ENGINE CONTROL SYSTEM

SECTION EC

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QG18DE (EXC CALIF CA)

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Alphabetical & P No. Index for DTC

NIEC0001

ALPHABETICAL INDEX FOR DTC

NIEC0001S01

Items (CONSULT-II screen terms)	DTC*1	Reference page
Unable to access PCM	—	EC-146
ABSL PRES SEN/CIRC	P0105	EC-185
AIR TEMP SEN/CIRC	P0110	EC-190
A/T 1ST GR FNCTN	P0731	***AT-295***
A/T 2ND GR FNCTN	P0732	***AT-302***
A/T 3RD GR FNCTN	P0733	***AT-308***
A/T 4TH GR FNCTN	P0734	***AT-314***
A/T COMM LINE	P0600*2	EC-472
A/T DIAG COMM LINE	P1605	EC-657
A/T TCC S/V FNCTN	P0744	***AT-327***
ATF TEMP SEN/CIRC	P0710	***AT-280***
CMP SEN/CIRCUIT	P0340	EC-363
CLOSED LOOP-B1	P1148	EC-523
CLOSED LOOP-B2	P1168	EC-523
CLOSED TP SW/CIRC	P0510	EC-464
COOLANT T SEN/CIRC*3	P0115	EC-196
*COOLAN T SEN/CIRC	P0125	EC-213
CKP SEN (COG)	P1336	EC-560
CKP SEN/CIRCUIT	P0335	EC-358
CYL 1 MISFIRE	P0301	EC-347
CYL 2 MISFIRE	P0302	EC-347
CYL 3 MISFIRE	P0303	EC-347
CYL 4 MISFIRE	P0304	EC-347
ECM (PCM)	P0605	EC-474
EGR SYSTEM	P0400	EC-369
EGR SYSTEM	P1402	EC-572
EGR TEMP SEN/CIRC	P1401	EC-565
EGR VOL CONT/V CIR	P0403	EC-378
ENGINE SPEED SIG	P0725	***AT-291***
ENG OVER TEMP	P0217	EC-329
ENG OVER TEMP	P1217*2	EC-532
EVAP GROSS LEAK	P0455	EC-428
EVAP PURG FLOW/MON	P1447	EC-617
EVAP SYS PRES SEN	P0450	EC-416
EVAP SMALL LEAK	P0440	EC-389

Items (CONSULT-II screen terms)	DTC*1	Reference page
EVAP SMALL LEAK	P1440	EC-580
EVAP VERY SML LEAK	P1441	EC-582
HO2S1 HTR (B1)	P0135	EC-259
HO2S1 (B1)	P0130	EC-218
HO2S1 (B1)	P0131	EC-227
HO2S1 (B1)	P0132	EC-233
HO2S1 (B1)	P0133	EC-240
HO2S1 (B1)	P0134	EC-251
HO2S1 HTR (B2)	P0155	EC-582
HO2S1 (B2)	P0150	EC-218
HO2S1 (B2)	P0151	EC-227
HO2S1 (B2)	P0152	EC-233
HO2S1 (B2)	P0153	EC-240
HO2S1 (B2)	P0154	EC-251
FUEL LEVL SEN/CIRC	P0464	EC-447
FUEL LEVL SEN/CIRC	P1464	EC-638
FUEL LEVEL SENSOR	P0461	EC-445
FUEL LV SE (SLOSH)	P0460	EC-441
FUEL SYS-LEAN/BK1	P0171	EC-306
FUEL SYS-RICH/BK1	P0172	EC-315
FUEL TEMP SEN/CIRC	P0180	EC-324
IACV/AAC VLV/CIRC	P0505	EC-455
IGN SIGNAL-PRIMARY	P1320	EC-549
INT/V TIM CONT-B1	P1110	EC-476
INT/V TIM V/CIR-B1	P1111	EC-482
INTK TIM S/CIRC-B1	P1140	EC-518
KNOCK SEN/CIRC-B1	P0325*2	EC-354
L/PRES SOL/CIRC	P0745	***AT-338***
MAF SEN/CIRCUIT*3	P0100	EC-176
MULTI CYL MISFIRE	P0300	EC-347
NATS MALFUNCTION	P1610 - P1615*2	***EL-305***
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	**P0000**	**—**
O/R CLTCH SOL/CIRC	P1760	***AT-359***
P-N POS SW/CIRCUIT	P1706	EC-659
PNP SW/CIRC	P0705	***AT-275***
PURG VOLUME CONT/V	P0443	EC-403
PURG VOLUME CONT/V	P1444	EC-597

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

Items (CONSULT-II screen terms)	DTC*1	Reference page
HO2S2 (B1)	P0137	EC-265
HO2S2 (B1)	P0138	EC-274
HO2S2 (B1)	P0139	EC-283
HO2S2 (B1)	P0140	EC-292
HO2S2 (B2)	P0157	EC-265
HO2S2 (B2)	P0158	EC-369
HO2S2 (B2)	P0159	EC-283
HO2S2 (B2)	P0160	EC-292
HO2S2 HTR (B1)	P0141	EC-300
HO2S2 HTR (B2)	P0161	EC-300
SFT SOL A/CIRC*3	P0750	***AT-343***
SFT SOL B/CIRC*3	P0755	***AT-347***
SWIRL CONT SOL/V	P1130	EC-489
SWIRL CONT SOL/V	P1131	EC-512
SWL CON VC SW/CIRC	P1165	EC-525
TCC SOLENOID/CIRC	P0740	***AT-323***
THERMOSTAT FNCTN	P1126	EC-487
TP SEN/CIRC A/T*3	P1705	***AT-351***
TRTL POS SEN/CIRC*3	P0120	EC-201
TW CATALYST SYS-B1	P0420	EC-385
TW CATALYST SYS-B2	P0430	EC-385
VC CUT/V BYPASS/V	P1491	EC-647
VC/V BYPASS/V	P1490	EC-641
VEH SPEED SEN/CIRC*4	P0500	EC-451
VEH SPD SEN/CIR A/T*4	P0720	***AT-286***
VENT CONTROL VALVE	P0446	EC-409
VENT CONTROL VALVE	P1446	EC-609
VENT CONTROL VALVE	P1448	EC-629

*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.

P NO. INDEX FOR DTC

=NIEC0001S02

DTC*1	Items (CONSULT-II screen terms)	Reference page
—	Unable to access PCM	EC-146
P0000	**NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.**	**—**
P0100	MAF SEN/CIRCUIT*3	EC-176
P0105	ABSL PRES SEN/CIRC	EC-185
P0110	AIR TEMP SEN/CIRC	EC-190
P0115	COOLANT T SEN/CIRC*3	EC-196
P0120	THRTL POS SEN/CIRC*3	EC-201
P0125	*COOLAN T SEN/CIRC	EC-213
P0130	HO2S1 (B1)	EC-218
P0131	HO2S1 (B1)	EC-227
P0132	HO2S1 (B1)	EC-233
P0133	HO2S1 (B1)	EC-240
P0134	HO2S1 (B1)	EC-251
P0135	HO2S1 HTR (B1)	EC-259
P0137	HO2S2 (B1)	EC-265
P0138	HO2S2 (B1)	EC-274
P0139	HO2S2 (B1)	EC-283
P0140	HO2S2 (B1)	EC-292
P0141	HO2S2 HTR (B1)	EC-300
P0150	HO2S1 (B2)	EC-218
P0151	HO2S1 (B2)	EC-227
P0152	HO2S1 (B2)	EC-233
P0153	HO2S1 (B2)	EC-240
P0154	HO2S1 (B2)	EC-251
P0155	HO2S1 HTR (B2)	EC-259
P0157	HO2S2 (B2)	EC-265
P0158	HO2S2 (B2)	EC-274
P0159	HO2S2 (B2)	EC-283
P0160	HO2S2 (B2)	EC-292
P0161	HO2S2 HTR (B2)	EC-300
P0171	FUEL SYS-LEAN/BK1	EC-306
P0174	FUEL SYS-LEAN/BK2	EC-306
P0172	FUEL SYS-RICH/BK1	EC-315
P0175	FUEL SYS-RICH/BK2	EC-315
P0180	FUEL TEMP SEN/CIRC	EC-324
P0217	ENG OVER TEMP	EC-329

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

DTC*1	Items (CONSULT-II screen terms)	Reference page
P0300	MULTI CYL MISFIRE	EC-347
P0301	CYL 1 MISFIRE	EC-347
P0302	CYL 2 MISFIRE	EC-347
P0303	CYL 3 MISFIRE	EC-347
P0304	CYL 4 MISFIRE	EC-347
P0325*2	KNOCK SEN/CIRC-B1	EC-354
P0335	CKP SEN/CIRCUIT	EC-358
P0340	CMP SEN/CIRCUIT	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-389
P0443	PURG VOLUME CONT/V	EC-403
P0446	VENT CONTROL VALVE	EC-409
P0450	EVAP SYS PRES SEN	EC-416
P0455	EVAP GROSS LEAK	EC-428
P0460	FUEL LV SE (SLOSH)	EC-441
P0461	FUEL LEVEL SENSOR	EC-445
P0464	FUEL LEVL SEN/CIRC	EC-447
P0500	VEH SPEED SEN/CIRC*4	EC-451
P0505	IACV/AAC VLV/CIRC	EC-455
P0510	CLOSED TP SW/CIRC	EC-464
P0600*2	A/T COMM LINE	EC-472
P0605	ECM (PCM)	EC-474
P0705	PNP SW/CIRC	***AT-275***
P0710	ATF TEMP SEN/CIRC	***AT-280***
P0720	VEH SPD SEN/CIR A/T*4	***AT-286***
P0725	ENGINE SPEED SIG	***AT-291***
P0731	A/T 1ST GR FNCTN	***AT-295***
P0732	A/T 2ND GR FNCTN	***AT-302***
P0733	A/T 3RD GR FNCTN	***AT-308***
P0734	A/T 4TH GR FNCTN	***AT-314***
P0740	TCC SOLENOID/CIRC	***AT-323***
P0744	A/T TCC S/V FNCTN	***AT-327***
P0745	L/PRESS SOL/CIRC	***AT-338***
P0750	SFT SOL A/CIRC*3	***AT-343***

DTC*1	Items (CONSULT-II screen terms)	Reference page
P0755	SFT SOL B/CIRC*3	***AT-347***
P1110	INT/V TIM CONT-B1	EC-476
P1111	INT/V TIM V/CIR-B1	EC-482
P1126	THERMOSTAT FNCTN	EC-487
P1130	SWIRL CONT S/V	EC-489
P1131	SWIRL CONT SOL/V	EC-512
P1140	INTK TIM S/CIRC-B1	EC-518
P1148	CLOSED LOOP-B1	EC-523
P1165	SWIRL CON VC SW/CIRC	EC-525
P1168	CLOSED LOOP-B2	EC-523
P1217*2	ENG OVER TEMP	EC-532
P1320	IGN SIGNAL-PRIMARY	EC-549
P1336	CKP SEN (COG)	EC-560
P1401	EGR TEMP SEN/CIRC	EC-565
P1402	EGR SYSTEM	EC-572
P1440	EVAP SMALL LEAK	EC-580
P1441	EVAP VERY SML LEAK	EC-582
P1444	PURG VOLUME CONT/V	EC-597
P1446	VENT CONTROL VALVE	EC-609
P1447	EVAP PURG FLOW/MON	EC-617
P1448	VENT CONTROL VALVE	EC-629
P1464	FUEL LEVEL SEN/CIRC	EC-638
P1490	VC/V BYPASS/V	EC-641
P1491	VC CUT/V BYPASS/V	EC-647
P1605	A/T DIAG COMM LINE	EC-657
P1610 - P1615*2	NATS MALFUNCTION	***EL-305***
P1705	TP SEN/CIRC A/T*3	***AT-351***
P1706	P-N POS SW/CIRCUIT	EC-659
P1760	O/R CLTCH SOL/CIRC	***AT-359***

*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.

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

NIEC0002

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 NISSAN MODEL B15 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), front 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), side air bag (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 NISSAN dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional 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.**

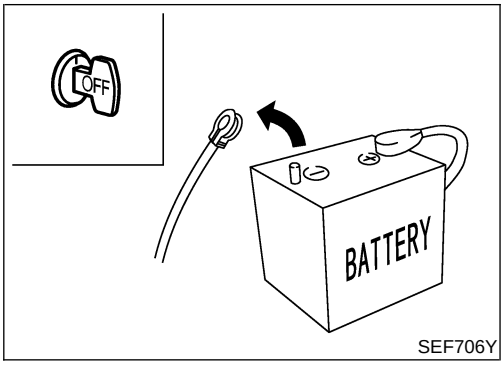
Precautions for On Board Diagnostic (OBD) System of Engine and A/T

NIEC0003

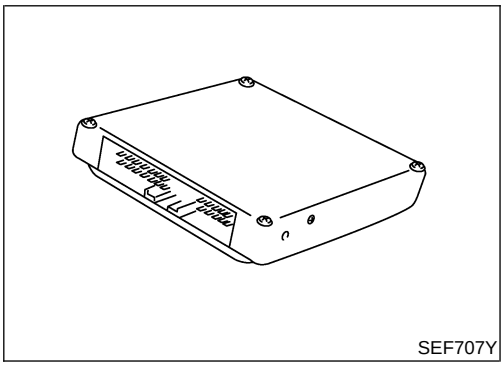
The PCM has an on board diagnostic system. It will light up the malfunction indicator lamp (MIL) to warn the driver of a malfunction causing emission deterioration.

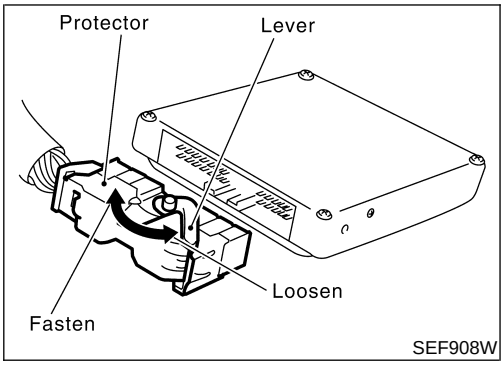
CAUTION:

- **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 PCM (self-diagnostic results of engine and the A/T) before returning the vehicle to the customer.**

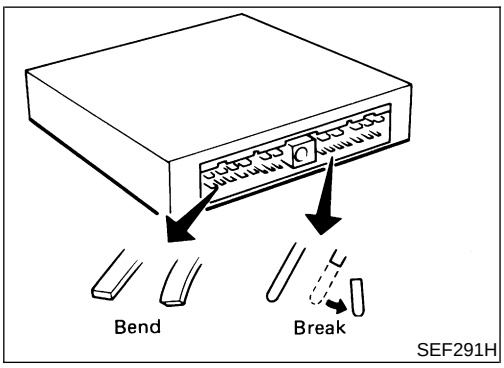


SEF706Y


SEF707Y



SEF908W

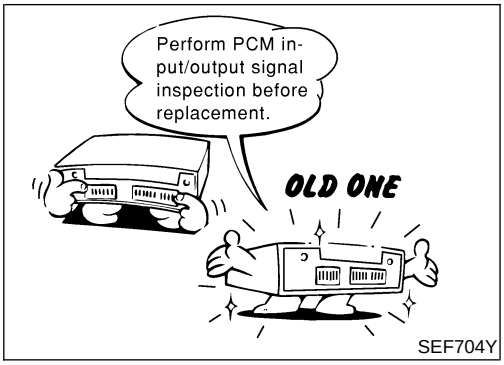


SEF291H

Precautions

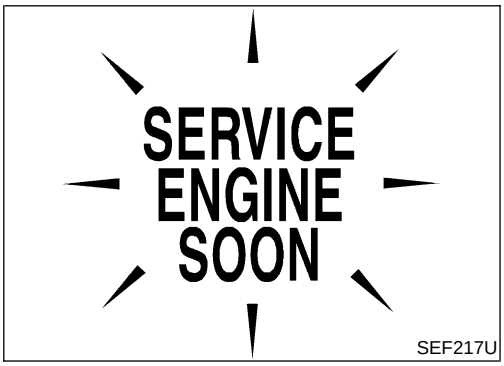
NIEC0005

- **Always use a 12 volt battery as power source.**
- **Do not attempt to disconnect battery cables while engine is running.**
- **Before connecting or disconnecting the PCM harness connector, turn ignition switch OFF and disconnect negative battery terminal. Failure to do so may damage the PCM because battery voltage is applied to PCM even if ignition switch is turned off.**
- **Before removing parts, turn off ignition switch and then disconnect battery ground cable.**
- **Do not disassemble PCM.**
- **If a battery terminal is disconnected, the memory will return to the PCM value.**
  The PCM 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.
- **When connecting PCM harness connector, fasten it securely with a lever as far as it will go, as shown at left.**
- **When connecting or disconnecting pin connectors into or from PCM, take care not to damage pin terminals (bend or break).**
  Make sure that there are not any bends or breaks on PCM pin terminals when connecting pin connectors.
- **Securely connect PCM 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 PCM harness at least 10 cm (4 in) away from adjacent harness, to prevent a PCM system malfunctions due to receiving external noise, degraded operation of ICs, etc.**
- **Keep PCM parts and harness dry.**



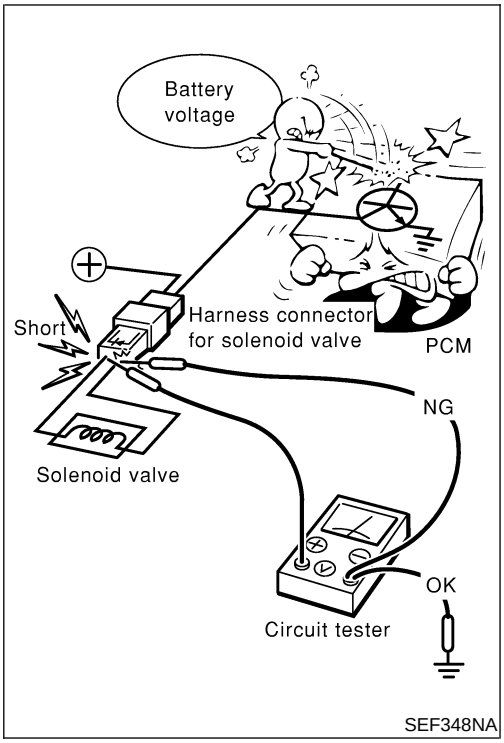
SEF704Y

- **Before replacing PCM, perform Terminals and Reference Value inspection and make sure PCM functions properly. Refer to EC-156.**



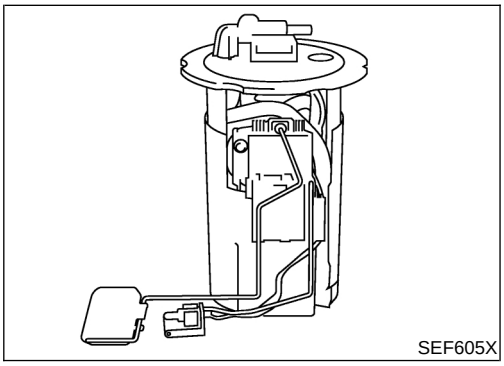
SEF217U

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

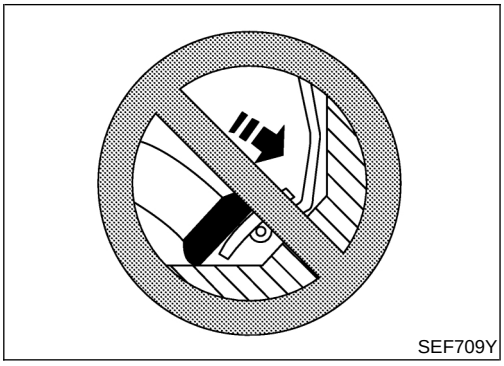


SEF348NA

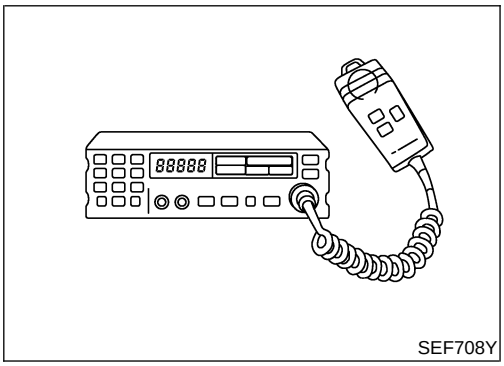
- **When measuring PCM signals with a circuit tester, never allow the two tester probes to contact.**
  Accidental contact of probes will cause a short circuit and damage the PCM power transistor.
- **Handle mass air flow sensor carefully to avoid damage.**
- **Do not disassemble mass air flow sensor.**
- **Do not clean mass air flow sensor with any type of detergent.**
- **Do not disassemble IAC valve-AAC valve.**
- **Even a slight leak in the air intake system can cause serious problems.**
- **Do not shock or jar the camshaft position sensor (PHASE).**


SEF605X

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


SEF709Y

- **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.**


SEF708Y

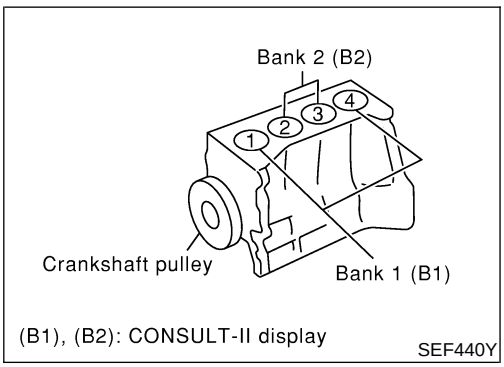
- **When installing C.B., ham radio or a mobile phone, be sure to observe the following as it may adversely affect electronic control systems depending on installation location.**

a) **Keep the antenna as far as possible from the electronic control units.**

b) **Keep the antenna feeder line more than 20 cm (8 in) away from the harness of electronic controls.**
Do not let them run parallel for a long distance.

c) **Adjust the antenna and feeder line so that the standing-wave ratio can be kept smaller.**

d) **Be sure to ground the radio to vehicle body.**



(B1), (B2): CONSULT-II display
SEF440Y

- **Regarding model B15, "-B1" indicates cylinders number 1 and 4 and "-B2" indicates cylinders number 2 and 3.**

Wiring Diagrams and Trouble Diagnosis

NIEC0006

When you read Wiring diagrams, refer to the following:

- ***GI-11***, "HOW TO READ WIRING DIAGRAMS"
- ***EL-9***, "POWER SUPPLY ROUTING" for power distribution circuit

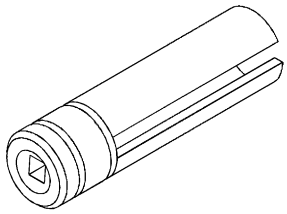
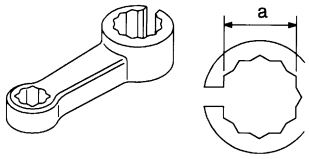
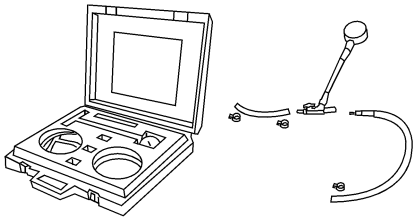
When you perform trouble diagnosis, refer to the following:

- ***GI-36***, "How to Follow Test Group in Trouble Diagnosis"
- ***GI-25***, "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT"

Special Service Tools

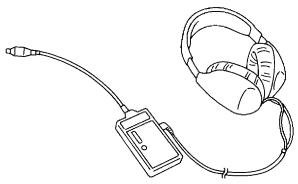
NIEC0007

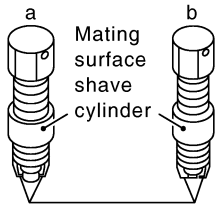
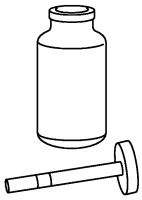
The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description	
KV10117100 (J36471-A) Heated oxygen sensor wrench	 NT379	Loosening or tightening front heated oxygen sensor with 22 mm (0.87 in) hexagon nut
KV10114400 (J-38365) Heated oxygen sensor wrench	 NT636	Loosening or tightening rear heated oxygen sensor **a: 22 mm (0.87 in)**
(J-44321) Fuel pressure gauge kit	 LEC642	Checking fuel pressure

Commercial Service Tools

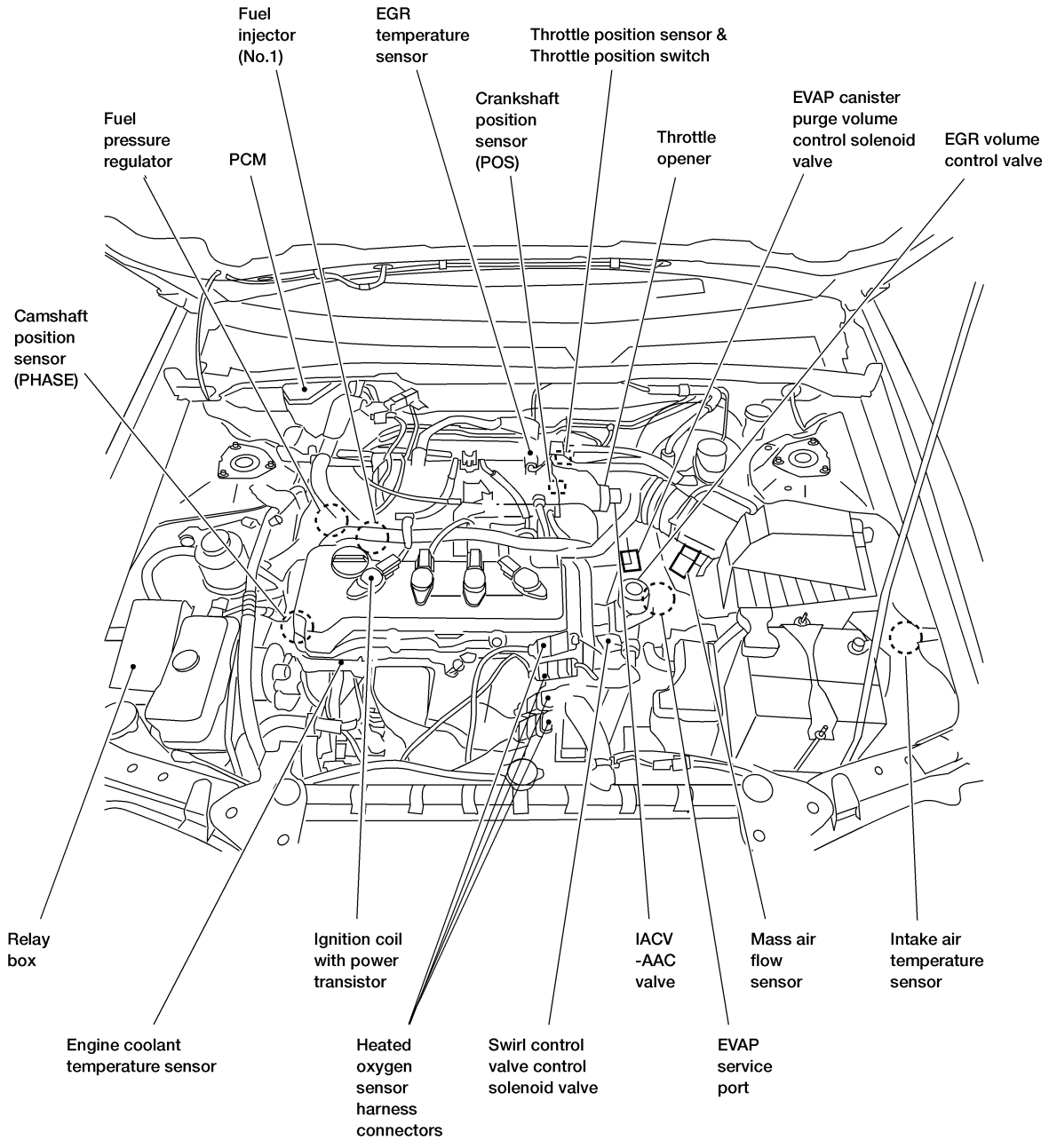
NIEC0008

Tool name	Description	
Fuel filler cap adapter (MLR-8382)	 NT815	Checking fuel tank vacuum relief valve opening pressure
Leak detector (J41416)	 NT703	Locating the EVAP leak

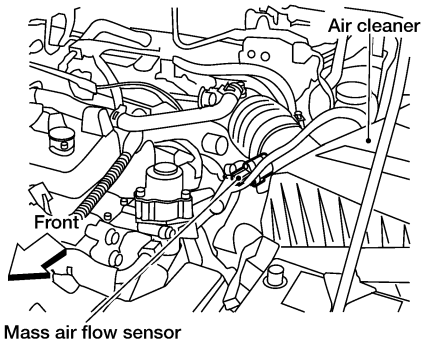
Tool name	Description	
Oxygen sensor thread cleaner (J-43897-18) (J-43897-12)	 NT778	Reconditioning the exhaust system threads before installing a new oxygen sensor. Use with anti-seize lubricant shown below. **a: J-43897-18 18 mm with 1.5 mm pitch dia., for Zirconia Oxygen Sensor** **b: J-43897-12 12 mm with 1.25 mm pitch dia., 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.

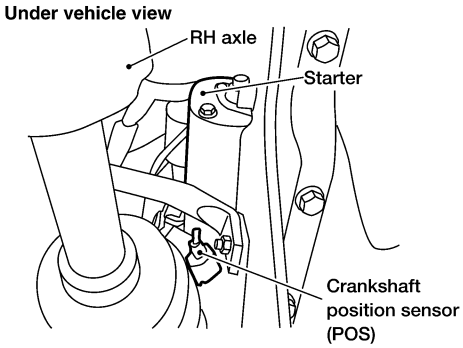
Engine Control Component Parts Location

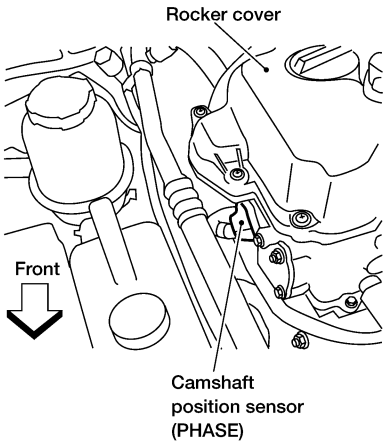
NIEC0009

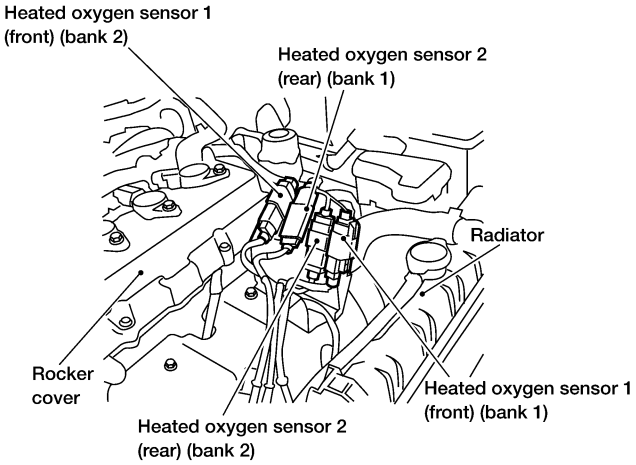


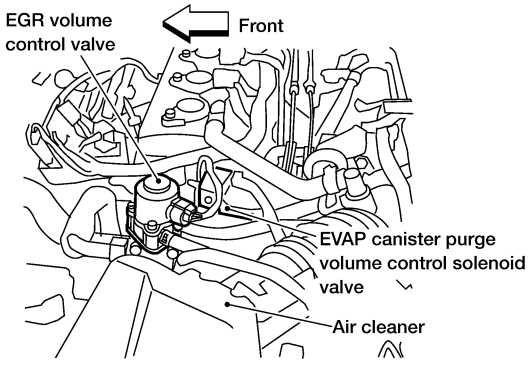
LEC235

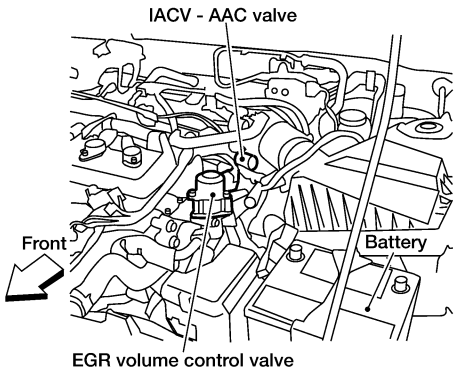

Air cleaner
Front
Mass air flow sensor


Under vehicle view
RH axle
Starter
Crankshaft
position sensor
(POS)


Rocker cover
Front
Camshaft
position sensor
(PHASE)

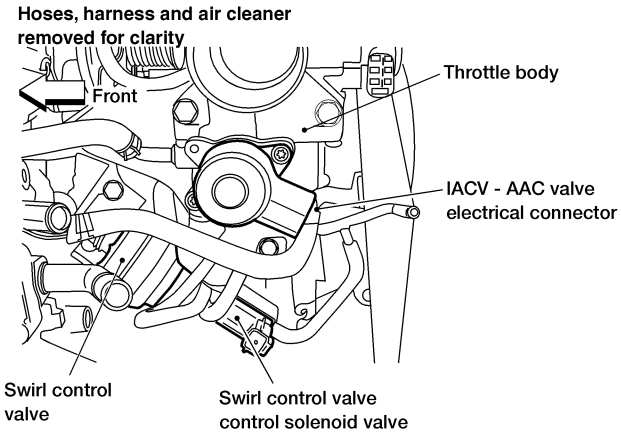

Heated oxygen sensor 1
(front) (bank 2)
Heated oxygen sensor 2
(rear) (bank 1)
Radiator
Rocker
cover
Heated oxygen sensor 1
(front) (bank 1)
Heated oxygen sensor 2
(rear) (bank 2)

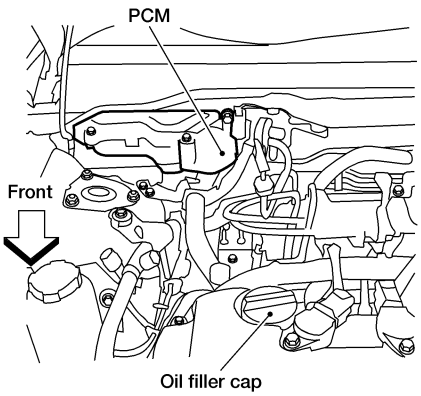

EGR volume
control valve
Front
EVAP canister purge
volume control solenoid
valve
Air cleaner

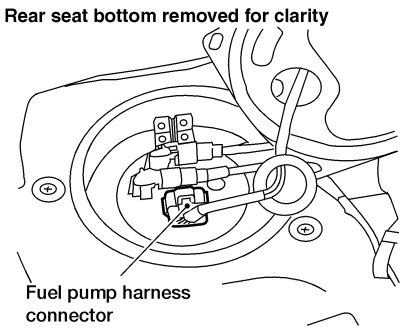

IACV - AAC valve
Front
Battery
EGR volume control valve

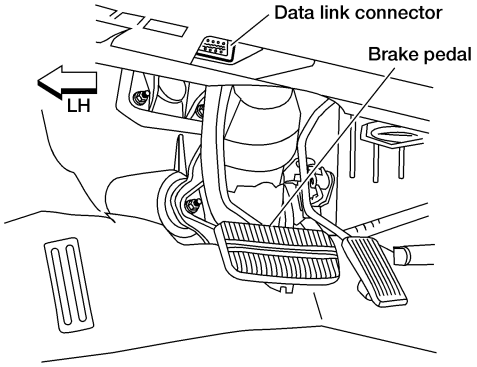
WEC828

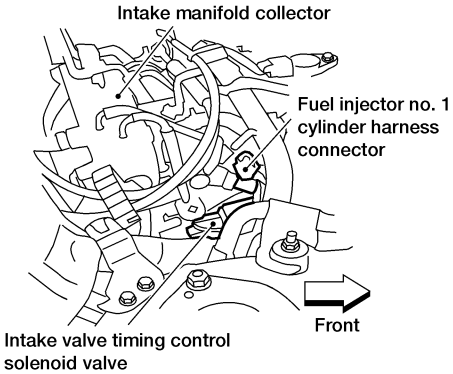
Engine Control Component Parts Location (Cont'd)

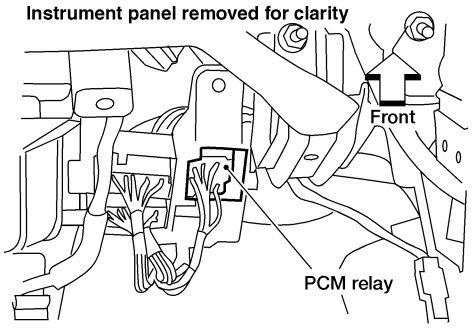




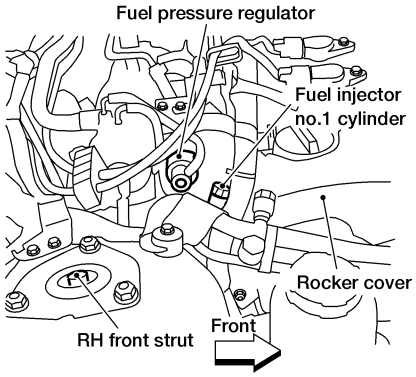


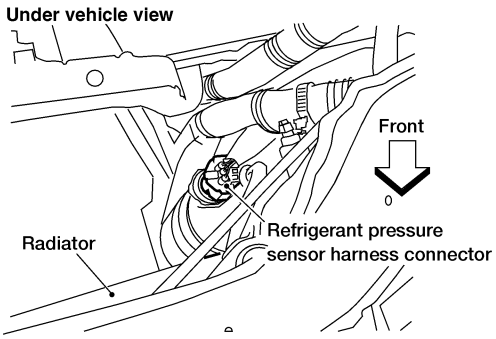


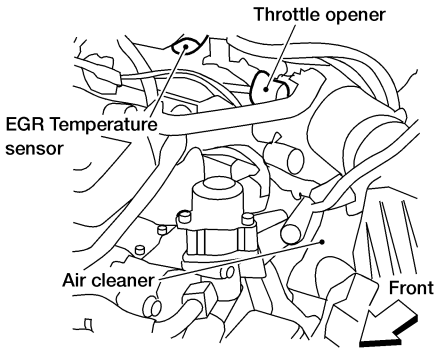


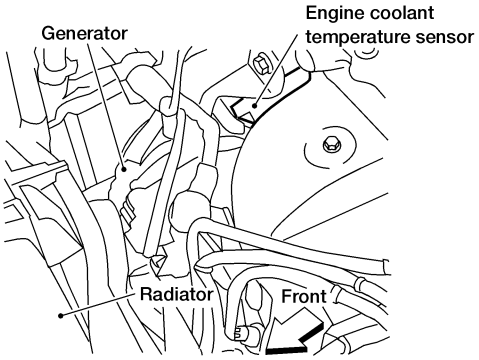


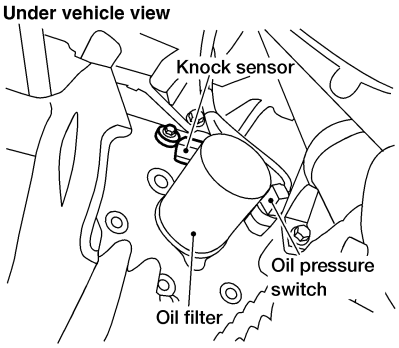
LEC237

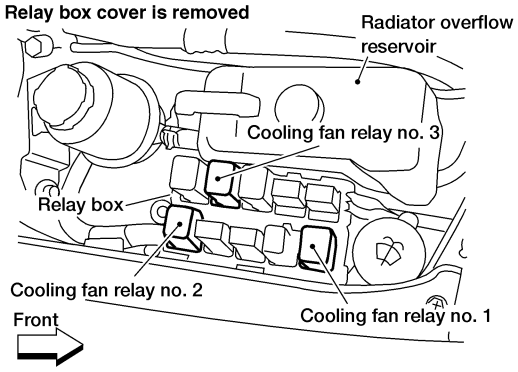

Fuel pressure regulator
Fuel injector
no.1 cylinder
Rocker cover
RH front strut
Front


