ENGINE CONTROL SYSTEM

SECTION EC

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Alphabetical & P No. Index for DTC

NHEC0001

ALPHABETICAL INDEX FOR DTC

NHEC0001S01

Items (CONSULT-II screen terms)	DTC*1	Reference page
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ABSL PRES SEN/CIRC	P0105	EC-172
AIR TEMP SEN/CIRC	P0110	EC-178
A/T 1ST GR FNCTN	P0731	AT-124
A/T 2ND GR FNCTN	P0732	AT-130
A/T 3RD GR FNCTN	P0733	AT-136
A/T 4TH GR FNCTN	P0734	AT-142
A/T COMM LINE	P0600*2	EC-476
A/T DIAG COMM LINE	P1605	EC-643
A/T TCC S/V FNCTN	P0744	AT-156
ATF TEMP SEN/CIRC	P0710	AT-108
CAM PS/CIRC (PHS)	P0340	EC-363
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CLOSED LOOP-B2	P1168	EC-507
CLOSED TP SW/CIRC	P0510	EC-467
COOLANT T SEN/CIRC*3	P0115	EC-183
*COOLANT T SEN/CIRC	P0125	EC-200
CPS/CIRC (POS) COG	P1336	EC-554
CPS/CIRCUIT (POS)	P0335	EC-355
CPS/CIRCUIT (REF)	P1335	EC-548
CYL 1 MISFIRE	P0301	EC-342
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CYL 3 MISFIRE	P0303	EC-342
CYL 4 MISFIRE	P0304	EC-342
CYL 5 MISFIRE	P0305	EC-342
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ECM	P0605	EC-479
EGR SYSTEM	P0400	EC-369
EGR SYSTEM	P1402	EC-570
EGR TEMP SEN/CIRC	P1401	EC-562
EGR VOL CONT/V CIR	P0403	EC-378
ENGINE SPEED SIG	P0725	AT-119
ENG OVER TEMP	P0217	EC-324
ENG OVER TEMP	P1217*2	EC-520
EVAP GROSS LEAK	P0455	EC-431

Items (CONSULT-II screen terms)	DTC*1	Reference page
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EVAP SYS PRES SEN	P0450	EC-419
EVAP SMALL LEAK	P0440	EC-390
EVAP SMALL LEAK	P1440	EC-579
FR O2 SE HEATER-B1	P0135	EC-252
FR O2 SE HEATER-B2	P0155	EC-252
FRONT O2 SENSOR-B1	P0130	EC-205
FRONT O2 SENSOR-B1	P0131	EC-215
FRONT O2 SENSOR-B1	P0132	EC-223
FRONT O2 SENSOR-B1	P0133	EC-231
FRONT O2 SENSOR-B1	P0134	EC-244
FRONT O2 SENSOR-B2	P0150	EC-205
FRONT O2 SENSOR-B2	P0151	EC-215
FRONT O2 SENSOR-B2	P0152	EC-223
FRONT O2 SENSOR-B2	P0153	EC-231
FRONT O2 SENSOR-B2	P0154	EC-244
FUEL LEVL SEN/CIRC	P0464	EC-450
FUEL LEVL SEN/CIRC	P1464	EC-622
FUEL LEVEL SENSOR	P0461	EC-448
FUEL LV SE (SLOSH)	P0460	EC-444
FUEL SYS-LEAN/BK1	P0171	EC-304
FUEL SYS-LEAN/BK2	P0174	EC-304
FUEL SYS-RICH/BK1	P0172	EC-312
FUEL SYS-RICH/BK2	P0175	EC-312
FUEL TEMP SEN/CIRC	P0180	EC-319
IACV/AAC VLV/CIRC	P0505	EC-458
IGN SIGNAL-PRIMARY	P1320	EC-537
KNOCK SEN/CIRC-B1	P0325*2	EC-350
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MAF SEN/CIRCUIT*3	P0100	EC-164
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NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	**P0000**	**—**
O/R CLTCH SOL/CIRC	P1760	AT-191
P-N POS SW/CIRCUIT	P1706	EC-646
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Items (CONSULT-II screen terms)	DTC*1	Reference page
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PURG VOLUME CONT/V	P1444	EC-581
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REAR O2 SENSOR-B1	P0138	EC-269
REAR O2 SENSOR-B1	P0139	EC-279
REAR O2 SENSOR-B1	P0140	EC-289
REAR O2 SENSOR-B2	P0157	EC-259
REAR O2 SENSOR-B2	P0158	EC-269
REAR O2 SENSOR-B2	P0159	EC-279
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TCS CIRC	P1212*2	EC-517
TCS C/U FUNCTN	P1211*2	EC-515
THERMOSTAT FNCTN	P1126	EC-481
TP SEN/CIRC A/T*3	P1705	AT-182
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TW CATALYST SYS-B1	P0420	EC-385
TW CATALYST SYS-B2	P0430	EC-385
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VC/V BYPASS/V	P1490	EC-625
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VEH SPD SEN/CIR A/T*4	P0720	AT-114
VENT CONTROL VALVE	P0446	EC-412
VENT CONTROL VALVE	P1446	EC-593
VENT CONTROL VALVE	P1448	EC-613

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

*2: This DTC is displayed with CONSULT-II only.

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

*4: The MIL illuminates when both the "Revolution sensor signal" and the "Vehicle speed sensor signal" meet the fail-safe condition at the same time.

NOTE:

Regarding A33 models, "-B1" and "BK1" indicate right bank and "-B2" and "BK2" indicate left bank.

P NO. INDEX FOR DTC

=NHEC0001S02

DTC*1	Items (CONSULT-II screen terms)	Reference page
—	Unable to access ECM	EC-126
P0000	**NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.**	**—**
P0100	MAF SEN/CIRCUIT*3	EC-164
P0105	ABSL PRES SEN/CIRC	EC-172
P0110	AIR TEMP SEN/CIRC	EC-178
P0115	COOLANT T SEN/CIRC*3	EC-183
P0120	THRTL POS SEN/CIRC*3	EC-188
P0125	*COOLANT T SEN/CIRC	EC-200
P0130	FRONT O2 SENSOR-B1	EC-205
P0131	FRONT O2 SENSOR-B1	EC-215
P0132	FRONT O2 SENSOR-B1	EC-223
P0133	FRONT O2 SENSOR-B1	EC-231
P0134	FRONT O2 SENSOR-B1	EC-244
P0135	FR O2 SE HEATER-B1	EC-252
P0137	REAR O2 SENSOR-B1	EC-259
P0138	REAR O2 SENSOR-B1	EC-269
P0139	REAR O2 SENSOR-B1	EC-279
P0140	REAR O2 SENSOR-B1	EC-289
P0141	RR O2 SE HEATER-B1	EC-297
P0150	FRONT O2 SENSOR-B2	EC-205
P0151	FRONT O2 SENSOR-B2	EC-215
P0152	FRONT O2 SENSOR-B2	EC-223
P0153	FRONT O2 SENSOR-B2	EC-231
P0154	FRONT O2 SENSOR-B2	EC-244
P0155	FR O2 SE HEATER-B2	EC-252
P0157	REAR O2 SENSOR-B2	EC-259
P0158	REAR O2 SENSOR-B2	EC-269
P0159	REAR O2 SENSOR-B2	EC-279
P0160	REAR O2 SENSOR-B2	EC-289
P0161	RR O2 SE HEATER-B2	EC-297
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P0172	FUEL SYS-RICH/BK1	EC-312
P0174	FUEL SYS-LEAN/BK2	EC-304
P0175	FUEL SYS-RICH/BK2	EC-312
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DTC*1	Items (CONSULT-II screen terms)	Reference page
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P0302	CYL 2 MISFIRE	EC-342
P0303	CYL 3 MISFIRE	EC-342
P0304	CYL 4 MISFIRE	EC-342
P0305	CYL 5 MISFIRE	EC-342
P0306	CYL 6 MISFIRE	EC-342
P0325*2	KNOCK SEN/CIRC-B1	EC-350
P0335	CPS/CIRCUIT (POS)	EC-355
P0340	CAM PS/CIRC (PHS)	EC-363
P0400	EGR SYSTEM	EC-369
P0403	EGR VOL CONT/V CIR	EC-378
P0420	TW CATALYST SYS-B1	EC-385
P0430	TW CATALYST SYS-B2	EC-385
P0440	EVAP SMALL LEAK	EC-390
P0443	PURG VOLUME CONT/V	EC-406
P0446	VENT CONTROL VALVE	EC-412
P0450	EVAP SYS PRES SEN	EC-419
P0455	EVAP GROSS LEAK	EC-431
P0460	FUEL LV SE (SLOSH)	EC-444
P0461	FUEL LEVEL SENSOR	EC-448
P0464	FUEL LEVL SEN/CIRC	EC-450
P0500	VEH SPEED SEN/CIRC*4	EC-454
P0505	IACV/AAC VLV/CIRC	EC-458
P0510	CLOSED TP SW/CIRC	EC-467
P0600*2	A/T COMM LINE	EC-476
P0605	ECM	EC-479
P0705	PNP SW/CIRC	AT-102
P0710	ATF TEMP SEN/CIRC	AT-108
P0720	VEH SPD SEN/CIR A/T*4	AT-114
P0725	ENGINE SPEED SIG	AT-119
P0731	A/T 1ST GR FNCTN	AT-124
P0732	A/T 2ND GR FNCTN	AT-130
P0733	A/T 3RD GR FNCTN	AT-136
P0734	A/T 4TH GR FNCTN	AT-142
P0740	TCC SOLENOID/CIRC	AT-151

DTC*1	Items (CONSULT-II screen terms)	Reference page
P0744	A/T TCC S/V FNCTN	AT-156
P0745	L/PRESS SOL/CIRC	AT-166
P0750	SFT SOL A/CIRC*3	AT-172
P0755	SFT SOL B/CIRC*3	AT-177
P1126	THERMOSTAT FNCTN	EC-481
P1130	SWIRL CONT SOL/V	EC-483
P1148	CLOSED LOOP-B1	EC-507
P1165	SWL CON VC SW/CIRC	EC-509
P1168	CLOSED LOOP-B2	EC-507
P1211*2	TCS C/U FUNCTN	EC-515
P1212*2	TCS CIRC	EC-517
P1217*2	ENG OVER TEMP	EC-520
P1320	IGN SIGNAL-PRIMARY	EC-537
P1335	CPS/CIRCUIT (REF)	EC-548
P1336	CPS/CIRC (POS) COG	EC-554
P1401	EGR TEMP SEN/CIRC	EC-562
P1402	EGR SYSTEM	EC-570
P1440	EVAP SMALL LEAK	EC-579
P1444	PURG VOLUME CONT/V	EC-581
P1446	VENT CONTROL VALVE	EC-593
P1447	EVAP PURG FLOW/MON	EC-601
P1448	VENT CONTROL VALVE	EC-613
P1464	FUEL LEVEL SEN/CIRC	EC-622
P1490	VC/V BYPASS/V	EC-625
P1491	VC CUT/V BYPASS/V	EC-631
P1605	A/T DIAG COMM LINE	EC-643
P1610 - P1615*2	NATS MALFUNCTION	EL-406
P1705	TP SEN/CIRC A/T*3	AT-182
P1706	P-N POS SW/CIRCUIT	EC-646
P1760	O/R CLTCH SOL/CIRC	AT-191

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

*2: This DTC is displayed with CONSULT-II only.

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

*4: The MIL illuminates when both the "Revolution sensor signal" and the "Vehicle speed sensor signal" meet the fail-safe condition at the same time.

NOTE:

Regarding A33 models, "-B1" and "BK1" indicate right bank and "-B2" and "BK2" indicate left bank.

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

NHEC0002

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER” used along with a seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. The SRS system composition which is available to INFINITI I30 is as follows:

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

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

WARNING:

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

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

NHEC0003

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

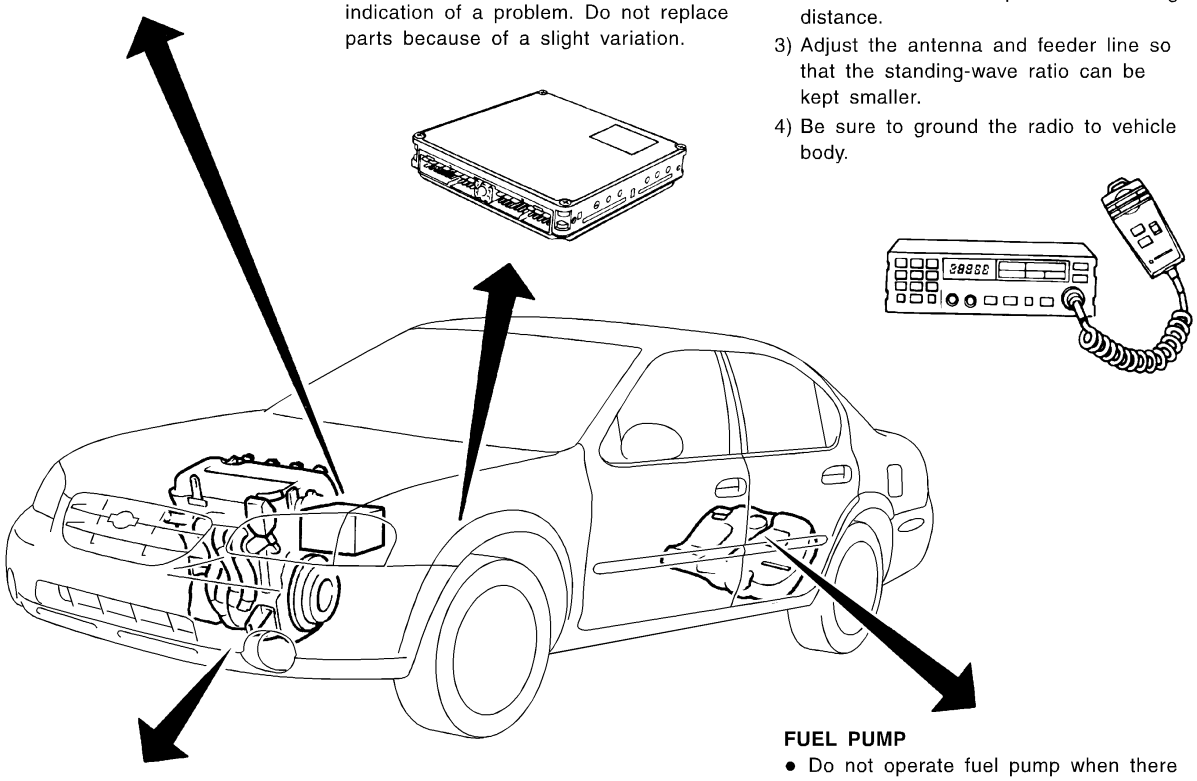
NHEC0004

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

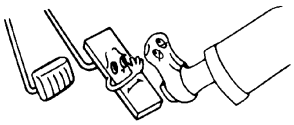
ECM
- Do not disassemble ECM.
- Do not turn dignosis mode selector forcibly.
- If a battery terminal is disconnected, the memory will return to the ECM value.
  The ECM will now start to self-control at its initial value. Engine operation can vary slightly when the terminal is disconnected. However,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

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

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



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

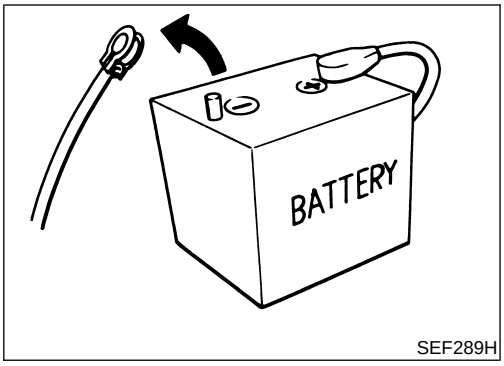


WHEN STARTING
- Do not depress accelerator pedal when starting.
- Immediately after starting, do not rev up engine unnecessarily.
- Do not rev up engine just prior to shutdown.

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

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

SEF242XB

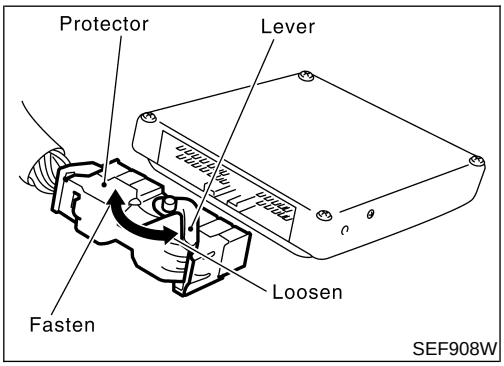


SEF289H

Precautions

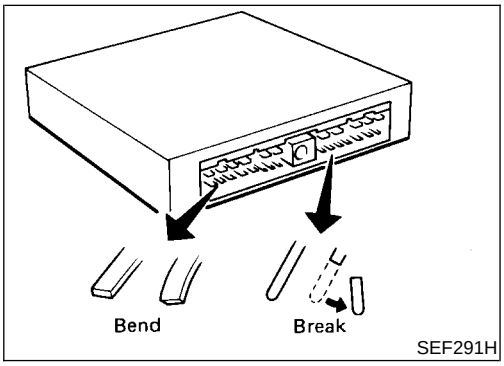
NHEC0005

- **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.**



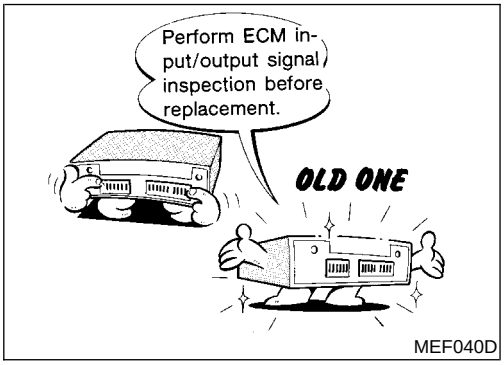
SEF908W

- **When connecting ECM harness connector, fasten it securely with a lever as far as it will go as shown at left.**



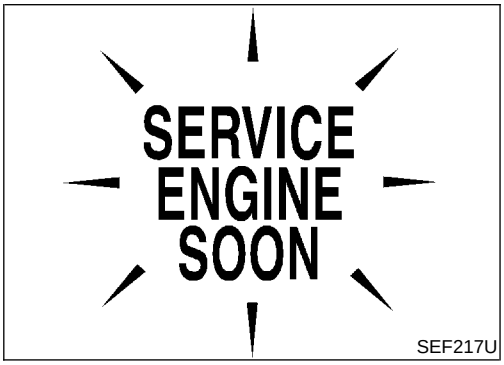
SEF291H

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



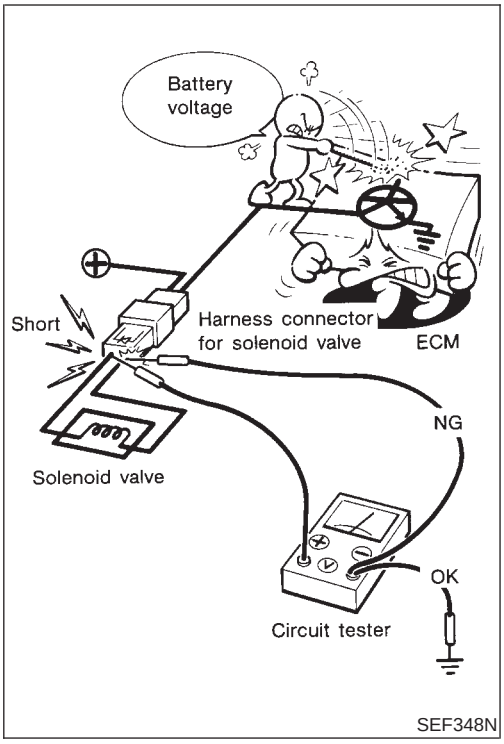
MEF040D

- **Before replacing ECM, perform "ECM Terminals and Reference Value" inspection and make sure ECM functions properly. Refer to EC-144.**

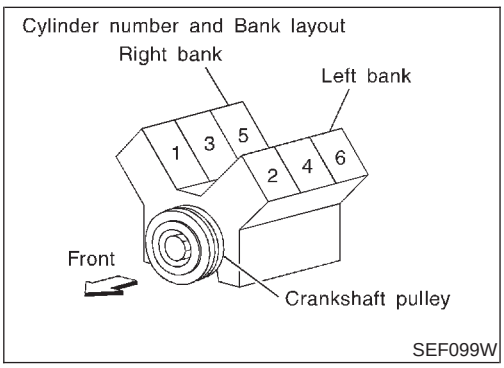


SEF217U

- **After performing each TROUBLE DIAGNOSIS, perform "DTC Confirmation Procedure" or "Overall Function Check".**
  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.
- **Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**



- **Regarding model A33, "-B1" indicates the right bank and "-B2" indicates the left bank as shown in the figure.**

Wiring Diagrams and Trouble Diagnosis

NHEC0006

When you read Wiring diagrams, refer to the following:

- GI-11, "HOW TO READ WIRING DIAGRAMS"
- EL-10, "POWER SUPPLY ROUTING" for power distribution circuit

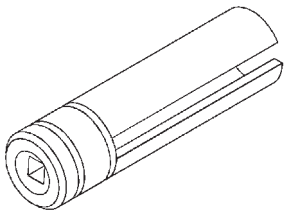
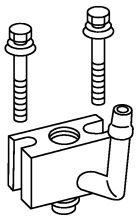
When you perform trouble diagnosis, refer to the following:

- GI-36, "HOW TO FOLLOW TEST GROUP IN TROUBLE DIAGNOSIS"
- GI-25, "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT"

Special Service Tools

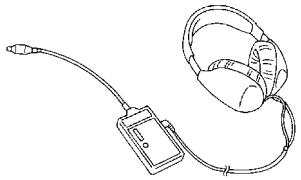
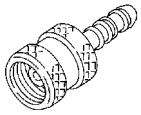
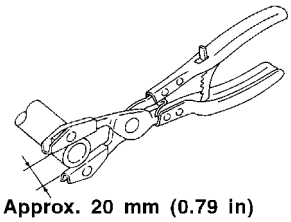
NHEC0007

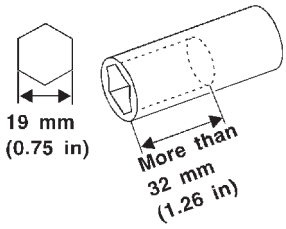
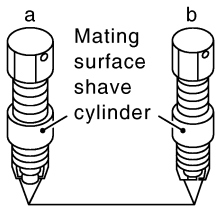
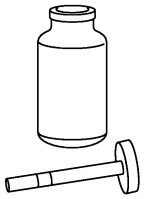
The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description	
KV10117100 (J36471-A) Front heated oxygen sensor wrench Rear heated oxygen sensor wrench	 NT379	Loosening or tightening front and rear heated oxygen sensors with 22 mm (0.87 in) hexagon nut
KV10117600 (J44321) Fuel pressure check adapter	 NT777	Checking fuel pressure with pressure gauge

Commercial Service Tools

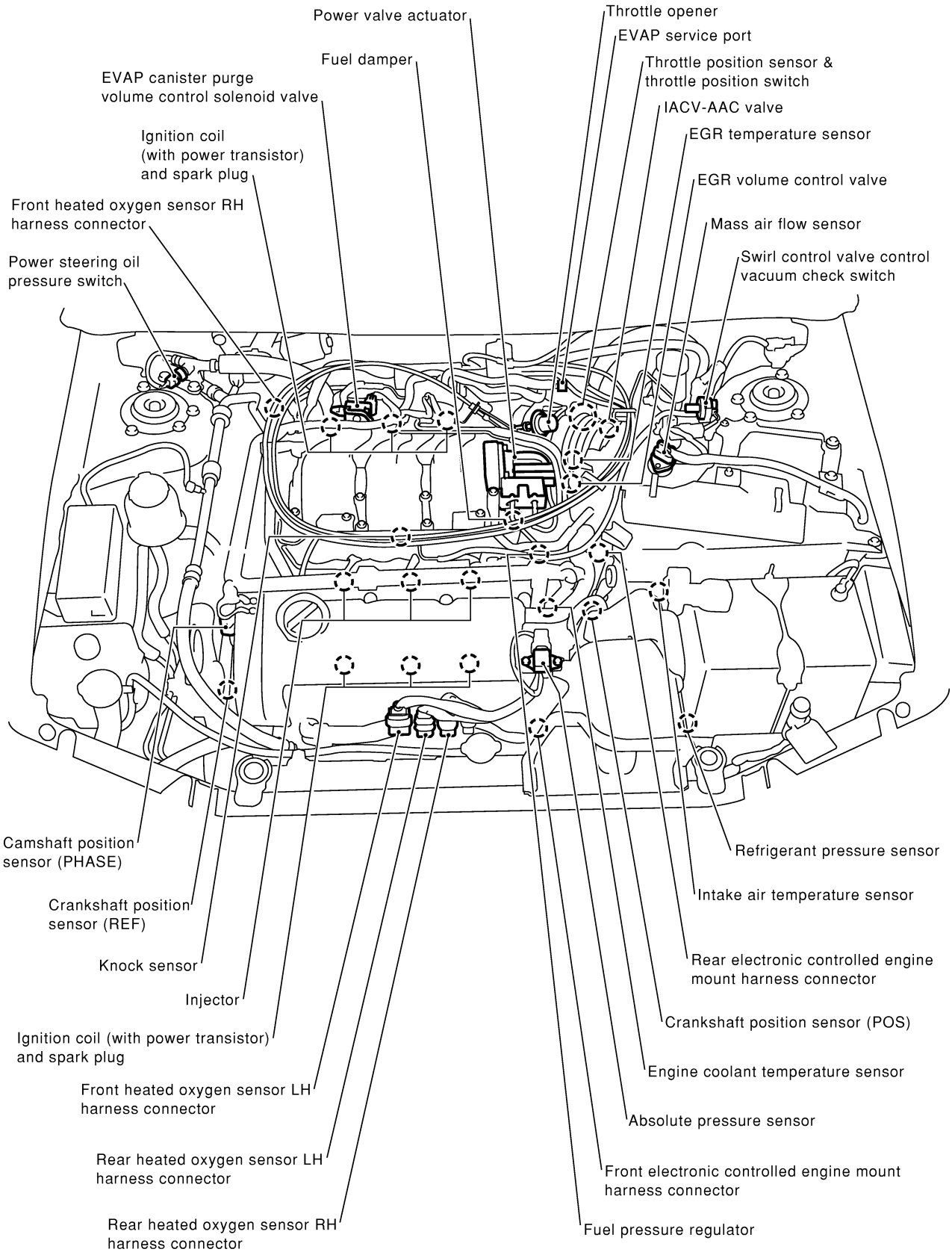
NHEC0008

Tool name (Kent-Moore No.)	Description	
Leak detector (J41416)	 NT703	Locating the EVAP leak
EVAP service port adapter (J41413-OBD)	 NT704	Applying positive pressure through EVAP service port
Hose clipper	 NT720	Clamping the EVAP purge hose between the fuel tank and EVAP canister applied to DTC P1440 [EVAP control system (small leak-positive pressure)]

Tool name (Kent-Moore No.)	Description	
Fuel filler cap adapter	 NT653	Checking fuel tank vacuum relief valve opening pressure
Socket wrench	 NT705	Removing and installing engine coolant temperature sensor
Oxygen sensor thread cleaner (J-43897-18) (J-43897-12)	 NT778	Reconditioning the exhaust system threads before installing a new oxygen sensor. Use with anti-seize lubricant shown below. **a: J-43897-18 18 mm diameter, for Zirconia Oxygen Sensor** **b: J-43897-12 12 mm diameter, for Titania Oxygen Sensor**
Anti-seize lubricant (Permatex™ 133AR or equivalent meeting MIL specification MIL-A-907)	 NT779	Lubricating oxygen sensor thread cleaning tool when reconditioning exhaust system threads.

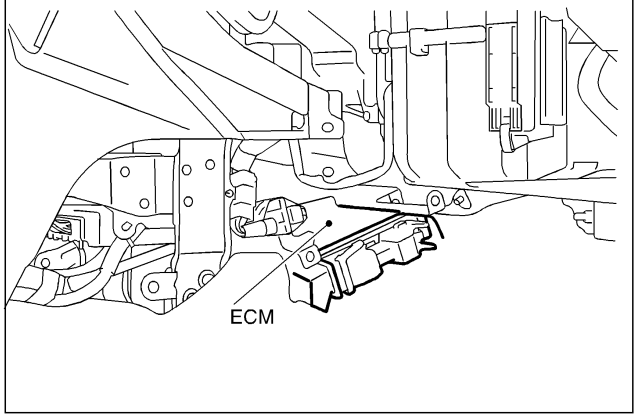
Engine Control Component Parts Location

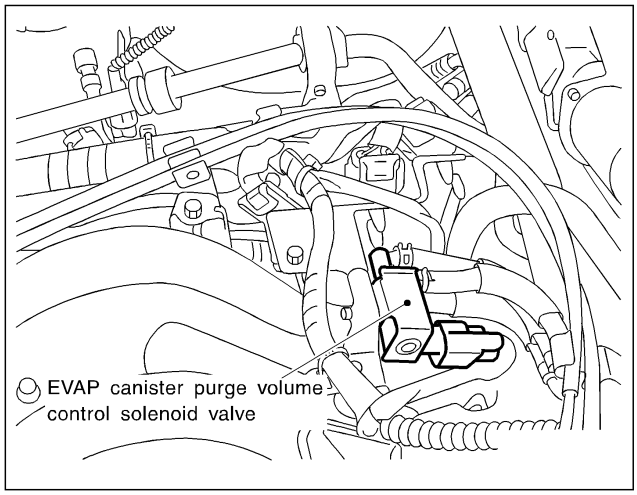
NHEC0009

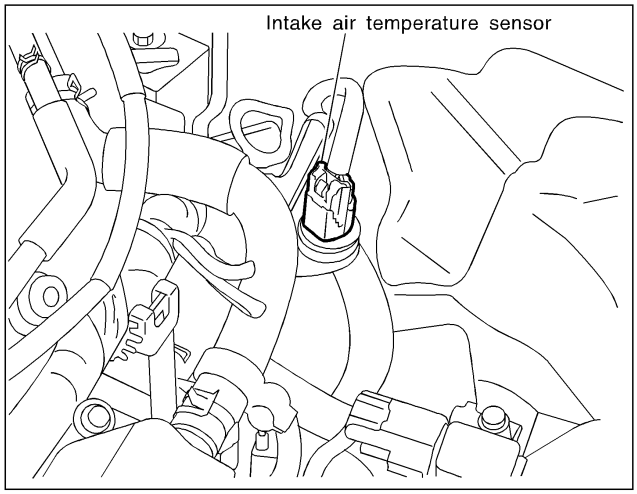


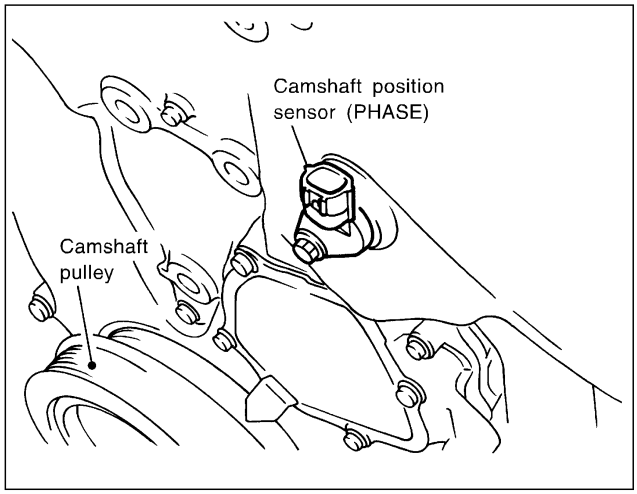
SEF243XA

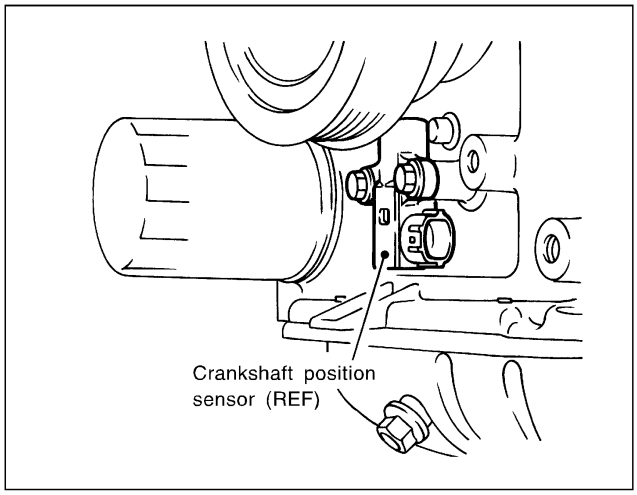
View with glove box removed

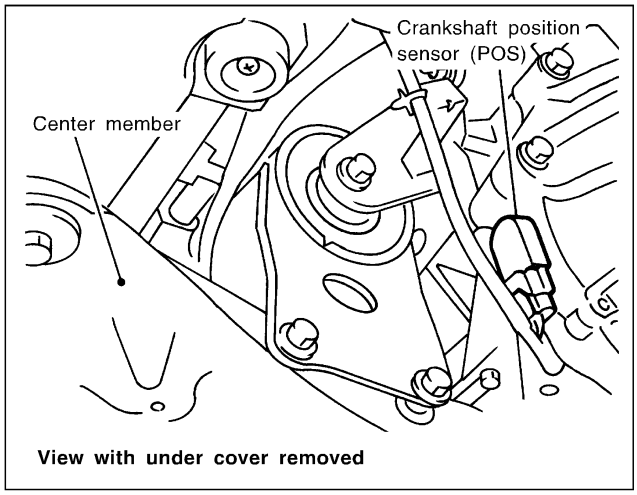






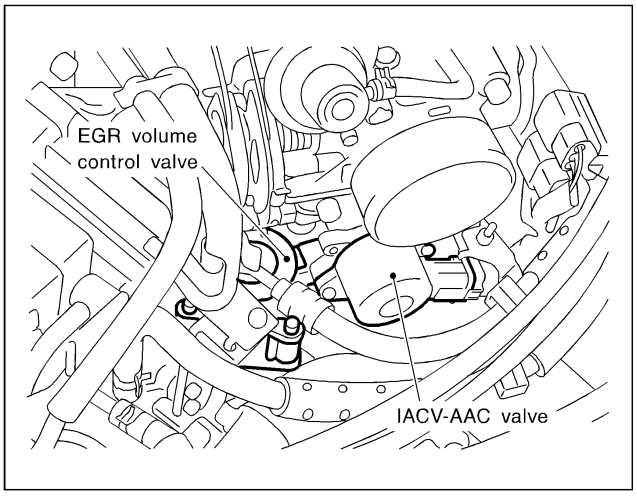


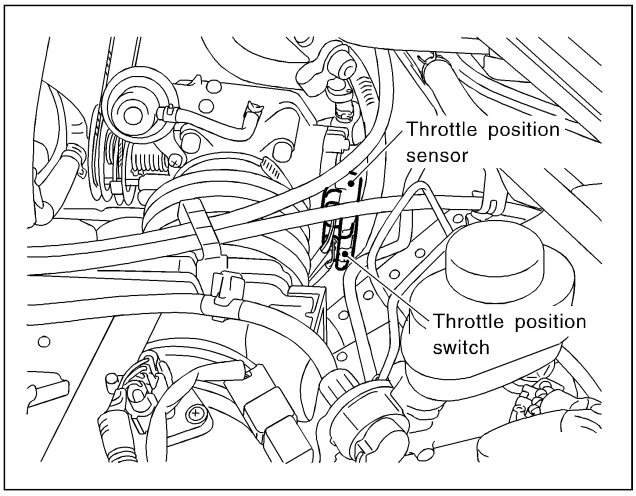


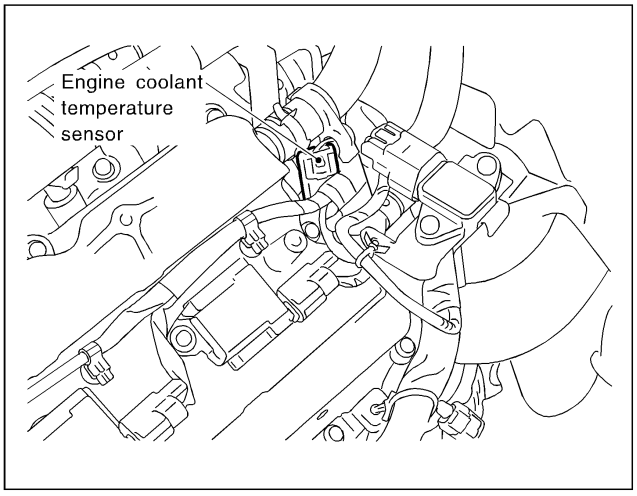


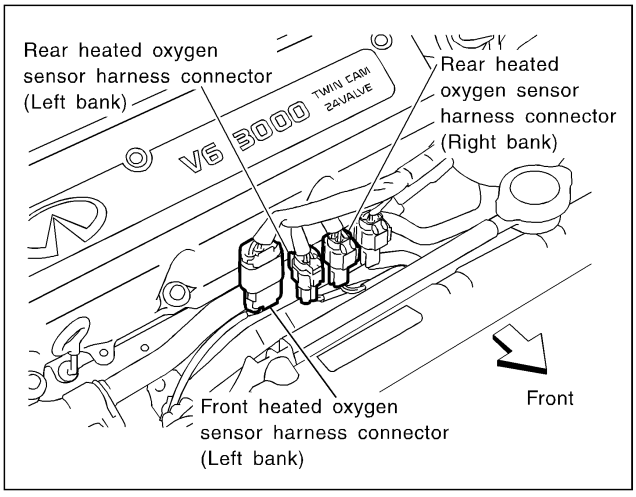
View with under cover removed

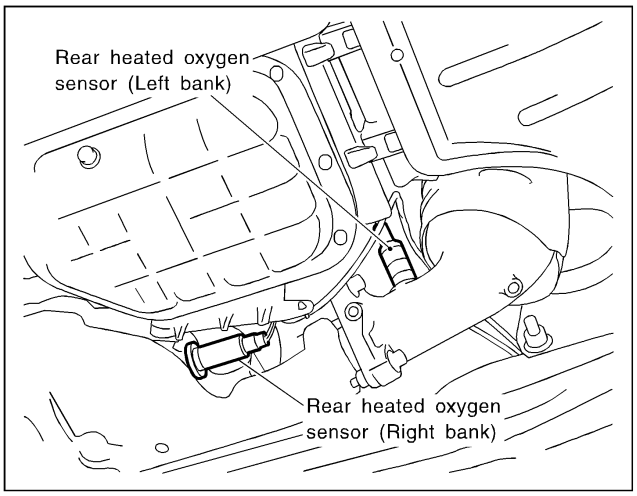
SEF244X

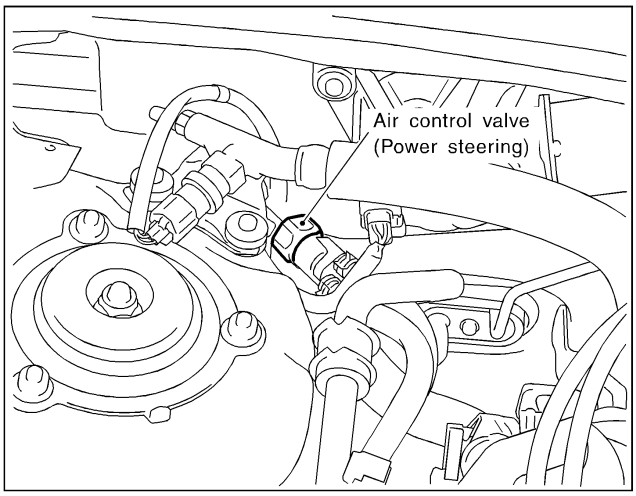

EGR volume
control valve
IACV-AAC valve


Throttle position
sensor
Throttle position
switch

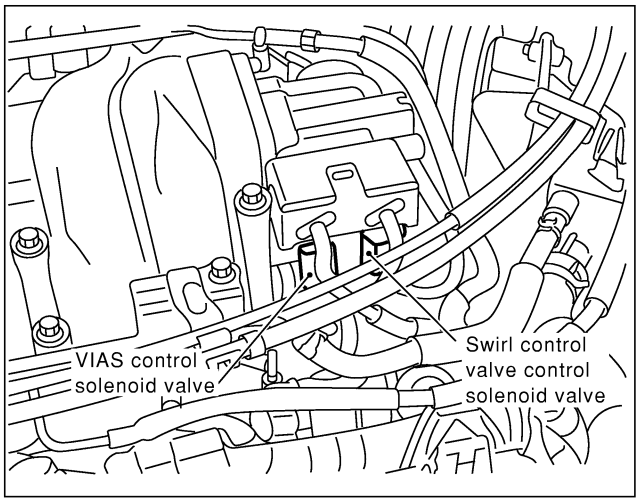

Engine coolant
temperature
sensor

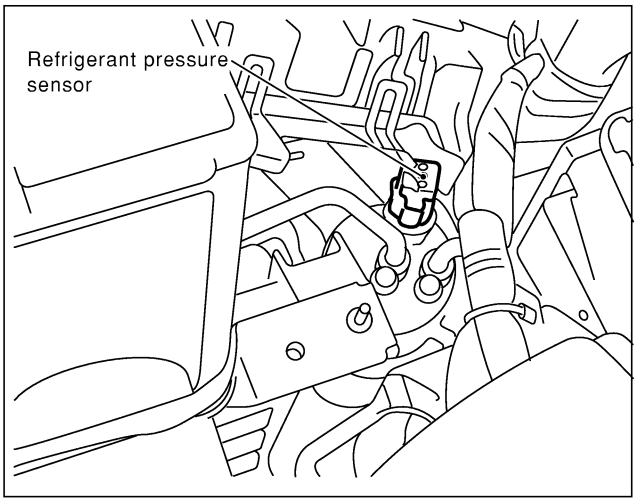

Rear heated oxygen
sensor harness connector
(Left bank)
Rear heated
oxygen sensor
harness connector
(Right bank)
V6 3000 TWIN CAM 24VALVE
Front
Front heated oxygen
sensor harness connector
(Left bank)

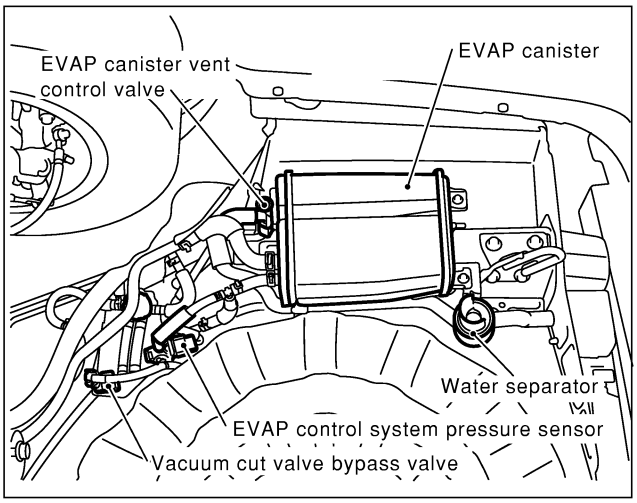

Rear heated oxygen
sensor (Left bank)
Rear heated oxygen
sensor (Right bank)


Air control valve
(Power steering)

SEF895X


VIAS control solenoid valve
Swirl control valve control solenoid valve

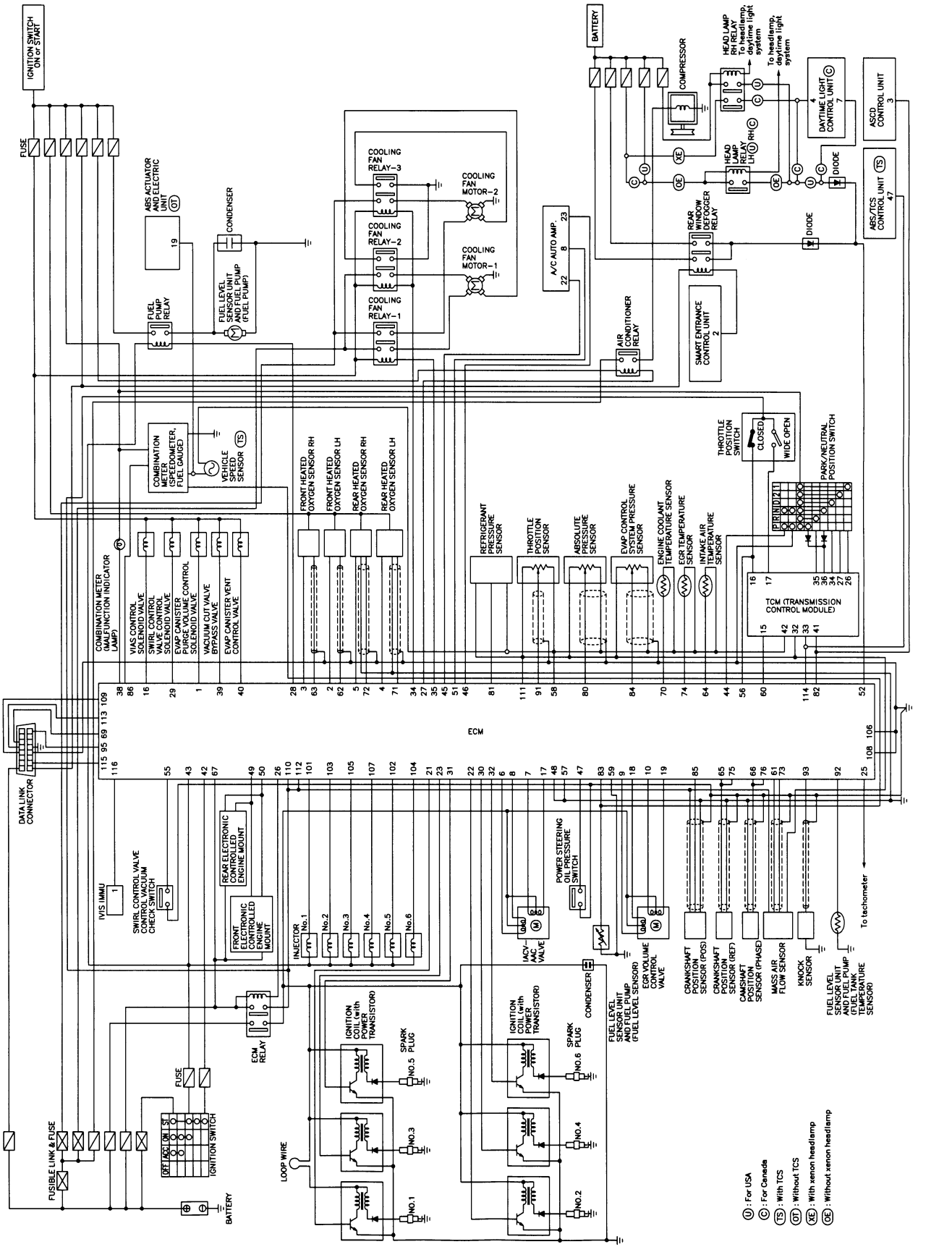

Refrigerant pressure sensor


EVAP canister vent control valve
EVAP canister
Water separator
EVAP control system pressure sensor
Vacuum cut valve bypass valve

SEF814Y

Circuit Diagram

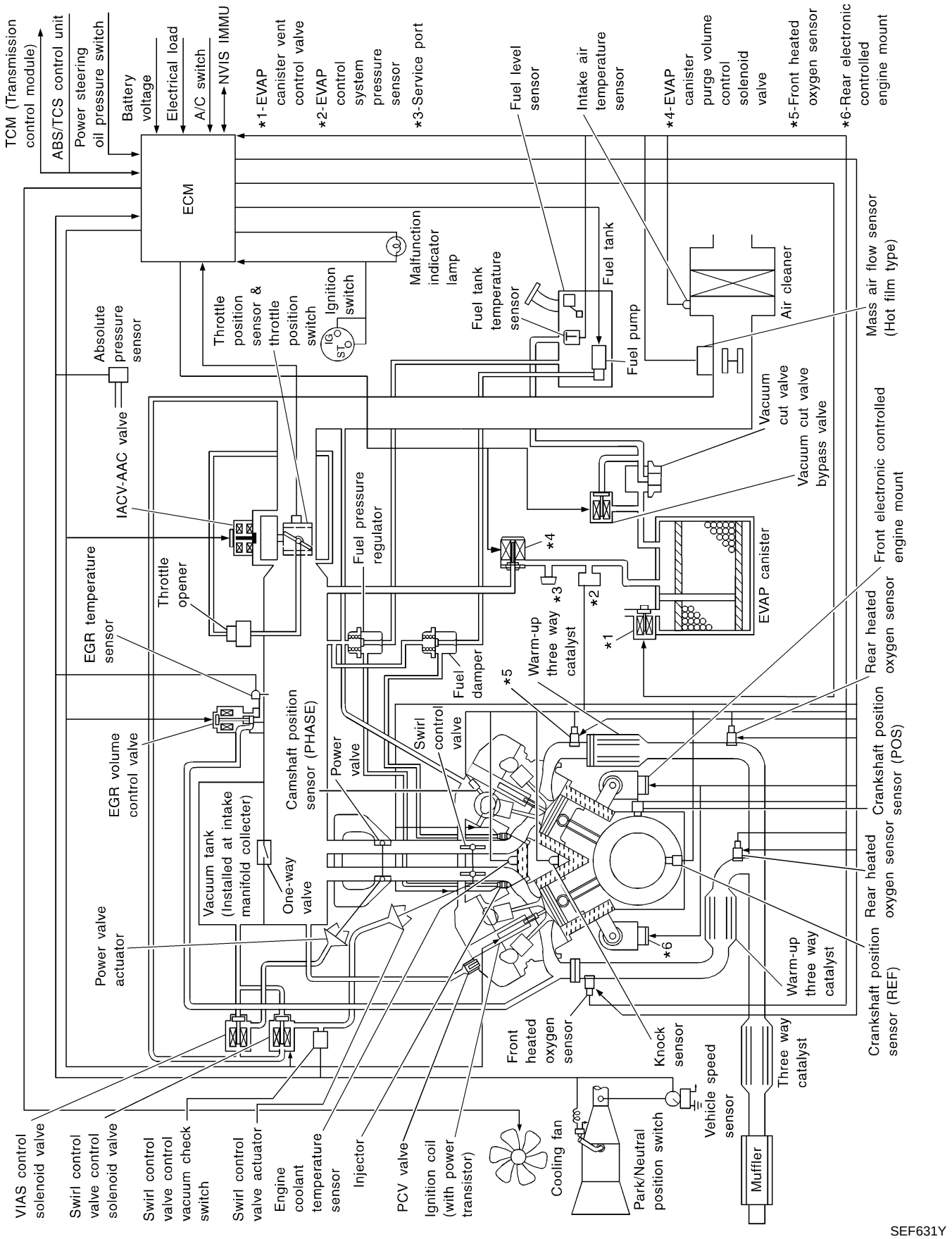
NHEC0010



MEC903C

System Diagram

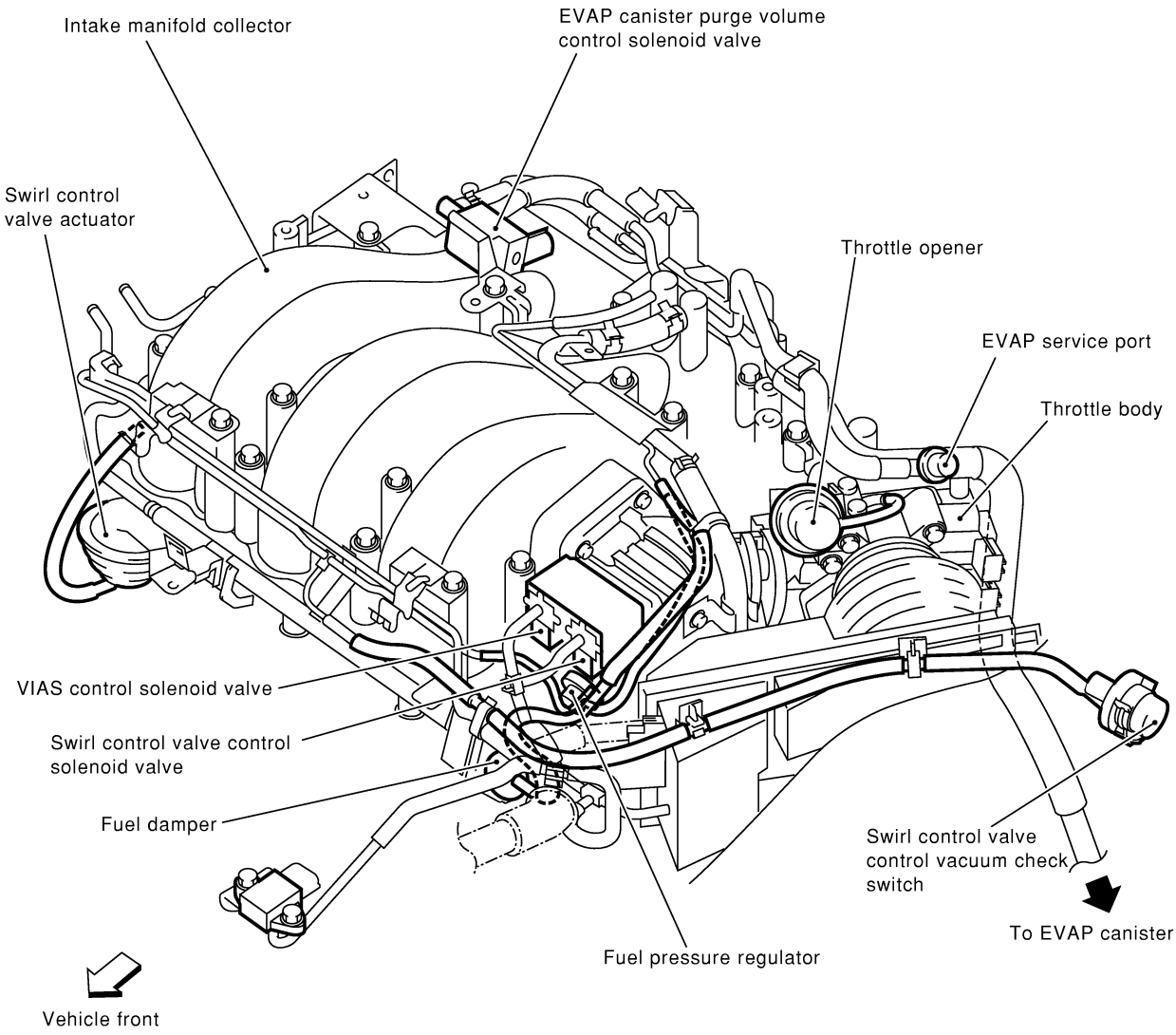
NHEC0011



SEF631Y

Vacuum Hose Drawing

NHEC0012



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

SEF249X

Refer to “System Diagram”, EC-25 for Vacuum Control System.

System Chart

NHEC0013

Input (Sensor)	ECM Function	Output (Actuator)
• Camshaft position sensor (PHASE) • Crankshaft position sensor (REF) • Mass air flow sensor • Engine coolant temperature sensor • Front heated oxygen sensor • Ignition switch • Throttle position sensor • Closed throttle position switch *3 • Park/neutral position (PNP) switch • Air conditioner switch • Knock sensor • EGR temperature sensor *1 • Intake air temperature sensor • Absolute pressure sensor • EVAP control system pressure sensor *1 • Battery voltage • Power steering oil pressure switch • Vehicle speed sensor • Fuel tank temperature sensor *1 • Crankshaft position sensor (POS) • Rear heated oxygen sensor *2 • TCM (Transmission control module) • Refrigerant pressure sensor • ABS/TCS control unit • Electrical load • Fuel level sensor*1	Fuel injection & mixture ratio control	Injectors
	Electronic ignition system	Power transistor
	Idle air control system	IACV-AAC valve
	Fuel pump control	Fuel pump relay
	On board diagnostic system	MIL (On the instrument panel)
	EGR control	EGR volume control valve
	Swirl control valve control	Swirl control valve control solenoid valve
	Power valve control	VIAS control solenoid valve
	Front heated oxygen sensor heater control	Front heated oxygen sensor heater
	Rear heated oxygen sensor heater control	Rear heated oxygen sensor heater
	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
	Air conditioning cut control	Air conditioner relay
	Cooling fan control	Cooling fan relays
	ON BOARD DIAGNOSIS for EVAP system	• EVAP canister vent control valve • Vacuum cut valve bypass valve

*1: These sensors are not used to control the engine system. They are used only for the on board diagnosis.
*2: This sensor is not used to control the engine system under normal conditions.
*3: 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

NHEC0014

Input/Output Signal Chart

NHEC0014S01

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed (POS signal)	Fuel injection & mixture ratio control	Injectors
Crankshaft position sensor (REF)	Engine speed (REF signal)		
Camshaft position sensor (PHASE)	Piston position		
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		
Park/neutral 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		
Battery	Battery voltage		
Absolute pressure sensor	Ambient air barometric pressure		
Power steering oil pressure switch	Power steering operation		
Rear heated oxygen sensor*	Density of oxygen in exhaust gas		
ABS/TCS control unit	TCS operation command		

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

Basic Multiport Fuel Injection System

NHEC0014S02

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 crankshaft position sensor and the mass air flow sensor.

Various Fuel Injection Increase/Decrease Compensation

NHEC0014S03

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

<Fuel increase>

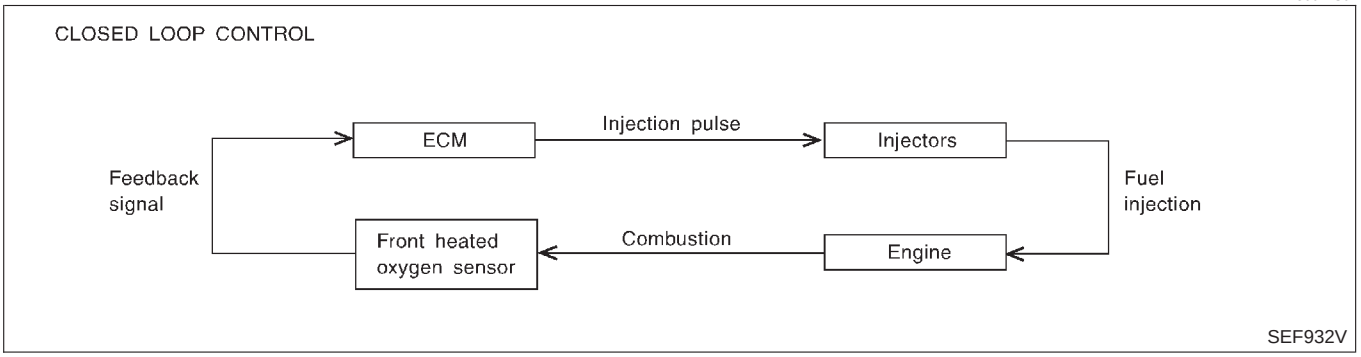
- During warm-up
- When starting the engine
- During acceleration
- Hot-engine operation
- When selector lever is changed from “N” to “D”
- High-load, high-speed operation

<Fuel decrease>

- During deceleration
- During high engine speed operation

Mixture Ratio Feedback Control (Closed loop control)

NHEC0014S04



The mixture ratio feedback system provides the best air-fuel mixture ratio for driveability and emission control. The warm-up three way catalyst can then better reduce CO, HC and NOx emissions. This system uses a front heated oxygen sensor in the exhaust manifold to monitor if the engine 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-205. This maintains the mixture ratio within the range of stoichiometric (ideal air-fuel mixture).
This stage is referred to as the closed loop control condition.
Rear heated oxygen sensor is located downstream of the warm-up three way catalyst. Even if the switching characteristics of the front heated oxygen sensor shift, the air-fuel ratio is controlled to stoichiometric by the signal from the rear heated oxygen sensor.

Open Loop Control

NHEC0014S05

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
- After shifting from "N" to "D"
- When starting the engine

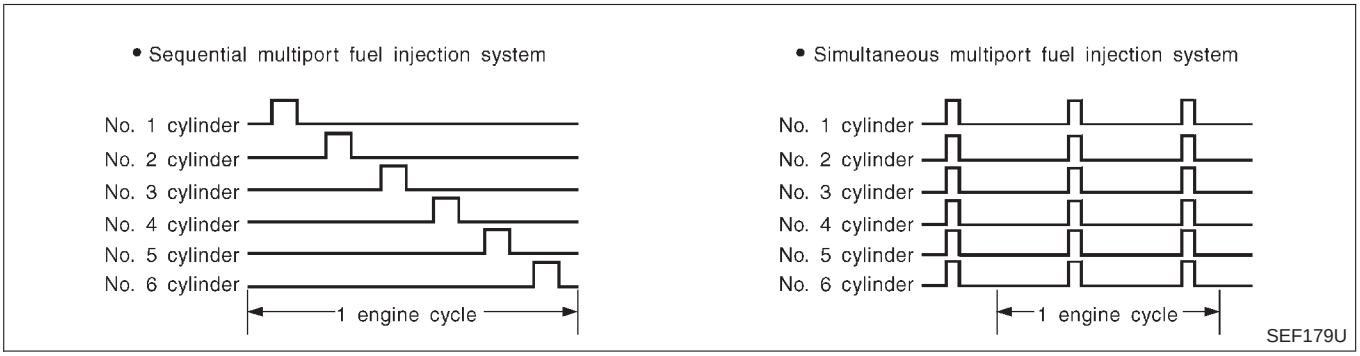
Mixture Ratio Self-learning Control

NHEC0014S06

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

Fuel Injection Timing

NHEC0014S07



Two types of systems are used.

Sequential Multiport Fuel Injection System

NHEC0014S0701

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

NHEC0014S0702

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

Fuel Shut-off

NHEC0014S08

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

Electronic Ignition (EI) System

DESCRIPTION

NHEC0015

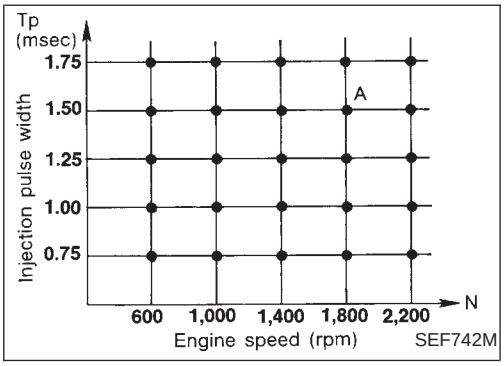
Input/Output Signal Chart

NHEC0015S01

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed (POS signal)	Ignition timing control	Power transistor
Crankshaft position sensor (REF)	Engine speed (REF signal)		
Camshaft position sensor (PHASE)	Piston position		
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		
Park/neutral position (PNP) switch	Gear position		
Battery	Battery voltage		

System Description

NHEC0015S02



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

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

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

Air Conditioning Cut Control

DESCRIPTION

NHEC0016

Input/Output Signal Chart

NHEC0016S01

Sensor	Input Signal to ECM	ECM function	Actuator
Air conditioner switch	Air conditioner "ON" signal	Air conditioner cut control	Air conditioner relay
Throttle position sensor	Throttle valve opening angle		
Crankshaft position sensor (POS)	Engine speed (POS signal)		
Crankshaft position sensor (REF)	Engine speed (REF signal)		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Vehicle speed sensor	Vehicle speed		
Refrigerant pressure sensor	Refrigerant pressure		
Power steering oil pressure switch	Power steering operation		

System Description

NHEC0016S02

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.
- When refrigerant pressure is excessively low or high.

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

DESCRIPTION

NHEC0017

Input/Output Signal Chart

NHEC0017S01

Sensor	Input Signal to ECM	ECM function	Actuator
Vehicle speed sensor	Vehicle speed	Fuel cut control	Injectors
Park/neutral position (PNP) switch	Neutral position		
Throttle position sensor	Throttle position		
Engine coolant temperature sensor	Engine coolant temperature		
Crankshaft position sensor (POS)	Engine speed (POS signal)		
Crankshaft position sensor (REF)	Engine speed (REF signal)		

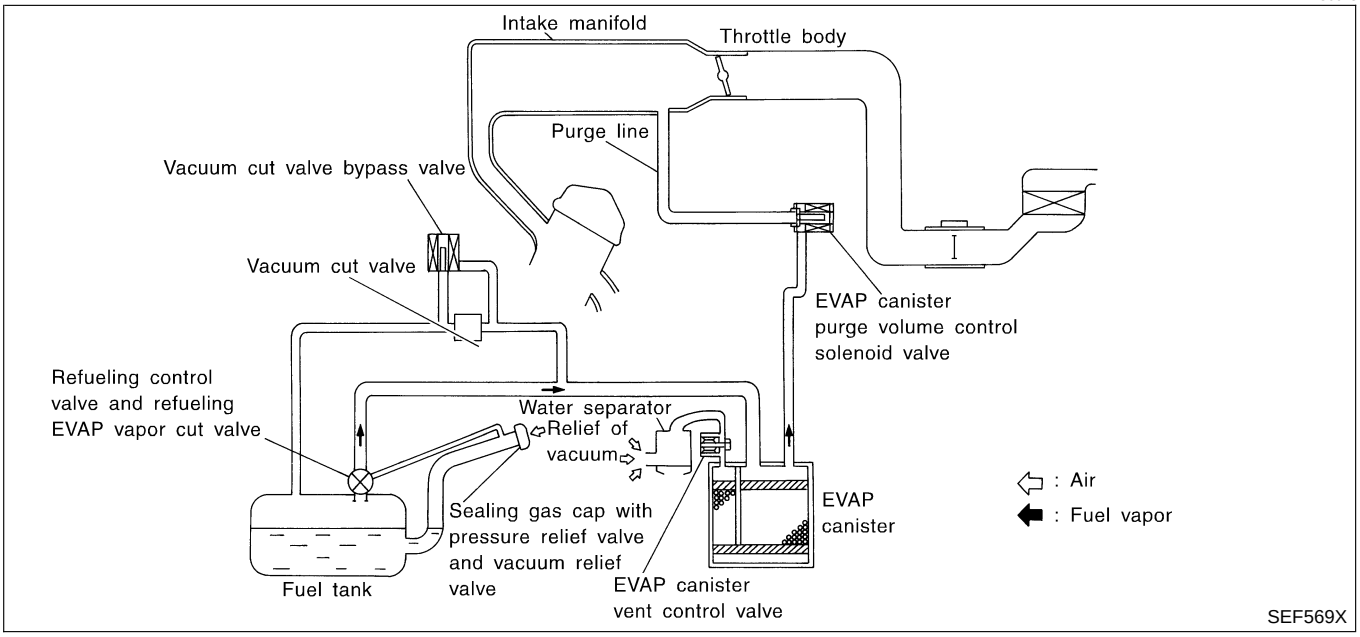
If the engine speed is above 1,800 rpm with no load (for example, in neutral and engine speed over 1,800 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed. Fuel cut will operate until the engine speed reaches 1,500 rpm, then fuel cut is cancelled.

NOTE:
This function is different from deceleration control listed under "Multiport Fuel Injection (MFI) System", EC-28.

Evaporative Emission System

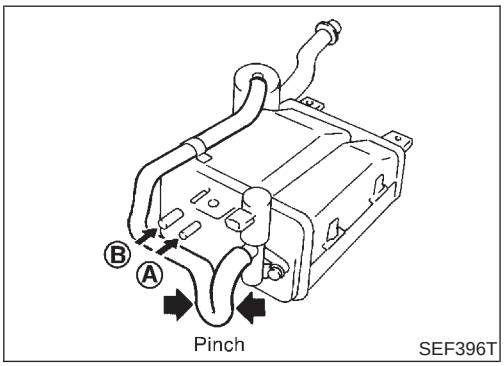
DESCRIPTION

NHEC0018



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

operates, the flow rate of vapor controlled by EVAP canister purge volume control solenoid valve is proportionally regulated as the air flow increases.
EVAP canister purge volume control solenoid valve also shuts off the vapor purge line during decelerating and idling.



INSPECTION

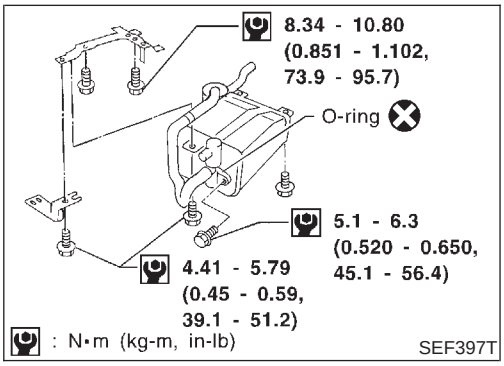
NHEC0019

EVAP Canister

NHEC0019S01

Check EVAP canister as follows:

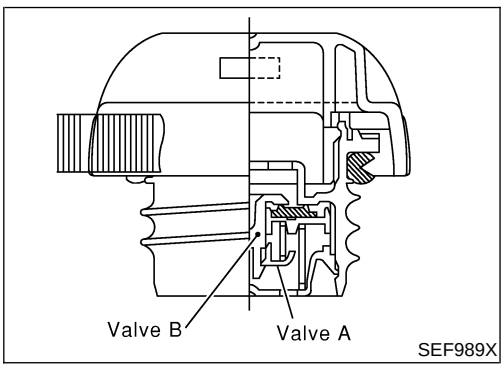
1. Pinch the fresh air hose.
2. Blow air into port **A** and check that it flows freely out of port **B**.



Tightening Torque

NHEC0019S02

Tighten EVAP canister as shown in the figure.
Make sure new O-ring is installed properly between EVAP canister and EVAP canister vent control valve.



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

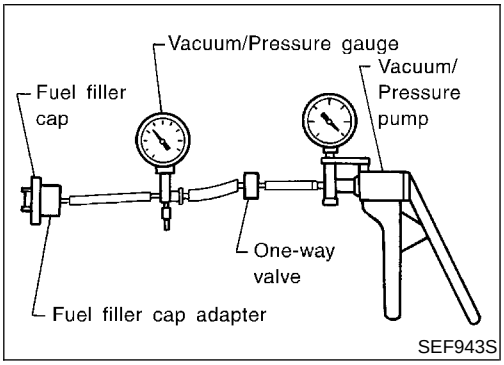
NHEC0019S03

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

Pressure:
15.3 - 20.0 kPa (0.156 - 0.204 kg/cm^2, 2.22 - 2.90 psi)
Vacuum:
−6.0 to −3.3 kPa (−0.061 to −0.034 kg/cm^2, −0.87 to −0.48 psi)

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

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



Vacuum Cut Valve and Vacuum Cut Valve Bypass Valve
NHEC0019S04

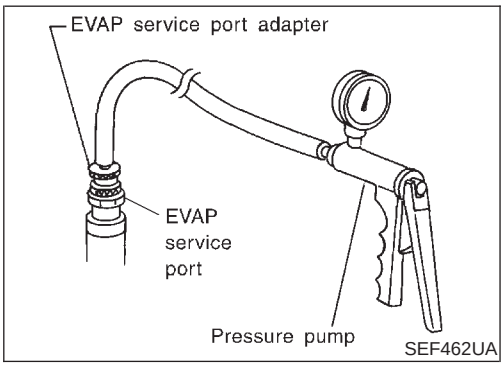
Refer to EC-631.

Evaporative Emission (EVAP) Canister Purge Volume Control Solenoid Valve
NHEC0019S05

Refer to EC-406.

Fuel Tank Temperature Sensor
NHEC0019S06

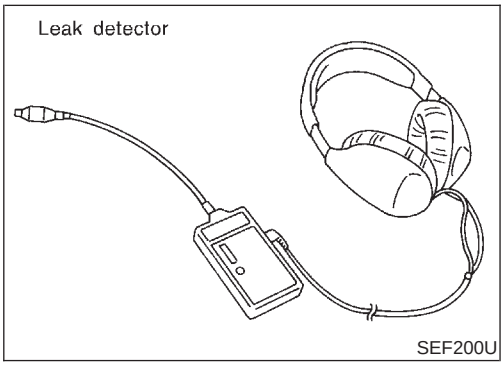
Refer to EC-319.



SEF462UA

Evap Service Port
NHEC0019S07

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.



SEF200U

How to Detect Fuel Vapor Leakage
NHEC0019S08

CAUTION:

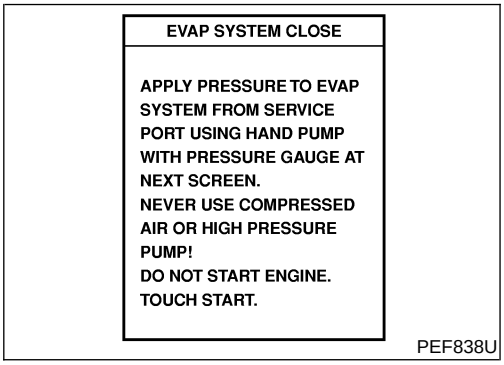
- **Never use compressed air or a high pressure pump.**
- **Do not exceed 4.12 kPa (0.042 kg/cm^2, 0.6 psi) of pressure in EVAP system.**

NOTE:

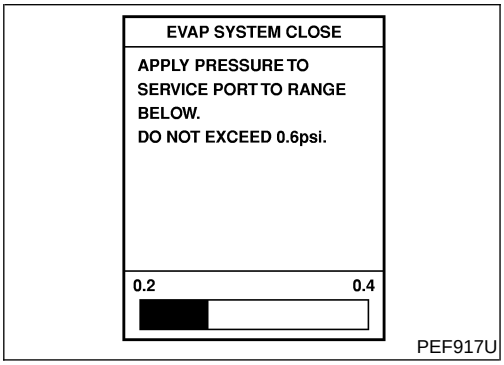
- Do not start engine.
- Improper installation of EVAP service port adapter to the EVAP service port may cause a leak.

With CONSULT-II
NHEC0019S0801

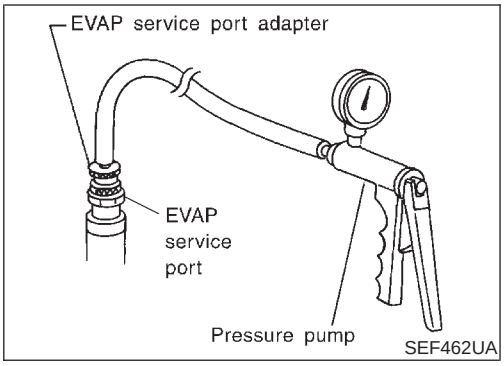
1) Attach the EVAP service port adapter securely to the EVAP service port.
2) Also attach the pressure pump and hose to the EVAP service port adapter.
3) Turn ignition switch "ON".
4) Select the "EVAP SYSTEM CLOSE" of "WORK SUPPORT MODE" with CONSULT-II.
5) Touch "START". A bar graph (Pressure indicating display) will appear on the screen.
6) Apply positive pressure to the EVAP system until the pressure indicator reaches the middle of the bar graph.
7) Remove EVAP service port adapter and hose with pressure pump.
8) Locate the leak using a leak detector. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-36.

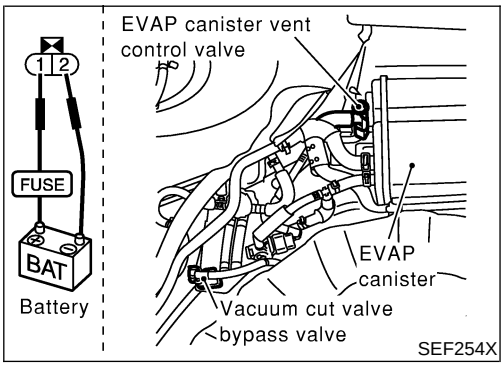


PEF838U



PEF917U





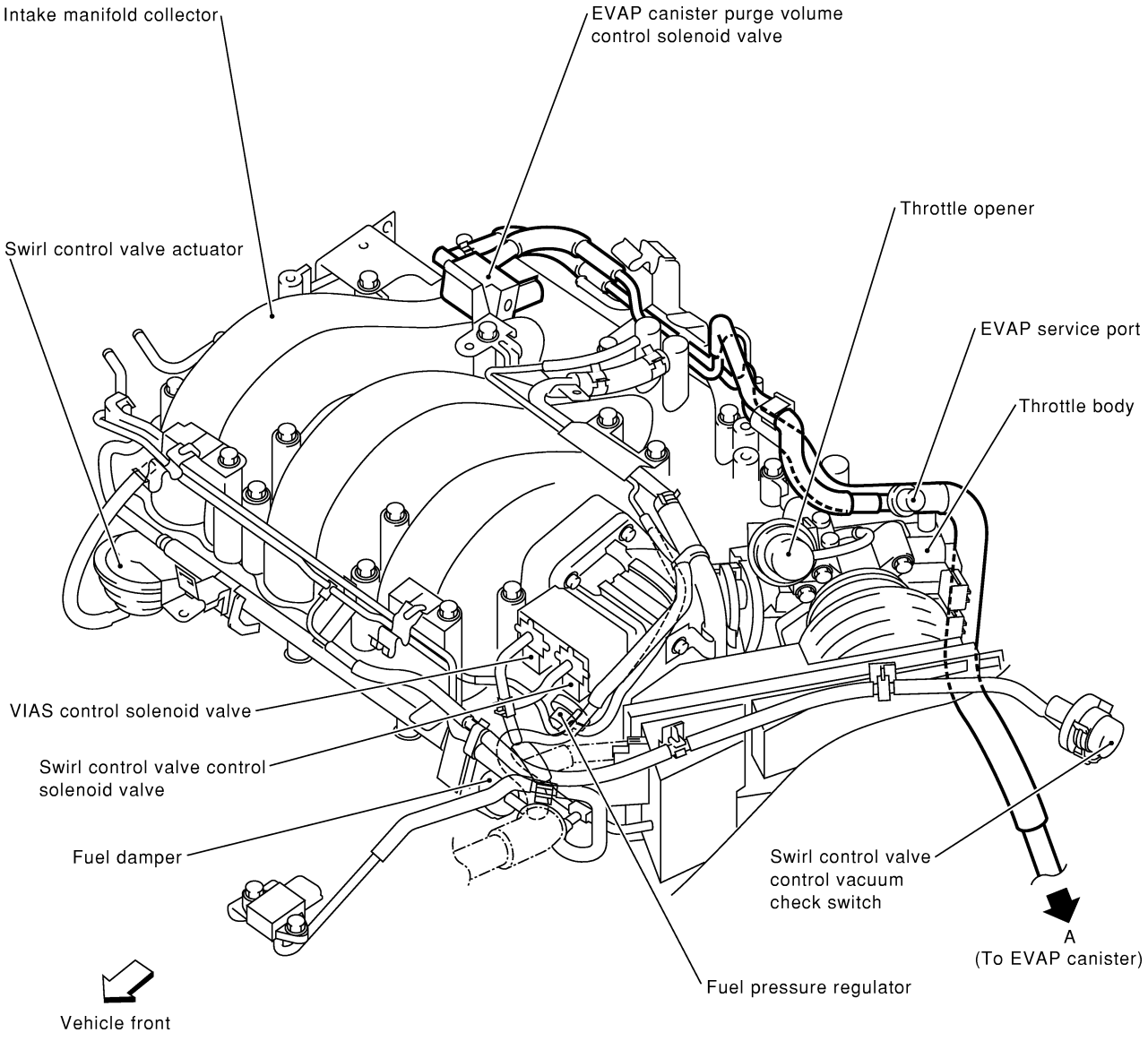
Without CONSULT-II

NHEC0019S0802

1) Attach the EVAP service port adapter securely to the EVAP service port.
2) Also attach the pressure pump with pressure gauge to the EVAP service port adapter.
3) 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.
4) 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).
5) Remove EVAP service port adapter and hose with pressure pump.
6) Locate the leak using a leak detector. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-36.

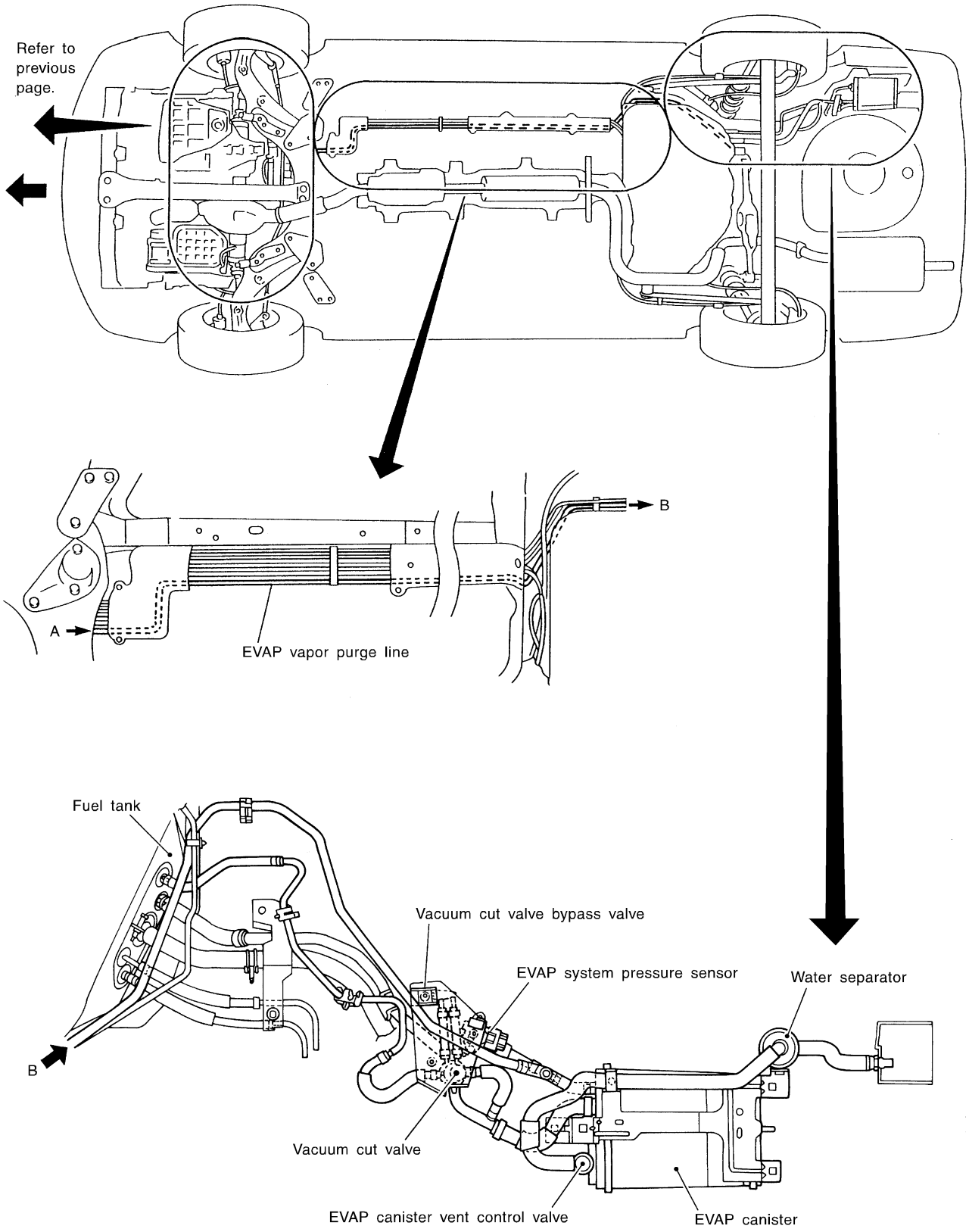
EVAPORATIVE EMISSION LINE DRAWING

NHEC0020



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

SEF251XA


Refer to previous page.
B
A
EVAP vapor purge line
Fuel tank
Vacuum cut valve bypass valve
EVAP system pressure sensor
Water separator
B
Vacuum cut valve
EVAP canister vent control valve
EVAP canister

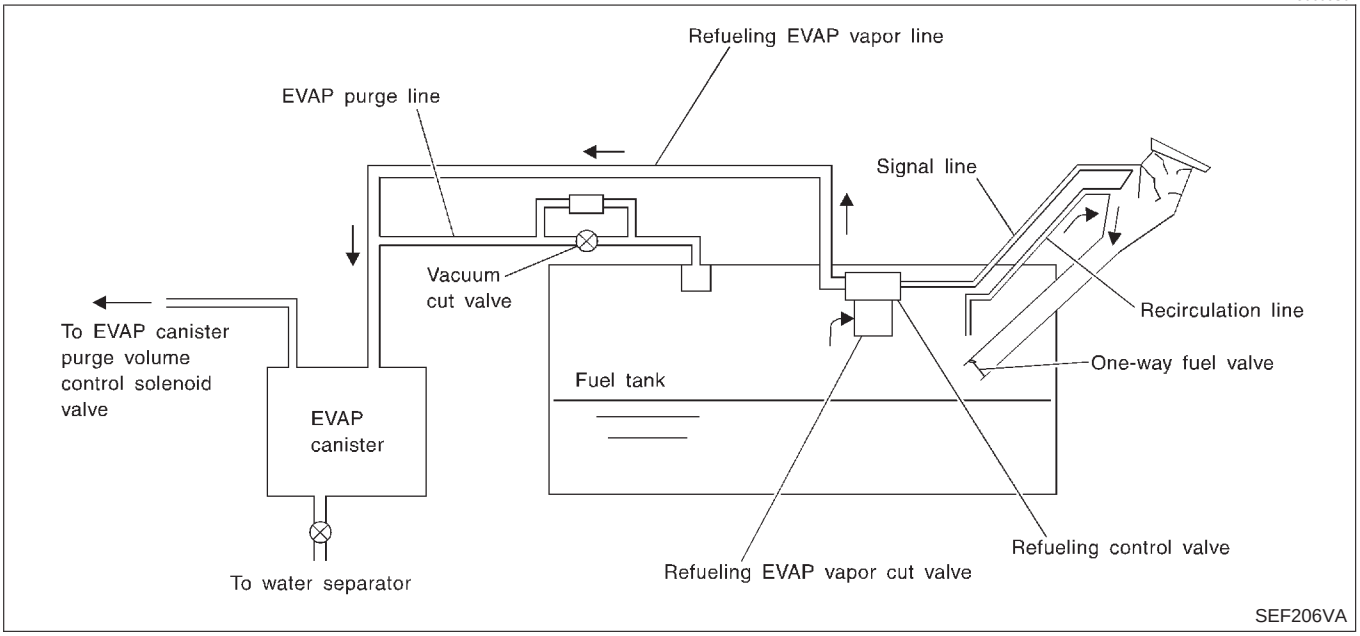
SEF253X

ON BOARD REFUELING VAPOR RECOVERY (ORVR)

NHEC0606

System Description

NHEC0606S01



From the beginning of refueling, the fuel tank pressure goes up. When the pressure reaches the setting value of the refueling control valve (RCV) opening pressure, the RCV is opened. After RCV opens, the air and vapor inside the fuel tank go through refueling EVAP vapor cut valve, RCV and refueling vapor line to the EVAP canister. The vapor is absorbed by the EVAP canister and the air is released to the atmosphere.
When the refueling has reached the full level of the fuel tank, the refueling EVAP vapor cut valve is closed and refueling is stopped because of auto shut-off. The vapor which was absorbed by the EVAP canister is purged during driving.
The RCV is always closed during driving and the evaporative emission control system is operated the same as conventional system.

WARNING:

When conducting inspections below, be sure to observe the following:

- **Put a "CAUTION: INFLAMMABLE" sign in workshop.**
- **Do not smoke while servicing fuel system. Keep open flames and sparks away from work area.**
- **Be sure to furnish the workshop with a CO_2 fire extinguisher.**

CAUTION:

- **Before removing fuel line parts, carry out the following procedures:**

a) Put drained fuel in an explosion-proof container and put lid on securely.
b) Release fuel pressure from fuel line. Refer to "Fuel Pressure Release", EC-50.
c) Disconnect battery ground cable.

- **Always replace O-ring when the fuel gauge retainer is removed.**
- **Do not kink or twist hose and tube when they are installed.**
- **Do not tighten hose and clamps excessively to avoid damaging hoses.**
- **After installation, run engine and check for fuel leaks at connection.**
- **Do not attempt to top off the fuel tank after the fuel pump nozzle shuts off automatically. Continued refueling may cause fuel overflow, resulting in fuel spray and possibly a fire.**

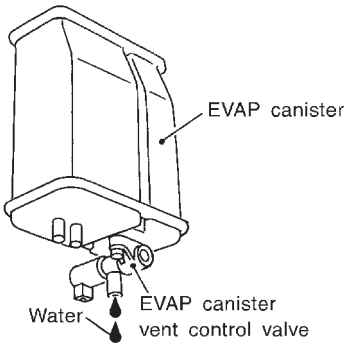
Diagnostic Procedure

NHEC0606S02

Symptom: Fuel Odor from EVAP Canister Is Strong.

NHEC0606S0201

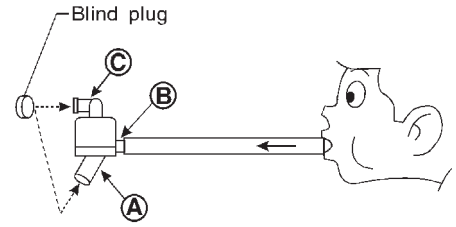
1	CHECK EVAP CANISTER	
1. Remove EVAP canister with EVAP canister vent control valve attached. 2. Weigh the EVAP canister with EVAP canister vent control valve attached. The weight should be less than 1.8 kg (4.0 lb). **OK or NG**		
OK	▶	GO TO 2.
NG	▶	GO TO 3.

2	CHECK IF EVAP CANISTER SATURATED WITH WATER	
Does water drain from the EVAP canister?  SEF596U **Yes or No**		
Yes	▶	GO TO 3.
No (With CONSULT-II)	▶	GO TO 6.
No (Without CONSULT-II)	▶	GO TO 7.

3	REPLACE EVAP CANISTER	
Replace EVAP canister with a new one.		
	▶	GO TO 4.

4	CHECK WATER SEPARATOR

1. Check visually for insect nests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that **A** and **C** are not clogged by blowing air into **B** with **A**, and then **C** plugged.



* Ⓐ: Bottom hole (To atmosphere)
Ⓑ: Emergency tube (From EVAP canister)
Ⓒ: Inlet port (To member)

SEF829T

5. In case of NG in items 2 - 4, replace the parts.

NOTE:
- Do not disassemble water separator.

OK or NG

OK	▶	GO TO 5.
NG	▶	Replace water separator.

5	DETECT MALFUNCTIONING PART

Check the EVAP hose between EVAP canister and water separator for clogging or poor connection.

	▶	Repair or replace EVAP hose.

6	CHECK REFUELING EVAP VAPOR CUT VALVE

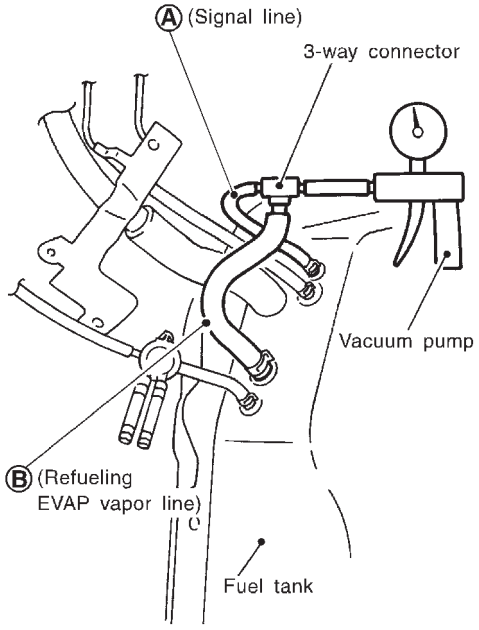
With CONSULT-II

1. Remove fuel tank. Refer to FE-5, "FUEL SYSTEM.
2. Drain fuel from the tank as follows:

a. Remove fuel feed hose located on the fuel gauge retainer.
b. Connect a spare fuel hose, one side to fuel gauge retainer where the hose was removed and the other side to a fuel container.
c. Drain fuel using "FUEL PUMP RELAY" in "ACTIVE TEST" mode with CONSULT-II.

3. Check refueling EVAP vapor cut valve for being stuck to close as follows.
   Blow air into the refueling EVAP vapor cut valve (from hose end B), and check that the air flows freely into the tank.
4. Check EVAP vapor cut valve for being stuck to open as follows.

a. Connect vacuum pump to hose ends A and B using a suitable 3-way connector.
b. Remove fuel gauge retainer with fuel gauge unit.
   Always replace O-ring with new one.
c. Put fuel tank upside down.
d. Apply vacuum pressure to both hose ends A and B [−13.3 kPa (−100 mmHg, −3.94 inHg)] with fuel gauge retainer remaining open and check that the pressure is applicable.



SEF142W

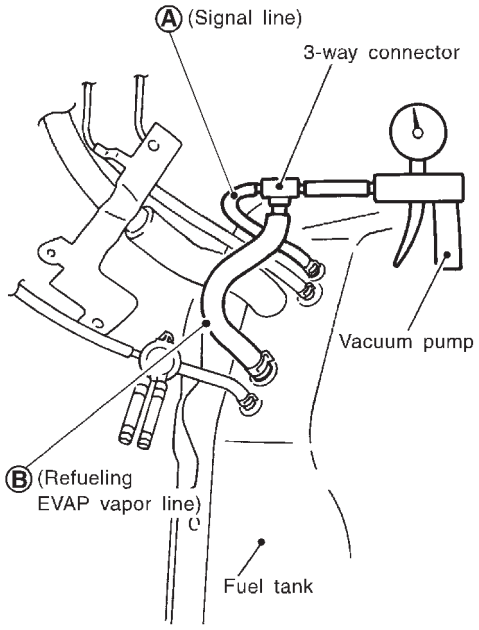
OK or NG

OK	▶	GO TO 8.
NG	▶	Replace refueling EVAP vapor cut valve with fuel tank.

7	CHECK REFUELING EVAP VAPOR CUT VALVE

Without CONSULT-II

1. Remove fuel tank. Refer to FE-5, "FUEL SYSTEM".
2. Drain fuel from the tank as follows:
a. Remove fuel gauge retainer.
b. Drain fuel from the tank using a hand pump into a fuel container.
3. Check refueling EVAP vapor cut valve for being stuck to close as follows.
   Blow air into the refueling EVAP vapor cut valve (from hose end B), and check that the air flows freely into the tank.
4. Check EVAP vapor cut valve for being stuck to open as follows.
a. Connect vacuum pump to hose ends A and B using a suitable 3-way connector.
b. Remove fuel gauge retainer with fuel gauge unit.
   Always replace O-ring with new one.
c. Put fuel tank upside down.
d. Apply vacuum pressure to both hose ends A and B [−13.3 kPa (−100 mmHg, −3.94 inHg)] with fuel gauge retainer remaining open and check that the pressure is applicable.



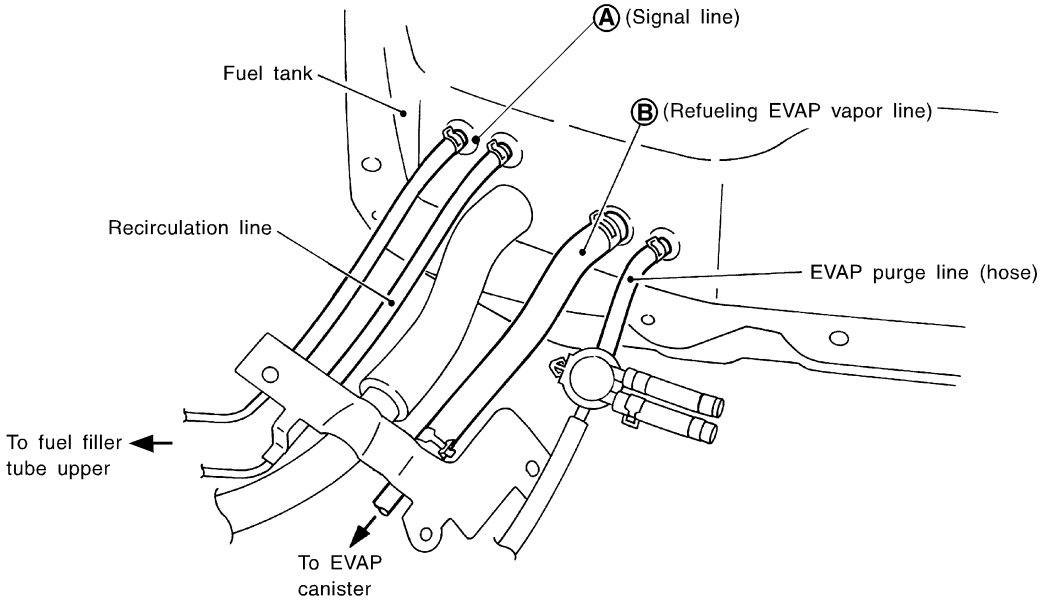
SEF142W

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace refueling EVAP vapor cut valve with fuel tank.

8	CHECK REFUELING CONTROL VALVE

1. Remove fuel filler cap.
2. Check air continuity between hose ends A and B.
   Blow air into the hose end B. Air should flow freely into the fuel tank.
3. Blow air into hose end A and check there is no leakage.
4. Apply pressure to both hose ends A and B [20 kPa (150 mmHg, 5.91 inHg)] using a pressure pump and a suitable 3-way connector. Check that there is no leakage.



SEF141W

OK or NG

OK	▶	**INSPECTION END**
NG	▶	Replace refueling control valve with fuel tank.

Symptom: Cannot Refuel/Fuel Odor From The Fuel Filler Opening Is Strong While Refueling.

NHEC0606S0202

1	CHECK EVAP CANISTER

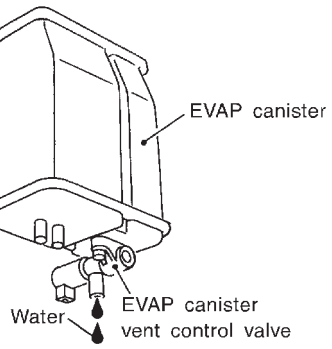
1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Weigh the EVAP canister with EVAP canister vent control valve attached.
   The weight should be less than 1.8 kg (4.0 lb).

OK or NG

OK	▶	GO TO 2.
NG	▶	GO TO 3.

2	CHECK IF EVAP CANISTER SATURATED WITH WATER

Does water drain from the EVAP canister?



SEF596U

Yes or No

Yes	▶	GO TO 3.
No	▶	GO TO 6.

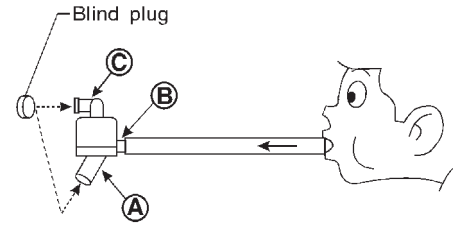
3	REPLACE EVAP CANISTER

Replace EVAP canister with a new one.

	▶	GO TO 4.

4	CHECK WATER SEPARATOR

1. Check visually for insect nests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that **A** and **C** are not clogged by blowing air into **B** with **A**, and then **C** plugged.



* Ⓐ: Bottom hole (To atmosphere)
Ⓑ: Emergency tube (From EVAP canister)
Ⓒ: Inlet port (To member)

SEF829T

5. In case of NG in items 2 - 4, replace the parts.

NOTE:

- Do not disassemble water separator.

OK or NG

OK	▶	GO TO 5.
NG	▶	Replace water separator.

5	DETECT MALFUNCTIONING PART

Check the EVAP hose between EVAP canister and water separator for clogging or poor connection.

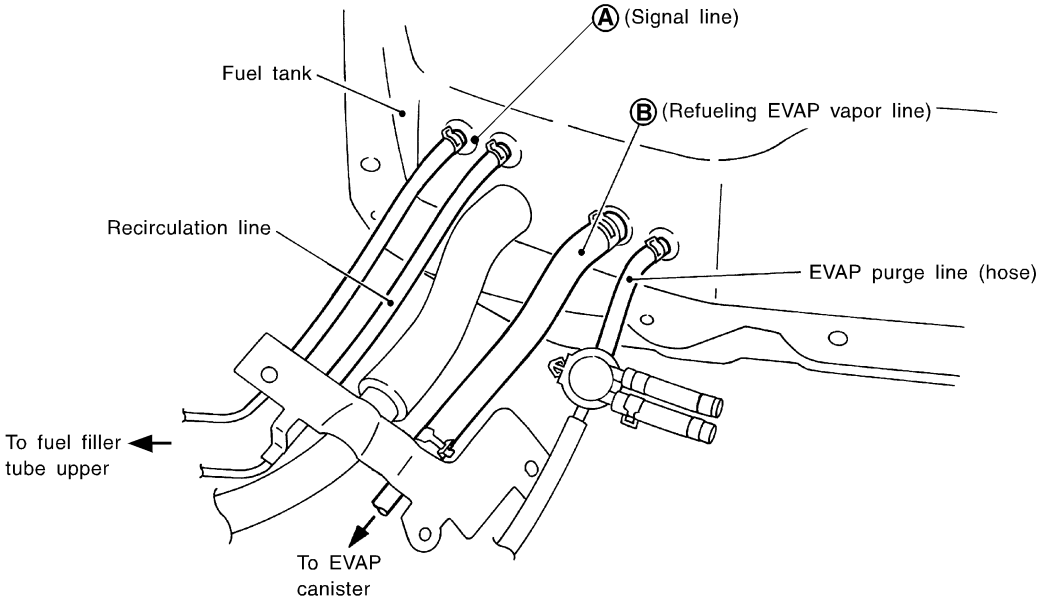
	▶	Repair or replace EVAP hose.

6	CHECK VENT HOSES AND VENT TUBES	
Check hoses and tubes between EVAP canister and refueling control valve for clogging, kink, looseness and improper connection.		
OK or NG		
OK	▶	GO TO 7.
NG	▶	Repair or replace hoses and tubes.

7	CHECK FILLER NECK TUBE	
Check signal line and recirculation line for clogging, dents and cracks.		
OK or NG		
OK	▶	GO TO 8.
NG	▶	Replace filler neck tube.

8 CHECK REFUELING CONTROL VALVE

1. Remove fuel filler cap.
2. Check air continuity between hose ends A and B.
   Blow air into the hose end B. Air should flow freely into the fuel tank.
3. Blow air into hose end A and check there is no leakage.
4. Apply pressure to both hose ends A and B [20 kPa (150 mmHg, 5.91 inHg)] using a pressure pump and a suitable 3-way connector. Check that there is no leakage.



SEF141W

OK or NG

OK (With CONSULT-II)	▶	GO TO 9.
OK (Without CONSULT-II)	▶	GO TO 10.
NG	▶	Replace refueling control valve with fuel tank.

9	CHECK REFUELING EVAP VAPOR CUT VALVE

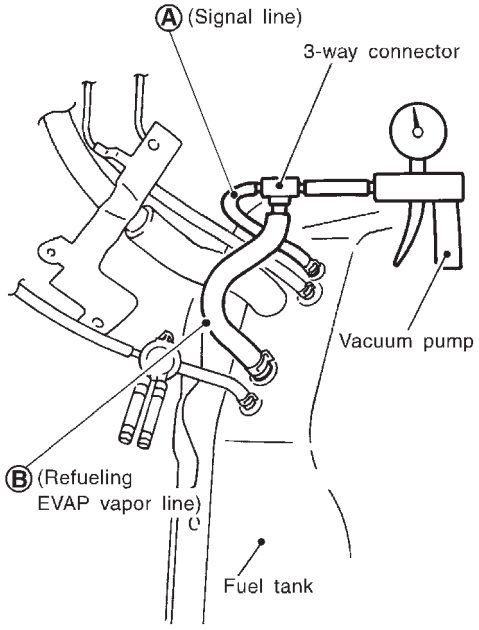
With CONSULT-II

1. Remove fuel tank. Refer to FE-5, "FUEL SYSTEM".
2. Drain fuel from the tank as follows:

a. Remove fuel feed hose located on the fuel gauge retainer.
b. Connect a spare fuel hose, one side to fuel gauge retainer where the hose was removed and the other side to a fuel container.
c. Drain fuel using "FUEL PUMP RELAY" in "ACTIVE TEST" mode with CONSULT-II.

3. Check refueling EVAP vapor cut valve for being stuck to close as follows.
   Blow air into the refueling EVAP vapor cut valve (from hose end B), and check that the air flows freely into the tank.
4. Check EVAP vapor cut valve for being stuck to open as follows.

a. Connect vacuum pump to hose ends A and B using a suitable 3-way connector.
b. Remove fuel gauge retainer with fuel gauge unit.
   Always replace O-ring with new one.
c. Put fuel tank upside down.
d. Apply vacuum pressure to both hose ends A and B [−13.3 kPa (−100 mmHg, −3.94 inHg)] with fuel gauge retainer remaining open and check that the pressure is applicable.



SEF142W

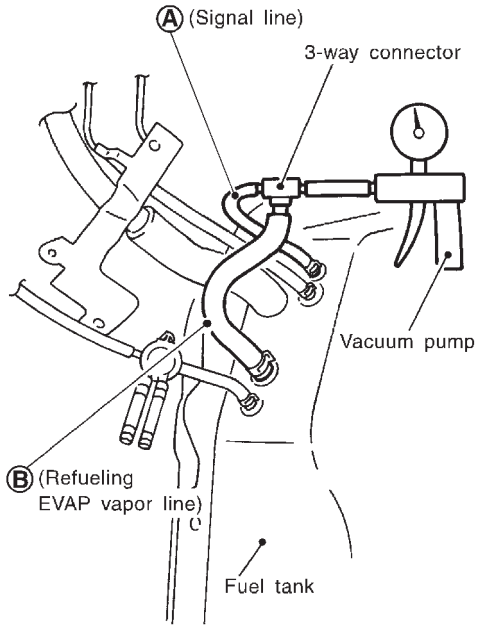
OK or NG

OK	▶	GO TO 11.
NG	▶	Replace refueling EVAP vapor cut valve with fuel tank.

10	CHECK REFUELING EVAP VAPOR CUT VALVE

Without CONSULT-II

1. Remove fuel tank. Refer to FE-5, "FUEL SYSTEM".
2. Drain fuel from the tank as follows:
a. Remove fuel gauge retainer.
b. Drain fuel from the tank using a hand pump into a fuel container.
3. Check refueling EVAP vapor cut valve for being stuck to close as follows.
   Blow air into the refueling EVAP vapor cut valve (from hose end B), and check that the air flows freely into the tank.
4. Check EVAP vapor cut valve for being stuck to open as follows.
a. Connect vacuum pump to hose ends A and B using a suitable 3-way connector.
b. Remove fuel gauge retainer with fuel gauge unit.
   Always replace O-ring with new one.
c. Put fuel tank upside down.
d. Apply vacuum pressure to both hose ends A and B [−13.3 kPa (−100 mmHg, −3.94 inHg)] with fuel gauge retainer remaining open and check that the pressure is applicable.



SEF142W

OK or NG

OK	▶	GO TO 11.
NG	▶	Replace refueling EVAP vapor cut valve with fuel tank.

11	CHECK FUEL FILLER TUBE

Check filler neck tube and hose connected to the fuel tank for clogging, dents and cracks.

OK or NG

OK	▶	GO TO 12.
NG	▶	Replace fuel filler tube.

12	CHECK ONE-WAY FUEL VALVE-I

Check one-way valve for clogging.

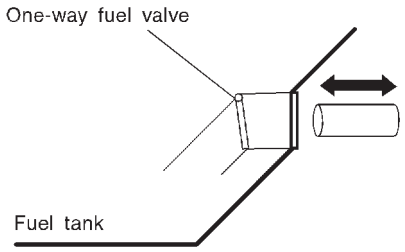
OK or NG

OK	▶	GO TO 13.
NG	▶	Repair or replace one-way fuel valve with fuel tank.

13	CHECK ONE-WAY FUEL VALVE-II

1. Make sure that fuel is drained from the tank.
2. Remove fuel filler tube and hose.
3. Check one-way fuel valve for operation as follows.
   When a stick is inserted, the valve should open, when removing stick it should close.

After removing filler tube

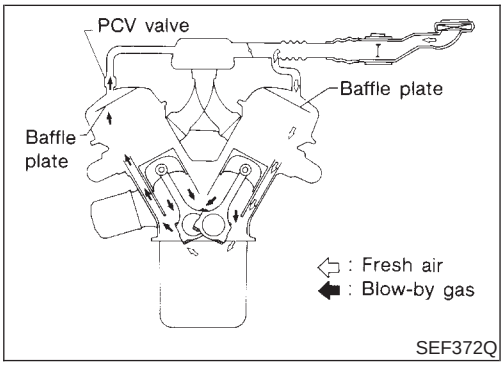


SEF665U

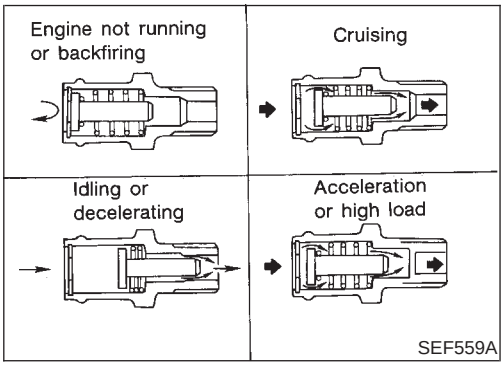
Do not drop any material into the tank.

OK or NG

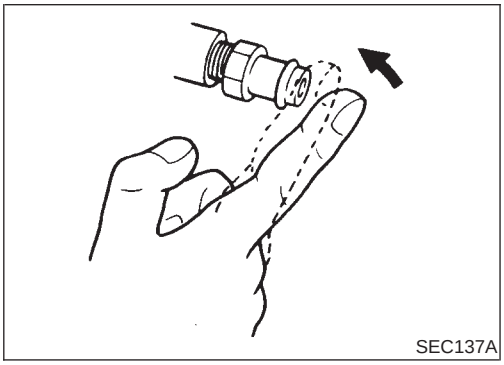
OK	▶	**INSPECTION END**
NG	▶	Replace fuel filler tube or replace one-way fuel valve with fuel tank.



SEF372Q



SEF559A



SEC137A

Positive Crankcase Ventilation

DESCRIPTION

NHEC0021

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

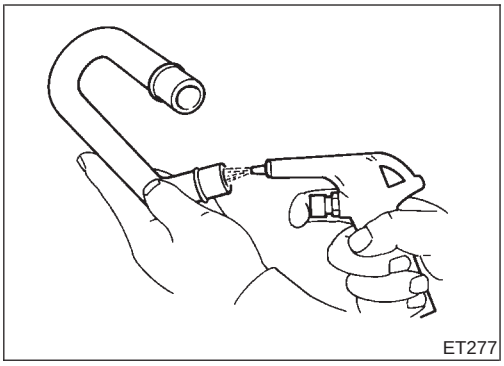
INSPECTION

NHEC0022

PCV (Positive Crankcase Ventilation) Valve

NHEC0022S01

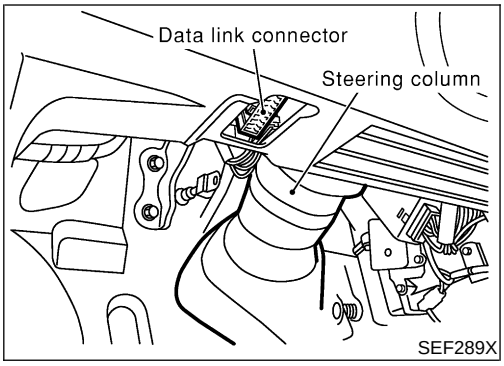
With engine running at idle, remove PCV valve ventilation hose from PCV valve; if the valve is working properly, a hissing noise will be heard as air passes through it and a strong vacuum should be felt immediately when a finger is placed over valve inlet.


ET277

PCV Valve Ventilation Hose

NHEC0022S02

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

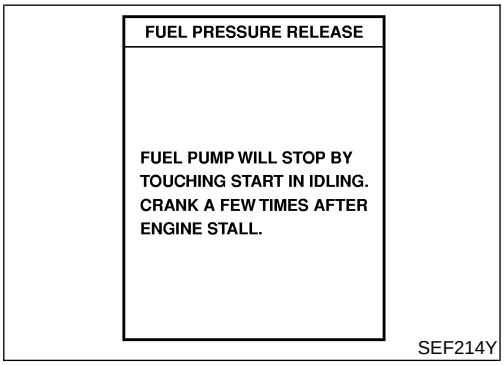
NHEC0023

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

WITH CONSULT-II

NHEC0023S01

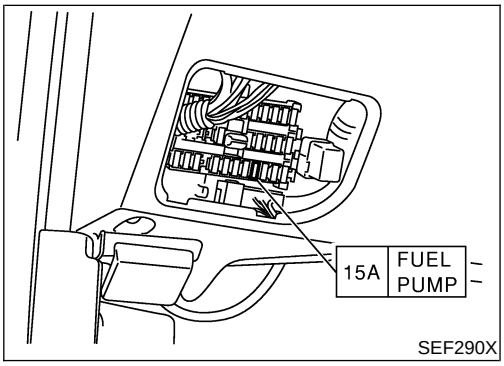
1. Turn ignition switch “ON”.
2. Perform “FUEL PRESSURE RELEASE” in “WORK SUPPORT” mode with CONSULT-II.
3. Start engine.
4. After engine stalls, crank it two or three times to release all fuel pressure.
5. Turn ignition switch “OFF”.



WITHOUT CONSULT-II

NHEC0023S02

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

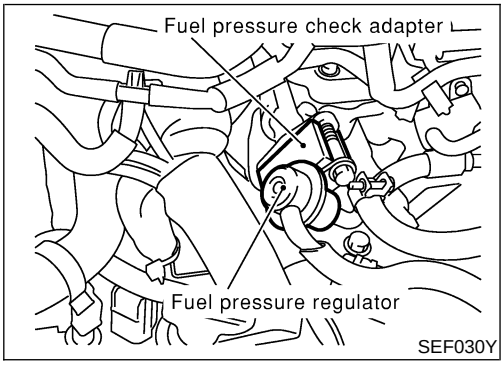


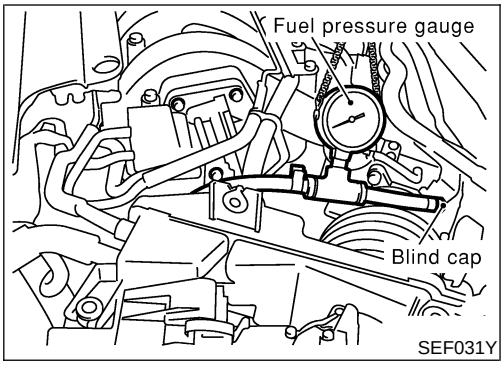
Fuel Pressure Check

NHEC0024

- **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 tube joint between fuel pressure regurator and injection tube and set fuel pressure check adapter (J44321).





3. Install pressure gauge to the fuel pressure check adapter as shown in the figure.
4. Start engine and check for fuel leakage.
5. Read the indication of fuel pressure gauge.

At idling:

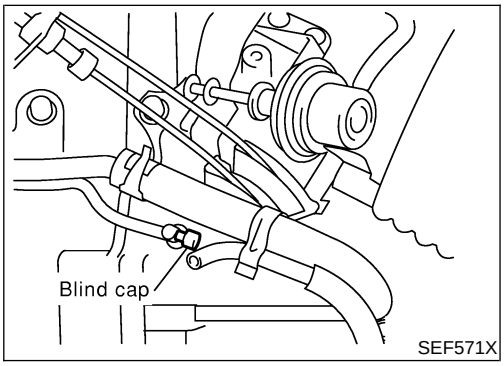
With vacuum hose connected

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

With vacuum hose disconnected

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

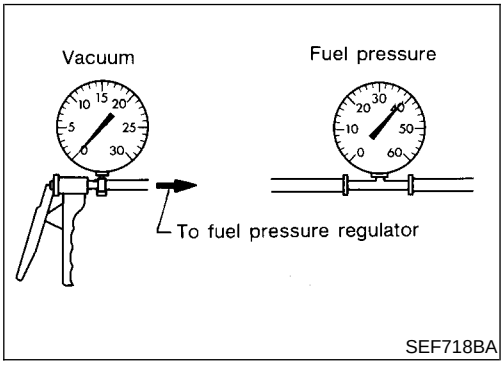
If results are unsatisfactory, perform Fuel Pressure Regulator Check.



Fuel Pressure Regulator Check

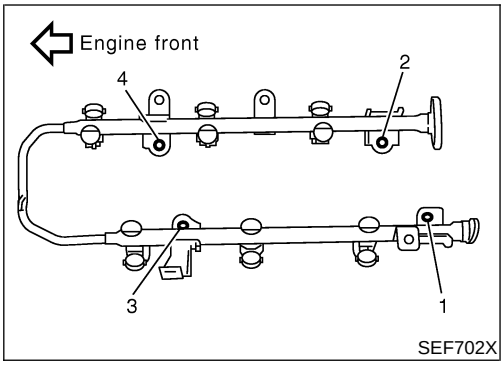
NHEC0025

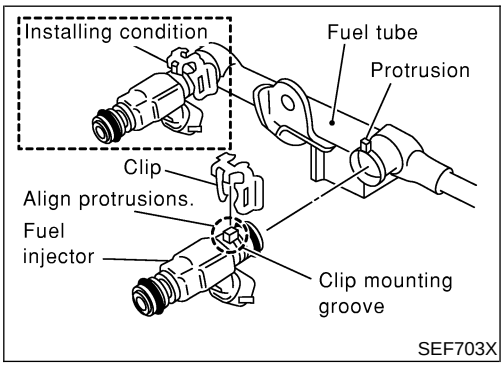
1. Stop engine and disconnect fuel pressure regulator vacuum hose from vacuum gallery.
2. Plug vacuum gallery with a blind cap.
3. Connect variable vacuum source to fuel pressure regulator.



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

NHEC0026

1. Release fuel pressure to zero.
2. Remove intake manifold collector. Refer to EM-19, “TIMING CHAIN”.
3. Remove fuel tube assemblies in numerical sequence as shown in the figure at left.
4. Expand and remove clips securing fuel injectors.
5. Extract fuel injectors straight from fuel tubes.

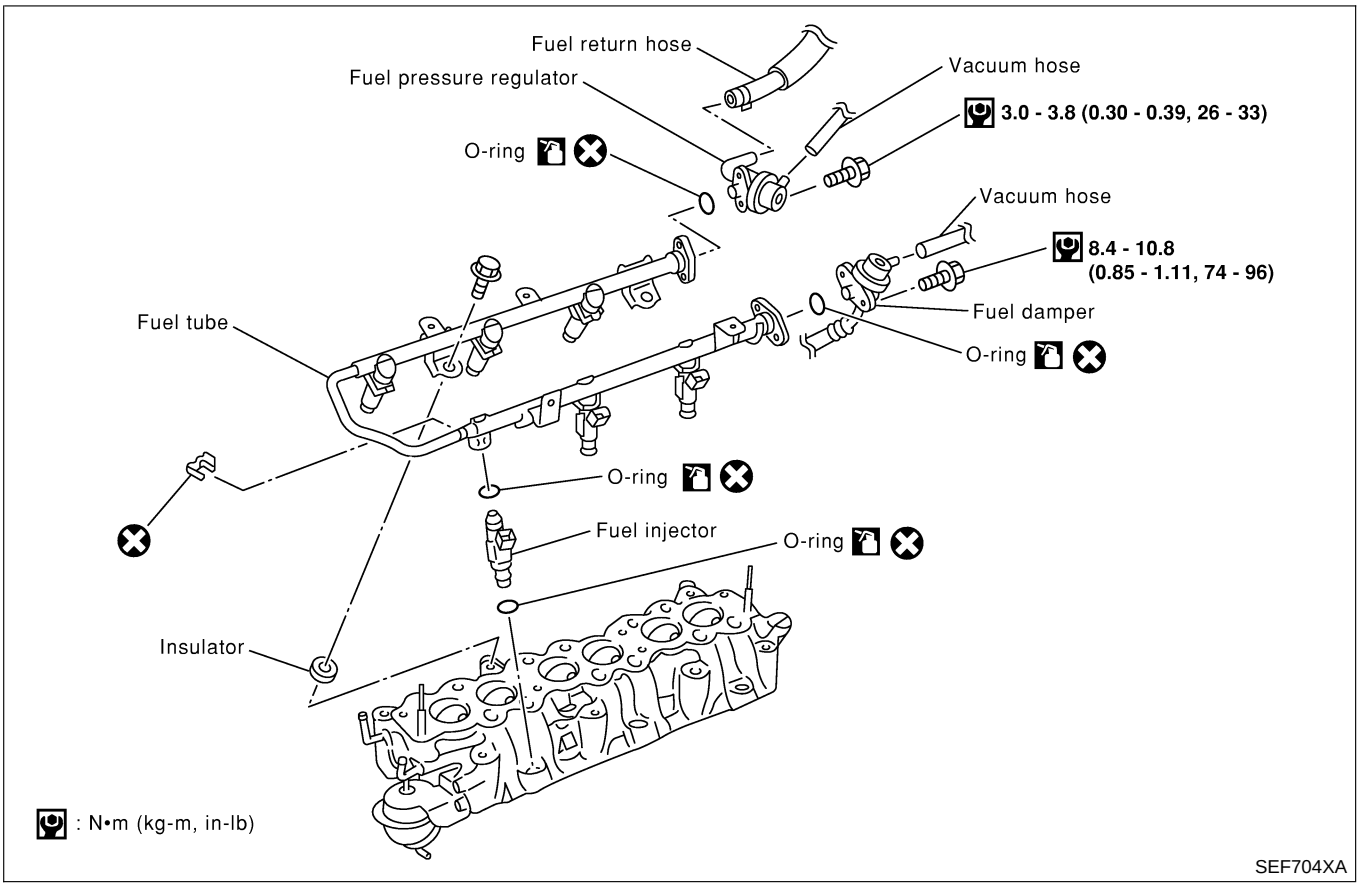
- **Be careful not to damage injector nozzles during removal.**
- **Do not bump or drop fuel injectors.**

6. Carefully install O-rings, including the one used with the pressure regulator.

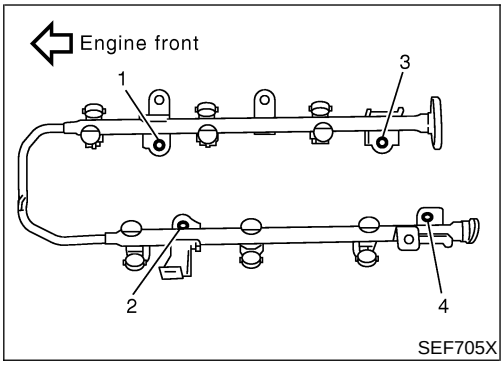
- **Lubricate O-rings with a smear of engine oil.**
- **Be careful not to damage O-rings with service tools, finger nails or clips. Do not expand or twist O-rings.**
- **Discard old clips; replace with new ones.**

7. Position clips in grooves on fuel injectors.

- **Make sure that protrusions of fuel injectors are aligned with cutouts of clips after installation.**



8. Align protrusions of fuel tubes with those of fuel injectors. Insert fuel injectors straight into fuel tubes.
9. After properly inserting fuel injectors, check to make sure that fuel tube protrusions are engaged with those of fuel injectors, and that flanges of fuel tubes are engaged with clips.



SEF705X

10. Tighten fuel tube assembly mounting nuts in numerical sequence (indicated in the figure at left) and in two stages.
    : Tightening torque N·m (kg-m, ft-lb)
    1st stage:
    9.3 - 10.8 (1.0 - 1.1, 6.9 - 7.9)
    2nd stage:
    20.6 - 26.5 (2.1 - 2.7, 16 - 19)
11. Install all parts removed in reverse order of removal.

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

How to Check Idle Speed and Ignition Timing

NHEC0607

IDLE SPEED

NHEC0607S01

- **Using CONSULT-II**

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

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

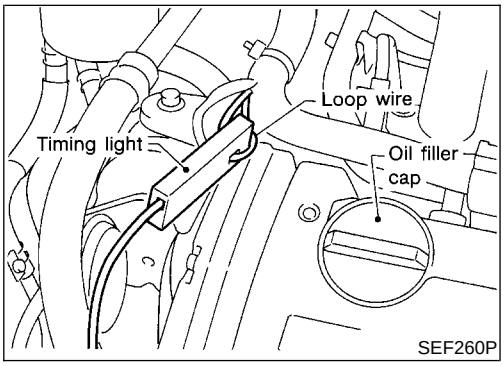
IGNITION TIMING

NHEC0607S02

Any of following two methods may be used.

- **Method A**

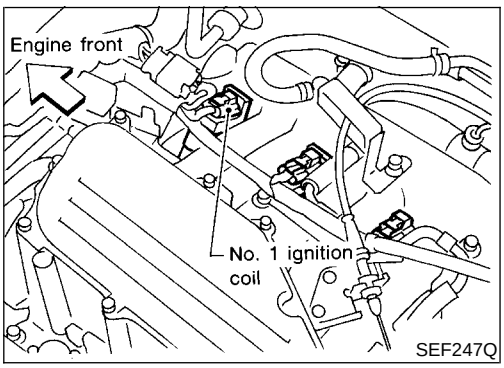
a) Attach timing light to loop wire as shown.
b) Check ignition timing.



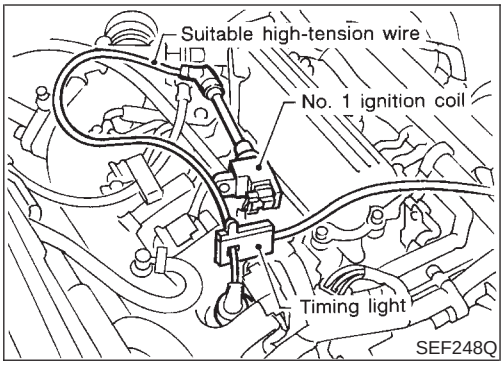
SEF260P

- **Method B**

a) Remove No. 1 ignition coil.

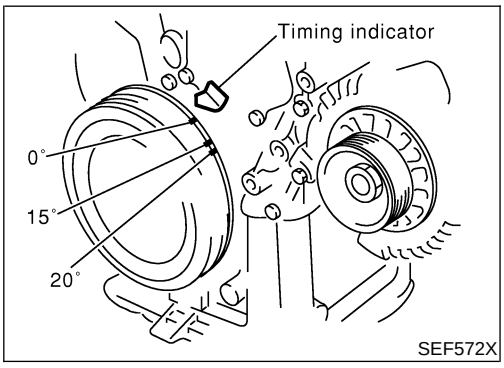


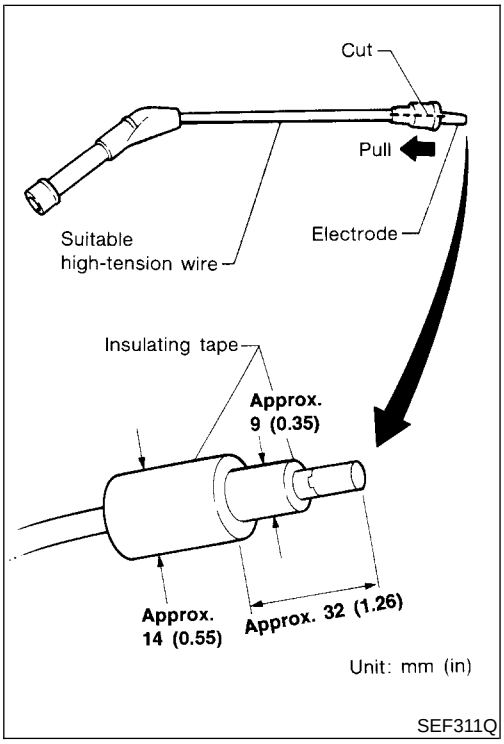
SEF247Q



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

c) Check ignition timing.





Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment

NHEC0028

NHEC0028S01

PREPARATION

1) Make sure that the following parts are in good order.

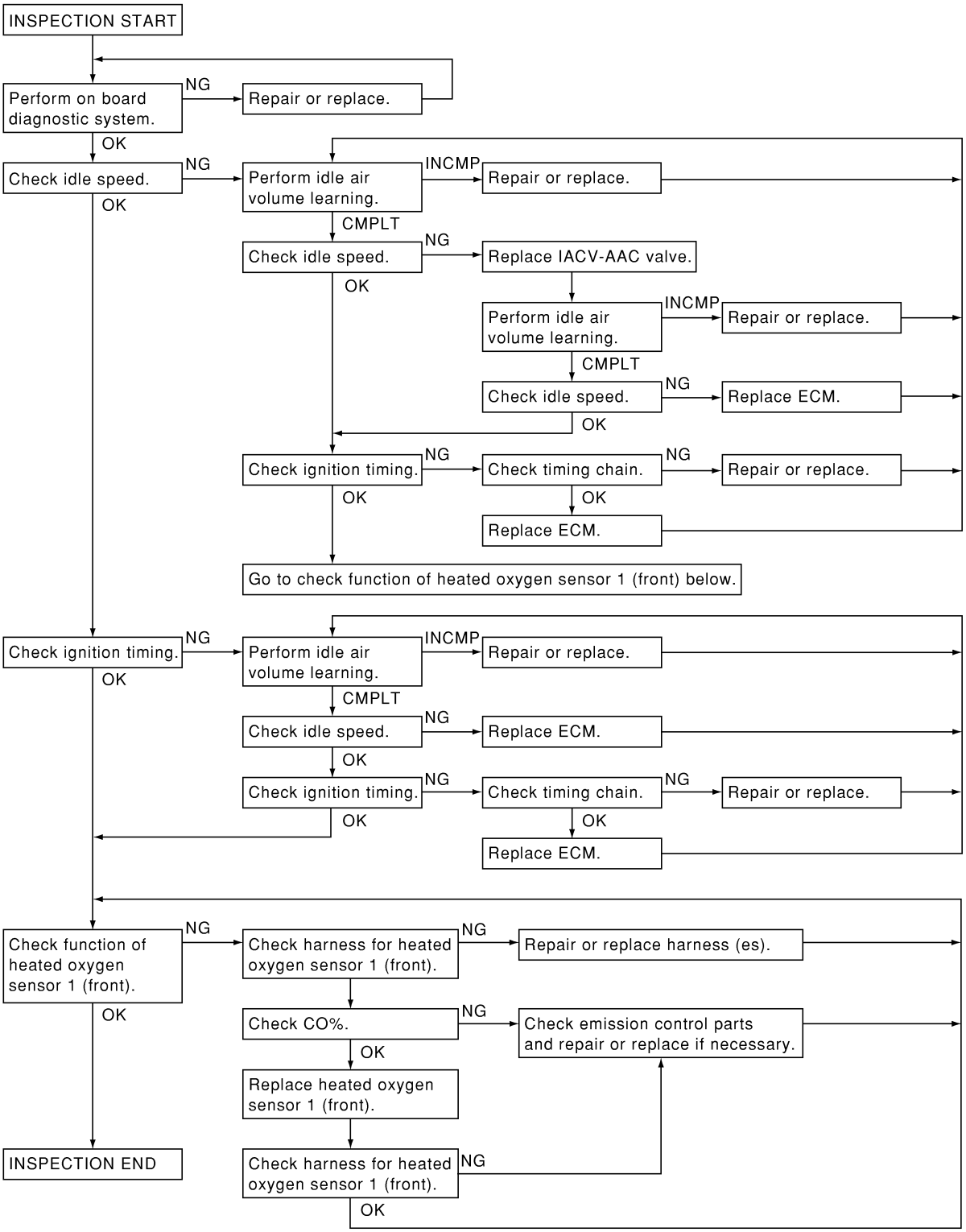
- Battery
- Ignition system
- Engine oil and coolant levels
- Fuses
- ECM harness connector
- Vacuum hoses

- Air intake system
  (Oil filler cap, oil level gauge, etc.)
- Fuel pressure
- Engine compression
- EGR valve operation
- Throttle valve
- Evaporative emission system

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

Overall Inspection Sequence

NHEC0028S0101



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

SEC141C

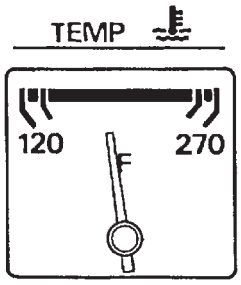
INSPECTION PROCEDURE

=NHEC0028S02

1	INSPECTION START

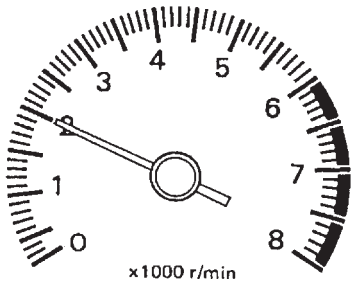
1. Visually check the following:
- Air cleaner clogging
- Hoses and ducts for leaks
- EGR valve operation
- Electrical connectors
- Gasket
- Throttle valve and throttle position sensor operation

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



SEF977U

4. Make sure that no DTC is displayed with CONSULT-II or GST.

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	REPAIR OR REPLACE

Repair or replace components as necessary according to corresponding "Diagnostic Procedure".

	▶	GO TO 3.

3	CHECK TARGET IDLE SPEED
With CONSULT-II 1. Start engine and warm it up to normal operating temperature. 2. Select "ENG SPEED" in "DATA MONITOR" mode with CONSULT-II. 3. Check idle speed. **700±50 rpm (in "P" or "N" position)**	
Without CONSULT-II 1. Start engine and warm it up to normal operating temperature. 2. Check idle speed. **700±50 rpm (in "P" or "N" position)**	
OK or NG	
OK ▶	GO TO 12.
NG ▶	GO TO 4.

4	PERFORM IDLE AIR VOLUME LEARNING
Refer to "Idle Air Volume Learning", EC-67. **Which is the result CMPLT or INCMP?**	
CMPLT or INCMP	
CMPLT ▶	GO TO 5.
INCMP ▶	1. Follow the construction of "Idle Air Volume Leaning". 2. GO TO 4.

5	CHECK TARGET IDLE SPEED AGAIN
With CONSULT-II 1. Start engine and warm it up to normal operating temperature. 2. Select "ENG SPEED" in "DATA MONITOR" mode with CONSULT-II. 3. Check idle speed. **700±50 rpm (in "P" or "N" position)**	
Without CONSULT-II 1. Start engine and warm it up to normal operating temperature. 2. Check idle speed. **700±50 rpm (in "P" or "N" position)**	
OK or NG	
OK ▶	GO TO 10.
NG ▶	GO TO 6.

6	REPLACE IACV-AAC VALVE
Replace IACV-AAC valve.	
▶	GO TO 7.

7	PERFORM IDLE AIR VOLUME LEARNING
Refer to "Idle Air Volume Learning", EC-67. **Which is the result CMPLT or INCMP?**	
CMPLT or INCMP	
CMPLT ▶	GO TO 8.
INCMP ▶	1. Follow the construction of "Idle Air Volume Learning". 2. GO TO 4.

8	CHECK TARGET IDLE SPEED AGAIN

With CONSULT-II
1. Start engine and warm it up to normal operating temperature.
2. Select "ENG SPEED" in "DATA MONITOR" mode with CONSULT-II.
3. Check idle speed.
   700±50 rpm (in "P" or "N" position)

Without CONSULT-II
1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.
   700±50 rpm (in "P" or "N" position)

OK or NG

OK	▶	GO TO 10.
NG	▶	GO TO 9.

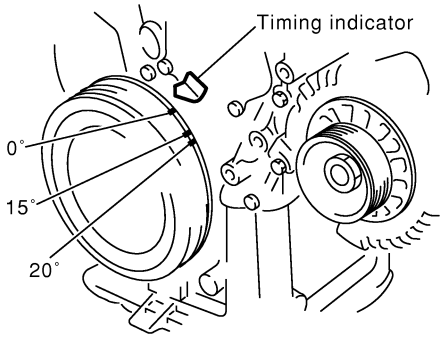
9	CHECK ECM FUNCTION

1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of a problem, but this is rarely the case.)
2. Perform initialization of IVIS (NATS) system and registration of IVIS (NATS) ignition key IDs. Refer to "IVIS (INFINITI VEHICLE IMMOBILIZER SYSTEM — NATS)", EC-84.

	▶	GO TO 4.

10	CHECK IGNITION TIMING

1. Start engine and warm it up to normal operating temperature.
2. Check ignition timing at idle using a timing light.



SEF572X

Ignition timing:
15°±5° BTDC (in "P" or "N" position)

OK or NG

OK	▶	GO TO 18.
NG	▶	GO TO 11.

11	CHECK TIMING CHAIN INSTALLATION

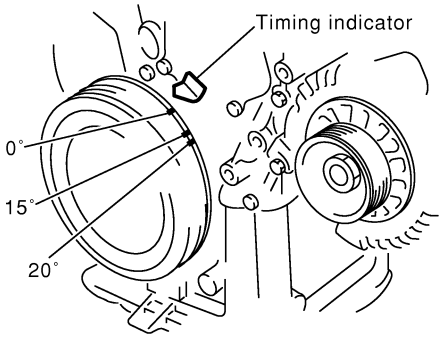
Check timing chain installation. Refer to EM-30, "Installation".

OK or NG

OK	▶	GO TO 9.
NG	▶	1. Repair the timing chain installation. 2. GO TO 4.

12	CHECK IGNITION TIMING

1. Start engine and let it idle.
2. Check ignition timing at idle using a timing light.



SEF572X

Ignition timing:
15°±5° BTDC (in "P" or "N" position)

OK or NG

OK	▶	GO TO 18.
NG	▶	GO TO 13.

13	PERFORM IDLE AIR VOLUME LEARNING

Refer to "Idle Air Volume Learning", EC-67.
Which is the result CMPLT or INCMP?

CMPLT or INCMP

CMPLT	▶	GO TO 14.
INCMP	▶	1. Follow the construction of "Idle Air volume Learning". 2. GO TO 13.

14	CHECK TARGET IDLE SPEED AGAIN

With CONSULT-II
1. Start engine and warm it up to normal operating temperature.
2. Select "ENG SPEED" in "DATA MONITOR" mode with CONSULT-II.
3. Check idle speed.
   700±50 rpm (in "P" or "N" position)

Without CONSULT-II
1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.
   700±50 rpm (in "P" or "N" position)

OK or NG

OK	▶	GO TO 16.
NG	▶	GO TO 15.

15	CHECK ECM FUNCTION

1. Substitute another known-good ECM to check ECM function.
   (ECM may be the cause of a problem, but this is rarely the case.)
2. Perform initialization of IVIS (NATS) system and registration of IVIS (NATS) ignition key IDs. Refer to "IVIS (INFINITI VEHICLE IMMOBILIZER SYSTEM — NATS)", EC-84.

	▶	GO TO 13.

16	CHECK IGNITION TIMING AGAIN	
Check ignition timing again. Refer to Test No. 12.		
OK or NG		
OK	▶	GO TO 18.
NG	▶	GO TO 17.

17	CHECK TIMING CHAIN INSTALLATION	
Check timing chain installation. Refer to EM-30, "Installation".		
OK or NG		
OK	▶	GO TO 15.
NG	▶	1. Repair the timing chain installation. 2. GO TO 13.

18	ERASE UNNECESSARY DTC	
After this inspection, unnecessary DTC No. might be displayed. Erase the stored memory in ECM and TCM (Transmission control module). Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-82 and AT-38, "HOW TO ERASE DTC".		
With CONSULT-II	▶	GO TO 19.
Without CONSULT-II	▶	GO TO 20.

19	CHECK HEATED OXYGEN SENSOR 1 (FRONT) (BANK 2) SIGNAL	
With CONSULT-II 1. Run engine at about 2,000 rpm for about 2 minutes under no-load. 2. See "HO2S1 MNTR (B2)" in "DATA MONITOR" mode. 3. Running engine at 2,000 rpm under no-load (engine is warmed up to normal operating temperature.), check that the monitor fluctuates between "LEAN" and "RICH" more than 5 times during 10 seconds.		
OK or NG		
OK	▶	GO TO 23.
NG (Monitor does not fluctuate.)	▶	GO TO 28.
NG (Monitor fluctuates less than 5 times.)	▶	GO TO 21.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	RICH

1 time: RICH → LEAN → RICH
2 times: RICH → LEAN → RICH → LEAN → RICH

SEF999Z

20	CHECK HEATED OXYGEN SENSOR 1 (FRONT) (BANK 2) SIGNAL
Without CONSULT-II 1. Run engine at about 2,000 rpm for about 2 minutes under no-load. 2. Set voltmeter probe between ECM terminal 62 and ground. 3. Make sure that the voltage fluctuates between 0 - 0.3V and 0.6 - 1.0V more than 5 times during 10 seconds at 2,000 rpm. **1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V** **2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V**	
OK or NG	
OK ▶	GO TO 23.
NG (Voltage does not fluctuate.) ▶	GO TO 28.
NG (Voltage fluctuates less than 5 times.) ▶	GO TO 21.

21	CHECK HEATED OXYGEN SENSOR 1 (FRONT) (BANK 2) SIGNAL
With CONSULT-II 1. Stop engine. 2. Replace heated oxygen sensor 1 (front) (bank 2). 3. Start engine and warm it up to normal operating temperature. 4. Run engine at approx. 2,000 rpm for approx. 2 minutes under no-load. 5. See "HO2S1 MNTR (B2)" in "DATA MONITOR" mode. 6. Running engine at 2,000 rpm under no-load (engine is warmed up to normal operating temperature.), check that the monitor fluctuates between "LEAN" and "RICH" more than 5 times during 10 seconds. **1 time: RICH → LEAN → RICH** **2 times: RICH → LEAN → RICH → LEAN → RICH**	
Without CONSULT-II 1. Stop engine. 2. Replace heated oxygen sensor 1 (front) (bank 2). 3. Start engine and warm it up to normal operating temperature. 4. Run engine at approx. 2,000 rpm for approx. 2 minutes under no-load. 5. Set voltmeter probe between ECM terminal 62 and ground. 6. Make sure that the voltage fluctuates between 0 - 0.3V and 0.6 - 1.0V more than 5 times during 10 seconds at 2,000 rpm. **1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V** **2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V**	
OK or NG	
OK (With CONSULT-II) ▶	GO TO 23.
OK (Without CONSULT-II) ▶	GO TO 24.
NG ▶	GO TO 22.

22	DETECT MALFUNCTIONING PART
Check the following. 1. Check fuel pressure regulator. Refer to EC-51. 2. Check mass air flow sensor and its circuit. Refer to EC-164. 3. Check injector and its circuit. Refer to EC-657. Clean or replace if necessary. 4. Check engine coolant temperature sensor and its circuit. Refer to EC-200. 5. 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 3.

23	CHECK HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1) SIGNAL

With CONSULT-II

1. See "HO2S1 MNTR (B1)" in "DATA MONITOR" mode.
2. Maintaining engine at 2,000 rpm under no-load (engine is warmed up to normal operating temperature.), check that the monitor fluctuates between "LEAN" and "RICH" more than 5 times during 10 seconds.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	RICH

1 time: RICH → LEAN → RICH
2 times: RICH → LEAN → RICH → LEAN → RICH

SEF999Z

OK or NG

OK	▶	**INSPECTION END**
NG (Monitor does not fluctuate.)	▶	GO TO 27.
NG (Monitor fluctuates less than 5 times.)	▶	GO TO 25.

24	CHECK HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1) SIGNAL

Without CONSULT-II

1. Set voltmeter probe between ECM terminal 63 and ground.
2. Make sure that the voltage fluctuates between 0 - 0.3V and 0.6 - 1.0V more than 5 times during 10 seconds at 2,000 rpm.
   1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
   2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

OK or NG

OK	▶	**INSPECTION END**
NG (Voltage does not fluctuate.)	▶	GO TO 27.
NG (Voltage fluctuates less than 5 times.)	▶	GO TO 25.

25	CHECK HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1) SIGNAL

With CONSULT-II

1. Stop engine.
2. Replace heated oxygen sensor 1 (front) (bank 1).
3. Start engine and warm it up to normal operating temperature.
4. Run engine at approx. 2,000 rpm for approx. 2 minutes under no-load.
5. See "HO2S1 MNTR (B1)" in "DATA MONITOR" mode.
6. Maintaining engine at 2,000 rpm under no-load (engine is warmed up to normal operating temperature.), check that the monitor fluctuates between "LEAN" and "RICH" more than 5 times during 10 seconds.
   1 time: RICH → LEAN → RICH
   2 times: RICH → LEAN → RICH → LEAN → RICH

Without CONSULT-II

1. Stop engine.
2. Replace heated oxygen sensor 1 (front) (bank 1).
3. Start engine and warm it up to normal operating temperature.
4. Run engine at approx. 2,000 rpm for approx. 2 minutes under no-load.
5. Set voltmeter probe between ECM terminal 63 and ground.
6. Make sure that the voltage fluctuates between 0 - 0.3V and 0.6 - 1.0V more than 5 times during 10 seconds at 2,000 rpm.
   1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
   2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 26.

26	DETECT MALFUNCTIONING PART

Check the following.

- Check fuel pressure regulator. Refer to EC-51.
- Check mass air flow sensor and its circuit. Refer to EC-164.
- Check injector and its circuit. Refer to EC-657.
  Clean or replace if necessary.
- Check engine coolant temperature sensor and its circuit. Refer to EC-200.
- 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 3.

27	CHECK HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1) HARNESS

1. Turn off engine and disconnect battery ground cable.
2. Disconnect ECM harness connector.
3. Disconnect heated oxygen sensor 1 (front) (bank 1) harness connector.
4. Check harness continuity between ECM terminal 63 and heated oxygen sensor 1 (front) (bank 1) harness connector terminal 1.
   Refer to Wiring Diagram, EC-208.
   Continuity should exist.

OK or NG

OK	▶	GO TO 30.
NG	▶	GO TO 29.

28	CHECK HEATED OXYGEN SENSOR 1 (FRONT) (BANK 2) HARNESS

1. Turn off engine and disconnect battery ground cable.
2. Disconnect ECM harness connector.
3. Disconnect heated oxygen sensor 1 (front) (bank 2) harness connector.
4. Check harness continuity between ECM terminal 62 and heated oxygen sensor 1 (front) (bank 2) harness connector terminal 1.
   Refer to Wiring Diagram, EC-209.
   Continuity should exist.

OK or NG

OK	▶	GO TO 30.
NG	▶	GO TO 29.

29	REPAIR OR REPLACE

Repair or replace harness between ECM and heated oxygen sensor 1 (front).

▶ GO TO 3.

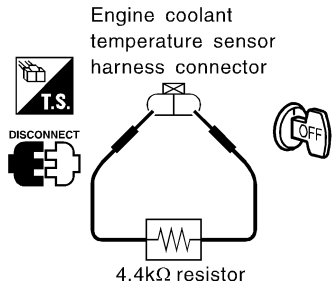
30	PREPARATION FOR "CO" % CHECK

With CONSULT-II
1. Reconnect ECM harness connector.
2. Turn ignition switch "ON".
3. Select "ENG COOLANT TEMP" in "ACTIVE TEST" mode.
4. Set "ENG COOLANT TEMP" to 5°C (41°F) by touching "DWN" and "Qd".

ACTIVE TEST	
ENG COOLANT TEMP	XXX °C
MONITOR	
ENG SPEED	XXX rpm
INJ PULSE-B1	XXX msec
IGN TIMING	XXX BTDC

SEF172Y

Without CONSULT-II
1. Disconnect ECM harness connector.
2. Disconnect engine coolant temperature sensor harness connector.
3. Connect a resistor (4.4 kΩ) between terminals of engine coolant temperature sensor harness connector.

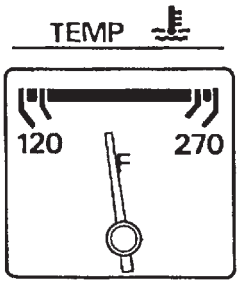


SEF982UA

▶ GO TO 31.

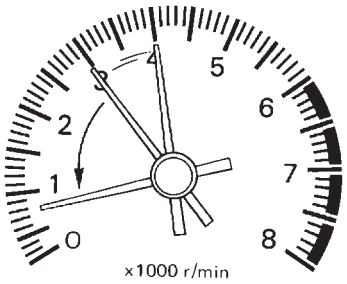
31	CHECK "CO" %

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



SEF976U

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



SEF978U

3. Check "CO" %.
   Idle CO: 3 - 11%
4. (Ⓧ) **Without CONSULT-II**
   After checking CO%,

a. Disconnect the resistor from terminals of engine coolant temperature sensor.
b. Connect engine coolant temperature sensor harness connector to engine coolant temperature sensor.

OK or NG

OK	▶	GO TO 32.
NG	▶	GO TO 33.

32	CHECK HEATED OXYGEN SENSOR 1 (FRONT) SIGNAL

(Ⓟ) **With CONSULT-II**

1. Stop engine.
2. Replace heated oxygen sensor 1 (front).
3. Start engine and warm it up to normal operating temperature.
4. Run engine at approx. 2,000 rpm for approx. 2 minutes under no-load.
5. See "HO2S1 MNTR (B1)/(B2)" in "DATA MONITOR" mode.
6. Maintaining engine at 2,000 rpm under no-load (engine is warmed up to normal operating temperature.), check that the monitor fluctuates between "LEAN" and "RICH" more than 5 times during 10 seconds.
   1 time: RICH → LEAN → RICH
   2 times: RICH → LEAN → RICH → LEAN → RICH

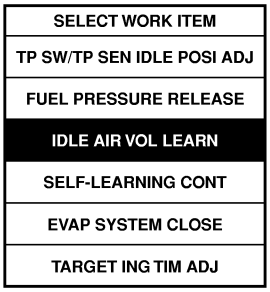
(Ⓧ) **Without CONSULT-II**

1. Stop engine.
2. Replace heated oxygen sensor 1 (front).
3. Start engine and warm it up to normal operating temperature.
4. Run engine at approx. 2,000 rpm for approx. 2 minutes under no-load.
5. Set voltmeter probe between ECM terminal 63 or 62 and ground.
6. Make sure that voltage fluctuates between 0 - 0.3V and 0.6 - 1.0V more than 5 times during 10 seconds at 2,000 rpm.
   1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
   2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

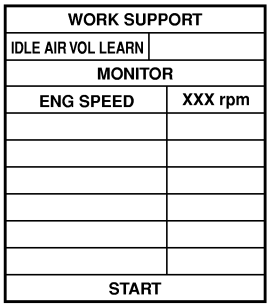
OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 33.

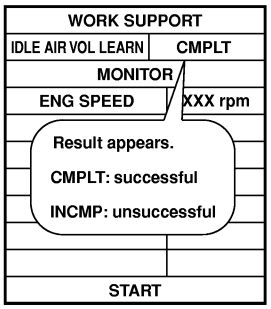
33	DETECT MALFUNCTIONING PART
Check the following. ● Connect heated oxygen sensor 1 (front) harness connectors to heated oxygen sensors 1 (front). ● Check fuel pressure regulator. Refer to EC-51. ● Check mass air flow sensor and its circuit. Refer to EC-164. ● Check injector and its circuit. Refer to EC-657. Clean or replace if necessary. ● Check engine coolant temperature sensor and its circuit. Refer to EC-200. ● 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 3.



SEF452Y



SEF454Y



SEF455Y

Idle Air Volume Learning

NHEC0642

DESCRIPTION

NHEC0642S01

"Idle Air Volume Learning" is an operation to learn the idle air volume that keeps each engine within the specific range. It must be performed under any of the following conditions:

- Each time IACV-AAC valve, throttle body or ECM is replaced.
- Idle speed or ignition timing is out of specification.

PRE-CONDITIONING

NHEC0642S02

Before performing "Idle Air Volume Learning", make sure that all of the following conditions are satisfied.
Learning will be cancelled if any of the following conditions are missed for even a moment.

- Battery voltage: More than 12.9V (At idle)
- Engine coolant temperature: 70 - 99°C (158 - 210°F)
- PNP switch: ON
- Electric load switch: OFF
  (Air conditioner, headlamp, rear window defogger)

On vehicles equipped with daytime light systems, set lighting switch to the 1st position to light only small lamps.

- Cooling fan motor: Not operating
- Steering wheel: Neutral (Straight-ahead position)
- Vehicle speed: Stopped
- Transmission: Warmed-up
  For models with CONSULT-II, drive vehicle until "FLUID TEMP SE" in "DATA MONITOR" mode of "A/T" system indicates less than 0.9V.
  For models without CONSULT-II, drive vehicle for 10 minutes.

OPERATION PROCEDURE

NHEC0642S03

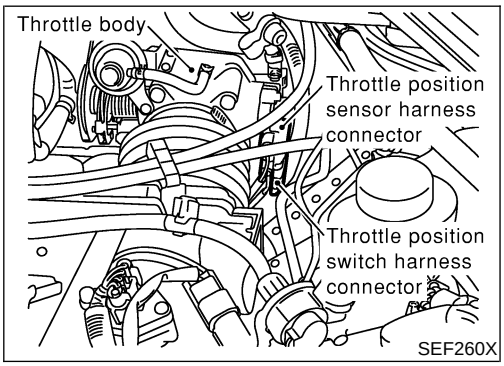
With CONSULT-II

NHEC0642S0301

1. Turn ignition switch "ON" and wait at least 1 second.
2. Turn ignition switch "OFF" and wait at least 10 seconds.
3. Start engine and warm it up to normal operating temperature.
4. Check that all items listed under the topic "PRE-CONDITIONING" (previously mentioned) are in good order.
5. Turn ignition switch "OFF" and wait at least 10 seconds.
6. Start the engine and let it idle for at least 30 seconds.
7. Select "IDLE AIR VOL LEARN" in "WORK SUPPORT" mode.
8. Touch "START" and wait 20 seconds.
9. Make sure that "CMPLT" is displayed on CONSULT-II screen. If "INCMP" is displayed, "Idle Air Volume Learning" will not be carried out successfully. In this case, find the cause of the problem by referring to the NOTE below.
10. Rev up the engine two or three times. Make sure that idle

speed and ignition timing are within specifications.

ITEM	SPECIFICATION
Idle speed	700±50 rpm (in "P" or "N" position)
Ignition timing	15°±5° BTDC (in "P" or "N" position)



Without CONSULT-II

NHEC0642S0302

1. Turn ignition switch "ON" and wait at least 1 second.
2. Turn ignition switch "OFF" and wait at least 10 seconds.
3. Start engine and warm it up to normal operating temperature.
4. Check that all items listed under the topic "PRE-CONDITIONING" (previously mentioned) are in good order.
5. Turn ignition switch "OFF" and wait at least 10 seconds.
6. Start the engine and let it idle for at least 30 seconds.
7. Disconnect throttle position sensor harness connector (brown), then reconnect it within 5 seconds.
8. Wait 20 seconds.
9. Make sure that idle speed is within specifications. If not, the result will be incomplete. In this case, find the cause of the problem by referring to the NOTE below.
10. Rev up the engine two or three times. Make sure that idle speed and ignition timing are within specifications.

ITEM	SPECIFICATION
Idle speed	700±50 rpm (in "P" or "N" position)
Ignition timing	15°±5° BTDC (in "P" or "N" position)

NOTE:
If idle air volume learning cannot be performed successfully, proceed as follows:

1) **Check that throttle valve is fully closed.**
2) **Check PCV valve operation.**
3) **Check that downstream of throttle valve is free from air leakage.**
4) **Adjust closed throttle position switch and reset memory. (Refer to Basic Inspection, EC-110.)**
5) **When the above four items check out OK, engine component parts and their installation condition are questionable. Check and eliminate the cause of the problem.**
   It is useful to perform "TROUBLE DIAGNOSIS — SPECIFICATION VALUE", EC-152.
6) **If any of the following conditions occur after the engine has started, eliminate the cause of the problem and perform "Idle air volume learning" all over again:**

- **Engine stalls.**
- **Erroneous idle.**
- **Blown fuses related to the IACV-AAC valve system.**

Introduction

NHEC0029

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:

Emission-related diagnostic information	SAE Mode
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
CONSULT-II	X	X	X	X	X	—
GST	X	X*1	X	—	X	X

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

The malfunction indicator lamp (MIL) on the instrument panel lights up when the same malfunction is detected in two consecutive trips (Two trip detection logic), or when the ECM enters fail-safe mode. (Refer to EC-126.)

Two Trip Detection Logic

NHEC0030

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

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

X: Applicable —: Not applicable

Items	MIL				DTC		1st trip DTC	
	1st trip		2nd trip		1st trip displaying	2nd trip displaying	1st trip displaying	2nd trip displaying
	Blinking	Lighting up	Blinking	Lighting up				
Coolant overtemperature enrichment protection — DTC: P0217	—	X	—	—	X	—	X	—
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0306 is being detected	X	—	—	—	—	—	X	—
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0306 is being detected	—	—	X	—	—	X	—	—
Closed loop control — DTC: P1148, P1168	—	X	—	—	X	—	X	—
Fail-safe items (Refer to EC-126.)	—	X	—	—	X*1	—	X*1	—
Except above	—	—	—	X	—	X	X	—

*1: Except “ECM”

Emission-related Diagnostic Information

NHEC0031

DTC AND 1ST TRIP DTC

NHEC0031S01

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”, EC-82.

For malfunctions in which 1st trip DTCs are displayed, refer to EC-79. These items are required by legal regulations to continuously monitor the system/component. In addition, the items monitored non-continuously are also displayed on CONSULT-II.

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

When a 1st trip DTC is detected, check, print out or write down and erase (1st trip) DTC and Freeze Frame data as specified in “Work Flow” procedure Step II, refer to EC-108. 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

NHEC0031S0101

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

With CONSULT-II

With GST

CONSULT-II or GST (Generic Scan Tool) Examples: P0340, P1320, P0705, P0750, etc.

These DTCs are prescribed by SAE J2012.

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

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

A sample of CONSULT-II display for DTC and 1st trip DTC is shown below. DTC or 1st trip DTC of a malfunction is displayed in SELF-DIAGNOSTIC RESULTS mode of CONSULT-II. Time data indicates how many times the vehicle was driven after the last detection of a DTC.

If the DTC is being detected currently, the time data will be “0”.

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

DTC display

SELF DIAG RESULTS	
DTC RESULTS	TIME
MAF SEN/CIRCUIT [P0100]	0

1st trip DTC display

SELF DIAG RESULTS	
DTC RESULTS	TIME
MAF SEN/CIRCUIT [P0100]	1t

SEF992X

FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA

NHEC0031S02

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 at the moment a malfunction is detected.

Data which are stored in the ECM memory, along with the 1st trip DTC, are called 1st trip freeze frame data.

The data, stored together with the DTC data, are called freeze frame data and displayed on CONSULT-II or GST. The 1st trip freeze frame data can only be displayed on the CONSULT-II screen, not on the GST. For details, see EC-95.

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 - P0306 Fuel Injection System Function — DTC: P0171, P0172, P0174, P0175
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", EC-82.

SYSTEM READINESS TEST (SRT) CODE

NHEC0031S03

System Readiness Test (SRT) code is specified in Mode 1 of SAE J1979.

As part of an enhanced emissions test for Inspection & Maintenance (I/M), certain states require the status of SRT be used to indicate whether the ECM has completed self-diagnosis of major emission systems and components. Completion must be verified in order for the emissions inspection to proceed.

If a vehicle is rejected for a State emissions inspection due to one or more SRT items indicating "INCMP", use the information in this Service Manual to set the SRT to "CMPLT".

In most cases the ECM will automatically complete its self-diagnosis cycle during normal usage, and the SRT status will indicate "CMPLT" for each application system. Once set as "CMPLT", the SRT status remains "CMPLT" until the self-diagnosis memory is erased.

Occasionally, certain portions of the self-diagnostic test may not be completed as a result of the customer's normal driving pattern; the SRT will indicate "INCMP" for these items.

NOTE:

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

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

NOTE:

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

SRT Item

=NHEC0031S0310

The table below shows required self-diagnostic items to set the SRT to "CMPLT".

SRT item (CONSULT-II indication)	Performance Priority*2	Required self-diagnostic items to set the SRT to "CMPLT"	Corresponding DTC No.
CATALYST	3	Three way catalyst function	P0420, P0430
EVAP SYSTEM	2	EVAP control system (small leak) (negative pressure)	P0440
	—	EVAP control system (small leak) (positive pressure)	P1440*1
	3	EVAP control system purge flow monitoring	P1447
O2 SENSOR	3	Front heated oxygen sensor (circuit)	P0130, P0150
		Front heated oxygen sensor (lean shift monitoring)	P0131, P0151
		Front heated oxygen sensor (rich shift monitoring)	P0132, P0152
		Front heated oxygen sensor (response monitoring)	P0133, P0153
		Front heated oxygen sensor (high voltage)	P0134, P0154
		Rear heated oxygen sensor (min. voltage monitoring)	P0137, P0157
		Rear heated oxygen sensor (max. voltage monitoring)	P0138, P0158
		Rear heated oxygen sensor (response monitoring)	P0139, P0159
		Rear heated oxygen sensor (high voltage)	P0140, P0160
O2 SEN HEATER	3	Front heated oxygen sensor heater	P0135, P0155
		Rear heated oxygen sensor heater	P0141, P0161
EGR SYSTEM	3	EGR function (close)	P0400
	1	EGR function (open)	P1402

*1: P1440 [EVAP control system (small leak) (positive pressure) diagnosis] is one type of SRT related diagnosis. This diagnosis, however, does not contribute to setting the SRT as "CMPLT", when no malfunction exists in the EVAP system. Therefore, P0440 must be used instead of P1440.

*2: If completion of several SRTs is required, perform driving patterns (DTC confirmation procedure), one by one based on the priority for models with CONSULT-II.

SRT Set Timing

=NHEC0031S0311

SRT is set as "CMPLT" after self-diagnosis has been performed one or more times. Completion of SRT is done regardless of whether the result is OK or NG. The set timing is different between OK and NG results and is shown in the table below.

Self-diagnosis result		Example				
		Diagnosis	Ignition cycle ← ON → OFF ← ON → OFF ← ON → OFF ← ON →			
All OK	Case 1	P0400	OK (1)	— (1)	OK (2)	— (2)
		P0402	OK (1)	— (1)	— (1)	OK (2)
		P1402	OK (1)	OK (2)	— (2)	— (2)
		SRT of EGR	"CMPLT"	"CMPLT"	"CMPLT"	"CMPLT"
	Case 2	P0400	OK (1)	— (1)	— (1)	— (1)
		P0402	— (0)	— (0)	OK (1)	— (1)
		P1402	OK (1)	OK (2)	— (2)	— (2)
		SRT of EGR	"INCMP"	"INCMP"	"CMPLT"	"CMPLT"
NG exists	Case 3	P0400	OK	OK	—	—
		P0402	—	—	—	—
		P1402	NG	—	NG	NG (Consecutive NG)
		(1st trip) DTC	1st trip DTC	—	1st trip DTC	DTC (= MIL "ON")
		SRT of EGR	"INCMP"	"INCMP"	"INCMP"	"CMPLT"

OK: Self-diagnosis is carried out and the result is OK.
NG: Self-diagnosis is carried out and the result is NG.
—: Self-diagnosis is not carried out.

When all SRT related self-diagnoses showed OK results in a single cycle (Ignition OFF-ON-OFF), the SRT will indicate "CMPLT". → Case 1 above
When all SRT related self-diagnoses showed OK results through several different cycles, the SRT will indicate "CMPLT" at the time the respective self-diagnoses have at least one OK result. → Case 2 above
If one or more SRT related self-diagnoses showed NG results in 2 consecutive cycles, the SRT will also indicate "CMPLT". → Case 3 above
The table above shows that the minimum number of cycles for setting SRT as "INCMP" is one (1) for each self-diagnosis (Case 1 & 2) or two (2) for one of self-diagnoses (Case 3). However, in preparation for the state emissions inspection, it is unnecessary of each self-diagnosis to be executed twice (Case 3) for the following reasons:

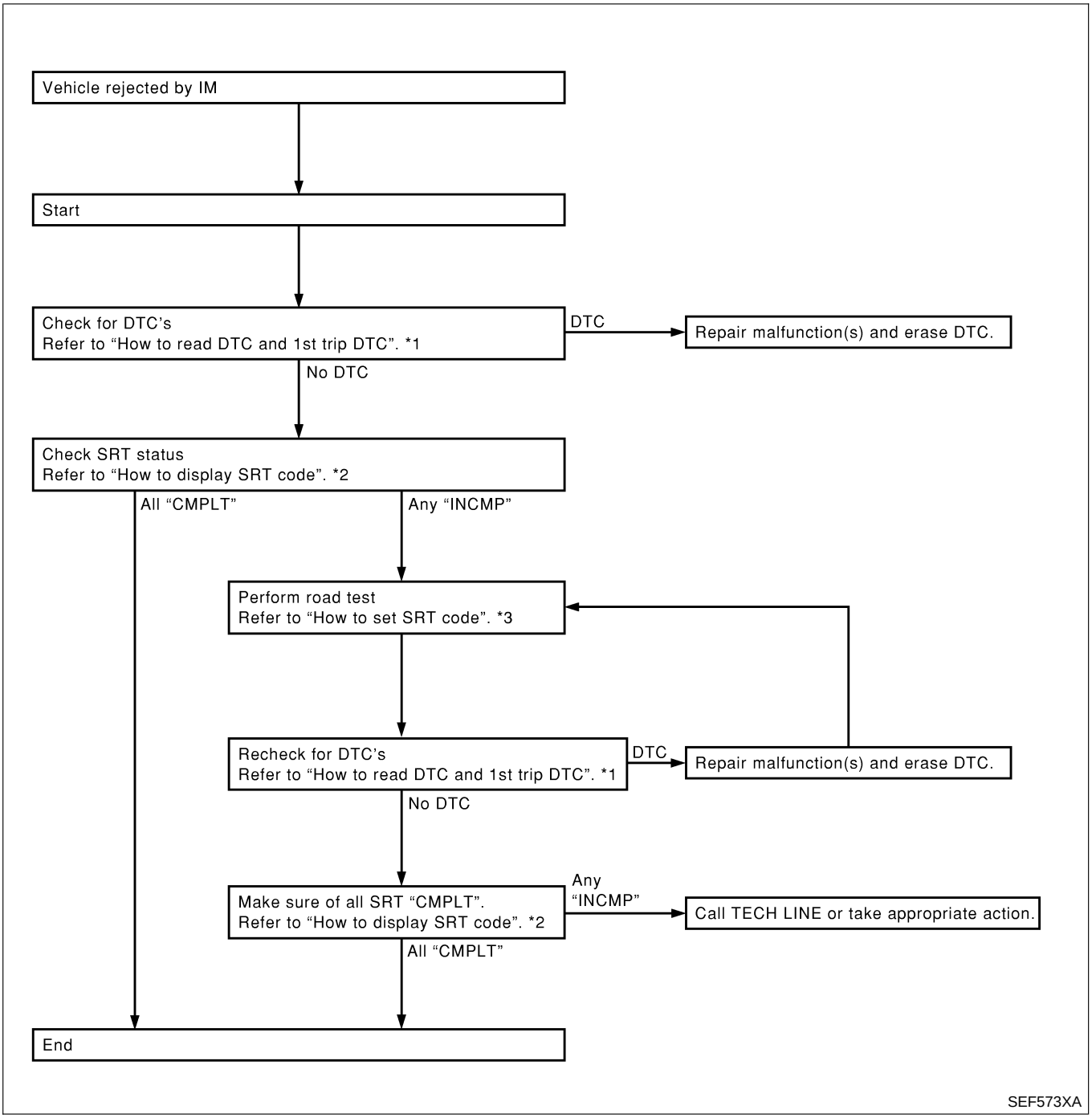
- The SRT will indicate "CMPLT" at the time the respective self-diagnoses have one (1) OK result.
- The emissions inspection requires "CMPLT" of the SRT only with OK self-diagnosis results.
- When, during SRT driving pattern, 1st trip DTC (NG) is detected prior to "CMPLT" of SRT, the self-diagnosis memory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

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

SRT Service Procedure

NHEC0031S0312

If a vehicle has failed the state emissions inspection due to one or more SRT items indicating "INCMP", review the flowchart diagnostic sequence on the next page.



*1 EC-70 *2 EC-74 *3 EC-75

How to Display SRT Code

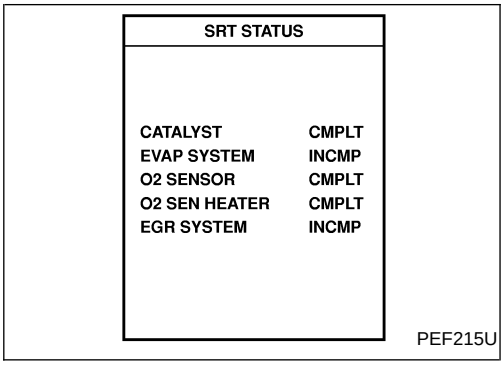
NHEC0031S0301

With CONSULT-II

Selecting "SRT STATUS" in "DTC CONFIRMATION" mode with CONSULT-II.
For items whose SRT codes are set, a "CMPLT" is displayed on the CONSULT-II screen; for items whose SRT codes are not set, "INCMP" is displayed.

With GST

Selecting Mode 1 with GST (Generic Scan Tool)
A sample of CONSULT-II display for SRT code is shown below.
"INCMP" means the self-diagnosis is incomplete and SRT is not set. "CMPLT" means the self-diagnosis is complete and SRT is set.



How to Set SRT Code

NHEC0031S0302

To set all SRT codes, self-diagnosis for the items indicated above must be performed one or more times. Each diagnosis may require a long period of actual driving under various conditions.

With CONSULT-II

Perform corresponding DTC Confirmation Procedure one by one based on "Performance Priority" in the table on EC-72.

Without CONSULT-II

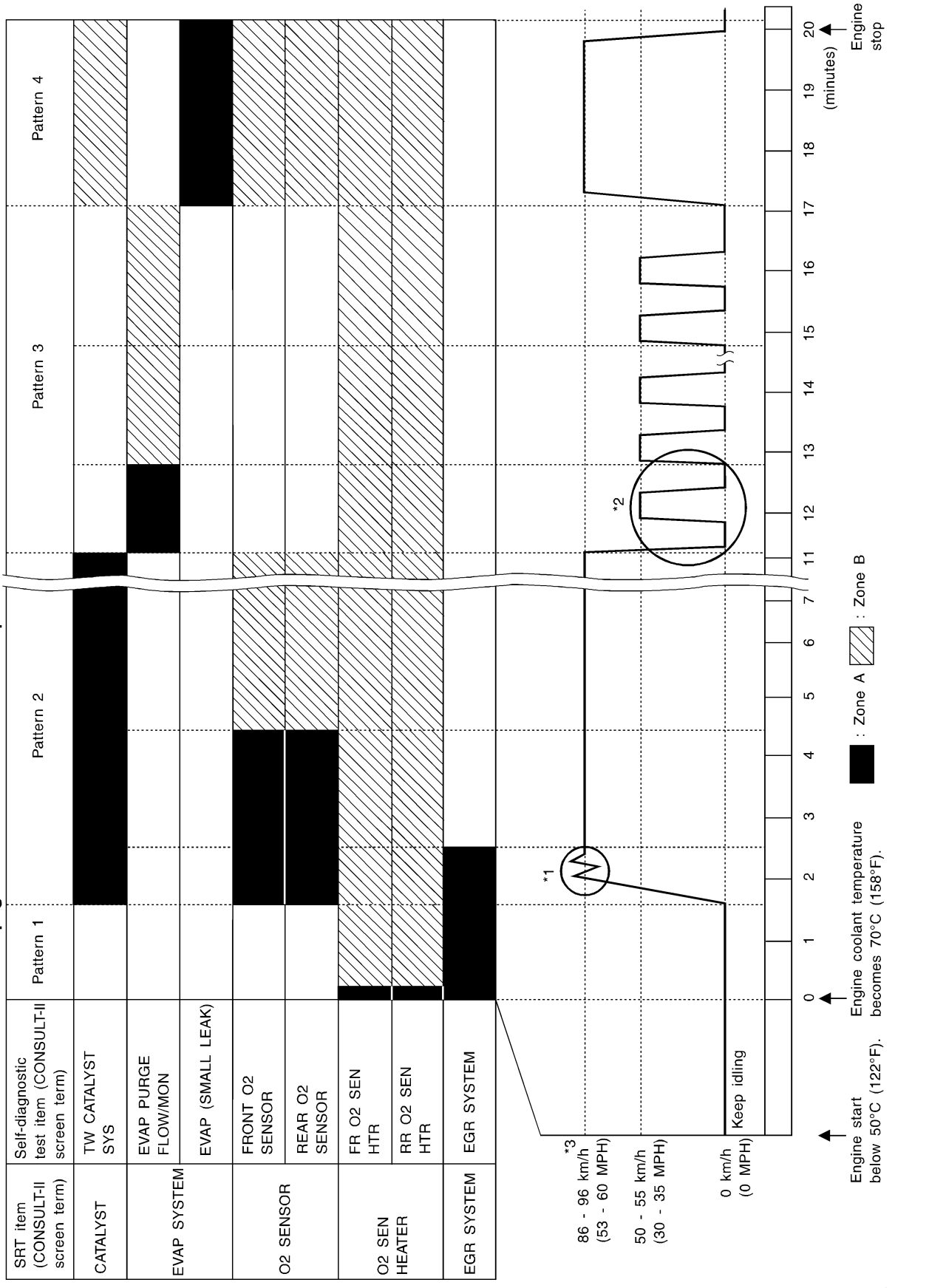
The most efficient driving pattern in which SRT codes can be properly set is explained on the next page. The driving pattern should be performed one or more times to set all SRT codes.

