (Foldout page).

M63, F3

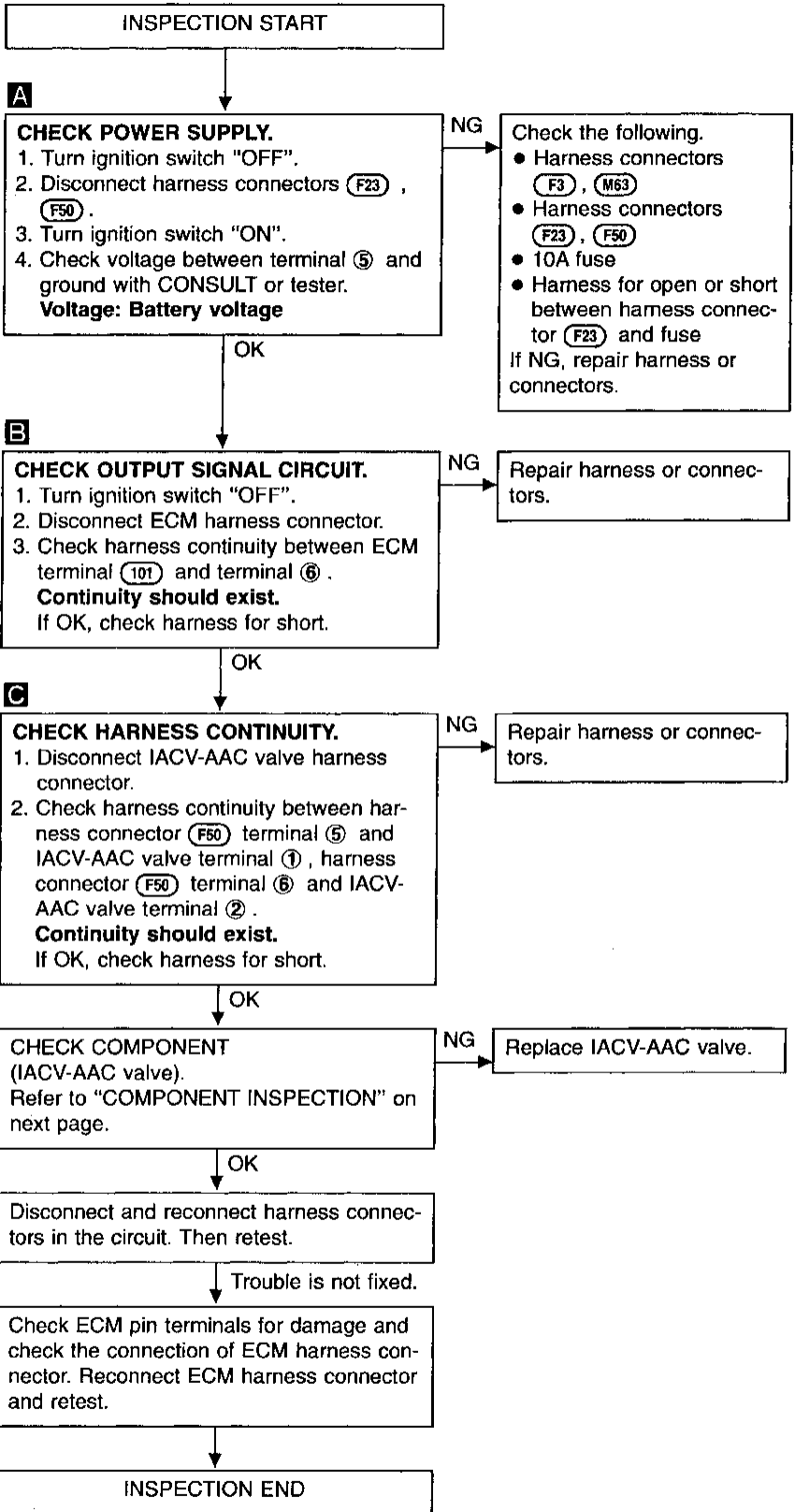
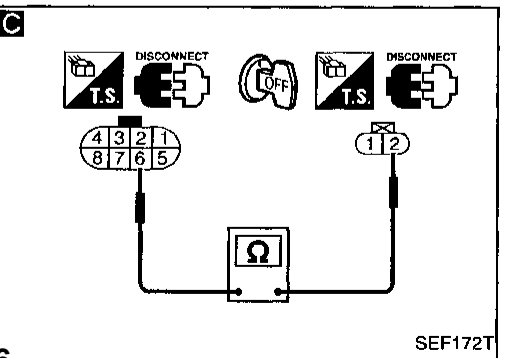
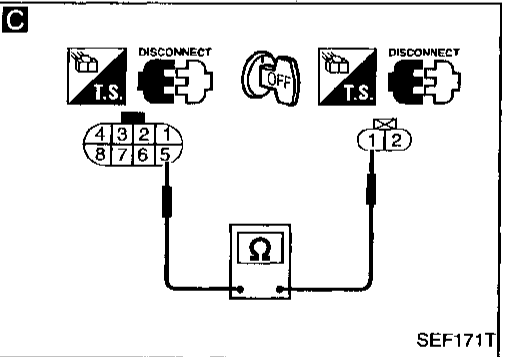
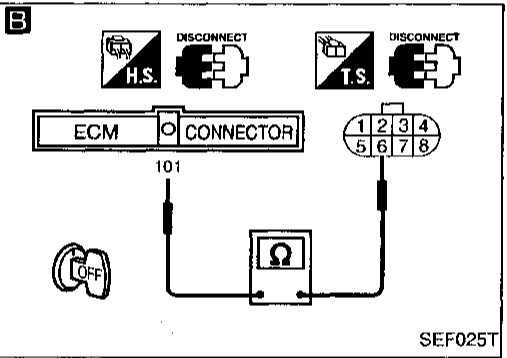
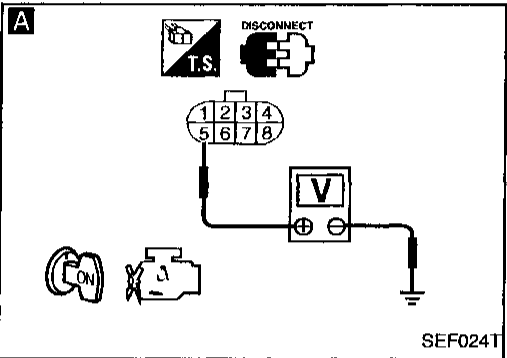
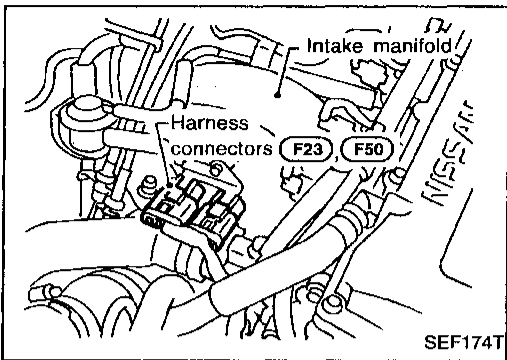


- RS
- BT
- HA
- EL
- IDX

TROUBLE DIAGNOSIS FOR DTC P0505

Idle Air Control Valve (IACV) — Auxiliary Air Control (AAC) Valve (Cont'd)

DIAGNOSTIC PROCEDURE



TROUBLE DIAGNOSIS FOR DTC P0505

Idle Air Control Valve (IACV) — Auxiliary Air Control (AAC) Valve (Cont'd)

COMPONENT INSPECTION

IACV-AAC valve

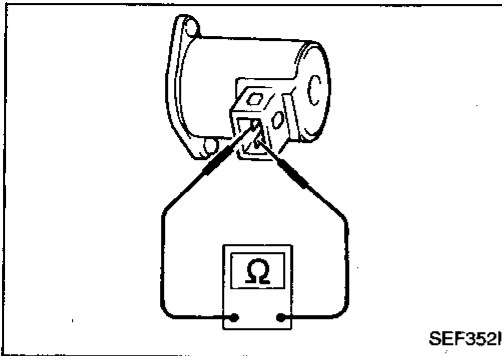
Disconnect IACV-AAC valve harness connector.

- Check IACV-AAC valve resistance.

Resistance:

Approximately 10Ω at 25°C (77°F)

- Check plunger for seizing or sticking.
- Check for broken spring.



GI

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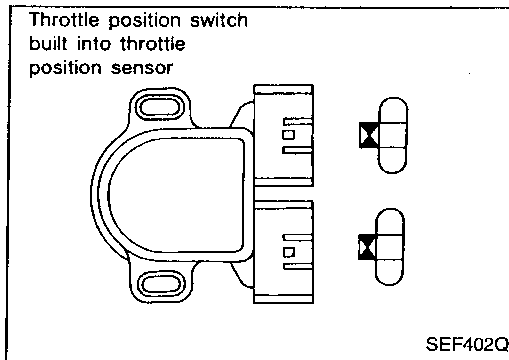
HA

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IDX

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TROUBLE DIAGNOSIS FOR DTC P0510

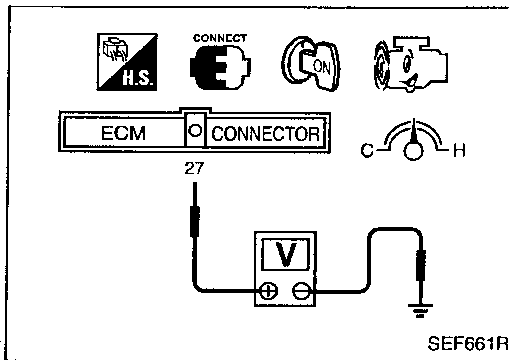


Closed Throttle Position Switch

A closed throttle position switch and wide open throttle position switch are built into the throttle position sensor unit. The wide open throttle position switch is used only for A/T control.

When the throttle valve is in the closed position, the closed throttle position switch sends a voltage signal to the ECM. The ECM only uses this signal to open or close the EVAP canister purge control valve when the throttle position sensor is malfunctioning.

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P0510 0203	<ul style="list-style-type: none"> ● Battery voltage from the closed throttle position switch is sent to ECM with the throttle valve opened. 	<ul style="list-style-type: none"> ● Harness or connectors (The closed throttle position switch circuit is shorted.) ● Closed throttle position switch



OVERALL FUNCTION CHECK

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



- 1) Start engine and warm it up sufficiently.
- 2) Check the voltage between ECM terminal ②⑦ and ground under the following conditions.

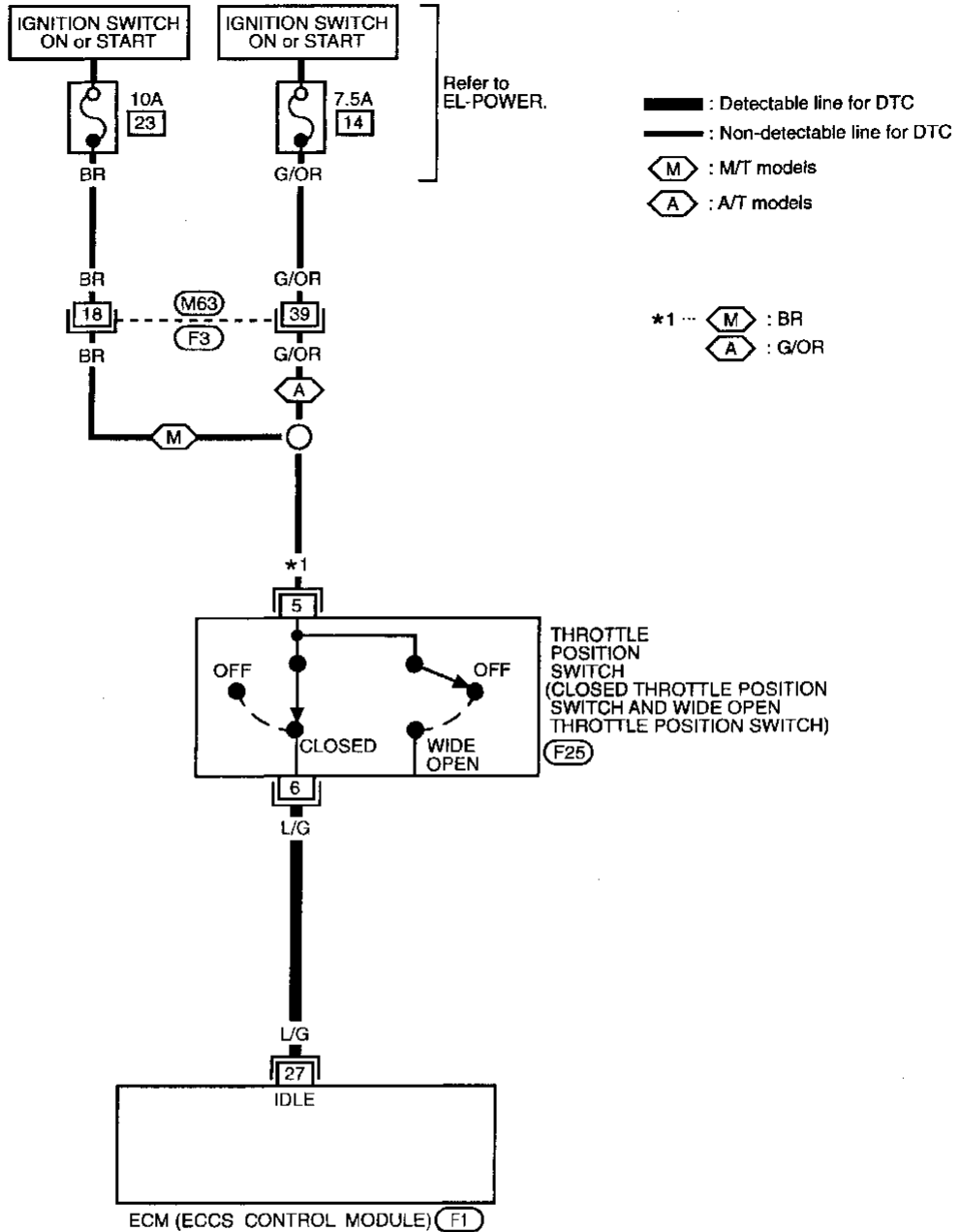
At idle: Battery voltage

At 2,000 rpm: Approximately 0V

TROUBLE DIAGNOSIS FOR DTC P0510

Closed Throttle Position Switch (Cont'd)

EC-TP/SW-01



GI

MA

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Refer to last page (Foldout page).

(M63) (F3)

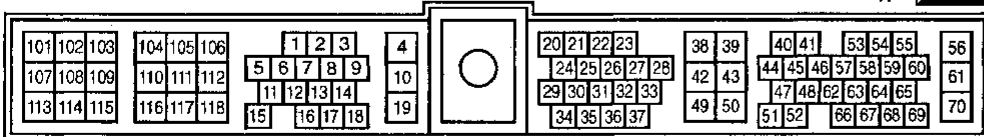
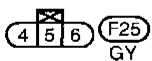
RS

BT

HA

EL

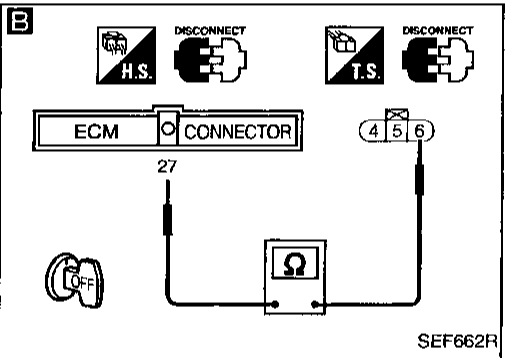
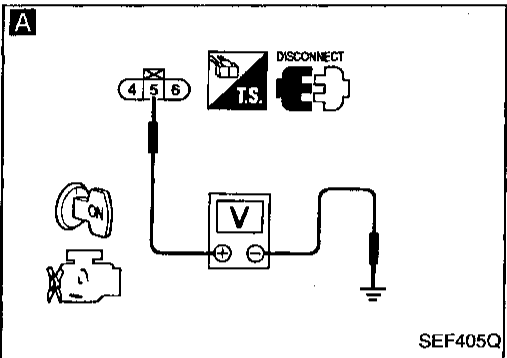
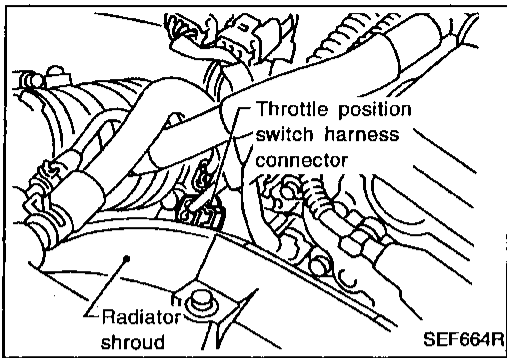
IDX



TROUBLE DIAGNOSIS FOR DTC P0510

Closed Throttle Position Switch (Cont'd)

DIAGNOSTIC PROCEDURE



INSPECTION START

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

NG → Check the following.
 • Harness connectors
 • M63, F3
 • 7.5A fuse (A/T models)
 • 10A fuse (M/T models)
 • Harness for open or short between throttle position switch and fuse
 If NG, repair harness or connectors.

B
CHECK INPUT SIGNAL CIRCUIT.
 1. Turn ignition switch "OFF".
 2. Disconnect ECM harness connector.
 3. Check harness continuity between ECM terminal ⑳ and terminal ⑥.
Continuity should exist.
 If OK, check harness for short.

NG → Repair harness or connectors.

OK → **ADJUST THROTTLE POSITION SWITCH.**
 Perform BASIC INSPECTION, EC-71.

OK → **CHECK COMPONENT**
 (Closed throttle position switch).
 Refer to "COMPONENT INSPECTION" on next page.

NG → Replace throttle position switch.

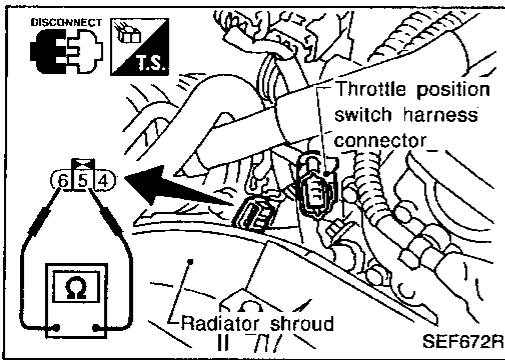
OK → Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed.
 Check ECM pin terminals for damage and check the connection of ECM harness connector.
 Reconnect ECM harness connector and retest.

INSPECTION END

TROUBLE DIAGNOSIS FOR DTC P0510

Closed Throttle Position Switch (Cont'd) COMPONENT INSPECTION



Closed throttle position switch

1. Start engine and warm it up sufficiently.
2. Turn ignition switch "OFF".
3. Disconnect throttle position switch harness connector.
4. Check continuity between terminals ⑤ and ⑥ while opening throttle valve manually.

Throttle valve conditions	Continuity
Completely closed	Yes
Partially open or completely open	No

If NG, replace throttle position switch.

GI

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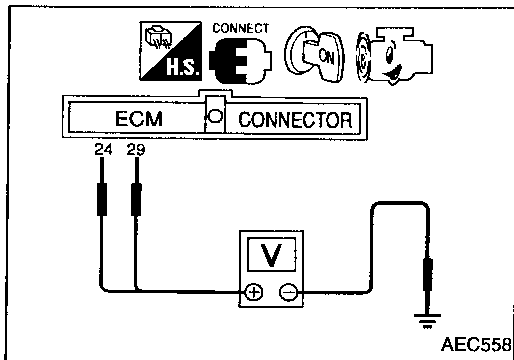
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A/T Control

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.

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Item (Possible Cause)
P0600	<ul style="list-style-type: none"> ● ECM receives incorrect voltage from A/T control unit continuously. 	<ul style="list-style-type: none"> ● Harness or connectors (The circuit between ECM and A/T control unit is open or shorted.)

*: This DTC can be detected only by "DATA MONITOR (AUTO TRIG)" with CONSULT.



DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT.
- 3) Start engine, and race more than 1,000 rpm once, then wait at least 40 seconds.

OVERALL FUNCTION CHECK

Use this procedure to check the overall function of the A/T control. During this check, a DTC might not be confirmed.

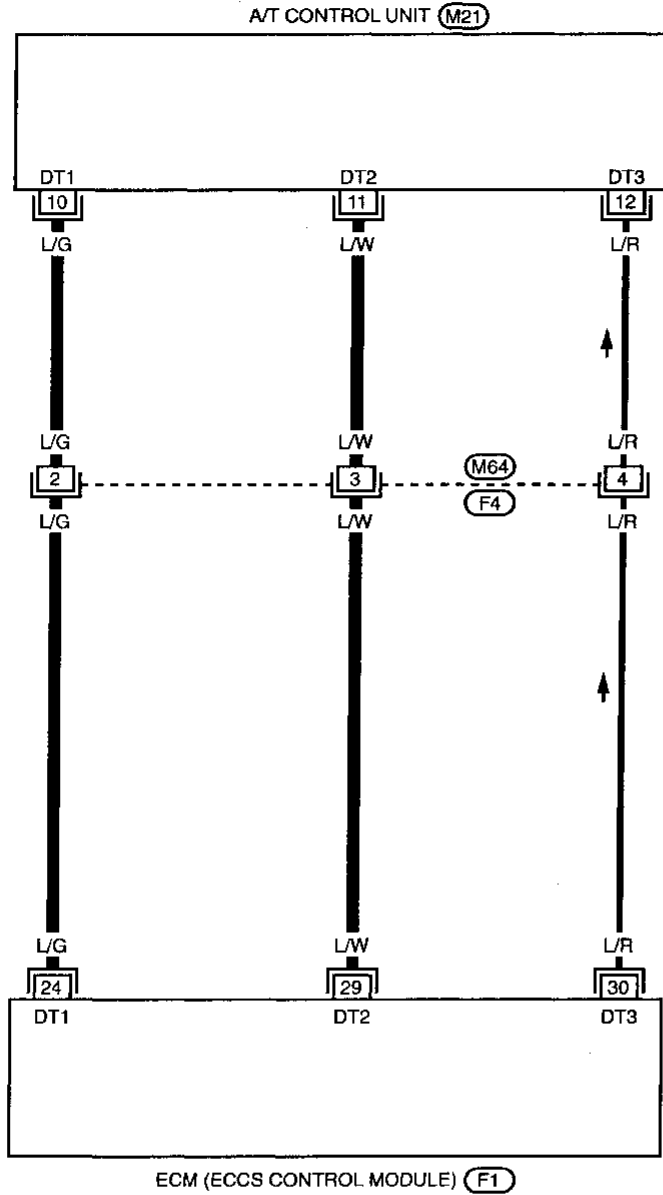
- 1) Turn ignition switch "ON".
- 2) Start engine.
- 3) Check voltage between
 - ECM terminal 24 and ground.
 - ECM terminal 29 and ground.

Voltage: Approximately 7V

TROUBLE DIAGNOSIS FOR DTC P0600

A/T Control (Cont'd)

EC-AT/C-01



: Detectable line for DTC
 : Non-detectable line for DTC

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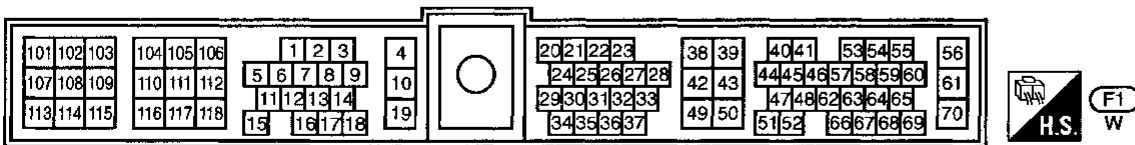
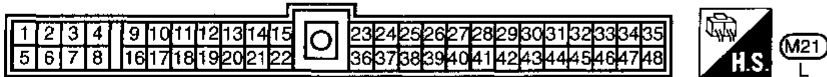
RS

BT

HA

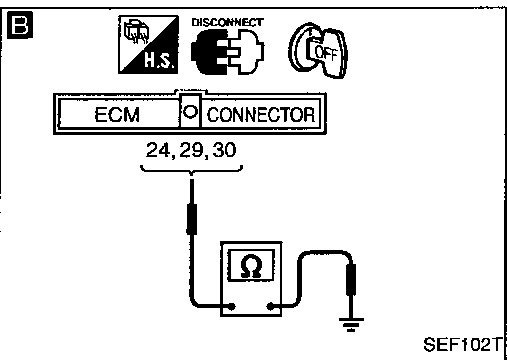
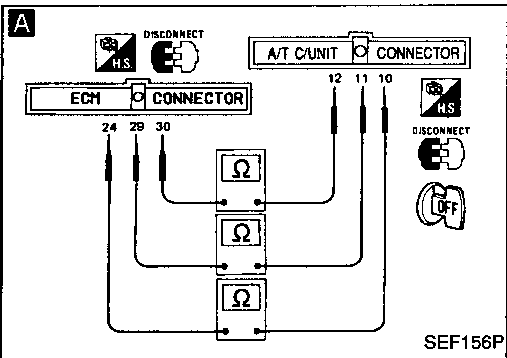
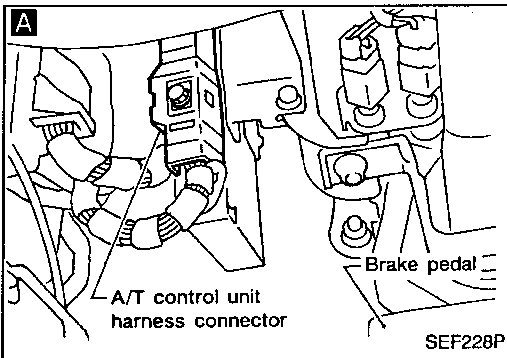
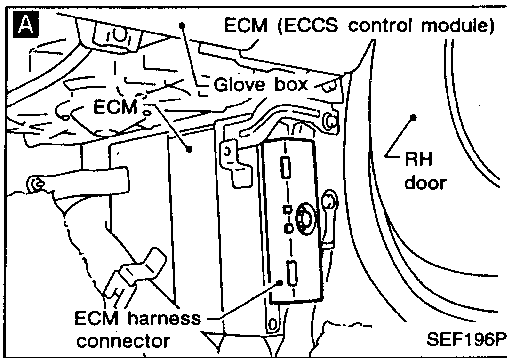
EL

IDX



TROUBLE DIAGNOSIS FOR DTC P0600

A/T Control (Cont'd) DIAGNOSTIC PROCEDURE



INSPECTION START

A
CHECK INPUT SIGNAL CIRCUIT.
1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector and A/T control unit harness connector.
3. Check harness continuity between ECM terminal ⑳ and terminal ⑩, ECM terminal ㉑ and terminal ⑪, ECM terminal ㉒ and terminal ⑫.
Continuity should exist.

NG → Check the following.
● Harness connectors
 (F4, M64)
● Harness continuity between ECM and A/T control unit
If NG, repair harness or connectors.

B
CHECK INPUT SIGNAL CIRCUIT.
Check harness continuity between ECM terminal ㉑ and ground, ECM terminal ㉒ and ground, ECM terminal ㉓ and ground.
Continuity should not exist.
If OK, check harness for short.

NG → Check the harness between ECM and A/T control unit.
If NG, repair harness.

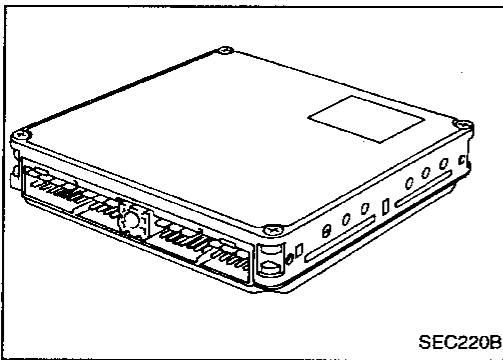
OK → Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed.

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

INSPECTION END

TROUBLE DIAGNOSIS FOR DTC P0605



Engine Control Module (ECM)-ECCS Control Module

The ECM consists of a microcomputer, diagnostic test mode selector, and connectors for signal input and output and for power supply. The unit controls the engine.

GI

MA

EM

Diagnostic Trouble Code No.	Malfunction is detected when	Check Item (Possible Cause)
P0605 0301	<ul style="list-style-type: none"> • ECM calculation function is malfunctioning. 	<ul style="list-style-type: none"> • ECM (ECCS control module)

LC

EC

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

FE



- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT.
- 3) Start engine.
- 4) Run engine for at least 30 seconds at idle speed.

CL

OR



- 1) Turn ignition switch "ON".
- 2) Start engine.
- 3) Run engine for at least 30 seconds at idle speed.
- 4) Select "Mode 7" with GST.

MT

AT

OR



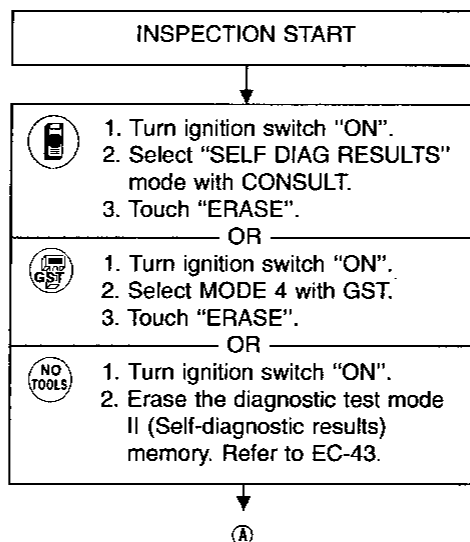
- 1) Turn ignition switch "ON".
- 2) Start engine and wait at least 30 seconds.
- 3) Turn ignition switch "OFF" and wait at least 5 seconds.
- 4) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.

PD

FA

DIAGNOSTIC PROCEDURE

RA



BR

ST

RS

BT

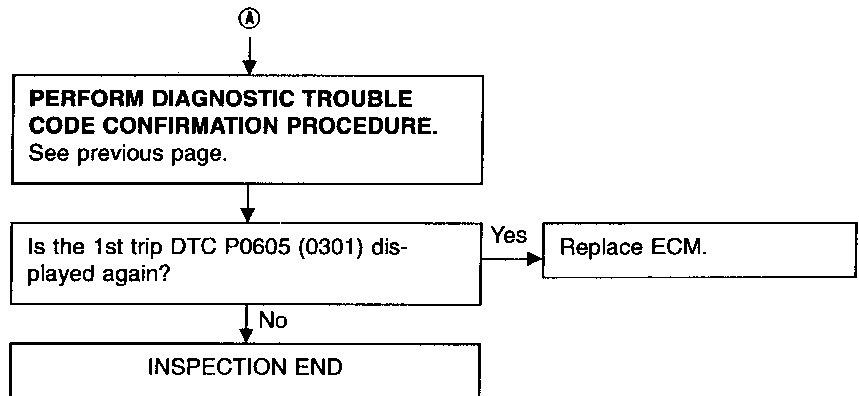
HA

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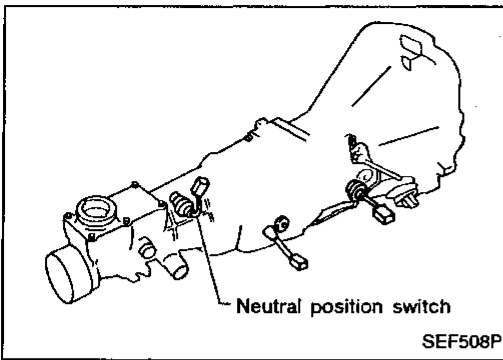
IDX

TROUBLE DIAGNOSIS FOR DTC P0605

Engine Control Module (ECM)-ECCS Control Module (Cont'd)



TROUBLE DIAGNOSIS FOR DTC P0705



Park/Neutral Position Switch

When the gear position is "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.

ECM receives signals from park position switch via A/T control unit.

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Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible cause)
P0705 1003	<ul style="list-style-type: none"> ● The signal of the park/neutral position switch is not changed in the process of engine starting and driving. 	<ul style="list-style-type: none"> ● Harness or connectors <ul style="list-style-type: none"> a. The neutral position switch or inhibitor switch circuit is open or shorted. b. The circuit between ECM and A/T control unit is open or shorted. ● Neutral position switch (M/T models) ● Inhibitor switch (A/T models) ● A/T control unit (A/T models)

TROUBLE DIAGNOSIS FOR DTC P0705

Park/Neutral Position Switch (Cont'd)

OVERALL FUNCTION CHECK

Use this procedure to check the overall function of the park/neutral position switch. During this check, a 1st trip DTC might not be confirmed.

- 1) Turn ignition switch "ON".
- 2) Perform "PARK/NEUT POSI SW CKT" in "FUNCTION TEST" mode with CONSULT.

OR

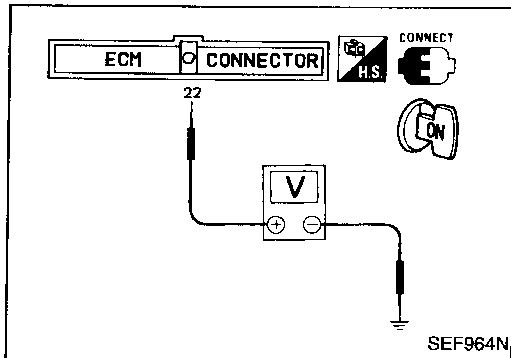
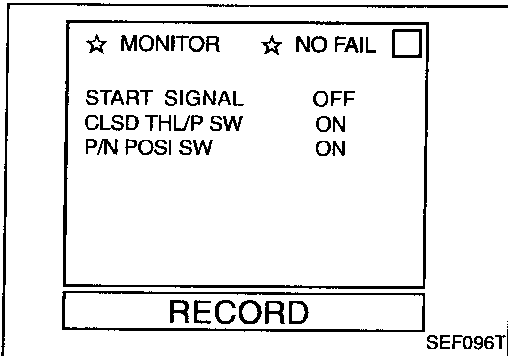
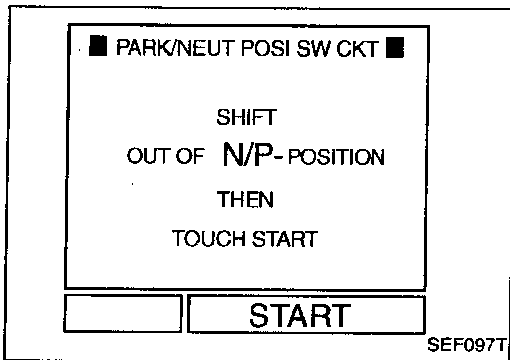
- 2) Select "P/N POSI SW" in "DATA MONITOR" mode with CONSULT.
- 3) Check the "P/N POSI SW" signal under the following conditions.

Condition (Gear position)	Known good signal
"N" and "P" (A/T only) position	ON
Except the above position	OFF

OR

- 1) Turn ignition switch "ON".
- 2) Check voltage between ECM terminal ② and body ground under the following conditions.

Condition (Gear position)	Voltage (V) (Known good data)
"N" and "P" (A/T only) position	Approx. 0
Except the above position	Approx. 5



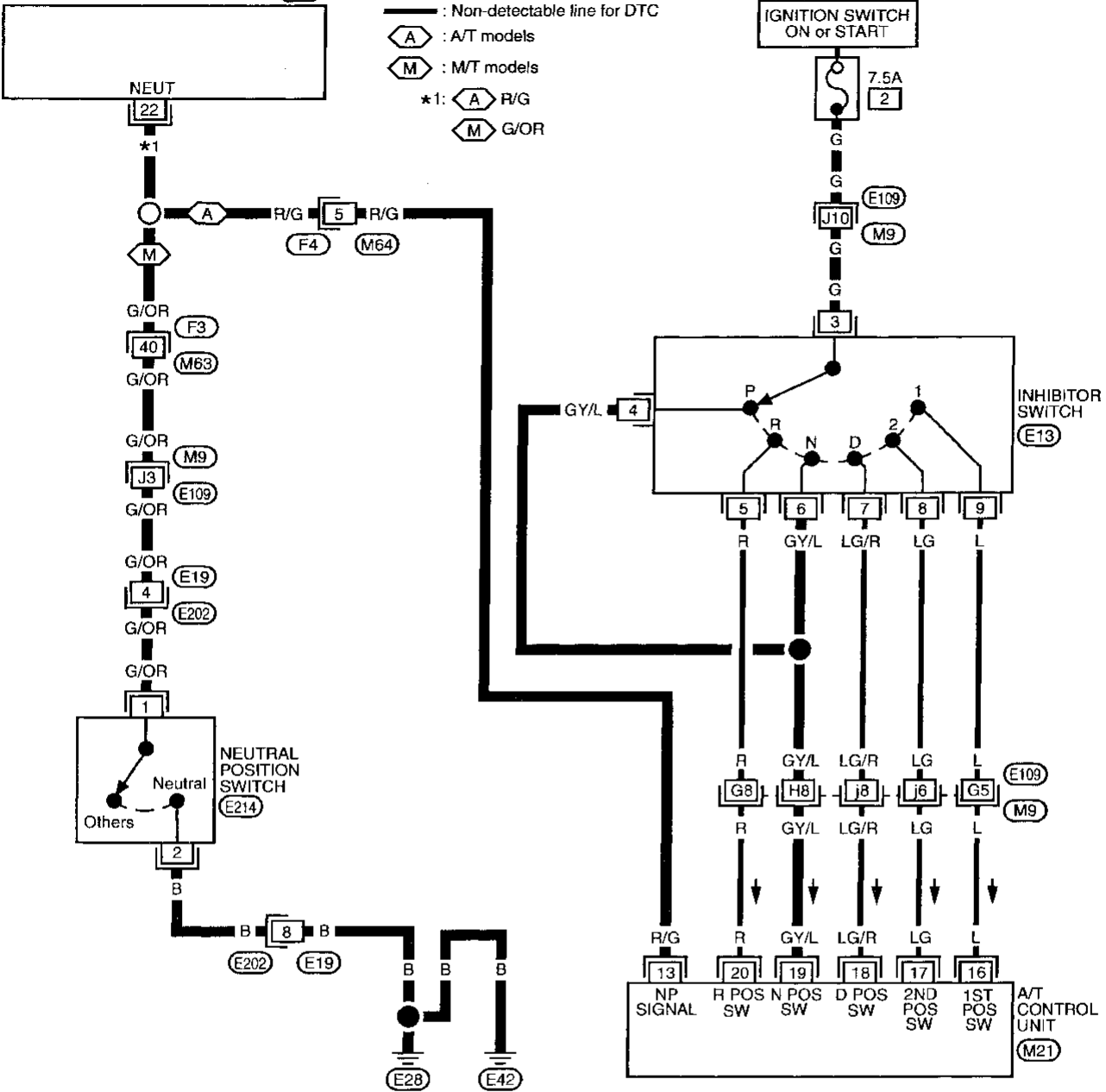
TROUBLE DIAGNOSIS FOR DTC P0705

Park/Neutral Position Switch (Cont'd)

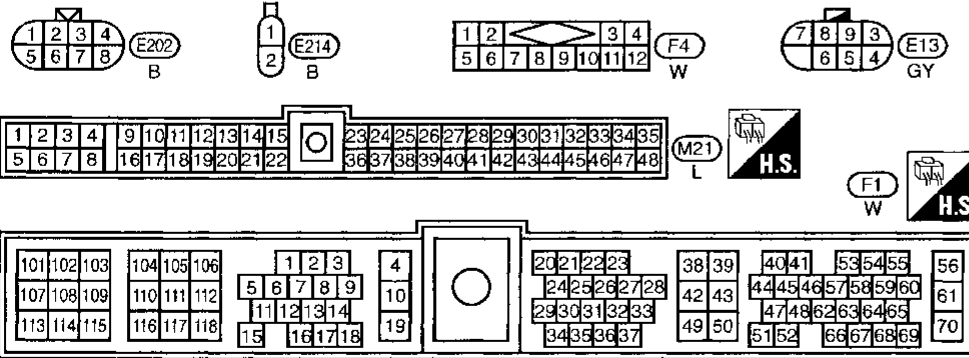
EC-PNP/SW-01

ECM (ECCS CONTROL MODULE) (F1)

- : Detectable line for DTC
- : Non-detectable line for DTC
- (A)** : A/T models
- (M)** : M/T models
- *1: **(A)** R/G
- (M)** G/OR



GI
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Refer to last page (Foldout page).

(M63), (F9)
(E109), (M9)

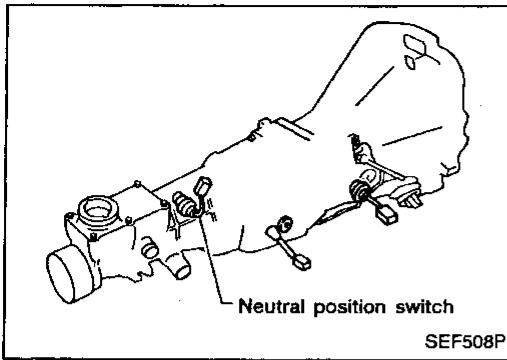
RS
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IDX

TROUBLE DIAGNOSIS FOR DTC P0705

Park/Neutral Position Switch (Cont'd)

DIAGNOSTIC PROCEDURE

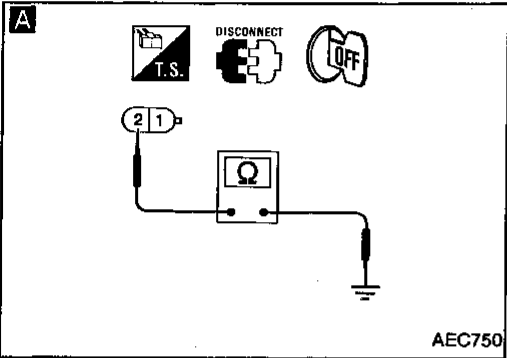


Neutral position switch (M/T models)

INSPECTION START

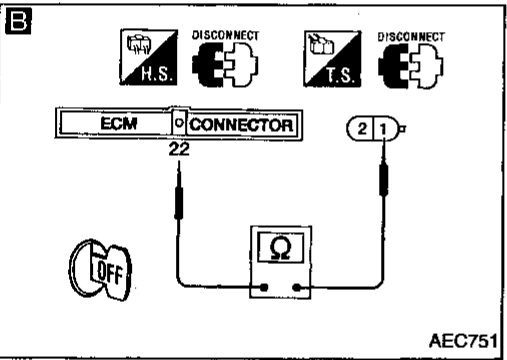
A
CHECK GROUND CIRCUIT.
1. Disconnect neutral position switch harness connector.
2. Check harness continuity between terminal ② and body ground.
Continuity should exist.
If OK, check harness for short.