Under vehicle view
Front
Radiator
Refrigerant pressure
sensor harness connector


Throttle opener
EGR Temperature
sensor
Air cleaner
Front

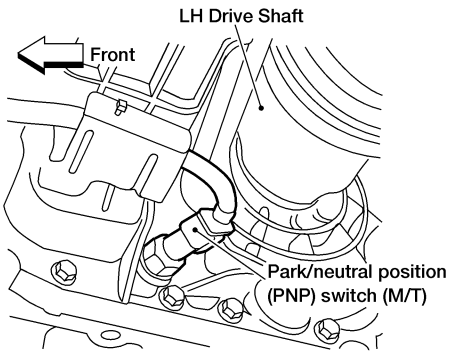

Generator
Engine coolant
temperature sensor
Radiator
Front

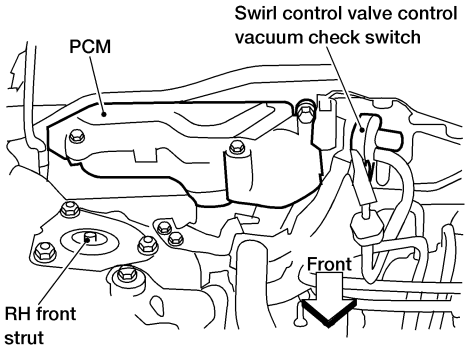

Under vehicle view
Knock sensor
Oil pressure
switch
Oil filter

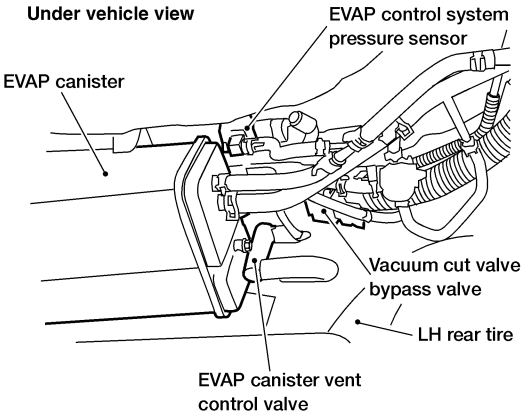

Relay box cover is removed
Radiator overflow
reservoir
Cooling fan relay no. 3
Relay box
Cooling fan relay no. 2
Cooling fan relay no. 1
Front

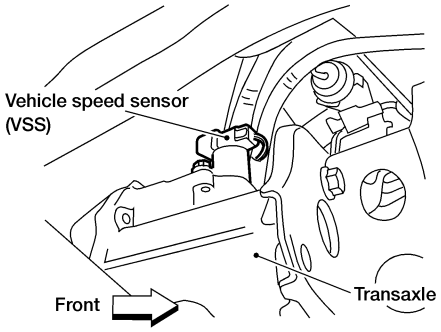
LEC238

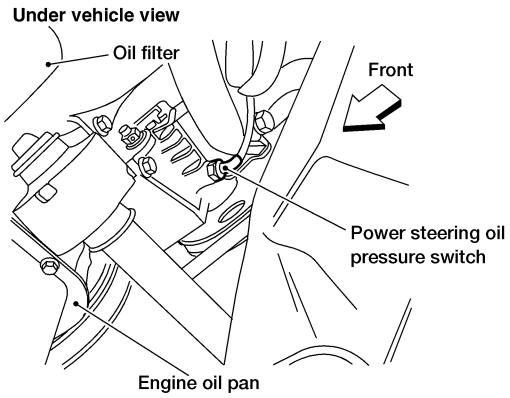
Engine Control Component Parts Location (Cont'd)

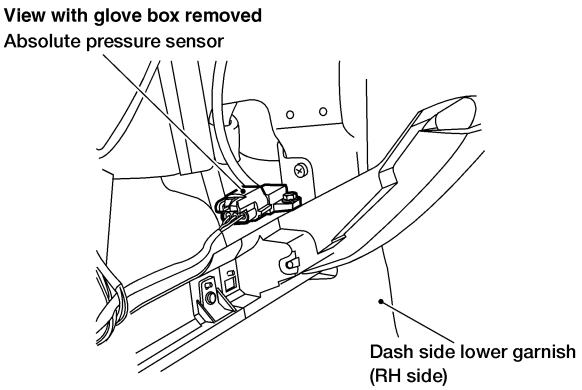








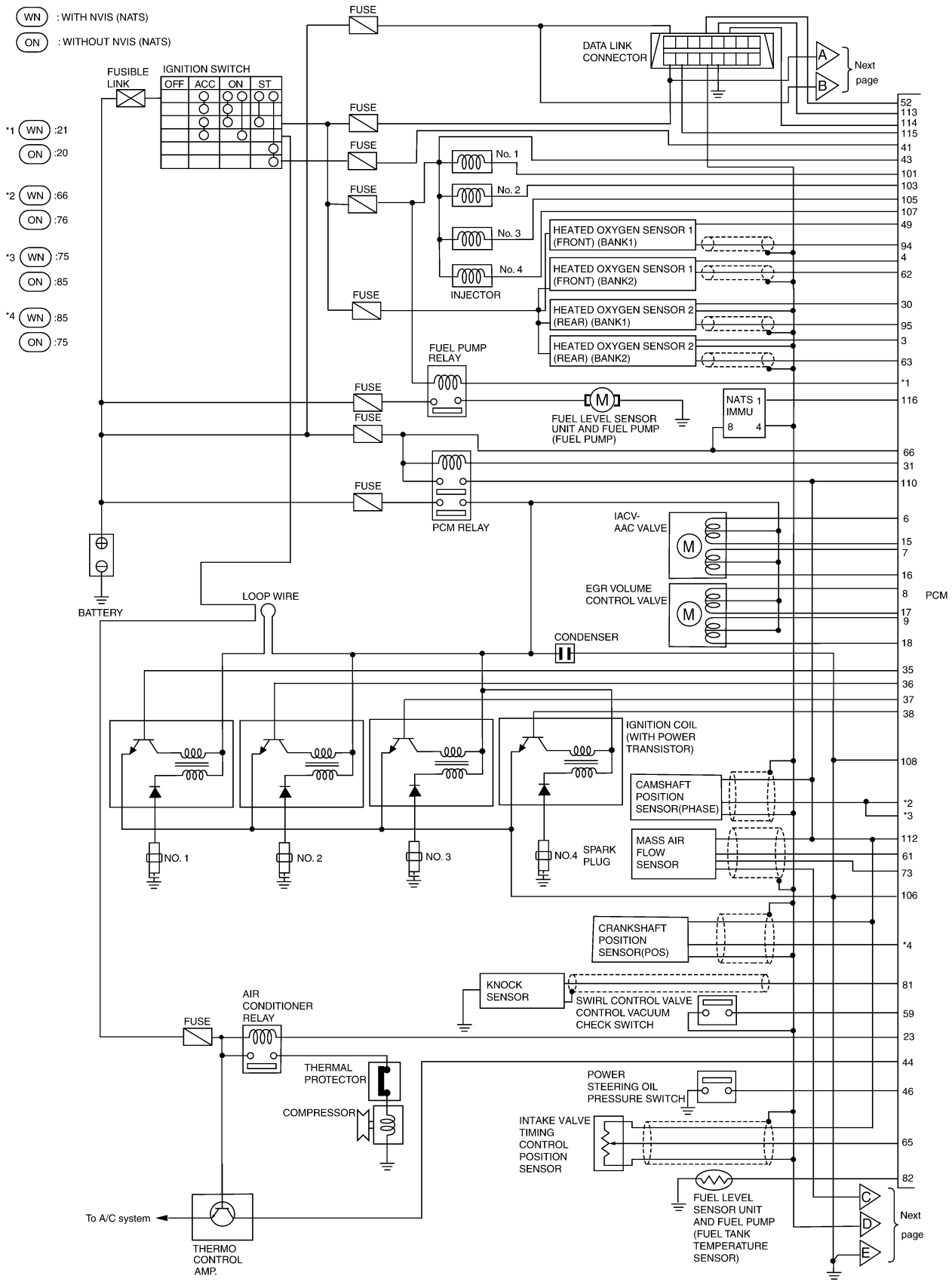




LEC239

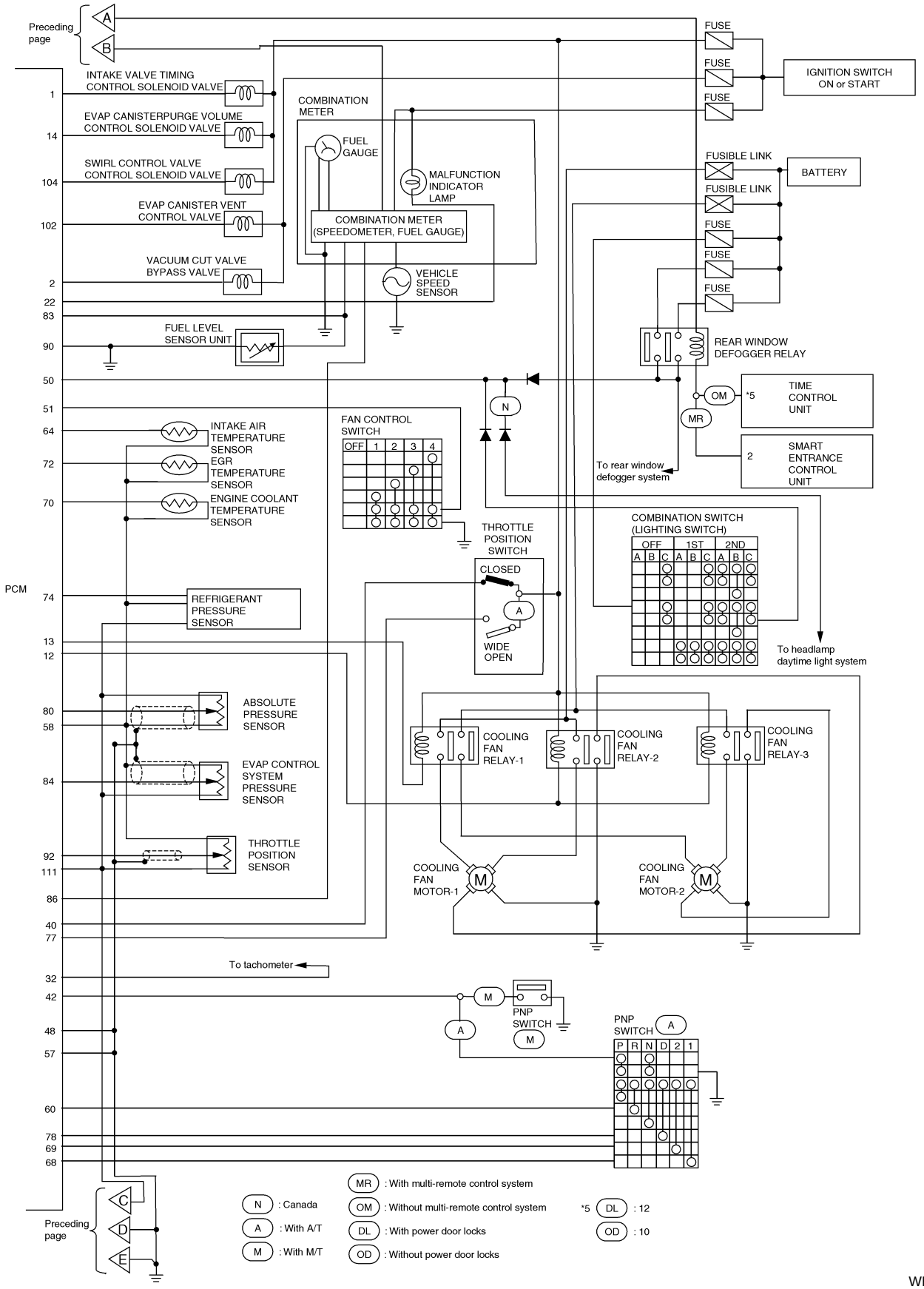
Circuit Diagram

NIEC0010



WEC829

Circuit Diagram (Cont'd)



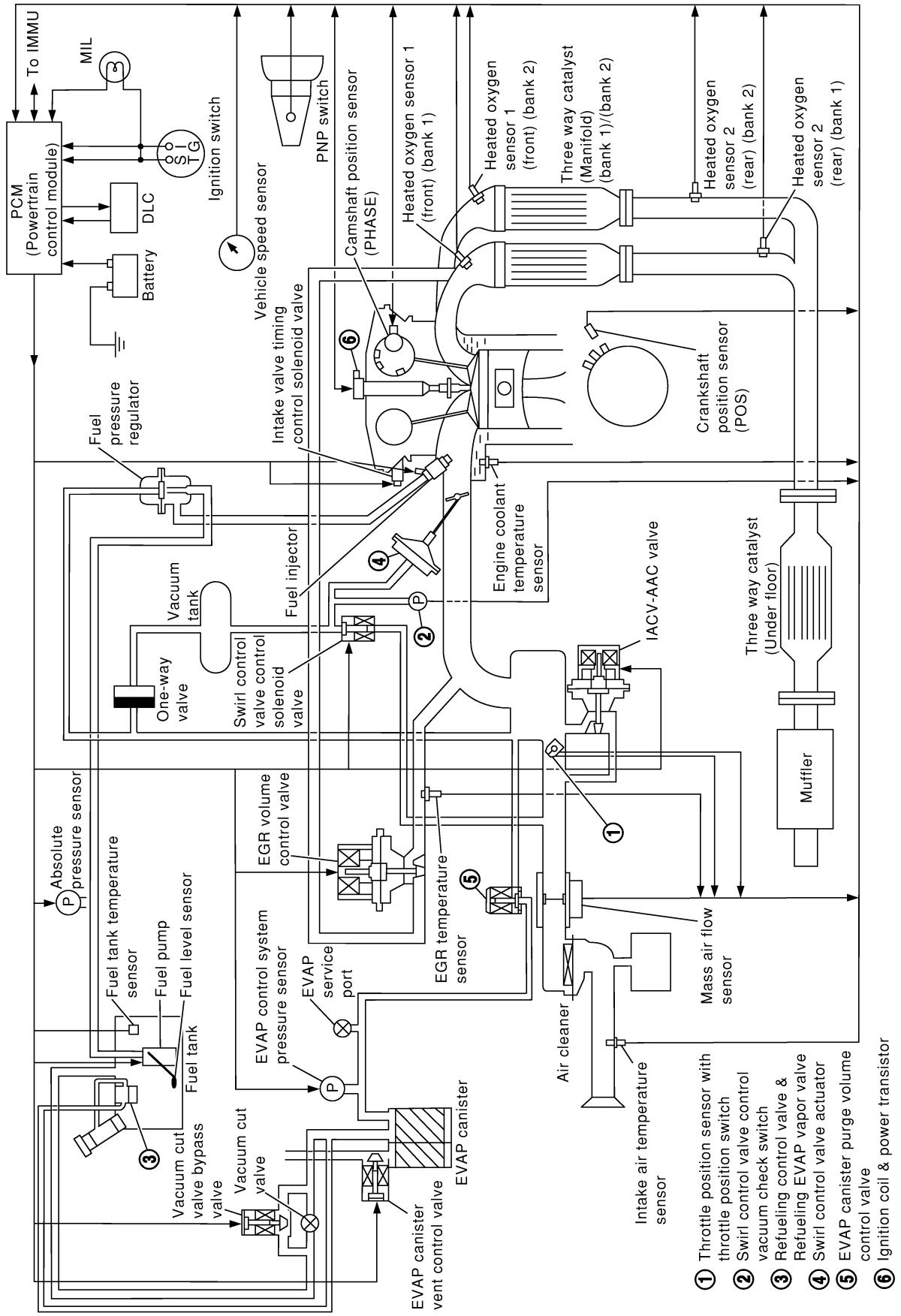
WEC380

System Diagram

NIEC0011

FOR CALIFORNIA MODELS

NIEC0011S01

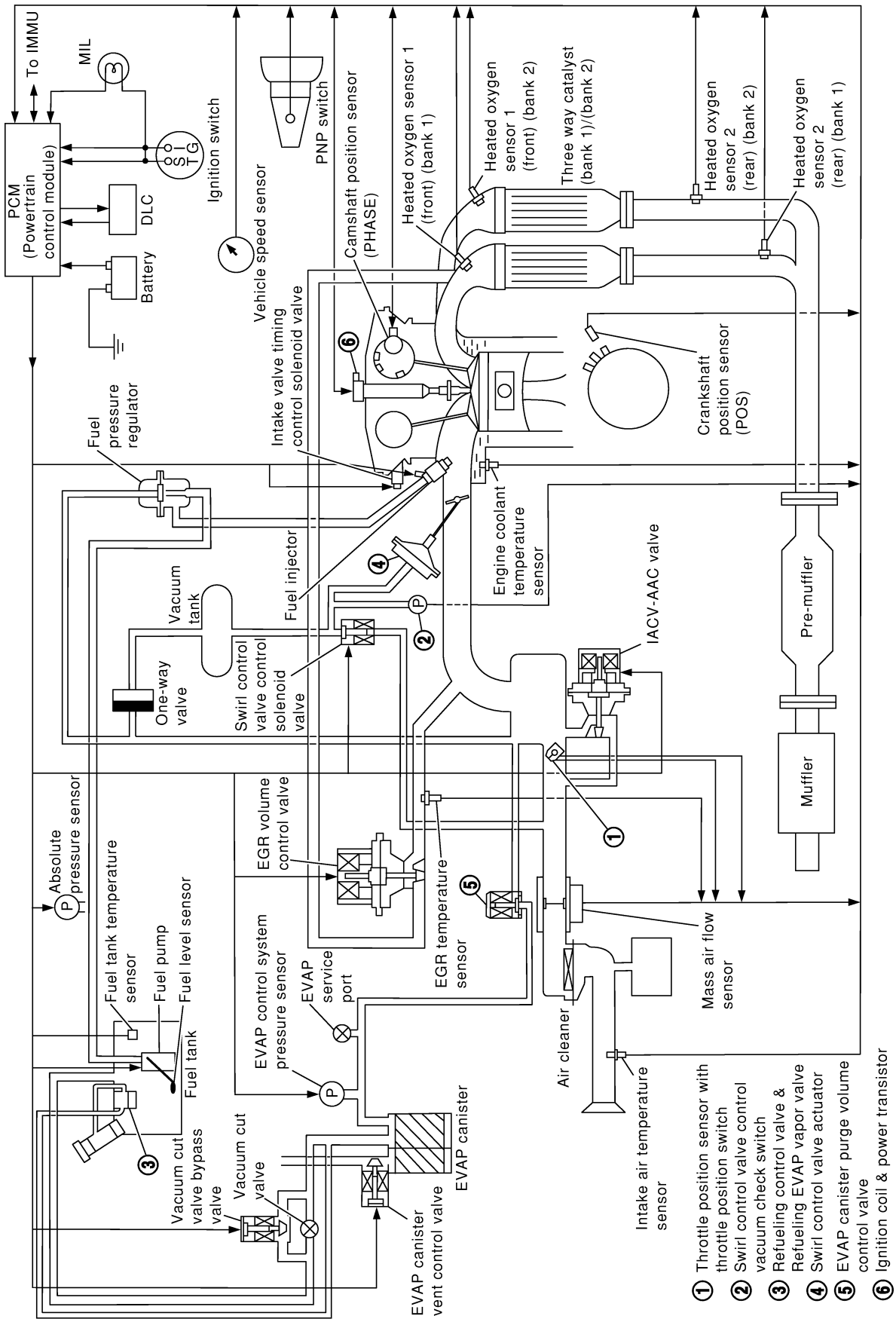


SEF441Y

System Diagram (Cont'd)

EXCEPT FOR CALIFORNIA MODELS

NIEC0011S02

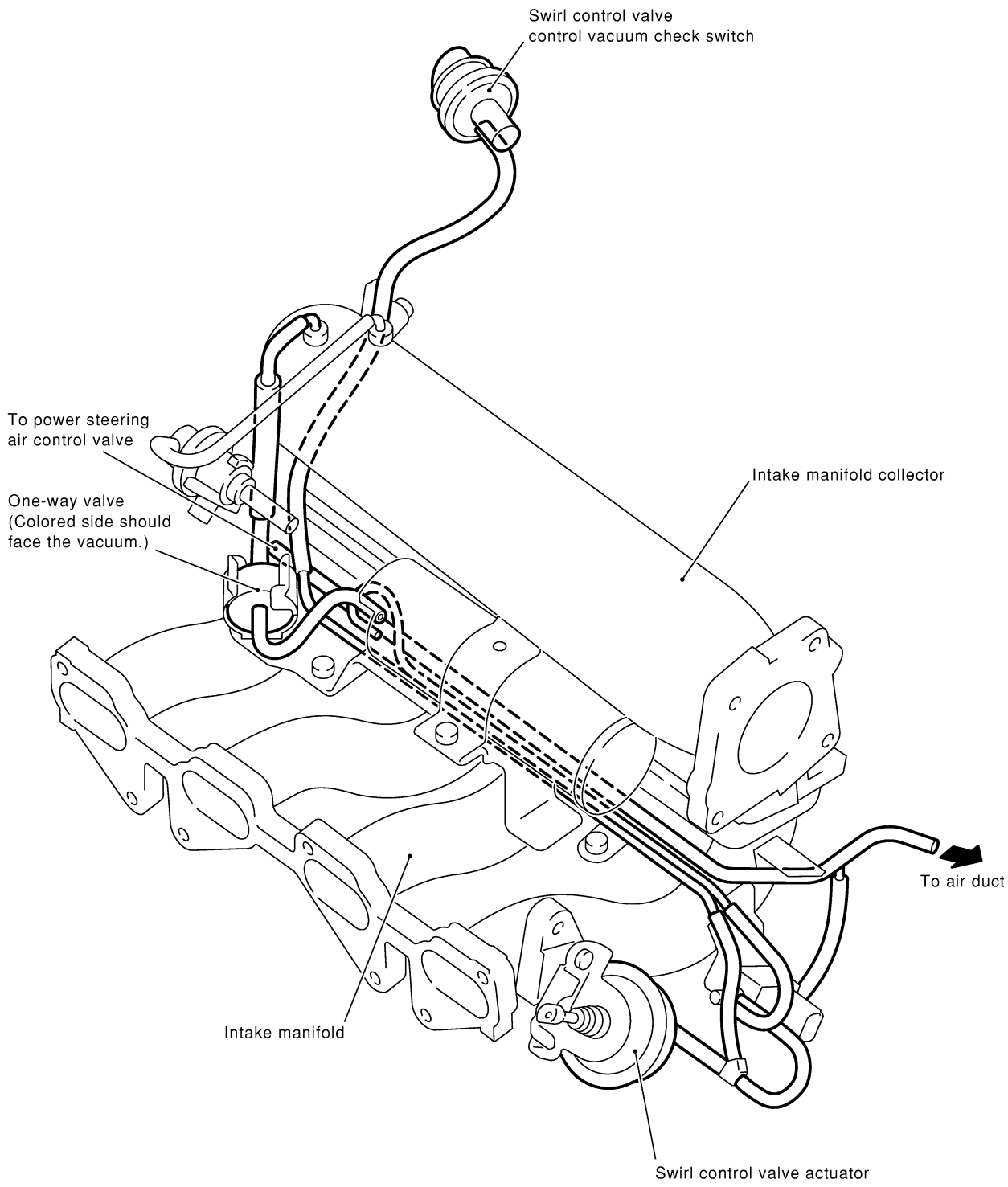


SEF442Y

Vacuum Hose Drawing

NIEC0012

Refer to “System Diagram” on EC-41 or EC-42 for vacuum control system.



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

SEF443Y

System Chart

NIEC0013

Input (Sensor)	PCM Function	Output (Actuator)
• Camshaft position sensor (PHASE) • Crankshaft position sensor (POS) • Mass air flow sensor • Engine coolant temperature sensor • Heated oxygen sensor 1 (front) • Ignition switch • Throttle position sensor • PNP switch • Air conditioner switch • Knock sensor • EGR temperature sensor*1 • EVAP control system pressure sensor*1 • Fuel tank temperature sensor*1 • Battery voltage • Power steering oil pressure switch • Vehicle speed sensor • Intake air temperature sensor • Absolute pressure sensor • Heated oxygen sensor 2 (rear) • TCM (Transmission control module)*2 • Closed throttle position switch*4 • Electrical load • Intake valve timing control position sensor*1 • Swirl control vacuum check switch*1 • Fuel level sensor*1 • Refrigerant pressure sensor	Fuel injection & mixture ratio control	Injectors
	Distributor ignition system	Power transistor
	Idle air control system	IACV-AAC valve
	Intake valve timing control	Intake valve timing control solenoid valve
	Fuel pump control	Fuel pump relay
	On board diagnostic system	Malfunction indicator lamp (On the instrument panel)
	EGR control	EGR volume control valve
	Swirl control valve control	Swirl control valve control solenoid valve
	Heated oxygen sensor 1 and 2 heater control	Heated oxygen sensor heater
	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
	Cooling fan control	Cooling fan relays
	Air conditioning cut control	Air conditioner relay
	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: The DTC related to A/T will be sent to PCM.

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

*4: This switch will operate in place of the throttle position sensor to control EVAP parts if the sensor malfunctions.

Multiport Fuel Injection (MFI) System

DESCRIPTION

Input/Output Signal Chart

NIEC0014

NIEC0014S01

Sensor	Input Signal to PCM	PCM function	Actuator
Camshaft position sensor (PHASE)	Engine speed and piston number	Fuel injection & mixture ratio control	Injector
Crankshaft position sensor (POS)	Engine speed		
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Heated oxygen sensor 1 (front)	Density of oxygen in exhaust gas		
Throttle position sensor	Throttle position Throttle valve idle position		
PNP switch	Gear position		
Vehicle speed sensor	Vehicle speed		
Ignition switch	Start signal		
Air conditioner switch	Air conditioner operation		
Knock sensor	Engine knocking condition		
Electrical load	Electrical load signal		
Battery	Battery voltage		
Power steering oil pressure switch	Power steering operation		
Heated oxygen sensor 2 (rear)*	Density of oxygen in exhaust gas		
Absolute pressure sensor	Ambient air barometric pressure		

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

Basic Multiport Fuel Injection System

NIEC0014S02

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

Various Fuel Injection Increase/Decrease Compensation

NIEC0014S03

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

<Fuel increase>

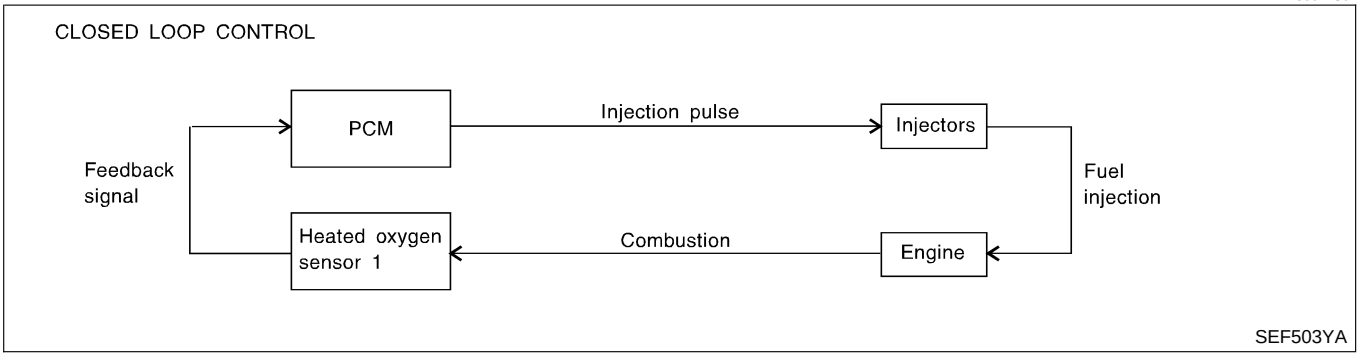
- During warm-up
- When starting the engine
- During acceleration
- Hot-engine operation
- When selector lever is changed from “N” to “D” (A/T models only)
- High-load, high-speed operation

<Fuel decrease>

- During deceleration
- During high engine speed operation
- During high vehicle speed operation
- Extremely high engine coolant temperature

Mixture Ratio Feedback Control (Closed loop control)

NIEC0014S04



The mixture ratio feedback system provides the best air-fuel mixture ratio for driveability and emission control. The three way catalyst can then better reduce CO, HC and NOx emissions. This system uses a heated oxygen sensor 1 (front) in the exhaust manifold to monitor if the engine operation is rich or lean. The PCM adjusts the injection pulse width according to the sensor voltage signal. For more information about the heated oxygen sensor 1 (front), refer to EC-218. 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.
Heated oxygen sensor 2 (rear) is located downstream of the three way catalyst. Even if the switching characteristics of the heated oxygen sensor 1 (front) shift, the air-fuel ratio is controlled to stoichiometric by the signal from the heated oxygen sensor 2 (rear).

Open Loop Control

NIEC0014S05

The open loop system condition refers to when the PCM 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 heated oxygen sensor 1 (front) or its circuit
- Insufficient activation of heated oxygen sensor 1 (front) at low engine coolant temperature
- High engine coolant temperature
- During warm-up
- When starting the engine

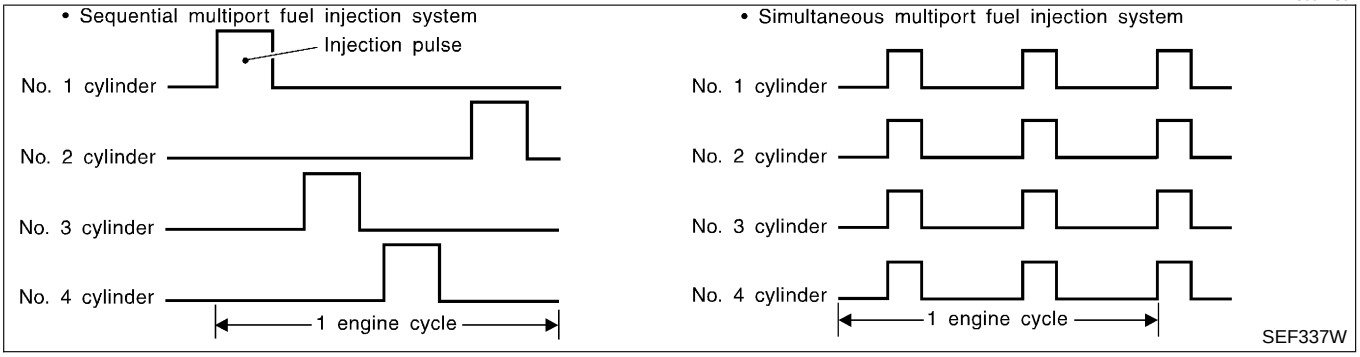
Mixture Ratio Self-learning Control

NIEC0014S06

The mixture ratio feedback control system monitors the mixture ratio signal transmitted from the heated oxygen sensor 1 (front). This feedback signal is then sent to the PCM. The PCM controls the basic mixture ratio as close to the theoretical mixture ratio as possible. However, the basic mixture ratio is not necessarily controlled as originally designed. Both manufacturing differences (i.e., mass air flow sensor hot film) and characteristic changes during operation (i.e., injector clogging) directly affect mixture ratio.
Accordingly, the difference between the basic and theoretical mixture ratios is monitored in this system. This is then computed in terms of "injection pulse duration" to automatically compensate for the difference between the two ratios.
"Fuel trim" refers to the feedback compensation value compared against the basic injection duration. Fuel trim includes short term fuel trim and long term fuel trim.
"Short term fuel trim" is the short-term fuel compensation used to maintain the mixture ratio at its theoretical value. The signal from the heated oxygen sensor 1 (front) 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

NIEC0014S07



Two types of systems are used.

Sequential Multiport Fuel Injection System

NIEC0014S0701

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

NIEC0014S0702

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

Fuel Shut-off

NIEC0014S08

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

Distributor Ignition (DI) System

DESCRIPTION

NIEC0015

Input/Output Signal Chart

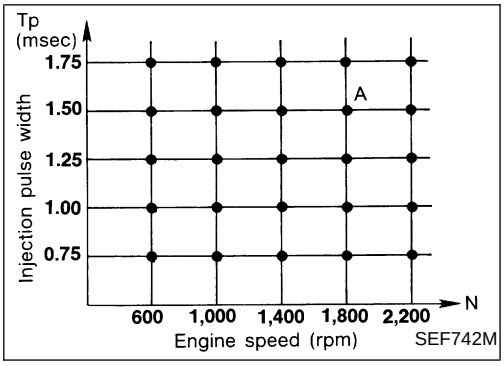
NIEC0015S01

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

Distributor Ignition (DI) System (Cont'd)

System Description

NIEC0015S02



The ignition timing is controlled by the PCM to maintain the best air-fuel ratio for every running condition of the engine. The ignition timing data is stored in the PCM. This data forms the map shown above.
The PCM receives information such as the injection pulse width and camshaft position sensor (PHASE) 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 PCM according to the other data stored in the PCM.

- 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 PCM. The PCM retards the ignition timing to eliminate the knocking condition.

Air Conditioning Cut Control

DESCRIPTION

NIEC0016

Input/Output Signal Chart

NIEC0016S01

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

System Description

NIEC0016S02

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 the refrigerant pressure is excessively high or low.

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

DESCRIPTION

Input/Output Signal Chart

NIEC0017

NIEC0017S01

Sensor	Input Signal to PCM	PCM function	Actuator
Vehicle speed sensor	Vehicle speed	Fuel cut control	Injectors
PNP switch	Neutral position		
Throttle position sensor	Throttle position		
Engine coolant temperature sensor	Engine coolant temperature		
Crankshaft position sensor (POS)	Engine speed		
Camshaft position sensor (PHASE)	Engine speed and piston number		

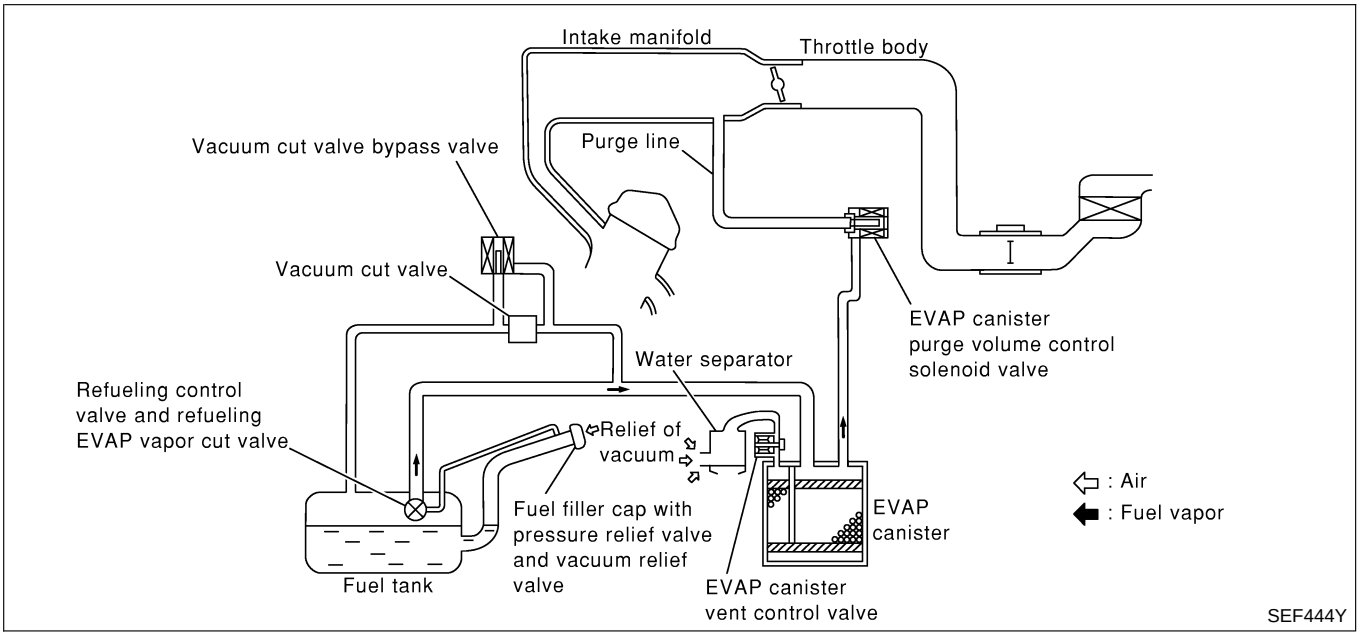
If the engine speed is above 2,500 rpm with no load, (for example, in Neutral and engine speed over 2,500 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed. Fuel cut will operate until the engine speed reaches 2,000 rpm, then fuel cut is cancelled.

NOTE:
This function is different from deceleration control listed under “Multiport Fuel Injection (MFI) System”, EC-45.

Evaporative Emission System

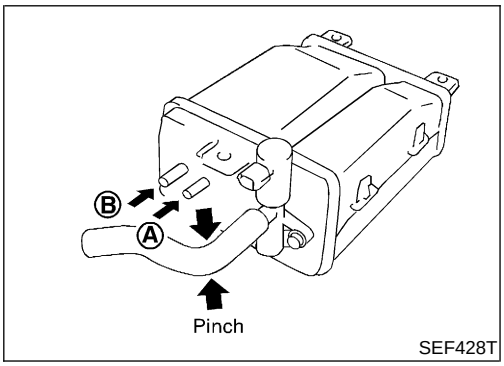
DESCRIPTION

NIEC0018



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 PCM. 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 control solenoid valve also shuts off the vapor purge line during decelerating and idling.