Driving Pattern

NHEC0031S0303

Driving pattern

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



SEF574X

- 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 70 and 58 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 70 and 58 is lower than 1.4V).**
- **The engine is started at the fuel tank temperature of warmer than 0°C (32°F) (where the voltage between the ECM terminal 92 and ground is less than 4.1V).**

Pattern 2:

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

Pattern 3:

- The driving pattern outlined in *2 must be repeated at least 3 times.

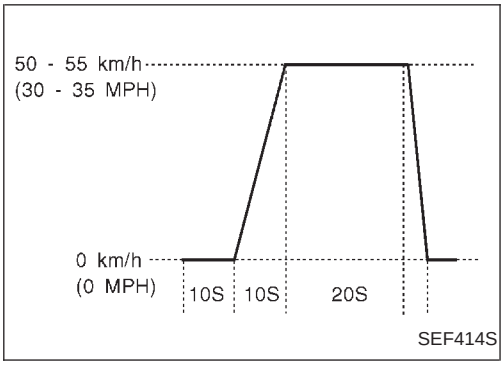
Pattern 4:

- 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.**
3) Repeat steps 1 and 2 until the EGR system SRT is set.



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

Suggested Transmission Gear Position for A/T Models

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

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

NHEC0031S04

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 (30 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 (Right bank)	01H	01H	Max.	X
	Three way catalyst function (Left bank)	03H	02H	Max.	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 (Right bank)	09H	04H	Max.	X
		0AH	84H	Min.	X
		0BH	04H	Max.	X
		0CH	04H	Max.	X
		0DH	04H	Max.	X
	Front heated oxygen sensor (Left bank)	11H	05H	Max.	X
		12H	85H	Min.	X
		13H	05H	Max.	X
		14H	05H	Max.	X
		15H	05H	Max.	X
	Rear heated oxygen sensor (Right bank)	19H	86H	Min.	X
		1AH	86H	Min.	X
		1BH	06H	Max.	X
		1CH	06H	Max.	X
	Rear heated oxygen sensor (Left bank)	21H	87H	Min.	X
		22H	87H	Min.	X
		23H	07H	Max.	X
		24H	07H	Max.	X

SRT item	Self-diagnostic test item	Test value (GST display)		Test limit	Application
		TID	CID		
O2 SENSOR HEATER	Front heated oxygen sensor heater (Right bank)	29H	08H	Max.	X
		2AH	88H	Min.	X
	Front heated oxygen sensor heater (Left bank)	2BH	09H	Max.	X
		2CH	89H	Min.	X
	Rear heated oxygen sensor heater (Right bank)	2DH	0AH	Max.	X
		2EH	8AH	Min.	X
	Rear heated oxygen sensor heater (Left bank)	2FH	0BH	Max.	X
		30H	8BH	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

EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS

NHEC0031S05

X: Applicable —: Not applicable

Items (CONSULT-II screen terms)	DTC*1	SRT code	Test value/ Test limit (GST only)	1st trip DTC*1	Reference page
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	**P0000**	—	—	—	—
MAF SEN/CIRCUIT	P0100	—	—	X	EC-164
ABSL PRES SEN/CIRC	P0105	—	—	X	EC-172
AIR TEMP SEN/CIRC	P0110	—	—	X	EC-178
COOLANT T SEN/CIRC	P0115	—	—	X	EC-183
THRTL POS SEN/CIRC	P0120	—	—	X	EC-188
*COOLAN T SEN/CIRC	P0125	—	—	X	EC-200
FRONT O2 SENSOR-B1	P0130	X	X	X*2	EC-205
FRONT O2 SENSOR-B1	P0131	X	X	X*2	EC-215
FRONT O2 SENSOR-B1	P0132	X	X	X*2	EC-223
FRONT O2 SENSOR-B1	P0133	X	X	X*2	EC-231
FRONT O2 SENSOR-B1	P0134	X	X	X*2	EC-244
FR O2 SE HEATER-B1	P0135	X	X	X*2	EC-252
REAR O2 SENSOR-B1	P0137	X	X	X*2	EC-259
REAR O2 SENSOR-B1	P0138	X	X	X*2	EC-269
REAR O2 SENSOR-B1	P0139	X	X	X*2	EC-279
REAR O2 SENSOR-B1	P0140	X	X	X*2	EC-289
RR O2 SE HEATER-B1	P0141	X	X	X*2	EC-297

Items (CONSULT-II screen terms)	DTC*1	SRT code	Test value/ Test limit (GST only)	1st trip DTC*1	Reference page
FRONT O2 SENSOR-B2	P0150	X	X	X*2	EC-205
FRONT O2 SENSOR-B2	P0151	X	X	X*2	EC-215
FRONT O2 SENSOR-B2	P0152	X	X	X*2	EC-223
FRONT O2 SENSOR-B2	P0153	X	X	X*2	EC-231
FRONT O2 SENSOR-B2	P0154	X	X	X*2	EC-244
FR O2 SE HEATER-B2	P0155	X	X	X*2	EC-252
REAR O2 SENSOR-B2	P0157	X	X	X*2	EC-259
REAR O2 SENSOR-B2	P0158	X	X	X*2	EC-269
REAR O2 SENSOR-B2	P0159	X	X	X*2	EC-279
REAR O2 SENSOR-B2	P0160	X	X	X*2	EC-289
RR O2 SE HEATER-B2	P0161	X	X	X*2	EC-297
FUEL SYS-LEAN/BK1	P0171	—	—	X	EC-304
FUEL SYS-RICH/BK1	P0172	—	—	X	EC-312
FUEL SYS-LEAN/BK2	P0174	—	—	X	EC-304
FUEL SYS-RICH/BK2	P0175	—	—	X	EC-312
FUEL TEMP SEN/CIRC	P0180	—	—	X	EC-319
ENG OVER TEMP	P0217	—	—	X	EC-324
MULTI CYL MISFIRE	P0300	—	—	X	EC-342
CYL 1 MISFIRE	P0301	—	—	X	EC-342
CYL 2 MISFIRE	P0302	—	—	X	EC-342
CYL 3 MISFIRE	P0303	—	—	X	EC-342
CYL 4 MISFIRE	P0304	—	—	X	EC-342
CYL 5 MISFIRE	P0305	—	—	X	EC-342
CYL 6 MISFIRE	P0306	—	—	X	EC-342
KNOCK SEN/CIRC-B1	P0325	—	—	—	EC-350
CPS/CIRCUIT (POS)	P0335	—	—	X	EC-355
CAM PS/CIRC (PHS)	P0340	—	—	X	EC-363
EGR SYSTEM	P0400	X	X	X*2	EC-369
EGR VOL CONT/V CIR	P0403	—	—	X	EC-378
TW CATALYST SYS-B1	P0420	X	X	X*2	EC-385
TW CATALYST SYS-B2	P0430	X	X	X*2	EC-385
EVAP SMALL LEAK	P0440	X	X	X*2	EC-390
PURG VOLUME CONT/V	P0443	—	—	X	EC-406
VENT CONTROL VALVE	P0446	—	—	X	EC-412
EVAPO SYS PRES SEN	P0450	—	—	X	EC-419
EVAP GROSS LEAK	P0455	X	X	X*2	EC-431
FUEL LV SE (SLOSH)	P0460	—	—	X	EC-444

Items (CONSULT-II screen terms)	DTC*1	SRT code	Test value/ Test limit (GST only)	1st trip DTC*1	Reference page
FUEL LEVEL SENSOR	P0461	—	—	X	EC-448
FUEL LEVEL SEN/CIRC	P0464	—	—	X	EC-450
VEH SPEED SEN/CIRC	P0500	—	—	X	EC-454
IACV/AAC VLV/CIRC	P0505	—	—	X	EC-458
CLOSED TP SW/CIRC	P0510	—	—	X	EC-467
A/T COMM LINE	P0600	—	—	—	EC-476
ECM	P0605	—	—	X	EC-479
PNP SW/CIRC	P0705	—	—	X	AT-102
ATF TEMP SEN/CIRC	P0710	—	—	X	AT-108
VEH SPD SEN/CIR AT	P0720	—	—	X	AT-114
ENGINE SPEED SIG	P0725	—	—	X	AT-119
A/T 1ST GR FNCTN	P0731	—	—	X	AT-124
A/T 2ND GR FNCTN	P0732	—	—	X	AT-130
A/T 3RD GR FNCTN	P0733	—	—	X	AT-136
A/T 4TH GR FNCTN	P0734	—	—	X	AT-142
TCC SOLENOID/CIRC	P0740	—	—	X	AT-151
A/T TCC S/V FNCTN	P0744	—	—	X	AT-156
L/PRESS SOL/CIRC	P0745	—	—	X	AT-166
SFT SOL A/CIRC	P0750	—	—	X	AT-172
SFT SOL B/CIRC	P0755	—	—	X	AT-177
THERMOSTAT FNCTN	P1126	—	—	X	EC-481
SWIRL CONT SOL/V	P1130	—	—	X	EC-483
CLOSED LOOP-B1	P1148	—	—	X	EC-507
SWL CON VC SW/CIRC	P1165	—	—	X	EC-509
CLOSED LOOP-B2	P1168	—	—	X	EC-507
TCS C/U FUN TN	P1211	—	—	X	EC-515
TCS CIRC	P1212	—	—	X	EC-517
ENG OVER TEMP	P1217	—	—	X	EC-520
IGN SIGNAL-PRIMARY	P1320	—	—	X	EC-537
CPS/CIRCUIT (REF)	P1335	—	—	X	EC-548
CPS/CIRC (POS) COG	P1336	—	—	X	EC-554
EGR TEMP SEN/CIRC	P1401	—	—	X	EC-562
EGR SYSTEM	P1402	X	X	X*2	EC-570
EVAP SMALL LEAK	P1440	X	X	X*2	EC-579
PURG VOLUME CONT/V	P1444	—	—	X	EC-581
VENT CONTROL VALVE	P1446	—	—	X	EC-593
EVAP PURG FLOW/MON	P1447	X	X	X*2	EC-601

Items (CONSULT-II screen terms)	DTC*1	SRT code	Test value/ Test limit (GST only)	1st trip DTC*1	Reference page
VENT CONTROL VALVE	P1448	—	—	X	EC-613
FUEL LEVEL SEN/CIRC	P1464	—	—	X	EC-622
VC/V BYPASS/V	P1490	—	—	X	EC-625
VC CUT/V BYPASS/V	P1491	—	—	X	EC-631
A/T DIAG COMM LINE	P1605	—	—	X	EC-643
TP SEN/CIRC A/T	P1705	—	—	X	AT-182
P-N POS SW/CIRCUIT	P1706	—	—	X	EC-646
O/R CLTCH SOL/CIRC	P1760	—	—	X	AT-191

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

*2: These are not displayed with GST.

NOTE:

Regarding A33 models, "-B1" and "BK1" indicate right bank and "-B2" and "BK2" indicate left bank.

HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION

NHEC0031S06

How to Erase DTC (With CONSULT-II)

NHEC0031S0601

NOTE:

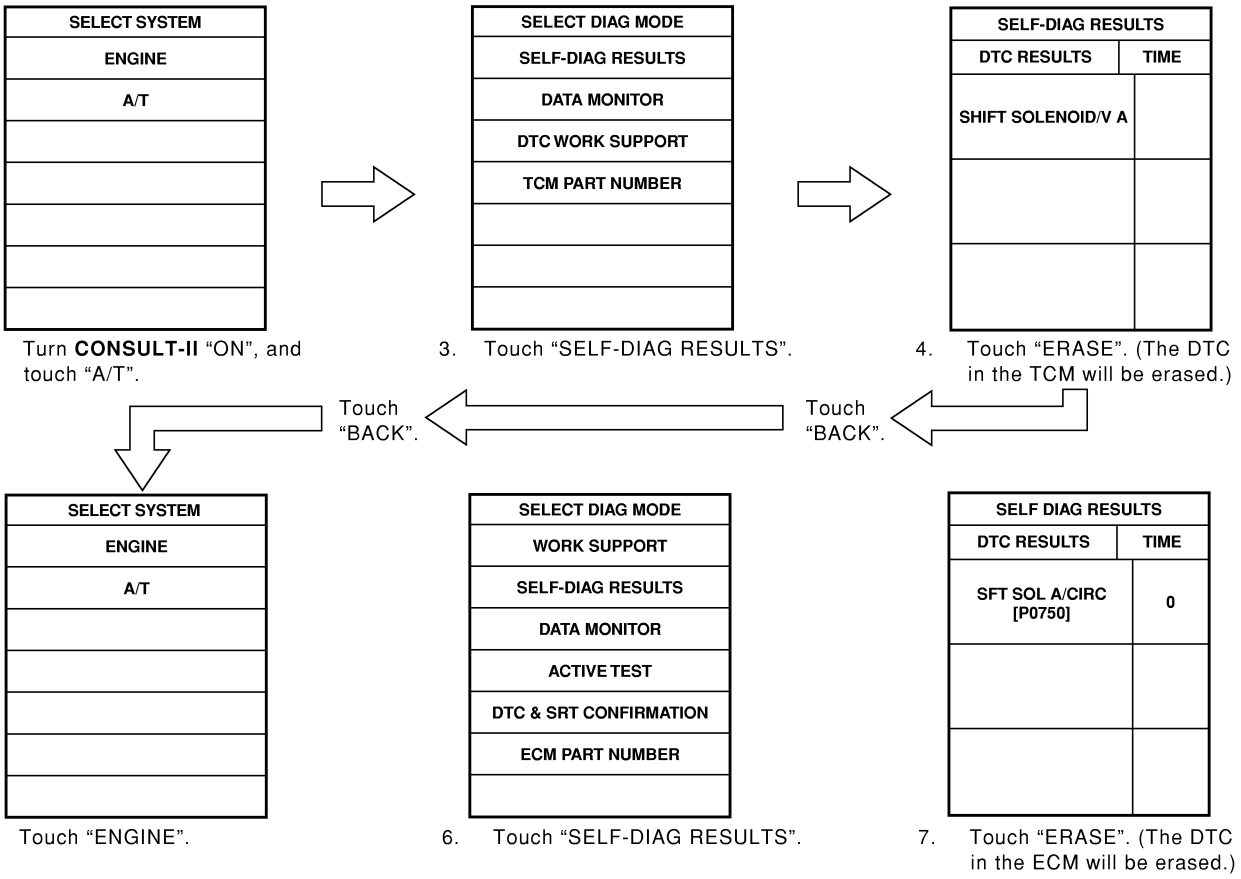
If the DTC is not for A/T related items (see EC-8), skip steps 2 through 4.

1. If the ignition switch stays "ON" after repair work, be sure to turn ignition switch "OFF" once. Wait at least 10 seconds and then turn it "ON" (engine stopped) again.
2. Turn CONSULT-II "ON" and touch "A/T".
3. Touch "SELF-DIAG RESULTS".
4. Touch "ERASE". [The DTC in the TCM (Transmission control module) will be erased.] Then touch "BACK" twice.
5. Touch "ENGINE".
6. Touch "SELF-DIAG RESULTS".
7. Touch "ERASE". (The DTC in the ECM will be erased.)

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

How to erase DTC (With CONSULT-II)

1. If the ignition switch stays "ON" after repair work, be sure to turn ignition switch "OFF" once. Wait at least 10 seconds and then turn it "ON" (engine stopped) again.



SEF966X

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

How to Erase DTC (GST) With GST)

NHEC0031S0602

NOTE:

If the DTC is not for A/T related items (see EC-8), skip step 2.

1. If the ignition switch stays "ON" after repair work, be sure to turn ignition switch "OFF" once. Wait at least 10 seconds and then turn it "ON" (engine stopped) again.
2. Perform "SELF-DIAGNOSTIC PROCEDURE (Without CONSULT-II)" 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 in the ECM can be erased by selecting Mode 4 with GST.

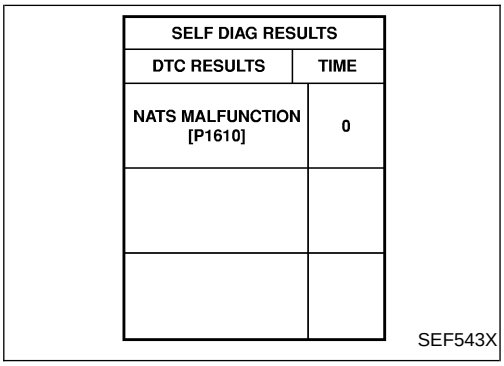
- **If the battery is disconnected, the emission-related diagnostic information will be lost after approx. 24 hours.**
- **The following data are cleared when the ECM memory is erased.**

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

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

IVIS (INFINITI VEHICLE IMMOBILIZER SYSTEM — NATS)

NHEC0031S08

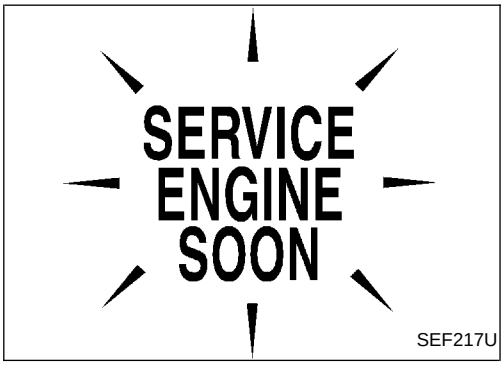


- **If the security indicator lights up with the ignition switch in the "ON" position or "NATS MALFUNCTION" is displayed on "SELF-DIAG RESULTS" screen, perform self-diagnostic results mode with CONSULT-II using NATS program card. Refer to "IVIS (Infiniti Vehicle Immobilizer System — NATS)" in EL section.**
- **Confirm no self-diagnostic results of IVIS (NATS) is displayed before touching "ERASE" in "SELF-DIAG RESULTS" mode with CONSULT-II.**
- **When replacing ECM, initialization of IVIS (NATS) system and registration of all IVIS (NATS) ignition key IDs must be carried out with CONSULT-II using NATS program card.**
  Therefore, be sure to receive all keys from vehicle owner. Regarding the procedures of IVIS (NATS) initialization and IVIS (NATS) ignition key ID registration, refer to CONSULT-II operation manual, IVIS/NVIS.

Malfunction Indicator Lamp (MIL)

DESCRIPTION

NHEC0032



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-160, "WARNING LAMPS" or see EC-692.

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

=NHEC0032S01

The on board diagnostic system has the following two functions.

Diagnostic Test Mode	KEY and ENG. Status	Function	Explanation of Function
Mode I	Ignition switch in "ON" position  Engine stopped 	BULB CHECK	This function checks the MIL bulb for damage (blown, open circuit, etc.). If the MIL does not come on, check MIL circuit.
	Engine running 	MALFUNCTION WARNING	This is a usual driving condition. When a malfunction is detected twice in two consecutive driving cycles (two trip detection logic), the MIL will light up to inform the driver that a malfunction has been detected. The following malfunctions will light up or blink the MIL in the 1st trip. ● Coolant overtemperature enrichment protection ● "Misfire (Possible three way catalyst damage)" ● "Closed loop control" ● Fail-safe mode

Diagnostic Test Mode I — Bulb Check

NHEC0032S03

In this mode, the MIL on the instrument panel should stay ON. If it remains OFF, check the bulb. Refer to EL-160, "WARNING LAMPS" or see EC-692.

Diagnostic Test Mode I — Malfunction Warning

NHEC0032S04

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

OBD System Operation Chart

NHEC0033

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

NHEC0033S01

- 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-69.
- The MIL will go off after the vehicle is driven 3 times with no malfunction. The drive is counted only when the recorded driving pattern is met (as stored in the ECM). If another malfunction occurs while counting, the counter will reset.
- The DTC and the freeze frame data will be stored until the vehicle is driven 40 times (driving pattern A) without the same malfunction recurring (except for Misfire and Fuel Injection System). For Misfire and Fuel Injection System, the DTC and freeze frame data will be stored until the vehicle is driven 80 times (driving pattern C) without the same malfunction recurring. The "TIME" in "SELF-DIAGNOSTIC RESULTS" mode of CONSULT-II will count the number of times the vehicle is driven.
- The 1st trip DTC is not displayed when the self-diagnosis results in "OK" for the 2nd trip.

SUMMARY CHART

NHEC0033S02

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)

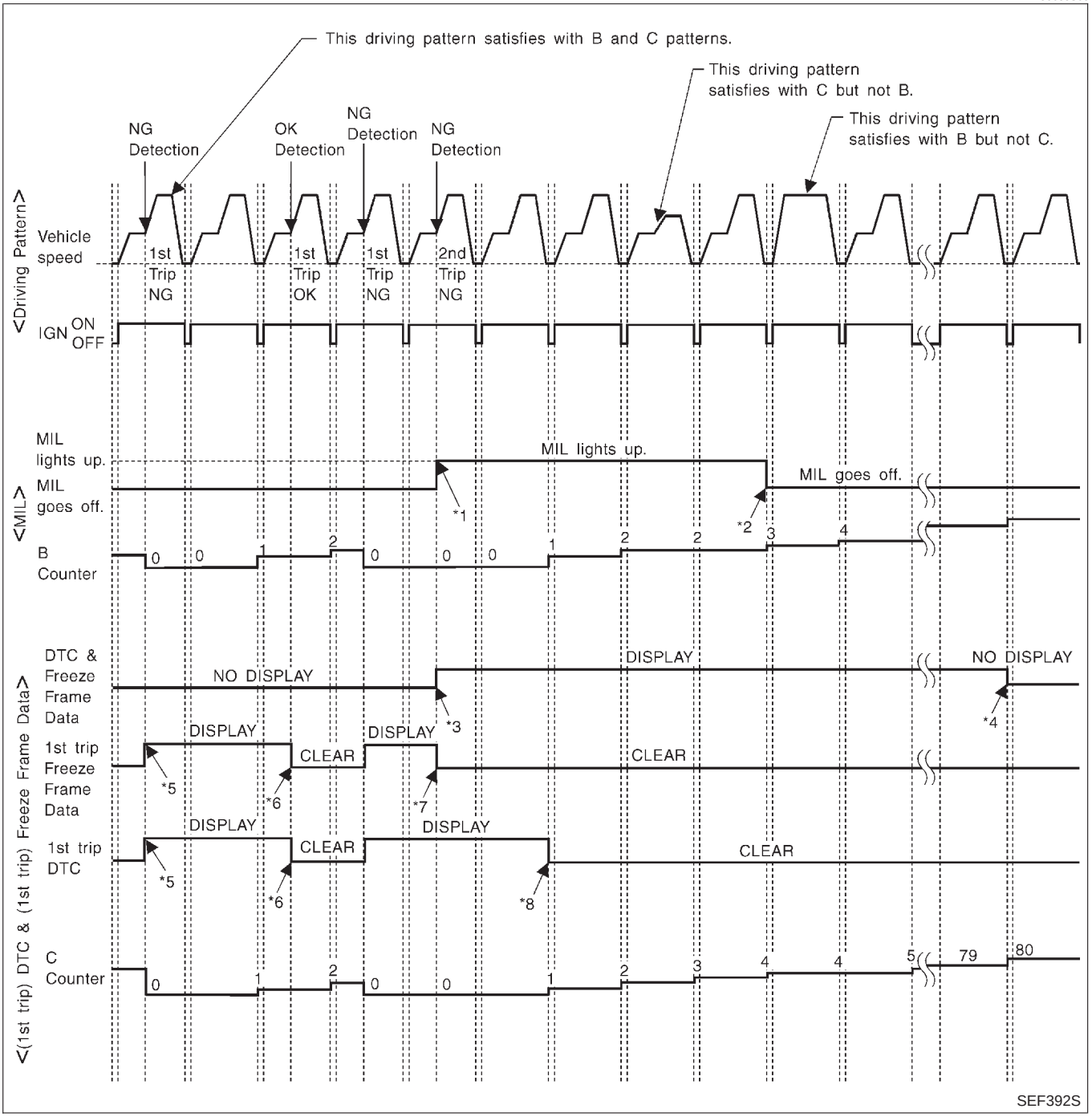
OBD System Operation Chart (Cont'd)

Items	Fuel Injection System	Misfire	Other
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-88.
For details about patterns "A" and "B" under "Other", see EC-90.
*1: Clear timing is at the moment OK is detected.
*2: Clear timing is when the same malfunction is detected in the 2nd trip.

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

=NHEC0033S03



*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"

NHEC0033S04

<Driving Pattern B>

NHEC0033S0401

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>

NHEC0033S0402

Driving pattern C means the vehicle operation as follows:

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

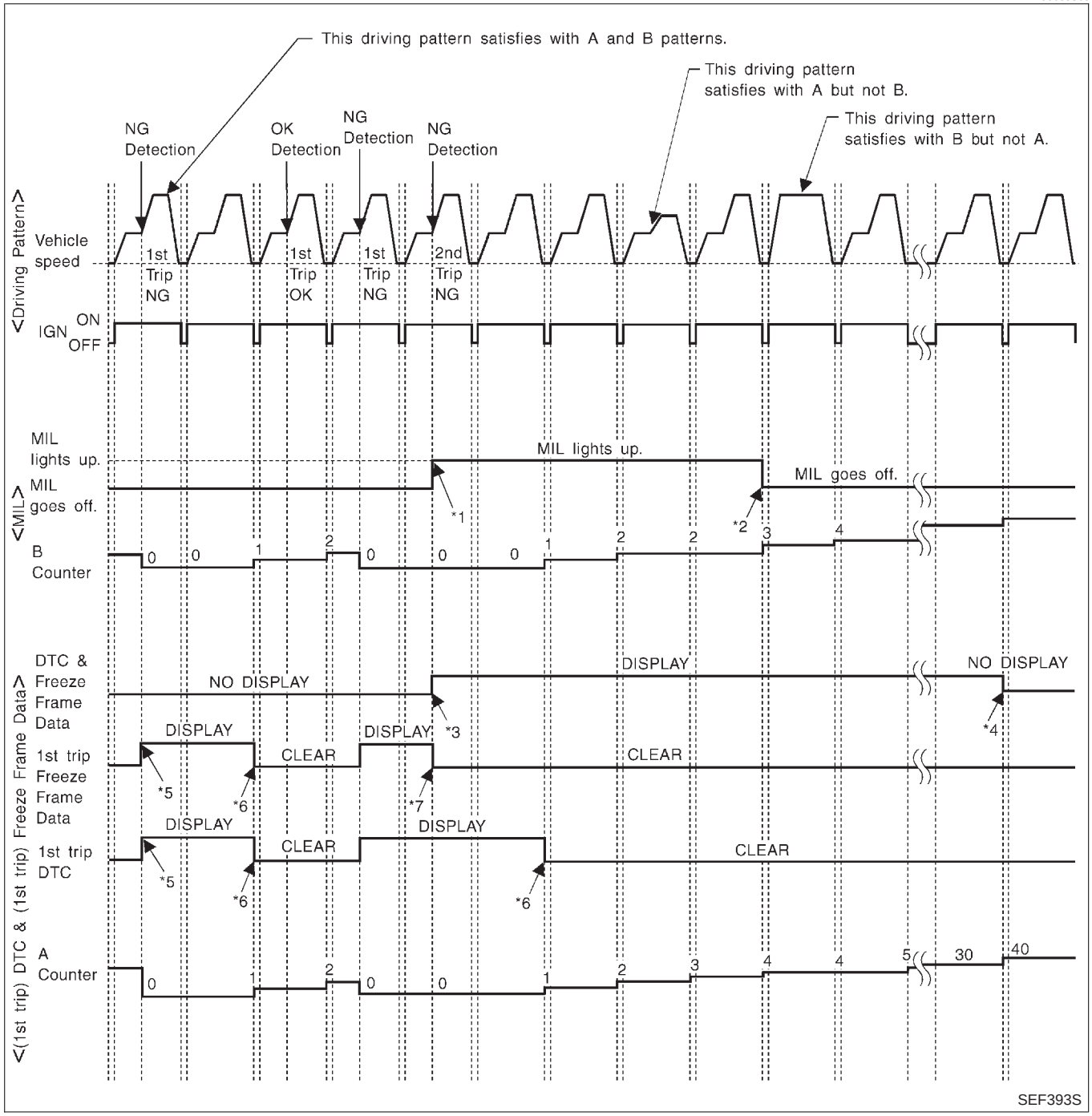
- When the freeze frame data shows lower than 70°C (158°F), "T" should be lower than 70°C (158°F).
- When the freeze frame data shows higher than or equal to 70°C (158°F), "T" should be higher than or equal to 70°C (158°F).

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

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

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

NHEC0033S05



*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.

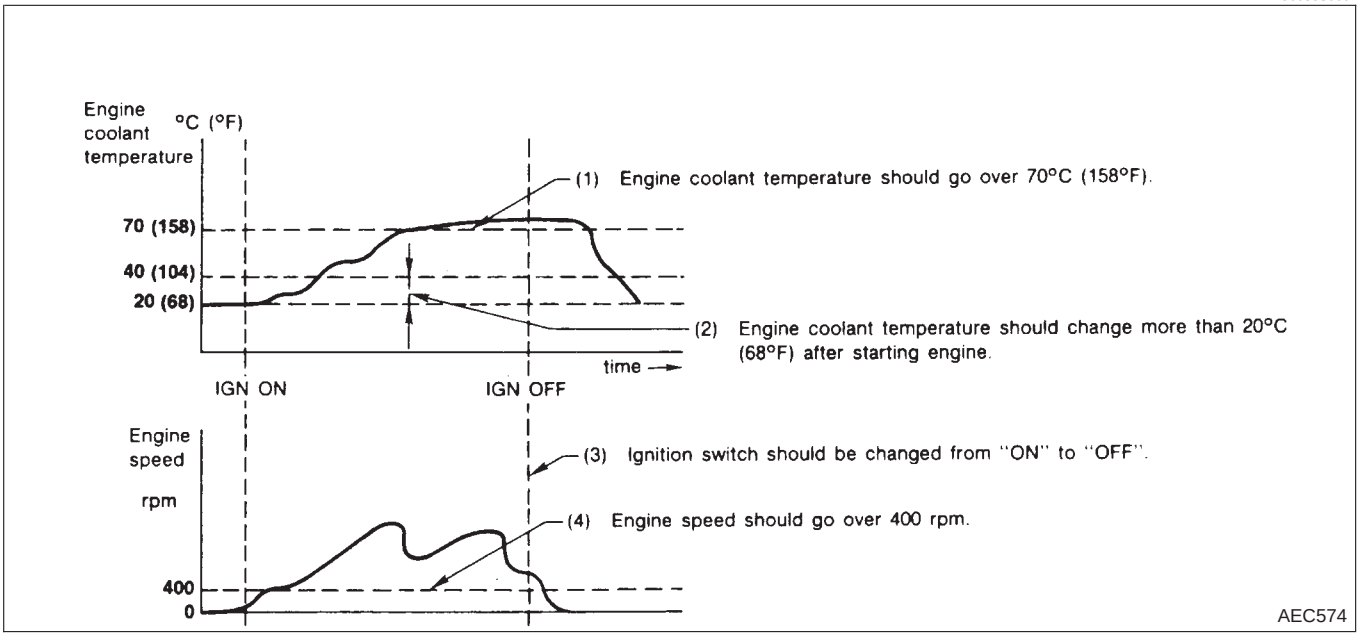
*7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.

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

NHEC0033S06

<Driving Pattern A>

NHEC0033S0601



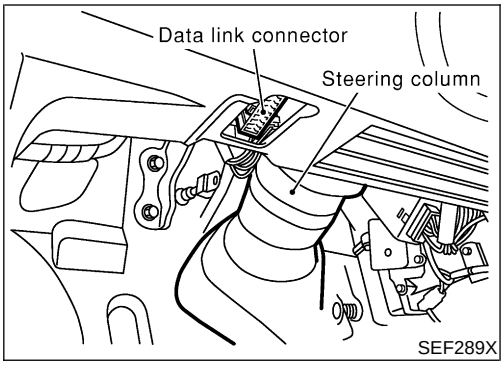
- The A counter will be cleared when the malfunction is detected regardless of (1) - (4).
- The A counter will be counted up when (1) - (4) are satisfied without the same malfunction.
- The DTC will not be displayed after the A counter reaches 40.

<Driving Pattern B>

NHEC0033S0602

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").



SEF289X

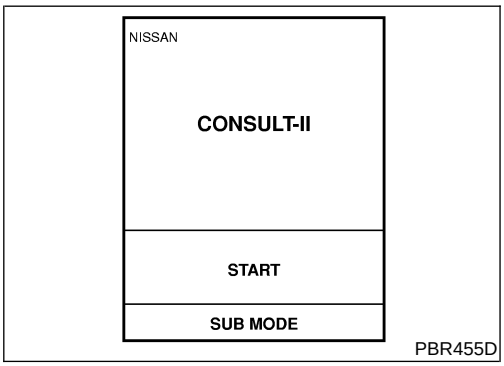
CONSULT-II

=NHEC0034

CONSULT-II INSPECTION PROCEDURE

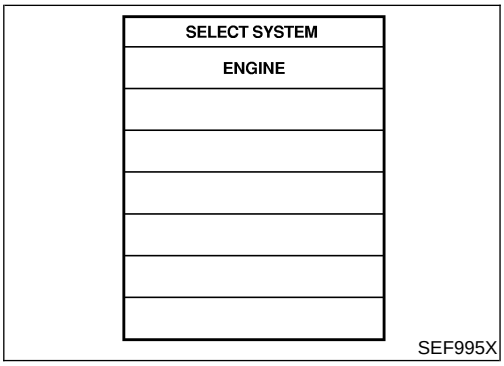
NHEC0034S01

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



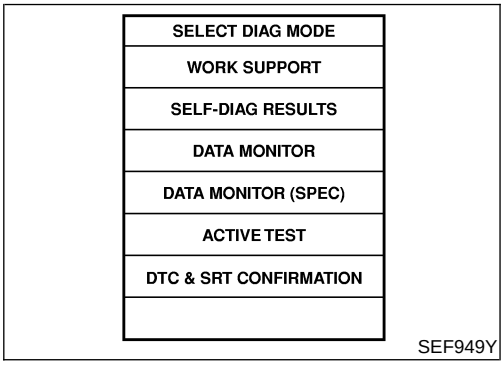
PBR455D

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



SEF995X

5. Touch “ENGINE”.



SEF949Y

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

For further information, see the CONSULT-II Operation Manual.

CONSULT-II (Cont'd)

ENGINE CONTROL COMPONENT PARTS/CONTROL SYSTEMS APPLICATION

NHEC0034S02

		Item	DIAGNOSTIC TEST MODE							
			WORK SUP-PORT	SELF-DIAGNOSTIC RESULTS		DATA MONI-TOR	DATA MONI-TOR (SPEC)	ACTIVE TEST	DTC & SRT CONFIRMATION	
				DTC*1	FREEZE FRAME DATA*2				SRT STATUS	DTC WORK SUP-PORT
ENGINE CONTROL COMPONENT PARTS	INPUT	Crankshaft position sensor (POS)		X	X	X	X			
		Crankshaft position sensor (REF)		X		X	X			
		Mass air flow sensor		X		X	X			
		Engine coolant temperature sensor		X	X	X	X	X		
		Front heated oxygen sensor		X		X	X		X	X
		Rear heated oxygen sensor		X		X	X		X	X
		Vehicle speed sensor		X	X	X	X			
		Throttle position sensor		X		X	X			
		Fuel tank temperature sensor		X		X	X	X		
		EVAP control system pressure sensor		X		X	X			
		Absolute pressure sensor		X		X	X			
		EGR temperature sensor		X		X	X			
		Intake air temperature sensor		X		X	X			
		Knock sensor		X						
		Ignition switch (start signal)				X	X			
		Closed throttle position switch		X		X	X			
		Closed throttle position switch (throttle position sensor signal)				X	X			
		Air conditioner switch				X	X			
		Park/neutral position (PNP) switch		X		X	X			
		Power steering oil pressure switch				X	X			
		Battery voltage				X	X			
		Ambient air temperature switch				X	X			
		Load signal				X	X			
		Swirl control valve control vacuum check switch		X		X	X			
		Fuel level sensor		X		X	X			

Item			DIAGNOSTIC TEST MODE							
			WORK SUP-PORT	SELF-DIAGNOSTIC RESULTS		DATA MONI-TOR	DATA MONI-TOR (SPEC)	ACTIVE TEST	DTC & SRT CONFIRMATION	
				DTC*1	FREEZE FRAME DATA*2				SRT STATUS	DTC WORK SUP-PORT
ENGINE CONTROL COMPONENT PARTS	OUTPUT	Injectors				X	X	X		
		Power transistor (Ignition timing)		X (Ignition signal)		X	X	X		
		IACV-AAC valve		X		X	X	X		
		EVAP canister purge volume control solenoid valve		X		X	X	X		X
		Air conditioner relay				X	X			
		Fuel pump relay	X			X	X	X		
		Cooling fan		X		X	X	X		
		EGR volume control valve		X		X	X	X		
		Front heated oxygen sensor heater		X		X	X		X	
		Rear heated oxygen sensor heater		X		X	X		X	
		EVAP canister vent control valve		X		X	X	X		
		Vacuum cut valve bypass valve		X		X	X	X		X
		Swirl control valve control solenoid valve		X		X	X	X		
		VIAS control solenoid valve				X	X	X		
		Electronic controlled engine mount				X	X	X		
		Calculated load value			X	X	X			

X: Applicable

*1: This item includes 1st trip DTCs.

*2: This mode includes 1st trip freeze frame data or freeze frame data. The items appear on CONSULT-II screen in freeze frame data mode only if a 1st trip DTC or DTC is detected. For details, refer to EC-70.

CONSULT-II (Cont'd)

FUNCTION

=NHEC0034S03

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

NHEC0034S04

WORK ITEM	CONDITION	USAGE
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. ● IGN SW "ON" ● ENGINE NOT RUNNING ● AMBIENT TEMPERATURE IS ABOVE 0°C (32°F). ● NO VACUUM AND NO HIGH PRESSURE IN EVAP SYSTEM ● TANK FUEL TEMP. IS MORE THAN 0°C (32°F). ● WITHIN 10 MINUTES AFTER STARTING "EVAP SYSTEM CLOSE" ● WHEN TRYING TO EXECUTE "EVAP SYSTEM CLOSE" UNDER THE CONDITION EXCEPT ABOVE, CONSULT-II WILL DISCONTINUE IT AND DISPLAY APPROPRIATE INSTRUCTION. **NOTE:** **WHEN STARTING ENGINE, CONSULT-II MAY DISPLAY "BATTERY VOLTAGE IS LOW. CHARGE BATTERY", EVEN IN USING CHARGED BATTERY.**	When detecting EVAP vapor leak point of EVAP system
TARGET IDLE RPM ADJ*	● IDLE CONDITION	When setting target idle speed
TARGET IGNITION TIMING ADJ*	● IDLE CONDITION	When adjusting target ignition timing After adjustment, confirm target ignition timing with a timing light.

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

SELF-DIAGNOSTIC MODE

NHEC0034S05

DTC and 1st Trip DTC

NHEC0034S0501

Regarding items of "DTC and 1st trip DTC", refer to "TROUBLE DIAGNOSIS — INDEX". (See EC-8.)

Freeze Frame Data and 1st Trip Freeze Frame Data

NHEC0034S0502

Freeze frame data item*1	Description
DIAG TROUBLE CODE [PXXXX]	• The engine control component part/control system has a trouble code, it is displayed as "PXXXX". (Refer to "TROUBLE DIAGNOSIS — INDEX", EC-8.)
FUEL SYS-B1*2	• "Fuel injection system status" at the moment a malfunction is detected is displayed. • One mode in the following is displayed. "MODE 2": Open loop due to detected system malfunction "MODE 3": Open loop due to driving conditions (power enrichment, deceleration enrichment) "MODE 4": Closed loop - using oxygen sensor(s) as feedback for fuel control "MODE 5": Open loop - has not yet satisfied condition to go to closed loop
FUEL SYS-B2*2	
CAL/LD VALUE [%]	• The calculated load value at the moment a malfunction is detected is displayed.
COOLANT TEMP [°C] or [°F]	• The engine coolant temperature at the moment a malfunction is detected is displayed.
S-FUEL TRIM-B1 [%]	• "Short-term fuel trim" at the moment a malfunction is detected is displayed. • The short-term fuel trim indicates dynamic or instantaneous feedback compensation to the base fuel schedule.
S-FUEL TRIM-B2 [%]	
L-FUEL TRIM-B1 [%]	• "Long-term fuel trim" at the moment a malfunction is detected is displayed. • The long-term fuel trim indicates much more gradual feedback compensation to the base fuel schedule than short-term fuel trim.
L-FUEL TRIM-B2 [%]	
ENGINE SPEED [rpm]	• The engine speed at the moment a malfunction is detected is displayed.
VHCL SPEED [km/h] or [mph]	• The vehicle speed at the moment a malfunction is detected is displayed.
ABSOL TH·P/S [%]	• The throttle valve opening angle at the moment a malfunction is detected is displayed.
B/FUEL SCHDL [msec]	• The base fuel schedule at the moment a malfunction is detected is displayed.
INT/A TEMP SE [°C] or [°F]	• The intake air temperature at the moment a malfunction is detected is displayed.

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

*2: Regarding A33 model, "-B1" indicates right bank and "-B2" indicates left bank.

CONSULT-II (Cont'd)

DATA MONITOR MODE

=NHEC0034S06

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
ENG SPEED [rpm]	○	○	• Indicates the engine speed computed from the REF signal (120° signal) of the crankshaft position sensor (REF).	
CKPS·RPM (POS) [rpm]	○		• Indicates the engine speed computed from the POS signal (1° signal) of the crankshaft position sensor (POS).	• 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.
POS COUNT	○		• Indicates the number of signal plate (Flywheel/Drive Plate) cogs (tooth) during one revolution of the engine.	
MAS A/F SE-B1 [V]	○	○	• The signal voltage of the mass air flow sensor is displayed.	• When the engine is stopped, a certain value is indicated.
COOLAN TEMP/S [°C] or [°F]	○	○	• The engine coolant temperature (determined by the signal voltage of the engine coolant temperature sensor) is displayed.	• When the engine coolant temperature sensor is open or short-circuited, ECM enters fail-safe mode. The engine coolant temperature determined by the ECM is displayed.
FR O2 SEN-B1 [V]	○	○	• The signal voltage of the front heated oxygen sensor is displayed.	
FR O2 SEN-B2 [V]	○			
RR O2 SEN-B1 [V]	○		• The signal voltage of the rear heated oxygen sensor is displayed.	
RR O2 SEN-B2 [V]	○			
FR O2 MNTR-B1 [RICH/LEAN]	○		• Display of front heated oxygen sensor signal during air-fuel ratio feedback control: RICH ... means the mixture became "rich", and control is being affected toward a leaner mixture. LEAN ... means the mixture became "lean", and control is being affected toward a rich mixture.	• After turning ON the ignition switch, "RICH" is displayed until air-fuel mixture ratio feedback control begins. • When the air-fuel ratio feedback is clamped, the value just before the clamping is displayed continuously.
FR O2 MNTR-B2 [RICH/LEAN]	○			
RR O2 MNTR-B1 [RICH/LEAN]	○		• Display of rear heated oxygen sensor signal: RICH ... means the amount of oxygen after three way catalyst is relatively small. LEAN ... means the amount of oxygen after three way catalyst is relatively large.	• When the engine is stopped, a certain value is indicated.
RR O2 MNTR-B2 [RICH/LEAN]	○			
VHCL SPEED SE [km/h] or [mph]	○	○	• The vehicle speed computed from the vehicle speed sensor signal is displayed.	
BATTERY VOLT [V]	○		• The power supply voltage of ECM is displayed.	
THRTL POS SEN [V]	○	○	• The throttle position sensor signal voltage is displayed.	
FUEL T/TMP SE [°C] or [°F]			• The fuel temperature judged from the tank fuel temperature sensor signal voltage is displayed.	

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
INT/A TEMP SE [°C] or [°F]	○		• The intake air temperature determined by the signal voltage of the intake air temperature sensor is indicated.	
EGR TEMP SEN [V]	○	○	• The signal voltage of the EGR temperature sensor is displayed.	
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 conditioner signal.	
P/N POSI SW [ON/OFF]	○	○	• Indicates [ON/OFF] condition from the park/neutral position (PNP) switch signal.	
PW/ST SIGNAL [ON/OFF]	○	○	• [ON/OFF] condition of the power steering oil pressure switch determined by the power steering oil pressure signal is indicated.	
AMB TEMP SW [ON/OFF]	○	○	• Indicates [ON/OFF] condition from the ambient air temperature switch signal.	
IGNITION SW [ON/OFF]	○		• Indicates [ON/OFF] condition from ignition switch.	
INJ PULSE-B1 [msec]		○	• Indicates the actual fuel injection pulse width compensated by ECM according to the input signals.	• When the engine is stopped, a certain computed value is indicated.
INJ PULSE-B2 [msec]				
B/FUEL SCHDL [msec]			• "Base fuel schedule" indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.	
IGN TIMING [BTDC]		○	• Indicates the ignition timing computed by ECM according to the input signals.	• When the engine is stopped, a certain value is indicated.
IACV-AAC/V [step]		○	• Indicates the IACV-AAC valve control value computed by ECM according to the input signals.	
PURG VOL C/V [%]		○	• Indicates the EVAP canister purge volume control solenoid valve control value computed by the ECM according to the input signals. • The opening becomes larger as the value increases.	
A/F ALPHA-B1 [%]		○	• The mean value of the air-fuel ratio feedback correction factor per cycle is indicated.	• When the engine is stopped, a certain value is indicated. • This data also includes the data for the air-fuel ratio learning control.
A/F ALPHA-B2 [%]				
EVAP SYS PRES [V]			• The signal voltage of EVAP control system pressure sensor is displayed.	

CONSULT-II (Cont'd)

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
AIR COND RLY [ON/OFF]		○	• The air conditioner relay control condition (determined by ECM according to the input signal) is indicated.	
FUEL PUMP RLY [ON/OFF]		○	• Indicates the fuel pump relay control condition determined by ECM according to the input signals.	
COOLING FAN [ON/OFF]		○	• Indicates the control condition of the cooling fan (determined by ECM according to the input signal). HIGH ... High speed operation LOW ... Low speed operation OFF ... Stop	
EGR VOL CON/V [step]		○	• Indicates the EGR volume control value computed by the ECM according to the input signals. • The opening becomes larger as the value increases.	
VENT CONT/V [ON/OFF]			• The control condition of the EVAP canister vent control valve (determined by ECM according to the input signal) is indicated. • ON ... Closed OFF ... Open	
FR O2 HTR-B1 [ON/OFF]			• Indicates [ON/OFF] condition of front heated oxygen sensor heater determined by ECM according to the input signals.	
FR O2 HTR-B2 [ON/OFF]				
RR O2 HTR-B1 [ON/OFF]			• Indicates [ON/OFF] condition of rear heated oxygen sensor heater determined by ECM according to the input signals.	
RR O2 HTR-B2 [ON/OFF]				
VC/V BYPASS/V [ON/OFF]			• The control condition of the vacuum cut valve bypass valve (determined by ECM according to the input signal) is indicated. • ON ... Open OFF ... Closed	
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 valve opening angle computed by ECM according to the signal voltage of the throttle position sensor.	
MASS AIRFLOW [g·m/s]			• Indicates the mass airflow computed by ECM according to the signal voltage of the mass airflow sensor.	
ABSOL PRES/SE [V]			• The signal voltage of the absolute pressure sensor is displayed.	

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
SWRL CONT S/V [ON/OFF]			• The control condition of the swirl control valve control solenoid valve (determined by ECM according to the input signals) is indicated. • ON ... Swirl control valve is closed. OFF ... Swirl control valve is opened.	
LOAD SIGNAL [ON/OFF]	○	○	• Indicates [ON/OFF] condition from the electrical load signal and/or lighting switch. ON ... rear defogger is operating and/or lighting switch is on. OFF ... rear defogger is not operating and lighting switch is not on.	
TRVL AFTER MIL [km] or [Mile]			• Distance traveled while MIL is activated	
VIAS S/V [ON/OFF]		○	• The control condition of the VIAS control solenoid valve (determined by ECM according to the input signal) is indicated. • OFF ... VIAS control solenoid valve is not operating. ON ... VIAS control solenoid valve is operating.	
SWL CON VC SW			• Indicates [ON/OFF] condition from the swirl control valve control vacuum check switch. ON ... Swirl control valve is not operational. OFF ... Swirl control valve is operational.	
ENGINE MOUNT [IDLE/TRVL]			• The control condition of the electronic controlled engine mount (computed by ECM according to the input signals) is indicated. • IDLE ... Idle condition • TRVL ... Driving condition	
FUEL LEVEL SE [V]			• The signal voltage of the fuel level sensor is displayed.	
IDL A/V LEAN			• Display the condition of idle air volume learning YET ... Idle air volume learning has not been performed yet. CMPLT ... Idle air volume learning has already been performed successfully. INCMP ... Idle air volume learning has not been performed successfully.	
Voltage [V]			• Voltage measured by the voltage probe.	
Frequenty [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.

CONSULT-II (Cont'd)

- Regarding A33 model, "-B1" indicates right bank and "-B2" indicates left bank.

DATA MONITOR (SPEC) MODE

NHEC0034S11

Monitored item [Unit]	PCM input signals	Main signals	Description	Remarks
MAS A/F SE-B1 [V]	○	○	• The signal voltage of the mass air flow sensor specification is displayed.	• When engine is running, specification range is indicated.
B/FUEL SCHDL [msec]			• "Base fuel schedule" indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.	• When engine is running, specification range is indicated.
A/F ALPHA-B1 [%]		○	• The mean value of the air-fuel ratio feedback correction factor per cycle is indicated.	• When engine is running, specification range is indicated. • This data also includes the data for the air-fuel ratio learning control.
A/F ALPHA-B2 [%]				

NOTE:

- Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.
- Regarding A33 model, "-B1" indicates right bank and "-B2" indicates left bank.

ACTIVE TEST MODE

NHEC0034S07

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
FUEL INJECTION	• Engine: Return to the original trouble condition • Change the amount of fuel injection using CONSULT-II.	If trouble symptom disappears, see CHECK ITEM.	• Harness and connector • Fuel injectors • Front heated oxygen sensor
IACV-AAC/V OPENING	• Engine: After warming up, idle the engine. • Change the IACV-AAC valve opening percent using CONSULT-II.	Engine speed changes according to the opening percent.	• Harness and connector • IACV-AAC valve
ENG COOLANT TEMP	• Engine: Return to the original trouble condition • Change the engine coolant temperature using CONSULT-II.	If trouble symptom disappears, see CHECK ITEM.	• Harness and connector • Engine coolant temperature sensor • Fuel injectors
IGNITION TIMING	• Engine: Return to the original trouble condition • Timing light: Set • Retard the ignition timing using CONSULT-II.	If trouble symptom disappears, see CHECK ITEM.	• Adjust initial ignition timing
POWER BALANCE	• Engine: After warming up, idle the engine. • A/C switch "OFF" • Shift lever "N" • Cut off each injector signal one at a time using CONSULT-II.	Engine runs rough or dies.	• Harness and connector • Compression • Injectors • Power transistor • Spark plugs • Ignition coils
COOLING FAN	• Ignition switch: ON • Turn the cooling fan "ON" and "OFF" using CONSULT-II.	Cooling fan moves and stops.	• Harness and connector • Cooling fan motor • Cooling fan relay
FUEL PUMP RELAY	• Ignition switch: ON (Engine stopped) • Turn the fuel pump relay "ON" and "OFF" using CONSULT-II and listen to operating sound.	Fuel pump relay makes the operating sound.	• Harness and connector • Fuel pump relay

CONSULT-II (Cont'd)

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
EGR VOL CONT/V	• Ignition switch: ON (Engine stopped) • Change EGR volume control valve opening step using CONSULT-II.	EGR volume control valve makes an operating sound.	• Harness and connector • EGR volume control 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 solenoid valve opening percent using CONSULT-II.	Engine speed changes according to the opening percent.	• Harness and connector • Solenoid valve
FUEL/T TEMP SEN	• Change the fuel tank temperature using CONSULT-II.		
VENT CONTROL/V	• Ignition switch: ON (Engine stopped) • Turn solenoid valve "ON" and "OFF" with the CONSULT-II and listen to operating sound.	Solenoid valve makes an operating sound.	• Harness and connector • Solenoid valve
VC/V BYPASS/V	• Ignition switch: ON (Engine stopped) • Turn solenoid valve "ON" and "OFF" with the CONSULT-II and listen to operating sound.	Solenoid valve makes an operating sound.	• Harness and connector • Solenoid valve
SWIRL CONT SOL VALVE	• Ignition switch: ON • Turn solenoid valve "ON" and "OFF" with CONSULT-II and listen for operating sound.	Solenoid valve makes an operating sound.	• Harness and connector • Solenoid valve
VIAS SOL VALVE	• Ignition switch: ON • Turn solenoid valve "ON" and "OFF" with CONSULT-II and listen for operating sound.	Solenoid valve makes an operating sound.	• Harness and connector • Solenoid valve
ENGINE MOUNTING	• Engine: After warming up, run engine at idle speed. • Gear position: "D"' range (Vehicle stopped) • Turn electronic controlled engine mount "IDLE" and "RAVEL" with the CONSULT-II.	Body vibration changes according to the electronic controlled engine mount condition.	• Harness and connector • Electronic controlled engine mount
IDLE AIR VOL LEARN	• In this test, the idle air volume that keeps the engine within the specified range is memorized in ECM.		

DTC & SRT CONFIRMATION MODE

NHEC0034S08

SRT STATUS Mode

NHEC0034S0801

For details, refer to "SYSTEM READINESS TEST (SRT) CODE", EC-71.

SRT Work Support Mode

NHEC0034S0803

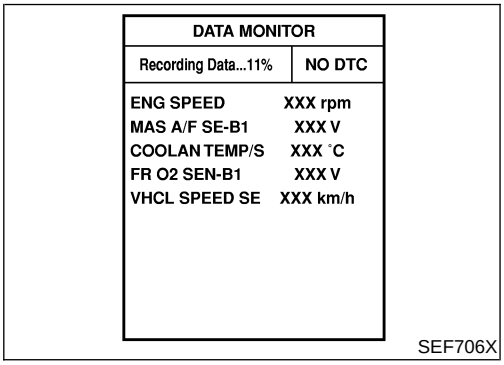
This mode enables a technician to drive a vehicle to set the SRT while monitoring the SRT status.

CONSULT-II (Cont'd)

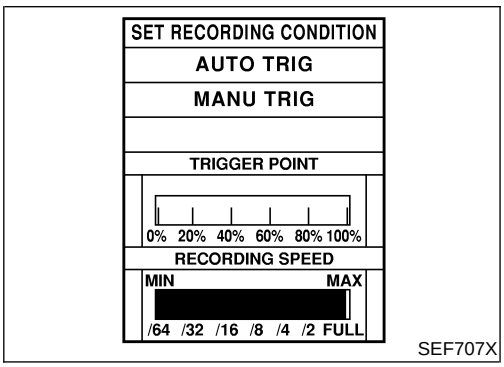
DTC Work Support Mode

NHEC0034S0802

Test mode	Test item	Condition	Reference page
EVAPORATIVE SYSTEM	EVAP SML LEAK P0440	Refer to corresponding trouble diagnosis for DTC.	EC-390
	EVAP SML LEAK P1440		EC-579
	PURG VOL CN/V P1444		EC-581
	PURGE FLOW P1447		EC-601
	VC CUT/V BP/V P1491		EC-631
FR O2 SENSOR	FR O2 SEN-B1 P0130		EC-205
	FR O2 SEN-B1 P0131		EC-215
	FR O2 SEN-B1 P0132		EC-223
	FR O2 SEN-B1 P0133		EC-231
	FR O2 SEN-B2 P0150		EC-205
	FR O2 SEN-B2 P0151		EC-215
	FR O2 SEN-B2 P0152		EC-223
	FR O2 SEN-B2 P0153		EC-231
RR O2 SENSOR	RR O2 SEN-B1 P0137		EC-259
	RR O2 SEN-B1 P0138		EC-269
	RR O2 SEN-B1 P0139		EC-279
	RR O2 SEN-B2 P0157		EC-259
	RR O2 SEN-B2 P0158		EC-269
	RR O2 SEN-B2 P0159		EC-279
EGR SYSTEM	EGR SYSTEM P0400		EC-369
	EGR SYSTEM P1402		EC-570



SEF706X



SEF707X

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

NHEC0034S10

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

1) "AUTO TRIG" (Automatic trigger):

- The malfunction will be identified on the CONSULT-II screen in real time.
  In other words, DTC/1st trip DTC and malfunction item will be displayed if the malfunction is detected by ECM.
  At the moment a malfunction is detected by ECM, "MONITOR" in "DATA MONITOR" screen is changed to "Recording Data ... xx%" as shown at left, and the data after the malfunction detection is recorded. Then when the percentage reached 100%, "REAL-TIME DIAG" screen is displayed. If "STOP" is touched on the screen during " Recording Data ... xx%", "REAL-TIME DIAG" screen is also displayed.
  The recording time after the malfunction detection and the recording speed can be changed by "TRIGGER POINT" and "Recording Speed". Refer to CONSULT-II OPERATION MANUAL.

2) "MANU TRIG" (Manual trigger):

- DTC/1st trip DTC and malfunction item will not be displayed

automatically on CONSULT-II screen even though a malfunction is detected by ECM.
DATA MONITOR can be performed continuously even though a malfunction is detected.

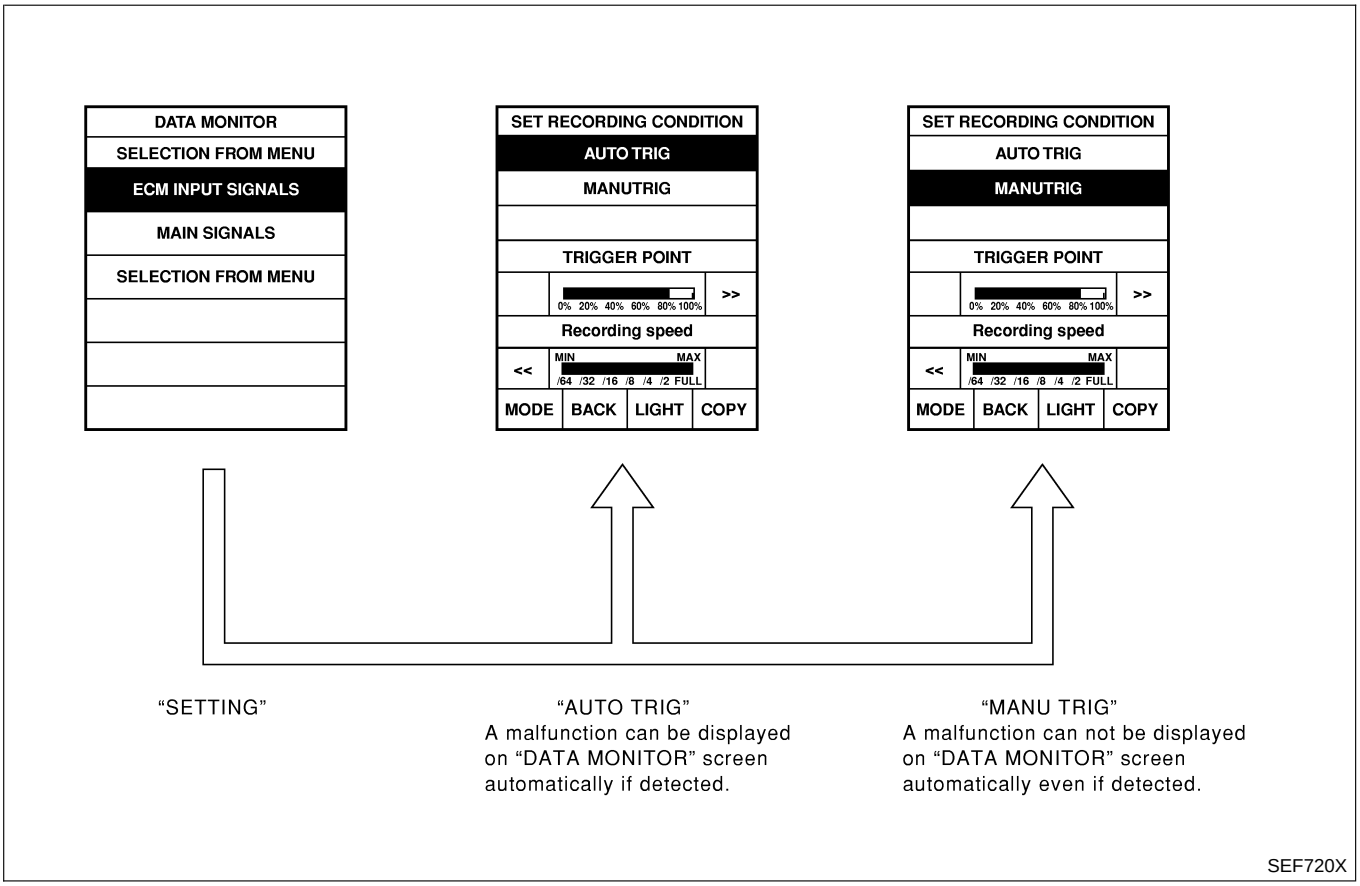
Use these triggers as follows:

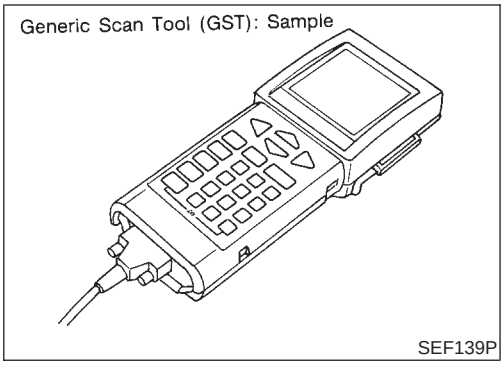
1) "AUTO TRIG"

- While trying to detect the DTC/1st trip DTC by performing the "DTC Confirmation Procedure", be sure to select to "DATA MONITOR (AUTO TRIG)" mode. You can confirm the malfunction at the moment it is detected.
- While narrowing down the possible causes, CONSULT-II should be set in "DATA MONITOR (AUTO TRIG)" mode, especially in case the incident is intermittent.
  When you are inspecting the circuit by gently shaking (or twisting) the suspicious connectors, components and harness in the "DTC Confirmation Procedure", the moment a malfunction is found the DTC/1st trip DTC will be displayed. (Refer to GI-26, "Incident Simulation Tests".)

2) "MANU TRIG"

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





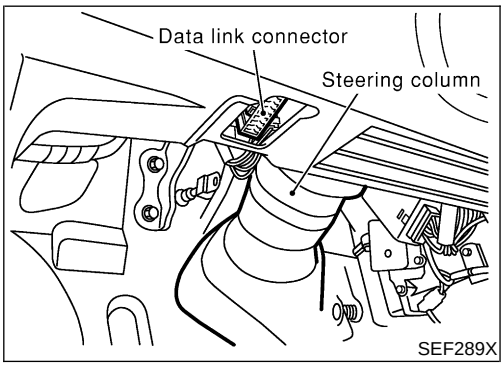
Generic Scan Tool (GST)

=NHEC0035

DESCRIPTION

NHEC0035S01

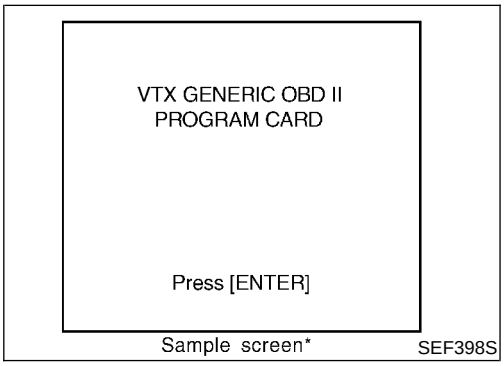
Generic Scan Tool (OBDII scan tool) complying with SAE J1978 has 8 different functions explained on the next page.
ISO9141 is used as the protocol.
The name “GST” or “Generic Scan Tool” is used in this service manual.



GST INSPECTION PROCEDURE

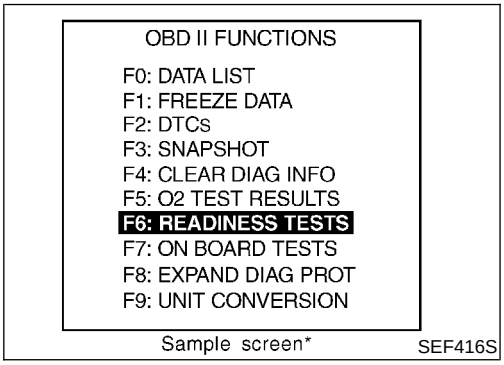
NHEC0035S02

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



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

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



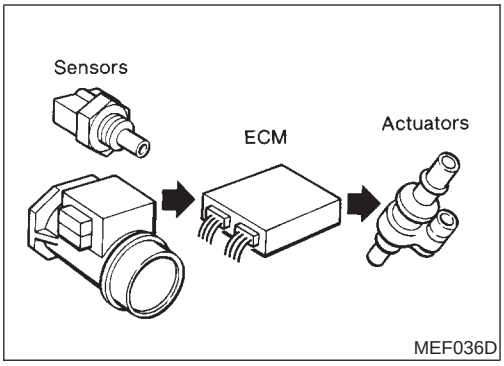
5. Perform each diagnostic mode according to each service procedure.

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

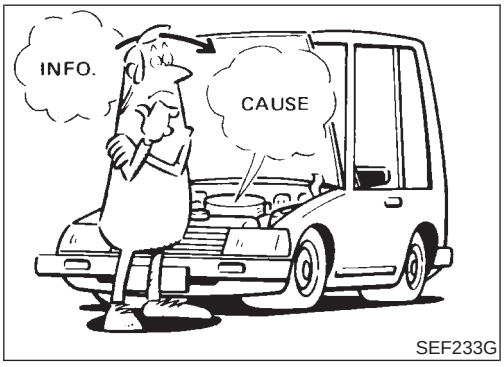
FUNCTION

NHEC0035S03

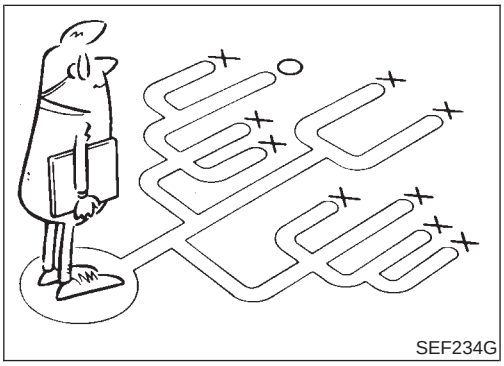
Diagnostic test mode		Function
MODE 1	READINESS TESTS	This mode gains access to current emission-related data values, including analog inputs and outputs, digital inputs and outputs, and system status information.
MODE 2	(FREEZE DATA)	This mode gains access to emission-related data value which were stored by ECM during the freeze frame. [For details, refer to "Freeze Frame Data" (EC-95).]
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, the 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
MODE 9	(CALIBRATION ID)	This mode enables the off-board test device to request specific vehicle information such as Vehicle Identification Number (VIN) and Calibration IDs.



MEF036D



SEF233G


SEF234G

KEY POINTS

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

SEF907L

Introduction

NHEC0036

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

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

A visual check only may not find the cause of the problems. A road test with CONSULT-II (or GST) or a circuit tester connected should be performed. Follow the “Work Flow” on EC-108.

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

NHEC0036S01

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 MIL 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.

Worksheet Sample

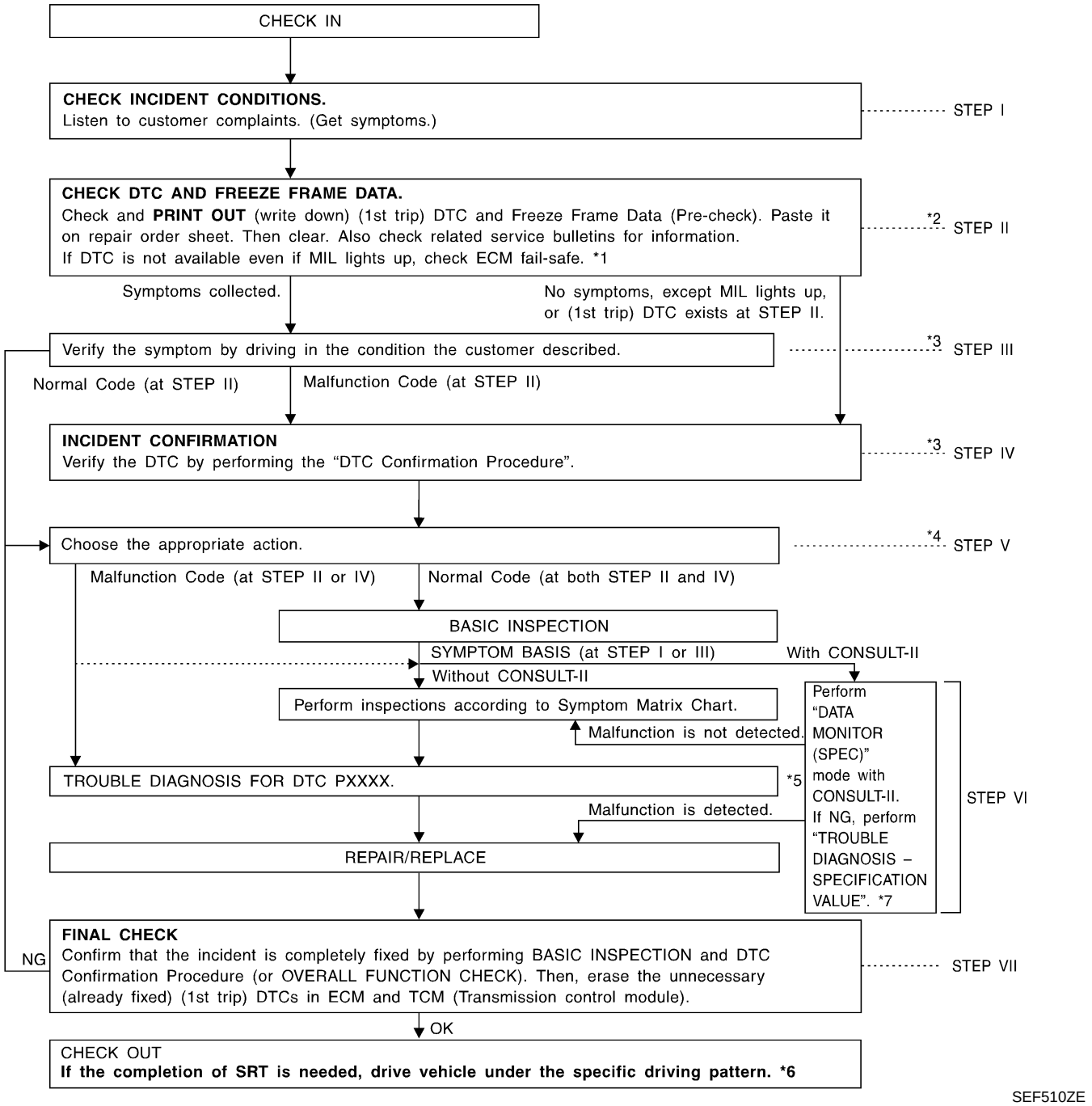
NHEC0036S0101

Customer name MR/MS	Model & Year	VIN
Engine #	Trans.	Mileage
Incident Date	Manuf. Date	In Service Date
Fuel and fuel filler cap	☐ Vehicle ran out of fuel causing misfire ☐ Fuel filler cap was left off or incorrectly screwed on.	
Symptoms — ☐ Startability	☐ Impossible to start ☐ No combustion ☐ Partial combustion ☐ Partial combustion affected by throttle position ☐ Partial combustion NOT affected by throttle position ☐ Possible but hard to start ☐ Others [ ]	
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 conditions — Weather	☐ Fine ☐ Raining ☐ Snowing ☐ Others [ ]	
Weather conditions — 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

NHEC0037



SEF510ZE

*1 EC-126

*2 If time data of "SELF-DIAG RESULTS" is other than "0" or "[1t]", perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156.

*3 If the incident cannot be verified, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156.

*4 If the on board diagnostic system cannot be performed, check main power supply and ground circuit. Refer to "TROUBLE DIAGNOSIS FOR POWER SUPPLY", EC-157.

*5 If malfunctioning part cannot be detected, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156.

*6 EC-76

*7 EC-152

DESCRIPTION FOR WORK FLOW

NHEC0037S01

STEP	DESCRIPTION
STEP I	Get detailed information about the conditions and the environment when the incident/symptom occurred using the "DIAGNOSTIC WORK SHEET", EC-107.
STEP II	Before confirming the concern, check and write down (print out using CONSULT-II or GST) the (1st trip) DTC and the (1st trip) freeze frame data, then erase the DTC and the data. (Refer to EC-82.) The (1st trip) DTC and the (1st trip) freeze frame data can be used when duplicating the incident at STEP III & IV. If the incident cannot be verified, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156. 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-134.) Also check related service bulletins for information.
STEP III	Try to confirm the symptom and under what conditions the incident occurs. The "DIAGNOSTIC WORK SHEET" and the freeze frame data are useful to verify the incident. Connect CONSULT-II to the vehicle in DATA MONITOR (AUTO TRIG) mode and check real time diagnosis results. If the incident cannot be verified, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156. If the malfunction code is detected, skip STEP IV and perform STEP V.
STEP IV	Try to detect the (1st trip) DTC by driving in (or performing) the "DTC Confirmation Procedure". Check and read the (1st trip) DTC and (1st trip) freeze frame data by using CONSULT-II or GST. During the (1st trip) DTC verification, be sure to connect CONSULT-II to the vehicle in DATA MONITOR (AUTO TRIG) mode and check real time diagnosis results. If the incident cannot be verified, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156. In case the "DTC Confirmation Procedure" is not available, perform the "Overall Function Check" instead. The (1st trip) DTC cannot be displayed by this check, however, this simplified "check" is an effective alternative. The "NG" result of the "Overall Function Check" is the same as the (1st trip) DTC detection.
STEP V	Take the appropriate action based on the results of STEP I through IV. If the malfunction code is indicated, proceed to TROUBLE DIAGNOSIS FOR DTC PXXXX. If the normal code is indicated, proceed to the BASIC INSPECTION. (Refer to EC-110.) If CONSULT-II is available, perform "DATA MONITOR (SPEC)" mode with CONSULT-II and proceed to the "TROUBLE DIAGNOSIS — SPECIFICATION VALUE". (Refer to EC-152.) (If malfunction is detected, proceed to "REPAIR/REPLACE".) Then perform inspections according to the Symptom Matrix Chart. (Refer to EC-134.)
STEP VI	Identify where to begin diagnosis based on the relationship study between symptom and possible causes. Inspect the system for mechanical binding, loose connectors or wiring damage using (tracing) "Harness Layouts". Gently shake the related connectors, components or wiring harness with CONSULT-II set in "DATA MONITOR (AUTO TRIG)" mode. Check the voltage of the related ECM terminals or monitor the output data from the related sensors with CONSULT-II. Refer to EC-138, 144. 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-28, "Circuit Inspection". Repair or replace the malfunction parts. If malfunctioning part cannot be detected, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156.
STEP VII	Once you have repaired the circuit or replaced a component, you need to run the engine in the same conditions and circumstances which resulted in the customer's initial complaint. Perform the "DTC Confirmation Procedure" and confirm the normal code [DTC No. P0000] is detected. If the incident is still detected in the final check, perform STEP VI by using a different method from the previous one. Before returning the vehicle to the customer, be sure to erase the unnecessary (already fixed) (1st trip) DTC in ECM and TCM (Transmission control module). (Refer to EC-82.)

Basic Inspection

NHEC0652

Precaution:
Perform Basic Inspection without electrical or mechanical loads applied;

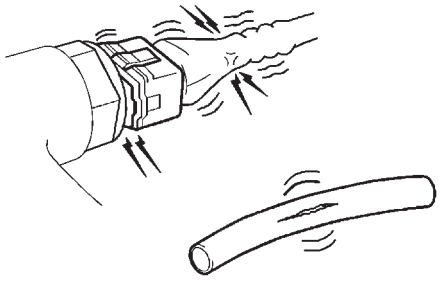
- Headlamp switch is OFF,
- Air conditioner switch is OFF,
- Rear window defogger switch is OFF,
- Steering wheel is in the straight-ahead position, etc.

On vehicles equipped with daytime light systems, set lighting switch to the 1st position to light only small lamps.

1	INSPECTION START

1. Check service records for any recent repairs that may indicate a related problem, or a current need for scheduled maintenance.
2. Open engine hood and check the following:

- Harness connectors for improper connections
- Vacuum hoses for splits, kinks and improper connections
- Wiring for improper connections, pinches and cuts
- Air cleaner clogging
- Hoses and ducts for leaks

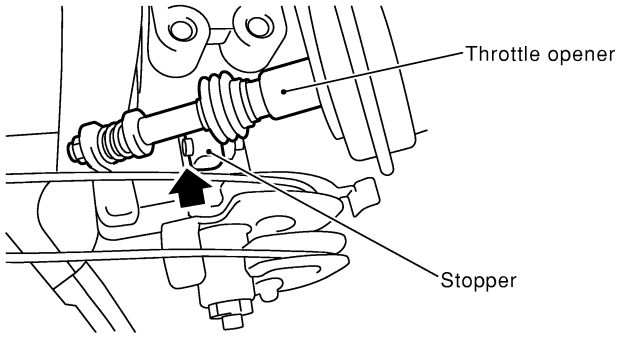


SEF983U

▶ GO TO 2.

2	CHECK THROTTLE OPENER OPERATION-I

Confirm that there is a clearance between throttle drum and stopper.

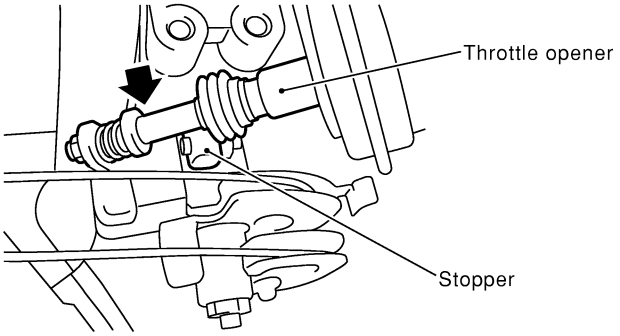


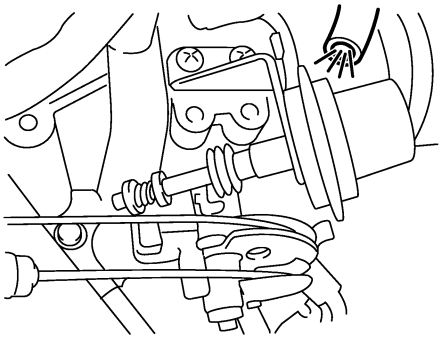
SEF622X

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

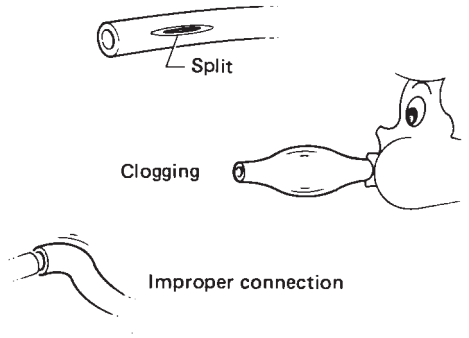
3	CHECK THROTTLE OPENER FIXING BOLTS
Check throttle opener fixing bolts for loosening.	
OK or NG	
OK ▶	1. Repair or replace throttle body assembly. 2. GO TO 2.
NG ▶	1. Retighten the fixing bolts. 2. GO TO 2.

4	CHECK THROTTLE OPENER OPERATION-II
1. Start engine and let it idle. 2. Confirm that throttle opener rod moves backward and there is a clearance between throttle drum and throttle opener rod.	
 SEF721X	
OK or NG	
OK ▶	GO TO 7.
NG ▶	GO TO 5.

5	CHECK VACUUM SOURCE FOR THROTTLE OPENER
1. Disconnect vacuum hose connected to throttle opener. 2. Check vacuum existence with engine running.	
 **Vacuum should exist.** SEF710X	
OK or NG	
OK ▶	1. Repair or replace throttle body assembly. 2. GO TO 4.
NG ▶	GO TO 6.

6	CHECK VACUUM HOSE

1. Stop engine.
2. Remove the vacuum hose.
3. Check the vacuum hose for splits, kinks and clogging.



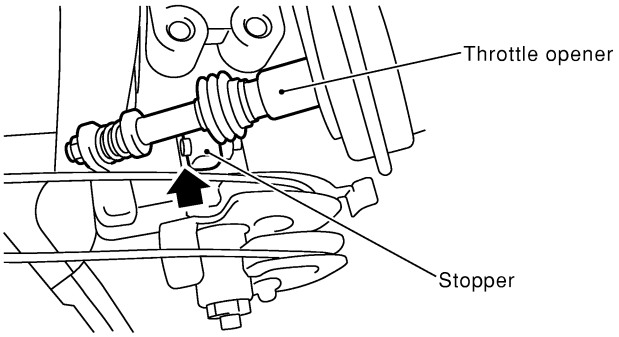
SEF109L

OK or NG

OK	▶	1. Clean vacuum port by blowing air. 2. GO TO 4.
NG	▶	1. Replace vacuum hose. 2. GO TO 4.

7	CHECK THROTTLE DRUM OPERATION

Confirm that throttle drum moves to contact the stopper.



SEF622X

OK or NG

OK	▶	GO TO 10.
NG	▶	GO TO 8.

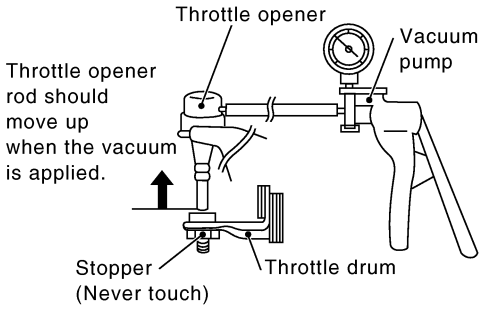
8	CHECK ACCELERATOR WIRE INSTALLATION

1. Stop engine.
2. Check accelerator wire for slack.

OK or NG

OK	▶	GO TO 9.
NG	▶	1. Adjust accelerator wire. Refer to FE-3, "Adjusting Accelerator Wire". 2. GO TO 7.

9	CHECK THROTTLE VALVE OPERATION	
1. Remove intake air ducts. 2. Check throttle valve operation when moving throttle drum by hand.		
OK or NG		
OK	▶	1. Retighten the throttle drum fixing nuts. 2. GO TO 7.
NG	▶	1. Clean the throttle body and throttle valve. 2. GO TO 7.

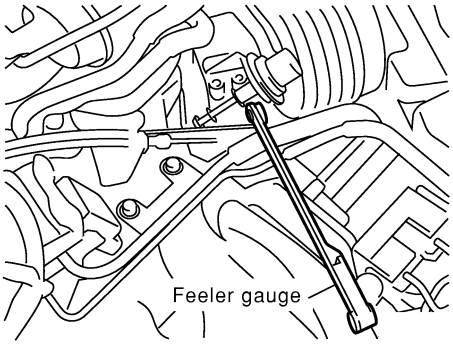
10	CHECK THROTTLE POSITION SWITCH CLOSED POSITION-I	
NOTE: **Always check ignition timing before performing the following.** 1. Warm up engine to normal operating temperature. 2. Stop engine. 3. Remove the vacuum hose connected to the throttle opener. 4. Connect suitable vacuum hose to vacuum pump as shown below.		
 SEF793WA		
5. Apply vacuum [more than −40.0 kPa (−300 mmHg, −11.81 inHg)] until the throttle drum is free from the throttle opener rod.		
Models with CONSULT-II	▶	GO TO 11.
Models without CONSULT-II	▶	GO TO 15.

11	CHECK THROTTLE POSITION SWITCH CLOSED POSITION-II

With CONSULT-II

1. Turn ignition switch "ON".
2. Select "CLSD THL/P SW" in "DATA MONITOR" mode with CONSULT-II.
3. Read "CLSD THL/P SW" signal under the following conditions.

- Insert a 0.05 mm (0.0020 in) and 0.15 mm (0.0059 in) feeler gauge alternately between stopper and throttle drum as shown in the figure and check the signal.



SEF576X

DATA MONITOR	
MONITOR	NO DTC
CLSD THL/P SW	ON

SEF173Y

"CLSD THL/P SW" signal should remain "ON" while inserting 0.05 mm (0.0020 in) feeler gauge.
"CLSD THL/P SW" signal should remain "OFF" while inserting 0.15 mm (0.0059 in) feeler gauge.

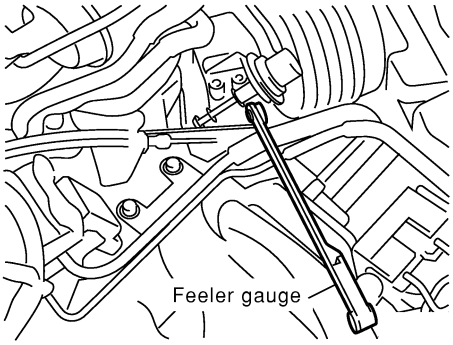
OK or NG

OK	▶	GO TO 14.
NG	▶	GO TO 12.

12	ADJUSTMENT THROTTLE POSITION SWITCH CLOSED POSITION-I

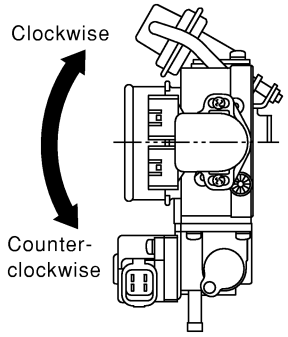
With CONSULT-II

1. Loosen throttle position sensor fixing bolts.
2. Confirm that proper vacuum is applied. Refer to test No. 10. During adjustment, vacuum should be applied.
3. Insert 0.05 mm (0.0020 in) feeler gauge between stopper and throttle drum as shown in the figure.



SEF576X

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



SEF670X

DATA MONITOR	
MONITOR	NO DTC
CLSD THL/P SW	OFF

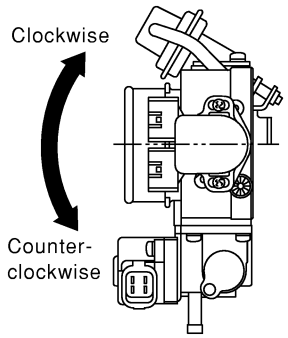
SEF305Y

▶	GO TO 13.

13	ADJUSTMENT THROTTLE POSITION SWITCH CLOSED POSITION-II

With CONSULT-II

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", then temporarily tighten sensor body fixing bolts.**



SEF670X

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 0.05 mm (0.0020 in) feeler gauge then insert 0.15 mm (0.0059 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 the "CLSD THL/P SW" signal again.
   The signal remains "OFF" while closing throttle valve.

OK or NG

OK	▶	GO TO 14.
NG	▶	GO TO 12.

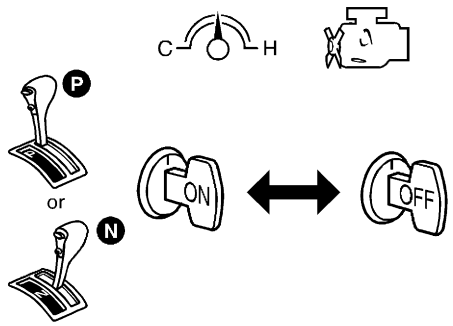
14	RESET THROTTLE POSITION SENSOR IDLE POSITION MEMORY

With CONSULT-II

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. Confirm that proper vacuum is applied. Refer to Test No. 10.
2. Attach blind cap to vacuum port from which vacuum hose to throttle opener was disconnected.
3. Start engine.
4. Warm up engine to normal operating temperature.
5. Select "CLSD THL POS" in "DATA MONITOR" mode.
6. Stop engine. (Turn ignition switch "OFF".)
7. Turn ignition switch "ON" and wait at least 5 seconds.



SEF864V

8. Turn ignition switch "OFF" and wait at least 10 seconds.
9. Repeat steps 7 and 8 until "CLSD THL POS" signal changes to "ON".

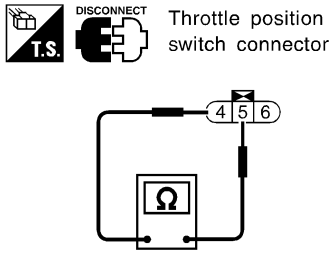
DATA MONITOR	
MONITOR	NO DTC
CLSD THL POS	ON

SEF061Y

▶	GO TO 19.

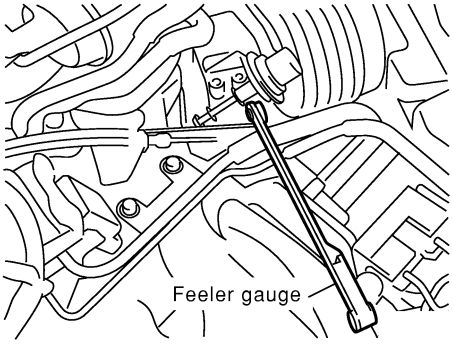
15	CHECK THROTTLE POSITION SWITCH CLOSED POSITION-II

1. Disconnect closed throttle position switch harness connector.
2. Check continuity between closed throttle position switch terminals **4** and **5** under the following conditions.



SEF711X

- Insert the 0.05 mm (0.0020 in) and 0.15 mm (0.0059 in) feeler gauge alternately between the stopper and throttle drum as shown in the figure.



SEF576X

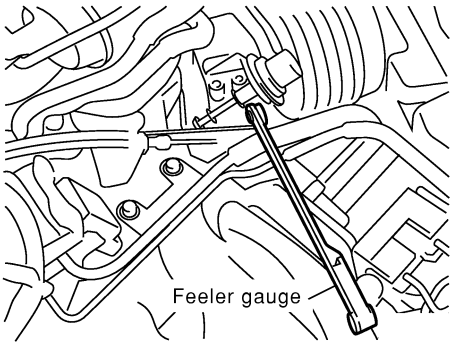
"Continuity should exist" while inserting 0.05 mm (0.0020 in) feeler gauge.
"Continuity should not exist" while inserting 0.15 mm (0.0059 in) feeler gauge.

OK or NG

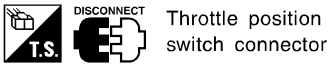
OK	▶	GO TO 18.
NG	▶	GO TO 16.

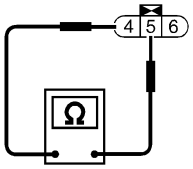
16	ADJUSTMENT THROTTLE POSITION SWITCH CLOSED POSITION-I

1. Loosen throttle position sensor fixing bolts.
2. Confirm that proper vacuum is applied. Refer to Test No. 10. During adjustment, vacuum should be applied.
3. Insert 0.05 mm (0.0020 in) feeler gauge between stopper and throttle drum as shown in the figure.



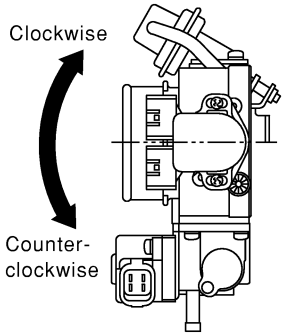
SEF576X





SEF711X

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

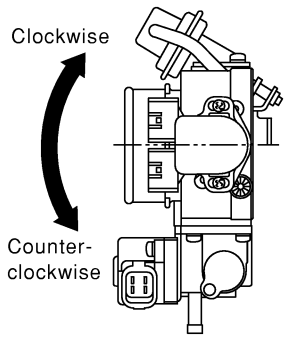


SEF670X

▶	GO TO 17.

17	ADJUSTMENT THROTTLE POSITION SWITCH CLOSED POSITION-II

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 temporarily tighten sensor body fixing bolts.**



SEF670X

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 0.05 mm (0.0020 in) feeler gauge then insert 0.15 mm (0.0059 in) feeler gauge.
4. Make sure two or three times that the 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.

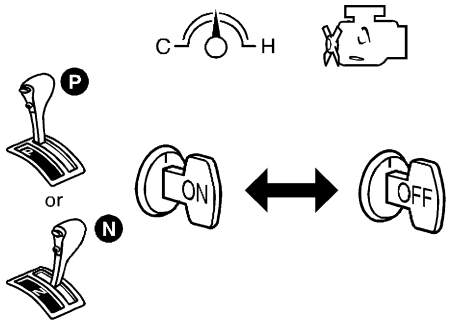
OK or NG

OK	▶	GO TO 18.
NG	▶	GO TO 16.

18	RESET THROTTLE POSITION SENSOR IDLE POSITION MEMORY

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

1. Confirm that proper vacuum is applied. Refer to Test No. 10.
2. Attach blind cap to vacuum port from which vacuum hose to throttle opener was disconnected.
3. Start engine.
4. Warm up engine to normal operating temperature.
5. Stop engine. (Turn ignition switch "OFF".)
6. Turn ignition switch "ON" and wait at least 5 seconds.



SEF864V

7. Turn ignition switch "OFF" and wait at least 10 seconds.
8. Repeat steps 6 and 7, 20 times.

	▶	GO TO 19.

19	CHECK (1ST TRIP) DTC	
1. Turn ignition switch "OFF". 2. Release vacuum from throttle opener. 3. Remove vacuum pump and vacuum hose from throttle opener. 4. Reinstall original vacuum hose to throttle opener securely. 5. Start engine and warm it up to normal operating temperature. 6. Rev (2,000 to 3,000 rpm) two or three times. 7. Make sure no (1st trip) DTC is displayed with CONSULT-II or GST.		
OK or NG		
OK	▶	GO TO 21.
NG	▶	GO TO 20.

20	REPAIR MALFUNCTION	
Repair or replace components as necessary according to corresponding "Diagnostic Procedure".		
	▶	GO TO 19.

21	CHECK TARGET IDLE SPEED	
With CONSULT-II 1. Start engine and warm it up to normal operating temperature. 2. Select "ENG SPEED" in "DATA MONITOR" mode with CONSULT-II. 3. Check idle speed. **700±50 rpm (in "P" or "N" position)**		
Without CONSULT-II 1. Start engine and warm it up to normal operating temperature. 2. Check idle speed. **700±50 rpm (in "P" or "N" position)**		
OK or NG		
OK	▶	GO TO 30.
NG	▶	GO TO 22.

22	PERFORM IDLE AIR VOLUME LEARNING	
Refer to "Idle Air Volume Learning", EC-67. **Which is the result CMPLT or INCMP?**		
CMPLT or INCMP		
CMPLT	▶	GO TO 23.
INCMP	▶	1. Follow the construction of "Idle Air Volume Leaning". 2. GO TO 22.

23	CHECK TARGET IDLE SPEED AGAIN
With CONSULT-II 1. Start engine and warm it up to normal operating temperature. 2. Select "ENG SPEED" in "DATA MONITOR" mode with CONSULT-II. 3. Check idle speed. **700±50 rpm (in "P" or "N" position)**	
Without CONSULT-II 1. Start engine and warm it up to normal operating temperature. 2. Check idle speed. **700±50 rpm (in "P" or "N" position)**	
	OK or NG
OK ▶	GO TO 28.
NG ▶	GO TO 24.

24	REPLACE IACV-AAC VALVE
Replace IACV-AAC valve.	
▶	GO TO 25.

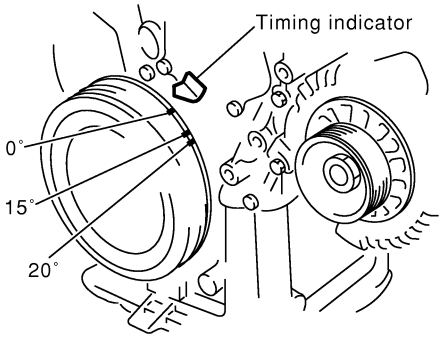
25	PERFORM IDLE AIR VOLUME LEARNING
Refer to "Idle Air Volume Learning", EC-67. **Which is the result CMPLT or INCMP?**	
	CMPLT or INCMP
CMPLT ▶	GO TO 26.
INCMP ▶	1. Follow the construction of "Idle Air Volume Learning". 2. GO TO 22.

26	CHECK TARGET IDLE SPEED AGAIN
With CONSULT-II 1. Start engine and warm it up to normal operating temperature. 2. Select "ENG SPEED" in "DATA MONITOR" mode with CONSULT-II. 3. Check idle speed. **700±50 rpm (in "P" or "N" position)**	
Without CONSULT-II 1. Start engine and warm it up to normal operating temperature. 2. Check idle speed. **700±50 rpm (in "P" or "N" position)**	
	OK or NG
OK ▶	GO TO 28.
NG ▶	GO TO 27.

27	CHECK ECM FUNCTION
1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of a problem, but this is rarely the case.) 2. Perform initialization of IVIS (NATS) system and registration of IVIS (NATS) ignition key IDs. Refer to "IVIS (INFINITI VEHICLE IMMOBILIZER SYSTEM — NATS)", EC-84.	
▶	GO TO 22.

28	CHECK IGNITION TIMING

1. Start engine and warm it up to normal operating temperature.
2. Check ignition timing at idle using a timing light.



SEF572X

Ignition timing:
15°±5° BTDC (in "P" or "N" position)

OK or NG

OK	▶	GO TO 36.
NG	▶	GO TO 29.

29	CHECK TIMING CHAIN INSTALLATION

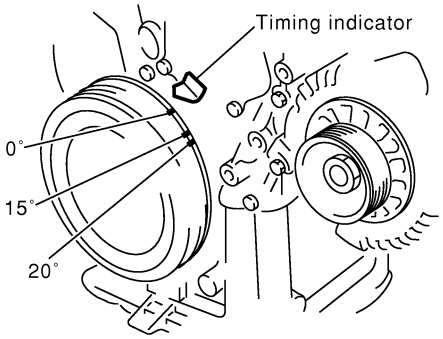
Check timing chain installation. Refer to EM-30, "Installation".

OK or NG

OK	▶	GO TO 27.
NG	▶	1. Repair the timing chain installation. 2. GO TO 22.

30	CHECK IGNITION TIMING

1. Start engine and let it idle.
2. Check ignition timing at idle using a timing light.



SEF572X

Ignition timing:
15°±5° BTDC (in "P" or "N" position)

OK or NG

OK	▶	GO TO 36.
NG	▶	GO TO 31.

31	PERFORM IDLE AIR VOLUME LEARNING	
Refer to "Idle Air Volume Learning", EC-67. **Which is the result CMPLT or INCMP?**		
CMPLT or INCMP		
CMPLT	▶	GO TO 32.
INCMP	▶	1. Follow the construction of "Idle Air volume Learning". 2. GO TO 31.

32	CHECK TARGET IDLE SPEED AGAIN	
With CONSULT-II 1. Start engine and warm it up to normal operating temperature. 2. Select "ENG SPEED" in "DATA MONITOR" mode with CONSULT-II. 3. Check idle speed. **700±50 rpm (in "P" or "N" position)**		
Without CONSULT-II 1. Start engine and warm it up to normal operating temperature. 2. Check idle speed. **700±50 rpm (in "P" or "N" position)**		
OK or NG		
OK	▶	GO TO 34.
NG	▶	GO TO 33.

33	CHECK ECM FUNCTION	
1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of a problem, but this is rarely the case.) 2. Perform initialization of IVIS (NATS) system and registration of IVIS (NATS) ignition key IDs. Refer to "IVIS (INFINITI VEHICLE IMMOBILIZER SYSTEM — NATS)", EC-84.		
	▶	GO TO 31.

34	CHECK IGNITION TIMING AGAIN	
Check ignition timing again. Refer to Test No. 30.		
OK or NG		
OK	▶	GO TO 36.
NG	▶	GO TO 35.

35	CHECK TIMING CHAIN INSTALLATION	
Check timing chain installation. Refer to EM-30, "Installation".		
OK or NG		
OK	▶	GO TO 33.
NG	▶	1. Repair the timing chain installation. 2. GO TO 31.

36	ERASE UNNECESSARY DTC	
After this inspection, unnecessary DTC No. might be displayed. Erase the stored memory in ECM and TCM (Transmission control module). Refer to "How to Erase Emission-Related Diagnostic Information", EC-82 and AT-38, "HOW TO ERASE DTC".		
	▶	**INSPECTION END**

DTC Inspection Priority Chart

NHEC0039

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

Priority	Detected items (DTC)
1	• P0100 Mass air flow sensor • P0110 Intake air temperature sensor • P0115 P0125 Engine coolant temperature sensor • P0120 Throttle position sensor • P0180 Fuel tank temperature sensor • P0325 Knock sensor • P0335 P1336 Crankshaft position sensor (POS) • P0340 Camshaft position sensor (PHASE) • P0403 EGR volume control valve • P0460 P0461 P0464 P1464 Fuel level sensor • P0500 Vehicle speed sensor • P0605 ECM • P1126 Thermostat function • P1320 Ignition signal • P1335 Crankshaft position sensor (REF) • P1605 A/T diagnosis communication line • P1706 Park/Neutral position (PNP) switch
2	• P0105 Absolute pressure sensor • P0130-P0134, P0150-P0154 Front heated oxygen sensor • P0135 P0155 Front heated oxygen sensor heater • P0137-P0140, P0157-P0160 Rear heated oxygen sensor • P0141 P0161 Rear heated oxygen sensor heater • P0217 Coolant overtemperature enrichment protection • P0443 P1444 EVAP canister purge volume control solenoid valve • P0446 P1446 P1448 EVAP canister vent control valve • P0450 EVAP control system pressure sensor • P0510 Closed throttle position switch • P0705-P0755 P1705 P1760 A/T related sensors, solenoid valves and switches • P1165 Swirl control valve control vacuum check switch • P1401 EGR temperature sensor • P1447 EVAP control system purge flow monitoring • P1490 P1491 Vacuum cut valve bypass valve
3	• P0171 P0172 P0174 P0175 Fuel injection system function • P0306 - P0300 Misfire • P0400 P1402 EGR function • P0420 P0430 Three way catalyst function • P0440 P1440 EVAP control system (SMALL LEAK) • P0455 EVAP control system (GROSS LEAK) • P0505 IACV-AAC valve • P0600 A/T communication line • P0731-P0734 P0744 A/T function • P1130 Swirl control valve control solenoid valve • P1148 P1168 Closed loop control

Fail-safe Chart

=NHEC0040

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

<table>
<tr><th>DTC No.</th><th>Detected items</th><th>Engine operating condition in fail-safe mode</th></tr>
<tr><td>P0100</td><td>Mass air flow sensor circuit</td><td>Engine speed will not rise more than 2,400 rpm due to the fuel cut.</td></tr>
<tr><td>P0115</td><td>Engine coolant temperature sensor circuit</td><td>Engine coolant temperature will be determined by ECM based on the time after turning ignition switch “ON” or “START”.
CONSULT-II displays the engine coolant temperature decided by ECM.
<table>
<tr><th>Condition</th><th>Engine coolant temperature decided (CONSULT-II display)</th></tr>
<tr><td>Just as ignition switch is turned ON or Start</td><td>40°C (104°F)</td></tr>
<tr><td>More than approx. 4 minutes after ignition ON or Start</td><td>80°C (176°F)</td></tr>
<tr><td>Except as shown above</td><td>40 - 80°C (104 - 176°F)
(Depends on the time)</td></tr>
</table></td></tr>
<tr><td>P0120</td><td>Throttle position sensor circuit</td><td>Throttle position will be determined based on the injected fuel amount and the engine speed.
Therefore, acceleration will be poor.
<table>
<tr><th>Condition</th><th>Driving condition</th></tr>
<tr><td>When engine is idling</td><td>Normal</td></tr>
<tr><td>When accelerating</td><td>Poor acceleration</td></tr>
</table></td></tr>
<tr><td>P0403</td><td>EGR volume control valve circuit</td><td>Engine speed will not rise more than 2,800 rpm due to the fuel cut.</td></tr>
<tr><td>P1335</td><td>Crankshaft position sensor (REF) circuit</td><td>Compression TDC signal (120° signal) is controlled by camshaft position sensor (PHASE) signal and crankshaft position sensor (POS) signal. Ignition timing will be delayed 0° to 2°.</td></tr>
<tr><td>Unable to access ECM</td><td>ECM</td><td>ECM fail-safe activating condition
The computing function of the ECM was judged to be malfunctioning.
When the fail-safe system activates (i.e., if the ECM detects a malfunction condition in the CPU of ECM), the 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, IACV-AAC valve operation and cooling fan operation are controlled under certain limitations.
<table>
<tr><th></th><th>ECM fail-safe operation</th></tr>
<tr><td>Engine speed</td><td>Engine speed will not rise more than 3,000 rpm</td></tr>
<tr><td>Fuel injection</td><td>Simultaneous multiport fuel injection system</td></tr>
<tr><td>Ignition timing</td><td>Ignition timing is fixed at the preset valve</td></tr>
<tr><td>Fuel pump</td><td>Fuel pump relay is “ON” when engine is running and “OFF” when engine stalls</td></tr>
<tr><td>IACV-AAC valve</td><td>Full open</td></tr>
<tr><td>Cooling fans</td><td>Cooling fan relay “ON” (High speed condition) when engine is running, and “OFF” when engine stalls.</td></tr>
</table>
Replace ECM, if ECM fail-safe condition is confirmed.</td></tr>
</table>

Symptom Diagnosis Procedure

NHEC0425

AA - HARD/NO START/RESTART

NHEC0425S01

Description

NHEC0425S0101

This describes the operations necessary to diagnose a Hard/No Start/Restart symptom. This will involve checking the Fuel, Air, Ignition, ECM, Power circuit, Ground circuit, Starting circuit, and other systems.
Refer to “Symptom Matrix Chart”, for details.

NOTE:
NATS (Nissan Anti-Theft System) can cause a no/hard start incident. If the security indicator lamp is illuminated when the ignition switch is in the ON position, a NATS malfunction is indicated.

Diagnostic Repair Procedure

NHEC0425S0102

Check the following:

1. Battery, Starter and Alternator
2. Main power supply and ground circuits
3. Fuel quality
4. Fuel Pump and Fuel Pressure Regulator operation: Gauge should read 34 psi at idle and 43 psi when fuel pressure regulator vacuum hose is disconnected and plugged.

For inoperative Fuel Pump refer to FUEL PUMP CONTROL

5. Engine compression: Spec = 142 - 185 psi at 300 rpm
6. Fuel Injections: INJECTOR NON-DETECTABLE
7. Ignition signal: P1320 - IGNITION SIGNAL
8. Base Idle speed, ignition timing and throttle position sensor adjustment: BASIC INSPECTION AND ADJUSTMENT
9. IACV-AAC Valve operation: Use CONSULT-II, ENGINE - ACTIVE TEST - IACV-AAC/V OPENING
10. EGR: Confirm it is not stuck or sticking open

Use CONSULT-II to check the operation of the following items:

11. START SIGNAL input to the ECM
12. P0100 - MASS AIR FLOW SENSOR
13. P0125 - ENGINE COOLANT TEMPERATURE SENSOR
14. P0335 - CRANKSHAFT POSITION SENSOR (POS)
15. P1335 - CRANKSHAFT POSITION SENSOR (REF)
16. P0340 - CAMSHAFT POSITION SENSOR

Other items to be checked as possible malfunction cause

17. PCV system
18. EVAP system
19. IACV-FICD
20. A/C circuit
21. Oil level and condition
22. Intake air leaks
23. Air Filter
24. Engine mechanical components
25. ABS/TCS Control Unit
26. ECM

AB - ENGINE STALL

NHEC0425S02

Description

NHEC0425S0201

This describes the operations necessary to diagnose an Engine Stall symptom. This will involve checking the Fuel, Air, Ignition, EGR, ECM and other systems.
Refer to “Symptom Matrix Chart” for details.

Diagnostic Repair Procedure

NHEC0425S0202

Check the following:

1. Battery and Alternator
2. Main power supply and ground circuits

3. Fuel quality
4. Fuel Pump and Fuel Pressure Regulator operation: Gauge should read 34 psi at idle and 43 psi when fuel pressure regulator vacuum hose is disconnected and plugged.

For inoperative Fuel Pump refer to FUEL PUMP CONTROL

5. Fuel Injectors: INJECTOR NON-DETECTABLE
6. Base Idle speed, ignition timing and throttle position sensor adjustment: BASIC INSPECTION AND ADJUSTMENT
7. Target idle speed: Spec = 625±50 rpm (A/T)/700±50 rpm (M/T)
8. IACV-AAC Valve operation: Use CONSULT-II, ENGINE - ACTIVE TEST - IACV-AAC/V OPENING
9. Ignition signal: P1320 - IGNITION SIGNAL
10. EGR: Confirm it is not stuck or sticking open

Use CONSULT-II to check the operation of the following items:

11. P0100 - MASS AIR FLOW SENSOR
12. P0131 - FRONT HEATED OXYGEN SENSOR
13. P0125 - ENGINE COOLANT TEMPERATURE SENSOR
14. P0120 - THROTTLE POSITION SENSOR
15. P0335 - CRANKSHAFT POSITION SENSOR (POS)
16. P1335 - CRANKSHAFT POSITION SENSOR (REF)
17. P0500 - VEHICLE SPEED SENSOR
18. Power Steering Oil Pressure Switch

Other items to be checked as possible malfunction cause

19. PCV system
20. EVAP system
21. IACV-FICD
22. A/C circuit
23. Oil level and condition
24. Intake air leaks
25. Air Filter
26. Engine mechanical components
27. ABS/TCS Control Unit
28. ECM

AC - HESITATION/SURGING/FLAT SPOT

NHEC0425S03

Description

NHEC0425S0301

This describes the operations necessary to diagnose a Hesitation/Surging/Flat Spot symptom. This will involve checking the Fuel, Air, Ignition, EGR, ECM and other systems.
Refer to "Symptom Matrix Chart" for details.

Diagnostic Repair Procedure

NHEC0425S0302

Check the followig:

1. Battery and Alternator
2. Main power supply and ground circuits
3. Fuel quality
4. Base Idle speed, ignition timing and throttle position sensor adjustment: BASIC INSPECTION AND ADJUSTMENT
5. Target idle speed: Spec = 625±50 rpm (A/T)/700±50 rpm (M/T)
6. IACV-AAC Valve operation: Use CONSULT-II, ENGINE - ACTIVE TEST - IACV-AAC/V OPENING
7. EGR: Confirm it is not stuck or sticking open or operating when conditions call for no EGR. P1402 EGR SYSTEM
8. Fuel Pump and Fuel Pressure Regulator operation: Gauge should read 34 psi at idle and 43 psi when fuel pressure regulator vacuum hose is disconnected and plugged.

For inoperative Fuel Pump refer to FUEL PUMP CONTROL

9. Fuel Injectors: INJECTOR NON-DETECTABLE
10. Ignition signal: P1320 - IGNITION SIGNAL

11. Knock Sensor circuit: P0325 - KNOCK SENSOR

Use CONSULT-II to check the operation of the following items:

12. P0100 - MASS AIR FLOW SENSOR
13. P0131 - FRONT HEATED OXYGEN SENSOR
14. P0125 - ENGINE COOLANT TEMPERATURE SENSOR
15. P0120 - THROTTLE POSITION SENSOR
16. P0500 - VEHICLE SPEED SENSOR
17. P1706 - PARK/NEUTRAL POSITION SWITCH

Other items to be checked as possible malfunction cause

18. PCV system
19. EVAP system
20. IACV-FICD
21. A/C circuit
22. Oil level and condition
23. Intake air leaks
24. Air Filter
25. Engine mechanical components
26. ECM

AD - SPARK KNOCK/DETONATION

NHEC0425S04

Description

NHEC0425S0401

This describes the operations necessary to diagnose a Spark Knock/Detonation symptom. This will involve checking the Ignition and ECM system.
Refer to "Symptom Matrix Chart" for details.

Diagnostic Repair Procedure

NHEC0425S0402

Check the followig:

1. Battery and Alternator
2. Main power supply and ground circuits
3. Fuel quality
4. Base Idle speed, ignition timing and throttle position sensor adjustment: BASIC INSPECTION AND ADJUSTMENT
5. Target idle speed: Spec = 625±50 rpm (A/T)/700±50 rpm (M/T)
6. IACV-AAC Valve operation: Use CONSULT-II, ENGINE - ACTIVE TEST - IACV-AAC/V OPENING
7. EGR operation: P0400 - EGR SYSTEM
8. Fuel Pump and Fuel Pressure Regulator operation: Gauge should read 34 psi at idle and 43 psi when fuel pressure regulator vacuum hose is disconnected and plugged.

For inoperative Fuel Pump refer to FUEL PUMP CONTROL

9. Ignition signal: P1320 - IGNITION SIGNAL
10. Fuel Injectors: INJECTOR NON-DETECTABLE
11. Knock Sensor circuit: P0325 - KNOCK SENSOR

Use CONSULT-II to check the operation of the following items:

12. P0100 - MASS AIR FLOW SENSOR
13. P0131 - FRONT HEATED OXYGEN SENSOR
14. P0125 - ENGINE COOLANT TEMPERATURE SENSOR

Other items to be checked as possible malfunction cause

15. Engine mechanical components
16. ECM

AE - LACK OF POWER/POOR ACCELERATION

NHEC0425S05

Description

NHEC0425S0501

This describes the operations necessary to diagnose a Lack of Power/Poor Acceleration symptom. This will involve checking the Fuel, Ignition, ECM, and other systems.
Refer to "Symptom Matrix Chart" for details.

Diagnostic Repair Procedure

NHEC0425S0502

Check the followig:

1. Battery and Alternator
2. Main power supply and ground circuits
3. Fuel quality
4. Base Idle speed, ignition timing and throttle position sensor adjustment: BASIC INSPECTION AND ADJUSTMENT
5. Fuel Pump and Fuel Pressure Regulator operation: Gauge should read 34 psi at idle and 43 psi when fuel pressure regulator vacuum hose is disconnected and plugged.

For inoperative Fuel Pump refer to FUEL PUMP CONTROL

6. Ignition signal: P1320 - IGNITION SIGNAL
7. IACV-AAC Valve operation: Use CONSULT-II, ENGINE - ACTIVE TEST - IACV-AAC/V OPENING
8. EGR: Confirm it is not stuck or sticking open or operating when conditions call for no EGR. P0400 EGR SYSTEM
9. Fuel Injectors: INJECTOR NON-DETECTABLE

Use CONSULT-II to check the operation of the following items:

10. P0100 - MASS AIR FLOW SENSOR
11. P0131 - FRONT HEATED OXYGEN SENSOR
12. P0125 - ENGINE COOLANT TEMPERATURE SENSOR
13. P0120 - THROTTLE POSITION SENSOR
14. P0500 - VEHICLE SPEED SENSOR
15. P1706 - PARK/NEUTRAL POSITION SWITCH

Other items to be checked as possible malfunction cause

16. PCV system
17. EVAP system
18. IACV-FICD
19. A/C circuit
20. Oil level and condition
21. Intake air leaks
22. Air Filter
23. Engine mechanical components
24. ABS/TCS Control Unit
25. ECM

AF - HIGH IDLE/LOW IDLE

NHEC0425S06

Description

NHEC0425S0601

This describes the operations necessary to diagnose a High Idle/Low Idle symptom. This will involve checking the Air, ECM, and other systems.
Refer to "Symptom Matrix Chart" for details.

Diagnostic Repair Procedure

NHEC0425S0602

Check the followig:

1. Battery and Alternator
2. Fuel quality
3. Air intake leaks
4. Base Idle speed, ignition timing and throttle position sensor adjustment: BASIC INSPECTION AND ADJUSTMENT
5. Target idle speed: Spec = 625±50 rpm (A/T)/700±50 rpm (M/T)
6. IACV-AAC Valve operation: Use CONSULT-II, ENGINE - ACTIVE TEST - IACV-AAC/V OPENING
7. IACV-FICD operation
8. Fuel Pump and Fuel Pressure Regulator operation: Gauge should read 34 psi at idle and 43 psi when fuel pressure regulator vacuum hose is disconnected and plugged.
9. EGR: Confirm that it is not stuck open or leaking exhaust into the intake manifold.

Use CONSULT-II to check the operation of the following items:

10. P0100 - MASS AIR FLOW SENSOR
11. P0131 - FRONT HEATED OXYGEN SENSOR
12. P0125 - ENGINE COOLANT TEMPERATURE SENSOR
13. P0120 - THROTTLE POSITION SENSOR

Other items to be checked as possible malfunction cause

14. PCV system
15. EVAP system
16. A/C circuit
17. Oil level and condition
18. ECM

AH - IDLE VIBRATION/ROUGH IDLE

NHEC0425S07

Description

NHEC0425S0701

This describes the operations necessary to diagnose an Idle Vibration/Rough Idle symptom. This will involve checking the Fuel, Air, Ignition, EGR, ECM, and other systems.
Refer to "Symptom Matrix Chart" for details.

Diagnostic Repair Procedure

NHEC0425S0702

Check the followig:

1. Battery and Alternator
2. Main power supply and ground circuits
3. Fuel quality
4. Base Idle speed, ignition timing and throttle position sensor adjustment: BASIC INSPECTION AND ADJUSTMENT
5. Target idle speed: Spec = 625±50 rpm (A/T)/700±50 rpm (M/T)
6. IACV-AAC Valve operation: Use CONSULT-II, ENGINE - ACTIVE TEST - IACV-AAC/V OPENING
7. EGR: Confirm it is not stuck open
8. Ignition signal: P1320 - IGNITION SIGNAL
9. Fuel Pump and Fuel Pressure Regulator operation: Gauge should read 34 psi at idle and 43 psi when fuel pressure regulator vacuum hose is disconnected and plugged.

For inoperative Fuel Pump refer to FUEL PUMP CONTROL

10. Fuel Injectors: INJECTOR NON-DETECTABLE

Use CONSULT-II to check the operation of the following items:

11. P0100 - MASS AIR FLOW SENSOR
12. P0131 - FRONT HEATED OXYGEN SENSOR
13. P0125 - ENGINE COOLANT TEMPERATURE SENSOR
14. P0120 - THROTTLE POSITION SENSOR
15. P1706 - PARK/NEUTRAL POSITION SWITCH
16. Front Engine Mount control
17. Electrical Load signal
18. Power steering oil pressure switch

Other items to be checked as possible malfunction cause

19. PCV system
20. EVAP system
21. IACV-FICD
22. A/C circuit
23. Oil level and condition
24. Intake air leaks
25. Air Filter
26. Engine mechanical components
27. ECM

AJ - SLOW/NO RETURN TO IDLE

NHEC0425S08

Description

NHEC0425S0801

This describes the operations necessary to diagnose a Slow/No Return to Idle symptom. This will involve checking the Air, ECM, and other systems.
Refer to "Symptom Matrix Chart" for details.

Diagnostic Repair Procedure

NHEC0425S0802

Check the followig:

1. Battery and Alternator
2. Fuel quality
3. Air intake leaks
4. Base Idle speed, ignition timing and throttle position sensor adjustment: BASIC INSPECTION AND ADJUSTMENT
5. Target idle speed: Spec = 625±50 rpm (A/T)/700±50 rpm (M/T)
6. IACV-AAC Valve operation: Use CONSULT-II, ENGINE - ACTIVE TEST - IACV-AAC/V OPENING
7. IACV-FICD operation
8. Fuel Pump and Fuel Pressure Regulator operation: Gauge should read 34 psi at idle and 43 psi when fuel pressure regulator vacuum hose is disconnected and plugged.
9. EGR: Confirm that it is not stuck open or leaking exhaust into the intake manifold.

Use CONSULT-II to check the operation of the following items:

10. P0100 - MASS AIR FLOW SENSOR
11. P0131 - FRONT HEATED OXYGEN SENSOR
12. P0125 - ENGINE COOLANT TEMPERATURE SENSOR
13. P0120 - THROTTLE POSITION SENSOR

Other items to be checked as possible malfunction cause

14. PCV system
15. EVAP system
16. A/C circuit
17. Oil level and condition
18. ECM

AL - EXCESSIVE FUEL CONSUMPTION

NHEC0425S09

Description

NHEC0425S0901

This describes the operations necessary to diagnose an Excessive Fuel Consumption symptom. This will involve checking the Fuel, Air, Ignition, ECM, and other systems.
Refer to "Symptom Matrix Chart" for details.

Diagnostic Repair Procedure

NHEC0425S0902

Check the followig:

1. Battery and Alternator
2. Main power supply and ground circuits
3. Fuel quality
4. Base Idle speed, ignition timing and throttle position sensor adjustment: BASIC INSPECTION AND ADJUSTMENT
5. Target idle speed: Spec = 625±50 rpm (A/T)/700±50 rpm (M/T)
6. IACV-AAC Valve operation: Use CONSULT-II, ENGINE - ACTIVE TEST - IACV-AAC/V OPENING
7. Fuel Pump and Fuel Pressure Regulator operation: Gauge should read 34 psi at idle and 43 psi when fuel pressure regulator vacuum hose is disconnected and plugged.

For inoperative Fuel Pump refer to FUEL PUMP CONTROL

8. Fuel Injectors: INJECTOR NON-DETECTABLE
9. Ignition signal: P1320 - IGNITION SIGNAL
10. EGR operation: P1402 - EGR SYSTEM
11. Knock Sensor circuit: P0325 - KNOCK SENSOR

Use CONSULT-II to check the operation of the following items:

12. P0100 - MASS AIR FLOW SENSOR
13. P0131 - FRONT HEATED OXYGEN SENSOR
14. P0125 - ENGINE COOLANT TEMPERATURE SENSOR
15. P0120 - THROTTLE POSITION SENSOR
16. P0500 - VEHICLE SPEED SENSOR
17. P1706 - PARK/NEUTRAL POSITION SWITCH

Other items to be checked as possible malfunction cause

18. PCV system
19. EVAP system
20. IACV-FICD
21. A/C circuit
22. Oil level and condition
23. Intake air leaks
24. Air Filter
25. Engine mechanical components
26. ECM

Symptom Matrix Chart

SYSTEM — BASIC ENGINE CONTROL SYSTEM

NHEC0041

NHEC0041S01

		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	
Fuel	Fuel pump circuit	1	1	2	3	2		2	2			3		2	EC-667
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			EC-51
	Injector circuit	1	1	2	3	2		2	2			2			EC-657
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			EC-32
Air	Positive crankcase ventilation system												1		EC-48
	Incorrect idle speed adjustment						1	1	1	1		1			EC-110
	IACV-AAC valve circuit	1	1	2	3	3	2	2	2	2		2		2	EC-458
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC-110
	Ignition circuit	1	1	2	2	2		2	2			2			EC-537
EGR	EGR volume control valve circuit	2	2	2	3	3						3			EC-378
	EGR system	2	1	2	3	3	3	2	2	3		3			EC-369, 570
Main power supply and ground circuit		2	2	3	3	3		3	3		2	3			EC-157
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	
Engine control	Crankshaft position sensor (REF) circuit	2	2												EC-548
	Crankshaft position sensor (POS) circuit														EC-355, 554
	Camshaft position sensor (PHASE) circuit	3													EC-363
	Mass air flow sensor circuit	1	1	2	2	2		2	2			2			EC-164
	Front heated oxygen sensor circuit				3										EC-205
	Engine coolant temperature sensor circuit	1					3			3					EC-183, 200
	Throttle position sensor circuit						2			2					EC-188
	Incorrect throttle position sensor adjustment		3	1		1	1	1	1	1		1			EC-110
	Vehicle speed sensor circuit		2	3		3						3			EC-454
	Knock sensor circuit			2											EC-350
	ECM	2	2	3	3	3	3	3	3	3	3				EC-479, 126
	Start signal circuit	2													EC-663
	Park/Neutral position switch circuit			3		3						3			EC-646
	Power steering oil pressure switch circuit		2					3	3						EC-677
	Electronic controlled engine mount control circuit														EC-673
	Electrical load signal circuit														EC-686

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

(continued on next page)

Symptom Matrix Chart (Cont'd)

SYSTEM — ENGINE MECHANICAL & OTHER

NHEC0041S02

		SYMPTOM													Reference section
		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	
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		1	EL section
	Alternator circuit														
	Starter circuit	3													
	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 Matrix Chart (Cont'd)

		SYMPTOM													Reference section
		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			
	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, LC section
	Oil level (Low)/Filthy oil														LC section
Cooling	Radiator/Hose/Radiator filler cap	5	5	5	5	5		5	5		4	5			
	Thermostat									5					
	Water pump														
	Water gallery														
	Cooling fan									5					EC section
	Coolant level (low)/ Contaminated coolant														MA section

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

Symptom Matrix Chart (Cont'd)

	SYMPTOM													Reference section
	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	
IVIS (Infiniti Vehicle Immobilizer System — NATS)	1	1												EC-84 or EL section
ABS/TCS control unit	2	2	2	2	2									EC-515, EC-517 or BR section

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

CONSULT-II Reference Value in Data Monitor Mode

NHEC0042

Remarks:

- Specification data are reference values.
- Specification data are output/input values which are detected or supplied by the ECM at the connector.

  * Specification data may not be directly related to their components signals/values/operations.

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

MONITOR ITEM	CONDITION		SPECIFICATION
ENG SPEED CKPS·RPM (POS)	• Tachometer: Connect • Run engine and compare tachometer indication with the CONSULT-II value.		Almost the same speed as the CONSULT-II value.
POS COUNT	• Engine: Running		179 - 181
MAS A/F SE-B1	• Engine: After warming up • Air conditioner switch: "OFF" • Shift lever: "N" • No-load	Idle	1.2 - 1.8V
		2,500 rpm	1.6 - 2.2V
COOLAN TEMP/S	• Engine: After warming up		More than 70°C (158°F)

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

MONITOR ITEM	CONDITION		SPECIFICATION
FR O2 SEN-B2 FR O2 SEN-B1	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
FR O2 MNTR-B2 FR O2 MNTR-B1			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.
RR O2 SEN-B1 RR O2 SEN-B2	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
RR O2 MNTR-B1 RR O2 MNTR-B2			LEAN ⟷ RICH
VHCL SPEED SE	• Turn drive wheels and compare speedometer indication with the CONSULT-II value		Almost the same speed as the CONSULT-II value
BATTERY VOLT	• Ignition switch: ON (Engine stopped)		11 - 14V
THRTL POS SEN	• Engine: After warming up, idle the engine	Throttle valve: fully closed	0.15 - 0.85V
	• Engine: After warming up • Ignition switch: ON (Engine stopped)	Throttle valve: fully opened	3.5 - 4.7V
EGR TEMP SEN	• Engine: After warming up		Less than 4.5V
START SIGNAL	• Ignition switch: ON → START → ON		OFF → ON → OFF
CLSD THL POS CLSD THL/P SW	• Engine: After warming up, idle the engine	Throttle valve: Idle position	ON
		Throttle valve: Slightly open	OFF
AIR COND SIG	• Engine: After warming up, idle the engine	Air conditioner switch: "OFF"	OFF
		Air conditioner switch: "ON" (Compressor operates.)	ON
P/N POSI SW	• Ignition switch: ON	Shift lever: "P" or "N"	ON
		Except above	OFF
PW/ST SIGNAL	• Engine: After warming up, idle the engine	Steering wheel in neutral position (forward direction)	OFF
		The steering wheel is turned	ON
AMB TEMP SW	• Ignition switch: ON • Compare ambient air temperature with the following:	Below 19°C (66°F)	OFF
		Above 25°C (77°F)	ON
IGNITION SW	• Ignition switch: ON → OFF → ON		ON → OFF → ON
INJ PULSE-B2 INJ PULSE-B1	• Engine: After warming up • Air conditioner switch: "OFF" • Shift lever: "N" • No-load	Idle	2.4 - 3.2 msec
		2,000 rpm	1.9 - 2.8 msec
B/FUEL SCHDL	• Engine: After warming up • Air conditioner switch: "OFF" • Shift lever: "N" • No-load	Idle	2.0 - 3.2 msec
		2,000 rpm	1.4 - 2.6 msec
IGN TIMING	• Engine: After warming up • Air conditioner switch: "OFF" • Shift lever: "N" • No-load	Idle	15°±5° BTDC
		2,000 rpm	More than 25° BTDC

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

MONITOR ITEM	CONDITION		SPECIFICATION
IACV-AAC/V	• Engine: After warming up • Air conditioner switch: "OFF" • Shift lever: "N" • No-load	Idle	2 - 10 step
		2,000 rpm	—
PURG VOL C/V	• Engine: After warming up • Air conditioner switch: "OFF" • Shift lever: "N" • No-load	Idle	0%
		2,000 rpm	—
A/F ALPHA-B2 A/F ALPHA-B1	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	54 - 155%
EVAP SYS PRES	• Ignition switch: ON		Approx. 3.4V
AIR COND RLY	• Air conditioner switch: OFF → ON		OFF → ON
FUEL PUMP RLY	• Ignition switch is turned to ON (Operates for 5 seconds) • Engine running and cranking		ON
	Except as shown above		OFF
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
EGR VOL CON/V	• Engine: After warming up • Air conditioner switch: "OFF" • Shift lever: "N" • No-load	Idle	0 step
		Engine speed: Revving from idle up to 3,000 rpm quickly	10 - 55 step
VENT CONT/V	• Ignition switch: ON		OFF
FR O2 HTR-B1 FR O2 HTR-B2	• Engine speed: Below 3,600 rpm		ON
	• Engine speed: Above 3,600 rpm		OFF
RR O2 HTR-B1 RR O2 HTR-B2	• Ignition switch: ON (Engine stopped) • Engine speed: Above 3,600 rpm		OFF
	• Engine speed: Below 3,600 rpm [After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more]		ON
VC/V BYPASS/V	Ignition switch: ON		OFF
CAL/LD VALUE	• Engine: After warming up • Air conditioner switch: "OFF" • Shift lever: "N" • No-load	Idle	14.0 - 33.0%
		2,500 rpm	12.0 - 25.0%
ABSOL TH·P/S	• Engine: After warming up	Throttle valve: fully closed	0.00%
	• Engine: After warming up • Ignition switch: ON (Engine stopped)	Throttle valve: fully opened	Approx. 80.0%
MASS AIRFLOW	• Engine: After warming up • Air conditioner switch: "OFF" • Shift lever: "N" • No-load	Idle	2.0 - 6.0 g·m/s
		2,500 rpm	7.0 - 20.0 g·m/s
ABSOL PRES/SE	• Ignition switch: ON		Approx. 4.4V

MONITOR ITEM	CONDITION		SPECIFICATION
SWRL CONT S/V	• Engine speed: Idle	Engine coolant temperature is between 15°C (59°F) to 50°C (122°F).	ON
		Engine coolant temperature is above 50°C (122°F).	OFF
SWL CON VC SW	• Engine speed: Idle • Engine coolant temperature is between 15°C (59°F) to 50°C (122°F).		OFF
	• Engine speed: Idle • Engine coolant temperature is between 55°C (131°F).		ON
ENGINE MOUNT	• Engine: Running	Idle	"IDLE"
		2,000 rpm	"TRVL"

Major Sensor Reference Graph in Data Monitor Mode

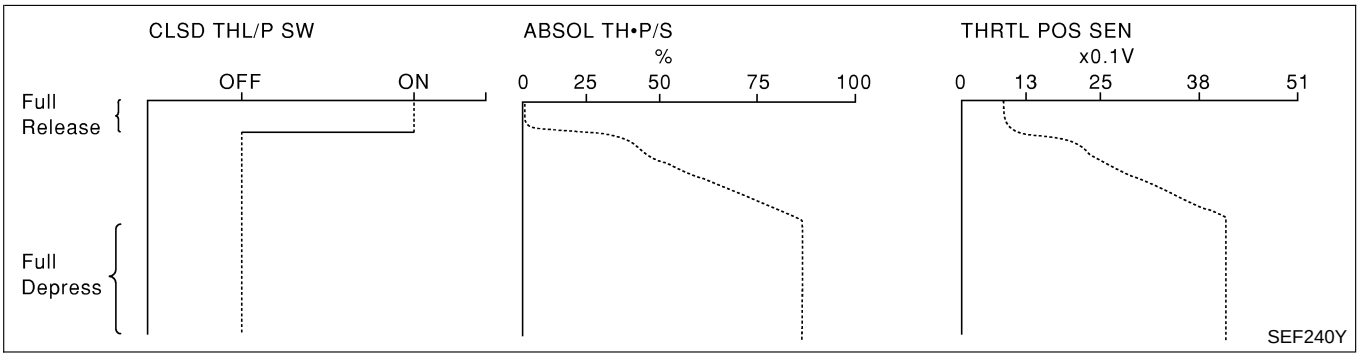
NHEC0043

The following are the major sensor reference graphs in "DATA MONITOR" mode.

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

NHEC0043S01

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

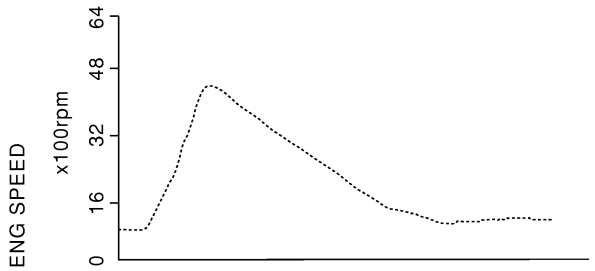


ENG SPEED, MAS A/F SE-B1, THRTL POS SEN, RR O2 SEN-B1, FR O2 SEN-B1, INJ PULSE-B1

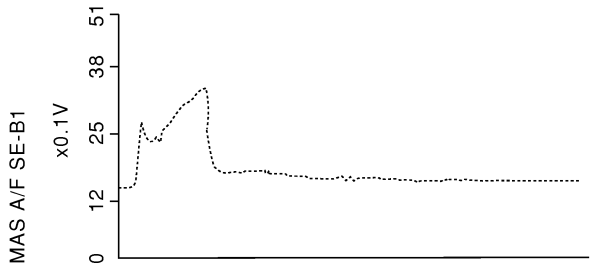
NHEC0043S02

Below is the data for "ENG SPEED", "MAS A/F SE-B1", "THRTL POS SEN", "RR O2 SEN-B1", "FR O2 SEN-B1" and "INJ PULSE-B1" when revving engine quickly up to 4,800 rpm under no load after warming up engine sufficiently.
Each value is for reference, the exact value may vary.

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

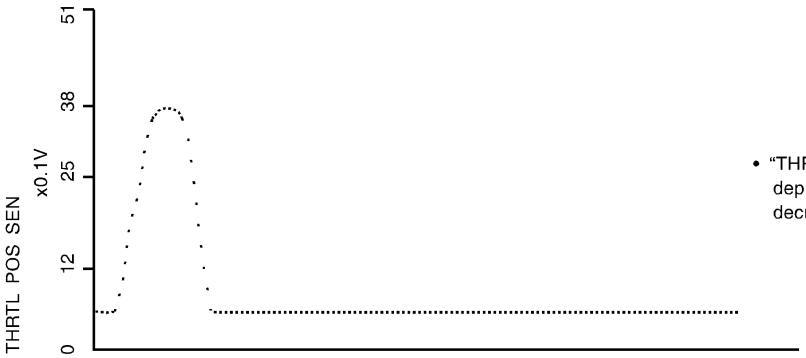


• "ENG SPEED" should increase gradually while depressing the accelerator pedal and should decrease gradually after releasing the pedal without any intemittent drop or rise.

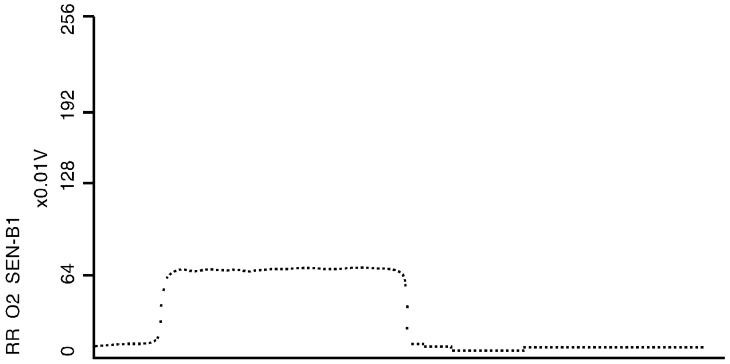


• "MAS A/F SE-B1" should increase when depressing the accelerator pedal and should decrease at the moment "THRTL POS SEN" is closed (accelerator pedal is released).

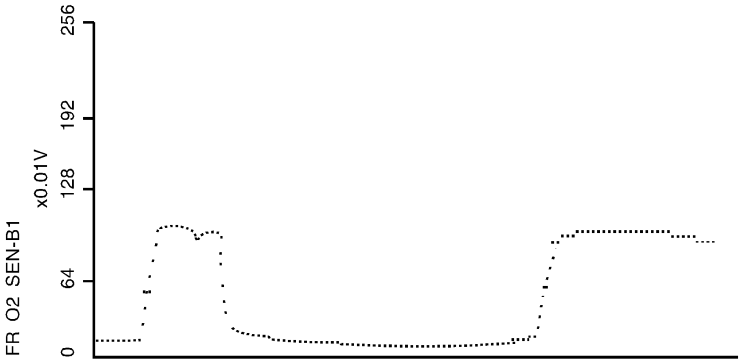
SEF241Y



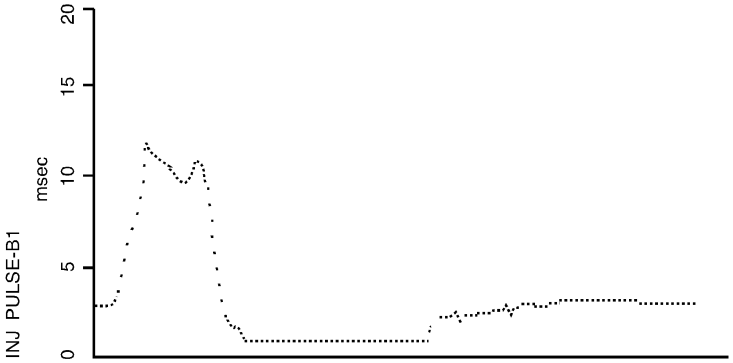
- "THRTL POS SEN" should increase while depressing the accelerator pedal and should decrease while releasing it.



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

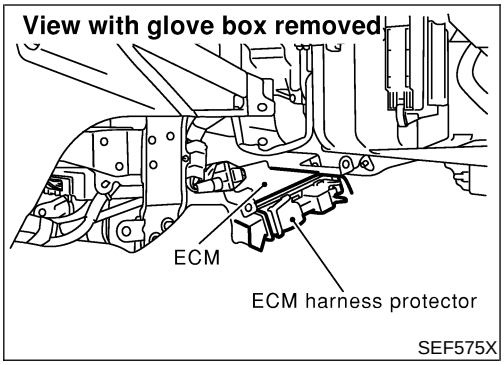


- "FR O2 SEN-B1" may increase immediately after depressing the accelerator pedal and may decrease after releasing the pedal.



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

SEF242Y



ECM Terminals and Reference Value

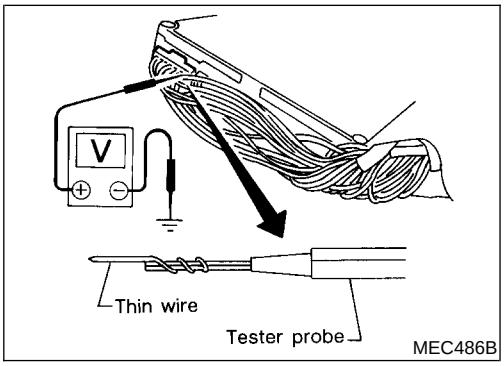
NHEC0044

PREPARATION

NHEC0044S01

1. ECM is located behind the instrument lower cover. For this inspection, remove instrument lower cover.

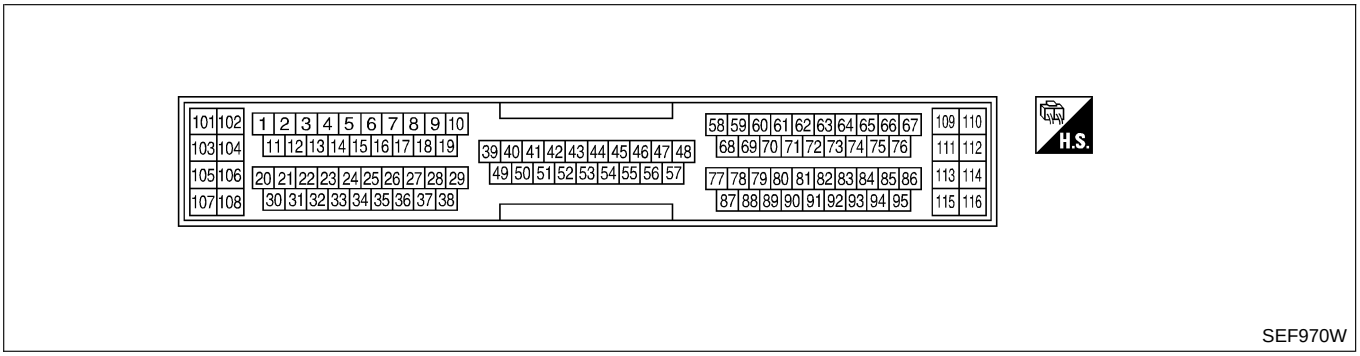
2. Remove ECM harness protector.



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

ECM HARNESS CONNECTOR TERMINAL LAYOUT

NHEC0044S02



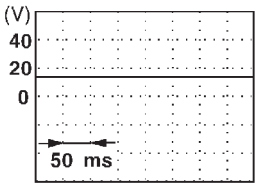
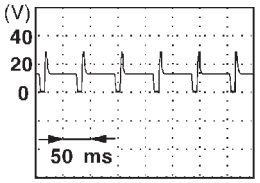
ECM INSPECTION TABLE

NHEC0044S03

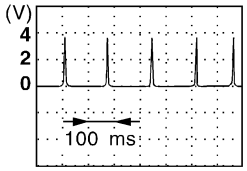
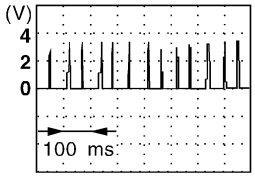
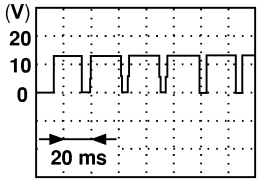
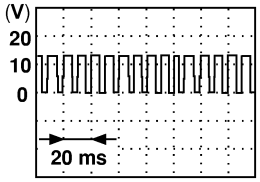
Specification data are reference values and are measured between each terminal and body ground.

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	PU/R	EVAP canister purge volume control solenoid valve	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)  SEF994U
			[Engine is running] ● Engine speed is about 2,000 rpm (More than 100 seconds after starting engine).	BATTERY VOLTAGE (11 - 14V)  SEF995U
2	R/L	Front heated oxygen sensor LH heater	**[Engine is running]** ● Engine speed is below 3,600 rpm.	0 - 1.0V
			[Engine is running] ● Engine speed is above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)
3	OR/L	Front heated oxygen sensor RH heater	**[Engine is running]** ● Engine speed is below 3,600 rpm.	0 - 1.0V
			[Engine is running] ● Engine speed is above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)
4	R/L	Rear heated oxygen sensor LH heater	**[Engine is running]** ● Engine speed is below 3,600 rpm. ● After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more.	0 - 1.0V
			[Ignition switch "ON"] ● Engine stopped **[Engine is running]** ● Engine speed is above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)
5	P/B	Rear heated oxygen sensor RH heater	**[Engine is running]** ● Engine speed is below 3,600 rpm. ● After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more.	0 - 1.0V
			[Ignition switch "ON"] ● Engine stopped **[Engine is running]** ● Engine speed is above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)
6 7 8 17	W/PU Y/B Y GY/L	IACV-AAC valve	**[Engine is running]** ● Idle speed	0.1 - 14V
9 10 18 19	G L/B BR P	EGR volume control valve	**[Engine is running]** ● Idle speed	0.1 - 14V

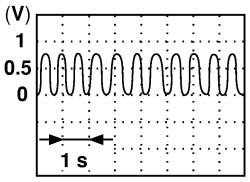
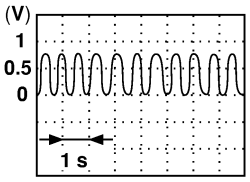
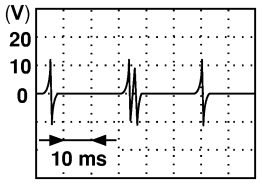
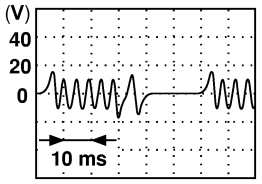
ECM Terminals and Reference Value (Cont'd)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
16	Y/G	VIAS control solenoid valve	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Engine speed is above 5,000 rpm.	0 - 1.0V
21 22 23 30 31 32	Y/R G/R L/R GY PU/W GY/R	Ignition signal No. 1 Ignition signal No. 2 Ignition signal No. 3 Ignition signal No. 4 Ignition signal No. 5 Ignition signal No. 6	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 0.2V★  SEF399T
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,500 rpm.	0.1 - 0.3V★  SEF645T
25	W/G	Tachometer	**[Engine is running]** ● **Warm-up condition** ● Idle speed	10 - 11V★  SEF579X
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,500 rpm.	10 - 11V★  SEF580X
26	W/B	ECM relay (Self shutt-off)	**[Engine is running]** **[Ignition switch "OFF"]** ● For a few seconds after turning ignition switch "OFF"	0 - 1.5V
			[Ignition switch "OFF"] ● A few seconds passed after turning ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
27	B/R	Air conditioner relay	**[Engine is running]** ● Both A/C switch and blower switch are "ON" (Compressor is operating).	0 - 1.0V
			[Engine is running] ● A/C switch is "OFF".	BATTERY VOLTAGE (11 - 14V)

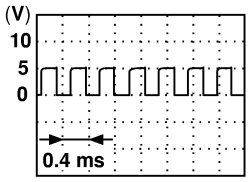
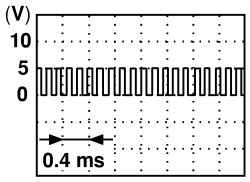
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
28	B/P	Fuel pump relay	**[Ignition switch "ON"]** ● For 1 second after turning ignition switch "ON" **[Engine is running]**	0 - 1.5V
			[Ignition switch "ON"] ● 1 second passed after turning ignition switch "ON".	BATTERY VOLTAGE (11 - 14V)
29	G	Swirl control valve control solenoid valve	**[Engine is running]** ● Idle speed ● Engine coolant temperature is between 15 to 50°C (59 to 122°F).	0 - 1.0V
			[Engine is running] ● Idle speed ● Engine coolant temperature is above 50°C (122°F).	BATTERY VOLTAGE (11 - 14V)
34	LG	Cooling fan relay (High)	**[Engine is running]** ● Cooling fan is operating at high speed.	0 - 1.0V
			[Engine is running] ● Cooling fan is not operating.	BATTERY VOLTAGE (11 - 14V)
35	BR/R	Cooling fan relay (Low)	**[Engine is running]** ● Cooling fan is operating.	0 - 1.0V
			[Engine is running] ● Cooling fan is not operating.	BATTERY VOLTAGE (11 - 14V)
38	LG/B	MIL	**[Ignition switch "ON"]**	0 - 1.0V
			[Engine is running] ● Idle speed	BATTERY VOLTAGE (11 - 14V)
39	OR/G	Vacuum cut valve bypass valve	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)
40	OR/L	EVAP canister vent control valve	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)
42	BR/W	Start signal	**[Ignition switch "ON"]**	Approximately 0V
			[Ignition switch "START"]	9 - 12V
43	R	Ignition switch	**[Ignition switch "OFF"]**	0V
			[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)
44	G/OR	PNP switch	**[Ignition switch "ON"]** ● Gear position is "P" or "N".	Approximately 0V
			[Ignition switch "ON"] ● Except the above gear position	BATTERY VOLTAGE (11 - 14V)
45	G/B	Air conditioner switch signal	**[Engine is running]** ● Both A/C switch and blower switch are "ON".	Approximately 0V
			[Engine is running] ● A/C switch is "OFF".	BATTERY VOLTAGE (11 - 14V)

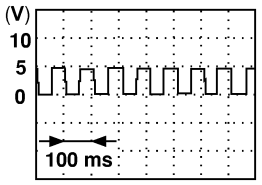
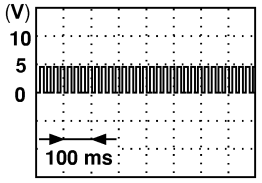
ECM Terminals and Reference Value (Cont'd)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
46	W/L	Ambient air temperature switch signal	**[Engine is running]** ● Idle speed ● Ambient air temperature is above 25°C (77°F). ● Air conditioner is operating.	0V
			[Engine is running] ● Idle speed ● Ambient air temperature is above 25°C (77°F). ● Air conditioner is not operating.	Approximately 5V
47	G	Power steering oil pressure switch	**[Engine is running]** ● Steering wheel is being turned.	0 - 1.0V
			[Engine is running] ● Steering wheel is not being turned.	BATTERY VOLTAGE (11 - 14V)
48	B	ECM ground	**[Engine is running]** ● Idle speed	Engine ground [Probe this terminal with (–) tester probe when measuring]
49	W	Electronic controlled engine mount-1	**[Engine is running]** ● Idle speed	0 - 1.0V
			[Engine is running] ● Except the above	BATTERY VOLTAGE (11 - 14V)
50	W/R	Electronic controlled engine mount-2	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Except the above	0 - 1.0V
51	PU	A/C cut signal	**[Engine is running]** ● Air conditioner is operating.	0 - 0.5V
52	W/G	Electrical load signal	**[Engine is running]** ● Rear window defogger: ON ● Hi-beam headlamp: ON	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Electrical load: OFF	0V
55	W/B	Swirl control valve control vacuum check switch	**[Engine is running]** ● Idle speed ● Engine coolant temperature is between 15 to 50°C (59 to 122°F).	Approximately 5V
			[Engine is running] ● Idle speed ● Engine coolant temperature is above 50°C (122°F).	0 - 1.0V
56	GY/L	Throttle position switch (Closed position)	**[Engine is running]** ● Accelerator pedal fully released	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Accelerator pedal depressed	Approximately 0V
57	B	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
58	B	Sensors' ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
59	B	Fuel level sensor ground	**[Engine is running]** ● Idle speed	Approximately 0V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
61	W	Mass air flow sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	1.2 - 1.8V
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,500 rpm.	1.6 - 2.2V
62	W	Front heated oxygen sensor LH	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)  SEF059V
63	W	Front heated oxygen sensor RH	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)  SEF059V
64	Y/G	Intake air temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with intake air temperature.
65 75	W W	Crankshaft position sensor (REF)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 2.3V★ (AC voltage)  SEF581X
66 76	W W	Camshaft position sensor (PHASE)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 4.2V★ (AC voltage)  SEF582X
67	W/L	Power supply for ECM (Buck-up)	**[Ignition switch "OFF"]**	BATTERY VOLTAGE (11 - 14V)
70	Y	Engine coolant temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with engine coolant temperature.

ECM Terminals and Reference Value (Cont'd)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
71	W	Rear heated oxygen sensor LH	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V
72	W	Rear heated oxygen sensor RH	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V
73	B	Mass air flow sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
74	SB	EGR temperature sensor	**[Ignition switch "ON"]**	Less than 4.5V
			[Engine is running] ● **Warm-up condition** ● EGR system is operating.	0 - 1.5V
80	W	Absolute pressure sensor	**[Ignition switch "ON"]**	Approximately 4.4V
81	W	Refrigerant pressure sensor	**[Engine is running]** ● **Warm-up condition** ● Both A/C switch and blower switch are "ON". (Compressor operates.)	0.36 - 3.88V
82	W	Throttle position sensor signal output	**[Engine is running]** ● **Warm-up condition** ● Accelerator pedal fully released	Approximately 0.4V
			[Ignition switch "ON"] ● Accelerator pedal fully depressed	Approximately 4V
83	G	Fuel level sensor	**[Ignition switch "ON"]**	Approximately 0 - 4.8V Output voltage varies with fuel level.
84	W	EVAP control system pressure sensor	**[Ignition switch "ON"]**	Approximately 3.4V
85	W	Crankshaft position sensor (POS)	**[Engine is running]** ● Idle speed	Approximately 2.4V  SEF057V
			[Engine is running] ● Engine speed is 2,000 rpm.	Approximately 2.3V  SEF058V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
86	P/L	Vehicle speed sensor	**[Engine is running]** ● Jack up front wheels. ● In 1st gear position ● 10 km/h (6 MPH)	Approximately 2.5V  SEF583X
			[Engine is running] ● Jack up front wheels. ● In 2nd gear position ● 30 km/h (19 MPH)	Approximately 2.0V  SEF584X
91	L/W	Throttle position sensor	**[Engine is running]** ● **Warm-up condition** ● Accelerator pedal fully released	0.15 - 0.85V
			[Ignition switch "ON"] ● Accelerator pedal fully depressed	3.5 - 4.7V
92	P/L	Fuel tank temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with fuel tank temperature.
93	W	Knock sensor	**[Engine is running]** ● Idle speed	Approximately 2.5V
101 102 103 104 105 107	R/B L/W R/W PU/R R/Y R/L	Injector No. 1 Injector No. 5 Injector No. 2 Injector No. 6 Injector No. 3 Injector No. 4	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
106 108	B B	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
110 112	R/G R/G	Power supply for ECM	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)
111	R	Sensors' power supply	**[Ignition switch "ON"]**	Approximately 5V
114	Y/B	Communication line (LAN)	**[Engine is running]** ● Idle speed	Approximately 2V
115	OR	Data link connector	**[Ignition switch "ON"]** ● CONSULT-II or GST is disconnected.	Approximately 2V

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

Description

NHEC0648

The specification (SP) value indicates the tolerance of the value that is displayed in “DATA MONITOR (SPEC)” mode of CONSULT-II during normal operation of the Engine Control System. When the value in “DATA MONITOR (SPEC)” mode is within the SP value, the Engine Control System is confirmed OK. When the value in “DATA MONITOR (SPEC)” mode is NOT within the SP value, the Engine Control System may have one or more malfunctions.

The SP value is used to detect malfunctions that may affect the Engine Control System, but will not light the MIL.

The SP value will be displayed for the following three items:

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

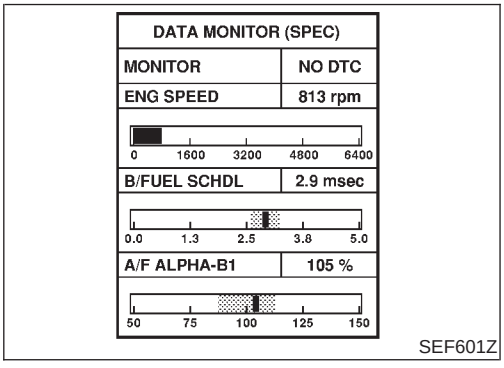
Testing Condition

NHEC0649

- Vehicle driven distance: More than 5,000 km (3,017 miles)
- Barometric pressure: 98.3 - 104.3 kPa (1.003 - 1.064 kg/cm^2, 14.25 - 15.12 psi)
- Atmospheric temperature: 20 - 30°C (68 - 86°F)
- Engine coolant temperature: 75 - 95°C (167 - 203°F)
- Transmission: Warmed-up*1
- Electrical load: Not applied*2
- Engine speed: Idle

*1: For A/T or CVT models, after the engine is warmed up to normal operating temperature, drive vehicle until “FLUID TEMP SE” (A/T or CVT fluid temperature sensor signal) indicates less than 0.9V. For M/T models, drive vehicle for 5 minutes after the engine is warmed up to normal operating temperature.

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



Inspection Procedure

NHEC0650

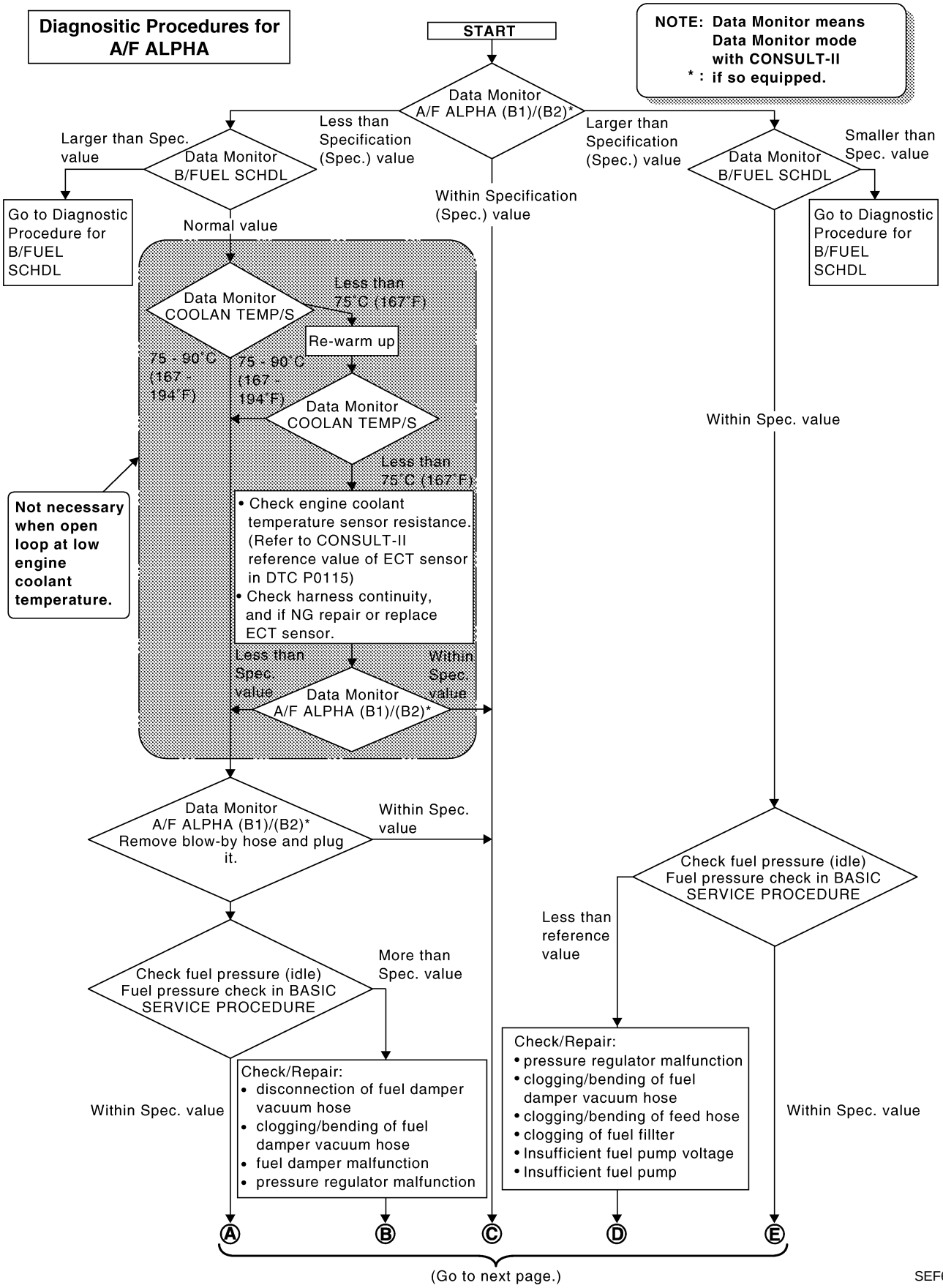
NOTE:

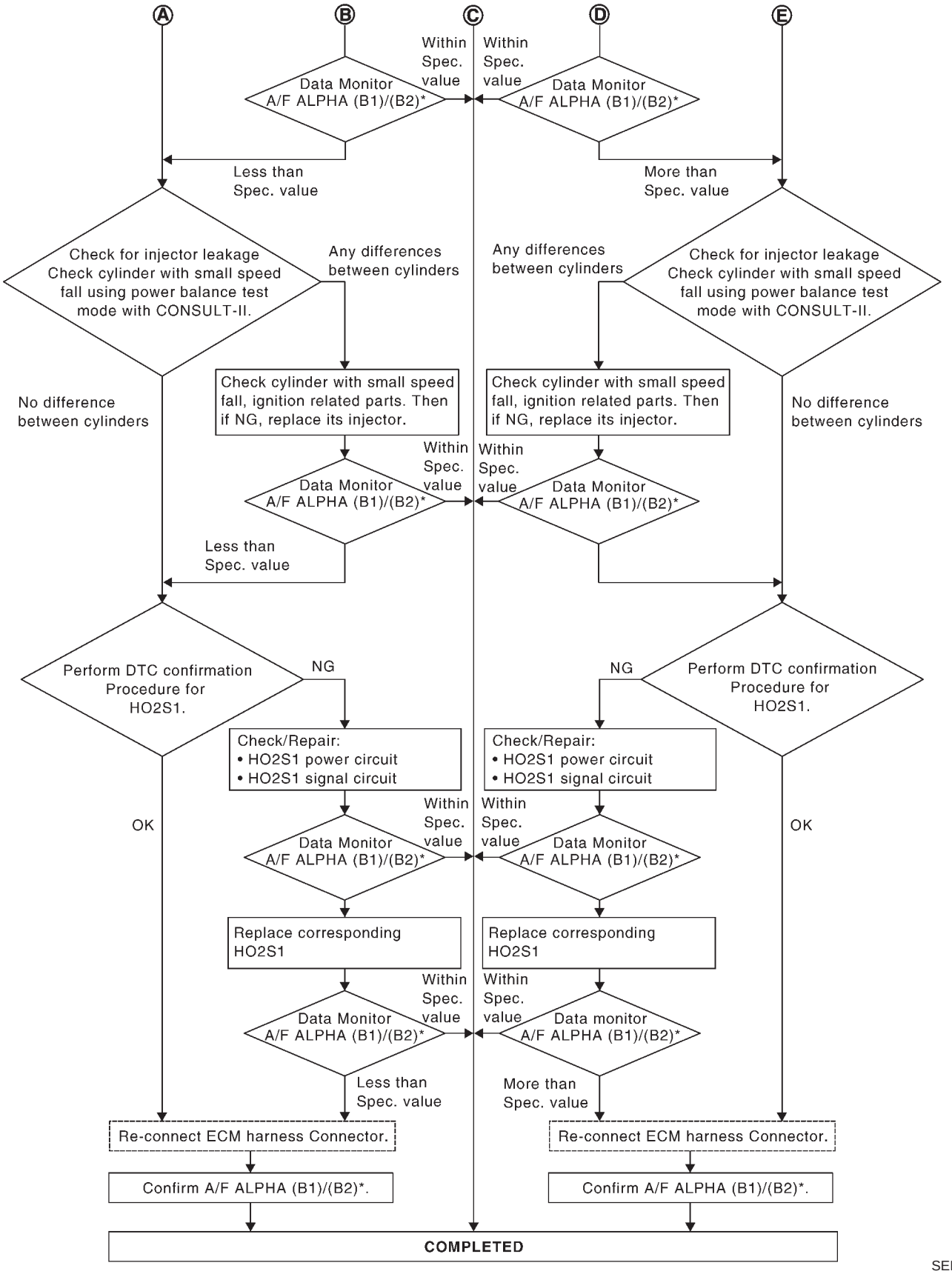
Perform “DATA MONITOR (SPEC)” mode in maximum scale display.

1. Perform “Basic Inspection”, EC-110.
2. Confirm that the testing conditions indicated above are met.
3. Select “B/FUEL SCHDL”, “A/F ALPHA-B1” and “MAS A/F SE-B1” in “DATA MONITOR (SPEC)” mode with CONSULT-II.
4. Make sure that monitor items are within the SP value.
5. If NG, go to “Diagnostic Procedure”, EC-153.

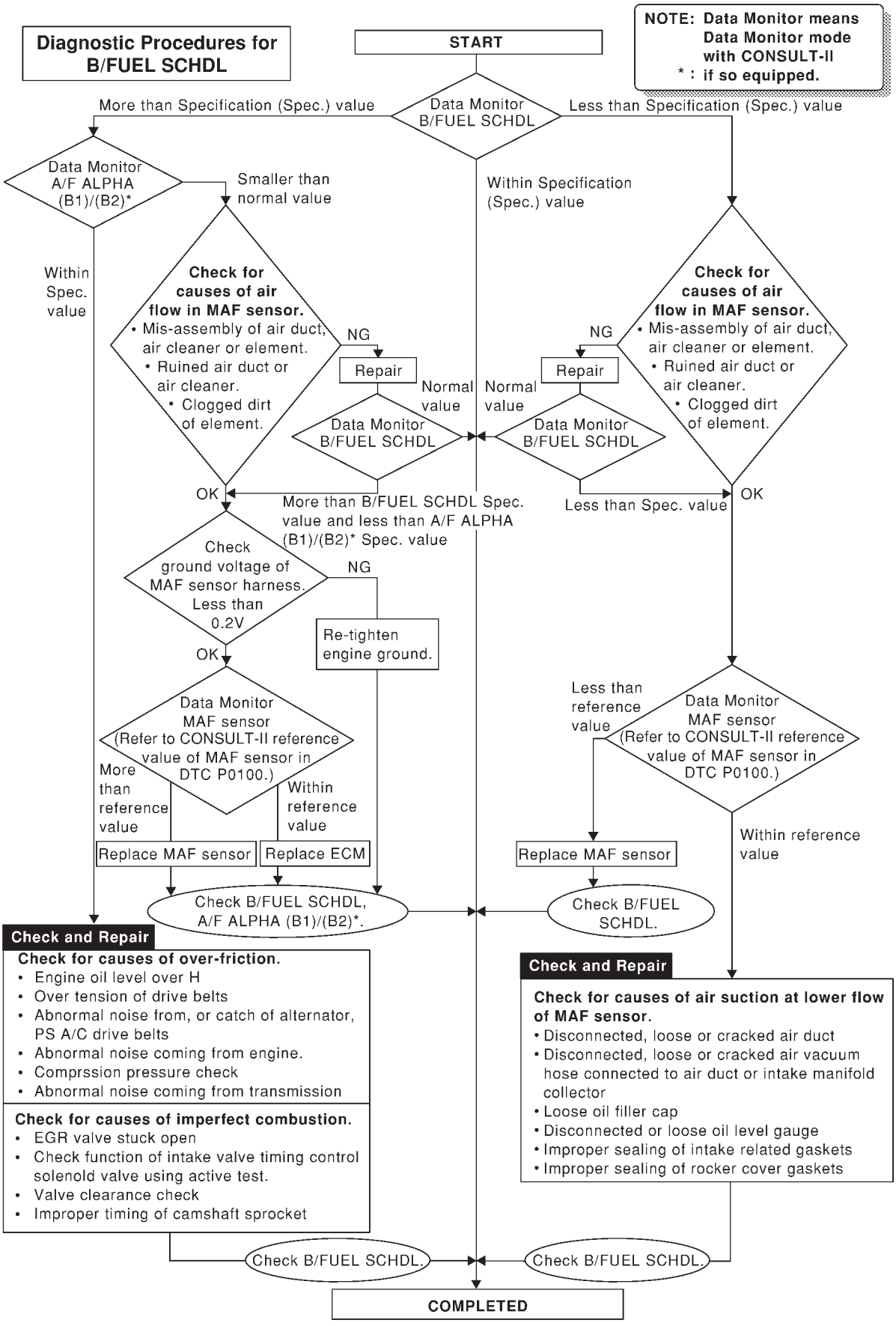
Diagnostic Procedure

NHEC0651




Ⓐ
Ⓑ
Ⓒ
Ⓓ
Ⓔ
Data Monitor A/F ALPHA (B1)/(B2)*
Within Spec. value
Less than Spec. value
More than Spec. value
Check for injector leakage Check cylinder with small speed fall using power balance test mode with CONSULT-II.
Any differences between cylinders
No difference between cylinders
Check cylinder with small speed fall, ignition related parts. Then if NG, replace its injector.
Perform DTC confirmation Procedure for HO2S1.
NG
OK
Check/Repair:
• HO2S1 power circuit
• HO2S1 signal circuit
Replace corresponding HO2S1
Data monitor A/F ALPHA (B1)/(B2)*
Re-connect ECM harness Connector.
Confirm A/F ALPHA (B1)/(B2)*.
COMPLETED

SEF768Z


Diagnostic Procedures for B/FUEL SCHDL
START
NOTE: Data Monitor means Data Monitor mode with CONSULT-II
* : if so equipped.
Data Monitor B/FUEL SCHDL
More than Specification (Spec.) value
Less than Specification (Spec.) value
Within Specification (Spec.) value
Data Monitor A/F ALPHA (B1)/(B2)*
Smaller than normal value
Within Spec. value
Check for causes of air flow in MAF sensor.
• Mis-assembly of air duct, air cleaner or element.
• Ruined air duct or air cleaner.
• Clogged dirt of element.
NG
Repair
Normal value
Data Monitor B/FUEL SCHDL
OK
More than B/FUEL SCHDL Spec. value and less than A/F ALPHA (B1)/(B2)* Spec. value
Check ground voltage of MAF sensor harness. Less than 0.2V
NG
Re-tighten engine ground.
OK
Data Monitor MAF sensor (Refer to CONSULT-II reference value of MAF sensor in DTC P0100.)
More than reference value
Within reference value
Replace MAF sensor
Replace ECM
Check B/FUEL SCHDL, A/F ALPHA (B1)/(B2)*.
Check and Repair
Check for causes of over-friction.
• Engine oil level over H
• Over tension of drive belts
• Abnormal noise from, or catch of alternator, PS A/C drive belts
• Abnormal noise coming from engine.
• Comprssion pressure check
• Abnormal noise coming from transmission
Check for causes of imperfect combustion.
• EGR valve stuck open
• Check function of intake valve timing control solenold valve using active test.
• Valve clearance check
• Improper timing of camshaft sprocket
Check B/FUEL SCHDL.
Less than Spec. value
OK
Less than reference value
Within reference value
Replace MAF sensor
Check B/FUEL SCHDL.
Check and Repair
Check for causes of air suction at lower flow of MAF sensor.
• Disconnected, loose or cracked air duct
• Disconnected, loose or cracked air vacuum hose connected to air duct or intake manifold collector
• Loose oil filler cap
• Disconnected or loose oil level gauge
• Improper sealing of intake related gaskets
• Improper sealing of rocker cover gaskets
Check B/FUEL SCHDL.
COMPLETED

SEF615Z

Description

NHEC0045

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 (1st trip) DTC 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

NHEC0045S01

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

Diagnostic Procedure

NHEC0046

1	INSPECTION START	
Erase (1st trip) DTCs. Refer to "HOW TO ERASE EMISSION — RELATED INFORMATION", EC-82.		
	▶	GO TO 2.

2	CHECK GROUND TERMINALS	
Check ground terminals for corroding or loose connection. Refer to GI-31, "GROUND INSPECTION".		
	OK or NG	
OK	▶	GO TO 3.
NG	▶	Repair or replace.

