ENGINE CONTROL SYSTEM

SECTION EC

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Alphabetical & P No. Index for DTC

NCEC0001

ALPHABETICAL INDEX FOR DTC

NCEC0001S01

Items (CONSULT screen terms)	DTC*6		Reference page
	CONSULT GST*2	ECM*1	
Unable to access ECM	—	—	EC-91
*COOLAN T SEN/CIRC	P0125	0908	EC-156
A/T 1ST GR FNCTN	P0731	1103	AT-112
A/T 2ND GR FNCTN	P0732	1104	AT-118
A/T 3RD GR FNCTN	P0733	1105	AT-124
A/T 4TH GR FNCTN	P0734	1106	AT-130
A/T COMM LINE	P0600	—	EC-325
A/T DIAG COMM LINE	P1605	0804	EC-428
A/T TCC S/V FNCTN	P0744	1107	AT-144
ABSL PRES SEN/CIRC	P0105	0803	EC-125
AIR TEMP SEN/CIRC	P0110	0401	EC-134
ATF TEMP SEN/CIRC	P0710	1208	AT-97
CAM POS SEN/CIRC	P0340	0101	EC-260
CLOSED LOOP	P1148	0307	EC-341
CLOSED TP SW/CIRC	P0510	0203	EC-320
COOLANT T SEN/CIRC	P0115	0103	EC-140
CPS/CIRC (OBD) COG	P1336	0905	EC-350
CPS/CIRCUIT (OBD)	P0335	0802	EC-255
CYL 1 MISFIRE	P0301	0608	EC-245
CYL 2 MISFIRE	P0302	0607	EC-245
CYL 3 MISFIRE	P0303	0606	EC-245
CYL 4 MISFIRE	P0304	0605	EC-245
ECM	P0605	0301	EC-329
EGR SYSTEM	P0400	0302	EC-267
EGR SYSTEM	P1402	0514	EC-366
EGR TEMP SEN/CIRC	P1401	0305	EC-360
EGRC SOLENOID/V	P1400	1005	EC-355
EGRC-BPT VALVE	P0402	0306	EC-275
ENGINE SPEED SIG	P0725	1207	AT-108
EVAP PURG FLOW/MON	P1447	0111	EC-390
EVAP SMALL LEAK	P0440	0705	EC-283
EVAP SMALL LEAK	P1440	0213	EC-372
EVAPO SYS PRES SEN	P0450	0704	EC-302
FR O2 SEN HEATER	P0135	0901	EC-190

Items (CONSULT screen terms)	DTC*6		Reference page
	CONSULT GST*2	ECM*1	
FRONT O2 SENSOR	P0130	0303	EC-161
FRONT O2 SENSOR	P0131	0411	EC-167
FRONT O2 SENSOR	P0132	0410	EC-172
FRONT O2 SENSOR	P0133	0409	EC-177
FRONT O2 SENSOR	P0134	0412	EC-184
FUEL SYS DIAG-LEAN	P0171	0115	EC-229
FUEL SYS DIAG-RICH	P0172	0114	EC-235
FUEL TEMP SEN/CIRC	P0180	0402	EC-241
IACV/AAC VLV/CIRC	P0505	0205	EC-315
IGN SIGNAL-PRIMARY	P1320	0201	EC-343
KNOCK SEN/CIRCUIT	P0325	0304	EC-250
L/PRESS SOL/CIRC	P0745	1205	AT-152
MAF SEN/CIRCUIT*3	P0100	0102	EC-116
MAP/BARO SW SOL/CIR	P1105	1302	EC-331
MULTI CYL MISFIRE	P0300	0701	EC-245
NO SELF DIAGNOSTIC FAILURE INDICATED	**P0000**	**0505**	—
NO SELF DIAGNOSTIC FAILURE INDICATED	No DTC	Flashing*5	EC-56
O/R CLTCH SOL/CIRC	P1760	1203	AT-176
OVER HEAT	—	0208	EC-436
P-N POS SW/CIRCUIT	P1706	1003	EC-431
PNP SW/CIRC	P0705	1101	AT-92
PURG CONT/V & S/V	P1493	0312	EC-420
PURG CONT/V S/V	P1492	0807	EC-414
PURG VOLUME CONT/V	P0443	1008	EC-291
PURG VOLUME CONT/V	P1444	0214	EC-380
REAR O2 SENSOR	P0137	0511	EC-195
REAR O2 SENSOR	P0138	0510	EC-203
REAR O2 SENSOR	P0139	0707	EC-210
REAR O2 SENSOR	P0140	0512	EC-218
RR O2 SEN HEATER	P0141	0902	EC-224
SFT SOL A/CIRC*3	P0750	1108	AT-158
SFT SOL B/CIRC*3	P0755	1201	AT-163
TCC SOLENOID/CIRC	P0740	1204	AT-139
THRTL POS SEN/CIRC*3	P0120	0403	EC-145
TP SEN/CIRC A/T*3	P1705	1206	AT-168
TW CATALYST SYSTEM	P0420	0702	EC-279

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

Items (CONSULT screen terms)	DTC*6		Reference page
	CONSULT GST*2	ECM*1	
VC CUT/V BYPASS/V	P1491	0311	EC-407
VC/V BYPASS/V	P1490	0801	EC-402
VEH SPD SEN/CIR AT*4	P0720	1102	AT-103
VEH SPEED SEN/CIRC*4	P0500	0104	EC-310
VENT CONTROL VALVE	P0446	0903	EC-296
VENT CONTROL VALVE	P1446	0215	EC-386
VENT CONTROL VALVE	P1448	0309	EC-397

*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 when the "Revolution sensor signal" and the "Vehicle speed sensor signal" meet the fail-safe condition at the same time.

*5: While engine is running.

*6: 1st trip DTC No. is the same as DTC No.

P NO. INDEX FOR DTC

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DTC*6		Items (CONSULT screen terms)	Reference page
CONSULT GST*2	ECM*1		
—	—	Unable to access ECM	EC-91
No DTC	Flashing*5	NO SELF DIAGNOSTIC FAILURE INDICATED	EC-56
P0000	**0505**	**NO SELF DIAGNOSTIC FAILURE INDICATED**	—
P0100	0102	MAF SEN/CIRCUIT*3	EC-116
P0105	0803	ABSL PRES SEN/CIRC	EC-125
P0110	0401	AIR TEMP SEN/CIRC	EC-134
P0115	0103	COOLANT T SEN/CIRC	EC-140
P0120	0403	THRTL POS SEN/CIRC*3	EC-145
P0125	0908	*COOLAN T SEN/CIRC	EC-156
P0130	0303	FRONT O2 SENSOR	EC-161
P0131	0411	FRONT O2 SENSOR	EC-167
P0132	0410	FRONT O2 SENSOR	EC-172
P0133	0409	FRONT O2 SENSOR	EC-177
P0134	0412	FRONT O2 SENSOR	EC-184
P0135	0901	FR O2 SEN HEATER	EC-190
P0137	0511	REAR O2 SENSOR	EC-195
P0138	0510	REAR O2 SENSOR	EC-203
P0139	0707	REAR O2 SENSOR	EC-210
P0140	0512	REAR O2 SENSOR	EC-218
P0141	0902	RR O2 SEN HEATER	EC-224
P0171	0115	FUEL SYS DIAG-LEAN	EC-229

DTC*6		Items (CONSULT screen terms)	Reference page
CONSULT GST*2	ECM*1		
P0172	0114	FUEL SYS DIAG-RICH	EC-235
P0180	0402	FUEL TEMP SEN/CIRC	EC-241
P0300	0701	MULTI CYL MISFIRE	EC-245
P0301	0608	CYL 1 MISFIRE	EC-245
P0302	0607	CYL 2 MISFIRE	EC-245
P0303	0606	CYL 3 MISFIRE	EC-245
P0304	0605	CYL 4 MISFIRE	EC-245
P0325	0304	KNOCK SEN/CIRCUIT	EC-250
P0335	0802	CPS/CIRCUIT (OBD)	EC-255
P0340	0101	CAM POS SEN/CIRC	EC-260
P0400	0302	EGR SYSTEM	EC-267
P0402	0306	EGRC-BPT VALVE	EC-275
P0420	0702	TW CATALYST SYSTEM	EC-279
P0440	0705	EVAP SMALL LEAK	EC-283
P0443	1008	PURG VOLUME CONT/V	EC-291
P0446	0903	VENT CONTROL VALVE	EC-296
P0450	0704	EVAPO SYS PRES SEN	EC-302
P0500	0104	VEH SPEED SEN/CIRC*4	EC-310
P0505	0205	IACV/AAC VLV/CIRC	EC-315
P0510	0203	CLOSED TP SW/CIRC	EC-320
P0600	—	A/T COMM LINE	EC-325
P0605	0301	ECM	EC-329
P0705	1101	PNP SW/CIRC	AT-92
P0710	1208	ATF TEMP SEN/CIRC	AT-97
P0720	1102	VEH SPD SEN/CIR AT*4	AT-103
P0725	1207	ENGINE SPEED SIG	AT-108
P0731	1103	A/T 1ST GR FNCTN	AT-112
P0732	1104	A/T 2ND GR FNCTN	AT-118
P0733	1105	A/T 3RD GR FNCTN	AT-124
P0734	1106	A/T 4TH GR FNCTN	AT-130
P0740	1204	TCC SOLENOID/CIRC	AT-139
P0744	1107	A/T TCC S/V FNCTN	AT-144
P0745	1205	L/PRESS SOL/CIRC	AT-152
P0750	1108	SFT SOL A/CIRC*3	AT-158
P0755	1201	SFT SOL B/CIRC*3	AT-163
P1105	1302	MAP/BARO SW SOL/CIR	EC-331

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

DTC*6		Items (CONSULT screen terms)	Reference page
CONSULT GST*2	ECM*1		
P1148	0307	CLOSED LOOP	EC-341
P1320	0201	IGN SIGNAL-PRIMARY	EC-343
P1336	0905	CPS/CIRC (OBD) COG	EC-350
P1400	1005	EGRC SOLENOID/V	EC-355
P1401	0305	EGR TEMP SEN/CIRC	EC-360
P1402	0514	EGR SYSTEM	EC-366
P1440	0213	EVAP SMALL LEAK	EC-372
P1444	0214	PURG VOLUME CONT/V	EC-380
P1446	0215	VENT CONTROL VALVE	EC-386
P1447	0111	EVAP PURG FLOW/MON	EC-390
P1448	0309	VENT CONTROL VALVE	EC-397
P1490	0801	VC/V BYPASS/V	EC-402
P1491	0311	VC CUT/V BYPASS/V	EC-407
P1492	0807	PURG CONT/V S/V	EC-414
P1493	0312	PURG CONT/V & S/V	EC-420
P1605	0804	A/T DIAG COMM LINE	EC-428
P1705	1206	TP SEN/CIRC A/T*3	AT-168
P1706	1003	P-N POS SW/CIRCUIT	EC-431
P1760	1203	O/R CLTCH SOL/CIRC	AT-176
—	0208	OVERHEAT	EC-436

*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 when the "Revolution sensor signal" and the "Vehicle speed sensor signal" meet the fail-safe condition at the same time.

*5: While engine is running.

*6: 1st trip DTC No. is the same as DTC No.

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

NCEC0002

The Supplemental Restraint System "AIR BAG" and "SEAT BELT PRE-TENSIONER", used along with a seat belt, help 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), seat belt pre-tensioners, a diagnosis sensor unit, warning lamp, wiring harness and spiral cable.

In addition to the supplemental air bag modules for a frontal collision, the supplemental side air bag used along with the seat belt helps to reduce the risk or severity of injury to the driver and front passenger in a side collision. The supplemental side air bag consists of air bag modules (located in the outer side of front seats), satellite sensor, diagnosis sensor unit (one of components of supplemental air bags for a frontal collision), wiring harness, warning lamp (one of components of supplemental air bags for a frontal collision). Information necessary to service the system safely is included in the **RS section** of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized INFINITI 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 (except "SEAT BELT PRE-TENSIONER" connector) can be identified with yellow harness connector (and with yellow harness protector or yellow insulation tape before the harness connectors).**

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

NCEC0003

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

CAUTION:

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

Engine Fuel & Emission Control System

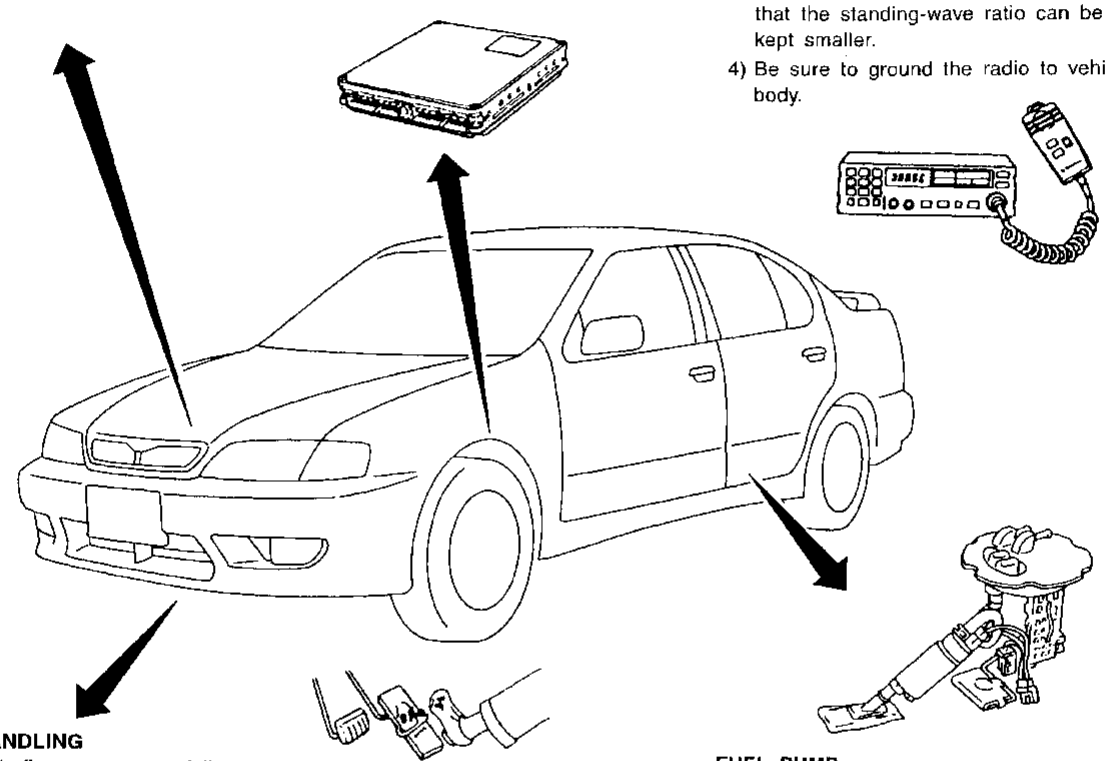
NCEC0004

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

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

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

1) Keep the antenna as far as possible from the electronic control units.
2) Keep the antenna feeder line more than 20 cm (8 in) away from the harness of electronic controls.
   Do not let them run parallel for a long distance.
3) Adjust the antenna and feeder line so that the standing-wave ratio can be kept smaller.
4) Be sure to ground the radio to vehicle body.



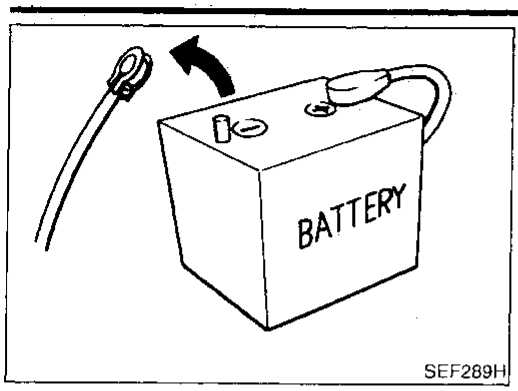
ECCS PARTS HANDLING
- Handle mass air flow sensor carefully to avoid damage.
- Do not disassemble mass air flow sensor.
- Do not clean mass air flow sensor with any type of detergent.
- Do not disassemble IAC valve-AAC valve.
- Even a slight leak in the air intake system can cause serious problems.
-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

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

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

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 (4 in) away from adjacent harness, to prevent an ECM system malfunctions due to receiving external noise, degraded operation of ICs, etc.
- Keep ECM parts and harness dry.
- Before removing parts, turn off ignition switch and then disconnect battery ground cable.

SEF331W

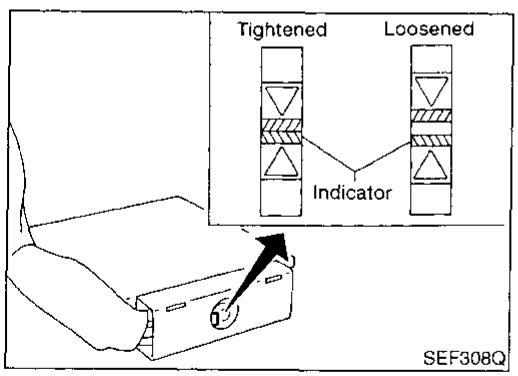


SEF289H

Precautions

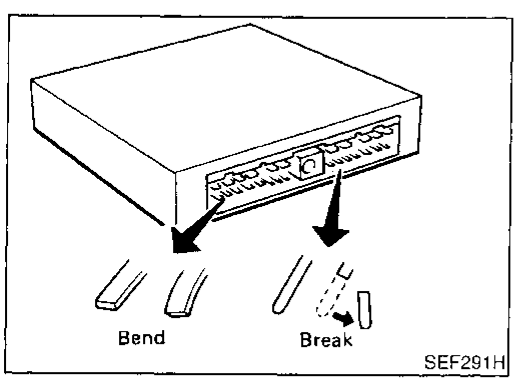
NCEC0005

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



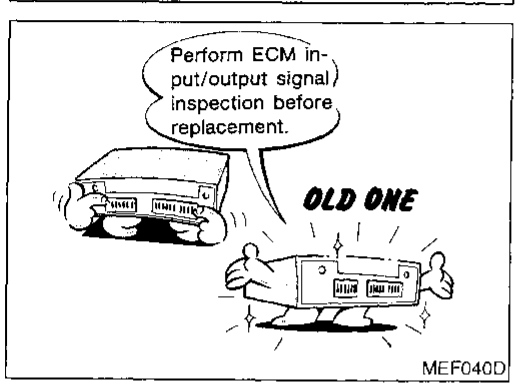
SEF308Q

- When connecting ECM harness connector, tighten securing bolt until the gap between orange indicators disappears.
  : 3 - 5 N·m (0.3 - 0.5 kg-m, 26 - 43 in-lb)



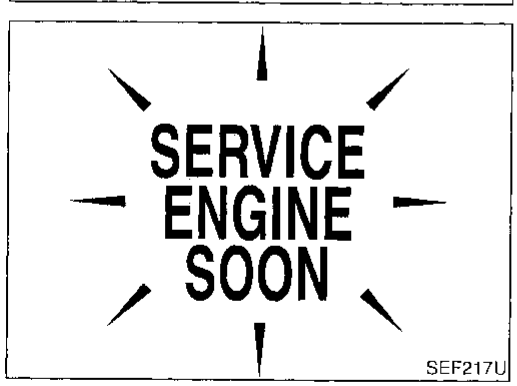
SEF291H

- When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).
  Make sure that there are not any bends or breaks on ECM pin terminals when connecting pin connectors.



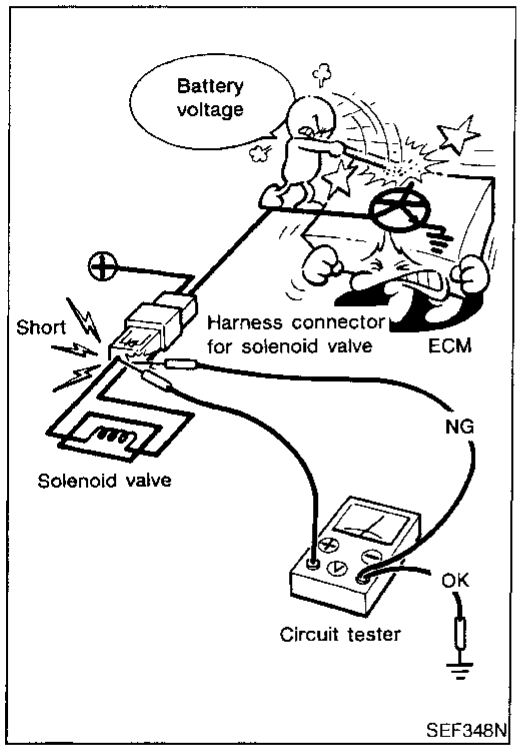
MEF040D

- Before replacing ECM, perform Terminals and Reference Value inspection and make sure ECM functions properly. Refer to EC-101.



SEF217U

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



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

Wiring Diagrams and Trouble Diagnosis

NCEC0006

When you read Wiring diagrams, refer to the followings:

- "HOW TO READ WIRING DIAGRAMS" in GI section
- "POWER SUPPLY ROUTING" for power distribution circuit in EL section

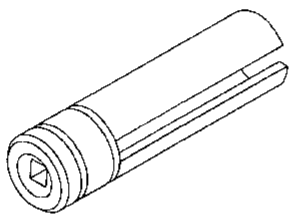
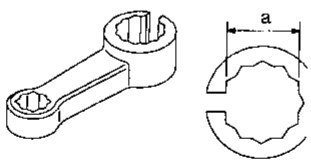
When you perform trouble diagnosis, refer to the followings:

- "HOW TO FOLLOW TEST GROUP IN TROUBLE DIAGNOSIS" in GI section
- "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT" in GI section

Special Service Tools

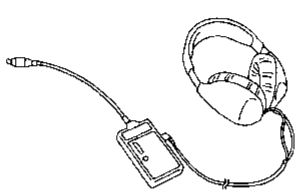
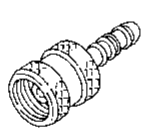
NCEC0007

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

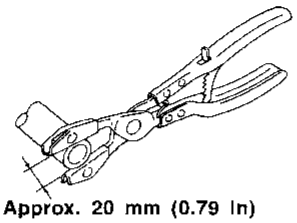
Tool number (Kent-Moore No.) Tool name	Description	
KV10117100 (J36471-A) Heated oxygen sensor wrench	 NT379	Loosening or tightening front heated oxygen sensor with 22 mm (0.87 in) hexagon nut
KV10114400 (J-38365) Heated oxygen sensor wrench	 NT636	Loosening or tightening rear heated oxygen sensor **a: 22 mm (0.87 in)**

Commercial Service Tools

NCEC0008

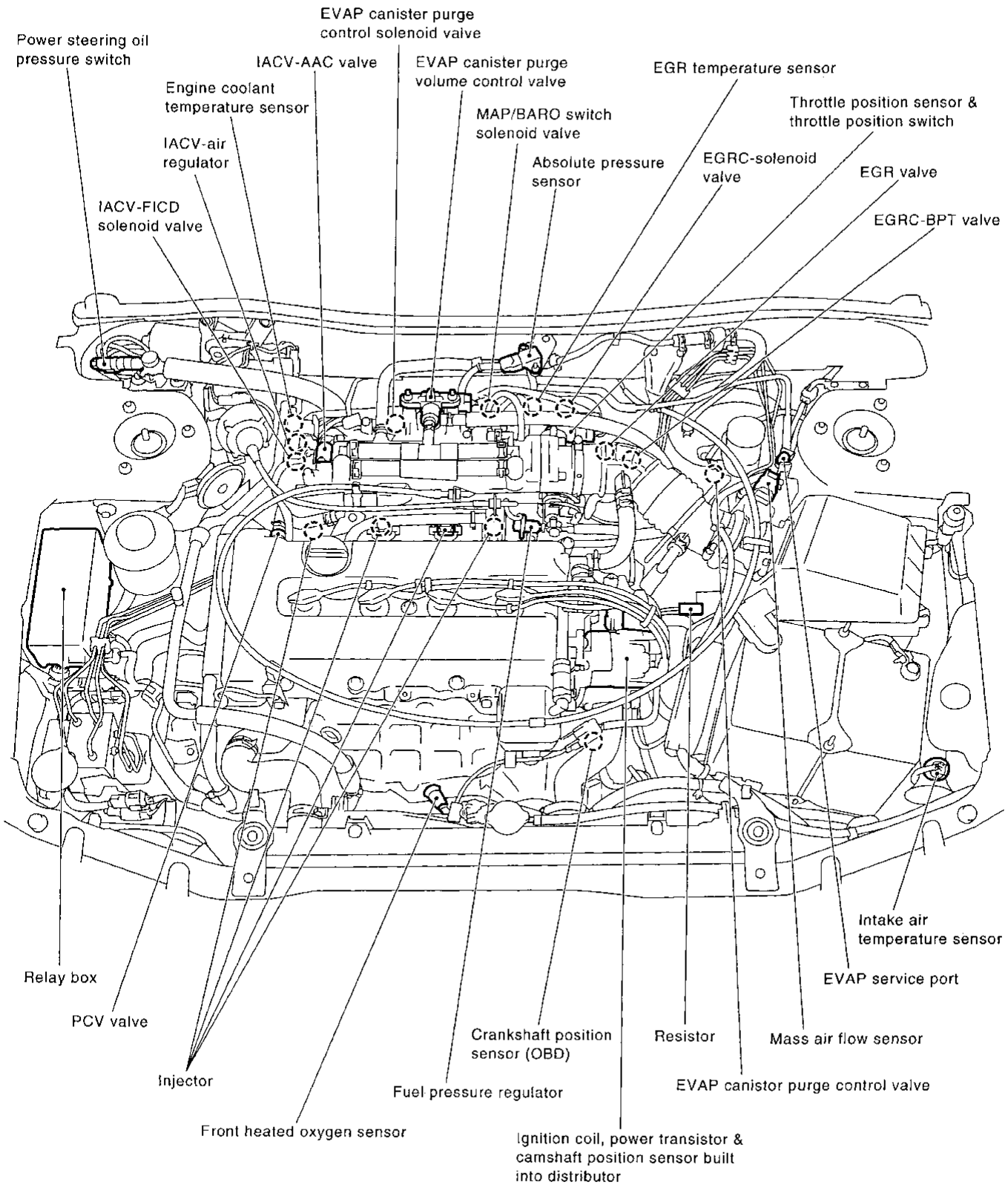
Tool name	Description	
Fuel filler cap adapter	 NT653	Checking fuel tank vacuum relief valve opening pressure
Leak detector (J41416)	 NT703	Locating the EVAP leak
EVAP service port adapter (J41413-OBD)	 NT704	Applying positive pressure through EVAP service port

Commercial Service Tools (Cont'd)

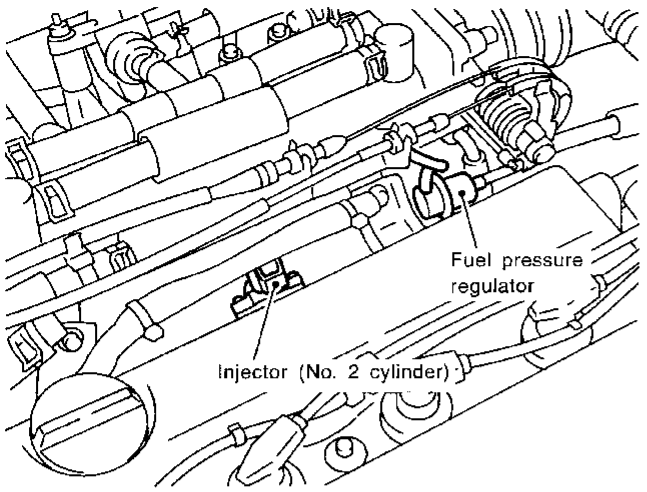
Tool name	Description	
Hose clipper (—)	 **Approx. 20 mm (0.79 in)** NT720	Clamping the EVAP purge hose between the fuel tank and EVAP canister applied to DTC P1440 [EVAP control system (Small leak — Positive pressure)]

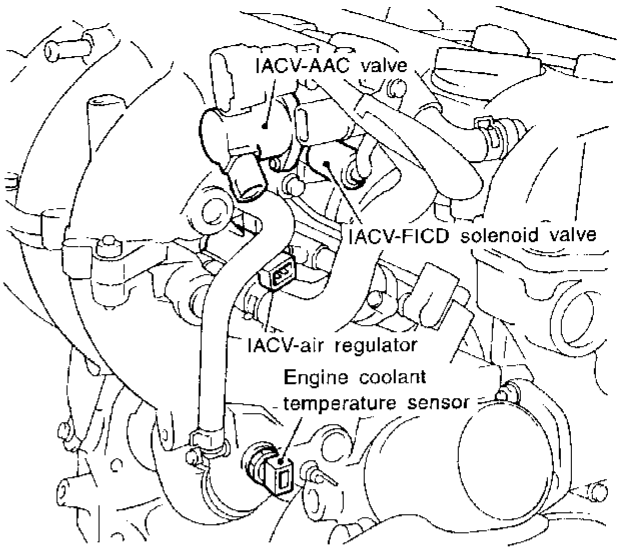
Engine Control Component Parts Location

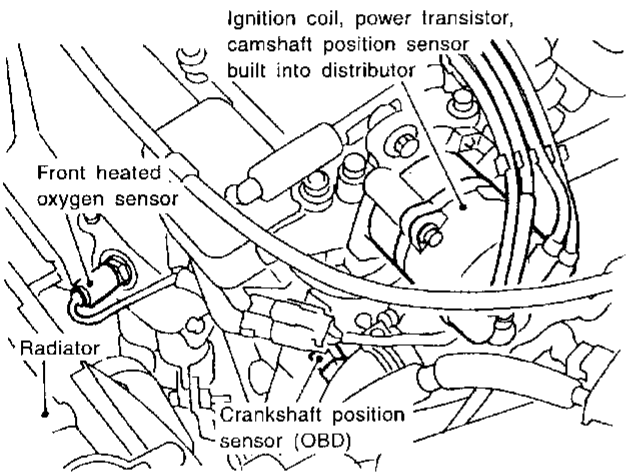
NCEC0009

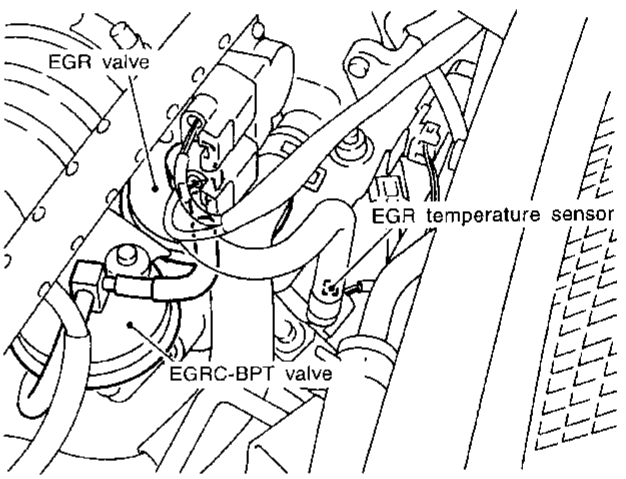


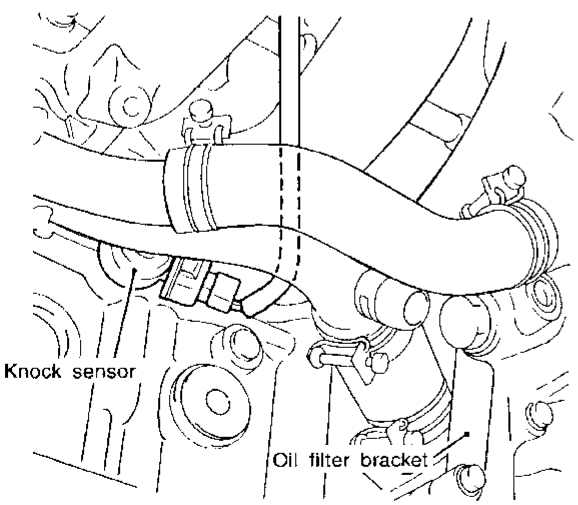
SEF332W


Fuel pressure regulator
Injector (No. 2 cylinder)

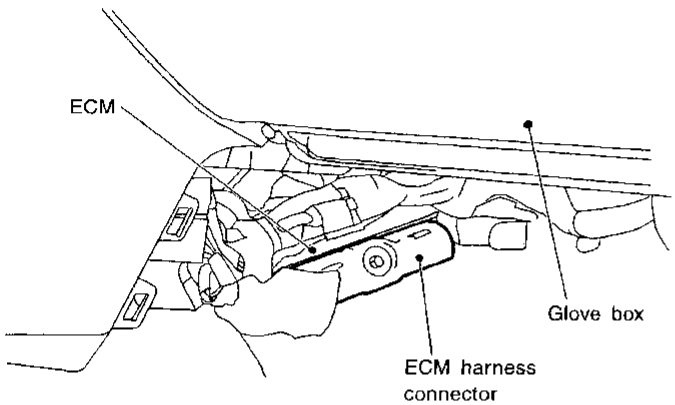

IACV-AAC valve
IACV-FICD solenoid valve
IACV-air regulator
Engine coolant temperature sensor

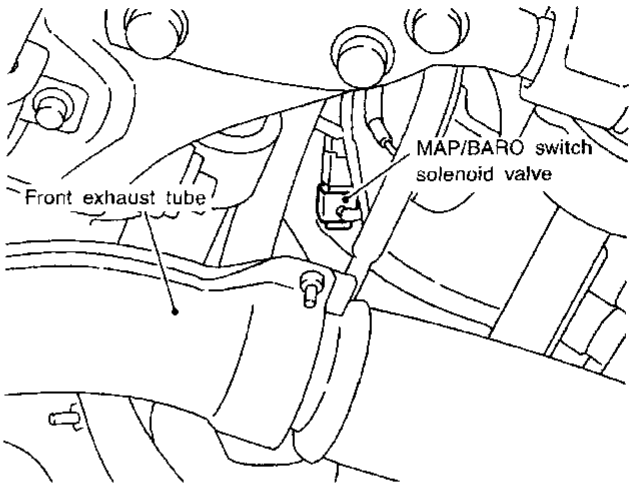

Ignition coil, power transistor, camshaft position sensor built into distributor
Front heated oxygen sensor
Radiator
Crankshaft position sensor (OBD)

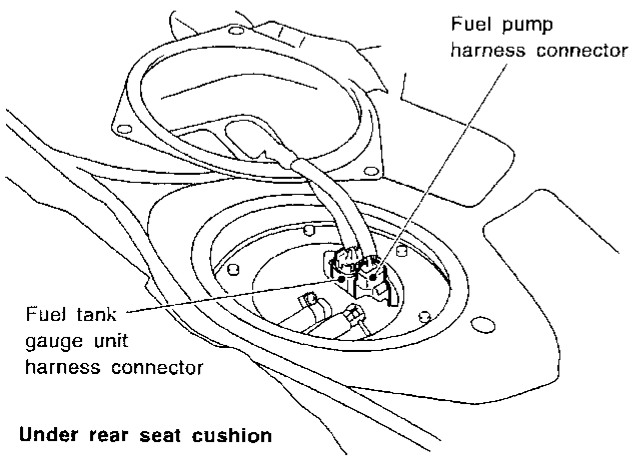

EGR valve
EGR temperature sensor
EGRC-BPT valve


Knock sensor
Oil filter bracket

SEF333W

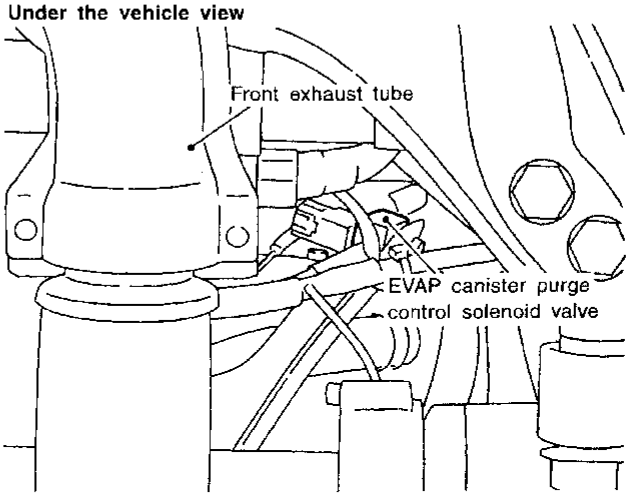


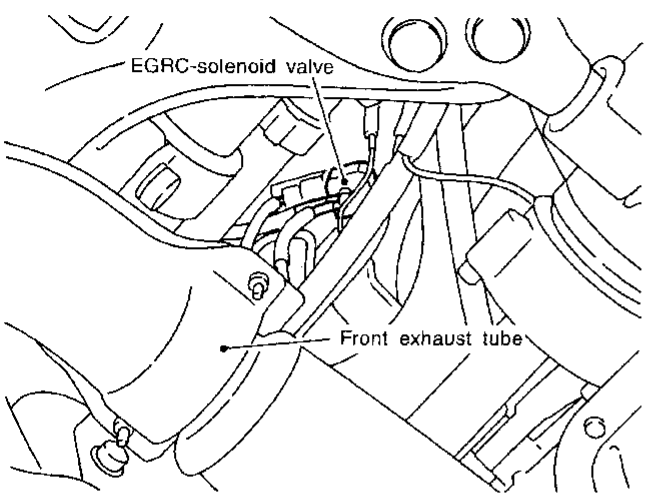




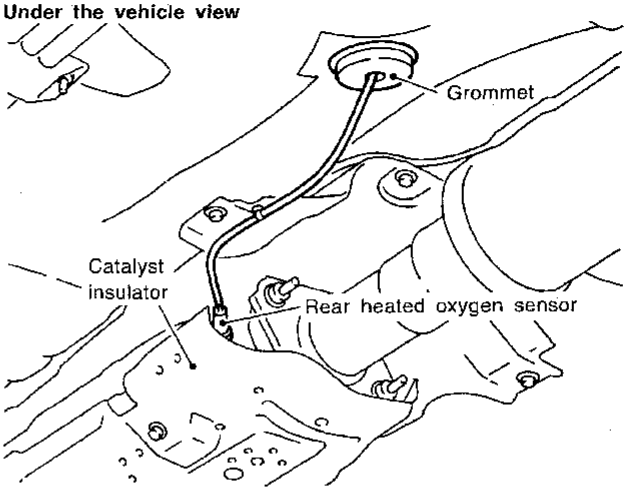
Under rear seat cushion

Under the vehicle view



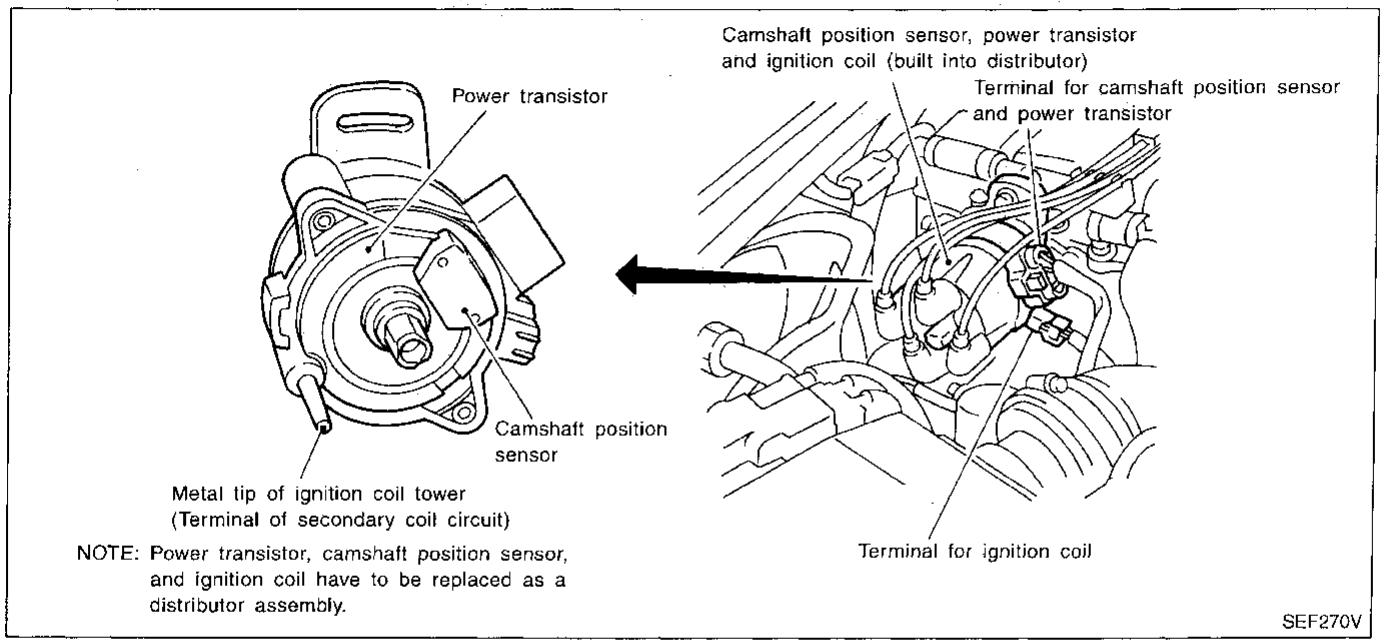


Under the vehicle view



SEF334W

Engine Control Component Parts Location (Cont'd)

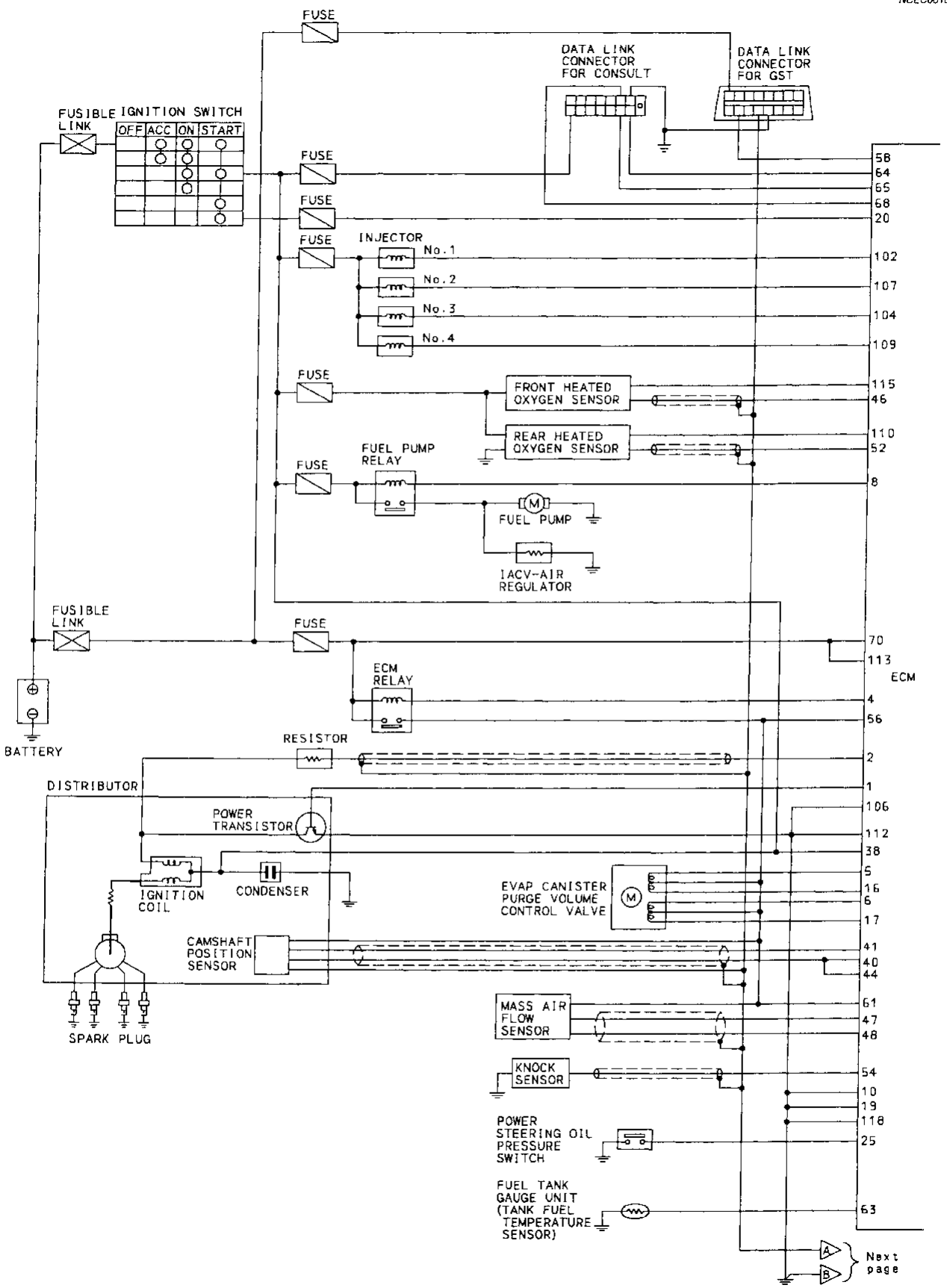


NOTE: Power transistor, camshaft position sensor, and ignition coil have to be replaced as a distributor assembly.

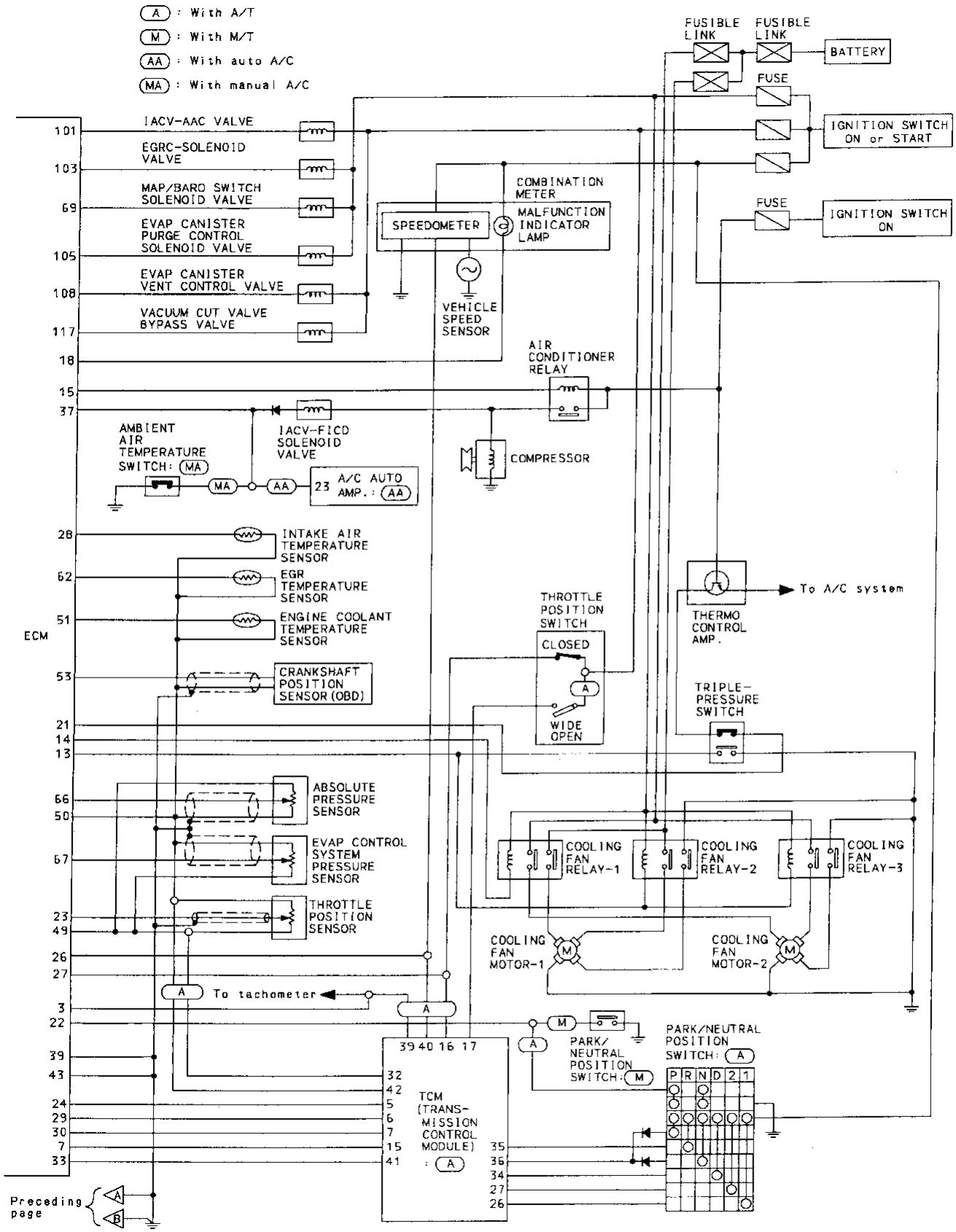
NOTE:

Circuit Diagram

NCEC0010



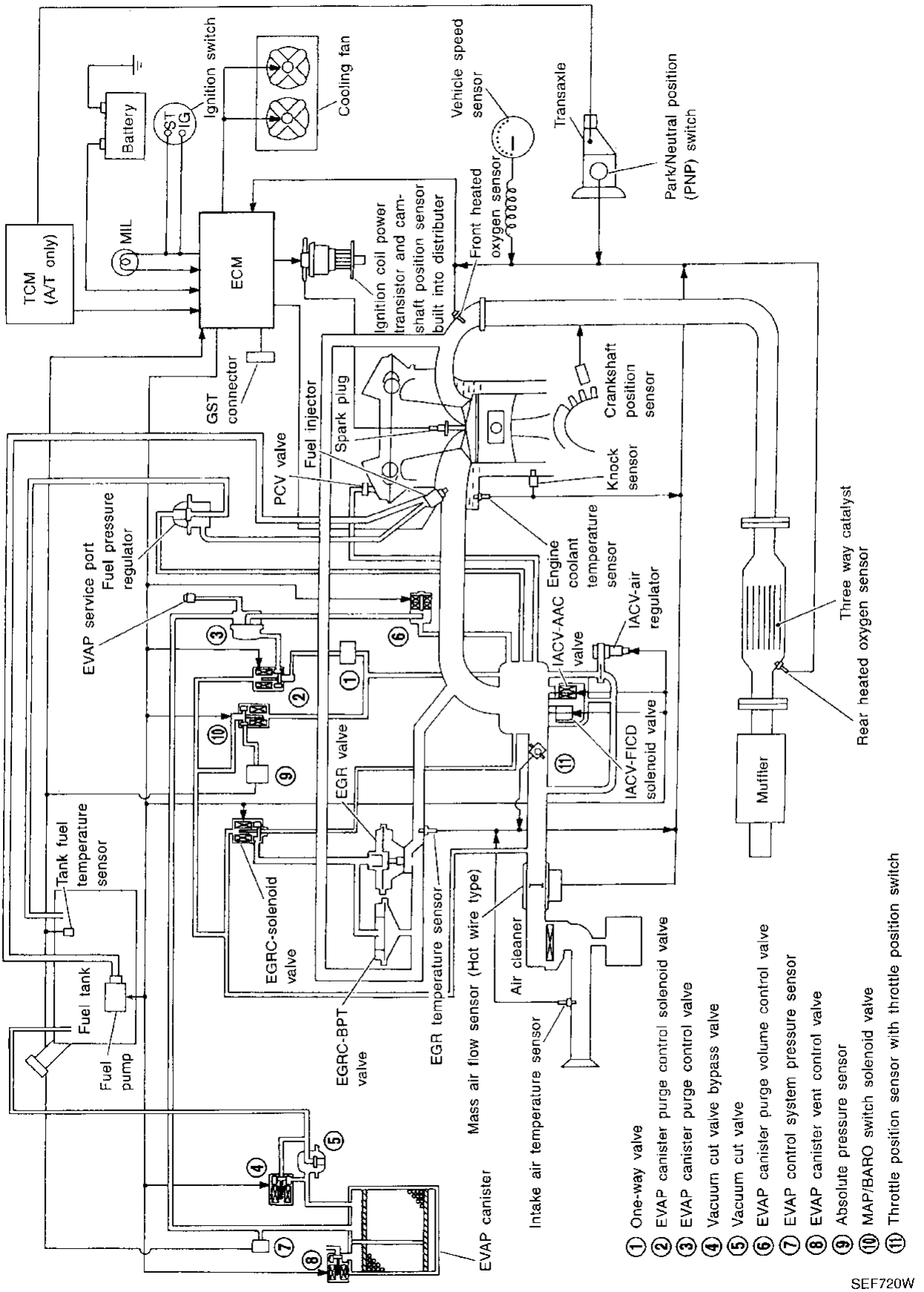
TEC521


(A) : With A/T
(M) : With M/T
(AA) : With auto A/C
(MA) : With manual A/C
FUSIBLE LINK
FUSIBLE LINK
BATTERY
FUSE
IGNITION SWITCH ON or START
FUSE
IGNITION SWITCH ON
IACV-AAC VALVE
EGRC-SOLENOID VALVE
MAP/BARO SWITCH SOLENOID VALVE
EVAP CANISTER PURGE CONTROL SOLENOID VALVE
EVAP CANISTER VENT CONTROL VALVE
VACUUM CUT VALVE BYPASS VALVE
101
103
69
105
108
117
18
15
37
COMBINATION METER
SPEEDOMETER
MALFUNCTION INDICATOR LAMP
VEHICLE SPEED SENSOR
AIR CONDITIONER RELAY
COMPRESSOR
AMBIENT AIR TEMPERATURE SWITCH: (MA)
IACV-FICD SOLENOID VALVE
23 A/C AUTO AMP.: (AA)
MA
AA
ECM
28
62
51
53
INTAKE AIR TEMPERATURE SENSOR
EGR TEMPERATURE SENSOR
ENGINE COOLANT TEMPERATURE SENSOR
CRANKSHAFT POSITION SENSOR (OBD)
THROTTLE POSITION SWITCH
CLOSED
WIDE OPEN
THERMO CONTROL AMP.
To A/C system
TRIPLE-PRESSURE SWITCH
21
14
13
66
50
67
23
49
ABSOLUTE PRESSURE SENSOR
EVAP CONTROL SYSTEM PRESSURE SENSOR
THROTTLE POSITION SENSOR
COOLING FAN RELAY-1
COOLING FAN RELAY-2
COOLING FAN RELAY-3
COOLING FAN MOTOR-1
COOLING FAN MOTOR-2
26
27
3
22
To tachometer
PARK/NEUTRAL POSITION SWITCH: (M)
PARK/NEUTRAL POSITION SWITCH: (A)
P R N D 2 1
39
43
24
29
30
7
33
39 40 16 17
32
42
5
6
7
15
41
TCM (TRANSMISSION CONTROL MODULE) : (A)
35
36
34
27
26
Preceding page
A
B

TEC560

System Diagram

NCEC0011

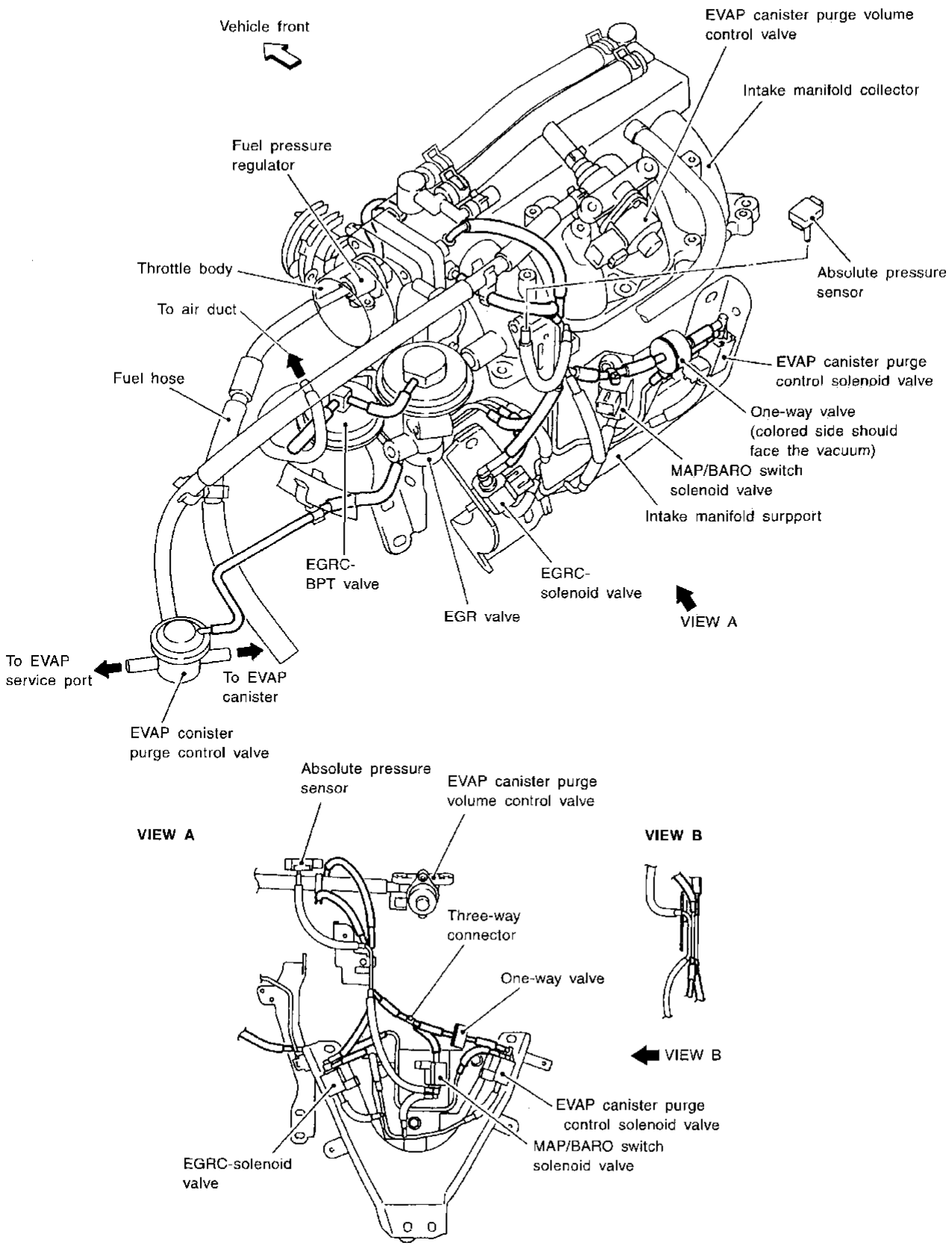


SEF720W

Vacuum Hose Drawing

NCEC0012

Refer to "System Diagram" on EC-20 for vacuum control system.



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

SEF335W

System Chart

NCEC0013

Input (Sensor)	ECM Function	Output (Actuator)
• Camshaft position sensor • Mass air flow sensor • Engine coolant temperature sensor • Front heated oxygen sensor • Ignition switch • Throttle position sensor • PNP switch • Air conditioner switch • Knock sensor • EGR temperature sensor*1 • Crankshaft position sensor (OBD)*1 • EVAP control system pressure sensor*1 • Tank fuel temperature sensor*1 • Battery voltage • Power steering oil pressure switch • Vehicle speed sensor • Intake air temperature sensor • Absolute pressure sensor • Rear heated oxygen sensor*3 • TCM (Transmission control module)*2 • Closed throttle position switch*4 • Ambient air temperature switch	Fuel injection & mixture ratio control	Injectors
	Distributor ignition system	Power transistor
	Idle air control system	IACV-AAC valve and IACV-FICD solenoid valve
	IACV-air regulator control	IACV-air regulator
	Fuel pump control	Fuel pump relay
	Front heated oxygen sensor monitor & on board diagnostic system	Malfunction indicator lamp (On the instrument panel)
	EGR control	EGRC-solenoid valve
	Front and rear heated oxygen sensor heater control	Heated oxygen sensor heater
	EVAP canister purge flow control	• EVAP canister purge volume control valve • EVAP canister purge control solenoid valve
	Cooling fan control	Cooling fan relay
	Air conditioning cut control	Air conditioner relay
	ON BOARD DIAGNOSIS for EVAP system	• EVAP canister vent control valve • Vacuum cut valve bypass valve • MAP/BARO switch solenoid valve

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

Multiport Fuel Injection (MFI) System

DESCRIPTION

Input/Output Signal Chart

NCEC0014

NCEC0014S01

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

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

Basic Multiport Fuel Injection System

NCEC0014S02

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

Various Fuel Injection Increase/Decrease Compensation

NCEC0014S03

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

<Fuel increase>

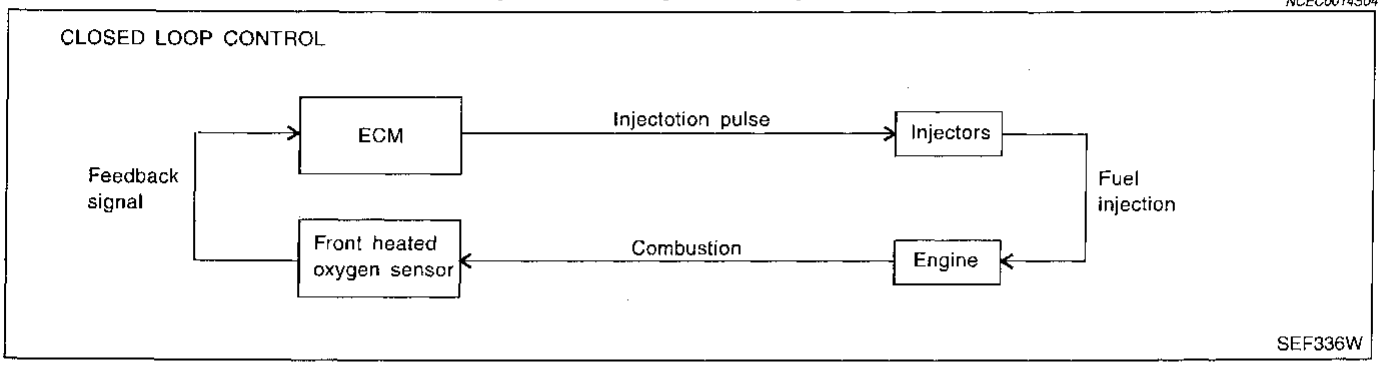
- During warm-up
- When starting the engine
- During acceleration
- Hot-engine operation
- When selector lever is changed from "N" to "D" (A/T models only)
- High-load, high-speed operation

<Fuel decrease>

- During deceleration
- During high engine speed operation
- During high vehicle speed operation (M/T models)
- Extremely high engine coolant temperature

Mixture Ratio Feedback Control (Closed loop control)

NCEC0014S04



The mixture ratio feedback system provides the best air-fuel mixture ratio for driveability and emission control. The three way catalyst can then better reduce CO, HC and NOx emissions. This system uses a front heated oxygen sensor in the exhaust manifold to monitor if the engine operation is rich or lean. The ECM adjusts the injection pulse width according to the sensor voltage signal. For more information about the front heated oxygen sensor, refer to EC-161. This maintains the mixture ratio within the range of stoichiometric (ideal air-fuel mixture).
This stage is referred to as the closed loop control condition.
Rear heated oxygen sensor is located downstream of the three way catalyst. Even if the switching characteristics of the front heated oxygen sensor shift, the air-fuel ratio is controlled to stoichiometric by the signal from the rear heated oxygen sensor.

Open Loop Control

NCEC0014S05

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

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

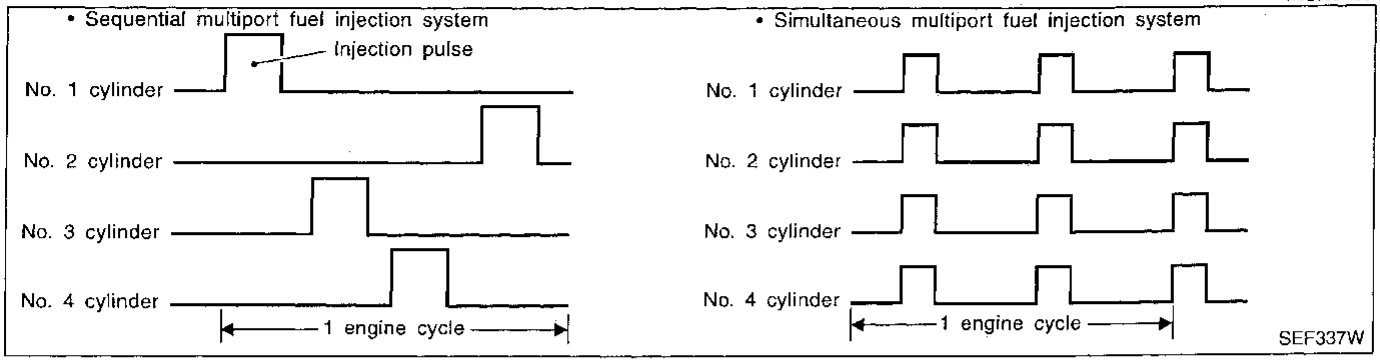
Mixture Ratio Self-learning Control

NCEC0014S06

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

Fuel Injection Timing

NCEC0014S07



Two types of systems are used.

Sequential Multiport Fuel Injection System

NCEC0014S0701

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

Simultaneous Multiport Fuel Injection System

NCEC0014S0702

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

Fuel Shut-off

NCEC0014S08

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

Distributor Ignition (DI) System

DESCRIPTION

NCEC0015

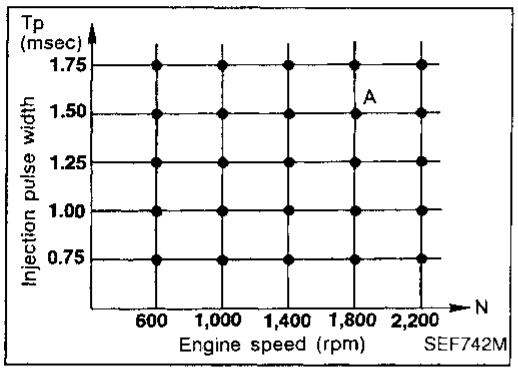
Input/Output Signal Chart

NCEC0015S01

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

System Description

NCEC0015S02



The ignition timing is controlled by the ECM to maintain the best air-fuel ratio for every running condition of the engine. The ignition timing data is stored in the ECM. This data forms the map shown above.
The ECM receives information such as the injection pulse width and camshaft position sensor signal. Computing this information, ignition signals are transmitted to the power transistor.
e.g., N: 1,800 rpm, Tp: 1.50 msec
A°BTDC
During the following conditions, the ignition timing is revised by the ECM according to the other data stored in the ECM.

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

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

Air Conditioning Cut Control

DESCRIPTION

NCEC0016

Input/Output Signal Chart

NCEC0016S01

Sensor	Input Signal to ECM	ECM function	Actuator
Air conditioner switch	Air conditioner "ON" signal	Air conditioner cut control	Air conditioner relay
PNP switch	Neutral position		
Throttle position sensor	Throttle valve opening angle		
Camshaft position sensor	Engine speed		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		

System Description

NCEC0016S02

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

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

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

DESCRIPTION

NCEC0017

Input/Output Signal Chart

NCEC0017S01

Sensor	Input Signal to ECM	ECM function	Actuator
Vehicle speed sensor	Vehicle speed	Fuel cut control	Injectors
PNP switch	Neutral position		
Throttle position sensor	Throttle position		
Engine coolant temperature sensor	Engine coolant temperature		
Camshaft position sensor	Engine speed		

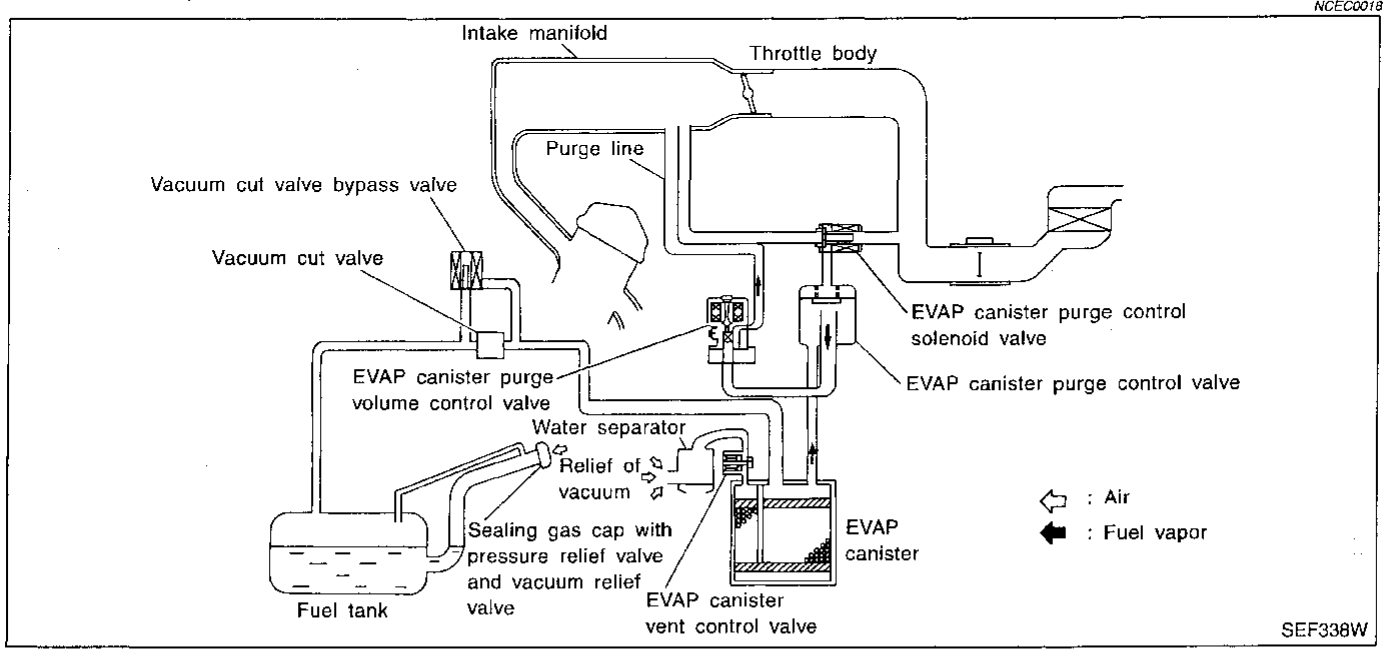
If the engine speed is above 3,950 rpm with no load, (for example, in Neutral and engine speed over 4,000 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed. Fuel cut will operate until the engine speed reaches 1,150 rpm, then fuel cut is cancelled.

NOTE:
This function is different from deceleration control listed under "Multiport Fuel Injection (MFI) System", EC-23.

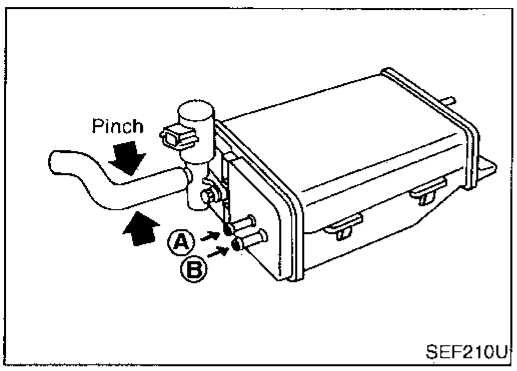
Evaporative Emission System

DESCRIPTION

NCEC0018



The evaporative emission system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the EVAP canister.
The fuel vapor in the sealed fuel tank is led into the EVAP canister which contains activated carbon and the vapor is stored there when the engine is not operating or when refueling to the fuel tank.
The vapor in the EVAP canister is purged by the air through the purge line to the intake manifold when the engine is operating.
EVAP canister purge volume control valve is controlled by ECM. 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 also shuts off the vapor purge line during decelerating and idling.



SEF210U

INSPECTION

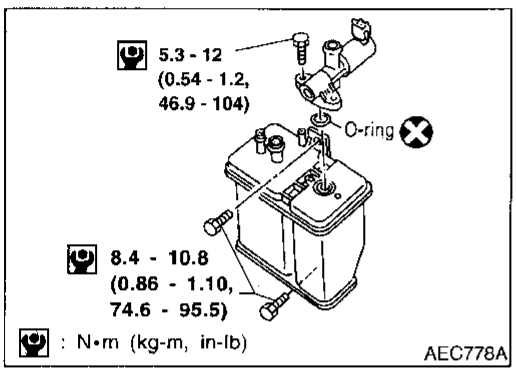
NCEC0019

EVAP Canister

NCEC0019S01

Check EVAP canister as follows:

1. Pinch the fresh air hose.
2. Blow air into port **A** and check that air flows freely through port **B**.



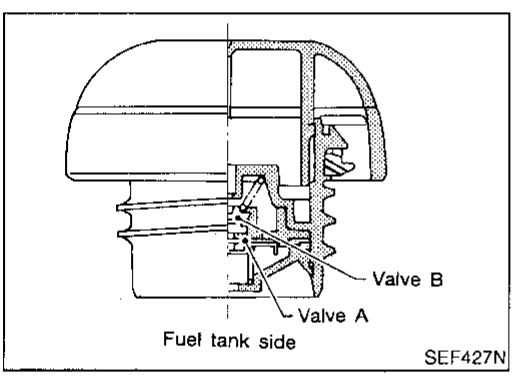
AEC778A

Tightening Torque

NCEC0019S02

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.



SEF427N

Fuel Tank Vacuum Relief Valve (Built into fuel filler cap)

NCEC0019S03

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

   Pressure:

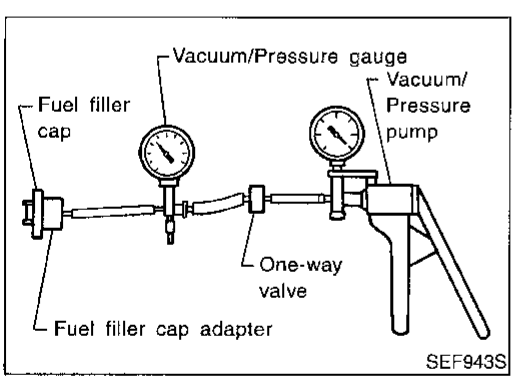
   16.0 - 20.0 kPa (0.163 - 0.204 kg/cm^2, 2.32 - 2.90 psi)

   Vacuum:

   −6.0 to −3.5 kPa (−0.061 to −0.036 kg/cm^2, −0.87 to −0.51 psi)
3. If out of specification, replace fuel filler cap as an assembly.

CAUTION:

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



SEF943S

Evaporative Emission (EVAP) Canister Purge Control Valve

NCEC0019S04

Refer to EC-420.

Vacuum Cut Valve and Vacuum Cut Valve Bypass Valve

NCEC0019S05

Refer to EC-407.

Evaporative Emission (EVAP) Canister Purge Volume Control Valve

NCEC0019S06

Refer to EC-380.

Evaporative Emission (EVAP) Canister Purge Control Solenoid Valve

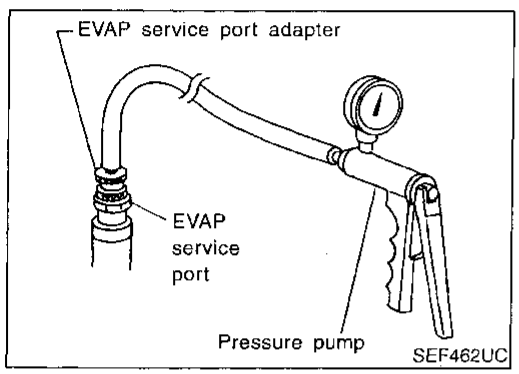
NCEC0019S07

Refer to EC-420.

Tank Fuel Temperature Sensor

NCEC0019S08

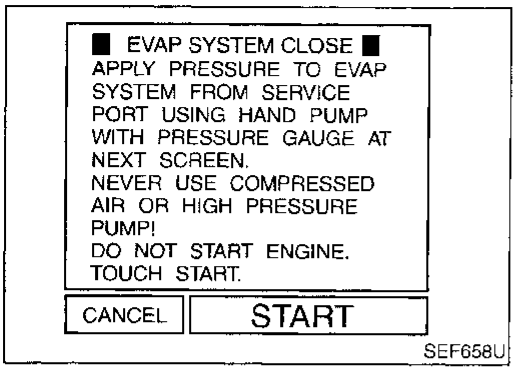
Refer to EC-241.

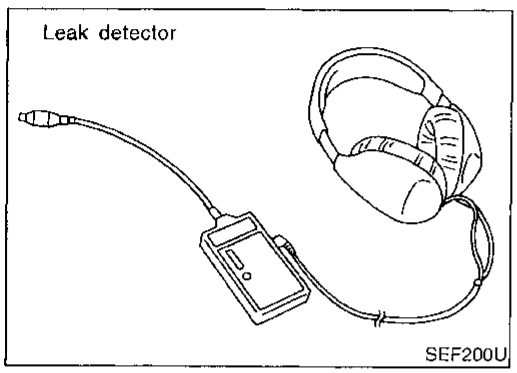


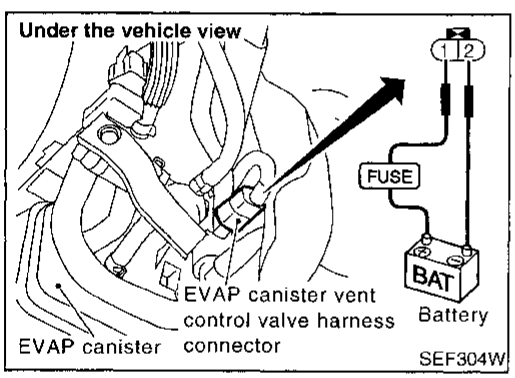
EVAP Service Port

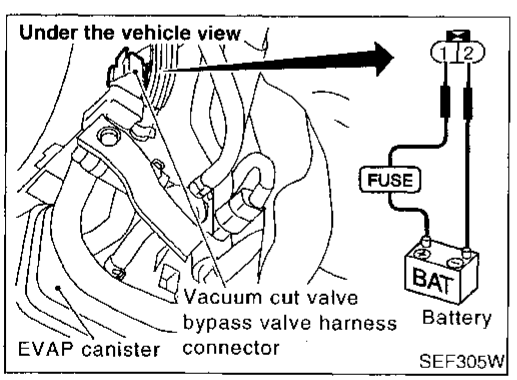
NCEC0019S09

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









How to Detect Fuel Vapor Leakage

NCEC0019S10

CAUTION:

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

NOTE:

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

With CONSULT

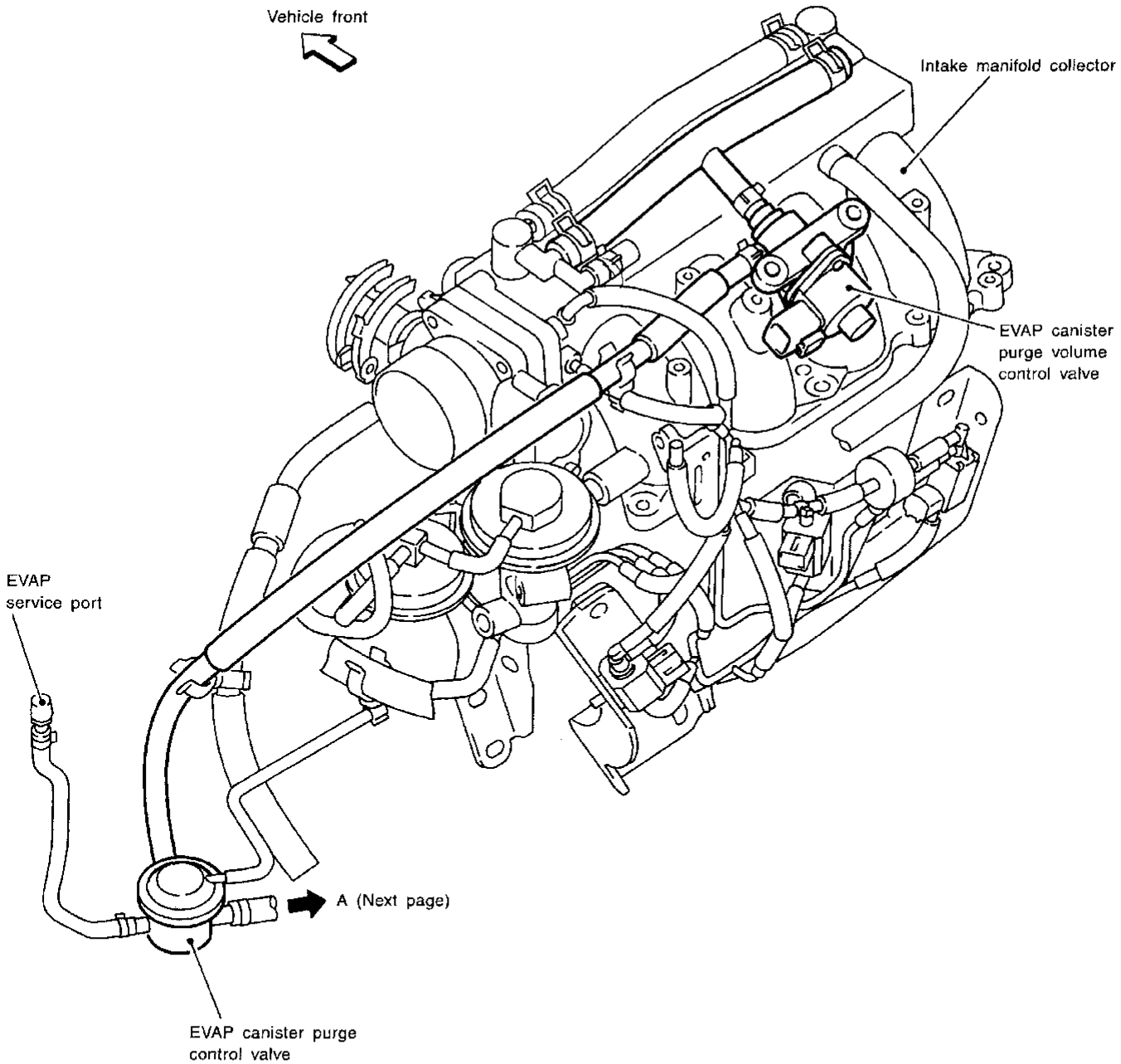
1) Attach the EVAP service port adapter securely to the EVAP service port.
2) Also attach the pressure pump and hose.
3) Turn ignition switch "ON".
4) Select the "EVAP SYSTEM CLOSE" of "WORK SUPPORT MODE" with CONSULT.
5) Touch "START". A bar graph (Pressure indicating display) will appear on the screen.
6) Apply positive pressure to the EVAP system until the pressure indicator reaches the middle of the bar graph.
7) Remove the EVAP service port adapter and hose with pressure pump.
8) Locate the leak using a leak detector. Refer to "Evaporative Emission Line Drawing", EC-31.

Without CONSULT

1) Attach the EVAP service port adapter securely to the EVAP service port and pressure pump with pressure gauge to the EVAP service port.
2) Apply battery voltage to between the terminals of both EVAP canister vent control valve and vacuum cut valve bypass valve to make a closed EVAP system.
3) To locate the leak, deliver positive pressure to the EVAP system until pressure gauge points reach 1.38 to 2.76 kPa (0.014 to 0.028 kg/cm^2, 0.2 to 0.4 psi).
4) Remove the EVAP service port adapter and hose with pressure pump.
5) Locate the leak using a leak detector. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-31.

EVAPORATIVE EMISSION LINE DRAWING

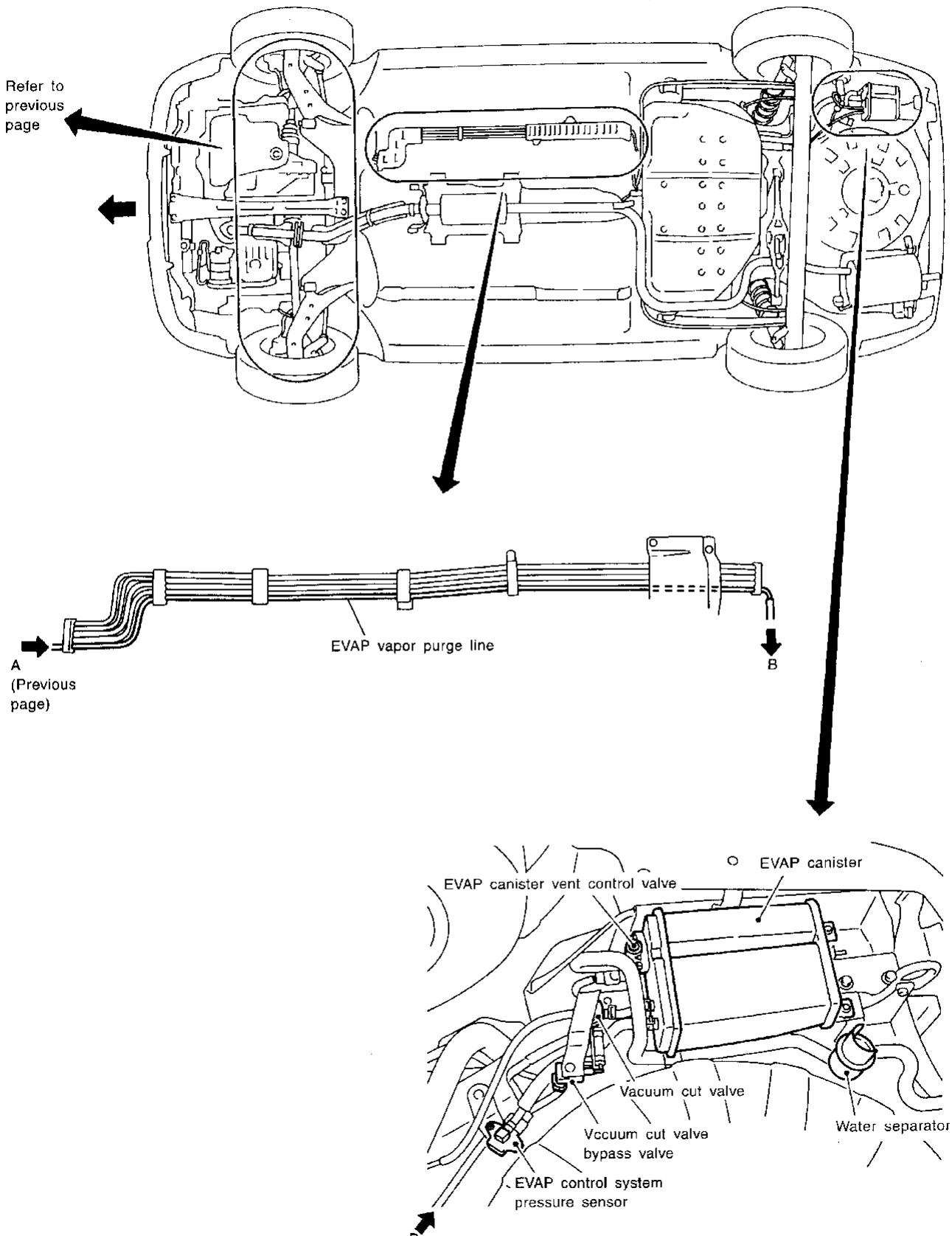
NCEC0020



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

SEF339W

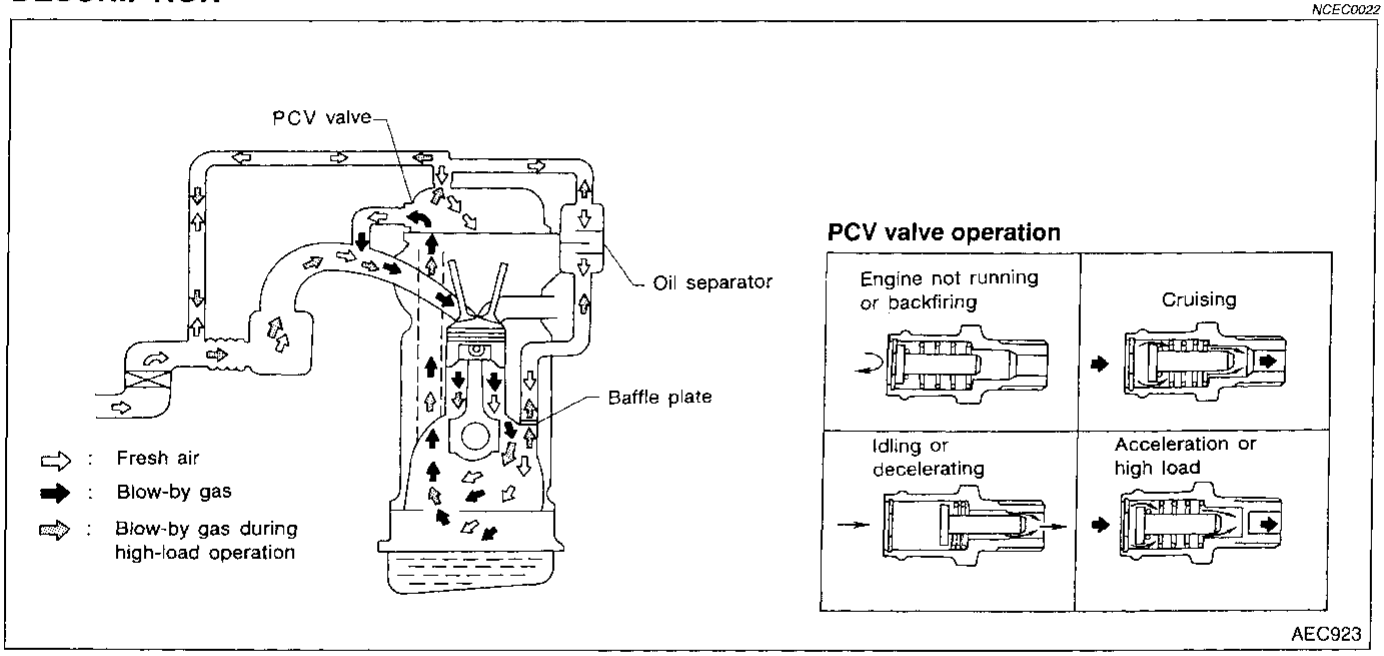
NOTE:
Do not use soapy water or any type of solvent while installing vacuum hoses or purge hoses.



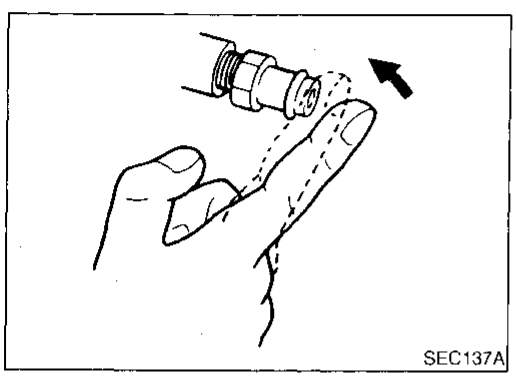
Positive Crankcase Ventilation

DESCRIPTION

NCEC0022



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.



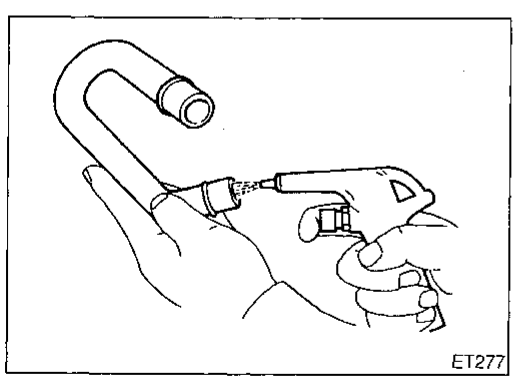
INSPECTION

NCEC0023

PCV (Positive Crankcase Ventilation) Valve

NCEC0023S01

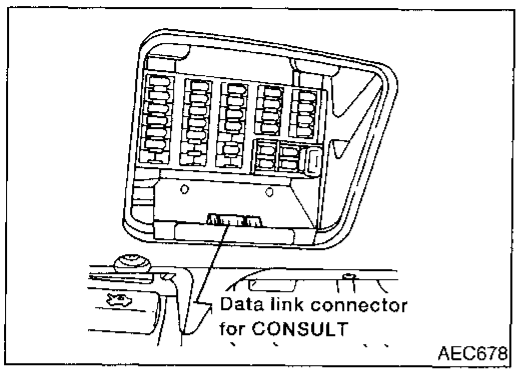
With engine running at idle, remove PCV valve from breather separator. A properly working valve makes a hissing noise as air passes through it. A strong vacuum should be felt immediately when a finger is placed over the valve inlet.



Ventilation Hose

NCEC0023S02

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

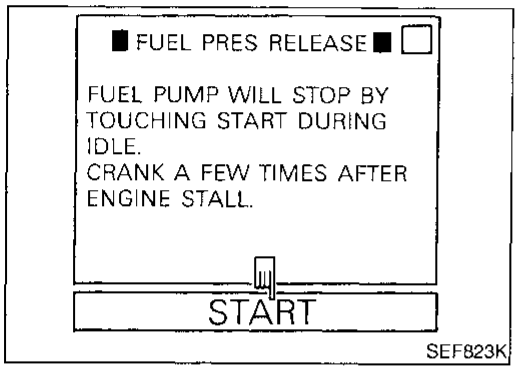
NCEC0024

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

WITH CONSULT

NCEC0024S01

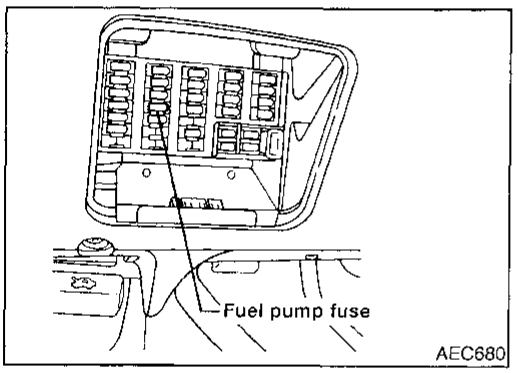
1. Start engine.
2. Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode with CONSULT.
3. After engine stalls, crank it two or three times to release all fuel pressure.
4. Turn ignition switch OFF.



WITHOUT CONSULT

NCEC0024S02

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

NCEC0025

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

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

At idle speed:

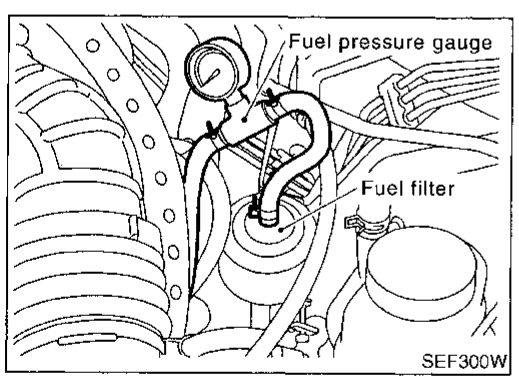
With vacuum hose connected

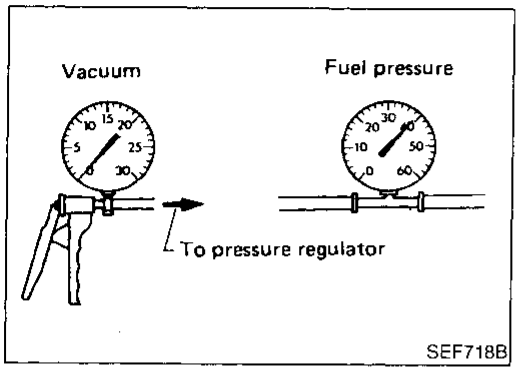
Approximately 235 kPa (2.4 kg/cm^2, 34 psi)

With vacuum hose disconnected

Approximately 294 kPa (3.0 kg/cm^2, 43 psi)

If results are unsatisfactory, perform Fuel Pressure Regulator Check, EC-35.



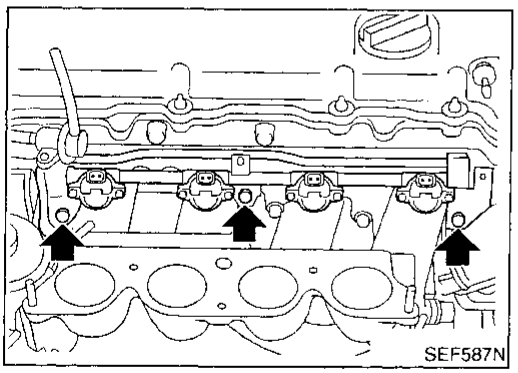


Fuel Pressure Regulator Check

NCEC0026

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

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

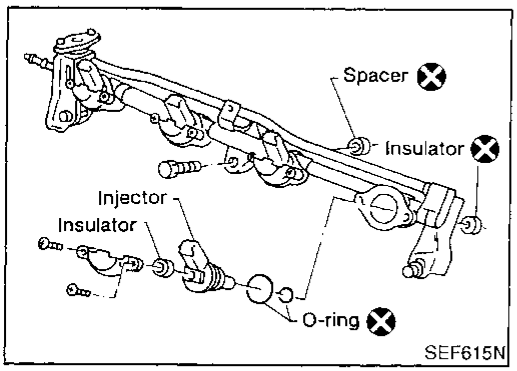


Injector

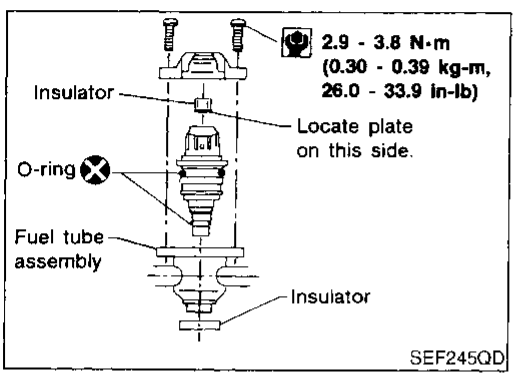
REMOVAL AND INSTALLATION

NCEC0027

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

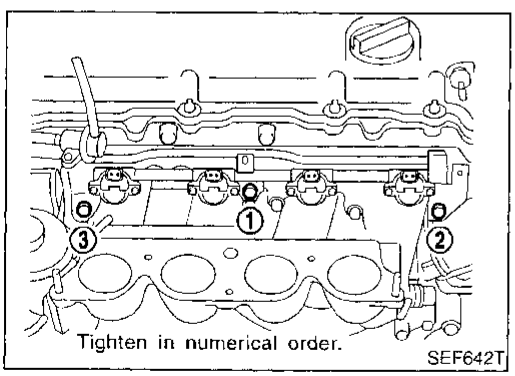


- **Push injector tail piece.**
- **Do not pull on the connector.**



7. Install injectors.

- **Clean exterior of injector tail piece.**
- **Use new O-rings.**



8. Install injectors with fuel tube assembly to intake manifold.
9. Install fuel hoses to fuel tube assembly.
10. Tighten fuel tube bolts to 9.32 to 10.8 N·m (0.95 to 1.10 kg-m, 6.9 to 8.0 ft-lb) as shown in the figure. Then tighten the bolts to 20.6 to 26.5 N·m (2.10 to 2.70 kg-m, 15 to 20 ft-lb).

Lubricate fuel hoses with a smear of silicone oil.

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

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

Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment

NCEC0028

PREPARATION

NCEC0028S01

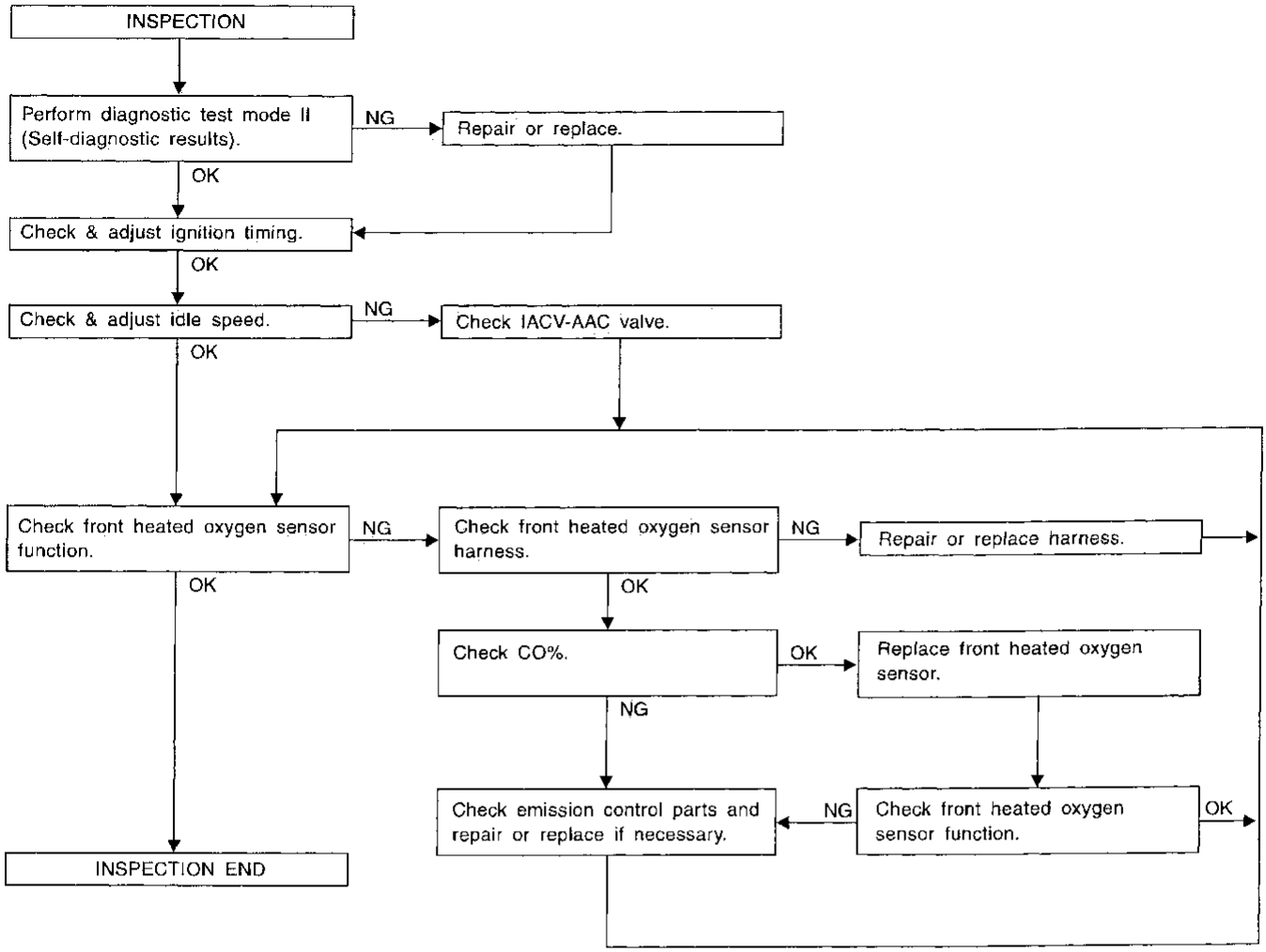
- Make sure that the following parts are in good order.

a) Battery
b) Ignition system
c) Engine oil and coolant levels
d) Fuses
e) ECM harness connector
f) Vacuum hoses
g) Air intake system
(Oil filler cap, oil level gauge, etc.)
h) Fuel pressure
i) Engine compression
j) EGR valve operation
k) Throttle valve
l) EVAP system

- On models equipped with air conditioner, checks should be carried out while the air conditioner is "OFF".
- On models equipped with automatic transaxle, when checking idle speed, ignition timing and mixture ratio, checks should be carried out while shift lever is in "P" or "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.

Overall Inspection Sequence

NCEC0026S0101



SEF941VB

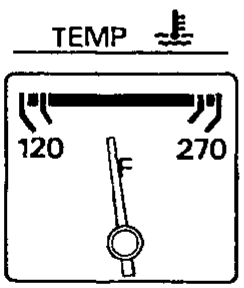
INSPECTION PROCEDURE

=NCEC0028S02

1 INSPECTION START

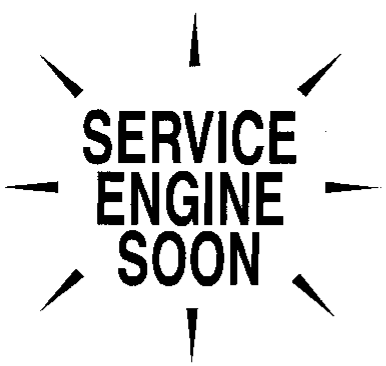
1. Visually check the following:
- Air cleaner clogging
- Hoses and duct for leaks
- EGR valve operation
- Electrical connectors
- Gasket (intake manifold, cylinder head, exhaust system)
- Throttle valve and throttle position sensor operation

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



SEF976U

3. Open engine hood and run engine at about 2,000 rpm for about 2 minutes under no-load.
4. Perform the Diagnostic Test Mode II (Self-diagnostic results). Refer to EC-57.



SEF217U

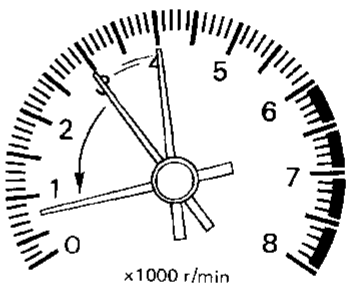
OK or NG

OK	▶	• GO TO 2. (With CONSULT) • GO TO 3. (Without CONSULT)
NG	▶	1. Repair or replace components as necessary. 2. GO TO 2. (With CONSULT) 3. GO TO 3. (Without CONSULT)

2 CHECK IGNITION TIMING

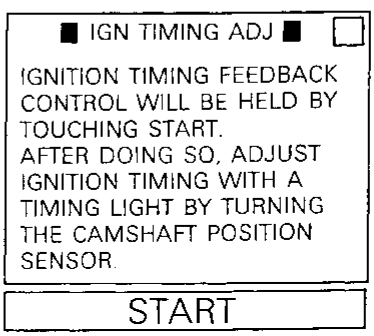
With CONSULT

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



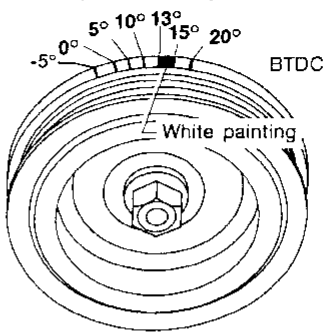
SEF978U

3. Select "IGNITION TIMING ADJ" in WORK SUPPORT mode.
4. Touch "START".



SEF546N

5. Rev engine (2,000 to 3,000 rpm) two or three times under no-load, then run engine at idle speed.
6. Check ignition timing with a timing light.



AEC804

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

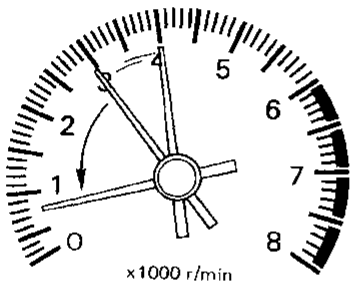
OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

3 CHECK IGNITION TIMING

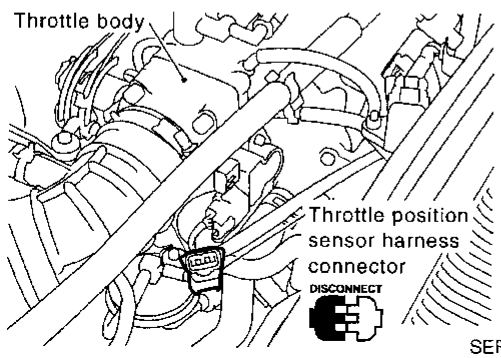
Without CONSULT

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



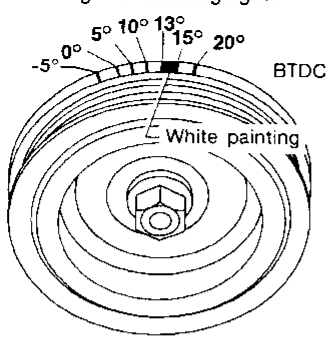
SEF978U

3. Turn off engine and disconnect throttle position sensor harness connector.



SEF341W

4. Start engine and rev it (2,000 to 3,000 rpm) two or three times under no-load, then run engine at idle speed.
5. Check ignition timing with a timing light.



AEC804

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

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

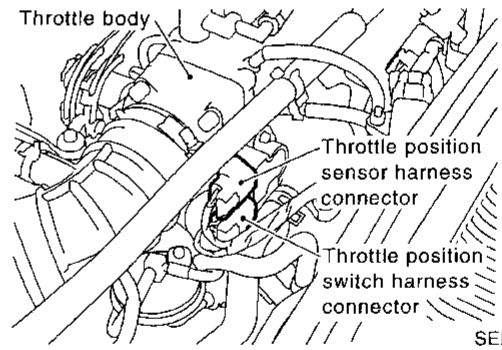
4 ADJUST IGNITION TIMING

With CONSULT

1. Adjust ignition timing to the specified value by turning distributor after loosening bolts which secure distributor.

Without CONSULT

1. Adjust ignition timing to the specified value by turning distributor after loosening bolts which secure distributor.
2. Turn off engine and connect throttle position sensor harness connector to throttle position sensor.



SEF297W

Models with CONSULT	▶	GO TO 2.
Models without CONSULT	▶	GO TO 3.

5 CHECK BASE IDLE SPEED

With CONSULT

1. Read idle speed in "IGN TIMING ADJ" in "WORK SUPPORT" mode.

IGN TIMING ADJ	
CONDITION SETTING	
IGN/T FEEDBACK	HOLD
MONITOR	
CMPS • RPM (REF)	762 rpm
IGN TIMING	15BTDC
CLSD THL POS	ON

SEF773W

M/T: 750±50 rpm
A/T: 750±50 rpm (in "P" or "N" position)

Without CONSULT

1. Check idle speed.

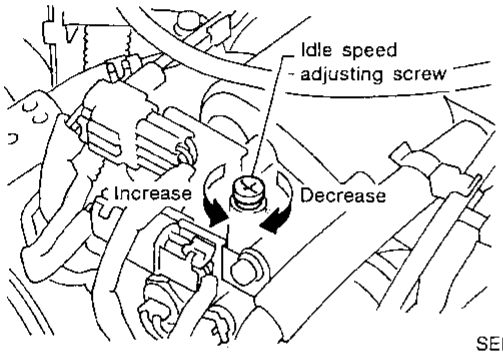
M/T: 750±50 rpm
A/T: 750±50 rpm (in "P" or "N" position)

OK or NG

OK (With CONSULT)	▶	GO TO 7.
OK (Without CONSULT)	▶	GO TO 8.
NG	▶	GO TO 6.

6 ADJUST BASE IDLE SPEED

1. Rev engine (2,000 to 3,000 rpm) two or three times under no-load, then run engine at idle speed.
2. Adjust idle speed by turning idle speed adjusting screw.



SEF053P

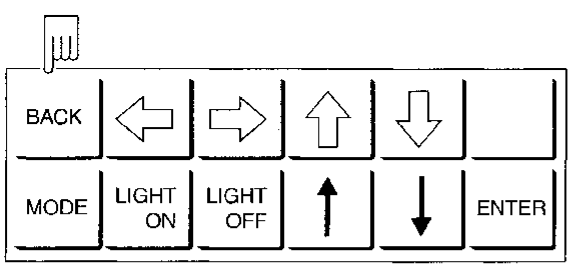
M/T: 750±50 rpm
A/T: 750±50 rpm (in "P" or "N" position)

Models with CONSULT ▶	GO TO 7.
Models without CONSULT ▶	GO TO 8.

7 CHECK TARGET IDLE SPEED

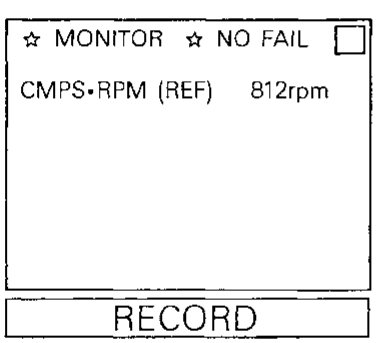
With CONSULT

1. Touch "BACK" on CONSULT.



SEF774W

2. Rev engine (2,000 to 3,000 rpm) two or three times under no-load, then run engine at idle speed.
3. Read idle speed in "DATA MONITOR" mode with CONSULT.



SEF550N

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

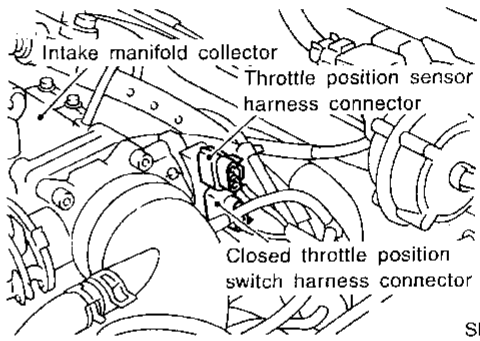
OK or NG

OK ▶	GO TO 10.
NG ▶	GO TO 9.

8 CHECK TARGET IDLE SPEED

Without CONSULT

1. Turn off engine and connect throttle position sensor harness connector.



SEF273V

2. Start engine.
3. Rev engine (2,000 to 3,000 rpm) two or three times under no-load, then run engine at idle speed.
4. Check target idle speed.
   M/T: 800±50 rpm
   A/T: 800±50 rpm (in "P" or "N" position)

OK or NG

OK ▶	GO TO 10.
NG ▶	GO TO 9.

9 DETECT MALFUNCTIONING PART

Check the following.

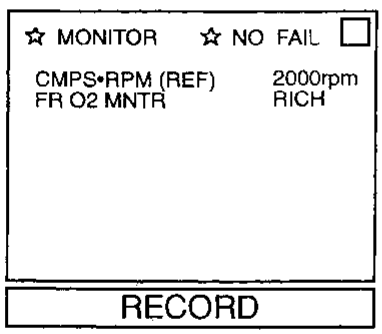
1. Check IACV-AAC valve and replace if necessary. Refer to EC-315.
2. Check IACV-AAC valve harness and repair if necessary. Refer to EC-315.
3. Check ECM function by substituting another known good ECM.
   (ECM may be the cause of a problem, but this is rarely the case.)

▶	GO TO 10.

10 CHECK FRONT HEATED OXYGEN SENSOR SIGNAL

With CONSULT

1. See "FR O2 MNTR" in "DATA MONITOR" mode.
2. Run engine at about 2,000 rpm for about 2 minutes under no-load.
3. Maintain engine at 2,000 rpm under no-load (engine is warmed up to normal operating temperature) and check that the monitor fluctuates between "LEAN" and "RICH" more than five times during 10 seconds.

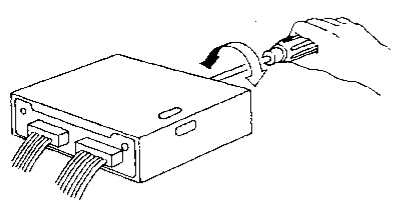


SEF054P

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

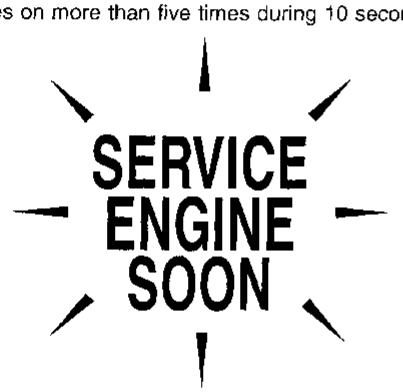
Without CONSULT

1. Set "Front heated oxygen sensor monitor" in the Diagnostic Test Mode II. (See page EC-56.)



SEF987K

2. Run engine at about 2,000 rpm for about 2 minutes under no-load (engine is warmed up to normal operating temperature).
3. Maintain engine at 2,000 rpm under no-load and check that MIL goes on more than five times during 10 seconds.



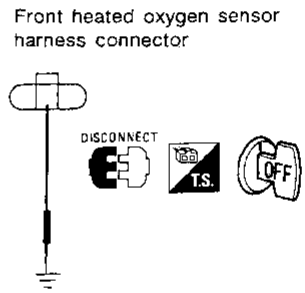
SEF217U

OK or NG

OK	▶	INSPECTION END
NG	▶	GO TO 11.

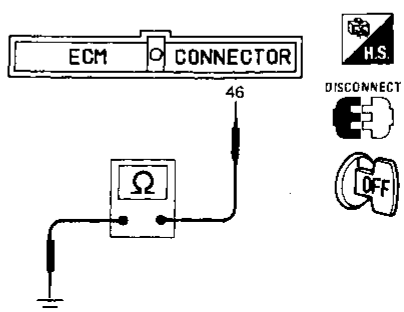
11 CHECK FRONT HEATED OXYGEN SENSOR HARNESS

1. Turn off engine and disconnect battery ground cable.
2. Disconnect ECM harness connector.
3. Disconnect front heated oxygen sensor harness connector.
4. Then connect harness connector terminal for front heated oxygen sensor to ground with a jumper wire.



MEF031DA

5. Check for continuity between terminal 46 of ECM harness connector and body ground.



SEF056P

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

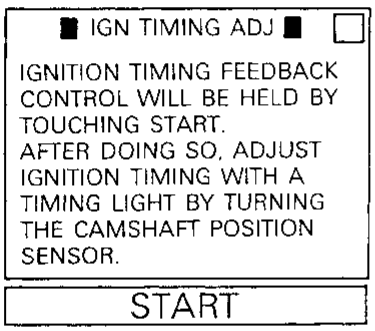
OK or NG

OK	▶	1. Connect ECM harness connector to ECM. 2. GO TO 13.
NG	▶	1. Repair or replace harness. 2. GO TO 12.

12 PREPARATION FOR IDLE SPEED ADJUSTING

With CONSULT

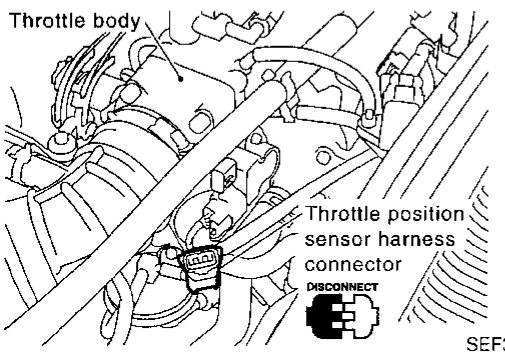
1. Select "IGN TIMING ADJ" in "WORK SUPPORT" mode.
2. Touch "START".



SEF546N

Without CONSULT

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



SEF341W

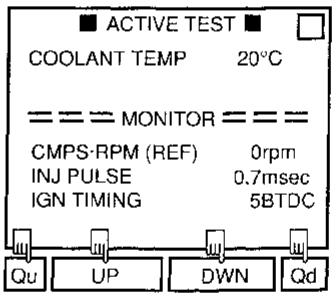
2. Start engine.

▶ GO TO 5.

13 PREPARATION FOR "CO" % CHECK

With CONSULT

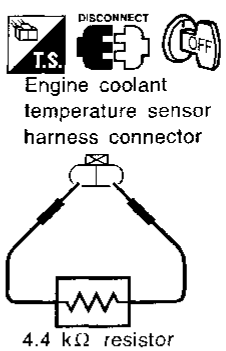
1. Connect ECM harness connector to ECM.
2. Connect battery ground cable.
3. Select "ENGINE COOLANT TEMP" in "ACTIVE TEST" mode.
4. Set "COOLANT TEMP" to 5°C (41°F) by touching "Qu" and "Qd" and "UP", "DOWN".



AEC681

Without CONSULT

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



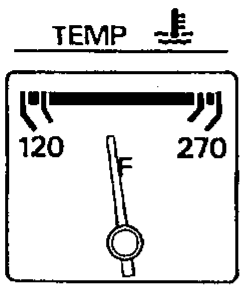
SEF053RA

4. Connect battery ground cable.

▶ GO TO 14.

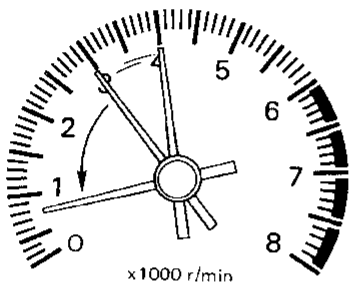
14	CHECK "CO" %

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



SEF976U

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



SEF978U

3. Check "CO"%.
   Idle CO: Less than 11% and engine runs smoothly.
4. (X) **Without CONSULT**
   After checking CO%,
a. Disconnect the resistor from terminals of engine coolant temperature sensor harness connector.
b. Connect engine coolant temperature sensor harness connector to engine coolant temperature sensor.

OK or NG

OK	▶	GO TO 15.
NG	▶	GO TO 16.

15	CHECK FRONT HEATED OXYGEN SENSOR SIGNAL

(B) **With CONSULT**
1. Replace front heated oxygen sensor.
2. See "FR O2 MNTR" in "DATA MONITOR" mode.
3. Maintain engine at 2,000 rpm under no-load (engine is warmed up to normal operating temperature.). Check that the monitor fluctuates between "LEAN" and "RICH" more than five times during 10 seconds.
   1 cycle: RICH → LEAN → RICH
   2 cycles: RICH → LEAN → RICH → LEAN → RICH

(X) **Without CONSULT**
1. Replace front heated oxygen sensor.
2. Set "Front heated oxygen sensor monitor" in the Diagnostic Test Mode II.
   (See page EC-56.)
3. Maintain engine at 2,000 rpm under no-load. Check that the malfunction indicator lamp goes on and off more than five times during 10 seconds.

OK or NG

OK	▶	GO TO 12.
NG	▶	GO TO 16.

16	DETECT MALFUNCTIONING PART

1. Connect front heated oxygen sensor harness connector to front heated oxygen sensor.
2. Check fuel pressure regulator. Refer to EC-35.
3. Check mass air flow sensor and its circuit.
   Refer to EC-116.
4. Check injector and its circuit.
   Refer to EC-450.
   Clean or replace if necessary.
5. Check engine coolant temperature sensor and its circuit.
   Refer to EC-140, 156.
6. Check ECM function by substituting another known good ECM.
   (ECM may be the cause of a problem, but this is rarely the case.)

	▶	GO TO 12.

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

Introduction

NCEC0029

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

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

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

X: Applicable —: Not applicable

	DTC	1st trip DTC	Freeze Frame data	1st trip Freeze Frame data	SRT code	Test value
ECM*3	X	X*1	—	—	—	—
CONSULT	X	X	X	X	X	—
GST	X	X*2	X	—	X	X

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

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

*3: In diagnostic test mode II (Self-diagnostic results)

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-91.)

Two Trip Detection Logic

NCEC0030

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

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

X: Applicable —: Not applicable

Items	MIL			DTC		1st trip DTC	
	1st trip		2nd trip 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: P1148 (0307)	—	X	—	X	—	X	—
Fail-safe items (Refer to EC-91.)	—	X	—	X*1	—	X*1	—
Except above	—	—	X	—	X	X	X

*1: Except "ECM".

Emission-related Diagnostic Information

NCEC0031

DTC AND 1ST TRIP DTC

NCEC0031S01

The 1st trip DTC (whose number is the same as the DTC number) is displayed for the latest self-diagnostic result obtained. If the ECM memory was cleared previously, and the 1st trip DTC did not reoccur, the 1st trip DTC will not be displayed. If a malfunction is detected during the 1st trip, the 1st trip DTC is stored in the ECM memory. The MIL will not light up (two trip detection logic). If the same malfunction is not detected in the 2nd trip (meeting the required driving pattern), the 1st trip DTC is cleared from the ECM memory. If the same malfunction is detected in the 2nd trip, both the 1st trip DTC and DTC are stored in the ECM memory and the MIL lights up. In other words, the DTC is stored in the ECM memory and the MIL lights up when the same malfunction occurs in two consecutive trips. If a 1st trip DTC is stored and a non-diagnostic operation is performed between the 1st and 2nd trips, only the 1st trip DTC will continue to be stored. For malfunctions that blink or light up the MIL during the 1st trip, the DTC and 1st trip DTC are stored in the ECM memory.
Procedures for clearing the DTC and the 1st trip DTC from the ECM memory are described in "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION". Refer to EC-54.
For malfunctions in which 1st trip DTCs are displayed, refer to EC-51. 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-81. 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

NCEC0031S0101

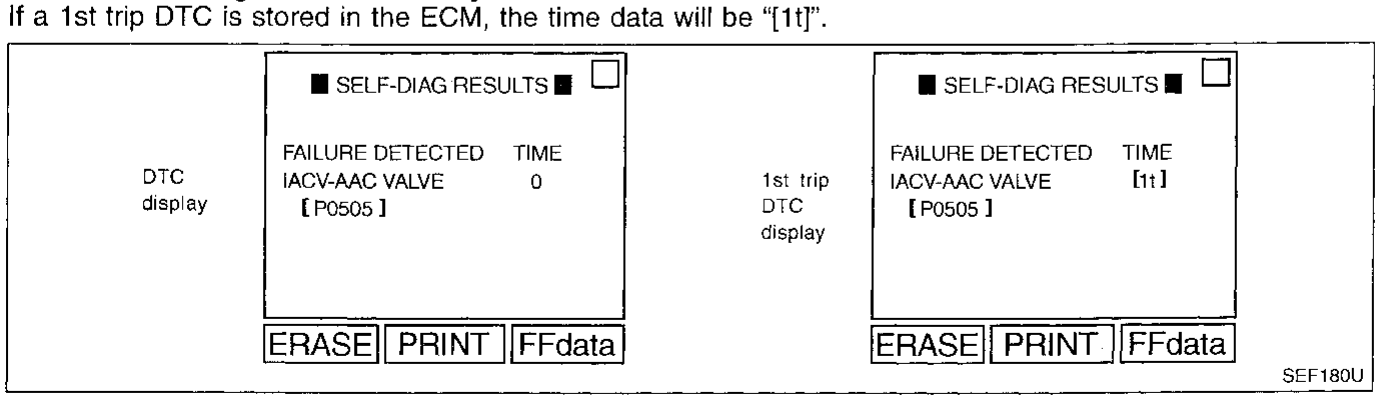
DTC and 1st trip DTC can be read by the following methods.

1) **No Tools**
The number of blinks of MIL in the Diagnostic Test Mode II (Self-Diagnostic Results) Examples: 0101, 0201, 1003, 1104, etc.
These DTCs are controlled by NISSAN.

2) **With CONSULT**
With GST
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 below. 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".
If a 1st trip DTC is stored in the ECM, the time data will be "[1t]".



FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA

NCEC0031S02

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

Data which are stored in the ECM memory, along with the 1st trip DTC, are called 1st trip freeze frame data. The data, stored together with the DTC data, are called freeze frame data and displayed on CONSULT or GST. The 1st trip freeze frame data can only be displayed on the CONSULT screen, not on the GST. For details, see EC-68.

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 1st trip freeze frame data can be stored in the ECM). If freeze frame data is stored in the ECM memory and freeze frame data with the same priority occurs later, the first (original) freeze frame data remains unchanged in the ECM memory.

Both 1st trip freeze frame data and freeze frame data (along with the DTCs) are cleared when the ECM memory is erased. Procedures for clearing the ECM memory are described in "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION". Refer to EC-54.

SYSTEM READINESS TEST (SRT) CODE

NCEC0031S03

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

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

SRT codes are set after self-diagnosis has been performed one 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 (18 test items) for the ECM used in G20 models.

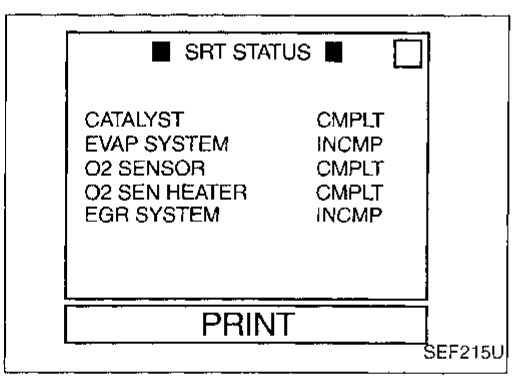
SRT items	Self-diagnostic test items
Catalyst monitoring	• Three way catalyst function P0420 (0702)
EVAP system monitoring	• EVAP control system (Small leak — Negative pressure) P0440 (0705) • EVAP control system (Small leak — Positive pressure) P1440 (0213) • EVAP control system purge flow monitoring P1447 (0111)
Oxygen sensor monitoring	• Front heated oxygen sensor (Circuit) P0130 (0303) • Front heated oxygen sensor (Lean shift monitoring) P0131 (0411) • Front heated oxygen sensor (Rich shift monitoring) P0132 (0410) • Front heated oxygen sensor (Response monitoring) P0133 (0409) • Front heated oxygen sensor (High voltage) P0134 (0412) • Rear heated oxygen sensor (Min. voltage monitoring) P0137 (0511) • Rear heated oxygen sensor (Max. voltage monitoring) P0138 (0510) • Rear heated oxygen sensor (Response monitoring) P0139 (0707) • Rear heated oxygen sensor (High voltage) P0140 (0512)
Oxygen sensor heater monitoring	• Front heated oxygen sensor heater P0135 (0901) • Rear heated oxygen sensor heater P0141 (0902)
EGR system monitoring	• EGR function (Close) P0400 (0302) • EGRC-BPT valve function P0402 (0306) • EGR function (Open) P1402 (0514)

Together with the DTC, the SRT code is cleared from the ECM memory using the method described later (Refer to EC-54). In addition, after engine control components/system are repaired or if the battery terminals remain disconnected for more than 24 hours, all SRT codes may be cleared from the ECM memory.

How to Display SRT Code

NCEC0031S0301

1. **With CONSULT**
   Selecting "SRT STATUS" in "DTC CONFIRMATION" 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 as shown below.



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

How to Set SRT Code

NCEC0031S0302

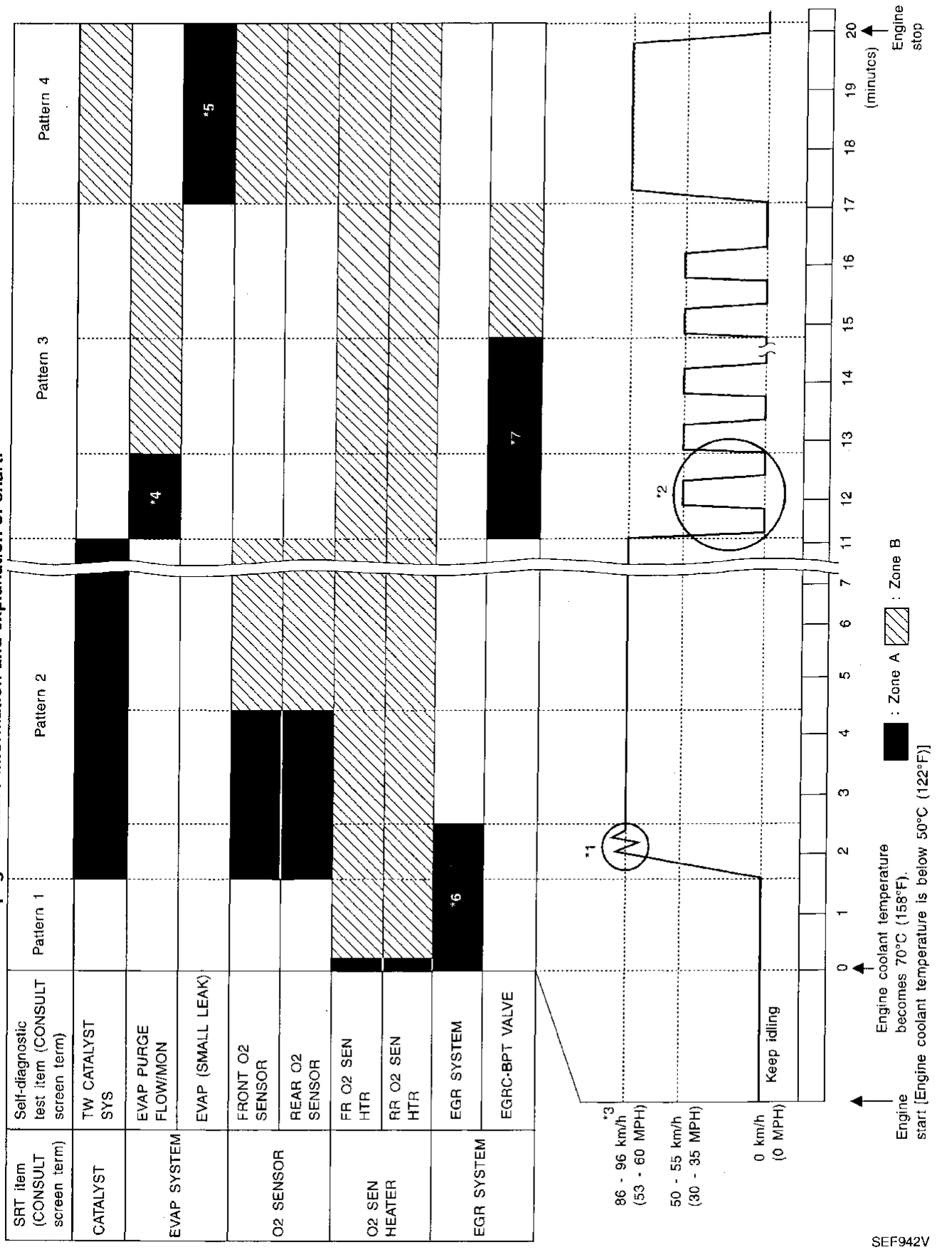
To set all SRT codes, self-diagnosis for the items indicated above must be performed one or more times. Each diagnosis may require a long period of actual driving under various conditions. The most efficient driving pattern in which SRT codes can be properly set is explained on the next page. The driving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

Driving Pattern

NCEC0031S0303

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



- The time required for each diagnosis varies with road surface conditions, weather, altitude, individual driving habits, etc.
  Zone A refers to the range where the time required, for the diagnosis under normal conditions*, is the shortest. Zone B refers to the range where the diagnosis can still be performed if the diagnosis is not completed within zone A.

*: Normal conditions refer to the following:

- Sea level
- Flat road
- Ambient air temperature: 20 - 30°C (68 - 86°F)
- Diagnosis is performed as quickly as possible under normal conditions.
  Under different conditions [For example: ambient air temperature other than 20 - 30°C (68 - 86°F)], diagnosis may also be performed.

Pattern 1:

- **The engine is started at the engine coolant temperature of −10 to 35°C (14 to 95°F) (where the voltage between the ECM terminals 51 and 50 is 3.0 - 4.3V).**
- **The engine must be operated at idle speed until the engine coolant temperature is greater than 70°C (158°F) (where the voltage between the ECM terminals 51 and 50 is lower than 1.4V).**
- **The engine is started at the tank fuel temperature of warmer than 0°C (32°F) (where the voltage between the ECM terminal 63 and ground is less than 4.1V).**

Pattern 2:

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

Pattern 3:

- The driving pattern outlined in *2 must be repeated at least three times.
  On M/T models, shift gears following "suggested upshift speeds" schedule on next page.

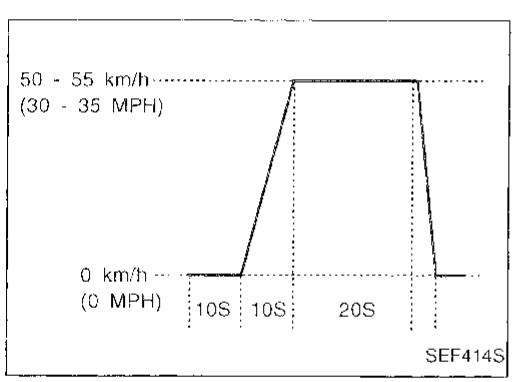
Pattern 4:

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

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

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

1) Decelerate vehicle to 0 km/h (0 MPH) and let engine idle.
2) Repeat driving pattern shown below at least 10 times.
   - **During acceleration, hold the accelerator pedal as steady as possible. (The THROTL POS SEN value of CONSULT should be between 0.8 to 1.2V.)**
3) Repeat steps 1 and 2 until the EGR system SRT is set.



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

*4: The driving pattern may be omitted when "PURG FLOW P1447" is performed using the "DTC WORK SUPPORT" mode with CONSULT.

*5: The driving pattern may be omitted when "EVAP SML LEAK P0440" is performed using the "DTC WORK SUPPORT" mode with CONSULT.
*6: The driving pattern may be omitted when all the followings are performed using the "DTC WORK SUPPORT" mode with CONSULT.

- "EGR SYSTEM P0400"
- "EGR SYSTEM P1402"

*7: The driving pattern may be omitted when "EGRC-BPT/VLV P0402" is performed using the "DTC WORK SUPPORT" mode with CONSULT.

Suggested transmission gear position for A/T models

Set the selector lever in the "D" position with "OD" ON.

Suggested upshift speeds for M/T models

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

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

Gear change	ACCEL shift point km/h (MPH)
1st to 2nd	24 (15)
2nd to 3rd	40 (25)
3rd to 4th	65 (40)
4th to 5th	75 (45)

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

Gear change	km/h (MPH)
1st to 2nd	25 (15)
2nd to 3rd	40 (25)
3rd to 4th	65 (40)
4th to 5th	75 (45)

Suggested maximum speed in each gear

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

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

Gear	km/h (MPH)
1st	55 (35)
2nd	95 (60)
3rd	135 (85)

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

NCEC0031S04

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

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

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

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

X: Applicable —: Not applicable

SRT item	Self-diagnostic test item	Test value (GST display)		Test limit	Application
		TID	CID		
CATALYST	Three way catalyst function	01H	01H	Max.	X
		02H	81H	Min.	X
EVAP SYSTEM	EVAP control system (Small leak)	05H	03H	Max.	X
	EVAP control system purge flow monitoring	06H	83H	Min.	X
O2 SENSOR	Front heated oxygen sensor	09H	04H	Max.	X
		0AH	84H	Min.	X
		0BH	04H	Max.	X
		0CH	04H	Max.	X
		0DH	04H	Max.	X
	Rear heated oxygen sensor	19H	86H	Min.	X
		1AH	86H	Min.	X
		1BH	06H	Max.	X
		1CH	06H	Max.	X
O2 SENSOR HEATER	Front heated oxygen sensor heater	29H	08H	Max.	X
		2AH	88H	Min.	X
	Rear heated oxygen sensor heater	2DH	0AH	Max.	X
		2EH	8AH	Min.	X
EGR SYSTEM	EGR function	31H	8CH	Min.	X
		32H	8CH	Min.	X
		33H	8CH	Min.	X
		34H	8CH	Min.	X
		35H	0CH	Max.	X
	EGRC-BPT valve function	36H	0CH	Max.	X
		37H	8CH	Min.	X

EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS

NCEC0031S05

X: Applicable —: Not applicable

Items (CONSULT screen terms)	DTC*4		SRT code	Test value/Test limit (GST only)	1st trip DTC*4	Reference page
	CONSULT GST*2	ECM*1				
NO SELF DIAGNOSTIC FAILURE INDICATED	**P0000**	**0505**	—	—	—	—
MAF SEN/CIRCUIT	P0100	0102	—	—	X	EC-116
ABSL PRES SEN/CIRC	P0105	0803	—	—	X	EC-125
AIR TEMP SEN/CIRC	P0110	0401	—	—	X	EC-134
COOLANT T SEN/CIRC	P0115	0103	—	—	X	EC-140
THRTL POS SEN/CIRC	P0120	0403	—	—	X	EC-145

Emission-related Diagnostic Information (Cont'd)

Items (CONSULT screen terms)	DTC*4		SRT code	Test value/Test limit (GST only)	1st trip DTC*4	Reference page
	CONSULT GST*2	ECM*1				
*COOLAN T SEN/CIRC	P0125	0908	—	—	X	EC-156
FRONT O2 SENSOR	P0130	0303	X	X	X*3	EC-161
FRONT O2 SENSOR	P0131	0411	X	X	X*3	EC-167
FRONT O2 SENSOR	P0132	0410	X	X	X*3	EC-172
FRONT O2 SENSOR	P0133	0409	X	X	X*3	EC-177
FRONT O2 SENSOR	P0134	0412	X	X	X*3	EC-184
FR O2 SEN HEATER	P0135	0901	X	X	X*3	EC-190
REAR O2 SENSOR	P0137	0511	X	X	X*3	EC-195
REAR O2 SENSOR	P0138	0510	X	X	X*3	EC-203
REAR O2 SENSOR	P0139	0707	X	X	X*3	EC-210
REAR O2 SENSOR	P0140	0512	X	X	X*3	EC-218
RR O2 SEN HEATER	P0141	0902	X	X	X*3	EC-224
FUEL SYS DIAG-LEAN	P0171	0115	—	—	X	EC-229
FUEL SYS DIAG-RICH	P0172	0114	—	—	X	EC-235
FUEL TEMP SEN/CIRC	P0180	0402	—	—	X	EC-241
MULTI CYL MISFIRE	P0300	0701	—	—	X	EC-245
CYL 1 MISFIRE	P0301	0608	—	—	X	EC-245
CYL 2 MISFIRE	P0302	0607	—	—	X	EC-245
CYL 3 MISFIRE	P0303	0606	—	—	X	EC-245
CYL 4 MISFIRE	P0304	0605	—	—	X	EC-245
KNOCK SEN/CIRCUIT	P0325	0304	—	—	—	EC-250
CPS/CIRCUIT (OBD)	P0335	0802	—	—	X	EC-255
CAM POS SEN/CIRC	P0340	0101	—	—	X	EC-260
EGR SYSTEM	P0400	0302	X	X	X*3	EC-267
EGRC-BPT VALVE	P0402	0306	X	X	X*3	EC-275
TW CATALYST SYSTEM	P0420	0702	X	X	X*3	EC-279
EVAP SMALL LEAK	P0440	0705	X	X	X*3	EC-283
PURG VOLUME CONT/V	P0443	1008	—	—	X	EC-291
VENT CONTROL VALVE	P0446	0903	—	—	X	EC-296
EVAPO SYS PRES SEN	P0450	0704	—	—	X	EC-302
VEH SPEED SEN/CIRC	P0500	0104	—	—	X	EC-310
IACV/AAC VLV/CIRC	P0505	0205	—	—	X	EC-315
CLOSED TP SW/CIRC	P0510	0203	—	—	X	EC-320
A/T COMM LINE	P0600	—	—	—	—	EC-325
ECM	P0605	0301	—	—	X	EC-329
PNP SW/CIRC	P0705	1101	—	—	X	AT-92

Items (CONSULT screen terms)	DTC*4		SRT code	Test value/Test limit (GST only)	1st trip DTC*4	Reference page
	CONSULT GST*2	ECM*1				
ATF TEMP SEN/CIRC	P0710	1208	—	—	X	AT-97
VEH SPD SEN/CIR AT	P0720	1102	—	—	X	AT-103
ENGINE SPEED SIG	P0725	1207	—	—	X	AT-108
A/T 1ST GR FNCTN	P0731	1103	—	—	X	AT-112
A/T 2ND GR FNCTN	P0732	1104	—	—	X	AT-118
A/T 3RD GR FNCTN	P0733	1105	—	—	X	AT-124
A/T 4TH GR FNCTN	P0734	1106	—	—	X	AT-130
TCC SOLENOID/CIRC	P0740	1204	—	—	X	AT-139
A/T TCC S/V FNCTN	P0744	1107	—	—	X	AT-144
L/PRESS SOL/CIRC	P0745	1205	—	—	X	AT-152
SFT SOL A/CIRC	P0750	1108	—	—	X	AT-158
SFT SOL B/CIRC	P0755	1201	—	—	X	AT-163
MAP/BARO SW SOL/CIR	P1105	1302	—	—	X	EC-331
CLOSED LOOP	P1148	0307	—	—	—	EC-341
IGN SIGNAL-PRIMARY	P1320	0201	—	—	X	EC-343
CPS/CIRC (OBD) COG	P1336	0905	—	—	X	EC-350
EGRC SOLENOID/V	P1400	1005	—	—	X	EC-355
EGR TEMP SEN/CIRC	P1401	0305	—	—	X	EC-360
EGR SYSTEM	P1402	0514	X	X	X*3	EC-366
EVAP SMALL LEAK	P1440	0213	X	X	X*3	EC-372
PURG VOLUME CONT/V	P1444	0214	—	—	X	EC-380
VENT CONTROL VALVE	P1446	0215	—	—	X	EC-386
EVAP PURG FLOW/MON	P1447	0111	X	X	X*3	EC-390
VENT CONTROL VALVE	P1448	0309	—	—	X	EC-397
VC/V BYPASS/V	P1490	0801	—	—	X	EC-402
VC CUT/V BYPASS/V	P1491	0311	—	—	X	EC-407
PURG CONT/V S/V	P1492	0807	—	—	X	EC-414
PURG CONT/V & S/V	P1493	0312	—	—	X	EC-420
A/T DIAG COMM LINE	P1605	0804	—	—	X	EC-428
TP SEN/CIRC A/T	P1705	1206	—	—	X	AT-168
P-N POS SW/CIRCUIT	P1706	1003	—	—	X	EC-431
O/R CLTCH SOL/CIRC	P1760	1203	—	—	X	AT-176

*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.

HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION

NCEC0031S06

How to Erase DTC (With CONSULT)

NCEC0031S0601

NOTE:

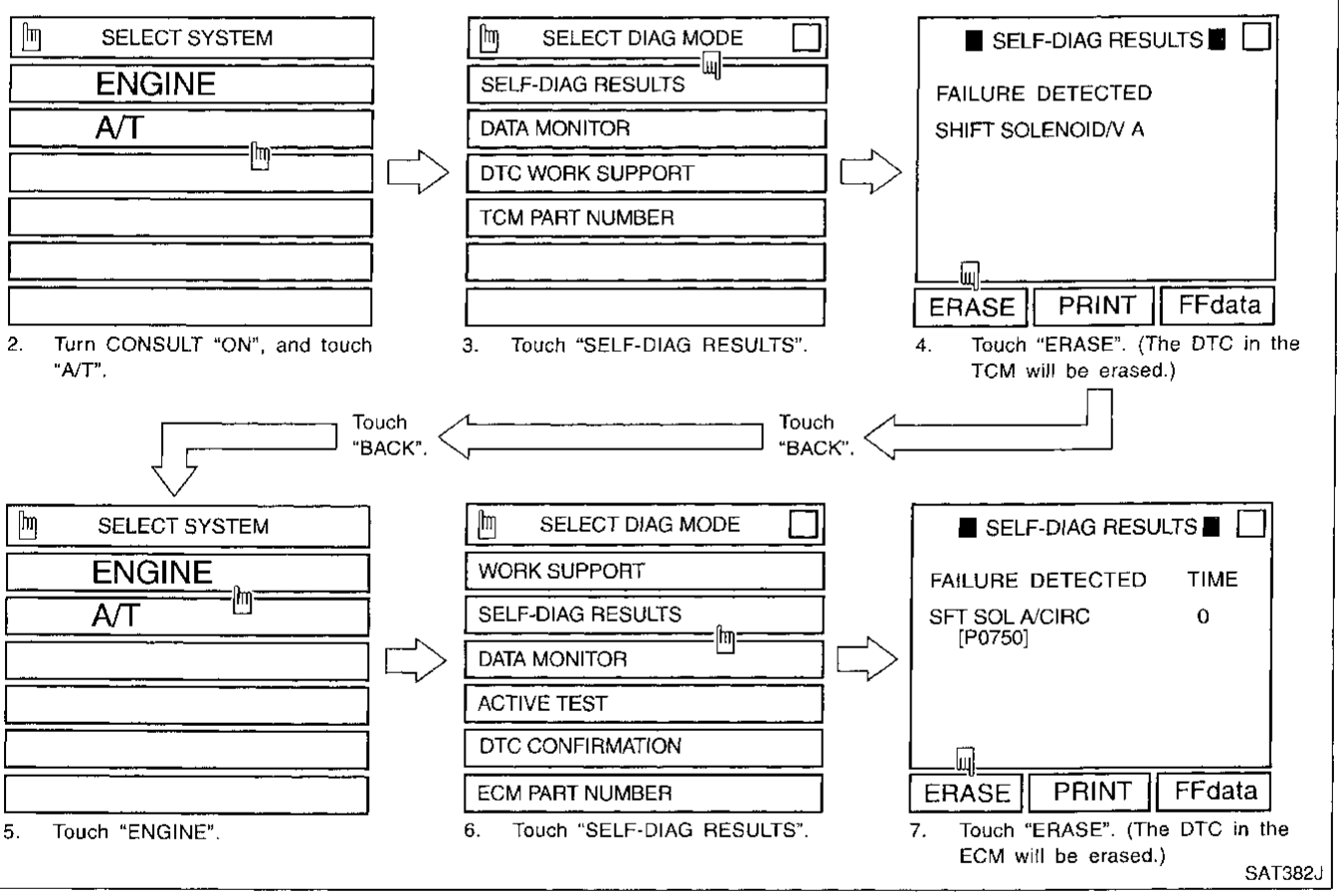
If the diagnostic trouble code is not for A/T related items (see EC-2), skip steps 2 through 4.

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 TCM (Transmission control module) will be erased.] Then touch "BACK" twice.
5. Touch "ENGINE".
6. Touch "SELF-DIAG RESULTS".
7. Touch "ERASE". (The DTC in the ECM will be erased.)

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

How to erase DTC (With CONSULT)

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.



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

How to Erase DTC (With GST)

NCEC0031S0602

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).

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

How to Erase DTC (No Tools)

NCEC0031S0603

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-57.)

The emission-related diagnostic information can be erased by changing the diagnostic test mode from Diagnostic Test Mode II to Mode I by turning the mode selector on the ECM. (Refer to EC-57.)

NOTE:

- **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.**

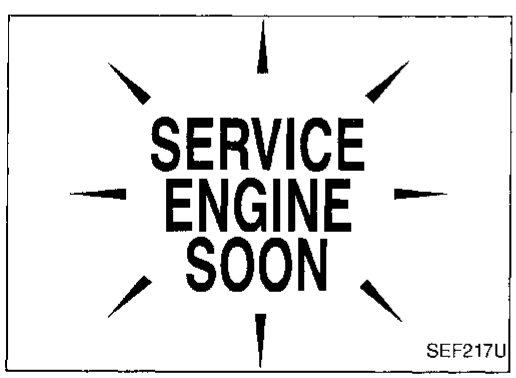
1) Diagnostic trouble codes
2) 1st trip diagnostic trouble codes
3) Freeze frame data
4) 1st trip freeze frame data
5) System readiness test (SRT) codes
6) Test values
7) Others

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.

Malfunction Indicator Lamp (MIL)

DESCRIPTION

NCEC0032



The MIL is located on the instrument panel.

1. The MIL will light up when the ignition switch is turned ON without the engine running. This is a bulb check.

- If the MIL does not light up, refer to EL section ("WARNING LAMPS") or see EC-475.

2. When the engine is started, the MIL should go off.
   If the MIL remains on, the on board diagnostic system has detected an engine system malfunction.

On Board Diagnostic System Function

=NCH:C0032S01

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

NCEC0032S0101

If the ECM is in Diagnostic Test Mode II, MIL may flash when engine is running. In this case, check ECM test mode selector following "HOW TO SWITCH DIAGNOSTIC TEST MODES" on next page.
How to switch the diagnostic test (function) modes, and details of the above functions are described later. (Refer to EC-57.)

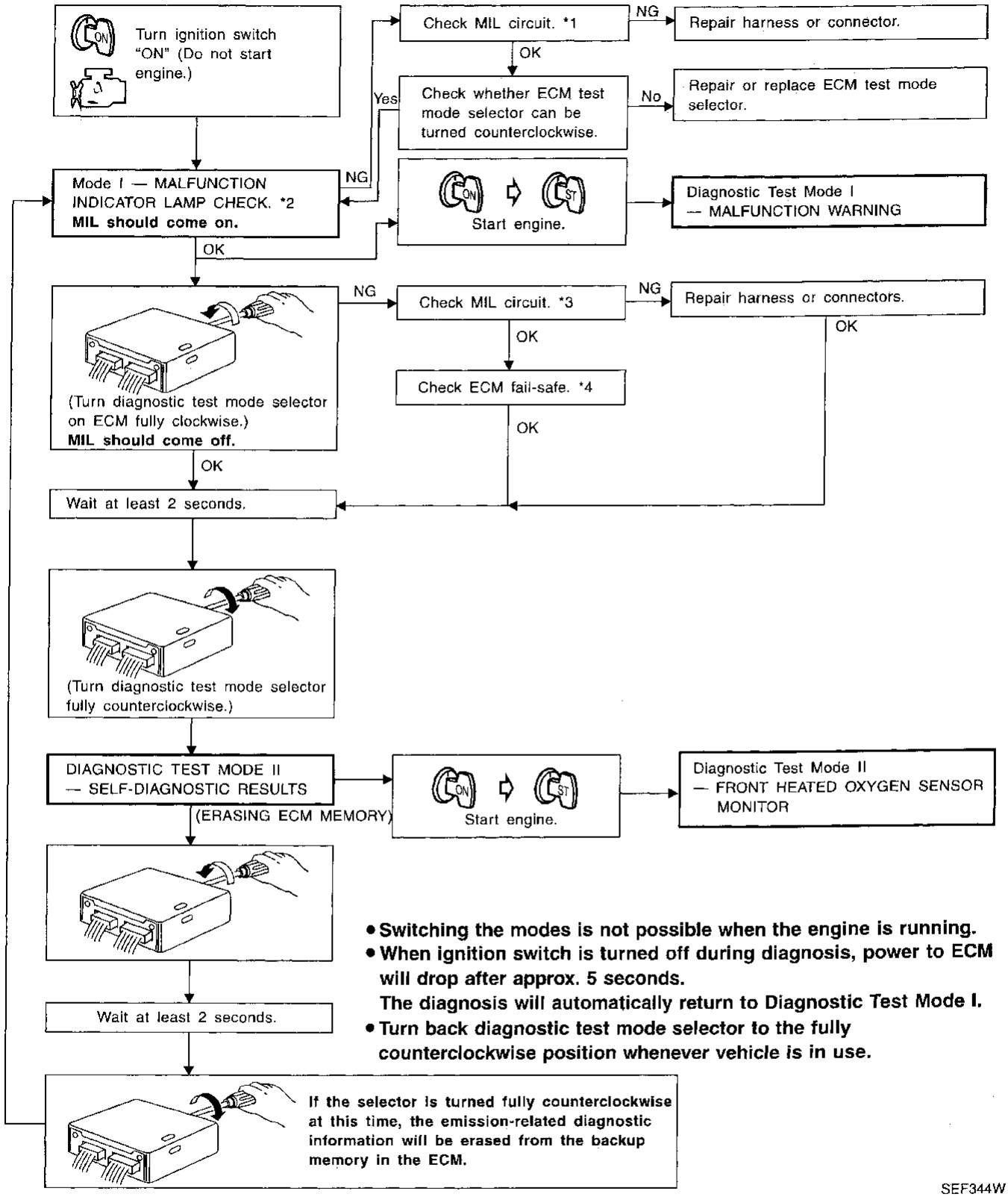
Condition		Diagnostic Test Mode I	Diagnostic Test Mode II
Ignition switch in "ON" position 	Engine stopped 	BULB CHECK	SELF-DIAGNOSTIC RESULTS
	Engine running 	MALFUNCTION WARNING	FRONT HEATED OXYGEN SENSOR MONITOR

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

How to Switch Diagnostic Test Modes

NCEC0032S02



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

SEF344W

*1: EC-475 *3: EC-475 *4: EC-91
*2: EC-56

Malfunction Indicator Lamp (MIL) (Cont'd)

Diagnostic Test Mode I — Bulb Check

NCEC0032S03

In this mode, the MIL on the instrument panel should stay ON. If it remains OFF, check the MIL bulb. Refer to EL section ("WARNING LAMPS") or see EC-475.

Diagnostic Test Mode I — Malfunction Warning

NCEC0032S04

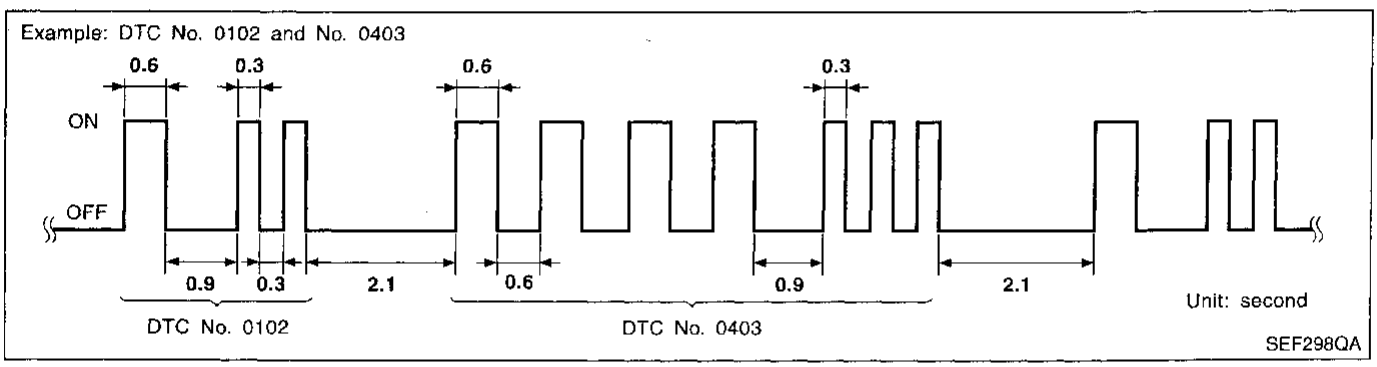
MIL	Condition
ON	When the malfunction is detected or the ECM's CPU is malfunctioning.
OFF	No malfunction.