INSPECTION

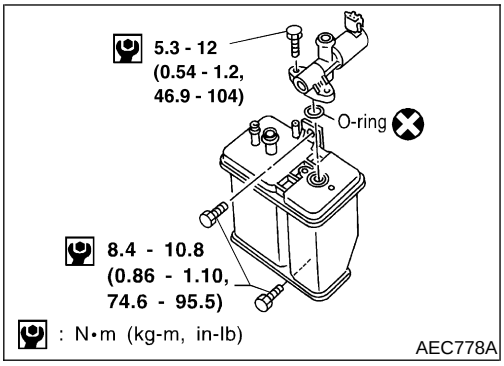
NIEC0019

EVAP Canister

NIEC0019S01

Check EVAP canister as follows:

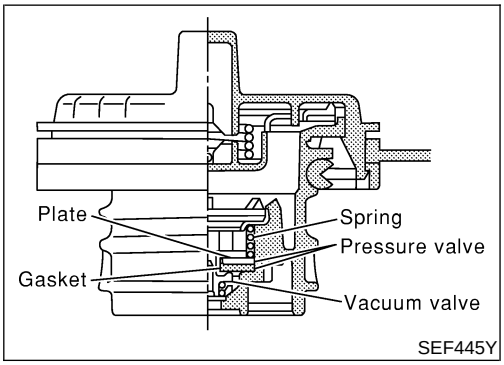
1. Pinch the fresh air hose.
2. Blow air into port **A** and check that air flows freely through port **B**.



Tightening Torque

NIEC0019S02

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)

NIEC0019S03

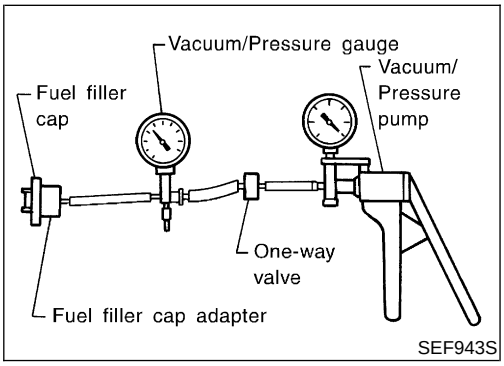
NOTE:
Refer to fuel filler cap adapter instruction manual before performing following inspection.

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 −3.4 kPa (−0.061 to −0.035 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 NISSAN 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
NIEC0019S05

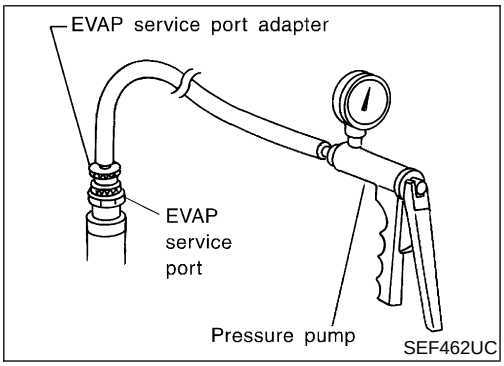
Refer to EC-647.

Evaporative Emission (EVAP) Canister Purge Volume Control Solenoid Valve
NIEC0019S06

Refer to EC-403.

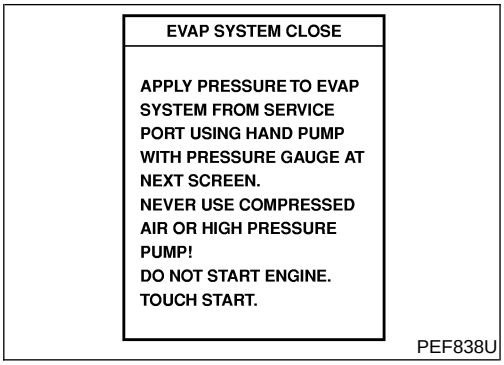
Fuel Tank Temperature Sensor
NIEC0019S08

Refer to EC-324.

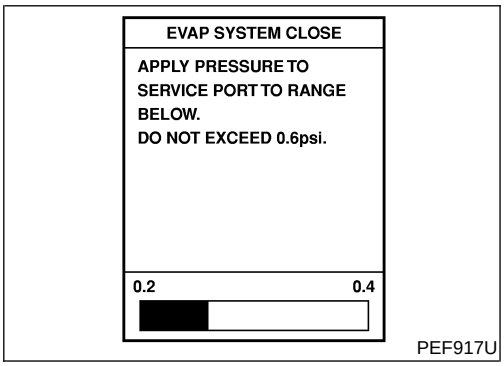


EVAP Service Port
NIEC0019S09

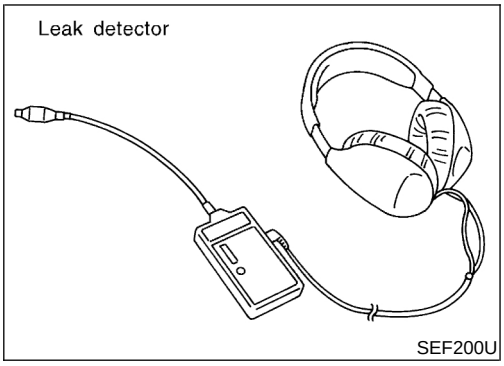
Positive pressure is delivered to the EVAP system through the EVAP service port. If fuel vapor leakage in the EVAP system occurs, use a leak detector to locate the leak.



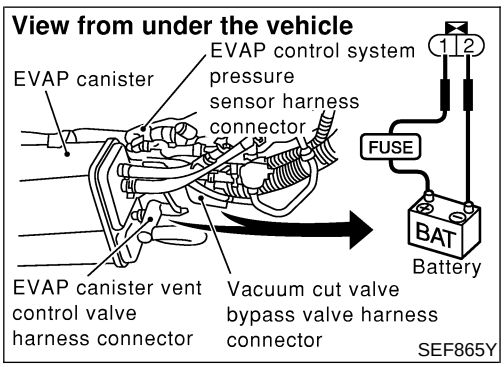
PEF838U



PEF917U



SEF200U



SEF865Y

How to Detect Fuel Vapor Leakage

NIEC0019S10

CAUTION:

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

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

With CONSULT-II

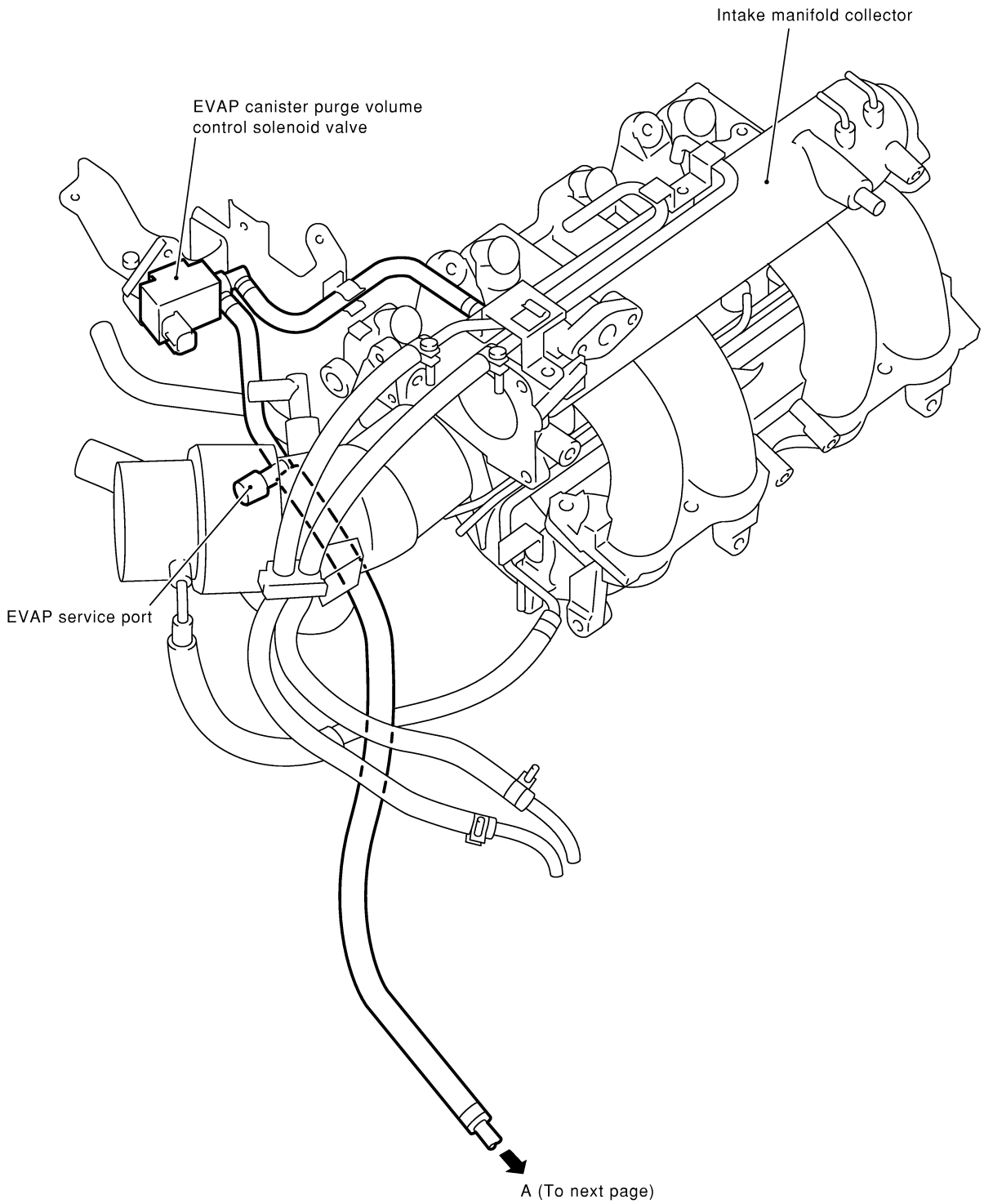
1) Attach the EVAP service port adapter securely to the EVAP service port.
2) Also attach the pressure pump and hose.
3) Turn ignition switch "ON".
4) Select the "EVAP SYSTEM CLOSE" of "WORK SUPPORT MODE" with CONSULT-II.
5) Touch "START". A bar graph (Pressure indicating display) will appear on the screen.
6) Apply positive pressure to the EVAP system until the pressure indicator reaches the middle of the bar graph.
7) Remove the EVAP service port adapter and hose with pressure pump.
8) Locate the leak using a leak detector. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-53.

Without CONSULT-II

1) Attach the EVAP service port adapter securely to the EVAP service port and pressure pump with pressure gauge to the EVAP service port.
2) Apply battery voltage to between the terminals of both EVAP canister vent control valve and vacuum cut valve bypass valve to make a closed EVAP system.
3) To locate the leak, deliver positive pressure to the EVAP system until pressure gauge points reach 1.38 to 2.76 kPa (0.014 to 0.028 kg/cm^2, 0.2 to 0.4 psi).
4) Remove the EVAP service port adapter and hose with pressure pump.
5) Locate the leak using a leak detector. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-53.

EVAPORATIVE EMISSION LINE DRAWING

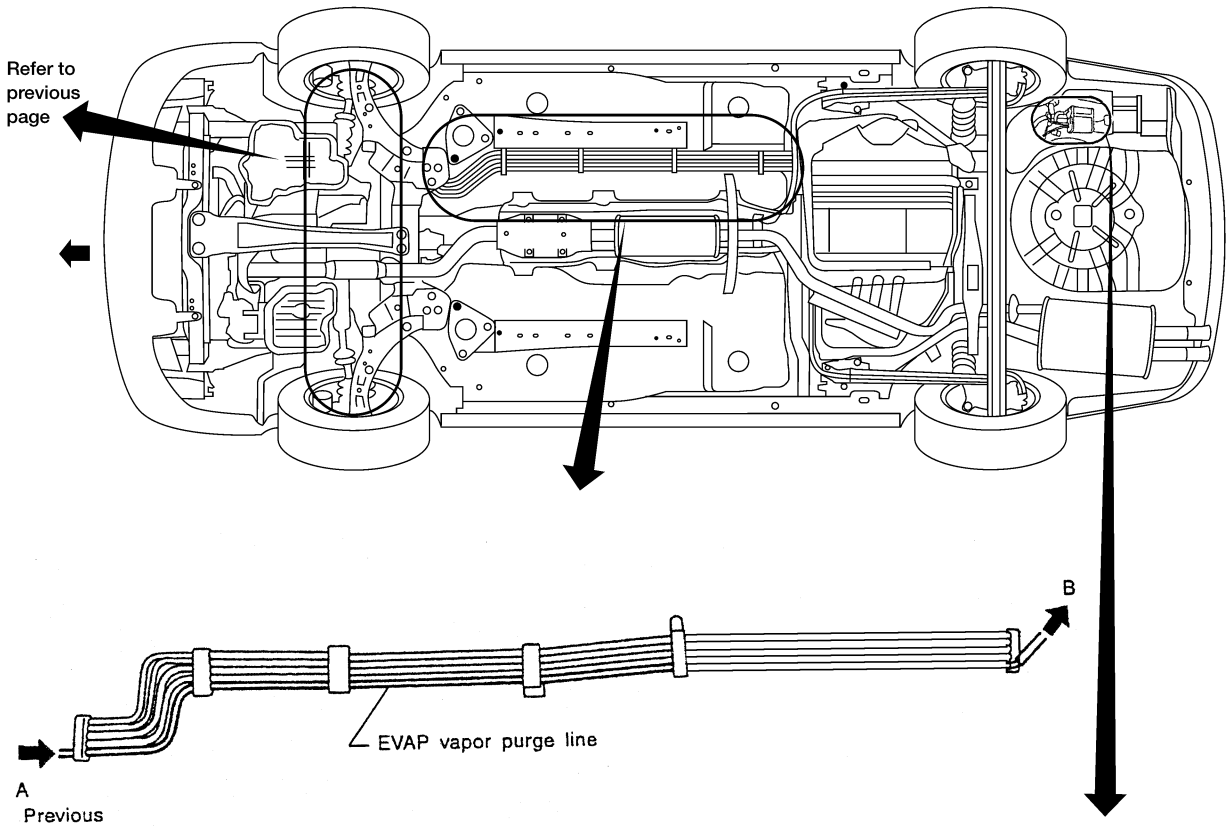
NIEC0020

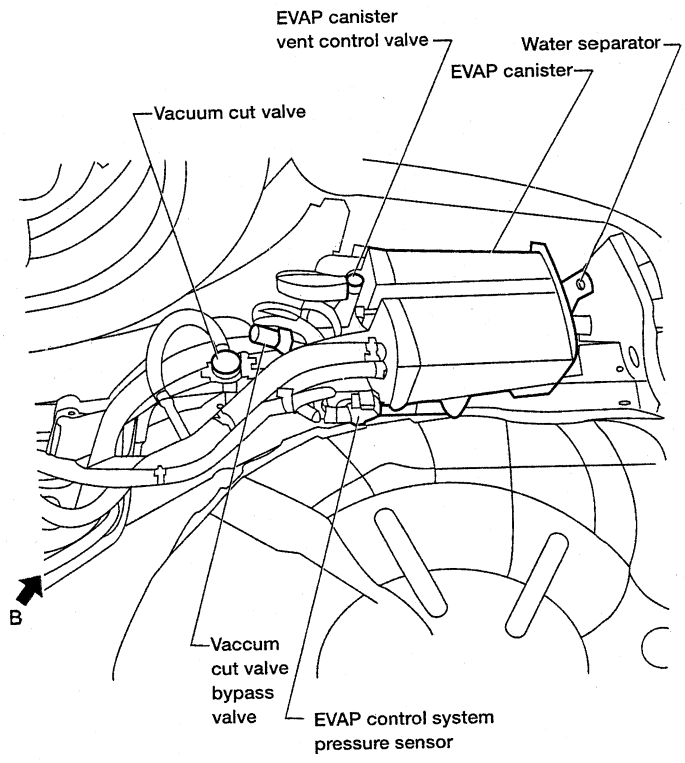


NOTE : Do not use soapy water or any type of solvent while installing vacuum hoses or purge hoses.

SEF446Y

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





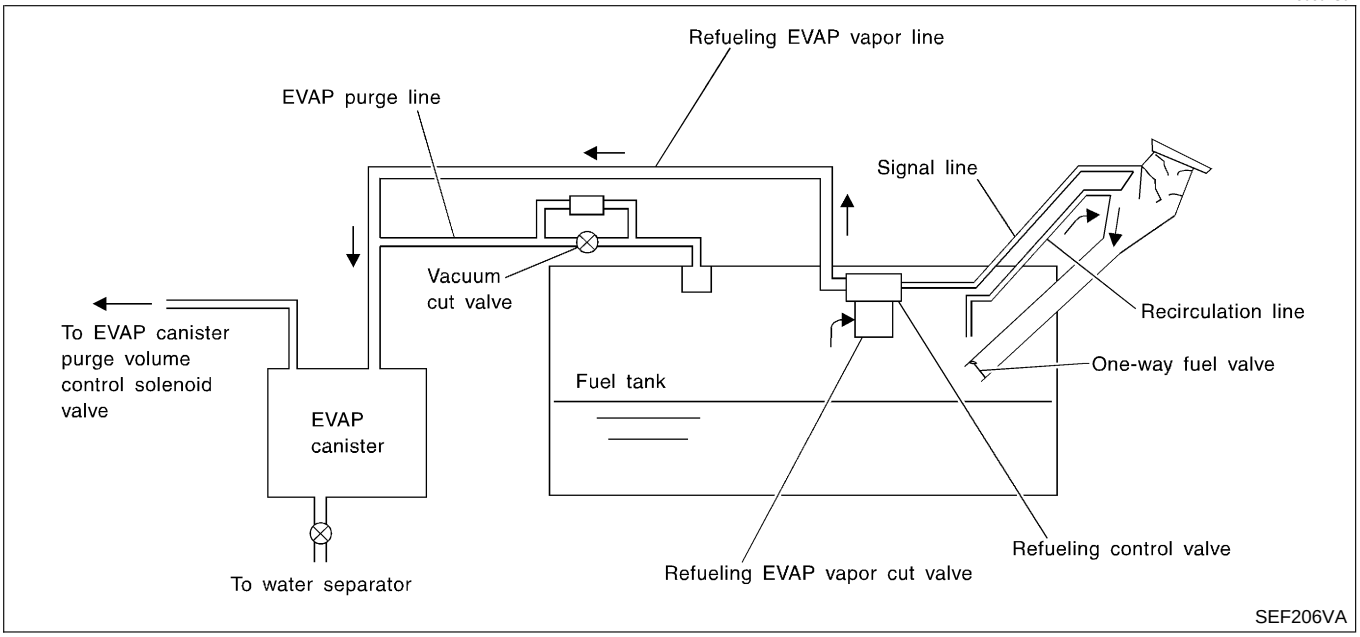
WEC362

ON BOARD REFUELING VAPOR RECOVERY (ORVR)

NIEC0502

System Description

NIEC0502S01



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-67.

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.**

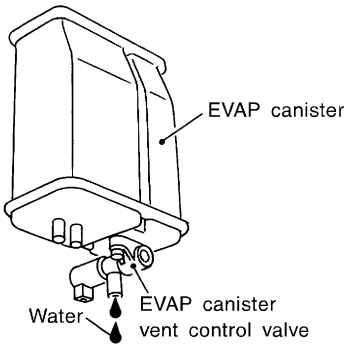
Diagnostic Procedure

NIEC0502S02

Symptom: Fuel Odor from EVAP Canister Is Strong.

NIEC0502S0201

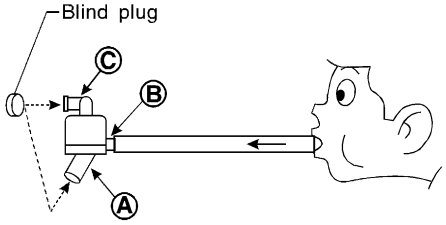
1	CHECK EVAP CANISTER	
1. Remove EVAP canister with EVAP canister vent control valve attached. 2. Weigh the EVAP canister with EVAP canister vent control valve attached. The weight should be less than 1.8 kg (4.0 lb).		
OK or NG		
OK	▶	GO TO 2.
NG	▶	GO TO 3.

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

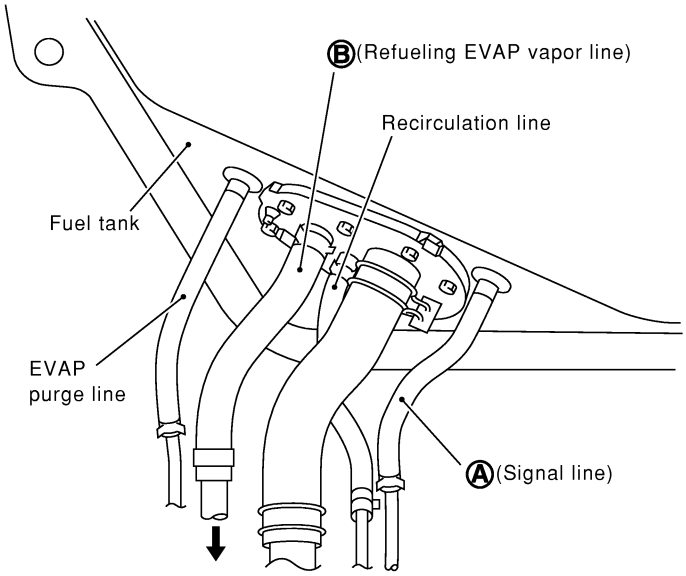
With CONSULT-II

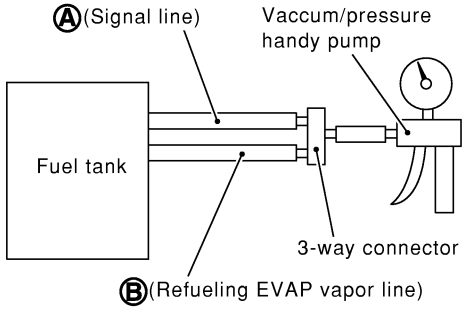
1. Remove fuel tank. Refer to ***FE-6***, "FUEL SYSTEM.
2. Drain fuel from the tank as follows:

a. Remove fuel feed hose located on the fuel level sensor unit retainer.
b. Connect a spare fuel hose, one side to fuel level sensor unit 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 level sensor 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 level sensor unit retainer remaining open and check that the pressure is applicable.





SEF246Y

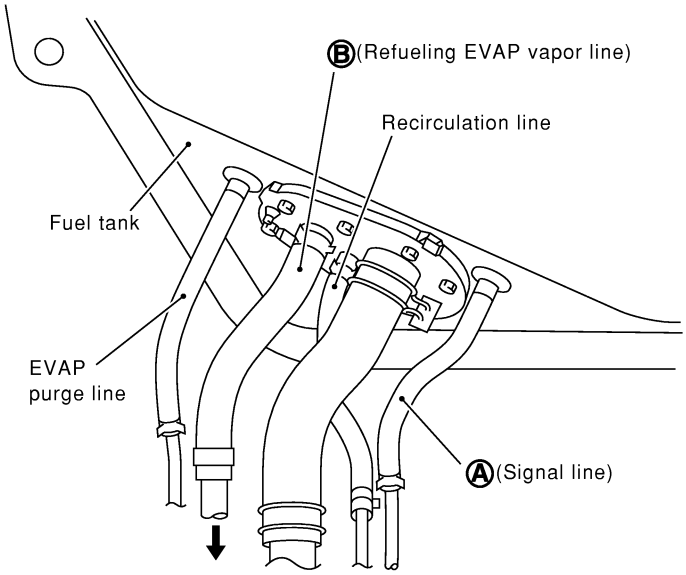
OK or NG

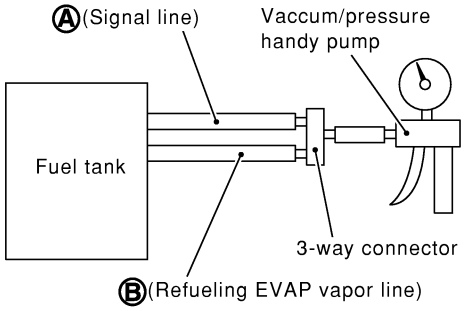
OK	▶	GO TO 8.
NG	▶	Replace refueling EVAP vapor cut valve with fuel tank.

7	CHECK REFUELING EVAP VAPOR CUT VALVE

Without CONSULT-II

1. Remove fuel tank. Refer to ***FE-6***, "FUEL SYSTEM".
2. Drain fuel from the tank as follows:
a. Remove fuel level sensor unit 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 level sensor unit retainer with fuel level sensor 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 level sensor unit retainer remaining open and check that the pressure is applicable.





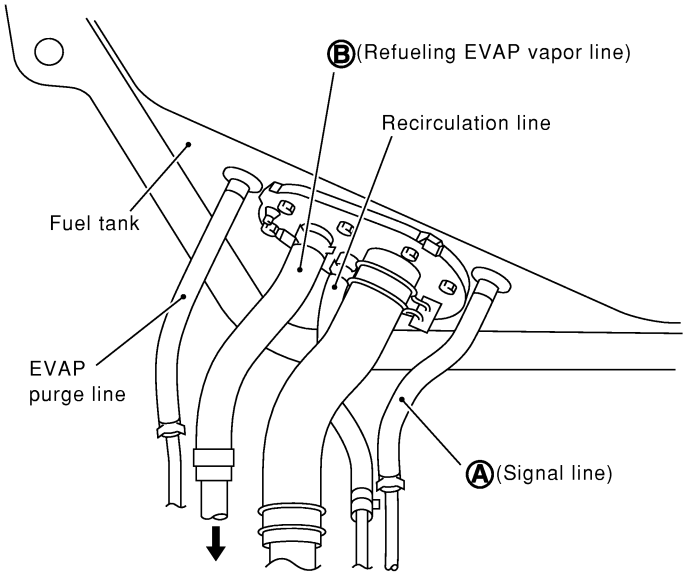
SEF246Y

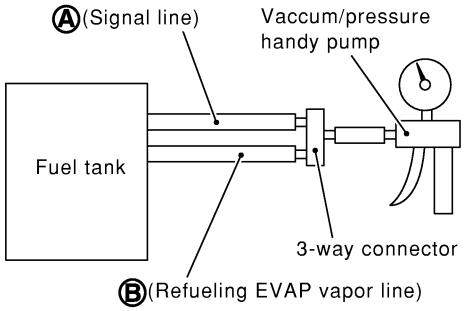
OK or NG

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.





SEF246Y

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.

NIEC0502S0202

1	CHECK EVAP CANISTER

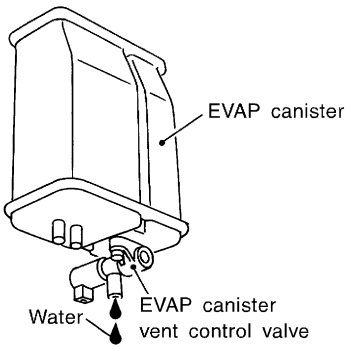
1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Weigh the EVAP canister with EVAP canister vent control valve attached.
   The weight should be less than 1.8 kg (4.0 lb).

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.

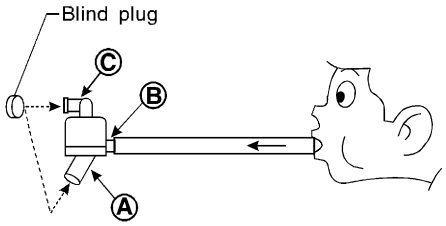
3	REPLACE EVAP CANISTER

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.



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

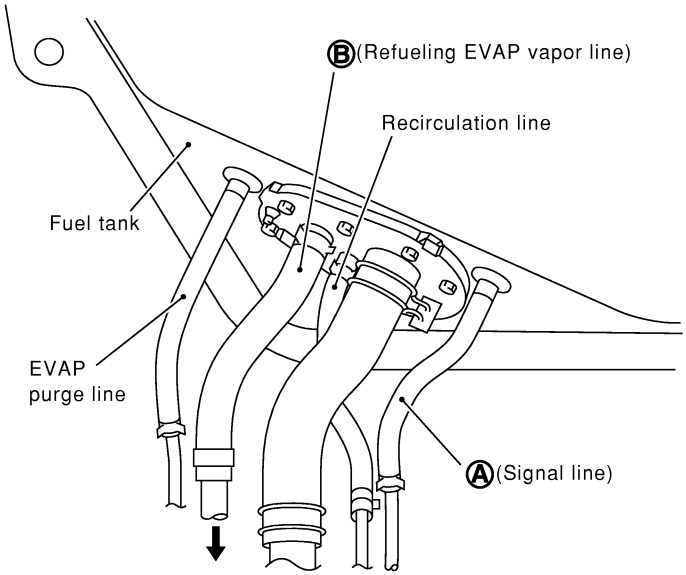
	▶	Repair or replace EVAP hose.

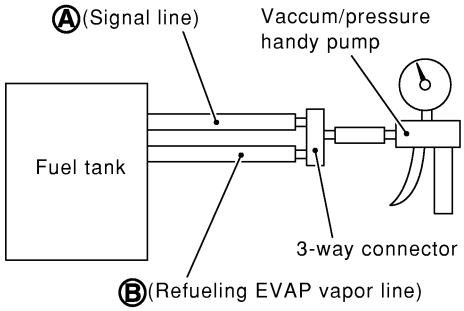
6	CHECK VENT HOSES AND VENT TUBES	
Check hoses and tubes between EVAP canister and refueling control valve for clogging, kink, looseness and improper connection.		
OK or NG		
OK	▶	GO TO 7.
NG	▶	Repair or replace hoses and tubes.

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.





SEF246Y

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

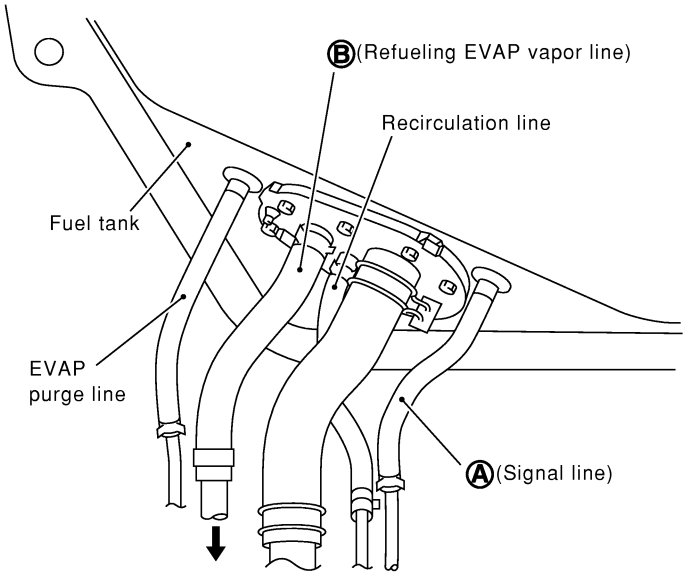
With CONSULT-II

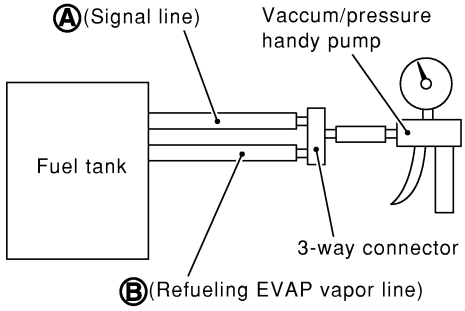
1. Remove fuel tank. Refer to ***FE-6***, "FUEL SYSTEM".
2. Drain fuel from the tank as follows:

a. Remove fuel feed hose located on the fuel level sensor unit retainer.
b. Connect a spare fuel hose, one side to fuel level sensor unit 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 level sensor unit retainer with fuel level sensor 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 level sensor unit retainer remaining open and check that the pressure is applicable.





SEF246Y

OK or NG

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

10	CHECK REFUELING EVAP VAPOR CUT VALVE

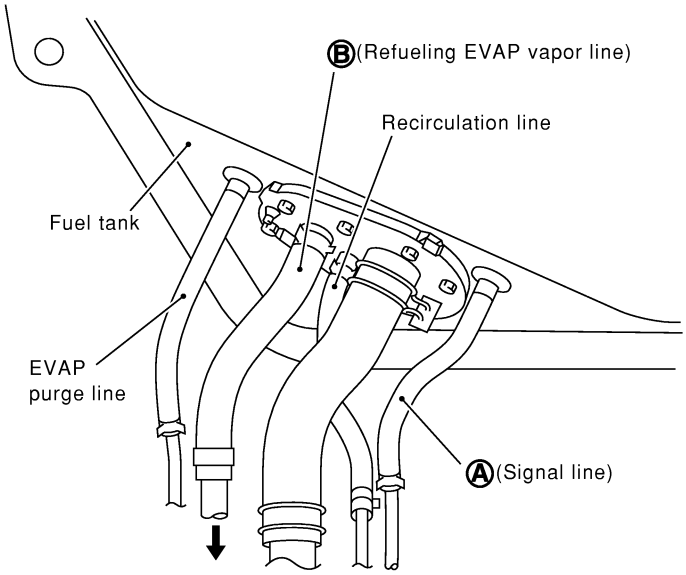
Without CONSULT-II

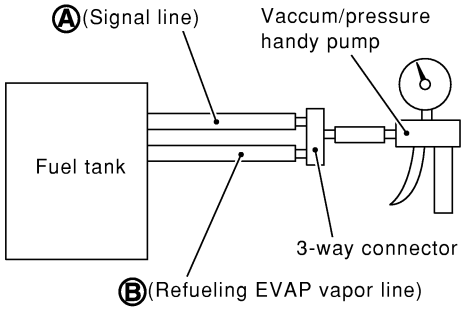
1. Remove fuel tank. Refer to ***FE-6***, "FUEL SYSTEM".
2. Drain fuel from the tank as follows:

a. Remove fuel level sensor unit 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 level sensor unit retainer with fuel level sensor 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 level sensor unit retainer remaining open and check that the pressure is applicable.





SEF246Y

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.

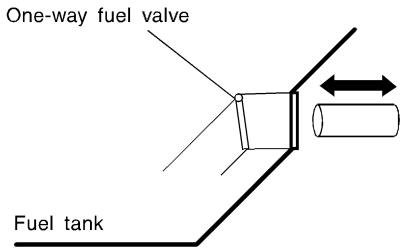
OK or NG

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.

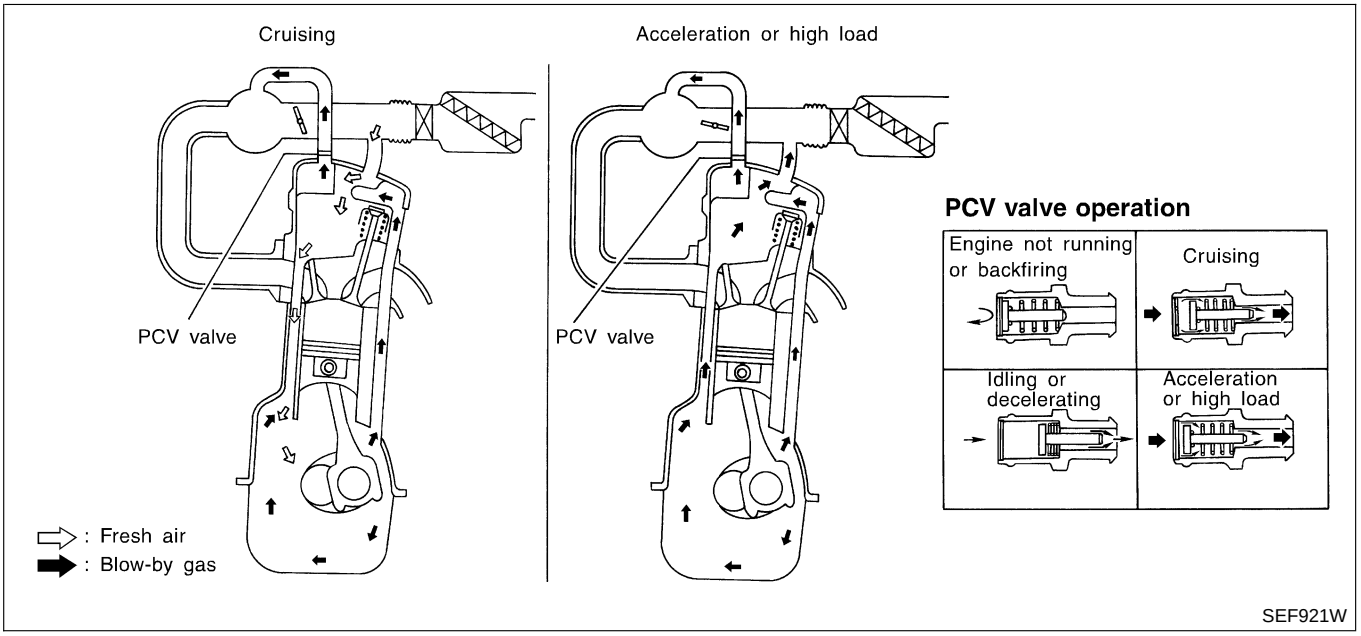
OK or NG

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

Positive Crankcase Ventilation

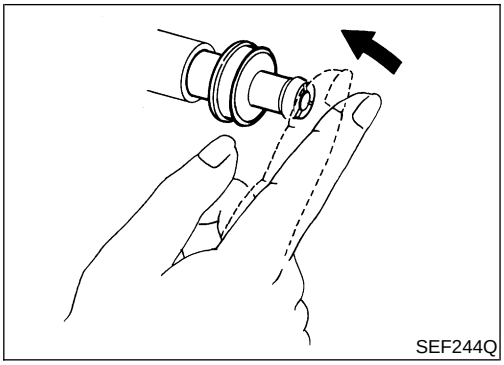
DESCRIPTION

NIEC0022



SEF921W

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


SEF244Q

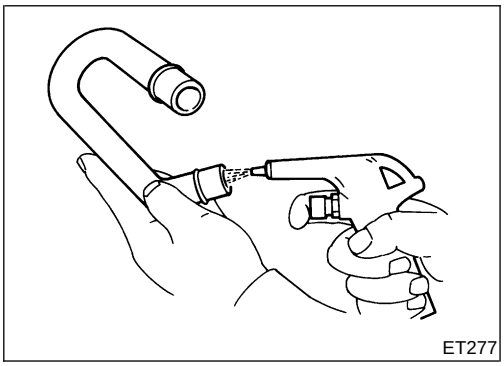
INSPECTION

NIEC0023

PCV (Positive Crankcase Ventilation) Valve

NIEC0023S01

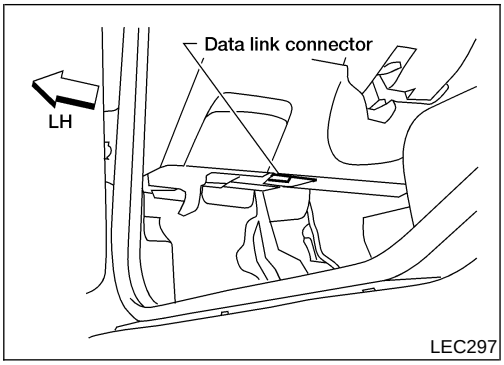
With engine running at idle, remove PCV valve from rocker cover. A properly working valve makes a hissing noise as air passes through it. A strong vacuum should be felt immediately when a finger is placed over the valve inlet.