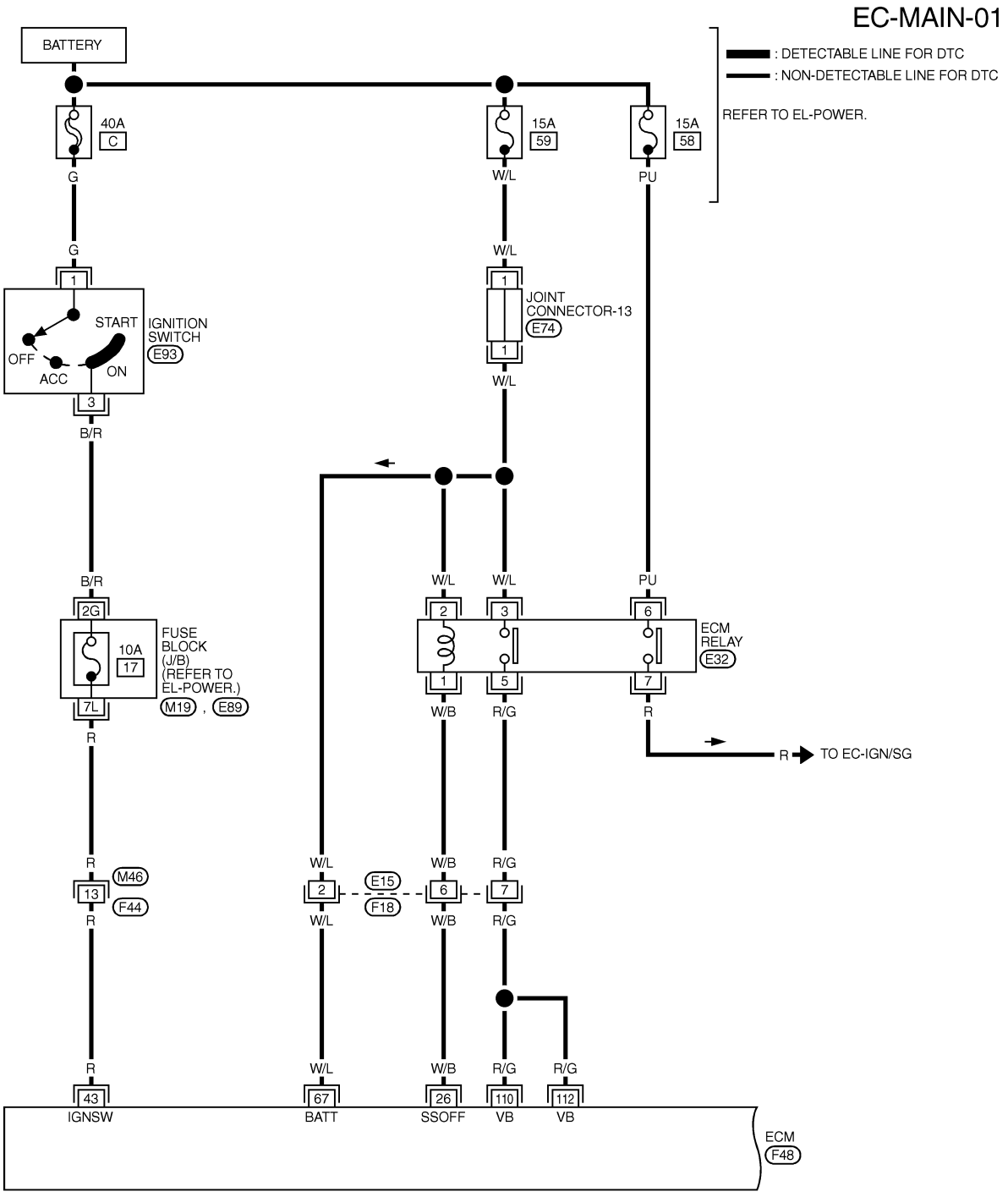
3	SEARCH FOR ELECTRICAL INCIDENT	
Perform GI-26, "Incident Simulation Tests".		
	OK or NG	
OK	▶	GO TO 4.
NG	▶	Repair or replace.

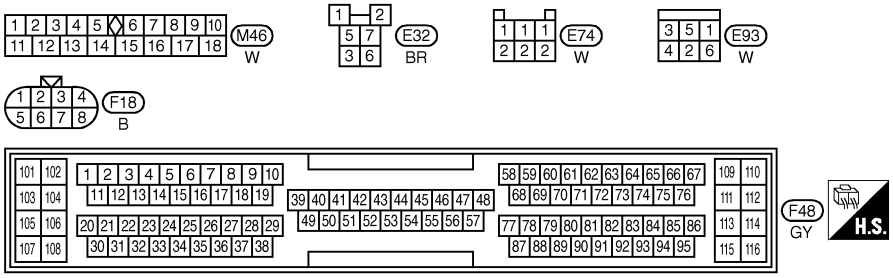
4	CHECK CONNECTOR TERMINALS	
Refer to GI-23, "How to Check Enlarged Contact Spring of Terminal".		
	OK or NG	
OK	▶	**INSPECTION END**
NG	▶	Repair or replace connector.

Main Power Supply and Ground Circuit

WIRING DIAGRAM

NHEC0047

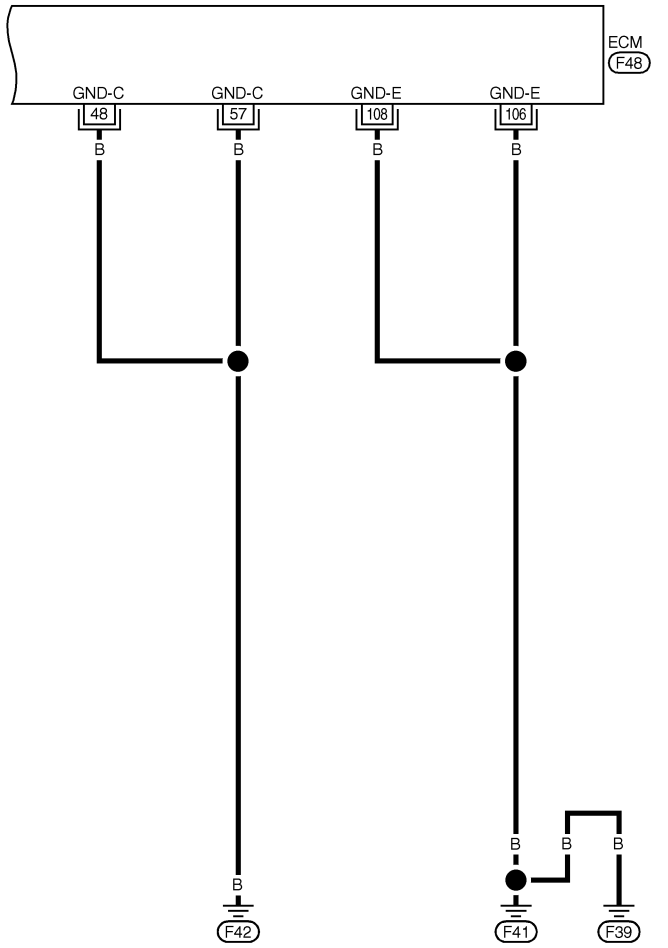


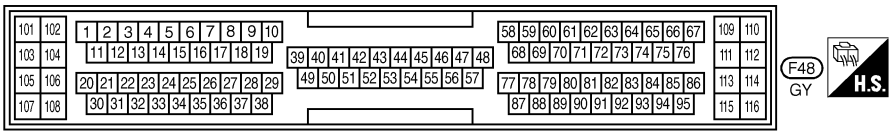


REFER TO THE FOLLOWING.
M19 -FUSE BLOCK-JUNCTION BOX (J/B)
E89 -FUSE BLOCK-JUNCTION BOX (J/B)

MEC798C

EC-MAIN-02





MEC717C

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
26	W/B	ECM RELAY (SELF-SHUTOFF)	ENGINE RUNNING FOR A FEW SECONDS AFTER TURNING IGN OFF	0 - 1.5V
			A FEW SECONDS PASSED AFTER TURNING IGN OFF	BATTERY VOLTAGE
43	R	IGN	IGN OFF	0V
			IGN ON	BATTERY VOLTAGE
48	B	ECM GROUND	ENGINE RUNNING AT IDLE SPEED	ENGINE GROUND (PROBE THIS TERMINAL WITH (–) TESTER PROBE WHEN MEASURING)
57	B	ECM GROUND	ENGINE RUNNING	ENGINE GROUND
67	W/L	POWER SUPPLY (BACK-UP)	IGN OFF	BATTERY VOLTAGE
106	B	ECM GROUND	ENGINE RUNNING AT IDLE SPEED	ENGINE GROUND
110	R/G	POWER SUPPLY FOR ECM	IGN ON	BATTERY VOLTAGE
112	R/G			

SEF630Y

DIAGNOSTIC PROCEDURE

NHEC0049

1	INSPECTION START

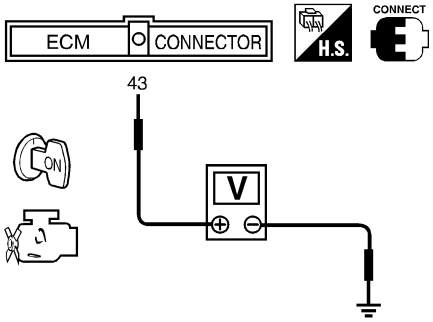
Start engine.
Is engine running?

Yes or No

Yes	▶	GO TO 9.
No	▶	GO TO 2.

2	CHECK ECM POWER SUPPLY CIRCUIT-I

1. Turn ignition switch "OFF" and then "ON".
2. Check voltage between ECM terminal 43 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF291X

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M46, F44
- Fuse block (J/B) connector M19, E89
- 10A fuse
- Harness for open or short between ECM and ignition switch

	▶	Repair harness or connectors.

4	CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-I

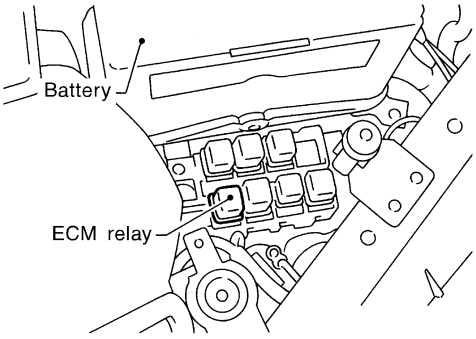
1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminals 48, 57, 106, 108 and engine ground.
   Refer to WIRING DIAGRAM.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

OK or NG

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

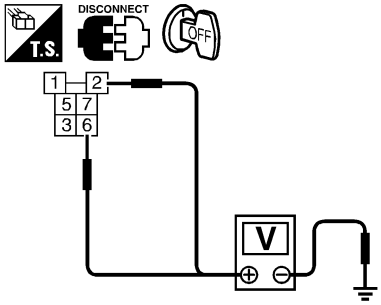
5	CHECK POWER SUPPLY-II

1. Disconnect ECM relay.



SEF589PB

2. Check voltage between ECM relay terminals 2, 6 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF292X

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 6.

6	DETECT MALFUNCTIONING PART

Check the following.
- 15A fuses
- Joint connector-13
- Harness for open or short between ECM relay and battery

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

7	CHECK OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 26 and ECM relay terminal 1.
   Continuity should exist.
2. Also check harness for short to ground and short to power.

OK or NG

OK	▶	Go to "DTC P1320 IGNITION SIGNAL", EC-537.
NG	▶	GO TO 8.

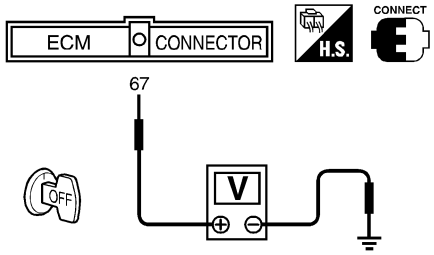
8	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E15, F18
- 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 ECM POWER SUPPLY CIRCUIT-II

1. Stop engine.
2. Check voltage between ECM terminal 67 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF293X

OK or NG

OK	▶	GO TO 11.
NG	▶	GO TO 10.

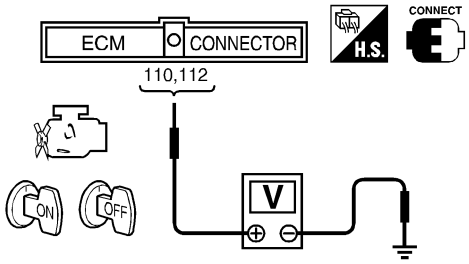
10	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E15, F18
- Harness for open or short between ECM and fuse

	▶	Repair harness or connectors.

11	CHECK ECM POWER SUPPLY CIRCUIT-III

1. Turn ignition switch "ON" and then "OFF".
2. Check voltage between ECM terminals 110, 112 and ground with CONSULT-II or tester.



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

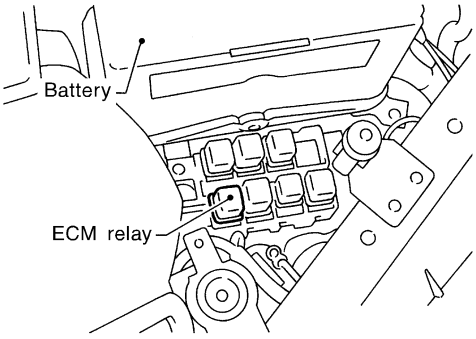
SEF294X

OK or NG

OK	▶	GO TO 17.
NG (Battery voltage does not exist.)	▶	GO TO 12.
NG (Battery voltage exists for more than a few seconds.)	▶	GO TO 14.

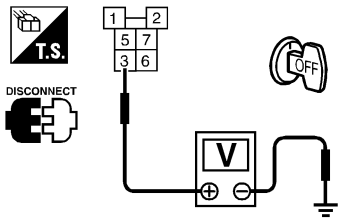
12	CHECK ECM POWER SUPPLY CIRCUIT-IV

1. Disconnect ECM relay.



SEF589PB

2. Check voltage between ECM relay terminal 3 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF295X

OK or NG

OK	▶	GO TO 14.
NG	▶	GO TO 13.

13	DETECT MALFUNCTIONING PART

Check the following.
- Joint connector-13
- Harness for open or short between ECM relay and 15A fuse

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

14	CHECK HARNESS CONTINUITY BETWEEN ECM RELAY AND ECM FOR OPEN AND SHORT

1. Check harness continuity between ECM terminals 110, 112 and ECM relay terminal 5.
   Refer to WIRING DIAGRAM.
   Continuity should exist.
2. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 16.
NG	▶	GO TO 15.

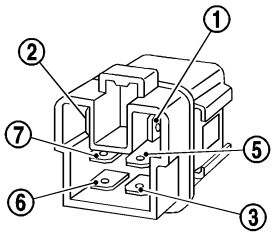
15	DETECT MALFUNCTIONING PART

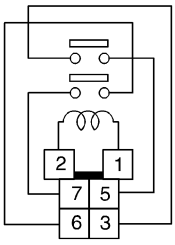
Check the following.
- Harness connectors E15, F18
- Harness for open or short between ECM and ECM relay

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

16	CHECK ECM RELAY

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





Condition	Continuity
12V direct current supply between terminals 1 and 2	Yes
OFF	No

SEF296X

OK or NG

OK	▶	GO TO 17.
NG	▶	Replace ECM relay.

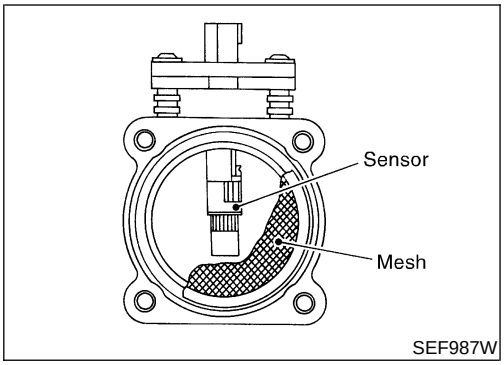
17	CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-II

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminals 48, 57, 106, 108 and engine ground.
   Refer to WIRING DIAGRAM.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 18.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

18	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156.	
▶	**INSPECTION END**



Component Description

NHEC0050

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-II Reference Value in Data Monitor Mode

NHEC0051

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAS A/F SE-B1	● Engine: After warming up ● Air conditioner switch: “OFF” ● Shift lever: “N” ● No-load	Idle	1.2 - 1.8V
		2,500 rpm	1.6 - 2.2V
CAL/LD VALUE	ditto	Idle	14.0 - 33.0%
		2,500 rpm	12.0 - 25.0%
MASS AIRFLOW	ditto	Idle	2.0 - 6.0 g·m/s
		2,500 rpm	7.0 - 20.0 g·m/s

On Board Diagnosis Logic

NHEC0053

Malfunction is detected when
(Malfunction A) an excessively high voltage from the sensor is sent to ECM when engine is not running,
(Malfunction B) an excessively low voltage from the sensor is sent to ECM when engine is running,
(Malfunction C) a high voltage from the sensor is sent to ECM under light load driving condition,
(Malfunction D) a low voltage from the sensor is sent to ECM under heavy load driving condition,
(Malfunction E) a voltage from the sensor is constantly approx. 1.0V when engine is running.

FAIL-SAFE MODE

NHEC0053S02

When the malfunction B 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.

Possible Cause

NHEC0426

MALFUNCTION A OR C

NHEC0426S01

- Harness or connectors
  (The sensor circuit is open or shorted.)
- Mass air flow sensor

MALFUNCTION B, D OR E

NHEC0426S02

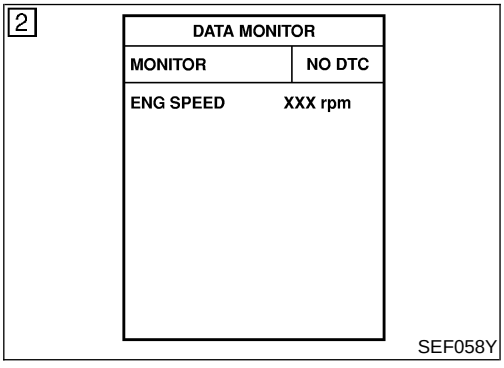
- Harness or connectors
  (The sensor circuit is open or shorted.)
- Intake air leaks
- Mass air flow sensor

DTC Confirmation Procedure

NHEC0054

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

NOTE:
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test.



PROCEDURE FOR MALFUNCTION A

NHEC0054S01

With CONSULT-II

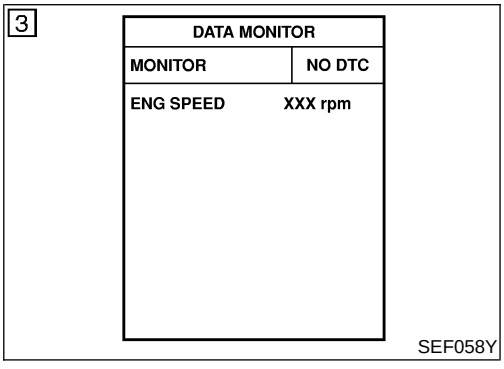
NHEC0054S0101

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Wait at least 6 seconds.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-169.

With GST

NHEC0054S0102

Follow the procedure "With CONSULT-II" above.



PROCEDURE FOR MALFUNCTION B AND E

NHEC0054S02

With CONSULT-II

NHEC0054S0201

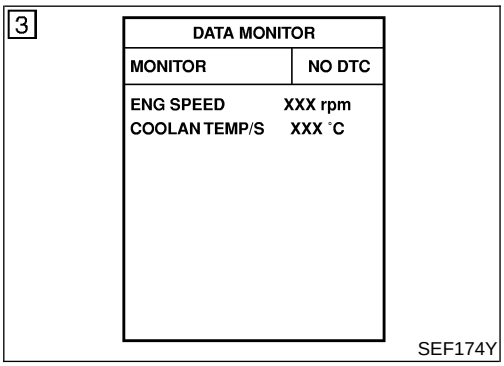
1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Start engine and wait 5 seconds at most.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-169.

With GST

NHEC0054S0202

Follow the procedure "With CONSULT-II" above.

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



PROCEDURE FOR MALFUNCTION C

NHEC0054S03

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-II

NHEC0054S0301

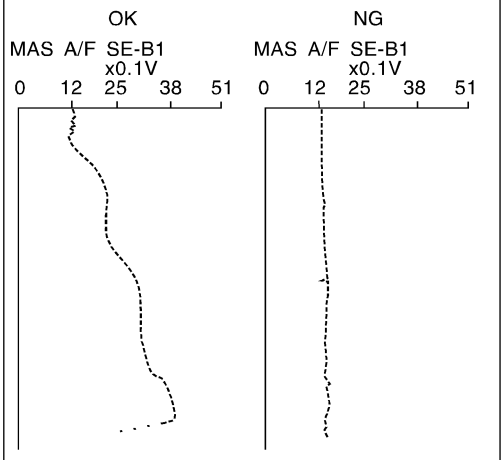
1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Start engine and warm it up to normal operating temperature.
4) Run engine for at least 10 seconds at idle speed.
5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-169.

With GST

NHEC0054S0302

Follow the procedure "With CONSULT-II" above.

6



SEF243Y

7

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

SEF175Y

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

SEF534P

PROCEDURE FOR MALFUNCTION D

NHEC0054S04

CAUTION:
Always drive vehicle at a safe speed.

With CONSULT-II

NHEC0054S0402

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-169.**
3) Select "DATA MONITOR" mode with CONSULT-II.
4) Check the voltage of MAS AIR/FL SE with "DATA MONITOR".
5) Increases engine speed to about 4,000 rpm.
6) Monitor the linear voltage rise in response to engine speed increases.
   If NG, go to "Diagnostic Procedure", EC-169.
   If OK, go to following step.
7) Maintain the following conditions for at least 10 consecutive seconds.

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

8) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-169.

Overall Function Check

NHEC0055

PROCEDURE FOR MALFUNCTION D

NHEC0055S01

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.

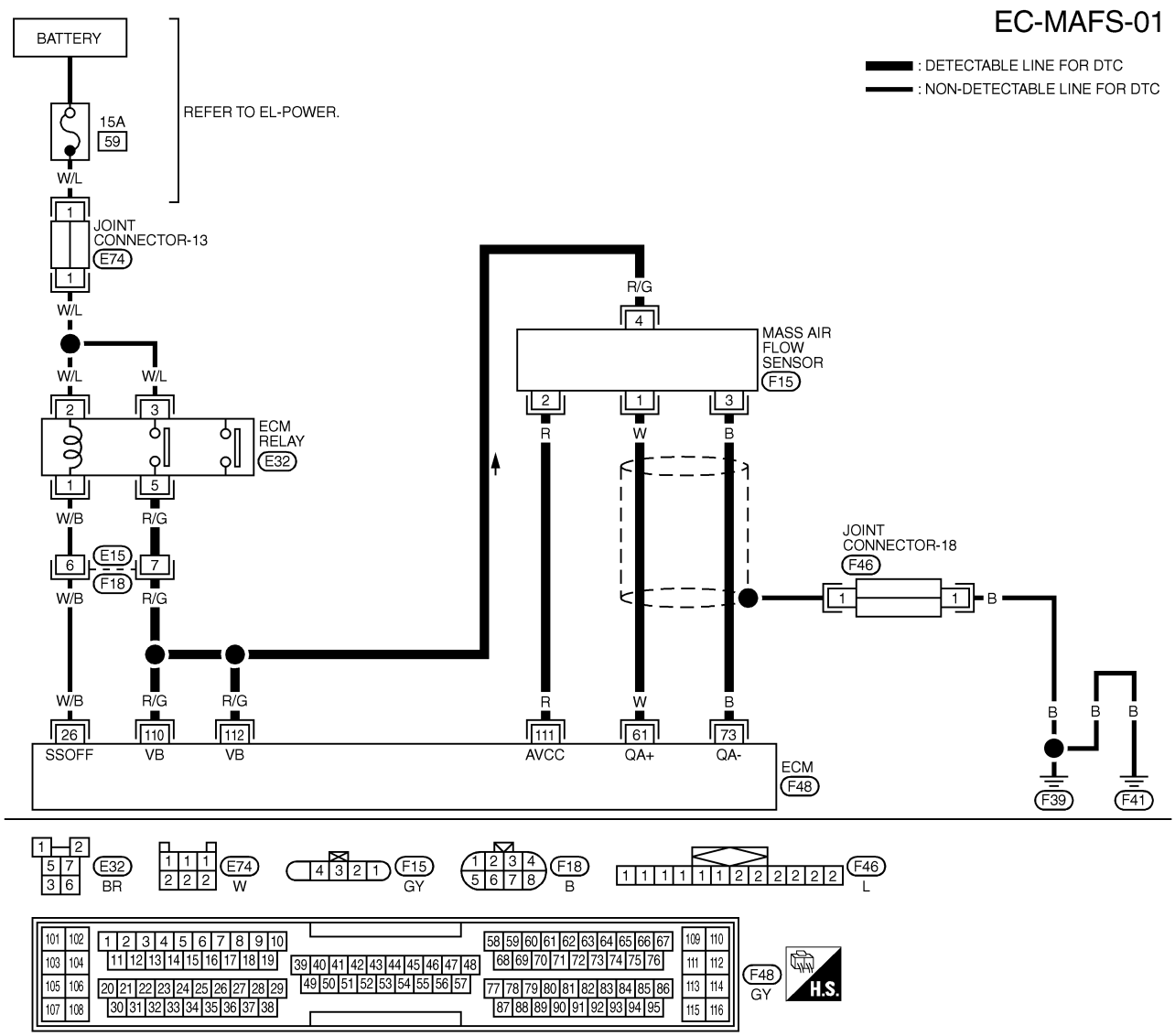
With GST

NHEC0055S0101

1) Start engine and warm it up to normal operating temperature.
2) Select "MODE 1" with GST.
3) Check the mass air flow sensor signal with "MODE 1".
4) Check for linear mass air flow sensor signal value rise in response to increases to about 4,000 rpm in engine speed.
5) If NG, go to "Diagnostic Procedure", EC-169.

Wiring Diagram

NHEC0056



MEC799C

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
61	W	MASS AIR FLOW SENSOR	ENGINE RUNNING AT IDLE SPEED UNDER WARM-UP CONDITION	1.2 - 1.8V
			ENGINE RUNNING AT 2,500 RPM UNDER WARM-UP CONDITION	1.6 - 2.2V
73	B	MASS AIR FLOW SENSOR GROUND	ENGINE RUNNING AT IDLE SPEED UNDER WARM-UP CONDITION	APPROX. 0V
111	R	SENSORS' POWER SUPPLY	IGN ON	APPROX. 5V

SEF650XB

Diagnostic Procedure

NHEC0057

1	INSPECTION START

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

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

MTBL0373

Type I or Type II

Type I	▶	GO TO 3.
Type II	▶	GO TO 2.

2	CHECK INTAKE SYSTEM

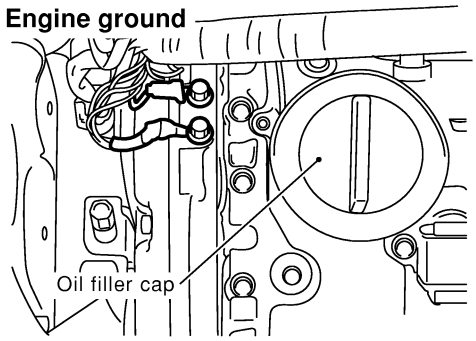
Check the following for connection.
- Air duct
- Vacuum hoses
- Intake air passage between air duct to intake manifold collector

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.

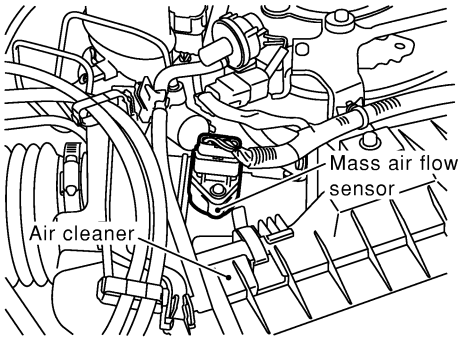


SEF255X

	▶	GO TO 4.

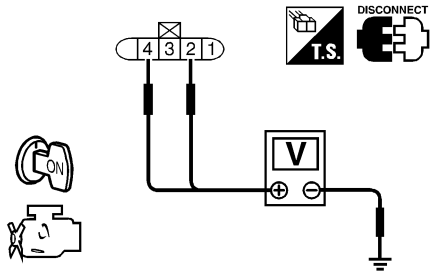
4	CHECK MAFS POWER SUPPLY CIRCUIT

1. Disconnect mass air flow sensor (MAFS) harness connector.



SEF256X

2. Turn ignition switch "ON".
3. Check voltage between MAFS terminals 2, 4 and ground with CONSULT-II or tester.



Terminal	Voltage
2	Approximately 5
4	Battery voltage

SEF297X

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART

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

	▶	Repair harness or connectors.

6	CHECK MAFS GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between MAFS terminal 3 and ECM terminal 73.
   Refer to Wiring Diagram.
   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 MAFS INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

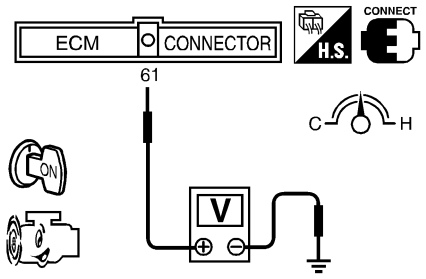
1. Check harness continuity between MAFS terminal 1 and ECM terminal 61.
   Refer to Wiring Diagram.
   Continuity should exist.
2. Also check harness for short to ground and short to power.

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

1. Reconnect harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 61 (Mass air flow sensor signal) and ground.



Condition	Voltage V
Ignition switch "ON" (Engine stopped.)	Approx. 1.0
Idle (Engine is warmed-up to normal operating temperature.)	1.2 - 1.8
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.6 - 2.2
Idle to about 4,000 rpm*	1.2 - 1.8 to Approx. 4.0

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

SEF298X

4. If the voltage is out of specification, disconnect MAFS harness connector and connect it again.
   Then repeat above check.

OK or NG

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

9	CHECK MAFS SHIELD CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect joint connector-18.
3. Check the following.

- Continuity between joint connector terminal 1 and ground
  Refer to Wiring Diagram.
- Joint connector-18
  (Refer to EL-463, "HARNESS LAYOUT".)

Continuity should exist.

4. Also check harness for short to ground and short to power.
5. Then reconnect joint connector-18.

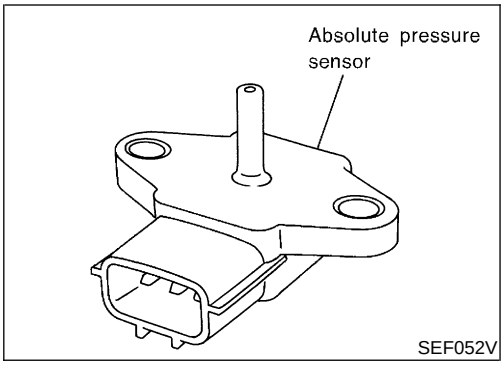
OK or NG

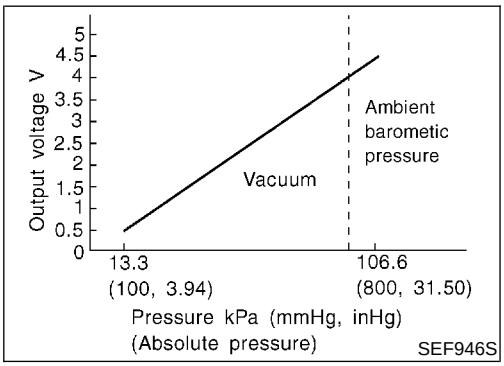
OK	▶	GO TO 10.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

10	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156.

▶ **INSPECTION END**





Component Description

NHEC0058

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

On Board Diagnosis Logic

NHEC0059

Malfunction is detected when an excessively low or high voltage from the sensor is sent to ECM.

Possible Cause

NHEC0427

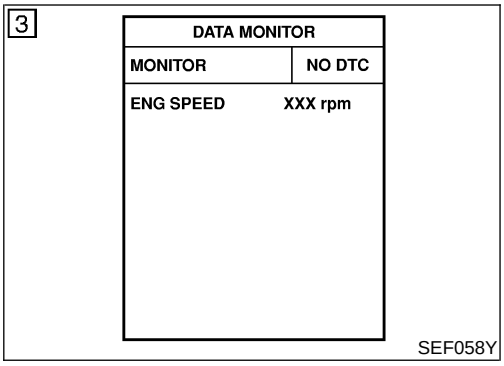
- Harness or connectors
  (Absolute pressure sensor circuit is open or shorted.)
- Absolute pressure sensor

DTC Confirmation Procedure

NHEC0060

NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.



WITH CONSULT-II

NHEC0060S01

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Wait at least 10 seconds.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-175.

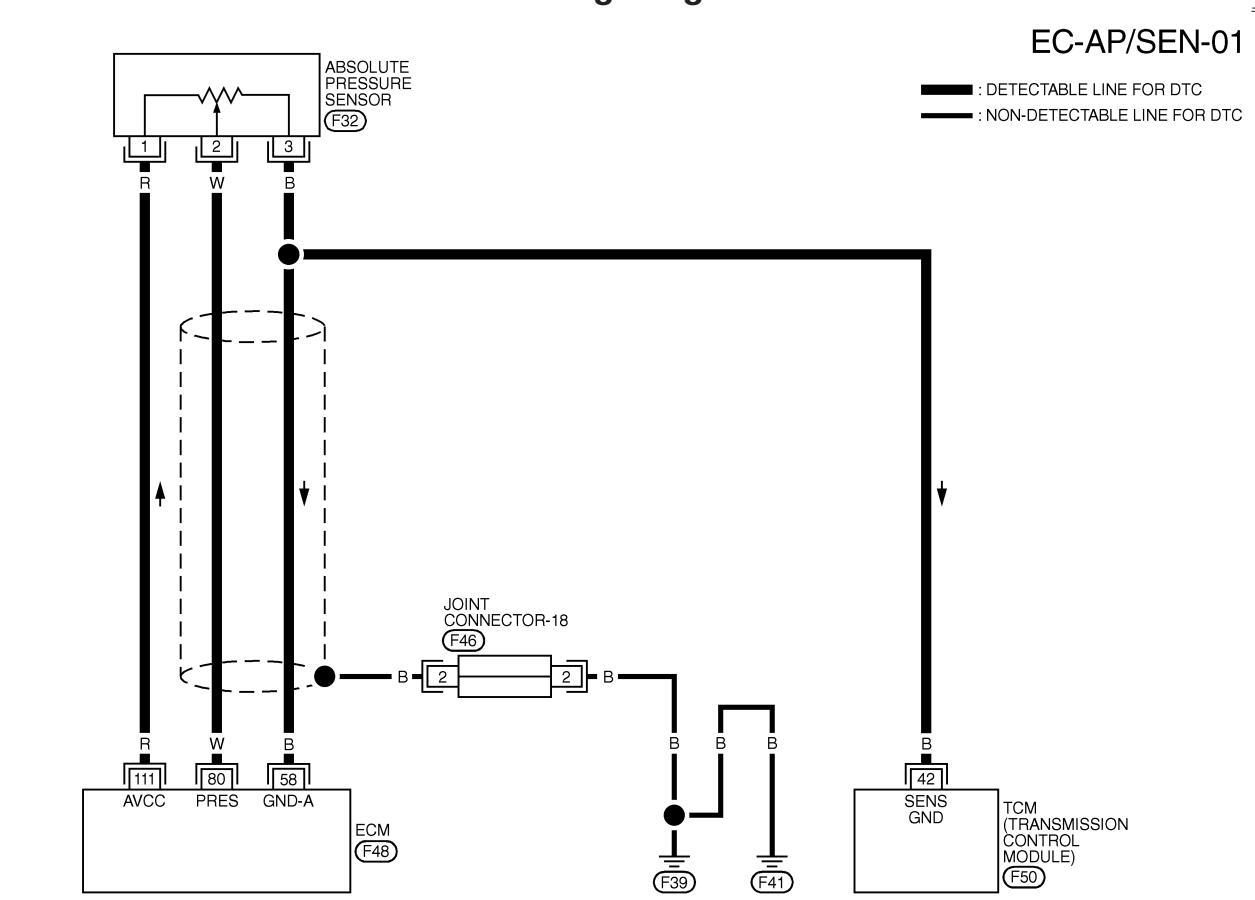
WITH GST

NHEC0060S02

Follow the procedure "WITH CONSULT-II" above.

Wiring Diagram

=NHEC0062



MEC800C

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
80	W	ABSOLUTE PRESSURE SENSOR	IGN ON	APPROX. 4.4V
111	R	SENSORS' POWER SUPPLY	IGN ON	APPROX. 5V
58	B	SENSORS' GROUND	IGN ON	APPROX. 0V

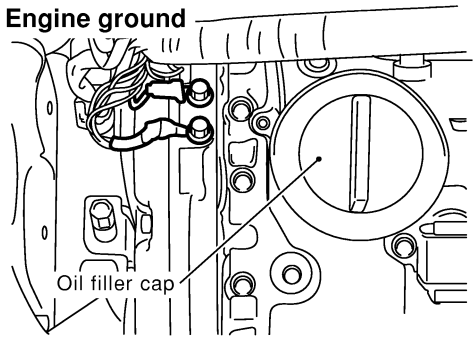
SEF651XB

Diagnostic Procedure

NHEC0063

1	RETIGHTEN GROUND SCREWS

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

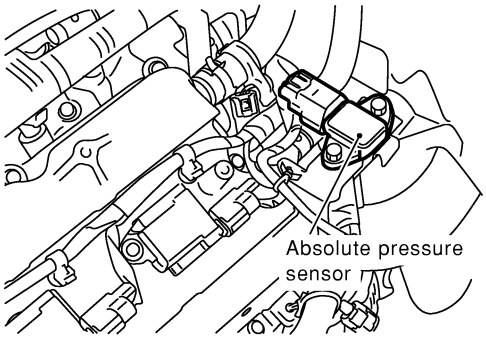


SEF255X

▶	GO TO 2.

2	CHECK ABSOLUTE PRESSURE SENSOR CONNECTOR FOR WATER

1. Disconnect absolute pressure sensor harness connector.



SEF257X

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

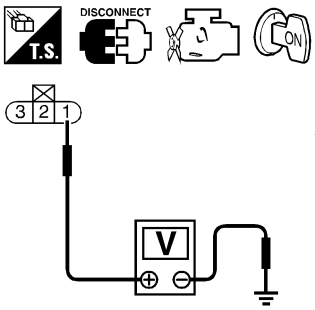
OK or NG

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

Diagnostic Procedure (Cont'd)

3	CHECK ABSOLUTE PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch "ON".
2. Check voltage between absolute pressure sensor terminal 1 and ground with CONSULT-II or tester.



Voltage: Approximately 5V

SEF299X

OK or NG

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

4	CHECK ABSOLUTE PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Check harness continuity between absolute pressure sensor terminal 3 and engine ground.
   Refer to Wiring Diagram.
   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 for open or short between ECM and absolute pressure sensor
- Harness for open or short between TCM (Transmission Control Module) and absolute pressure sensor

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

6	CHECK ABSOLUTE PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

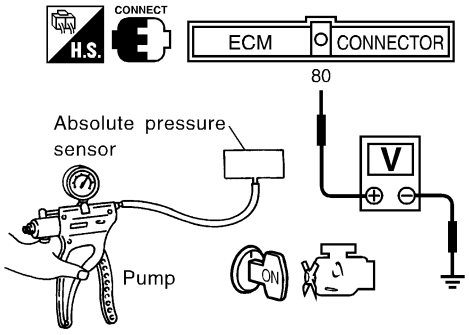
1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 80 and absolute pressure sensor terminal 2.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

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 ABSOLUTE PRESSURE SENSOR

1. Remove absolute pressure sensor with its harness connector connected.
2. Remove hose from absolute pressure sensor.
3. Install a vacuum pump to absolute pressure sensor.
4. Turn ignition switch "ON" and check output voltage between ECM terminal 80 and engine ground under the following conditions.



Applied vacuum kPa (mmHg, inHg)	Voltage V
Not applied	3.2 - 4.8
–26.7 (–200, –7.87)	1.0 to 1.4V lower than above value

SEF300X

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.**

OK or NG

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

8	CHECK ABSOLUTE PRESSURE SENSOR SHIELD CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect joint connector-18.
3. Check the following.
- Continuity between joint connector terminal 2 and ground
  Refer to Wiring Diagram.
- Joint connector
  (Refer to EL-463, "HARNESS LAYOUT".)
  Continuity should exist.
4. Also check harness for short to ground and short to power.
5. Then reconnect joint connector-18.

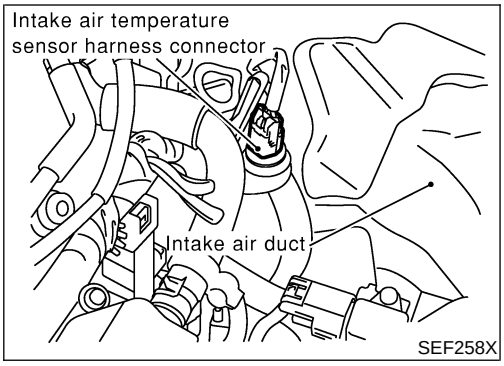
OK or NG

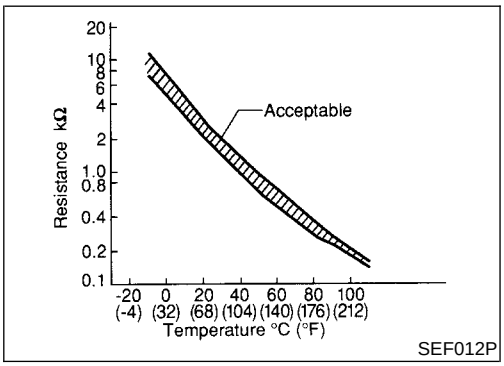
OK	▶	GO TO 9.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

9	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156.

▶ **INSPECTION END**





Component Description

NHEC0064

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 64 (Intake air temperature sensor) and body ground.

CAUTION:

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

On Board Diagnosis Logic

NHEC0065

Malfunction is detected when
(Malfunction A) an excessively low or high voltage from the sensor is sent to ECM,
(Malfunction B) rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signal from engine coolant temperature sensor.

Possible Cause

NHEC0428

- Harness or connectors
  (The sensor circuit is open or shorted.)
- Intake air temperature sensor

DTC Confirmation Procedure

NHEC0066

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 10 seconds before conducting the next test.

3

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

5

DATA MONITOR	
MONITOR	NO DTC
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h

SEF176Y

PROCEDURE FOR MALFUNCTION A

NHEC0066S01

With CONSULT-II

NHEC0066S0101

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Wait at least 5 seconds.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-181.

With GST

NHEC0066S0102

Follow the procedure "With CONSULT-II" above.

PROCEDURE FOR MALFUNCTION B

NHEC0066S02

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-II

NHEC0066S0201

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

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

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

2) Turn ignition switch "ON".
3) Select "DATA MONITOR" mode with CONSULT-II.
4) Start engine.
5) Hold vehicle speed at more than 70 km/h (43 MPH) for 100 consecutive seconds.
6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-181.

With GST

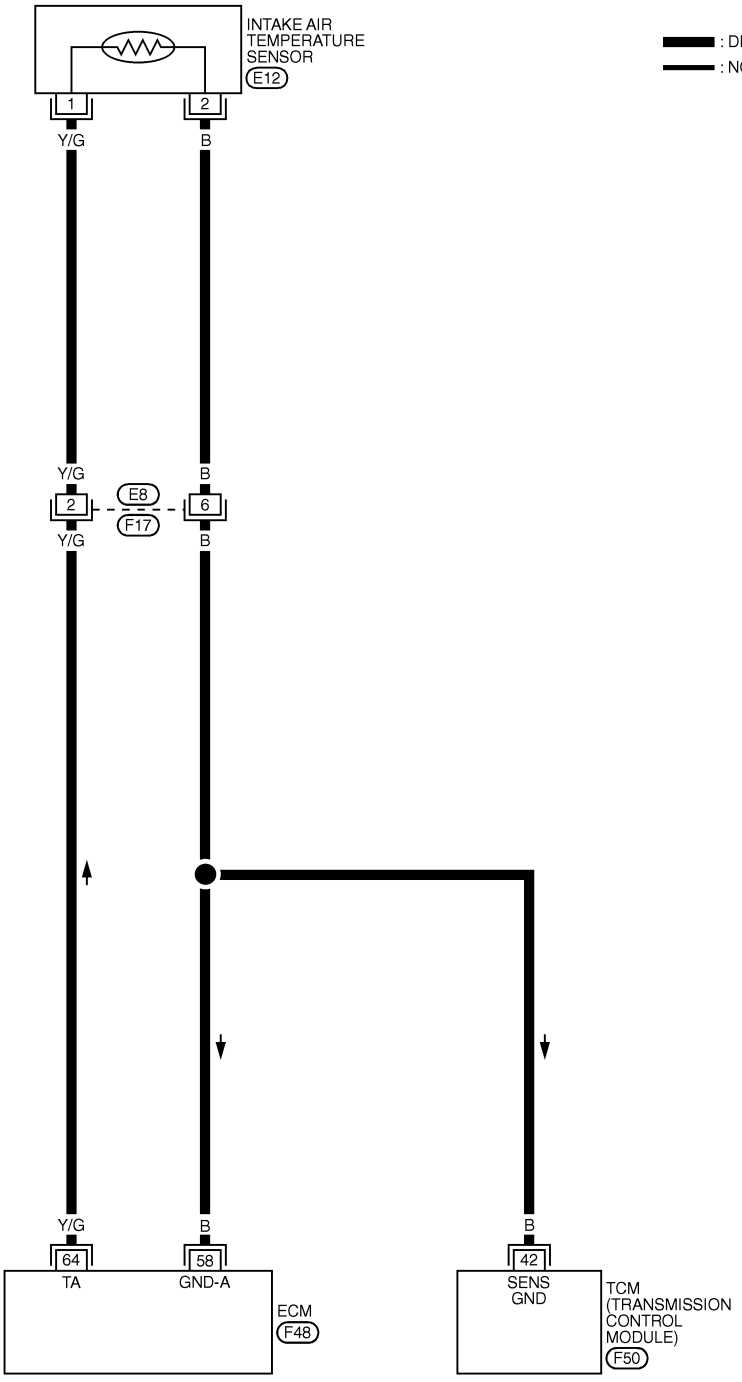
NHEC0066S0202

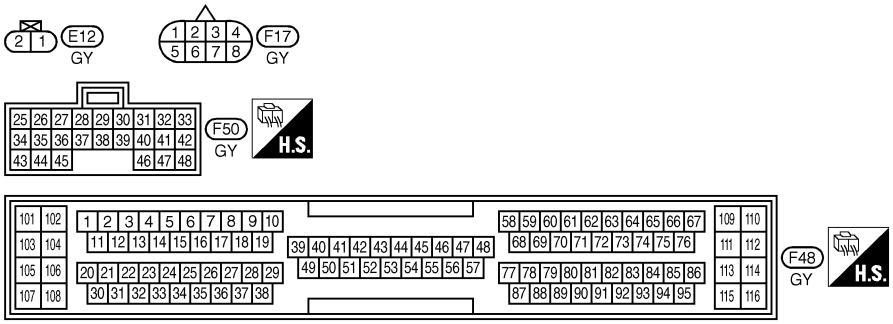
Follow the procedure "With CONSULT-II" above.

Wiring Diagram

NHEC0067

EC-IATS-01





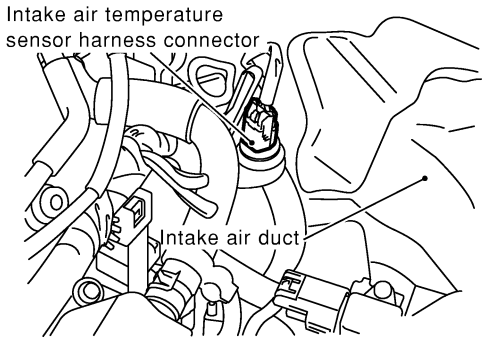
MEC801C

Diagnostic Procedure

NHEC0068

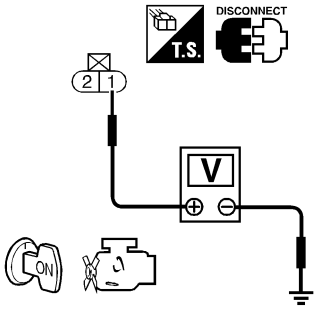
1	CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

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



SEF258X

3. Turn ignition switch “ON”.
4. Check voltage between terminal 1 and ground.



Voltage: Approximately 5V

SEF301X

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F17
- Harness for open or short between ECM and intake air temperature sensor

	▶	Repair harness or connectors.

3	CHECK INTAKE AIR TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Check harness continuity between sensor terminal 2 and engine ground.
   Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

OK or NG

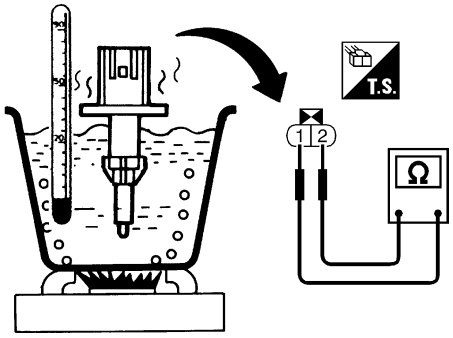
OK	▶	GO TO 5.
NG	▶	GO TO 4.

Diagnostic Procedure (Cont'd)

4	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E8, F17 ● Harness for open or short between ECM and intake air temperature sensor ● Harness for open or short between TCM (Transmission Control Module) and intake air temperature sensor	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

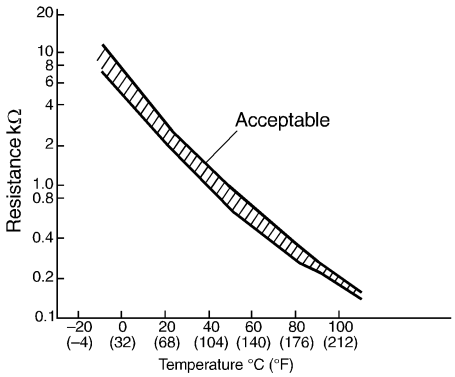
5	CHECK INTAKE AIR TEMPERATURE SENSOR

Check resistance between intake air temperature sensor terminals 1 and 2 as shown in the figure.



<Reference data>

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

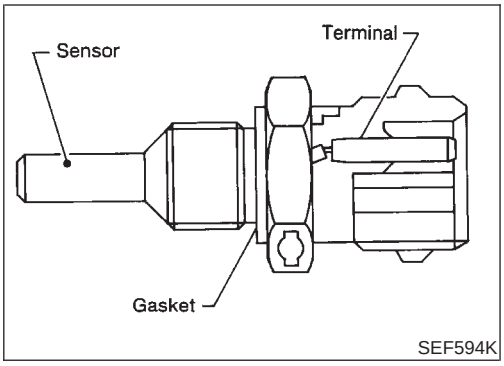


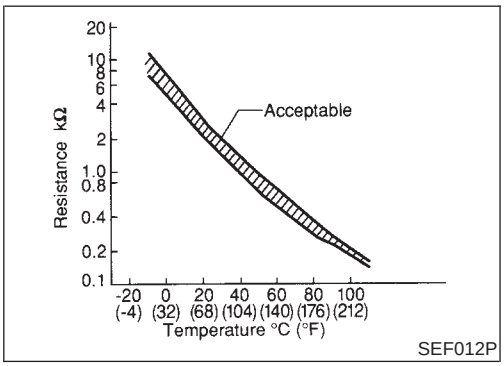
SEF302X

OK or NG

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

6	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156.	
▶	**INSPECTION END**





Component Description

NHEC0069

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 70 (Engine coolant temperature sensor) and body ground.

CAUTION:

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

On Board Diagnosis Logic

NHEC0070

Malfunction is detected when an excessively high or low voltage from the sensor is sent to ECM.

FAIL-SAFE MODE

NHEC0070S02

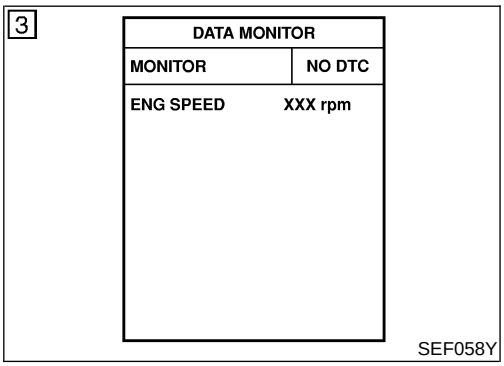
When this malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

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-II displays the engine coolant temperature decided by ECM.	
	Condition	Engine coolant temperature decided (CONSULT-II 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)

Possible Cause

NHEC0429

- Harness or connectors
  (The sensor circuit is open or shorted.)
- Engine coolant temperature sensor



DTC Confirmation Procedure

NHEC0071

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

NHEC0071S01

1) Turn ignition switch “ON”.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Wait at least 5 seconds.
4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-186.

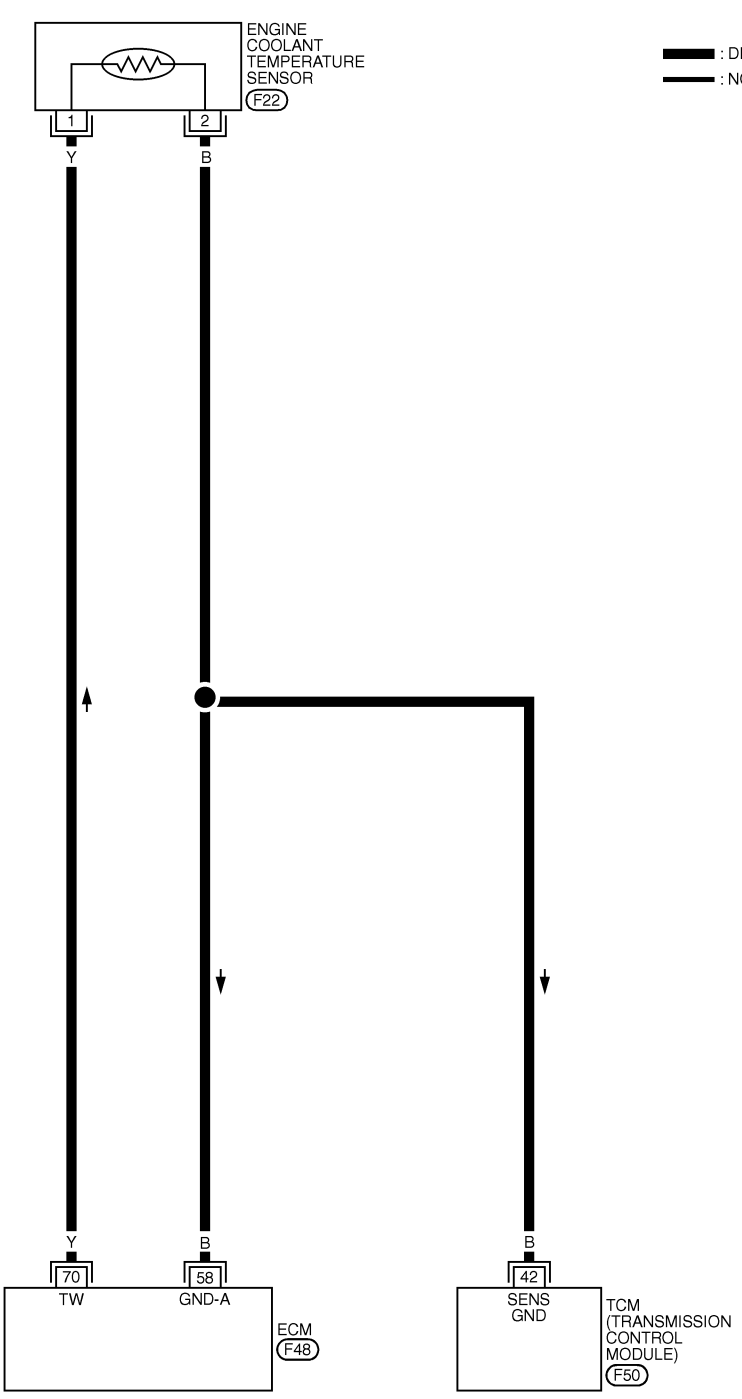
WITH GST

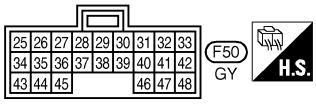
NHEC0071S02

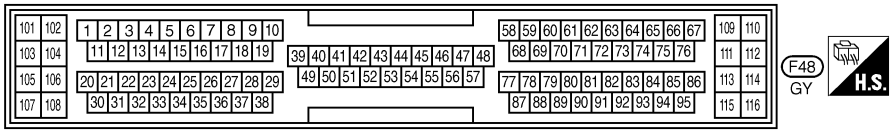
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

NHEC0072







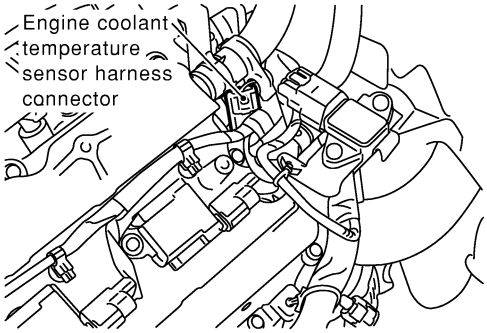
MEC802C

Diagnostic Procedure

NHEC0073

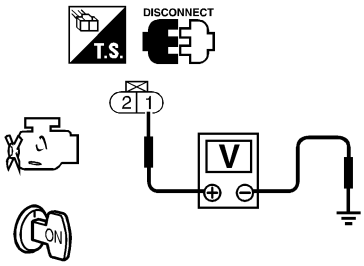
1	CHECK ECTS POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect engine coolant temperature sensor (ECTS) harness connector.



SEF259X

3. Turn ignition switch “ON”.
4. Check voltage between ECTS terminal 1 and ground with CONSULT-II or tester.



Voltage: Approximately 5V

SEF585X

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 ECTS GROUND CIRCUIT FOR OPEN AND CIRCUIT

1. Turn ignition switch “OFF”.
2. Check harness continuity between ECTS terminal 2 and engine ground.
   Refer to Wiring Diagram.
   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.

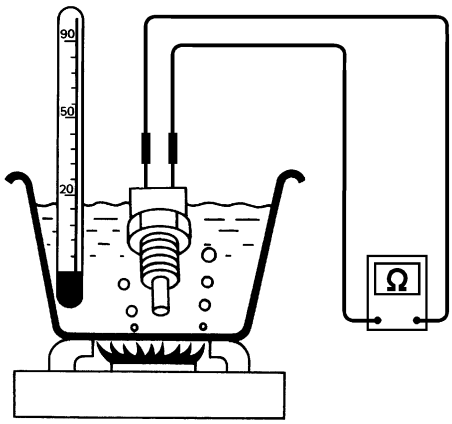
3	DETECT MALFUNCTIONING PART

Check the following.
- Harness for open or short between ECM and engine coolant temperature sensor
- Harness for open or short between TCM (Transmission Control Module) and engine coolant temperature sensor

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

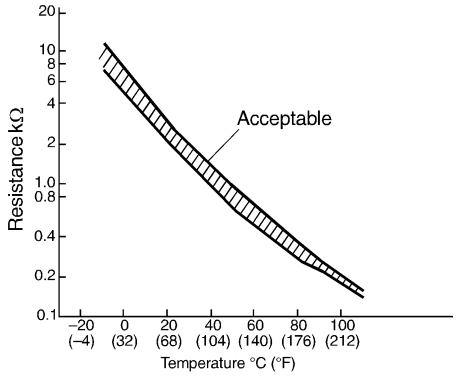
4	CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check resistance between engine coolant temperature sensor terminals 1 and 2 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



SEF304X

OK or NG

OK	▶	GO TO 5.
NG	▶	Replace engine coolant temperature sensor.

5	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156.	
▶	**INSPECTION END**

Description

NHEC0074

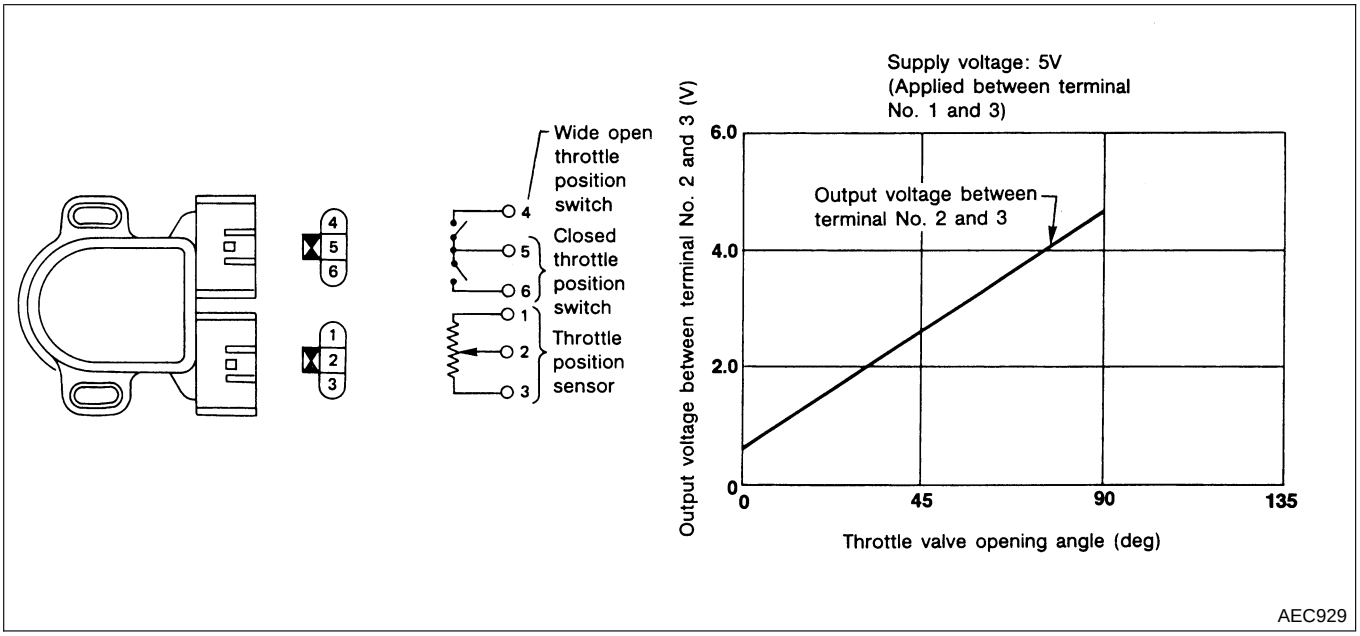
NOTE:
If DTC P0120 is displayed with DTC P0510, first perform the trouble diagnosis for DTC P0510. Refer to EC-467.

COMPONENT DESCRIPTION

NHEC0074S01

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-II Reference Value in Data Monitor Mode

NHEC0075

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
THRTL POS SEN	● Engine: After warming up, idle the engine	Throttle valve: fully closed	0.15 - 0.85V
	● Engine: After warming up ● Ignition switch: ON (Engine stopped)	Throttle valve: fully opened	3.5 - 4.7V
ABSOL TH·P/S	● Engine: After warming up, idle the engine	Throttle valve: fully closed	0.00%
	● Engine: After warming up ● Ignition switch: ON (Engine stopped)	Throttle valve: fully opened	Approx. 80.0%

On Board Diagnosis Logic

NHEC0077

Malfunction is detected when
(Malfunction A) an excessively low or high voltage from the sensor is sent to ECM,
(Malfunction B) a high voltage from the sensor is sent to ECM under light load driving conditions,
(Malfunction C) a low voltage from the sensor is sent to ECM under heavy load driving conditions.

FAIL-SAFE MODE

NHEC0077S02

When the malfunction A 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

Possible Cause

NHEC0430

MALFUNCTION A

NHEC0430S01

- Harness or connectors
  (The throttle position sensor circuit is open or shorted.)
- Throttle position sensor

MALFUNCTION B

NHEC0430S02

- Harness or connectors
  (The throttle position sensor circuit is open or shorted.)
- Throttle position sensor
- Fuel injector
- Crankshaft position sensor (REF)
- Crankshaft position sensor (POS)
- Mass air flow sensor

MALFUNCTION C

NHEC0430S03

- Harness or connectors
  (The throttle position sensor circuit is open or shorted.)
- Intake air leaks
- Throttle position sensor

DTC Confirmation Procedure

NHEC0078

NOTE:

- **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 “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR MALFUNCTION A

NHEC0078S01

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.**

2

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
VHCL SPEED SE	XXX km/h
P/N POSI SW	OFF

SEF065Y

With CONSULT-II

NHEC0078S0101

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

Vehicle speed	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-194.

With GST

NHEC0078S0102

Follow the procedure "With CONSULT-II" above.

3

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

PROCEDURE FOR MALFUNCTION B

NHEC0078S02

With CONSULT-II

NHEC0078S0201

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

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

4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-194.

With GST

NHEC0078S0202

Follow the procedure "With CONSULT-II" above.

6

DATA MONITOR	
MONITOR	NO DTC
THRTL POS SEN	XXX V
ABSOL TH-P/S	XXX %

SEF177Y

PROCEDURE FOR MALFUNCTION C

NHEC0078S03

CAUTION:
Always drive vehicle at a safe speed.

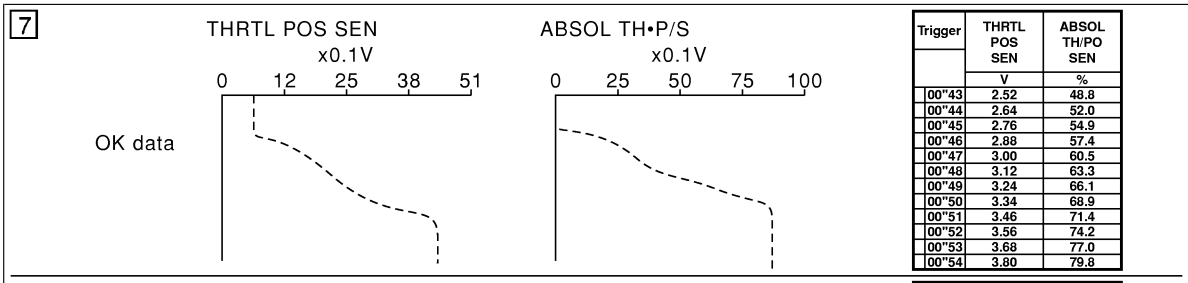
With CONSULT-II

NHEC0078S0301

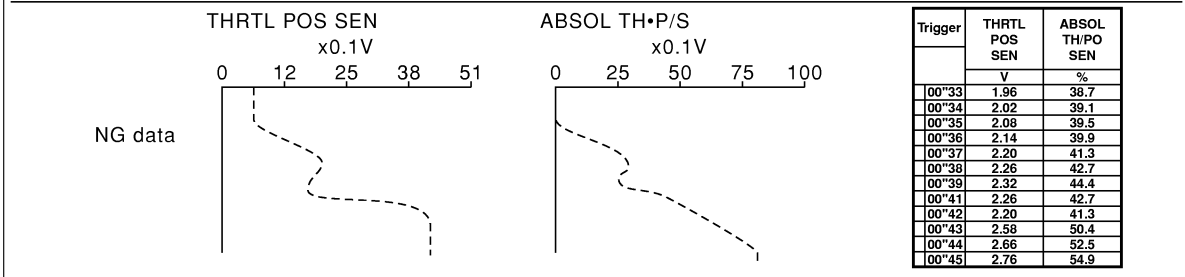
1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 10 seconds.
3) Turn ignition switch "ON".
4) Select "MANU TRIG" in "DATA MONITOR" mode with CONSULT-II.
5) Select "THRTL POS SEN" and "ABSOL TH·P/S" in "DATA MONITOR" mode with CONSULT-II.
6) Press RECORD on CONSULT-II SCREEN at the same time accelerator pedal is depressed.
7) Print out the recorded graph and check the following:

- The voltage rise is linear in response to accelerator pedal depression.
- The voltage when accelerator pedal is fully depressed is approximately 4V.
  If NG, go to "Diagnostic Procedure", EC-194.
  If OK, go to following step.

7



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



Trigger	THRTL POS SEN	ABSOL TH/PO SEN
	V	%
00"33	1.96	38.7
00"34	2.02	39.1
00"35	2.08	39.5
00"36	2.14	39.9
00"37	2.20	41.3
00"38	2.26	42.7
00"39	2.32	44.4
00"41	2.26	42.7
00"42	2.20	41.3
00"43	2.58	50.4
00"44	2.66	52.5
00"45	2.76	54.9

SEF245Y

8) Select "AUTO TRIG" in "DATA MONITOR" mode with CONSULT-II.

9

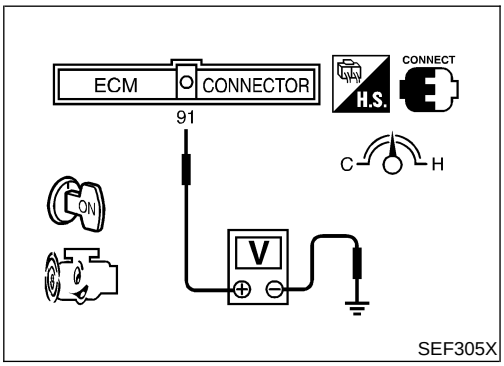
DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
COOLAN TEMP/S	XXX °C

SEF178Y

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

ENG SPEED	More than 2,000 rpm
MAS AIR/FL SE	More than 3.2V
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-194.



With GST

NHEC0078S0302

1) Start engine and warm it up to normal operating temperature.
2) Maintain the following conditions for at least 10 consecutive seconds.

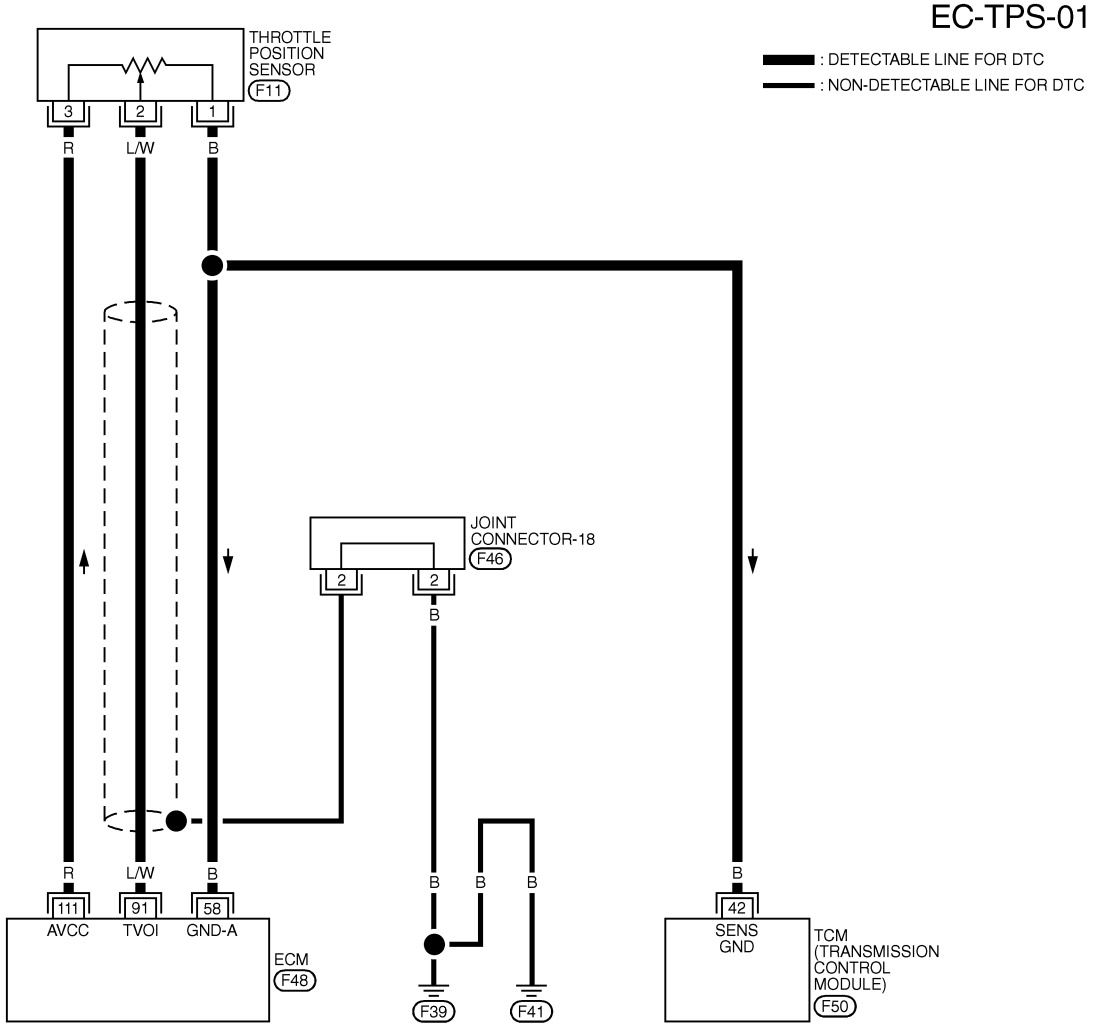
Gear position	Suitable position
Engine speed	More than 2,000 rpm
Engine coolant temperature	More than 70°C (158°F)
Voltage between ECM terminal 91 (Mass air flow sensor signal) and ground	More than 3.2V

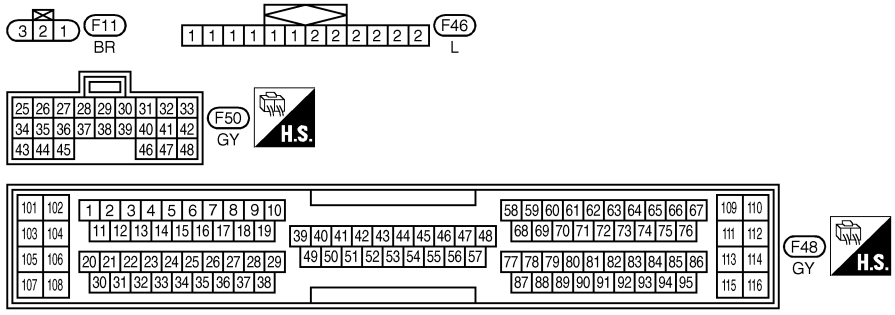
3) Select "MODE 7" with GST.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-194.

Wiring Diagram

NHEC0079

EC-TPS-01





MEC803C

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
91	L/W	THROTTLE POSITION SENSOR	ENGINE RUNNING UNDER WARM-UP CONDITION WITH ACCELERATOR PEDAL FULLY RELEASED	0.15 - 0.85V
			IGN ON WITH ACCELERATOR PEDAL FULLY DEPRESSED	3.5 - 4.7V
111	R	SENSORS' POWER SUPPLY	IGN ON	APPROX. 5V
58	B	SENSORS' GROUND	ENGINE RUNNING AT IDLE SPEED UNDER WARM-UP CONDITION	APPROX. 0V

SEF652XB

Diagnostic Procedure

NHEC0080

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

Check the following items. Refer to “Basic Inspection”, EC-110.

Items	Specifications
Ignition timing	15° ± 5° BTDC
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.05 mm (0.0020 in): ON 0.15 mm (0.0059 in): OFF
Target idle speed	700 ± 50 rpm (in “P” or “N” position)

MTBL0595

	▶	GO TO 3.

3	CHECK INTAKE SYSTEM.

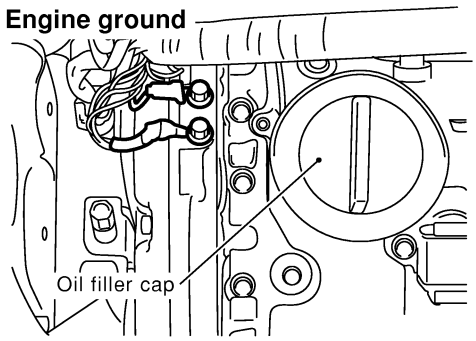
1. Turn ignition switch “OFF”.
2. Check the following for connection.
- Air duct
- Vacuum hoses
- Intake air passage between air duct to intake manifold collector

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.

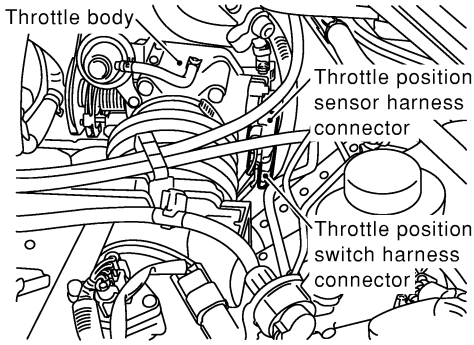


SEF255X

	▶	GO TO 5.

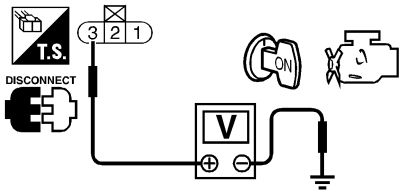
5	CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT

1. Disconnect throttle position sensor harness connector.



SEF260X

2. Turn ignition switch "ON".
3. Check voltage between throttle position sensor terminal 3 and ground with CONSULT-II or tester.



Voltage: Approximately 5V

SEF306X

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 THROTTLE POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Check harness continuity between sensor terminal 1 and engine ground.
   Refer to Wiring Diagram.
   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 for open or short between ECM and throttle position sensor
- Harness for open or short between TCM (Transmission Control Module) and throttle position sensor

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

8	CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 91 and throttle position sensor terminal 2. Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

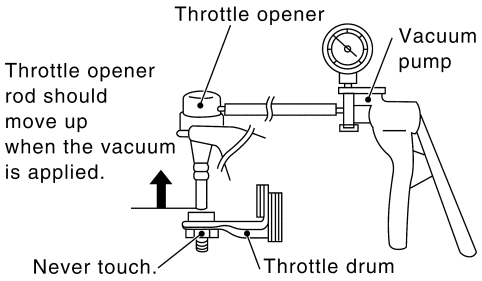
OK or NG

OK (With CONSULT-II)	▶	GO TO 9.
OK (Without CONSULT-II)	▶	GO TO 10.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

9	CHECK THROTTLE POSITION SENSOR

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine (ignition switch OFF).
3. Remove the vacuum hose connected to the throttle opener.
4. Connect suitable vacuum hose to the vacuum pump and the opener.
5. Apply vacuum [more than −40.0 kPa (−300 mmHg, −11.81 inHg)] until the throttle drum becomes free from the rod of the throttle opener.



SEF793W

6. Turn ignition switch ON.
7. Select "DATA MONITOR" mode with CONSULT-II.
8. Check voltage of "THRTL POS SEN" under the following conditions.
   Voltage measurement must be made with throttle position sensor installed in vehicle.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
THRTL POS SEN	XXX V

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

SEF062Y

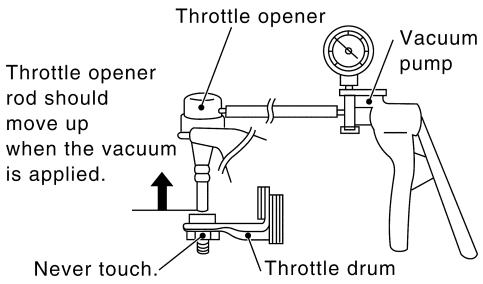
OK or NG

OK	▶	GO TO 12.
NG	▶	GO TO 11.

10	CHECK THROTTLE POSITION SENSOR

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine (ignition switch OFF).
3. Remove the vacuum hose connected to the throttle opener.
4. Connect suitable vacuum hose to the vacuum pump and the opener.
5. Apply vacuum [more than −40.0 kPa (−300 mmHg, −11.81 inHg)] until the throttle drum becomes free from the rod of the throttle opener.



SEF793W

6. Turn ignition switch ON.
7. Check voltage between ECM terminal 91 (Throttle position sensor signal) and ground.
   Voltage measurement must be made with throttle position sensor installed in vehicle.

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

MTBL0231

OK or NG

OK	▶	GO TO 12.
NG	▶	GO TO 11.

11	ADJUST CLOSED THROTTLE POSITION SWITCH

Adjust closed throttle position switch. Refer to "Basic Inspection", EC-110.

Items	Specifications
Ignition timing	15° ± 5° BTDC
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.05 mm (0.0020 in): ON 0.15 mm (0.0059 in): OFF
Target idle speed	700 ± 50 rpm (in "P" or "N" position)

MTBL0595

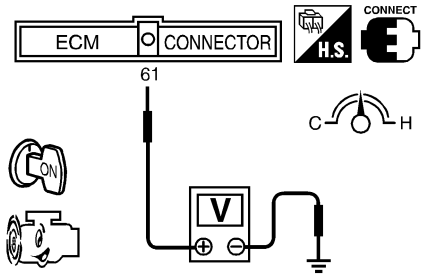
OK or NG

OK	▶	GO TO 12.
NG	▶	Replace throttle position sensor. To adjust it, perform "Basic Inspection", EC-110.

Diagnostic Procedure (Cont'd)

12	CHECK MASS AIR FLOW SENSOR

1. Reconnect harness connectors disconneted.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 61 (Mass air flow sensor signal) and ground.



Condition	Voltage V
Ignition switch "ON" (Engine stopped.)	Approx. 1.0
Idle (Engine is warmed-up to normal operating temperature.)	1.2 - 1.8
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.6 - 2.2
Idle to about 4,000 rpm*	1.2 - 1.8 to Approx. 4.0

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

SEF298X

4. If the voltage is out of specification, disconnect mass air flow sensor harness connector and connect it again. Then repeat above check.

OK or NG

OK	▶	GO TO 13.
NG	▶	Replace mass air flow sensor.

13	CHECK CRANKSHAFT POSITION SENSOR (POS)

1. Install all removed parts.
2. Perform "DTC Confirmation Procedure" for DTC P0335 and P1336. Refer to EC-356, 555.

OK or NG

OK	▶	GO TO 14.
NG	▶	Replace crankshaft position sensor (POS).

14	CHECK CRANKSHAFT POSITION SENSOR (REF)

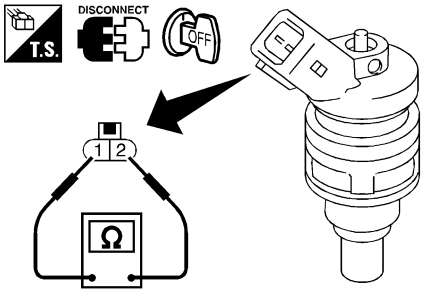
Perform "DTC Confirmation Procedure" for DTC P1335. Refer to EC-549.

OK or NG

OK	▶	GO TO 15.
NG	▶	Replace crankshaft position sensor (REF).

15	CHECK FUEL INJECTOR

1. Disconnect injector harness connector.
2. Check resistance between terminals as shown in the figure.



Resistance: 14 - 15Ω [at 20°C (68°F)]

SEF964X

OK or NG

OK	▶	GO TO 16.
NG	▶	Replace fuel injector.

16	CHECK THROTTLE POSTION SENSOR SHIELD CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect joint connector-18
3. Check the following

- Continuity between joint connector terminal 2 and ground
- Joint connector
  (Refer to EL-463, "HARNESS LAYOUT".)
  Continuity should exist.
- Also check harness for short to ground and short to power.
- Then reconnect joint connector-18.

OK or NG

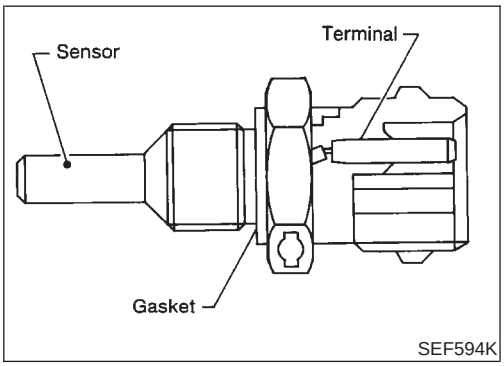
OK	▶	GO TO 17.
NG	▶	Repair open circuit or short to ground or short to to power in harness or connectors.

17	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156.	
▶	**INSPECTION END**

Description

NHEC0081

NOTE:
If DTC P0125 is displayed with P0115, first perform the trouble diagnosis for DTC P0115. Refer to EC-183.

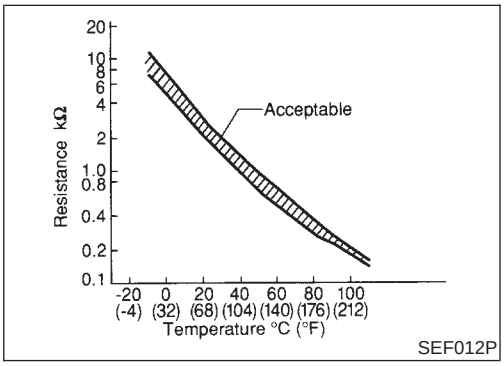


SEF594K

COMPONENT DESCRIPTION

NHEC0081S01

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



SEF012P

<Reference data>

Engine coolant temperature °C (°F)	Voltage* V	Resistance kΩ
−10 (14)	4.4	9.2
20 (68)	3.5	2.1 - 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 70 (Engine coolant temperature sensor) and body ground.

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

On Board Diagnosis Logic

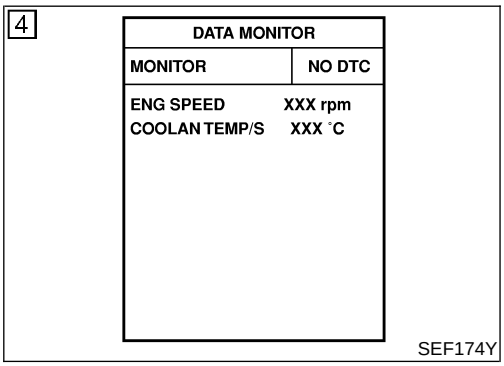
NHEC0082

Malfunction is detected when voltage sent to ECM from the sensor is not practical, even when some time has passed after starting the engine, or engine coolant temperature is insufficient for closed loop fuel control.

Possible Cause

NHEC0431

- Harness or connectors
  (High resistance in the circuit)
- Engine coolant temperature sensor
- Thermostat



DTC Confirmation Procedure

NHEC0083

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 10 seconds before conducting the next test.

WITH CONSULT-II

NHEC0083S01

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Check that "COOLAN TEMP/S" is above 10°C (50°F).
   If it is above 10°C (50°F), the test result will be OK.
   If it is below 10°C (50°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 10°C (50°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-203.

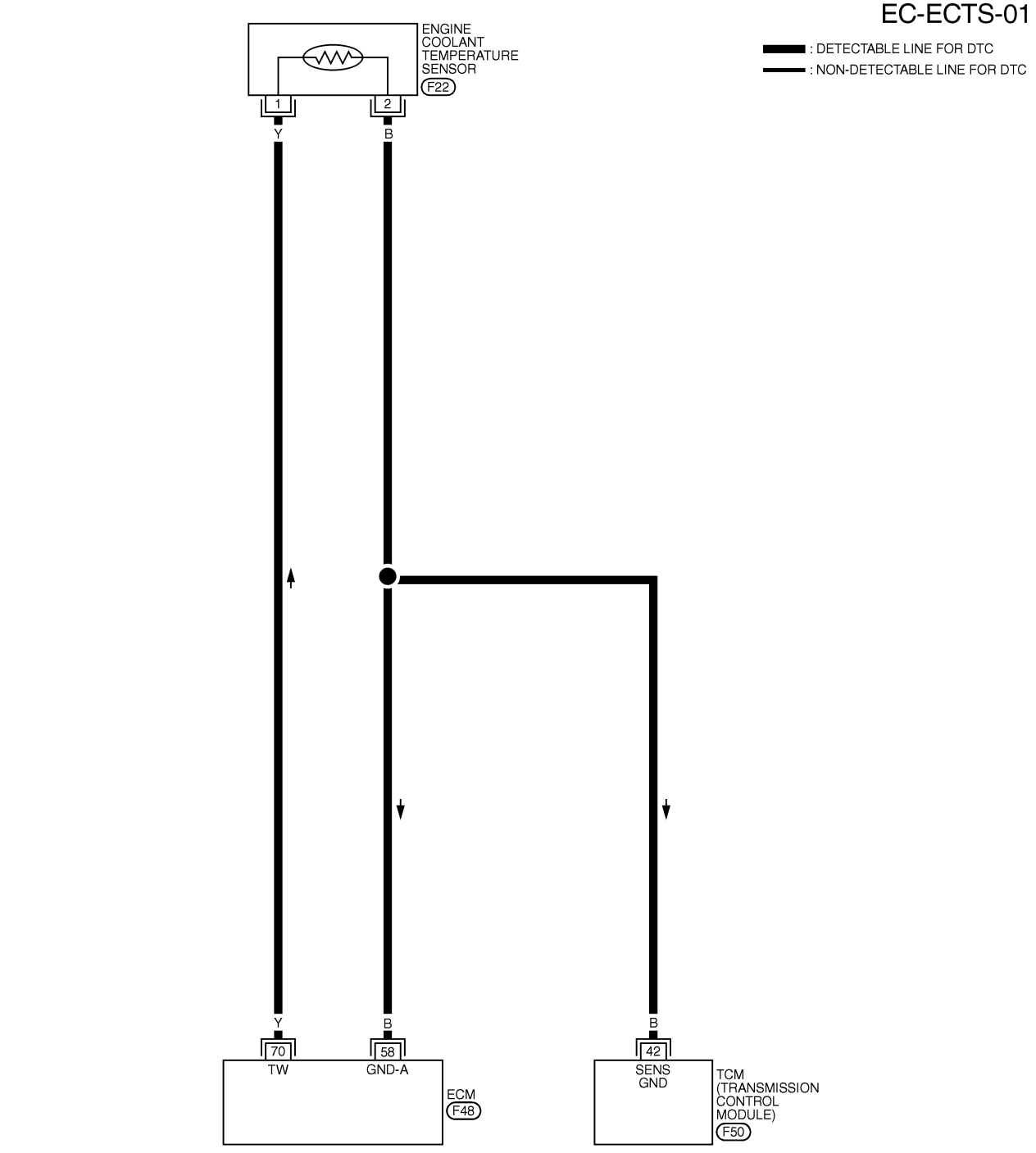
WITH GST

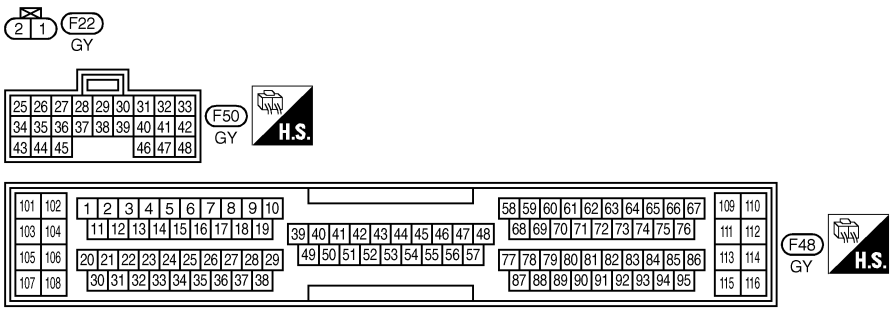
NHEC0083S02

Follow the procedure "WITH CONSULT-II" above.

Wiring Diagram

NHEC0084





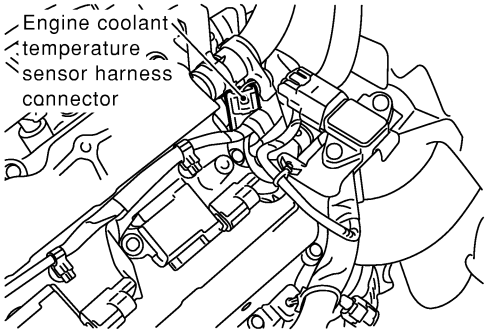
MEC802C

Diagnostic Procedure

NHEC0085

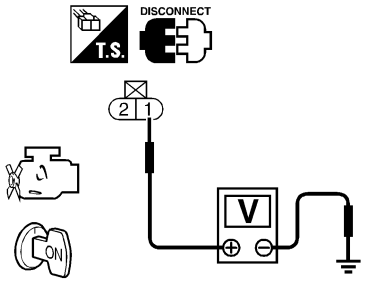
1	CHECK ECTS POWER SUPPLY CIRCUIT

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



SEF259X

3. Turn ignition switch “ON”.
4. Check voltage between ECTS terminal 1 and ground with CONSULT-II or tester.



Voltage: Approximately 5V

SEF303X

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 ECTS GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Check harness continuity between ECTS terminal 2 and engine ground.
   Refer to Wiring Diagram.
   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.

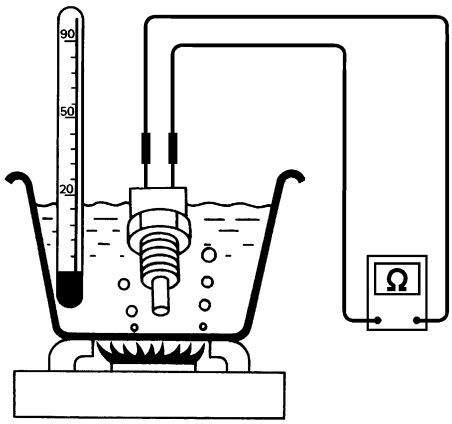
3	DETECT MALFUNCTIONING PART

Check the following.
- Harness for open or short between ECM and engine coolant temperature sensor
- Harness for open or short between TCM (Transmission Control Module) and engine coolant temperature sensor

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

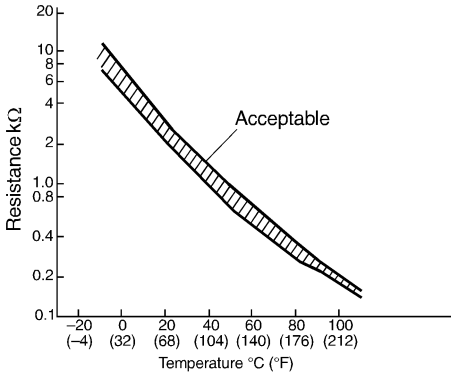
4	CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check resistance between engine coolant temperature sensor terminals 1 and 2 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



SEF304X

OK or NG

OK	▶	GO TO 5.
NG	▶	Replace engine coolant temperature sensor.

5	CHECK THERMOSTAT OPERATION

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

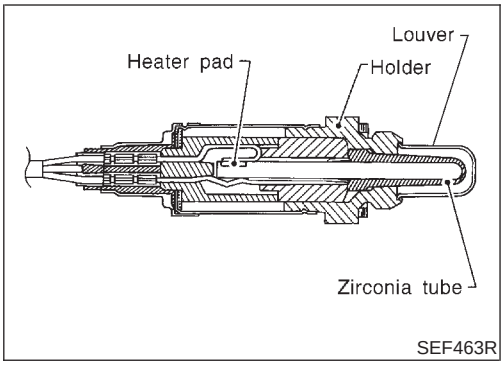
OK or NG

OK	▶	GO TO 6.
NG	▶	Repair or replace thermostat. Refer to LC-14, "Thermostat".

6	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156.

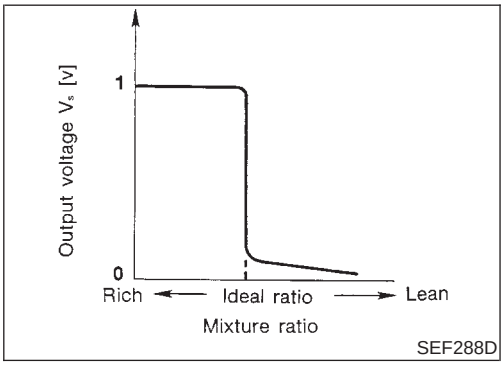
▶ **INSPECTION END**



Component Description

NHEC0086

The front heated oxygen sensor is placed into the front tube. 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.

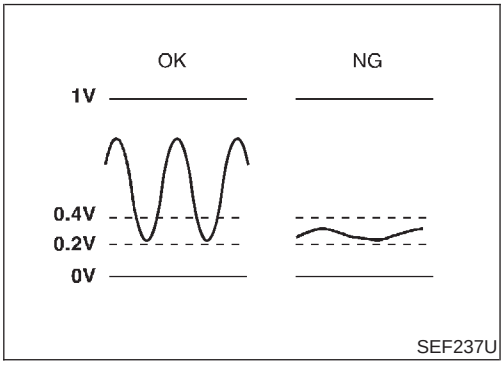


CONSULT-II Reference Value in Data Monitor Mode

NHEC0087

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
FR O2 SEN-B1 FR O2 SEN-B2	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
FR O2 MNTR-B1 FR O2 MNTR-B2			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.



On Board Diagnosis Logic

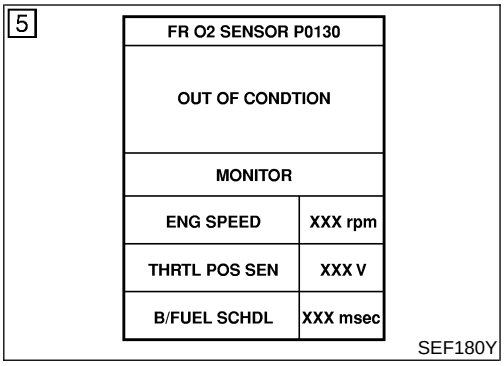
NHEC0089

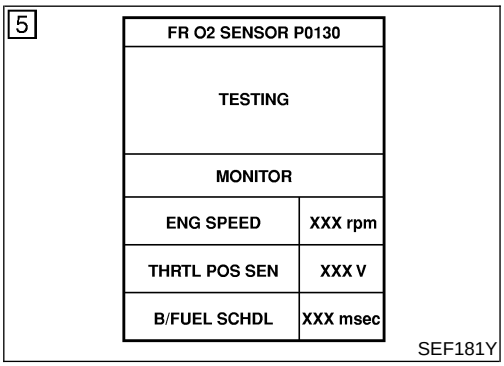
Under the condition in which the front heated oxygen sensor signal is not input, the ECM circuits will read a continuous approximately 0.3V. Therefore, for this diagnosis, the time that output voltage is within 200 to 400 mV range is monitored, and the diagnosis checks that this time is not inordinately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

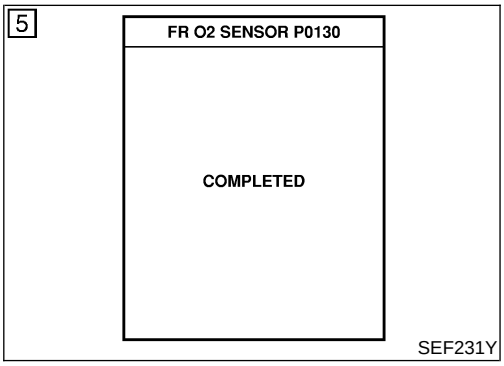
Possible Cause

NHEC0432

- Harness or connectors
  (The sensor circuit is open or shorted.)
- Front heated oxygen sensor







DTC Confirmation Procedure

NHEC0090

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 10 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-II

NHEC0090S01

1) Start engine and warm it up to normal operating temperature.
2) Select “FR O2 SEN-B1 (-B2) P0130 (P0150)” of “FRONT O2 SENSOR” in “DTC WORK SUPPORT” mode with CONSULT-II.
3) Touch “START”.
4) Let it idle for at least 3 minutes.

NOTE:

Never raise engine speed above 3,600 rpm after this step. If the engine speed limit is exceeded, return to step 4.

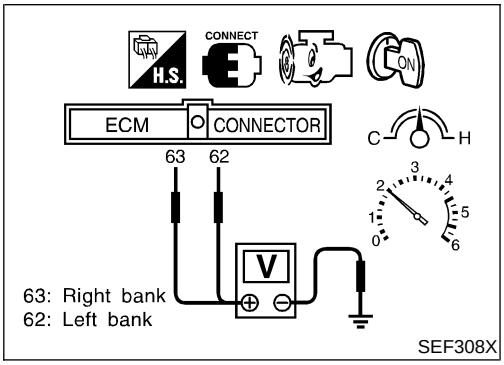
5) When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 10 to 60 seconds.)

ENG SPEED	1,400 - 2,400 rpm
Vehicle speed	70 - 120 km/h (43 - 75 MPH)
B/FUEL SCHDL	2.0 - 10 msec
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-210.

During this test, P1148 and P1168 may be stored in ECM.



Overall Function Check

NHEC0091

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

NHEC0091S01

1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 63 (Right bank front HO2S signal) or 62 (Lleft bank front HO2S 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.

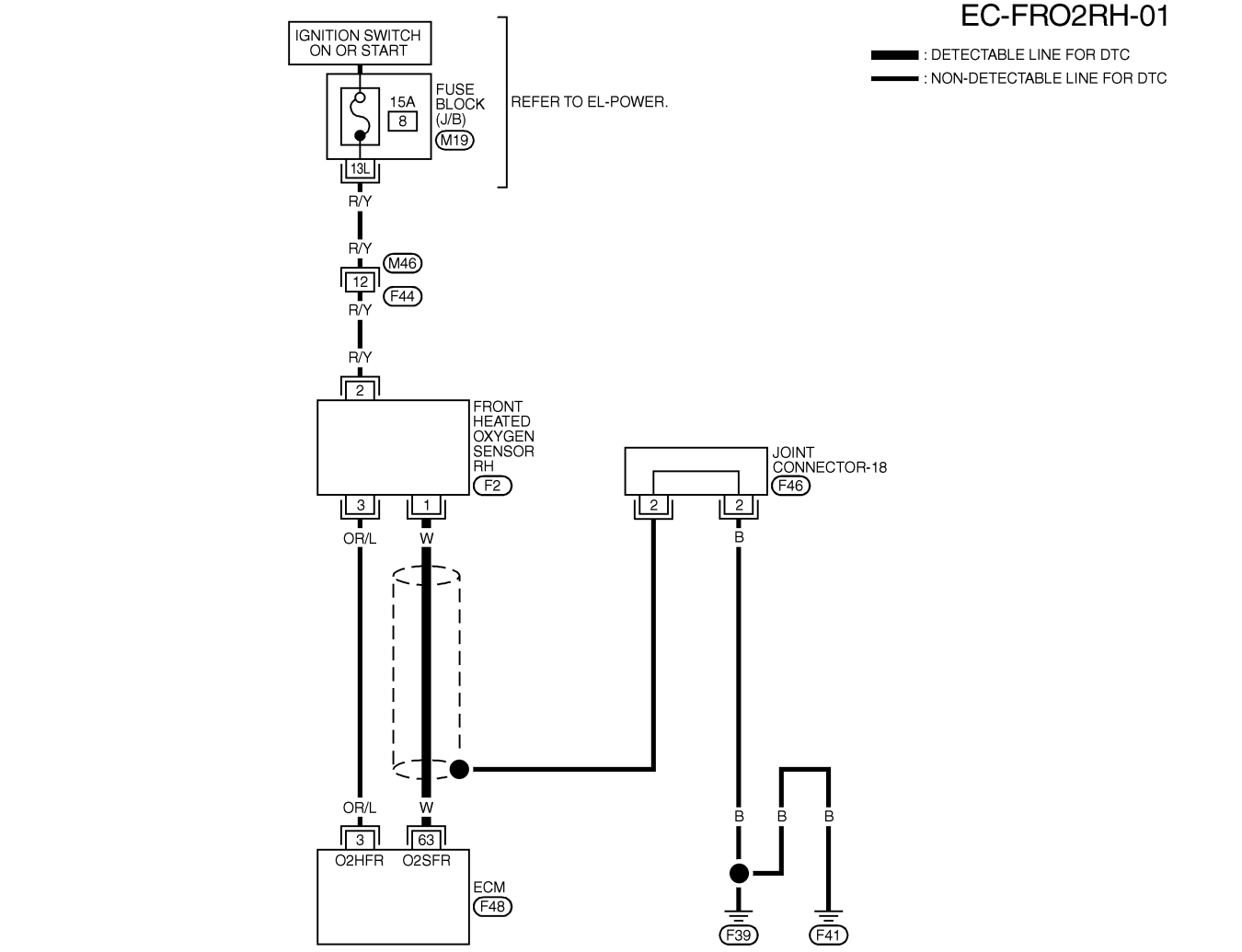
4) If NG, go to "Diagnostic Procedure", EC-210.

Wiring Diagram

=NHEC0092

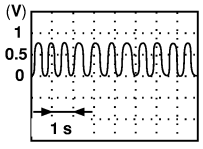
RIGHT BANK

NHEC0092S01



MEC805C

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
63	W	FRONT HEATED OXYGEN SENSOR RH	ENGINE RUNNING AT 2,000 RPM AFTER WARMING UP TO NORMAL OPERATING TEMPERATURE	0 - APPROX. 1.0V 

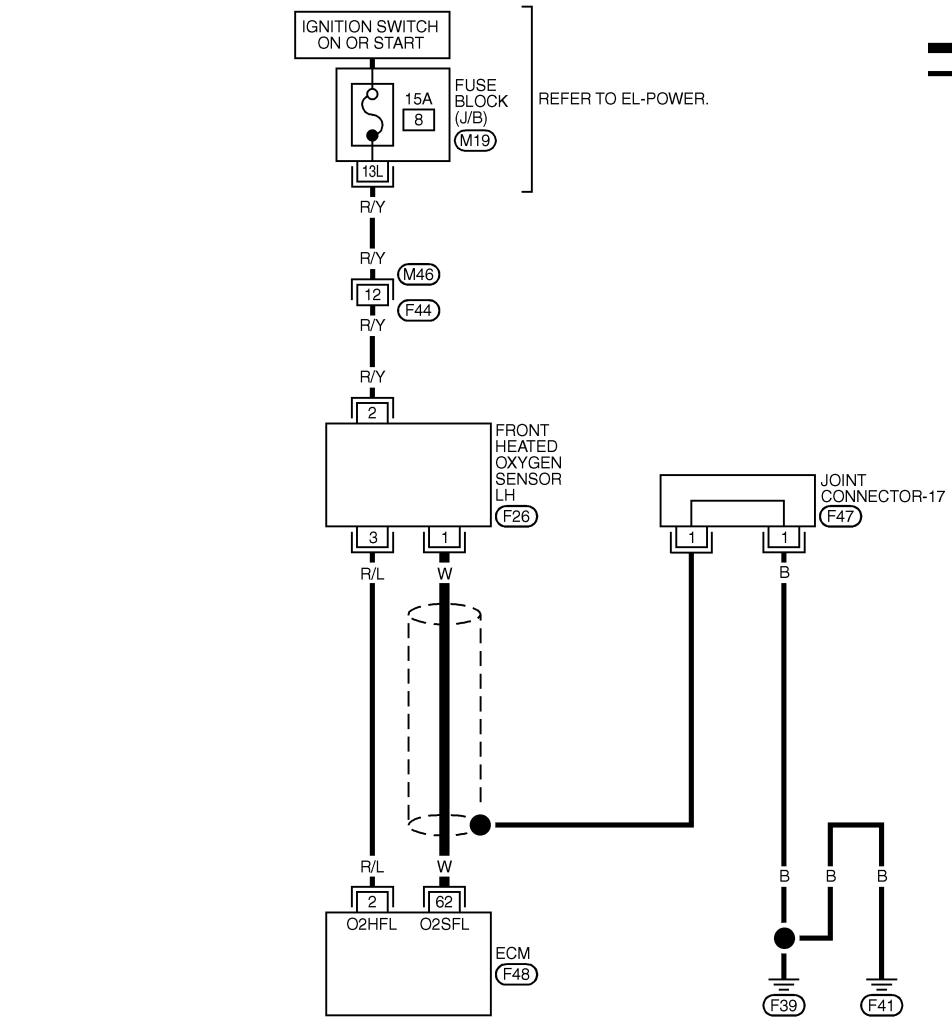
SEF854Y

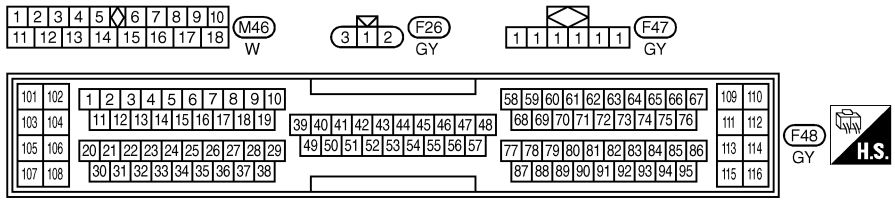
LEFT BANK

NHEC0092S02

EC-FRO2LH-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC

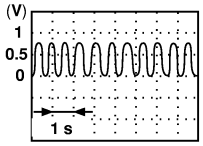




REFER TO THE FOLLOWING.
M19 -FUSE BLOCK-
JUNCTION BOX (J/B)

MEC804C

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
62	W	FRONT HEATED OXYGEN SENSOR LH	ENGINE RUNNING AT 2,000 RPM AFTER WARMING UP TO NORMAL OPERATING TEMPERATURE	0 - APPROX. 1.0V 

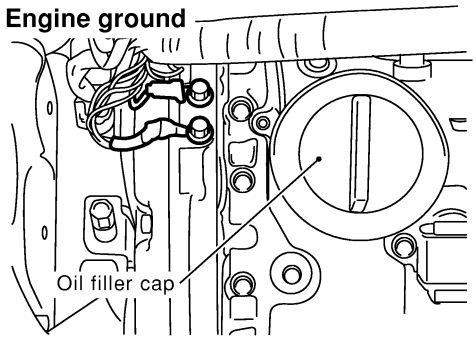
SEF855Y

Diagnostic Procedure

NHEC0093

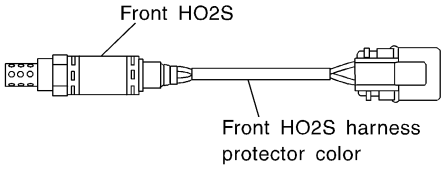
1	INSPECTION START

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



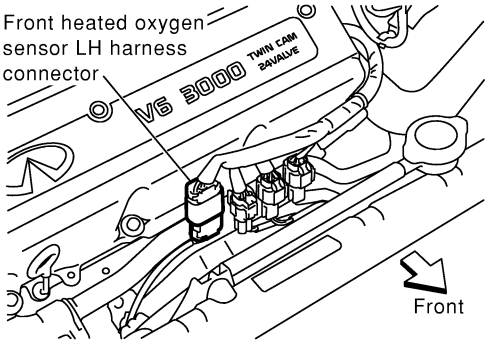
SEF255X

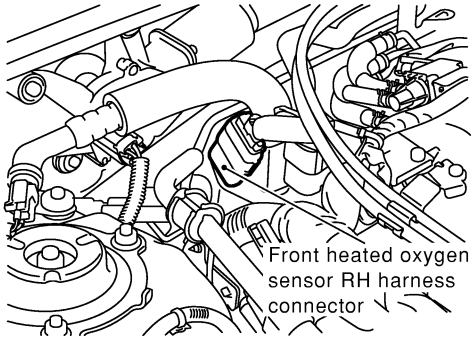
3. Make sure front HO2S harness protector color, and disconnect corresponding front heated oxygen sensor harness connector.



P0130 (-B1) Right bank: Black
P0150 (-B2) Left bank: Blue

SEF194WO





SEF902X

▶	GO TO 2.

2 CHECK FRONT HO2S INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal and front HO2S terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0130	63	1	Right
P0150	62	1	Left

MTBL0332

Continuity should exist.

3. Check harness continuity between ECM terminal or front HO2S terminal and ground as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM or Sensor	Ground	
P0130	63 or 1	Ground	Right
P0150	62 or 1	Ground	Left

MTBL0333

Continuity should not exist.

4. Also check harness for short to power.

OK or NG

OK (With CONSULT-II) ▶	GO TO 3.
OK (Without CONSULT-II) ▶	GO TO 4.
NG ▶	Repair open circuit or short to ground or short to power in harness or connectors.

3	CHECK FRONT HEATED OXYGEN SENSOR

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" and adjust "TRIGGER POINT" to 100% in "DATA MONITOR" mode with CONSULT-II.
3. Select "FR O2 SEN-B1 (-B2)" and "FR O2 MNTR-B1 (-B2)".
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch "RECORD" on CONSULT-II screen.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
FR O2 SEN-B1	XXX V
RR O2 SEN-B2	XXX V

SEF063Y

6. Check the following.

- "FR O2 MNTR-B1 (-B2)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds. 5 times (cycles) are counted as shown below.

Right bank

cycle	1	2	3	4	5
FR O2 MNTR-B1	R-L	R-L	R-L	R-L	R-L

Left bank

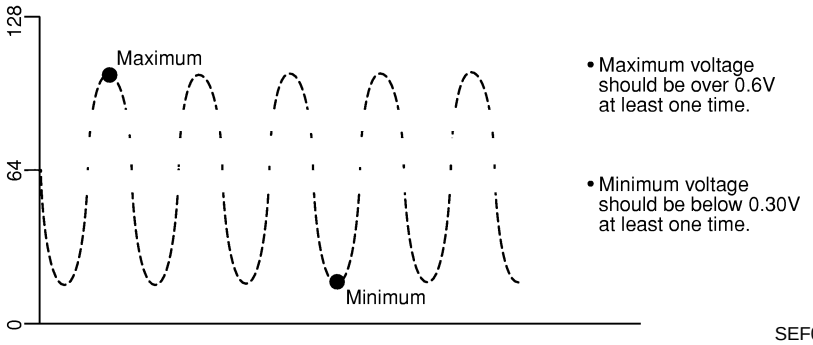
cycle	1	2	3	4	5
FR O2 MNTR-B2	R-L	R-L	R-L	R-L	R-L

R means FR O2 MNTR-B1(-B2) indicates RICH
L means FR O2 MNTR-B1(-B2) indicates LEAN

SEF702W

- "FR O2 SEN-B1 (-B2)" voltage goes above 0.6V at least once.
- "FR O2 SEN-B1 (-B2)" voltage goes below 0.3V at least once.
- "FR O2 SEN-B1 (-B2)" voltage never exceeds 1.0V.

Trigger	ENG SPEED	FR O2 SEN-B1
	rpm	V
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX



SEF064Y

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.

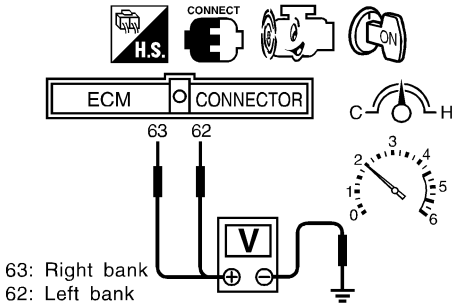
OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

4	CHECK FRONT HEATED OXYGEN SENSOR

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 63 (right bank front HO2S signal) or 62 (left bank front HO2S signal) and engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.



- The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.
- 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.

1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

SEF967X

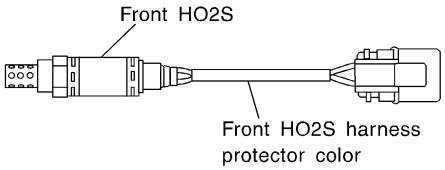
CAUTION:
Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	REPLACE FRONT HEATED OXYGEN SENSOR

1. Turn ignition switch "OFF".
2. Check front heated oxygen sensor harness protector color.



P0130 (-B1) Right bank: Black
P0150 (-B2) Left bank: Blue

SEF194WO

CAUTION:
Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

	▶	Replace malfunctioning front heated oxygen sensor.

6	CHECK FRONT HO2S SHIELD CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect joint connector-17 or joint connector-18.
3. Check the following.

- Continuity between joint connector terminal 1 or 2 and ground
- Joint connector
  (Refer to EL-463, "HARNESS LAYOUT".)

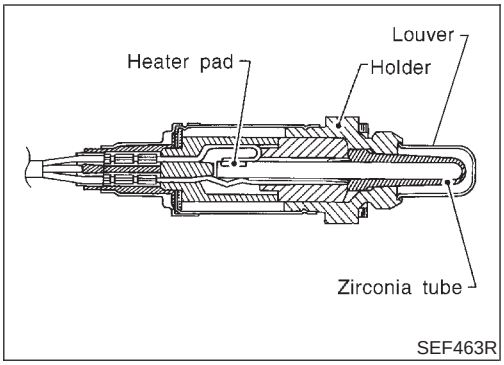
Continuity should exist.

4. Also check harness for short to ground and short to power.
5. Then reconnect joint connector-17 or joint connector-18.

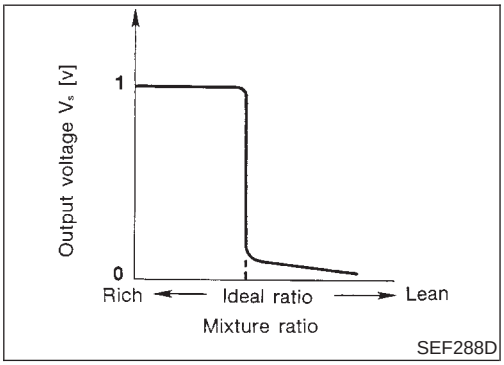
OK or NG

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

7	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156.	
▶	**INSPECTION END**



SEF463R



SEF288D

Component Description

NHEC0094

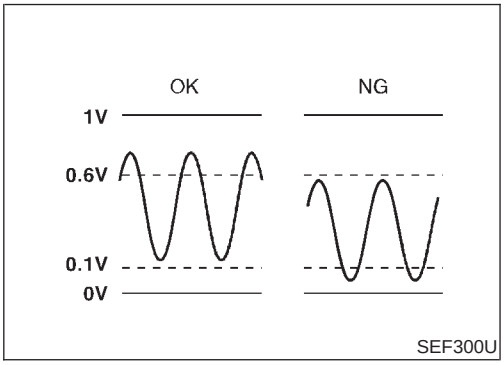
The front heated oxygen sensor is placed into the front tube. It detects the amount of oxygen in the exhaust gas compared to the outside air. The front heated oxygen sensor has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V 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-II Reference Value in Data Monitor Mode

NHEC0095

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
FR O2 SEN-B1 FR O2 SEN-B2	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
FR O2 MNTR-B1 FR O2 MNTR-B2			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.



SEF300U

On Board Diagnosis Logic

NHEC0097

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.

Malfunction is detected when the maximum and minimum voltage from the sensor are not reached to the specified voltages.

Possible Cause

NHEC0433

- Front heated oxygen sensor
- Front heated oxygen sensor heater
- Fuel pressure
- Injectors
- Intake air leaks

DTC Confirmation Procedure

NHEC0098

CAUTION:

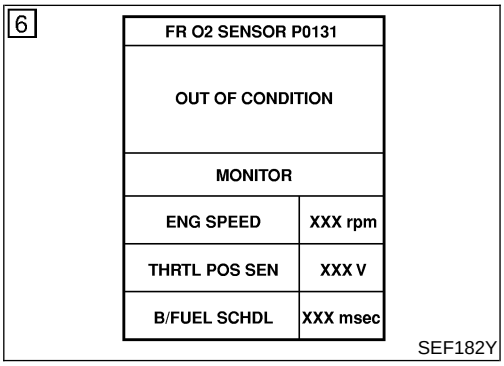
Always drive vehicle at a safe speed.

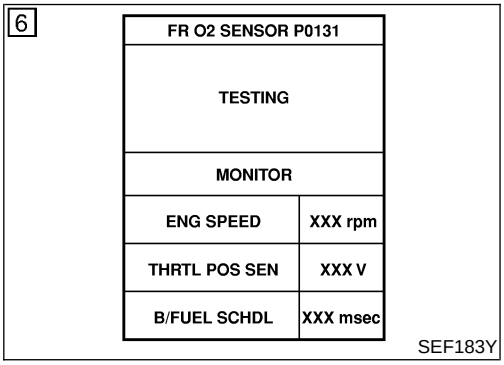
NOTE:

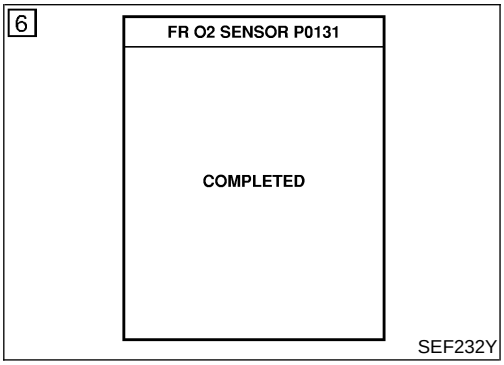
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

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







WITH CONSULT-II

NHEC0098S01

1) Start engine and warm it up to normal operating temperature.
2) Stop engine and wait at least 10 seconds.
3) Turn ignition switch “ON” and select “FR O2 SEN-B1 (-B2) P0131 (P0151)” of “FRONT O2 SENSOR” in “DTC WORK SUPPORT” mode with CONSULT-II.
4) Touch “START”.
5) Start engine and let it idle for at least 3 minutes.

NOTE:

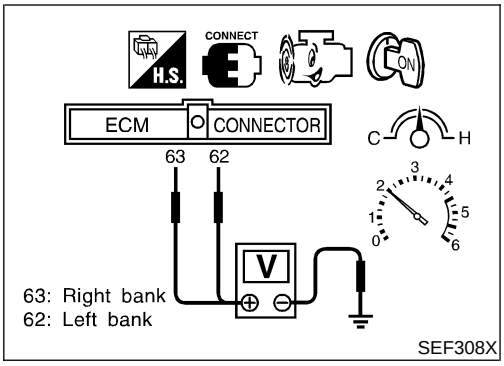
Never raise engine speed above 3,600 rpm after this step. If the engine speed limit is exceeded, return to step 5.

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

ENG SPEED	1,200 - 2,600 rpm
Vehicle speed	80 - 100 km/h (50 - 62 MPH)
B/FUEL SCHDL	3 - 9 msec
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-217.



Overall Function Check

NHEC0099

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

NHEC0099S01

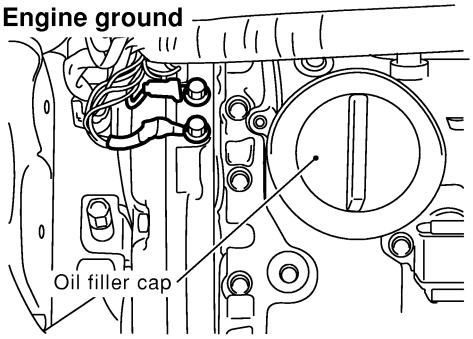
1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 63 (Right bank front HO2S signal) or 62 (Left bank front HO2S signal) and engine ground.
3) Check one of the following with engine speed held at 2,000 rpm constant under no load.
- The maximum 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-217.

Diagnostic Procedure

NHEC0100

1	RETIGHTEN GROUND SCREWS

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



▶	GO TO 2.

2	RETIGHTEN FRONT HEATED OXYGEN SENSOR

Loosen and retighten corresponding front heated oxygen sensor.

Tightening torque:

40 - 60 N·m (4.1 - 6.2 kg-m, 30 - 44 ft-lb)

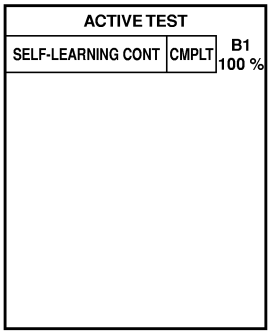
▶	GO TO 3.

Diagnostic Procedure (Cont'd)

3	CLEAR THE SELF-LEARNING DATA

With CONSULT-II

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



SEF218Y

4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 or P0174 detected?
   Is it difficult to start engine?

Without CONSULT-II

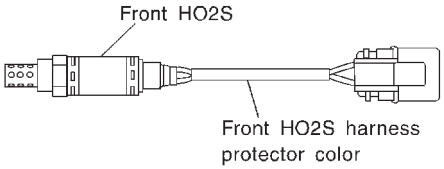
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch "OFF".
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC P0100 is displayed.
6. Erase the 1st trip DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-82.
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 or P0174 detected?
   Is it difficult to start engine?

Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0171, P0174. Refer to EC-304.
No	▶	GO TO 4.

4	CHECK FRONT HEATED OXYGEN SENSOR HEATER

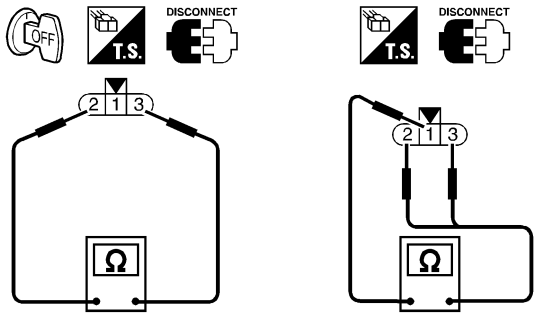
1. Stop engine.
2. Check front heated oxygen sensor harness protector color.



P0131 (-B1) Right bank: Black
P0151 (-B2) Left bank: Blue

SEF194WA

3. Disconnect front HO2S harness connector.
4. Check resistance between front HO2S terminals as follows.



Terminals	Resistance
2 and 3	2.3 - 4.3Ω at 25°C (77°F)
1 and 2 1 and 3	∞Ω (Continuity should not exist.)

SEF310X

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.

OK or NG

OK (With CONSULT-II)	▶	GO TO 5.
OK (Without CONSULT-II)	▶	GO TO 6.
NG	▶	GO TO 7.

5	CHECK FRONT HEATED OXYGEN SENSOR

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" and adjust "TRIGGER POINT" to 100% in "DATA MONITOR" mode with CONSULT-II.
3. Select "FR O2 SEN-B1 (-B2)" and "FR O2 MNTR-B1 (-B2)".
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch "RECORD" on CONSULT-II screen.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
FR O2 SEN-B1	XXX V
RR O2 SEN-B2	XXX V

SEF063Y

6. Check the following.

- "FR O2 MNTR-B1 (-B2)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds. 5 times (cycles) are counted as shown below.

Right bank

cycle	1	2	3	4	5
FR O2 MNTR-B1	R-L	R-L	R-L	R-L	R-L-R

Left bank

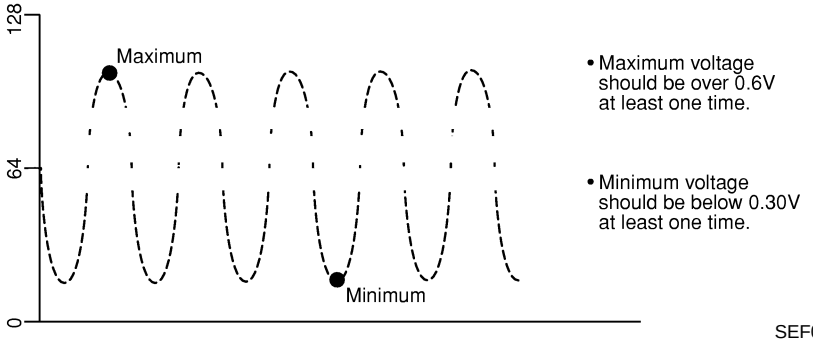
cycle	1	2	3	4	5
FR O2 MNTR-B2	R-L	R-L	R-L	R-L	R-L-R

R means FR O2 MNTR-B1(-B2) indicates RICH
L means FR O2 MNTR-B1(-B2) indicates LEAN

SEF702W

- "FR O2 SEN-B1 (-B2)" voltage goes above 0.6V at least once.
- "FR O2 SEN-B1 (-B2)" voltage goes below 0.3V at least once.
- "FR O2 SEN-B1 (-B2)" voltage never exceeds 1.0V.

Trigger	ENG SPEED	FR O2 SEN-B1
	rpm	V
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX



SEF064Y

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.

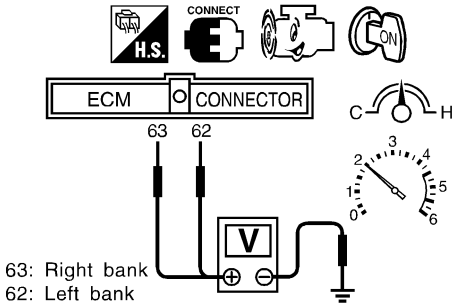
OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

6	CHECK FRONT HEATED OXYGEN SENSOR

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 63 (Right bank front HO2S signal) or 62 (Left bank front HO2S signal) and engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.



- The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.
- 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.

1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

SEF967X

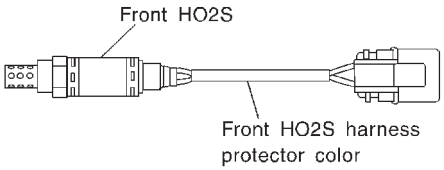
CAUTION:
Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	REPLACE FRONT HEATED OXYGEN SENSOR

1. Turn ignition switch "OFF".
2. Check front heated oxygen sensor harness protector color.



P0131 (-B1) Right bank: Black
P0151 (-B2) Left bank: Blue

SEF194WA

CAUTION:
Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

	▶	Replace malfunctioning front heated oxygen sensor.

Diagnostic Procedure (Cont'd)

8	CHECK FRONT HO2S SHIELD CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect joint connector-17 or joint connector-18.
3. For circuit, refer to "DTC P0130 (RIGHT BANK, -B1), P0150 (LEFT BANK, -B2) FRONT HEATED OXYGEN SENSOR (FRONT HO2S) (CIRCUIT)", EC-205.
4. Check the following.

- Continuity between joint connector terminal 1 or 2 and ground
- Joint connector

(Refer to EL-463, "HARNESS LAYOUT".)

Continuity should exist.

5. Also check harness for short to ground and short to power.
6. Then reconnect joint connector-17 or joint connector-18.

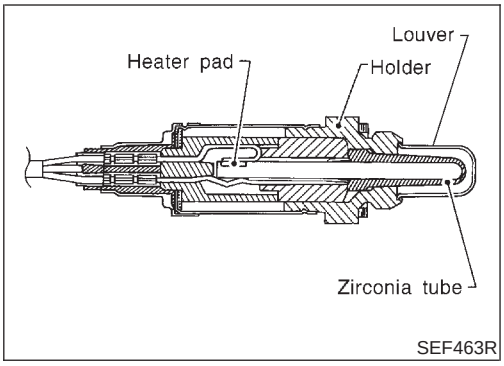
OK or NG

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

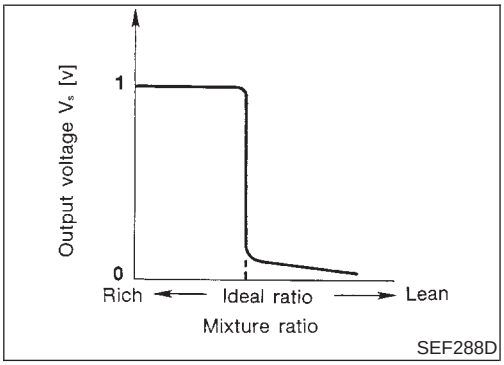
9	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156.
For circuit, refer to "DTC P0130 (RIGHT BANK, -B1), P0150 (LEFT BANK, -B2) FRONT HEATED OXYGEN SENSOR (FRONT HO2S) (CIRCUIT)", EC-205.

	▶	**INSPECTION END**



SEF463R



SEF288D

Component Description

NHEC0101

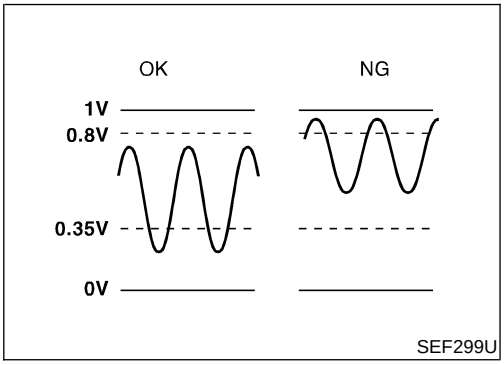
The front heated oxygen sensor is placed into the front tube. It detects the amount of oxygen in the exhaust gas compared to the outside air. The front heated oxygen sensor has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V 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-II Reference Value in Data Monitor Mode

NHEC0102

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
FR O2 SEN-B1 FR O2 SEN-B2	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
FR O2 MNTR-B1 FR O2 MNTR-B2			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.



SEF299U

On Board Diagnosis Logic

NHEC0104

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.

Malfunction is detected when the maximum and minimum voltages from the sensor are beyond the specified voltages.

Possible Cause

NHEC0434

- Front heated oxygen sensor
- Fuel pressure
- Injectors
- Front heated oxygen sensor heater

DTC Confirmation Procedure

NHEC0105

CAUTION:

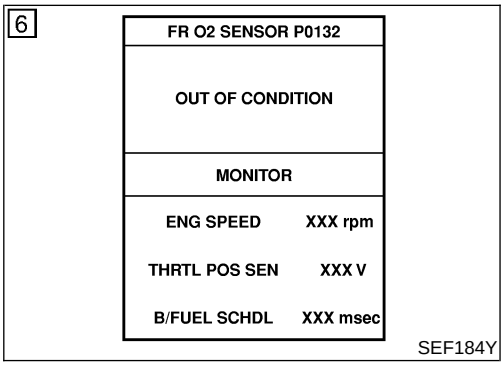
Always drive vehicle at a safe speed.

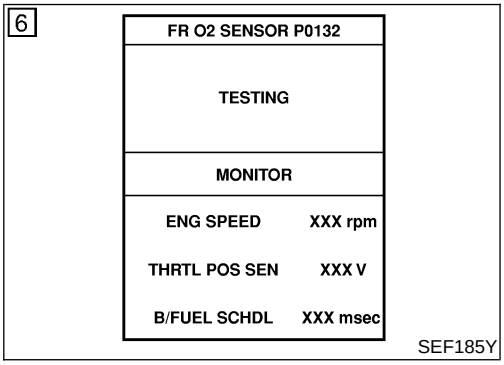
NOTE:

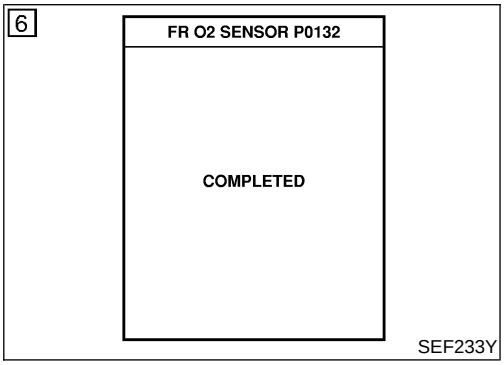
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

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-II

NHEC0105S01

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 SEN-B1 (-B2) P0132 (P0152)” of “FRONT O2 SENSOR” in “DTC WORK SUPPORT” mode with CONSULT-II.
4) Touch “START”.
5) Start engine and let it idle for at least 3 minutes.

NOTE:

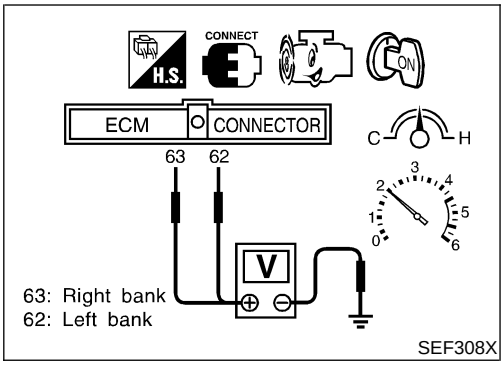
Never raise engine speed above 3,600 rpm after this step. If the engine speed limit is exceeded, return to step 5.

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

ENG SPEED	1,200 - 2,600 rpm
Vehicle speed	80 - 100 km/h (50 - 62 MPH)
B/FUEL SCHDL	3 - 9 msec
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-225.



Overall Function Check

NHEC0106

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

NHEC0106S01

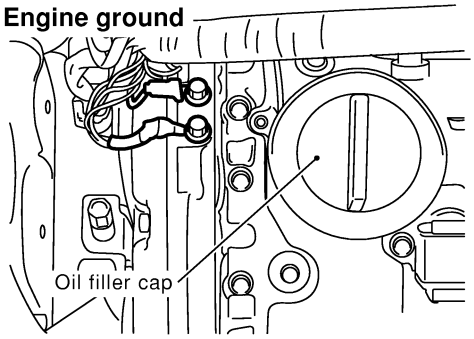
1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 63 (Right bank front HO2S signal) or 62 (Left bank front HO2S signal) and engine ground.
3) Check one of the following with engine speed held at 2,000 rpm constant under no load.
   - The maximum 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-225.

Diagnostic Procedure

NHEC0107

1	RETIGHTEN GROUND SCREWS

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



▶	GO TO 2.

2	RETIGHTEN FRONT HEATED OXYGEN SENSOR

Loosen and retighten corresponding front heated oxygen sensor.

Tightening torque:

40 - 60 N·m (4.1 - 6.2 kg-m, 30 - 44 ft-lb)

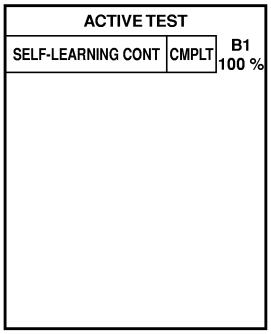
▶	GO TO 3.

Diagnostic Procedure (Cont'd)

3	CLEAR THE SELF-LEARNING DATA

With CONSULT-II

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



SEF218Y

4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 or P0175 detected?
   Is it difficult to start engine?

Without CONSULT-II

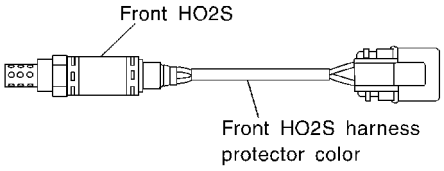
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch "OFF".
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC P0100 is displayed.
6. Erase the 1st trip DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-82.
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 or P0175 detected?
   Is it difficult to start engine?

Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0172, P0175. Refer to EC-312.
No	▶	GO TO 4.

4	CHECK FRONT HO2S CONNECTOR FOR WATER

1. Turn ignition switch "OFF".
2. Check front heated oxygen sensor harness protector color.



P0132 (-B1) Right bank: Black
P0152 (-B2) Left bank: Blue

SEF194WD

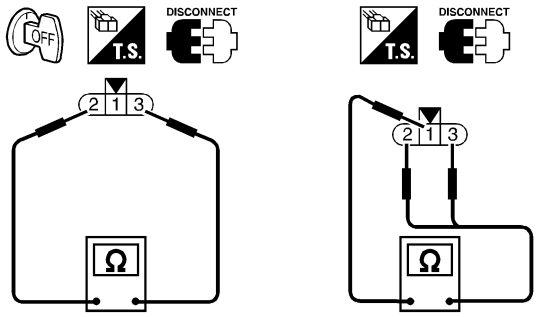
3. Disconnect front heated oxygen sensor harness connector.
4. Check connectors for water.
   Water should not exist.

OK or NG

OK	▶	GO TO 5.
NG	▶	Repair or replace harness or connectors.

5	CHECK FRONT HEATED OXYGEN SENSOR HEATER

Check resistance between front HO2S terminals as follows.



Terminals	Resistance
2 and 3	2.3 - 4.3Ω at 25°C (77°F)
1 and 2 1 and 3	∞Ω (Continuity should not exist.)

SEF310X

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.

OK or NG

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

6	CHECK FRONT HEATED OXYGEN SENSOR

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" and adjust "TRIGGER POINT" to 100% in "DATA MONITOR" mode with CONSULT-II.
3. Select "FR O2 SEN-B1 (-B2)" and "FR O2 MNTR-B1 (-B2)".
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch "RECORD" on CONSULT-II screen.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
FR O2 SEN-B1	XXX V
RR O2 SEN-B2	XXX V

SEF063Y

6. Check the following.

- "FR O2 MNTR-B1 (-B2)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds. 5 times (cycles) are counted as shown below.

Right bank

cycle	1	2	3	4	5
FR O2 MNTR-B1	R-L	R-L	R-L	R-L	R-L

Left bank

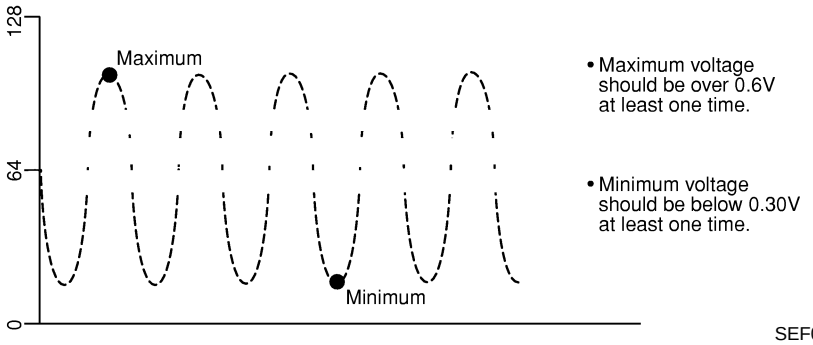
cycle	1	2	3	4	5
FR O2 MNTR-B2	R-L	R-L	R-L	R-L	R-L

R means FR O2 MNTR-B1(-B2) indicates RICH
L means FR O2 MNTR-B1(-B2) indicates LEAN

SEF702W

- "FR O2 SEN-B1 (-B2)" voltage goes above 0.6V at least once.
- "FR O2 SEN-B1 (-B2)" voltage goes below 0.3V at least once.
- "FR O2 SEN-B1 (-B2)" voltage never exceeds 1.0V.

Trigger	ENG SPEED	FR O2 SEN-B1
	rpm	V
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX



SEF064Y

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.

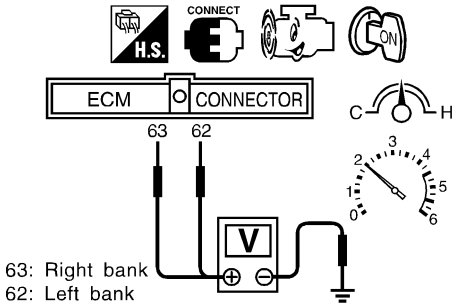
OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 8.

7	CHECK FRONT HEATED OXYGEN SENSOR

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 63 (Right bank front HO2S signal) or 62 (Left bank front HO2S signal) and engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.



- The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.
- 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.

1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

SEF967X

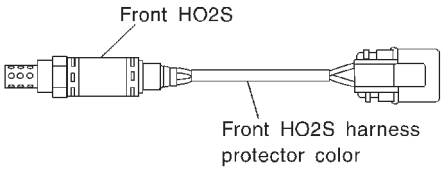
CAUTION:
Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 8.

8	REPLACE FRONT HEATED OXYGEN SENSOR

1. Turn ignition switch "OFF".
2. Check front heated oxygen sensor harness protector color.



P0132 (-B1) Right bank: Black
P0152 (-B2) Left bank: Blue

SEF194WD

CAUTION:
Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

	▶	Replace malfunctioning front heated oxygen sensor.

Diagnostic Procedure (Cont'd)

9	CHECK FRONT HO2S SHIELD CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect joint connector-17 or joint connector-18.
   For circuit, refer to "DTC P0130 (RIGHT BANK, -B1), P0150 (LEFT BANK, -B2) FRONT HEATED OXYGEN SENSOR (FRONT HO2S) (CIRCUIT)", EC-205.
3. Check the following.

- Continuity between joint connector terminal 1 or 2 and ground
- Joint connector

(Refer to EL-463, "HARNESS LAYOUT".)

Continuity should exist.

4. Also check harness for short to ground and short to power.
5. Then reconnect joint connector-17 or joint connector-18.

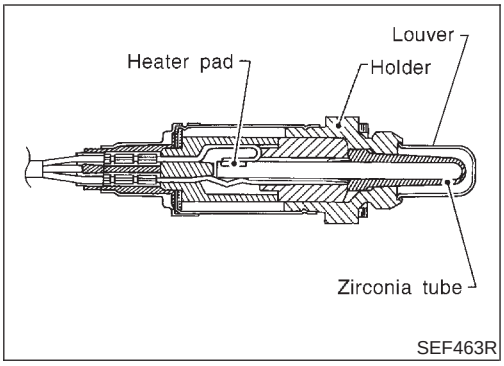
OK or NG

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

10	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156.
For circuit, refer to "DTC P0130 (RIGHT BANK, -B1), P0150 (LEFT BANK, -B2) FRONT HEATED OXYGEN SENSOR (FRONT HO2S) (CIRCUIT)", EC-205.

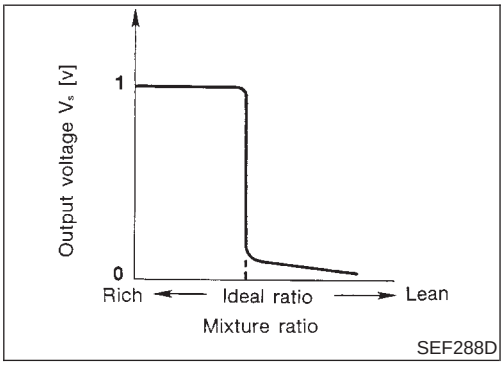
	▶	**INSPECTION END**



Component Description

NHEC0108

The front heated oxygen sensor is placed into the front tube. 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.

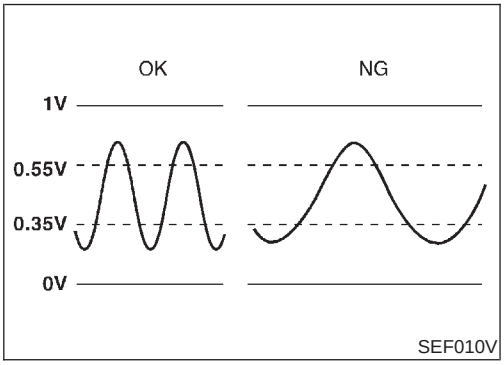


CONSULT-II Reference Value in Data Monitor Mode

NHEC0109

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
FR O2 SEN-B1 FR O2 SEN-B2	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
FR O2 MNTR-B1 FR O2 MNTR-B2			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.



On Board Diagnosis Logic

NHEC0111

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.
Malfunction is detected when the response of the voltage signal from the sensor takes more than the specified time.

Possible Cause

NHEC0435

- 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 valve

Possible Cause (Cont'd)

- Mass air flow sensor

DTC Confirmation Procedure

NHEC0112

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 10 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-II

NHEC0112S01

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 SEN-B1 (-B2) P0133 (P0153)" of "FRONT O2 SENSOR" in "DTC WORK SUPPORT" mode with CONSULT-II.
4) Touch "START".
5) Start engine and let it idle for at least 3 minutes.

NOTE:

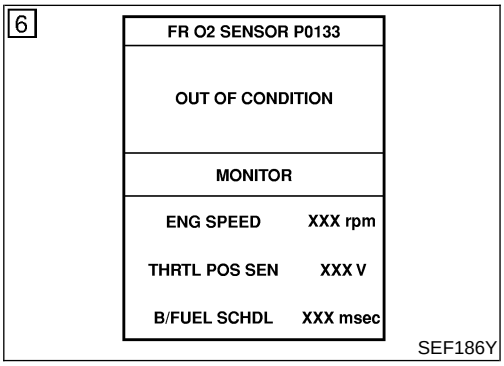
Never raise engine speed above 3,600 rpm after this step. If the engine speed limit is exceeded, return to step 5.

6) When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take approximately 40 to 50 seconds.)

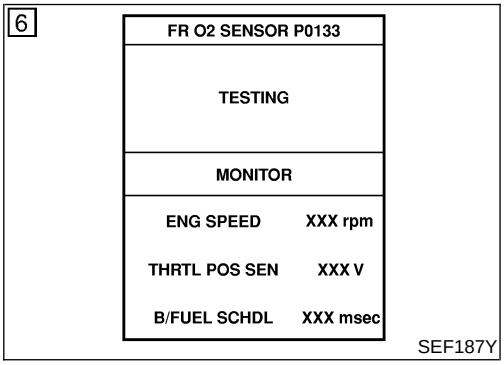
ENG SPEED	1,200 - 2,800 rpm
Vehicle speed	80 - 120 km/h (50 - 75 MPH)
B/FUEL SCHDL	3 - 9 msec
Selector lever	Suitable position

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

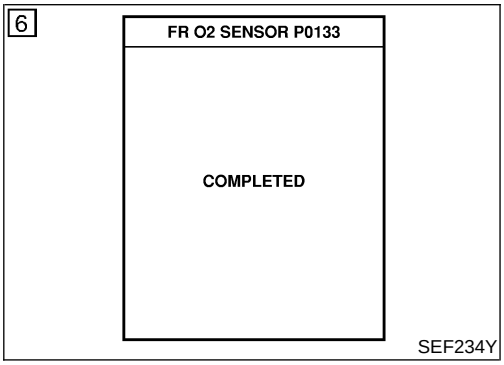
7) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-236.



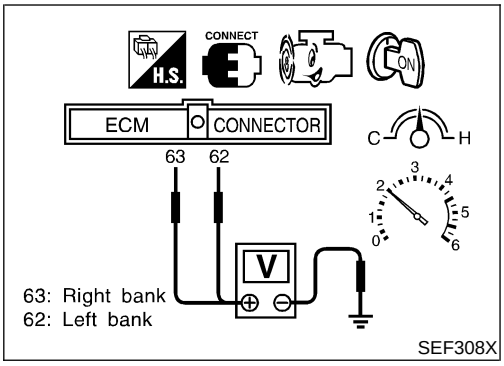
SEF186Y



SEF187Y



SEF234Y



Overall Function Check

NHEC0113

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

NHEC0113S01

1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 63 (Right bank front HO2S signal) or 62 (Left bank front HO2S signal) and engine ground.
3) Check the following with engine speed held at 2,000 rpm constant under no load.

- The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.

  1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

  2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

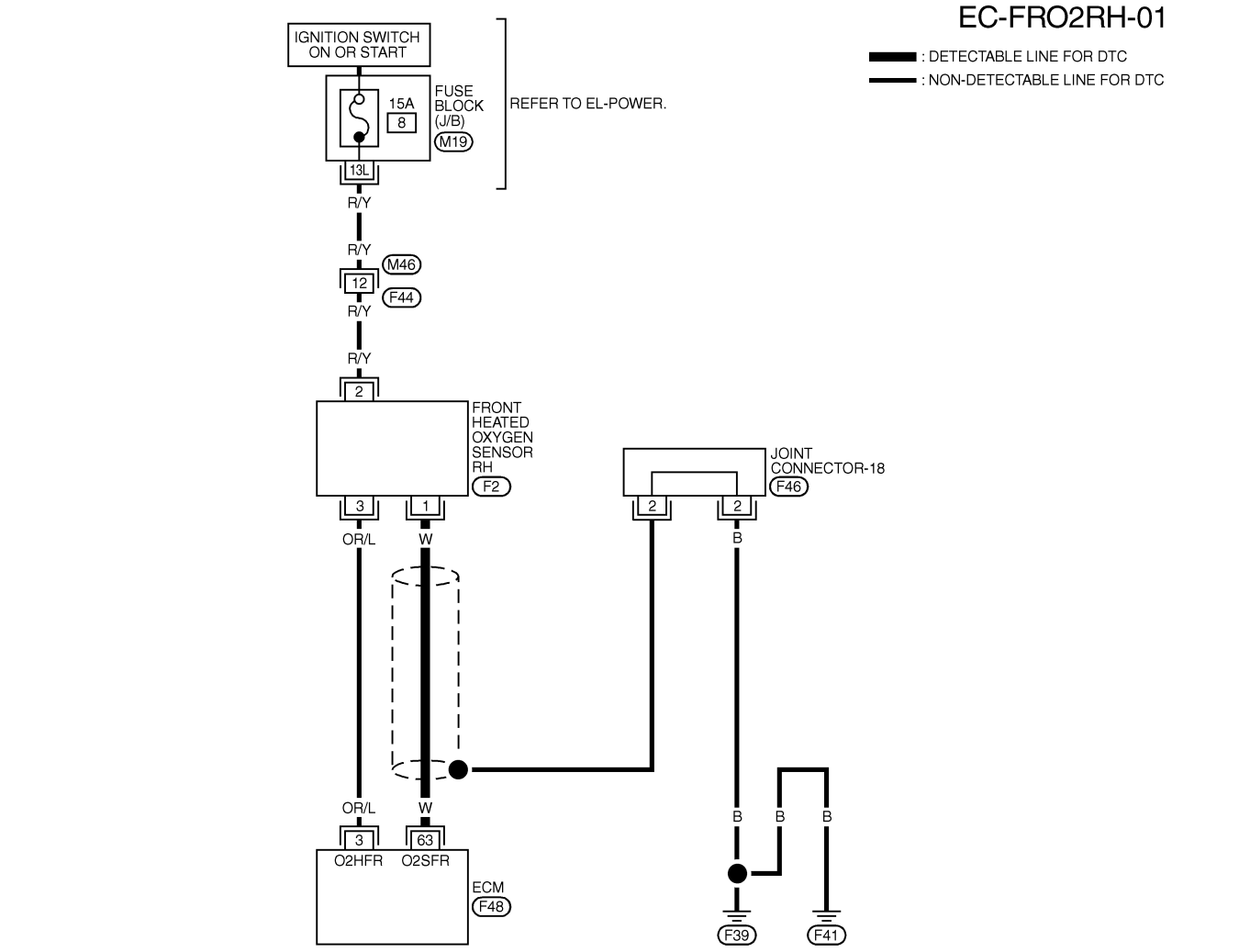
4) If NG, go to “Diagnostic Procedure”, EC-236.

Wiring Diagram

NHEC0114

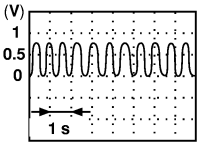
RIGHT BANK

NHEC0114S01



MEC805C

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

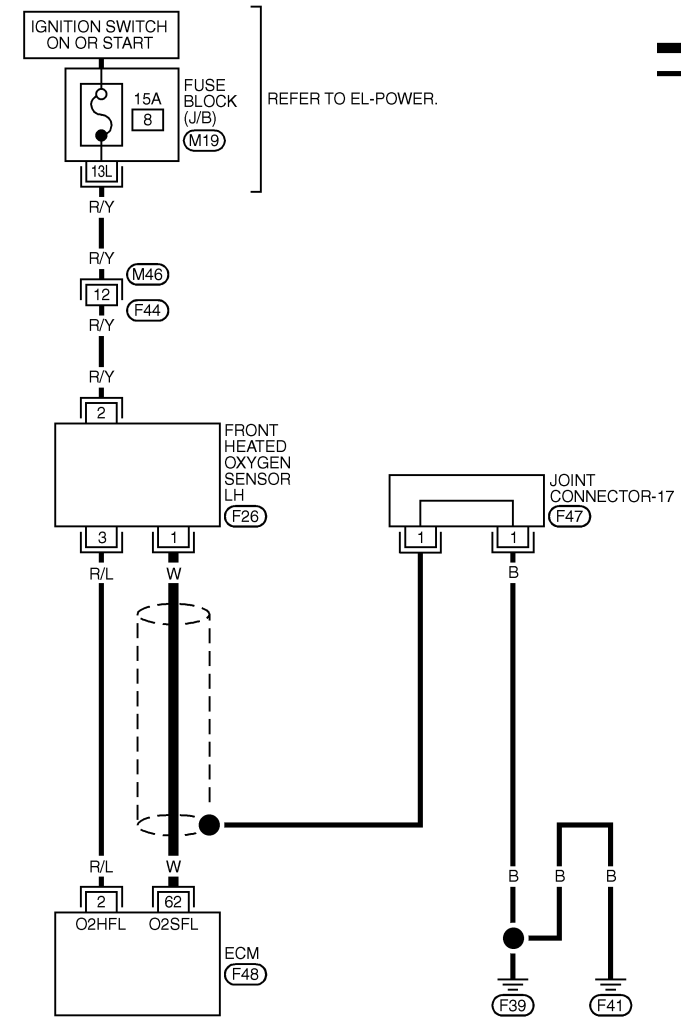
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
63	W	FRONT HEATED OXYGEN SENSOR RH	ENGINE RUNNING AT 2,000 RPM AFTER WARMING UP TO NORMAL OPERATING TEMPERATURE	0 - APPROX. 1.0V 

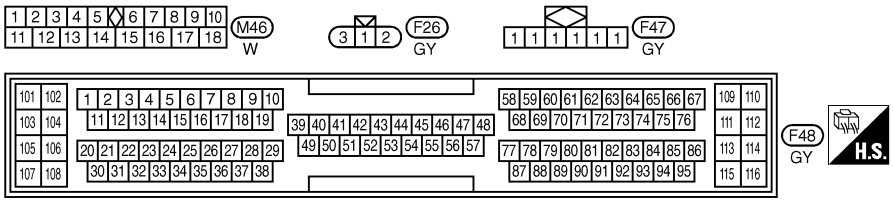
SEF854Y

LEFT BANK

NHEC0114S02

EC-FRO2LH-01

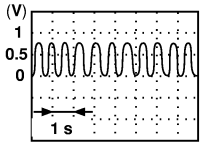




REFER TO THE FOLLOWING.
M19 -FUSE BLOCK-
JUNCTION BOX (J/B)

MEC804C

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
62	W	FRONT HEATED OXYGEN SENSOR LH	ENGINE RUNNING AT 2,000 RPM AFTER WARMING UP TO NORMAL OPERATING TEMPERATURE	0 - APPROX. 1.0V 

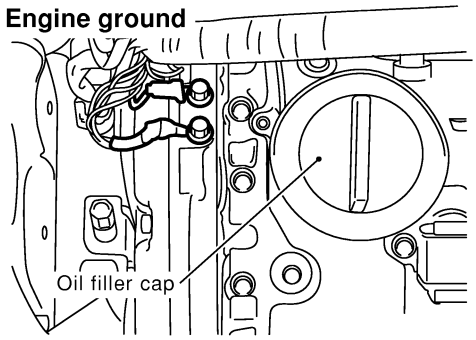
SEF855Y

Diagnostic Procedure

NHEC0115

1	RETIGHTEN GROUND SCREWS

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



SEF255X

	▶	GO TO 2.

2	RETIGHTEN FRONT HEATED OXYGEN SENSOR

Loosen and retighten corresponding front heated oxygen sensor.

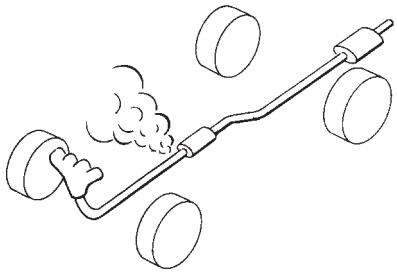
Tightening torque:

40 - 60 N·m (4.1 - 6.2 kg-m, 30 - 44 ft-lb)

	▶	GO TO 3.

3	CHECK FOR 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.

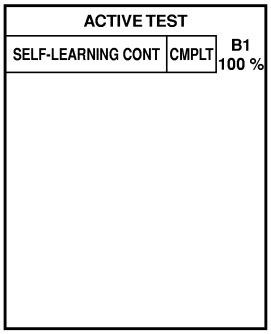
OK or NG

OK	▶	GO TO 5.
NG	▶	Repair or replace.

5	CLEAR THE SELF-LEARNING DATA

With CONSULT-II

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



SEF218Y

4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected?
   Is it difficult to start engine?

Without CONSULT-II

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 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC P0100 is displayed.
6. Erase the 1st trip DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-82.
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected?
   Is it difficult to start engine?

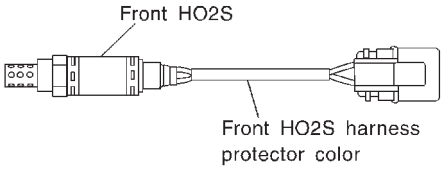
Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to EC-304, 312.
No	▶	GO TO 6.

Diagnostic Procedure (Cont'd)

6	CHECK FRONT HO2S HARNESS PROTECTOR COLOR

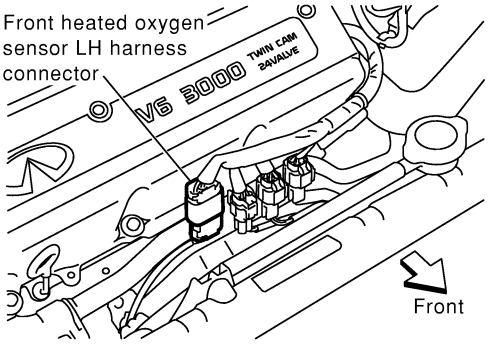
1. Turn ignition switch "OFF".
2. Check front heated oxygen sensor harness protector.

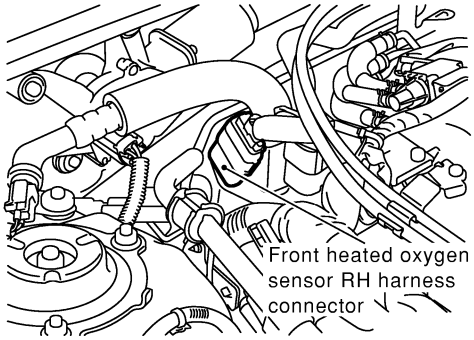


P0133 (-B1) Right bank: Black
P0153 (-B2) Left bank: Blue

SEF194WF

3. Disconnect corresponding front heated oxygen sensor harness connector.





SEF902X

	▶	GO TO 7.

7	CHECK FRONT HO2S INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal and front HO2S terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0133	63	1	Right
P0153	62	1	Left

MTBL0334

Continuity should exist.

3. Check harness continuity between ECM terminal or FRONT HO2S terminal and ground as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM or Sensor	Ground	
P0133	63 or 1	Ground	Right
P0153	62 or 1	Ground	Left

MTBL0335

Continuity should not exist.

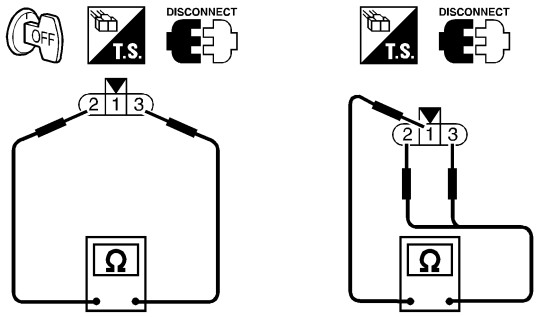
4. Also check harness for short to power.

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 FRONT HEATED OXYGEN SENSOR HEATER

Check resistance between front HO2S terminals as follows.



Terminals	Resistance
2 and 3	2.3 - 4.3Ω at 25°C (77°F)
1 and 2 1 and 3	∞Ω (Continuity should not exist.)

SEF310X

CAUTION:

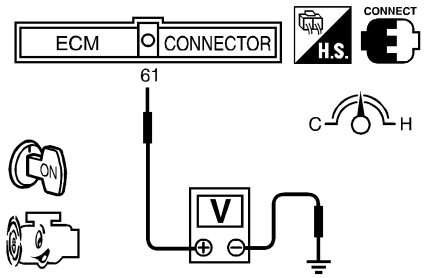
Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 13.

9	CHECK MASS AIR FLOW SENSOR

1. Reconnect harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 61 (Mass air flow sensor signal) and ground.



Condition	Voltage V
Ignition switch "ON" (Engine stopped.)	Approx. 1.0
Idle (Engine is warmed-up to normal operating temperature.)	1.2 - 1.8
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.6 - 2.2
Idle to about 4,000 rpm*	1.2 - 1.8 to Approx. 4.0

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

SEF298X

4. If the voltage is out of specification, disconnect mass air flow sensor harness connector and connect it again. Then repeat above check.

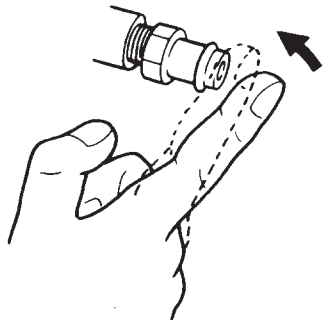
OK or NG

OK	▶	GO TO 10.
NG	▶	Replace mass air flow sensor.

Diagnostic Procedure (Cont'd)

10	CHECK PCV VALVE

1. Install all removed parts.
2. Start engine and let it idle.
3. Remove PCV valve ventilation hose from PCV valve.
4. Make sure that a hissing noise will be heard as air passes through it and a strong vacuum should be felt immediately when a finger is placed over valve inlet.



SEC137A

OK or NG

OK (With CONSULT-II)	▶	GO TO 11.
OK (Without CONSULT-II)	▶	GO TO 12.
NG	▶	Replace PCV valve.

11 **CHECK FRONT HEATED OXYGEN SENSOR**

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" and adjust "TRIGGER POINT" to 100% in "DATA MONITOR" mode with CONSULT-II.
3. Select "FR O2 SEN-B1 (-B2)" and "FR O2 MNTR-B1 (-B2)".
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch "RECORD" on CONSULT-II screen.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
FR O2 SEN-B1	XXX V
RR O2 SEN-B2	XXX V

SEF063Y

6. Check the following.

- "FR O2 MNTR-B1 (-B2)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds. 5 times (cycles) are counted as shown below.

Right bank

cycle	1	2	3	4	5
FR O2 MNTR-B1	R-L-R-L-R-L-R-L-R-L				

Left bank

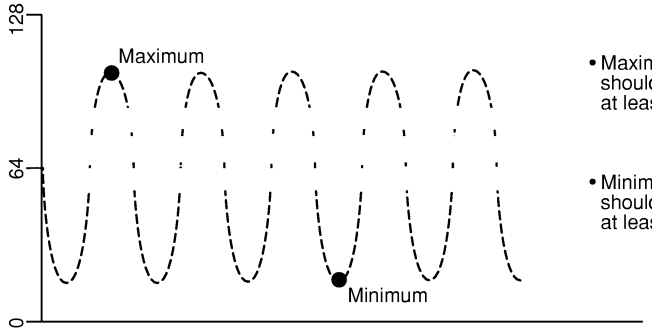
cycle	1	2	3	4	5
FR O2 MNTR-B2	R-L-R-L-R-L-R-L-R-L				

R means FR O2 MNTR-B1(-B2) indicates RICH
L means FR O2 MNTR-B1(-B2) indicates LEAN

SEF702W

- "FR O2 SEN-B1 (-B2)" voltage goes above 0.6V at least once.
- "FR O2 SEN-B1 (-B2)" voltage goes below 0.3V at least once.
- "FR O2 SEN-B1 (-B2)" voltage never exceeds 1.0V.

Trigger	ENG SPEED	FR O2 SEN-B1
	rpm	V
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX



SEF064Y

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.

OK or NG

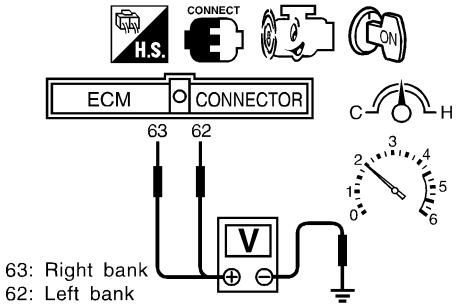
OK	▶	GO TO 14.
NG	▶	GO TO 13.

Diagnostic Procedure (Cont'd)

12	CHECK FRONT HEATED OXYGEN SENSOR

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 63 (Right bank front HO2S signal) or 62 (Left bank front HO2S signal) and engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.



- The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.
- 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.

1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

SEF967X

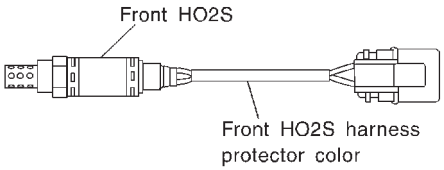
CAUTION:
Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

OK	▶	GO TO 14.
NG	▶	GO TO 13.

13	REPLACE FRONT HEATED OXYGEN SENSOR

1. Turn ignition switch "OFF".
2. Check front heated oxygen sensor harness protector color.



P0133 (-B1) Right bank: Black
P0153 (-B2) Left bank: Blue

SEF194WF

	▶	Replace malfunctioning front heated oxygen sensor.

14	CHECK FRONT HO2S SHIELD CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect joint connector-17 or joint connector-18.
3. Check the following.

- Continuity between joint connector terminal 1 or 2 and ground
- Joint connector
  (Refer to EL-463, "HARNESS LAYOUT".)
  Continuity should exist.

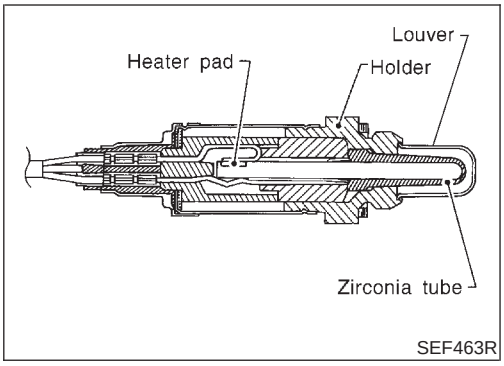
4. Also check harness for short to ground and short to power.
5. Then reconnect joint connector-17 or joint connector-18.

OK or NG

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

Diagnostic Procedure (Cont'd)

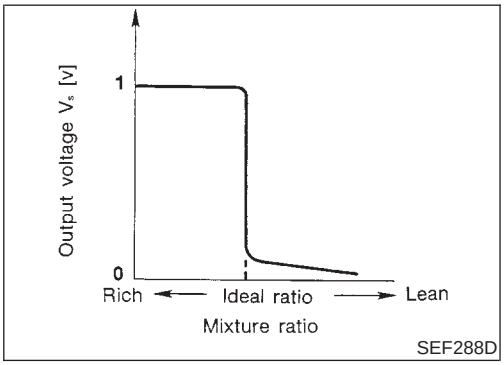
15	**CHECK INTERMITTENT INCIDENT**
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156.	
▶	**INSPECTION END**



Component Description

NHEC0116

The front heated oxygen sensor is placed into the front tube. 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.

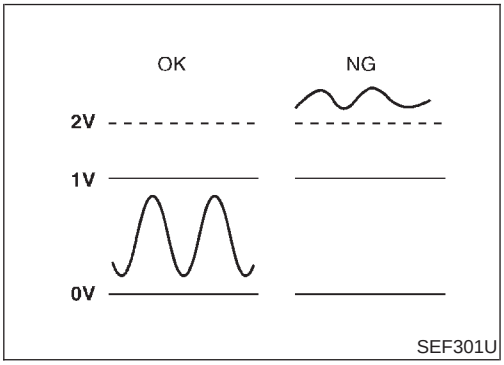


CONSULT-II Reference Value in Data Monitor Mode

NHEC0117

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
FR O2 SEN-B1 FR O2 SEN-B2	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
FR O2 MNTR-B1 FR O2 MNTR-B2			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.



On Board Diagnosis Logic

NHEC0119

To judge the malfunction, the diagnosis checks that the front heated oxygen sensor output is not inordinately high.
Malfunction is detected when an excessively high voltage from the sensor is sent to ECM.

Possible Cause

NHEC0436

- Harness or connectors
  (The sensor circuit is open or shorted.)
- Front heated oxygen sensor

5

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C

SEF174Y

DTC Confirmation Procedure

NHEC0120

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

NHEC0120S01

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 10 seconds.
3) Turn ignition switch "ON".
4) Select "DATA MONITOR" mode with CONSULT-II.
5) Restart engine and let it idle for 25 seconds.
6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-248.

WITH GST

NHEC0120S02

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 10 seconds.
3) Restart engine and let it idle for 25 seconds.
4) Turn ignition switch "OFF" and wait at least 10 seconds.
5) Restart engine and let it idle for 25 seconds.
6) Select "MODE 3" with GST.
7) If DTC is detected, go to "Diagnostic Procedure", EC-248.