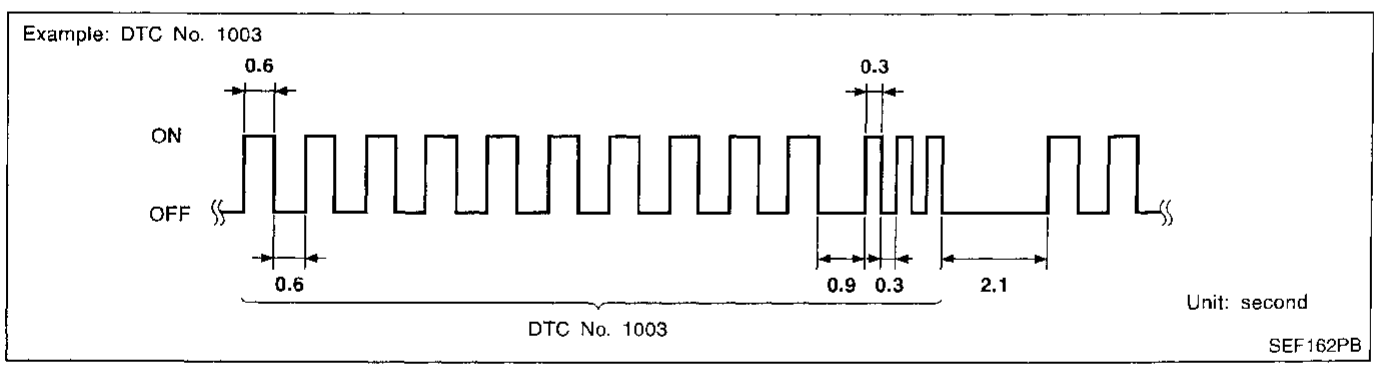
- These DTC numbers are clarified in Diagnostic Test Mode II (SELF-DIAGNOSTIC RESULTS).

Diagnostic Test Mode II — Self-diagnostic Results

NCEC0032S05

In this mode, the DTC and 1st trip DTC are indicated by the number of blinks of the MIL.
The DTC and 1st trip DTC are displayed at the same time. If the MIL does not illuminate in diagnostic test mode I (Malfunction warning), all displayed items are 1st trip DTCs. If only one code is displayed when the MIL illuminates in diagnostic test mode II (SELF-DIAGNOSTIC RESULTS), it is a DTC; if two or more codes are displayed, they may be either DTCs or 1st trip DTCs. DTC No. is same as that of 1st trip DTC. These unidentified codes can be identified by using the CONSULT 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 (PNP) switch.
In this way, all the detected malfunctions are classified by their DTC numbers. The DTC "0505" refers to no malfunction. (See TROUBLE DIAGNOSIS — INDEX, EC-2.)

How to Erase Diagnostic Test Mode II (Self-diagnostic results)

NCEC0032S0501

The DTC 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 DTC will be lost from the backup memory after approx. 24 hours.**
- **Be careful not to erase the stored memory before starting trouble diagnoses.**

Diagnostic Test Mode II — Front Heated Oxygen Sensor Monitor

NCEC0032S06

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

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

*: Maintains conditions just before switching to open loop.

To check the 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 MIL comes ON more than 5 times within 10 seconds with engine running at 2,000 rpm under no-load.

OBD System Operation Chart

NCEC0033

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

NCEC0033S01

- 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-44.
- 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

NCEC0033S02

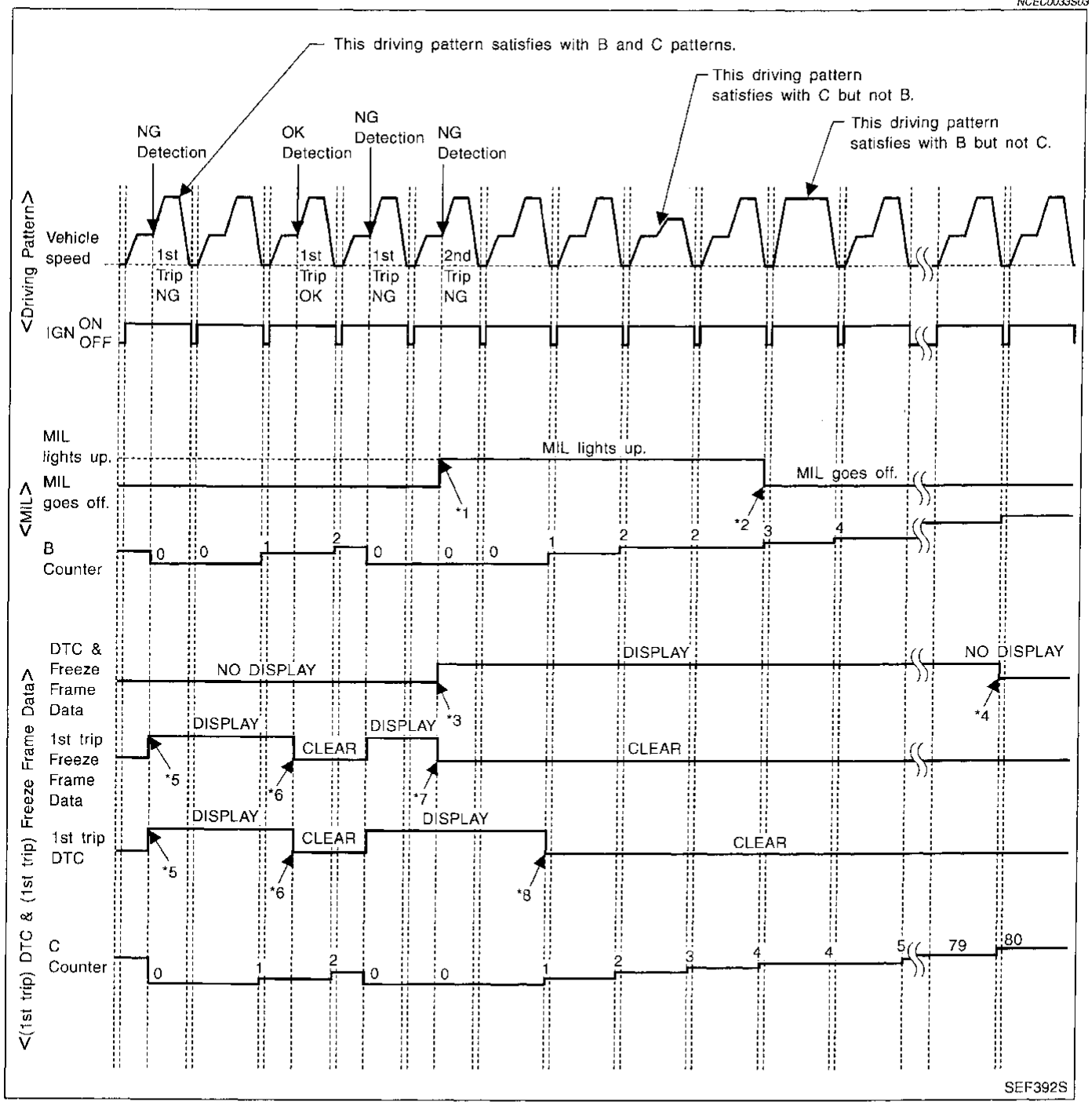
Items	Fuel Injection System	Misfire	Other
MIL (goes off)	3 (pattern B)	3 (pattern B)	3 (pattern B)
DTC, Freeze Frame Data (no display)	80 (pattern C)	80 (pattern C)	40 (pattern A)
1st Trip DTC (clear)	1 (pattern C), *1	1 (pattern C), *1	1 (pattern B)
1st Trip Freeze Frame Data (clear)	*1, *2	*1, *2	1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

For details about patterns "B" and "C" under "Fuel Injection System" and "Misfire", see EC-61.
For details about patterns "A" and "B" under "Other", see EC-63.
*1: Clear timing is at the moment OK is detected.
*2: Clear timing is when the same malfunction is detected in the 2nd trip.

OBD System Operation Chart (Cont'd)

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

NCEC0033S03



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

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

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

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

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

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

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

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

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

NCEC0033S04

Driving Pattern B

NCEC0033S0401

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

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

Driving Pattern C

NCEC0033S0402

Driving pattern C means the vehicle operation as follows:

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

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

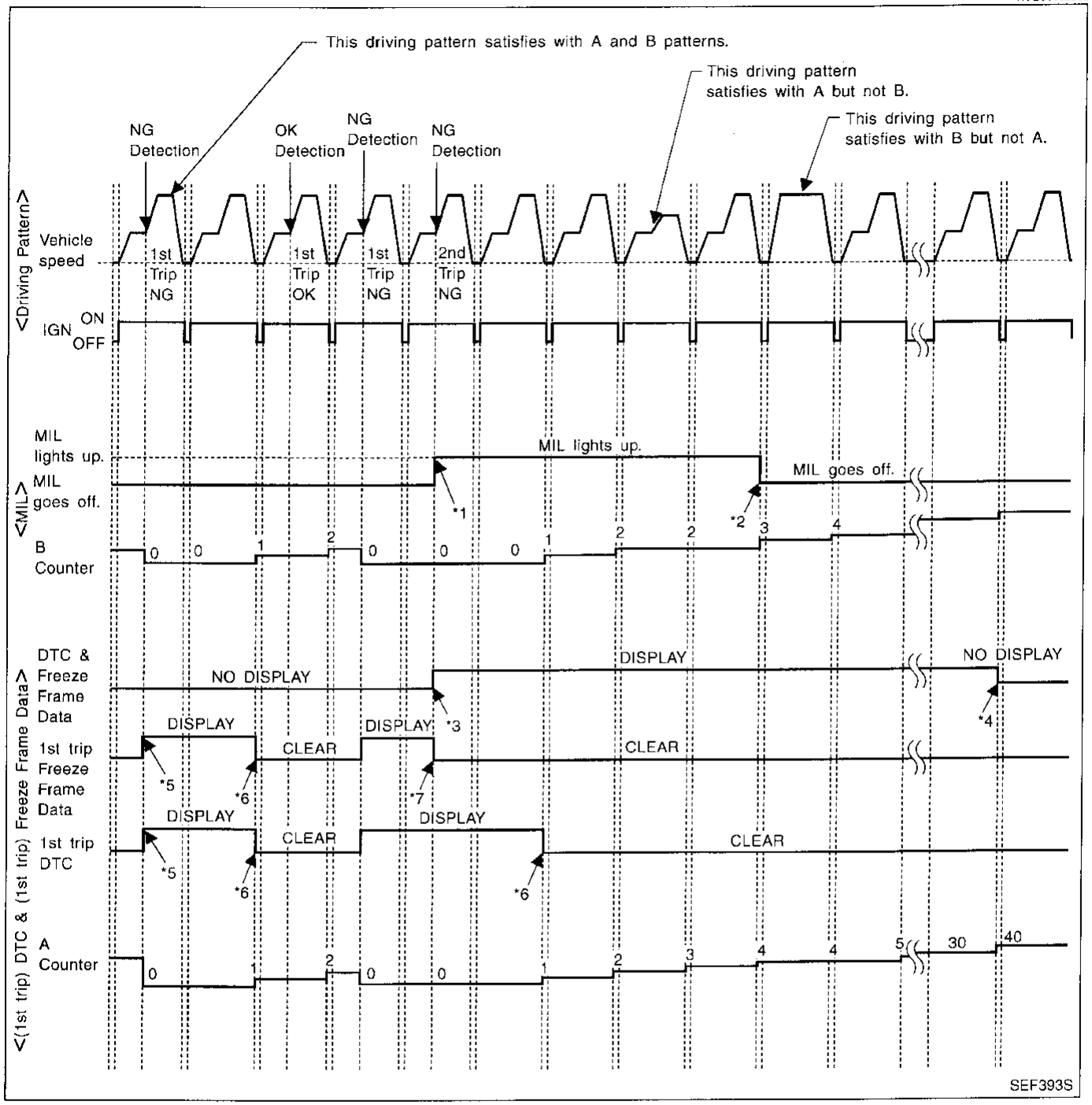
Example:
If the stored freeze frame data is as follows:
Engine speed: 850 rpm, Calculated load value: 30%, Engine coolant temperature: 80°C (176°F)
To be satisfied with driving pattern C, the vehicle should run under the following conditions:
Engine speed: 475 - 1,225 rpm, Calculated load value: 27 -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

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

OBD System Operation Chart (Cont'd)

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

NCEC0033S05



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

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

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

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

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

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

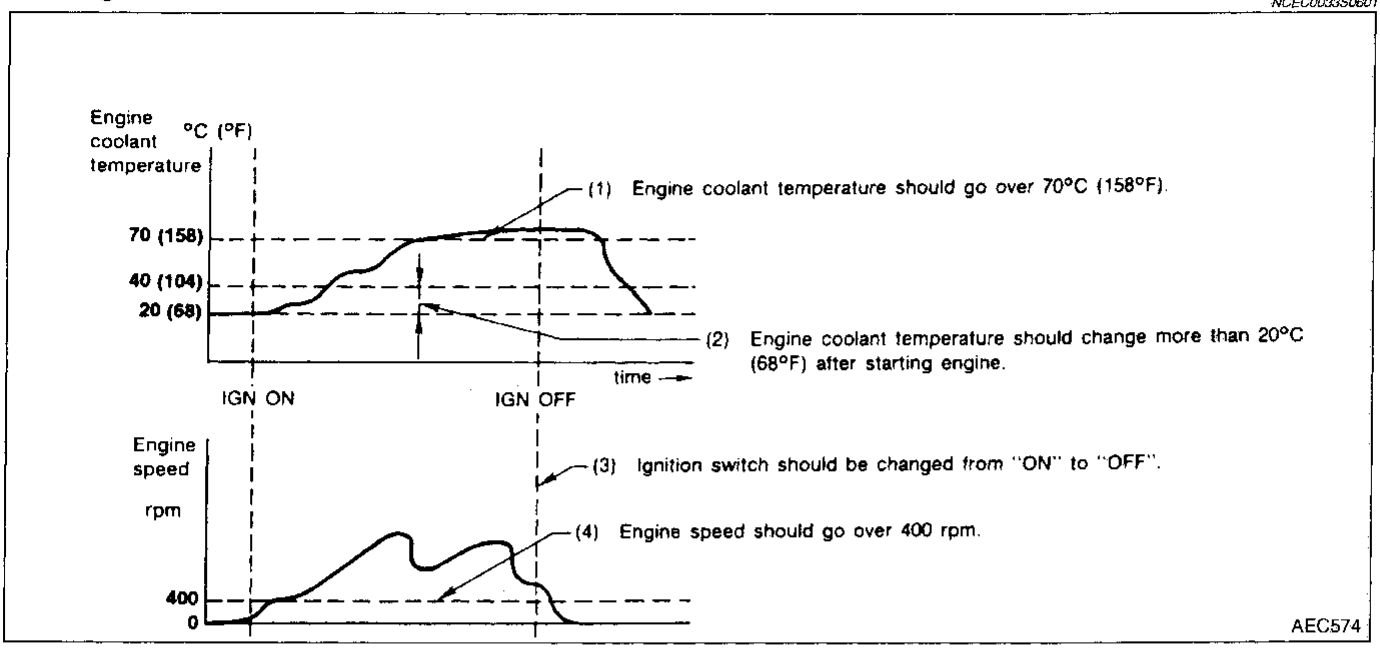
*7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.

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

NCEC0033S06

Driving Pattern A

NCEC0033S0601



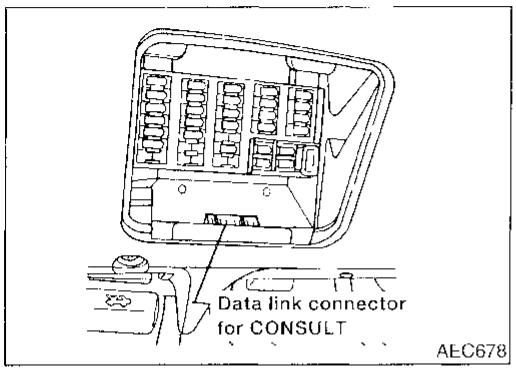
- The A counter will be cleared when the malfunction is detected regardless of (1) - (4).
- The A counter will be counted up when (1) - (4) are satisfied without the same malfunction.
- The DTC will not be displayed after the A counter reaches 40.

Driving Pattern B

NCEC0033S0602

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").



AEC678

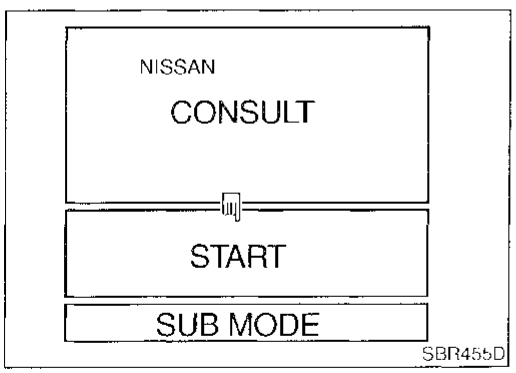
CONSULT

=NCEC0034

CONSULT INSPECTION PROCEDURE

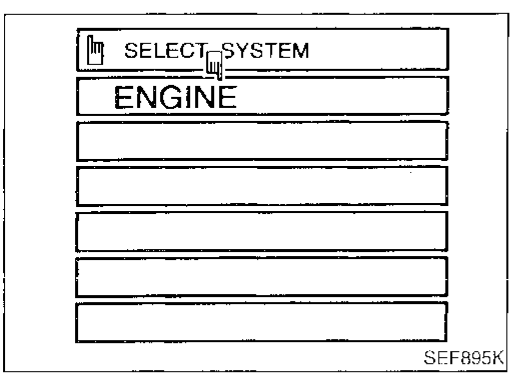
NCEC0034S01

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



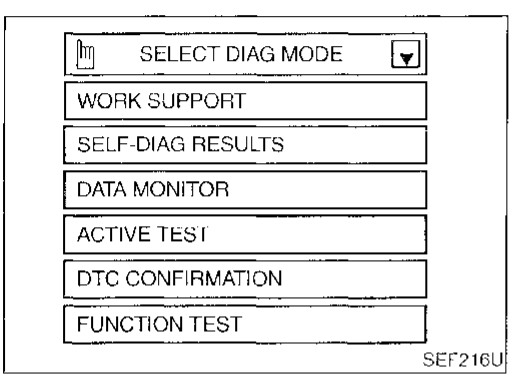
SBR455D

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



SEF895K

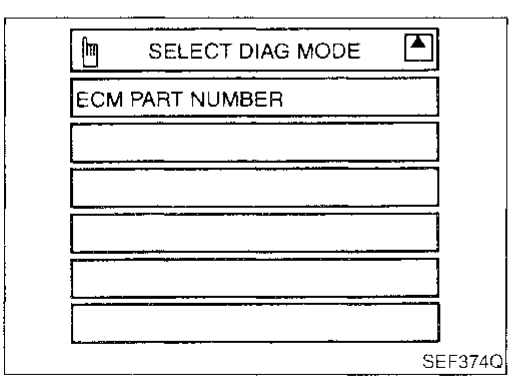
5. Touch "ENGINE".



SEF216U

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 UE990 program card. Screen differs in accordance with the program card used.



SEF374Q

ENGINE CONTROL COMPONENT PARTS/CONTROL SYSTEMS APPLICATION

NCEC0034S02

		Item	DIAGNOSTIC TEST MODE							
			WORK SUPPORT	SELF-DIAGNOSTIC RESULTS		DATA MONITOR	ACTIVE TEST	FUNCTION TEST	DTC CONFIRMATION	
				DTC*1	FREEZE FRAME DATA*2				SRT STATUS	DTC WORK SUPPORT
ENGINE CONTROL COMPONENT PARTS	INPUT	Camshaft position sensor		X	X	X				
		Mass air flow sensor		X		X				
		Engine coolant temperature sensor		X	X	X	X			
		Front heated oxygen sensor		X		X		X	X	X
		Rear heated oxygen sensor		X		X			X	X
		Vehicle speed sensor		X	X	X		X		
		Throttle position sensor	X	X		X		X		
		Tank fuel temperature sensor		X		X	X			
		EVAP control system pressure sensor		X		X				
		Absolute pressure sensor		X	X	X				
		EGR temperature sensor		X		X				
		Intake air temperature sensor		X		X				
		Crankshaft position sensor (OBD)		X						
		Knock sensor		X						
		Ignition switch (start signal)				X		X		
		Closed throttle position switch		X		X				
		Closed throttle position switch (throttle position sensor signal)				X		X		
		Air conditioner switch				X				
		Park/Neutral position (PNP) switch		X		X		X		
		Power steering oil pressure switch				X		X		
		Battery voltage				X				

CONSULT (Cont'd)

Item			DIAGNOSTIC TEST MODE							
			WORK SUP-PORT	SELF-DIAGNOS-TIC RESULTS		DATA MONITOR	ACTIVE TEST	FUNC-TION TEST	DTC CONFIRMATION	
				DTC*1	FREEZE FRAME DATA*2				SRT STATUS	DTC WORK SUP-PORT
ENGINE CONTROL COMPONENT PARTS	OUT-PUT	Injectors				X	X	X		
		Power transistor (Ignition timing)	X	X (Ignition signal)		X	X	X		
		IACV-AAC valve	X	X		X	X	X		
		EVAP canister purge control solenoid valve		X		X	X			X
		EVAP canister purge volume control valve		X		X	X			X
		Air conditioner relay				X				
		Fuel pump relay	X			X	X	X		
		EGRC-solenoid valve		X		X	X	X*3		
		Front heated oxygen sensor heater		X		X			X	
		Rear heated oxygen sensor heater		X		X			X	
		Cooling fan		X		X	X	X		
		EVAP canister vent control valve		X		X	X			
		Vacuum cut valve bypass valve		X		X	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-46.

*3: If this function test mode is not available, use the "ACTIVE TEST" mode.

FUNCTION

NCEC0034S03

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.
DTC confirmation	The status of system monitoring tests and the self-diagnosis status/result can be confirmed.

Diagnostic test mode	Function
Function test	Conducted by CONSULT instead of a technician to determine whether each system is "OK" or "NG".
ECM part number	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

NCEC0034S04

WORK ITEM	CONDITION	USAGE
THRTL POS SEN ADJ	CHECK THE THROTTLE POSITION SENSOR SIGNAL. ADJUST IT TO THE SPECIFIED VALUE BY ROTATING THE SENSOR BODY UNDER THE FOLLOWING CONDITIONS. • IGN SW "ON" • ENG NOT RUNNING • ACC PEDAL NOT PRESSED	When adjusting throttle position sensor initial position
IGNITION TIMING ADJ	• IGNITION TIMING FEEDBACK CONTROL WILL BE HELD BY TOUCHING "START". AFTER DOING SO, ADJUST IGNITION TIMING WITH A TIMING LIGHT BY TURNING THE CRANKSHAFT POSITION SENSOR.	When adjusting initial ignition timing
IACV-AAC VALVE ADJ	SET ENGINE SPEED AT THE SPECIFIED VALUE UNDER THE FOLLOWING CONDITIONS. • ENGINE WARMED UP • NO-LOAD	When adjusting idle speed
FUEL PRESSURE RELEASE	• FUEL PUMP WILL STOP BY TOUCHING "START" DURING IDLING. CRANK A FEW TIMES AFTER ENGINE STALLS.	When releasing fuel pressure from fuel line
EVAP SYSTEM CLOSE	OPEN THE VACUUM CUT VALVE BYPASS VALVE AND CLOSE THE EVAP CANISTER VENT CONTROL VALVE IN ORDER TO MAKE EVAP SYSTEM CLOSE UNDER THE FOLLOWING CONDITIONS. • BATTERY VOLTAGE IS SUFFICIENT. • IGN SW "ON" • ENGINE NOT RUNNING • AMBIENT TEMPERATURE IS ABOVE 0°C (32°F). • NO VACUUM AND NO HIGH PRESSURE IN EVAP SYSTEM • TANK FUEL TEMP. IS MORE THAN 0°C (32°F). • WITHIN 10 MINUTES AFTER STARTING "EVAP SYSTEM CLOSE" WHEN TRYING TO EXECUTE "EVAP SYSTEM CLOSE" UNDER THE CONDITIONS ABOVE, CONSULT WILL DISCONTINUE AND DISPLAY INSTRUCTIONS. **NOTE:** **WHEN STARTING ENGINE, CONSULT MAY DISPLAY "BATTERY VOLTAGE IS LOW. CHARGE BATTERY", EVEN WHEN USING A CHARGED BATTERY.**	When detecting EVAP vapor leak point of EVAP system

SELF DIAGNOSTIC MODE

NCEC0034S05

DTC and 1st Trip DTC

NCEC0034S0501

Regarding items of "DTC and 1st trip DTC", refer to "TROUBLE DIAGNOSIS — INDEX", EC-2.

CONSULT (Cont'd)

Freeze Frame Data and 1st Trip Freeze Frame Data

NCEC0034S0502

Freeze frame data item*	Description
DIAG TROUBLE CODE [PXXXX]	• Engine Control component part/control system has a trouble code, it is displayed as "PXXXX". [Refer to "Alphabetical & P No. Index for DTC" (EC-2).]
FUEL SYS DATA	• "Fuel injection system status" at the moment a malfunction is detected is displayed. • One mode in the following is displayed. "MODE 2": Open loop due to detected system malfunction "MODE 3": Open loop due to driving conditions (power enrichment, deceleration enrichment) "MODE 4": Closed loop - using oxygen sensor(s) as feedback for fuel control "MODE 5": Open loop - has not yet satisfied condition to go to closed loop
CAL/LD VALUE [%]	• The calculated load value at the moment a malfunction is detected is displayed.
COOLANT TEMP [°C] or [°F]	• The engine coolant temperature at the moment a malfunction is detected is displayed.
S-FUEL TRIM [%]	• "Short-term fuel trim" at the moment a malfunction is detected is displayed. • The short-term fuel trim indicates dynamic or instantaneous feedback compensation to the base fuel schedule.
L-FUEL TRIM [%]	• "Long-term fuel trim" at the moment a malfunction is detected is displayed. • The long-term fuel trim indicates much more gradual feedback compensation to the base fuel schedule than short-term fuel trim.
ENGINE SPEED [rpm]	• The engine speed at the moment a malfunction is detected is displayed.
VHCL SPEED [km/h] or [mph]	• The vehicle speed at the moment a malfunction is detected is displayed.
ABSOL PRESS [kPa] or [kg/cm^2] or [psi]	• The absolute pressure at the moment a malfunction is detected is displayed.

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

DATA MONITOR MODE

NCEC0034S06

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
CMPS·RPM (REF) [rpm]	○	○	• Indicates the engine speed computed from the REF signal (180° signal) of the camshaft position sensor.	• Accuracy becomes poor if engine speed drops below the idle rpm. • If the signal is interrupted while the engine is running, an abnormal value may be indicated.
MAS AIR/FL SE [V]	○	○	• The signal voltage of the mass air flow sensor is displayed.	• When the engine is stopped, a certain value is indicated.
COOLAN TEMP/S [°C] or [°F]	○	○	• The engine coolant temperature (determined by the signal voltage of the engine coolant temperature sensor) is displayed.	• When the engine coolant temperature sensor is open or short-circuited, ECM enters fail-safe mode. The engine coolant temperature determined by the ECM is displayed.
FR O2 SENSOR [V]	○	○	• The signal voltage of the front heated oxygen sensor is displayed.	
RR O2 SENSOR [V]	○	○	• The signal voltage of the rear heated oxygen sensor is displayed.	

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
FR O2 MNTR [RICH/LEAN]	○	○	• Display of front heated oxygen sensor signal during air-fuel ratio feedback control: RICH ... means the mixture became "rich", and control is being affected toward a leaner mixture. LEAN ... means the mixture became "lean", and control is being affected toward a rich mixture.	• After turning ON the ignition switch, "RICH" is displayed until air-fuel mixture ratio feedback control begins. • When the air-fuel ratio feedback is clamped, the value just before the clamping is displayed continuously.
RR O2 MNTR [RICH/LEAN]	○		• Display of rear heated oxygen sensor signal: RICH ... means the amount of oxygen after three way catalyst is relatively small. LEAN ... means the amount of oxygen after three way catalyst is relatively large.	• When the engine is stopped, a certain value is indicated.
VHCL SPEED SE [km/h] or [mph]	○	○	• The vehicle speed computed from the vehicle speed sensor signal is displayed.	
BATTERY VOLT [V]	○	○	• The power supply voltage of ECM is displayed.	
THRTL POS SEN [V]	○	○	• The throttle position sensor signal voltage is displayed.	
TANK F/TMP SE [°C] or [°F]	○		• The fuel temperature judged from the tank fuel temperature sensor signal voltage is displayed.	
EGR TEMP SEN [V]	○		• The signal voltage of the EGR temperature sensor is displayed.	
INT/A TEMP SE [°C] or [°F]	○		• The intake air temperature determined by the signal voltage of the intake air temperature sensor is indicated.	
START SIGNAL [ON/OFF]	○	○	• Indicates [ON/OFF] condition from the starter signal.	• After starting the engine, [OFF] is displayed regardless of the starter signal.
CLSD THL/P SW [ON/OFF]			• Indicates mechanical contact [ON/OFF] condition of the closed throttle position switch.	
CLSD THL POS [ON/OFF]	○	○	• Indicates idle position [ON/OFF] computed by ECM according to the throttle position sensor signal.	
AIR COND SIG [ON/OFF]	○	○	• Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioning signal.	
P/N POSI SW [ON/OFF]	○	○	• Indicates [ON/OFF] condition from the PNP switch signal.	
PW/ST SIGNAL [ON/OFF]	○	○	• Indicates [ON/OFF] condition of the power steering oil pressure switch determined by the power steering oil pressure switch signal.	
IGNITION SW [ON/OFF]	○		• Indicates [ON/OFF] condition from ignition switch.	

CONSULT (Cont'd)

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
INJ PULSE [msec]		○	• Indicates the actual fuel injection pulse width compensated by ECM according to the input signals.	• When the engine is stopped, a certain computed value is indicated.
B/FUEL SCHDL [msec]		○	• "Base fuel schedule" indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.	
IGN TIMING [BTDC]		○	• Indicates the ignition timing computed by ECM according to the input signals.	
IACV-AAC/V [%]		○	• Indicates the IACV-AAC valve control value computed by ECM according to the input signals.	
PURG VOL C/V [step]		○	• Indicates the EVAP canister purge volume control value computed by the ECM according to the input signals. • The opening becomes larger as the value increases.	
A/F ALPHA [%]			• Indicates the mean value of the air-fuel ratio feedback correction factor per cycle.	• 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]		○	• The signal voltage of EVAP control system pressure sensor is displayed.	
AIR COND RLY [ON/OFF]			• Indicates the air conditioner relay control condition determined by ECM according to the input signals.	
FUEL PUMP RLY [ON/OFF]			• Indicates the fuel pump relay control condition determined by ECM according to the input signals.	
COOLING FAN [HI/LOW/OFF]			• Indicates the control condition of the cooling fan determined by ECM according to the input signals. HI ... High speed operation LOW ... Low speed operation OFF ... Stop	
EGRC SOL/V [ON/OFF] (FLOW/CUT)			• Indicates the control condition of the EGRC-solenoid valve determined by ECM according to the input signals. • ON ... EGR valve is operational OFF ... EGR valve operation is cut-off	
VENT CONT/V [ON/OFF]			• The control condition of the EVAP canister vent control valve (determined by ECM according to the input signal) is indicated. • ON ... Closed OFF ... Open	
FR O2 HEATER [ON/OFF]			• Indicates [ON/OFF] condition of front heated oxygen sensor heater determined by ECM according to the input signals.	

CONSULT (Cont'd)

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
RR O2 HEATER [ON/OFF]			• Indicates [ON/OFF] condition of rear heated oxygen sensor heater determined by ECM according to the input signals.	
VC/V BYPASS/V [ON/OFF]			• The control condition of the vacuum cut valve bypass valve (determined by ECM according to the input signal) is indicated. • ON ... Open OFF ... Closed	
PURG CONT S/V [ON/OFF]			• The control condition of the EVAP canister purge control solenoid valve (computed by the ECM according to the input signals) is indicated. • ON ... Canister purge is operational OFF ... Canister purge operation is cut-off	
CAL/LD VALUE [%]			• "Calculated load value" indicates the value of the current airflow divided by peak airflow.	
ABSOL TH·P/S [%]			• "Absolute throttle position sensor" indicates the throttle opening computed by ECM according to the signal voltage of the throttle position sensor.	
MASS AIRFLOW [gm/s]			• Indicates the mass airflow computed by ECM according to the signal voltage of the mass air flow sensor.	
MAP/BARO SW/V [MAP/BARO]			• The control condition of the MAP/BARO switch solenoid valve (determined by ECM according to the input signal) is indicated. MAP ... Intake manifold absolute pressure BARO ... Ambient barometric pressure	
ABSOL PRES/SE [V]			• The signal voltage of the absolute pressure sensor is displayed.	
VOLTAGE [V]			• Voltage measured by the voltage probe.	
PULSE [msec] or [Hz] or [%]			• Pulse width, frequency or duty cycle measured by the pulse probe.	• Only "#" is displayed if item is unable to be measured. • Figures with "#"s are temporary ones. They are the same figures as an actual piece of data which was just previously measured.

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

ACTIVE TEST MODE

NCEC0034S07

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
FUEL INJECTION	• Engine: Return to the original trouble condition • Change the amount of fuel injection using CONSULT.	If trouble symptom disappears, see CHECK ITEM.	• Harness and connector • Fuel injectors • Front heated oxygen sensor

CONSULT (Cont'd)

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
IACV-AAC/V OPENING	• Engine: After warming up, idle the engine. • Change the IACV-AAC valve opening percent using CONSULT.	Engine speed changes according to the opening percent.	• Harness and connector • IACV-AAC valve
ENG COOLANT TEMP	• Engine: Return to the original trouble condition • Change the engine coolant temperature indication using CONSULT.	If trouble symptom disappears, see CHECK ITEM.	• Harness and connector • Engine coolant temperature sensor • Fuel injectors
IGNITION TIMING	• Engine: Return to the original trouble condition • Timing light: Set • Retard the ignition timing using CONSULT.	If trouble symptom disappears, see CHECK ITEM.	• Adjust initial ignition timing
POWER BALANCE	• Engine: After warming up, idle the engine. • Air conditioner switch "OFF" • Shift lever "N" • Cut off each injector signal one at a time using CONSULT.	Engine runs rough or dies.	• Harness and connector • Compression • Injectors • Power transistor • Spark plugs • Ignition coils
COOLING FAN	• Ignition switch: ON • Turn the cooling fan "ON" and "OFF" using CONSULT.	Cooling fan moves and stops.	• Harness and connector • Cooling fan motor
FUEL PUMP RELAY	• Ignition switch: ON (Engine stopped) • Turn the fuel pump relay "ON" and "OFF" using CONSULT and listen to operating sound.	Fuel pump relay makes the operating sound.	• Harness and connector • Fuel pump relay
EGRC SOLENOID VALVE	• Ignition switch: ON • Turn EGRC-solenoid valve "ON" and "OFF" using CONSULT and listen to operating sound.	EGRC-solenoid valve makes an operating sound.	• Harness and connector • EGRC-solenoid valve
SELF-LEARNING CONT	• In this test, the coefficient of self-learning control mixture ratio returns to the original coefficient by touching "CLEAR" on the screen.		
PURG VOL CONT/V	• Engine: After warming up, run engine at 1,500 rpm. • Change the EVAP canister purge volume control valve opening step using CONSULT.	Engine speed changes according to the opening step.	• Harness and connector • EVAP canister purge volume control valve
TANK F/TEMP SEN	• Change the tank fuel temperature using CONSULT.		
VENT CONTROL/V	• Ignition switch: ON (Engine stopped) • Turn solenoid valve "ON" and "OFF" using CONSULT and listen to operating sound.	Solenoid valve makes an operating sound.	• Harness and connector • Solenoid valve
VC/V BYPASS/V	• Ignition switch: ON (Engine stopped) • Turn solenoid valve "ON" and "OFF" using CONSULT and listen to operating sound.	Solenoid valve makes an operating sound.	• Harness and connector • Solenoid valve

CONSULT (Cont'd)

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
PURG CONT S/V	• Start engine. • Turn the EVAP canister purge control solenoid valve "ON" and "OFF" using CONSULT and listen for operating sound.	EVAP canister purge control solenoid valve makes an operating sound. Check vacuum signal for EVAP canister purge control valve. VC ON ... Vacuum exists. VC OFF ... Vacuum does not exist.	• Harness and connector • EVAP canister purge control solenoid valve • Vacuum hose
MAP/BARO SW/V	• Ignition switch: ON (Engine stopped) • Turn the MAP/BARO switch solenoid valve between "MAP" and "BARO" using CONSULT and listen to operating sound.	MAP/BARO switch solenoid valve makes an operating sound.	• Harness and connector • MAP/BARO switch solenoid valve

DTC CONFIRMATION MODE

NCEC0034S08

SRT STATUS Mode

NCEC0034S0801

For details, refer to "SYSTEM READINESS TEST (SRT) CODE", EC-46.

DTC Work Support Mode

NCEC0034S0802

TEST MODE	TEST ITEM	CONDITION	REFERENCE PAGE
EVAPORATIVE SYSTEM	EVAP SML LEAK P0440	Refer to corresponding trouble diagnosis for DTC.	EC-283
	EVAP SML LEAK P1440		EC-372
	PURG VOL CN/V P1444		EC-380
	PURGE FLOW P1447		EC-390
	VC CUT/V BP/V P1491		EC-407
	PURG CN/V & S/V P1493		EC-420
FR O2 SENSOR	FR O2 SENSOR P0130		EC-161
	FR O2 SENSOR P0131		EC-167
	FR O2 SENSOR P0132		EC-172
	FR O2 SENSOR P0133		EC-177
RR O2 SENSOR	RR O2 SENSOR P0137		EC-195
	RR O2 SENSOR P0138		EC-203
	RR O2 SENSOR P0139		EC-210
EGR SYSTEM	EGR SYSTEM P0400		EC-267
	EGRC-BPT/VLV P0402		EC-275
	EGR SYSTEM P1402		EC-366

FUNCTION TEST MODE

NCEC0034S09

FUNCTION TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
SELF-DIAG RESULTS	• Ignition switch: ON (Engine stopped) • Displays the results of on board diagnostic system.	—	Objective system

CONSULT (Cont'd)

FUNCTION TEST ITEM	CONDITION	JUDGEMENT		CHECK ITEM (REMEDY)
CLOSED THROTTLE POSI	• Ignition switch: ON (Engine stopped) • Closed throttle position sensor circuit is tested when throttle is opened and closed fully. ("IDLE POSITION" is the test item name for the vehicles in which idle is selected by throttle position sensor.)	Throttle valve: opened	OFF	• Harness and connector • Throttle position sensor (Closed throttle position) • Throttle position sensor (Closed throttle position) adjustment • Throttle linkage • Verify operation in DATA MONITOR mode.
		Throttle valve: closed	ON	
THROTTLE POSI SEN CKT	• Ignition switch: ON (Engine stopped) • Throttle position sensor circuit is tested when throttle is opened and closed fully.	Range (Throttle valve fully opened — Throttle valve fully closed)	More than 3.0V	• Harness and connector • Throttle position sensor • Throttle position sensor adjustment • Throttle linkage • Verify operation in DATA MONITOR mode.
PARK/NEUT POSI SW CKT	• Ignition switch: ON (Engine stopped) • PNP switch circuit is tested when shift lever is manipulated.	Out of N/P positions	OFF	• Harness and connector • PNP switch • Linkage or PNP switch adjustment
		In N/P positions	ON	
FUEL PUMP CIRCUIT	• Ignition switch: ON (Engine stopped) • Fuel pump circuit is tested by checking the pulsation in fuel pressure when fuel tube is pinched.	There is pressure pulsation on the fuel feed hose.		• Harness and connector • Fuel pump • Fuel pump relay • Fuel filter clogging • Fuel level
EGRC SOL/V CIRCUIT*	• Ignition switch: ON (Engine stopped) • EGRC-solenoid valve circuit is tested by checking solenoid valve operating noise.	The EGRC-solenoid valve makes an operating sound every 3 seconds.		• Harness and connector • EGRC-solenoid valve
COOLING FAN CIRCUIT	• Ignition switch: ON (Engine stopped) • Cooling fan circuit is tested when cooling fan is rotated.	The cooling fan rotates and stops every 3 seconds.		• Harness and connector • Cooling fan motor • Cooling fan relay
START SIGNAL CIRCUIT	• Ignition switch: ON → START • Start signal circuit is tested when engine is started by operating the starter. Before cranking, battery voltage and engine coolant temperature are displayed. During cranking, average battery voltage, mass air flow sensor output voltage and cranking speed are displayed.	Start signal: OFF → ON		• Harness and connector • Ignition switch
PW/ST SIGNAL CIRCUIT	• Ignition switch: ON (Engine running) • Power steering circuit is tested when steering wheel is rotated fully and then set to a straight line running position.	Locked position	ON	• Harness and connector • Power steering oil pressure switch • Power steering oil pump
		Neutral position	OFF	
VEHICLE SPEED SEN CKT	• Vehicle speed sensor circuit is tested when vehicle is running at a speed of 10 km/h (6 MPH) or higher.	Vehicle speed sensor input signal is greater than 4 km/h (2 MPH)		• Harness and connector • Vehicle speed sensor • Electric speedometer

CONSULT (Cont'd)

FUNCTION TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
IGN TIMING ADJ	• 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.	• Adjust ignition timing (by moving camshaft position sensor or distributor) • Camshaft position sensor drive mechanism
MIXTURE RATIO TEST	• Air-fuel ratio feedback circuit (injection system, ignition system, vacuum system, etc.) is tested by examining the front heated oxygen sensor output at 2,000 rpm under non-loaded state.	Front heated oxygen sensor COUNT: More than 5 times during 10 seconds	• INJECTION SYS (Injector, fuel pressure regulator, harness or connector) • IGNITION SYS (Spark plug, power transistor, ignition coil, harness or connector) • VACUUM SYS (Intake air leaks) • Front heated oxygen sensor circuit • Front heated oxygen sensor operation • Fuel pressure high or low • Mass air flow sensor
POWER BALANCE	• After warming up, idle the engine. • Injector operation of each cylinder is stopped one after another, and resultant change in engine rotation is examined to evaluate combustion of each cylinder. (This is only displayed for models where a sequential multiport fuel injection system is used.)	Difference in engine speed is greater than 25 rpm before and after cutting off the injector of each cylinder.	• Injector circuit (Injector, harness or connector) • Ignition circuit (Spark plug, power transistor, ignition coil, harness or connector) • Compression • Valve timing
IACV-AAC/V SYSTEM	• After warming up, idle the engine. • IACV-AAC valve system is tested by detecting change in engine speed when IACV-AAC valve opening is changed to 0%, 20% and 80%.	Difference in engine speed is greater than 150 rpm between when valve opening is at 80% and at 20%.	• Harness and connector • IACV-AAC valve • Air passage restriction between air inlet and IACV-AAC valve • IAS (Idle adjusting screw) adjustment

*: If this function test mode is not available, use the "ACTIVE TEST" mode.

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

NCEC0034S10

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.

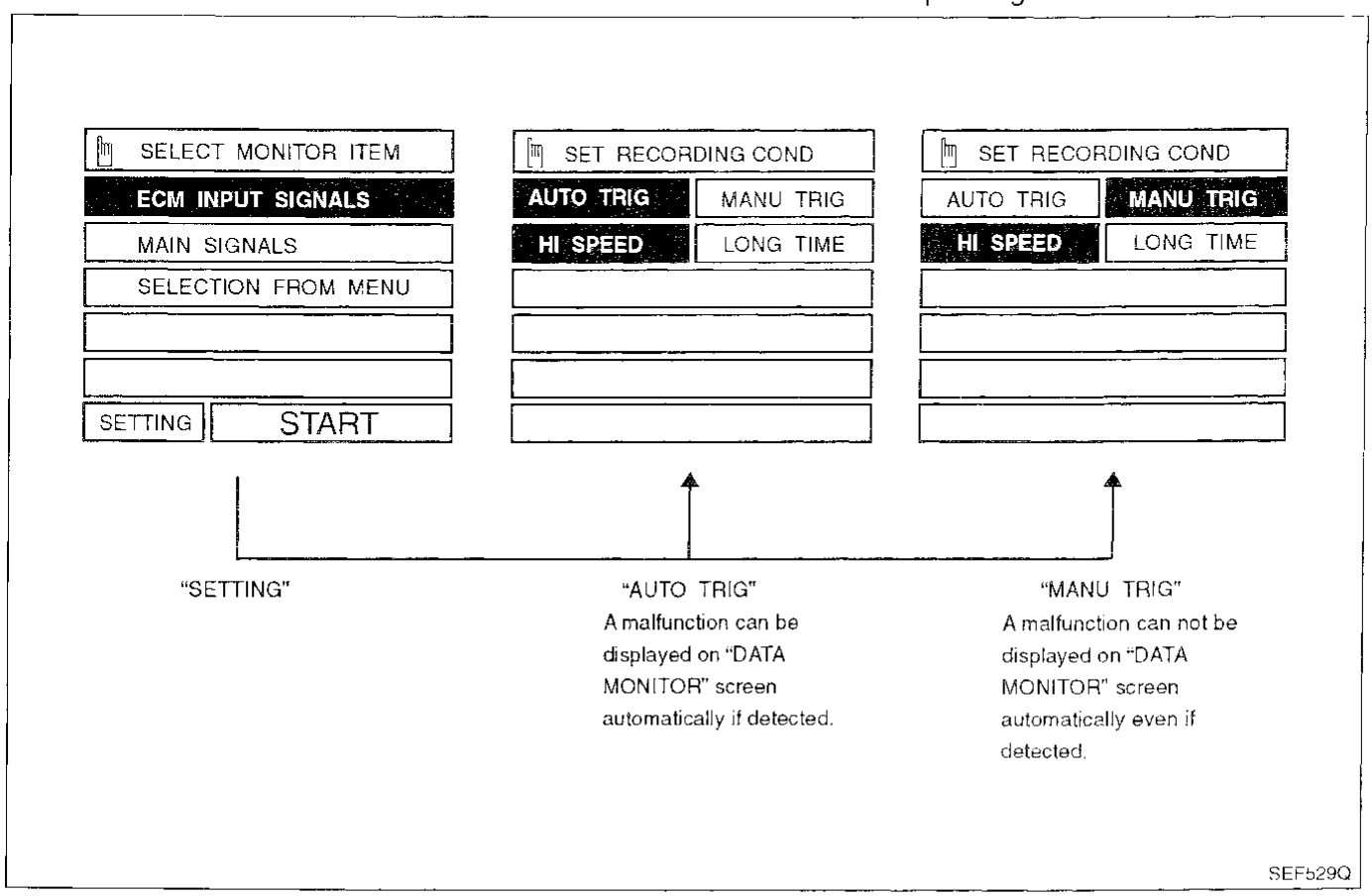
Use these triggers as follows:

1) "AUTO TRIG"

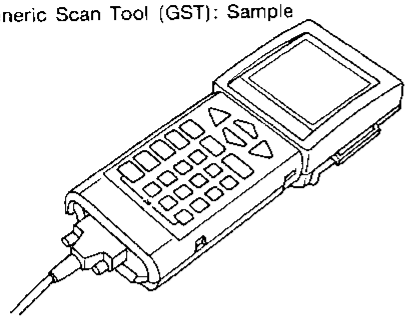
- While trying to detect the DTC/1st trip DTC by performing the "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE", be sure to select to "DATA MONITOR (AUTO TRIG)" mode. You can confirm the malfunction at the moment it is detected.
- While narrowing down the possible causes, CONSULT should be set in "DATA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

2) "MANU TRIG"

- If the malfunction is displayed as soon as "DATA MONITOR" is selected, reset CONSULT to "MANU TRIG". By selecting "MANU TRIG" you can monitor and store the data. The data can be utilized for further diagnosis, such as a comparison with the value for the normal operating condition.



Generic Scan Tool (GST): Sample



SEF139P

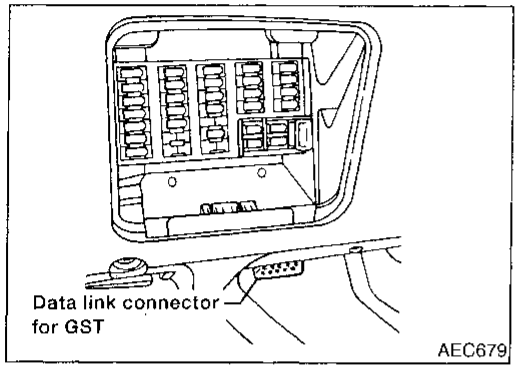
Generic Scan Tool (GST)

=NCEC0035

DESCRIPTION

NCEC0035S01

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.

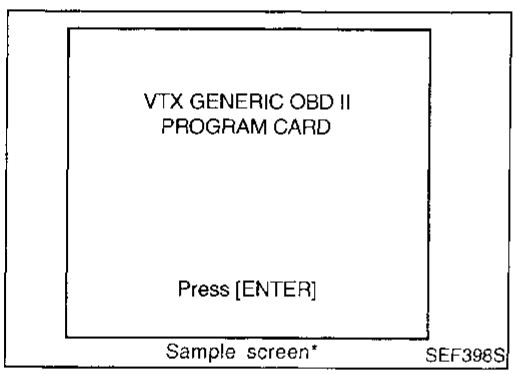


AEC679

GST INSPECTION PROCEDURE

NCEC0035S02

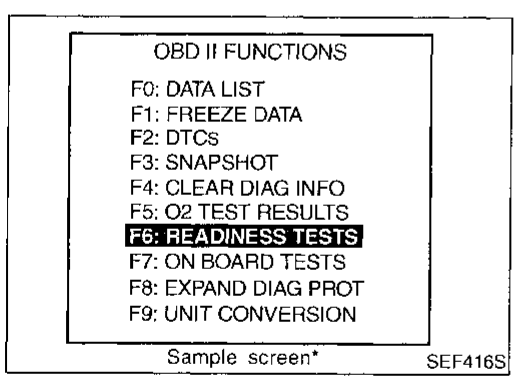
1. Turn ignition switch OFF.
2. Connect "GST" to data link connector for GST. (Data link connector for GST is located under LH dash panel near the fuse box cover.)



Sample screen* SEF398S

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

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



Sample screen* SEF416S

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

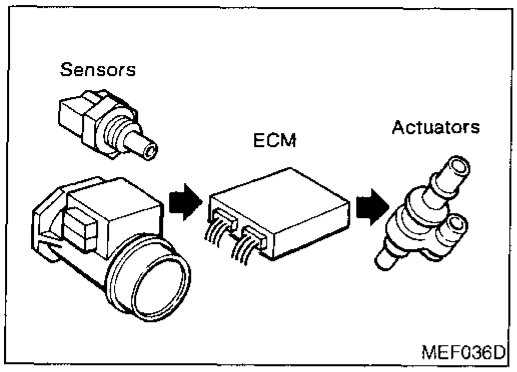
For further information, see the GST Operation Manual of the tool maker.

Generic Scan Tool (GST) (Cont'd)

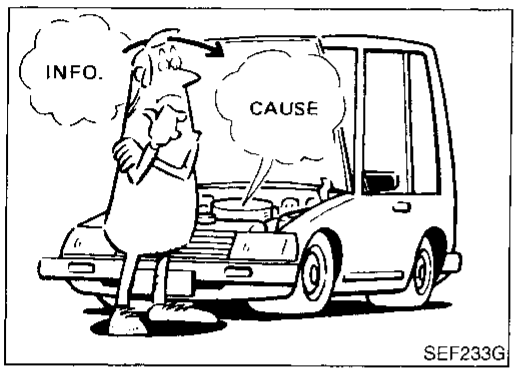
FUNCTION

NCEC0035S03

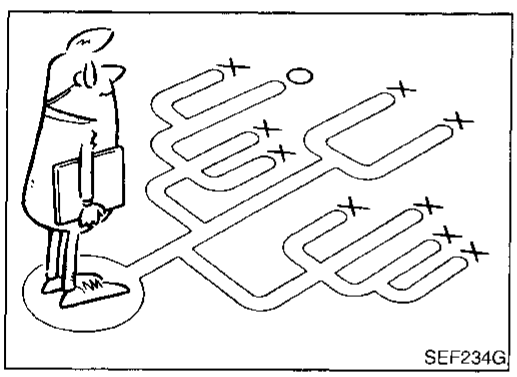
Diagnostic test mode		Function
MODE 1	READINESS TESTS	This mode gains access to current emission-related data values, including analog inputs and outputs, digital inputs and outputs, and system status information.
MODE 2	(FREEZE DATA)	This mode gains access to emission-related data value which were stored by ECM during the freeze frame. [For details, refer to "Freeze Frame Data" (EC-68).]
MODE 3	DTCs	This mode gains access to emission-related power train trouble codes which were stored by ECM.
MODE 4	CLEAR DIAG INFO	This mode can clear all emission-related diagnostic information. This includes: • Clear number of diagnostic trouble codes (MODE 1) • Clear diagnostic trouble codes (MODE 3) • Clear trouble code for freeze frame data (MODE 1) • Clear freeze frame data (MODE 2) • Reset status of system monitoring test (MODE 1) • Clear on board monitoring test results (MODE 6 and 7)
MODE 6	(ON BOARD TESTS)	This mode accesses the results of on board diagnostic monitoring tests of specific components/systems that are not continuously monitored.
MODE 7	(ON BOARD TESTS)	This mode enables the off board test drive to obtain test results for emission-related powertrain components/systems that are continuously monitored during normal driving conditions.
MODE 8	—	This mode can close EVAP system in ignition switch "ON" position (Engine stopped). When this mode is performed, following parts can be opened or closed. • EVAP canister vent control valve open • Vacuum cut valve bypass valve closed In the following conditions, this mode cannot function. • Low ambient temperature • Low battery voltage • Engine running • Ignition switch "OFF" • Low fuel temperature • Too much pressure is applied to EVAP system



MEF036D



SEF233G


SEF234G

KEY POINTS

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

SEF907L

Introduction

NCEC0036

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-81.

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

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

DIAGNOSTIC WORKSHEET

NCEC0036S01

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

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

Utilize a diagnostic worksheet like the one on the next page in order to organize all the information for troubleshooting.

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

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

Worksheet Sample

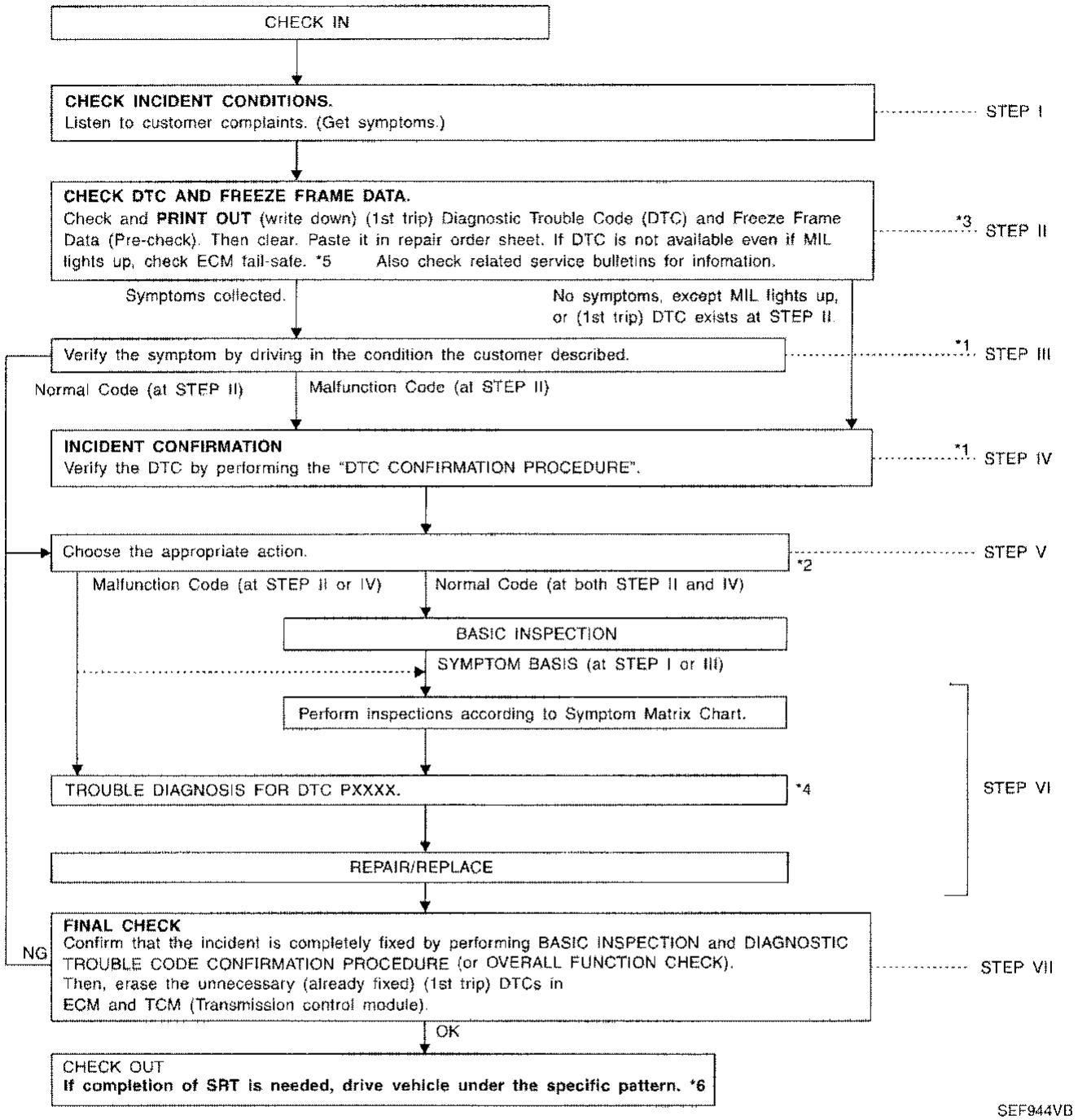
NCEC0036S0101

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

MTBL0017

Work Flow

NCEC0037



SEF944VB

*1: If the incident cannot be duplicated, refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-110.

*2: If the on board diagnostic system cannot be performed, check main power supply and ground circuit. Refer to "TROUBLE DIAGNOSIS FOR POWER SUPPLY", EC-111.

*3: If time data of "SELF-DIAG RESULTS" is other than "0" or "1t" refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT", EC-110.

*4: If the malfunctioning part cannot be found, refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-110.

*5: EC-91

*6: EC-48

Work Flow (Cont'd)

DESCRIPTION FOR WORK FLOW

NCEC0037S01

STEP	DESCRIPTION
STEP I	Get detailed information about the conditions and the environment when the incident/symptom occurred using the "DIAGNOSTIC WORK SHEET", EC-80.
STEP II	Before confirming the concern, check and write down (print out using CONSULT 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-54.) The (1st trip) DTC and the (1st trip) freeze frame data can be used when duplicating the incident at STEP III & IV. Study the relationship between the cause, specified by (1st trip) DTC, and the symptom described by the customer. (The "Symptom Matrix Chart" will be useful. See EC-92.) Also check related service bulletins for information.
STEP III	Try to confirm the symptom and under what conditions the incident occurs. The "DIAGNOSTIC WORK SHEET" and the freeze frame data are useful to verify the incident. Connect CONSULT to the vehicle in DATA MONITOR (AUTO TRIG) mode and check real time diagnosis results. If the incident cannot be verified, perform INCIDENT SIMULATION TESTS. (Refer to GI section.) If the malfunction code is detected, skip STEP IV and perform STEP V.
STEP IV	Try to detect the (1st trip) Diagnostic Trouble Code by driving in (or performing) the "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE". Check and read the (1st trip) DTC and (1st trip) freeze frame data by using CONSULT or Generic Scan Tool. During the (1st trip) DTC verification, be sure to connect CONSULT to the vehicle in DATA MONITOR (AUTO TRIG) mode and check real time diagnosis results. If the incident cannot be verified, perform INCIDENT SIMULATION TESTS. (Refer to GI section.) In case the "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" is not available, perform the "OVERALL FUNCTION CHECK" instead. The (1st trip) DTC cannot be displayed by this check, however, this simplified "check" is an effective alternative. The "NG" result of the "OVERALL FUNCTION CHECK" is the same as the (1st trip) DTC detection.
STEP V	Take the appropriate action based on the results of STEP I through IV. If the malfunction code is indicated, proceed to TROUBLE DIAGNOSIS FOR DTC PXXXX. If the normal code is indicated, proceed to the BASIC INSPECTION. (Refer to EC-83.) Then perform inspections according to the Symptom Matrix Chart. (Refer to EC-92.)
STEP VI	Identify where to begin diagnosis based on the relationship study between symptom and possible causes. Inspect the system for mechanical binding, loose connectors or wiring damage using (tracing) "Harness Layouts". Gently shake the related connectors, components or wiring harness with CONSULT set in "DATA MONITOR (AUTO TRIG)" mode. Check the voltage of the related ECM terminals or monitor the output data from the related sensors with CONSULT. Refer to EC-101. The "DIAGNOSTIC PROCEDURE" in EC section contains a description based on open circuit inspection. A short circuit inspection is also required for the circuit check in the DIAGNOSTIC PROCEDURE. For details, refer to GI section ("HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT", "Circuit Inspection"). Repair or replace the malfunction parts.
STEP VII	Once you have repaired the circuit or replaced a component, you need to run the engine in the same conditions and circumstances which resulted in the customer's initial complaint. Perform the "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" and confirm the normal code [Diagnostic trouble code No. P0000 or 0505] is detected. If the incident is still detected in the final check, perform STEP VI by using a different method from the previous one. Before returning the vehicle to the customer, be sure to erase the unnecessary (already fixed) (1st trip) DTC in ECM. (Refer to EC-54.)

Basic Inspection

NCEC0038

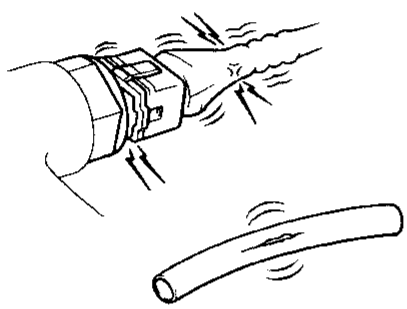
Precaution:

Perform Basic Inspection without electrical or mechanical loads applied;

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

1 INSPECTION START

1. Check service records for any recent repairs that may indicate a related problem, or 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

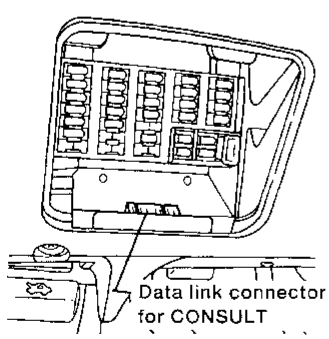


SEF142I

With CONSULT	▶	GO TO 2.
Without CONSULT	▶	GO TO 11.

2 CONNECT CONSULT TO THE VEHICLE

Connect "CONSULT" to the data link connector for CONSULT and select "ENGINE" from the menu. Refer to EC-64.



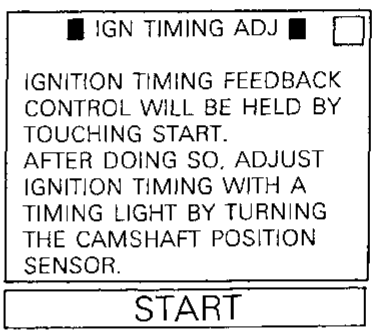
AEC678

	▶	GO TO 3.

3 CHECK IGNITION TIMING

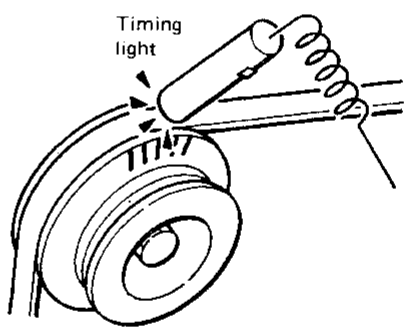
With CONSULT

1. Warm up engine to normal operating temperature.
2. Select "IGN TIMING ADJ" in "WORK SUPPORT" mode.
3. Touch "START".



SEF555N

4. Check ignition timing at idle using timing light.



SEF284G

Ignition timing:

15°±2° BTDC (M/T)

15°±2° BTDC (A/T in "P" or "N" position)

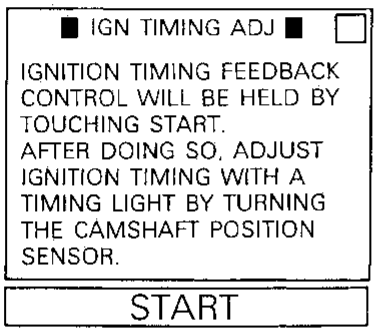
OK or NG

OK	▶	GO TO 4.
NG	▶	1. Adjust ignition timing by turning distributor. Refer to "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment", EC-36. 2. GO TO 4.

4	CHECK BASE IDLE SPEED

With CONSULT

1. Select "IGN TIMING ADJ" in "WORK SUPPORT" mode and touch "START".



SEF546N

2. Check idle speed.

M/T: 750±50 rpm
A/T: 750±50 rpm (in "P" or "N" position)

OK or NG

OK	▶	GO TO 5.
NG	▶	1. Adjust base idle speed by turning idle speed adjusting screw. Refer to "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment", EC-36. 2. GO TO 5.

5	CHECK CLOSED THROTTLE POSITION SWITCH IDLE POSITION

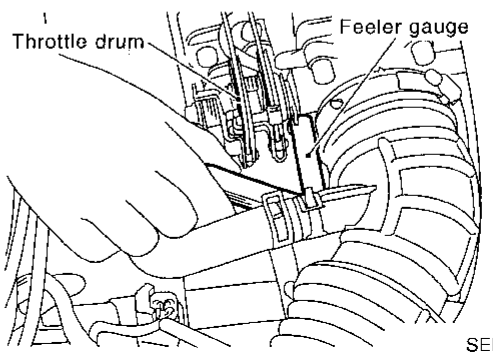
With CONSULT

NOTE:

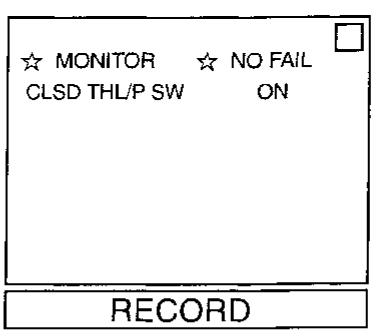
Always check ignition timing and base idle speed before performing the following.

1. Warm up engine to normal operating temperature.
2. Stop engine.
3. Turn ignition switch "ON".
4. Select "DATA MONITOR" mode with CONSULT.
5. Select "CLSD THL/P SW" from the menu.
6. Read "CLSD THL/P SW" signal under the following conditions.

- Insert a 0.15 mm (0.006 in) and 0.3 mm (0.012 in) feeler gauge alternately between the throttle adjust screw (TAS) and throttle drum as shown in the figure and check the signal.



SEF342W



SEF577W

"CLSD THL/P SW" signal should remain "ON" while inserting 0.15 mm (0.006 in) feeler gauge.
"CLSD THL/P SW" signal should remain "OFF" while inserting 0.3 mm (0.012 in) feeler gauge.

OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 6.

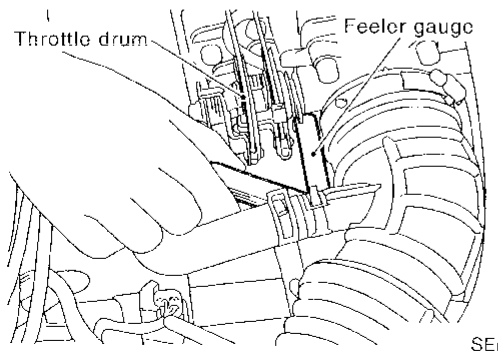
6 ADJUSTMENT THROTTLE POSITION SENSOR IDLE POSITION-1

Ⓗ **With CONSULT**

NOTE:

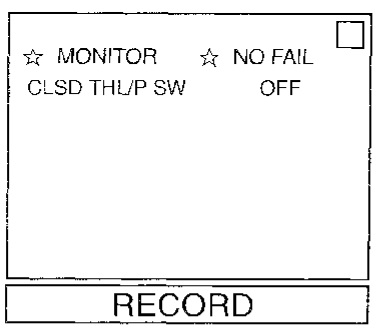
- **Never adjust throttle adjust screw (TAS).**
- **Do not touch throttle drum when checking "CLSD THL/P SW" signal.**
  Doing so may cause an incorrect adjustment.

1. Warm engine up to normal operating temperature.
2. Stop engine.
3. Loosen throttle position sensor fixing bolts.
4. Turn ignition switch "ON".
5. Select "CLSD THL/P SW" in "DATA MONITOR" mode.
6. Insert a 0.15 mm (0.006 in) feeler gauge between throttle adjust screw and throttle drum as shown in the figure.



SEF342W

7. Open throttle valve and then close.
8. Check "CLSD THL/P SW" signal.



SEF122W

"CLSD THL/P SW" signal should remain "OFF" when the throttle valve is closed.

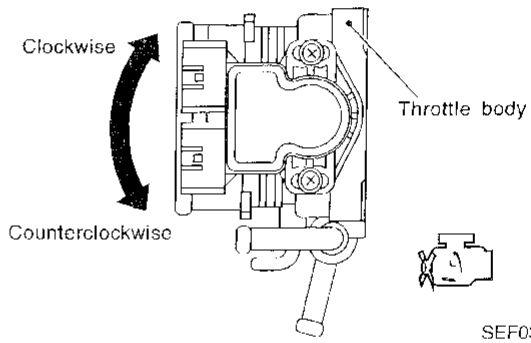
OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

7 ADJUSTMENT THROTTLE POSITION SENSOR IDLE POSITION-2

Ⓗ **With CONSULT**

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



SEF033W

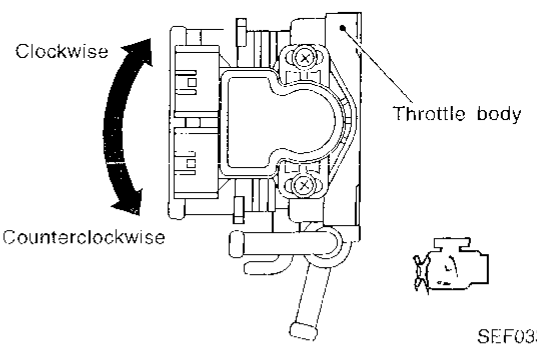
	▶	GO TO 8.

8 ADJUSTMENT THROTTLE POSITION SENSOR IDLE POSITION-3

Ⓗ **With CONSULT**

1. Temporarily tighten sensor body fixing bolts as follows.

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



SEF033W

2. Make sure two or three times that the signal is "ON" when the throttle valve is closed and "OFF" when it is opened.
3. Remove 0.15 mm (0.006 in) feeler gauge then insert 0.3 mm (0.012 in) feeler gauge.
4. Make sure two or three times that the signal remains "OFF" when the throttle valve is closed.
5. Tighten throttle position sensor.
6. Check "CLSD THL/P SW" signal again.
   The signal remains "OFF" while closing throttle valve.

OK or NG

OK	▶	1. Remove 0.3 mm (0.012 in) feeler gauge. 2. GO TO 9.
NG	▶	GO TO 6.

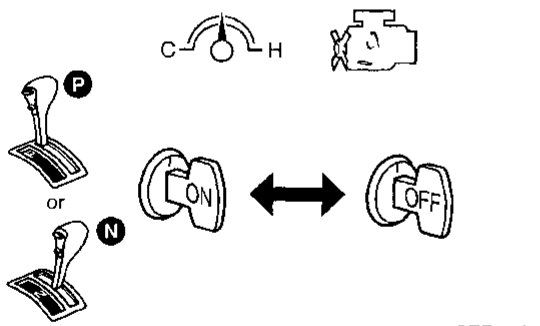
9	RESET THROTTLE POSITION SENSOR IDLE POSITION MEMORY

With CONSULT

NOTE:

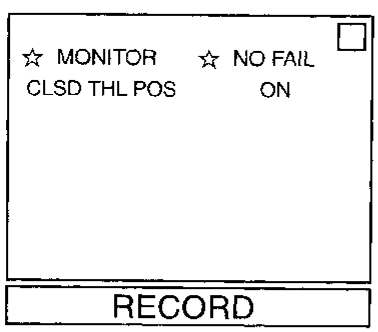
Always warm up engine to normal operating temperature. If engine is cool, the throttle position sensor idle position memory will not be reset correctly.

1. Start engine.
2. Warm up engine to normal operating temperature.
3. Select "CLSD THL POS" in "DATA MONITOR" mode.
4. Stop engine. (Turn ignition switch "OFF".)
5. Turn ignition switch "ON" and wait at least 5 seconds.



SEF864V

6. Turn ignition switch "OFF" and wait at least 5 seconds.
7. Repeat steps 5 and 6 until "CLSD THL POS" in "DATA MONITOR" mode with CONSULT changes to "ON".



SEF123W

	▶	GO TO 10.

10	CHECK TARGET IDLE SPEED

With CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Select "CMPS·RPM (REF)" in "DATA MONITOR" mode.
3. Check idle speed.

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

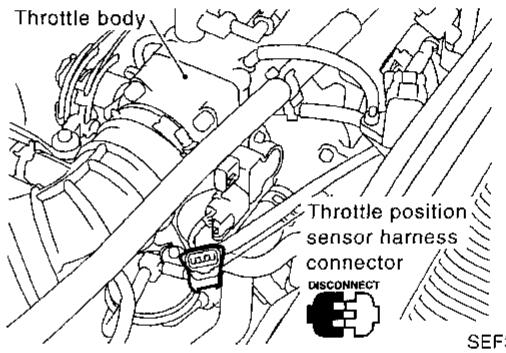
OK or NG

OK	▶	**INSPECTION END**
NG	▶	Adjust idle speed. Refer to "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment", EC-36.

11	CHECK IGNITION TIMING

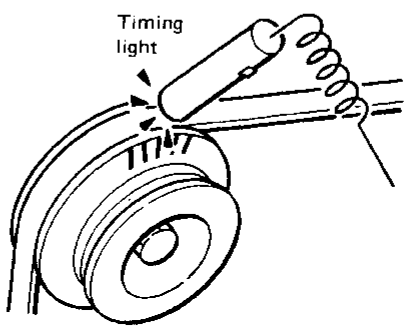
Without CONSULT

1. Warm up engine to normal operating temperature.
2. Stop engine and disconnect throttle position sensor harness connector.



SEF341W

3. Start engine.
4. Rev engine (2,000 to 3,000 rpm) two or three times under no-load and then run engine at idle speed.
5. Check ignition timing at idle using timing light.



SEF284G

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

OK or NG

OK	▶	GO TO 12.
NG	▶	1. Adjust ignition timing by turning distributor. Refer to "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment", EC-36. 2. GO TO 12.

12	CHECK BASE IDLE SPEED

Without CONSULT

Make sure that engine speed falls to the following speed.

M/T: 750±50 rpm
A/T: 750±50 rpm (in "P" or "N" position)

OK or NG

OK	▶	GO TO 13.
NG	▶	1. Adjust base idle speed by turning idle speed adjusting screw. Refer to "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment", EC-36. 2. GO TO 13.

13 CHECK CLOSED THROTTLE POSITION SWITCH IDLE POSITION

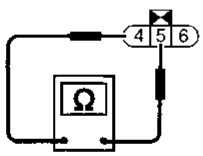
Without CONSULT

NOTE:

Always check ignition timing and base idle speed before performing the following.

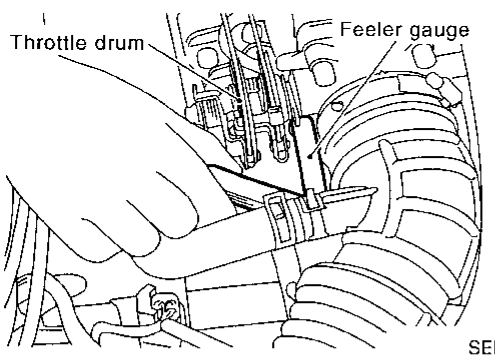
1. Warm up engine to normal operating temperature.
2. Stop engine.
3. Disconnect closed throttle position switch harness connector .
4. Connect the tester probe to closed throttle position switch terminals 4 and 5.
5. Check harness continuity under the following conditions.

Closed throttle position swich connector



SEF735W

- Insert the 0.15 mm (0.006 in) and 0.3 mm (0.012 in) feeler gauge alternately between the throttle adjust screw (TAS) and throttle drum as shown in the figure.



SEF342W

"Continuity should exist" while inserting 0.15 mm (0.006 in) feeler gauge.

"Continuity should not exist" while inserting 0.3 mm (0.012 in) feeler gauge.

OK or NG

OK	▶	GO TO 15.
NG	▶	GO TO 14.

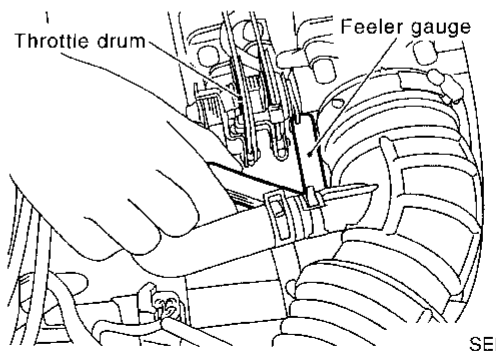
14 ADJUSTMENT THROTTLE POSITION SENSOR IDLE POSITION-1

Without CONSULT

NOTE:

- **Never adjust throttle adjust screw (TAS).**
- **Do not touch throttle drum when checking "continuity". Doing so may cause an incorrect adjustment.**

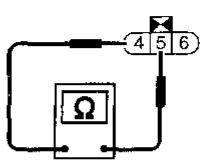
1. Warm engine up to normal operating temperature.
2. Stop engine.
3. Loosen throttle position sensor fixing bolts.
4. Disconnect closed throttle position sensor harness connector.
5. Insert 0.15 mm (0.006 in) feeler gauge between the throttle adjust screw and throttle drum as shown in the figure.



SEF342W

6. Open throttle valve then close.
7. Check continuity between closed throttle position switch terminal 4 and 5.

Closed throttle position swich connector



SEF735W

The continuity should not exist while closing the throttle position sensor body.

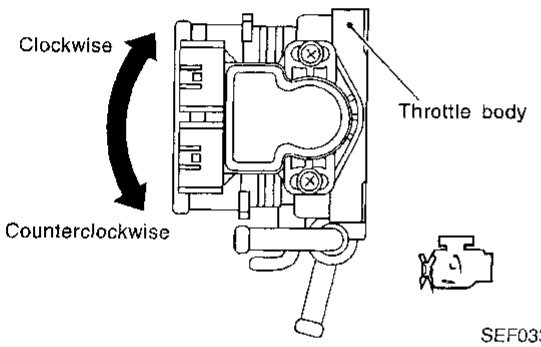
OK or NG

OK	▶	GO TO 16.
NG	▶	GO TO 15.

15 ADJUSTMENT THROTTLE POSITION SENSOR IDLE POSITION-2

Without CONSULT

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

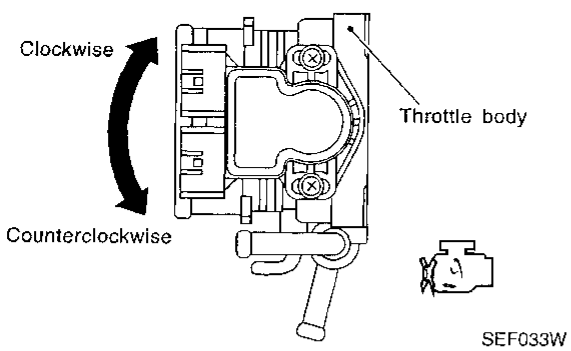


▶ GO TO 16.

16 ADJUSTMENT THROTTLE POSITION SENSOR IDLE POSITION-3

Without CONSULT

1. Temporarily tighten sensor body fixing bolts as follows.
- **Gradually move the sensor body clockwise and stop it when the continuity comes to exist, then tighten sensor body fixing bolts.**



2. Make sure two or three times that the continuity exists when the throttle valve is closed and continuity does not exist when it is opened.
3. Remove 0.15 mm (0.006 in) feeler gauge then insert 0.3 mm (0.012 in) feeler gauge.
4. Make sure two or three times that continuity does not exist when the throttle valve is closed.
5. Tighten throttle position sensor.
6. Check the continuity again.
   Continuity does not exist while closing the throttle valve.

OK or NG

OK	▶	GO TO 17.
NG	▶	GO TO 14.

17 REINSTALLATION

Without CONSULT

1. Remove 0.3 mm (0.012 in) feeler gauge.
2. Reconnect throttle position sensor harness connector and closed throttle position switch harness connector.
3. Rev engine (2,000 to 3,000 rpm) two or three times under no-load and then run engine at idle speed.

▶ GO TO 18.

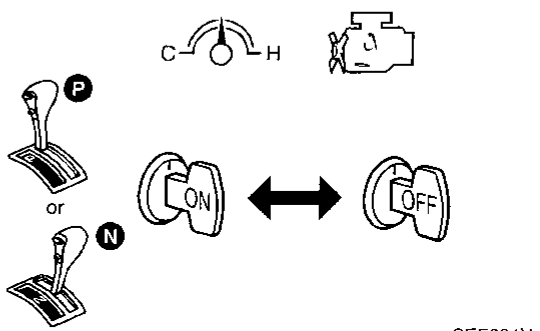
18 RESET THROTTLE POSITION SENSOR IDLE POSITION MEMORY

Without CONSULT

NOTE:

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

1. Start engine.
2. Warm up engine to normal operating temperature.
3. Stop engine. (Turn ignition switch "OFF".)
4. Turn ignition switch "ON" and wait at least 5 seconds.



5. Turn ignition switch "OFF" and wait at least 5 seconds.
6. Repeat steps 4 and 5, 20 times.

▶ GO TO 19.

19 CHECK TARGET IDLE SPEED

Without CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.
   M/T: 800±50 rpm
   A/T: 800±50 rpm (in "P" or "N" position)

OK or NG

OK	▶	GO TO 20.
NG	▶	1. Adjust target idle speed. Refer to "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment", EC-36. 2. GO TO 20.

20	ERASE UNNECESSARY DTC
After this inspection, unnecessary DTC No. might be displayed. Erase the stored memory in ECM and TCM. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" (EC-54) and "HOW TO ERASE DTC" in AT section.	
▶	**INSPECTION END**

DTC Inspection Priority Chart

NCEC0039

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

Priority	Detected items (DTC)
1	• P0100 Mass air flow sensor (0102) • P0110 Intake air temperature sensor (0401) • P0115, P0125 Engine coolant temperature sensor (0103) (0908) • P0120 Throttle position sensor (0403) • P0180 Tank fuel temperature sensor (0402) • P0325 Knock sensor (0304) • P0340 Camshaft position sensor (0101) • P0500 Vehicle speed sensor (0104) • P0605 ECM (0301) • P1320 Ignition signal (0201) • P1400 EGRC-solenoid valve (1005) • P1605 A/T diagnosis communication line (0804) • P1706 Park/Neutral position switch (1003)
2	• P0105 Absolute pressure sensor (0803) • P0130 - P0134 Front heated oxygen sensor (0303 - 0412) • P0135 Front heated oxygen sensor heater (0901) • P0137 - P0140 Rear heated oxygen sensor (0510 - 0707) • P0141 Rear heated oxygen sensor heater (0902) • P0335, P1336 Crankshaft position sensor (OBD) (0802) (0905) • P0450 EVAP control system pressure sensor (0704) • P0510 Closed throttle position switch (0203) • P0705 - P0725, P0740 - P1760 A/T related sensors, solenoid valves and switches (1101 - 1208) (1108 - 1206) • P1105 MAP/BARO switch solenoid valve (1302) • P1401 EGR temperature sensor (0305) • P1444, P0443 EVAP canister purge volume control valve (0214) (1008) • P1447 EVAP control system purge flow monitoring (0111) • P1448, P0446, P1446 EVAP canister vent control valve (0309) (0903) (0215) • P1490, P1491 Vacuum cut valve bypass valve (0801) (0311) • P1492, P1493 EVAP canister purge control valve/solenoid valve (0807) (0312)
3	• P0172, P0171 Fuel injection system function (0114), (0115) • P0300 - P0304 Misfire (0701 - 0605) • P0400, P1402 EGR function (0302) (0514) • P0402 EGRC-BPT valve function (0306) • P0420 Three way catalyst function (0702) • P0440, P1440 EVAP control system (SMALL LEAK) (0705) (0213) • P0505 IACV-AAC valve (0205) • P0731 - P0734, P0744 A/T function (1103 - 1106) (1107) • P1148 Closed loop control (0307)

Fail-safe Chart

=NCEC0040

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	The ECM functions 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.
			Condition: Just as ignition switch is turned ON or Start — Engine coolant temperature decided (CONSULT display): 40°C (104°F)
			Condition: More than approx. 4 minutes after ignition ON or Start — Engine coolant temperature decided (CONSULT display): 80°C (176°F)
			Condition: Except as shown above — Engine coolant temperature decided (CONSULT display): 40 - 80°C (104 - 176°F) (Depends on the time)
P0120	0403	Throttle position sensor circuit	Throttle position will be determined based on the injected fuel amount and the engine speed. Therefore, acceleration will be poor.
			Condition: When engine is idling — Driving condition: Normal
			Condition: When accelerating — Driving condition: Poor acceleration
Unable to access ECM	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 MIL on the instrument panel lights to warn the driver. However it is not possible to access ECM and DTC cannot be confirmed. **Engine control with fail-safe** When ECM fail-safe is operating, fuel injection, ignition timing, fuel pump operation and IACV-AAC valve operation are controlled under certain limitations.
			Engine speed: **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 valve
			Fuel pump: Fuel pump relay is "ON" when engine is running and "OFF" when engine stalls
			IACV-AAC valve: Full open
			Replace ECM, if ECM fail-safe condition is confirmed.

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

Symptom Matrix Chart

NCEC0041

SYSTEM — ENGINE CONTROL SYSTEM

NCEC0041S01

		SYMPTOM													
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	Reference page
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel pump circuit	1	1	2	3	2		2	2			3		2	EC-457
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			EC-35
	Injector circuit	1	1	2	3	2		2	2			2			EC-451
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			EC-27
Air	Positive crankcase ventilation system	3	3	4	4	4	4	4	4	4		4	1		EC-33
	Incorrect idle speed adjustment	3	3				1	1	1	1		1			EC-36
	IACV-AAC valve circuit	1	1	2	3	3	2	2	2	2		2		2	EC-315
	IACV-FICD solenoid valve circuit	2	2	3	3	3	3	3	3	3		3			EC-470
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC-36
	Ignition circuit	1	1	2	2	2		2	2			2			EC-343
EGR	EGRC-solenoid valve circuit		2	2	3	3						3			EC-355
	EGR system	2	1	2	3	3	3	2	2	3		3			EC-267, 275, 366
Main power supply and ground circuit		2	2	3	3	3		3	3		2	3		2	EC-111
Air conditioner circuit		2	2	3	3	3	3	3	3	3		3		2	HA section

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

(continued on next page)

Symptom Matrix Chart (Cont'd)

	SYMPTOM													Reference page
	HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Camshaft position sensor circuit	2	2	3	3	3		3	3			3			EC-260
Mass air flow sensor circuit	1	1	2	2	2		2	2			2			EC-116
Front heated oxygen sensor circuit		1	2	3	2		2	2			2			EC-161, 167
Engine coolant temperature sensor circuit	1	1	2	3	2	3	2	2	3		2			EC-140, 156
Throttle position sensor circuit		1	2		2	2	2	2	2		2			EC-145
Incorrect throttle position sensor adjustment		3	1		1	1	1	1	1		1			EC-83
Vehicle speed sensor circuit		2	3		3						3			EC-310
Knock sensor circuit			2								3			EC-250
ECM	2	2	3	3	3	3	3	3	3	3	3			EC-329, 91
Start signal circuit	2													EC-455
PNP switch circuit			3		3		3	3			3			EC-431
Power steering oil pressure switch circuit		2					3	3						EC-462

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

(continued on next page)

Symptom Matrix Chart (Cont'd)

SYSTEM — ENGINE MECHANICAL & OTHER

NCEC0041S03

		SYMPTOM													
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	Reference page
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel tank	5	5												FE section
	Fuel piping			5	5	5		5	5			5			—
	Vapor lock														
	Valve deposit	5		5	5	5		5	5			5			
	Poor fuel (Heavy weight gasoline, Low octane)														
Air	Air duct	5	5	5	5	5	5	5	5	5		5			
	Air cleaner														
	Air leakage from air duct (Mass air flow sensor — throttle body)														
	Throttle body, Throttle wire														FE section
	Air leakage from intake manifold/ Collector/Gasket														—
Cranking	Battery	1	1	1		1		1	1					1	EL section
	Alternator circuit														
	Starter circuit	3										1			
	Flywheel/Drive plate	6													EM section
	PNP switch	4													AT section

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

(continued on next page)

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Engine	Cylinder head	5	5	5	5	5		5	5			5			EM section
	Cylinder head gasket										4		3		
	Cylinder block	6	6	6	6	6		6	6			6	4		
	Piston														
	Piston ring														
	Connecting rod														
	Bearing														
	Crankshaft														
Valve mechanism	Timing chain	5	5	5	5	5		5	5			5			EM section
	Camshaft														
	Intake valve												3		
	Exhaust valve														
Exhaust	Exhaust manifold/Tube/Muffler/ Gasket	5	5	5	5	5		5	5			5			FE section
	Three way catalyst														
Lubrication	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery	5	5	5	5	5		5	5			5			MA, EM and LC sections
	Oil level (Low)/Filthy oil														
Cooling	Radiator/Hose/Radiator filler cap	5	5	5	5	5		5	5		4	5			LC section
	Thermostat									5					
	Water pump														
	Water gallery														
	Cooling fan									5					EC-436
	Coolant level (low)/ Contaminated coolant														MA section

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

CONSULT Reference Value in Data Monitor Mode

NCEC0042

Remarks:

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

MONITOR ITEM	CONDITION		SPECIFICATION
CMPS·RPM (REF)	• Tachometer: Connect • Run engine and compare tachometer indication with the CONSULT value.		Almost the same speed as the CONSULT value.
MAS AIR/FL SE	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: "N" • No-load	Idle	1.3 - 1.7V
		2,500 rpm	1.8 - 2.4V
COOLAN TEMP/S	• Engine: After warming up		More than 70°C (158°F)
FR O2 SENSOR	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ 0.6 - 1.0V
FR O2 MNTR			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.
RR O2 SENSOR	• Engine: After warming up	Revving engine from idle to 3,000 rpm quickly	0 - 0.3V ⟷ 0.6 - 1.0V
RR O2 MNTR			LEAN ⟷ RICH
VHCL SPEED SE	• Turn drive wheels and compare speedometer indication with the CONSULT value		Almost the same speed as the CONSULT value
BATTERY VOLT	• Ignition switch: ON (Engine stopped)		11 - 14V
THRTL POS SEN	• Ignition switch: ON (Engine stopped) • Engine: After warming up	Throttle valve fully closed	0.2 - 0.8V
		Throttle valve fully opened	3.5 - 4.5V
EGR TEMP SEN	• Engine: After warming up		Less than 4.5V
START SIGNAL	• Ignition switch: ON → START → ON		OFF → ON → OFF
CLSD THL/P SW CLSD THL POS	• Engine: After warming up • Ignition switch: ON (Engine stopped)	Throttle valve: Idle position	ON
		Throttle valve: Slightly open	OFF
AIR COND SIG	• Engine: After warming up, idle the engine	A/C switch "OFF"	OFF
		A/C switch "ON" (Compressor operates)	ON
P/N POSI SW	• Ignition switch: ON	Shift lever "P" or "N"	ON
		Except above	OFF
PW/ST SIGNAL	• Engine: After warming up, idle the engine	Steering wheel in neutral position (forward direction)	OFF
		The steering wheel is turned	ON
IGNITION SW	• Ignition switch: ON → OFF		ON → OFF
INJ PULSE	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: "N" • No-load	Idle	2.4 - 3.2 msec
		2,000 rpm	1.9 - 2.8 msec

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

MONITOR ITEM	CONDITION		SPECIFICATION
B/FUEL SCHDL	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: "N" • No-load	Idle	1.0 - 1.6 msec
		2,000 rpm	0.7 - 1.3 msec
IGN TIMING	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: "N" • No-load	Idle	13 - 15° BTDC
		2,000 rpm	More than 25° BTDC
IACV-AAC/V	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: "N" • No-load	Idle	20 - 40%
		2,000 rpm	—
PURG VOL C/V	• Engine: After warming up • No-load • M/T models: Lift up drive wheels and shift to 1st gear position.	Idle	0 step
		More than 60 seconds after starting engine Rev engine up from 2,000 to 4,000 rpm.	More than 1 step
A/F ALPHA	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	53 - 155%
EVAP SYS PRES	• Ignition switch: ON		Approx. 3.4V
AIR COND RLY	• Air conditioner switch: OFF → ON		OFF → ON
FUEL PUMP RLY	• Ignition switch is turned to ON (Operates for 5 seconds) • Engine running and cranking • When engine is stopped (stops in 1.0 seconds)		ON
	• Except as shown above		OFF
COOLING FAN	• After warming up engine, idle the engine. • Air conditioner switch: OFF	Engine coolant temperature is 94°C (201°F) or less	OFF
		Engine coolant temperature is between 95°C (203°F) and 104°C (219°F)	LOW
		Engine coolant temperature is 105°C (221°F) or more	HIGH
VENT CONT/V	• Ignition switch: ON		OFF
EGRC SOL/V	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: N (A/T models) • No-load • M/T models: Lift up drive wheels and shift to 1st gear position.	Idle	OFF (CUT)
		A/T models: Rev engine up from 2,000 to 4,000 rpm. M/T models: Rev engine up from 2,000 to 4,000 rpm.	ON (FLOW)
FR O2 HEATER	• Engine speed: Below 3,200 rpm		ON
	• Engine speed: Above 3,200 rpm		OFF
RR O2 HEATER	• Engine speed: Running [After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more]		ON
	• Ignition switch ON (Engine stopped)		OFF
VC/V BYPASS/V	• Ignition switch: ON		OFF

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

MONITOR ITEM	CONDITION		SPECIFICATION
PURG CONT S/V	• Engine: After warming up • No-load • M/T models: Lift up drive wheels and shift to 1st gear position.	Idle	OFF
		More than 60 seconds after starting engine A/T models: 2,000 rpm M/T models: 2,000 rpm and more than 16 km/h (10 MPH)	ON
CAL/LD VALUE	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: "N" • No-load	Idle	20.0 - 35.5%
		2,500 rpm	17.0 - 30.0%
ABSOL TH·P/S	• Ignition switch: ON (Engine stopped) • After warming up	Throttle valve fully closed	0.0%
		Throttle valve fully opened	Approx. 88%
MASS AIRFLOW	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: N • No-load	Idle	2.5 - 5.0 g·m/s
		2,500 rpm	7.1 - 12.5 g·m/s
MAP/BARO SW/V	• Ignition switch: ON (Engine stopped)		MAP
	• Engine speed: Idle	For 5 seconds after starting engine	BARO
		More than 5 seconds after starting engine	MAP
ABSOL PRES/SE	• Ignition switch: ON (Engine stopped)		Approx. 4.4V
	• Engine speed: Idle	For 5 seconds after starting engine	Approx. 4.4V
		More than 5 seconds after starting engine	Approx. 1.2V

Major Sensor Reference Graph in Data Monitor Mode

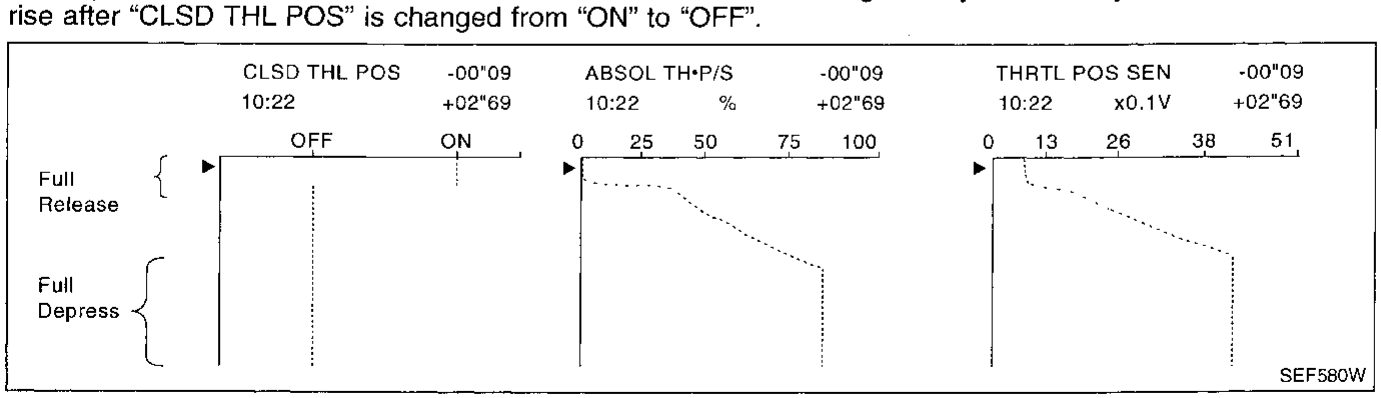
NCEC0043

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 POS

NCEC0043S01

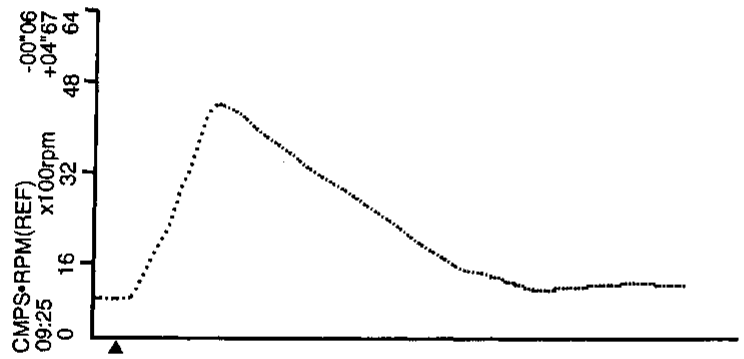
Below is the data for "THRTL POS SEN", "ABSOL TH·P/S" and "CLSD THL POS" when depressing the accelerator pedal with the ignition switch "ON".
The signal of "THRTL POS SEN" and "ABSOL TH·P/S" should rise gradually without any intermittent drop or rise after "CLSD THL POS" is changed from "ON" to "OFF".



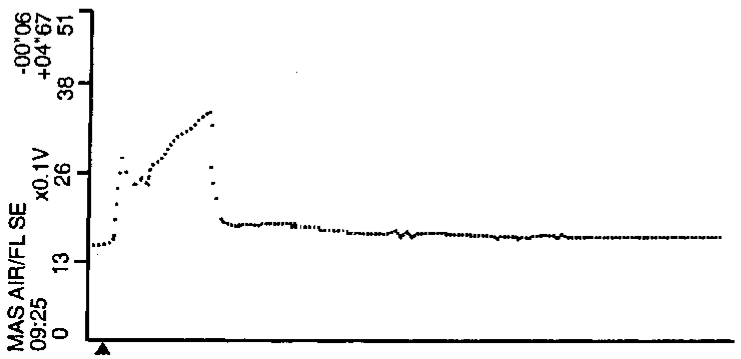
CMPS·RPM (REF), MAS AIR/FL SE, THRTL POS SEN, RR O2 SEN, FR O2 SEN, INJ PULSE

NCEC0043S02

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



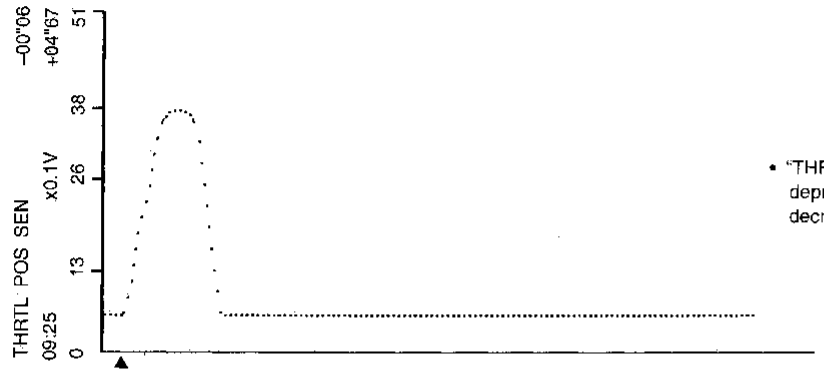
• "CMPS•RPM(REF)" should increase gradually while depressing the accelerator pedal and should decrease gradually after releasing the pedal without any intermittent drop or rise.



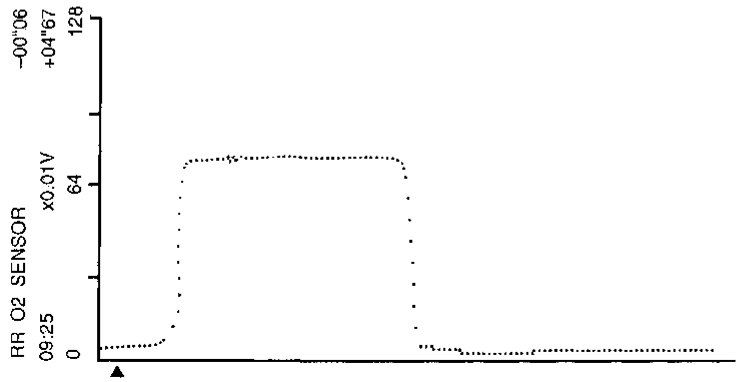
• "MAS AIR/FL SE" should increase when depressing the accelerator pedal and should decrease at the moment "THRTL POS SEN" is closed (accelerator pedal is released).

SEF059P

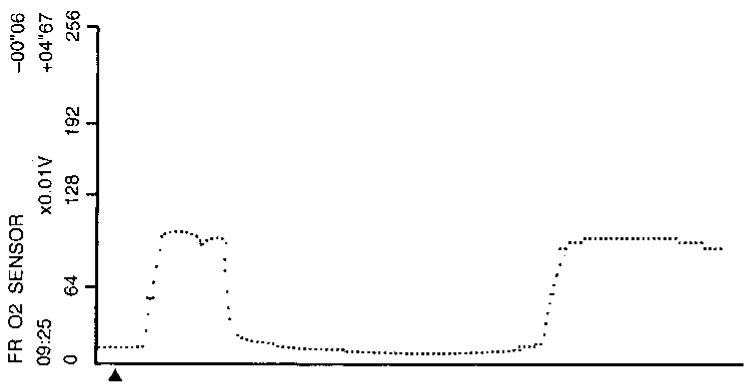
Major Sensor Reference Graph in Data Monitor Mode (Cont'd)



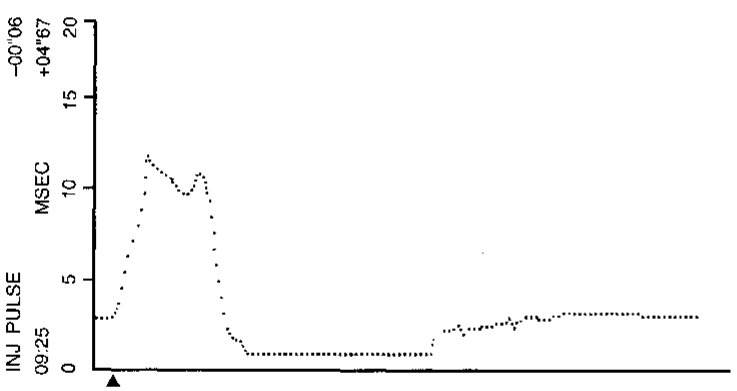
- "THRTL POS SEN" should increase while depressing the accelerator pedal and should decrease while releasing it.



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

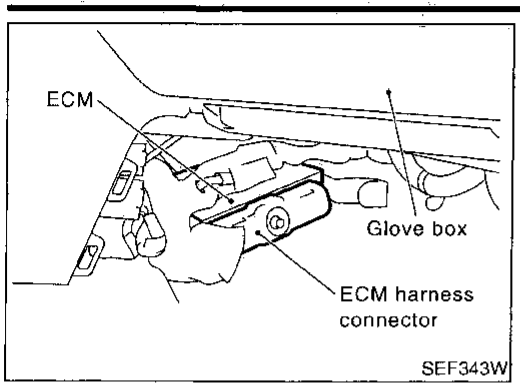


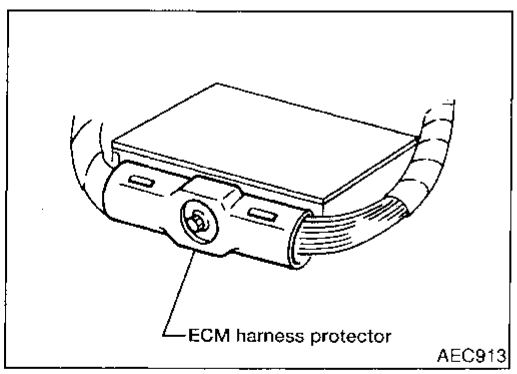
- "FR O2 SENSOR" may increase immediately after depressing the accelerator pedal and may decrease after releasing the pedal.

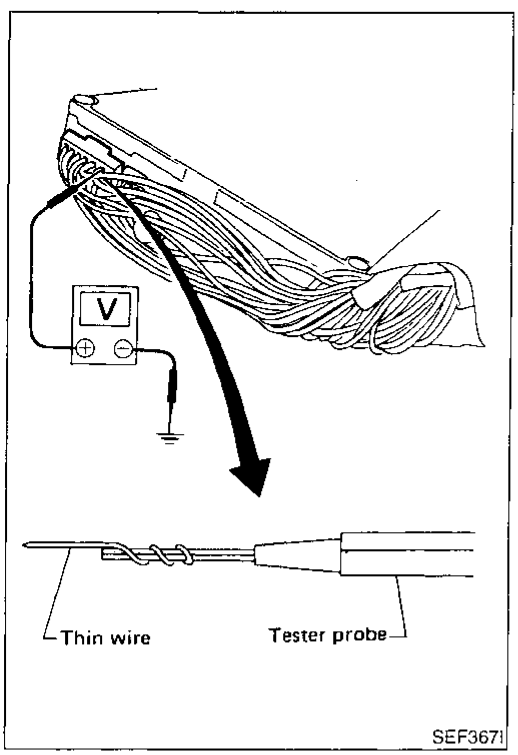


- "INJ PULSE" should increase when depressing the accelerator pedal and should decrease when the pedal is released.

SEF417R







ECM Terminals and Reference Value

NCEC0044

PREPARATION

NCEC0044S01

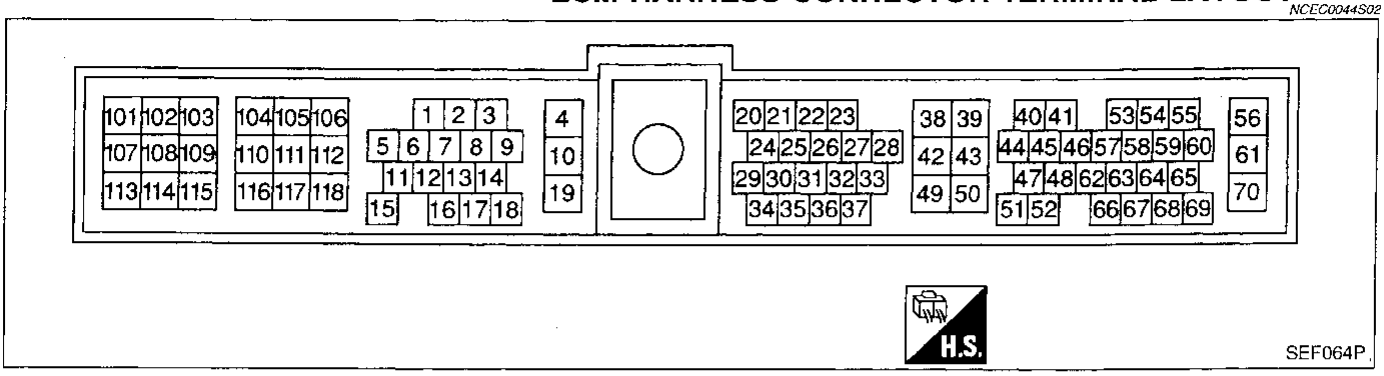
1. ECM is located behind the center console. For this inspection:
- Remove the front passenger center console panel.

2. Remove ECM harness protector.

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

ECM HARNESS CONNECTOR TERMINAL LAYOUT

NCEC0044S02

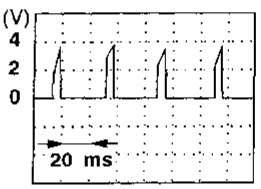
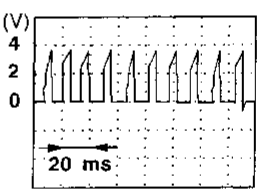
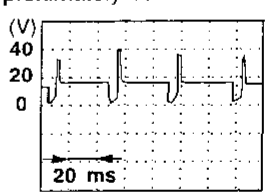
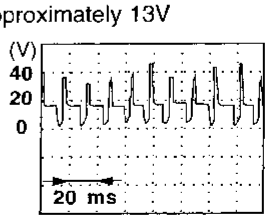


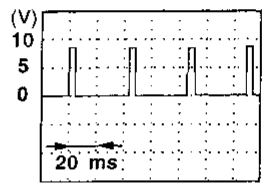
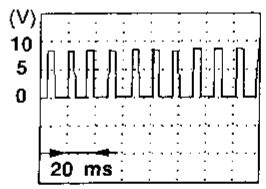
SEF064P

ECM INSPECTION TABLE

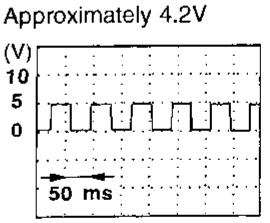
NCEC0044S03

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

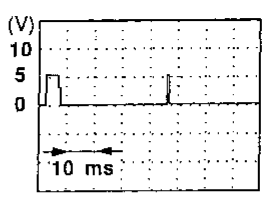
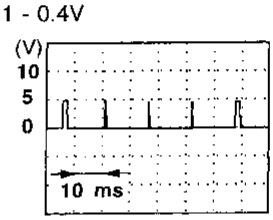
TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	W/B	Ignition signal	**[Engine is running]** • **Warm-up condition** • Idle speed	0.2 - 0.3V  SEF996V
			[Engine is running] • Engine speed is 2,000 rpm	Approximately 0.5V  SEF997V
2	W	Ignition check	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 13V  SEF998V
			[Engine is running] • Engine speed is 2,000 rpm	Approximately 13V  SEF999V

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	L/OR	Tachometer	**[Engine is running]** • **Warm-up condition** • Idle speed	0.6 - 1.6V  SEF001W
			[Engine is running] • Engine speed is 2,000 rpm	2 - 3V  SEF002W
4	W/G	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch "OFF"]** • For 5 seconds after turning ignition switch "OFF"	0 - 1V
			[Ignition switch "OFF"] • 5 seconds passed after turning ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
5	L	EVAP canister purge volume control valve	**[Engine is running]** • **Warm-up condition** • Idle speed	0 - 0.6V
6	G			
7	PU (A/T models)	A/T check signal	**[Ignition switch "ON"]** **[Engine is running]**	5 - 7V
8	B/P	Fuel pump relay	**[Ignition switch "ON"]** • For 5 seconds after turning ignition switch "ON" **[Engine is running]**	0 - 1V
			[Ignition switch "ON"] • More than 5 seconds after turning ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
10	B	ECM ground	**[Engine is running]** • Idle speed	Engine ground
13	LG	Cooling fan relay (High)	**[Engine is running]** • Cooling fan is not operating	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] • Cooling fan (High) is operating	0 - 0.6V
14	L/Y	Cooling fan relay (Low)	**[Engine is running]** • Cooling fan is not operating	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] • Cooling fan is operating	0 - 0.6V
15	L/W	Air conditioner relay	**[Engine is running]** • Both A/C switch and blower switch are "ON"	0 - 0.6V
			[Engine is running] • A/C switch is "OFF"	BATTERY VOLTAGE (11 - 14V)

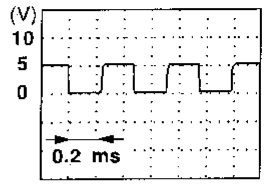
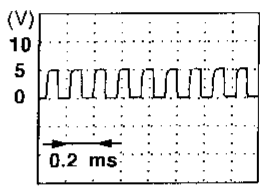
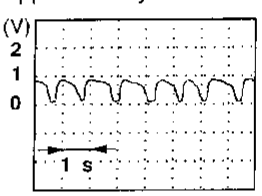
ECM Terminals and Reference Value (Cont'd)

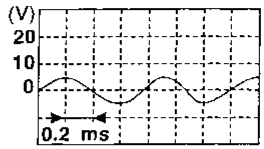
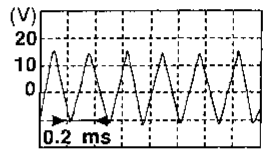
TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
16	Y	EVAP canister purge volume control valve	**[Engine is running]** • Idle speed	BATTERY VOLTAGE (11 - 14V)
17	OR			
18	OR/L	Malfunction indicator lamp	**[Ignition switch "ON"]**	Approximately 0.1V
			[Engine is running] • Idle speed	BATTERY VOLTAGE (11 - 14V)
19	B	ECM ground	**[Engine is running]** • Idle speed	Engine ground
20	B/Y	Start signal	**[Ignition switch "ON"]**	Approximately 0V
			[Ignition switch "START"]	9 - 12V
21	L/W	Air conditioner switch	**[Engine is running]** • Both air conditioner switch and blower switch are "ON" (Compressor operates)	Approximately 0V
			[Engine is running] • Air conditioner switch is "OFF"	BATTERY VOLTAGE (11 - 14V)
22	G/OR	PNP switch	**[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	BATTERY VOLTAGE (11 - 14V)
23	Y	Throttle position sensor	**[Ignition switch "ON"]** • Accelerator pedal released	0.2 - 0.8V
			[Ignition switch "ON"] • Accelerator pedal fully depressed	3.5 - 4.5V
24	Y/R	A/T signal No. 1	**[Ignition switch "ON"]** **[Engine is running]** • Idle speed	6 - 8V
25	SB	Power steering oil pressure switch	**[Engine is running]** • Steering wheel is fully turned	Approximately 0V
			[Engine is running] • Steering wheel is not turned	Approximately 5V
26	Y/G	Vehicle speed sensor	**[Engine is running]** • Lift up the vehicle • In 2nd gear position • Vehicle speed is 40 km/h (25 MPH)	0 - Approximately 4.2V  SEF003W
27	Y	Throttle position switch (Closed position)	**[Ignition switch "ON"]** • **Warm-up condition** • Accelerator pedal released	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch "ON"] • Accelerator pedal depressed	Approximately 0V
28	R/Y	Intake air temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with intake air temperature

ECM Terminals and Reference Value (Cont'd)

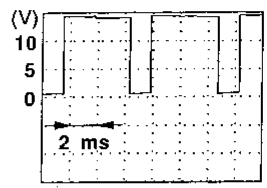
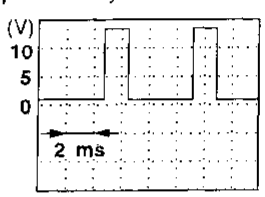
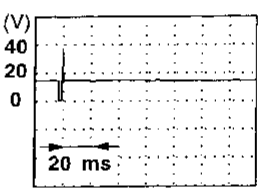
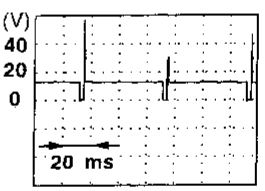
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
29	Y/G	A/T signal No. 2	**[Ignition switch "ON"]** **[Engine is running]** • Idle speed	6 - 8V
30	Y/B	A/T signal No. 3	**[Ignition switch "ON"]**	0V
37	G	Ambient air temperature switch	**[Engine is running]** • Idle speed • Ambient air temperature is above 23.5°C (74°F) • Air conditioner is operating	Approximately 0.15V
			[Engine is running] • Idle speed • Ambient air temperature is above 23.5°C (74°F) • Air conditioner is not operating	Approximately 0V
			[Engine is running] • Idle speed • Ambient air temperature is below 20.5°C (69°F) • Air conditioner is operating	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] • Idle speed • Ambient air temperature is below 20.5°C (69°F) • Air conditioner is not operating	Approximately 4.6V
38	W/R	Ignition switch	**[Ignition switch "OFF"]**	0V
			[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)
39	B	ECM ground	**[Engine is running]** • Idle speed	Engine ground
40 44	L L	Camshaft position sensor (Reference signal)	**[Engine is running]** • **Warm-up condition** • Idle speed	0.1 - 0.4V  SEF006W
			[Engine is running] • Engine speed is 2,000 rpm	0.1 - 0.4V  SEF007W
43	B	ECM ground	**[Engine is running]** • Idle speed	Engine ground (Probe this terminal with (–) tester probe when measuring)

ECM Terminals and Reference Value (Cont'd)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
41	B/W	Camshaft position sensor (Position signal)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 2.5V  SEF004W
			[Engine is running] • Engine speed is 2,000 rpm	Approximately 2.4V  SEF005W
46	W	Front heated oxygen sensor	**[Engine is running]** • **Warm-up condition** • Engine speed is 2,000 rpm	0 - Approximately 0.7V  SEF008W
47	OR	Mass air flow sensor	**[Engine is running]** • **Warm-up condition** • Idle speed	1.3 - 1.7V
			[Engine is running] • **Warm-up condition** • Engine speed is 2,500 rpm	1.8 - 2.4V
48	W	Mass air flow sensor ground	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V
49	P/L	Sensors' power supply	**[Ignition switch "ON"]**	Approximately 5V
50	B	Sensors' ground	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V
51	BR/Y	Engine coolant temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with engine coolant temperature
52	W	Rear heated oxygen sensor	**[Engine is running]** • After warming up to normal operating temperature and engine speed is 2,000 rpm	0 - Approximately 1.0V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
53	W	Crankshaft position sensor (OBD)	**[Engine is running]** • **Warm-up condition** • Idle speed	3 - 5V (AC range)  SEF721W
			[Engine is running] • Engine speed is 2,000 rpm	6 - 9V (AC range)  SEF722W
54	W	Knock sensor	**[Engine is running]** • Idle speed	2.0 - 3.0V
56 61	W/R W/R	Power supply for ECM	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)
58	L/B	Data link connector for GST	**[Engine is running]** • Idle speed (GST is disconnected)	6 - 10V
62	R/B	EGR temperature sensor	**[Engine is running]** • **Warm-up condition** • Idle speed	Less than 4.5V
			[Engine is running] • **Warm-up condition** • EGR system is operating	0 - 1.5V
63	LG/R	Tank fuel temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with fuel temperature
64	G/B	Data link connector for CONSULT	**[Engine is running]** • Idle speed (CONSULT is connected and turned on)	Approximately 0 - 14V
65	GY/L			Approximately 0 - 10V
68	G/W			Approximately 0 - 4V
66	W	Absolute pressure sensor	**[Ignition switch "ON"]** **[Engine is running]** • For 5 seconds after starting engine	Approximately 4.4V
			[Engine is running] • **Warm-up condition** • More than 5 seconds after starting engine	Approximately 1.4V
67	W	EVAP control system pressure sensor	**[Ignition switch "ON"]**	Approximately 3.4V
69	GY/R	MAP/BARO switch solenoid valve	**[Ignition switch "ON"]** • For 5 seconds after turning ignition switch "ON" **[Engine is running]** • For 5 seconds after starting engine	0 - 1V
			[Ignition switch "ON"] • More than 5 seconds after turning ignition switch "ON" **[Engine is running]** • More than 5 seconds after starting engine	BATTERY VOLTAGE (11 - 14V)

ECM Terminals and Reference Value (Cont'd)

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
70	W/L	Power supply for ECM (Back-up)	**[Ignition switch "OFF"]**	BATTERY VOLTAGE (11 - 14V)
101	SB	IACV-AAC valve	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 10V  SEF015W
			[Engine is running] • **Warm-up condition** • Engine speed is 2,000 rpm	Approximately 5 - 13V  SEF016W
102 104 107 109	R/B G/B Y/B L/B	Injector No. 1 Injector No. 3 Injector No. 2 Injector No. 4	**[Engine is running]** • **Warm-up condition** • Idle speed	BATTERY VOLTAGE (11 - 14V)  SEF011W
			[Engine is running] • **Warm-up condition** • Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14V)  SEF012W
103	P	EGRC-solenoid valve	**[Engine is running]** • **Warm-up condition** • M/T models: Lift up drive wheels and shift to 1st gear position • Rev engine up from 2,000 to 4,000 rpm	0 - 0.7V
			[Engine is running] • **Warm-up condition** • Idle speed	BATTERY VOLTAGE (11 - 14V)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
105	PU	EVAP canister purge control solenoid valve	**[Engine is running]** • **Warm-up condition** • More than 60 seconds after starting engine • M/T models: Lift up drive wheels and shift to 1st gear position • Engine speed is 2,000 rpm	Approximately 0V
			[Engine is running] • **Warm-up condition** • Idle speed	BATTERY VOLTAGE (11 - 14V)
106	B	ECM ground	**[Engine is running]** • Idle speed	Engine ground
108	PU/W	EVAP canister vent control valve	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)
110	R/Y	Rear heated oxygen sensor heater	**[Engine is running]** • After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more	Approximately 0.7V
			[Ignition switch "ON"] • Engine stopped	BATTERY VOLTAGE (11 - 14V)
112	B	ECM ground	**[Engine is running]** • Idle speed	Engine ground
113	W/L	Current return	**[Engine is running]** • Idle speed	BATTERY VOLTAGE (11 - 14V)
115	OR	Front heated oxygen sensor heater	**[Engine is running]** • Engine speed is below 3,200 rpm	Approximately 0V
			[Engine is running] • Engine speed is above 3,200 rpm	BATTERY VOLTAGE (11 - 14V)
117	PU/R	Vacuum cut valve bypass valve	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)
118	B	ECM ground	**[Engine is running]** • Idle speed	Engine ground

Description

NCEC0045

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

COMMON I/I REPORT SITUATIONS

NCEC0045S01

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

Diagnostic Procedure

NCEC0046

1	INSPECTION START
Erase (1st trip) DTCs. Refer to "HOW TO ERASE EMISSION-RELATED INFORMATION" (EC-54).	
▶	GO TO 2.

2	CHECK GROUND TERMINALS	
Check ground terminals for corroding or loose connection. Refer to "Circuit Inspection", "GROUND INSPECTION" in GI section.		
	OK or NG	
OK	▶	GO TO 3.
NG	▶	Repair or replace.

3	SEARCH FOR ELECTRICAL INCIDENT	
Perform "Incident Simulation Tests" in GI section.		
	OK or NG	
OK	▶	GO TO 4.
NG	▶	Repair or replace.

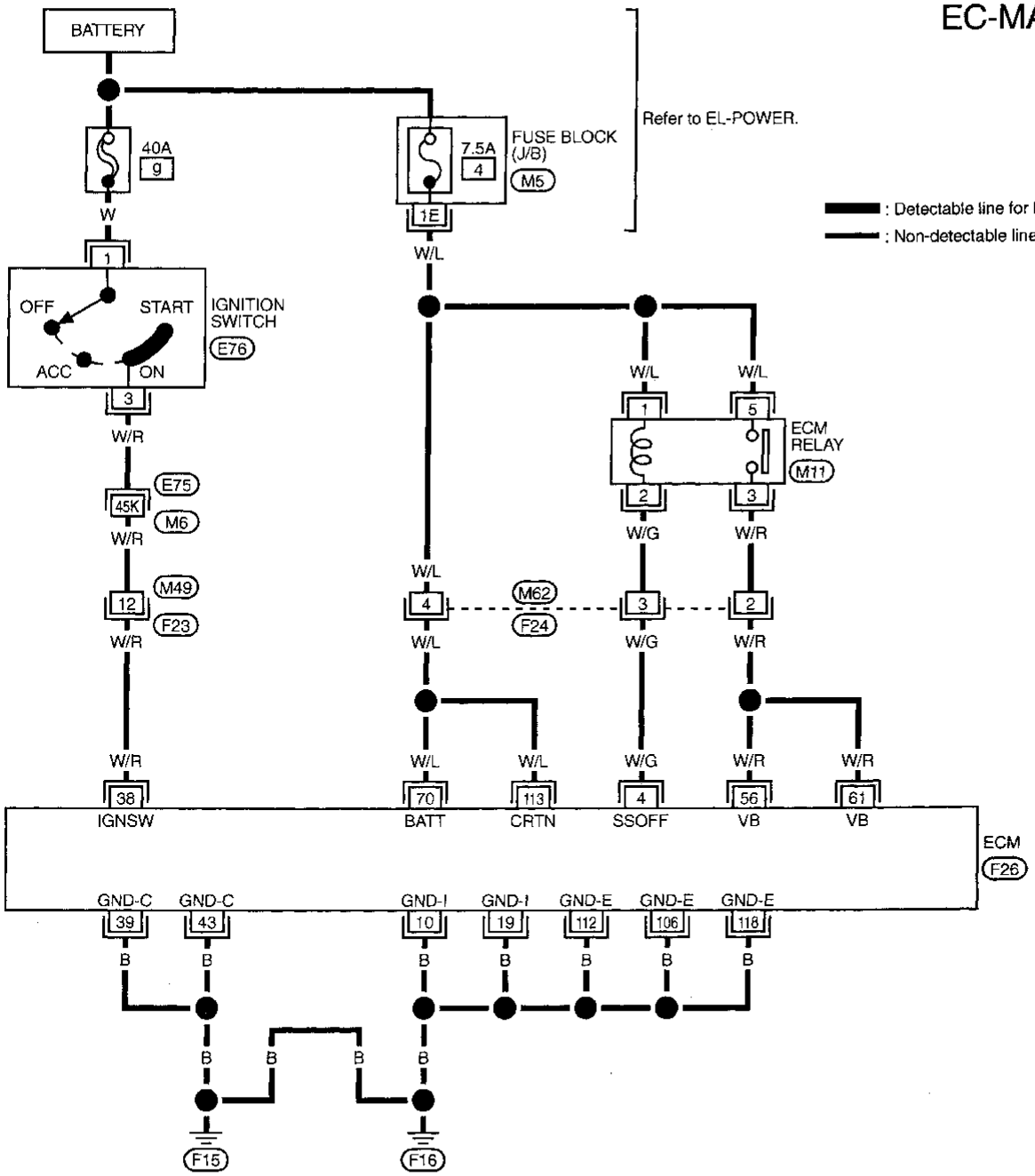
4	CHECK CONNECTOR TERMINALS	
Refer to "How to Check Enlarged Contact Spring of Terminal" in GI section.		
	OK or NG	
OK	▶	**INSPECTION END**
NG	▶	Repair or replace connector.

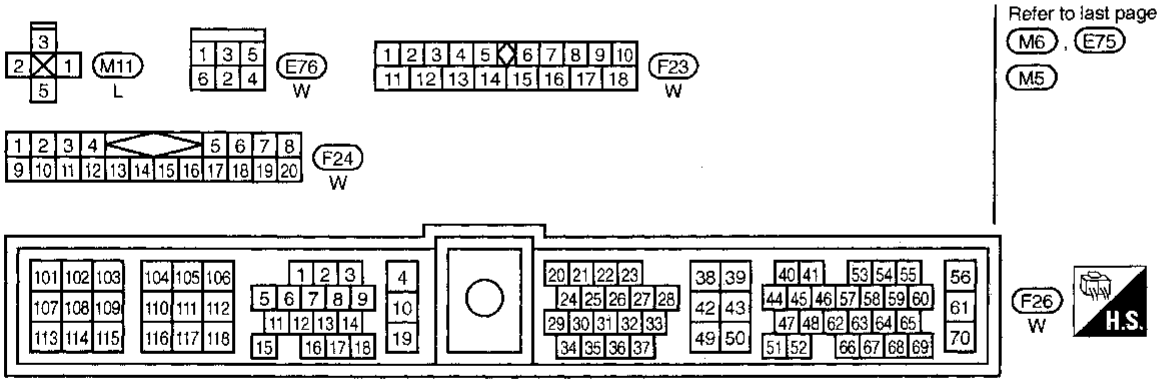
Main Power Supply and Ground Circuit

WIRING DIAGRAM

NCEC0047

EC-MAIN-01





Refer to last page (Foldout page).
M6, E75
M5

TEC522

ECM TERMINALS AND REFERENCE VALUE

NCEC0048

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	W/G	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch "OFF"]** • For 5 seconds after turning ignition switch "OFF"	0 - 1V
			[Ignition switch "OFF"] • 5 seconds passed after turning ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
10	B	ECM ground	**[Engine is running]** • Idle speed	Engine ground
19	B	ECM ground	**[Engine is running]** • Idle speed	Engine ground
38	W/R	Ignition switch	**[Ignition switch "OFF"]**	0V
			[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)
39	B	ECM ground	**[Engine is running]** • Idle speed	Engine ground
43	B	ECM ground	**[Engine is running]** • Idle speed	Engine ground (Probe this terminal with (–) tester probe when measuring)
56 61	W/R W/R	Power supply for ECM	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)
70	W/L	Power supply for ECM (Back-up)	**[Ignition switch "OFF"]**	BATTERY VOLTAGE (11 - 14V)
106	B	ECM ground	**[Engine is running]** • Idle speed	Engine ground
112	B	ECM ground	**[Engine is running]** • Idle speed	Engine ground
113	W/L	Current return	**[Engine is running]** • Idle speed	BATTERY VOLTAGE (11 - 14V)
118	B	ECM ground	**[Engine is running]** • Idle speed	Engine ground

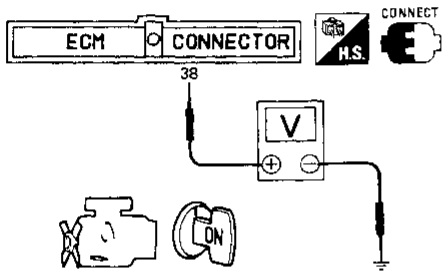
DIAGNOSTIC PROCEDURE

NCEC0049

1	INSPECTION START	
Start engine. Is engine running?		
	Yes or No	
Yes	▶	GO TO 4.
No	▶	GO TO 2.

2 CHECK POWER SUPPLY-I

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



SEF065P

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 14.
NG	▶	GO TO 3.

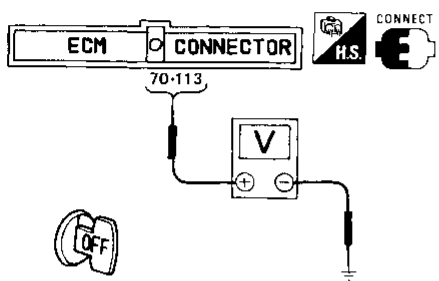
3 DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E75, M6
- Harness connectors M49, F23
- Harness for open or short between ECM and ignition switch

▶	Repair harness or connectors.

4 CHECK POWER SUPPLY-II

1. Stop engine.
2. Check voltage between ECM terminals 70, 113 and ground with CONSULT or tester.



SEF066P

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

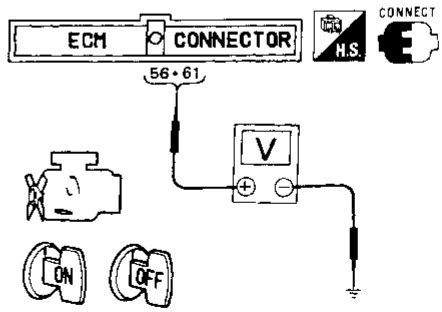
5 DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M62, F24
- Fuse block (J/B)
- 7.5A fuse
- Harness for open or short between ECM and fuse

▶	Repair harness or connectors.

6 CHECK POWER SUPPLY-III

1. Turn ignition switch "ON" and then "OFF".
2. Check voltage between ECM terminals 56, 61 and ground with CONSULT or tester.



SEF067P

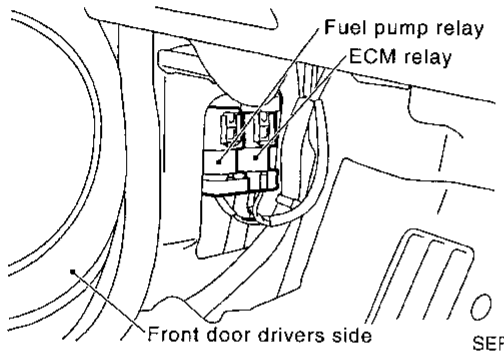
Voltage:
After turning ignition switch "OFF", battery voltage will exist for a few seconds, then drop to approximately 0V.

OK or NG

OK	▶	GO TO 14.
NG (Battery voltage does not exist.)	▶	GO TO 7.
NG (Battery voltage exists for more than a few seconds.)	▶	GO TO 13.

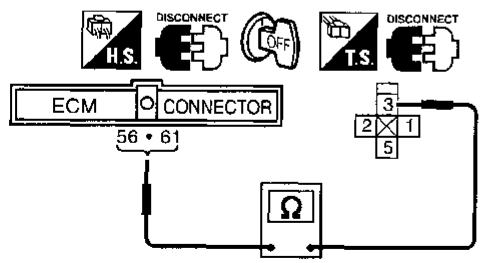
7 CHECK HARNESS CONTINUITY BETWEEN ECM RELAY AND ECM

1. Disconnect ECM harness connector.
2. Disconnect ECM relay.



SEF291W

3. Check harness continuity between ECM terminals 56, 61 and relay terminal 3.



SEF195W

Continuity should exist.

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

OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 8.

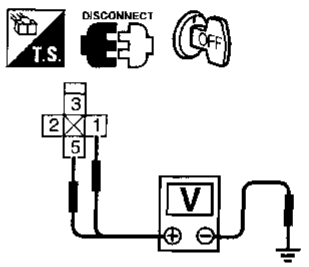
8 DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M62, F24
- Harness for open or short between ECM relay and ECM

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

9 CHECK VOLTAGE BETWEEN ECM RELAY AND GROUND

Check voltage between relay terminals 1, 5 and ground with CONSULT or tester.



SEF196W

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 11.
NG	▶	GO TO 10.

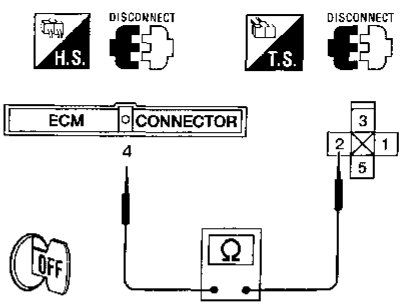
10 DETECT MALFUNCTIONING PART

Check the following.
- Harness for open or short between ECM relay and fuse

▶	Repair harness or connectors.

11 CHECK OUTPUT SIGNAL CIRCUIT

1. Check harness continuity between ECM terminal 4 and relay terminal 2.



AEC492

Continuity should exist.

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

OK or NG

OK	▶	GO TO 13.
NG	▶	GO TO 12.

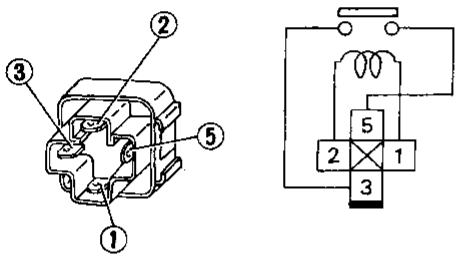
12 DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M62, F24
- Harness for open or short between ECM relay and ECM

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

13	CHECK ECM RELAY

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



SEF511P

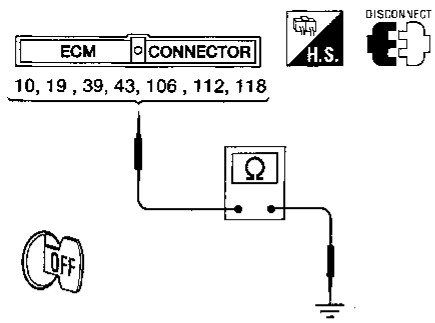
12V (1 - 2) applied: Continuity exists.
No voltage applied: No continuity

OK or NG

OK	▶	GO TO 14.
NG	▶	Replace ECM relay.

14	CHECK GROUND CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminals 10, 19, 39, 43, 106, 112, 118 and engine ground.



AEC496

Continuity should exist.

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

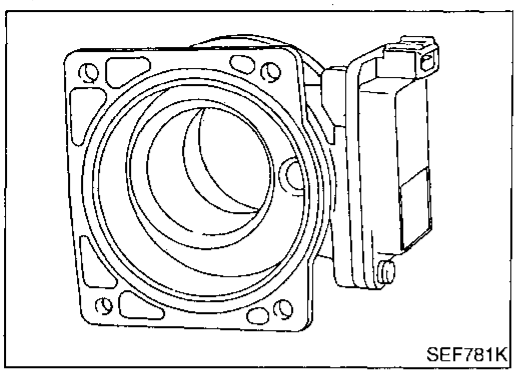
OK or NG

OK	▶	GO TO 15.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

15	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-110.

	▶	**INSPECTION END**


SEF781K

Component Description

NCEC0050

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

CONSULT Reference Value in Data Monitor Mode

NCEC0051

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAS AIR/FL SE	• Engine: After warming up • Air conditioner switch: "OFF" • Shift lever: "N" • No-load	Idle	1.3 - 1.7V
		2,500 rpm	1.8 - 2.4V
CAL/LD VALUE	• Engine: After warming up • Air conditioner switch: "OFF" • Shift lever: "N" • No-load	Idle	20.0 - 35.5%
		2,500 rpm	17.0 - 30.0%
MASS AIRFLOW	• Engine: After warming up • Air conditioner switch: "OFF" • Shift lever: "N" • No-load	Idle	2.5 - 5.0 g·m/s
		2,500 rpm	7.1 - 12.5 g·m/s

ECM Terminals and Reference Value

NCEC0052

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	OR	Mass air flow sensor	**[Engine is running]** • **Warm-up condition** • Idle speed	1.3 - 1.7V
			[Engine is running] • **Warm-up condition** • Engine speed is 2,500 rpm	1.8 - 2.4V
48	W	Mass air flow sensor ground	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V

On Board Diagnosis Logic

NCEC0053

DTC No.		Malfunction is detected when ...	Check Items (Possible Cause)
P0100 0102	A)	An excessively high voltage from the sensor is sent to ECM when engine is not running.	• Harness or connectors (The sensor circuit is open or shorted.) • Mass air flow sensor
	C)	A high voltage from the sensor is sent to ECM under light load driving condition.	
	B)	An excessively low voltage from the sensor is sent to ECM* when engine is running.	• Harness or connectors (The sensor circuit is open or shorted.) • Intake air leaks • Mass air flow sensor
	D)	A low voltage from the sensor is sent to ECM under heavy load driving condition.	

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

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

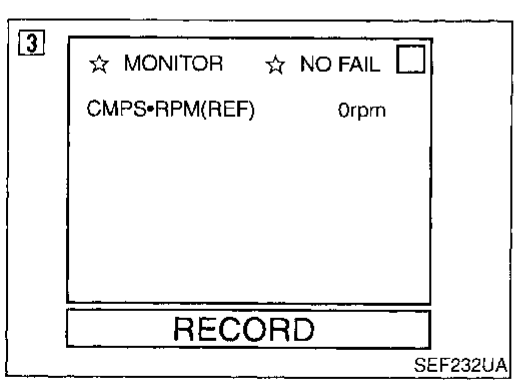
DTC Confirmation Procedure

NCEC0054

Perform "PROCEDURE FOR MALFUNCTION A" first. If the 1st trip DTC cannot be confirmed, perform "PROCEDURE FOR MALFUNCTION B". If there is no problem on "PROCEDURE FOR MALFUNCTION B", perform "PROCEDURE FOR MALFUNCTION C". If there is no problem on "PROCEDURE FOR MALFUNCTION C", perform "PROCEDURE FOR MALFUNCTION D".

CAUTION:
Always drive vehicle at a safe speed.

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



PROCEDURE FOR MALFUNCTION A

NCEC0054S01

With CONSULT

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
3) Wait at least 6 seconds.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-122.

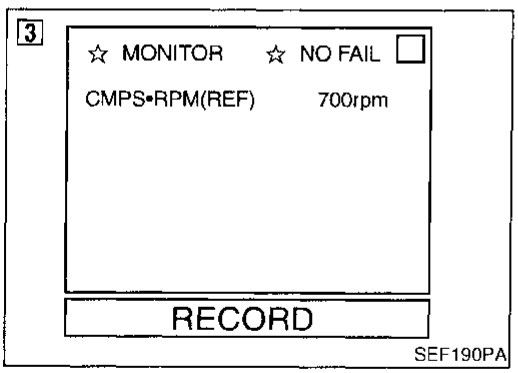
With GST

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

3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-122.

No Tools

1) Turn ignition switch "ON", and wait at least 6 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.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-122.



PROCEDURE FOR MALFUNCTION B

NCEC0054S02

With CONSULT

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
3) Start engine and wait 5 seconds at most.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-122.

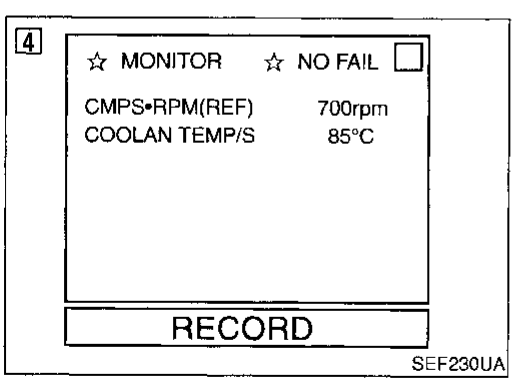
With GST

1) Turn ignition switch "ON".
2) Start engine and wait 5 seconds at most.
3) Select "MODE 7" with GST.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-122.

No Tools

1) Turn ignition switch "ON".
2) Start engine and wait 5 seconds at most.
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.
5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-122.

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



PROCEDURE FOR MALFUNCTION C

NCEC0054S03

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

With CONSULT

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

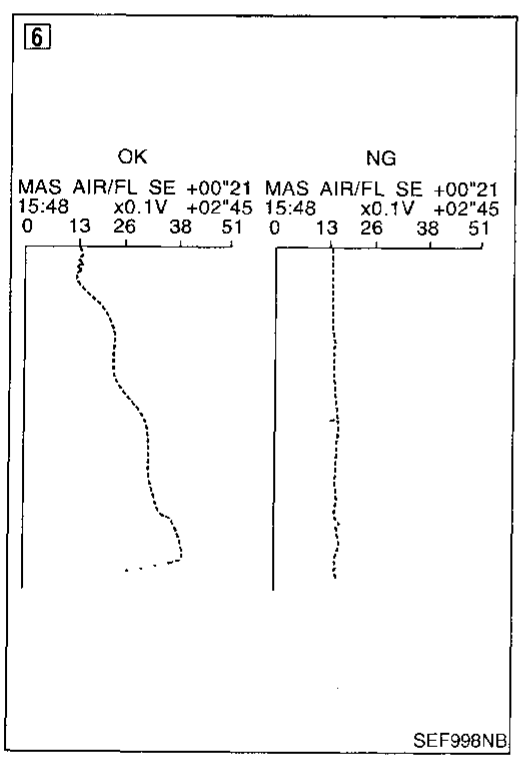
5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-122.

With GST

1) Start engine and warm it up to normal operating temperature.
2) Run engine for at least 10 seconds at idle speed.
3) Select "MODE 7" with GST.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-122.

No Tools

1) Start engine and warm it up to normal operating temperature.
2) Run engine for at least 10 seconds at idle speed.
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.
5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-122.



PROCEDURE FOR MALFUNCTION D

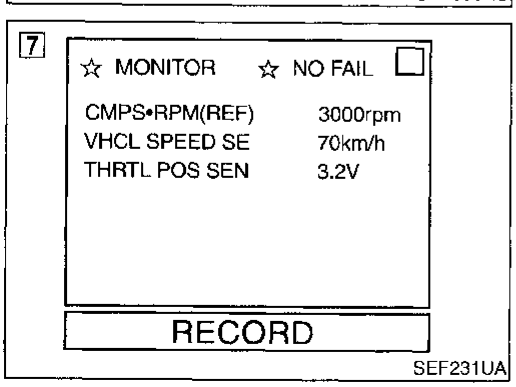
NCEC0054S04

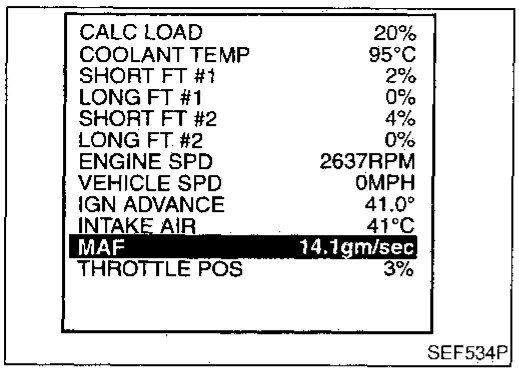
With CONSULT

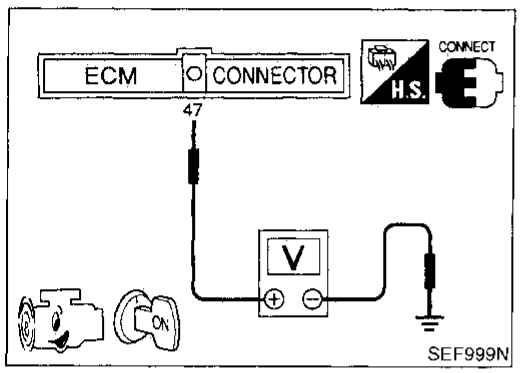
1) Turn ignition switch "ON".
2) Start engine and warm it up to normal operating temperature. If engine cannot be started, go to "Diagnostic Procedure", EC-122.
3) Select "DATA MONITOR" mode with CONSULT.
4) Check the voltage of MAS AIR/FL SE with "DATA MONITOR".
5) Increases engine speed to about 4,000 rpm.
6) Monitor the linear voltage rise in response to engine speed increases.
   If NG, go to "Diagnostic Procedure", EC-122.
   If OK, go to following step.
7) Maintain the following conditions for at least 10 consecutive seconds.

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

8) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-122.







Overall Function Check

NCEC0055

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

PROCEDURE FOR MALFUNCTION D

NCEC0055S01

With GST

1) Turn ignition switch "ON".
2) Start engine and warm it up to normal operating temperature.
3) Select "MODE 1" with GST.
4) Check the mass air flow sensor signal with "MODE 1".
5) Check for linear mass air flow rise in response to increases to about 4,000 rpm in engine speed.
6) If NG, go to "Diagnostic Procedure", EC-122.

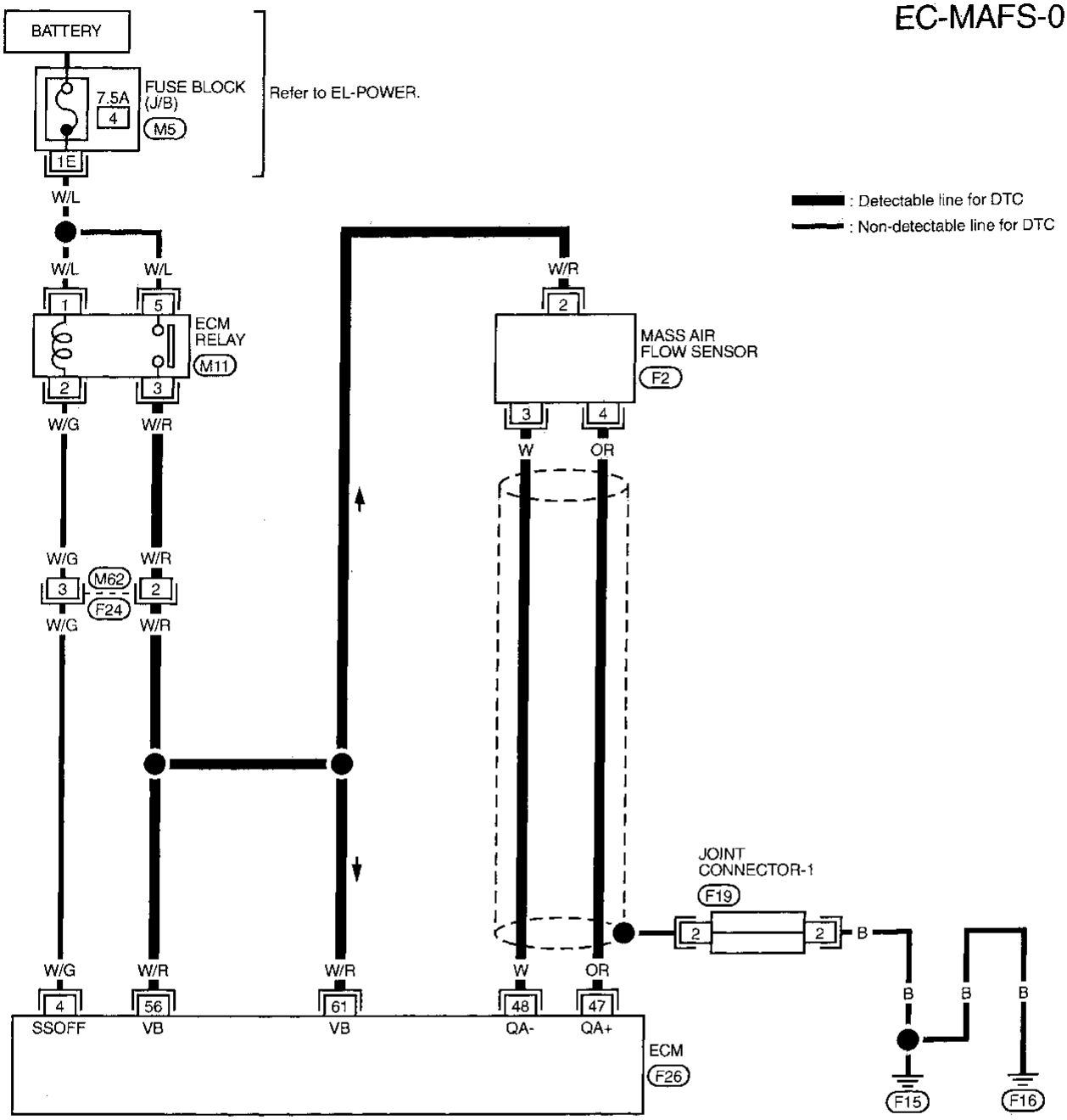
No Tools

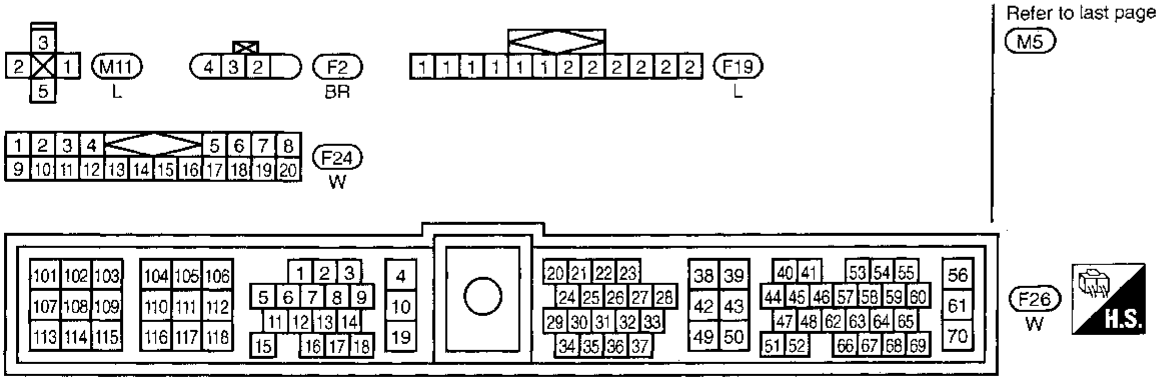
1) Turn ignition switch "ON".
2) Start engine and warm it up to normal operating temperature.
3) Check the voltage between ECM terminal 47 (Mass air flow sensor signal) and ground.
4) Check for linear voltage rise in response to increases to about 4,000 rpm in engine speed.
5) If NG, go to "Diagnostic Procedure", EC-122.

Wiring Diagram

NCEC0056

EC-MAFS-01





Refer to last page (Foldout page).
M5

TEC523

Diagnostic Procedure

NCEC0057

1 INSPECTION START

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

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

MTBL0063

Type I or Type II

Type I	▶	GO TO 3.
Type II	▶	GO TO 2.

2 CHECK INTAKE SYSTEM

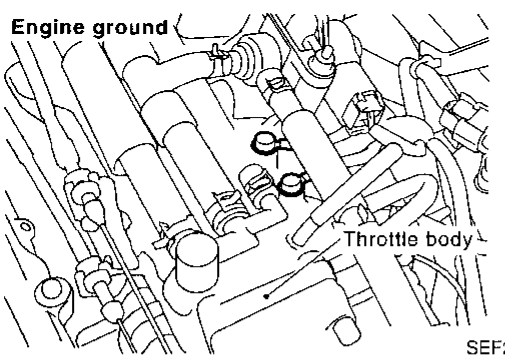
Check the followings for connection.
- Air duct
- Vacuum hoses
- Intake air passage between air duct to collector

OK or NG

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

3 RETIGHTEN GROUND SCREWS

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

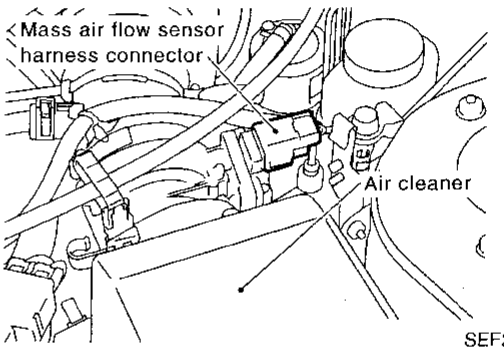


SEF292W

	▶	GO TO 4.

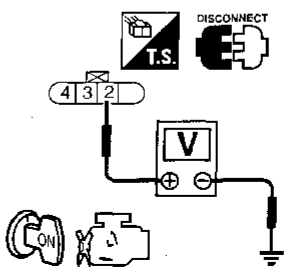
4 CHECK POWER SUPPLY

1. Disconnect mass air flow sensor harness connector.



SEF293W

2. Turn ignition switch "ON".
3. Check voltage between terminal 2 and ground with CONSULT or tester.



SEF197W

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

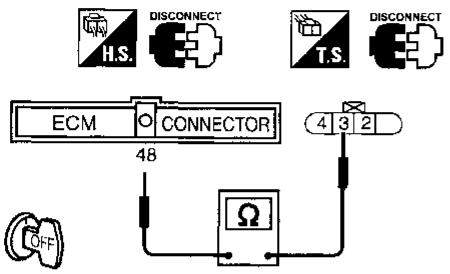
5 DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M62, F24
- Harness for open or short between ECM relay and mass air flow sensor
- Harness for open or short between mass air flow sensor and ECM

	▶	Repair harness or connectors.

6	CHECK GROUND CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between terminal 3 and ECM terminal 48.



SEF198W

Continuity should exist.

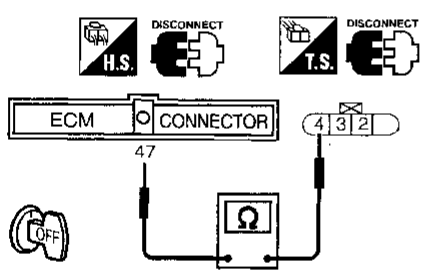
4. Also check harness for short to ground and short to power.

OK or NG

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

7	CHECK INPUT SIGNAL CIRCUIT

1. Check harness continuity between terminal 4 and ECM terminal 47.



SEF199W

Continuity should exist.

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

OK or NG

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

8	CHECK MASS AIR FLOW SENSOR

Refer to "Component Inspection", EC-124.

OK or NG

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

9	CHECK SHIELD CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect joint connector-1.
3. Check the following.
- Continuity between joint connector-1 terminal 2 and ground
- Joint connector-1
  (Refer to "HARNESS LAYOUT" in EL section.)

Continuity should exist.

4. Also check harness for short to ground and short to power.
5. Then reconnect joint connector-1.

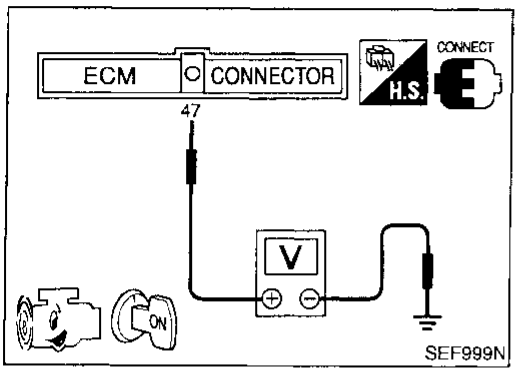
OK or NG

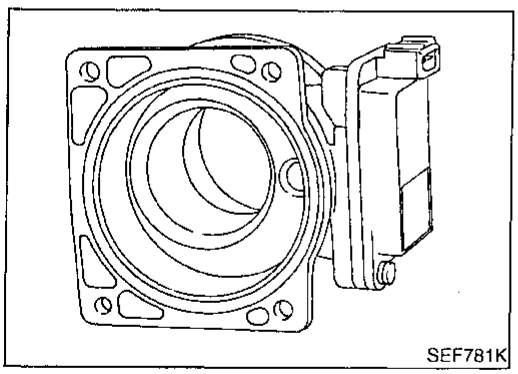
OK	▶	GO TO 10.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

10	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-110.