NG → Check the following.
• Harness connectors (E202), (E19)
• Harness for open or short between neutral position switch and body ground
If NG, repair harness or connectors.



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

NG → Check the following.
• Harness connectors (F3), (M63)
• Harness connectors (M9), (E109)
• Harness connectors (E19), (E202)
• Harness for open or short between ECM and neutral position switch
If NG, repair harness or connectors.



CHECK COMPONENT
(Neutral position switch).
Refer to MT section

NG → Replace neutral position switch.

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

Trouble is not fixed.

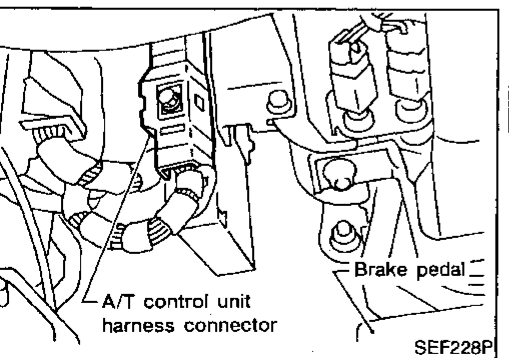
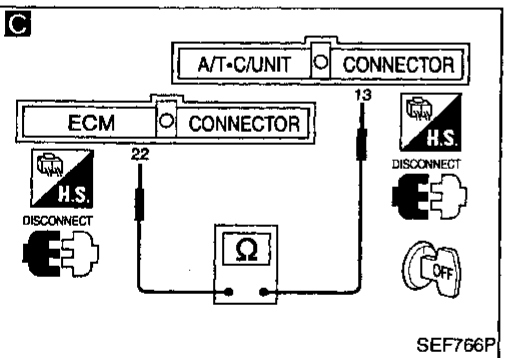
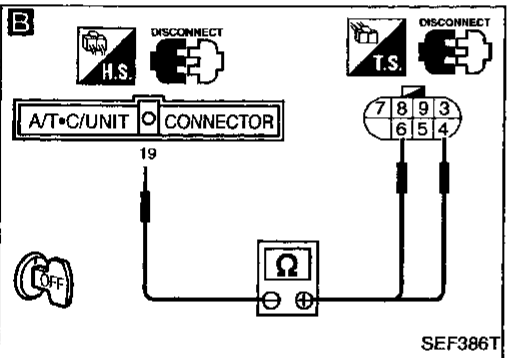
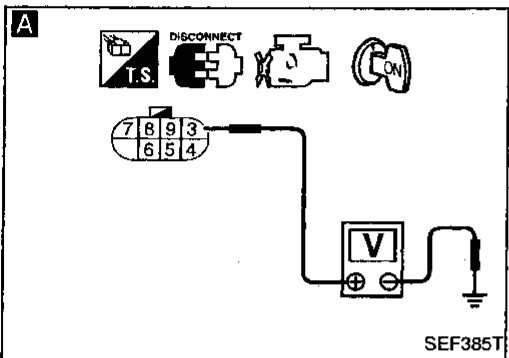
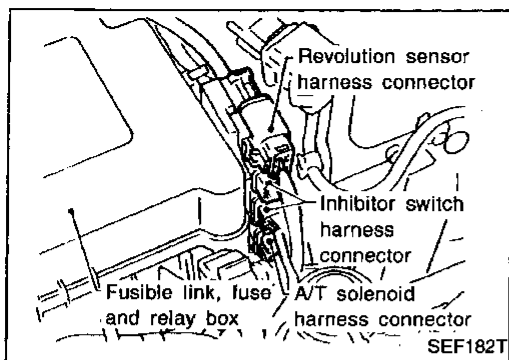
Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

INSPECTION END

TROUBLE DIAGNOSIS FOR DTC P0705

Park/Neutral Position Switch (Cont'd)

DIAGNOSTIC PROCEDURE



Inhibitor switch

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 connector
- (M9), (E109)
- 7.5A fuse
- Harness for open or short between inhibitor switch and fuse

If NG, repair harness or connectors.

B

CHECK INPUT SIGNAL CIRCUIT-I.

1. Turn ignition switch "OFF".
2. Disconnect A/T control unit harness connector.
3. Check harness continuity between A/T control unit terminal ⑬ and terminals ④, ⑥.

Continuity should exist.

If OK, check harness for short.

NG

Check the following.

- Harness connectors
- (E109), (M9)
- Harness for open or short between inhibitor switch and A/T control unit

If NG, repair harness or connectors.

C

CHECK INPUT SIGNAL CIRCUIT-II.

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal ⑫ and A/T control unit terminal ⑬.

Continuity should exist.

If OK, check harness for short.

NG

Check the following.

- Harness connectors
- (F4), (M64)
- Harness for open or short between ECM and A/T control unit

If NG, repair harness or connectors.

CHECK COMPONENT
(Inhibitor switch).
Refer to AT section.

NG

Replace inhibitor switch.

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

Trouble is not fixed.

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

INSPECTION END

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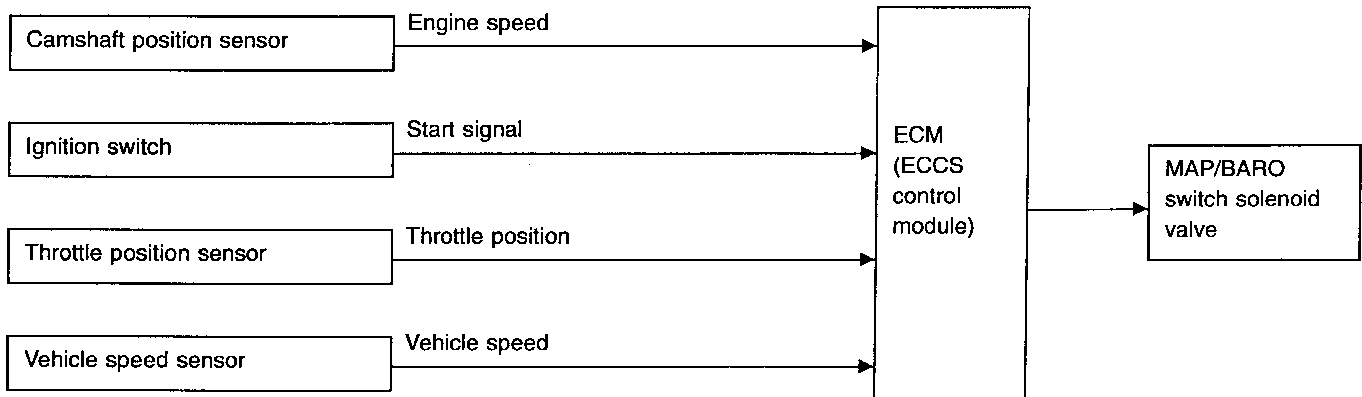
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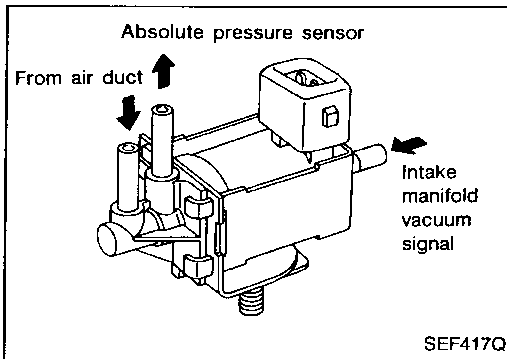
Manifold Absolute Pressure (MAP)/Barometric Pressure (BARO) Switch Solenoid Valve

SYSTEM DESCRIPTION



This system allows the absolute pressure sensor to monitor either ambient barometric pressure or intake manifold pressure. The MAP/BARO switch solenoid valve switches between two passages by ON-OFF pulse signals from the ECM. (One passage is from the intake air duct, the other is from the intake manifold.) Either ambient barometric pressure or intake manifold pressure is applied to the absolute pressure sensor.

Solenoid	Conditions
ON	<ul style="list-style-type: none"> • Immediately after turning ignition switch ON or • More than 5 minutes after the solenoid valve shuts OFF. <p style="text-align: center;">and</p> <ul style="list-style-type: none"> • Throttle valve is shut or almost fully shut for more than 1 second <p style="text-align: center;">and</p> <ul style="list-style-type: none"> • Vehicle speed is less than 100 km/h (62 MPH).



COMPONENT DESCRIPTION


The MAP/BARO switch solenoid valve switches its air flow passage according to the voltage signal sent from the ECM. When voltage is supplied from the ECM, the MAP/BARO switch solenoid turns "ON". Then, the absolute pressure sensor can monitor the ambient barometric pressure. When voltage is not supplied from the ECM, the MAP/BARO switch solenoid valve turns "OFF". Then, the sensor monitors intake manifold pressure.

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P1105 1302	<ul style="list-style-type: none"> • MAP/BARO switch solenoid valve receives the voltage supplied though ECM does not supply the voltage to the valve. • There is little difference between MAP/BARO switch solenoid valve input voltage at ambient barometric pressure and voltage at intake manifold pressure. 	<ul style="list-style-type: none"> • 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


TROUBLE DIAGNOSIS FOR DTC P1105

Manifold Absolute Pressure (MAP)/Barometric Pressure (BARO) Switch Solenoid Valve (Cont'd)


DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

-  1) Start engine and warm it up sufficiently. GI
2) Turn ignition switch "OFF" and wait at least 5 seconds. MA
3) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT.
4) Start engine and let it idle.
5) Wait at least 20 seconds. EM

OR

-  1) Start engine and warm it up sufficiently. LC
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Start engine and let it idle.
4) Wait at least 20 seconds.
5) Select "MODE 7" with GST. **EC**

OR

-  1) Start engine and warm it up sufficiently. FE
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Start engine and let it idle.
4) Wait at least 20 seconds. CL
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. MT

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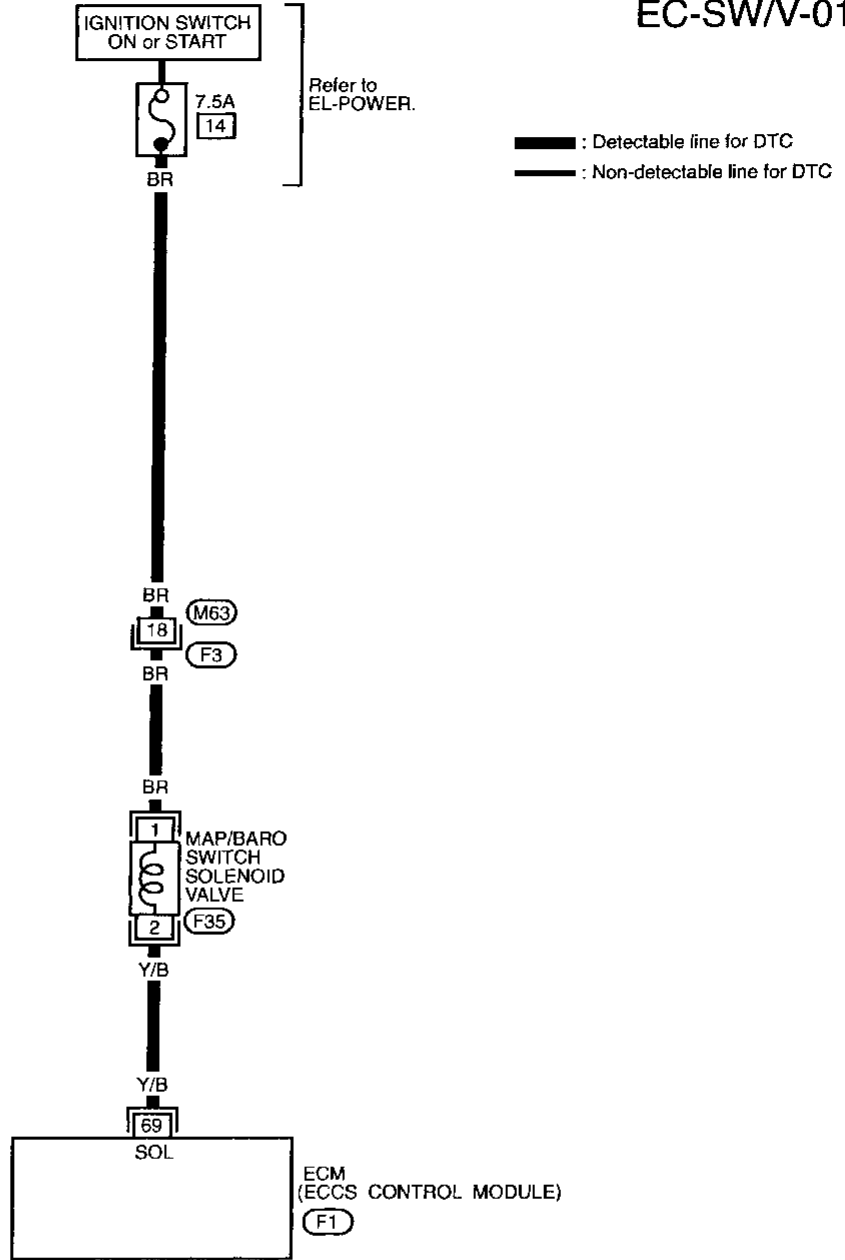
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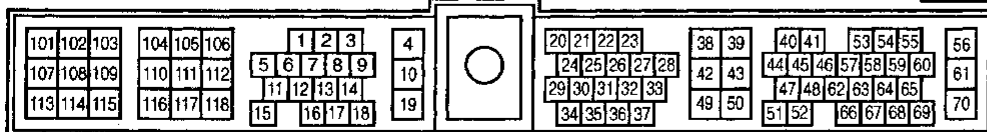
TROUBLE DIAGNOSIS FOR DTC P1105

Manifold Absolute Pressure (MAP)/Barometric Pressure (BARO) Switch Solenoid Valve (Cont'd)

EC-SW/V-01



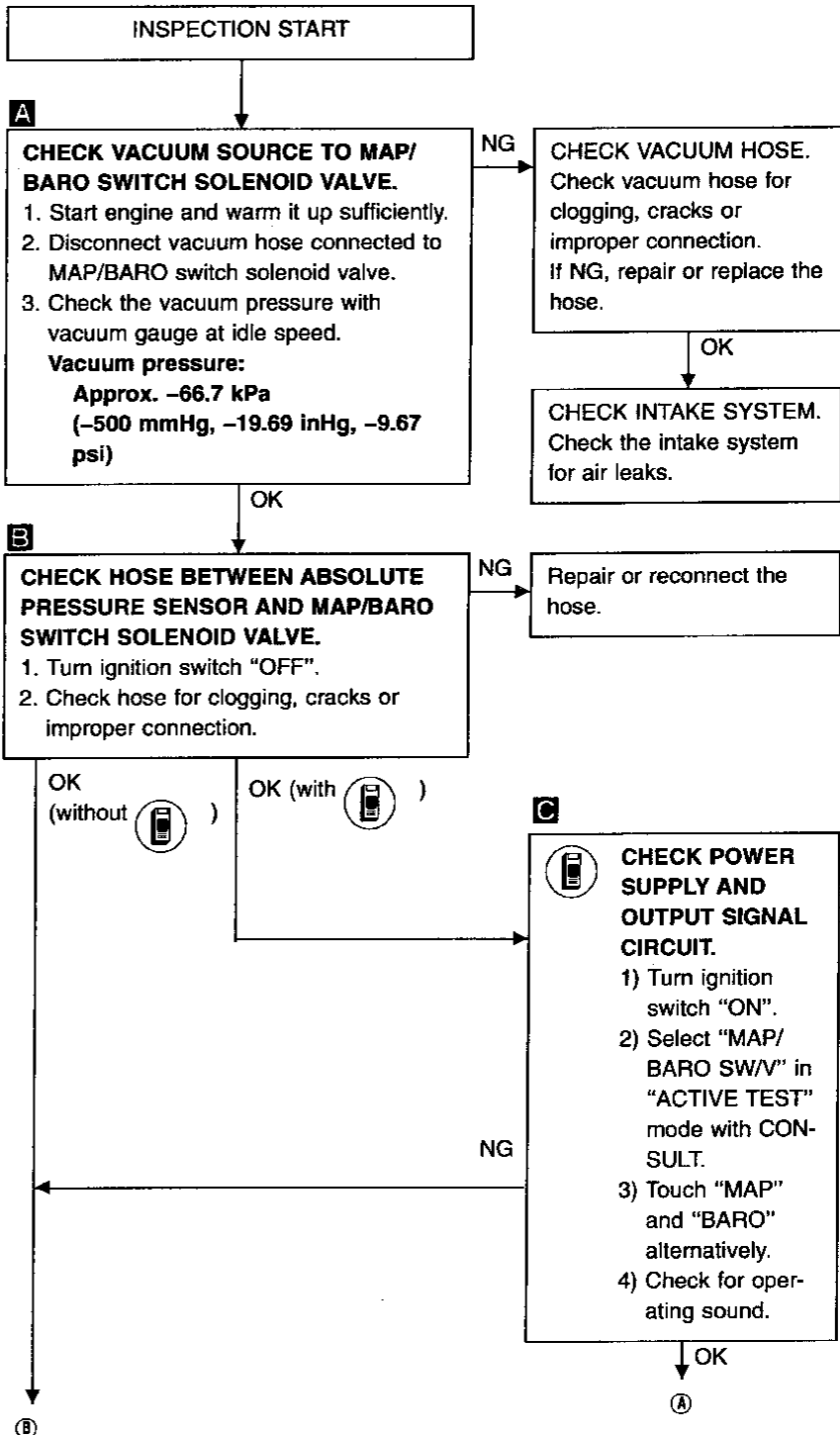
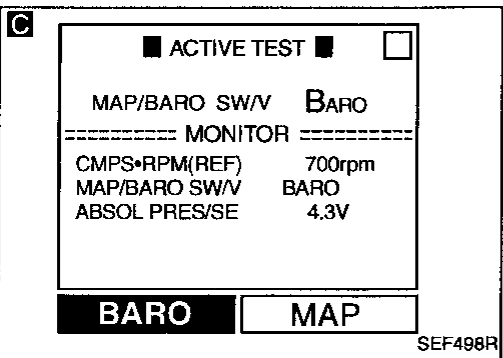
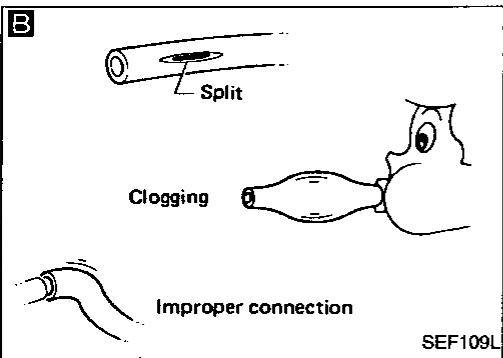
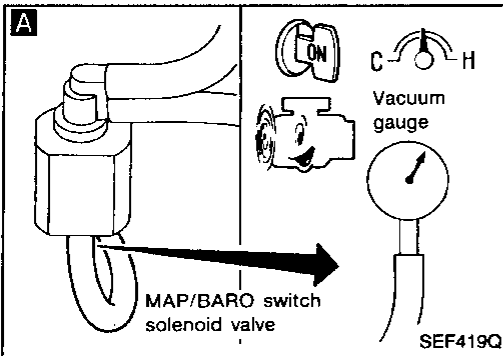
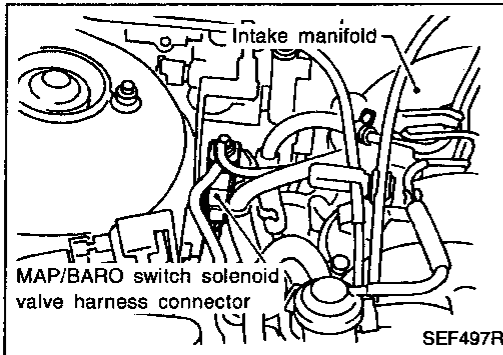
Refer to last page (Foldout page).



TROUBLE DIAGNOSIS FOR DTC P1105

Manifold Absolute Pressure (MAP)/Barometric Pressure (BARO) Switch Solenoid Valve (Cont'd)

DIAGNOSTIC PROCEDURE

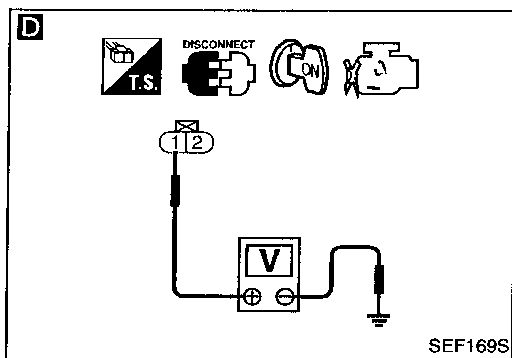


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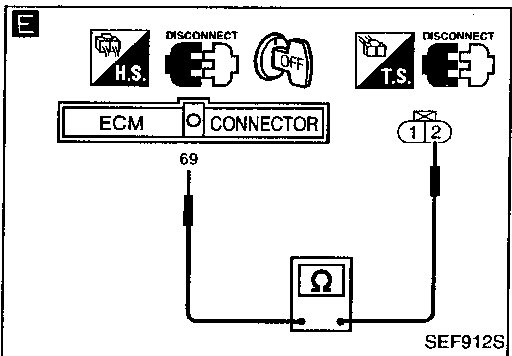


TROUBLE DIAGNOSIS FOR DTC P1105

Manifold Absolute Pressure (MAP)/Barometric Pressure (BARO) Switch Solenoid Valve (Cont'd)



SEF169S



SEF912S

D

CHECK POWER SUPPLY.

1. Turn ignition switch "OFF".
2. Disconnect MAP/BARO switch solenoid valve harness connector.
3. Turn ignition switch "ON".
4. Check voltage between terminal ① and engine ground with CONSULT or tester.

Voltage: Battery voltage
If OK, check harness for short.

NG

Check the following.

- Harness connectors
- F3, M63
- 7.5A fuse
- Harness for open or short between MAP/BARO switch solenoid valve and fuse

If NG, repair harness or connectors.

E

CHECK OUTPUT SIGNAL CIRCUIT.

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal ⑥ and terminal ② with CONSULT or tester.

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

NG

Repair harness or connectors.

CHECK COMPONENT
(Absolute pressure sensor).
Refer to "COMPONENT INSPECTION" of "TROUBLE DIAGNOSIS FOR DTC P0105", EC-105.

NG

Replace absolute pressure sensor.

CHECK COMPONENT
(MAP/BARO switch solenoid valve).
Refer to "COMPONENT INSPECTION" on next page.

NG

Replace MAP/BARO switch solenoid valve.

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

TROUBLE DIAGNOSIS FOR DTC P1105

Manifold Absolute Pressure (MAP)/Barometric Pressure (BARO) Switch Solenoid Valve (Cont'd)

COMPONENT INSPECTION

MAP/BARO switch solenoid valve

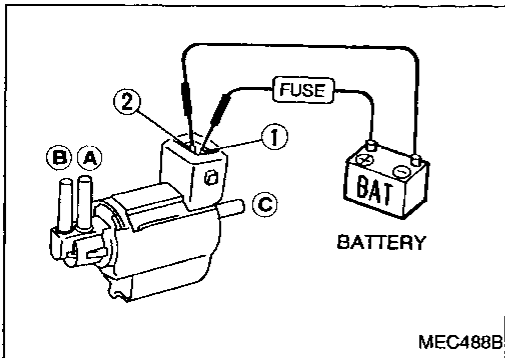
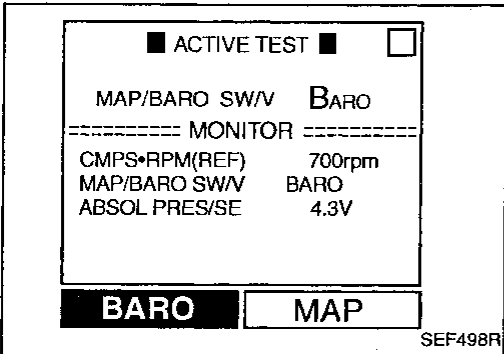
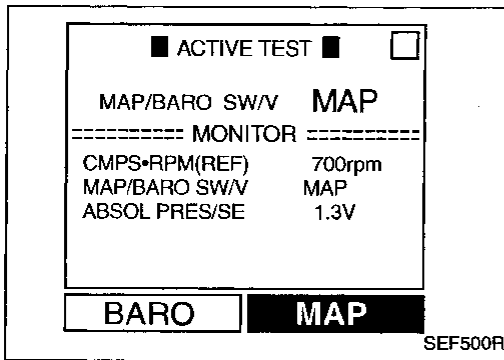
1. Start engine and warm it up sufficiently.
2. Perform "MAP/BARO SW/V" in "ACTIVE TEST" mode with CONSULT.
3. Check the following.
 - When "MAP" is selected, "ABSOL PRES/SE" indicates approximately 1.3V.
 - When "BARO" is selected, "ABSOL PRES/SE" indicates approximately 4.3V.
4. If NG, replace solenoid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

OR

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

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

3. If NG, replace solenoid valve.



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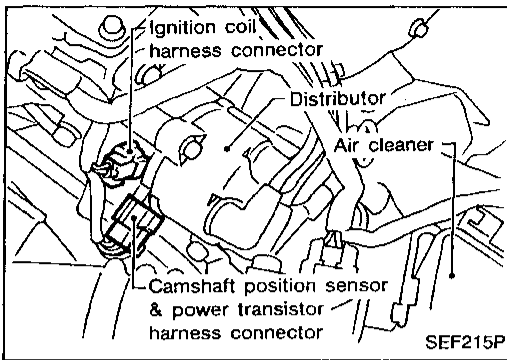
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TROUBLE DIAGNOSIS FOR DTC P1320



Ignition Signal

Ignition coil & power transistor (Built into distributor)

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.

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Item (Possible Cause)
P1320 0201	<ul style="list-style-type: none"> ● The ignition signal in the primary circuit is not sent during engine cranking or running. 	<ul style="list-style-type: none"> ● Harness or connectors (The ignition primary circuit is open or shorted.) ● Power transistor unit ● Resistor ● Camshaft position sensor ● Camshaft position sensor circuit

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

Note: If both DTC P0340 (0101) and P1320 (0201) are displayed, perform TROUBLE DIAGNOSIS FOR DTC P0340 first. (See EC-168.)



- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT.
- 3) Start engine. (If engine does not run, turn ignition switch to "START" for at least 5 seconds.)

OR



- 1) Turn ignition switch "ON".
- 2) Start engine. (If engine does not run, turn ignition switch to "START" for at least 5 seconds.)
- 3) Select MODE 7 with GST.

OR



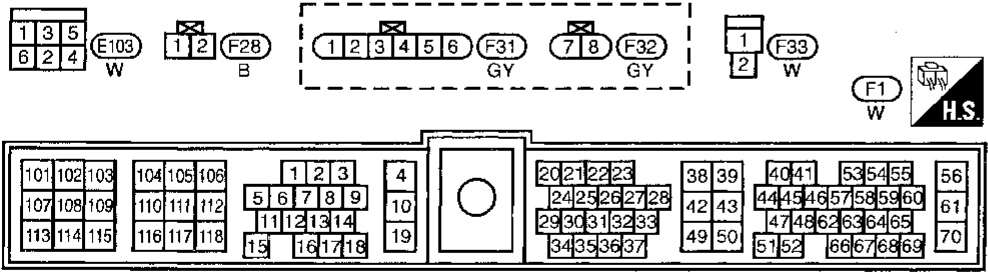
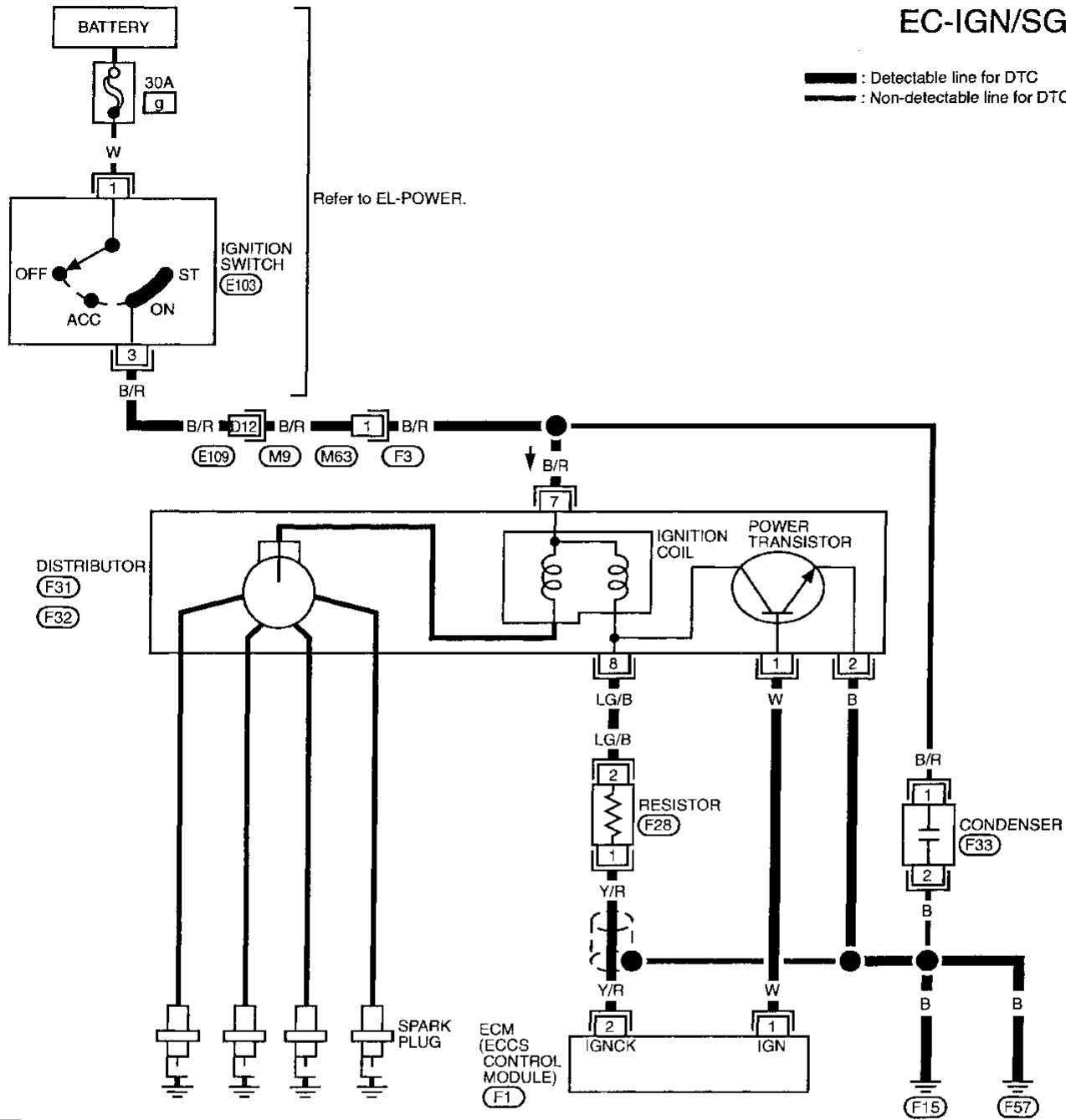
- 1) Turn ignition switch "ON".
- 2) Start engine. (If engine does not run, turn ignition switch to "START" for at least 5 seconds.)
- 3) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
- 4) Perform diagnostic test mode II (Self-diagnostic results) with ECM.

TROUBLE DIAGNOSIS FOR DTC P1320

Ignition Signal (Cont'd)

EC-IGN/SG-01

— : Detectable line for DTC
 - - - : Non-detectable line for DTC

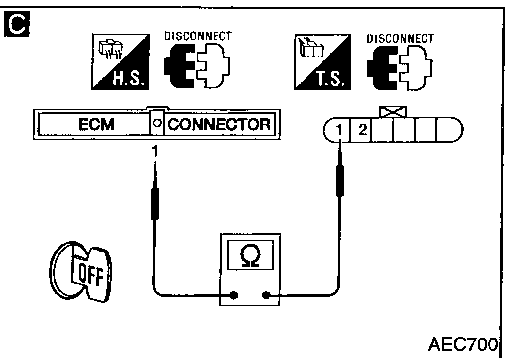
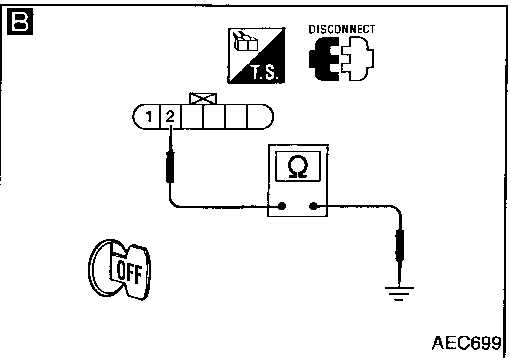
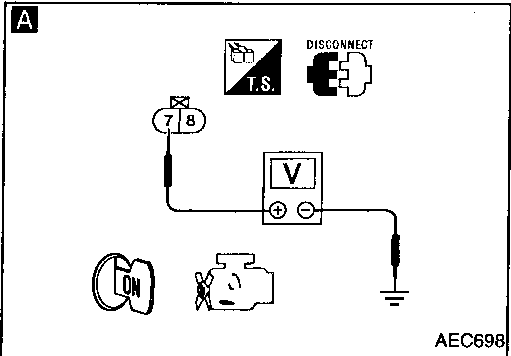
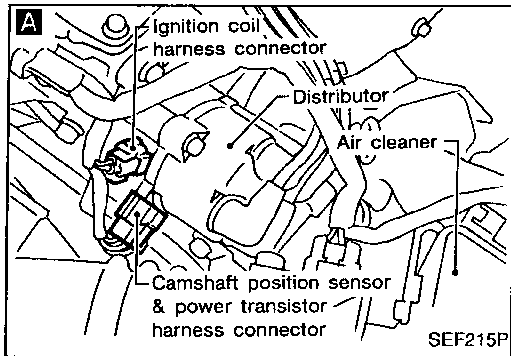


Refer to last page (Foldout page).
 E109, M9
 M63, F3

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TROUBLE DIAGNOSIS FOR DTC P1320

Ignition Signal (Cont'd) DIAGNOSTIC PROCEDURE



INSPECTION START

Turn ignition switch "OFF", and restart engine.
Is engine running?

Yes → A

CHECK POWER SUPPLY.
1. Turn ignition switch "OFF".
2. Disconnect ignition coil harness connector.
3. Turn ignition switch "ON".
4. Check voltage between terminal 7 and ground with CONSULT or tester.
Voltage: Battery voltage

NG → Check the following.
• Harness connectors (E109, M9)
• Harness connectors (M63, F3)
• Harness for open or short between ignition coil and ignition switch
If NG, repair harness or connectors.

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

NG → Repair harness or connectors.

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

NG → Repair harness or connectors.

CHECK COMPONENTS (Ignition coil, power transistor). Refer to "COMPONENT INSPECTION", EC-246.

NG → Replace malfunctioning component(s).

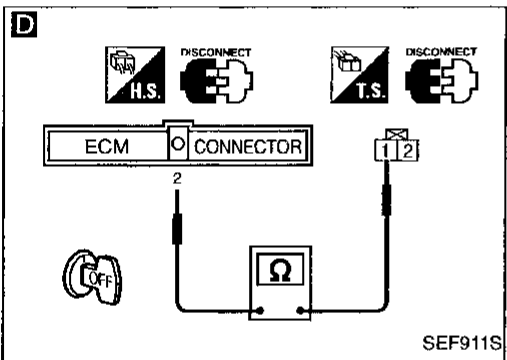
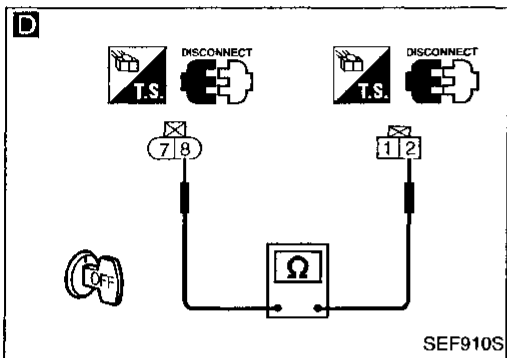
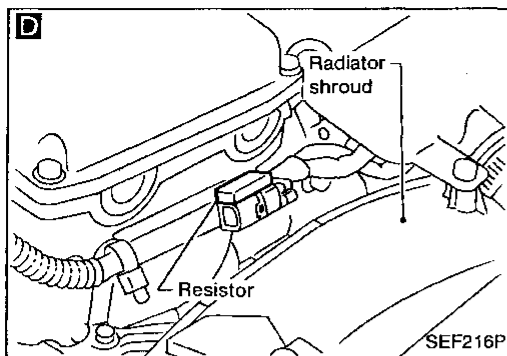
Disconnect and reconnect harness connectors in the circuit. Then retest.

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

TROUBLE DIAGNOSIS FOR DTC P1320

Ignition Signal (Cont'd)



D

CHECK INPUT SIGNAL CIRCUIT.

1. Stop engine.
2. Disconnect ignition coil harness connector.
3. Strip tape covering resistor and condenser.
4. Disconnect resistor harness connector.
5. Disconnect ECM harness connector.
6. Check harness continuity between ignition coil terminal ⑧ and resistor terminal ①, resistor terminal ① and ECM terminal ②.

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

NG → Repair harness or connectors.

OK

CHECK COMPONENTS (Resistor).
Refer to "COMPONENT INSPECTION" on next page.

NG → Replace resistor.

OK

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

Trouble is not fixed.

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

INSPECTION END

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TROUBLE DIAGNOSIS FOR DTC P1320

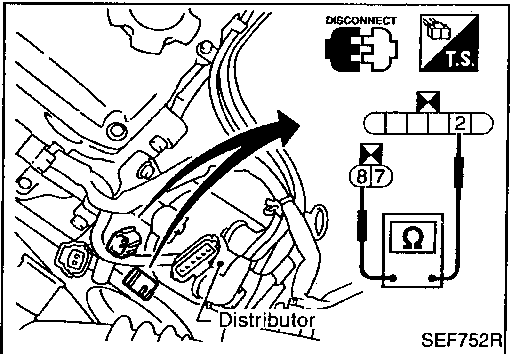
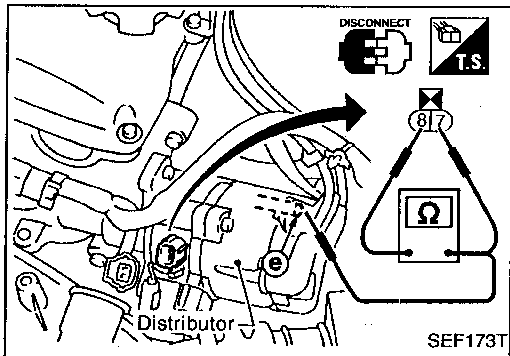
Ignition Signal (Cont'd) COMPONENT INSPECTION

Ignition coil

1. Disconnect ignition coil harness connector.
2. Remove distributor cap.
3. Check resistance as shown in the figure.

Terminal	Resistance
⑦ - ⑧	Approximately 1 Ω
⑧ - ⑨	Approximately 20 k Ω

If NG, replace distributor assembly.

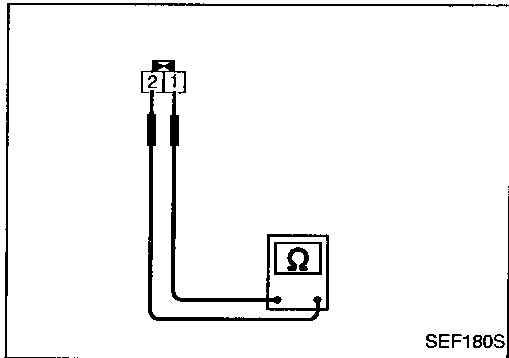


Power transistor

1. Disconnect camshaft position sensor & power transistor harness connector and ignition coil harness connector.
2. Check power transistor resistance between terminals ② and ⑧.

Terminals	Resistance	Result
② and ⑧	Except 0 Ω	OK
	0 Ω	NG

If NG, replace distributor assembly.

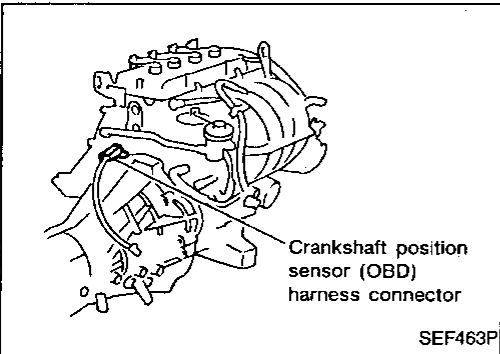
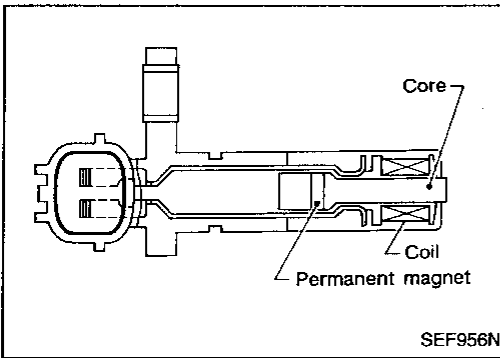


Resistor

1. Disconnect resistor harness connector.
2. Check resistance between terminals ① and ②.

Resistance: Approximately 2.2 k Ω

If NG, replace resistor.



Crankshaft Position Sensor (CKPS) (OBD) (COG)

The crankshaft position sensor (OBD) is located on the transmission housing facing the gear teeth (cogs) of the flywheel or drive plate. It detects the fluctuation of the engine revolution.

The sensor consists of a permanent magnet, core and coil.

When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.

The changing gap causes the magnetic field near the sensor to change.

Due to the changing magnetic field, the voltage from the sensor changes.

The ECM receives the voltage signal and detects the fluctuation of the engine revolution.

This sensor is not used to control the engine system.

It is used only for the on board diagnosis of misfire.