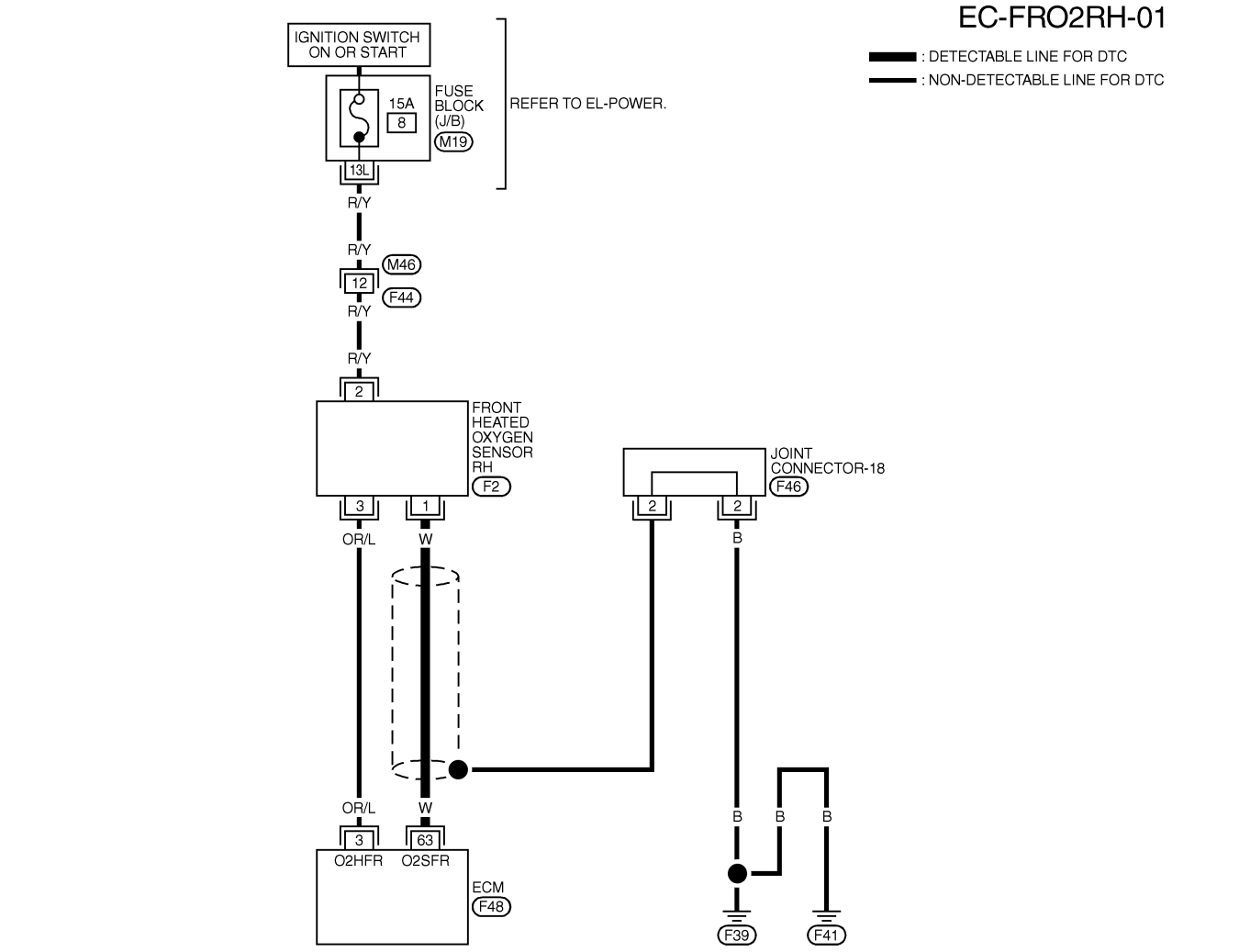
- **When using GST, "DTC Confirmation Procedure" should be performed twice as much as when using CONSULT-II because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II is recommended.**

Wiring Diagram

NHEC0121

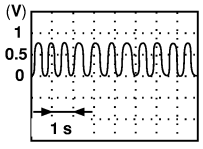
RIGHT BANK

NHEC0121S01



MEC805C

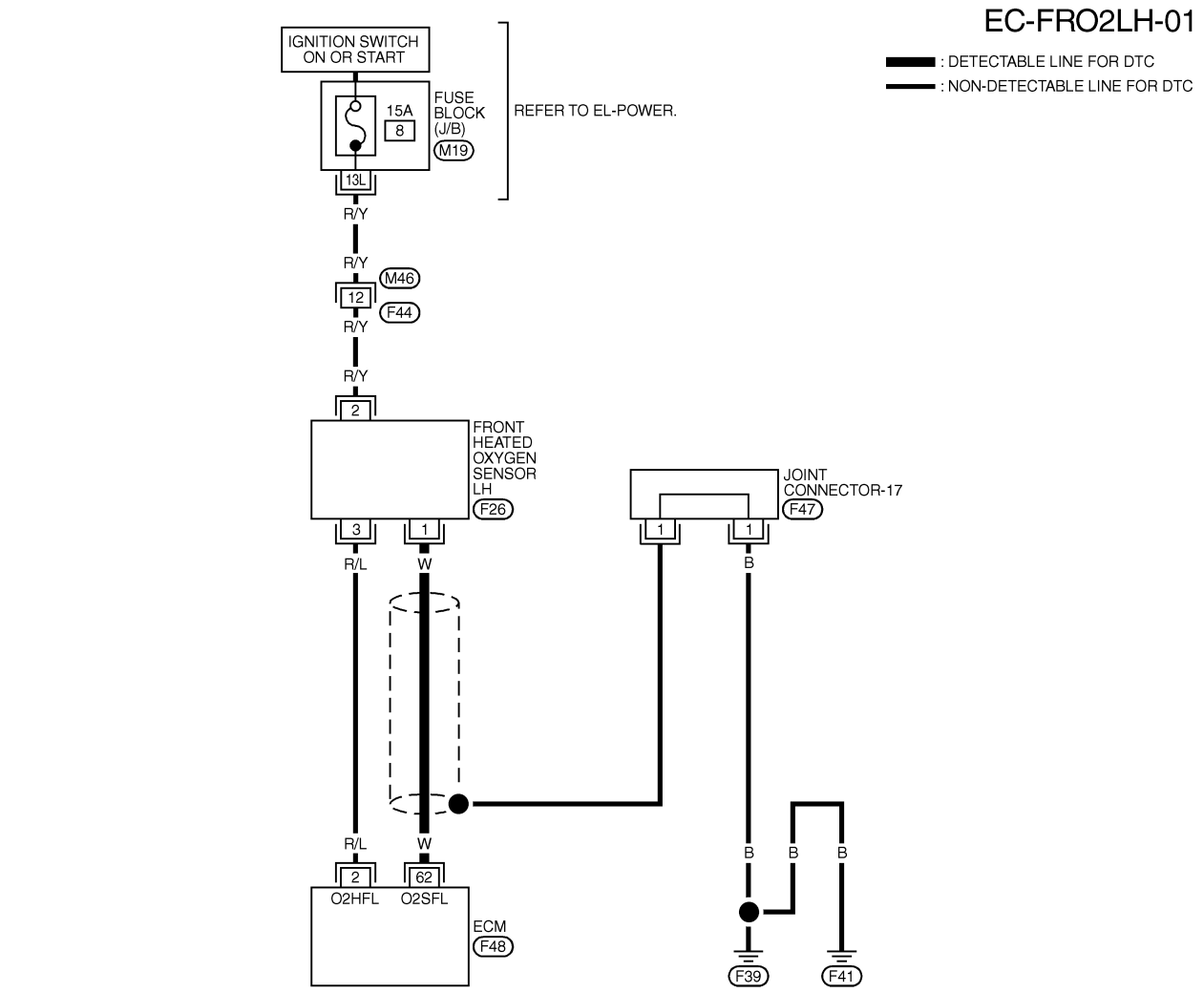
ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
63	W	FRONT HEATED OXYGEN SENSOR RH	ENGINE RUNNING AT 2,000 RPM AFTER WARMING UP TO NORMAL OPERATING TEMPERATURE	0 - APPROX. 1.0V 

SEF854Y

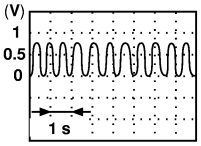
LEFT BANK

NHEC0121S02



MEC804C

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
62	W	FRONT HEATED OXYGEN SENSOR LH	ENGINE RUNNING AT 2,000 RPM AFTER WARMING UP TO NORMAL OPERATING TEMPERATURE	0 - APPROX. 1.0V 

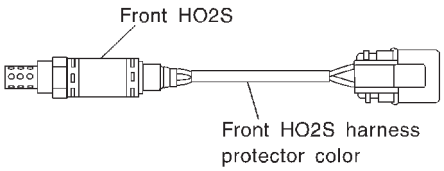
SEF855Y

Diagnostic Procedure

NHEC0122

1	INSPECTION START

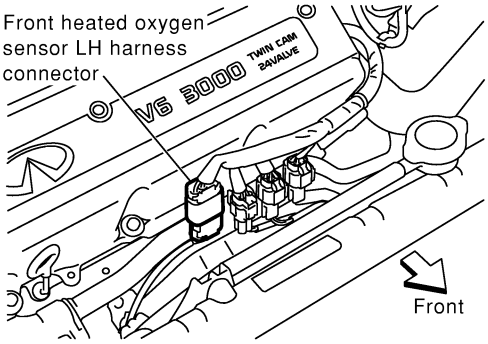
1. Turn ignition switch “OFF”.
2. Check front heated oxygen sensor harness protector color.

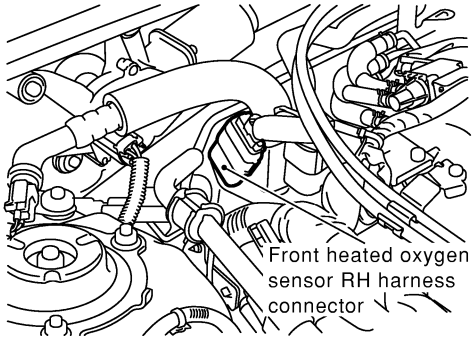


P0134 (-B1) Right bank: Black
P0154 (-B2) Left bank: Blue

SEF194WB

3. Disconnect corresponding front heated oxygen sensor harness connector.





SEF902X

▶	GO TO 2.

2	RETIGHTEN FRONT HEATED OXYGEN SENSOR

Loosen and retighten corresponding front heated oxygen sensor.

Tightening torque:
40 - 60 N·m (4.1 - 6.2 kg-m, 30 - 44 ft-lb)

▶	GO TO 3.

3 CHECK FRONT HO2S INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal and front HO2S terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0134	63	1	Right
P0154	62	1	Left

MTBL0336

Continuity should exist.

3. Check harness continuity between ECM terminal or front HO2S terminal and ground as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM or Sensor	Ground	
P0134	63 or 1	Ground	Right
P0154	62 or 1	Ground	Left

MTBL0337

Continuity should not exist.

4. Also check harness for 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 HO2S CONNECTOR FOR WATER

1. Disconnect front heated oxygen sensor harness connector.
2. Check connectors for water.

Water should not exist.

OK or NG

OK (With CONSULT-II)	▶	GO TO 5.
OK (Without CONSULT-II)	▶	GO TO 6.
NG	▶	Repair or replace harness or connectors.

5	CHECK FRONT HEATED OXYGEN SENSOR

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" and adjust "TRIGGER POINT" to 100% in "DATA MONITOR" mode with CONSULT-II.
3. Select "FR O2 SEN-B1 (-B2)" and "FR O2 MNTR-B1 (-B2)".
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch "RECORD" on CONSULT-II screen.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
FR O2 SEN-B1	XXX V
RR O2 SEN-B2	XXX V

SEF063Y

6. Check the following.

- "FR O2 MNTR-B1 (-B2)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds. 5 times (cycles) are counted as shown left:

Right bank

cycle	1	2	3	4	5
FR O2 MNTR-B1	R-L	R-L	R-L	R-L	R-L-R

Left bank

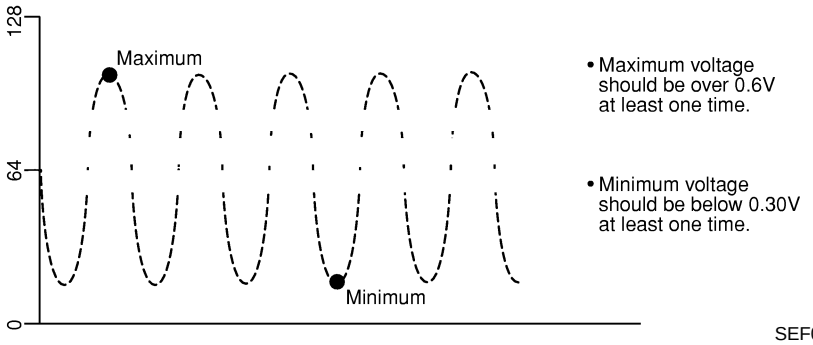
cycle	1	2	3	4	5
FR O2 MNTR-B2	R-L	R-L	R-L	R-L	R-L-R

R means FR O2 MNTR-B1(-B2) indicates RICH
L means FR O2 MNTR-B1(-B2) indicates LEAN

SEF702W

- "FR O2 SEN-B1 (-B2)" voltage goes above 0.6V at least once.
- "FR O2 SEN-B1 (-B2)" voltage goes below 0.3V at least once.
- "FR O2 SEN-B1 (-B2)" voltage never exceeds 1.0V.

Trigger	ENG SPEED	FR O2 SEN-B1
	rpm	V
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX



SEF064Y

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.

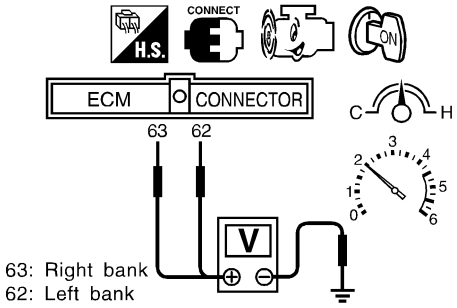
OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

6	CHECK FRONT HEATED OXYGEN SENSOR

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 63 (Right bank front HO2S signal) or 62 (Left bank front HO2S signal) and engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.



- The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.
- 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.

1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

SEF967X

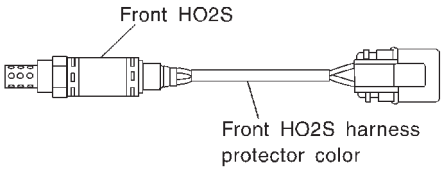
CAUTION:
Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	REPLACE FRONT HEATED OXYGEN SENSOR

1. Turn ignition switch "OFF".
2. Check front heated oxygen sensor harness protector color.



P0134 (-B1) Right bank: Black
P0154 (-B2) Left bank: Blue

SEF194WB

CAUTION:
Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

	▶	Replace malfunctioning front heated oxygen sensor.

8	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156.	
▶	**INSPECTION END**

Description

NHEC0123

SYSTEM DESCRIPTION

NHEC0123S01

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed	Front heated oxygen sensor heater control	Front heated oxygen sensor heaters
Crankshaft position sensor (REF)			

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

OPERATION

NHEC0123S02

Engine speed rpm	Front heated oxygen sensor heaters
Above 3,600	OFF
Below 3,600	ON

CONSULT-II Reference Value in Data Monitor Mode

NHEC0124

Specification data are reference values.

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

On Board Diagnosis Logic

NHEC0126

Malfunction is detected when 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.)

Possible Cause

NHEC0437

- Harness or connectors
  (The front heated oxygen sensor heater circuit is open or shorted.)
- Front heated oxygen sensor heater

2

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

DTC Confirmation Procedure

NHEC0127

NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 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-II

NHEC0127S01

1) Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II.
2) Start engine and run it for at least 6 seconds at idle speed.
3) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-256.

WITH GST

NHEC0127S02

1) Start engine and run it for at least 6 seconds at idle speed.
2) Turn ignition switch “OFF” and wait at least 10 seconds.
3) Start engine and run it for at least 6 seconds at idle speed.
4) Select “MODE 3” with GST.
5) If DTC is detected, go to “Diagnostic Procedure”, EC-256.

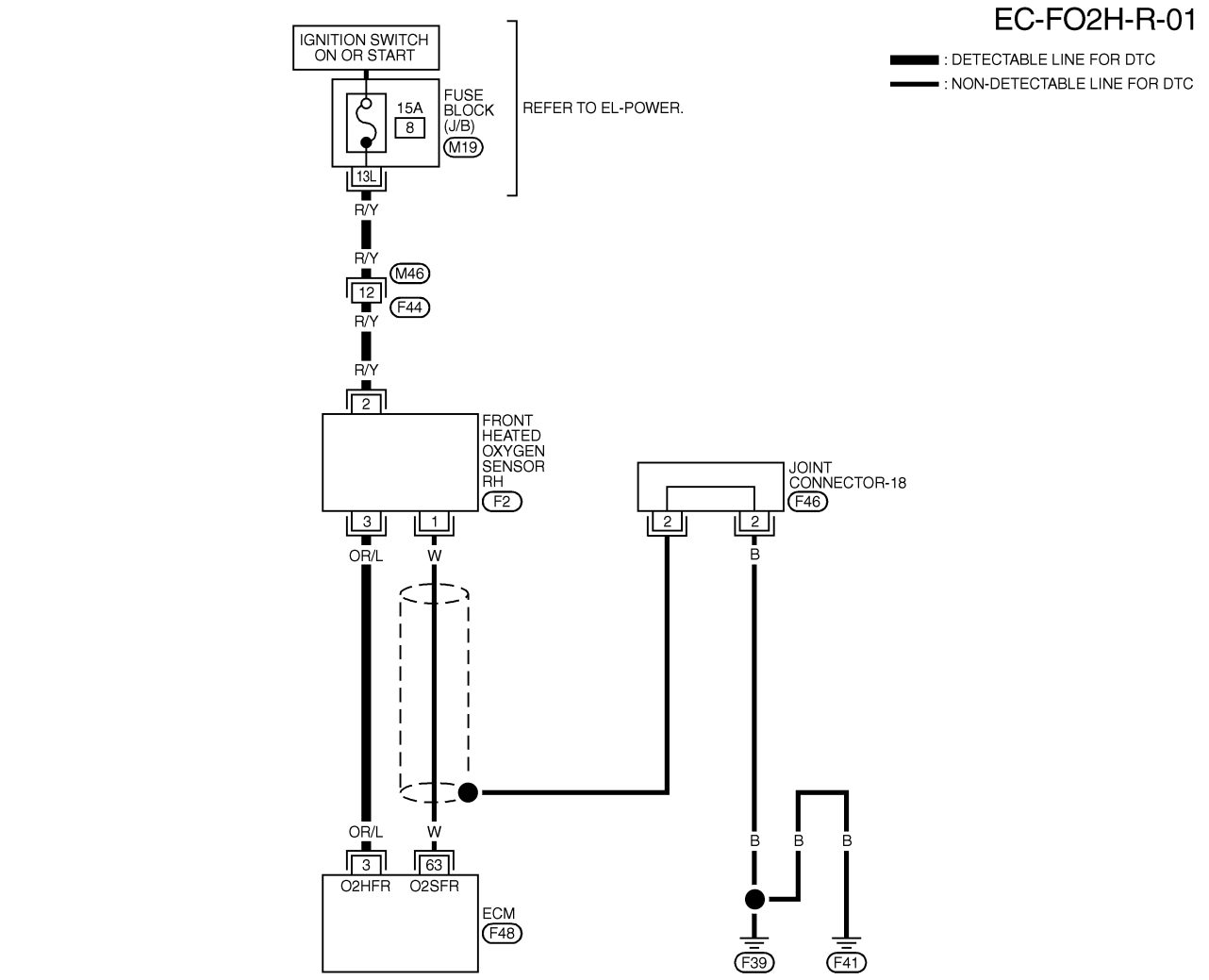
- **When using GST, “DTC Confirmation Procedure” should be performed twice as much as when using CONSULT-II because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II is recommended.**

Wiring Diagram

NHEC0128

RIGHT BANK

NHEC0128S01



MEC807C

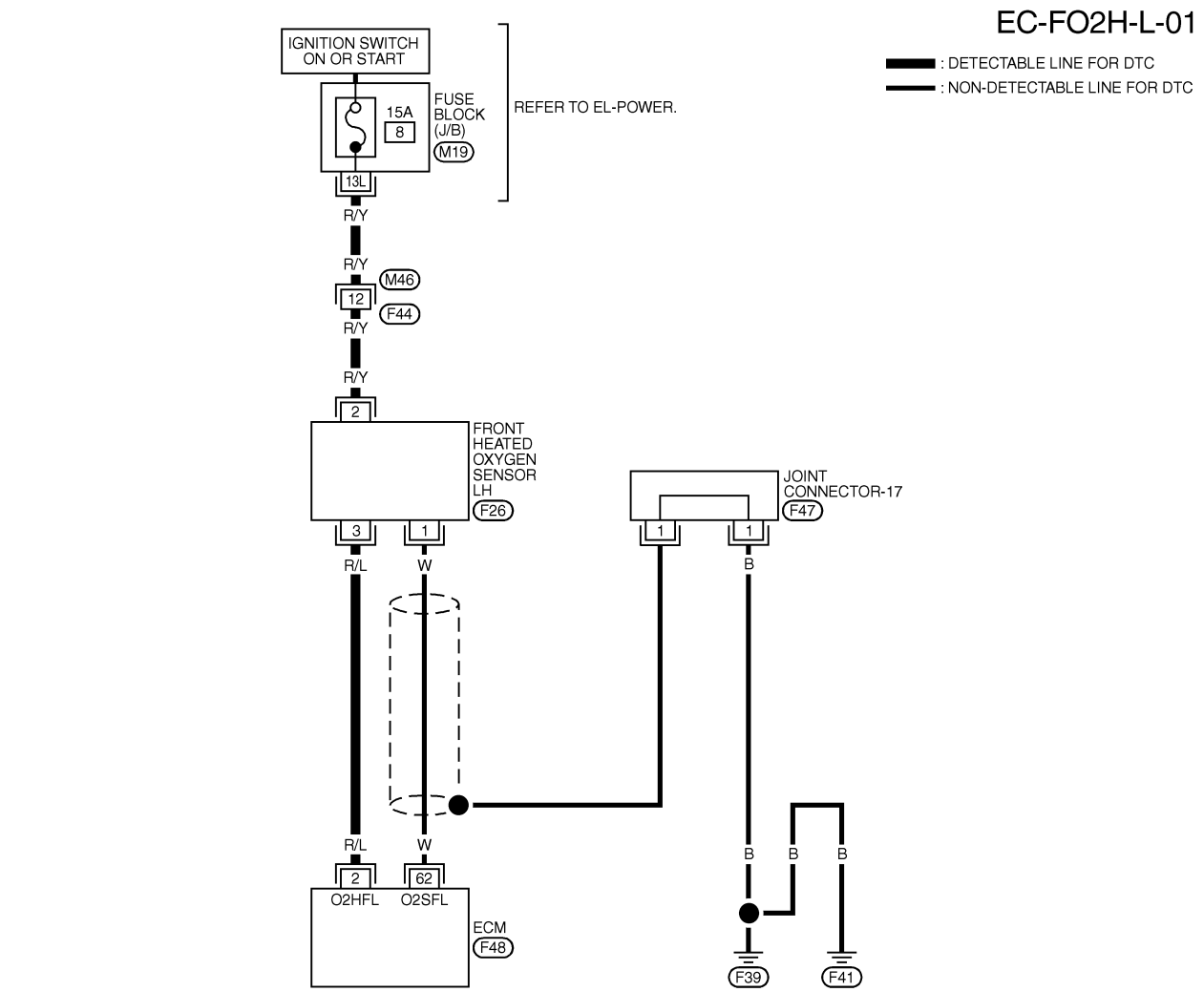
ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

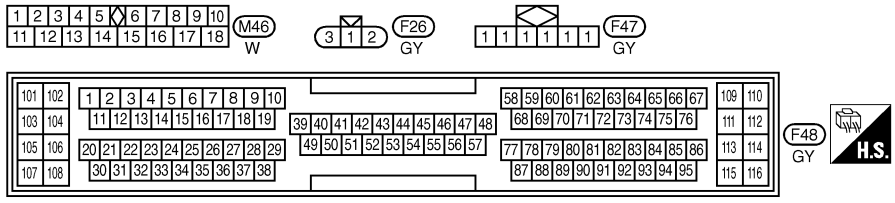
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
3	OR/L	FRONT HEATED OXYGEN SENSOR RH HEATER	ENGINE RUNNING BELOW 3,600 RPM	0 - 1.0V
			ENGINE RUNNING ABOVE 3,600 RPM	BATTERY VOLTAGE

SEF655XB

LEFT BANK

NHEC0128S02





REFER TO THE FOLLOWING.
M19 -FUSE BLOCK-
JUNCTION BOX (J/B)

MEC806C

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
2	R/L	FRONT HEATED OXYGEN SENSOR LH HEATER	ENGINE RUNNING BELOW 3,600 RPM	0 - 1.0V
			ENGINE RUNNING ABOVE 3,600 RPM	BATTERY VOLTAGE

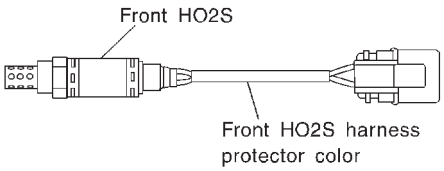
SEF656XB

Diagnostic Procedure

NHEC0129

1	CHECK FRONT HO2S POWER SUPPLY CIRCUIT

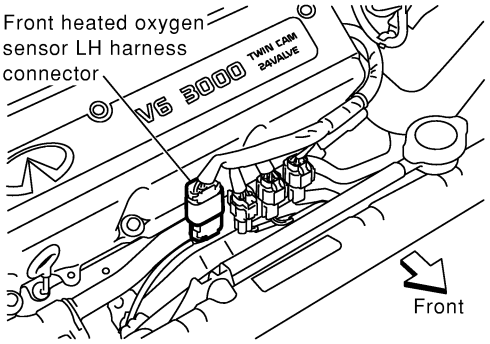
1. Turn ignition switch “OFF”.
2. Check front heated oxygen sensor harness protector color.

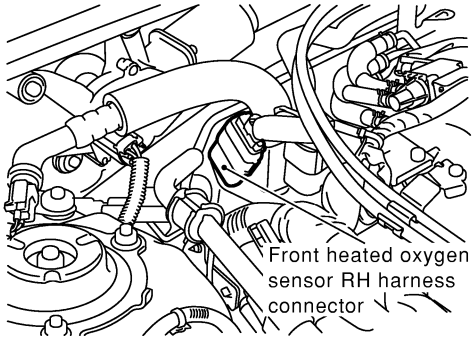


P0135 (-B1) Right bank: Black
P0155 (-B2) Left bank: Blue

SEF194WC

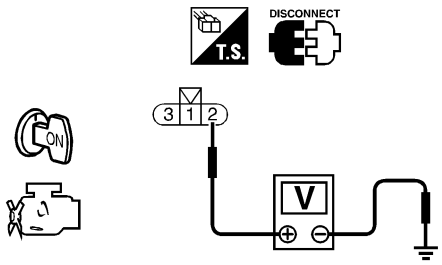
3. Disconnect corresponding front heated oxygen sensor harness connector.





SEF902X

4. Turn ignition switch “ON”.
5. Check voltage between front HO2S terminal 2 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF311X

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M46, F44
- Fuse block (J/B) connector M19
- 15A fuse
- Harness for open or short between front heated oxygen sensor and fuse

	▶	Repair harness or connectors.

3	CHECK FRONT HO2S GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal and front HO2S terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0135	3	3	Right
P0155	2	3	Left

MTBL0338

Continuity should exist.

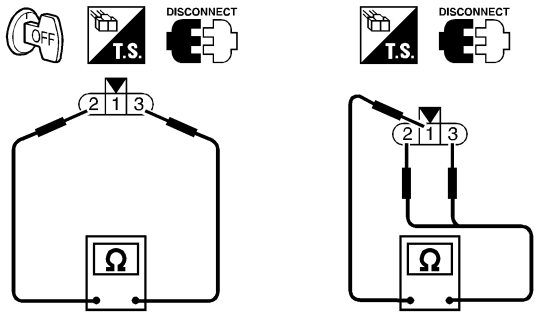
4. Also check harness for short to ground and short to power.

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

Check resistance between front HO2S terminals as follows.



Terminals	Resistance
2 and 3	2.3 - 4.3Ω at 25°C (77°F)
1 and 2 1 and 3	∞Ω (Continuity should not exist.)

SEF310X

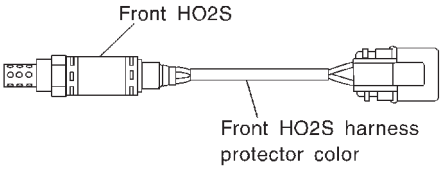
CAUTION:
Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	REPLACE FRONT HEATED OXYGEN SENSOR

1. Turn ignition switch "OFF".
2. Check front heated oxygen sensor harness protector color.



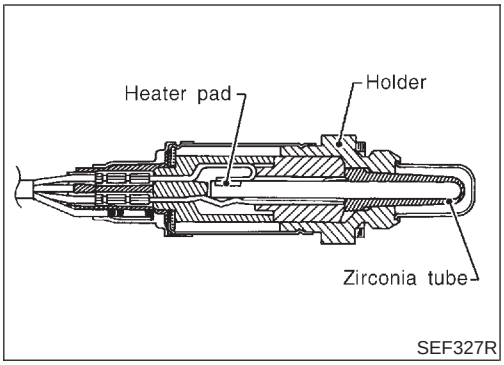
P0135 (-B1) Right bank: Black
P0155 (-B2) Left bank: Blue

SEF194WC

CAUTION:
Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

▶	Replace malfunctioning front heated oxygen sensor.

6	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156.	
▶	**INSPECTION END**



Component Description

NHEC0130

The rear heated oxygen sensor, after three way catalyst, monitors the oxygen level in the exhaust gas on each bank.

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.

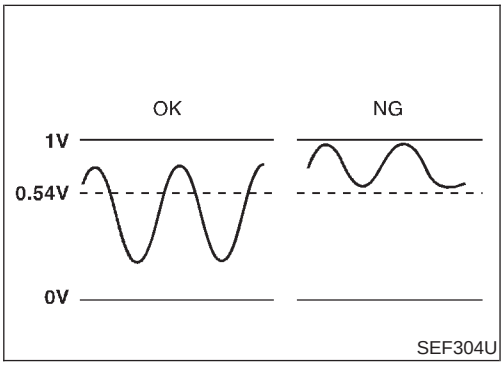
Under normal conditions the rear heated oxygen sensor is not used for engine control operation.

CONSULT-II Reference Value in Data Monitor Mode

NHEC0131

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
RR O2 SEN-B1 RR O2 SEN-B2	● Engine: After warming up	Revving engine from idle up to 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
RR O2 MNTR-B1 RR O2 MNTR-B2			LEAN ⟷ RICH



On Board Diagnosis Logic

NHEC0133

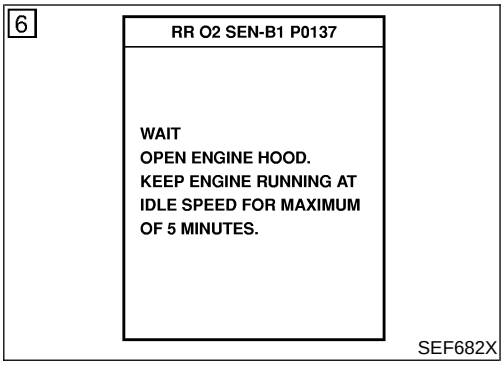
The rear heated oxygen sensor has a much longer switching time between rich and lean than the front heated oxygen sensor. The oxygen storage capacity before the three way catalyst causes the longer switching time. To judge the malfunctions of rear heated oxygen sensor, ECM monitors whether the minimum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

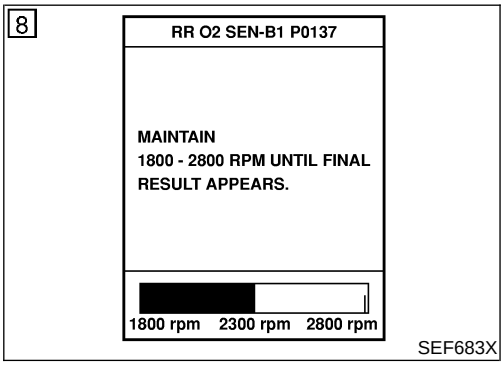
Malfunction is detected when the minimum voltage from the sensor is not reached to the specified voltage.

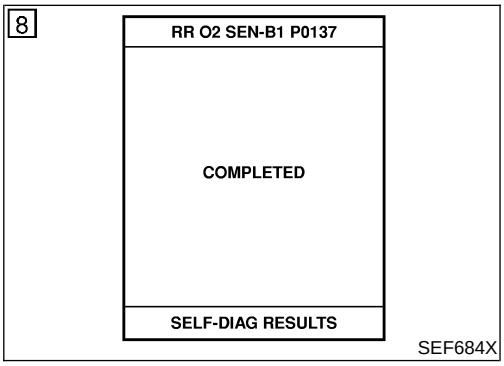
Possible Cause

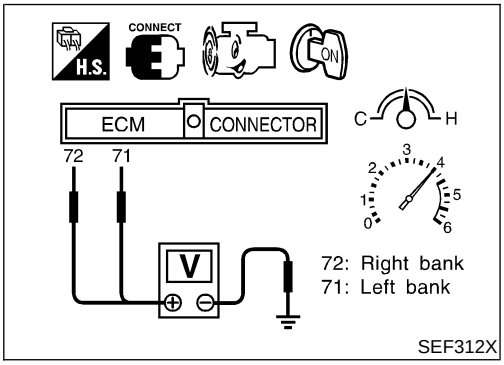
NHEC0438

- Harness or connectors
  (The sensor circuit is open or shorted.)
- Rear heated oxygen sensor
- Fuel pressure
- Injectors









DTC Confirmation Procedure

NHEC0134

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Open engine hood before conducting following procedure.

WITH CONSULT-II

NHEC0134S01

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch “OFF” and wait at least 10 seconds.
3) Turn ignition switch “ON”.
4) Select “DATA MONITOR” mode with CONSULT-II.
5) Make sure that “COOLAN TEMP/S” indicates more than 70°C (158°F).
6) Select “RR O2 SEN-B1 (-B2) P0137 (P0157)” of “REAR O2 SENSOR” in “DTC WORK SUPPORT” mode with CONSULT-II.
7) Start engine and follow the instruction of CONSULT-II.
8) Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”.
   If NG is displayed, refer to “Diagnostic Procedure”, EC-264.
   If “CANNOT BE DIAGNOSED” is displayed, perform the following.

a) Stop engine and cool down until “COOLAN TEMP/S” indicates less than 70°C (158°F).
b) Turn ignition switch “ON”.
c) Select “DATA MONITOR” mode with CONSULT-II.
d) Start engine.
e) Return to step 6 again when the “COOLAN TEMP/S” reaches to 70°C (158°F).

Overall Function Check

NHEC0135

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.

WITH GST

NHEC0135S01

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 terminal 72 (Right bank rear HO2S signal) or 71 (Left bank rear HO2S signal) and engine ground.
4) Check the voltage when racing up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be below 0.54V 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 “D” position with “OD” OFF.

The voltage should be below 0.54V at least once during this procedure.

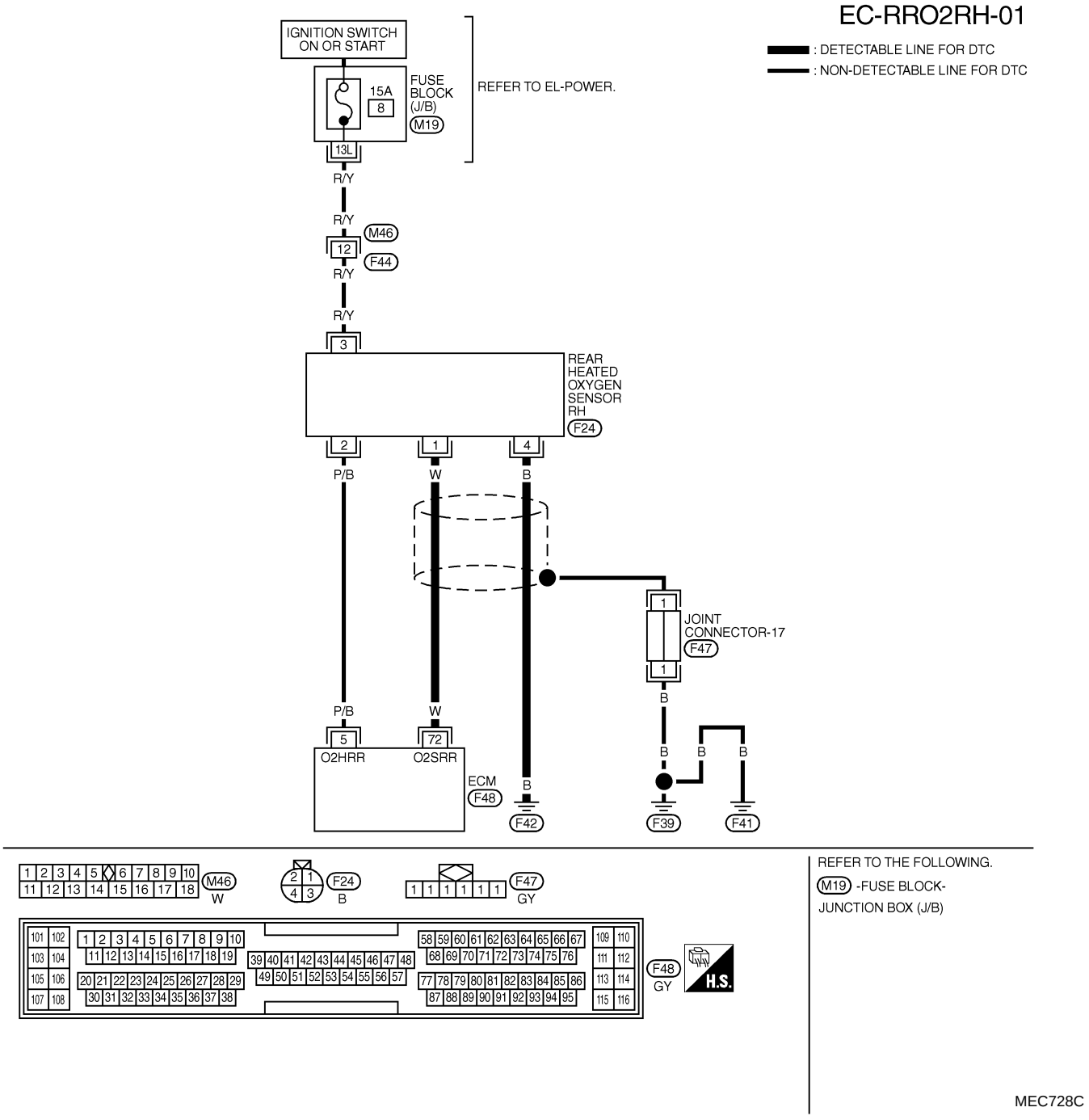
6) If NG, go to "Diagnostic Procedure", EC-264.

Wiring Diagram

=NHEC0136

RIGHT BANK

NHEC0136S01



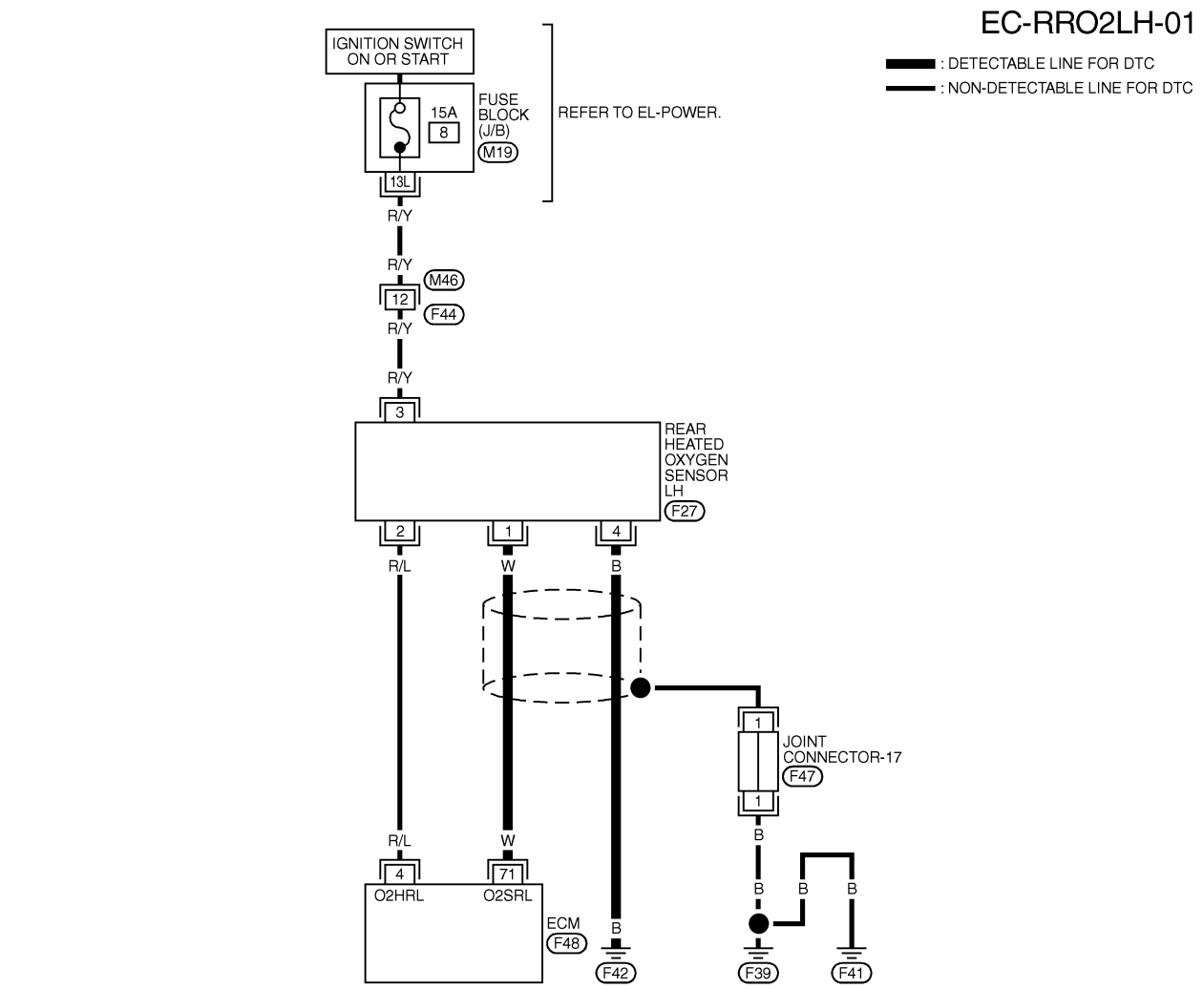
ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
72	W	REAR HEATED OXYGEN SENSOR RH	ENGINE RUNNING FROM IDLE UP TO 2,000 RPM UNDER WARM-UP CONDITION	0 - APPROX. 1.0V

SEF657XB

LEFT BANK

NHEC0136S02



MEC727C

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
71	W	REAR HEATED OXYGEN SENSOR LH	ENGINE RUNNING FROM IDLE UP TO 2,000 RPM UNDER WARM-UP CONDITION	0 - APPROX. 1.0V

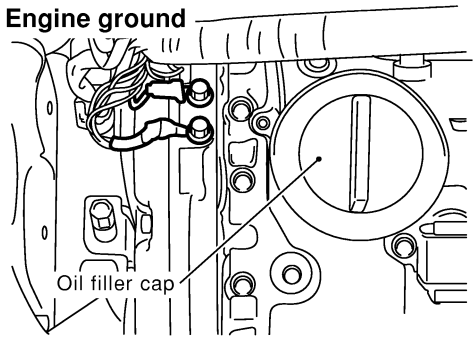
SEF658XB

Diagnostic Procedure

NHEC0137

1	RETIGHTEN GROUND SCREWS

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



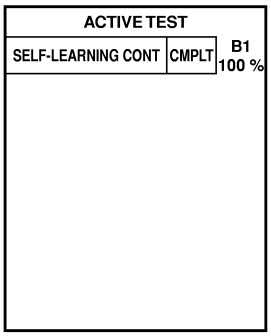
SEF255X

▶	GO TO 2.

2	CLEAR THE SELF-LEARNING DATA

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARN CONTROL” in “ACTIVE TEST” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “START”.



SEF218Y

4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 or P0175 detected?
   Is it difficult to start engine?

Without CONSULT-II

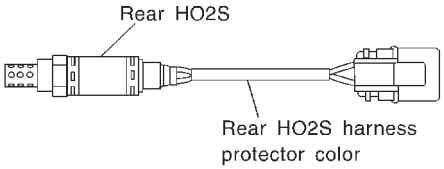
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF”.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC P0100 is displayed.
6. Erase the 1st trip DTC memory. Refer to “HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION”, EC-82.
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 or P0175 detected?
   Is it difficult to start engine?

Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0172, P0175. Refer to EC-312.
No	▶	GO TO 3.

3 **CHECK REAR HO2S INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT**

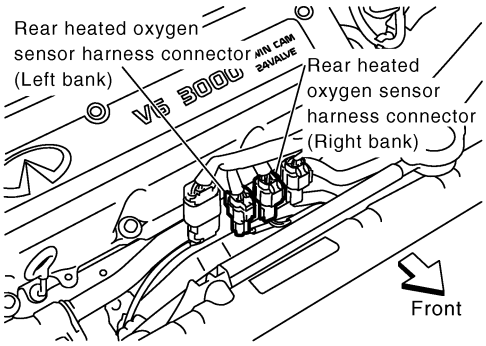
1. Turn ignition switch "OFF".
2. Check rear heated oxygen sensor harness protector color.



P0137 (-B1) Right bank: White
P0157 (-B2) Left bank: Red

SEF194WH

3. Disconnect corresponding rear heated oxygen sensor harness connector.



SEF467W

4. Disconnect ECM harness connector.
5. Check harness continuity between ECM terminal and rear HO2S terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0137	72	1	Right
P0157	71	1	Left

MTBL0339

Continuity should exist.

6. Check harness continuity between ECM terminal or rear HO2S terminal and ground as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM or Sensor	Ground	
P0137	72 or 1	Ground	Right
P0157	71 or 1	Ground	Left

MTBL0340

Continuity should not exist.

7. Also check harness for 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.

Diagnostic Procedure (Cont'd)

4	CHECK REAR HO2S GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between rear HO2S terminal 4 and engine ground.
   Refer to Wiring Diagram.
   Continuity should exist.
2. Also check harness for short to ground and short to power.

OK or NG

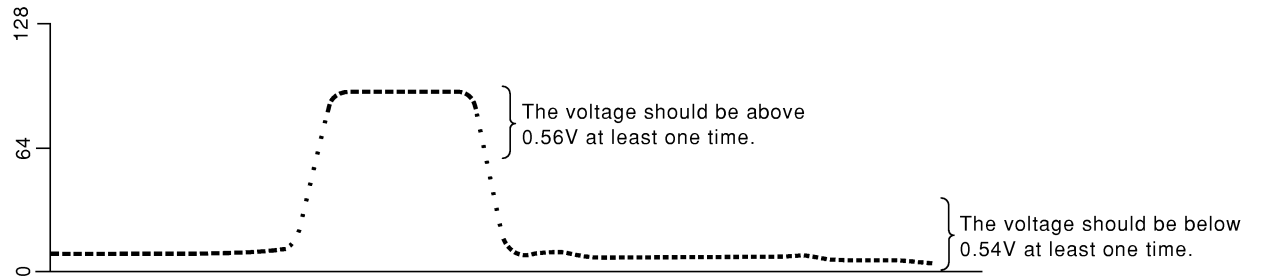
OK (With CONSULT-II)	▶	GO TO 5.
OK (Without CONSULT-II)	▶	GO TO 6.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK REAR HEATED OXYGEN SENSOR

With CONSULT-II

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 SEN-B1 (-B2)" as the monitor item with CONSULT-II.
4. Check "RR O2 SEN-B1 (-B2)" at idle speed when adjusting "FUEL INJECTION" to ±25%.

(Reference data)



SEF066Y

"RR O2 SEN-B1 (-B2)" should be above 0.56V at least once when the "FUEL INJECTION" is +25%.
"RR O2 SEN-B1 (-B2)" should be below 0.54V at least once when the "FUEL INJECTION" is −25%.

CAUTION:

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

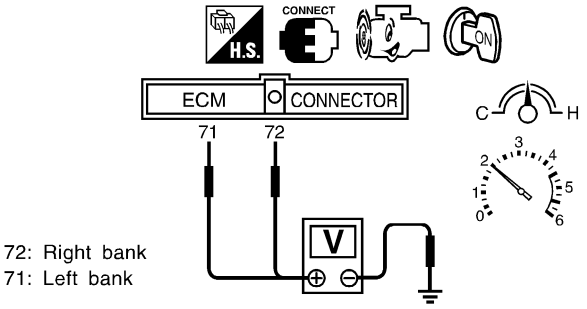
OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 8.

6	CHECK REAR HEATED OXYGEN SENSOR-I

Without CONSULT-II

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 terminal 72 (Right bank rear HO2S signal) or 71 (Left bank rear HO2S signal) and engine ground.
4. Check the voltage when rewing up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)



72: Right bank
71: Left bank

The voltage should be above 0.56V at least once during this procedure.

SEF313X

OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 7.

7	CHECK REAR HEATED OXYGEN SENSOR-II

Idle vehicle for 10 minutes, then check voltage between the same terminals as in Test No. 6; or check voltage when coasting from 80 km/h (50 MPH) in "D" position with "OD" OFF.

The voltage should go below 0.54V at least once during this procedure.

CAUTION:

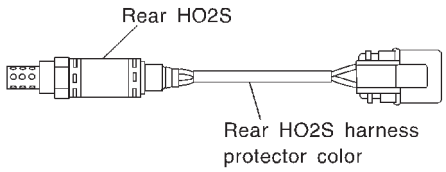
Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 8.

8	REPLACE REAR HEATED OXYGEN SENSOR

1. Stop vehicle and turn ignitioin switch OFF.
2. Check rear heated oxygen sensor harness protector color.



P0137 (-B1) Right bank: White
P0157 (-B2) Left bank: Red

SEF194WH

CAUTION:

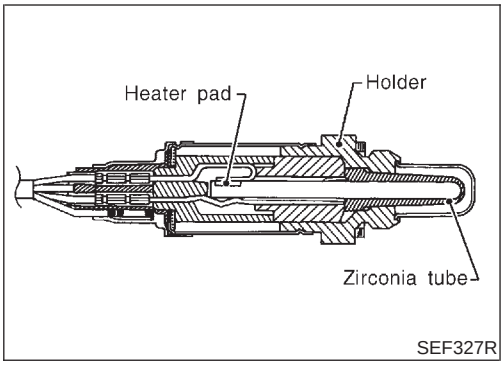
Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

	▶	Replace malfunctioning rear heated oxygen sensor.

Diagnostic Procedure (Cont'd)

9	CHECK REAR HO2S SHIELD CIRCUIT FOR OPEN AND SHORT
1. Turn ignition switch "OFF". 2. Disconnect joint connector-17. 3. Check the following. ● Continuity between joint connector terminal 1 and ground ● Joint connector (Refer to EL-463, "HARNESS LAYOUT".) **Continuity should exist.** 4. Also check harness for short to ground and short to power. 5. Then reconnect joint connector-17.	
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
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156.	
▶	**INSPECTION END**



Component Description

NHEC0138

The rear heated oxygen sensor, after three way catalyst, monitors the oxygen level in the exhaust gas on each bank.

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.

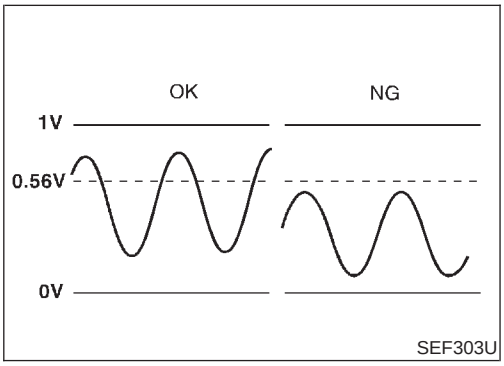
Under normal conditions the rear heated oxygen sensor is not used for engine control operation.

CONSULT-II Reference Value in Data Monitor Mode

NHEC0139

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
RR O2 SEN-B1 RR O2 SEN-B2	● Engine: After warming up	Revving engine from idle up to 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
RR O2 MNTR-B1 RR O2 MNTR-B2			LEAN ⟷ RICH



On Board Diagnosis Logic

NHEC0141

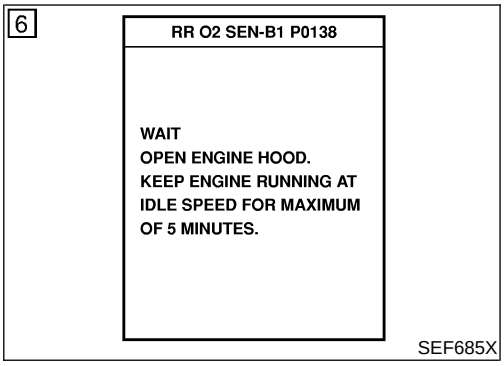
The rear heated oxygen sensor has a much longer switching time between rich and lean than the front heated oxygen sensor. The oxygen storage capacity before the three way catalyst causes the longer switching time. To judge the malfunctions of rear heated oxygen sensor, ECM monitors whether the maximum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

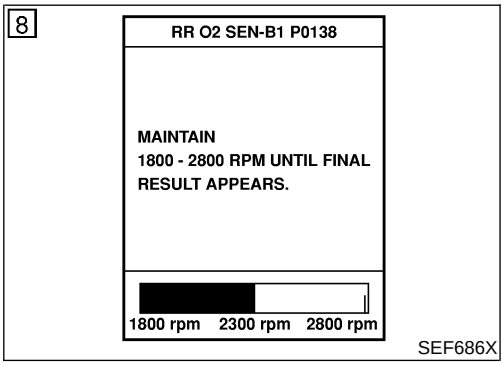
Malfunction is detected when the maximum voltage from the sensor is not reached to the specified voltage.

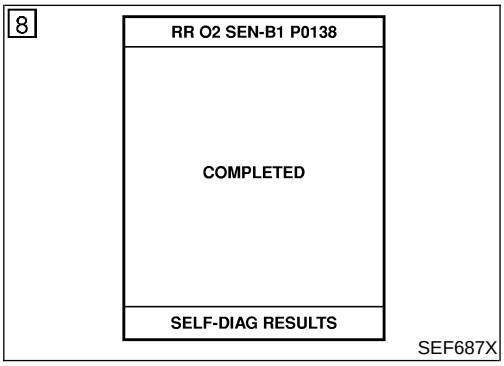
Possible Cause

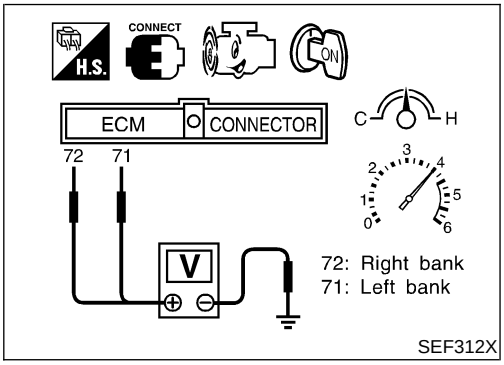
NHEC0439

- Harness or connectors
  (The sensor circuit is open or shorted.)
- Rear heated oxygen sensor
- Fuel pressure
- Injectors
- Intake air leaks









DTC Confirmation Procedure

NHEC0142

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Open engine hood before conducting following procedure.

WITH CONSULT-II

NHEC0142S01

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch “OFF” and wait at least 10 seconds.
3) Turn ignition switch “ON”.
4) Select “DATA MONITOR” mode with CONSULT-II.
5) Make sure that “COOLAN TEMP/S” indicates more than 70°C (158°F).
6) Select “RR O2 SEN-B1 (-B2) P0138 (P0158)” of “REAR O2 SENSOR” in “DTC WORK SUPPORT” mode with CONSULT-II.
7) Start engine and follow the instruction of CONSULT-II.
8) Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”.
   If NG is displayed, refer to “Diagnostic Procedure”, EC-274.
   If “CANNOT BE DIAGNOSED” is displayed, perform the following.

a) Stop engine and cool down until “COOLAN TEMP/S” indicates less than 70°C (158°F).
b) Turn ignition switch “ON”.
c) Select “DATA MONITOR” mode with CONSULT-II.
d) Start engine.
e) Return to step 6 again when the “COOLAN TEMP/S” reaches to 70°C (158°F).

Overall Function Check

NHEC0143

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.

WITH GST

NHEC0143S01

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 terminal 72 (Right bank rear HO2S signal) or 71 (Left bank rear HO2S signal) and engine ground.
4) Check the voltage when racing up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.56V at least once during this procedure.
   If the voltage can be confirmed in step 4, step 5 is not necessary.
5) Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in “D” position with “OD” OFF.

The voltage should be above 0.56V at least once during this procedure.

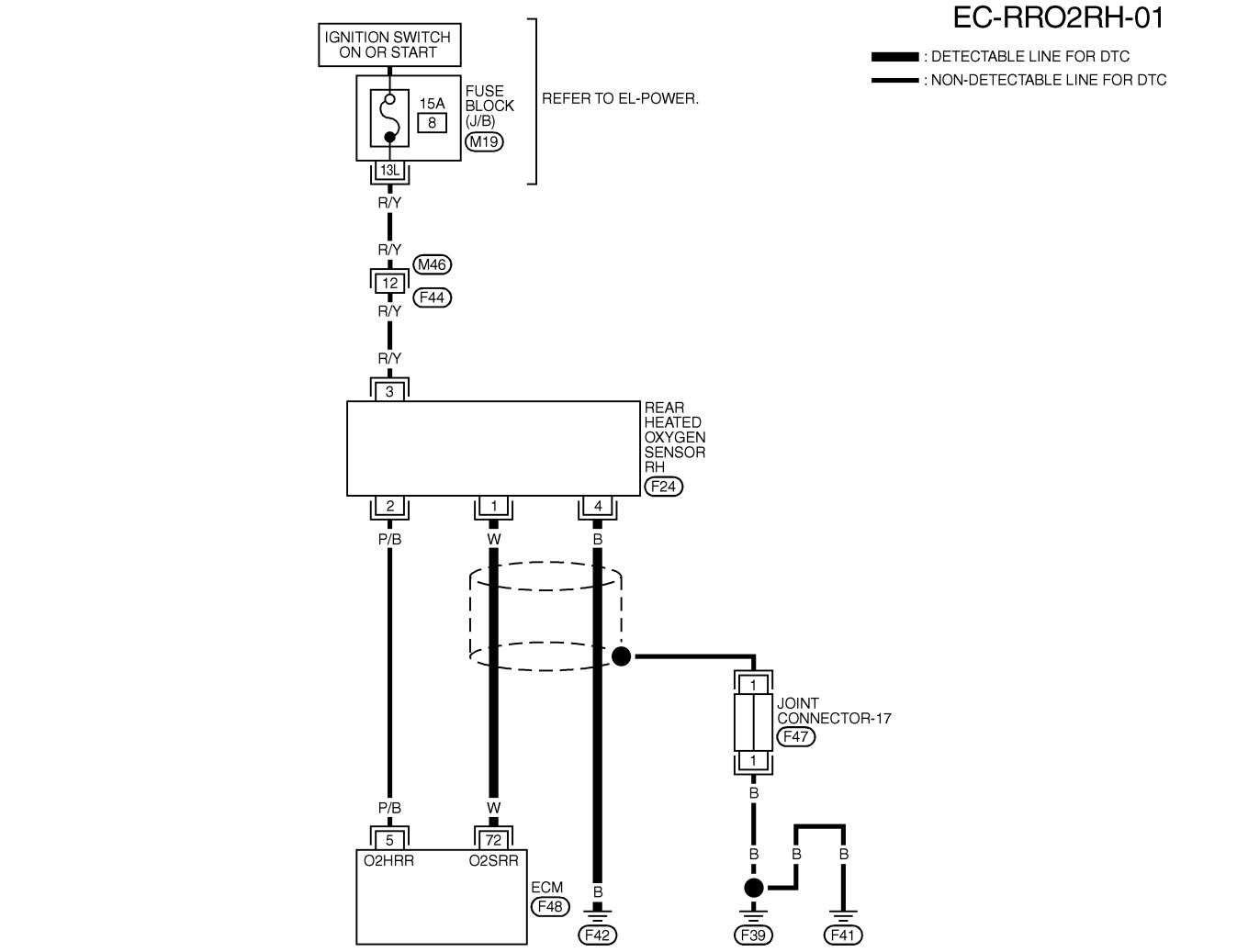
6) If NG, go to "Diagnostic Procedure", EC-274.

Wiring Diagram

=NHEC0144

RIGHT BANK

NHEC0144S01



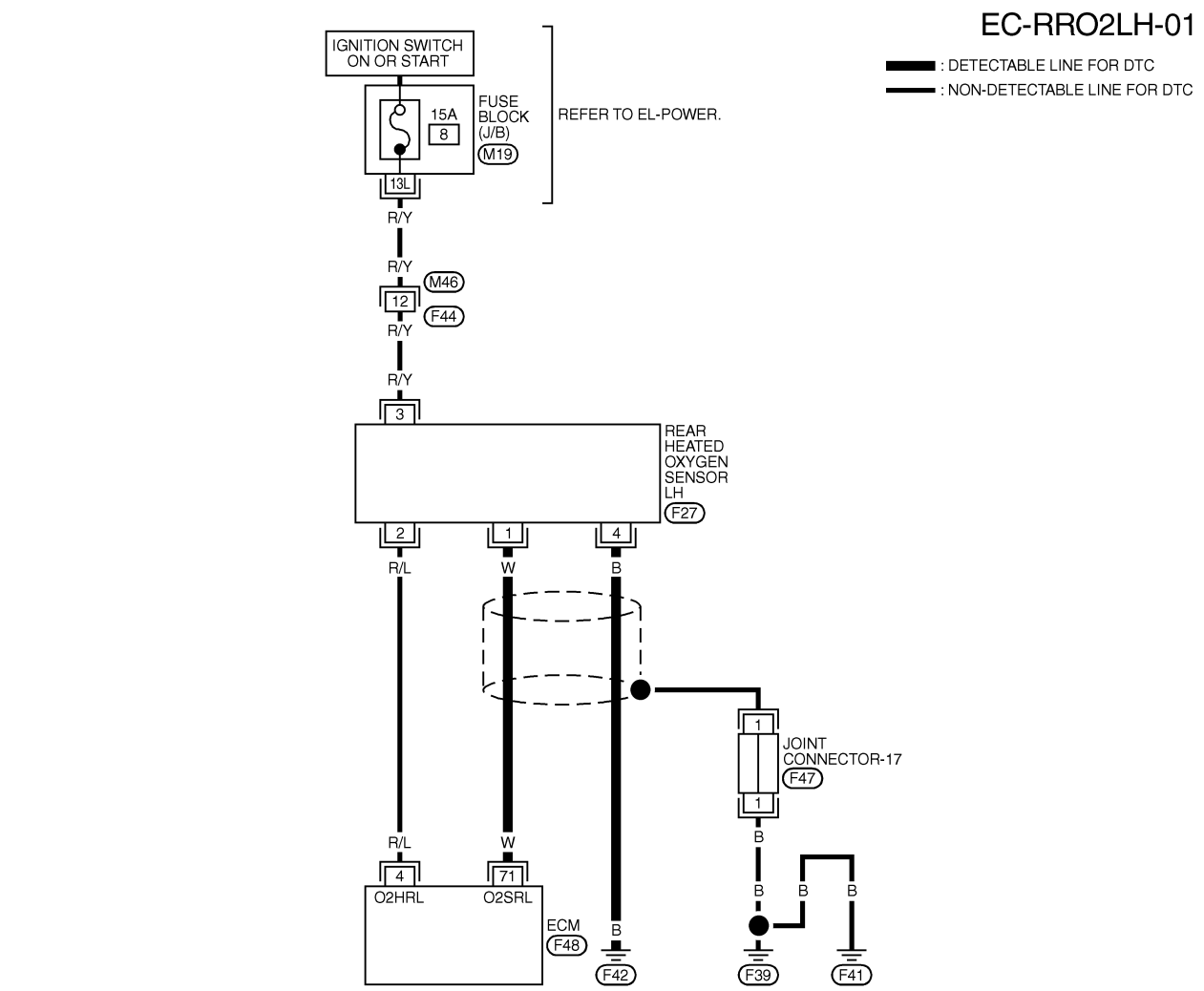
ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

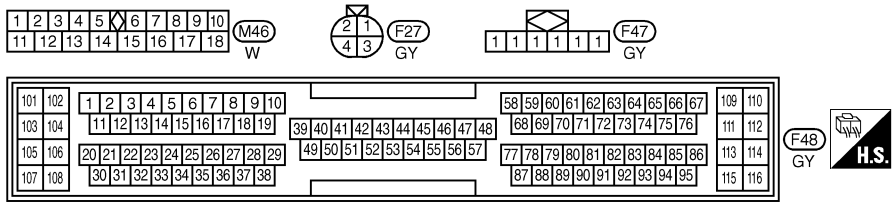
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
72	W	REAR HEATED OXYGEN SENSOR RH	ENGINE RUNNING FROM IDLE UP TO 2,000 RPM UNDER WARM-UP CONDITION	0 - APPROX. 1.0V

SEF657XB

LEFT BANK

NHEC0144S02





REFER TO THE FOLLOWING.
M19 -FUSE BLOCK-
JUNCTION BOX (J/B)

MEC727C

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
71	W	REAR HEATED OXYGEN SENSOR LH	ENGINE RUNNING FROM IDLE UP TO 2,000 RPM UNDER WARM-UP CONDITION	0 - APPROX. 1.0V

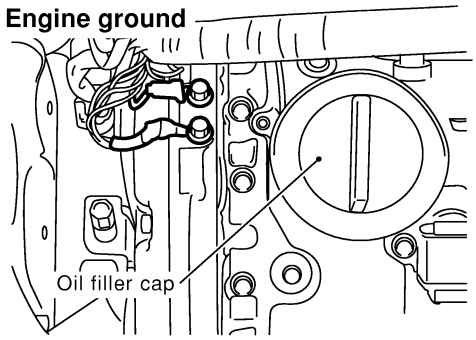
SEF658XB

Diagnostic Procedure

NHEC0145

1	RETIGHTEN GROUND SCREWS

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



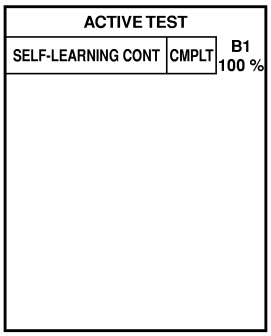
SEF255X

▶	GO TO 2.

2	CLEAR THE SELF-LEARNING DATA

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARN CONTROL” in “ACTIVE TEST” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “START”.



SEF218Y

4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 or P0174 detected?
   Is it difficult to start engine?

Without CONSULT-II

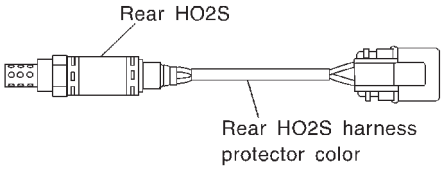
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF”.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC P0100 is displayed.
6. Erase the 1st trip DTC memory. Refer to “HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION”, EC-82.
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 or P0174 detected?
   Is it difficult to start engine?

Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0171, P0174. Refer to EC-304.
No	▶	GO TO 3.

3	CHECK REAR HO2S INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

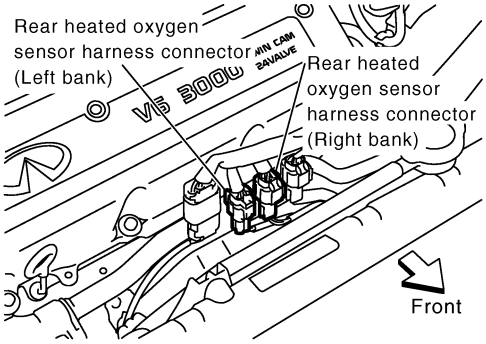
1. Turn ignition switch "OFF".
2. Check rear heated oxygen sensor harness protector color.



P0138 (-B1) Right bank: White
P0158 (-B2) Left bank: Red

SEF194WI

3. Disconnect corresponding rear heated oxygen sensor harness connector.



SEF467W

4. Disconnect ECM harness connector.
5. Check harness continuity between ECM terminal and rear HO2S terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0138	72	1	Right
P0158	71	1	Left

MTBL0341

Continuity should exist.

6. Check harness continuity between ECM terminal or rear HO2S terminal and ground as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM or Sensor	Ground	
P0138	72 or 1	Ground	Right
P0158	71 or 1	Ground	Left

MTBL0342

Continuity should not exist.

7. Also check harness for 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.

Diagnostic Procedure (Cont'd)

4	CHECK REAR HO2S GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between rear HO2S terminal 4 and engine ground.
   Refer to Wiring Diagram.
   Continuity should exist.
2. Also check harness for short to ground and short to power.

OK or NG

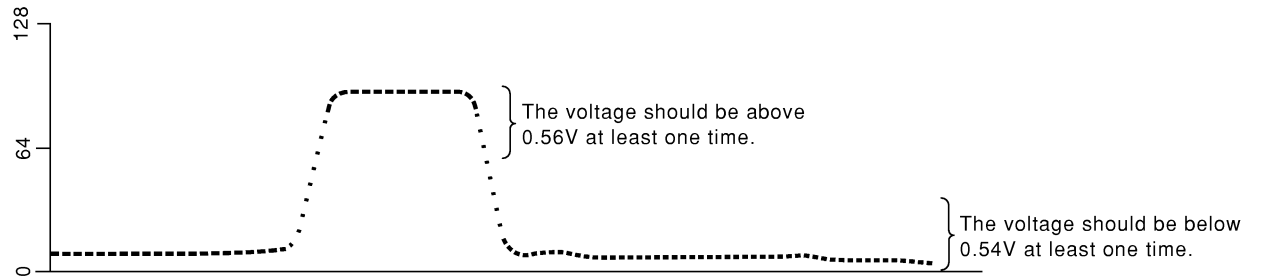
OK (With CONSULT-II)	▶	GO TO 5.
OK (Without CONSULT-II)	▶	GO TO 6.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK REAR HEATED OXYGEN SENSOR

With CONSULT-II

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 SEN-B1 (-B2)" as the monitor item with CONSULT-II.
4. Check "RR O2 SEN-B1 (-B2)" at idle speed when adjusting "FUEL INJECTION" to ±25%.

(Reference data)



SEF066Y

"RR O2 SEN-B1 (-B2)" should be above 0.56V at least once when the "FUEL INJECTION" is +25%.
"RR O2 SEN-B1 (-B2)" should be below 0.54V at least once when the "FUEL INJECTION" is −25%.

CAUTION:

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

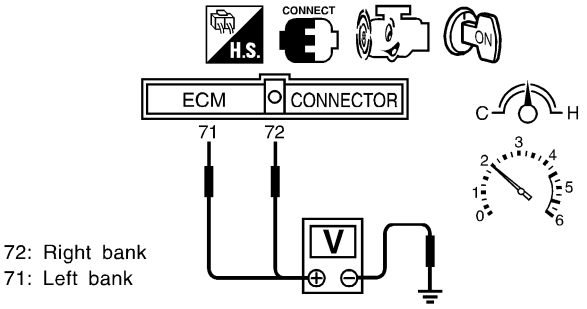
OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 8.

6	CHECK REAR HEATED OXYGEN SENSOR-I

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 terminal 72 (Right bank rear HO2S signal) or 71 (Left bank rear HO2S signal) and engine ground.
4. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)



The voltage should be above 0.56V at least once during this procedure.

SEF313X

OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 7.

7	CHECK REAR HEATED OXYGEN SENSOR-II

Idle vehicle for 10 minutes, then check voltage between the same terminals as in Test No. 6; or check voltage when coasting from 80 km/h (50 MPH) in "D" position with "OD" OFF.

The voltage should go below 0.54V at least once during this procedure.

CAUTION:

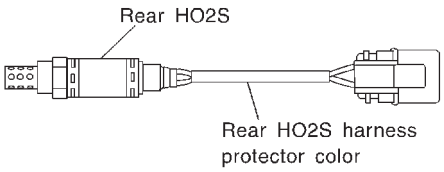
Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 8.

8	REPLACE REAR HEATED OXYGEN SENSOR

1. Stop vehicle and turn ignition switch "OFF".
2. Check rear heated oxygen sensor harness protector color.



P0138 (-B1) Right bank: White
P0158 (-B2) Left bank: Red

SEF194WI

CAUTION:

Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

	▶	Replace malfunctioning rear heated oxygen sensor.

Diagnostic Procedure (Cont'd)

9	CHECK REAR HO2S SHIELD CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect joint connector-17.
3. Check the following.

- Continuity between joint connector terminal 1 and ground
- Joint connector

(Refer to EL-463, "HARNESS LAYOUT".)

Continuity should exist.

4. Also check harness for short to ground and short to power.
5. Then reconnect joint connector-17.

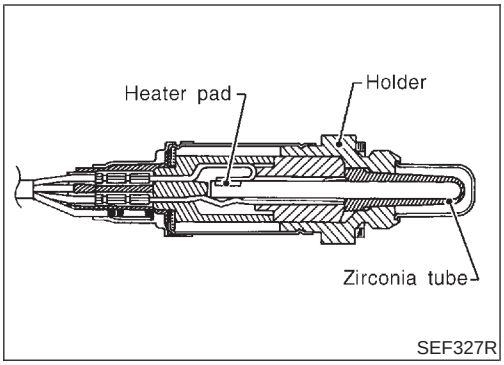
OK or NG

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

10	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156.

▶ **INSPECTION END**



Component Description

NHEC0146

The rear heated oxygen sensor, after three way catalyst, monitors the oxygen level in the exhaust gas on each bank.

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.

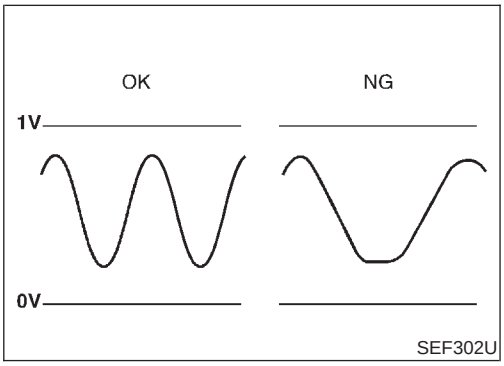
Under normal conditions the rear heated oxygen sensor is not used for engine control operation.

CONSULT-II Reference Value in Data Monitor Mode

NHEC0147

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
RR O2 SEN-B1 RR O2 SEN-B2	● Engine: After warming up	Revving engine from idle up to 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
RR O2 MNTR-B1 RR O2 MNTR-B2			LEAN ⟷ RICH



On Board Diagnosis Logic

NHEC0149

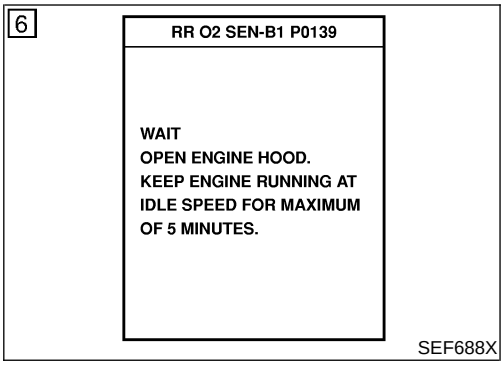
The rear heated oxygen sensor has a much longer switching time between rich and lean than the front heated oxygen sensor. The oxygen storage capacity before the three way catalyst causes the longer switching time. To judge the malfunctions of rear heated oxygen sensor, ECM monitors whether the switching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

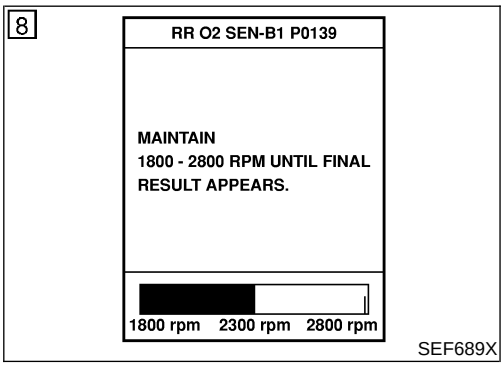
Malfunction is detected when it takes more time for the sensor to respond between rich and lean than the specified time.

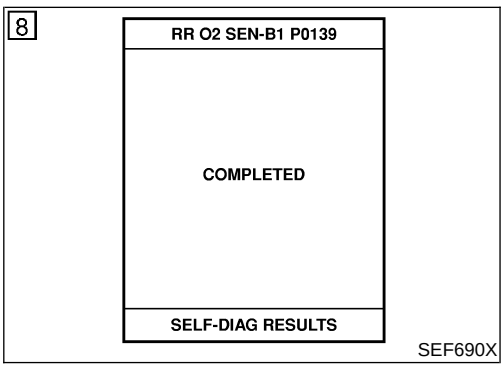
Possible Cause

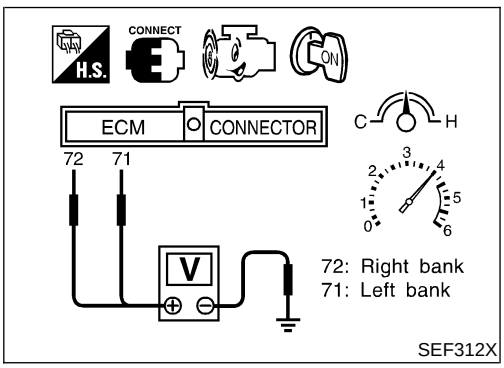
NHEC0440

- Harness or connectors
  (The sensor circuit is open or shorted.)
- Rear heated oxygen sensor
- Fuel pressure
- Injectors
- Intake air leaks









DTC Confirmation Procedure

NHEC0150

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Open engine hood before conducting following procedure.

WITH CONSULT-II

NHEC0150S01

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch “OFF” and wait at least 10 seconds.
3) Turn ignition switch “ON”.
4) Select “DATA MONITOR” mode with CONSULT-II.
5) Make sure that “COOLAN TEMP/S” indicates more than 70°C (158°F).
6) Select “RR O2 SEN-B1 (-B2) P0139 (P0159)” of “REAR O2 SENSOR” in “DTC WORK SUPPORT” mode with CONSULT-II.
7) Start engine and follow the instruction of CONSULT-II.
8) Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”.
   If NG is displayed, refer to “Diagnostic Procedure”, EC-284.
   If “CANNOT BE DIAGNOSED” is displayed, perform the following.

a) Stop engine and cool down until “COOLAN TEMP/S” indicates less than 70°C (158°F).
b) Turn ignition switch “ON”.
c) Select “DATA MONITOR” mode with CONSULT-II.
d) Start engine.
e) Return to step 6 again when the “COOLAN TEMP/S” reaches to 70°C (158°F).

Overall Function Check

NHEC0151

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.

WITH GST

NHEC0151S01

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 terminal 72 (Right bank rear HO2S signal) or 71 (Left bank rear HO2S signal) and engine ground.
4) Check the voltage when racing up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should 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 “D” position with “OD” OFF.

The voltage should change at more than 0.06V for 1 second during this procedure.

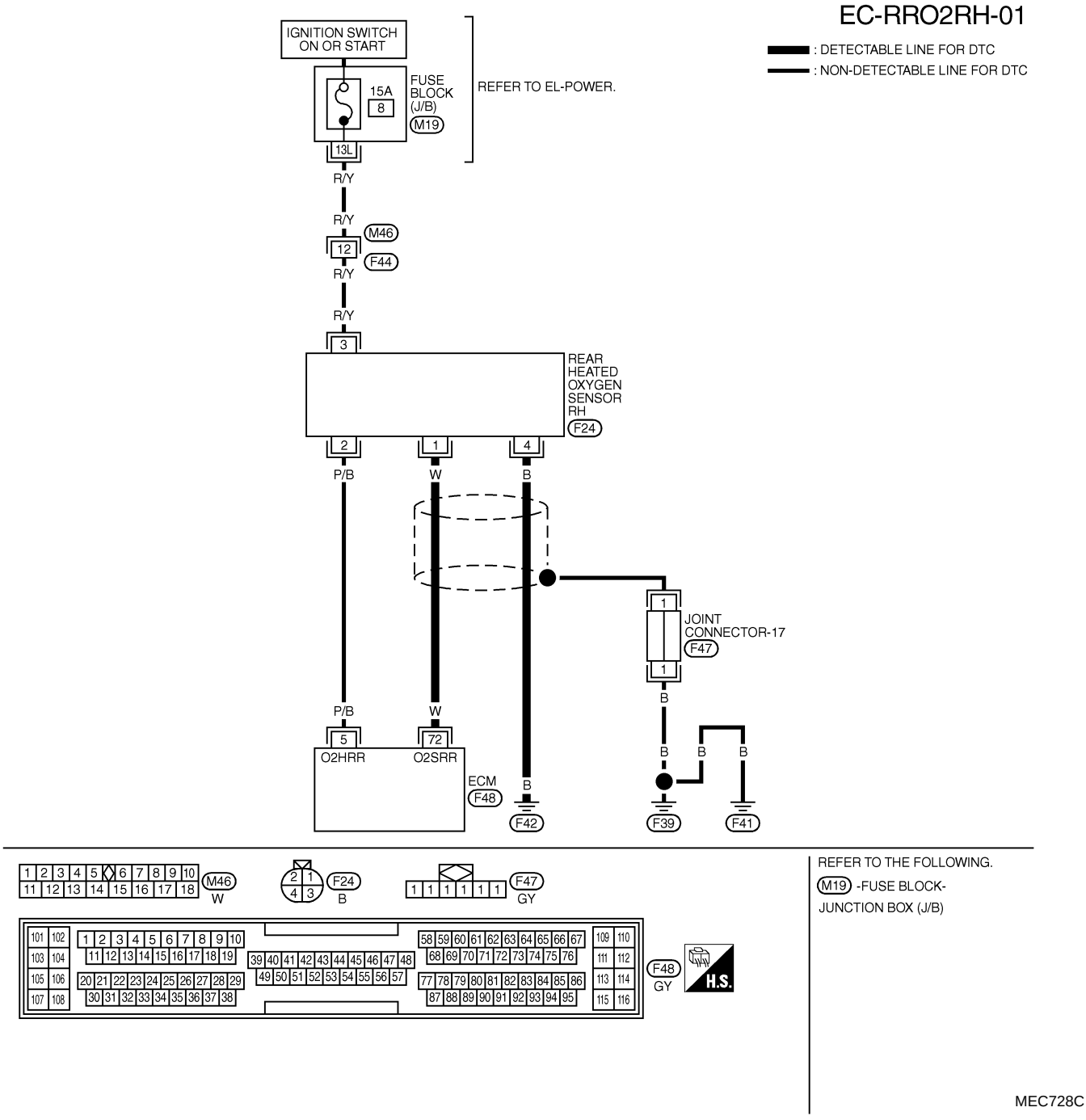
6) If NG, go to "Diagnostic Procedure", EC-284.

Wiring Diagram

=NHEC0152

RIGHT BANK

NHEC0152S01



ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

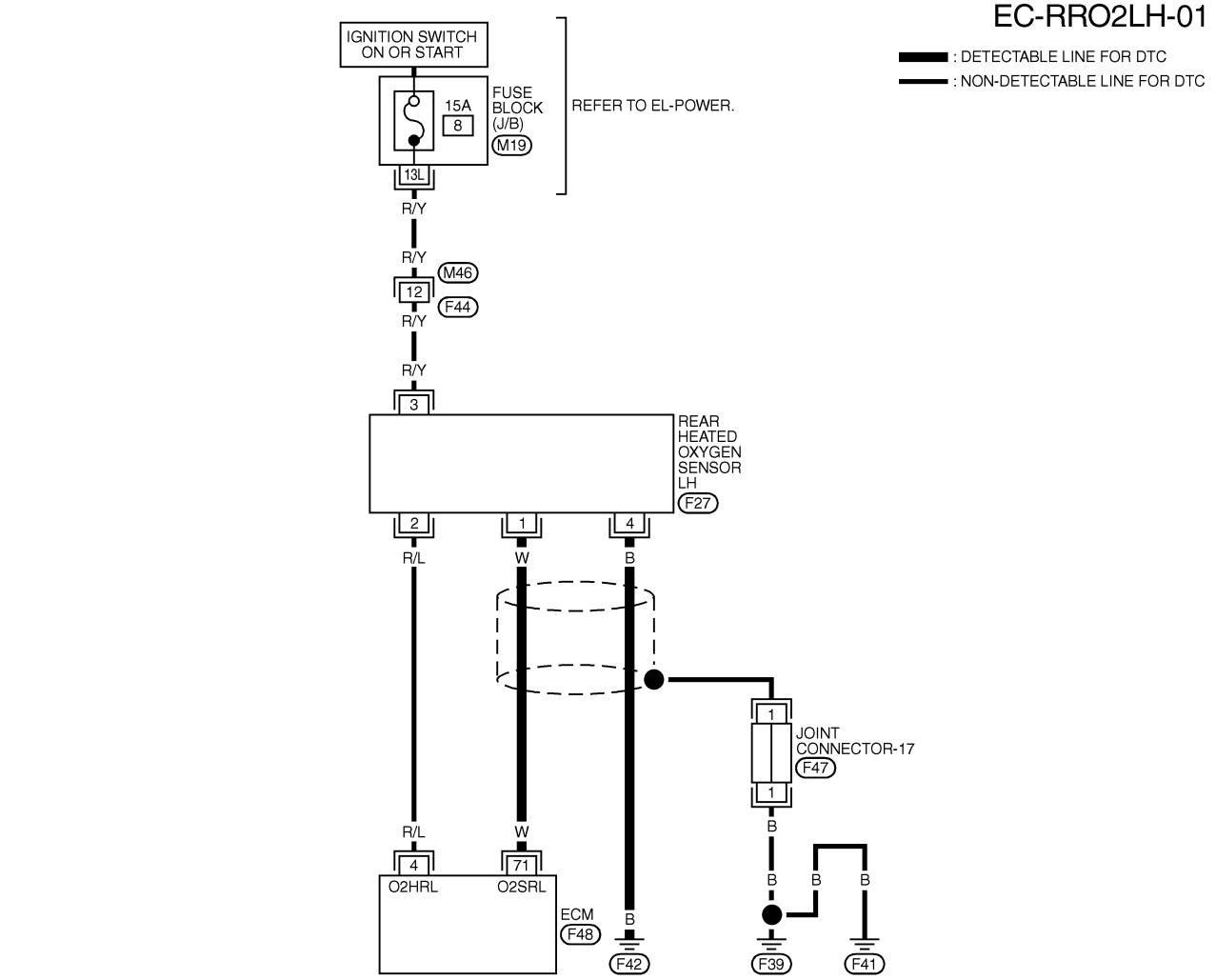
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
72	W	REAR HEATED OXYGEN SENSOR RH	ENGINE RUNNING FROM IDLE UP TO 2,000 RPM UNDER WARM-UP CONDITION	0 - APPROX. 1.0V

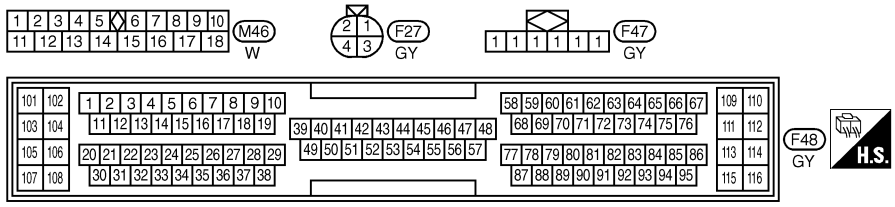
SEF657XB

LEFT BANK

NHEC0152S02

EC-RRO2LH-01





REFER TO THE FOLLOWING.
M19 -FUSE BLOCK-
JUNCTION BOX (J/B)

MEC727C

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
71	W	REAR HEATED OXYGEN SENSOR LH	ENGINE RUNNING FROM IDLE UP TO 2,000 RPM UNDER WARM-UP CONDITION	0 - APPROX. 1.0V

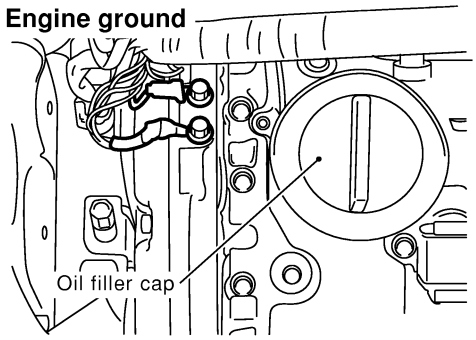
SEF658XB

Diagnostic Procedure

NHEC0153

1	RETIGHTEN GROUND SCREWS

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



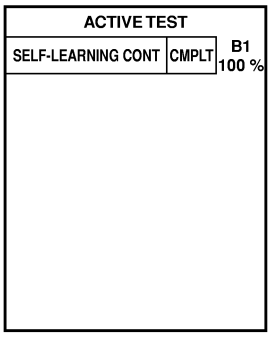
SEF255X

	▶	GO TO 2.

2	CLEAR THE SELF-LEARNING DATA

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARN CONTROL” in “ACTIVE TEST” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “START”.



SEF218Y

4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected?
   Is it difficult to start engine?

Without CONSULT-II

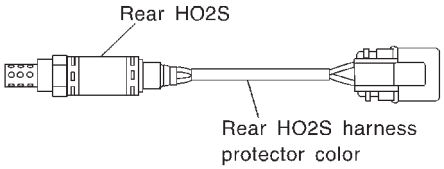
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF”.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC No. 0100 is displayed.
6. Erase the 1st trip DTC memory. Refer to “HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION”, EC-82.
7. Make sure DTC No. 0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected?
   Is it difficult to start engine?

Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to EC-304, 312.
No	▶	GO TO 3.

3 **CHECK REAR HO2S INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT**

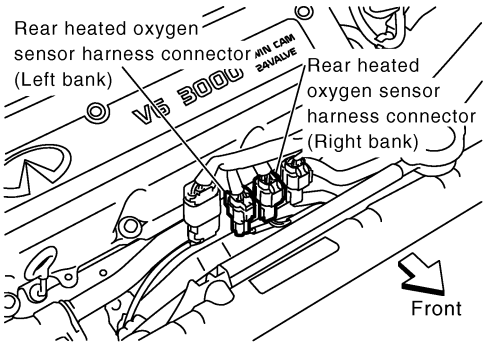
1. Turn ignition switch "OFF".
2. Check rear heated oxygen sensor harness protector color.



P0139 (-B1) Right bank: White
P0159 (-B2) Left bank: Red

SEF194WK

3. Disconnect corresponding rear heated oxygen sensor harness connector.



SEF467W

4. Disconnect ECM harness connector.
5. Check harness continuity between ECM terminal and rear HO2S terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0139	72	1	Right
P0159	71	1	Left

MTBL0343

Continuity should exist.

6. Check harness continuity between ECM terminal or rear HO2S terminal and ground as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM or Sensor	Ground	
P0139	72 or 1	Ground	Right
P0159	71 or 1	Ground	Left

MTBL0344

Continuity should not exist.

7. Also check harness for 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.

Diagnostic Procedure (Cont'd)

4	CHECK REAR HO2S GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between rear HO2S terminal 4 and engine ground.
   Refer to Wiring Diagram.
   Continuity should exist.
2. Also check harness for short to ground and short to power.

OK or NG

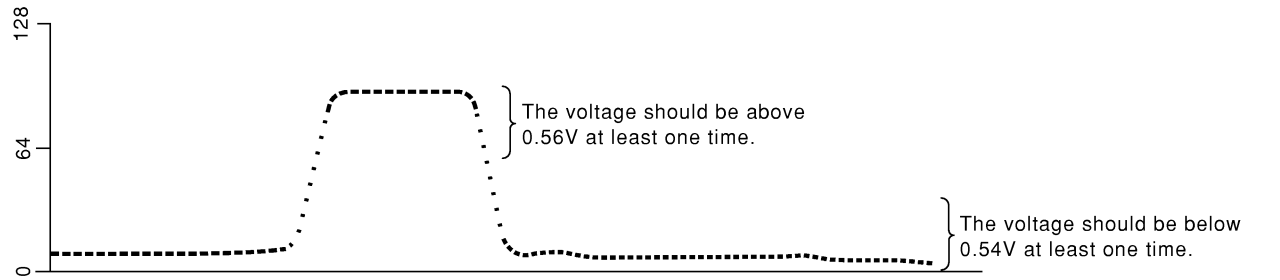
OK (With CONSULT-II)	▶	GO TO 5.
OK (Without CONSULT-II)	▶	GO TO 6.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors

5	CHECK REAR HEATED OXYGEN SENSOR

With CONSULT-II

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 SEN-B1 (-B2)" as the monitor item with CONSULT-II.
4. Check "RR O2 SEN-B1 (-B2)" at idle speed when adjusting "FUEL INJECTION" to ±25%.

(Reference data)



SEF066Y

"RR O2 SEN-B1 (-B2)" should be above 0.56V at least once when the "FUEL INJECTION" is +25%.
"RR O2 SEN-B1 (-B2)" should be below 0.54V at least once when the "FUEL INJECTION" is −25%.

CAUTION:

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

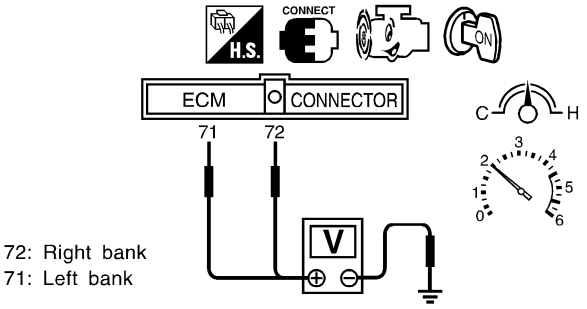
OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 8.

6	CHECK REAR HEATED OXYGEN SENSOR-I

Without CONSULT-II

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 terminal 72 (Right bank rear HO2S signal) or 71 (Left bank rear HO2S 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.)



72: Right bank
71: Left bank

The voltage should be above 0.56V at least once during this procedure.

SEF313X

OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 7.

7	CHECK REAR HEATED OXYGEN SENSOR-II

Idle vehicle for 10 minutes, then check voltage between the same terminals as in Test No. 6; or check voltage when coasting from 80 km/h (50 MPH) in "D" position with "OD" OFF.

The voltage should go below 0.54V at least once during this procedure.

CAUTION:

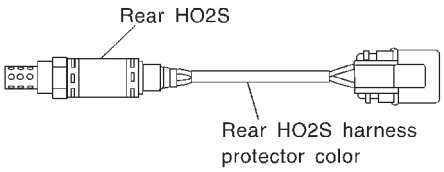
Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 8.

8	REPLACE REAR HEATED OXYGEN SENSOR

1. Stop vehicle and turn ignition switch "OFF".
2. Check rear heated oxygen sensor harness protector color.



P0139 (-B1) Right bank: White
P0159 (-B2) Left bank: Red

SEF194WK

CAUTION:

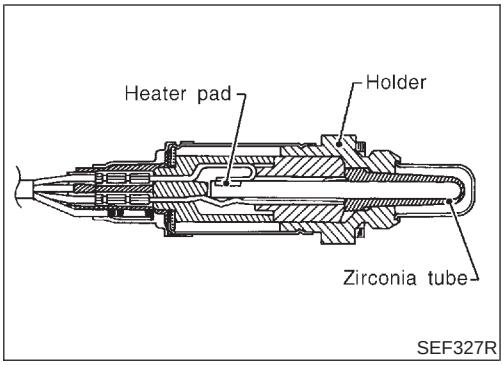
Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

	▶	Replace malfunctioning rear heated oxygen sensor.

Diagnostic Procedure (Cont'd)

9	CHECK REAR HO2S SHIELD CIRCUIT FOR OPEN AND SHORT
1. Turn ignition switch "OFF". 2. Disconnect joint connector-17. 3. Check the following. ● Continuity between joint connector terminal 1 and ground ● Joint connector (Refer to EL-463, "HARNESS LAYOUT".) **Continuity should exist.** 4. Also check harness for short to ground and short to power. 5. Then reconnect joint connector-17.	
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
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156.	
▶	**INSPECTION END**



Component Description

NHEC0154

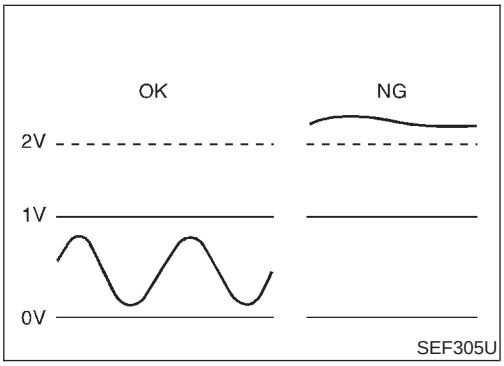
The rear heated oxygen sensor, after three way catalyst, monitors the oxygen level in the exhaust gas on each bank.
Even if switching characteristics of the front heated oxygen sensor are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the rear heated oxygen sensor.
This 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-II Reference Value in Data Monitor Mode

NHEC0155

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
RR O2 SEN-B1 RR O2 SEN-B2	• Engine: After warming up	Revving engine from idle up to 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
RR O2 MNTR-B1 RR O2 MNTR-B2			LEAN ⟷ RICH



On Board Diagnosis Logic

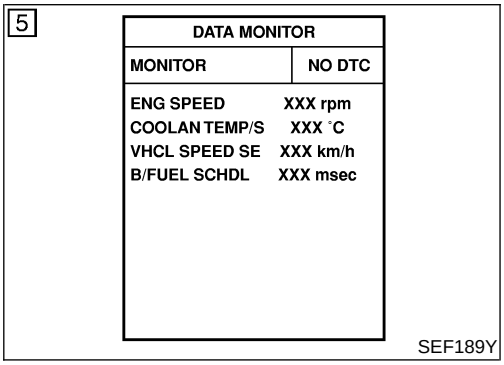
NHEC0157

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 voltage is unusually high during the various driving condition such as fuel-cut.
Malfunction is detected when an excessively high voltage from the sensor is sent to ECM.

Possible Cause

NHEC0441

- Harness or connectors
  (The sensor circuit is open or shorted.)
- Rear heated oxygen sensor



DTC Confirmation Procedure

NHEC0158

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 10 seconds before conducting the next test.

WITH CONSULT-II

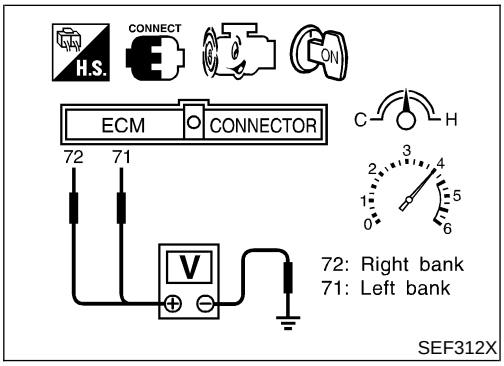
NHEC0158S01

1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.

2) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
3) Stop vehicle with engine running.
4) Let engine idle for 1 minute.
5) Maintain the following conditions for at least 5 consecutive seconds.

ENG SPEED	1,300 - 3,100 rpm
VHCL SPEED SE	64 - 130 km/h (40 - 81 MPH)
B/FUEL SCHDL	0.5 - 6.4 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-293.



Overall Function Check

NHEC0159

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.

WITH GST

NHEC0159S01

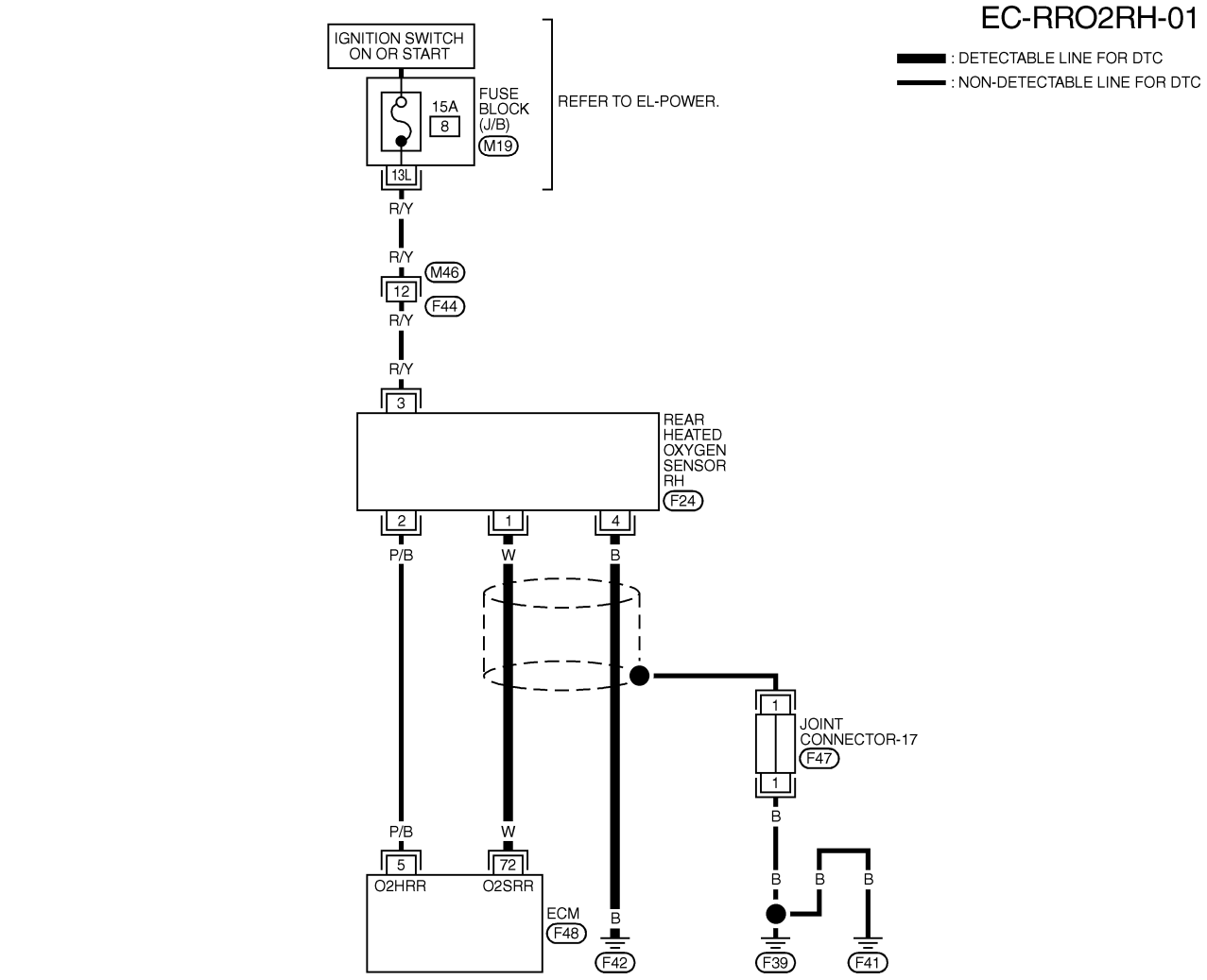
1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Set voltmeter probes between ECM terminal 72 (Right bank rear HO2S signal) or 71 (Left bank rear HO2S signal) and engine ground.
4) Check the voltage when racing up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be below 2V during this procedure.
5) If NG, go to "Diagnostic Procedure", EC-293.

Wiring Diagram

NHEC0160

RIGHT BANK

NHEC0160S01



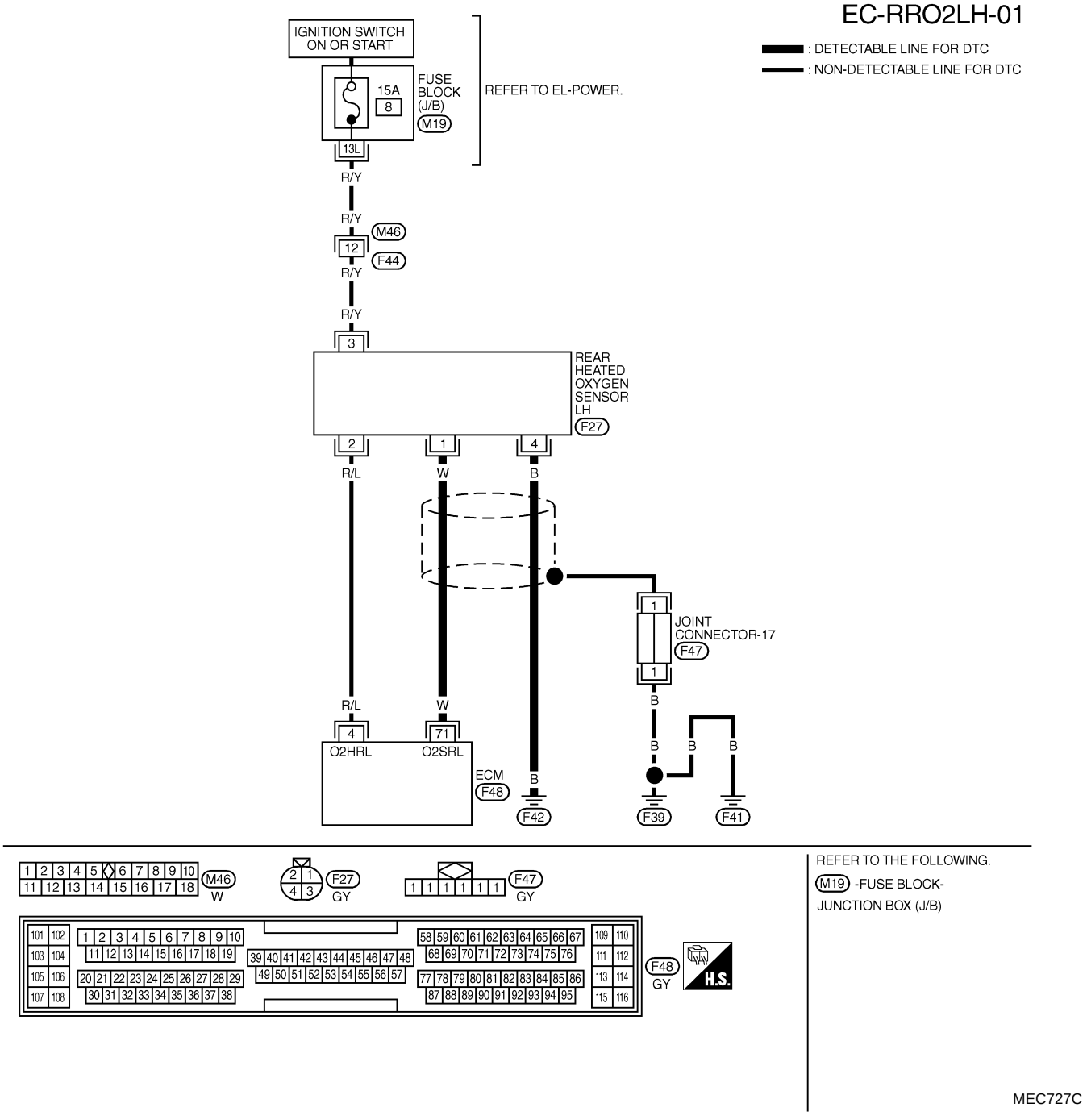
ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
72	W	REAR HEATED OXYGEN SENSOR RH	ENGINE RUNNING FROM IDLE UP TO 2,000 RPM UNDER WARM-UP CONDITION	0 - APPROX. 1.0V

SEF657XB

LEFT BANK

NHEC0160S02



ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
71	W	REAR HEATED OXYGEN SENSOR LH	ENGINE RUNNING FROM IDLE UP TO 2,000 RPM UNDER WARM-UP CONDITION	0 - APPROX. 1.0V

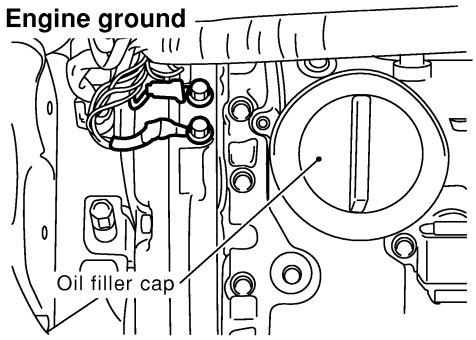
SEF658XB

Diagnostic Procedure

NHEC0161

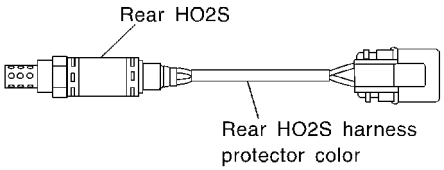
1	INSPECTION START

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



SEF255X

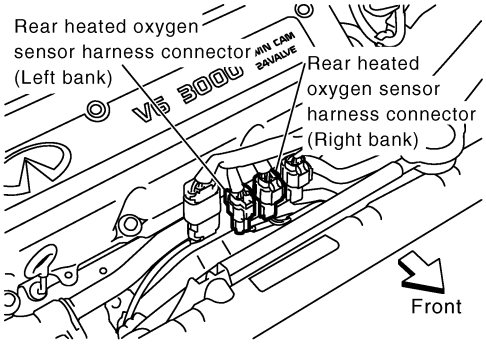
3. Check rear heated oxygen sensor harness protector color.



P0140 (-B1) Right bank: White
P0160 (-B2) Left bank: Red

SEF194WL

4. Disconnect corresponding rear heated oxygen sensor harness connector.



SEF467W

5. Disconnect ECM harness connector.

▶	GO TO 2.

2	CHECK REAR HO2S INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal and rear HO2S terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0140	72	1	Right
P0160	71	1	Left

MTBL0345

Continuity should exist.

2. Check harness continuity between ECM terminal or rear HO2S terminal and ground as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM or Sensor	Ground	
P0140	72 or 1	Ground	Right
P0160	71 or 1	Ground	Left

MTBL0346

Continuity should not exist.

3. 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 REAR HO2S GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between rear HO2S terminal 4 and engine ground. Refer to Wiring Diagram.
   Continuity should exist.
2. 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 REAR HO2S CONNECTORS FOR WATER

Check rear heated oxygen sensor connector and harness connector for water.
Water should not exist.

OK or NG

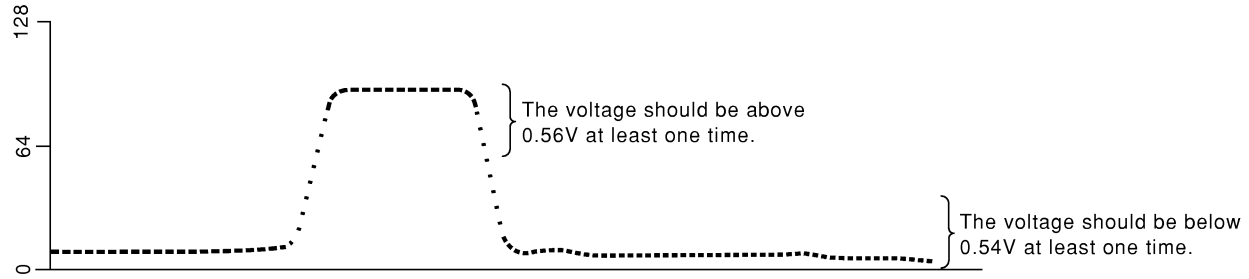
OK (With CONSULT-II)	▶	GO TO 5.
OK (Without CONSULT-II)	▶	GO TO 6.
NG	▶	Repair or replace harness or connectors.

5	CHECK REAR HEATED OXYGEN SENSOR

With CONSULT-II

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 SEN-B1 (-B2)" as the monitor item with CONSULT-II.
4. Check "RR O2 SEN-B1 (-B2)" at idle speed when adjusting "FUEL INJECTION" to ±25%.

(Reference data)



SEF066Y

"RR O2 SEN-B1 (-B2)" should be above 0.56V at least once when the "FUEL INJECTION" is +25%.
"RR O2 SEN-B1 (-B2)" should be below 0.54V at least once when the "FUEL INJECTION" is −25%.
CAUTION:
Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

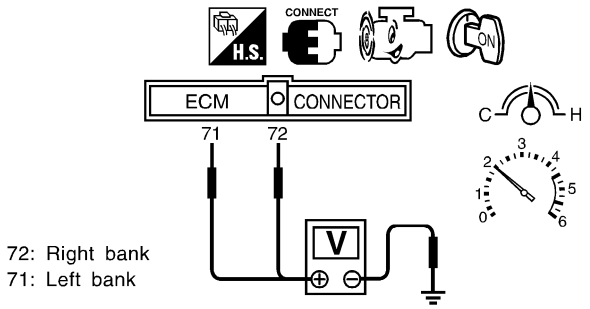
OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 8.

6	CHECK REAR HEATED OXYGEN SENSOR-I

Without CONSULT-II

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 terminal 72 (Right bank rear HO2S signal) or 71 (Left bank rear HO2S signal) and engine ground.
4. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
(Depress and release accelerator pedal as soon as possible.)



The voltage should be above 0.56V at least once during this procedure.

SEF313X

OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 7.

7	CHECK REAR HEATED OXYGEN SENSOR-II

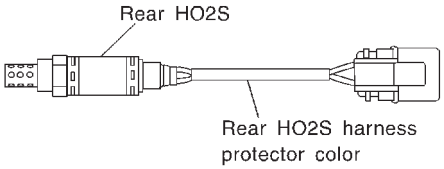
Idle vehicle for 10 minutes, then check voltage between the same terminals as in Test No. 6; or check voltage when coasting from 80 km/h (50 MPH) in "D" position with "OD" OFF.
The voltage should go below 0.54V at least once during this procedure.
CAUTION:
Discard any heated oxygen sensor which has been 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.

OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 8.

8	REPLACE REAR HEATED OXYGEN SENSOR

1. Stop vehicle and turn ignition switch "OFF".
2. Check rear heated oxygen sensor harness protector color.



P0140 (-B1) Right bank: White
P0160 (-B2) Left bank: Red

SEF194WL

CAUTION:
Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

	▶	Replace malfunctioning rear heated oxygen sensor.

9	CHECK REAR HO2S SHIELD CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect joint connector-17.
3. Check the following.
- Continuity between joint connector terminal 1 and ground
- Joint connector
  (Refer to EL-463, "HARNESS LAYOUT".)
  Continuity should exist.
4. Also check harness for short to ground and short to power.
5. Then reconnect joint connector-17.

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

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156.

	▶	**INSPECTION END**

Description

NHEC0162

SYSTEM DESCRIPTION

NHEC0162S01

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed	Rear heated oxygen sensor heater control	Rear heated oxygen sensor heaters
Crankshaft position sensor (REF)			

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

OPERATION

NHEC0162S02

Engine speed rpm	Rear heated oxygen sensor heaters
Above 3,600	OFF
Below 3,600	ON

CONSULT-II Reference Value in Data Monitor Mode

NHEC0163

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
RR O2 HTR-B1 RR O2 HTR-B2	● Ignition switch: ON (Engine stopped) ● Engine is running above 3,600 rpm.	OFF
	● Engine is running below 3,600 rpm after driving for 2 minutes at a speed of 70 km/h (43 MPH) or more.	ON

On Board Diagnosis Logic

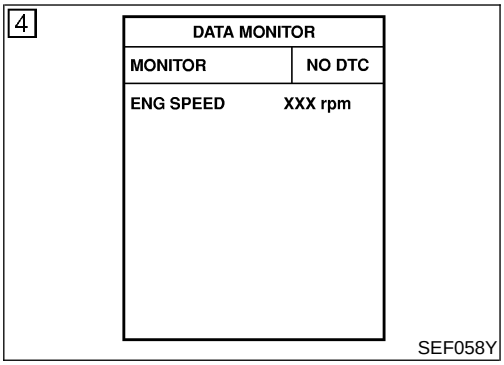
NHEC0165

Malfunction is detected when 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.)

Possible Cause

NHEC0442

- Harness or connectors
  (The rear heated oxygen sensor heater circuit is open or shorted.)
- Rear heated oxygen sensor heater



DTC Confirmation Procedure

NHEC0166

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 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-II

NHEC0166S01

1) Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II.
2) Start engine.
3) Drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
4) Stop vehicle and let engine idle for at least 6 seconds.
5) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-301.

WITH GST

NHEC0166S02

1) Start engine.
2) Drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
3) Stop vehicle and let engine idle for at least 6 seconds.
4) Turn ignition switch “OFF” and wait at least 10 seconds.
5) Start engine.
6) Drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
7) Stop vehicle and let engine idle for at least 6 seconds.
8) Select “MODE 3” with GST.
9) If DTC is detected, go to “Diagnostic Procedure”, EC-301.

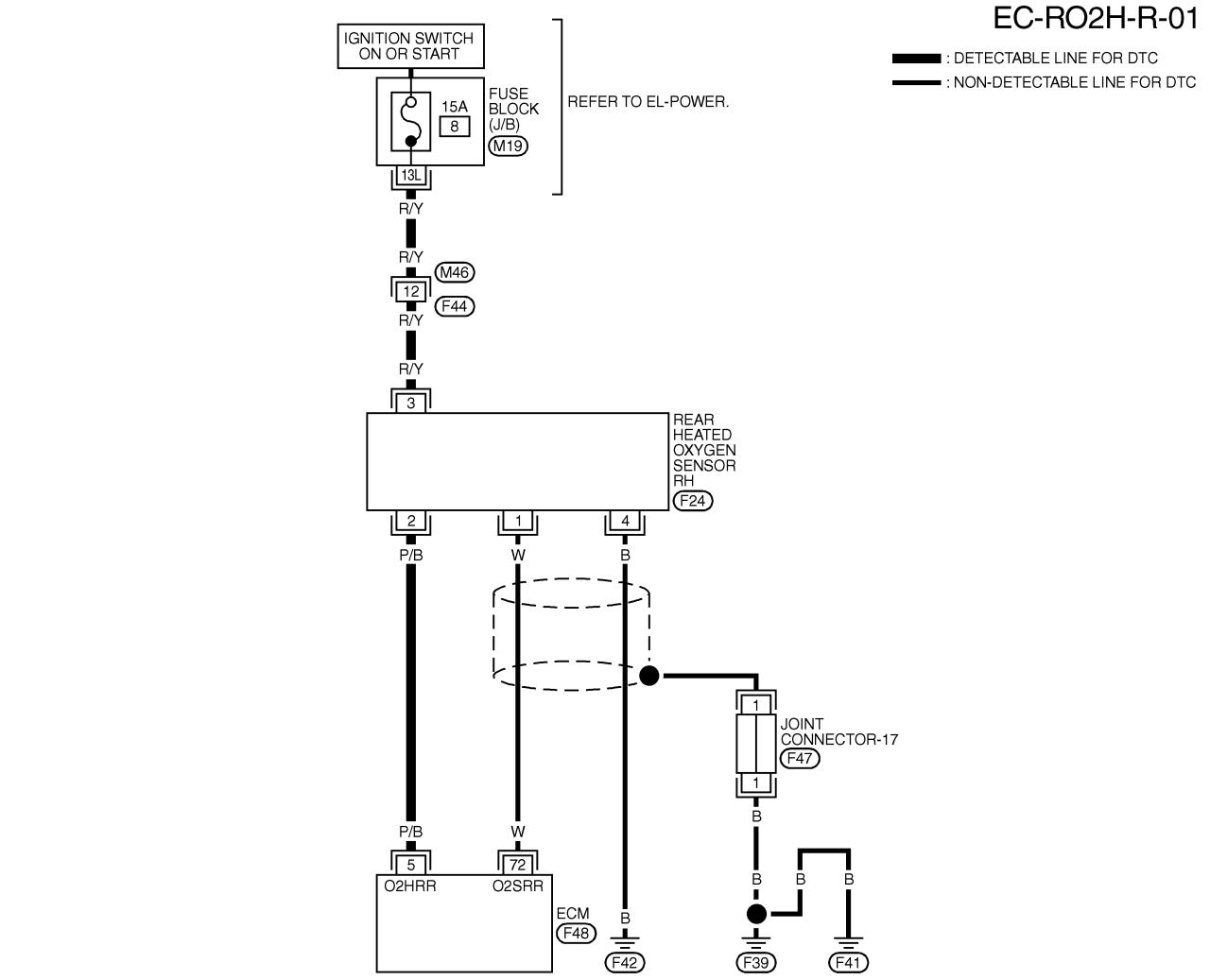
- **When using GST, “DTC Confirmation Procedure” should be performed twice as much as when using CONSULT-II because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II is recommended.**

Wiring Diagram

NHEC0167

RIGHT BANK

NHEC0167S01



ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

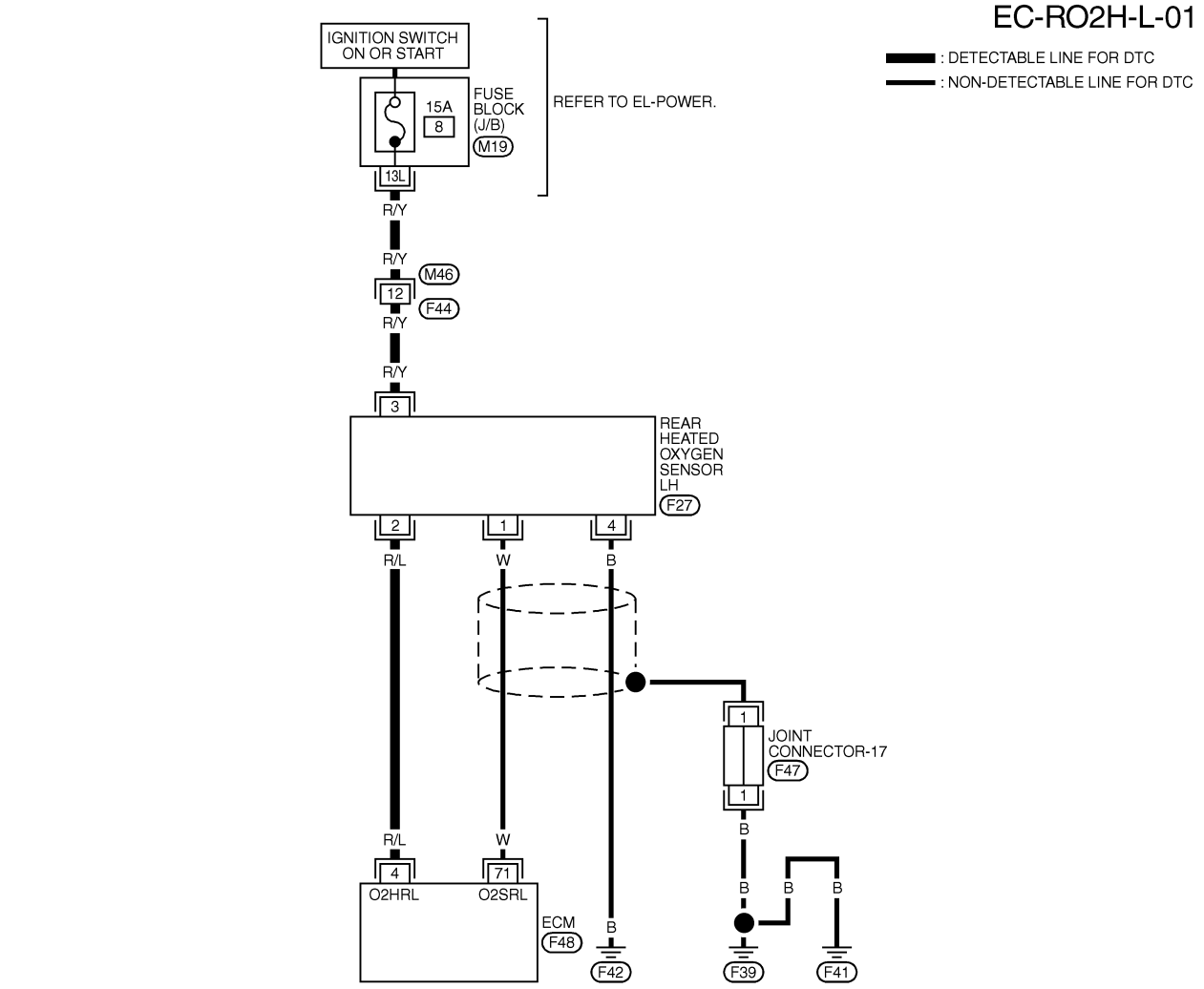
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
5	P/B	REAR HEATED OXYGEN SENSOR RH HEATER	IGN ON	BATTERY VOLTAGE
			ENGINE RUNNING ABOVE 3,600 RPM	
			ENGINE RUNNING BELOW 3,600 RPM AFTER DRIVING FOR 2 MINITES AT A SPEED OF 70 KM/H (43 MPH) OR MORE	0 - 1.0V

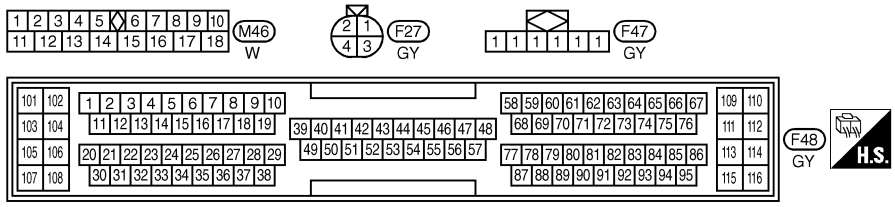
SEF659XB

Wiring Diagram (Cont'd)

LEFT BANK

NHEC0167S02





REFER TO THE FOLLOWING.
M19 -FUSE BLOCK-
JUNCTION BOX (J/B)

MEC730C

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
4	R/L	REAR HEATED OXYGEN SENSOR LH HEATER	IGN ON ENGINE RUNNING ABOVE 3,600 RPM	BATTERY VOLTAGE
			ENGINE RUNNING BELOW 3,600 RPM AFTER DRIVING FOR 2 MINITES AT A SPEED OF 70 KM/H (43 MPH) OR MORE	0 - 1.0V

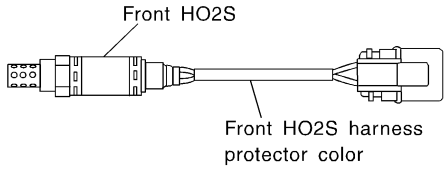
SEF660XB

Diagnostic Procedure

NHEC0168

1	CHECK REAR HO2S POWER SUPPLY CIRCUIT

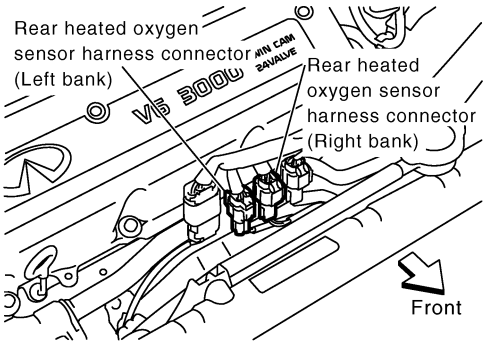
1. Turn ignition switch “OFF”.
2. Check rear heated oxygen sensor harness protector color.



P0141 (-B1) Right bank: Black
P0161 (-B2) Left bank: Blue

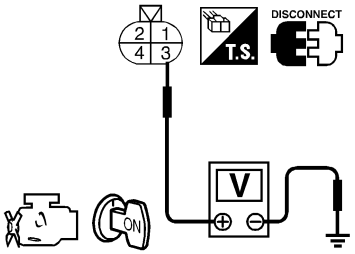
SEF194WP

3. Disconnect corresponding rear heated oxygen sensor harness connector.



SEF467W

4. Turn ignition switch “ON”.
5. Check voltage between rear HO2S terminal 3 and ground.



Voltage: Battery voltage

SEF314X

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M46, F44
- Fuse block (J/B) connector M19
- 15A fuse
- Harness for open or short between rear heated oxygen sensor and fuse

	▶	Repair harness or connectors.

3	CHECK REAR HO2S GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal and rear HO2S terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0141	5	2	Right
P0161	4	2	Left

MTBL0347

Continuity should exist.

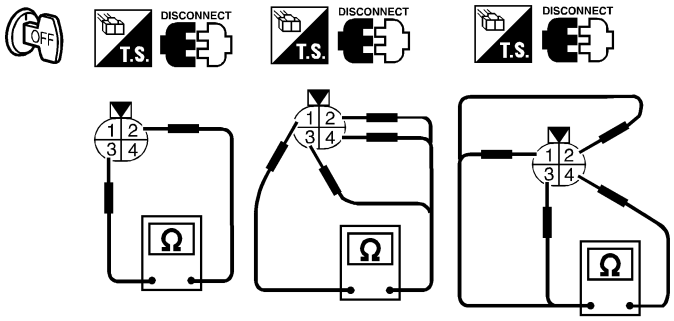
4. Also check harness for short to ground and short to power.

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 REAR HEATED OXYGEN SENSOR HEATER

Check the resistance between rear HO2S terminals as follows.



Terminal No.	Resistance
2 and 3	2.3 - 4.3Ω at 25°C (77°F)
1 and 2, 3, 4	∞ Ω (Continuity should not exist.)
4 and 1, 2, 3	

SEF315X

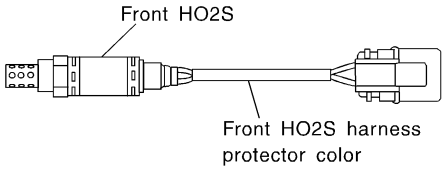
CAUTION:
Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	REPLACE REAR HEATED OXYGEN SENSOR

Check rear heated oxygen sensor harness protector color.



P0141 (-B1) Right bank: Black
P0161 (-B2) Left bank: Blue

SEF194WP

CAUTION:
Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

	▶	Replace malfunctioning rear heated oxygen sensor.

6	**CHECK INTERMITTENT INCIDENT**
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156.	
▶	**INSPECTION END**

On Board Diagnosis Logic

NHEC0169

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the front heated oxygen sensors. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios. In case the amount of the compensation value is extremely large (The actual mixture ratio is too lean.), the ECM judges the condition as the fuel injection system malfunction and light up the MIL (2 trip detection logic).

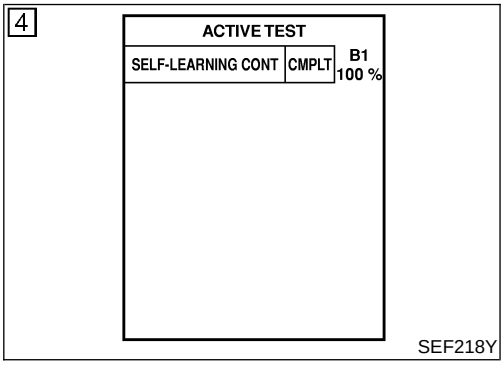
Sensor	Input Signal to ECM	ECM function	Actuator
Front heated oxygen sensors	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Injectors

Malfunction is detected when fuel injection system does not operate properly, the amount of mixture ratio compensation is too large. (The mixture ratio is too lean.)

Possible Cause

NHEC0487

- Intake air leaks
- Front heated oxygen sensor
- Injectors
- Exhaust gas leaks
- Incorrect fuel pressure
- Lack of fuel
- Mass air flow sensor



DTC Confirmation Procedure

NHEC0170

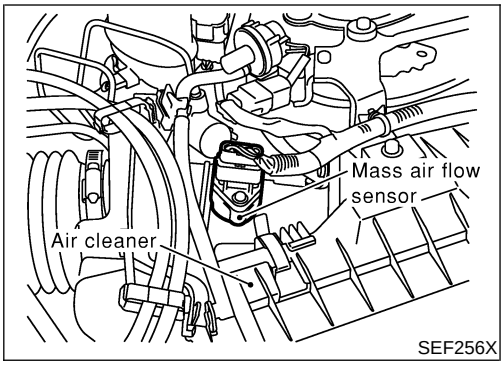
NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

NHEC0170S01

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch “OFF” and wait at least 10 seconds.
3) Turn ignition switch “ON” and select “SELF-LEARN CONTROL” in “ACTIVE TEST” mode with CONSULT-II.
4) Clear the self-learning control coefficient by touching “START”.
5) Select “DATA MONITOR” mode with CONSULT-II.
6) Start engine again and let it idle for at least 10 minutes.
   The 1st trip DTC P0171 or P0174 should be detected at this stage, if a malfunction exists. If so, go to “Diagnostic Procedure”, EC-308.
7) If it is difficult to start engine at step 6, the fuel injection system has a malfunction, too.
8) Crank engine while depressing accelerator pedal. If engine starts, go to “Diagnostic Procedure”, EC-308. If engine does not start, check exhaust and intake air leak visually.



WITH GST

NHEC0170S02

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 10 seconds.
3) Disconnect mass air flow sensor harness connector. Then restart and run engine for at least 5 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 let it idle for at least 10 minutes.
8) Select "MODE 7" with GST. The 1st trip DTC P0171 or P0174 should be detected at this stage, if a malfunction exists. If so, go to "Diagnostic Procedure", EC-308.
9) If it is difficult to start engine at step 7, the fuel injection system has a malfunction.
10) Crank engine while depressing accelerator pedal. If engine starts, go to "Diagnostic Procedure", EC-308. If engine does not start, check exhaust and intake air leak visually.

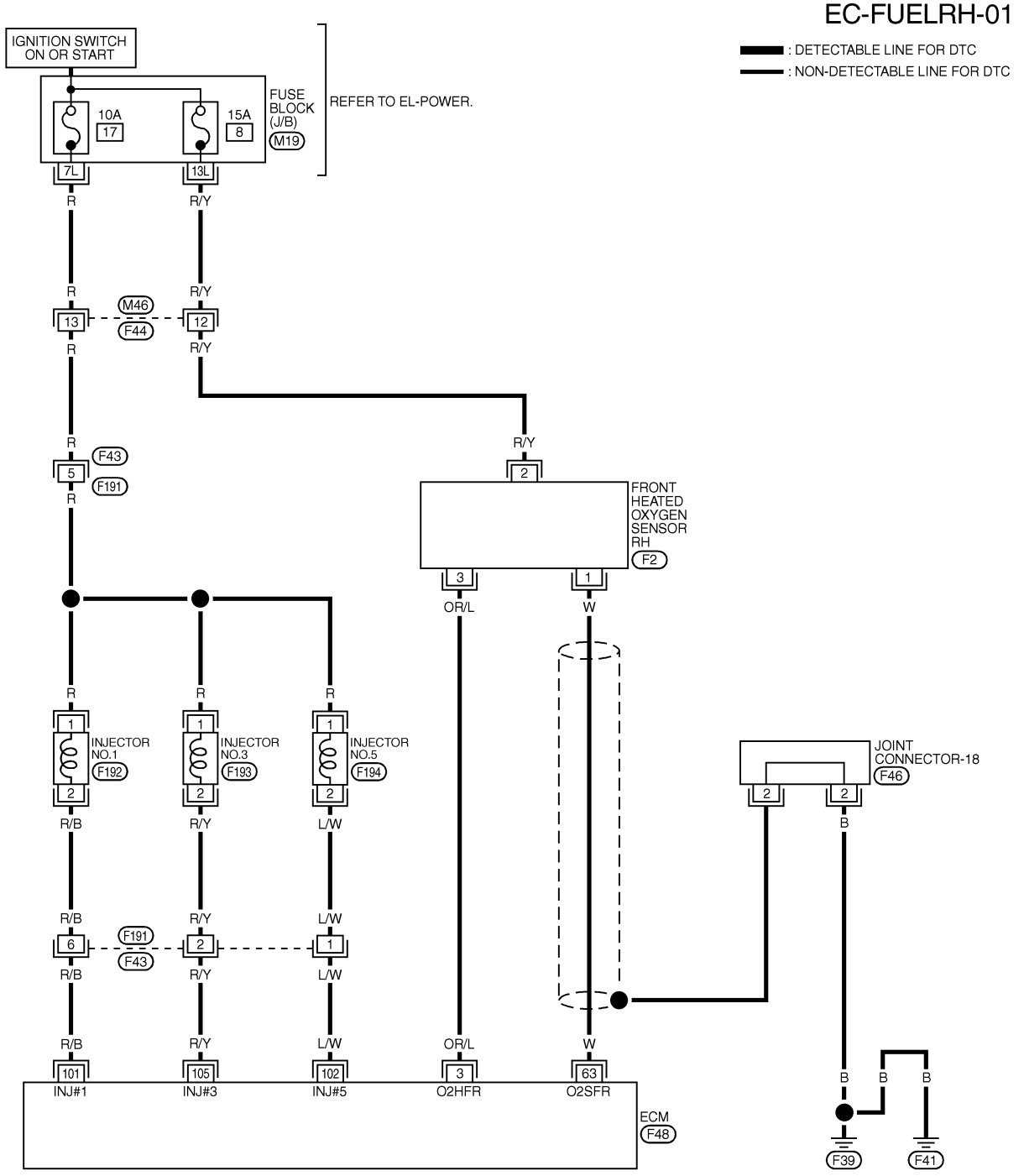
Wiring Diagram

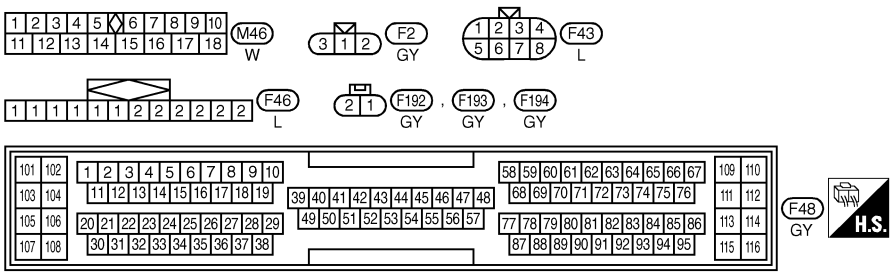
NHEC0171

NHEC0171S01

RIGHT BANK

EC-FUELRH-01





REFER TO THE FOLLOWING.
M19 -FUSE BLOCK-
JUNCTION BOX (J/B)

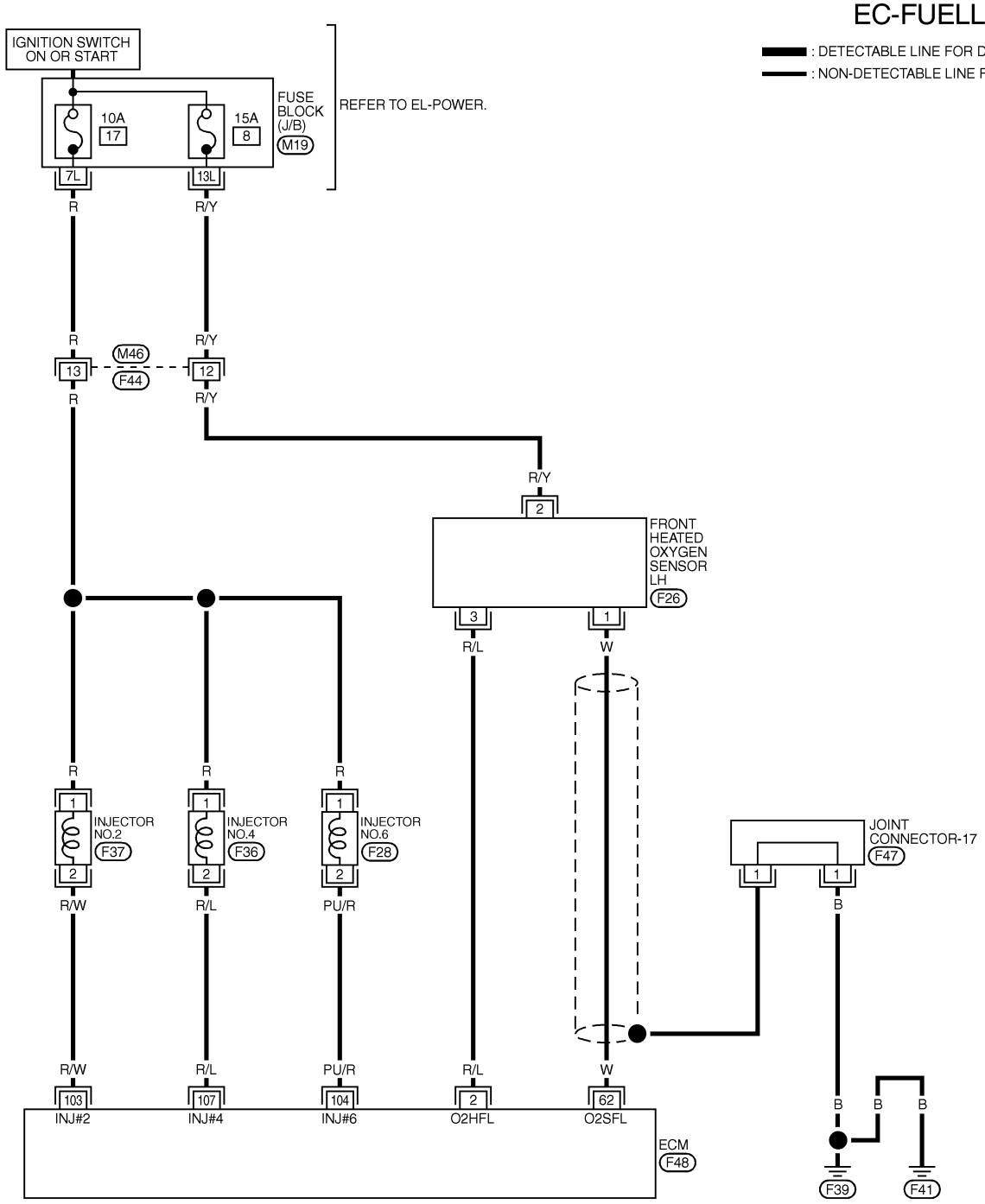
MEC810C

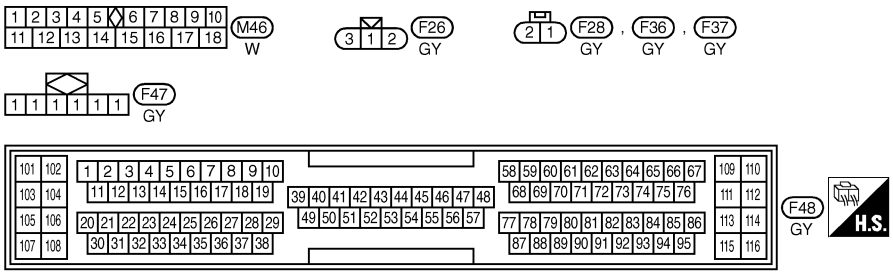
LEFT BANK

NHEC0171S02

EC-FUELLH-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC





REFER TO THE FOLLOWING.
M19 -FUSE BLOCK-JUNCTION BOX (J/B)

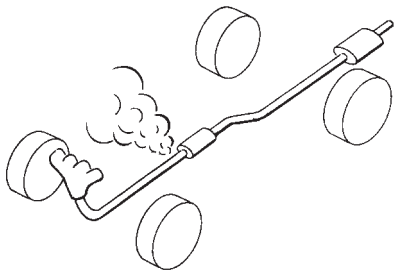
MEC811C

Diagnostic Procedure

NHEC0172

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 FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect corresponding front heated oxygen sensor harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal and front HO2S terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0171	63	1	Right
P0174	62	1	Left

MTBL0348

Continuity should exist.

5. Check harness continuity between ECM terminal or front HO2S terminal and ground as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM or Sensor	Ground	
P0171	63 or 1	Ground	Right
P0174	62 or 1	Ground	Left

MTBL0349

Continuity should not exist.

6. Also check harness for 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-50. 2. Install fuel pressure gauge and check fuel pressure. Refer to EC-50. **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 667.) ● Fuel pressure regulator (Refer to EC-51.) ● Fuel lines (Refer to MA-16, "Checking Fuel Lines".) ● Fuel filter for clogging		
	▶	Repair or replace.

6	CHECK MASS AIR FLOW SENSOR	
With CONSULT-II 1. Install all removed parts. 2. Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT-II. **2.0 - 6.0 g·m/sec: at idling** **7.0 - 20.0 g·m/sec: at 2,500 rpm**		
With GST 1. Install all removed parts. 2. Check mass air flow sensor signal in MODE 1 with GST. **2.0 - 6.0 g·m/sec: at idling** **7.0 - 20.0 g·m/sec: at 2,500 rpm** **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-164.

Diagnostic Procedure (Cont'd)

7	CHECK FUNCTION OF INJECTORS

With CONSULT-II

1. Start engine.
2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-II.

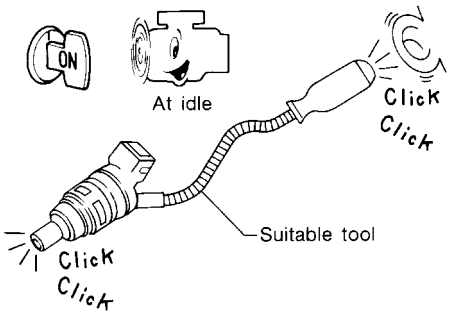
ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS AIF SE-B1	XXX V
IACV-AAC/V	XXX step

SEF070Y

3. Make sure that each circuit produces a momentary engine speed drop.

Without CONSULT-II

1. Start engine.
2. Listen to each injector operating sound.



MEC703B

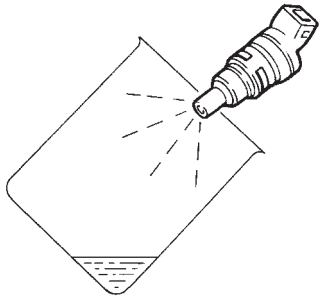
Clicking noise should be heard.

OK or NG

OK	▶	GO TO 8.
NG	▶	Perform trouble diagnosis for "INJECTORS", EC-657.

8	CHECK INJECTOR

1. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
2. Turn ignition switch "OFF".
3. Disconnect injector harness connectors on left bank (for DTC P0171), right bank (for DTC P0174).
4. Remove injector gallery assembly. Refer to EC-52.
   Keep fuel hose and all injectors connected to injector gallery.
   The injector harness connectors on right bank (for DTC P0171), left bank (for DTC P0174) should remain connected.
5. Disconnect all ignition coil harness connectors.
6. Prepare pans or saucers under each injector.
7. Crank engine for about 3 seconds. Make sure that fuel sprays out from injectors.



SEF595Q

Fuel should be sprayed evenly for each injector.

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace injectors from which fuel does not spray out. Always replace O-ring with new ones.

9	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156.	
▶	**INSPECTION END**

On Board Diagnosis Logic

NHEC0173

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the front heated oxygen sensors. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios. In case the amount of the compensation value is extremely large (The actual mixture ratio is too rich.), the ECM judges the condition as the fuel injection system malfunction and light up the MIL (2 trip detection logic).

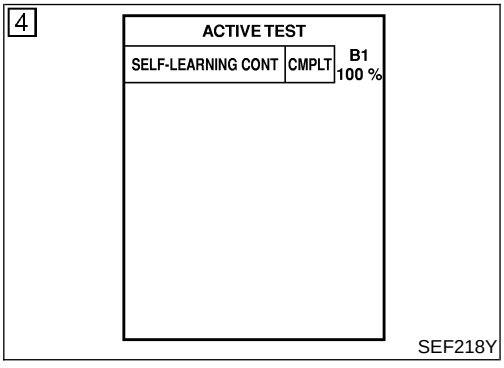
Sensor	Input Signal to ECM	ECM function	Actuator
Front heated oxygen sensors	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Injectors

Malfunction is detected when fuel injection system does not operate properly, the amount of mixture ratio compensation is too large. (The mixture ratio is too rich.)

Possible Cause

NHEC0488

- Front heated oxygen sensor
- Injectors
- Exhaust gas leaks
- Incorrect fuel pressure
- Mass air flow sensor



DTC Confirmation Procedure

NHEC0174

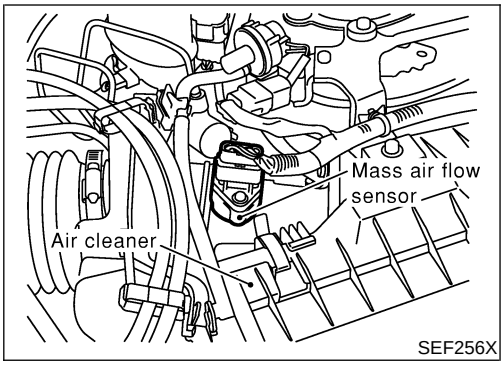
NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

NHEC0174S01

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch “OFF” and wait at least 10 seconds.
3) Turn ignition switch “ON” and select “SELF-LEARN CONTROL” in “ACTIVE TEST” mode with CONSULT-II.
4) Clear the self-learning control coefficient by touching “START”.
5) Select “DATA MONITOR” mode with CONSULT-II.
6) Start engine again and let it idle for at least 10 minutes.
   The 1st trip DTC P0172, P0175 should be detected at this stage, if a malfunction exists. If so, go to “Diagnostic Procedure”, EC-316.
7) If it is difficult to start engine at step 6, the fuel injection system has a malfunction, too.
8) Crank engine while depressing accelerator pedal.
   If engine starts, go to “Diagnostic Procedure”, EC-316. If engine does not start, remove ignition plugs and check for fouling, etc.



WITH GST

NHEC0174S02

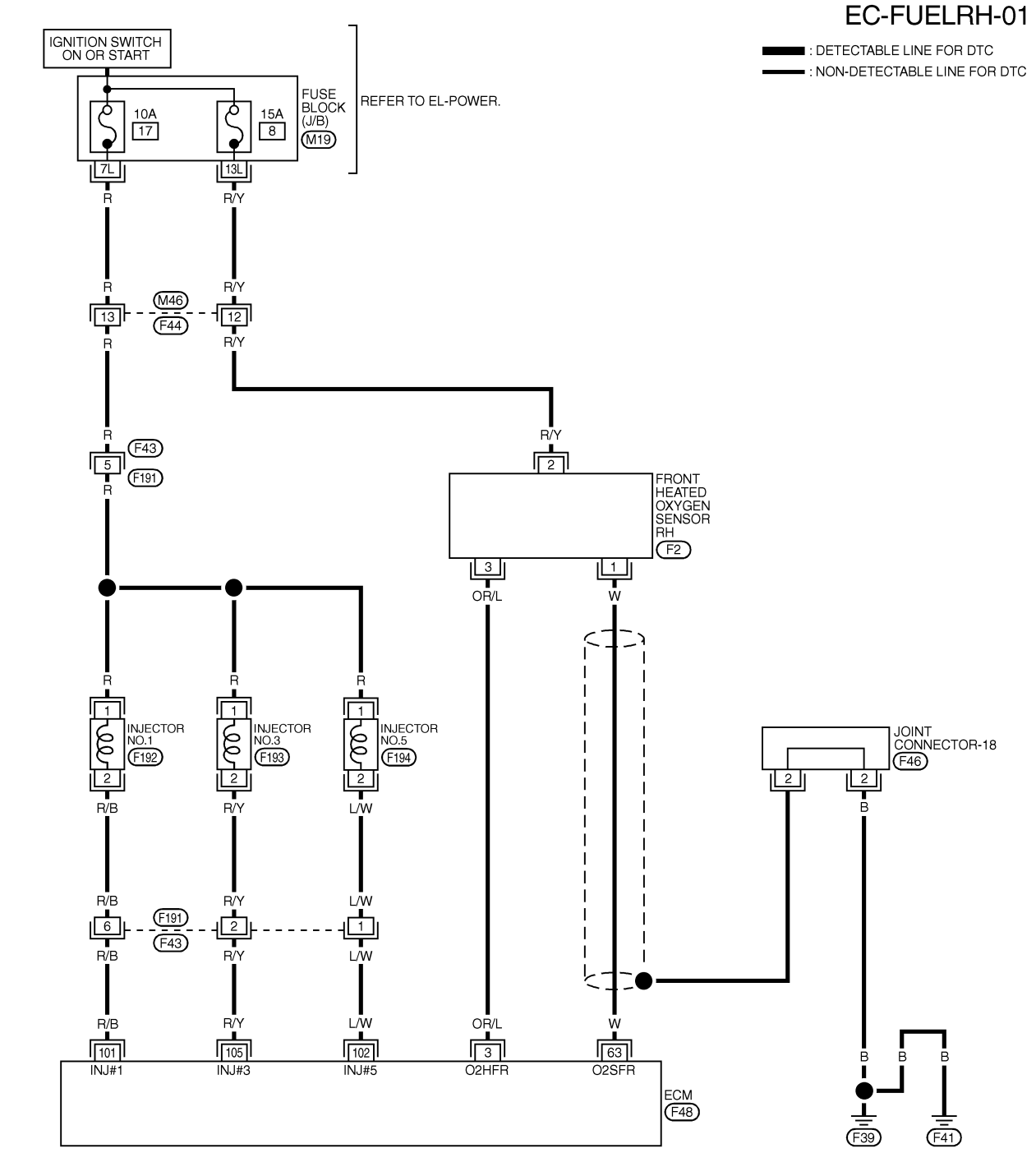
1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 10 seconds.
3) Disconnect mass air flow sensor harness connector. Then restart and run engine for at least 5 seconds at idle speed.
4) Stop engine and reconnect mass air flow sensor harness 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 let it idle for at least 10 minutes.
8) Select "MODE 7" with GST. The 1st trip DTC P0172 or P0175 should be detected at this stage, if a malfunction exists. If so, go to "Diagnostic Procedure", EC-316.
9) If it is difficult to start engine at step 7, the fuel injection system has a malfunction.
10) Crank engine while depressing accelerator pedal.
    If engine starts, go to "Diagnostic Procedure", EC-316. If engine does not start, check exhaust and intake air leak visually.

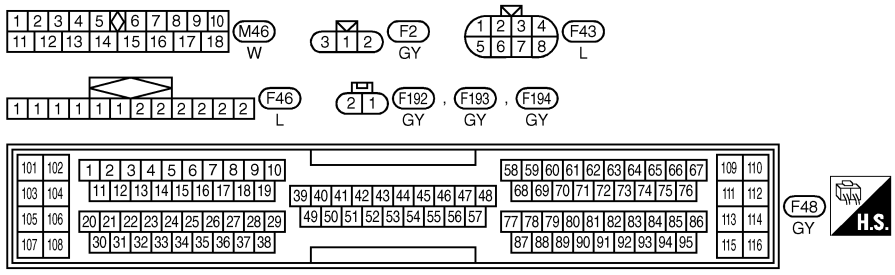
Wiring Diagram

NHEC0175

RIGHT BANK

NHEC0175S01





REFER TO THE FOLLOWING.
M19 -FUSE BLOCK-
JUNCTION BOX (J/B)

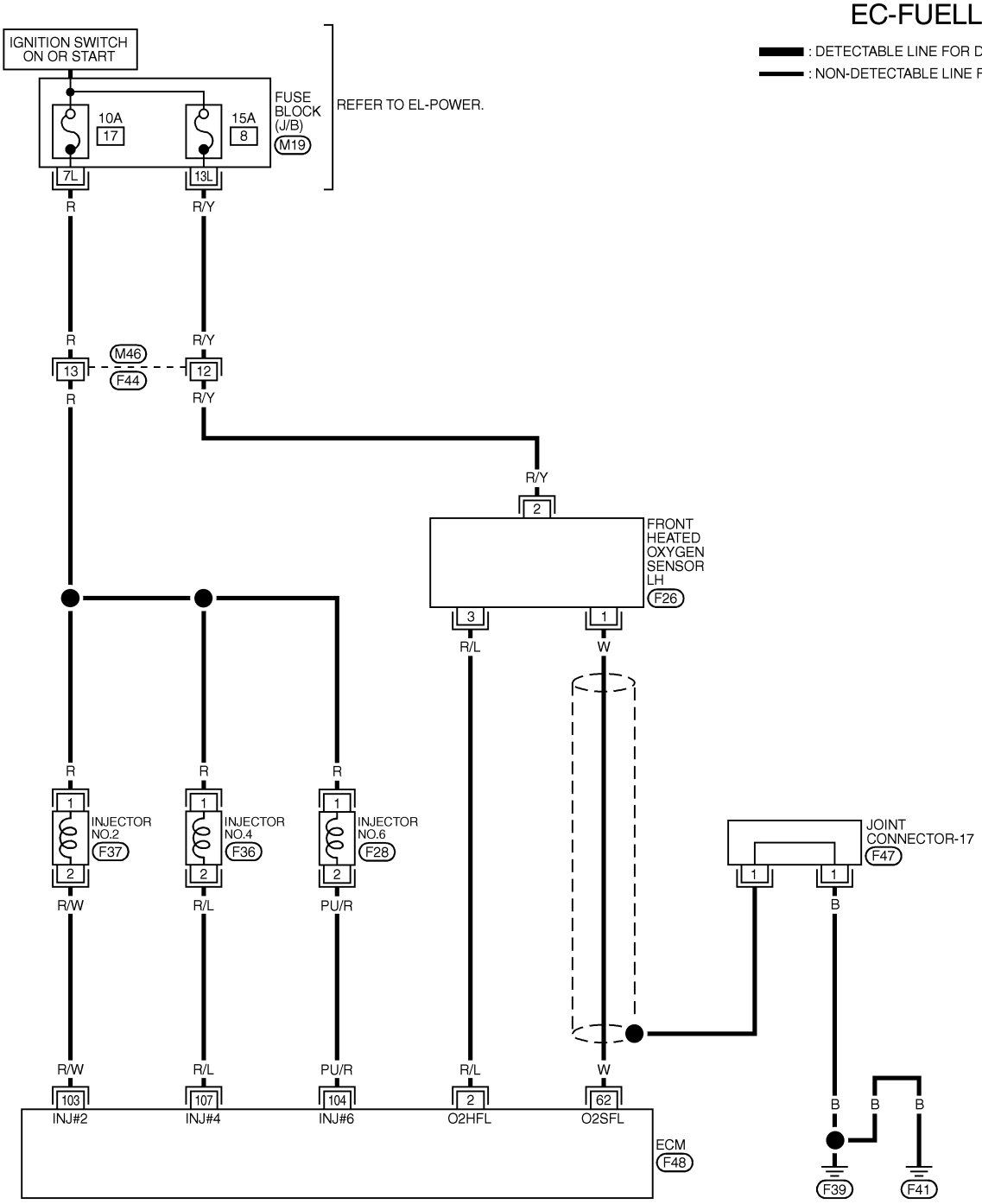
MEC810C

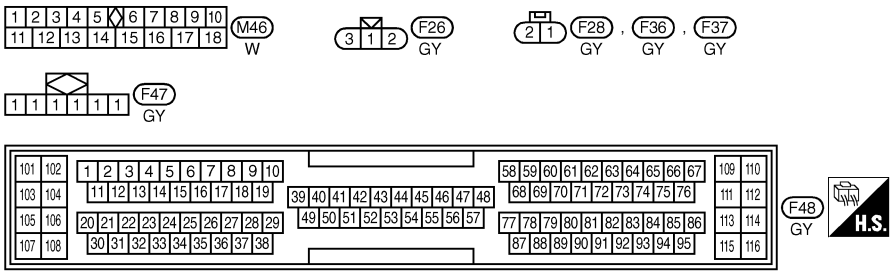
LEFT BANK

NHEC0175S02

EC-FUELLH-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC





REFER TO THE FOLLOWING.
M19 -FUSE BLOCK-JUNCTION BOX (J/B)

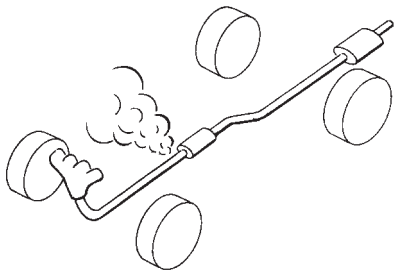
MEC811C

Diagnostic Procedure

NHEC0176

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 FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect corresponding front heated oxygen sensor harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal and front HO2S terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0172	63	1	Right
P0175	62	1	Left

MTBL0350

Continuity should exist.

5. Check harness continuity between ECM terminal or front HO2S terminal and ground as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM or Sensor	Ground	
P0172	63 or 1	Ground	Right
P0175	62 or 1	Ground	Left

MTBL0351

Continuity should not exist.

6. Also check harness for 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-50.
2. Install fuel pressure gauge and check fuel pressure. Refer to EC-50.

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 667.)
- Fuel pressure regulator (Refer to EC-51.)

	▶	Repair or replace.

6	CHECK MASS AIR FLOW SENSOR

With CONSULT-II

1. Install all removed parts.
2. Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT-II.

2.0 - 6.0 g·m/sec: at idling

7.0 - 20.0 g·m/sec: at 2,500 rpm

With GST

1. Install all removed parts.
2. Check mass air flow sensor signal in MODE 1 with GST.

2.0 - 6.0 g·m/sec: at idling

7.0 - 20.0 g·m/sec: at 2,500 rpm

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-164.

Diagnostic Procedure (Cont'd)

7	CHECK FUNCTION OF INJECTORS

With CONSULT-II

1. Start engine.
2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-II.

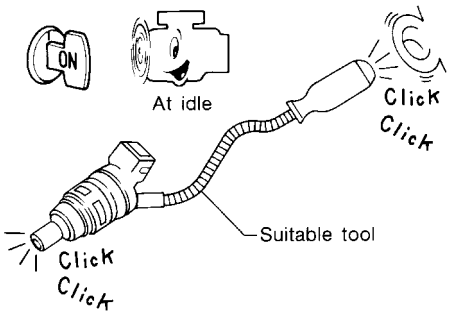
ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS AIF SE-B1	XXX V
IACV-AAC/V	XXX step

SEF070Y

3. Make sure that each circuit produces a momentary engine speed drop.

Without CONSULT-II

1. Start engine.
2. 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-658.

8	CHECK INJECTOR

1. Remove injector assembly. Refer to EC-52.
   Keep fuel hose and all injectors connected to injector gallery.
2. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
3. Disconnect injector harness connectors left bank (for DTC P0172), right bank (for P0175).
   The injector harness connectors on right bank (for P0172), left bank (for P0175) should remain connected.
4. Disconnect all ignition coil harness connectors.
5. Prepare pans or saucers under each injectors.
6. Crank engine for about 3 seconds.
   Make sure fuel does not drip from injector.

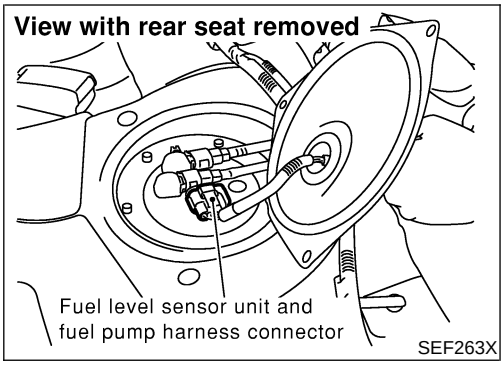
OK or NG

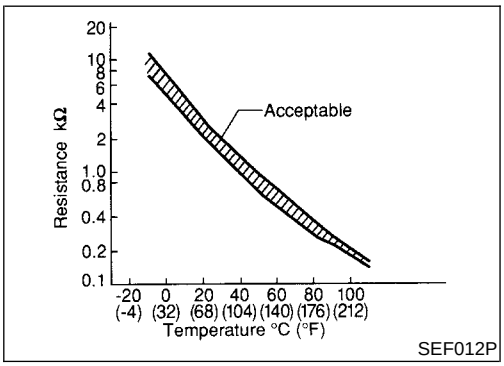
OK (Does not drip.)	▶	GO TO 9.
NG (Drips.)	▶	Replace the injectors from which fuel is dripping. Always replace O-ring with new one.

9	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156.

▶ **INSPECTION END**





Component Description

NHEC0177

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

<Reference data>

Fuel 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 92 (Fuel tank temperature sensor) and body ground.

CAUTION:

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

On Board Diagnosis Logic

NHEC0178

Malfunction is detected when 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.

Possible Cause

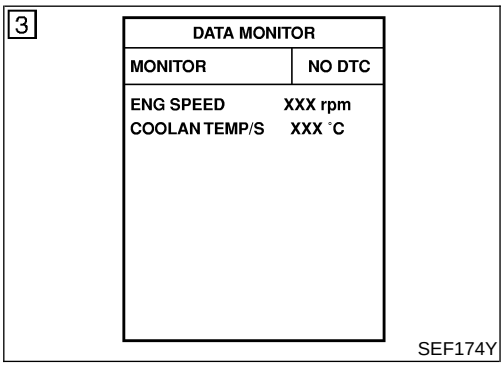
NHEC0489

- Harness or connectors
  (The sensor circuit is open or shorted.)
- Fuel tank temperature sensor

DTC Confirmation Procedure

NHEC0179

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.



WITH CONSULT-II

NHEC0179S01

1) Turn ignition switch “ON”.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Wait at least 10 seconds.
   If the result is NG, go to “Diagnostic Procedure”, EC-322.
   If the result is OK, go to following step.
4) Check “COOLAN TEMP/S” value.
   If “COOLAN TEMP/S” is less than 60°C (140°F), the result will be OK.
   If “COOLAN TEMP/S” is above 60°C (140°F), go to the following step.
5) Cool engine down until “COOLAN TEMP/S” 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-322.

WITH GST

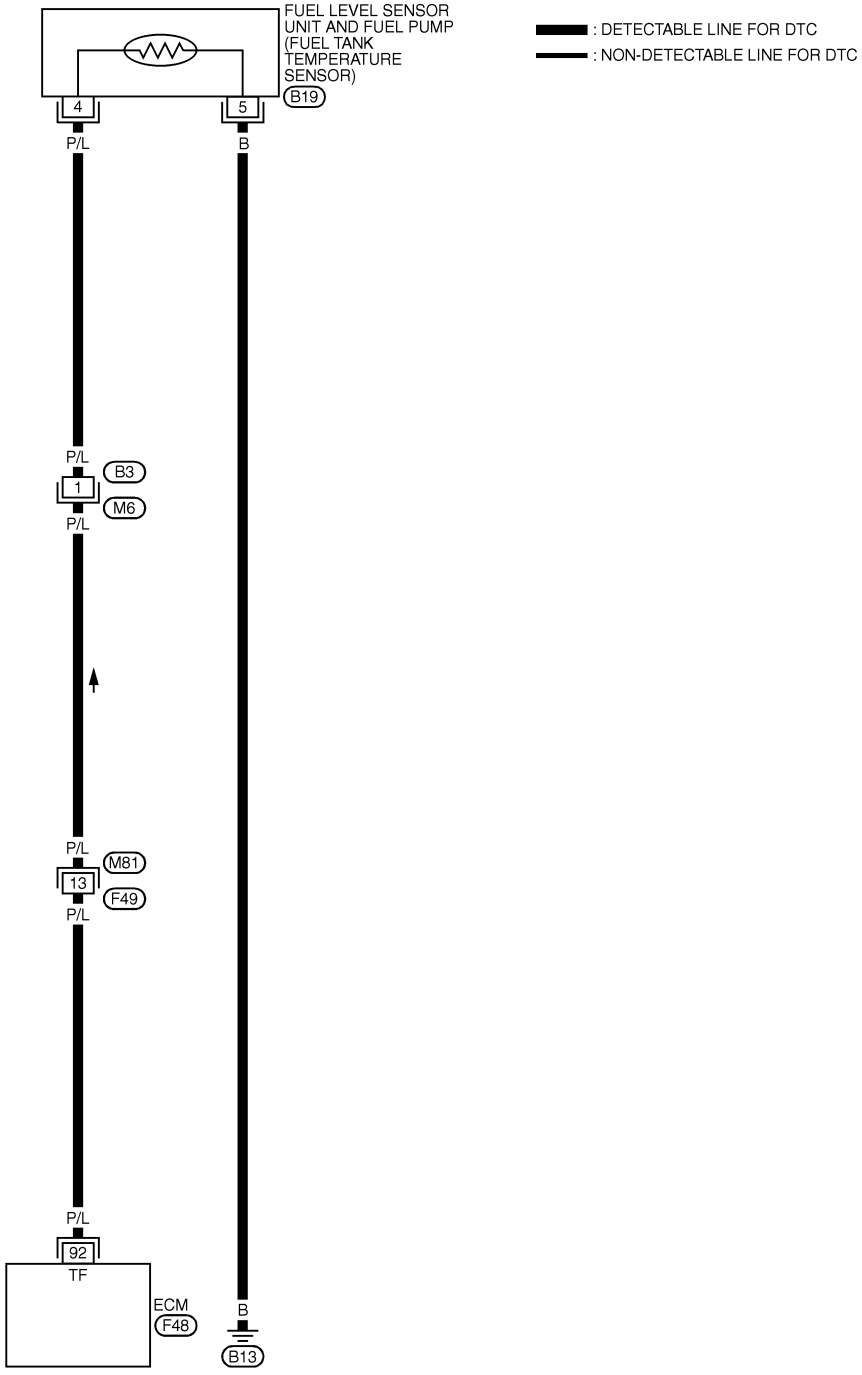
NHEC0179S02

Follow the procedure “With CONSULT-II” above.

Wiring Diagram

NHEC0180

EC-TFTS-01



MEC735C

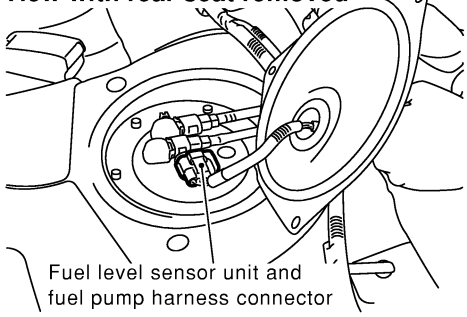
Diagnostic Procedure

NHEC0181

1	CHECK FUEL TANK TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

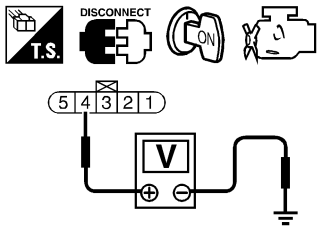
1. Turn ignition switch “OFF”.
2. Disconnect fuel level sensor unit and fuel pump harness connector.

View with rear seat removed



SEF263X

3. Turn ignition switch “ON”.
4. Check voltage between fuel level sensor unit and fuel pump terminal 4 and ground with CONSULT-II or tester.



Voltage: Approximately 5V

SEF586X

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors B3, M6
- Harness connectors M81, F49
- Harness for open or short between ECM and fuel level sensor unit and fuel pump

	▶	Repair harness or connector.

3	CHECK FUEL TANK TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

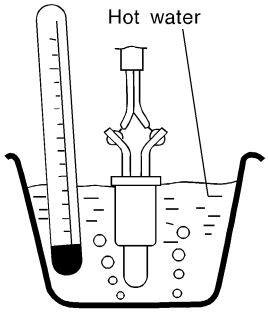
1. Turn ignition switch “OFF”.
2. Check harness continuity between fuel level sensor unit and fuel pump terminal 5 and body ground. Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

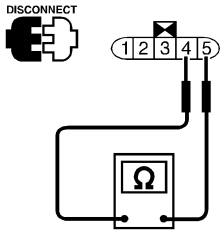
OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK FUEL TANK TEMPERATURE SENSOR

1. Remove fuel level sensor unit.
2. Check resistance between fuel level sensor unit and fuel pump terminals 4 and 5 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

SEF587X

OK or NG

OK	▶	GO TO 5.
NG	▶	Replace fuel level sensor unit.