	▶	**INSPECTION END**





Component Inspection

NCEC0058

MASS AIR FLOW SENSOR

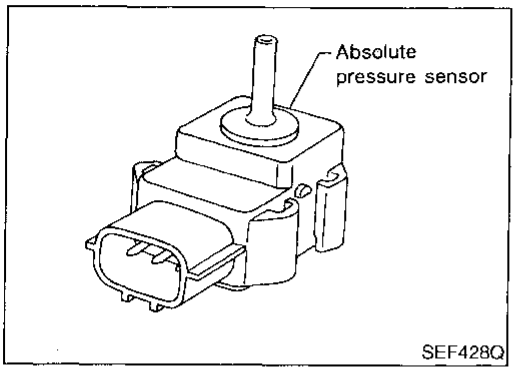
NCEC0058S01

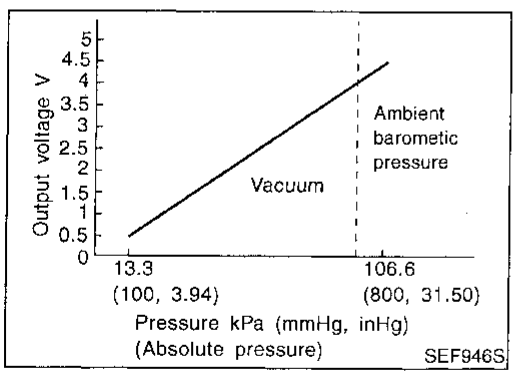
1. Turn ignition switch "ON".
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 47 (Mass air flow sensor signal) and ground.

Conditions	Voltage V
Ignition switch "ON" (Engine stopped.)	Less than 1.0
Idle (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.8 - 2.4
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 the voltage is out of specification, disconnect mass air flow sensor harness connector and connect it again. Repeat above check.
5. If NG, remove mass air flow sensor from air duct. Check hot film for damage or dust.





Component Description

NCEC0059

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.

On Board Diagnosis Logic

NCEC0060

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

DTC Confirmation Procedure

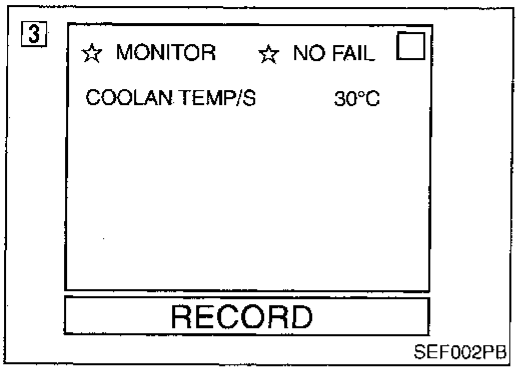
NCEC0061

Perform "PROCEDURE FOR MALFUNCTION A" first. If the 1st trip DTC cannot be confirmed, perform "PROCEDURE FOR MALFUNCTION B". If the 1st trip DTC is not confirmed on "PROCEDURE FOR MALFUNCTION B", perform "PROCEDURE FOR MALFUNCTION C".

NOTE:

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

DTC Confirmation Procedure (Cont'd)



PROCEDURE FOR MALFUNCTION A

NCEC0061S01

With CONSULT

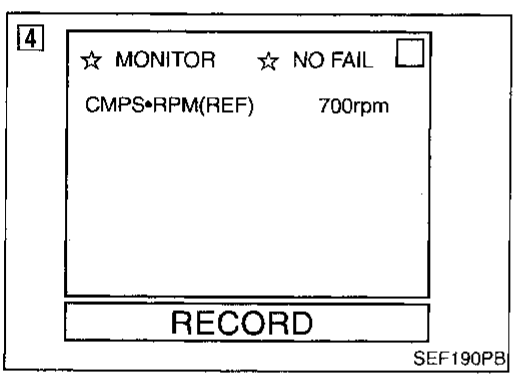
1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
3) Wait at least 6 seconds.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-129.

With GST

1) Turn ignition switch "ON" and wait at least 6 seconds.
2) Select "MODE 7" with GST.
3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-129.

No Tools

1) Turn ignition switch "ON" and wait at least 6 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.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-129.



PROCEDURE FOR MALFUNCTION B

NCEC0061S02

With CONSULT

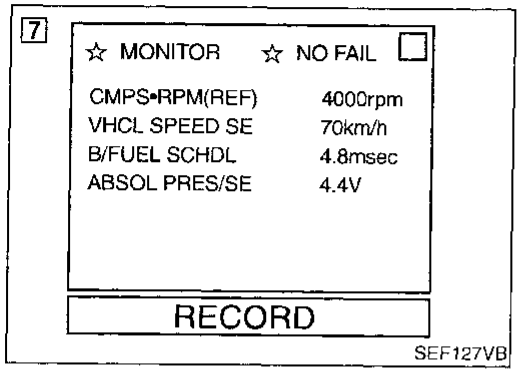
1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT.
4) Start engine and let it idle.
5) Wait at least 15 seconds.
6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-129.

With GST

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Start engine.
4) Let engine idle and wait at least 15 seconds.
5) Select "MODE 7" with GST.
6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-129.

No Tools

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Start engine.
4) Let engine idle and wait at least 15 seconds.
5) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
6) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
7) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-129.



PROCEDURE FOR MALFUNCTION C

NCEC0061S03

CAUTION:

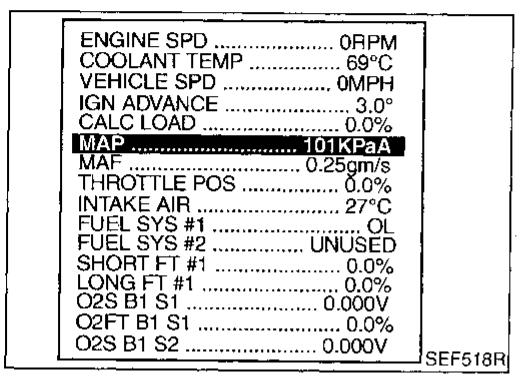
Always drive vehicle at a safe speed.

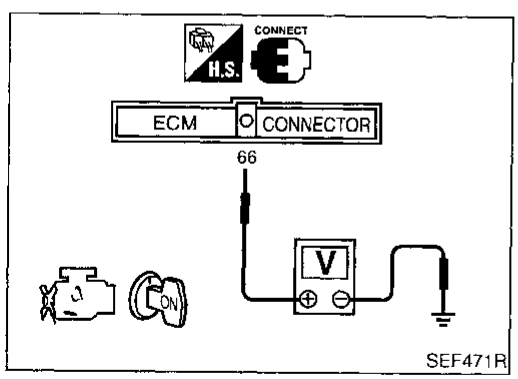
With CONSULT

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT and check "ABSOL PRES/SE" signal.
   The voltage of "ABSOL PRES/SE" should be more than 1.74 [V].
   If the check result is NG, go to "Diagnostic Procedure", EC-129.
   If the check result is OK, go to following step.
3) Start engine and warm it up to normal operating temperature.
4) Turn ignition switch "OFF" and wait at least 5 seconds.
5) Start engine and let it idle for at least 13 seconds.
6) Select "DATA MONITOR" mode with CONSULT.
7) Drive the vehicle at least 3 consecutive seconds under the following conditions,

B/FUEL SCHDL	More than 3.7 msec
CMPS·RPM (REF)	3,000 - 4,800 rpm
Selector lever	Suitable position
Driving location	Driving vehicle uphill (Increased engine load) will help maintain the driving conditions required for this test.

8) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-129.





Overall Function Check

NCEC0062

PROCEDURE FOR MALFUNCTION C

NCEC0062S01

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

With GST

1) Turn ignition switch "ON".
2) Select absolute pressure sensor signal in "MODE 1" with GST.
3) Make sure that the pressure of absolute pressure sensor signal is more than 46 kPa (0.47 kg/cm^2, 6.7 psi).
4) If NG, go to "Diagnostic Procedure", EC-129.

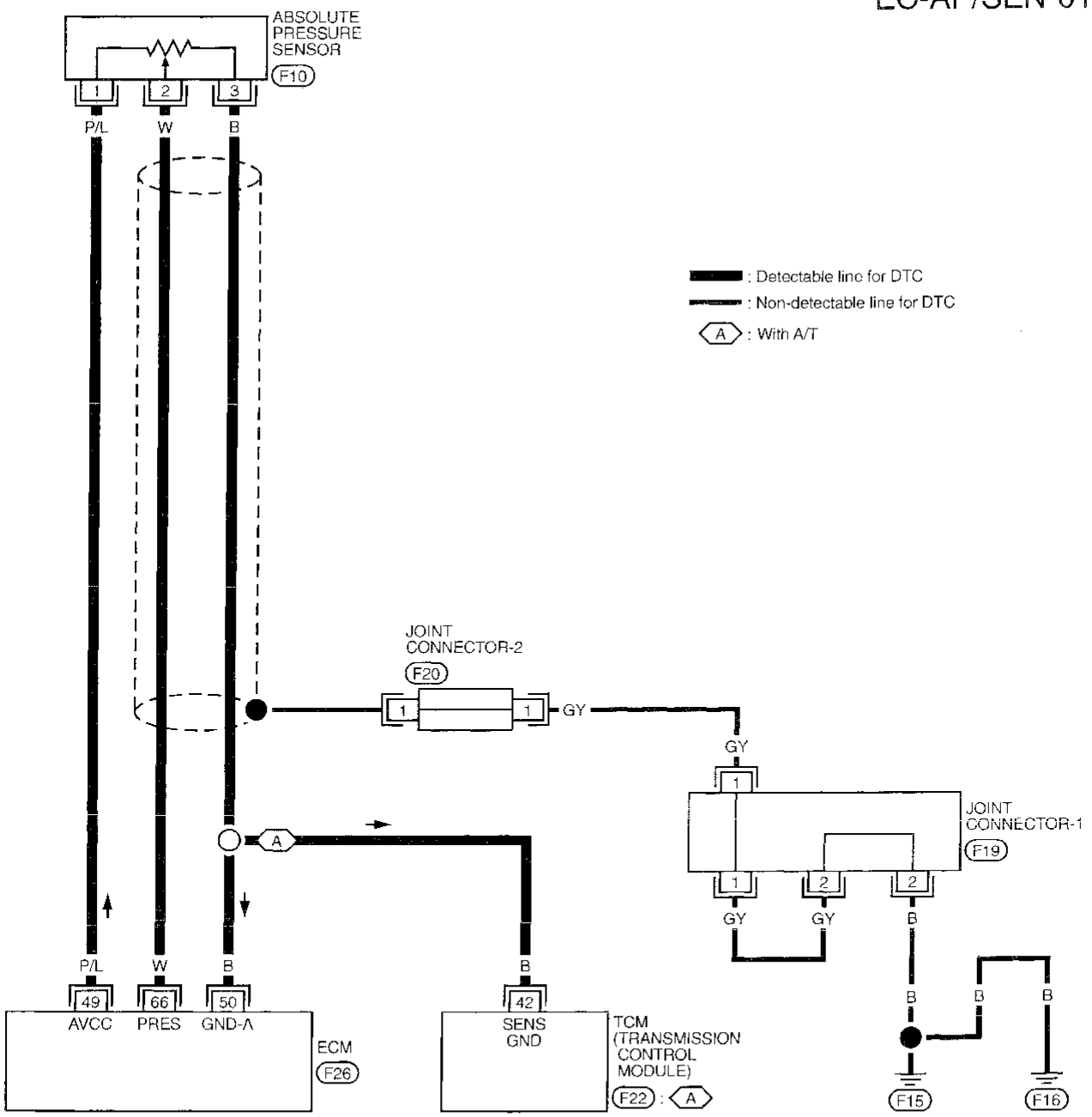
No Tools

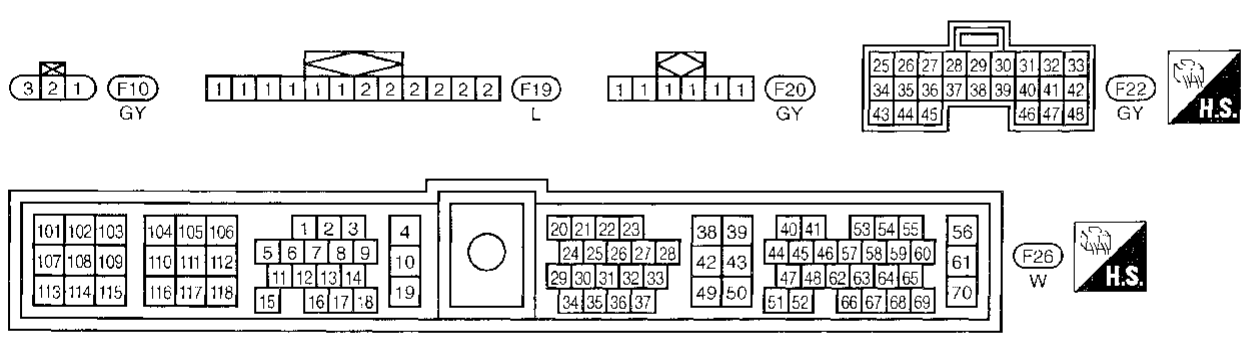
1) Turn ignition switch "ON".
2) Make sure that the voltage between ECM terminal 66 (Absolute pressure sensor signal) and ground is more than 1.74 [V].
3) If NG, go to "Diagnostic Procedure", EC-129.

Wiring Diagram

NCEC0063

EC-AP/SEN-01





TEC524

Diagnostic Procedure

NCEC0064

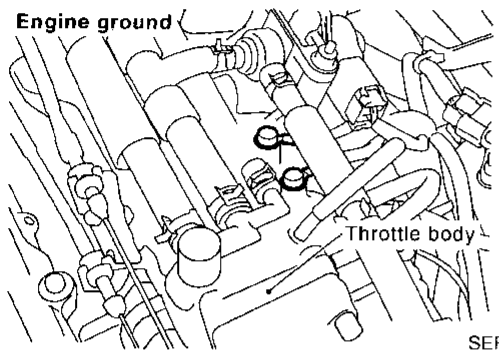
If the trouble is duplicated after "PROCEDURE FOR MALFUNCTION A or C", perform "PROCEDURE A" below. If the trouble is duplicated after "PROCEDURE FOR MALFUNCTION B", perform "PROCEDURE B" EC-131.

PROCEDURE A

NCEC0064S01

1	RETIGHTEN GROUND SCREWS

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

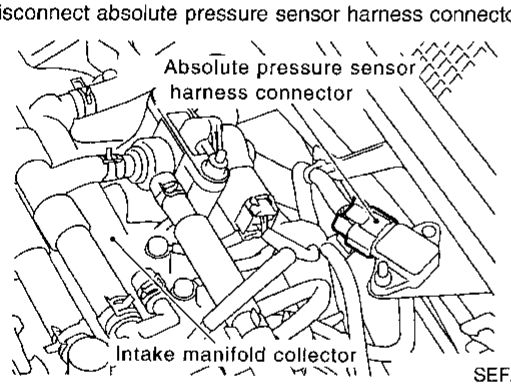


SEF292W

	▶	GO TO 2.

2	CHECK CONNECTOR

1. Disconnect absolute pressure sensor harness connector.



SEF294W

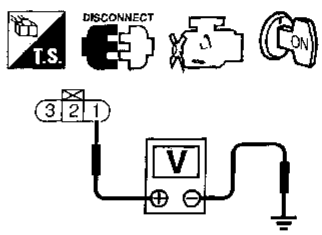
2. Check sensor harness connector for water.
   Water should not exist.

OK or NG

OK	▶	GO TO 3.
NG	▶	Repair or replace harness connector.

3	CHECK POWER SUPPLY

1. Turn ignition switch "ON".
2. Check voltage between terminal 1 and engine ground with CONSULT or tester.



SEF200W

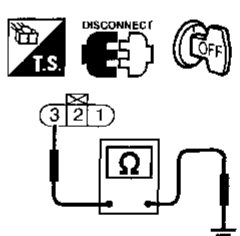
Voltage: Approximately 5V

OK or NG

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

4	CHECK GROUND CIRCUIT

1. Turn ignition switch "OFF".
2. Check harness continuity between terminal 3 and engine ground.



SEF201W

Continuity should exist.

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

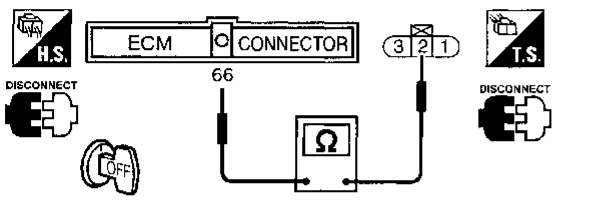
OK or NG

OK	▶	GO TO 5.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

Diagnostic Procedure (Cont'd)

5	CHECK INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 66 and terminal 2.



SEF202W

Continuity should exist.

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

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 6.

6	DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between ECM and absolute pressure sensor
- Harness for open or short between absolute pressure sensor and TCM (Transmission control module)

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

7	CHECK ABSOLUTE PRESSURE SENSOR

"Refer to Component Inspection", EC-133.

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace absolute pressure sensor.

8	CHECK SHIELD CIRCUIT

1. Turn ignition switch "OFF".
2. Remove joint connector-2.
3. Check the following.
   - Continuity between joint connector-2 terminal 1 and ground
   - Joint connector-1
   - Joint connector-2

   (Refer to "HARNESS LAYOUT" in EL section.)

   Continuity should exist.
4. Also check harness for short to ground and short to power.
5. Then reconnect joint connector-2.

OK or NG

OK	▶	GO TO 9.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

9	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-110.

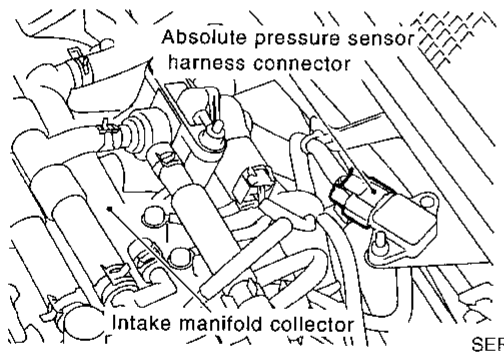
	▶	**INSPECTION END**

PROCEDURE B

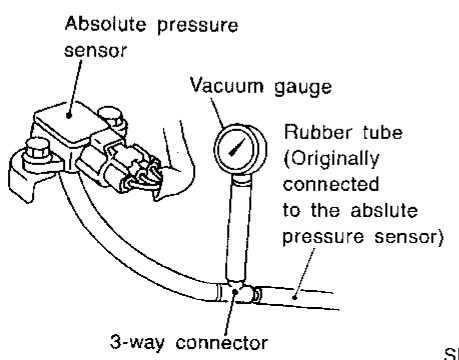
=NCEC0064S02

1 INSPECTION START

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch "OFF".
3. Attach the vacuum gauge between the absolute pressure sensor and the rubber tube connected to the MAP/BARO switch solenoid valve.



SEF294W



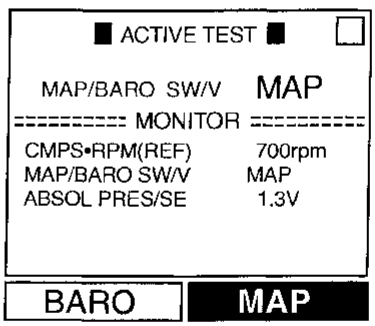
SEF290W

Models with CONSULT ▶	GO TO 2.
Models without CONSULT ▶	GO TO 3.

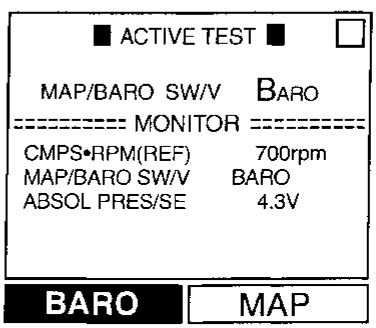
2 CHECK VACUUM SOURCE TO ABSOLUTE PRESSURE SENSOR

(With CONSULT)

1. Start engine and let it idle.
2. Select "MAP/BARO SW/V" in "ACTIVE TEST" mode with CONSULT.
3. Touch "MAP" and "BARO" alternately and check for vacuum.



SEF500R



SEF498R

MAP/BARO SW/V	Vacuum
BARO	Should not exist
MAP	Should exist

MTBL0079

OK or NG

OK ▶	GO TO 8.
NG ▶	GO TO 4.

3 CHECK VACUUM SOURCE TO ABSOLUTE PRESSURE SENSOR

(Without CONSULT)

1. Start engine and let it idle.
2. Check for vacuum under the following condition.

Condition	Vacuum
For 5 seconds after starting engine	Should not exist
More than 5 seconds after starting engine	Should exist

MTBL0080

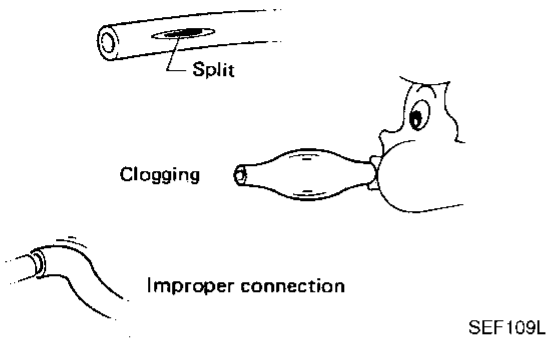
OK or NG

OK ▶	GO TO 8.
NG ▶	GO TO 4.

Diagnostic Procedure (Cont'd)

4	CHECK VACUUM HOSE

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



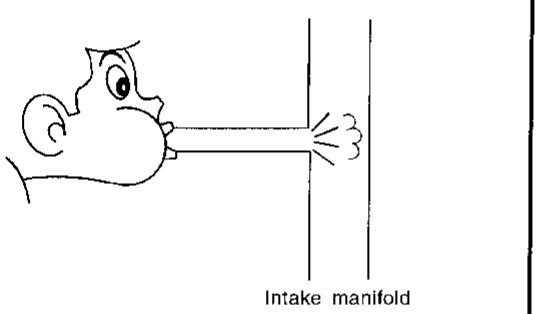
SEF109L

OK or NG

OK	▶	GO TO 5.
NG	▶	Clean, repair or replace the hose.

5	CHECK VACUUM PORT

Check vacuum port for clogging.



SEF368U

OK or NG

OK	▶	GO TO 6.
NG	▶	Clean or repair the vacuum port.

6	CHECK MAP/BARO SWITCH SOLENOID VALVE

Refer to "Component Inspection", EC-340.

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace MAP/BARO switch solenoid valve.

7	CHECK INTAKE SYSTEM

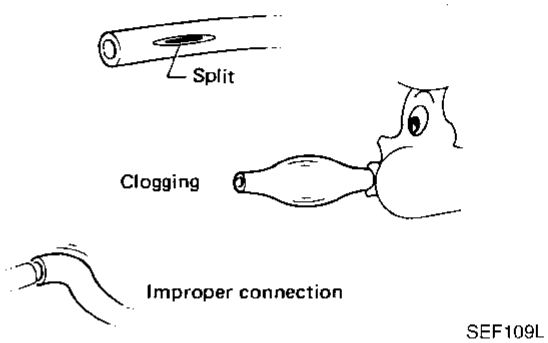
Check intake system for air leaks.

OK or NG

OK	▶	GO TO 11.
NG	▶	Repair it.

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

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



SEF109L

OK or NG

OK	▶	GO TO 9.
NG	▶	Repair or reconnect hose.

9	CHECK HARNESS CONNECTOR

1. Disconnect absolute pressure sensor harness connector.
2. Check sensor harness connector for water.
   Water should not exist.

OK or NG

OK	▶	GO TO 10.
NG	▶	Repair or replace harness connector.

10	CHECK ABSOLUTE PRESSURE SENSOR

Refer to "Component Inspection", EC-133.

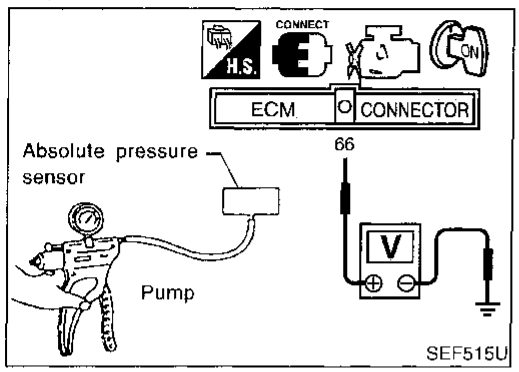
OK or NG

OK	▶	GO TO 11.
NG	▶	Replace absolute pressure sensor.

11	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-110.

	▶	**INSPECTION END**



Component Inspection

NCEC0065

ABSOLUTE PRESSURE SENSOR

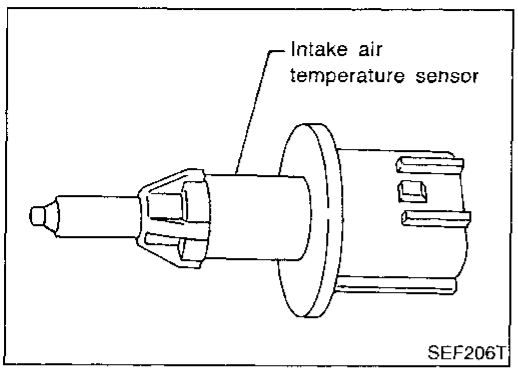
NCEC0065S01

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 ECM terminal 66 (Absolute pressure sensor signal) and engine ground.
   The voltage should be 3.2 to 4.8V.
4. Use pump to apply vacuum of −26.7 kPa (−200 mmHg, −7.87 inHg) to absolute pressure sensor as shown in figure and check the output voltage.
   The voltage should be 1.0 to 1.4V lower than the value measured in step 3.

CAUTION:

- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply below −93.3 kPa (−700 mmHg, −27.56 inHg) or over 101.3 kPa (760 mmHg, 29.92 inHg) of pressure.**

5. If NG, replace absolute pressure sensor.

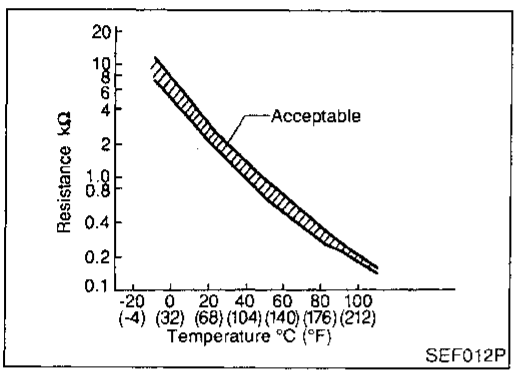


Component Description

NCEC0066

The intake air temperature sensor is mounted to the air duct housing. The sensor detects intake air temperature and transmits a signal to the ECM.

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



<Reference data>

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

*: These data are reference values and are measured between ECM terminal 28 (Intake air temperature sensor) and ECM terminal 43 (ECM ground).

On Board Diagnosis Logic

NCEC0067

DTC No.	Malfunction is detected when ...		Check Items (Possible Cause)
P0110 0401	A)	An excessively low or high voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Intake air temperature sensor
	B)	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signal from engine coolant temperature sensor.	

Engine operating condition in fail-safe mode
The ECM functions on the assumption that the intake air temperature is 25°C (77°F).

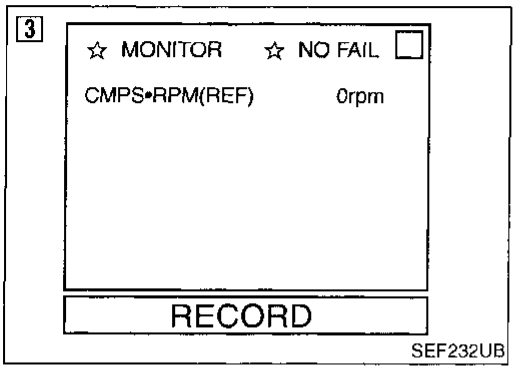
DTC Confirmation Procedure

NCEC0068

Perform "PROCEDURE FOR MALFUNCTION A" first. If the 1st trip DTC cannot be confirmed, perform "PROCEDURE FOR MALFUNCTION B".

NOTE:

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



PROCEDURE FOR MALFUNCTION A

NCEC0068S01

With CONSULT

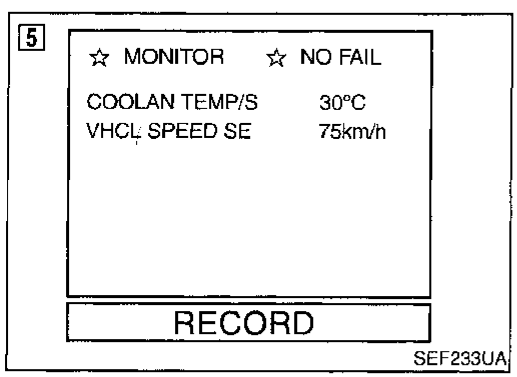
1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
3) Wait at least 5 seconds.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-138.

With GST

1) Turn ignition switch "ON" and wait at least 5 seconds.
2) Select MODE 7 with GST.
3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-138.

No Tools

1) Turn ignition switch "ON" and wait at least 5 seconds.
2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
3) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-138.



PROCEDURE FOR MALFUNCTION B

NCEC0068S02

CAUTION:
Always drive vehicle at a safe speed.

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

With CONSULT

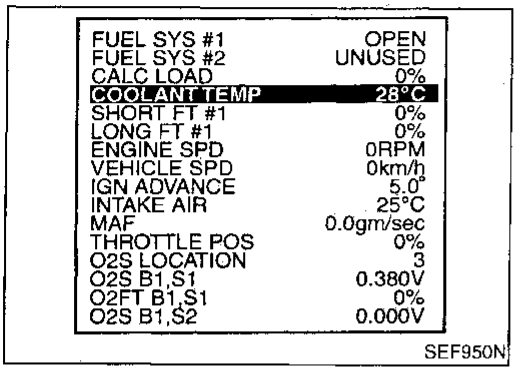
1) Wait until engine coolant temperature is less than 90°C (194°F).

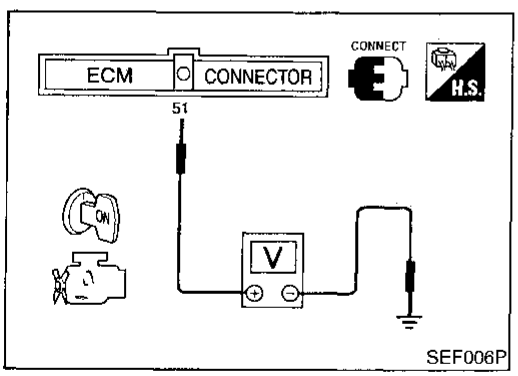
a) Turn ignition switch "ON".
b) Select "DATA MONITOR" mode with CONSULT.
c) Check the engine coolant temperature.
d) If the engine coolant temperature is not less than 90°C (194°F), turn ignition switch "OFF" and cool down engine.

- Perform the following steps before engine coolant temperature is above 90°C (194°F).

2) Turn ignition switch "ON".
3) Select "DATA MONITOR" mode with CONSULT.
4) Start engine.
5) Hold vehicle speed more than 70 km/h (44 MPH) for 105 consecutive seconds.
6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-138.

DTC Confirmation Procedure (Cont'd)





With GST

1) Wait until engine coolant temperature is less than 90°C (194°F).

a) Turn ignition switch "ON".

b) Select MODE 1 with GST.

c) Check the engine coolant temperature.

d) If the engine coolant temperature is above 90°C (194°F), turn ignition switch "OFF" and cool down engine.

- Perform the following steps before engine coolant temperature is above 90°C (194°F).

2) Start engine.

3) Hold vehicle speed more than 70 km/h (44 MPH) for 105 consecutive seconds.

4) Select MODE 7 with GST.

5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-138.

No Tools

1) Wait until engine coolant temperature is less than 90°C (194°F).

a) Turn ignition switch "ON".

b) Check voltage between ECM terminal 51 (Engine coolant temperature sensor signal) and ground.

Voltage: More than 1.0V

c) If the voltage is less than 1.0V, turn ignition switch "OFF" and cool down engine.

- Perform the following steps before the voltage is below 1.0V.

2) Start engine.

3) Hold vehicle speed more than 70 km/h (44 MPH) for 105 consecutive seconds.

4) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".

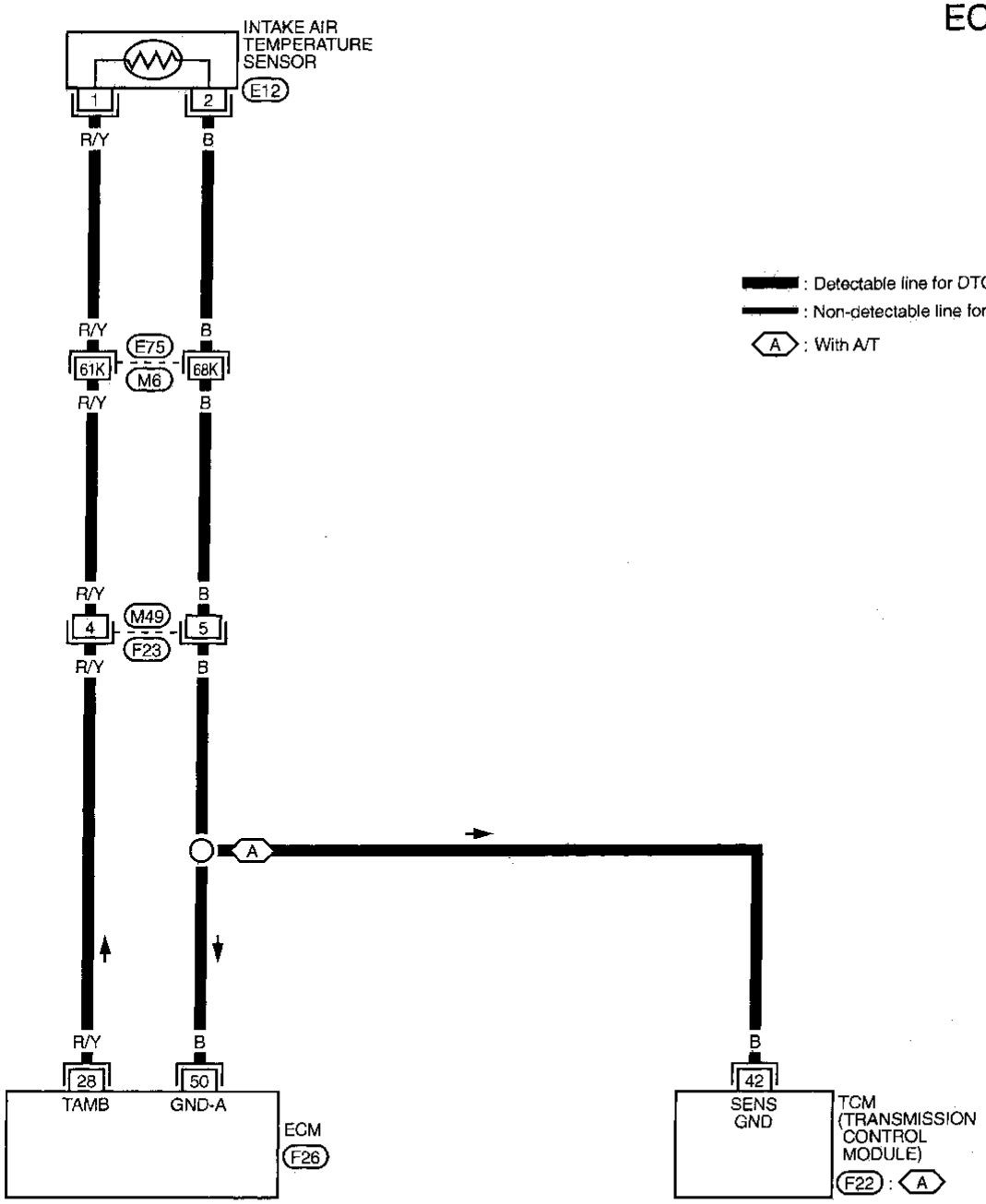
5) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.

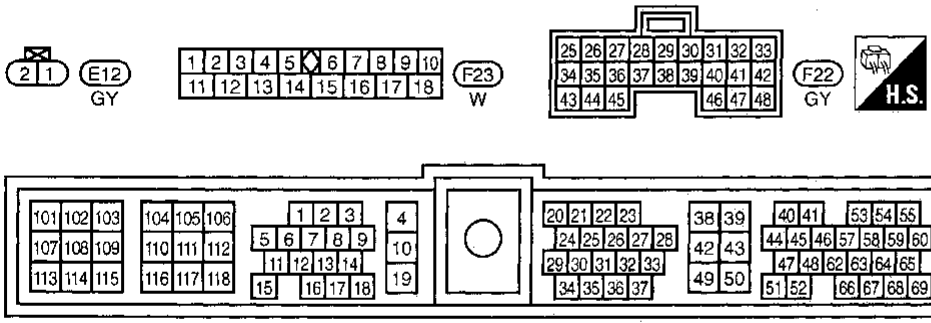
6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-138.

Wiring Diagram

NCEC0069

EC-IATS-01





Refer to last page (Foldout page).
M6, E75

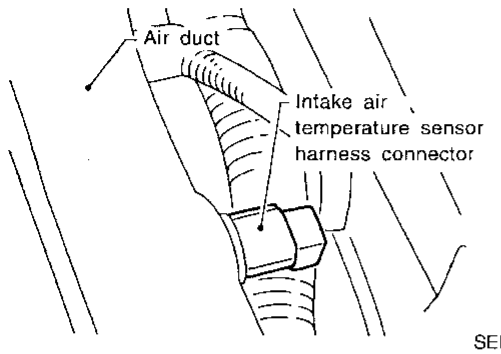
TEC525

Diagnostic Procedure

NCEC0070

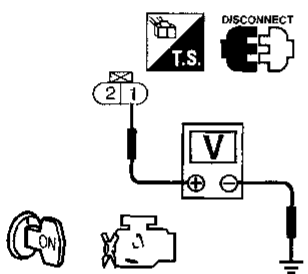
1 CHECK POWER SUPPLY

1. Turn ignition switch "OFF".
2. Disconnect intake air temperature sensor harness connector.



SEF213T

3. Turn ignition switch "ON".
4. Check voltage between terminal 1 and ground with CONSULT or tester.



SEF203W

Voltage: Approximately 5V

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

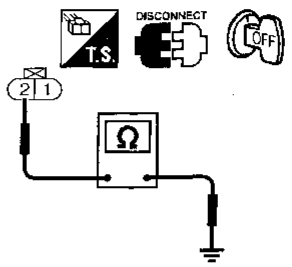
2 DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E75, M6
- Harness connectors M49, F23
- Harness for open or short between ECM and intake air temperature sensor

	▶	Repair harness or connectors.

3 CHECK GROUND CIRCUIT

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



SEF204W

Continuity should exist.

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

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4 DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E75, M6
- Harness connectors M49, F23
- Harness for open or short between ECM and intake air temperature sensor
- Harness for open or short between intake air temperature sensor and TCM (Transmission control module)

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

5 CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to "Component Inspection", EC-139.

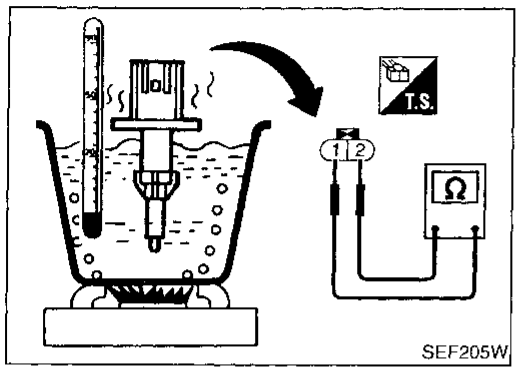
OK or NG

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

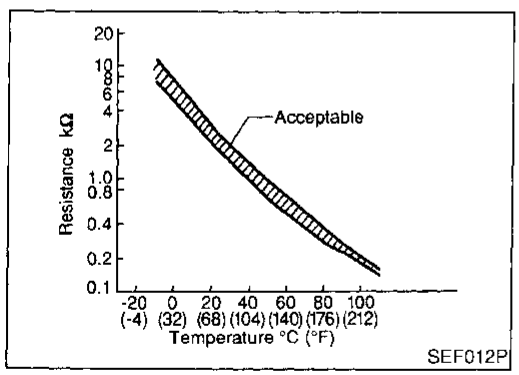
6 CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-110.

	▶	**INSPECTION END**



SEF205W



SEF012P

Component Inspection

NCEC0071

INTAKE AIR TEMPERATURE SENSOR

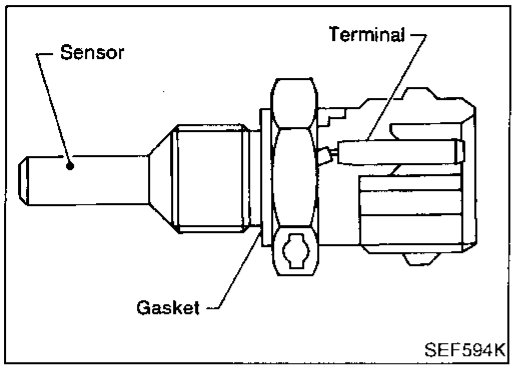
NCEC0071S01

Check resistance as shown in the figure.

<Reference data>

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

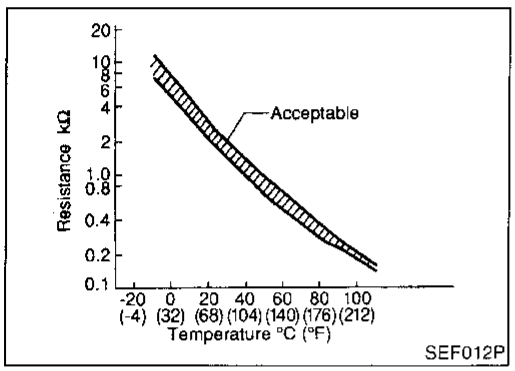
If NG, replace intake air temperature sensor.



Component Description

NCEC0072

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



<Reference data>

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

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

CONSULT Reference Value in Data Monitor Mode

NCEC0073

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

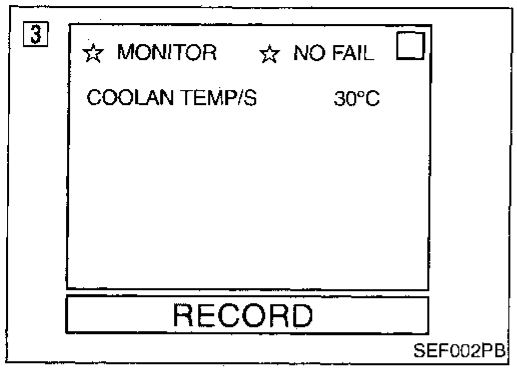
On Board Diagnosis Logic

NCEC0074

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0115 0103	• An excessively high or low voltage from the sensor is sent to ECM.*	• Harness or connectors (The sensor circuit is open or shorted.) • Engine coolant temperature sensor

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

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



DTC Confirmation Procedure

NCEC0075

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

With CONSULT

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
3) Wait at least 5 seconds.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-143.

With GST

1) Turn ignition switch "ON" and wait at least 5 seconds.
2) Select "MODE 7" with GST.
3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-143.

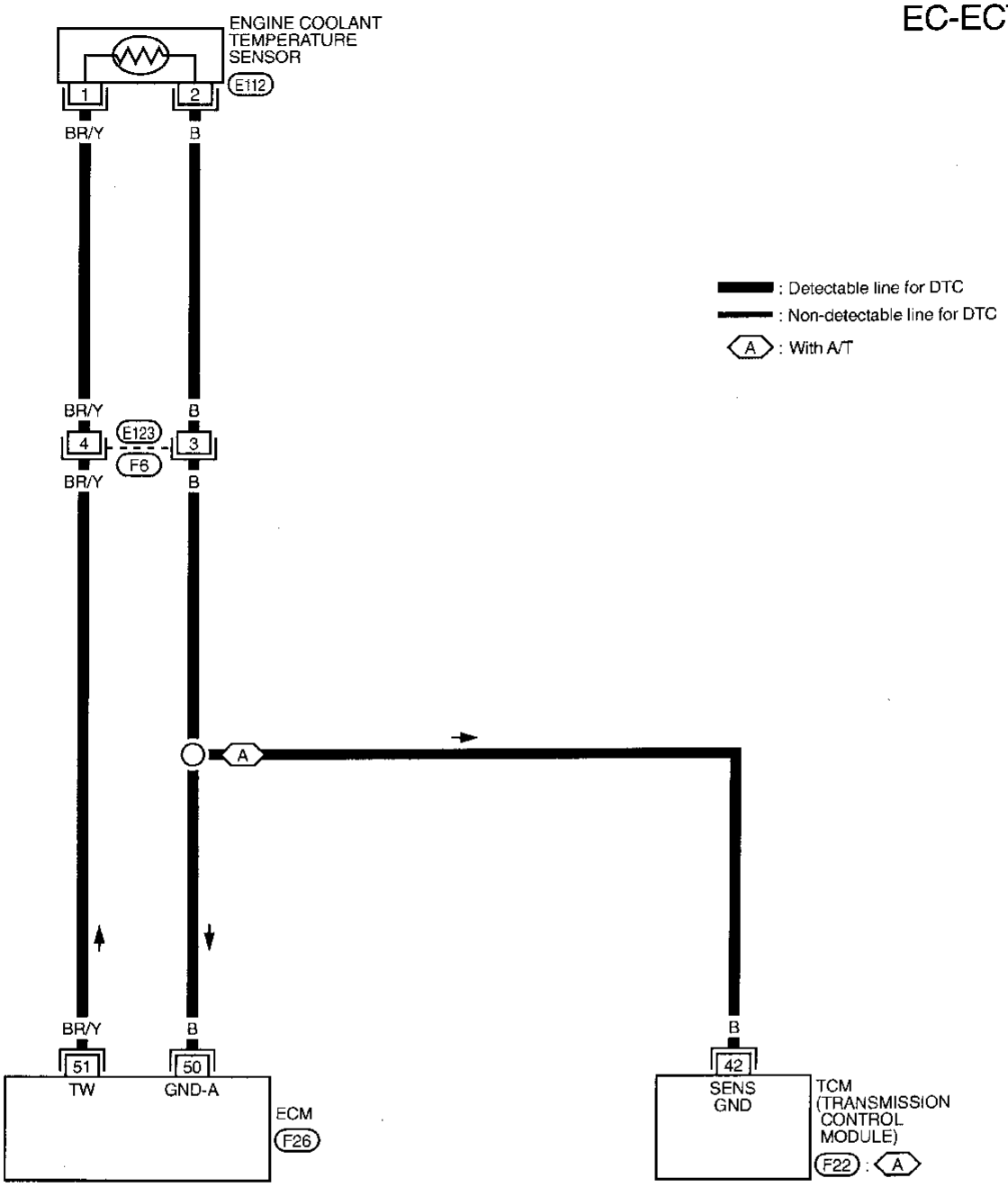
No Tools

1) Turn ignition switch "ON" and wait at least 5 seconds.
2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
3) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-143.

Wiring Diagram

NCEC0076

EC-ECTS-01



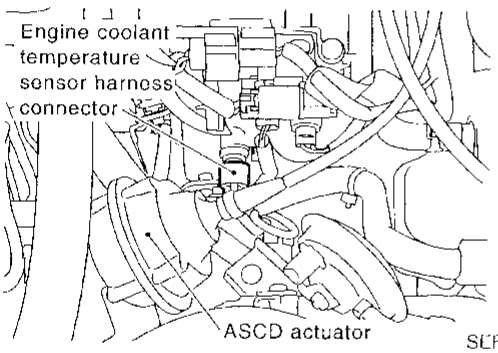
TEC526

Diagnostic Procedure

NCEC0077

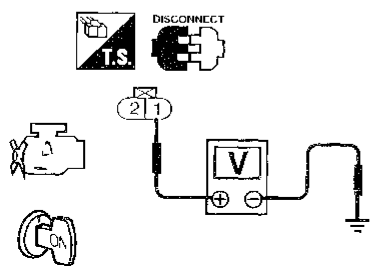
1 CHECK POWER SUPPLY

1. Turn ignition switch "OFF".
2. Disconnect engine coolant temperature sensor harness connector.



SEF296W

3. Turn ignition switch "ON".
4. Check voltage between terminal 1 and ground with CONSULT or tester.



SEF206W

Voltage: Approximately 5V

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

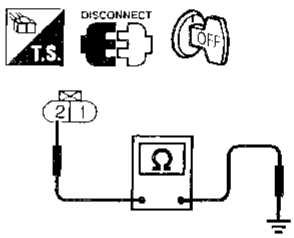
2 DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E123, F6
- Harness for open or short between ECM and engine coolant temperature sensor

	▶	Repair harness or connectors.

3 CHECK GROUND CIRCUIT

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



SEF207W

Continuity should exist.

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

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4 DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E123, F6
- Harness for open or short between ECM and engine coolant temperature sensor
- Harness for open or short between engine coolant temperature sensor and TCM (Transmission control module)

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

5 CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to "Component Inspection", EC-144.

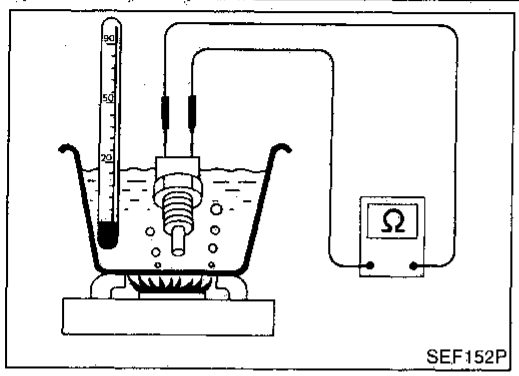
OK or NG

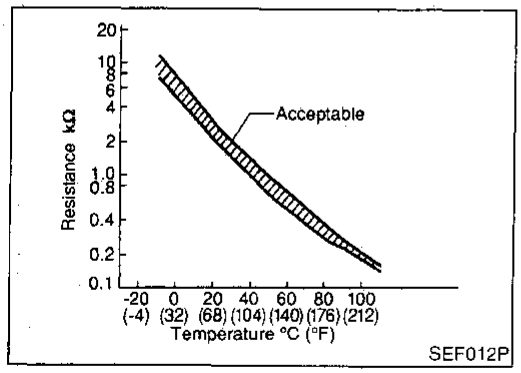
OK	▶	GO TO 6.
NG	▶	Replace engine coolant temperature sensor.

6 CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-110.

	▶	INSPECTION END





Component Inspection

NCEC0078

ENGINE COOLANT TEMPERATURE SENSOR

NCEC0078S01

Check resistance as shown in the figure.
<Reference data>

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

If NG, replace engine coolant temperature sensor.

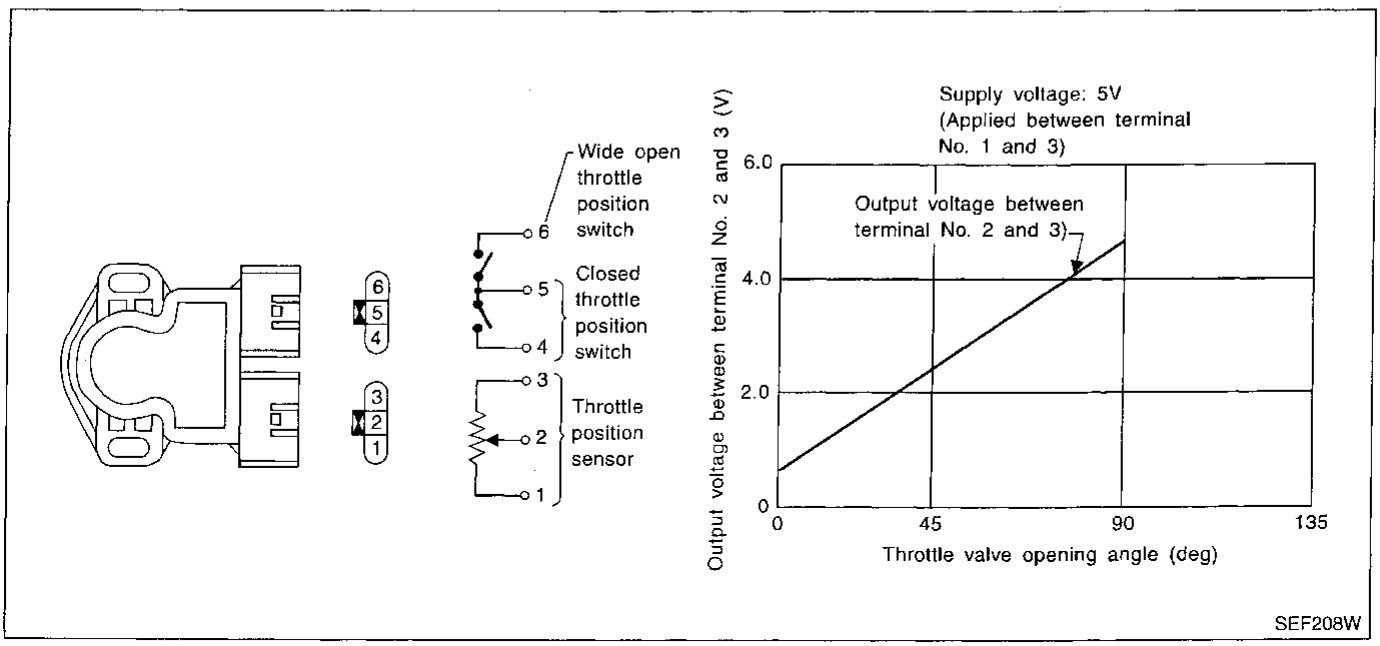
Component Description

NCEC0079

NOTE:
If DTC P0120 (0403) is displayed with DTC P0510 (0203), first perform trouble diagnosis for DTC P0510, EC-320.

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

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



CONSULT Reference Value in Data Monitor Mode

NCEC0080

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
THRTL POS SEN	• Ignition switch: ON (Engine stopped) • Engine: After warming up	Throttle valve: fully closed	0.2 - 0.8V
		Throttle valve: fully opened	3.5 - 4.5V
ABSOL TH·P/S	• Ignition switch: ON (Engine stopped) • Engine: After warming up	Throttle valve: fully closed	0.0%
		Throttle valve: fully opened	Approx. 88%

ECM Terminals and Reference Value

NCEC0081

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
23	Y	Throttle position sensor	**[Ignition switch "ON"]** • **Warm-up condition** • Accelerator pedal fully released	0.2 - 0.8V
			[Ignition switch "ON"] • Accelerator pedal fully depressed	3.5 - 4.5V
49	P/L	Sensors' power supply	**[Ignition switch "ON"]**	Approximately 5V

ECM Terminals and Reference Value (Cont'd)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
50	B	Sensors' ground	**[Engine is running]** • Idle speed	Approximately 0V

On Board Diagnosis Logic

NCEC0082

DTC No.		Malfunction is detected when ...	Check Items (Possible Cause)
P0120 0403	A)	An excessively low or high voltage from the sensor is sent to ECM.*	• Harness or connectors (The throttle position sensor circuit is open or shorted.) • Throttle position sensor
	B)	A high voltage from the sensor is sent to ECM under light load driving condition.	• Harness or connectors (The throttle position sensor circuit is open or shorted.) • Throttle position sensor • Fuel injector • Camshaft position sensor • Mass air flow sensor
	C)	A low voltage from the sensor is sent to ECM under heavy load driving condition.	• Harness or connectors (The throttle position sensor circuit is open or shorted.) • Intake air leaks • Throttle position sensor

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

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

DTC Confirmation Procedure

NCEC0083

Perform "PROCEDURE FOR MALFUNCTION A" first. If the 1st trip DTC cannot be confirmed, perform "PROCEDURE FOR MALFUNCTION B". If there is no problem on "PROCEDURE FOR MALFUNCTION B", perform "PROCEDURE FOR MALFUNCTION C".

NOTE:

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

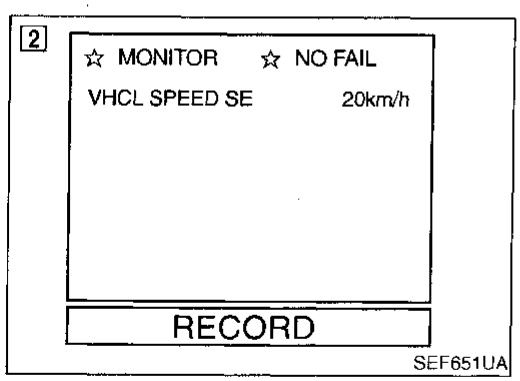
PROCEDURE FOR MALFUNCTION A

NCEC0083S01

CAUTION:
Always drive vehicle at a safe speed.

TESTING CONDITION:

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



With CONSULT

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

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

3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-153.

With GST

1) Start engine and maintain the following conditions for at least 5 consecutive seconds.

Vehicle speed	More than 4 km/h (2 MPH)
Selector lever	Suitable position except "P" or "N" position

2) Select "MODE 7" with GST.
3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-153.

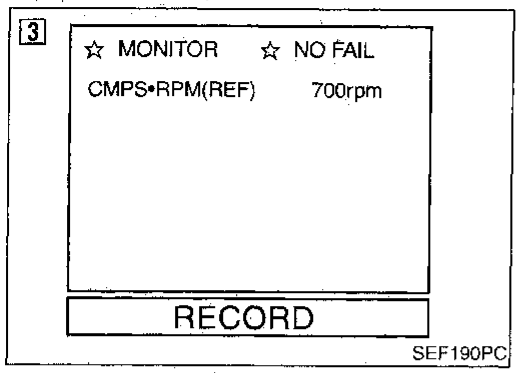
No Tools

1) Start engine and maintain the following conditions for at least 5 consecutive seconds.

Vehicle speed	More than 4 km/h (2 MPH)
Selector lever	Suitable position except "P" or "N" position

2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Turn ignition switch "ON" and perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-153.

DTC Confirmation Procedure (Cont'd)



PROCEDURE FOR MALFUNCTION B

NCEC0083S02

With CONSULT

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

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

4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-153.

With GST

1) Start engine and let it idle for at least 10 seconds.
   If idle speed is over 1,000 rpm, maintain the following conditions for at least 10 seconds to keep engine speed below 1,000 rpm.

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

2) Select "MODE 7" with GST.
3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-153.

No Tools

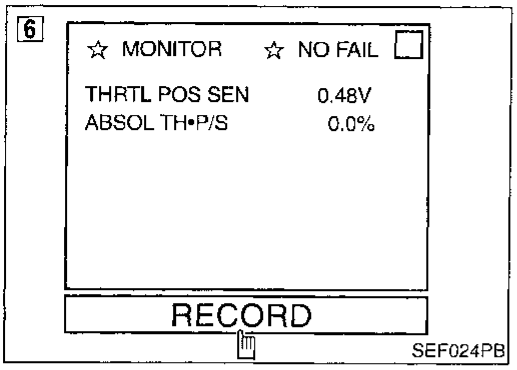
1) Start engine and let it idle for at least 10 seconds.
   If idle speed is over 1,000 rpm, maintain the following conditions for at least 10 seconds to keep engine speed below 1,000 rpm.

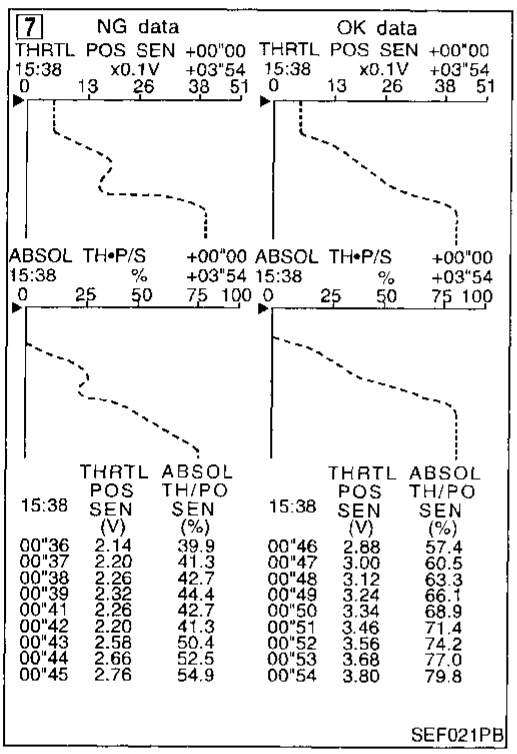
A/T model	Selector lever	Suitable position except "P" or "N" position
	Brake pedal	Depressed
	Vehicle speed	0 km/h (0 MPH)

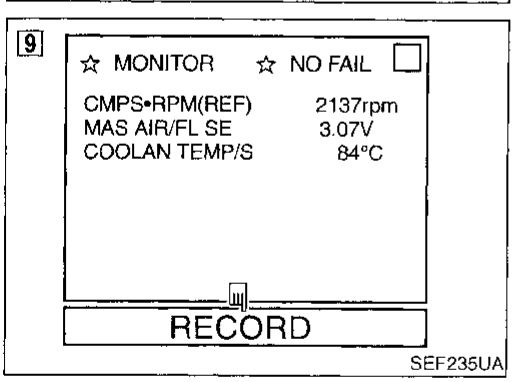
M/T model	Selector lever	Suitable position except "N" (Higher gear position such as 3rd or 4th is better to keep low engine rpm.)
	Accelerator pedal	Released
	Vehicle speed	As slow as possible

2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Turn ignition switch "ON" and perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-153.

DTC Confirmation Procedure (Cont'd)







PROCEDURE FOR MALFUNCTION C

NCEC0083S03

CAUTION:
Always drive vehicle at a safe speed.

With CONSULT

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Turn ignition switch "ON".
4) Select "MANU TRIG" and "HI SPEED" in "DATA MONITOR" mode with CONSULT.
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 graph and check the following:

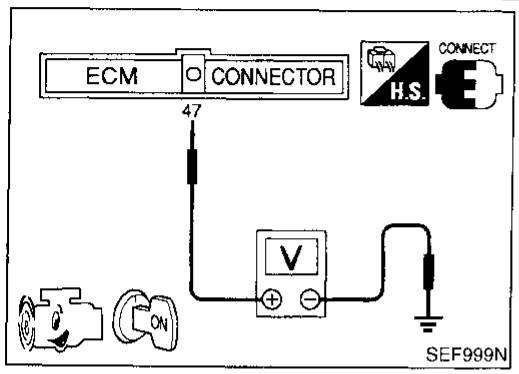
- The voltage rise is linear in response to accelerator pedal depression.
- The voltage when accelerator pedal is fully depressed is approximately 4V.

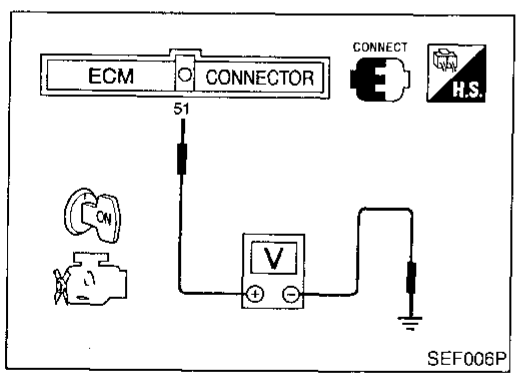
If NG, go to "Diagnostic Procedure", EC-153.
If OK, go to following step.

8) Select "AUTO TRIG" in "DATA MONITOR" mode with CONSULT.
9) Maintain the following conditions for at least 10 consecutive seconds.

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

10) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-153.





With GST

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

Gear position	Suitable position
Engine speed	More than 2,000 rpm
Engine coolant temperature	More than 70°C (158°F)
Voltage between ECM terminal 47 (Mass air flow sensor signal) and ground	More than 3V

2) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-153.

No Tools

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

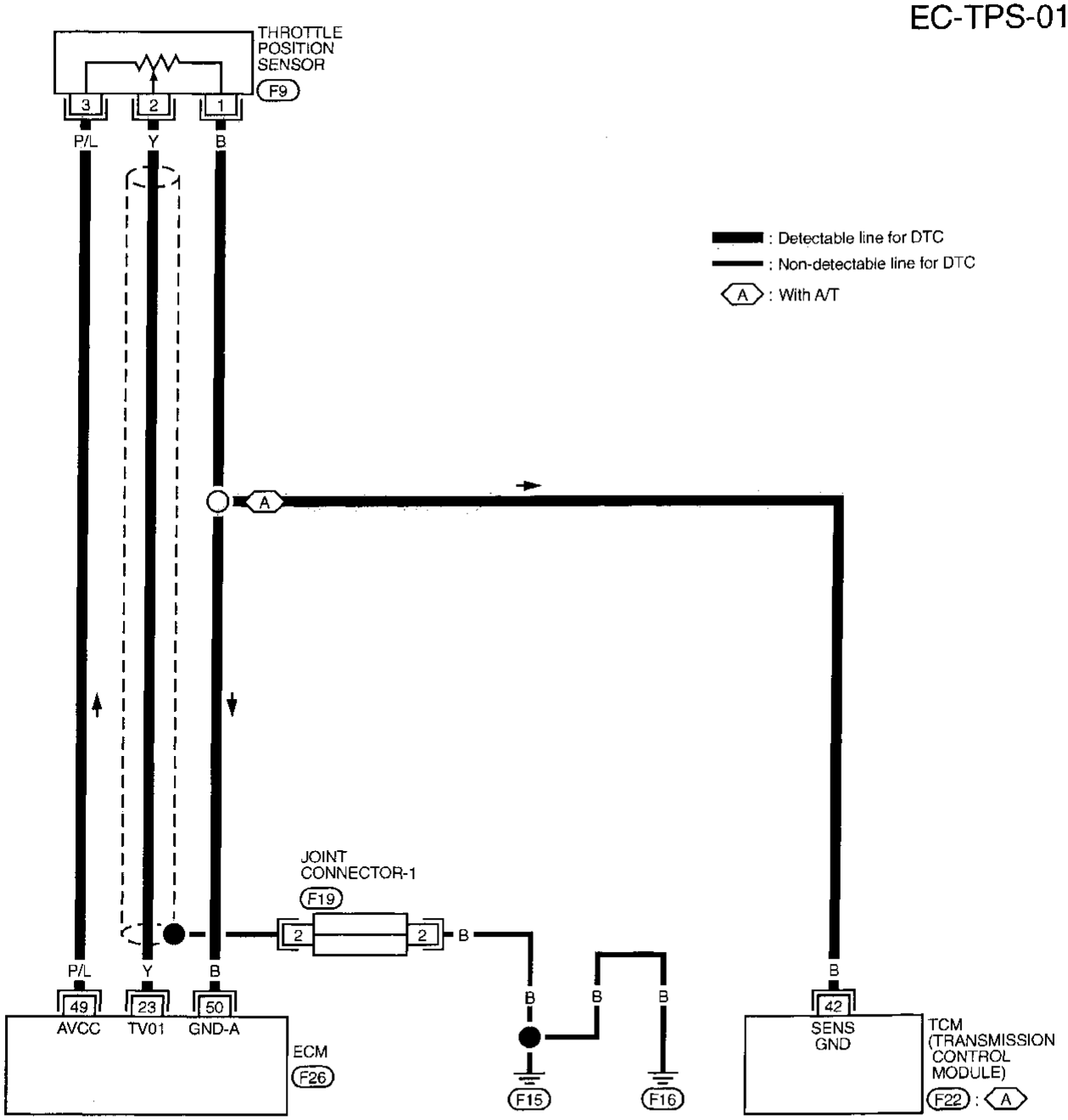
Gear position	Suitable position
Engine speed	More than 2,000 rpm
Voltage between ECM terminal 47 (Mass air flow sensor signal) and ground	More than 3V
Voltage between ECM terminal 51 (Engine coolant temperature sensor signal) and ground	Less than 1.5V

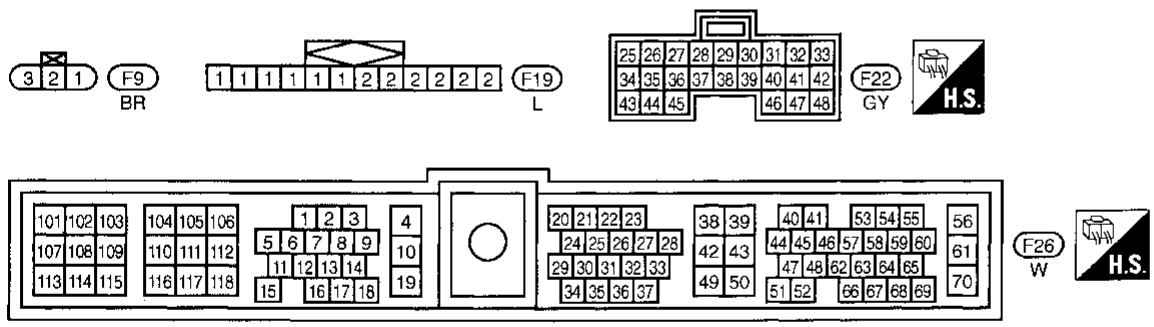
2) Stop the vehicle, turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
3) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-153.

Wiring Diagram

NCEC0084

EC-TPS-01





TEC527

Diagnostic Procedure

NCEC0085

1 INSPECTION START

Which malfunction A, B or C is duplicated?

MALFUNCTION	Type
A	A
B	B
C	C

MTBL0066

Type A, B or C

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

2 ADJUST THROTTLE POSITION SENSOR

Perform "Basic Inspection", EC-83.

OK or NG

OK	▶	GO TO 3.

3 CHECK INTAKE SYSTEM

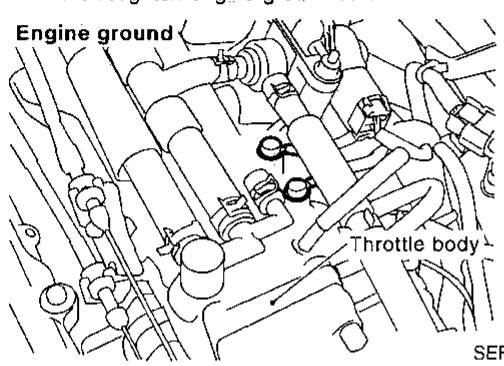
Check the followings for connection.
- Air duct
- Vacuum hoses
- Intake air passage between air duct to intake manifold collector

OK or NG

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

4 RETIGHTEN GROUND SCREWS

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

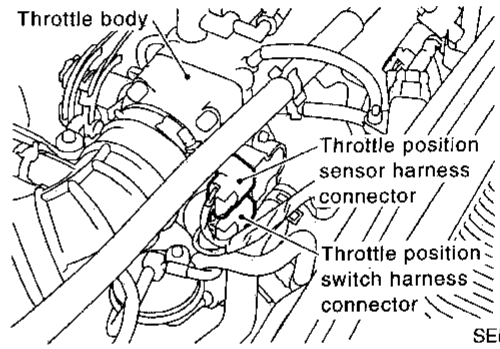


SEF292W

	▶	GO TO 5.

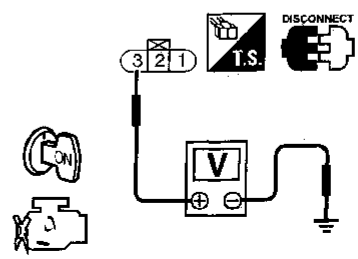
5 CHECK POWER SUPPLY

1. Disconnect throttle position sensor harness connector.



SEF297W

2. Turn ignition switch "ON".
3. Check voltage between terminal 3 and ground with CONSULT or tester.



SEF209W

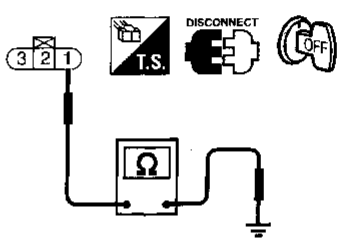
Voltage: Approximately 5V

OK or NG

OK	▶	GO TO 6.
NG	▶	Repair harness or connectors.

6 CHECK GROUND CIRCUIT

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



SEF210W

Continuity should exist.

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

OK or NG

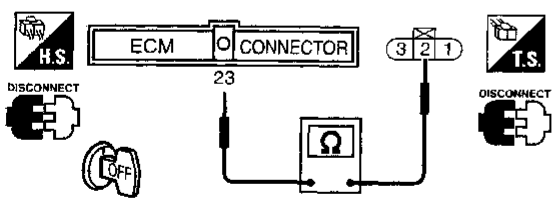
OK	▶	GO TO 8.
NG	▶	GO TO 7.

Diagnostic Procedure (Cont'd)

7	DETECT MALFUNCTIONING PART
Check the following. • Harness for open or short between ECM and throttle position sensor • Harness for open or short between throttle position sensor and TCM (Transmission control module)	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

8	CHECK INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 23 and terminal 2.



SEF211W

Continuity should exist.

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

OK or NG

OK	▶	GO TO 9.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

9	CHECK THROTTLE POSITION SENSOR

Refer to "Component Inspection", EC-155.

OK or NG

OK (Type B in step1)	▶	GO TO 10.
OK (Type A or C in step1)	▶	GO TO 13.
NG	▶	Replace throttle position sensor. To adjust it, perform "Basic Inspection", EC-83.

10	CHECK MASS AIR FLOW SENSOR

Refer to "Component Inspection", EC-124.

OK or NG

OK	▶	GO TO 11.
NG	▶	Replace mass air flow sensor.

11	CHECK CAMSHAFT POSITION SENSOR

Refer to "Component Inspection", EC-266.

OK or NG

OK	▶	GO TO 12.
NG	▶	Replace camshaft position sensor.

12	CHECK FUEL INJECTOR

Refer to "Component Inspection", EC-453.

OK or NG

OK	▶	GO TO 13.
NG	▶	Replace fuel injector.

13	CHECK SHIELD CIRCUIT

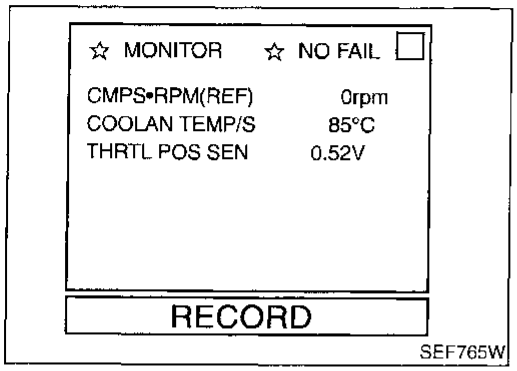
1. Turn ignition switch "OFF".
2. Remove joint connector-1.
3. Check the following.
   - Continuity between joint connector-1 terminal 2 and ground
   - Joint connector-1
     (Refer to "HARNESS LAYOUT" in EL section.)

   Continuity should exist.
4. Also check harness for short to ground and short to power.
5. Then reconnect joint connector.

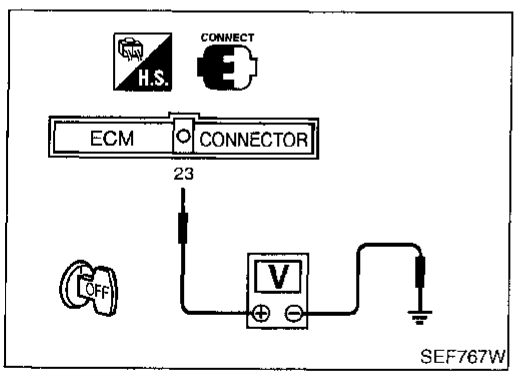
OK or NG

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

14	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-110.	
▶	INSPECTION END



SEF765W



SEF767W

Component Inspection

NCEC0086

THROTTLE POSITION SENSOR

NCEC0086S01

Ⓐ With CONSULT

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

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

Throttle valve conditions	Voltage (V)
Completely closed	0.2 - 0.8 (a)
Partially open	Between (a) and (b)
Completely open	3.5 - 4.5 (b)

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

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

Ⓑ Without CONSULT

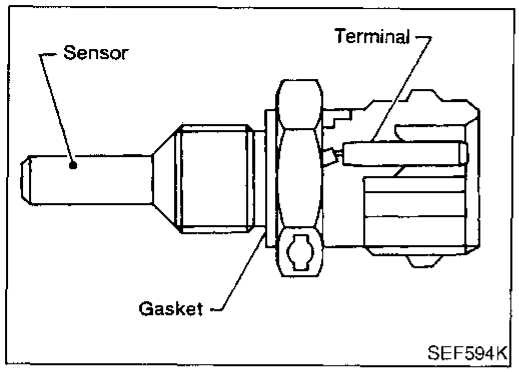
1) Start engine and warm it up to normal operating temperature.
2) Stop engine and turn ignition switch "ON".
3) Check voltage between ECM terminal 23 (Throttle position sensor signal) and ground under the following conditions.

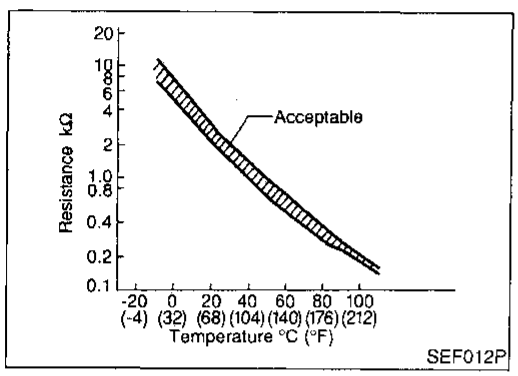
NOTE:
Voltage measurement must be made with throttle position sensor installed in vehicle.

Throttle valve conditions	Voltage (V)
Completely closed	0.2 - 0.8 (a)
Partially open	Between (a) and (b)
Completely open	3.5 - 4.5 (b)

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

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





Component Description

NCEC0087

NOTE:
If DTC P0125 (0908) is displayed with P0115 (0103), first perform trouble diagnosis for DTC P0115, EC-140.

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

<Reference data>

Engine coolant temperature °C (°F)	Voltage* V	Resistance kΩ
−10 (14)	4.4	9.2
20 (68)	3.5	2.1 - 2.9
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

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

CONSULT Reference Value in Data Monitor Mode

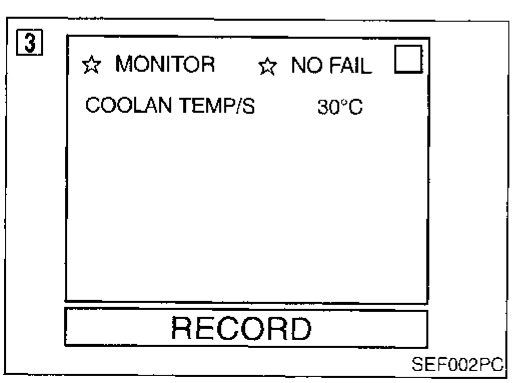
NCEC0088

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

On Board Diagnosis Logic

NCEC0089

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



DTC Confirmation Procedure

NCEC0090

CAUTION:
Be careful not to overheat engine.

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

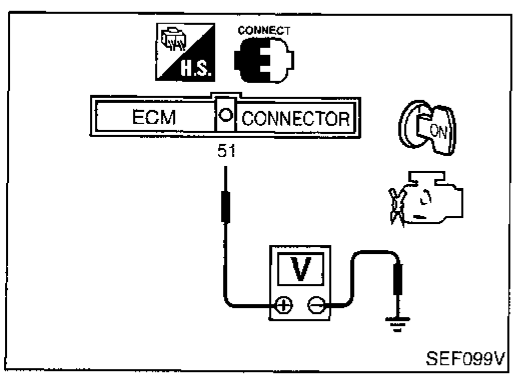
With CONSULT

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.

3) Check that "COOLAN TEMP/S" is above 15°C (59°F).
If it is above 15°C (59°F), the test result will be OK. If it is below 15°C (59°F), go to following step.
4) Start engine and run it for 65 minutes at idle speed.
If "COOLAN TEMP/S" increases to more than 15°C (59°F) within 65 minutes, stop engine because the test result will be OK.
5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-159.

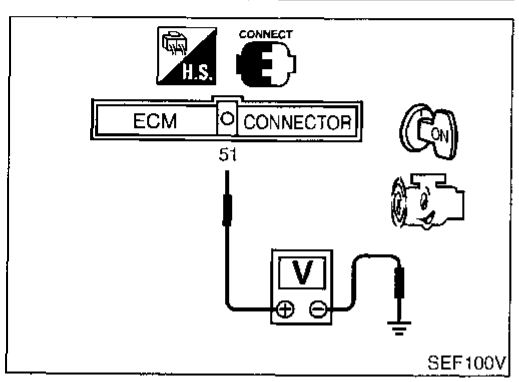
With GST

1) Turn ignition switch "ON".
2) Select "MODE 1" with GST.
3) Check that engine coolant temperature is above 15°C (59°F).
If it is above 15°C (59°F), the test result will be OK. If it is below 15°C (59°F), go to following step.
4) Start engine and run it for 65 minutes at idle speed.
If engine coolant temperature increases to more than 15°C (59°F) within 65 minutes, stop engine because the test result will be OK.
5) Select "MODE 7" with GST.
6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-159.



No Tools

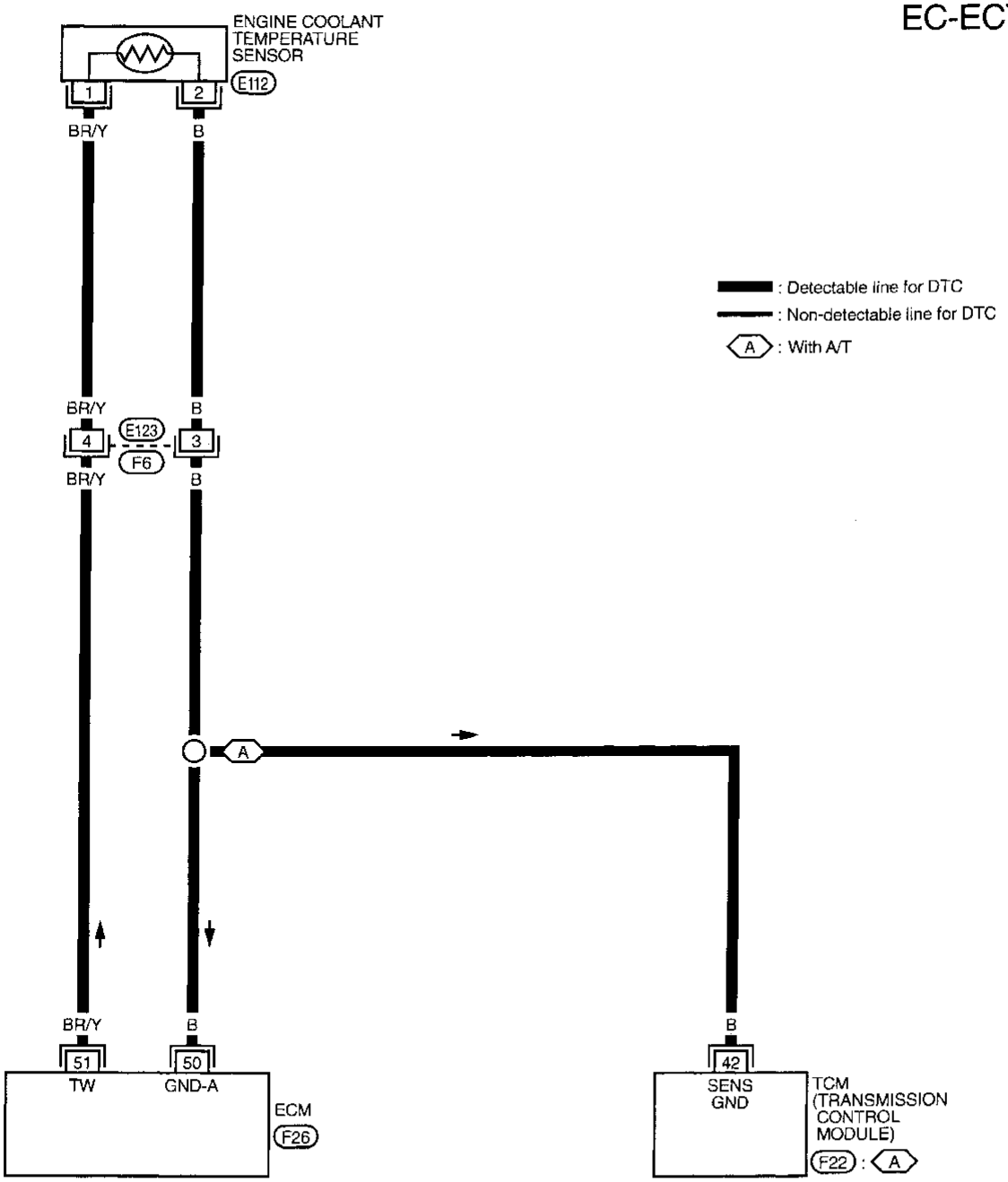
1) Turn ignition switch "ON".
2) Check that voltage between ECM terminal 51 (Engine coolant temperature sensor signal) and ground is less than 3.72V.
If it is less than 3.72V, the test result will be OK. If it is over 3.72V, go to following step.
3) Start engine and run it for 65 minutes at idle speed. Then measure voltage between ECM terminal 51 and ground.
If the voltage decreases to less than 3.72V within 65 minutes, stop engine because the test result will be OK.
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.
6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-159.

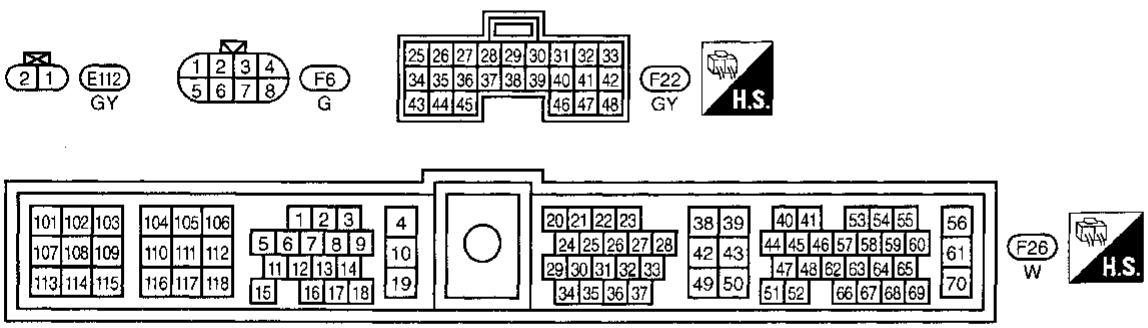


Wiring Diagram

NCEC0091

EC-ECTS-01





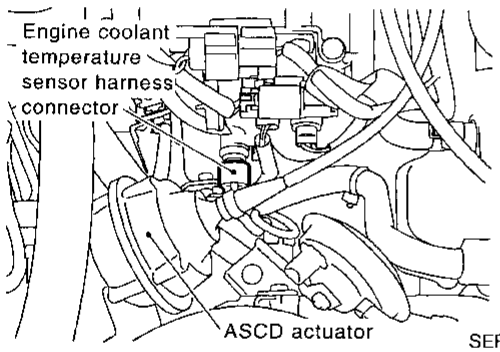
TEC526

Diagnostic Procedure

NCEC0092

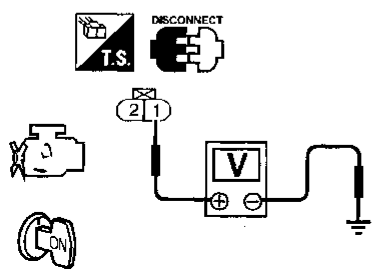
1 CHECK POWER SUPPLY

1. Turn ignition switch "OFF".
2. Disconnect engine coolant temperature sensor harness connector.



SEF296W

3. Turn ignition switch "ON".
4. Check voltage between terminal 1 and ground with CONSULT or tester.



SEF206W

Voltage: Approximately 5V

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

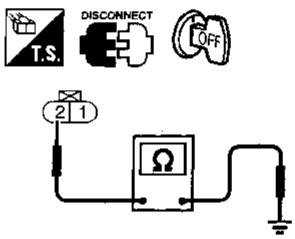
2 DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E123, F6
- Harness for open or short between ECM and engine coolant temperature sensor

	▶	Repair harness or connectors.

3 CHECK GROUND CIRCUIT

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



SEF207W

Continuity should exist.

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

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4 DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E123, F6
- Harness for open or short between ECM and engine coolant temperature sensor
- Harness for open or short between engine coolant temperature sensor and TCM (Transmission control module)

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

5 CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to "Component Inspection" on next page.

OK or NG

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

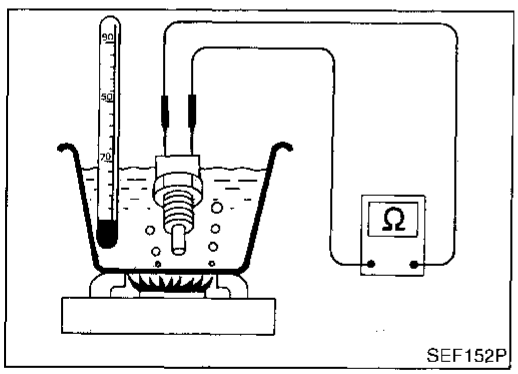
6 CHECK THERMOSTAT OPERATION

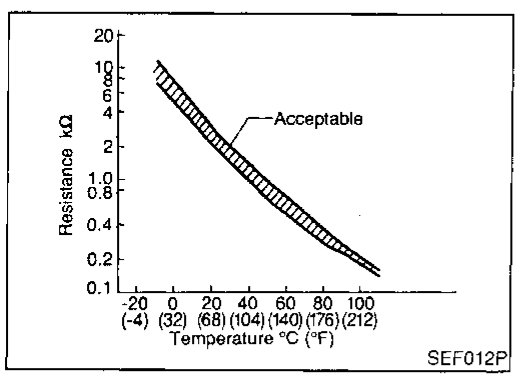
When the engine is cooled [lower than 76.5°C (170°F)], condition grasp lower radiator hose and confirm the engine coolant does not flow.

OK or NG

OK	▶	GO TO 7.
NG	▶	Repair or replace thermostat. Refer to LC section ("Thermostat", "ENGINE COOLING SYSTEM").

7	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-110.	
▶	INSPECTION END





Component Inspection

NCEC0093

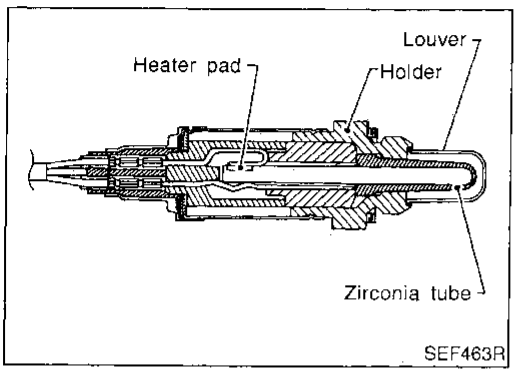
ENGINE COOLANT TEMPERATURE SENSOR

NCEC0093S01

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

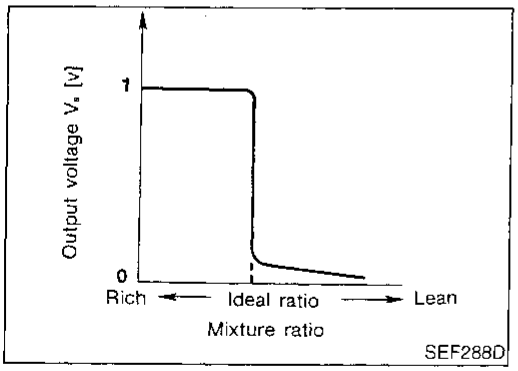
If NG, replace engine coolant temperature sensor.



Component Description

NCEC0094

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



CONSULT Reference Value in Data Monitor Mode

NCEC0095

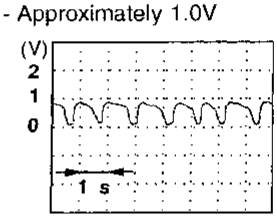
Specification data are reference values.

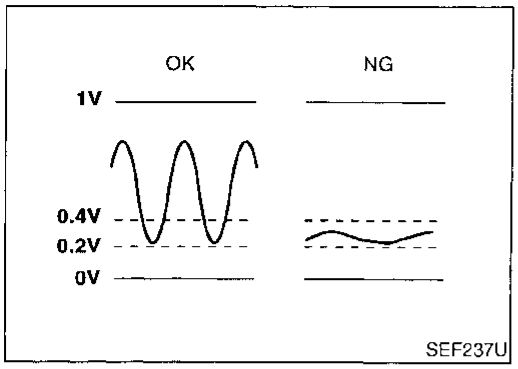
MONITOR ITEM	CONDITION		SPECIFICATION
FR O2 SENSOR	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
FR O2 MNTR			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.

ECM Terminals and Reference Value

NCEC0096

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
46	W	Front heated oxygen sensor	**[Engine is running]** • After warming up to normal operating temperature and engine speed is 2,000 rpm	0 - Approximately 1.0V  SEF008W

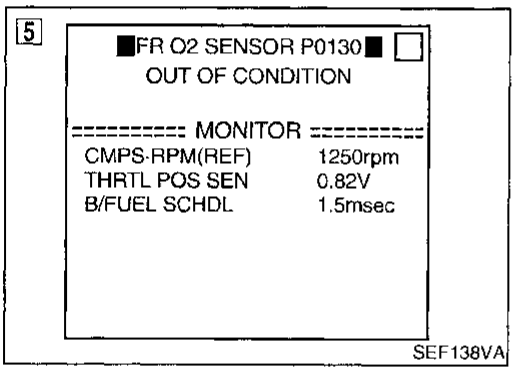


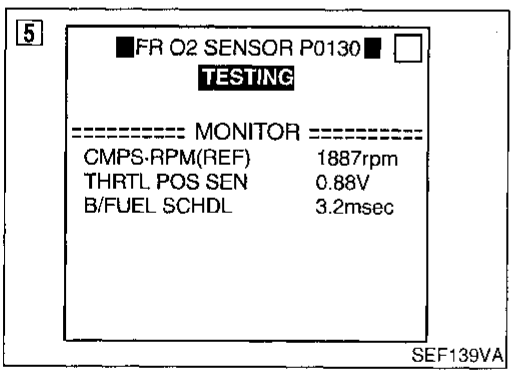
On Board Diagnosis Logic

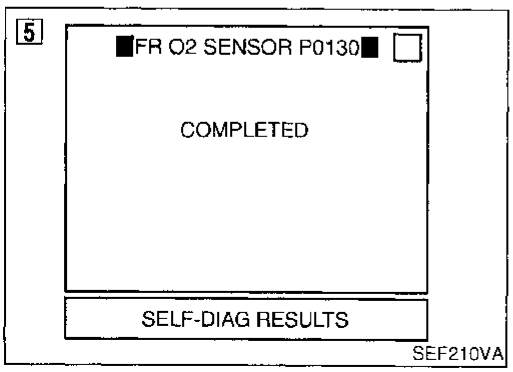
NCEC0097

Under the condition in which the front heated oxygen sensor signal is not input, the ECM circuits will read a continuous approximately 0.3V. Therefore, for this diagnosis, the time that output voltage is within 200 to 400 mV range is monitored, and the diagnosis checks that this time is not inordinately long.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0130 0303	• The voltage from the sensor is constantly approx. 0.3V.	• Harness or connectors (The sensor circuit is open or shorted.) • Front heated oxygen sensor







DTC Confirmation Procedure

NCEC0098

CAUTION:
Always drive vehicle at a safe speed.

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

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

With CONSULT

1) Start engine and warm it up to normal operating temperature.
2) Select "FR O2 SENSOR P0130" of "FRONT O2 SENSOR" in "DTC WORK SUPPORT" mode with CONSULT.
3) Touch "START".
4) Let it idle for at least 3.5 minutes.

NOTE:
Never raise engine speed above 3,200 rpm after this step. If the engine speed limit is exceeded, return to step 4.

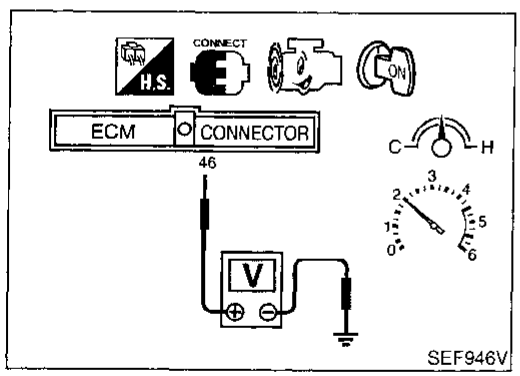
5) When the following conditions are met, "TESTING" will be displayed on the CONSULT screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take approximately 10 to 60 seconds.)

CMPS·RPM (REF)	1,400 - 2,800 rpm (A/T) 2,200 - 2,800 rpm (M/T)
Vehicle speed	70 - 100 km/h (43 - 62 MPH)
B/FUEL SCHDL	1.0 - 4.5 msec (A/T) 1.0 - 3.7 msec (M/T)
Selector lever	Suitable position

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

6) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-165.

During this test, P1148 may be displayed on CONSULT screen.



Overall Function Check

NCEC0099

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.

Without CONSULT

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

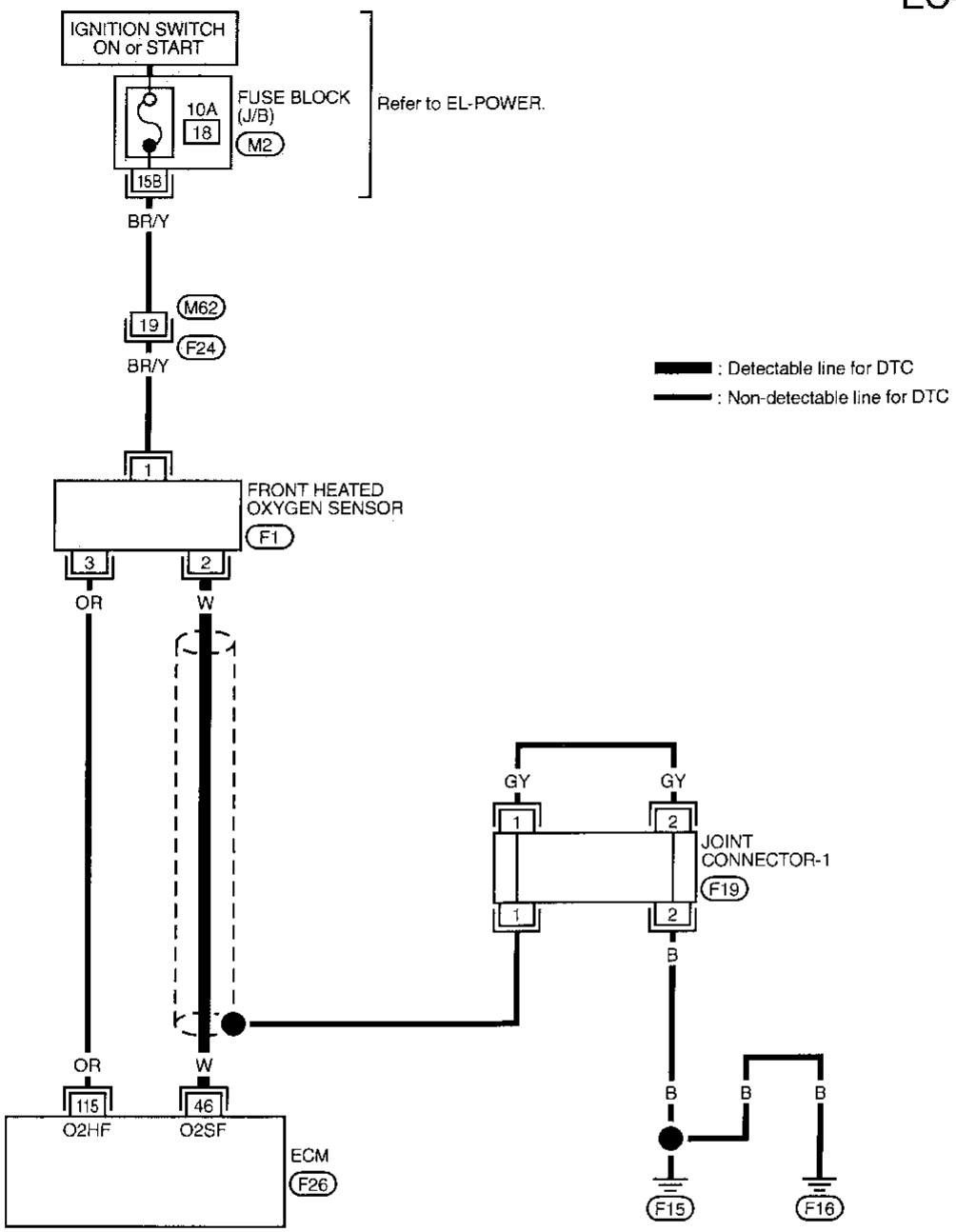
- The voltage does not remain in the range of 0.2 - 0.4V.

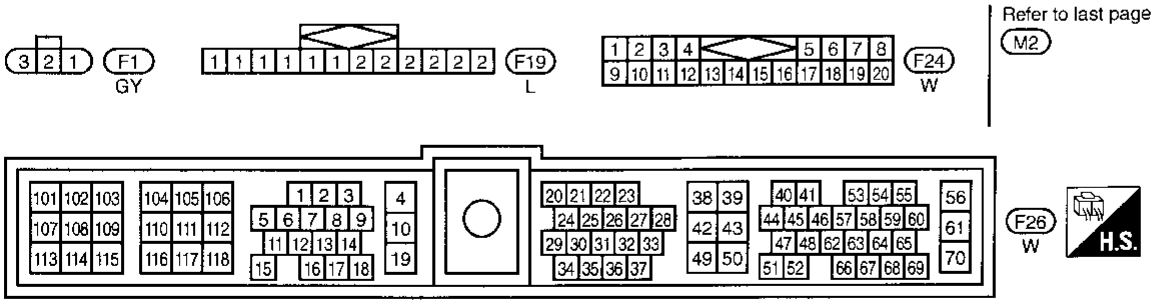
4) If NG, go to "Diagnostic Procedure", EC-165.

Wiring Diagram

NCEC0100

EC-FRO2-01





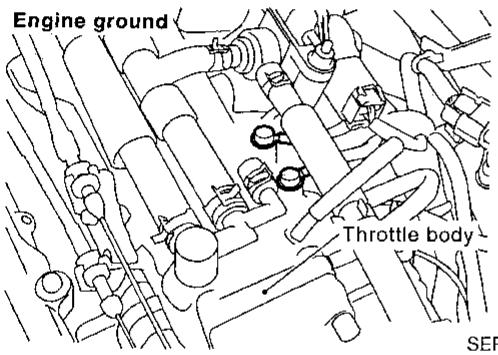
TEC528

Diagnostic Procedure

NCEC0101

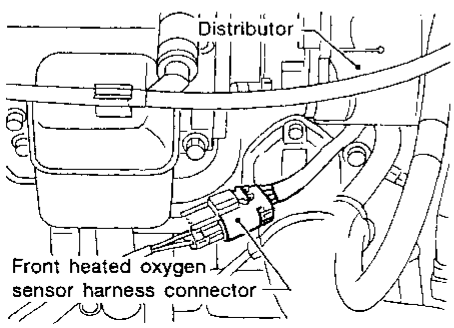
1 INSPECTION START

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



SEF292W

3. Disconnect front heated oxygen sensor harness connector.

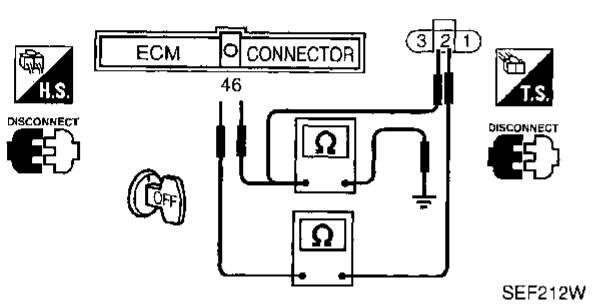


SEF089P

▶ GO TO 2.

2 CHECK INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 46 and terminal 2.



SEF212W

Continuity should exist.

3. Check harness continuity between ECM terminal 46 (or terminal 2) and ground.

Continuity should not exist.

4. Also check harness for short to power.

OK or NG

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

3 CHECK FRONT HEATED OXYGEN SENSOR

Refer to "Component Inspection", EC-166.

OK or NG

OK	▶	GO TO 4.
NG	▶	Replace front heated oxygen sensor.

4 CHECK SHIELD CIRCUIT

1. Turn ignition switch "OFF".
2. Remove joint connector-1.
3. Check the following.
- Continuity between joint connector-1 terminal 1 and ground
- Joint connector-1
  (Refer to "HARNESS LAYOUT" in EL section.)

Continuity should exist.

4. Also check harness for short to ground and short to power.
5. Then reconnect joint connector.

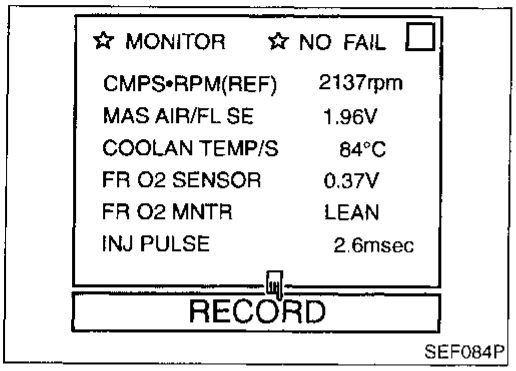
OK or NG

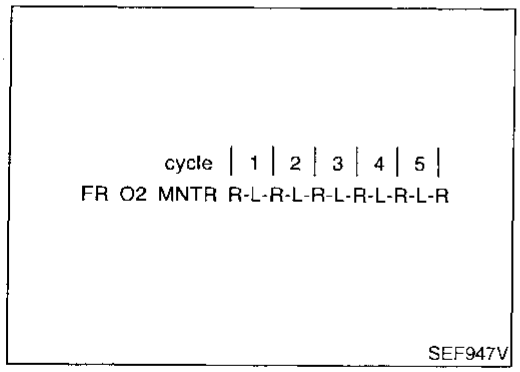
OK	▶	GO TO 5.
NG	▶	Repair open circuit, short to ground or short to power in harness or connectors.

5 CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-110.

▶ INSPECTION END





Component Inspection

NCEC0102

FRONT HEATED OXYGEN SENSOR

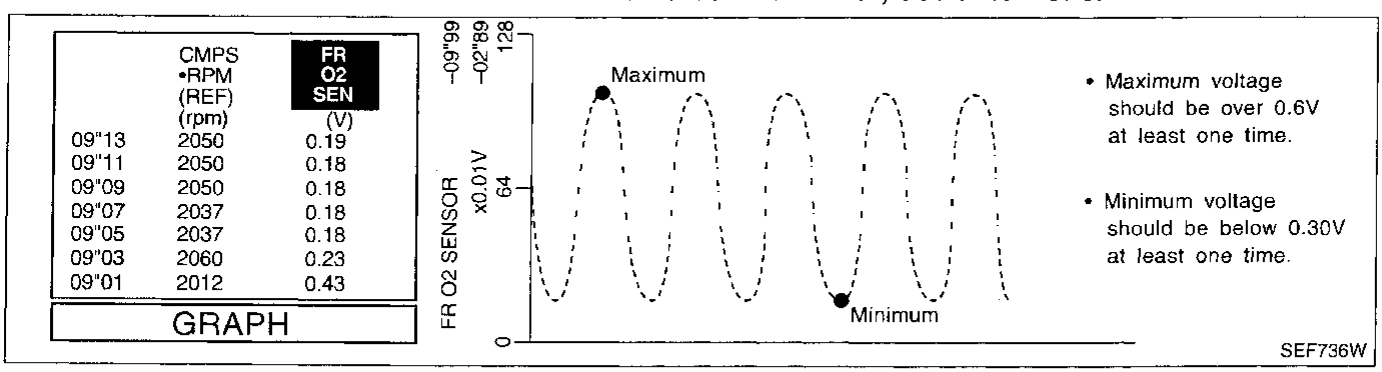
NCEC0102S01

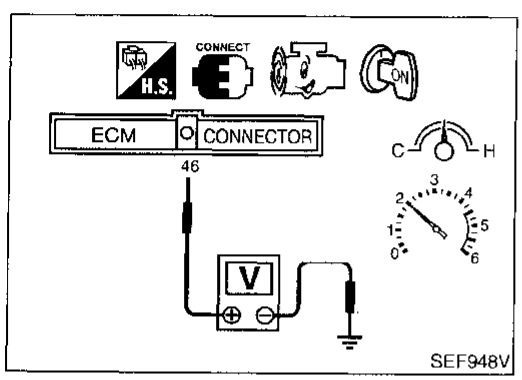
With CONSULT

1) Start engine and warm it up to normal operating temperature.
2) Select "MANU TRIG" and "HI SPEED" in "DATA MONITOR" mode, 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:
  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 0.3V at least once.
- "FR O2 SENSOR" voltage never exceeds 1.0V.

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



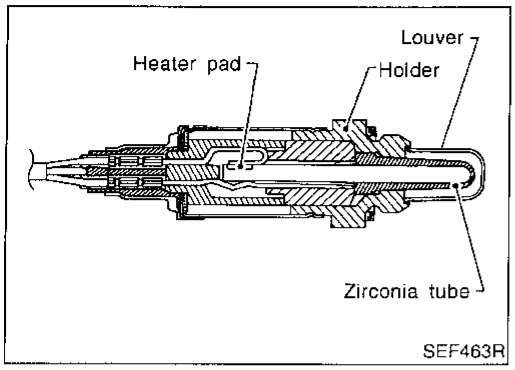


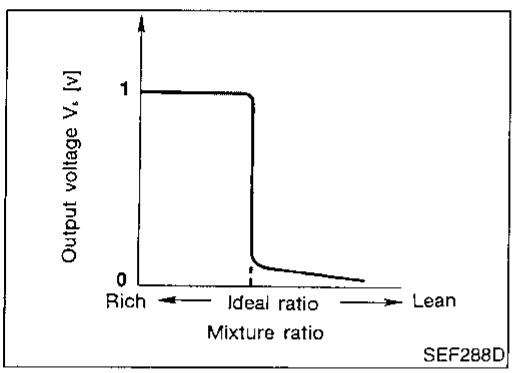
Without CONSULT

1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 46 (Front heated oxygen sensor signal) and 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 five 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 0.3V at least one time.
- The voltage never exceeds 1.0V.

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





Component Description

NCEC0103

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

CONSULT Reference Value in Data Monitor Mode

NCEC0104

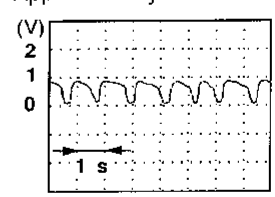
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
FR O2 SENSOR	• 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.

ECM Terminals and Reference Value

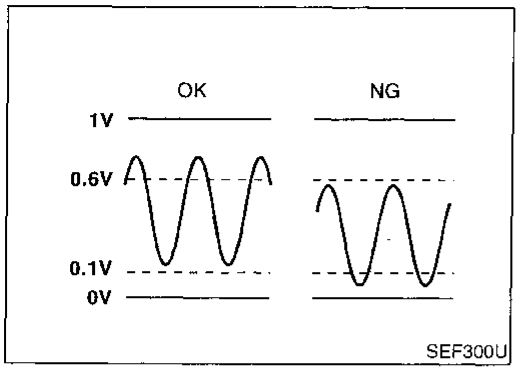
NCEC0105

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
46	W	Front heated oxygen sensor	**[Engine is running]** • After warming up to normal operating temperature and engine speed is 2,000 rpm	0 - Approximately 1.0V  SEF008W

DTC P0131 FRONT HEATED OXYGEN SENSOR (FRONT HO2S) (LEAN SHIFT MONITORING)

On Board Diagnosis Logic

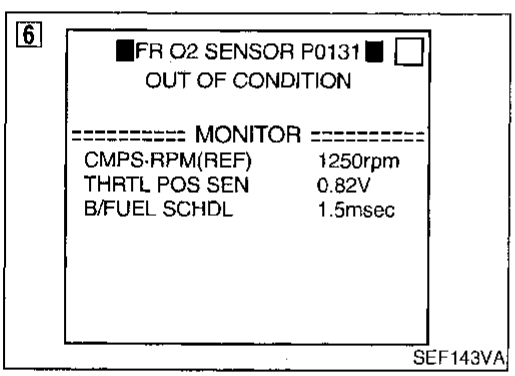


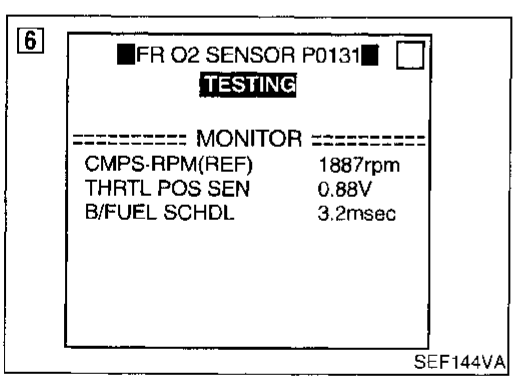
On Board Diagnosis Logic

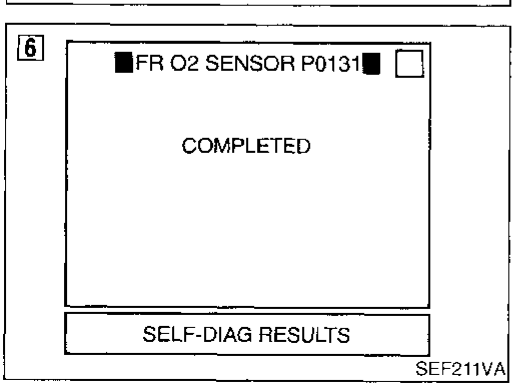
NCEC0106

To judge the malfunction, the output from the front heated oxygen sensor is monitored to determine whether the "rich" output is sufficiently high and whether the "lean" output is sufficiently low. When both the outputs are shifting to the lean side, the malfunction will be detected.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0131 0411	• The maximum and minimum voltages from the sensor are not reached to the specified voltages.	• Front heated oxygen sensor • Front heated oxygen sensor heater • Fuel pressure • Injectors • Intake air leaks







DTC Confirmation Procedure

NCEC0107

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

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

TESTING CONDITION:

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

With CONSULT

1) Start engine and warm it up to normal operating temperature.
2) Stop engine and wait at least 5 seconds.
3) Turn ignition switch "ON" and select "FR O2 SENSOR P0131" of "FRONT O2 SENSOR" in "DTC WORK SUPPORT" mode with CONSULT.
4) Touch "START".
5) Start engine and let it idle for at least 3.5 minutes.

NOTE:

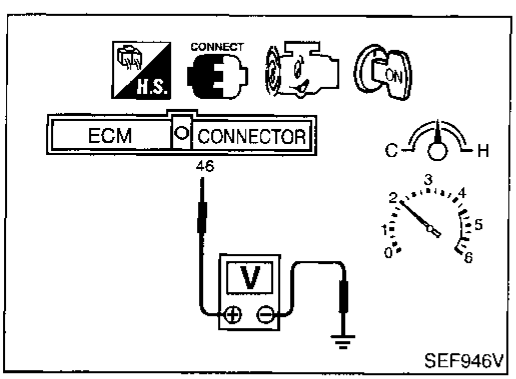
Never raise engine speed above 3,200 rpm after this step. If the engine speed limit is exceeded, return to step 5.

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

CMPS·RPM (REF)	1,400 - 2,800 rpm (A/T) 2,000 - 3,000 rpm (M/T)
Vehicle speed	80 - 100 km/h (50 - 62 MPH)
B/FUEL SCHDL	1.3 - 4.5 msec (A/T) 1.0 - 4.5 msec (M/T)
Selector lever	Suitable position

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

7) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-169.



Overall Function Check

NCEC0108

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.

Without CONSULT

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

- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is over 0.1V at least one time.

4) If NG, go to "Diagnostic Procedure", EC-169.

Diagnostic Procedure

NCEC0109

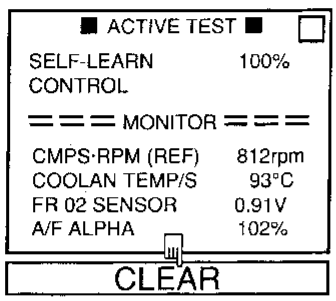
1	RETIGHTEN FRONT HEATED OXYGEN SENSOR
1. Turn ignition switch "OFF". 2. Loosen and retighten front heated oxygen sensor. **Tightening torque:** **40 - 60 N·m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)**	
▶	GO TO 2.

Diagnostic Procedure (Cont'd)

2	CLEAR THE SELF-LEARNING DATA.

With CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Select "SELF-LEARNING CONT" in "ACTIVE TEST" mode with CONSULT.
3. Clear the self-learning control coefficient by touching "CLEAR".

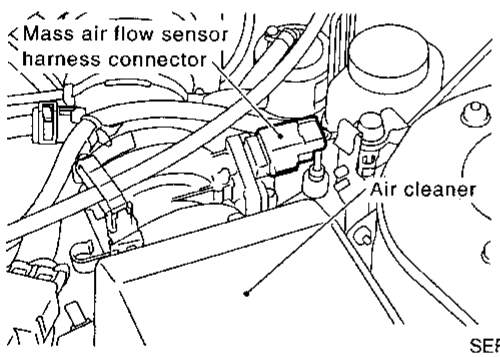


AEC547

4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 detected? Is it difficult to start engine?

Without CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch "OFF".
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 3 seconds at idle speed.



SEF293W

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. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-54.
7. Make sure diagnostic trouble code No. 0505 is displayed in Diagnostic Test Mode II.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC 0115 detected? Is it difficult to start engine?

Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0171. Refer to EC-229.
No	▶	GO TO 3.

3	CHECK FRONT HEATED OXYGEN SENSOR HEATER

Refer to "Component Inspection", EC-193.

OK or NG

OK	▶	GO TO 4.
NG	▶	Replace front heated oxygen sensor.

4	CHECK FRONT HEATED OXYGEN SENSOR

Refer to "Component Inspection", EC-171.

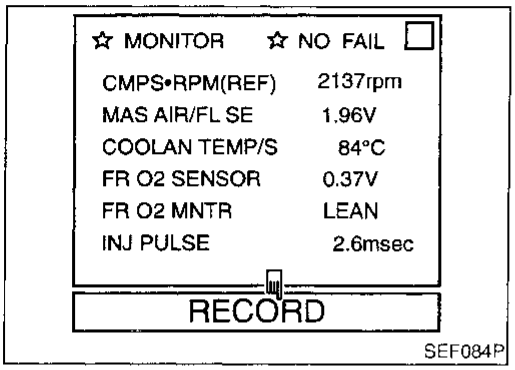
OK or NG

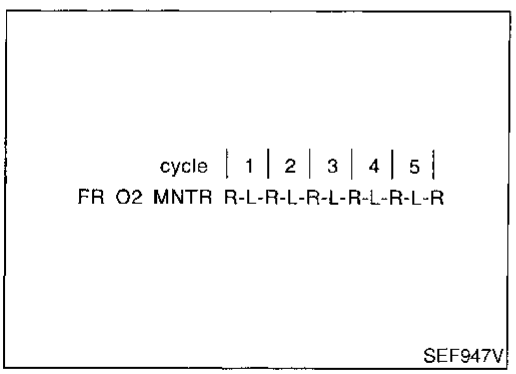
OK	▶	GO TO 5.
NG	▶	Replace front heated oxygen sensor.

5	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-110.
Refer to "Wiring Diagram", EC-164, for circuit.

	▶	**INSPECTION END**





Component Inspection

NCEC0110

FRONT HEATED OXYGEN SENSOR

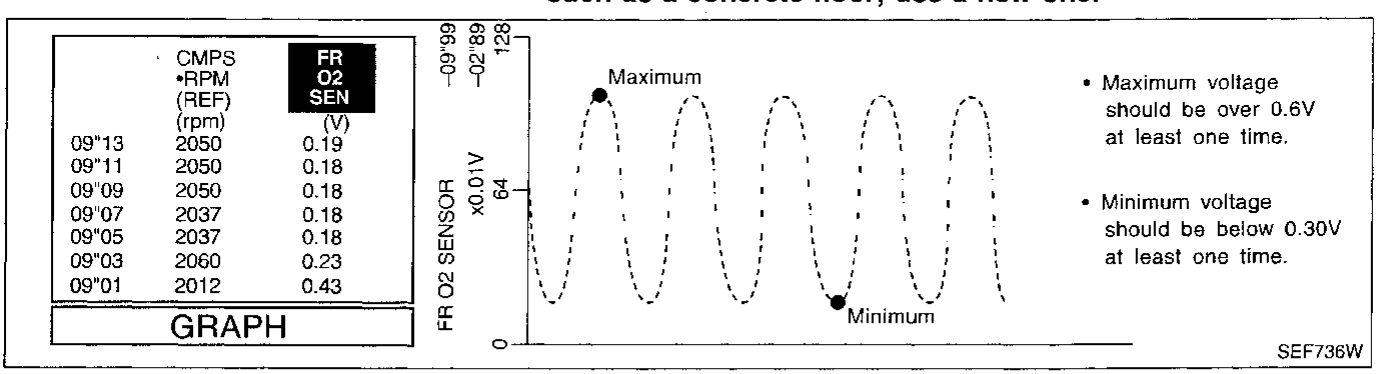
NCEC0110S02

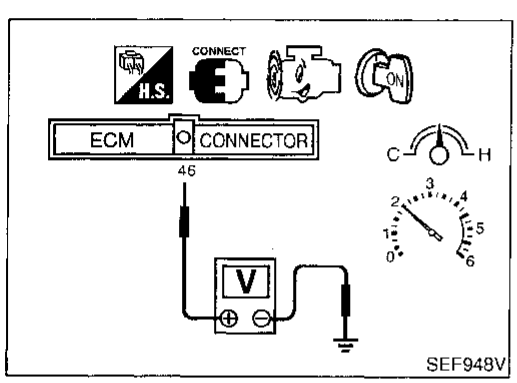
With CONSULT

1) Start engine and warm it up to normal operating temperature.
2) Select "MANU TRIG" and "HI SPEED" in "DATA MONITOR" mode, 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:
  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 0.3V at least once.
- "FR O2 SENSOR" voltage never exceeds 1.0V.

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





Without CONSULT

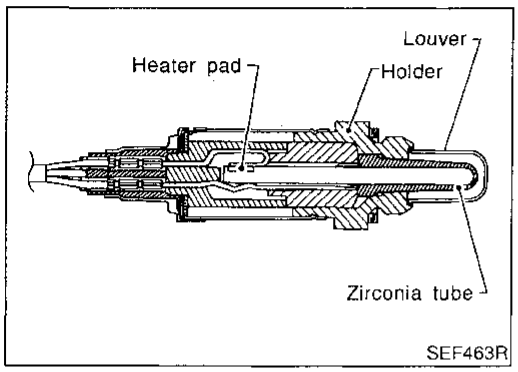
1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 46 (Front heated oxygen sensor signal) and engine ground.
3) Check the following with engine speed held at 2,000 rpm constant under no load.

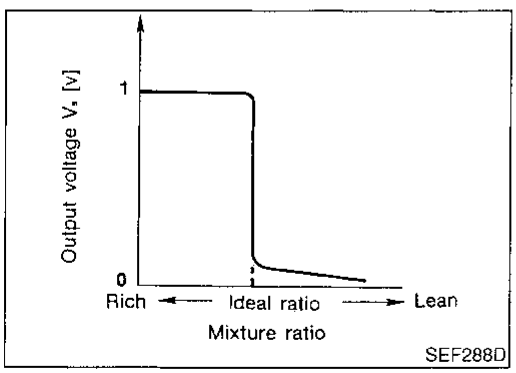
- Malfunction indicator lamp goes on more than five times within 10 seconds in Diagnostic Test Mode II (FRONT HEATED OXYGEN SENSOR MONITOR).
- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is below 0.3V at least one time.
- The voltage never exceeds 1.0V.

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

DTC P0132 FRONT HEATED OXYGEN SENSOR (FRONT HO2S) (RICH SHIFT MONITORING)

Component Description





Component Description

NCEC0111

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

CONSULT Reference Value in Data Monitor Mode

NCEC0112

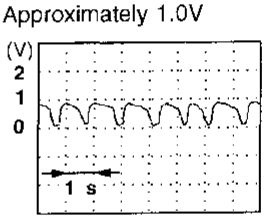
Specification data are reference values.

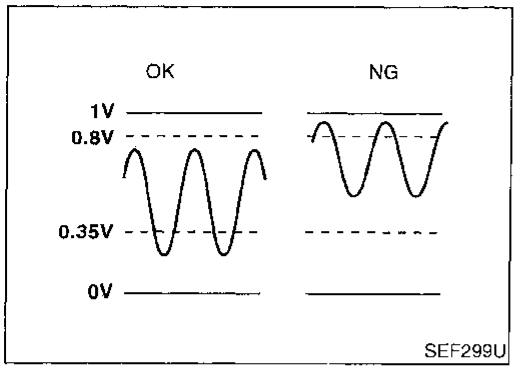
MONITOR ITEM	CONDITION		SPECIFICATION
FR O2 SENSOR	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
FR O2 MNTR			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.

ECM Terminals and Reference Value

NCEC0113

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
46	W	Front heated oxygen sensor	**[Engine is running]** • After warming up to normal operating temperature and engine speed is 2,000 rpm	0 - Approximately 1.0V  SEF008W

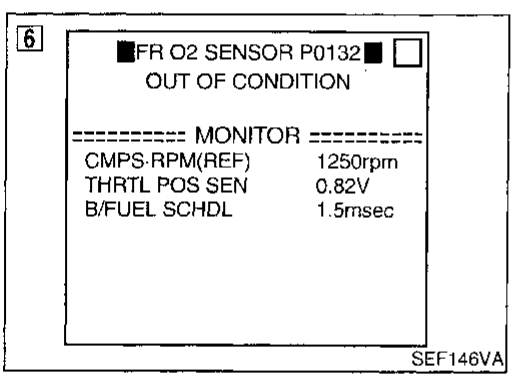


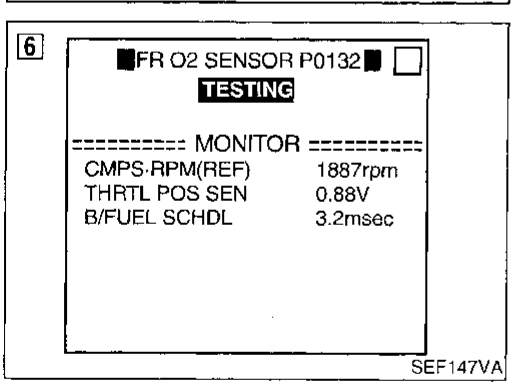
On Board Diagnosis Logic

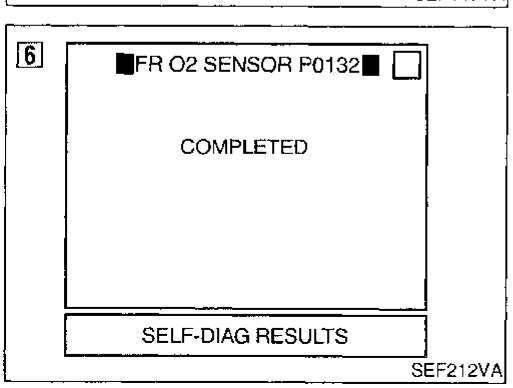
NCEC0114

To judge the malfunction, the output from the front heated oxygen sensor is monitored to determine whether the "rich" output is sufficiently high. The "lean" output is sufficiently low. When both the outputs are shifting to the rich side, the malfunction will be detected.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0132 0410	• The maximum and minimum voltages from the sensor are beyond the specified voltages.	• Front heated oxygen sensor • Front heated oxygen sensor heater • Fuel pressure • Injectors







DTC Confirmation Procedure

NCEC0115

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

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

TESTING CONDITION:

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

With CONSULT

1) Start engine and warm it up to normal operating temperature.
2) Stop engine and wait at least 5 seconds.
3) Turn ignition switch "ON" and select "FR O2 SENSOR P0132" of "FRONT O2 SENSOR" in "DTC WORK SUPPORT" mode with CONSULT.
4) Touch "START".
5) Start engine and let it idle for at least 3.5 minutes.

NOTE:

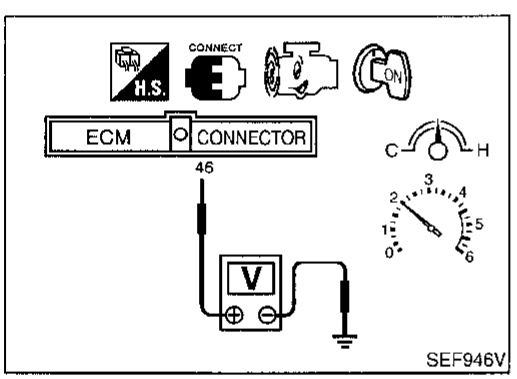
Never raise engine speed above 3,200 rpm after this step. If the engine speed limit is exceeded, return to step 5.

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

CMPS·RPM (REF)	1,400 - 2,800 rpm (A/T) 2,000 - 3,000 rpm (M/T)
Vehicle speed	80 - 100 km/h (50 - 62 MPH)
B/FUEL SCHDL	1.3 - 4.5 msec (A/T) 1.0 - 4.5 msec (M/T)
Selector lever	Suitable position

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

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



Overall Function Check

NCEC0116

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.

Without CONSULT

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

- The maximum voltage is below 0.8V at least one time.
- The minimum voltage is below 0.35V at least one time.

4) If NG, go to "Diagnostic Procedure", EC-174.

Diagnostic Procedure

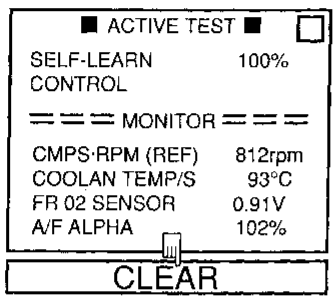
NCEC0117

1	RETIGHTEN FRONT HEATED OXYGEN SENSOR
1. Turn ignition switch "OFF". 2. Loosen and retighten front heated oxygen sensor. **Tightening torque:** **40 - 60 N·m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)**	
▶	GO TO 2.

2	CLEAR THE SELF-LEARNING DATA

With CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Select "SELF-LEARNING CONT" in "ACTIVE TEST" mode with CONSULT.
3. Clear the self-learning control coefficient by touching "CLEAR".

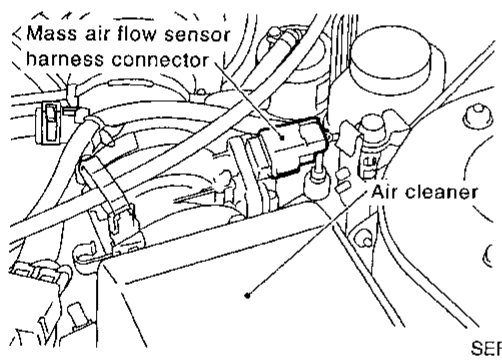


AEC547

4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 detected? Is it difficult to start engine?

Without CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch "OFF".
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 3 seconds at idle speed.



SEF293W

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. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-54.
7. Make sure diagnostic trouble code No. 0505 is displayed in Diagnostic Test Mode II.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC 0114 detected? Is it difficult to start engine?

Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0172. Refer to EC-235.
No	▶	GO TO 3.

3	CHECK HARNESS CONNECTOR

1. Turn ignition switch "OFF".
2. Disconnect front heated oxygen sensor harness connector.
3. Check harness connector for water.
   Water should not exit.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair or replace harness connector.

4	CHECK FRONT HEATED OXYGEN SENSOR HEATER

Refer to "Component Inspection", EC-193.

OK or NG

OK	▶	GO TO 5.
NG	▶	Replace front heated oxygen sensor.

5	CHECK FRONT HEATED OXYGEN SENSOR

Refer to "Component Inspection", EC-176.

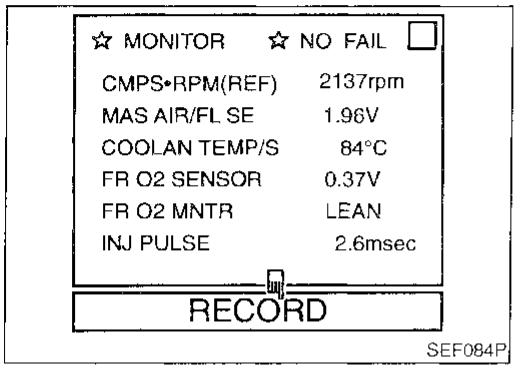
OK or NG

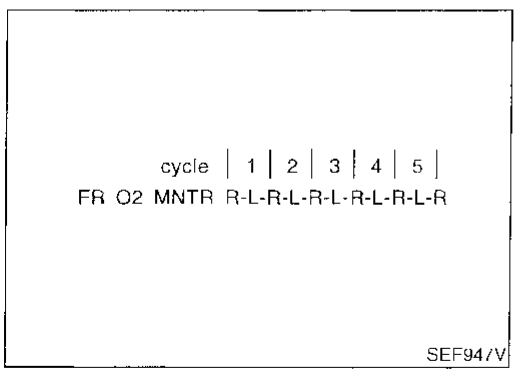
OK	▶	GO TO 6.
NG	▶	Replace front heated oxygen sensor.

6	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-110.
Refer to "Wiring Diagram", EC-164, for circuit.

	▶	**INSPECTION END**





Component Inspection

NCEC0118

FRONT HEATED OXYGEN SENSOR

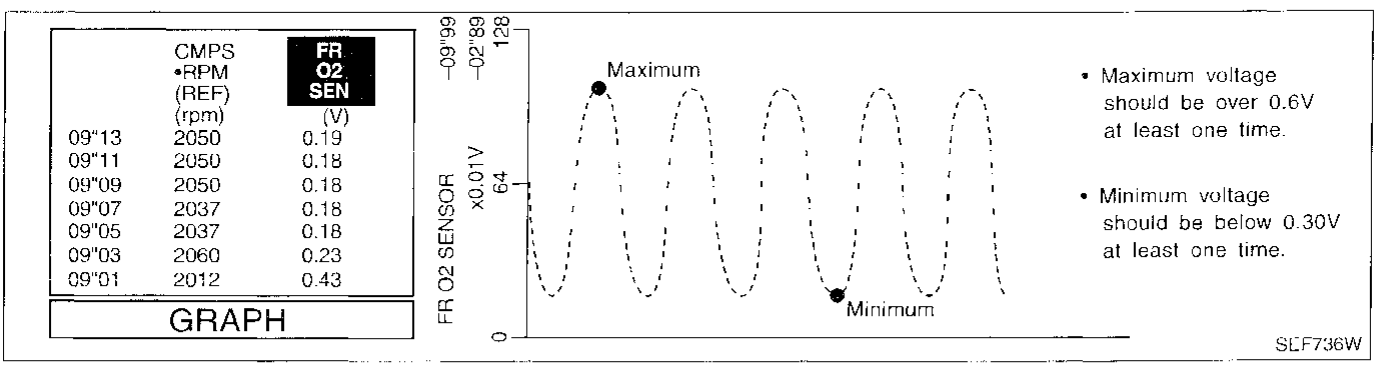
NCEC0118S02

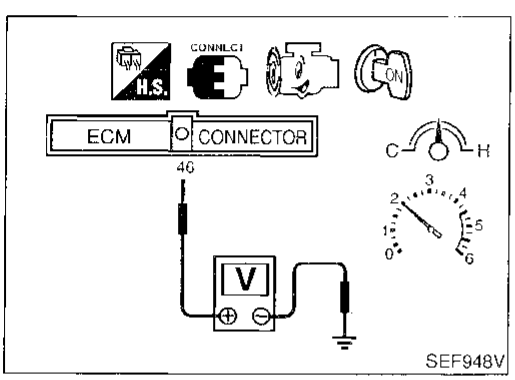
With CONSULT

1) Start engine and warm it up to normal operating temperature.
2) Select "MANU TRIG" and "HI SPEED" in "DATA MONITOR" mode, 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:
  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 0.3V at least once.
- "FR O2 SENSOR" voltage never exceeds 1.0V.

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



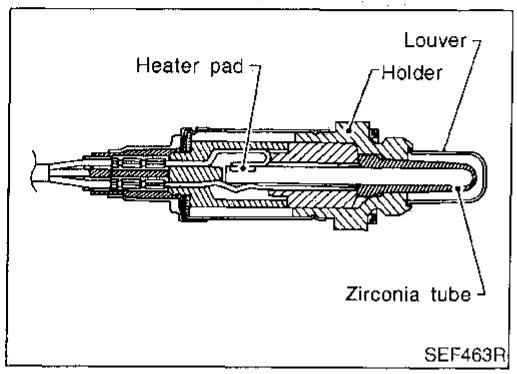


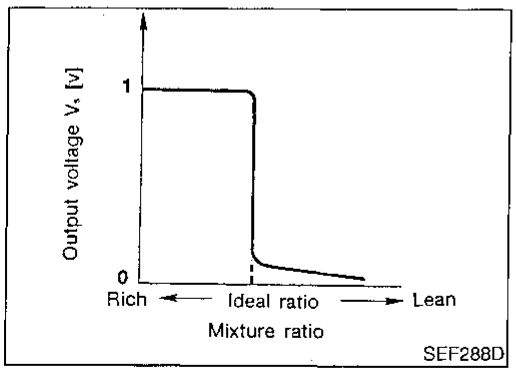
Without CONSULT

1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 46 (Front heated oxygen sensor signal) and 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 0.3V at least one time.
- The voltage never exceeds 1.0V.

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





Component Description

NCEC0119

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

CONSULT Reference Value in Data Monitor Mode

NCEC0120

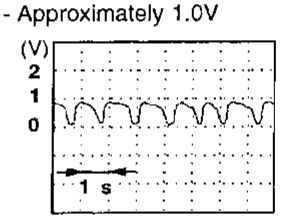
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
FR O2 SENSOR	• 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.

ECM Terminals and Reference Value

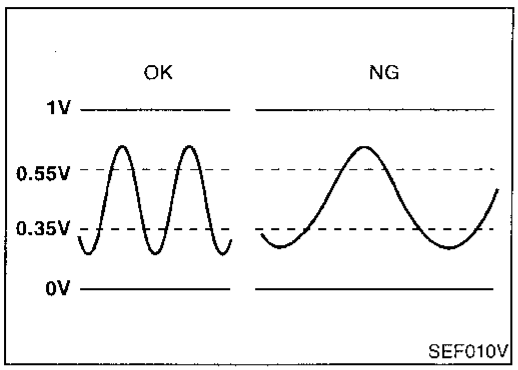
NCEC0121

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
46	W	Front heated oxygen sensor	**[Engine is running]** • After warming up to normal operating temperature and engine speed is 2,000 rpm	0 - Approximately 1.0V  SEF008W

DTC P0133 FRONT HEATED OXYGEN SENSOR (FRONT HO2S) (RESPONSE MONITORING)

On Board Diagnosis Logic

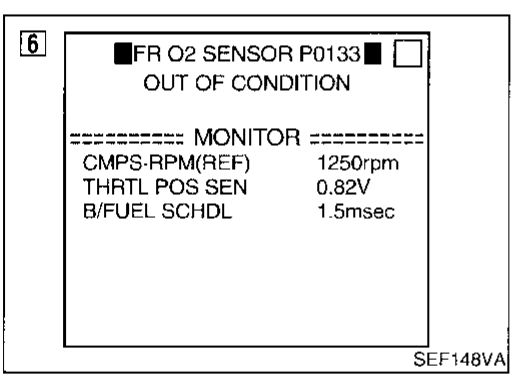


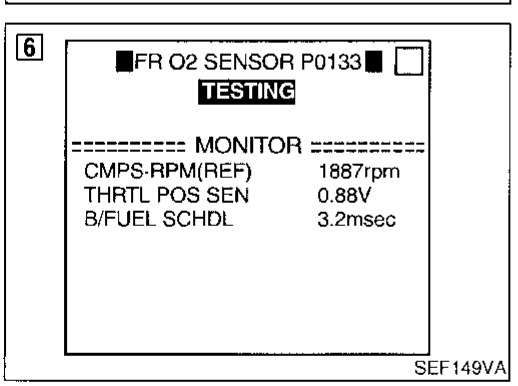
On Board Diagnosis Logic

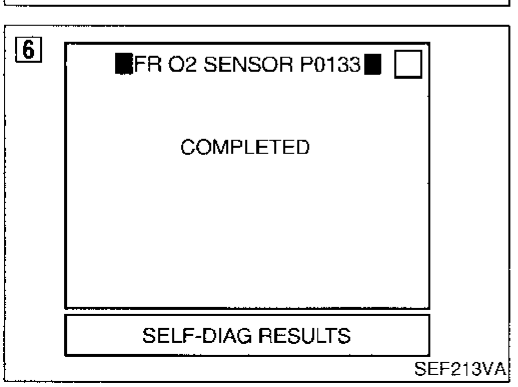
NCEC0122

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

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0133 0409	• The response of the voltage signal from the sensor takes more than the specified time.	• Harness or connectors (The sensor circuit is open or shorted.) • Front heated oxygen sensor • Front heated oxygen sensor heater • Fuel pressure • Injectors • Intake air leaks • Exhaust gas leaks • PCV • Mass air flow sensor







DTC Confirmation Procedure

NCEC0123

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

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

TESTING CONDITION:

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

With CONSULT

1) Start engine and warm it up to normal operating temperature.
2) Stop engine and wait at least 5 seconds.
3) Turn ignition switch "ON" and select "FR O2 SENSOR P0133" of "FRONT O2 SENSOR" in "DTC WORK SUPPORT" mode with CONSULT.
4) Touch "START".
5) Start engine and let it idle for at least 3.5 minutes.

NOTE:

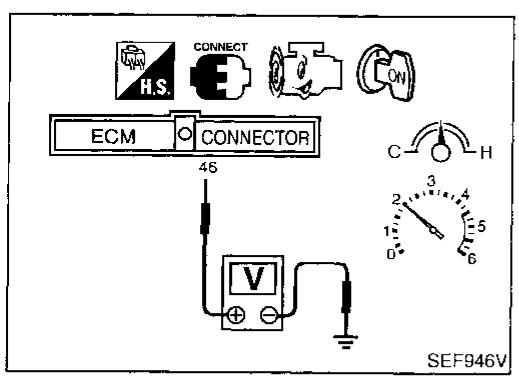
Never raise engine speed above 3,200 rpm after this step. If the engine speed limit is exceeded, return to step 5.

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

CMPS·RPM (REF)	1,900 - 3,100 rpm (A/T) 2,200 - 3,200 rpm (M/T)
Vehicle speed	78 - 100 km/h (49 - 62 MPH)
B/FUEL SCHDL	2.0 - 4.5 msec (A/T) 1.7 - 4.5 msec (M/T)
Selector lever	Suitable position

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

7) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-181.



Overall Function Check

NCEC0124

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.

Without CONSULT

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

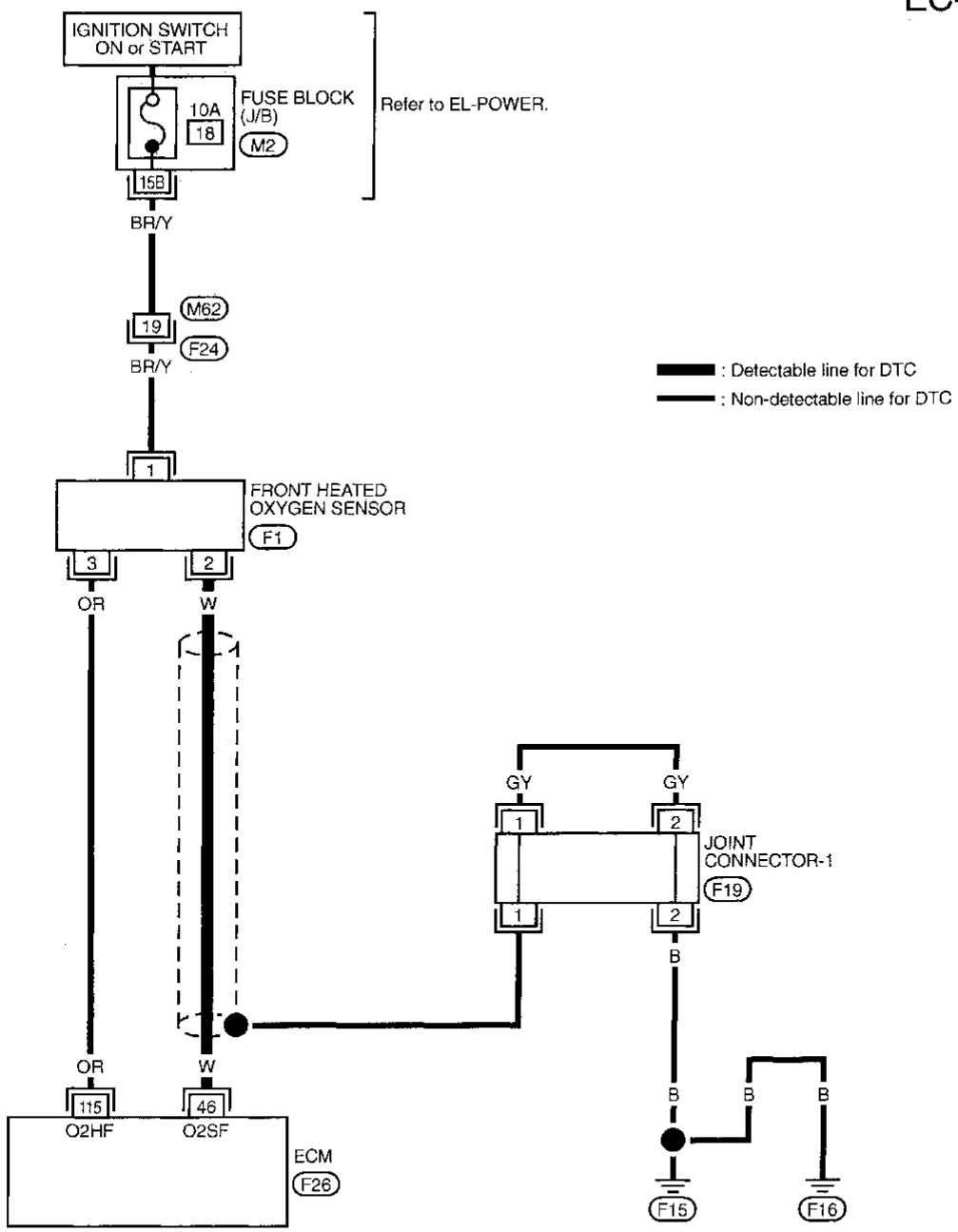
- Malfunction indicator lamp goes on more than five times within 10 seconds in Diagnostic Test Mode II (FRONT HEATED OXYGEN SENSOR MONITOR).

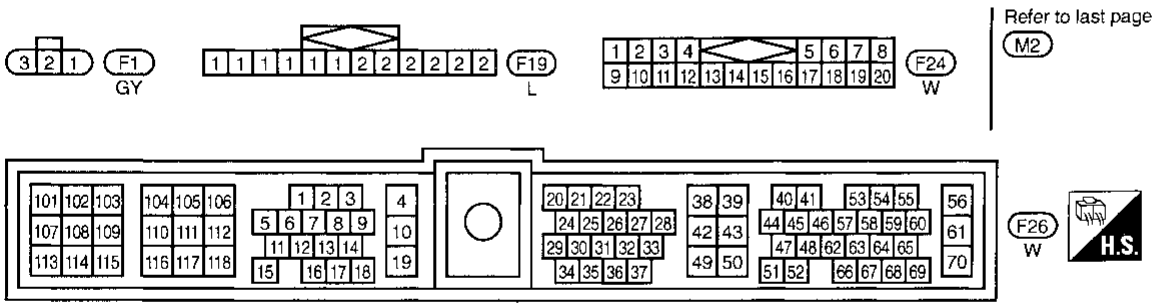
4) If NG, go to "Diagnostic Procedure", EC-181.

Wiring Diagram

NCEC0125

EC-FRO2-01





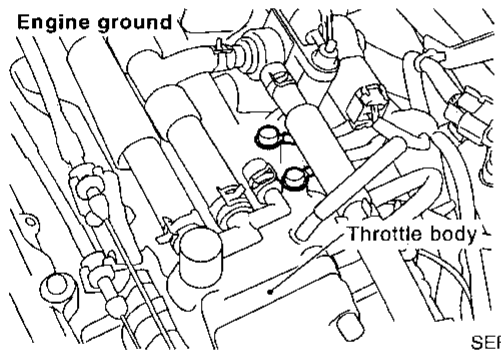
TEC528

Diagnostic Procedure

NCEC0126

1 RETIGHTEN GROUND SCREWS

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



SEF292W

▶ GO TO 2.

2 RETIGHTEN FRONT HEATED OXYGEN SENSOR

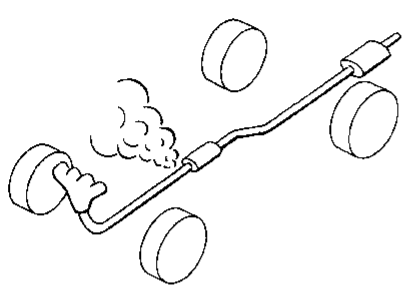
Loosen and retighten front heated oxygen sensor.

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

▶ GO TO 3.

3 CHECK EXHAUST AIR LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust air leak before three way catalyst.



SEF099P

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair or replace.

4 CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

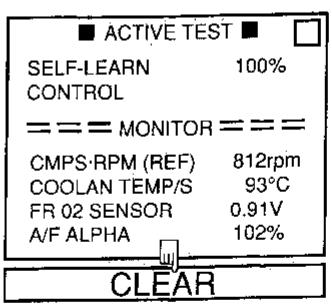
OK or NG

OK	▶	GO TO 5.
NG	▶	Repair or replace.

5 CLEAR THE SELF-LEARNING DATA

With CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Select "SELF-LEARNING CONT" in "ACTIVE TEST" mode with CONSULT.
3. Clear the self-learning control coefficient by touching "CLEAR".

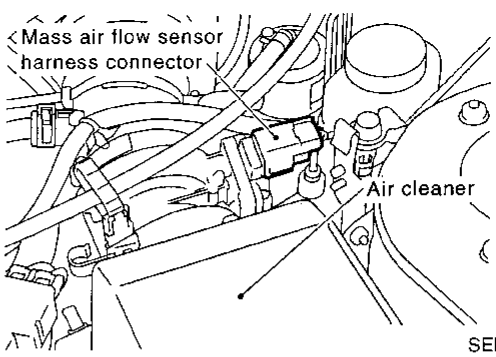


AEC547

4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 or P0172 detected? Is it difficult to start engine?

Without CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch "OFF".
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 3 seconds at idle speed.



SEF293W

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. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-54.
7. Make sure diagnostic trouble code No. 0505 is displayed in Diagnostic Test Mode II.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC 0114 or 0115 detected? Is it difficult to start engine?

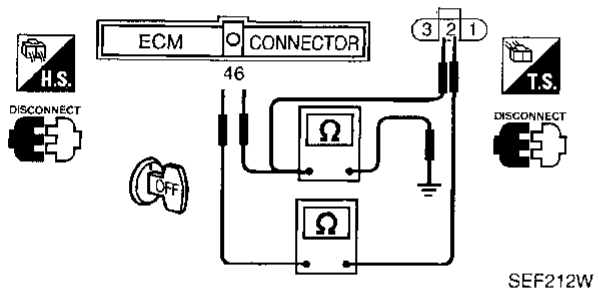
Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0171, P0172. Refer to EC-229, 235.
No	▶	GO TO 6.

Diagnostic Procedure (Cont'd)

6	CHECK INPUT SIGNAL CIRCUIT

1. Disconnect front heated oxygen sensor harness connector and ECM harness connector.
2. Check harness continuity between ECM terminal 46 and terminal 2.



SEF212W

Continuity should exist.

3. Check harness continuity between ECM terminal 46 (or terminal 2) and ground.

Continuity should not exist.

4. Also check harness for short to power.

OK or NG

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

7	CHECK FRONT HEATED OXYGEN SENSOR HEATER

Refer to "Component Inspection", EC-193.

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace front heated oxygen sensor.

8	CHECK FRONT HEATED OXYGEN SENSOR

Refer to "Component Inspection", EC-183.

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace front heated oxygen sensor.

9	CHECK MASS AIR FLOW SENSOR

Refer to "Component Inspection", EC-124.

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace mass air flow sensor.

10	CHECK PCV VALVE

Refer to "Positive Crankcase Ventilation", EC-33.

OK or NG

OK	▶	GO TO 11.
NG	▶	Repair or replace PCV valve.

11	CHECK SHIELD CIRCUIT

1. Turn ignition switch "OFF".
2. Remove joint connector-1.
3. Check the following.
   - Continuity between joint connector-1 terminal 1 and ground
   - Joint connector-1
     (Refer to "HARNESS LAYOUT" in EL section.)

   Continuity should exist.
4. Also check harness for short to ground and short to power.
5. Then reconnect joint connector.

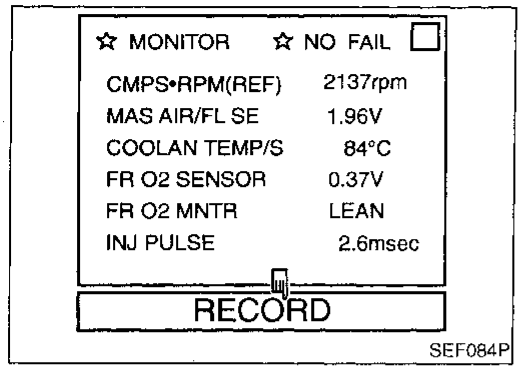
OK or NG

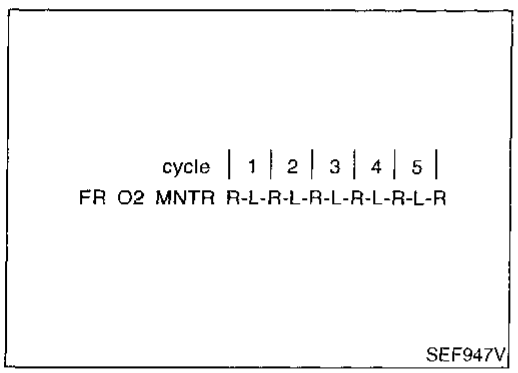
OK	▶	GO TO 12.
NG	▶	Repair open circuit, short to ground or short to power in harness or connectors.

12	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-110.

	▶	INSPECTION END





Component Inspection

NCEC0127

FRONT HEATED OXYGEN SENSOR

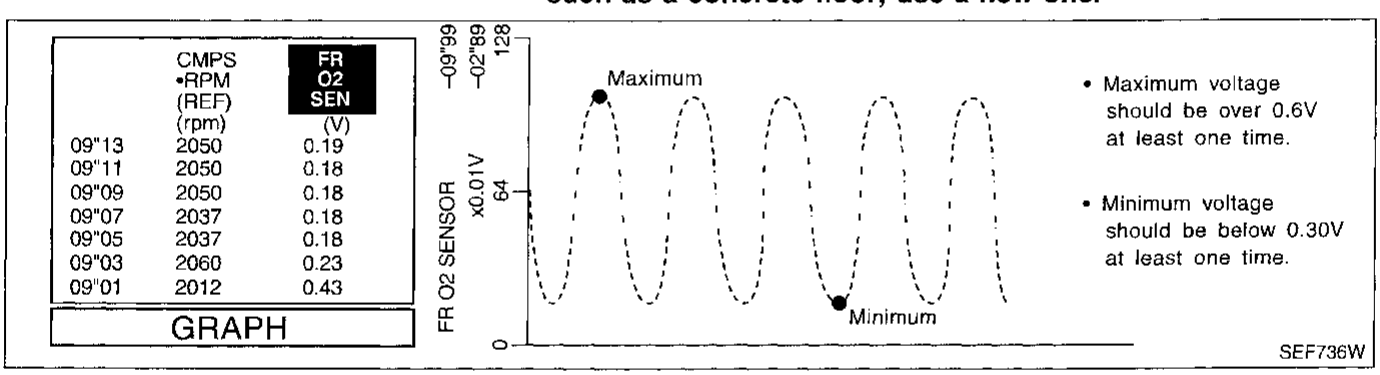
NCEC0127S02

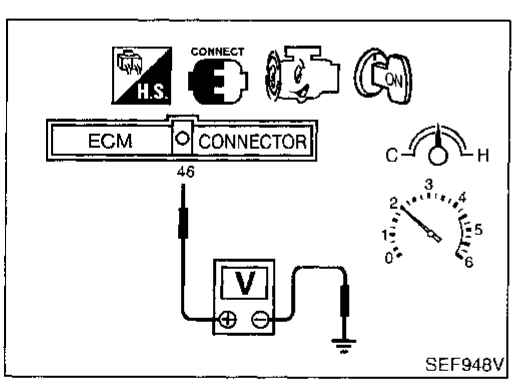
With CONSULT

1) Start engine and warm it up to normal operating temperature.
2) Select "MANU TRIG" and "HI SPEED" in "DATA MONITOR" mode, 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" five times in 10 seconds.
  5 times (cycles) are counted as shown below:
  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 0.3V at least once.
- "FR O2 SENSOR" voltage never exceeds 1.0V.

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





Without CONSULT

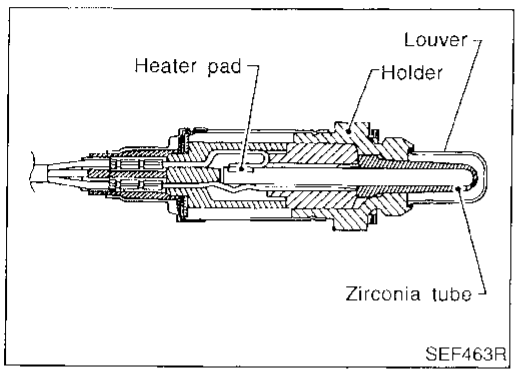
1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 46 (Front heated oxygen sensor signal) and engine ground.
3) Check the following with engine speed held at 2,000 rpm constant under no load.