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Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P1336 0905	<ul style="list-style-type: none"> ● A chipping of the flywheel or drive plate gear tooth (cog) is detected by the ECM. 	<ul style="list-style-type: none"> ● Harness or connectors ● Crankshaft position sensor (OBD) ● Flywheel (Drive plate)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE



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

OR



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

OR

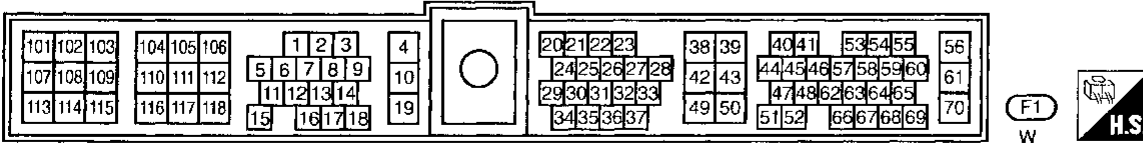
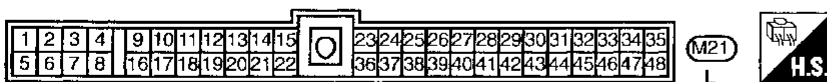
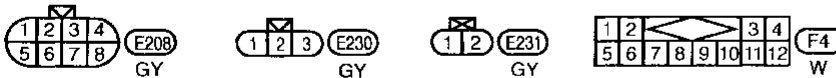
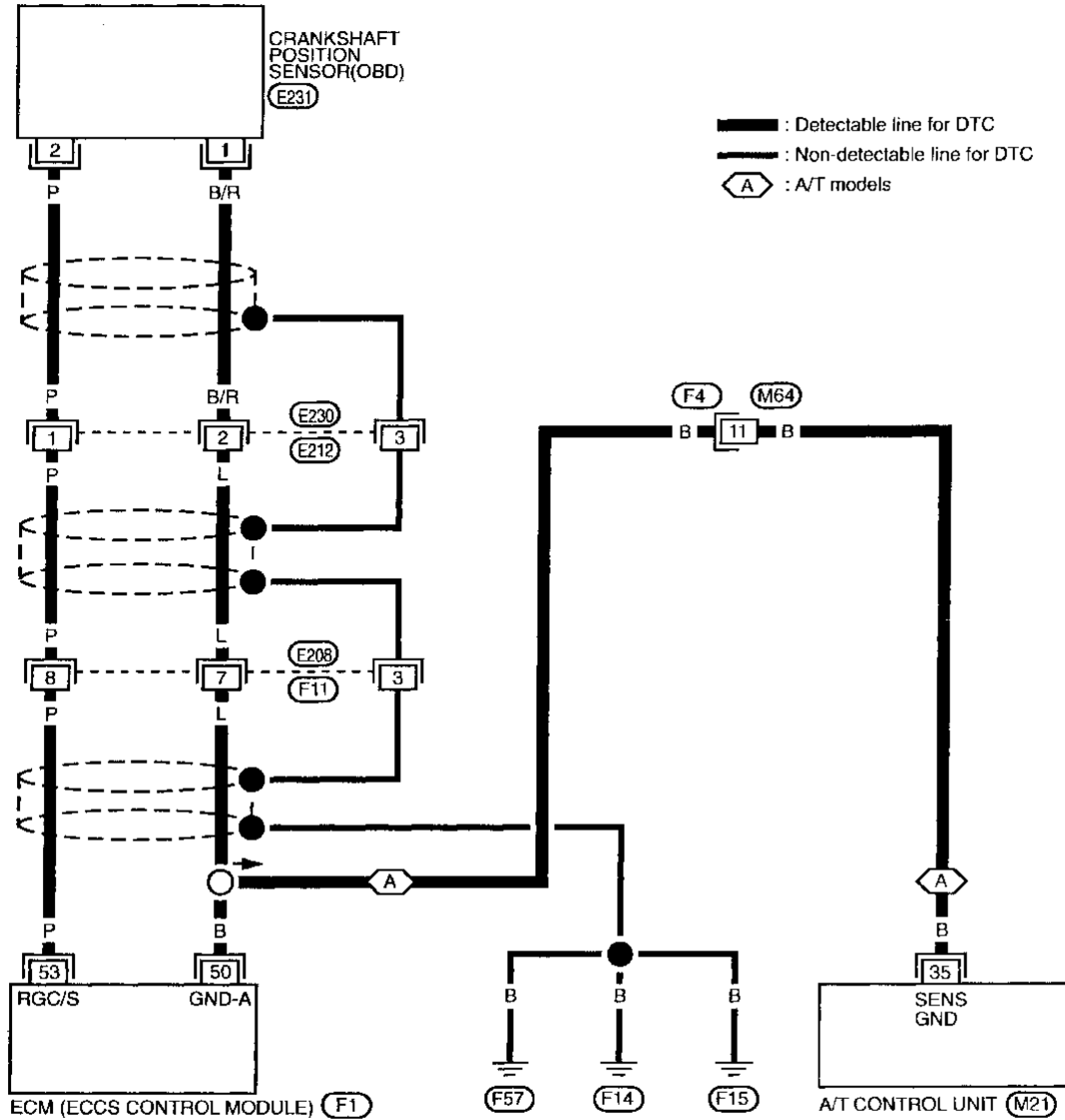


- 1) Start engine and run it for at least 2 minutes at idle speed.
- 2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
- 3) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.

TROUBLE DIAGNOSIS FOR DTC P1336

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

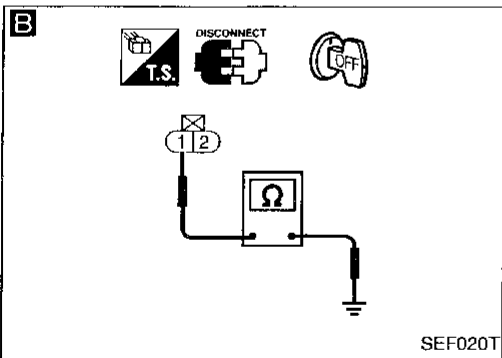
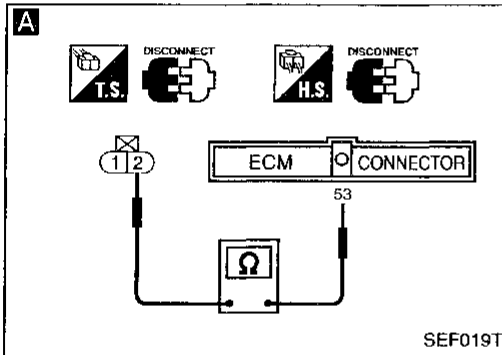
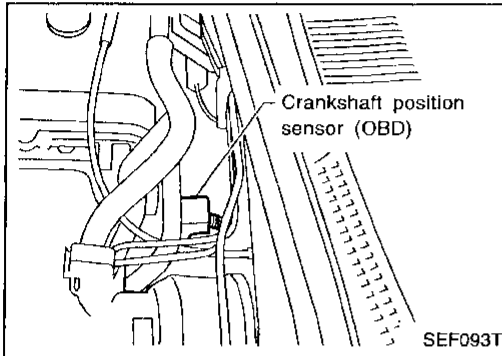
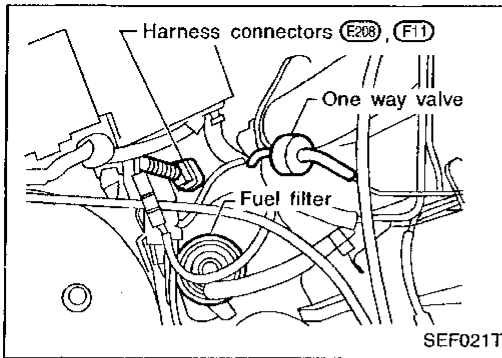
EC-CKPS-01



TROUBLE DIAGNOSIS FOR DTC P1336

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

DIAGNOSTIC PROCEDURE



INSPECTION START

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

NG → Check the following.
 • Harness connectors (E230), (E212)
 • Harness connectors (E208), (F11)
 • Harness for open or short between ECM and crankshaft position sensor (OBD)
 If NG, repair harness or connectors.

B
CHECK GROUND CIRCUIT.
 1. Turn ignition switch "OFF".
 2. Reconnect ECM harness connector.
 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 (E230), (E212)
 • Harness connectors (E208), (F11)
 • Harness connectors (F4), (M64)
 • Harness for open or short between ECM and crankshaft position sensor (OBD) harness connector
 • Harness for open or short between A/T control unit and crankshaft position sensor (OBD)
 If NG, repair harness or connectors.

Loosen and retightening engine ground screws.
Note: If engine ground is loose, voltage between harness connector (F11) terminal ③ and engine body may be changed by retightening.

Loosen and retighten the fixing bolt of the crankshaft position sensor (OBD). Then retest.

Trouble is not fixed.

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

NG → Replace crankshaft position sensor (OBD).

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

Trouble is not fixed.

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

Trouble is not fixed.

Visually check for chipping flywheel (drive plate) gear tooth (cog).

NG → Replace the flywheel (drive plate).

↓ OK
 INSPECTION END

GI

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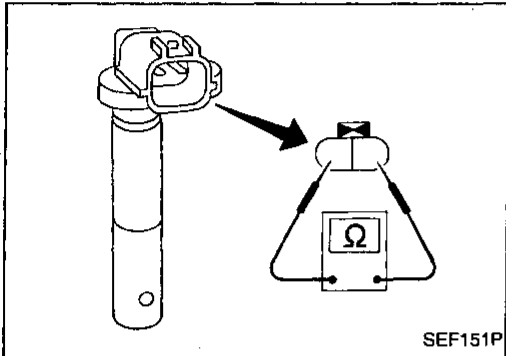
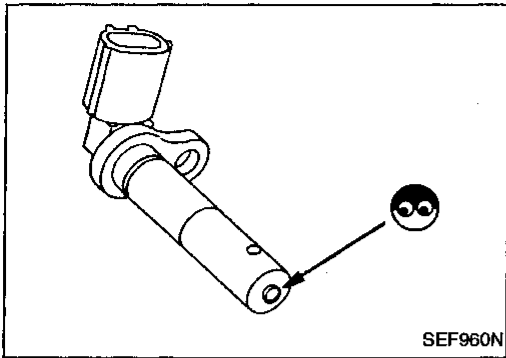
TROUBLE DIAGNOSIS FOR DTC P1336

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

COMPONENT INSPECTION

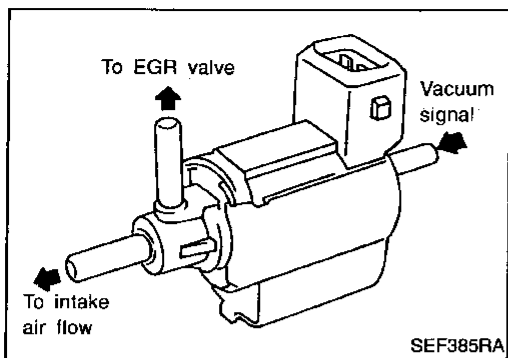
Crankshaft position sensor (OBD)

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



5. Check resistance as shown in the figure.
Resistance: Approximately 166.5 - 203.5 Ω at 20°C (68°F)

TROUBLE DIAGNOSIS FOR DTC P1400

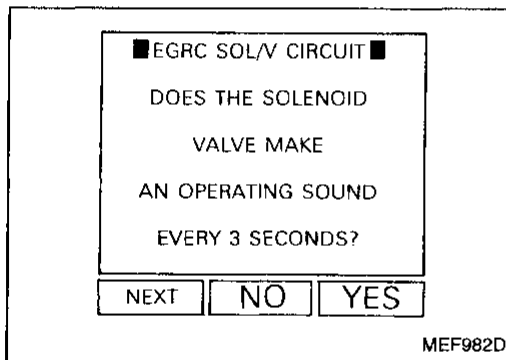


EGRC-Solenoid Valve

The EGRC-solenoid valve responds to signals from the ECM. When the ECM sends an ON (ground) signal, the coil in the solenoid valve is energized. A plunger will then move to cut the vacuum signal (from the throttle body to the EGR valve.)

When the ECM sends an OFF signal, the vacuum signal passes through the solenoid valve. The signal then reaches the EGR valve.

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P1400 1005	<ul style="list-style-type: none"> The improper voltage signal is sent to ECM through EGRC-solenoid valve. 	<ul style="list-style-type: none"> Harness or connectors (The EGRC-solenoid valve circuit is open or shorted.) EGRC-solenoid valve



OVERALL FUNCTION CHECK

Use this procedure to check the overall function of the EGRC-solenoid valve circuit. During this check, a 1st trip DTC might not be confirmed.

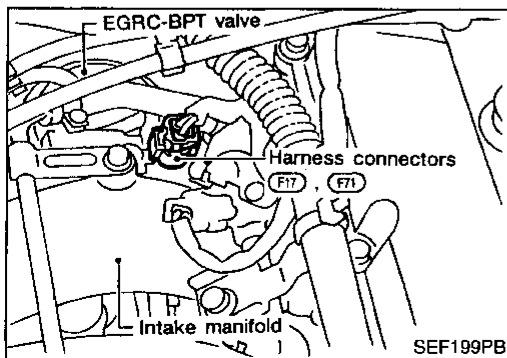
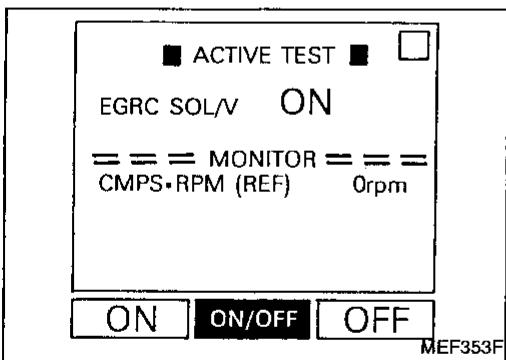
- 1) Turn ignition switch "ON".
- 2) Perform "EGRC SOL/V CIRCUIT" in "FUNCTION TEST" mode with CONSULT.

OR

- 1) Turn ignition switch "ON".
- 2) Perform "EGRC SOLENOID VALVE" in "ACTIVE TEST" mode with CONSULT and check the operating sound, according to ON/OFF switching.

OR

- 1) Turn ignition switch "ON".
- 2) Check operating sound of the solenoid valve when disconnecting and reconnecting harness connector.



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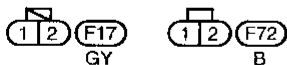
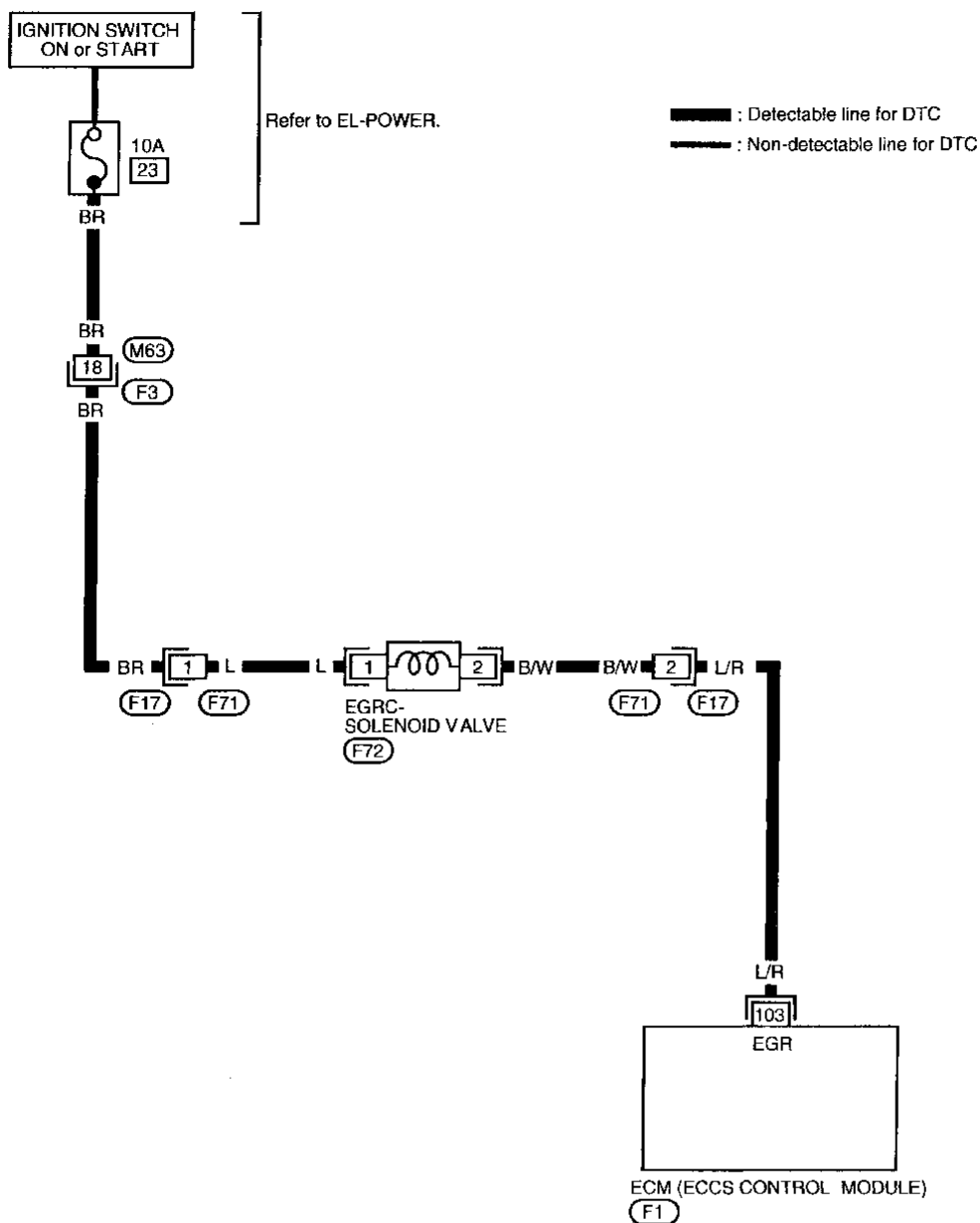
EL

IDX

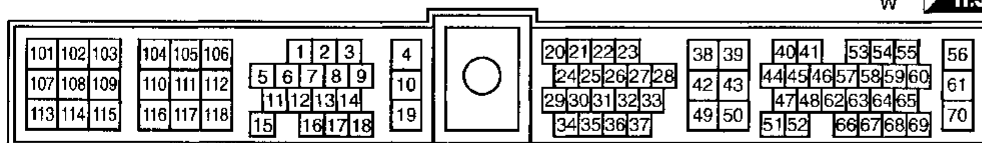
TROUBLE DIAGNOSIS FOR DTC P1400

EGRC-Solenoid Valve (Cont'd)

EC-EGRC/V-01



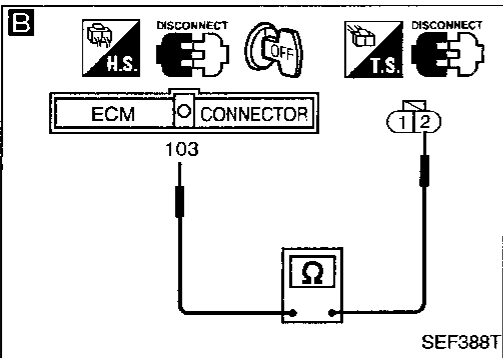
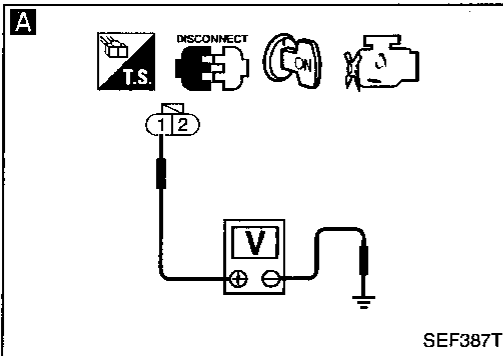
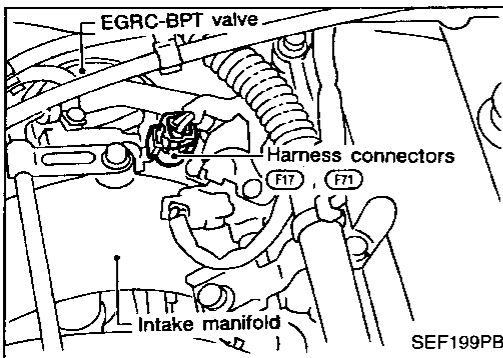
Refer to last page (Foldout page).
 (M63), (F3)



TROUBLE DIAGNOSIS FOR DTC P1400

EGRC-Solenoid Valve (Cont'd)

DIAGNOSTIC PROCEDURE



INSPECTION START

A
CHECK POWER SUPPLY.
 1. Turn ignition switch "OFF".
 2. Disconnect harness connectors (F17), (F71).
 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
 • (M63), (F3)
 • 10A fuse
 • Harness for open or short between harness connector (F17) and fuse
 If NG, repair harness or connectors.

B
CHECK OUTPUT SIGNAL CIRCUIT.
 1. Turn ignition switch "OFF".
 2. Disconnect ECM harness connector.
 3. Check harness continuity between ECM terminal (103) and terminal ②.
Continuity should exist.
 If OK, check harness for short.

NG
 Check the following.
 • Harness for open or short between EGRC-solenoid valve and ECM
 If NG, repair harness or connectors.

Check the following.
 • Harness for open or short between EGRC-solenoid valve and harness connector (F17)

NG
 Repair harness or connectors.

CHECK COMPONENT
 (EGRC-solenoid valve).
 Refer to "COMPONENT INSPECTION" on next page.

NG
 Replace EGRC-solenoid valve.

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

GI
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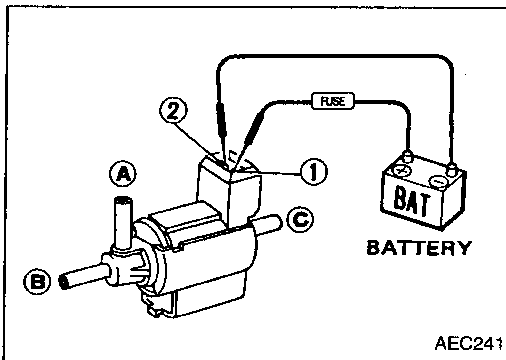
TROUBLE DIAGNOSIS FOR DTC P1400

EGRC-Solenoid Valve (Cont'd)

COMPONENT INSPECTION

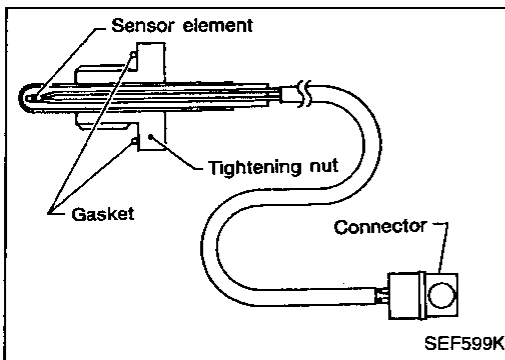
EGRC-solenoid valve

Check air passage continuity.



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

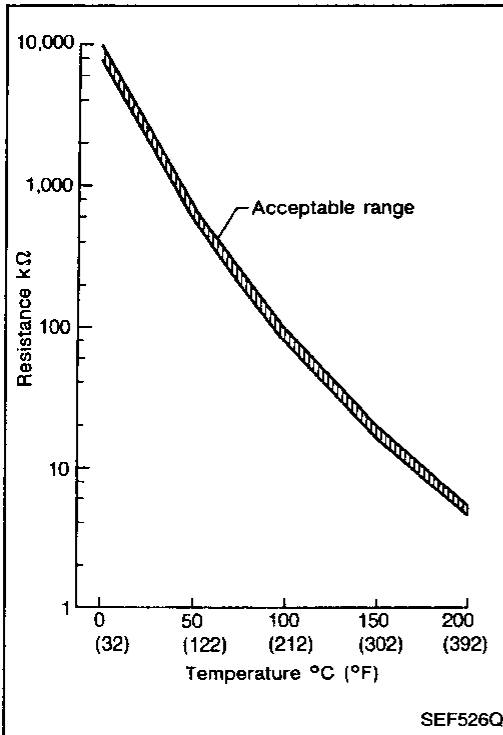
If NG, replace solenoid valve.



EGR Temperature Sensor

The EGR temperature sensor detects temperature changes in the EGR passage way. When the EGR valve opens, hot exhaust gases flow, and the temperature in the passage way changes. The EGR temperature sensor is a thermistor that modifies a voltage signal sent from the ECM. This modified signal then returns to the ECM as an input signal. As the temperature increases, EGR temperature sensor resistance decreases.

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



<Reference data>

EGR temperature °C (°F)	Voltage (V)	Resistance (MΩ)
0 (32)	4.81	7.9 - 9.7
50 (122)	2.82	0.57 - 0.70
100 (212)	0.8	0.08 - 0.10

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P1401 0305	A) An excessively low voltage from the EGR temperature sensor is sent to ECM, even when engine coolant temperature is low.	<ul style="list-style-type: none"> • Harness or connectors (The EGR temperature sensor circuit is shorted.) • EGR temperature sensor • Malfunction of EGR function, EGRC-BPT valve or EGRC-solenoid valve
	B) An excessively high voltage from the EGR temperature sensor is sent to ECM, even when engine coolant temperature is high.	<ul style="list-style-type: none"> • Harness or connectors (The EGR temperature sensor circuit is open.) • EGR temperature sensor • Malfunction of EGR function, EGRC-BPT valve or EGRC-solenoid valve

GI

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TROUBLE DIAGNOSIS FOR DTC P1401

EGR Temperature Sensor (Cont'd)

OVERALL FUNCTION CHECK

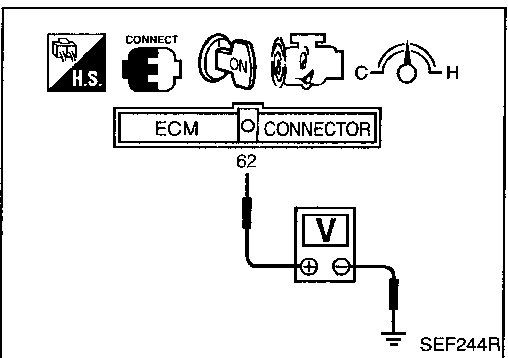
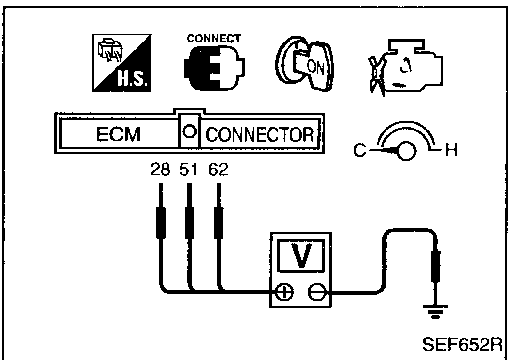
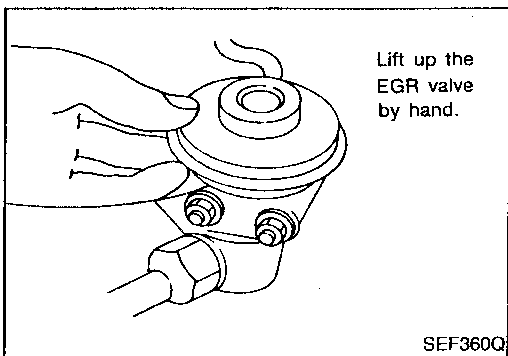
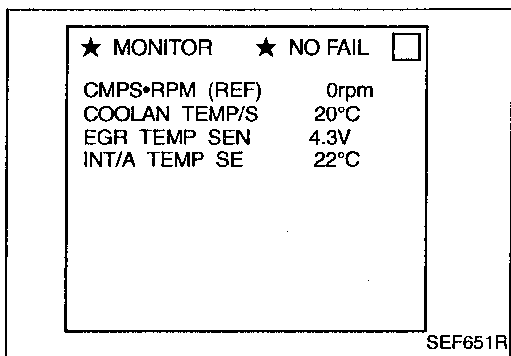
Use this procedure to check the overall function of the EGR temperature sensor. During this check, a 1st trip DTC might not be confirmed.

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-172 and 180.)
- 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-172, 180 and 251.)

OR

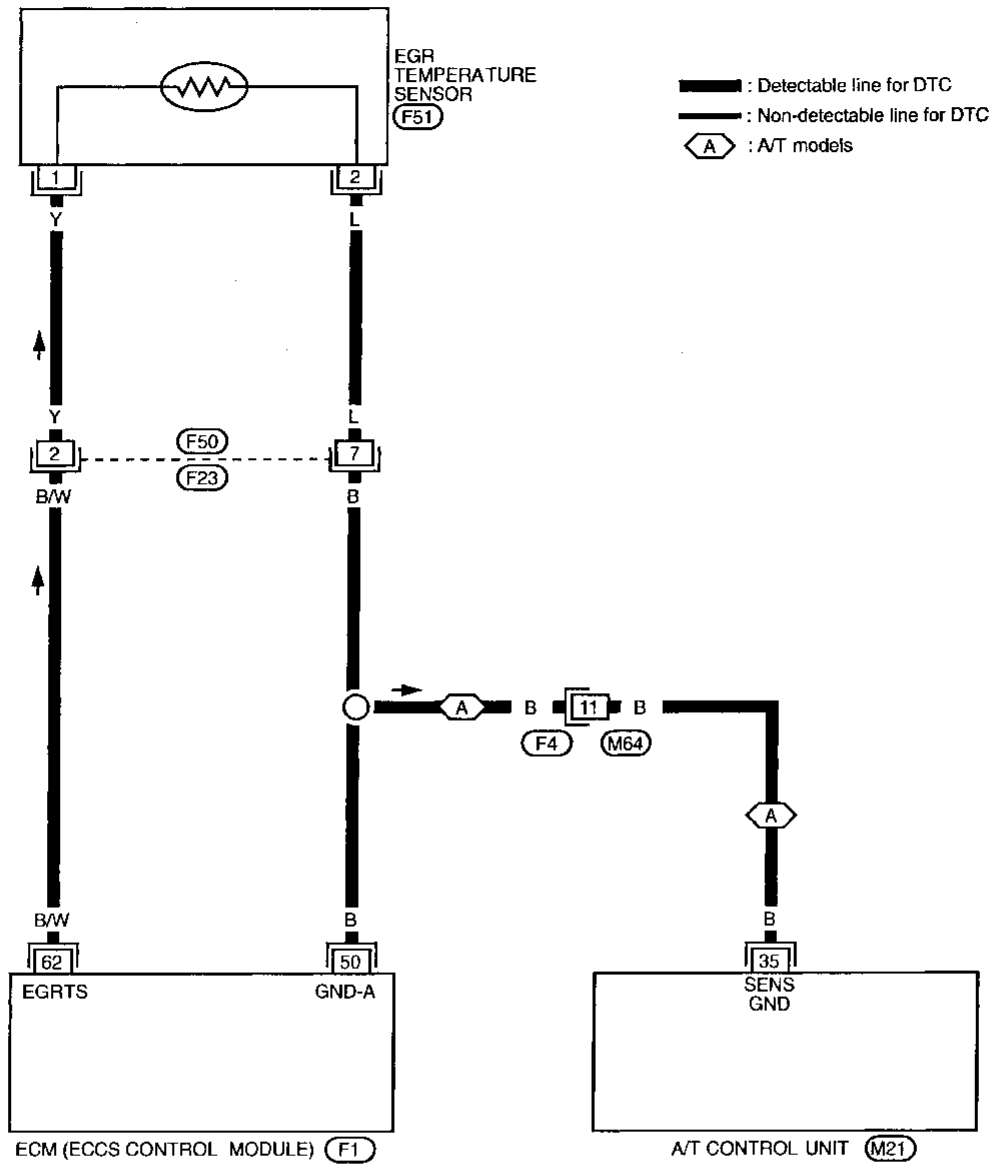
- 1) Turn ignition switch "ON".
- 2) Confirm that voltage between ECM terminals ⑤1, ②8 and ground are more than 2.72V. (If necessary, wait until engine coolant temperature and intake air temperature equal atmospheric temperature.)
- 3) Confirm that voltage between ECM terminal ⑥2 and ground is between 3.45V and 5.0V.
- 4) Start engine and warm it up sufficiently.
- 5) Run engine at idle for at least 2 minutes.
- 6) Confirm that EGR valve is not lifting. If NG, go to TROUBLE DIAGNOSES FOR DTC P0400 and P0402. (See pages EC-172 and 180.)
- 7) Check voltage between ECM terminal ⑥2 and ground at about 1,500 rpm with EGR valve lifted up to the full position by hand.
Voltage should decrease to less than 1.0V.
- 8) If step 7 is OK, perform TROUBLE DIAGNOSES FOR DTC P0400, P0402 and P1400. (See pages EC-172, 180 and 251.)



TROUBLE DIAGNOSIS FOR DTC P1401

EGR Temperature Sensor (Cont'd)

EC-EGR/TS-01



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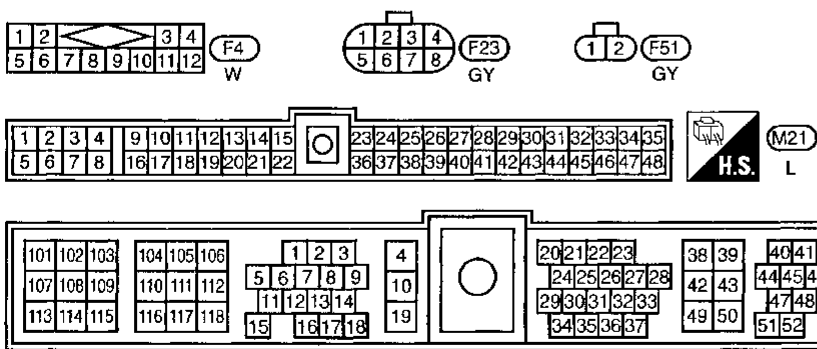
RS

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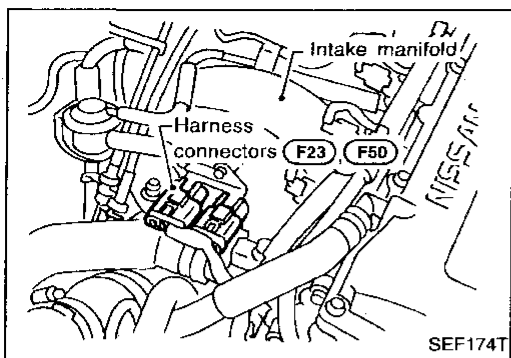
IDX



TROUBLE DIAGNOSIS FOR DTC P1401

EGR Temperature Sensor (Cont'd)

DIAGNOSTIC PROCEDURE



INSPECTION START

A

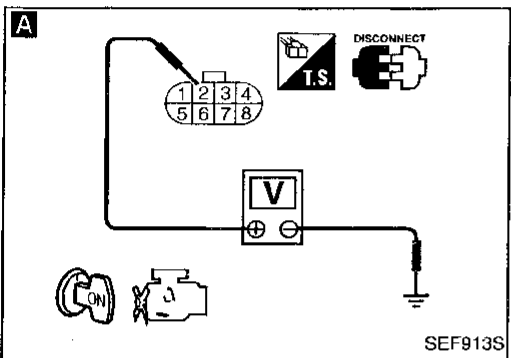
CHECK POWER SUPPLY.

- 1) Disconnect harness connectors (F50), (F23).
- 2) Turn ignition switch "ON".
- 3) Check voltage between terminal ② and ground with CONSULT or tester.

Voltage: Approximately 5V

NG → Repair harness or connectors.

OK →



B

CHECK GROUND CIRCUIT.

- 1) Turn ignition switch "OFF".
- 2) Check harness continuity between terminal ⑦ and engine ground.

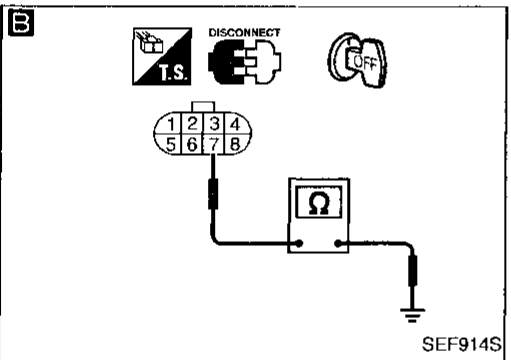
Continuity should exist.
If OK, check harness for short.

NG → Check the following.

- Harness connectors (F4), (M64)
- Harness continuity between ECM and harness connector (F23)
- Harness for open or short between A/T control unit and harness connector (F23)

If NG, repair harness or connector.

OK →



C

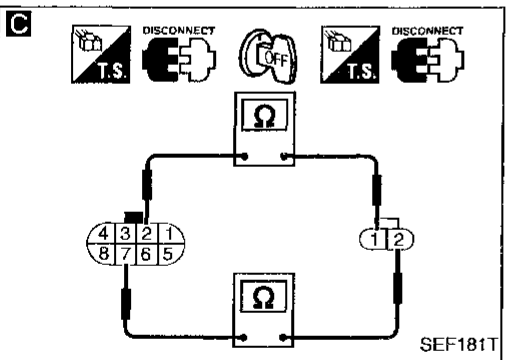
CHECK HARNESS CONTINUITY.

- 1) Disconnect EGR temperature sensor harness connector.
- 2) Check harness continuity between harness connector (F50) terminal ② and harness connector (F51) terminal ①, harness connector (F50) terminal ⑦ and harness connector (F51) terminal ②.

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

NG → Repair harness or connectors.

OK →



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

NG → Replace EGR temperature sensor.

OK →

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

↓ Trouble is not fixed.

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

INSPECTION END

TROUBLE DIAGNOSIS FOR DTC P1401

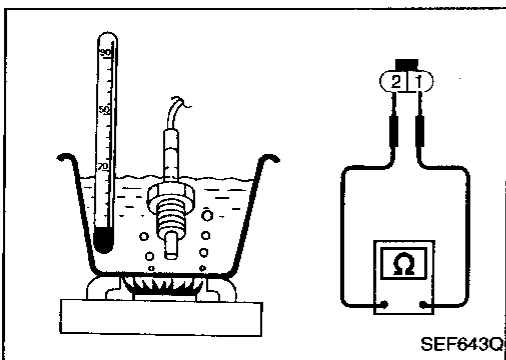
EGR Temperature Sensor (Cont'd)

COMPONENT INSPECTION

EGR temperature sensor

Check resistance change and resistance value.

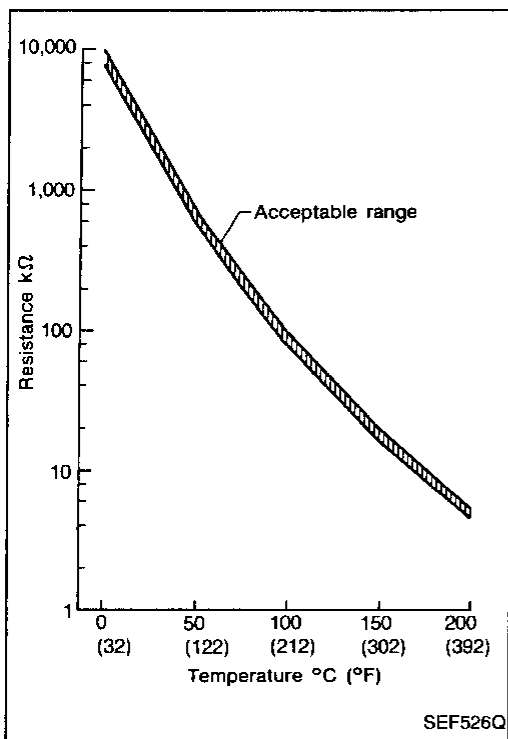
(Reference data)



SEF643Q

EGR temperature °C (°F)	Voltage (V)	Resistance (MΩ)
0 (32)	4.81	7.9 - 9.7
50 (122)	2.82	0.57 - 0.70
100 (212)	0.8	0.08 - 0.10

If NG, replace EGR temperature sensor.



SEF526Q

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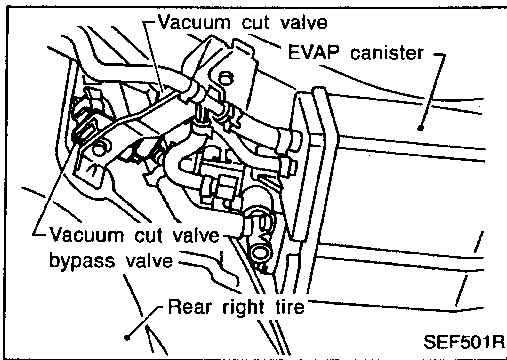
BT

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TROUBLE DIAGNOSIS FOR DTC P1441



Vacuum Cut Valve Bypass Valve

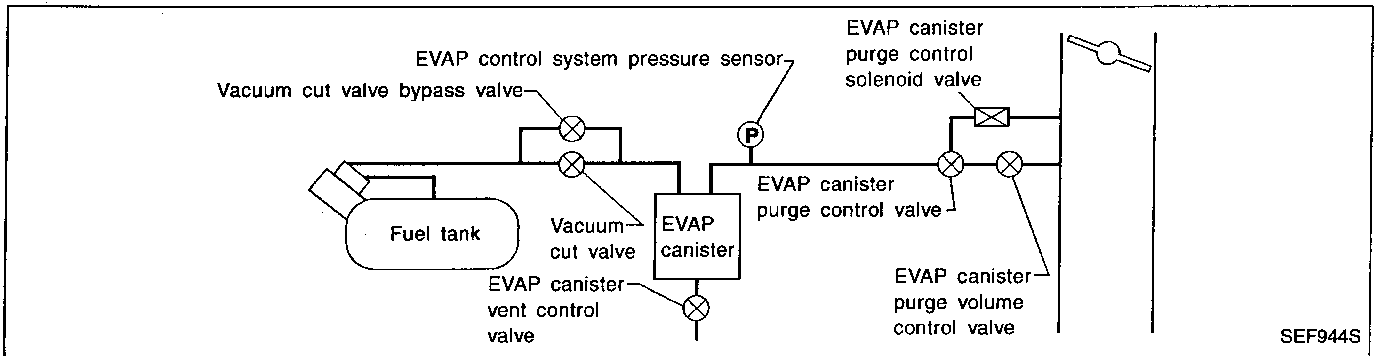
The vacuum cut valve and vacuum cut valve bypass valve are installed in parallel on the EVAP purge line between the fuel tank and the EVAP canister.