5	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156.	
▶	**INSPECTION END**

System Description

NHEC0608

COOLING FAN CONTROL

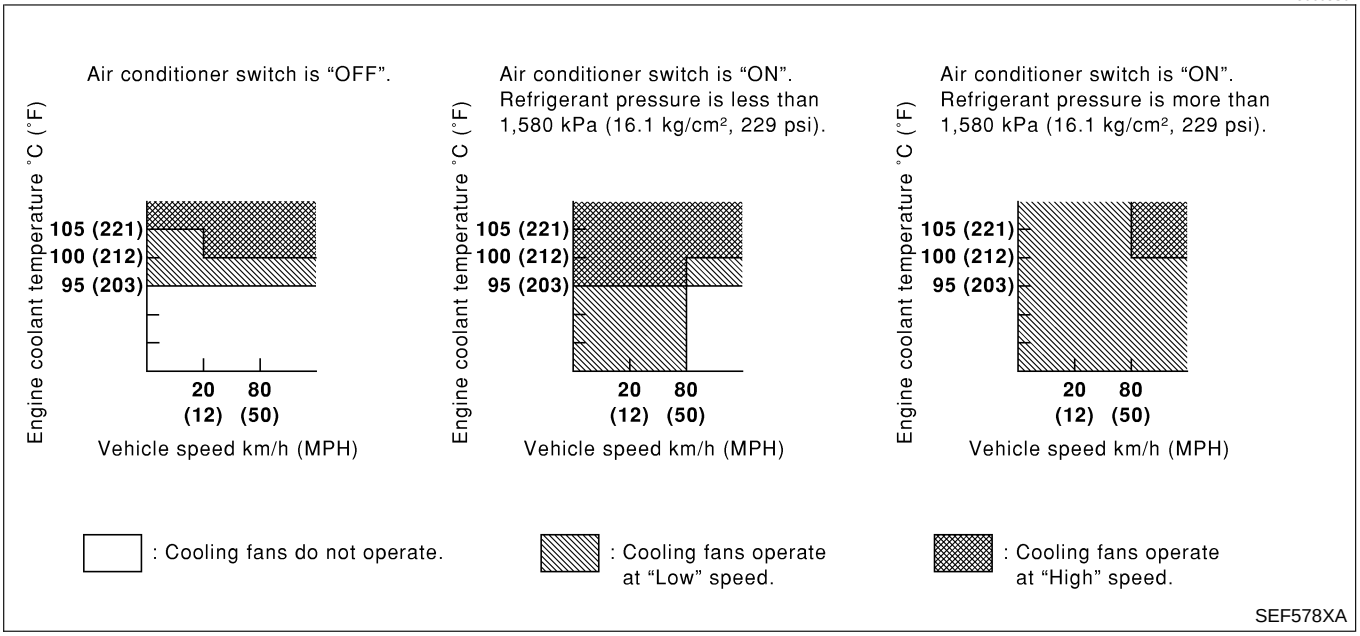
NHEC0608S01

Sensor	Input Signal to ECM	ECM function	Actuator
Vehicle speed sensor	Vehicle speed	Cooling fan control	Cooling fan relay(s)
Engine coolant temperature sensor	Engine coolant temperature		
Air conditioner switch	Air conditioner “ON” signal		
Ignition switch	Start signal		
Refrigerant pressure sensor	Refrigerant pressure		

The ECM controls the cooling fan corresponding to the vehicle speed, engine coolant temperature, refrigerant pressure and air conditioner ON signal. The control system has 3-step control [HIGH/LOW/OFF].

OPERATION

NHEC0608S02



CONSULT-II Reference Value in Data Monitor Mode

NHEC0609

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

On Board Diagnosis Logic

NHEC0610

This diagnosis checks whether the engine coolant temperature is extraordinary high, even when the load is not heavy.
When malfunction is detected, the malfunction indicator lamp (MIL) will light up even in the first trip.
Malfunction is detected when engine coolant temperature is excessively high under normal engine speed.

Possible Cause

NHEC0611

- Harness or connectors
  (The cooling fan circuit is open or shorted)
- Cooling fan
- Thermostat
- Improper ignition timing
- Engine coolant temperature sensor
- Blocked radiator
- Blocked front end (Improper fitting of nose mask)
- Crushed vehicle frontal area (Vehicle frontal is collided but not repaired)
- Blocked air passage by improper installation of front fog lamp or fog lamps.
- Improper mixture ratio of coolant
- Damaged bumper

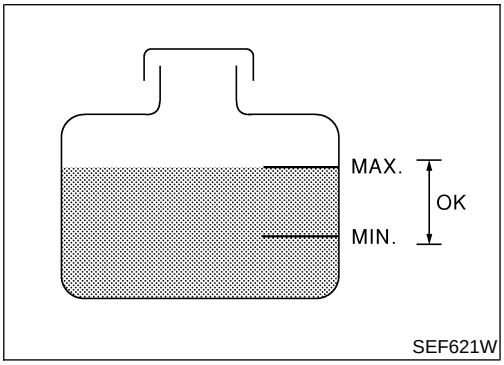
For more information, refer to “MAIN 12 CAUSES OF OVERHEATING”, EC-341.

Overall Function Check

NHEC0612

Use this procedure to check the overall function of the coolant overtemperature enrichment protection 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 the 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-II

NHEC0612S01

1) Check the coolant level and mixture ratio (using coolant tester) in the reservoir tank and radiator.
   Allow engine to cool before checking coolant level and mixture ratio.
- If the coolant level in the reservoir and/or radiator is below the proper range, go to “Diagnostic Procedure”, EC-330.
- If the coolant mixture ratio is out of the range of 45 to 55%, replace the coolant in the following procedure MA-14, “Changing Engine Coolant”.

a) Fill radiator with coolant up to specified level with a filling speed

of 2 liters per minute like pouring coolant from a kettle. Be sure to use coolant with the proper mixture ratio. Refer to MA-12, "Anti-freeze Coolant Mixture Ratio".

b) After refilling coolant, run engine to ensure that no water-flow noise is emitted.

c) After checking or replacing coolant, go to step 3 below.

2) Ask the customer if engine coolant has been added. If it has been added, go to "Diagnostic Procedure", EC-330. After repair, go to the next step.

3) Start engine and let it idle.

4) Make sure that A/C switch is "OFF" and air conditioner is not operating. If NG, check air conditioner circuit. Refer to HA-28, "TROUBLE DIAGNOSES". After repair, go to the next step.

5) Perform "COOLANT TEMP" in "ACTIVE TEST" mode with CONSULT-II.

a) Set "COOLANT TEMP" to 95°C (203°F) and make sure that cooling fan operates at low speed.
If NG, go to "Diagnostic Procedure", EC-330.

b) Set "COOLANT TEMP" to 105°C (221°F) and make sure that cooling fan operates at high speed. If NG, go to "Diagnostic Procedure", EC-330. After repair, go to the next step.

6) Check for blocked coolant passage.

a) Warm up engine to normal operating temperature, then grasp radiator upper hose and lower hose and make sure that coolant flows.
If NG, go to "Diagnostic Procedure", EC-330. After repair, go to the next step.
Be extremely careful not to touch any moving or adjacent parts.

7) Check for blocked radiator air passage.

a) When market fog lamps have been installed, check for damaged fans and clogging in the condenser and radiator.

b) Check the front end for clogging caused by insects or debris.

c) Check for improper fitting of front-end cover, damaged radiator grille or bumper, damaged vehicle front.
If NG, take appropriate action and then go to the next step.

8) Check function of ECT sensor.
Refer to step 7 of "Diagnostic Procedure", EC-330.
If NG, replace ECT sensor and go to the next step.

9) Check ignition timing. Refer to basic inspection, EC-110.
Make sure that ignition timing is 15°±5° at idle.
If NG, adjust ignition timing and then recheck.

WITH GST

NHEC0612S02

1) Check the coolant level and mixture ratio (using coolant tester) in the reservoir tank and radiator.
Allow engine to cool before checking coolant level and mixture ratio.

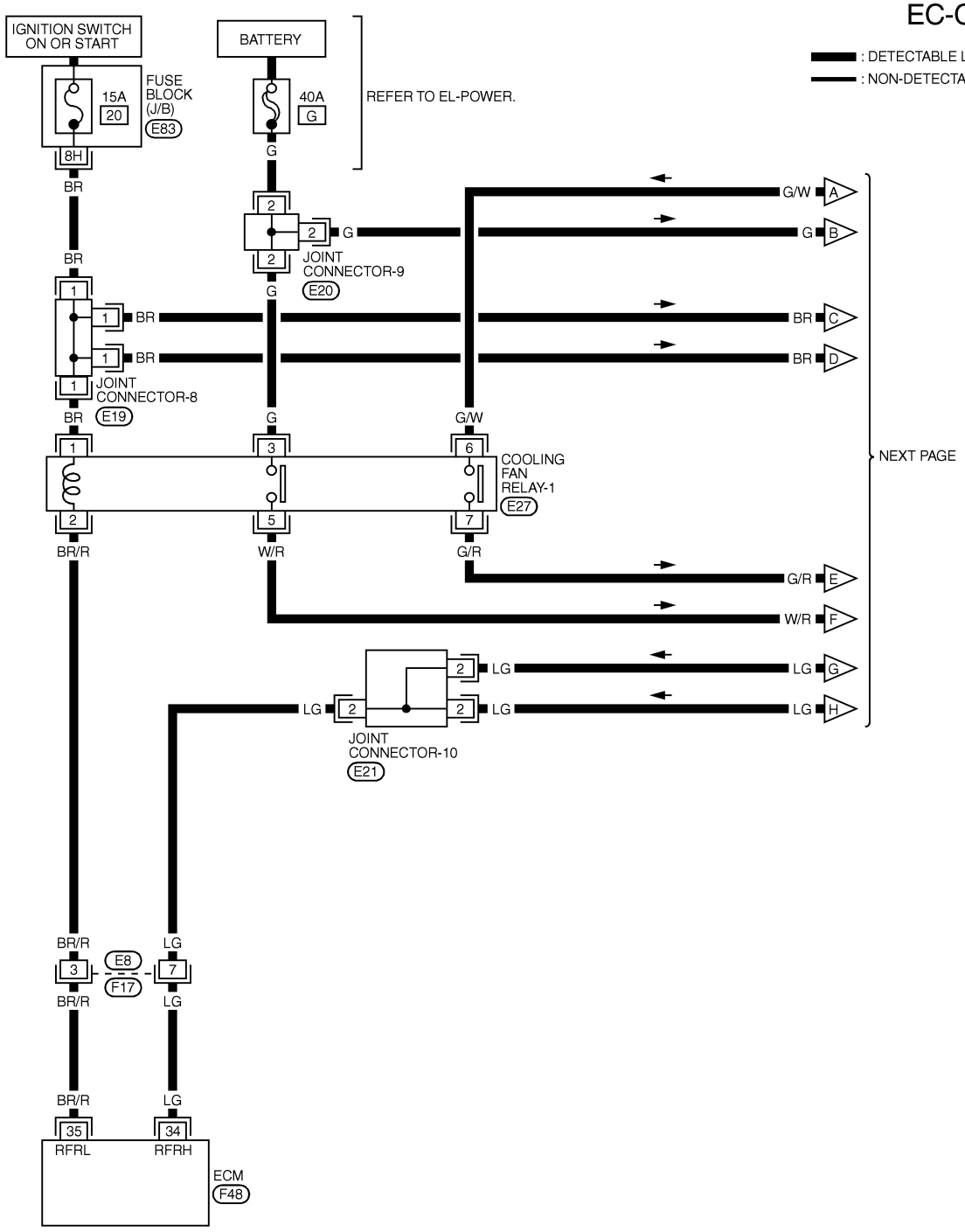
- If the coolant level in the reservoir and/or radiator is below the proper range, and go to "Diagnostic Procedure", EC-330.
- If the coolant mixture ratio is out of the range of 45 to 55%, replace the coolant in the following procedure MA-14, "Changing Engine Coolant".

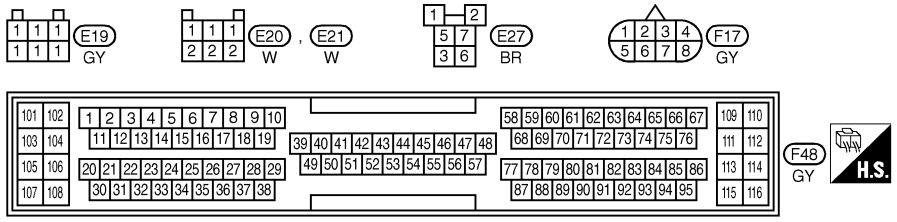
a) Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute like pouring coolant from a kettle. Be sure to use coolant with the proper mixture ratio. Refer to MA-12, "Anti-freeze Coolant Mixture Ratio".

b) After refilling coolant, run engine to ensure that no water-flow noise is emitted.
c) After checking or replacing coolant, go to step 3 below.
2) Ask the customer if engine coolant has been added. If it has been added, go to "Diagnostic Procedure", EC-330. After repair, go to the next step.
3) Start engine and let it idle.
4) Make sure that A/C switch is "OFF" and air conditioner is not operating. If NG, check air conditioner circuit. Refer to HA-28, "TROUBLE DIAGNOSES". After repair, go to the next step.
5) Turn ignition switch "OFF"
6) Disconnect engine coolant temperature sensor harness connector.
7) Connect 150Ω resistor to engine coolant temperature sensor.
8) Start engine and make sure that cooling fan operates.
Be careful not to overheat engine.
If NG, go to "Diagnostic Procedure", EC-330. After repair, go to the next step.
9) Check for blocked coolant passage.
a) Warm up engine to normal operating temperature, then grasp radiator upper hose and lower hose and make sure that coolant flows.
If NG, go to "Diagnostic Procedure", EC-330. After repair, go to the next step.
Be extremely careful not to touch any moving or adjacent parts.
10) Check for blocked radiator air passage.
a) When market fog lamps have been installed, check for damaged fans and clogging in the condenser and radiator.
b) Check the front end for clogging caused by insects or debris.
c) Check for improper fitting of front-end cover, damaged radiator grille or bumper, damaged vehicle front.
If NG, take appropriate action and then go to the next step.
11) Check function of ECT sensor.
Refer to step 6 of "Diagnostic Procedure", EC-330.
If NG, replace ECT sensor and go to the next step.
12) Check ignition timing. Refer to basic inspection, EC-110.
Make sure that ignition timing is 15°±5° at idle.
If NG, adjust ignition timing and then recheck.

Wiring Diagram

NHEC0613

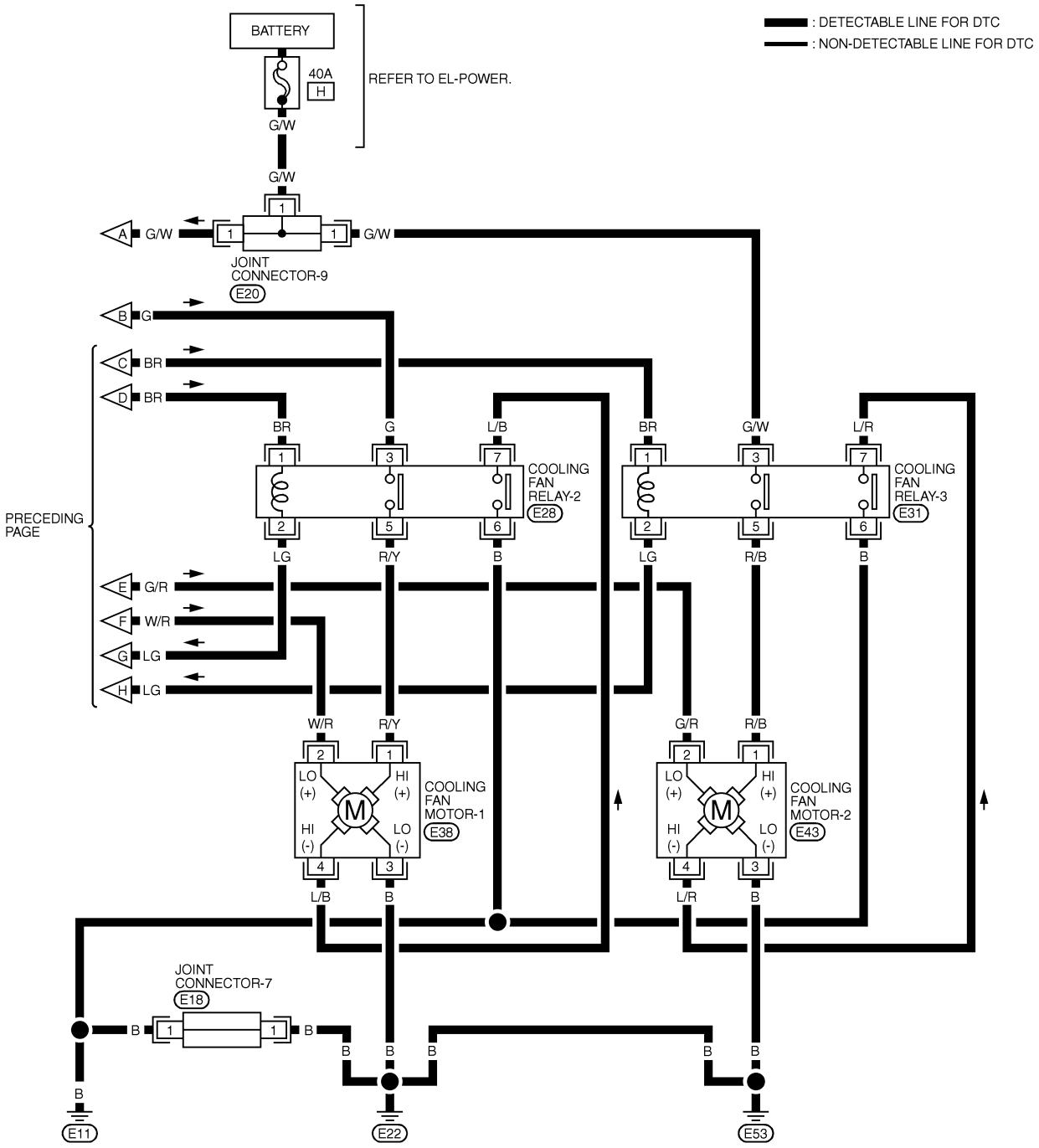




REFER TO THE FOLLOWING.
E83 -FUSE BLOCK-
JUNCTION BOX (J/B)

MEC759C

EC-COOL/F-02



MEC879C

Wiring Diagram (Cont'd)

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
34	LG	COOLING FAN RELAY (HIGH)	ENGINE RUNNING WITH COOLING FAN NOT OPERATING	BATTERY VOLTAGE
			ENGINE RUNNING WITH COOLING FAN OPERATING AT HIGH SPEED	0 - 1.0V
35	BR/R	COOLING FAN RELAY (LOW)	ENGINE RUNNING WITH COOLING FAN NOT OPERATING	BATTERY VOLTAGE
			ENGINE RUNNING WITH COOLING FAN OPERATING AT LOW SPEED	0 - 1.0V

SEF630XB

Diagnostic Procedure

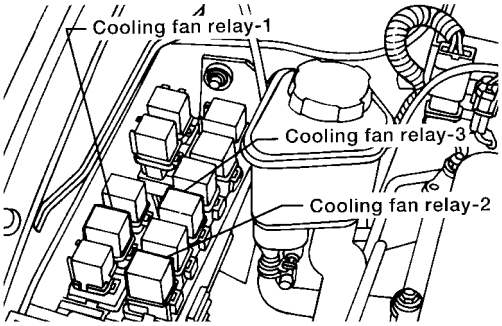
NHEC0614

1	INSPECTION START
Do you have CONSULT-II?	
Yes or No	
Yes ▶	GO TO 2.
No ▶	GO TO 4.

2	CHECK COOLING FAN LOW SPEED OPERATION

With CONSULT-II

1. Disconnect cooling fan relays-2 and -3.



AEC707

2. Turn ignition switch "ON".
3. Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT-II.

ACTIVE TEST	
COOLING FAN	OFF
MONITOR	
COOLAN TEMP/S	XXX °C

SEF646X

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-336.)

3	CHECK COOLING FAN HIGH SPEED OPERATION

With CONSULT-II

1. Turn ignition switch "OFF".
2. Reconnect cooling fan relays-2 and -3.
3. Disconnect cooling fan relay-1.
4. Turn ignition switch "ON".
5. Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT-II.

ACTIVE TEST	
COOLING FAN	OFF
MONITOR	
COOLAN TEMP/S	XXX °C

SEF111X

6. Make sure that cooling fans-1 and -2 operate at higher speed than low speed.

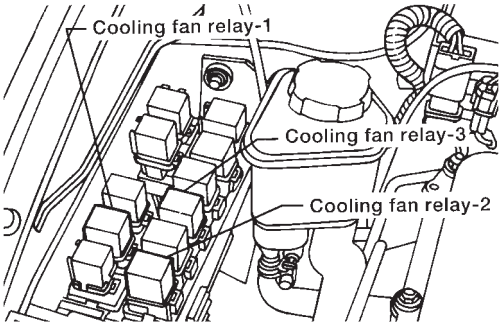
OK or NG

OK	▶	GO TO 6.
NG	▶	Check cooling fan high speed control circuit. (Go to PROCEDURE B, EC-339.)

4	CHECK COOLING FAN LOW SPEED OPERATION

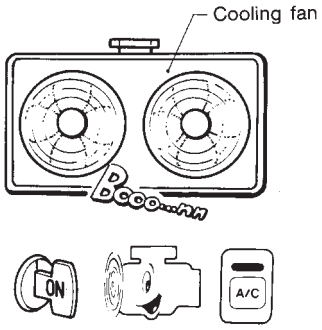
Without CONSULT-II

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

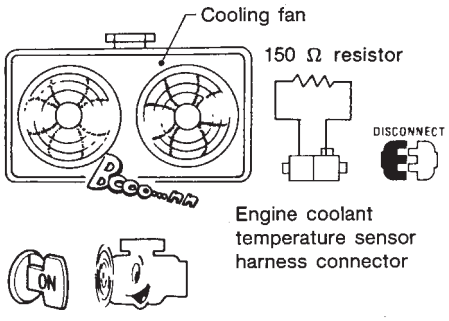
OK or NG

OK	▶	GO TO 5.
NG	▶	Check cooling fan low speed control circuit. (Go to PROCEDURE A, EC-336.)

5	CHECK COOLING FAN HIGH SPEED OPERATION

Without CONSULT-II

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-339.)

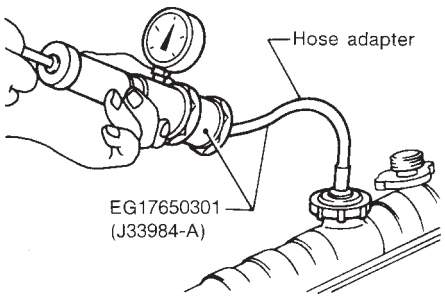
6	CHECK COOLING SYSTEM FOR LEAK

Apply pressure to the cooling system with a tester, and check if the pressure drops.

Testing pressure: 157 kPa (1.6 kg/cm^2, 23 psi)

CAUTION:

Higher than the specified pressure may cause radiator damage.



SLC754A

Pressure should not drop.

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	DETECT MALFUNCTIONING PART

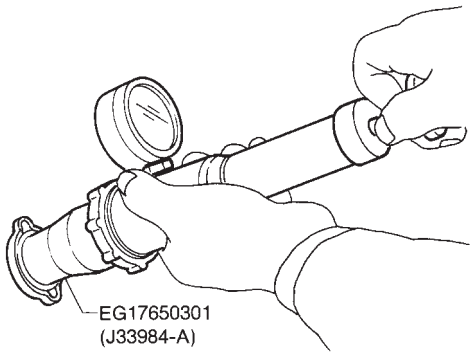
Check the following for leak.

- Hose
- Radiator
- Water pump (Refer to LC-10, "Water Pump".)

	▶	Repair or replace.

8	CHECK RADIATOR CAP

Apply pressure to cap with a tester and check radiator cap relief pressure.



SLC755A

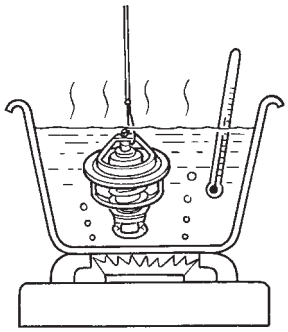
Radiator cap relief pressure:
59 - 98 kPa (0.6 - 1.0 kg/cm^2, 9 - 14 psi)

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace radiator cap.

9	CHECK THERMOSTAT

1. Remove thermostat.
2. Check valve seating condition at normal room temperatures.
   It should seat tightly.
3. Check valve opening temperature and valve lift.



SLC343

Valve opening temperature:
82°C (180°F) [standard]
Valve lift:
More than 8.6 mm/95°C (0.339 in/203°F)

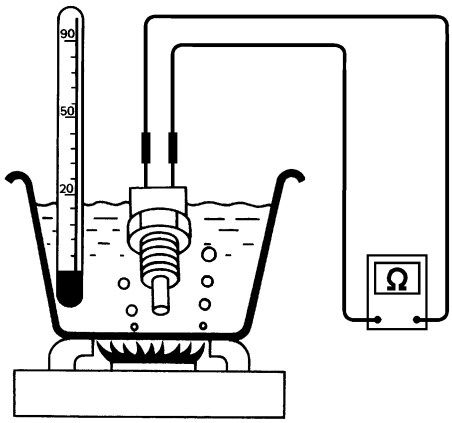
4. Check if valve is closed at 5°C (9°F) below valve opening temperature. For details, refer to LC-14, "Thermostat".

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace thermostat

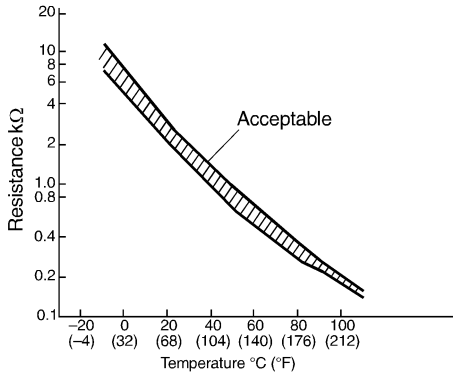
10	CHECK ENGINE COOLANT TEMPERATURE SENSOR

1. Remove engine coolant temperature sensor.
2. Check resistance between engine coolant temperature sensor terminals 1 and 2 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



SEF304X

OK or NG

OK	▶	GO TO 11.
NG	▶	Replace engine coolant temperature sensor.

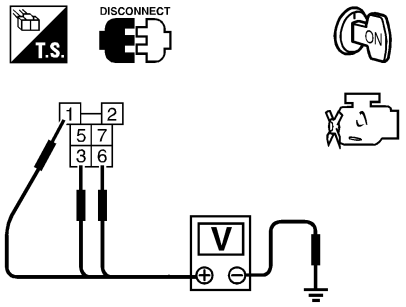
11	CHECK MAIN 12 CAUSES
If the cause cannot be isolated, go to "MAIN 12 CAUSES OF OVERHEATING", EC-341.	
▶	**INSPECTION END**

PROCEDURE A

=NHEC0614S01

1	CHECK COOLING FAN POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect cooling fan relay-1.
3. Turn ignition switch "ON".
4. Check voltage between cooling fan relay-1 terminals 1, 3, 6 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF590X

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

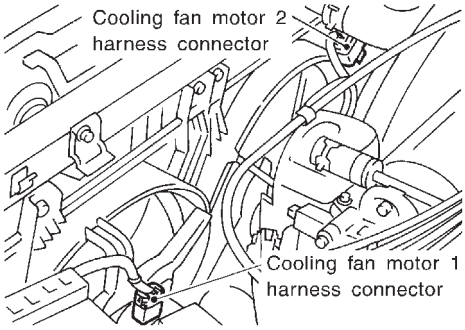
2	DETECT MALFUNCTIONING PART

Check the following.
- Joint connector-8
- Joint connector-9
- 15A fuse
- 40A fusible links
- Harness for open or short between cooling fan relay-1 and fuse
- Harness for open or short between cooling fan relay-1 and battery

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

3	CHECK COOLING FAN GROUND CIRCUIT FOR OPEN AND SHORT

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 cooling fan relay-1 terminal 5 and cooling fan motor-1 terminal 2, cooling fan motor-1 terminal 3 and body ground. Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to ground and short to power.
5. Check harness continuity between cooling fan relay-1 terminal 7 and cooling fan motor-2 terminal 2, cooling fan motor-2 terminal 3 and body ground. Refer to Wiring Diagram.
   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 COOLING FAN OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 35 and cooling fan relay-1 terminal 2. Refer to Wiring Diagram.
   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.

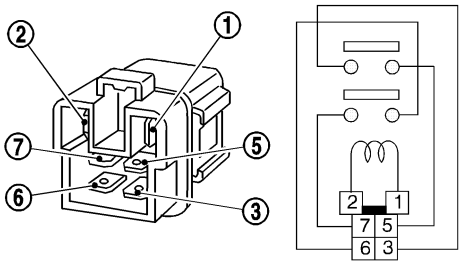
5	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F17
- 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

Check continuity between cooling fan relay-1 terminals 3 and 5, 6 and 7 under the following conditions.



Conditions	Continuity
12V direct current supply between terminals 1 and 2	Yes
No current supply	No

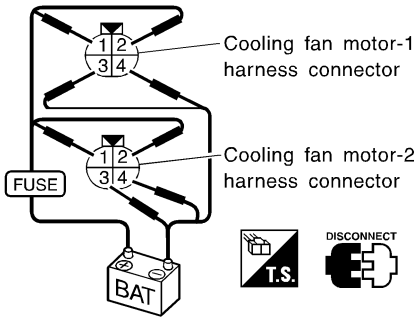
SEF591X

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace cooling fan relay.

7	CHECK COOLING FAN MOTORS-1 AND -2

Supply battery voltage between the following terminals and check operation.



	Speed	Terminals	
		(+)	(–)
Cooling fan motor-1	Low	2	3
	High	1 , 2	3 , 4
Cooling fan motor-2	Low	2	3
	High	1 , 2	3 , 4

SEF592X

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace cooling fan motors.

8	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156.

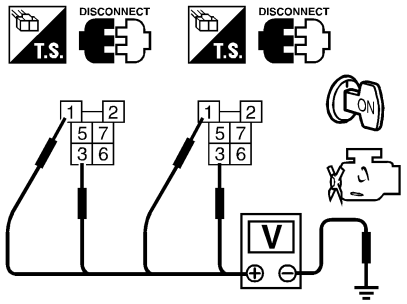
▶ **INSPECTION END**

PROCEDURE B

=NHEC0614S02

1	CHECK COOLING FAN POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect cooling fan relays-2 and -3.
3. Turn ignition switch "ON".
4. Check voltage between cooling fan relays-2 and -3 terminals 1, 3 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF593X

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Joint connector-8
- Joint connector-9
- Harness for open or short between cooling fan relays-2 and -3 and joint connectors-8, -9
- Harness for open or short between cooling fan relays-2 and -3 and joint connectors-8, -9

	▶	Repair harness or connectors.

3	CHECK COOLING FAN GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect cooling fan motor-1 harness connector and cooling fan motor-2 harness connector.
3. Check harness continuity between cooling fan relay-2 terminal 5 and cooling fan motor-1 terminal 1, cooling fan relay-2 terminal 7 and cooling fan motor-1 terminal 4, cooling fan relay-2 terminal 6 and body ground. Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to ground and short to power.
5. Check harness continuity between cooling fan relay-3 terminal 5 and cooling fan motor-2 terminal 1, cooling fan relay-3 terminal 7 and cooling fan motor-2 terminal 4, cooling fan relay-3 terminal 6 and body ground. Refer to Wiring Diagram.
   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.

Diagnostic Procedure (Cont'd)

4	CHECK COOLING FAN OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 34 and cooling fan relay-2 terminal 2, cooling fan relay-3 terminal 2. Refer to Wiring Diagram.
   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.

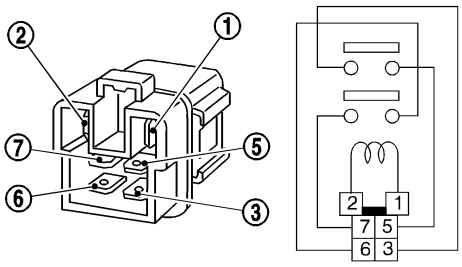
5	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F17
- Joint connector-10
- 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

Check continuity between cooling fan relay-2, -3 terminals 3 and 5, 6 and 7 under the following conditions.



Conditions	Continuity
12V direct current supply between terminals 1 and 2	Yes
No current supply	No

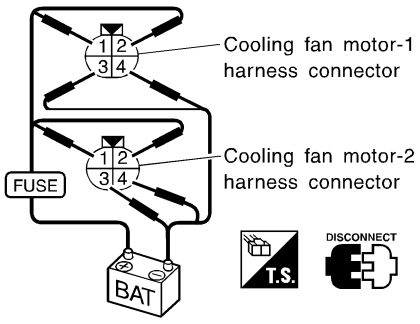
SEF591X

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace cooling fan relays.

7	CHECK COOLING FAN MOTORS

Supply battery voltage between the following terminals and check operation.



	Speed	Terminals (+)	Terminals (−)
Cooling fan motor-1	Low	2	3
	High	1 , 2	3 , 4
Cooling fan motor-2	Low	2	3
	High	1 , 2	3 , 4

SEF592X

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace cooling fan motors.

8	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156.	
▶	INSPECTION END

Main 12 Causes of Overheating

NHEC0615

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 MA-11, "RECOMMENDED FLUIDS AND LUBRICANTS".
	3	• Coolant level	• Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	See MA-14, "Changing Engine Coolant".
	4	• Radiator cap	• Pressure tester	59 - 98 kPa (0.6 - 1.0 kg/cm^2, 9 - 14 psi) (Limit)	See LC-9, "System Check".
ON*2	5	• Coolant leaks	• Visual	No leaks	See LC-9, "System Check".
ON*2	6	• Thermostat	• Touch the upper and lower radiator hoses	Both hoses should be hot	See LC-14, "Thermostat" and LC-16, "Radiator".
ON*1	7	• Cooling fan	• CONSULT-II	Operating	See trouble diagnosis for DTC P0217 (EC-324).
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 MA-14, "Changing Engine Coolant".
OFF*4	10	• Coolant return from reservoir tank to radiator	• Visual	Should be initial level in reservoir tank	See MA-13, "ENGINE MAINTENANCE".
OFF	11	• Cylinder head	• Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	See EM-41, "Inspection".
	12	• Cylinder block and pistons	• Visual	No scuffing on cylinder walls or piston	See EM-60, "Inspection".

*1: Turn the ignition switch ON.
*2: Engine running at 3,000 rpm for 10 minutes.
*3: Drive at 90 km/h (56 MPH) for 30 minutes and then let idle for 10 minutes.
*4: After 60 minutes of cool down time.
For more information, refer to LC-21, "OVERHEATING CAUSE ANALYSIS".

On Board Diagnosis Logic

NHEC0182

When a misfire occurs, engine speed will fluctuate. If the engine speed fluctuates enough to cause the CKP sensor signal to vary, ECM can determine that a misfire is occurring.

Sensor	Input Signal to ECM	ECM function
Crankshaft position sensor (POS)	Engine speed	On board diagnosis of misfire

The misfire detection logic consists of the following two conditions.

1. One Trip Detection Logic (Three Way Catalyst Damage)
   On the first trip that a misfire condition occurs that can damage the three way catalyst (TWC) due to overheating, the MIL will blink.
   When a misfire condition occurs, the ECM monitors the CKP sensor signal every 200 engine revolutions for a change.
   When the misfire condition decreases to a level that will not damage the TWC, the MIL will turn off.
   If another misfire condition occurs that can damage the TWC on a second trip, the MIL will blink.
   When the misfire condition decreases to a level that will not damage the TWC, the MIL will remain on.
   If another misfire condition occurs that can damage the TWC, the MIL will begin to blink again.
2. Two Trip Detection Logic (Exhaust quality deterioration)
   For misfire conditions that will not damage the TWC (but will affect vehicle emissions), the MIL will only light when the misfire is detected on a second trip. During this condition, the ECM monitors the CKP sensor signal every 1,000 engine revolutions.
   A misfire malfunction can be detected on any one cylinder or on multiple cylinders.

Malfunction is detected when multiple cylinders misfire, No. 1 cylinder misfires, No. 2 cylinder misfires, No. 3 cylinder misfires, No. 4 cylinder misfires, No. 5 cylinder misfires and No. 6 cylinder misfires.

Possible Cause

NHEC0490

- Improper spark plug
- Insufficient compression
- Incorrect fuel pressure
- EGR volume control 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 or flywheel
- Front heated oxygen sensor

4

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h
P/N POSI SW	OFF
B/FUEL SCHDL	XXX msec

SEF213Y

DTC Confirmation Procedure

NHEC0183

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 10 seconds before conducting the next test.

WITH CONSULT-II

NHEC0183S01

1) Turn ignition switch "ON", and select "DATA MONITOR" mode with CONSULT-II.
2) Start engine and warm it up to normal operating temperature.
3) Turn ignition switch "OFF" and wait at least 10 seconds.
4) Start engine again and drive at 1,500 to 3,000 rpm for at least 3 minutes.
   Hold the accelerator pedal as steady as possible.

NOTE:

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

5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-343.

WITH GST

NHEC0183S02

Follow the procedure "With CONSULT-II" above.

Diagnostic Procedure

NHEC0184

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	
1. 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" of "DTC P1402 EGR FUNCTION (OPEN)". Refer to EC-572.		
OK or NG		
OK	▶	GO TO 4.
NG	▶	Repair EGR system.

Diagnostic Procedure (Cont'd)

4	PERFORM POWER BALANCE TEST

With CONSULT-II

1. Perform "POWER BALANCE" in "ACTIVE TEST" mode.

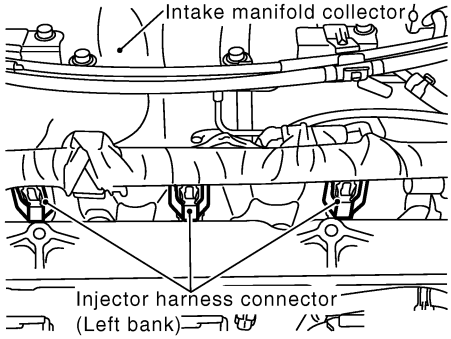
ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS AIF SE-B1	XXX V
IACV-AAC/V	XXX step

SEF070Y

2. Is there any cylinder which does not produce a momentary engine speed drop?

Without CONSULT-II

When disconnecting each injector harness connector one at a time, is there any cylinder which does not produce a momentary engine speed drop?



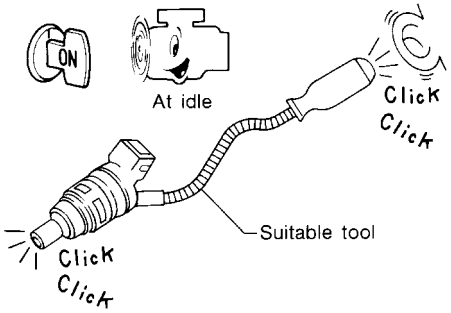
SEF281X

Yes or No

Yes	▶	GO TO 5.
No	▶	GO TO 8.

5	CHECK INJECTOR

Does each injector make an operating sound at idle?



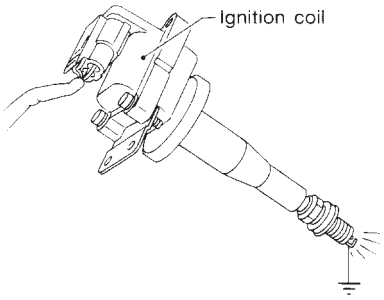
MEC703B

Yes or No

Yes	▶	GO TO 6.
No	▶	Check injector(s) and circuit(s). Refer to EC-657.

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.



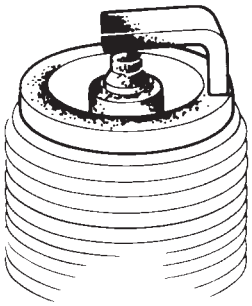
SEF575Q

OK or NG

OK	▶	GO TO 7.
NG	▶	Check ignition coil, power transistor and their circuits. Refer to "DTC P1320 IGNITION SIGNAL", EC-537.

7	CHECK SPARK PLUGS

Remove the spark plugs and check for fouling, etc.



SEF156I

OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace spark plug(s) with standard type one(s). For spark plug type, refer to MA-13, "ENGINE MAINTENANCE".

8	CHECK COMPRESSION PRESSURE

Check compression pressure. Refer to EM-12, "Measurement of Compression Pressure".

Standard:

1,275 kPa (13.0 kg/cm^2, 185 psi)/300 rpm

Minimum:

981 kPa (10.0 kg/cm^2, 142 psi)/300 rpm

Difference between each cylinder:

98 kPa (1.0 kg/cm^2, 14 psi)/300 rpm

OK or NG

OK	▶	GO TO 9.
NG	▶	Check pistons, piston rings, valves, valve seats and cylinder head gaskets.

Diagnostic Procedure (Cont'd)

9	CHECK FUEL PRESSURE
1. Install all removed parts. 2. Release fuel pressure to zero. Refer to EC-50. 3. Install fuel pressure gauge and check fuel pressure. Refer to EC-50. **At idle:** **Approx. 235 kPa (2.4 kg/cm^2, 34 psi)**	
OK or NG	
OK ▶	GO TO 11.
NG ▶	GO TO 10.

10	DETECT MALFUNCTIONING PART
Check the following. ● Fuel pump and circuit (Refer to 667.) ● Fuel pressure regulator (Refer to EC-51.) ● Fuel lines (Refer to MA-16, "Checking Fuel Lines".) ● Fuel filter for clogging	
▶	Repair or replace.

11	CHECK IGNITION TIMING
Check the following items. Refer to "Basic Inspection", EC-110.	

Items	Specifications
Ignition timing	15° ± 5° BTDC
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.05 mm (0.0020 in): ON 0.15 mm (0.0059 in): OFF
Target idle speed	700 ± 50 rpm (in "P" or "N" position)

MTBL0595

OK or NG	
OK (With CONSULT-II) ▶	GO TO 12.
OK (Without CONSULT-II) ▶	GO TO 13.
NG ▶	Follow the "Basic Inspection".

12	CHECK FRONT HEATED OXYGEN SENSOR LH/RH

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" and "HI SPEED" in "DATA MONITOR" mode with CONSULT-II, and select "FR O2 SEN-B1 (-B2)" and "FR O2 MNTR-B1 (-B2)".
3. Hold engine speed at 2,000 rpm under no load during the following steps.
4. Touch "RECORD" on CONSULT-II screen.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
FR O2 SEN-B1	XXX V
RR O2 SEN-B2	XXX V

SEF063Y

5. Check the following.

- "FR O2 MNTR-B1 (-B2)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds. 5 times (cycles) are counted as shown left:

Right bank

cycle	1	2	3	4	5
FR O2 MNTR-B1	R-L	R-L	R-L	R-L	R-L-R

Left bank

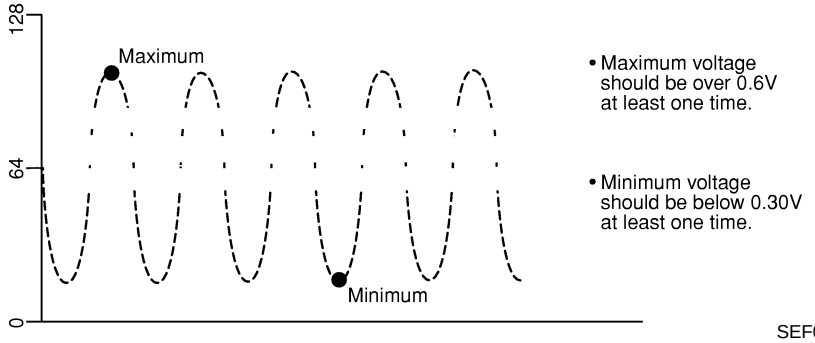
cycle	1	2	3	4	5
FR O2 MNTR-B2	R-L	R-L	R-L	R-L	R-L-R

R means FR O2 MNTR-B1(-B2) indicates RICH
L means FR O2 MNTR-B1(-B2) indicates LEAN

SEF702W

- "FR O2 SEN-B1 (-B2)" voltage goes above 0.6V at least once.
- "FR O2 SEN-B1 (-B2)" voltage goes below 0.3V at least once.
- "FR O2 SEN-B1 (-B2)" voltage never exceeds 1.0V.

Trigger	ENG SPEED	FR O2 SEN-B1
	rpm	V
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX



SEF064Y

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.

OK or NG

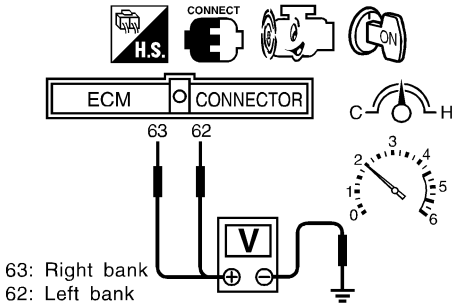
OK	▶	GO TO 15.
NG	▶	GO TO 14.

Diagnostic Procedure (Cont'd)

13	CHECK FRONT HEATED OXYGEN SENSOR LH/RH

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 63 (right bank front HO2S signal) or 62 (left bank front HO2S signal) and engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.



- The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.
- 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.

1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

SEF967X

CAUTION:

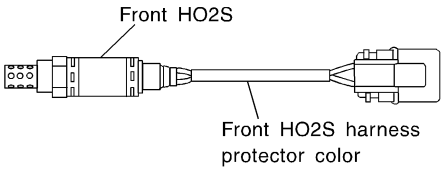
Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

OK	▶	GO TO 15.
NG	▶	GO TO 14.

14	REPLACE FRONT HEATED OXYGEN SENSOR

1. Turn ignition switch "OFF".
2. Check front heated oxygen sensor harness protector color.



Right bank: Black
Left bank: Blue

SEF194WM

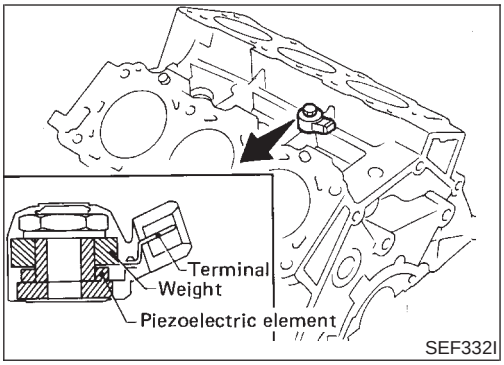
	▶	Replace malfunctioning front heated oxygen sensor.

15	CHECK MASS AIR FLOW SENSOR
With CONSULT-II Check mass air flow sensor signal in "DATA MONITOR" mode with CONSULT-II. **2.0 - 6.0 g·m/sec: at idling** **7.0 - 20.0 g·m/sec: at 2,500 rpm**	
With GST Check mass air flow sensor signal in MODE 1 with GST. **2.0 - 6.0 g·m/sec: at idling** **7.0 - 20.0 g·m/sec: at 2,500 rpm**	
OK or NG	
OK ▶	GO TO 16.
NG ▶	Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-164.

16	CHECK SYMPTOM MATRIX CHART
Check items on the rough idle symptom in "Symptom Matrix Chart", EC-134.	
OK or NG	
OK ▶	GO TO 17.
NG ▶	Repair or replace.

17	ERASE THE 1ST TRIP DTC
Erase the 1st trip DTC from the ECM memory after performing the tests. Refer to EC-82. Some tests may cause a 1st trip DTC to be set.	
▶	GO TO 18.

18	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156.	
▶	**INSPECTION END**



Component Description

NHEC0185

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.

On Board Diagnosis Logic

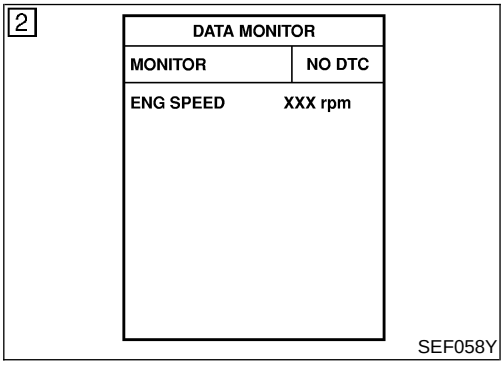
NHEC0187

Malfunction is detected when an excessively low or high voltage from the knock sensor is sent to ECM.

Possible Cause

NHEC0491

- Harness or connectors
  (The knock sensor circuit is open or shorted.)
- Knock sensor



DTC Confirmation Procedure

NHEC0188

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 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-II

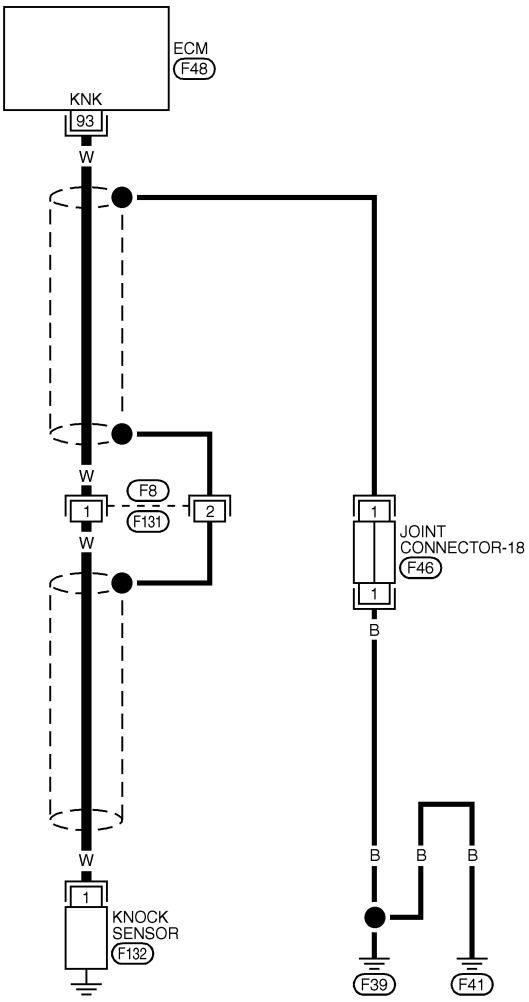
NHEC0188S01

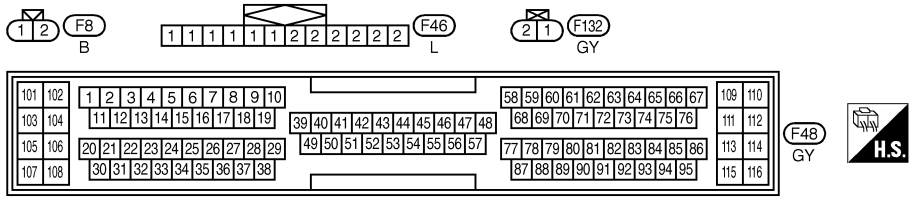
1) Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II.
2) Start engine and run it for at least 5 seconds at idle speed.
3) If DTC is detected, go to “Diagnostic Procedure”, EC-352.

Wiring Diagram

NHEC0189

EC-KS-01





MEC736C

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
93	W	KNOCK SENSOR	ENGINE RUNNING AT IDLE SPEED	APPROX. 2.5V

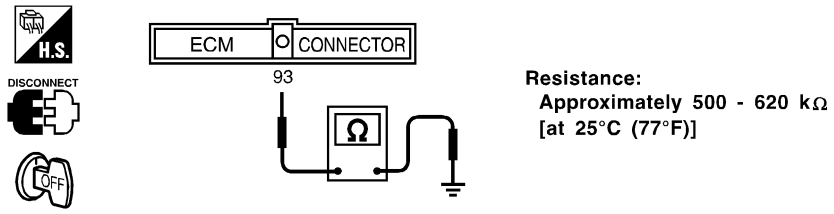
SEF663XB

Diagnostic Procedure

NHEC0190

1	CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-I

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check resistance between ECM terminal 93 and engine ground.
   NOTE:
   It is necessary to use an ohmmeter which can measure more than 10 MΩ.



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

SEF321X

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

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 2.

2	CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-II

1. Disconnect knock sensor harness connector.
2. Check harness continuity between ECM terminal 93 and knock sensor terminal 1. Refer to Wiring Diagram.
   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 connector F8, F131
- Harness for open or short between ECM and knock sensor

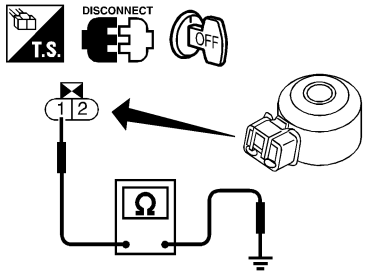
	▶	Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK KNOCK SENSOR

Check resistance between knock sensor terminal 1 and ground.

NOTE:

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



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

SEF322X

CAUTION:

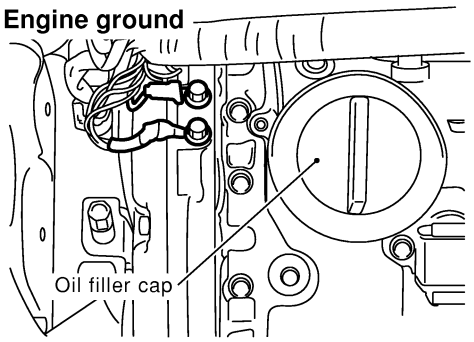
Do not use any knock sensors that have been dropped or physically damaged. Use only new ones.

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace knock sensor.

5	RETIGHTEN GROUND SCREWS

Loose and retighten engine ground screws.



SEF255X

	▶	GO TO 6.

6	CHECK KNOCK SENSOR SHIELD CIRCUIT FOR OPEN AND SHORT

1. Disconnect harness connectors F8, F131.
2. Check harness continuity between harness connector F8 terminal 2 and engine ground. Refer to Wiring Diagram.
   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

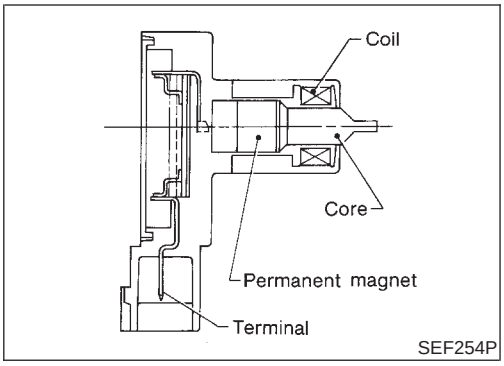
Check the following.

- Harness connectors F8, F131
- Joint connectors-18
- Harness for open or short between harness connector F8 and engine ground

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

Diagnostic Procedure (Cont'd)

8	**CHECK INTERMITTENT INCIDENT**
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156.	
▶	**INSPECTION END**



Component Description

NHEC0191

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

CONSULT-II Reference Value in Data Monitor Mode

NHEC0492

Specification data are reference values.

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

On Board Diagnosis Logic

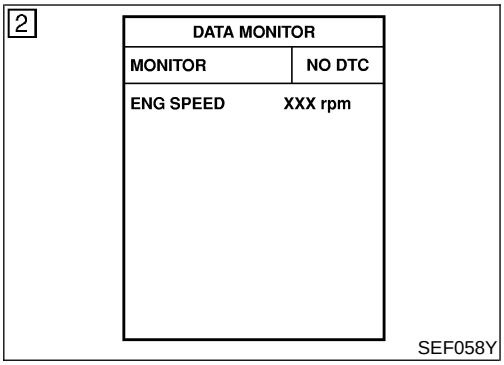
NHEC0193

Malfunction is detected when 1° signal is not entered to ECM for the first few seconds during engine cranking, or 1° signal is not entered to ECM during engine running.

Possible Cause

NHEC0493

- Harness or connectors
  (The crankshaft position sensor (POS) circuit is open or shorted.)
- Crankshaft position sensor (POS)
- Starter motor (Refer to EL section.)
- Starting system circuit (Refer to EL section.)
- Dead (Weak) battery



DTC Confirmation Procedure

NHEC0194

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

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

WITH CONSULT-II

NHEC0194S01

1) Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II.
2) Crank engine for at least two seconds.
3) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-358.

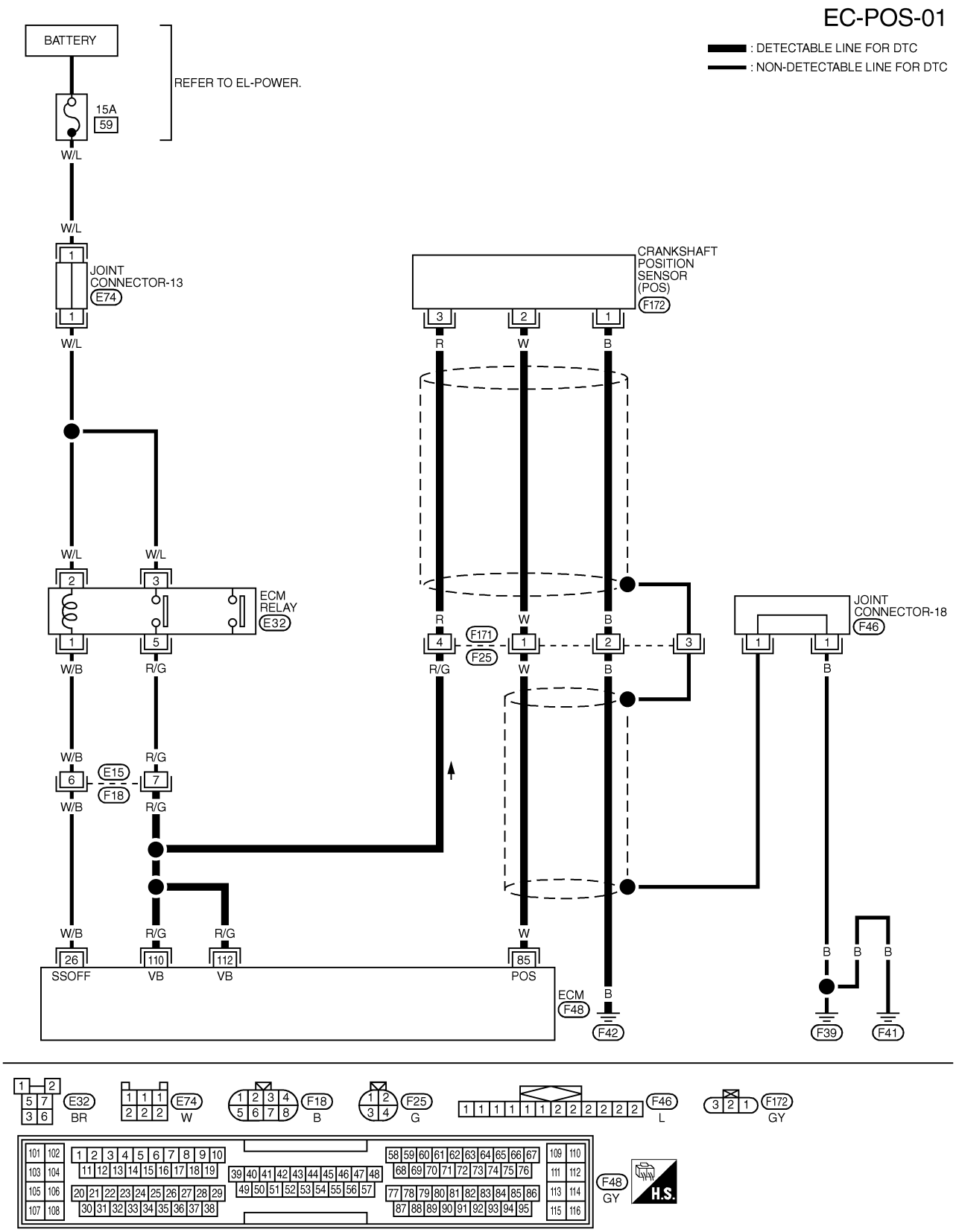
WITH GST

NHEC0194S02

Follow the procedure “With CONSULT-II” above.

Wiring Diagram

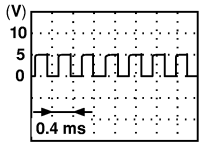
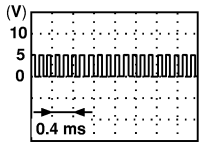
NHEC0195



MEC812C

Wiring Diagram (Cont'd)

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
85	W	CRANKSHAFT POSITION SENSOR (POS)	ENGINE RUNNING AT IDLE SPEED UNDER WARM-UP CONDITION	APPROX. 2.4V 
			ENGINE RUNNING AT 2,000 RPM	APPROX. 2.3V 

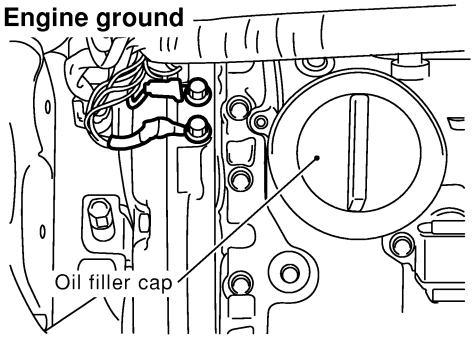
SEF856Y

Diagnostic Procedure

NHEC0196

1	RETIGHTEN GROUND SCREWS

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

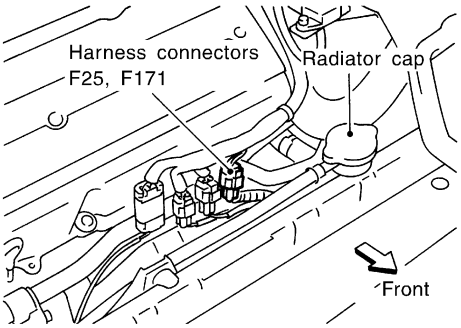


SEF255X

▶	GO TO 2.

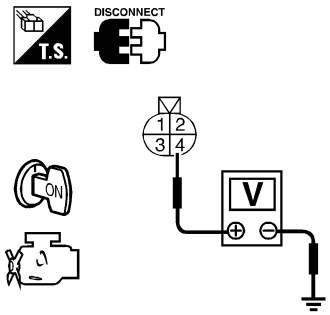
2	CHECK CKPS (POS) POWER SUPPLY CIRCUIT

1. Disconnect harness connectors F25, F171.



SEF511WB

2. Check voltage between harness connector F25 terminal 4 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF323X

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 F25, F171
- Harness connectors E15, F18
- Harness for open or short between ECM and crankshaft position sensor (POS)
- Harness for open or short between ECM relay and crankshaft position sensor (POS)

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

4	CHECK CKPS (POS) GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between harness connector F25 terminal 2 and engine ground. Refer to Wiring Diagram.
   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 CKPS (POS) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

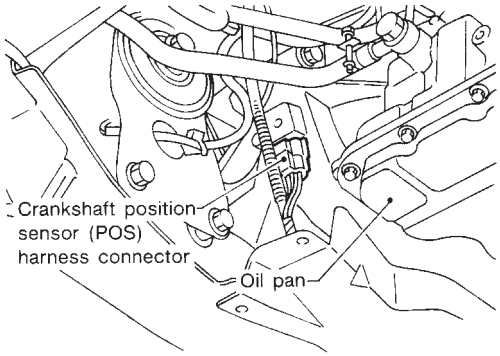
1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 85 and harness connector F25 terminal 1.
   Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

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 CKPS (POS) SUB-HARNESS CIRCUIT FOR OPEN AND SHORT

1. Disconnect CKPS (POS) harness connector.



SEF367Q

2. Check harness continuity between CKPS (POS) terminals and harness connector F171 terminals as follows.

CKPS (POS) terminal	Harness connector F171 terminal
1	2
2	1
3	4

MTBL0352

Continuity should exist.

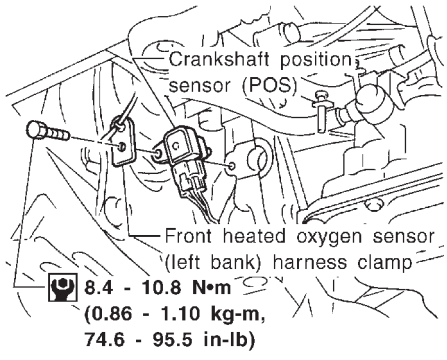
3. Also check harness for short to ground and short to power.

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 CKPS (POS) INSTALLATION

Check that CKPS (POS) and front HO2S (Left bank) harness clamp are installed correctly as shown below.



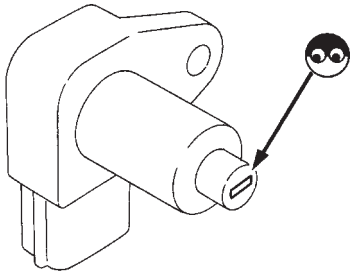
SEM222F

OK or NG

OK	▶	GO TO 8.
NG	▶	Install CKPS (POS) correctly.

8	CHECK CRANKSHAFT POSITION SENSOR (POS)-I

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



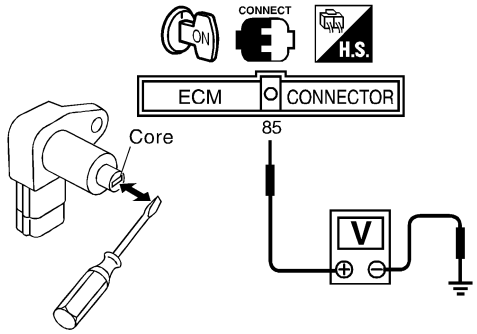
SEF587P

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace crankshaft position sensor (POS).

9	CHECK CRANKSHAFT POSITION SENSOR (POS)-II

1. Reconnect disconnected harness connectors.
2. Turn ignition switch "ON".
3. Check voltage between ECM terminal 85 and ground by briefly touching the sensor core with a flat-bladed screwdrivers.



ECM terminal	Condition	Voltage
85	Contacted	Approximately 5V
	Pulled away	Approximately 0V

There should be a steady 5V as the flat-bladed screwdriver is drawn away slowly.

SEF324X

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace crankshaft position sensor (POS).

10	CHECK CKPS (POS) SHIELD CIRCUIT FOR OPEN AND SHORT

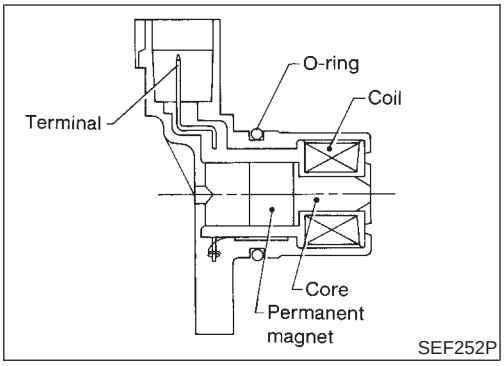
1. Disconnect harness connectors F25, F171.
2. Check harness continuity between harness connector F25 terminal 3 and engine ground. Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 12.
NG	▶	GO TO 11.

11	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors F25, F171 ● Joint connector-18 ● Harness for open or short between harness connector F25 and engine ground	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

12	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156.	
▶	**INSPECTION END**



Component Description

NHEC0197

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

On Board Diagnosis Logic

NHEC0199

Malfunction is detected when
(Malfunction A) the cylinder No. signal is not sent to ECM for the first few seconds during engine cranking,
(Malfunction B) the cylinder No. signal is not sent to ECM during engine running,
(Malfunction C) the cylinder No. signal is not in the normal pattern during engine running.

Possible Cause

NHEC0494

- Harness or connectors
  [The camshaft position sensor (PHASE) circuit is open or shorted.]
- Camshaft position sensor (PHASE)
- Starter motor (Refer to SC section.)
- Starting system circuit (Refer to SC section.)
- Dead (Weak) battery

DTC Confirmation Procedure

NHEC0200

NOTE:

- **Perform "PROCEDURE FOR MALFUNCTION A" first. If 1st trip DTC cannot be confirmed, perform "PROCEDURE FOR MALFUNCTION B AND C".**
- If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10.5V at idle.

DTC Confirmation Procedure (Cont'd)

2

DATA MONITOR	
MONITOR	NO DTC
COOLAN TEMP/S	XXX °C

SEF013Y

3

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

PROCEDURE FOR MALFUNCTION A

NHEC0200S01

With CONSULT-II

NHEC0200S0101

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Crank engine for at least 2 seconds.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-366.

With GST

NHEC0200S0102

Follow the procedure "With CONSULT-II" above.

PROCEDURE FOR MALFUNCTION B AND C

NHEC0200S02

With CONSULT-II

NHEC0200S0201

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Start engine and run it for at least 2 seconds at idle speed.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-366.

With GST

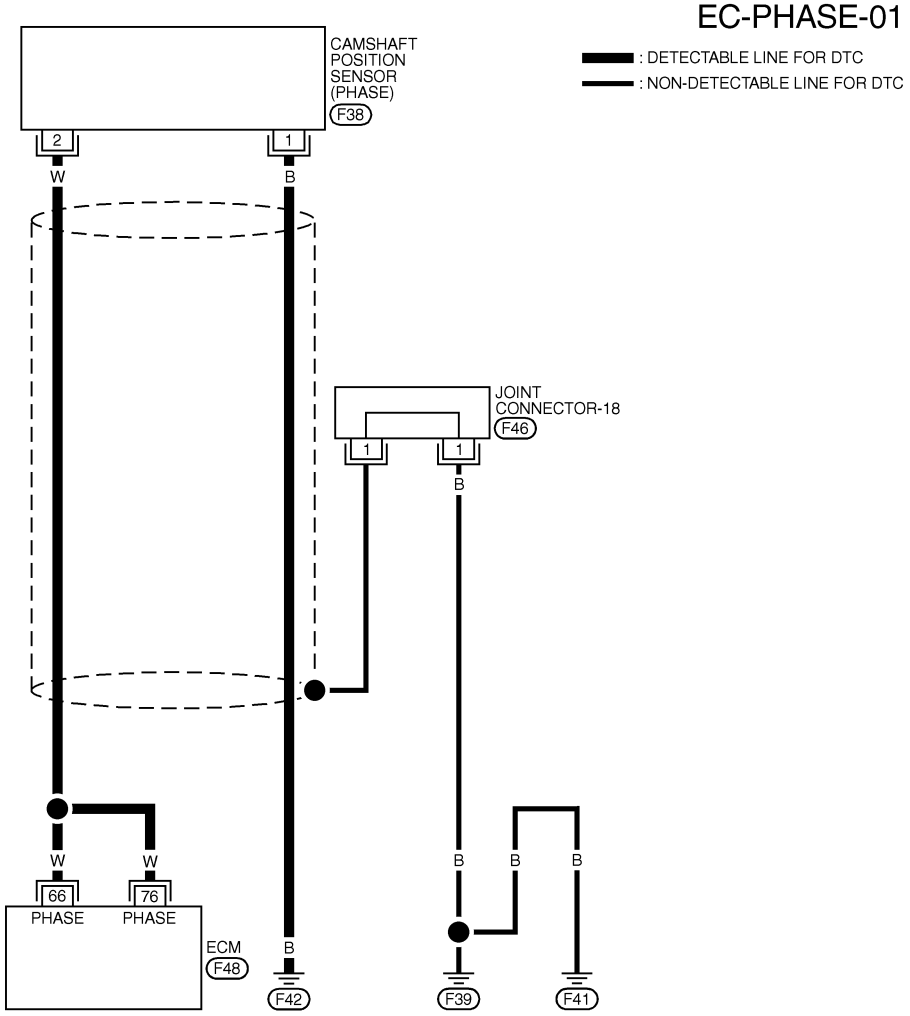
NHEC0200S0202

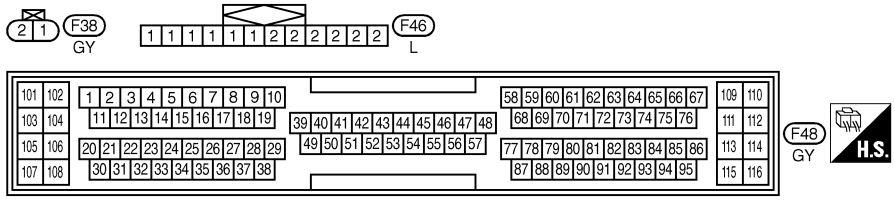
Follow the procedure "With CONSULT-II" above.

Wiring Diagram

NHEC0201

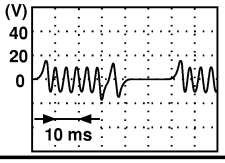
EC-PHASE-01





MEC738C

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

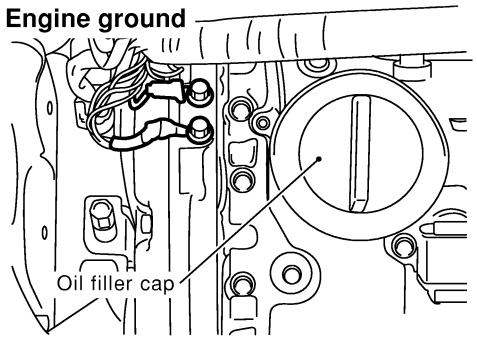
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
66 76	W W	CAMSHAFT POSITION SENSOR (PHASE)	ENGINE RUNNING AT IDLE SPEED	APPROX. 4.2V (AC RANGE) 

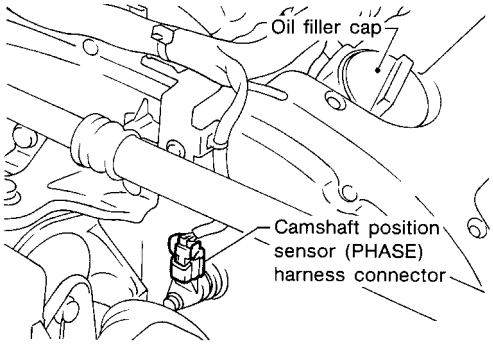
SEF857Y

Diagnostic Procedure

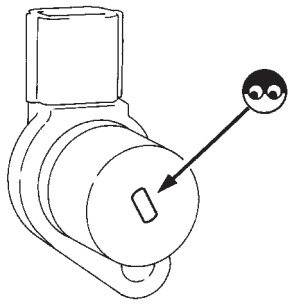
NHEC0202

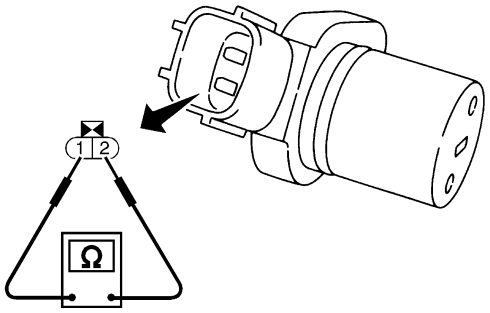
1	CHECK STARTING SYSTEM	
Turn ignition switch to “START” position. **Does the engine turn over?** **Does the starter motor operate?**		
Yes or No		
Yes	▶	GO TO 2.
No	▶	Check starting system. (Refer to SC-6, “STARTING SYSTEM”.)

2	RETIGHTEN GROUND SCREWS	
1. Turn ignition switch “OFF”. 2. Loosen and retighten engine ground screws.		
 SEF255X		
	▶	GO TO 3.

3	CHECK CMPS (PHASE) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
1. Turn ignition switch “OFF”. 2. Disconnect ECM harness connector and CMPS (PHASE) harness connector.		
 SEF274P		
3. Check harness continuity between CMPS (PHASE) terminal 2 and ECM terminals 66, 76. Refer to Wiring Diagram. **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 CMPS (PHASE) GROUND CIRCUIT FOR OPEN AND SHORT	
1. Check harness continuity between CMPS (PHASE) terminal 1 and engine ground. **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 connector.

5	CHECK CAMSHAFT POSITION SENSOR (PHASE)-I	
1. Loosen the fixing bolt of the camshaft position sensor (PHASE). 2. Remove the CMPS (PHASE). 3. Visually check the CMPS (PHASE) for chipping.  SEF583P **OK or NG**		
OK	▶	GO TO 6.
NG	▶	Replace camshaft position sensor (PHASE).

6	CHECK CAMSHAFT POSITION SENSOR (PHASE)-II	
Check resistance between CMPS (PHASE) terminals 1 and 2 as shown below.  **Resistance:** **Approximately 1,440 - 1,760 Ω at 20°C (68°F) (HITACHI make)** **Approximately 2,090 - 2,550 Ω at 20°C (68°F) (MITSUBISHI make)** SEF325X **OK or NG**		
OK	▶	GO TO 7.
NG	▶	Replace camshaft position sensor (PHASE).

7	CHECK CMPS (PHASE) SHIELD CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect joint connector-18.
3. Check the following.
- Continuity between joint connector terminal 1 and ground
- Joint connector
  (Refer to EL-463, "HARNESS LAYOUT".)

Continuity should exist.

4. Also check harness for short to ground and short to power.
5. Then reconnect joint connector-18.

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 INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156.	
▶	**INSPECTION END**

Description

NHEC0203

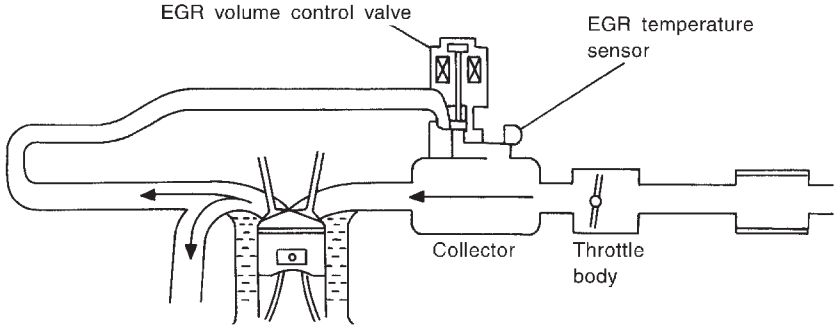
SYSTEM DESCRIPTION

NHEC0203S01

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed (POS signal)	EGR volume control	EGR volume control valve
Crankshaft position sensor (REF)	Engine speed (REF signal)		
Vehicle speed sensor	Vehicle speed		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		
Battery	Battery voltage		
Mass air flow sensor	Amount of intake air		
Air conditioner switch	Air conditioner operation		
Power steering oil pressure switch	Power steering load signal		
Electrical load	Electrical load signal		
PNP switch	Park/Neutral position signal		
TCM (Transmission Control Module)	Gear position, shifting signal		

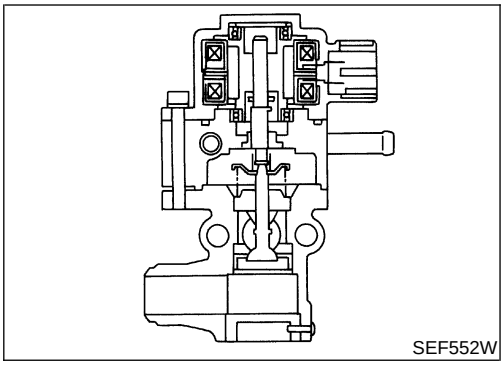
This system controls flow rate of EGR led from exhaust manifold to intake manifold. The opening of the EGR by-pass passage in the EGR volume control valve changes to control the flow rate. A built-in step motor moves the valve in steps corresponding to the ECM output pulses. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions. The EGR volume control valve remains close under the following conditions.

- Engine stopped
- Engine starting
- Engine idling
- Low engine coolant temperature
- Excessively high engine coolant temperature
- High engine speed
- Wide open throttle
- Low battery voltage



SEF551W

Description (Cont'd)


SEF552W

COMPONENT DESCRIPTION

NHEC0203S02

EGR volume control valve

NHEC0203S0203

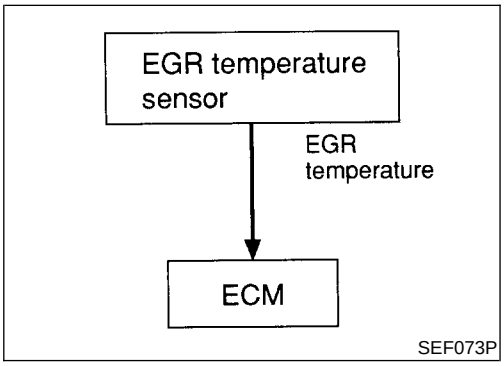
The EGR volume control valve uses a step motor to control the flow rate of EGR from exhaust manifold. This motor has four winding phases. It operates according to the output pulse signal of the ECM. Two windings are turned ON and OFF in sequence. Each time an ON pulse is issued, the valve opens or closes, 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-II Reference Value in Data Monitor Mode

NHEC0495

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
EGR TEMP SEN	• Engine: After warming up		Less than 4.5V
EGR VOL CON/V	• Engine: After warming up • Air conditioner switch: "OFF" • Shift lever: "N" • No-load	Idle	0 step
		Revving engine up to 3,000 rpm quickly	10 - 55 step



SEF073P

On Board Diagnosis Logic

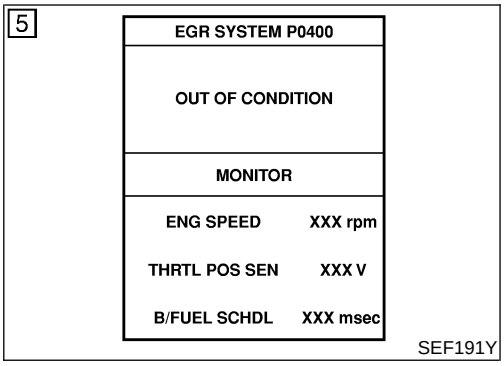
NHEC0204

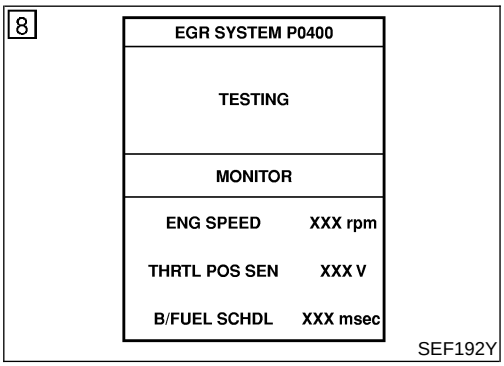
If the absence of EGR flow is detected by EGR temperature sensor under the condition that calls for EGR, a low-flow malfunction is diagnosed.
Malfunction is detected when no EGR flow is detected under condition that calls for EGR.

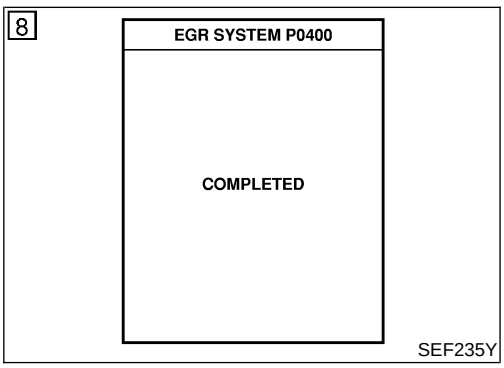
Possible Cause

NHEC0496

- Harness or connectors
  (EGR volume control valve circuit is open or shorted.)
- EGR volume control valve stuck closed
- Dead (Weak) battery
- EGR passage clogged
- EGR temperature sensor and circuit
- Exhaust gas leaks







DTC Confirmation Procedure

NHEC0205

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 10 seconds before conducting the next test.
- P0400 will not be displayed at "SELF-DIAG RESULTS" mode with CONSULT-II even though DTC work support test result is NG.

TESTING CONDITION:

- **Before performing the following procedure, confirm battery voltage is more than 10V at idle, then stop engine immediately.**
- **For best results, perform the test at a temperature of 5°C (41°F) or higher.**

WITH CONSULT-II

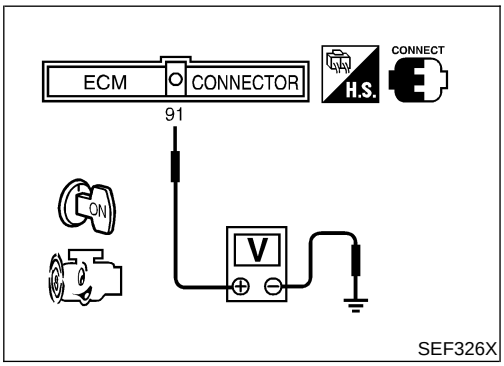
NHEC0205S01

1) Turn ignition switch "OFF" and wait at least 10 seconds.
2) Turn ignition switch "ON"
3) Check "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT-II.
   Confirm COOLAN TEMP/S value 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 engine coolant temperature with a fan or means other than ambient air. Doing so may produce an inaccurate diagnostic result.
4) Start engine and let it idle monitoring "COOLAN TEMP/S" value. When the "COOLAN TEMP/S" value reaches 60°C (140°F), immediately go to the next step.
5) Select "EGR SYSTEM P0400" of "EGR SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
6) Touch "START".
7) Accelerate vehicle to a speed of 40 km/h (25 MPH) once and then stop vehicle with engine running.
   If "COMPLETED" appears on CONSULT-II screen, go to step 9.
   If "COMPLETED" does not appear on CONSULT-II screen, go to the following step.
8) When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions until "TESTING" changes to "COMPLETED". (It will take approximately 30 seconds or more.)

ENG SPEED	1,200 - 2,400 rpm
Vehicle speed	Suitable speed
B/FUEL SCHDL	More than 4 msec
THRTL POS SEN	0.65 - 1.08V
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-374.



WITH GST

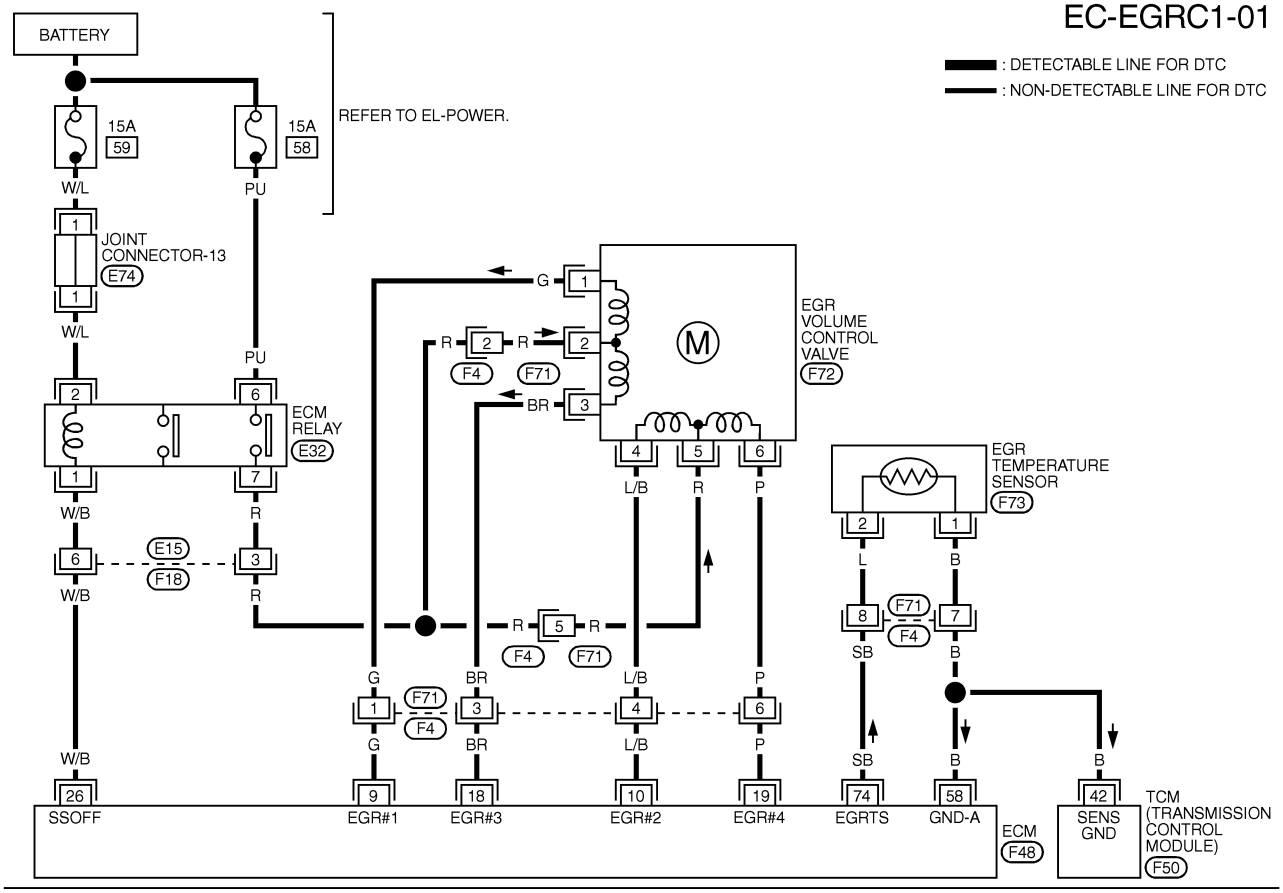
NHEC0205S02

1) Turn ignition switch "OFF" and wait at least 10 seconds.
2) Turn ignition switch "ON".
3) Check engine coolant temperature in MODE 1 with GST.
   Engine coolant temperature: 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.
4) Start engine and let it idle monitoring the value of "COOLAN TEMP/S". When the engine coolant temperature reaches 60°C (140°F), immediately go to the next step.
5) Maintain the following conditions for at least 1 minute.
   Engine speed: 1,200 - 2,400 rpm
   Vehicle speed: Suitable speed
   Voltage between ECM terminal 91 and ground: 0.65 - 1.08V
   Selector lever: Suitable position
6) Stop vehicle.
7) Turn ignition switch "OFF" and wait at least 10 seconds, then turn "ON".
8) Repeat step 3 to 5.
9) Select "MODE 3" with GST.
10) If DTC is detected, go to "Diagnostic Procedure", EC-374.

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

Wiring Diagram

NHEC0207



MEC813C

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
9	G	EGR VOLUME CONTROL VALVE	ENGINE RUNNING AT IDLE SPEED	0.1 - 14V
10	L/B			
18	BR			
19	P			

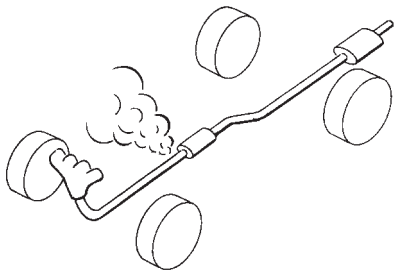
SEF666XB

Diagnostic Procedure

NHEC0208

1	CHECK EXHAUST SYSTEM

1. Start engine.
2. Check exhaust pipes and muffler for leaks.



SEF099P

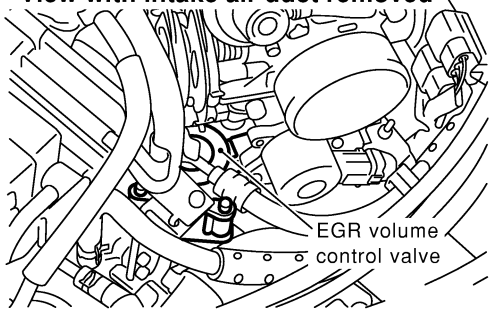
OK or NG

OK	▶	GO TO 2.
NG	▶	Repair or replace exhaust system.

2	CHECK EGR VOLUME CONTROL VALVE POWER SUPPLY CIRCUIT

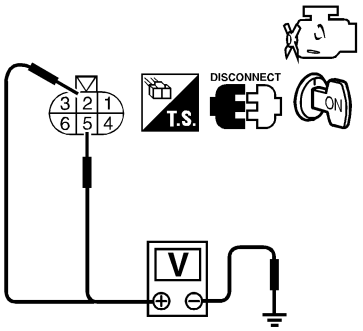
1. Disconnect EGR volume control vale harness connector.

View with intake air duct removed



SEF265X

2. Turn ignition switch “ON”.
3. Check voltage between EGR volume control valve terminals 2, 5 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF327X

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E15, F18 ● Harness connectors F4, F71 ● Harness for open or short between ECM relay and EGR volume control valve	
▶	Repair harness or connectors.

4	CHECK EGR VOLUME CONTROL VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminals and EGR volume control valve terminals as follows. Refer to Wiring Diagram.

ECM terminal	EGR volume control valve
9	1
10	4
18	3
19	6

MTBL0356

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 F4, F71 ● Harness for open or short between ECM and EGR volume control valve	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

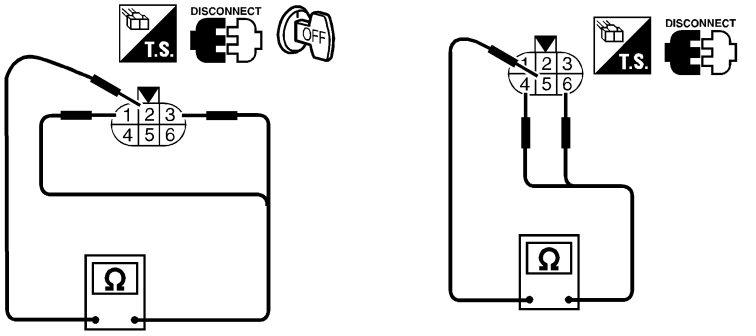
6	CHECK EGR PASSAGE	
Check EGR passage for clogging and cracks.		
OK or NG		
OK	▶	GO TO 7.
NG	▶	Repair or replace EGR passage.

7	CHECK EGR TEMPERATURE SENSOR AND CIRCUIT	
Refer to "DTC Confirmation Procedure", EC-563.		
OK or NG		
OK	▶	GO TO 8.
NG	▶	Replace EGR temperature sensor.

Diagnostic Procedure (Cont'd)

8	CHECK EGR VOLUME CONTROL VALVE-I

Check resistance between EGR volume control valve terminal 2 and terminals 1, 3, terminal 5 and terminals 4, 6.



Resistance:
20.9 - 23.1 Ω [At 20°C (68°F)]

SEF588X

OK or NG

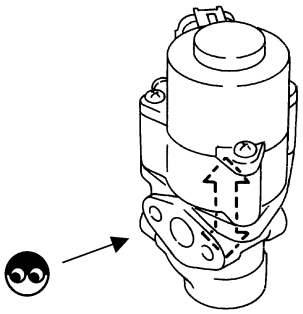
OK (With CONSULT-II)	▶	GO TO 9.
OK (Without CONSULT-II)	▶	GO TO 10.
NG	▶	Replace EGR volume control valve.

9	CHECK EGR VOLUME CONTROL VALVE-II

With CONSULT-II

1. Remove EGR volume control valve.
2. Reconnect ECM harness connector and EGR volume control valve harness connector.
3. Turn ignition switch "ON".
4. Perform "EGR VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II.
5. Check that EGR volume control valve shaft moves smoothly forward and backward according to the valve opening steps.

ACTIVE TEST	
EGR VOL CONT/V	20 step
MONITOR	
ENG SPEED	XXX rpm



SEF067Y

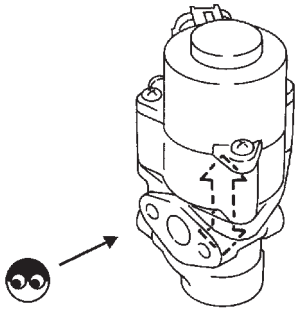
OK or NG

OK	▶	GO TO 11.
NG	▶	Replace EGR volume control valve.

10	CHECK EGR VOLUME CONTROL VALVE-II

Without CONSULT-II

1. Remove EGR volume control valve.
2. Reconnect ECM harness connector and EGR volume control valve harness connector.
3. Turn ignition switch "ON" and "OFF".
4. Check that EGR volume control valve shaft moves smoothly forward and backward according to the ignition switch position.



SEF560W

OK or NG

OK	▶	GO TO 11.
NG	▶	Replace EGR volume control valve.

11	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156.	
▶	**INSPECTION END**

Description

NHEC0497

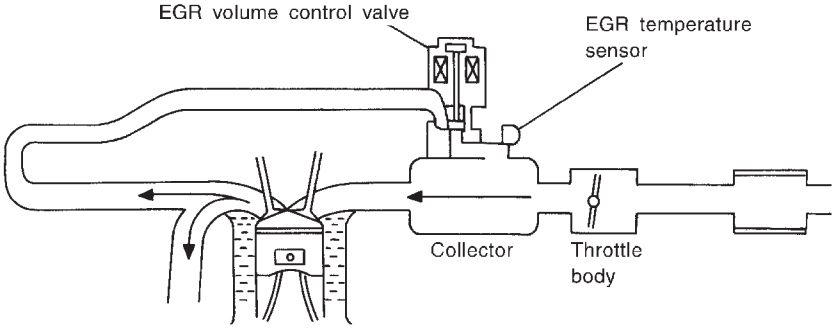
SYSTEM DESCRIPTION

NHEC0497S01

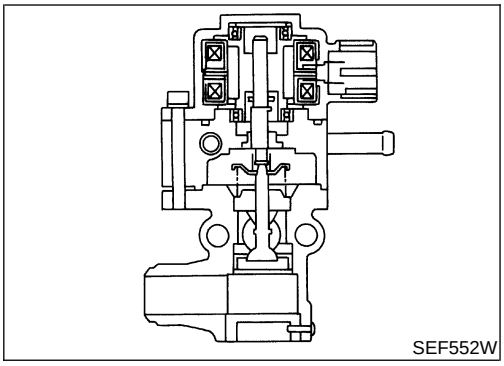
Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed (POS signal)	EGR volume control	EGR volume control valve
Crankshaft position sensor (REF)	Engine speed (REF signal)		
Vehicle speed sensor	Vehicle speed		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		
Battery	Battery voltage		
Mass air flow sensor	Amount of intake air		
Air conditioner switch	Air conditioner operation		
Power steering oil pressure switch	Power steering load signal		
Electrical load	Electrical load signal		
PNP switch	Park/Neutral position signal		
TCM (Transmission Control Module)	Gear position, shifting signal		

This system controls flow rate of EGR led from exhaust manifold to intake manifold. The opening of the EGR by-pass passage in the EGR 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. The EGR volume control valve remains close under the following conditions.

- Engine stopped
- Engine starting
- Engine idling
- Low engine coolant temperature
- Excessively high engine coolant temperature
- High engine speed
- Wide open throttle
- Low battery voltage



SEF551W


SEF552W

COMPONENT DESCRIPTION

NHEC0497S02

EGR volume control valve

NHEC0497S0201

The EGR volume control valve uses a step motor to control the flow rate of EGR from exhaust manifold. 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-II Reference Value in Data Monitor Mode

NHEC0498

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
EGR TEMP SEN	• Engine: After warming up		Less than 4.5V
EGR VOL CON/V	• Engine: After warming up • Air conditioner switch: "OFF" • Shift lever: "N" • No-load	Idle	0 step
		Revving engine up to 3,000 rpm quickly	10 - 55 step

On Board Diagnosis Logic

NHEC0499

Malfunction is detected when an improper voltage signal is sent to ECM through the valve.

FAIL-SAFE MODE

NHEC0499S02

When the ECM enters the fail-safe mode, the MIL illuminates.

Detected items	Engine operating condition in fail-safe mode
EGR volume control valve circuit	Engine speed will not rise more than 2,800 rpm due to the fuel cut.

Possible Cause

NHEC0500

- Harness or connectors
  (EGR volume control valve circuit is open or shorted.)
- EGR volume control valve

DTC Confirmation Procedure

NHEC0501

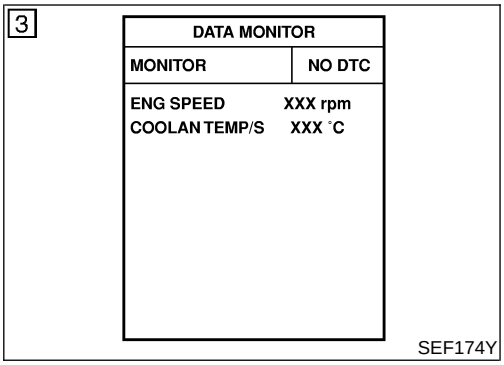
NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

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

DTC Confirmation Procedure (Cont'd)



WITH CONSULT-II

NHEC0501S01

1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
2) Start engine and warm it up to normal operating temperature.
3) Rev engine from idle to 2,000 rpm 10 times.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-382.

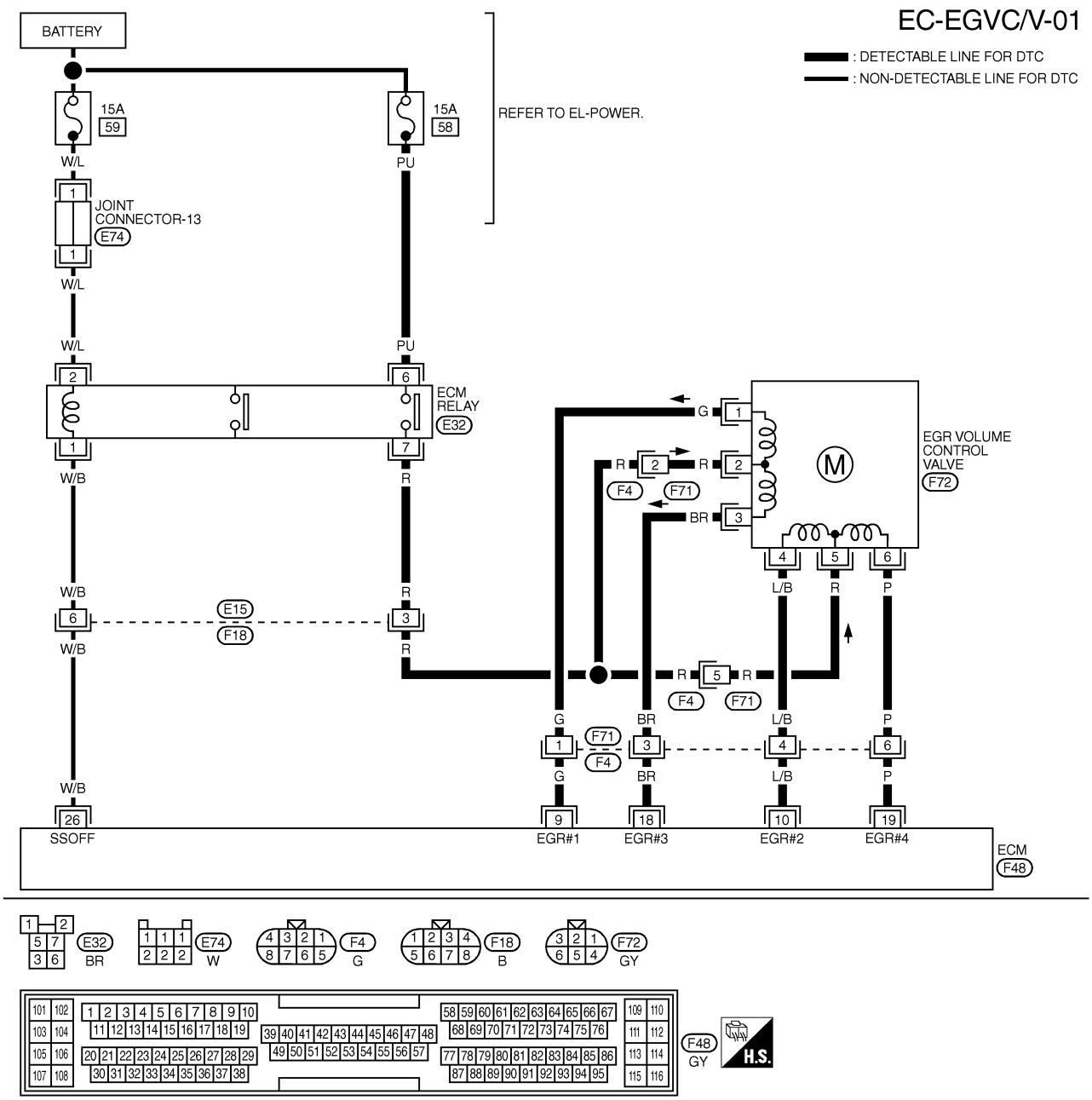
WITH GST

NHEC0501S02

Follow the procedure "With CONSULT-II" above.

Wiring Diagram

=NHEC0502



MEC814C

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
9	G	EGR VOLUME CONTROL VALVE	ENGINE RUNNING AT IDLE SPEED	0.1 - 14V
10	L/B			
18	BR			
19	P			

SEF666XB

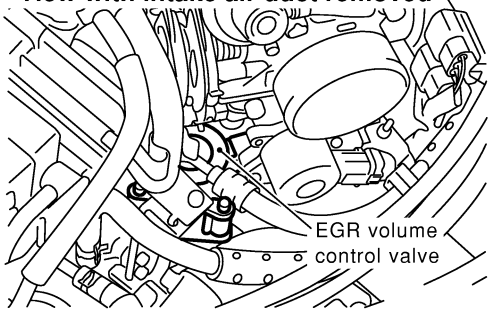
Diagnostic Procedure

NHEC0503

1	CHECK EGR VOLUME CONTROL VALVE POWER SUPPLY CIRCUIT

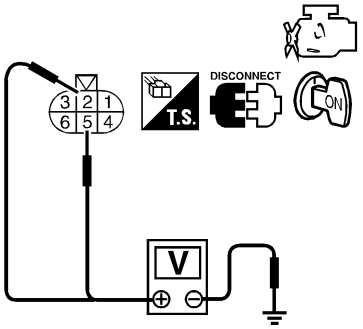
1. Disconnect EGR volume control valve harness connector.

View with intake air duct removed



SEF265X

2. Turn ignition switch “ON”.
3. Check voltage between EGR volume control valve terminals 2, 5 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF327X

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E15, F18
- Harness connectors F4, F71
- Harness for open or short between ECM relay and EGR volume control valve

	▶	Repair harness or connectors.

3	CHECK EGR VOLUME CONTROL VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. disconnect ECM harness connector.
3. Check harness continuity between ECM terminals and EGR volume control valve terminals as follows. Refer to Wiring Diagram.

ECM terminal	EGR volume control valve
9	1
10	4
18	3
19	6

MTBL0356

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.

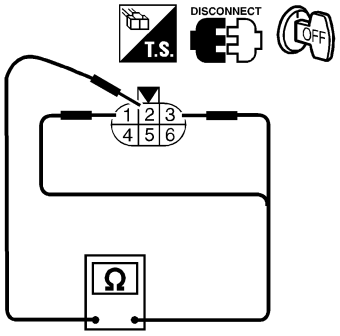
4	DETECT MALFUNCTIONING PART

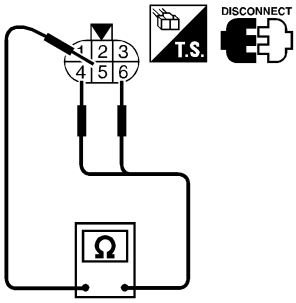
Check the following.
- Harness connectors F4, F71
- Harness for open or short between ECM and EGR volume control valve

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

5	CHECK EGR VOLUME CONTROL VALVE-I

Check resistance between EGR volume control valve terminal 2 and terminals 1, 3, terminal 5 and terminals 4, 6.





Resistance:
20.9 - 23.1 Ω [At 20°C (68°F)]

SEF588X

OK or NG

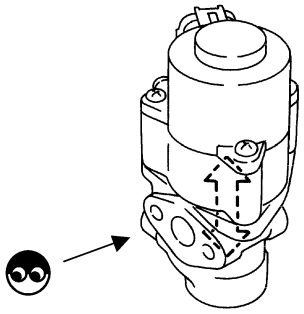
OK (With CONSULT-II)	▶	GO TO 6.
OK (Without CONSULT-II)	▶	GO TO 7.
NG	▶	Replace EGR volume control valve.

6	CHECK EGR VOLUME CONTROL VALVE-II

With CONSULT-II

1. Remove EGR volume control valve.
2. Reconnect ECM harness connector and EGR volume control valve harness connector.
3. Turn ignition switch "ON".
4. Perform "EGR VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II.
5. Check that EGR volume control valve shaft moves smoothy forward and backward according to the valve opening steps.

ACTIVE TEST	
EGR VOL CONT/V	20 step
MONITOR	
ENG SPEED	XXX rpm



SEF067Y

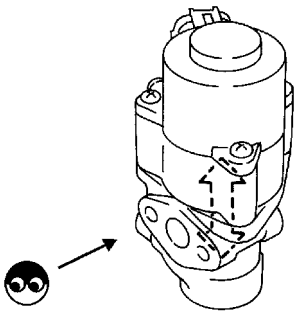
OK or NG

OK	▶	GO TO 8.
NG	▶	Replace EGR volume control valve.

7	CHECK EGR VOLUME CONTROL VALVE-II

Without CONSULT-II

1. Remove EGR volume control valve.
2. Reconnect ECM harness connector and EGR volume control valve harness connector.
3. Turn ignition switch "ON" and "OFF".
4. Check that EGR volume control valve shaft moves smoothly forward and backward according to the ignition switch position.

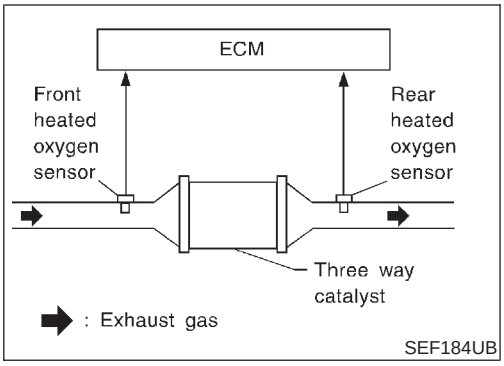


SEF560W

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace EGR volume control valve.

8	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156.	
▶	**INSPECTION END**



On Board Diagnosis Logic

NHEC0214

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

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

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

Malfunction is detected when warm-up three way catalyst does not operate properly, warm-up three way catalyst does not have enough oxygen storage capacity.

Possible Cause

NHEC0504

- Warm-up three way catalyst
- Exhaust tube
- Intake air leaks
- Injectors
- Injector leaks
- Spark plug
- Improper ignition timing

SRT WORK SUPPORT	
CATALYST	INCMP
EVAP SYSTEM	CMPLT
O2 SEN HEATER	CMPLT
O2 SENSOR	CMPLT
MONITOR	
ENG SPEED	XXX rpm
THRTL POS SEN	XXX V
B/FUEL SCHDL	XXX msec

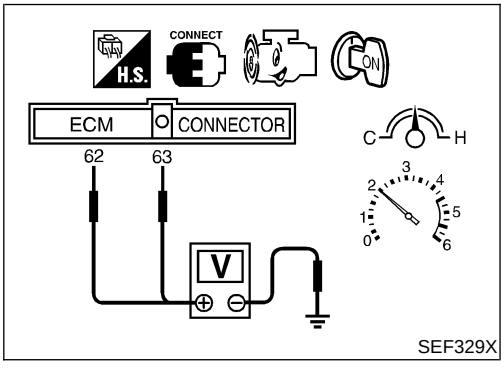
SEF557X

SRT WORK SUPPORT	
CATALYST	CMPLT
EVAP SYSTEM	CMPLT
O2 SEN HEATER	CMPLT
O2 SENSOR	CMPLT
MONITOR	
ENG SPEED	XXX rpm
THRTL POS SEN	XXX V
B/FUEL SCHDL	XXX msec

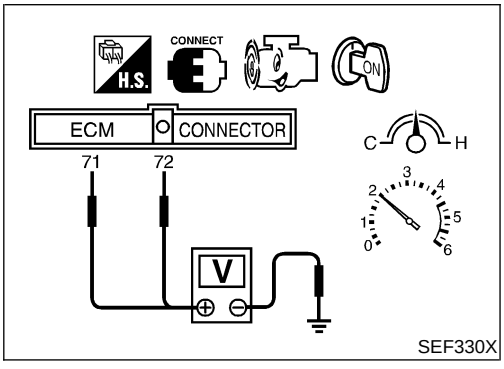
SEF559X

SELF DIAG RESULTS	
DTC RESULTS	TIME
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	

SEF560X



SEF329X



SEF330X

DTC Confirmation Procedure

NHEC0215

NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

NHEC0215S01

TESTING CONDITION:

- **Open engine hood before conducting the following procedure.**
- **Do not hold engine speed for more than the specified minutes below.**

1) Turn ignition switch “ON”.
2) Select “DTC & SRT CONFIRMATION” then “SRT WORK SUPPORT” mode with CONSULT-II.
3) Start engine.
4) Rev engine up to 3,000±500 rpm and hold it for 3 consecutive minutes then release the accelerator pedal completely.
5) Wait 5 seconds at idle.
6) Rev engine up to 2,500±500 rpm and maintain it until “INCMP” of CATALYST changes to “CMPLT” (It will take approximately 5 minutes).
   If not “CMPLT”, stop engine and cool it down to less than 70°C (158°F) and then retest from step 1.
7) Select “SELF-DIAG RESULTS” mode with CONSULT-II.
8) Confirm that the 1st trip DTC is not detected.
   If the 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-387.

Overall Function Check

NHEC0216

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

CAUTION:

Always drive vehicle at a safe speed.

WITH GST

NHEC0216S01

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 63 (front heated oxygen sensor right bank signal), 62 (front heated oxygen sensor left bank signal) and engine ground, and ECM terminals 72 (rear heated oxygen sensor right bank signal), 71 (rear heated oxygen sensor left bank 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 terminals 72 and engine ground, or 71 and engine ground is very less than that of ECM terminals 63 and engine ground, or 62 and engine ground.
   Switching frequency ratio = A/B

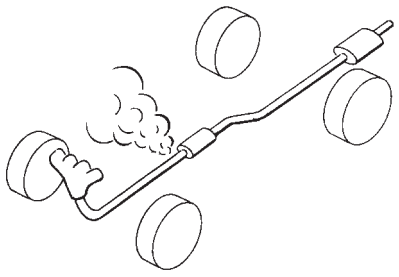
A: Rear heated oxygen sensor voltage switching frequency
B: Front heated oxygen sensor voltage switching frequency
This ratio should be less than 0.75.
If the ratio is greater than above, it means warm-up three way catalyst does not operate properly. Go to "Diagnostic Procedure", EC-387.

NOTE:
If the voltage at terminal 62 or 63 does not switch periodically more than 5 times within 10 seconds at step 5, perform trouble diagnosis for "DTC P0133, P0153" first. (See EC-231.)

Diagnostic Procedure

NHEC0217

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 warm-up 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.

Diagnostic Procedure (Cont'd)

4	CHECK IGNITION TIMING

Check the following items. Refer to "Basic Inspection", EC-110.

Items	Specifications
Ignition timing	15° ± 5° BTDC
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.05 mm (0.0020 in): ON 0.15 mm (0.0059 in): OFF
Target idle speed	700 ± 50 rpm (in "P" or "N" position)

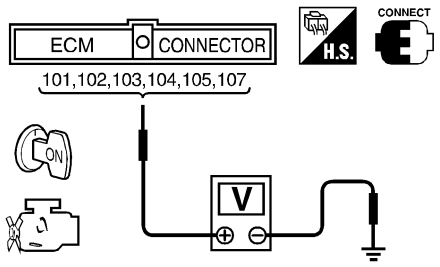
MTBL0595

OK or NG

OK	▶	GO TO 5.
NG	▶	Follow the "Basic Inspection".

5	CHECK INJECTORS

1. Refer to WIRING DIAGRAM for Injectors, EC-658.
2. Stop engine and then turn ignition switch "ON".
3. Check voltage between ECM terminals 101, 102, 103, 104, 105, 107 and ground with CONSULT-II or tester.



Battery voltage should exist.

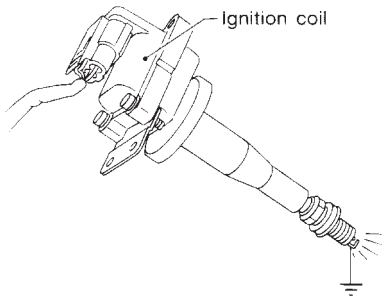
SEF331X

OK or NG

OK	▶	GO TO 6.
NG	▶	Perform "Diagnostic Procedure", "INJECTOR", EC-659.

6	CHECK IGNITION SPARK

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



SEF575Q

OK or NG

OK	▶	GO TO 7.
NG	▶	Check ignition coil with power transistor and their circuit. Refer to EC-537.

7	CHECK INJECTOR

1. Turn ignition switch "OFF".
2. Remove injector assembly.
   Refer to EC-52.
   Keep fuel hose and all injectors connected to injector gallery.
3. Disconnect all ignition coil harness connectors.
4. Turn ignition switch "ON".
   Make sure fuel does not drip from injector.

OK or NG

OK (Does not drip.)	▶	GO TO 8.
NG (Drips.)	▶	Replace the injector(s) from which fuel is dripping.

8	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156.

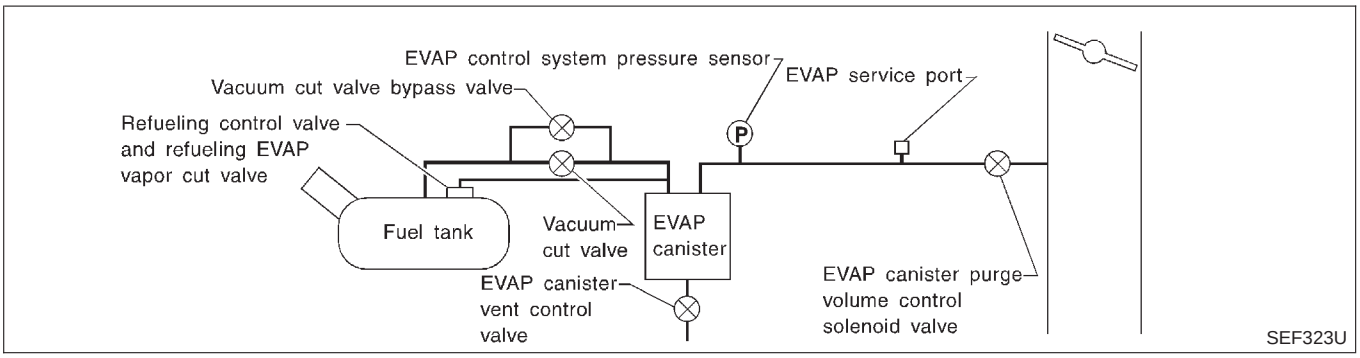
Trouble is fixed.	▶	**INSPECTION END**
Trouble is not fixed.	▶	Replace warm-up three way catalyst.

On Board Diagnosis Logic

NHEC0218

NOTE:
If DTC P0440 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-613.)

This diagnosis detects leaks in the EVAP purge line using engine intake manifold vacuum.
If pressure does not increase, the ECM will check for leaks in the line between the fuel tank and EVAP canister purge volume control solenoid valve, under the following “Vacuum test” conditions.
The vacuum cut valve bypass valve is opened to clear the line between the fuel tank and the EVAP canister purge volume control solenoid valve. The EVAP canister vent control valve will then be closed to shut the EVAP purge line off. The EVAP canister purge volume control solenoid valve is opened to depressurize the EVAP purge line using intake manifold vacuum. After this occurs, the EVAP canister purge volume control solenoid valve will be closed.



Malfunction is detected when EVAP control system has a leak, EVAP control system does not operate properly.

CAUTION:

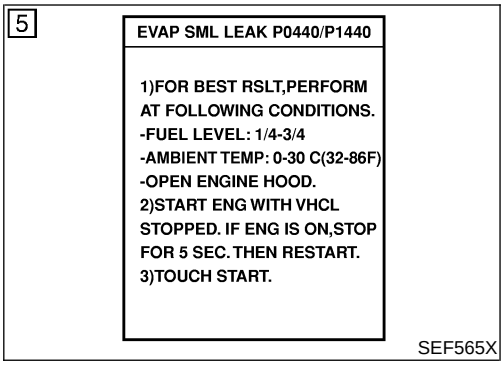
- **Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.**
- **If the fuel filler cap is not tightened properly, the MIL may come on.**
- **Use only a genuine NISSAN rubber tube as a replacement.**

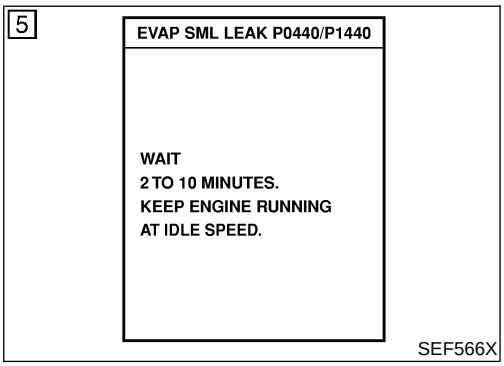
Possible Cause

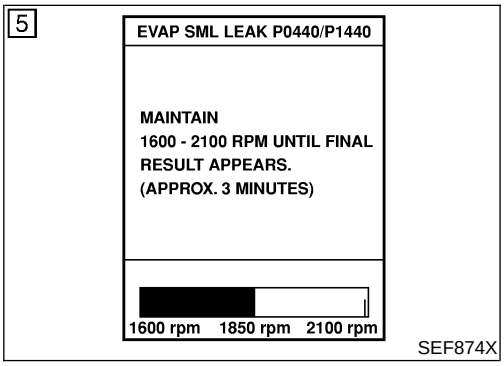
NHEC0510

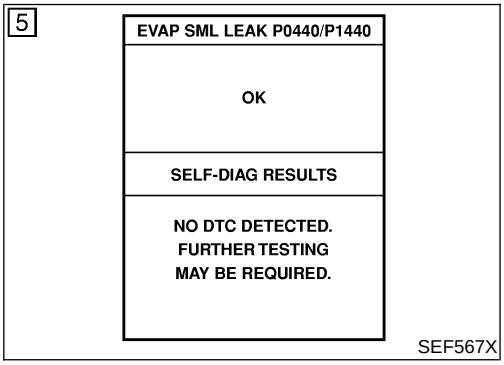
- Incorrect fuel tank vacuum relief valve
- Incorrect fuel filler cap used
- Fuel filler cap remains open or fails to close.
- Foreign matter caught in fuel filler cap.
- Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.
- Foreign matter caught in EVAP canister vent control valve.
- EVAP canister or fuel tank leaks
- EVAP purge line (pipe and rubber tube) leaks

- EVAP purge line rubber tube bent.
- Blocked or bent rubber tube to EVAP control system pressure sensor
- Loose or disconnected rubber tube
- EVAP canister vent control valve and the circuit
- EVAP canister purge volume control solenoid valve and the circuit
- Absolute pressure sensor
- Fuel tank temperature sensor
- O-ring of EVAP canister vent control valve is missing or damaged.
- Water separator
- EVAP canister is saturated with water.
- EVAP control system pressure sensor
- Fuel level sensor and the circuit
- Refueling control valve
- ORVR system leaks









DTC Confirmation Procedure

NHEC0219

NOTE:

- **If DTC P0440 or P1440 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-110.)**
- If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

- **Perform "DTC WORK SUPPORT" when the fuel level is between 1/4 to 3/4 full and vehicle is placed on flat level surface.**
- **Always perform test at a temperature of 0 to 30°C (32 to 86°F).**

WITH CONSULT-II

NHEC0219S01

1) Turn ignition switch "ON".
2) Turn ignition switch "OFF" and wait at least 10 seconds.
3) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
4) Make sure that the following conditions are met.
   COOLAN TEMP/S: 0 - 70°C (32 - 158°F)
   INT/A TEMP SE: 0 - 30°C (32 - 86°F)
5) Select "EVAP SML LEAK P0440/P1440" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
   Follow the instruction displayed.

NOTE:

If the engine speed cannot be maintained within the range displayed on the CONSULT-II screen, go to "Basic Inspection", EC-110.

6) Make sure that "OK" is displayed.
   If "NG" is displayed, refer to "Diagnostic Procedure", EC-393.

NOTE:

Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.

WITH GST

NHEC0219S02

NOTE:

Be sure to read the explanation of "Driving Pattern" on EC-76 before driving vehicle.

1) Start engine.
2) Drive vehicle according to "Driving Pattern", EC-76.
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 10 seconds.
6) Start engine.
   It is not necessary to cool engine down before driving.
7) Drive vehicle again according to the "Driving Pattern", EC-76.
8) Stop vehicle.
9) Select "MODE 3" with GST.

- If P0440 or P1440 is displayed on the screen, go to "Diagnostic Procedure", EC-393.
- If P1447 is displayed on the screen, go to "Diagnostic Procedure" for DTC P1447, EC-604.

- If P0440, P1440 and P1447 are not displayed on the screen, go to the following step.

10) Select "MODE 1" with GST.

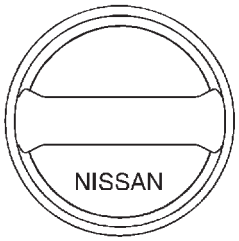
- If SRT of EVAP system is set, the result will be OK.
- If SRT of EVAP system is not set, go to step 6.

Diagnostic Procedure

NHEC0220

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 by 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

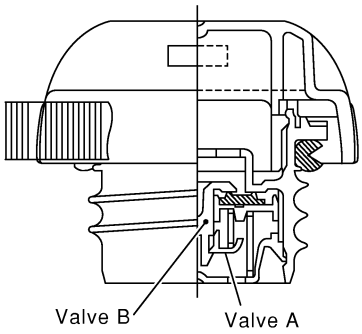
Check for air releasing sound while opening the fuel filler cap.

OK or NG

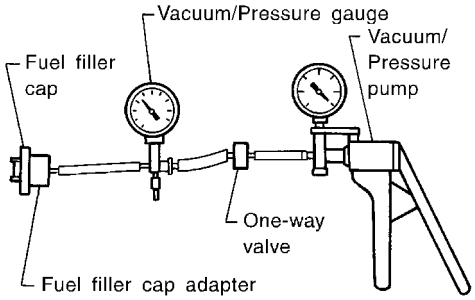
OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	CHECK FUEL TANK VACUUM RELIEF VALVE

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



SEF989X



SEF943S

Pressure:
15.3 - 20.0 kPa (0.156 - 0.204 kg/cm^2, 2.22 - 2.90 psi)
Vacuum:
−6.0 to −3.3 kPa (−0.061 to −0.034 kg/cm^2, −0.87 to −0.48 psi)

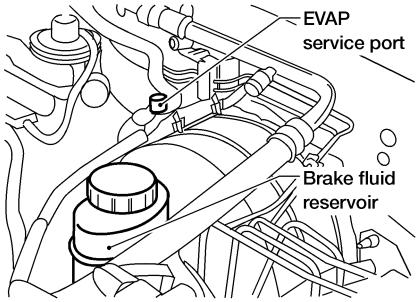
CAUTION:
Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.

OK or NG

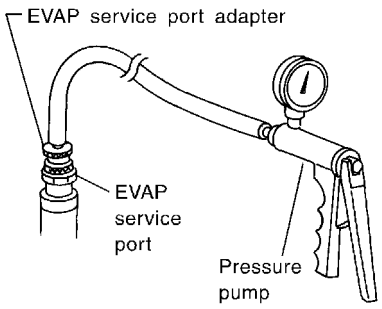
OK	▶	GO TO 5.
NG	▶	Replace fuel filler cap with a genuine one.

5	INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.



AEC649A



SEF916U

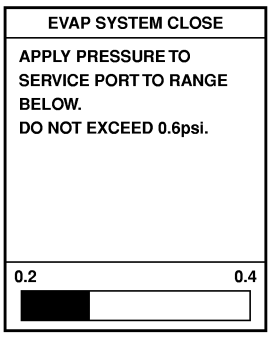
NOTE:
Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.

Models with CONSULT-II ▶	GO TO 6.
Models without CONSULT-II ▶	GO TO 7.

6	CHECK FOR EVAP LEAK

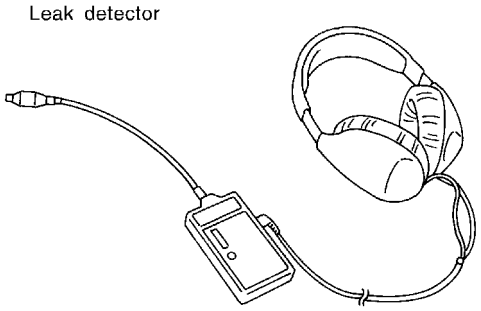
With CONSULT-II

1. Turn ignition switch "ON".
2. Select "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-II.
3. Touch "START" and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.
   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.**



PEF917U

4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-36.



SEF200U

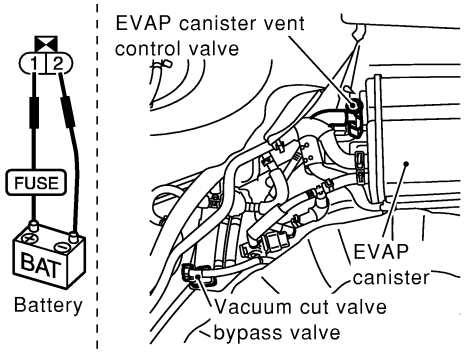
OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace.

7	CHECK FOR EVAP LEAK

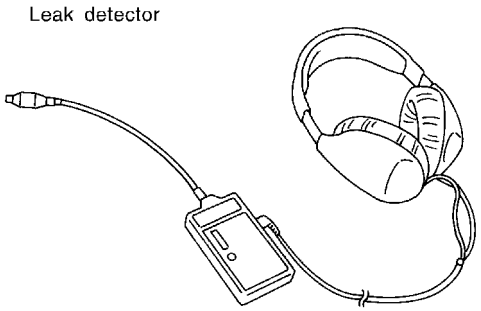
Without CONSULT-II

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.)
3. Apply 12 volts DC to vacuum cut valve bypass valve. The valve will open. (Continue to apply 12V until the end of test.)



SEF254X

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), then remove pump and EVAP service port adapter.
   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 EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-36.



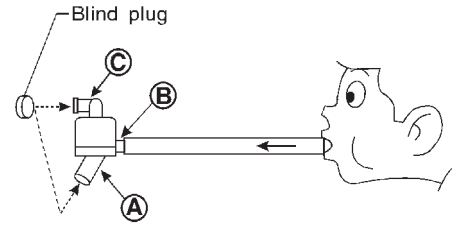
SEF200U

OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace.

8	CHECK WATER SEPARATOR

1. Check visually for insect nests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that **A** and **C** are not clogged by blowing air into **B** with **A**, and then **C** plugged.



* Ⓐ: Bottom hole (To atmosphere)
Ⓑ: Emergency tube (From EVAP canister)
Ⓒ: Inlet port (To member)

SEF829T

5. In case of NG in items 2 - 4, replace the parts.

NOTE:
- Do not disassemble water separator.

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace water separator.

9	CHECK EVAP CANISTER VENT CONTROL VALVE, O-RING AND CIRCUIT

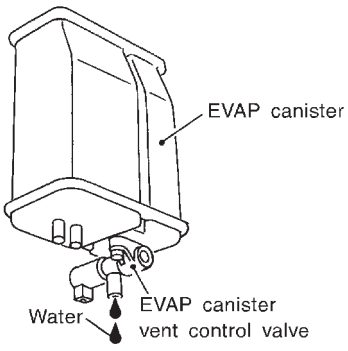
Refer to "DTC Confirmation Procedure", EC-413.

OK or NG

OK	▶	GO TO 10.
NG	▶	Repair or replace EVAP canister vent control valve and O-ring or harness/connector.

10	CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Does water drain from the EVAP canister?



SEF596U

Yes or No

Yes	▶	GO TO 11.
No (With CONSULT-II)	▶	GO TO 13.
No (Without CONSULT-II)	▶	GO TO 14.

11	CHECK EVAP CANISTER
Weigh the EVAP canister with the EVAP canister vent control valve attached. **The weight should be less than 1.8 kg (4.0 lb).** **OK or NG**	
OK (With CONSULT-II) ▶	GO TO 13.
OK (Without CONSULT-II) ▶	GO TO 14.
NG ▶	GO TO 12.

12	DETECT MALFUNCTIONING PART
Check the following. ● EVAP canister for damage ● EVAP hose between EVAP canister and water separator for clogging or poor connection	
▶	Repair hose or replace EVAP canister.

13	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-II

1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
2. Start engine.
3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode.
4. Touch "Qu" on CONSULT-II screen to increase "PURG VOL CONT/V" opening to 100.0%.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
FR O2 MNTR-B1	LEAN
THRTL POS SEN	XXX V
A/F ALPHA-B1	XXX %

Vacuum should exist.

SEF224Y

OK or NG

OK ▶	GO TO 16.
NG ▶	GO TO 15.

14	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
4. Start engine and let it idle for at least 80 seconds.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.
   Vacuum should exist.

OK or NG

OK ▶	GO TO 17.
NG ▶	GO TO 15.

15	CHECK VACUUM HOSE
Check vacuum hoses for clogging or disconnection. Refer to "Vacuum Hose Drawing", EC-26.	
OK or NG	
OK (With CONSULT-II) ▶	GO TO 16.
OK (Without CONSULT-II) ▶	GO TO 17.
NG ▶	Repair or reconnect the hose.

16	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

1. Start engine.
2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.

ACTIVE TEST	
PURG VOL CONT/V	0.0%
MONITOR	
ENG SPEED	XXX rpm
FR O2 MNTR-B1	RICH
FR O2 MNTR-B2	RICH
THRTL POS SEN	XXX V
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %

SEF068Y

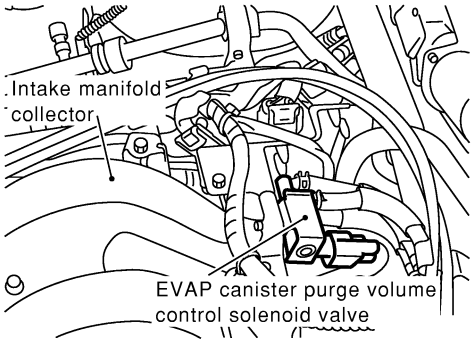
OK or NG

OK ▶	GO TO 18.
NG ▶	GO TO 17.

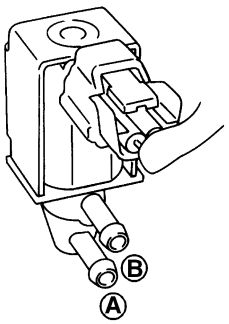
17	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



SEF266X

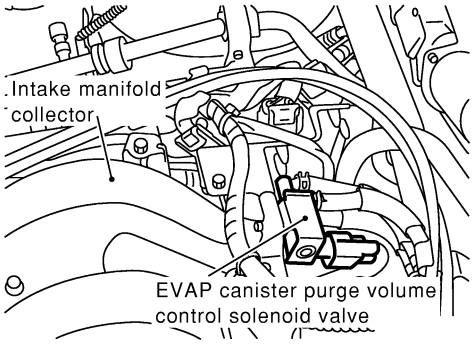


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

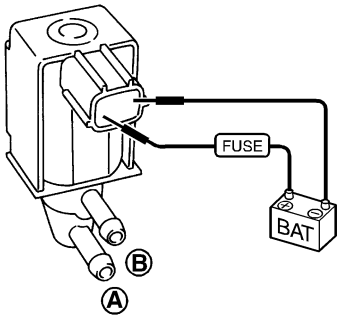
SEF334X

Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



SEF266X



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

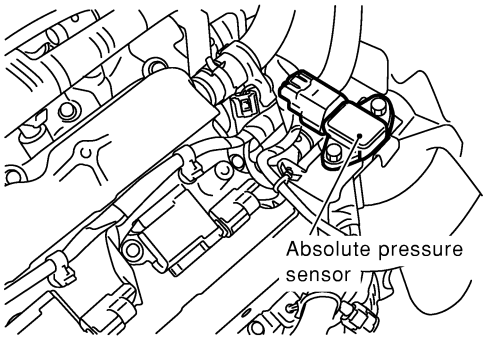
SEF335X

OK or NG

OK	▶	GO TO 18.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

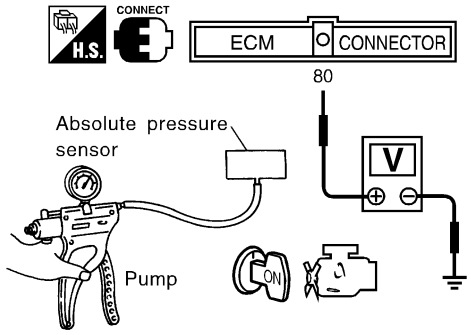
18	CHECK ABSOLUTE PRESSURE SENSOR

1. Remove absolute pressure sensor with its harness connector connected.



SEF257X

2. Remove hose from absolute pressure sensor.
3. Install a vacuum pump to absolute pressure sensor.
4. Turn ignition switch "ON" and check output voltage between ECM terminal 80 and engine ground under the following conditions.



Applied vacuum kPa (mmHg, inHg)	Voltage V
Not applied	3.2 - 4.8
–26.7 (–200, –7.87)	1.0 to 1.4V lower than above value

SEF300X

CAUTION:

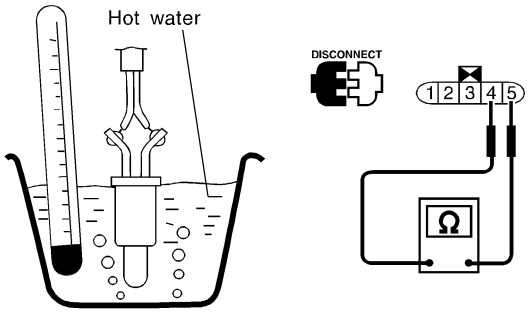
- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply below −93.3 kPa (–700 mmHg, –27.56 inHg) or over 101.3 kPa (760 mmHg, 29.92 inHg) of pressure.**

OK or NG

OK	▶	GO TO 19.
NG	▶	Replace absolute pressure sensor.

19	CHECK FUEL TANK TEMPERATURE SENSOR

1. Remove fuel level sensor unit.
2. Check resistance between fuel level sensor unit and fuel pump terminals 4 and 5 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

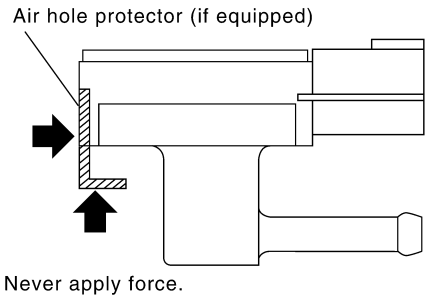
SEF587X

OK or NG

OK	▶	GO TO 20.
NG	▶	Replace fuel level sensor unit.

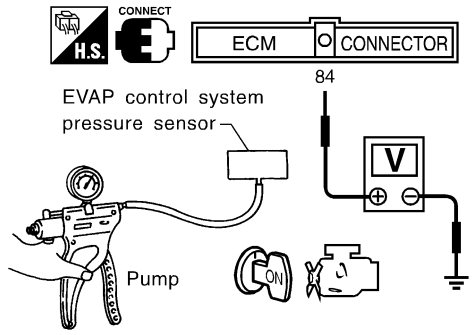
20	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.
   CAUTION:
   - **Never apply force to the air hole protector of the sensor if equipped.**



SEF799W

2. Remove hose from EVAP control system pressure sensor.
3. Turn ignition switch "ON".
4. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.
   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. Check input voltage between ECM terminal 84 and 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

SEF342X

CAUTION:
- **Discard and EVAP control system pressure sensor which has been dropped from a height of more than 0.5m (19.7in) onto a hard surface such as a concrete floor; use a new one.**

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 System", EC-32.

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.

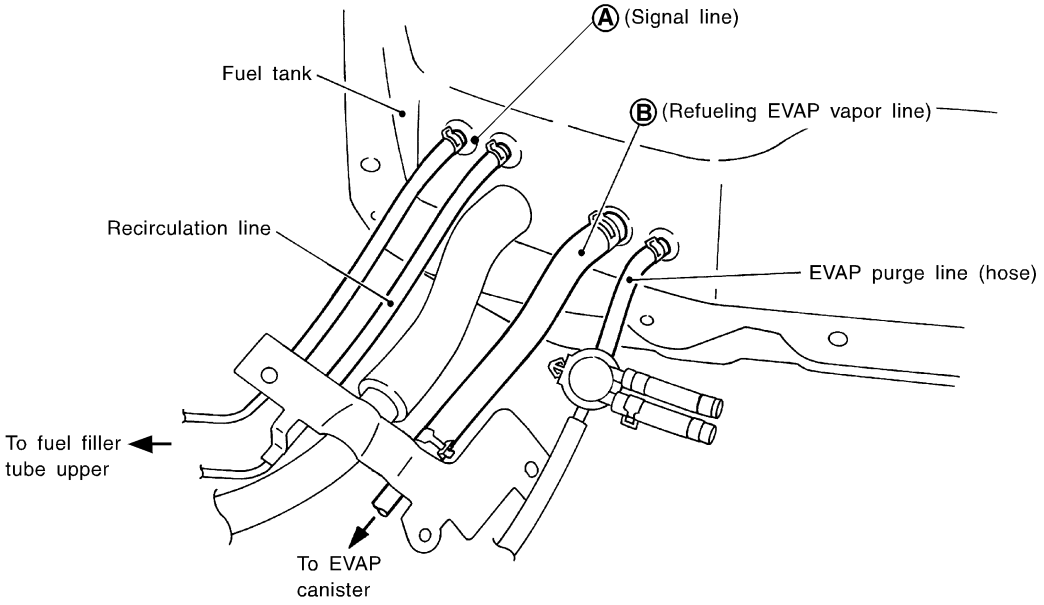
	▶	GO TO 23.

23	CHECK REFUELING EVAP VAPOR LINE	
Check refueling EVAP vapor line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to "ON BOARD REFUELING VAPOR RECOVERY (ORVR)", EC-38.		
OK or NG		
OK	▶	GO TO 24.
NG	▶	Repair or replace hoses and tubes.

24	CHECK SIGNAL LINE AND RECIRCULATION LINE	
Check signal line and recirculation line between filler neck tube and fuel tank for clogging, kink, cracks, looseness and improper connection.		
OK or NG		
OK	▶	GO TO 25.
NG	▶	Repair or replace hoses, tubes or filler neck tube.

25 CHECK REFUELING CONTROL VALVE

1. Remove fuel filler cap.
2. Check air continuity between hose ends A and B.
   Blow air into the hose end B. Air should flow freely into the fuel tank.
3. Blow air into hose end A and check there is no leakage.
4. Apply pressure to both hose ends A and B [20 kPa (150 mmHg, 5.91 inHg)] using a pressure pump and a suitable 3-way connector. Check that there is no leakage.



SEF141W

OK or NG		
OK	▶	GO TO 26.
NG	▶	Replace refueling control valve with fuel tank.

26	CHECK FUEL LEVEL SENSOR	
Refer to EL-158, "Fuel Level Sensor Unit Check".		
OK or NG		
OK	▶	GO TO 27.
NG	▶	Replace fuel level sensor unit.

27	**CHECK INTERMITTENT INCIDENT**
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156.	
▶	**INSPECTION END**

Description

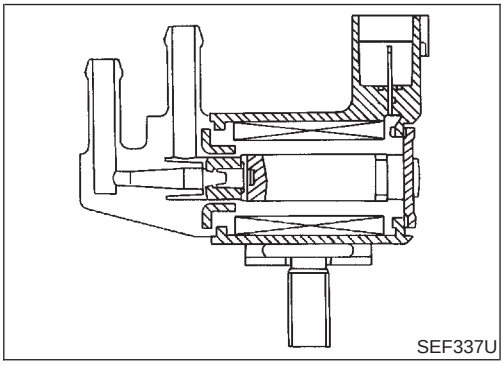
NHEC0221

SYSTEM DESCRIPTION

NHEC0221S01

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed (POS signal)	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
Crankshaft position sensor (REF)	Engine speed (REF signal)		
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		
Throttle position switch	Closed throttle position		
Front heated oxygen sensors	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Fuel tank 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 solenoid valve changes to control the flow rate. The EVAP canister purge volume control solenoid valve repeats ON/OFF operation according to the signal sent from the ECM. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions. When the engine is operating, the flow rate of fuel vapor from the EVAP canister is regulated as the air flow changes.


SEF337U

COMPONENT DESCRIPTION

NHEC0221S02

The EVAP canister purge volume control solenoid valve uses a ON/OFF duty to control the flow rate of fuel vapor from the EVAP canister. The EVAP canister purge volume control solenoid valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of fuel vapor that will flow through the valve.

CONSULT-II Reference Value in Data Monitor Mode

NHEC0222

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PURG VOL C/V	• Engine: After warming up • Air conditioner switch “OFF” • Shift lever: “N” • No-load	Idle (Vehicle stopped)	0%
		2,000 rpm	—

On Board Diagnosis Logic

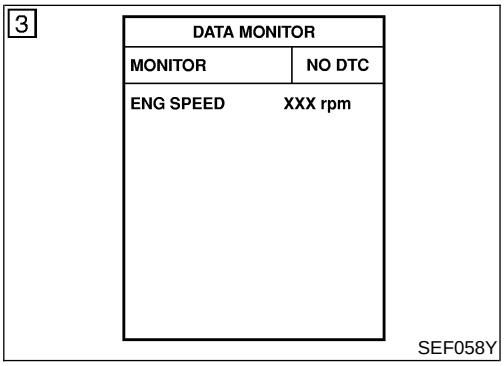
NHEC0224

Malfunction is detected when an improper voltage signal is sent to ECM through the valve.

Possible Cause

NHEC0511

- Harness or connectors
  (The valve circuit is open or shorted.)
- EVAP canister purge volume control solenoid valve



DTC Confirmation Procedure

NHEC0225

NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

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

WITH CONSULT-II

NHEC0225S01

1) Turn ignition switch “ON”.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Start engine and let it idle for at least 13 seconds.
4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-409.

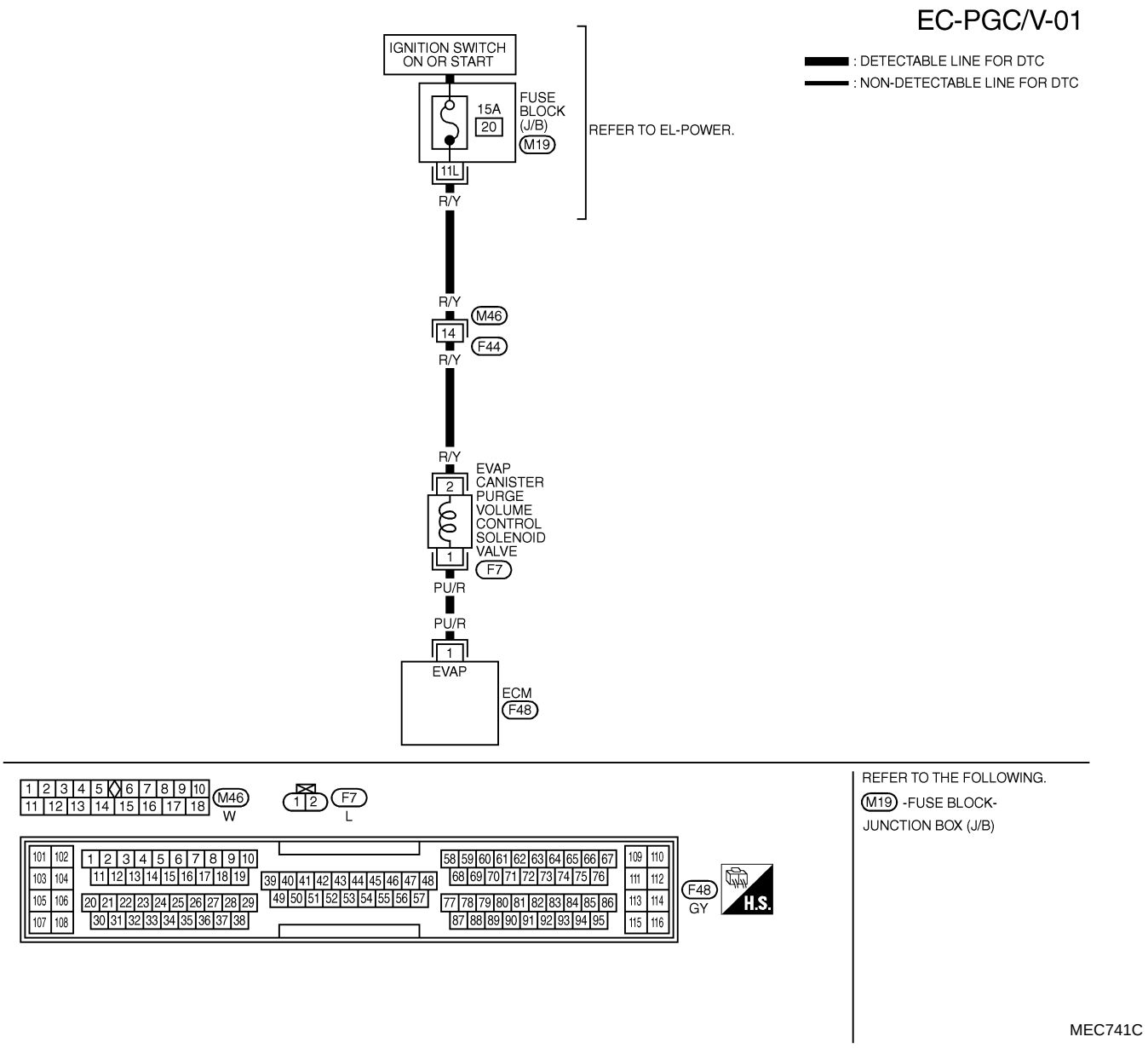
WITH GST

NHEC0225S02

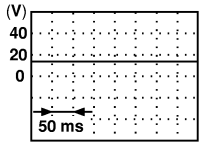
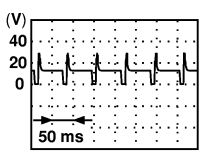
Follow the proocedure “WITH CONSULT-II” above.

Wiring Diagram

NHEC0226



ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
1	PU/R	EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE	ENGINE RUNNING AT IDLE SPEED	BATTERY VOLTAGE 
			ENGINE RUNNING AT 2,000 RPM (MORE THAN 100 SECONDS AFTER STARTING ENGINE)	BATTERY VOLTAGE 

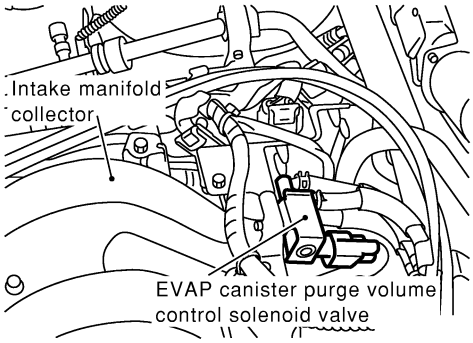
SEF858Y

Diagnostic Procedure

NHEC0227

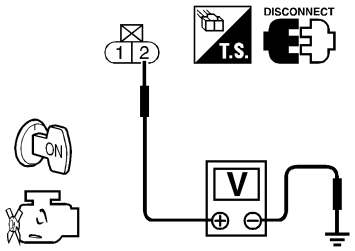
1	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.



SEF266X

3. Turn ignition switch “ON”.
4. Check voltage between EVAP canister purge volume control solenoid valve terminal 2 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF333X

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M46, F44
- Fuse block (J/B) connector M19
- 15A fuse
- Harness for open or short between EVAP canister purge volume control solenoid valve and fuse

	▶	Repair harness or connectors.

Diagnostic Procedure (Cont'd)

3	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 1 and EVAP canister purge volume control solenoid valve terminal 1. Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

OK or NG

OK (With CONSULT-II)	▶	GO TO 4.
OK (Without CONSULT-II)	▶	GO TO 5.
NG	▶	Repair open circuit or short to ground and short to power in harness or connetors.

4	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-II

1. Start engine.
2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.

ACTIVE TEST	
PURG VOL CONT/V	0.0%
MONITOR	
ENG SPEED	XXX rpm
FR O2 MNTR-B1	RICH
FR O2 MNTR-B2	RICH
THRTL POS SEN	XXX V
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %

SEF068Y

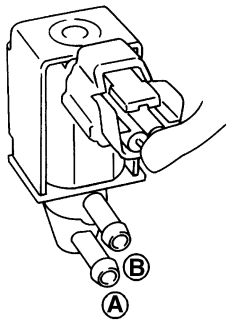
OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

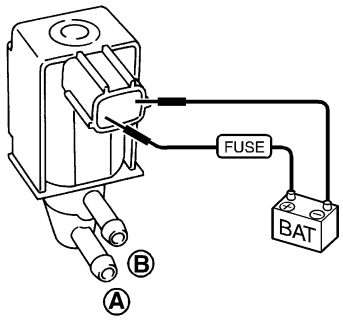


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

SEF334X

Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



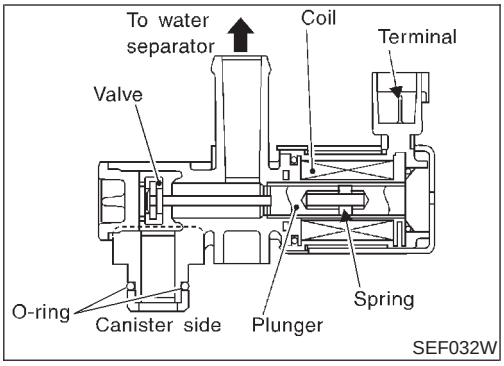
Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

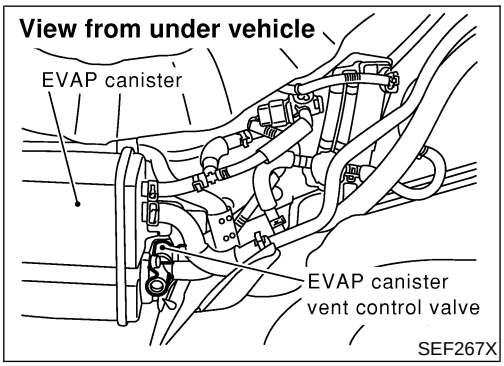
SEF335X

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

6	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156.	
▶	**INSPECTION END**





Component Description

NHEC0228

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

This solenoid valve responds to signals from the ECM. When the ECM sends an ON signal, the coil in the solenoid valve is energized. A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.

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

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

CONSULT-II Reference Value in Data Monitor Mode

NHEC0229

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	• Ignition switch: ON	OFF

On Board Diagnosis Logic

NHEC0231

Malfunction is detected when an improper voltage signal is sent to ECM through EVAP canister vent control valve.

Possible Cause

NHEC0512

- Harness or connectors
  (The valve circuit is open or shorted.)
- EVAP canister vent control valve

DTC Confirmation Procedure

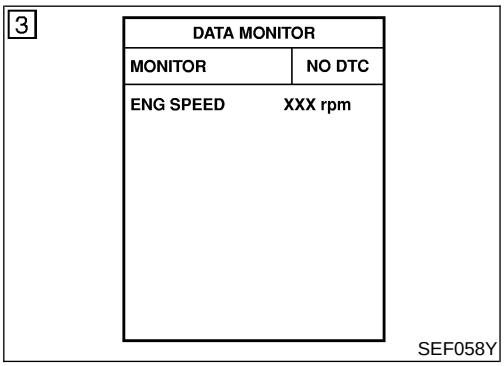
NHEC0232

NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

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



WITH CONSULT-II

NHEC0232S01

1) Turn ignition switch “ON”.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Start engine and wait at least 8 seconds.
4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-415.

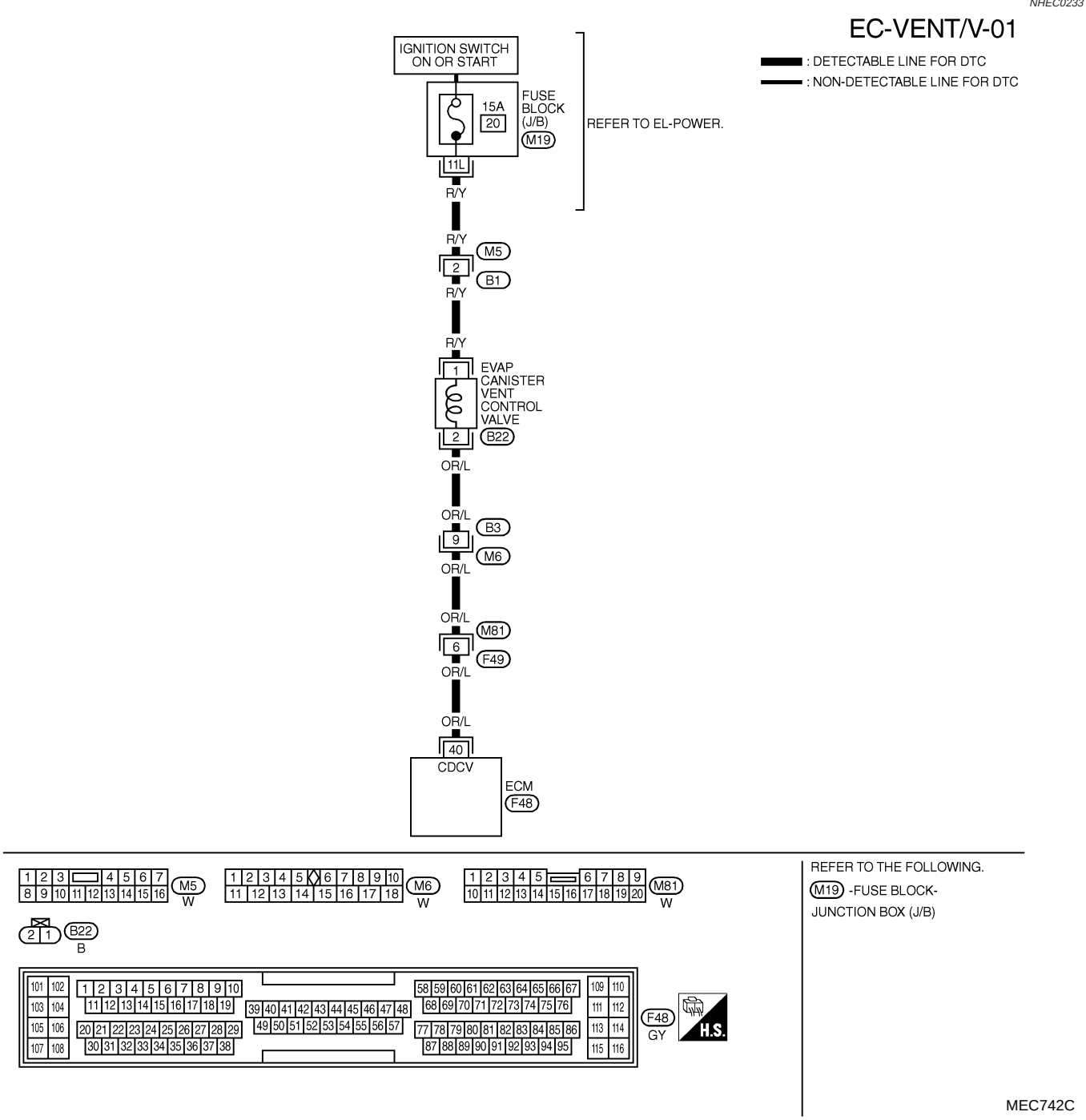
WITH GST

NHEC0232S02

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

NHEC0233



ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
40	OR/L	EVAP CANISTER VENT CONTROL VALVE	IGN ON	BATTERY VOLTAGE

SEF668XB

Diagnostic Procedure

NHEC0234

1	INSPECTION START	
1. Do you have CONSULT-II?		
Yes or No		
Yes	▶	GO TO 2.
No	▶	GO TO 3.

2	CHECK EVAP CANISTER VENT CONTROL VALVE CIRCUIT	
With CONSULT-II		
1. Turn ignition switch “OFF” and then turn “ON”.		
2. Select “VENT CONTROL/V” in “ACTIVE TEST” mode with CONSULT-II.		
3. Touch “ON/OFF” on CONSULT-II screen.		

ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
FR O2 SEN-B1	XXX V
THRTL POS SEN	XXX V
A/F ALPHA-B1	XXX %

SEF221Y

4. Check for operating sound of the valve.
   Clicking noise should be heard.

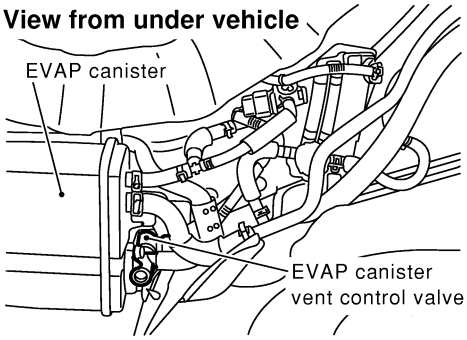
OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 3.

Diagnostic Procedure (Cont'd)

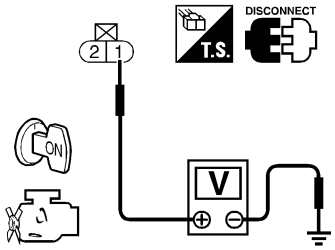
3	CHECK EVAP CANISTER VENT CONTROL VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect EVAP canister vent control valve harness connector.



SEF267X

3. Turn ignition switch "ON".
4. Check voltage between EVAP canister vent control valve terminal 1 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF336X

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M5, B1
- Fuse block (J/B) connector M19
- 15A fuse
- Harness for open or short between EVAP canister vent control valve and fuse

	▶	Repair harness or connectors.

5	CHECK EVAP CANISTER VENT CONTROL VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 40 and EVAP canister vent control valve terminal 2.
   Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

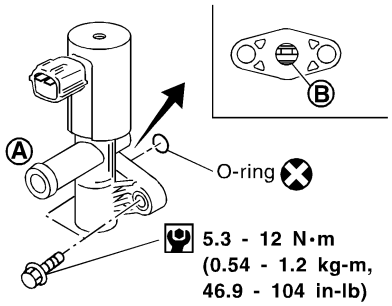
OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 6.

6	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors B3, M6 ● Harness connectors M81, F49 ● 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 RUBBER TUBE FOR CLOGGING
1. Disconnect rubber tube connected to EVAP canister vent control valve. 2. Check the rubber tube for clogging.	
OK or NG	
OK ▶	GO TO 8.
NG ▶	Clean the rubber tube using an air blower.

8	CHECK EVAP CANISTER VENT CONTROL VALVE-I
1. Remove EVAP canister vent control valve from EVAP canister. 2. Check portion **B** of EVAP canister vent control valve for being rusted.	



SEF337X

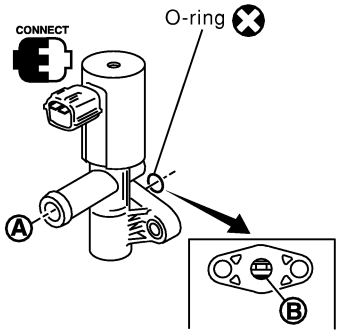
OK or NG	
OK ▶	GO TO 9.
NG ▶	Replace EVAP canister vent control valve.

Diagnostic Procedure (Cont'd)

9	CHECK EVAP CANISTER VENT CONTROL VALVE-II

With CONSULT-II

1. Reconnect harness connectors disconnected.
2. Turn ignition switch "ON".
3. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
4. Check air passage continuity and operation delay time.



ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
FR O2 SEN-B1	XXX V
THRTL POS SEN	XXX V
A/F ALPHA-B1	XXX %

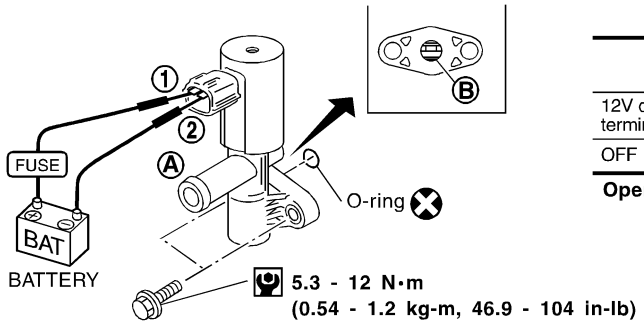
Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

SEF222Y

Without CONSULT-II

Check air passage continuity and operation delay time under the following conditions.



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

Operation takes less than 1 second.

SEF339X

Make sure new O-ring is installed properly.

OK or NG

OK	▶	GO TO 11.
NG	▶	GO TO 10.

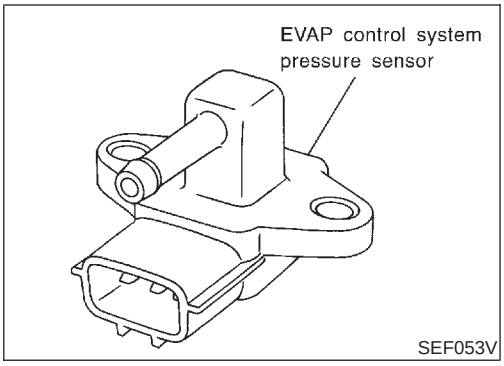
10	CHECK EVAP CANISTER VENT CONTROL VALVE-III

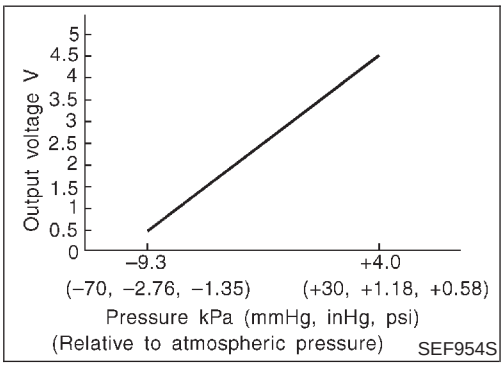
1. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
2. Perform Test No. 9 again.

OK or NG

OK	▶	GO TO 11.
NG	▶	Replace EVAP canister vent control valve.

11	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156.	
▶	**INSPECTION END**





Component Description

NHEC0235

The EVAP control system pressure sensor detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases. The EVAP control system pressure sensor is not used to control the engine system. It is used only for on board diagnosis.

CONSULT-II Reference Value in Data Monitor Mode

NHEC0236

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
EVAP SYS PRES	• Ignition switch: ON	Approx. 3.4V

On Board Diagnosis Logic

NHEC0238

Malfunction is detected when an improper voltage signal from EVAP control system pressure sensor is sent to ECM.

Possible Cause

NHEC0513

- Harness or connectors
  (The EVAP control system pressure sensor circuit is open or shorted.)
- Rubber hose to EVAP control system pressure sensor is clogged, vent, kinked, disconnected or improper connection.
- EVAP control system pressure sensor
- EVAP canister vent control valve
- EVAP canister purge volume control solenoid valve
- EVAP canister

Possible Cause (Cont'd)

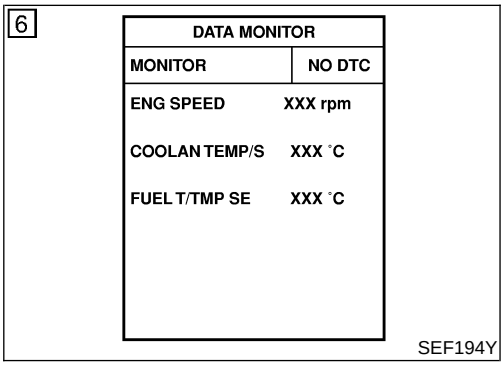
- Rubber hose from EVAP canister vent control valve to water separator

DTC Confirmation Procedure

NHEC0239

NOTE:
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test.

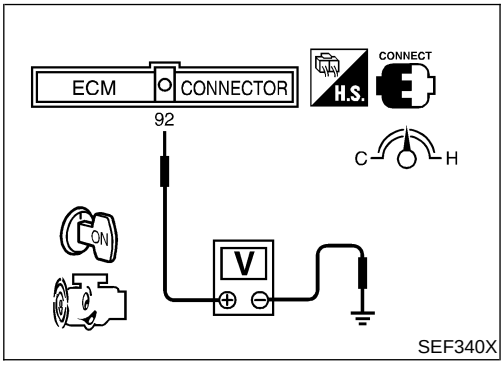
TESTING CONDITION:
Always perform test at a temperature of 5°C (41°F) or more.



WITH CONSULT-II

NHEC0239S01

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 10 seconds.
3) Turn ignition switch "ON".
4) Select "DATA MONITOR" mode with CONSULT-II.
5) Make sure that "FUEL T/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-422.



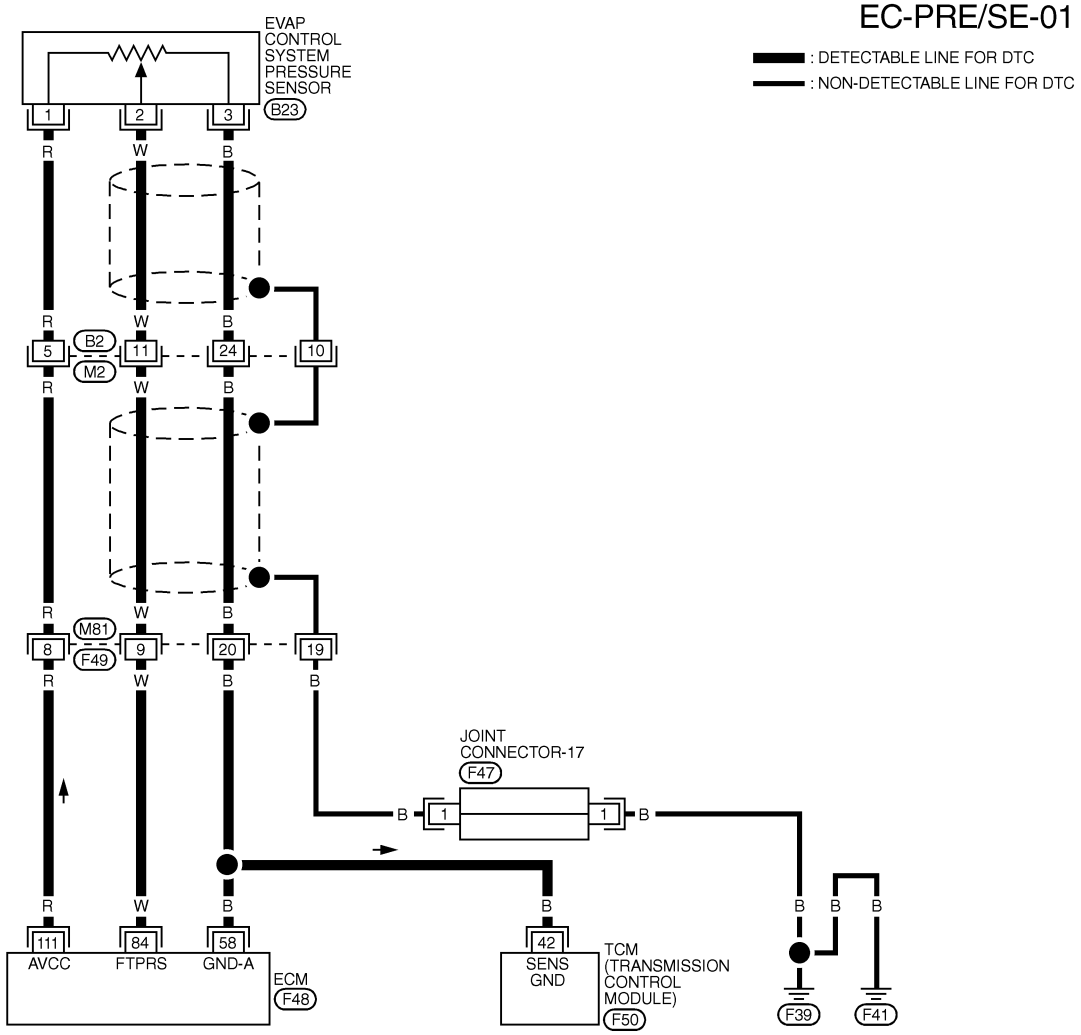
WITH GST

NHEC0239S02

1) Start engine and warm it up to normal operating temperature.
2) Check that voltage between ECM terminal 92 (Fuel tank temperature sensor signal) and ground is less than 4.2V.
3) Turn ignition switch "OFF" and wait at least 10 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-422.

Wiring Diagram

NHEC0240



MEC815C

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
58	B	SENSORS' GROUND	ENGINE RUNNING AT IDLE SPEED UNDER WARM-UP CONDITION	APPROX. 0V
84	W	EVAP CONTROL SYSTEM PRESSURE SENSOR	IGN ON	APPROX. 3.4V
111	R	SENSORS' POWER SUPPLY	IGN ON	APPROX. 5V

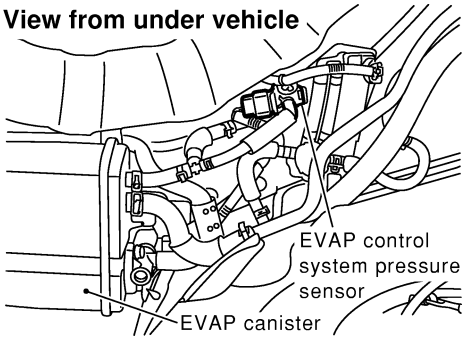
SEF623XB

Diagnostic Procedure

NHEC0241

1	CHECK RUBBER TUBE

1. Turn ignition switch “OFF”.
2. Check rubber tube connected to the EVAP control system pressure sensor for clogging, vent, kink, disconnection or improper connection.



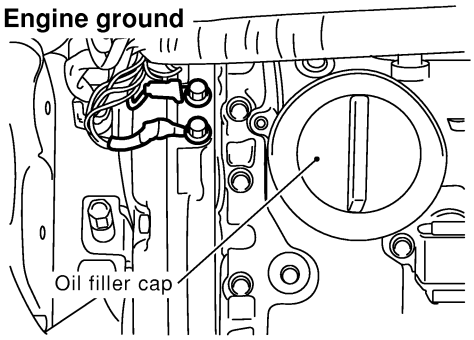
SEF268X

OK or NG

OK	▶	GO TO 2.
NG	▶	Reconnect, repair or replace.