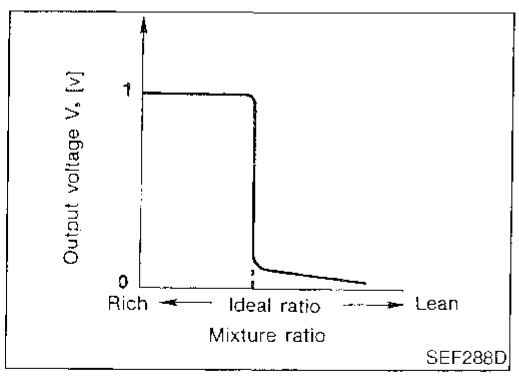
- Malfunction indicator lamp goes on more than five times within 10 seconds in Diagnostic Test Mode II (FRONT HEATED OXYGEN SENSOR MONITOR).
- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is below 0.3V at least one time.
- The voltage never exceeds 1.0V.

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

DTC P0134 FRONT HEATED OXYGEN SENSOR (FRONT HO2S) (HIGH VOLTAGE)

Component Description





Component Description

NCEC0128

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

CONSULT Reference Value in Data Monitor Mode

NCEC0129

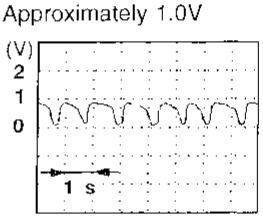
Specification data are reference values.

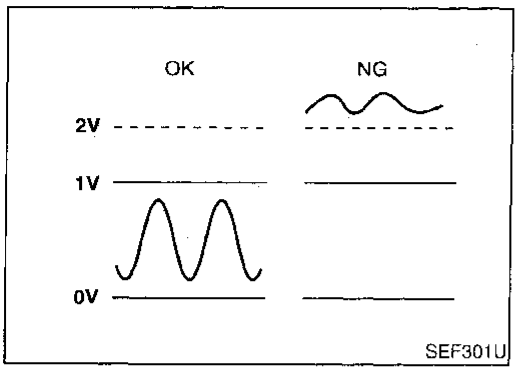
MONITOR ITEM	CONDITION		SPECIFICATION
FR O2 SENSOR	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
FR O2 MNTR			LEAN < —> RICH Changes more than 5 times during 10 seconds.

ECM Terminals and Reference Value

NCEC0130

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
46	W	Front heated oxygen sensor	**[Engine is running]** • After warming up to normal operating temperature and engine speed is 2,000 rpm	0 - Approximately 1.0V  SEF008W

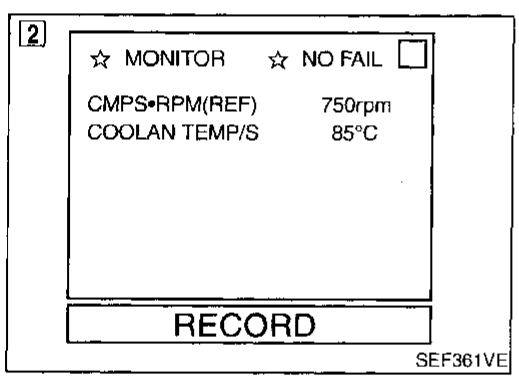


On Board Diagnosis Logic

NCEC0131

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

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0134 0412	• An excessively high voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Front heated oxygen sensor



DTC Confirmation Procedure

NCEC0132

NOTE:

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

With CONSULT

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Turn ignition switch "ON".
4) Select "DATA MONITOR" mode with CONSULT.
5) Restart engine and let it idle for 2 minutes.
6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-188.

With GST

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Restart engine and let it idle for 2 minutes.
4) Turn ignition switch "OFF" and wait at least 5 seconds.
5) Restart engine and let it idle for 2 minutes.
6) Select "MODE 3" with GST.
7) If DTC is detected, go to "Diagnostic Procedure", EC-188.

No Tools

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Restart engine and let it idle for 2 minutes.
4) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
5) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-188.

- **When using GST, "DTC Confirmation Procedure" should**

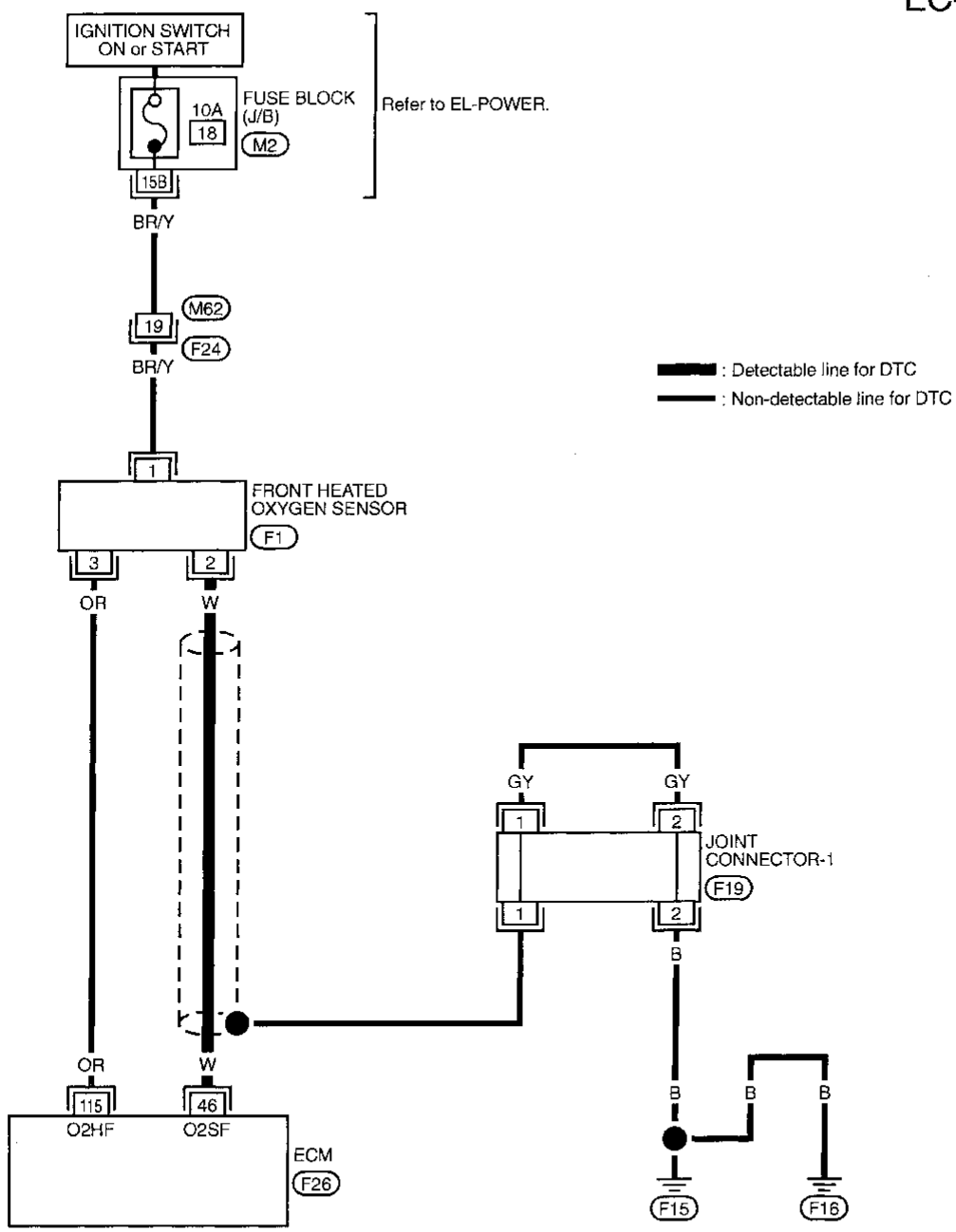
DTC Confirmation Procedure (Cont'd)

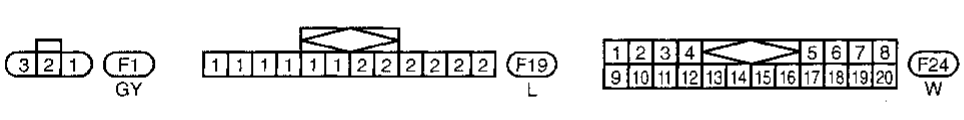
be performed twice as much as when using CONSULT or ECM (Diagnostic Test Mode II) because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT or ECM (Diagnostic Test Mode II) is recommended.

Wiring Diagram

NCEC0133

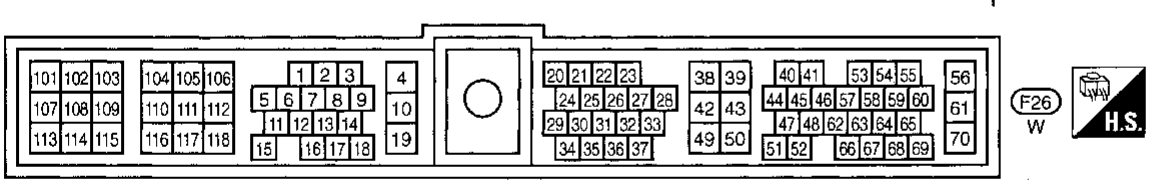
EC-FRO2-01





Refer to last page (Foldout page).

M2



TEC528

Diagnostic Procedure

NCEC0134

1	RETIGHTEN FRONT HEATED OXYGEN SENSOR

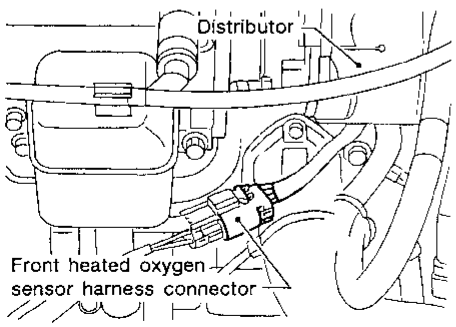
Loosen and retighten front heated oxygen sensor.

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

▶ GO TO 2.

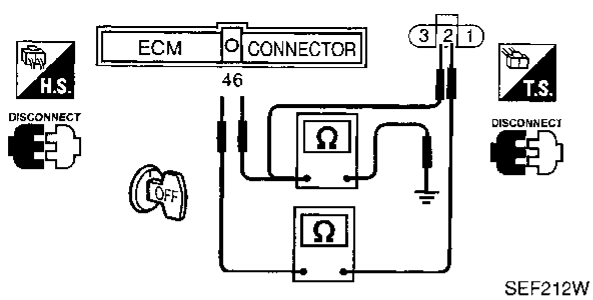
2	CHECK INPUT SIGNAL CIRCUIT

1. Disconnect front heated oxygen sensor harness connector and ECM harness connector.



SEF089P

2. Check harness continuity between ECM terminal 46 and terminal 2.



SEF212W

Continuity should exist.

3. Check harness continuity between ECM terminal 46 (or terminal 2) and ground.

Continuity should not exist.

4. Also check harness for short to power.

OK or NG

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

3	CHECK HARNESS CONNECTOR

Check front heated oxygen sensor harness connector for water.

Water should not exist.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair or replace harness connector.

4	CHECK FRONT HEATED OXYGEN SENSOR

Refer to "Component Inspection", EC-189.

OK or NG

OK	▶	GO TO 5.
NG	▶	Replace front heated oxygen sensor.

5	CHECK SHIELD CIRCUIT

1. Turn ignition switch "OFF".
2. Remove joint connector-1.
3. Check the following.
   - Continuity between joint connector-1 terminal 1 and ground
   - Joint connector-1
     (Refer to "HARNESS LAYOUT" in EL section.)

   Continuity should exist.
4. Also check harness for short to ground and short to power. Then reconnect joint connector.

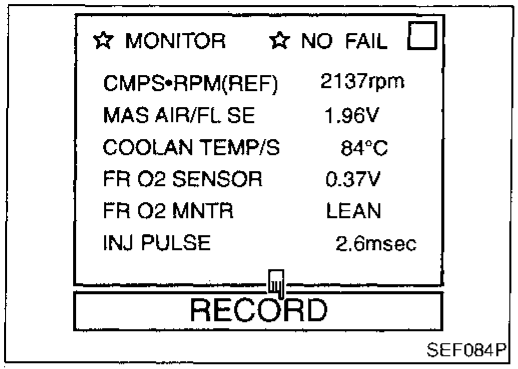
OK or NG

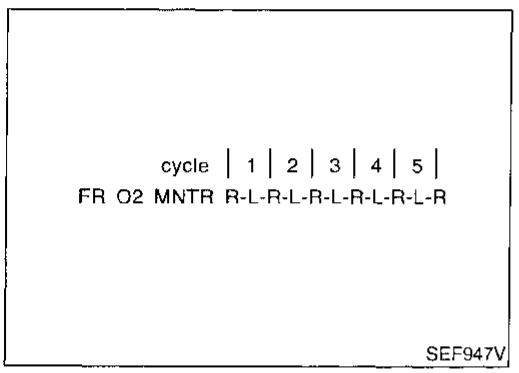
OK	▶	GO TO 6.
NG	▶	Repair open circuit, short to ground or short to power in harness or connectors.

6	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-110.

▶ **INSPECTION END**





Component Inspection

NCEC0135

FRONT HEATED OXYGEN SENSOR

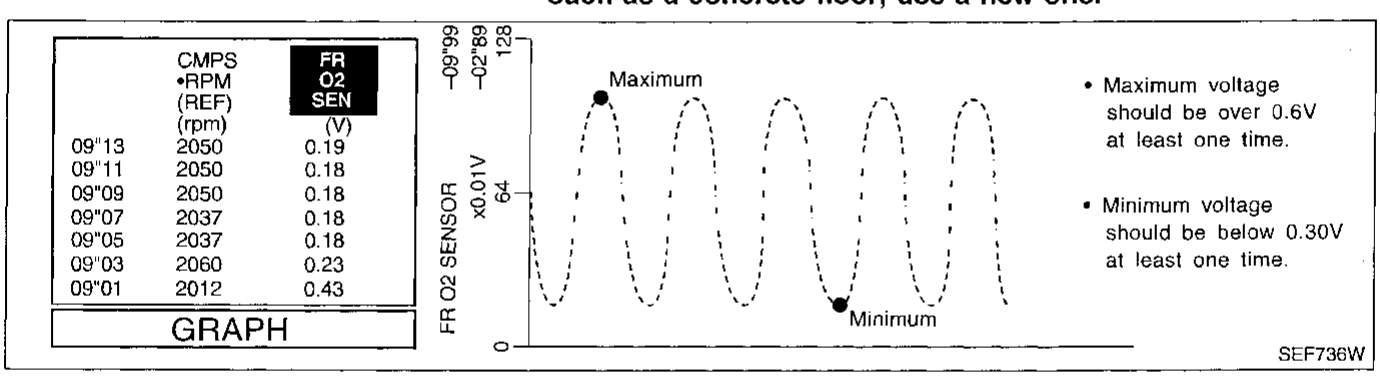
NCEC0135S01

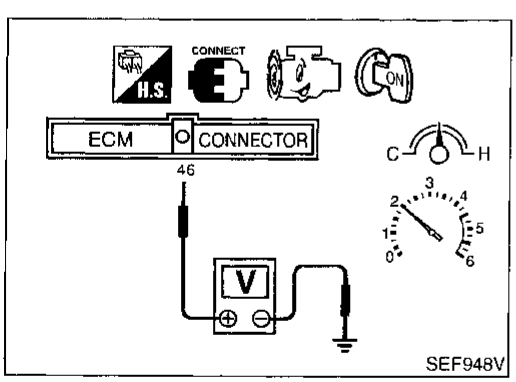
With CONSULT

1) Start engine and warm it up to normal operating temperature.
2) Select "MANU TRIG" and "HI SPEED" in "DATA MONITOR" mode, 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" five times in 10 seconds.
  5 times (cycles) are counted as shown below:
  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 0.3V at least once.
- "FR O2 SENSOR" voltage never exceeds 1.0V.

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





Without CONSULT

1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 46 (Front heated oxygen sensor signal) and 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 five 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 0.3V at least one time.
- The voltage never exceeds 1.0V.

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

Description

NCEC0136

SYSTEM DESCRIPTION

NCEC0136S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	Front heated oxygen sensor heater control	Front heated oxygen sensor heater

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

OPERATION

NCEC0136S02

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

CONSULT Reference Value in Data Monitor Mode

NCEC0137

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
FR O2 HEATER	• Engine speed: Below 3,200 rpm	ON
	• Engine speed: Above 3,200 rpm	OFF

ECM Terminals and Reference Value

NCEC0138

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
115	OR	Front heated oxygen sensor heater	**[Engine is running]** • Engine speed is below 3,200 rpm.	Approximately 0V
			[Engine is running] • Engine speed is above 3,200 rpm.	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NCEC0139

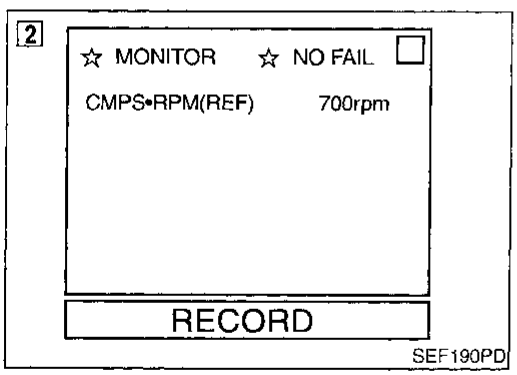
DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0135 0901	• The current amperage in the front heated oxygen sensor heater circuit is out of the normal range. (An improper voltage drop signal is sent to ECM through the front heated oxygen sensor heater.)	• Harness or connectors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

DTC Confirmation Procedure

NCEC0140

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

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



With CONSULT

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.
3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-193.

With GST

1) Start engine and run it for at least 5 seconds at idle speed.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Start engine and run it for at least 5 seconds at idle speed.
4) Select "MODE 3" with GST.
5) If DTC is detected, go to "Diagnostic Procedure", EC-193.

No Tools

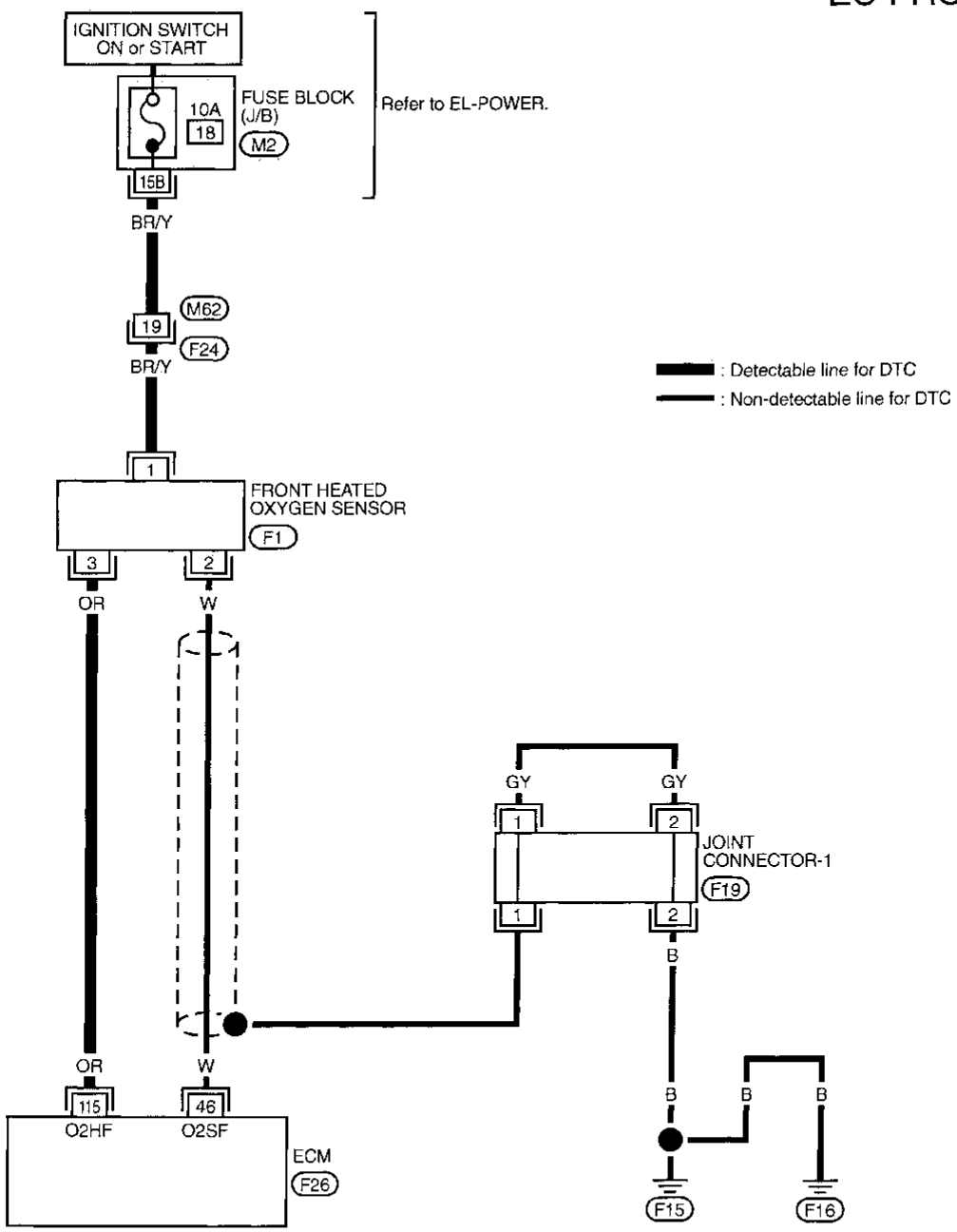
1) Start engine and run it for at least 5 seconds at idle speed.
2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
3) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-193.

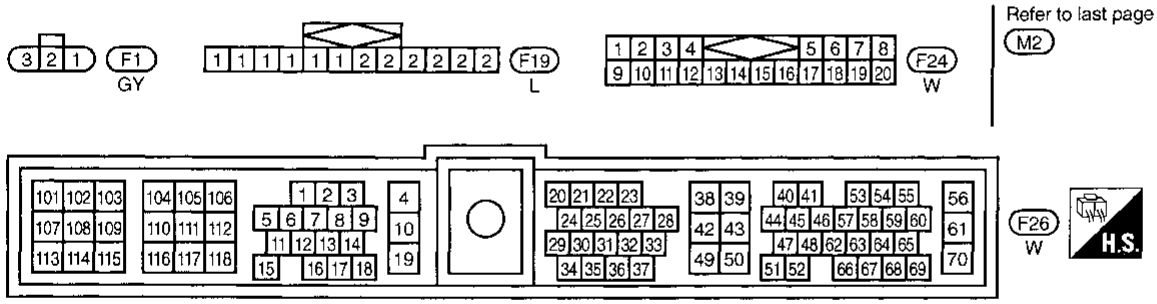
- **When using GST, "DTC Confirmation Procedure" should be performed twice as much as when using CONSULT or ECM (Diagnostic Test Mode II) because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT or ECM (Diagnostic Test Mode II) is recommended.**

Wiring Diagram

NCEC0141

EC-FRO2/H-01





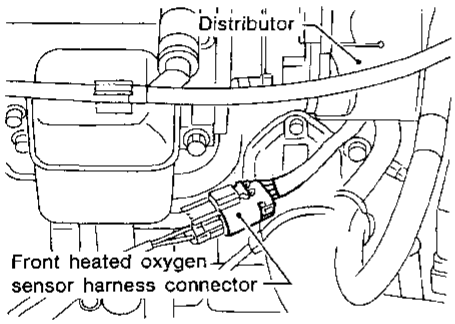
TEC529

Diagnostic Procedure

NCEC0142

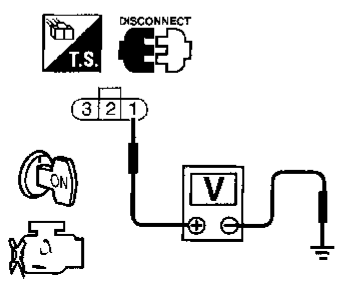
1 CHECK POWER SUPPLY

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



SEF089P

3. Turn ignition switch "ON".
4. Check voltage between terminal 1 and ground with CONSULT or tester.



SEF213W

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

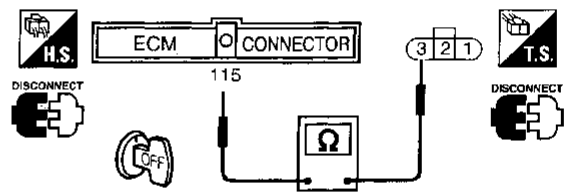
2 DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M62, F24
- 10A fuse
- Harness for open or short between front heated oxygen sensor and fuse

▶	Repair harness or connectors.

3 CHECK GROUND CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between terminal 3 and ECM terminal 115.



SEF214W

Continuity should exist.

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

OK or NG

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

4 CHECK FRONT HEATED OXYGEN SENSOR HEATER

Refer to "Component Inspection", EC-193.

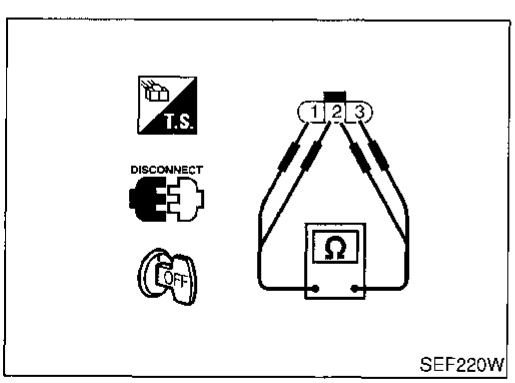
OK or NG

OK	▶	GO TO 5.
NG	▶	Replace front heated oxygen sensor.

5 CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-110.

▶	INSPECTION END



SEF220W

Component Inspection

NCEC0143

FRONT HEATED OXYGEN SENSOR HEATER

NCEC0143S01

Check resistance between terminals 3 and 1.

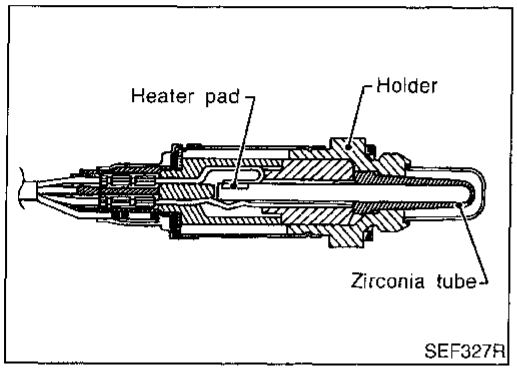
Resistance: 2.3 - 4.3 Ω at 25°C (77°F)

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.



Component Description

NCEC0144

The rear heated oxygen sensor (Rear HO2S), after three way catalyst, monitors the oxygen level in the exhaust gas.
Even if switching characteristics of the front heated oxygen sensor are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the rear heated oxygen sensor.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the rear heated oxygen sensor is not used for engine control operation.

CONSULT Reference Value in Data Monitor Mode

NCEC0145

Specification data are reference values.

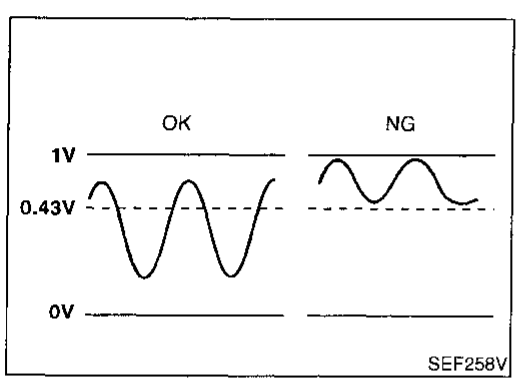
MONITOR ITEM	CONDITION		SPECIFICATION
RR O2 SENSOR	• Engine: After warming up	Revving engine from idle to 3,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
RR O2 MNTR			LEAN ⟷ RICH

ECM Terminals and Reference Value

NCEC0146

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
52	W	Rear heated oxygen sensor	**[Engine is running]** • After warming up to normal operating temperature and engine speed is 2,000 rpm	0 - Approximately 1.0V



On Board Diagnosis Logic

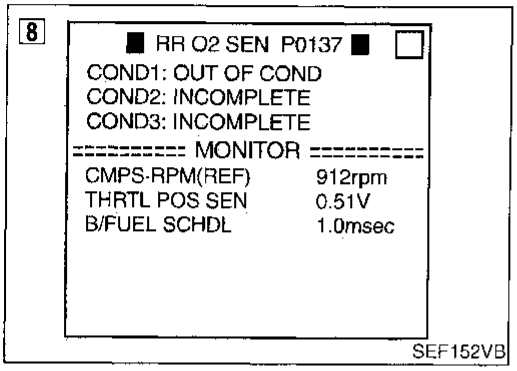
NCEC0147

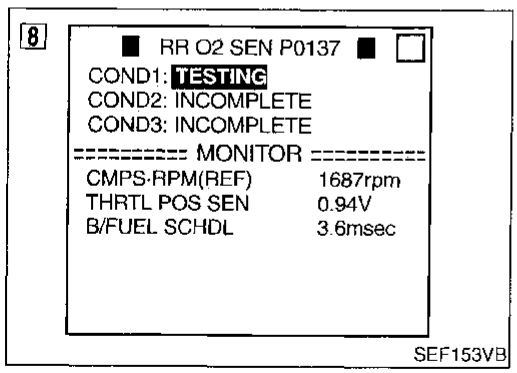
The rear heated oxygen sensor has a much longer switching time between rich and lean than the front heated oxygen sensor. The oxygen storage capacity before the three way catalyst causes the longer switching time. To judge the malfunctions of rear heated oxygen sensor, ECM monitors whether the minimum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

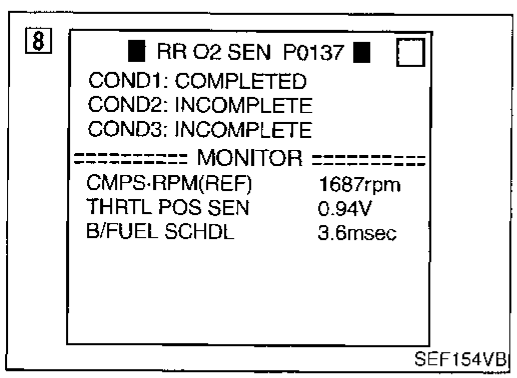
DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0137 0511	• The minimum voltage from the sensor does not reach the specified voltage.	• Harness or connectors (The sensor circuit is open or shorted.) • Rear heated oxygen sensor • Fuel pressure • Injectors

DTC P0137 REAR HEATED OXYGEN SENSOR (REAR HO2S) (MIN. VOLTAGE MONITORING)

DTC Confirmation Procedure







DTC Confirmation Procedure

NCEC0148

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

- **"COMPLETED" will appear on CONSULT screen when all tests "COND1", "COND2" and "COND3" are completed.**
- If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Never stop engine during this procedure. If the engine is stopped, retry this procedure from step 2 in "Procedure for COND1".

With CONSULT

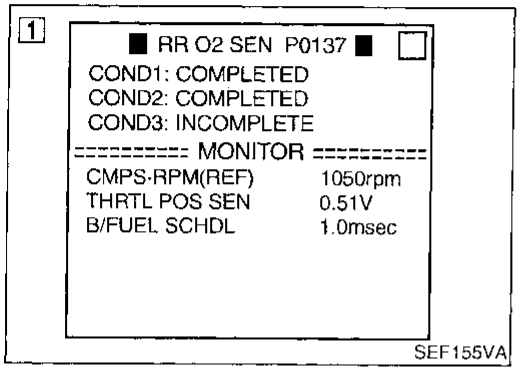
Procedure for COND1

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Turn ignition switch "ON" and select "RR O2 SENSOR P0137" of "REAR O2 SENSOR" in "DTC WORK SUPPORT" mode with CONSULT.
4) Touch "START".
5) Start engine and let it idle for at least 30 seconds.
6) Rev engine up to 2,000 rpm 2 or 3 times quickly under no load. If "COMPLETED" appears on CONSULT screen, go to step 2 in "Procedure for COND3".
   If "COMPLETED" does not appear on CONSULT screen, go to the following step.
7) Drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
8) When the following conditions are met, "TESTING" will be displayed at "COND1" on the CONSULT screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take approximately 30 seconds.)

CMPS·RPM (REF)	1,400 - 3,400 rpm
Vehicle speed	64 - 120 km/h (40 - 75 MPH)
B/FUEL SCHDL	0.5 - 3.9 msec
Selector lever	Suitable position

NOTE:

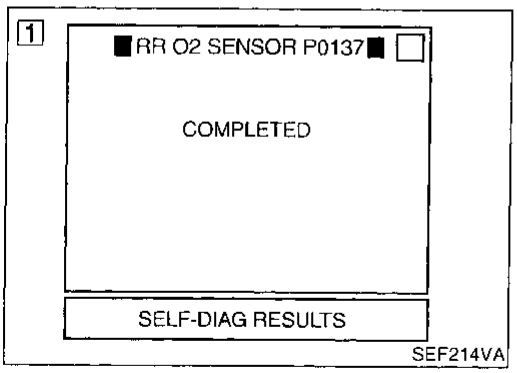
- **If "TESTING" is not displayed after 5 minutes, retry from step 2 in "Procedure for COND1".**
- **If "COMPLETED" already appears at "COND2" on CONSULT screen before "Procedure for COND2" is conducted, it is unnecessary to conduct step 1 in "Procedure for COND2".**



Procedure for COND2

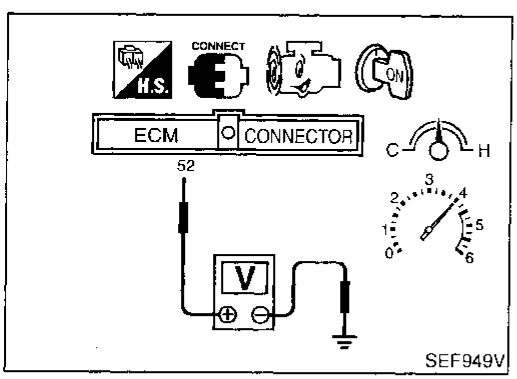
1) While driving, release accelerator pedal completely with "OD" OFF (A/T models only) from the above condition [step 8] until "INCOMPLETE" at "COND2" on CONSULT screen has turned to "COMPLETED". (It will take approximately 4 seconds.)

NOTE:
If "COMPLETED" already appears at "COND3" on CONSULT screen before "Procedure for COND3" is conducted, it is unnecessary to conduct step 1 in "Procedure for COND3".



Procedure for COND3

1) Stop vehicle and let it idle until "INCOMPLETE" of "COND3" on CONSULT screen has turned to "COMPLETED". (It will take a maximum of approximately 6 minutes.)
2) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-199.



Overall Function Check

NCEC0149

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

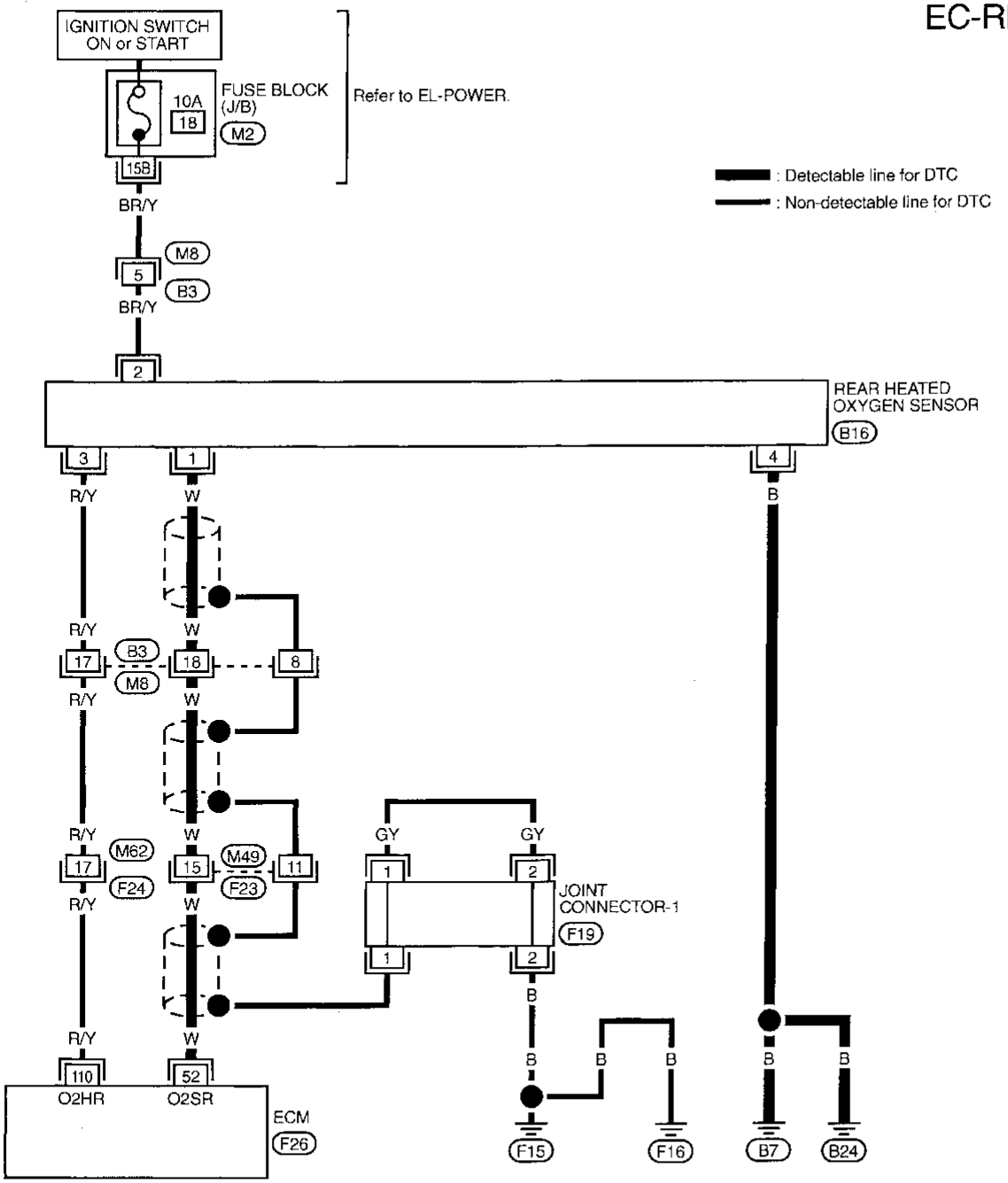
Without CONSULT

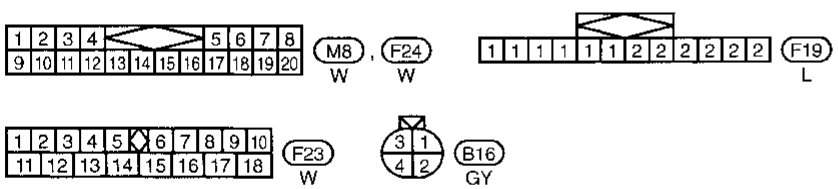
1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Set voltmeter probes between ECM terminals 52 (Rear heated oxygen sensor signal) and engine ground.
4) Check the voltage when revving engine up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be below 0.43V at least once during this procedure.
   If the voltage can be confirmed in step 4, step 5 is not necessary.
5) Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), D position with "OD" OFF (A/T).
   The voltage should be below 0.43V at least once during this procedure.
6) If NG, go to "Diagnostic Procedure", EC-199.

Wiring Diagram

NCEC0150

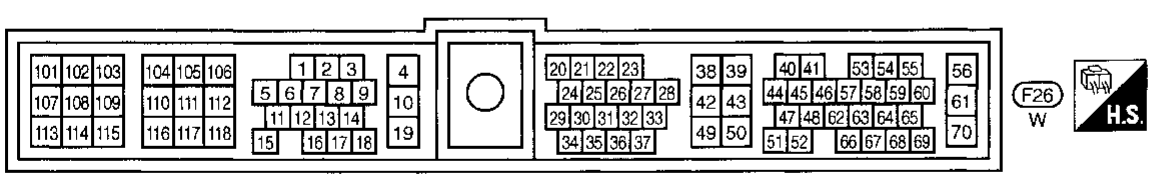
EC-RRO2-01





Refer to last page (Foldout page).

M2



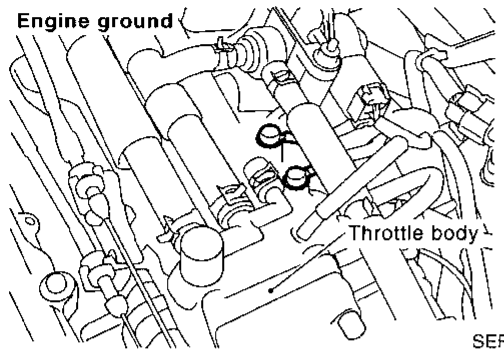
TEC530

Diagnostic Procedure

NCEC0151

1	RETIGHTEN GROUND SCREWS

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

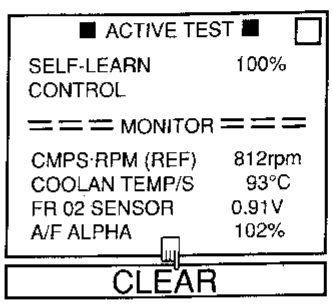


▶	GO TO 2.

2	CLEAR THE SELF-LEARNING DATA

With CONSULT

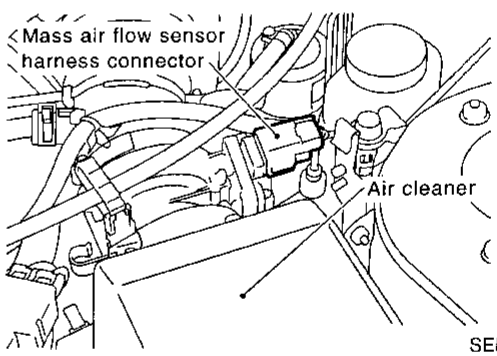
1. Start engine and warm it up to normal operating temperature.
2. Select "SELF-LEARNING CONT" in "ACTIVE TEST" mode with CONSULT.
3. Clear the self-learning control coefficient by touching "CLEAR".



4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 detected? Is it difficult to start engine?

Without CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch "OFF".
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 3 seconds at idle speed.



4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure diagnostic trouble code No. 0102 is displayed in Diagnostic Test Mode II.
6. Erase the diagnostic test mode II (Self-diagnostic results) memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-54.
7. Make sure diagnostic trouble code No. 0505 is displayed in Diagnostic Test Mode II.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC 0114 detected? Is it difficult to start engine?

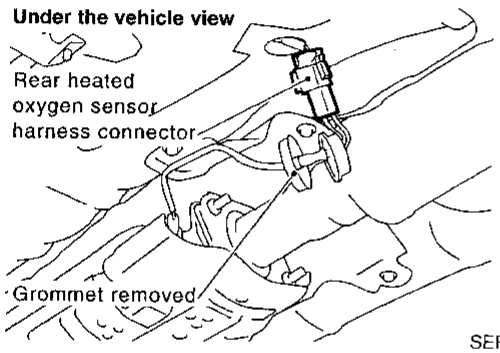
Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0172. Refer to EC-235.
No	▶	GO TO 3.

Diagnostic Procedure (Cont'd)

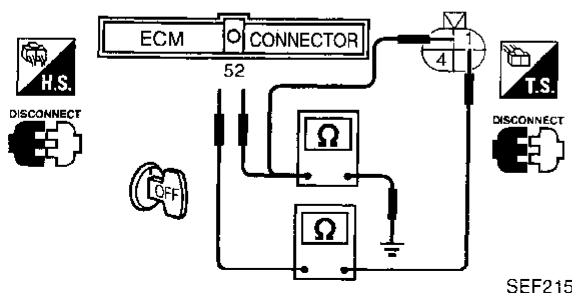
3 CHECK INPUT SIGNAL CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect rear heated oxygen sensor harness connector and ECM harness connector.



SEF298W

3. Check harness continuity between ECM terminal 52 and terminal 1.



SEF215W

Continuity should exist.

4. Check harness continuity between ECM terminal 52 (or terminal 1) and ground.

Continuity should not exist.

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

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4 DETECT MALFUNCTIONING PART

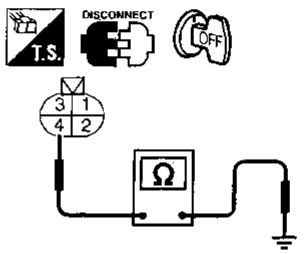
Check the following.

- Harness connectors B3, M8
- Harness connectors M49, F23
- Harness for open or short between rear heated oxygen sensor and ECM

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

5 CHECK GROUND CIRCUIT

1. Check harness continuity between terminal 4 and body ground.



SEF216W

Continuity should exist.

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

OK or NG

OK	▶	GO TO 6.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

6 CHECK REAR HEATED OXYGEN SENSOR

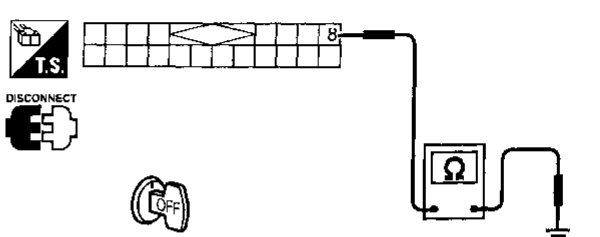
Refer to "Component Inspection", EC-201.

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace rear heated oxygen sensor.

7 CHECK SHIELD CIRCUIT

1. Reconnect harness connectors disconnected.
2. Disconnect harness connectors B3, M8.
3. Check harness continuity between terminal 8 and engine ground.



SEF217W

Continuity should exist.

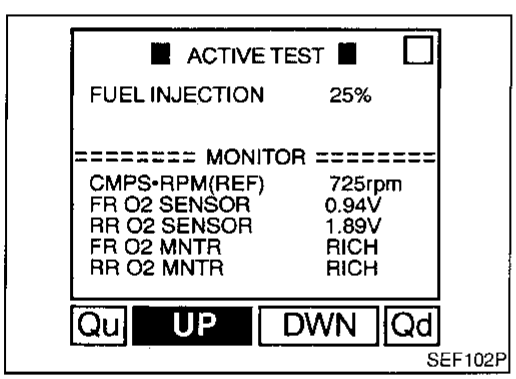
4. Also check harness for short to ground and short to power.
5. Then reconnect harness connectors.

OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 8.

8	DETECT MALFUNCTIONING PART
Check the following. • Harness connectors M49, F23 • Harness connectors B3, M8 • Joint connector-1 (Refer to "HARNESS LAYOUT" in EL section.) • Harness for open or short between harness connector M8 and engine ground	
▶	Repair open circuit, short to ground or short to power in harness or connectors.

9	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-110.	
▶	INSPECTION END



Component Inspection

NCEC0152

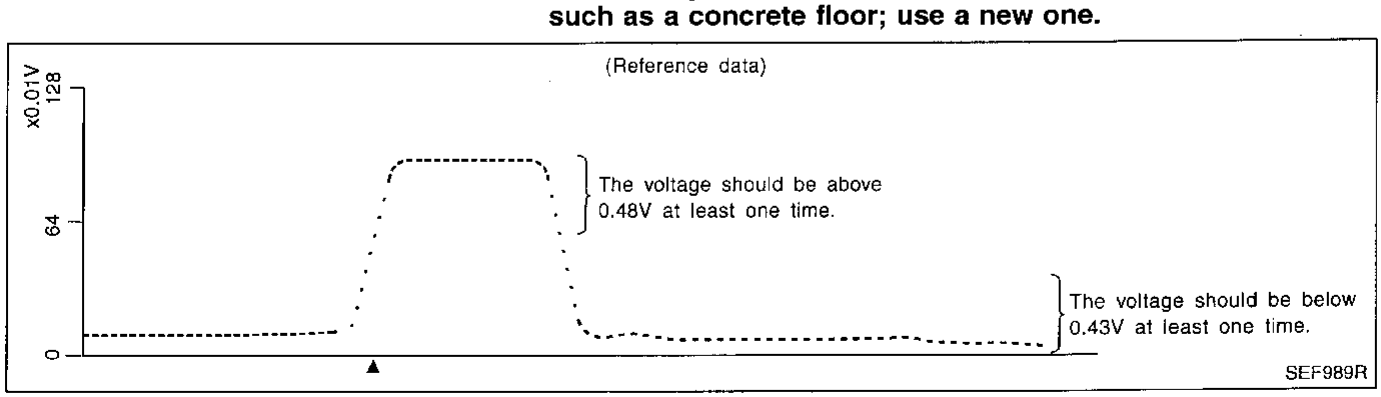
REAR HEATED OXYGEN SENSOR

NCEC0152S01

With CONSULT

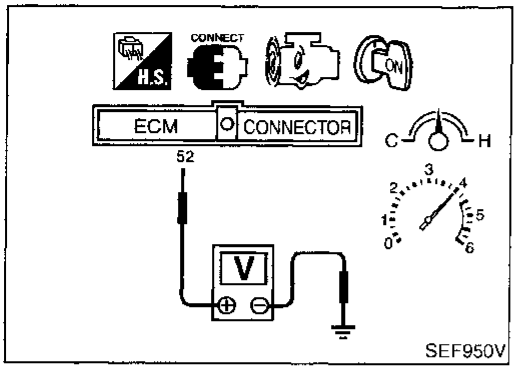
1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "RR O2 SENSOR" as the monitor item with CONSULT.
4) Check "RR O2 SENSOR" at idle speed when adjusting "FUEL INJECTION" to ±25%.
   "RR O2 SENSOR" should be above 0.48V at least once when the "FUEL INJECTION" is +25%."RR O2 SENSOR" should be below 0.43V at least once when the "FUEL INJECTION" is –25%.

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.



DTC P0137 REAR HEATED OXYGEN SENSOR (REAR HO2S) (MIN. VOLTAGE MONITORING)

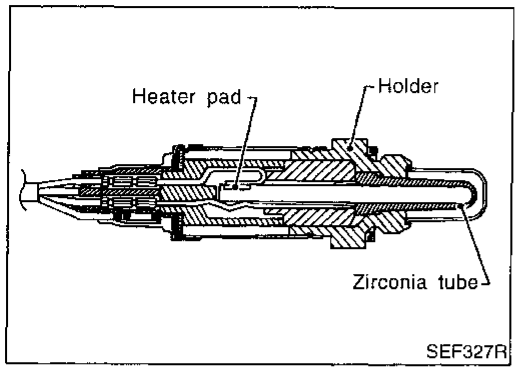
Component Inspection (Cont'd)



Without CONSULT

1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Set voltmeter probes between ECM terminals 52 (Rear heated oxygen sensor signal) and engine ground.
4) Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.48V at least once.
   If the voltage is above 0.48V at step 4, step 5 is not necessary.
5) Check the voltage when revving up to 6,000 rpm under no load. Or keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), D position with "OD" OFF (A/T).
   The voltage should be below 0.43V at least once.

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



Component Description

NCEC0153

The rear heated oxygen sensor (Rear HO2S), after three way catalyst, monitors the oxygen level in the exhaust gas.
Even if switching characteristics of the front heated oxygen sensor are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the rear heated oxygen sensor.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the rear heated oxygen sensor is not used for engine control operation.

CONSULT Reference Value in Data Monitor Mode

NCEC0154

Specification data are reference values.

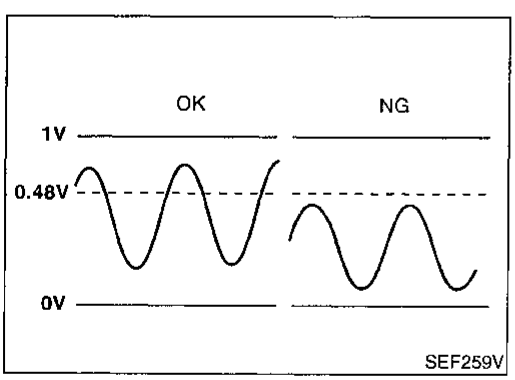
MONITOR ITEM	CONDITION		SPECIFICATION
RR O2 SENSOR	• Engine: After warming up	Revving engine from idle to 3,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
RR O2 MNTR			LEAN ⟷ RICH

ECM Terminals and Reference Value

NCEC0155

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
52	W	Rear heated oxygen sensor	**[Engine is running]** • After warming up to normal operating temperature and engine speed is 2,000 rpm	0 - Approximately 1.0V

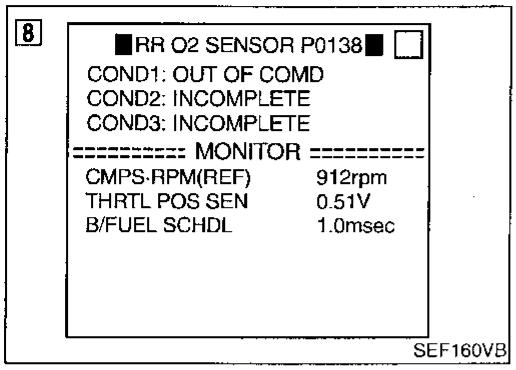


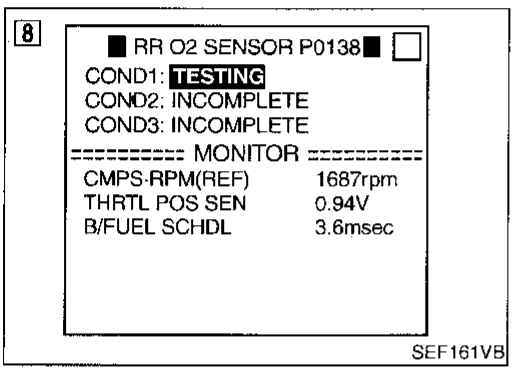
On Board Diagnosis Logic

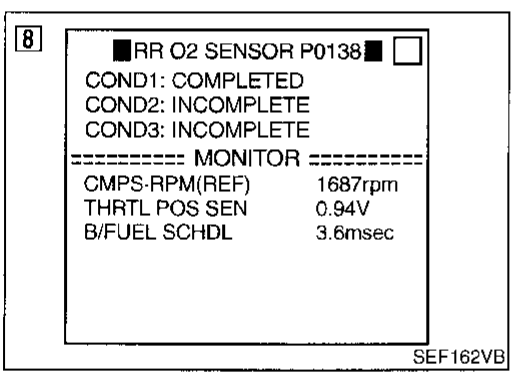
NCEC0156

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

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0138 0510	• The maximum voltage from the sensor does not reach the specified voltage.	• Harness or connectors (The sensor circuit is open or shorted.) • Rear heated oxygen sensor • Fuel pressure • Injectors • Intake air leaks







DTC Confirmation Procedure

NCEC0157

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

- **"COMPLETED" will appear on CONSULT screen when all tests "COND1", "COND2" and "COND3" are completed.**
- If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Never stop engine during this procedure. If the engine is stopped, retry this procedure from step 2 in "Procedure for COND1".

With CONSULT

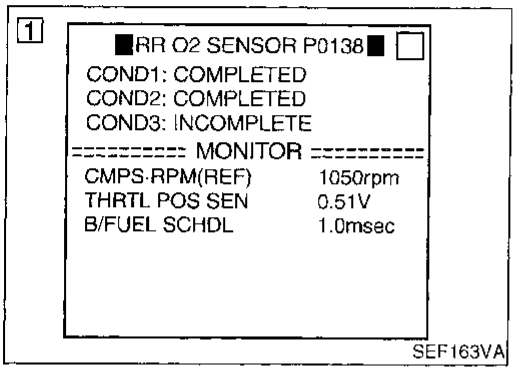
Procedure for COND1

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Turn ignition switch "ON" and select "RR O2 SENSOR P0138" of "REAR O2 SENSOR" in "DTC WORK SUPPORT" mode with CONSULT.
4) Touch "START".
5) Start engine and let it idle for at least 30 seconds.
6) Rev engine up to 2,000 rpm two or three times quickly under no load.
   If "COMPLETED" appears on CONSULT screen, go to step 3 in "Procedure for COND2".
   If "COMPLETED" does not appear on CONSULT screen, go to the following step.
7) Drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
8) When the following conditions are met, "TESTING" will be displayed at "COND1" on the CONSULT screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take approximately 30 seconds.)

CMPS·RPM (REF)	1,400 - 3,400 rpm
Vehicle speed	64 - 120 km/h (40 - 75 MPH)
B/FUEL SCHDL	0.5 - 3.9 msec
Selector lever	Suitable position

NOTE:

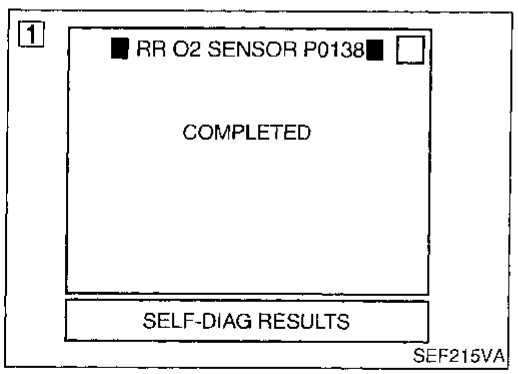
- **If "TESTING" is not displayed after 5 minutes, retry from step 2 in "Procedure for COND1".**
- **If "COMPLETED" already appears at "COND2" on CONSULT screen before "Procedure for COND2" is conducted, it is unnecessary to conduct step 1 in "Procedure for COND2".**



Procedure for COND2

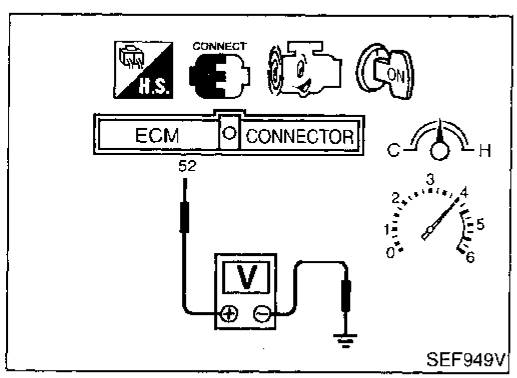
1) While driving, release accelerator pedal completely with "OD" OFF (A/T models only) from the above condition [step 8] until "INCOMPLETE" at "COND2" on CONSULT screen is turned to "COMPLETED". (It will take approximately 4 seconds.)

NOTE:
If "COMPLETED" already appears at "COND3" on CONSULT screen before "Procedure for COND3" is conducted, it is unnecessary to conduct step 1 in "Procedure for COND3".



Procedure for COND3

1) Stop vehicle and let it idle until "INCOMPLETE" of "COND3" on CONSULT screen has turned to "COMPLETED". (It will take a maximum of approximately 6 minutes.)
2) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS".
   If "NG" is displayed, refer to "Diagnostic Procedure", EC-207.



Overall Function Check

NCEC0158

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

Without CONSULT

1) Start engine and drive vehicle at a speed of 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Set voltmeter probes between ECM terminals 52 (Rear heated oxygen sensor signal) and engine ground.
4) Check the voltage when revving engine up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.48V at least once during this procedure.
   If the voltage can be confirmed in step 4, step 5 is not necessary.
5) Keep vehicle at idling for 10 minutes, then check the voltage.
   Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), D position with "OD" OFF (A/T).
   The voltage should be above 0.48V at least once during this procedure.
6) If NG, go to "Diagnostic Procedure", EC-207.

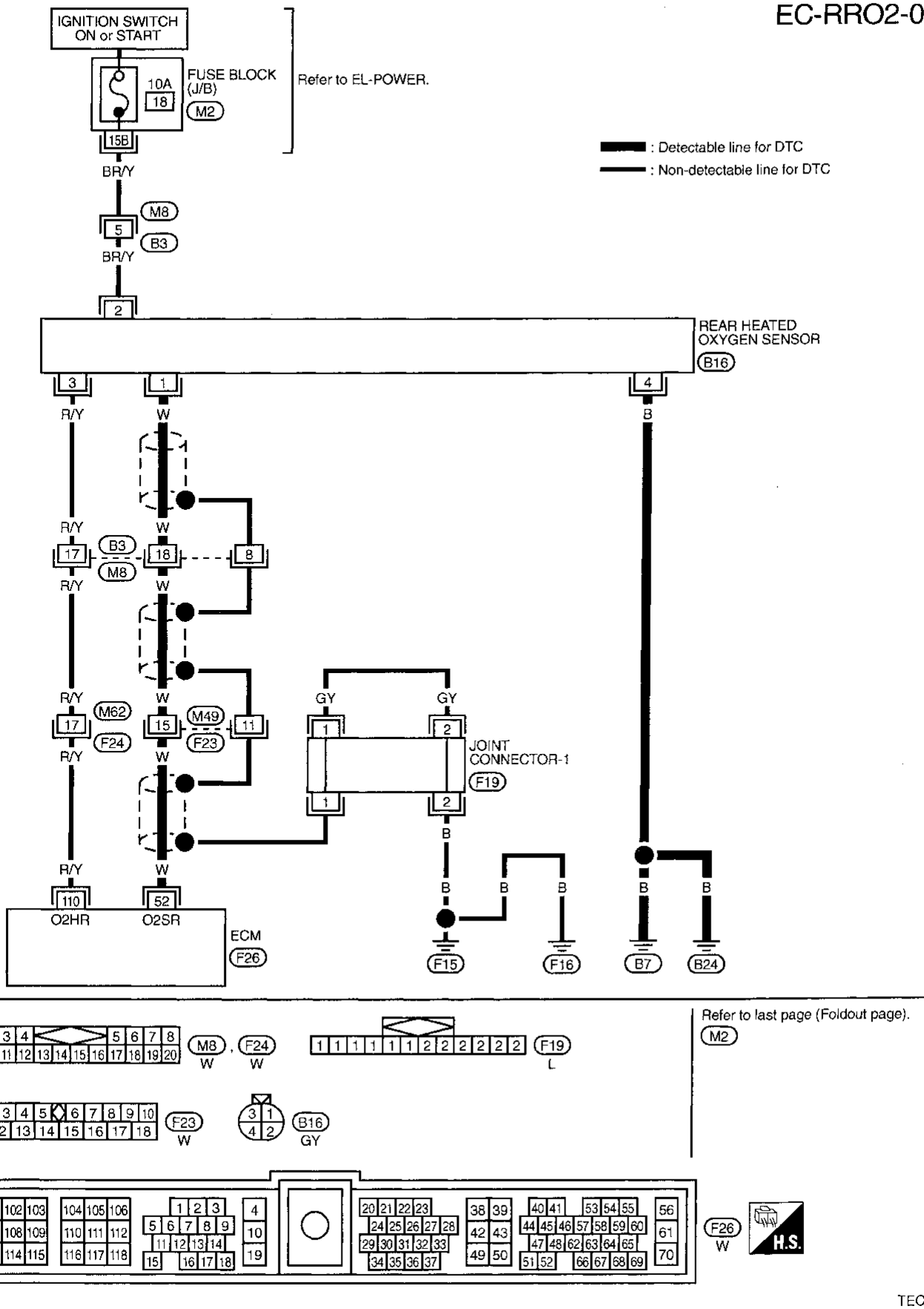
DTC P0138 REAR HEATED OXYGEN SENSOR (REAR HO2S) (MAX. VOLTAGE MONITORING)

Wiring Diagram

Wiring Diagram

NCEC0159

EC-RRO2-01



Refer to last page (Foldout page).

M2

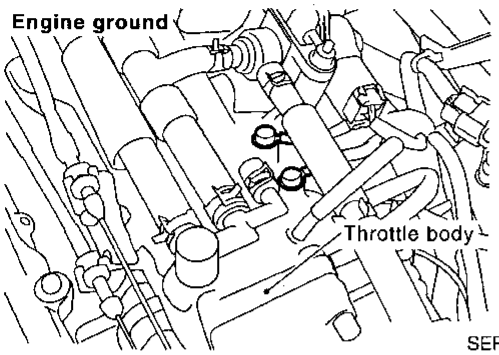
TEC530

Diagnostic Procedure

NCEC0160

1	RETIGHTEN GROUND SCREWS

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



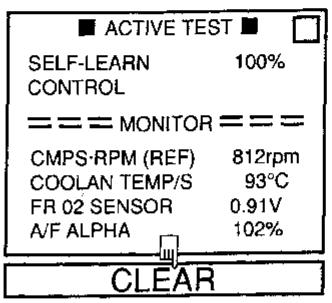
SEF292W

▶ GO TO 2.

2	CLEAR THE SELF-LEARNING DATA

With CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Select "SELF-LEARNING CONT" in "ACTIVE TEST" mode with CONSULT.
3. Clear the self-learning control coefficient by touching "CLEAR".

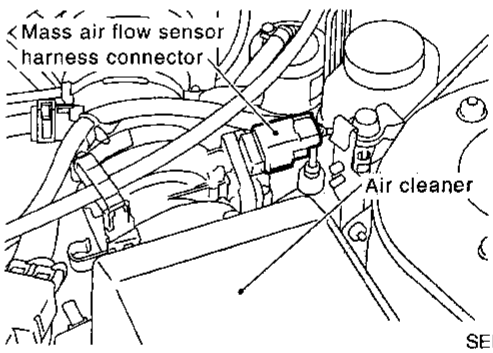


AEC547

4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 detected? Is it difficult to start engine?

Without CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch "OFF".
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 3 seconds at idle speed.



SEF293W

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. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-54.
7. Make sure diagnostic trouble code No. 0505 is displayed in Diagnostic Test Mode II.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC 0115 detected? Is it difficult to start engine?

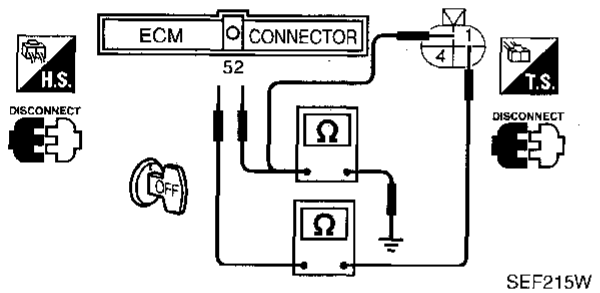
Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0171. Refer to EC-229.
No	▶	GO TO 3.

Diagnostic Procedure (Cont'd)

3 CHECK INPUT SIGNAL CIRCUIT

1. Disconnect rear heated oxygen sensor harness connector and ECM harness connector.
2. Check harness continuity between ECM terminal 52 and terminal 1.



SEF215W

Continuity should exist.

3. Check harness continuity between ECM terminal 52 (or terminal 1) and ground.

Continuity should not exist.

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

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

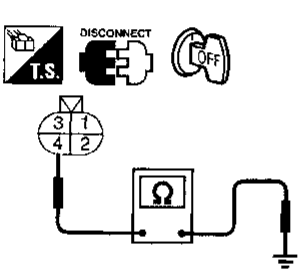
4 DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors B3, M8
- Harness connectors M62, F24
- Harness for open or short between ECM and rear heated oxygen sensor

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

5 CHECK GROUND CIRCUIT

1. Check harness continuity between terminal 3 and engine ground.



SEF216W

Continuity should exist.

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

OK or NG

OK	▶	GO TO 6.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

6 CHECK REAR HEATED OXYGEN SENSOR

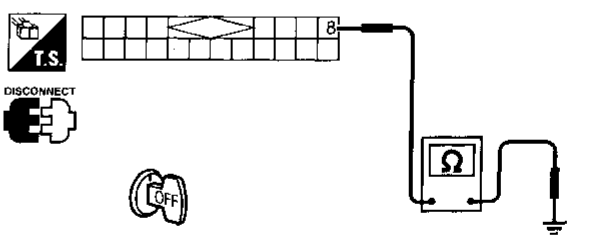
Refer to "Component Inspection", EC-209.

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace rear heated oxygen sensor.

7 CHECK SHIELD CIRCUIT

1. Reconnect harness connectors disconnected.
2. Disconnect harness connectors B3, M8.
3. Check harness continuity between terminal 8 and engine ground.



SEF217W

Continuity should exist.

4. Also check harness for short to ground and short to power.
5. Then reconnect harness connectors.

OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 8.

8 DETECT MALFUNCTIONING PART

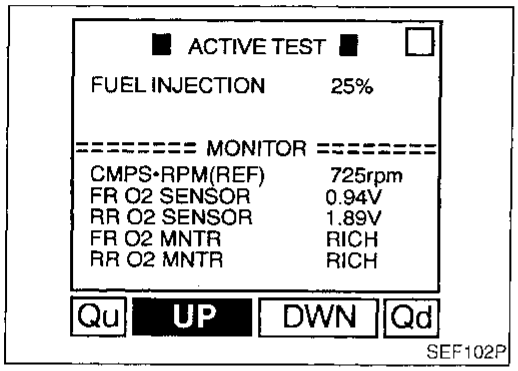
Check the following.
- Harness connectors M62, F24
- Harness connectors B3, M8
- Joint connector-1 (Refer to "HARNESS LAYOUT" in EL section.)
- Harness for open or short between harness connector M8 and engine ground

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

9 CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-110.

	▶	INSPECTION END



Component Inspection

NCEC0161

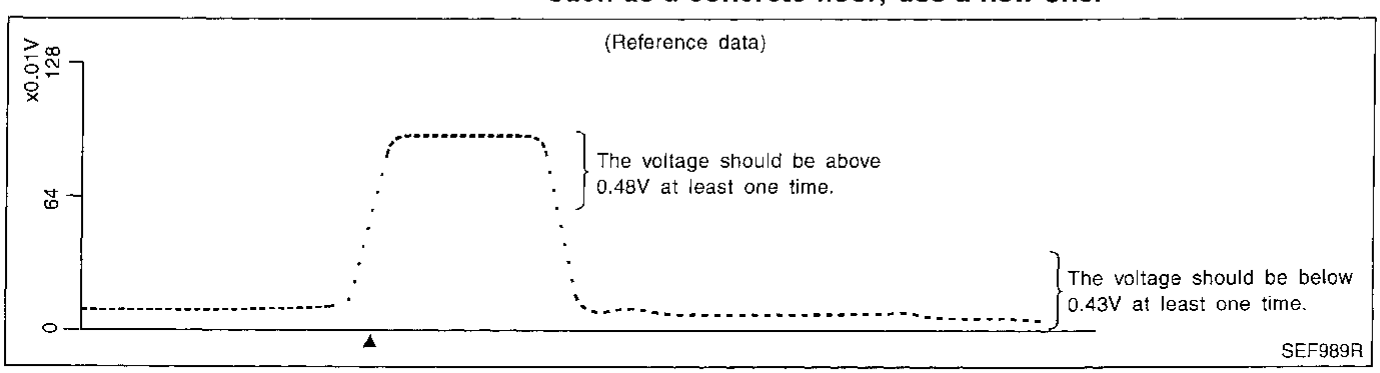
REAR HEATED OXYGEN SENSOR

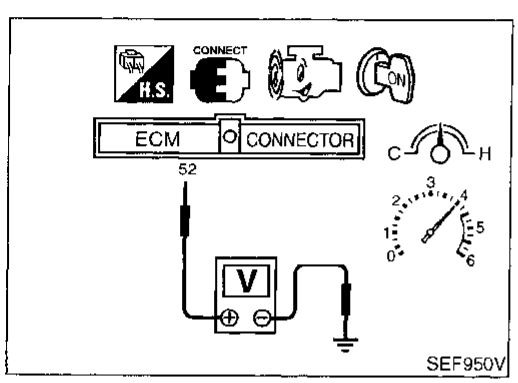
NCEC0161S01

With CONSULT

1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes..
2) Stop vehicle with engine running.
3) Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "RR O2 SENSOR" as the monitor item with CONSULT.
4) Check "RR O2 SENSOR" at idle speed when adjusting "FUEL INJECTION" to ±25%.
   "RR O2 SENSOR" should be above 0.48V at least once when the "FUEL INJECTION" is +25%.
   "RR O2 SENSOR" should be below 0.43V at least once when the "FUEL INJECTION" is −25%.

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.





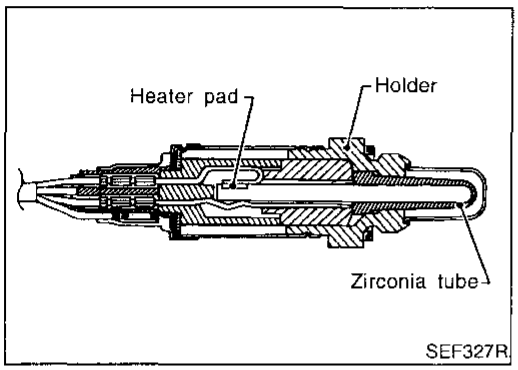
Without CONSULT

1) Start engine and drive vehicle at a speed of 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Set voltmeter probes between ECM terminals 52 (Rear heated oxygen sensor signal) and engine ground.
4) Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.48V at least once.
   If the voltage is above 0.48V at step 4, step 5 is not necessary.
5) Check the voltage when revving up to 6,000 rpm under no load. Or keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), D position with "OD" OFF (A/T).
   The voltage should be below 0.43V at least once.

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

DTC P0139 REAR HEATED OXYGEN SENSOR (REAR HO2S) (RESPONSE MONITORING)

Component Description



Component Description

NCEC0162

The rear heated oxygen sensor (Rear HO2S), after three way catalyst, monitors the oxygen level in the exhaust gas.
Even if switching characteristics of the front heated oxygen sensor are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the rear heated oxygen sensor.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the rear heated oxygen sensor is not used for engine control operation.

CONSULT Reference Value in Data Monitor Mode

NCEC0163

Specification data are reference values.

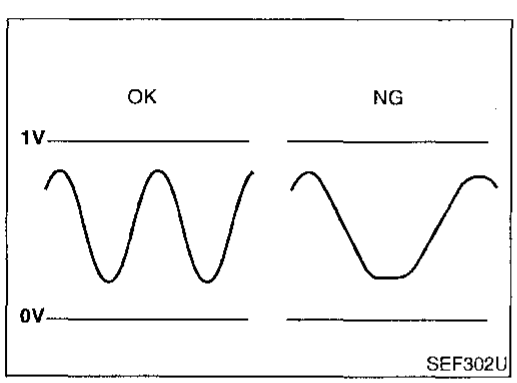
MONITOR ITEM	CONDITION		SPECIFICATION
RR O2 SENSOR	• Engine: After warming up	Revving engine from idle to 3,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
RR O2 MNTR			LEAN ⟷ RICH

ECM Terminals and Reference Value

NCEC0164

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
52	W	Rear heated oxygen sensor	**[Engine is running]** • After warming up to normal operating temperature and revving engine from idle to 2,000 rpm	0 - Approximately 1.0V

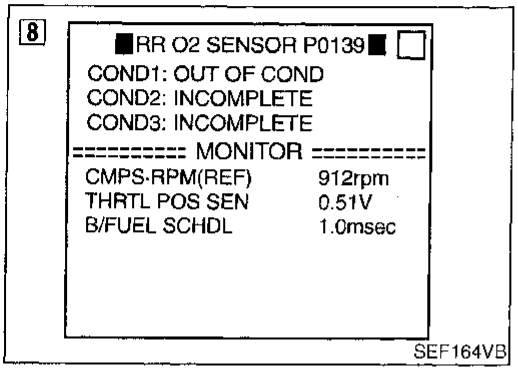


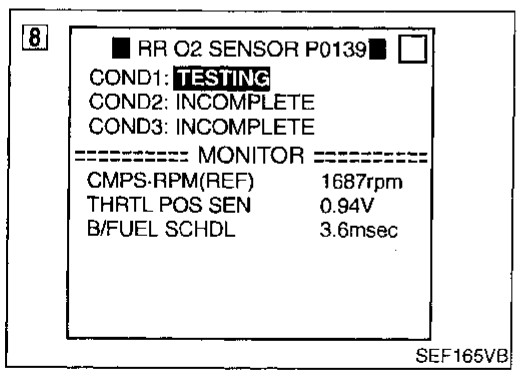
On Board Diagnosis Logic

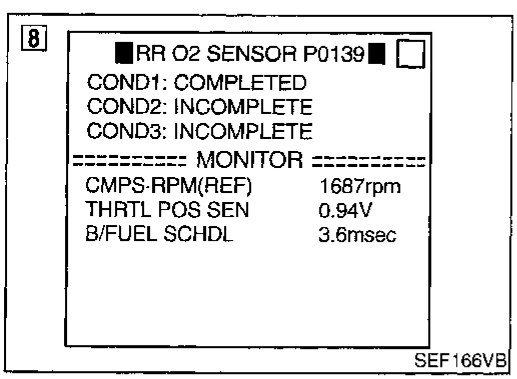
NCEC0165

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

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0139 0707	• It takes more than the specified time for the sensor to respond between rich and lean.	• Harness or connectors (The sensor circuit is open or shorted.) • Rear heated oxygen sensor • Fuel pressure • Injectors • Intake air leaks







DTC Confirmation Procedure

NCEC0166

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

- **"COMPLETED" will appear on CONSULT screen when all tests "COND1", "COND2" and "COND3" are completed.**
- If "DTC Confirmation Procedure " has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Never stop engine during this procedure. If the engine is stopped, retry this procedure from step 2 in "Procedure for COND1".

Ⓑ With CONSULT

Procedure for COND1

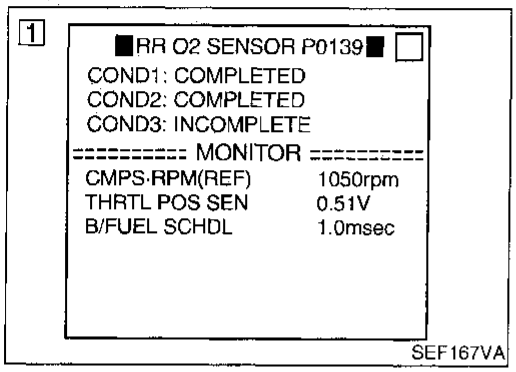
1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Turn ignition switch "ON" and select "RR O2 SENSOR P0139" of "REAR O2 SENSOR" in "DTC WORK SUPPORT" mode with CONSULT.
4) Touch "START".
5) Start engine and let it idle for at least 30 seconds.
6) Rev engine up to 2,000 rpm two or three times quickly under no load.
   If "COMPLETED" appears on CONSULT screen, go to step 2 in "Procedure for COND3".
   If "COMPLETED" does not appear on CONSULT screen, go to the following step.
7) Drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
8) When the following conditions are met, "TESTING" will be displayed at "COND1" on the CONSULT screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take approximately 30 seconds.)

CMPS·RPM (REF)	1,400 - 3,400 rpm
Vehicle speed	64 - 120 km/h (40 - 75 MPH)
B/FUEL SCHDL	0.5 - 3.9 msec
Selector lever	Suitable position

NOTE:

- **If "TESTING" is not displayed after 5 minutes, retry from step 2 in "Procedure for COND1".**
- **If "COMPLETED" already appears at "COND2" on CONSULT screen before "Procedure for COND2" is conducted, it is unnecessary to conduct step 1 in "Procedure for COND2".**

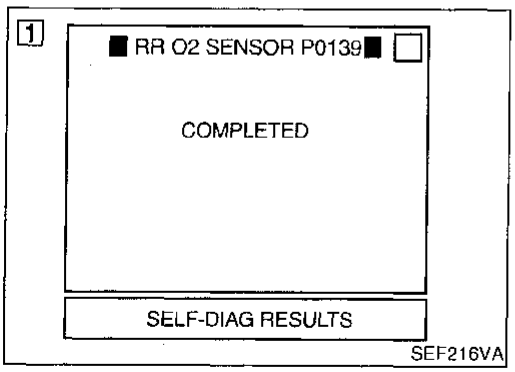
DTC Confirmation Procedure (Cont'd)



Procedure for COND2

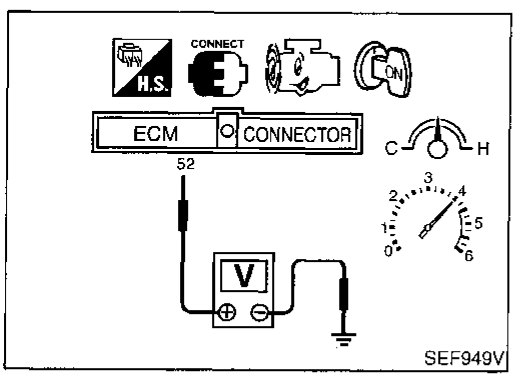
1) While driving, release accelerator pedal completely with "OD" OFF (A/T models only) from the above condition [step 8] until "INCOMPLETE" at "COND2" on CONSULT screen has turned to "COMPLETED". (It will take approximately 4 seconds.)

NOTE:
If "COMPLETED" already appears at "COND3" on CONSULT screen before "Procedure for COND3" is conducted, it is unnecessary to conduct step 1 in "Procedure for COND3".



Procedure for COND3

1) Stop vehicle and let it idle until "INCOMPLETE" of "COND3" on CONSULT screen has turned to "COMPLETED". (It will take a maximum of approximately 6 minutes.)
2) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS".
   If "NG" is displayed, refer to "Diagnostic Procedure", EC-214.



Overall Function Check

NCEC0167

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

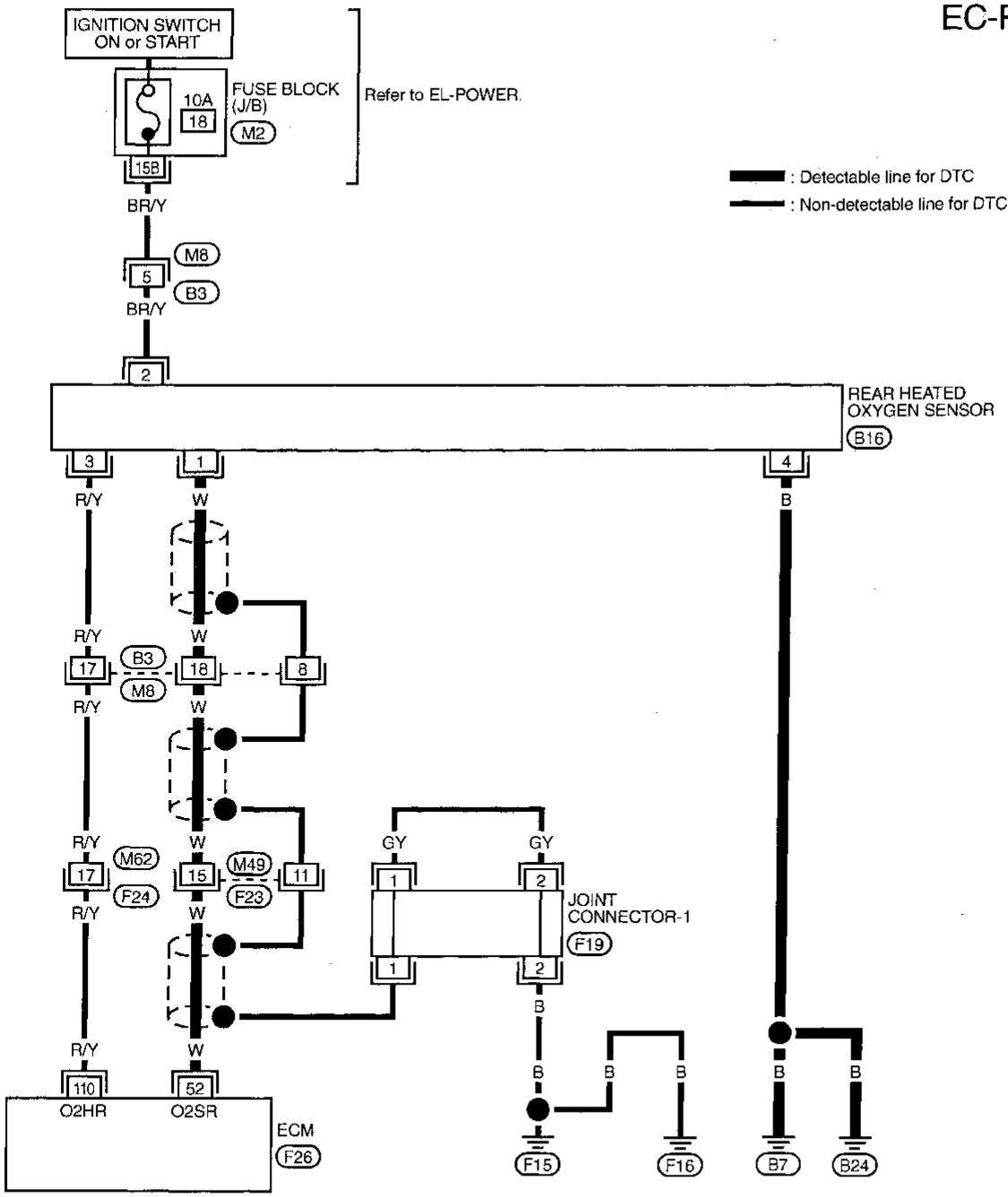
Without CONSULT

1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Set voltmeter probes between ECM terminals 52 (Rear heated oxygen sensor signal) and engine ground.
4) Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should change at more than 0.06V for 1 second during this procedure.
   If the voltage can be confirmed in step 4, step 5 is not necessary.
5) Keep vehicle at idling for 10 minutes, then check the voltage.
   Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), D position with "OD" OFF (A/T).
   The voltage should change at more than 0.06V for 1 second during this procedure.
6) If NG, go to "Diagnostic Procedure", EC-214.

Wiring Diagram

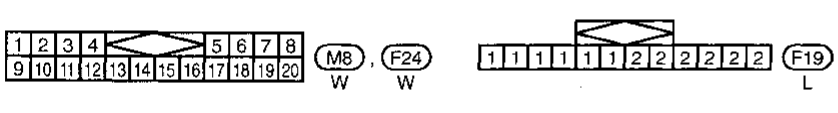
NCEC0168

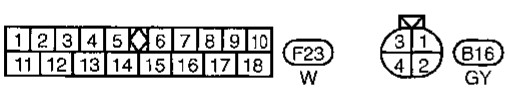
EC-RRO2-01

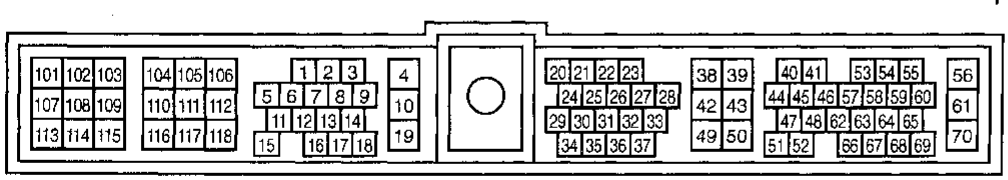


: Detectable line for DTC

: Non-detectable line for DTC







Refer to last page (Foldout page).

M2

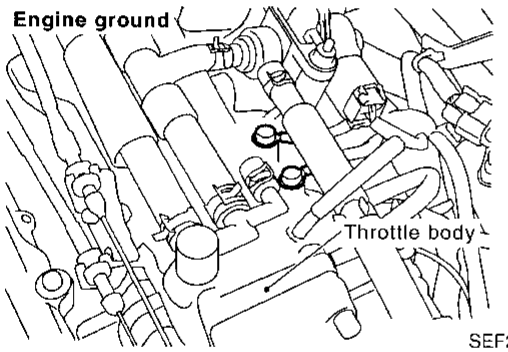
TEC530

Diagnostic Procedure

NCEC0169

1 RETIGHTEN GROUND SCREWS

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

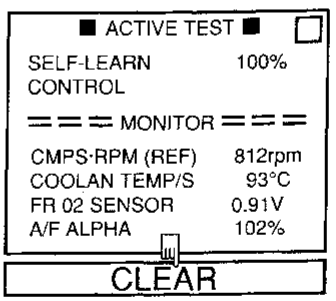


▶ GO TO 2.

2 CLEAR THE SELF-LEARNING DATA

With CONSULT

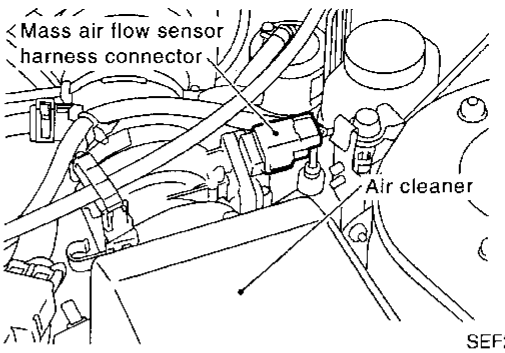
1. Start engine and warm it up to normal operating temperature.
2. Select "SELF-LEARNING CONT" in "ACTIVE TEST" mode with CONSULT.
3. Clear the self-learning control coefficient by touching "CLEAR".



4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 detected? Is it difficult to start engine?

Without CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch "OFF".
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 3 seconds at idle speed.



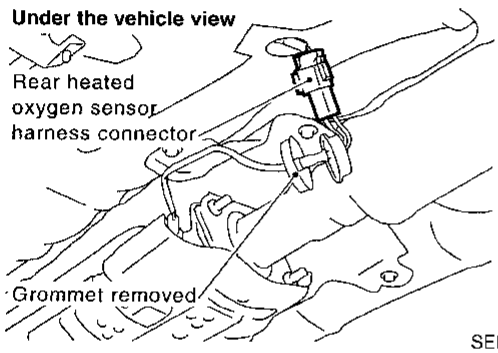
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure diagnostic trouble code No. 0102 is displayed in Diagnostic Test Mode II.
6. Erase the diagnostic test mode II (Self-diagnostic results) memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-54.
7. Make sure diagnostic trouble code No. 0505 is displayed in Diagnostic Test Mode II.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC 0114 detected? Is it difficult to start engine?

Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0172. Refer to EC-235.
No	▶	GO TO 3.

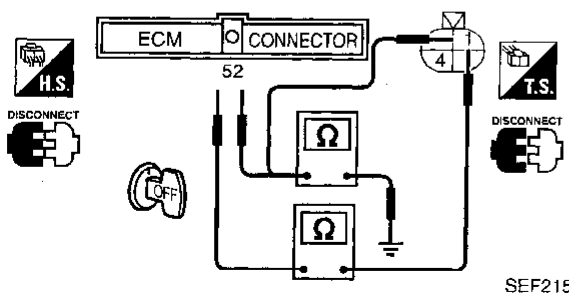
3	CHECK INPUT SIGNAL CIRCUIT

1. Disconnect rear heated oxygen sensor harness connector and ECM harness connector.



SEF298W

2. Check harness continuity between ECM terminal 52 and terminal 1.



SEF215W

Continuity should exist.

3. Check harness continuity between ECM terminal 52 (or terminal 1) and ground.

Continuity should not exist.

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

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

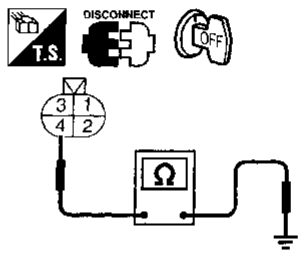
4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors B3, M8
- Harness connectors M62, F24
- Harness for open or short between rear heated oxygen sensor and ECM

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

5	CHECK GROUND CIRCUIT

1. Check harness continuity between terminal 3 and engine ground.



SEF216W

Continuity should exist.

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

OK or NG

OK	▶	GO TO 6.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK REAR HEATED OXYGEN SENSOR

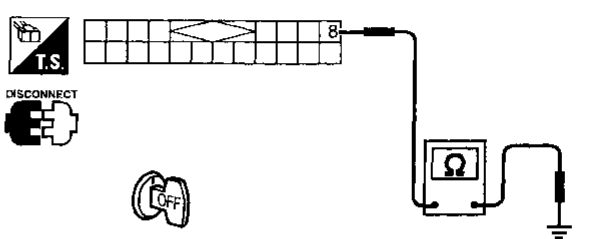
Refer to "Component Inspection", EC-216.

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace rear heated oxygen sensor.

7	CHECK SHIELD CIRCUIT

1. Reconnect harness connectors disconnected.
2. Disconnect harness connectors B3, M8.
3. Check harness continuity between terminal 8 and engine ground.



SEF217W

Continuity should exist.

4. Also check harness for short to ground and short to power.
5. Then reconnect harness connectors.

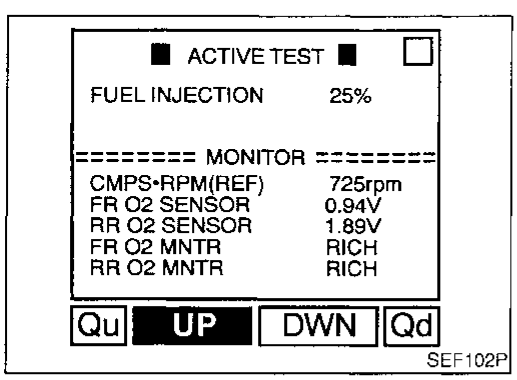
OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 8.

Diagnostic Procedure (Cont'd)

8	DETECT MALFUNCTIONING PART
Check the following. • Harness connectors M62, F24 • Harness connectors B3, M8 • Joint connector-1 (Refer to "HARNESS LAYOUT" in EL section.) • Harness for open or short between harness connector M8 and engine ground	
▶	Repair open circuit, short to ground or short to power in harness or connectors.

9	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-110.	
▶	INSPECTION END



Component Inspection

NCEC0170

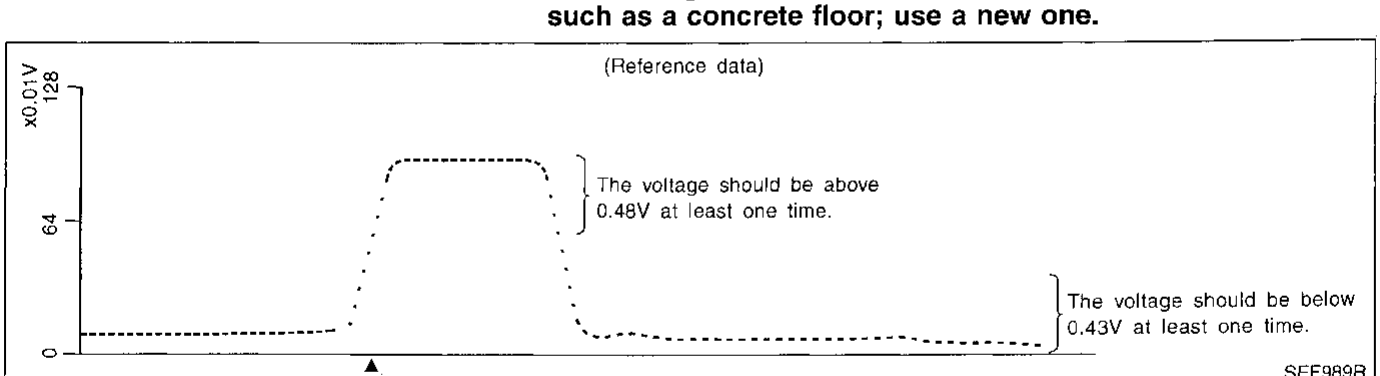
REAR HEATED OXYGEN SENSOR

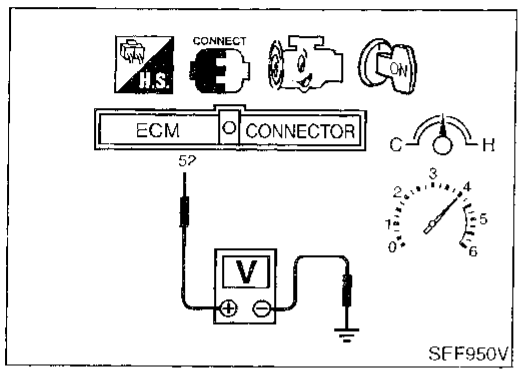
NCEC0170S01

With CONSULT

1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "RR O2 SENSOR" as the monitor item with CONSULT.
4) Check "RR O2 SENSOR" at idle speed when adjusting "FUEL INJECTION" to ±25%.
   "RR O2 SENSOR" should be above 0.48V at least once when the "FUEL INJECTION" is +25%.
   "RR O2 SENSOR" should be below 0.43V at least once when the "FUEL INJECTION" is –25%.

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.

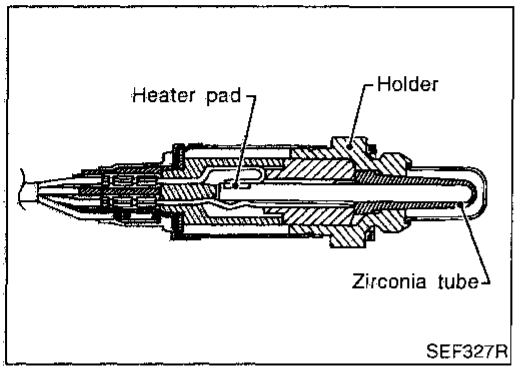




Without CONSULT

1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Set voltmeter probes between ECM terminals 52 (Rear heated oxygen sensor signal) and engine ground.
4) Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.48V at least once.
   If the voltage is above 0.48V at step 4, step 5 is not necessary.
5) Check the voltage when revving up to 6,000 rpm under no load. Or keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), D position with "OD" OFF (A/T).
   The voltage should be below 0.43V at least once.

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



Component Description

NCEC0171

The rear heated oxygen sensor (Rear HO2S), after three way catalyst, monitors the oxygen level in the exhaust gas.
Even if switching characteristics of the front heated oxygen sensor are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the rear heated oxygen sensor.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the rear heated oxygen sensor is not used for engine control operation.

CONSULT Reference Value in Data Monitor Mode

NCEC0172

Specification data are reference values.

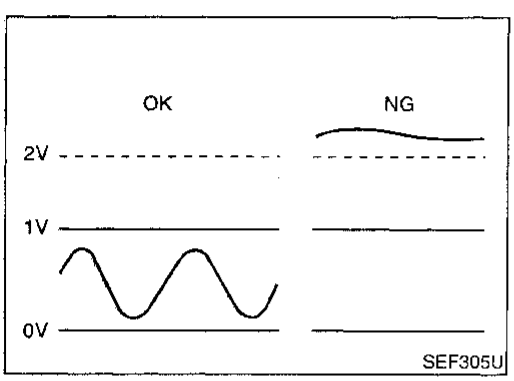
MONITOR ITEM	CONDITION		SPECIFICATION
RR O2 SENSOR	• Engine: After warming up	Revving engine from idle to 3,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
RR O2 MNTR			LEAN ⟷ RICH

ECM Terminals and Reference Value

NCEC0173

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
52	W	Rear heated oxygen sensor	**[Engine is running]** • After warming up to normal operating temperature and revving engine from idle to 2,000 rpm	0 - Approximately 1.0V

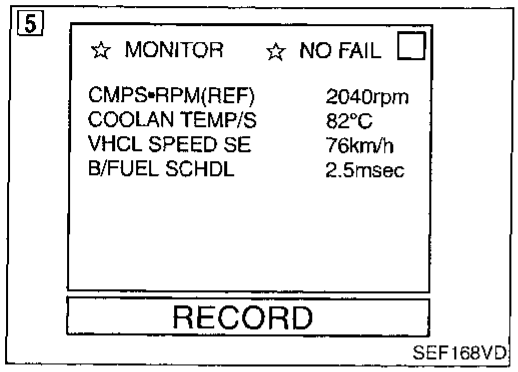


On Board Diagnosis Logic

NCEC0174

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

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0140 0512	• An excessively high voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Rear heated oxygen sensor



DTC Confirmation Procedure

NCEC0175

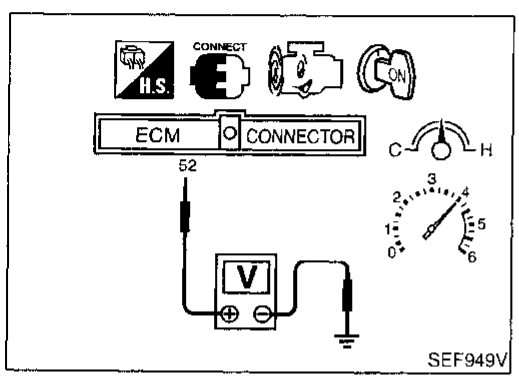
NOTE:
If "DTC Confirmation Procedure " has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

With CONSULT

1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT.
2) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
3) Stop vehicle with engine running.
4) Let engine idle for 1 minute.
5) Maintain the following conditions for at least 5 consecutive seconds.

CMPS·RPM (REF)	1,400 - 3,400 rpm
VHCL SPEED SE	64 - 120 km/h (40 - 75 MPH)
B/FUEL SCHDL	0.5 - 3.9 msec
COOLAN TEMP/S	70 - 100°C (158 - 212°F)
Selector lever	Suitable position

6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-221.



Overall Function Check

NCEC0176

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

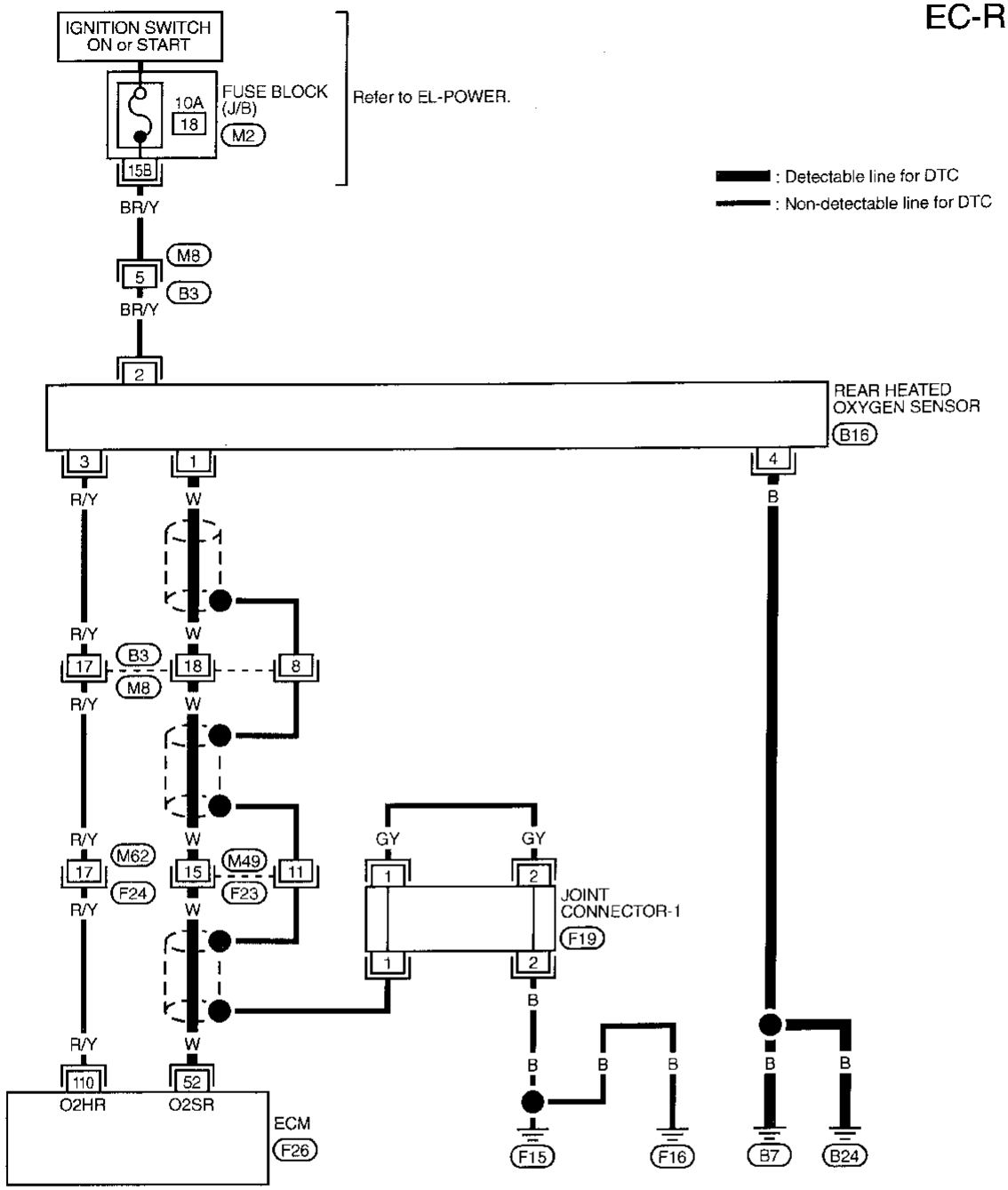
Without CONSULT

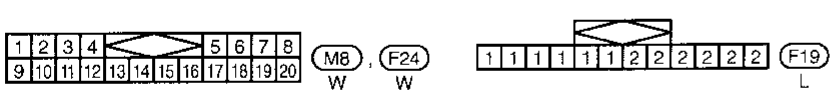
1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Set voltmeter probes between ECM terminals 52 (Rear heated oxygen sensor signal) and engine ground.
4) Check the voltage after revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be below 2V during this procedure.
5) If NG, go to "Diagnostic Procedure", EC-221.

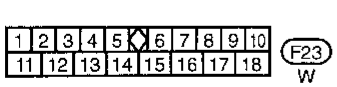
Wiring Diagram

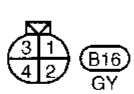
NCEC0177

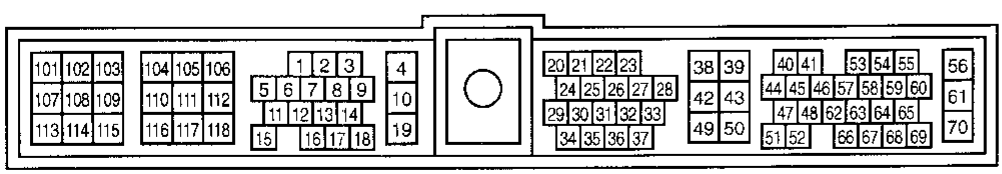
EC-RRO2-01











Refer to last page (Foldout page).
M2

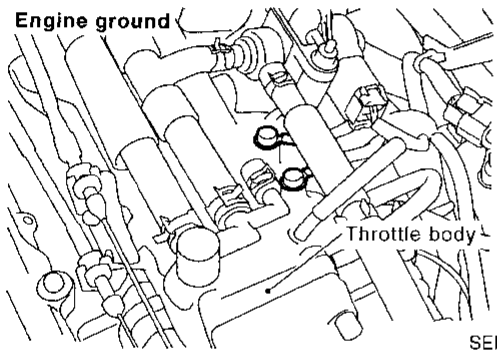
TEC530

Diagnostic Procedure

NCEC0179

1 RETIGHTEN GROUND SCREWS

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

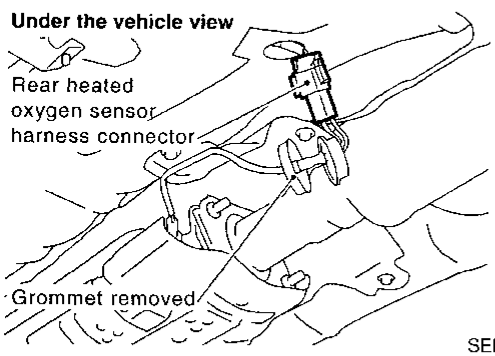


SEF292W

▶ GO TO 2.

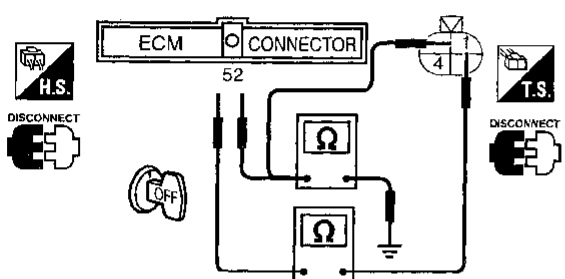
2 CHECK INPUT SIGNAL CIRCUIT

1. Disconnect rear heated oxygen sensor harness connector and ECM harness connector.



SEF298W

2. Check harness continuity between ECM terminal 52 and terminal 1.



SEF215W

Continuity should exist.

3. Check harness continuity between ECM terminal 52 (or terminal 1) and ground.

Continuity should not exist.

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

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

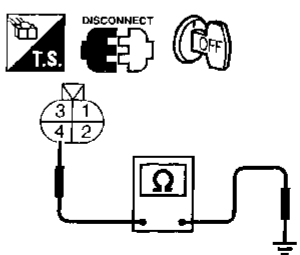
3 DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors B3, M8
- Harness connectors M62, F24
- Harness for open or short between rear heated oxygen sensor and ECM

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

4 CHECK GROUND CIRCUIT

1. Check harness continuity between terminal 3 and engine ground.



SEF216W

Continuity should exist.

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

OK or NG

OK	▶	GO TO 5.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

5 CHECK HARNESS CONNECTOR

Check rear heated oxygen sensor harness connector for water.
Water should not exist.

OK or NG

OK	▶	GO TO 6.
NG	▶	Repair or replace harness connector.

6 CHECK REAR HEATED OXYGEN SENSOR

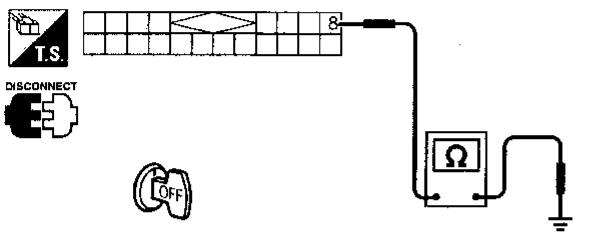
Refer to "Component Inspection", EC-222.

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace rear heated oxygen sensor.

7	CHECK SHIELD CIRCUIT

1. Reconnect harness connectors disconnected.
2. Disconnect harness connectors B3, M8.
3. Check harness continuity between terminal 8 and engine ground.



SEF217W

Continuity should exist.

4. Also check harness for short to ground and short to power.
5. Then reconnect harness connectors.

OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 8.

8	DETECT MALFUNCTIONING PART

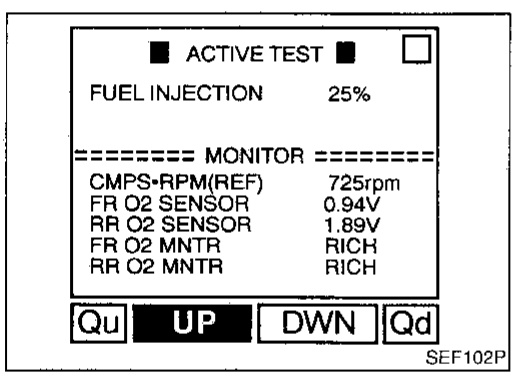
Check the following.
- Harness connectors M62, F24
- Harness connectors B3, M8
- Joint connector-1 (Refer to "HARNESS LAYOUT" in EL section.)
- Harness for open or short between harness connector M8 and engine ground

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

9	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-110.

▶	**INSPECTION END**



SEF102P

Component Inspection

NCEC0179

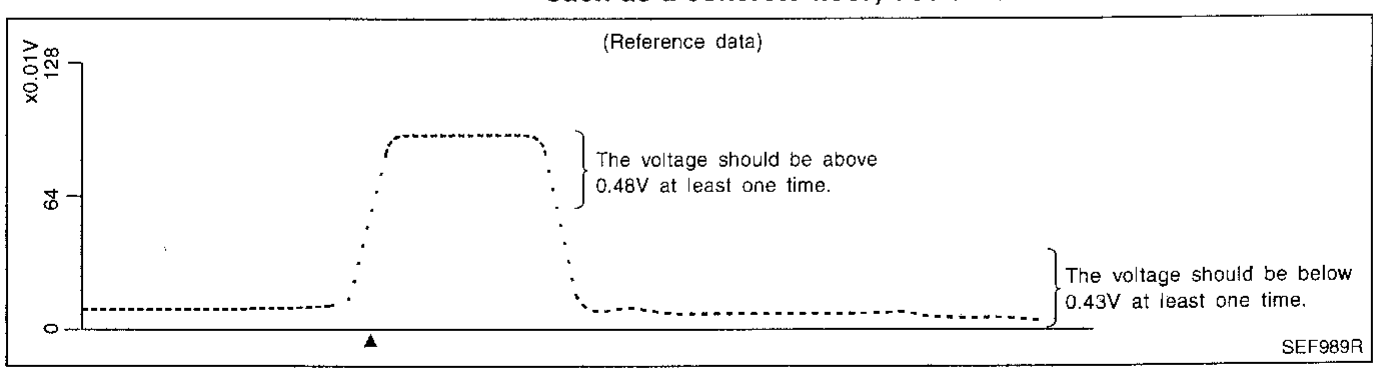
REAR HEATED OXYGEN SENSOR

NCEC0179S01

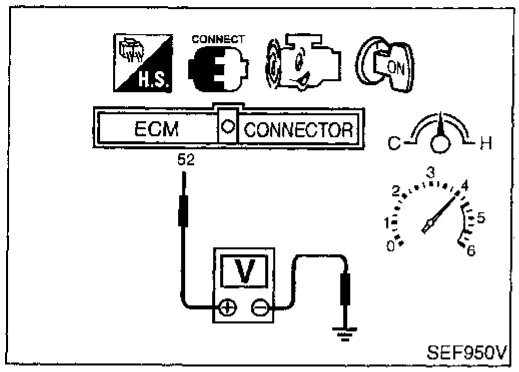
With CONSULT

1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "RR O2 SENSOR" as the monitor item with CONSULT.
4) Check "RR O2 SENSOR" at idle speed when adjusting "FUEL INJECTION" to ±25%.
   "RR O2 SENSOR" should be above 0.48V at least once when the "FUEL INJECTION" is +25%.
   "RR O2 SENSOR" should be below 0.43V at least once when the "FUEL INJECTION" is −25%.

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.



SEF989R



⊗ Without CONSULT

1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Set voltmeter probes between ECM terminals 52 (Rear heated oxygen sensor signal) and engine ground.
4) Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.48V at least once.
   If the voltage is above 0.48V at step 4, step 5 is not necessary.
5) Check the voltage when revving up to 6,000 rpm under no load. Or keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), D position with "OD" OFF (A/T).
   The voltage should be below 0.43V at least once.

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

Description

NCEC0180

SYSTEM DESCRIPTION

NCEC0180S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	Rear heated oxygen sensor heater control	Rear heated oxygen sensor heater

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

OPERATION

NCEC0180S02

Engine condition	Rear heated oxygen sensor heater
Engine stopped	OFF
Engine is running. [After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more]	ON

CONSULT Reference Value in Data Monitor Mode

NCEC0181

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
RR O2 HEATER	• Engine speed: Idle [After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more]	ON
	• Ignition switch ON (Engine stopped)	OFF

ECM Terminals and Reference Value

NCEC0182

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
110	R/Y	Rear heated oxygen sensor heater	**[Engine is running]** • After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more	Approximately 0.7V
			[Ignition switch "ON"] • Engine stopped	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NCEC0183

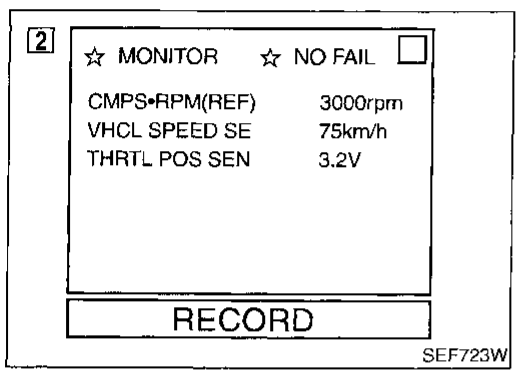
DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0141 0902	• The current amperage in the rear heated oxygen sensor heater circuit is out of the normal range. (An improper voltage drop signal is sent to ECM through the rear heated oxygen sensor heater.)	• Harness or connectors (The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

DTC Confirmation Procedure

NCEC0184

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

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



With CONSULT

1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT.
2) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-227.

With GST

1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
4) Select "MODE 3" with GST.
5) If DTC is detected, go to "Diagnostic Procedure", EC-227.

No Tools

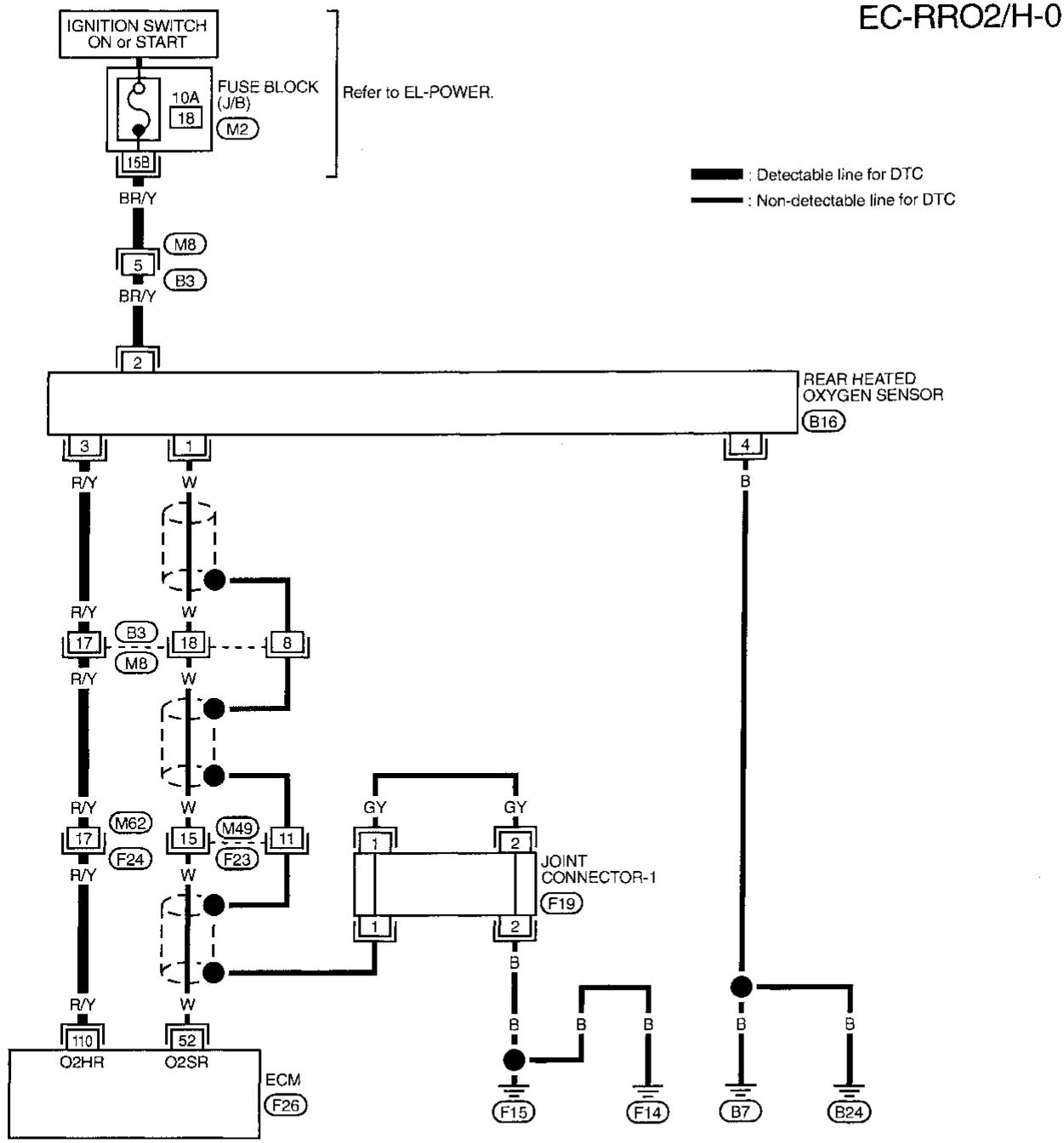
1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
3) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-227.

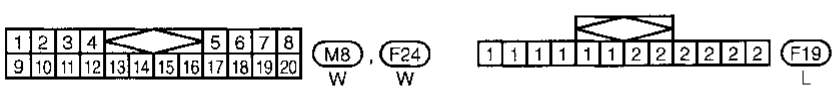
When using GST, "DTC Confirmation Procedure " should be performed twice as much as when using CONSULT or ECM (Diagnostic Test Mode II) because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT or ECM (Diagnostic Test Mode II) is recommended.

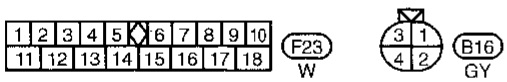
Wiring Diagram

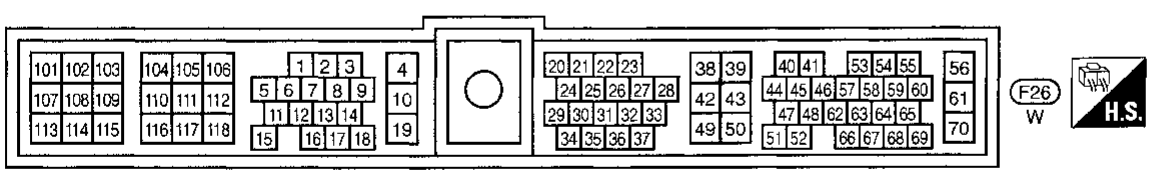
NCEC0185

EC-RRO2/H-01









Refer to last page (Foldout page).
M2

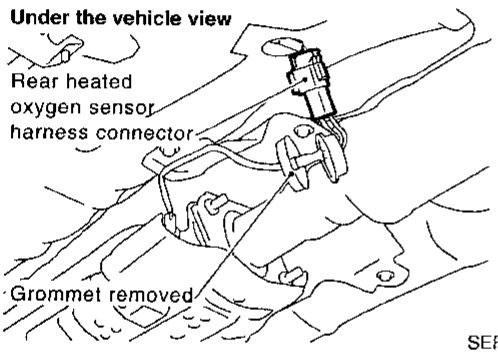
TEC531

Diagnostic Procedure

NCEC0186

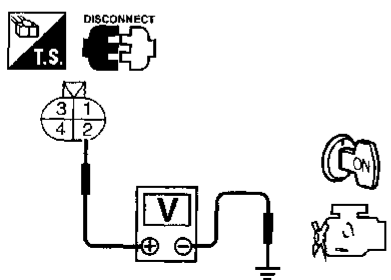
1 CHECK POWER SUPPLY

1. Turn ignition switch "OFF".
2. Disconnect rear heated oxygen sensor harness connector.



SEF298W

3. Turn ignition switch "ON".
4. Check voltage between terminal 2 and ground.



SEF218W

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

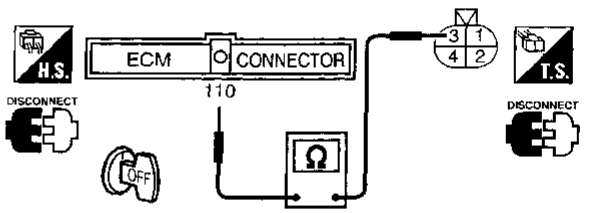
2 DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M62, F24
- Harness connectors B3, M8
- Harness for open or short between rear heated oxygen sensor and fuse

	▶	Repair harness or connectors.

3 CHECK GROUND CIRCUIT

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



SEF219W

Continuity should exist.

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

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4 DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors B3, M5
- Harness connectors M62, F24
- Harness for open or short between rear heated oxygen sensor heater and ECM

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

5 CHECK REAR HEATED OXYGEN SENSOR HEATER

Refer to "Component Inspection", EC-228.

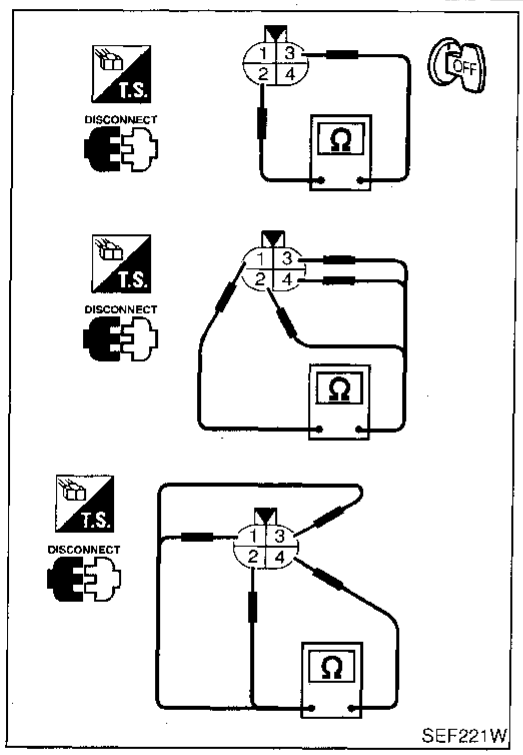
OK or NG

OK	▶	GO TO 6.
NG	▶	Replace rear heated oxygen sensor.

6 CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-110.

	▶	INSPECTION END



Component Inspection

NCEC0187

REAR HEATED OXYGEN SENSOR HEATER

NCEC0187S01

Check the following.

1. Check resistance between terminals 1 and 4.
   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.

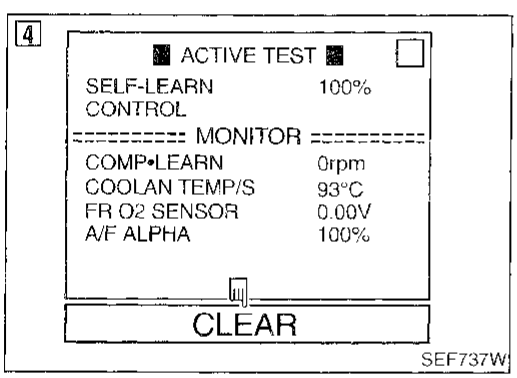
On Board Diagnosis Logic

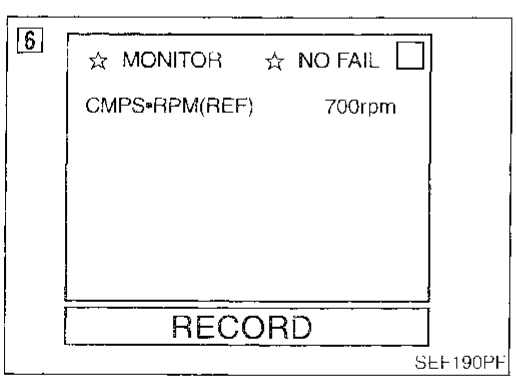
NCEC0188

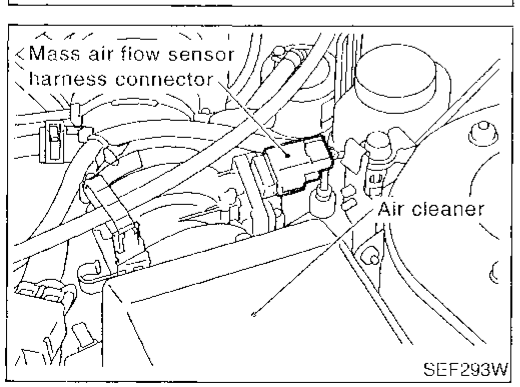
With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the front heated oxygen sensor. The ECM calculates the necessary compensation to correct the offset between the actual 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 injection system malfunction and lights up the MIL (2 trip detection logic).

Sensor	Input Signal to ECM	ECM function	Actuator
Front heated oxygen sensor	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection & mixture ratio control	Injectors

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







DTC Confirmation Procedure

NCEC0189

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

With CONSULT

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Turn ignition switch "ON" and select "SELF-LEARN CONTROL" in "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 let it idle for at least 10 minutes. The 1st trip DTC P0171 should be detected at this stage, if a malfunction exists. If so, go to "Diagnostic Procedure", EC-232.
7) If it is difficult to start engine at step 6, the fuel injection system has a malfunction.
8) Crank engine while depressing accelerator pedal. If engine starts, go to "Diagnostic Procedure", EC-232. If engine does not start, visually check for exhaust and intake air leak.

With GST

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Disconnect mass air flow sensor harness connector. Then restart and run engine for at least 3 seconds at idle speed.
4) Stop engine and reconnect mass air flow sensor harness connector.
5) Select "MODE 7" with GST. Make sure 1st trip DTC P0100 is detected.
6) Select "MODE 4" with GST and erase the 1st trip DTC P0100.

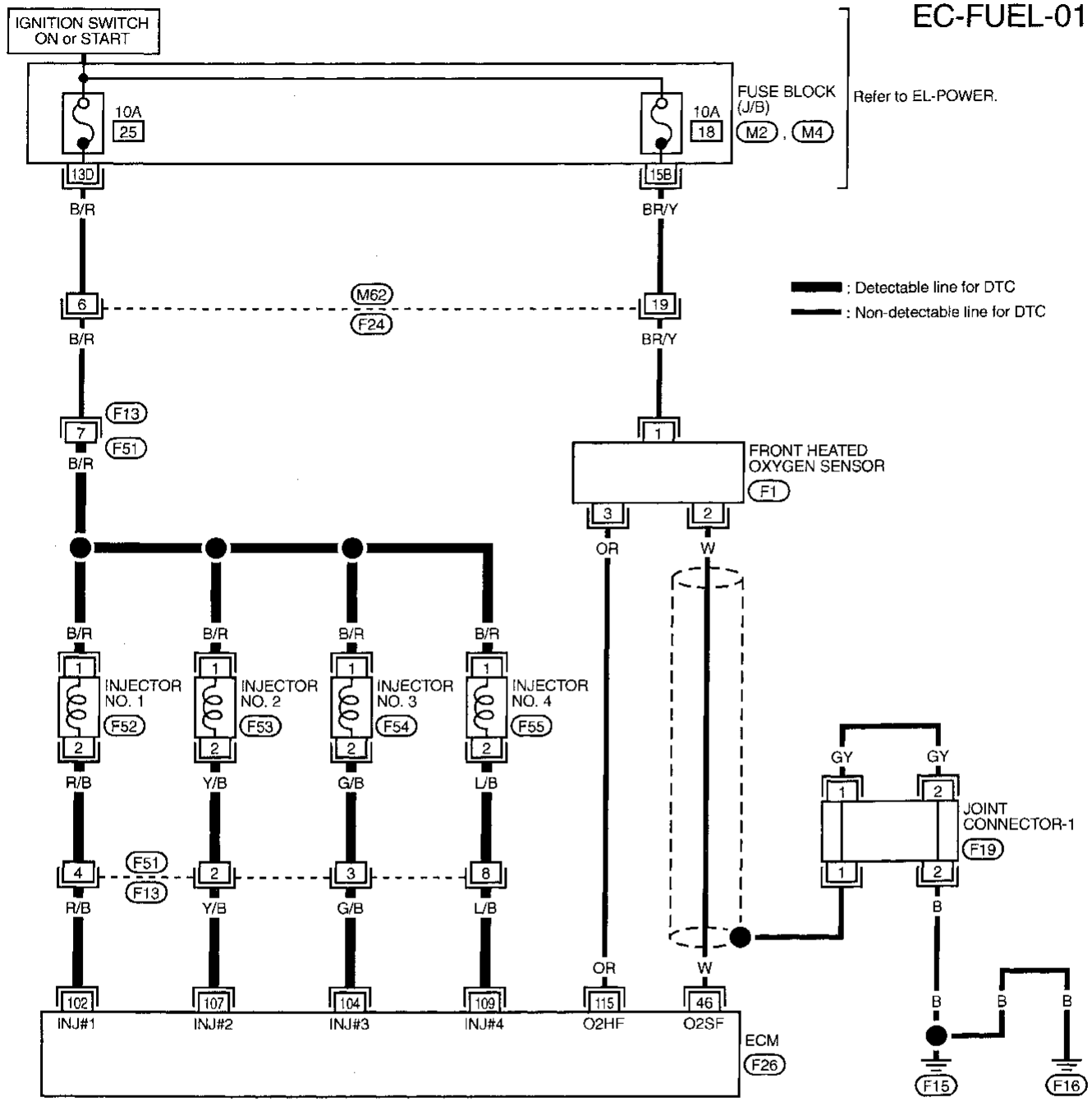
7) Start engine again and run it for at least 10 minutes at idle speed.
8) Select "MODE 7" with GST. The 1st trip DTC P0171 should be detected at this stage, if a malfunction exists. If so, go to "Diagnostic Procedure", EC-232.
9) If it is difficult to start engine at step 8, the fuel injection system has a malfunction.
10) Crank engine while depressing accelerator pedal. If engine starts, go to "Diagnostic Procedure", EC-232. If engine does not start, visually check for exhaust and intake air leak.

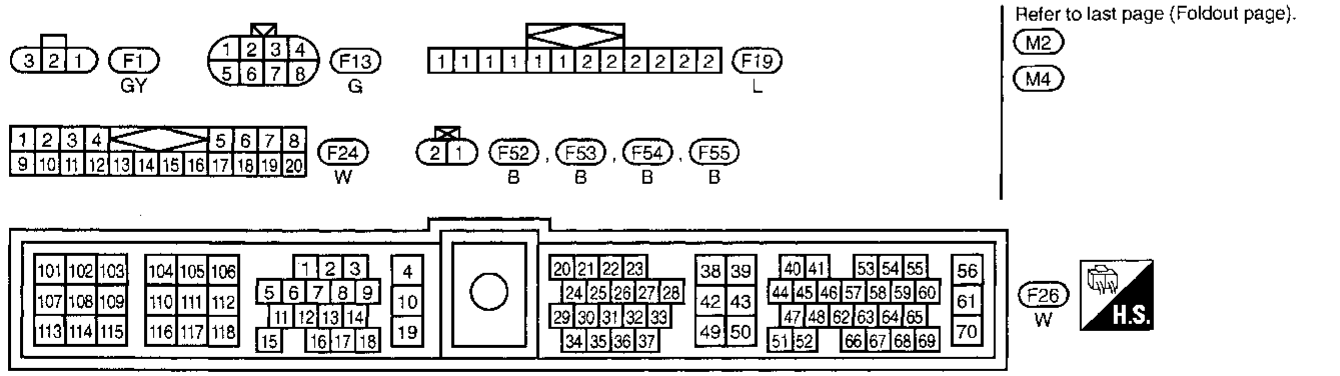
(NO TOOLS) No Tools

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Disconnect mass air flow sensor harness connector. Then restart and run engine for at least 3 seconds at idle speed.
4) Stop engine and reconnect mass air flow sensor harness connector.
5) 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. Refer to "How to Erase DTC (No Tools)", EC-55.
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. If so, go to "Diagnostic Procedure", EC-232.
10) If it is difficult to start engine at step 9, the fuel injection system also has a malfunction.
11) Crank engine while depressing accelerator pedal. If engine starts, go to "Diagnostic Procedure", EC-232. If engine does not start, visually check for exhaust and intake air leak.

Wiring Diagram

NCEC0190





Refer to last page (Foldout page).
M2
M4

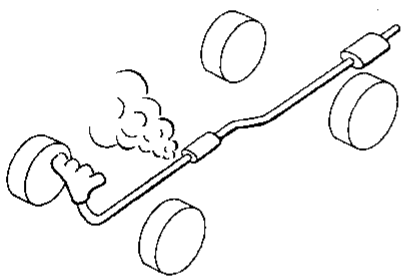
TEC532

Diagnostic Procedure

NCEC0191

1 CHECK EXHAUST AIR LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust air leak before three way catalyst.



SEF099P

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair or replace.

2 CHECK FOR INTAKE AIR LEAK

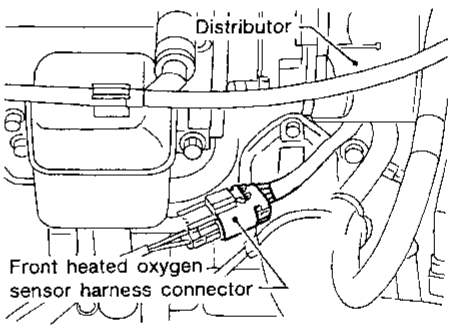
Listen for an intake air leak after the mass air flow sensor.

OK or NG

OK	▶	GO TO 3.
NG	▶	Repair or replace.

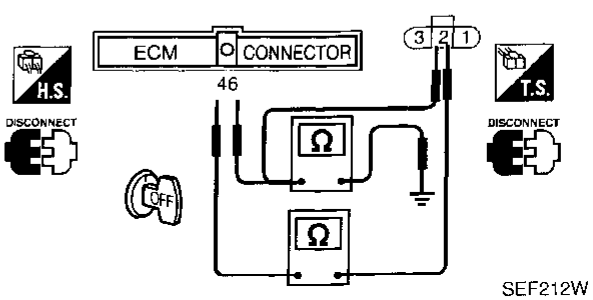
3 CHECK FRONT HEATED OXYGEN SENSOR CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect front heated oxygen sensor harness connector and ECM harness connector.



SEF089P

3. Check harness continuity between ECM terminal 46 and terminal 1.



SEF212W

Continuity should exist.

4. Check harness continuity between ECM terminal 46 (or terminal 2) and ground.

Continuity should not exist.

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

OK or NG

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

4 CHECK FUEL PRESSURE

1. Release fuel pressure to zero.
   Refer to EC-34.
2. Install fuel pressure gauge and check fuel pressure.

At idling:

When fuel pressure regulator valve vacuum hose is connected.

235 kPa (2.4 kg/cm^2, 34 psi)

When fuel pressure regulator valve vacuum hose is disconnected.

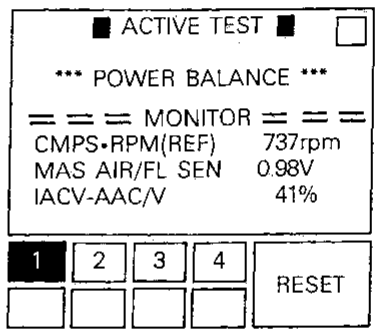
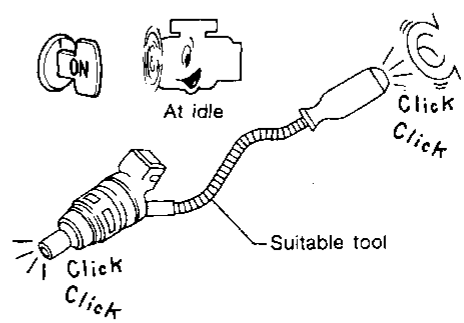
294 kPa (3.0 kg/cm^2, 43 psi)

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART
Check the following. • Fuel pump and circuit Refer to EC-457. • Fuel pressure regulator Refer to EC-35. • Fuel lines Refer to "ENGINE MAINTENANCE" in MA section. • Fuel filter for clogging	
▶	Repair or replace.

6	CHECK MASS AIR FLOW SENSOR
With CONSULT Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT. **at idling: 2.5 - 5.0 g·m/sec** **at 2,500 rpm: 7.1 - 12.5 g·m/sec**	
With GST Check mass air flow sensor signal in MODE 1 with GST. **at idling: 2.5 - 5.0 g·m/sec** **at 2,500 rpm: 7.1 - 12.5 g·m/sec**	
No Tools Check voltage between ECM terminal 47 (Mass air flow sensor signal) and ground. **at idling: 1.3 - 1.7V** **at 2,500 rpm: 1.8 - 2.4V**	
OK or NG	
OK ▶	GO TO 7.
NG ▶	Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-116.

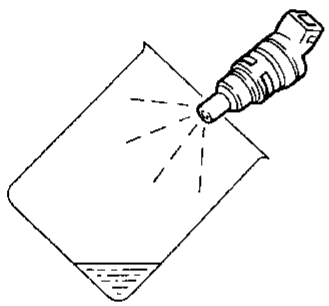
7	CHECK FUNCTION OF INJECTORS
With CONSULT 1. Install all parts removed. 2. Start engine. 3. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.	
 MEF354F	
4. Make sure that each circuit produces a momentary engine speed drop.	
Without CONSULT 1. Install all parts removed. 2. Start engine. 3. Listen to each injector operating sound.	
 MEC703B	
Clicking noise should be heard.	
OK or NG	
OK ▶	GO TO 8.
NG ▶	Perform trouble diagnosis for "INJECTORS", EC-451.

8	REMOVE INJECTOR
1. Confirm that the engine is cooled down and there are no fire hazards near the vehicle. 2. Turn ignition switch "OFF". 3. Remove injector with fuel tube assembly. Refer to EC-35. Keep fuel hose and all injectors connected to injector gallery. The injector harness connectors should remain connected.	
▶	GO TO 9.

Diagnostic Procedure (Cont'd)

9	CHECK INJECTOR

1. Disconnect all ignition coil harness connectors.
2. Place pans or saucers under each injector.
3. Crank engine for about 3 seconds. Make sure that fuel sprays out from injectors.



SEF595Q

Fuel should be sprayed evenly for each cylinder.

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace injectors from which fuel does not spray out. Always replace O-ring with new one.

10	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-110.

	▶	**INSPECTION END**

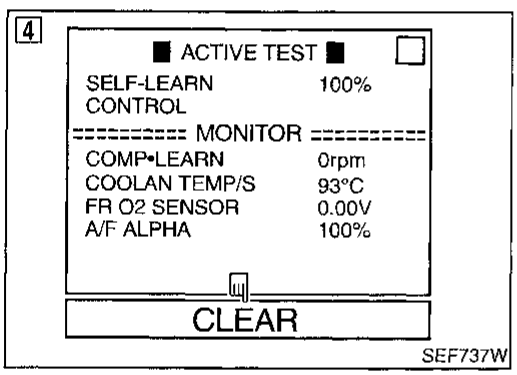
On Board Diagnosis Logic

NCEC0192

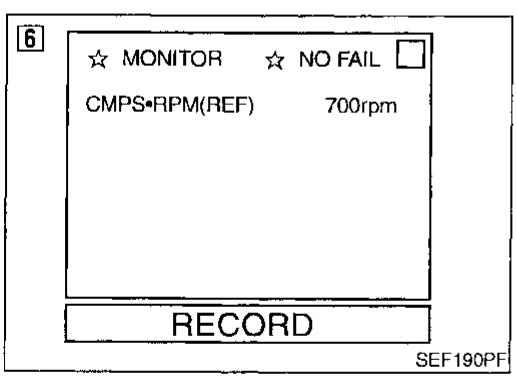
With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the front heated oxygen sensor. The ECM calculates the necessary compensation to correct the offset between the actual 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 injection system malfunction and lights up the MIL (2 trip detection logic).

Sensor	Input Signal to ECM	ECM function	Actuator
Front heated oxygen sensor	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection & mixture ratio control	Injectors

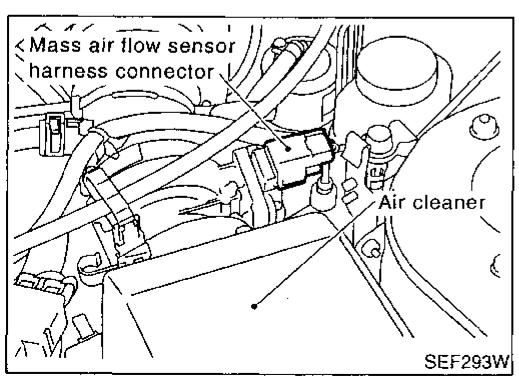
DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0172 0114	• Fuel injection system does not operate properly. • The amount of mixture ratio compensation is too large. (The mixture ratio is too rich.)	• Front heated oxygen sensor • Injectors • Exhaust gas leaks • Incorrect fuel pressure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



SEF737W



SEF190PF



SEF293W

DTC Confirmation Procedure

NCEC0193

NOTE:

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

With CONSULT

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Turn ignition switch "ON" and select "SELF-LEARN CONTROL" in "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 let it idle for at least 10 minutes. The 1st trip DTC P0172 should be detected at this stage, if a malfunction exists. If so, go to "Diagnostic Procedure", EC-238.
7) If it is difficult to start engine at step 6, the fuel injection system has a malfunction.
8) Crank engine while depressing accelerator pedal. If engine starts, go to "Diagnostic Procedure", EC-238. If engine does not start, remove ignition plugs and check for fouling, etc.

With GST

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Disconnect mass air flow sensor harness connector. Then restart and run engine for at least 3 seconds at idle speed.
4) Stop engine and reconnect mass air flow sensor harness connector.
5) Select "MODE 7" with GST. Make sure 1st trip DTC P0100 is detected.
6) Select "MODE 4" with GST and erase the 1st trip DTC P0100.

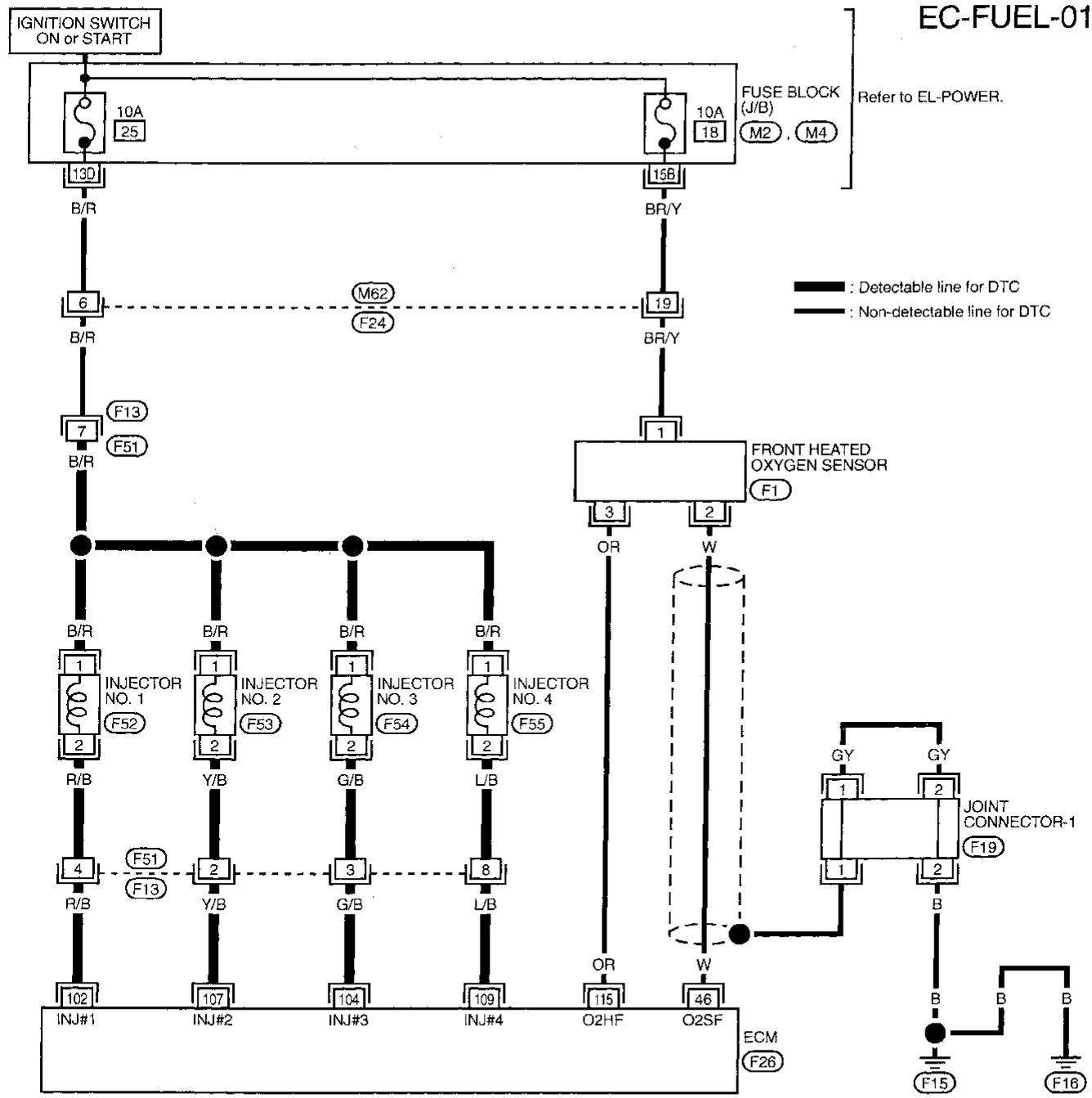
7) Start engine again and run it for at least 10 minutes at idle speed.
8) Select "MODE 7" with GST. The 1st trip DTC P0172 should be detected at this stage, if a malfunction exists. If so, go to "Diagnostic Procedure", EC-238.
9) If it is difficult to start engine at step 8, the fuel injection system has a malfunction.
10) Crank engine while depressing accelerator pedal.
If engine starts, go to "Diagnostic Procedure", EC-238. If engine does not start, remove ignition plugs and check for fouling, etc.

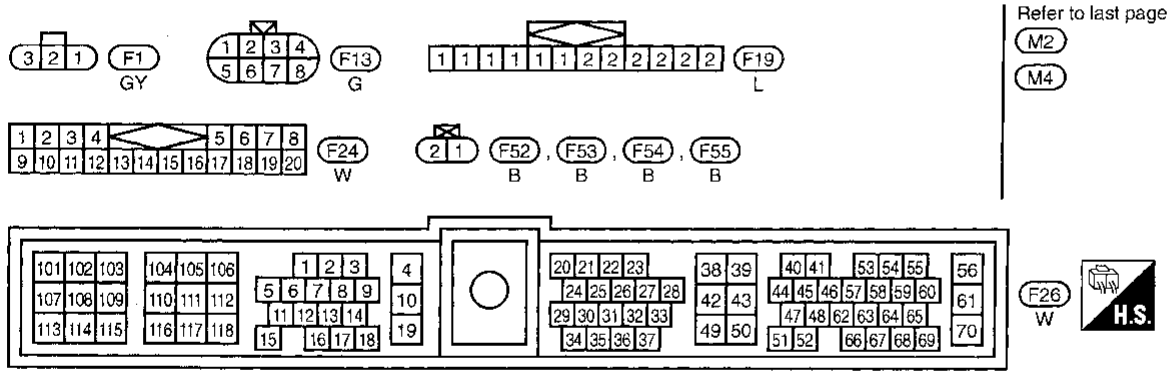
No Tools

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Disconnect mass air flow sensor harness connector. Then restart engine and run it 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. Refer to "How to Erase DTC (No Tools)", EC-55.
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 0114 should be detected at this stage, if a malfunction exists. If so, go to "Diagnostic Procedure", EC-238.
10) If it is difficult to start engine at step 9, the fuel injection system also has a malfunction.
11) Crank engine while depressing accelerator pedal.
If engine starts, go to "Diagnostic Procedure", EC-238. If engine does not start, remove ignition plugs and check for fouling, etc.

Wiring Diagram

NCEC0194





Refer to last page (Foldout page).
M2
M4

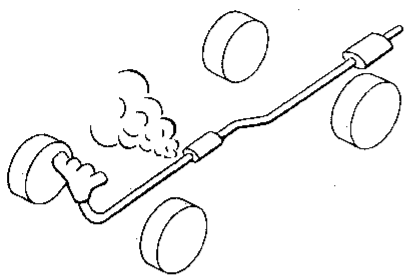
TEC532

Diagnostic Procedure

NCEC0195

1	CHECK FOR EXHAUST AIR LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust air leak before the three way catalyst.



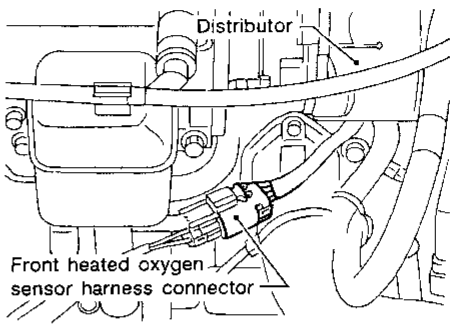
SEF099P

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair or replace.

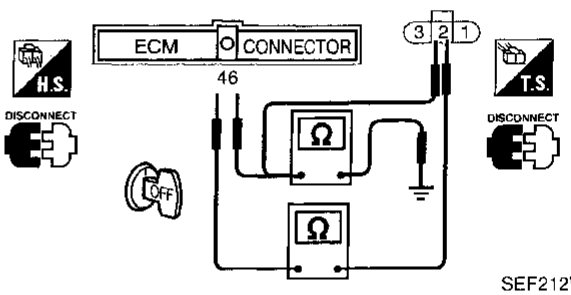
2	CHECK FRONT HEATED OXYGEN SENSOR CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect front heated oxygen sensor harness connector and ECM harness connector.



SEF089P

3. Check harness continuity between ECM terminal 46 and terminal 1.



SEF212W

Continuity should exist.

4. Check harness continuity between ECM terminal 46 (or terminal 2) and ground.
   Continuity should not exist.
5. Also check harness for short to ground and short to power.

OK or NG

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

3	CHECK FUEL PRESSURE

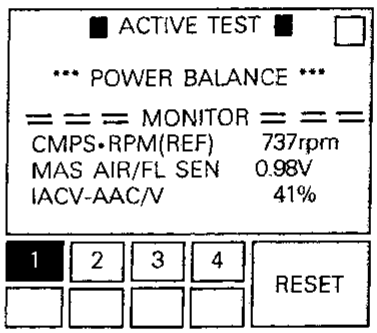
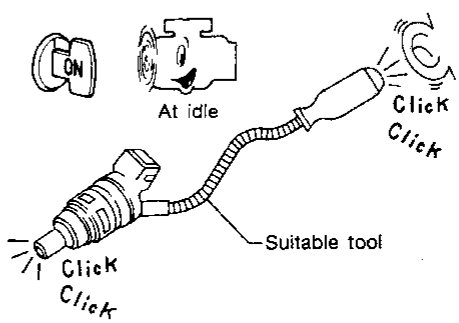
1. Release fuel pressure to zero.
   Refer to EC-34.
2. Install fuel pressure gauge and check fuel pressure.
   At idling:
   When fuel pressure regulator valve vacuum hose is connected.
   Approximately 235 kPa (2.4 kg/cm^2, 34 psi)
   When fuel pressure regulator valve vacuum hose is disconnected.
   Approximately 294 kPa (3.0 kg/cm^2, 43 psi)

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART
Check the following. • Fuel pump and circuit (Refer to EC-457.) • Fuel pressure regulator (Refer to EC-35.)	
▶	Repair or replace.

5	CHECK MASS AIR FLOW SENSOR
With CONSULT Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT. **at idling: 2.5 - 5.0 g·m/sec** **at 2,500 rpm: 7.1 - 12.5 g·m/sec**	
With GST Check mass air flow sensor signal in MODE 1 with GST. **at idling: 2.5 - 5.0 g·m/sec** **at 2,500 rpm: 7.1 - 12.5 g·m/sec**	
No Tools Check voltage between ECM terminal 47 (Mass air flow sensor signal) and ground. **at idling: 1.3 - 1.7V** **at 2,500 rpm: 1.8 - 2.4V**	
OK or NG	
OK ▶	GO TO 6.
NG ▶	Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-122.

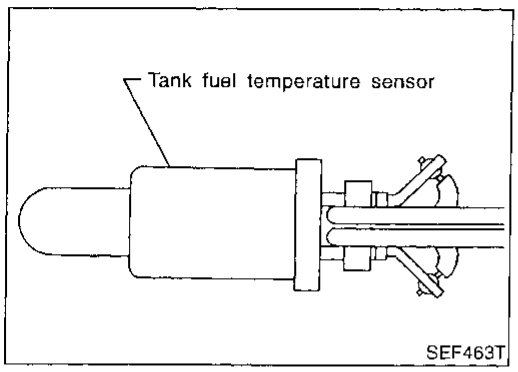
6	CHECK FUNCTION OF INJECTORS
With CONSULT 1. Install all parts removed. 2. Start engine. 3. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.	
 MEF354F	
4. Make sure that each circuit produces a momentary engine speed drop.	
Without CONSULT 1. Install all parts removed. 2. Start engine. 3. Listen to each injector operating sound.	
 MEC703B	
Clicking noise should be heard.	
OK or NG	
OK ▶	GO TO 7.
NG ▶	Perform trouble diagnosis for "INJECTORS", EC-451.

7	REMOVE INJECTOR
1. Confirm that the engine is cooled down and there are no fire hazards near the vehicle. 2. Turn ignition switch "OFF". 3. Remove injector assembly. Refer to EC-35. Keep fuel hose and all injectors connected to injector gallery.	
▶	GO TO 8.

Diagnostic Procedure (Cont'd)

8	CHECK INJECTOR
1. Disconnect all injector harness connectors. 2. Disconnect all ignition coil harness connectors. 3. Prepare pans or saucers under each injectors. 4. Crank engine for about 3 seconds. Make sure fuel does not drip from injector. **OK or NG**	
OK (Does not drip) ▶	GO TO 9.
NG (Drips) ▶	Replace the injectors from which fuel is dripping. Always replace O-ring with new one.

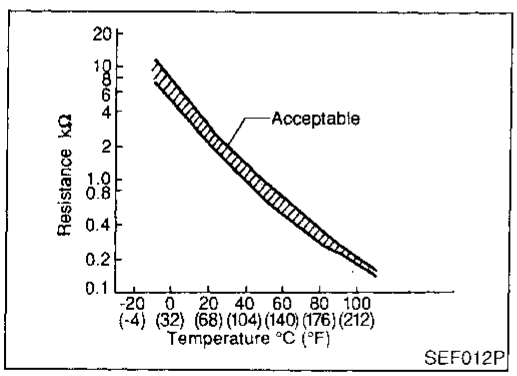
9	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-110.	
▶	**INSPECTION END**



Component Description

NCEC0196

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>

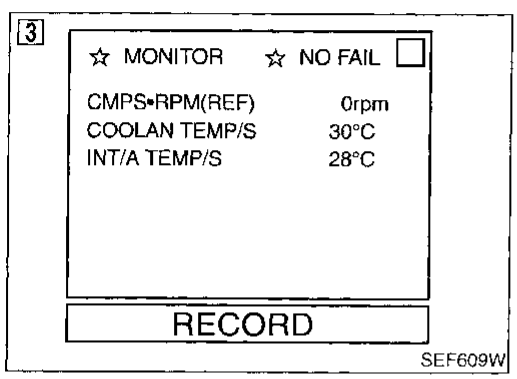
Fluid temperature °C (°F)	Voltage* V	Resistance kΩ
20 (68)	3.5	2.3 - 2.7
50 (122)	2.2	0.79 - 0.90

*: These data are reference values and are measured between ECM terminal 63 (Tank fuel temperature sensor) and ECM terminal 43 (ECM ground).

On Board Diagnosis Logic

NCEC0197

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0180 0402	• An excessively high or low voltage is sent to ECM. • Rationally incorrect voltage is sent to ECM, compared with the voltage signals from engine coolant temperature sensor and intake air temperature sensor.	• Harness or connectors (The sensor circuit is open or shorted.) • Tank fuel temperature sensor



DTC Confirmation Procedure

NCEC0198

NOTE:

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

With CONSULT

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
3) Wait at least 10 seconds.
   If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-244.
   If the result is OK, go to following step.
4) Check "COOLAN TEMP/S" signal.
   If the signal is less than 60°C (140°F), the result will be OK.
   If the signal is above 60°C (140°F), go to the following step.
5) Cool engine down until "COOLAN TEMP/S" signal is less than 60°C (140°F).
6) Wait at least 10 seconds.
7) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-244.