The vacuum cut valve prevents the intake manifold vacuum from being applied to the fuel tank.

The vacuum cut valve bypass valve is a solenoid type valve and generally remains closed. It opens only for on board diagnosis.

The vacuum cut valve bypass valve responds to signals from the ECM. When the ECM sends an ON (ground) signal, the valve is opened. The vacuum cut valve is then bypassed to apply intake manifold vacuum to the fuel tank.

EVAPORATIVE EMISSION SYSTEM DIAGRAM



Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P1441 0801	A) An improper voltage signal is sent to ECM through vacuum cut valve bypass valve.	<ul style="list-style-type: none"> ● 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.	<ul style="list-style-type: none"> ● Vacuum cut valve bypass valve ● Vacuum cut valve ● Bypass hoses for clogging ● EVAP control system pressure sensor

TROUBLE DIAGNOSIS FOR DTC P1441

Vacuum Cut Valve Bypass Valve (Cont'd)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

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

Procedure for malfunction A



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

OR

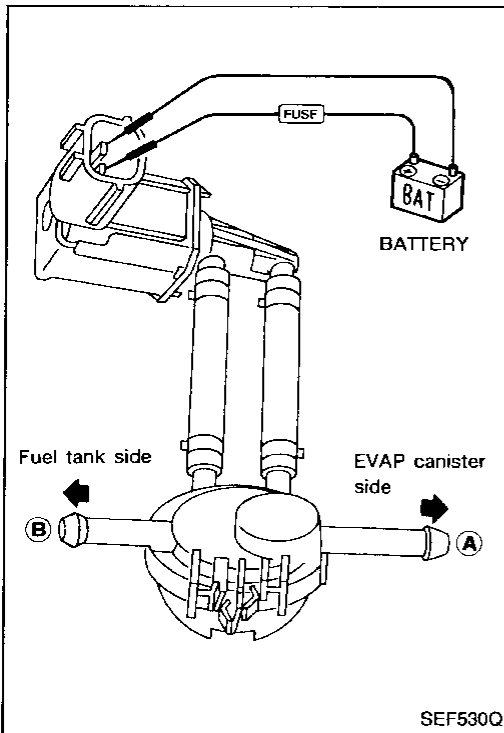


- 1) Start engine and wait at least 5 seconds.
- 2) Select "MODE 7" with GST.

OR



- 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

Procedure for malfunction B

- 1) Remove vacuum cut valve and vacuum cut valve bypass valve as an assembly.
- 2) Apply vacuum to port (A) and check that there is no suction from port (B).
- 3) Apply vacuum to port (B) and check that there is suction from port (A).
- 4) Blow air in port (B) and check that there is a resistance to flow out of port (A).
- 5) Supply battery voltage to the terminal.
- 6) Blow air in port (A) and check that air flows freely out of port (B).
- 7) Blow air in port (B) and check that air flows freely out of port (A).

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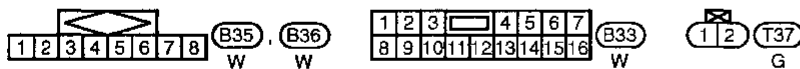
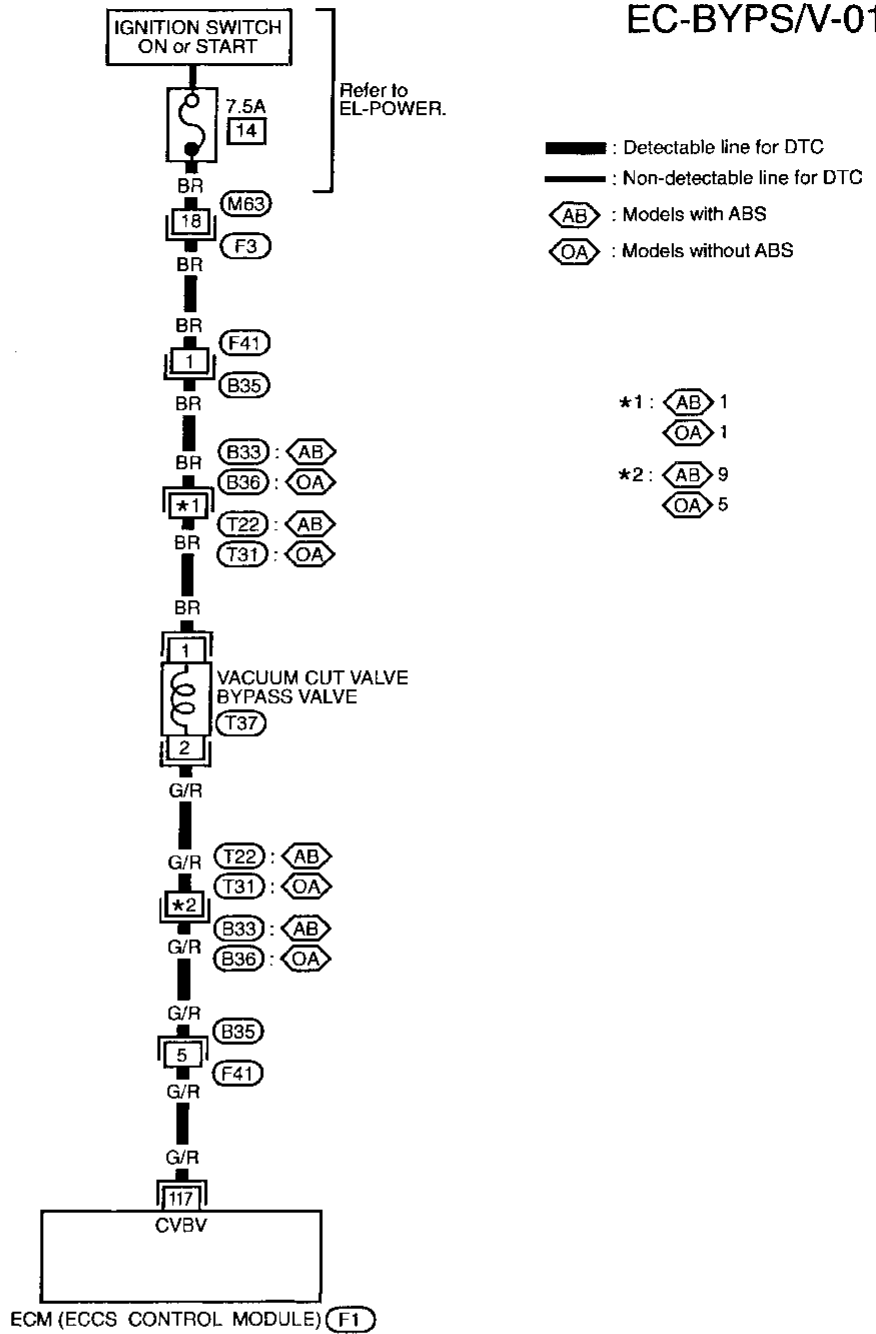
EL

IDX

TROUBLE DIAGNOSIS FOR DTC P1441

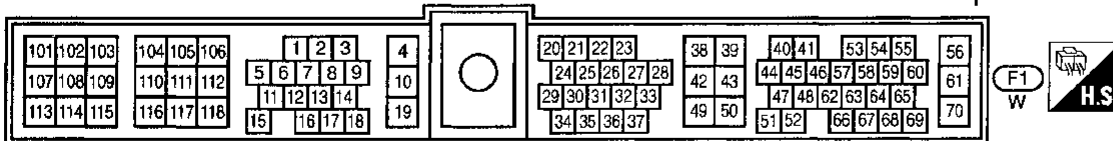
Vacuum Cut Valve Bypass Valve (Cont'd)

EC-BYPS/V-01



Refer to last page (Foldout page).

(M63), (F3)

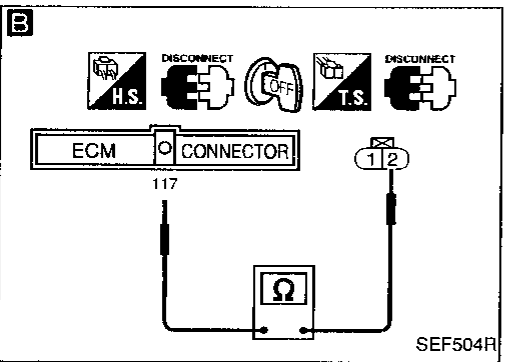
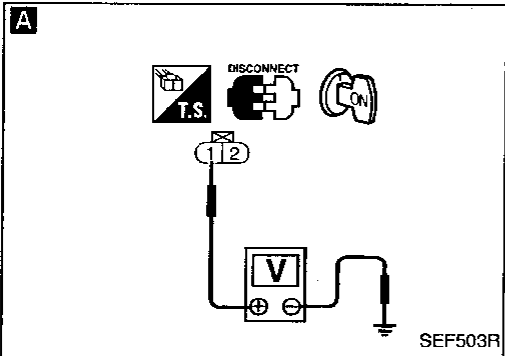
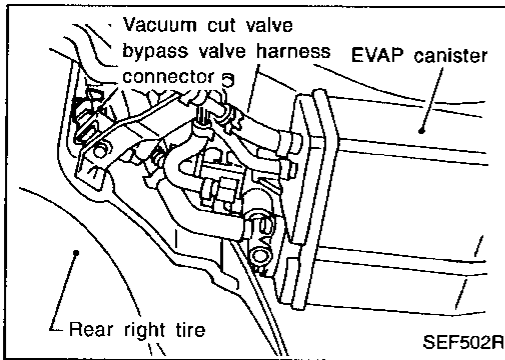


TROUBLE DIAGNOSIS FOR DTC P1441

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 ① and ground with CONSULT or tester.
Voltage: Battery voltage

NG → Check the following.

- Harness connectors (M63), (F3)
- Harness connectors (F41), (B35)
- Harness connectors (Models with ABS) (B33), (T22) (Models without ABS) (B36), (T31)
- 7.5A fuse
- Harness for open or short between vacuum cut valve bypass valve and fuse

If NG, repair harness or connectors.

OK ↓

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

NG → Check the following.

- Harness connectors (Models with ABS) (T22), (B33) (Models without ABS) (T31), (B36)
- Harness connectors (B35), (F41)
- Harness for open or short between vacuum cut valve bypass valve and ECM

If NG, repair harness or connectors.

OK ↓

CHECK COMPONENT
(Vacuum cut valve bypass valve). Refer to "COMPONENT INSPECTION" on next page.

NG → Replace vacuum cut valve bypass valve.

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

↓ Trouble is not fixed.
Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

INSPECTION END

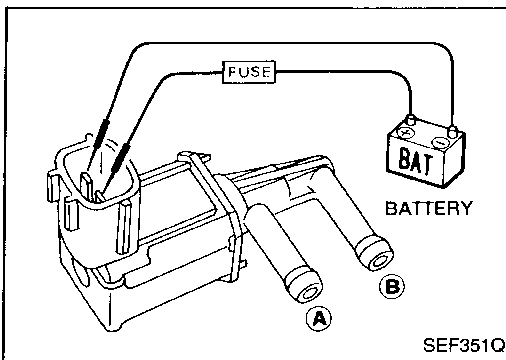
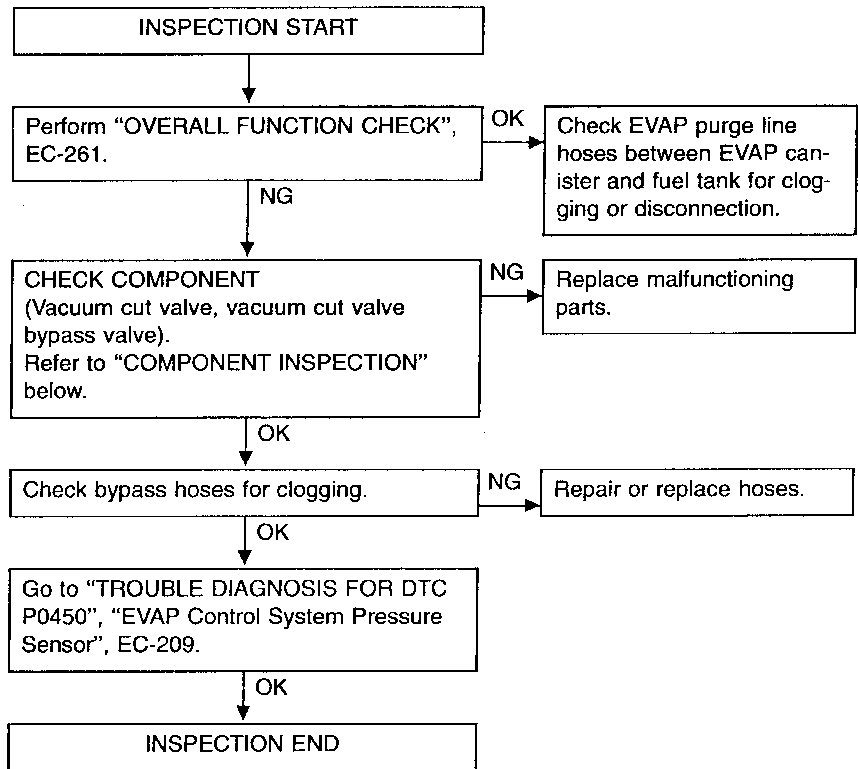
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TROUBLE DIAGNOSIS FOR DTC P1441

Vacuum Cut Valve Bypass Valve (Cont'd)

DIAGNOSTIC PROCEDURE

Procedure for malfunction B



COMPONENT INSPECTION

Vacuum cut valve bypass valve

Check air passage continuity.

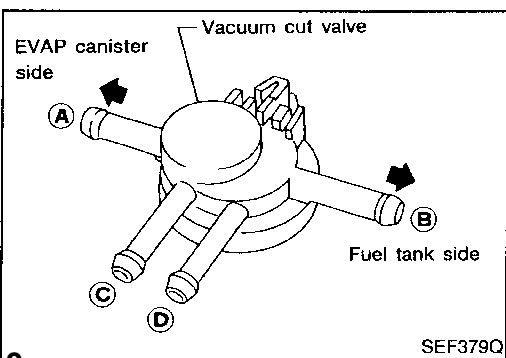
Condition	Air passage continuity between (A) and (B)
12V direct current supply between terminals	Yes
No supply	No

If NG, replace vacuum cut valve bypass valve.

Vacuum cut valve

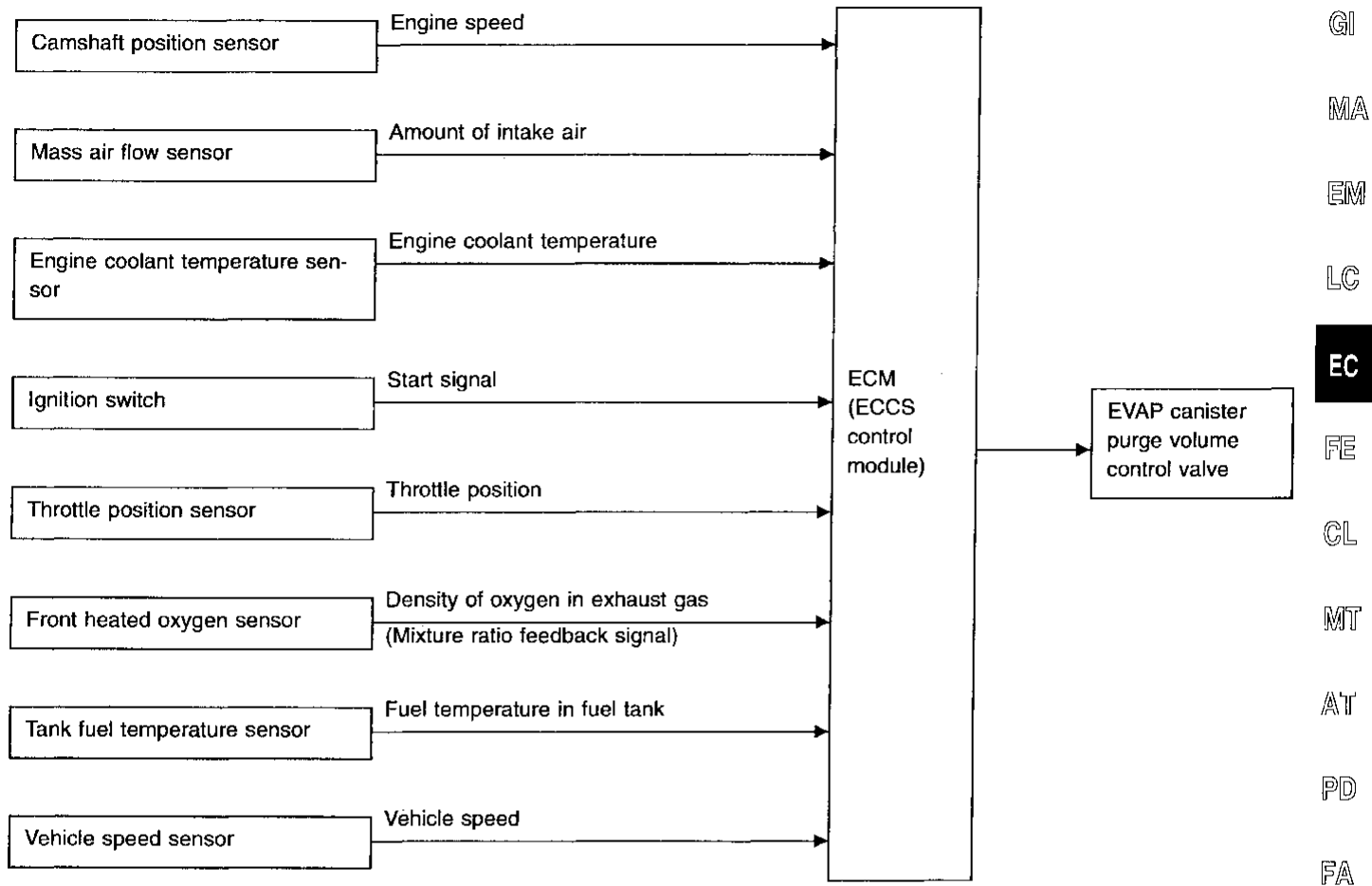
Check vacuum cut valve as follows:

1. Plug port (C) and (D) with fingers.
2. Apply vacuum to port (A) and check that there is no suction from port (B).
3. Apply vacuum to port (B) and check that there is suction from port (A).
4. Blow air in port (B) and check that there is a resistance to flow out of port (A).
5. Open port (C) and (D).
6. Blow air in port (A) check that air flows freely out of port (C).
7. Blow air in port (B) check that air flows freely out of port (D).

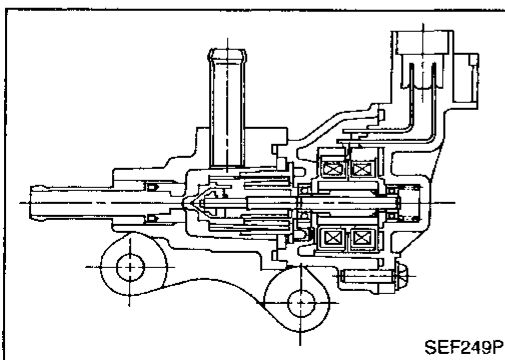


Evaporative Emission (EVAP) Canister Purge Volume Control Valve

SYSTEM DESCRIPTION



This system controls flow rate of fuel vapor from the EVAP canister. The opening of the vapor by-pass passage in the EVAP canister purge volume control valve changes to control the flow rate. A built-in step motor moves the valve in steps corresponding to the ECM output pulses. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions. When the engine is operating, the flow rate of fuel vapor from the EVAP canister is regulated as the air flow changes.



COMPONENT DESCRIPTION

The EVAP canister purge volume control valve uses a step motor to control the flow rate of fuel vapor from the EVAP canister. This motor has four winding phases. It operates according to the output pulse signal of the ECM. Two windings are turned ON and OFF in sequence. Each time an ON pulse is issued, the valve opens or closes, changing the flow rate. When no change in the flow rate is needed, the ECM does not issue the pulse signal. A certain voltage signal is issued so that the valve remains at that particular opening.

TROUBLE DIAGNOSIS FOR DTC P1445


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

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P1445 1008	A) An improper voltage signal is sent to ECM through the valve.	<ul style="list-style-type: none"> ● Harness or connectors (The valve circuit is open or shorted.) ● EVAP canister purge volume control valve
	B) The canister purge flow is detected during the specified driving conditions, even when EVAP canister purge volume control valve is completely closed.	<ul style="list-style-type: none"> ● 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.)


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) Jack up drive wheels.
 2) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT.
 3) Start engine and let it idle for at least 90 seconds.
 4) Move selector/gearshift lever to "1" range (A/T) or "1st" gear (M/T).
 5) Race engine from idle to 2,000 to 3,000 rpm more than 10 times.


OR

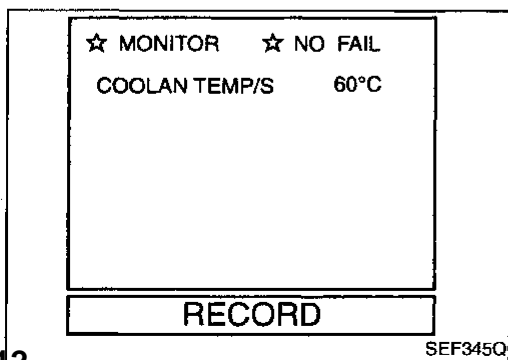
-  1) Jack up drive wheels.
 2) Start engine and let it idle for at least 90 seconds.
 3) Move selector/gearshift lever to "1" range (A/T) or "1st" gear (M/T).
 4) Race engine from idle to 2,000 to 3,000 rpm more than 10 times.
 5) Select "MODE 7" with GST.

OR

-  1) Jack up drive wheels.
 2) Start engine and let it idle for at least 90 seconds.
 3) Move selector/gearshift lever to "1" range (A/T) or "1st" gear (M/T).
 4) Race engine from idle to 2,000 to 3,000 rpm more than 10 times.
 5) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
 6) Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.

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 for at least 70 seconds.



TROUBLE DIAGNOSIS FOR DTC P1445

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

- Maintain the following conditions for at least 50 seconds.

Gear position:

- "2" or "D" range (A/T)
- "3rd" or "4th" gear (M/T)

Vehicle speed:

40 - 80 km/h (25 - 50 MPH)

Engine speed:

1,500 - 2,500 rpm

Engine coolant temperature:

Less than 100°C (212°F)

OR

ENGINE SPD	825RPM
COOLANT TEMP	69°C
VEHICLE SPD	0MPH
IGN ADVANCE	8.0°
CALC LOAD	28.2%
MAP	36KPaA
MAF	5.20gm/s
THROTTLE POS	0.0%
INTAKE AIR	27°C
FUEL SYS #1	OLDRIVE
FUEL SYS #2	UNUSED
SHORT FT #1	0.8%
LONG FT #1	0.0%
O2S B1 S1	0.200V
O2FT B1 S1	0.8%
O2S B1 S2	0.010V

SEF519R



- Jack up drive wheels.
- Turn ignition switch "ON" and select "MODE 1" mode with GST.
- 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.)
- Start engine and let it idle for at least 70 seconds.
- Maintain the following conditions for at least 50 seconds.

Gear position:

- "2" or "D" range (A/T)
- "3rd" or "4th" gear (M/T)

Vehicle speed:

40 - 80 km/h (25 - 50 MPH)

Engine speed:

1,500 - 2,500 rpm

Engine coolant temperature:

Less than 100°C (212°F)

OR



- Jack up drive wheels.
- Turn ignition switch "ON".
- Start engine and warm it up until the voltage between ECM terminal ⑤ 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.)
- Start engine and let it idle for at least 70 seconds.
- Maintain the following conditions for at least 50 seconds.

Gear position:

- "2" or "D" range (A/T)
- "3rd" or "4th" gear (M/T)

Vehicle speed:

40 - 80 km/h (25 - 50 MPH)

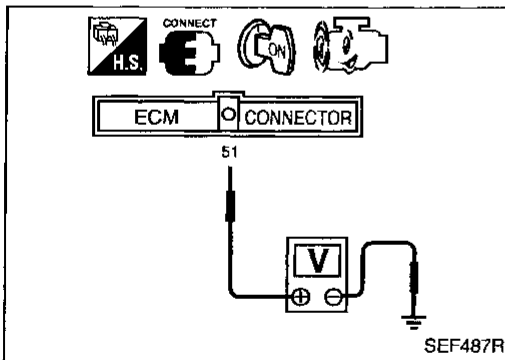
Engine speed:

1,500 - 2,500 rpm

Voltage between ECM terminal ⑤ and ground:

More than 0.8V

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



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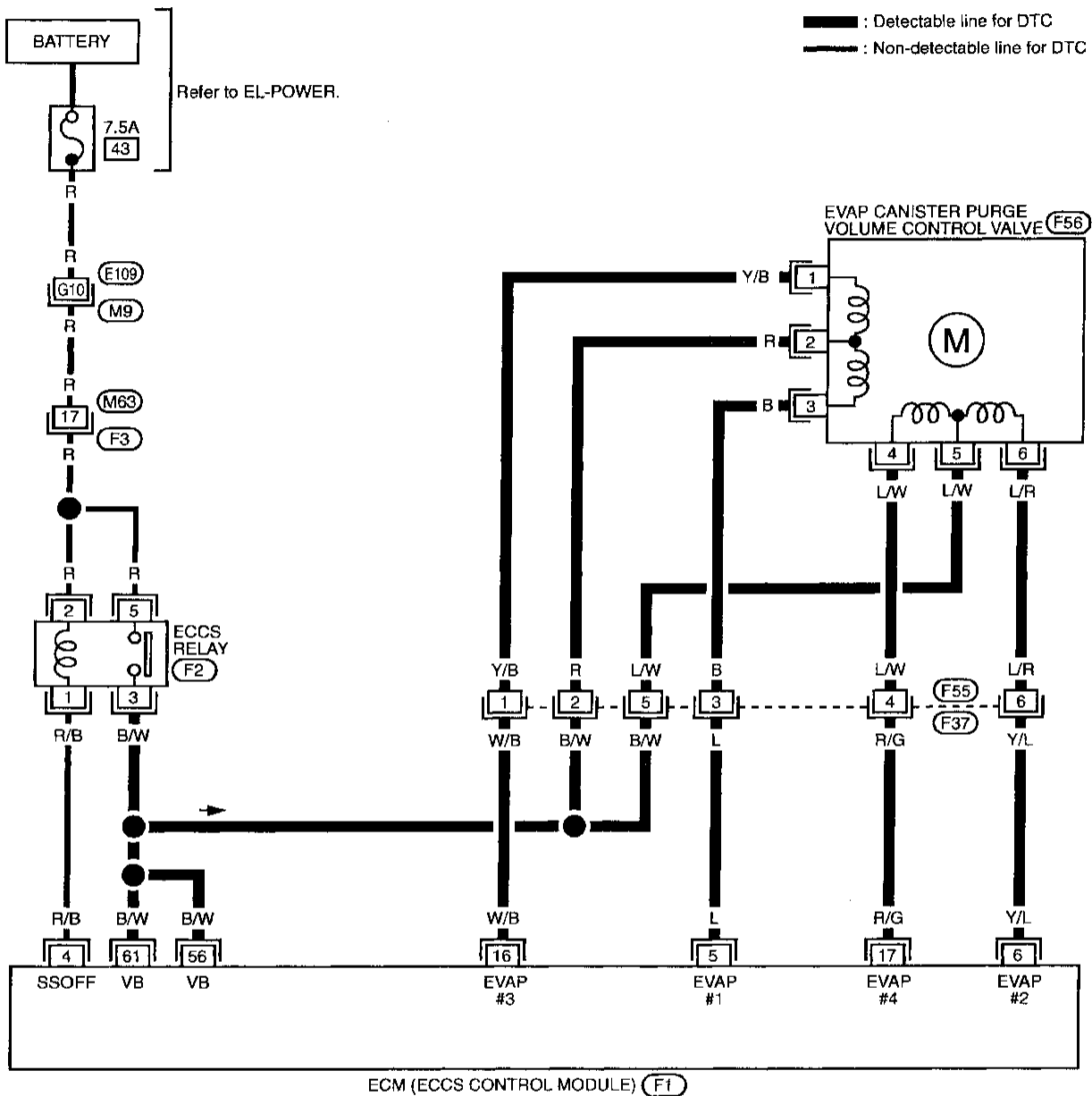
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TROUBLE DIAGNOSIS FOR DTC P1445

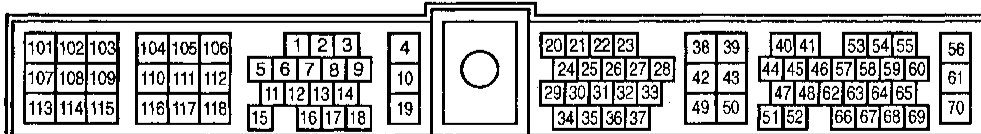
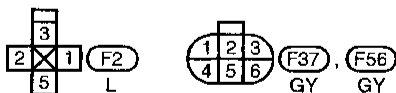
Evaporative Emission (EVAP) Canister Purge Volume Control Valve (Cont'd)

EC-PGC/V-01



Refer to last page (Foldout page).

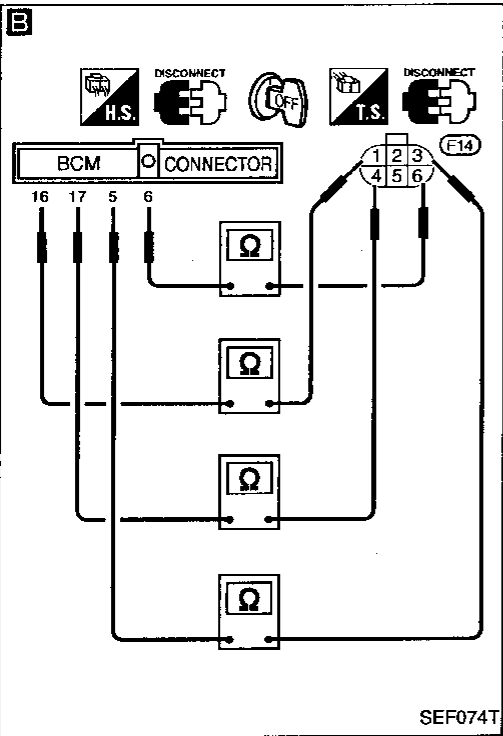
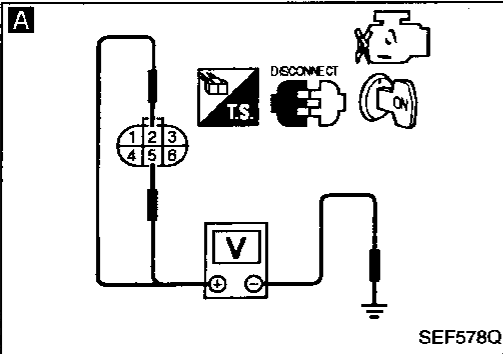
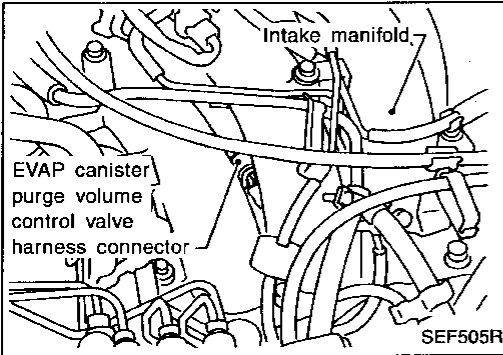
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TROUBLE DIAGNOSIS FOR DTC P1445

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.
 • ECCS relay
 • 7.5A fuse
 • Harness for open or short between EVAP canister purge volume control valve and fusible link
 • Harness for open or short between EVAP canister purge volume control valve and ECM
 If NG, repair harness or connectors.

B
CHECK OUTPUT SIGNAL CIRCUIT.
 1. Turn ignition switch "OFF".
 2. Disconnect ECM harness connector.
 3. Check harness continuity between ECM terminal ⑤ and terminal ③, ECM terminal ⑥ and terminal ⑥, ECM terminal ⑩ and terminal ①, ECM terminal ⑰ and terminal ④.
Continuity should exist.
 If OK, check harness for short.

NG → Replace 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-212.

NG → Replace EVAP control system pressure sensor.

OK →
CHECK COMPONENT
 (EVAP canister purge volume control valve).
 Refer to "COMPONENT INSPECTION" on next page.

NG → Replace EVAP canister purge volume control valve.

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

Trouble is not fixed.
 Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

INSPECTION END

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TROUBLE DIAGNOSIS FOR DTC P1445

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

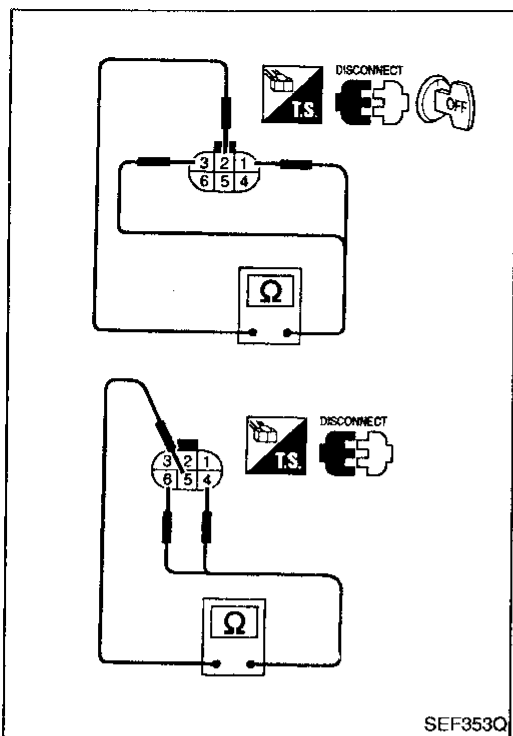
COMPONENT INSPECTION

EVAP canister purge volume control valve

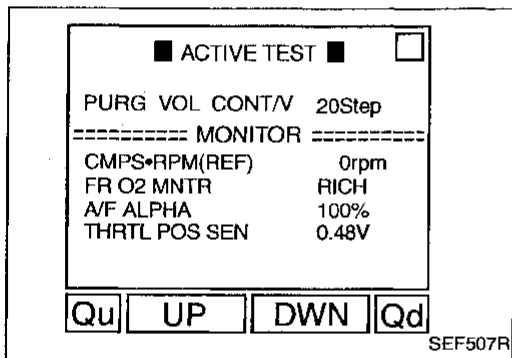
1. Disconnect EVAP canister purge volume control valve harness connector.
2. Check resistance between the following terminals.
terminal ② and terminals ①, ③
terminal ⑤ and terminals ④, ⑥
Resistance:
Approximately 30Ω [At 25°C (77°F)]
3. Reconnect EVAP canister purge volume control valve harness connector.
4. Remove EVAP canister purge volume control valve from intake manifold collector and disconnect hoses from the valve.
(Plug the purge hoses. The EVAP canister purge volume control valve harness connector should remain connected.)
5. Turn ignition switch "ON".
6. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT. Check that EVAP canister purge volume control valve shaft moves smoothly forward and backward according to the valve opening.
If NG, replace the EVAP canister purge volume control valve.

OR

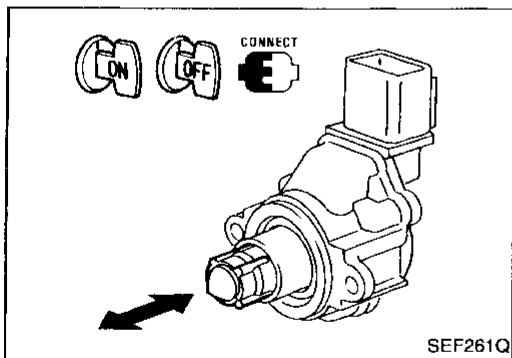
1. Disconnect EVAP canister purge volume control valve harness connector.
2. Check resistance between the following terminals.
terminal ② and terminals ①, ③
terminal ⑤ and terminals ④, ⑥
Resistance:
Approximately 30Ω [At 25°C (77°F)]
3. Reconnect EVAP canister purge volume control valve harness connector.
4. Remove EVAP canister purge volume control valve from intake manifold collector and disconnect hoses from the valve.
(Plug the purge hoses. The EVAP canister purge volume control valve harness connector should remain connected.)
5. Turn ignition switch "ON" and "OFF". Check that EVAP canister purge volume control valve shaft moves smoothly forward and backward according to the ignition switch position.
If NG, replace the EVAP canister purge volume control valve.



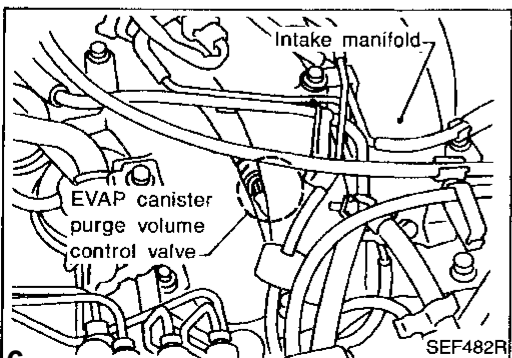
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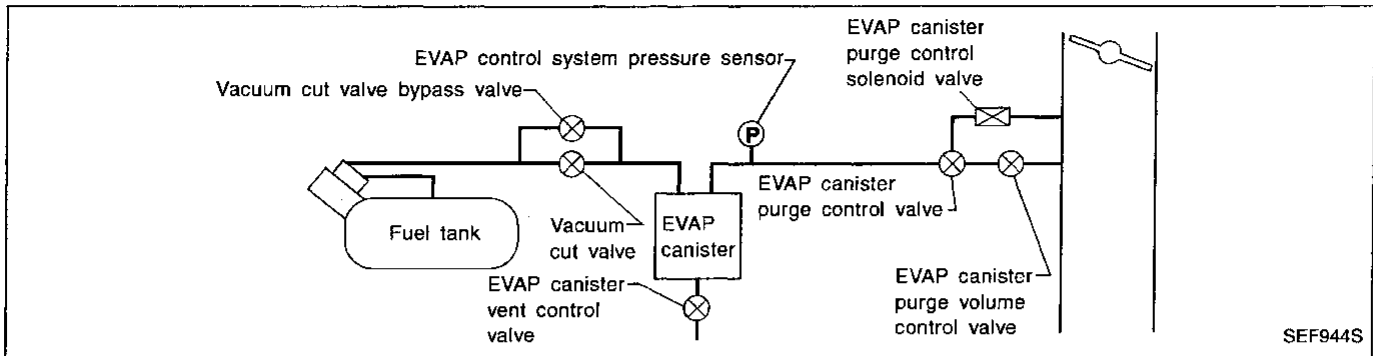


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Evaporative Emission (EVAP) Control System Purge Flow Monitoring



SYSTEM DESCRIPTION

In this evaporative emission (EVAP) control system, purge flow occurs during non-closed throttle conditions. Purge volume is related to air intake volume. Under normal purge conditions (non-closed throttle), the EVAP canister purge volume control valve and EVAP canister purge control valve are open. Purge flow exposes the EVAP control system pressure sensor to intake manifold vacuum.

ON BOARD DIAGNOSIS LOGIC

Under normal conditions (non-closed throttle), sensor output voltage indicates if pressure drop and purge flow are adequate. If not, a fault is determined.

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1447 0111	<ul style="list-style-type: none"> ● EVAP control system does not operate properly. ● EVAP control system has a leak between intake manifold and EVAP control system pressure sensor. 	<ul style="list-style-type: none"> ● EVAP canister purge volume control valve stuck closed ● EVAP canister purge control valve stuck closed ● EVAP control system pressure sensor ● Loose or disconnected rubber tube ● Blocked rubber tube ● EVAP canister purge control solenoid valve ● Blocked or bent rubber tube to MAP/BARO switch solenoid valve ● Cracked EVAP canister ● Absolute pressure sensor ● MAP/BARO switch solenoid valve

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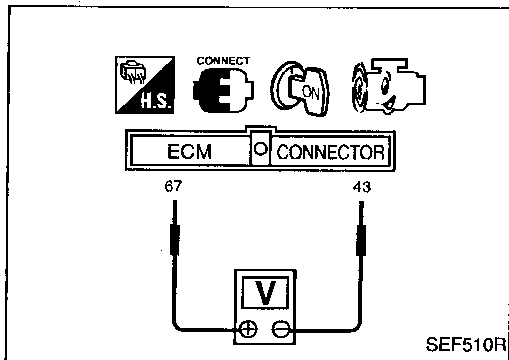
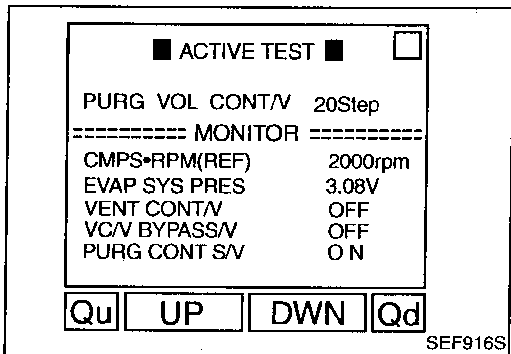
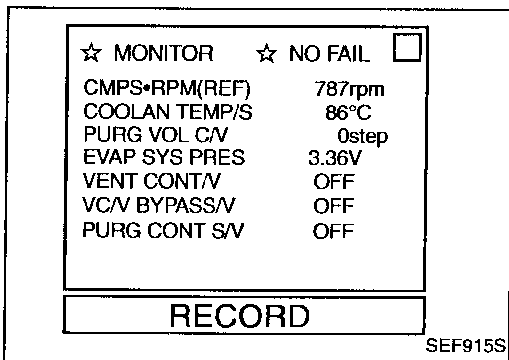
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TROUBLE DIAGNOSIS FOR DTC P1447

Evaporative Emission (EVAP) Control System Purge Flow Monitoring (Cont'd)



OVERALL FUNCTION CHECK

Use this procedure to check the overall monitoring function of the EVAP control system purge flow. During this check, a 1st trip DTC might not be confirmed.

- 1) Start engine.
- 2) Select "EVAP SYS PRES" in "DATA MONITOR" mode with CONSULT.
- 3) Check EVAP control system pressure sensor value at idle speed.
- 4) Select "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT.
- 5) Touch "START" and set "PURG VOL CONT/V" to 20 steps by touching "UP" or "Qu".
- 6) Maintain the following conditions for at least 30 seconds. Verify that EVAP control system pressure sensor value ("EVAP SYS PRES") stays 0.1V less than the value at idle speed for at least 2 seconds.