ET277

Ventilation Hose

NIEC0023S02

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.



LEC297

Fuel Pressure Release

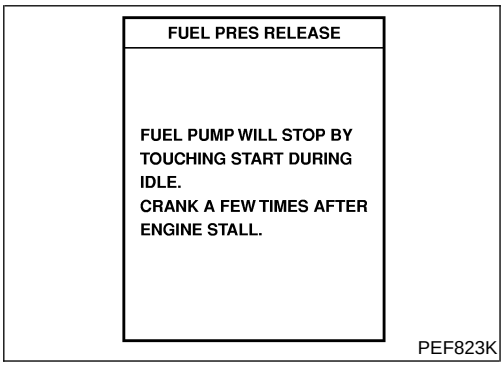
NIEC0024

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

WITH CONSULT-II

NIEC0024S01

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

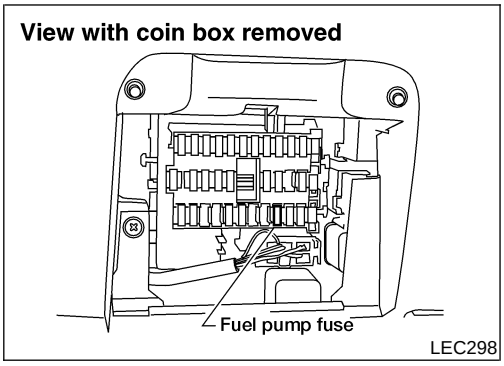


PEF823K

WITHOUT CONSULT-II

NIEC0024S02

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

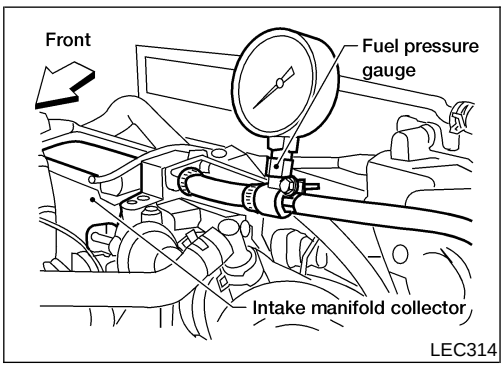


LEC298

Fuel Pressure Check

NIEC0025

- **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 Kit J-44321 to check fuel pressure.**
- **Do not perform fuel pressure check with system operating. Fuel pressure gauge may indicate false readings.**



LEC314

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

At idle speed:

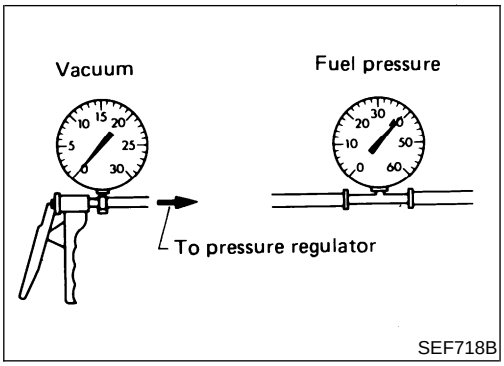
With vacuum hose connected

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

With vacuum hose disconnected

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

If results are unsatisfactory, perform Fuel Pressure Regulator Check, EC-68.



Fuel Pressure Regulator Check

NIEC0026

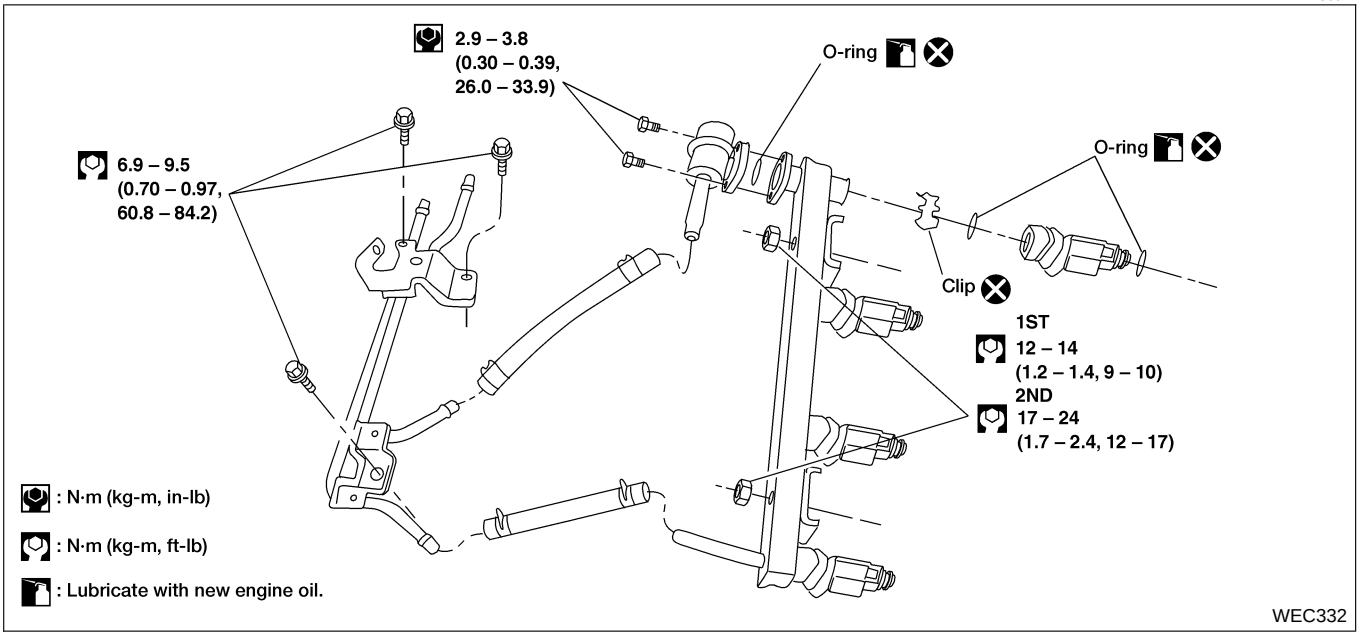
1. Stop engine and disconnect fuel pressure regulator vacuum hose from intake manifold collector.
2. Plug intake manifold collector with a rubber cap.
3. Connect variable vacuum source to fuel pressure regulator.
4. Start engine and read indication of fuel pressure gauge as vacuum is changed.

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

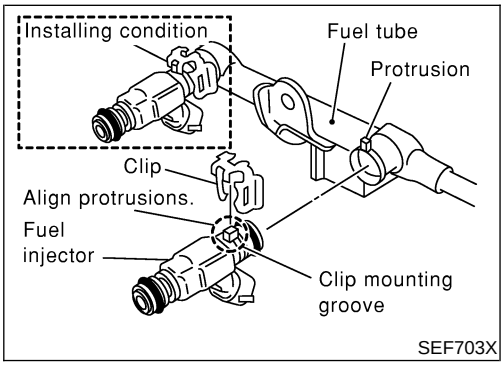
Injector

REMOVAL AND INSTALLATION

NIEC0027



1. Release fuel pressure to zero. Refer to “Fuel Pressure Release”, EC-67.
2. Remove accelerator cables.
3. Remove intake manifold bracket.
4. Remove PCV hose with bracket.
5. Disconnect injector harness connectors.
6. Disconnect fuel pressure regulator vacuum hose from intake manifold collector.
7. Disconnect fuel hoses from fuel tube assembly.
8. Remove injectors with fuel tube assembly.



9. Expand and remove clips securing fuel injectors.
10. Extract fuel injectors straight from fuel tubes.

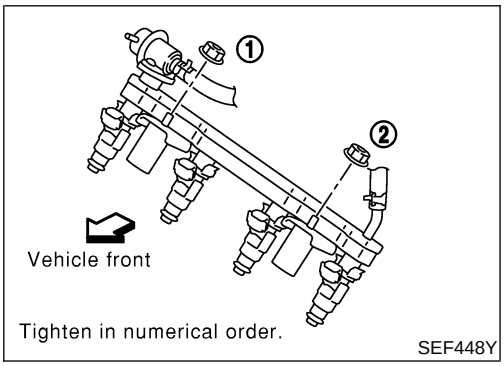
- **Be careful not to damage injector nozzles during removal.**
- **Do not bump or drop fuel injectors.**

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

- **Lubricate O-rings by smearing 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.**

12. Position clips in grooves on fuel injectors.
- **Make sure that protrusions of fuel injectors are aligned with cutouts of clips after installation.**

13. Align protrusions of fuel tubes with those of fuel injectors.
14. 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.



15. Tighten fuel tube assembly mounting nuts in two stages.
: Tightening torque N·m (kg-m, ft-lb)
1st stage:
12 - 13 (1.2 - 1.4, 9 - 10)
2nd stage:
17 - 23 (1.7 - 2.4, 13 - 17)
16. Install all removed parts in the 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

NIEC0666

IDLE SPEED

NIEC0666S01

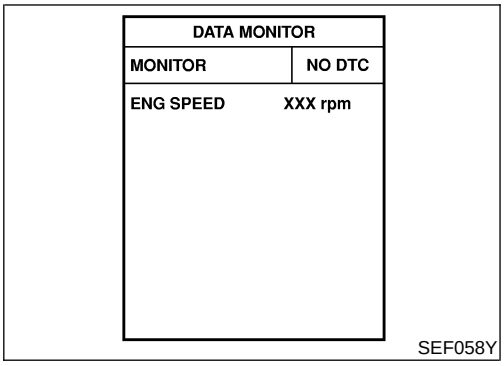
Method A

- **With CONSULT-II**

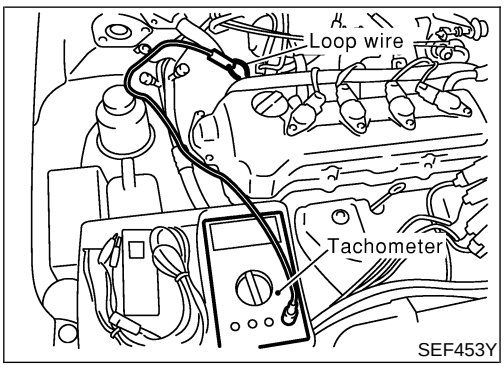
Check idle speed in "DATA MONITOR" mode with CONSULT-II.

- **With GST**

Check idle speed in "MODE 1" with GST.



Method B (Using Loop wire)
Check the idle speed using loop wire as shown in the figure.

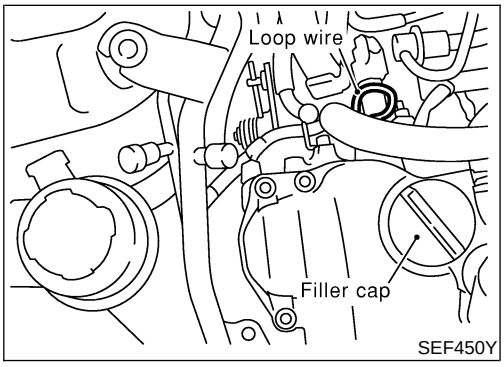


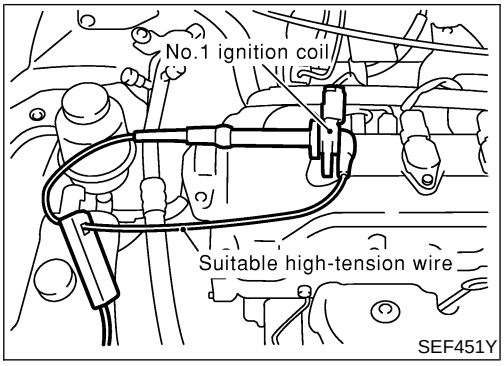
IGNITION TIMING

NIEC0666S02

Any of following two methods may be used.
Method A

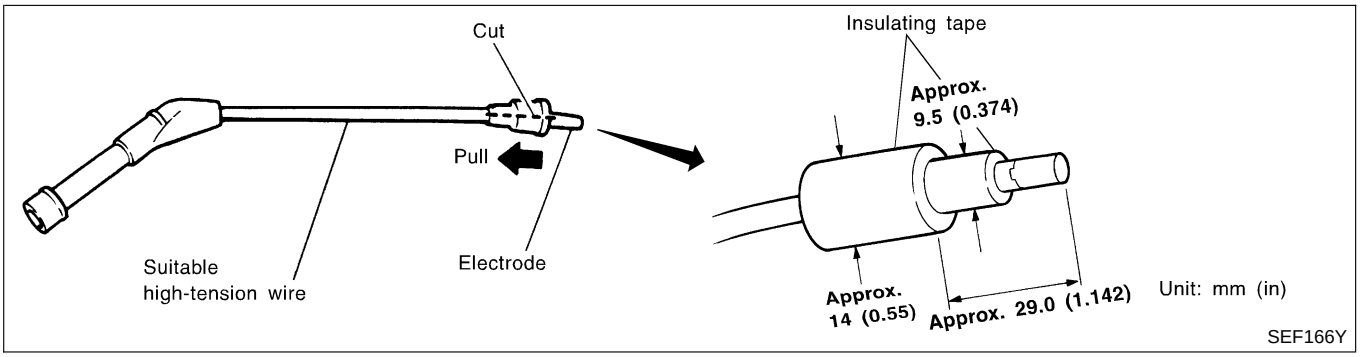
1) Attach timing light to loop wire at the location shown in the figure.
2) Check ignition timing.





Method B

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



Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment

=NIEC0028

PREPARATION

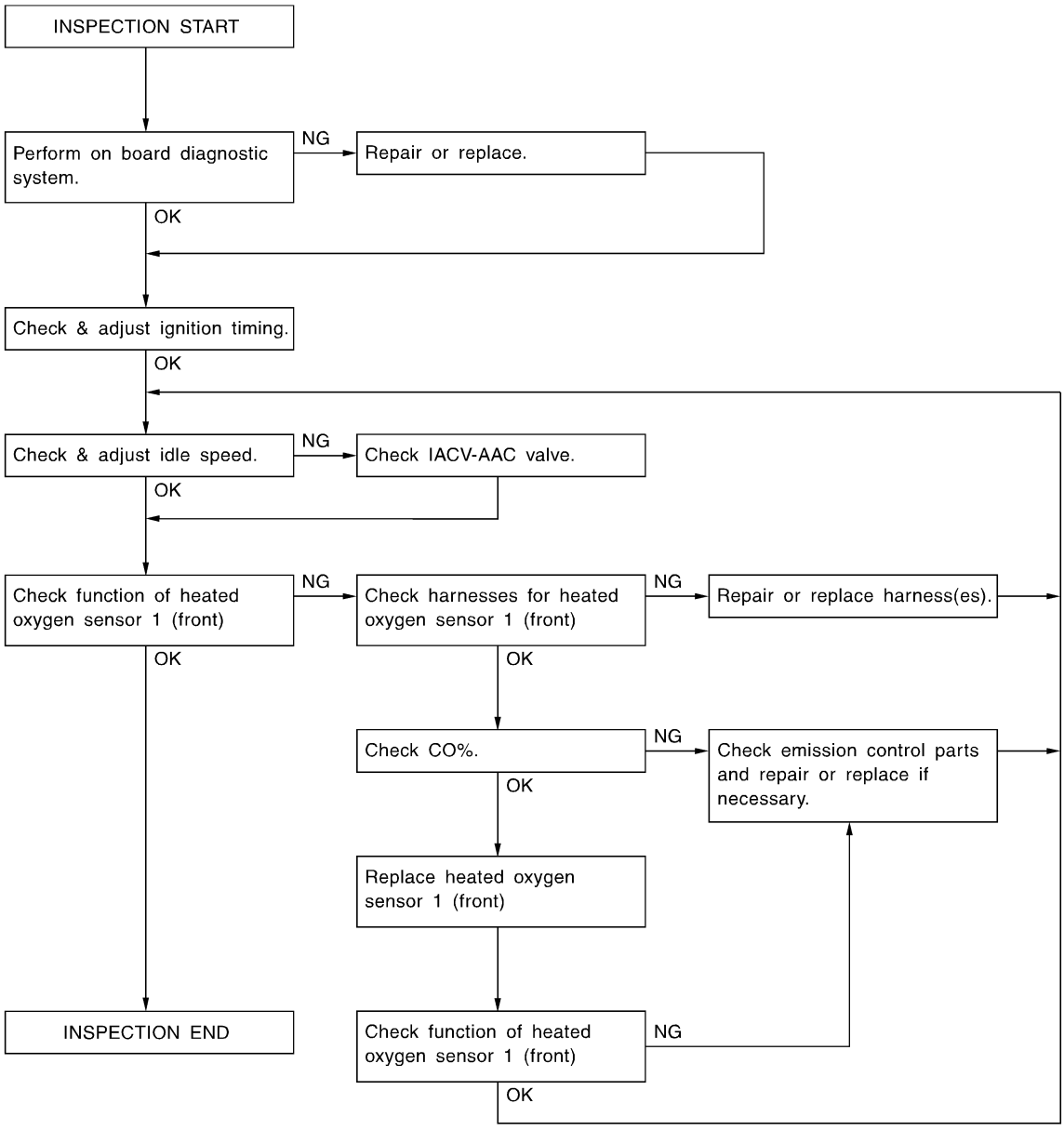
NIEC0028S01

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

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

Overall Inspection Sequence

NIEC0028S0101



SEF554Y

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.

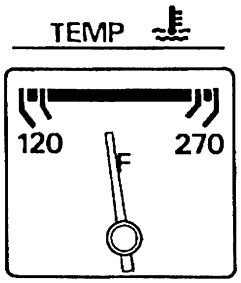
INSPECTION PROCEDURE

=NIEC0028S02

1	INSPECTION START

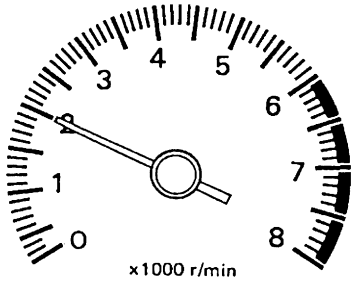
1. Visually check the following:
- Air cleaner clogging
- Hoses and ducts for leaks
- EGR valve operation
- Electrical connectors
- Gasket
- Throttle position and throttle position sensor operation

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.

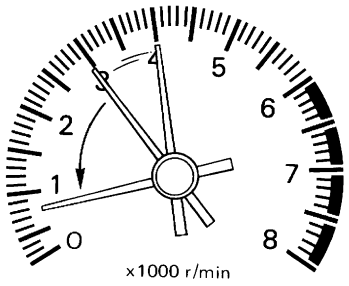
OK or NG

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.

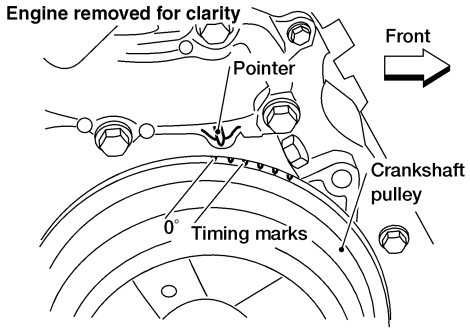
3	CHECK IGNITION TIMING

1. Run engine at about 2,000 rpm for about 2 minutes under no-load.
2. Rev engine (2,000 to 3,000 rpm) two or three times under no-load, then run engine at idle speed for about 1 minute.



SEF978U

3. Check ignition timing with a timing light.



LEC245

M/T: 9°±2° BTDC
A/T: 9°±2° BTDC (in "P" or "N" position)

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Check camshaft position sensor (PHASE) and circuit, repair or replace if necessary. Refer to EC-363.
- Check crankshaft position sensor (POS) and circuit, repair or replace if necessary. Refer to EC-358, EC-560.
- Check PCM function by substituting another known good PCM.
  (PCM may be the cause of a problem, but this is rarely the case.)

	▶	GO TO 3.

5	CHECK TARGET IDLE SPEED

With CONSULT-II

1. Run engine at about 2,000 rpm for about 2 minutes under no-load and run engine for about 1 minute at idle speed.
2. Read idle speed in "DATA MONITOR" mode with CONSULT-II.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

M/T: 650±50 rpm
A/T: 800±50 rpm (in "P" or "N" position)

Without CONSULT-II

1. Run engine at about 2,000 rpm for about 2 minutes under no-load and run engine for about 1 minute at idle speed.
2. Check idle speed.

M/T: 650±50 rpm
A/T: 800±50 rpm (in "P" or "N" position)

OK or NG

OK (With CONSULT-II)	▶	GO TO 8.
OK (Without CONSULT-II)	▶	GO TO 9.
NG	▶	GO TO 6.

6	CHECK TARGET IDLE SPEED AGAIN

Perform test No. 5 again.

OK or NG

OK (With CONSULT-II)	▶	GO TO 8.
OK (Without CONSULT-II)	▶	GO TO 9.
NG	▶	GO TO 7.

7	DETECT MALFUNCTIONING PART

Check the following.
- Check IACV-AAC valve and replace if necessary. Refer to EC-455.
- Check IACV-AAC valve harness and repair if necessary. Refer to EC-459.
- Check PCM function by substituting another known-good PCM.
  (PCM may be the cause of a problem, but this is rarely the case.)

With CONSULT-II	▶	GO TO 8.
Without CONSULT-II	▶	GO TO 9.

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

With CONSULT-II

1. Run engine at about 2,000 rpm for about 2 minutes under no-load.
2. See "HO2S1 MNTR B1" 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.

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

SEF449Y

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

OK or NG

OK	▶	GO TO 12.
NG (Monitor does not fluctuate.)	▶	GO TO 17.
NG (Monitor fluctuates less than 5 times.)	▶	GO TO 10.

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

Without CONSULT-II

1. Run engine at about 2,000 rpm for about 2 minutes under no-load.
2. Set voltmeter probe between PCM 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 12.
NG (Voltage does not fluctuate.)	▶	GO TO 17.
NG (Voltage fluctuates less than 5 times.)	▶	GO TO 10.

10	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 "HO2S MNTR (B1)" 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 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 PCM terminal 94 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 12.
OK (Without CONSULT-II)	▶	GO TO 13.
NG	▶	GO TO 11.

11	DETECT MALFUNCTIONING PART

Check the following.

1. Check fuel pressure regulator. Refer to EC-68.
2. Check mass air flow sensor and its circuit. Refer to EC-176.
3. Check injector and its circuit. Refer to EC-665.
   Clean or replace if necessary.
4. Check engine coolant temperature sensor and its circuit. Refer to EC-196.
5. Check PCM function by substituting another known-good PCM.
   (PCM may be the cause of a problem, but this is rarely the case.)

	▶	GO TO 3.

12	CHECK HEATED OXYGEN SENSOR 1 (FRONT) (BANK 2) SIGNAL

With CONSULT-II

1. See "HO2S1 MNTR (B2)" in "DATA MONITOR" mode.
2. 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.

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

SEF449Y

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

OK or NG

OK	▶	**INSPECTION END**
NG (Monitor does not fluctuate.)	▶	GO TO 16.
NG (Monitor fluctuates less than 5 times.)	▶	GO TO 14.

13	CHECK HEATED OXYGEN SENSOR 1 (FRONT) (BANK 2) SIGNAL

Without CONSULT-II

1. Set voltmeter probe between PCM terminal 62 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 16.
NG (Voltage fluctuates less than 5 times.)	▶	GO TO 14.

14	CHECK FRONT 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. 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 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 PCM 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	▶	**INSPECTION END**
NG	▶	GO TO 15.

15	DETECT MALFUNCTIONING PART

Check the following.
- Check fuel pressure regulator. Refer to EC-68.
- Check mass air flow sensor and its circuit. Refer to EC-176.
- Check injector and injector circuit. Refer to EC-665.
  Clean or replace if necessary.
- Check engine coolant temperature sensor and circuit. Refer to EC-196.
- Check PCM function by substituting another known-good PCM.
  (PCM may be the cause of a problem, but this is rarely the case.)

	▶	GO TO 5.

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

1. Turn off engine and disconnect battery ground cable.
2. Disconnect PCM harness connector.
3. Disconnect heated oxygen sensor 1 (front) (bank 2) harness connector.
4. Check harness continuity between PCM terminal 62 and heated oxygen sensor 1 (front) (bank 2) harness connector terminal 1.
   Refer to Wiring Diagram, EC-221.
   Continuity should exist.

OK or NG

OK	▶	GO TO 19.
NG	▶	GO TO 18.

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

1. Turn off engine and disconnect battery ground cable.
2. Disconnect PCM harness connector.
3. Disconnect heated oxygen sensor 1 (front) (bank 1) harness connector.
4. Check harness continuity between PCM terminal 62 and heated oxygen sensor 1 (front) (bank 1) harness connector terminal 1.
   Refer to Wiring Diagram, EC-221.
   Continuity should exist.

OK or NG

OK	▶	GO TO 19.
NG	▶	GO TO 18.

18	REPAIR OR REPLACE

Repair or replace harness between PCM and heated oxygen sensor.

	▶	GO TO 5.

19	PREPARATION FOR "CO" % CHECK

With CONSULT-II

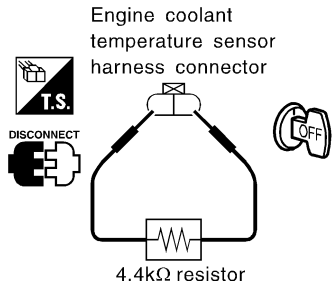
1. Reconnect PCM harness connector and battery ground cable.
2. Turn ignition switch "ON".
3. Select "COOLANT TEMP" in "ACTIVE TEST" mode.
4. Set "COOLANT TEMP" to 5°C (41°F) by touching "DWN" and "Qd".

ACTIVE TEST	
COOLANT TEMP	5°C
MONITOR	
ENG-SPEED	XXX rpm
INJ PULSE-B1	XXX msec
INJ PULSE-B2	XXX msec
IGN TIMING	XXX BTDC

SEF712Y

Without CONSULT-II

1. Disconnect PCM 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.

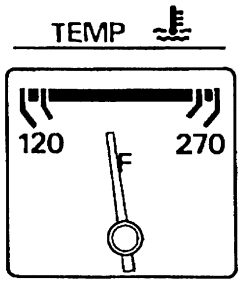


SEF982UA

	▶	GO TO 20.

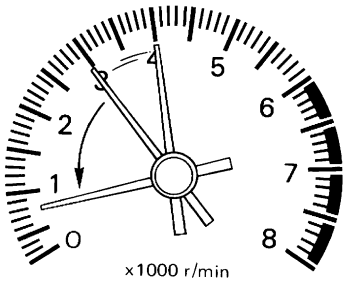
20	CHECK "CO" %

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: 0 - 8%
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 21.
NG	▶	GO TO 22.

21	CHECK HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1/BANK 2) SIGNAL

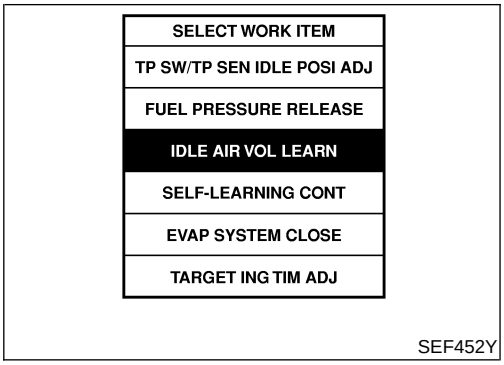
Ⓟ **With CONSULT-II**
1. Stop engine.
2. Replace heated oxygen sensor 1 (front) (bank 1/bank 2).
3. Start engine and warm it up to normal operating temperature.
4. Run engine at approx. 2,000 rpm for approx. 2 minutes under no-load.
5. See "HO2S1 (B1)" and "HO2S1 (B2)" in "DATA MONITOR" mode.
6. Maintaining 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) (bank 1/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 PCM terminal 94 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

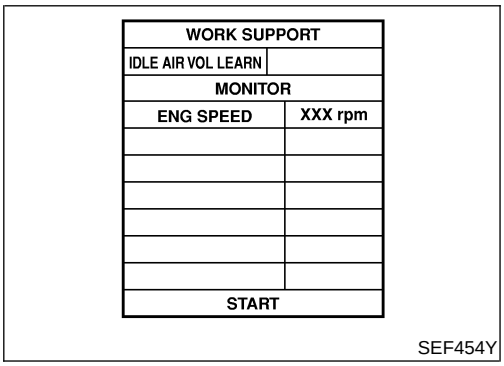
OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 22.

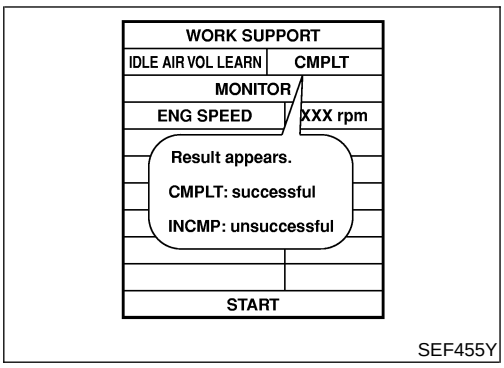
22	DETECT MALFUNCTIONING PART
Check the following. ● Connect front heated oxygen sensor harness connectors to front heated oxygen sensors. ● Check fuel pressure regulator. Refer to EC-68. ● Check mass air flow sensor and circuit. Refer to EC-176. ● Check injector and injector circuit. Refer to EC-665. Clean or replace if necessary. ● Check engine coolant temperature sensor and circuit. Refer to EC-196. ● Check PCM function by substituting another known good PCM. (PCM may be the cause of a problem, but this is rarely the case.)	
▶	GO TO 5.



SEF452Y



SEF454Y



SEF455Y

Idle Air Volume Learning

=NIEC0503

DESCRIPTION

NIEC0503S01

"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 PCM is replaced.
- Idle speed or ignition timing is out of specification.

PRE-CONDITIONING

NIEC0503S02

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 - 95°C (158 - 203°F)
- PNP switch: ON
- Electric load switch: OFF
  (Air conditioner, headlamp, rear window defogger)

On vehicles equipped with daytime running light systems, if the parking brake is applied before the engine is started the headlamp will not be illuminated.

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

OPERATION PROCEDURE

NIEC0503S03

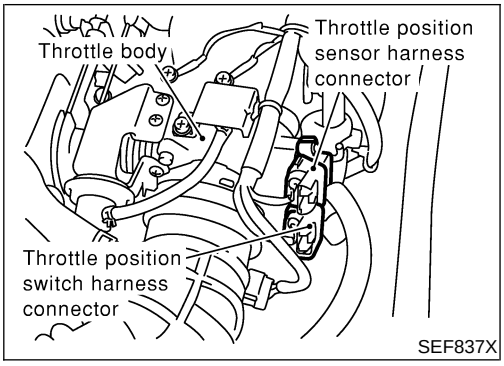
Ⓐ With CONSULT-II

NIEC0503S0301

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 5 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 on next page.
10. Rev up the engine two or three times. Make sure that idle speed and ignition timing are within specifications.

ITEM	SPECIFICATION
Idle speed	M/T: 650±50 rpm A/T: 800±50 rpm (in "P" or "N" position)
Ignition timing	M/T: 9°±2° BTDC A/T: 9°±2° BTDC (in "P" or "N" position)

Idle Air Volume Learning (Cont'd)



Without CONSULT-II

NIEC0503S0302

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", EC-83, 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	M/T: 650±50 rpm A/T: 800±50 rpm (in "P" or "N" position)
Ignition timing	M/T: 9°±2° BTDC A/T: 9°±2° 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 that downstream of throttle valve is free from air leakage.**
3) **Adjust closed throttle position switch and reset memory. (Refer to Basic Inspection, EC-131.)**
4) **When the above three items check out OK, engine component parts and their installation condition are questionable. Check and eliminate the cause of the problem.**
5) **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

NIEC0029

The PCM has an on board diagnostic system, which detects malfunctions related to engine sensors or actuators. The PCM 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 PCM enters fail-safe mode. (Refer to EC-146.)

Two Trip Detection Logic

NIEC0030

When a malfunction is detected for the first time, 1st trip DTC and 1st trip Freeze Frame data are stored in the PCM 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 PCM 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 PCM 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 - P0304 is being detected	X	—	—	—	X	—	X	—
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0304 has been detected	—	—	X	—	—	X	—	—
Closed loop control — DTC: P1148	—	X	—	—	X	—	X	—
Fail-safe items (Refer to EC-146.)	—	X	—	—	X*1	—	X*1	—
Except above	—	—	—	X	—	X	X	—

*1: Except “PCM”

Emission-related Diagnostic Information

NIEC0031

DTC AND 1ST TRIP DTC

NIEC0031S01

The 1st trip DTC (whose number is the same as the DTC number) is displayed for the latest self-diagnostic result obtained. If the PCM 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 PCM memory. The MIL will not light up (two trip detection logi0319c). If the same malfunction is not detected in the 2nd trip (meeting the required driving pattern), the 1st trip DTC is cleared from the PCM memory. If the same malfunction is detected in the 2nd trip, both the 1st trip DTC and DTC are stored in the PCM memory and the MIL lights up. In other words, the DTC is stored in the PCM 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 PCM memory.

Procedures for clearing the DTC and the 1st trip DTC from the PCM memory are described in “HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION”, EC-98.

For malfunctions in which 1st trip DTCs are displayed, refer to EC-96. 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-129. 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

NIEC0031S0101

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.

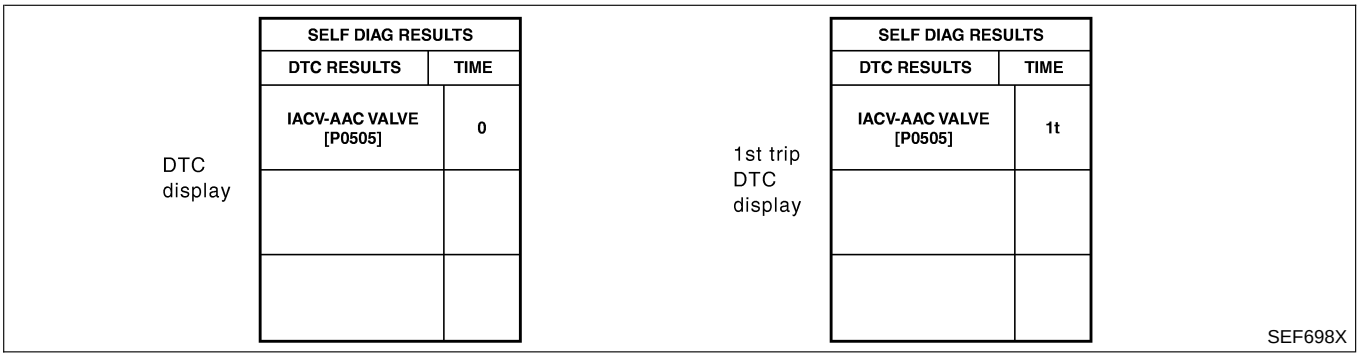
(CONSULT-II also displays the malfunctioning component or system.)

- **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 PCM, the time data will be “[1t]”.



FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA

NIEC0031S02

The PCM 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 PCM 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-112.
Only one set of freeze frame data (either 1st trip freeze frame data or freeze frame data) can be stored in the PCM. 1st trip freeze frame data is stored in the PCM 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 PCM memory, 1st trip freeze frame data is no longer stored. Remember, only one set of freeze frame data can be stored in the PCM. The PCM has the following priorities to update the data.

Priority	Items	
1	Freeze frame data	Misfire — DTC: P0300 - P0304 Fuel Injection System Function — DTC: P0171, P0172
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 PCM 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 PCM). If freeze frame data is stored in the PCM memory and freeze frame data with the same priority occurs later, the first (original) freeze frame data remains unchanged in the PCM memory.
Both 1st trip freeze frame data and freeze frame data (along with the DTCs) are cleared when the PCM memory is erased. Procedures for clearing the PCM memory are described in "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-98.

SYSTEM READINESS TEST (SRT) CODE

NIEC0031S03

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 PCM 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 PCM 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 PCM 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

=NIEC0031S0307

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

SRT item (CONSULT-II indication)	Performance Priority*	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
	3	EVAP control system (very small leak) (negative pressure/positive pressure)	P1441
		EVAP control system purge flow monitoring	P1447
O2 SENSOR	3	Heated oxygen sensor 1 (front) (bank 1)/(bank 2) (circuit)	P0130, P0150
		Heated oxygen sensor 1 (front) (bank 1)/(bank 2) (lean shift monitoring)	P0131, P0151
		Heated oxygen sensor 1 (front) (bank 1)/(bank 2) (rich shift monitoring)	P0132, P0152
		Heated oxygen sensor 1 (front) (bank 1)/(bank 2) (response monitoring)	P0133, P0153
		Heated oxygen sensor 1 (front) (bank 1)/(bank 2) (high voltage)	P0134, P0154
		Heated oxygen sensor 2 (rear) (bank 1)/(bank 2) (min. voltage monitoring)	P0137, P0157
		Heated oxygen sensor 2 (rear) (bank 1)/(bank 2) (max. voltage monitoring)	P0138, P0158
		Heated oxygen sensor 2 (rear) (bank 1)/(bank 2) (response monitoring)	P0139, P0159
		Heated oxygen sensor 2 (rear) (bank 1)/(bank 2) (high voltage)	P0140, P0160
O2 SEN HEATER	3	Heated oxygen sensor 1 (front) heater (bank 1)/(bank 2)	P0135, P0155
		Heated oxygen sensor 2 (rear) heater (bank 1)/(bank 2)	P0141, P0161
EGR SYSTEM	3	EGR function (close)	P0400
	1	EGR function (open)	P1402

*: 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

=NIEC0031S0308

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 PCM after repair.
- If the 1st trip DTC is erased, all the SRT will indicate "INCMP".