2	RETIGHTEN GROUND SCREWS

Loosen and retighten engine ground screws.



SEF255X

	▶	GO TO 3.

3	CHECK CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check sensor harness connector for water.

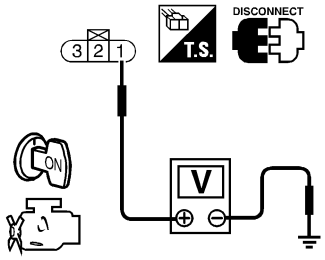
Water should not exist.

OK or NG

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

4	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch "ON".
2. Check voltage between EVAP control system pressure sensor terminal 1 and ground with CONSULT-II or tester.



Voltage: Approximately 5V

SEF341X

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors B2, M2
- Harness connectors M81, F49
- Harness for open or short between EVAP control system pressure sensor and ECM

	▶	Repair harness or connectors.

6	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Check harness continuity between EVAP control system pressure sensor terminal 3 and engine ground. Refer to Wiring Diagram.
   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 B2, M2
- Harness connectors M81, F49
- 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.

Diagnostic Procedure (Cont'd)

8	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 84 and EVAP control system pressure sensor terminal 2. Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

OK or NG

OK (With CONSULT-II)	▶	GO TO 10.
OK (Without CONSULT-II)	▶	GO TO 11.
NG	▶	GO TO 9.

9	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors B2, M2
- Harness connectors M81, F49
- 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 SOLENOID VALVE

With CONSULT-II
1. Start engine.
2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.

ACTIVE TEST	
PURG VOL CONT/V	0.0%
MONITOR	
ENG SPEED	XXX rpm
FR O2 MNTR-B1	RICH
FR O2 MNTR-B2	RICH
THRTL POS SEN	XXX V
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %

SEF068Y

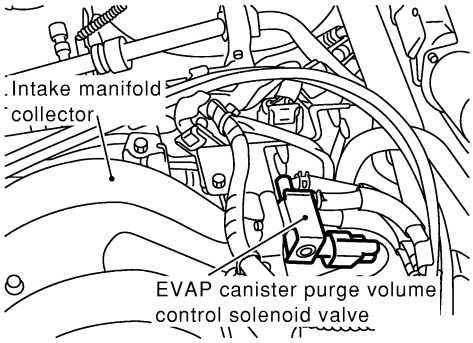
OK or NG

OK	▶	GO TO 12.
NG	▶	GO TO 11.

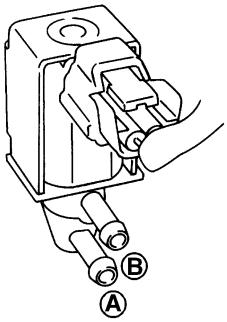
11	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



SEF266X

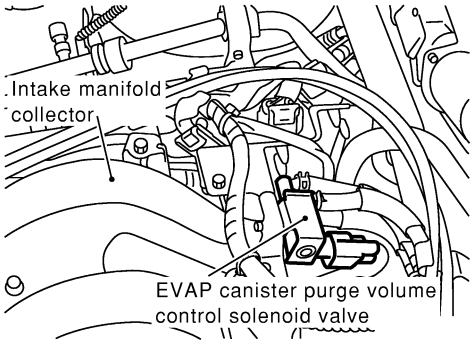


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

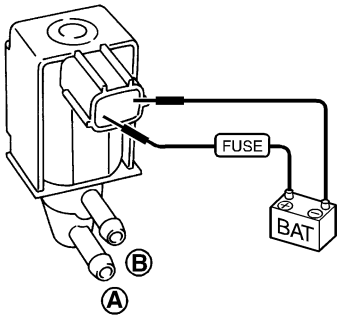
SEF334X

Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



SEF266X



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

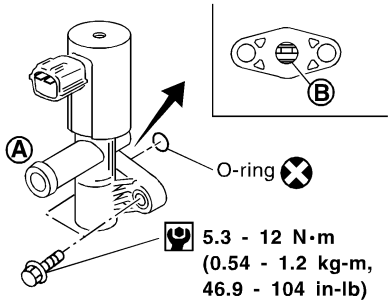
SEF335X

OK or NG

OK	▶	GO TO 12.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

Diagnostic Procedure (Cont'd)

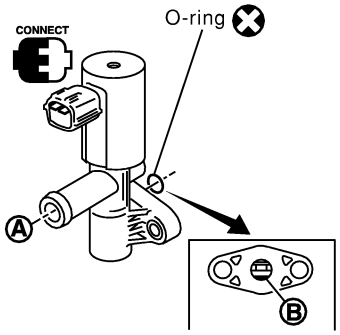
12	CHECK RUBBER TUBE FOR CLOGGING	
1. Disconnect rubber tube connected to EVAP canister vent control valve. 2. Check the rubber tube for clogging. **OK or NG**		
OK	▶	GO TO 13.
NG	▶	Clean the rubber tube using an air blower.

13	CHECK EVAP CANISTER VENT CONTROL VALVE-I	
1. Remove EVAP canister vent control valve from EVAP canister. 2. Check portion **B** of EVAP canister vent control valve for being rusted.  SEF337X **OK or NG**		
OK	▶	GO TO 14.
NG	▶	Replace EVAP canister vent control valve.

14	CHECK EVAP CANISTER VENT CONTROL VALVE

With CONSULT-II

1. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
2. Check air passage continuity and operation delay time under the following conditions.



ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
FR O2 SEN-B1	XXX V
THRTL POS SEN	XXX V
A/F ALPHA-B1	XXX %

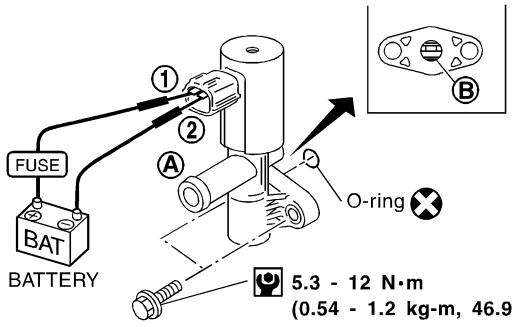
Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

SEF222Y

Without CONSULT-II

Check air passage continuity and operation delay time under the following conditions.



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

Operation takes less than 1 second.

SEF339X

Make sure new O-ring is installed properly.

OK or NG

OK	▶	GO TO 16.
NG	▶	GO TO 15.

15	CHECK EVAP CANISTER VENT CONTROL VALVE-III

1. Clean the air passage (portion **A** to **B**) of EVAP canister vent control valve using an air blower.
2. Perform Test No. 14 again.

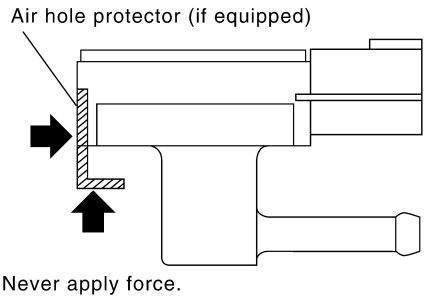
OK or NG

OK	▶	GO TO 16.
NG	▶	Replace EVAP canister vent control valve.

Diagnostic Procedure (Cont'd)

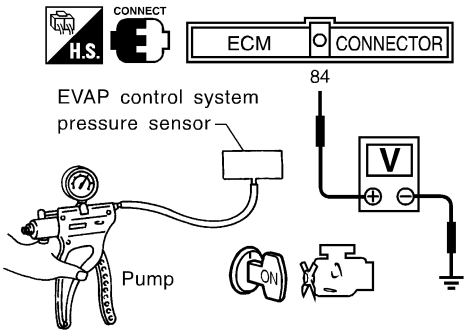
16	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.
   CAUTION:
   - **Never apply force to the air hole protector of the sensor if equipped.**



SEF799W

2. Remove hose from EVAP control system pressure sensor.
3. Turn ignition switch "ON".
4. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.
   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. Check input voltage between ECM terminal 84 and 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

SEF342X

CAUTION:
- **Discard and EVAP control system pressure sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**

OK or NG

OK	▶	GO TO 17.
NG	▶	Replace EVAP control system pressure sensor.

17	CHECK RUBBER TUBE

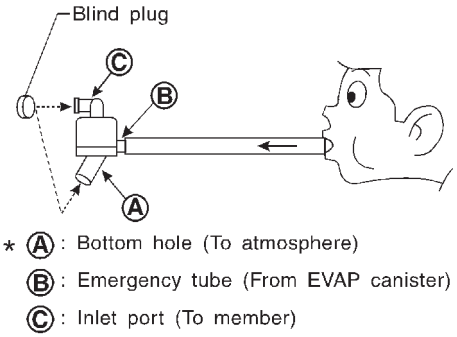
Check obstructed rubber tube connected to EVAP canister vent control valve.

OK or NG

OK	▶	GO TO 18.
NG	▶	Clean rubber tube using an air blower, repair or replace rubber tube.

18	CHECK WATER SEPARATOR

1. Check visually for insect nests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that **A** and **C** are not clogged by blowing air into **B** with **A**, and then **C** plugged.



* Ⓐ: Bottom hole (To atmosphere)
Ⓑ: Emergency tube (From EVAP canister)
Ⓒ: Inlet port (To member)

SEF829T

5. In case of NG in items 2 - 4, replace the parts.

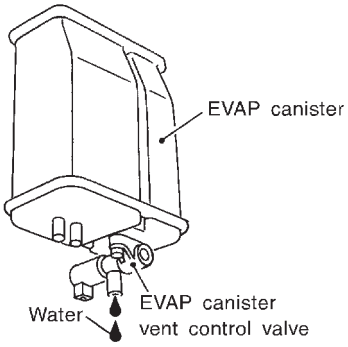
NOTE:
- Do not disassemble water separator.

OK or NG

OK	▶	GO TO 19.
NG	▶	Replace water separator.

19	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 20.
No	▶	GO TO 22.

20	CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve attached.
The weight should be less than 1.8 kg (4.0 lb).

OK or NG

OK	▶	GO TO 18.
NG	▶	GO TO 17.

Diagnostic Procedure (Cont'd)

21	DETECT MALFUNCTIONING PART
Check the following. ● EVAP canister for damage ● EVAP hose between EVAP canister and water separator for clogging or poor connection	
▶	Repair hose or replace EVAP canister.

22	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR SHIELD CIRCUIT FOR OPEN AND SHORT
1. Reconnect harness connectors disconnected. 2. Disconnect harness connectors B2, M2. 3. Check harness continuity between harness connector M2 terminal 10 and engine ground. **Continuity should exist.** 4. Also check harness for short to ground and short to power.	
OK or NG	
OK ▶	GO TO 24.
NG ▶	GO TO 23.

23	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors B2, M2 ● Harness connectors M81, F49 ● Joint connector-17 ● Harness for open or short between harness connector M2 and engine ground	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

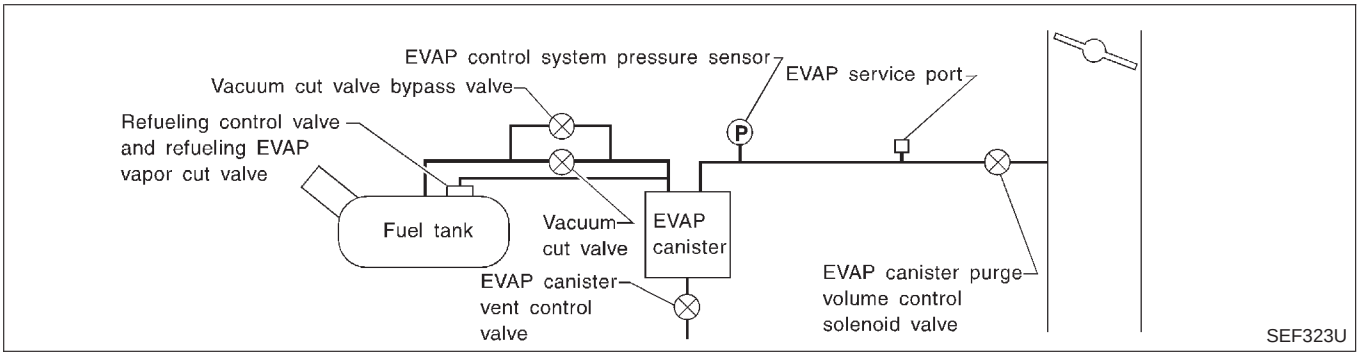
24	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156.	
▶	**INSPECTION END**

On Board Diagnosis Logic

NHEC0644

NOTE:
If DTC P0455 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-613.)

This diagnosis detects a very large leak (fuel filler cap fell off etc.) in EVAP system between the fuel tank and EVAP canister purge volume control solenoid valve.



Malfunction is detected when EVAP control system has a very large leak such as fuel filler cap fell off, EVAP control system does not operate properly.

CAUTION:

- **Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.**
- **If the fuel filler cap is not tightened properly, the MIL may come on.**
- **Use only a genuine NISSAN rubber tube as a replacement.**

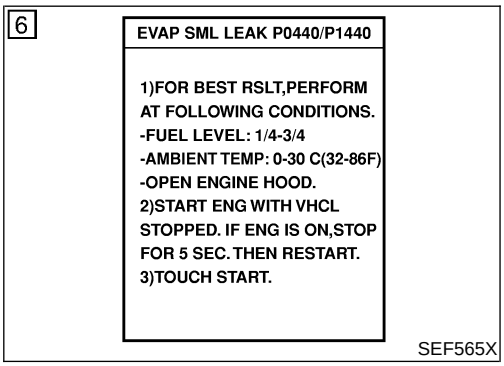
Possible Cause

NHEC0645

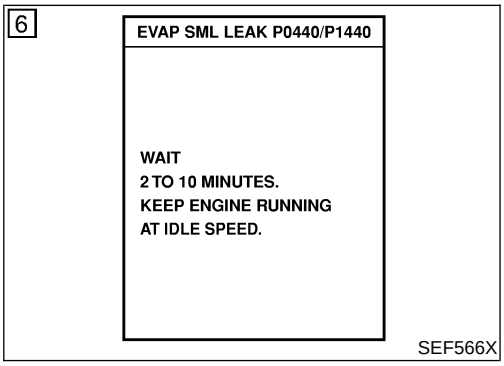
- Fuel filler cap remains open or fails to close.
- Incorrect fuel tank vacuum relief valve
- Incorrect fuel filler cap used
- Foreign matter caught in fuel filler cap.
- Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.
- Foreign matter caught in EVAP canister vent control valve.
- EVAP canister or fuel tank leaks
- EVAP purge line (pipe and rubber tube) leaks
- EVAP purge line rubber tube bent.
- Blocked or bent rubber tube to EVAP control system pressure sensor
- Loose or disconnected rubber tube
- EVAP canister vent control valve and the circuit
- EVAP canister purge volume control solenoid valve and the circuit
- Absolute pressure sensor
- Fuel tank temperature sensor
- O-ring of EVAP canister vent control valve is missing or damaged.

Possible Cause (Cont'd)

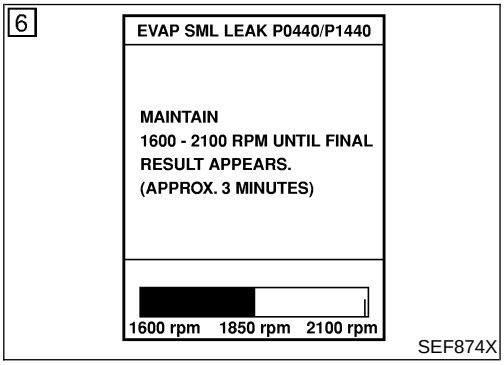
- EVAP control system pressure sensor
- Refueling control valve
- ORVR system leaks



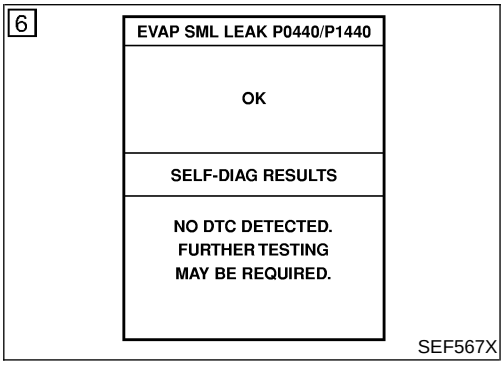
SEF565X



SEF566X



SEF874X



SEF567X

DTC Confirmation Procedure

NHEC0646

CAUTION:

Never remove fuel filler cap during the DTC Confirmation Procedure.

NOTE:

- **If DTC P0455 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-613.)**
- **Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.**
- If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

- **Perform "DTC WORK SUPPORT" when the fuel level is between 1/4 to 3/4 full and vehicle is placed on flat level surface.**
- **Open engine hood before conducting the following procedures.**

WITH CONSULT-II

NHEC0646S01

1) Tighten fuel filler cap securely until ratcheting sound is heard.
2) Turn ignition switch "ON".
3) Turn ignition switch "OFF" and wait at least 10 seconds.
4) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
5) Make sure 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)
6) Select "EVAP SML LEAK P0440/P1440" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
   Follow the instruction displayed.

NOTE:

If the engine speed cannot be maintained within the range displayed on the CONSULT-II screen, go to "Basic Inspection", EC-110.

7) Make sure that "OK" is displayed.
   If "NG" is displayed, select "SELF-DIAG RESULTS" mode and make sure that "EVAP GROSS LEAK [P0455]" is displayed. If it is displayed, refer to "Diagnostic Procedure", EC-433.
   If P0440 is displayed, perform "Diagnostic Procedure" for DTC P0440.

WITH GST

NHEC0646S02

NOTE:
Be sure to read the explanation of "Driving Pattern" on EC-76 before driving vehicle.

1) Start engine.
2) Drive vehicle according to "Driving Pattern", EC-76.
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 10 seconds.
6) Start engine.
   It is not necessary to cool engine down before driving.
7) Drive vehicle again according to the "Driving Pattern", EC-76.
8) Stop vehicle.
9) Select "MODE 3" with GST.
- If P0455 is displayed on the screen, go to "Diagnostic Procedure", EC-433.
- If P0440 or P1440 is displayed on the screen, go to "Diagnostic Procedure", for DTC P0440, EC-393.
- If P1447 is displayed on the screen, go to "Diagnostic Procedure" for DTC P1447, EC-604.
- If P0455, P0440, P1440 and P1447 are not displayed on the screen, go to the following step.

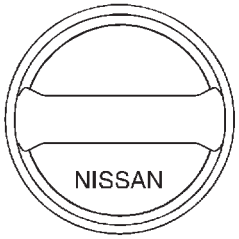
10) Select "MODE 1" with GST.
- If SRT of EVAP system is set, the result will be OK.
- If SRT of EVAP system is not set, go to step 6.

Diagnostic Procedure

NHEC0647

1	CHECK FUEL FILLER CAP DESIGN

1. Turn ignition switch "OFF".
2. Check for genuine NISSAN fuel filler cap design.



SEF915U

OK or NG

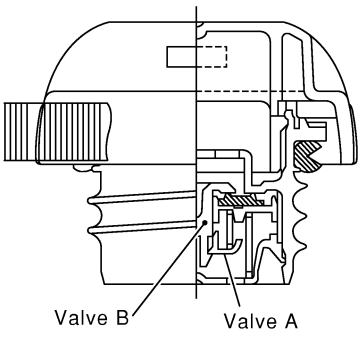
OK	▶	GO TO 2.
NG	▶	Replace with genuine NISSAN fuel filler cap.

2	CHECK FUEL FILLER CAP INSTALLATION
Check that the cap is tightened properly by 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.

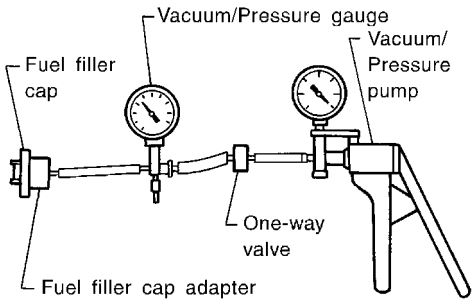
3	CHECK FUEL FILLER CAP FUNCTION
Check for air releasing sound while opening the fuel filler cap. **OK or NG**	
OK ▶	GO TO 5.
NG ▶	GO TO 4.

4 CHECK FUEL TANK VACUUM RELIEF VALVE

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



SEF989X



SEF943S

Pressure:
15.3 - 20.0 kPa (0.156 - 0.204 kg/cm^2, 2.22 - 2.90 psi)
Vacuum:
−6.0 to −3.3 kPa (−0.061 to −0.034 kg/cm^2, −0.87 to −0.48 psi)

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

OK or NG

OK ▶	GO TO 5.
NG ▶	Replace fuel filler cap with a genuine one.

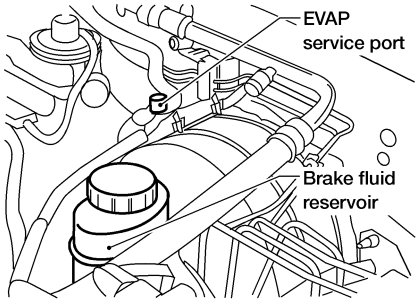
5	CHECK EVAP PURGE LINE
Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks, improper connection or disconnection. Refer to "Evaporative Emission System", EC-32.	
OK or NG	
OK ▶	GO TO 6.
NG ▶	Repair or reconnect the hose.

6	CLEAN EVAP PURGE LINE
Clean EVAP purge line (pipe and rubber tube) using air blower.	
▶	GO TO 7.

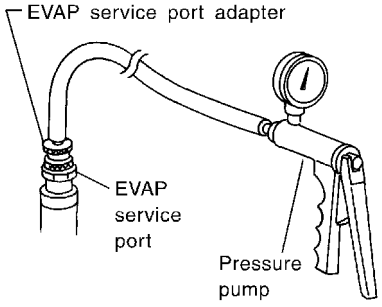
7	CHECK EVAP CANISTER VENT CONTROL VALVE, O-RING AND CIRCUIT
Refer to "DTC Confirmation Procedure", EC-413.	
OK or NG	
OK ▶	GO TO 8.
NG ▶	Repair or replace EVAP canister vent control valve and O-ring or harness/connector.

8	INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.



AEC649A



SEF916U

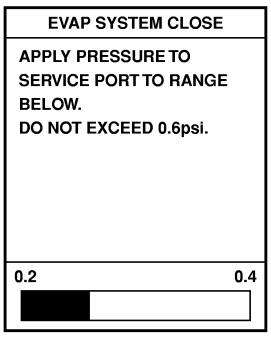
NOTE:
Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.

Models with CONSULT-II ▶	GO TO 9.
Models without CONSULT-II ▶	GO TO 10.

9	CHECK FOR EVAP LEAK

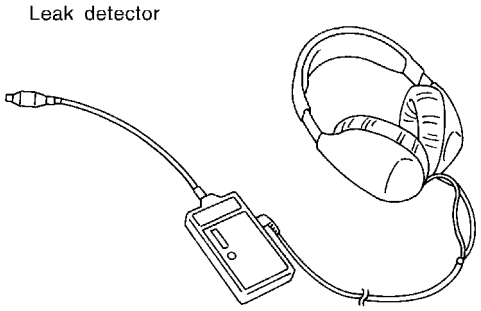
With CONSULT-II

1. Turn ignition switch "ON".
2. Select "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-II.
3. Touch "START" and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.
   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.**



PEF917U

4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-36.



SEF200U

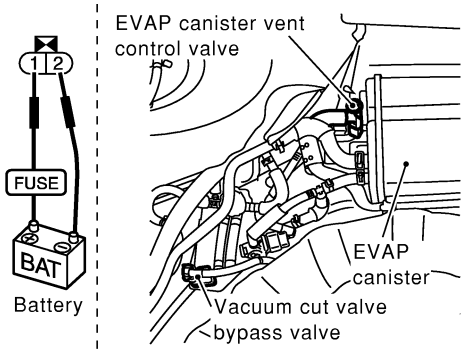
OK or NG

OK	▶	GO TO 11.
NG	▶	Repair or replace.

10	CHECK FOR EVAP LEAK

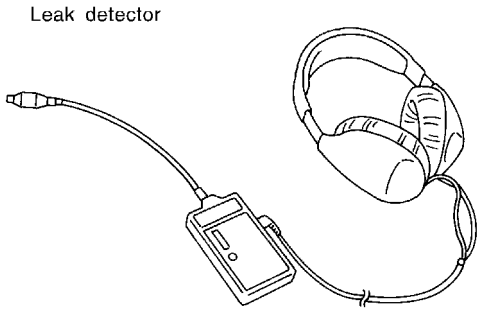
Without CONSULT-II

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.)
3. Apply 12 volts DC to vacuum cut valve bypass valve. The valve will open. (Continue to apply 12V until the end of test.)



SEF254X

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), then remove pump and EVAP service port adapter.
   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 EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-36.



SEF200U

OK or NG

OK	▶	GO TO 12.
NG	▶	Repair or replace.

11	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-II

1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
2. Start engine.
3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode.
4. Touch "Qu" on CONSULT-II screen to increase "PURG VOL CONT/V" opening to 100.0%.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
FR O2 MNTR-B1	LEAN
THRTL POS SEN	XXX V
A/F ALPHA-B1	XXX %

Vacuum should exist.

SEF224Y

OK or NG

OK	▶	GO TO 14.
NG	▶	GO TO 13.

12	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
4. Start engine and let it idle for at least 80 seconds.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

Vacuum should exist.

OK or NG

OK	▶	GO TO 15.
NG	▶	GO TO 13.

13	CHECK VACUUM HOSE

Check vacuum hoses for clogging or disconnection. Refer to "Vacuum Hose Drawing", EC-26.

OK or NG

OK (With CONSULT-II)	▶	GO TO 14.
OK (Without CONSULT-II)	▶	GO TO 15.
NG	▶	Repair or reconnect the hose.

14	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

1. Start engine.
2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.

ACTIVE TEST	
PURG VOL CONT/V	0.0%
MONITOR	
ENG SPEED	XXX rpm
FR O2 MNTR-B1	RICH
FR O2 MNTR-B2	RICH
THRTL POS SEN	XXX V
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %

SEF068Y

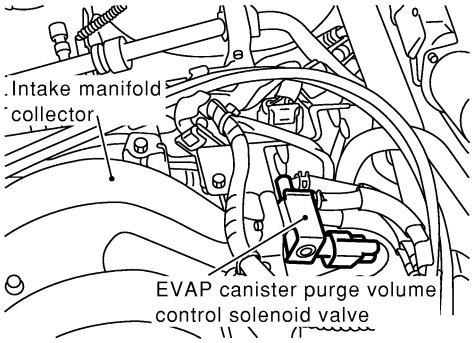
OK or NG

OK	▶	GO TO 16.
NG	▶	GO TO 15.

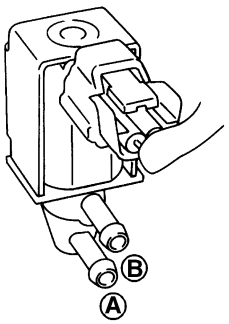
15	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



SEF266X

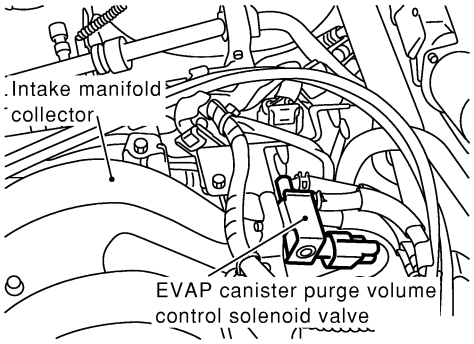


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

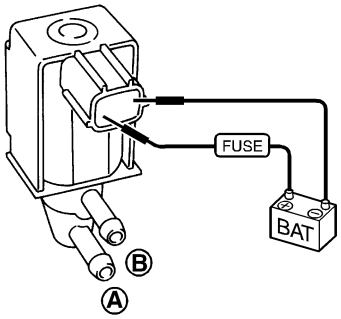
SEF334X

Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



SEF266X



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

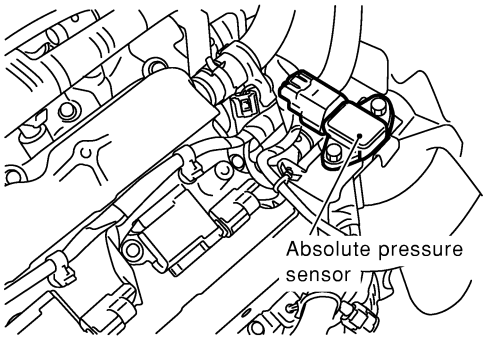
SEF335X

OK or NG

OK	▶	GO TO 16.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

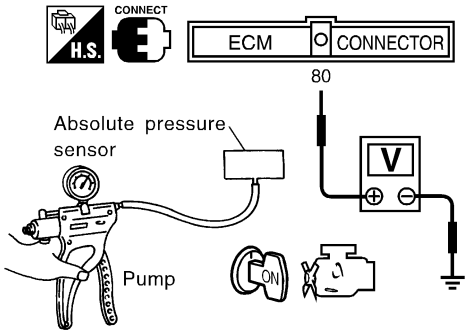
16	CHECK ABSOLUTE PRESSURE SENSOR

1. Remove absolute pressure sensor with its harness connector connected.



SEF257X

2. Remove hose from absolute pressure sensor.
3. Install a vacuum pump to absolute pressure sensor.
4. Turn ignition switch "ON" and check output voltage between ECM terminal 80 and engine ground under the following conditions.



Applied vacuum kPa (mmHg, inHg)	Voltage V
Not applied	3.2 - 4.8
–26.7 (–200, –7.87)	1.0 to 1.4V lower than above value

SEF300X

CAUTION:

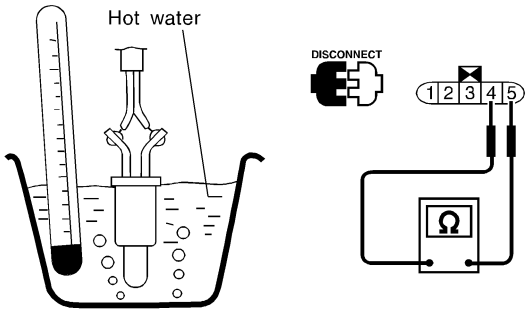
- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply below −93.3 kPa (–700 mmHg, –27.56 inHg) or over 101.3 kPa (760 mmHg, 29.92 inHg) of pressure.**

OK or NG

OK	▶	GO TO 17.
NG	▶	Replace absolute pressure sensor.

17	CHECK FUEL TANK TEMPERATURE SENSOR

1. Remove fuel level sensor unit.
2. Check resistance between fuel level sensor unit and fuel pump terminals 4 and 5 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

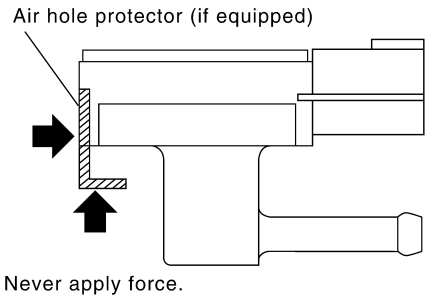
SEF587X

OK or NG

OK	▶	GO TO 18.
NG	▶	Replace fuel level sensor unit.

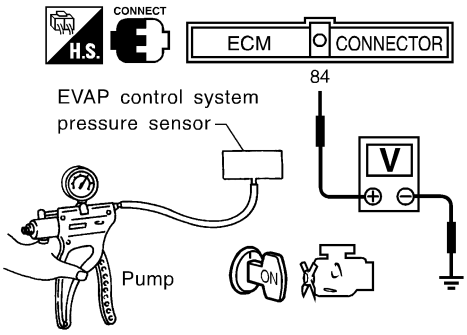
18	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.
   CAUTION:
   - **Never apply force to the air hole protector of the sensor if equipped.**



SEF799W

2. Remove hose from EVAP control system pressure sensor.
3. Turn ignition switch "ON".
4. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.
   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. Check input voltage between ECM terminal 84 and 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

SEF342X

CAUTION:
- **Discard and EVAP control system pressure sensor which has been dropped from a height of more than 0.5m (19.7in) onto a hard surface such as a concrete floor; use a new one.**

OK or NG

OK	▶	GO TO 19.
NG	▶	Replace EVAP control system pressure sensor.

19	CHECK REFUELING EVAP VAPOR LINE

Check refueling EVAP vapor line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to "ON BOARD REFUELING VAPOR RECOVERY (ORVR)", EC-38.

OK or NG

OK	▶	GO TO 20.
NG	▶	Repair or replace hoses and tubes.

20	CHECK SIGNAL LINE AND RECIRCULATION LINE

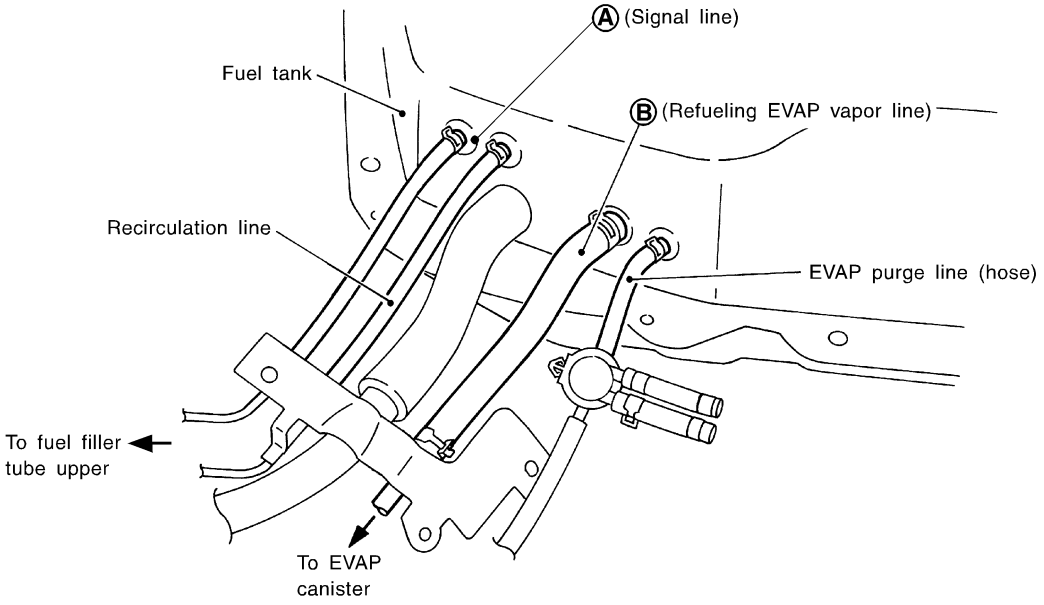
Check signal line and recirculation line between filler neck tube and fuel tank for clogging, kink, cracks, looseness and improper connection.

OK or NG

OK	▶	GO TO 21.
NG	▶	Repair or replace hoses, tubes or filler neck tube.

21	CHECK REFUELING CONTROL VALVE

1. Remove fuel filler cap.
2. Check air continuity between hose ends A and B.
   Blow air into the hose end B. Air should flow freely into the fuel tank.
3. Blow air into hose end A and check there is no leakage.
4. Apply pressure to both hose ends A and B [20 kPa (150 mmHg, 5.91 inHg)] using a pressure pump and a suitable 3-way connector. Check that there is no leakage.

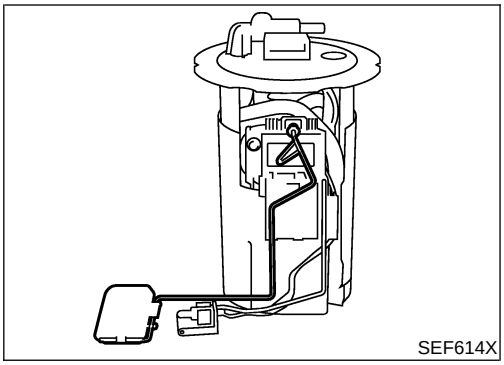


SEF141W

OK or NG

OK	▶	GO TO 22.
NG	▶	Replace refueling control valve with fuel tank.

22	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156.	
▶	**INSPECTION END**


SEF614X

Component Description

NHEC0616

The fuel level sensor is mounted in the fuel level sensor unit. The sensor detects a fuel level in the fuel tank and transmits a signal to the ECM.
It consists of two parts, one is mechanical float and the other side is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

On Board Diagnostic Logic

NHEC0617

When the vehicle is parked, naturally the fuel level in the fuel tank is stable. It means that output signal of the fuel level sensor does not change. If ECM senses sloshing signal from the sensor, fuel level sensor malfunction is detected.
Malfunction is detected when even though the vehicle is parked, a signal being varied is sent from the fuel level sensor to ECM.

Possible Cause

NHEC0618

- Fuel level sensor circuit
  (The fuel level sensor circuit is open or shorted.)
- Fuel level sensor

3

DATA MONITOR	
MONITOR	NO DTC
FUEL T/TMP SE	XXX °C
FUEL LEVEL SE	XXX V

SEF195Y

DTC Confirmation Procedure

NHEC0619

NOTE:
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

NHEC0619S01

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Start engine and wait maximum of 2 consecutive minutes.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-446.

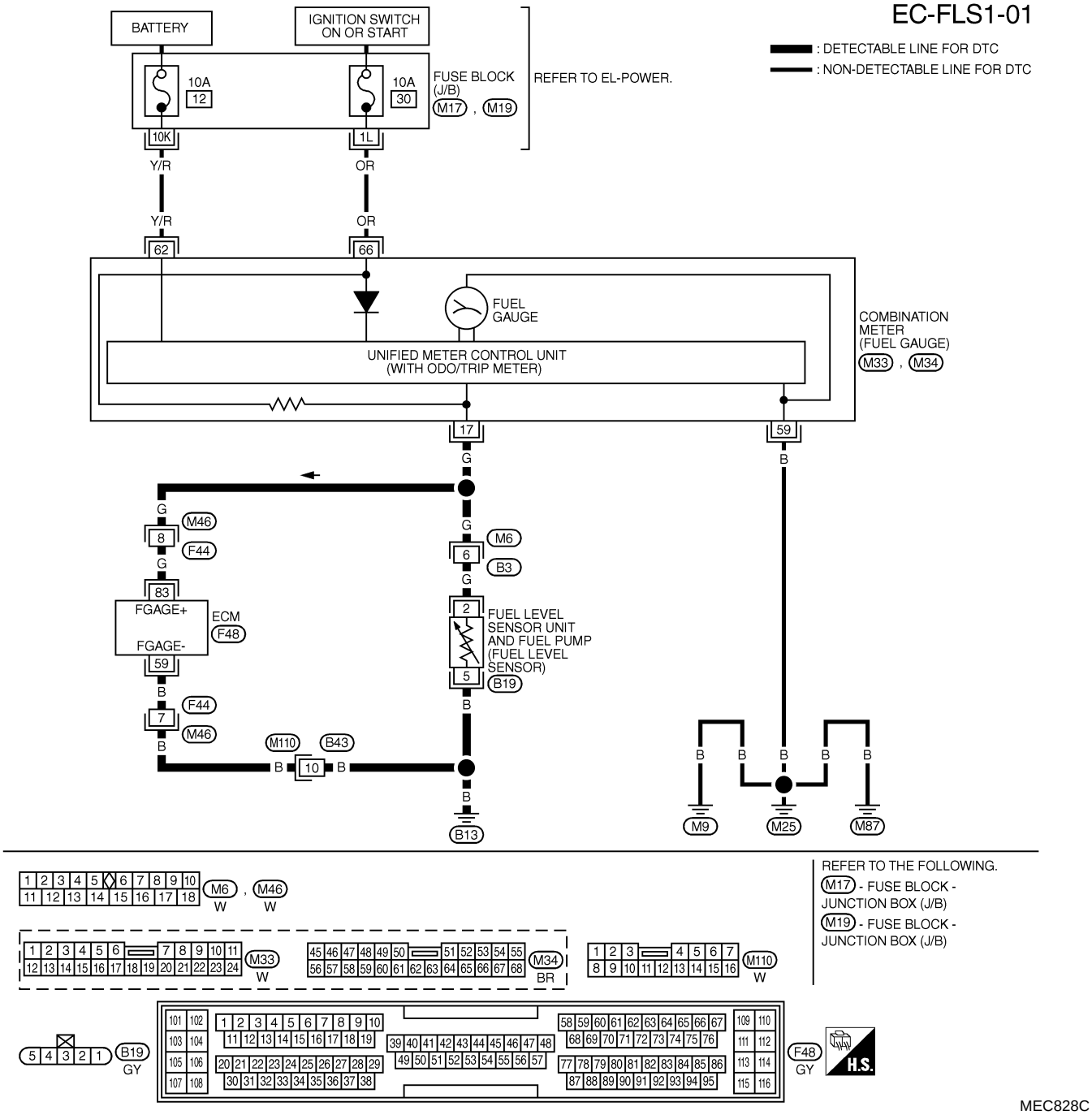
WITH GST

NHEC0619S02

Follow the procedure "WITH CONSULT-II" above.

Wiring Diagram

NHEC0620



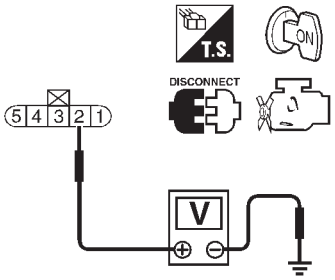
MEC828C

Diagnostic Procedure

=NHEC0621

1	CHECK FUEL LEVEL SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect fuel level sensor until and fuel pump harness connector.
3. Turn ignition switch “ON”.
4. Check voltage between fuel level sensor unit and fuel pump terminal 2 and ground with CONSULT-II or a tester.



Voltage: Battery voltage

SEF524Z

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M6, B3
- Harness for open or short between combination meter and fuel level sensor until and fuel pump

	▶	Repair or replace harness or connectors.

3	CHECK FUEL LEVEL SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Check harness continuity between fuel level sensor unit and fuel pump terminal 5 and body ground. Refer to Wiring Diagram.
   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 FUEL LEVEL SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 83 and fuel level sensor unit and fuel pump terminal 2, ECM terminal 59 and fuel level sensor unit and fuel pump terminal 5. Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

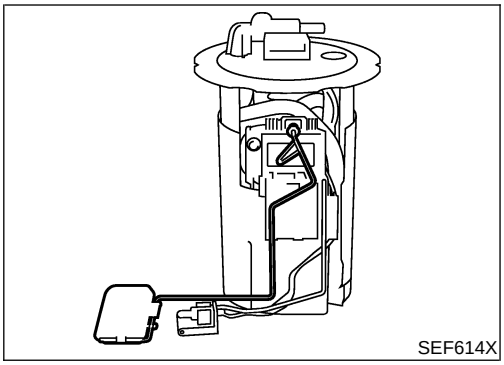
OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors M110, B43 ● Harness connectors M46, F44 ● Harness for open or short between ECM and fuel level sensor	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK FUEL LEVEL SENSOR
Refer to EL-158, "Fuel Level Sensor Unit Check".	
OK or NG	
OK ▶	GO TO 7.
NG ▶	Replace fuel level sensor unit.

7	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156.	
▶	**INSPECTION END**


SEF614X

Component Description

=NHEC0622

The fuel level sensor is mounted in the fuel level sensor unit. The sensor detects a fuel level in the fuel tank and transmits a signal to the ECM.
It consists of two parts, one is mechanical float and the other side is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

On Board Diagnostic Logic

NHEC0623

Driving long distances naturally affect fuel gauge level.
This diagnosis detects the fuel gauge malfunction of the gauge not moving even after a long distance has been driven.
Malfunction is detected when the output signal of the fuel level sensor does not change within the specified range even though the vehicle has been driven a long distance.

Possible Cause

NHEC0624

- Harness or connectors
  (The level sensor circuit is open or shorted.)
- Fuel level sensor

Overall Function Check

NHEC0625

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

WARNING:
When performing following procedure, be sure to observe the handling of the fuel. Refer to FE-6 “Fuel Tank”.

TESTING CONDITION:
Before starting overall function check, preparation of draining fuel and refilling fuel is required.

7

DATA MONITOR	
MONITOR	NO DTC
FUEL T/TMP SE	XXX °C
FUEL LEVEL SE	XXX V

SEF195Y

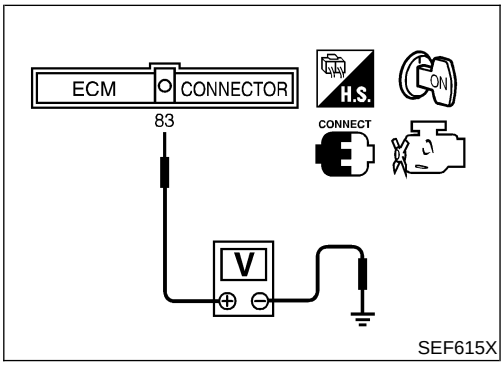
WITH CONSULT-II

NHEC0625S01

NOTE:
Start from step 11, if it is possible to confirm that the fuel cannot be drained by 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) in advance.

1) Prepare a fuel container and a spare hose.
2) Release fuel pressure from fuel line, refer to “Fuel Pressure Release”, EC-50.
3) Remove the fuel feed hose on the fuel level sensor unit.
4) Connect a spare fuel hose where the fuel feed hose was removed.

5) Turn ignition switch "OFF" and wait at least 10 seconds then turn "ON".
6) Select "FUEL LEVEL SE" in "DATA MONITOR" mode with CONSULT-II.
7) Check "FUEL LEVEL SE" output voltage and note it.
8) Select "FUEL PUMP" in "ACTIVE TEST" mode with CONSULT-II.
9) Touch "ON" and drain fuel approximately 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) and stop it.
10) Fill fuel into the fuel tank for 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal).
11) Check "FUEL LEVEL SE" output voltage and note it.
12) Check "FUEL LEVEL SE" output voltage and confirm whether the voltage changes more than 0.03V during step 7 to 11.
If NG, check the fuel level sensor, refer to EL-158, "FUEL LEVEL SENSOR UNIT CHECK".

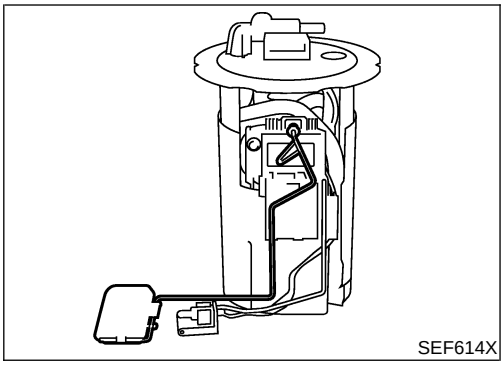


WITH GST

NHEC0625S02

NOTE:
Start from step 11, if it is possible to confirm that the fuel cannot be drained by 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) in advance.

1) Prepare a fuel container and a spare hose.
2) Release fuel pressure from fuel line, refer to "Fuel Pressure Release", EC-50.
3) Remove the fuel feed hose on the fuel level sensor unit.
4) Connect a spare fuel hose where the fuel feed hose was removed.
5) Turn ignition switch "OFF".
6) Set voltmeters probe between ECM terminal 83 (fuel level sensor signal) and ground.
7) Turn ignition switch "ON".
8) Check voltage between ECM terminal 83 and ground and note it.
9) Drain fuel by 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) from the fuel tank using proper equipment.
10) Fill fuel into the fuel tank for 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal).
11) Confirm that the voltage between ECM terminal 83 and ground changes more than 0.03V during step 8 - 10.
If NG, check component of fuel level sensor, refer to EL-158, "FUEL LEVEL SENSOR UNIT CHECK".


SEF614X

Component Description

NHEC0626

The fuel level sensor is mounted in the fuel level sensor unit. The sensor detects a fuel level in the fuel tank and transmits a signal to the ECM.
It consists of two parts, one is mechanical float and the other side is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

On Board Diagnostic Logic

NHEC0627

ECM receives two signals from the fuel level sensor circuit.
One is fuel level sensor power supply circuit, and the other is fuel level sensor ground circuit.
This diagnosis indicates the former, to detect open or short circuit malfunction.
Malfunction is detected when an excessively low or high voltage is sent from the sensor is sent to ECM.

Possible Cause

NHEC0628

- Fuel level sensor circuit
  (The fuel level sensor circuit is open or shorted.)
- Fuel level sensor

DTC Confirmation Procedure

NHEC0629

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11V at ignition switch “ON”.

2

DATA MONITOR	
MONITOR	NO DTC
FUEL T/TMP SE	XXX ˚C
FUEL LEVEL SE	XXX V

SEF195Y

WITH CONSULT-II

NHEC0629S01

1) Turn ignition switch “ON”.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Wait at least 5 seconds.
4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-452.

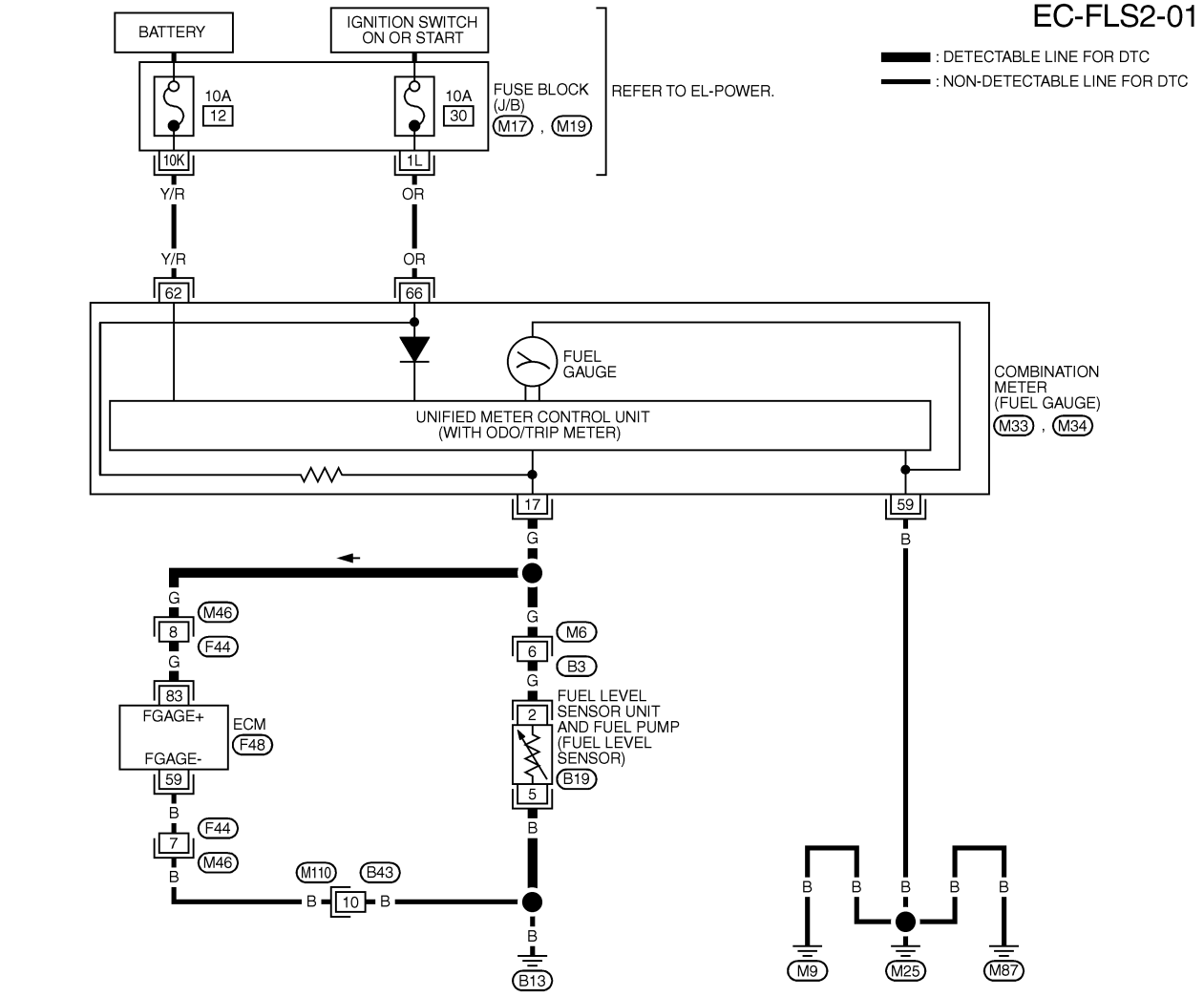
WITH GST

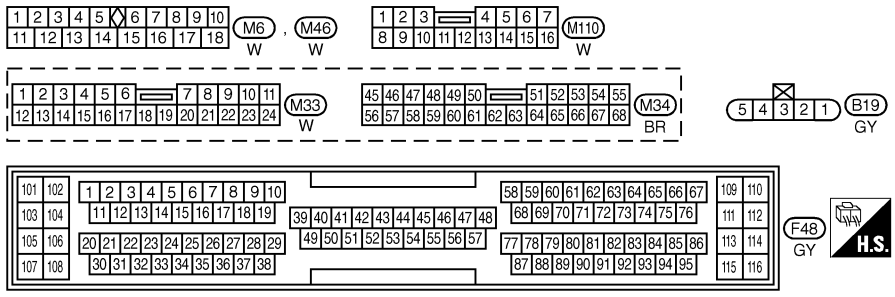
NHEC0629S02

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

NHEC0630





REFER TO THE FOLLOWING.
M17 - FUSE BLOCK - JUNCTION BOX (J/B)
M19 - FUSE BLOCK - JUNCTION BOX (J/B)

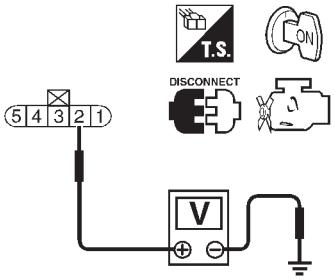
MEC877C

Diagnostic Procedure

=NHEC0631

1	CHECK FUEL LEVEL SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect fuel level sensor until and fuel pump harness connector.
3. Turn ignition switch “ON”.
4. Check voltage between fuel level sensor unit and fuel pump terminal 2 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF524Z

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M6, B3
- Harness for open or short between combination meter and fuel level sensor until and fuel pump

	▶	Repair or replace harness or connectors.

3	CHECK FUEL LEVEL SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Check harness continuity between fuel level sensor unit and fuel pump terminal 5 and body ground. Refer to Wiring Diagram.
   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 FUEL LEVEL SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 83 and fuel level sensor unit and fuel pump terminal 2. Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

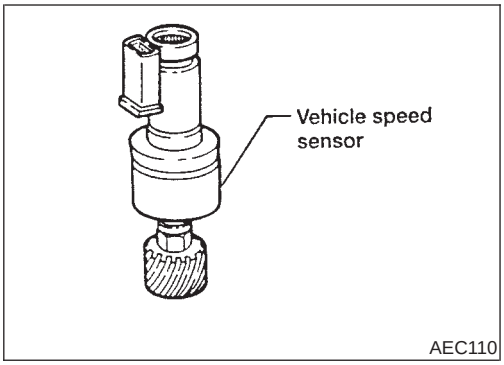
OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors M110, B43 ● Harness connectors M46, F44 ● Harness for open or short between ECM and fuel level sensor	
▶	Repair open circuit or short to ground or short to power in harness on connectors.

6	CHECK FUEL LEVEL SENSOR
Refer to EL-158, "Fuel Level Sensor Unit Check".	
OK or NG	
OK ▶	GO TO 7.
NG ▶	Replace fuel level sensor unit.

7	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156.	
▶	**INSPECTION END**



AEC110

Component Description

=NHEC0242

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.

On Board Diagnosis Logic

NHEC0244

Malfunction is detected when the almost 0 km/h (0 MPH) signal from vehicle speed sensor is sent to ECM even when vehicle is being driven.

Possible Cause

NHEC0514

- Harness or connector
  (The vehicle speed sensor circuit is open or shorted.)
- Vehicle speed sensor

DTC Confirmation Procedure

NHEC0245

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 10 seconds before conducting the next test.

TESTING CONDITION:

Steps 1 and 2 may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

5

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
B/FUEL SCHDL	XXX msec
PW/ST SIGNAL	OFF
VHCL SPEED SE	XXX km/h

SEF196Y

WITH CONSULT-II

NHEC0245S01

1) Start engine (TCS switch “OFF”).
2) Read “VHCL SPEED SE” in “DATA MONITOR” mode with CONSULT-II. The vehicle speed on CONSULT-II should exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.
   If NG, go to “Diagnostic Procedure”, EC-457.
   If OK, go to following step.
3) Select “DATA MONITOR” mode with CONSULT-II.
4) Warm engine up to normal operating temperature.

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

ENG SPEED	1,400 - 2,400 rpm
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	4 - 8 msec
Selector lever	Suitable position
PW/ST SIGNAL	OFF

6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-457.

Overall Function Check

NHEC0246

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

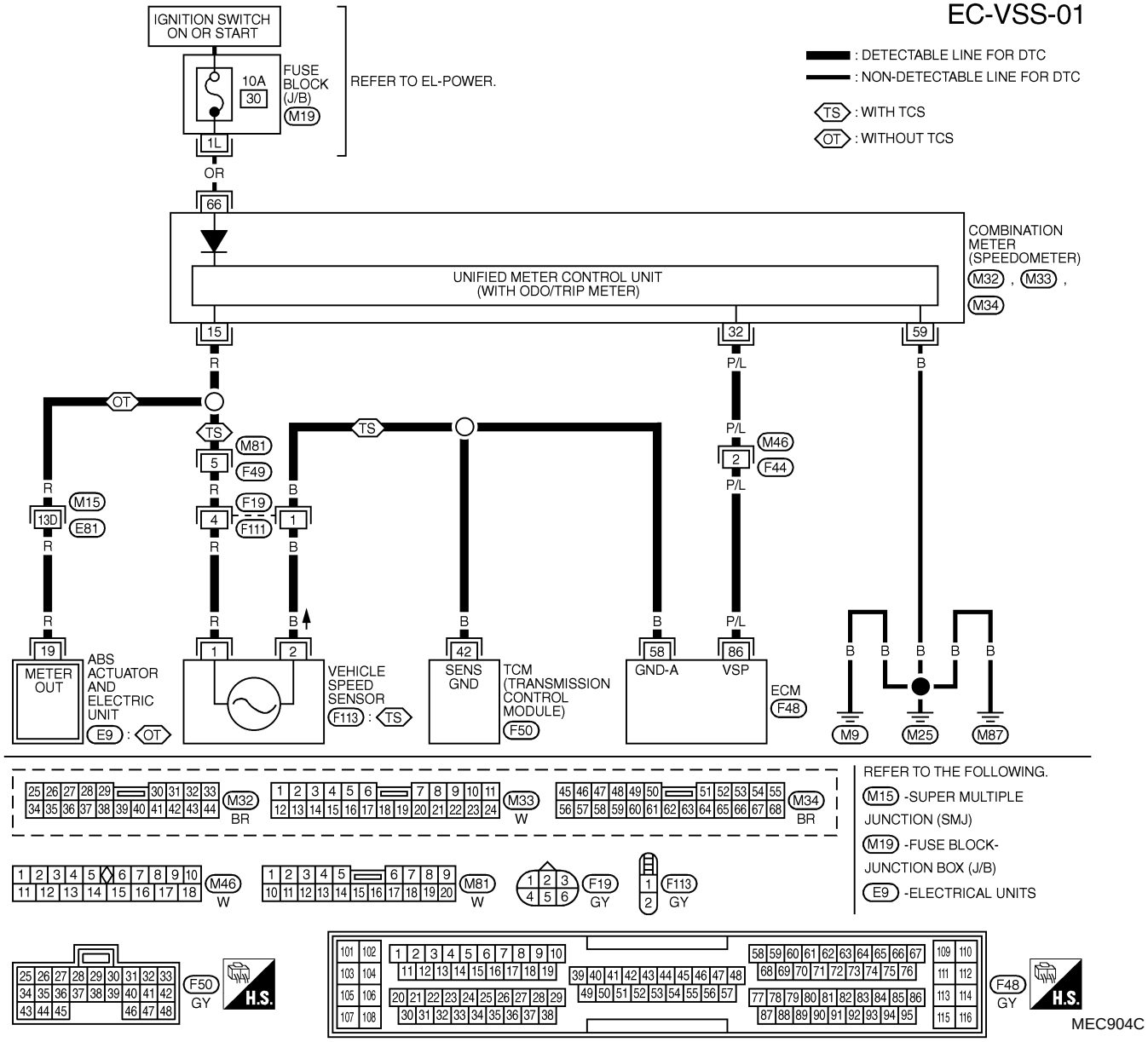
WITH GST

NHEC0246S01

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-457.

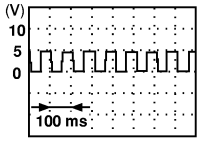
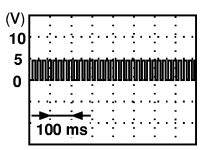
Wiring Diagram

NHEC0247



MEC904C

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
86	P/L	VEHICLE SPEED SENSOR	VEHICLE DRIVING AT 10 KM/H (6 MPH) IN 1ST GEAR POSITION UNDER LIFTED UP CONDITION	APPROX. 2.0V 
			VEHICLE DRIVING AT 30 KM/H (19 MPH) IN 2ND GEAR POSITION UNDER LIFTED UP CONDITION	APPROX. 2.5V 

SEF859Y

Diagnostic Procedure

NHEC0248

1	CHECK VEHICLE SPEED SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector and combination meter harness connector.
3. Check harness continuity between ECM terminal 86 and combination meter terminal 32.
   Refer to Wiring Diagram.
   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 M46, F44
- 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	CHECK SPEEDOMETER CIRCUIT FOR OPEN AND SHORT

Check the following.
- Harness connectors M81, F49
- Harness connectors F19, F111
- Harness connectors M15, E81
- Harness for open and short between combination meter and ABS actuator and electric unit
- Harness for open or short between combination meter and vehicle speed sensor
- Harness for open or short between vehicle speed sensor and ECM
- Harness for open or short between vehicle speed sensor and TCM (Transmission control module)

OK or NG

OK	▶	Check combination meter and vehicle speed sensor. Refer to EL section.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK INTERMITTENT INCIDENT

Refer to “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-156.

	▶	**INSPECTION END**

Description

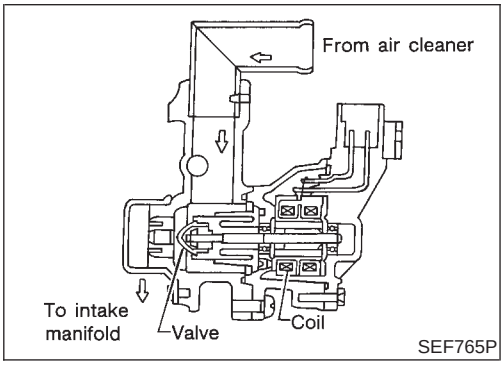
NHEC0249

SYSTEM DESCRIPTION

NHEC0249S01

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed (POS signal)	Idle air control	IACV-AAC valve
Crankshaft position sensor (REF)	Engine speed (REF signal)		
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		
Park/neutral 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		
Ambient air temperature switch	Ambient air temperature		
Intake air temperature sensor	Intake air temperature		
Absolute pressure sensor	Ambient barometic pressure		

This system automatically controls engine idle speed to a specified level. Idle speed is controlled through fine adjustment of the amount of air which by-passes the throttle valve via IACV-AAC valve. The IACV-AAC valve changes the opening of the air by-pass passage to control the amount of auxiliary air. This valve is actuated by a step motor built into the valve, which moves the valve in the axial direction in steps corresponding to the ECM output signals. One step of IACV-AAC valve movement causes the respective opening of the air by-pass passage. (i.e. when the step advances, the opening is enlarged.) The opening of the valve is varied to allow for optimum control of the engine idling speed. The crankshaft position sensor (POS) detects the actual engine speed and sends a signal to the ECM. The ECM then controls the step position of the IACV-AAC valve so that engine speed coincides with the target value memorized in ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by takig into consideration various engine conditions, such as during warm up, deceleration, and engine load (air conditioner, power steering and cooling fan operation).



COMPONENT DESCRIPTION

NHEC0249S02

IACV-AAC Valve

NHEC0249S0201

The IACV-AAC valve is operated by a step motor for centralized control of auxiliary air supply. This motor has four winding phases and is actuated by the output signals of ECM which turns ON and OFF two windings each in seqeunce. Each time the IACV-AAC valve opens or closes to change tha auxiliary air quantity, the ECM sends a pulse signal to the step motor. When no change in the auxiliary air quantity is needed, the ECM does not issue the pulse signal. A certain voltage signal is issued so that the valve remains at that particular opening.

CONSULT-II Reference Value in Data Monitor Mode

NHEC0250

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
IACV-AAC/V	• Engine: After warming up • Air conditioner switch: “OFF” • Shift lever: “N” • No-load	Idle	2 - 10 step
		2,000 rpm	—

On Board Diagnosis Logic

NHEC0252

Malfunction is detected when
(Malfunction A) the IACV-AAC valve does not operate properly,
(Malfunction B) the IACV-AAC valve does not operate properly.

Possible Cause

NHEC0515

MALFUNCTION A

NHEC0515S01

- Harness or connectors
  (The IACV-AAC valve circuit is open.)
- IACV-AAC valve

MALFUNCTION B

NHEC0515S02

- Harness or connectors
  (The IACV-AAC valve circuit is shorted.)
- Air control valve (Power steering)
- IACV-AAC valve

DTC Confirmation Procedure

NHEC0253

NOTE:

- If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.
- **Perform “PROCEDURE FOR MALFUNCTION A” first. If 1st trip DTC cannot be confirmed, perform “PROCEDURE FOR MALFUNCTION B”.**
- **If the target idle speed is out of the specified value, perform “Idle Air Volume Learning”, EC-67, before conducting “DTC Confirmation Procedure”. For the target idle speed, refer to the “Service Data and Specifications (SDS)”, EC-693.**

DTC Confirmation Procedure (Cont'd)

2

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

PROCEDURE FOR MALFUNCTION A

NHEC0253S01

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5V with ignition switch "ON".

With CONSULT-II

NHEC0253S0101

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Start engine and let it idle.
4) Keep engine speed at 2,500 rpm for three seconds, then let it idle for three seconds.
   Do not rev engine to more than 3,000 rpm.
5) Perform step 4 once more.
6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-462.

With GST

NHEC0253S0102

Follow the procedure "With CONSULT-II" above.

4

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C

SEF174Y

PROCEDURE FOR MALFUNCTION B

NHEC0253S02

TESTING CONDITION:

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

With CONSULT-II

NHEC0253S0201

1) Open engine hood.
2) Start engine and warm it up to normal operating temperature.
3) Turn ignition switch "OFF" and wait at least 10 seconds.
4) Turn ignition switch "ON" again and select "DATA MONITOR" mode with CONSULT-II.
5) Start engine and run it for at least 1 minute at idle speed.
6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-462.

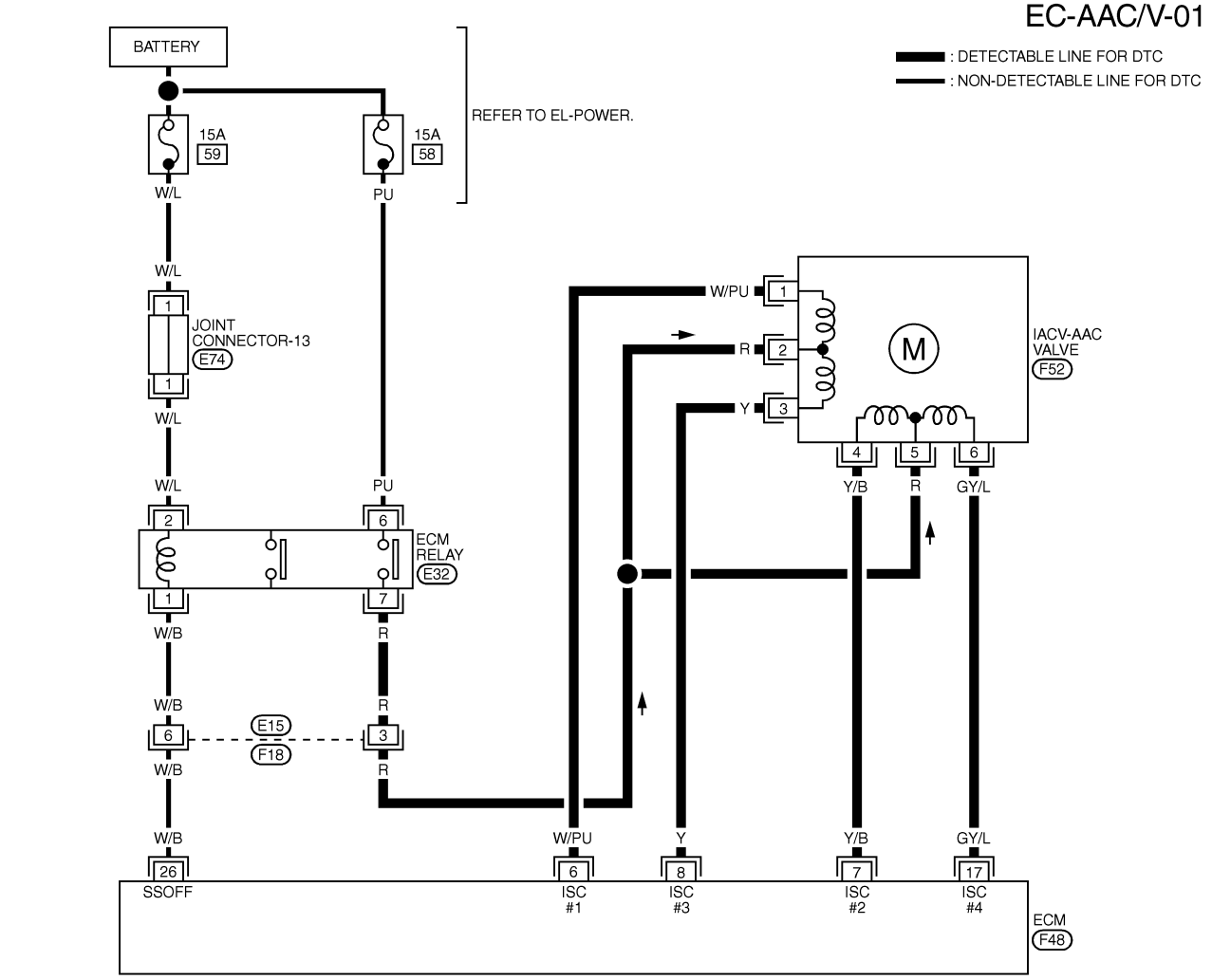
With GST

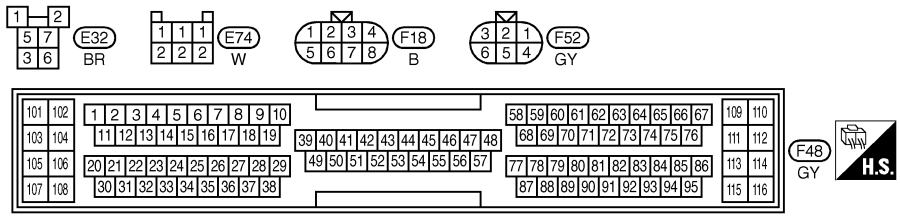
NHEC0253S0202

Follow the procedure "With CONSULT-II" above.

Wiring Diagram

NHEC0254





MEC817C

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
6	W/PU	IACV-AAC VALVE	ENGINE RUNNING AT IDLE SPEED	0.1 - 14V
7	Y/B			
8	Y			
17	GY/L			

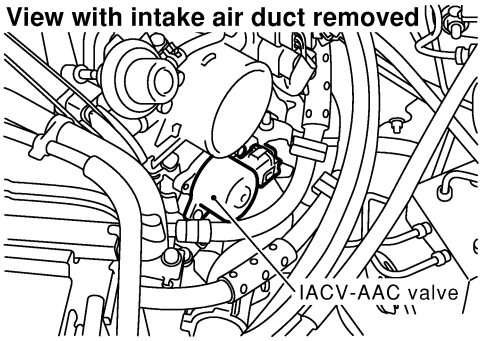
SEF625XB

Diagnostic Procedure

NHEC0255

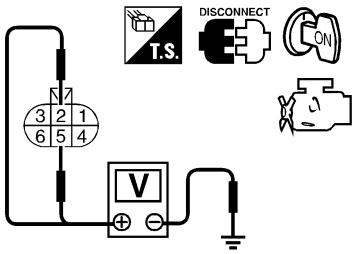
1	CHECK IACV-AAC VALVE POWER SUPPLY CIRCUIT

1. Stop engine.
2. Disconnect IACV-AAC valve harness connector.



SEF269X

3. Turn ignition switch “ON”.
4. Check voltage between IACV-AAC valve terminals 2, 5 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF343X

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E15, F18
- Harness for open or short between IACV-AAC valve and ECM relay

	▶	Repair harness or connectors.

3	CHECK IACV-AAC VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminals and IACV-AAC valve terminals as follows. Refer to Wiring Diagram.

ECM terminal	IACV-AAC valve terminal
6	1
7	4
8	3
17	6

MTBL0354

Continuity should exist.

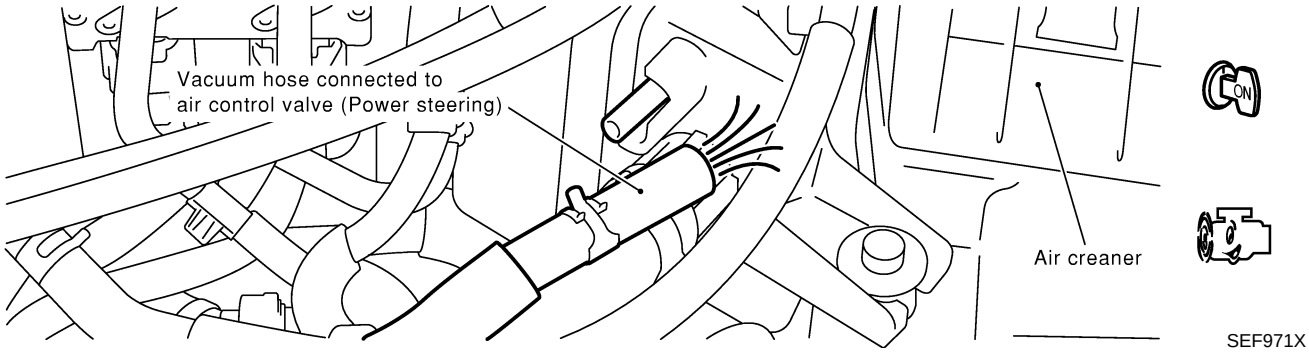
4. Also check harness for short to ground and short to power.

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 AIR CONTROL VALVE (POWER STEERING) OPERATION-I

1. Reconnect ECM harness connector and IACV-AAC valve harness connector.
2. Disconnect vacuum hose connected to air control valve (Power steering) at intake air duct.
3. Start engine and let it idle.
4. Check vacuum hose for vacuum existence.



SEF971X

Vacuum slightly exists or does not exist.

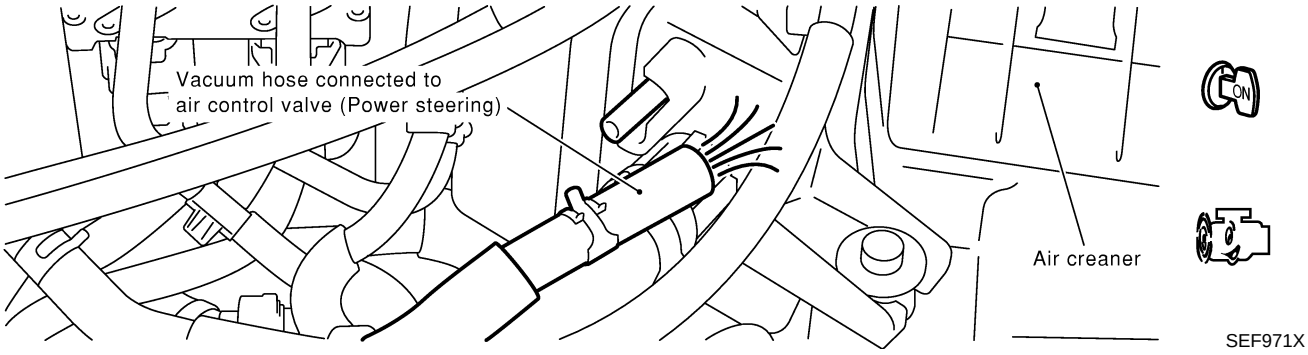
OK or NG

OK	▶	GO TO 5.
NG	▶	Replace air control valve (Power steering).

Diagnostic Procedure (Cont'd)

5	CHECK AIR CONTROL VALVE (POWER STEERING) OPERATION-II

Check vacuum hose for vacuum existence when steering wheel is turned.



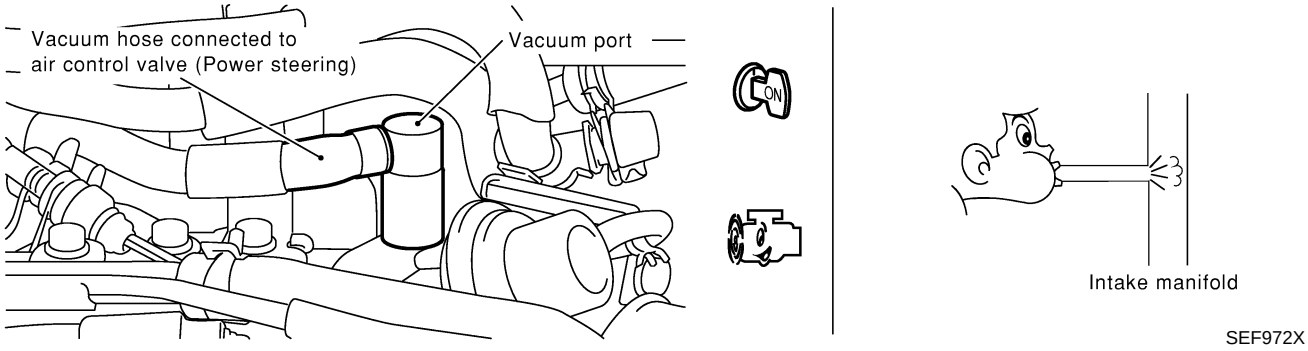
Vacuum should exist.

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 6.

6	CHECK VACUUM PORT

1. Stop engine.
2. Disconnect vacuum hose connected to air control valve (Power steering) at vacuum port.
3. Blow air into vacuum port.
4. Check that air flows freely.

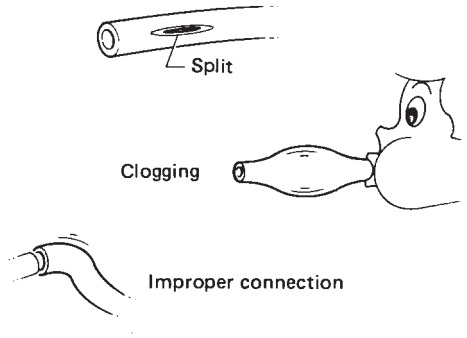


OK or NG

OK	▶	GO TO 7.
NG	▶	Repair or clean vacuum port.

7	CHECK VACUUM HOSES AND TUBES

1. Disconnect vacuum hoses between air control valve (Power steering) and vacuum port, air control valve (Power steering) and intake air duct.
2. Check the hoses and tubes for crack, clogging, improper connection or disconnection.



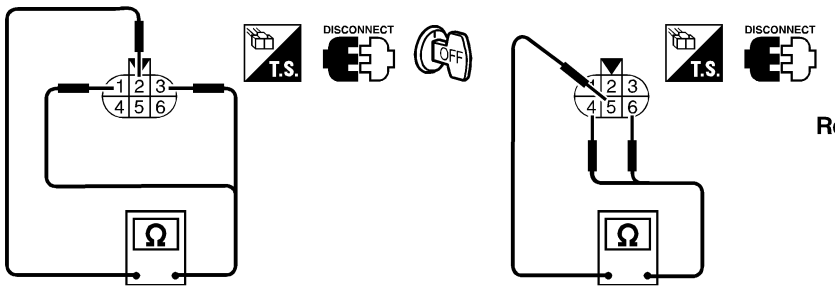
SEF109L

OK or NG

OK	▶	GO TO 8.
NG	▶	Repair hoses or tubes.

8	CHECK IACV-AAC VALVE-I

1. Disconnect IACV-AAC valve harness connector.
2. Check resistance between IACV-AAC valve terminal 2 and terminals 1, 3, terminal 5 and terminals 4, 6.



Resistance:
Approximately 22Ω [at 20°C (68°F)]

SEF344X

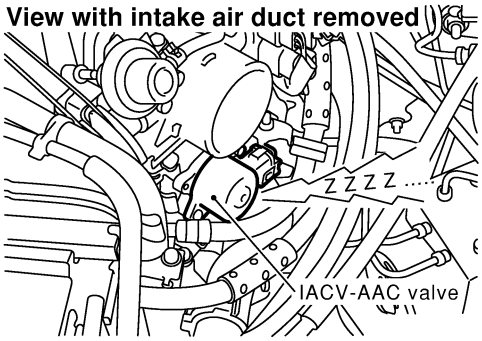
OK or NG

OK	▶	GO TO 9.
NG	▶	Replace IACV-AAC valve assembly.

Diagnostic Procedure (Cont'd)

9	CHECK IACV-AAC VALVE-II

1. Reconnect IACV-AAC valve harness connector and ECM harness connector.
2. Turn ignition switch "ON" and "OFF", and ensure the IACV-AAC valve makes operating sound according to the ignition switch position.



SEF589X

OK or NG

OK	▶	GO TO 11.
NG	▶	GO TO 10.

10	REPLACE IACV-AAC VALVE

1. Replace IACV-AAC valve assembly.
2. Perform "Idle Air Volume Learning", EC-67.

Is the result CMPLT or INCMP?

CMPLT or INCMP

CMPLT	▶	**INSPECTION END**
INCMP	▶	Follow the construction of "Idle Air Volume Learning".

11	CHECK TARGET IDLE SPEED

1. Turn ignition switch "OFF".
2. Reconnect all harness connectors and vacuum hoses.
3. Start engine and warm it up to normal operating temperature.
4. Also warm up transmission to normal operating temperature.

- For models with CONSULT-II, drive vehicle until "FLUID TEMP SE" in "DATA MONITOR" mode of "A/T" system indicates less than 0.9V.
- For models without CONSULT-II, drive vehicle for 10 minutes.

5. Stop vehicle with engine running.
6. Check target idle speed.

700±50 rpm (in "P" or "N" position)

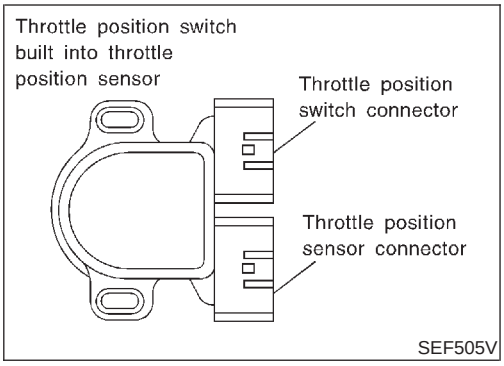
OK or NG

OK	▶	GO TO 12.
NG	▶	Perform "Idle Air Volume Learning", EC-67

12	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156.

▶ **INSPECTION END**



Component Description

NHEC0256

A closed throttle position switch and wide open throttle position switch are built into the throttle position sensor unit. The wide open throttle position switch is used only for A/T control.

When the throttle valve is in the closed position, the closed throttle position switch sends a voltage signal to the ECM. The ECM only uses this signal to open or close the EVAP canister purge volume control solenoid valve when the throttle position sensor is malfunctioning.

CONSULT-II Reference Value in Data Monitor Mode

NHEC0257

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
CLSD THL/P SW*	● Engine: After warming up, idle the engine	Throttle valve: Idle position	ON
		Throttle valve: Slightly open	OFF

*: This item is not available.

On Board Diagnosis Logic

NHEC0259

Malfunction is detected when battery voltage from the closed throttle position switch is sent to ECM with the throttle valve opened.

Possible Cause

NHEC0516

- Harness or connectors
  (The closed throttle position switch circuit is shorted.)
- Closed throttle position switch
- Throttle position sensor

4

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
CLSD THL/P SW	ON

SEF197Y

6

DATA MONITOR	
MONITOR	NO DTC
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h
THRTL POS SEN	XXX V

SEF198Y

DTC Confirmation Procedure

NHEC0260

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 10 seconds before conducting the next test.

WITH CONSULT-II

NHEC0260S01

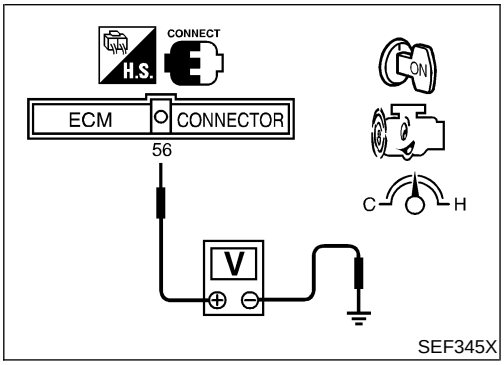
1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF", wait at least 10 seconds and then start engine.
3) Select "CLSD THL/P SW" in "DATA MONITOR" mode.
   If "CLSD THL/P SW" is not available, go to step 5.
4) Check the signal under the following conditions.

Condition	Signal indication
Throttle valve: Idle position	ON
Throttle valve: Slightly open	OFF

   If the result is NG, go to "Diagnostic Procedure", EC-471.
   If OK, go to following step.
5) Select "DATA MONITOR" mode with CONSULT-II.
6) Drive the vehicle for at least 5 consecutive seconds under the following condition.

THRTL POS SEN	More than 2.5V
VHCL SPEED SE	More than 4 km/h (2 MPH)
Selector lever	Suitable position
Driving location	Driving vehicle uphill (Increased engine load) will help maintain the driving conditions required for this test.

7) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-471.



SEF345X

Overall Function Check

NHEC0261

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.

WITH GST

NHEC0261S01

1) Start engine and warm it up to normal operating temperature.
2) Check the voltage between ECM terminal 56 (Closed throttle position switch signal) and ground under the following conditions.

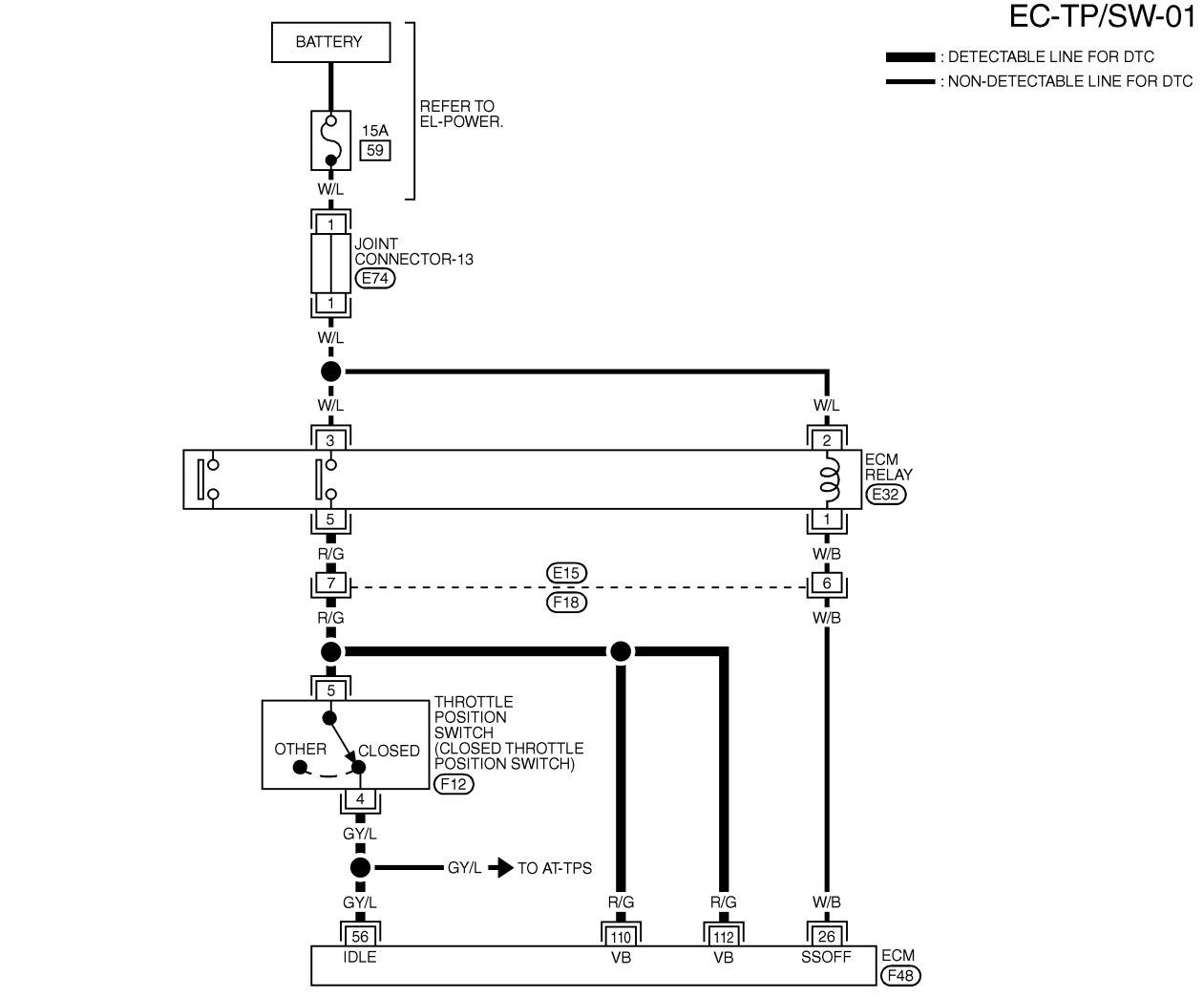
   At idle: Battery voltage

At 2,000 rpm: Approximately 0V

3) If NG, go to "Diagnostic Procedure", EC-471.

Wiring Diagram

=NHEC0262



MEC818C

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
5	R/G	THROTTLE POSITION SWITCH (CLOSED POSITION)	ENGINE RUNNING WITH ACCELERATOR PEDAL FULLY RELEASED UNDER WARM-UP CONDITION	BATTERY VOLTAGE
			IGN ON WITH ACCELERATOR PEDAL DEPRESSED	APPROX. 0V

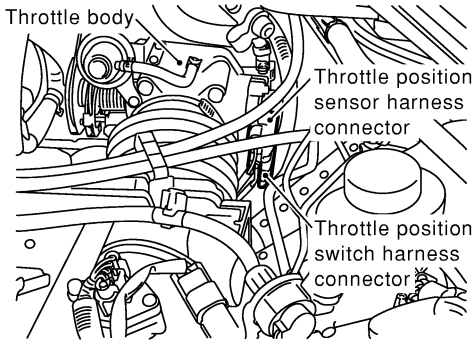
SEF626XC

Diagnostic Procedure

NHEC0263

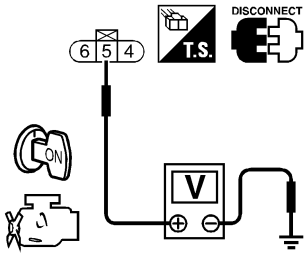
1	CHECK CLOSED THROTTLE POSITION SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect throttle position switch harness connector.



SEF260X

3. Turn ignition switch “ON”.
4. Check voltage between throttle position switch terminal 5 and engine ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF346X

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E15, F18
- Harness for open or short between throttle position switch and ECM relay
- Harness for open or short between throttle position switch and ECM

	▶	Repair harness or connectors.

3	CHECK CLOSED THROTTLE POSITION SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 56 and throttle position switch terminal 4.
   Refer to Wiring Diagram.
   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 IGNITION TIMING AND ENGINE IDLE SPEED

Check the following items. Refer to "Basic Inspection", EC-110.

Items	Specifications
Ignition timing	15° ± 5° BTDC
Idle speed	700 ± 50 rpm (in "P" or "N" position)

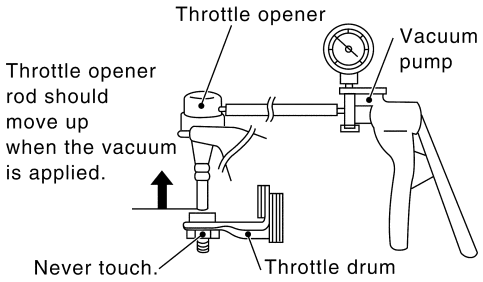
MTBL0616

Models with CONSULT-II ▶	GO TO 5.
Models without CONSULT-II ▶	GO TO 6.

5	CHECK THROTTLE POSITION SWITCH

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch "OFF".
3. Remove vacuum hose connected to throttle opener.
4. Connect suitable vacuum hose to vacuum pump and the throttle opener.
5. Apply vacuum [more than −40.0 kPa (−300 mmHg, −11.81 inHg)] until the throttle drum becomes free from the rod of the throttle opener.



SEF793W

6. Turn ignition switch "ON".
7. Select "DATA MONITOR" mode with CONSULT-II.
8. Check indication of "CLSD THL/P SW" under the following conditions.
   Measurement must be made with throttle position switch installed in vehicle.

Throttle valve conditions	CLSD THL/P SW
Completely closed	ON
Partially open or completely open	OFF

MTBL0355

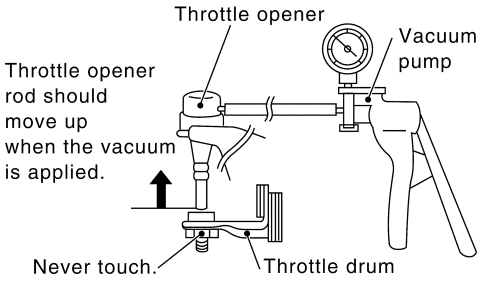
OK or NG

OK ▶	GO TO 8.
NG ▶	GO TO 7.

6	CHECK THROTTLE POSITION SWITCH

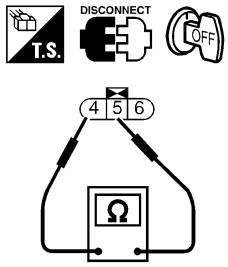
Without CONSULT-II

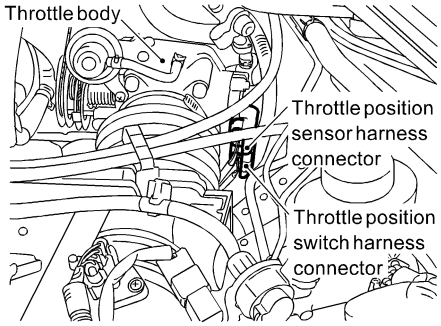
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch "OFF".
3. Remove vacuum hose connected to throttle opener.
4. Connect suitable vacuum hose to vacuum pump and the throttle opener.
5. Apply vacuum [more than −40.0 kPa (−300 mmHg, −11.81 inHg)] until the throttle drum becomes free from the rod of the throttle opener.



SEF793W

6. Disconnect closed throttle position switch harness connector.
7. Check continuity between closed throttle position switch terminals 4 and 5 under the following conditions. Resistance measurement must be made with throttle position switch installed in vehicle.





Throttle valve conditions	Continuity
Completely closed	Yes
Partially open or completely open	No

SEF347X

OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 7.

7	ADJUST THROTTLE POSITION SWITCH

Check the following items. Refer to "Basic Inspection", EC-110.

Items	Specifications
Ignition timing	15° ± 5° BTDC
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.05 mm (0.0020 in): ON 0.15 mm (0.0059 in): OFF
Target idle speed	700 ± 50 rpm (in "P" or "N" position)

MTBL0595

Is it possible to adjust closed throttle position switch?

Yes or No

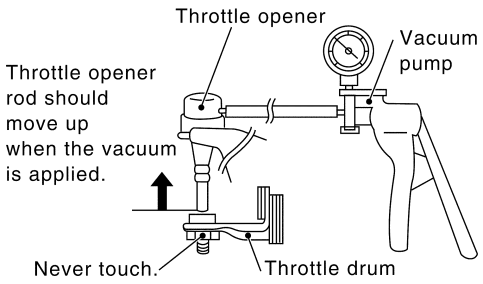
Yes (With CONSULT-II)	▶	GO TO 8.
Yes (Without CONSULT-II)	▶	GO TO 9.
No	▶	Replace throttle position switch.

Diagnostic Procedure (Cont'd)

8	CHECK THROTTLE POSITION SENSOR

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine (ignition switch OFF).
3. Remove the vacuum hose connected to the throttle opener.
4. Connect suitable vacuum hose to the vacuum pump and the opener.
5. Apply vacuum [more than −40.0 kPa (−300 mmHg, −11.81 inHg)] until the throttle drum becomes free from the rod of the throttle opener.



SEF793W

6. Turn ignition switch ON.
7. Select "DATA MONITOR" mode with CONSULT-II.
8. Check voltage of "THRTL POS SEN" under the following conditins.
   Voltage measurement must be made with throttle position sensor installed in vehicle.

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

MTBL0230

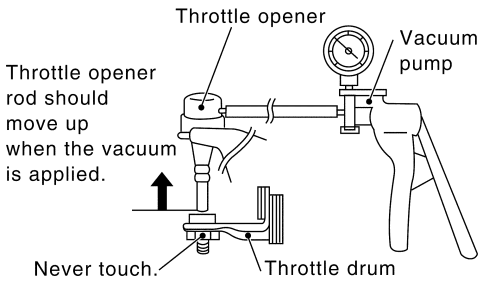
OK or NG

OK	▶	GO TO 10.
NG	▶	Replace throttle position sensor.

9	CHECK THROTTLE POSITION SENSOR

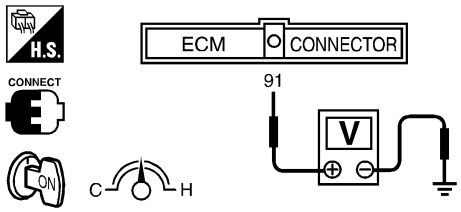
Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine (ignition switch OFF).
3. Remove the vacuum hose connected to the throttle opener.
4. Connect suitable vacuum hose to the vacuum pump and the opener.
5. Apply vacuum [more than −40.0 kPa (−300 mmHg, −11.81 inHg)] until the throttle drum becomes free from the rod of the throttle opener.



SEF793W

6. Turn ignition switch ON.
7. Check voltage between ECM terminal 91 (Throttle position sensor signal) and ground.
   Voltage measurement must be made with throttle position sensor installed in vehicle.



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

SEF348X

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace throttle position sensor.

10	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156.	
▶	**INSPECTION END**

System Description

NHEC0264

This circuit line (LAN) is used to control the smooth shifting up and down of A/T during the hard acceleration/deceleration.
Pulse signals are exchanged between ECM and TCM (Transmission Control Module).
Be sure to erase the malfunction information such as DTC not only in TCM but also ECM after the A/T related repair.

On Board Diagnosis Logic

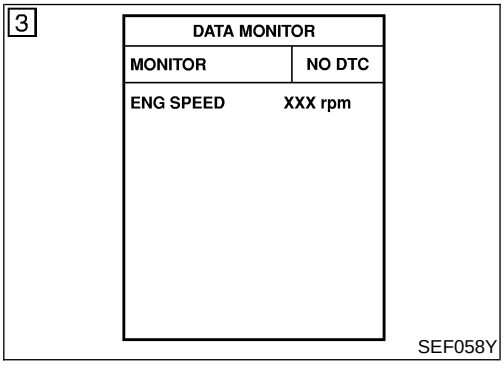
NHEC0266

Malfunction is detected when ECM receives incorrect voltage from TCM (Transmission Control Module) continuously.

Possible Cause

NHEC0517

- Harness or connectors
  [The communication line circuit between ECM and TCM (Transmission Control Module) is open or shorted.]
- TCM
- Dead (Weak) battery



DTC Confirmation Procedure

NHEC0267

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10.5V at idle.

WITH CONSULT-II

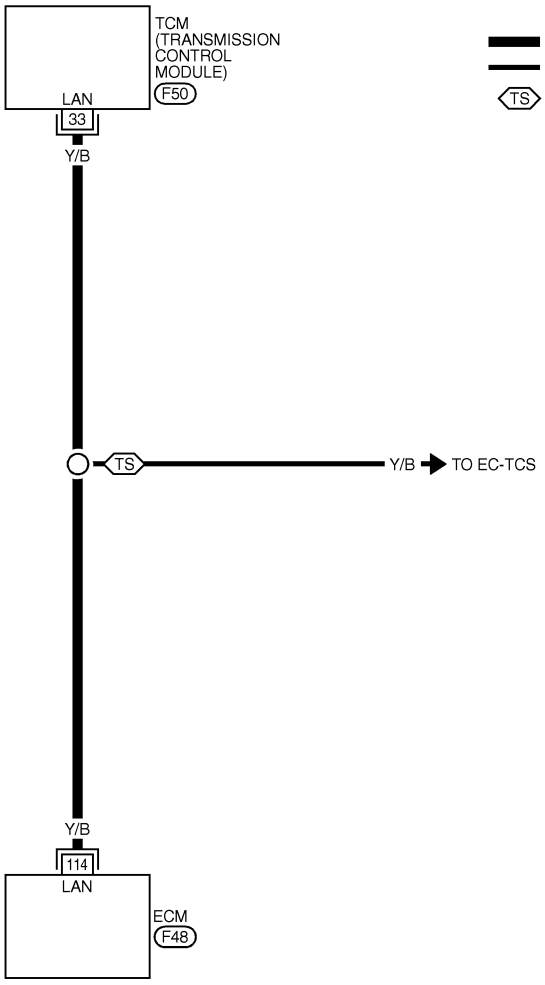
NHEC0267S01

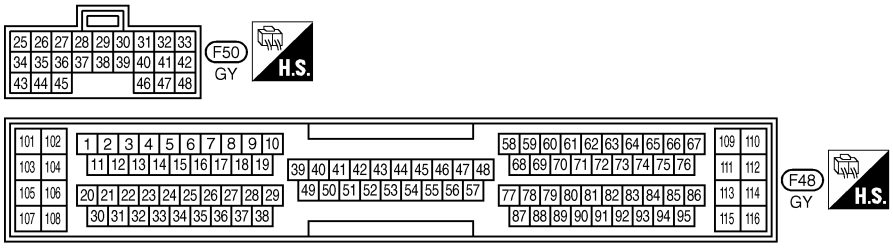
1) Turn ignition switch “ON”.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Start engine and let it idle for at least 2 seconds.
4) If DTC is detected, go to “Diagnostic Procedure”, EC-478.

Wiring Diagram

NHEC0269

EC-AT/C-01





MEC747C

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
114	Y/B	COMMUNICATION LINE (LAN)	ENGINE RUNNING AT IDLE SPEED	APPROX. 2V

SEF629XB

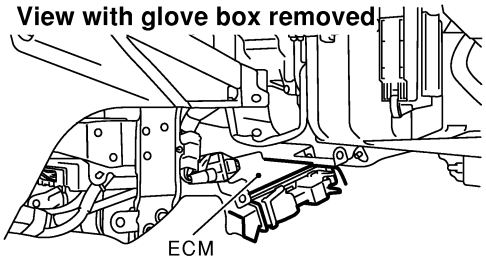
Diagnostic Procedure

NHEC0270

1	CHECK A/T CONTROL INPUT SIGNAL CIRCUIT FOR OPEN

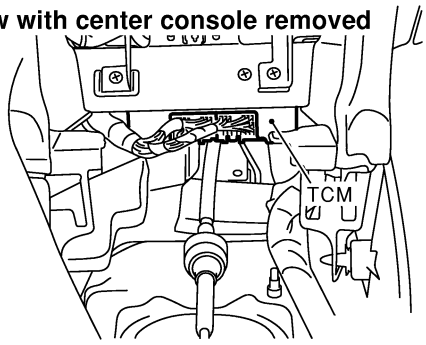
1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector and TCM (Transmission Control Module) harness connector.

View with glove box removed



SEF270X

View with center console removed



SEF271X

3. Check harness continuity between ECM terminal 114 and TCM terminal 33.
   Refer to Wiring Diagram.
   Continuity should exist.

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair harness or connectors.

2	CHECK A/T CONTROL INPUT SIGNAL CIRCUIT FOR SHORT

1. Check harness continuity between ECM terminal 114 and ground.
   Refer to Wiring Diagram.
   Continuity should not exist.
2. Also check harness for short to power.

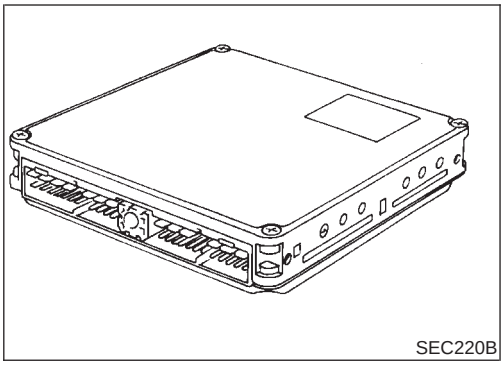
OK or NG

OK	▶	GO TO 3.
NG	▶	Repair short to ground or short to power in harness or connectos.

3	CHECK INTERMITTENT INCIDENT

Refer to “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-156.

▶ **INSPECTION END**



SEC220B

Component Description

NHEC0271

The ECM consists of a microcomputer, diagnostic test mode selector, and connectors for signal input and output and for power supply. The unit controls the engine.

On Board Diagnosis Logic

NHEC0272

Malfunction is detected when ECM calculation function is malfunctioning.

Possible Cause

NHEC0518

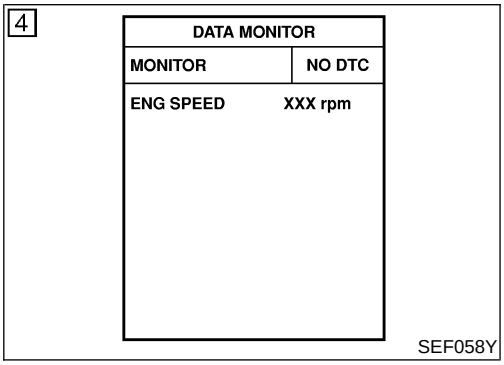
- ECM

DTC Confirmation Procedure

NHEC0273

NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.



SEF058Y

WITH CONSULT-II

NHEC0273S01

1) Turn ignition switch “ON”.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Start engine.
4) Run engine for at least 30 seconds at idle speed.
5) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-480.

WITH GST

NHEC0273S02

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

NHEC0274

1	INSPECTION START

With CONSULT-II

1. Turn ignition switch “ON”.
2. Select “SELF DIAG RESULTS” mode with CONSULT-II.
3. Touch “ERASE”.
4. **Perform “DTC Confirmation Procedure”.**
   See EC-479.
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 EC-479.
5. Is the 1st trip DTC P0605 displayed again?

Yes or No

Yes	▶	GO TO 2.
No	▶	**INSPECTION END**

2	REPLACE ECM

1. Replace ECM.
2. Perform initialization of IVIS (NATS) system and registration of all IVIS (NATS) ignition key IDs. Refer to “IVIS (INFINITI VEHICLE IMMOBILIZER SYSTEM — NATS)”, EC-84.
3. Perform “Idle Air Volume Learning”, EC-67,

Is the result CMPLT or INCMP?

CMPLT or INCMP

CMPLT	▶	**INSPECTION END**
INCMP	▶	Follow the construction of “Idle Air Volume Learning”.

On Board Diagnosis Logic

NHEC0519

Engine coolant temperature has not risen enough to open the thermostat even though the engine has run long enough.
This is due to a leak in the seal or the thermostat open stuck.
Malfunction is detected when the engine coolant temperature does not reach to specified temperature even though the engine has run long enough.

Possible Cause

NHEC0520

- Thermostat function
- Leakage from sealing portion of thermostat
- Engine coolant temperature sensor

DTC Confirmation Procedure

NHEC0521

NOTE:
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

- **For best results, perform at ambient temperature of –10°C (14°F) or higher.**
- **For best results, perform at engine coolant temperature of –10°C (14°F) to 60°C (140°F).**

WITH CONSULT-II

NHEC0521S01

1) Replace thermostat with new one. Refer to LC-14, "Thermostat". Use only a genuine NISSAN thermostat as a replacement. If an incorrect thermostat is used, the MIL may come on.
2) Turn ignition switch "ON".
3) Select "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT-II.
4) Check that the "COOLAN TEMP/S" is above 60°C (140°F).
   If it is below 60°C (140°F), go to following step.
   If it is above 60°C (140°F), stop engine and cool down the engine to less than 60°C (140°F), then retry from step 1.
5) Drive vehicle for 10 consecutive minutes under the following conditions.

VHCL SPEED SE	80 - 120 km/h (50 - 75 MPH)

   If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-482.

WITH GST

NHEC0521S02

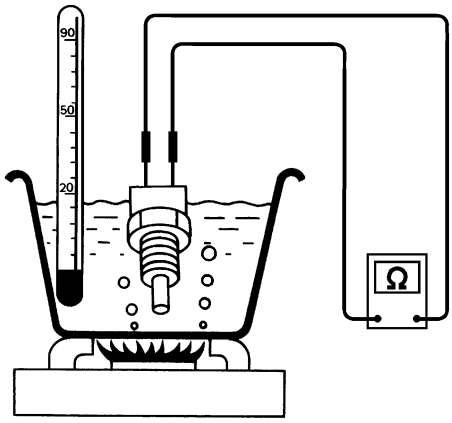
1) Follow the prodedure "WITH CONSULT-II" above.

Diagnostic Procedure

NHEC0522

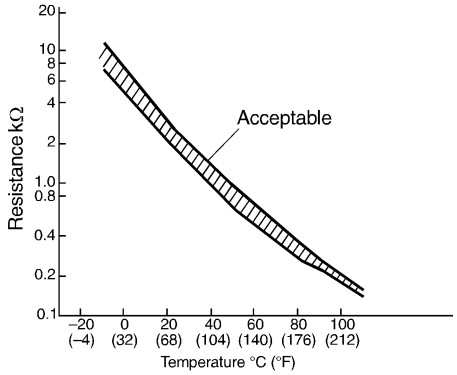
1	CHECK ENGINE COOLANT TEMPERATURE SENSOR

1. Turn ignition switch OFF.
2. Remove engine coolant temperature sensor.
3. Check resistance between engine coolant temperature sensor terminals under the following conditions.



<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



SEF304X

OK or NG

OK	▶	**INSPECTION END**
NG	▶	Replace engine coolant temperature sensor.

Description

NHEC0523

If DTC P1130 is displayed with P1165, first perform trouble diagnosis for DTC P1165, EC-509.

SYSTEM DESCRIPTION

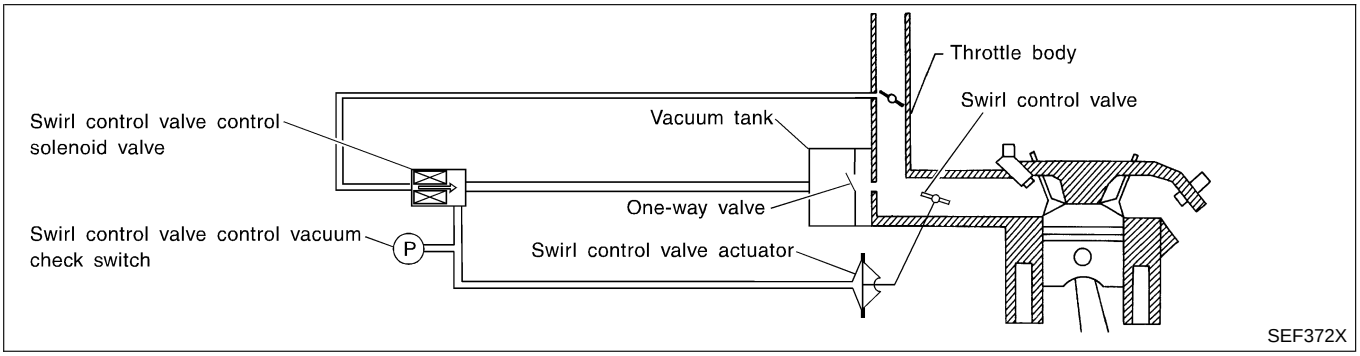
NHEC0523S01

Sensor	Input Signal to ECM	ECM function	Actuator
Throttle position sensor	Throttle position	Swirl control valve control	Swirl control valve control solenoid valve ↓ Vacuum signal Swirl control valve actuator ↓ Swirl control valve
Ignition switch	Start signal		
Crankshaft position sensor (POS)	Engine speed (POS signal)		
Crankshaft position sensor (REF)	Engine speed (REF signal)		
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		

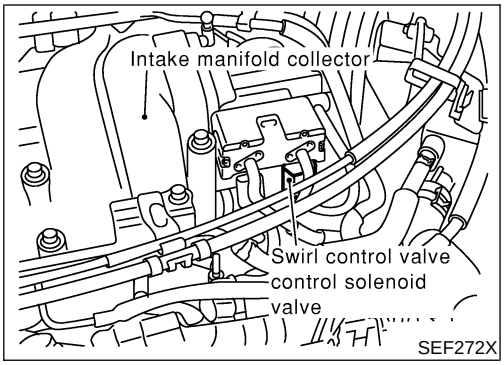
This system has a swirl control valve in the intake passage of each cylinder.
While idling and during low engine speed operation, the swirl control valve closes. Thus the velocity of the air in the intake passage increases, promoting the vaporization of the fuel and producing a swirl in the combustion chamber.
Because of this operation, this system tends to increase the burning speed of the gas mixture, improve fuel consumption, and increase the stability in running conditions.
Also, except when idling and during low engine speed operation, this system opens the swirl control valve. In this condition, this system tends to increase power by improving intake efficiency via reduction of intake flow resistance, intake flow.
The solenoid valve controls swirl control valve's shut/open condition. This solenoid valve is operated by the ECM.

Throttle position sensor (Idle position)	Engine speed	Swirl control valve control solenoid valve	Swirl control valve
ON	Below 3,200 rpm	ON	Closed
OFF	Less than 3,200 rpm	ON	Closed
	More than 3,600 rpm	OFF	Open

When engine coolant temperature is below 10°C (50°F) and above 55°C (131°F), swirl control valve is kept open regardless of above condition.



Description (Cont'd)



COMPONENT DESCRIPTION

NHEC0523S02

Swirl Control Valve Control Solenoid Valve

NHEC0523S0201

The swirl control valve control solenoid valve responds to signals from the ECM. When the ECM sends an ON (ground) signal, the solenoid valve is bypassed to apply intake manifold vacuum to the swirl control valve actuator. This operation closes the swirl control valve. When the ECM sends an OFF signal, the vacuum signal is cut and the swirl control valve opens.

CONSULT-II Reference Value in Data Monitor Mode

NHEC0524

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
SWRL CONT S/V	● Engine speed: Idle	Engine coolant temperature is between 15°C (59°F) to 50°C (122°F).	ON
		Engine coolant temperature is above 55°C (131°F).	OFF

On Board Diagnosis Logic

NHEC0526

Malfunction is detected when
(Malfunction A) An improper voltage signal is sent to ECM through swirl control valve control solenoid valve,
(Malfunction B) The vacuum signal is not sent to swirl control valve under specified driving conditions, even though swirl control valve control solenoid valve is ON,
(Malfunction C) The vacuum signal is sent to swirl control valve even though swirl control valve control solenoid valve is OFF.

Possible Cause

NHEC0527

MALFUNCTION A

NHEC0527S01

- Harness or connectors
  (The swirl control valve control solenoid valve circuit is open or shorted.)
- Swirl control valve control solenoid valve

MALFUNCTION B

NHEC0527S02

- Harness or connector
  (The swirl control valve control solenoid valve circuit is open.)
- Swirl control valve control solenoid valve
- Intake system
  (Intake air leaks)
- Hoses and tubes between intake manifold, vacuum tank and swirl control valve actuator
- Swirl control valve actuator
- Swirl control valve control vacuum check switch
- Mass air flow sensor
- Crankshaft position sensor (REF)
- Throttle position sensor

MALFUNCTION C

NHEC0527S03

- Harness or connector
  (The swirl control valve control solenoid valve circuit is shorted.)
- Swirl control valve control vacuum check switch
- Crankshaft position sensor (REF)
- Throttle position sensor
- Hoses and tubes between air cleaner and swirl control valve vacuum check switch
- Swirl control valve control solenoid valve

DTC Confirmation Procedure

NHEC0528

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 10 seconds before conducting the next test.

2

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

4

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C

SEF174Y

PROCEDURE FOR MALFUNCTION A

NHEC0528S01

With CONSULT-II

NHEC0528S0101

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Wait at least 5 seconds.
   If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-488.

With GST

NHEC0528S0102

Follow the procedure "With CONSULT-II" above.

PROCEDURE FOR MALFUNCTION B

NHEC0528S02

TESTING CONDITION:

- **Always perform the test at a temperature above 5°C (41°F).**
- **Before performing the following procedure, confirm that battery voltage is more than 10V at idle, then stop engine immediately.**

With CONSULT-II

NHEC0528S0201

1) Turn ignition switch "OFF" and wait at least 10 seconds.
2) Turn ignition switch "ON".
3) Check "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT-II.
4) Confirm COOLAN TEMP/S value is 40°C (104°F) or less.
   If the value is more than 40°C (104°F), park the vehicle in a cool place and retry from step 1.
5) Start engine and wait until COOLAN TEMP/S value increases to more than 55°C (131°F).
   If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-488.

With GST

NHEC0528S0202

Follow the procedure "With CONSULT-II" above.

DTC Confirmation Procedure (Cont'd)

4

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C

SEF174Y

PROCEDURE FOR MALFUNCTION C

NHEC0528S03

TESTING CONDITION:

- **Always perform the test at a temperature above 5°C (41°F).**
- **Before performing the following procedure, confirm that battery voltage is more than 10V at idle.**

With CONSULT-II

NHEC0528S0301

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 10 seconds.
3) Turn ignition switch "ON" again and select "DATA MONITOR" mode with CONSULT-II.
4) Start engine and let it idle for at least 20 seconds. If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-488.

With GST

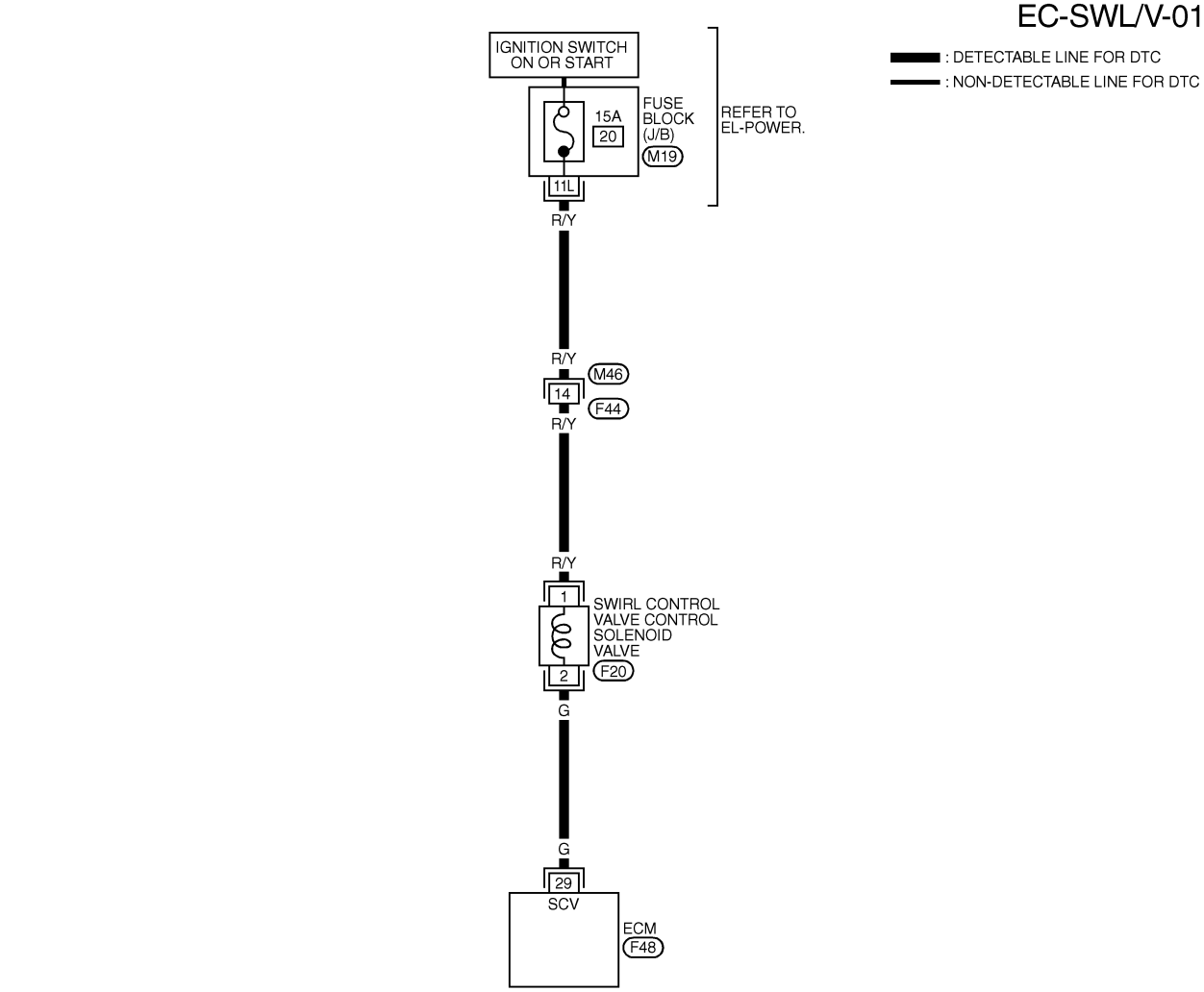
NHEC0528S0302

Follow the procedure "With CONSULT-II" above.

Wiring Diagram

NHEC0529

EC-SWL/V-01



ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
29	G	SWIRL CONTROL VALVE CONTROL SOLENOID VALVE	ENGINE RUNNING AT IDLE SPEED WITH ENGINE COOLANT TEMPERATURE BETWEEN 15°C (59°F) AND 50°C (122°F).	0 - 1V
			ENGINE RUNNING AT IDLE SPEED WITH ENGINE COOLANT TEMPERATURE ABOVE 55°C (131°F).	BATTERY VOLTAGE

SEF627XB

Diagnostic Procedure

NHEC0530

PROCEDURE A

NHEC0530S01

1	INSPECTION START
Do you have CONSULT-II?	
Yes or No	
Yes ▶	GO TO 2.
No ▶	GO TO 3.

2	CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE CIRCUIT

With CONSULT-II

1. Turn ignition switch “ON”.
2. Select “SWIRL CONT SOL/V” in “ACTIVE TEST” mode with CONSULT-II.
3. Touch “ON” and “OFF” on CONSULT-II screen.

ACTIVE TEST	
SWIRL CONT SOL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
IACV-AAC/V	XXX step

SEF069Y

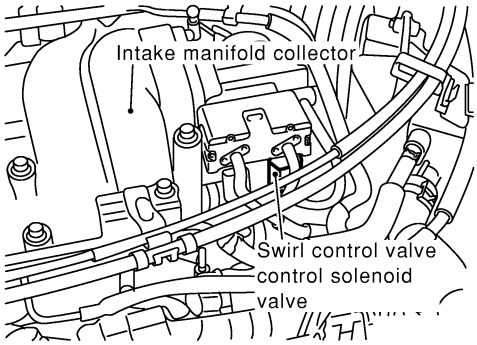
4. Make sure that clicking sound is heard from the swirl control valve control solenoid valve.

OK or NG

OK ▶	GO TO 6.
NG ▶	GO TO 3.

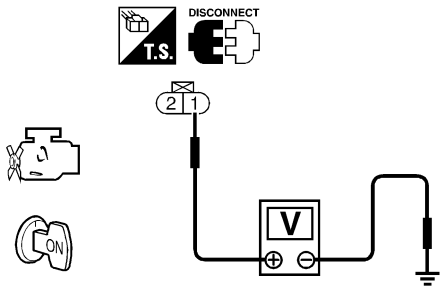
3	CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect swirl control valve control solenoid valve harness connector.



SEF272X

3. Turn ignition switch "ON".
4. Check voltage between swirl control valve control solenoid valve terminal 1 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF619X

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M46, F44
- 15A fuse
- Harness for open or short between swirl control valve control solenoid valve and fuse

	▶	Repair harness or connectors.

5	CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 29 and swirl control valve control solenoid valve terminal 2. Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

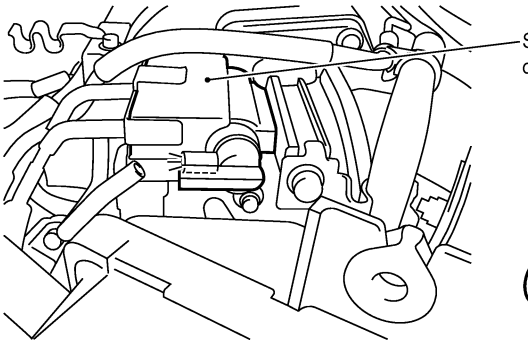
OK or NG

OK	▶	GO TO 6.
NG	▶	Repair open circuit, short to ground or short to power in harness connectors.

6	CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE

With CONSULT-II

1. Reconnect the disconnected harness connectors.
2. Start engine and let it idle.
3. Remove vacuum hose connected to swirl control valve actuator.
4. Select "SWIRL CONT SOL/V" in "ACTIVE TEST" mode with CONSULT-II.
5. Touch "ON" and "OFF" on CONSULT-II screen.
6. Check vacuum existence and operation delay time under the following conditions.



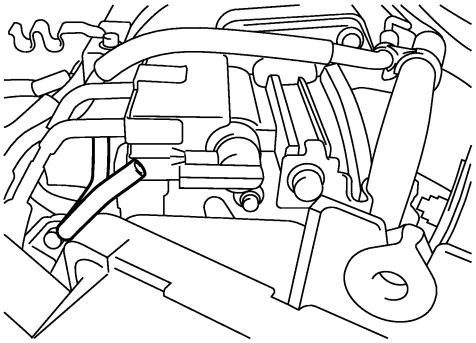
SWIRL CONT SOL/V	Vacuum
ON	should exist.
OFF	should not exist.

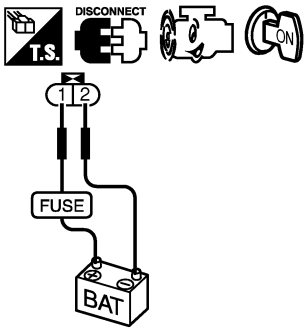
Operation takes less than 1 second.

SEF046Y

Without CONSULT-II

1. Reconnect ECM harness connector.
2. Remove vacuum hose connected to swirl control valve actuator.
3. Start engine and let it idle.
4. Apply 12V of direct current between swirl control valve control solenoid valve terminals 1 and 2.
5. Check vacuum existence and operation delay time under the following conditions.





Condition	Vacuum
12V direct current supply	Should exist.
No supply	Should not exist.

Operation takes less than 1 second.

SEF047Y

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace intake manifold collector assembly.

7	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156.	
▶	**INSPECTION END**

PROCEDURE B

NHEC0530S02

1	CHECK INTAKE SYSTEM	
1. Start engine and let it idle. 2. Check intake air system for air leaks. **OK or NG**		
OK (With CONSULT-II)	▶	GO TO 2.
OK (Without CONSULT-II)	▶	GO TO 3.
NG	▶	Repair intake system.

2	CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE CIRCUIT	
With CONSULT-II 1. Select "SWIRL CONT SOL/V" in "ACTIVE TEST" mode with CONSULT-II. 2. Touch "ON" and "OFF" on CONSULT-II screen.		
3. Make sure that clicking sound is heard from the swirl control valve control solenoid valve. **OK or NG**		
OK	▶	GO TO 6.
NG	▶	GO TO 3.

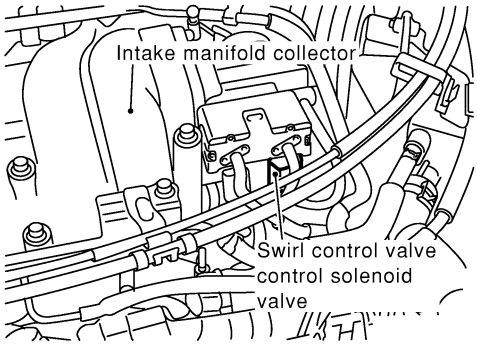
ACTIVE TEST	
SWIRL CONT SOL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
IACV-AAC/V	XXX step

SEF069Y

Diagnostic Procedure (Cont'd)

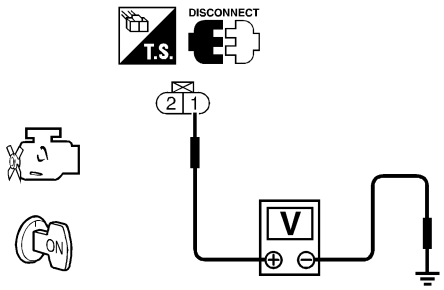
3	CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect swirl control valve control solenoid valve harness connector.



SEF272X

3. Turn ignition switch "ON".
4. Check voltage between swirl control valve control solenoid valve terminal 1 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF619X

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M46, F44
- 15A fuse
- Harness for open or short between swirl control valve control solenoid valve and fuse

	▶	Repair harness or connectors.

5	CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

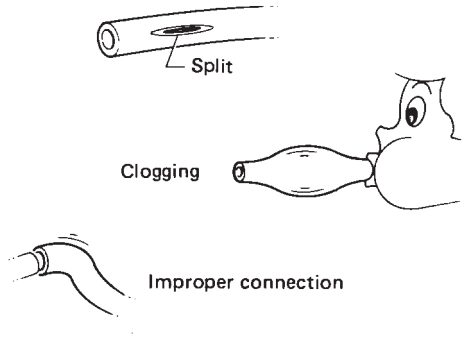
1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 29 and swirl control valve control solenoid valve terminal 2. Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 6.
NG	▶	Repair open circuit, short to ground or short to power in harness connectors.

6	CHECK HOSES

Check hoses and tubes between intake manifold, and swirl control valve actuator for crack, clogging, improper connection or disconnection.



SEF109L

OK or NG

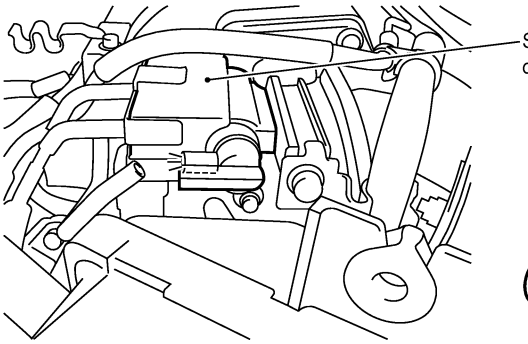
OK	▶	GO TO 7.
NG	▶	Repair hoses or tubes.

Diagnostic Procedure (Cont'd)

7	CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE

With CONSULT-II

1. Reconnect the disconnected harness connectors.
2. Start engine and let it idle.
3. Remove vacuum hose connected to swirl control valve actuator.
4. Select "SWIRL CONT SOL/V" in "ACTIVE TEST" mode with CONSULT-II.
5. Touch "ON" and "OFF" on CONSULT-II screen.
6. Check vacuum existence and operation delay time under the following conditions.



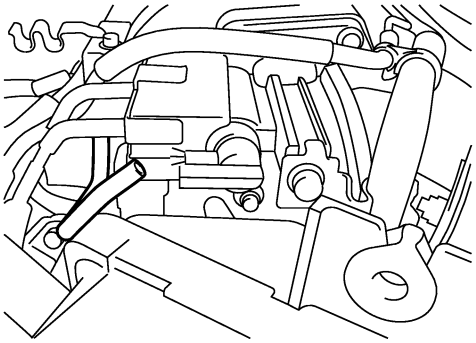
SWIRL CONT SOL/V	Vacuum
ON	should exist.
OFF	should not exist.

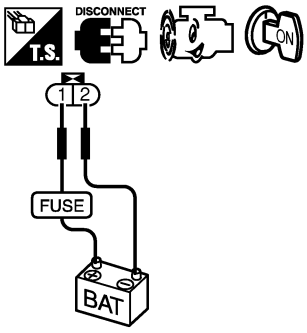
Operation takes less than 1 second.

SEF046Y

Without CONSULT-II

1. Reconnect ECM harness connector.
2. Remove vacuum hose connected to swirl control valve actuator.
3. Start engine and let it idle.
4. Apply 12V of direct current between swirl control valve control solenoid valve terminals 1 and 2.
5. Check vacuum existence and operation delay time under the following conditions.





Condition	Vacuum
12V direct current supply	Should exist.
No supply	Should not exist.

Operation takes less than 1 second.

SEF047Y

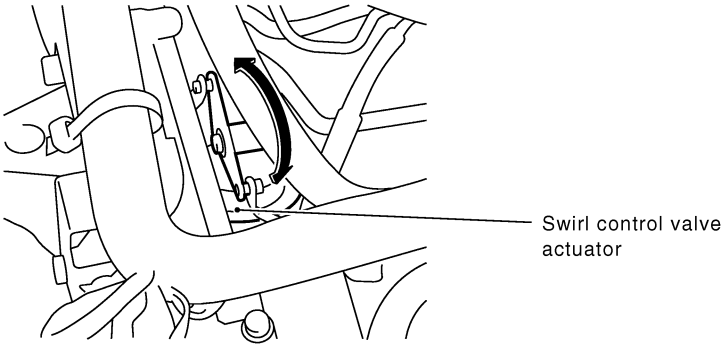
OK or NG

OK	▶	GO TO 8.
NG	▶	Replace intake manifold collector assembly.

8	CHECK SWIRL CONTROL VALVE ACTUATOR

With CONSULT-II

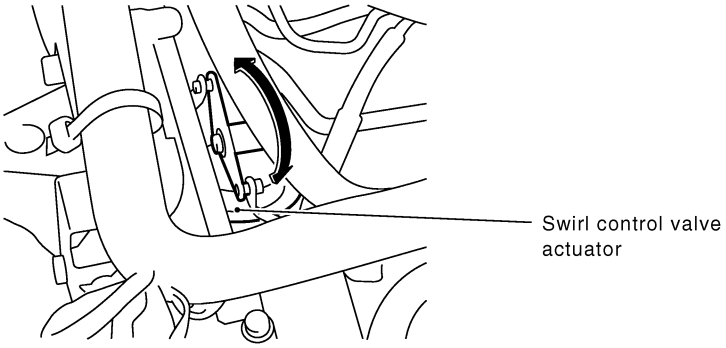
1. Reconnect vacuum hose between swirl control valve actuator and swirl control valve control solenoid valve.
2. Start engine and let it idle.
3. Select "SWIRL CONT SOL/V" in "ACTIVE TEST" mode.
4. Touch "ON" and "OFF" on CONSULT-II screen.
5. Make sure that swirl control valve actuator rod moves according to "SWIRL CONT SOL/V indication.



SEF621X

Without CONSULT-II

1. Reconnect vacuum hose between swirl control valve actuator and swirl control valve control solenoid valve.
2. Start engine and let it idle.
3. Apply 12V direct current between swirl control valve control solenoid valve terminals 1 and 2.
4. Make sure that swirl control valve actuator rod moves according to 12V direct current being applied.



SEF621X

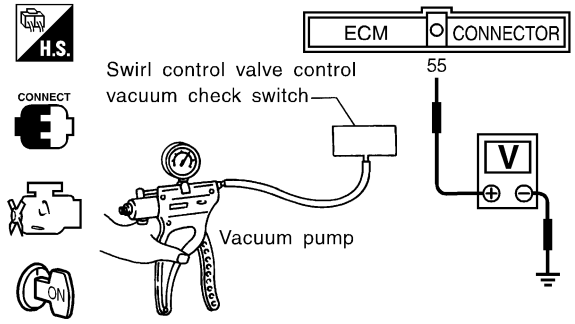
OK or NG

OK	▶	GO TO 9.
NG	▶	Replace swirl control valve and actuator.

Diagnostic Procedure (Cont'd)

9	CHECK SWIRL CONTROL VALVE CONTROL VACUUM CHECK SWITCH

1. Turn ignition switch "OFF".
2. Disconnect vacuum hose connected to swirl control valve control vacuum check switch.
3. Attach vacuum pump to swirl control valve control vacuum check switch.
4. Turn ignition switch "ON".
5. Check voltage between ECM terminal 55 and ground under the following conditions.



Applied pressure	Voltage V
More than –20.0 kPa (–150 mmHg, –5.91 inHg)	Engine ground
–20.0 to –23.0 kPa (–150 to –172 mmHg, –5.91 to –6.77 inHg)	Engine ground or Approx. 4.8
Less than –23.0 kPa (–172 mmHg, –6.77 inHg)	Approx. 4.8

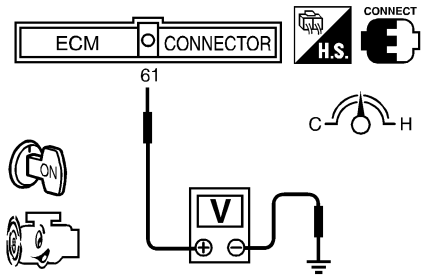
SEF709X

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace swirl control valve control vacuum check switch.

10	CHECK MASS AIR FLOW SENSOR

1. Reconnect harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 61 (Mass air flow sensor signal) and ground.



Condition	Voltage V
Ignition switch "ON" (Engine stopped.)	Approx. 1.0
Idle (Engine is warmed-up to normal operating temperature.)	1.2 - 1.8
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.6 - 2.2
Idle to about 4,000 rpm*	1.2 - 1.8 to Approx. 4.0

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

SEF298X

4. If the voltage is out of specification, disconnect MAFS harness connector and connect it again. Then repeat above check.

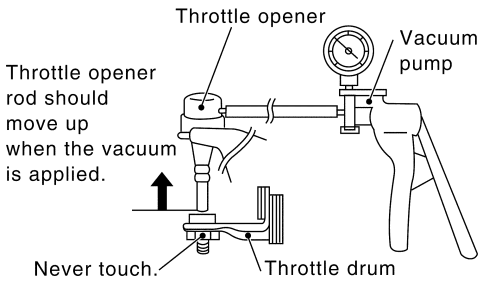
OK or NG

OK (With CONSULT-II)	▶	GO TO 11.
OK (Without CONSULT-II)	▶	GO TO 12.
NG	▶	Replace mass air flow sensor.

11	CHECK THROTTLE POSITION SENSOR

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine (ignition switch OFF).
3. Remove the vacuum hose connected to the throttle opener.
4. Connect suitable vacuum hose to the vacuum pump and the opener.
5. Apply vacuum [more than −40.0 kPa (−300 mmHg, −11.81 inHg)] until the throttle drum becomes free from the rod of the throttle opener.



SEF793W

6. Turn ignition switch ON.
7. Select "DATA MONITOR" mode with CONSULT-II.
8. Check voltage of "THRTL POS SEN" under the following conditions.
   Voltage measurement must be made with throttle position sensor installed in vehicle.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
THRTL POS SEN	XXX V

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

SEF062Y

OK or NG

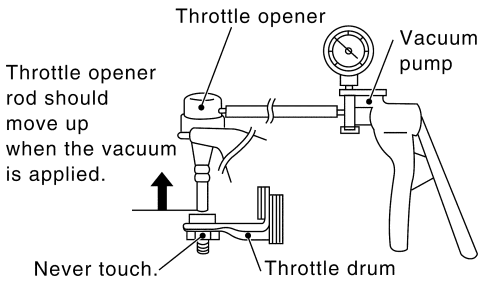
OK	▶	GO TO 14.
NG	▶	GO TO 13.

Diagnostic Procedure (Cont'd)

12	CHECK THROTTLE POSITION SENSOR

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine (ignition switch OFF).
3. Remove the vacuum hose connected to the throttle opener.
4. Connect suitable vacuum hose to the vacuum pump and the opener.
5. Apply vacuum [more than −40.0 kPa (−300 mmHg, −11.81 inHg)] until the throttle drum becomes free from the rod of the throttle opener.



SEF793W

6. Turn ignition switch ON.
7. Check voltage between ECM terminal 91 (Throttle position sensor signal) and ground.
   Voltage measurement must be made with throttle position sensor installed in vehicle.

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

MTBL0231

OK or NG

OK	▶	GO TO 14.
NG	▶	GO TO 13.

13	ADJUST CLOSED THROTTLE POSITION SWITCH

Adjust closed throttle position switch. Refer to "Basic Inspection", EC-110.

Items	Specifications
Ignition timing	15° ± 5° BTDC
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.05 mm (0.0020 in): ON 0.15 mm (0.0059 in): OFF
Target idle speed	700 ± 50 rpm (in "P" or "N" position)

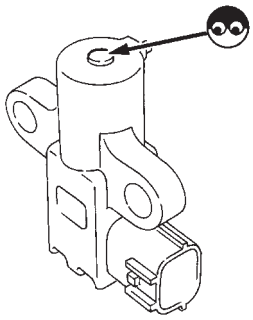
MTBL0595

OK or NG

OK	▶	GO TO 14.
NG	▶	Replace throttle position sensor. To adjust it, perform "Basic Inspection", EC-110.

14	CHECK CRANKSHAFT POSITION SENSOR (REF)-I

1. Turn ignition switch "OFF".
2. Loosen the fixing bolts and remove the CKPS (REF).
3. Visually check the CKPS (REF) for chipping.



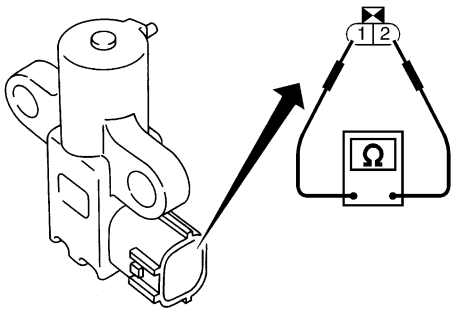
SEF585P

OK or NG

OK	▶	GO TO 15.
NG	▶	Replace crankshaft position sensor (REF).

15	CHECK CRANKSHAFT POSITION SENSOR (REF)-II

Check resistance between CKPS (REF) terminals 1 and 2.



Resistance: Approximately
470 - 570 Ω
[AT 20°C (68°F)]

SEF350X

OK or NG

OK	▶	GO TO 16.
NG	▶	Replace crankshaft position sensor (REF).

16	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156.

▶ **INSPECTION END**

PROCEDURE C

NHEC0530S03

1	INSPECTION START

Do you have CONSULT-II?

Yes or No

Yes	▶	GO TO 2.
No	▶	GO TO 3.

Diagnostic Procedure (Cont'd)

2	CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE CIRCUIT

With CONSULT-II

1. Turn ignition switch "OFF".
2. Select "SWIRL CONT SOL/V" in "ACTIVE TEST" mode with CONSULT-II.
3. Touch "ON" and "OFF" on CONSULT-II screen.

ACTIVE TEST	
SWIRL CONT SOL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
IACV-AAC/V	XXX step

SEF069Y

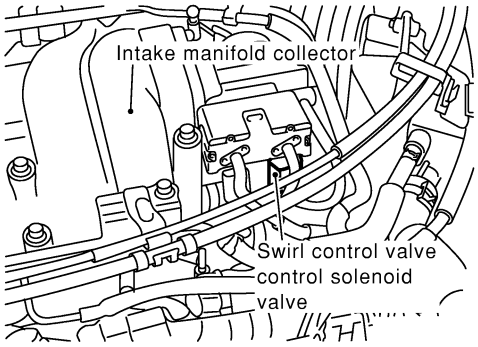
4. Make sure that clicking sound is heard from the swirl control valve control solenoid valve.

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 3.

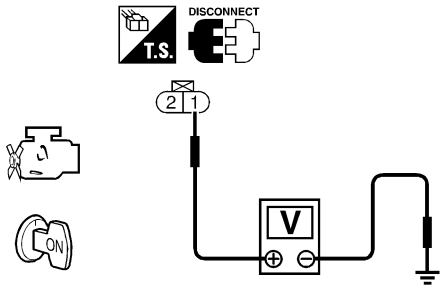
3	CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect swirl control valve control solenoid valve harness connector.



SEF272X

3. Turn ignition switch "ON".
4. Check voltage between swirl control valve control solenoid valve terminal 1 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF619X

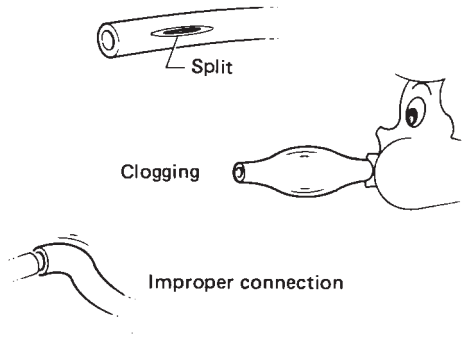
OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors M46, F44 ● 15A fuse ● Harness for open or short between swirl control valve control solenoid valve and fuse	
▶	Repair harness or connectors.

5	CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
1. Turn ignition switch "OFF". 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminal 29 and terminal 2. Refer to Wiring Diagram. **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, short to ground or short to power in harness connectors.

6	CHECK HOSES
Check hoses and tubes between air cleaner and swirl control valve vacuum check switch for clogging or improper connection.	



SEF109L

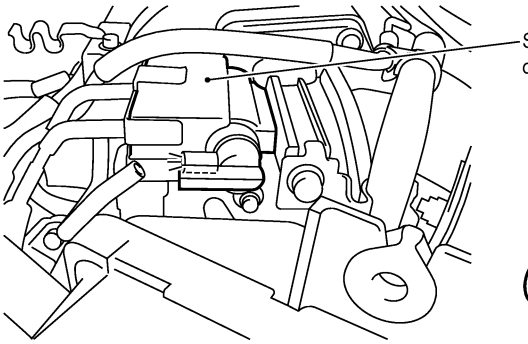
OK or NG	
OK ▶	GO TO 7.
NG ▶	Repair hoses or tubes.

Diagnostic Procedure (Cont'd)

7	CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE

With CONSULT-II

1. Reconnect the disconnected harness connectors.
2. Start engine and let it idle.
3. Remove vacuum hose connected to swirl control valve actuator.
4. Select "SWIRL CONT SOL/V" in "ACTIVE TEST" mode with CONSULT-II.
5. Touch "ON" and "OFF" on CONSULT-II screen.
6. Check vacuum existence and operation delay time under the following conditions.



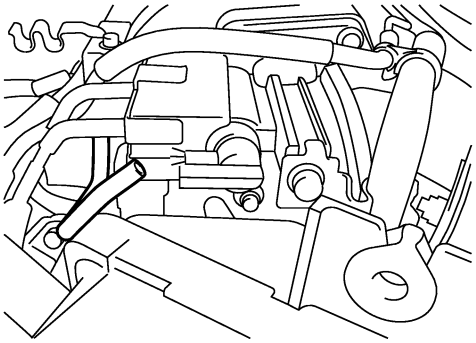
SWIRL CONT SOL/V	Vacuum
ON	should exist.
OFF	should not exist.

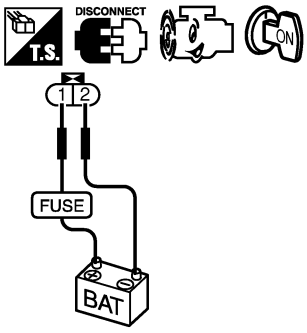
Operation takes less than 1 second.

SEF046Y

Without CONSULT-II

1. Reconnect ECM harness connector.
2. Remove vacuum hose connected to swirl control valve actuator.
3. Start engine and let it idle.
4. Apply 12V of direct current between swirl control valve control solenoid valve terminals 1 and 2.
5. Check vacuum existence and operation delay time under the following conditions.





Condition	Vacuum
12V direct current supply	Should exist.
No supply	Should not exist.

Operation takes less than 1 second.

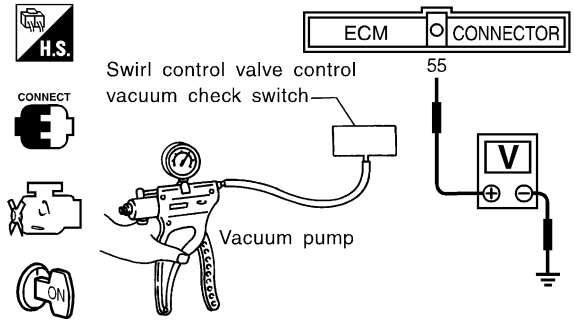
SEF047Y

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace intake manifold collector assembly.

8	CHECK SWIRL CONTROL VALVE CONTROL VACUUM CHECK SWITCH

1. Turn ignition switch "OFF".
2. Disconnect vacuum hose connected to swirl control valve control vacuum check switch.
3. Attach vacuum pump to swirl control valve control vacuum check switch.
4. Turn ignition switch "ON".
5. Check voltage between ECM terminal 55 and ground under the following conditions.



Applied pressure	Voltage V
More than –20.0 kPa (–150 mmHg, –5.91 inHg)	Engine ground
–20.0 to –23.0 kPa (–150 to –172 mmHg, –5.91 to –6.77 inHg)	Engine ground or Approx. 4.8
Less than –23.0 kPa (–172 mmHg, –6.77 inHg)	Approx. 4.8

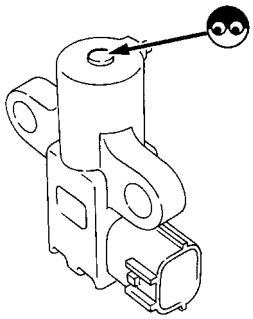
SEF709X

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace swirl control valve control vacuum check switch.

9	CHECK CRANKSHAFT POSITION SENSOR (REF)-I

1. Turn ignition switch "OFF".
2. Loosen the fixing bolts and remove the CKPS (REF).
3. Visually check the CKPS (REF) for chipping.



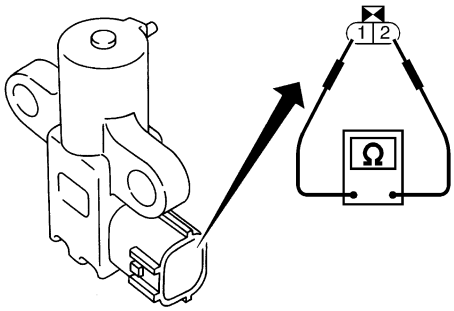
SEF585P

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace crankshaft position sensor (REF).

10	CHECK CRANKSHAFT POSITION SENSOR (REF)-II

Check resistance between CKPS (REF) terminals 1 and 2.



Resistance: Approximately
470 - 570 Ω
[AT 20°C (68°F)]

SEF350X

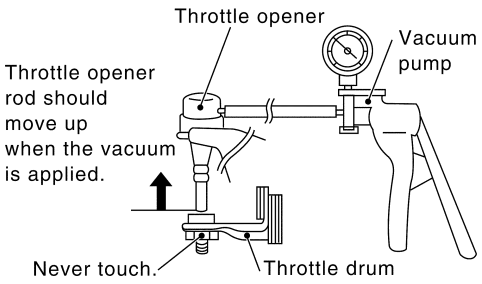
OK or NG

OK (With CONSULT-II)	▶	GO TO 11.
OK (Without CONSULT-II)	▶	GO TO 12.
NG	▶	Replace crankshaft position sensor (REF).

11	CHECK THROTTLE POSITION SENSOR

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine (ignition switch OFF).
3. Remove the vacuum hose connected to the throttle opener.
4. Connect suitable vacuum hose to the vacuum pump and the opener.
5. Apply vacuum [more than −40.0 kPa (−300 mmHg, −11.81 inHg)] until the throttle drum becomes free from the rod of the throttle opener.



SEF793W

6. Turn ignition switch ON.
7. Select "DATA MONITOR" mode with CONSULT-II.
8. Check voltage of "THRTL POS SEN" under the following conditions.
   Voltage measurement must be made with throttle position sensor installed in vehicle.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
THRTL POS SEN	XXX V

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

SEF062Y

OK or NG

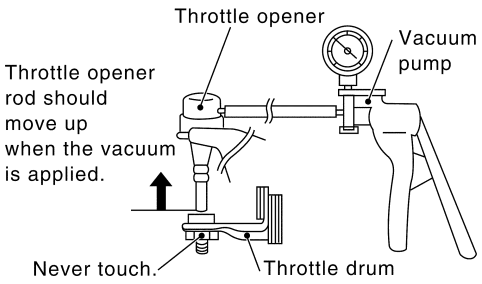
OK	▶	GO TO 14.
NG	▶	GO TO 13.

Diagnostic Procedure (Cont'd)

12	CHECK THROTTLE POSITION SENSOR

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine (ignition switch OFF).
3. Remove the vacuum hose connected to the throttle opener.
4. Connect suitable vacuum hose to the vacuum pump and the opener.
5. Apply vacuum [more than −40.0 kPa (−300 mmHg, −11.81 inHg)] until the throttle drum becomes free from the rod of the throttle opener.



SEF793W

6. Turn ignition switch ON.
7. Check voltage between ECM terminal 91 (Throttle position sensor signal) and ground.
   Voltage measurement must be made with throttle position sensor installed in vehicle.

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

MTBL0231

OK or NG

OK	▶	GO TO 14.
NG	▶	GO TO 13.

13	ADJUST CLOSED THROTTLE POSITION SWITCH

Adjust closed throttle position switch. Refer to "Basic Inspection", EC-110.

Items	Specifications
Ignition timing	15° ± 5° BTDC
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.05 mm (0.0020 in): ON 0.15 mm (0.0059 in): OFF
Target idle speed	700 ± 50 rpm (in "P" or "N" position)

MTBL0595

OK or NG

OK	▶	GO TO 14.
NG	▶	Replace throttle position sensor. To adjust it, perform "Basic Inspection", EC-110.

14	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156.

▶ **INSPECTION END**

On Board Diagnosis Logic

NHEC0282

★ The closed loop control has the one trip detection logic.

Malfunction is detected when the closed loop control function for right bank does not operate even when vehicle is driving in the specified condition, the closed loop control function for left bank does not operate even when vehicle is driving in the specified condition.

Possible Cause

NHEC0531

- The front heated oxygen sensor circuit is open or shorted.
- Front heated oxygen sensor
- Front heated oxygen sensor heater

DTC Confirmation Procedure

NHEC0283

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 10 seconds before conducting the next test.

TESTING CONDITION:

- **Never raise engine speed above 3,600 rpm during the “DTC Confirmation Procedure”. If the engine speed limit is exceeded, retry the procedure from step 2.**
- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**

3

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
FR O2 SEN-B1	XXX V
RR O2 SEN-B2	XXX V

SEF063Y

WITH CONSULT-II

NHEC0283S01

1) Start engine and warm it up to normal operating temperature.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Hold engine speed at 2,000 rpm and check one of the following.

- “FR O2 SEN-B1 (-B2)” voltage should go above 0.70V at least once.
- “FR O2 SEN-B1 (-B2)” voltage should go below 0.21V at least once.

If the check result is NG, perform “Diagnosis Procedure”, EC-508.

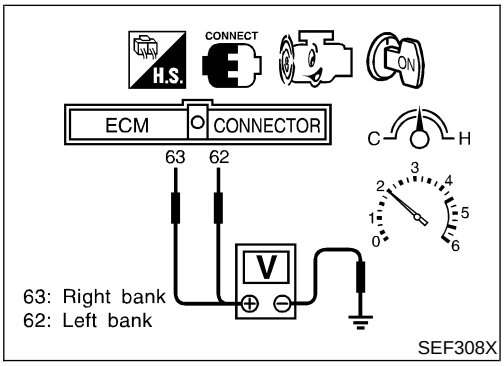
If the check result is OK, perform the following step.

4) Let engine idle at least 5 minutes.
5) Maintain the following condition at least 50 consecutive seconds.

B/FUEL SCHDL	3 msec or more
ENG SPEED	1,800 - 3,000 rpm
Selector lever	Suitable position
VHCL SPEED SE	More than 70 km/h (43 MPH)

During this test, P0130 and/or P0150 may be displayed on CONSULT-II screen.

6) If DTC is detected, go to "Diagnostic Procedure", EC-508.



Overall Function Check

NHEC0284

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

WITH GST

NHEC0284S01

1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 63 (Front heated oxygen sensor right bank signal) or 62 (Front heated oxygen sensor left bank signal) and engine ground.
3) Check the following with engine speed held at 2,000 rpm constant under no-load.

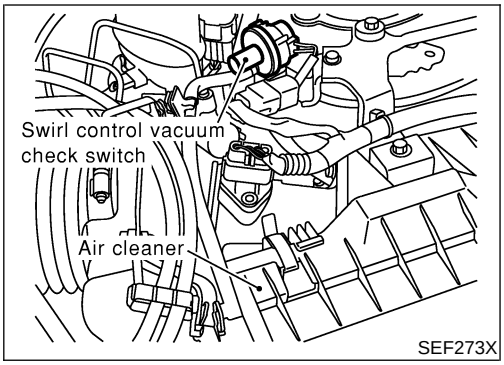
- The voltage should go above 0.70V at least once.
- The voltage should go below 0.21V at least once.

4) If NG, go to "Diagnostic Procedure", EC-508.

Diagnostic Procedure

NHEC0285

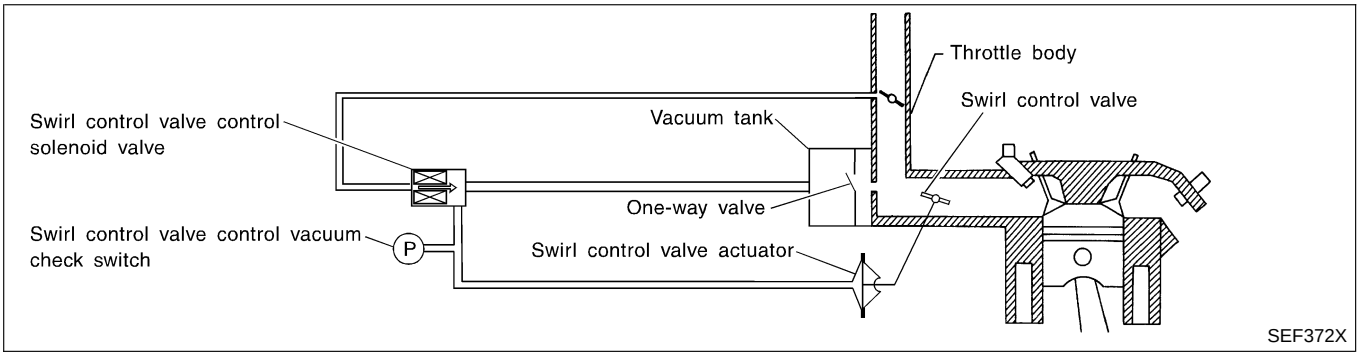
Perform trouble diagnosis for "DTC P0133, P0153", EC-231.



Component Description

NHEC0532

The swirl control valve control vacuum check switch detects vacuum signal to the swirl control valve, and sends “ON” or “OFF” signal to the ECM.
When vacuum is supplied to the valve, the swirl control valve control vacuum check switch sends “OFF” signal to the ECM.
The swirl control valve control vacuum check switch is not used to control the engine system, it is used for on board diagnosis.



CONSULT-II Reference Value in Data Monitor Mode

NHEC0533

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
SWL CON VC SW	• Engine speed: Idle • Engine coolant temperature is between 15°C (59°F) to 50°C (122°F).	OFF
	• Engine speed: Idle • Engine coolant temperature is above 55°C (131°F).	ON

On Board Diagnosis Logic

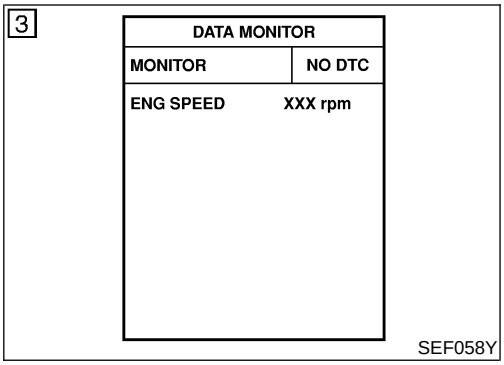
NHEC0535

Malfunction is detected when the swirl control valve control vacuum check switch remains “OFF” under specified engine conditions.

Possible Cause

NHEC0536

- Harness or connectors
  (Swirl control valve control vacuum check switch circuit is open.)
- Hoses
  (Hoses are clogged or connected incorrectly.)
- Swirl control valve control solenoid valve
- Swirl control valve control vacuum check switch



DTC Confirmation Procedure

NHEC0537

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Always perform the test at a temperature above 5°C (41°F).

WITH CONSULT-II

NHEC0537S01

1) Turn ignition switch “OFF” and wait at least 10 seconds.
2) Turn ignition switch “ON”.
3) Select “DATA MONITOR” mode with CONSULT-II and wait at least 5 seconds.
   If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-512.

WITH GST

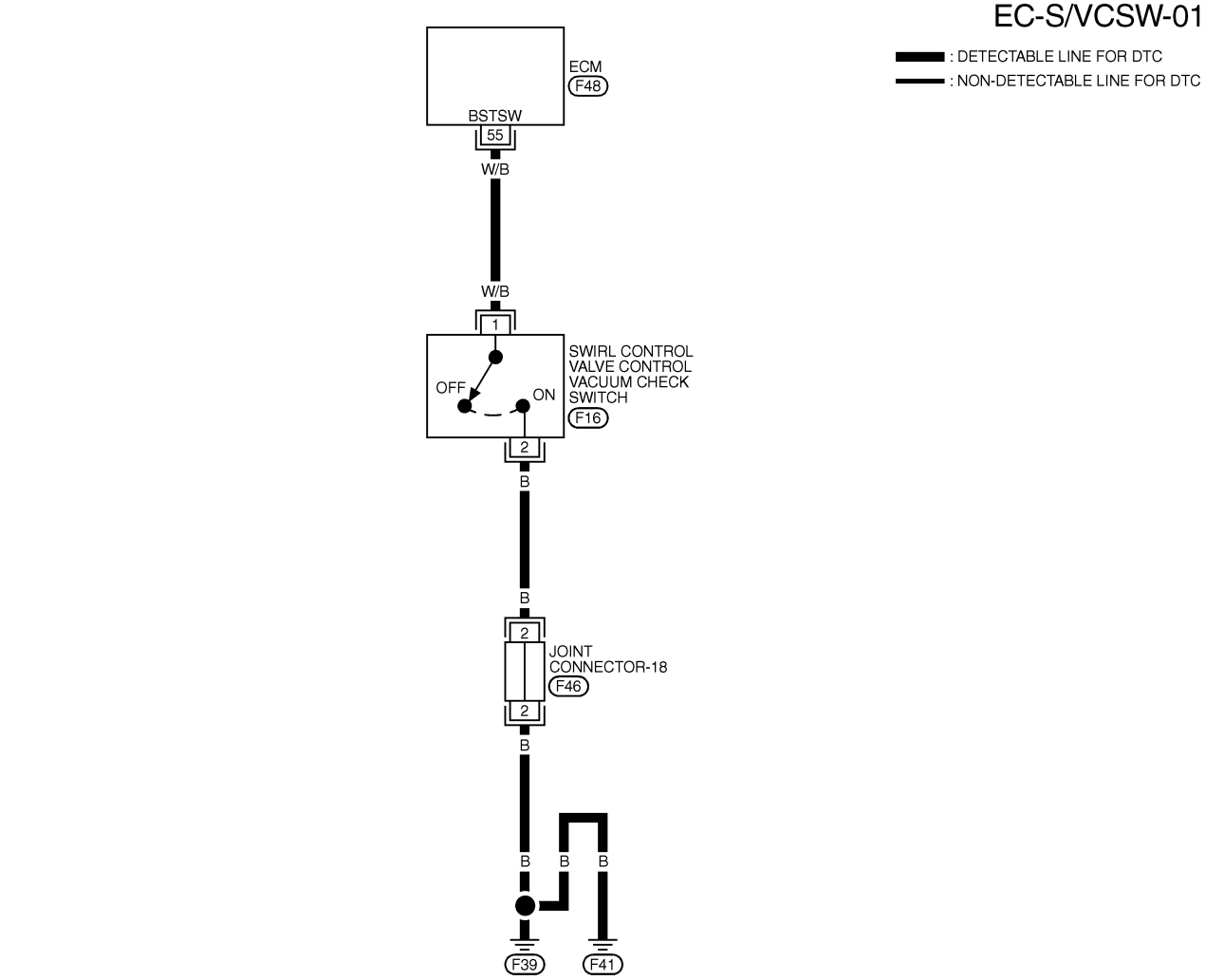
NHEC0537S02

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

NHEC0538

EC-S/VCSW-01



MEC750C

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
55	W/B	SWIRL CONTROL VALVE CONTROL VACUUM CHECK SWITCH	ENGINE RUNNING AT IDLE SPEED WITH ENGINE COOLANT TEMPERATURE BETWEEN 15°C (59°F) AND 50°C (122°F).	APPROX. 5V
			ENGINE RUNNING AT IDLE SPEED WITH ENGINE COOLANT TEMPERATURE ABOVE 55°C (131°F).	0 - 1V

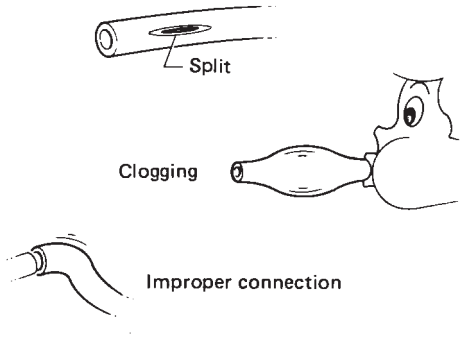
SEF628XB

Diagnostic Procedure

NHEC0539

1	CHECK HOSES

1. Turn ignition switch “OFF”.
2. Check hose for clogging or improper connection.



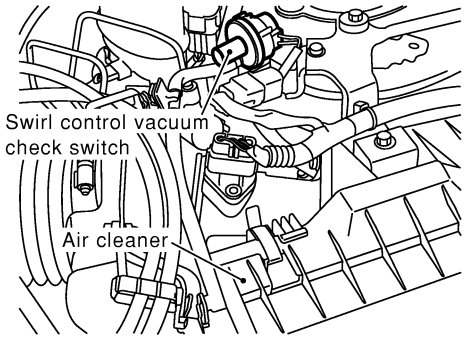
SEF109L

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair or reconnect the hose.

2	CHECK SWIRL CONTROL VALVE CONTROL VACUUM CHECK SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect swirl control valve control vacuum check switch harness connector.



SEF273X

2. Check harness continuity between terminal 2 and ground. Refer to Wiring Diagram.
   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.
- Joint connector-18
- Harness for open or short between swirl control valve control vacuum check switch and engine ground

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

4	CHECK SWIRL CONTROL VALVE CONTROL VACUUM CHECK SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

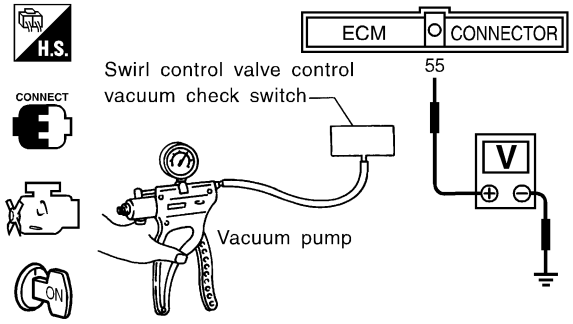
1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 55 and swirl control valve control vacuum check switch terminal 1. Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

OK or NG

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

5	CHECK SWIRL CONTROL VALVE CONTROL VACUUM CHECK SWITCH

1. Turn ignition switch "OFF".
2. Disconnect vacuum hose connected to swirl control valve control vacuum check switch.
3. Attach vacuum pump to swirl control valve control vacuum check switch.
4. Turn ignition switch "ON".
5. Check voltage between ECM terminal 55 and ground under the following conditions.



Applied pressure	Voltage V
More than –20.0 kPa (–150 mmHg, –5.91 inHg)	Engine ground
–20.0 to –23.0 kPa (–150 to –172 mmHg, –5.91 to –6.77 inHg)	Engine ground or Approx. 4.8
Less than –23.0 kPa (–172 mmHg, –6.77 inHg)	Approx. 4.8

SEF709X

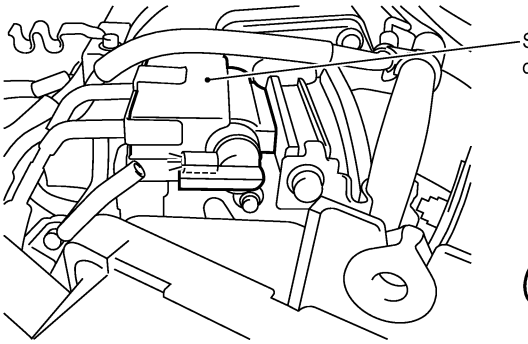
OK or NG

OK	▶	GO TO 6.
NG	▶	Replace swirl control valve control vacuum check switch.

6	CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE

With CONSULT-II

1. Reconnect the disconnected harness connectors.
2. Start engine and let it idle.
3. Remove vacuum hose connected to swirl control valve actuator.
4. Select "SWIRL CONT SOL/V" in "ACTIVE TEST" mode with CONSULT-II.
5. Touch "ON" and "OFF" on CONSULT-II screen.
6. Check vacuum existence and operation delay time under the following conditions.



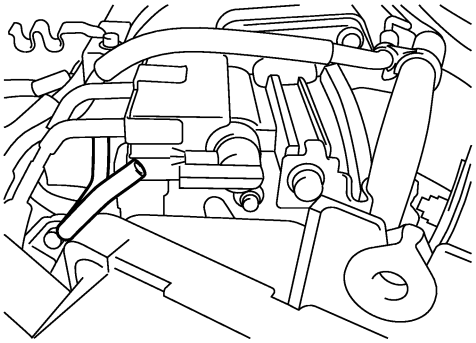
SWIRL CONT SOL/V	Vacuum
ON	should exist.
OFF	should not exist.

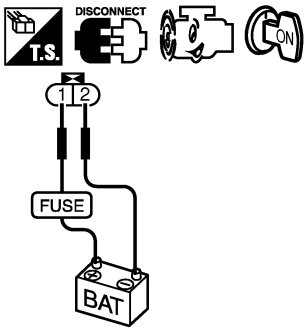
Operation takes less than 1 second.

SEF046Y

Without CONSULT-II

1. Reconnect ECM harness connector.
2. Remove vacuum hose connected to swirl control valve actuator.
3. Start engine and let it idle.
4. Apply 12V of direct current between swirl control valve control solenoid valve terminals and 2.
5. Check vacuum existence and operation delay time under the following conditions.





Condition	Vacuum
12V direct current supply	Should exist.
No supply	Should not exist.

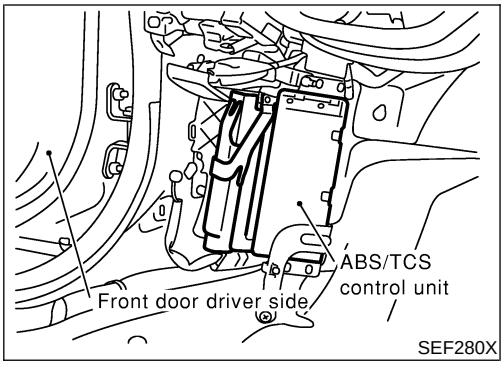
Operation takes less than 1 second.

SEF047Y

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace intake manifold collector assembly.

7	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156.	
▶	**INSPECTION END**



Description

NHEC0540

The malfunction information related to ABS/TCS control unit is transferred through the line (LAN) from ABS/TCS control unit to ECM.

Be sure to erase the malfunction information such as DTC not only for ABS/TCS control unit but also for ECM after the ABS/TCS related repair.

DTC ERASING PROCEDURE FOR ABS/TCS RELATED REPAIR

NHEC0540S01

1) Turn ignition switch “OFF” and then turn it “ON”.
2) Connect CONSULT-II and select “ABS”.
3) Select “ABS” and touch “SELF-DIAG RESULTS”.
4) Touch “ERASE”.
5) Touch “BACK” then erase malfunction code which has been stored in the TCM or ECM.