Engine speed:

Approx. 2,000 rpm

OR

- 1) Lift up drive wheels.
- 2) Start engine and warm it up sufficiently.
- 3) Turn ignition switch "OFF", wait at least 5 seconds.
- 4) Start engine and wait at least 70 seconds.
- 5) Set voltmeter probes to ECM terminals 67 (EVAP control system pressure sensor signal) and 43 (ground).
- 6) Check EVAP control system pressure sensor value at idle speed.
- 7) Establish and maintain the following conditions for at least 30 seconds.

Air conditioner switch: ON

Steering wheel: Fully turned

Headlamp switch: ON

Rear window defogger switch: ON

Engine speed: Approx. 3,500 rpm

Intake manifold vacuum:

-73.3 to -60.0 kPa (-550 to -450 mmHg,

-21.65 to -17.72 inHg, -10.63 to -8.70 psi)

Gear position:

M/T models

Any position other than "Neutral" or "Reverse"

A/T models

Any position other than "P", "N" or "R".

Return all conditions to normal. Repeat this procedure at least 5 times.

Verify that EVAP control system pressure sensor value stays 0.1V less than the value at idle speed for at least 2 seconds.

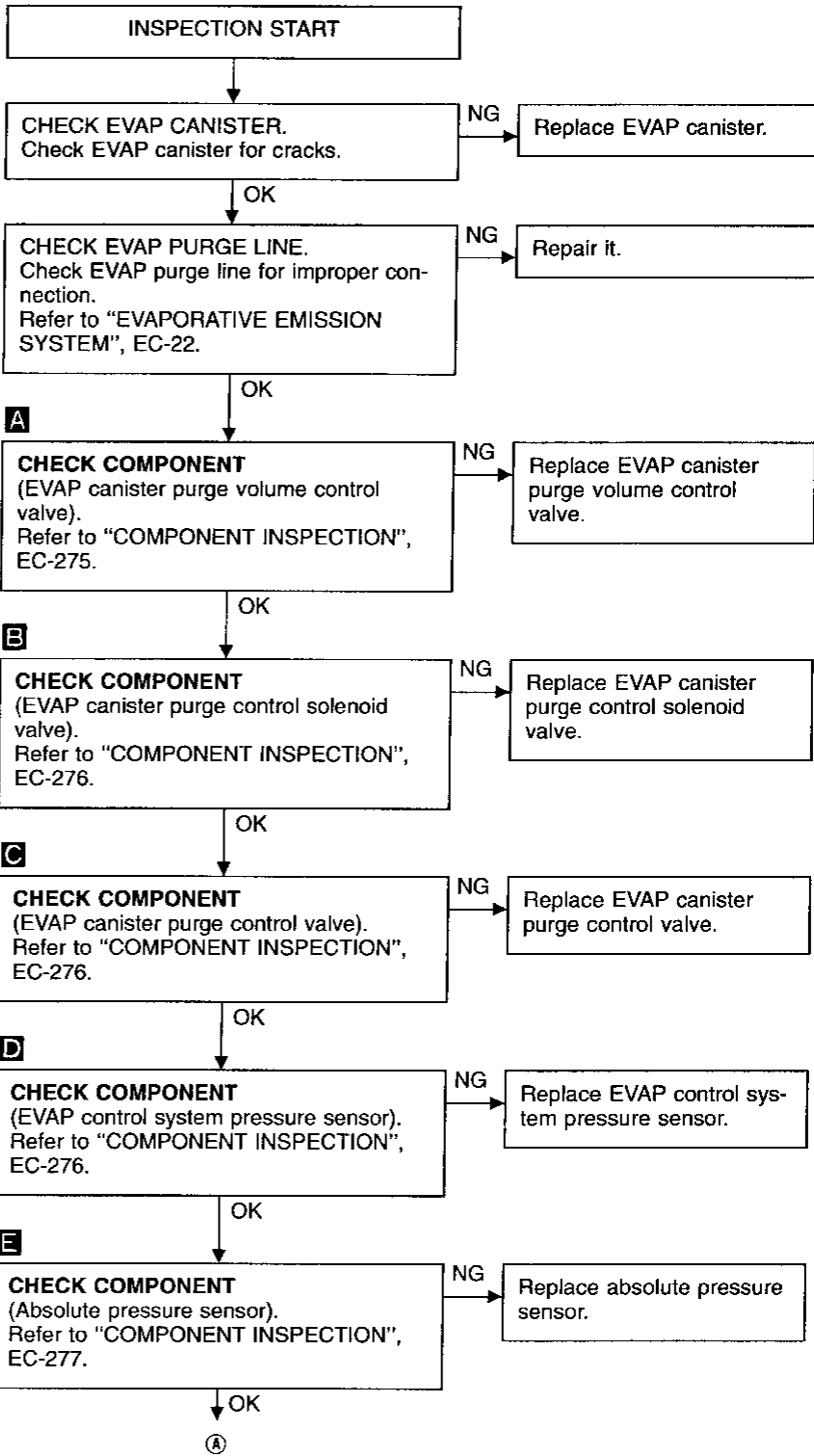
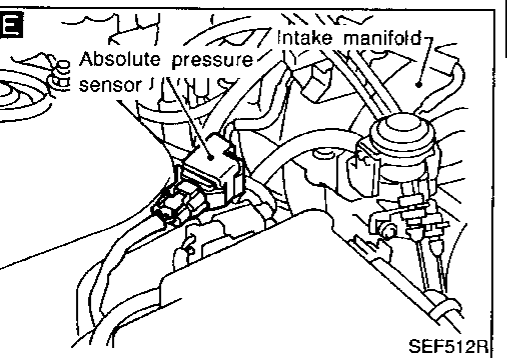
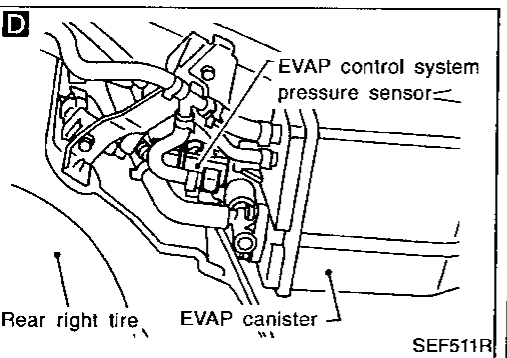
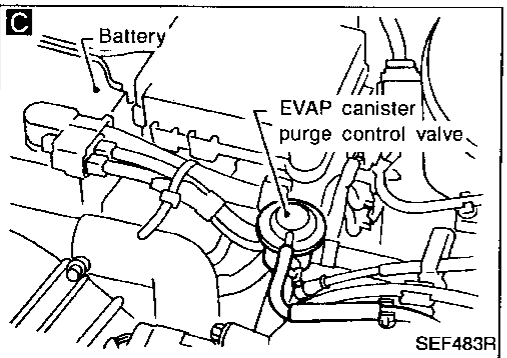
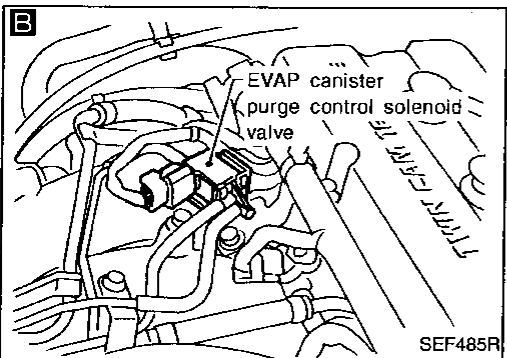
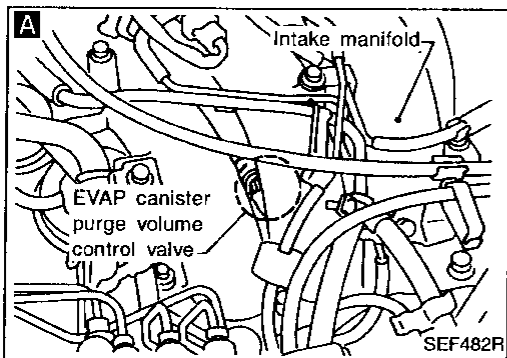
CAUTION:

Do not run vehicle at speeds greater than 80 km/h (50 MPH).

TROUBLE DIAGNOSIS FOR DTC P1447

Evaporative Emission (EVAP) Control System Purge Flow Monitoring (Cont'd)

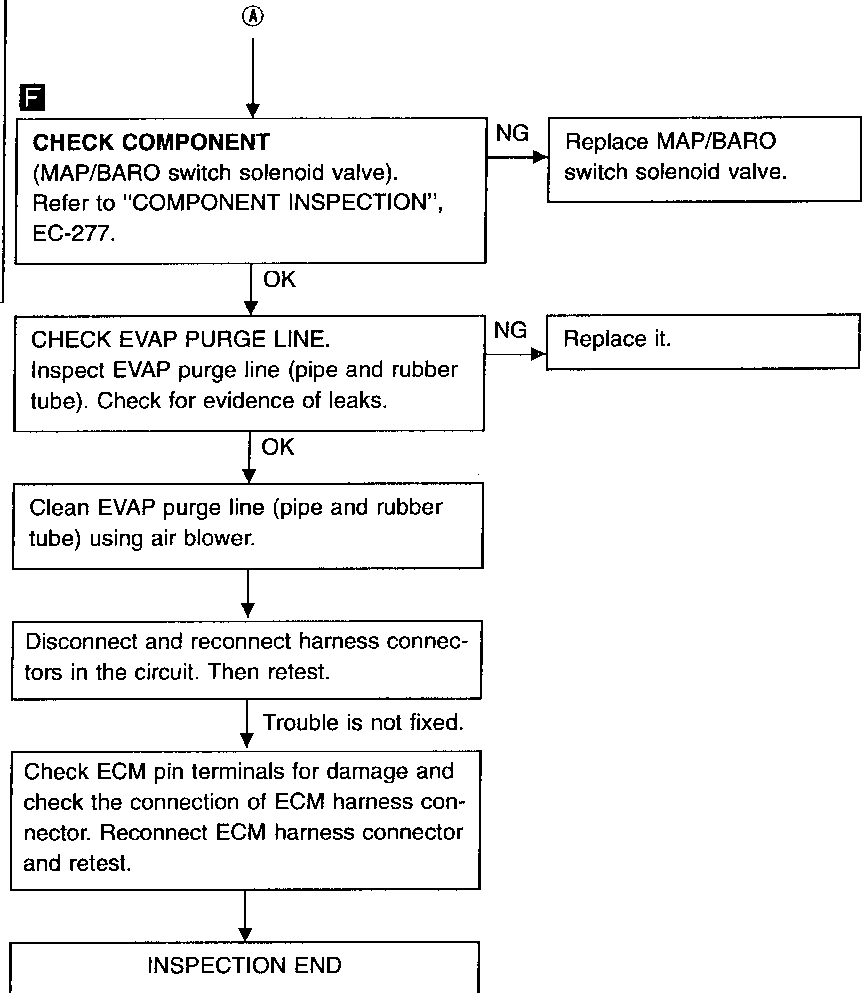
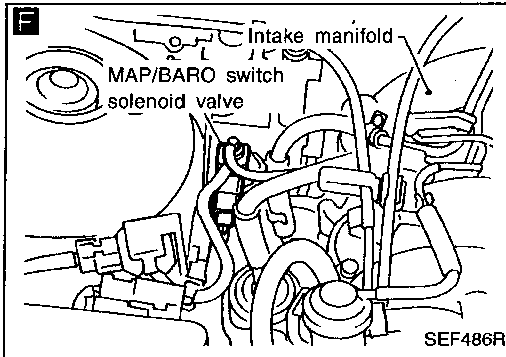
DIAGNOSTIC PROCEDURE



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TROUBLE DIAGNOSIS FOR DTC P1447

Evaporative Emission (EVAP) Control System Purge Flow Monitoring (Cont'd)



TROUBLE DIAGNOSIS FOR DTC P1447

Evaporative Emission (EVAP) Control System Purge Flow Monitoring (Cont'd)

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.
(Refer to EC-268.)
terminal ② and terminals ①, ③
terminal ⑤ and terminals ④, ⑥

Resistance:

Approximately 30Ω [At 25°C (77°F)]

- 3) Reconnect EVAP canister purge volume control valve harness connector.
- 4) Remove EVAP canister purge volume control valve from intake manifold collector and disconnect hoses from the valve.
(Plug the purge hoses. The EVAP canister purge volume control valve harness connector should remain connected.)
- 5) Turn ignition switch "ON".
- 6) Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT. Check that EVAP canister purge volume control valve shaft moves smoothly forward and backward according to the valve opening.
If NG, replace the EVAP canister purge volume control valve.

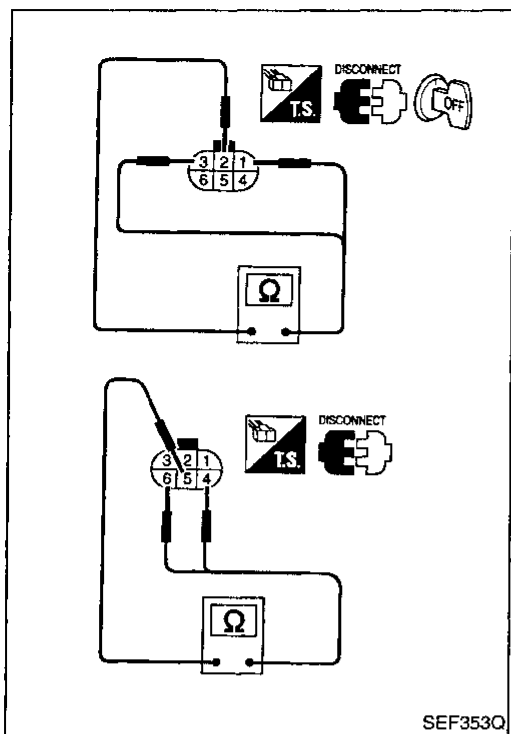
OR

- 1) Disconnect EVAP canister purge volume control valve harness connector.
- 2) Check resistance between the following terminals.
terminal ② and terminals ①, ③
terminal ⑤ and terminals ④, ⑥

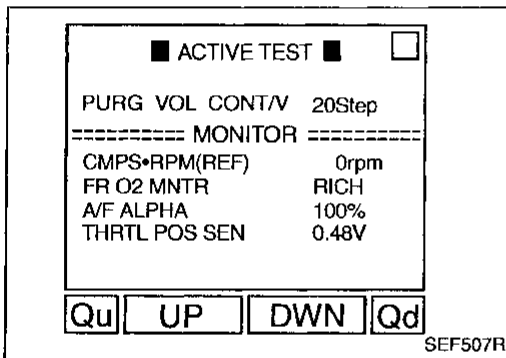
Resistance:

Approximately 30Ω [At 25°C (77°F)]

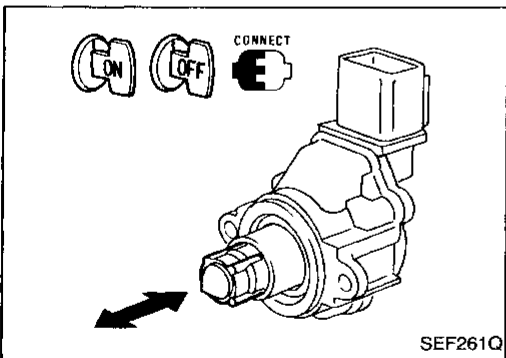
- 3) Reconnect EVAP canister purge volume control valve harness connector.
- 4) Remove EVAP canister purge volume control valve from intake manifold collector and disconnect hoses from the valve.
(Plug the purge hoses. The EVAP canister purge volume control valve harness connector should remain connected.)
- 5) Turn ignition switch "ON" and "OFF". Check that EVAP canister purge volume control valve shaft moves smoothly forward and backward according to the ignition switch position.
If NG, replace the EVAP canister purge volume control valve.



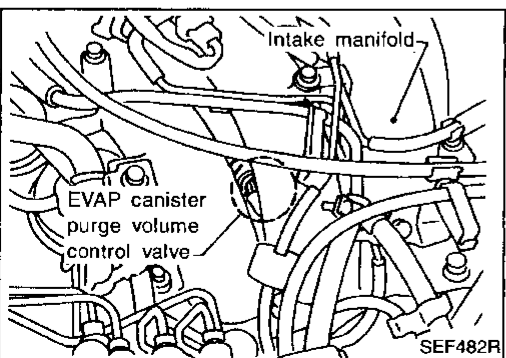
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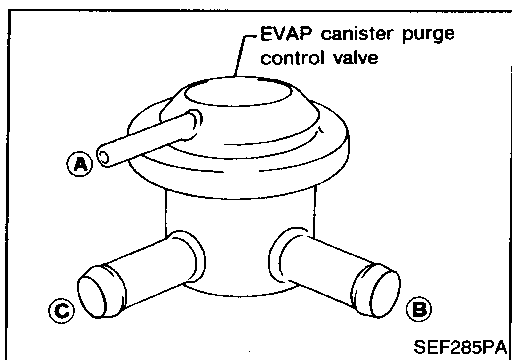
TROUBLE DIAGNOSIS FOR DTC P1447

Evaporative Emission (EVAP) Control System Purge Flow Monitoring (Cont'd)

EVAP canister purge control valve

Check EVAP canister purge control valve as follows:

1. Plug the port (B).
2. Apply pressure [80.0 kPa (600 mmHg, 23.62 inHg, 11.60 psi)] to port (A). Then keep it for 15 seconds, and check there is no leakage.
3. Repeat step 2 for port (C).

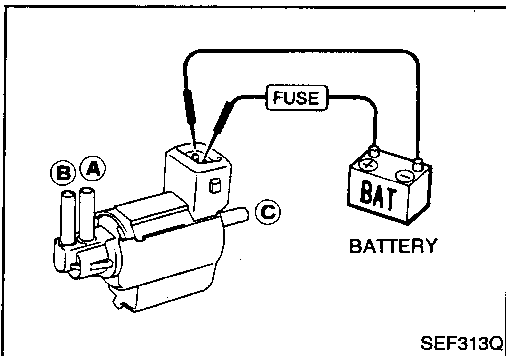


EVAP canister purge control solenoid valve

Check air passage continuity.

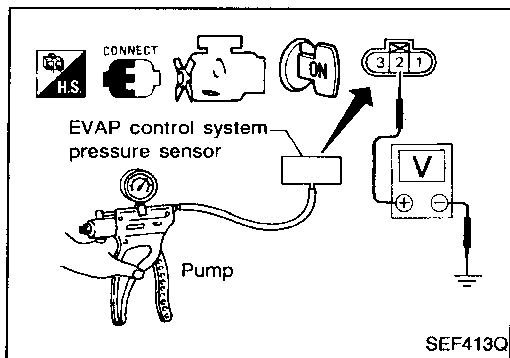
Condition	Air passage continuity between (A) and (B)	Air passage continuity between (A) and (C)
12V direct current supply between terminals	Yes	No
No supply	No	Yes

If NG, replace solenoid valve.



EVAP control system pressure sensor

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



Pressure (Relative to atmospheric pressure)	Voltage (V)
0 kPa (0 mmHg, 0 inHg, 0 psi)	3.0 - 3.6
-9.3 kPa (-70 mmHg, -2.76 inHg, -1.35 psi)	0.4 - 0.6

Refer to EC-209.

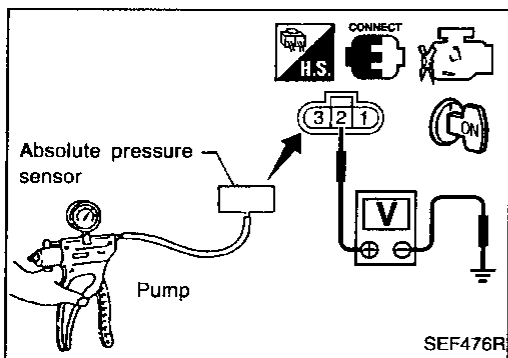
CAUTION:

Always calibrate the vacuum pump gauge when using it.

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

TROUBLE DIAGNOSIS FOR DTC P1447

Evaporative Emission (EVAP) Control System Purge Flow Monitoring (Cont'd)



Absolute pressure sensor

1. Remove absolute pressure sensor with its harness connector connected.
2. Remove hose from absolute pressure sensor.
3. Turn ignition switch "ON" and check output voltage between terminal ② and engine ground. (Refer to EC-99.)

The voltage should be 3.2 to 4.8 V.

4. Use pump to apply vacuum of -26.7 kPa (-200 mmHg, -7.87 inHg, -3.87 psi) to absolute pressure sensor as shown in figure and check the output voltage.

The voltage should be 1.0 to 1.4 V lower than the value measured in step 3.

CAUTION:

Always calibrate the vacuum pump gauge when using it.

5. If NG, replace absolute pressure sensor.

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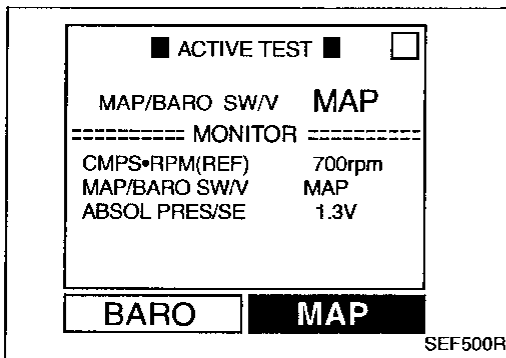
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MAP/BARO switch solenoid valve

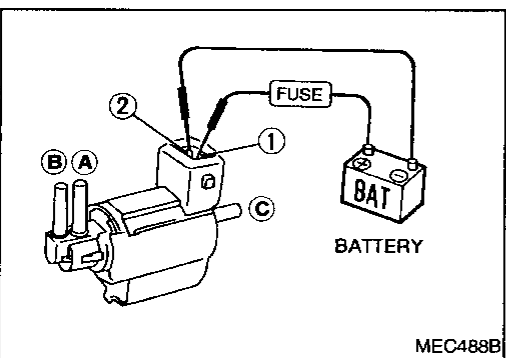
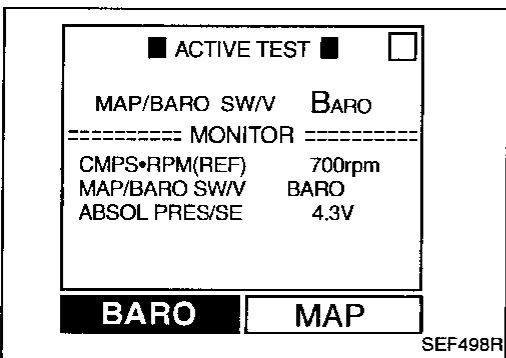
1. Start engine and warm it up sufficiently.
2. Perform "MAP/BARO SW/V" in "ACTIVE TEST" mode with CONSULT.
3. Check the following.
 - When "MAP" is selected, "ABSOL PRES/SE" indicates approximately 1.3V.
 - When "BARO" is selected, "ABSOL PRES/SE" indicates approximately 4.3V.
4. If NG, replace solenoid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

OR

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

Condition	Air passage continuity between ① and ②	Air passage continuity between ① and ③
12V direct current supply between terminals ① and ②	Yes	No
No supply	No	Yes

3. If NG, replace solenoid valve.



TROUBLE DIAGNOSIS FOR DTC P1605

A/T Diagnosis Communication Line

The malfunction information related to A/T (Automatic Transmission) is transferred through the line (circuit) from A/T control unit to ECM. Therefore, be sure to erase the malfunction information such as DTC not only in A/T control unit but also ECM after the A/T related repair.

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Item (Possible Cause)
P1605 0804	<ul style="list-style-type: none">• An incorrect signal from A/T control units is sent to ECM.	<ul style="list-style-type: none">• Harness or connectors (The communication line circuit between ECM and A/T control unit is open or shorted.)• Dead (Weak) battery• A/T control unit

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

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



- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT.
- 3) Start engine and let it idle for at least 40 seconds.

OR



- 1) Turn ignition switch "ON".
- 2) Start engine and let it idle for at least 40 seconds.
- 3) Select "MODE 7" with GST.

OR

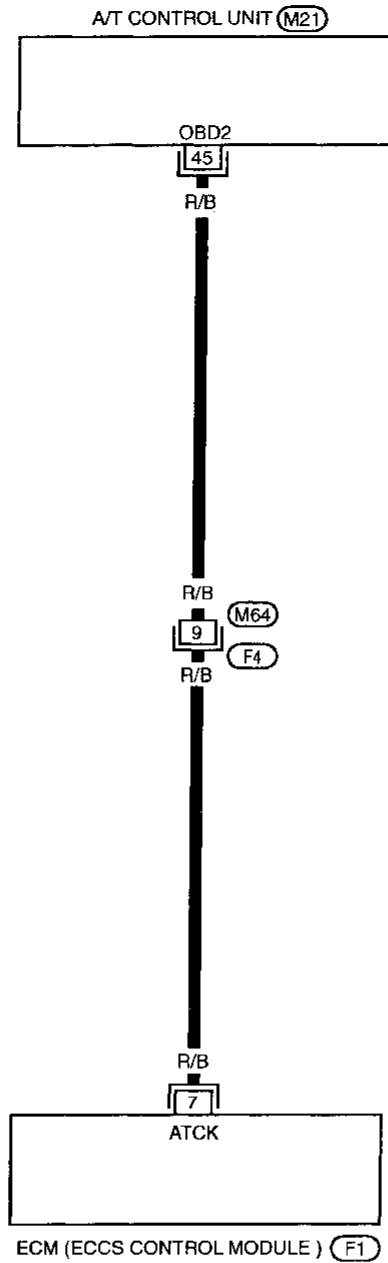


- 1) Turn ignition switch "ON".
- 2) Start engine and let it idle for at least 40 seconds.
- 3) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
- 4) Perform diagnostic test mode II (self-diagnostic results) with ECM.

TROUBLE DIAGNOSIS FOR DTC P1605

A/T Diagnosis Communication Line (Cont'd)

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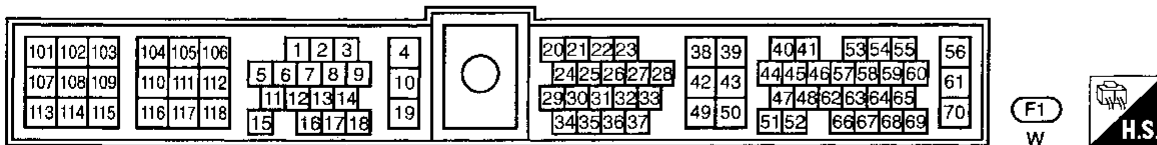
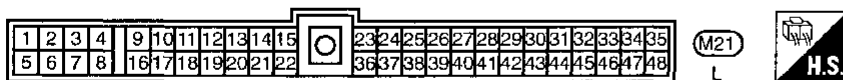
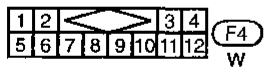
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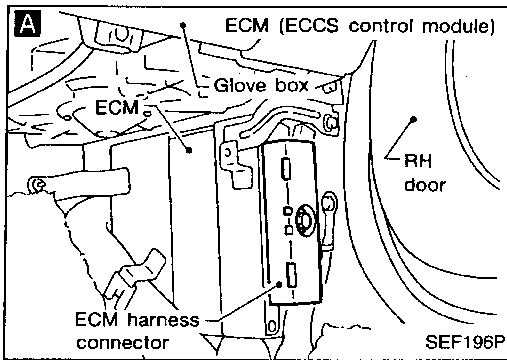
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TROUBLE DIAGNOSIS FOR DTC P1605

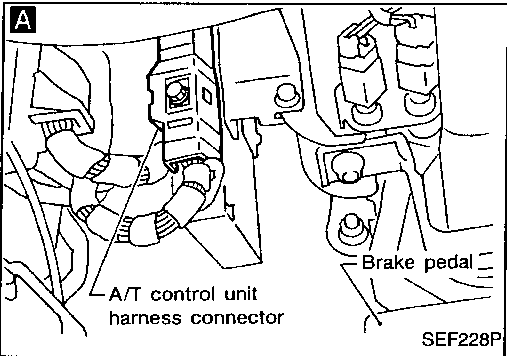
A/T Diagnosis Communication Line (Cont'd)



INSPECTION START

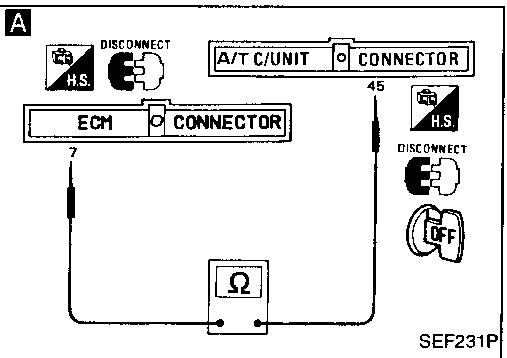
A
CHECK INPUT SIGNAL CIRCUIT.
 1. Turn ignition switch "OFF".
 2. Disconnect ECM harness connector and A/T control unit harness connector.
 3. Check harness continuity between ECM terminal ⑦ and terminal ④5.
Continuity should exist.
 If OK, check harness for short.

NG
 Check the following.
 • Harness connectors
 (F4), (M64)
 • Harness for open or short between ECM and A/T control unit
 If NG, repair harness or connectors.



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

Trouble is not fixed.
 Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.



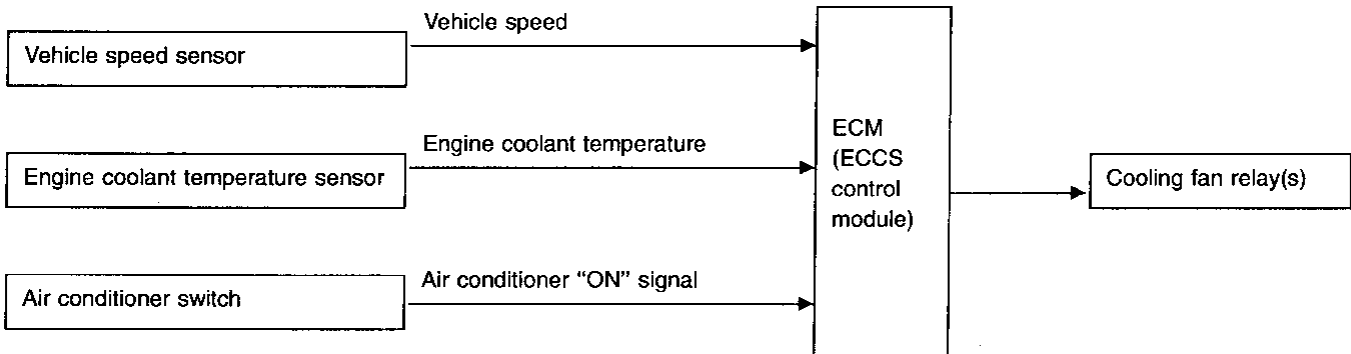
INSPECTION END

Overheat

Note: Since this diagnosis does not meet P1900 of SAEJ2012, it is indicated only by CONSULT.

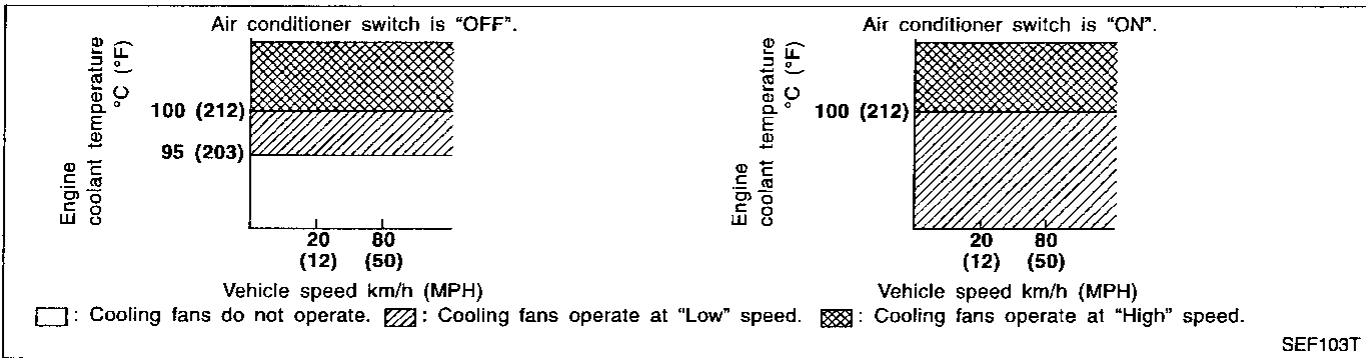
SYSTEM DESCRIPTION

Cooling fan control (A/C models)



The ECM controls the cooling fan corresponding to the vehicle speed, engine coolant temperature, air conditioner ON signal. The control system has 3-step control [HIGH/LOW/OFF].

Operation



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TROUBLE DIAGNOSIS FOR DTC P1900

Overheat (Cont'd)

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	<ul style="list-style-type: none">• Engine coolant temperature reaches an abnormally high temperature.	<ul style="list-style-type: none">• Harness or connectors (The cooling fan circuit is open or shorted.)• Cooling fan• Radiator hose• Radiator• Radiator cap• Water pump• Thermostat <p>For more information, refer to "MAIN 12 CAUSES OF OVERHEATING", (EC-291).</p>

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.

- 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").
- After refilling coolant, run engine to ensure that no water-flow noise is emitted.

For models with A/C, start DIAGNOSTIC PROCEDURE from "CHECK COOLING FAN LOW SPEED OPERATION" (A on EC-285).

For models without A/C, start DIAGNOSTIC PROCEDURE from "CHECK COOLING SYSTEM FOR LEAK" (C on EC-290).

TROUBLE DIAGNOSIS FOR DTC P1900

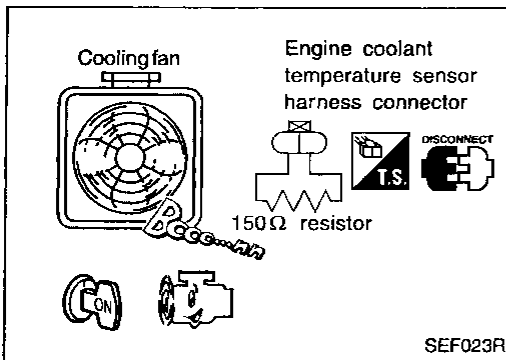
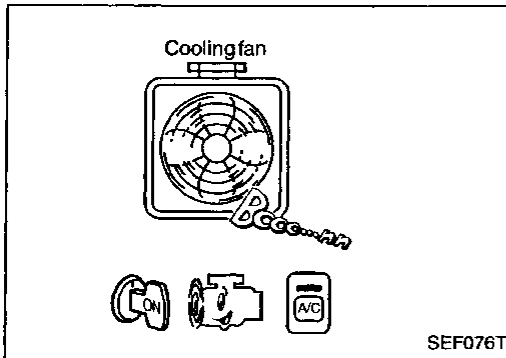
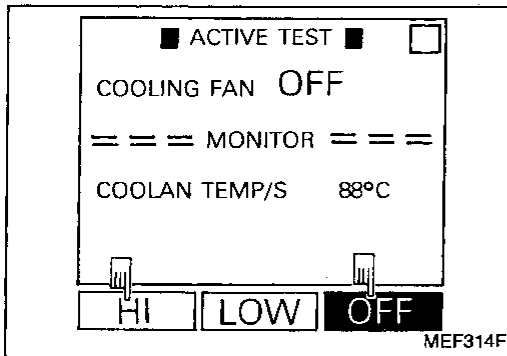
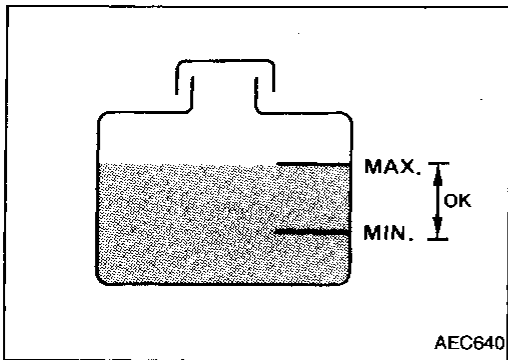
Overheat (Cont'd)

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-285).

- 2) Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to "DIAGNOSTIC PROCEDURE" (EC-285).

- 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.

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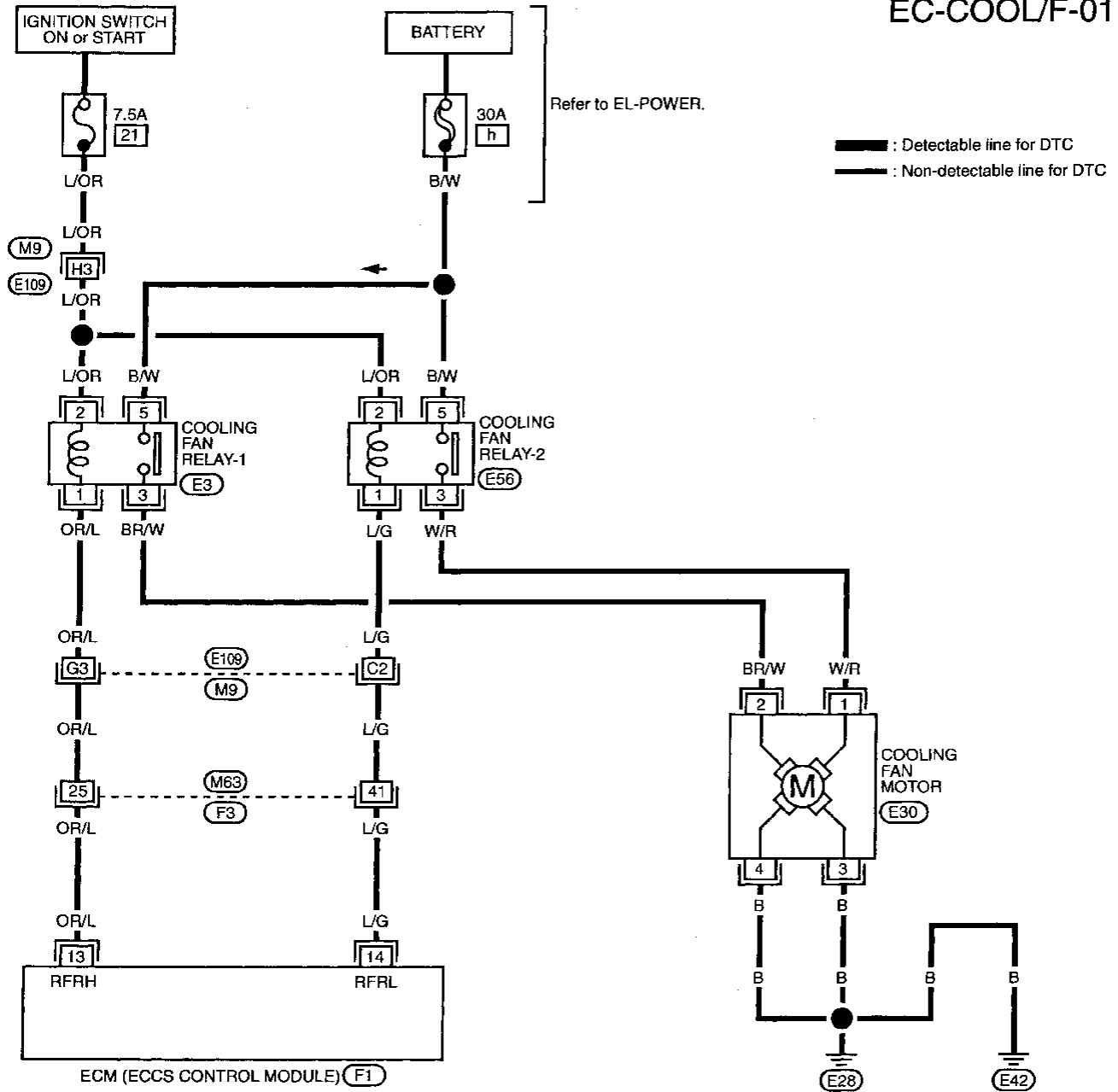
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TROUBLE DIAGNOSIS FOR DTC P1900

Overheat (Cont'd)

EC-COOL/F-01



Refer to last page (Foldout page).

- E109, M9
- M63, F3

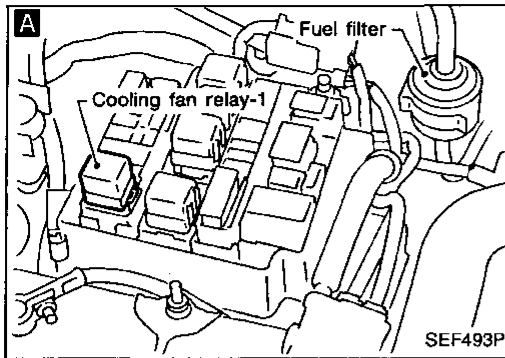


101	102	103	104	105	106	1	2	3	4	20	21	22	23	38	39	40	41	53	54	55	56					
107	108	109	110	111	112	5	6	7	8	9	10	24	25	26	27	28	42	43	44	45	46	57	58	59	60	61
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						15	16	17	18		34	35	36	37			51	52	66	67	68	69				

TROUBLE DIAGNOSIS FOR DTC P1900

Overheat (Cont'd)

DIAGNOSTIC PROCEDURE



INSPECTION START

A **CHECK COOLING FAN LOW SPEED OPERATION.**

1. Disconnect cooling fan relay-1.
2. Turn ignition switch "ON".
3. Perform "COOLING FAN CIRCUIT" in "FUNCTION TEST" mode with CONSULT.