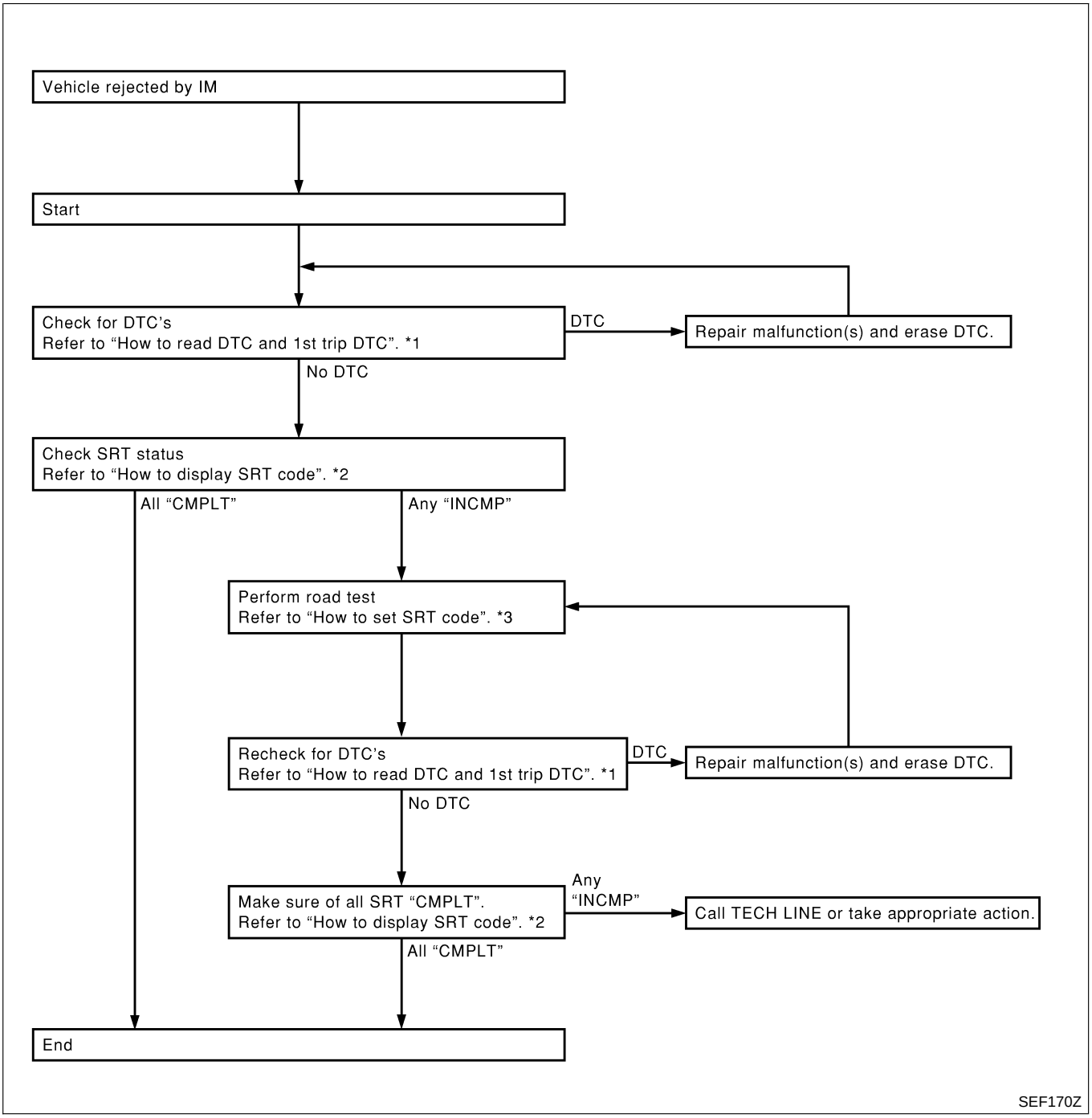
NOTE:

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

NIEC0031S0309

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-86 *2 EC-90 *3 EC-91

How to Display SRT Code

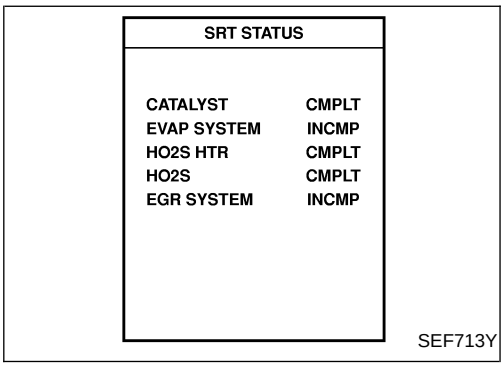
NIEC0031S0301

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

NIEC0031S0302

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-88.

Without CONSULT-II

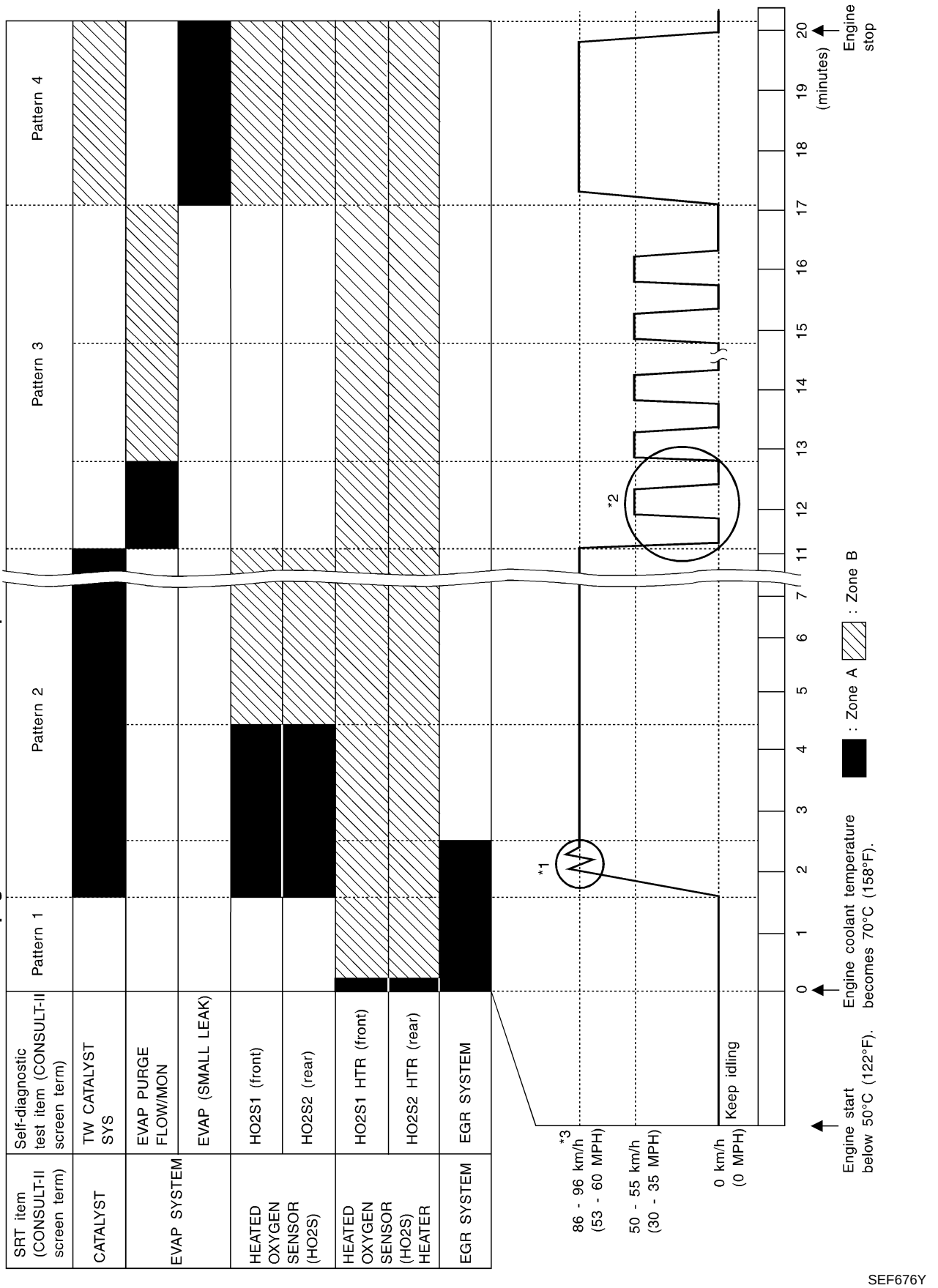
The most efficient driving pattern in which SRT codes can be properly set is explained on the next page. The driving pattern should be performed one or more times to set all SRT codes.

Emission-related Diagnostic Information (Cont'd)

Driving Pattern

NIEC0031S0303

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.



SEF676Y

- 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 PCM 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 PCM 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 PCM terminal 82 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.

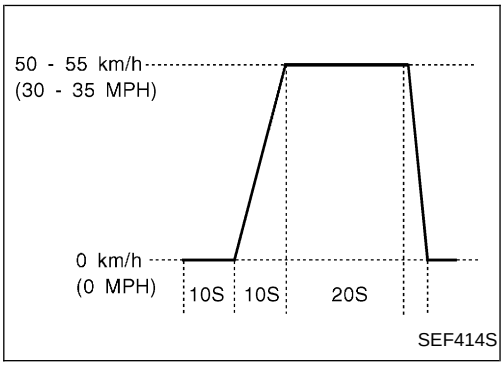
Pattern 4:

- 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.

Suggested upshift speeds for M/T models

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

	For normal acceleration in low altitude areas [less than 1,219 m (4,000 ft)]:	For quick acceleration in low altitude areas and high altitude areas [over 1,219 m (4,000 ft)]:
Gear change	ACCEL shift point km/h (MPH)	km/h (MPH)
1st to 2nd	24 (15)	25 (15)
2nd to 3rd	40 (25)	40 (25)
3rd to 4th	65 (40)	65 (40)
4th to 5th	75 (45)	75 (45)

Suggested Maximum Speed in Each Gear

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

Gear	km/h (MPH)
1st	48 (30)
2nd	84 (52)
3rd	128 (80)
4th	—
5th	—

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

NIEC0031S04

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 PCM during self-diagnosis. The test limit is a reference value which is specified as the maximum or minimum value and is compared with the test value being monitored.
Items for which these data (test value and test limit) are displayed are the same as SRT code items (9 test items).
These data (test value and test limit) are specified by Test ID (TID) and Component ID (CID) and can be displayed on the GST screen.

X: Applicable —: Not applicable

SRT item	Self-diagnostic test item	Test value (GST display)		Test limit	Application
		TID	CID		
CATALYST	Three way catalyst function (bank 1)	02H	81H	Min.	X
	Three way catalyst function (bank 2)	02H	81H	Min.	X
EVAP SYSTEM	EVAP control system (Small leak)	05H	03H	Max.	X
	EVAP control system purge flow monitoring	06H	83H	Min.	X

SRT item	Self-diagnostic test item	Test value (GST display)		Test limit	Application
		TID	CID		
O2 SENSOR	Heated oxygen sensor 1 (front) (bank 1)	09H	04H	Max.	X
		0AH	84H	Min.	X
		0BH	04H	Max.	X
		0CH	04H	Max.	X
		0DH	04H	Max.	X
	Heated oxygen sensor 1 (front) (bank 2)	11H	05H	Max.	X
		12H	85H	Min.	X
		13H	05H	Max.	X
		14H	05H	Max.	X
		15H	05H	Max.	X
	Heated oxygen sensor 2 (rear) (bank 1)	19H	86H	Min.	X
		1AH	86H	Min.	X
		1BH	06H	Max.	X
		1CH	06H	Max.	X
	Heated oxygen sensor 2 (rear) (bank 2)	21H	87H	Min.	X
		22H	87H	Min.	X
		23H	07H	Max.	X
		24H	07H	Max.	X
O2 SENSOR HEATER	Heated oxygen sensor 1 heater (front) (bank 1)	29H	08H	Max.	X
		2AH	88H	Min.	X
	Heated oxygen sensor 1 heater (front) (bank 2)	2BH	09H	Max.	X
		2CH	89H	Min.	X
	Heated oxygen sensor 2 heater (rear) (bank 1)	2DH	0AH	Max.	X
		2EH	8AH	Min.	X
	Heated oxygen sensor 2 heater (rear) (bank 2)	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

NIEC0031S05

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-176
ABSL PRES SEN/CIRC	P0105	—	—	X	EC-185
AIR TEMP SEN/CIRC	P0110	—	—	X	EC-190
COOLANT T SEN/CIRC	P0115	—	—	X	EC-196
THRTL POS SEN/CIRC	P0120	—	—	X	EC-201
*COOLAN T SEN/CIRC	P0125	—	—	X	EC-213
HO2S1 (B1)	P0130	X	X	X*2	EC-218
HO2S1 (B1)	P0131	X	X	X*2	EC-227
HO2S1 (B1)	P0132	X	X	X*2	EC-233
HO2S1 (B1)	P0133	X	X	X*2	EC-240
HO2S1 (B1)	P0134	X	X	X*2	EC-251
HO2S1 HTR (B1)	P0135	X	X	X*2	EC-259
HO2S2 (B1)	P0137	X	X	X*2	EC-265
HO2S2 (B1)	P0138	X	X	X*2	EC-274
HO2S2 (B1)	P0139	X	X	X*2	EC-283
HO2S2 (B1)	P0140	X	X	X*2	EC-292
HO2S2 HTR (B1)	P0141	X	X	X*2	EC-300
HO2S1 (B2)	P0150	X	X	X*2	EC-218
HO2S1 (B2)	P0151	X	X	X*2	EC-227
HO2S1 (B2)	P0152	X	X	X*2	EC-233
HO2S1 (B2)	P0153	X	X	X*2	EC-240
HO2S1 (B2)	P0154	X	X	X*2	EC-251
HO2S1 HTR (B2)	P0155	X	X	X*2	EC-259
HO2S2 (B2)	P0157	X	X	X*2	EC-265
HO2S2 (B2)	P0158	X	X	X*2	EC-274
HO2S2 (B2)	P0159	X	X	X*2	EC-283
HO2S2 (B2)	P0160	X	X	X*2	EC-292
HO2S2 HTR (B2)	P0161	X	X	X*2	EC-300
FUEL SYS-LEAN/BK1	P0171	—	—	X	EC-306
FUEL SYS-RICH/BK1	P0172	—	—	X	EC-315
FUEL SYS-LEAN/BK2	P0174	—	—	X	EC-306
FUEL SYS-RICH/BK2	P0175	—	—	X	EC-315
FUEL TEMP SEN/CIRC	P0180	—	—	X	EC-324

Items (CONSULT-II screen terms)	DTC*1	SRT code	Test value/ Test limit (GST only)	1st trip DTC*1	Reference page
ENG OVER TEMP	P0217	—	—	X	EC-329
MULTI CYL MISFIRE	P0300	—	—	X	EC-347
CYL 1 MISFIRE	P0301	—	—	X	EC-347
CYL 2 MISFIRE	P0302	—	—	X	EC-347
CYL 3 MISFIRE	P0303	—	—	X	EC-347
CYL 4 MISFIRE	P0304	—	—	X	EC-347
KNOCK SEN/CIRC-B1	P0325	—	—	—	EC-354
CKP SEN/CIRCUIT	P0335	—	—	X	EC-358
CMP SEN/CIRCUIT	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-389
PURG VOLUME CONT/V	P0443	—	—	X	EC-403
VENT CONTROL VALVE	P0446	—	—	X	EC-409
EVAPO SYS PRES SEN	P0450	—	—	X	EC-416
EVAP GROSS LEAK	P0455	—	X	X*2	EC-428
FUEL LV SE (SLOSH)	P0460	—	—	X	EC-441
FUEL LEVEL SENSOR	P0461	—	—	X	EC-445
FUEL LEVEL SEN/CIRC	P0464	—	—	X	EC-447
VEH SPEED SEN/CIRC	P0500	—	—	X	EC-451
IACV/AAC VLV/CIRC	P0505	—	—	X	EC-455
CLOSED TP SW/CIRC	P0510	—	—	X	EC-464
A/T COMM LINE	P0600	—	—	—	EC-472
ECM (PCM)	P0605	—	—	X	EC-474
PNP SW/CIRC	P0705	—	—	X	***AT-275***
ATF TEMP SEN/CIRC	P0710	—	—	X	***AT-280***
VEH SPD SEN/CIR AT	P0720	—	—	X	***AT-286***
ENGINE SPEED SIG	P0725	—	—	X	***AT-291***
A/T 1ST GR FNCTN	P0731	—	—	X	***AT-295***
A/T 2ND GR FNCTN	P0732	—	—	X	***AT-302***
A/T 3RD GR FNCTN	P0733	—	—	X	***AT-308***
A/T 4TH GR FNCTN	P0734	—	—	X	***AT-314***
TCC SOLENOID/CIRC	P0740	—	—	X	***AT-323***
A/T TCC S/V FNCTN	P0744	—	—	X	***AT-327***
L/PRESS SOL/CIRC	P0745	—	—	X	***AT-338***

Items (CONSULT-II screen terms)	DTC*1	SRT code	Test value/ Test limit (GST only)	1st trip DTC*1	Reference page
SFT SOL A/CIRC	P0750	—	—	X	***AT-343***
SFT SOL B/CIRC	P0755	—	—	X	***AT-347***
INT/V TIMING CONT	P1110	—	—	X	EC-476
INT TIM S/CIR-B1	P1140	—	—	X	EC-518
THERMOSTAT FNCTN	P1126	—	—	X	EC-487
SWIRL CONT SOL/V	P1130	—	—	X	EC-489
CLOSED LOOP-B1	P1148	—	—	X	EC-523
SWL CON VC SW/CIRC	P1165	—	—	X	EC-525
CLOSED LOOP-B2	P1168	—	—	X	EC-523
ENG OVER TEMP	P1217	—	—	X	EC-532
IGN SIGNAL-PRIMARY	P1320	—	—	X	EC-549
CKP SEN COG	P1336	—	—	X	EC-560
EGR TEMP SEN/CIRC	P1401	—	—	X	EC-565
EGR SYSTEM	P1402	X	X	X*2	EC-572
EVAP SMALL LEAK	P1440	X	X	X*2	EC-580
EVAP VERY SML LEAK	P1441	X*3	X	X*2	EC-582
PURG VOLUME CONT/V	P1444	—	—	X	EC-597
VENT CONTROL VALVE	P1446	—	—	X	EC-609
EVAP PURG FLOW/MON	P1447	X	X	X*2	EC-617
VENT CONTROL VALVE	P1448	—	—	X	EC-629
FUEL LEVEL SEN/CIRC	P1464	—	—	X	EC-638
VC/V BYPASS/V	P1490	—	—	X	EC-641
VC CUT/V BYPASS/V	P1491	—	—	X	EC-647
A/T DIAG COMM LINE	P1605	—	—	X	EC-657
TP SEN/CIRC A/T	P1705	—	—	X	***AT-351***
P-N POS SW/CIRCUIT	P1706	—	—	X	EC-659
O/R CLTCH SOL/CIRC	P1760	—	—	X	***AT-359***

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

*2: These are not displayed with GST.

*3: SRT will not be set, if the self-diag results are NG.

HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION

NIEC0031S06

How to Erase DTC (With CONSULT-II)

NIEC0031S0601

NOTE:

If the DTC is not for A/T related items (see EC-22), skip steps 2 through 4.

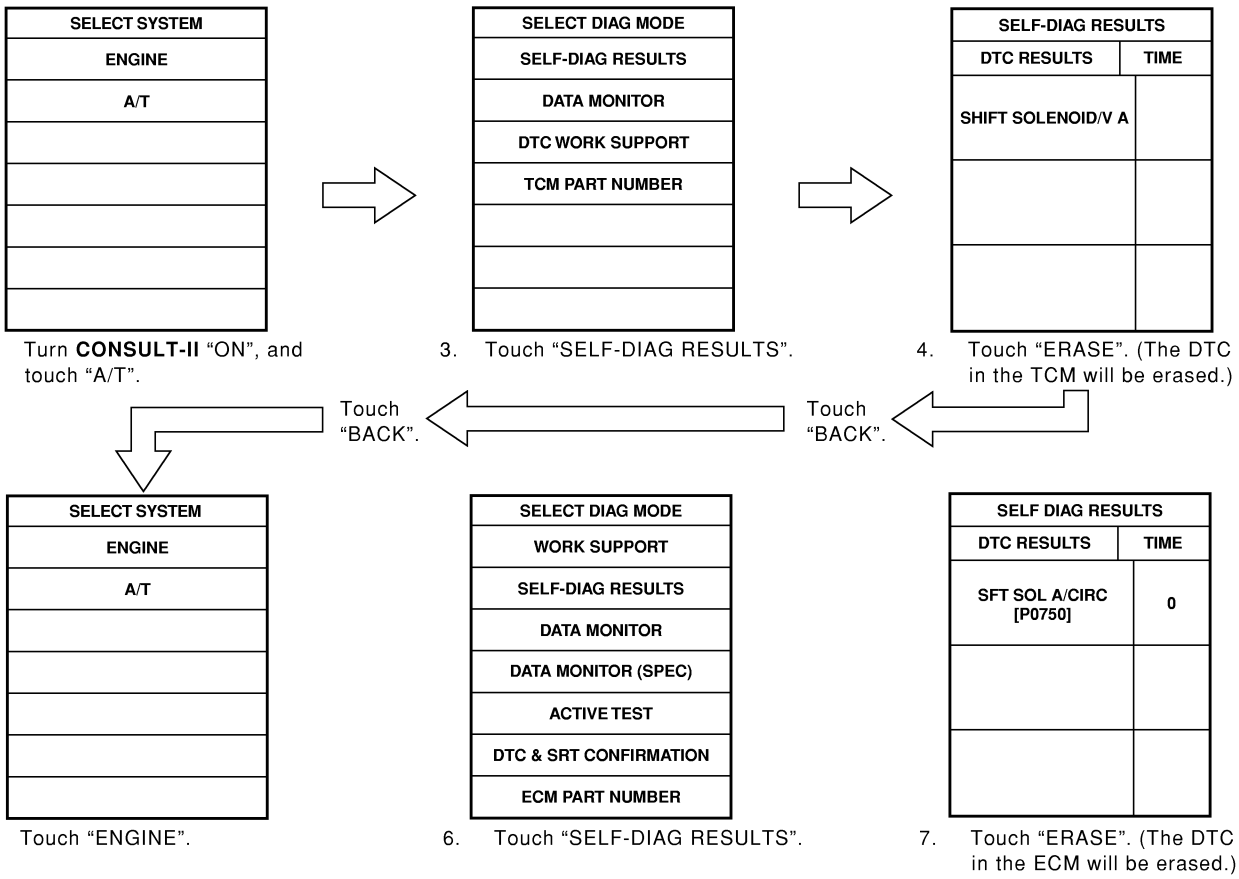
1. If the ignition switch stays "ON" after repair work, be sure to turn ignition switch "OFF" once. Wait at least 10 seconds and then turn it "ON" (engine stopped) again.
2. Turn CONSULT-II "ON" and touch "A/T".
3. Touch "SELF-DIAG RESULTS".
4. Touch "ERASE". [The DTC in the PCM (A/T control part of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

6. Touch "SELF-DIAG RESULTS".
7. Touch "ERASE". (The DTC in the PCM will be erased.)

- If DTCs are displayed for PCM (A/T control part and engine control part of PCM), they need to be erased individually from the PCM 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.



SEF823YA

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

How to Erase DTC (GST With GST)

NIEC0031S0602

NOTE:

If the DTC is not for A/T related items (see EC-22), 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 PCM 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 PCM memory is erased.**

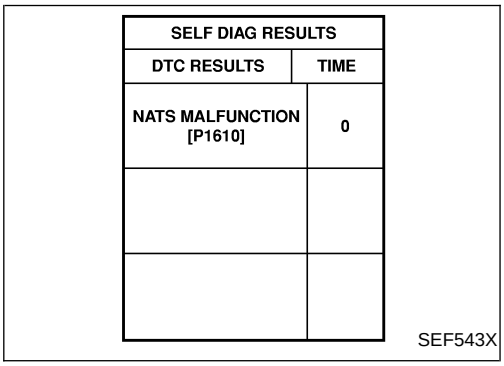
1) Diagnostic trouble codes
2) 1st trip diagnostic trouble codes
3) Freeze frame data
4) 1st trip freeze frame data
5) System readiness test (SRT) codes

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 PCM memory during work procedures.

NVIS (NISSAN VEHICLE IMMOBILIZER SYSTEM — NATS)

NIEC0031S07

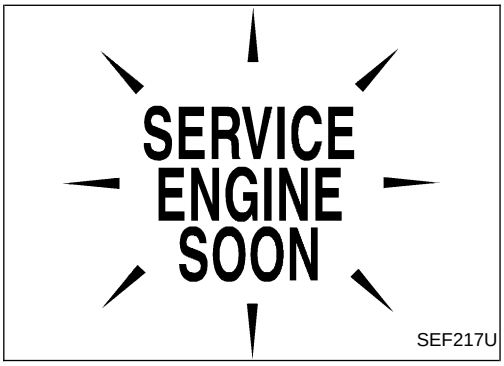


- **If the security indicator lights up with the ignition switch in the "ON" position or "NATS MALFUNCTION" is displayed on "SELF-DIAG RESULTS" screen, perform self-diagnostic results mode with CONSULT-II using NATS program card. Refer to *EL-306*, "NVIS (NISSAN Vehicle Immobilizer System — NATS)".**
- **Confirm no self-diagnostic results of NVIS (NATS) are displayed before touching "ERASE" in "SELF-DIAG RESULTS" mode with CONSULT-II.**
- **When replacing PCM, initialization of NVIS (NATS) system and registration of all NVIS (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 NVIS (NATS) initialization and NVIS (NATS) ignition key ID registration, refer to CONSULT-II OPERATION MANUAL IVIS/NVIS.

Malfunction Indicator Lamp (MIL)

DESCRIPTION

NIEC0032



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-105***, "WARNING LAMPS" or see EC-698.

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

=NIEC0032S01

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

NIEC0032S0102

In this mode, the MIL on the instrument panel should stay ON. If it remains OFF, check the bulb. Refer to ***EL-105***, "WARNING LAMPS" or see EC-698.

Diagnostic Test Mode I — Malfunction Warning

NIEC0032S0103

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

OBD System Operation Chart

=NIEC0033

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

NIEC0033S01

- When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data are stored in the PCM memory.
- When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data are stored in the PCM memory, and the MIL will come on. For details, refer to “Two Trip Detection Logic” on EC-85.
- 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 PCM). 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

NIEC0033S02

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

For details about patterns “B” and “C” under “Fuel Injection System” and “Misfire”, see EC-104.

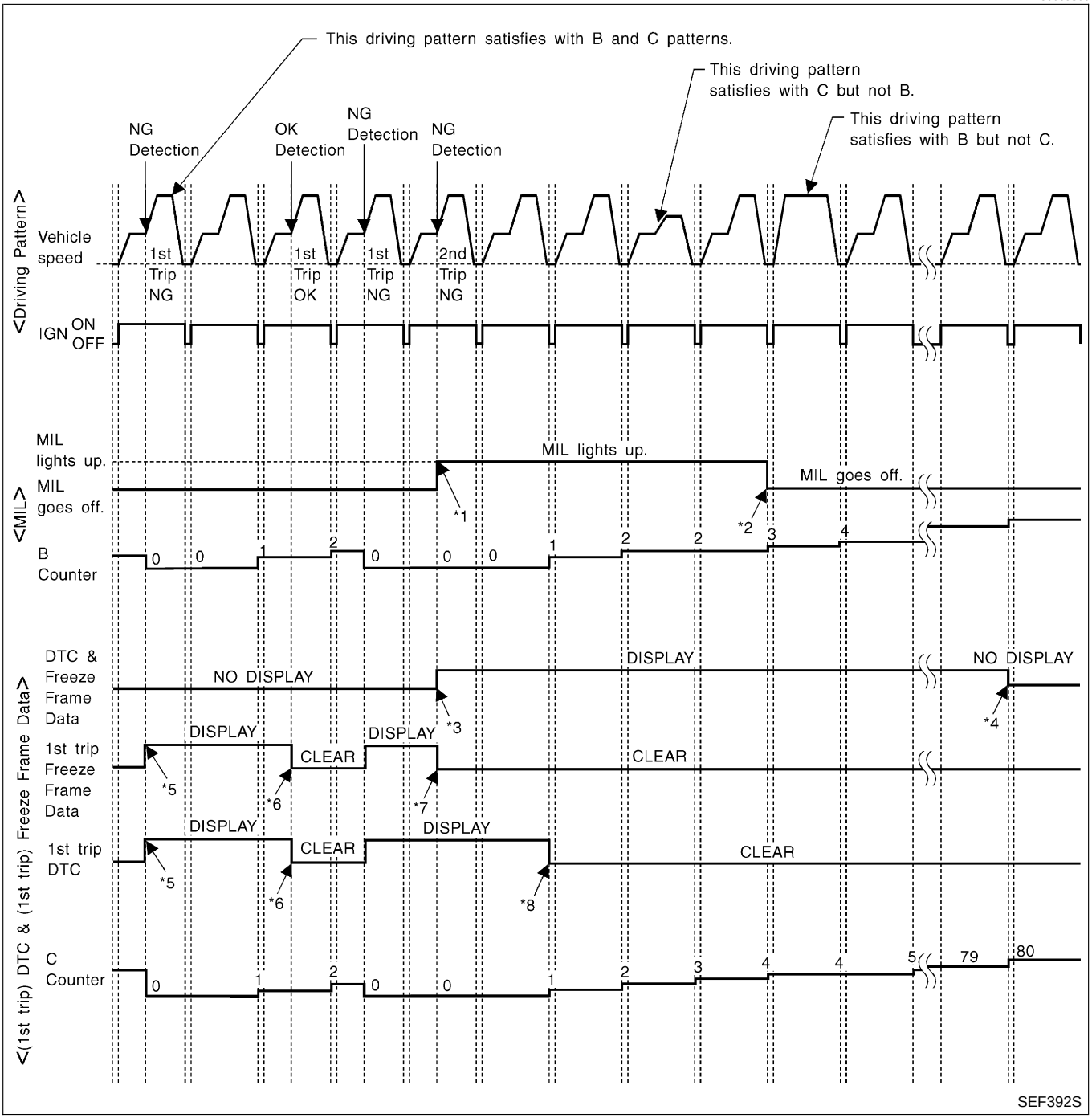
For details about patterns “A” and “B” under “Other”, see EC-106.

*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"

=NIEC0033S03



*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 PCM.

*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 PCM.)

*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 PCM.

*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 PCM.

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

=NIEC0033S04

Driving Pattern B

NIEC0033S0401

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

NIEC0033S0402

Driving pattern C means the vehicle operation as follows:

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

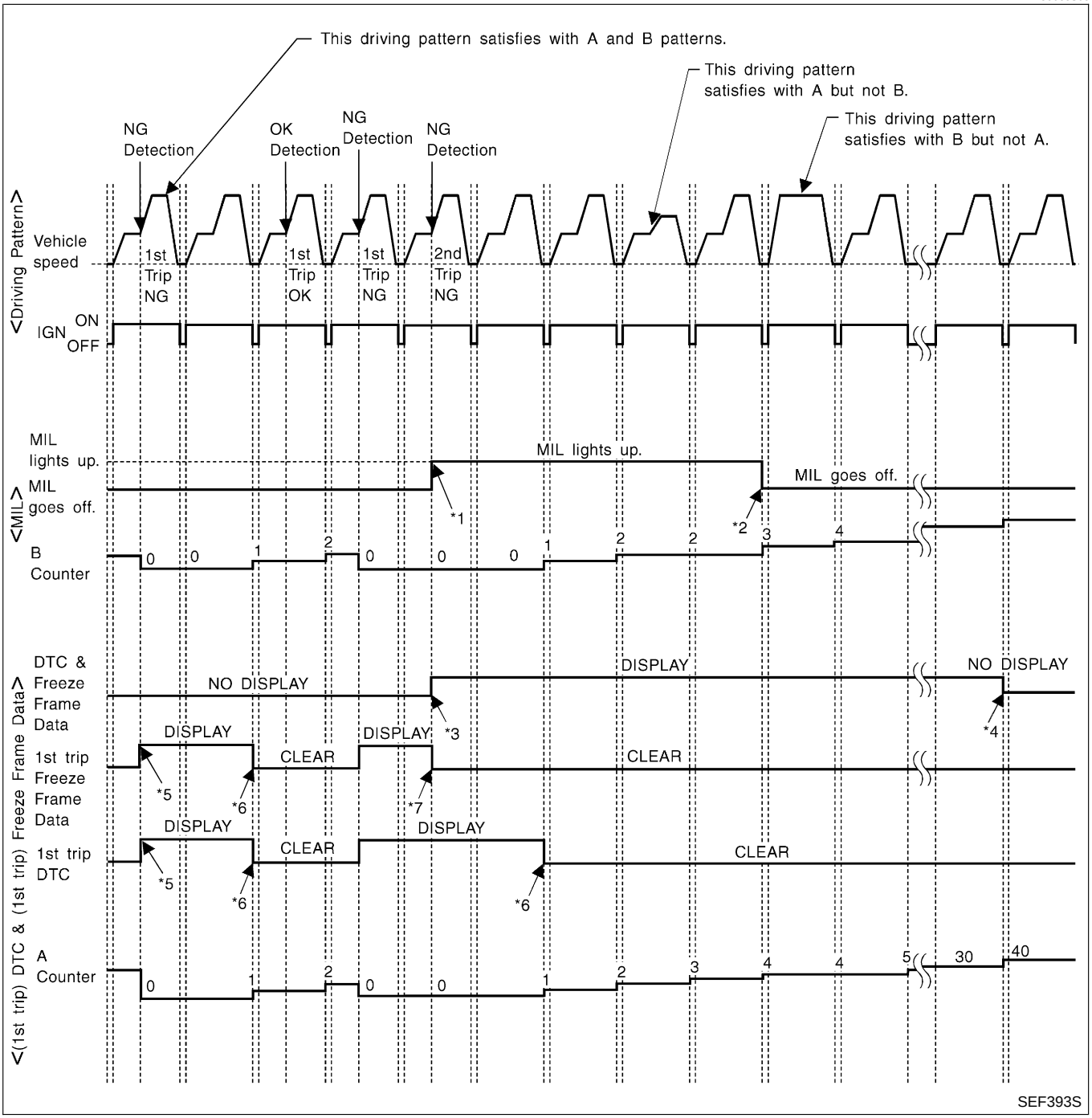
- When the freeze frame data shows lower than 70°C (158°F), "T" should be lower than 70°C (158°F).
- When the freeze frame data shows higher than or equal to 70°C (158°F), "T" should be higher than or equal to 70°C (158°F).

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

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

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

NIEC0033S05



*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 PCM.

*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 PCM.)

*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 PCM.

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

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

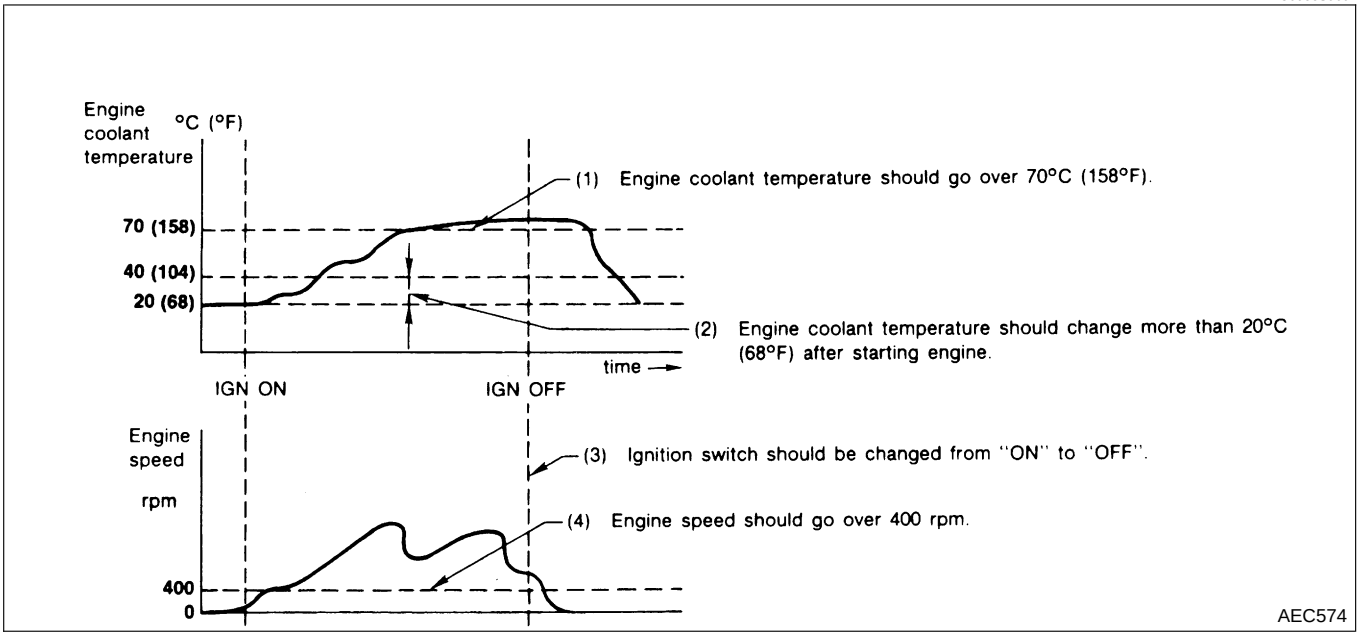
OBD System Operation Chart (Cont'd)

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

NIEC0033S06

Driving Pattern A

NIEC0033S0601



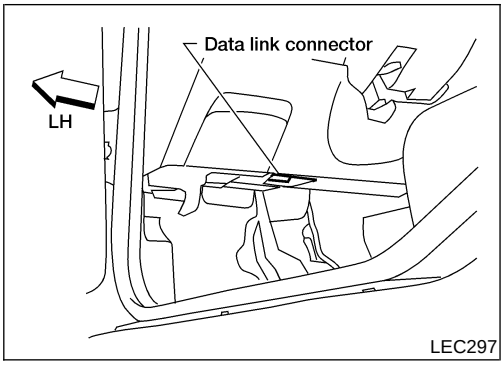
- The A counter will be cleared when the malfunction is detected regardless of (1) - (4).
- The A counter will be counted up when (1) - (4) are satisfied without the same malfunction.
- The DTC will not be displayed after the A counter reaches 40.

Driving Pattern B

NIEC0033S0602

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").



LEC297

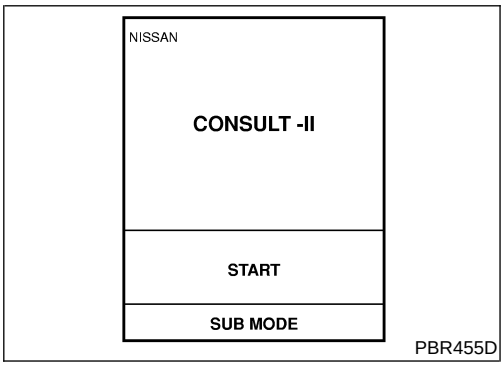
CONSULT-II

=NIEC0504

CONSULT-II INSPECTION PROCEDURE

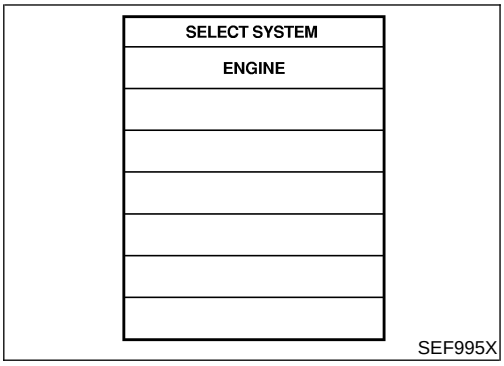
NIEC0504S01

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.