On Board Diagnosis Logic

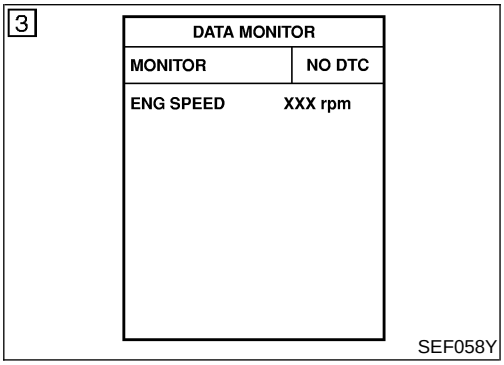
NHEC0542

Freeze frame data is not stored in the ECM for the ABS/TCS control unit. The MIL will not light up for ABS/TCS control unit.
Malfunction is detected when
(Malfunction A) ECM receives incorrect voltage from ABS/TCS control unit continuously,
(Malfunction B) TCS operation (Fuel cut) continues for an abnormally long time.

Possible Cause

NHEC0543

- ABS/TCS control unit
- TCS related parts (Refer to BR section.)



DTC Confirmation Procedure

NHEC0544

Perform “Procedure for malfunction A” first. If the 1st trip DTC cannot be confirmed, perform “Overall Function Check”, “Procedure for malfunction B”.

PROCEDURE FOR MALFUNCTION A

NHEC0544S01

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10.5V at idle.

With CONSULT-II

NHEC0544S0101

1) Turn ignition switch “ON”.

2) Select "DATA MONITOR" mode with CONSULT-II.
3) Start engine and let it idle for at least 3 seconds.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-516.

Overall Function Check

NHEC0545

Use this procedure to check the overall function of ABS/TCS control unit. During this check, a DTC might not be confirmed.

PROCEDURE FOR MALFUNCTION B

NHEC0545S01

1) Lift up driving wheels.
2) Start engine and warm it up to normal operating temperature.
3) Place TCS OFF switch in "ON" position.
4) Drive vehicle with "D" position (OD "ON" or "OFF") and check engine running conditions as follows.

Engine speed ("D" position)	Engine running condition
Idle	Normal
More than 1,600 rpm	Rough

5) If NG, go to "Diagnostic Procedure", EC-516.

Diagnostic Procedure

NHEC0546

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

PROCEDURE A

NHEC0546S01

Go to "SELF-DIAGNOSIS PROCEDURE" of "TROUBLE DIAGNOSES" in BR section.

PROCEDURE B

NHEC0546S02

1	CHECK DRIVING CONDITION	
Ask a customer if he or she has driven the vehicle under abnormal condition such as: ● driving with front wheels slipping for a long time. ● driving with front wheels lifted up for a long time.		
	Yes or No	
Yes	▶	**INSPECTION END (NO FAILURE)**
No	▶	Go to BR-154, "Poor Acceleration".

Description

NHEC0547

This circuit line is used to control the smooth engine operation of ABS/TCS during the TCS operation. Pulse signals are exchanged between ECM and ABS/TCS control unit.

Be sure to erase the malfunction information such as DTC not only in ABS/TCS control unit but also ECM after the ABS/TCS related repair.

DTC ERASING PROCEDURE FOR ABS/TCS RELATED REPAIR

NHEC0547S01

1) Turn ignition switch “OFF” and then turn it “ON”.
2) Connect CONSULT-II and select “ABS”.
3) Select “ABS” and touch “SELF-DIAG RESULTS”.
4) Touch “ERASE”.
5) Touch “BACK” then erase malfunction code which has been stored in the TCM or ECM.

On Board Diagnosis Logic

NHEC0549

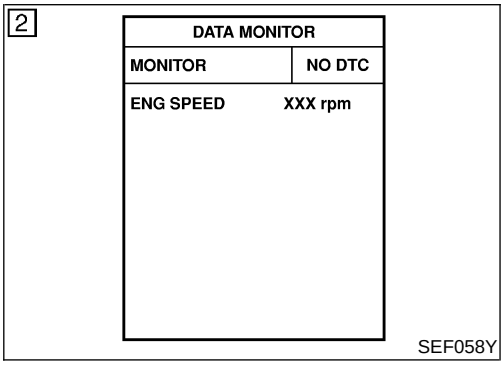
Freeze frame data is not stored in the ECM for the ABS/TCS communication line. The MIL will not light up for the ABS /TCS communication line.

Malfunction is detected when ECM receives incorrect voltage from ABS/TCS control unit continuously.

Possible Cause

NHEC0550

- Harness or connectors
  (The communication line circuit between ECM and ABS/TCS control unit is open or shorted.)
- ABS/TCS control unit
- Dead (Weak) battery



DTC Confirmation Procedure

NHEC0551

TESTING CONDITION:

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

WITH CONSULT-II

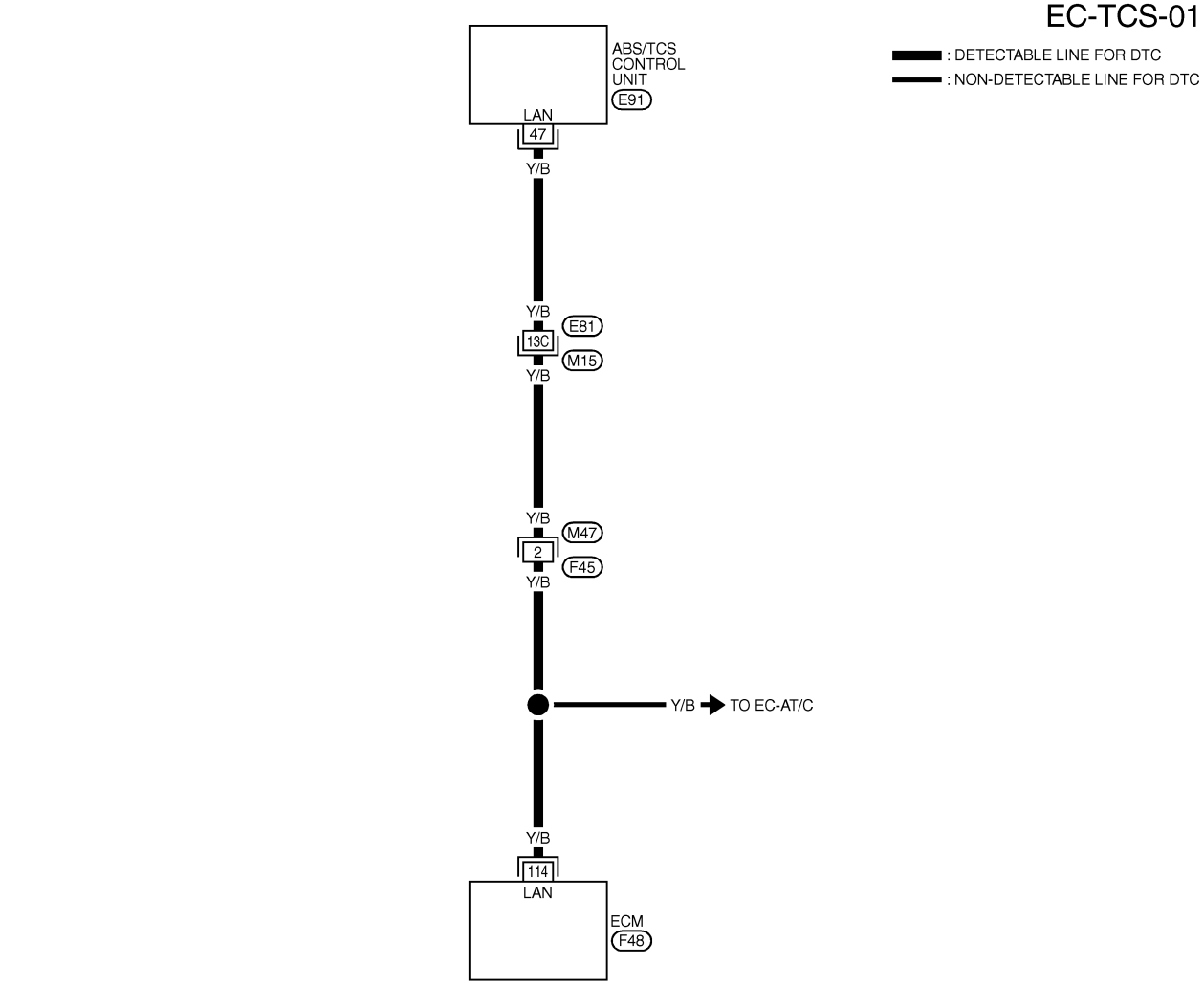
NHEC0551S01

1) Turn ignition switch “ON”.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Start engine and let it idle for at least 3 seconds.
4) If a 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-519.

Wiring Diagram

NHEC0552

EC-TCS-01



MEC758C

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
114	Y/B	COMMUNICATION LINE (LAN)	ENGINE RUNNING AT IDLE SPEED	APPROX. 2V

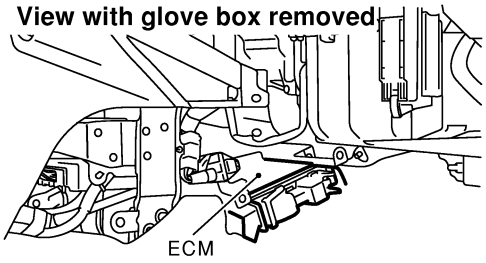
SEF629XB

Diagnostic Procedure

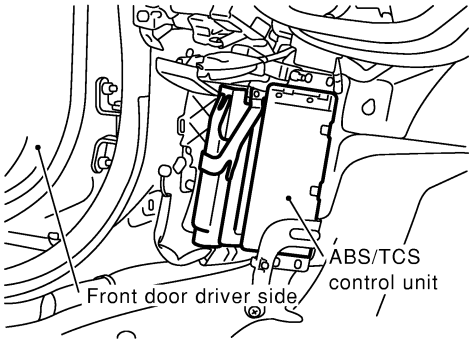
NHEC0553

1	CHECK INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector and ABS/TCS control unit harness connector.



SEF270X



SEF280X

3. Check harness continuity between ECM terminal 114 and ABS/TCS control unit terminal 47.
   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 E81, M15
- Harness connectors M47, F45
- Check harness for open or short between ECM and ABS/TCS control unit.

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

3	CHECK INTERMITTENT INCIDENT

Perform “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-156.

	▶	**INSPECTION END**

System Description

NHEC0554

COOLING FAN CONTROL

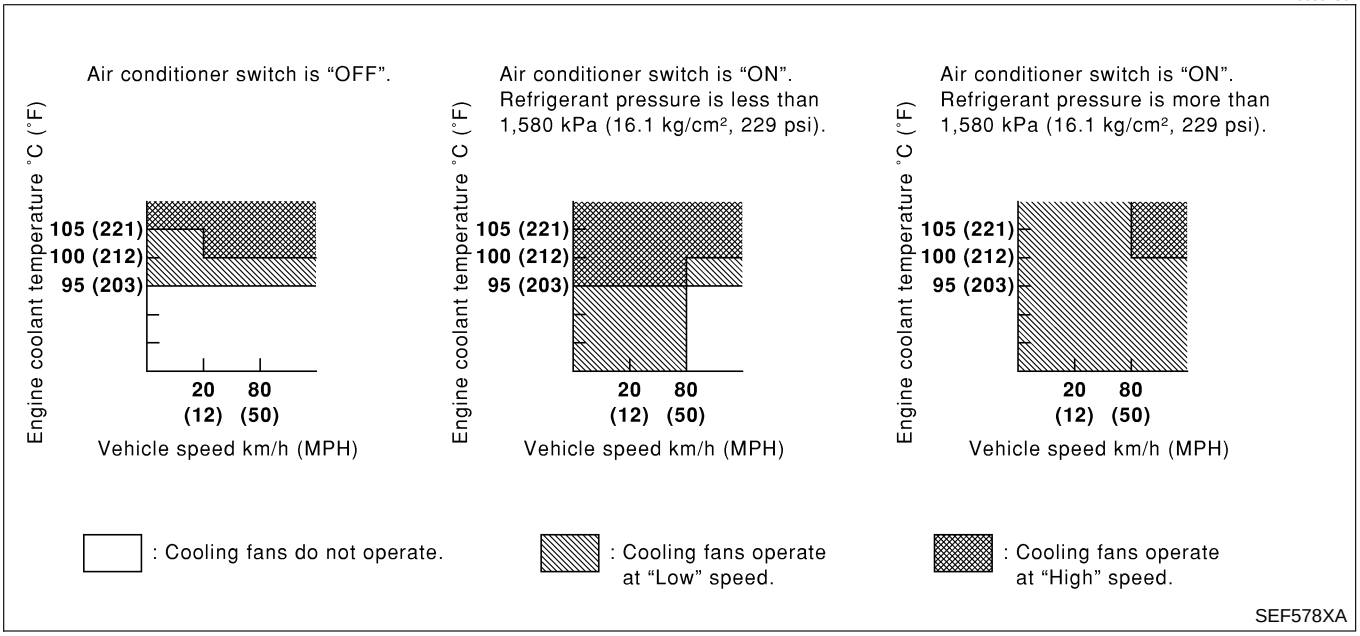
NHEC0554S01

Sensor	Input Signal to ECM	ECM function	Actuator
Vehicle speed sensor	Vehicle speed	Cooling fan control	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, refrigerant pressure and air conditioner ON signal. The control system has 3-step control [HIGH/LOW/OFF].

OPERATION

NHEC0554S02



CONSULT-II Reference Value in Data Monitor Mode

NHEC0555

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

On Board Diagnosis Logic

=NHEC0557

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.
Malfunction is detected when cooling fan does not operate properly (Overheat), cooling fan system does not operate properly (Overheat) and engine coolant was not added to the system using the proper filling method.

Possible Cause

NHEC0563

- Harness or connectors
  (The cooling fan circuit is open or shorted.)
- Cooling fan
- Radiator hose
- Radiator
- Radiator cap
- Water pump
- Thermostat

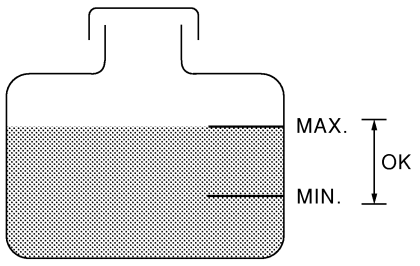
For more information, refer to “MAIN 12 CAUSES OF OVERHEATING”, EC-536.

CAUTION:

When a malfunction is indicated, be sure to replace the coolant following the procedure in the MA-14, “Changing Engine Coolant”. 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-12, “Anti-freeze Coolant Mixture Ratio”.**
2) **After refilling coolant, run engine to ensure that no water-flow noise is emitted.**

1



SEF621W

Overall Function Check

NHEC0558

Use this procedure to check the overall function of the cooling fan. During this check, a 1st trip 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-II

NHEC0558S01

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-525.
2) Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to “Diagnostic Procedure”, EC-525.
3) Turn ignition switch “ON”.
4) Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-II.

4

ACTIVE TEST	
COOLING FAN	OFF
MONITOR	
COOLAN TEMP/S	XXX °C

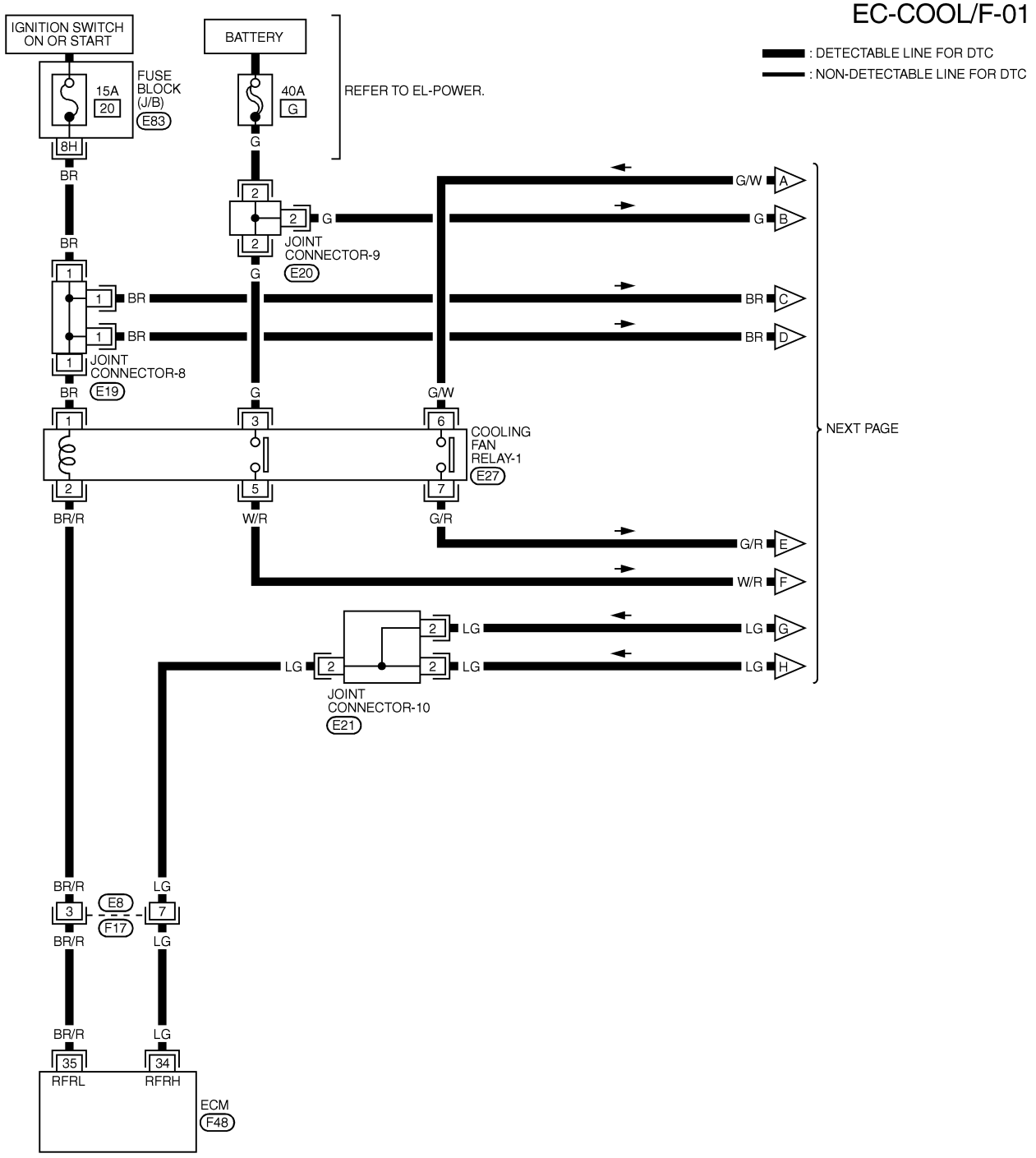
SEF111X

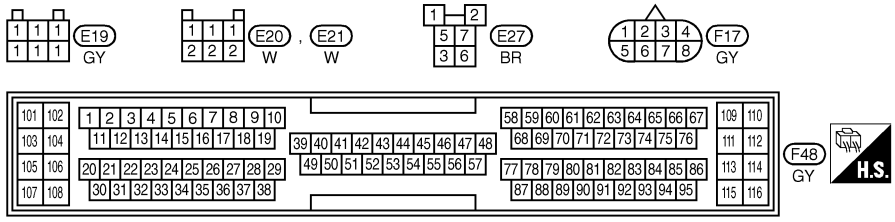
5) If the results are NG, go to "Diagnostic Procedure", EC-525.

Wiring Diagram

NHEC0559

EC-COOL/F-01

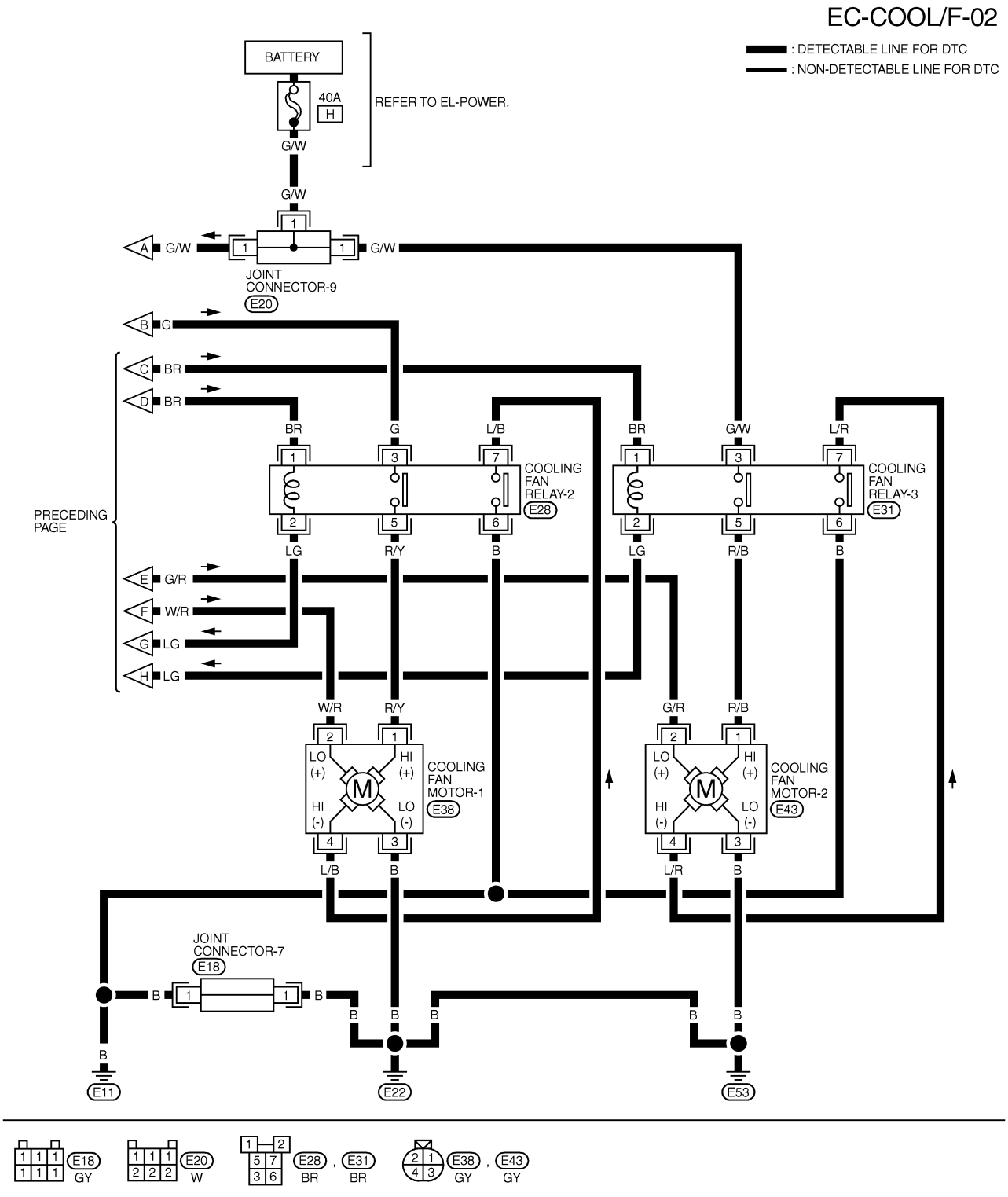




REFER TO THE FOLLOWING.
E83 -FUSE BLOCK-
JUNCTION BOX (J/B)

MEC759C

Wiring Diagram (Cont'd)



MEC879C

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
34	LG	COOLING FAN RELAY (HIGH)	ENGINE RUNNING WITH COOLING FAN NOT OPERATING	BATTERY VOLTAGE
			ENGINE RUNNING WITH COOLING FAN OPERATING AT HIGH SPEED	0 - 1.0V
35	BR/R	COOLING FAN RELAY (LOW)	ENGINE RUNNING WITH COOLING FAN NOT OPERATING	BATTERY VOLTAGE
			ENGINE RUNNING WITH COOLING FAN OPERATING AT LOW SPEED	0 - 1.0V

SEF630XB

Diagnostic Procedure

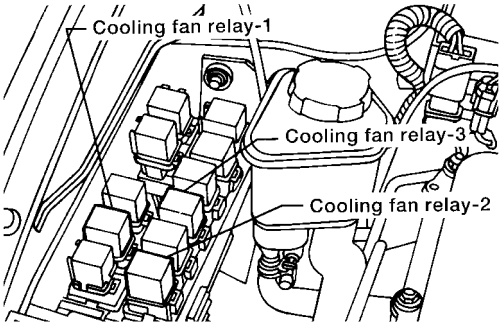
NHEC0560

1	INSPECTION START
Do you have CONSULT-II?	
Yes or No	
Yes ▶	GO TO 2.
No ▶	GO TO 4.

2	CHECK COOLING FAN LOW SPEED OPERATION

With CONSULT-II

1. Disconnect cooling fan relays-2 and -3.



AEC707

2. Turn ignition switch "ON".
3. Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT-II.

ACTIVE TEST	
COOLING FAN	OFF
MONITOR	
COOLAN TEMP/S	XXX °C

SEF646X

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-531.)

3	CHECK COOLING FAN HIGH SPEED OPERATION

With CONSULT-II

1. Turn ignition switch "OFF".
2. Reconnect cooling fan relays-2 and -3.
3. Disconnect cooling fan relay-1.
4. Turn ignition switch "ON".
5. Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT-II.

ACTIVE TEST	
COOLING FAN	OFF
MONITOR	
COOLAN TEMP/S	XXX °C

SEF111X

6. Make sure that cooling fans-1 and -2 operate at higher speed than low speed.

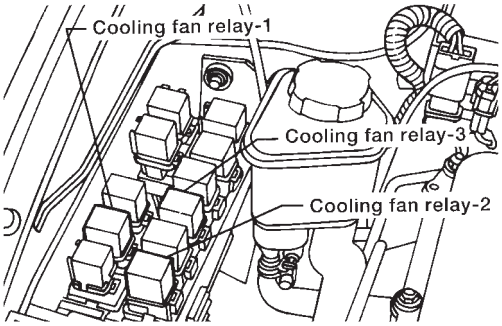
OK or NG

OK	▶	GO TO 6.
NG	▶	Check cooling fan high speed control circuit. (Go to PROCEDURE B, EC-534.)

4	CHECK COOLING FAN LOW SPEED OPERATION

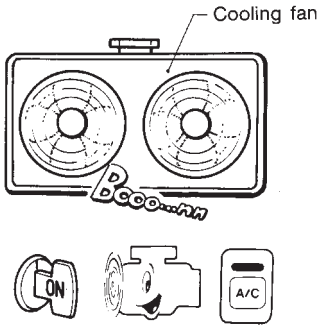
Without CONSULT-II

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

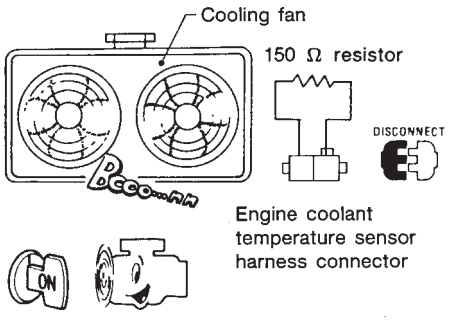
OK or NG

OK	▶	GO TO 5.
NG	▶	Check cooling fan low speed control circuit. (Go to PROCEDURE A, EC-531.)

5	CHECK COOLING FAN HIGH SPEED OPERATION

Without CONSULT-II

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-534.)

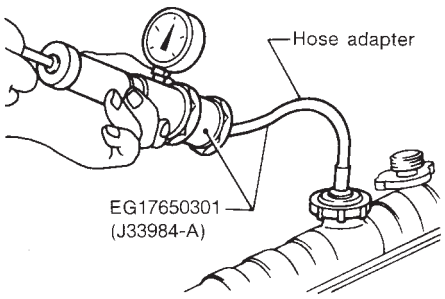
6	CHECK COOLING SYSTEM FOR LEAK

Apply pressure to the cooling system with a tester, and check if the pressure drops.

Testing pressure: 157 kPa (1.6 kg/cm^2, 23 psi)

CAUTION:

Higher than the specified pressure may cause radiator damage.



SLC754A

Pressure should not drop.

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	DETECT MALFUNCTIONING PART

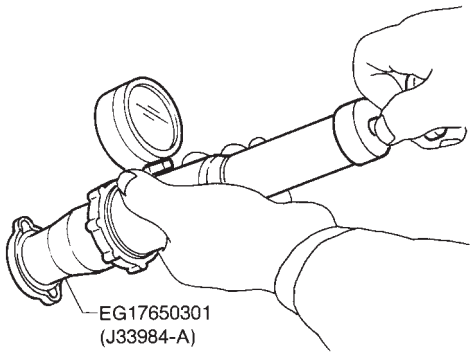
Check the following for leak.

- Hose
- Radiator
- Water pump (Refer to LC-10, "Water Pump".)

	▶	Repair or replace.

8	CHECK RADIATOR CAP

Apply pressure to cap with a tester and check radiator cap relief pressure.



SLC755A

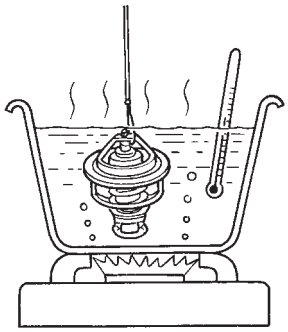
Radiator cap relief pressure:
59 - 98 kPa (0.6 - 1.0 kg/cm^2, 9 - 14 psi)

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace radiator cap.

9	CHECK THERMOSTAT

1. Remove thermostat.
2. Check valve seating condition at normal room temperatures.
   It should seat tightly.
3. Check valve opening temperature and valve lift.



SLC343

Valve opening temperature:
82°C (180°F) [standard]
Valve lift:
More than 8.6 mm/95°C (0.339 in/203°F)

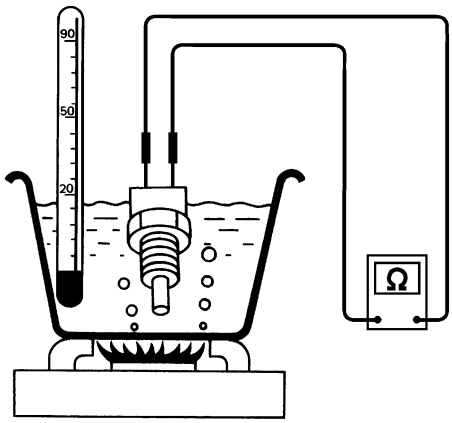
4. Check if valve is closed at 5°C (9°F) below valve opening temperature. For details, refer to LC-14, "Thermostat".

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace thermostat.

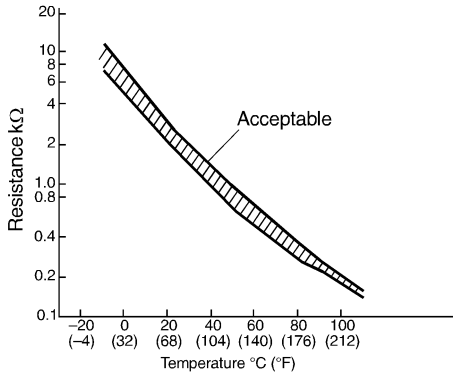
10	CHECK ENGINE COOLANT TEMPERATURE SENSOR

1. Remove engine coolant temperature sensor.
2. Check resistance between engine coolant temperature sensor terminals 1 and 2 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



SEF304X

OK or NG

OK	▶	GO TO 11.
NG	▶	Replace engine coolant temperature sensor.

11	CHECK MAIN 12 CAUSES

If the cause cannot be isolated, go to "MAIN 12 CAUSES OF OVERHEATING", EC-536.

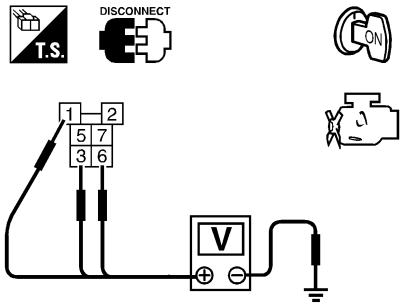
	▶	**INSPECTION END**

PROCEDURE A

=NHEC0560S01

1	CHECK COOLING FAN POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect cooling fan relay-1.
3. Turn ignition switch "ON".
4. Check voltage between cooling fan relay-1 terminals 1, 3, 6 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF590X

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

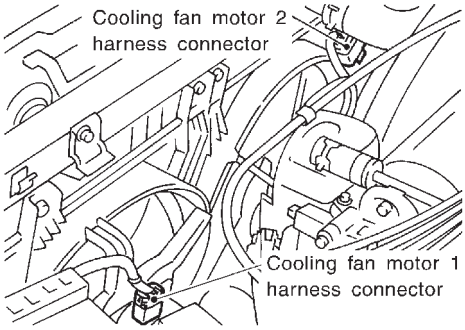
2	DETECT MALFUNCTIONING PART

Check the following.
- Joint connector-8
- Joint connector-9
- 15A fuse
- 40A fusible links
- Harness for open or short between cooling fan relay-1 and fuse
- Harness for open or short between cooling fan relay-1 and battery

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

3	CHECK COOLING FAN GROUND CIRCUIT FOR OPEN AND SHORT

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 cooling fan relay-1 terminal 5 and cooling fan motor-1 terminal 2, cooling fan motor-1 terminal 3 and body ground. Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to ground and short to power.
5. Check harness continuity between cooling fan relay-1 terminal 7 and cooling fan motor-2 terminal 2, cooling fan motor-2 terminal 3 and body ground. Refer to Wiring Diagram.
   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 COOLING FAN OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 35 and cooling fan relay-1 terminal 2. Refer to Wiring Diagram.
   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.

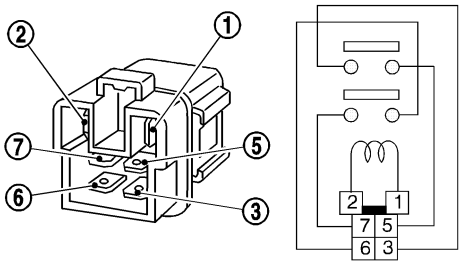
5	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F17
- 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

Check continuity between cooling fan relay-1 terminals 3 and 5, 6 and 7 under the following conditions.



Conditions	Continuity
12V direct current supply between terminals 1 and 2	Yes
No current supply	No

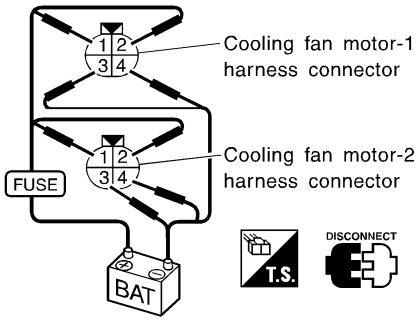
SEF591X

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace cooling fan relay.

7	CHECK COOLING FAN MOTORS-1 AND -2

Supply battery voltage between the following terminals and check operation.



	Speed	Terminals (+)	Terminals (–)
Cooling fan motor-1	Low	2	3
	High	1 , 2	3 , 4
Cooling fan motor-2	Low	2	3
	High	1 , 2	3 , 4

SEF592X

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace cooling fan motors.

8	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156.

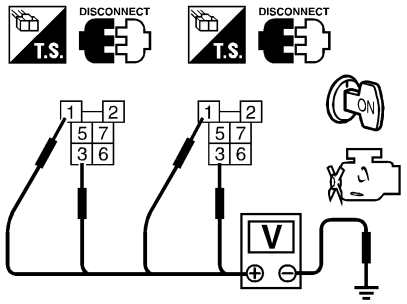
▶ **INSPECTION END**

PROCEDURE B

=NHEC0560S02

1	CHECK COOLING FAN POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect cooling fan relays-2 and -3.
3. Turn ignition switch "ON".
4. Check voltage between cooling fan relays-2 and -3 terminals 1, 3 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF593X

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Joint connector-8
- Joint connector-9
- Harness for open or short between cooling fan relays-2 and -3 and joint connectors-8, -9
- Harness for open or short between cooling fan relays-2 and -3 and joint connectors-8, -9

	▶	Repair harness or connectors.

3	CHECK COOLING FAN GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect cooling fan motor-1 harness connector and cooling fan motor-2 harness connector.
3. Check harness continuity between cooling fan relay-2 terminal 5 and cooling fan motor-1 terminal 1, cooling fan relay-2 terminal 7 and cooling fan motor-1 terminal 4, cooling fan relay-2 terminal 6 and body ground. Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to ground and short to power.
5. Check harness continuity between cooling fan relay-3 terminal 5 and cooling fan motor-2 terminal 1, cooling fan relay-3 terminal 7 and cooling fan motor-2 terminal 4, cooling fan relay-3 terminal 6 and body ground. Refer to Wiring Diagram.
   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 COOLING FAN OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 34 and cooling fan relay-2 terminal 2, cooling fan relay-3 terminal 2. Refer to Wiring Diagram.
   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.

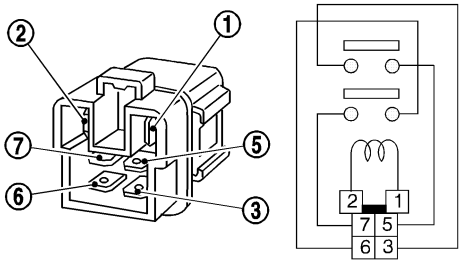
5	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, E17
- Joint connector-10
- 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

Check continuity between cooling fan relay-2, -3 terminals 3 and 5, 6 and 7 under the following conditions.



Conditions	Continuity
12V direct current supply between terminals 1 and 2	Yes
No current supply	No

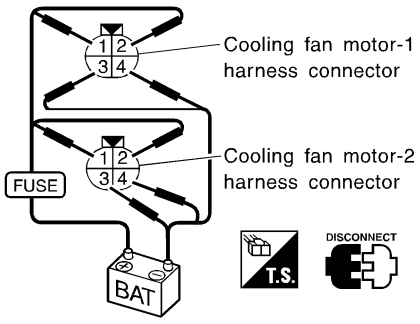
SEF591X

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace cooling fan relays.

7	CHECK COOLING FAN MOTORS

Supply battery voltage between the following terminals and check operation.



	Speed	Terminals (+)	Terminals (–)
Cooling fan motor-1	Low	2	3
	High	1 , 2	3 , 4
Cooling fan motor-2	Low	2	3
	High	1 , 2	3 , 4

SEF592X

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace cooling fan motors.

Diagnostic Procedure (Cont'd)

8	CHECK INTERMITTENT INCIDENT
1. Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156.	
▶	INSPECTION END

Main 12 Causes of Overheating

NHEC0561

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 MA-11, "RECOMMENDED FLUIDS AND LUBRICANTS".
	3	• Coolant level	• Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	See MA-14, "Changing Engine Coolant".
	4	• Radiator cap	• Pressure tester	59 - 98 kPa (0.6 - 1.0 kg/cm^2, 9 - 14 psi) (Limit)	See LC-9, "System Check".
ON*2	5	• Coolant leaks	• Visual	No leaks	See LC-9, "System Check".
ON*2	6	• Thermostat	• Touch the upper and lower radiator hoses	Both hoses should be hot	See LC-14, "Thermostat" and LC-16, "Radiator".
ON*1	7	• Cooling fan	• CONSULT-II	Operating	See trouble diagnosis for DTC P1217 (EC-520).
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 MA-14, "Changing Engine Coolant".
OFF*4	10	• Coolant return from reservoir tank to radiator	• Visual	Should be initial level in reservoir tank	See MA-13, "ENGINE MAINTENANCE".
OFF	11	• Cylinder head	• Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	See EM-41, "Inspection".
	12	• Cylinder block and pistons	• Visual	No scuffing on cylinder walls or piston	See EM-60, "Inspection".

*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 LC-21, "OVERHEATING CAUSE ANALYSIS".

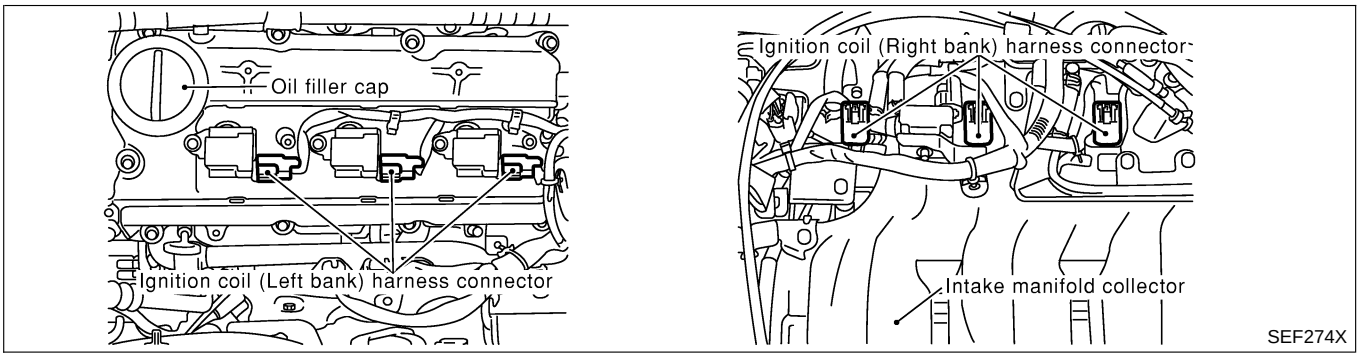
Component Description

NHEC0286

IGNITION COIL & POWER TRANSISTOR

NHEC0286S01

The ignition signal from the ECM is sent to and amplified by the power transistor. The power transistor turns on and off the ignition coil primary circuit. This on-off operation induces the proper high voltage in the coil secondary circuit.



On Board Diagnosis Logic

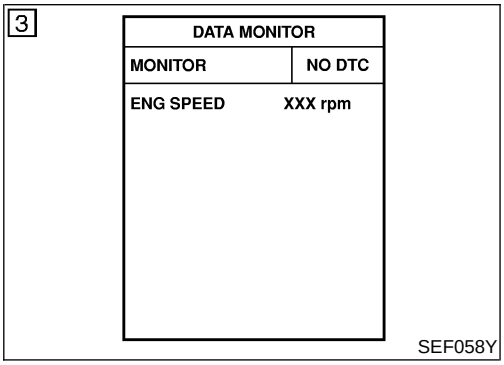
NHEC0288

Malfunction is detected when the ignition signal in the primary circuit is not sent to ECM during engine cranking or running.

Possible Cause

NHEC0572

- Harness or connectors (The ignition primary circuit is open or shorted.)
- Power transistor unit built into ignition coil
- Condenser
- Crankshaft position sensor (REF)
- Crankshaft position sensor (REF) circuit



DTC Confirmation Procedure

NHEC0289

NOTE:

- If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.
- **If DTC P1320 is displayed with DTC P0335, P0340, P1335 or P1336, perform trouble diagnosis for DTC P0335, P0340, P1335 or P1336 first. Refer to EC-355, EC-363, EC-548 or EC-554.**

DTC Confirmation Procedure (Cont'd)

WITH CONSULT-II

NHEC0289S01

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Start engine. (If engine does not run, turn ignition switch to "START" for at least 5 seconds.)
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-542.

WITH GST

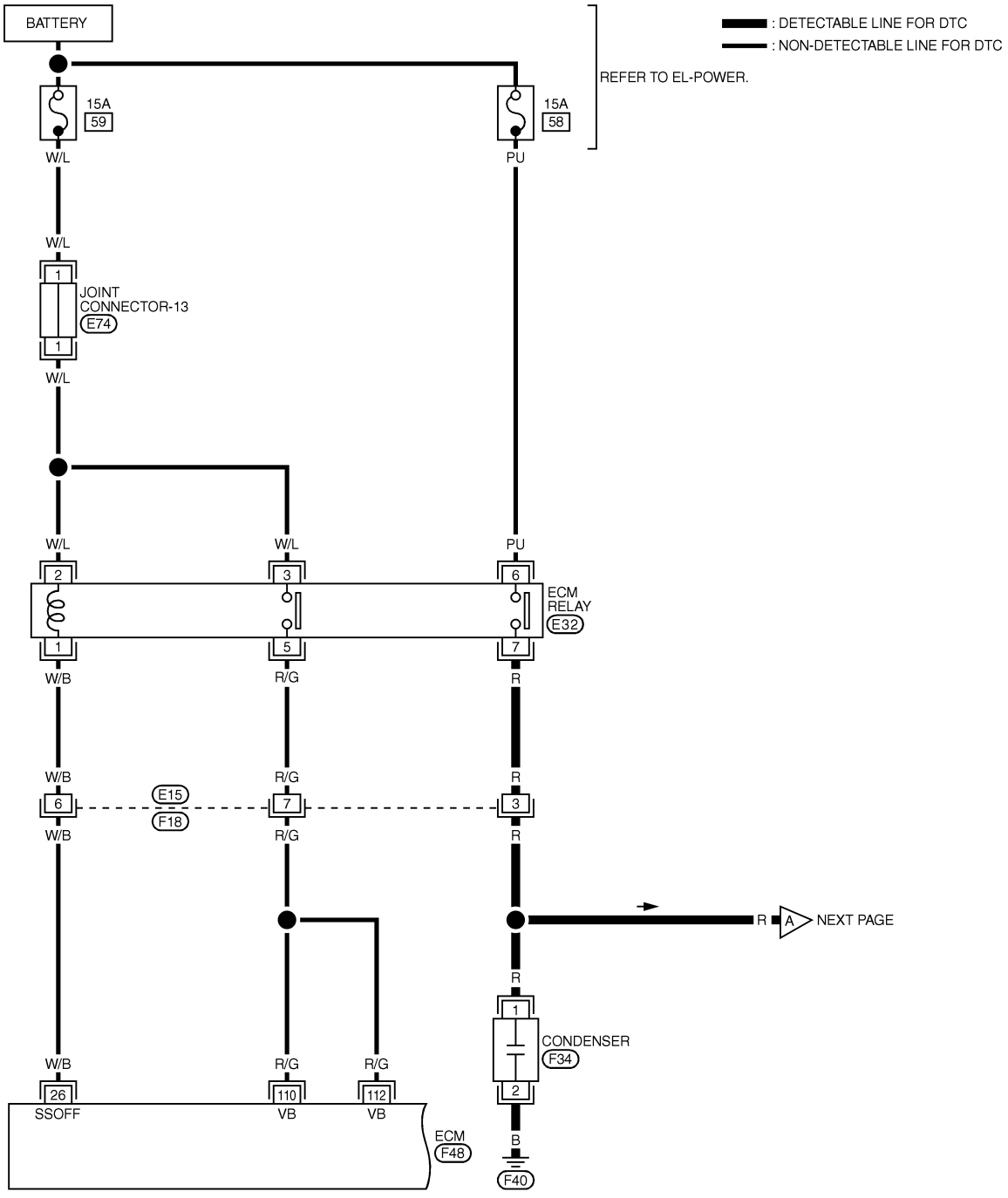
NHEC0289S02

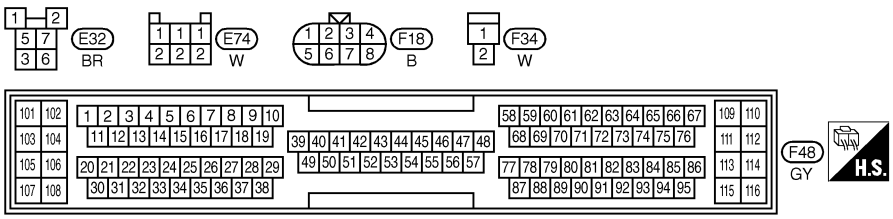
Follow the procedure "WITH CONSULT-II" above.

Wiring Diagram

NHEC0290

EC-IGN/SG-01

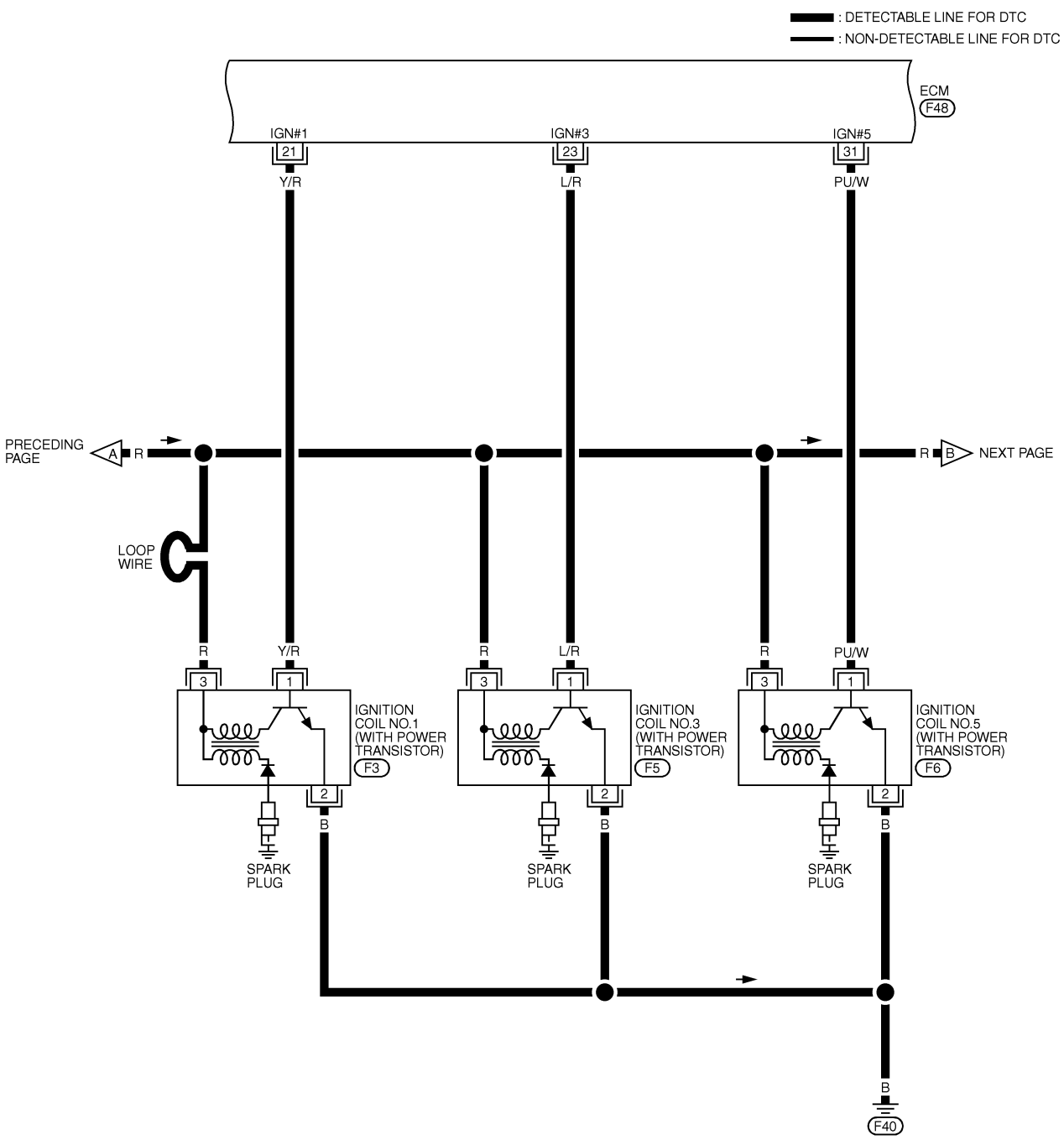


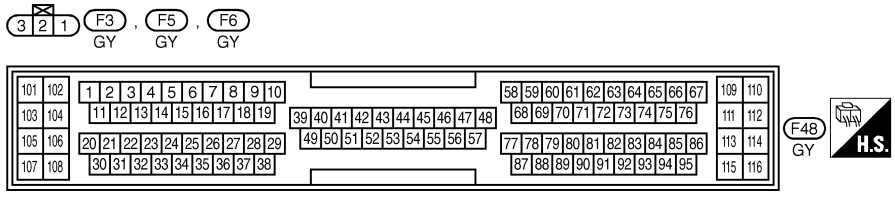


MEC819C

Wiring Diagram (Cont'd)

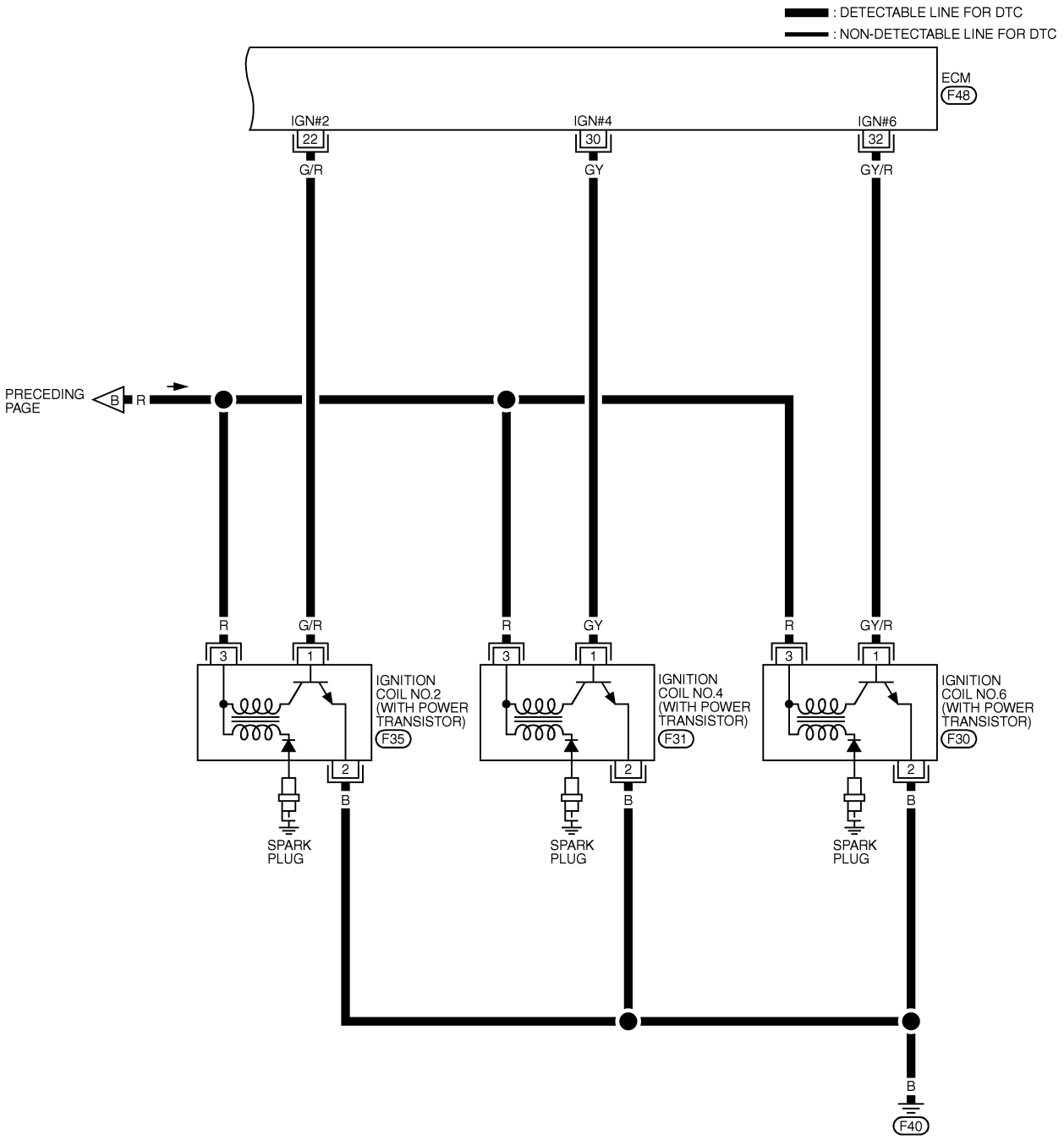
EC-IGN/SG-02

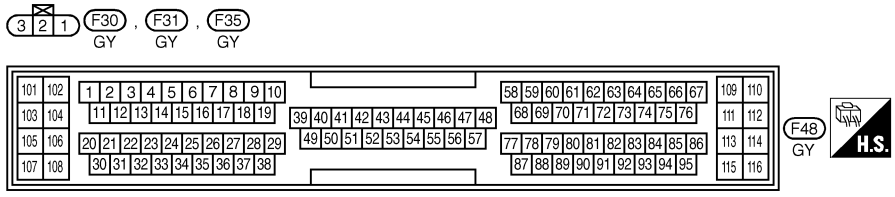




MEC752C

EC-IGN/SG-03

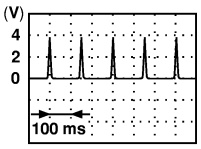
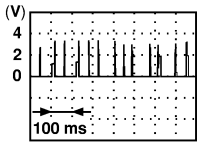




MEC753C

Wiring Diagram (Cont'd)

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN THE ECM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
21	Y/R	IGNITION SIGNAL NO. 1	ENGINE RUNNING AT IDLE SPEED UNDER THE WARM UP CONDITION	0 - 0.2V★ 
22	G/R	IGNITION SIGNAL NO. 2		
23	L/R	IGNITION SIGNAL NO. 3		
30	GY	IGNITION SIGNAL NO. 4	ENGINE RUNNING AT 2,500 RPM	0 - 0.2V★ 
31	PU/W	IGNITION SIGNAL NO. 5		
32	GY/R	IGNITION SIGNAL NO. 6		

★ : AVERAGE VOLTAGE FOR PULSE SIGNAL (ACUTUAL PULSE SIGNAL CAN BE CONFIRMED BY OSCILLOSCOPE.)

SEF860Y

Diagnostic Procedure

NHEC0291

1	CHECK ENGINE START
Turn ignition switch "OFF", and restart engine. **Is engine running?**	
Yes or No	
Yes (With CONSULT-II) ▶	GO TO 2.
Yes (Without CONSULT-II) ▶	GO TO 12.
No ▶	GO TO 3.

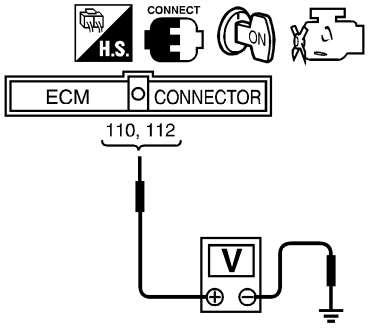
2	SEARCH FOR MALFUNCTIONING CIRCUIT
With CONSULT-II 1. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-II. 2. Search for circuit which does not produce a momentary engine speed drop.	
▶	GO TO 12.

ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS AIF SE-B1	XXX V
IACV-AAC/V	XXX step

SEF070Y

3	CHECK IGNITION COIL POWER SUPPLY CIRCUIT-I

1. Turn ignition switch ON.
2. Check voltage between ECM terminals 110, 112 and ground with CONSULT-II or tester.



Voltage: Battery voltage

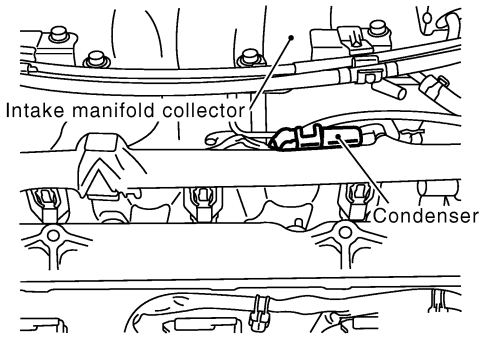
SEF366X

OK or NG

OK	▶	GO TO 4.
NG	▶	Go to TROUBLE DIAGNOSIS FOR POWER SUPPLY, EC-157.

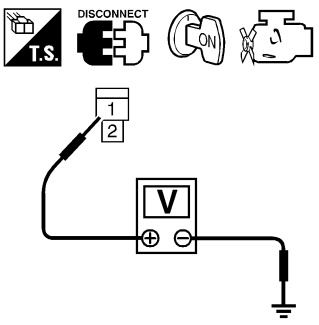
4	CHECK IGNITION COIL POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect condenser harness connector.



SEF275X

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



Voltage: Battery voltage

SEF367X

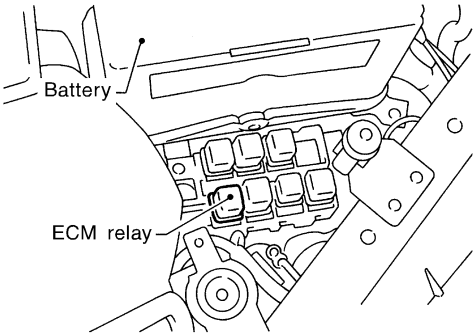
OK or NG

OK	▶	GO TO 10.
NG	▶	GO TO 5.

Diagnostic Procedure (Cont'd)

5	CHECK IGNITION COIL POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF.
2. Disconnect ECM relay.



SEF589PB

3. Check harness continuity between ECM relay terminal 7 and condenser terminal 1. Refer to Wiring Diagram.
   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.

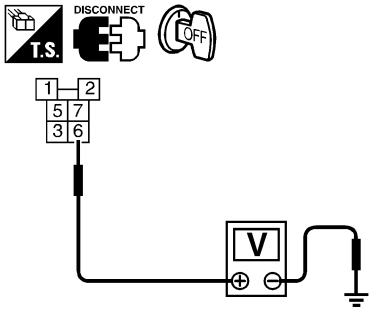
6	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F18, E15
- Harness for open or short between ECM relay and condenser

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

7	CHECK IGNITION COIL POWER SUPPLY CIRCUIT-IV

Check voltage between ECM relay terminal 6 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF368X

OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 8.

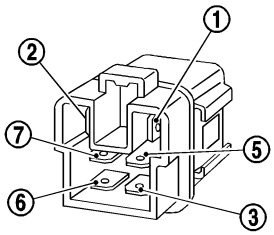
8	DETECT MALFUNCTIONING PART

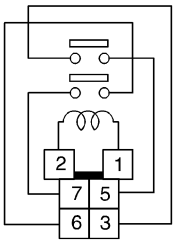
Check the following.
- 15A fuse
- Harness for open and short between ECM relay and fuse

	▶	Repair or replace harness or connectors.

9	CHECK ECM RELAY

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





Condition	Continuity
12V direct current supply between terminals 1 and 2	Yes
OFF	No

SEF296X

OK or NG

OK	▶	GO TO 17.
NG	▶	Replace ECM relay.

10	CHECK CONDENSER GROUND CIRCUIT FOR OPEN AND SHORT

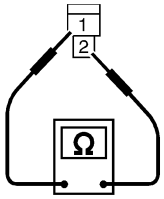
1. Turn ignition switch OFF.
2. Check harness continuity between condenser terminal 2 and engine ground. Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 11.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

11	CHECK CONDENSER

Check resistance between condenser terminals 1 and 2.



Resistance: Above 1MΩ at 25°C (77°F)

SEF369X

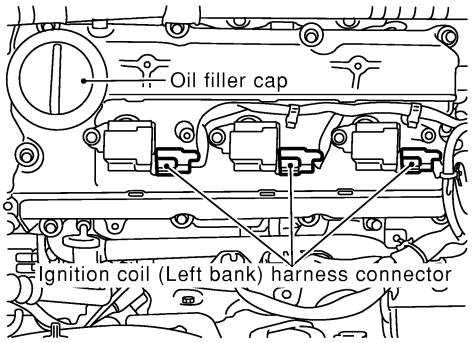
OK or NG

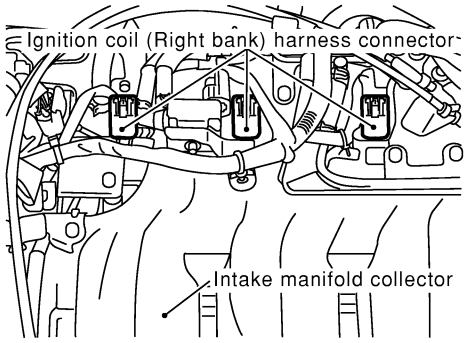
OK	▶	GO TO 12.
NG	▶	Replace condenser.

Diagnostic Procedure (Cont'd)

12	CHECK IGNITION COIL POWER SUPPLY CIRCUIT-V

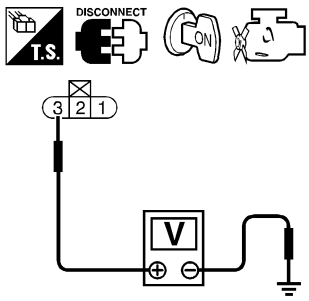
1. Turn ignition switch OFF.
2. Reconnect harness connectors disconnected.
3. Disconnect ignition coil harness connector.





SEF274X

4. Turn ignition switch ON.
5. Check voltage between ignition coil terminal 3 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF370X

OK or NG

OK	▶	GO TO 14.
NG	▶	GO TO 13.

13	DETECT MALFUNCTIONING PART

Check the harness for open or short between ignition coil and harness connector F18.

	▶	Repair or replace harness or connectors.

14	CHECK IGNITION COIL GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between ignition coil terminal 2 and engine ground. Refer to Wiring Diagram.
   Continuity should exist.
3. 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 IGNITION COIL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

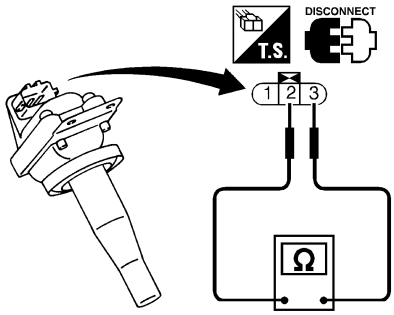
1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminals 21, 22, 23, 30, 31, 32 and ignition coil terminal 1. Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 16.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

16	CHECK IGNITION COIL WITH POWER TRANSISTOR

Check resistance between ignition coil terminals 2 and 3.



Terminals	Resistance	Result
2 and 3	Not 0Ω	OK
	0Ω	NG

SEF371X

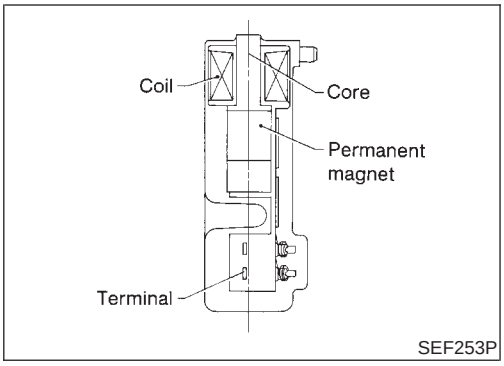
OK or NG

OK	▶	GO TO 17.
NG	▶	Replace ignition coil with power transistor.

17	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156.

▶ **INSPECTION END**



Component Description

NHEC0573

The crankshaft position sensor (REF) is located on the oil pan (upper) facing the crankshaft pulley. It detects the TDC (Top Dead Center) signal (120° signal).
The sensor consists of a permanent magnet, core and coil.
When engine is running, the gap between the sensor and the crankshaft pulley will periodically change. Permeability near the sensor also changes.
Due to the permeability change, the magnetic flux near the core is changed. Therefore, the voltage signal generated in the coil is changed.
The ECM receives the voltage signal and detects the TDC signal (120° signal).

CONSULT-II Reference Value in Data Monitor Mode

NHEC0574

Specification data are reference values.

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

On Board Diagnosis Logic

NHEC0576

Malfunction is detected when
(Malfunction A) 120° signal is not entered to ECM for the first few seconds during engine cranking,
(Malfunction B) 120° signal is not entered to ECM during engine running,
(Malfunction C) 120° signal cycle excessively changes during engine running.

FAIL-SAFE MODE

NHEC0576S01

When the ECM enters the fail-safe mode, the MIL illuminates.

Detected items	Engine operating condition in fail-safe mode
Crankshaft position sensor (REF) circuit	Compression TDC signal (120° signal) is controlled by camshaft position sensor (PHASE) signal and crankshaft position sensor (POS) signal. Ignition timing will be delayed 0° to 2°.

Possible Cause

NHEC0577

- Harness or connectors
  (The crankshaft position sensor (REF) circuit is open or shorted.)
- Crankshaft position sensor (REF)
- Starter motor (Refer to SC section.)
- Starting system circuit (Refer to SC section.)
- Dead (Weak) battery

DTC Confirmation Procedure

NHEC0578

NOTE:

- **Perform "PROCEDURE FOR MALFUNCTION A" first. If 1st trip DTC cannot be confirmed, perform "PROCEDURE FOR MALFUNCTION B AND C".**
- If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

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

2

DATA MONITOR	
MONITOR	NO DTC
COOLAN TEMP/S	XXX °C

SEF013Y

PROCEDURE FOR MALFUNCTION A

NHEC0578S01

With CONSULT-II

NHEC0578S0101

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Crank engine for at least 2 seconds.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-551.

With GST

NHEC0578S0102

Follow the procedure "With CONSULT-II" above.

3

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

PROCEDURE FOR MALFUNCTION B AND C

NHEC0578S02

With CONSULT-II

NHEC0578S0201

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Start engine and run it for at least 2 seconds at idle speed.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-551.

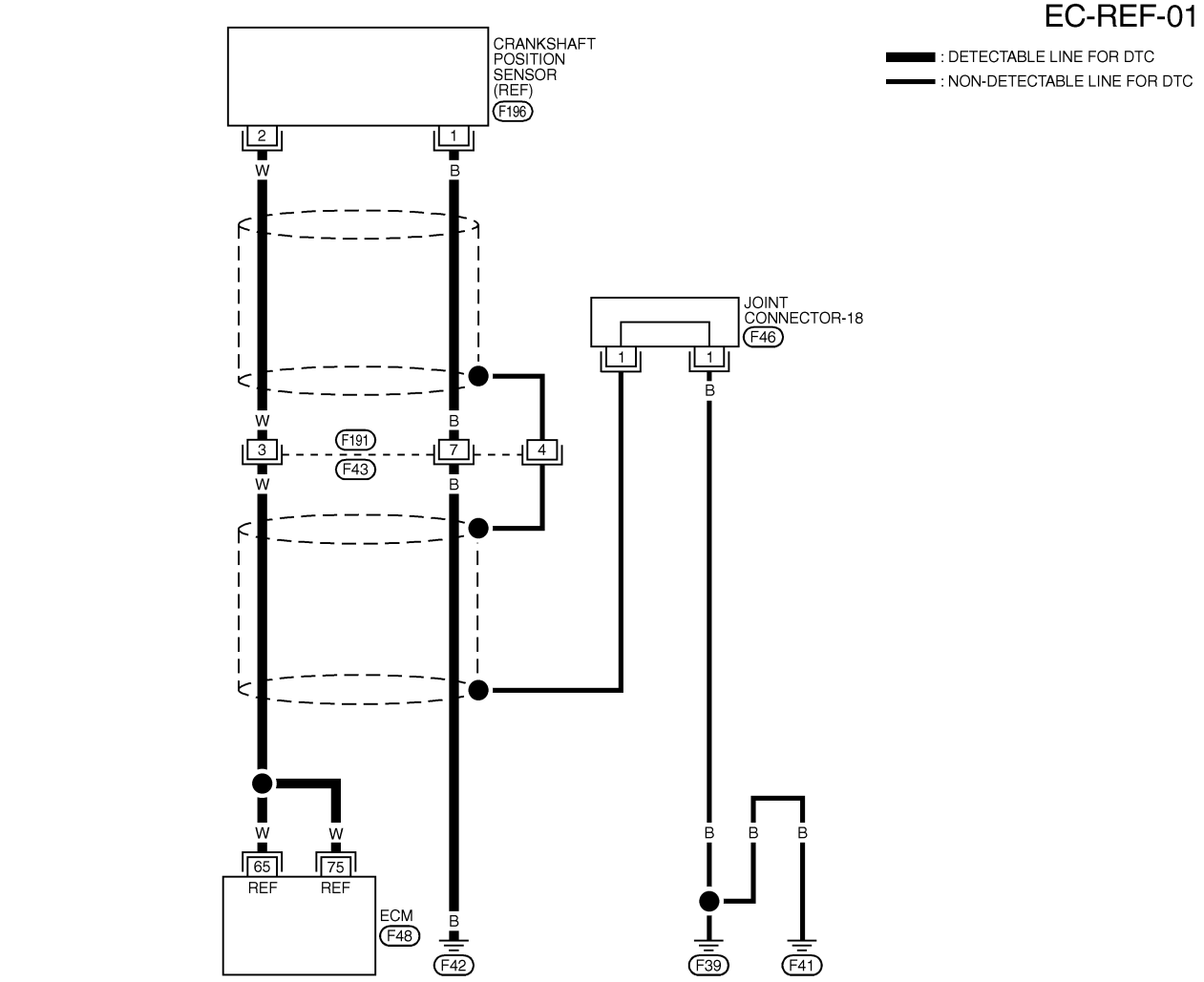
With GST

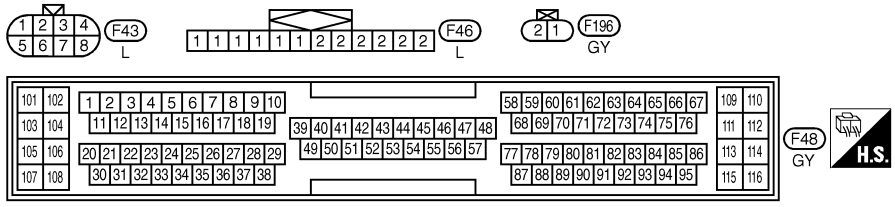
NHEC0578S0202

Follow the procedure "With CONSULT-II" above.

Wiring Diagram

NHEC0579





MEC754C

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
65 75	W W	CRANKSHAFT POSITION SENSOR (REF)	ENGINE RUNNING AT IDLE SPEED UNDER WARM-UP CONDITION	APPROX. 2.3V★ (AC VOLTAGE) (V) 20 10 0 10 ms

★ : AVERAGE VOLTAGE FOR PULSE SIGNAL (ACTUAL PULSE SIGNAL CAN BE CONFIRMED BY OSCILLOSCOPE.)

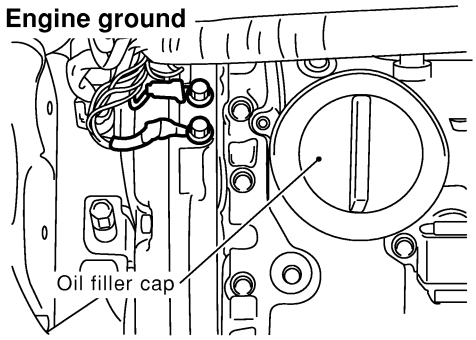
SEF861Y

Diagnostic Procedure

NHEC0580

1	RETIGHTEN GROUND SCREWS

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

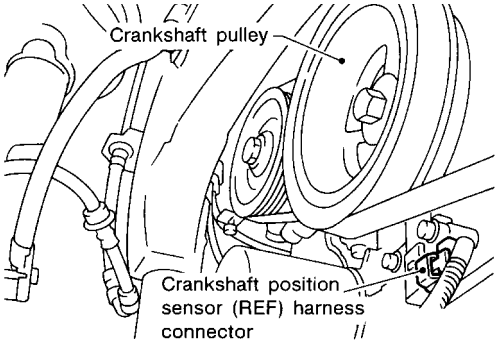


SEF255X

▶	GO TO 2.

2	CHECK CKPS (REF) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect CKPS (REF) harness connector.



SEF591PA

2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminals 65, 75 and CKPS (REF) terminal 2. Refer to Wiring Diagram.
   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 F43, F191
- Harness for open or short between crankshaft position sensor (REF) and ECM

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

4	CHECK CKPS (REF) GROUND CIRCUIT FOR OPEN AND SHORT

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

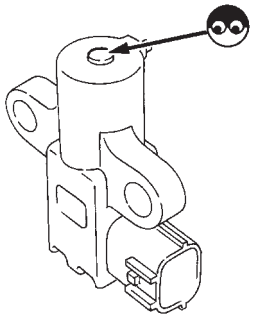
5	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F43, F191
- Harness for open or short between crankshaft position sensor (REF) and engine ground

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

6	CHECK CKPS (REF)-I

1. Loosen the fixing bolts and remove the CKPS (REF).
2. Visually check the CKPS (REF) for chipping.



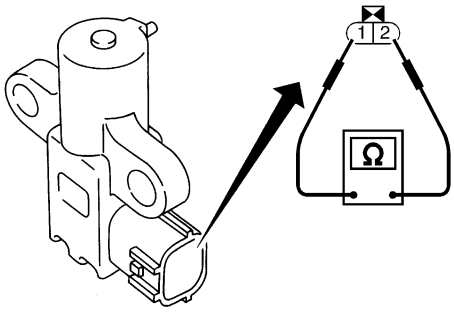
SEF585P

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace crankshaft position sensor (REF).

7	CHECK CKPS (REF)-II

Check resistance between CKPS (REF) terminals 1 and 2.



Resistance: Approximately
470 - 570 Ω
[AT 20°C (68°F)]

SEF350X

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace crankshaft position sensor (REF).

8	CHECK CKPS (REF) SHIELD CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect harness connectors F43, F191.
3. Check harness continuity between harness connector F43 terminal 4 and engine ground.
   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

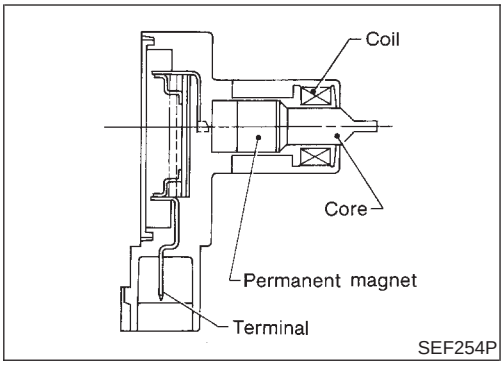
Check the following.
- Harness connectors F43, F191
- Joint connector-18
- Harness for open or short between harness connector F43 and engine ground

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

10	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156.

	▶	**INSPECTION END**



Component Description

NHEC0292

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

CONSULT-II Reference Value in Data Monitor Mode

NHEC0581

Specification data are reference values.

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

On Board Diagnosis Logic

NHEC0294

Malfunction is detected when chipping of the signal plate (flywheel or drive plate) gear tooth (cog) is detected by the ECM.

Possible Cause

NHEC0582

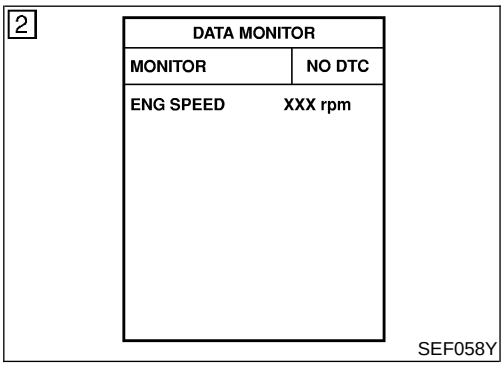
- Harness or connectors
- Crankshaft position sensor (POS)
- Signal plate (Drive plate/Flywheel)

DTC Confirmation Procedure

NHEC0295

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

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



WITH CONSULT-II

NHEC0295S01

1) Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II.
2) Start engine and run it for at least 70 seconds at idle speed.
3) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-557.

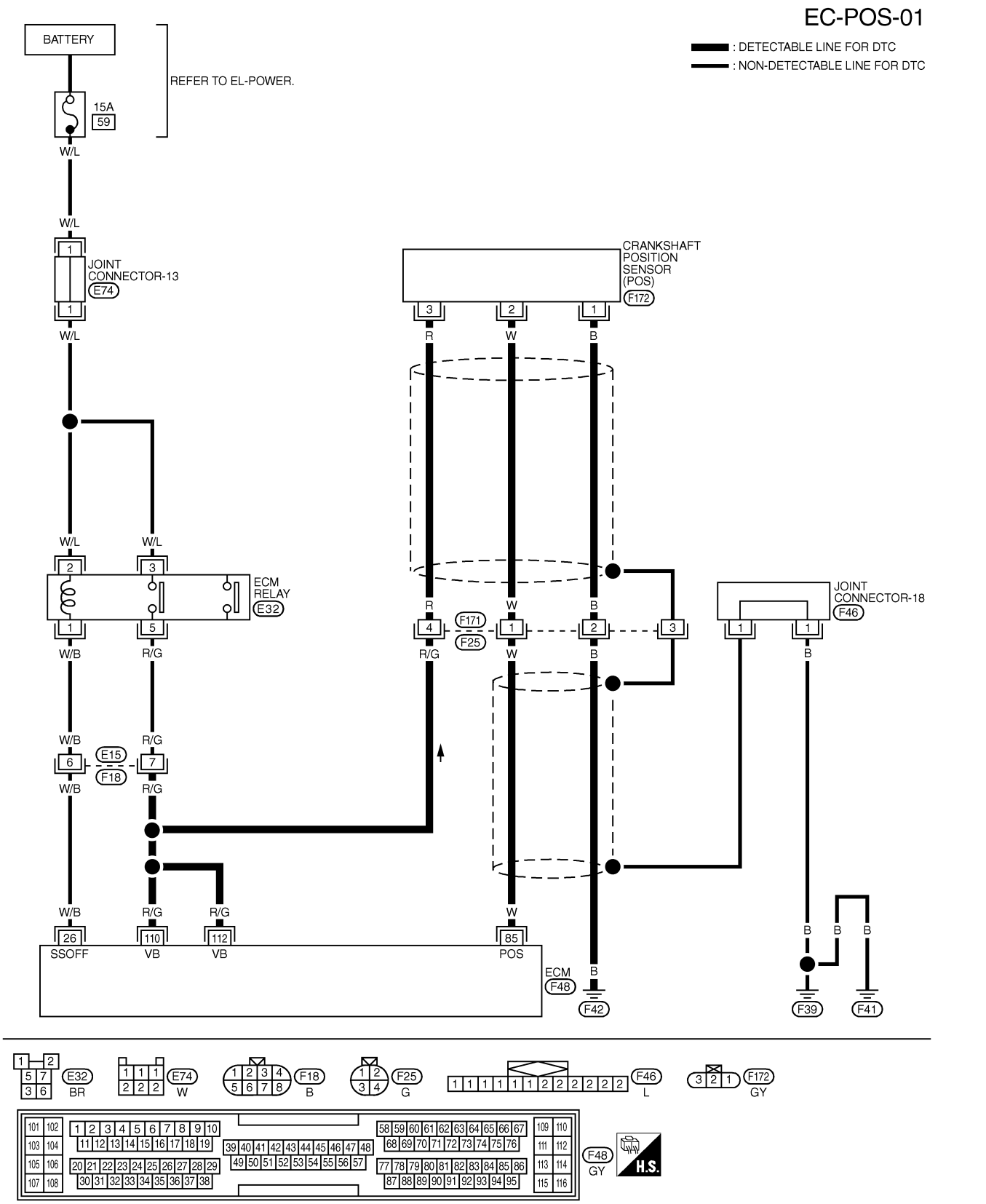
WITH GST

NHEC0295S02

Follow the procedure “WITH CONSULT-II” above.

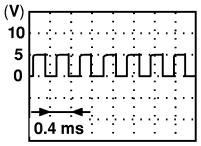
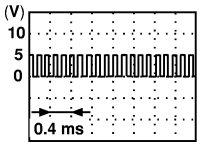
Wiring Diagram

NHEC0296



MEC812C

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
85	W	CRANKSHAFT POSITION SENSOR (POS)	ENGINE RUNNING AT IDLE SPEED UNDER WARM-UP CONDITION	APPROX. 2.4V 
			ENGINE RUNNING AT 2,000 RPM	APPROX. 2.3V 

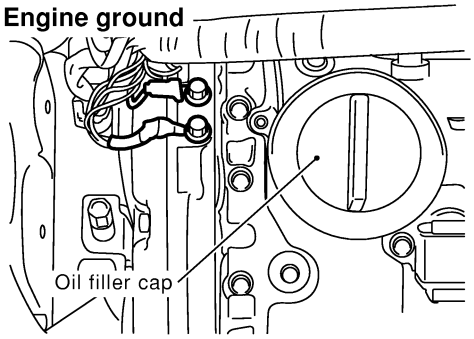
SEF856Y

Diagnostic Procedure

NHEC0297

1	RETIGHTEN GROUND SCERWS

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

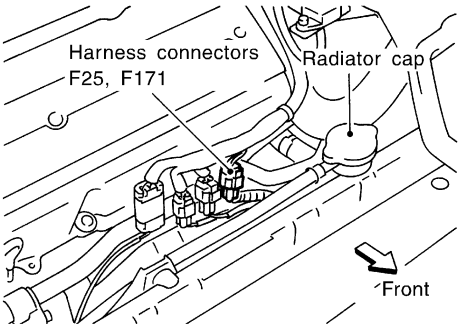


SEF255X

▶	GO TO 2.

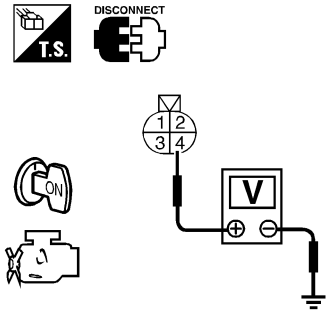
2	CHECK CKPS (POS) POWER SUPPLY CIRCUIT

1. Disconnect harness connectors F25, F171.



SEF511WB

2. Check voltage between harness connector F25 terminal 4 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF323X

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 F25, F171
- Harness connectors E15, F18
- Harness for open or short between ECM and crankshaft position sensor (POS)
- Harness for open or short between ECM relay and crankshaft position sensor (POS)

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

4	CHECK CKPS (POS) GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between harness connector F25 terminal 2 and engine ground. Refer to Wiring Diagram.
   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 CKPS (POS) INPUT SIGNAL CIRCUIT

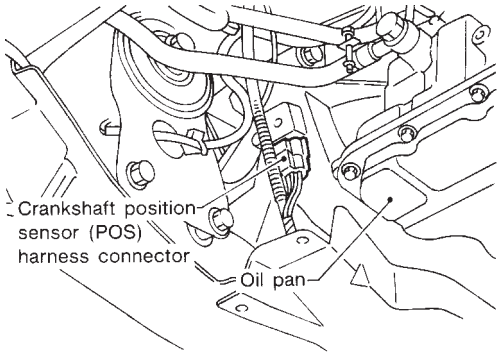
1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 85 and harness connector F25 terminal 1. Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

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 CKPS (POS) SUB-HARNESS CIRCUIT FOR OPEN AND SHORT

1. Disconnect CKPS (POS) harness connector.



SEF367Q

2. Check harness continuity between CKPS (POS) terminals and harness connector F171 terminals as follows.

CKPS (POS) terminal	Harness connector F171 terminal
1	2
2	1
3	4

MTBL0352

Continuity should exist.

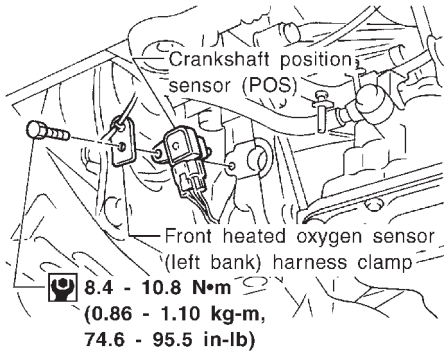
3. Also check harness for short to ground and short to power.

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 CKPS (POS) INSTALLATION

Check that CKPS (POS) and front HO2S (Left bank) harness clamp are installed correctly as shown below.



SEM222F

OK or NG

OK	▶	GO TO 8.
NG	▶	Install CKPS (POS) correctly.

8	CHECK IMPROPER INSTALLATION

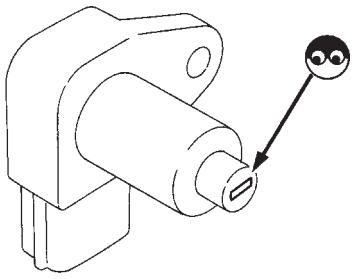
1. Loosen and retighten the fixing bolt of the crankshaft position sensor (POS).
2. Reconnect harness connectors disconnected.
3. Perform "DTC Confirmation Procedure", EC-555 again.

Is a 1st trip DTC P1336 detected?

Yes	▶	GO TO 9.
No	▶	**INSPECTION END**

9	CHECK CRANKSHAFT POSITION SENSOR (POS)

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



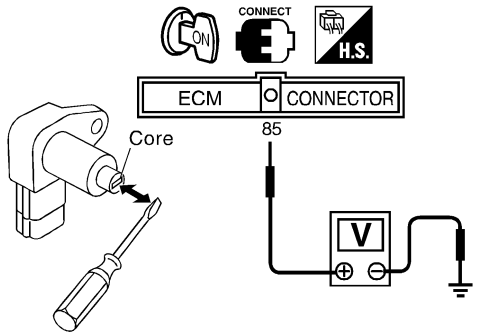
SEF587P

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace crankshaft position sensor (POS).

10	CHECK CRANKSHAFT POSITION SENSOR (POS)-II

1. Reconnect harness connectors disconnected.
2. Turn ignition switch ON.
3. Check voltage between ECM terminal 85 and ground by briefly touching the sensor core with a flat-bladed screwdriver.



ECM terminal	Condition	Voltage
85	Contacted	Approximately 5V
	Pulled away	Approximately 0V

There should be a steady 5V as the flat-bladed screwdriver is drawn away slowly.

SEF324X

OK or NG

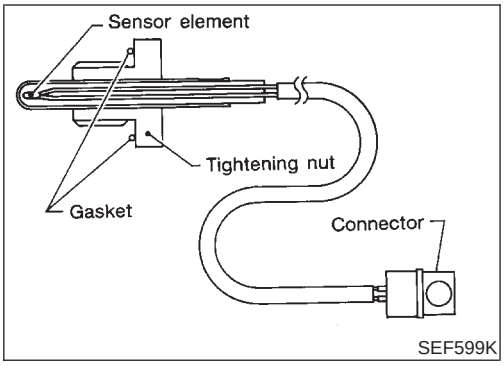
OK	▶	GO TO 11.
NG	▶	Replace crankshaft position sensor (POS).

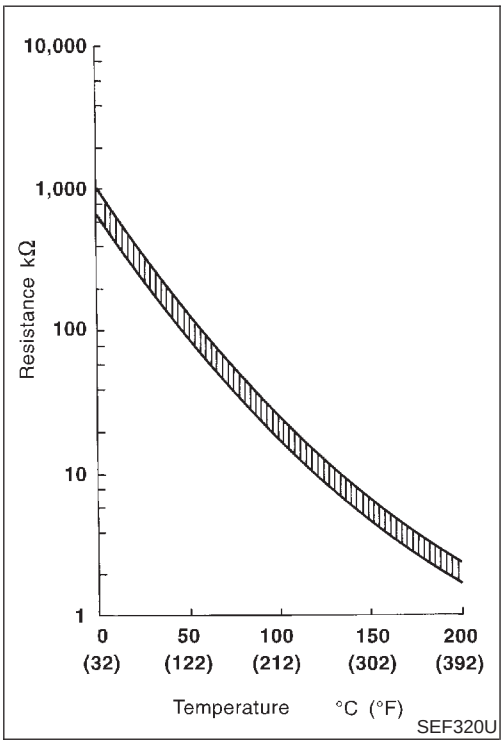
11	CHECK CKPS (POS) SHIELD CIRCUIT FOR OPEN AND SHORT	
1. Disconnect harness connectors F25, F171. 2. Check harness continuity between harness connector F25 terminal 3 and engine ground. Refer to Wiring Diagram. **Continuity should exist.** 3. Also check harness for short to ground and short to power.		
OK or NG		
OK	▶	GO TO 13.
NG	▶	GO TO 12.

12	DETECT MALFUNCTIONING PART	
Check the following. ● Harness connectors F25, F171 ● Joint connector-18 ● Harness for open or short between harness connector F25 and engine ground		
	▶	Repair open circuit or short to ground or short to power in harness or connectors.

13	CHECK GEAR TOOTH	
Visually check for chipping signal plate (flywheel or drive plate) gear tooth (cog).		
OK or NG		
OK	▶	GO TO 14.
NG	▶	Replace the signal plate (flywheel or drive plate).

14	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156.		
	▶	**INSPECTION END**





Component Description

NHEC0305

The EGR temperature sensor detects temperature changes in the EGR passage way. When the EGR volume control valve opens, hot exhaust gases flow, and the temperature in the passage way changes. The EGR temperature sensor is a thermistor that modifies a voltage signal sent from the ECM. This modified signal then returns to the ECM as an input signal. As the temperature increases, EGR temperature sensor resistance decreases.
This sensor is not directly used to control the engine system. It is used only for the on board diagnosis.

<Reference data>

EGR temperature °C (°F)	Voltage* V	Resistance MΩ
0 (32)	4.61	0.68 - 1.11
50 (122)	2.53	0.09 - 0.12
100 (212)	0.87	0.017 - 0.024

*: These data are reference values and are measured between ECM terminal 74 (EGR temperature sensor) and body ground.

When EGR system is operating.

Voltage: 0 - 1.5V

CAUTION:

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

On Board Diagnosis Logic

NHEC0306

Malfunction is detected when
(Malfunction A) an excessively low voltage from the EGR temperature sensor is sent to ECM even when engine coolant temperature is low,
(Malfunction B) an excessively high voltage from the EGR temperature sensor is sent to ECM even when engine coolant temperature is high.

Possible Cause

NHEC0583

MALFUNCTION A

NHEC0583S02

- Harness or connectors (The EGR temperature sensor circuit is shorted.)
- EGR temperature sensor
- Malfunction of EGR function

MALFUNCTION B

NHEC0583S03

- Harness or connectors (The EGR temperature sensor circuit is open.)
- EGR temperature sensor

- Malfunction of EGR function

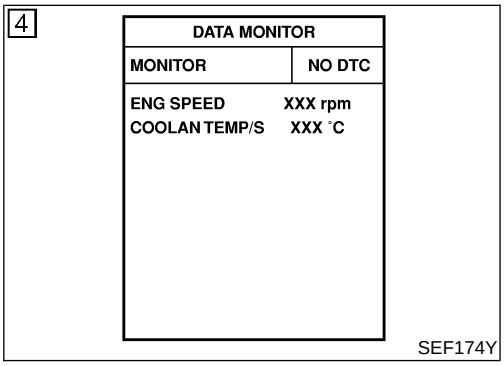
DTC Confirmation Procedure

NHEC0307

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 10 seconds before conducting the next test.



PROCEDURE FOR MALFUNCTION A

NHEC0307S01

With CONSULT-II

NHEC0307S0101

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Verify that "COOLAN TEMP/S" 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-566.

With GST

NHEC0307S0102

Follow the procedure "With CONSULT-II" above.

DTC Confirmation Procedure (Cont'd)

4

ACTIVE TEST	
EGR VOL CONT/V	50 step
MONITOR	
ENG SPEED	XXX rpm
EGR TEMP SEN	XXX V

SEF200Y

6

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h
THRTL POS SEN	XXX V
B/FUEL SCHDL	XXX msec

SEF201Y

PROCEDURE FOR MALFUNCTION B

NHEC0307S02

CAUTION:

Always drive vehicle at a safe speed.

TESTING CONDITION:

Always perform the test at a temperature above –10°C (14°F).

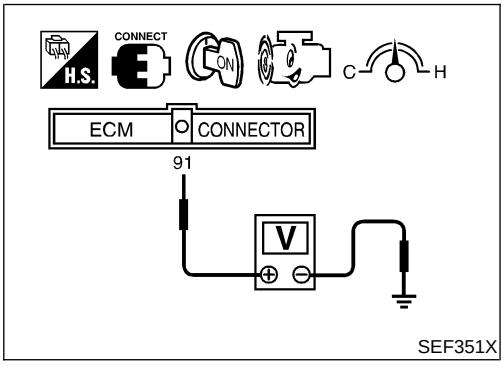
With CONSULT-II

NHEC0307S0201

1) Start engine and warm it up to normal operating temperature.
2) Select "EGR VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II.
3) Hold engine speed at 1,500 rpm.
4) Touch "Qu" and set the EGR volume control valve opening to 50 step and check EGR TEMP SEN.
   EGR TEMP SEN should decrease to less than 1.0V.
   If the check result is NG, go to "Diagnostic Procedure", EC-566.
   If the check result is OK, go to the following step.
5) Turn ignition switch "OFF" and wait at least 10 seconds.
6) Start engine and maintain the following conditions for at least 5 consecutive seconds.

ENG SPEED	1,200 - 2,400 rpm
VHCL SPEED SE	10 km/h (6 MPH) or more
B/FUEL SCHDL	More than 4 msec
THRTL POS SEN	0.65 - 1.08V
Selector lever	Suitable position

7) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-566.



SEF351X

With GST

NHEC0307S0202

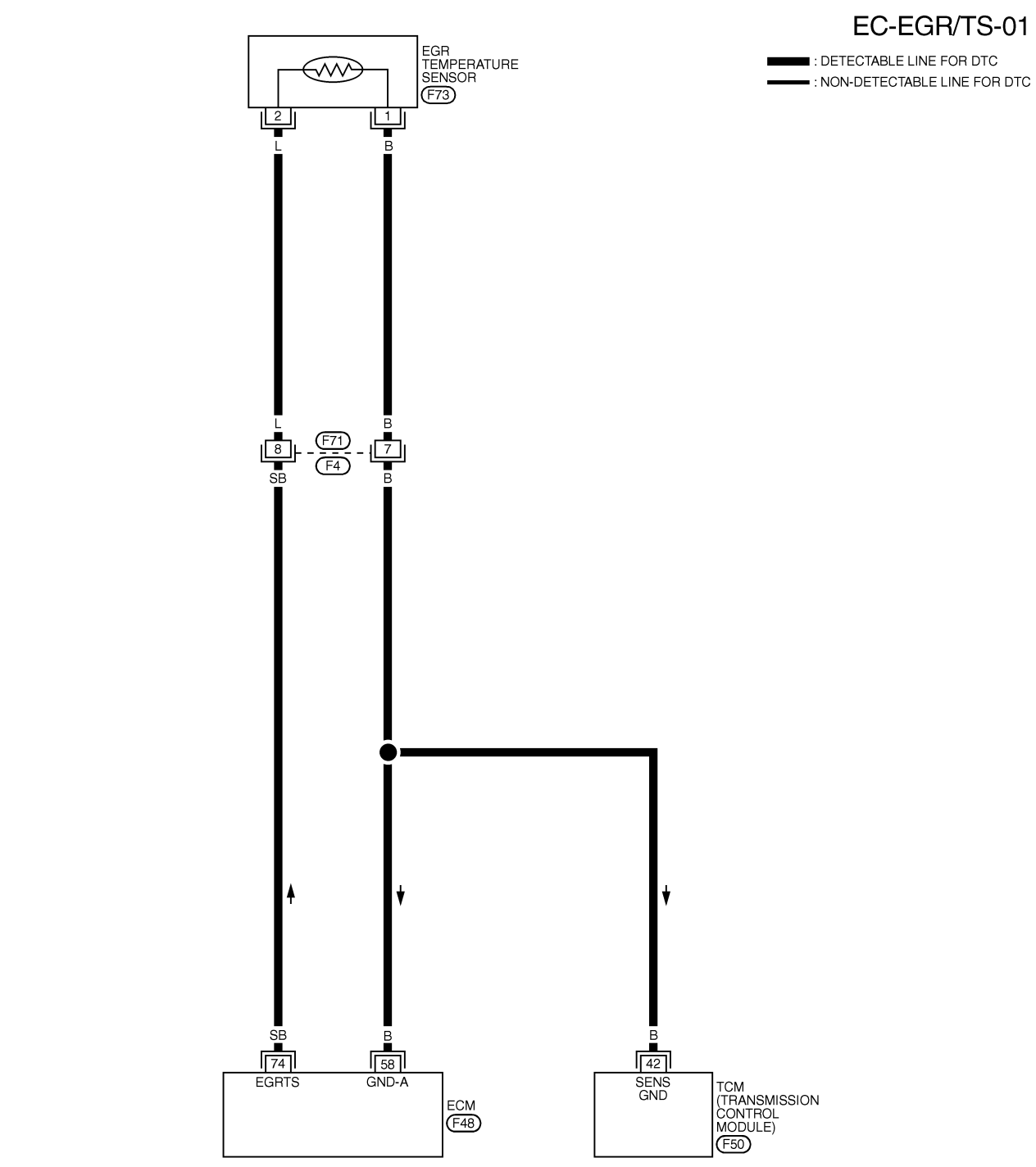
1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 10 seconds, then turn "ON".
3) Select "MODE 1" with GST and maintain the following conditions for at least 5 consecutive seconds.

Engine speed	1,200 - 2,400 rpm
Vehicle speed	10 km/h (6 MPH) or more
Voltage between ECM terminal 91 and ground	0.65 - 1.08V
Selector lever	Suitable position

4) Select "MODE 7" with GST.
5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-566.

Wiring Diagram

NHEC0309



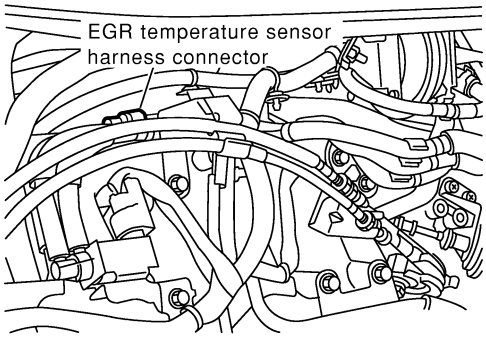
MEC011D

Diagnostic Procedure

NHEC0310

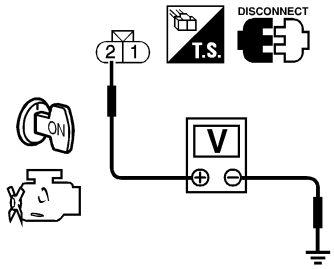
1	CHECK EGR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect EGR temperature sensor harness connector.



SEF277X

3. Turn ignition switch “ON”.
4. Check voltage between EGR temperature sensor terminal 2 and ground with CONSULT-II or tester.



Voltage: Approximately 5V

SEF896X

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F4, F71
- Harness for open or short between ECM and EGR temperature sensor

	▶	Repair or replace harness or connectors.

3	CHECK EGR TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Check harness continuity between EGR temperature sensor terminal 1 and engine ground. Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to ground or short to power.

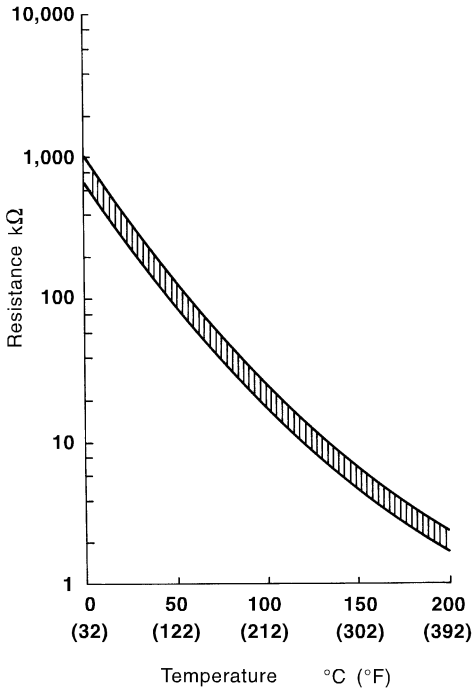
OK or NG

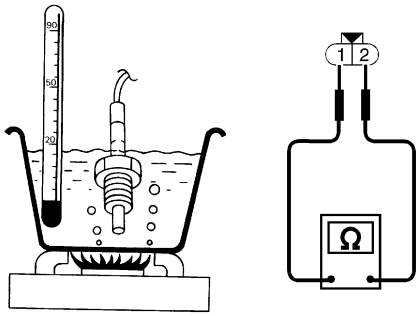
OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors F4, F71 ● Harness for open or short between ECM and EGR temperature sensor ● Harness for open or short between TCM (Transmission Control Module) and EGR temperature sensor	
▶	Repair open circuit or short to ground or short to power in harness or connector.

5	CHECK EGR TEMPERATURE SENSOR

1. Remove EGR temperature sensor.
2. Check resistance between EGR temperature sensor terminals 1 and 2 under the following conditions.





<Reference data>

EGR temperature °C (°F)	Voltage V	Resistance MΩ
0 (32)	4.61	0.68 - 1.11
50 (122)	2.53	0.09 - 0.12
100 (212)	0.87	0.017 - 0.024

SEF353X

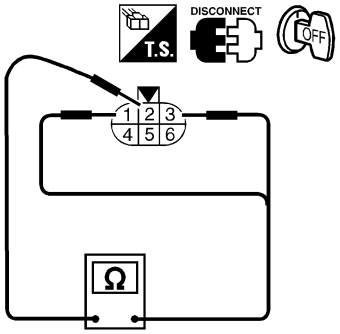
OK or NG

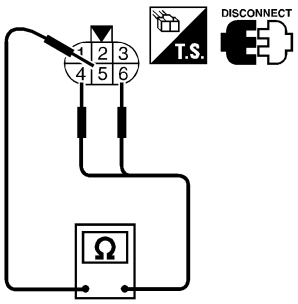
OK	▶	GO TO 6.
NG	▶	Replace EGR temperature sensor.

Diagnostic Procedure (Cont'd)

6	CHECK EGR VOLUME CONTROL VALVE-I

1. Disconnect EGR volume control valve.
2. Check resistance between EGR volume control valve terminal 2 and terminals 1, 3, terminal 5 and terminals 4, 6.





Resistance:
20.9 - 23.1 Ω [At 20°C (68°F)]

SEF588X

OK or NG

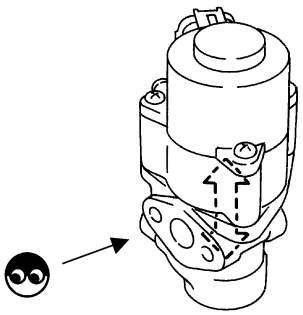
OK (With CONSULT-II)	▶	GO TO 7.
OK (Without CONSULT-II)	▶	GO TO 8.
NG	▶	Replace EGR volume control valve.

7	CHECK EGR VOLUME CONTROL VALVE-II

With CONSULT-II

1. Remove EGR volume control valve.
2. Reconnect ECM harness connector and EGR volume control valve harness connector.
3. Turn ignition switch ON.
4. Perform "EGR VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II.
5. Check that EGR volume control valve shaft moves smoothly forward and backward according to the valve opening steps.

ACTIVE TEST	
EGR VOL CONT/V	20 step
MONITOR	
ENG SPEED	XXX rpm



SEF067Y

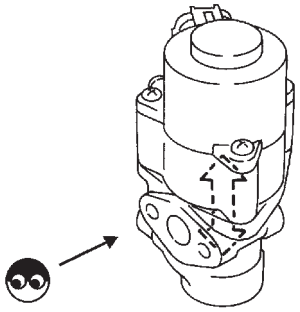
OK or NG

OK	▶	GO TO 9.
NG	▶	Replace EGR volume control valve.

8	CHECK EGR VOLUME CONTROL VALVE-II

Without CONSULT-II

1. Remove EGR volume control valve.
2. Reconnect ECM harness connector and EGR volume control valve harness connector.
3. Turn ignition switch ON and OFF.
4. Check that EGR volume control valve shaft moves smoothly forward and backward according to the ignition switch position.



SEF560W

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace EGR volume control valve.

9	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156.	
▶	**INSPECTION END**

Description

NHEC0311

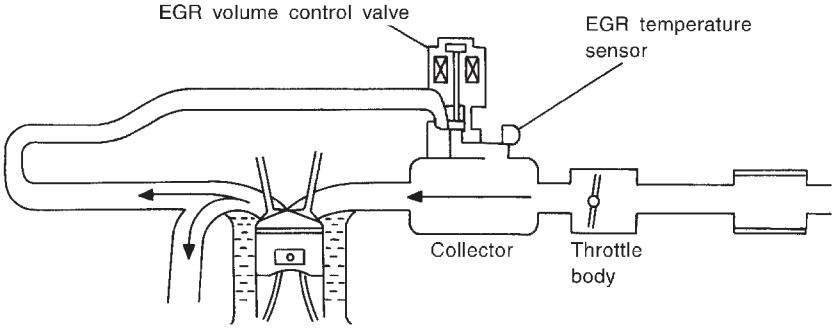
SYSTEM DESCRIPTION

NHEC0311S01

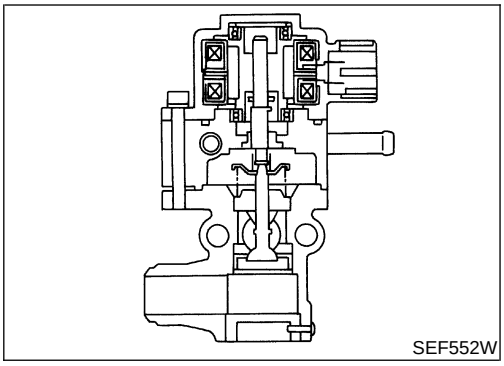
Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed (POS signal)	EGR volume control	EGR volume control valve
Crankshaft position sensor (REF)	Engine speed (REF signal)		
Vehicle speed sensor	Vehicle speed		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		
Battery	Battery voltage		
Mass air flow sensor	Amount of intake air		
Air conditioner switch	Air conditioner operation		
Power steering oil pressure switch	Power steering load signal		
Electrical load	Electrical load signal		
Park/Neutral position switch	Park/Neutral position		
TCM (Transmission Control Module)	Gear position, shifting signal		

This system controls flow rate of EGR led from exhaust manifold to intake manifold. The opening of the EGR by-pass passage in the EGR 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. The EGR volume control valve remains close under the following conditions.

- Engine stopped
- Engine starting
- Engine idling
- Low engine coolant temperature
- Excessively high engine coolant temperature
- High engine speed
- Wide open throttle
- Low battery voltage



SEF551W


SEF552W

COMPONENT DESCRIPTION

NHEC0311S02

EGR Volume Control Valve

NHEC0311S0203

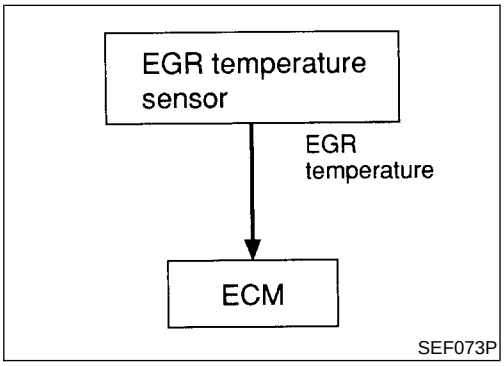
The EGR volume control valve uses a step motor to control the flow rate of EGR from exhaust manifold. This motor has four winding phases. It operates according to the output pulse signal of the ECM. Two windings are turned ON and OFF in sequence. Each time an ON pulse is issued, the valve opens or closes, 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-II Reference Value in Data Monitor Mode

NHEC0584

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
EGR TEMP SEN	• Engine: After warming up		Less than 4.5V
EGR VOL CON/V	• Engine: After warming up • Air conditioner switch: "OFF" • Shift lever: "N" • No-load	Idle	0 step
		Revving engine up to 3,000 rpm quickly	10 - 55 step



SEF073P

On Board Diagnosis Logic

NHEC0312

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

Malfunction is detected when EGR flow is detected under condition that does not call for EGR.

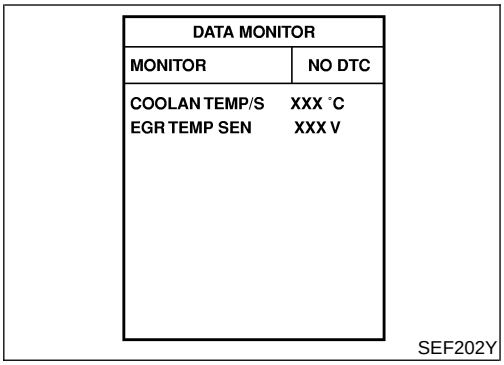
NOTE:

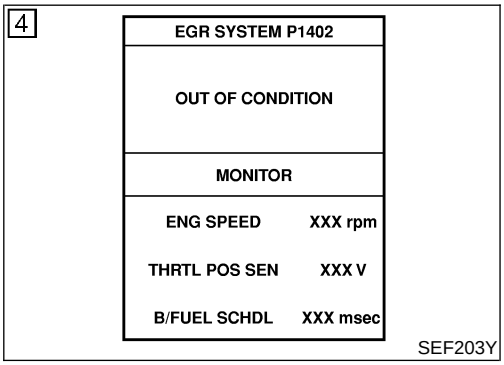
Diagnosis for this DTC will occur when engine coolant temperature is below 50 to 60°C (122 to 140°F). Therefore, it will be better to turn ignition switch "ON" (start engine) at the engine coolant temperature below 30°C (86°F) when starting DTC confirmation procedure.

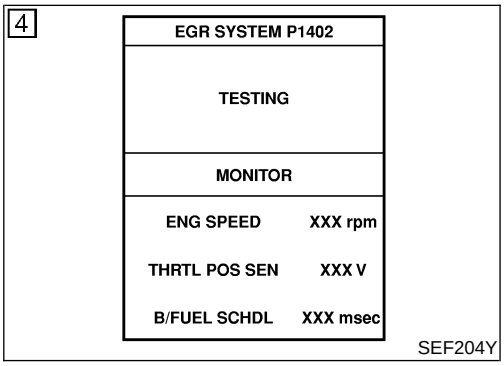
Possible Cause

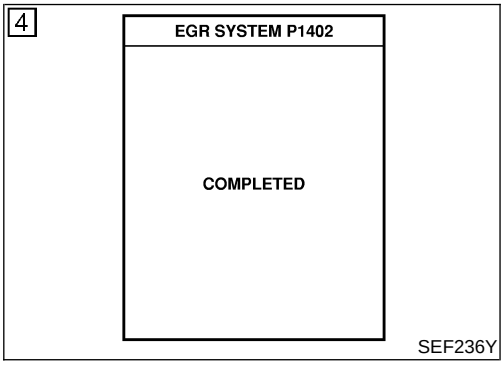
NHEC0586

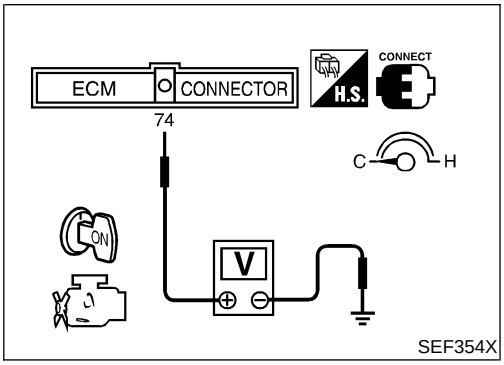
- Harness or connectors
  (EGR volume control valve circuit is open or shorted.)
- EGR volume control valve leaking or stuck open
- EGR temperature sensor
- EGRC-BPT valve











DTC Confirmation Procedure

NHEC0313

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

- **Always perform the test at a temperature above −10°C (14°F).**
- **Engine coolant temperature and EGR temperature must be verified in "DATA MONITOR" mode with CONSULT-II before starting DTC WORK SUPPORT test. If it is out of range below, the test cannot be conducted.**

  COOLAN TEMP/S: −10 to 35°C (14 to 95°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 temperature or EGR temperature with a fan or means other than ambient air. Doing so may produce an inaccurate diagnostic result.

*: Although CONSULT-II screen displays "–10 to 40°C (14 to 104°F)" as a range of engine coolant temperature, ignore it.

WITH CONSULT-II

NHEC0313S01

1) Turn ignition switch "OFF", and wait at least 10 seconds, and then turn "ON".
2) Select "EGR SYSTEM P1402" of "EGR SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
3) Touch "START".
4) Start engine and let it idle until "TESTING" on CONSULT-II screen is turned to "COMPLETED". (It will take 80 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 35°C (14 to 95°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-574.

WITH GST

NHEC0313S02

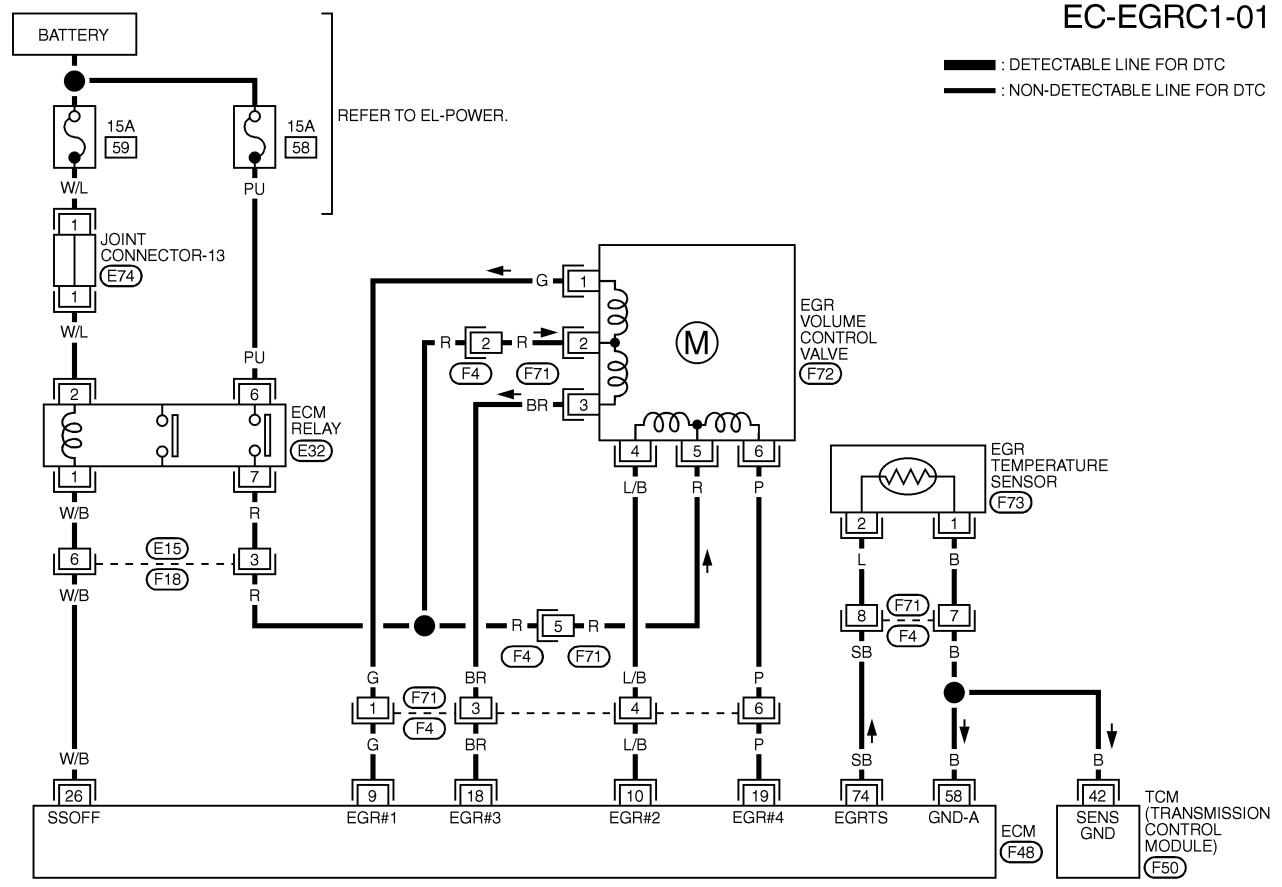
1) Turn ignition switch "ON" and select "MODE 1" with GST.
2) Check that engine coolant temperature is within the range of −10 to 35°C (14 to 95°F).
3) Check that voltage between ECM terminal 74 (EGR temperature sensor signal) and ground is less than 4.8V.
4) Start engine and let it idle for at least 80 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-574.

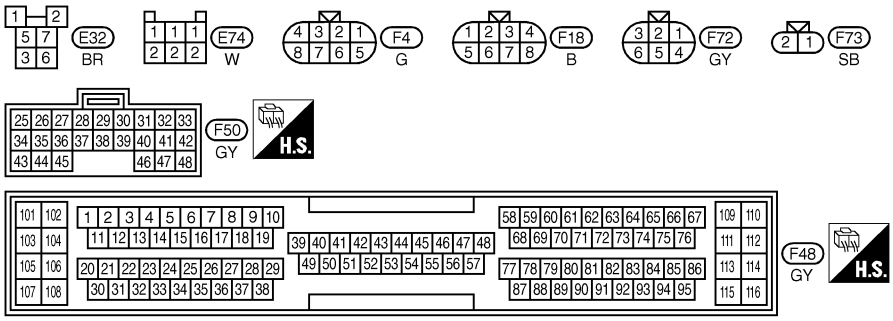
- **When using GST, "DTC Confirmation Procedure" should be performed twice as much as when using CONSULT-II because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II is recommended.**

Wiring Diagram

NHEC0314

EC-EGRC1-01





MEC813C

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
9	G	EGR VOLUME CONTROL VALVE	ENGINE RUNNING AT IDLE SPEED	0.1 - 14V
10	L/B			
18	BR			
19	P			

SEF666XB

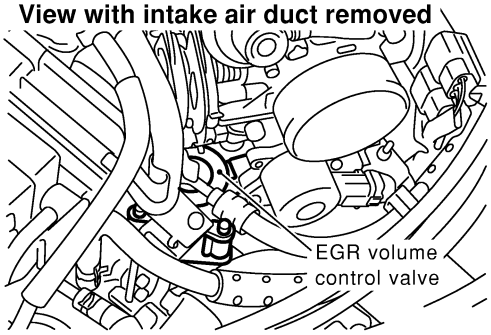
Diagnostic Procedure

NHEC0315

1	CHECK EGR VOLUME CONTROL VALVE POWER SUPPLY CIRCUIT

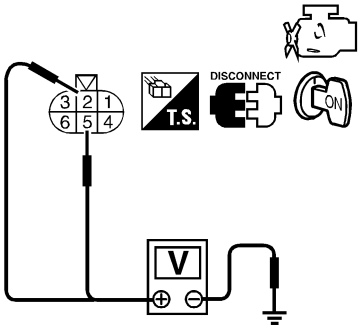
1. Disconnect EGR volume control valve harness connector.

View with intake air duct removed



SEF265X

2. Turn ignition switch ON.
3. Check voltage between EGR volume control valve terminals 2, 5 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF327X

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E15, F18
- Harness connectors F4, F71
- Harness for open or short between ECM relay and EGR volume control valve

	▶	Repair harness or connectors.

3	CHECK EGR VOLUME CONTROL VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminals and EGR volume control valve terminals as follows. Refer to Wiring Diagram.

ECM terminal	EGR volume control valve
9	1
10	4
18	3
19	6

MTBL0356

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.

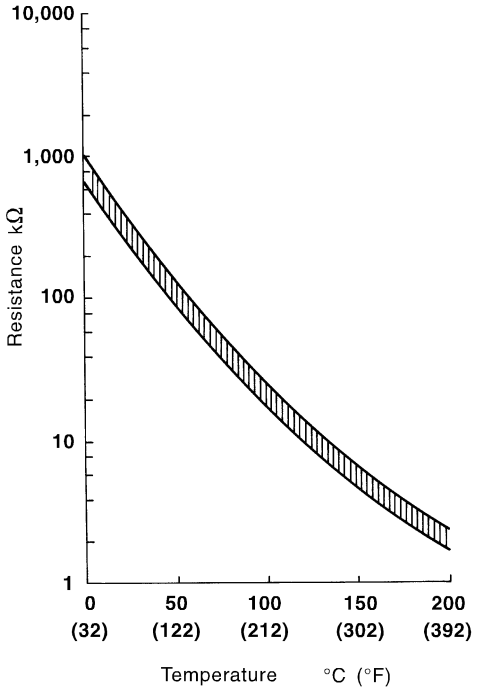
4	DETECT MALFUNCTIONING PART

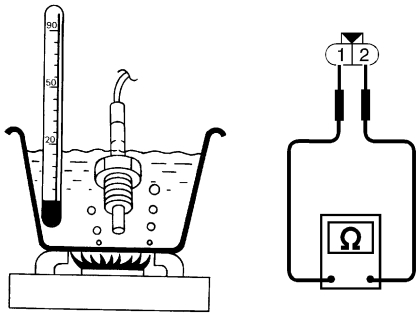
Check the following.
- Harness connectors F4, F71
- Harness for open or short between ECM and EGR volume control valve

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

5	CHECK EGR TEMPERATURE SENSOR

1. Remove EGR temperature sensor.
2. Check resistance between EGR temperature sensor terminals 1 and 2 under the following conditions.





<Reference data>

EGR temperature °C (°F)	Voltage V	Resistance MΩ
0 (32)	4.61	0.68 - 1.11
50 (122)	2.53	0.09 - 0.12
100 (212)	0.87	0.017 - 0.024

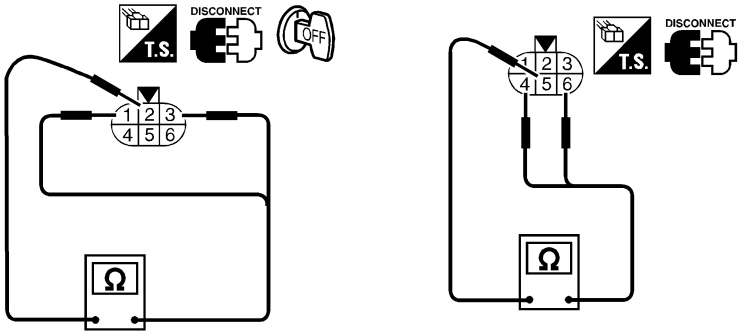
SEF353X

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace EGR temperature sensor.

6	CHECK EGR VOLUME CONTROL VALVE-I

Check resistance between EGR volume control valve terminal 2 and terminals 1, 3, terminal 5 and terminals 4, 6.



Resistance:
20.9 - 23.1 Ω [At 20°C (68°F)]

SEF588X

OK or NG

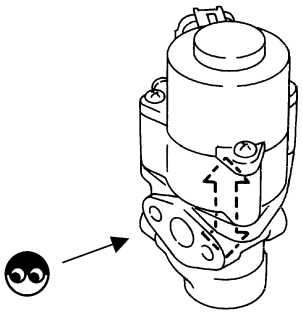
OK (With CONSULT-II)	▶	GO TO 7.
OK (Without CONSULT-II)	▶	GO TO 8.
NG	▶	Replace EGR volume control valve.

7	CHECK EGR VOLUME CONTROL VALVE-II

With CONSULT-II

1. Remove EGR volume control valve.
2. Reconnect ECM harness connector and EGR volume control valve harness connector.
3. Turn ignition switch "ON".
4. Perform "EGR VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II.
5. Check that EGR volume control valve shaft moves smoothly forward and backward according to the valve opening steps.

ACTIVE TEST	
EGR VOL CONT/V	20 step
MONITOR	
ENG SPEED	XXX rpm



SEF067Y

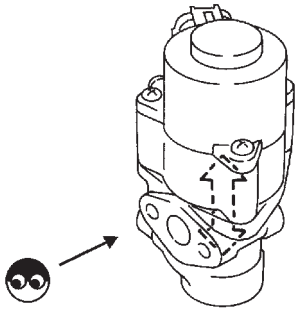
OK or NG

OK	▶	GO TO 9.
NG	▶	Replace EGR volume control valve.

8	CHECK EGR VOLUME CONTROL VALVE-II

Without CONSULT-II

1. Remove EGR volume control valve.
2. Reconnect ECM harness connector and EGR volume control valve harness connector.
3. Turn ignition switch ON and OFF.
4. Check that EGR volume control valve shaft moves smoothly forward and backward according to the ignition switch position.



SEF560W

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace EGR volume control valve.

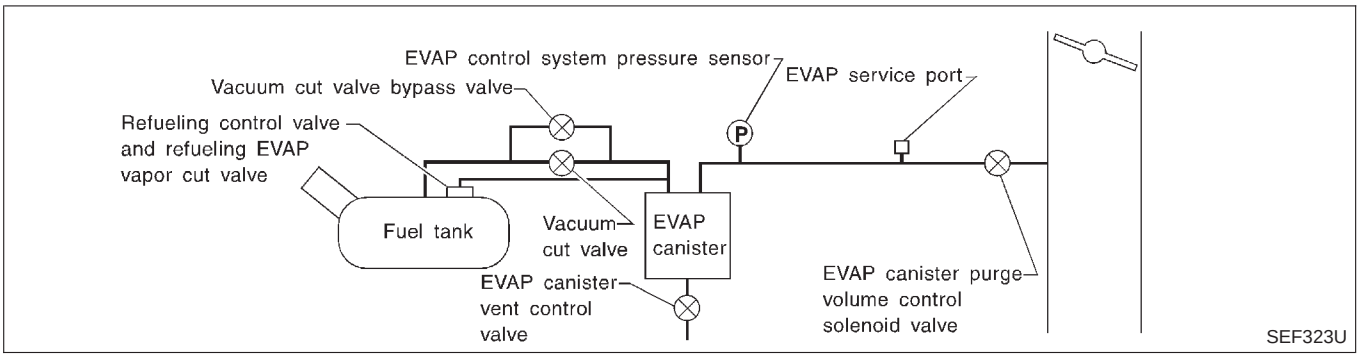
9	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156.	
▶	**INSPECTION END**

On Board Diagnosis Logic

NHEC0316

NOTE:
If DTC P1440 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-613.)

This diagnosis detects leaks in the EVAP purge line using of vapor pressure in the fuel tank.
The EVAP canister vent control valve is closed to shut the EVAP purge line. The vacuum cut valve bypass valve will then be opened to clear the line between the fuel tank and the EVAP canister purge volume control solenoid valve. The EVAP control system pressure sensor can now monitor the pressure inside the fuel tank.
If pressure increases, the ECM will check for leaks in the line between the vacuum cut valve and EVAP canister purge volume control solenoid valve.



Malfunction is detected when EVAP control system has a leak, EVAP control system does not operate properly.

CAUTION:

- **Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.**
- **If the fuel filler cap is not tightened properly, the MIL may come on.**
- **Use only a genuine NISSAN rubber tube as a replacement.**

Possible Cause

NHEC0587

- Incorrect fuel tank vacuum relief valve
- Incorrect fuel filler cap used
- Fuel filler cap remains open or fails to close.
- Foreign matter caught in fuel filler cap.
- Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.
- Foreign matter caught in EVAP canister vent control valve.
- EVAP canister or fuel tank leaks
- EVAP purge line (pipe and rubber tube) leaks

Possible Cause (Cont'd)

- EVAP purge line rubber tube bent.
- Blocked or bent rubber tube to EVAP control system pressure sensor
- Loose or disconnected rubber tube
- EVAP canister vent control valve and the circuit
- EVAP canister purge volume control solenoid valve
- Absolute pressure sensor
- Fuel tank temperature sensor
- O-ring of EVAP canister vent control valve is missing or damaged.
- Water separator
- EVAP canister is saturated with water.
- Fuel level sensor and the circuit
- EVAP control system pressure sensor
- Refueling control valve
- ORVR system leaks

DTC Confirmation Procedure

NHEC0317

Refer to "P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)", EC-390.

Diagnostic Procedure

NHEC0643

Refer to "P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)", EC-390.

Description

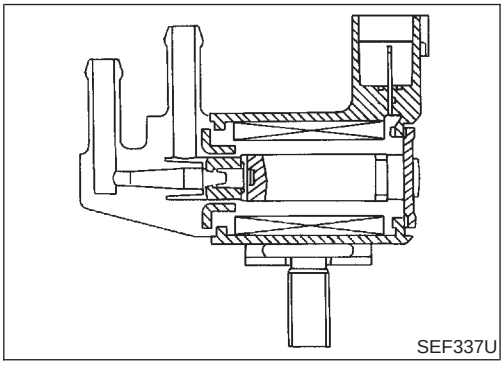
NHEC0319

SYSTEM DESCRIPTION

NHEC0319S01

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed (POS signal)	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
Crankshaft position sensor (REF)	Engine speed (REF signal)		
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		
Throttle position switch	Closed throttle position		
Front heated oxygen sensors	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Fuel tank 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 solenoid valve changes to control the flow rate. The EVAP canister purge volume control solenoid valve repeats ON/OFF operation according to the signal sent from the ECM. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions. When the engine is operating, the flow rate of fuel vapor from the EVAP canister is regulated as the air flow changes.


SEF337U

COMPONENT DESCRIPTION

NHEC0319S02

The EVAP canister purge volume control solenoid valve uses a ON/OFF duty to control the flow rate of fuel vapor from the EVAP canister. The EVAP canister purge volume control solenoid valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of fuel vapor that will flow through the valve.

CONSULT-II Reference Value in Data Monitor Mode

NHEC0320

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PURG VOL C/V	• Engine: After warming up • Air conditioner switch “OFF” • Shift lever: “N” • No-load	Idle (Vehicle stopped)	0%
		2,000 rpm	—

On Board Diagnosis Logic

NHEC0322

Malfunction is detected when the canister purge flow is detected during the specified driving conditions, even when EVAP canister purge volume control solenoid valve is completely closed.

Possible Cause

NHEC0588

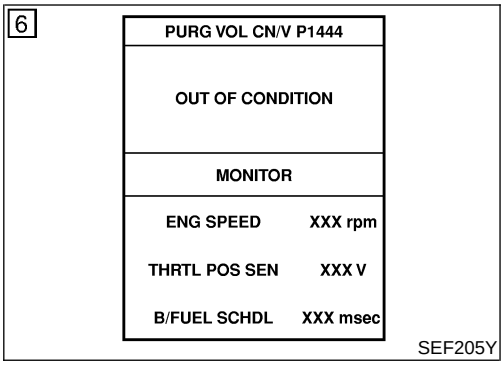
- EVAP control system pressure sensor
- EVAP canister purge volume control solenoid valve (The valve is stuck open.)
- EVAP canister vent control valve
- EVAP canister
- Hoses
  (Hoses are connected incorrectly or clogged.)

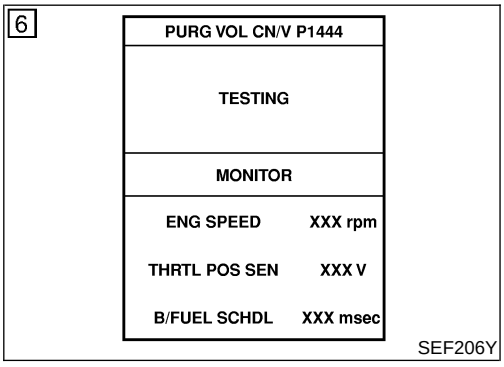
DTC Confirmation Procedure

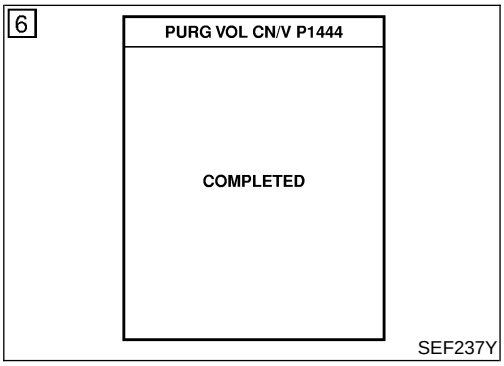
NHEC0323

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Always perform test at a temperature of 5°C (41°F) or more.







WITH CONSULT-II

NHEC0323S01

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 10 seconds.
3) Turn ignition switch "ON".
4) Select "PURG VOL CN/V P1444" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
5) Touch "START".
6) Start engine and let it idle until "TESTING" on CONSULT-II changes to "COMPLETED". (It will take for approximately 10 seconds.)
   If "TESTING" is not displayed after 5 minutes, retry from step 2.
7) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-585.

WITH GST

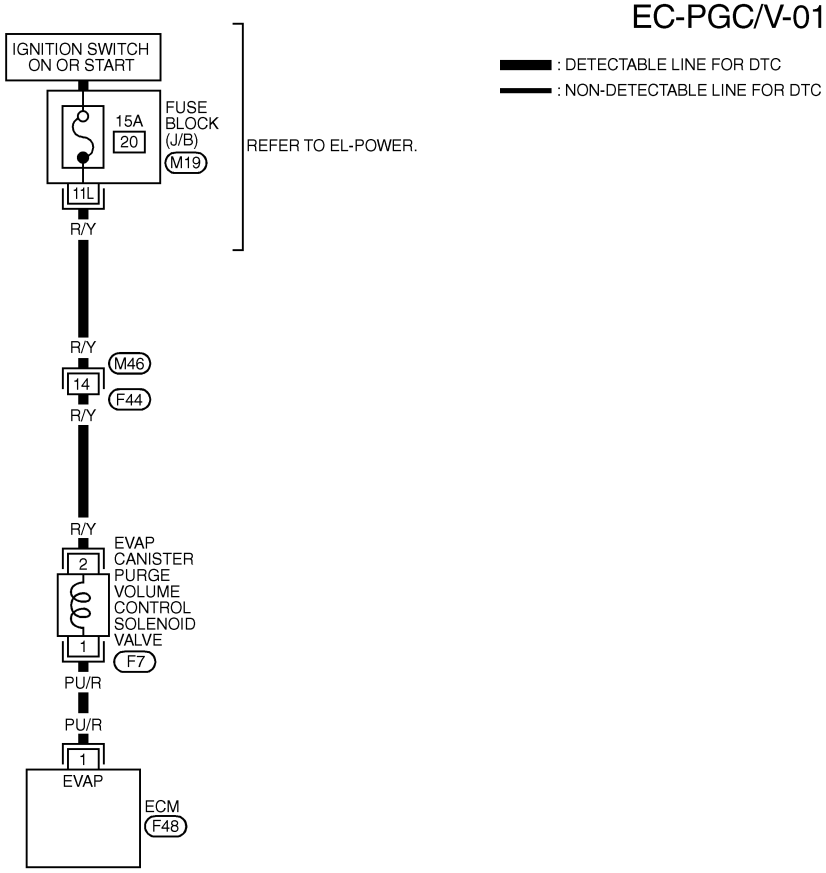
NHEC0323S02

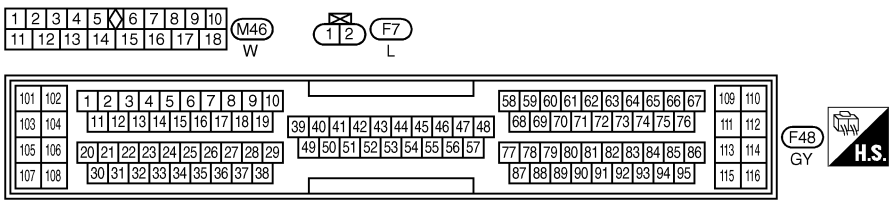
1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 10 seconds.
3) Start engine and let it idle for at least 20 seconds.
4) Select "MODE 7" with GST.
5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-585.

Wiring Diagram

NHEC0324

EC-PGC/V-01

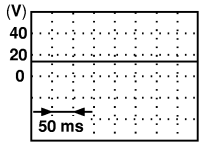
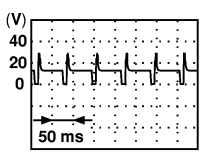




REFER TO THE FOLLOWING.
M19 -FUSE BLOCK-
JUNCTION BOX (J/B)

MEC741C

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
1	PU/R	EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE	ENGINE RUNNING AT IDLE SPEED	BATTERY VOLTAGE 
			ENGINE RUNNING AT 2,000 RPM (MORE THAN 100 SECONDS AFTER STARTING ENGINE)	BATTERY VOLTAGE 

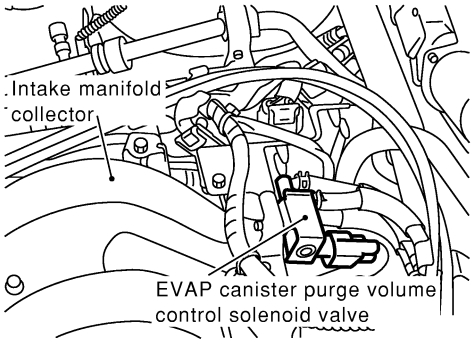
SEF858Y

Diagnostic Procedure

NHEC0325

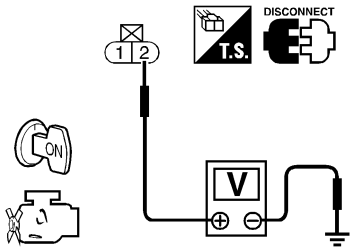
1	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.



SEF266X

3. Turn ignition switch “ON”.
4. Check voltage between EVAP canister purge volume control solenoid valve terminal 1 and engine ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF333X

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M46, F44
- Fuse block (J/B) connector M19
- 15A fuse
- Harness for open or short between EVAP canister purge volume control solenoid valve and fuse

	▶	Repair harness or connectors.

3	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

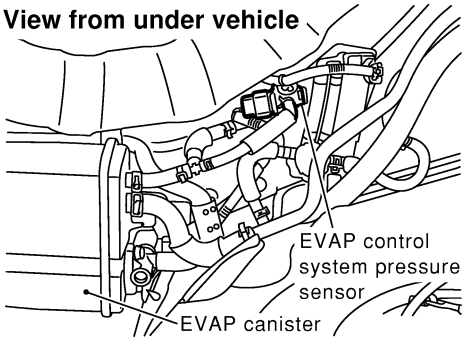
1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 1 and EVAP canister purge volume control solenoid valve terminal 2. Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

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 CONTROL SYSTEM PRESSURE SENSOR HOSE

Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.



SEF268X

OK or NG

OK	▶	GO TO 5.
NG	▶	Repair it.

5	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

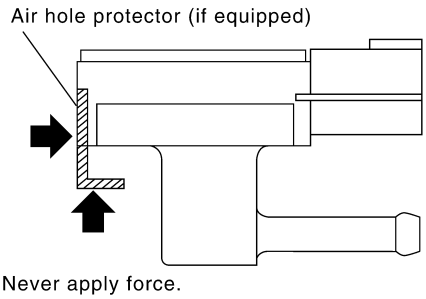
1. Disconnect EVAP control system pressure sensor harness connector.
2. Check connectors for water.
   Water should not exist.

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace EVAP control system pressure sensor.

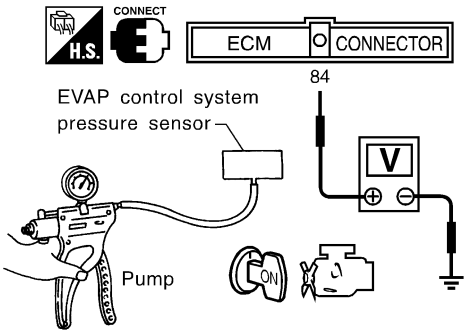
6	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.
   CAUTION:
   - **Never apply force to the air hole protector of the sensor if equipped.**



SEF799W

2. Remove hose from EVAP control system pressure sensor.
3. Turn ignition switch "ON".
4. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.
   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. Check input voltage between ECM terminal 84 and 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

SEF342X

CAUTION:
- **Discard and EVAP control system pressure sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**

OK or NG

OK (With CONSULT-II)	▶	GO TO 7.
OK (Without CONSULT-II)	▶	GO TO 8.
NG	▶	Replace EVAP control system pressure sensor.

Diagnostic Procedure (Cont'd)

7	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

1. Turn ignition switch "OFF".
2. Reconnect harness connectors disconnected.
3. Start engine.
4. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.

ACTIVE TEST	
PURG VOL CONT/V	0.0%
MONITOR	
ENG SPEED	XXX rpm
FR O2 MNTR-B1	RICH
FR O2 MNTR-B2	RICH
THRTL POS SEN	XXX V
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %

SEF068Y

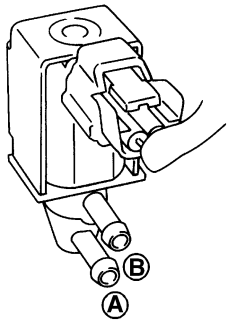
OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 8.

8	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

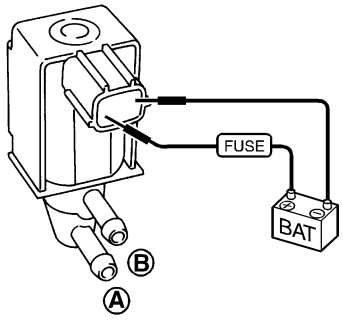


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

SEF334X

Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



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

SEF335X

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

9	CHECK RUBBER TUBE FOR CLOGGING

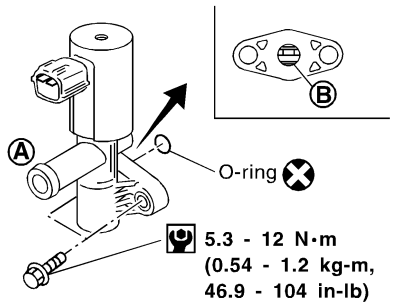
1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

OK or NG

OK	▶	GO TO 10.
NG	▶	Clean the rubber tube using an air blower.

10	CHECK EVAP CANISTER VENT CONTROL VALVE-I

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.



SEF337X

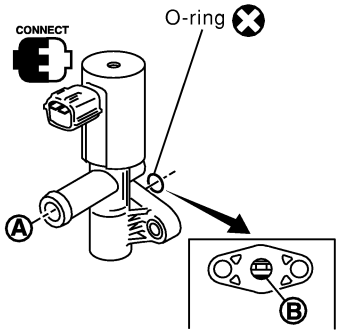
OK or NG

OK	▶	GO TO 11.
NG	▶	Replace EVAP canister vent control valve.

11	CHECK EVAP CANISTER VENT CONTROL VALVE-II

With CONSULT-II

1. Reconnect harness connectors disconnected.
2. Turn ignition switch "ON".
3. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
4. Check air passage continuity and operation delay time.



ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
FR O2 SEN-B1	XXX V
THRTL POS SEN	XXX V
A/F ALPHA-B1	XXX %

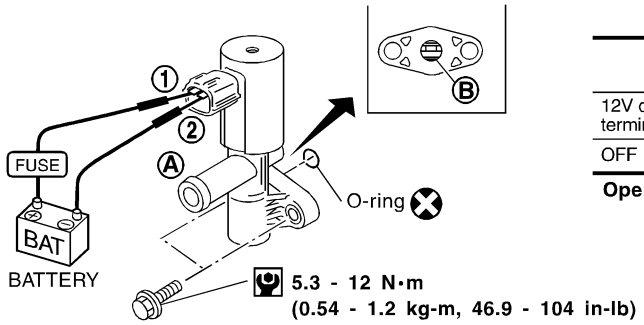
Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

SEF222Y

Without CONSULT-II

Check air passage continuity and operation delay time under the following conditions.



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

Operation takes less than 1 second.

SEF339X

Make sure new O-ring is installed properly.

OK or NG

OK	▶	GO TO 13.
NG	▶	GO TO 12.

12	CHECK EVAP CANISTER VENT CONTROL VALVE-III

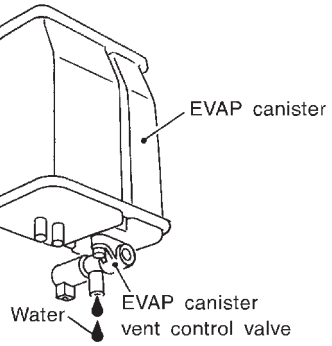
1. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
2. Perform procedure 9 again.

OK or NG

OK	▶	GO TO 13.
NG	▶	Replace EVAP canister vent control valve.

13	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 14.
No	▶	GO TO 17.

14	CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve attached.
The weight should be less than 1.8 kg (4.0 lb).

OK or NG

OK	▶	GO TO 16.
NG	▶	GO TO 15.

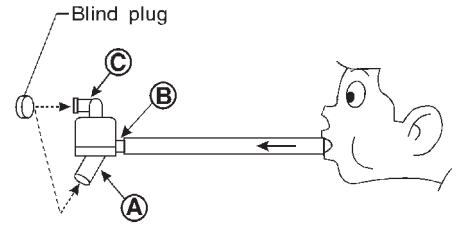
15	DETECT MALFUNCTIONING PART

Check the following.
- EVAP canister for damage
- EVAP hose between EVAP canister and water separater for clogging or poor connection

	▶	Repair hose or replace EVAP canister.

16	CHECK WATER SEPARATOR

1. Check visually for insect nests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that **A** and **C** are not clogged by blowing air into **B** with **A**, and then **C** plugged.



* Ⓐ: Bottom hole (To atmosphere)
Ⓑ: Emergency tube (From EVAP canister)
Ⓒ: Inlet port (To member)

SEF829T

5. In case of NG in items 2 - 4, replace the parts.

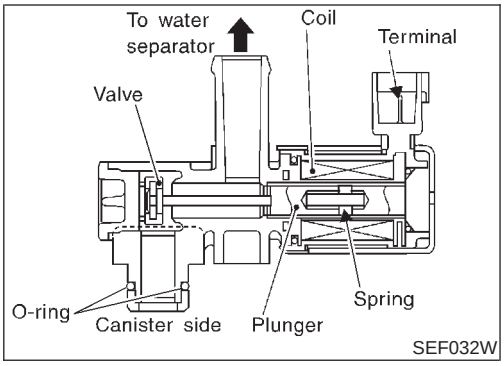
NOTE:

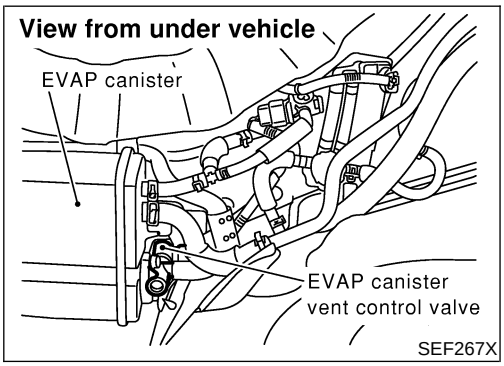
- Do not disassemble water separator.

OK or NG

OK	▶	GO TO 17.
NG	▶	Clean or replace water separator.

17	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156.	
▶	**INSPECTION END**





Component Description

NHEC0326

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

This solenoid valve responds to signals from the ECM. When the ECM sends an ON signal, the coil in the solenoid valve is energized. A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.

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

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

CONSULT-II Reference Value in Data Monitor Mode

NHEC0327

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	• Ignition switch: ON	OFF

On Board Diagnosis Logic

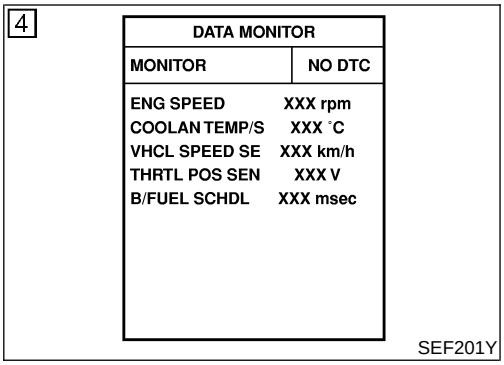
NHEC0329

Malfunction is detected when EVAP canister vent control valve remains closed under specified driving conditions.

Possible Cause

NHEC0589

- 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

NHEC0330

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 10 seconds before conducting the next test.

WITH CONSULT-II

NHEC0330S01

1) Turn ignition switch “ON”.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Start engine.
4) Drive vehicle at a speed of approximately 80 km/h (50 MPH) for a maximum of 15 minutes.

NOTE:

If a malfunction exists, NG result may be displayed quicker.

5) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-596.

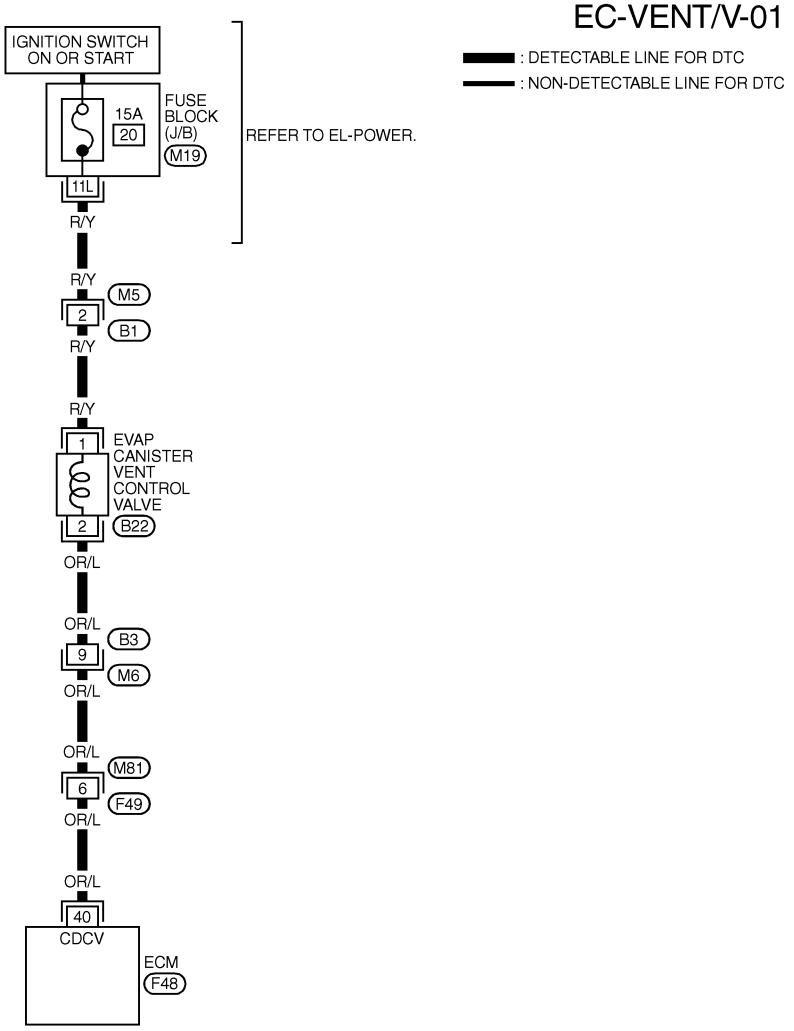
WITH GST

NHEC0330S02

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

NHEC0331



ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
40	OR/L	EVAP CANISTER VENT CONTROL VALVE	IGN ON	BATTERY VOLTAGE

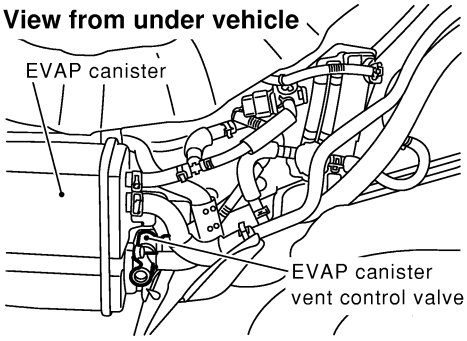
SEF668XB

Diagnostic Procedure

NHEC0332

1	CHECK RUBBER TUBE

1. Turn ignition switch “OFF”.
2. Disconnect rubber tube connected to EVAP canister vent control valve.
3. Check the rubber tube for clogging.



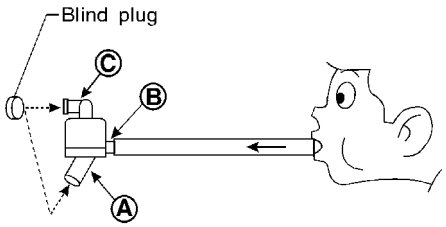
SEF267X

OK or NG

OK	▶	GO TO 2.
NG	▶	Clean rubber tube using an air blower.

2	CHECK WATER SEPARATOR

1. Check visually for insect nests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that **A** and **C** are not clogged by blowing air into **B** with **A**, and then **C** plugged.



* Ⓐ: Bottom hole (To atmosphere)
Ⓑ: Emergency tube (From EVAP canister)
Ⓒ: Inlet port (To member)

SEF829T

5. In case of NG in items 2 - 4, replace the parts.

NOTE:

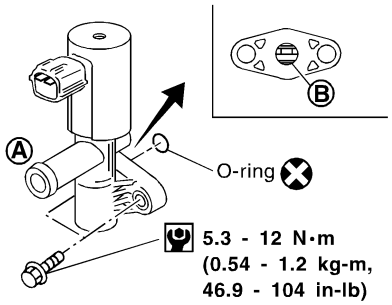
- Do not disassemble water separator.

OK or NG

OK	▶	GO TO 3.
NG	▶	Clean or replace water separator.

3	CHECK EVAP CANISTER VENT CONTROL VALVE-I

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.



SEF337X

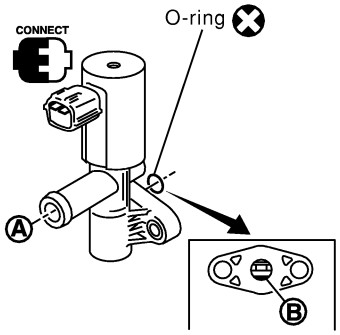
OK or NG

OK	▶	GO TO 4.
NG	▶	Replace EVAP canister vent control valve.

4	CHECK EVAP CANISTER VENT CONTROL VALVE-II

With CONSULT-II

1. Turn ignition switch ON.
2. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
3. Check air passage continuity and operation delay time.



ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
FR O2 SEN-B1	XXX V
THRTL POS SEN	XXX V
A/F ALPHA-B1	XXX %

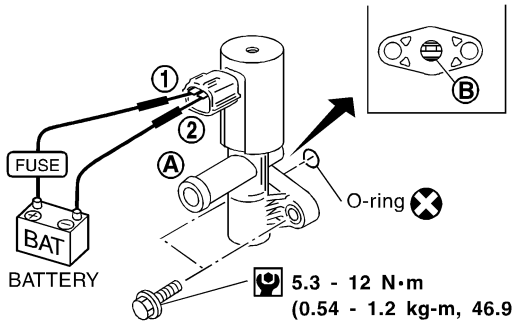
Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

SEF222Y

Without CONSULT-II

Check air passage continuity and operation delay time under the following conditions.



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

Operation takes less than 1 second.

SEF339X

Make sure new O-ring is installed properly.

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

Diagnostic Procedure (Cont'd)

5	CHECK EVAP CANISTER VENT CONTROL VALVE-III

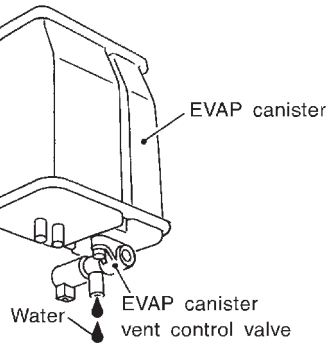
1. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
2. Perform the procedure 4 again.

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace EVAP canister vent control valve.

6	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 7.
No	▶	GO TO 9.

7	CHECK EVAP CANISTER

Weigh the EVAP canister with the 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.
- EVAP canister for damage
- EVAP hose between EVAP canister and water separator for clogging or poor connection

	▶	Repair hose or replace EVAP canister.

9	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE

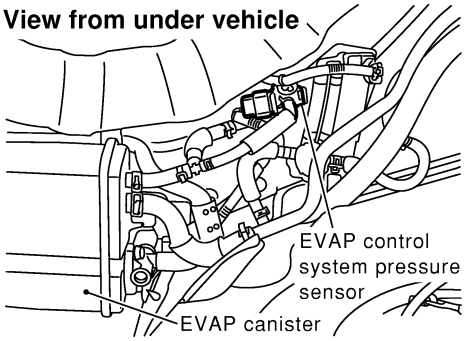
Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.

OK or NG

OK	▶	GO TO 10.
NG	▶	Repair it.

10	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.



SEF268X

2. Check connectors for water.
   Water should not exist.

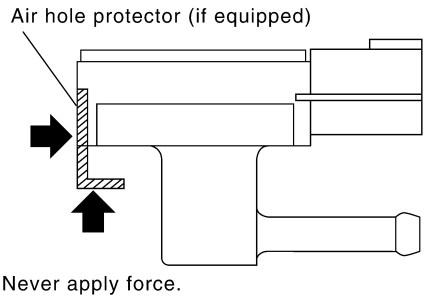
OK or NG

OK	▶	GO TO 11.
NG	▶	Replace EVAP control system pressure sensor.

Diagnostic Procedure (Cont'd)

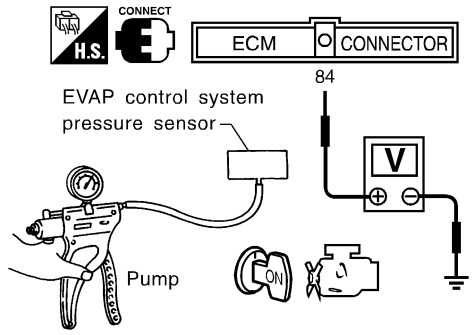
11	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.
   CAUTION:
   - **Never apply force to the air hole protector of the sensor if equipped.**



SEF799W

2. Remove hose from EVAP control system pressure sensor.
3. Turn ignition switch "ON".
4. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.
   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. Check input voltage between ECM terminal 84 and 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

SEF342X

CAUTION:
- **Discard and EVAP control system pressure sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**

OK or NG

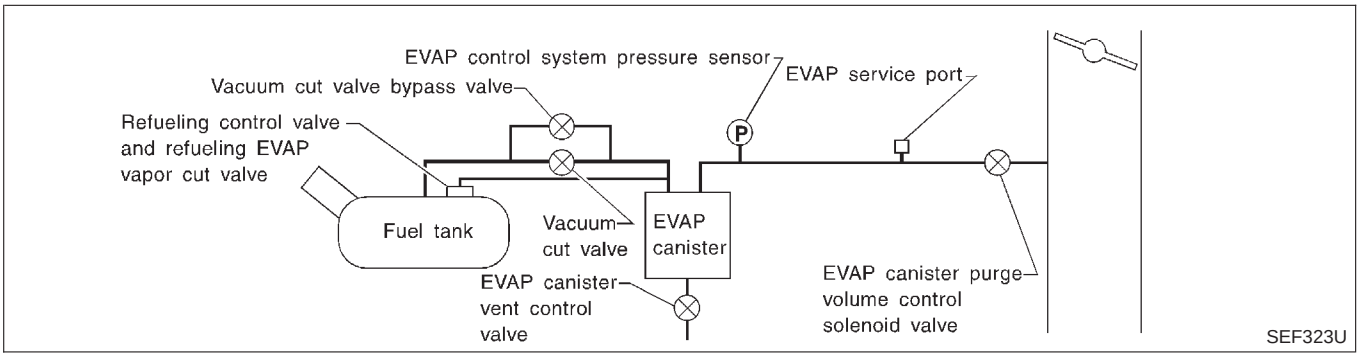
OK	▶	GO TO 12.
NG	▶	Replace EVAP control system pressure sensor.

12	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156.	
▶	**INSPECTION END**

System Description

NHEC0333

NOTE:
If DTC P1447 is displayed with P0510, perform trouble diagnosis for DTC P0510 first. (See EC-467.)



In this evaporative emission (EVAP) control system, purge flow occurs during non-closed throttle conditions. Purge volume is related to air intake volume. Under normal purge conditions (non-closed throttle), the EVAP canister purge volume control solenoid valve is open to admit purge flow. Purge flow exposes the EVAP control system pressure sensor to intake manifold vacuum.

On Board Diagnosis Logic

NHEC0334

Under normal conditions (non-closed throttle), sensor output voltage indicates if pressure drop and purge flow are adequate. If not, a fault is determined.
Malfunction is detected when EVAP control system does not operate properly, EVAP control system has a leak between intake manifold and EVAP control system pressure sensor.

Possible Cause

NHEC0590

- EVAP canister purge volume control solenoid valve stuck closed
- EVAP control system pressure sensor and the circuit
- Loose, disconnected or improper connection of rubber tube
- Blocked rubber tube
- Cracked EVAP canister
- EVAP canister purge volume control solenoid valve circuit
- Closed throttle position switch
- Blocked purge port
- EVAP canister vent control valve

5

PURG FLOW P1447	
OUT OF CONDITION	
MONITOR	
ENG SPEED	XXX rpm
THRTL POS SEN	XXX V
B/FUEL SCHDL	XXX msec

SEF207Y

6

PURG FLOW P1447	
TESTING	
MONITOR	
ENG SPEED	XXX rpm
THRTL POS SEN	XXX V
B/FUEL SCHDL	XXX msec

SEF208Y

6

PURG FLOW P1447
COMPLETED

SEF238Y

DTC Confirmation Procedure

NHEC0335

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 10 seconds before conducting the next test.

TESTING CONDITION:

Always perform test at a temperature of 5°C (41°F) or more.

WITH CONSULT-II

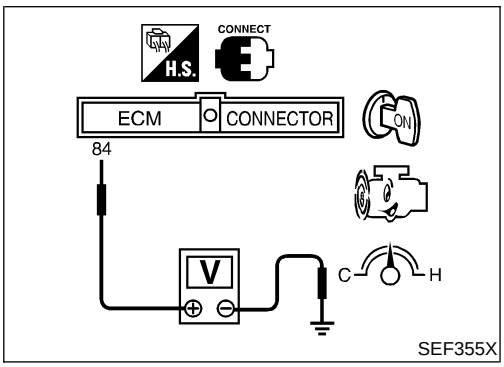
NHEC0335S01

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch “OFF” and wait at least 10 seconds.
3) Start engine and let it idle for at least 70 seconds.
4) Select “PURG FLOW P1447” of “EVAPORATIVE SYSTEM” in “DTC CONFIRMATION” mode with CONSULT-II.
5) Touch “START”.
   If “COMPLETED” is displayed, go to step 7.
6) When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take at least 35 seconds.)

Selector lever	Suitable position
Vehicle speed	32 - 120 km/h (20 - 75 MPH)
ENG SPEED	500 - 3,000 rpm
B/FUEL SCHDL	1.3 - 8.1 msec
Engine coolant temperature	70 - 100°C (158 - 212°F)

If “TESTING” is not changed for a long time, retry from step 2.

7) Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to “Diagnostic Procedure”, EC-604.



SEF355X

Overall Function Check

NHEC0336

Use this procedure to check the overall monitoring function of the EVAP control system purge flow monitoring. During this check, a 1st trip DTC might not be confirmed.

WITH GST

NHEC0336S01

1) Lift up drive wheels.
2) Start engine (TCS switch “OFF”) and warm it up to normal operating temperature.
3) Turn ignition switch “OFF”, wait at least 10 seconds.
4) Start engine and wait at least 70 seconds.

5) Set voltmeter probes to ECM terminals 84 (EVAP control system pressure sensor signal) and ground.
6) Check EVAP control system pressure sensor value at idle speed and note it.
7) Establish and maintain the following conditions for at least 1 minute.

Air conditioner switch	ON
Steering wheel	Fully turned
Headlamp switch	ON
Rear window defogger switch	ON
Engine speed	Approx. 3,000 rpm
Gear position	Any position other than "P", "N" or "R"

8) Verify that EVAP control system pressure sensor value stays 0.1V less than the value at idle speed (measured at step 6) for at least 1 second.
9) If NG, go to "Diagnostic Procedure", EC-604.

Diagnostic Procedure

=NHEC0337

1	CHECK EVAP CANISTER

1. Turn ignition switch “OFF”.
2. Check EVAP canister for cracks.

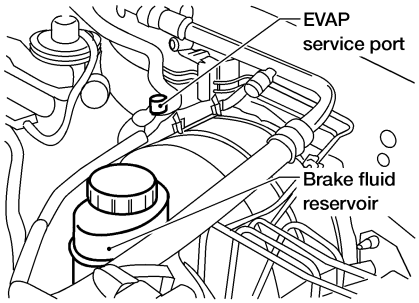
OK or NG

OK (With CONSULT-II)	▶	GO TO 2.
OK (Without CONSULT-II)	▶	GO TO 3.
NG	▶	Replace EVAP canister.

2	CHECK PURGE FLOW

With CONSULT-II

1. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge.



AEC649A

2. Start engine and let it idle.
3. Select “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-II.
4. Rev engine up to 2,000 rpm.
5. Touch “Qd” and “Qu” on CONSULT-II screen to adjust “PURG VOL CONT/V” opening and check vacuum existence.

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
FR O2 MNTR-B1	LEAN
THRTL POS SEN	XXX V
A/F ALPHA-B1	XXX %

PURG VOL CONT/V	VACUUM
100.0%	Should exist
0.0%	Should not exist

SEF225Y

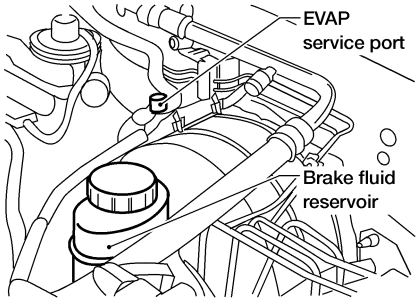
OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 4.

3	CHECK PURGE FLOW

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge.



AEC649A

4. Start engine and let it idle for at least 80 seconds.
5. Check vacuum gauge indication when revving engine up to 2,000 rpm.
   Vacuum should exist.
6. Release the accelerator pedal fully and let idle.
   Vacuum should not exist.

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 4.

4	CHECK EVAP PURGE LINE

1. Turn ignition switch "OFF".
2. Check EVAP purge line for improper connection or disconnection.
   Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-36.

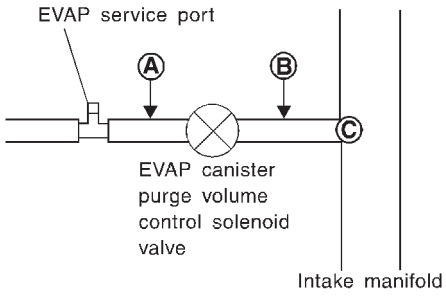
OK or NG

OK (With CONSULT-II)	▶	GO TO 5.
OK (Without CONSULT-II)	▶	GO TO 6.
NG	▶	Repair it.

Diagnostic Procedure (Cont'd)

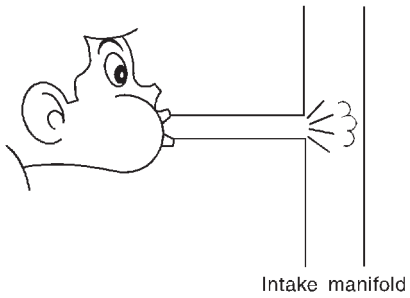
5	CHECK EVAP PURGE HOSE AND PURGE PORT

1. Disconnect purge hoses connected to EVAP service port **A** and EVAP canister purge volume control solenoid valve **B**.



SEF367U

2. Blow air into each hose and EVAP purge port **C**.
3. Check that air flows freely.



SEF368U

OK or NG

OK	▶	GO TO 6.
NG	▶	Repair or clean hoses and/or purge port.

6	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

1. Start engine.
2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.

ACTIVE TEST	
PURG VOL CONT/V	0.0%
MONITOR	
ENG SPEED	XXX rpm
FR O2 MNTR-B1	RICH
FR O2 MNTR-B2	RICH
THRTL POS SEN	XXX V
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %

SEF068Y

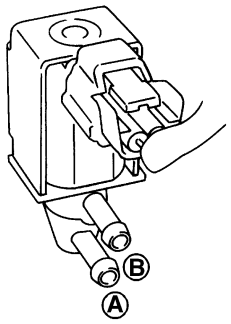
OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

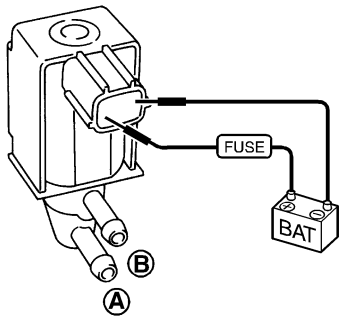


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

SEF334X

Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



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

SEF335X

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace EVAP canister purge volume control solenoid 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.

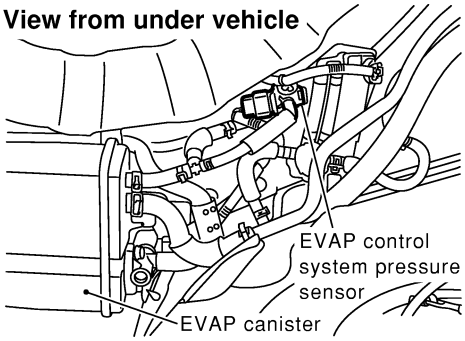
OK or NG

OK	▶	GO TO 9.
NG	▶	Repair it.

Diagnostic Procedure (Cont'd)

9	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.



SEF268X

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-420.

OK or NG

OK	▶	GO TO 11.
NG	▶	Replace EVAP control system pressure sensor.