With GST

1) Turn ignition switch "ON" and wait at least 10 seconds.
2) Select "MODE 7" with GST.
   If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-244.
   If the result is OK, go to following step.
3) Select "MODE 1" with GST and check for the engine coolant temperature.
   If the temperature is less than 60°C (140°F), the result will be OK.
   If the temperature is above 60°C (140°F), go to the following step.
4) Cool engine down until the engine coolant temperature is less than 60°C (140°F).
5) Wait at least 10 seconds.
6) Select "MODE 7" with GST.
7) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-244.

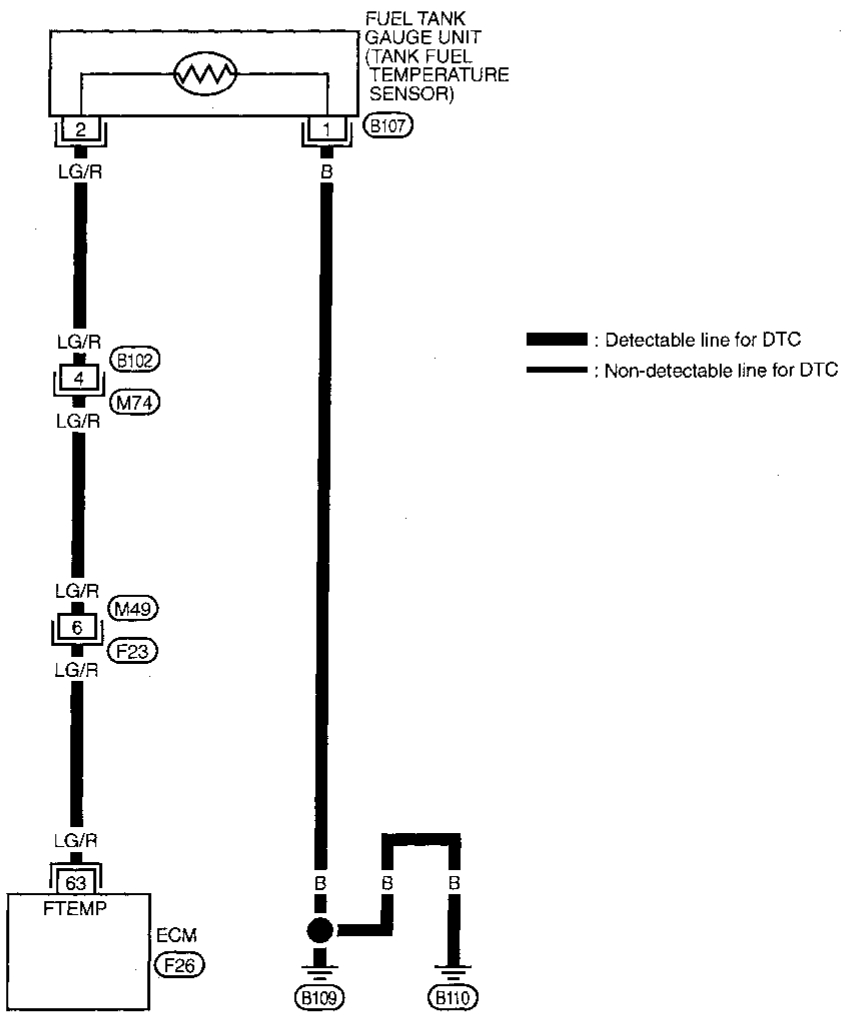
No Tools

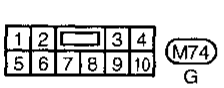
1) Turn ignition switch "ON" and wait at least 10 seconds.
2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
3) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
   If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-244.
   If the result is OK, go to following step.
4) Check voltage between ECM terminal 51 (Engine coolant terperature sensor signal) and ground.
   If the voltage is more than 1.9V, the result will be OK.
   If the voltage is less than 1.9V, go to the following step.
5) Cool engine down until the voltage becomes more than 1.9V.
6) Wait at least 10 seconds.
7) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
8) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
9) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-244.

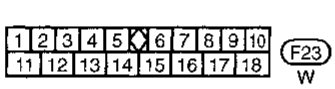
Wiring Diagram

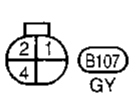
NCEC0199

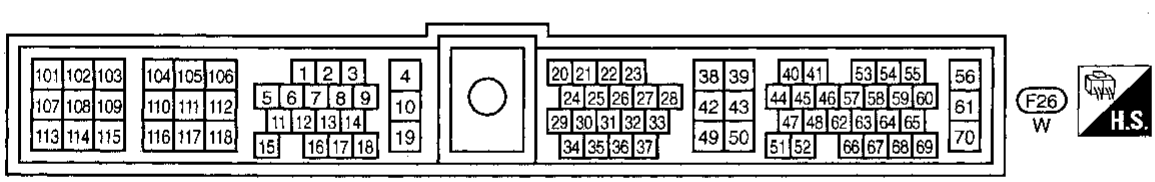
EC-TFTS-01











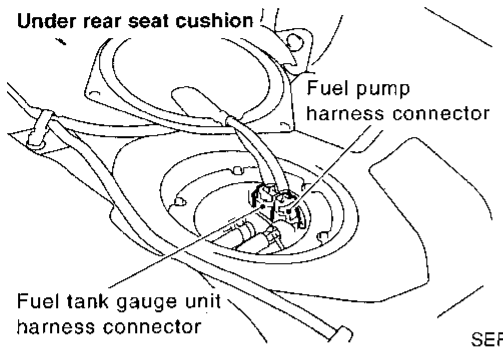
TEC533

Diagnostic Procedure

NCEC0200

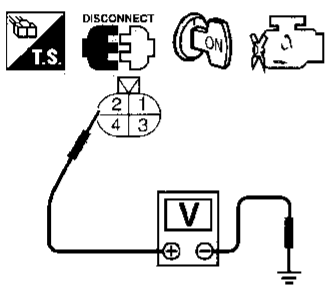
1 CHECK POWER SUPPLY

1. Turn ignition switch "OFF".
2. Disconnect fuel tank gauge unit harness connector.



SEF299W

3. Turn ignition switch "ON".
4. Check voltage between terminal 2 and ground with CONSULT or tester.



SEF222W

Voltage: Approximately 5V

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

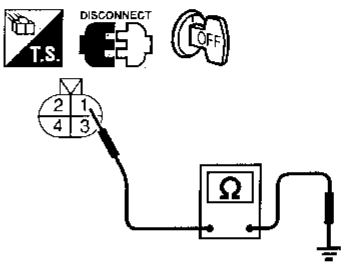
2 DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors B102, M74
- Harness connectors M49, F23
- Harness for open or short between ECM and fuel tank gauge unit

	▶	Repair harness or connector.

3 CHECK GROUND CIRCUIT

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



SEF223W

Continuity should exist.

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

OK or NG

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

4 CHECK TANK FUEL TEMPERATURE SENSOR

Refer to "Component Inspection", EC-244.

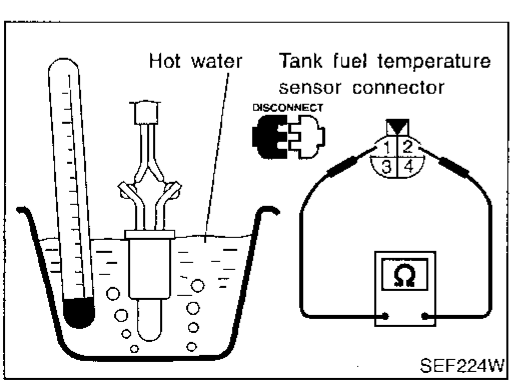
OK or NG

OK	▶	GO TO 5.
NG	▶	Replace tank fuel temperature sensor.

5 CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-110.

	▶	INSPECTION END



SEF224W

Component Inspection

NCEC0201

TANK FUEL TEMPERATURE SENSOR

NCEC0201S01

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

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

If NG, replace tank fuel temperature sensor.

On Board Diagnosis Logic

NCEC0202

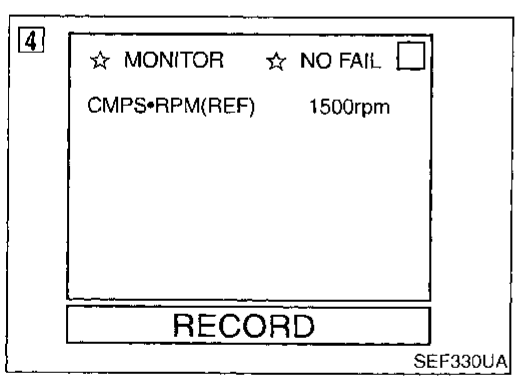
If a misfire occurs, the engine speed will fluctuate. If the fluctuation is detected by the crankshaft position sensor (OBD), the misfire is diagnosed.

Sensor	Input Signal to ECM	ECM function
Crankshaft position sensor (OBD)	Engine speed	On board diagnosis of misfire

The misfire detection logic consists of the following two conditions.

1. One Trip Detection Logic (Three Way Catalyst Damage)
   When a misfire is detected which will overheat and damage the three way catalyst, the 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 MIL will light up based on two trip detection logic. In this condition, ECM monitors the misfire for every 1,000 revolutions of the engine.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0300 (0701)	• Multiple cylinders misfire.	• Improper spark plug • Insufficient compression • Incorrect fuel pressure • EGR valve • The injector circuit is open or shorted • Injectors • Intake air leak • The ignition secondary circuit is open or shorted • Lack of fuel • Drive plate/Flywheel • Front heated oxygen sensor • Incorrect distributor roter
P0301 (0608)	• No. 1 cylinder misfires.	
P0302 (0607)	• No. 2 cylinder misfires.	
P0303 (0606)	• No. 3 cylinder misfires.	
P0304 (0605)	• No. 4 cylinder misfires.	



DTC Confirmation Procedure

NCEC0203

CAUTION:
Always drive vehicle at a safe speed.

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

With CONSULT

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

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

5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-246.

With GST

1) Start engine and warm it up to normal operating temperature.

DTC Confirmation Procedure (Cont'd)

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

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

4) Select "MODE 7" with GST.
5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-246.

No Tools

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Start engine again and drive at 1,500 - 3,000 rpm for at least 3 minutes.
   Hold the accelerator pedal as steady as possible.
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.
6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-246.

Diagnostic Procedure

NCEC0204

1	CHECK FOR INTAKE AIR LEAK	
1. Start engine and run it at idle speed. 2. Listen for the sound of the intake air leak.		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Discover air leak location and repair.

2	CHECK FOR EXHAUST SYSTEM CLOGGING	
Stop engine and visually check exhaust tube, three way catalyst and muffler for dents.		
OK or NG		
OK	▶	GO TO 3.
NG	▶	Repair or replace it.

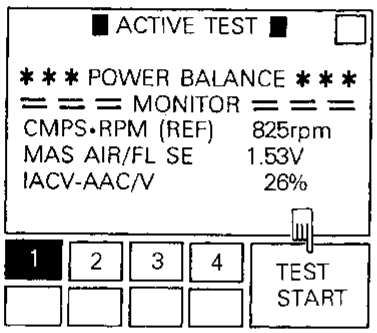
3	CHECK EGR FUNCTION	
Perform DTC Confirmation Procedure for DTC P1402 EGR FUNCTION (OPEN). Refer to EC-366.		
OK or NG		
OK	▶	GO TO 4.
NG	▶	Repair EGR system.

Diagnostic Procedure (Cont'd)

4 PERFORM POWER BALANCE TEST

With CONSULT

1. Perform "POWER BALANCE" in "ACTIVE TEST" mode.

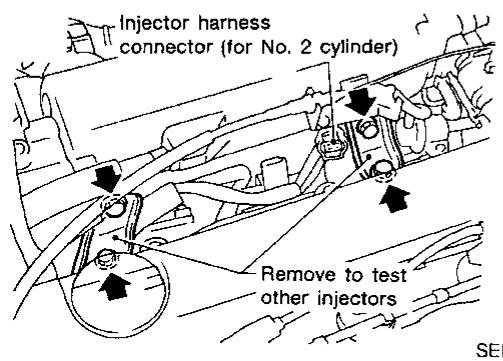


SEF564N

2. Is there any cylinder which does not produce a momentary engine speed drop?

Without CONSULT

When disconnecting each injector harness connector one at a time, is there any cylinder which does not produce a momentary engine speed drop?



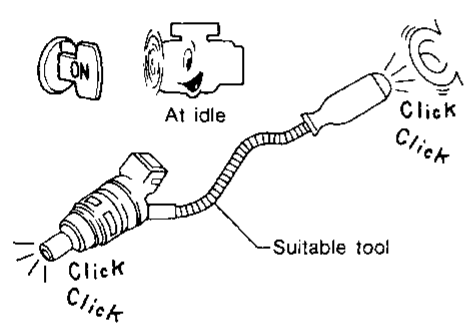
SEF565N

Yes or No

Yes	▶	GO TO 5.
No	▶	GO TO 8.

5 CHECK INJECTOR

Does each injector make an operating sound at idle?



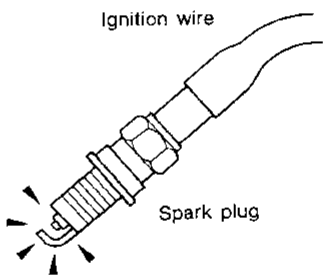
MEC703B

Yes or No

Yes	▶	GO TO 6.
No	▶	Check injector(s) and circuit(s). Refer to EC-451.

6 CHECK IGNITION SPARK

1. Turn Ignition switch "OFF".
2. Disconnect ignition wire from spark plug.
3. Connect a known good spark plug to the ignition wire.
4. Place end of spark plug against a suitable ground and crank engine.
5. Check for spark.



SEF282G

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

7 CHECK IGNITION WIRES

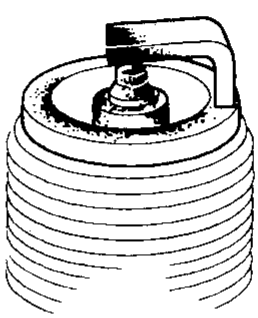
Refer to "Component Inspection", EC-249.

OK or NG

OK	▶	Check distributor rotor head for incorrect parts. Check ignition coil, power transistor and their circuits. Refer to EC-343.
NG	▶	Replace.

8 CHECK SPARK PLUGS

Remove the spark plugs and check for fouling, etc.



SEF156I

OK or NG

OK	▶	GO TO 9.
NG	▶	Repair or replace spark plug(s) with standard type one(s). For spark plug type, refer to "ENGINE MAINTENANCE" in MA section.

Diagnostic Procedure (Cont'd)

9	CHECK COMPRESSION PRESSURE

Refer to EM section.
- Check compression pressure.

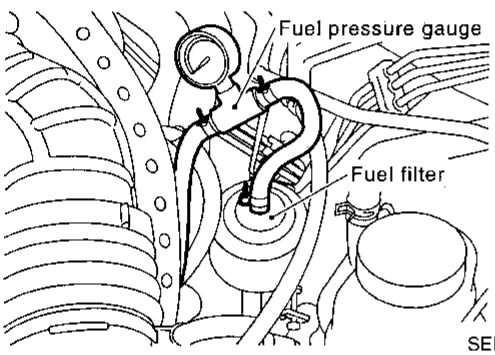
Standard:
1,226 kPa (12.5 kg/cm², 178 psi)/300 rpm
Minimum:
1,030 kPa (10.5 kg/cm², 149 psi)/300 rpm
Difference between each cylinder:
98 kPa (1.0 kg/cm², 14 psi)/300 rpm

OK or NG

OK	▶	GO TO 10.
NG	▶	Check pistons, piston rings, valves, valve seats and cylinder head gaskets.

10	CHECK FUEL PRESSURE

1. Install any parts removed.
2. Release fuel pressure to zero. Refer to EC-34.
3. Install fuel pressure gauge and check fuel pressure.



At idle: Approx. 235 kPa (2.4 kg/cm², 34 psi)

OK or NG

OK	▶	GO TO 12.
NG	▶	GO TO 11.

11	DETECT MALFUNCTIONING PART

Check the following.
- Fuel pump and circuit Refer to EC-457.
- Fuel pressure regulator Refer to EC-35.
- Fuel lines Refer to "ENGINE MAINTENANCE" in MA section.
- Fuel filter for clogging

	▶	Repair or replace.

12	CHECK IGNITION TIMING

Perform "Basic Inspection", EC-83.

OK or NG

OK	▶	GO TO 13.
NG	▶	Adjust ignition timing.

13	CHECK FRONT HEATED OXYGEN SENSOR

Refer to "Component Inspection", EC-171.

OK or NG

OK	▶	GO TO 14.
NG	▶	Replace front heated oxygen sensor.

14	CHECK MASS AIR FLOW SENSOR

With CONSULT
Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT.
at idling: 2.5 - 5.0 g·m/sec
at 2,500 rpm: 7.1 - 12.5 g·m/sec

With GST
Check mass air flow sensor signal in MODE 1 with GST.
at idling: 2.5 - 5.0 g·m/sec
at 2,500 rpm: 7.1 - 12.5 g·m/sec

No Tools
Check voltage between ECM terminal 47 (Mass air flow sensor signal) and ground.
at idling: 1.3 - 1.7V
at 2,500 rpm: 1.8 - 2.4V

OK or NG

OK	▶	GO TO 16.
NG	▶	GO TO 15.

15	CHECK CONNECTORS

Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds.
Refer to EC-116.

OK or NG

NG	▶	Repair or replace it.

16	CHECK SYMPTOM MATRIX CHART

Check items on the rough idle symptom in "Symptom Matrix Chart", EC-92.

OK or NG

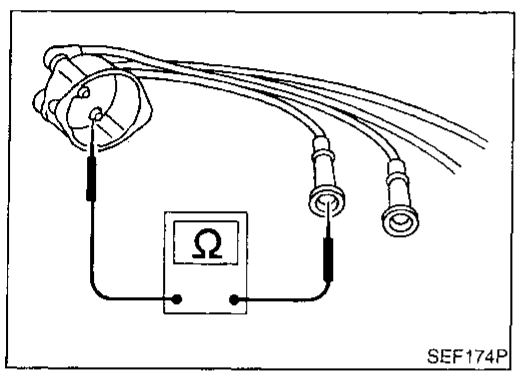
OK	▶	GO TO 17.
NG	▶	Repair or replace.

17	ERASE THE 1ST TRIP DTC

Some tests may cause a 1st trip DTC to be set.
Erase the 1st trip DTC from the ECM memory after performing the tests. Refer to EC-54.

	▶	GO TO 18.

18	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-110.	
▶	INSPECTION END



Component Inspection

NCEC0205

IGNITION WIRES

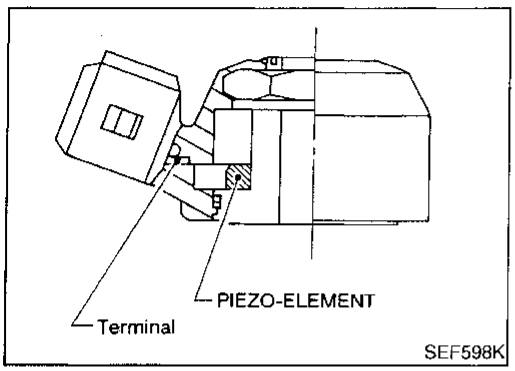
NCEC0205S01

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.



Component Description

NCEC0206

The knock sensor is attached to the cylinder block. It senses engine knocking using a piezoelectric element. A knocking vibration from the cylinder block is sensed as vibrational pressure. This pressure is converted into a voltage signal and sent to the ECM.
Freeze frame data will not be stored in the ECM for the knock sensor. The MIL will not light for knock sensor malfunction. The knock sensor has one trip detection logic.

ECM Terminals and Reference Value

NCEC0207

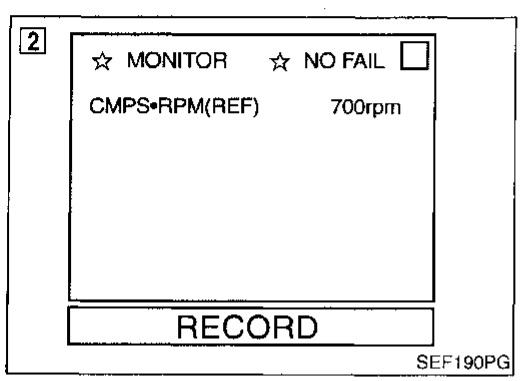
Specification data are reference values and are measured between each terminal and 43 (ECM ground).

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
54	W	Knock sensor	**[Engine is running]** • Idle speed	2.0 - 3.0V

On Board Diagnosis Logic

NCEC0208

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0325 0304	• An excessively low or high voltage from the knock sensor is sent to ECM.	• Harness or connectors (The knock sensor circuit is open or shorted.) • Knock sensor



DTC Confirmation Procedure

NCEC0209

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

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

With CONSULT

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.
3) If DTC is detected, go to "Diagnostic Procedure", EC-253.

With GST

1) Start engine and run it for at least 5 seconds at idle speed.
2) Select "MODE 3" with GST.
3) If DTC is detected, go to "Diagnostic Procedure", EC-253.

No Tools

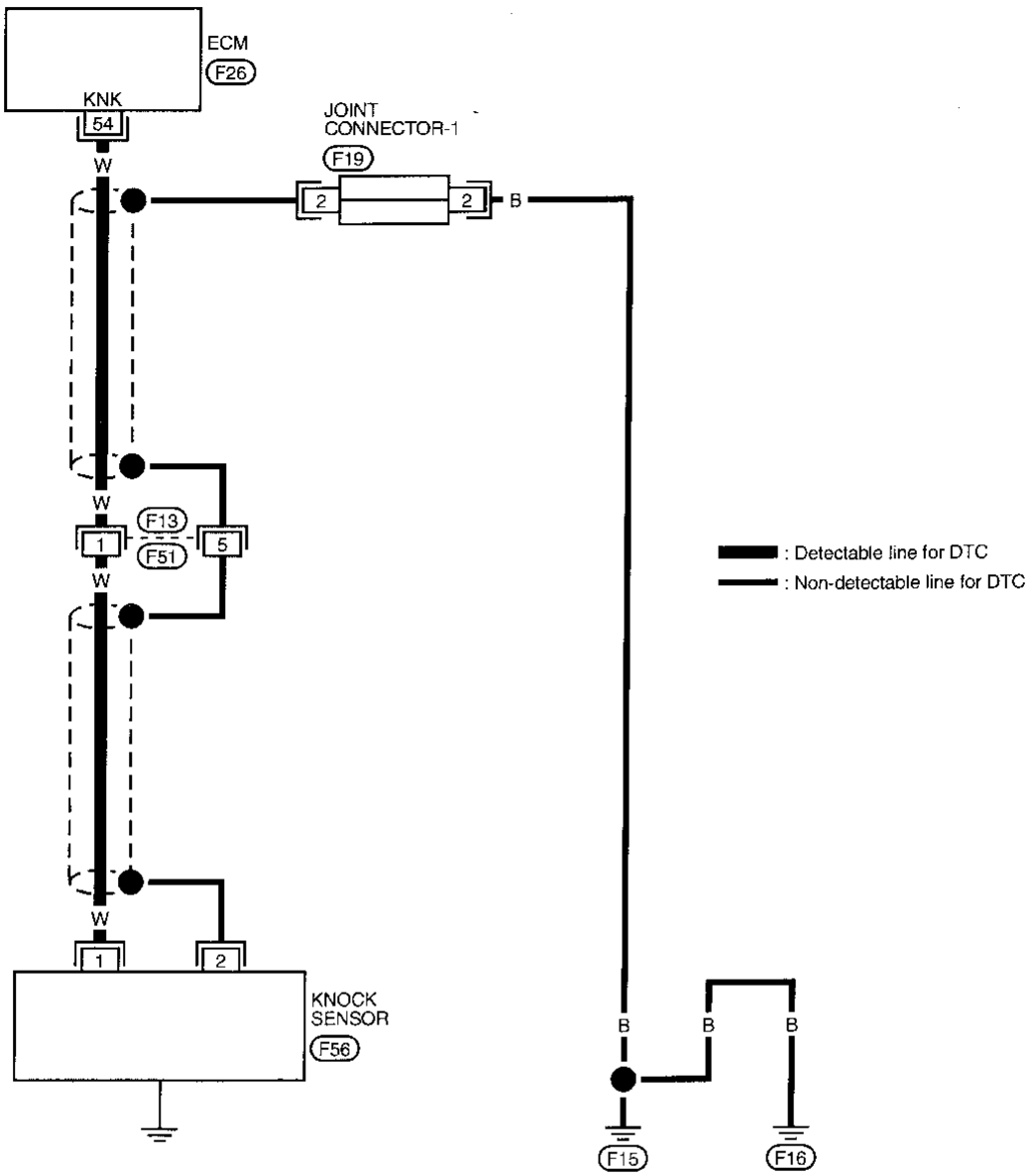
1) Start engine and run it for at least 5 seconds at idle speed.
2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".

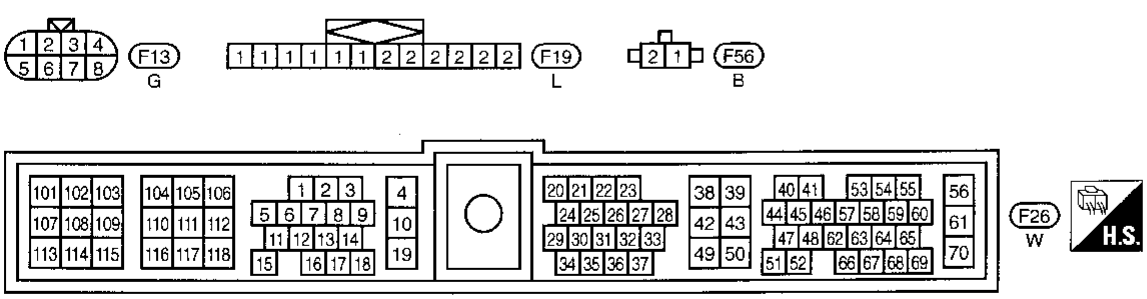
3) Perform "Diagnostic Test Mode II" (Self-diagnostic results) with ECM.
4) If DTC is detected, go to "Diagnostic Procedure", EC-253.

Wiring Diagram

NCEC0210

EC-KS-01





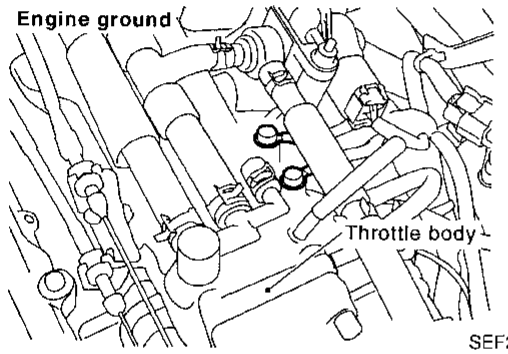
TEC534

Diagnostic Procedure

NCEC0211

1 RETIGHTEN GROUND SCREWS

Loosen and retighten engine ground screws.

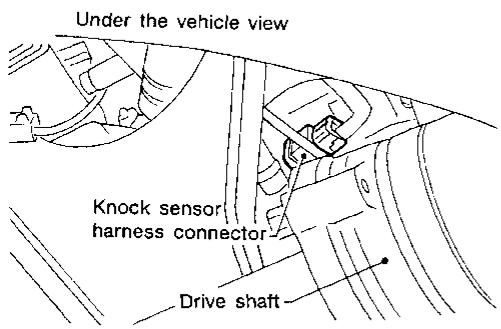


SEF292W

▶ GO TO 2.

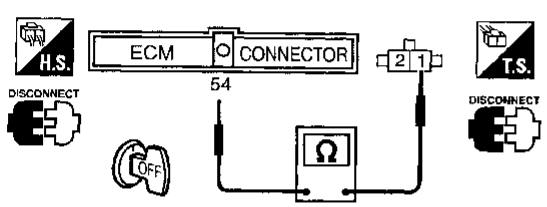
2 CHECK INPUT SIGNAL CIRCUIT-1

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector and knock sensor harness connector.



MEF438FA

3. Check harness continuity between terminal 1 and ECM terminal 54.



SEF225W

Continuity should exist.

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

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

3 DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F13, F51
- Harness for open or short between knock sensor and ECM

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

4 CHECK KNOCK SENSOR

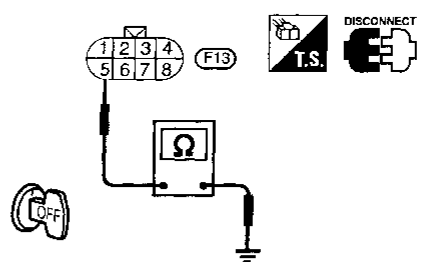
Knock sensor
Refer to "Component Inspection", EC-254.

OK or NG

OK	▶	GO TO 5.
NG	▶	Replace knock sensor.

5 CHECK SHIELD CIRCUIT

1. Reconnect harness connectors disconnected.
2. Disconnect harness connectors F13, F51.
3. Check harness continuity between terminal 5 and engine ground.



SEF226W

Continuity should exist.

4. Also check harness for short to ground and short to power.
5. Then reconnect harness connectors.

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 6.

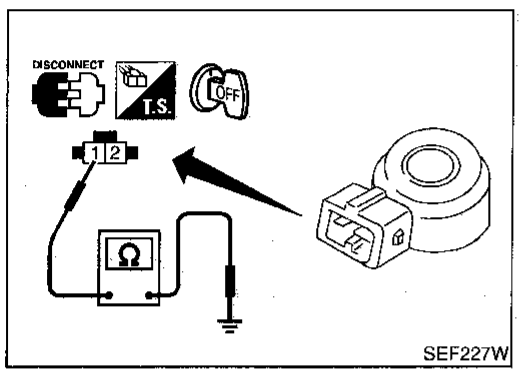
6 DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F13, F51
- Joint connector-1 (Refer to "HARNESS LAYOUT" in EL section.)
- Harness for open or short between harness connector F13 and engine ground

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

Diagnostic Procedure (Cont'd)

7	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-110.	
▶	INSPECTION END



Component Inspection

NCEC0212

KNOCK SENSOR

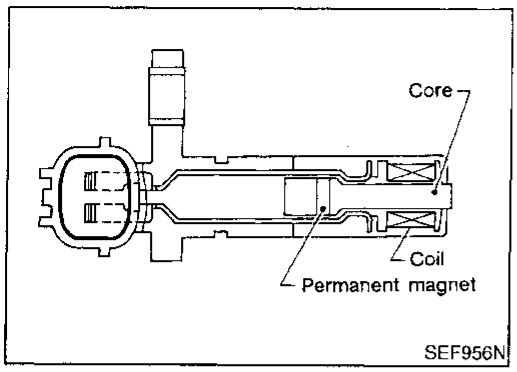
NCEC0212S01

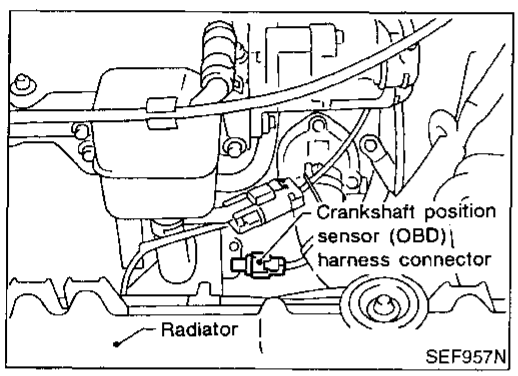
- Use an ohmmeter which can measure more than 10 MΩ.

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

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

CAUTION:
Discard any knock sensors that have been dropped or physically damaged. Use only new ones.





Component Description

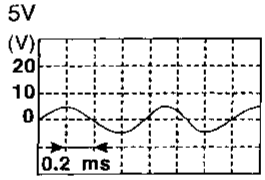
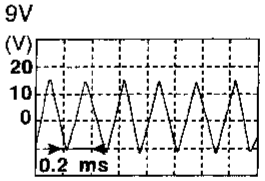
NCEC0213

The crankshaft position sensor (OBD) is located on the transaxle housing facing the gear teeth (cogs) of the flywheel or drive plate. It detects the fluctuation of the engine revolution.
The sensor consists of a permanent magnet, core and coil.
When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.
The changing gap causes the magnetic field near the sensor to change.
Due to the changing magnetic field, the voltage from the sensor changes.
The ECM receives the voltage signal and detects the fluctuation of the engine revolution.
This sensor is not directly used to control the engine system. It is used only for the on board diagnosis.

ECM Terminals and Reference Value

NCEC0214

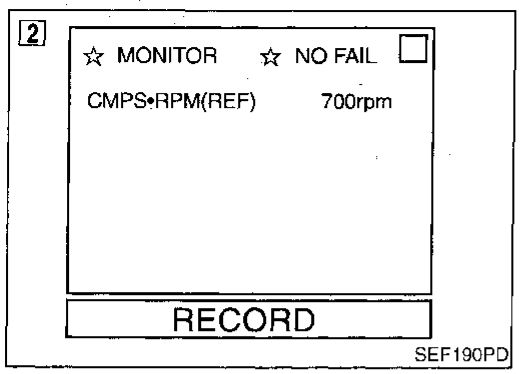
Specification data are reference values and are measured between each terminal and 43 (ECM ground).

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (AC Voltage)
53	W	Crankshaft position sensor (OBD)	**[Engine is running]** • **Warm-up condition** • Idle speed	3 - 5V  SEF721W
			[Engine is running] • Engine speed is 2,000 rpm	6 - 9V  SEF722W

On Board Diagnosis Logic

NCEC0215

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0335 0802	• The proper pulse signal from the crankshaft position sensor (OBD) is not sent to ECM while the engine is running at the specified engine speed.	• Harness or connectors (The crankshaft position sensor (OBD) circuit is open.) • Crankshaft position sensor (OBD)



DTC Confirmation Procedure

NCEC0216

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

With CONSULT

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.
3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-258.

With GST

1) Start engine and run it for at least 10 seconds at idle speed.
2) Select "MODE 7" with GST.
3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-258.

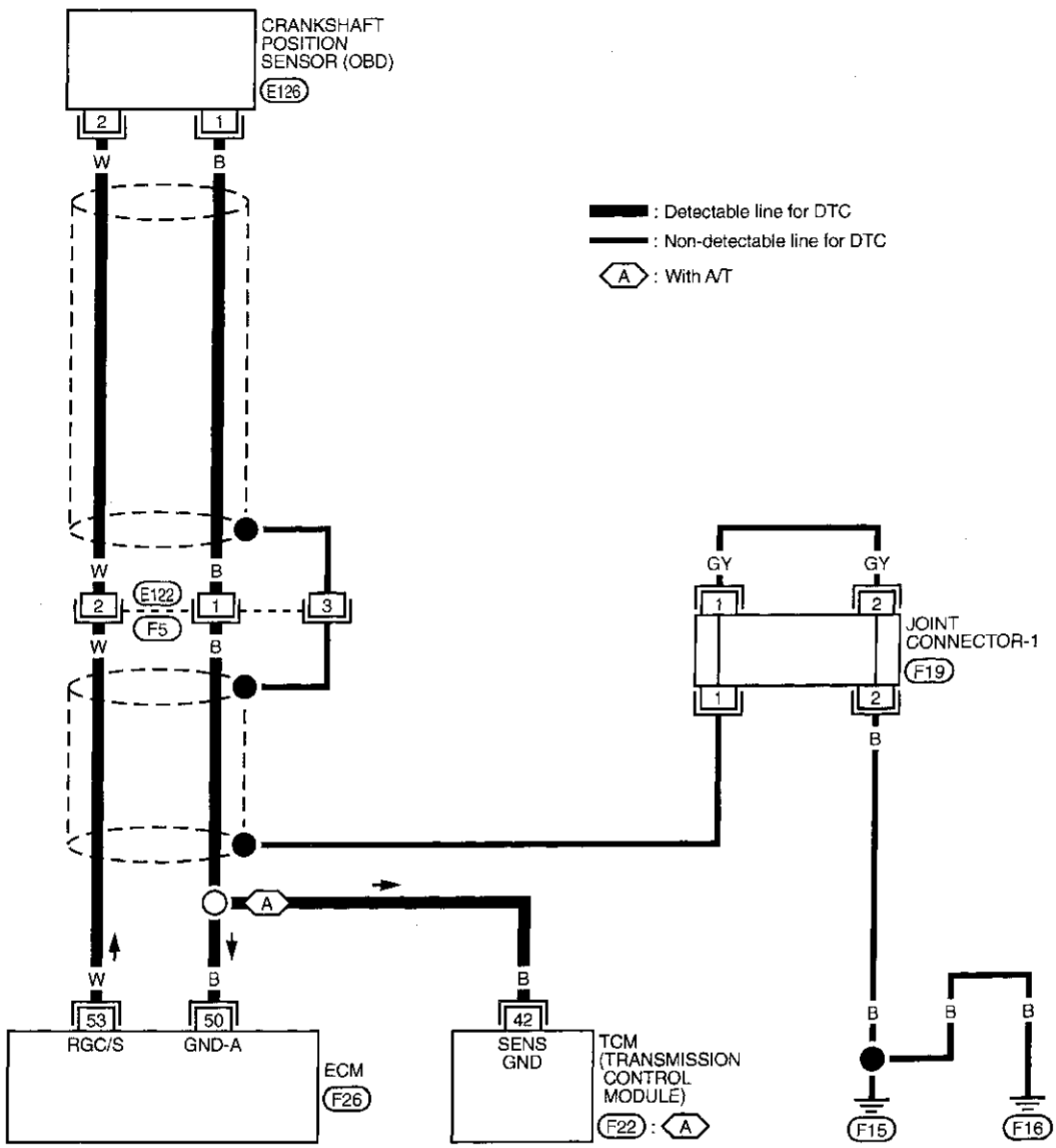
No Tools

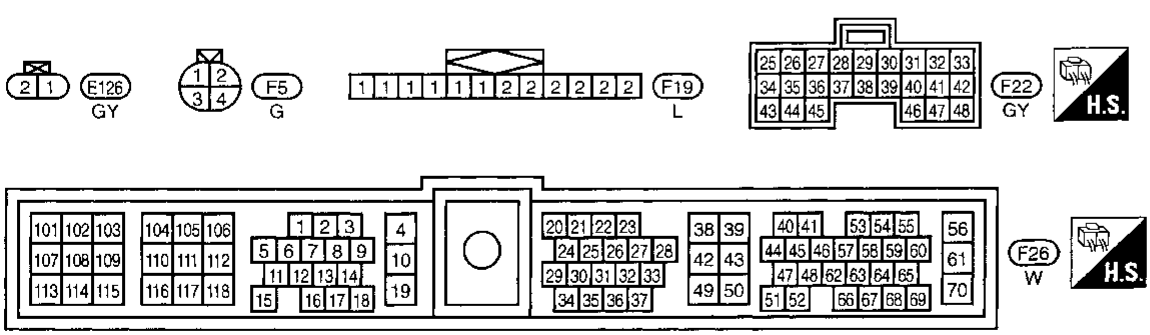
1) Start engine and run it for at least 10 seconds at idle speed.
2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
3) Perform "Diagnostic Test Mode II" (Self-diagnostic results) with ECM.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-258.

Wiring Diagram

NCEC0217

EC-CKPS-01





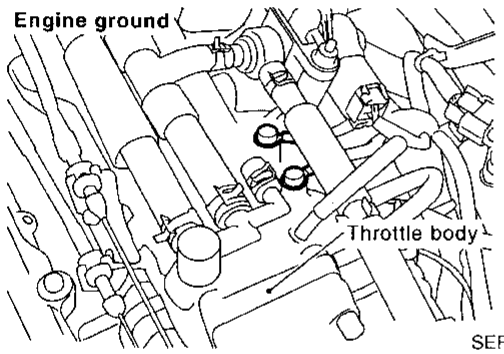
TEC535

Diagnostic Procedure

NCEC0218

1 RETIGHTEN GROUND SCREWS

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

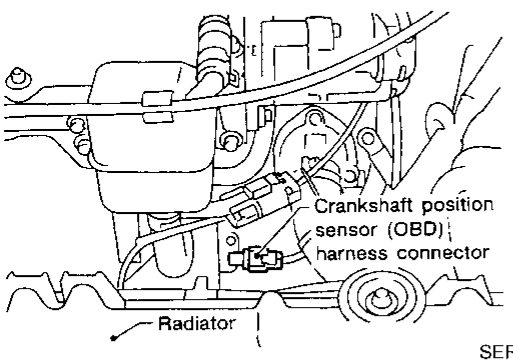


SEF292W

▶ GO TO 2.

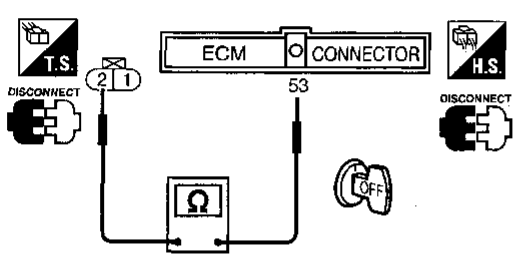
2 CHECK INPUT SIGNAL CIRCUIT

1. Disconnect crankshaft position sensor (OBD) and ECM harness connectors.



SEF957N

2. Check continuity between ECM terminal 53 and terminal 2.



SEF228W

Continuity should exist.

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

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

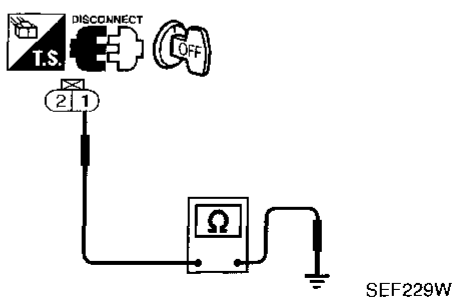
3 DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F5, E122
- Harness for open or short between crankshaft position sensor (OBD) and ECM

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

4 CHECK GROUND CIRCUIT

1. Reconnect ECM harness connector.
2. Check harness continuity between terminal 1 and engine ground.



SEF229W

Continuity should exist.

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

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

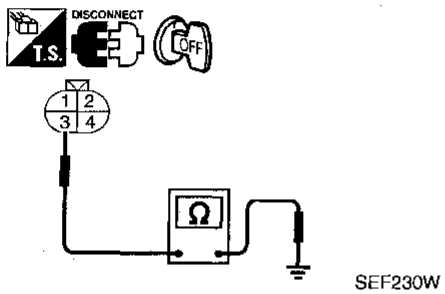
5 DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F5, E122
- Harness for open or short between crankshaft position sensor (OBD) and ECM
- Harness for open or short between crankshaft position sensor (OBD) and TCM (Transmission control module)

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

6	CHECK SHIELD CIRCUIT

1. Disconnect harness connectors F5, E122.
2. Check harness continuity between terminal 3 and engine ground.



SEF230W

Continuity should exist.

3. Also check harness for short to ground and short to power.
4. Then reconnect harness connectors.

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F5, E122
- Joint connector-1 (Refer to "HARNESS LAYOUT" in EL section.)
- Harness for open or short between harness connector F5 and Engine ground

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

8	CHECK CRANKSHAFT POSITION SENSOR (OBD)

Refer to "Component Inspection", EC-259.

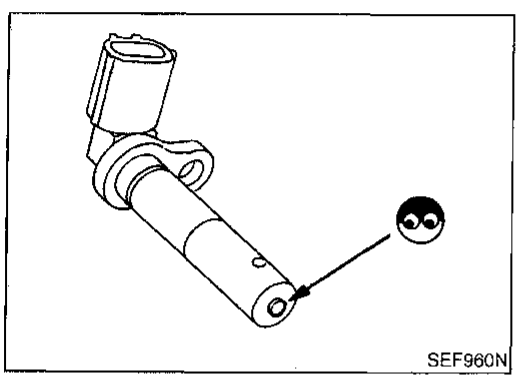
OK or NG

OK	▶	GO TO 9.
NG	▶	Replace crankshaft position sensor (OBD).

9	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-110.

▶	**INSPECTION END**



SEF960N

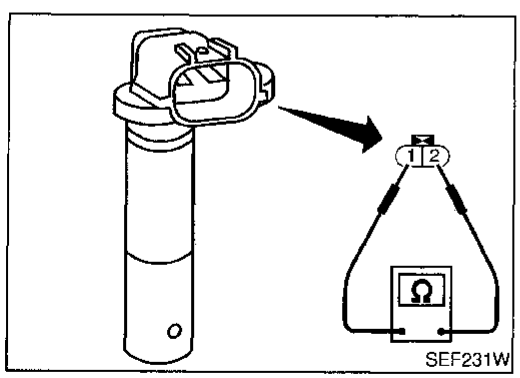
Component Inspection

NCEC0219

CRANKSHAFT POSITION SENSOR (OBD)

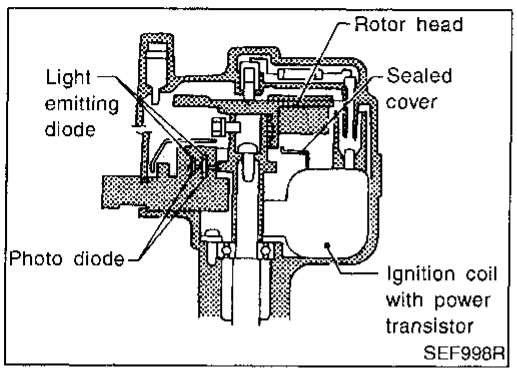
NCEC0219S01

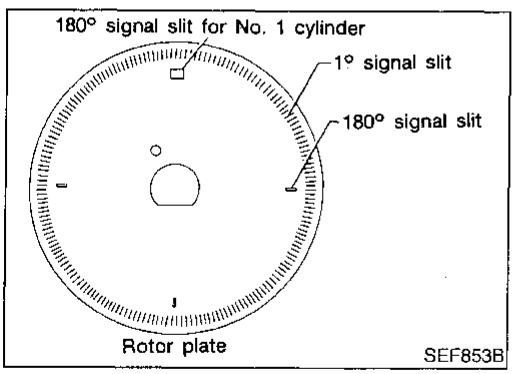
1. Disconnect crankshaft position sensor (OBD) harness connector.
2. Loosen the fixing bolt of the sensor.
3. Remove the sensor.
4. Visually check the sensor for chipping.



SEF231W

5. Check resistance as shown in the figure.
   Resistance: 166 - 204 Ω [at 25°C (77°F)]
   If NG, replace crankshaft position sensor (OBD).





Component Description

NCEC0220

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

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

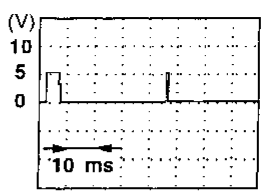
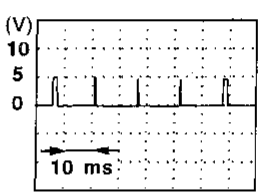
The rotor plate is positioned between the LED and the photo diode. The LED transmits light to the photo diode. As the rotor plate turns, the slits cut the light to generate rough-shaped pulses. These pulses are converted into on-off signals by the wave-forming circuit and sent to the ECM.

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

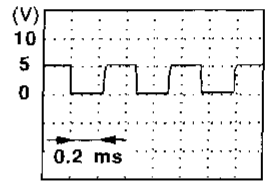
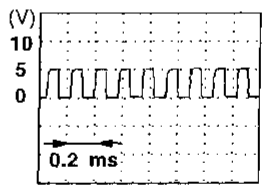
ECM Terminals and Reference Value

NCEC0221

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
40	L	Camshaft position sensor (Reference signal)	**[Engine is running]** • **Warm-up condition** • Idle speed	0.1 - 0.4V  SEF006W
44	L		**[Engine is running]** • Engine speed is 2,000 rpm	0.1 - 0.4V  SEF007W

ECM Terminals and Reference Value (Cont'd)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
41	B/W	Camshaft position sensor (Position signal)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 2.5V  SEF004W
			[Engine is running] • Engine speed is 2,000 rpm	Approximately 2.3 - 2.5V  SEF005W

On Board Diagnosis Logic

NCEC0222

DTC No.		Malfunction is detected when ...	Check Items (Possible Cause)
P0340 0101	A)	Either 1° or 180° signal is not sent to ECM for the first few seconds during engine cranking.	• 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
	B)	Either 1° or 180° signal is not sent to ECM often enough while the engine speed is higher than the specified engine speed.	
	C)	The relation between 1° and 180° signal is not in the normal range during the specified engine speed.	

DTC Confirmation Procedure

NCEC0223

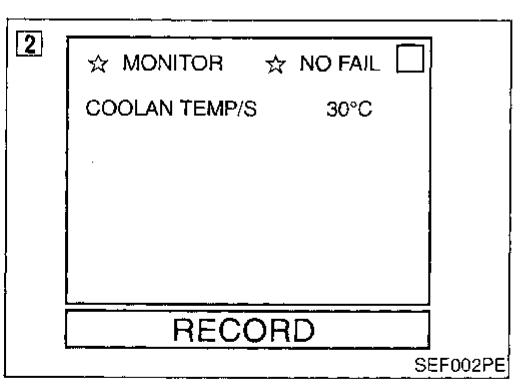
Perform "Procedure for malfunction A" first. If DTC cannot be confirmed, perform "Procedure for malfunction B and C".

NOTE:

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

TESTING CONDITION:

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



SEF002PE

PROCEDURE FOR MALFUNCTION A

NCEC0223S01

With CONSULT

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
3) Crank engine for at least 2 seconds.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-264.

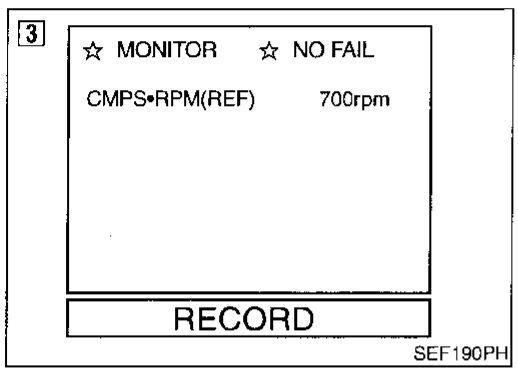
With GST

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

3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-264.

No Tools

1) Crank engine for at least 2 seconds.
2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
3) Perform "Diagnostic Test Mode II" (Self-diagnostic results) with ECM.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-264.



PROCEDURE FOR MALFUNCTION B AND C

NCEC0223S02

With CONSULT

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
3) Start engine and run it for at least 2 seconds at idle speed.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-264.

With GST

1) Start engine and run it for at least 2 seconds at idle speed.
2) Select "MODE 7" with GST.
3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-264.

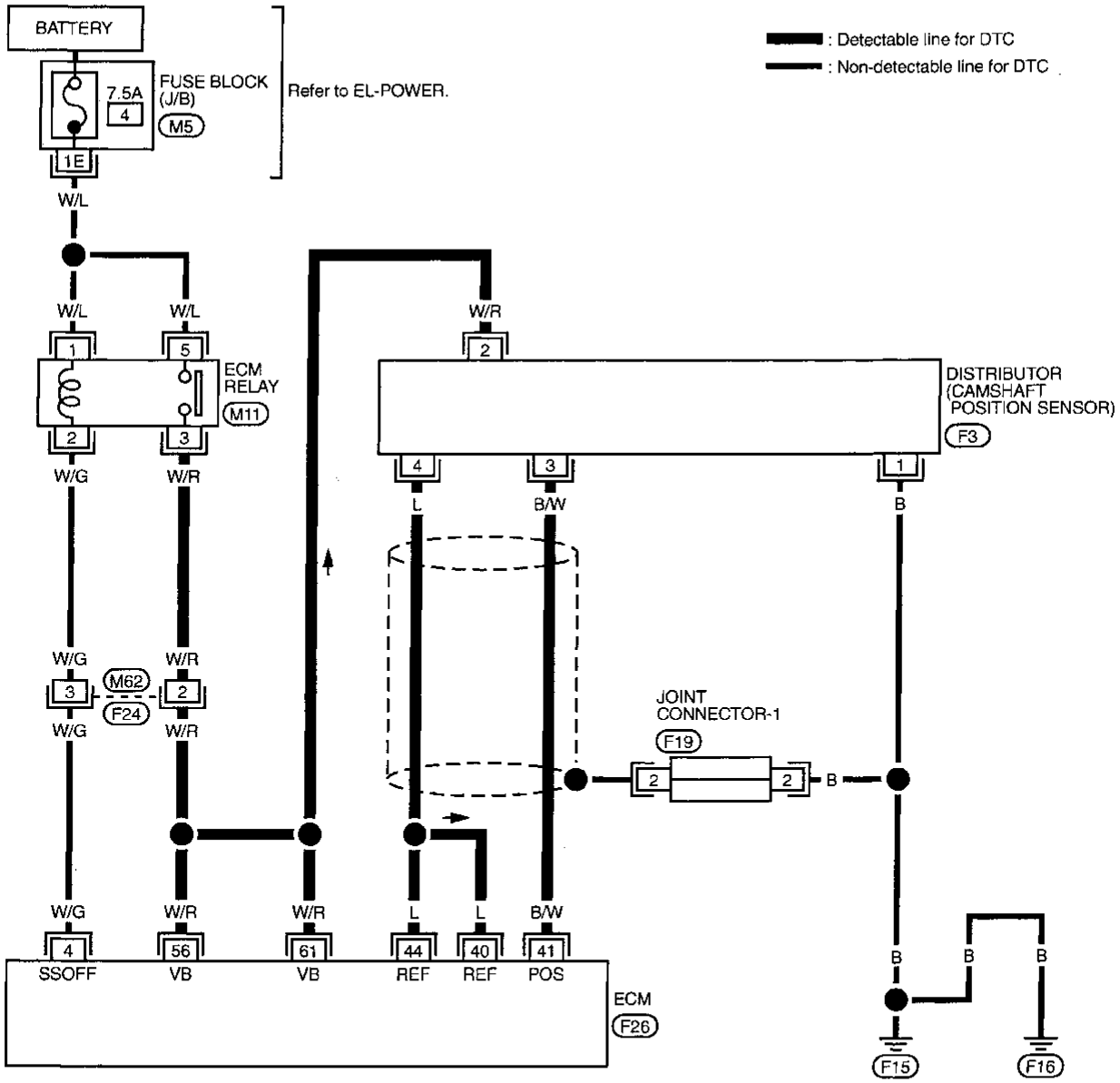
No Tools

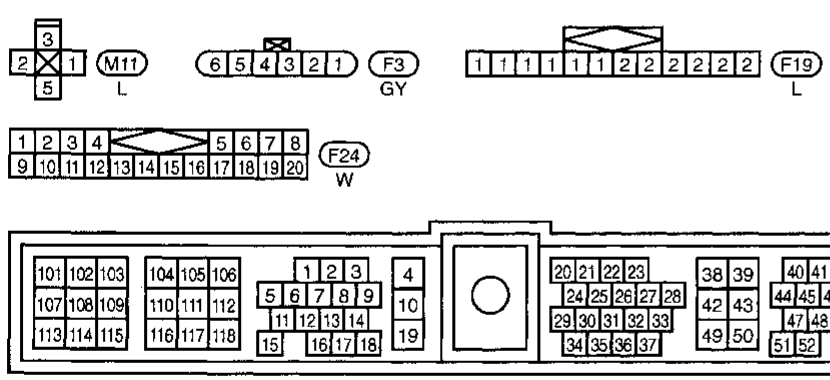
1) Start engine and run it for at least 2 seconds at idle speed.
2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
3) Perform "Diagnostic Test Mode II" (Self-diagnostic results) with ECM.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-264.

Wiring Diagram

NCEC0224

EC-CMPS-01





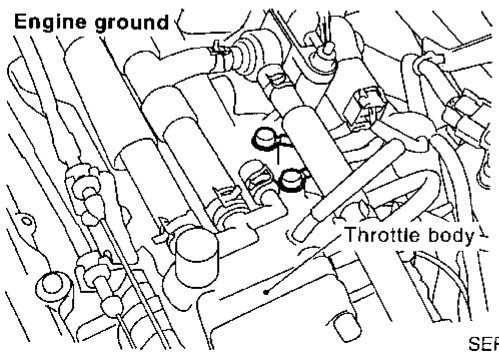
Refer to last page (Foldout page).
M5

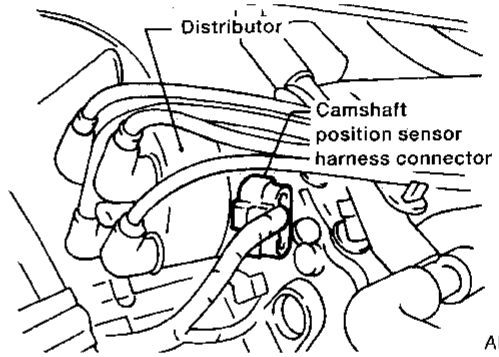
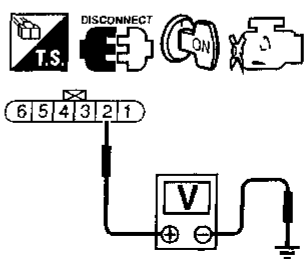
TEC536

Diagnostic Procedure

NCEC0225

1	CHECK STARTING SYSTEM	
Does the engine turn over? (Does the starter motor operate?) **Yes or No**		
Yes	▶	GO TO 2.
No	▶	Check starting system. (Refer to EL section.)

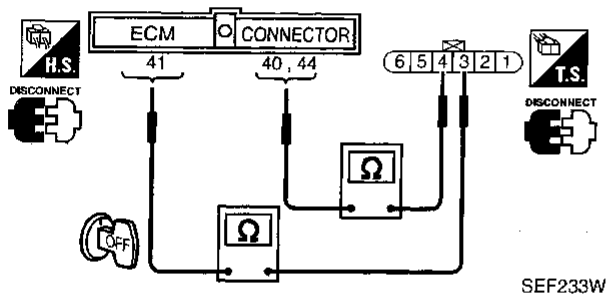
2	RETIGHTEN GROUND SCREWS	
1. Turn ignition switch "OFF". 2. Loosen and retighten engine ground screws.  SEF292W		
	▶	GO TO 3.

3	CHECK POWER SUPPLY	
1. Disconnect camshaft position sensor harness connector.  AEC685 2. Turn ignition switch "ON". 3. Check voltage between terminal 2 and ground with CONSULT or tester.  SEF232W **Voltage: Battery voltage** **OK or NG**		
OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART	
Check the following. • Harness connectors M62, F24 • Harness for open or short between camshaft position sensor and ECM relay • Harness for open or short between camshaft position sensor and ECM		
	▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK INPUT SIGNAL CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between sensor terminal 3 and ECM terminal 41, sensor terminal 4 and ECM terminals 40, 44.



SEF233W

Continuity should exist.

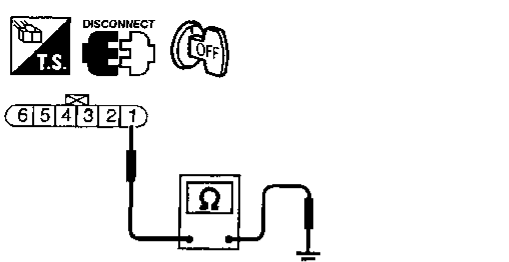
4. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 6.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK GROUND CIRCUIT

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



SEF234W

Continuity should exist.

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

OK or NG

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

7	CHECK CAMSHAFT POSITION SENSOR

Refer to "Component Inspection", EC-266.

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace camshaft position sensor.

8	CHECK SHIELD CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect joint connector-1.
3. Check the following.
   - Continuity between joint connector-1 terminal 2 and ground
   - Joint connector-1
     (Refer to "HARNESS LAYOUT" in EL section.)

   Continuity should exist.
4. Also check harness for short to ground and short to power.
5. Then reconnect joint connector-1.

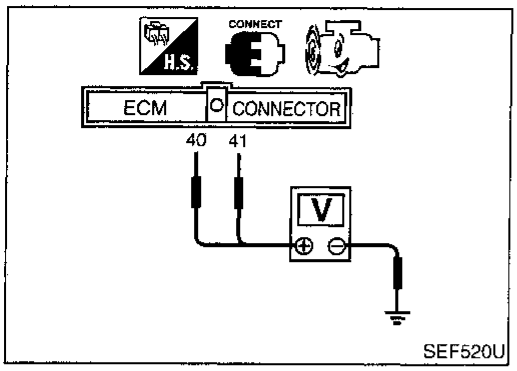
OK or NG

OK	▶	GO TO 9.
NG	▶	Repair open circuit, short to ground or short to power in harness or connectors.

9	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-110.

	▶	**INSPECTION END**



Component Inspection

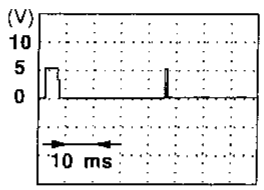
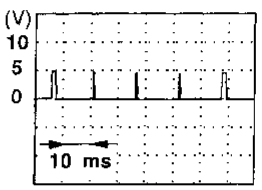
=NCEC0226

CAMSHAFT POSITION SENSOR

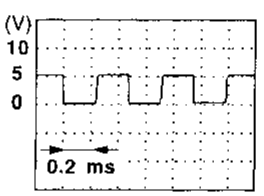
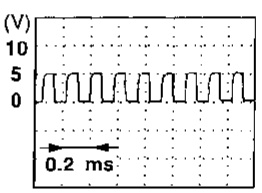
NCEC0226S01

1. Start engine and warm it up to normal operating temperature.
2. Check voltage between ECM terminals 40, 41 and engine ground under the following conditions.

Terminal 40 (or 44) and engine ground

Condition	Idle	2,000 rpm
Voltage	0.1 - 0.4V	0.1 - 0.4V
Pulse signal	 SEF006W	 SEF007W

Terminal 41 and engine ground

Condition	Idle	2,000 rpm
Voltage	Approximately 2.5V	Approximately 2.4V
Pulse signal	 SEF004W	 SEF005W

If NG, replace distributor assembly with camshaft position sensor.

Description

NCEC0227

SYSTEM DESCRIPTION

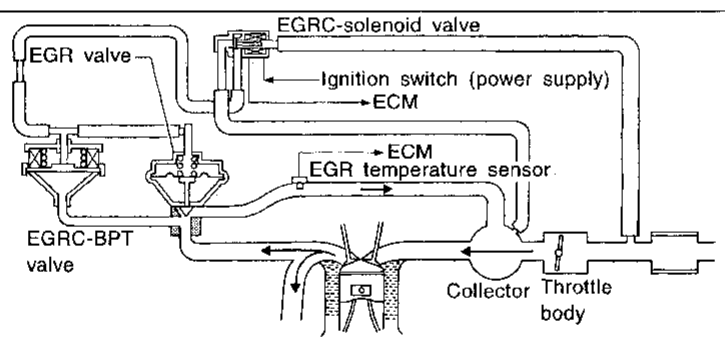
NCEC0227S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	EGR control	EGRC-solenoid valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		
Vehicle speed sensor	Vehicle speed		

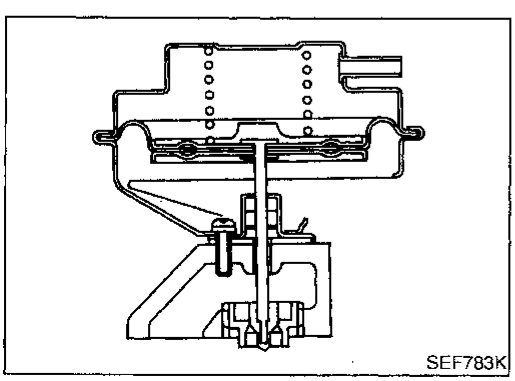
This system cuts and controls vacuum applied to the EGR valve to suit engine operating conditions. This cut-and-control operation is accomplished through the ECM and the EGRC-solenoid valve. When the ECM detects any of the following conditions, current flows through the solenoid valve is cut. This causes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

- Low engine coolant temperature
- Engine starting
- High-speed engine operation
- Engine idling
- Excessively high engine coolant temperature
- Mass air flow sensor malfunction

EGR and vacuum



SEF317U



SEF783K

COMPONENT DESCRIPTION

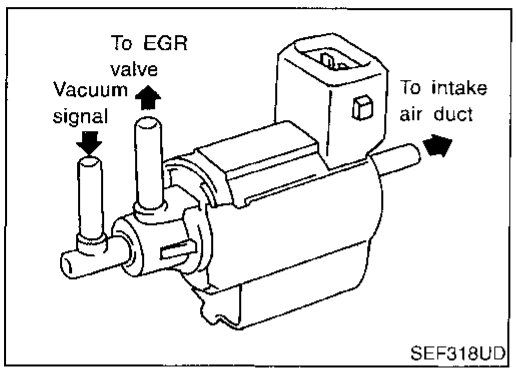
NCEC0227S02

Exhaust Gas Recirculation (EGR) Valve

NCEC0227S0201

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.

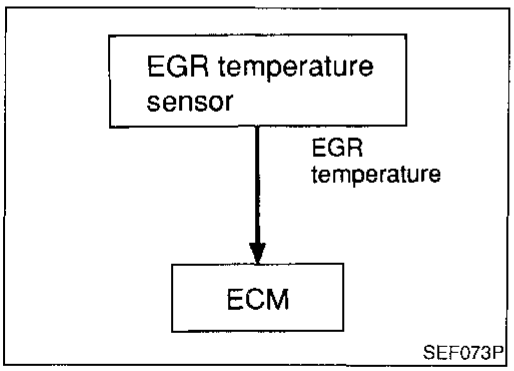
Description (Cont'd)



EGRC-Solenoid Valve

NCEC0227S0202

The EGRC-solenoid valve responds to signals from the ECM. When the ECM sends an ON (ground) signal, the coil in the solenoid valve is energized. The vacuum signal passes through the solenoid valve. The signal then reaches the EGR valve.
When the ECM sends an OFF signal, a plunger will then move to cut the vacuum signal from the intake manifold collector to the EGR valve.

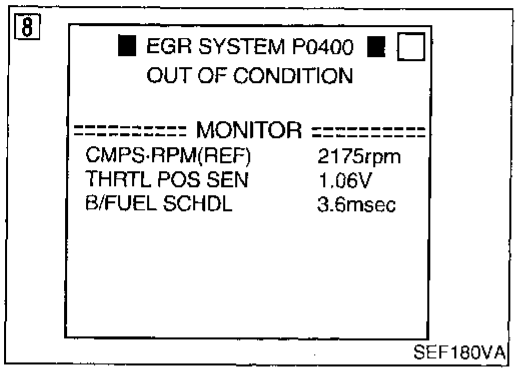


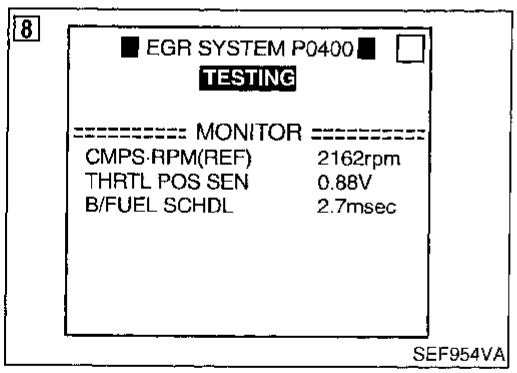
On Board Diagnosis Logic

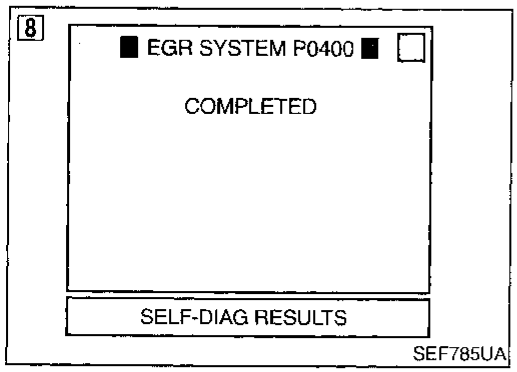
NCEC0228

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.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0400 0302	• No EGR flow is detected under conditions that call for EGR.	• EGR valve stuck closed • EGRC-BPT valve • Vacuum hose • EGRC-solenoid valve • EGR passage • EGR temperature sensor • Exhaust gas leaks







DTC Confirmation Procedure

NCEC0229

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

- If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.
- P0400 will not be displayed at "SELF-DIAG RESULTS" mode with CONSULT even though DTC work support test result is "NG".

TESTING CONDITION:

For best results, perform the test at a temperature above 5°C (41°F).

With CONSULT

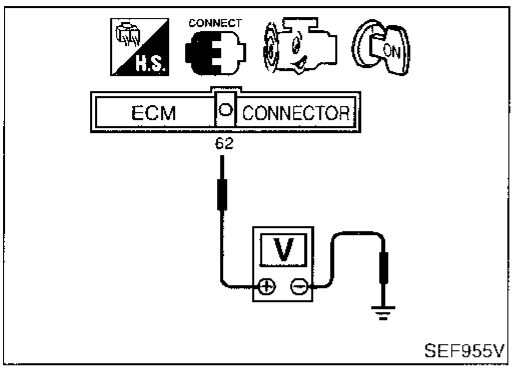
1) Turn ignition switch "ON".
2) Check "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT and confirm it is within the range listed below.

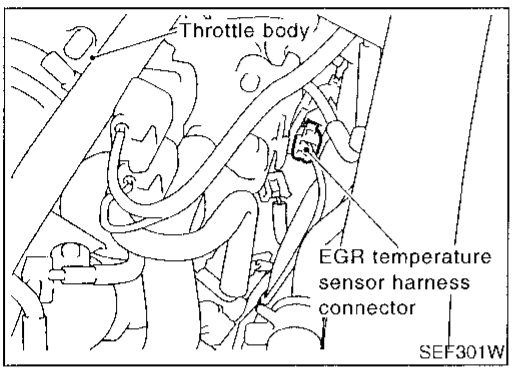
   COOLAN TEMP/S: Less than 40°C (104°F)

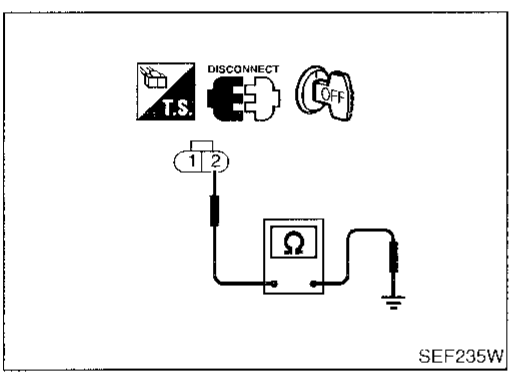
   If the value is out of range, park the vehicle in a cool place and allow the engine temperature to stabilize. Do not attempt to lower the coolant temperature with a fan or means other than ambient air. Doing so may produce an inaccurate diagnostic result.
3) Start engine and let it idle monitoring "COOLAN TEMP/S" value. When the "COOLAN TEMP/S" value reaches 70°C (158°F), immediately go to the next step.
4) Select "EGR SYSTEM P0400" of "EGR SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT.
5) Touch "START".
6) Accelerate vehicle to a speed of 40 km/h (25 MPH) once and then stop vehicle with engine running.
   If "COMPLETED" appears on CONSULT screen, go to step 9.
   If "COMPLETED" does not appear on CONSULT screen, go to the following step.
7) Check the output voltage of "THRTL POS SEN" (at closed throttle position) and note it.
8) When the following conditions are met, "TESTING" will be displayed on the CONSULT screen. Maintain the conditions until "TESTING" changes to "COMPLETED". (It will take approximately 30 seconds or more.)

CMPS·RPM (REF)	1,800 - 2,800 rpm (A/T) 1,600 - 2,800 rpm (M/T)
Vehicle speed	10 km/h (6 MPH) or more
B/FUEL SCHDL	2.0 - 3.5 msec (A/T) 1.8 - 3.0 msec (M/T)
THRTL POS SEN	(X + 0.05) – (X + 0.87) V X = Voltage value measured at step 7
Selector lever	Suitable position

   If "TESTING" is not displayed after 5 minutes, retry from step 2.
9) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-272.







Overall Function Check

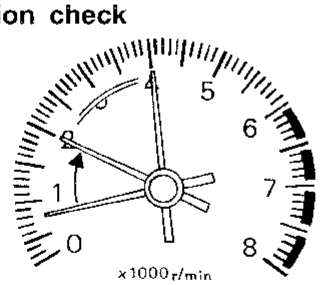
NCEC0230

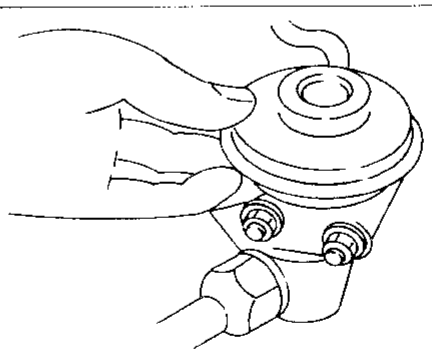
Use this procedure to check the overall EGR function. During this check, a 1st trip DTC might not be confirmed.

⊗ Without CONSULT

1) Start engine and warm it up to normal operating temperature.
2) Check the EGR valve lifting when revving engine from idle to 3,000 rpm under no load.
   EGR valve should lift up and down without sticking.
   If NG, go to "Diagnostic Procedure", EC-272.
3) Check voltage between ECM terminal 62 (EGR temperature sensor signal) and ground at idle speed.
   Less than 4.5V should exist.
   If NG, go to next step.
4) Turn ignition switch "OFF".
5) Disconnect EGR temperature sensor harness connector.
6) Check harness continuity between EGR temperature sensor harness connector terminal 2 and engine ground.
   Continuity should exist.
7) Perform "Component Inspection", "EGR TEMPERATURE SENSOR". Refer to EC-365.

Overall function check





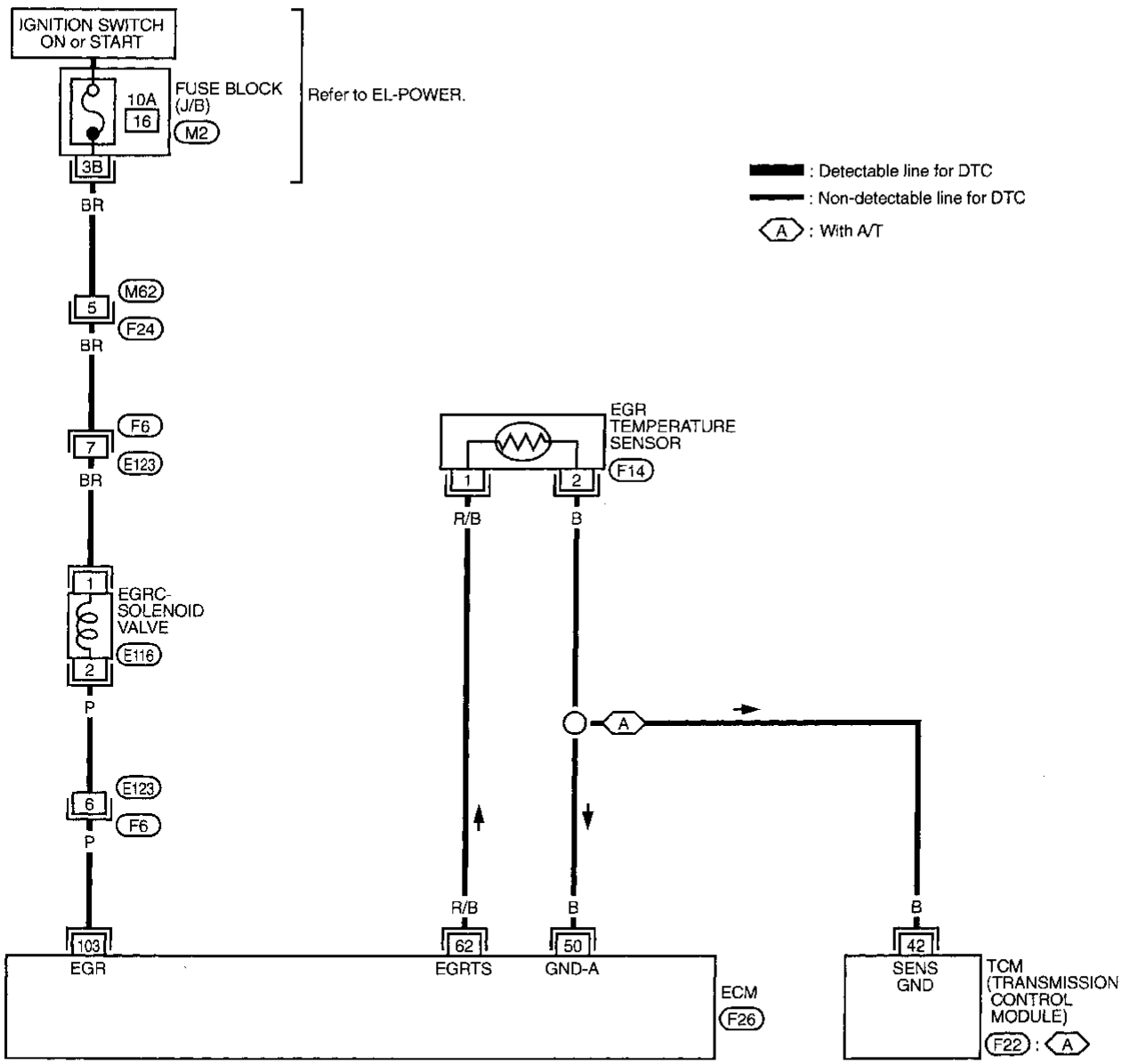
Check the EGR valve lifting when revving engine from 2,000 rpm up to 4,000 rpm.

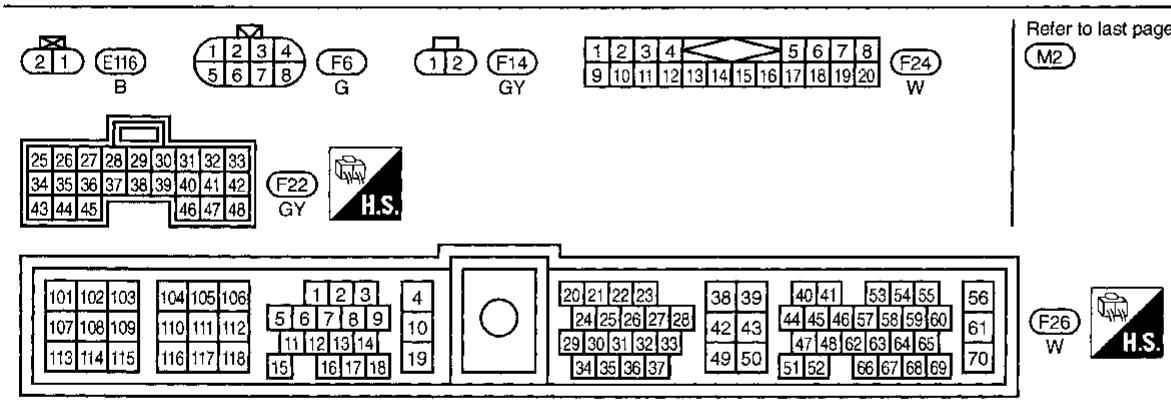
SEF642Q

Wiring Diagram

NCEC0231

EC-EGRC1-01





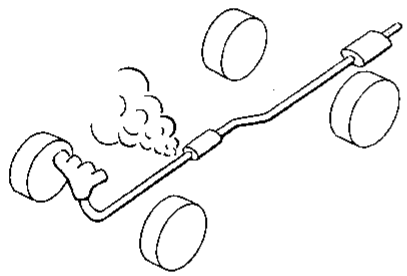
TEC537

Diagnostic Procedure

NCEC0232

1 CHECK EXHAUST SYSTEM

1. Start engine.
2. Check exhaust pipes and muffler for leaks.



SEF099P

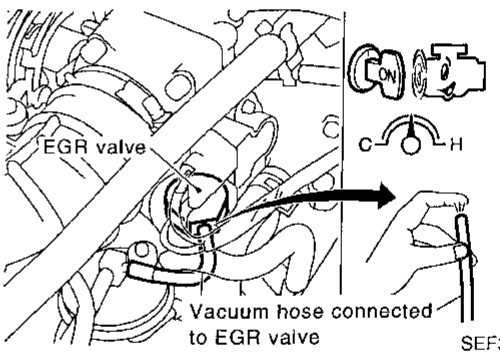
OK or NG

OK (With CONSULT)	▶	GO TO 2.
OK (Without CONSULT)	▶	GO TO 3.
NG	▶	Repair or replace exhaust system.

2 CHECK VACUUM SOURCE TO EGR VALVE

With CONSULT

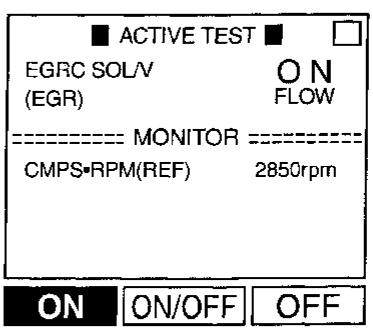
1. Warm engine up to normal operating temperature.
2. Disconnect vacuum hose to EGR valve.
3. Check for vacuum existence at idle.



SEF302W

Vacuum should not exist at idle.

4. Select "EGRC SOLENOID VALVE" in "ACTIVE TEST" mode with CONSULT and turn the solenoid valve "ON".
5. Check for vacuum existence when revving engine from idle up to 3,000 rpm.



SEF788U

Vacuum should exist when revving engine.

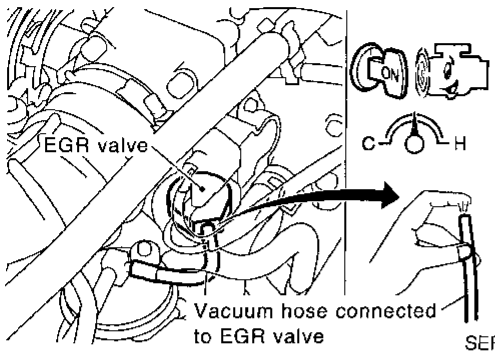
OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 5.

3	CHECK VACUUM SOURCE TO EGR VALVE

Without CONSULT

1. Warm engine up to normal operating temperature.
2. Disconnect vacuum hose to EGR valve.
3. Check for vacuum existence at idle.



SEF302W

Vacuum should not exist at idle.

4. Check for vacuum existence when revving engine from idle up to 3,000 rpm quickly.

Vacuum should exist when revving engine.

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 5.

4	CHECK EGR VALVE

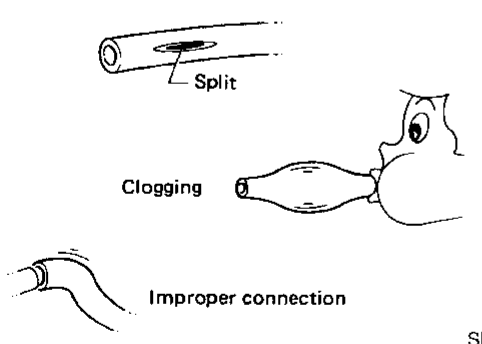
Refer to "Component Inspection", EC-274.

OK or NG

OK	▶	GO TO 11.
NG	▶	Replace EGR valve.

5	CHECK VACUUM HOSE

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



SEF109L

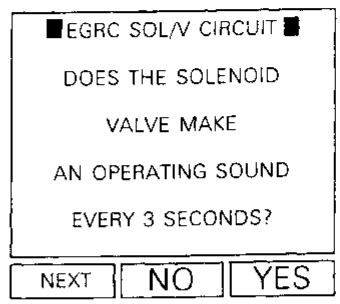
OK or NG

OK (With CONSULT)	▶	GO TO 6.
OK (Without CONSULT)	▶	GO TO 7.
NG	▶	Repair or replace vacuum hose.

6	CHECK EGRC-SOLENOID VALVE OPERATION

With CONSULT

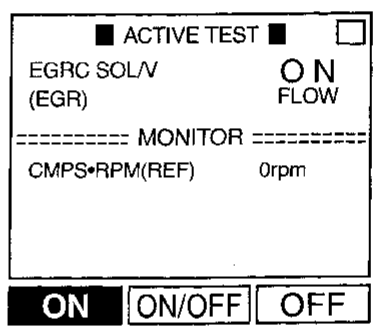
1. Turn ignition switch "ON".
2. Perform "EGRC SOL/V CIRCUIT" in "FUNCTION TEST" mode with CONSULT.



MEF957D

With CONSULT

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



SEF789U

Clicking noise should be heard.

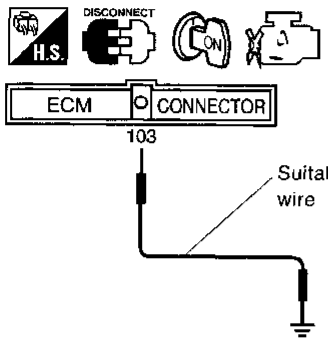
OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace EGRC-solenoid valve or repair circuit.

7	CHECK EGRC-SOLENOID VALVE OPERATION

Without CONSULT

1. Disconnect ECM harness connector.
2. Turn ignition switch "ON".
3. Connect a suitable jumper wire between ECM terminal 103 and engine ground.



SEF491V

4. Check operating sound of the solenoid valve when disconnecting and reconnecting the jumper wire.
   Clicking noise should be heard.

OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace EGRC-solenoid valve or repair circuit.

8	CHECK EGRC-SOLENOID VALVE

Refer to "Component Inspection", EC-359.

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace EGRC-solenoid valve.

9	CHECK EGRC-BPT VALVE

Refer to "Component Inspection", EC-274.

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace EGRC-BPT valve.

10	CHECK EGR TEMPERATURE SENSOR

Refer to "Component Inspection", EC-365.

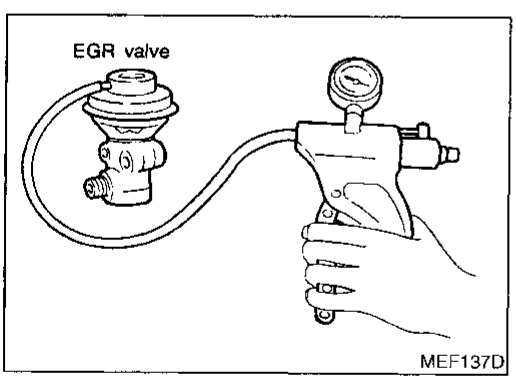
OK or NG

OK	▶	GO TO 11.
NG	▶	Replace EGR temperature sensor.

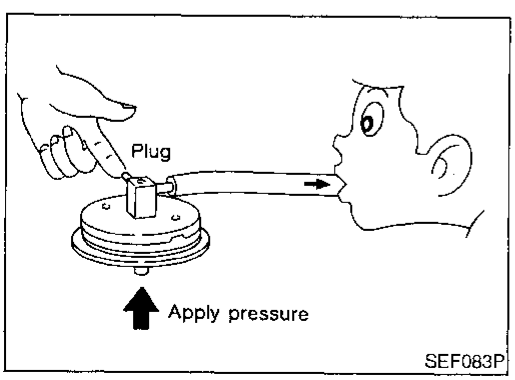
11	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-110.

	▶	INSPECTION END



MEF137D



SEF083P

Component Inspection

NCEC0233

EGR VALVE

NCEC0233S01

- Apply vacuum to EGR vacuum port with a hand vacuum pump.
  EGR valve spring should lift.
- Check for sticking.
  If NG, repair or replace EGR valve.

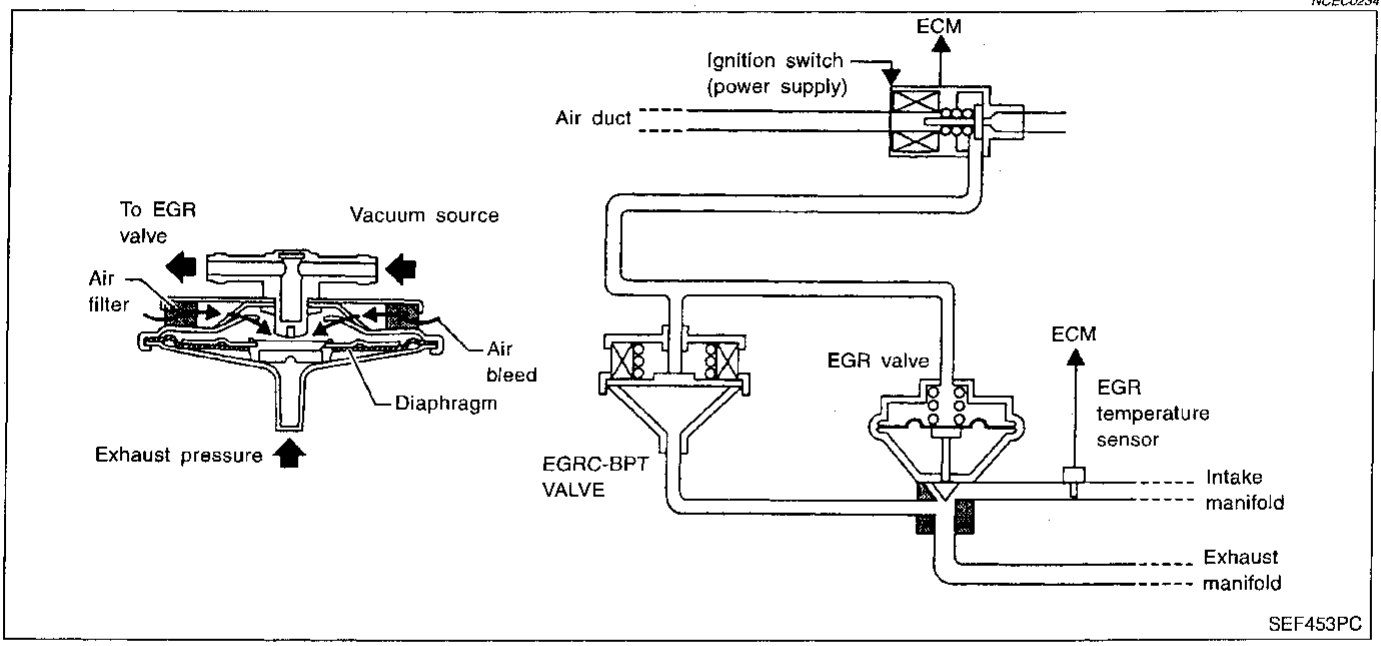
EGRC-BPT VALVE

NCEC0233S04

1. Plug one of two ports of EGRC-BPT valve.
2. Vacuum from the other port and check for leakage while applying a pressure above 0.981 kPa (100 mmH_2O, 3.94 inH_2O) from under EGRC-BPT valve.
3. If a leakage is noted, replace the valve.

Description

NCEC0234



SYSTEM DESCRIPTION

NCEC0234S01

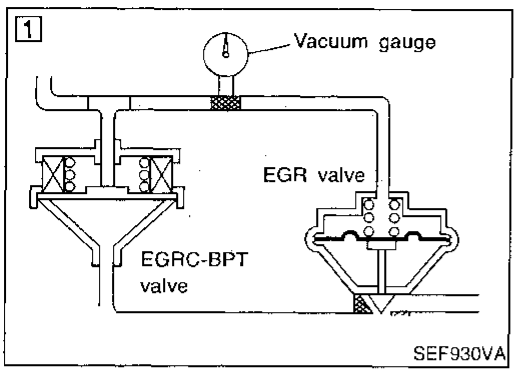
The EGRC-BPT valve monitors exhaust pressure to activate the diaphragm, controlling throttle body vacuum applied to the EGR valve. In other words, recirculated exhaust gas is controlled in response to positioning of the EGR valve or to engine operation.

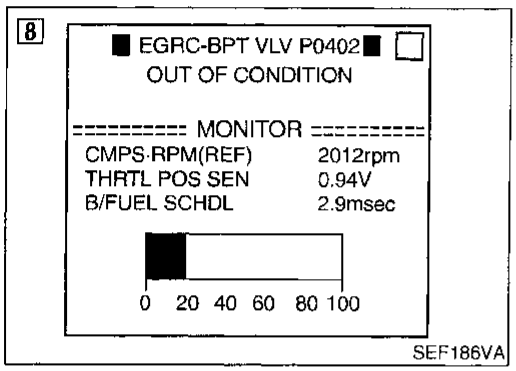
On Board Diagnosis Logic

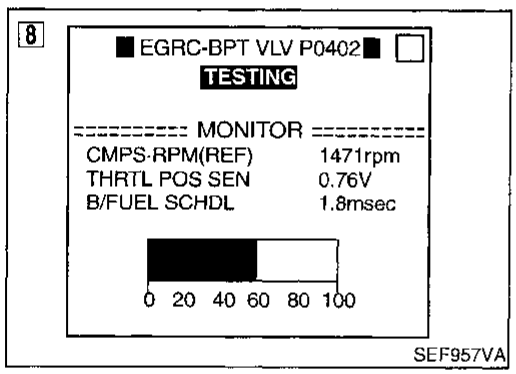
NCEC0235

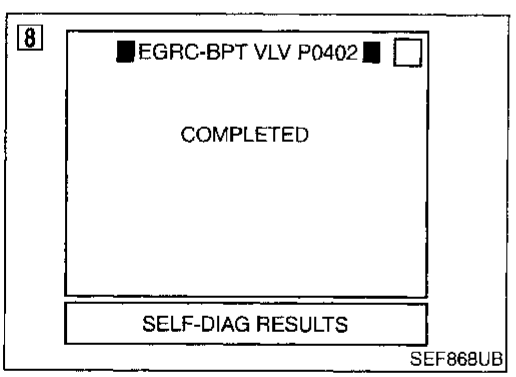
If too much EGR flow exists due to an EGRC-BPT valve malfunction, off idle engine roughness will increase. If the roughness is large, then the vacuum to the EGR valve is interrupted through the EGRC-solenoid valve. If the engine roughness is reduced at that time, the EGRC-BPT valve malfunction is indicated.

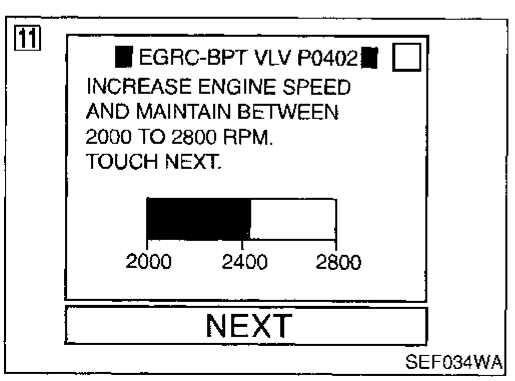
DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0402 0306	• The EGRC-BPT valve does not operate properly.	• EGRC-BPT valve • EGR valve • Loose or disconnected rubber tube • Blocked rubber tube • Camshaft position sensor • Blocked exhaust system • Orifice • Mass air flow sensor • EGRC-solenoid valve











DTC Confirmation Procedure

NCEC0236

CAUTION:
Always drive vehicle at a safe speed.

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

TESTING CONDITION:

- **Always perform at a temperature above 5°C (41°F).**
- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**

With CONSULT

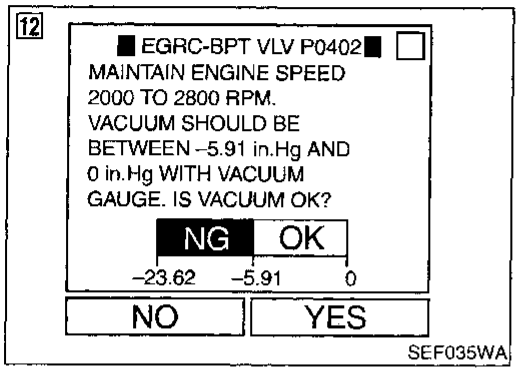
1) Install vacuum gauge between EGRC-BPT valve and EGR valve as shown in the illustration.
2) Start engine and warm it up to normal operating temperature.
3) Stop engine and wait at least 5 seconds.
4) Turn ignition switch "ON" and select "EGRC-BPT/V P0402" of "EGR SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT.
5) Start engine and let it idle.
6) Touch "START".
7) Check the output voltage of "THRTL POS SEN" (at closed throttle position) and note it.
8) When the following conditions are met, "TESTING" will be displayed on the CONSULT screen and the bar chart may increase. Maintain the conditions many times until "COMPLETED" appears.

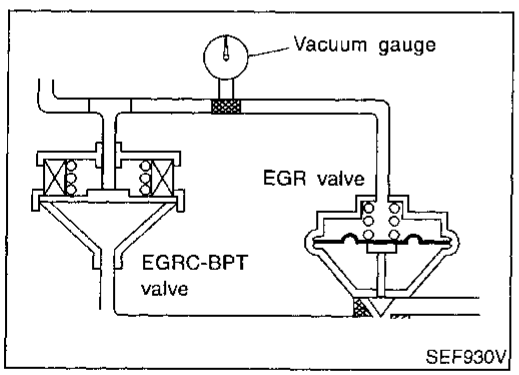
Selector lever	Suitable position
CMPS·RPM (REF)	1,400 - 1,600 rpm (A/T) 1,400 - 2,200 rpm (M/T)
Vehicle speed	30 - 54 km/h (19 - 34 MPH) (A/T) 30 - 100 km/h (19 - 62 MPH) (M/T)
B/FUEL SCHDL	1.5 - 2.0 msec (A/T) 1.3 - 2.0 msec (M/T)
THRTL POS SEN	X – (X + 0.8) V X = Voltage value measured at step 7

NOTE:

- **The bar chart on CONSULT screen indicates the status of this test. However, the test may be finished before the bar chart becomes full scale.**
- **If the bar chart indication does not continue to progress, completely release accelerator pedal once and try to meet the conditions again.**
- **If "TESTING" does not appear on CONSULT screen, retry from step 2.**

9) If CONSULT instructs to carry out "Overall Function Check", go to next step. If "NG" is displayed, refer to "Diagnostic Procedure", EC-277.
10) Open engine hood.
11) Raise engine speed to 2,000 to 2,800 rpm under no-load and hold it. Then touch "NEXT" on CONSULT screen.





12) Check vacuum gauge while keeping engine speed at 2,000 to 2,800 rpm.
Vacuum should be 0 to −20 kPa (0 to −150 mmHg, 0 to −5.91 inHg).
If NG, go to "Diagnostic Procedure", EC-277.
If OK, touch "YES" on the CONSULT screen.

13) Check the rubber tube between intake manifold collector, EGRC-solenoid valve, EGR valve and EGRC-BPT valve for cracks, blockages or twisting.
If NG, repair or replace.
If OK, touch "YES" on the CONSULT screen.

Overall Function Check

NCEC0237

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

⊗ Without CONSULT

1) Install vacuum gauge between EGRC-BPT valve and EGR valve as shown in the illustration.
2) Lift up vehicle.
3) Start engine and shift to 1st gear position (M/T) or "1" position (A/T).
4) Check vacuum gauge while keeping engine speed at 2,000 to 2,800 rpm.
Vacuum should be 0 to −20 kPa (0 to −150 mmHg, 0 to −5.91 inHg).
If NG, go to "Diagnostic Procedure", EC-277.
If OK, go to next step.
5) Check rubber tube between intake manifold collector, EGRC-solenoid valve, EGR valve and EGRC-BPT valve for misconnection, cracks or blockages.
6) If NG, go to "Diagnostic Procedure", EC-277.

Diagnostic Procedure

NCEC0238

1	CHECK HOSE
Check vacuum hose for clogging and improper connection.	
OK or NG	
OK ▶	GO TO 2.
NG ▶	Repair or replace vacuum hose.

2	CHECK EXHAUST SYSTEM
Check exhaust system for collapse.	
OK or NG	
OK ▶	GO TO 3.
NG ▶	Repair or replace exhaust system.

3	CHECK ORIFICE
Check if orifice is installed in vacuum hose between EGRC-BPT valve and EGRC-solenoid valve.	
OK or NG	
OK ▶	GO TO 4.
NG ▶	Replace vacuum hose.

4	CHECK EGRC-BPT VALVE
Refer to "Component Inspection", EC-278.	
OK or NG	
OK ▶	GO TO 5.
NG ▶	Replace EGRC-BPT valve.

Diagnostic Procedure (Cont'd)

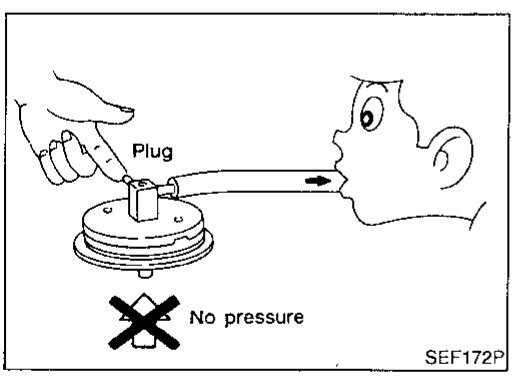
5	CHECK CAMSHAFT POSITION SENSOR
Refer to "Component Inspection", EC-266.	
OK or NG	
OK ▶	GO TO 6.
NG ▶	Replace camshaft position sensor.

6	CHECK MASS AIR FLOW SENSOR
Refer to "Component Inspection", EC-124.	
OK or NG	
OK ▶	GO TO 7.
NG ▶	Replace mass air flow sensor.

7	CHECK EGRC-SOLENOID VALVE
Refer to "Component Inspection", EC-359.	
OK or NG	
OK ▶	GO TO 8.
NG ▶	Replace EGRC-solenoid valve.

8	CHECK EGR VALVE
Refer to "Component Inspection", EC-274.	
OK or NG	
OK ▶	GO TO 9.
NG ▶	Replace EGR valve.

9	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-110.	
▶	INSPECTION END



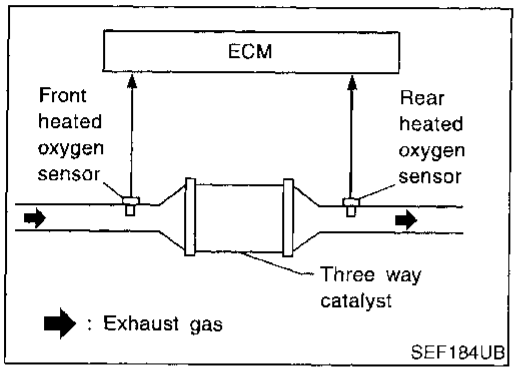
Component Inspection

NCEC0239

EGRC-BPT VALVE

NCEC0239S01

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.

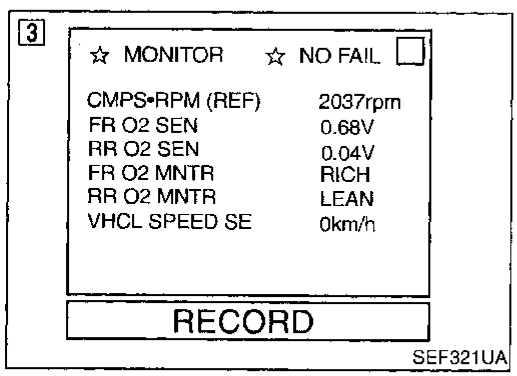


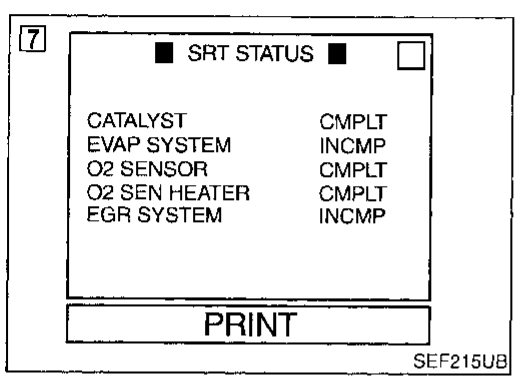
On Board Diagnosis Logic

NCEC0240

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

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0420 0702	• Three way catalyst does not operate properly. • Three way catalyst does not have enough oxygen storage capacity.	• Three way catalyst • Exhaust tube • Intake air leaks • Injectors • Injector leaks • Spark plug • Improper ignition timing





DTC Confirmation Procedure

NCEC0241

CAUTION:
Always drive vehicle at a safe speed.

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

Ⓑ With CONSULT

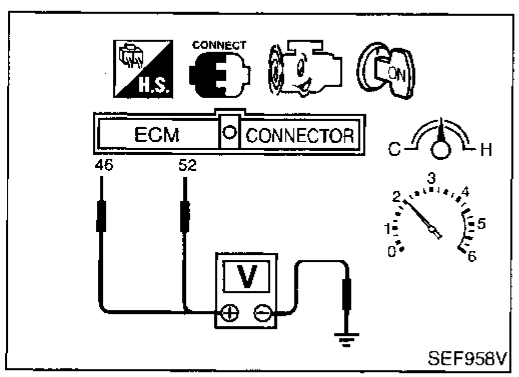
1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Set "MANU TRIG" and "HI SPEED", then select "FR O2 SENSOR", "RR O2 SENSOR", "FR O2 MNTR", "RR O2 MNTR" in "DATA MONITOR" mode with CONSULT.
4) Touch "RECORD" on CONSULT screen with engine speed held at 2,000 rpm constantly under no load.
5) Make sure that the switching frequency between "RICH" and "LEAN" of "RR O2 MNTR" is much less than that of "FR O2 MNTR" as shown below.
   Switching frequency ratio = A/B
   A: Rear heated oxygen sensor switching frequency
   B: Front heated oxygen sensor switching frequency
   This ratio should be less than 0.75.
   If the ratio is greater than above, the three way catalyst is not operating properly.
   If the "FR O2 MNTR" does not indicate "RICH" and "LEAN" periodically more than 5 times within 10 seconds at step 4, perform trouble diagnoses for DTC P0133 first. (See EC-177.)
   If the result is NG, go to "Diagnostic Procedure", EC-281.
   If the result is OK, go to following step.
6) Select "AUTO TRIG" in "DATA MONITOR" mode with CONSULT.
7) Drive vehicle at a speed of approximately 84 to 96 km/h (52 to

60 MPH) with the following for at least 10 consecutive minutes. (Drive the vehicle in an area where vehicle speed and accelerator pressure can be held steady and constant.)

M/T	5th position
A/T	D position ("OD" ON)

If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-281.

8) Select "SRT STATUS" in "DTC CONFIRMATION" mode with CONSULT.
9) Verify that "CATALYST" is "CMPLT".
If not "CMPLT", repeat the test from step 6.



Overall Function Check

NCEC0242

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

⊗ Without CONSULT

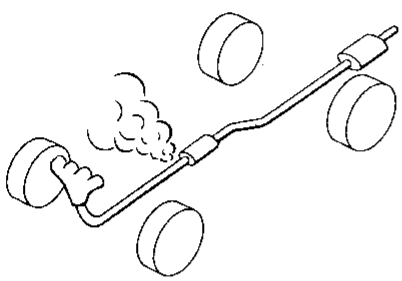
1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Set voltmeters probes between ECM terminals 46 (Front heated oxygen sensor signal), 52 (Rear heated oxygen sensor signal) and engine ground.
4) Keep engine speed at 2,000 rpm constant under no load.
5) Make sure that the voltage switching frequency (high & low) between ECM terminal 52 and engine ground is much less than that of ECM terminal 46 and engine ground.
Switching frequency ratio = A/B
A: Rear heated oxygen sensor voltage switching frequency
B: Front heated oxygen sensor voltage switching frequency
This ratio should be less than 0.75.
If the ratio is greater than above, it means three way catalyst does not operate properly.

NOTE:
If the voltage at terminal 46 does not switch periodically more than 5 times within 10 seconds at step 4, perform trouble diagnosis for DTC P0133 first. (See EC-161.)

Diagnostic Procedure

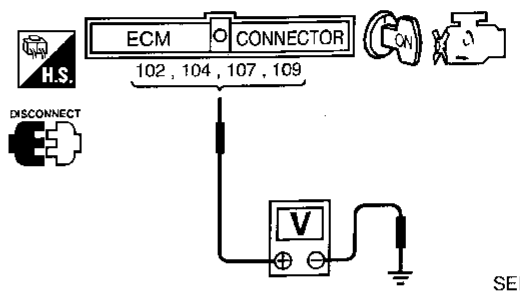
NCEC0243

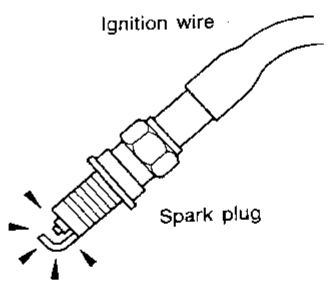
1	CHECK EXHAUST SYSTEM
Visually check exhaust tubes and muffler for dent.	
OK or NG	
OK ▶	GO TO 2.
NG ▶	Repair or replace.

2	CHECK EXHAUST AIR LEAK
1. Start engine and run it at idle. 2. Listen for an exhaust air leak before the three way catalyst.	
 SEF099P	
OK or NG	
OK ▶	GO TO 3.
NG ▶	Repair or replace.

3	CHECK INTAKE AIR LEAK
Listen for an intake air leak after the mass air flow sensor.	
OK or NG	
OK ▶	GO TO 4.
NG ▶	Repair or replace.

4	CHECK IGNITION TIMING
Check for ignition timing. Refer to TROUBLE DIAGNOSIS — "BASIC INSPECTION", EC-83.	
OK or NG	
OK ▶	GO TO 5.
NG ▶	Adjust ignition timing.

5	CHECK INJECTORS
1. Refer to Wiring Diagram for Injectors, EC-451. 2. Stop engine and then turn ignition switch "ON". 3. Check voltage between ECM terminals 102, 104, 107 and 109 and ground with CONSULT or tester.	
 SEF236W	
Battery voltage should exist.	
OK or NG	
OK ▶	GO TO 6.
NG ▶	Perform "Diagnostic Procedure" INJECTOR, EC-452.

6	CHECK IGNITION SPARK
1. Disconnect ignition wire from spark plug. 2. Connect a known good spark plug to the ignition wire. 3. Place end of spark plug against a suitable ground and crank engine. 4. Check for spark.	
 SEF282G	
OK or NG	
OK ▶	GO TO 8.
NG ▶	GO TO 7.

7	CHECK IGNITION WIRES
Refer to "Component Inspection", EC-249.	
OK or NG	
OK ▶	Check ignition coil, power transistor and their circuits. Refer to EC-343.
NG ▶	Replace.

Diagnostic Procedure (Cont'd)

8	CHECK INJECTOR
1. Turn ignition switch "OFF". 2. Remove injector assembly. Refer to EC-35. Keep fuel hose and all injectors connected to injector gallery. 3. Disconnect camshaft position sensor harness connector. 4. Turn ignition switch "ON". Make sure fuel does not drip from injector. **OK or NG**	
OK (Does not drip) ▶	GO TO 9.
NG (Drips) ▶	Replace the injector(s) from which fuel is dripping.

9	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-110.	
Trouble is fixed ▶	**INSPECTION END**
Trouble is not fixed ▶	Replace three way catalyst.

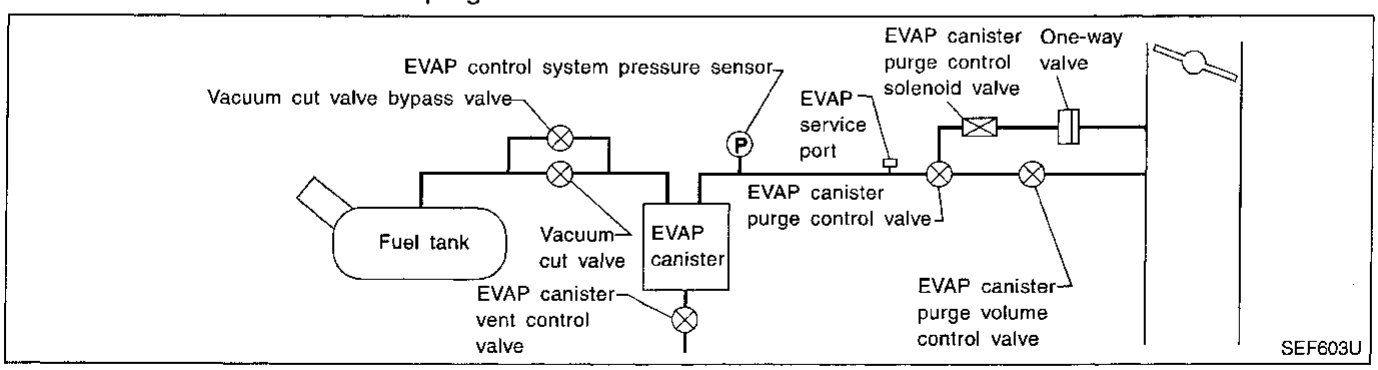
On Board Diagnosis Logic

NCEC0244

NOTE:

If DTC P0440 is displayed with DTC P1448, perform trouble diagnosis for DTC P1448 first. (See EC-397.)

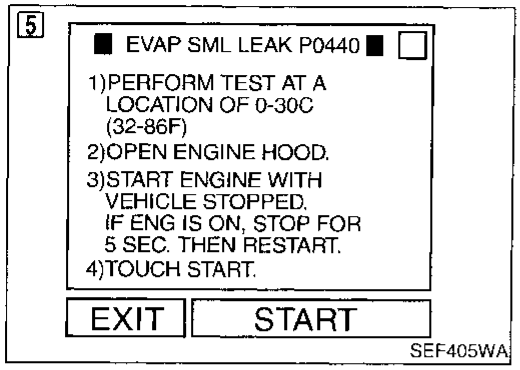
This diagnosis detects leaks in the EVAP purge line using engine intake manifold vacuum.
If pressure does not increase, the ECM will check for leaks in the line between the fuel tank and EVAP canister purge control valve under the following "Vacuum test" conditions.
The vacuum cut valve bypass valve 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 volume control valve and EVAP canister purge control valve will be closed.

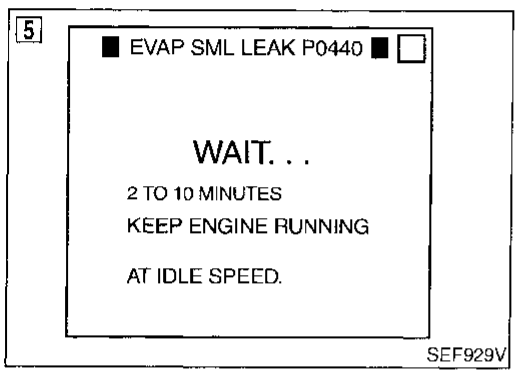


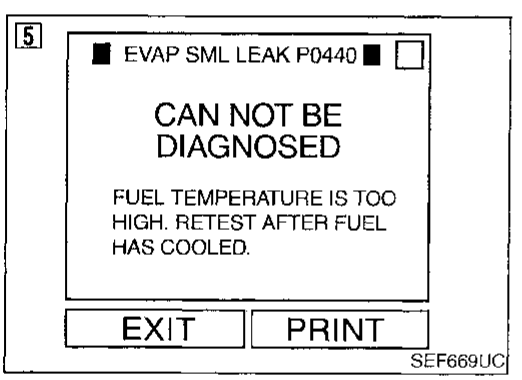
DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0440 0705	• EVAP control system has a leak. • EVAP control system does not operate properly.	• Incorrect fuel tank vacuum relief valve • Incorrect fuel filler cap used • Fuel filler cap remains open or fails to close. • Foreign matter caught in fuel filler cap. • Leak is in line between intake manifold and EVAP canister purge control valve. • Foreign matter caught in EVAP canister vent control valve. • EVAP canister or fuel tank leaks • EVAP purge line (pipe and rubber tube) leaks • EVAP purge line rubber tube bent. • Blocked or bent rubber tube to EVAP control system pressure sensor • Loose or disconnected rubber tube • EVAP canister vent control valve and the circuit • EVAP canister purge control valve • EVAP canister purge volume control valve • EVAP canister purge control solenoid valve and the circuit • Absolute pressure sensor • Tank fuel temperature sensor • MAP/BARO switch solenoid valve and the circuit • Blocked or bent rubber tube to MAP/BARO switch solenoid valve • O-ring of EVAP canister vent control valve is missing or damaged. • Water separator • EVAP canister is saturated with water. • EVAP control system pressure sensor

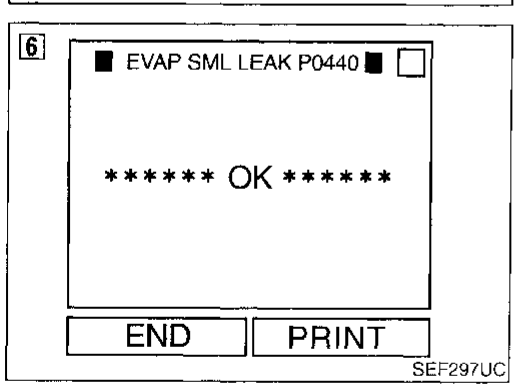
CAUTION:

- **Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.**
- **If the fuel filler cap is not tightened properly, the MIL may come on.**
- **Use only a genuine NISSAN rubber tube as a replacement.**









DTC Confirmation Procedure

NCEC0245

NOTE:

- **If DTC P0440 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. Refer to EC-397.**
- If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

With CONSULT

TESTING CONDITION:

- **Perform "DTC WORK SUPPORT" when the fuel level is less than 3/4 full and vehicle is placed on flat level surface.**
- **Always perform test at a temperature of 0 to 30°C (32 to 86°F).**
- **It is better that the fuel level is low.**

1) Turn ignition switch "ON".
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT.
4) Check that the following conditions are met.

COOLAN TEMP/S	0 - 70°C (32 - 158°F)
INT/A TEMP SE	0 - 60°C (32 - 140°F)

5) Select "EVAP SML LEAK P0440" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT. Follow the instruction displayed.

NOTE:

- **If the CONSULT screen shown at left is displayed, stop the engine and stabilize the vehicle temperature at 25°C (77°F) or cooler. After "TANK F/TMP SE" becomes less than 30°C (86°F), retest. (Use a fan to reduce the stabilization time.)**
- **If the engine cannot be maintained within the range on CONSULT screen, go to "Basic Inspection", EC-83.**

6) Make sure that "OK" is displayed.
If "NG" is displayed, refer to "Diagnostic Procedure", EC-286.

With GST

1) Start engine.
2) Drive vehicle according to "Driving pattern", EC-48.

NOTE:

Be sure to read the explanation of "Driving pattern" on EC-48 before driving vehicle.

3) Stop vehicle.
4) Select "MODE 1" with GST.

- If SRT of EVAP system is not set yet, go to the following step.
- If SRT of EVAP system is set, the result will be OK.

5) Turn ignition switch "OFF" and wait at least 5 seconds.
6) Start engine.
It is not necessary to cool engine down before driving.
7) Drive vehicle again according to the "Driving pattern", EC-48.
8) Stop vehicle.
9) Select "MODE 3" with GST.

- If P1447 is displayed on the screen, go to "Diagnostic Procedure", EC-393.
- If P0440 is displayed on the screen, go to "Diagnostic Procedure", EC-286.

- If P1440 is displayed on the screen, go to "Diagnostic Procedure", EC-374.
- If P0440, P1440 and P1447 are not displayed on the screen, go to the following step.

10) Select "MODE 1" with GST.
- If SRT of EVAP system is set, the result will be OK.
- If SRT of EVAP system is not set, go to step 5.

No Tools

1) Start engine.
2) Drive vehicle according to "Driving pattern", EC-48.

NOTE:
- **Be sure to read the explanation of "Driving pattern" on EC-48 before driving vehicle.**

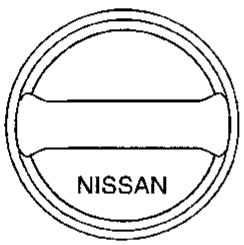
3) Stop vehicle.
4) Turn ignition switch "OFF" and wait at least 5 seconds.
5) Turn ignition switch "ON" and perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-286.

Diagnostic Procedure

NCEC0246

1 CHECK FUEL FILLER CAP DESIGN

1. Turn ignition switch "OFF".
2. Check for genuine NISSAN fuel filler cap design.



SEF915U

OK or NG

OK	▶	GO TO 2.
NG	▶	Replace with genuine NISSAN fuel filler cap.

2 CHECK FUEL FILLER CAP INSTALLATION

Check that the cap is tightened properly rotating the cap clockwise.

OK or NG

OK	▶	GO TO 3.
NG	▶	• Open fuel filler cap, then clean cap and fuel filler neck threads using air blower. • Retighten until ratching sound is heard.

3 CHECK FUEL FILLER CAP FUNCTION

Check for air releasing sound while opening the fuel filler cap.

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4 CHECK FUEL TANK VACUUM RELIEF VALVE

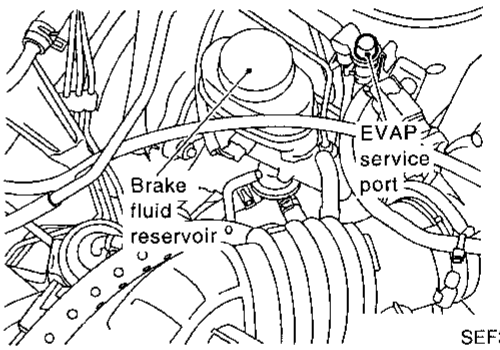
Refer to "Evaporative Emission System", EC-27.

OK or NG

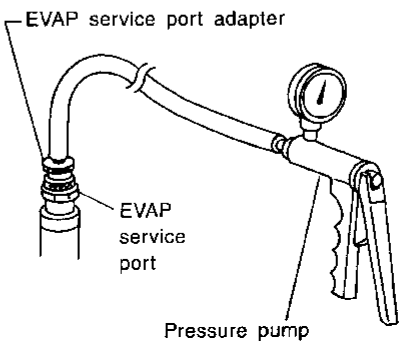
OK	▶	GO TO 5.
NG	▶	Replace fuel filler cap with a genuine one.

5 INSTALL PRESSURE PUMP

1. Install the EVAP service port adapter and the pressure pump securely to EVAP service port.



SEF303W



SEF462UE

NOTE:

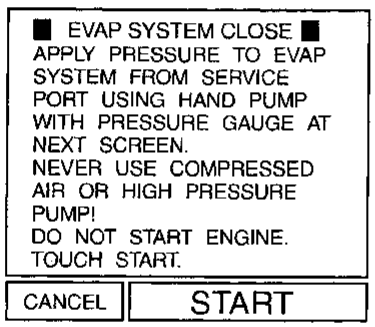
- **Improper installation of service port may cause leaking.**

Models with CONSULT	▶	GO TO 6.
Models without CONSULT	▶	GO TO 7.

6	CHECK FOR EVAP LEAK

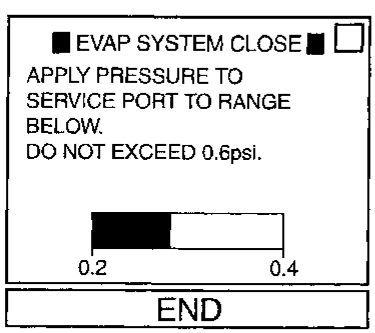
With CONSULT

1. Turn ignition switch "ON".
2. Select "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT.



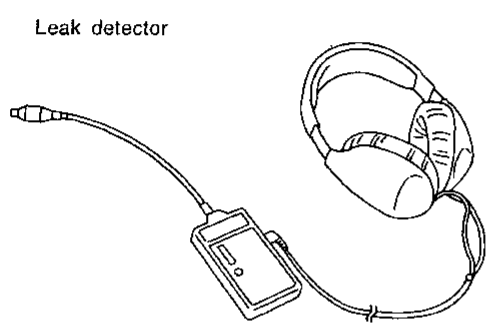
SEF658U

3. Touch "START" and apply pressure into the EVAP line until the pressure indicator reaches the middle of bar graph.
   NOTE:
   - **Never use compressed air or a high pressure pump.**
   - **Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in the system.**



SEF917U

4. Using EVAP leak detector, locate the leak portion. For the leak detector, refer to instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-31.



SEF200U

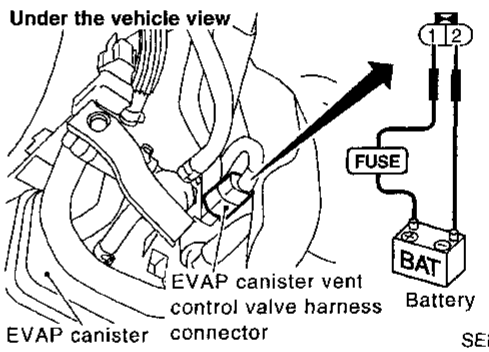
OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace.

7	CHECK FOR EVAP LEAK

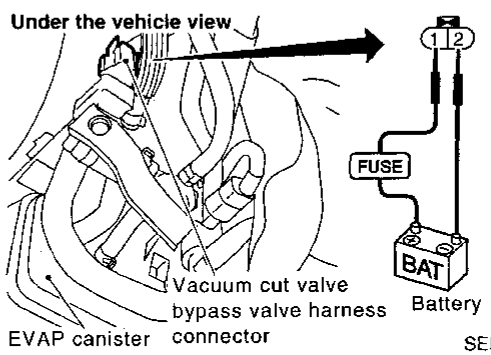
Without CONSULT

1. Turn ignition switch "OFF".
2. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)



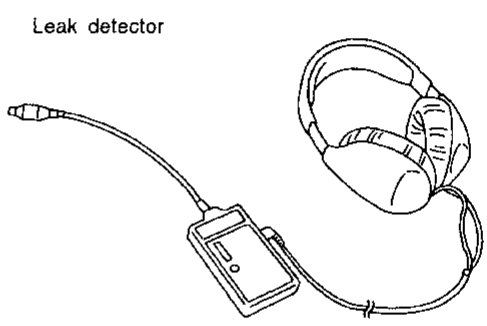
SEF304W

3. Apply 12 volts DC to vacuum cut valve bypass valve. The valve will open. (Continue to apply 12 volts until the end of test.)



SEF305W

4. Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg).
   NOTE:
   - **Never use compressed air or a high pressure pump.**
   - **Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in the system.**
5. Using EVAP leak detector, locate the leak. For the leak detector, refer to instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-31.



SEF200U

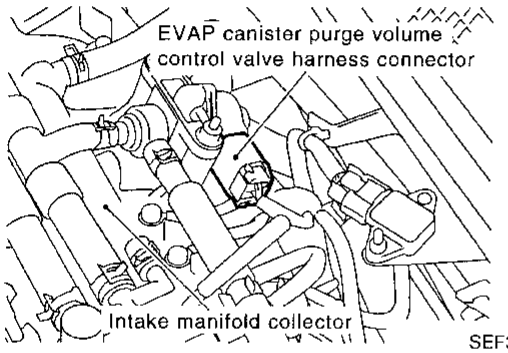
OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace.

Diagnostic Procedure (Cont'd)

8	CHECK EVAP CANISTER PURGE VOLUME CONTROL VALVE

Refer to "Component Inspection", EC-295.

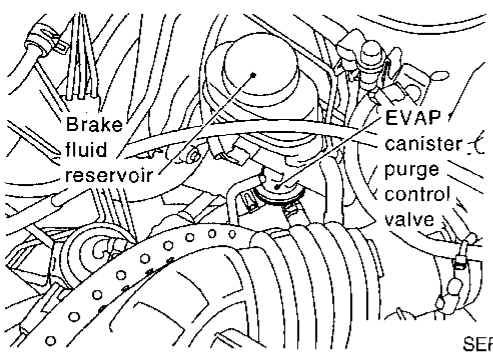


OK or NG

OK	▶	GO TO 9.
NG	▶	Replace EVAP canister purge volume control valve.

9	CHECK EVAP CANISTER PURGE CONTROL VALVE

Refer to "Component Inspection", EC-427.



OK or NG

OK	▶	GO TO 10.
NG	▶	Replace EVAP canister purge control valve.

10	CHECK EVAP CANISTER VENT CONTROL VALVE, O-RING AND CIRCUIT

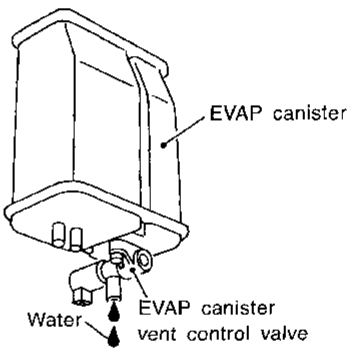
Refer to "DTC Confirmation Procedure", EC-297.

OK or NG

OK	▶	GO TO 11.
NG	▶	Repair or replace EVAP canister vent control valve and O-ring or harness/ connectors.

11	CHECK IF EVAP CANISTER IS SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Check if water will drain from the EVAP canister.



Yes or No

Yes	▶	GO TO 12.
No (With CONSULT)	▶	GO TO 14.
No (Without CONSULT)	▶	GO TO 15.

12	CHECK EVAP CANISTER

Weigh the EVAP canister with EVAP canister vent control valve attached.
The weight should be less than 1.8 kg (4.0 lb).

OK or NG

OK (With CONSULT)	▶	GO TO 14.
OK (Without CONSULT)	▶	GO TO 15.
NG	▶	GO TO 13.

13	DETECT MALFUNCTIONING PART

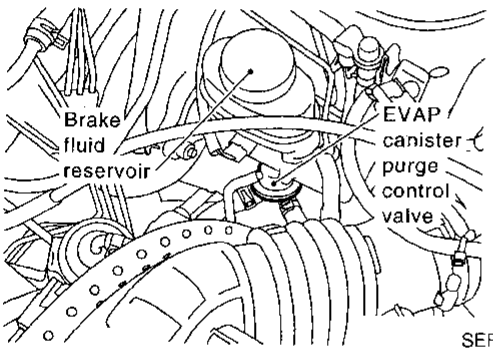
Check the following.
1. Visually check the EVAP canister for damage.
2. Check hose connection between EVAP canister and water separator for clogging and poor connection.
3. Check water separator.
   Refer to "Component Inspection", EC-389.

	▶	Repair hose or replace EVAP canister or water separator.

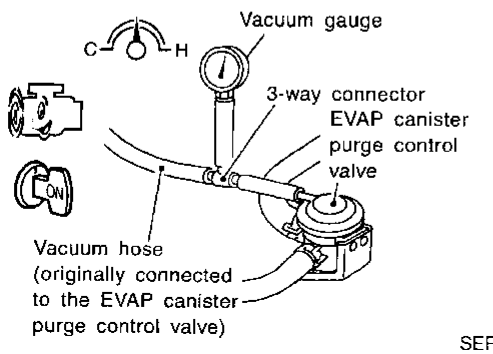
14	CHECK EVAP CANISTER PURGE CONTROL SOLENOID VALVE

With CONSULT

1. Disconnect vacuum hose from EVAP canister purge control valve and install vacuum gauge.

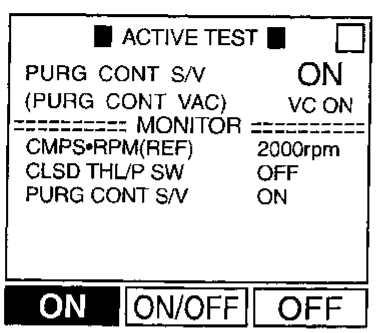


SEF307W



SEF622U

2. Start engine and let it idle.
3. Perform "PURG CONT S/V" in "ACTIVE TEST" mode.
4. Rev engine up to 2,000 rpm.
5. Select "ON" and "OFF" on CONSULT screen to turn on "PURG CONT/V S/V".



SEF738W

ON: Vacuum should exist.
OFF: Vacuum should not exist.

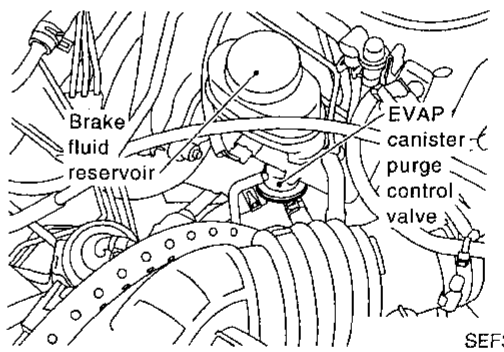
OK or NG

OK	▶	GO TO 17.
NG	▶	GO TO 16.

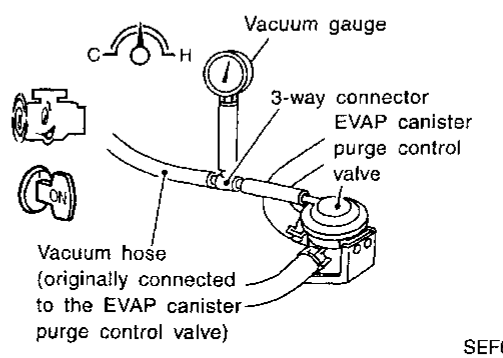
15	CHECK EVAP CANISTER PURGE CONTROL SOLENOID VALVE

Without CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Lift up drive wheels.
4. Disconnect vacuum hose from EVAP canister purge volume control valve and install vacuum gauge.



SEF307W



SEF622U

5. Start engine and let it idle for at least 60 seconds.
6. Shift selector lever to 1st gear position (M/T models).
7. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.
   While operating solenoid valve, vacuum should exist.
8. Release the accelerator pedal and let idle.
   Vacuum should not exist.

OK or NG

OK	▶	GO TO 17.
NG	▶	GO TO 16.

16	DETECT MALFUNCTIONING PART

Check the following.

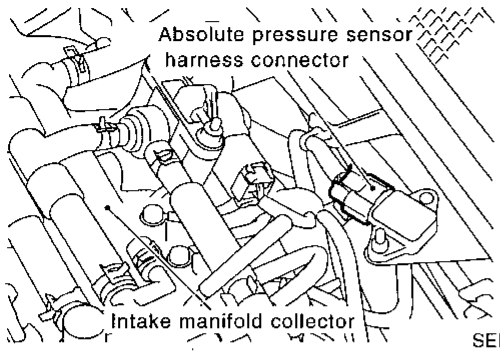
- EVAP canister purge control solenoid valve
  Refer to "Component Inspection", EC-419.
- Vacuum hoses for clogging or disconnection.
  Refer to "Vacuum Hose Drawing", EC-21.

	▶	Repair hoses or replace EVAP canister purge control solenoid valve.

Diagnostic Procedure (Cont'd)

17	CHECK ABSOLUTE PRESSURE SENSOR

Refer to "Component Inspection", EC-133.



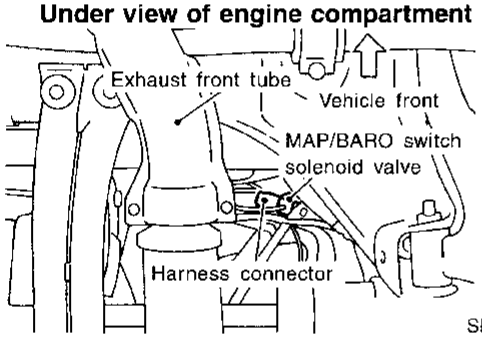
OK or NG

OK	▶	GO TO 18.
NG	▶	Replace absolute pressure sensor.

18	CHECK MAP/BARO SWITCH SOLENOID VALVE AND CIRCUIT

Refer to "DTC Confirmation Procedure", EC-332.

Under view of engine compartment



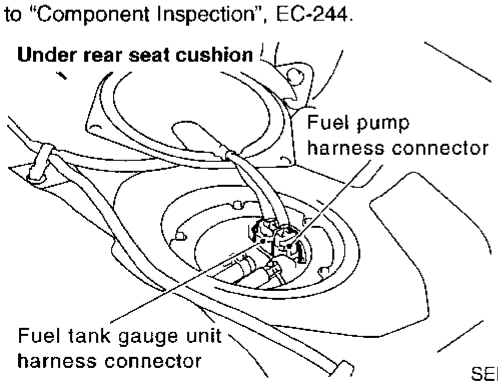
OK or NG

OK	▶	GO TO 19.
NG	▶	Repair or replace MAP/BARO switch solenoid valve or harness/connector.

19	CHECK TANK FUEL TEMPERATURE SENSOR

Refer to "Component Inspection", EC-244.

Under rear seat cushion



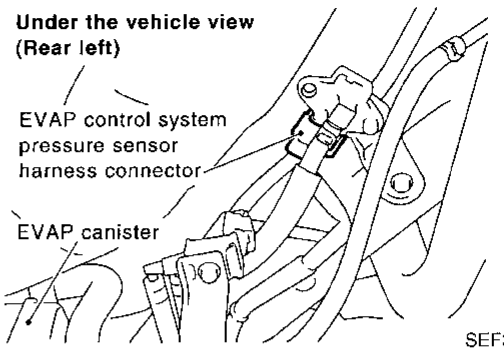
OK or NG

OK	▶	GO TO 20.
NG	▶	Replace tank fuel temperature sensor.

20	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to "Component Inspection", EC-308.

Under the vehicle view (Rear left)



OK or NG

OK	▶	GO TO 21.
NG	▶	Replace EVAP control system pressure sensor.

21	CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection.
Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-31.

OK or NG

OK	▶	GO TO 22.
NG	▶	Repair or reconnect the hose.

22	CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

	▶	GO TO 23.

23	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-110.

	▶	**INSPECTION END**

Description

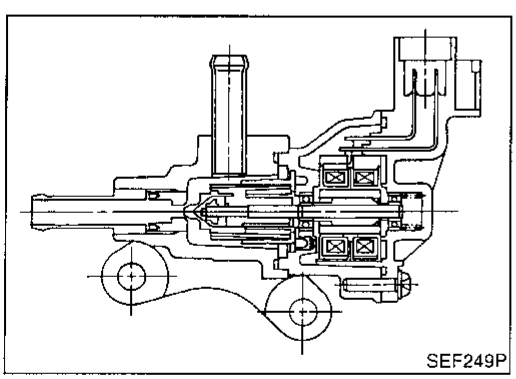
NCEC0248

SYSTEM DESCRIPTION

NCEC0248S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	EVAP canister purge control	EVAP canister purge volume control valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Battery	Battery voltage		
Ignition switch	Start signal		
Closed throttle position switch	Closed throttle position		
Throttle position sensor	Throttle position		
Front heated oxygen sensor	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Tank fuel temperature sensor	Fuel temperature in fuel tank		
Vehicle speed sensor	Vehicle speed		

This system controls flow rate of fuel vapor from the EVAP canister. The opening of the vapor bypass passage in the EVAP canister purge volume control 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.



SEF249P

COMPONENT DESCRIPTION

NCEC0248S02

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.

CONSULT Reference Value in Data Monitor Mode

NCEC0249

MONITOR ITEM	CONDITION		SPECIFICATION
PURG VOL C/V	• Engine: After warming up • No-load • Lift up drive wheels and shift to 1st gear position.	Idle	0 step
		More than 60 seconds after starting engine More than 16 km/h (10 MPH)	More than 1 step

DTC P0443 EVAPORATIVE EMISSION (EVAP) CANISTER PURGE VOLUME CONTROL VALVE (CIRCUIT)

ECM Terminals and Reference Value

ECM Terminals and Reference Value

NCEC0250

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
5	L	EVAP canister purge volume control valve	**[Engine is running]** • **Warm-up condition** • Idle speed	0 - 0.6V
6	G			
16	Y	EVAP canister purge volume control valve	**[Engine is running]** • Idle speed	BATTERY VOLTAGE (11 - 14V)
17	OR			

On Board Diagnosis Logic

NCEC0251

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0443 1008	• An improper voltage signal is sent to ECM through the valve.	• Harness or connectors (The valve circuit is open or shorted.) • EVAP canister purge volume control valve

DTC Confirmation Procedure

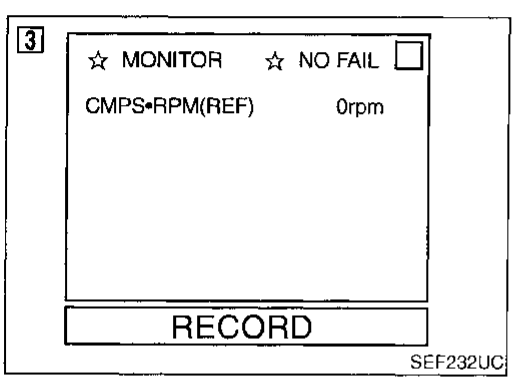
NCEC0252

NOTE:

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

TESTING CONDITION:

Before performing the following procedure, confirm battery voltage is more than 11V with ignition switch "ON".



With CONSULT

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
3) Wait at least 5 seconds.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-294.

With GST

1) Turn ignition switch "ON" and wait at least 5 seconds.
2) Select "MODE 7" with GST.
3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-294.

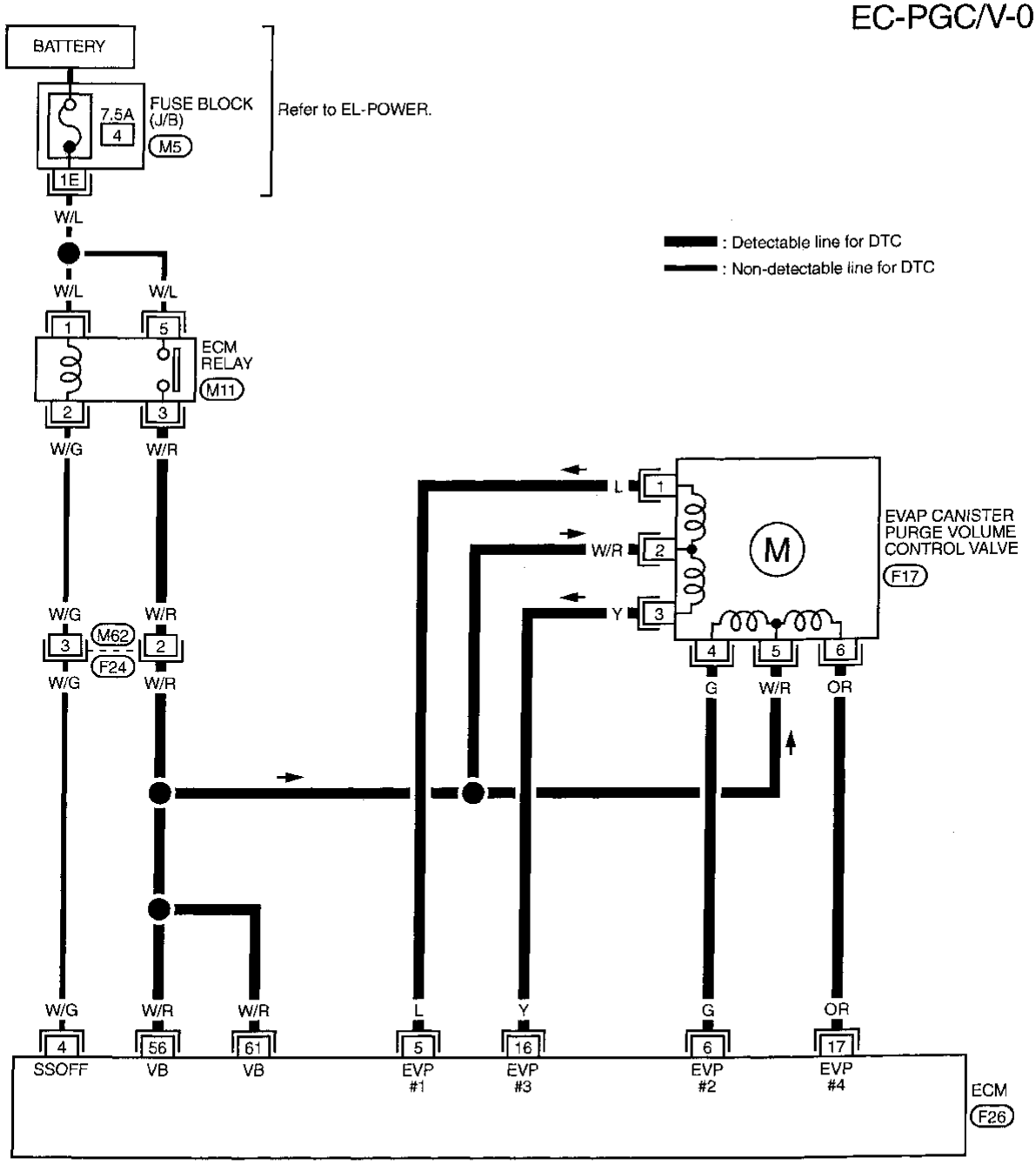
No Tools

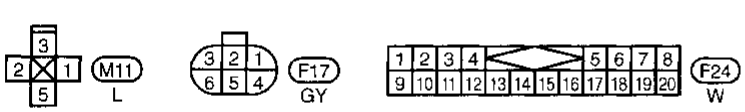
1) Turn ignition switch "ON" and wait at least 5 seconds.
2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
3) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-294.

Wiring Diagram

NCEC0253

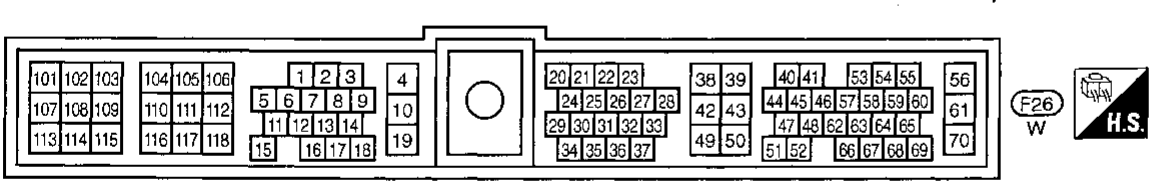
EC-PGC/V-01





Refer to last page (Foldout page).

M5



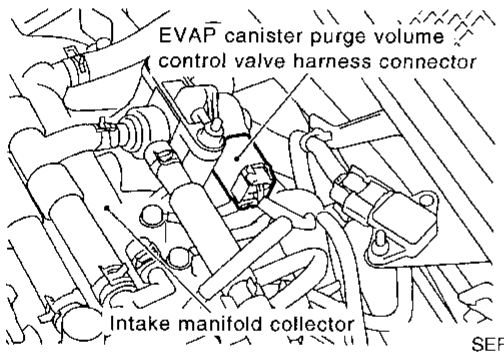
TEC538

Diagnostic Procedure

NCEC0254

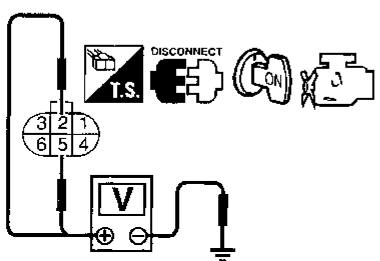
1 CHECK POWER SUPPLY

1. Turn ignition switch "OFF".
2. Disconnect EVAP canister purge volume control valve harness connector.



SEF306W

3. Turn ignition switch "ON".
4. Check voltage between terminals 2, 5 and engine ground with CONSULT or tester.



SEF237W

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2 DETECT MALFUNCTIONING PART

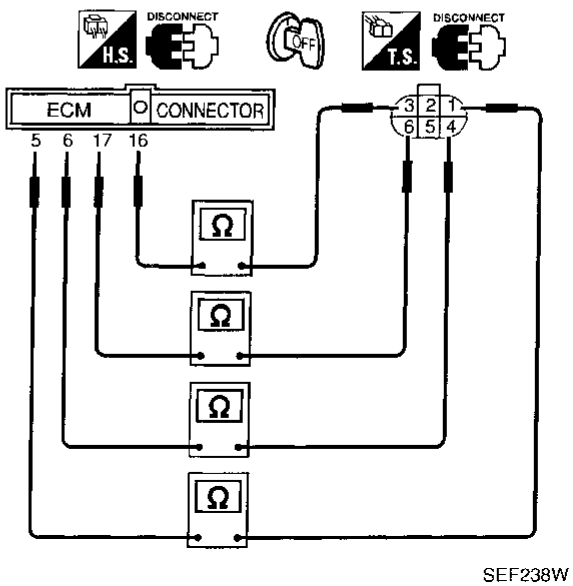
Check the following.

- Harness connectors M62, F24
- Harness for open or short between EVAP canister purge volume control valve and ECM relay
- Harness for open or short between EVAP canister purge volume control valve and ECM

	▶	Repair harness or connectors.

3 CHECK OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between
   ECM terminal 16 and terminal 3,
   ECM terminal 17 and terminal 6,
   ECM terminal 5 and terminal 1,
   ECM terminal 6 and terminal 4.



SEF238W

Continuity should exist.

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

OK or NG

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

4 CHECK EVAP CANISTER PURGE VOLUME CONTROL VALVE

Refer to "Component Inspection" EC-295.

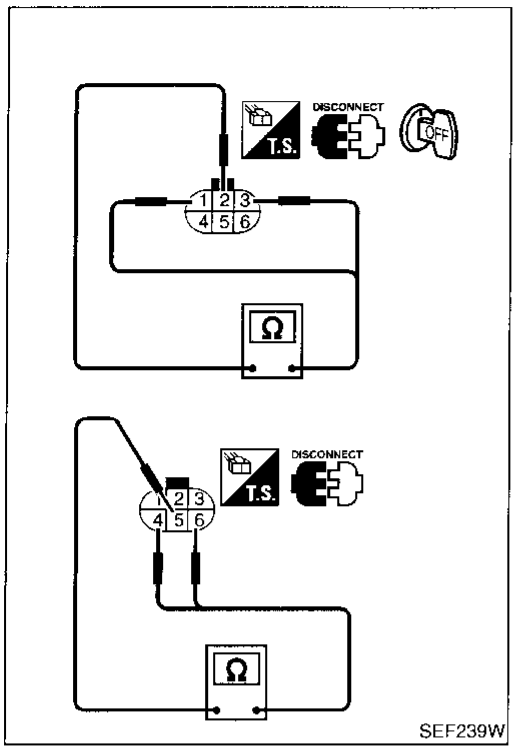
OK or NG

OK	▶	GO TO 5.
NG	▶	Replace EVAP canister purge volume control valve.

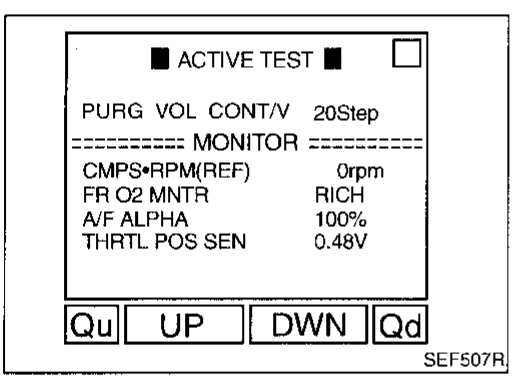
5 CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-110.

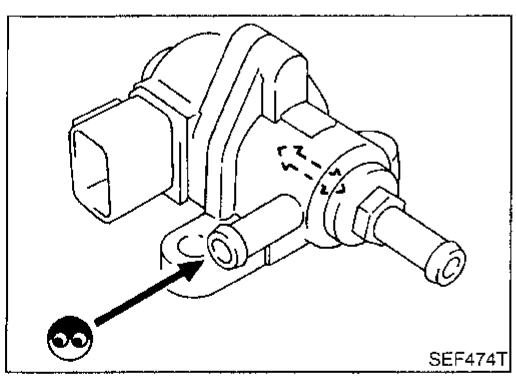
	▶	INSPECTION END



SEF239W



SEF507R


SEF474T

Component Inspection

NCEC0255

EVAP CANISTER PURGE VOLUME CONTROL VALVE

NCEC0255S01

With CONSULT

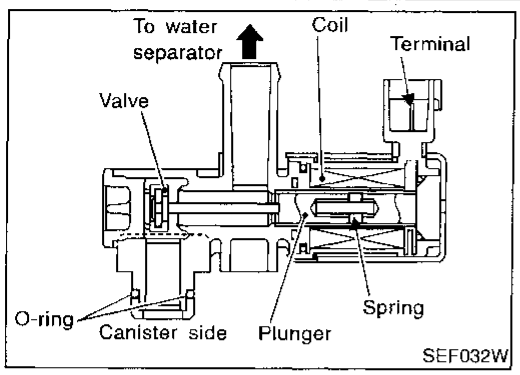
1) Disconnect EVAP canister purge volume control valve harness connector.
2) Check resistance between the following terminals.
   terminal 2 and terminals 1, 3
   terminal 5 and terminals 4, 6
   Resistance: 35 - 43Ω [At 20°C (68°F)]
   If NG, replace the EVAP canister purge volume control valve.
   If OK, go to the following step.
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.

Without CONSULT

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: 35 - 43Ω [At 20°C (68°F)]
   If NG, replace the EVAP canister purge volume control valve.
   If OK, go to the following step.
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.

DTC P0446 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (CIRCUIT)

Component Description



Component Description

NCEC0256

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

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

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

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

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

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

CONSULT Reference Value in Data Monitor Mode

NCEC0257

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	• Ignition switch: ON	OFF

ECM Terminals and Reference Value

NCEC0258

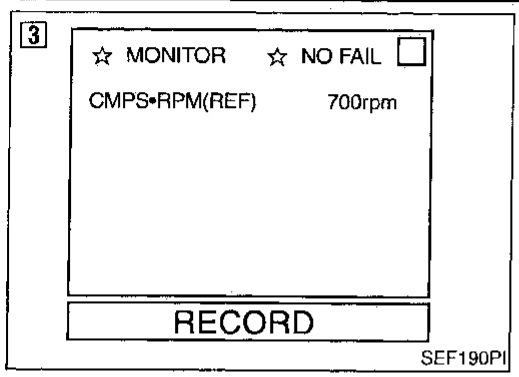
Specification data are reference values and are measured between each terminal and 43 (ECM ground).

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
108	PU/W	EVAP canister vent control valve	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NCEC0259

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0446 0903	• An improper voltage signal is sent to ECM through EVAP canister vent control valve.	• Harness or connectors (EVAP canister vent control valve circuit is open or shorted.) • EVAP canister vent control valve



DTC Confirmation Procedure

NCEC0260

NOTE:

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

TESTING CONDITION:

Before performing the following procedure, confirm battery voltage is more than 11V at idle.

With CONSULT

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
3) Start engine and wait at least 5 seconds.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-299.

With GST

1) Start engine and wait at least 5 seconds.
2) Select "MODE 7" with GST.
3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-299.

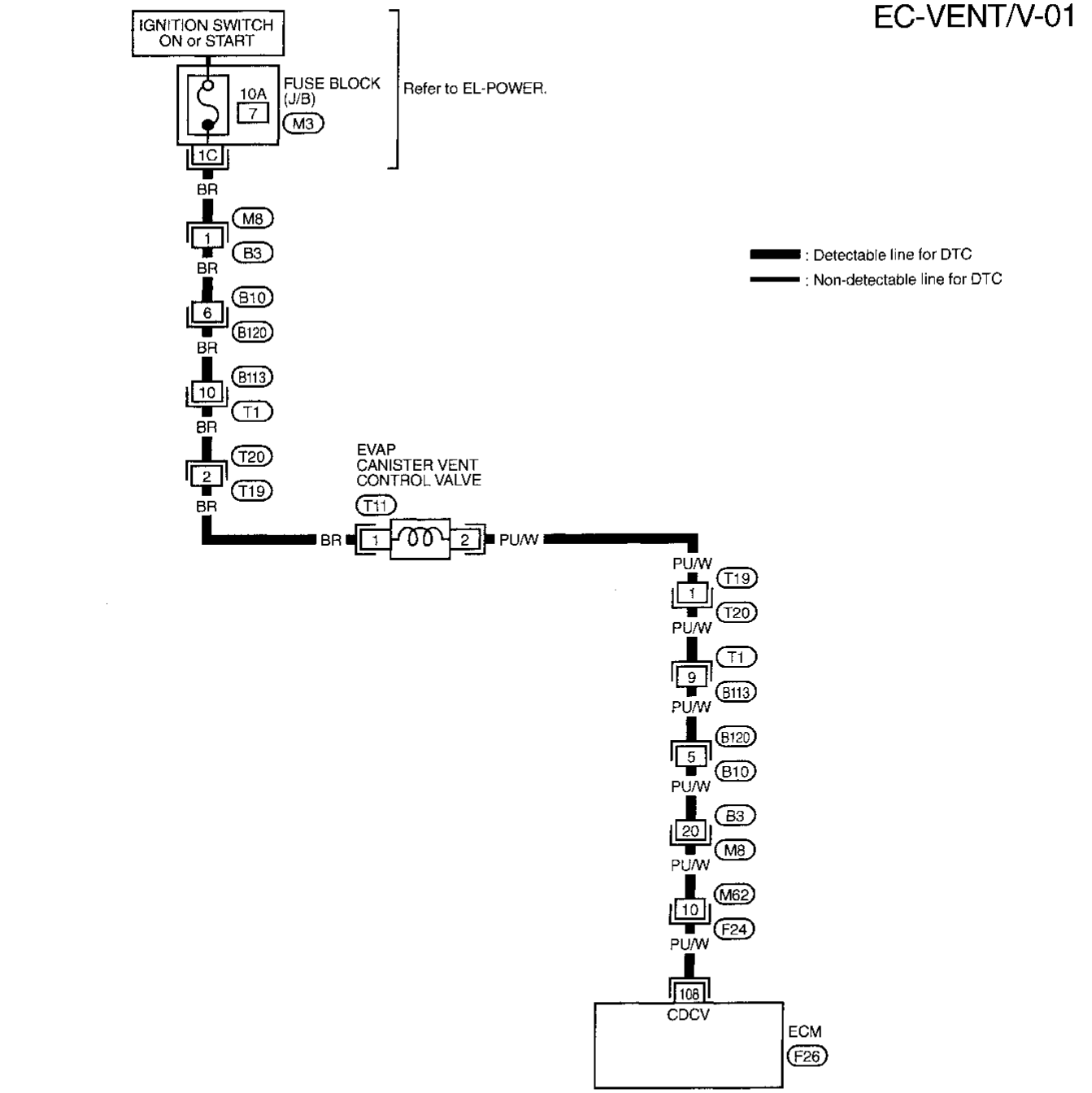
No Tools

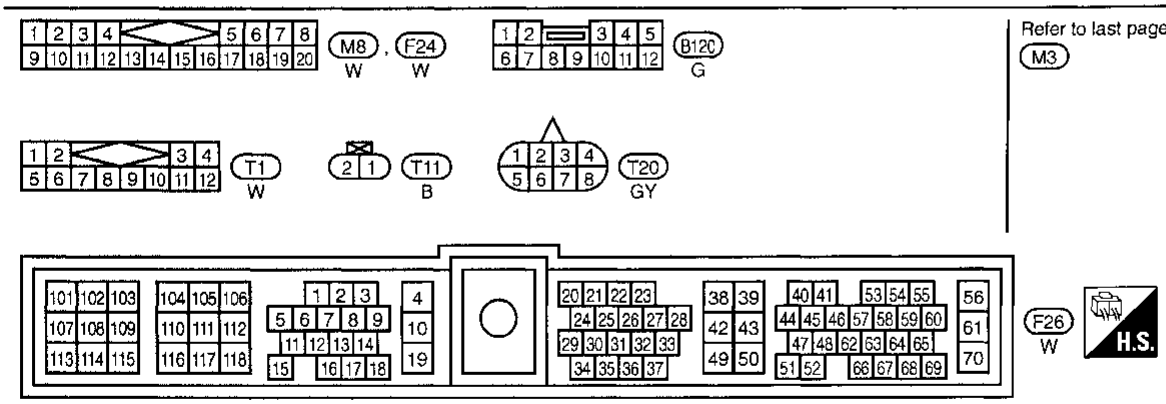
1) Start engine and wait at least 5 seconds.
2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
3) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-299.