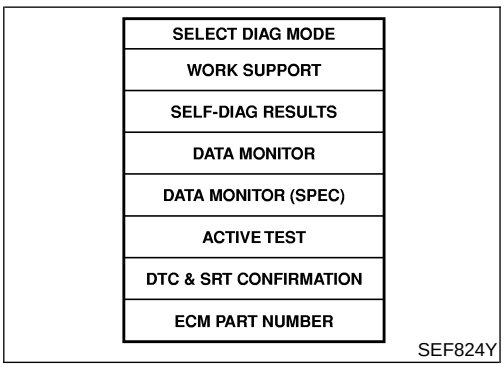
PBR455D

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



SEF995X

5. Touch “ENGINE”.



SEF824Y

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

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

ENGINE CONTROL COMPONENT PARTS/CONTROL SYSTEMS APPLICATION

NIEC0504S02

		Item	DIAGNOSTIC TEST MODE							
			WORK SUP-PORT	SELF-DIAGNOS-TIC 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	Camshaft position sensor (PHASE)		X	X					
		Crankshaft position sensor (POS)		X			X			
		Mass air flow sensor		X		X	X			
		Engine coolant temperature sensor		X	X	X	X	X		
		Heated oxygen sensor 1 (front)		X		X	X		X	X
		Heated oxygen sensor 2 (rear)		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	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			
		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 SUPPORT	SELF-DIAGNOSTIC RESULTS		DATA MONITOR	DATA MONITOR (SPEC)	ACTIVE TEST	DTC & SRT CONFIRMATION	
				DTC*1	FREEZE FRAME DATA*2				SRT STATUS	DTC WORK SUPPORT
ENGINE CONTROL COMPONENT PARTS	OUTPUT	Injectors				X	X	X		
		Power transistor (Ignition timing)	X	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		
		Heated oxygen sensor 1 heater		X		X	X		X	
		Heated oxygen sensor 2 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		
		Intake valve timing control solenoid valve		X		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-86.

CONSULT-II (Cont'd)

FUNCTION

=NIEC0504S03

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 PCM can be read.
Data monitor (SPEC)	Input/Output specification 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 PCMs and also shifts some parameters in a specified range.
DTC & SRT confirmation	The status of system monitoring tests and the self-diagnosis status/result can be confirmed.
PCM part number	PCM part number can be read.

*1 The following emission-related diagnostic information is cleared when the PCM 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

=NIEC0504S04

WORK ITEM	CONDITION	USAGE
TP SW/TP SEN IDLE POSI ADJ	● FOLLOW THE BASIC INSPECTION INSTRUCTION IN THE SERVICE MANUAL.	When adjusting the idle throttle position
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
IDLE AIR VOL LEARN	● THE IDLE AIR VOLUME THAT KEEPS THE ENGINE WITHIN THE SPECIFIED RANGE IS MEMORIZED IN PCM.	When learning the idle air volume
SELF-LEARNING CONT	● THE COEFFICIENT OF SELF-LEARNING CONTROL MIXTURE RATIO RETURNS TO THE ORIGINAL COEFFICIENT.	When clear the coefficient of self-learning control value
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. ● If once the "TARGET IDLE RPM ADJ" has been done, the Idle Air Volume Learning procedure will not be completed.

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

SELF-DIAGNOSTIC MODE

=NIEC0504S05

DTC and 1st Trip DTC

NIEC0504S0501

Regarding items of "DTC and 1st trip DTC", refer to "TROUBLE DIAGNOSIS — INDEX" (See EC-22.)

Freeze Frame Data and 1st Trip Freeze Frame Data

NIEC0504S0502

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-22.)
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*2 [%]	● "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*2 [%]	
L-FUEL TRIM-B1*2 [%]	● "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*2 [%]	
ENGINE SPEED [rpm]	● The engine speed at the moment a malfunction is detected is displayed.
VEHICLE 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 B15 model, "-B1" indicates cylinders No. 1 and 4, "-B2" indicates cylinders No. 2 and 3.

DATA MONITOR MODE

=NIEC0504S06

Monitored item [Unit]	PCM input signals	Main signals	Description	Remarks
ENG SPEED [rpm]	○	○	• Indicates the engine speed computed from the REF signal (180° signal) of the camshaft position sensor (PHASE).	
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.
B/FUEL SCHDL [msec]			• "Base fuel schedule" indicates the fuel injection pulse width programmed into PCM, prior to any learned on board correction.	
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 [%]				
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, PCM enters fail-safe mode. The engine coolant temperature determined by the PCM is displayed.
HO2S1 (B1) [V]	○	○	• The signal voltage of the heated oxygen sensor 1 (front) is displayed.	
HO2S1 (B2) [V]	○	○		
HO2S2 (B1) [V]	○		• The signal voltage of the heated oxygen sensor 2 (rear) is displayed.	
HO2S2 (B2) [V]	○	○		
HO2S1 MNTR (B1) [RICH/LEAN]	○		• Display of heated oxygen sensor 1 (front) 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.
HO2S1 MNTR (B2) [RICH/LEAN]	○			
HO2S2 MNTR (B1) [RICH/LEAN]	○		• Display of heated oxygen sensor 2 (rear) 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.
HO2S2 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 PCM 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.	

CONSULT-II (Cont'd)

Monitored item [Unit]	PCM 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.	
EVAP SYS PRES [V]			• The signal voltage of EVAP control system pressure sensor is displayed.	
ABSOL PRES/SE [V]			• The signal voltage of the absolute pressure sensor is displayed.	
FUEL LEVEL SE [V]			• The signal voltage of the fuel level 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 POS [ON/OFF]	○	○	• Indicates idle position [ON/OFF] computed by PCM according to the throttle position sensor signal.	
CLSD THL/P SW [ON/OFF]			• Indicates mechanical contact [ON/OFF] condition of the closed throttle position switch.	
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.	
LOAD SIGNAL [ON/OFF]	○	○	• Indicates [ON/OFF] condition from the electrical load signal and/or lighting switch. ON ... rear defogger is operating and/or lighting switch is on. OFF ... rear defogger is not operating and lighting switch is not on.	
IGNITION SW [ON/OFF]	○		• Indicates [ON/OFF] condition from ignition switch.	
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.	
INJ PULSE-B1 [msec]		○	• Indicates the actual fuel injection pulse width compensated by PCM according to the input signals.	• When the engine is stopped, a certain computed value is indicated.
INJ PULSE-B2 [msec]				
IGN TIMING [BTDC]		○	• Indicates the ignition timing computed by PCM according to the input signals.	• When the engine is stopped, a certain value is indicated.

Monitored item [Unit]	PCM input signals	Main signals	Description	Remarks
CAL/LD VALUE [%]			• "Calculated load value" indicates the value of the current airflow divided by peak airflow.	
ABSOL TH·P/S [degree]			• "Absolute throttle position sensor" indicates the throttle valve opening angle computed by PCM according to the signal voltage of the throttle position sensor.	
MASS AIRFLOW [g·m/s]			• Indicates the mass airflow computed by PCM according to the signal voltage of the mass airflow sensor.	
IACV-AAC/V [step]		○	• Indicates the IACV-AAC valve control value computed by PCM according to the input signals.	
PURG VOL C/V [%]		○	• Indicates the EVAP canister purge volume control solenoid valve control value computed by the PCM according to the input signals. • The opening becomes larger as the value increases.	
EGR VOL CON/V [step]		○	• Indicates the EGR volume control value computed by the PCM according to the input signals. • The opening becomes larger as the value increases.	
SWRL CONT S/V [ON/OFF]			• The control condition of the swirl control valve control solenoid valve (determined by PCM according to the input signals) is indicated. • ON ... Swirl control valve is closed. OFF ... Swirl control valve is opened.	
AIR COND RLY [ON/OFF]		○	• The air conditioner relay control condition (determined by PCM according to the input signal) is indicated.	
FUEL PUMP RLY [ON/OFF]		○	• Indicates the fuel pump relay control condition determined by PCM according to the input signals.	
INT/V SOL-B1			• The control condition of the intake valve timing control solenoid valve is indicated. • ON ... Intake valve timing control solenoid is operating. OFF ... Intake valve timing control solenoid is not operating.	
VC/V BYPASS/V [ON/OFF]			• The control condition of the vacuum cut valve bypass valve (determined by PCM according to the input signal) is indicated. • ON ... Open OFF ... Closed	

CONSULT-II (Cont'd)

Monitored item [Unit]	PCM input signals	Main signals	Description	Remarks
VENT CONT/V [ON/OFF]			● The control condition of the EVAP canister vent control valve (determined by PCM according to the input signal) is indicated. ● ON ... Closed OFF ... Open	
COOLING FAN [ON/OFF]		○	● Indicates the control condition of the cooling fan (determined by PCM according to the input signal). HIGH ... High speed operation LOW ... Low speed operation OFF ... Stop	
HO2S1 HTR (B1) [ON/OFF]			● Indicates [ON/OFF] condition of heated oxygen sensor 1 heater determined by PCM according to the input signals.	
HO2S1 HTR (B2) [ON/OFF]				
HO2S2 HTR (B1) [ON/OFF]			● Indicates [ON/OFF] condition of heated oxygen sensor 2 heater determined by PCM according to the input signals.	
HO2S2 HTR (B2) [ON/OFF]				
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.	
TRVL AFTER MIL [km] or [Mile]			● Distance traveled while MIL is activated	
Voltage [V]			● Voltage measured by the voltage probe.	
Frequency [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.

DATA MONITOR (SPEC) MODE

=NIEC0504S11

Monitored item [Unit]	PCM input signals	Main signals	Description	Remarks
ENG SPEED [rpm]	○	○	• Indicates the engine speed computed from the REF signal (180° signal) of the camshaft position sensor (PHASE).	
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 PCM, 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 [%]				
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, PCM enters fail-safe mode. The engine coolant temperature determined by the PCM is displayed.
HO2S1 (B1) [V]	○	○	• The signal voltage of the heated oxygen sensor 1 (front) is displayed.	
HO2S1 (B2) [V]	○	○		
HO2S2 (B1) [V]	○		• The signal voltage of the heated oxygen sensor 2 (rear) is displayed.	
HO2S2 (B2) [V]	○	○		
HO2S1 MNTR (B1) [RICH/LEAN]	○		• Display of heated oxygen sensor 1 (front) 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.
HO2S1 MNTR (B2) [RICH/LEAN]	○			
HO2S2 MNTR (B1) [RICH/LEAN]	○		• Display of heated oxygen sensor 2 (rear) 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.
HO2S2 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 PCM 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.	

CONSULT-II (Cont'd)

Monitored item [Unit]	PCM 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.	
EVAP SYS PRES [V]			• The signal voltage of EVAP control system pressure sensor is displayed.	
ABSOL PRES/SE [V]			• The signal voltage of the absolute pressure sensor is displayed.	
FUEL LEVEL SE [V]			• The signal voltage of the fuel level 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 POS [ON/OFF]	○	○	• Indicates idle position [ON/OFF] computed by PCM according to the throttle position sensor signal.	
CLSD THL/P SW [ON/OFF]			• Indicates mechanical contact [ON/OFF] condition of the closed throttle position switch.	
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.	
LOAD SIGNAL [ON/OFF]	○	○	• Indicates [ON/OFF] condition from the electrical load signal and/or lighting switch. ON ... rear defogger is operating and/or lighting switch is on. OFF ... rear defogger is not operating and lighting switch is not on.	
IGNITION SW [ON/OFF]	○		• Indicates [ON/OFF] condition from ignition switch.	
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.	
INJ PULSE-B1 [msec]		○	• Indicates the actual fuel injection pulse width compensated by PCM according to the input signals.	• When the engine is stopped, a certain computed value is indicated.
INJ PULSE-B2 [msec]				
IGN TIMING [BTDC]		○	• Indicates the ignition timing computed by PCM according to the input signals.	• When the engine is stopped, a certain value is indicated.

Monitored item [Unit]	PCM input signals	Main signals	Description	Remarks
CAL/LD VALUE [%]			• "Calculated load value" indicates the value of the current airflow divided by peak airflow.	
ABSOL TH·P/S [degree]			• "Absolute throttle position sensor" indicates the throttle valve opening angle computed by PCM according to the signal voltage of the throttle position sensor.	
MASS AIRFLOW [g·m/s]			• Indicates the mass airflow computed by PCM according to the signal voltage of the mass airflow sensor.	
IACV-AAC/V [step]		○	• Indicates the IACV-AAC valve control value computed by PCM according to the input signals.	
PURG VOL C/V [%]		○	• Indicates the EVAP canister purge volume control solenoid valve control value computed by the PCM according to the input signals. • The opening becomes larger as the value increases.	
EGR VOL CON/V [step]		○	• Indicates the EGR volume control value computed by the PCM according to the input signals. • The opening becomes larger as the value increases.	
SWRL CONT S/V [ON/OFF]			• The control condition of the swirl control valve control solenoid valve (determined by PCM according to the input signals) is indicated. • ON ... Swirl control valve is closed. OFF ... Swirl control valve is opened.	
AIR COND RLY [ON/OFF]		○	• The air conditioner relay control condition (determined by PCM according to the input signal) is indicated.	
FUEL PUMP RLY [ON/OFF]		○	• Indicates the fuel pump relay control condition determined by PCM according to the input signals.	
INT/V SOL-B1			• The control condition of the intake valve timing control solenoid valve is indicated. • ON ... Intake valve timing control solenoid is operating. OFF ... Intake valve timing control solenoid is not operating.	
VC/V BYPASS/V [ON/OFF]			• The control condition of the vacuum cut valve bypass valve (determined by PCM according to the input signal) is indicated. • ON ... Open OFF ... Closed	

CONSULT-II (Cont'd)

Monitored item [Unit]	PCM input signals	Main signals	Description	Remarks
VENT CONT/V [ON/OFF]			• The control condition of the EVAP canister vent control valve (determined by PCM according to the input signal) is indicated. • ON ... Closed OFF ... Open	
COOLING FAN [ON/OFF]		○	• Indicates the control condition of the cooling fan (determined by PCM according to the input signal). HIGH ... High speed operation LOW ... Low speed operation OFF ... Stop	
HO2S1 HTR (B1) [ON/OFF]			• Indicates [ON/OFF] condition of heated oxygen sensor 1 heater determined by PCM according to the input signals.	
HO2S1 HTR (B2) [ON/OFF]				
HO2S2 HTR (B1) [ON/OFF]			• Indicates [ON/OFF] condition of heated oxygen sensor 2 heater determined by PCM according to the input signals.	
HO2S2 HTR (B2) [ON/OFF]				
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.	
TRVL AFTER MIL [km] or [Mile]			• Distance traveled while MIL is activated	
Voltage [V]			• Voltage measured by the voltage probe.	
Frequency [msec] or [Hz] or [%]			• Pulse width, frequency or duty cycle measured by the pulse probe.	• Only "#" is displayed if item is unable to be measured. • Figures with "#"s are temporary ones. They are the same figures as an actual piece of data which was just previously measured.

NOTE:

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

ACTIVE TEST MODE

NIEC0504S07

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 • Heated oxygen sensor 1 (front)
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

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
IACV-AAC/V OPENING	• Engine: After warming up, idle the engine. • Change the IACV-AAC valve opening percent using CONSULT-II.	Engine speed changes according to the opening percent.	• Harness and connector • IACV-AAC valve
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
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
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
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
VALVE TIMING SOL	• Ignition switch: ON (Engine stopped) • 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
SWIRL CONT SOL VALVE	• Ignition switch: ON (Engine stopped) • 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
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

DTC & SRT CONFIRMATION MODE

NIEC0504S08

SRT STATUS Mode

NIEC0504S0801

For details, refer to "SYSTEM READINESS TEST (SRT) CODE", EC-87.

SRT Work Support Mode

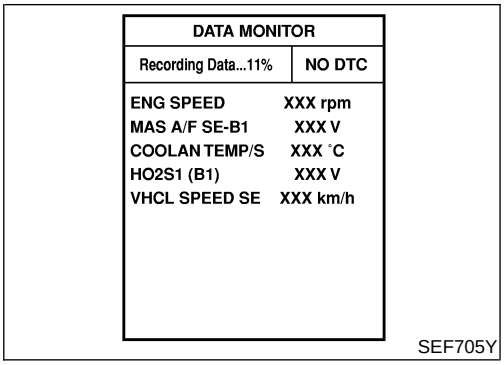
NIEC0504S0802

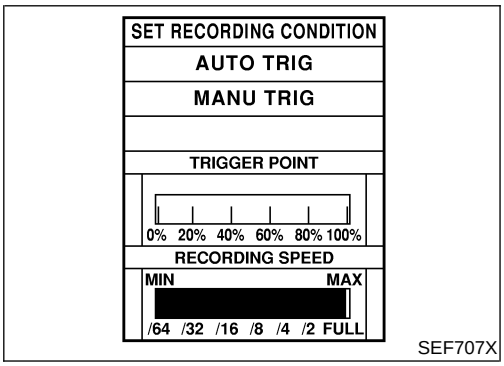
This mode enables a technician to drive a vehicle to set the SRT while monitoring the SRT status.

DTC Work Support Mode

NIEC0504S0803

Test mode	Test item	Condition	Reference page
EVAPORATIVE SYSTEM	EVAP SML LEAK P0440/P1441	Refer to corresponding trouble diagnosis for DTC.	EC-389, 582
	PURG VOL CN/V P1444		EC-597
	PURGE FLOW P1447		EC-617
	VC CUT/V BP/V P1491		EC-647
HEATED OXYGEN SENSOR 1 (FRONT)	HO2S1 (B1) P0130		EC-218
	HO2S1 (B1) P0131		EC-227
	HO2S1 (B1) P0132		EC-233
	HO2S1 (B1) P0133		EC-240
	HO2S2 (B1) P0150		EC-218
	HO2S2 (B1) P0151		EC-227
	HO2S2 (B1) P0152		EC-233
	HO2S2 (B1) P0153		EC-240
HEATED OXYGEN SENSOR 2 (REAR)	HO2S2 (B1) P0137		EC-265
	HO2S2 (B1) P0138		EC-274
	HO2S2 (B1) P0139		EC-283
	HO2S2 (B2) P0157		EC-265
	HO2S2 (B2) P0158		EC-274
	HO2S2 (B2) P0159		EC-283
EGR SYSTEM	EGR SYSTEM P0400		EC-369
	EGR SYSTEM P1402		EC-572





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

NIEC0504S09

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 PCM.
  At the moment a malfunction is detected by PCM, "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 PCM.
  DATA MONITOR can be performed continuously even though a malfunction is detected.

Use these triggers as follows:

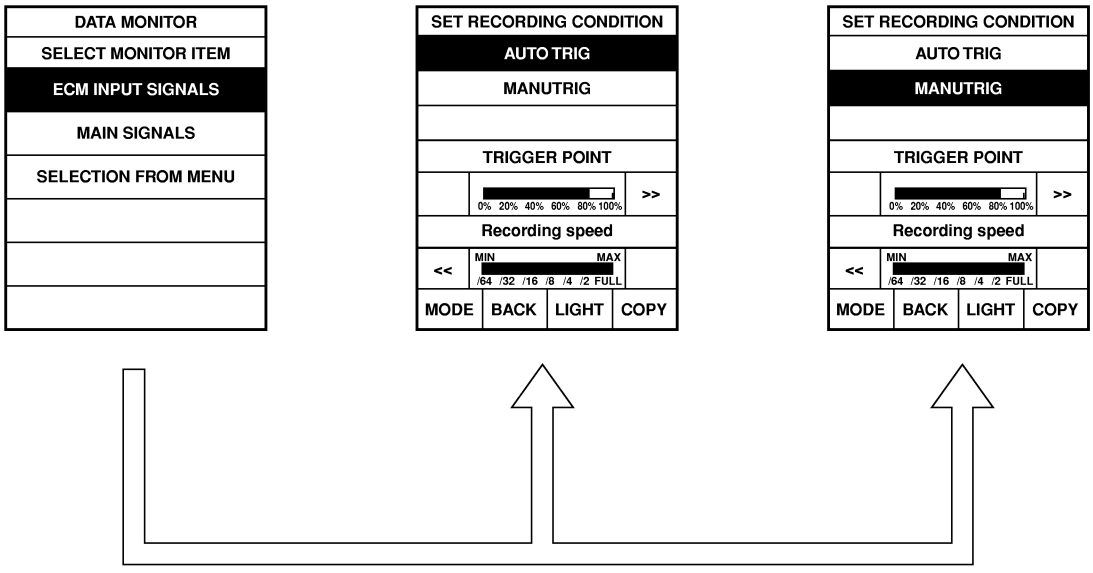
1) "AUTO TRIG"

- 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.

CONSULT-II (Cont'd)



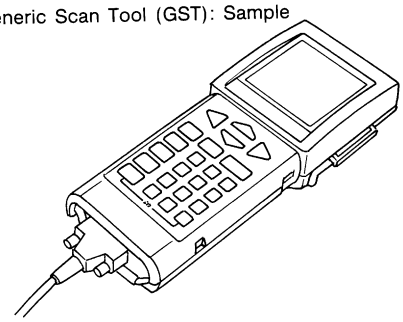
"SETTING"

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

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

SEF714Y

Generic Scan Tool (GST): Sample



SEF139P

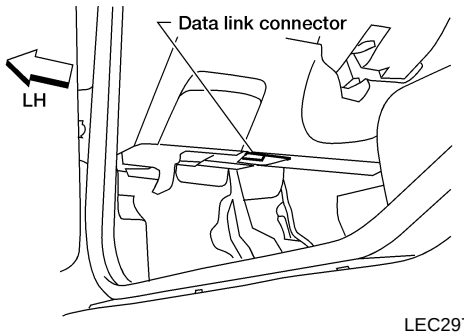
Generic Scan Tool (GST)

=NIEC0035

DESCRIPTION

NIEC0035S01

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.

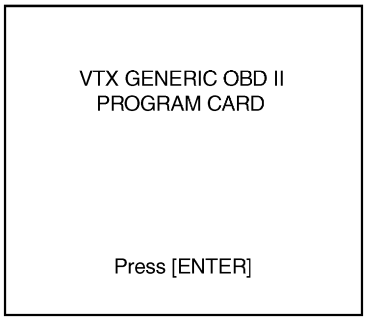


LEC297

GST INSPECTION PROCEDURE

NIEC0035S02

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

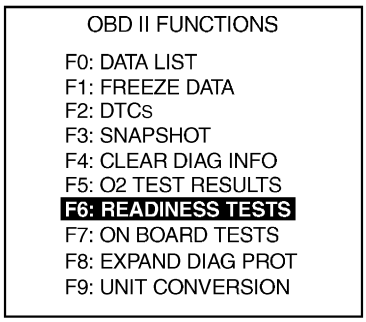


Sample screen*

SEF398S

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

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



Sample screen*

SEF416S

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

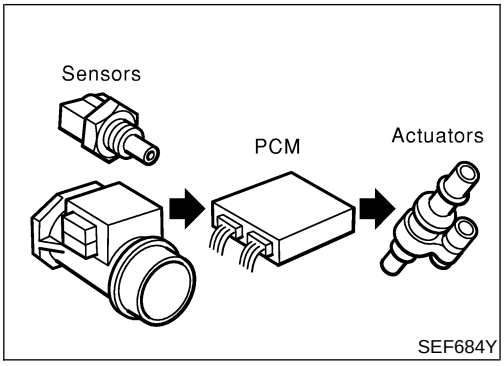
For further information, see the GST Operation Manual of the tool maker.

Generic Scan Tool (GST) (Cont'd)

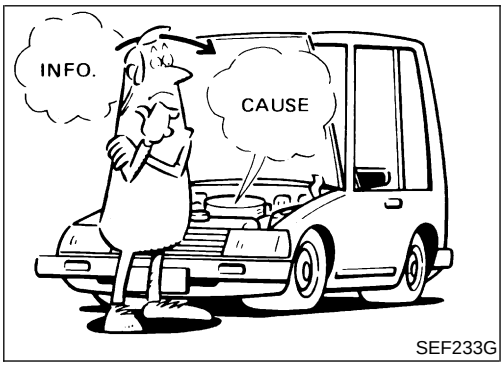
FUNCTION

NIEC0035S03

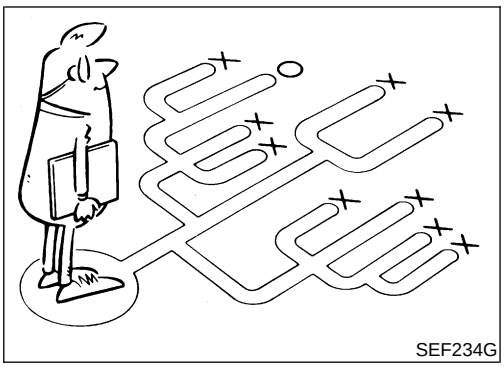
Diagnostic test mode		Function
MODE 1	READINESS TESTS	This mode gains access to current emission-related data values, including analog inputs and outputs, digital inputs and outputs, and system status information.
MODE 2	(FREEZE DATA)	This mode gains access to emission-related data value which were stored by PCM during the freeze frame. [For details, refer to "Freeze Frame Data" (EC-112).]
MODE 3	DTCs	This mode gains access to emission-related power train trouble codes which were stored by PCM.
MODE 4	CLEAR DIAG INFO	This mode can clear all emission-related diagnostic information. This includes: ● Clear number of diagnostic trouble codes (MODE 1) ● Clear diagnostic trouble codes (MODE 3) ● Clear trouble code for freeze frame data (MODE 1) ● Clear freeze frame data (MODE 2) ● Reset status of system monitoring test (MODE 1) ● Clear on board monitoring test results (MODE 6 and 7)
MODE 6	(ON BOARD TESTS)	This mode accesses the results of on board diagnostic monitoring tests of specific components/systems that are not continuously monitored.
MODE 7	(ON BOARD TESTS)	This mode enables the off board test drive to obtain test results for emission-related powertrain components/systems that are continuously monitored during normal driving conditions.
MODE 8	—	This mode can close EVAP system in ignition switch "ON" position (Engine stopped). When this mode is performed, following parts can be opened or closed. ● EVAP canister vent control valve open ● Vacuum cut valve bypass valve closed In the following conditions, this mode cannot function. ● Low ambient temperature ● Low battery voltage ● Engine running ● Ignition switch "OFF" ● Low fuel temperature ● Too much pressure is applied to EVAP system
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.



SEF684Y



SEF233G


SEF234G

KEY POINTS

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

SEF907L

Introduction

NIEC0036

The engine has an PCM to control major systems such as fuel control, ignition control, idle air control system, etc. The PCM 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-129.

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

NIEC0036S01

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

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

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

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

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

Worksheet Sample

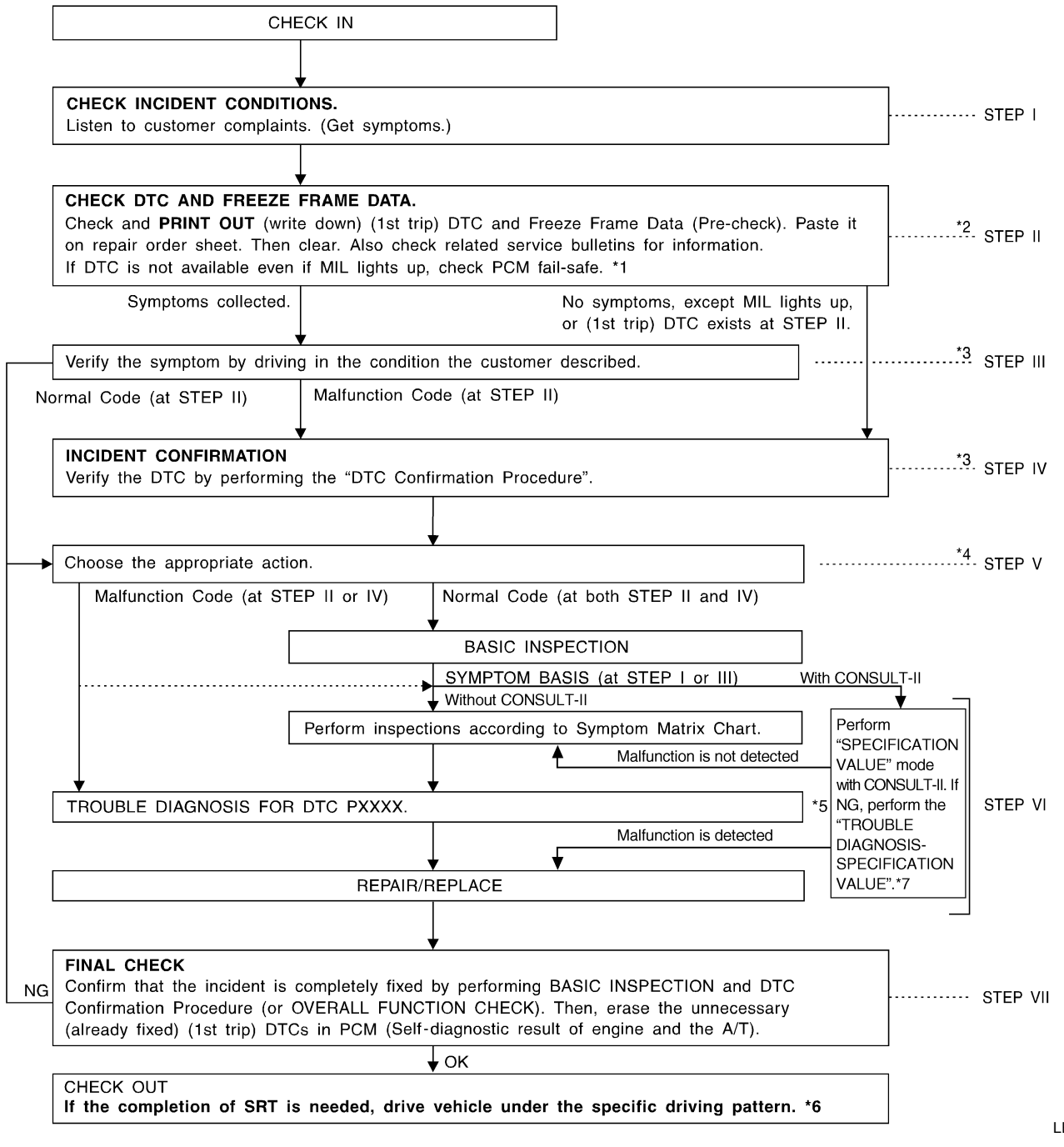
NIEC0036S0101

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

MTBL0017

Work Flow

NIEC0037



LEC463

*1: EC-146

*2: If time data of "SELF-DIAG RESULTS" is other than "0" or "1t", refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT", EC-169.

*3: If the incident cannot be duplicated, refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-169.

*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-170.

*5: If the malfunctioning part cannot be found, refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-169.

*6: EC-92

*7: EC-165

Work Flow (Cont'd)

DESCRIPTION FOR WORK FLOW

NIEC0037S01

STEP	DESCRIPTION
STEP I	Get detailed information about the conditions and the environment when the incident/symptom occurred using the "DIAGNOSTIC WORK SHEET", EC-128.
STEP II	Before confirming the concern, check and write down (print out using CONSULT-II or Generic Scan Tool) the (1st trip) Diagnostic Trouble Code (DTC) and the (1st trip) freeze frame data, then erase the code and the data. (Refer to EC-98.) The (1st trip) DTC and the (1st trip) freeze frame data can be used when duplicating the incident at STEP III & IV. Study the relationship between the cause, specified by (1st trip) DTC, and the symptom described by the customer. (The "Symptom Matrix Chart" will be useful. See EC-147.) 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 INCIDENT SIMULATION TESTS. (Refer to ***GI-26***.) If the malfunction code is detected, skip STEP IV and perform STEP V.
STEP IV	Try to detect the (1st trip) Diagnostic Trouble Code by driving in (or performing) the "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE". Check and read the (1st trip) DTC and (1st trip) freeze frame data by using CONSULT-II or Generic Scan Tool. 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 INCIDENT SIMULATION TESTS. (Refer to ***GI-26***.) In case the "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" is not available, perform the "OVERALL FUNCTION CHECK" instead. The (1st trip) DTC cannot be displayed by this check, however, this simplified "check" is an effective alternative. The "NG" result of the "OVERALL FUNCTION CHECK" is the same as the (1st trip) DTC detection.
STEP V	Take the appropriate action based on the results of STEP I through IV. If the malfunction code is indicated, proceed to TROUBLE DIAGNOSIS FOR DTC PXXXX. If the normal code is indicated, proceed to the BASIC INSPECTION. (Refer to EC-131.) If CONSULT-II is available, perform "SPECIFICATION VALUE" mode with CONSULT-II and proceed to the "TROUBLE DIAGNOSIS — SPECIFICATION VALUE" EC-165. (If malfunction is detected, repair or replace as necessary.) Then perform inspections according to the Symptom Matrix Chart. (Refer to EC-147.)
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 PCM terminals or monitor the output data from the related sensors with CONSULT-II. Refer to EC-156. The "DIAGNOSTIC PROCEDURE" in EC section contains a description based on open circuit inspection. A short circuit inspection is also required for the circuit check in the DIAGNOSTIC PROCEDURE. For details, refer to GI section ("HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT", "Circuit Inspection"). Repair or replace the malfunction parts. If malfunctioning part cannot be detected, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-169.
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 or 0505] is detected. If the incident is still detected in the final check, perform STEP VI by using a different method from the previous one. Before returning the vehicle to the customer, be sure to erase the unnecessary (already fixed) (1st trip) DTC in PCM (self-diagnostic results of engine and A/T). (Refer to EC-98.)

Basic Inspection

NIEC0038

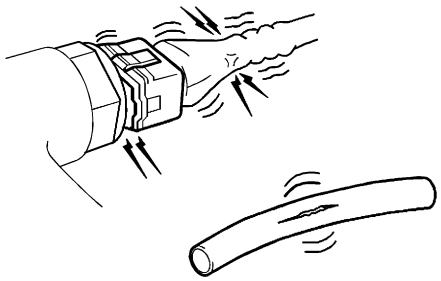
Precaution:
Perform Basic Inspection without electrical or mechanical loads applied;

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

1	INSPECTION START

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

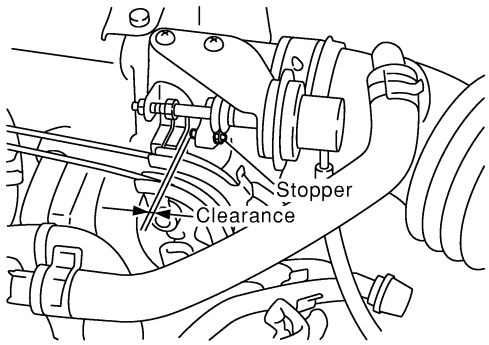


SEF983U

▶ GO TO 2.

2	CHECK THROTTLE OPENER OPERATION-I

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



SEF456Y

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	CHECK THROTTLE OPENER FIXING BOLTS

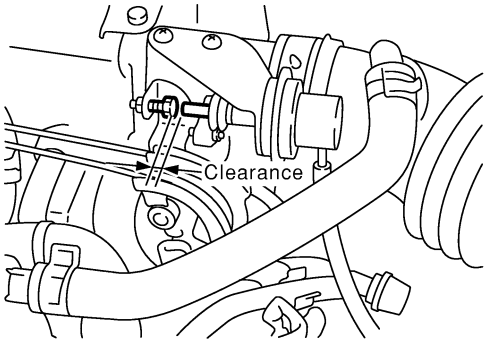
Check throttle opener fixing bolts for loosening.

OK or NG

OK	▶	Repair or replace throttle body assembly.
NG	▶	Retighten the fixing bolts.

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.



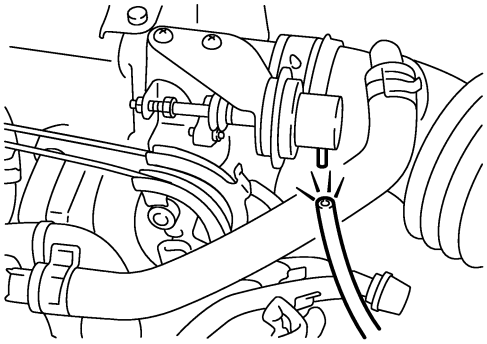
SEF457Y

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.



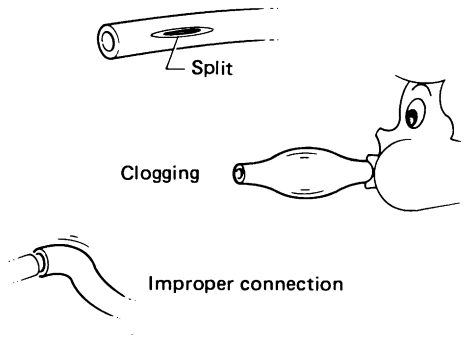
SEF458Y

OK or NG

OK	▶	Repair or replace throttle body assembly.
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.



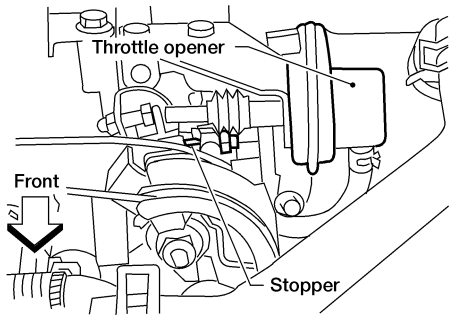
SEF109L

OK or NG

OK	▶	Clean vacuum port by blowing air.
NG	▶	Replace vacuum hose.

7	CHECK THROTTLE DRUM OPERATION

Confirm that throttle drum moves to contact the stopper.



LEC317

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	▶	Adjust accelerator wire. Refer to ***FE-3***, "Adjusting Accelerator Wire".

9	CHECK THROTTLE VALVE OPERATION

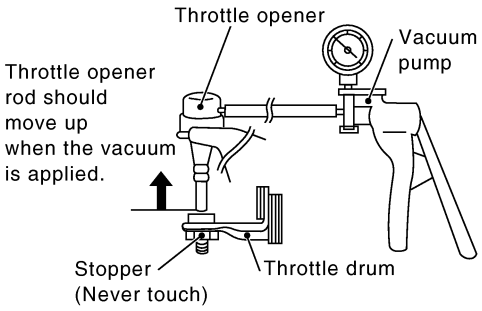
1. Remove intake air ducts.
2. Check throttle valve operation when moving throttle drum by hand.

OK or NG

OK	▶	Retighten the throttle drum fixing nuts.
NG	▶	Clean the throttle body and throttle valve.

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.