11	CHECK RUBBER TUBE FOR CLOGGING

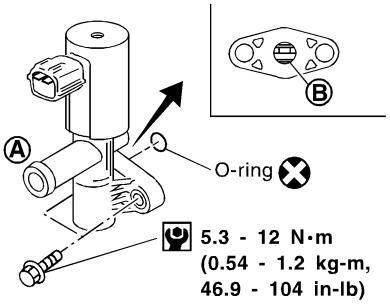
1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

OK or NG

OK	▶	GO TO 12.
NG	▶	Clean the rubber tube using an air blower.

12	CHECK EVAP CANISTER VENT CONTROL VALVE-I

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.



SEF337X

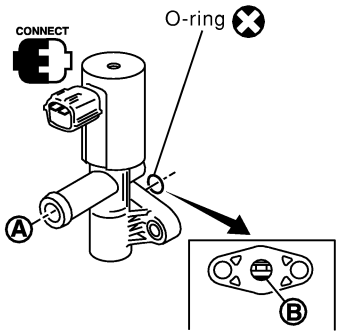
OK or NG

OK	▶	GO TO 13.
NG	▶	Replace EVAP canister vent control valve.

13	CHECK EVAP CANISTER VENT CONTROL VALVE-II

With CONSULT-II

1. Reconnect harness connectors disconnected.
2. Turn ignition switch "ON".
3. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
4. Check air passage continuity and operation delay time.



ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
FR O2 SEN-B1	XXX V
THRTL POS SEN	XXX V
A/F ALPHA-B1	XXX %

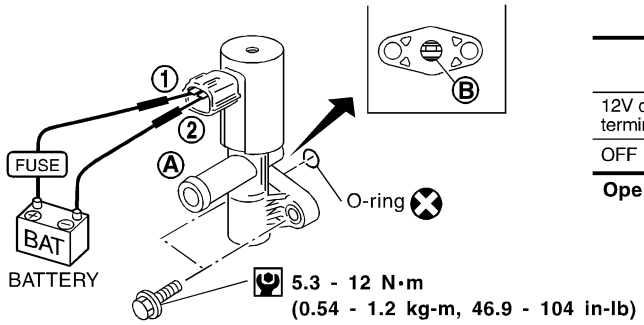
Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

SEF222Y

Without CONSULT-II

Check air passage continuity and operation delay time under the following conditions.



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

Operation takes less than 1 second.

SEF339X

Make sure new O-ring is installed properly.

OK or NG

OK	▶	GO TO 15.
NG	▶	GO TO 14.

14	CHECK EVAP CANISTER VENT CONTROL VALVE-III

1. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
2. Perform Test No. 13 again.

OK or NG

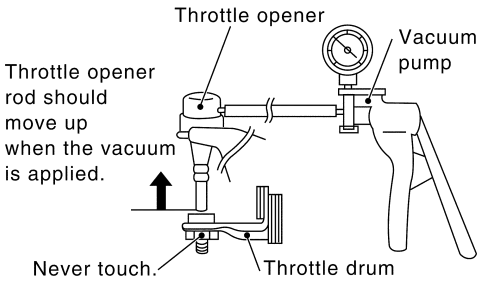
OK (With CONSULT-II)	▶	GO TO 15.
OK (Without CONSULT-II)	▶	GO TO 16.
NG	▶	Replace EVAP canister vent control valve.

Diagnostic Procedure (Cont'd)

15	CHECK THROTTLE POSITION SWITCH

With CONSULT-II

1. Install all removed parts.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch "OFF".
4. Remove vacuum hose connected to throttle opener.
5. Connect suitable vacuum hose to vacuum pump and the throttle opener.
6. Apply vacuum [more than −40.0 kPa (−300 mmHg, −11.81 inHg)] until the throttle drum becomes free from the rod of the throttle opener.



SEF793W

7. Turn ignition switch "ON".
8. Select "DATA MONITOR" mode with CONSULT-II.
9. Check indication of "CLSD THL/P SW" under the following conditions.
   Measurement must be made with throttle position switch installed in vehicle.

Throttle valve conditions	CLSD THL/P SW
Completely closed	ON
Partially open or completely open	OFF

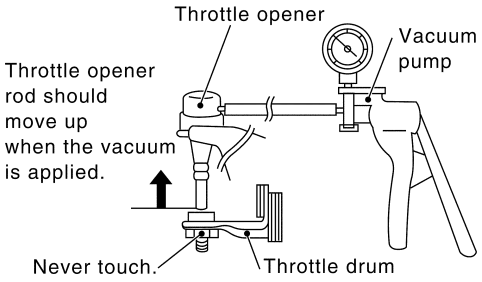
MTBL0355

OK or NG

OK	▶	GO TO 18.
NG	▶	GO TO 17.

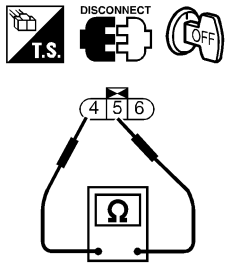
16 CHECK THROTTLE POSITION SWITCH

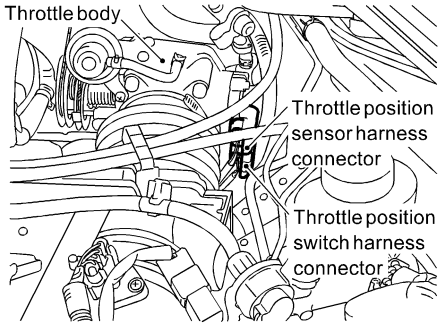
1. Install all removed parts.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch "OFF".
4. Remove vacuum hose connected to throttle opener.
5. Connect suitable vacuum hose to vacuum pump and the throttle opener.
6. Apply vacuum [more than −40.0 kPa (−300 mmHg, −11.81 inHg)] until the throttle drum becomes free from the rod of the throttle opener.



SEF793W

7. Disconnect closed throttle position switch harness connector.
8. Check continuity between closed throttle position switch terminals 4 and 5 under the following conditions. Resistance measurement must be made with throttle position switch installed in vehicle.





Throttle valve conditions	Continuity
Completely closed	Yes
Partially open or completely open	No

SEF347X

OK or NG

OK	▶	GO TO 18.
NG	▶	GO TO 17.

17 ADJUST THROTTLE POSITION SWITCH

Check the following items. Refer to "Basic Inspection", EC-110.

Items	Specifications
Ignition timing	15° ± 2° BTDC
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.05 mm (0.0020 in): ON 0.15 mm (0.0059 in): OFF
Target idle speed	700 ± 50 rpm (in "P" or "N" position)

MTBL0382

Is it possible to adjust closed throttle position switch?

Yes or No

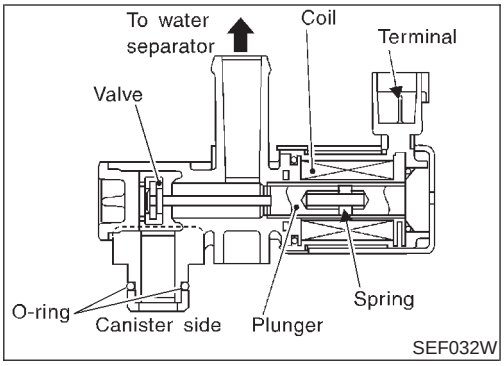
Yes	▶	GO TO 18.
No	▶	Replace throttle position switch.

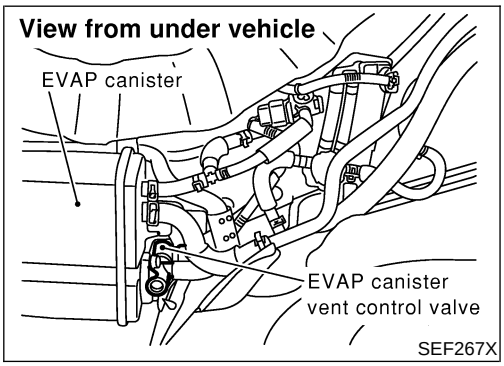
Diagnostic Procedure (Cont'd)

18	CHECK EVAP PURGE LINE	
Inspect EVAP purge line (pipe and rubber tube). Check for evidence of leaks. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-36.		
OK or NG		
OK	▶	GO TO 19.
NG	▶	Replace it.

19	CLEAN EVAP PURGE LINE	
Clean EVAP purge line (pipe and rubber tube) using air blower.		
	▶	GO TO 20.

20	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156.		
	▶	**INSPECTION END**





Component Description

NHEC0338

NOTE:
If DTC P1448 is displayed with P0440, 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 valve responds to signals from the ECM. When the ECM sends an ON signal, the coil in the solenoid valve is energized. A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.

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

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

CONSULT-II Reference Value in Data Monitor Mode

NHEC0339

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	• Ignition switch: ON	OFF

On Board Diagnosis Logic

NHEC0341

Malfunction is detected when EVAP canister vent control valve remains opened under specified driving conditions.

Possible Cause

NHEC0591

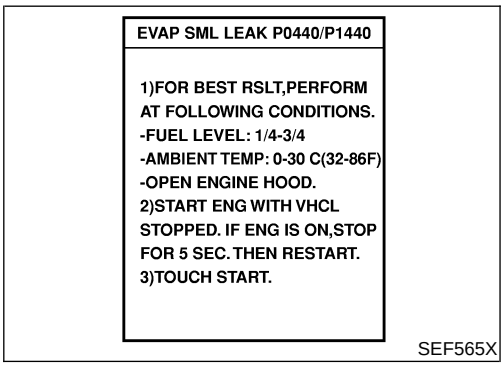
- EVAP canister vent control valve
- EVAP control system pressure sensor and circuit
- Blocked rubber tube to EVAP canister vent control valve
- Water separator
- EVAP canister is saturated with water.
- Vacuum cut valve

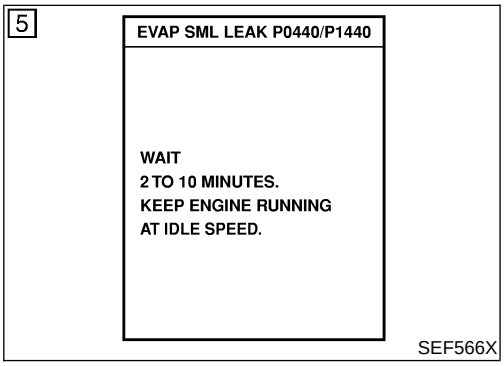
DTC Confirmation Procedure

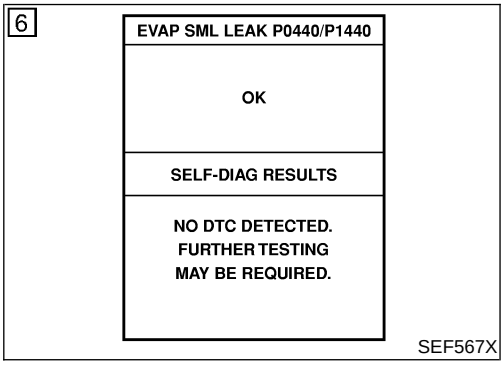
NHEC0342

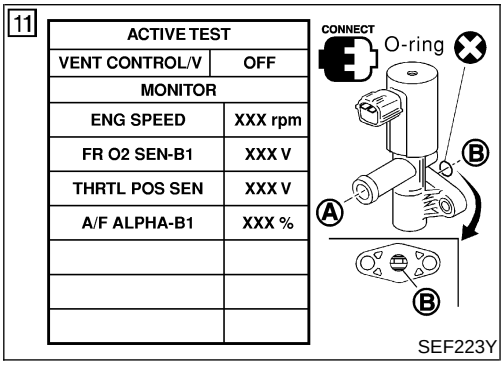
NOTE:

- **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 10 seconds before conducting the next test.









WITH CONSULT-II

NHEC0342S01

TESTING CONDITION:

- **Perform "DTC WORK SUPPORT" when the fuel level is between 1/4 to 3/4 full and vehicle is placed on flat level surface.**
- **Always perform test at a temperature of 0 to 30°C (32 to 86°F).**

1) Turn ignition switch "ON".
2) Turn ignition switch "OFF" and wait at least 10 seconds.
3) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
4) Make sure that the following conditions are met.

COOLAN TEMP/S	0 - 70°C (32 - 158°F)
INT/A TEMP SE	0 - 30°C (32 - 86°F)

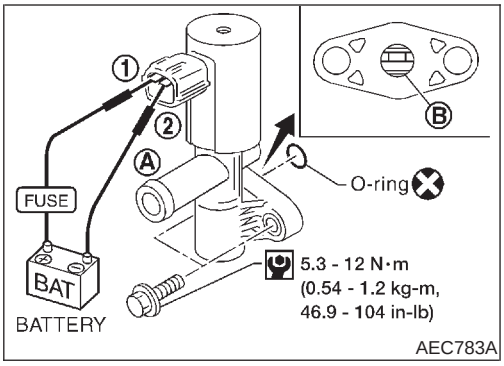
5) Select "EVAP SML LEAK P0440/P1440" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
   Follow the instruction displayed.
   If the engine speed cannot be maintained within the range displayed on the CONSULT-II screen, go to "Basic Inspection", EC-110.
6) Make sure that "OK" is displayed.
   If "NG" is displayed, go to the following step.

NOTE:
Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.

7) Stop engine and wait at least 10 seconds, then turn "ON".
8) Disconnect hose from water separator.
9) Select "VENT CONTROL/V" of "ACTIVE TEST" mode with CONSULT-II.
10) Touch "ON" and "OFF" alternately.
11) Make sure the following.

Condition VENT CONTROL/V	Air passage continuity between **A** and **B**
ON	No
OFF	Yes

If the result is NG, go to "Diagnostic Procedure", EC-617.
If the result is OK, go to "Diagnostic Procedure" for DTC P0440, EC-393.



Overall Function Check

NHEC0343

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.

WITH GST

NHEC0343S01

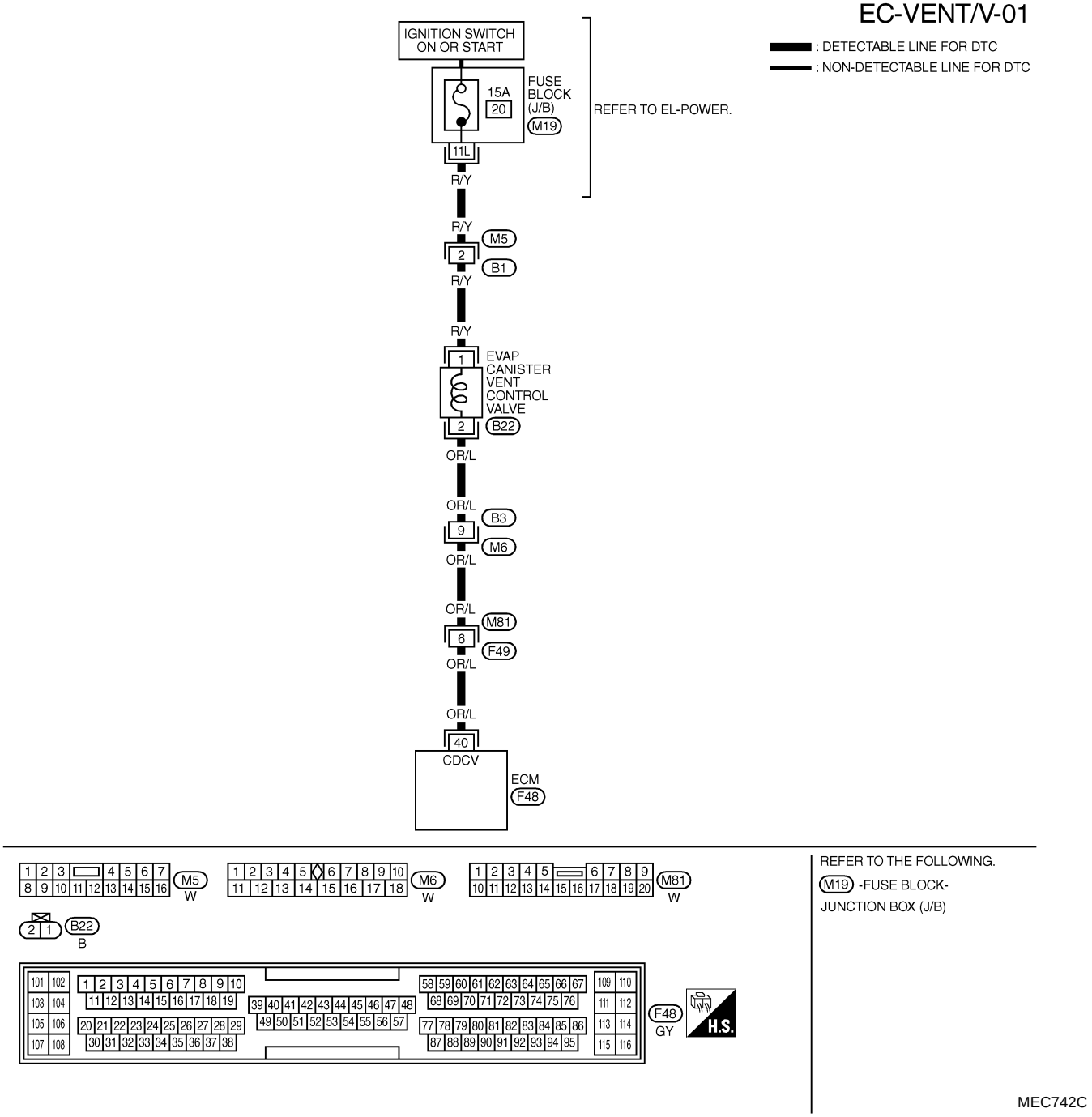
1) Disconnect hose from water separator.
2) Disconnect EVAP canister vent control valve harness connector.
3) Verify the following.

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-617.
If the result is OK, go to “Diagnostic Procedure” for DTC P0440, EC-393.

Wiring Diagram

NHEC0344



ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
40	OR/L	EVAP CANISTER VENT CONTROL VALVE	IGN ON	BATTERY VOLTAGE

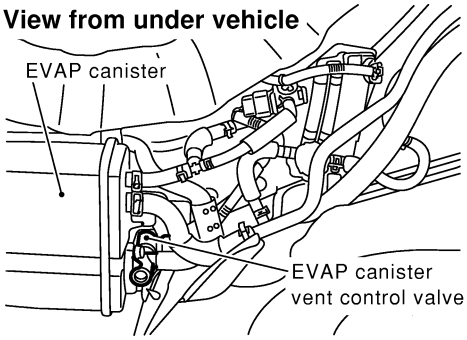
SEF668XB

Diagnostic Procedure

NHEC0345

1	CHECK RUBBER TUBE

1. Turn ignition switch “OFF”.
2. Disconnect rubber tube connected to EVAP canister vent control valve.
3. Check the rubber tube for clogging.



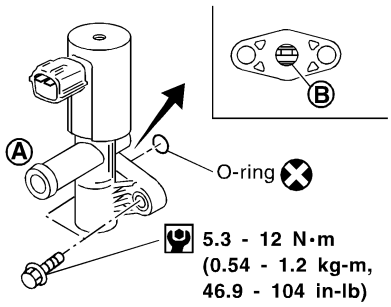
SEF267X

OK or NG

OK	▶	GO TO 2.
NG	▶	Clean rubber tube using an air blower.

2	CHECK EVAP CANISTER VENT CONTROL VALVE-I

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.



SEF337X

OK or NG

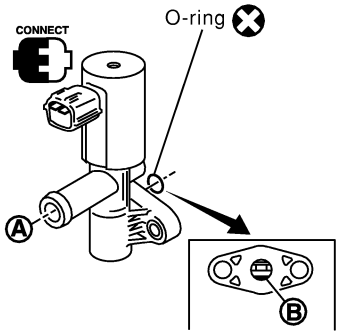
OK	▶	GO TO 3.
NG	▶	Replace EVAP canister vent control valve.

Diagnostic Procedure (Cont'd)

3	CHECK EVAP CANISTER VENT CONTROL VALVE-II

With CONSULT-II

1. Turn ignition switch ON.
2. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
3. Check air passage continuity and operation delay time.



ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
FR O2 SEN-B1	XXX V
THRTL POS SEN	XXX V
A/F ALPHA-B1	XXX %

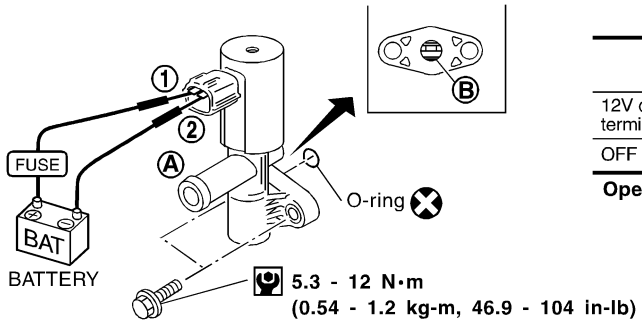
Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

SEF222Y

Without CONSULT-II

Check air passage continuity and operation delay time under the following conditions.



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

Operation takes less than 1 second.

SEF339X

Make sure new O-ring is installed properly.

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	CHECK EVAP CANISTER VENT CONTROL VALVE-III

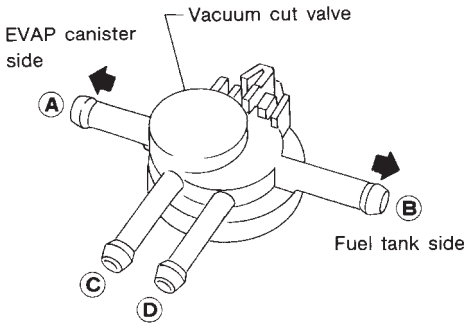
1. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
2. Perform Test No. 3 again.

OK or NG

OK	▶	GO TO 5.
NG	▶	Replace EVAP canister vent control valve.

5	CHECK VACUUM CUT VALVE

1. Turn ignition switch OFF.
2. Remove vacuum cut valve.
3. Check vacuum cut valve as follows:



SEF379Q

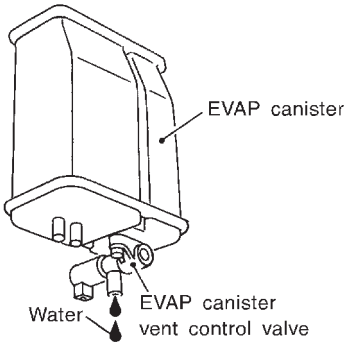
a. Plug port **C** and **D** with fingers.
b. Apply vacuum to port **A** and check that there is no suction from port **B**.
c. Apply vacuum to port **B** and check that there is suction from port **A**.
d. Blow air in port **B** and check that there is a resistance to flow out of port **A**.
e. Open port **C** and **D**.
f. Blow air in port **A** check that air flows freely out of port **C**.
g. Blow air in port **B** check that air flows freely out of port **D**.

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace vacuum cut valve.

6	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 7.
No	▶	GO TO 9.

7	CHECK EVAP CANISTER

Weigh the EVAP canister with the 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.

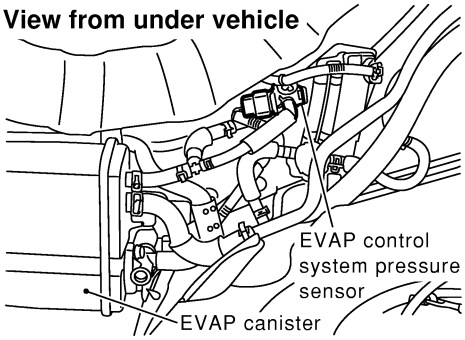
Diagnostic Procedure (Cont'd)

8	DETECT MALFUNCTIONING PART
Check the following. ● EVAP canister for damage ● EVAP hose between EVAP canister and water separator for clogging or poor connection	
▶	Repair hose or replace EVAP canister.

9	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 10.
NG ▶	Repair it.

10	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.



SEF268X

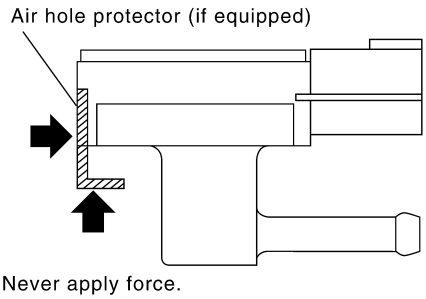
2. Check connectors for water.
   Water should not exist.

OK or NG

OK ▶	GO TO 11.
NG ▶	Replace EVAP control system pressure sensor.

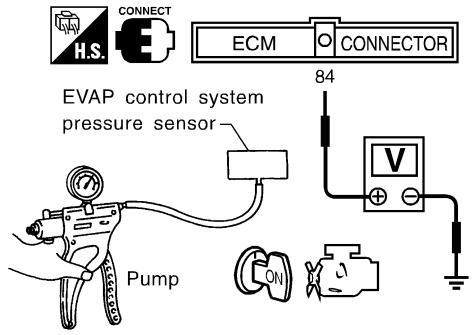
11	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.
   CAUTION:
   - **Never apply force to the air hole protector of the sensor if equipped.**



SEF799W

2. Remove hose from EVAP control system pressure sensor.
3. Turn ignition switch "ON".
4. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.
   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. Check input voltage between ECM terminal 84 and 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

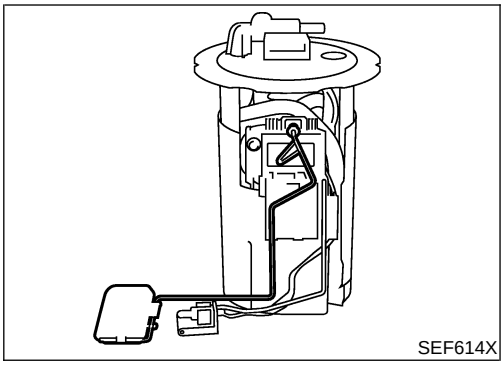
SEF342X

CAUTION:
- **Discard and EVAP control system pressure sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**

OK or NG

OK	▶	GO TO 12.
NG	▶	Replace EVAP control system pressure sensor.

12	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156.	
▶	**INSPECTION END**


SEF614X

Component Description

NHEC0632

The fuel level sensor is mounted in the fuel level sensor unit. The sensor detects a fuel level in the fuel tank and transmits a signal to the ECM.
It consists of two parts, one is mechanical float and the other side is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

On Board Diagnostic Logic

NHEC0633

ECM receives two signals from the fuel level sensor.
One is fuel level sensor power supply circuit, and the other is fuel level sensor ground circuit.
This diagnosis indicates the latter to detect open circuit malfunction. Malfunction is detected when a high voltage from the sensor is sent to ECM.

Possible Cause

NHEC0634

- Fuel level sensor circuit
  (The fuel level sensor circuit is open or shorted.)

DTC Confirmation Procedure

NHEC0635

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

3

DATA MONITOR	
MONITOR	NO DTC
FUEL T/TMP SE	XXX ˚C
FUEL LEVEL SE	XXX V

SEF195Y

WITH CONSULT-II

NHEC0635S01

1) Turn ignition switch “ON”.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Wait at least 5 seconds.
4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-624.

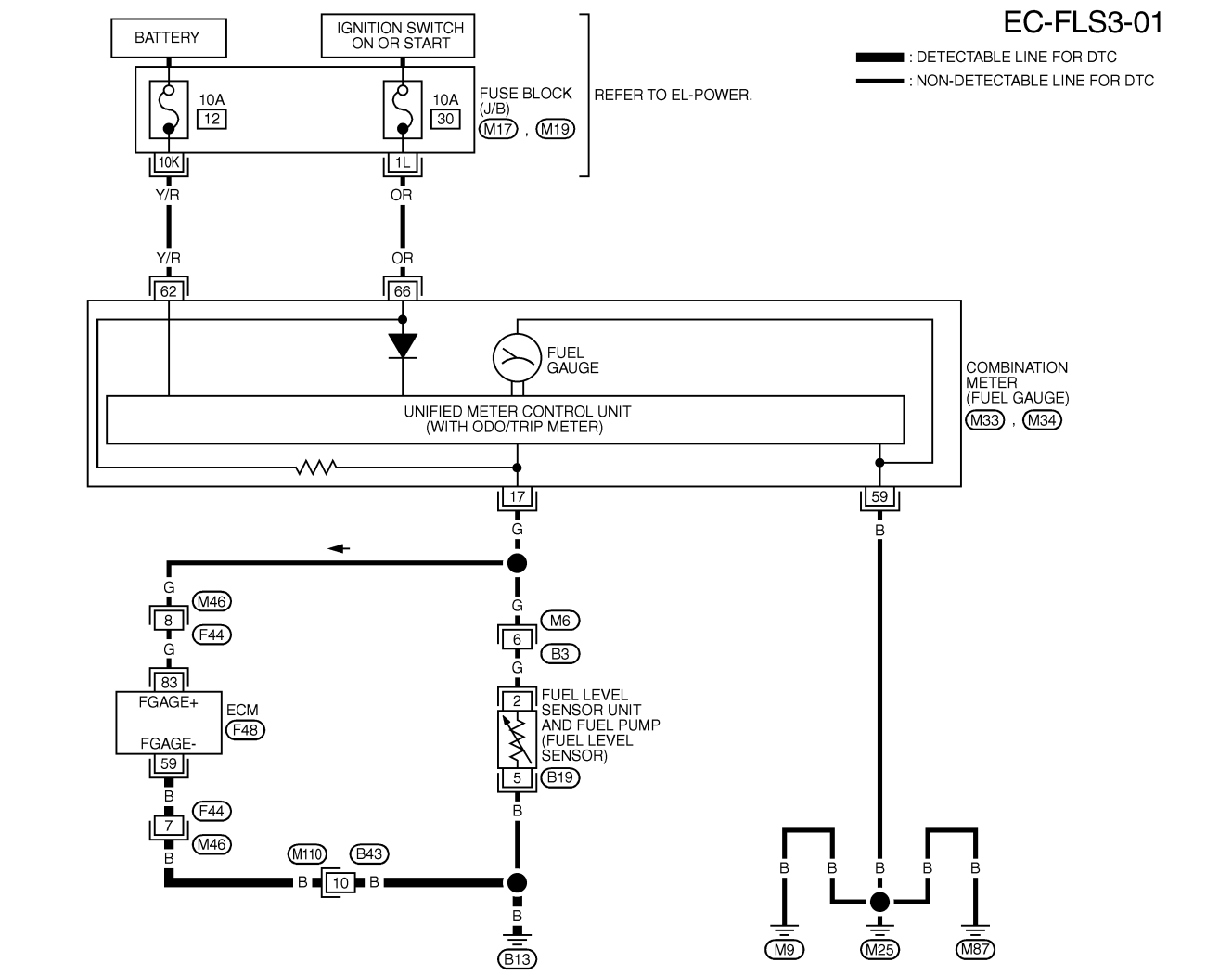
WITH GST

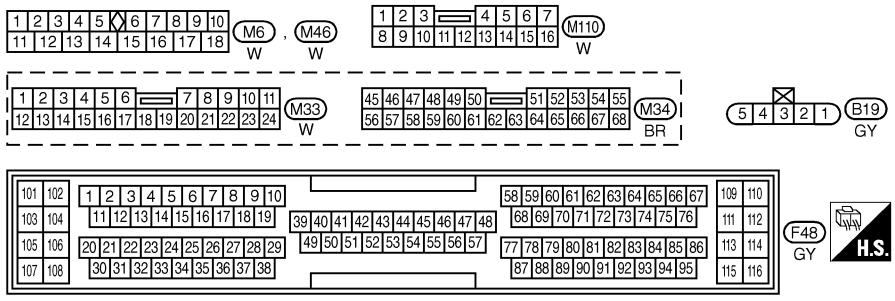
NHEC0635S02

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

NHEC0640





REFER TO THE FOLLOWING.
M17 - FUSE BLOCK - JUNCTION BOX (J/B)
M19 - FUSE BLOCK - JUNCTION BOX (J/B)

MEC878C

Diagnostic Procedure

=NHEC0641

1	CHECK FUEL LEVEL SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 59 and body ground. Refer to Wiring Diagram.
   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

1. Check the following.
- Harness connectors F44, M46
- Harness connectors M110, B43
- Harness for open and short between ECM and body ground

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

3	CHECK FUEL LEVEL SENSOR

Refer to EL-158, “Fuel Level Sensor Unit Check”.

OK or NG

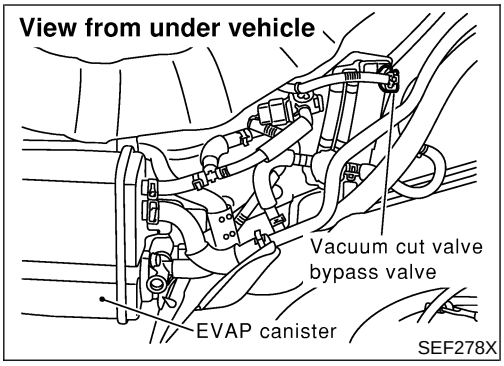
OK	▶	GO TO 4.
NG	▶	Replace fuel level sensor unit.

4	CHECK INTERMITTENT INCIDENT

Refer to “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-156.

OK or NG

	▶	**INSPECTION END**



Description

=NHEC0346

COMPONENT DESCRIPTION

NHEC0346S01

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.

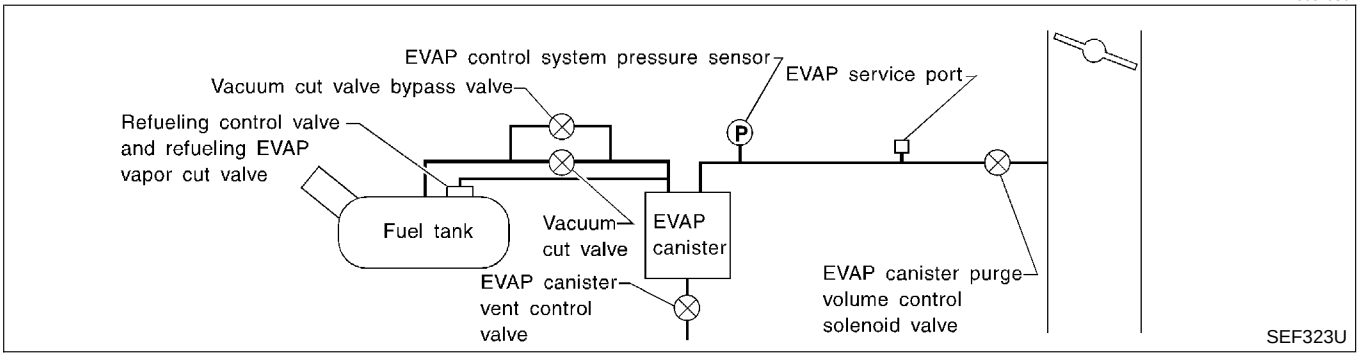
The vacuum cut valve prevents the intake manifold vacuum from being applied to the fuel tank.

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

NHEC0346S02



CONSULT-II Reference Value in Data Monitor Mode

NHEC0347

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VC/V BYPASS/V	• Ignition switch: ON	OFF

On Board Diagnosis Logic

NHEC0349

Malfunction is detected when an improper voltage signal is sent to ECM through vacuum cut valve bypass valve.

Possible Cause

NHEC0592

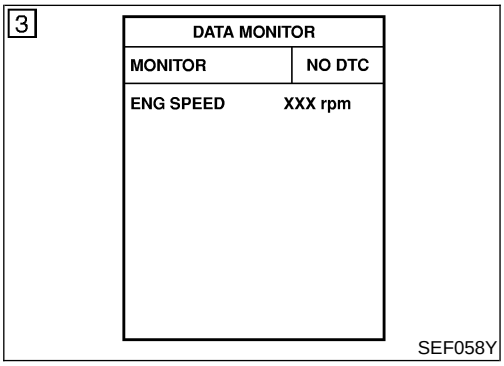
- Harness or connectors
  (The vacuum cut valve bypass valve circuit is open or shorted.)
- Vacuum cut valve bypass valve

DTC Confirmation Procedure

NHEC0350

NOTE:
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test.

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



WITH CONSULT-II

NHEC0350S01

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Start engine and wait at least 5 seconds.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-628.

WITH GST

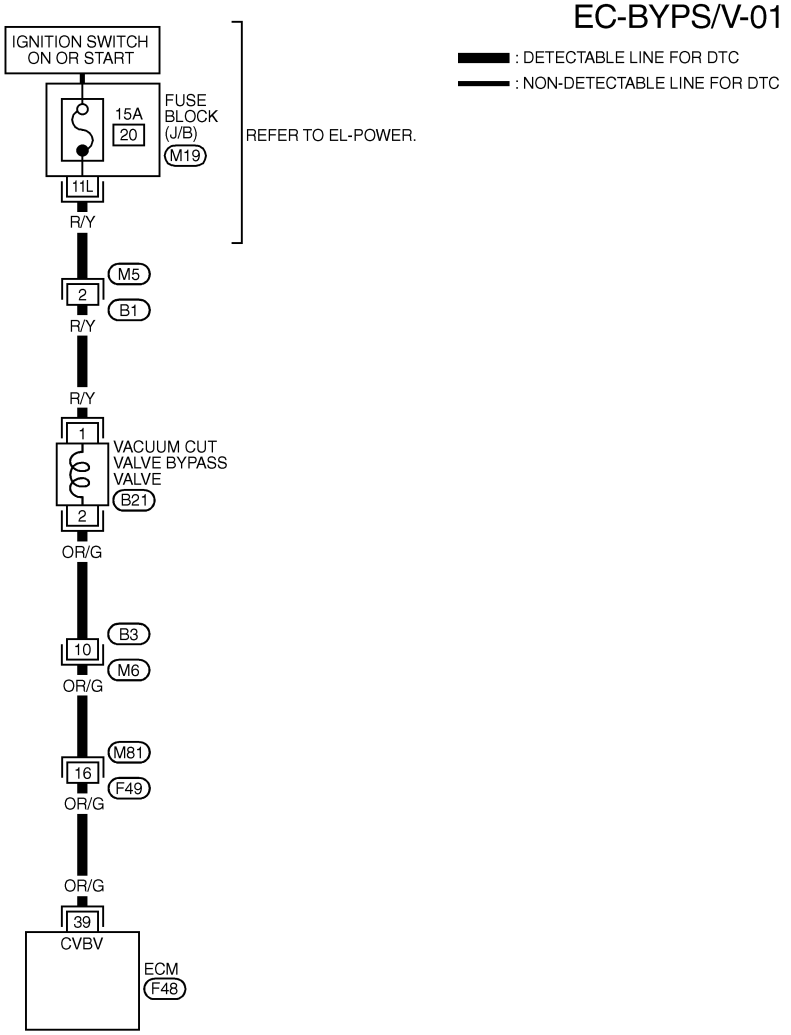
NHEC0350S02

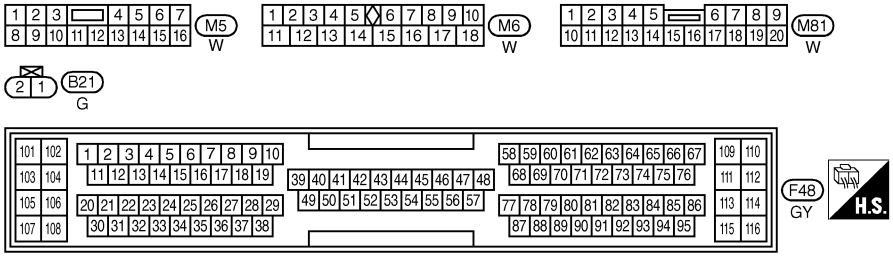
Follow the procedure "WITH CONSULT-II" above.

Wiring Diagram

NHEC0351

EC-BYPS/V-01





REFER TO THE FOLLOWING.
M19 -FUSE BLOCK-
JUNCTION BOX (J/B)

MEC821C

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
39	OR/G	VACUUM CUT VALVE BYPASS VALVE	IGN ON	BATTERY VOLTAGE

SEF634XB

Diagnostic Procedure

NHEC0352

1	INSPECTION START	
Do you have CONSULT-II?		
Yes or No		
Yes	▶	GO TO 2.
No	▶	GO TO 3.

2	CHECK VACUUM CUT VALVE BYPASS VALVE CIRCUIT	

With CONSULT-II

1. Turn ignition switch “OFF” and then “ON”.
2. Select “VC/V BYPASS/V” in “ACTIVE TEST” mode with CONSULT-II.
3. Touch “ON/OFF” on CONSULT-II screen.

ACTIVE TEST	
VC/V BYPASS/V	OFF
MONITOR	
ENG SPEED	XXX rpm
FR O2 MNTR-B1	RICH
THRTL POS SEN	XXX V
A/F ALPHA-B1	XXX %

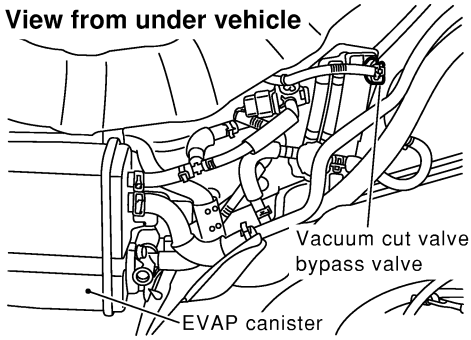
SEF209Y

4. 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.

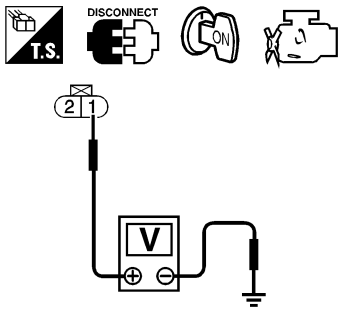
3	CHECK VACUUM CUT VALVE BYPASS VALUE POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect vacuum cut valve bypass valve harness connector.



SEF278X

3. Turn ignition switch "ON".
4. Check voltage between vacuum cut valve bypass valve terminal 1 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF356X

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M5, B1
- Fuse block (J/B) connector M19
- 15A fuse
- Harness for open or short between vacuum cut valve bypass valve and fuse

	▶	Repair harness or connectors.

5	CHECK VACUUM CUT VALVE BYPASS VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 39 and vacuum cut valve bypass valve terminal 2. Refer to Wiring Diagram.
   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.

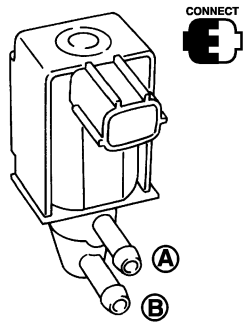
Diagnostic Procedure (Cont'd)

6	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors B3, M6 ● Harness connectors M81, F49 ● 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

With CONSULT-II

1. Reconnect harness disconnected connectors.
2. Turn ignition switch ON.
3. Perform "VC/V BYPASS/V" in "ACTIVE TEST" mode.
4. Check air passage continuity and operation delay time under the following conditions.



ACTIVE TEST	
VC/V BYPASS/V	OFF
MONITOR	
ENG SPEED	XXX rpm
FR O2 MNTR-B1	RICH
THRTL POS SEN	XXX V
A/F ALPHA-B1	XXX %

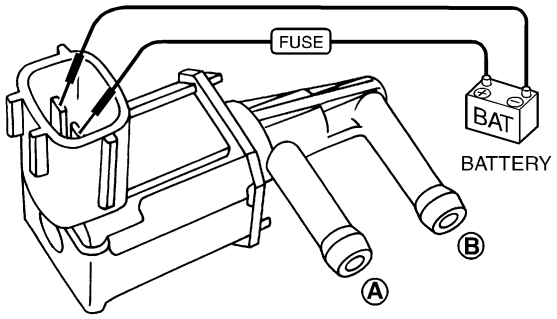
Condition VC/V BYPASS/V	Air passage continuity between A and B
ON	Yes
OFF	No

Operation takes less than 1 second.

SEF226Y

Without CONSULT-II

Check air passage continuity and operation delay time under the following conditions.



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

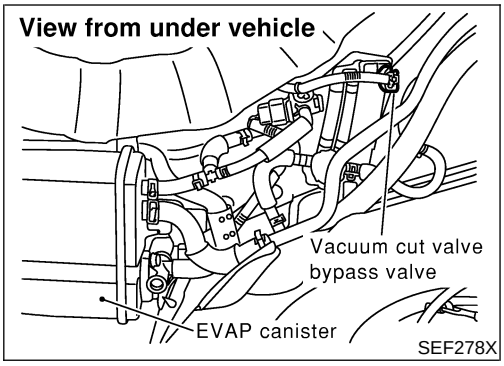
Operation takes less than 1 second.

SEF358X

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace vacuum cut valve bypass valve.

8	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156.	
▶	**INSPECTION END**



Description

NHEC0353

COMPONENT DESCRIPTION

NHEC0353S01

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.

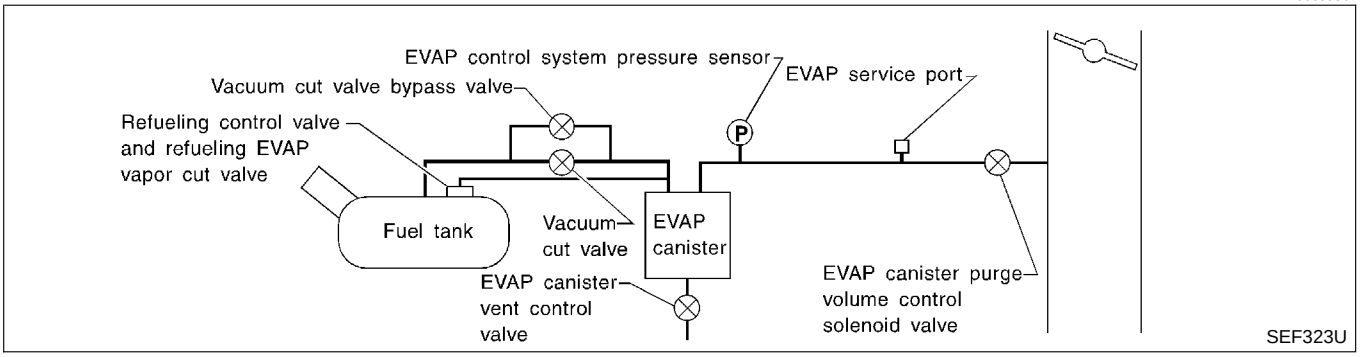
The vacuum cut valve prevents the intake manifold vacuum from being applied to the fuel tank.

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

NHEC0353S02



CONSULT-II Reference Value in Data Monitor Mode

NHEC0354

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VC/V BYPASS/V	• Ignition switch: ON	OFF

On Board Diagnosis Logic

NHEC0356

Malfunction is detected when vacuum cut valve bypass valve does not operate properly.

Possible Cause

NHEC0593

- Vacuum cut valve bypass valve
- Vacuum cut valve
- Bypass hoses for clogging
- EVAP control system pressure sensor and circuit
- EVAP canister vent control valve
- Hose between fuel tank and vacuum cut valve clogged
- Hose between vacuum cut valve and EVAP canister clogged
- EVAP canister
- EVAP purge port of fuel tank for clogging

DTC Confirmation Procedure

NHEC0357

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 10 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-II

NHEC0357S01

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 10 seconds.
4) Start engine and let it idle for at least 70 seconds.
5) Select “VC CUT/V BP/V P1491” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II.
6) Touch “START”.
7) When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take at least 30 seconds.)

ENG SPEED	1,000 - 3,000 rpm
Selector lever	Suitable position
Vehicle speed	35 - 120 km/h (22 - 75 MPH)
B/FUEL SCHDL	1.3 - 8.1 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”. If “NG” is displayed, refer to “Diagnostic Procedure”, EC-635.

7

VC CUT/V BP/V P1491	
OUT OF CONDITION	
MONITOR	
ENG SPEED	XXX rpm
VHCL SPEED SE	XXX km/h
B/FUEL SCHDL	XXX msec

SEF210Y

7

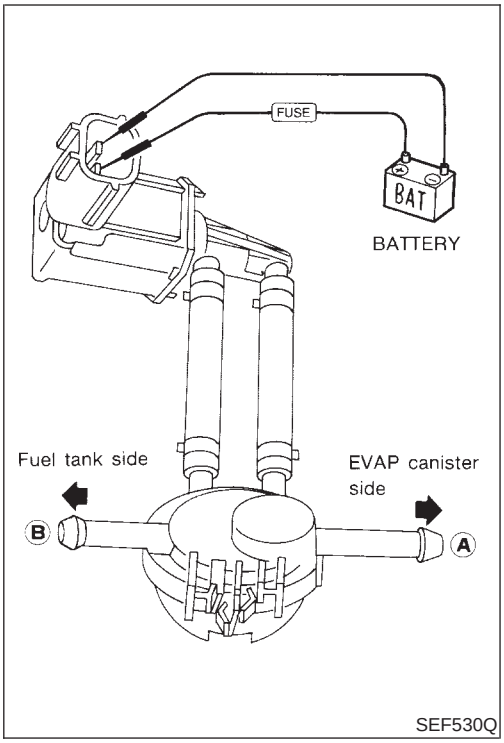
VC CUT/V BP/V P1491	
TESTING	
MONITOR	
ENG SPEED	XXX rpm
VHCL SPEED SE	XXX km/h
B/FUEL SCHDL	XXX msec

SEF211Y

7

VC CUT/V BP/V P1491
COMPLETED

SEF239Y



Overall Function Check

NHEC0358

Use this procedure to check the overall function of vacuum cut valve bypass valve. During this check, the 1st trip DTC might not be confirmed.

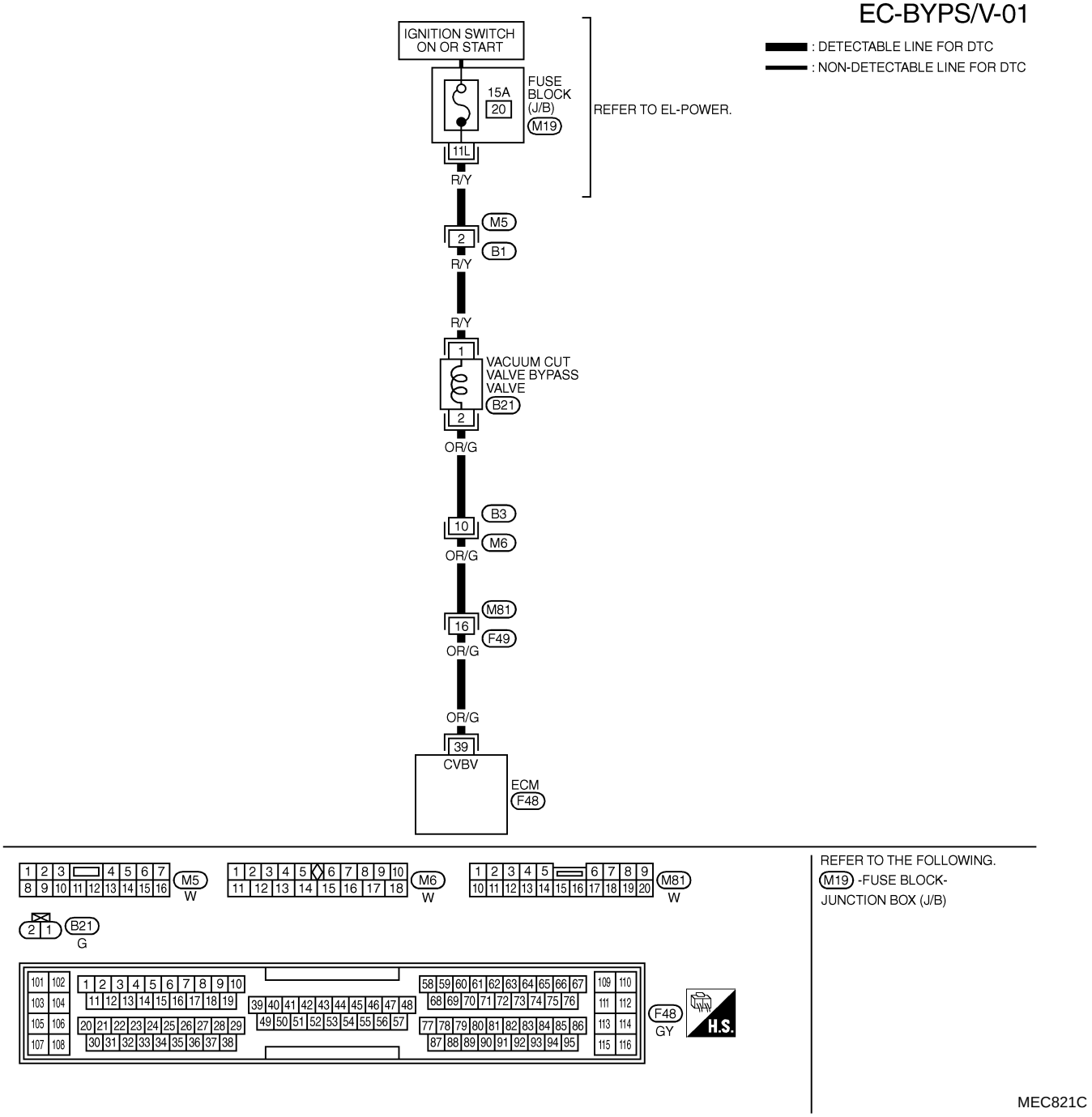
WITH GST

NHEC0358S01

1) Remove vacuum cut valve and vacuum cut valve bypass valve as an assembly.
2) Apply vacuum to port **A** and check that there is no suction from port **B**.
3) Apply vacuum to port **B** and check that there is suction from port **A**.
4) Blow air in port **B** and check that there is a resistance to flow out of port **A**.
5) Supply battery voltage to the terminal.
6) Blow air in port **A** and check that air flows freely out of port **B**.
7) Blow air in port **B** and check that air flows freely out of port **A**.
8) If NG, go to “Diagnostic Procedure”, EC-635.

Wiring Diagram

NHEC0359



ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
39	OR/G	VACUUM CUT VALVE BYPASS VALVE	IGN ON	BATTERY VOLTAGE

SEF634XB

Diagnostic Procedure

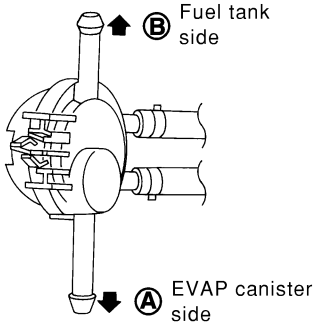
NHEC0360

1	INSPECTION START
Do you have CONSULT-II? **Yes or No**	
Yes ▶	GO TO 2.
No ▶	GO TO 3.

2	CHECK VACUUM CUT VALVE BYPASS VALVE OPERATION

With CONSULT-II

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-II 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.



ACTIVE TEST	
VC/V BYPASS/V	OFF
MONITOR	
ENG SPEED	XXX rpm
FR O2 MNTR-B1	RICH
THRTL POS SEN	XXX V
A/F ALPHA-B1	XXX %

SEF309Y

OK or NG

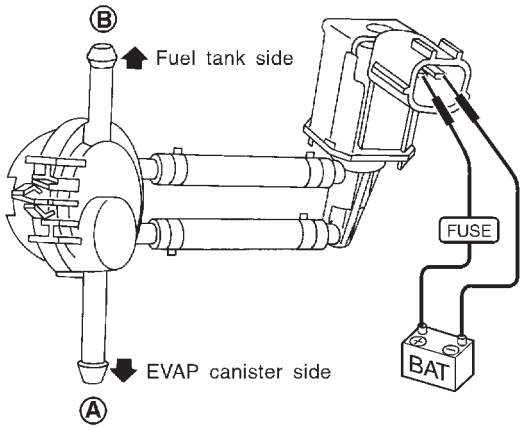
OK ▶	GO TO 4.
NG ▶	GO TO 5.

Diagnostic Procedure (Cont'd)

3	CHECK VACUUM CUT VALVE BYPASS VALVE OPERATION

Without CONSULT-II

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 7.

4	CHECK EVAP PURGE LINE

Check EVAP purge line between EVAP canister and fuel tank for clogging or disconnection.

OK or NG

OK	▶	GO TO 5.
NG	▶	Repair it.

5	CHECK EVAP PURGE PORT

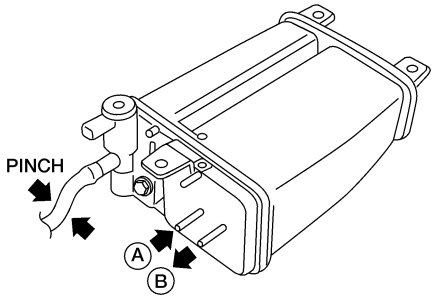
Check EVAP purge port of fuel tank for clogging.

OK or NG

OK	▶	GO TO 6.
NG	▶	Clean EVAP purge port.

6	CHECK EVAP CANISTER

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



AEC630A

OK or NG

OK	▶	GO TO 12.
NG	▶	Replace EVAP canister.

7	CHECK BYPASS HOSE

Check bypass hoses for clogging.

OK or NG

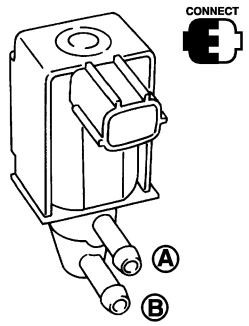
OK	▶	GO TO 8.
NG	▶	Repair or replace hoses.

Diagnostic Procedure (Cont'd)

8	CHECK VACUUM CUT VALVE BYPASS VALVE

With CONSULT-II

1. Perform "VC/V BYPASS/V" in "ACTIVE TEST" mode.
2. Check air passage continuity and operation delay time under the following conditions.



ACTIVE TEST	
VC/V BYPASS/V	OFF
MONITOR	
ENG SPEED	XXX rpm
FR O2 MNTR-B1	RICH
THRTL POS SEN	XXX V
A/F ALPHA-B1	XXX %

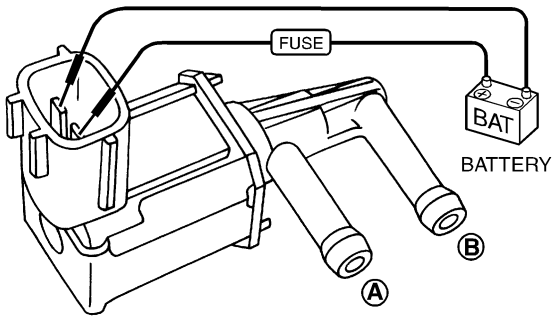
Condition VC/V BYPASS/V	Air passage continuity between A and B
ON	Yes
OFF	No

Operation takes less than 1 second.

SEF226Y

Without CONSULT-II

Check air passage continuity and operation delay time under the following conditions.



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

Operation takes less than 1 second.

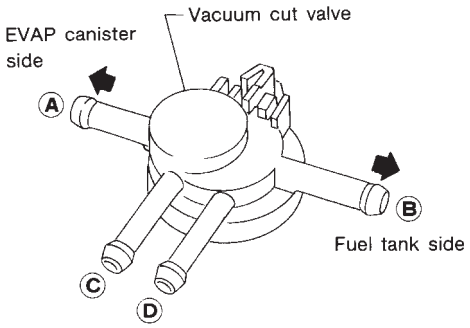
SEF358X

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace vacuum cut valve bypass valve.

9	CHECK VACUUM CUT VALVE

Check vacuum cut valve as follows:



SEF379Q

a. Plug port **C** and **D** with fingers.
b. Apply vacuum to port **A** and check that there is no suction from port **B**.
c. Apply vacuum to port **B** and check that there is suction from port **A**.
d. Blow air in port **B** and check that there is a resistance to flow out of port **A**.
e. Open port **C** and **D**.
f. Blow air in port **A** check that air flows freely out of port **C**.
g. Blow air in port **B** check that air flows freely out of port **D**.

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace vacuum cut valve.

10	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE

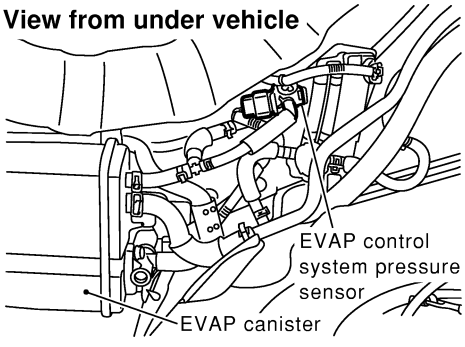
1. Turn ignition switch "OFF".
2. Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.

OK or NG

OK	▶	GO TO 11.
NG	▶	Repair or replace.

11	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.



SEF268X

2. Check connectors for water.
Water should not exist.

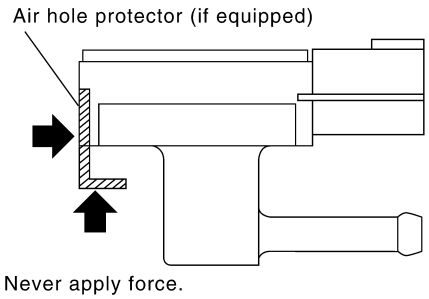
OK or NG

OK	▶	GO TO 12.
NG	▶	Replace EVAP control system pressure sensor.

Diagnostic Procedure (Cont'd)

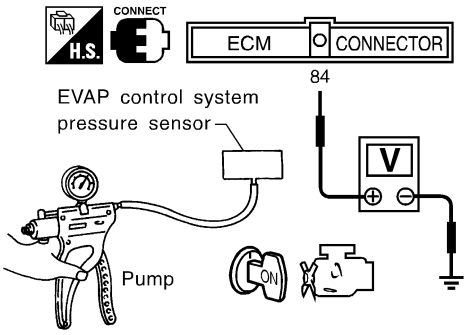
12	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.
   CAUTION:
   - **Never apply force to the air hole protector of the sensor if equipped.**



SEF799W

2. Remove hose from EVAP control system pressure sensor.
3. Turn ignition switch "ON".
4. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.
   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. Check input voltage between ECM terminal 84 and 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

SEF342X

CAUTION:
- **Discard and EVAP control system pressure sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**

OK or NG

OK	▶	GO TO 13.
NG	▶	Replace EVAP control system pressure sensor.

13	CHECK RUBBER TUBE FOR CLOGGING

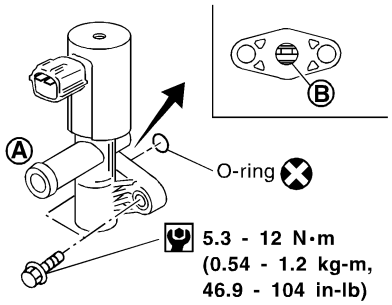
1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

OK or NG

OK	▶	GO TO 14.
NG	▶	Clean the rubber tube using an air blower.

14 CHECK EVAP CANISTER VENT CONTROL VALVE-I

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.



SEF337X

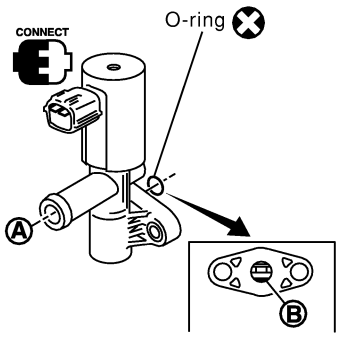
OK or NG

OK	▶	GO TO 15.
NG	▶	Replace EVAP canister vent control valve.

15 CHECK EVAP CANISTER VENT CONTROL VALVE-II

With CONSULT-II

1. Reconnect harness disconnected connectors.
2. Turn ignition switch ON.
3. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
4. Check air passage continuity and operation delay time.



ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
FR O2 SEN-B1	XXX V
THRTL POS SEN	XXX V
A/F ALPHA-B1	XXX %

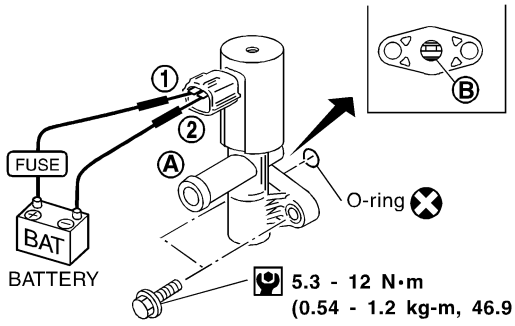
Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

SEF222Y

Without CONSULT-II

Check air passage continuity and operation delay time under the following conditions.



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

Operation takes less than 1 second.

SEF339X

Make sure new O-ring is installed properly.

OK or NG

OK	▶	GO TO 17.
NG	▶	GO TO 16.

Diagnostic Procedure (Cont'd)

16	CHECK EVAP CANISTER VENT CONTROL VALVE-III	
1. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower. 2. Perform the Test No. 15 again.		
OK or NG		
OK	▶	GO TO 17.
NG	▶	Replace EVAP canister vent control valve.

17	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156.		
	▶	**INSPECTION END**

Component Description

NHEC0361

The malfunction information related to A/T (Automatic Transmission) is transferred through the line (circuit) from TCM (Transmission control module) to ECM. Therefore, be sure to erase the malfunction information such as DTC not only in TCM (Transmission control module) but also ECM after the A/T related repair.

On Board Diagnosis Logic

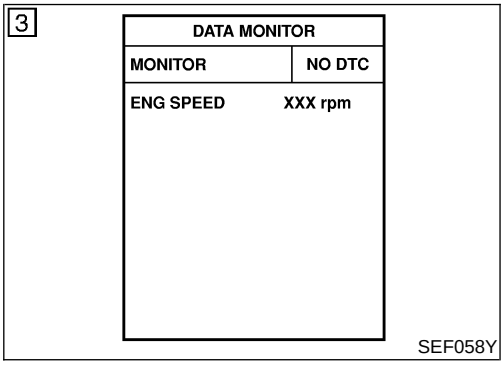
NHEC0363

Malfunction is detected when an incorrect signal from TCM (Transmission control module) is sent to ECM.

Possible Cause

NHEC0594

- 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

NHEC0364

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

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

WITH CONSULT-II

NHEC0364S01

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Start engine and wait at least 40 seconds.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-645.

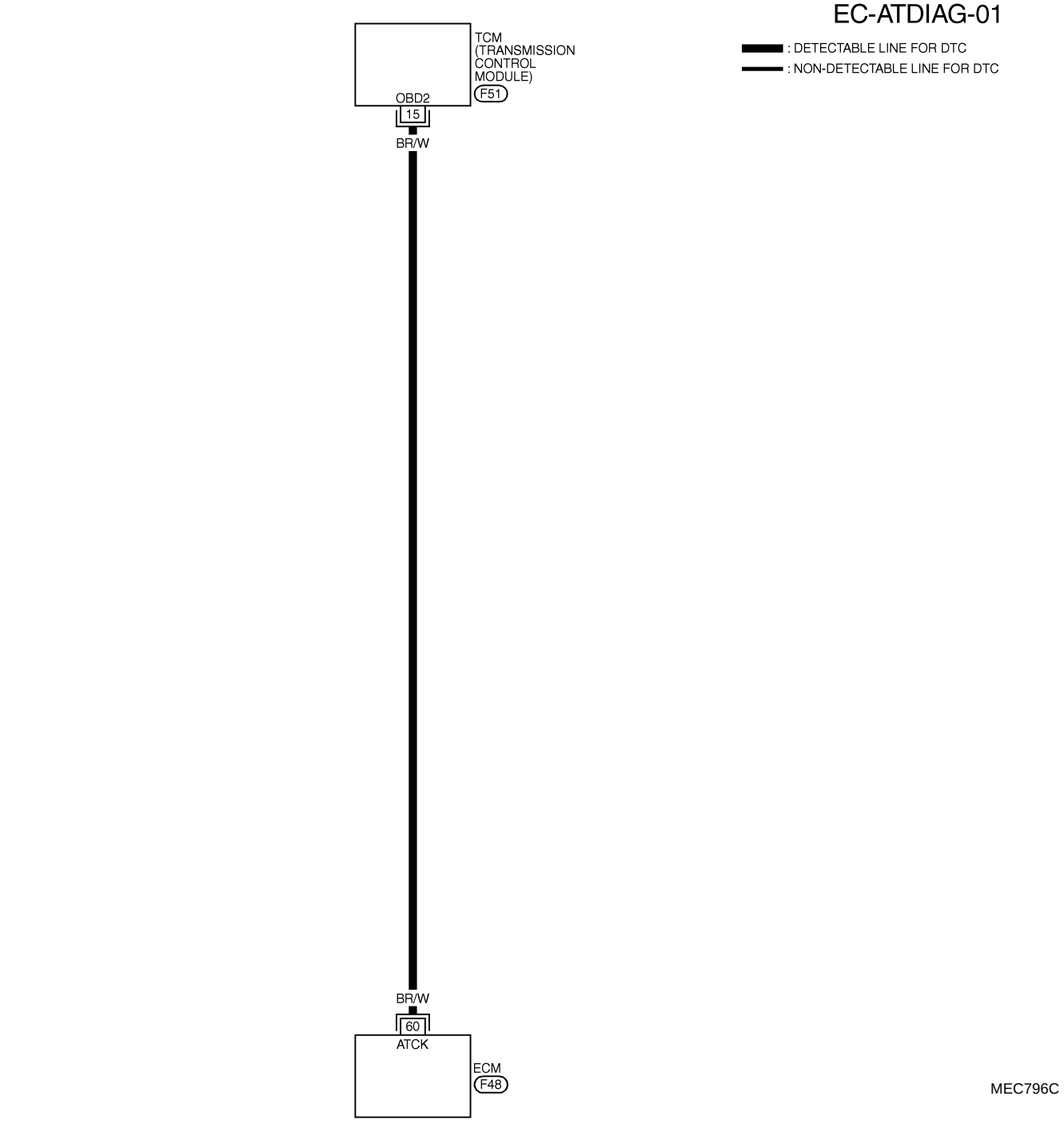
WITH GST

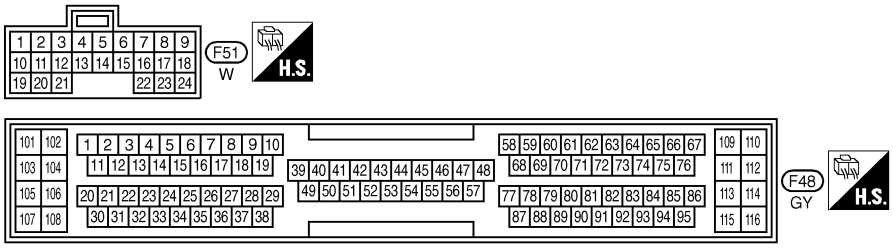
NHEC0364S02

Follow the procedure "WITH CONSULT-II" above.

Wiring Diagram

=NHEC0365





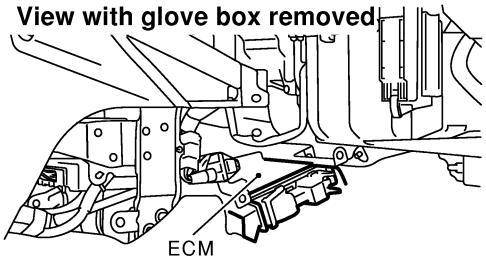
Diagnostic Procedure

NHEC0366

1	CHECK A/T DIAGNOSIS COMMUNICATION LINE INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

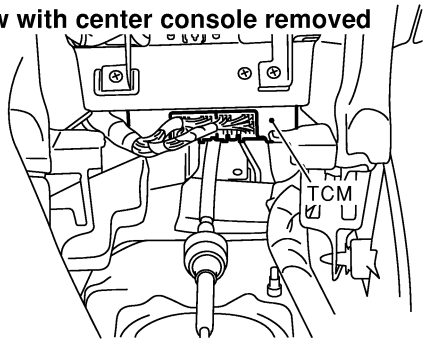
1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector and TCM (Transmission Control Module) harness connector.

View with glove box removed



SEF270X

View with center console removed



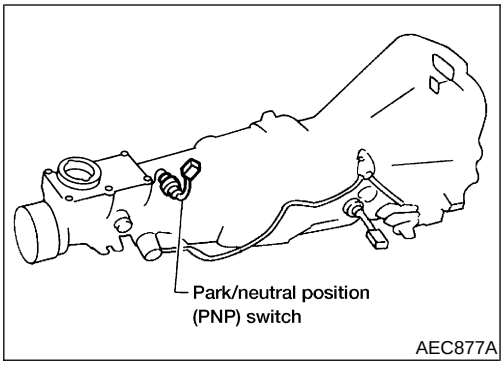
SEF271X

3. Check harness continuity between ECM terminal 60 and TCM terminal 15. Refer to Wiring Diagram.
   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
Refer to “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-156.	
▶	**INSPECTION END**



Component Description

NHEC0367

When the gear position is “P” (A/T models only) or “N”, park/neutral position (PNP) switch is “ON”.
ECM detects the position because the continuity of the line (the “ON” signal) exists.
For A/T models, the park/neutral position (PNP) switch assembly also includes a transmission range switch to detect selector lever position.

CONSULT-II Reference Value in Data Monitor Mode

NHEC0368

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

On Board Diagnosis Logic

NHEC0370

Malfunction is detected when the signal of the park/neutral position (PNP) switch is not changed in the process of engine starting and driving.

Possible Cause

NHEC0595

- Harness or connectors
  [The park/neutral position (PNP) switch circuit is open or shorted.]
- Park/neutral position (PNP) switch

DTC Confirmation Procedure

NHEC0371

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 10 seconds before conducting the next test.

2

DATA MONITOR	
MONITOR	NO DTC
P/N POSI SW	ON

SEF212Y

5

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h
P/N POSI SW	OFF
B/FUEL SCHDL	XXX msec

SEF213Y

WITH CONSULT-II

NHEC0371S01

1) Turn ignition switch "ON".
2) Select "P/N POSI SW" in "DATA MONITOR" mode with CONSULT-II. Then check the "P/N POSI SW" signal under the following conditions.

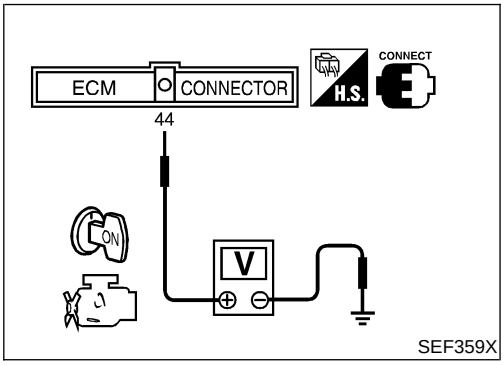
Position (Selector lever)	Known-good signal
"N" and "P" position	ON
Except the above position	OFF

If NG, go to "Diagnostic Procedure", EC-649.
If OK, go to following step.

3) Select "DATA MONITOR" mode with CONSULT-II.
4) Start engine and warm it up to normal operating temperature.
5) Maintain the following conditions for at least 60 consecutive seconds.

ENG SPEED	1,800 - 2,600 rpm
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	2 - 10 msec
VHCL SPEED SE	70 - 100 km/h (43 - 75 MPH)
Selector lever	Suitable position

6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-649.



SEF359X

Overall Function Check

NHEC0372

Use this procedure to check the overall function of the park/neutral position (PNP) switch circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

NHEC0372S01

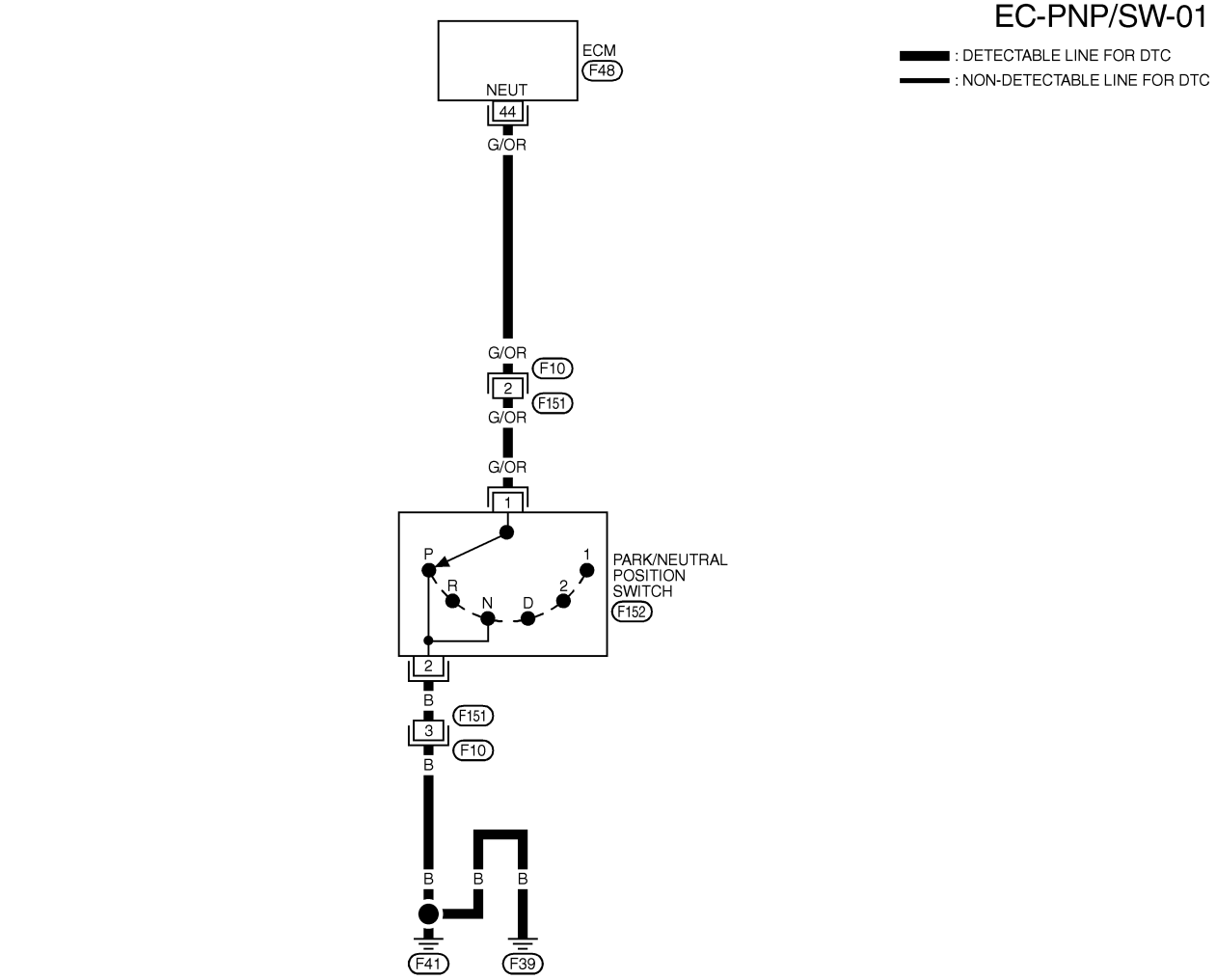
1) Turn ignition switch "ON".
2) Check voltage between ECM terminal 44 and body ground under the following conditions.

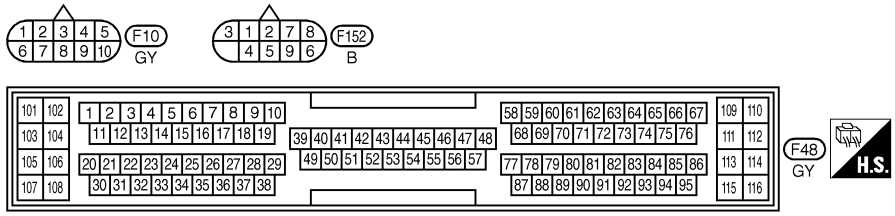
Condition (Gear position)	Voltage V (Known good data)
"P" and "N" position	Approx. 0
Except the above position	Battery voltage

3) If NG, go to "Diagnostic Procedure", EC-649.

Wiring Diagram

NHEC0373





MEC822C

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
44	G/OR	PARK/NEUTRAL POSITION (PNP) SWITCH	IGN ON WITH GEAR POSITION "N" OR "P"	APPROX. 0V
			IGN ON WITHOUT THE ABOVE GEAR POSITION	BATTERY VOLTAGE

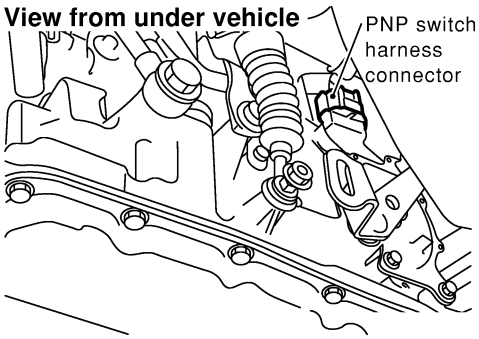
SEF973XA

Diagnostic Procedure

NHEC0374

1	CHECK PNP SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect park/neutral position (PNP) switch harness connector.



SEF279X

3. Check harness continuity between PNP switch terminal 2 and engine ground. Refer to Wiring Diagram.
   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 F10, F151
- Harness for open or short between park/neutral position (PNP) switch and engine ground

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

3	CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 44 and PNP switch terminal 1. Refer to Wiring Diagram.
   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 F10, F151
- Harness for open or short between ECM and park/neutral position (PNP) switch

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

5	CHECK PARK/NEUTRAL POSITION (PNP) SWITCH

Refer to AT-105, “Diagnostic Procedure”.

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace park/neutral position (PNP) switch.

Diagnostic Procedure (Cont'd)

6	**CHECK INTERMITTENT INCIDENT**
Refer to "TROUBLE DIGNOSIS FOR INTERMITTENT INCIDENT", EC-156.	
▶	**INSPECTION END**

Description

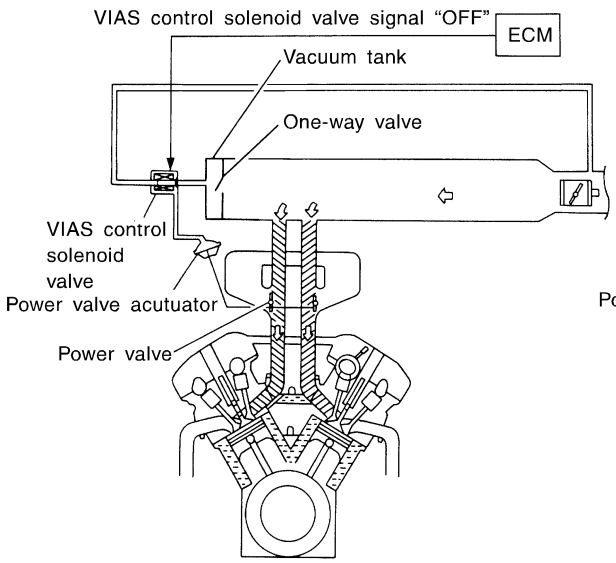
NHEC0596

SYSTEM DESCRIPTION

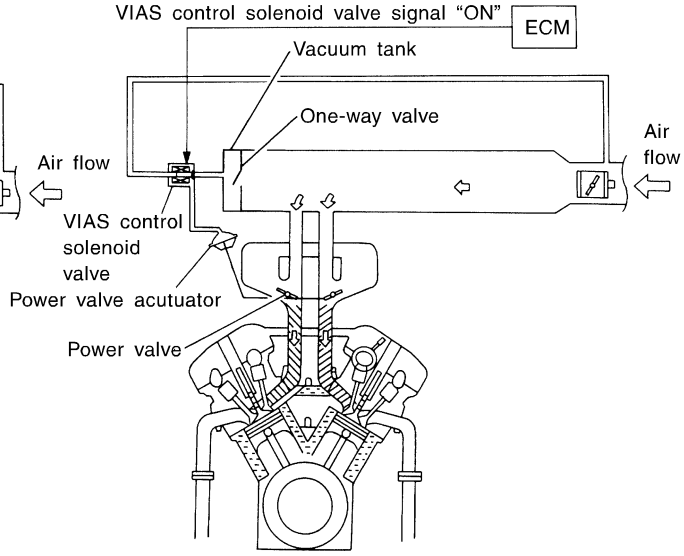
NHEC0596S01

Sensor	Input Signal to ECM	ECM function	Actuator
Mass air flow sensor	Amount of intake air	VIAS control	VIAS control solenoid valve
Throttle position sensor	Throttle position		
Closed throttle position	Throttle valve idle position		
Ignition switch	Start signal		
Crankshaft position sensor (POS)	Engine speed (POS signal)		
Crankshaft position sensor (REF)	Engine speed (REF signal)		
Engine coolant temperature sensor	Engine coolant temperature		

When VIAS control signal is "OFF".



When VIAS control signal is "ON".

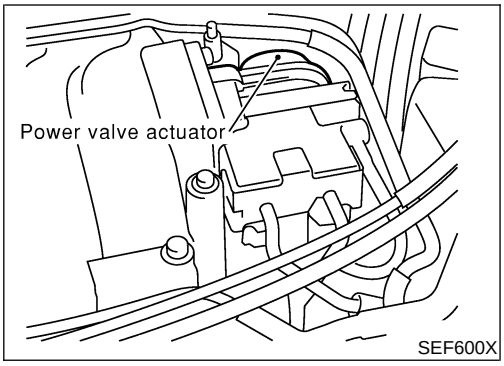


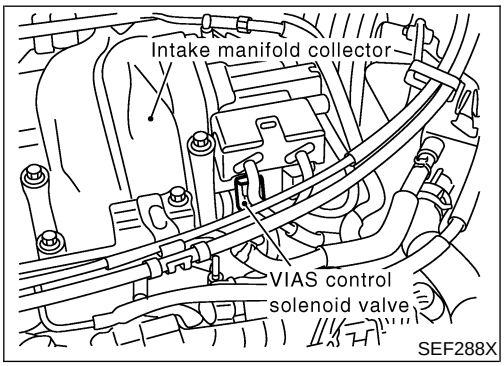
SEF599X

When the engine is running at low or medium speed, the power valve is fully closed. Under this condition, the effective suction port length is equivalent to the total length of the intake manifold collector's suction port including the intake valve. This long suction port provides increased air intake which results in improved suction efficiency and higher torque generation.

The surge tank and one-way valve are provided. When engine is running at high speed, the ECM sends the signal to the VIAS control solenoid valve. This signal introduces the intake manifold vacuum into the power valve actuator and therefore opens the power valve to two suction passages together in the collector.

Under this condition, the effective port length is equivalent to the length of the suction port provided independently for each cylinder. This shortened port length results in enhanced engine output with reduced suction resistance under high speeds.





COMPONENT DESCRIPTION

NHEC0596S02

Power Valve

NHEC0596S0201

The power valve is installed in intake manifold collector and used to control the suction passage of the variable induction air control system. It is set in the fully closed or fully opened position by the power valve actuator operated by the vacuum stored in the surge tank. The vacuum in the surge tank is controlled by the VIAS control solenoid valve.

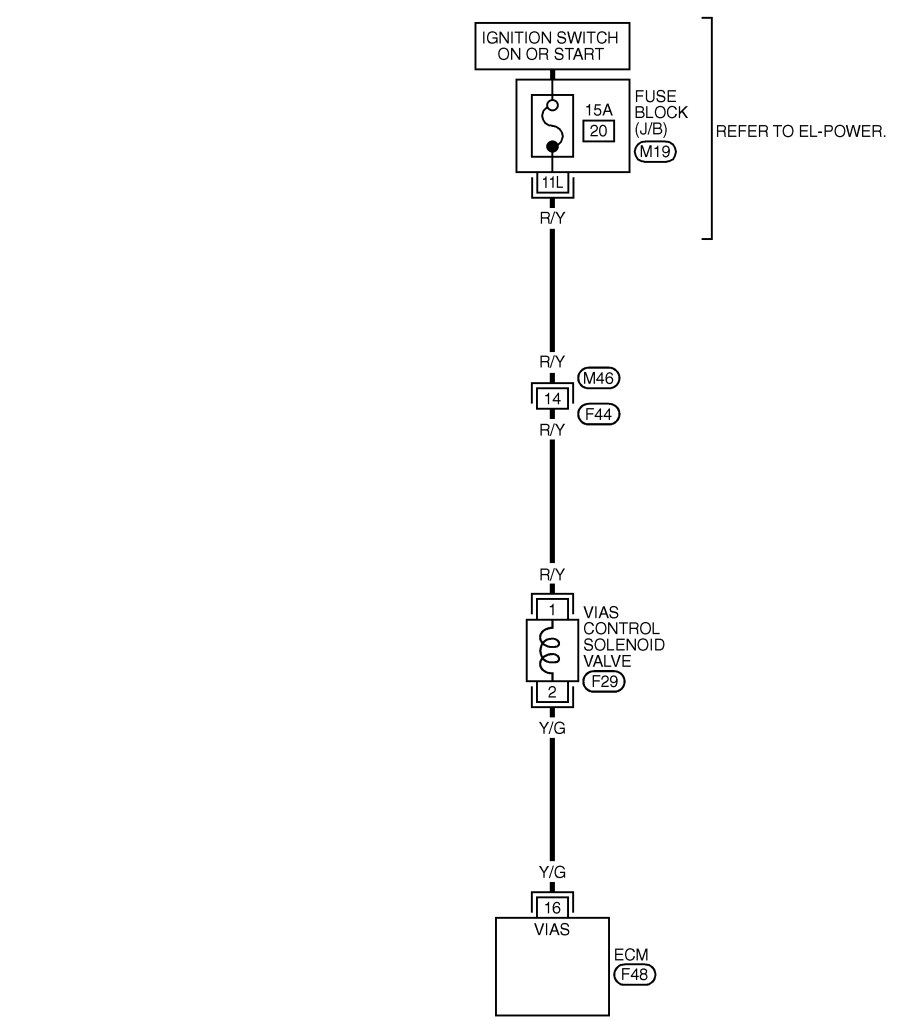
VIAS Control Solenoid Valve

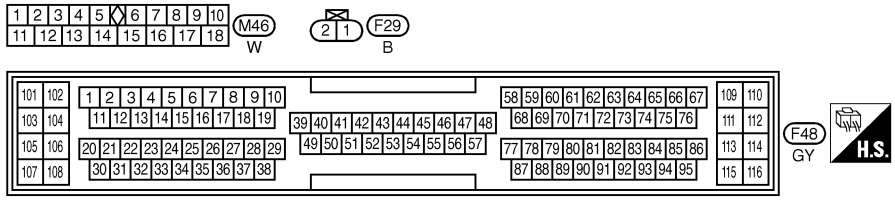
NHEC0596S0202

The VIAS control solenoid valve cuts the intake manifold vacuum signal for power valve control. It responds to ON/OFF signals from the ECM. When the solenoid is off, the vacuum signal from the intake manifold is cut. When the ECM sends an ON signal the coil pulls the plunger downward and feeds the vacuum signal to the power valve actuator.

Wiring Diagram

NHEC0597





REFER TO THE FOLLOWING.
M19 - FUSE BLOCK - JUNCTION BOX (J/B)

MEC768C

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
16	Y/G	VIAS CONTROL SOLENOID VALVE	ENGINE RUNNING AT IDLE SPEED	BATTERY VOLTAGE
			ENGINE RUNNING ABOVE 5,000 RPM	0 - 1.0V

SEF636XB

Diagnostic Procedure

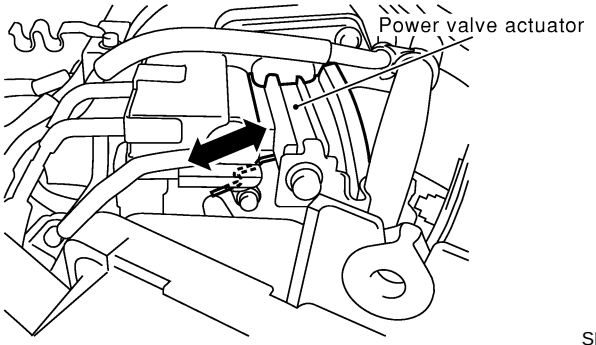
NHEC0598

1	CHECK OVERALL FUNCTION

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Perform “VIAS SOL VALVE” in “ACTIVE TEST” mode with CONSULT-II.
3. Turn VIAS control solenoid valve “ON” and “OFF”, and make sure that power valve actuator rod moves.

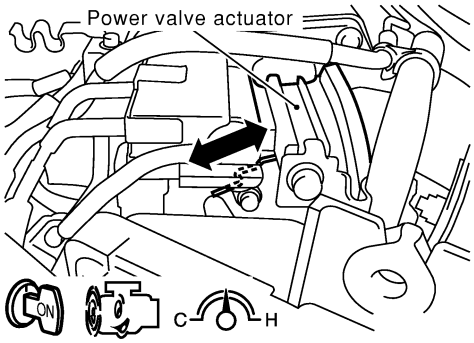
ACTIVE TEST	
VIAS SOLENOID/V	OFF
MONITOR	
ENG SPEED	XXX rpm
IACV-AAC/V	XXX step



SEF051Y

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Rev engine quickly up to above 5,000 rpm and make sure that power valve actuator rod moves.



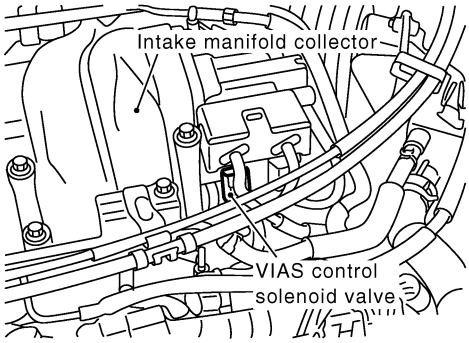
SEF052Y

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 2.

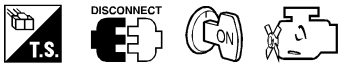
2	CHECK VIAS CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

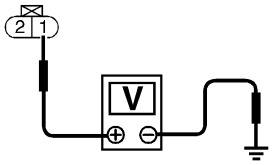
1. Stop engine.
2. Disconnect VIAS control solenoid valve harness connector.



SEF288X

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





Voltage: Battery voltage

SEF603X

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M46, F44
- 15A fuse
- Harness continuity between fuse and VIAS control solenoid valve

	▶	Repair harness or connectors.

4	CHECK VIAS CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

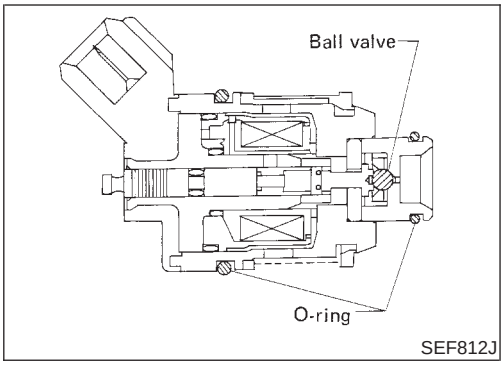
1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 16 and terminal 2. Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

OK or NG

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

5	RETEST OVERALL FUNCTION	
1. Reconnect harness connectors disconnected. 2. Perform Test No. 1 again.		
OK or NG		
OK	▶	**INSPECTION END**
NG	▶	GO TO 6.

6	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156.		
OK or NG		
OK	▶	Replace VIAS control solenoid valve as intake manifold collector assembly.
NG	▶	Repair or replace harness or connectors.



Component Description

NHEC0383

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-II Reference Value in Data Monitor Mode

NHEC0384

Specification data are reference values.

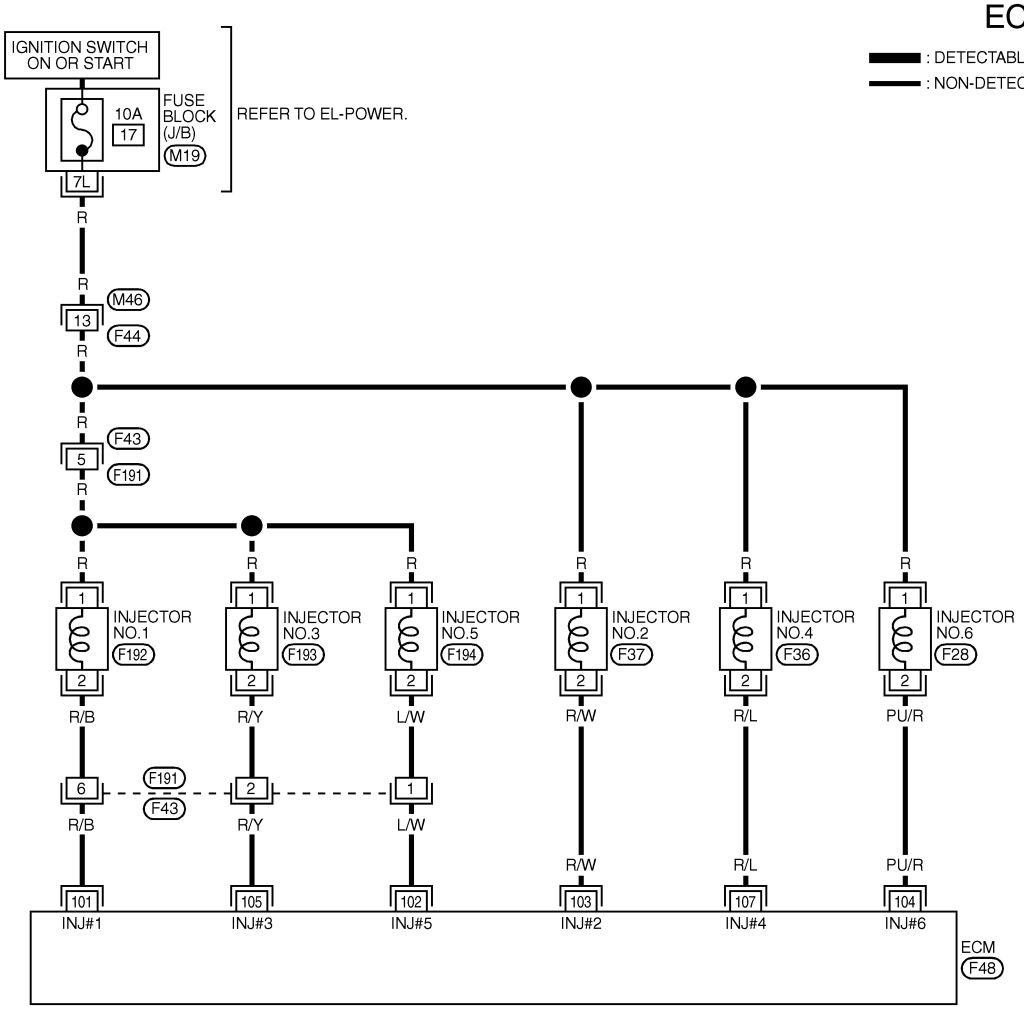
MONITOR ITEM	CONDITION		SPECIFICATION
INJ PULSE-B2 INJ PULSE-B1	● Engine: After warming up ● Air conditioner switch: “OFF” ● Shift lever: “N” ● No-load	Idle	2.4 - 3.2 msec
		2,000 rpm	1.9 - 2.8 msec
B/FUEL SCHDL	ditto	Idle	2.0 - 3.2 msec
		2,000 rpm	1.4 - 2.6 msec

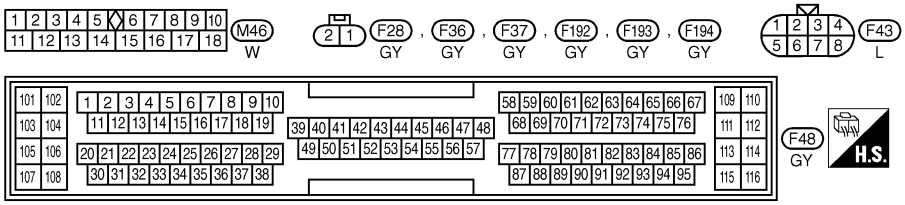
Wiring Diagram

NHEC0386

EC-INJECT-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC



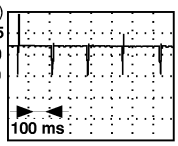


REFER TO THE FOLLOWING.
M19 -FUSE BLOCK-
JUNCTION BOX (J/B)

MEC823C

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
101	R/B	INJECTOR NO. 1	ENGINE RUNNING AT IDLE SPEED UNDER WARM-UP CONDITION	BATTERY VOLTAGE
102	L/W	INJECTOR NO. 5		
103	R/W	INJECTOR NO. 2		
104	PU/R	INJECTOR NO. 6		
105	R/Y	INJECTOR NO. 3		
107	R/L	INJECTOR NO. 4		



SEF862Y

Diagnostic Procedure

NHEC0387

1	INSPECTION START

Turn ignition switch to “START”.
Is any cylinder ignited?

Yes or No

Yes	▶	GO TO 2.
No	▶	GO TO 3.

2	CHECK OVERALL FUNCTION

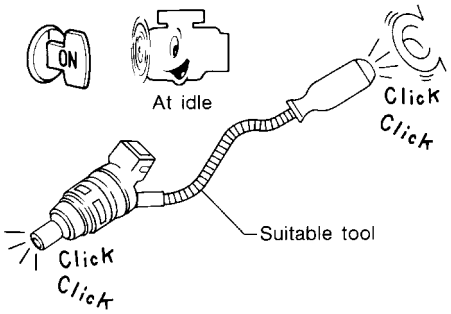
With CONSULT-II
1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-II.

ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS AIF SE-B1	XXX V
IACV-AAC/V	XXX step

SEF070Y

3. Make sure that each circuit produces a momentary engine speed drop.

Without CONSULT-II
1. Start engine.
2. Listen to each injector operating sound.



MEC703B

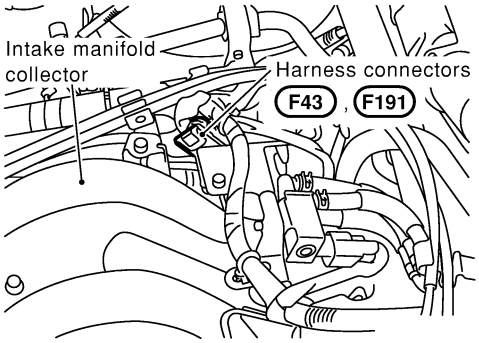
Clicking noise should be heard.

OK or NG

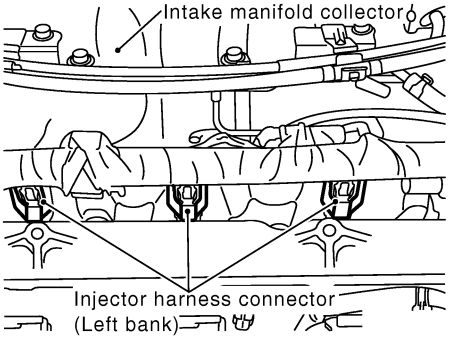
OK	▶	**INSPECTION END**
NG	▶	GO TO 3.

3	CHECK INJECTOR POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect injector harness connectors (Left bank) and harness connectors F43, F191 (Right bank).

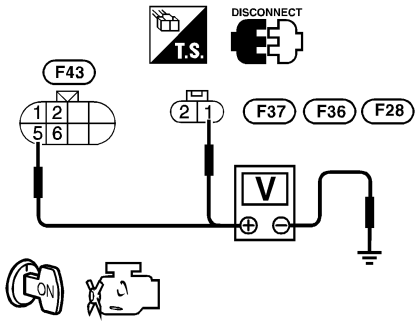


SEF276X



SEF281X

3. Turn ignition switch "ON".
4. Check voltage between injector terminal 1 and ground, harness connector F43 terminal 5 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF897X

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M46, F44
- Harness connectors F43, F191
- Fuse block (J/B) connector M19
- 10A fuse
- Harness for open or short between injector and fuse
- Harness for open or short between harness connector F43 and fuse

	▶	Repair harness or connectors.

5	CHECK INJECTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between injector terminal 2 and ECM terminals 103, 104, 107, harness connector F191 terminals 6, 2, 1 and ECM terminals 101, 105, 102. Refer to Wiring Diagram.
   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 F43, F191
- Harness for open or short between harness connector F191 and ECM
- Harness for open or short between ECM and injector

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

7	CHECK SUB-HARNESS CIRCUIT FOR OPEN AND SHORT (RIGHT BANK)

1. Remove intake manifold collector.
2. Disconnect injector harness connectors (Right bank).
3. Check harness continuity between the following terminals. Refer to Wiring Diagram.

Harness connector F191	Injector F192, F193, F194
5	1
6, 2, 1	2

MTBL0359

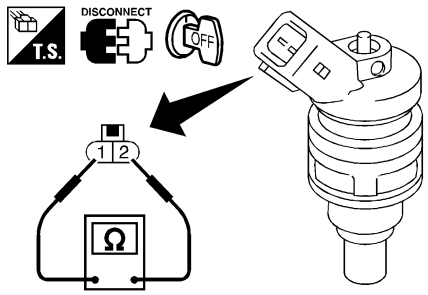
Continuity should exist.

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 INJECTOR

1. Disconnect injector harness connector.
2. Check resistance between terminals as shown in the figure.



Resistance: 14 - 15Ω [at 20°C (68°F)]

SEF964X

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace injector.

Diagnostic Procedure (Cont'd)

9	**CHECK INTERMITTENT INCIDENT**
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156.	
▶	**INSPECTION END**

CONSULT-II Reference Value in Data Monitor Mode

NHEC0388

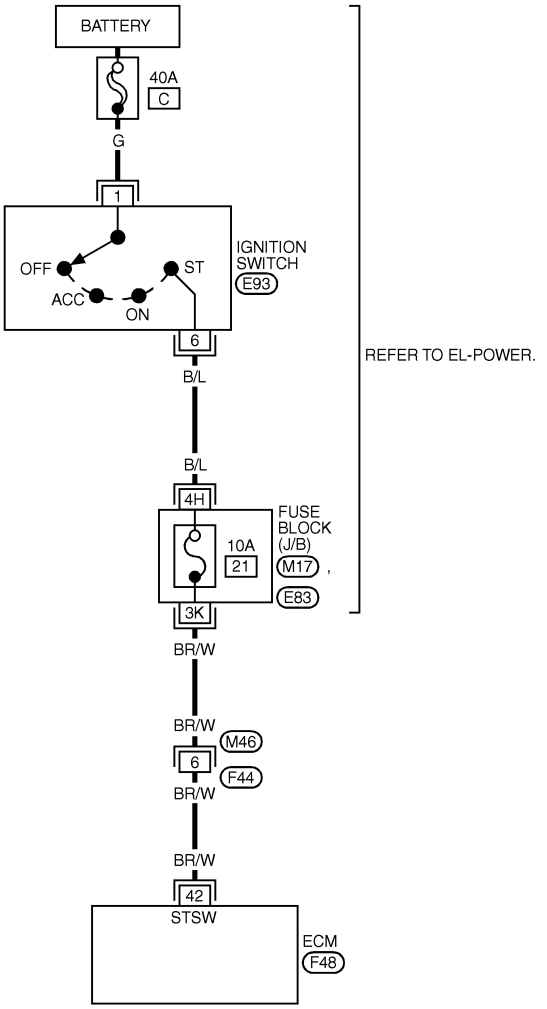
Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
START SIGNAL	● Ignition switch: ON → START → ON	OFF → ON → OFF

Wiring Diagram

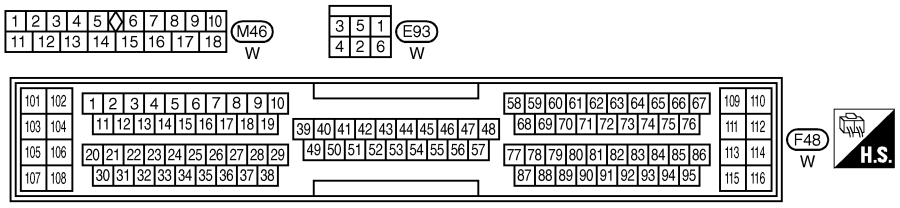
=NHEC0390

EC-S/SIG-01



: DETECTABLE LINE FOR DTC

: NON-DETECTABLE LINE FOR DTC



REFER TO THE FOLLOWING.
M17 -FUSE BLOCK-
JUNCTION BOX (J/B)
E83 -FUSE BLOCK-
JUNCTION BOX (J/B)

MEC762C

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
42	BR/W	START SIGNAL	IGN ON	APPROX 0V
			IGN START	9 - 12V

SEF638XB

Diagnostic Procedure

NHEC0391

1	INSPECTION START

Do you have CONSULT-II?

Yes or No

Yes	▶	GO TO 2.
No	▶	GO TO 3.

2	CHECK OVERALL FUNCTION

With CONSULT-II

1. Turn ignition switch “ON”.
2. Check “START SIGNAL” in “DATA MONITOR” mode with CONSULT-II under the following conditions.

DATA MONITOR	
MONITOR	NO DTC
START SIGNAL	OFF
CLSD THL POS	ON
AIR COND SIG	OFF
P/N POSI SW	ON

Condition	“START SIGNAL”
Ignition switch “ON”	OFF
Ignition switch “START”	ON

SEF072Y

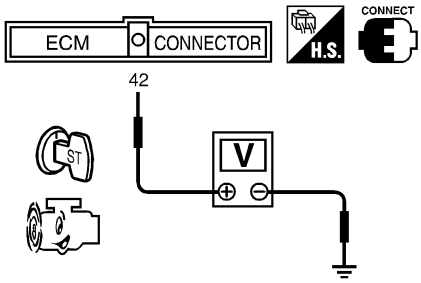
OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 4.

3	CHECK OVERALL FUNCTION

Without CONSULT-II

Check voltage between ECM terminal 42 and ground under the following conditions.



Condition	Voltage
Ignition switch “START”	Battery voltage
Other positions	Approximately 0V

SEF362X

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 4.

4	CHECK STARTING SYSTEM

Turn ignition switch “OFF”, then turn it to “START”.

Does starter motor operate?

Yes or No

Yes	▶	GO TO 5.
No	▶	Refer to SC-6, “STARTING SYSTEM”.

Diagnostic Procedure (Cont'd)

5	CHECK FUSE
1. Turn ignition switch "OFF". 2. Disconnect 10A fuse. 3. Check if 10A fuse is OK.	
OK or NG	
OK ▶	GO TO 6.
NG ▶	Replace 10A fuse.

6	CHECK START SIGNAL INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
1. Disconnect ECM harness connector. 2. Disconnect ignition switch harness connector. 3. Check harness continuity between ECM terminal 42 and fuse block, ignition switch and fuse block. Refer to Wiring Diagram. **Continuity should exist.** 4. 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 M46, F44 ● Fuse block (J/B) connectors M17, E83 ● Harness for open or short between ignition switch and fuse ● Harness for open or short between ECM and fuse	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

8	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156.	
▶	**INSPECTION END**

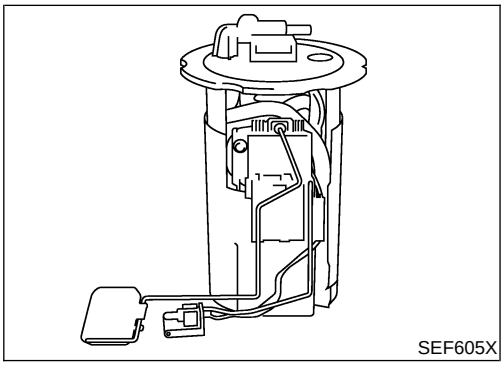
System Description

NHEC0392

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed (POS signal)	Fuel pump control	Fuel pump relay
Crankshaft position sensor (REF)	Engine speed (REF signal)		
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 120° signal from the crankshaft position sensor (REF), it knows that the engine is rotating, and causes the pump to operate. If the 120° signal is not received when the ignition switch is on, the engine stalls. The ECM stops pump operation and prevents battery discharging, thereby improving safety. The ECM does not directly drive the fuel pump. It controls the ON/OFF fuel pump relay, which in turn controls the fuel pump.

Condition	Fuel pump operation
Ignition switch is turned to ON.	Operates for 1 second.
Engine running and cranking	Operates.
When engine is stopped	Stops in 1.5 seconds.
Except as shown above	Stops.


SEF605X

Component Description

NHEC0393

The fuel pump with a fuel damper is an in-tank type (the pump and damper are located in the fuel tank).

CONSULT-II Reference Value in Data Monitor Mode

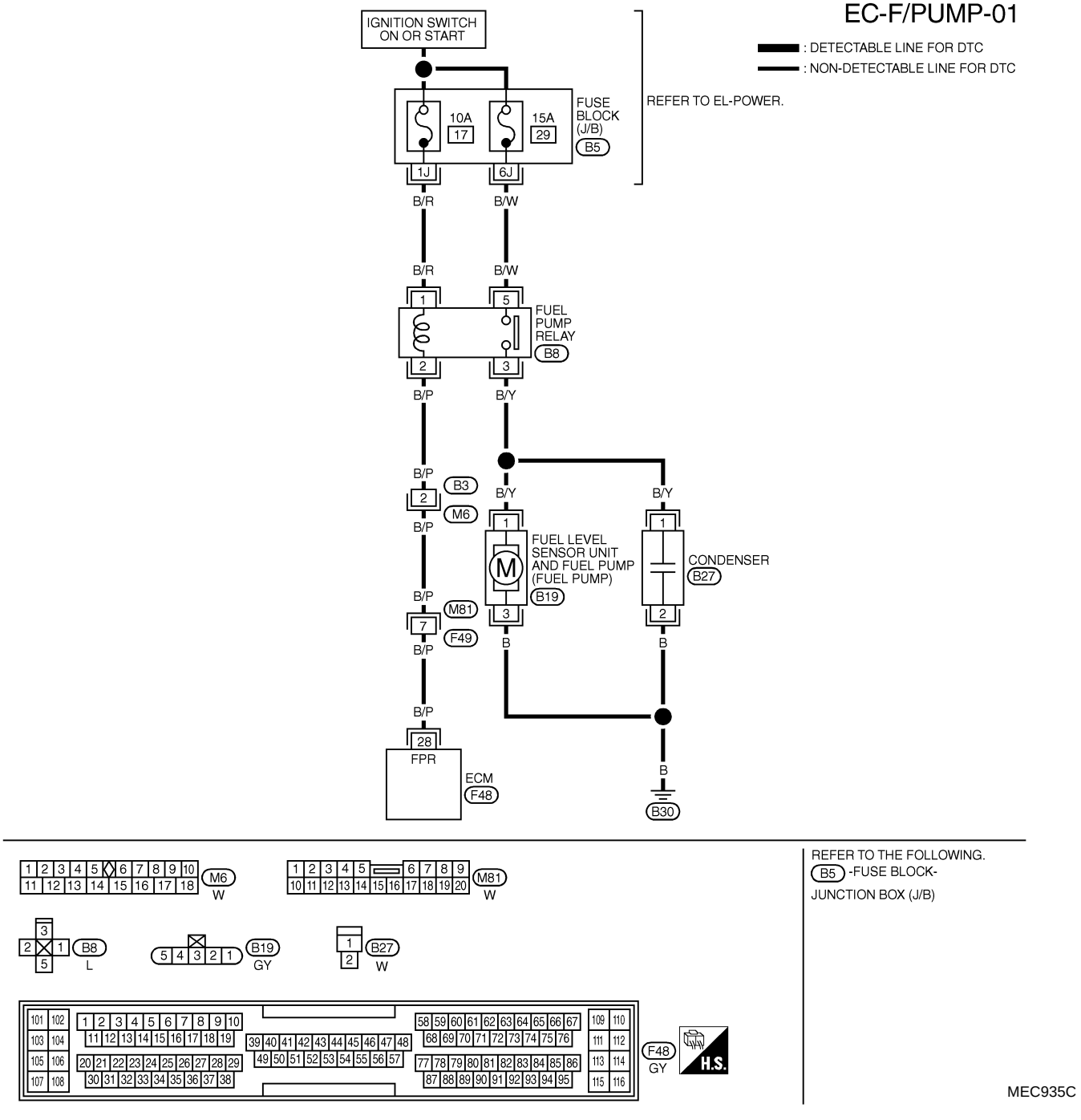
NHEC0394

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
FUEL PUMP RLY	● Ignition switch is turned to ON. (Operates for 1 second.) ● Engine running and cranking	ON
	Except as shown above	OFF

Wiring Diagram

NHEC0396



ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
28	B/P	FUEL PUMP RELAY	FOR 1 SECOND AFTER IGN ON	0 - 1.5V
			ENGINE RUNNING	
			MORE THAN 1 SECOND AFTER IGN ON	BATTERY VOLTAGE (11 - 14V)

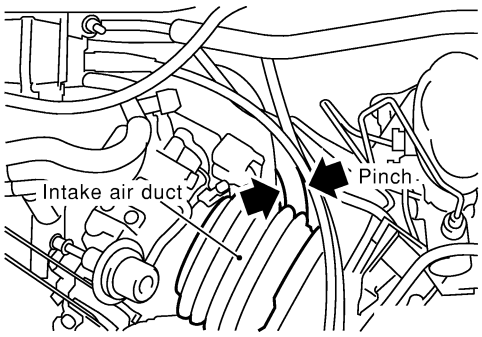
SEF639XB

Diagnostic Procedure

NHEC0397

1	CHECK OVERALL FUNCTION

1. Turn ignition switch “ON”.
2. Pinch fuel feed hose with two fingers.



SEF606X

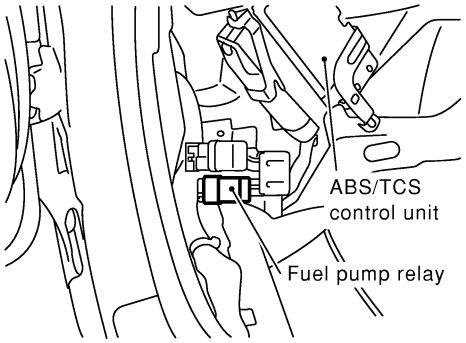
Fuel pressure pulsation should be felt on the fuel feed hose for 1 second after ignition switch is turned “ON”.

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 2.

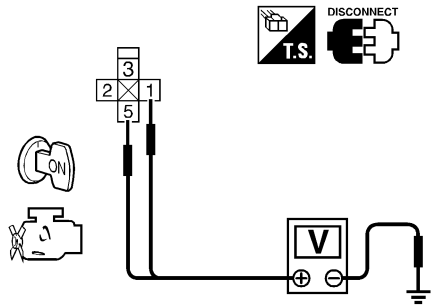
2	CHECK FUEL PUMP RELAY POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect fuel pump relay.



SEF284X

3. Turn ignition switch “ON”.
4. Check voltage between terminals 1, 5 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF898X

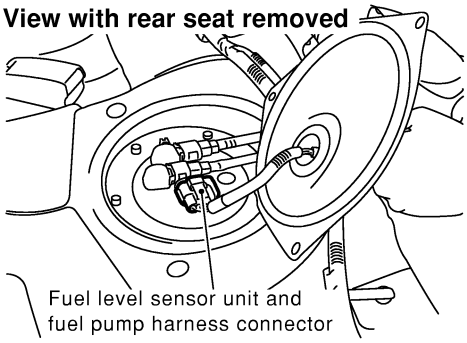
OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	DETECT MALFUNCTIONING PART
Check the following. ● Fuse block (J/B) connector B5 ● 10A fuse ● 15A fuse ● Harness for open or short between fuse and fuel pump relay	
▶	Repair harness or connectors.

4	CHECK FUEL PUMP POWER SUPPLY AND GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect fuel level sensor unit and fuel pump harness connector.



SEF263X

3. Check harness continuity between fuel pump terminal 3 and body ground, fuel pump terminal 1 and fuel pump relay terminal 3. Refer to Wiring Diagram.
   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 for open or short between fuel pump relay and fuel pump ● Harness for open or short between fuel pump and body ground	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK FUEL PUMP RELAY OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 28 and fuel pump relay terminal 2. Refer to Wiring Diagram.
   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 B3, M6 ● Harness connectors M81, F49 ● Harness for open or short between ECM and fuel pump relay	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

8	CHECK FUEL PUMP RELAY

With CONSULT-II

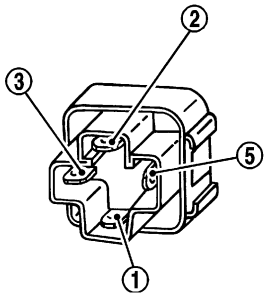
1. Reconnect fuel pump relay, fuel level sensor unit and fuel pump harness connector and ECM harness connector.
2. Turn ignition switch "ON".
3. Turn fuel pump relay "ON" and "OFF" in "ACTIVE TEST" mode with CONSULT-II and check operating sound.

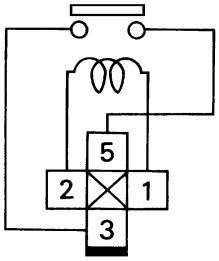
ACTIVE TEST	
FUEL PUMP RELAY	ON
MONITOR	
ENG SPEED	XXX rpm

SEF073Y

Without CONSULT-II

Check continuity between terminals 3 and 5 under the following conditions.





Conditions	Continuity
12V direct current supply between terminals 1 and 2	Yes
No current supply	No

SEF608X

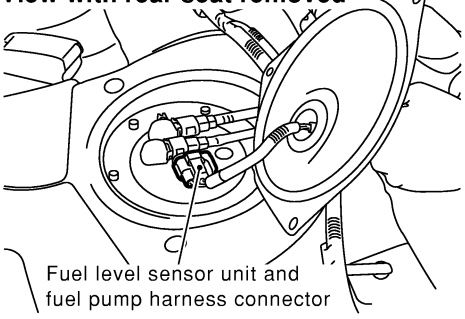
OK or NG

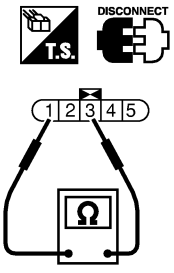
OK	▶	GO TO 9.
NG	▶	Replace fuel pump relay.

9	CHECK FUEL PUMP

1. Disconnect fuel level sensor unit and fuel pump harness connector.
2. Check resistance between fuel level sensor unit and fuel pump terminals 1 and 3.

View with rear seat removed





Resistance: 0.2 - 5.0 Ω [at 25°C (77°F)]

SEF609X

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace fuel pump.

Diagnostic Procedure (Cont'd)

10	**CHECK INTERMITTENT INCIDENT**
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156.	
▶	**INSPECTION END**

System Description

NHEC0599

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed (POS signal)	Engine mount control	Electronic controlled engine mount
Crankshaft position sensor (REF)	Engine speed (REF signal)		
Vehicle speed sensor	Vehicle speed		

The ECM controls the engine mount operation corresponding to the engine speed and the vehicle speed. The control system has 2-step control [soft/hard].

Vehicle condition	Engine mount control
Idle (with vehicle stopped)	Soft
Driving	Hard

CONSULT-II Reference Value in Data Monitor Mode

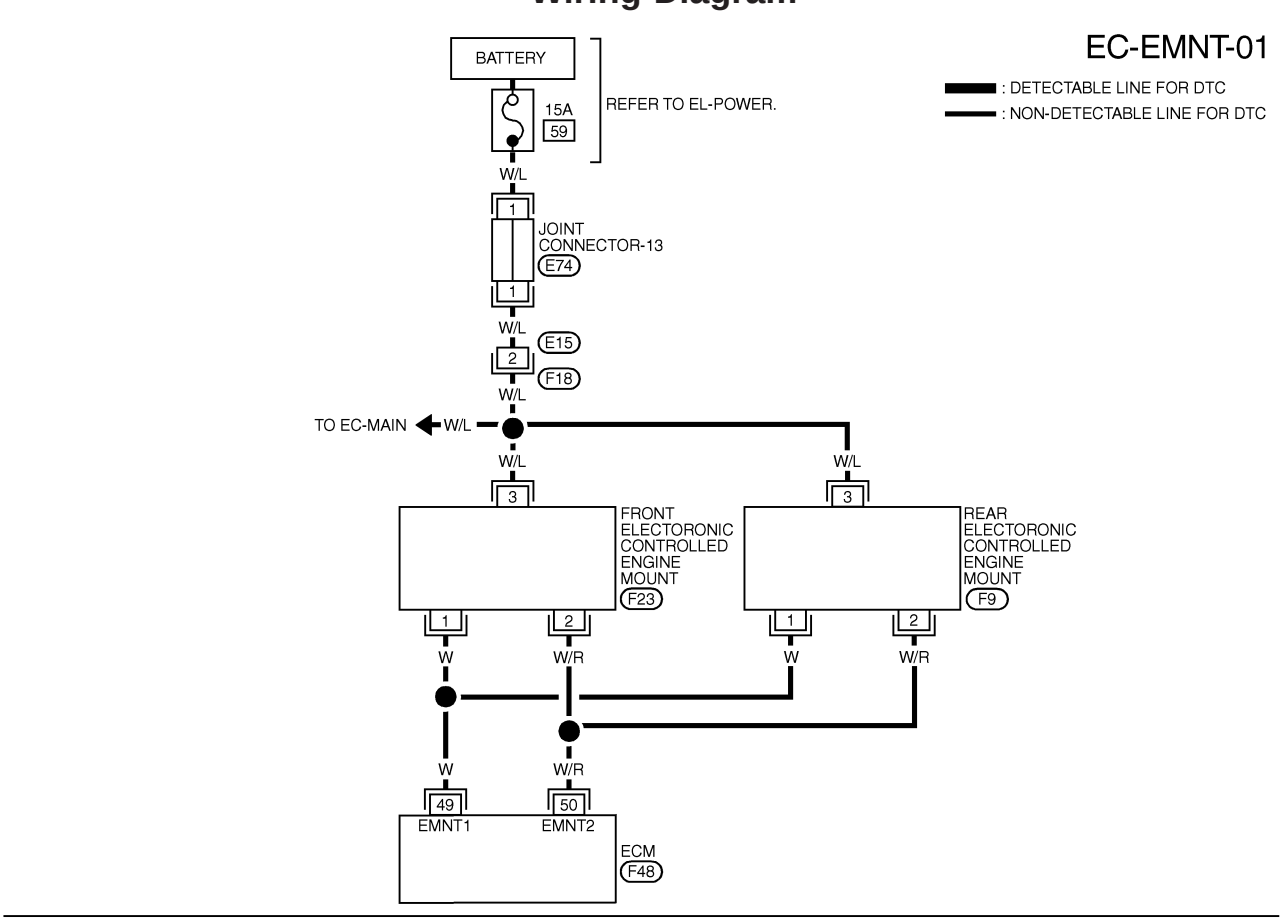
NHEC0600

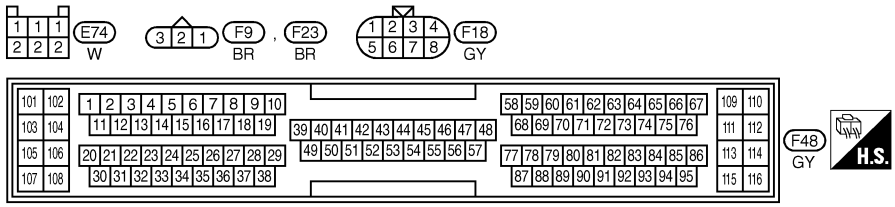
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ENGINE MOUNT	• Engine: Running	Idle	“IDLE”
		2,000 rpm	“TRVL”

Wiring Diagram

NHEC0602





MEC824C

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
49	W	ELECTRONIC CONTROLLED ENGINE MOUNT-1	ENGINE RUNNING AT IDLE SPEED	0 - 1.0V
			ENGINE RUNNING AT 2,000 RPM	BATTERY VOLTAGE
50	W/R	ELECTRONIC CONTROLLED ENGINE MOUNT-2	ENGINE RUNNING AT IDLE SPEED	BATTERY VOLTAGE
			ENGINE RUNNING AT 2,000 RPM	0 - 1.0V

SEF640XB

Diagnostic Procedure

NHEC0603

1 **CHECK THE OVERALL FUNCTION**

With CONSULT-II

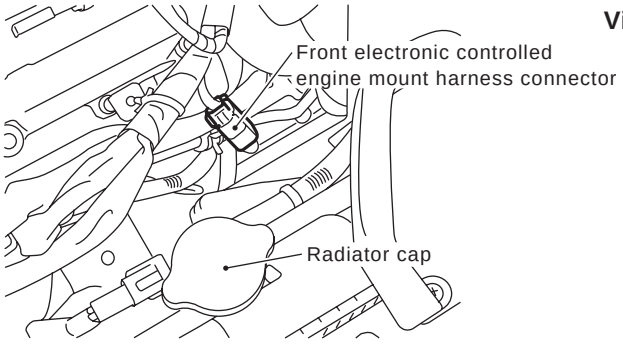
1. After warming up engine, run it at idle speed.
2. Shift selector lever to “D” range while depressing the brake pedal and pulling the parking brake control lever.
3. Perform “ENGINE MOUNTING” in “ACTIVE TEST” mode with CONSULT-II and check that the body vibration changes according to switching the condition (With vehicle stopped).

ACTIVE TEST	
ENG MOUNTING	IDLE
MONITOR	
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX ˚C

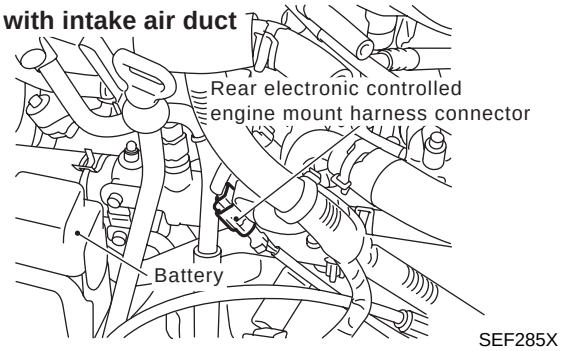
SEF074Y

Without CONSULT

1. After warming up engine, run it at idle speed.
2. Shift selector lever to “D” range while depressing the brake pedal and pulling the parking brake control lever.
3. Disconnect front or rear electronic controlled engine mount harness connector when engine speed is more than 1,000 rpm.



View with intake air duct



SEF285X

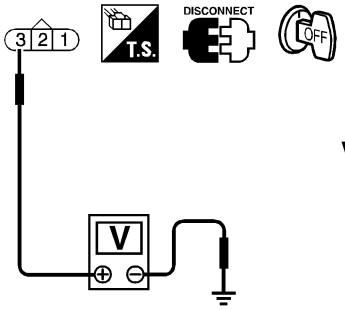
4. When returning engine speed to idle speed, check that the body vibration increases, compared with the condition of the above step 2 (With vehicle stopped).

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 2.

2	CHECK ELECTRONIC CONTROLLED ENGINE MOUNT POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect front or rear electronic controlled engine mount harness connector.
3. Check voltage between electronic controlled engine mount terminal 3 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF899X

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E15, F18
- 15A fuse
- Harness for open or short between electronic controlled engine mount and battery

	▶	Repair harness or connectors.

4	CHECK ELECTRONIC CONTROLLED ENGINE MOUNT OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 49 and electronic controlled engine mount terminal 1, ECM terminal 50 and electronic controlled engine mount terminal 2. Refer to Wiring Diagram.
   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, short to ground or short to power in harness connectors.

5	CHECK ELECTRONIC CONTROLLED ENGINE MOUNT

Visually check front and rear electronic controlled engine mount.

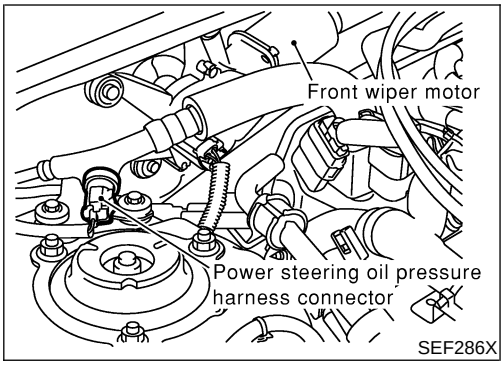
OK or NG

OK	▶	GO TO 6.
NG	▶	Replace front or rear engine mount assembly.

6	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156.

	▶	**INSPECTION END**



Component Description

NHEC0398

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-II Reference Value in Data Monitor Mode

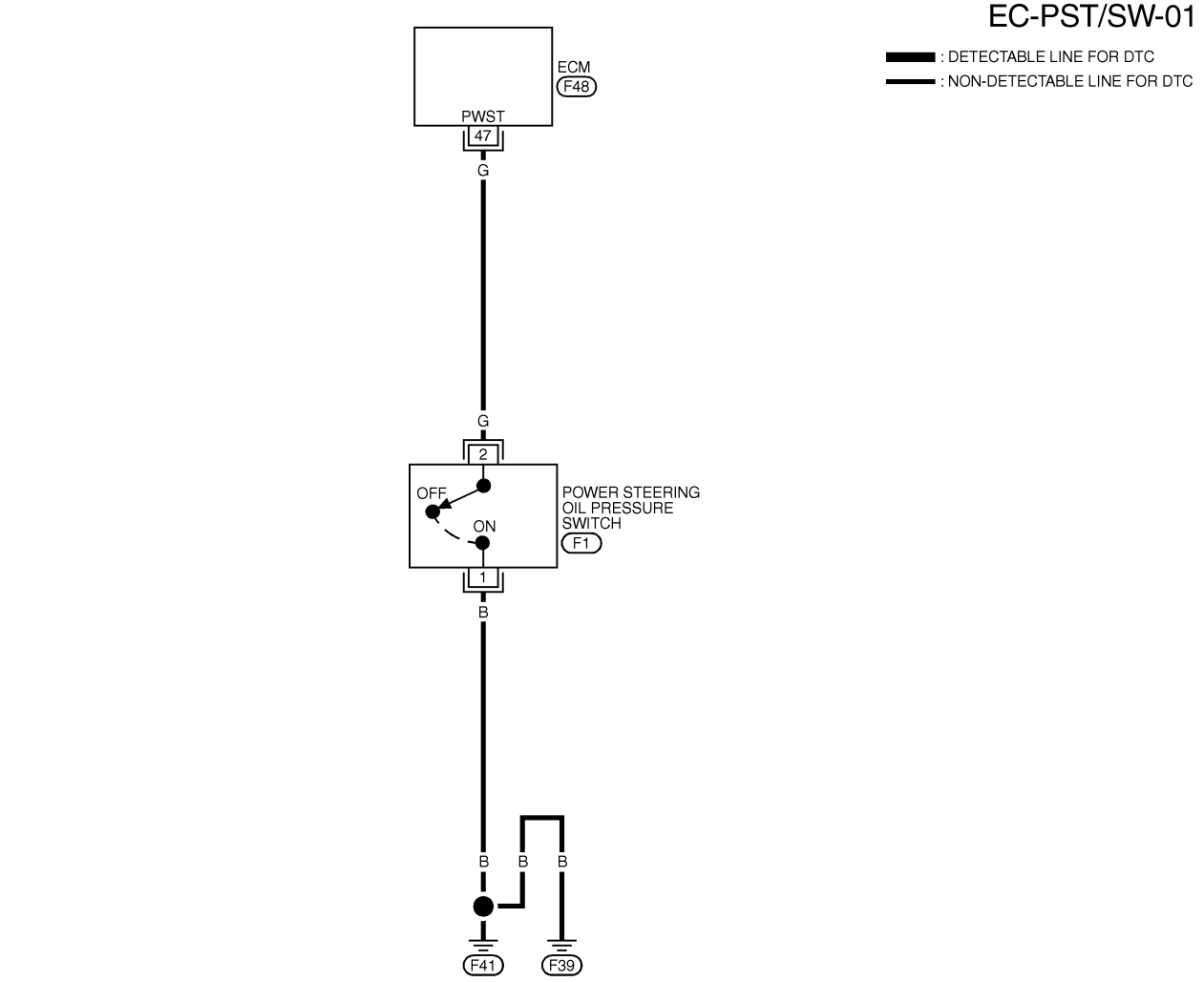
NHEC0399

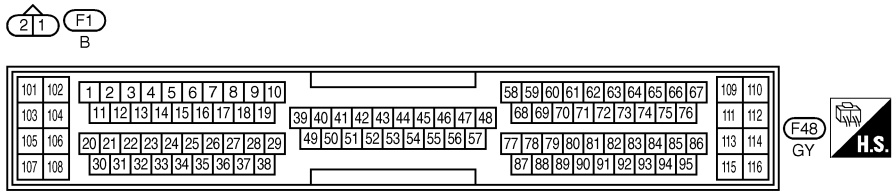
Specification data are reference values.

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

Wiring Diagram

NHEC0401





MEC765C

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
47	G	POWER STEERING OIL PRESSURE SWITCH	ENGINE RUNNING WITH STEERING WHEEL BEING FULLY TURNED	0 - 1.0V
			ENGINE RUNNING WITH STEERING WHEEL NOT BEING TURNED	BATTERY VOLTAGE

SEF641XB

Diagnostic Procedure

NHEC0402

1	INSPECTION START
Do you have CONSULT-II?	
Yes or No	
Yes ▶	GO TO 2.
No ▶	GO TO 3.

2	CHECK OVERALL FUNCTION

With CONSULT-II

1. Start engine.
2. Check “PW/ST SIGNAL” in “DATA MONITOR” mode with CONSULT-II under the following conditions.

DATA MONITOR	
MONITOR	NO DTC
PW/ST SIGNAL	OFF

Conditions	PW/ST SIGNAL
Steering is in neutral position	OFF
Steering is turned	ON

SEF054Y

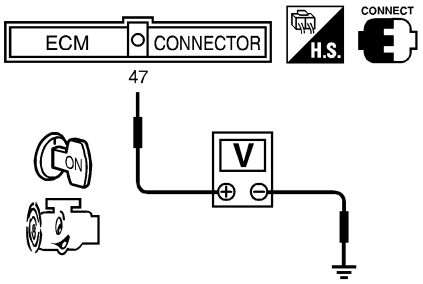
OK or NG

OK ▶	**INSPECTION END**
NG ▶	GO TO 4.

3	CHECK OVERALL FUNCTION

Without CONSULT-II

1. Start engine.
2. Check voltage between ECM terminal 47 and ground under the following conditions.



Conditions	Voltage
Steering is neutral position.	Approximately 5V
Steering is turned to full position.	Approximately 0V

SEF363X

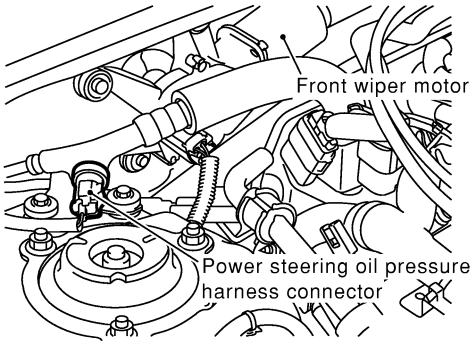
OK or NG

OK ▶	**INSPECTION END**
NG ▶	GO TO 4.

Diagnostic Procedure (Cont'd)

4	CHECK POWER STEERING OIL PRESSURE SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect power steering oil pressure switch harness connector.



SEF286X

3. Check harness continuity between power steering oil pressure switch terminal 1 and engine ground. Refer to Wiring Diagram.
   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 POWER STEERING OIL PRESSURE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

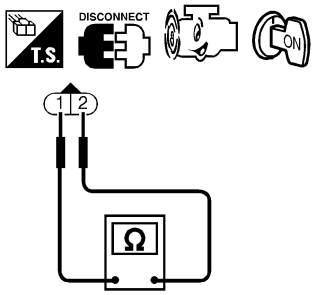
1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 47 and power steering oil pressure switch terminal 2. Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

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 POWER STEERING OIL PRESSURE SWITCH

1. Disconnect power steering oil pressure switch harness connector then start engine.
2. Check continuity between power steering oil pressure switch terminals 1 and 2 under the following conditions.



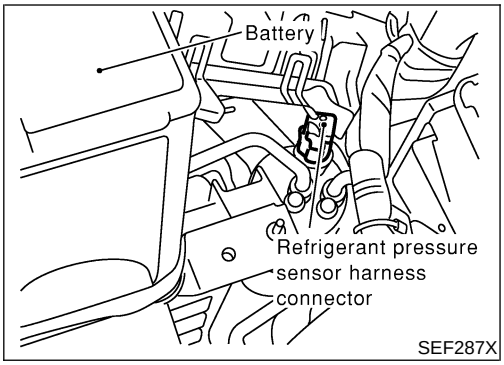
Conditions	Continuity
Steering wheel is being fully turned.	Yes
Steering wheel is not being turned.	No

SEF364X

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace power steering oil pressure switch.

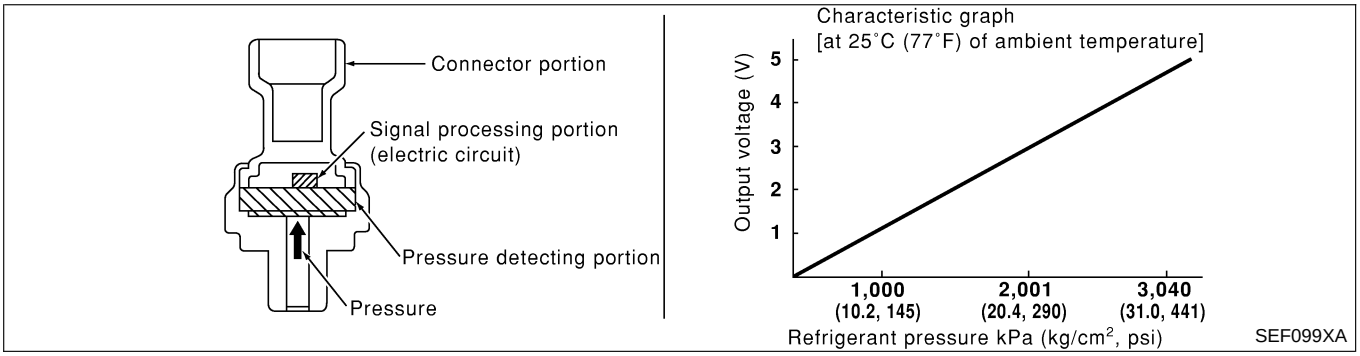
7	**CHECK INTERMITTENT INCIDENT**
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156.	
▶	**INSPECTION END**



Description

NHEC0636

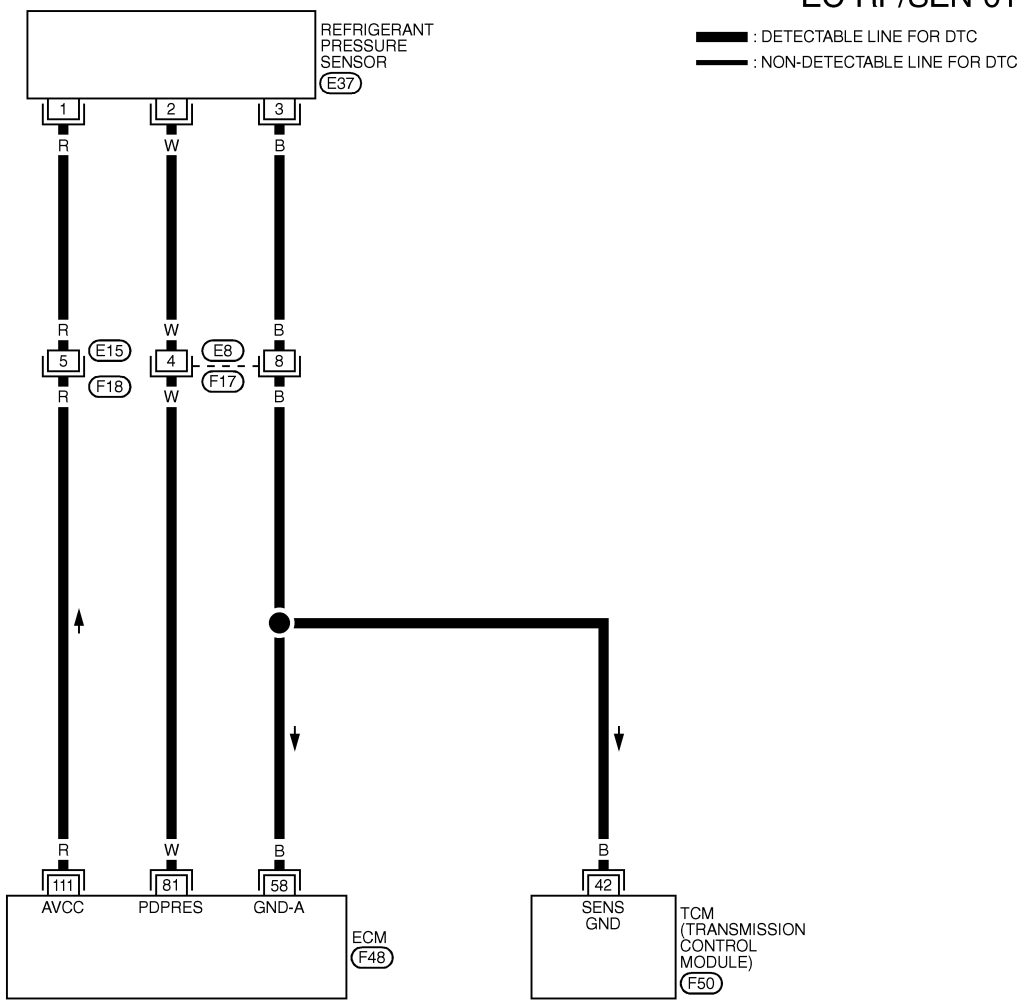
The refrigerant pressure sensor is installed at the liquid tank of the air conditioner system. The sensor uses an electrostatic volume pressure transducer to convert refrigerant pressure to voltage. The voltage signal is sent to ECM, and ECM controls cooling fan system.

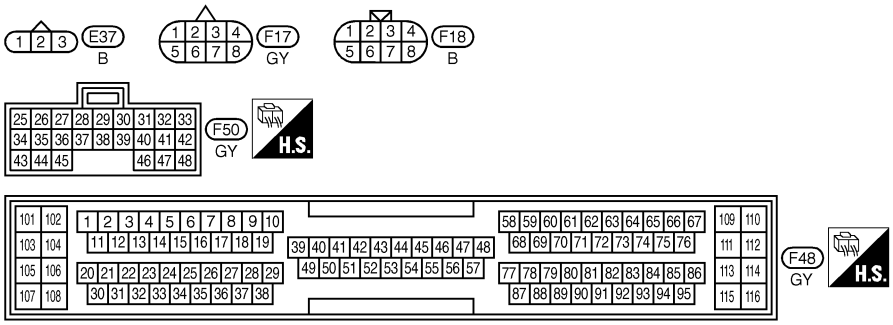


Wiring Diagram

NHEC0637

EC-RP/SEN-01





MEC829C

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
58	B	SENSOR'S GROUND	ENGINE RUNNING AT IDLE SPEED UNDER WARM-UP CONDITION	0V
81	W	REFRIGERANT PRESSURE SENSOR	ENGINE RUNNING UNDER WARM-UP CONDITION WITH A/C SWITCH AND BLOWER SWITH ON	0.36 - 3.88V
111	R	SENSOR'S POWER SUPPLY	IGN ON	APPROX. 5V

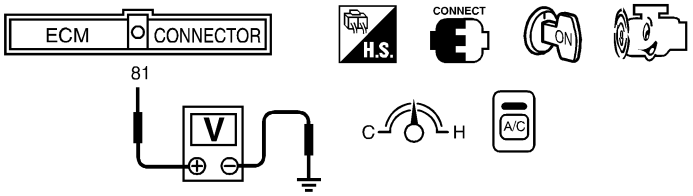
SEF643XB

Diagnostic Procedure

NHEC0638

1	CHECK REFRIGERANT PRESSURE SENSOR OVERALL FUNCTION

1. Start engine and warm it up to normal operating temperature.
2. Turn A/C switch and blower switch “ON”.
3. Check voltage between ECM terminal 81 and ground with CONSULT-II or tester.



Voltage: 0.36 - 3.88V

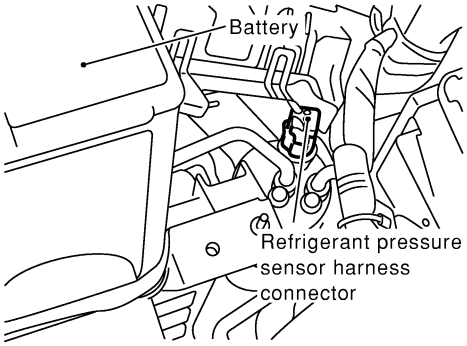
SEF617X

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 2.

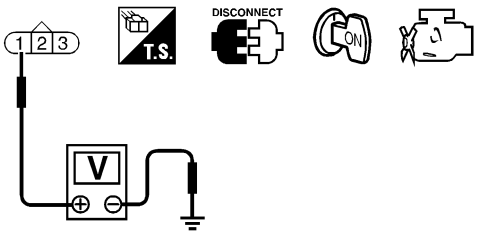
2	CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn A/C switch and blower switch “OFF”.
2. Stop engine.
3. Disconnect refrigerant pressure sensor harness connector.



SEF287X

4. Turn ignition switch “ON”.
5. Check voltage between refrigerant pressure sensor terminal 1 and ground with CONSULT-II or tester.



Voltage: Approximately 5V

SEF618X

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E15, F18 ● Harness for open or short between ECM and refrigerant pressure sensor	
▶	Repair harness or connectors.

4	CHECK REFRIGERANT PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT	
1. Turn ignition switch "OFF". 2. Check harness continuity between refrigerant pressure sensor terminal 3 and engine ground. Refer to Wiring Diagram. **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 E8, F17 ● Harness for open or short between ECM and refrigerant pressure sensor ● Harness for open or short between TCM (Transmission control module) and refrigerant pressure sensor	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK REFRIGERANT PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 81 and refrigerant pressure sensor terminal 2. Refer to Wiring Diagram. **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 E8, F17 ● Harness for open or short between ECM and refrigerant pressure sensor	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

8	CHECK REFRIGERANT PRESSURE SENSOR	
Refer to HA-80, "Refrigerant pressure sensor".		
OK or NG		
OK	▶	GO TO 9.
NG	▶	Replace refrigerant pressure sensor.

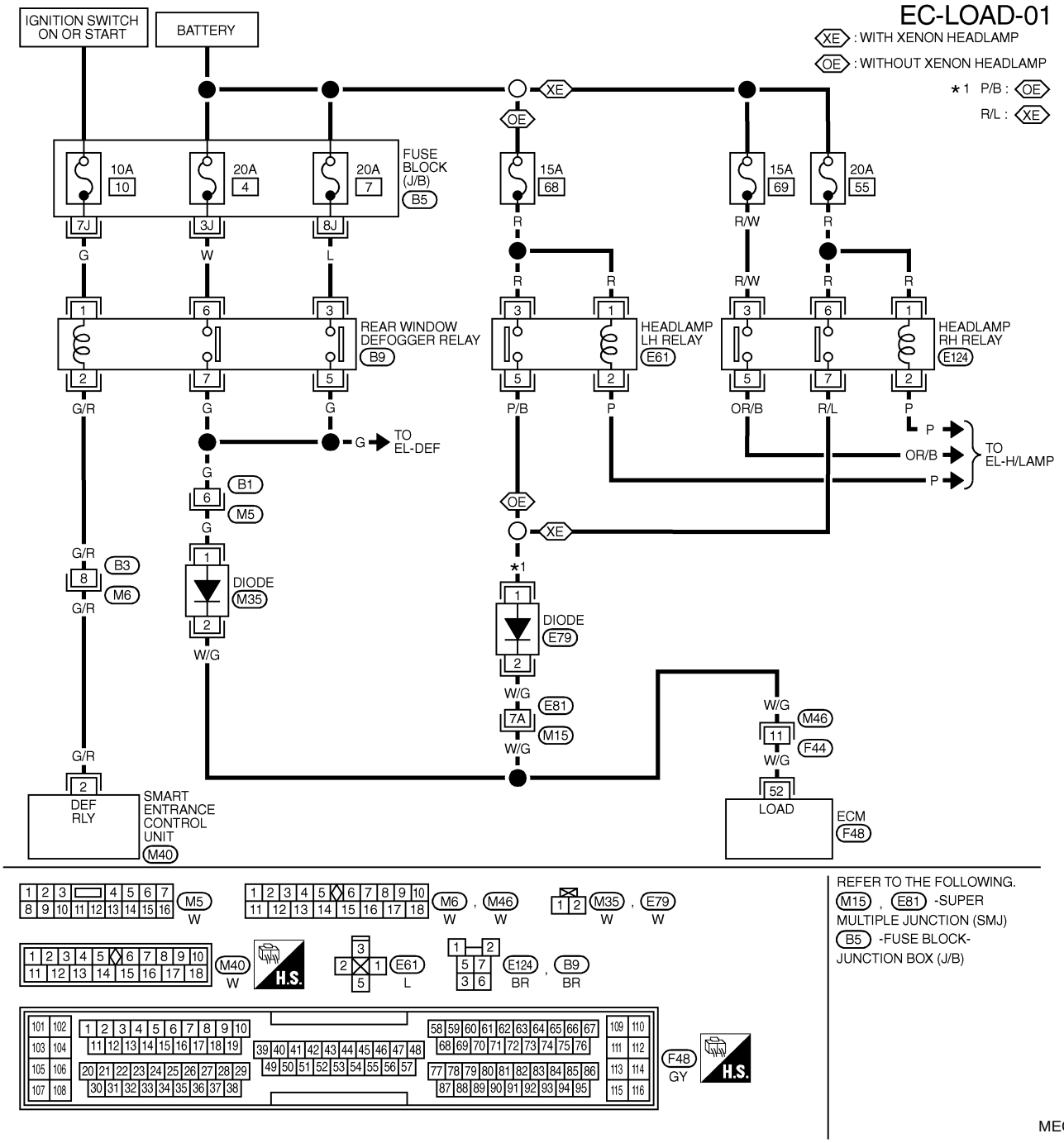
9	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156.	
▶	**INSPECTION END**

Wiring Diagram

NHEC0604

FOR USA

NHEC0604S01



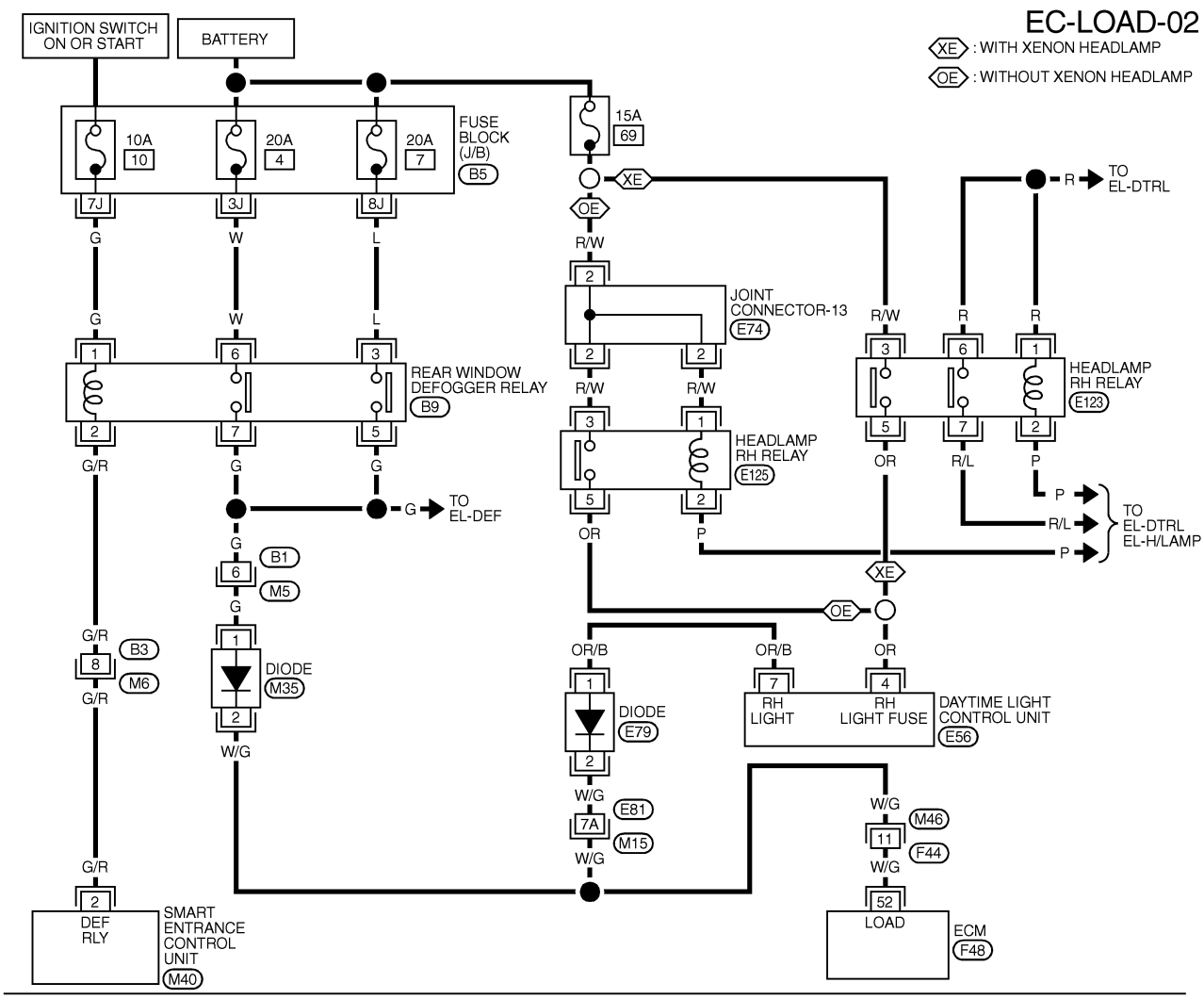
ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
52	W/G	ELECTRICAL LOAD SIGNAL	IGN ON WITH REAR WINDOW DEFOGGER SWITCH ON OR LIGHTING SWITCH ON AT 1ST POSITION	BATTERY VOLTAGE
			IGN ON UNDER EXCEPT ABOVE CONDITION	0V

SEF642XB

FOR CANADA

NHEC0604S02



MEC908C

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
52	W/G	ELECTRICAL LOAD SIGNAL	IGN ON WITH REAR WINDOW DEFOGGER SWITCH ON OR LIGHTING SWITCH ON AT 1ST POSITION	BATTERY VOLTAGE
			IGN ON UNDER EXCEPT ABOVE CONDITION	0V

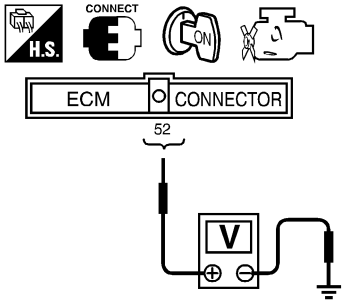
SEF642XB

Diagnostic Procedure

NHEC0605

1	CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-I

1. Turn ignition switch “ON”.
2. Check voltage between ECM terminal 52 and ground under the following conditions.



Condition	Voltage
Rear window defogger switch “ON”	BATTERY VOLTAGE
Rear window defogger switch “OFF”	0V

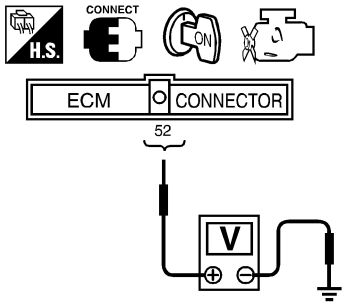
SEF610X

OK or NG

OK	▶	GO TO 2.
NG	▶	GO TO 3.

2	CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-II

Check voltage between ECM terminal 52 and ground under the following conditions.



Condition	Voltage
Lighting switch “ON” at 1st position	BATTERY VOLTAGE
Lighting switch “OFF”	0V

SEF611X

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 7.

3	CHECK REAR WINDOW DEFOGGER FUNCTION

1. Start engine.
2. Turn “ON” the rear window defogger switch.
3. Check the rear windshield. Is the rear windshield heated up?

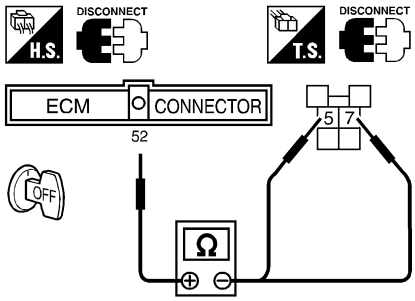
Yes or No

Yes	▶	GO TO 4.
No	▶	Refer to EL-190, “Rear Window Defogger”.

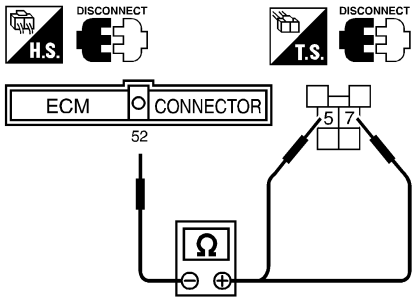
4	CHECK REAR WINDOW DEFOGGER INPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Stop engine.
2. Disconnect ECM harness connector.
3. Disconnect rear window defogger relay.
4. Check harness continuity between ECM terminal 52 and rear window defogger relay terminals 5 and 7.

CONDITION 1



CONDITION 2



CONDITION	CONTINUITY
1	Should exist.
2	Should not exist.

SEF612X

5. 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 B1, M5
- Harness connectors M46, F44
- Diode M35
- Harness for open and short between ECM and rear window defigger relay

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

6	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156.

	▶	**INSPECTION END**

7	CHECK HEADLAMP FUNCTION

1. Start engine.
2. Turn the lighting switch "ON" at 1st position with high beam.
3. Check that headlamps are illuminated.

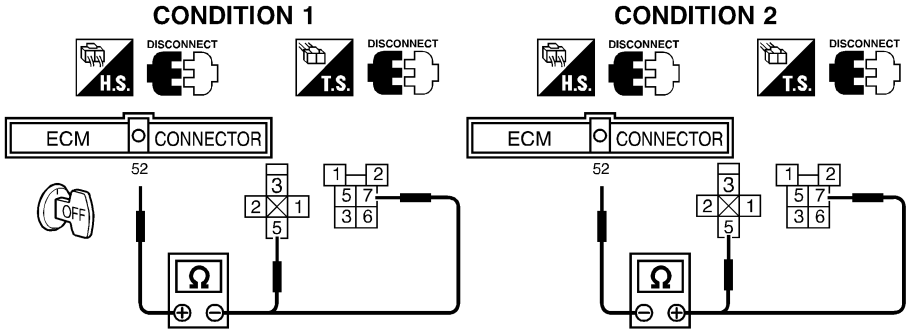
OK or NG

OK	▶	GO TO 8.
NG	▶	Refer to EL-34, "HEADLAMP (FOR USA)" or "EL-65, "HEADLAMP (FOR CANADA) — DAYTIME LIGHT SYSTEM".

Diagnostic Procedure (Cont'd)

8	CHECK HEADLAMP INPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Stop engine.
2. Disconnect ECM harness connector.
3. Disconnect headlamp RH relay (Models with xenon headlamp), headlamp LH relay (Models without xenon headlamp).
4. Check harness continuity between ECM terminal 52 and headlamp RH relay terminal 7 or headlamp LH relay terminal 5 under the following conditions.



CONDITION	CONTINUITY
1	Should exist.
2	Should not exist.

SEF900X

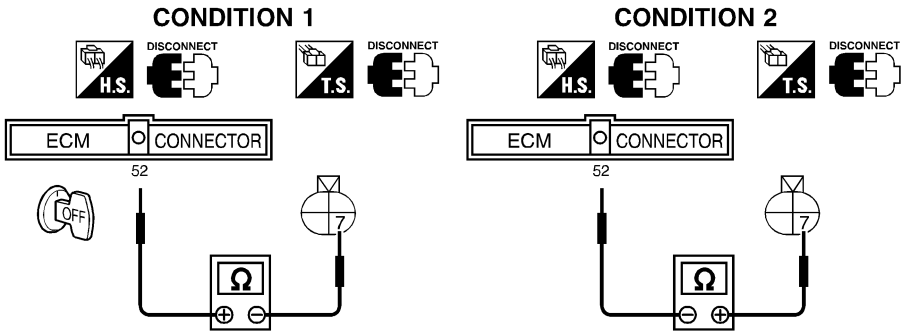
5. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 11.
NG	▶	GO TO 10.

9	CHECK HEADLAMP INPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Stop engine.
2. Disconnect ECM harness connector.
3. Disconnect daytime light control unit harness connector (Models for Canada).
4. Check harness continuity between ECM terminal 52 and daytime light control unit terminal 7 under the following conditions.



CONDITION	CONTINUITY
1	Should exist.
2	Should not exist.

SEF901X

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

OK or NG

OK	▶	GO TO 11.
NG	▶	GO TO 10.

10	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E81, M15
- Harness connectors M46, F44
- Diode E79
- Harness for open and short between ECM and headlamp RH relay, headlamp LH relay or daytime light control unit

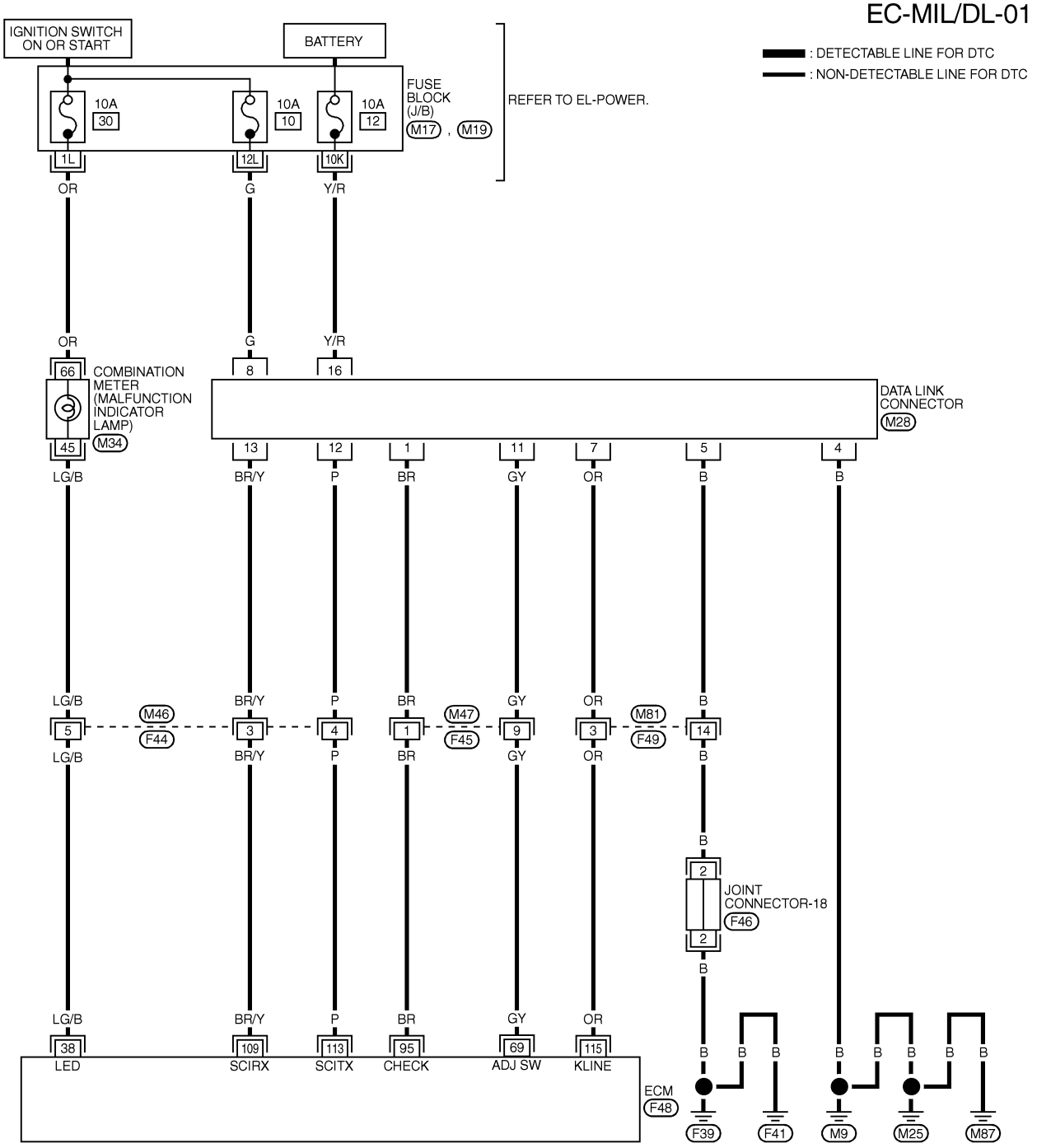
	▶	Repair open circuit or short to ground or short to power in harness or connectors.

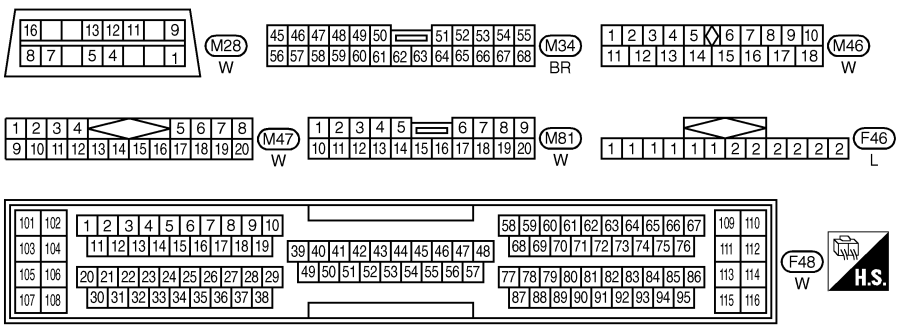
11	**CHECK INTERMITTENT INCIDENT**
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-156.	
▶	**INSPECTION END**

Wiring Diagram

NHEC0407

EC-MIL/DL-01





REFER TO THE FOLLOWING.
M17 -FUSE BLOCK- JUNCTION BOX (J/B)
M19 -FUSE BLOCK- JUNCTION BOX (J/B)

MEC827C

Fuel Pressure Regulator

NHEC0408

Fuel pressure at idling kPa (kg/cm^2, psi)	
Vacuum hose is connected.	Approximately 235 (2.4, 34)
Vacuum hose is disconnected.	Approximately 294 (3.0, 43)

Idle Speed and Ignition Timing

NHEC0409

Target idle speed*1	No-load*2 (in “P” or N” position)	700±50 rpm
Air conditioner: ON	In “P” or N” position	825 rpm or more
Ignition timing*1	In “P” or N” position	15°±5° BTDC
Throttle position sensor idle position		0.15 - 0.85V

*1: Throttle position sensor harness connector connected
*2: Under the following conditions:

- Air conditioner switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Mass Air Flow Sensor

NHEC0411

Supply voltage	Battery voltage (11 - 14V)
Output voltage at idle	1.2 - 1.8*V
Mass air flow (Using CONSULT-II or GST)	2.0 - 6.0 g·m/sec at idle* 7.0 - 20.0 g·m/sec at 2,500 rpm*

*: Engine is warmed up to normal operating temperature and running under no-load.

Engine Coolant Temperature Sensor

NHEC0412

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

NHEC0413

EGR temperature °C (°F)	Voltage V	Resistance MΩ
0 (32)	4.61	0.68 - 1.11
50 (122)	2.53	0.09 - 0.12
100 (212)	0.87	0.017 - 0.024

Front Heated Oxygen Sensor Heater

NHEC0414

Resistance [at 25°C (77°F)]	2.3 - 4.3Ω

Fuel Pump

NHEC0415

Resistance [at 25°C (77°F)]	0.2 - 5.0Ω

IACV-AAC Valve

NHEC0416

Resistance [at 20°C (68°F)]	Approximately 22Ω

Injector

NHEC0417

Resistance [at 20°C (68°F)]	14 - 15Ω

Resistor

NHEC0418

Resistance [at 25°C (77°F)]	Approximately 2.2 kΩ

Throttle Position Sensor

NHEC0419

Throttle valve conditions	Voltage (at normal operating temperature, engine off, ignition switch ON, throttle opener disengaged)
Completely closed (a)	0.15 - 0.85V
Partially open	Between (a) and (b)
Completely open (b)	3.5 - 4.7V

Calculated Load Value

NHEC0420

	Calculated load value % (Using CONSULT-II or GST)
At idle	14.0 - 33.0
At 2,500 rpm	12.0 - 25.0

Intake Air Temperature Sensor

NHEC0421

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

Rear Heated Oxygen Sensor Heater

NHEC0422

Resistance [at 25°C (77°F)]	2.3 - 4.3Ω

Crankshaft Position Sensor (REF)

NHEC0423

Resistance [at 20°C (68°F)]	470 - 570Ω

Fuel Tank Temperature Sensor

NHEC0424

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

Camshaft Position Sensor (PHASE)

NHEC0639

Resistance [at 20°C (68°F)]	HITACHI make	1,440 - 1,760Ω
	MITSUBISHI make	2,090 - 2,550Ω