Wiring Diagram

NCEC0261

EC-VENT/V-01





Refer to last page (Foldout page).

M3

TEC539

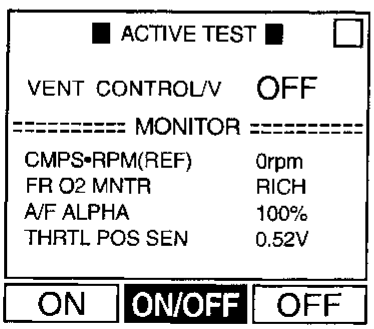
Diagnostic Procedure

NCEC0262

1	INSPECTION START
Do you have CONSULT?	
Yes or No	
Yes ▶	GO TO 2.
No ▶	GO TO 3.

2	CHECK CIRCUIT

1. Turn ignition switch "ON".
2. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.



SEF361U

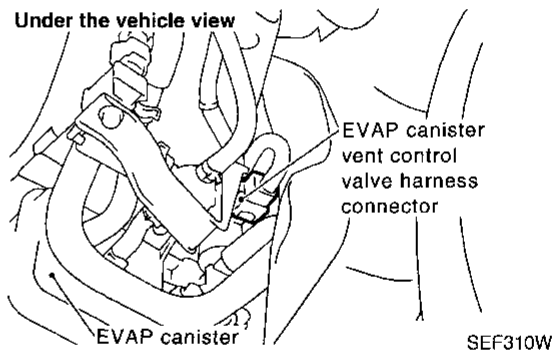
3. Make sure that ratcheting sound is heard from the vent control valve.

OK or NG

OK ▶	GO TO 7.
NG ▶	GO TO 3.

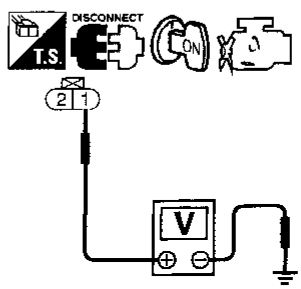
3	CHECK POWER SUPPLY

1. Turn ignition switch "OFF".
2. Disconnect EVAP canister vent control valve harness connector.



SEF310W

3. Turn ignition switch "ON".
4. Check voltage between terminal 1 and ground with CONSULT or tester.



SEF240W

Voltage: Battery voltage

OK or NG

OK ▶	GO TO 5.
NG ▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.

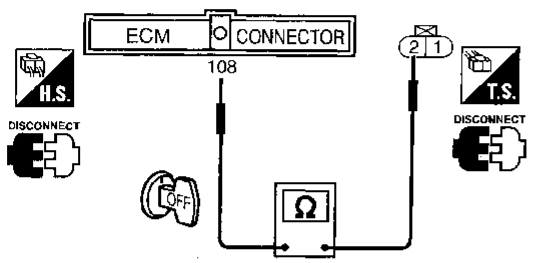
- Harness connectors M8, B3
- Harness connectors B10, B120
- Harness connectors B113, T1
- Harness connectors T20, T19
- 10A fuse
- Harness for open or short between EVAP canister vent control valve and fuse

▶	Repair harness or connectors.

Diagnostic Procedure (Cont'd)

5	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.



SEF241W

Continuity should exist.

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

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 6.

6	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M8, B3
- Harness connectors B10, B120
- Harness connectors B113, T1
- Harness connectors T20, T19
- Harness for open or short between EVAP canister vent control valve and ECM

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

7	CHECK EVAP CANISTER VENT CONTROL VALVE AND O-RING

Refer to "Component Inspection", EC-300.

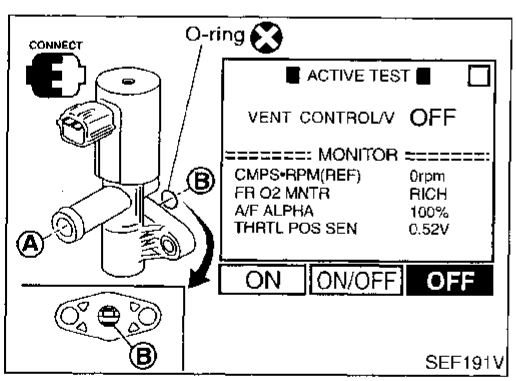
OK or NG

OK	▶	GO TO 8.
NG	▶	Replace EVAP canister vent control valve and O-ring.

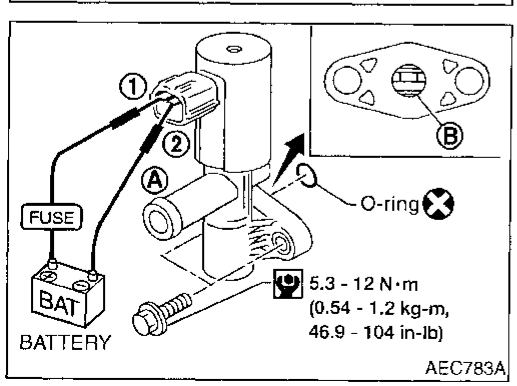
8	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-110.

▶	INSPECTION END



SEF191V



AEC783A

Component Inspection

NCEC0263

EVAP CANISTER VENT CONTROL VALVE

NCEC0263S01

Check air passage continuity.

Ⓗ With CONSULT

Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.

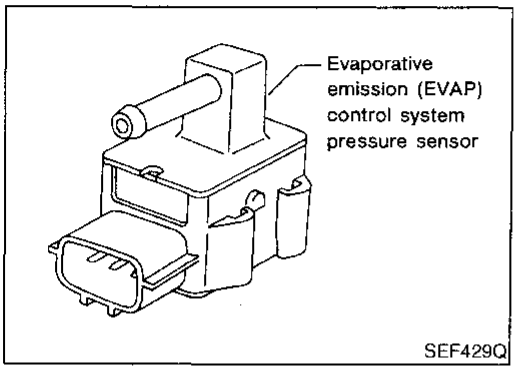
Condition VENT CONTROL/V	Air passage continuity between **A** and **B**
ON	No
OFF	Yes

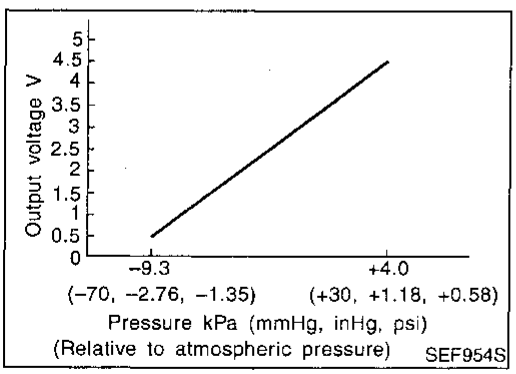
Ⓧ Without CONSULT

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

If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.

If the portion B is rusted, replace EVAP canister vent control valve. Make sure new O-ring is installed properly.





Component Description

NCEC0264

The EVAP control system pressure sensor detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases. The EVAP control system pressure sensor is not used to control the engine system. It is used only for on board diagnosis.

CONSULT Reference Value in Data Monitor Mode

NCEC0265

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
EVAP SYS PRES	• Ignition switch: ON	Approx. 3.4V

ECM Terminals and Reference Value

NCEC0266

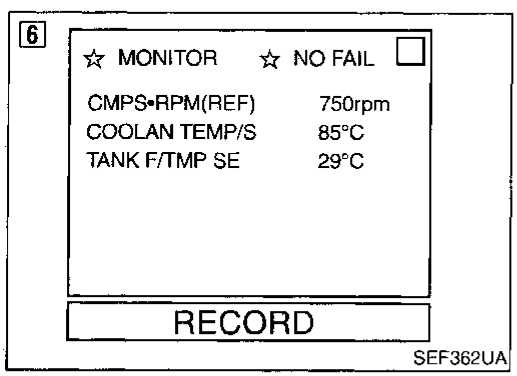
Specification data are reference values and are measured between each terminal and 43 (ECM ground).

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
49	P/L	Sensors' power supply	**[Ignition switch "ON"]**	Approximately 5V
50	B	Sensors' ground	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V
67	W	EVAP control system pressure sensor	**[Ignition switch "ON"]**	Approximately 3.4V

On Board Diagnosis Logic

NCEC0267

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0450 0704	• An improper voltage signal from EVAP control system pressure sensor is sent to ECM.	• Harness or connectors (The EVAP control system pressure sensor circuit is open or shorted.) • Rubber hose to EVAP control system pressure is clogged, vent, kinked, disconnected or improper connection. • EVAP control system pressure sensor • EVAP canister vent control valve • EVAP canister purge volume control valve • EVAP canister • Rubber hose from EVAP canister vent control valve to water separator



DTC Confirmation Procedure

NCEC0268

NOTE:

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

TESTING CONDITION:

- **Always perform test at a temperature above 5°C (41°F).**
- **Before performing the following procedure, confirm battery voltage is more than 10V at idle.**

With CONSULT

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Turn ignition switch "ON".
4) Select "DATA MONITOR" mode with CONSULT.
5) Make sure that "TANK F/TEMP SE" is more than 0°C (32°F).
6) Start engine and wait at least 20 seconds.
7) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-306.

With GST

1) Start engine and warm it up to normal operating temperature.
2) Check that voltage between ECM terminal 63 (Tank fuel temperature sensor signal) and ground is less than 4.2V.
3) Turn ignition switch "OFF" and wait at least 5 seconds.
4) Start engine and wait at least 20 seconds.
5) Select "MODE 7" with GST.
6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-306.

No Tools

1) Start engine and warm it up to normal operating temperature.
2) Check that voltage between ECM terminal 63 (Tank fuel temperature sensor signal) and ground is less than 4.2V.
3) Turn ignition switch "OFF" and wait at least 5 seconds.

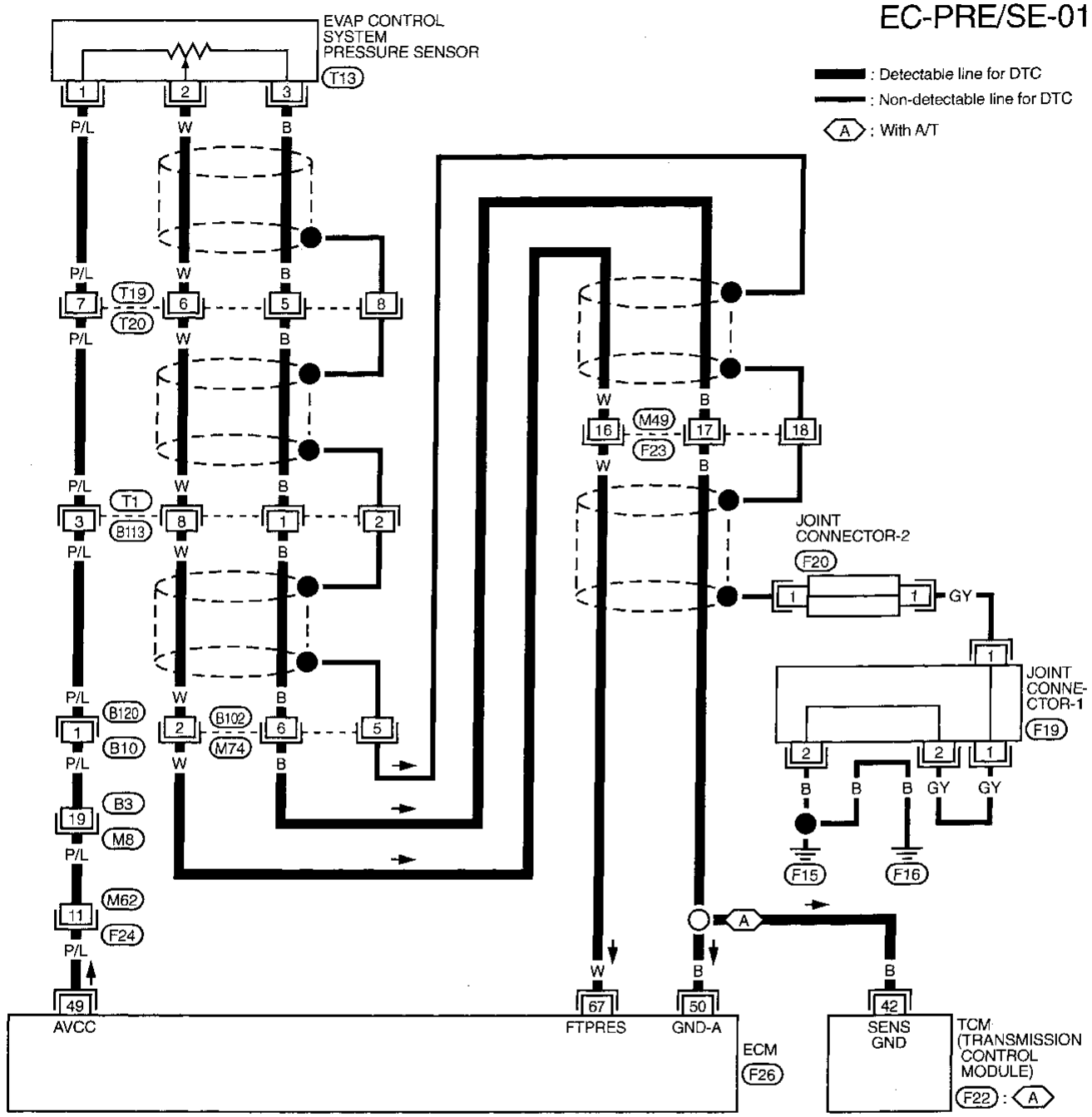
DTC Confirmation Procedure (Cont'd)

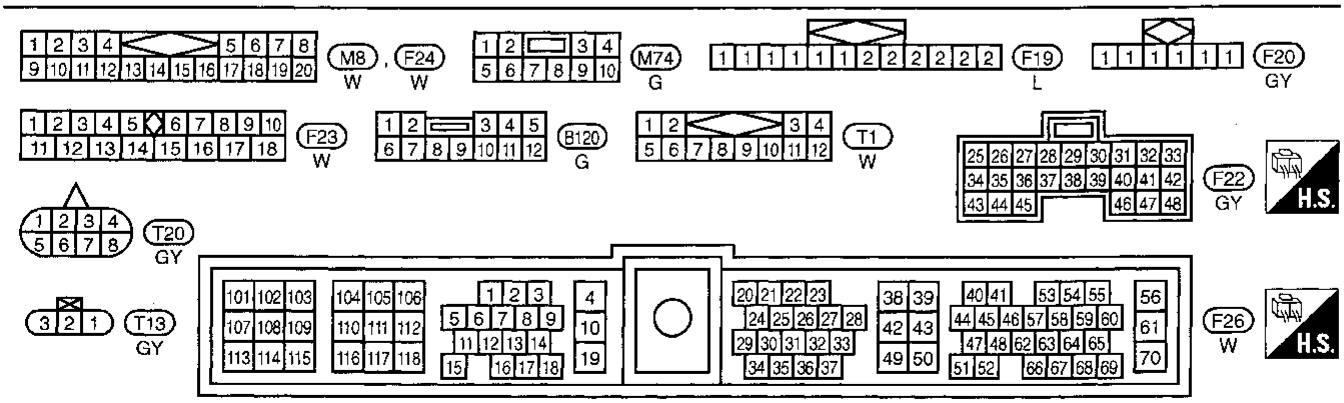
4) Start engine and wait at least 20 seconds.
5) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
6) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
7) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-306.

Wiring Diagram

NCEC0269

EC-PRE/SE-01





TEC540

Diagnostic Procedure

NCEC0270

1 CHECK RUBBER TUBE CONNECTED TO THE SENSOR

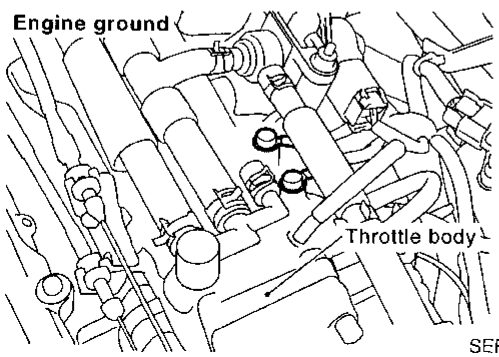
Check rubber tube connected to the sensor for clogging, vent, kink, disconnection or improper connection.

OK or NG

OK	▶	GO TO 2.
NG	▶	Reconnect, repair or replace.

2 RETIGHTEN GROUND SCREWS

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

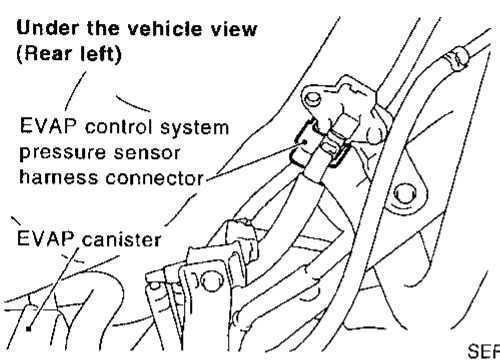


SEF292W

▶ GO TO 3.

3 CHECK HARNESS CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.



SEF309W

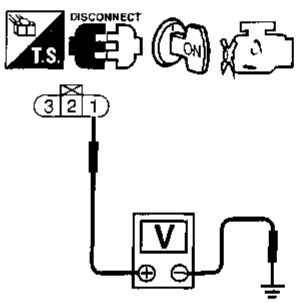
2. Check sensor harness connector for water.
   Water should not exist.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair or replace harness connector.

4 CHECK POWER SUPPLY

1. Turn ignition switch "ON".
2. Check voltage between terminal 1 and engine ground with CONSULT or tester.



SEF242W

Voltage: Approximately 5V

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

5 DETECT MALFUNCTIONING PART

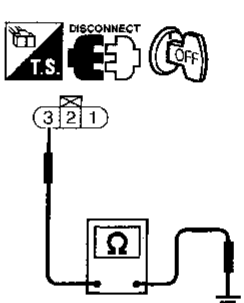
Check the following.

- Harness connectors F24, M62
- Harness connectors M8, B3
- Harness connectors B10, B120
- Harness connectors B113, T1
- Harness connectors T20, T19
- Harness for open or short between EVAP control system pressure sensor and ECM

▶ Repair harness or connectors.

6 CHECK GROUND CIRCUIT

1. Turn ignition switch "OFF".
2. Check harness continuity between terminal 3 and engine ground.



SEF243W

Continuity should exist.

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

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

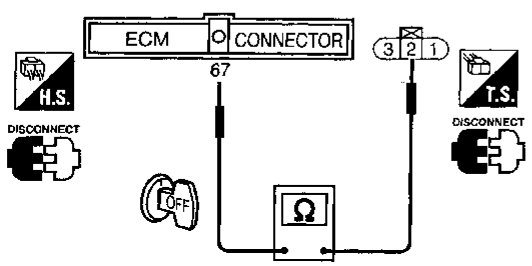
7	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F24, M62
- Harness connectors M8, B3
- Harness connectors B10, B120
- Harness connectors B113, T1
- Harness connectors T20, T19
- Harness for open or short between EVAP control system pressure sensor and ECM
- Harness for open or short between EVAP control system pressure sensor and TCM (Transmission control module)

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

8	CHECK INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 67 and terminal 2.



SEF244W

Continuity should exist.

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

OK or NG

OK	▶	GO TO 10.
NG	▶	GO TO 9.

9	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F24, M62
- Harness connectors M8, B3
- Harness connectors B10, B120
- Harness connectors B113, T1
- Harness connectors T20, T19
- Harness for open or short between ECM and EVAP control system pressure sensor

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

10	CHECK EVAP CANISTER PURGE VOLUME CONTROL VALVE

Refer to "Component Inspection", EC-295.

OK or NG

OK	▶	GO TO 11.
NG	▶	Replace EVAP canister purge volume control valve.

11	CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to "Component Inspection", EC-389.

OK or NG

OK	▶	GO TO 12.
NG	▶	Replace EVAP canister vent control valve.

12	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to "Component Inspection", EC-308.

OK or NG

OK	▶	GO TO 13.
NG	▶	Replace EVAP control system pressure sensor.

13	CHECK RUBBER TUBE FOR CLOGGING

Check obstructed water separator and rubber tube to EVAP canister vent control valve and clean the rubber tube using air blower.
For water separator, refer to EC-389.

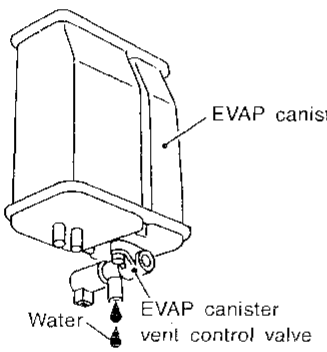
OK or NG

OK	▶	GO TO 14.
NG	▶	Clean, repair or replace rubber tube and/or water separator.

Diagnostic Procedure (Cont'd)

14	CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Check if water will drain from the EVAP canister.



SEF596U

Yes or No

Yes	▶	GO TO 15.
No	▶	GO TO 17.

15	CHECK EVAP CANISTER

Weigh the EVAP canister with EVAP canister vent control valve attached.

The weight should be less than 1.8 kg (4.0 lb).

OK or NG

OK	▶	GO TO 17.
NG	▶	GO TO 16.

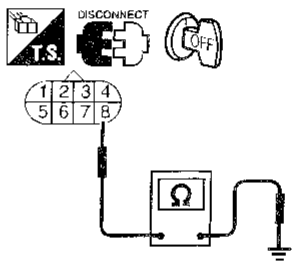
16	DETECT MALFUNCTIONING PART

Check the following.
1. Visually check the EVAP canister for damage.
2. Check hose connection between EVAP canister and water separator for clogging and poor connection.
3. Check water separator.
   Refer to "Component Inspection", EC-389.

	▶	Repair hose or replace EVAP canister or water separator.

17	CHECK SHIELD CIRCUIT

1. Reconnect disconnected harness connectors.
2. Disconnect harness connectors T19, T20.
3. Check harness continuity between terminal 8 and engine ground.



SEF245W

Continuity should exist.

4. Also check harness for short to power.
5. Then reconnect harness connectors.

OK or NG

OK	▶	GO TO 19.
NG	▶	GO TO 18.

18	DETECT MALFUNCTIONING PART

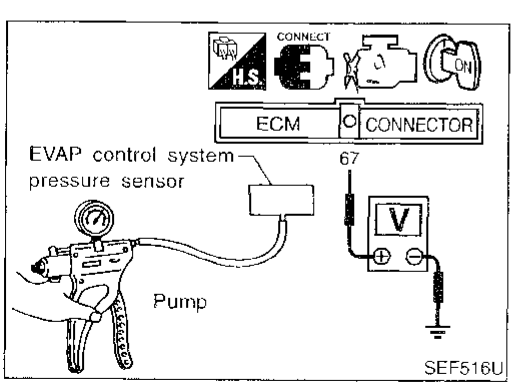
Check the following.
- Harness connectors T20, T19
- Harness connectors B113, T1
- Harness connectors B10, B120
- Harness connectors M8, B3
- Harness connectors F24, M62
- Joint connector-2 (Refer to "HARNESS LAYOUT" in EL section.)
- Joint connector-1 (Refer to "HARNESS LAYOUT" in EL section.)
- Harness for open or short between harness connector T20 and engine ground

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

19	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-110.

	▶	INSPECTION END



SEF516U

Component Inspection

EVAP CONTROL SYSTEM PRESSURE SENSOR

NCEC0271

NCEC0271S01

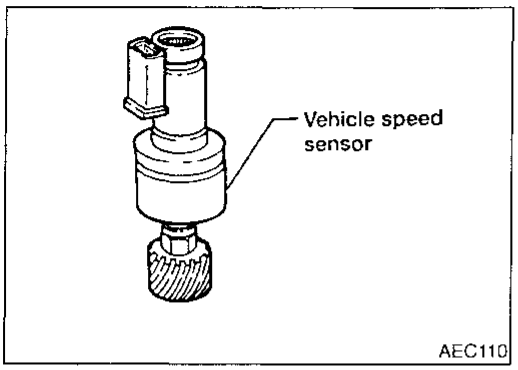
1. Remove EVAP control system pressure sensor with its harness connector connected.
2. Remove hose from EVAP control system pressure sensor.
3. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.
4. Check output voltage between ECM terminal 67 and engine ground.

Pressure (Relative to atmospheric pressure)	Voltage (V)
0 kPa (0 mmHg, 0 inHg)	3.0 - 3.6
−9.3 kPa (−70 mmHg, −2.76 inHg)	0.4 - 0.6

CAUTION:

- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply below −20 kPa (−150 mmHg, −5.91 inHg) or over 20 kPa (150 mmHg, 5.91 inHg) of pressure.**

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



Component Description

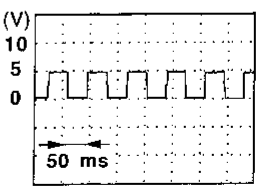
NCEC0272

The vehicle speed sensor is installed in the transaxle. It contains a pulse generator which provides a vehicle speed signal to the speedometer. The speedometer then sends a signal to the ECM.

ECM Terminals and Reference Value

NCEC0273

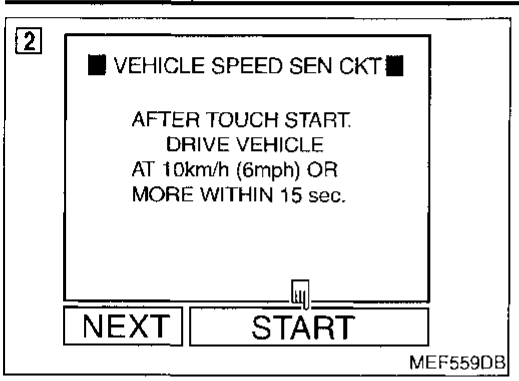
Specification data are reference values and are measured between each terminal and 43 (ECM ground).

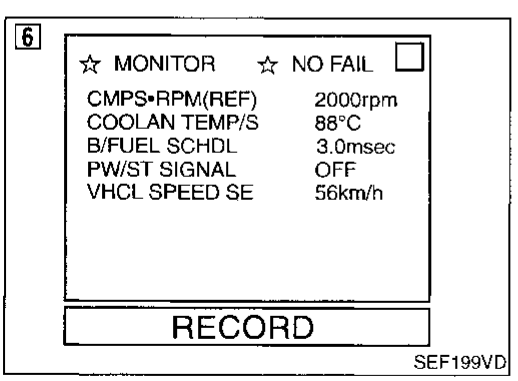
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
26	Y/G	Vehicle speed sensor	**[Engine is running]** • Lift up the vehicle • In 2nd gear position • Vehicle speed is 40 km/h (25 MPH)	0 - Approximately 4.2V  SEF003W

On Board Diagnosis Logic

NCEC0274

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0500 0104	• The almost 0 km/h (0 MPH) signal from vehicle speed sensor is sent to ECM even when vehicle is being driven.	• Harness or connector (The vehicle speed sensor circuit is open or shorted.) • Vehicle speed sensor





DTC Confirmation Procedure

NCEC0275

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

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

TESTING CONDITION:

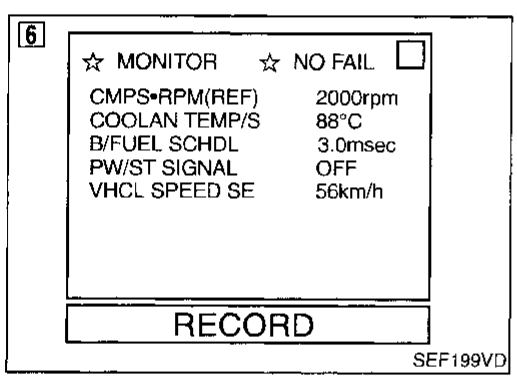
This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

With CONSULT

1) Start engine.
2) Perform "VEHICLE SPEED SEN CIRCUIT" in "FUNCTION TEST" mode with CONSULT.
3) If NG, go to "Diagnostic Procedure", EC-314.
   If OK, go to following step.
4) Select "DATA MONITOR" mode with CONSULT.
5) Warm engine up to normal operating temperature.
6) Maintain the following conditions for at least 10 consecutive seconds.

CMPS-RPM (REF)	2,000 - 3,200 rpm (A/T) 1,950 - 2,900 rpm (M/T)
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	2.3 - 3.5 msec (A/T) 2.3 - 3.7 msec (M/T)
Selector lever	Suitable position
PW/ST SIGNAL	OFF

7) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-314.



With CONSULT

1) Start engine
2) Read vehicle speed sensor signal in "DATA MONITOR" mode with CONSULT. The vehicle speed on CONSULT should exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.
3) If NG, go to "Diagnostic Procedure", EC-314.
   If OK, go to following step.
4) Select "DATA MONITOR" mode with CONSULT.
5) Warm engine up to normal operating temperature.
6) Maintain the following conditions for at least 10 consecutive seconds.

CMPS-RPM (REF)	2,000 - 3,200 rpm (A/T) 1,950 - 2,900 rpm (M/T)
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	2.3 - 3.5 msec (A/T) 2.3 - 3.7 msec (M/T)
Selector lever	Suitable position
PW/ST SIGNAL	OFF

7) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-314.

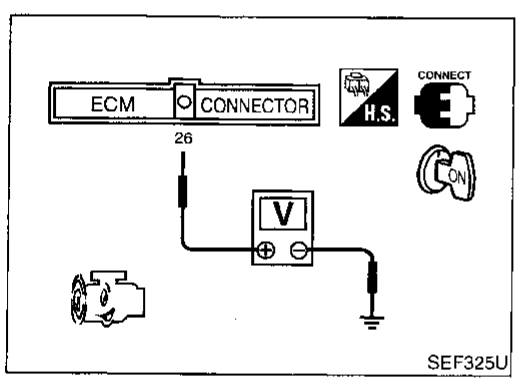
Overall Function Check

NCEC0276

Use this procedure to check the overall function of the EVAP canister vent control valve circuit. During this check, a 1st trip DTC might not be confirmed.

With GST

1) Lift up drive wheels.
2) Start engine.
3) Read vehicle speed sensor signal in "MODE 1" with GST. The vehicle speed sensor on GST should be able to exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.
4) If NG, go to "Diagnostic Procedure", EC-314.



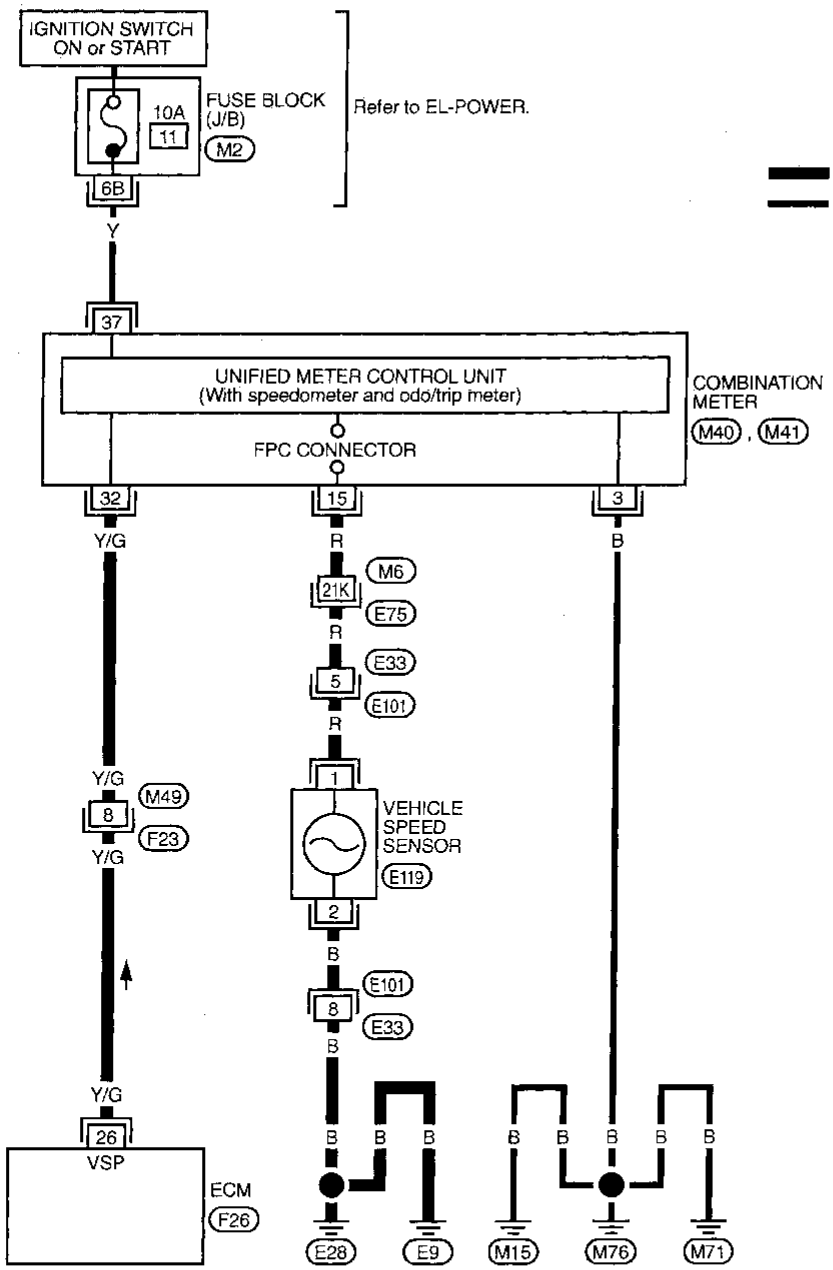
No Tools

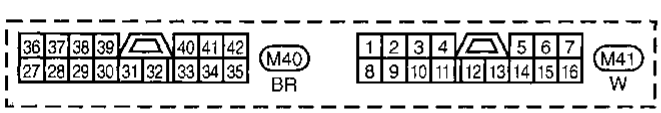
1) Lift up drive wheels.
2) Start engine.
3) Read the voltage signal between ECM terminal 26 (Vehicle speed sensor signal) and ground with oscilloscope.
4) Verify that the oscilloscope screen shows the signal wave as shown at "ECM Terminals and Reference Value", EC-310.
5) If NG, go to "Diagnostic Procedure", EC-314.

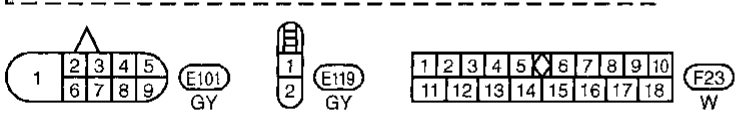
Wiring Diagram

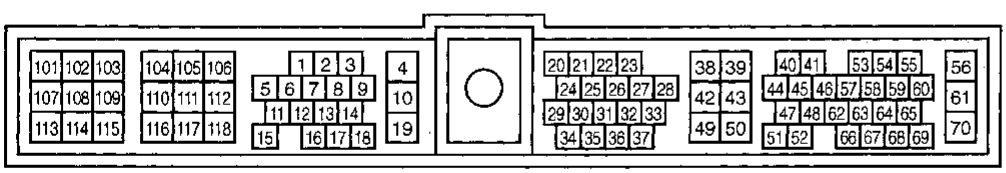
NCEC0277

EC-VSS-01









Refer to last page (Foldout page).
M6 , E75
M2

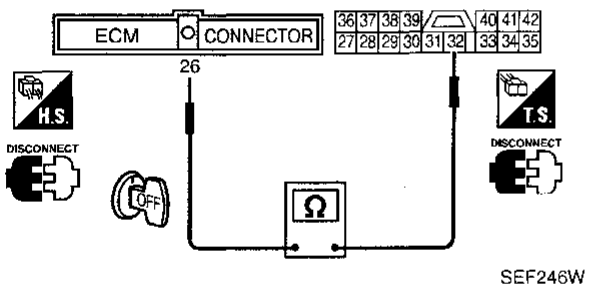
TEC541

Diagnostic Procedure

NCEC0278

1	CHECK INPUT SIGNAL CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector and combination meter harness connector.
3. Check harness continuity between ECM terminal 26 and meter terminal 32.



SEF246W

Continuity should exist.

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

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F23, M49
- Harness for open or short between ECM and combination meter

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

3	CHECK SPEEDOMETER FUNCTION

Make sure that speedometer functions properly.

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M6, E75
- Harness connectors E33, E101
- Harness for open or short between combination meter and vehicle speed sensor

	▶	Repair harness or connectors. Check vehicle speed sensor and its circuit. Refer to EL section.

5	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-110.

	▶	INSPECTION END

Description

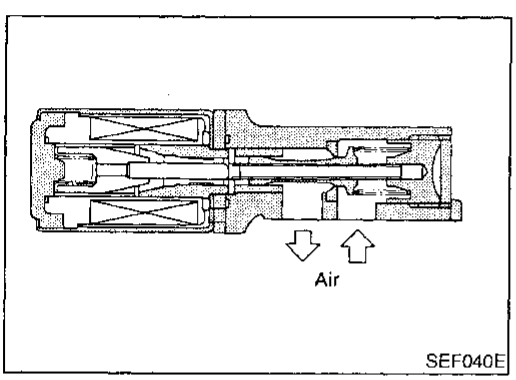
NCEC0279

SYSTEM DESCRIPTION

NCEC0279S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	ECM	IACV-AAC valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		
PNP switch	Park/Neutral position		
Air conditioner switch	Air conditioner operation		
Power steering oil pressure switch	Power steering load signal		
Battery	Battery voltage		
Vehicle speed sensor	Vehicle speed		
Cooling fan	Cooling fan operation		

This system automatically controls engine idle speed to a specified level. Idle speed is controlled through fine adjustment of the amount of air which bypasses the throttle valve via IACV-AAC valve. The IACV-AAC valve repeats ON/OFF operation according to the signal sent from the ECM. The camshaft position sensor detects the actual engine speed and sends a signal to the ECM. The ECM then controls the ON/OFF time of the IACV-AAC valve so that engine speed coincides with the target value memorized in ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by taking into consideration various engine conditions, such as during warm up, deceleration, and engine load (air conditioner, power steering and cooling fan operation).



COMPONENT DESCRIPTION

NCEC0279S02

The IAC valve-AAC valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of air that will flow through the valve. The more air that flows through the valve, the higher the idle speed.

CONSULT Reference Value in Data Monitor Mode

NCEC0280

MONITOR ITEM	CONDITION		SPECIFICATION
IACV-AAC/V	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: "N" • No-load	Idle	20 - 40%
		2,000 rpm	—

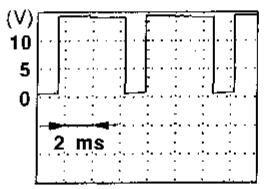
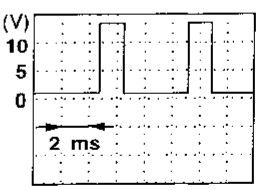
DTC P0505 IDLE AIR CONTROL VALVE (IACV) — AUXILIARY AIR CONTROL (AAC) VALVE

ECM Terminals and Reference Value

ECM Terminals and Reference Value

=NCEC0281

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	SB	IACV-AAC valve	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 10V  SEF015W
			[Engine is running] • **Warm-up condition** • Engine speed is 2,000 rpm	Approximately 5 - 13V  SEF016W

On Board Diagnosis Logic

NCEC0282

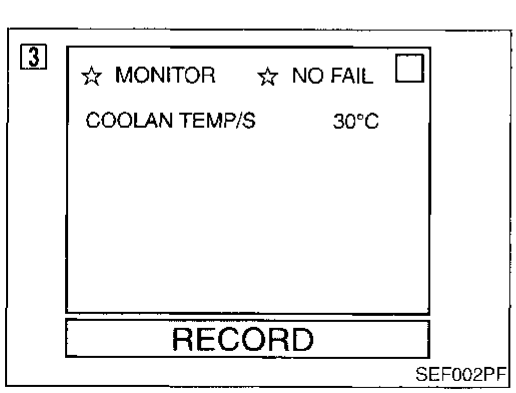
DTC No.		Malfunction is detected when ...	Check Items (Possible Cause)
P0505 0205	A)	The IACV-AAC valve does not operate properly.	• Harness or connectors (The IACV-AAC valve circuit is open.) • IACV-AAC valve
	B)	The IACV-AAC valve does not operate properly.	• Harness or connectors (The IACV-AAC valve circuit is shorted.) • IACV-AAC valve

DTC Confirmation Procedure

NCEC0283

NOTE:

- If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.
- **Perform "Procedure for malfunction A" first. If DTC cannot be confirmed, perform "Procedure for malfunction B".**



SEF002PF

PROCEDURE FOR MALFUNCTION A

NCEC0283S01

With CONSULT

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
3) Start engine and run it at idle at least 2 seconds.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-319.

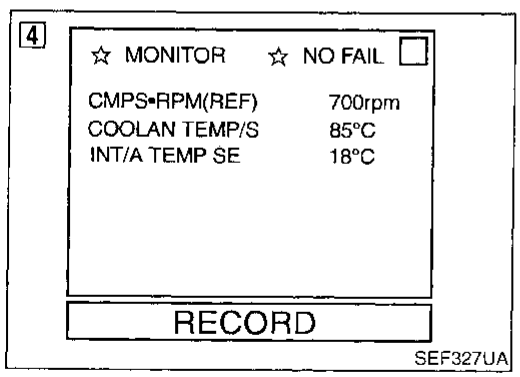
With GST

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

3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-319.

No Tools

1) Start engine and run it at idle 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.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-319.



PROCEDURE FOR MALFUNCTION B

NCEC0283S02

TESTING CONDITION:

Before performing the following procedure, make sure battery voltage is more than 11V at idle.

With CONSULT

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Turn ignition switch "ON" again and select "DATA MONITOR" mode with CONSULT.
4) Start engine and run it for at least 1 minute at idle speed.
5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-319.

With GST

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Start engine again and run it for at least 1 minute at idle speed.
4) Select "MODE 7" with GST.
5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-319.

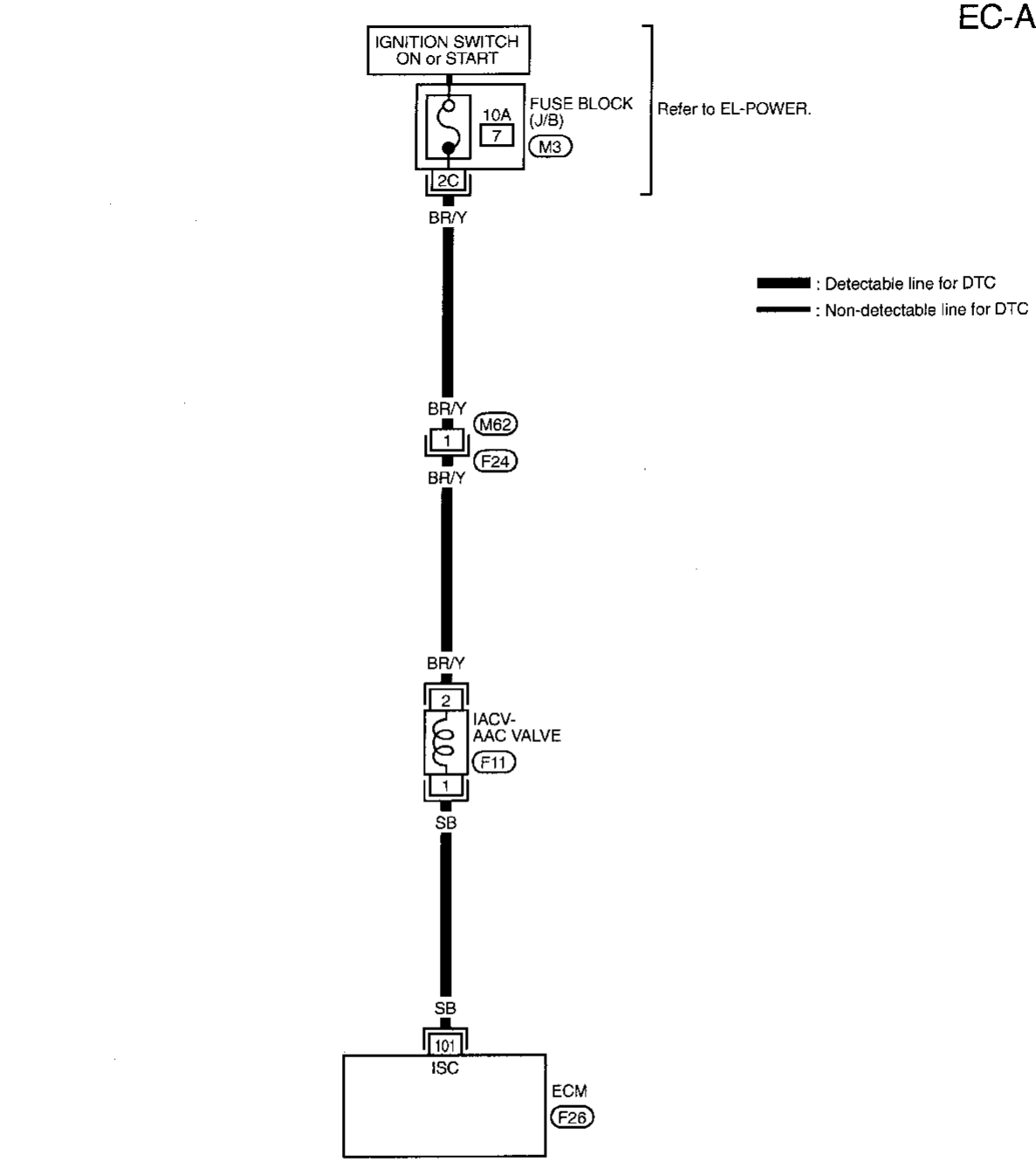
No Tools

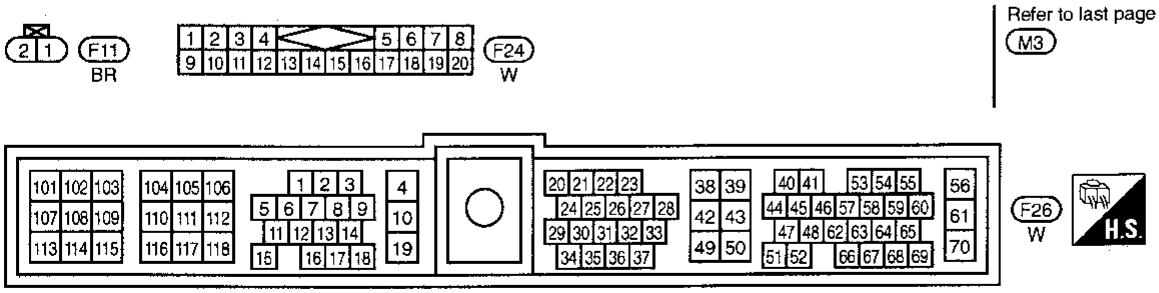
1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Start engine again and run it for at least 1 minute at idle speed.
4) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
5) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-319.

Wiring Diagram

NCEC0284

EC-AAC/V-01





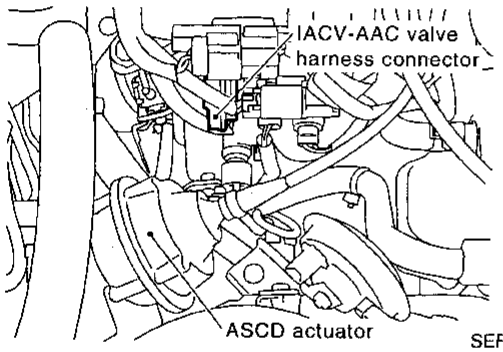
TEC542

Diagnostic Procedure

NCEC0285

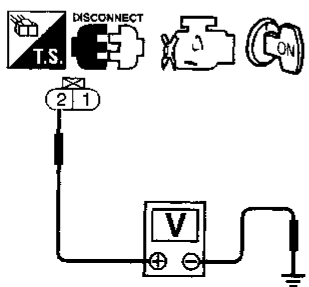
1 CHECK POWER SUPPLY

1. Stop engine.
2. Disconnect IACV-AAC valve harness connector.



SEF311W

3. Turn ignition switch "ON".
4. Check voltage between terminal 2 and ground with CONSULT or tester.



SEF247W

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

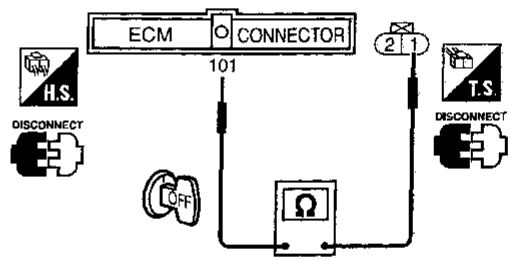
2 DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F24, M62
- 10A fuse
- Harness for open or short between IACV-AAC and fuse

▶	Repair harness or connectors.

3 CHECK OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 101 and terminal 1.



SEF248W

Continuity should exist.

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

OK or NG

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

4 CHECK IACV-AAC VALVE

Refer to "Component Inspection", EC-319.

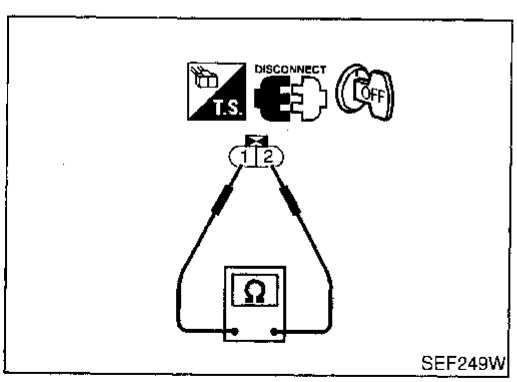
OK or NG

OK	▶	GO TO 5.
NG	▶	Replace IACV-AAC valve.

5 CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-110.

▶	**INSPECTION END**



SEF249W

Component Inspection

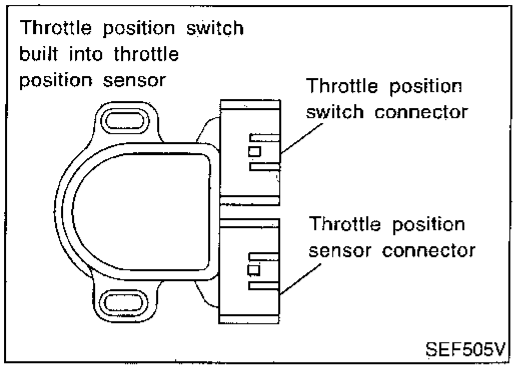
NCEC0286

IACV-AAC VALVE

NCEC0286S01

Disconnect IACV-AAC valve harness connector.
- Check IACV-AAC valve resistance.

  Resistance: Approximately 10 Ω [at 25°C (77°F)]
- Check plunger for seizing or sticking.
- Check for broken spring.



Component Description

NCEC0287

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.

ECM Terminals and Reference Value

NCEC0288

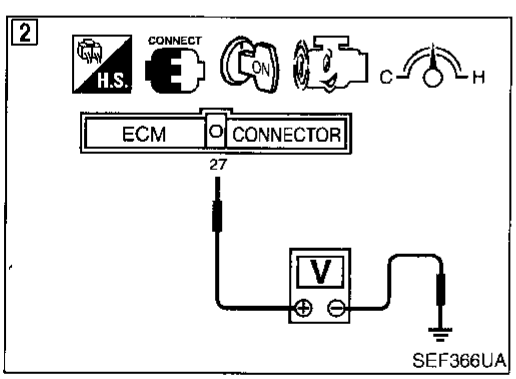
Specification data are reference values and are measured between each terminal and 43 (ECM ground).

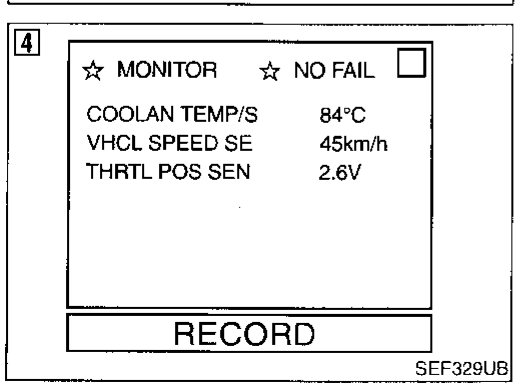
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
27	Y	Throttle position switch (Closed position)	**[Ignition switch "ON"]** • **Warm-up condition** • Accelerator pedal released	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch "ON"] • Accelerator pedal depressed	Approximately 0V

On Board Diagnosis Logic

NCEC0289

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0510 0203	• Battery voltage from the closed throttle position switch is sent to ECM with the throttle valve opened.	• Harness or connectors (The closed throttle position switch circuit is shorted.) • Closed throttle position switch • Throttle position sensor





DTC Confirmation Procedure

NCEC0290

CAUTION:
Always drive vehicle at a safe speed.

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

With CONSULT

1) Start engine and warm it up to normal operating temperature.
2) Check voltage between ECM terminal 27 (Closed throttle position switch signal) and ground under the following conditions.

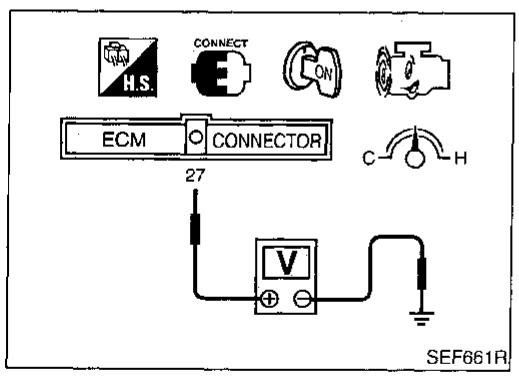
Condition	Voltage
At idle	Battery voltage
At 2,000 rpm	Approximately 0V

If the result is NG, go to "Diagnostic Procedure", EC-323.
If OK, go to following step.

3) Select "DATA MONITOR" mode with CONSULT.
4) Drive the vehicle for at least 5 consecutive seconds under the following condition.

THRTL POS SEN	More than 2.3V
VHCL SPEED SE	More than 4 km/h (2 MPH)
Selector lever	Suitable position
Driving pattern	Driving vehicle uphill (Increased engine load) will help maintain the driving conditions required for this test.

5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-323.



Overall Function Check

NCEC0291

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

⊗ Without CONSULT

1) Start engine and warm it up to normal operating temperature.
2) Check the voltage between ECM terminal 27 (Closed throttle position switch signal) and ground under the following conditions.

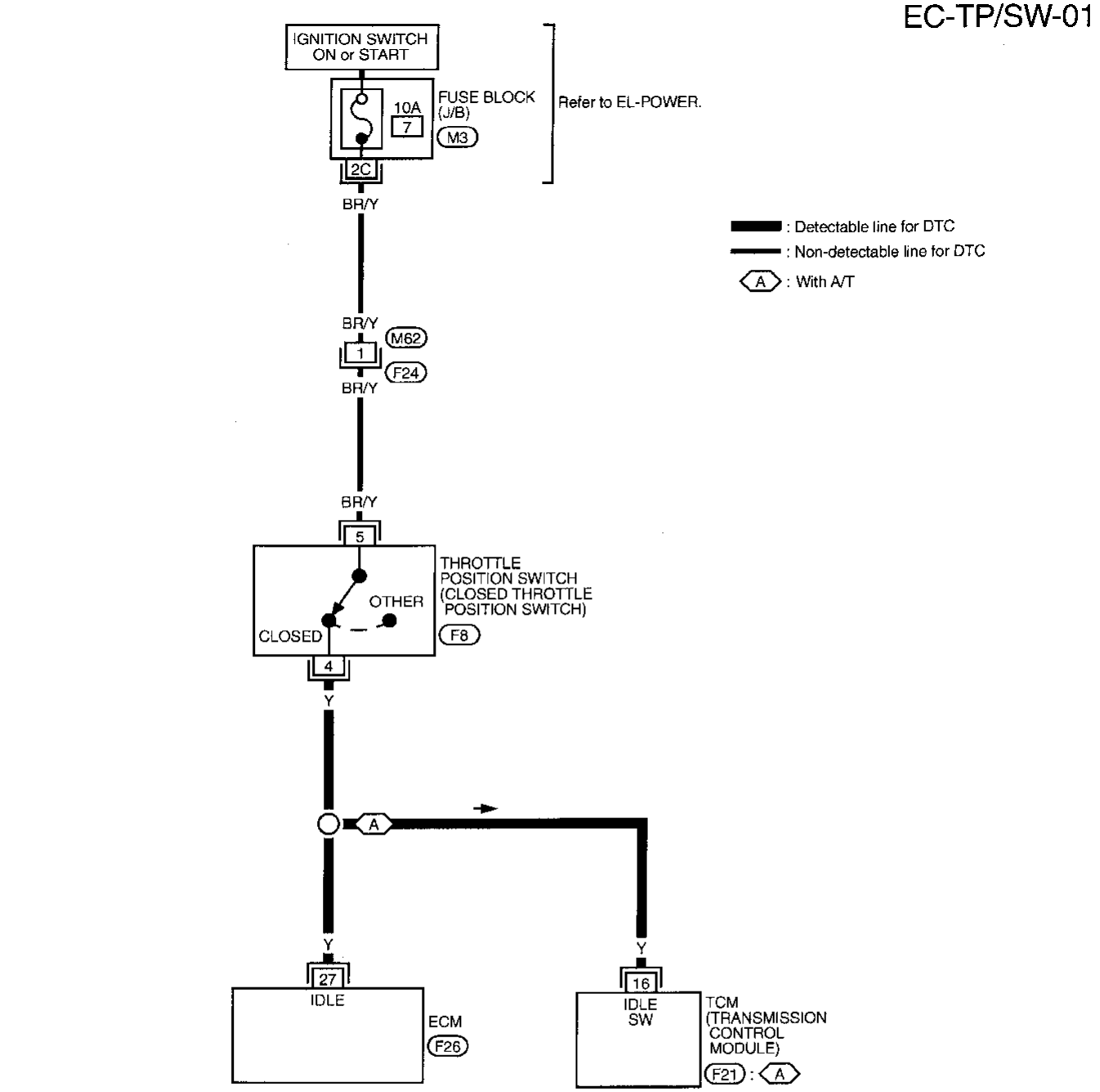
Condition	Voltage
At idle	Battery voltage
At 2,000 rpm	Approximately 0V

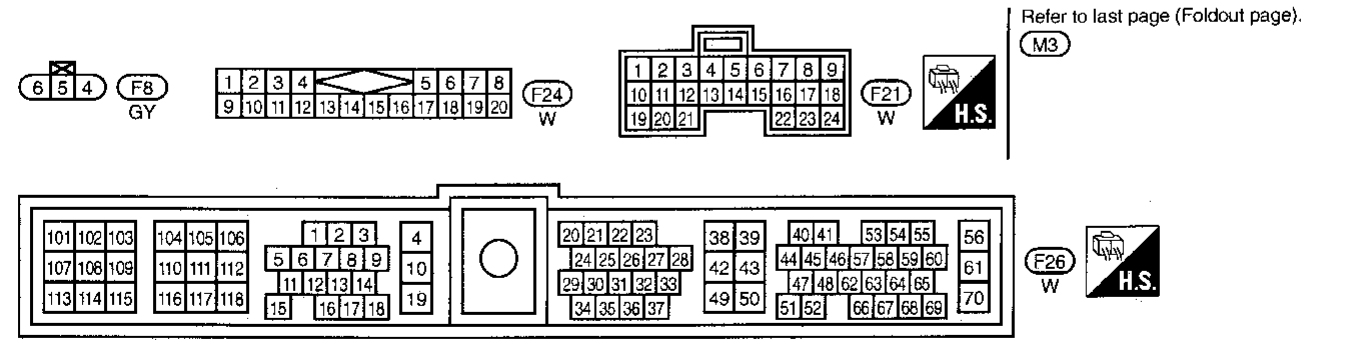
3) If NG, go to "Diagnostic Procedure", EC-323.

Wiring Diagram

NCEC0292

EC-TP/SW-01





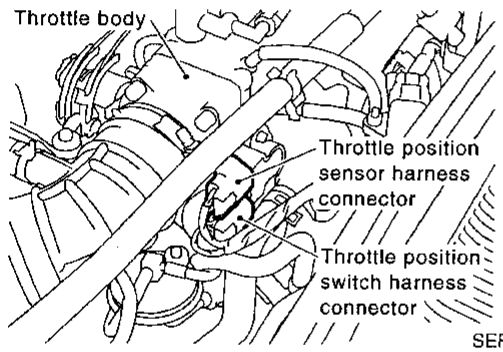
TEC543

Diagnostic Procedure

NCEC0293

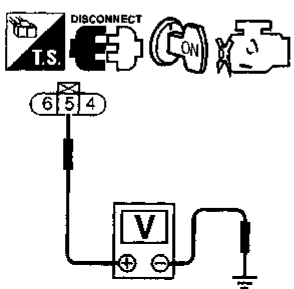
1 CHECK POWER SUPPLY

1. Turn ignition switch "OFF".
2. Disconnect throttle position switch harness connector.



SEF297W

3. Turn ignition switch "ON".
4. Check voltage between terminal 5 and engine ground with CONSULT or tester.



SEF250W

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

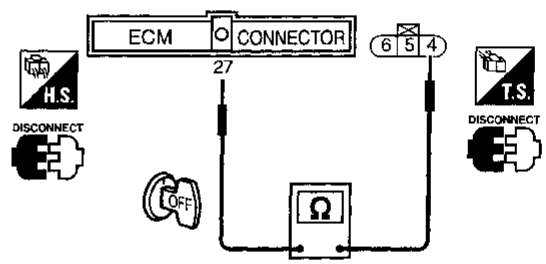
2 DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F24, M62
- 10A fuse
- Harness for open or short between throttle position switch and fuse

	▶	Repair harness or connectors.

3 CHECK INPUT SIGNAL CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 27 and terminal 4.



SEF251W

Continuity should exist.

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

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4 DETECT MALFUNCTIONING PART

Check the following.
- Harness for open or short between throttle position switch and ECM
- Harness for open or short between throttle position switch and TCM (Transmission control module)

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

5 ADJUST THROTTLE POSITION SWITCH IDLE POSITION

Perform Basic Inspection, EC-83.

	▶	GO TO 6.

6 CHECK CLOSED THROTTLE POSITION SWITCH

Refer to "Component Inspection", EC-324.

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace throttle position switch.

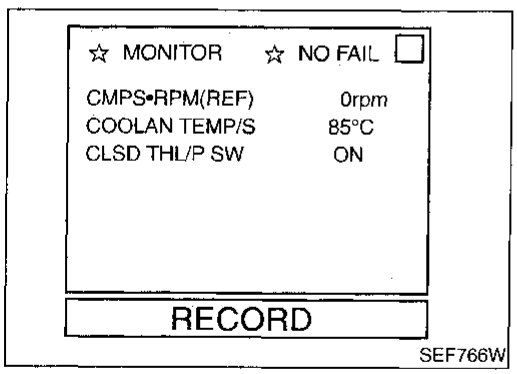
7 CHECK THROTTLE POSITION SENSOR

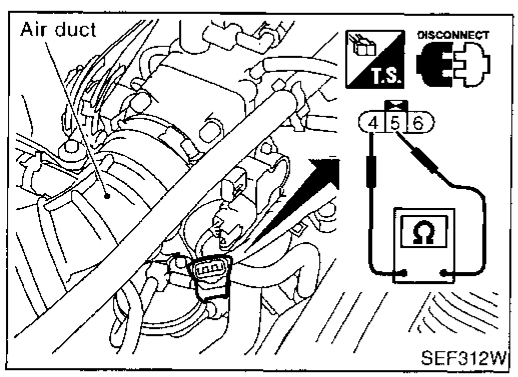
Refer to "Component Inspection", EC-155.

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace throttle position sensor.

8	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-110.	
▶	INSPECTION END





Component Inspection

NCEC0294

CLOSED THROTTLE POSITION SWITCH

NCEC0294S01

Ⓐ With CONSULT

1) Start engine and warm it up to normal operating temperature.
2) Stop engine and turn ignition switch "ON".
3) Select "DATA MONITOR" mode with CONSULT.
4) Check indication of "CLSD THL/P SW" under the following conditions.

NOTE:
Measurement must be made with closed throttle position switch installed in vehicle.

Throttle valve conditions	CLSD THL/P SW
Completely closed	ON
Partially open or completely open	OFF

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

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

Ⓑ Without CONSULT

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF".
3) Disconnect throttle position switch harness connector.
4) Check continuity between terminals 4 and 5 under the following conditions.

NOTE:
Continuity measurement must be made with closed throttle position switch installed in vehicle.

Throttle valve conditions	Continuity
Completely closed	Yes
Partially open or completely open	No

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

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

System Description

NCEC0494

These circuit lines are used to control the smooth shifting up and down of A/T during the hard acceleration/deceleration. Voltage signals are exchanged between ECM and TCM (Transmission control module).

ECM Terminals and Reference Value

NCEC0495

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

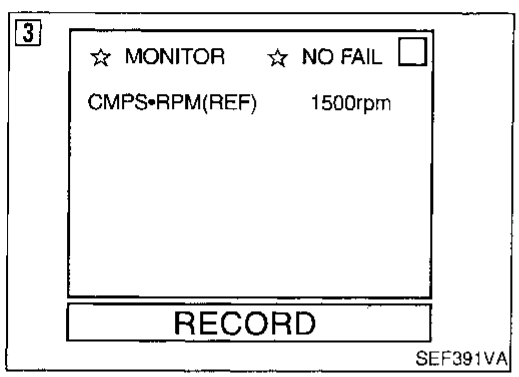
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
24	Y/R	A/T signal No. 1	**[Ignition switch "ON"]** **[Engine is running]** • Idle speed	6 - 8V
29	Y/G	A/T signal No. 2	**[Ignition switch "ON"]** **[Engine is running]** • Idle speed	6 - 8V
30	Y/B	A/T signal No. 3	**[Ignition switch "ON"]**	0V

On Board Diagnosis Logic

NCEC0496

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0600*	• ECM receives incorrect voltage from TCM (Transmission control module) continuously.	• Harness or connectors [The circuit between ECM and TCM (Transmission control module) is open or shorted.]

*: This DTC can be detected only by "DATA MONITOR (AUTO TRIG)" with CONSULT.



DTC Confirmation Procedure

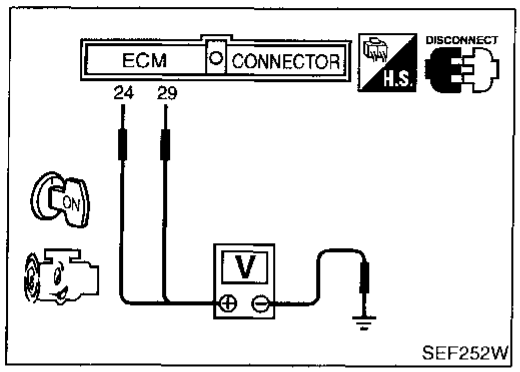
NCEC0497

NOTE:

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

With CONSULT

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
3) Start engine, and rev engine more than 1,000 rpm once, then let it idle for more than 40 seconds.
4) If DTC is detected, go to "Diagnostic Procedure", EC-328.



Overall Function Check

NCEC0498

Use this procedure to check the overall function of the A/T control circuit. During this check, a DTC might not be confirmed.

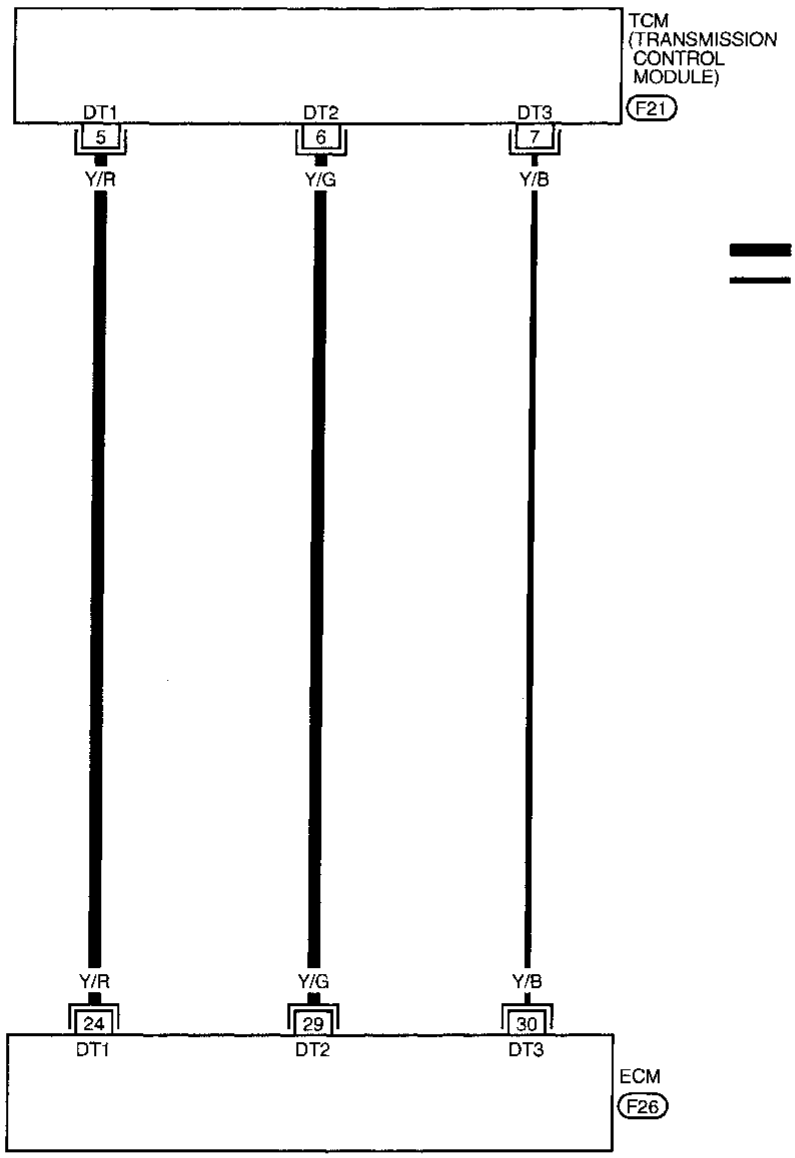
Without CONSULT

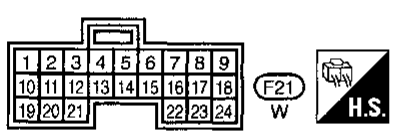
1) Start engine.
2) Check voltage between
   ECM terminal 24 and ground.
   ECM terminal 29 and ground.
   Voltage: 6 - 8V
3) If NG, go to "Diagnostic Procedure", EC-328.

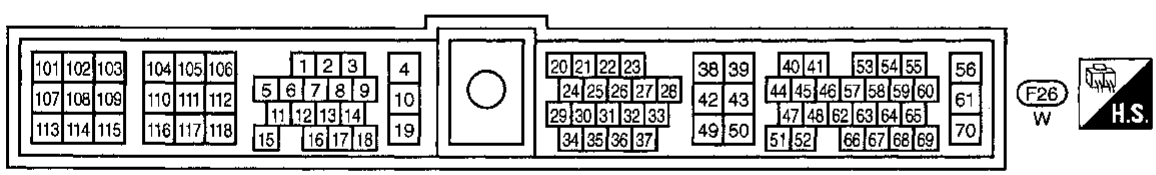
Wiring Diagram

NCEC0499

EC-AT/C-01







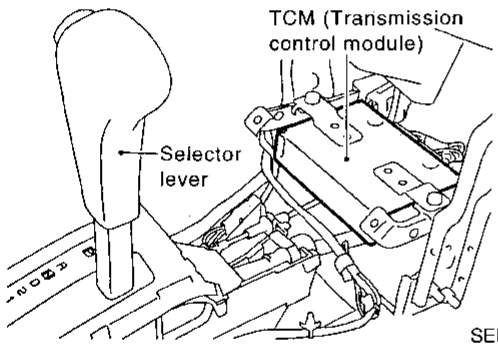
TEC672

Diagnostic Procedure

NCEC0500

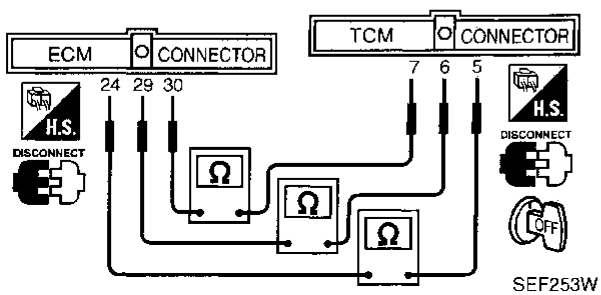
1	CHECK INPUT SIGNAL CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector and TCM (Transmission control module) harness connector.



SEF313W

3. Check harness continuity between ECM terminal 24 and terminal 5, ECM terminal 29 and terminal 6, ECM terminal 30 and terminal 7.



SEF253W

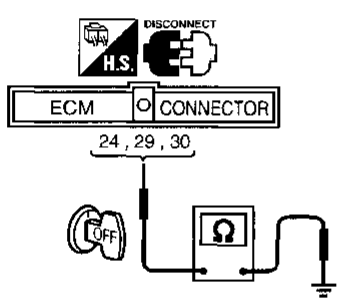
Continuity should exist.

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair harness or connectors.

2	CHECK INPUT SIGNAL CIRCUIT

1. Check harness continuity between ECM terminal 24 and ground, ECM terminal 29 and ground, ECM terminal 30 and ground.



SEF254W

Continuity should not exist.

2. Also check harness for short to power.

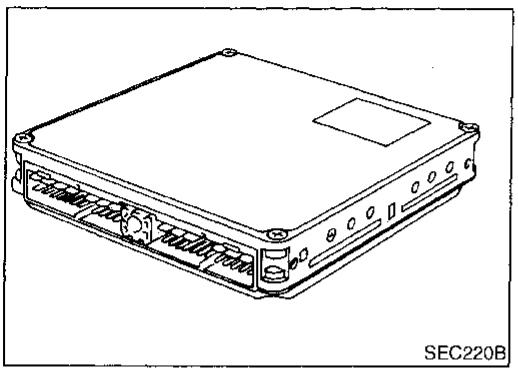
OK or NG

OK	▶	GO TO 3.
NG	▶	Repair short to ground or short to power in harness.

3	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-110.

▶ **INSPECTION END**


SEC220B

Component Description

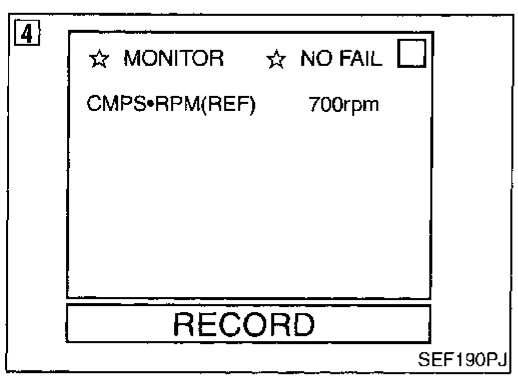
NCEC0295

The ECM consists of a microcomputer, diagnostic test mode selector, and connectors for signal input and output and for power supply. The ECM controls the engine.

On Board Diagnosis Logic

NCEC0296

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0605 0301	• ECM calculation function is malfunctioning.	• ECM



SEF190PJ

DTC Confirmation Procedure

NCEC0297

NOTE:

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

With CONSULT

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.
5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-330.

With GST

1) Turn ignition switch "ON".
2) Start engine.
3) Run engine for at least 30 seconds at idle speed.
4) Select "Mode 7" with GST.
5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-330.

No Tools

1) Turn ignition switch "ON".
2) Start engine and wait at least 30 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.
5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-330.

Diagnostic Procedure

NCEC0298

1	INSPECTION START
With CONSULT 1. Turn ignition switch "ON". 2. Select "SELF DIAG RESULTS" mode with CONSULT. 3. Touch "ERASE". 4. Perform "DTC Confirmation Procedure". See previous page. 5. Is the 1st trip DTC P0605 displayed again?	
With GST 1. Turn ignition switch "ON". 2. Select MODE 4 with GST. 3. Touch "ERASE". 4. Perform "DTC Confirmation Procedure". See previous page. 5. Is the 1st trip DTC P0605 displayed again?	
No Tools 1. Turn ignition switch "ON". 2. Erase the Diagnostic Test Mode II (Self-diagnostic results) memory. Refer to EC-55. 3. Perform "DTC Confirmation Procedure". See previous page. 4. Is the 1st trip DTC 0301 displayed again?	
Yes or No	
Yes ▶	Replace ECM.
No ▶	**INSPECTION END**

Description

NCEC0299

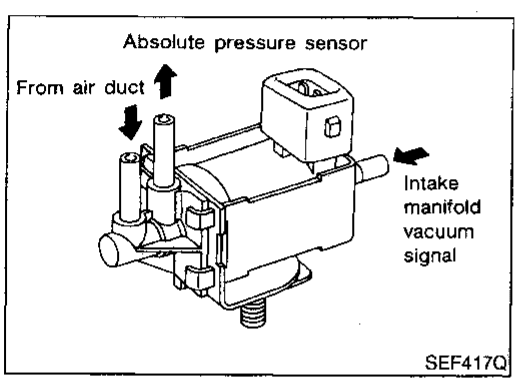
SYSTEM DESCRIPTION

NCEC0299S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	On board diagnosis of EVAP system	MAP/BARO switch solenoid valve
Ignition switch	Start signal		
Throttle position sensor	Throttle position		
Vehicle speed sensor	Vehicle speed		

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	• For 5 seconds after turning ignition switch "ON" (Engine is not running) or • For 5 seconds after starting engine or • More than 5 minutes after the solenoid valve shuts OFF.



COMPONENT DESCRIPTION

NCEC0299S02

The MAP/BARO switch solenoid valve switches its air flow passage according to the voltage signal sent from the ECM. When voltage is supplied from the ECM, the MAP/BARO switch solenoid turns "ON". Then, the absolute pressure sensor can monitor the ambient barometric pressure. When voltage is not supplied from the ECM, the MAP/BARO switch solenoid valve turns "OFF". Then, the sensor monitors intake manifold pressure.

CONSULT Reference Value in Data Monitor Mode

NCEC0300

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
MAP/BARO SW/V	• For 5 seconds after starting engine	BARO
	• More than 5 seconds after turning ignition switch "ON" • More than 5 seconds after starting engine	MAP

DTC P1105 MANIFOLD ABSOLUTE PRESSURE (MAP)/BAROMETRIC PRESSURE (BARO) SWITCH SOLENOID VALVE

ECM Terminals and Reference Value

ECM Terminals and Reference Value

NCEC0301

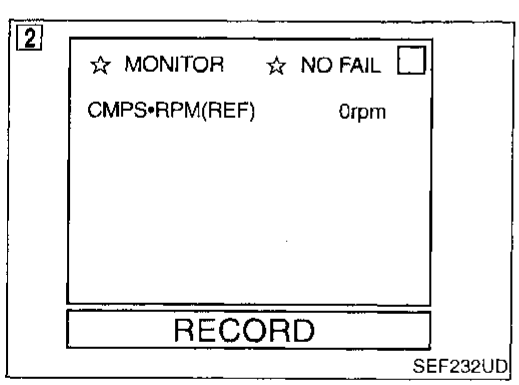
Specification data are reference values and are measured between each terminal and 43 (ECM ground).

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
69	GY/R	MAP/BARO switch solenoid valve	**[Ignition switch "ON"]** • For 5 seconds after turning ignition switch "ON" **[Engine is running]** • For 5 seconds after starting engine	0 - 1V
			[Ignition switch "ON"] • More than 5 seconds after turning ignition switch "ON" **[Engine is running]** • More than 5 seconds after starting engine	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NCEC0302

DTC No.	Malfunction is detected when ...		Check Items (Possible Cause)
P1105 1302	A)	MAP/BARO switch solenoid valve receives the voltage supplied though ECM does not supply the voltage to the valve.	• Harness or connectors (MAP/BARO switch solenoid valve circuit is open or shorted.) • MAP/BARO switch solenoid valve
	B)	There is little difference between MAP/BARO switch solenoid valve input voltage at ambient barometric pressure and voltage at intake manifold pressure.	• Harness or connectors (MAP/BARO switch solenoid valve circuit is open or shorted.) • Hoses (Hoses are clogged, vent, kinked, disconnected or improper connection.) • Absolute pressure sensor • MAP/BARO switch solenoid valve



DTC Confirmation Procedure

NCEC0303

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

NOTE:

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

PROCEDURE FOR MALFUNCTION A

NCEC0303S01

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11V at ignition switch "ON".

Ⓐ With CONSULT

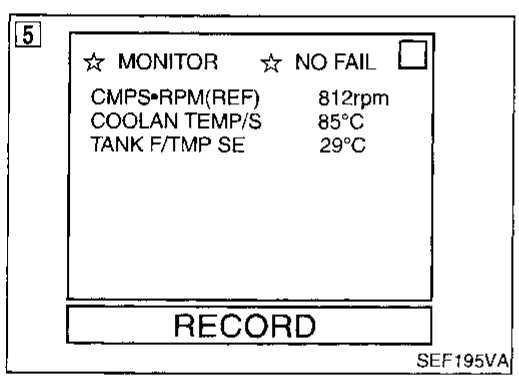
1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT.
2) Wait at least 10 seconds.
3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-336.

With GST

1) Turn ignition switch "ON" and wait at least 10 seconds.
2) Select "MODE 7" with GST.
3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-336.

No Tools

1) Turn ignition switch "ON" and wait at least 10 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.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-336.



PROCEDURE FOR MALFUNCTION B

NCEC0303S02

TESTING CONDITION:

Always perform at a temperature above 5°C (41°F).

With CONSULT

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Turn ignition switch "ON" again and select "DATA MONITOR" mode with CONSULT.
4) Make sure that "TANK/F/TEMP SE" is more than 0°C (32°F).
5) Start engine and let it idle for at least 10 seconds.
6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-336.

With GST

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Turn ignition switch "ON".
4) Check that voltage between ECM terminal 63 and ground is less than 4.2V.
5) Start engine and let it idle for at least 10 seconds.
6) Select "MODE 7" with GST.
7) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-336.

No Tools

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Turn ignition switch "ON".
4) Check that voltage between ECM terminal 63 and ground is less than 4.2V.
5) Start engine and let it idle for at least 10 seconds.
6) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".

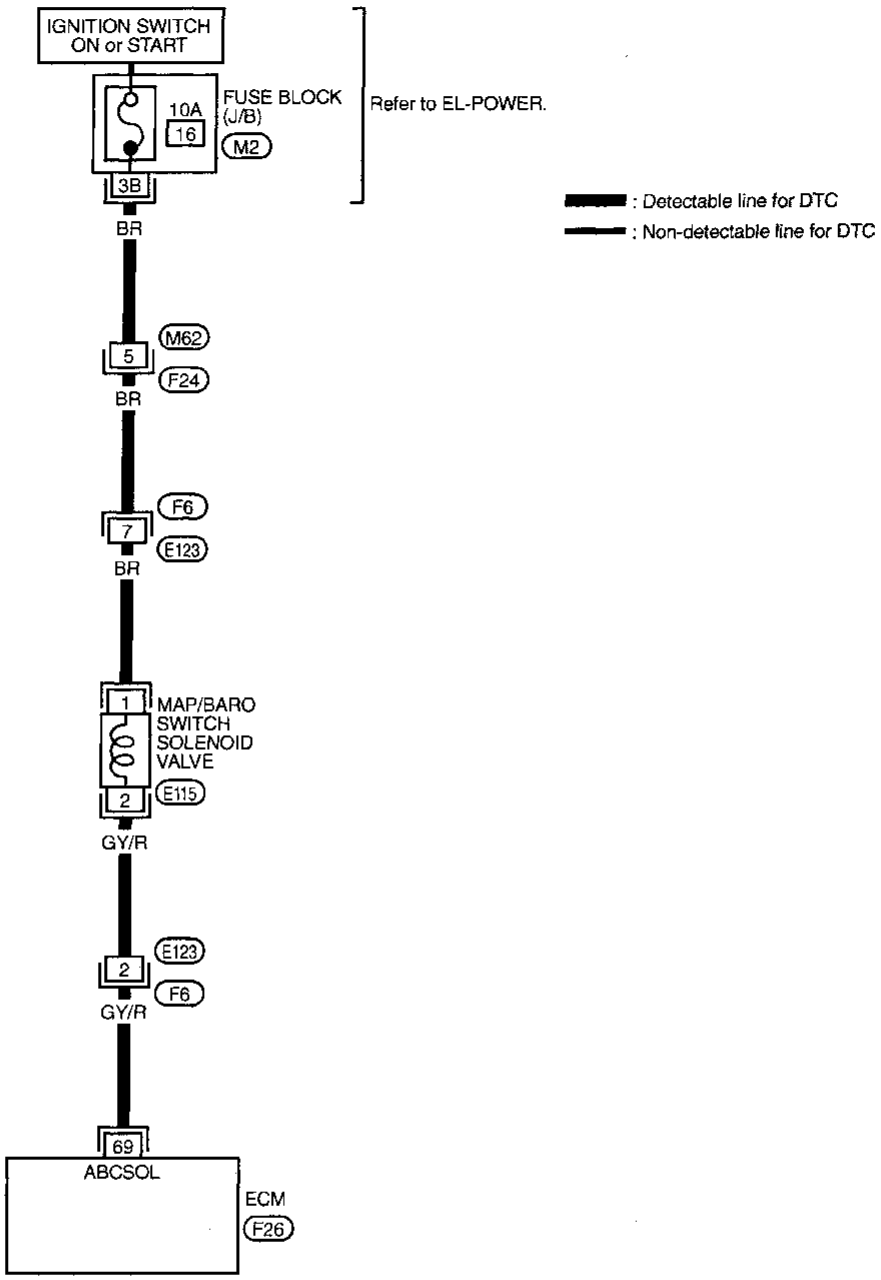
DTC Confirmation Procedure (Cont'd)

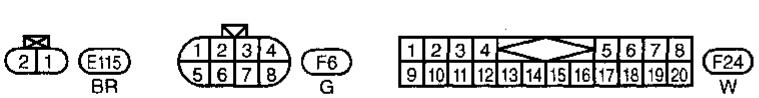
7) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
8) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-336.

Wiring Diagram

NCEC0304

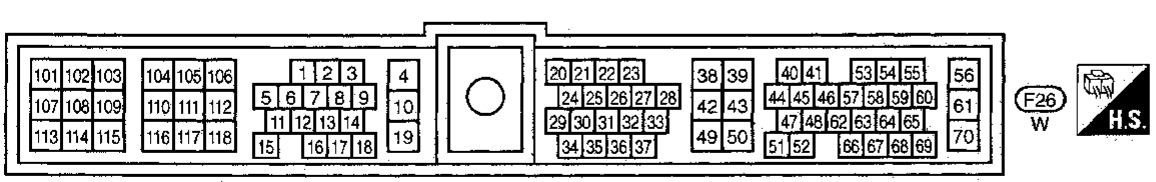
EC-SW/V-01





Refer to last page (Foldout page).

M2



TEC544

Diagnostic Procedure

NCEC0305

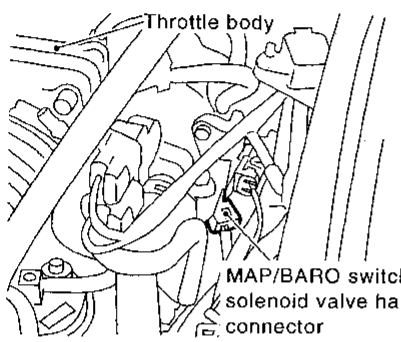
If the trouble is duplicated after "PROCEDURE FOR MALFUNCTION A", perform "PROCEDURE A" below. If the trouble is duplicated after "PROCEDURE FOR MALFUNCTION B", perform "PROCEDURE B" on next page.

PROCEDURE A

NCEC0305S01

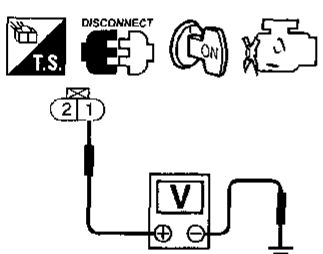
1	CHECK POWER SUPPLY

1. Turn ignition switch "OFF".
2. Disconnect MAP/BARO switch solenoid valve harness connector.



SEF314W

3. Turn ignition switch "ON".
4. Check voltage between terminal 1 and engine ground with CONSULT or tester.



SEF255W

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

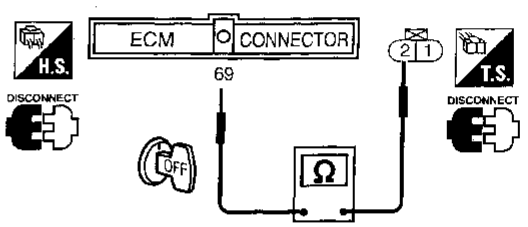
2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M62, F24
- Harness connectors F6, E123
- 10A fuse
- Harness for open or short between MAP/BARO switch solenoid valve and fuse

	▶	Repair harness or connectors.

3	CHECK OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 69 and terminal 2.



SEF256W

Continuity should exist.

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

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E123, F6
- Harness for open or short between MAP/BARO switch solenoid valve and ECM

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

5	CHECK MAP/BARO SWITCH SOLENOID VALVE

Refer to "Component Inspection", EC-340.

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace MAP/BARO switch solenoid valve.

6	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-110.

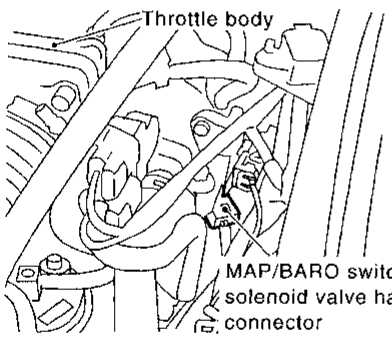
	▶	INSPECTION END

PROCEDURE B

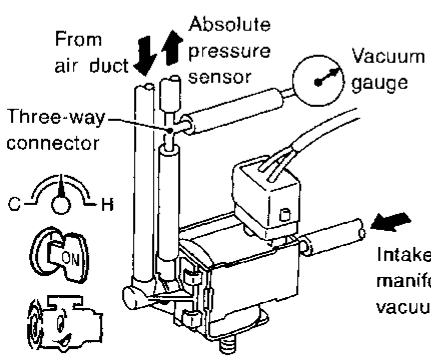
=NCEC0305S02

1 INSPECTION START

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch "OFF".
3. Connect MAP/BARO switch solenoid valve and absolute pressure sensor with a rubber tube that has vacuum gauge.



SEF314W



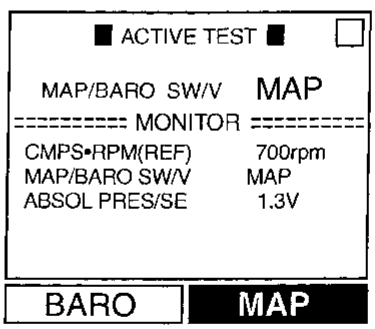
SEF676T

Models with CONSULT	▶	GO TO 2.
Models without CONSULT	▶	GO TO 3.

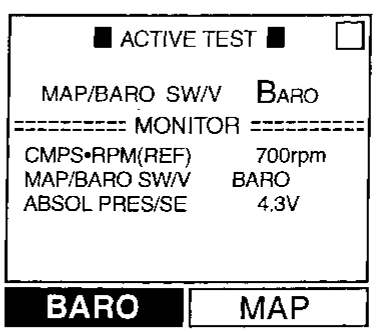
2 CHECK VACUUM SOURCE TO MAP/BARO SWITCH SOLENOID VALVE AND CIRCUIT

With CONSULT

1. Turn ignition switch "ON".
2. Select "MAP/BARO SW/V" in "ACTIVE TEST" mode with CONSULT.
3. Start engine and let it idle.
4. Touch "MAP" and "BARO" alternately and check for vacuum.



SEF500R



SEF498R

MAP/BARO SW/V	Vacuum
BARO	Should not exist
MAP	Should exist

MTBL0079

OK or NG

OK	▶	GO TO 12.
NG	▶	GO TO 4.

3 CHECK VACUUM SOURCE TO ABSOLUTE PRESSURE SENSOR

Without CONSULT

1. Start engine and let it idle.
2. Check for vacuum under the following condition.

Condition	Vacuum
For 5 seconds after starting engine	Should not exist
More than 5 seconds after starting engine	Should exist

MTBL0080

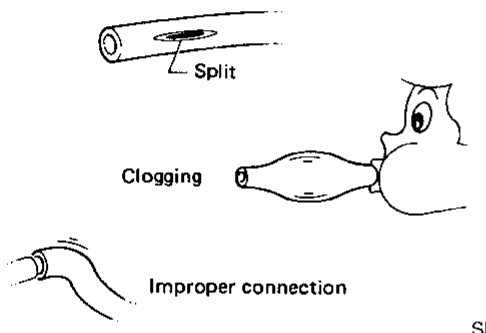
OK or NG

OK	▶	GO TO 12.
NG	▶	GO TO 4.

Diagnostic Procedure (Cont'd)

4 CHECK VACUUM HOSE

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



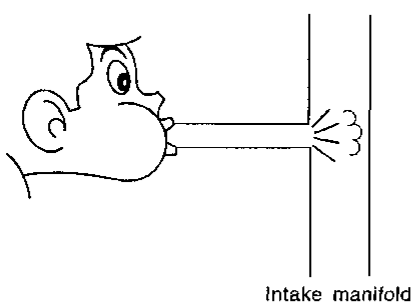
SEF109L

OK or NG

OK	▶	GO TO 5.
NG	▶	Clean, repair or reconnect the hose.

5 CHECK VACUUM PORT

Check vacuum port for clogging.



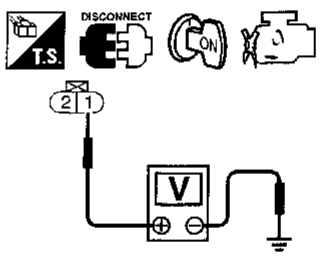
SEF368U

OK or NG

OK	▶	GO TO 6.
NG	▶	Clean or repair the vacuum port.

6 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 ground with CONSULT or tester.



SEF255W

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

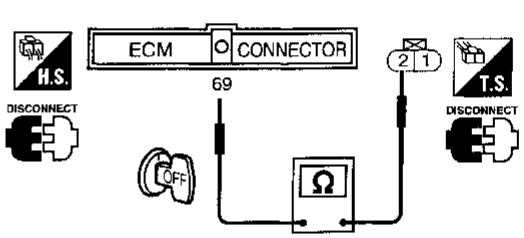
7 DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M62, F24
- Harness connectors F6, E123
- 10A fuse
- Harness for open or short between MAP/BARO switch solenoid valve and fuse

	▶	Repair harness or connectors.

8 CHECK OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 69 and terminal 2.



SEF256W

Continuity should exist.

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

OK or NG

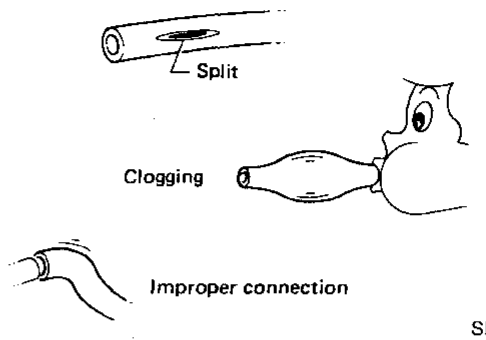
OK	▶	GO TO 10.
NG	▶	GO TO 9.

9	DETECT MALFUNCTIONING PART
Check the following. • Harness connectors F6, E123 • Harness for open or short between MAP/BARO switch solenoid valve and ECM	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

10	CHECK MAP/BARO SWITCH SOLENOID VALVE
Refer to "Component Inspection", EC-340.	
OK or NG	
OK ▶	GO TO 11.
NG ▶	Replace MAP/BARO switch solenoid valve.

11	CHECK INTAKE SYSTEM
Check intake system for air leaks.	
OK or NG	
OK ▶	GO TO 15.
NG ▶	Repair it.

12	CHECK HOSE BETWEEN ABSOLUTE PRESSURE SENSOR AND MAP/BARO SWITCH SOLENOID VALVE
Check hose for clogging, cracks, disconnection or improper connection.	

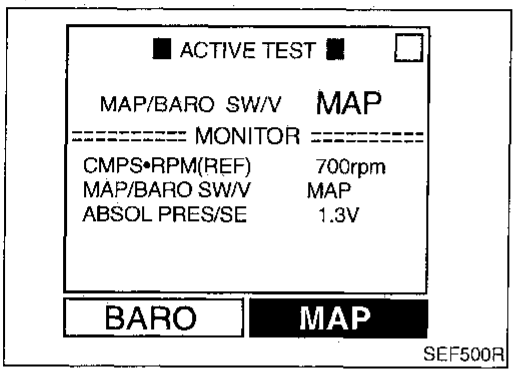


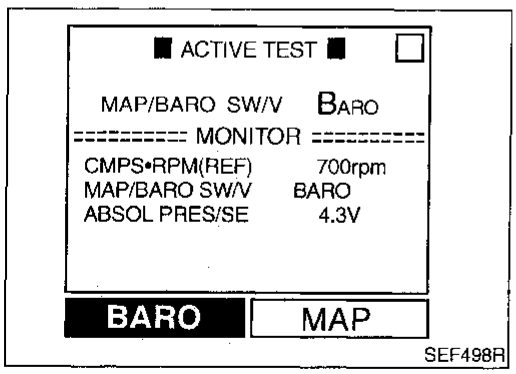
OK or NG	
OK ▶	GO TO 13.
NG ▶	Repair or reconnect hose.

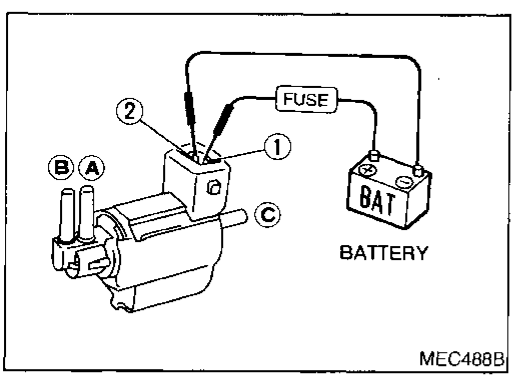
13	CHECK HARNESS CONNECTOR
1. Disconnect absolute pressure sensor harness connector. 2. Check sensor harness connector for water. **Water should not exist.**	
OK or NG	
OK ▶	GO TO 14.
NG ▶	Repair or replace harness connector.

14	CHECK ABSOLUTE PRESSURE SENSOR
Refer to "Component Inspection", EC-133.	
OK or NG	
OK ▶	GO TO 15.
NG ▶	Replace absolute pressure sensor.

15	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-110.	
▶	**INSPECTION END**







Component Inspection

NCEC0306

MAP/BARO SWITCH SOLENOID VALVE

NCEC0306S01

With CONSULT

1) Start engine and warm it up to normal operating temperature.
2) Perform "MAP/BARO SW/V" in "ACTIVE TEST" mode with CONSULT.
3) Check the following.

- Condition: At idle under no-load
- CONSULT display

MAP/BARO	ABSOL PRES/SE (Voltage)
BARO	More than 2.6V
MAP	Less than the voltage at BARO

- Time for voltage to change

MAP/BARO SW/V	Required time to switch
BARO to MAP	Less than 1 second
MAP to BARO	

4) If NG, check solenoid valve as shown below.

Without CONSULT

1) Turn ignition switch "OFF" and 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

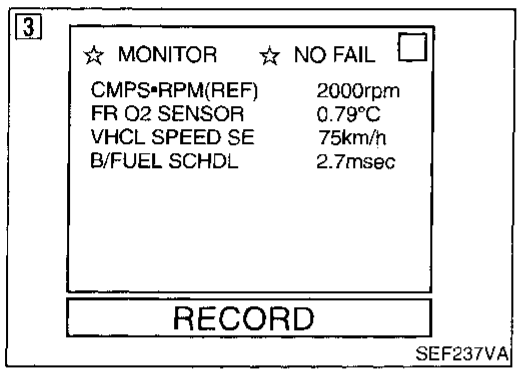
3) Check the time required for the solenoid valve to switch. It should be less than 1 second.
4) If NG, replace solenoid valve.

On Board Diagnosis Logic

NCEC0307

★ The closed loop control has the one trip detection logic.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1148 0307	• The closed loop control function does not operate even when vehicle is driving in the specified condition.	• The front heated oxygen sensor circuit is open or shorted. • Front heated oxygen sensor • Front heated oxygen sensor heater



DTC Confirmation Procedure

NCEC0308

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

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

TESTING CONDITION:

- **Never raise engine speed above 3,200 rpm during the "DTC Confirmation Procedure". If the engine speed limit is exceeded, retry the procedure from step 4.**
- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**

With CONSULT

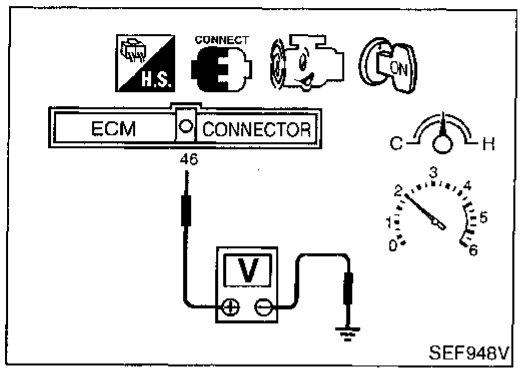
1) Start engine and warm it up to normal operating temperature.
2) Select "DATA MONITOR" mode with CONSULT.
3) Hold engine speed at 2,000 rpm and check the following.
   - "FR O2 SENSOR" voltage should go above 0.70V at least once.
   - "FR O2 SENSOR" voltage should go below 0.23V at least once.

   If the result is NG, perform "Diagnosis Procedure", EC-342.
   If the result is OK, perform the following step.
4) Let engine idle at least 4 minutes.
5) Maintain the following condition at least 50 consecutive seconds.

B/FUEL SCHDL	1.0 msec or more (A/T) 0.9 msec or more (M/T)
CMPS·RPM (REF)	1,800 - 3,200 rpm (A/T) 1,900 - 3,200 rpm (M/T)
Selector lever	Suitable position
VHCL SPEED SE	More than 70 km/h (44 MPH)

During this test, P0130 DTC may be displayed on CONSULT screen.

6) If DTC is detected, go to "Diagnostic Procedure", EC-342.



Overall Function Check

NCEC0309

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

⊗ Without CONSULT

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

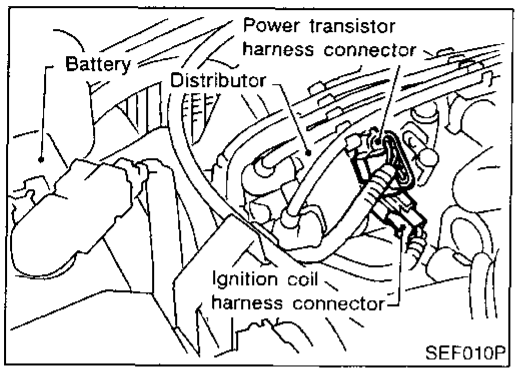
- The voltage should go above 0.70V at least once.
- The voltage should go below 0.23V at least once.

4) If NG, go to "Diagnostic Procedure", EC-342.

Diagnostic Procedure

NCEC0310

Refer to "Diagnostic Procedure" for DTC P0133, EC-181.



Component Description

NCEC0319

IGNITION COIL & POWER TRANSISTOR (BUILT INTO DISTRIBUTOR)

NCEC0319S01

The ignition coil is built into distributor. The ignition signal from the ECM is sent to the power transistor. The power transistor switches on and off the ignition coil primary circuit. As the primary circuit is turned on and off, the proper high voltage is induced in the coil secondary circuit.

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

CONSULT Reference Value in Data Monitor Mode

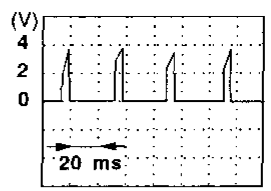
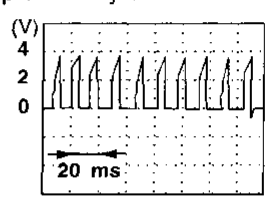
NCEC0320

MONITOR ITEM	CONDITION		SPECIFICATION
IGN TIMING	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: "N" • No-load	Idle	13 - 15° BTDC
		2,000 rpm	More than 25° BTDC

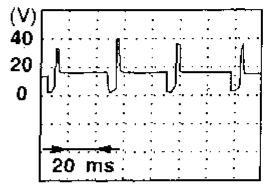
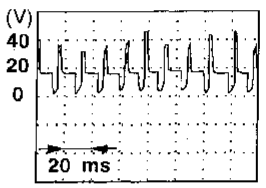
ECM Terminals and Reference Value

NCEC0321

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	W/B	Ignition signal	**[Engine is running]** • **Warm-up condition** • Idle speed	0.2 - 0.6V  SEF996V
			[Engine is running] • Engine speed is 2,000 rpm	Approximately 0.5V  SEF997V

ECM Terminals and Reference Value (Cont'd)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
2	W	Ignition check	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 13V  SEF998V
			[Engine is running] • Engine speed is 2,000 rpm	Approximately 13V  SEF999V

On Board Diagnosis Logic

NCEC0322

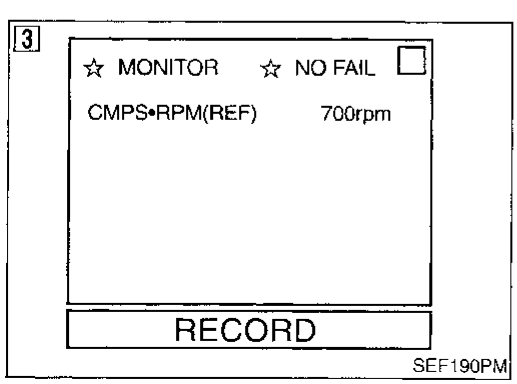
DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1320 0201	• The ignition signal in the primary circuit is not sent to ECM during engine cranking or running.	• Harness or connectors (The ignition primary circuit is open or shorted.) • Power transistor unit. • Resistor • Camshaft position sensor • Camshaft position sensor circuit

DTC Confirmation Procedure

NCEC0323

NOTE:

- If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.
- **If DTC P1320 (0201) is displayed with P0340 (0101), perform trouble diagnosis for DTC P0340 first. Refer to EC-260.**



SEF190PM

With CONSULT

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
3) Start engine and wait at least 4 seconds. (If engine does not run, turn ignition switch to "START" at least 5 seconds.)
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-347.

With GST

1) Turn ignition switch "ON".
2) Start engine and wait at least 4 seconds. (If engine does not run, turn ignition switch to "START" at least 5 seconds.)

3) Select MODE 3 with GST.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-347.

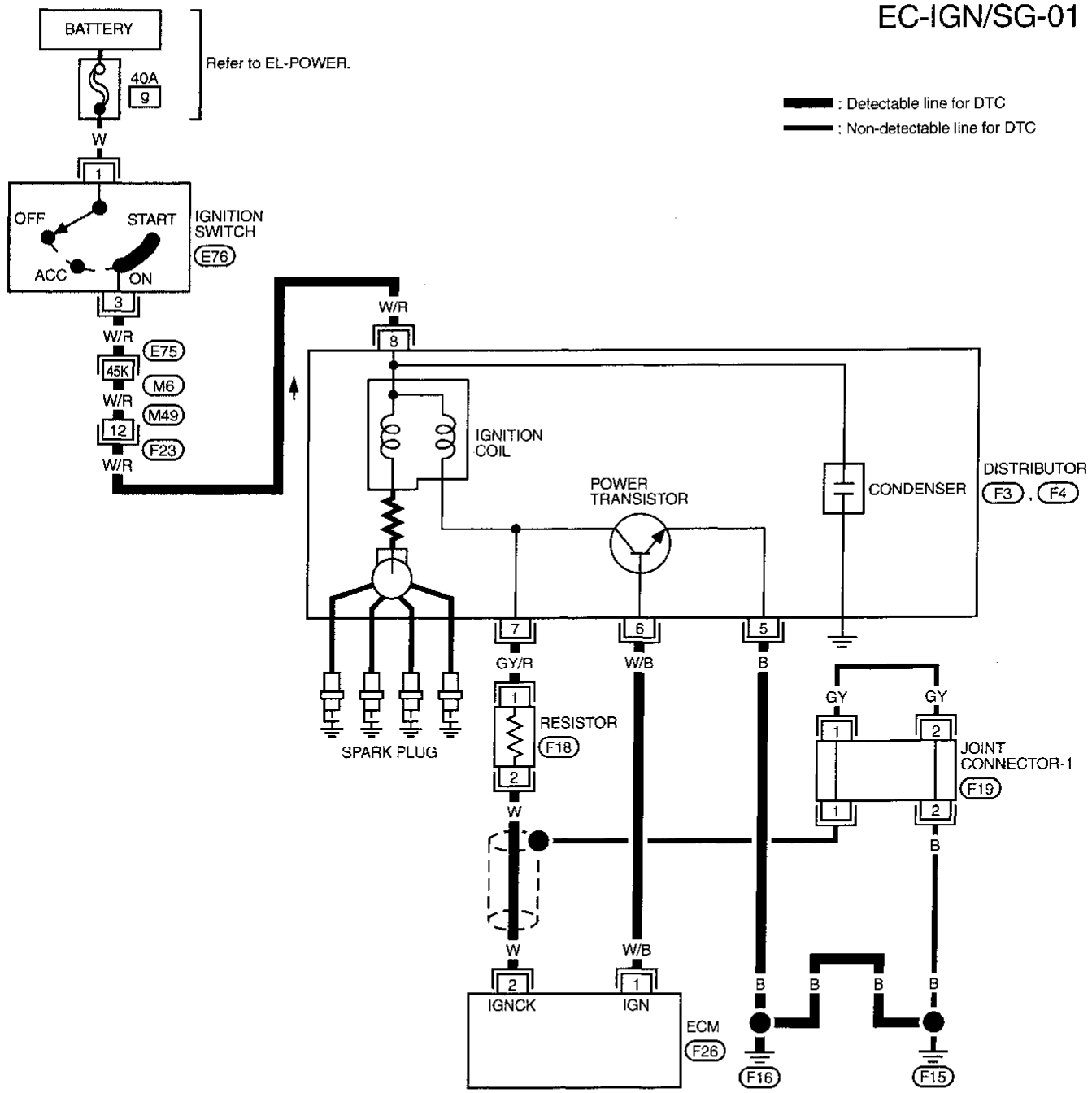
No Tools

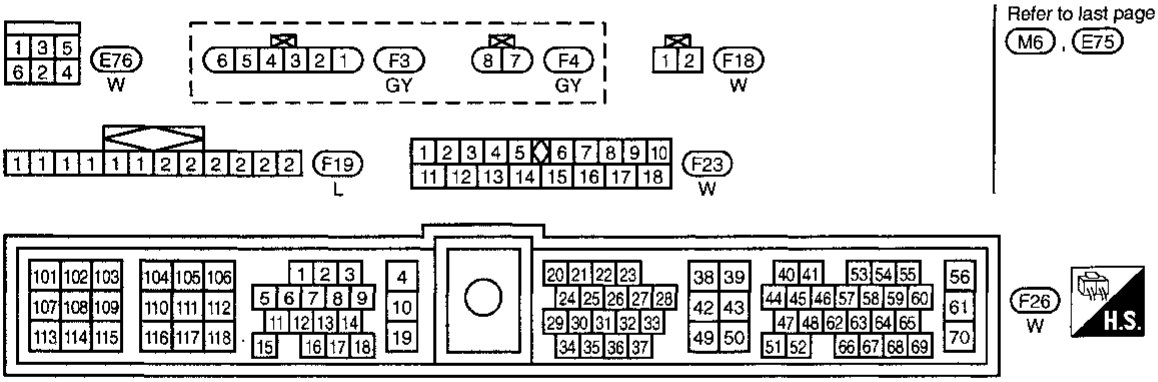
1) Turn ignition switch "ON".
2) Start engine and wait at least 4 seconds. (If engine does not run, turn ignition switch to "START" at least 5 seconds.)
3) Turn ignition switch "OFF" and wait at least 5 seconds, and then turn "ON".
4) Perform "Diagnostic Test Mode II" (Self-diagnostic results) with ECM.
5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-347.

Wiring Diagram

NCEC0324

EC-IGN/SG-01





Refer to last page (Foldout page).
M6 , E75

TEC545

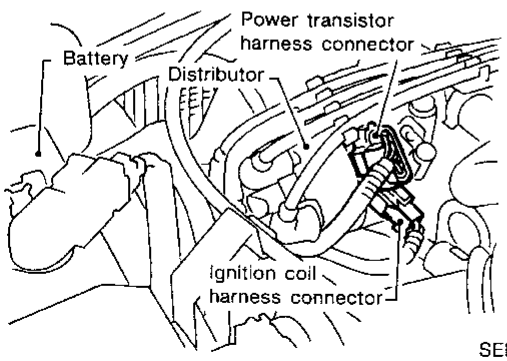
Diagnostic Procedure

NCEC0325

1	CHECK ENGINE START
Turn ignition switch "OFF", and restart engine. **Is engine running?**	
Yes or No	
Yes ▶	GO TO 7.
No ▶	GO TO 2.

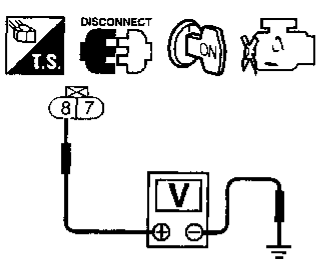
2	CHECK POWER SUPPLY

1. Turn ignition switch "OFF".
2. Disconnect ignition coil harness connector.



SEF010P

3. Turn ignition switch "ON".
4. Check voltage between terminal 8 and ground with CONSULT or tester.



SEF257W

Voltage: Battery voltage

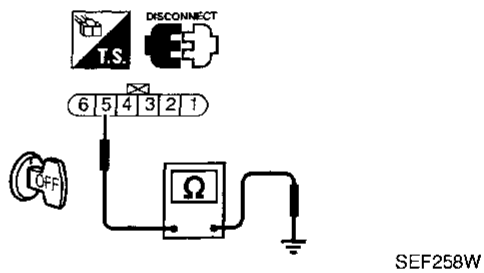
OK or NG

OK ▶	GO TO 4.
NG ▶	GO TO 3.

3	DETECT MALFUNCTIONING PART
Check the following. • Harness connectors E75, M6 • Harness connectors M49, F23 • Harness for open or short between ignition coil and ignition switch	
▶	Repair harness or connectors.

4	CHECK GROUND CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect power transistor harness connector.
3. Check harness continuity between terminal 5 and engine ground.



SEF258W

Continuity should exist.

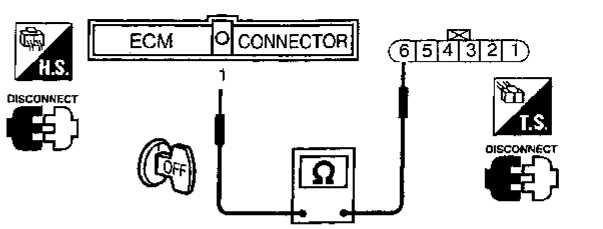
4. Also check harness for short to ground and short to power.

OK or NG

OK ▶	GO TO 5.
NG ▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 1 and power transistor terminal 6.



SEF259W

Continuity should exist.

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

OK or NG

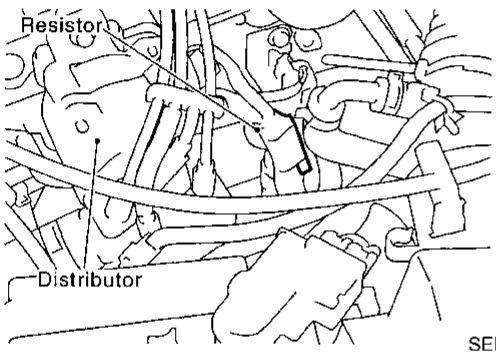
OK ▶	GO TO 6.
NG ▶	Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK IGNITION COIL, POWER TRANSISTOR
Refer to "Component Inspection", EC-348.	
OK or NG	
OK ▶	GO TO 7.
NG ▶	Replace malfunctioning component(s).

Diagnostic Procedure (Cont'd)

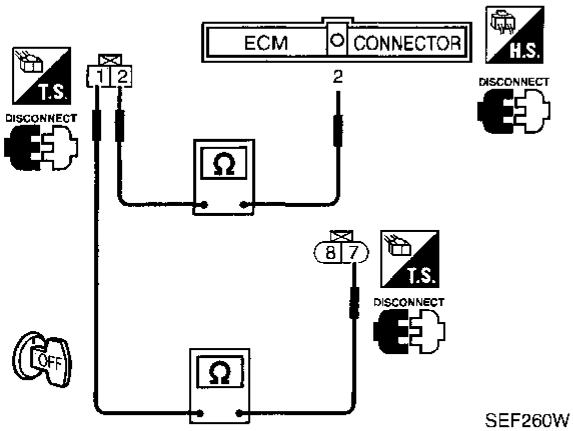
7	CHECK INPUT SIGNAL CIRCUIT

1. Stop engine.
2. Disconnect ignition coil harness connector.
3. Strip tape covering resistor.
4. Disconnect resistor harness connector.



SEF315W

5. Disconnect ECM harness connector.
6. Check harness continuity between ignition coil terminal 7 and resistor terminal 1, resistor terminal 2 and ECM terminal 2.



SEF260W

Continuity should exist.

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

OK or NG

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

8	CHECK RESISTOR

Refer to "Component Inspection" EC-349.

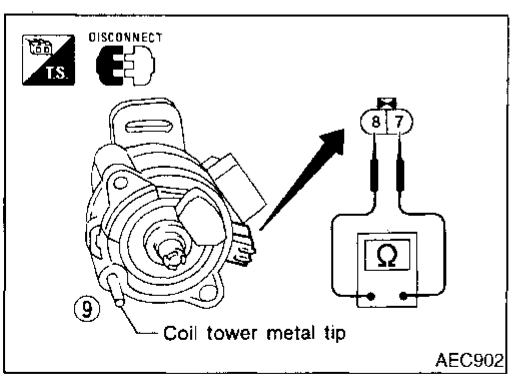
OK or NG

OK	▶	GO TO 9.
NG	▶	Replace resistor.

9	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-110.

	▶	INSPECTION END



AEC902

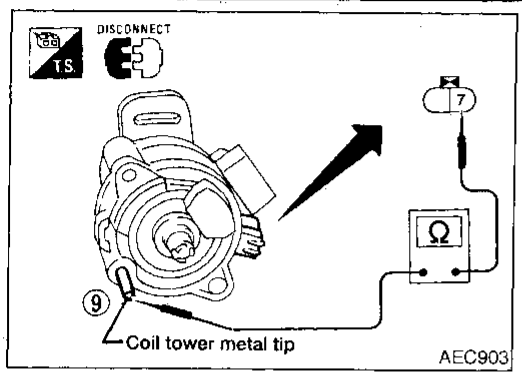
Component Inspection

NCEC0326

IGNITION COIL

NCEC0326S01

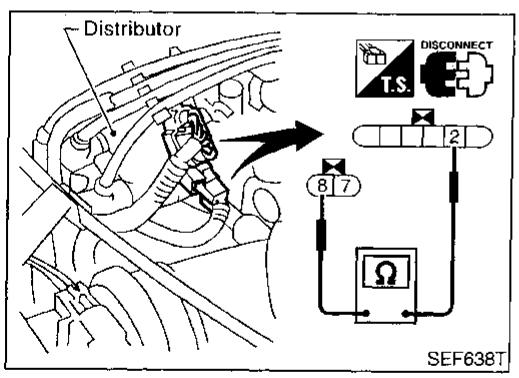
1. Disconnect ignition coil harness connector.
2. Check resistance as shown in the figure.



3. For checking secondary coil, remove distributor cap.
4. Check resistance between ignition coil harness connector terminal 8 and coil tower metal tip 9 (secondary terminal) on the distributor head.

Terminal	Resistance [at 25°C (77°F)]
7 - 8 (Primary coil)	Approximately 0.5 - 1.0Ω
8 - secondary terminal on distributor head (Secondary coil)	Approximately 25 kΩ

If NG, replace distributor.



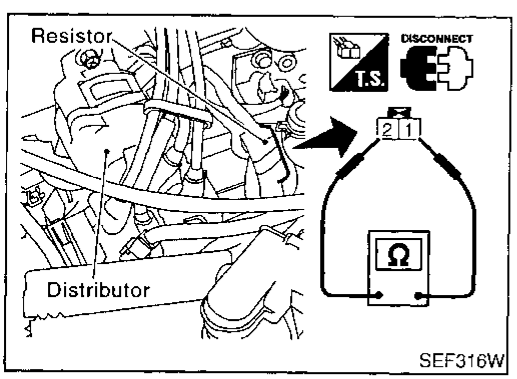
POWER TRANSISTOR

NCEC0326S02

1. Disconnect power transistor harness connector.
2. Check power transistor resistance between terminals 5 and 7.

Terminals	Resistance	Result
5 and 7	Except 0Ω	OK
	0Ω	NG

If NG, replace distributor.



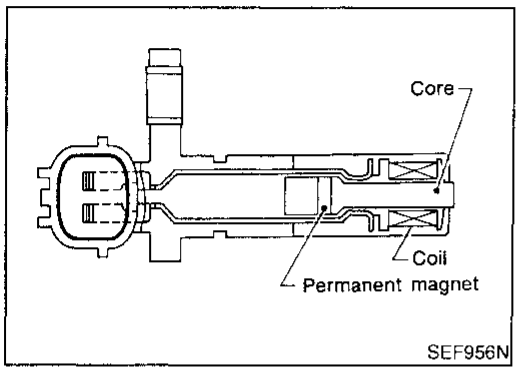
RESISTOR

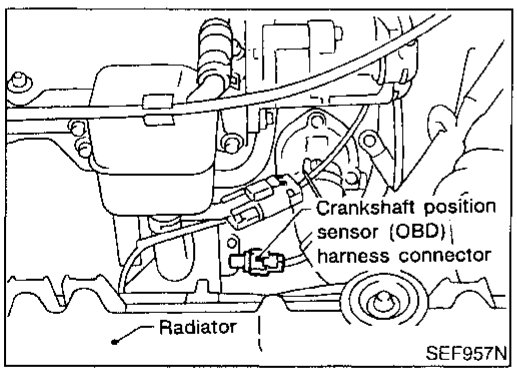
NCEC0326S03

1. Disconnect resistor harness connector.
2. Check resistance between terminals 1 and 2.

Resistance: Approximately 2.2 kΩ [at 25°C (77°F)]

If NG, replace resistor.





Component Description

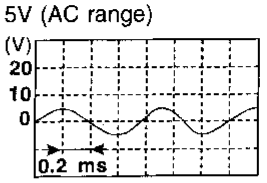
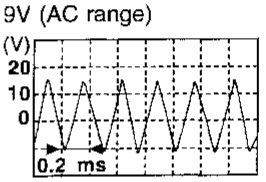
NCEC0327

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.

ECM Terminals and Reference Value

NCEC0328

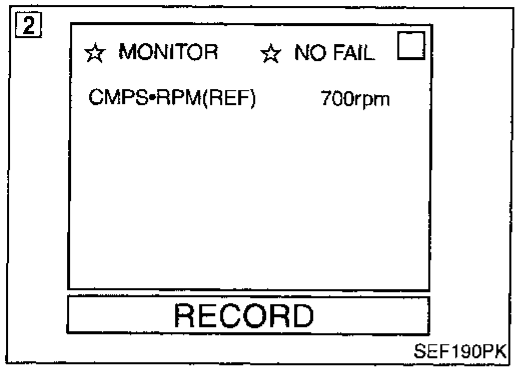
Specification data are reference values and are measured between each terminal and 43 (ECM ground).

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (AC Voltage)
50	B	Sensors' ground	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V
53	W	Crankshaft position sensor (OBD)	**[Engine is running]** • **Warm-up condition** • Idle speed	3 - 5V (AC range)  SEF721W
			[Engine is running] • Engine speed is 2,000 rpm	6 - 9V (AC range)  SEF722W

On Board Diagnosis Logic

NCEC0329

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1336 0905	• A chipping of the flywheel or drive plate gear tooth (cog) is detected by the ECM.	• Harness or connectors • Crankshaft position sensor (OBD) • Drive plate/Flywheel



DTC Confirmation Procedure

NCEC0330

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

With CONSULT

1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT.
2) Start engine and run it for at least 4 minutes at idle speed.
3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-353.

With GST

1) Start engine and run it for at least 4 minutes at idle speed.
2) Select "MODE 7" with GST.
3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-353.

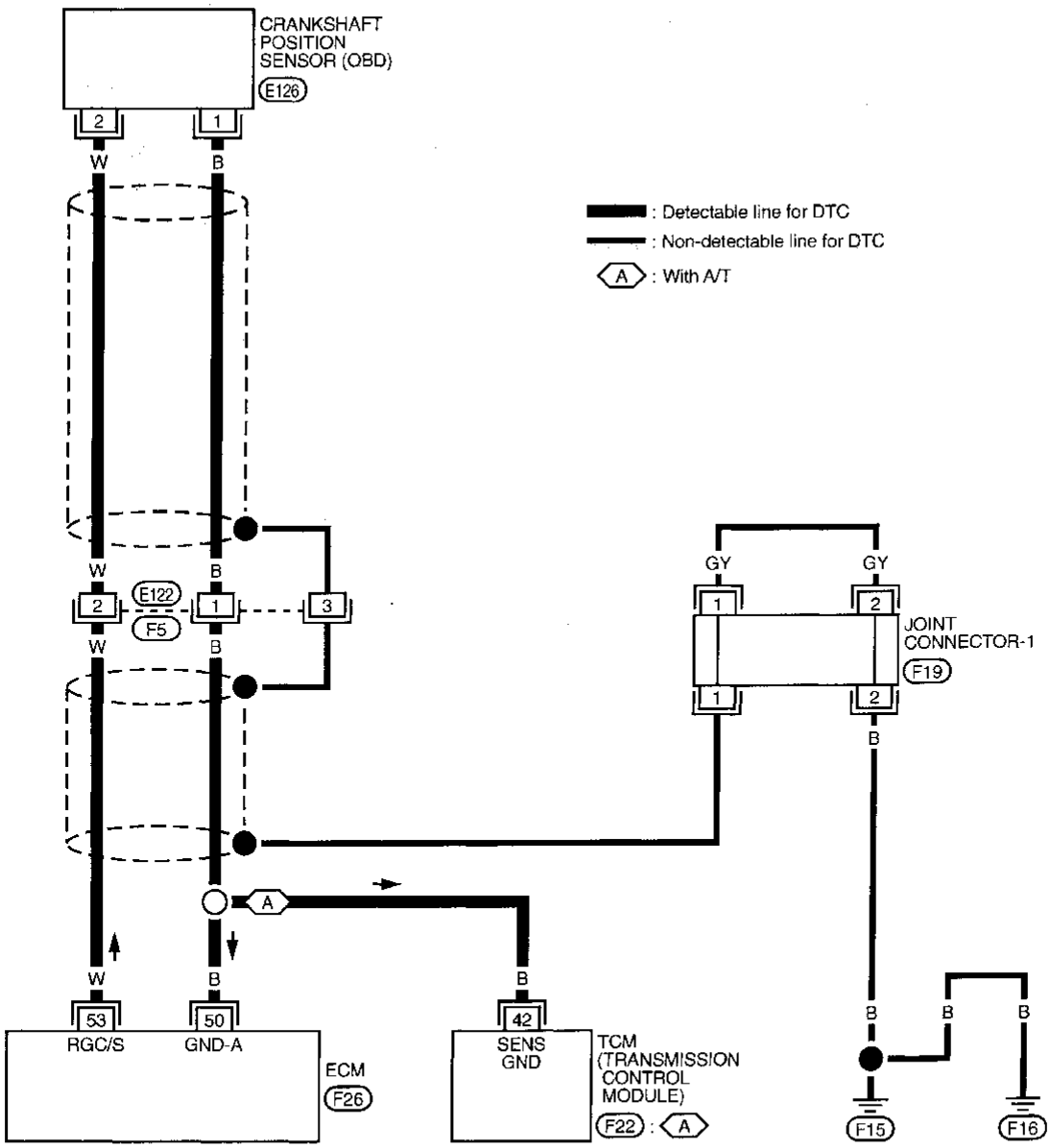
No Tools

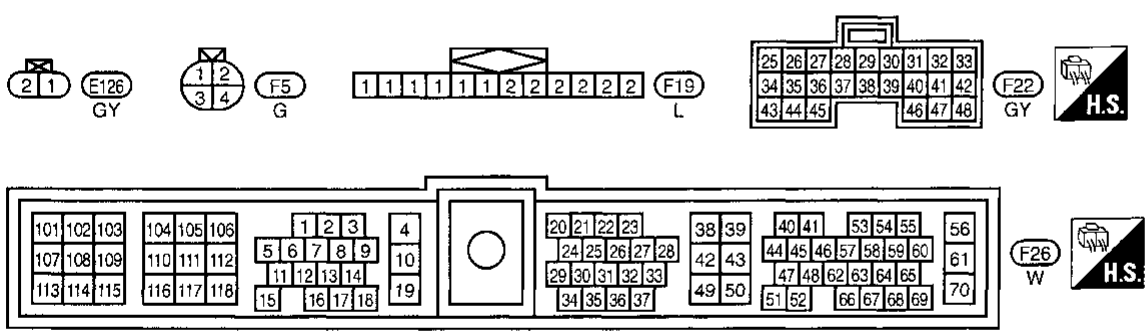
1) Start engine and run it for at least 4 minutes at idle speed.
2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
3) Perform "Diagnostic Test Mode II" (Self-diagnostic results) with ECM.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-353.

Wiring Diagram

NCEC0331

EC-CKPS-01





TEC535

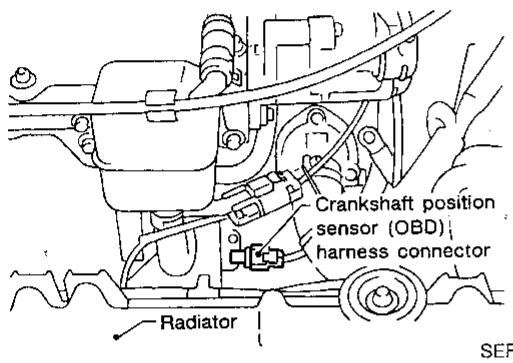
Diagnostic Procedure

NCEC0932

1	RETIGHTEN GROUND SCREWS
1. Turn ignition switch "OFF". 2. Loosen and retighten engine ground screws.	
▶	GO TO 2.

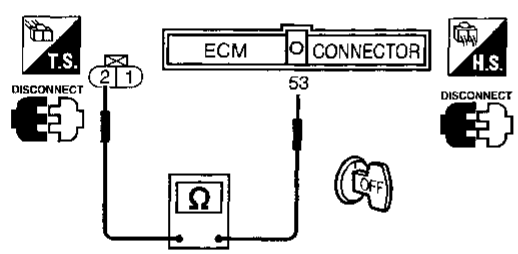
2	CHECK INPUT SIGNAL CIRCUIT

1. Disconnect crankshaft position sensor (OBD) and ECM harness connectors.



SEF957N

2. Check continuity between ECM terminal 53 and terminal 2.



SEF228W

Continuity should exist.

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

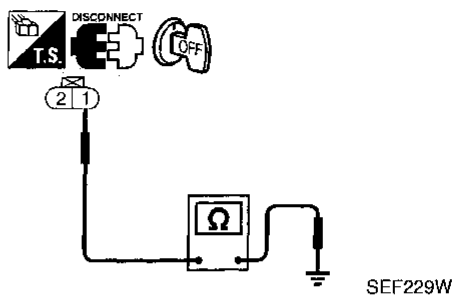
OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	DETECT MALFUNCTIONING PART
Check the following. • Harness connectors F5, E122 • Harness for open or short between crankshaft position sensor (OBD) and ECM	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK GROUND CIRCUIT

1. Reconnect ECM harness connectors.
2. Check harness continuity between terminal 1 and engine ground.



SEF229W

Continuity should exist.

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

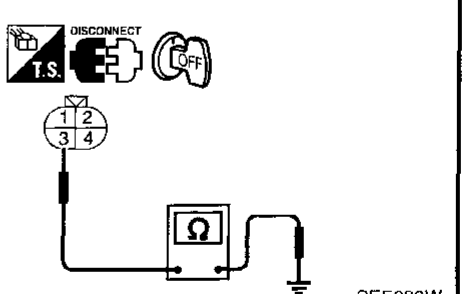
OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART
Check the following. • Harness connectors F5, E122 • Harness for open or short between crankshaft position sensor (OBD) and ECM • Harness for open or short between crankshaft position sensor (OBD) and TCM (Transmission control module)	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK SHIELD CIRCUIT

1. Disconnect harness connectors F5, E122.
2. Check harness continuity between terminal 3 and engine ground.



SEF230W

Continuity should exist

3. Also check harness for short to ground and short to power.
4. Then reconnect harness connectors.

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

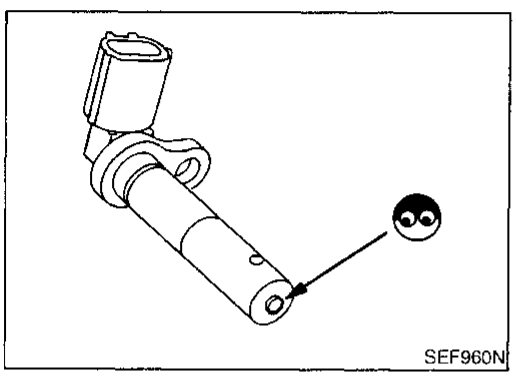
7	DETECT MALFUNCTIONING PART
Check the following. • Harness connectors F5, E122 • Joint connector-1 (Refer to "HARNESS LAYOUT" in EL section.) • Harness for open or short between harness connector F5 and engine ground	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

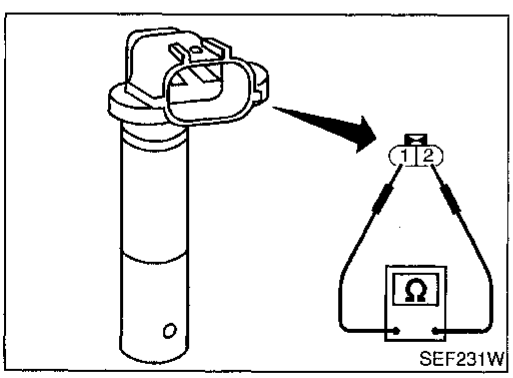
8	CHECK IMPROPER INSTALLATION
Loosen and retighten the fixing bolt of the crankshaft position sensor (OBD). Then retest.	
Trouble is not fixed. ▶	GO TO 9.

9	CHECK CRANKSHAFT POSITION SENSOR (OBD)
Refer to "Component Inspection", EC-354.	
OK or NG	
OK ▶	GO TO 10.
NG ▶	Replace crankshaft position sensor (OBD).

10	CHECK GEAR TOOTH
Visually check for chipping flywheel or drive plate gear tooth (cog).	
OK or NG	
OK ▶	GO TO 11.
NG ▶	Replace the flywheel or drive plate.

11	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-110.	
▶	**INSPECTION END**


SEF960N



SEF231W

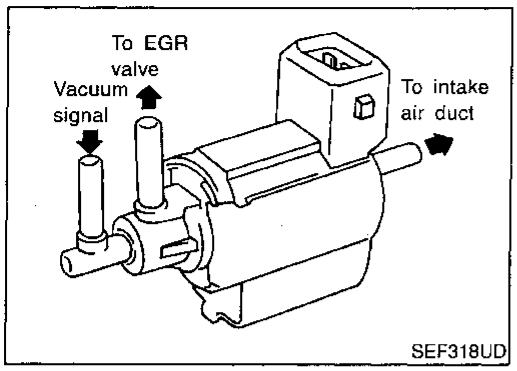
Component Inspection

NCEC0333

CRANKSHAFT POSITION SENSOR (OBD)

NCEC0333S01

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: 166 - 204 Ω [at 25°C (77°F)]



Component Description

NCEC0334

The EGRC-solenoid valve responds to signals from the ECM. When the ECM sends an ON (ground) signal, the coil in the solenoid valve is energized. The vacuum signal passes through the solenoid valve. The signal then reaches the EGR valve.
When the ECM sends an OFF signal, a plunger will then move to cut the vacuum signal from the intake manifold collector to the EGR valve.

CONSULT Reference Value in Data Monitor Mode

NCEC0335

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
EGRC SOL/V	• Engine: After warming up • Air conditioner switch: "OFF" • Shift lever: "N" (A/T models) • No-load • M/T models: Lift up drive wheels and shift to 1st gear position.	Idle	OFF
		Rev engine up from 2,000 to 4,000 rpm.	ON

ECM Terminals and Reference Value

NCEC0336

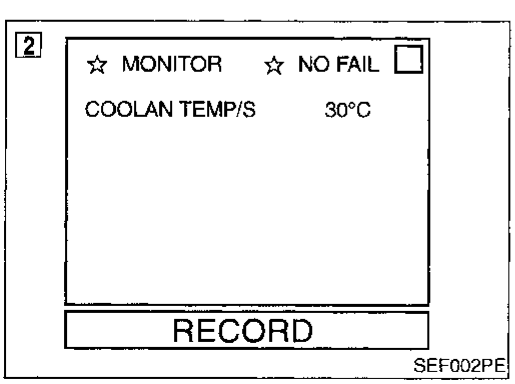
Specification data are reference values and are measured between each terminal and 43 (ECM ground).

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
103	P	EGRC-solenoid valve	**[Engine is running]** • **Warm-up condition** • Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] • **Warm-up condition** • M/T models: Lift up drive wheels and shift to 1st gear position. • Rev engine up from 2,000 to 4,000 rpm.	0 - 0.7V

On Board Diagnosis Logic

NCEC0337

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1400 1005	• The improper voltage signal is sent to ECM through EGRC-solenoid valve.	• Harness or connectors (The EGRC-solenoid valve circuit is open or shorted.) • EGRC-solenoid valve



DTC Confirmation Procedure

NCEC0338

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

With CONSULT

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT and wait at least 5 seconds.
3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-358.

DTC Confirmation Procedure (Cont'd)

With GST

1) Turn ignition switch "ON" and wait at least 5 seconds.
2) Select "MODE 7" with GST.
3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-358.

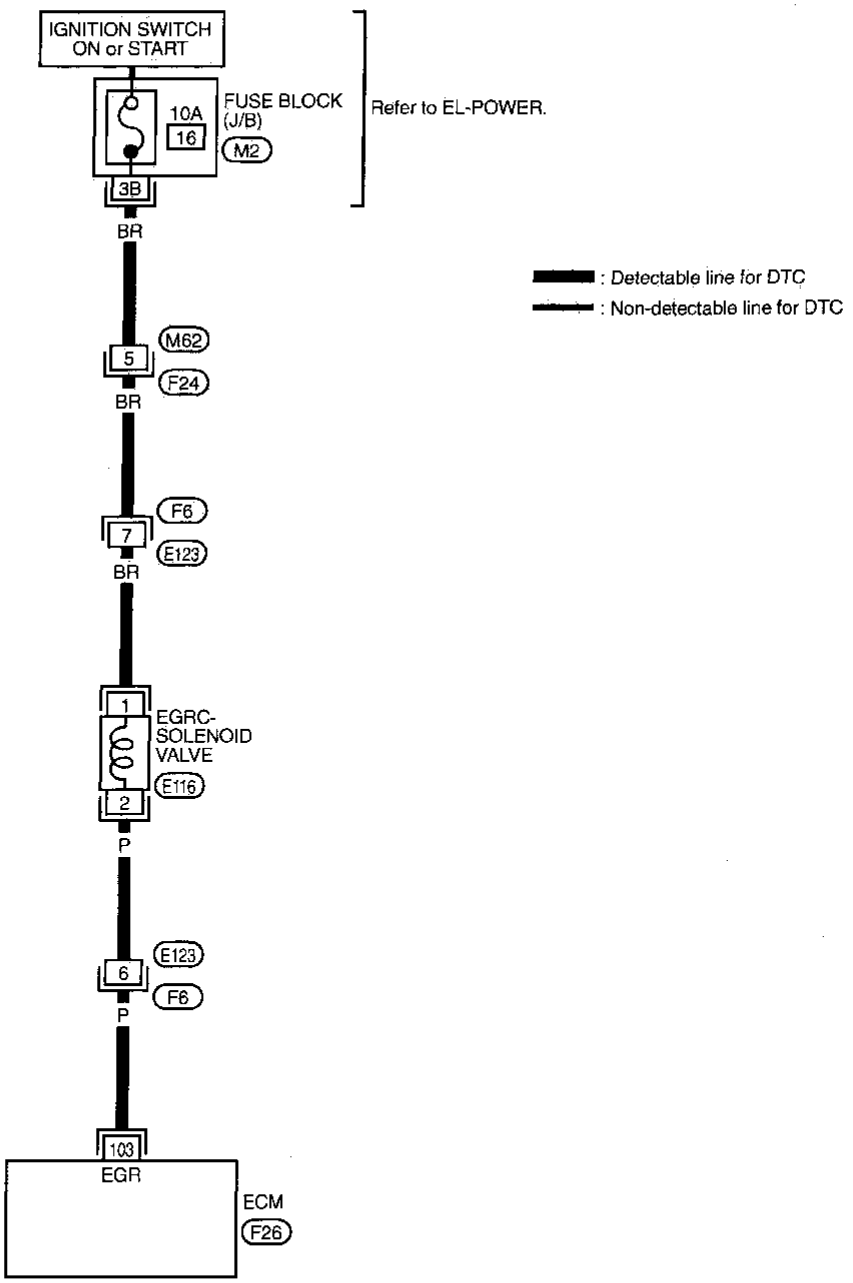
No Tools

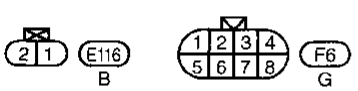
1) Turn ignition switch "ON" and wait at least 5 seconds.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Turn ignition switch "ON" and perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-358.

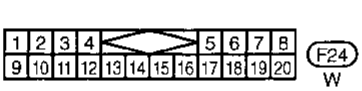
Wiring Diagram

NCEC0339

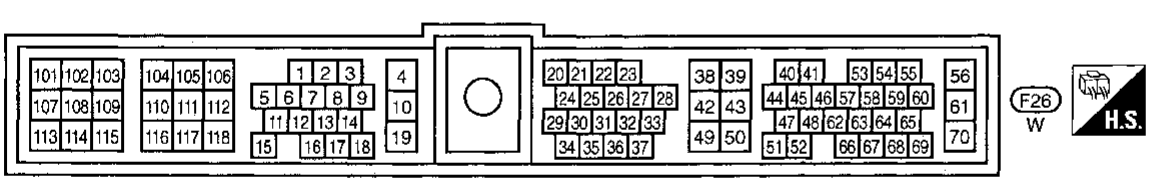
EC-EGRC/V-01







Refer to last page (Foldout page).
M2



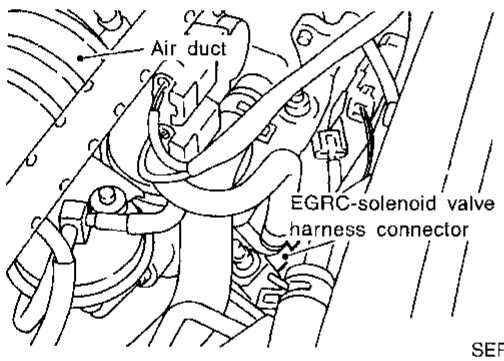
TEC546

Diagnostic Procedure

NCEC0340

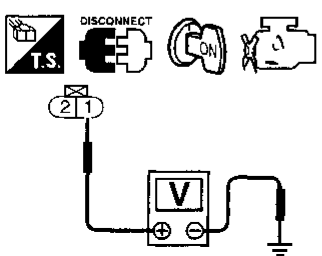
1 CHECK POWER SUPPLY

1. Turn ignition switch "OFF".
2. Disconnect EGRC-solenoid valve harness connector.



SEF317W

3. Turn ignition switch "ON".
4. Check voltage between terminal 1 and ground with CONSULT or tester.



SEF261W

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

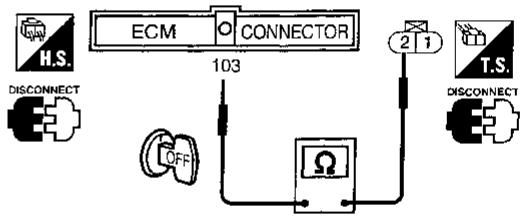
2 DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M62, F24
- Harness connectors F6, E123
- 10A fuse
- Harness for open or short between EGRC-solenoid valve and fuse

▶	Repair harness or connectors.

3 CHECK OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 103 and terminal 2.



SEF262W

Continuity should exist.

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

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4 DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F6, E123
- Harness for open or short between EGRC-solenoid valve and ECM

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

5 CHECK EGRC-SOLENOID VALVE

Refer to "Component Inspection", EC-359.

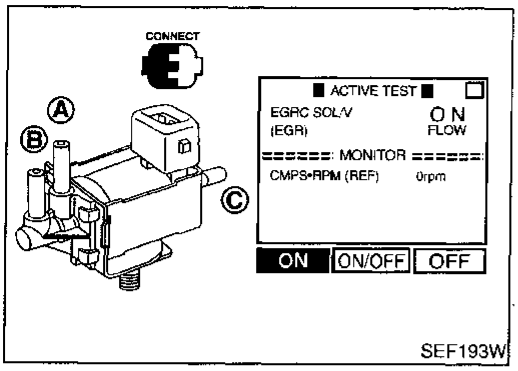
OK or NG

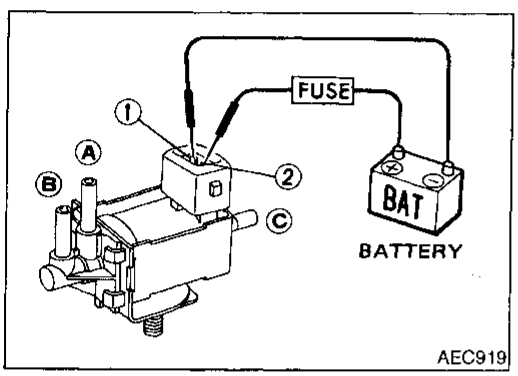
OK	▶	GO TO 6.
NG	▶	Replace EGRC-solenoid valve.

6 CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-110.

▶	**INSPECTION END**





Component Inspection

NCEC0341

EGRC-SOLENOID VALVE

NCEC0341S01

Check air passage continuity.

With CONSULT

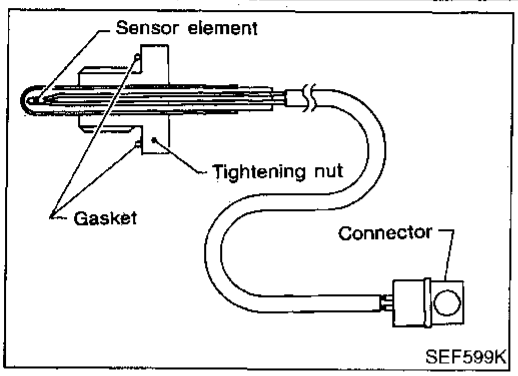
Perform "EGRC SOLENOID VALVE" in "ACTIVE TEST" mode.

Condition EGRC SOLENOID VALVE	Air passage continuity between **A** and **B**	Air passage continuity between **A** and **C**
ON	Yes	No
OFF	No	Yes

Without CONSULT

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

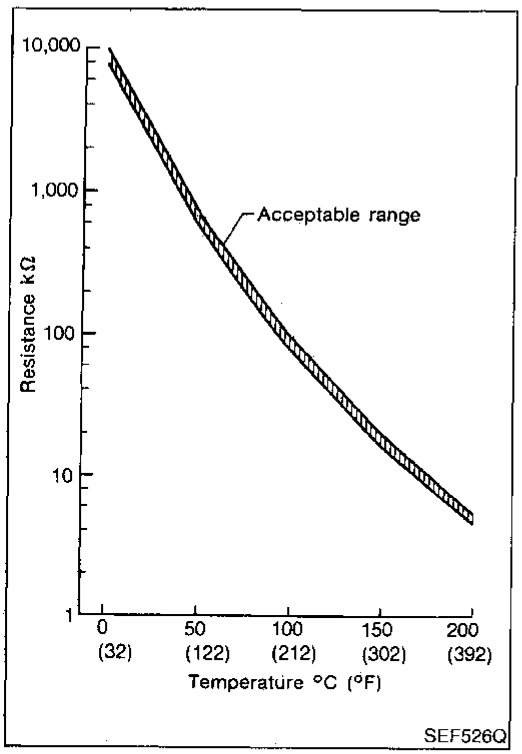
If NG or operation takes more than 1 second, replace solenoid valve.



Component Description

NCEC0342

The EGR temperature sensor detects temperature changes in the EGR passageway. When the EGR valve opens, hot exhaust gases flow, and the temperature in the passageway changes. The EGR temperature sensor is a thermistor that modifies a voltage signal sent from the ECM. This modified signal then returns to the ECM as an input signal. As the temperature increases, EGR temperature sensor resistance decreases. This sensor is not used to control the engine system.
It is used only for the on board diagnosis.



<Reference data>

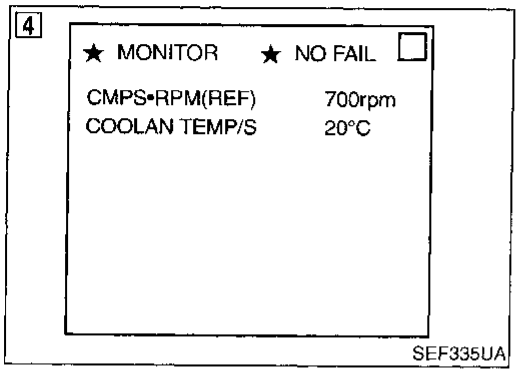
EGR temperature °C (°F)	Voltage* V	Resistance MΩ
0 (32)	4.81	7.9 - 9.7
50 (122)	2.82	0.57 - 0.70
100 (212)	0.8	0.08 - 0.10

*: These data are reference values and are measured between ECM terminal 62 (EGR temperature sensor) and ECM terminal 43 (ECM ground).
When EGR system is operating.
Voltage: 0 - 1.5V

On Board Diagnosis Logic

NCEC0343

DTC No.		Malfunction is detected when ...	Check Items (Possible Cause)
P1401 0305	A)	An excessively low voltage from the EGR temperature sensor is sent to ECM even when engine coolant temperature is low.	• Harness or connectors (The EGR temperature sensor circuit is shorted.) • EGR temperature sensor • Malfunction of EGR function, EGRC-BPT valve or EGRC-solenoid valve
	B)	An excessively high voltage from the EGR temperature sensor is sent to ECM even when engine coolant temperature is high.	• Harness or connectors (The EGR temperature sensor circuit is open.) • EGR temperature sensor • Malfunction of EGR function, EGRC-BPT valve or EGRC-solenoid valve



DTC Confirmation Procedure

NCEC0344

Perform "PROCEDURE FOR MALFUNCTION A" first. If 1st trip DTC cannot be confirmed, perform "PROCEDURE FOR MALFUNCTION B".

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

PROCEDURE FOR MALFUNCTION A

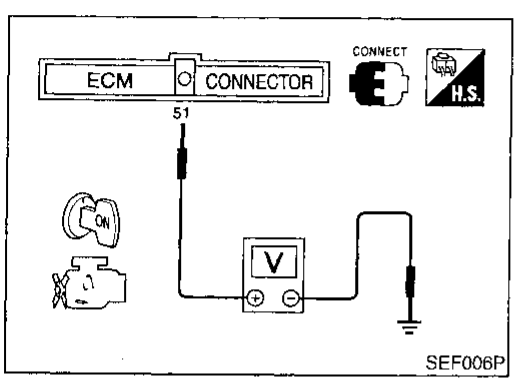
NCEC0344S01

With CONSULT

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
3) Verify that engine coolant temperature is less than 40°C (104°F).
   If the engine coolant temperature is above the range, cool the engine down.
4) Start engine and let it idle for at least 8 seconds.
5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-364.

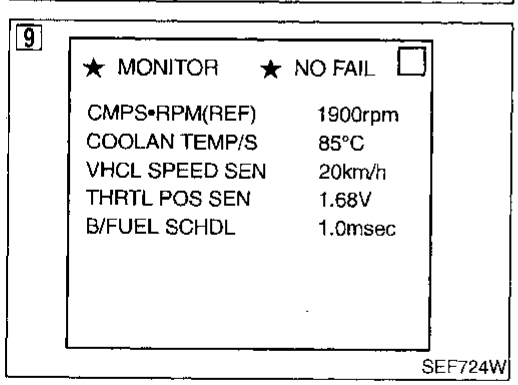
With GST

1) Turn ignition switch "ON".
2) Select "MODE 1" with GST.
3) Verify that engine coolant temperature is less than 40°C (104°F).
   If the engine coolant temperature is above the range, cool the engine down.
4) Start engine and let it idle for at least 8 seconds.
5) Select "MODE 7" with GST.
6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-364.



No Tools

1) Turn ignition switch "ON".
2) Verify that voltage between ECM terminal 51 (Engine coolant temperature sensor signal) is more than 2.7V.
   If the voltage is below the range, cool the engine down.
3) Start engine and let it idle for at least 8 seconds.
4) Turn ignition switch "OFF" and wait at least 5 seconds.
5) Turn ignition switch "ON" and perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-364.



PROCEDURE FOR MALFUNCTION B

NCEC0344S02

CAUTION:
Always drive vehicle at a safe speed.

TESTING CONDITION:
Always perform the test at a temperature above 5°C (41°F).

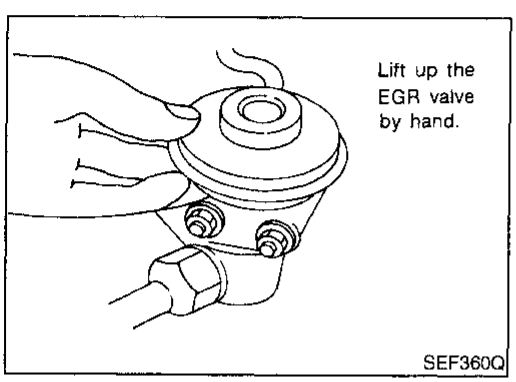
With CONSULT

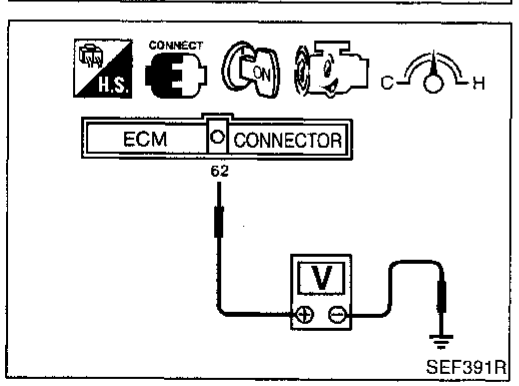
1) Start engine and warm it up to normal operating temperature.
2) Confirm that EGR valve is not lifting.
   If the result is NG, perform trouble diagnosis for DTC P1402. Refer to EC-366.
3) Select "DATA MONITOR" mode with CONSULT.

4) Read "EGR TEMP SEN" at about 1,500 rpm while holding the EGR valve in full open position by hand.
Voltage should decrease to less than 1.0V.
If the result is NG, go to "Diagnostic Procedure", EC-364.
If the result is OK, go to following step.
5) Turn ignition switch "OFF" and wait at least 5 seconds.
6) Turn ignition switch "ON".
7) Check the output voltage of "THRTL POS SEN" (at closed throttle position) and note it.
8) Start engine.
9) Maintain the following conditions for at least 5 consecutive seconds.

CMPS·RPM (REF)	1,800 - 2,800 rpm (A/T) 1,600 - 2,800 rpm (M/T)
COOLAN TEMP/S	Above 80°C (176°F)
VHCL SPEED SE	10 km/h (6 MPH) or more
B/FUEL SCHDL	2.0 - 3.5 msec (A/T) 1.8 - 3.0 msec (M/T)
THRTL POS SEN	(X + 0.05) - (X + 0.87) V X = Voltage value measured at step 7
Selector lever	Suitable position

10) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-364.