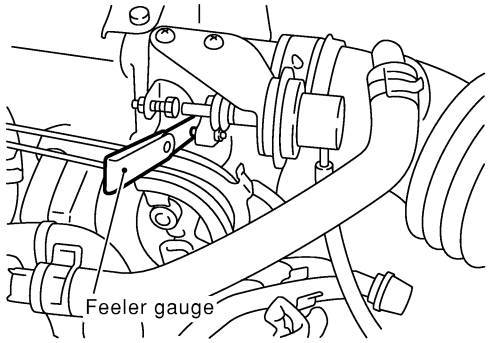
With CONSULT-II	▶	GO TO 11.
Without CONSULT-II	▶	GO TO 17.

11	CHECK THROTTLE POSITION SWITCH CLOSED POSITION-II

With CONSULT-II

1. Turn ignition switch "ON".
2. Select "TP SW/TP SEN IDLE POSI ADJ" in "WORK SUPPORT" mode or "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.



SEF459Y

TP SW/TP SEN IDLE POSI ADJ	
MONITOR	
COOLAN TEMP/S	91°C
CLSD THL POS	ON
CLSD THL/P SW	ON

SEF715Y

"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.

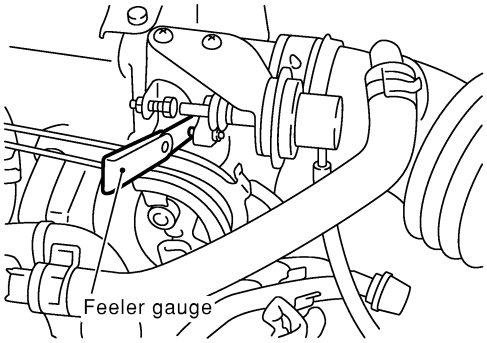
OK or NG

OK	▶	GO TO 14.
NG	▶	GO TO 12.

12	ADJUSTMENT THROTTLE POSITION SWITCH CLOSED POSITION-I

With CONSULT-II

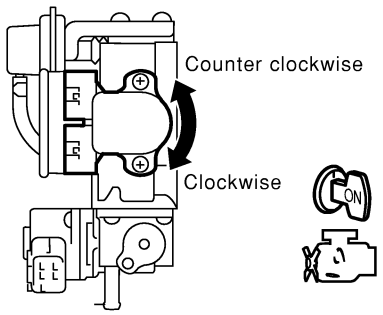
1. Loosen throttle position sensor fixing bolts.
2. Confirm that proper vacuum is applied. Refer to test No. 10. During adjustment, vacuum should be applied.
3. Insert 0.05 mm (0.0020 in) feeler gauge between stopper and throttle drum as shown in the figure.



SEF459Y

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

TP SW/TP SEN IDLE POSI ADJ	
MONITOR	
COOLAN TEMP/S	91°C
CLSD THL POS	ON
CLSD THL/P SW	OFF



SEF717Y

▶	GO TO 13.

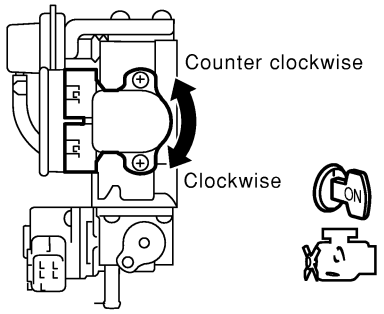
13	ADJUSTMENT THROTTLE POSITION SWITCH CLOSED POSITION-II

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.**

TP SW/TP SEN IDLE POSI ADJ	
MONITOR	
COOLAN TEMP/S	91°C
CLSD THL POS	ON
CLSD THL/P SW	ON



SEF718Y

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.

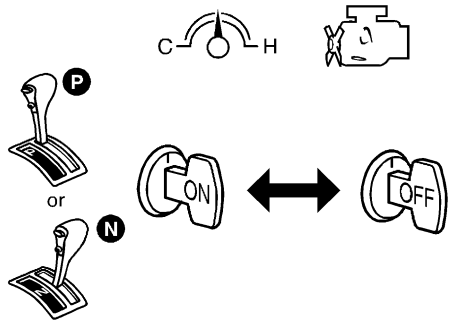
14	RESET THROTTLE POSITION SENSOR IDLE POSITION MEMORY

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 "TP SW/TP SEN IDLE POSI ADJ" in "WORK SUPPORT" 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".

TP SW/TP SEN IDLE POSI ADJ	
MONITOR	
COOLAN TEMP/S	91°C
CLSD THL POS	ON
CLSD THL/P SW	ON

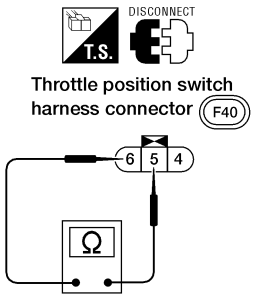
SEF715Y

▶	GO TO 15.

15	CHECK THROTTLE POSITION SWITCH CLOSED POSITION-II

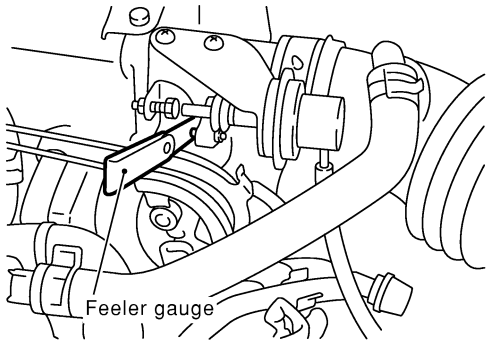
⊗ **Without CONSULT-II**

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



LAT193

- 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.



SEF459Y

"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.

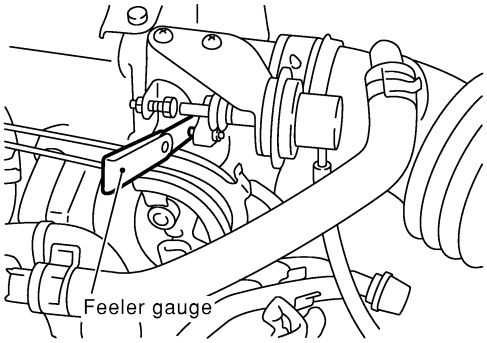
OK or NG

OK	▶	GO TO 18.
NG	▶	GO TO 16.

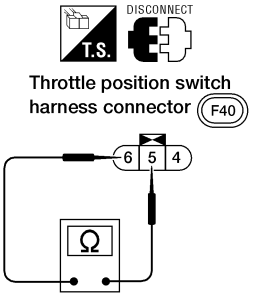
16	ADJUSTMENT THROTTLE POSITION SWITCH CLOSED POSITION-I

Without 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.

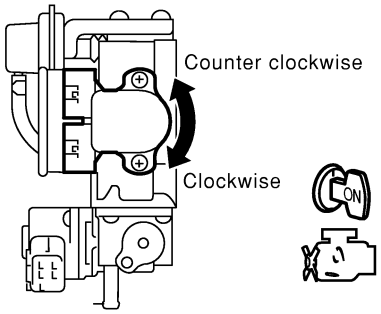


SEF459Y



LAT193

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



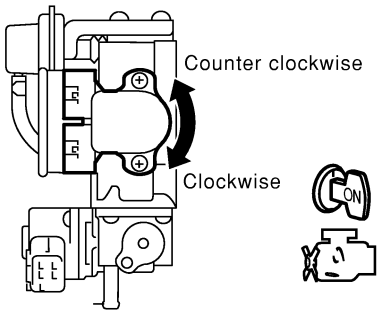
SEF460Y

▶	GO TO 17.

17	ADJUSTMENT THROTTLE POSITION SWITCH CLOSED POSITION-II

Without CONSULT-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.**



SEF460Y

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.

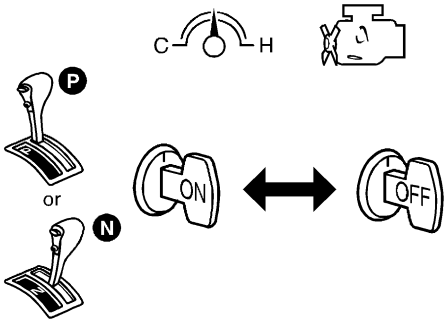
18	RESET THROTTLE POSITION SENSOR IDLE POSITION MEMORY

Without 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. Stop engine. (Turn ignition switch "OFF".)
6. Turn ignition switch "ON" and wait at least 5 seconds.



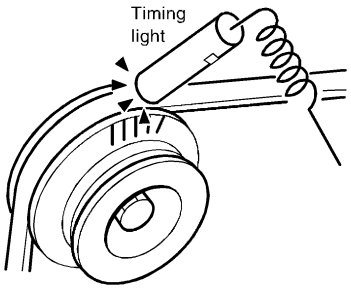
SEF864V

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

	▶	GO TO 19.

19	CHECK IGNITION TIMING-I

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. Check ignition timing at idle using a timing light.



SEF984U

Ignition timing:
9°±2° BTDC (in "P" or "N" position)

OK or NG

OK (With CONSULT II)	▶	GO TO 25.
OK (Without CONSULT II)	▶	GO TO 26.
NG	▶	GO TO 20.

20	DETECT MALFUNCTIONING PART

Check the following.
- Crankshaft position sensor (POS) circuit and function. Refer to EC-358.
- Camshaft position sensor (PHASE) circuit and function. Refer to EC-363.

OK or NG

OK	▶	GO TO 22.
NG	▶	GO TO 21.

21	REPAIR MALFUNCTION

Repair or replace malfunctioning part following the "Diagnostic Procedure" corresponding the detected malfunction.

	▶	GO TO 23.

22	CHECK PCM FUNCTION

1. Substitute another known good PCM to check PCM function. (PCM may be the cause of a problem, but this is rarely the case.)
2. Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs. Refer to "NVIS (NISSAN VEHICLE IMMOBILIZER SYSTEM — NATS)", EC-100.

	▶	GO TO 23.

23	PERFORM IDLE AIR VOLUME LEARNING

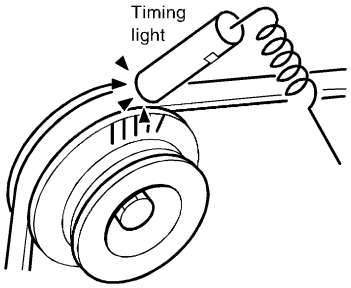
Refer to "Idle Air Volume Learning", EC-83.
Which is the result CMPLT or INCMP?

CMPLT or INCMP

CMPLT	▶	GO TO 24.
INCMP	▶	Follow the instruction of "Idle Air Volume Learning", EC-83.

24	CHECK IGNITION TIMING-II

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



SEF984U

Ignition timing:
M/T = 9° ± 2° BTDC
A/T = 9° ± 2° BTDC (in "P" or "N" position)

OK or NG

OK (With CONSULT-II)	▶	GO TO 25.
OK (Without CONSULT-II)	▶	GO TO 26.
NG	▶	GO TO 22.

25	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.
3. Check idle speed.
M/T: 650±50 rpm
A/T: 800±50 rpm (in "P" or "N" position)

OK or NG

OK	▶	GO TO 34.
NG	▶	GO TO 27.

26	CHECK TARGET IDLE SPEED

Without CONSULT-II
1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.
M/T: 650±50 rpm
A/T: 800±50 rpm (in "P" or "N" position)

OK or NG

OK	▶	GO TO 34.
NG	▶	GO TO 27.

27	CHECK FOR INTAKE AIR LEAK

1. Start engine and let it idle.
2. Listen for an air leak from PCV hose and after IACV-AAC valve.

OK or NG

OK	▶	GO TO 29.
NG	▶	GO TO 28.

28	REPAIR MALFUNCTION
1. Stop engine. 2. Repair or replace malfunctioning part.	
▶	GO TO 31.

29	DETECT MALFUNCTIONING PART
Check the IACV-AAC valve circuit and function. Refer to EC-455.	
OK or NG	
OK ▶	GO TO 31.
NG ▶	GO TO 30.

30	REPAIR MALFUNCTION
Repair or replace malfunction part following the "Diagnostic Procedure" corresponding the detected malfunction.	
▶	GO TO 31.

31	PERFORM IDLE AIR VOLUME LEARNING
Refer to "Idle Air Volume Learning", EC-83. **Which is the result CMPLT or INCMP?**	
CMPLT or INCMP	
CMPLT ▶	GO TO 32.
INCMP ▶	Follow the instruction of "Idle Air Volume Learning", EC-83.

32	CHECK TARGET IDLE SPEED AGAIN
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. **M/T: 650±50 rpm** **A/T: 800±50 rpm (in "P" or "N" position)**	
OK or NG	
OK ▶	GO TO 34.
NG ▶	GO TO 33.

33	CHECK PCM FUNCTION
1. Substitute another known good PCM to check PCM function. (PCM may be the cause of a problem, but this is rarely the case.) 2. Perform initialization of NVIS (NATS) system and registration of NVIS (NATS) ignition key IDs. Refer to "NVIS (NISSAN VEHICLE IMMOBILIZER SYSTEM — NATS)", EC-100.	
▶	GO TO 31.

34	ERASE UNNECESSARY DTC
After this inspection, unnecessary DTC No. might be displayed. Erase the stored memory in PCM (self-diagnostic results of engine and the A/T). Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-98 and ***AT-40***, "HOW TO ERASE DTC".	
▶	**INSPECTION END**

DTC Inspection Priority Chart

NIEC0039

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 PCM • P1126 Thermostat function • P1320 Ignition signal • P1605 A/T diagnosis communication line • P1706 Park/Neutral position (PNP) switch
2	• P0105 Absolute pressure sensor • P0130-P0134, P0150-P0154 Heated oxygen sensor 1 (front) • P0135, P0155 Heated oxygen sensor 1 heater (front) • P0137-P0140, P0157-P0160 Heated oxygen sensor 2 (rear) • P0141, P0161 Heated oxygen sensor 2 heater (rear) • P0217 Coolant overtemperature enrichment protection • P0335, P1336 Crankshaft position sensor (POS) • 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-P0725, P0740-P1760 A/T related sensors, solenoid valves and switches • P1111 Intake valve timing control solenoid valve • P1140 Intake valve timing control position sensor circuit • P1165 Swirl control valve control vacuum switch • P1401 EGR temperature sensor • P1447 EVAP control system purge flow monitoring • P1490, P1491 Vacuum cut valve bypass valve
3	• P0171, P0172 Fuel injection system function • P0300-P0304 Misfire • P0400, P1402 EGR function • P0420 Three way catalyst function • P0440/P1440, P1441 EVAP control system (SMALL LEAK, VERY SMALL LEAK) • P0455 EVAP control system (GROSS LEAK) • P0505 IACV-AAC valve • P0600 A/T communication line • P0731-P0734, P0744 A/T function • P1110 Intake valve timing control function • P1130, P1131 Swirl control valve control solenoid valve • P1148 Closed loop control

Fail-safe Chart

=NIEC0040

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

DTC No.	Detected items	Engine operating condition in fail-safe mode	
P0100	Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.	
P0115	Engine coolant temperature sensor circuit	Engine coolant temperature will be determined by PCM based on the time after turning ignition switch “ON” or “START”. CONSULT-II displays the engine coolant temperature decided by PCM.	
		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)
P0120	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
P0403	EGR volume control valve circuit	Engine speed will not rise more than 2,800 rpm due to the fuel cut.	
Unable to access PCM	PCM	**PCM fail-safe activating condition** The computing function of the PCM was judged to be malfunctioning. When the fail-safe system activates (i.e., if the PCM detects a malfunction condition in the CPU of PCM), the MIL on the instrument panel lights to warn the driver. However it is not possible to access PCM and DTC cannot be confirmed. **Engine control with fail-safe** When PCM fail-safe is operating, fuel injection, ignition timing, fuel pump operation and IACV-AAC valve operation are controlled under certain limitations.	
			PCM fail-safe operation
		Engine speed	Engine speed will not rise more than 3,000 rpm
		Fuel injection	Simultaneous multiport fuel injection system
		Ignition timing	Ignition timing is fixed at the preset valve
		Fuel pump	Fuel pump relay is “ON” when engine is running and “OFF” when engine stalls
		IACV-AAC valve	Full open
		Replace PCM, if PCM fail-safe condition is confirmed.	

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

Symptom Matrix Chart

NIEC0041

SYSTEM — ENGINE CONTROL SYSTEM

NIEC0041S01

		SYMPTOM													
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	Reference page
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel pump circuit	1	1	2	3	2		2	2			3		2	EC-674
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			EC-68
	Injector circuit	1	1	2	3	2		2	2			2			EC-665
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			EC-49
Air	Positive crankcase ventilation system	3	3	4	4	4	4	4	4	4		4	1		EC-65
	Incorrect idle speed adjustment	3	3				1	1	1	1		1			EC-131
	IACV-AAC valve circuit	1	1	2	3	3	2	2	2	2		2		2	EC-455
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC-131
	Ignition circuit	1	1	2	2	2		2	2			2			EC-549
EGR	EGR volume control valve circuit		2	2	3	3						3			EC-378
	EGR system	2	1	2	3	3	3	2	2	3		3			EC-369, EC-572
Main power supply and ground circuit		2	2	3	3	3		3	3		2	3		2	EC-170
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													
	HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	Reference page
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Camshaft position sensor (PHASE) circuit	2	2	3	3	3		3	3			3			EC-363
Mass air flow sensor circuit	1	1	2	2	2		2	2			2			EC-176
Heated oxygen sensor 1 (front) circuit		1	2	3	2		2	2			2			EC-218
Engine coolant temperature sensor circuit	1	1	2	3	2	3	2	2	3		2			EC-196, 213
Throttle position sensor circuit		1	2		2	2	2	2	2		2			EC-201
Incorrect throttle position sensor adjustment		3	1		1	1	1	1	1		1			EC-131
Swirl control valve circuit	3	3						2						EC-512
Intake valve timing control system		3	3		3		3				3			EC-518
Vehicle speed sensor circuit		2	3		3						3			EC-451
Knock sensor circuit			2								3			EC-354
PCM	2	2	3	3	3	3	3	3	3	3	3			EC-474, 146
Start signal circuit	2													EC-670
PNP switch circuit			3		3		3	3			3			EC-659
Power steering oil pressure switch circuit		2					3	3						EC-680
Electrical load signal circuit							3	3						EC-689

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

(continued on next page)

SYSTEM — ENGINE MECHANICAL & OTHER

NIEC0041S03

		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 tank	5	5												FE section
	Fuel piping			5	5	5		5	5			5			—
	Vapor lock														
	Valve deposit	5		5	5	5		5	5			5			
	Poor fuel (Heavy weight gasoline, Low octane)														
Air	Air duct	5	5	5	5	5	5	5	5	5		5			
	Air cleaner														
	Air leakage from air duct (Mass air flow sensor — throttle body)														
	Throttle body, Throttle wire														FE section
	Air leakage from intake manifold/ Collector/Gasket														—
Cranking	Battery	1	1	1		1		1	1					1	EL section
	Alternator circuit														
	Starter circuit	3										1			
	Flywheel/Drive plate/Signal 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 page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Engine	Cylinder head	5	5	5	5	5		5	5			5			EM section
	Cylinder head gasket										4		3		
	Cylinder block	6	6	6	6	6		6	6			6	4		
	Piston														
	Piston ring														
	Connecting rod														
	Bearing														
	Crankshaft														
Valve mechanism	Timing chain	5	5	5	5	5		5	5			5			EM section
	Camshaft														
	Intake valve												3		
	Exhaust valve														
Exhaust	Exhaust manifold/Tube/Muffler/ Gasket	5	5	5	5	5		5	5			5			FE section
	Three way catalyst														
Lubrication	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery	5	5	5	5	5		5	5			5			MA, EM and LC sections
	Oil level (Low)/Filthy oil														
Cooling	Radiator/Hose/Radiator filler cap	5	5	5	5	5		5	5		4	5			
	Thermostat									5					LC section
	Water pump														
	Water gallery														
	Cooling fan									5					EC-532
	Coolant level (low)/ Contaminated coolant														MA section

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

CONSULT-II Reference Value in Data Monitor Mode

NIEC0042

Remarks:

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

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

  (i.e., Adjust ignition timing with a timing light before monitoring IGN TIMING. Specification data might be displayed even when ignition timing is not adjusted to specification. This IGN TIMING monitors the data calculated by the PCM according to the input signals from the camshaft position sensor and other ignition timing related sensors.)
- If the real-time diagnosis results are NG, and the on board diagnostic system results are OK, when diagnosing the mass air flow sensor, first check to see if the fuel pump control circuit is normal.

MONITOR ITEM	CONDITION		SPECIFICATION
ENG SPEED	• Tachometer: Connect • Run engine and compare tachometer indication with the CONSULT-II value.		Almost the same speed as the CONSULT-II value.
MAS A/F SE-B1	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: “N” • No-load	Idle	1.0 - 1.7V
		2,500 rpm	1.5 - 2.4V
B/FUEL SCHDL	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: “N” • No-load	Idle	1.0 - 1.6 msec
		2,000 rpm	0.7 - 1.3 msec
A/F ALPHA-B1 A/F ALPHA-B2	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	53 - 155%
COOLAN TEMP/S	• Engine: After warming up		More than 70°C (158°F)
HO2S1 (B1) HO2S1 (B2)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ 0.6 - 1.0V
HO2S2 (B1) HO2S2 (B2)	• Engine: After warming up	Revving engine from idle to 3,000 rpm quickly	0 - 0.3V ⟷ 0.6 - 1.0V
HO2S1 MNTR (B1) HO2S1 MNTR (B2)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	LEAN ⟷ RICH Changes more than 5 times during 10 seconds.
HO2S2 MNTR (B1) HO2S2 MNTR (B2)	• Engine: After warming up	Revving engine from idle to 3,000 rpm quickly	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) • Vacuum is applied using a vacuum pump	Throttle valve: fully opened	3.5 - 4.7V
EGR TEMP SEN	• Engine: After warming up		Less than 4.5V
EVAP SYS PRES	• Ignition switch: ON		Approx. 3.4V
ABSOL PRES/SE	• Ignition switch: ON		Approx. 4.4V
START SIGNAL	• Ignition switch: ON → START → ON		OFF → ON → OFF

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

MONITOR ITEM	CONDITION		SPECIFICATION
CLSD THL POS CLSD THL/P SW	• Engine: After warming up • Ignition switch: ON (Engine stopped) • Vacuum is applied using a vacuum pump	Throttle valve: Idle position	ON
		Throttle valve: Slightly open	OFF
AIR COND SIG	• Engine: After warming up, idle the engine	A/C switch "OFF"	OFF
		A/C switch "ON" (Compressor operates)	ON
P/N POSI SW	• Ignition switch: ON	Shift lever "P" or "N"	ON
		Except above	OFF
PW/ST SIGNAL	• Engine: After warming up, idle the engine	Steering wheel in neutral position (forward direction)	OFF
		The steering wheel is turned	ON
IGNITION SW	• Ignition switch: ON → OFF		ON → OFF
INJ PULSE-B1 INJ PULSE-B2	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: "N" • No-load	Idle	2.4 - 3.2 msec
		2,000 rpm	1.9 - 3.2 msec
IGN TIMING	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: "N" • No-load	Idle	9°±2° BTDC
		2,000 rpm	More than 25° BTDC
CAL/LD VALUE	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: "N" • No-load	Idle	20.0 - 35.5%
		2,500 rpm	12.0 - 27.0%
ABSOL TH·P/S	• Engine: After warming up, idle the engine	Throttle valve: fully closed	0.0°
	• 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	1.4 - 4.0 g·m/s
		2,500 rpm	5.0 - 10.0 g·m/s
IACV-AAC/V	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: "N" • No-load	Idle	5 - 20 steps
		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	—
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 steps
AIR COND RLY	• Air conditioner switch: OFF → ON		OFF → ON

MONITOR ITEM	CONDITION		SPECIFICATION
FUEL PUMP RLY	• Ignition switch is turned to ON (Operates for 5 seconds) • Engine running and cranking • When engine is stopped (stops in 1.0 seconds)		ON
	• Except as shown above		OFF
INT/V SOL-B1	• Engine is running • Engine speed is more than 2,000 rpm • Quickly depressed accelerator pedal		OFF →ON
VC/V BYPASS/V	• Ignition switch: ON		OFF
VENT CONT/V	• Ignition switch: ON		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
HO2S1 HTR (B1) HO2S1 HTR (B2)	• Engine speed: Below 3,600 rpm		ON
	• Engine speed: Above 3,600 rpm		OFF
HO2S2 HTR (B1) HO2S2 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
SWRL CONT S/V	• Engine speed: Idle	Engine coolant temperature is between 15°C (59°F) to 55°C (131°F).	ON
		Engine coolant temperature is above 55°C (131°F).	OFF
SWL CON VC SW	• Engine speed: Idle • Engine coolant temperature is between 15°C (59°F) to 55°C (131°F).		OFF
	• Engine speed: Idle • Engine coolant temperature is more than 55°C (131°F).		ON

Major Sensor Reference Graph in Data Monitor Mode

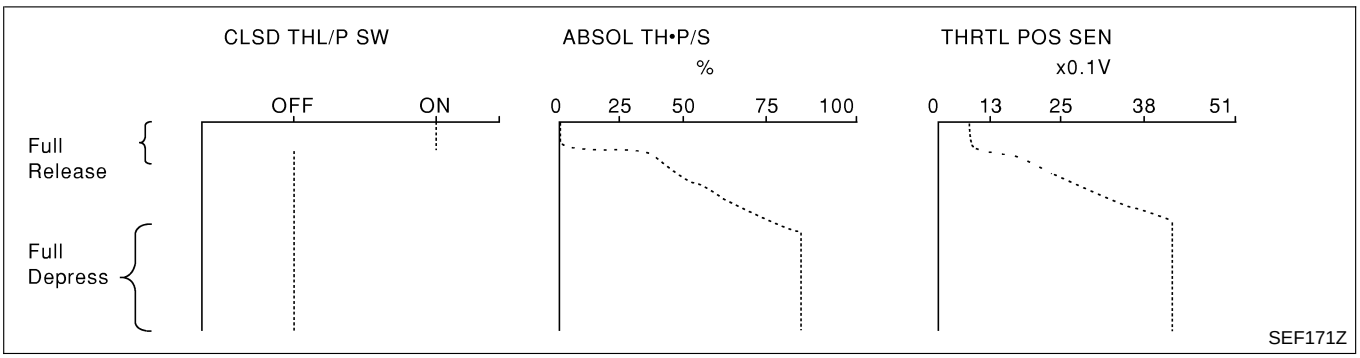
=NIEC0043

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

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

NIEC0043S01

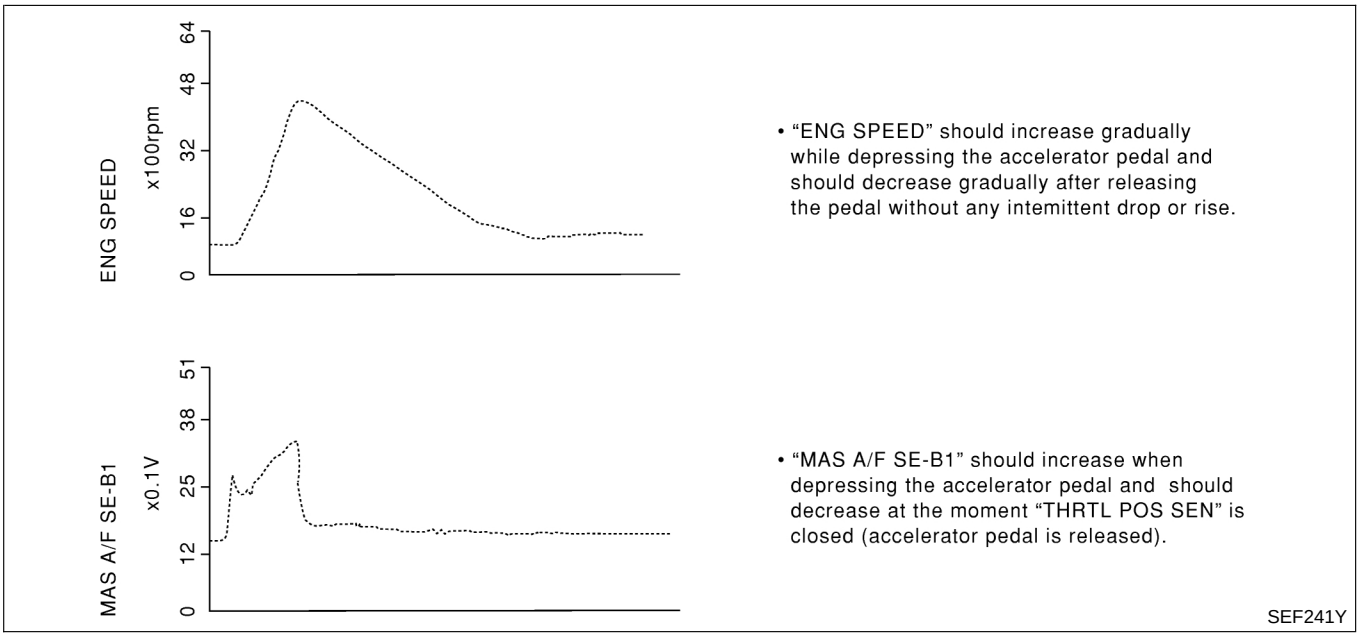
Below is the data for “THRTL POS SEN”, “ABSOL TH·P/S” and “CLSD THL/P SW” when depressing the accelerator pedal with the ignition switch “ON”.
The signal of “THRTL POS SEN” and “ABSOL TH·P/S” should rise gradually without any intermittent drop or rise after “CLSD THL/P SW” is changed from “ON” to “OFF”.

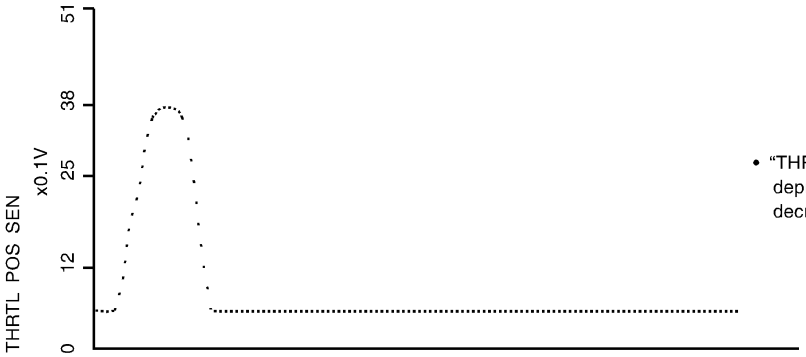


ENG SPEED, MAS A/F SE-B1, THRTL POS SEN, HO2S2 (B1/B2), HO2S1 (B1/B2), INJ PULSE-B1

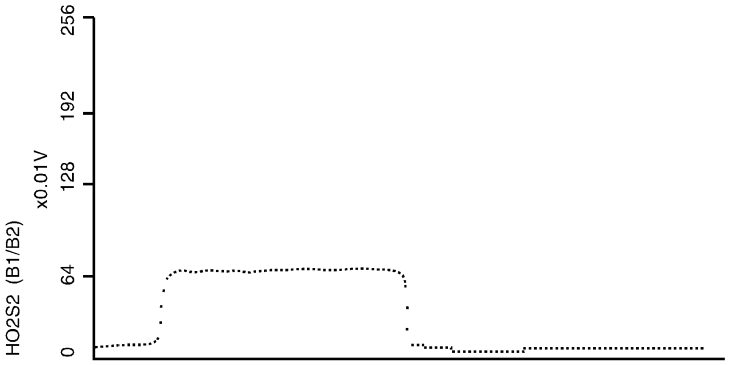
NIEC0043S02

Below is the data for “ENG SPEED”, “MAS A/F SE-B1”, “THRTL POS SEN”, “HO2S2 (B1/B2)”, “HO2S1 (B1/B2)” and “INJ PULSE” when revving engine quickly up to 4,800 rpm under no load after warming up engine to normal operating temperature.
Each value is for reference, the exact value may vary.

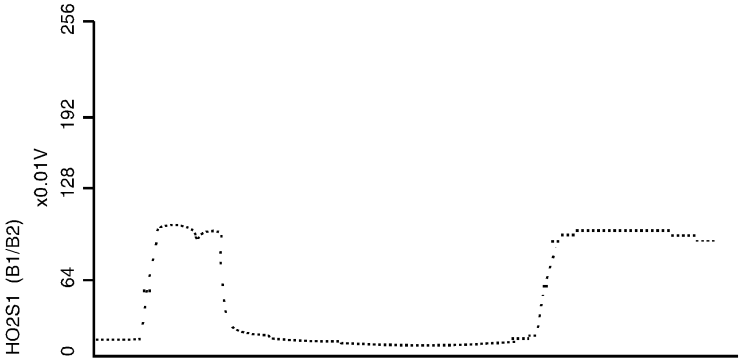




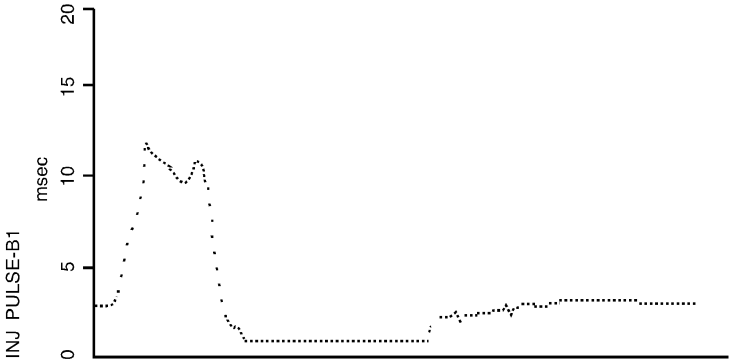
- "THRTL POS SEN" should increase while depressing the accelerator pedal and should decrease while releasing it.



- "HO2S2 (B1/B2)" may increase immediately after depressing the accelerator pedal and may decrease after releasing the pedal.

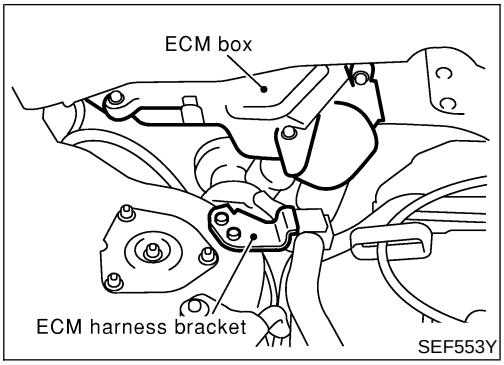


- "HO2S1 (B1/B2)" may increase immediately after depressing the accelerator pedal and may decrease after releasing the pedal.



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

SEF242YB



PCM Terminals and Reference Value

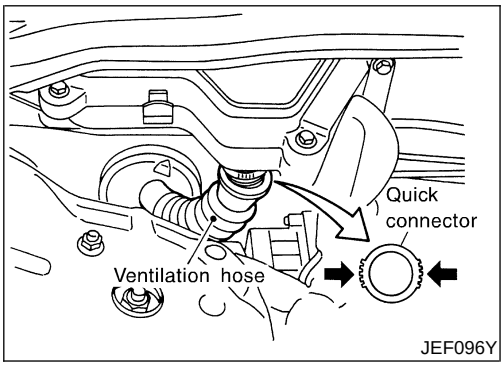
NIEC0044

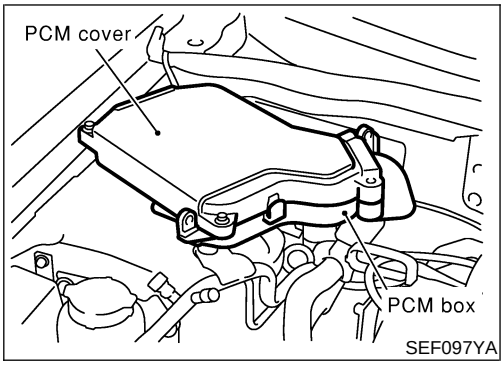
PREPARATION

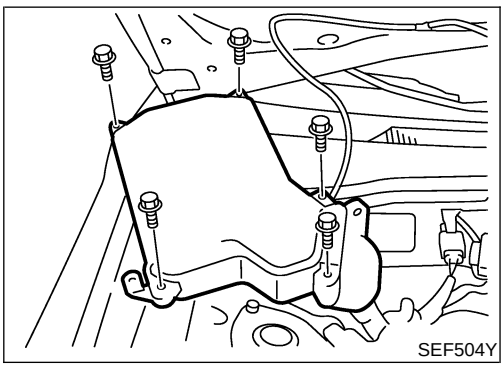
NIEC0044S01

1. PCM is located in the right side of the cowl top (behind the strut tower).
   For this inspection:

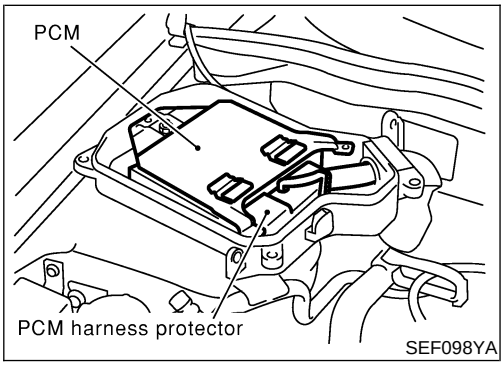
- Remove engine control harness bracket on the strut tower.
- Remove quick connector on the ventilation hose.
- Remove PCM fixing bolts and pull PCM out all the way.





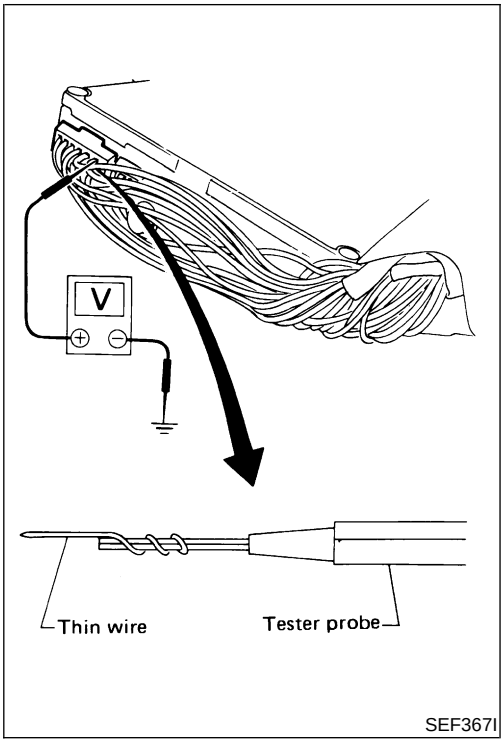


- Remove PCM cover fixing bolts.



- Remove PCM fixing bolts.
- Remove PCM with the harness from the cover.