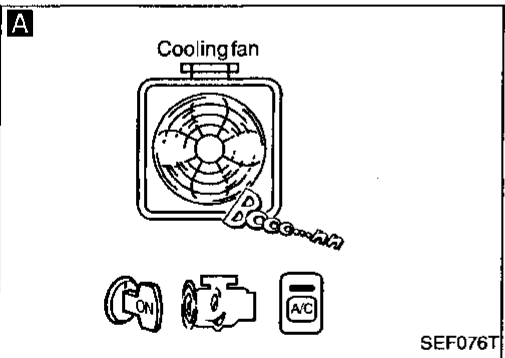
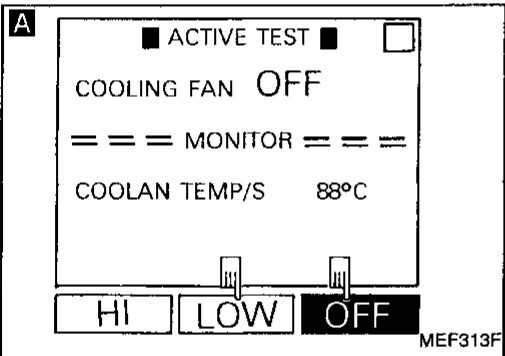
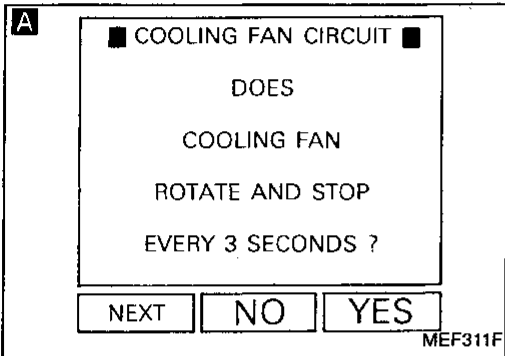
OR

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.)

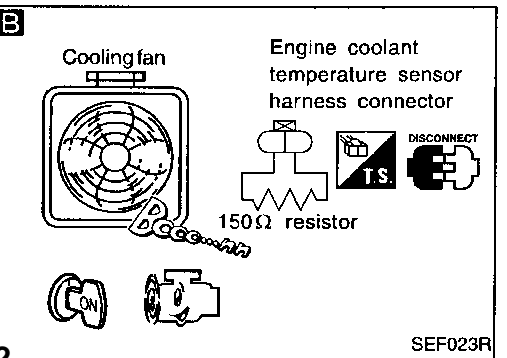
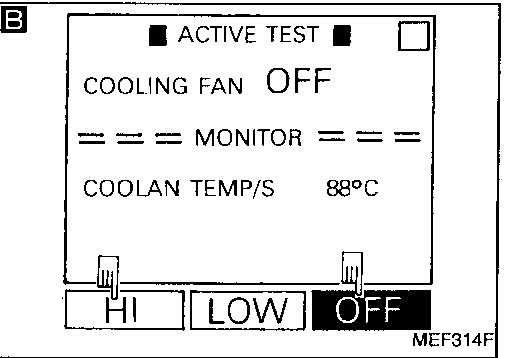
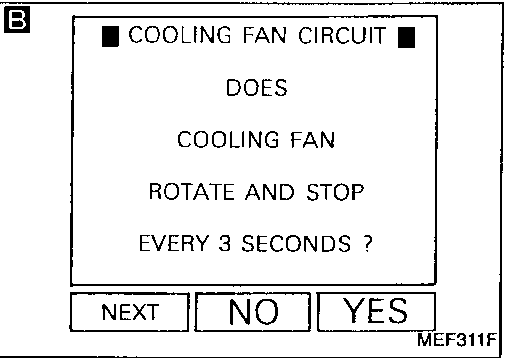
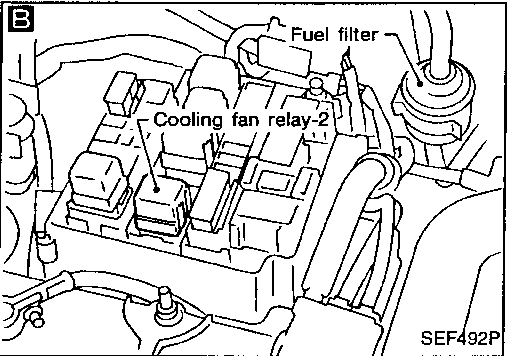
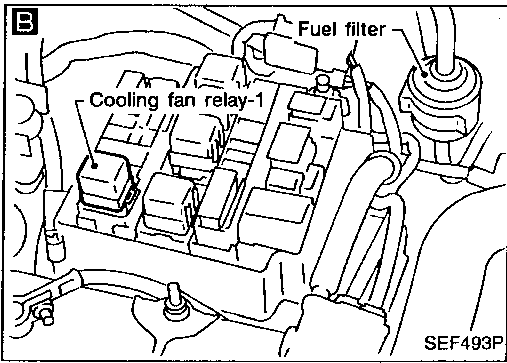


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TROUBLE DIAGNOSIS FOR DTC P1900

Overheat (Cont'd)



A

B

CHECK COOLING FAN HIGH SPEED OPERATION.

1. Turn ignition switch "OFF".
2. Reconnect cooling fan relay-1.
3. Disconnect cooling fan relay-2.
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.

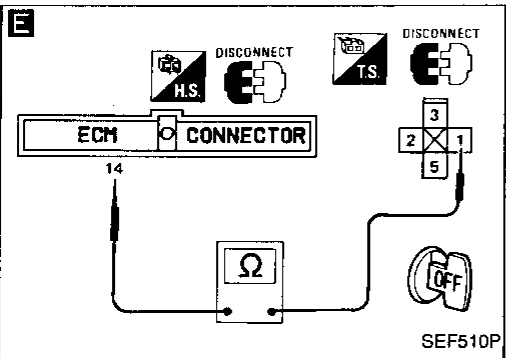
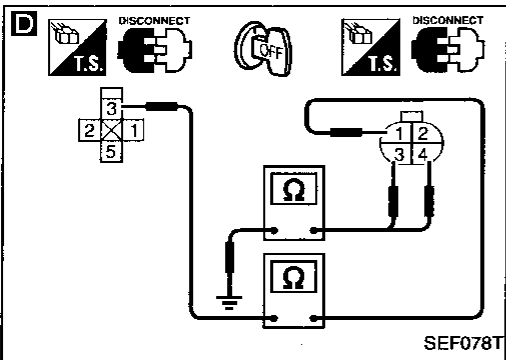
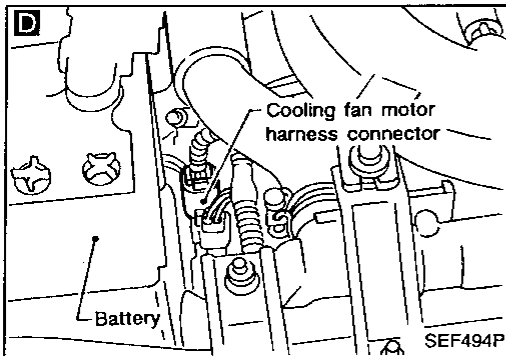
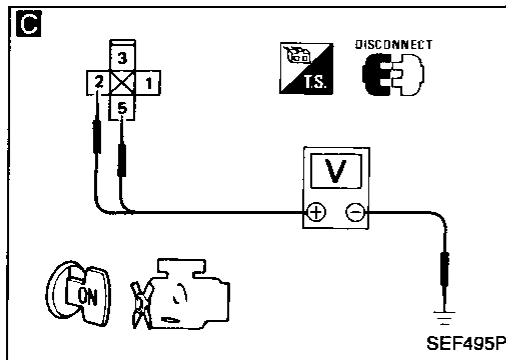
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(Go to EC-290.)

NG → Check cooling fan high speed control circuit. (Go to PROCEDURE B.)

TROUBLE DIAGNOSIS FOR DTC P1900

Overheat (Cont'd)



PROCEDURE A

INSPECTION START

C

CHECK POWER SUPPLY.

1. Turn ignition switch "OFF".
2. Disconnect cooling fan relay-2.
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 (M9), (E109)
- 7.5A fuse
- 30A fusible links
- Harness for open or short between cooling fan relay-2 and fuse
- Harness for open or short between cooling fan relay-2 and battery

If NG, repair harness or connectors.

OK

D

CHECK GROUND CIRCUIT.

1. Turn ignition switch "OFF".
2. Disconnect cooling fan motor harness connector.
3. Check harness continuity between terminal ③ and terminal ①. **Continuity should exist.** If OK, check harness for short.
4. Check harness continuity between terminals ③, ④ and body ground. **Continuity should exist.** If OK, check harness for short.

NG

Repair harness or connectors.

OK

E

CHECK OUTPUT SIGNAL CIRCUIT.

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal ⑭ and terminal ①. **Continuity should exist.**

NG

Check the following.

- Harness connectors (E109), (M9)
- Harness connectors (M63), (F3)
- Harness for open or short between cooling fan relay-2 and ECM

If NG, repair harness or connectors.

OK

CHECK COMPONENT
(Cooling fan relay-2).
Refer to "COMPONENT INSPECTION", EC-292.

NG

Replace cooling fan relay.

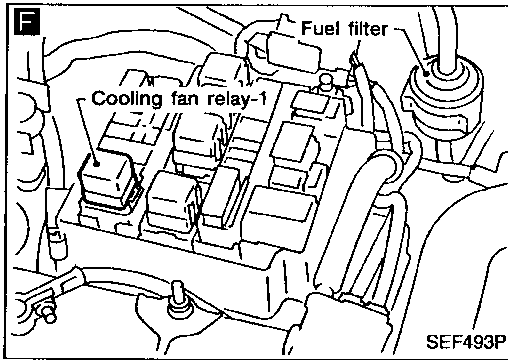
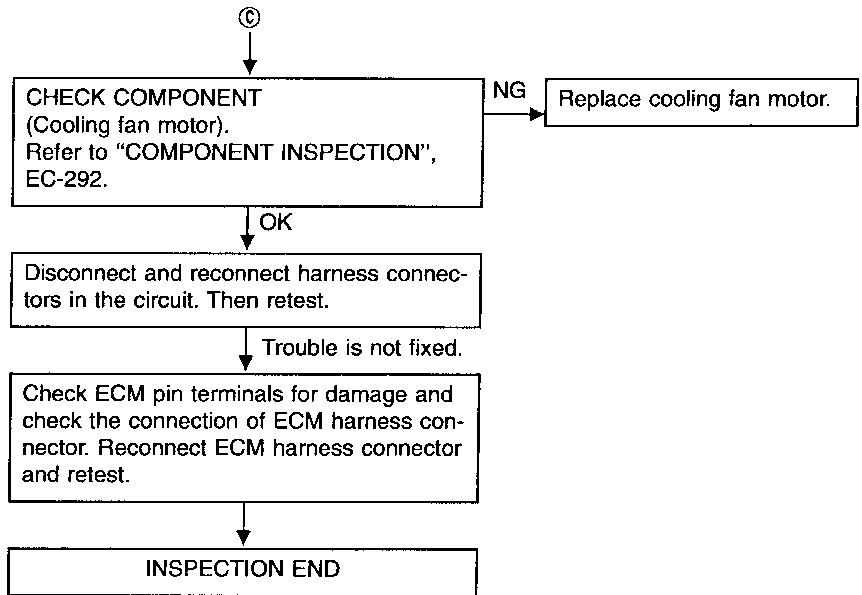
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TROUBLE DIAGNOSIS FOR DTC P1900

Overheat (Cont'd)



PROCEDURE B

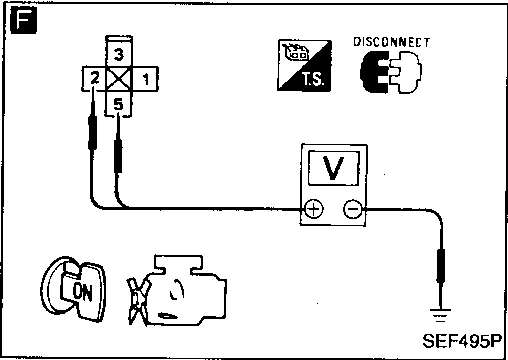
INSPECTION START

F **CHECK POWER SUPPLY.**

1. Turn ignition switch "OFF".
2. Disconnect cooling fan relay-1.
3. Turn ignition switch "ON".
4. Check voltage between cooling fan relay-1 terminals ②, ⑤ and ground with CONSULT or tester.

Voltage: Battery voltage

- NG
- Check the following.
- Harness connectors M9, E109
 - 7.5A fuse
 - 30A fuse
 - 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.

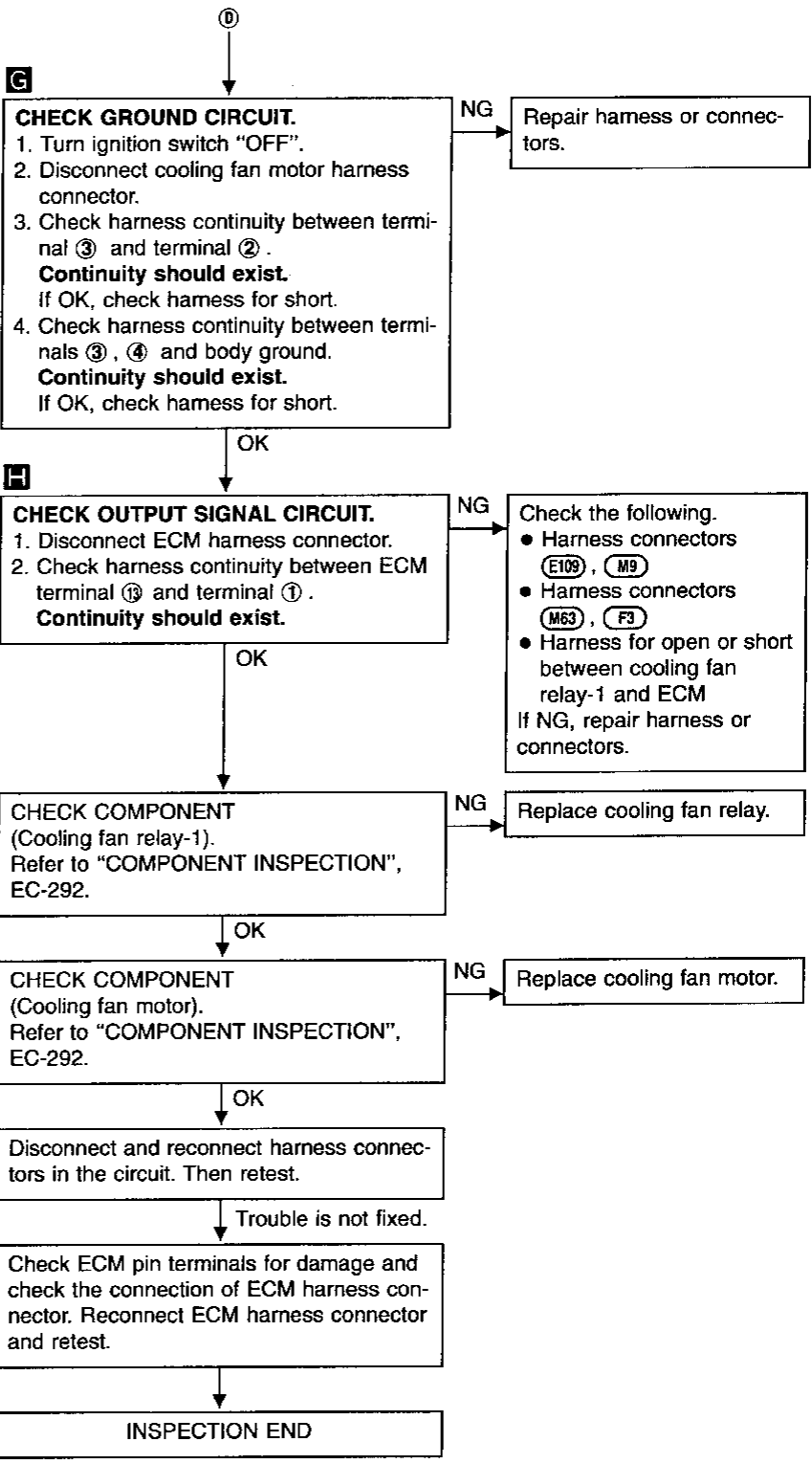
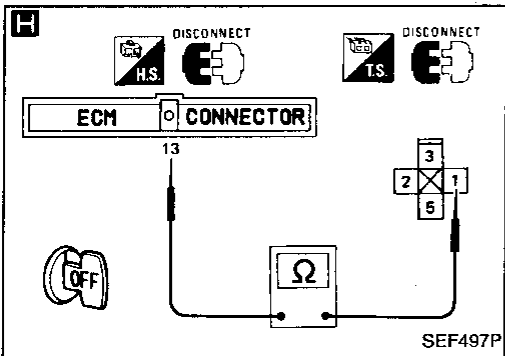
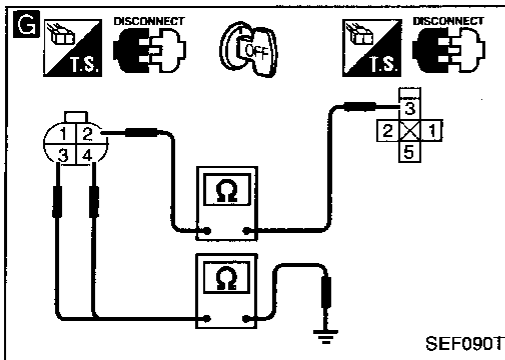


OK

(Go to ① on next page.)

TROUBLE DIAGNOSIS FOR DTC P1900

Overheat (Cont'd)



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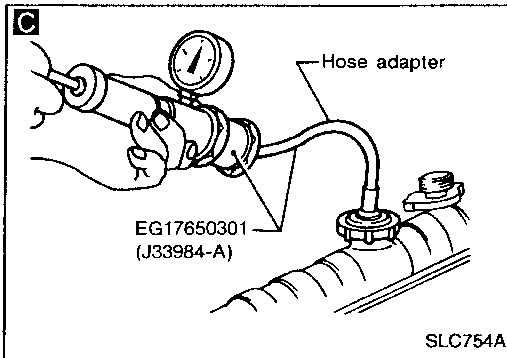
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TROUBLE DIAGNOSIS FOR DTC P1900

Overheat (Cont'd)



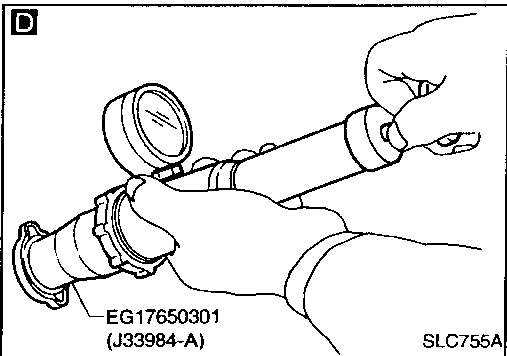
C

CHECK COOLING SYSTEM FOR LEAK.
Apply pressure to the cooling system with a tester, and check if the pressure drops.
Testing pressure:
157 kPa (1.6 kg/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

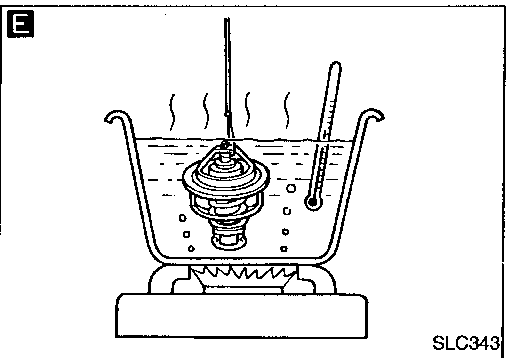
Refer to LC section ("Water Pump").



D

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.



E

CHECK THERMOSTAT.

1. Check valve seating condition at normal room temperatures. It should seat tightly.
2. Check valve opening temperature and valve lift.
Valve opening temperature:
76.5°C (170°F) [standard]
Valve lift:
More than 10 mm/90°C (0.39 in/194°F)
3. Check if valve is closed at 5°C (9°F) below valve opening temperature. For details, refer to LC section ("Thermostat").

NG → Replace thermostat

OK → Check engine coolant temperature sensor. Refer to "COMPONENT INSPECTION", EC-115.

NG → Replace engine coolant temperature sensor.

If the cause can not be isolated, go to "MAIN 12 CAUSES OF OVERHEATING", EC-291.

INSPECTION END

Perform FINAL CHECK by the following procedure after repair is completed.

1. Warm up engine. Run the vehicle for 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".

TROUBLE DIAGNOSIS FOR DTC P1900

Overheat (Cont'd)

MAIN 12 CAUSES OF OVERHEATING

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	<ul style="list-style-type: none"> Blocked radiator Blocked condenser Blocked radiator grille Blocked bumper 	<ul style="list-style-type: none"> Visual 	No blocking	—
	2	<ul style="list-style-type: none"> Coolant mixture 	<ul style="list-style-type: none"> Coolant tester 	50 - 50% coolant mixture	See "RECOMMENDED FLUIDS AND LUBRICANTS" in MA section
	3	<ul style="list-style-type: none"> Coolant level 	<ul style="list-style-type: none"> Visual 	Coolant up to MAX level in reservoir tank and radiator filler neck	See "Changing Engine Coolant", "ENGINE MAINTENANCE" in MA section
	4	<ul style="list-style-type: none"> Radiator cap 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Coolant leaks 	<ul style="list-style-type: none"> Visual 	No leaks	See "System Check" "ENGINE COOLING SYSTEM" in LC section
ON*2	6	<ul style="list-style-type: none"> Thermostat 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Cooling fan 	<ul style="list-style-type: none"> CONSULT 	Operating	See "TROUBLE DIAGNOSIS FOR DTC P1900" (EC-281)
OFF	8	<ul style="list-style-type: none"> Combustion gas leak 	<ul style="list-style-type: none"> Color checker chemical tester 4 Gas analyzer 	Negative	—
ON*3	9	<ul style="list-style-type: none"> Coolant temperature gauge 	<ul style="list-style-type: none"> Visual 	Gauge less than 3/4 when driving	—
		<ul style="list-style-type: none"> Coolant overflow to reservoir tank 	<ul style="list-style-type: none"> Visual 	No overflow during driving and idling	See "Changing Engine Coolant", "ENGINE MAINTENANCE" in MA section
OFF*4	10	<ul style="list-style-type: none"> Coolant return from reservoir tank to radiator 	<ul style="list-style-type: none"> Visual 	Should be initial level in reservoir tank	See "ENGINE MAINTENANCE" in MA section
OFF	11	<ul style="list-style-type: none"> Cylinder head 	<ul style="list-style-type: none"> Straight gauge feeler gauge 	0.1 mm (0.004 in) Maximum distortion (warping)	See "Inspection", "CYLINDER HEAD" in EM section
	12	<ul style="list-style-type: none"> Cylinder block and pistons 	<ul style="list-style-type: none"> 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.

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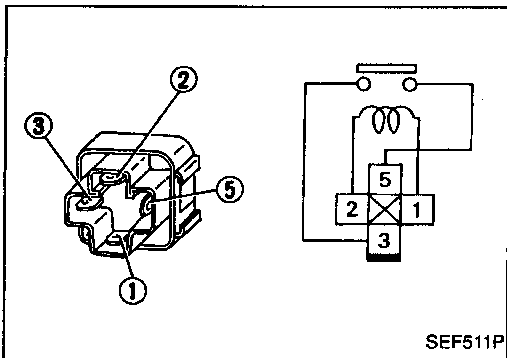
TROUBLE DIAGNOSIS FOR DTC P1900

Overheat (Cont'd)

COMPONENT INSPECTION (A/C models)

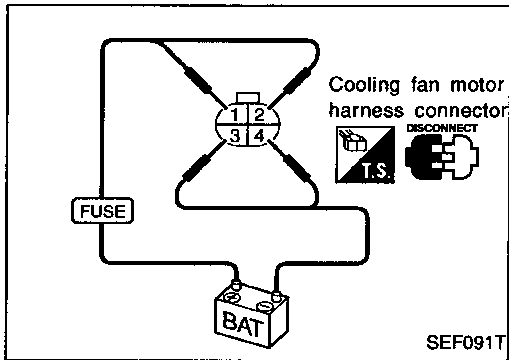
Cooling fan relays-1 and -2

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.



Cooling fan motor (A/C models)

1. Disconnect cooling fan motor harness connectors.
2. Supply cooling fan motor terminals with battery voltage and check operation.

	Speed	Terminals	
		(⊕)	(⊖)
Cooling fan motor	Low	①	④
	High	① , ②	③ , ④

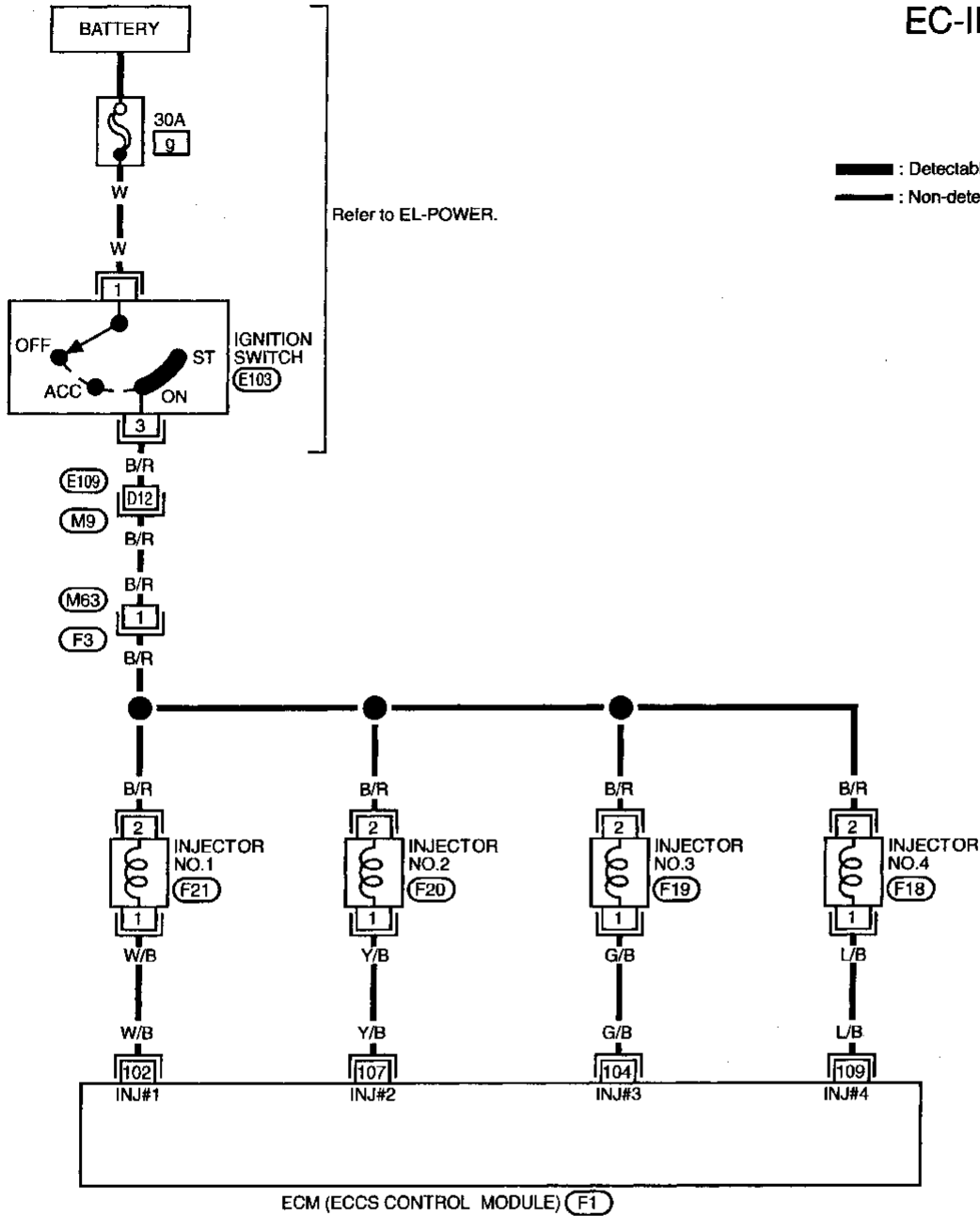
Cooling fan motor should operate.

If NG, replace cooling fan motor.

TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

Injector

EC-INJECT-01



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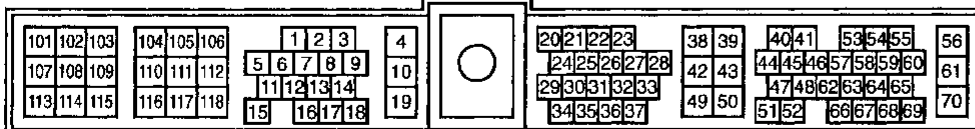
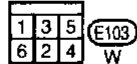
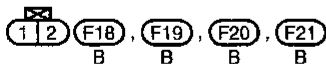
EL

IDX

Refer to last page (Foldout page).

E109 , M9

M63 , F3

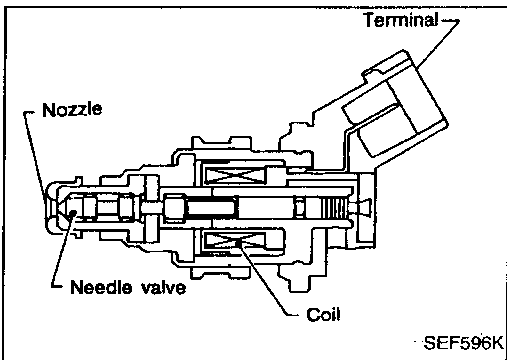


TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

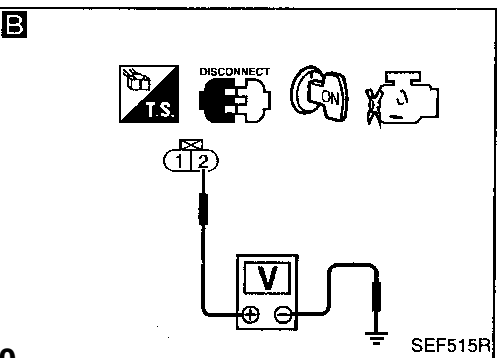
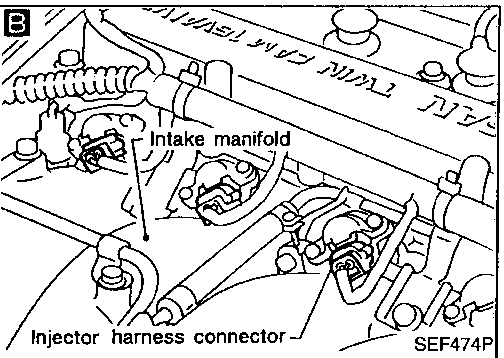
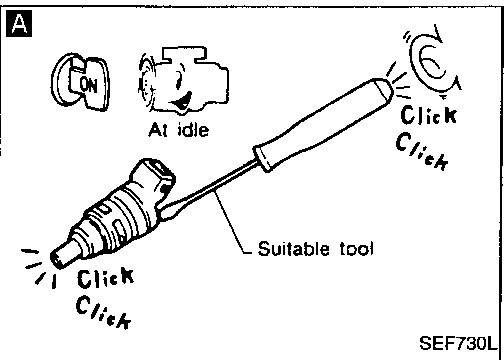
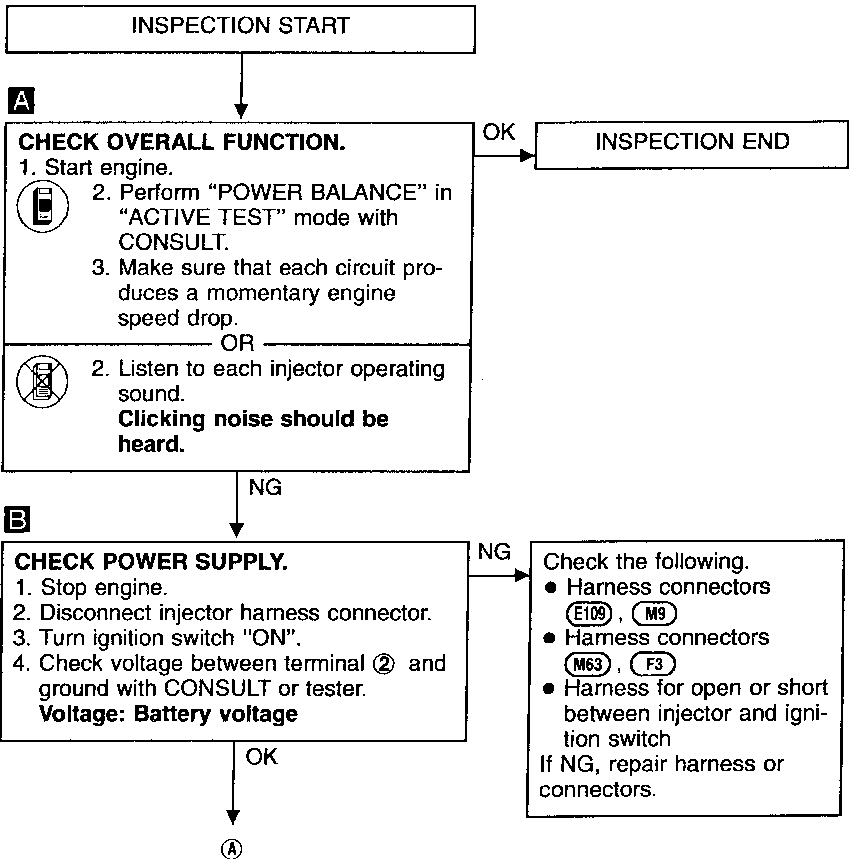
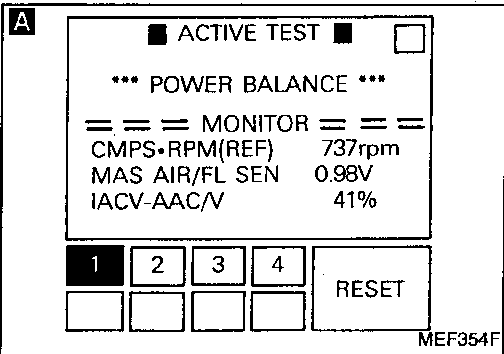
Injector (Cont'd)

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.

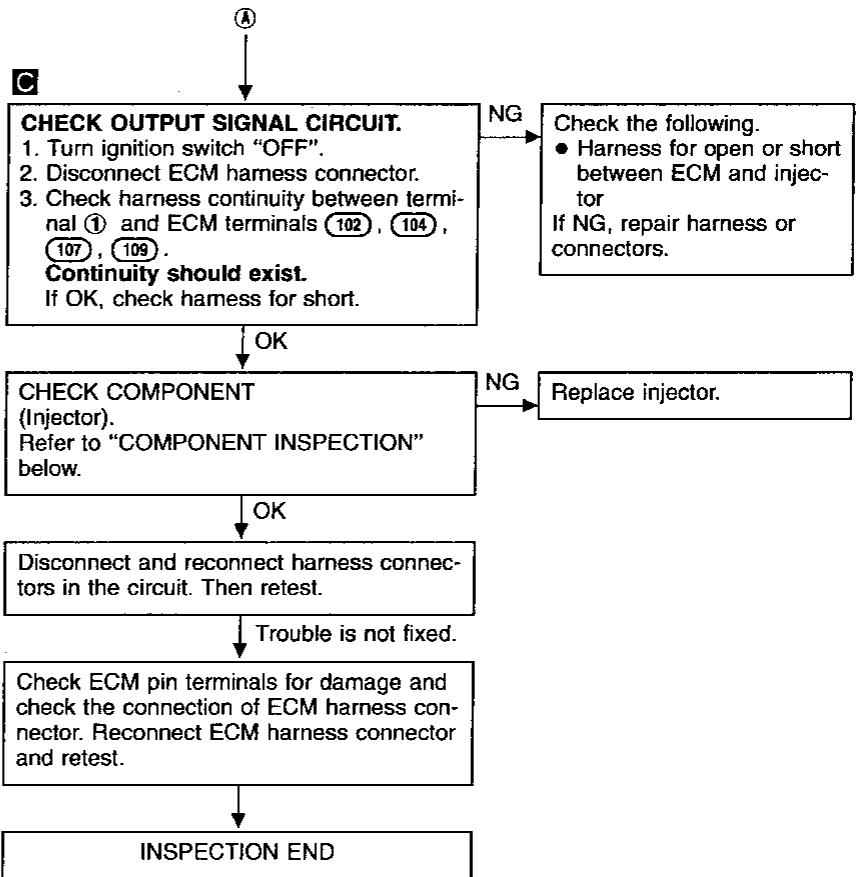
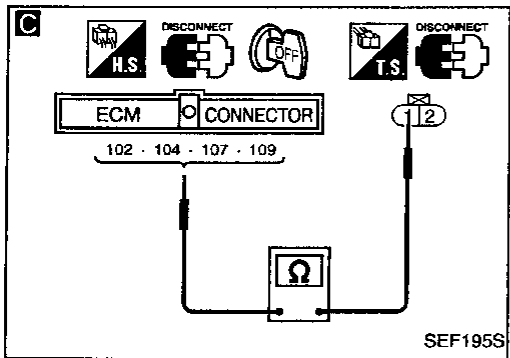


DIAGNOSTIC PROCEDURE



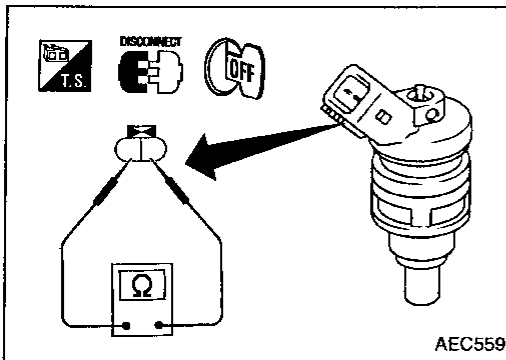
TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

Injector (Cont'd)



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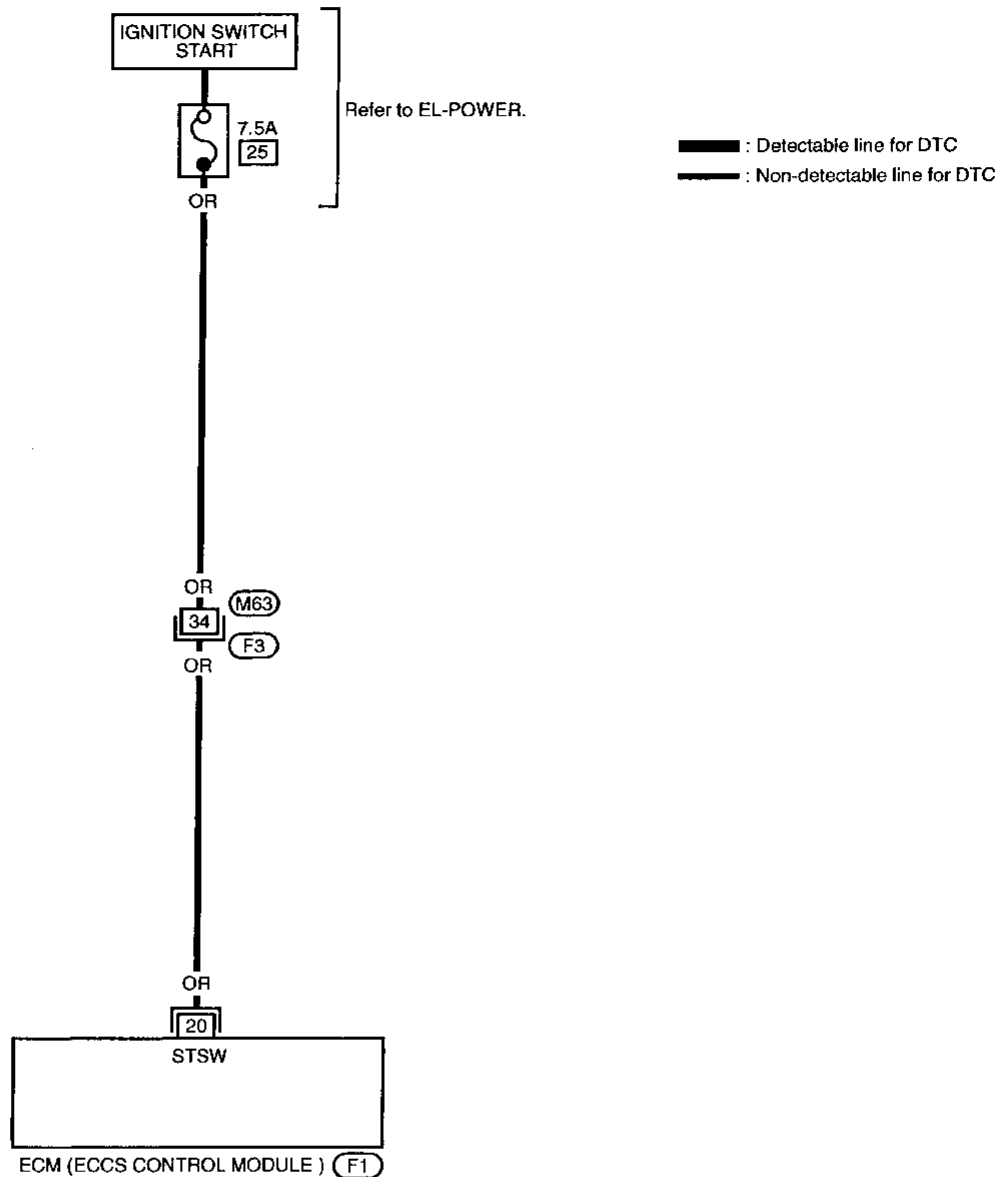
COMPONENT INSPECTION

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

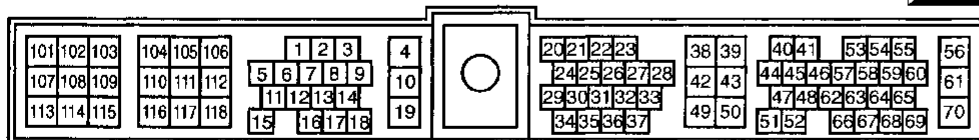
EC-S/SIG-01



Refer to last page (Foldout page).

(F1) W 

(M63) (F3)



TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

Start Signal (Cont'd) DIAGNOSTIC PROCEDURE

A

■ START SIGNAL CKT ■

1. CLOSE THROTTLE, SHIFT TO P OR N RANGE.
2. TOUCH START AND START ENGINE IMMEDIATELY.

NEXT START

SEF191L

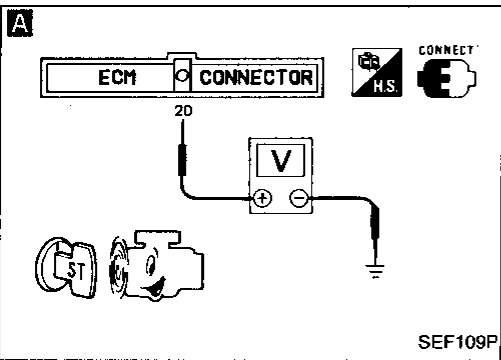
A

☆ MONITOR ☆ NO FAIL

START SIGNAL	OFF
CLSD TH/P SW	ON
AIR COND SIG	OFF
P/N POSI SW	ON

RECORD

SEF111P



INSPECTION START

A

CHECK OVERALL FUNCTION.