Overall Function Check

NCEC0345

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

PROCEDURE FOR MALFUNCTION B

NCEC0345S01

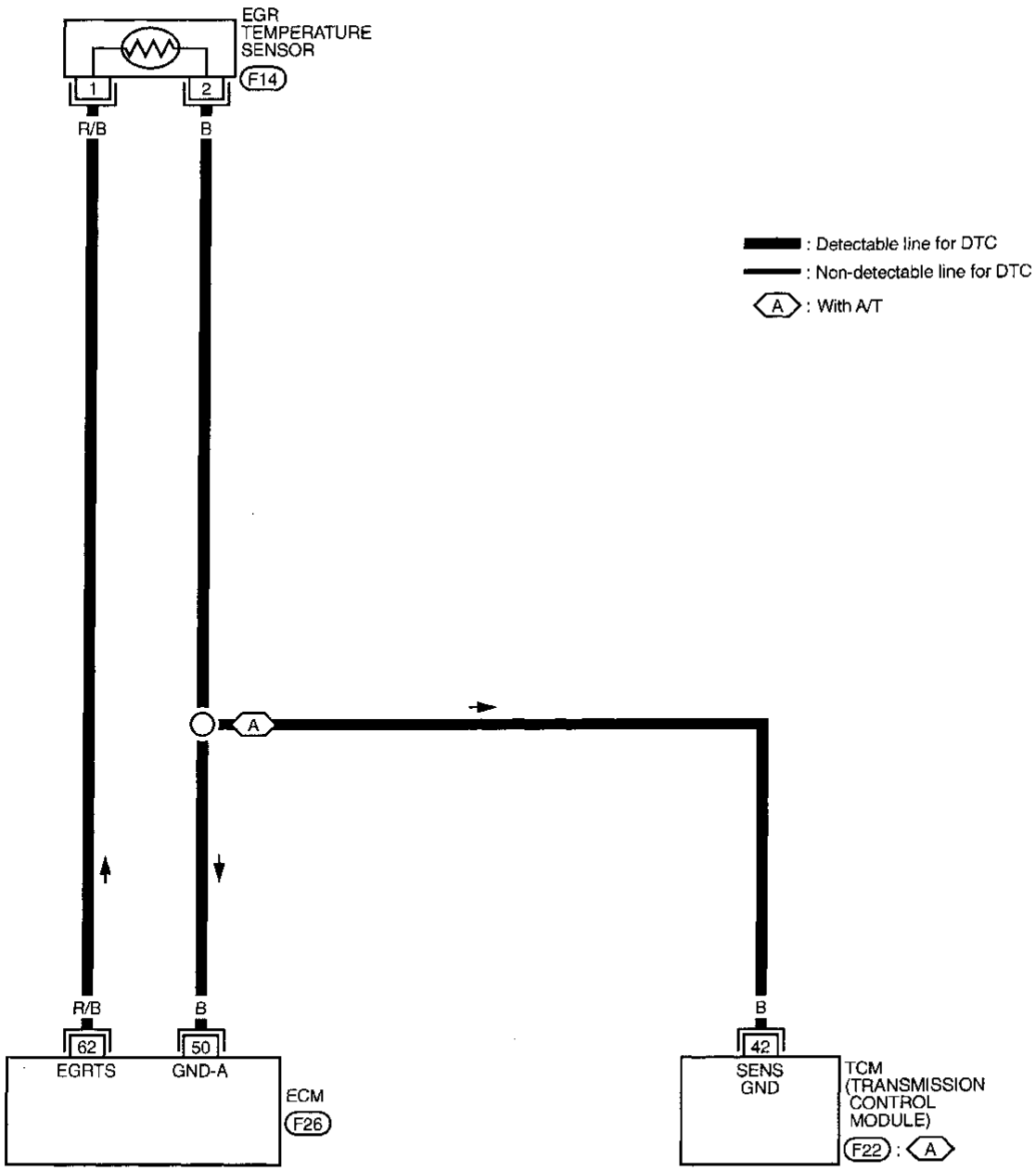
Without CONSULT

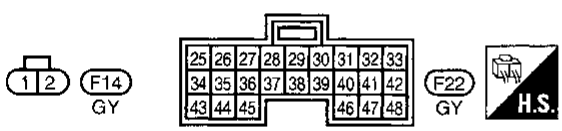
1) Start engine and warm it up to normal operating temperature.
2) Confirm that EGR valve is not lifting. If NG, perform trouble diagnosis for DTC P1402. Refer to EC-367.
3) Check voltage between ECM terminal 62 (EGR temperature sensor signal) and ground at about 1,500 rpm with EGR valve lifted up to the full position by hand.
Voltage should decrease to less than 1.0V.
4) If NG, go to "Diagnostic Procedure", EC-364.
If OK, perform trouble diagnoses for DTC P0400 and P1400. Refer to EC-267, 355.

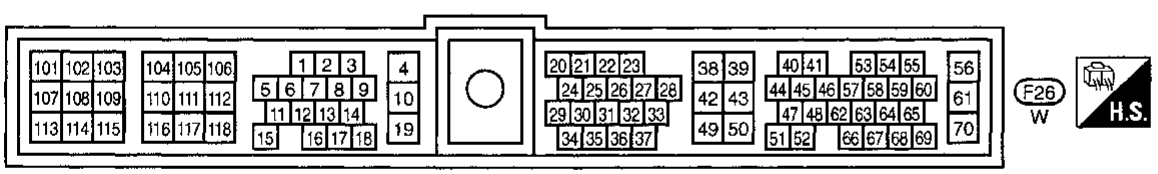
Wiring Diagram

NCEC0346

EC-EGR/TS-01







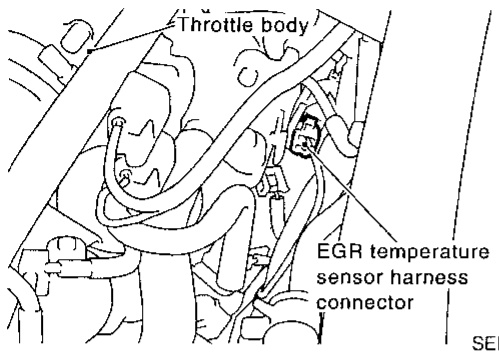
TEC547

Diagnostic Procedure

NCEC0347

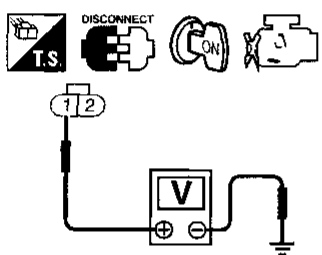
1 CHECK POWER SUPPLY

1. Turn ignition switch "OFF".
2. Disconnect EGR temperature sensor harness connector.



SEF301W

3. Turn ignition switch "ON".
4. Check voltage between terminal 1 and ground with CONSULT or tester.



SEF263W

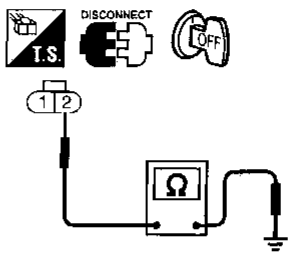
Voltage: Approximately 5V

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair harness or connectors.

2 CHECK GROUND CIRCUIT

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



SEF264W

Continuity should exist.

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

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

3 DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between EGR temperature sensor and ECM
- Harness for open or short between EGR temperature sensor and TCM (Transmission control module)

	▶	Repair open circuit or short to ground or short to power in harness or connector.

4 CHECK EGR TEMPERATURE SENSOR

Refer to "Component Inspection", EC-365.

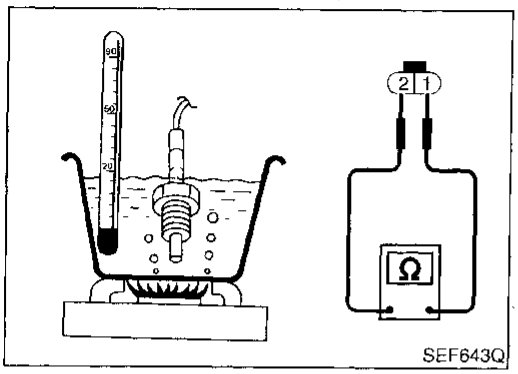
OK or NG

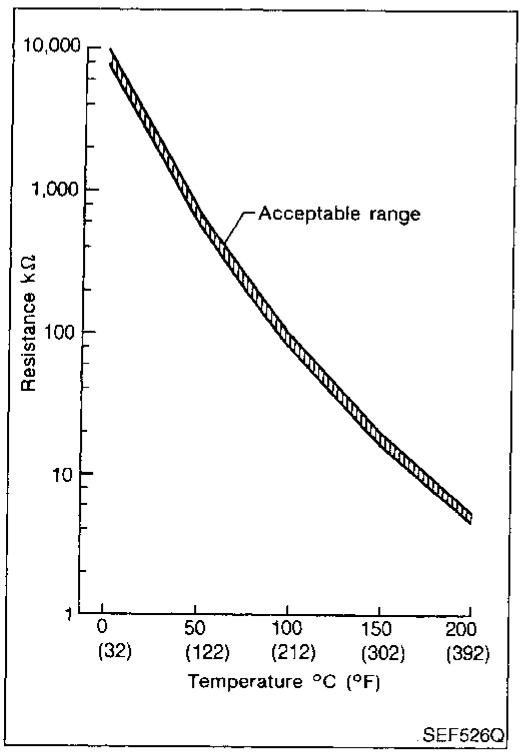
OK	▶	GO TO 5.
NG	▶	Replace EGR temperature sensor.

5 CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-110.

	▶	**INSPECTION END**





Component Inspection

NCEC0348

EGR TEMPERATURE SENSOR

NCEC0348S01

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.

Description

NCEC0349

SYSTEM DESCRIPTION

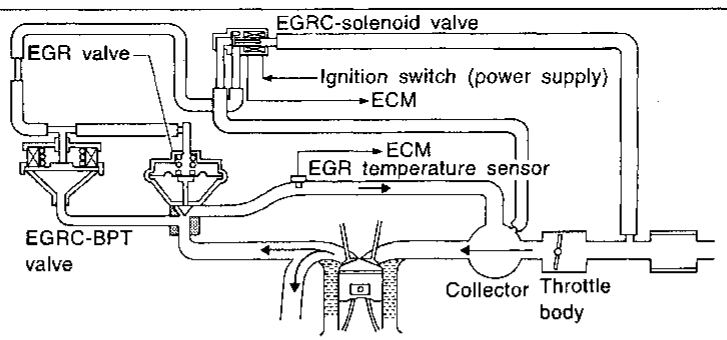
NCEC0349S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	EGR control	EGRC-solenoid valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		
Vehicle speed sensor	Vehicle speed		

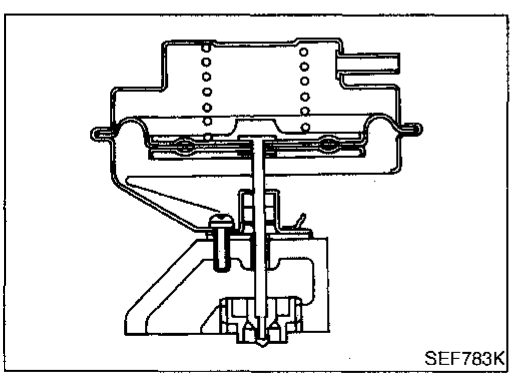
This system cuts and controls vacuum applied to the EGR valve to suit engine operating conditions. This cut-and-control operation is accomplished through the ECM and the EGRC-solenoid valve. When the ECM detects any of the following conditions, current through the solenoid valve is cut. This causes the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

- Low engine coolant temperature
- Engine starting
- High-speed engine operation
- Engine idling
- Excessively high engine coolant temperature
- Mass air flow sensor malfunction

EGR and vacuum



SEF317U



SEF783K

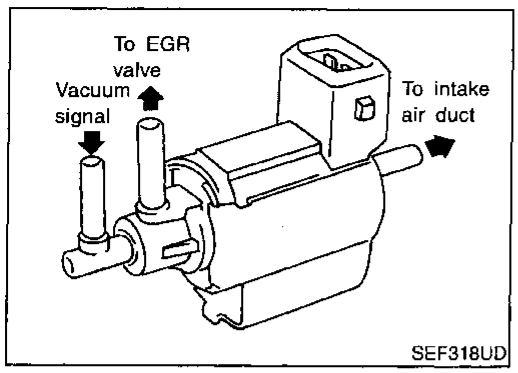
COMPONENT DESCRIPTION

NCEC0349S02

Exhaust Gas Recirculation (EGR) Valve

NCEC0349S0201

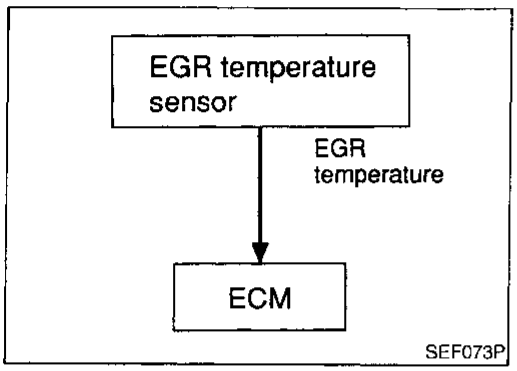
The EGR valve controls the amount of exhaust gas routed to the intake manifold. Vacuum is applied to the EGR valve in response to throttle valve opening. The vacuum controls the movement of a taper valve connected to the vacuum diaphragm in the EGR valve.



EGRC-solenoid Valve

NCEC0349S0202

The EGRC-solenoid valve responds to signals from the ECM. When the ECM sends an ON (ground) signal, the coil in the solenoid valve is energized. The vacuum signal passes through the solenoid valve. The signal then reaches the EGR valve.
When the ECM sends an OFF signal, a plunger will then move to cut the vacuum signal from the intake manifold collector to the EGR valve.



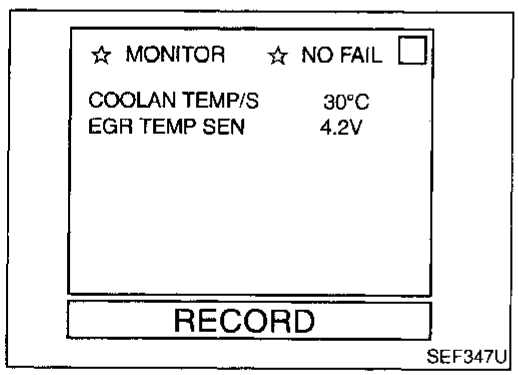
On Board Diagnosis Logic

NCEC0350

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

NOTE:
Diagnosis for this DTC will occur when engine coolant temperature is below 50 to 60°C (122 to 140°F). Therefore, it will be better to turn ignition switch "ON" (Start engine) at the engine coolant temperature below 30°C (86°F) when starting DTC confirmation procedure.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1402 0514	• EGR flow is detected under conditions that do not call for EGR.	• EGRC-solenoid valve • EGR valve leaking or stuck open • EGR temperature sensor • EGRC-BPT valve



DTC Confirmation Procedure

NCEC0351

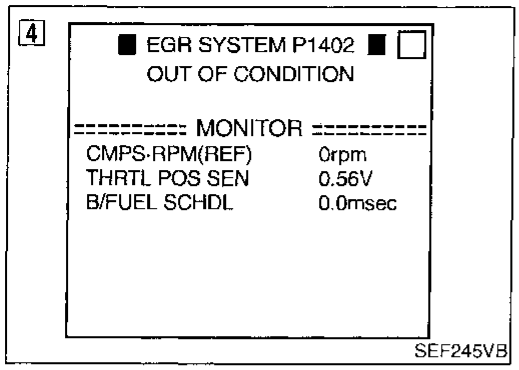
NOTE:
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

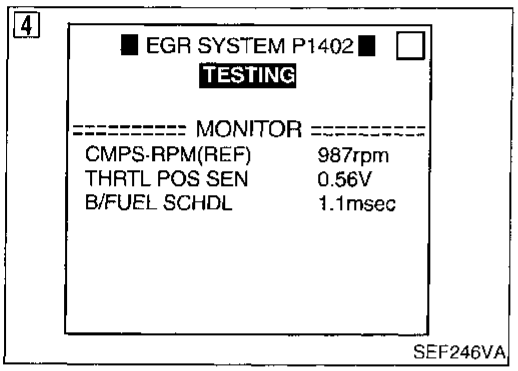
TESTING CONDITION:

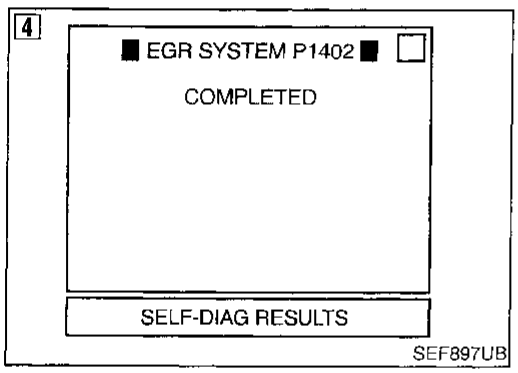
- **Always perform at a temperature above −10°C (14°F).**
- **Engine coolant temperature and EGR temperature must be verified in "DATA MONITOR" mode with CONSULT before starting DTC WORK SUPPORT test. If it is out of range below, the test cannot be conducted.**
  COOLAN TEMP/S: −10 to 30°C (14 to 86°F)*
  EGR TEMP SEN: Less than 4.8V
  If the values are out of the ranges indicated above, park the vehicle in a cool place and allow the engine temperature to stabilize. Do not attempt to reduce the engine coolant or EGR temperature with a fan or means other than ambient air. Doing so may produce an inaccurate diagnostic result.

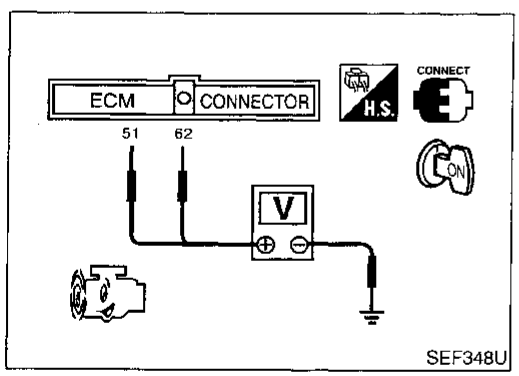
*: Although CONSULT screen displays "−10 to 40°C (14 to 104°F)" as a range of engine coolant temperature, ignore it.

DTC Confirmation Procedure (Cont'd)









With CONSULT

1) Turn ignition switch "OFF" and wait at least 5 seconds, then turn ignition switch "ON".
2) Select "EGR SYSTEM P1402" of "EGR SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT.
3) Touch "START". Follow instruction of CONSULT.
4) Start engine and let it idle until "TESTING" on CONSULT screen is turned to "COMPLETED". (It will take 60 seconds or more.)
   If "TESTING" is not displayed after 5 minutes, turn ignition "OFF" and cool the engine coolant temperature to the range of −10 to 30°C (14 to 86°F). Retry from step 1.
5) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-370.

With GST

1) Turn ignition switch "ON" and select "MODE 1" with GST.
2) Check that engine coolant temperature is within the range of −10 to 30°C (14 to 86°F).
3) Check that voltage between ECM terminal 62 (EGR temperature sensor signal) and ground is less than 4.8V.
4) Start engine and let it idle for at least 60 seconds.
5) Stop engine.
6) Perform from step 1 to 4.
7) Select "MODE 3" with GST.
8) If DTC is detected, go to "Diagnostic Procedure", EC-370.

No Tools

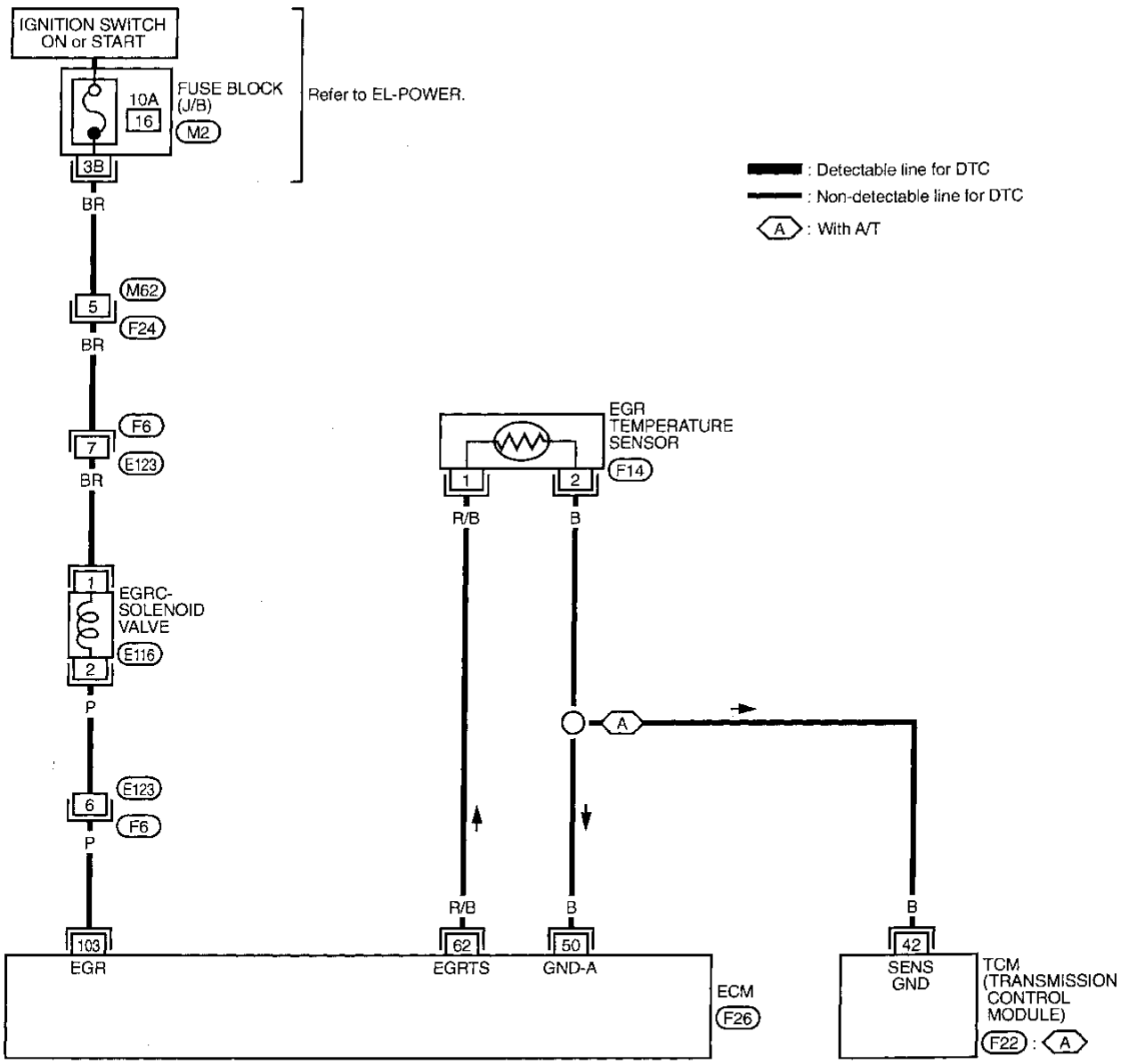
1) Turn ignition switch "ON".
2) Check the following voltages.
   ECM terminal 51 (Engine coolant temperature sensor signal) and ground: 3.2 - 4.4V
   ECM terminal 62 (EGR temperature sensor signal) and ground: Less than 4.8V
3) Start engine and let it idle for at least 60 seconds.
4) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
5) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
6) If DTC is detected, go to "Diagnostic Procedure", EC-370.

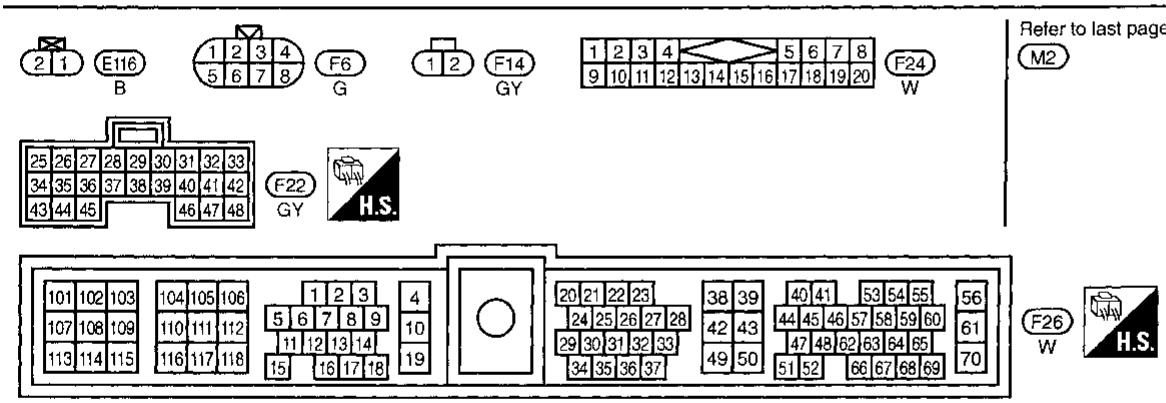
When using GST, "DTC Confirmation Procedure" should be performed twice as much as when using CONSULT or ECM (Diagnostic Test Mode II) because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT or ECM (Diagnostic Test Mode II) is recommended.

Wiring Diagram

NCEC0352

EC-EGRC1-01





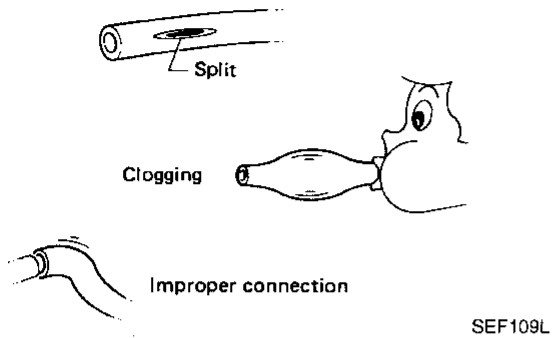
TEC537

Diagnostic Procedure

NCEC0353

1 CHECK VACUUM HOSE

Check vacuum hose for clogging, cracks or improper connection.
Refer to "Vacuum Hose Drawing", EC-21.



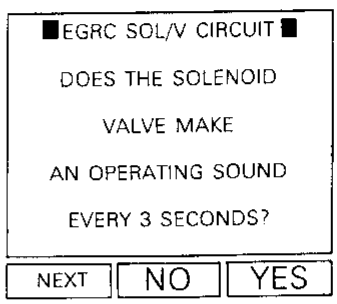
SEF109L

OK or NG

OK (With CONSULT)	▶	GO TO 2.
OK (Without CONSULT)	▶	GO TO 3.
NG	▶	Repair or replace vacuum hose.

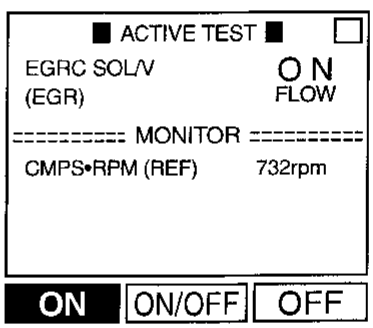
2 CHECK EGRC-SOLENOID VALVE CIRCUIT

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



MEF957D

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



SEF319U

Clicking noise should be heard.

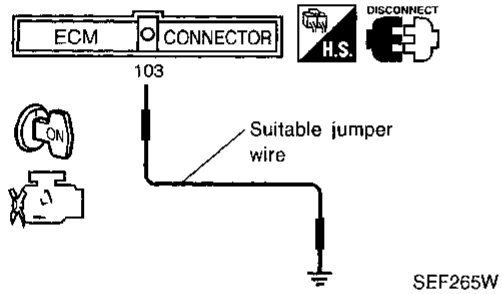
OK or NG

OK	▶	GO TO 4.
NG	▶	Repair or replace EGRC-solenoid valve or repair circuit.

3	CHECK EGRC-SOLENOID VALVE CIRCUIT

Without CONSULT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Turn ignition switch "ON".
4. Connect a suitable jumper wire between ECM terminal 103 and engine ground.



SEF265W

5. Check operating sound of the solenoid valve when disconnecting the jumper wire.
   Clicking noise should be heard.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair or replace EGRC-solenoid valve or repair circuit.

4	CHECK EGRC-SOLENOID VALVE

Refer to "Component Inspection", EC-359.

OK or NG

OK	▶	GO TO 5.
NG	▶	Replace EGRC-solenoid valve.

5	CHECK EGR VALVE

Refer to "Component Inspection", EC-371.

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace EGR valve.

6	CHECK EGRC-BPT VALVE

Refer to "Component Inspection", EC-371.

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace EGRC-BPT valve.

7	CHECK EGR TEMPERATURE SENSOR

Refer to "Component Inspection" on EC-365.

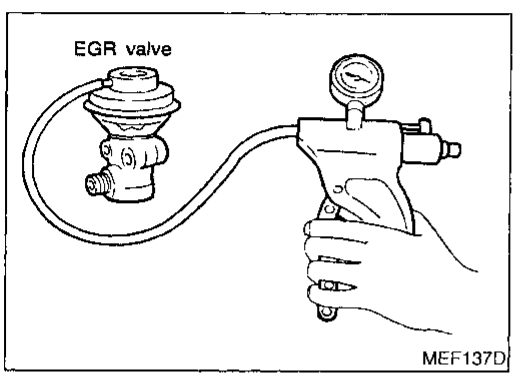
OK or NG

OK	▶	GO TO 8.
NG	▶	Replace EGR temperature sensor.

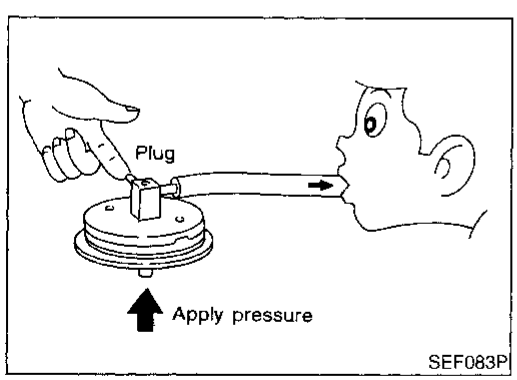
8	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-110.

	▶	**INSPECTION END**



MEF137D



SEF083P

Component Inspection

NCEC0354

EGR VALVE

NCEC0354S01

- Apply vacuum to EGR vacuum port with a hand vacuum pump.
  EGR valve spring should lift.
- Check for sticking.

If NG, repair or replace EGR valve.

EGRC-BPT VALVE

NCEC0354S04

1. Plug one of two ports of EGRC-BPT valve.
2. Vacuum from the other port and check for leakage while applying a pressure above 0.981 kPa (100 mmH_2O, 3.94 inH_2O) from under EGRC-BPT valve.
3. If a leakage is noted, replace the valve.

DTC P1440 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM (SMALL LEAK) (POSITIVE PRESSURE)

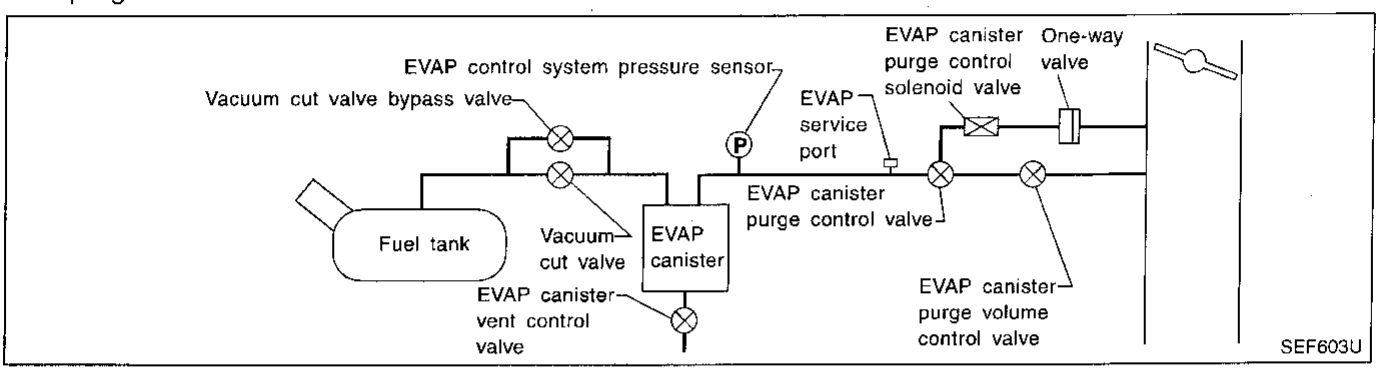
On Board Diagnosis Logic

NCEC0355

NOTE:

If DTC P1440 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. Refer to EC-397.

This diagnosis detects leaks in the EVAP purge line using vapor pressure in the fuel tank.
The EVAP canister vent control valve is closed to shut the EVAP purge line. The vacuum cut valve bypass valve will then be opened to clear the line between the fuel tank and the EVAP canister purge 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.

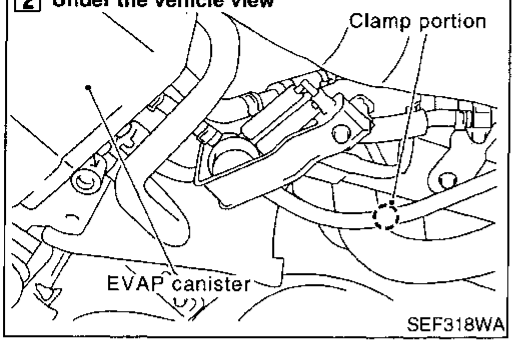


DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1440 0213	• EVAP control system has a leak. • EVAP control system does not operate properly.	• Incorrect fuel tank vacuum relief valve • Incorrect fuel filler cap used • Fuel filler cap remains open or fails to close. • Foreign matter caught in fuel filler cap. • Leak is in line between intake manifold and EVAP canister purge control valve. • Foreign matter caught in EVAP canister vent control valve. • EVAP canister or fuel tank leaks • EVAP purge line (pipe and rubber tube) leaks • EVAP purge line rubber tube bent. • Blocked or bent rubber tube to EVAP control system pressure sensor • Loose or disconnected rubber tube • EVAP canister vent control valve and the circuit • 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. • Water separator • EVAP canister is saturated with water.

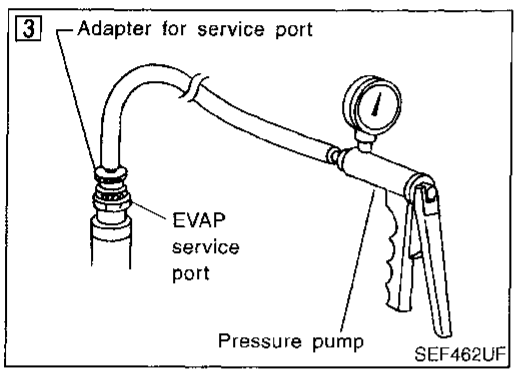
CAUTION:

- **Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.**
- **If the fuel filler cap is not tightened properly, the MIL may come on.**
- **Use only a genuine NISSAN rubber tube as a replacement.**

2 Under the vehicle view



3



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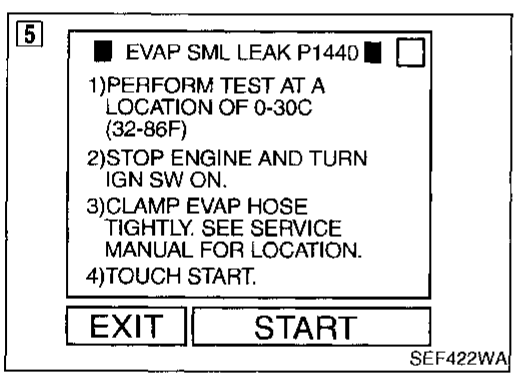
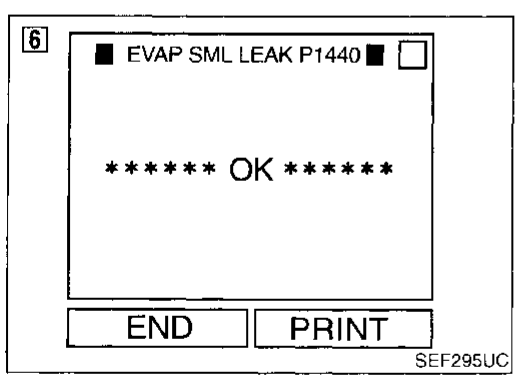


6



DTC Confirmation Procedure

NCEC0356

NOTE:

- If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.
- **If DTC P1440 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. Refer to EC-397.**

With CONSULT

CAUTION:

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

NOTE:

- Always remove EVAP service port adapter from EVAP service port after applying air up to 0.69 to 1.38 kPa (5.14 to 10.34 mmHg, 0.202 to 0.407 inHg).
- During the test, clamp the EVAP hose tightly as shown at left.

1) Turn ignition switch "OFF".
2) Clamp the EVAP hose as shown at left.
3) Install EVAP service port adapter and pressure pump to EVAP service port securely.
4) Turn ignition switch "ON".
5) Select "EVAP SML LEAK P1440" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT. Follow the instruction displayed.
6) Make sure that "OK" is displayed.
   If "NG" is displayed, refer to "Diagnostic Procedure", EC-374.

With GST

NOTE:

Be sure to read the explanation of "Driving pattern" on EC-48 before driving vehicle.

1) Start engine.
2) Drive vehicle according to "Driving pattern", EC-48.
3) Stop vehicle.
4) Select "MODE 1" with GST.
   - If SRT of EVAP system is not set yet, go to the following step.
   - If SRT of EVAP system is set, the result will be OK.
5) Turn ignition switch "OFF" and wait at least 5 seconds.
6) Start engine.
   It is not necessary to cool engine down before driving.
7) Drive vehicle again according to the "Driving pattern", EC-48.
8) Stop vehicle.
9) Select "MODE 3" with GST.
   - If P1447 is displayed on the screen, go to "Diagnostic Procedure", EC-393.
   - If P0440 is displayed on the screen, go to "Diagnostic Procedure", EC-286.
   - If P1440 is displayed on the screen, go to trouble diagnosis for DTC P1440, EC-374.
   - If P0440, P1440 and P1447 are not displayed on the screen, go to the following step.
10) Select "MODE 1" with GST.

DTC Confirmation Procedure (Cont'd)

- If SRT of EVAP system is set, the result will be OK.
- If SRT of EVAP system is not set, go to step 5.

No Tools

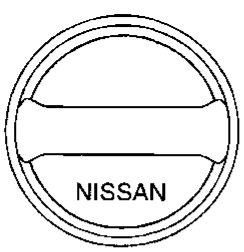
NOTE:

- **Be sure to read the explanation of "Driving pattern" on EC-48 before driving vehicle.**
- **It is better that the fuel level is low.**

1) Start engine.
2) Drive vehicle according to "Driving pattern", EC-48.
3) Stop vehicle.
4) Turn ignition switch "OFF" and wait at least 5 seconds.
5) Turn ignition switch "ON" and perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-374.

Diagnostic Procedure

NCEC0357

1	CHECK FUEL FILLER CAP DESIGN
1. Turn ignition switch "OFF".  SEF915U 2. Check for genuine NISSAN fuel filler cap design. **OK or NG**	
OK ▶	GO TO 2.
NG ▶	Replace with genuine NISSAN fuel filler cap.

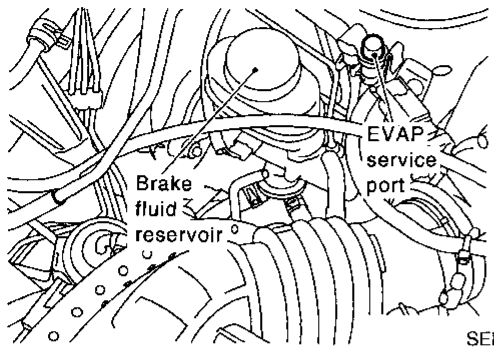
2	CHECK FUEL FILLER CAP INSTALLATION
Check that the cap is tightened properly rotating the cap clockwise. **OK or NG**	
OK ▶	GO TO 3.
NG ▶	• Open fuel filler cap, then clean cap and fuel filler neck threads using air blower. • Retighten until ratcheting sound is heard.

3	CHECK FUEL FILLER CAP FUNCTION
Check for air releasing sound while opening the fuel filler cap. **OK or NG**	
OK ▶	GO TO 5.
NG ▶	GO TO 4.

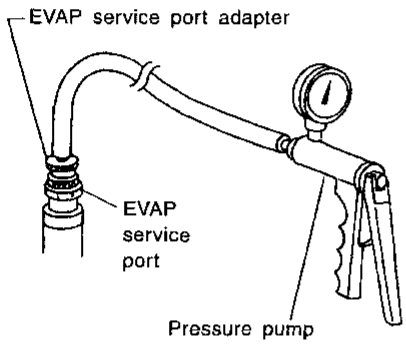
4	CHECK FUEL TANK VACUUM RELIEF VALVE
Refer to "Evaporative Emission System", EC-27. **OK or NG**	
OK ▶	GO TO 5.
NG ▶	Replace fuel filler cap with a genuine one.

5	INSTALL PRESSURE PUMP

1. Install the EVAP service port adapter and the pressure pump securely to EVAP service port.



SEF303W



SEF462UE

NOTE:

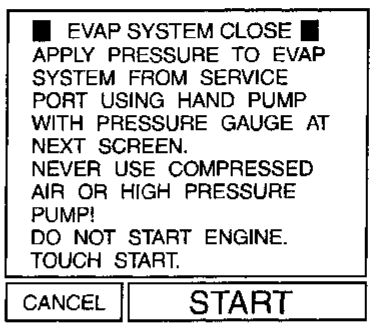
- **Improper installation of service port may cause leaking.**

Models with CONSULT	▶	GO TO 6.
Models without CONSULT	▶	GO TO 7.

6	CHECK FOR EVAP LEAK

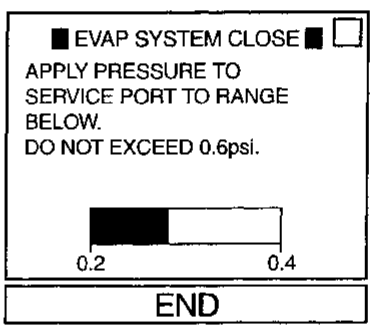
With CONSULT

1. Turn ignition switch "ON".
2. Select "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT.



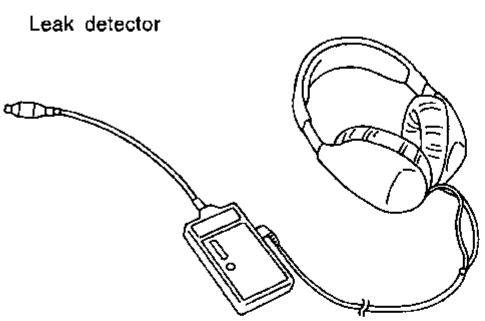
SEF658U

3. Touch "START" and apply pressure into the EVAP line until the pressure indicator reaches the middle of bar graph.
   NOTE:
   - **Never use compressed air or a high pressure pump.**
   - **Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in the system.**



SEF917U

4. Using EVAP leak detector, locate the leak portion. For the leak detector, refer to instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-31.



SEF200U

OK or NG

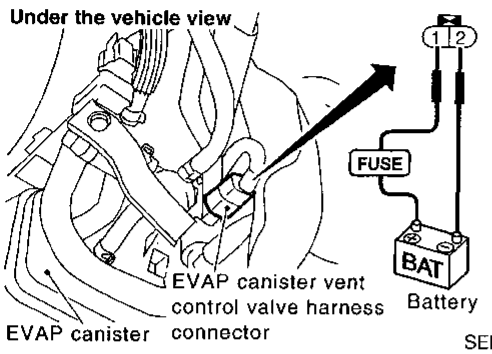
OK	▶	GO TO 8.
NG	▶	Repair or replace.

Diagnostic Procedure (Cont'd)

7	CHECK FOR EVAP LEAK

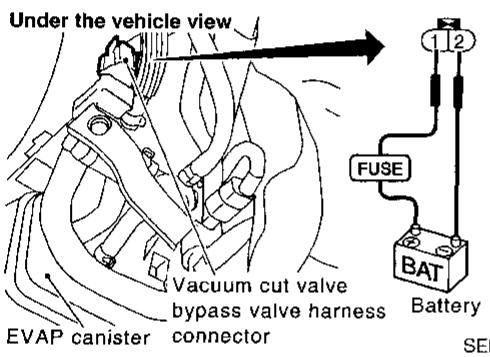
Without CONSULT

1. Turn ignition switch "OFF".
2. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)



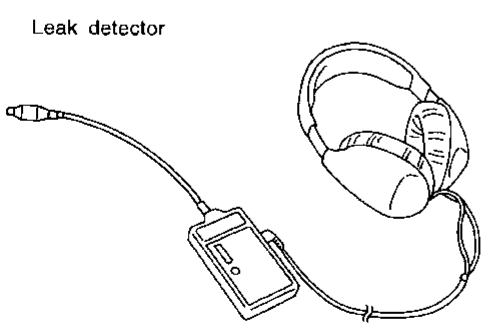
SEF304W

3. Apply 12 volts DC to vacuum cut valve bypass valve. The valve will open. (Continue to apply 12 volts until the end of test.)



SEF305W

4. Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg).
   NOTE:
   - **Never use compressed air or a high pressure pump.**
   - **Do not exceed 4.12 kPa (0.042 kg/cm^2, 0.6 psi) of pressure in the system.**
5. Using EVAP leak detector, locate the leak. For the leak detector, refer to instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-31.



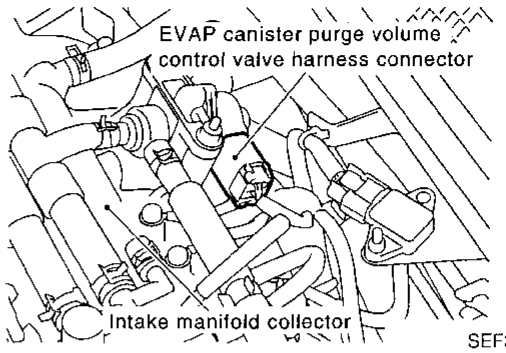
SEF200U

OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace.

8	CHECK EVAP CANISTER PURGE VOLUME CONTROL VALVE

Refer to "Component Inspection", EC-295.



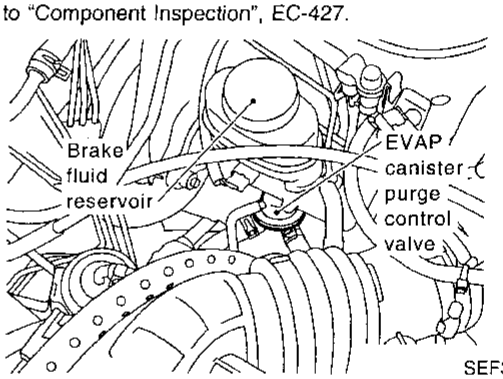
SEF306W

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace EVAP canister purge volume control valve.

9	CHECK EVAP CANISTER PURGE CONTROL VALVE

Refer to "Component Inspection", EC-427.



SEF307W

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace EVAP canister purge control valve.

10	CHECK WATER SEPARATOR

Refer to "Component Inspection", EC-389.

OK or NG

OK	▶	GO TO 11.
NG	▶	Replace water separator.

11	CHECK EVAP CANISTER VENT CONTROL VALVE, O-RING AND CIRCUIT

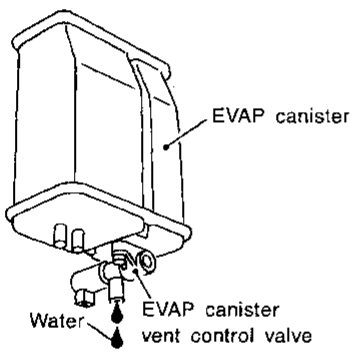
Refer to "DTC Confirmation Procedure", EC-297.

OK or NG

OK	▶	GO TO 12.
NG	▶	Repair or replace EVAP canister vent control valve and O-ring or harness/ connectors.

12	CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Check if water will drain from the EVAP canister.



SEF596U

Yes or No

Yes	▶	GO TO 13.
No (With CONSULT)	▶	GO TO 15.
No (Without CONSULT)	▶	GO TO 16.

13	CHECK EVAP CANISTER

Weigh the EVAP canister with EVAP canister vent control valve attached.

The weight should be less than 1.8 kg (4.0 lb).

OK or NG

OK (With CONSULT)	▶	GO TO 15.
OK (Without CONSULT)	▶	GO TO 16.
NG	▶	GO TO 14.

14	DETECT MALFUNCTIONING PART

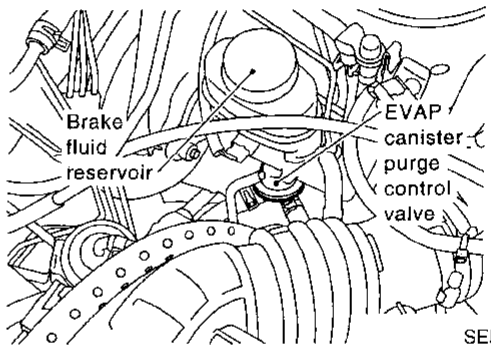
Check the following.
1. Visually check the EVAP canister for damage.
2. Check hose connection between EVAP canister and water separator for clogging and poor connection.
3. Check water separator.
   Refer to "Component Inspection", EC-389.

	▶	Repair hose or replace EVAP canister or water separator.

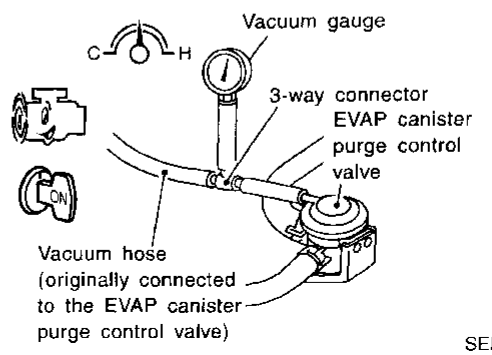
15	CHECK EVAP CANISTER PURGE CONTROL SOLENOID VALVE

With CONSULT

1. Disconnect vacuum hose from EVAP canister purge control valve and install vacuum gauge.

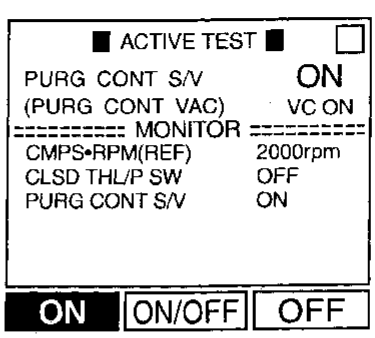


SEF307W



SEF622U

2. Start engine and let it idle.
3. Perform "PURG CONT S/V" in "ACTIVE TEST" mode.
4. Rev engine up to 2,000 rpm.
5. Select "ON" and "OFF" on CONSULT screen to turn on "PURG CONT/V S/V".



SEF738W

ON: Vacuum should exist.
OFF: Vacuum should not exist.

OK or NG

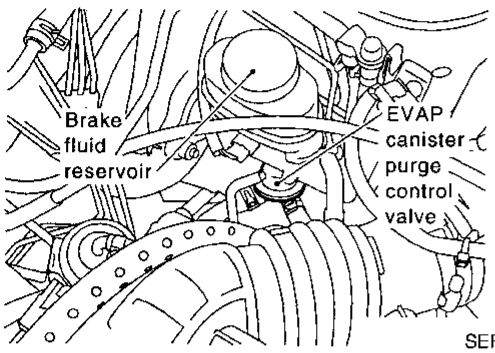
OK	▶	GO TO 18.
NG	▶	GO TO 17.

Diagnostic Procedure (Cont'd)

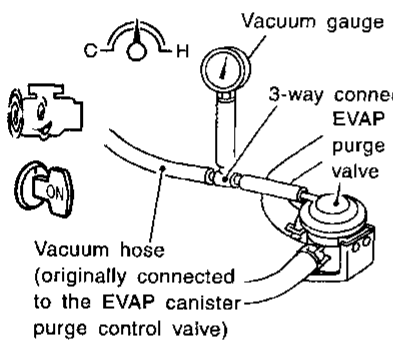
16	CHECK EVAP CANISTER PURGE CONTROL SOLENOID VALVE

Without CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Lift up drive wheels.
4. Disconnect vacuum hose from EVAP canister purge volume control valve and install vacuum gauge.



SEF307W



SEF622U

5. Start engine and let it idle for at least 60 seconds.
6. Shift selector lever to 1st gear position (M/T models).
7. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.
   While operating solenoid valve, vacuum should exist.
8. Release the accelerator pedal and let idle.
   Vacuum should not exist.

OK or NG

OK	▶	GO TO 18.
NG	▶	GO TO 17.

17	DETECT MALFUNCTIONING PART

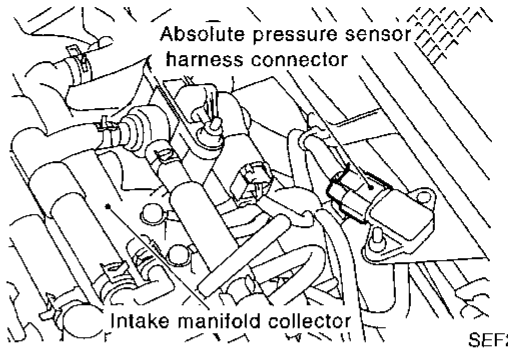
Check the following.

- EVAP canister purge control solenoid valve
  Refer to "Component Inspection", EC-419.
- Vacuum hoses for clogging or disconnection.
  Refer to "Vacuum Hose Drawing", EC-21.

	▶	Repair hoses or replace EVAP canister purge control solenoid valve.

18	CHECK ABSOLUTE PRESSURE SENSOR

Refer to "Component Inspection", EC-133.



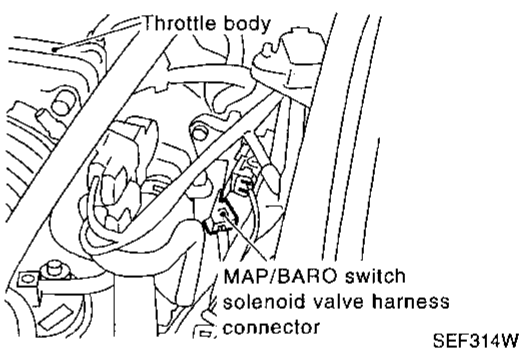
SEF294W

OK or NG

OK	▶	GO TO 19.
NG	▶	Replace absolute pressure sensor.

19	CHECK MAP/BARO SWITCH SOLENOID VALVE

Refer to "Component Inspection", EC-336.



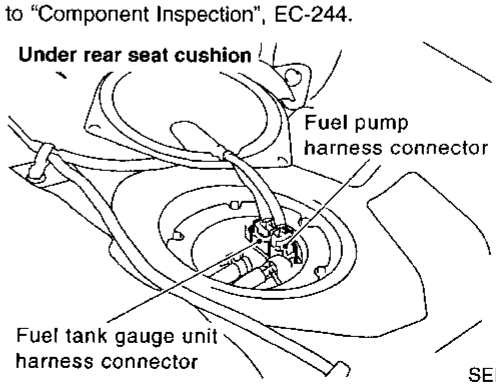
SEF314W

OK or NG

OK	▶	GO TO 20.
NG	▶	Replace MAP/BARO switch solenoid valve.

20	CHECK TANK FUEL TEMPERATURE SENSOR

Refer to "Component Inspection", EC-244.



SEF299W

OK or NG

OK	▶	GO TO 21.
NG	▶	Replace tank fuel temperature sensor.

21	CHECK EVAP PURGE LINE	
Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection. Refer to "Evaporative Emission System", EC-31.		
OK or NG		
OK	▶	GO TO 22.
NG	▶	Repair or reconnect the hose.

22	CLEAN EVAP PURGE LINE
Clean EVAP purge line (pipe and rubber tube) using air blower.	
▶	GO TO 23.

23	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-110.	
▶	**INSPECTION END**

Description

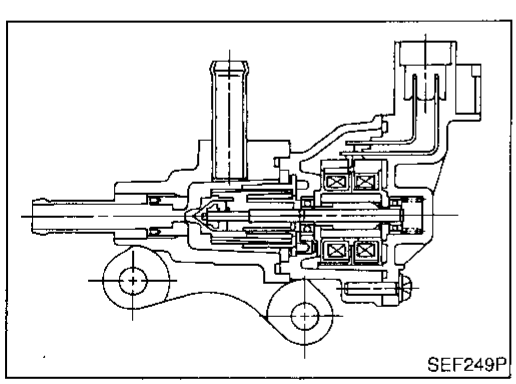
NCEC0359

SYSTEM DESCRIPTION

NCEC0359S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	EVAP purge flow control	EVAP canister purge volume control valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Battery	Battery voltage		
Ignition switch	Start signal		
Closed throttle position switch	Closed throttle position		
Throttle position sensor	Throttle position		
Front heated oxygen sensor	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Tank fuel temperature sensor	Fuel temperature in fuel tank		
Vehicle speed sensor	Vehicle speed		

This system controls flow rate of fuel vapor from the EVAP canister. The opening of the vapor by-pass passage in the EVAP canister purge volume control 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.


SEF249P

COMPONENT DESCRIPTION

NCEC0359S02

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.

CONSULT Reference Value in Data Monitor Mode

NCEC0360

MONITOR ITEM	CONDITION		SPECIFICATION
PURG VOL C/V	• Engine: After warming up • No-load • Lift up drive wheels and shift to 1st gear position.	Idle	0 step
		More than 60 seconds after starting engine A/T models: 2,000 rpm M/T models: 2,000 rpm and more than 16 km/h (10 MPH)	More than 1 step

ECM Terminals and Reference Value

NCEC0361

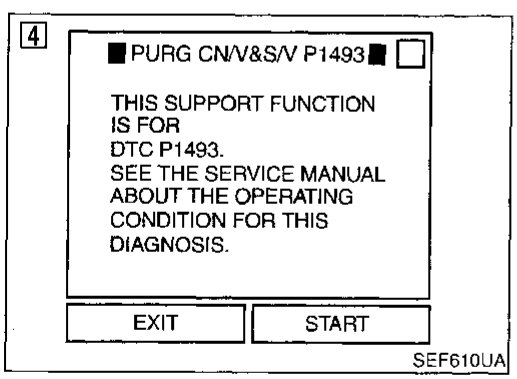
Specification data are reference values and are measured between each terminal and 43 (ECM ground).

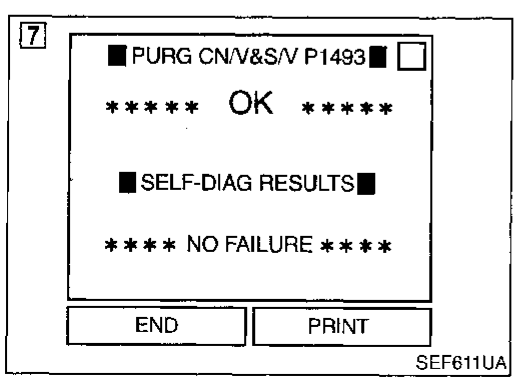
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
5	L	EVAP canister purge volume control valve	**[Engine is running]** • **Warm-up condition** • Idle speed	0 - 0.6V
6	G			
16	Y	EVAP canister purge volume control valve	**[Engine is running]** • Idle speed	BATTERY VOLTAGE (11 - 14V)
17	OR			

On Board Diagnosis Logic

NCEC0362

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1444 0214	• The canister purge flow is detected during the specified driving conditions, even when EVAP canister purge volume control valve is completely closed.	• EVAP control system pressure sensor and circuit • EVAP canister purge volume control valve (The valve is stuck open.) • EVAP canister purge control valve • EVAP canister • Hoses (Hoses are connected incorrectly or clogged.) • EVAP canister vent control valve





DTC Confirmation Procedure

NCEC0363

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

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

TESTING CONDITION:

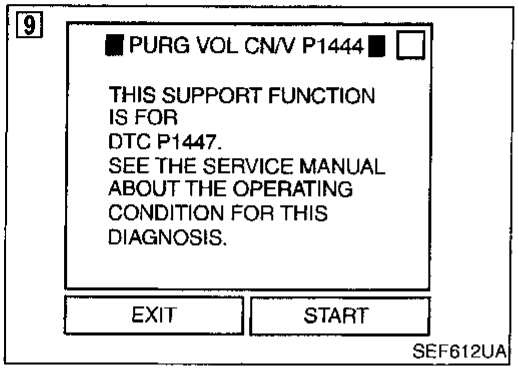
Always perform at a temperature above 5°C (41°F).

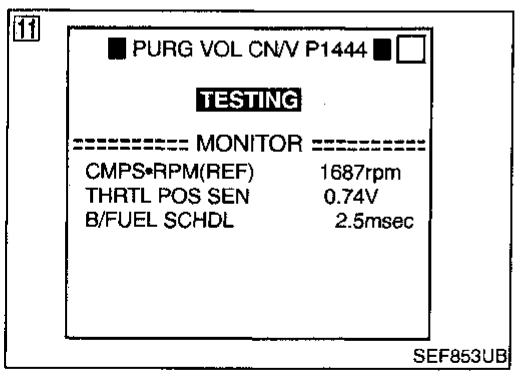
With CONSULT

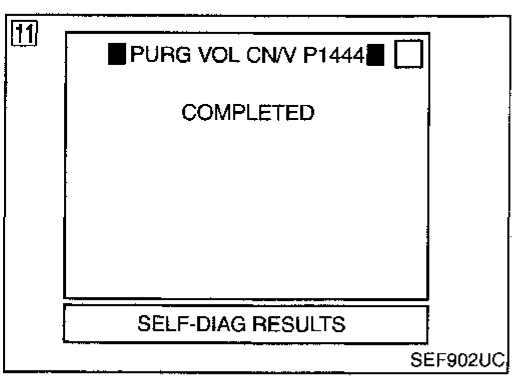
1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Turn ignition switch "ON".
4) Select "PURG CN/V & S/V P1493" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT.
5) Touch "START".
6) Start engine and let it idle for at least 90 seconds.
7) When the following conditions are met, "TESTING" will be displayed on the CONSULT screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take at least 30 seconds.)

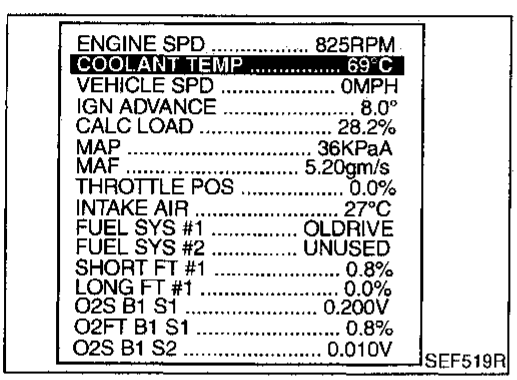
DTC P1444 EVAPORATIVE EMISSION (EVAP) CANISTER PURGE VOLUME CONTROL VALVE

DTC Confirmation Procedure (Cont'd)









Selector lever	Suitable position
Vehicle speed	36 - 120 km/h (22 - 75 MPH)
CMPS·RPM (REF)	1,000 rpm or more
B/FUEL SCHDL	1 - 4.5 msec

8) Stop vehicle with engine running.
9) Select "PURG VOL CN/V P1444" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT.
10) Touch "START".
If "COMPLETED" is displayed, go to step 12.
11) When the following conditions are met, "TESTING" will be displayed on the CONSULT screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take at least 20 seconds.)

Selector lever	Suitable position
Vehicle speed	36 - 120 km/h (22 - 75 MPH)
CMPS·RPM (REF)	1,000 rpm or more
B/FUEL SCHDL	1 - 4.5 msec

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

12) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-384.

With GST

NOTE:
It is better that the fuel level is low.

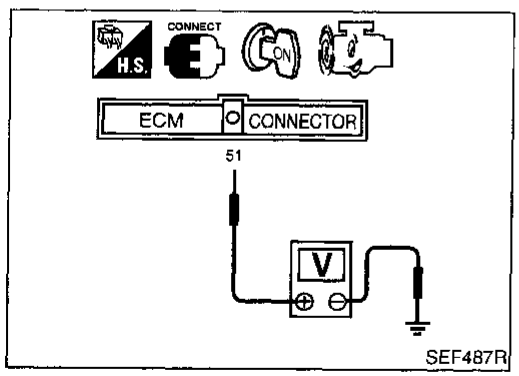
1) Start engine and warm it up to normal operating temperature.
2) Select "MODE 1" with GST.
3) Check engine coolant temperature.
Engine coolant temperature: 40 - 100°C (104 - 212°F)
Be sure that engine coolant temperature does not exceed 100°C (212°F). If it becomes higher than 100°C (212°F), cool down the engine and perform the procedure again from the beginning.
4) Turn ignition switch "OFF" and wait at least 5 seconds.
5) Restart engine and let it idle for at least 100 seconds.
6) Maintain the following conditions for at least 80 seconds.

Gear position	Suitable gear position
Vehicle speed	36 - 120 km/h (22 - 75 MPH)
Engine speed	1,000 rpm or more
Engine coolant temperature	40 - 100°C (104 - 212°F)

NOTE:

- **Hold the accelerator pedal as steady as possible during driving in step 6.**
- **If the driving conditions are not satisfied in step 6, restart the procedure.**

7) Select "MODE 7" with GST.
8) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-384.



Without CONSULT

NOTE:

It is better that the fuel level is low.

1) Start engine and warm it up to normal operating temperature.
2) Check voltage between ECM terminal 51 (Engine coolant temperature sensor signal) and ground

   Voltage: 0.8 - 1.5V

   Perform the following procedure before the voltage drops below 0.8V. If the voltage drops below 0.8V, cool down the engine and perform the procedure again from the beginning.
3) Turn ignition switch "OFF" and wait at least 5 seconds.
4) Restart engine and let it idle for at least 100 seconds.
5) Maintain the following conditions for at least 80 seconds.

Gear position	Suitable gear position
Vehicle speed	36 - 120 km/h (22 - 75 MPH)
Engine speed	1,000 rpm or more
Voltage between ECM terminal 51 and ground	0.8 - 1.5V

NOTE:

- **Hold the accelerator pedal as steady as possible during driving in step 5.**
- **If the driving conditions are not satisfied in step 5, restart the procedure.**

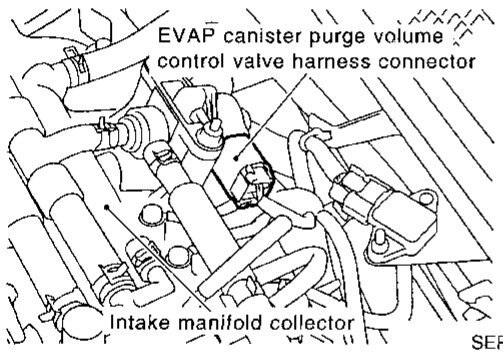
6) Turn ignition switch "OFF", wait at least 5 seconds, and then turn "ON".
7) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
8) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-384.

Diagnostic Procedure

=NCEC0364

1	CHECK EVAP CANISTER PURGE VOLUME CONTROL VALVE

Refer to "Component Inspection", EC-385.



SEF306W

OK or NG

OK	▶	GO TO 2.
NG	▶	Replace EVAP canister purge volume control valve.

2	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE

Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.

OK or NG

OK	▶	GO TO 3.
NG	▶	Install hose properly or replace it.

3	CHECK HARNESS CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check harness connector for water.
   Water should not exist.

OK or NG

OK	▶	GO TO 4.
NG	▶	Replace EVAP control system pressure sensor.

4	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR AND CIRCUIT

Refer to "DTC confirmation Procedure", EC-303.

OK or NG

OK	▶	GO TO 5.
NG	▶	Replace EVAP control system pressure sensor and repair or replace harness and connector.

5	CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to "Component Inspection", EC-389.

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace EVAP canister vent control valve.

6	CHECK RUBBER TUBE FOR CLOGGING

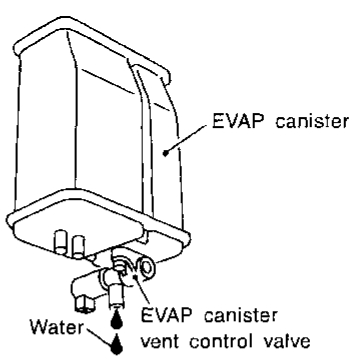
Check obstructed water separator, improper connection of hose and rubber tube to EVAP canister vent control valve and clean the rubber tube using air blower.
For water separator, refer to "Component Inspection", EC-389.

OK or NG

OK	▶	GO TO 7.
NG	▶	Clean, repair or replace rubber tube and/or water separator.

7	CHECK IF EVAP CANISTER IS SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Check if water will drain from the EVAP canister.



SEF596U

Yes or No

Yes	▶	GO TO 8.
No	▶	GO TO 10.

8	CHECK EVAP CANISTER

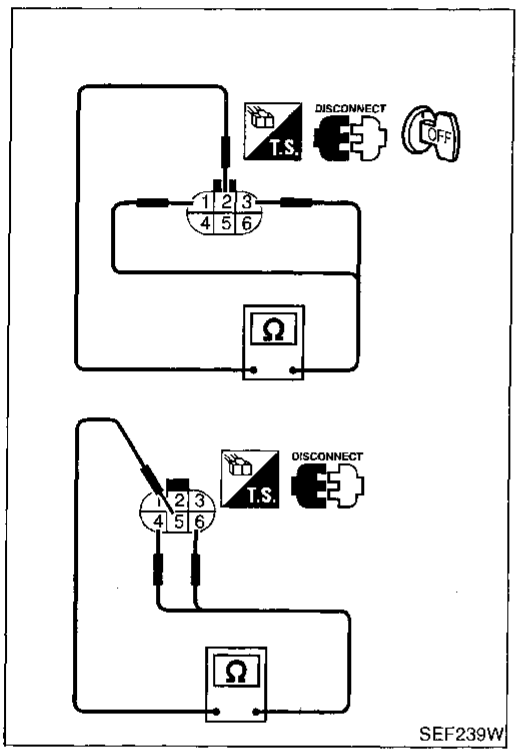
Weigh the EVAP canister with EVAP canister vent control valve attached.
The weight should be less than 1.8 kg (4.0 lb).

OK or NG

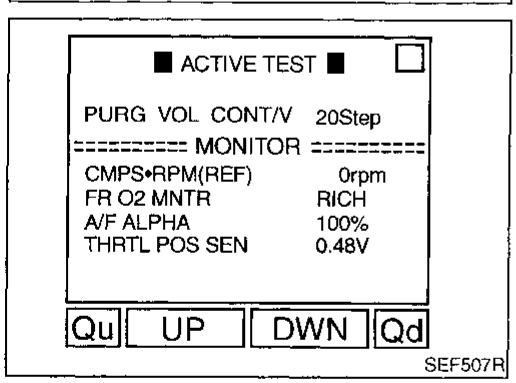
OK	▶	GO TO 10.
NG	▶	GO TO 9.

9	DETECT MALFUNCTIONING PART
Check the following. 1. Visually check the EVAP canister for damage. 2. Check hose connection between EVAP canister and water separator for clogging and poor connection.	
▶	Repair hose or replace EVAP canister.

10	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-110. Refer to "Wiring Diagram", EC-293 for the circuit.	
▶	INSPECTION END



SEF239W



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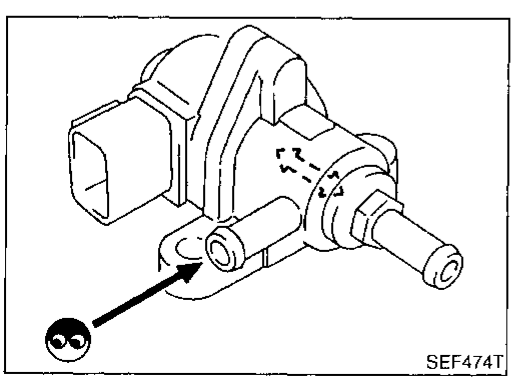

SEF474T

Component Inspection

EVAP CANISTER PURGE VOLUME CONTROL VALVE

NCEC0365

NCEC0365S01

With CONSULT

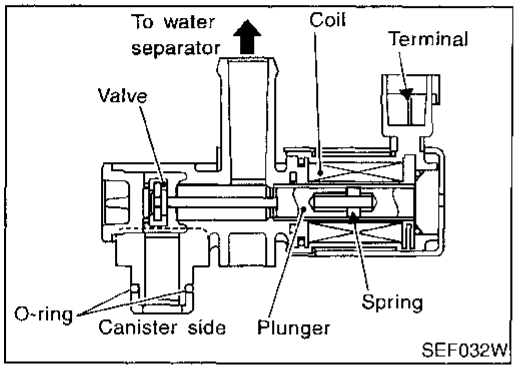
1) Disconnect EVAP canister purge volume control valve harness connector.
2) Check resistance between the following terminals.
   terminal 2 and terminals 1, 3
   terminal 5 and terminals 4, 6
   Resistance: 35 - 43Ω [At 20°C (68°F)]
3) Reconnect EVAP canister purge volume control valve harness connector.
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.

Without CONSULT

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: 35 - 43Ω [At 20°C (68°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.

DTC P1446 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (CLOSE)

Component Description



Component Description

NCEC0366

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent.
This solenoid (the EVAP canister vent control valve) responds to signals from the ECM.
When the ECM sends an ON signal, the coil in the solenoid valve is energized.
A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.
This solenoid valve is used only for diagnosis, and usually remains opened.
When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows "EVAP Control System (Small Leak)" diagnosis.

CONSULT Reference Value in Data Monitor Mode

NCEC0367

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	• Ignition switch: ON	OFF

ECM Terminals and Reference Value

NCEC0368

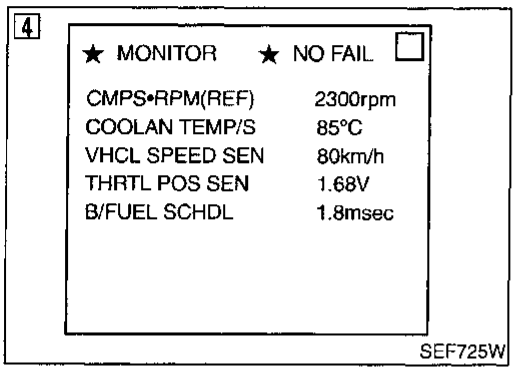
Specification data are reference values and are measured between each terminal and 43 (ECM ground).

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
108	PU/W	EVAP canister vent control valve	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NCEC0369

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1446 0215	• EVAP canister vent control valve remains closed under specified driving conditions.	• EVAP canister vent control valve • EVAP control system pressure sensor and the circuit • Blocked rubber tube to EVAP canister vent control valve • Water separator • EVAP canister is saturated with water.



DTC Confirmation Procedure

NCEC03/0

CAUTION:
Always drive vehicle at a safe speed.

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

With CONSULT

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
3) Start engine.
4) Drive vehicle at a speed of approximately 80 km/h (50 MPH) for a maximum of 15 minutes.

NOTE:
If a malfunction exists, NG result may be displayed quicker.

5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-388.

With GST

1) Start engine.
2) Drive vehicle at a speed of approximately 80 km/h (50 MPH) for 15 minutes.
3) Select "MODE 7" with GST.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-388.

No Tools

1) Start engine.
2) Drive vehicle at a speed of approximately 80 km/h (50 MPH) for 15 minutes.
3) Turn ignition switch "OFF" and wait at least 5 seconds.
4) Turn ignition switch "ON" and perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-388.

Diagnostic Procedure

=NCEC0371

1 CHECK RUBBER TUBE FOR CLOGGING

Check obstructed water separator and rubber tube to EVAP canister vent control valve and clean the rubber tube using air blower.
For water separator, refer to EC-389.

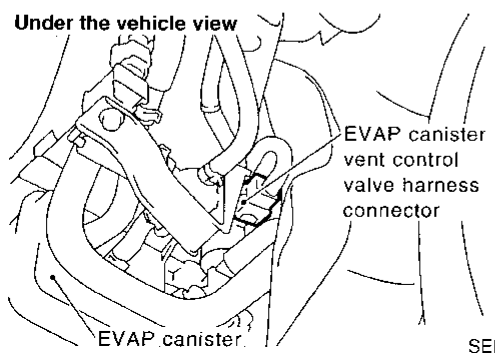
OK or NG

OK	▶	GO TO 2.
NG	▶	Clean, repair or replace rubber tube and/or water separator.

2 CHECK EVAP CANISTER VENT CONTROL VALVE AND O-RING

Refer to "COMPONENT INSPECTION", EC-389.

Under the vehicle view



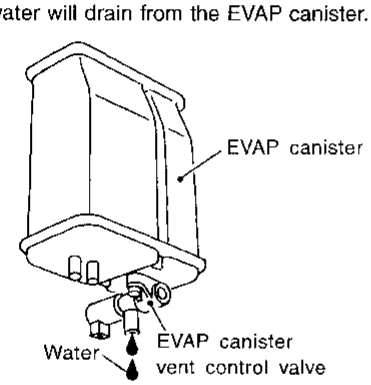
SEF310W

OK or NG

OK	▶	GO TO 3.
NG	▶	Replace EVAP canister vent control valve and O-ring.

3 CHECK IF EVAP CANISTER IS SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Check if water will drain from the EVAP canister.



SEF596U

Yes or No

Yes	▶	GO TO 4.
No	▶	GO TO 6.

4 CHECK EVAP CANISTER

Weigh the EVAP canister with EVAP canister vent control valve attached.
The weight should be less than 1.8 kg (4.0 lb).

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

5 DETECT MALFUNCTIONING PART

Check the following.
1. Visually check the EVAP canister for damage.
2. Check hose connection between EVAP canister and water separator for clogging and poor connection.
3. Check water separator.
   Refer to "Component Inspection", EC-389.

	▶	Repair hose or replace EVAP canister or water separator.

6 CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE

Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.

OK or NG

OK	▶	GO TO 7.
NG	▶	Install hose properly or replace it.

7 CHECK HARNESS CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check harness connector for water.
   Water should not exist.

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace EVAP control system pressure sensor.

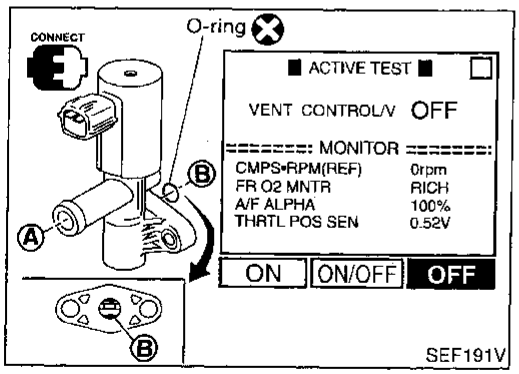
8 CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR AND CIRCUIT

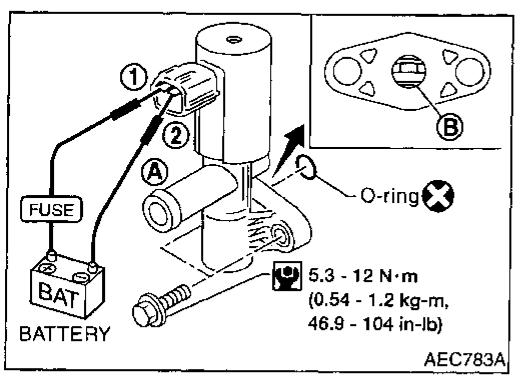
Refer to "DTC Confirmation Procedure", EC-303.

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace EVAP control system pressure sensor and repair or replace harness and connector.

9	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-110.	
▶	INSPECTION END





Component Inspection

EVAP CANISTER VENT CONTROL VALVE

NCEC0372

NCEC0372S01

Check air passage continuity.

With CONSULT

Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.

Condition VENT CONTROL/V	Air passage continuity between **A** and **B**
ON	No
OFF	Yes

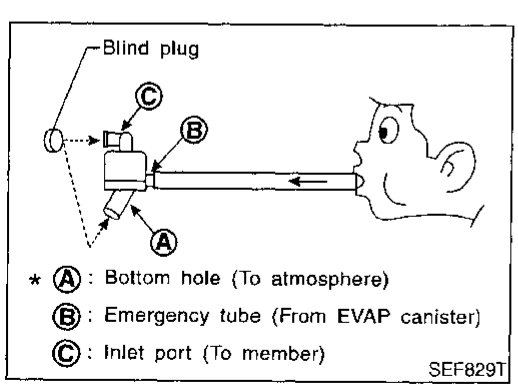
Without CONSULT

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

If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.

If the portion B is rusted, replace EVAP canister vent control valve.

Make sure new O-ring is installed properly.



WATER SEPARATOR

NCEC0372S03

1. Check visually for insect nests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that **A** and **C** are not clogged by blowing air into **B** with **A**, and then **C** plugged.
5. In case of NG in items 2 - 4, replace the parts.

- **Do not disassemble water separator.**

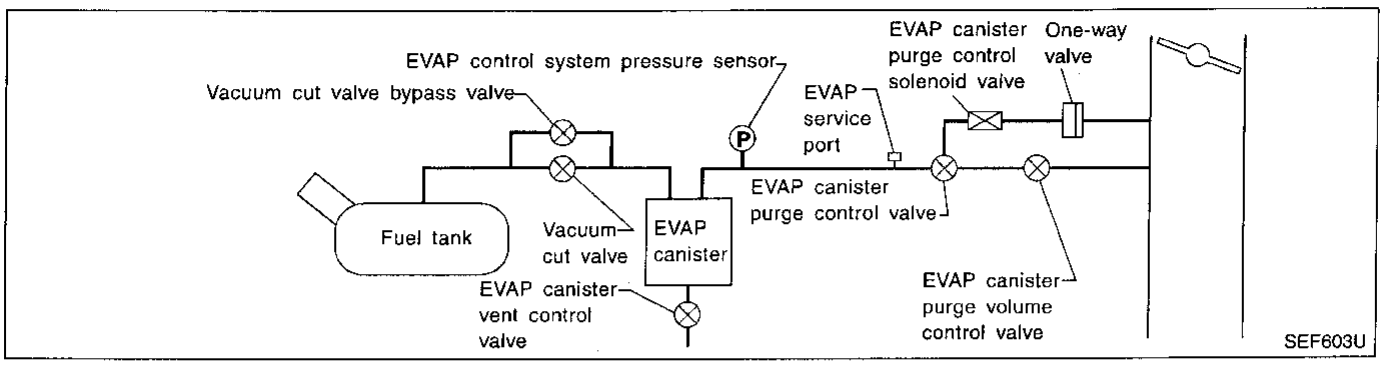
DTC P1447 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PURGE FLOW MONITORING

System Description

System Description

NCEC0373

NOTE:
If DTC P1447 is displayed with P0510, perform trouble diagnosis for DTC P0510 first. (See EC-320.)



In this evaporative emission (EVAP) control system, purge flow occurs during non-vehicle stopped conditions (M/T models) and 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.

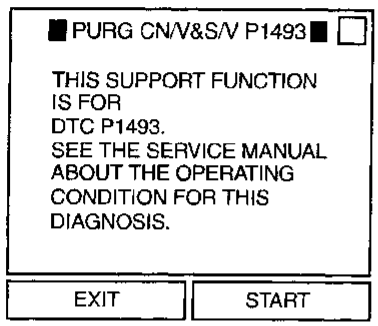
On Board Diagnosis Logic

NCEC0374

Under normal conditions (non-closed throttle), sensor output voltage indicates if pressure drop and purge flow are adequate. If not, a fault is determined.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1447 0111	• EVAP control system does not operate properly. • EVAP control system has a leak between intake manifold and EVAP control system pressure sensor.	• EVAP canister purge volume control valve stuck closed • EVAP canister purge control valve stuck closed • EVAP control system pressure sensor and the circuit • Loose, disconnected or improper connection of 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 • Closed throttle position switch • Improper connection of one-way valve • Blocked purge port • EVAP canister vent control valve

4



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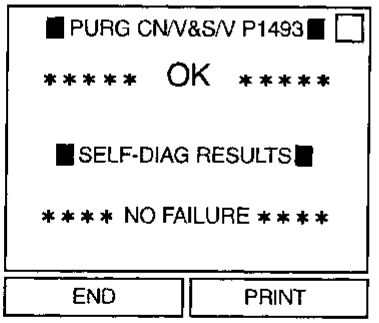

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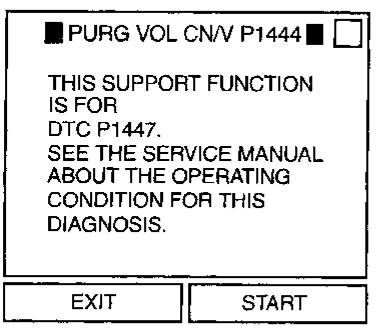

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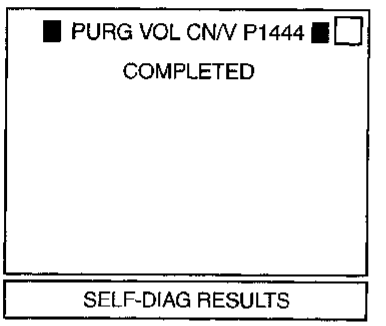

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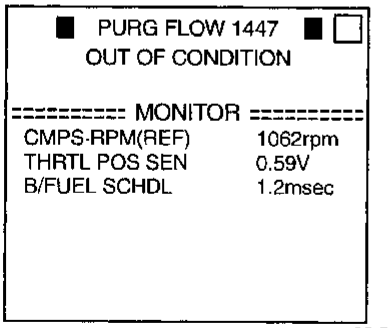


SEF250VA

DTC Confirmation Procedure

NCEC0375

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

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

TESTING CONDITION:

Always perform at a temperature above 5°C (41°F).

With CONSULT

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Start engine and let it idle for at least 1 minute.
4) Select "PURG CN/V & S/V P1493" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT.
5) Touch "START".
6) When the following conditions are met, "TESTING" will be displayed on the CONSULT screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take at least 30 seconds.)

CMPS-RPM (REF)	1,000 rpm or more
Selector lever	Suitable position
Vehicle speed	36 - 120 km/h (22 - 75 MPH)
B/FUEL SCHDL	1 - 4.5 msec

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

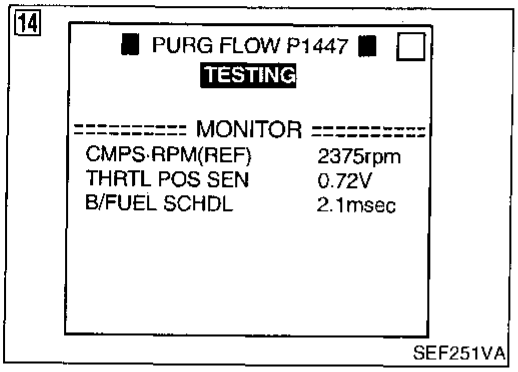
7) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS" and go to the following step. If "NG" is displayed, refer to "Diagnostic Procedure" of DTC P1493, EC-424.
8) Select "PURG VOL CN/V P1444" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT.
9) Touch "START".
   If "COMPLETED" is displayed, go to step 11.
10) When the following conditions are met, "TESTING" will be displayed on the CONSULT screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take at least 20 seconds.)

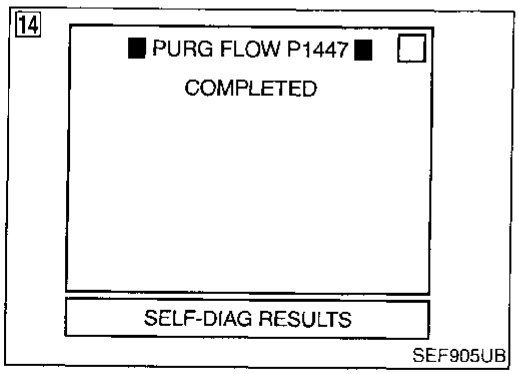
CMPS-RPM (REF)	1,000 rpm or more
Selector lever	Suitable position
Vehicle speed	36 - 120 km/h (22 - 75 MPH)
B/FUEL SCHDL	1 - 4.5 msec

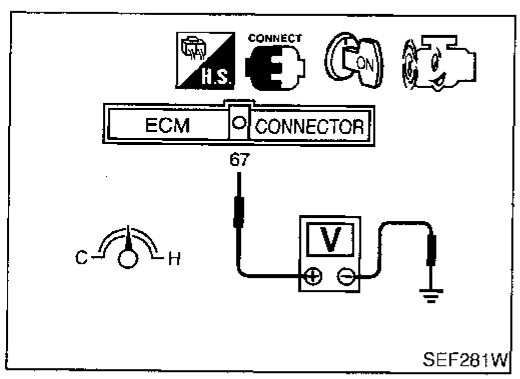
If "TESTING" is not displayed after 5 minutes, retry from step 2.

11) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS" and go to the following step. If "NG" is displayed, refer to "Diagnostic Procedure" of DTC P1444, EC-381.
12) Select "PURG FLOW P1447" of "EVAPORATIVE SYSTEM" in "DTC CONFIRMATION" mode with CONSULT.
13) Touch "START".

DTC Confirmation Procedure (Cont'd)







14) When the following conditions are met, "TESTING" will be displayed on the CONSULT screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take at least 35 seconds.)

Selector lever	Suitable position
Vehicle speed	30 - 120 km/h (19 - 75 MPH)
CMPS·RPM (REF)	1,000 rpm or more
Engine coolant temperature	70 - 100°C (158 - 212°F)

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

15) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-393.

Overall Function Check

NCEC0376

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.

⊗ Without CONSULT

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF", wait at least 5 seconds.
3) Start engine and wait at least 70 seconds.
4) Set voltmeter probes to ECM terminal 67 (EVAP control system pressure sensor signal) and ground.
5) Check EVAP control system pressure sensor value at idle speed.
6) Establish and maintain the following conditions for at least 1 minute.

Air conditioner switch		ON
Steering wheel		Fully turned
Headlamp switch		ON
Rear window defogger switch		ON
Engine speed		Approx. 3,000 rpm
Gear position	M/T models	Any position other than "Neutral" or "Reverse"
	A/T models	Any position other than "P", "N" or "R"

Verify that EVAP control system pressure sensor value stays 0.1V less than the value at idle speed for at least 1 second.

7) If NG, go to "Diagnostic Procedure", EC-393.

Diagnostic Procedure

NCEC0377

1	CHECK EVAP CANISTER

1. Turn ignition switch "OFF".
2. Check EVAP canister for cracks.

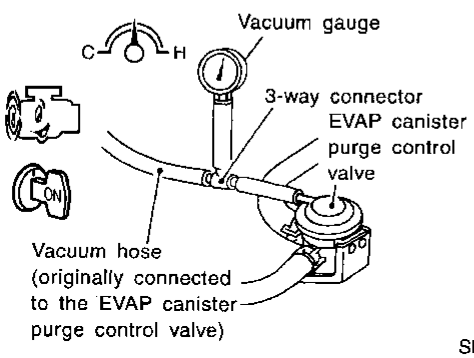
OK or NG

OK (With CONSULT) ▶	GO TO 2.
OK (Without CONSULT) ▶	GO TO 3.
NG ▶	Replace EVAP canister.

2	CHECK PURGE FLOW

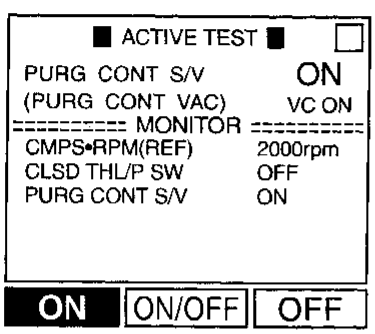
With CONSULT

1. Disconnect vacuum hose from EVAP canister purge control valve and install vacuum gauge.



SEF622U

2. Start engine and let it idle.
3. Perform "PURG CONT S/V" in "ACTIVE TEST" mode.
4. Rev engine up to 2,000 rpm.
5. Select "ON" and "OFF" on CONSULT screen to turn on "PURG CONT/V S/V".



SEF738W

ON: Vacuum should exist.
OFF: Vacuum should not exist.

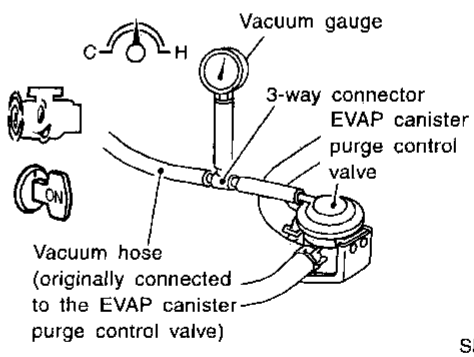
OK or NG

OK ▶	GO TO 8.
NG ▶	GO TO 4.

3	CHECK PURGE FLOW

Without CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Lift up drive wheels.
4. Disconnect vacuum hose from EVAP canister purge volume control valve and install vacuum gauge.



SEF622U

5. Start engine and let it idle for at least 60 seconds.
6. Shift selector lever to 1st gear position (M/T models).
7. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.
   While operating solenoid valve, vacuum should exist.
8. Release the accelerator pedal and let idle.
   Vacuum should not exist.

OK or NG

OK ▶	GO TO 8.
NG ▶	GO TO 4.

4	CHECK EVAP PURGE LINE

Check EVAP purge line for improper connection or disconnection. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-31.

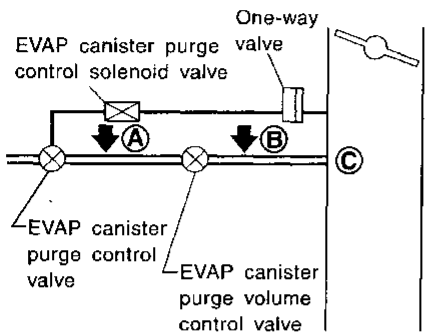
OK or NG

OK ▶	GO TO 5.
NG ▶	Repair it.

Diagnostic Procedure (Cont'd)

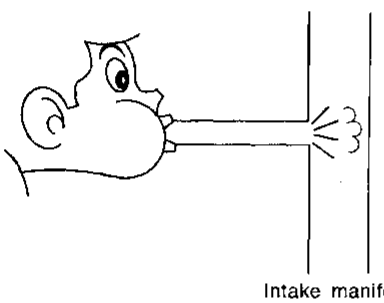
5	CHECK EVAP PURGE HOSE AND PURGE PORT

1. Turn ignition switch "OFF".
2. Disconnect purge hoses connected to EVAP canister purge control valve **A** and EVAP canister purge volume control valve **B**.



SEF621U

3. Blow air into each hose and EVAP purge port **C**.



SEF368U

4. Check that air flows freely.

OK or NG

OK	▶	GO TO 6.
NG	▶	Repair or clean hoses and/or purge port.

6	CHECK ONE-WAY VALVE

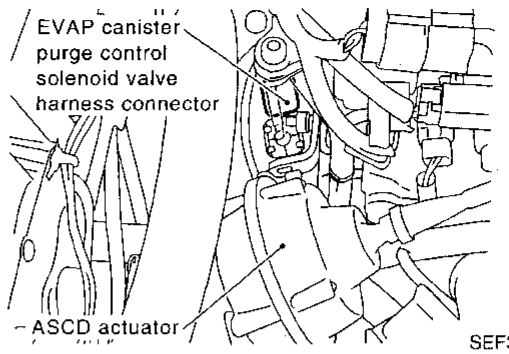
Refer to "Component Inspection", EC-396.

OK or NG

OK	▶	GO TO 7.
NG	▶	Reconnect one-way valve properly or replace it.

7	CHECK EVAP CANISTER PURGE CONTROL SOLENOID VALVE

Refer to "Component Inspection", EC-419.



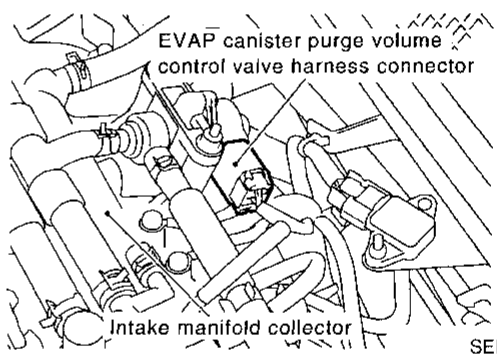
SEF308W

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace EVAP canister purge control solenoid valve.

8	CHECK EVAP CANISTER PURGE VOLUME CONTROL VALVE

Refer to "Component Inspection", EC-295.



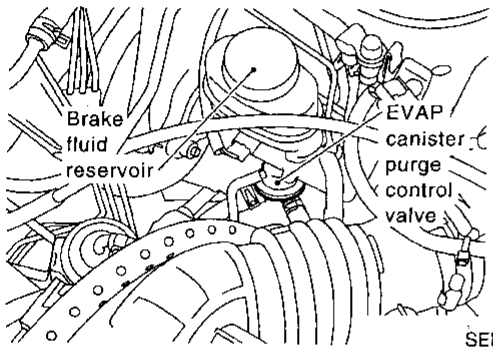
SEF306W

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace EVAP canister purge volume control valve.

9	CHECK EVAP CANISTER PURGE CONTROL VALVE

Refer to "Component Inspection", EC-419.



OK or NG

OK	▶	GO TO 10.
NG	▶	Replace EVAP canister purge control valve.

10	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE

Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.

OK or NG

OK	▶	GO TO 11.
NG	▶	Install hose properly or replace it.

11	CHECK HARNESS CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check harness connector for water.
   Water should not exist.

OK or NG

OK	▶	GO TO 12.
NG	▶	Replace EVAP control system pressure sensor.

12	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR AND CIRCUIT

Perform to "DTC Confirmation Procedure", EC-303.

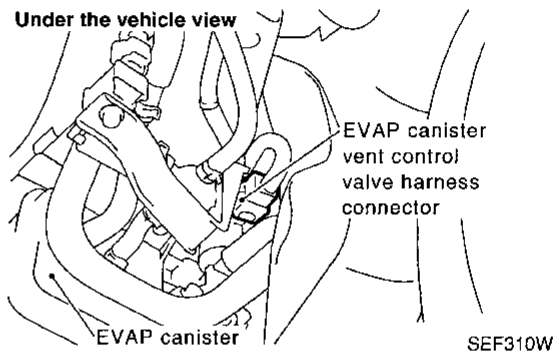
OK or NG

OK	▶	GO TO 13.
NG	▶	Replace EVAP control system pressure sensor and repair or replace harness and connector.

13	CHECK EVAP CANISTER VENT CONTROL VALVE AND O-RING

Refer to "Component Inspection", EC-389.

Under the vehicle view



OK or NG

OK	▶	GO TO 14.
NG	▶	Replace EVAP canister vent control valve and O-ring.

14	CHECK EVAP PURGE LINE

Inspect EVAP purge line (pipe and rubber tube). Check for evidence of leaks.

OK or NG

OK	▶	GO TO 15.
NG	▶	Replace it.

15	CLEAN EVAP PURGE LINE

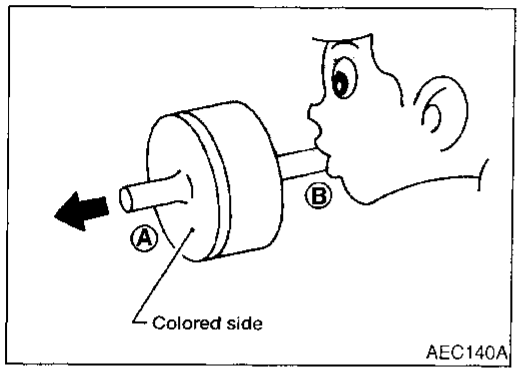
Clean EVAP purge line (pipe and rubber tube) using air blower.

	▶	GO TO 16.

16	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-110.

	▶	**INSPECTION END**



Component Inspection

NCEC0378

ONE-WAY VALVE

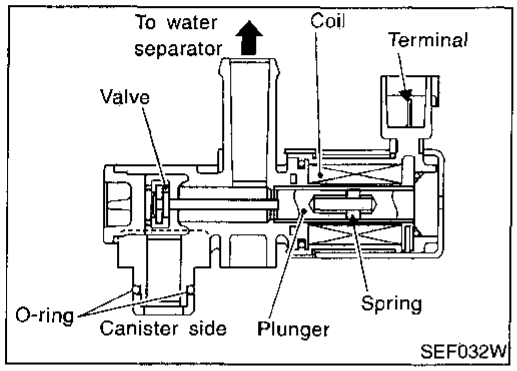
NCEC0378S05

Check one-way valve air passage continuity.

Condition	Air passage continuity
Blow air into side **B** to **A**	Yes
Blow air into side **A** to **B**	No

If NG, replace one-way valve.

Make sure to install one-way valve with the colored side facing the vacuum.



Component Description

NCEC0379

NOTE:
If DTC P1448 is displayed with P0440 or P1440, perform trouble diagnosis for DTC P1448 first.

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent.
This solenoid (the EVAP canister vent control valve) responds to signals from the ECM.
When the ECM sends an ON signal, the coil in the solenoid valve is energized.
A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.
This solenoid valve is used only for diagnosis, and usually remains opened.
When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows "EVAP Control System (Small Leak)" diagnosis.

CONSULT Reference Value in Data Monitor Mode

NCEC0380

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	• Ignition switch: ON	OFF

ECM Terminals and Reference Value

NCEC0381

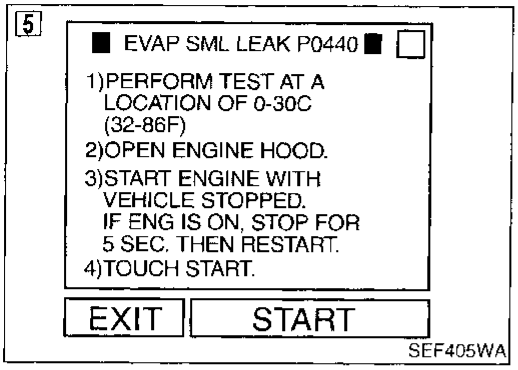
Specification data are reference values and are measured between each terminal and 43 (ECM ground).

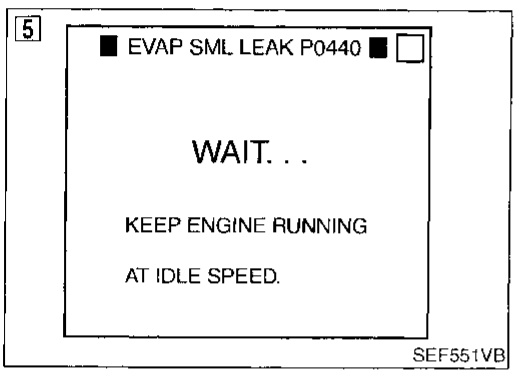
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
108	PU/W	EVAP canister vent control valve	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)

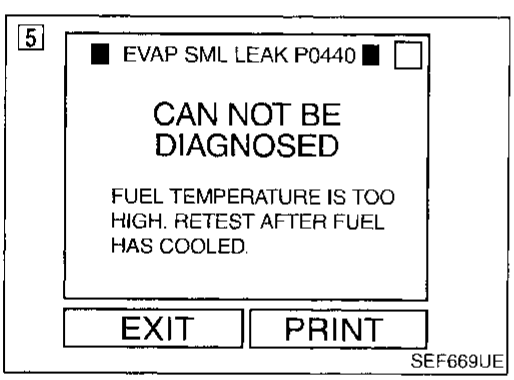
On Board Diagnosis Logic

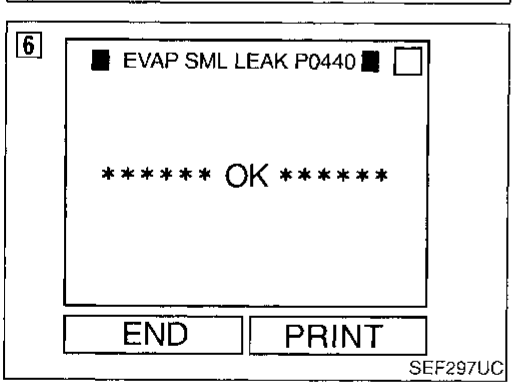
NCEC0382

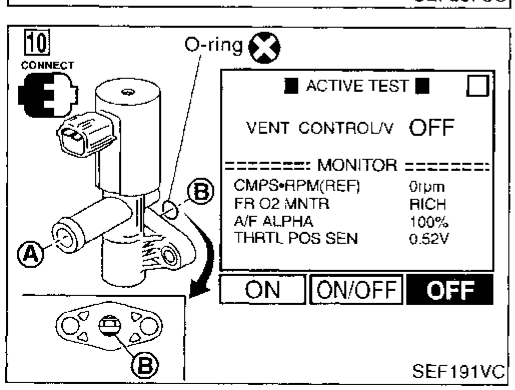
DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1448 0309	• EVAP canister vent control valve remains opened under specified driving conditions.	• EVAP canister vent control valve • EVAP control system pressure sensor • Blocked rubber tube to EVAP canister vent control valve • Water separator • EVAP canister is saturated with water. • Vacuum cut valve











DTC Confirmation Procedure

NCEC0383

NOTE:

- **If DTC P1448 is displayed with P0440 or P1440, perform trouble diagnosis for DTC P1448 first.**
- If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

With CONSULT

TESTING CONDITION:

- **Perform "DTC WORK SUPPORT" when the fuel level is less than 3/4 full and vehicle is placed on flat level surface.**
- **Always perform test at a temperature of 0 to 30°C (32 to 86°F).**
- **It is better that the fuel level is low.**

1) Turn ignition switch "ON".
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT.
4) Check that the following conditions are met.

COOLAN TEMP/S	0 - 70°C (32 - 158°F)
INT/A TEMP SE	0 - 60°C (32 - 140°F)

5) Select "EVAP SML LEAK P0440" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT. Follow the instruction displayed.

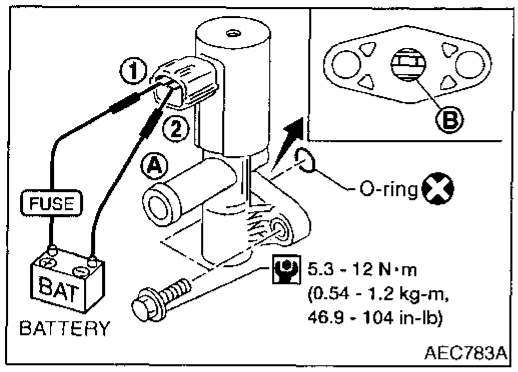
NOTE:

- **If the CONSULT screen shown at left is displayed, stop the engine and stabilize the vehicle temperature at 25°C (77°F) or cooler. After "TANK F/TMP SE" becomes less than 30°C (86°F), retest. (Use a fan to reduce the stabilization time.)**
- **If the engine speed cannot be maintained within the range displayed on CONSULT screen, go to "Basic Inspection", EC-83.**
- **The engine idle portion of this test (See illustration at left.) will take approximately 5 minutes.**

6) Make sure that "OK" is displayed.
If "NG" is displayed, go to following step.
7) Disconnect hose from water separator.
8) Select "VENT CONTROL/V" of "ACTIVE TEST" mode with CONSULT.
9) Touch "ON" and "OFF" alternately.
10) Make sure of the following.

Condition	Air passage continuity between **A** and **B**
Touching "ON"	No
Touching "OFF"	Yes

If the result is NG, go to "Diagnostic Procedure", EC-399.
If the result is OK, go to "Diagnostic Procedure" for DTC P0440, EC-286.



Overall Function Check

NCEC0384

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.

⊗ Without CONSULT

1) Disconnect hose from water separator.
2) Disconnect EVAP canister vent control valve harness connector.
3) Verify the following.

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

If the result is NG, go to "Diagnostic Procedure", EC-399.
If the result is OK, perform trouble diagnosis for DTC P0440. Refer to EC-283.

Diagnostic Procedure

NCEC0385

1 CHECK RUBBER TUBE

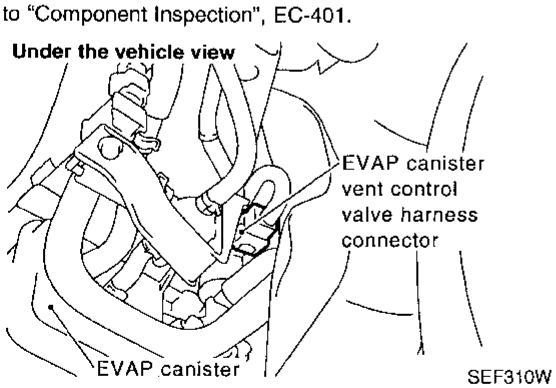
1. Turn ignition switch "OFF".
2. Check disconnection or obstruction of rubber tube connected to EVAP canister vent control valve.

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair or clean rubber tube.

2 CHECK EVAP CANISTER VENT CONTROL VALVE AND O-RING

Refer to "Component Inspection", EC-401.

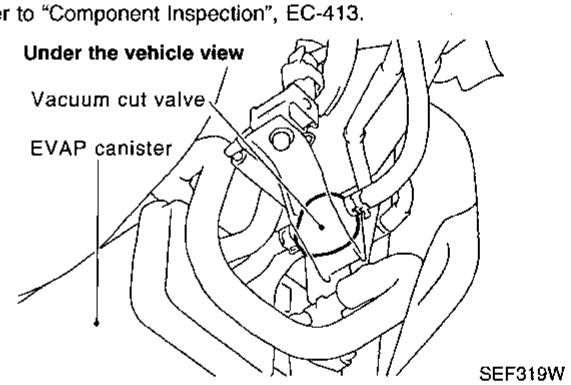


OK or NG

OK	▶	GO TO 3.
NG	▶	Replace EVAP canister vent control valve and O-ring.

3 CHECK VACUUM CUT VALVE

Refer to "Component Inspection", EC-413.



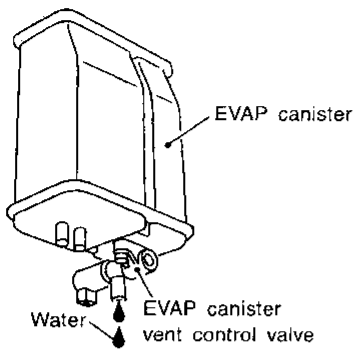
OK or NG

OK	▶	GO TO 4.
NG	▶	Replace vacuum cut valve.

Diagnostic Procedure (Cont'd)

4	CHECK IF EVAP CANISTER IS SATURATED WITH WATER

1. Remove EVAP canister with the vent control valve attached.
2. Check if water will drain from the EVAP canister.



SEF596U

Yes or No

Yes	▶	GO TO 7.
No	▶	GO TO 5.

5	CHECK EVAP CANISTER

Weigh the EVAP canister with EVAP canister vent control valve attached.
The weight should be less than 1.8 kg (4.0lb).

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 6.

6	DETECT MALFUNCTIONING PART

Check the following.
1. Visually check the EVAP canister for damage.
2. Check hose connection between EVAP canister and water separator for clogging and poor connection.
3. Check water separator.
   Refer to "Component Inspection", EC-401.

	▶	Repair hose or replace EVAP canister or water separator.

7	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE

Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.

OK or NG

OK	▶	GO TO 8.
NG	▶	Install hose property or replace it.

8	CHECK HARNESS CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check harness connector for water.
   Water should not exist.

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace EVAP control system pressure sensor.

9	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Perform "DTC Confirmation Procedure", EC-303.

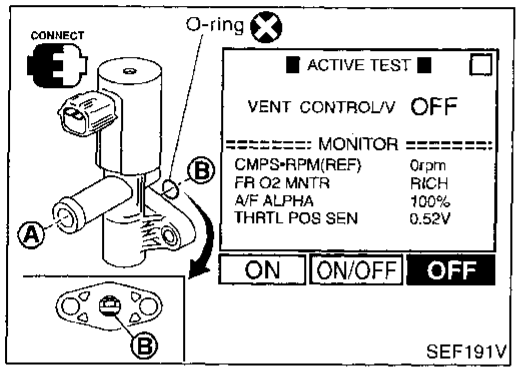
OK or NG

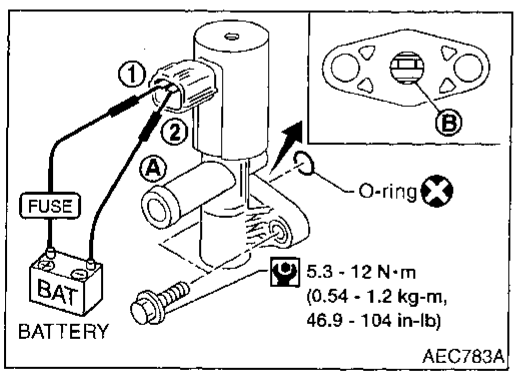
OK	▶	GO TO 10.
NG	▶	Replace EVAP control system pressure sensor and repair or replace harness and connector.

10	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-110.

	▶	**INSPECTION END**





Component Inspection

NCEC0386

EVAP CANISTER VENT CONTROL VALVE

NCEC0386S01

Check air passage continuity.

With CONSULT

Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.

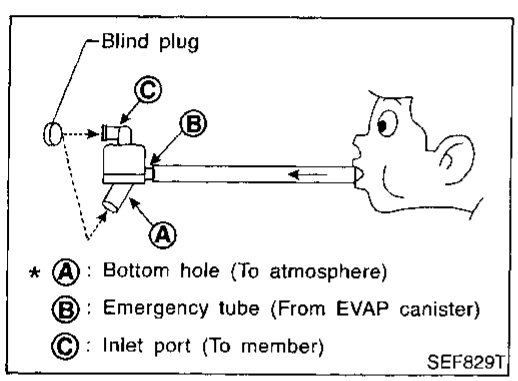
Condition VENT CONTROL/V	Air passage continuity between **A** and **B**
ON	No
OFF	Yes

Without CONSULT

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

If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.

If the portion B is rusted, replace EVAP canister vent control valve. Make sure new O-ring is installed properly.

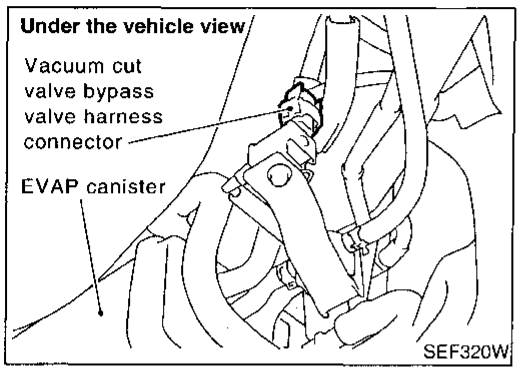


WATER SEPARATOR

NCEC0386S03

1. Check visually for insect nests in water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that **A** and **C** are not clogged by blowing air into **B** with **A**, and then **C** plugged.
5. In case of NG in items 2 - 4, replace the parts.

- **Do not disassemble water separator.**



Description

NCEC0387

COMPONENT DESCRIPTION

NCEC0387S01

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.

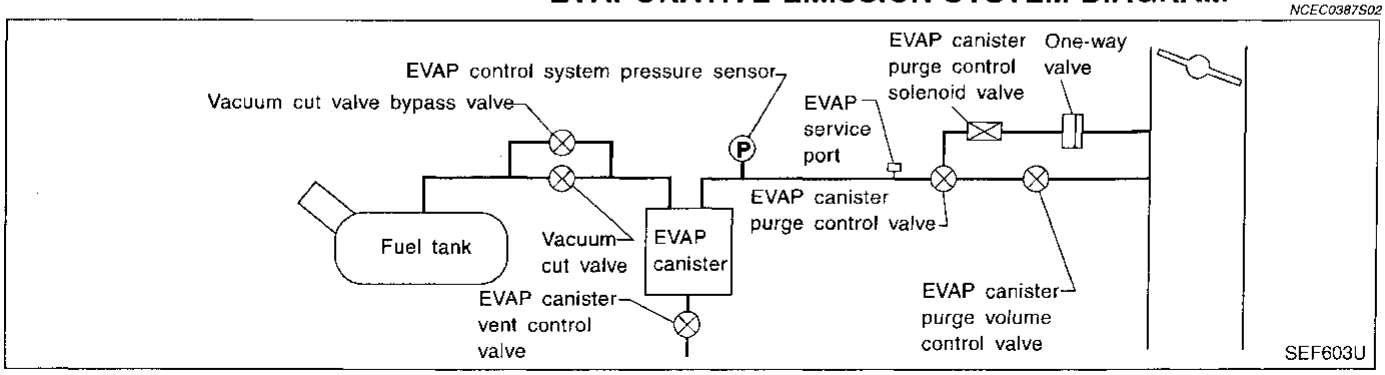
The vacuum cut valve prevents the intake manifold vacuum from being applied to the fuel tank.

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

NCEC0387S02



CONSULT Reference Value in Data Monitor Mode

NCEC0388

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VC/V BYPASS/V	• Ignition switch: ON	OFF

ECM Terminals and Reference Value

NCEC0389

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
117	PU/R	Vacuum cut valve bypass valve	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NCEC0390

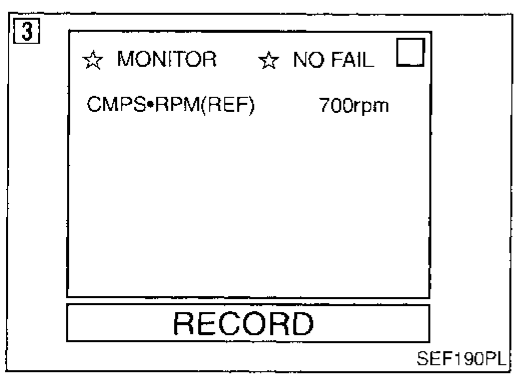
DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1490 0801	• An improper voltage signal is sent to ECM through vacuum cut valve bypass valve.	• Harness or connectors (The vacuum cut valve bypass valve circuit is open or shorted.) • Vacuum cut valve bypass valve

DTC Confirmation Procedure

NCEC0391

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

TESTING CONDITION:
Before performing the following procedure, confirm battery voltage is more than 11V at idle.



With CONSULT
1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
3) Start engine and wait at least 5 seconds.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-405.

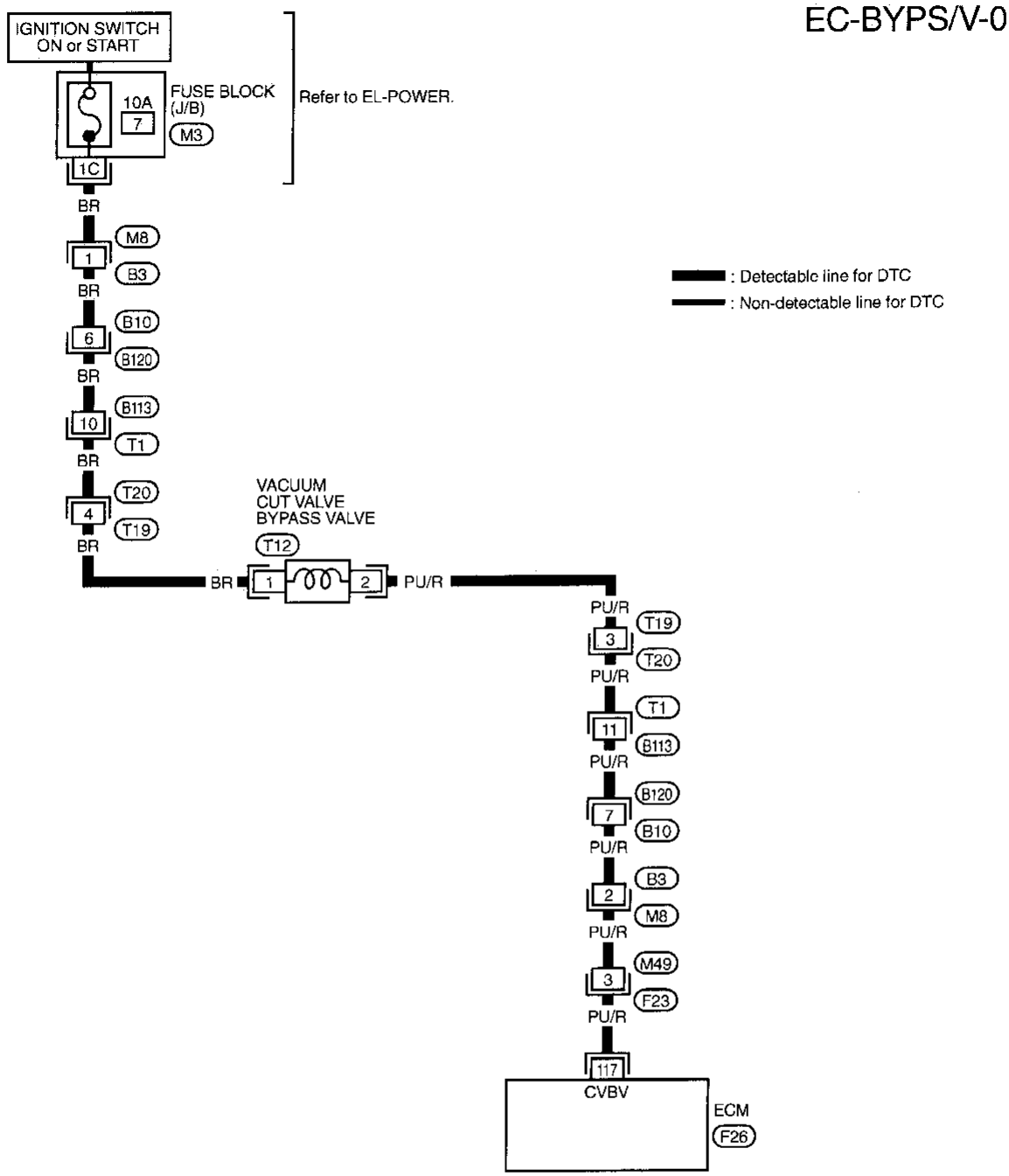
With GST
1) Start engine and wait at least 5 seconds.
2) Select "MODE 7" with GST.
3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-405.

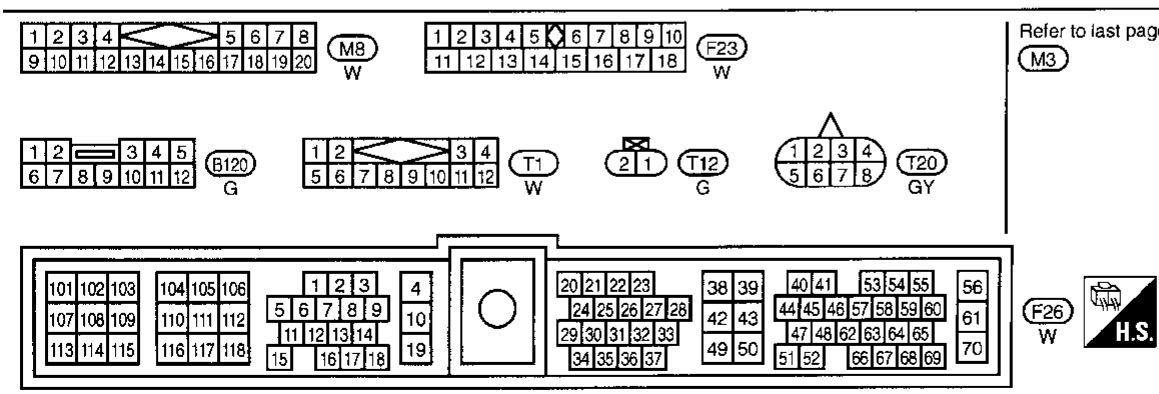
No Tools
1) Start engine and wait at least 5 seconds.
2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
3) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-405.

Wiring Diagram

NCEC0392

EC-BYPS/V-01





TEC548

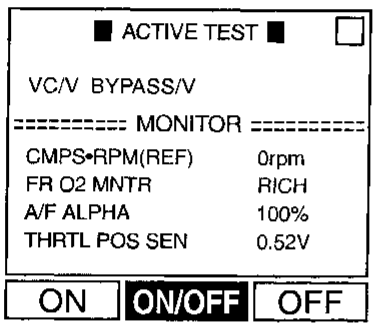
Diagnostic Procedure

NCEC0393

1	INSPECTION START
Do you have CONSULT?	
Yes or No	
Yes ▶	GO TO 2.
No ▶	GO TO 3.

2	CHECK VACUUM CUT VALVE BYPASS VALVE CIRCUIT

1. Turn ignition switch "ON".
2. Perform "VC/V BYPASS/V" in "ACTIVE TEST" mode.



SEF364U

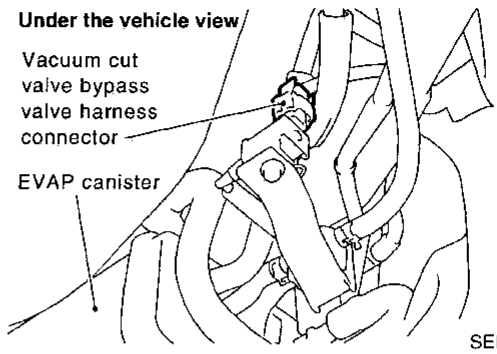
3. Make sure that clicking sound is heard from the vacuum cut valve bypass valve.

OK or NG

OK ▶	GO TO 7.
NG ▶	GO TO 3.

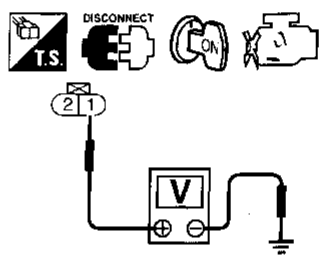
3	CHECK POWER SUPPLY

1. Turn ignition switch "OFF".
2. Disconnect vacuum cut valve bypass valve harness connector.



SEF320W

3. Turn ignition switch "ON".
4. Check voltage between terminal 1 and ground with CONSULT or tester.



SEF282W

Voltage: Battery voltage

OK or NG

OK ▶	GO TO 5.
NG ▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

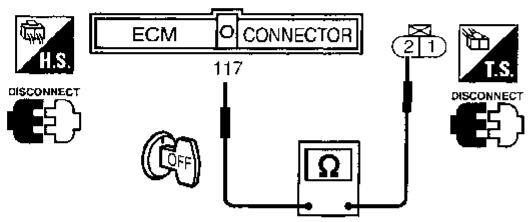
Check the following.
- Harness connectors M8, B3
- Harness connectors B10, B120
- Harness connectors B113, T1
- Harness connectors T20, T19
- 10A fuse
- Harness for open or short between vacuum cut valve bypass valve and fuse

▶	Repair harness or connectors.

Diagnostic Procedure (Cont'd)

5	CHECK OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 117 and terminal 2.



SEF283W

Continuity should exist.

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

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 6.

6	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors T19, T20
- Harness connectors T1, B113
- Harness connectors B120, B10
- Harness connectors B3, M8
- Harness for open or short between vacuum cut valve bypass valve and ECM

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

7	CHECK VACUUM CUT VALVE BYPASS VALVE

Refer to "Component Inspection", EC-406.

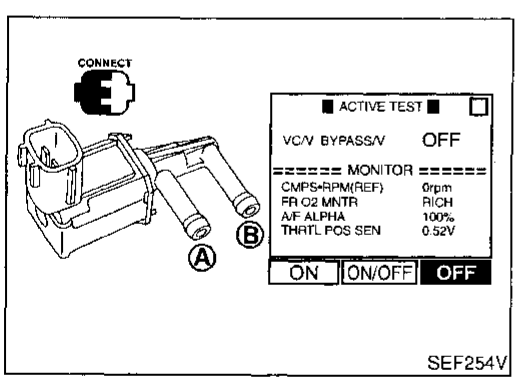
OK or NG

OK	▶	GO TO 8.
NG	▶	Replace vacuum cut valve bypass valve.

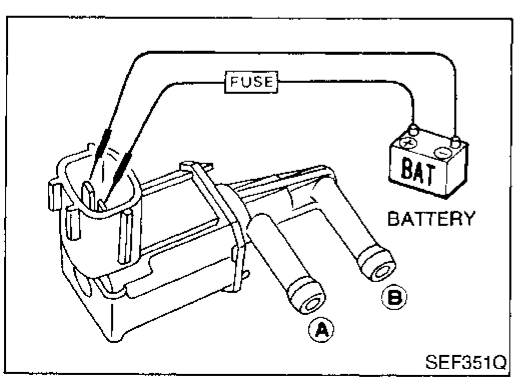
8	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-110.

▶	**INSPECTION END**



SEF254V



SEF351Q

Component Inspection

NCEC0394

VACUUM CUT VALVE BYPASS VALVE

NCEC0394S01

Check air passage continuity.

With CONSULT

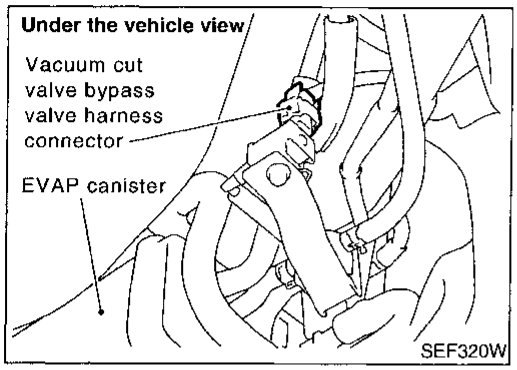
Perform "VC/V BYPASS/V" in "ACTIVE TEST" mode.

Condition VC/V BYPASS/V	Air passage continuity between **A** and **B**
ON	Yes
OFF	No

Without CONSULT

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

If NG or operation takes more than 1 second, replace vacuum cut valve bypass valve.



Description

NCEC0395

COMPONENT DESCRIPTION

NCEC0395S01

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.

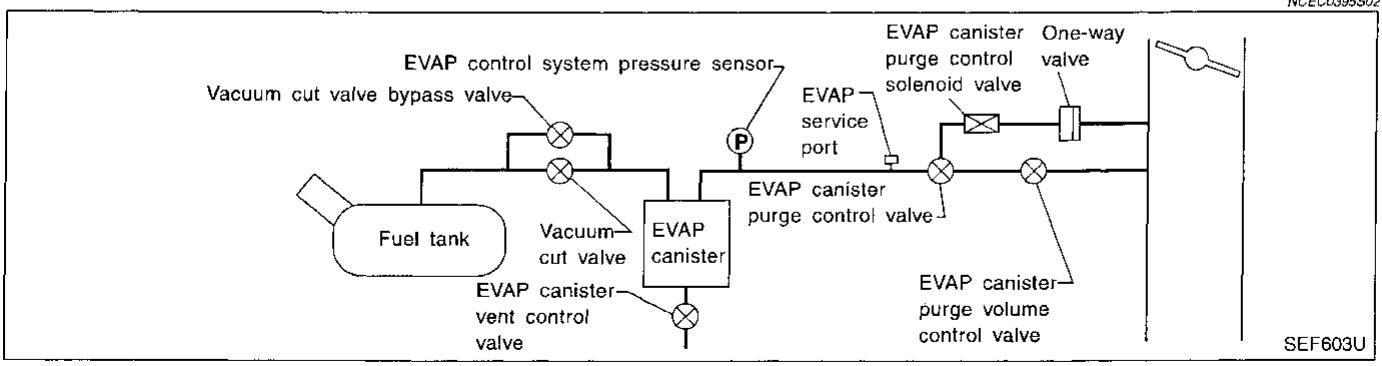
The vacuum cut valve prevents the intake manifold vacuum from being applied to the fuel tank.

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

NCEC0395S02



CONSULT Reference Value in Data Monitor Mode

NCEC0396

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VC/V BYPASS/V	• Ignition switch: ON	OFF

ECM Terminals and Reference Value

NCEC0397

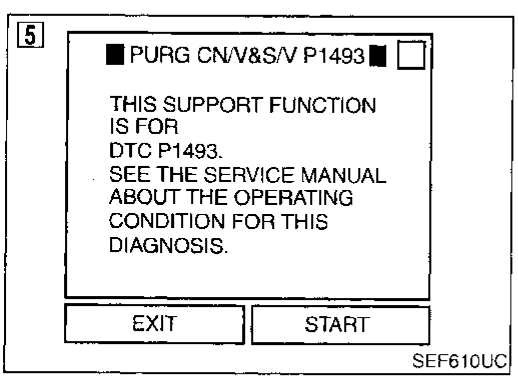
Specification data are reference values and are measured between each terminal and 43 (ECM ground).

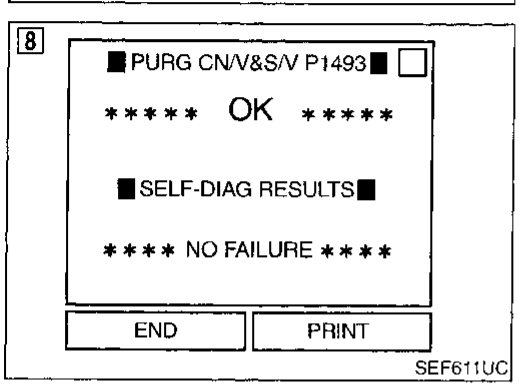
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
117	PU/R	Vacuum cut valve bypass valve	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)

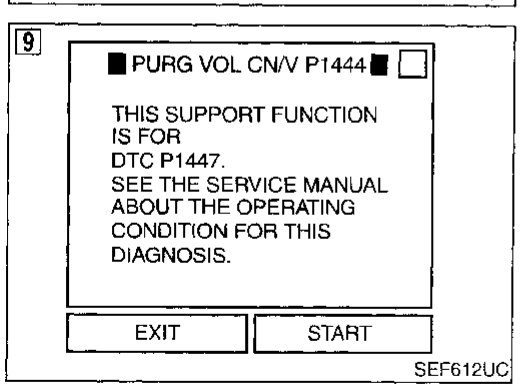
On Board Diagnosis Logic

NCEC0398

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1491 0311	• Vacuum cut valve bypass valve does not operate properly.	• Vacuum cut valve bypass valve • Vacuum cut valve • Bypass hoses for clogging • EVAP control system pressure sensor • EVAP canister vent control valve • Hose between fuel tank and vacuum cut valve clogged • Hose between vacuum cut valve and EVAP canister clogged • EVAP canister • EVAP purge port of fuel tank for clogging







DTC Confirmation Procedure

NCEC0399

CAUTION:
Always drive vehicle at a safe speed.

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

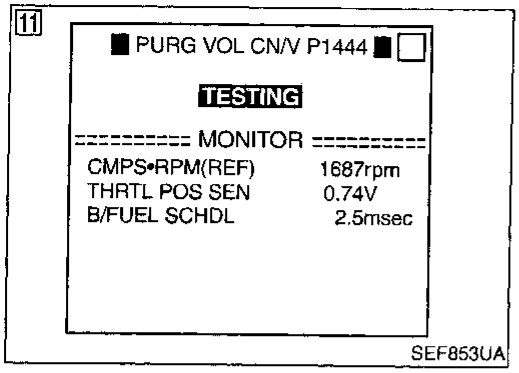
TESTING CONDITION:
Always perform test at a temperature of 5 to 30°C (41 to 86°F).

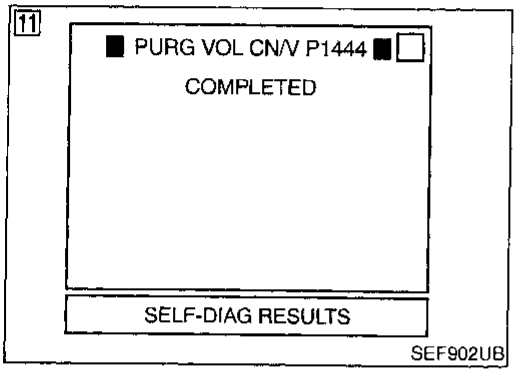
With CONSULT

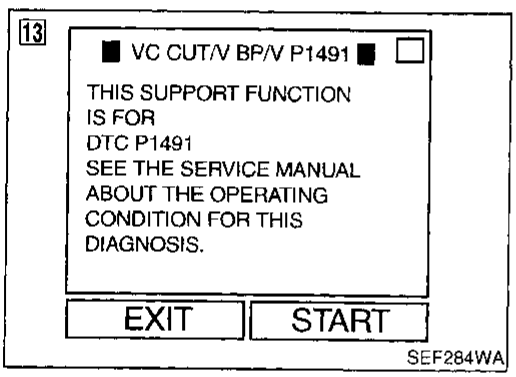
1) Turn ignition switch "ON".
2) Start engine and warm it up to normal operating temperature.
3) Turn ignition switch "OFF" and wait at least 5 seconds.
4) Start engine and let it idle for at least 1 minute.
5) Select "PURG CN/V & S/V P1493" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT.
6) Touch "START".
7) When the following conditions are met, "TESTING" will be displayed on the CONSULT screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take at least 30 seconds.)

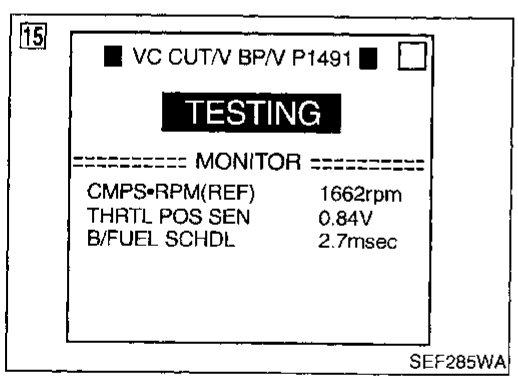
CMPS·RPM (REF)	1,000 rpm or more
Selector lever	Suitable position
Vehicle speed	36 - 120 km/h (22 - 75 MPH)
B/FUEL SCHDL	1 - 4.5 msec

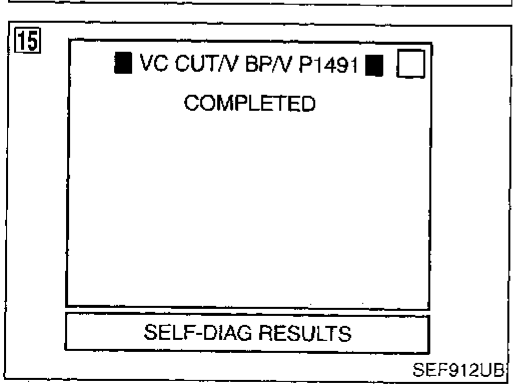
If "TESTING" is not displayed after 5 minutes, retry from step 3.











8) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS" and go to the following step.
   If "NG" is displayed, refer to "Diagnostic Procedure" for DTC P1493, EC-427.
9) Select "PURG VOL CN/V P1444" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT.
10) Touch "START".
    If "COMPLETED" is displayed, go to step 12.
11) When the following conditions are met, "TESTING" will be displayed on the CONSULT screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take at least 20 seconds.)

CMPS·RPM (REF)	1,000 rpm or more
Selector lever	Suitable position
Vehicle speed	36 - 120 km/h (22 - 75 MPH)
B/FUEL SCHDL	1 - 4.5 msec

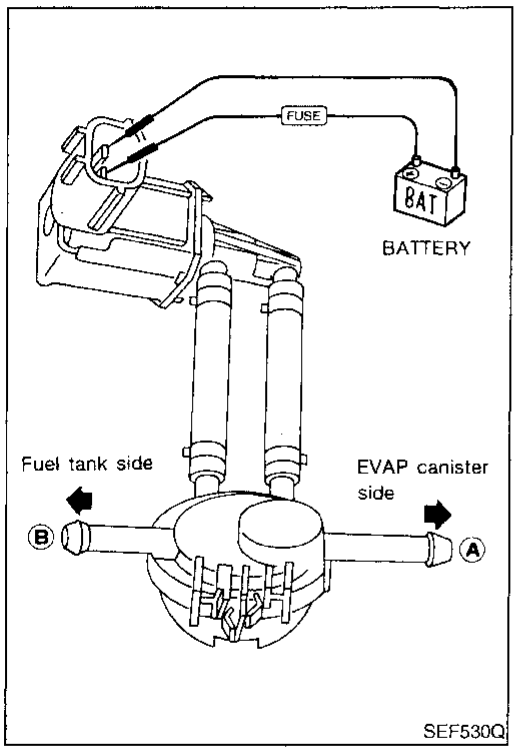
If "TESTING" is not displayed after 5 minutes, retry from step 3.

12) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS" and go to the following step.
    If "NG" is displayed, refer to "Diagnostic Procedure" for DTC P1444, EC-384.
13) Select "VC/V BYPASS/V P1491" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT.
14) Touch "START".
15) When the following conditions are met, "TESTING" will be displayed on the CONSULT screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take at least 30 seconds.)

CMPS·RPM (REF)	1,000 rpm or more
Selector lever	Suitable position
Vehicle speed	36 - 120 km/h (22 - 75 MPH)
B/FUEL SCHDL	0.5 - 4.5 msec

If "TESTING" is not displayed after 5 minutes, retry from step 3.

16) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS".
    If "NG" is displayed, refer to "Diagnostic Procedure", EC-410.



Overall Function Check

NCEC0400

Without CONSULT

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 flow freely out of port **B**.
7) Blow air in port **B** and check that air flow freely out of port **A**.
8) If NG, go to "Diagnostic Procedure", EC-410.

Diagnostic Procedure

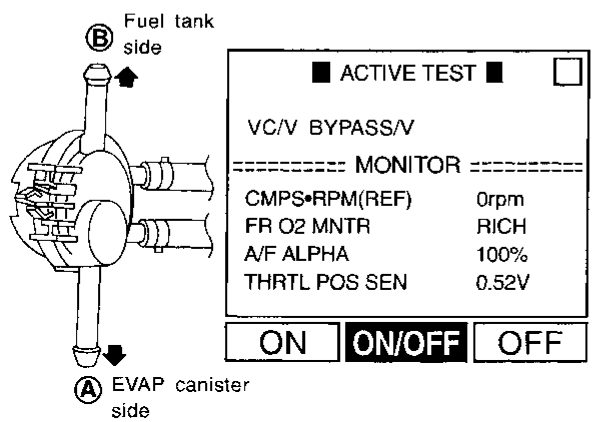
NCEC0401

1	INSPECTION START	
Do you have CONSULT?		
	Yes or No	
Yes	▶	GO TO 2.
No	▶	GO TO 3.

2	CHECK VACUUM CUT VALVE BYPASS VALVE OPERATION

With CONSULT

1. Turn ignition switch "OFF".
2. Remove vacuum cut valve and vacuum cut valve bypass valve as an assembly.
3. Apply vacuum to port **A** and check that there is no suction from port **B**.
4. Apply vacuum to port **B** and check that there is suction from port **A**.
5. Blow air in port **B** and check that there is a resistance to flow out of port **A**.
6. Turn ignition switch "ON".
7. Select "VC/V BYPASS/V" in "ACTIVE TEST" mode with CONSULT and touch "ON".
8. Blow air in port **A** and check that air flows freely out of port **B**.
9. Blow air in port **B** and check that air flows freely out of port **A**.



SEF069W

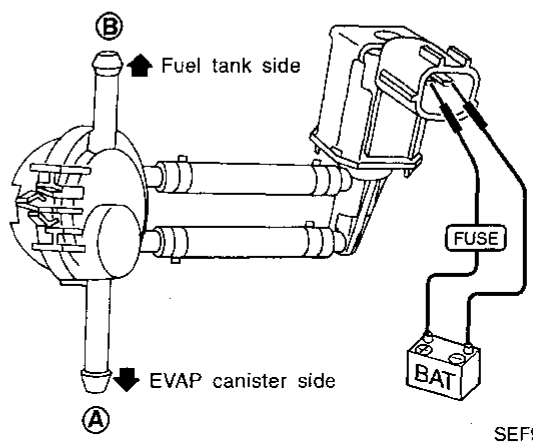
OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 5.

3	CHECK VACUUM CUT VALVE BYPASS VALVE OPERATION

Without CONSULT

1. Turn ignition switch "OFF".
2. Remove vacuum cut valve and vacuum cut valve bypass valve as an assembly.
3. Apply vacuum to port **A** and check that there is no suction from port **B**.
4. Apply vacuum to port **B** and check that there is suction from port **A**.
5. Blow air in port **B** and check that there is a resistance to flow out of port **A**.
6. Disconnect vacuum cut valve bypass valve harness connector.
7. Supply battery voltage to the terminal.
8. Blow air in port **A** and check that air flows freely out of port **B**.
9. Blow air in port **B** and check that air flows freely out of port **A**.



SEF914U

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 5.

4	CHECK EVAP PURGE LINE

1. Check EVAP purge line between EVAP canister and fuel tank for clogging or disconnection.
2. Check EVAP purge port of fuel tank for clogging.
3. Check EVAP canister. Refer to EC-28.

OK or NG

OK	▶	GO TO 8.
NG (Step 1)	▶	Repair it.
NG (Step 2)	▶	Clean EVAP purge port.
NG (Step 3)	▶	Replace EVAP canister.

5	CHECK BYPASS HOSE

Check bypass hoses for clogging.

OK or NG

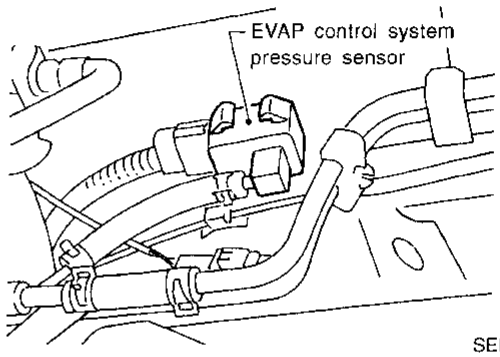
OK	▶	GO TO 6.
NG	▶	Repair or replace hoses.

Diagnostic Procedure (Cont'd)

6	CHECK VACUUM CUT VALVE BYPASS VALVE
Refer to "Component Inspection", EC-413.	
OK or NG	
OK ▶	GO TO 7.
NG ▶	Replace vacuum cut valve bypass valve.

7	CHECK VACUUM CUT VALVE
Refer to "Component Inspection", EC-413.	
OK or NG	
OK ▶	GO TO 8.
NG ▶	Replace vacuum cut valve.

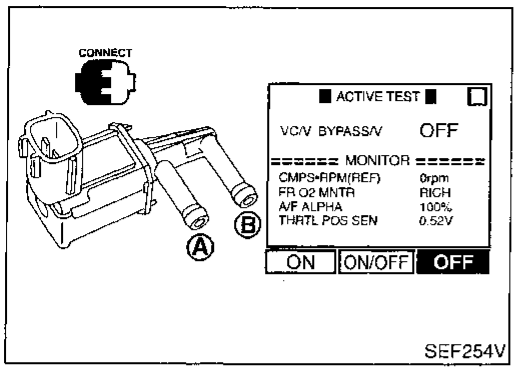
8	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE
1. Turn ignition switch "OFF". 2. Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.	
OK or NG	
OK ▶	GO TO 9.
NG ▶	Repair it

9	CHECK CONNECTOR
1. Disconnect EVAP control system pressure sensor harness connector.	
 SEF190S	
2. Check connectors for water. **Water should not exist.**	
OK or NG	
OK ▶	GO TO 10.
NG ▶	Replace EVAP control system pressure sensor.

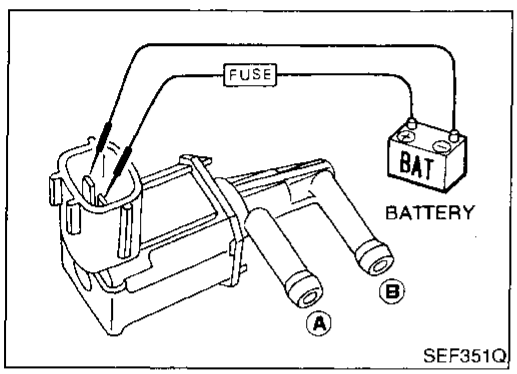
10	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR FUNCTION
Refer to "DTC Confirmation Procedure" for DTC P0450, EC-303.	
OK or NG	
OK ▶	GO TO 11.
NG ▶	Replace EVAP control system pressure sensor.

11	CHECK EVAP CANISTER VENT CONTROL VALVE
Refer to "Component Inspection", EC-401.	
OK or NG	
OK ▶	GO TO 12.
NG ▶	Replace EVAP canister vent control valve.

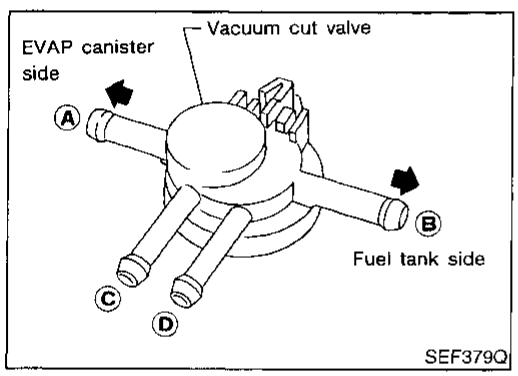
12	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-110.	
▶	INSPECTION END



SEF254V



SEF351Q



SEF379Q

Component Inspection

NCEC0402

VACUUM CUT VALVE BYPASS VALVE

NCEC0402S01

Check air passage continuity.

With CONSULT

Perform "VC/V BYPASS/V" in "ACTIVE TEST" mode.

Condition VC/V BYPASS/V	Air passage continuity between **A** and **B**
ON	Yes
OFF	No

Without CONSULT

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

If NG or operation takes more than 1 second, replace vacuum cut valve bypass valve.

VACUUM CUT VALVE

NCEC0402S02

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**.

Description

NCEC0403

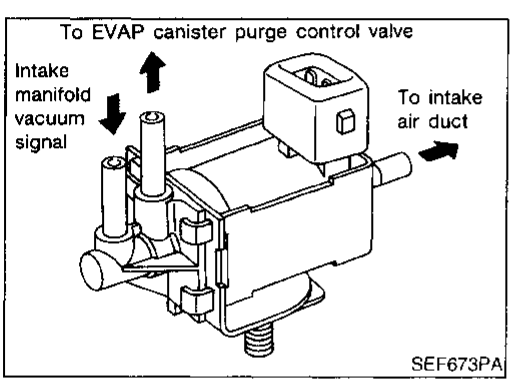
SYSTEM DESCRIPTION

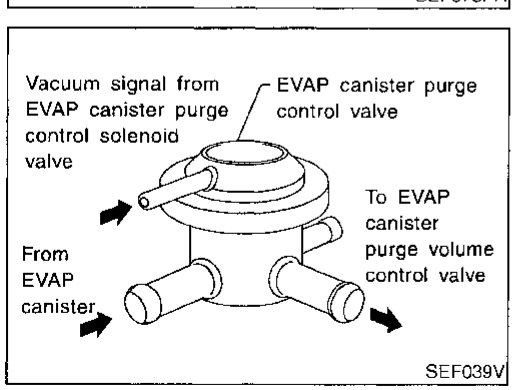
NCEC0403S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	EVAP canister purge control	EVAP canister purge control solenoid valve ↓ Vacuum signal ↓ EVAP canister purge control valve
Engine coolant temperature sensor	Engine coolant temperature		
Throttle position sensor	Throttle position		
Vehicle speed sensor	Vehicle speed		
Ignition switch	Start signal		
Front heated oxygen sensor	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		

This system controls the vacuum signal applied to the EVAP canister purge control valve.
When the ECM detects any of the following conditions, current does not flow through the EVAP canister purge control solenoid valve.
The solenoid valve cuts the vacuum signal so that the EVAP canister purge control valve remains closed.

- Ignition switch "ON"
- Closed throttle position
- Low engine coolant temperature
- During deceleration
- Engine stopped
- Low vehicle speed (M/T models)
- For 60 seconds after starting engine
  (After warm-up to normal operating temperature)





COMPONENT DESCRIPTION

NCEC0403S02

EVAP Canister Purge Control Solenoid Valve

NCEC0403S0201

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

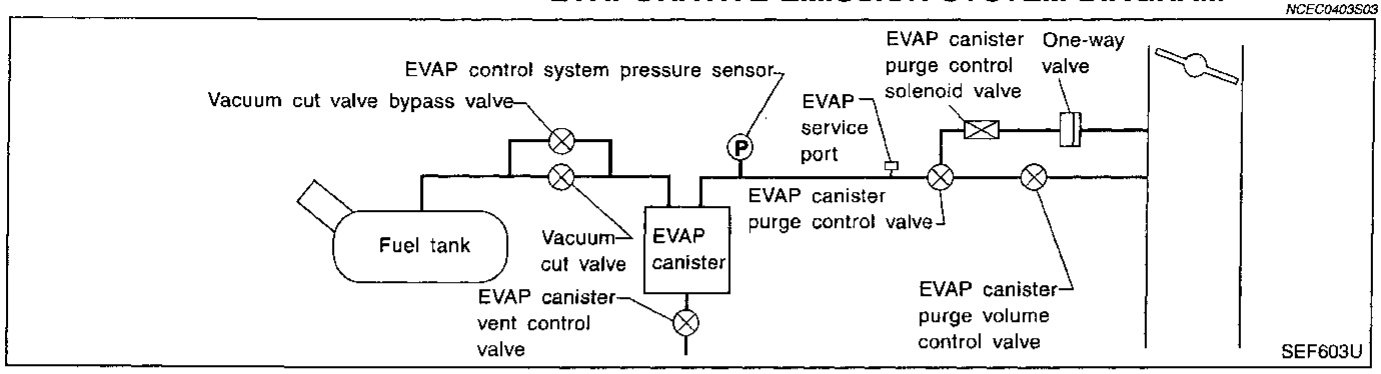
NCEC0403S0202

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

Description (Cont'd)

EVAPORATIVE EMISSION SYSTEM DIAGRAM

NCEC0403S03



CONSULT Reference Value in Data Monitor Mode

NCEC0404

MONITOR ITEM	CONDITION		SPECIFICATION
PURG CONT S/V	• Engine: After warming up • Shift lever: N • No-load • M/T models: Lift up drive wheels and shift to 1st gear position.	Idle	OFF
		More than 60 seconds after starting engine Rev engine up from 2,000 to 4,000 rpm.	ON

ECM Terminals and Reference Value

NCEC0405

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
105	PU	EVAP canister purge control solenoid valve	**[Engine is running]** • **Warm-up condition** • More than 60 seconds after starting engine • M/T models: Lift up drive wheels and shift to 1st gear position. • Engine speed is 2,000 rpm.	Approximately 0V
			[Engine is running] • **Warm-up condition** • Idle speed	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NCEC0406

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1492	• An improper voltage signal is sent to ECM through EVAP canister purge control solenoid valve.	• Harness or connectors (The EVAP canister purge control solenoid valve circuit is open or shorted.) • EVAP canister purge control solenoid valve

DTC Confirmation Procedure

NCEC0407

NOTE:

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

With CONSULT

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
3) Wait at least 5 seconds.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-418.

With GST

1) Turn ignition switch "ON" and wait at least 5 seconds.
2) Select "MODE 3" with GST.
3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-418.

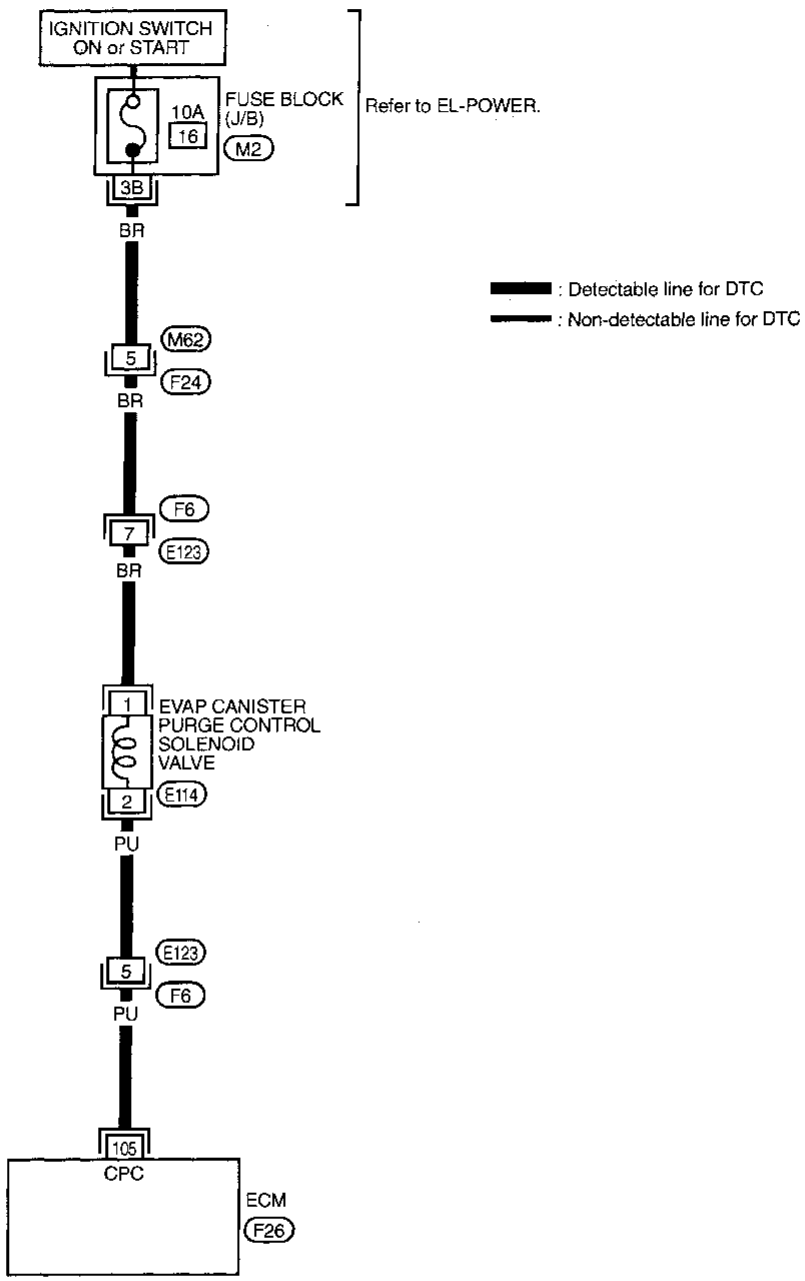
No Tools

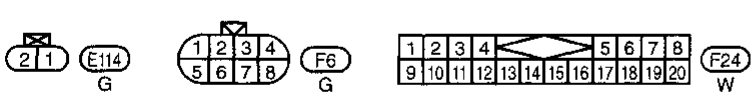
1) Turn ignition switch "ON" and wait at least 5 seconds.
2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
3) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-418.