1. Turn ignition switch "ON".
2. Perform "START SIGNAL CKT" in "FUNCTION TEST" mode with CONSULT.

OR

OK → INSPECTION END

CHECK OVERALL FUNCTION.

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 ② and ground.

Voltage:
Ignition switch "START"
Battery voltage
Except above
Approximately 0V

NG

Check the following.

- Harness connector (M53), (F3)
- 7.5A fuse
- Harness for open or short between ECM and ignition switch

If NG, repair harness or connectors.

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

Trouble is not fixed.

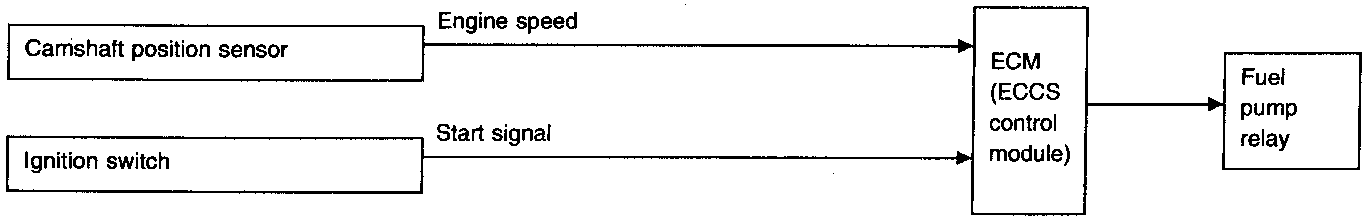
Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

INSPECTION END

- GI
- MA
- EM
- LC
- EC**
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- MT
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- PD
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- RA
- BR
- ST
- RS
- BT
- HA
- EL
- IDX

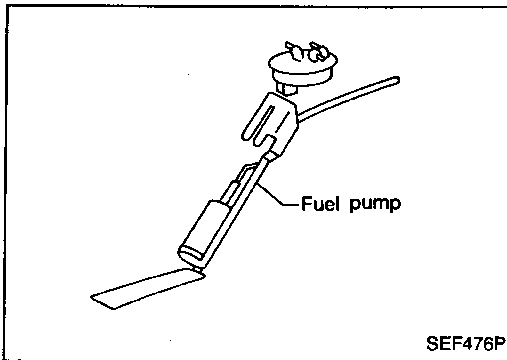
Fuel Pump

SYSTEM DESCRIPTION



The ECM activates the fuel pump for several seconds after the ignition switch is turned on to improve engine startability. If the ECM receives a 180° signal from the camshaft position sensor, it knows that the engine is rotating, and causes the pump to operate. If the 180° signal is not received when the ignition switch is on, the engine stalls. The ECM stops pump operation and prevents battery discharging, thereby improving safety. The ECM does not directly drive the fuel pump. It controls the ON/OFF fuel pump relay, which in turn controls the fuel pump.

Condition	Fuel pump operation
Ignition switch is turned to ON.	Operates for 5 seconds
Engine running and cranking	Operates
When engine is stopped	Stops in 1 second
Except as shown above	Stops



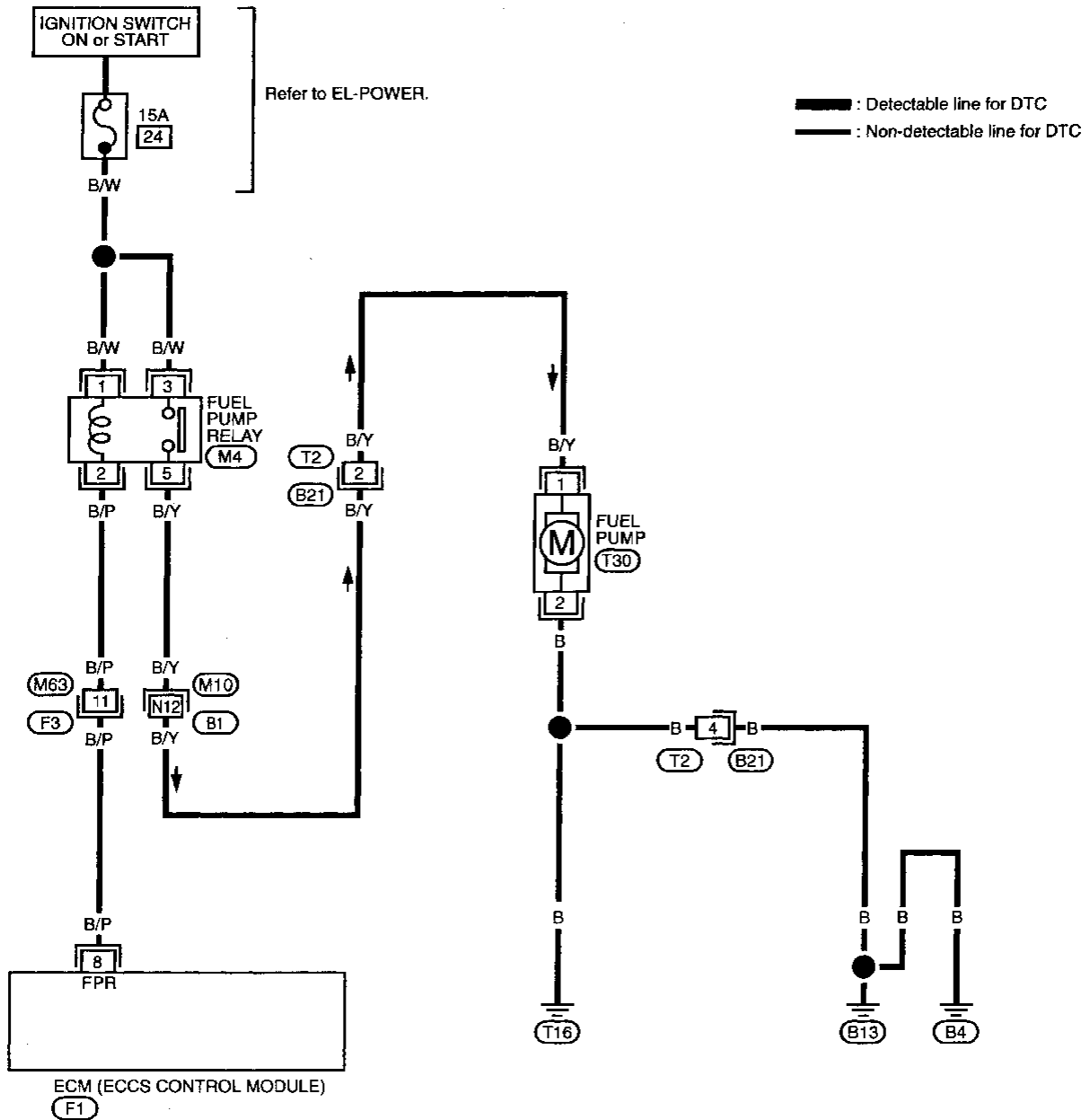
COMPONENT DESCRIPTION

The fuel pump with a fuel damper is an in-tank type (the pump and damper are located in the fuel tank).

TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

Fuel Pump (Cont'd)

EC-F/PUMP-01



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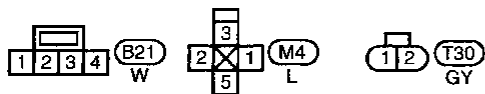
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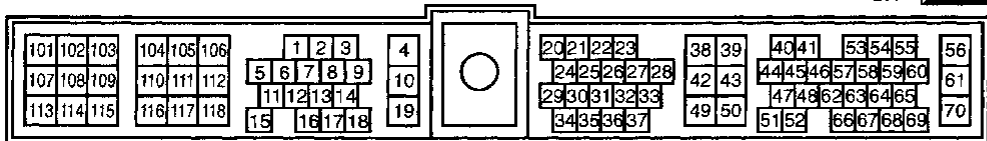
IDX



Refer to last page (Foldout page).

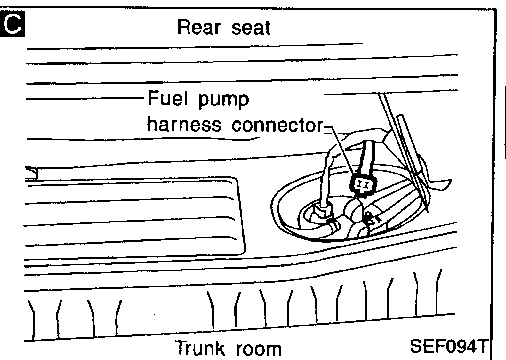
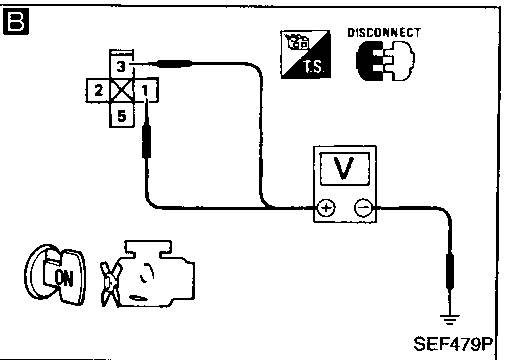
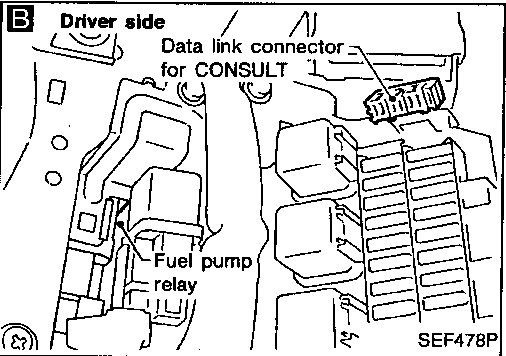
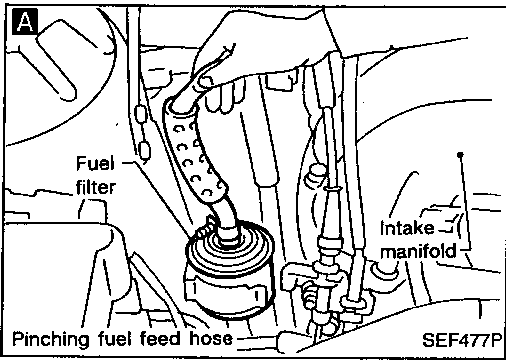
(M63), (F3)

(M10), (B1)



TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

Fuel Pump (Cont'd) DIAGNOSTIC PROCEDURE



INSPECTION START

A
CHECK OVERALL FUNCTION.
1. Turn ignition switch "ON".
2. Pinch fuel feed hose with fingers.
Fuel pressure pulsation should be felt on the fuel feed hose for 5 seconds after ignition switch is turned "ON".

OK → INSPECTION END

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.
• 15A fuse
• Harness continuity between fuse and fuel pump relay
If NG, repair harness or connectors.

C
CHECK GROUND CIRCUIT.
1. Turn ignition switch "OFF".
2. Disconnect fuel pump harness connector.
3. Check harness continuity between fuel pump terminal ② and body ground, fuel pump terminal ① and relay terminal ⑤.
Continuity should exist.
If OK, check harness for short.

NG → Check the following.
• Harness connectors (T2), (B21)
• Harness connectors (M10), (B1)
• Harness for open or short between fuel pump and body ground
• Harness for open or short between fuel pump and fuel pump relay
If NG, repair harness or connectors.

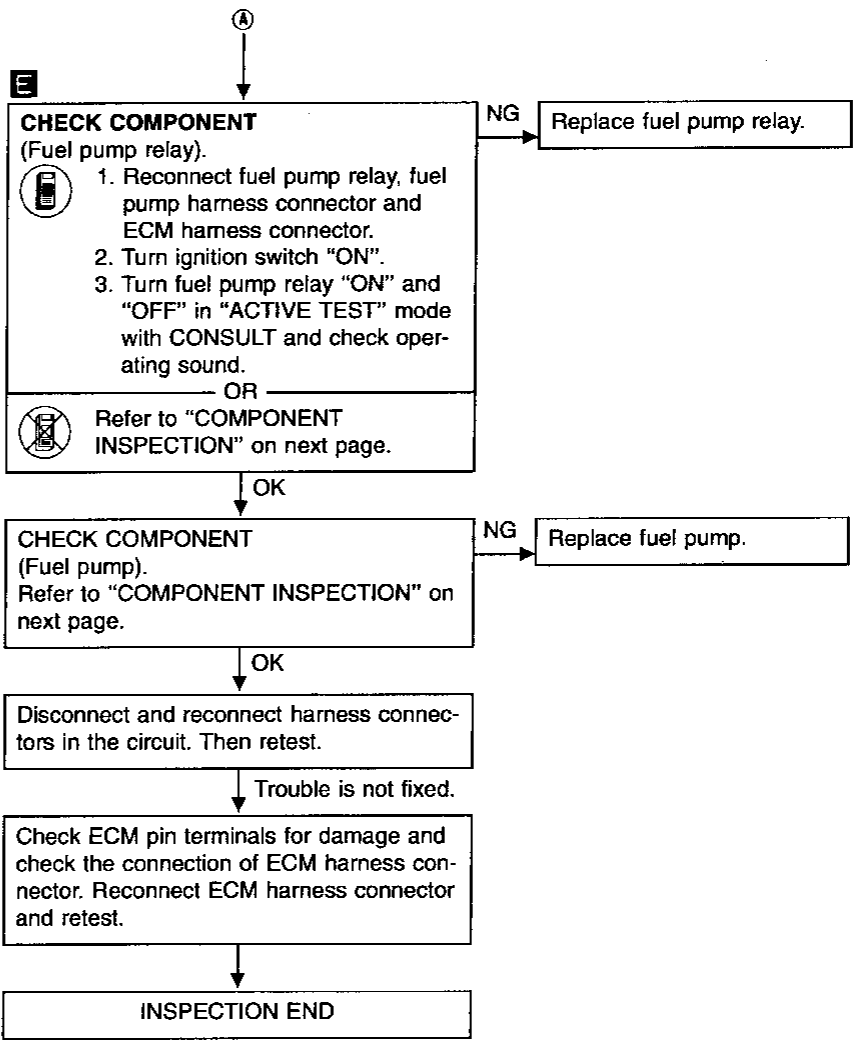
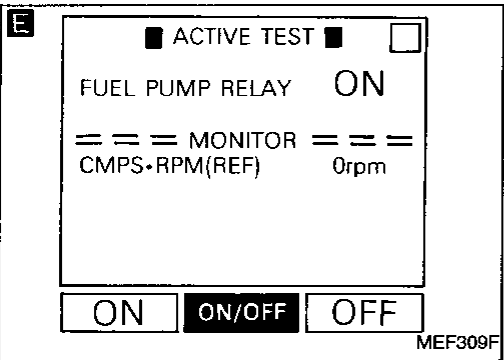
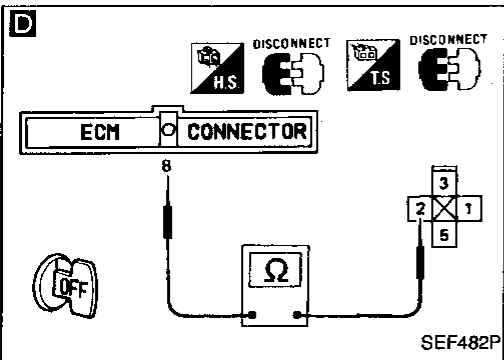
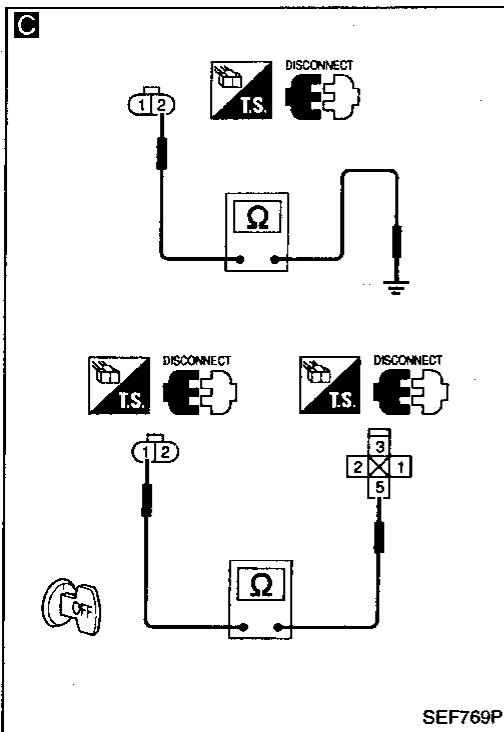
D
CHECK OUTPUT SIGNAL CIRCUIT.
1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal ⑧ and relay terminal ②.
Continuity should exist.
If OK, check harness for short.

NG → Check the following.
• Harness connectors (M63), (F3)
• Harness for open or short between ECM and fuel pump relay
If NG, repair harness or connectors.

OK → A

TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

Fuel Pump (Cont'd)



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TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

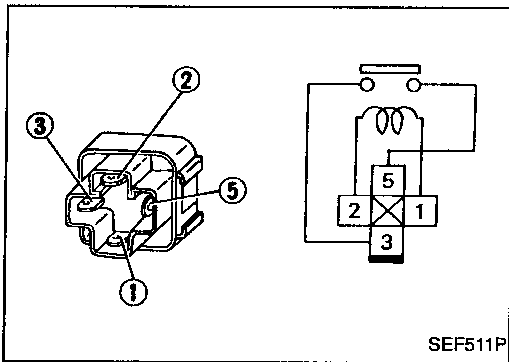
Fuel Pump (Cont'd) COMPONENT INSPECTION

Fuel pump relay

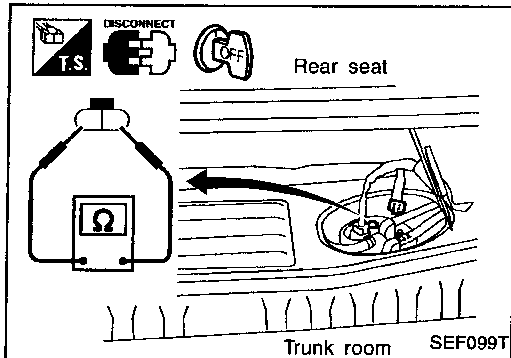
Check continuity between terminals ③ and ⑤.

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

If NG, replace relay.



SEF511P



Trunk room SEF099T

Fuel pump

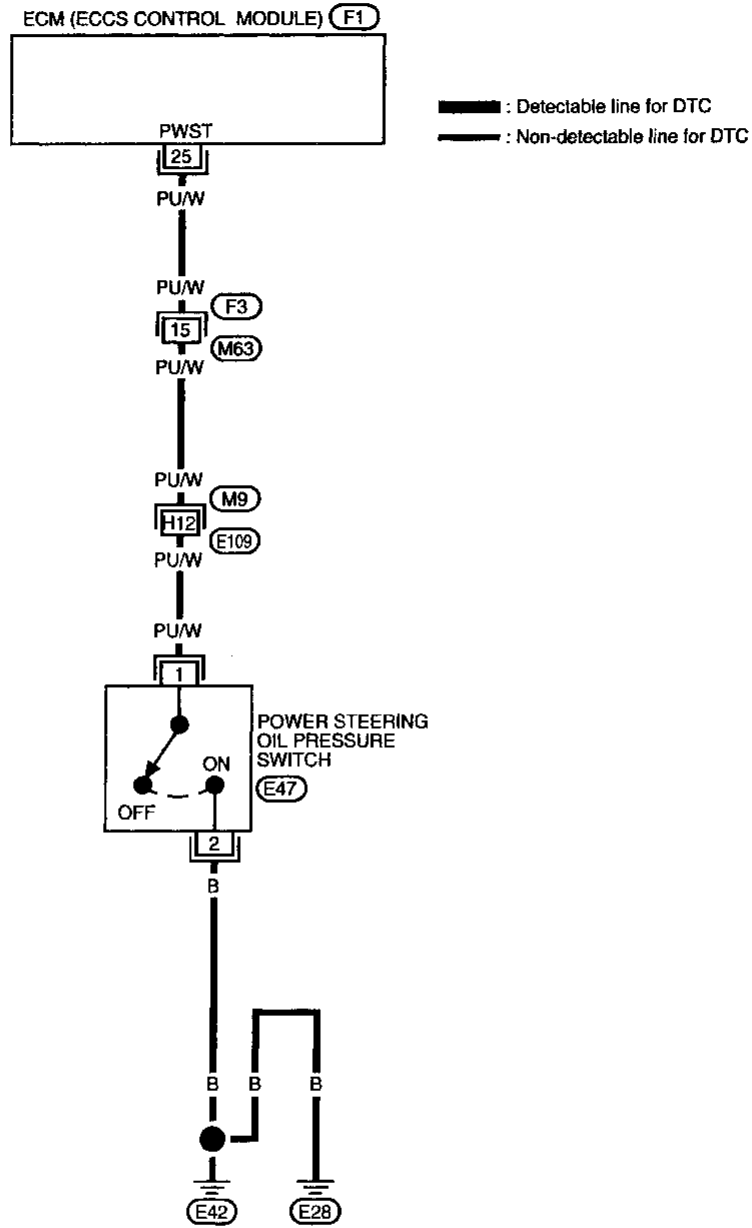
1. Disconnect fuel pump harness connector.
2. Check resistance between terminals a and b.

Resistance: 0.2 - 5.0Ω at 25°C (77°F)

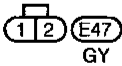
If NG, replace fuel pump.

Power Steering Oil Pressure Switch

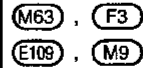
EC-PST/SW-01



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Refer to last page (Foldout page).



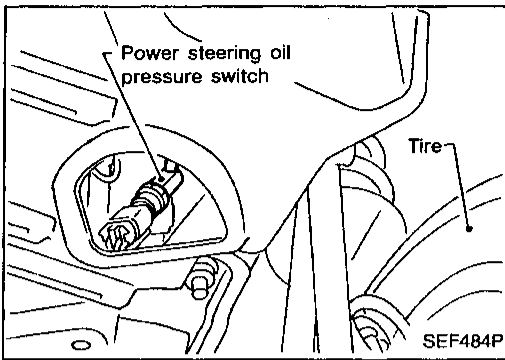
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113	114	115	116	117	118	11	12	13	14	19	29	30	31	32	33	47	48	62	63	64	65	66	67	68	69	70				
						15	16	17	18		34	35	36	37	49	50	51	52												

TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

Power Steering Oil Pressure Switch (Cont'd)

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.



A

■ PW/ST SIGNAL CIRCUIT ■

HOLD STEERING WHEEL
IN A FULL
LOCKED POSITION
THEN
TOUCH START

NEXT START

MEF023E

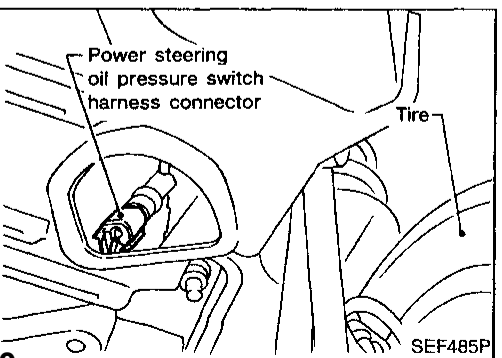
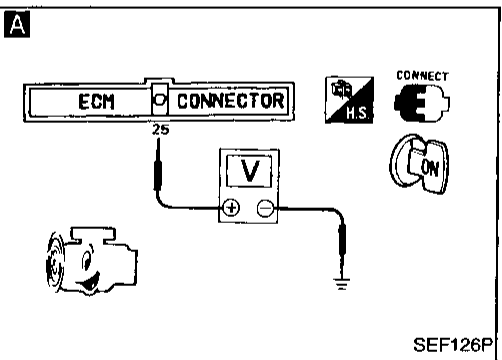
A

☆ MONITOR ☆ NO FAIL

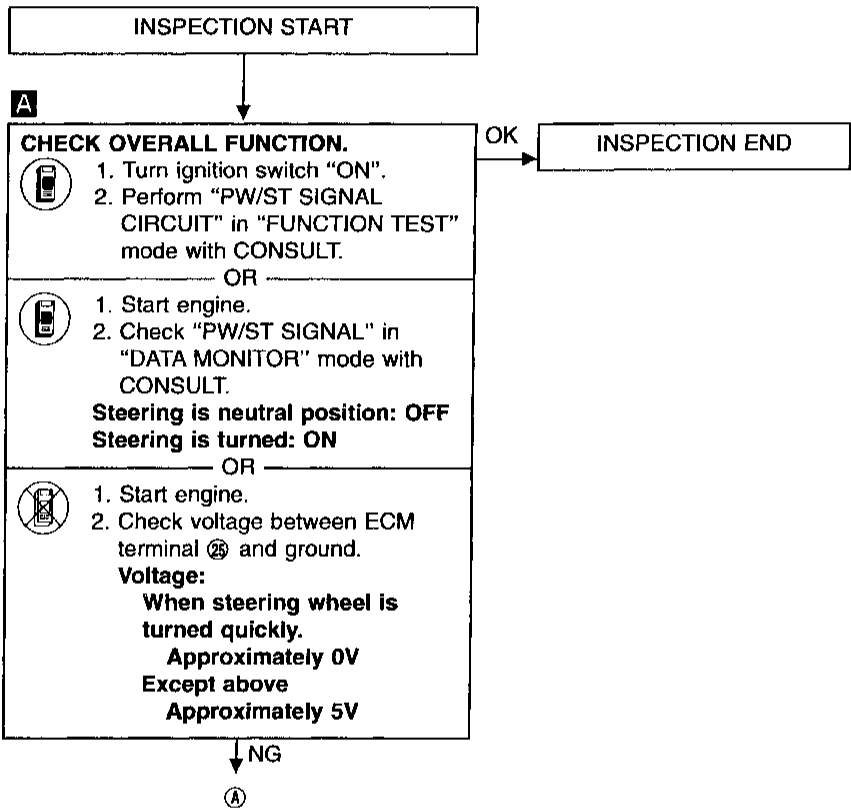
PW/ST SIGNAL OFF

RECORD

SEF591I

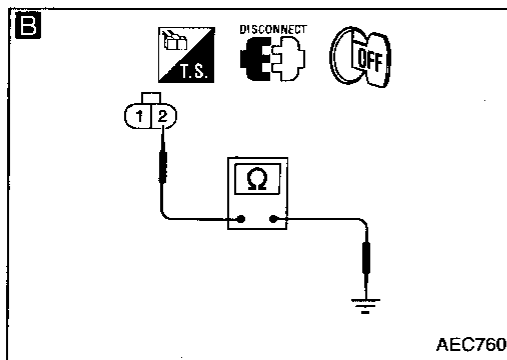


DIAGNOSTIC PROCEDURE



TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

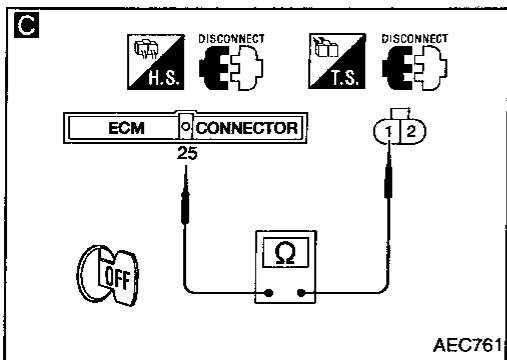
Power Steering Oil Pressure Switch (Cont'd)



B

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.



C

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

NG → Check the following.
 • Harness connectors (F3, M63)
 • Harness connectors (M9, E108)
 • Harness for open or short between ECM and power steering oil pressure switch
 If NG, repair harness or connectors.

CHECK COMPONENT
 (Power steering oil pressure switch).
 Refer to "COMPONENT INSPECTION" below.

NG → Replace power steering oil pressure switch.

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

Trouble is not fixed.

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

INSPECTION END

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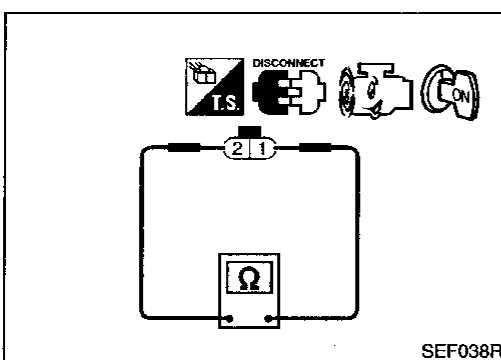
RS

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COMPONENT INSPECTION

Power steering oil pressure switch

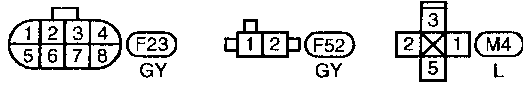
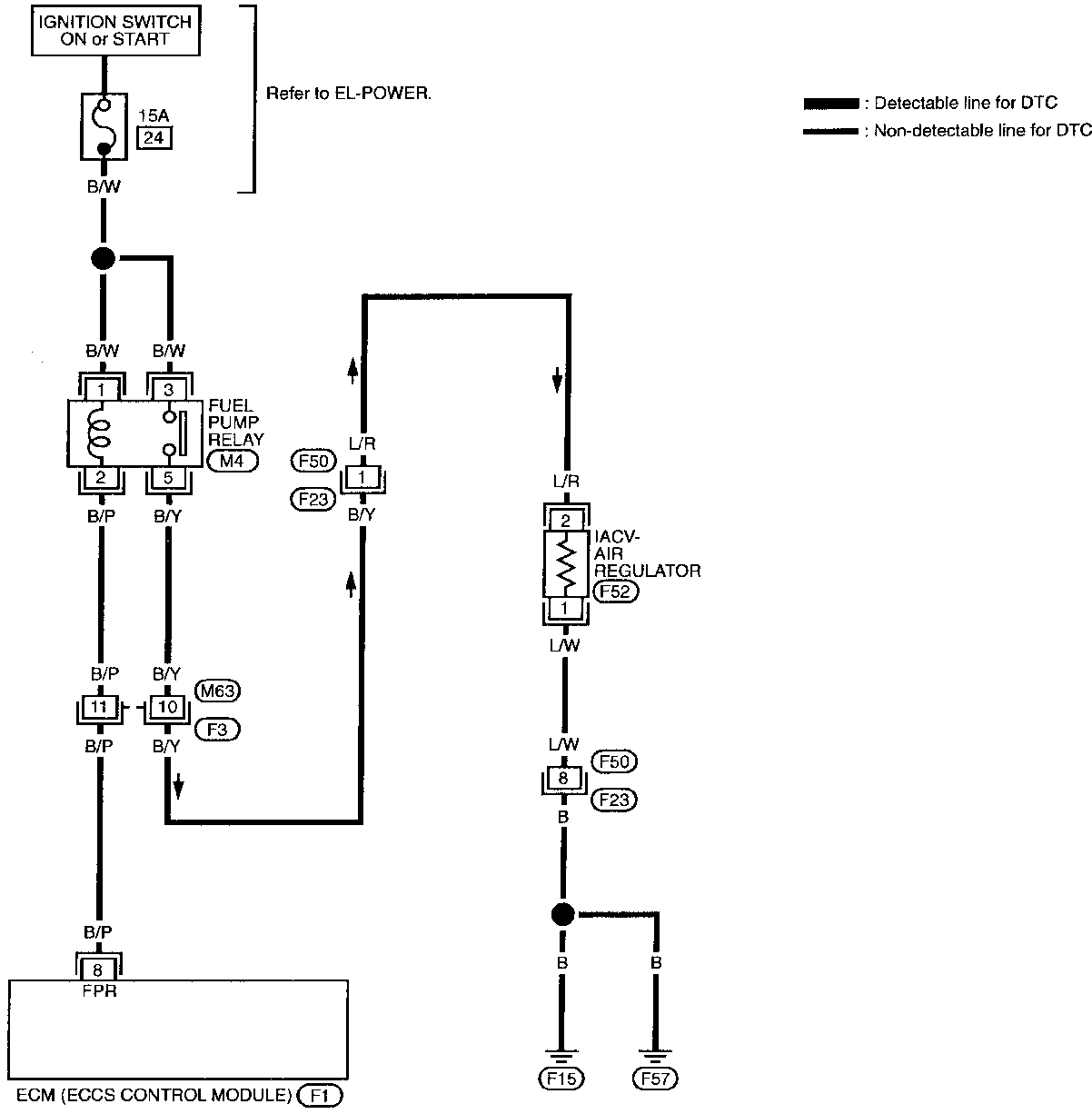
1. Disconnect power steering oil pressure switch harness connector then start engine.
2. Check continuity between terminals ① and ②.

Conditions	Continuity
Steering wheel is being turned	Yes
Steering wheel is not being turned	No

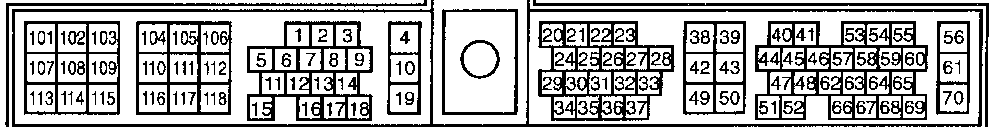
If NG, replace power steering oil pressure switch.

IACV-Air Regulator

EC-AIRREG-01



Refer to last page (Foldout page).
 (M63), (F3)

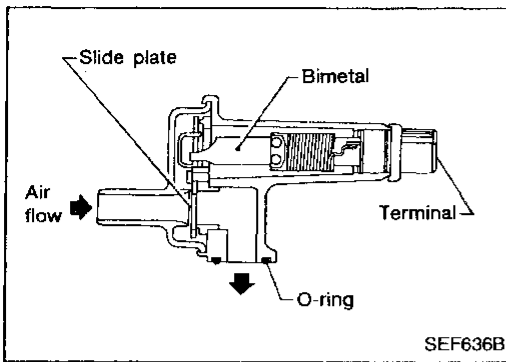


TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

IACV-Air Regulator (Cont'd)

DESCRIPTION

The idle air control valve (IACV)-air regulator provides an air by-pass when the engine is cold for a fast idle during warm-up. A bimetal, heater and rotary shutter are built into the IACV-air regulator. When the bimetal temperature is low, the air by-pass port opens. As the engine starts and electric current flows through a heater, the bimetal begins to turn the shutter to close the by-pass port. The air passage remains closed until the engine stops and the bimetal temperature drops.



DIAGNOSTIC PROCEDURE

A

■ FUEL PUMP CIRCUIT ■
 PINCH FUEL FEED HOSE WITH FINGERS IS THERE ANY PRESSURE PULSATION ON THE FUEL FEED HOSE?
 OR
 DOES THE FUEL PUMP RELAY MAKE AN OPERATING SOUND EVERY 3 SECONDS?

NEXT NO YES

MEF591B

A

■ ACTIVE TEST ■ □

FUEL PUMP RELAY ON

== MONITOR ==
 CMPS-RPM(REF) Orpm

ON ON/OFF OFF

MEF309F

INSPECTION START

A

CHECK CONTROL FUNCTION.

1. Turn ignition switch "ON".

2. Perform "FUEL PUMP CIRCUIT" in "FUNCTION TEST" mode with CONSULT.

OR

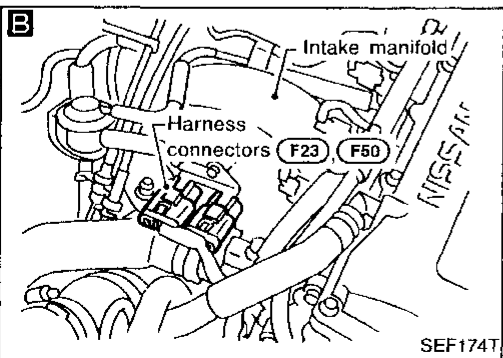
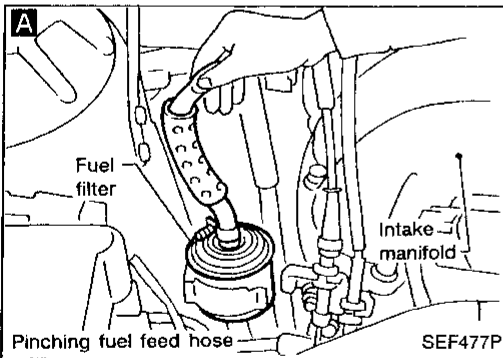
2. Turn fuel pump relay "ON" and "OFF" in "ACTIVE TEST" mode with CONSULT and check operating sound.

OR

2. Pinch fuel feed hose with fingers. **Fuel pressure pulsation should be felt on the fuel feed hose for 5 seconds after ignition switch is turned "ON".**

NG → Check fuel pump control circuit. (See page EC-298.)

OK
 (A)



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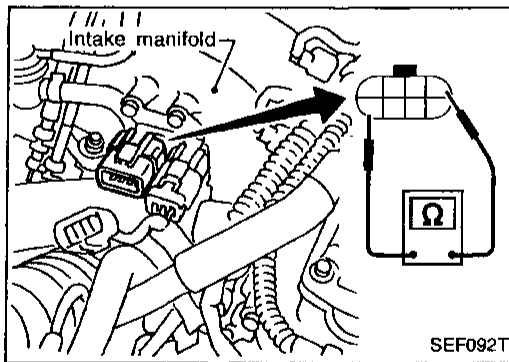
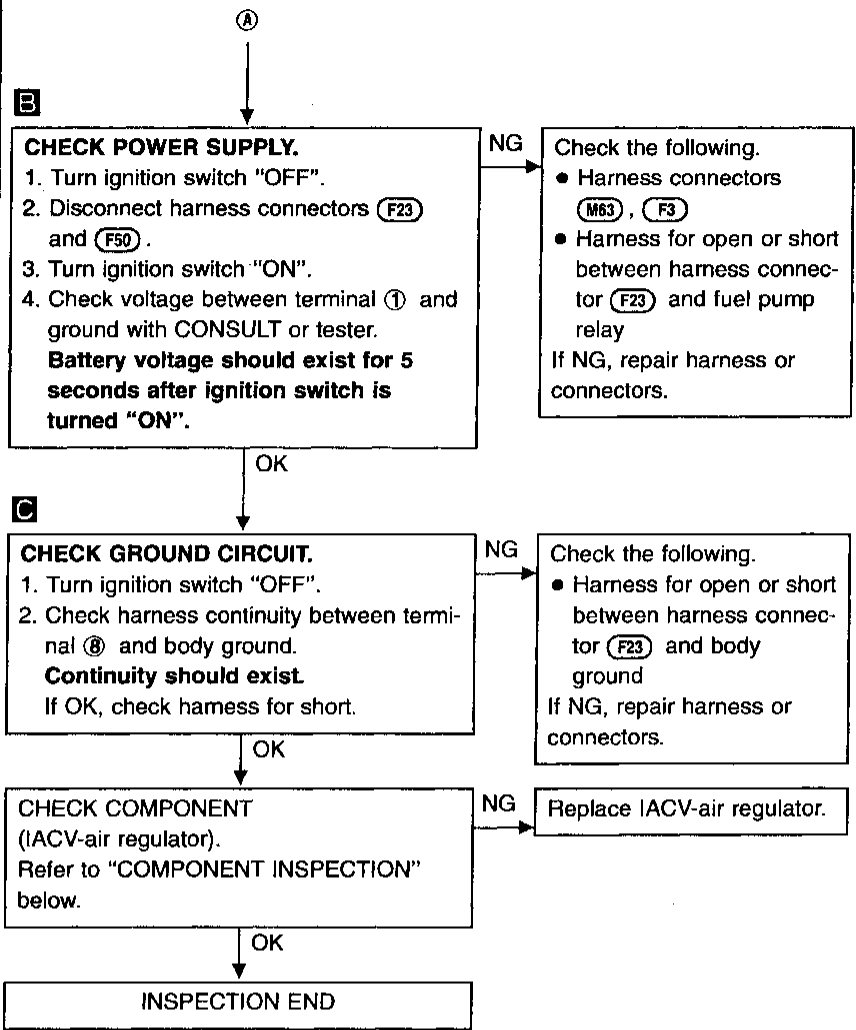
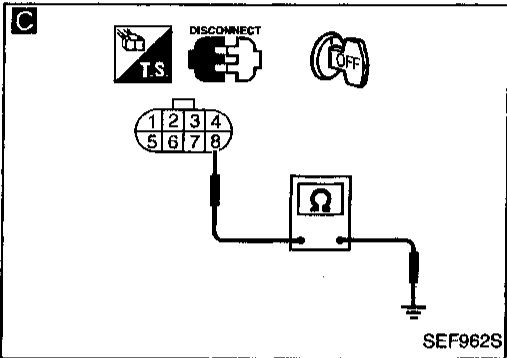
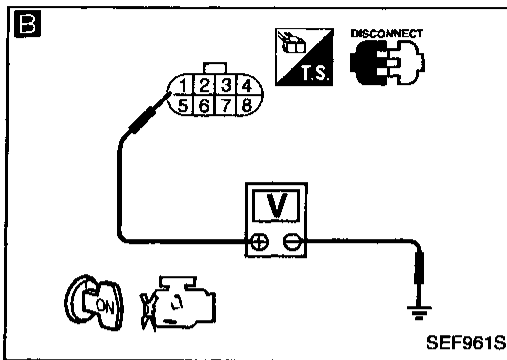
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453

TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

IACV-Air Regulator (Cont'd)



COMPONENT INSPECTION

IACV-air regulator

Disconnect EFI (IACV-air regulator) sub-harness connector.

- Check IACV-air regulator resistance.