Wiring Diagram

NCEC0408

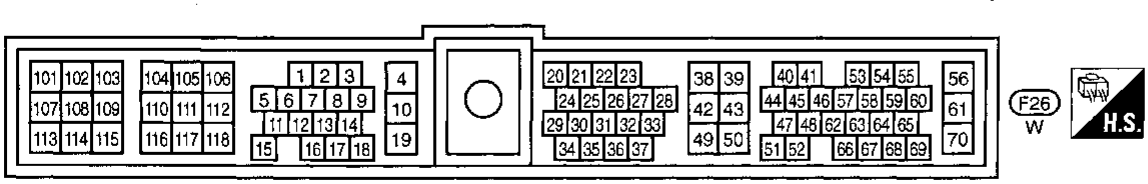
EC-CANI/V-01





Refer to last page (Foldout page).

M2



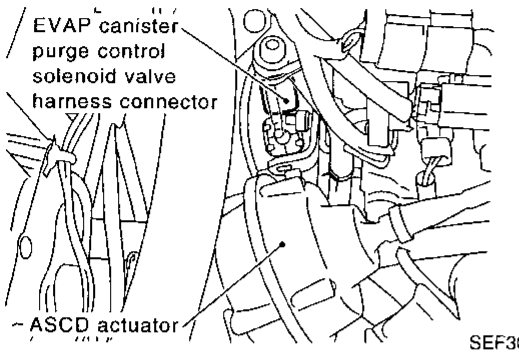
TEC549

Diagnostic Procedure

NCEC0409

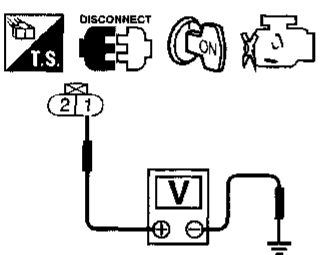
1 CHECK POWER SUPPLY

1. Disconnect EVAP canister purge control solenoid valve harness connector.



SEF308W

2. Turn ignition switch "ON".
3. Check voltage between terminal 1 and ground with CONSULT or tester.



SEF286W

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

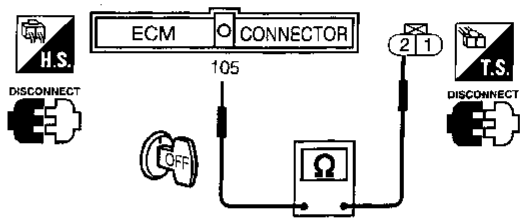
2 DETECT MALFUNCTIONING PART

Check the following.
- 10A fuse
- Harness connectors M62, F24
- Harness connectors F6, E123
- Harness for open or short between EVAP canister purge control solenoid valve and fuse

▶	Repair harness or connectors.

3 CHECK OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 105 and terminal 2.



SEF287W

Continuity should exist.

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

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4 DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F6, E123
- Harness for open or short between EVAP canister purge control solenoid valve and ECM

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

5 CHECK EVAP CANISTER PURGE CONTROL SOLENOID VALVE

Refer to "Component Inspection", EC-419.

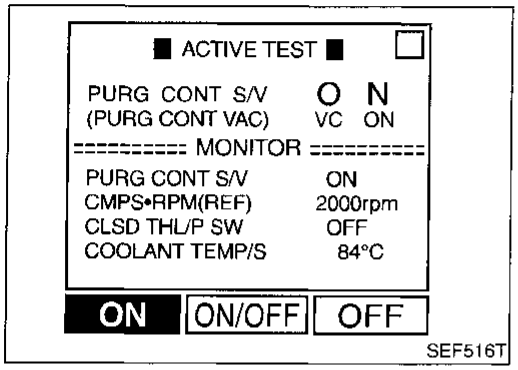
OK or NG

OK	▶	GO TO 6.
NG	▶	Replace EVAP canister purge control solenoid valve.

6 CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-110.

▶	**INSPECTION END**



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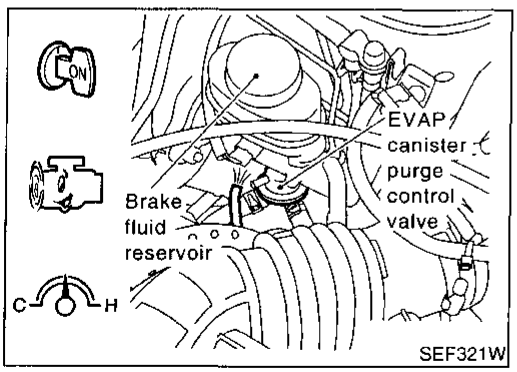

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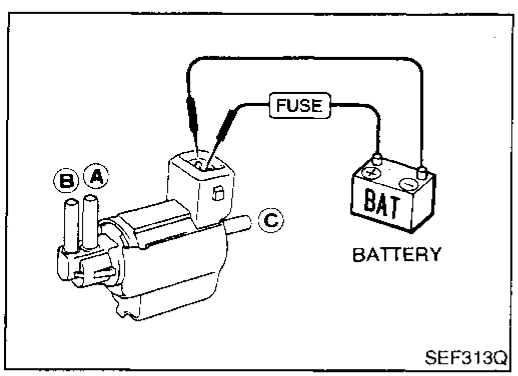

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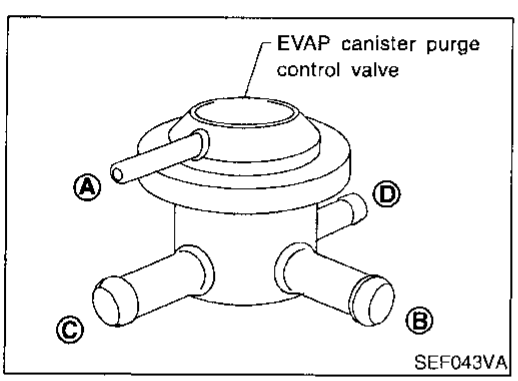


SEF043VA

Component Inspection

EVAP CANISTER PURGE CONTROL SOLENOID VALVE

NCEC0410

NCEC0410S01

With CONSULT

1. Lift up driving wheels (M/T models only).
2. Turn ignition switch "ON".
3. Select "PURG CONT S/V" of "ACTIVE TEST" mode with CONSULT.
4. Start engine and warm it up to normal operating temperature.
5. Disconnect vacuum hose at EVAP canister purge control valve.
6. Touch "ON" and "OFF" and check for vacuum passing through the hose.

Condition	Vacuum
Idle	Not exist
2,000 rpm (A/T models) 2,000 rpm with 1st gear position (M/T models)	Exist

Without CONSULT

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 or operation takes more than 1 second, replace solenoid valve.

EVAP CANISTER PURGE CONTROL VALVE

NCEC0410S02

Check EVAP canister purge control valve as follows:

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

Description

NCEC0411

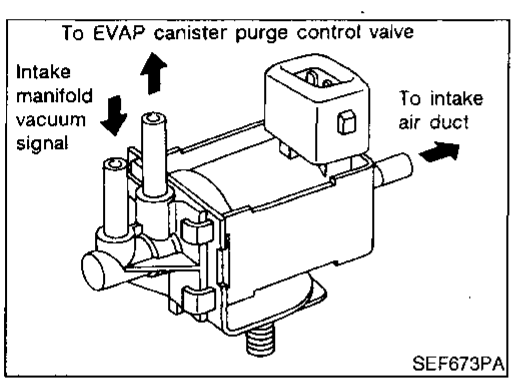
SYSTEM DESCRIPTION

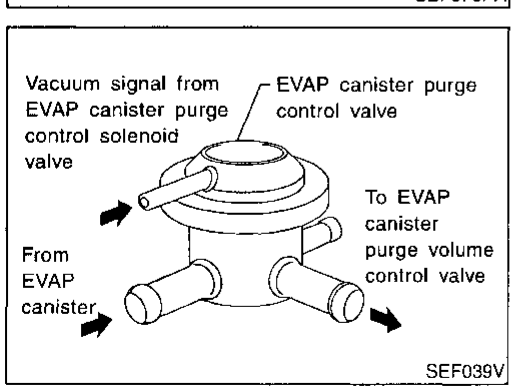
NCEC0411S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	EVAP canister purge control	EVAP canister purge control solenoid valve ↓ Vacuum signal ↓ EVAP canister purge control valve
Engine coolant temperature sensor	Engine coolant temperature		
Throttle position sensor	Throttle position		
Vehicle speed sensor	Vehicle speed		
Ignition switch	Start signal		
Front heated oxygen sensor	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		

This system controls the vacuum signal applied to the EVAP canister purge control valve.
When the ECM detects any of the following conditions, current does not flow through the EVAP canister purge control solenoid valve.
The solenoid valve cuts the vacuum signal so that the EVAP canister purge control valve remains closed.

- Ignition switch "ON"
- Closed throttle position
- Low engine coolant temperature
- During deceleration
- Engine stopped
- Low vehicle speed (M/T models)
- For 60 seconds after starting engine
  (After warm-up to normal operating temperature)





COMPONENT DESCRIPTION

NCEC0411S02

EVAP Canister Purge Control Solenoid Valve

NCEC0411S0201

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

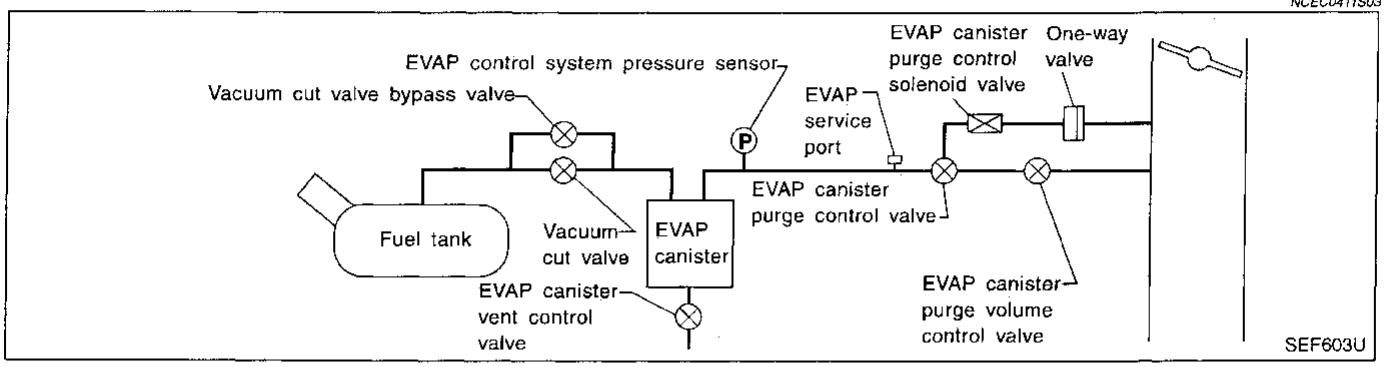
NCEC0411S0202

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

Description (Cont'd)

EVAPORATIVE EMISSION SYSTEM DIAGRAM

NCEC0411S03



CONSULT Reference Value in Data Monitor Mode

NCEC0412

MONITOR ITEM	CONDITION		SPECIFICATION
PURG CONT S/V	• Engine: After warming up • Shift lever: N • No-load • M/T models: Lift up drive wheels and shift to 1st gear position.	Idle	OFF
		More than 60 seconds after starting engine Rev engine up from 2,000 to 4,000 rpm.	ON

ECM Terminals and Reference Value

NCEC0413

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
105	PU	EVAP canister purge control solenoid valve	**[Engine is running]** • **Warm-up condition** • More than 60 seconds after starting engine • M/T models: Lift up drive wheels and shift to 1st gear position. • Engine speed is 2,000 rpm.	Approximately 0V
			[Engine is running] • **Warm-up condition** • Idle speed	BATTERY VOLTAGE (11 - 14V)

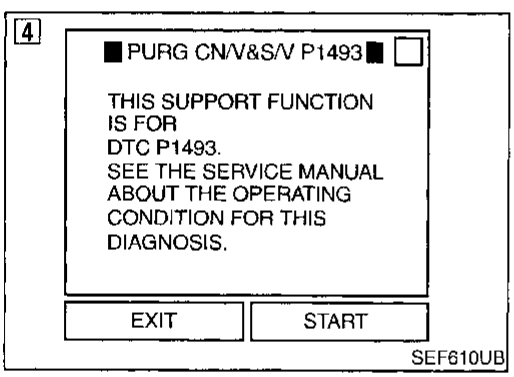
DTC P1493 EVAPORATIVE EMISSION (EVAP) CANISTER PURGE CONTROL VALVE/SOLENOID VALVE

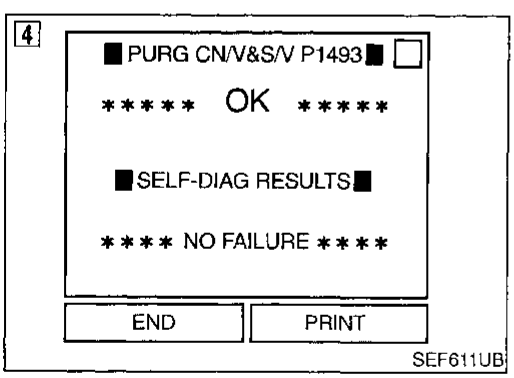
On Board Diagnosis Logic

On Board Diagnosis Logic

NCEC0414

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1493	• EVAP canister purge control valve does not operate properly (stuck open).	• EVAP canister purge control valve • EVAP canister purge control solenoid valve • Vacuum hoses for clogging or disconnection • EVAP control system pressure sensor • EVAP canister vent control valve • Water separator • EVAP canister saturated with water





DTC Confirmation Procedure

NCEC0415

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

- **If DTC P1493 is displayed with P1492, first perform trouble diagnosis for DTC P1492. (See EC-414.)**
- If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

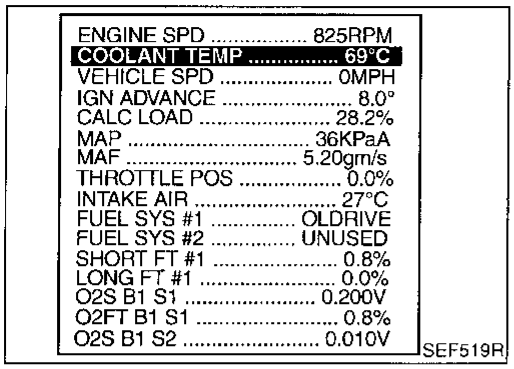
Ⓑ With CONSULT

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Start engine and let it idle for at least 90 seconds.
4) Select "PURG CN/V & S/V P1493" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT.
5) Touch "START".
6) When the following conditions are met, "TESTING" will be displayed on the CONSULT screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take approximately 30 seconds.)

Selector lever	Suitable position
Vehicle speed	36 - 120 km/h (22 - 75 MPH)
CMPS-RPM (REF)	1,000 rpm or more
B/FUEL SCHDL	1 - 4.5 msec

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

7) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS".
   If "NG" is displayed, refer to "Diagnostic Procedure", EC-424.



With GST

NOTE:

- **Hold the accelerator pedal as steady as possible during driving in step 6.**
- **If the driving conditions are not satisfied in step 6, restart the procedure.**
- **It is better that the fuel level is low.**

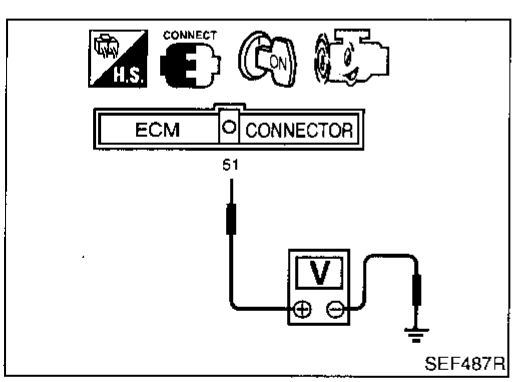
1) Start engine and warm it up to normal operating temperature.
2) Select "MODE 1" with GST.
3) Check engine coolant temperature.

   Engine coolant temperature: 40 - 100°C (104 - 212°F)

   Be sure that engine coolant temperature does not exceed 100°C (212°F). If it becomes higher than 100°C (212°F), cool down the engine and perform the procedure again from the beginning.
4) Turn ignition switch "OFF" and wait at least 5 seconds.
5) Restart engine and let it idle for at least 100 seconds.
6) Maintain the following conditions for at least 30 seconds.

Gear position	Suitable gear position
Vehicle speed	36 - 120 km/h (22 - 75 MPH)
Engine speed	1,000 rpm or more
Engine coolant temperature	40 - 100°C (104 - 212°F)

7) Select "MODE 7" with GST.
8) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-424.



Without CONSULT

NOTE:

- **Hold the accelerator pedal as steady as possible during driving in step 5.**
- **If the driving conditions are not satisfied in step 5, restart the procedure.**
- **It is better that the fuel level is low.**

1) Start engine and warm it up to normal operating temperature.
2) Check voltage between ECM terminal 51 (Engine control temperature sensor signal) and ground

   Voltage: 0.8 - 1.5V

   Perform the following procedure before the voltage drops below 0.8V. If the voltage drops below 0.8V, cool down the engine and perform the entire procedure all over again.
3) Turn ignition switch "OFF" and wait at least 5 seconds.
4) Restart engine and let it idle for at least 100 seconds.
5) Maintain the following conditions for at least 30 seconds.

DTC Confirmation Procedure (Cont'd)

Gear position	Suitable gear position
Vehicle speed	36 - 120 km/h (22 - 75 MPH)
Engine speed	1,000 rpm or more
Check voltage between ECM terminal 51 and ground	0.8 - 1.5V

6) Stop the vehicle, turn ignition switch "OFF", wait at least 5 seconds, and then turn "ON".
7) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
8) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-424.

Diagnostic Procedure

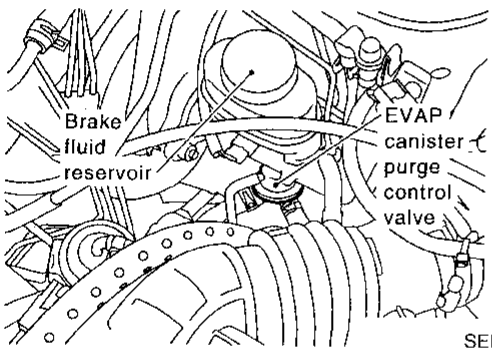
NCEC0416

1	INSPECTION START	
Do you have CONSULT?		
	Yes or No	
Yes	▶	GO TO 2.
No	▶	GO TO 3.

2	CHECK VACUUM SIGNAL

With CONSULT

1. Turn ignition switch "OFF".
2. Disconnect vacuum hose to EVAP canister purge control valve and install vacuum gauge.



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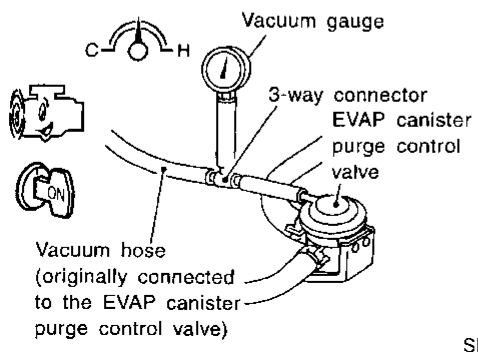
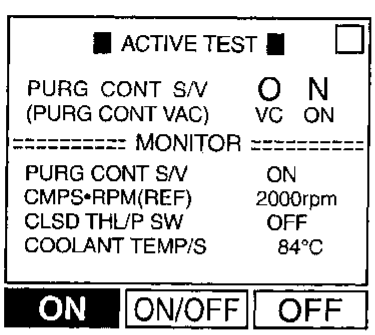


SEF622U

3. Start engine.
4. Perform "PURG CONT S/V" in "ACTIVE TEST" mode.
5. Select "ON" and "OFF" on CONSULT screen.
6. Check vacuum hose for vacuum while revving engine up to 2,000 rpm.



SEF516T

ON: Vacuum should exist.
OFF: Vacuum should not exist.

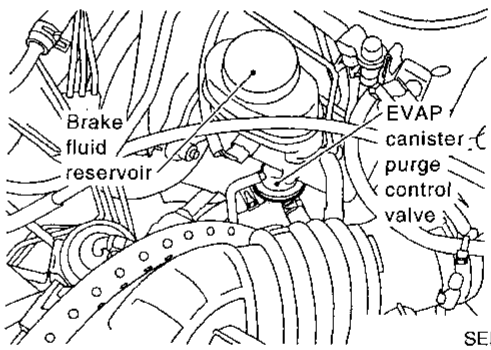
OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

3	CHECK VACUUM SIGNAL

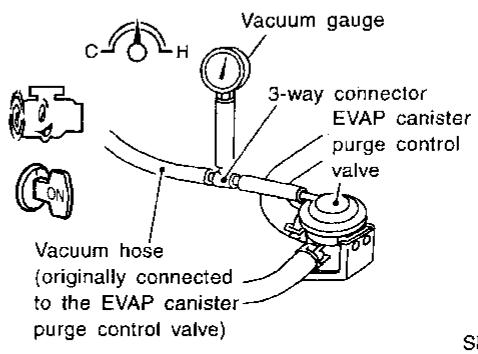
Without CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Lift up drive wheels.
4. Disconnect vacuum hose to EVAP canister purge control valve.



SEF307W

5. Install vacuum gauge and start engine and let it idle at least 60 seconds.



SEF622U

6. Shift selector lever to 1st gear position (M/T models).
7. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.
   While operating solenoid valve, vacuum should exist.
8. Release the accelerator pedal and let it idle.
   Vacuum should not exist.

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	CHECK EVAP CANISTER PURGE CONTROL SOLENOID VALVE

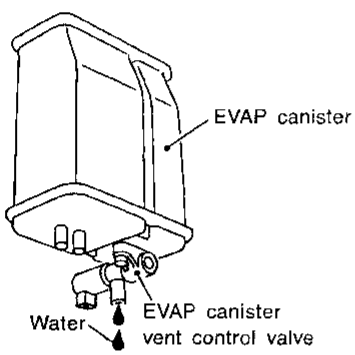
Refer to "Component Inspection", EC-427.

OK or NG

OK	▶	Check vacuum hoses for improper connection, clogging or disconnection. Refer to "Vacuum Hose Drawing", EC-21.
NG	▶	Replace EVAP canister purge control solenoid valve.

Diagnostic Procedure (Cont'd)

5	CHECK EVAP CANISTER VENT CONTROL VALVE
Refer to "Components Inspection", EC-401.	
OK or NG	
OK ▶	GO TO 6.
NG ▶	Replace EVAP canister vent control valve.

6	CHECK IF EVAP CANISTER IS SATURATED WITH WATER
1. Remove EVAP canister with EVAP canister vent control valve attached. 2. Check if water drains from the EVAP canister.	
 SEF596U	
Yes or No	
Yes ▶	GO TO 7.
No ▶	GO TO 9.

7	CHECK EVAP CANISTER
Weigh the EVAP canister with EVAP canister vent control valve attached. **The weight should be less than 1.8 kg (4.0 lb).**	
OK or NG	
OK ▶	GO TO 9.
NG ▶	GO TO 8.

8	DETECT MALFUNCTIONING PART
Check the following. 1. Visually check the EVAP canister for damage. 2. Check hose connection between EVAP canister and water separator for clogging and poor connection. 3. Check water separator. Refer to "Component Inspection", EC-401.	
▶	Repair hose or replace EVAP canister or water separator.

9	CHECK EVAP CANISTER PURGE CONTROL VALVE
Refer to "Component Inspection", EC-427.	
OK or NG	
OK ▶	GO TO 10.
NG ▶	Replace EVAP canister purge control valve.

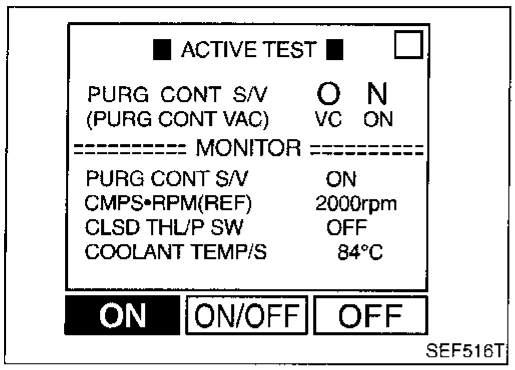
10	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE
Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.	
OK or NG	
OK ▶	GO TO 11.
NG ▶	Install hose property or replace it.

11	CHECK HARNESS CONNECTOR
1. Disconnect EVAP control system pressure sensor harness connector. 2. Check harness connector for water. **Water should not exist.**	
OK or NG	
OK ▶	GO TO 12.
NG ▶	Replace EVAP control system pressure sensor.

12	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR AND CIRCUIT
Perform "DTC Confirmation Procedure", EC-303.	
OK or NG	
OK ▶	GO TO 13.
NG ▶	Replace EVAP control system pressure sensor and repair or replace harness and connector.

13	CHECK EVAPORATIVE EMISSION LINE
Check EVAP purge line hoses for leak or clogging. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-31.	
OK or NG	
OK ▶	GO TO 14.
NG ▶	Repair EVAP purge line hoses.

14	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-110.	
▶	**INSPECTION END**



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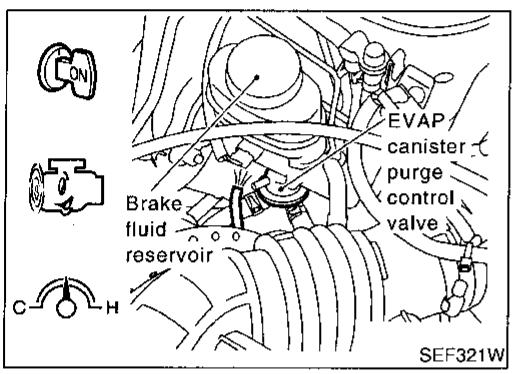

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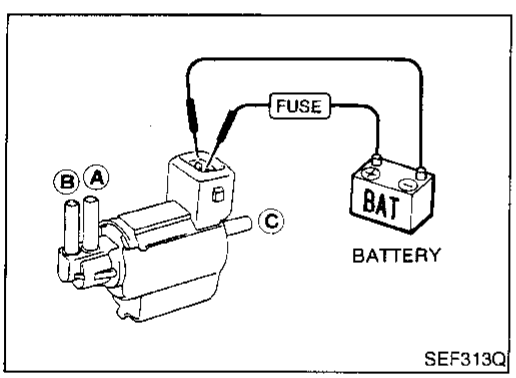

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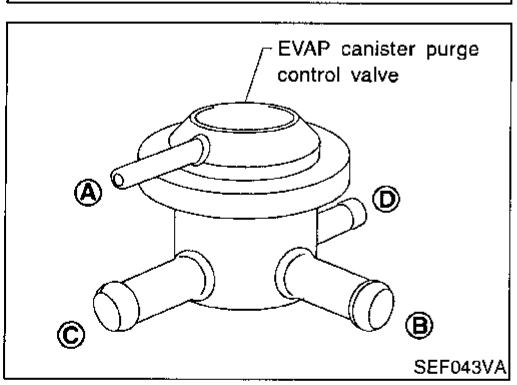


SEF043VA

Component Inspection

EVAP CANISTER PURGE CONTROL SOLENOID VALVE

NCEC0417

NCEC0417S01

Ⓑ With CONSULT

1. Lift up driving wheels (M/T models only).
2. Turn ignition switch "ON".
3. Select "PURG CONT S/V" of "ACTIVE TEST" mode with CONSULT.
4. Start engine and warm it up to normal operating temperature.
5. Disconnect vacuum hose at EVAP canister purge control valve.
6. Touch "ON" and "OFF" and check for vacuum passing through the hose.

Condition	Vacuum
Idle	Not exist
2,200 rpm (A/T models) 2,000 rpm with 1st gear position (M/T models)	Exist

Ⓧ Without CONSULT

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 or operation takes more than 1 second, replace solenoid valve.

EVAP CANISTER PURGE CONTROL VALVE

NCEC0417S02

Check EVAP canister purge control valve as follows:

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

System Description

NCEC0418

The malfunction information related to A/T (Automatic Transaxle) is transferred through the line (circuit) from TCM (Transmission Control Module) to ECM. Therefore, be sure to erase the malfunction information such as DTC not only in TCM (Transmission Control Module) but also ECM after the A/T related repair.

ECM Terminals and Reference Value

NCEC0419

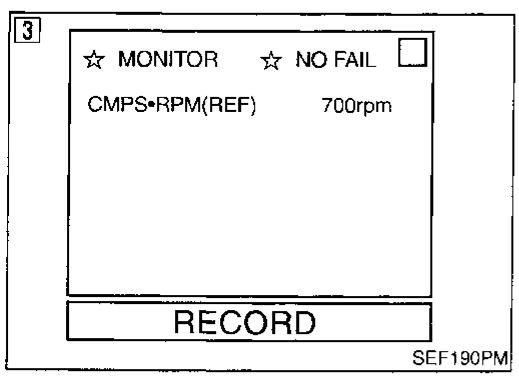
Specification data are reference values and are measured between each terminal and 43 (ECM ground).

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
7	PU	A/T check signal	**[Ignition switch "ON"]** **[Engine is running]**	5 - 7V

On Board Diagnosis Logic

NCEC0420

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1605 0804	• An incorrect signal from TCM (Transmission Control Module) is sent to ECM.	• Harness or connectors [The communication line circuit between ECM and TCM (Transmission Control Module) is open or shorted.] • Dead (Weak) battery • TCM (Transmission Control Module)



DTC Confirmation Procedure

NCEC0421

NOTE:

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

With CONSULT

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
3) Start engine and let it idle for at least 40 seconds.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-430.

With GST

1) Start engine and let it idle for at least 40 seconds.
2) Select "MODE 7" with GST.
3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-430.

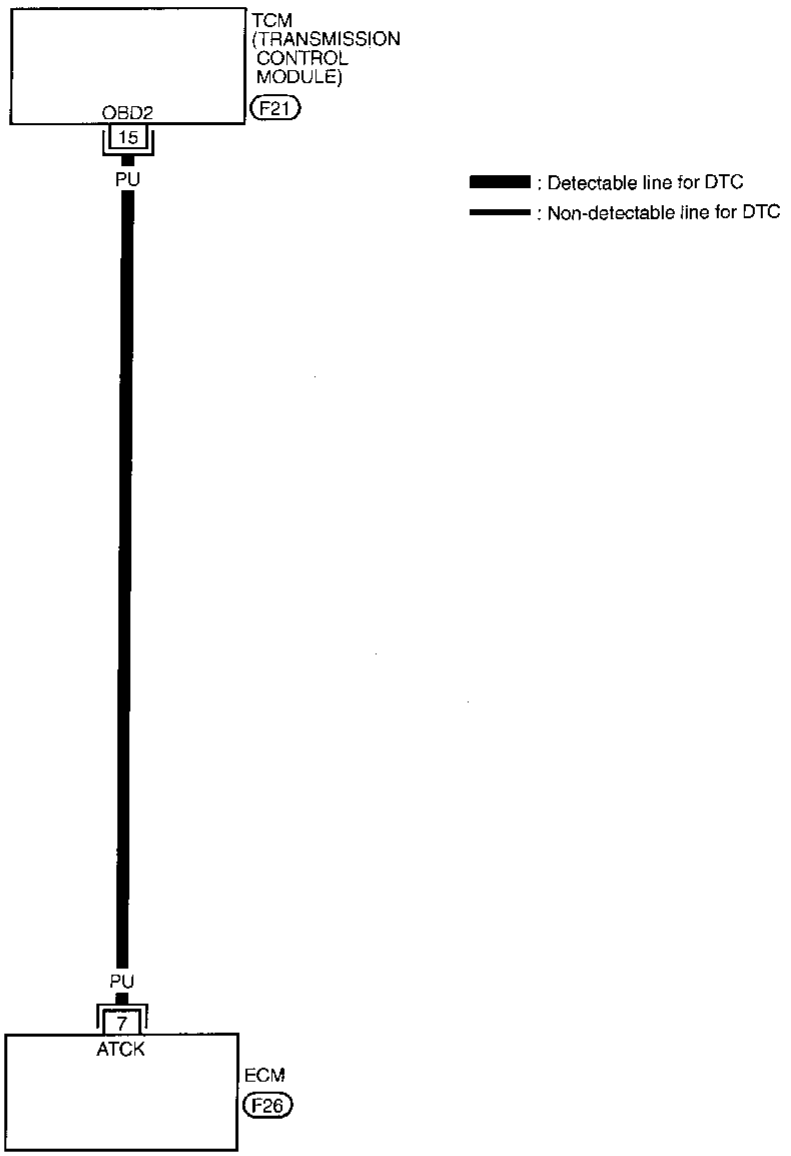
No Tools

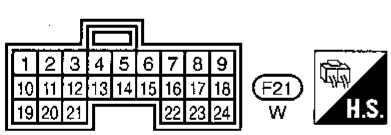
1) Start engine and let it idle for at least 40 seconds.
2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
3) Perform "Diagnostic Test Mode II" (Self-diagnostic results) with ECM.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-430.

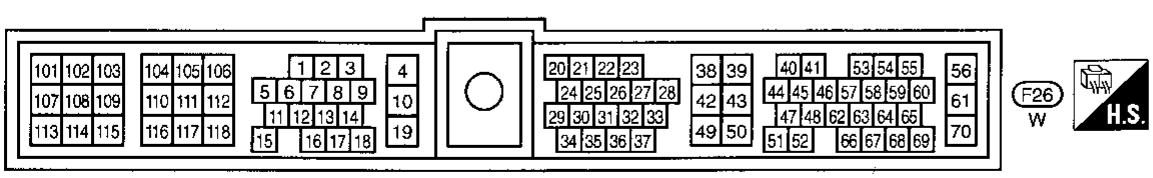
Wiring Diagram

NCEC0422

EC-ATDIAG-01







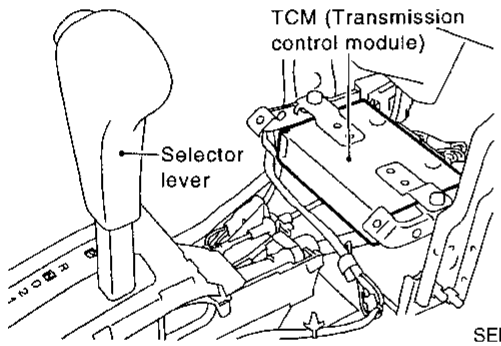
TEC550

Diagnostic Procedure

NCEC0423

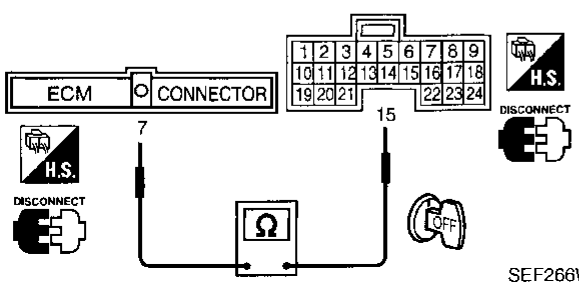
1	CHECK INPUT SIGNAL CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector and TCM harness connector.



SEF313W

3. Check harness continuity between ECM terminal 7 and TCM terminal 15.



SEF266W

Continuity should exist.

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

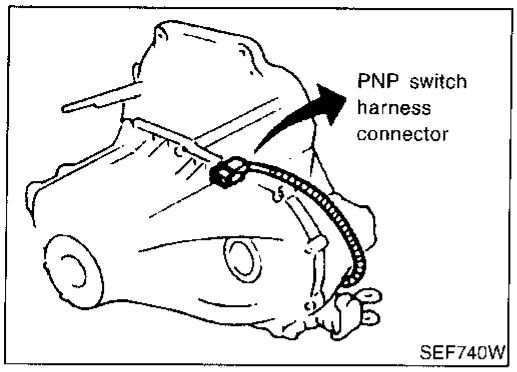
OK or NG

OK	▶	GO TO 2.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

2	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-110.

▶ **INSPECTION END**



Component Description

NCEC0424

When the gear position is "P" (A/T models only) or "N", park/neutral position (PNP) switch is "ON".
ECM detects the park/neutral position when continuity with ground exists.

CONSULT Reference Value in Data Monitor Mode

NCEC0425

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
P/N POSI SW	• Ignition switch: ON	Shift lever: "P" or "N"	ON
		Except above	OFF

ECM Terminals and Reference Value

NCEC0426

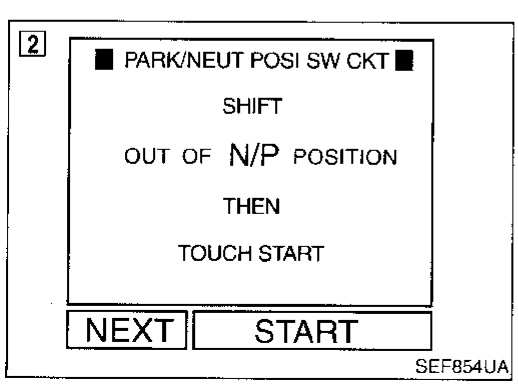
Specification data are reference values and are measured between each terminal and 43 (ECM ground).

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
22	G/OR	PNP switch	**[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	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NCEC0427

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1706 1003	• The signal of the PNP switch is not changed in the process of engine starting and driving.	• Harness or connectors (The PNP switch circuit is open or shorted.) • PNP switch



DTC Confirmation Procedure

NCEC0428

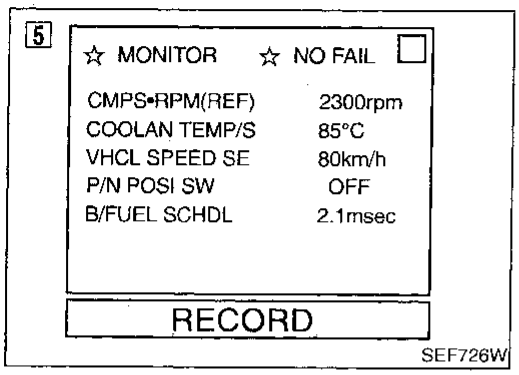
CAUTION:
Always drive vehicle at a safe speed.

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

With CONSULT

1) Turn ignition switch "ON".

DTC Confirmation Procedure (Cont'd)



2) Perform "PARK/NEUT POSI SW CKT" in "FUNCTION TEST" mode with CONSULT.
Select "P/N POSI SW" in "DATA MONITOR" mode with CONSULT. Then check the "P/N POSI SW" signal under the following conditions.

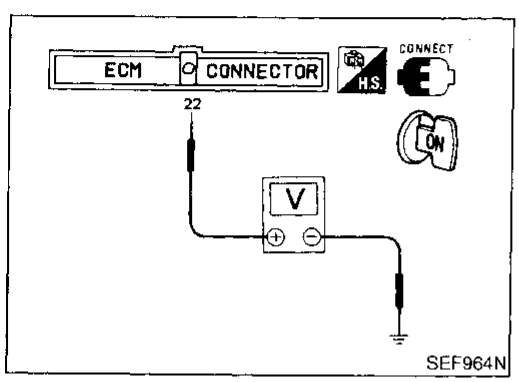
Position (Selector lever)	Known good signal
"N" and "P" (A/T only) position	ON
Except the above position	OFF

If NG, go to "Diagnostic Procedure", EC-434.
If OK, go to following step.

3) Select "DATA MONITOR" mode with CONSULT.
4) Start engine and warm it up to normal operating temperature.
5) Maintain the following conditions for at least 50 consecutive seconds.

CMPS·RPM (REF)	2,100 - 3,000 rpm (M/T) 1,800 - 2,600 rpm (A/T)
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	0.9 - 3.7 msec (M/T) 1 - 4 msec (A/T)
VHCL SPEED SE	70 - 100 km/h (43 - 62 MPH)
Selector lever	Suitable position

6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-434.



Overall Function Check

NCEC0429

Use this procedure to check the overall function of the park/neutral position switch circuit. During this check, a 1st trip DTC might not be confirmed.

⊗ Without CONSULT

1) Turn ignition switch "ON".
2) Check voltage between ECM terminal 22 (PNP switch signal) and body ground under the following conditions.

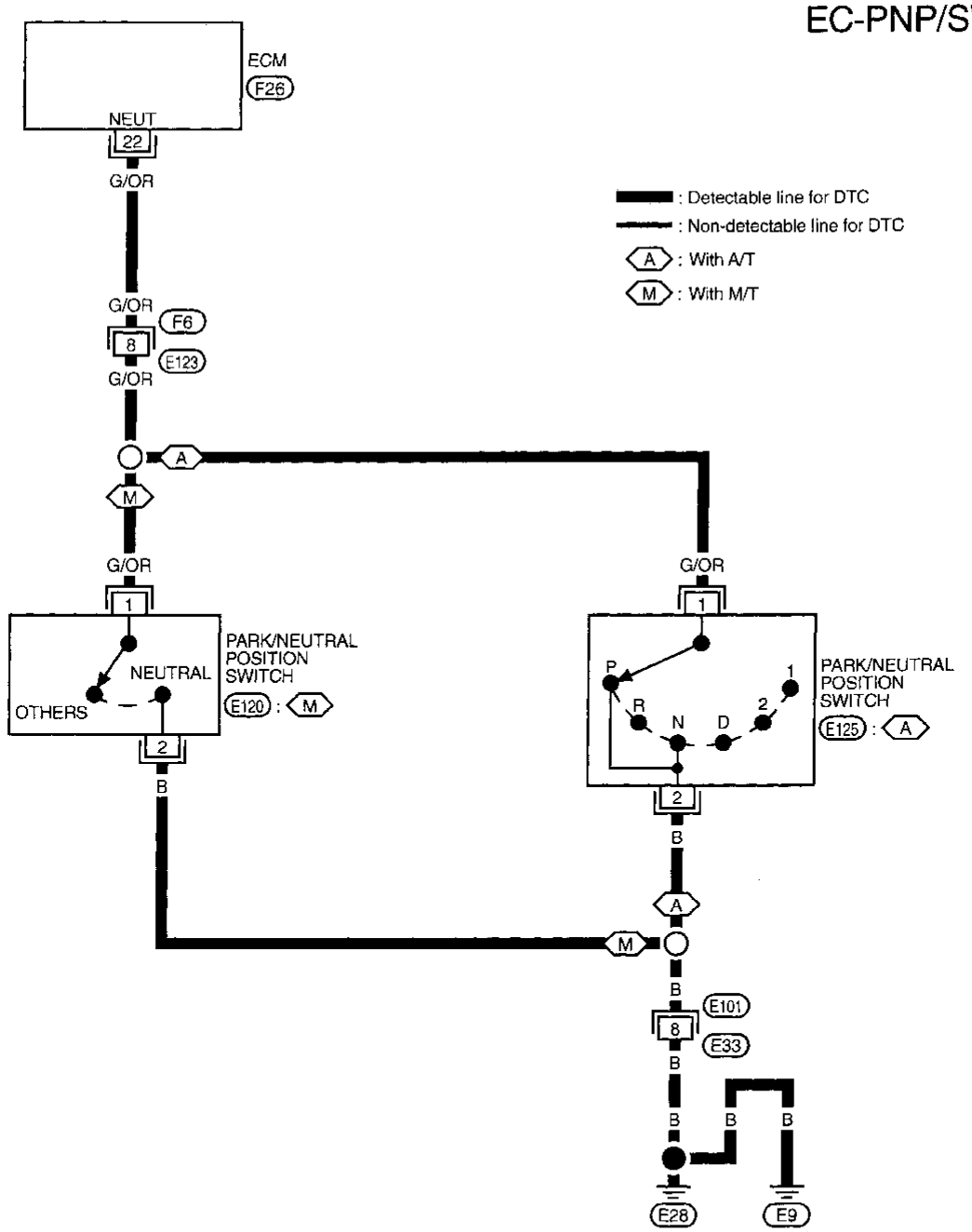
Condition (Gear position)	Voltage (V) (Known good data)
"P" (A/T only) and "N" position	Approx. 0
Except the above position	BATTERY VOLTAGE (11 - 14V)

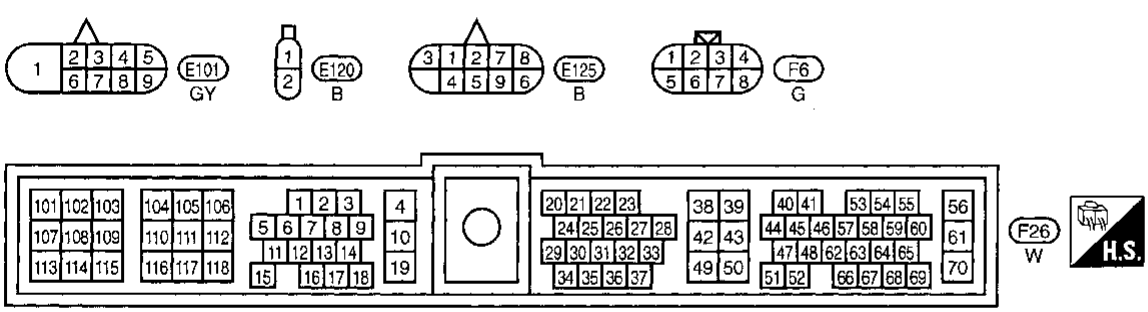
3) If NG, go to "Diagnostic Procedure", EC-434.

Wiring Diagram

NCEC0430

EC-PNP/SW-01





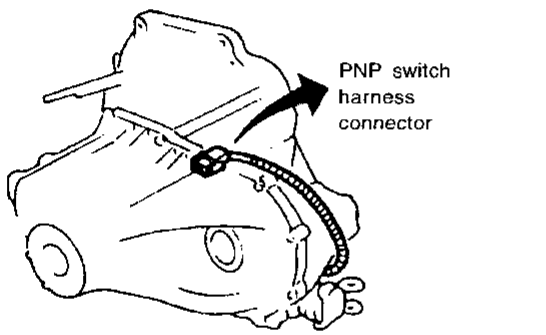
TEC551

Diagnostic Procedure For M/T Models

NCEC0431

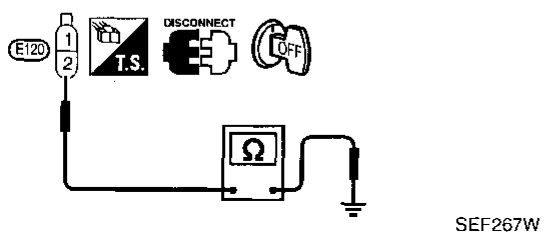
1 CHECK GROUND CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect PNP switch harness connector.



SEF740W

3. Check harness continuity between terminal 2 and body ground.



SEF267W

Continuity should exist.

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

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

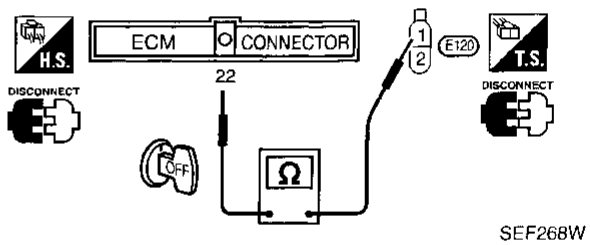
2 DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E101, E33
- Harness for open or short between PNP switch and body ground

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

3 CHECK INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 22 and terminal 1.



SEF268W

Continuity should exist.

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

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4 DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F6, E123
- Harness for open or short between ECM and PNP switch

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

5 CHECK PNP SWITCH

Refer to MT section.

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace PNP switch.

6 CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-110.

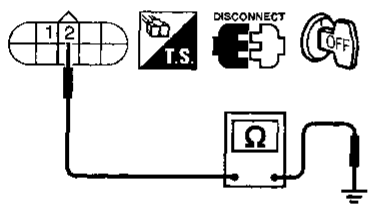
▶	**INSPECTION END**

Diagnostic Procedure For A/T Models

=NCEC0432

1	CHECK GROUND CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect PNP switch harness connector.
3. Check continuity between terminal 2 and ground with CONSULT or tester.



SEF269W

Continuity should exist.

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

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

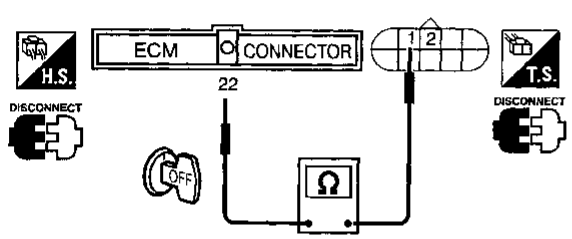
2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E101, E33
- Harness for open or short between PNP switch and body ground

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

3	CHECK INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 22 and terminals 1.



SEF270W

Continuity should exist.

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

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F6, E123
- Harness for open or short between PNP switch and ECM

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

5	CHECK PNP SWITCH

Refer to AT section.

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace PNP switch.

6	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-110.

▶	**INSPECTION END**

System Description

NCEC0433

COOLING FAN CONTROL

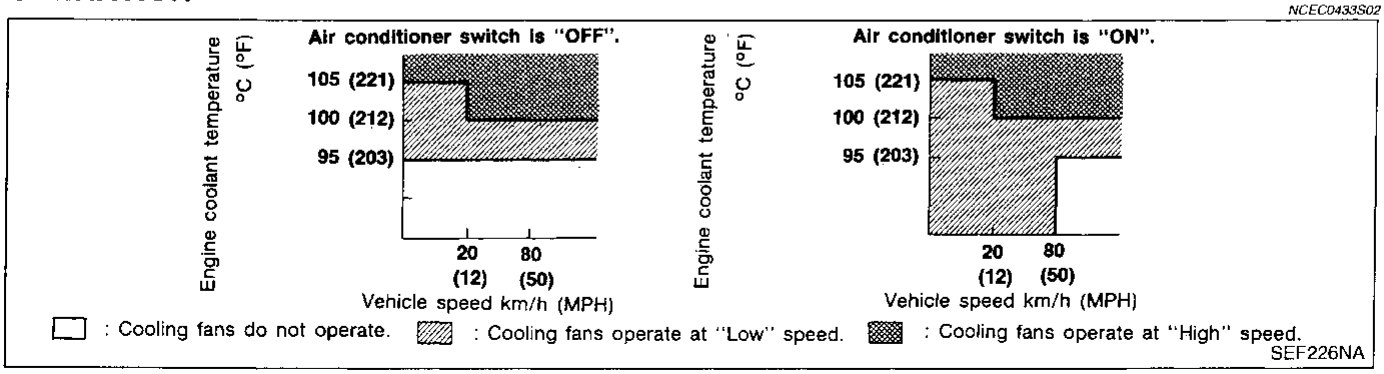
NCEC0433S01

Sensor	Input Signal to ECM	ECM function	Actuator
Vehicle speed sensor	Vehicle speed	ECM	Cooling fan relay(s)
Engine coolant temperature sensor	Engine coolant temperature		
Air conditioner switch	Air conditioner "ON" signal		
Ignition switch	Start signal		

The ECM controls the cooling fan corresponding to the vehicle speed, engine coolant temperature, and air conditioner ON signal. The control system has 3-step control [HIGH/LOW/OFF].

OPERATION

NCEC0433S02



SEF226NA

CONSULT Reference Value in Data Monitor Mode

NCEC0486

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
AIR COND SIG	• Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates)	ON
COOLING FAN	• After warming up engine, idle the engine. • Air conditioner switch: OFF	Engine coolant temperature is 94°C (201°F) or less	OFF
		Engine coolant temperature is between 95°C (203°F) and 104°C (219°F)	LOW
		Engine coolant temperature is 105°C (221°F) or more	HIGH

ECM Terminals and Reference Value

=NCEC0487

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
13	LG	Cooling fan relay (High)	**[Engine is running]** • Cooling fan is not operating	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] • Cooling fan (High) is operating	0 - 0.6V
14	L/Y	Cooling fan relay (Low)	**[Engine is running]** • Cooling fan is not operating	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] • Cooling fan (Low) is operating	0.06V
21	L/W	Air conditioner switch	**[Engine is running]** • Both air conditioner switch and blower switch are "ON" (Compressor operates)	Approximately 0V
			[Engine is running] • Air conditioner switch is "OFF"	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

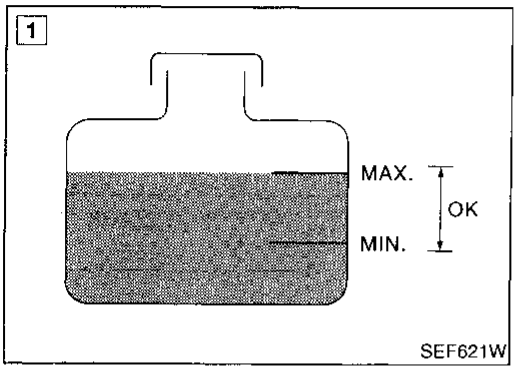
NCEC0488

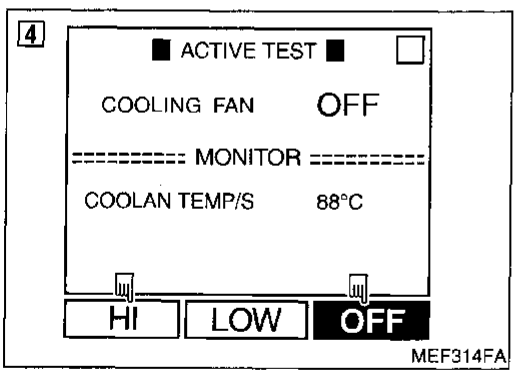
If the cooling fan or another component in the cooling system malfunctions, engine coolant temperature will rise.
When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is indicated.

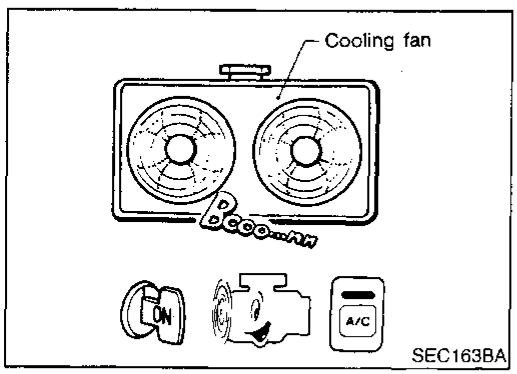
Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
0208	• Cooling fan does not operate properly (Overheat). • Cooling fan system does not operate properly (Overheat). • Engine coolant was not added to the system using the proper filling method.	• Harness or connectors (The cooling fan circuit is open or shorted.) • Cooling fan • Radiator hose • Radiator • Radiator cap • Water pump • Thermostat For more information, refer to "MAIN 12 CAUSES OF OVERHEATING", EC-448.

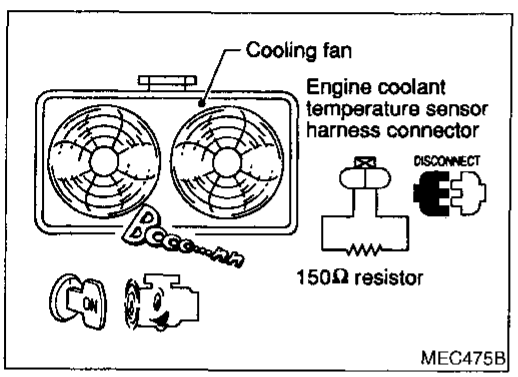
CAUTION:
When a malfunction is indicated, be sure to replace the coolant following the procedure in the MA section ("Changing Engine Coolant", "ENGINE MAINTENANCE"). Also, replace the engine oil.

1) **Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute. Be sure to use coolant with the proper mixture ratio. Refer to MA section ("Anti-freeze Coolant Mixture Ratio", "RECOMMENDED FLUIDS AND LUBRICANTS").**
2) **After refilling coolant, run engine to ensure that no water-flow noise is emitted.**









Overall Function Check

NCEC0489

Use this procedure to check the overall function of the cooling fan. During this check, a DTC might not be confirmed.

WARNING:

Never remove the radiator cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator.

Wrap a thick cloth around cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.

With CONSULT

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-440.
2) Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to "Diagnostic Procedure", EC-440.
3) Turn ignition switch "ON".
4) Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT.
5) If the results are NG, go to "Diagnostic Procedure", EC-440.

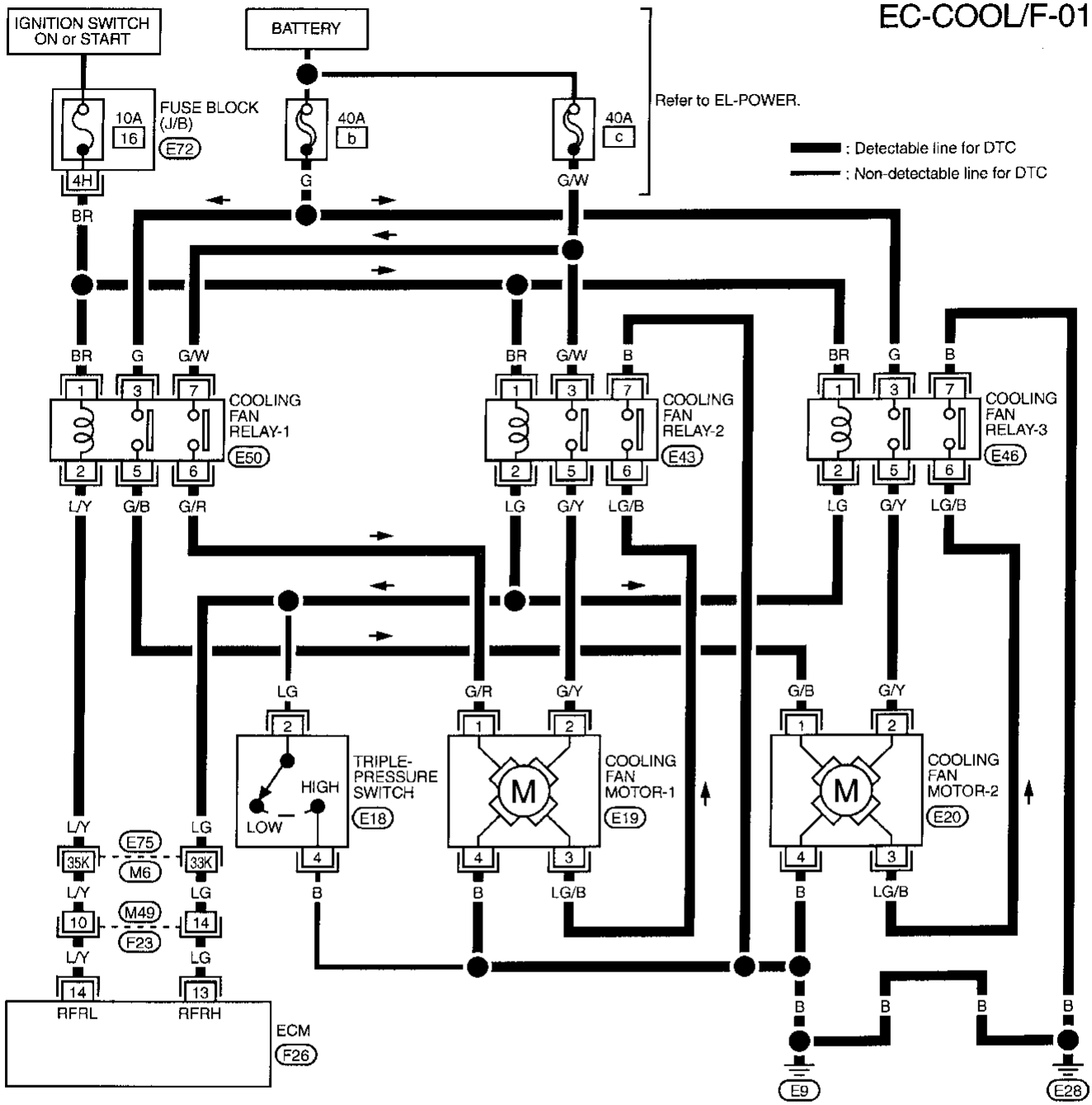
Without CONSULT

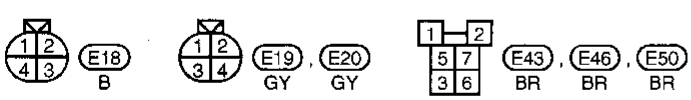
1) Check the coolant level in the reservoir tank and radiator.
   Allow engine to cool before checking coolant level.
   If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to "Diagnostic Procedure", EC-440.
2) Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to "Diagnostic Procedure", EC-440.
3) Start engine.
   Be careful not to overheat engine.
4) Set temperature control lever to full cold position.
5) Turn air conditioner switch "ON".
6) Turn blower fan switch "ON".
7) Run engine at idle for a few minutes with air conditioner operating.
   Be careful not to overheat engine.
8) Make sure that cooling fan operates at low speed.
   If NG, go to "Diagnostic Procedure", EC-440.
   If OK, go to the following step.
9) Turn ignition switch "OFF".
10) Turn air conditioner switch and blower fan switch "OFF".
11) Disconnect engine coolant temperature sensor harness connector.
12) Connect 150Ω resistor to engine coolant temperature sensor harness connector.
13) Restart engine and make sure that cooling fan operates at higher speed than low speed.
    Be careful not to overheat engine.
14) If NG, go to "Diagnostic Procedure", EC-440.

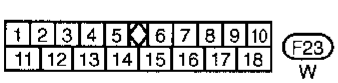
Wiring Diagram

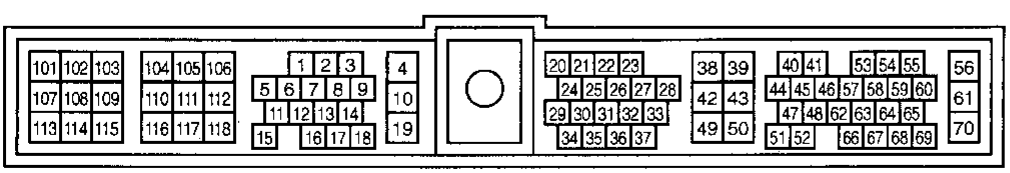
NCEC0490

EC-COOL/F-01









Refer to last page (Foldout page).
M6 , E75
E72

TEC552

Diagnostic Procedure

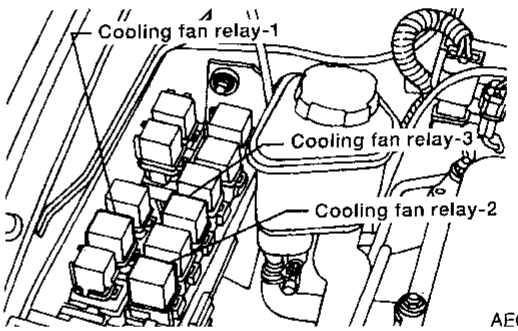
NCEC0491

1	INSPECTION START
Do you have CONSULT?	
Yes or No	
Yes ▶	GO TO 2.
No ▶	GO TO 4.

2	CHECK COOLING FAN LOW SPEED OPERATION

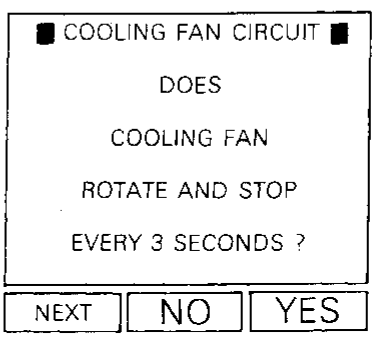
With CONSULT

1. Disconnect cooling fan relays-2 and -3.



AEC707

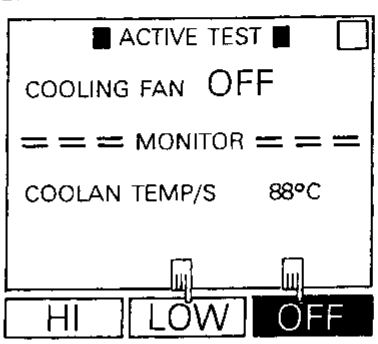
2. Turn ignition switch "ON".
3. Perform "COOLING FAN CIRCUIT" in "FUNCTION TEST" mode with CONSULT.



MEF311F

With CONSULT

1. Disconnect cooling fan relays-2 and -3.
2. Turn ignition switch "ON".
3. Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT.



MEF313F

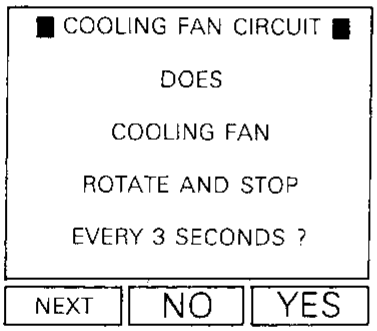
4. Make sure that cooling fans-1 and -2 operate at low speed.

OK or NG

OK ▶	GO TO 3.
NG ▶	Check cooling fan low speed control circuit. (Go to PROCEDURE A, EC-444.)

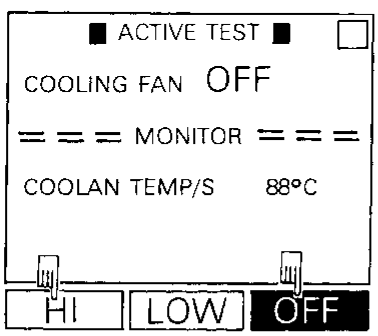
3 CHECK COOLING FAN HIGH SPEED OPERATION

With CONSULT
1. Turn ignition switch "OFF".
2. Reconnect cooling fan relays-2 and -3.
3. Disconnect cooling fan relay-1.
4. Turn ignition switch "ON".
5. Perform "COOLING FAN CIRCUIT" in "FUNCTION TEST" mode with CONSULT.



MEF311F

With CONSULT
1. Turn ignition switch "OFF".
2. Reconnect cooling fan relays-2 and -3.
3. Disconnect cooling fan relay-1.
4. Turn ignition switch "ON".
5. Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT.



MEF314F

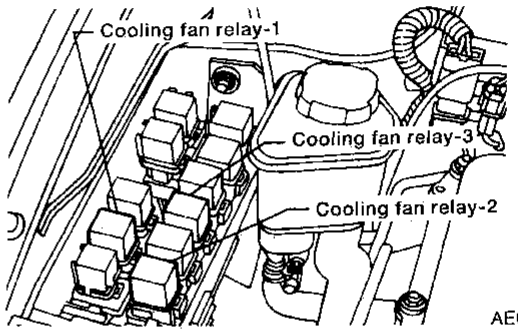
6. Make sure that cooling fans-1 and -2 operate at higher speed than low speed.

OK or NG

OK	▶	GO TO 6.
NG	▶	Check cooling fan high speed control circuit. (Go to PROCEDURE B, EC-446.)

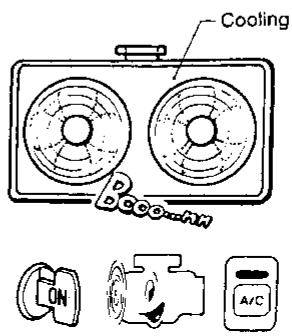
4 CHECK COOLING FAN LOW SPEED OPERATION

Without CONSULT
1. Disconnect cooling fan relays-2 and -3.



AEC707

2. Start engine and let it idle.
3. Set temperature lever at full cold position.
4. Turn air conditioner switch "ON".
5. Turn blower fan switch "ON".
6. Make sure that cooling fans-1 and -2 operate at low speed.



SEC163BA

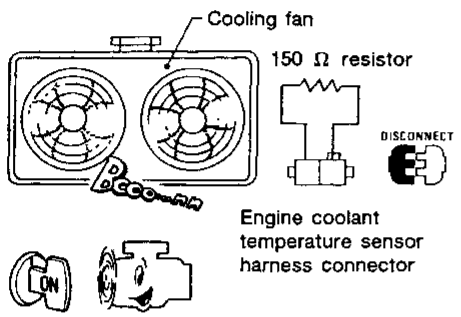
OK or NG

OK	▶	GO TO 5.
NG	▶	Check cooling fan low speed control circuit. (Go to PROCEDURE A, EC-444.)

5 CHECK COOLING FAN HIGH SPEED OPERATION

Without CONSULT

1. Turn ignition switch "OFF".
2. Reconnect cooling fan relays-2 and -3.
3. Disconnect cooling fan relay-1.
4. Turn air conditioner switch and blower fan switch "OFF".
5. Disconnect engine coolant temperature sensor harness connector.
6. Connect 150Ω resistor to engine coolant temperature sensor harness connector.
7. Restart engine and make sure that cooling fans-1 and -2 operate at higher speed than low speed.



MEF613EA

OK or NG

OK	▶	GO TO 6.
NG	▶	Check cooling fan high speed control circuit. (Go to PROCEDURE B, EC-446.)

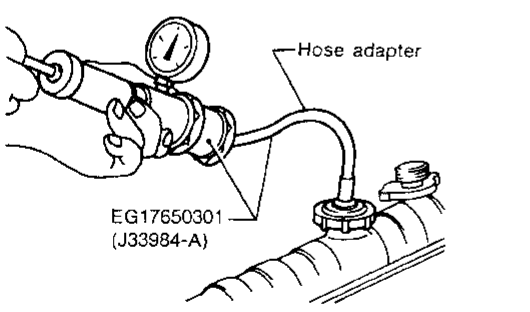
6 CHECK COOLING SYSTEM FOR LEAK

Apply pressure to the cooling system with a tester, and check if the pressure drops.

Testing pressure: 157 kPa (1.6 kg/cm², 23 psi)

CAUTION:

Higher than the specified pressure may cause radiator damage.



SLC754A

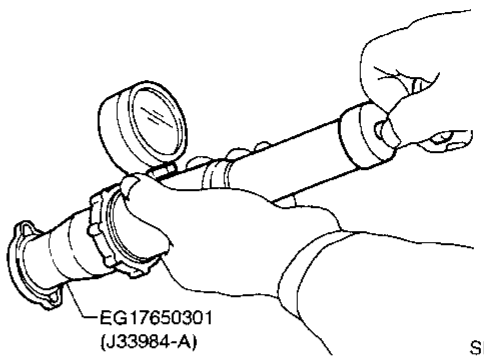
Pressure should not drop.

OK or NG

OK	▶	GO TO 7.
NG	▶	**Check the following for leak** • Hose • Radiator • Water pump Refer to LC section ("Water Pump").

7 CHECK RADIATOR CAP

Apply pressure to cap with a tester.



SLC755A

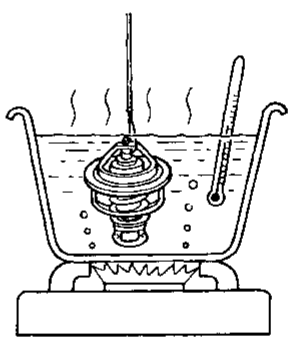
Radiator cap relief pressure:
59 - 98 kPa (0.6 - 1.0 kg/cm², 9 - 14 psi)

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace radiator cap.

8 CHECK THERMOSTAT

1. Check valve seating condition at normal room temperatures.
   It should seat tightly.
2. Check valve opening temperature and valve lift.



SLC343

Valve opening temperature:
76.5°C (170°F) [standard]
Valve lift:
More than 8 mm/90°C (0.31 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").

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace thermostat

9 CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to "COMPONENT INSPECTION", EC-160.

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace engine coolant temperature sensor.

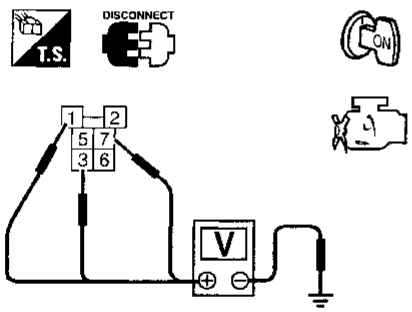
10	CHECK MAIN 12 CAUSES
If the cause cannot be isolated, go to "MAIN 12 CAUSES OF OVERHEATING", EC-448.	
▶	INSPECTION END

PROCEDURE A

=NCEC0491S01

1 CHECK POWER SUPPLY

1. Turn ignition switch "OFF".
2. Disconnect cooling fan relay-1.
3. Turn ignition switch "ON".
4. Check voltage between terminals 1, 3, 7 and ground with CONSULT or tester.



SEF727W

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

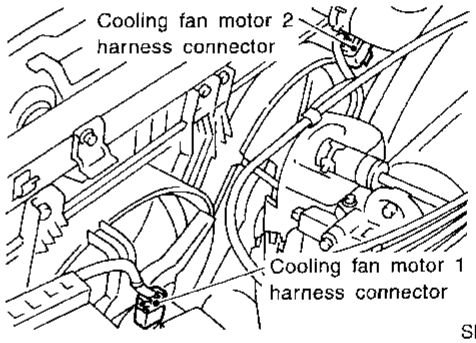
2 DETECT MALFUNCTIONING PART

Check the following.
- 10A fuse
- 40A fusible link
- Harness for open or short between cooling fan relay-1 and fuse
- Harness for open or short between cooling fan relay-1 and battery

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

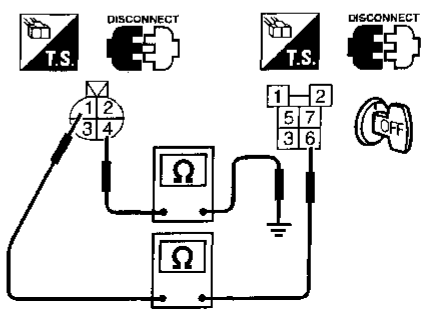
3 CHECK GROUND CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect cooling fan motor-1 harness connector and cooling fan motor-2 harness connector.



SEF304V

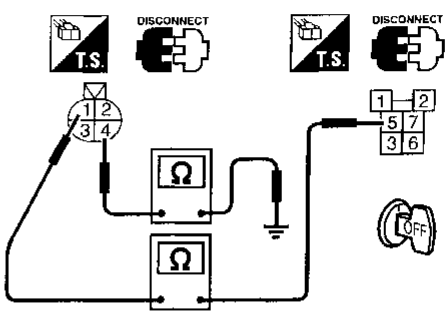
3. Check harness continuity between relay-1 terminal 6 and motor-1 terminal 1, motor-1 terminal 4 and body ground.



SEF728W

Continuity should exist.

4. Also check harness for short to ground and short to power.
5. Check harness continuity between relay-1 terminal 5 and motor-2 terminal 1, motor-2 terminal 4 and body ground.



SEF729W

Continuity should exist.

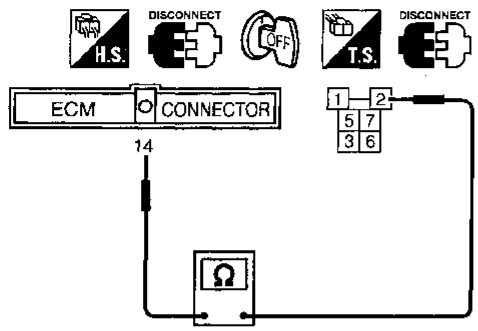
6. Also check harness for short to ground and short to power.

OK or NG

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

4	CHECK OUTPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 14 and relay-1 terminal 2.



SEF730W

Continuity should exist.

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

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E75, M6
- Harness connectors M49, F23
- Harness for open or short between cooling fan relay-1 and ECM

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

6	CHECK COOLING FAN RELAY-1

Refer to "Component Inspection", EC-449.

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace cooling fan relay.

7	CHECK COOLING FAN MOTORS-1 AND -2

Refer to "Component Inspection", EC-449.

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace cooling fan motors.

8	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-110.

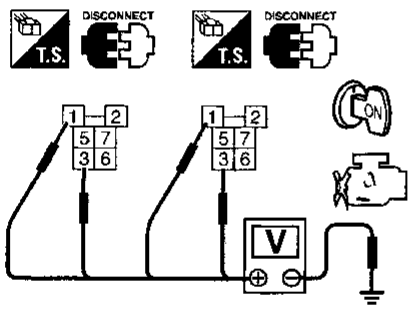
	▶	**INSPECTION END**

PROCEDURE B

=NCEC0491S02

1 CHECK POWER SUPPLY

1. Turn ignition switch "OFF".
2. Disconnect cooling fan relays-2 and -3.
3. Turn ignition switch "ON".
4. Check voltage between cooling fan relays-2 and -3 terminals 1, 3 and ground with CONSULT or tester.



SEF731W

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

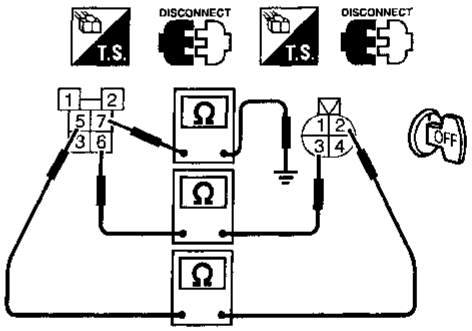
2 DETECT MALFUNCTIONING PART

Check the following.
- Harness for open or short between cooling fan relays-2 and -3 and fuse
- Harness for open or short between cooling fan relays-2 and -3 and fusible link

	▶	Repair harness or connectors.

3 CHECK GROUND CIRCUIT

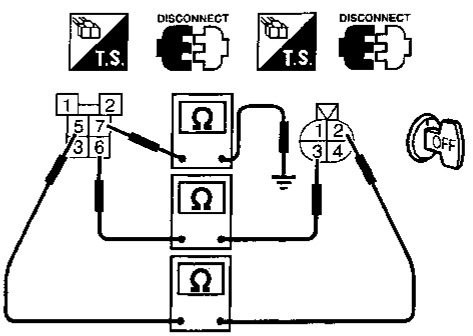
1. Turn ignition switch "OFF".
2. Disconnect cooling fan motor-1 harness connector and cooling fan motor-2 harness connector.
3. Check harness continuity between relay-2 terminal 5 and motor-1 terminal 2, relay-2 terminal 6 and motor-1 terminal 3, relay-2 terminal 7 and body ground.



SEF732W

Continuity should exist.

4. Also check harness for short to ground and short to power.
5. Check harness continuity between relay-3 terminal 5 and motor-2 terminal 2, relay-3 terminal 6 and motor-2 terminal 3, relay-3 terminal 7 and body ground.



SEF732W

Continuity should exist.

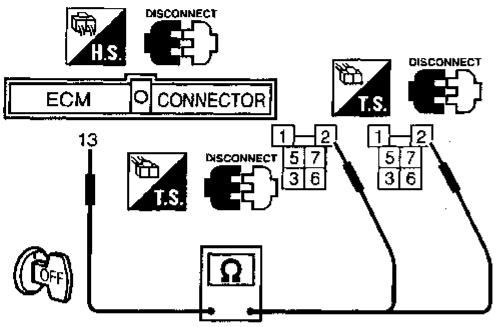
6. Also check harness for short to ground and short to power.

OK or NG

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

4	CHECK OUTPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 13 and cooling fan relay-2 terminal 2, cooling fan relay-3 terminal 2.



SEF733W

Continuity should exist.

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

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E75, M6
- Harness connectors M49, F23
- Harness for open or short between cooling fan relays-2 and -3 and ECM

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

6	CHECK COOLING FAN RELAYS-2 AND -3

Refer to "Component Inspection", EC-449.

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace cooling fan relays.

7	CHECK COOLING FAN MOTORS

Refer to "Component Inspection", EC-449.

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace cooling fan motors.

8	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-110.

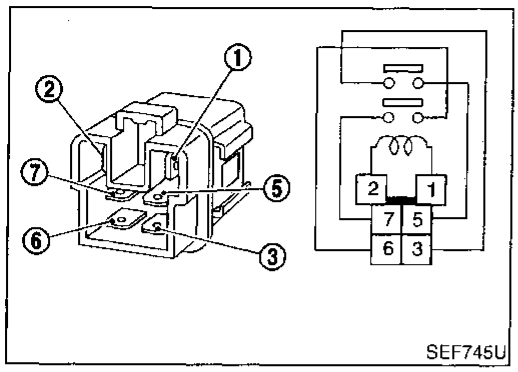
	▶	**INSPECTION END**

Main 12 Causes of Overheating

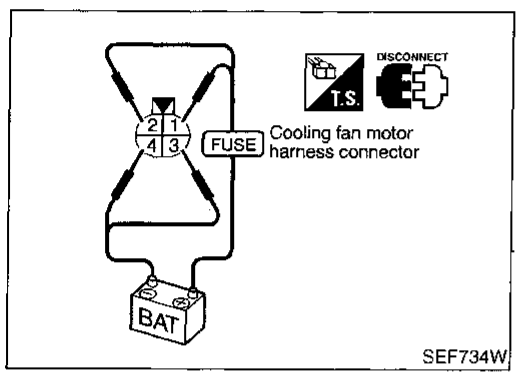
NCEC0492

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	• Blocked radiator • Blocked condenser • Blocked radiator grille • Blocked bumper	• Visual	No blocking	—
	2	• Coolant mixture	• Coolant tester	50 - 50% coolant mixture	See "RECOMMENDED FLUIDS AND LUBRICANTS" in MA section.
	3	• Coolant level	• Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	See "Changing Engine Coolant", "ENGINE MAINTENANCE" in MA section.
	4	• Radiator cap	• Pressure tester	59 - 98 kPa (0.6 - 1.0 kg/cm^2, 9 - 14 psi) (Limit)	See "System Check", "ENGINE COOLING SYSTEM" in LC section.
ON*2	5	• Coolant leaks	• Visual	No leaks	See "System Check", "ENGINE COOLING SYSTEM" in LC section.
ON*2	6	• Thermostat	• Touch the upper and lower radiator hoses	Both hoses should be hot	See "Thermostat" and "Radiator", "ENGINE COOLING SYSTEM" in LC section.
ON*1	7	• Cooling fan	• CONSULT	Operating	See "TROUBLE DIAGNOSIS FOR OVERHEAT" (EC-436).
OFF	8	• Combustion gas leak	• Color checker chemical tester 4 Gas analyzer	Negative	—
ON*3	9	• Coolant temperature gauge	• Visual	Gauge less than 3/4 when driving	—
		• Coolant overflow to reservoir tank	• Visual	No overflow during driving and idling	See "Changing Engine Coolant", "ENGINE MAINTENANCE" in MA section.
OFF*4	10	• Coolant return from reservoir tank to radiator	• Visual	Should be initial level in reservoir tank	See "ENGINE MAINTENANCE" in MA section.
OFF	11	• Cylinder head	• Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	See "Inspection", "CYLINDER HEAD" in EM section.
	12	• Cylinder block and pistons	• Visual	No scuffing on cylinder walls or piston	See "Inspection", "CYLINDER BLOCK" in EM section.

*1: Turn the ignition switch ON.
*2: Engine running at 3,000 rpm for 10 minutes.
*3: Drive at 90 km/h (55 MPH) for 30 minutes and then let idle for 10 minutes.
*4: After 60 minutes of cool down time.
For more information, refer to "OVERHEATING CAUSE ANALYSIS" in LC section.



SEF745U



SEF734W

Component Inspection

NCEC0493

COOLING FAN RELAYS-1, -2 AND -3

NCEC0493S01

Check continuity between terminals 3 and 5, 6 and 7.

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

If NG, replace relay.

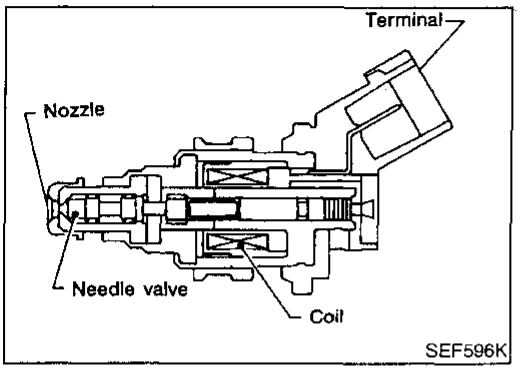
COOLING FAN MOTORS-1 AND -2

NCEC0493S02

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.



Component Description

NCEC0435

The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the injector circuit, the coil in the injector is energized. The energized coil pulls the needle valve back and allows fuel to flow through the injector into the intake manifold. The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the injector remains open. The ECM controls the injection pulse duration based on engine fuel needs.

CONSULT Reference Value in Data Monitor Mode

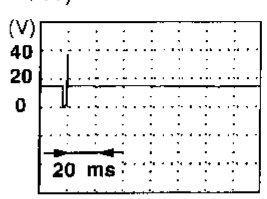
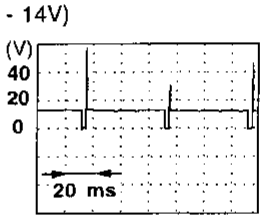
NCEC0436

MONITOR ITEM	CONDITION		SPECIFICATION
INJ PULSE	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: "N" • No-load	Idle	2.4 - 3.2 msec
		2,000 rpm	1.9 - 2.8 msec
B/FUEL SCHDL	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: "N" • No-load	Idle	1.0 - 1.6 msec
		2,000 rpm	0.7 - 1.3 msec

ECM Terminals and Reference Value

NCEC0437

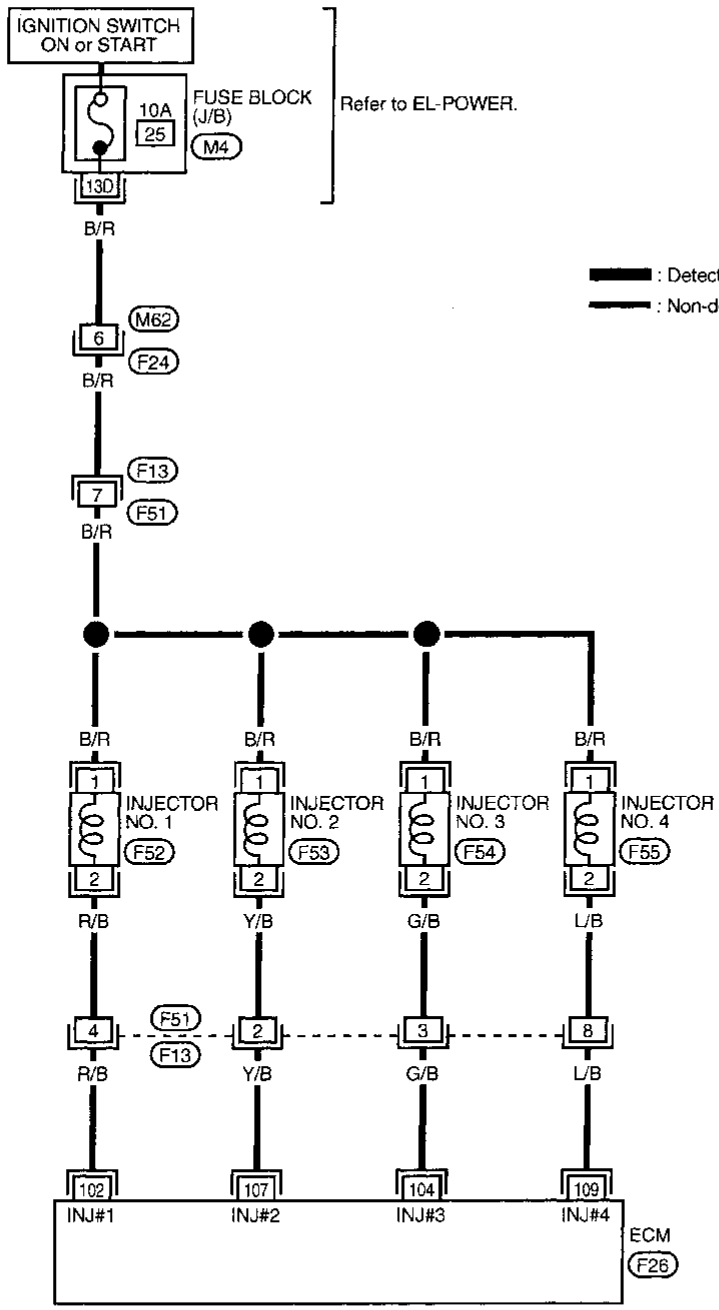
Specification data are reference values and are measured between each terminal and 43 (ECM ground).

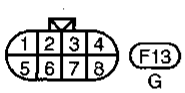
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
102 104 107 109	R/B G/B Y/B L/B	Injector No. 1 Injector No. 3 Injector No. 2 Injector No. 4	**[Engine is running]** • **Warm-up condition** • Idle speed	BATTERY VOLTAGE (11 - 14V)  SEF011W
			[Engine is running] • **Warm-up condition** • Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14V)  SEF012W

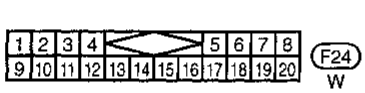
Wiring Diagram

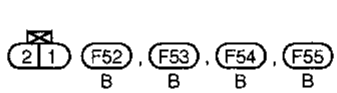
NCEC0434

EC-INJECT-01

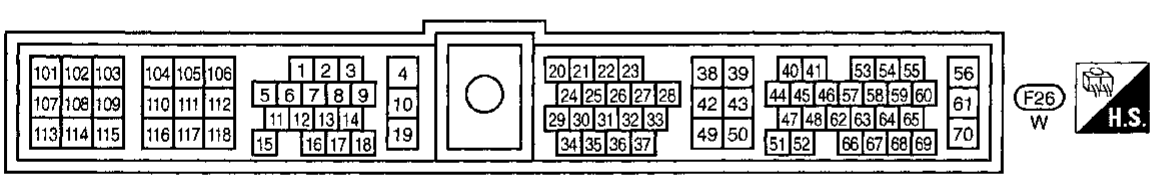








Refer to last page (Foldout page).
M4



TEC553

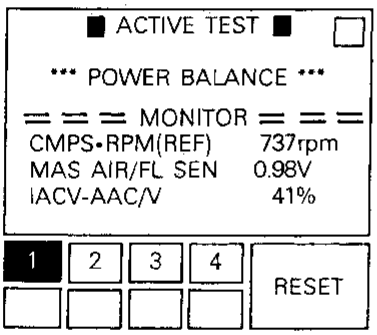
Diagnostic Procedure

NCEC0438

1 CHECK OVERALL FUNCTION

With CONSULT

1. Start engine.
2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.

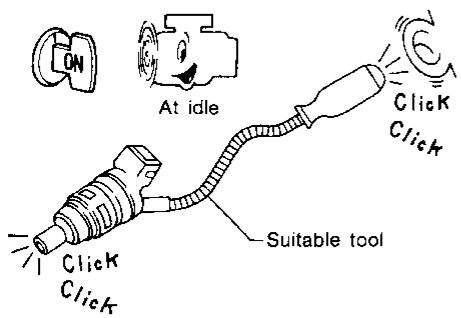


MEF354F

3. Make sure that each circuit produces a momentary engine speed drop.

Without CONSULT

1. Start engine.
2. Listen to each injector operating sound.



MEC703B

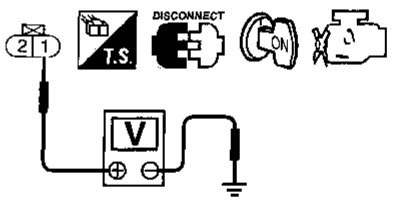
Clicking noise should be heard.

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 2.

2 CHECK POWER SUPPLY

1. Stop engine.
2. Disconnect injector harness connector.
3. Turn ignition switch "ON".
4. Check voltage between terminal 1 and ground with CONSULT or tester.



SEF271W

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

3 DETECT MALFUNCTIONING PART

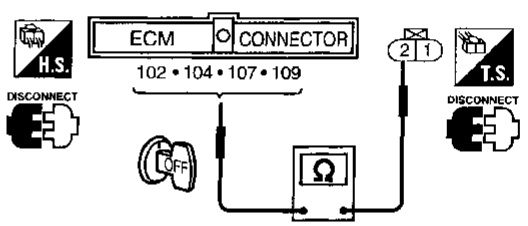
Check the following.

- 10A fuse
- Harness connectors M62, F24
- Harness connectors F13, F51
- Harness for open or short between injector and fuse

	▶	Repair harness or connectors.

4 CHECK OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between injector harness connector terminal 2 and ECM terminals 102, 104, 107, 109.



SEF272W

Continuity should exist.

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

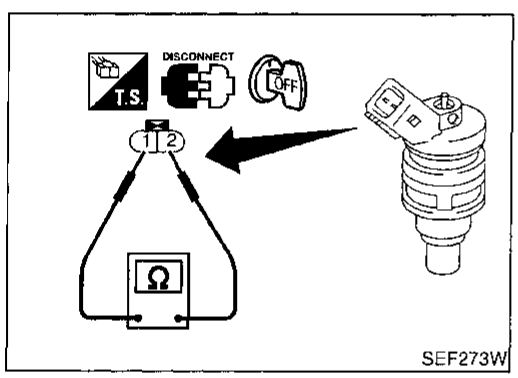
OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART
Check the following. • Harness connectors F51, F13 • Harness for open or short between ECM and injector	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK INJECTOR
Refer to "Component Inspection", EC-453.	
OK or NG	
OK ▶	GO TO 7.
NG ▶	Replace injector.

7	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-110.	
▶	**INSPECTION END**



Component Inspection

INJECTOR

NCEC0439

NCEC0439S01

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.

CONSULT Reference Value in Data Monitor Mode

NCEC0441

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
START SIGNAL	• Ignition switch: ON → START → ON	OFF → ON → OFF

ECM Terminals and Reference Value

NCEC0442

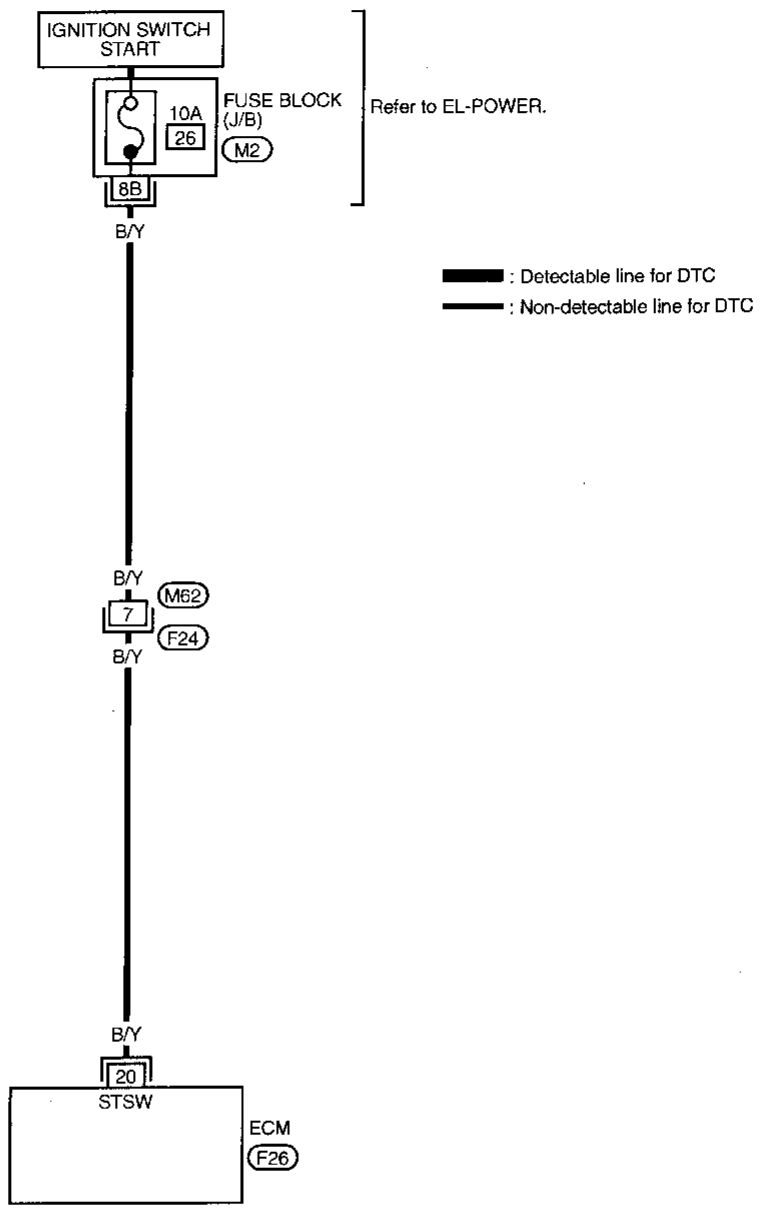
Specification data are reference values and are measured between each terminal and 43 (ECM ground).

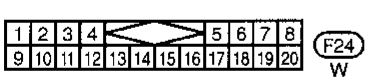
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
20	B/Y	Start signal	**[Ignition switch "ON"]**	Approximately 0V
			[Ignition switch "START"]	9 - 12V

Wiring Diagram

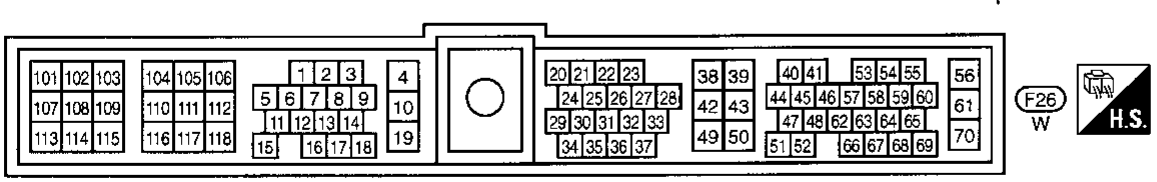
NCEC0440

EC-S/SIG-01





Refer to last page (Foldout page).
M2



TEC554

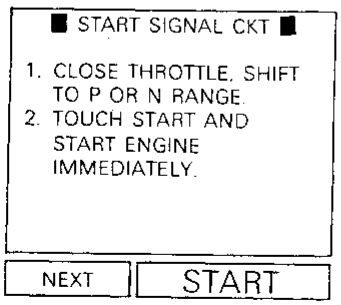
Diagnostic Procedure

NCEC0443

1	INSPECTION START
Do you have CONSULT?	
Yes or No	
Yes ▶	GO TO 2.
No ▶	GO TO 3.

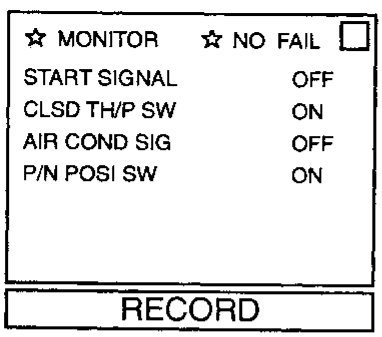
2	CHECK OVERALL FUNCTION

With CONSULT
1. Turn ignition switch "ON".
2. Perform "START SIGNAL CKT" in "FUNCTION TEST" mode with CONSULT.



SEF191L

With CONSULT
1. Turn ignition switch "ON".
2. Check "START SIGNAL" in "DATA MONITOR" mode with CONSULT under the following conditions.



SEF111P

Condition	"START SIGNAL"
IGN "ON"	OFF
IGN "START"	ON

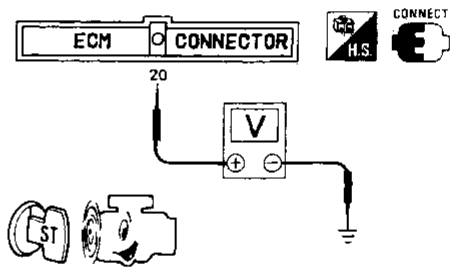
MTBL0140

OK or NG

OK ▶	INSPECTION END
NG ▶	GO TO 4.

3	CHECK OVERALL FUNCTION

Without CONSULT
1. Turn ignition switch to "START".
2. Check voltage between ECM terminal 20 and ground under the following conditions.



SEF109P

Condition	Voltage
Ignition switch "START"	Battery voltage
Except above	Approximately 0V

MTBL0143

OK or NG

OK ▶	INSPECTION END
NG ▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M62, F24
- 10A fuse
- Harness for open or short between ECM and ignition switch

OK or NG

OK ▶	GO TO 5.
NG ▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-110.	
▶	INSPECTION END

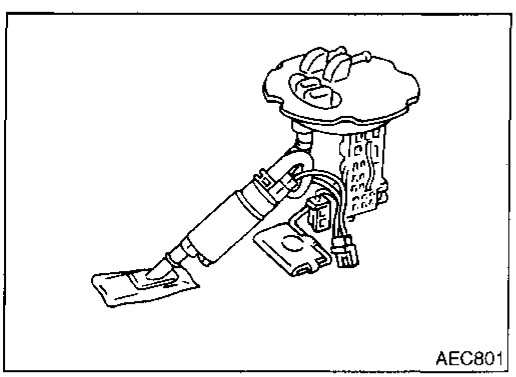
System Description

NCEC0444

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	ECM	Fuel pump relay
Ignition switch	Start signal		

The ECM activates the fuel pump for several seconds after the ignition switch is turned on to improve engine startability. If the ECM receives a 180° signal from the camshaft position sensor, it knows that the engine is rotating, and causes the pump to perform. If the 180° signal is not received when the ignition switch is on, the engine stalls. The ECM stops pump operation and prevents battery discharging, thereby improving safety. The ECM does not directly drive the fuel pump. It controls the ON/OFF fuel pump relay, which in turn controls the fuel pump.

Condition	Fuel pump operation
Ignition switch is turned to ON.	Operates for 5 seconds
Engine running and cranking	Operates
When engine is stopped	Stops in 1 second
Except as shown above	Stops



Component Description

NCEC0501

A turbine type design fuel pump is used in the fuel tank.

CONSULT Reference Value in Data Monitor Mode

NCEC0445

MONITOR ITEM	CONDITION	SPECIFICATION
FUEL PUMP RLY	• Ignition switch is turned to ON (Operates for 5 seconds) • Engine running and cranking • When engine is stopped (stops in 1.0 seconds)	ON
	• Except as shown above	OFF

ECM Terminals and Reference Value

NCEC0446

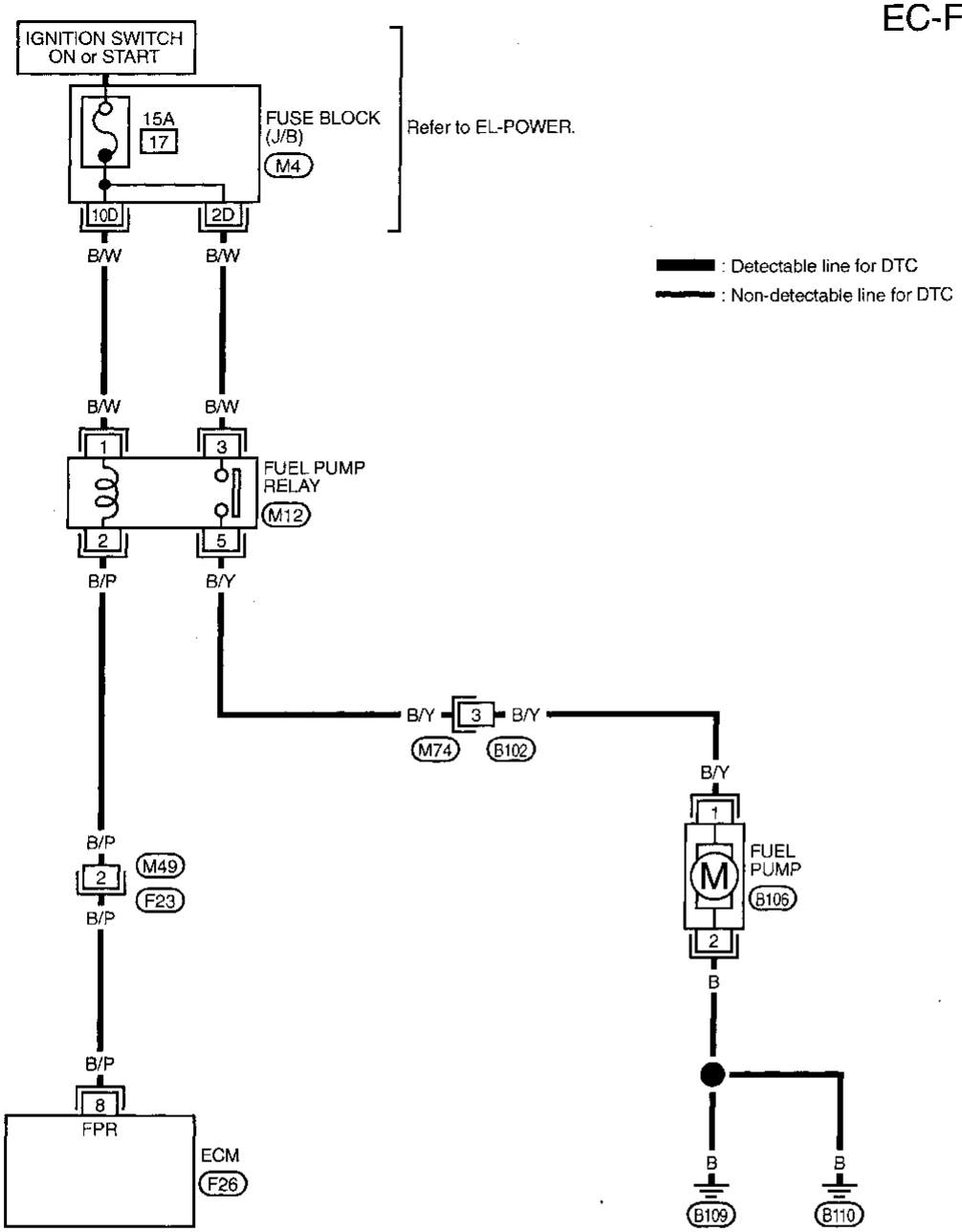
Specification data are reference values and are measured between each terminal and 43 (ECM ground).

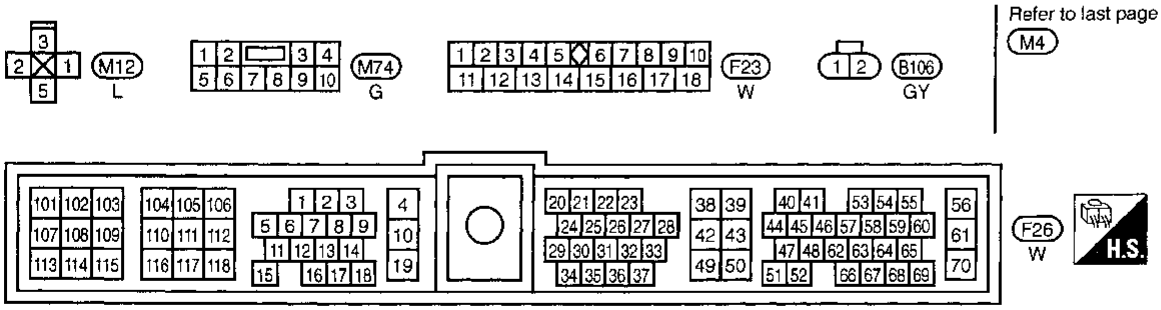
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
8	B/P	Fuel pump relay	**[Ignition switch "ON"]** • For 5 seconds after turning ignition switch "ON" **[Engine is running]**	0 - 1V
			[Ignition switch "ON"] • More than 5 seconds after turning ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)

Wiring Diagram

NCEC0447

EC-F/PUMP-01





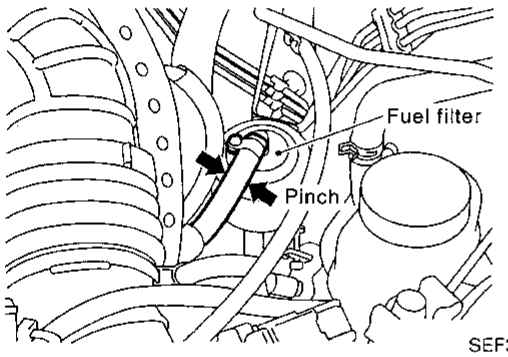
TEC555

Diagnostic Procedure

NCEC0448

1 CHECK OVERALL FUNCTION

1. Turn ignition switch "ON".
2. Pinch fuel feed hose with fingers.



SEF325W

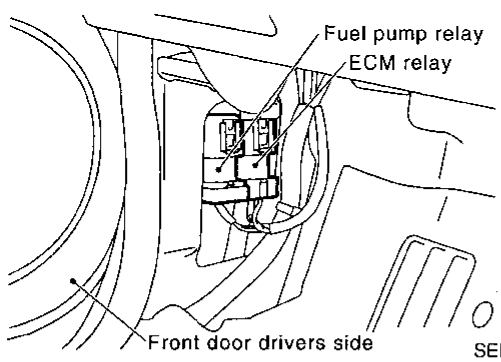
Fuel pressure pulsation should be felt on the fuel feed hose for 5 seconds after ignition switch is turned "ON".

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 2.

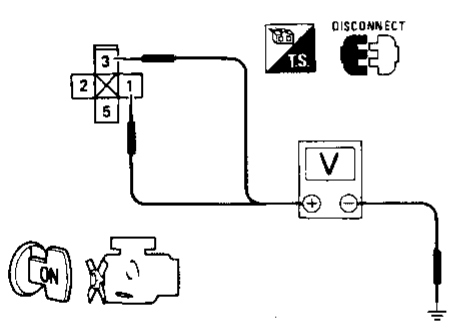
2 CHECK POWER SUPPLY

1. Turn ignition switch "OFF".
2. Disconnect fuel pump relay.



SEF291W

3. Turn ignition switch "ON".
4. Check voltage between terminals 1, 3 and ground with CONSULT or tester.



SEF479P

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

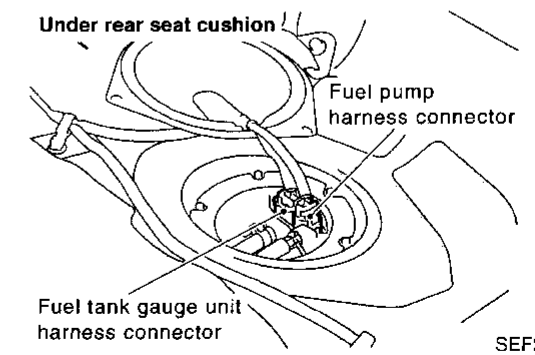
3 DETECT MALFUNCTIONING PART

Check the following.
- 15A fuse
- Harness for open or short between fuse and fuel pump relay

	▶	Repair harness or connectors.

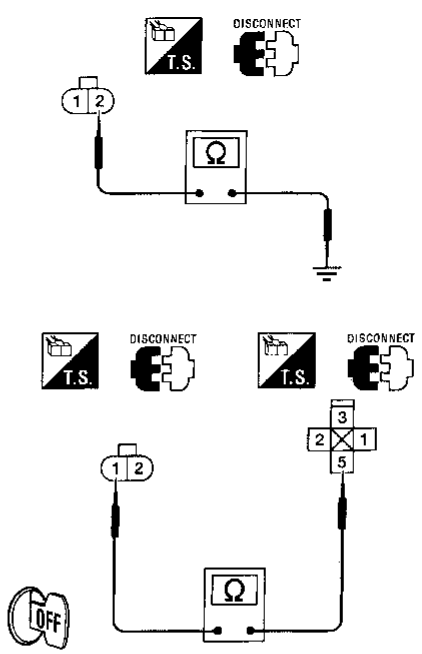
4 CHECK POWER GROUND CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect fuel pump harness connector.



SEF299W

3. Check harness continuity between terminal 2 and body ground, terminal 1 and fuel pump relay connector terminal 5.



AEC758

Continuity should exist.

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

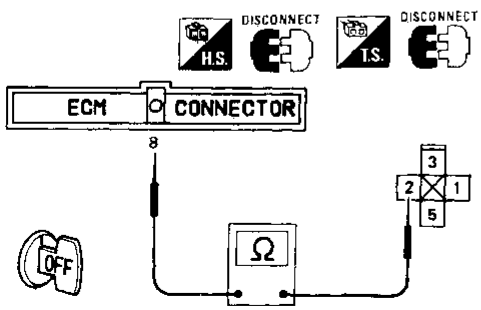
OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

Diagnostic Procedure (Cont'd)

5	DETECT MALFUNCTIONING PART
Check the following. • Harness connectors M74, B102 • Harness for open or short between fuel pump and body ground • Harness for open or short between fuel pump and fuel pump relay	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK OUTPUT SIGNAL CIRCUIT
1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 8 and fuel pump relay connector terminal 2.	



SEF482P

Continuity should exist.

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

OK or NG

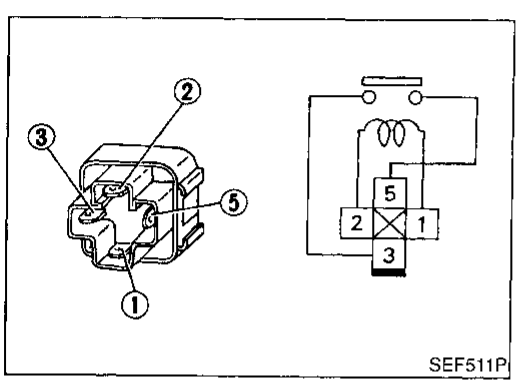
OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	DETECT MALFUNCTIONING PART
Check the following. • Harness connectors M49, F23 • Harness for open or short between ECM and fuel pump relay	
NG ▶	Repair open circuit or short to ground or short to power in harness or connectors.

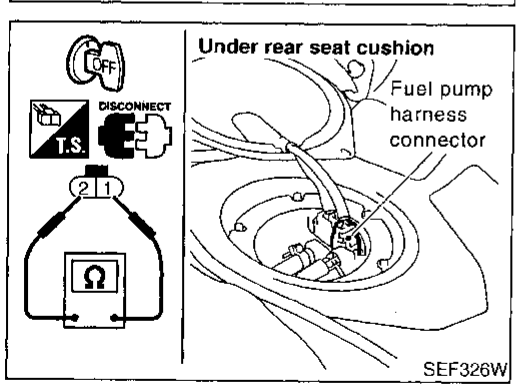
8	CHECK FUEL PUMP RELAY	
Refer to "Component Inspection", EC-460.		
OK or NG		
OK	▶	GO TO 9.
NG	▶	Replace fuel pump relay.

9	CHECK FUEL PUMP	
Refer to "Component Inspection", EC-460.		
OK or NG		
OK	▶	GO TO 10.
NG	▶	Replace fuel pump.

10	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-110.	
▶	**INSPECTION END**



SEF511P



SEF326W

Component Inspection

NCEC0449

FUEL PUMP RELAY

NCEC0449S01

Check continuity between terminals 3 and 5.

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

If NG, replace relay.

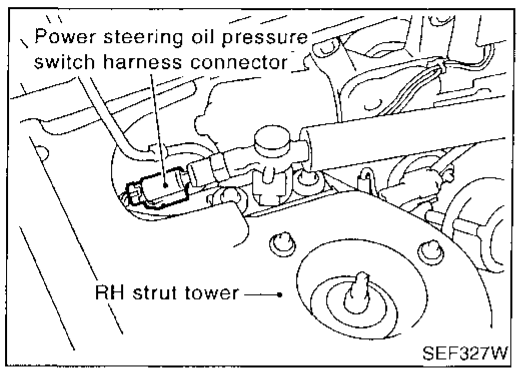
FUEL PUMP

NCEC0449S02

1. Disconnect fuel pump harness connector.
2. Check resistance between terminals 1 and 2.

   Resistance: 0.2 - 5.0Ω [at 25°C (77°F)]

   If NG, replace fuel pump.



Component Description

NCEC0451

The power steering oil pressure switch is attached to the power steering high-pressure tube and detects a power steering load. When a power steering load is detected, it signals the ECM. The ECM adjusts the IACV-AAC valve to increase the idle speed and adjust for the increased load.

CONSULT Reference Value in Data Monitor Mode

NCEC0452

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PW/ST SIGNAL	• Engine: After warming up, idle the engine	Steering wheel in neutral position (forward direction)	OFF
		The steering wheel is fully turned	ON

ECM Terminals and Reference Value

NCEC0453

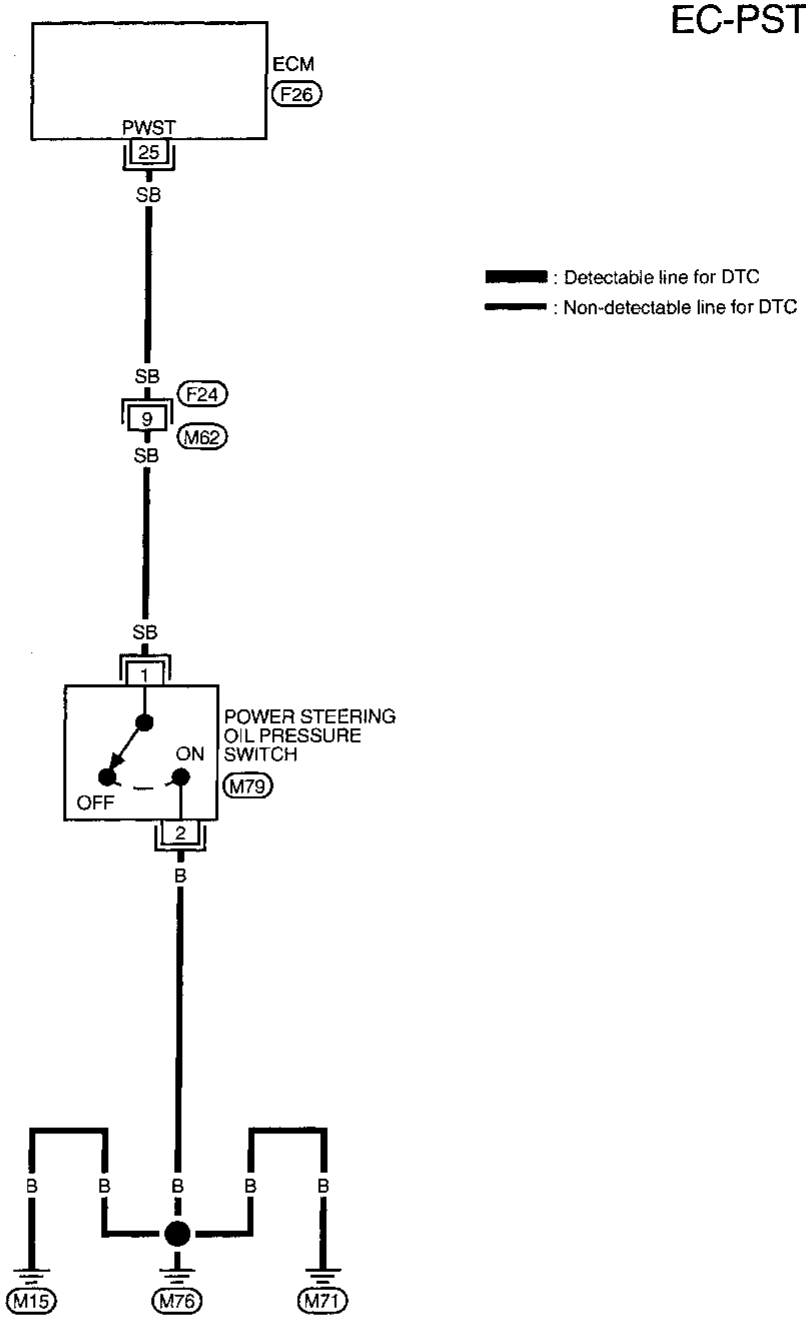
Specification data are reference values and are measured between each terminal and 43 (ECM ground).

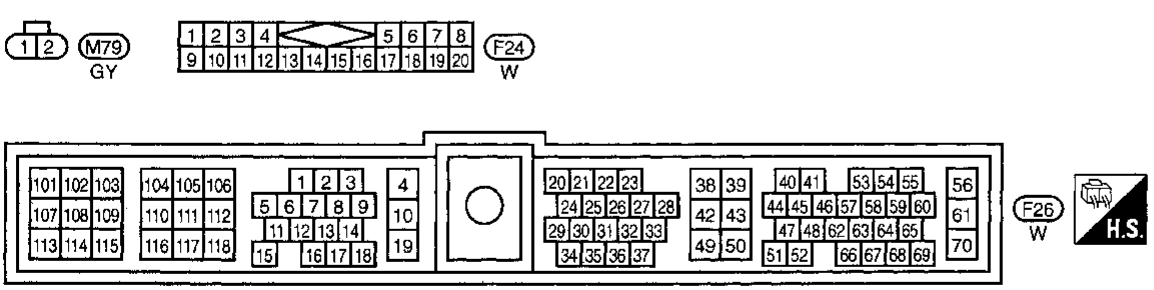
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
25	SB	Power steering oil pressure switch	**[Engine is running]** • Steering wheel is fully turned	Approximately 0V
			[Engine is running] • Steering wheel is not turned	Approximately 5V

Wiring Diagram

NCEC0450

EC-PST/SW-01





TEC556

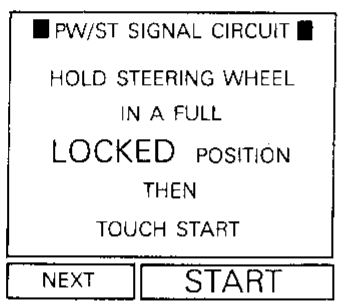
Diagnostic Procedure

=NCEC0454

1	INSPECTION START
Do you have CONSULT?	
Yes or No	
Yes ▶	GO TO 2.
No ▶	GO TO 3.

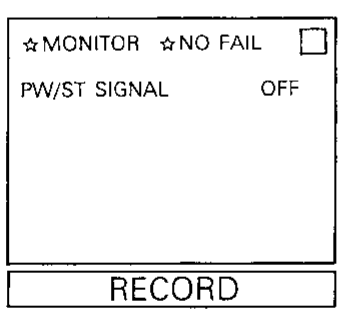
2	CHECK OVERALL FUNCTION

With CONSULT
1. Turn ignition switch "ON".
2. Perform "PW/ST SIGNAL CIRCUIT" in "FUNCTION TEST" mode with CONSULT.



MEF023E

With CONSULT
1. Start engine.
2. Check "PW/ST SIGNAL" in "DATA MONITOR" mode with CONSULT under the following conditions.



SEF591I

Steering is in neutral position	OFF
Steering is turned	ON

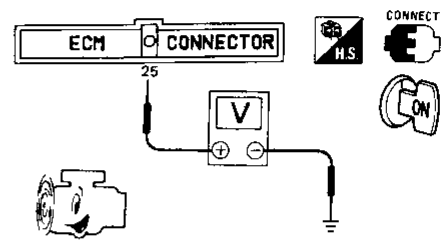
MTBL0141

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 4.

3	CHECK OVERALL FUNCTION

Without CONSULT
1. Start engine.
2. Check voltage between ECM terminal 25 and ground under the following conditions.



SEF126P

Condition	Voltage
When steering wheel is turned quickly	Approximately 0V
Except above	Approximately 5V

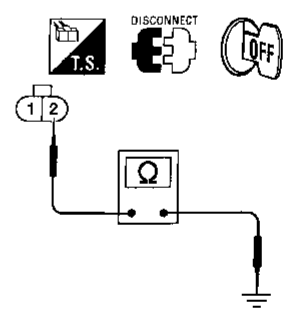
MTBL0142

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 4.

4	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.



AEC760

Continuity should exist.

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

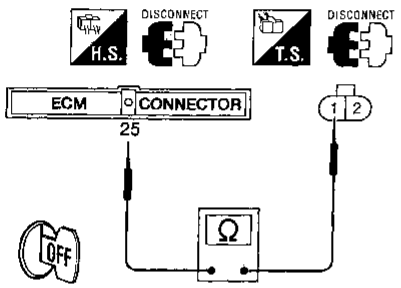
OK or NG

OK	▶	GO TO 5.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

Diagnostic Procedure (Cont'd)

5	CHECK INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 25 and terminal 1.



AEC761

Continuity should exist.

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

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 6.

6	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F24, M62
- Harness for open or short between ECM and power steering oil pressure switch

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

7	CHECK POWER STEERING OIL PRESSURE SWITCH

Refer to "Component Inspection", EC-464.

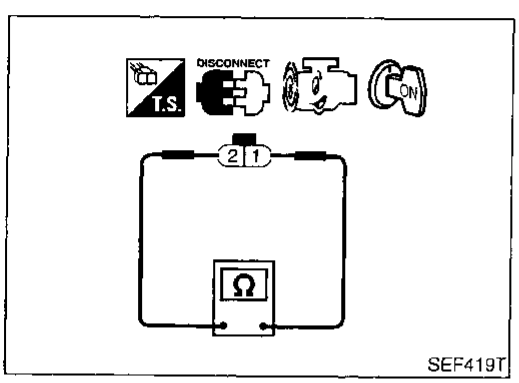
OK or NG

OK	▶	GO TO 8.
NG	▶	Replace power steering oil pressure switch.

8	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-110.

▶	**INSPECTION END**



SEF419T

Component Inspection

NCEC0455

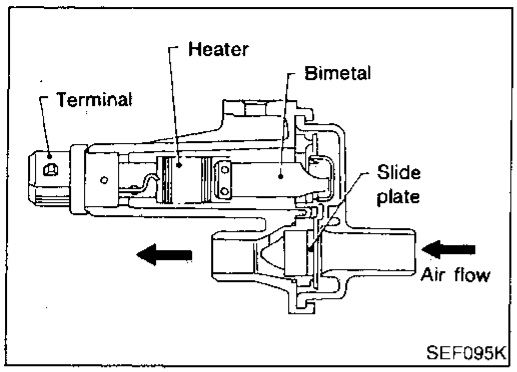
POWER STEERING OIL PRESSURE SWITCH

NCEC0455S01

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.



Description

NCEC0457

The idle air control valve (IACV)-air regulator provides an air bypass 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 bypass port opens. As the engine starts and electric current flows through a heater, the bimetal begins to turn the shutter to close the bypass port. The air passage remains closed until the engine stops and the bimetal temperature drops.

ECM Terminals and Reference Value

NCEC0458

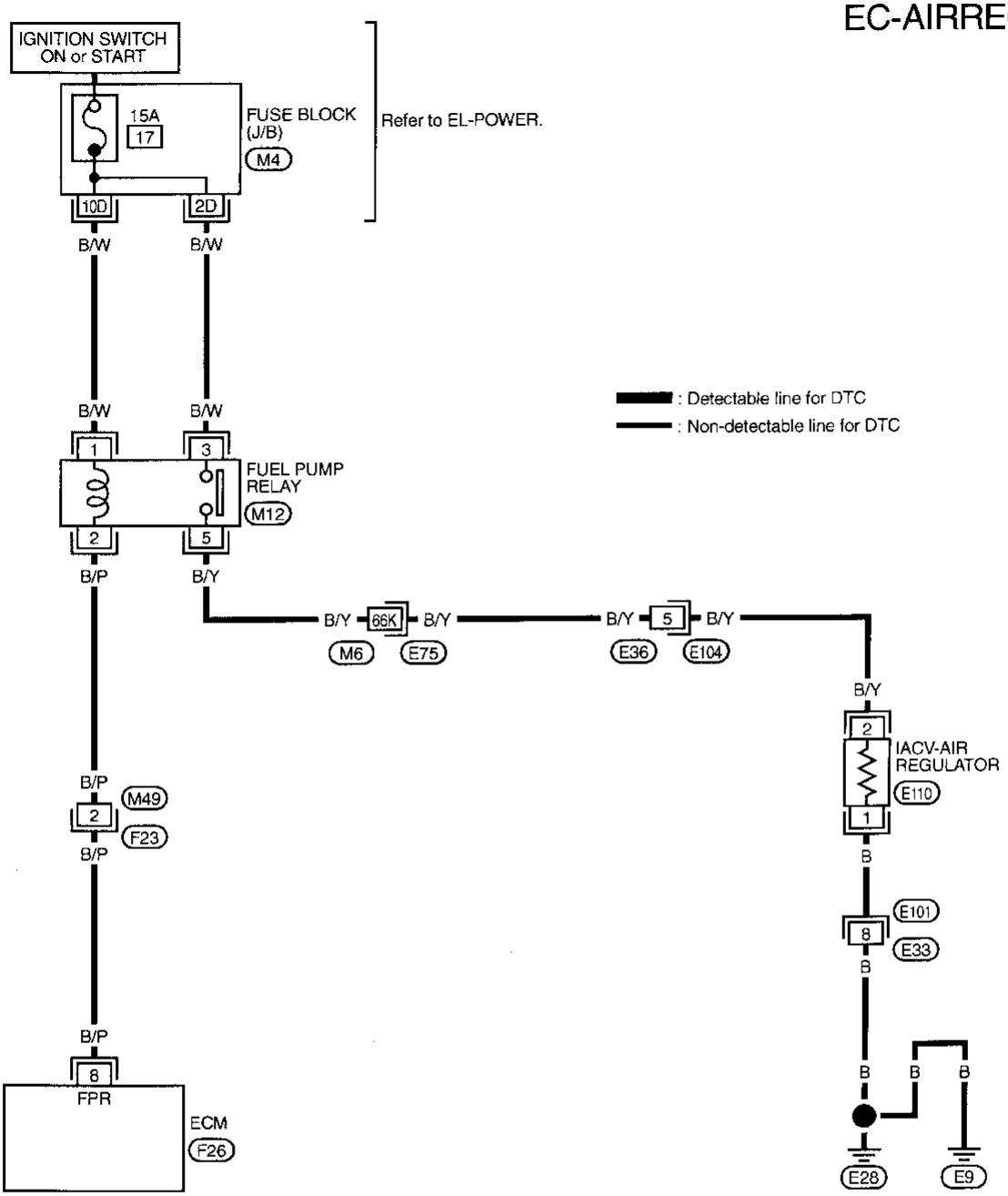
Specification data are reference values and are measured between each terminal and 43 (ECM ground).

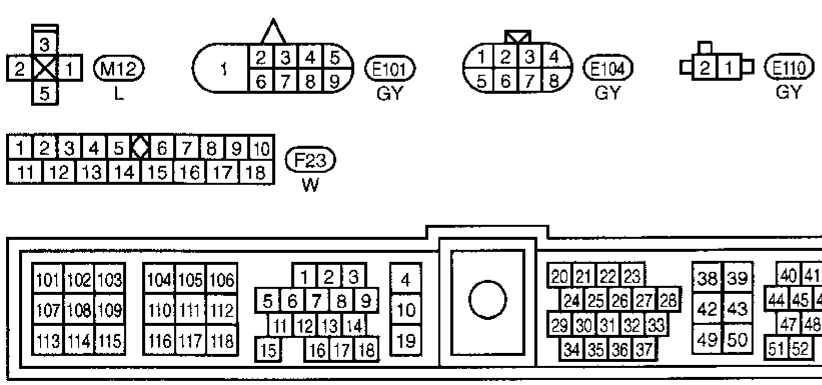
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
8	B/P	Fuel pump relay	**[Ignition switch "ON"]** • For 5 seconds after turning ignition switch "ON" **[Engine is running]**	0 - 1V
			[Ignition switch "ON"] • More than 5 seconds after turning ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)

Wiring Diagram

NCEC0456

EC-AIRREG-01





Refer to last page (Foldout page).

M6, E75

M4

TEC557

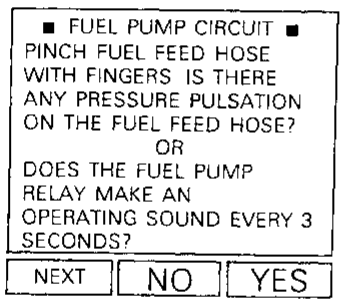
Diagnostic Procedure

=NCEC0459

1 CHECK CONTROL FUNCTION

With CONSULT

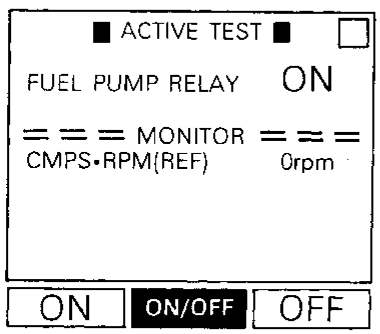
1. Turn ignition switch "ON".
2. Perform "FUEL PUMP CIRCUIT" in "FUNCTION TEST" mode with CONSULT.



MEF591B

With CONSULT

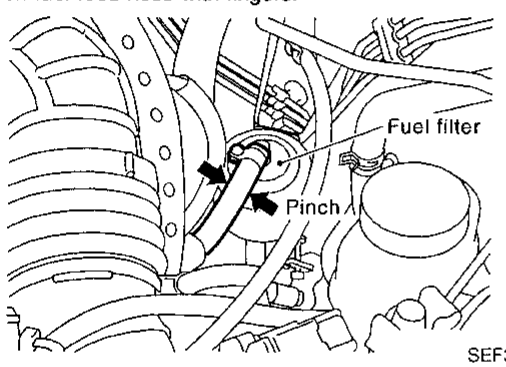
1. Turn ignition switch "ON".
2. Turn fuel pump relay "ON" and "OFF" in "ACTIVE TEST" mode with CONSULT and check operating sound.



MEF309F

Without CONSULT

1. Turn ignition switch "ON".
2. Pinch fuel feed hose with fingers.



SEF325W

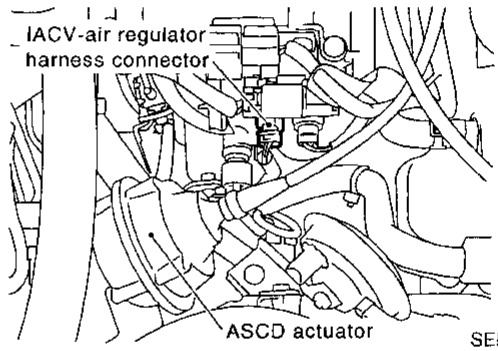
Fuel pressure pulsation should be felt on the fuel feed hose for 5 seconds after ignition switch is turned "ON".

OK or NG

OK	▶	GO TO 2.
NG	▶	Check fuel pump control circuit. Refer to EC-457.

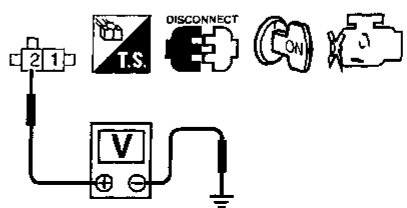
2 CHECK POWER SUPPLY

1. Turn ignition switch "OFF".
2. Disconnect IACV-air regulator harness connector.



SEF328W

3. Turn ignition switch "ON".
4. Check voltage between terminal 2 and ground with CONSULT or tester.



SEF274W

Battery voltage should exist for 5 seconds after ignition switch is turned "ON".

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

3 DETECT MALFUNCTIONING PART

Check the following.

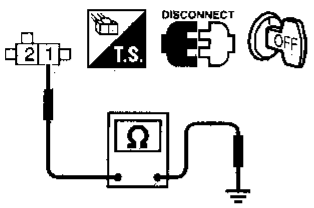
- Harness connectors M6, E75
- Harness connectors E36, E104
- Harness for open or short between IACV-air regulator and fuel pump relay

	▶	Repair harness or connectors.

Diagnostic Procedure (Cont'd)

4	CHECK GROUND CIRCUIT

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



SEF275W

Continuity should exist.

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

OK or NG

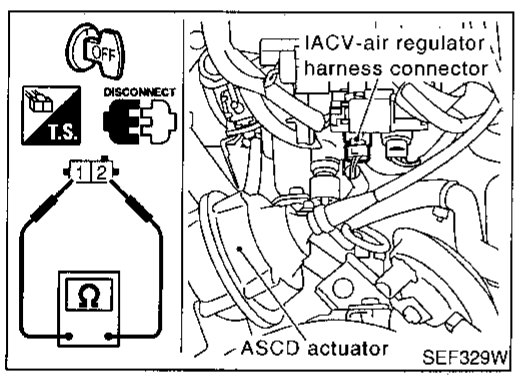
OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E101, E33
- Harness for open or short between IACV-air regulator and body ground.

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

6	CHECK IACV-AIR REGULATOR	
Refer to "COMPONENT INSPECTION" below.		
OK or NG		
OK	▶	**INSPECTION END**
NG	▶	Replace IACV-air regulator.



Component Inspection

NCEC0460

IACV-AIR REGULATOR

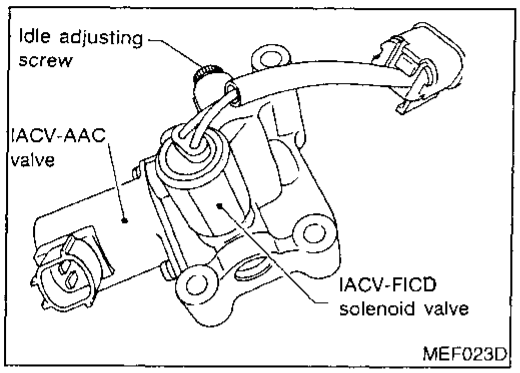
NCEC0460S01

Disconnect IACV-air regulator harness connector.

- Check IACV-air regulator resistance.

  Resistance: Approximately 70 - 80 Ω [at 25°C (77°F)]

- Check IACV-air regulator for clogging.



Component Description

NCEC0462

When the air conditioner is on, the IAC valve-FICD solenoid valve supplies additional air to adjust to the increased load.

ECM Terminals and Reference Value

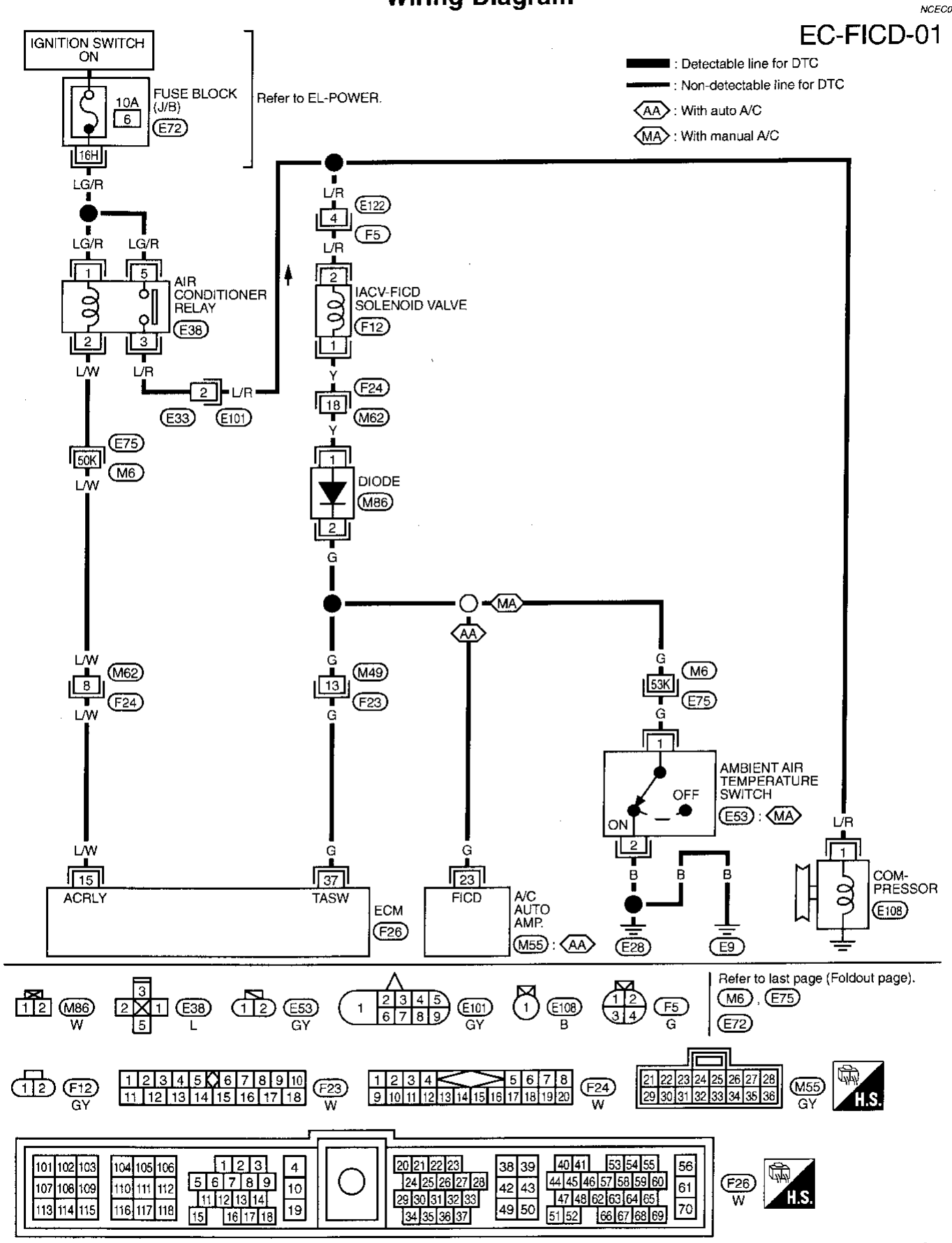
NCEC0463

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
15	L/W	Air conditioner relay	**[Engine is running]** • Both A/C switch and blower switch are "ON"	0 - 0.6V
			[Engine is running] • A/C switch is "OFF"	BATTERY VOLTAGE (11 - 14V)
21	L/W	Air conditioner switch	**[Engine is running]** • Both air conditioner switch and blower switch are "ON" (Compressor operates)	Approximately 0V
			[Engine is running] • Air conditioner switch is "OFF"	BATTERY VOLTAGE (11 - 14V)
37	G	Ambient air temperature switch	**[Engine is running]** • Idle speed • Ambient air temperature is above 23.5°C (74°F) • Air conditioner is operating	Approximately 0.15V
			[Engine is running] • Idle speed • Ambient air temperature is above 23.5°C (74°F) • Air conditioner is not operating	Approximately 0V
			[Engine is running] • Idle speed • Ambient air temperature is below 20.5°C (69°F) • Air conditioner is operating	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] • Idle speed • Ambient air temperature is below 20.5°C (69°F) • Air conditioner is not operating	Approximately 4.6V

Wiring Diagram

NCEC0461



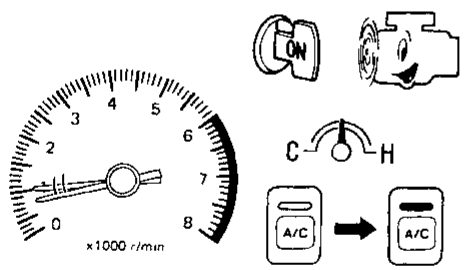
TEC558

Diagnostic Procedure

NCEC0464

1 CHECK OVERALL FUNCTION

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.
   M/T: 800±50 rpm
   A/T: 800±50 rpm (in "N" position)
   If NG, adjust idle speed.
3. Turn air conditioner switch and blower fan switch "ON".
4. Recheck idle speed.



MEF634E

M/T: 850 rpm or more
A/T: 850 rpm or more (in "N" position)

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 2.

2 CHECK AIR CONDITIONER FUNCTION

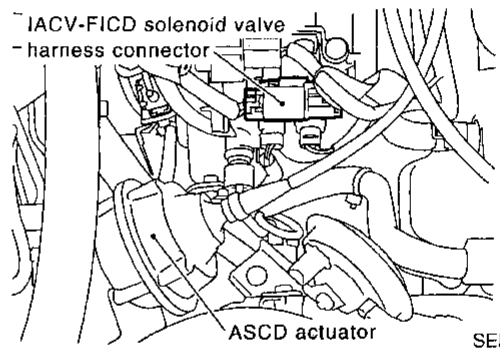
Check if air conditioner compressor functions normally.

OK or NG

OK	▶	GO TO 3.
NG	▶	Refer to "TROUBLE DIAGNOSES" in HA section.

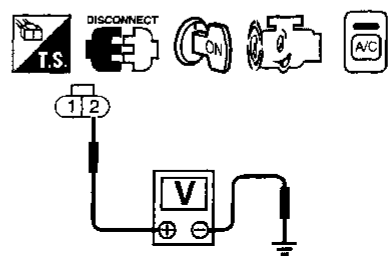
3 CHECK POWER SUPPLY

1. Stop engine.
2. Disconnect IACV-FICD solenoid valve harness connector.



SEF330W

3. Start engine, then turn air conditioner switch and blower fan switch "ON".
4. Check voltage between terminal 2 and ground with CONSULT or tester.



SEF276W

Voltage: Battery voltage

OK or NG

OK (With auto A/C)	▶	GO TO 5.
OK (With manual A/C)	▶	GO TO 10.
NG	▶	GO TO 4.

4 DETECT MALFUNCTIONING PART

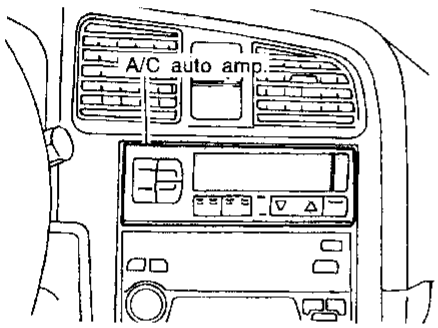
Check the following.
- Harness connectors E122, F5
- Harness for open or short between IACV-FICD solenoid valve and harness connector E101

	▶	Repair harness or connectors.

5 CHECK GROUND CIRCUIT

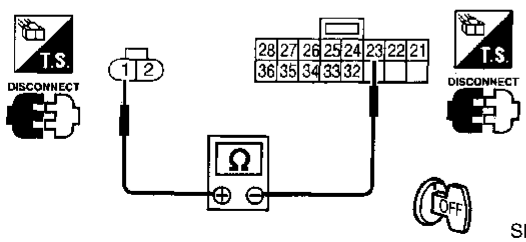
(Models with auto A/C)

1. Turn ignition switch "OFF".
2. Disconnect A/C auto amp. harness connector.



SEF739W

3. Check harness continuity between solenoid valve terminal 1 and amp. terminal 23.



SEF277W

Continuity should exist.

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

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 6.

6 DETECT MALFUNCTIONING PART

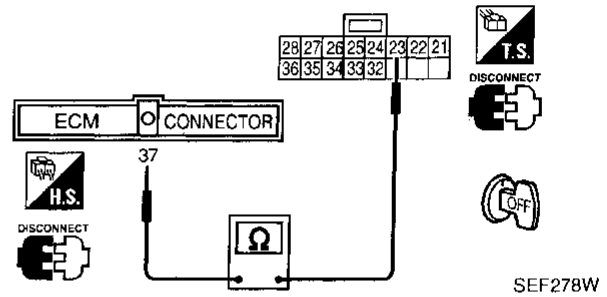
Check the following.

- Harness connectors F24, M62
- Diode M86
- Harness for open or short between IACV-FICD solenoid valve and A/C auto amp.

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

7 CHECK INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connectors.
2. Check harness continuity between ECM terminal 37 and amp. terminal 23.



SEF278W

Continuity should exist.

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

OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 8.

8 DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M49, F23
- Harness for open or short between ECM and A/C auto amp.

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

9 CHECK A/C AUTO AMP.

Refer to "TROUBLE DIAGNOSES" in HA section.

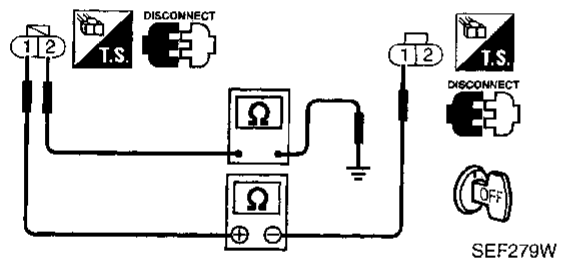
OK or NG

OK	▶	GO TO 15.
NG	▶	Replace A/C auto amp.

10	CHECK GROUND CIRCUIT

(Models with manual A/C)

1. Turn ignition switch "OFF".
2. Disconnect ambient air temperature switch harness connector.
3. Check harness continuity between solenoid valve terminal 1 and switch terminal 1, and switch terminal 2 and body ground.



SEF279W

Continuity should exist.

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

OK or NG

OK	▶	GO TO 12.
NG	▶	GO TO 11.

11	DETECT MALFUNCTIONING PART

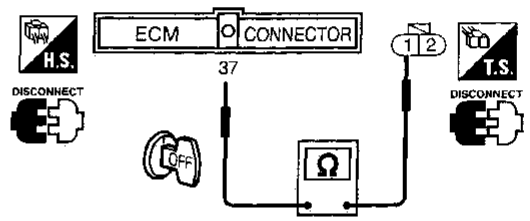
Check the following.

- Harness connectors F24, M62
- Harness connectors M6, E75
- Diode M86
- Harness for open or short between IACV-FICD solenoid valve and ambient air temperature switch
- Harness for open of short between ambient air temperature switch and body ground

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

12	CHECK INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 37 and switch terminal 1.



SEF280W

Continuity should exist.

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

OK or NG

OK	▶	GO TO 14.
NG	▶	GO TO 13.

13	DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M49, F23
- Harness for open or short between ECM and harness connector M6

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

14	CHECK AMBIENT AIR TEMPERATURE SWITCH

Refer to "TROUBLE DIAGNOSES" in HA section.

OK or NG

OK	▶	GO TO 15.
NG	▶	Replace ambient air temperature switch.

15	CHECK IACV-FICD SOLENOID VALVE

Refer to "Component Inspection", EC-474.

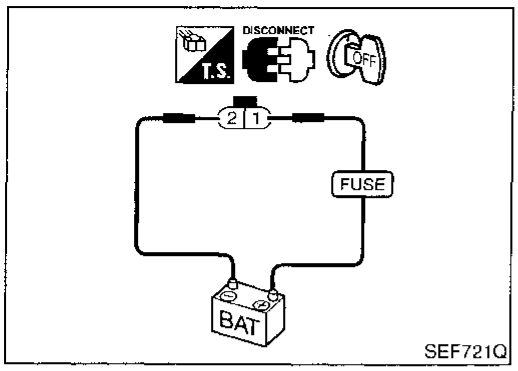
OK or NG

OK	▶	GO TO 16.
NG	▶	Replace IACV-FICD solenoid valve.

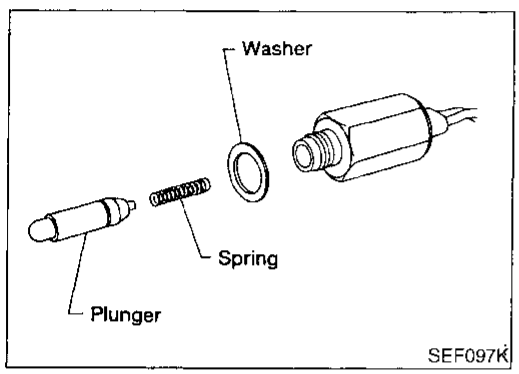
16	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-110.

▶	INSPECTION END



SEF721Q



SEF097K

Component Inspection

NCEC0465

IACV-FICD SOLENOID VALVE

NCEC0465S01

Disconnect IACV-FICD solenoid valve harness connector.

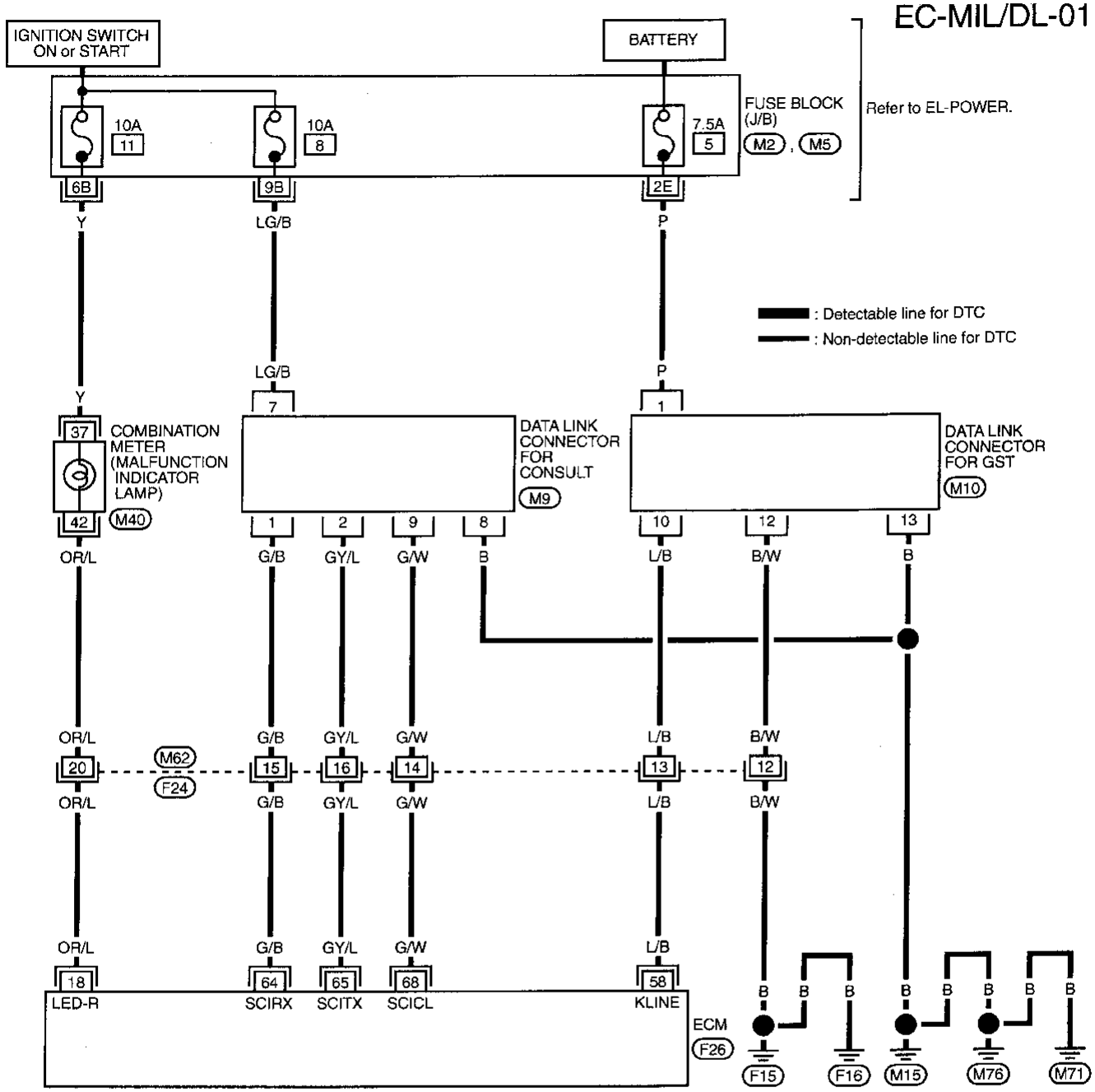
- Check for clicking sound when applying 12V direct current to terminals.

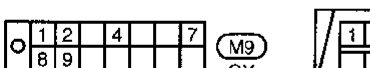
- Check plunger for seizing or sticking.
- Check for broken spring.

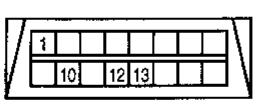
Wiring Diagram

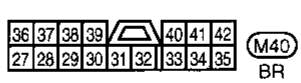
NCEC0466

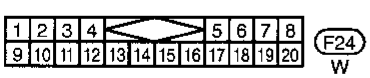
EC-MIL/DL-01



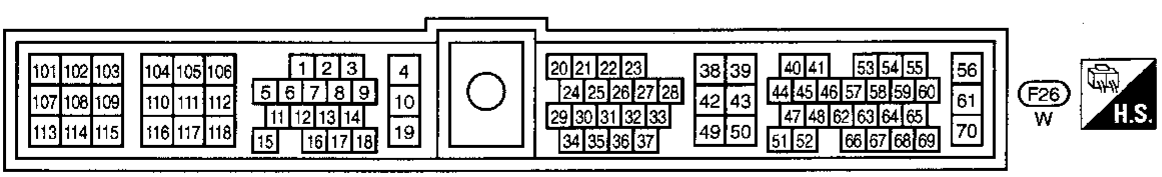








Refer to last page (Foldout page).
M2
M5



TEC559

Fuel Pressure Regulator

NCEC0467

Fuel pressure at idling kPa (kg/cm², psi)	Vacuum hose is connected	Approximately 235 (2.4, 34)
	Vacuum hose is disconnected	Approximately 294 (3.0, 43)

Idle Speed and Ignition Timing

NCEC0468

Base idle speed*1 rpm	No-load*4 (in "P" or "N" position)	750±50
Target idle speed*2 rpm	No-load*4 (in "P" or "N" position)	800±50
Air conditioner: ON rpm	In "P" or "N" position	850 or more
Ignition timing*3	In "P" or "N" position	15°±2° BTDC
Throttle position sensor idle position V		0.2 - 0.8

*1: Throttle position sensor harness connector disconnected or using CONSULT "WORK SUPPORT" mode
*2: Throttle position sensor harness connector connected
*3: Throttle position sensor harness connector disconnected
*4: Under the following conditions:

- Air conditioner switch: OFF
- Electrical load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Ignition Coil

NCEC0469

Primary voltage V	Battery voltage (11 - 14)
Primary resistance [at 25°C (77°F)] Ω	0.5 - 1.0
Secondary resistance [at 25°C (77°F)] kΩ	Approximately 25

Mass Air Flow Sensor

NCEC0470

Supply voltage V	Battery voltage (11 - 14)
Output voltage V	1.3 - 1.7*
Mass air flow (Using CONSULT or GST) g·m/sec	2.5 - 5.0 at idle* 7.1 - 12.5 at 2,500 rpm*

*: Engine is warmed up to normal operating temperature and idling under no-load.

Engine Coolant Temperature Sensor

NCEC0471

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

EGR Temperature Sensor

NCEC0472

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

NCEC0473

Resistance [at 25°C (77°F)] Ω	0.2 - 5.0

IACV-AAC Valve

NCEC0474

Resistance [at 25°C (77°F)] Ω	Approximately 10.0

Injector

NCEC0475

Resistance [at 25°C (77°F)] Ω	10 - 14

Resistor

NCEC0476

Resistance [at 25°C (77°F)] Ω	Approximately 2.2

Throttle Position Sensor

NCEC0477

Throttle valve conditions	Resistance [at 25°C (77°F)]
Completely closed	Approximately 0.6 kΩ
Partially open	0.6 - 4.0 kΩ
Completely open	Approximately 4.0 kΩ

Front Heated Oxygen Sensor Heater

NCEC0478

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

Calculated Load Value

NCEC0479

	Calculated load value % (Using CONSULT or GST)
At idle	20.0 - 35.5
At 2,500 rpm	17.0 - 30.0

Intake Air Temperature Sensor

NCEC0480

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

EVAP Canister Purge Volume Control Valve

NCEC0481

Resistance [at 20°C (68°F)] Ω	35 - 43

Rear Heated Oxygen Sensor Heater

NCEC0483

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

Crankshaft Position Sensor (OBD)

NCEC0484

Resistance [at 25°C (77°F)] Ω	166 - 204

Tank Fuel Temperature Sensor

NCEC0485

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