Resistance:

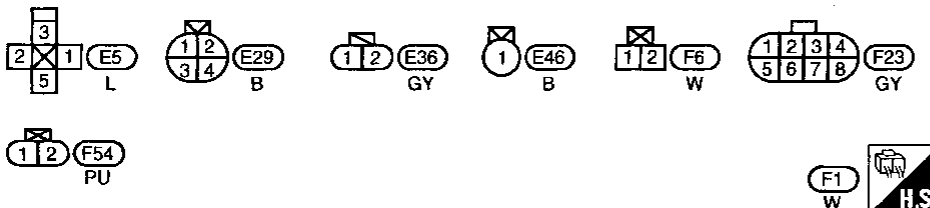
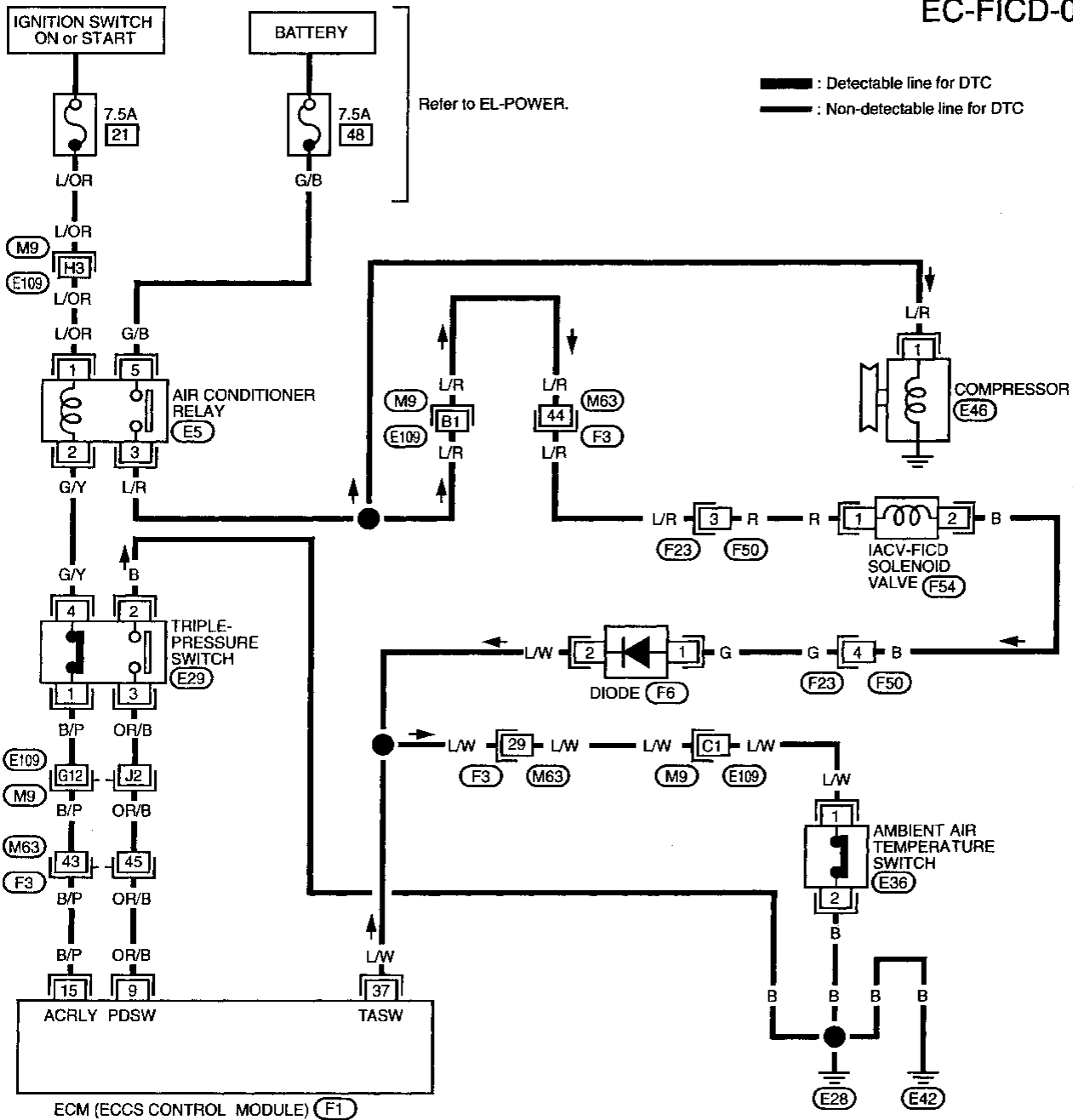
Approximately 70 - 80Ω at 25°C (77°F)

- Check IACV-air regulator for clogging.

IACV-FICD Solenoid Valve

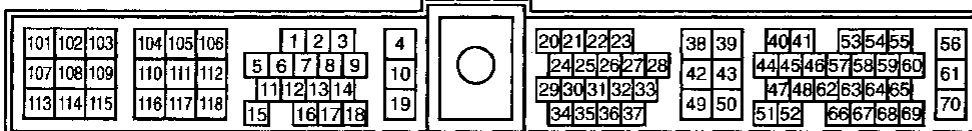
EC-FICD-01

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Refer to last page (Foldout page).

E109, M9
M63, F3

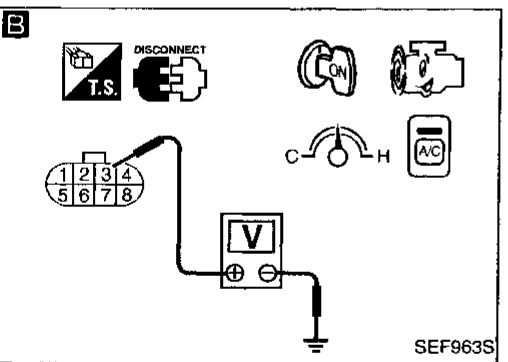
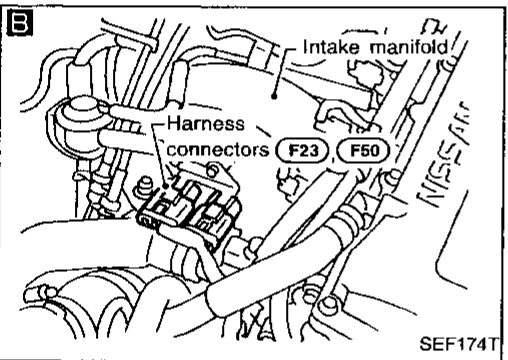
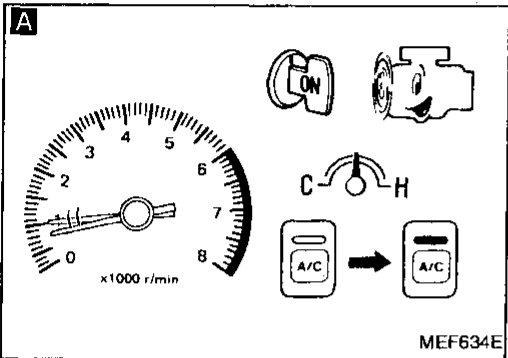
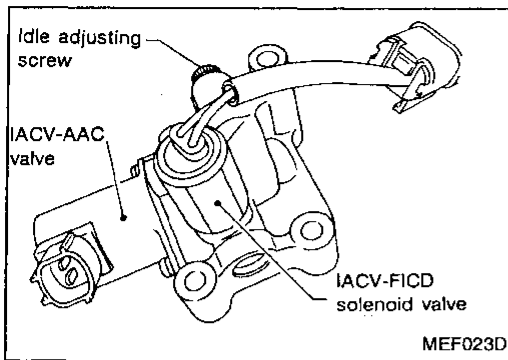


TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

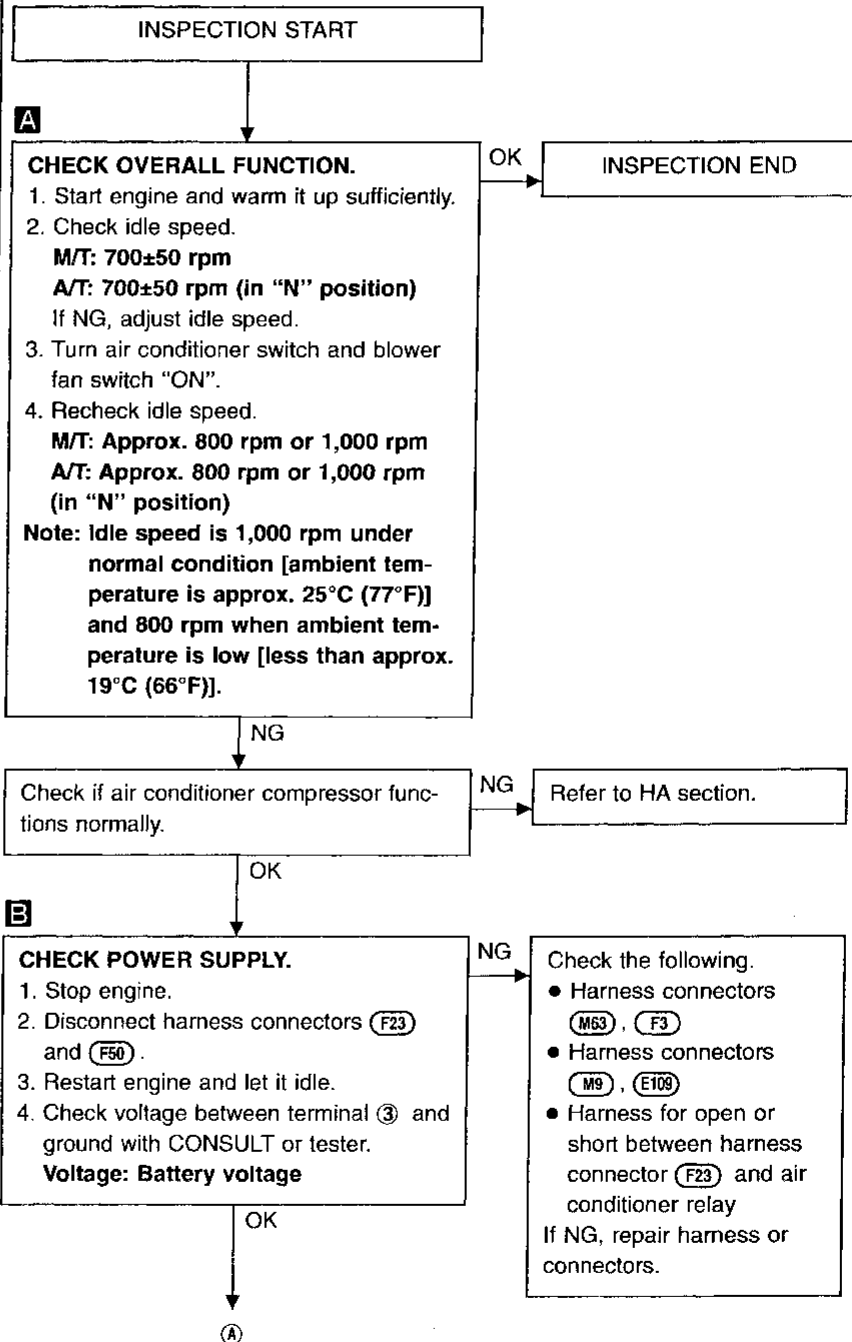
IACV-FICD Solenoid Valve (Cont'd)

DESCRIPTION

The idle air adjusting (IAA) unit is made up of the IACV-AAC valve, IACV-FICD solenoid valve and idle adjusting screw. It receives the signal from the ECM and controls the idle speed at the preset value.

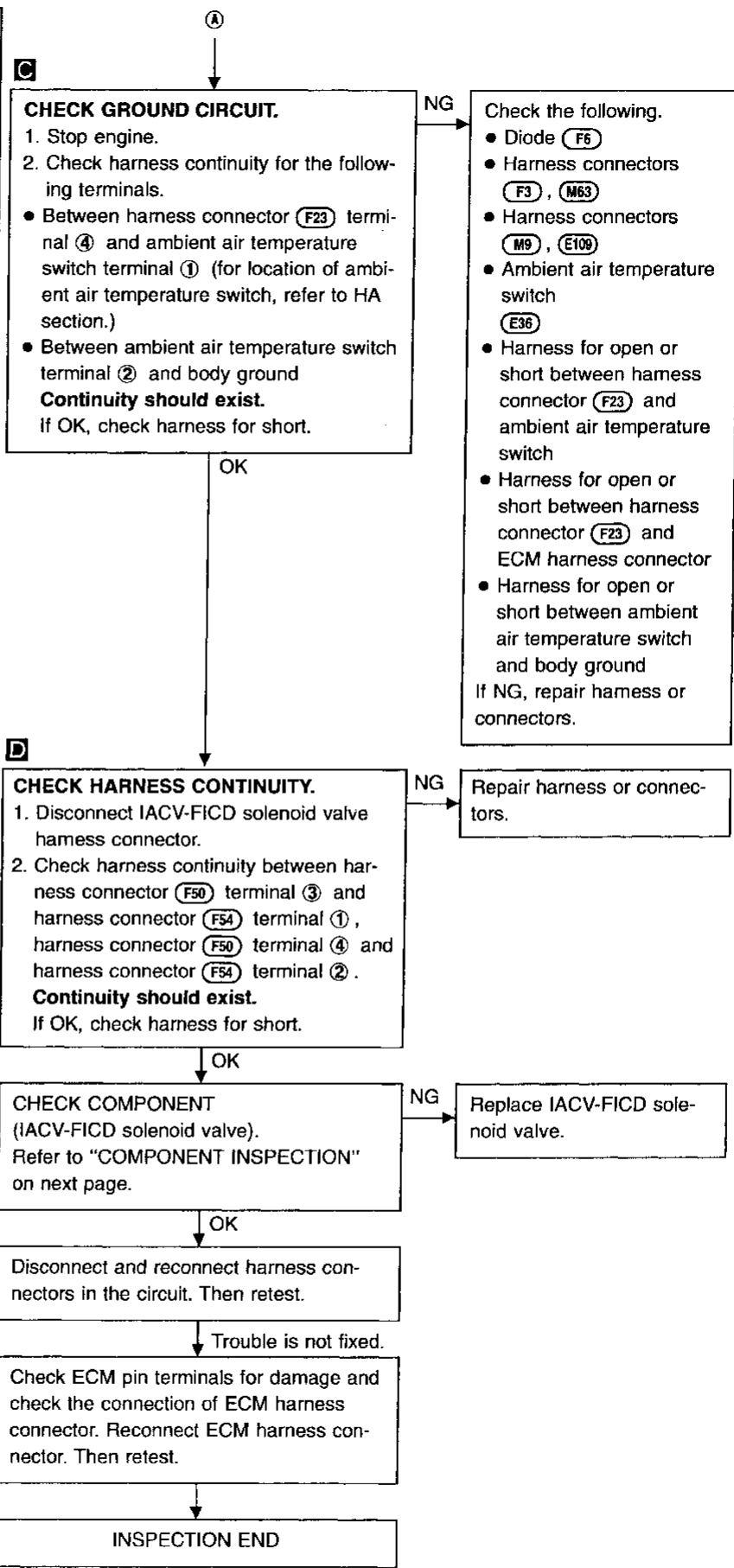
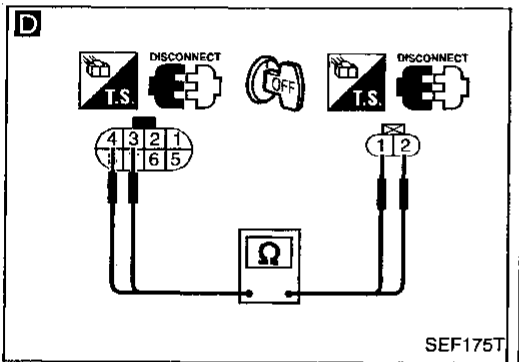
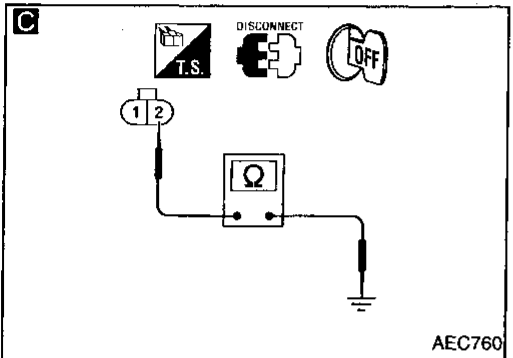
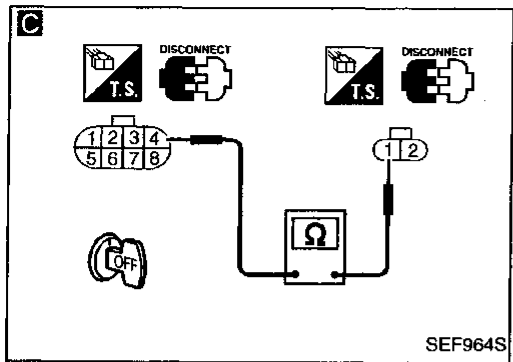


DIAGNOSTIC PROCEDURE



TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

IACV-FICD Solenoid Valve (Cont'd)



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TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

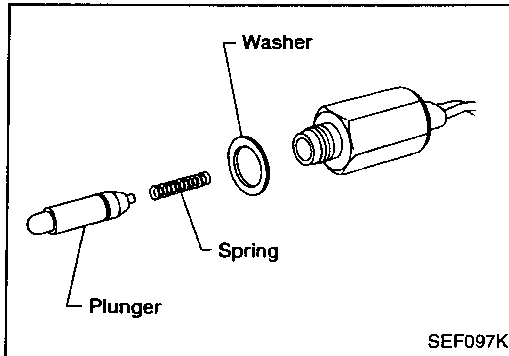
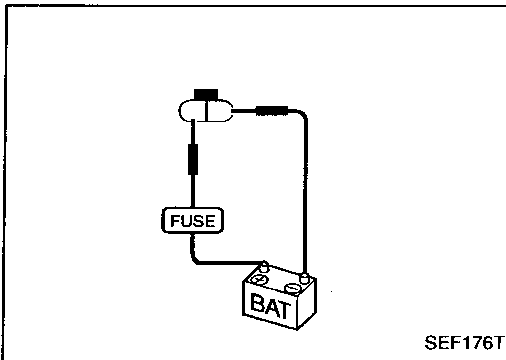
IACV-FICD Solenoid Valve (Cont'd)

COMPONENT INSPECTION

IACV-FICD solenoid valve

Disconnect IACV-FICD solenoid valve harness connector.

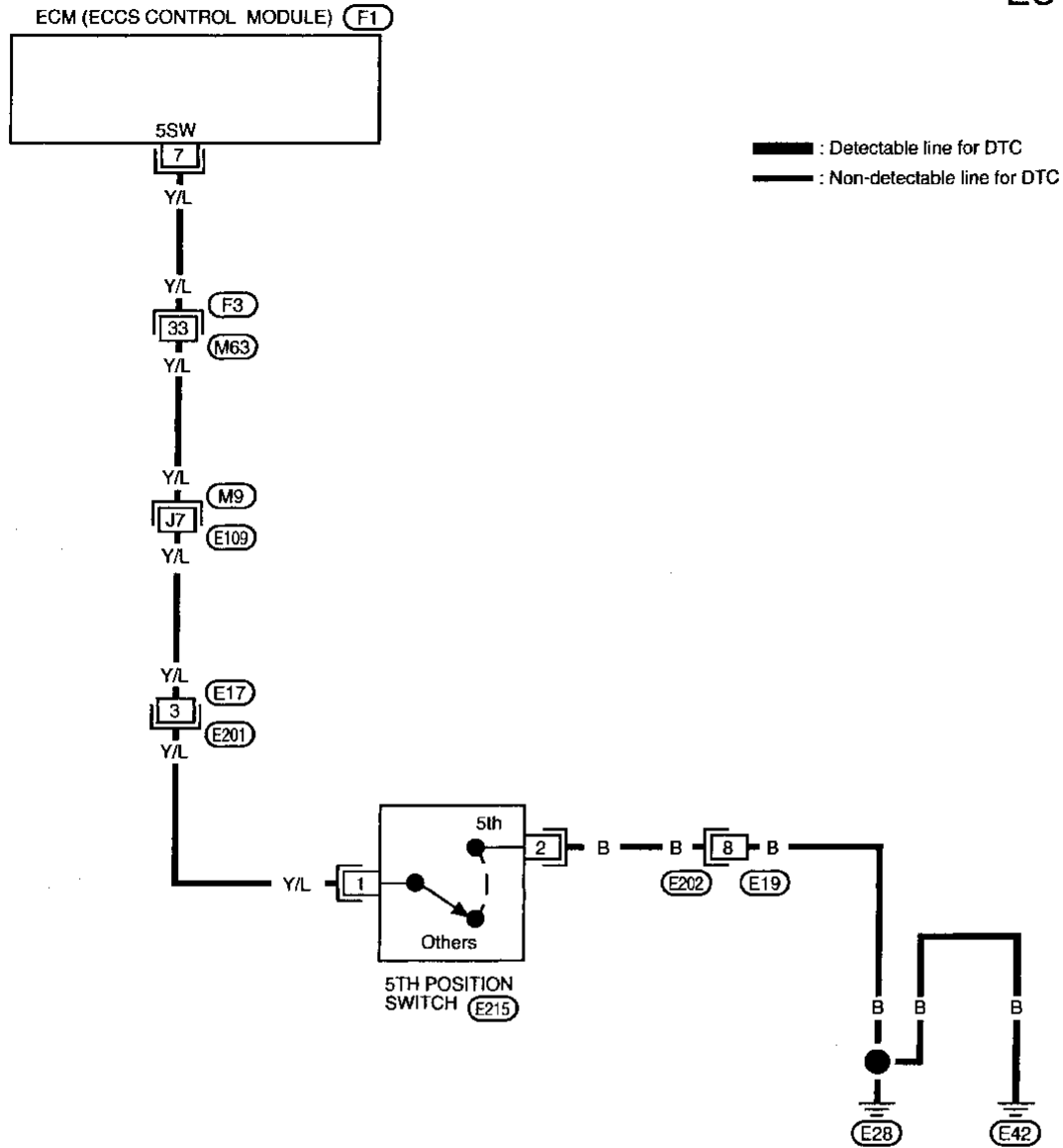
- Check for clicking sound when applying 12V direct current to terminals.



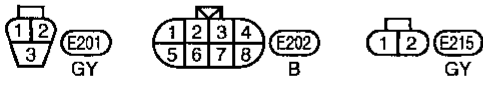
- Check plunger for seizing or sticking.
- Check for broken spring.

5th Position Switch

EC-5TH/P-01

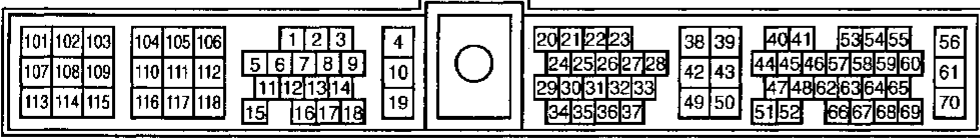


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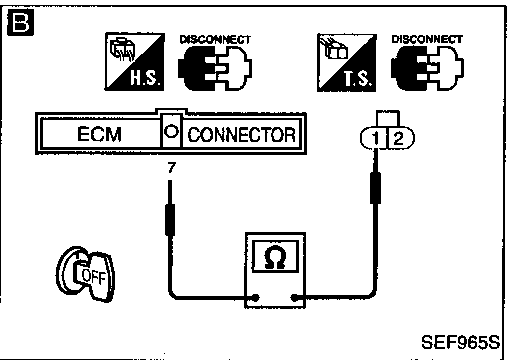
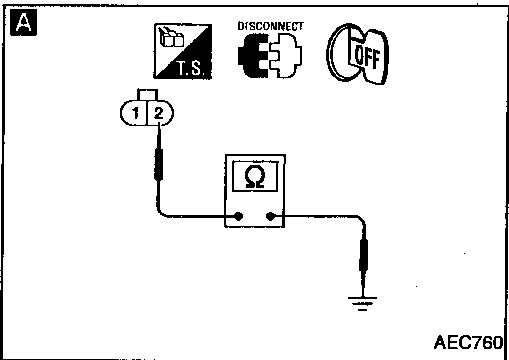
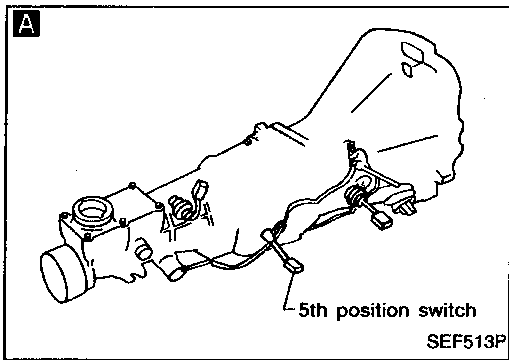
Refer to last page (Foldout page).

M63, F3
E109, M9



TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

5th Position Switch (Cont'd) DIAGNOSTIC PROCEDURE



INSPECTION START

CHECK OVERALL FUNCTION.
 1. Turn ignition switch "ON".
 2. Check voltage between ECM terminal ⑦ and ground under the following conditions.
Voltage:
 Gear position: "5th" position
 Approximately 0V
 Gear position: Except above position
 Above 5V

A
CHECK GROUND CIRCUIT.
 1. Turn ignition switch "OFF".
 2. Disconnect 5th position switch harness connector.
 3. Check harness continuity between terminal ② and engine ground.
Continuity should exist.
 If OK, check harness for short.

NG
 Check the following.
 • Harness connectors
 (E202), (E19)
 • Harness for open or short between 5th position switch and engine ground
 If NG, repair harness or connectors.

B
CHECK INPUT SIGNAL CIRCUIT.
 1. Disconnect ECM harness connector.
 2. Check harness continuity between ECM terminal ⑦ and terminal ①.
Continuity should exist.
 If OK, check harness for short.

NG
 Check the following.
 • Harness connectors
 (F3), (M63)
 • Harness connectors
 (M9), (E109)
 • Harness connectors
 (E17), (E201)
 • Harness for open or short between ECM and 5th position switch
 If NG, repair harness or connectors.

CHECK COMPONENT
 (5th position switch).
 Refer to MT section ("ON-VEHICLE SERVICE").

NG
 Replace 5th position switch.

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

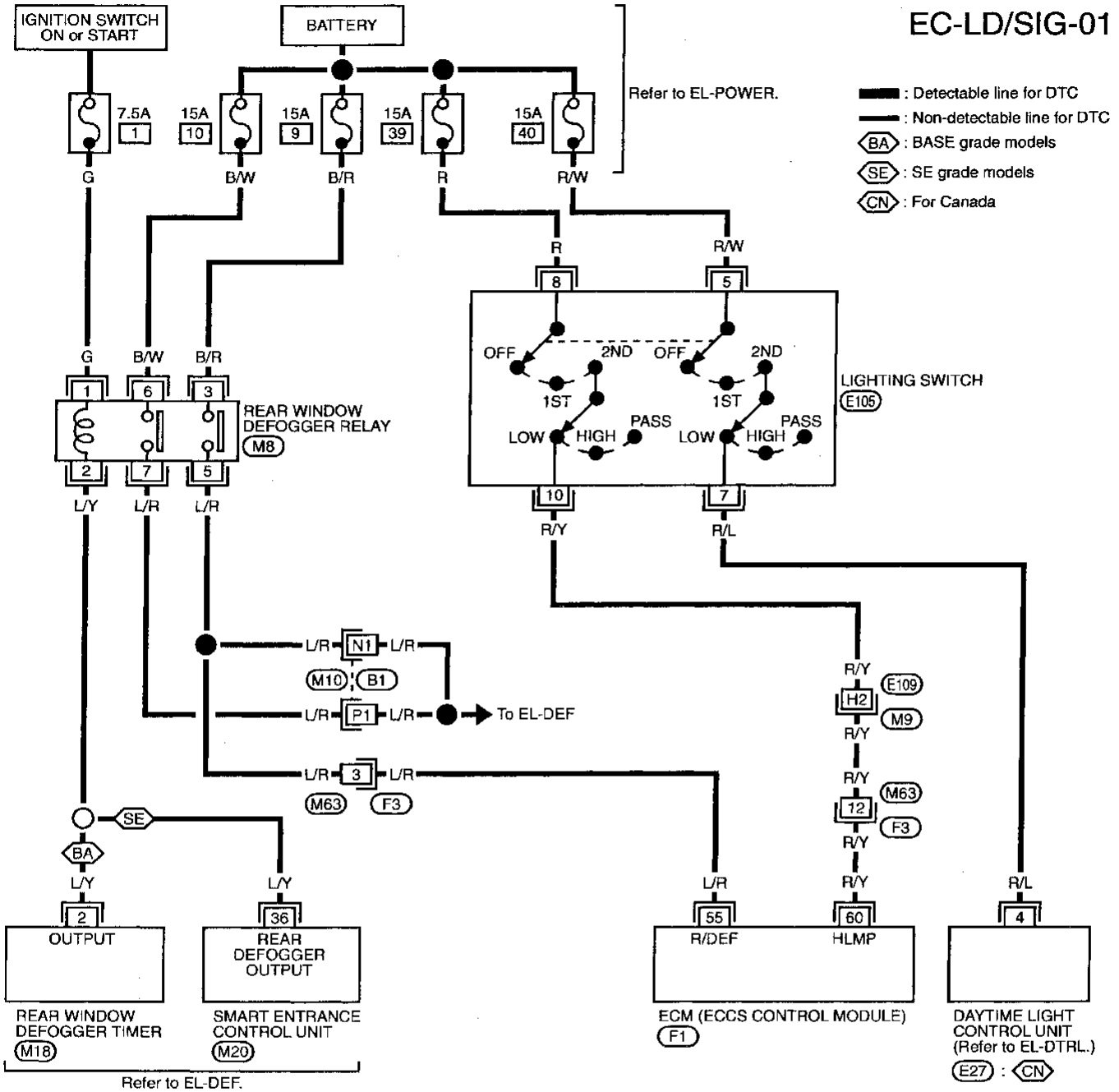
Trouble is not fixed.

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

INSPECTION END

Electrical Load Signal

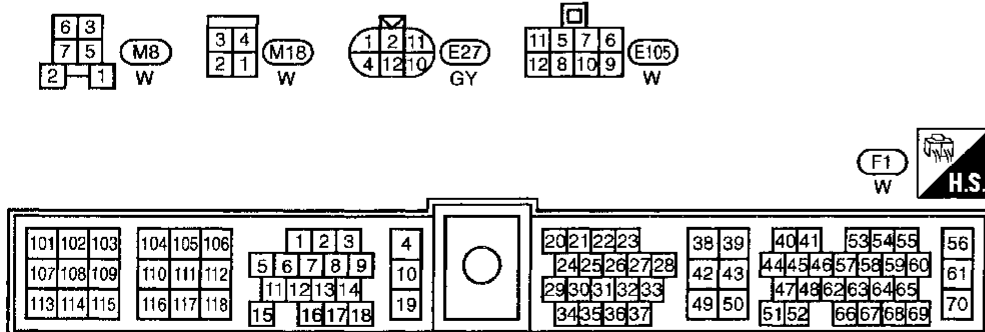
EC-LD/SIG-01



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Refer to last page (Foldout page).

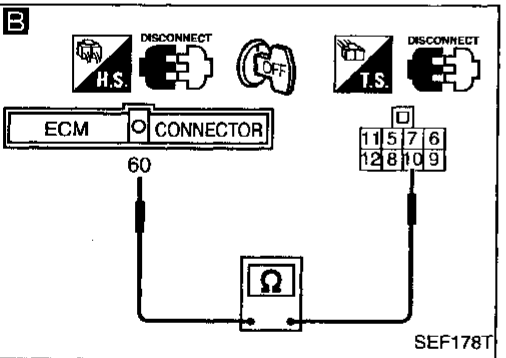
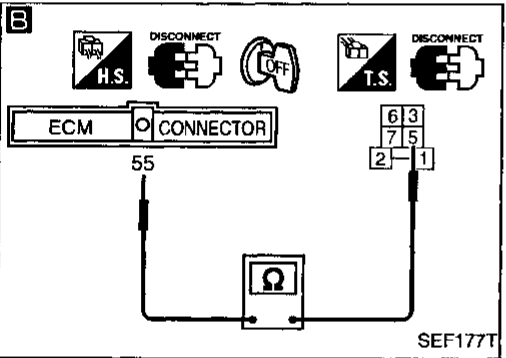
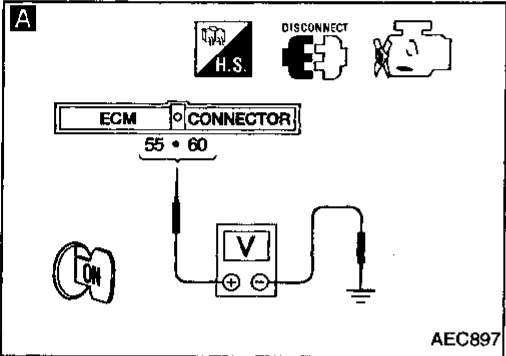
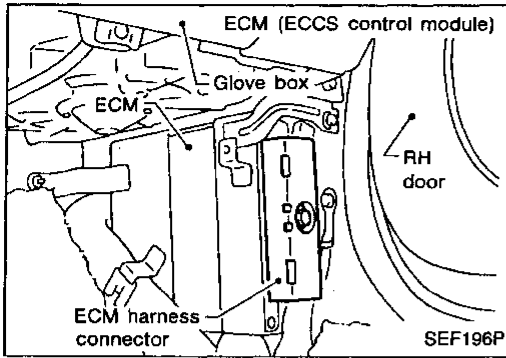
- (M10), (B1)
- (M63), (F3)
- (E109), (M9)
- (M20)



TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

Electrical Load Signal (Cont'd)

DIAGNOSTIC PROCEDURE



INSPECTION START

A
CHECK OVERALL FUNCTION.
 1. Turn ignition switch "OFF".
 2. Disconnect ECM harness connector.
 3. Turn ignition switch "ON".
 4. Check voltage between ECM terminal ⑤⑤, ⑥⑥ and ground with CONSULT or tester.
Voltage between ⑤⑤ and ground:
 Rear window defogger "ON"
 Battery positive voltage
 Rear window defogger "OFF"
 0V
Voltage between ⑥⑥ and ground:
 Lighting switch "ON"
 Battery positive voltage
 Lighting switch "OFF"
 0V

OK → INSPECTION END

Check if rear window defogger functions properly.

NG → Refer to EL section ("REAR WINDOW DEFOGGER").

B
CHECK INPUT SIGNAL CIRCUIT.
 1. Turn rear window defogger switch and lighting switch "OFF".
 2. Turn ignition switch "OFF".
 3. Disconnect rear window defogger relay.
 4. Disconnect lighting switch harness connector.
 5. Disconnect ECM harness connector.
 6. Check harness continuity between ECM terminal ⑤⑤ and rear window defogger relay terminal ⑤, ECM terminal ⑥⑥ and lighting switch terminal ⑩⑩.
Continuity should exist.
 If OK, check harness for short.

NG → Check the following.
 For terminal ⑤⑤
 • Harness connectors (M63, F3, M10, B1)
 • Harness for open or short between ECM and rear window defogger relay
 For terminal ⑥⑥
 • Harness connectors (M63, F3, M9, E109)
 • Harness for open or short between ECM and lighting switch
 If NG, repair harness or connectors.

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

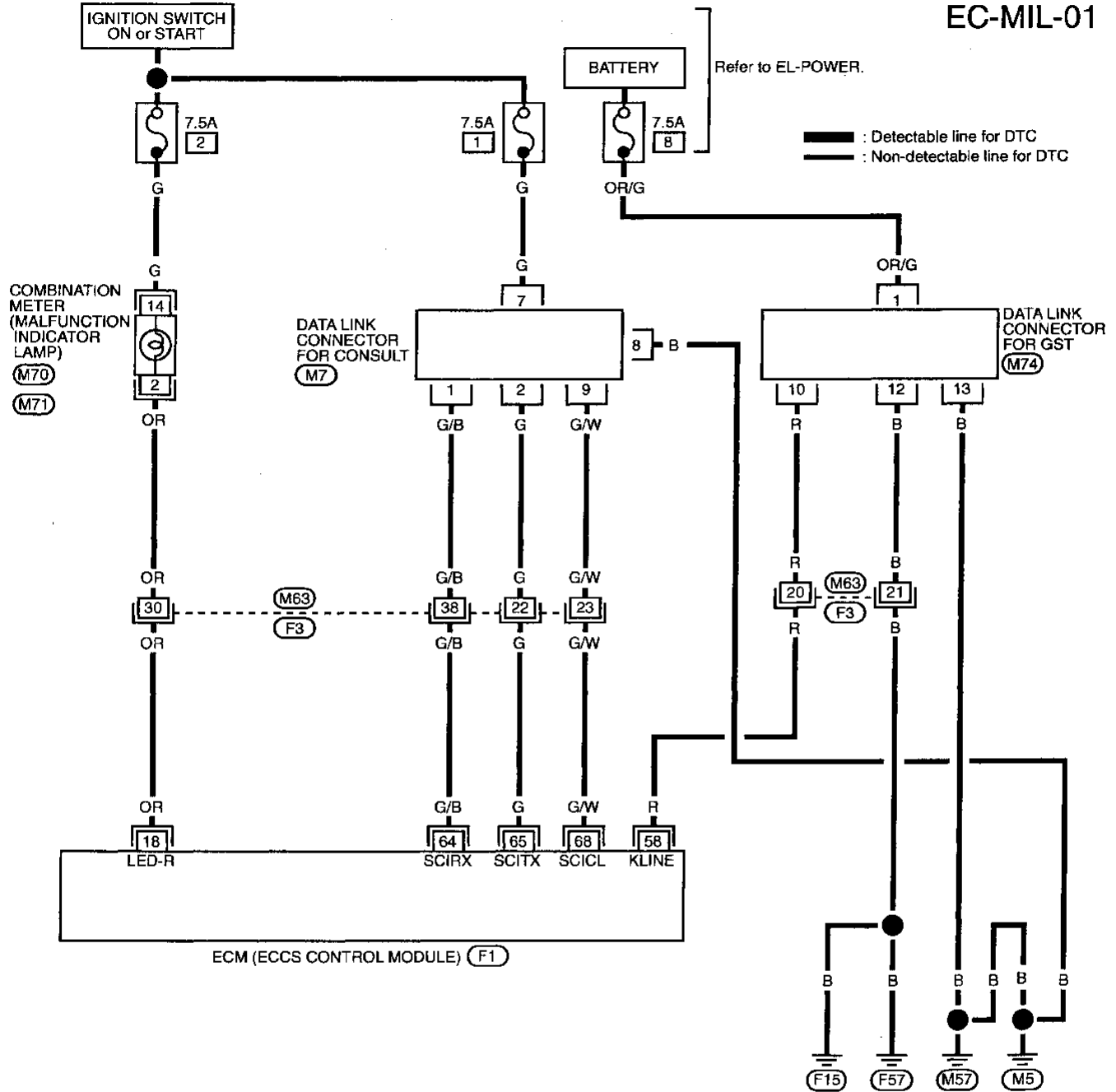
Trouble is not fixed.
 Check ECM pin terminals for damage and check loose connection of ECM harness connector. Reconnect ECM harness connector and retest.

INSPECTION END

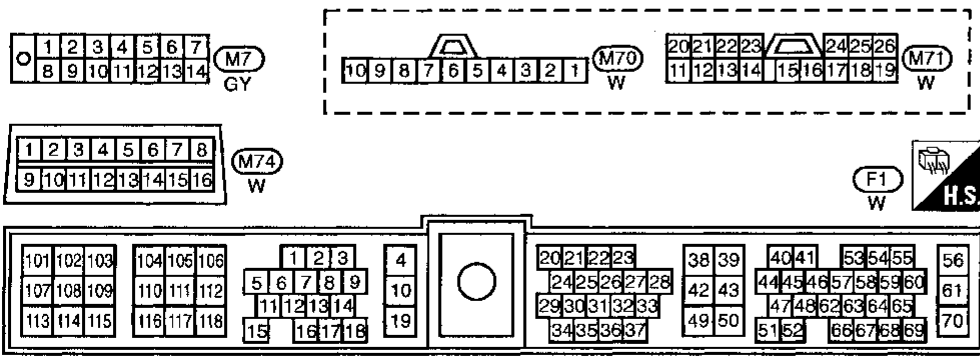
TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

MIL & Data Link Connectors

EC-MIL-01



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SERVICE DATA AND SPECIFICATIONS (SDS)

General Specifications

FUEL PRESSURE REGULATOR	
Fuel pressure at idling kPa (kg/cm ² , psi)	
Vacuum hose is connected	Approximately 235 (2.4, 34)
Vacuum hose is disconnected	Approximately 294 (3.0, 43)

Inspection and Adjustment

Idle speed*1	rpm
No-load*2 (in "N" position)	700±50
Air conditioner: ON (in "N" position)	800 or more
Ignition timing	20°±2° BTDC
Throttle position sensor idle position V	0.3 - 0.7

*1: Feedback controlled and needs no adjustments

*2: Under the following conditions:

- Air conditioner switch: OFF
- Electric load: OFF (Lights, heater, fan & rear defogger)

IGNITION COIL

Primary voltage	V	Battery voltage (11 - 14)
Primary resistance [at 20°C (68°F)]	Ω	Approximately 1.0
Secondary resistance [at 20°C (68°F)]	kΩ	Approximately 26.0

MASS AIR FLOW SENSOR

Supply voltage	V	Battery voltage (11 - 14)
Output voltage	V	1.3 - 1.7
Mass air flow	g·m/sec	1.5 - 4.5 at idle* 6.0 - 14.0 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

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

FUEL PUMP

Resistance [at 25°C (77°F)]	Ω	0.2 - 5.0
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IACV-AAC VALVE

Resistance [at 25°C (77°F)]	Ω	Approximately 10.0
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INJECTOR

Resistance [at 25°C (77°F)]	Ω	10 - 14
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RESISTOR

Resistance [at 25°C (77°F)]	kΩ	Approximately 2.2
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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

SERVICE DATA AND SPECIFICATIONS (SDS)

Inspection and Adjustment (Cont'd)

CALCULATED LOAD VALUE

	Calculated load value %
At idle	10.0 - 24.0
At 2,500 rpm	11.0 - 25.0

INTAKE AIR TEMPERATURE SENSOR

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

FRONT HEATED OXYGEN SENSOR HEATER

Resistance [at 25°C (77°F)]	Ω	2.3 - 4.3
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REAR HEATED OXYGEN SENSOR HEATER

Resistance [at 25°C (77°F)]	Ω	2.3 - 4.3
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CRANKSHAFT POSITION SENSOR (OBD)

Resistance [at 20°C (68°F)]	Ω	166.5 - 203.5
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