2. Remove PCM harness protector.

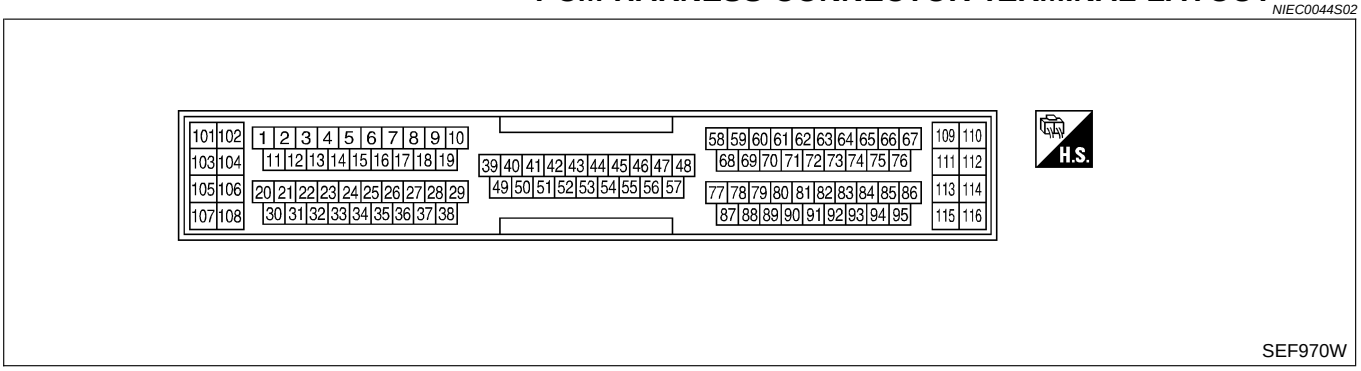


3. Perform all voltage measurements with the connector connected. Extend tester probe as shown to perform tests easily.
- Open harness securing clip to make testing easier.
- Use extreme care not to touch 2 pins at one time.
- Data is for comparison and may not be exact.

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

PCM HARNESS CONNECTOR TERMINAL LAYOUT

NIEC0044S02



PCM INSPECTION TABLE

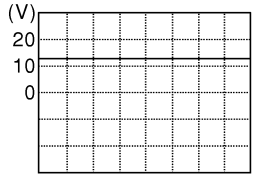
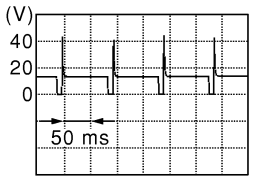
NIEC0044S03

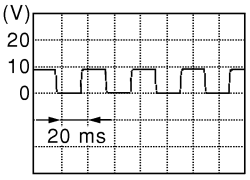
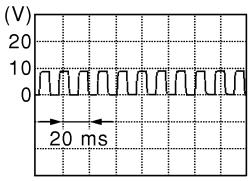
Specification data are reference values and are measured between each terminal and ground.

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

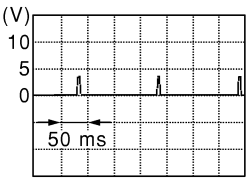
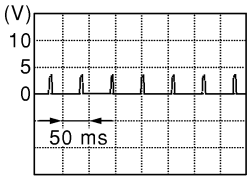
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	Y/R	Intake valve timing control solenoid valve	**[Engine is running]** ● Intake valve timing control is operating	Approximately 0V
			[Engine is not running] ● Intake valve timing control is not operating	BATTERY VOLTAGE (11 - 14V)
2	L/B	Vacuum cut valve bypass valve	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)

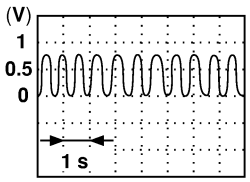
PCM Terminals and Reference Value (Cont'd)

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	W/R	Heated oxygen sensor 2 (rear) heater (bank 2)	**[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
30	G/Y	Heated oxygen sensor 2 (rear) heater (bank 1)	**[Ignition switch "ON"]** ● Engine stopped **[Engine is running]** ● Engine speed is above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)
4	R/B	Heated oxygen sensor 1 (front) heater (bank 2)	**[Engine is running]** ● Engine speed is below 3,600 rpm.	0 - 1.0V
49	GY/L	Heated oxygen sensor 1 (front) heater (bank 1)	**[Engine is running]** ● Engine speed is above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)
6 7 15 16	R LG P OR	IACV-AAC valve	**[Engine is running]** ● Idle speed	0.1 - 14V
8 9 17 18	SB W/B R/Y Y	EGR volume control valve	**[Engine is running]** ● Idle speed	0.1 - 14V
12	LG/B	Cooling fan relay (High)	**[Engine is running]** ● Cooling fan is not operating	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Cooling fan (High) is operating	0 - 0.6V
13	LG/R	Cooling fan relay (Low)	**[Engine is running]** ● Cooling fan is not operating	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Cooling fan is operating	0 - 0.6V
14	GY/L	EVAP canister purge volume control solenoid valve	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)  SEF462Y
			[Engine is running] ● Engine speed is about 2,000 rpm (More than 100 seconds after starting engine).	BATTERY VOLTAGE (11 - 14V)  SEF461Y

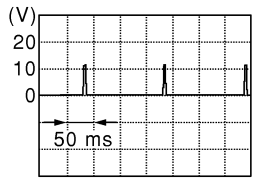
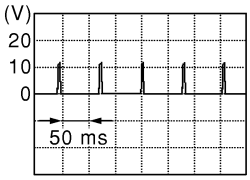
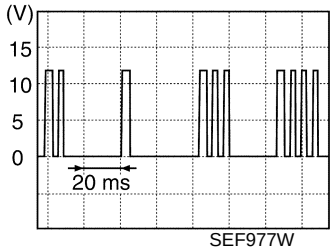
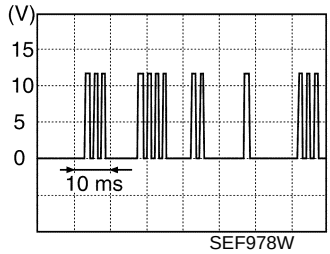
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
20 Without NVIS (NATS)	B/P	Fuel pump relay	**[Ignition switch "ON"]** ● For 5 seconds after turning ignition switch "ON" **[Engine is running]**	0 - 1V
21 With NVIS (NATS)			**[Ignition switch "ON"]** ● More than 5 seconds after turning ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
22	OR/L	Malfunction indicator lamp	**[Ignition switch "ON"]**	0 - 1.0V
			[Engine is running] ● Idle speed	BATTERY VOLTAGE (11 - 14V)
23	L/W	Air conditioner relay	**[Engine is running]** ● Both A/C switch and blower switch are "ON" (Compressor operates)	0 - 0.6V
			[Engine is running] ● A/C switch is "OFF"	BATTERY VOLTAGE (11 - 14V)
31	W/G	PCM relay (Self shut-off)	**[Engine is running]** **[Ignition switch "OFF"]** ● For 7 seconds after turning ignition switch "OFF"	0 - 1.0V
			[Ignition switch "OFF"] ● 7 seconds passed after turning ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
32	L/OR	Tachometer	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 4 - 5V  SEF463Y
			[Engine is running] ● Engine speed is 2,000 rpm	Approximately 4 - 5V  SEF464Y

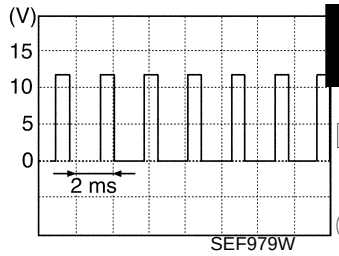
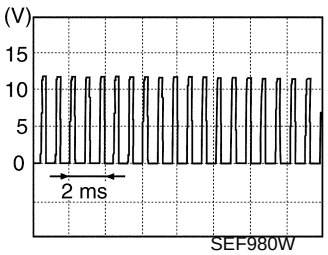
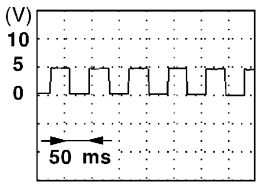
PCM Terminals and Reference Value (Cont'd)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
35 36 37 38	BR PU L/R GY/R	Ignition signal	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V  SEF465Y
			[Engine is running] ● Engine speed is 2,000 rpm	Approximately 0.5V  SEF466Y
40	Y/PU	Throttle position switch (Closed position)	**[Engine is running]** ● **Warm-up condition** ● Accelerator pedal fully released	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Accelerator pedal depressed	Approximately 0V
41	B/Y	Start signal	**[Ignition switch "ON"]**	Approximately 0V
			[Ignition switch "START"]	9 - 12V
42	G/OR	PNP switch	**[Ignition switch "ON"]** ● Gear position is "Neutral position" (M/T models) ● Gear position is "P" or "N" (A/T models)	Approximately 0V
			[Ignition switch "ON"] ● Except the above gear position	BATTERY VOLTAGE (11 - 14V)
43	B/R	Ignition switch	**[Ignition switch "OFF"]**	0V
			[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)
44	L/R	Air conditioner switch	**[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)
46	PU	Power steering oil pressure switch	**[Engine is running]** ● Steering wheel is being turned.	Approximately 0V
			[Engine is running] ● Steering wheel is not being turned.	Approximately 5V
48	B	PCM ground	**[Engine is running]** ● Idle speed	Engine ground [Probe this terminal with (–) tester probe when measuring]
50	R/W	Electrical load signal	**[Ignition switch "ON"]** ● Lighting switch and/or rear window defogger switch "ON"	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch "ON"] ● Lighting switch and rear window defogger switch "OFF"	0V

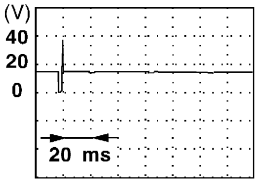
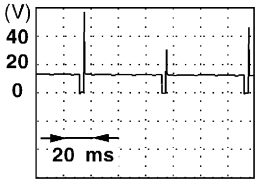
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
51	LG/B	Heater fan switch	**[Engine is running]** ● Heater fan switch "ON"	Approximately 0V
			[Engine is running] ● Heater fan switch "OFF"	Approximately 5V
54	Y/R	A/T signal No. 1	**[Engine is running]** ● Idle speed	Approximately 0 - 1.0V
55	Y/G	A/T signal No. 2	**[Engine is running]** ● Idle speed	Approximately 0 - 1.0V
56	G/Y	A/T signal No. 4	**[Engine is running]** ● Idle speed	Approximately 0 - 1.0V
57	B	PCM ground	**[Engine is running]** ● Idle speed	Engine ground
58	B	Sensor's ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
59	P/L	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
61	G	Mass air flow sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	1.3 - 1.7V
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,500 rpm	1.8 - 2.4V
62	W	Heated oxygen sensor 1 (front) (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - Approximately 1.0V (Periodically change)  SEF059V
94	W	Heated oxygen sensor 1 (front) (bank 1)		
63	W	Heated oxygen sensor 2 (rear) (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - Approximately 1.0V
95	R/L	Heated oxygen sensor 2 (rear) (bank 1)		
64	R/Y	Intake air temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with intake air temperature.

PCM Terminals and Reference Value (Cont'd)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
65	R	Intake valve timing control position sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.5 - 0.6V  SEF191Z
			[Engine is running] ● Engine speed is 2,000 rpm	Approximately 0.5 - 0.6V  SEF192Z
66 75 Without NVIS (NATS)	R	Camshaft position sensor (PHASE)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 2.0 - 3.0V  SEF977W
76 85 With NVIS (NATS)			**[Engine is running]** ● Engine speed is 2,000 rpm	Approximately 2.0 - 3.0V  SEF978W
67	W/L	Power supply for PCM (Back-up)	**[Ignition switch "OFF"]**	BATTERY VOLTAGE (11 - 14V)
70	BR/W	Engine coolant temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with engine coolant temperature.
71	GY	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
72	PU	EGR temperature sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Less than 4.5V
			[Engine is running] ● **Warm-up condition** ● EGR system is operating	0 - 1.5V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
73	B	Mass air flow sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
74	R/L	Refrigerant pressure sensor	**[Engine is running]** ● **Warm-up condition** ● Both A/C switch and blower switch are "ON" (Compressor operates)	0.36 - 3.88V
75 Without NVIS (NATS)	R	Crankshaft position sensor (POS)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 3.0 - 4.0V  SEF979W
85 With NVIS (NATS)			**[Engine is running]** ● Engine speed is 2,000 rpm	Approximately 3.0 - 4.0V  SEF980W
80	W	Absolute pressure sensor	**[Ignition switch "ON"]**	Approximately 4.4V
81	W	Knock sensor	**[Engine is running]** ● Idle speed	Approximately 2.5V
82	G/OR	Fuel tank temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with fuel tank temperature.
83	G	Fuel level sensor	**[Ignition switch "ON"]**	Approximately 0 - 4.8V Output voltage varies with fuel level.
84	P	EVAP control system pressure sensor	**[Ignition switch "ON"]**	Approximately 3.4V
86	PU/R	Vehicle speed sensor	**[Engine is running]** ● Lift up the vehicle ● In 2nd gear position ● Vehicle speed is 40 km/h (25 MPH)	0 - Approximately 4.2V  SEF003W
90	B/W	Fuel level sensor ground	**[Engine is running]** ● Idle speed	Approximately 0V

PCM Terminals and Reference Value (Cont'd)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
92	Y	Throttle position sensor	**[Engine is running]** ● **Warm-up condition** ● Accelerator pedal fully released ● Vacuum is created using vacuum pump	0.15 - 0.85V
			[Ignition switch "ON"] ● Accelerator pedal fully depressed ● Vacuum is created using vacuum pump	3.5 - 4.7V
101 103 105 107	R/B Y/B G/B L/B	Injector No. 1 Injector No. 2 Injector No. 3 Injector No. 4	**[Engine is running]** ● **Warm-up condition** ● Idle speed	BATTERY VOLTAGE (11 - 14V)  SEF011W
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14V)  SEF012W
102	L/Y	EVAP canister vent control valve	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)
104	P/L	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)
106 108	B B	PCM ground	**[Engine is running]** ● Idle speed	Engine ground
110 112	W W	Power supply for PCM	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)
111	R	Sensor's power supply	**[Ignition switch "ON"]**	Approximately 5V
115	L/G	DATA link connector	**[Ignition switch "ON"]** ● CONSULT-II or GST is disconnected.	Approximately 8V

Description

NIEC1183

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 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 PCM prior to any learned on board correction.)
- A/F ALPHA-B1/B2 (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

NIEC1183S01

- Vehicle driven distance: More than 5,000 km (3,107 miles)
- Barometric pressure: 98.3 - 104.3 kPa (1.003 - 1.064 kg/cm^2, 14.25 - 15.12 psi)
- Atmosphere temperature: 20° to 30° C (68° to 86° F)
- Engine coolant temperature: 75° to 95° C (167° to 203°)
- Transmission: Warmed-up *1
- Electrical load: Not applied *2
- Engine speed: Idle

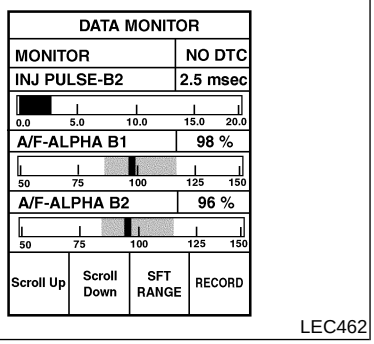
*1: For A/T models, after the engine is warmed-up to normal operating temperature, drive vehicle until “FLUID TEMP SE” (A/T fluid temperature sensor signal) indicates more than 60° C (140° F). For M/T models, drive vehicle for 5 minutes after the engine is warmed-up to normal operating temperature.
*2: Rear window defogger switch, air conditioner switch, and lighting switch are “OFF”. Cooling fans are not operating. Steering wheel straight ahead.

INSPECTION PROCEDURE

NIEC1183S02

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

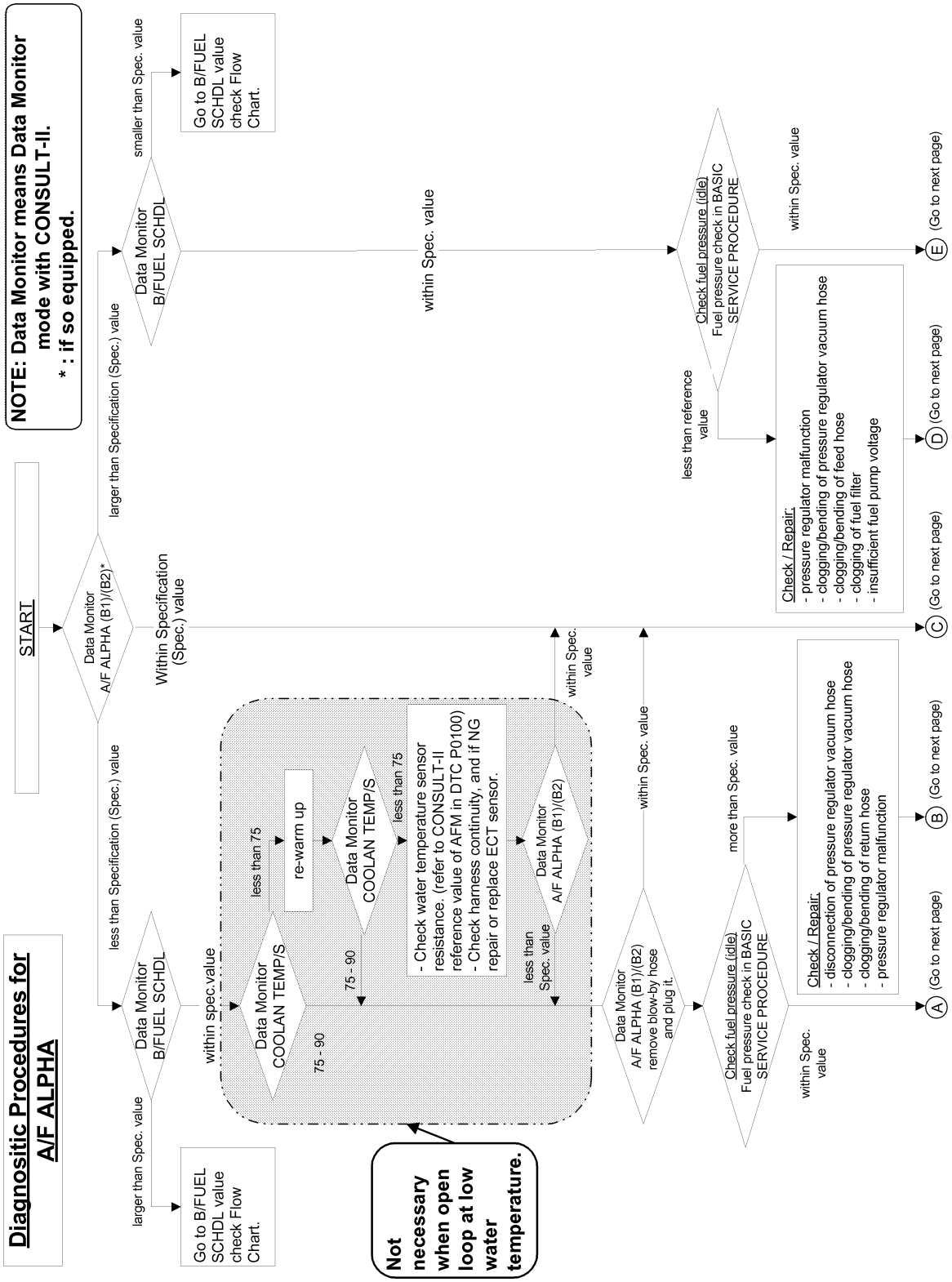
1. Perform “Basic Inspection”. Refer to “Basic Inspection”, EC-131.
2. Confirm that the testing conditions indicated above are met.
3. Select “B/FUEL SCHDL”, “A/F ALPHA-B1”, “A/F ALPHA-B2”, and “MAS A/F SE-B1” in “DATA MONITOR (SPEC)” mode with CONSULT-II.
4. Make sure that monitor items are within the SP value.
5. If NG, go to “Diagnostic Procedure”. Refer to “Diagnostic Procedure”, EC-166.



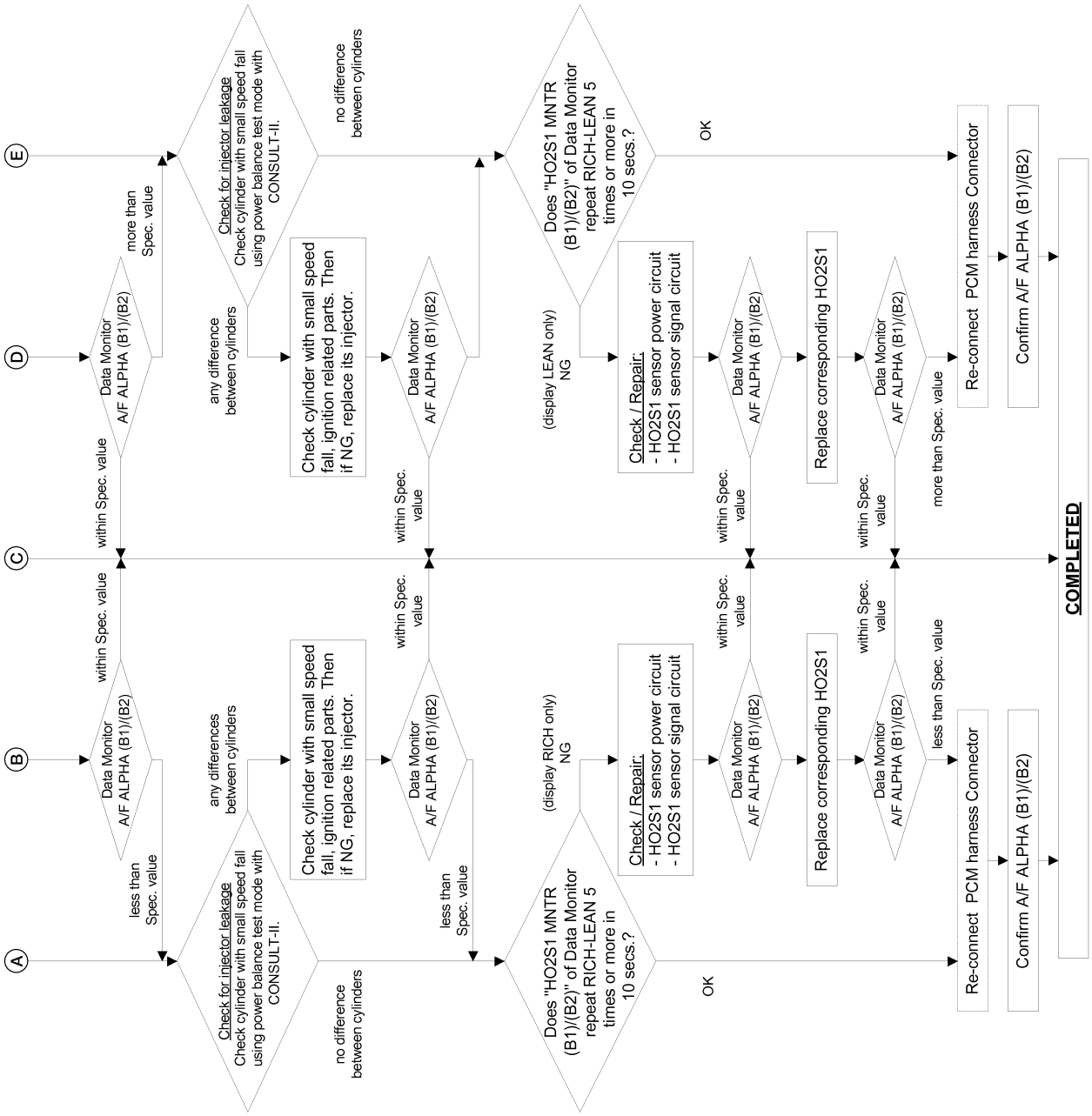
LEC462

Diagnostic Procedure

NIEC1184



LEC459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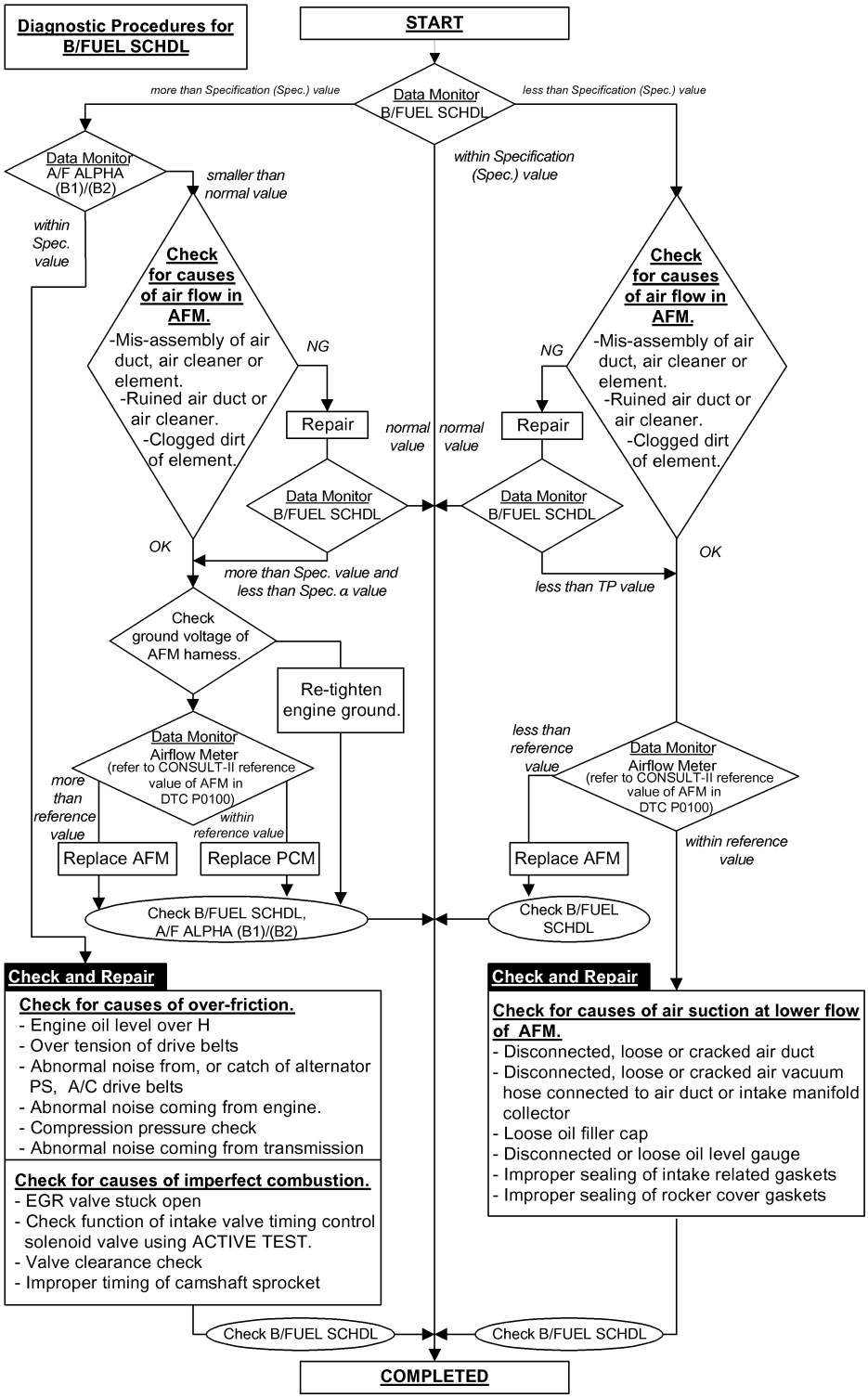
Ⓒ
Ⓓ
Ⓔ
Data Monitor A/F ALPHA (B1)/(B2)
within Spec. value
less than Spec. value
more than Spec. value
Check for injector leakage
Check cylinder with small speed fall using power balance test mode with CONSULT-II.
any differences between cylinders
no difference between cylinders
Check cylinder with small speed fall, ignition related parts. Then if NG, replace its injector.
Does "HO2S1 MNTR (B1)/(B2)" of Data Monitor repeat RICH-LEAN 5 times or more in 10 secs.?
(display RICH only)
(display LEAN only)
NG
OK
Check / Repair:
- HO2S1 sensor power circuit
- HO2S1 sensor signal circuit
Replace corresponding HO2S1
Re-connect PCM harness Connector
Confirm A/F ALPHA (B1)/(B2)
COMPLETED

LEC460


Diagnostic Procedures for B/FUEL SCHDL
START
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 AFM.
-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 Spec. value and less than Spec. α value
less than TP value
Check ground voltage of AFM harness.
Re-tighten engine ground.
Data Monitor Airflow Meter (refer to CONSULT-II reference value of AFM in DTC P0100)
more than reference value
within reference value
less than reference value
Replace AFM
Replace PCM
Check B/FUEL SCHDL, A/F ALPHA (B1)/(B2)
Check B/FUEL SCHDL
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.
- Compression pressure check
- Abnormal noise coming from transmission
Check for causes of imperfect combustion.
- EGR valve stuck open
- Check function of intake valve timing control solenoid valve using ACTIVE TEST.
- Valve clearance check
- Improper timing of camshaft sprocket
Check for causes of air suction at lower flow of AFM.
- 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
COMPLETED

LEC461

Description

NIEC0045

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

COMMON I/I REPORT SITUATIONS

NIEC0045S01

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 data does not appear during the DTC CONFIRMATION PROCEDURE.
VI	The TROUBLE DIAGNOSIS for PXXXX does not indicate the problem area.

Diagnostic Procedure

NIEC0046

1	**INSPECTION START**
Erase (1st trip) DTCs. Refer to "HOW TO ERASE EMISSION-RELATED INFORMATION", EC-98.	
▶	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.

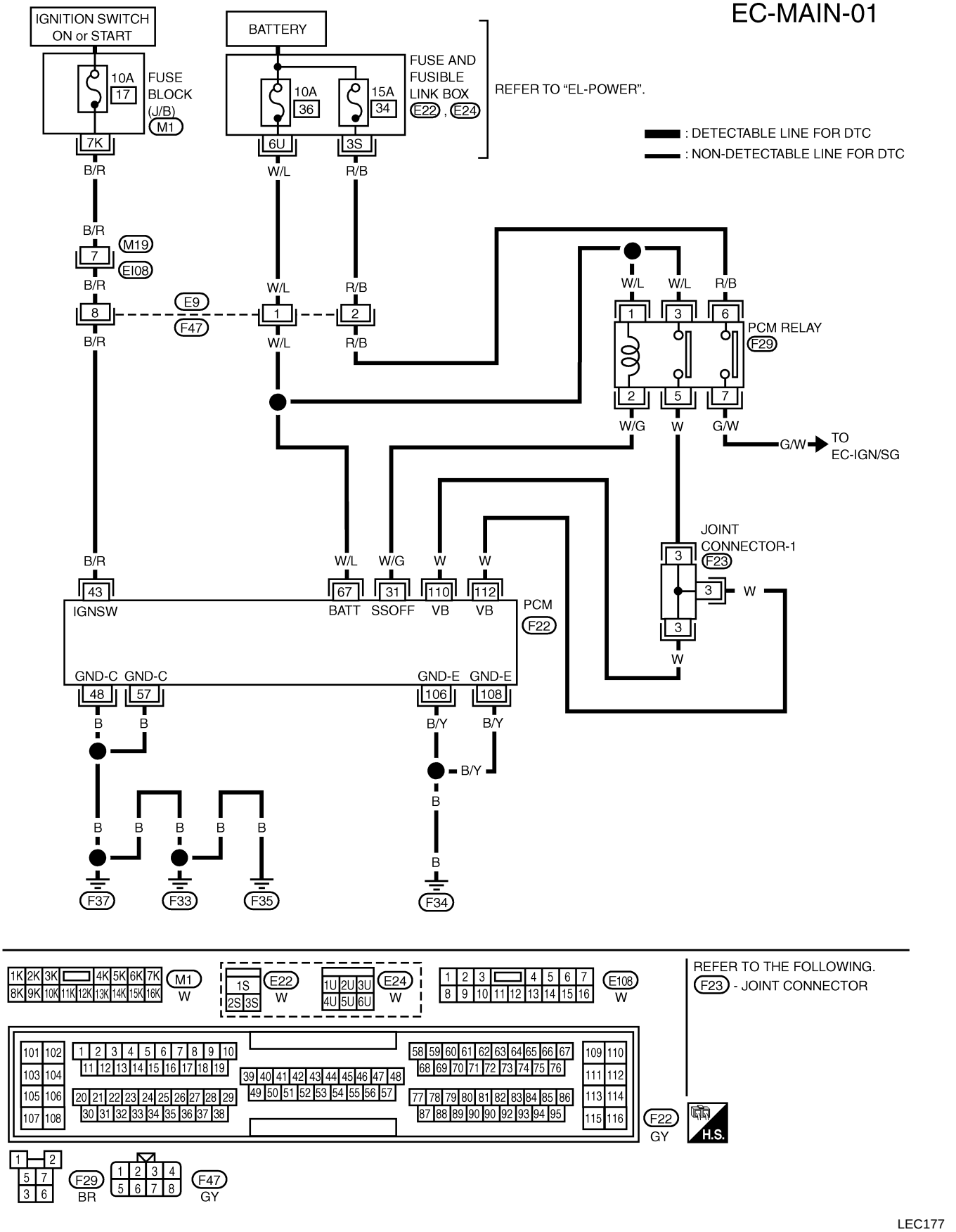
3	**SEARCH FOR ELECTRICAL INCIDENT**
Refer to ***GI-26***, "Incident Simulation Tests".	
OK or NG	
OK ▶	GO TO 4.
NG ▶	Repair or replace.

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.

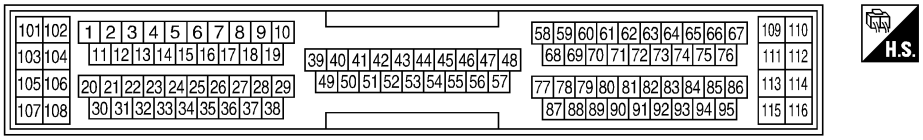
Main Power Supply and Ground Circuit

WIRING DIAGRAM

NIEC0047



LEC177



SEF970W

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

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
31	W/G	PCM RELAY (SELF-SHUTOFF)	ENGINE RUNNING FOR 5 SECONDS AFTER TURNING IGN OFF	0-1.0V
			5 SECONDS PASSED AFTER TURNING IGN OFF	BATTERY VOLTAGE
43	B/R	IGN	IGN OFF	0V
			IGN ON	BATTERY VOLTAGE
48	B	PCM GROUND	ENGINE RUNNING	ENGINE GROUND
57	B	PCM GROUND	ENGINE RUNNING AT IDLE SPEED	APPROX. 0-1.0V
67	W/L	POWER SUPPLY (BACK-UP)	IGN OFF	BATTERY VOLTAGE
106 108	B/Y B/Y	PCM GROUND	ENGINE RUNNING AT IDLE SPEED	ENGINE GROUND
110 112	W W	POWER SUPPLY FOR PCM	IGN ON	BATTERY VOLTAGE

LEC429

DIAGNOSTIC PROCEDURE

=NIEC0049

1	INSPECTION START

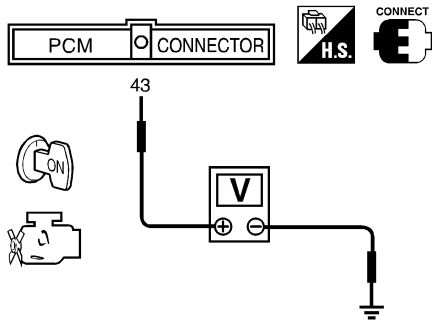
Start engine.
Is engine running?

Yes or No

Yes	▶	GO TO 4.
No	▶	GO TO 2.

2	CHECK POWER SUPPLY-I

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



Voltage: Battery voltage

SEF637Y

OK or NG

OK	▶	GO TO 14.
NG	▶	GO TO 3.

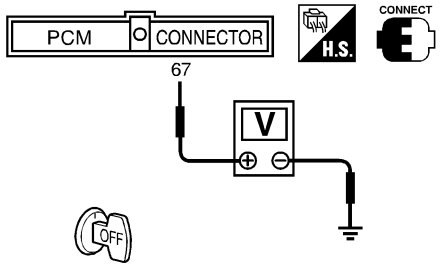
3	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E9, F47
- Harness connectors M19, E108
- Harness for open or short between PCM and 10A fuse

	▶	Repair harness or connectors.

4	CHECK POWER SUPPLY-II

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



Voltage: Battery voltage

SEF638Y

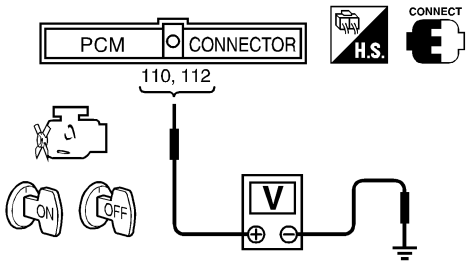
OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E9, F47 ● 10A fuse ● Harness for open or short between PCM and 10A fuse	
▶	Repair harness or connectors.

6	CHECK POWER SUPPLY-III

1. Turn ignition switch "ON" and then "OFF".
2. Check voltage between PCM 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.

SEF639Y

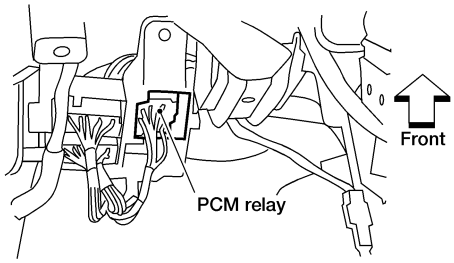
OK or NG

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

7	CHECK HARNESS CONTINUITY BETWEEN PCM RELAY AND PCM

1. Disconnect PCM harness connector.
2. Disconnect PCM relay.

View with glove box removed



WEC248

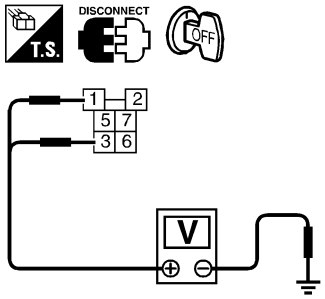
3. Check harness continuity between PCM terminals 110, 112 and PCM relay terminal 5. Refer to "Wiring Diagram", EC-170.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 8.

8	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E9, F47 ● Joint connector-1 ● Harness for open or short between PCM relay and PCM	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

9	CHECK VOLTAGE BETWEEN PCM RELAY AND GROUND
Check voltage between PCM relay terminals 1, 3 and ground with CONSULT-II or tester.	



Voltage: Battery voltage

SEF469Y

OK or NG

OK	▶	GO TO 11.
NG	▶	GO TO 10.

10	DETECT MALFUNCTIONING PART
Check the harness for open or short between PCM relay and fuse.	
▶	Repair harness or connectors.

11	CHECK OUTPUT SIGNAL CIRCUIT
1. Check harness continuity between PCM terminal 31 and PCM relay terminal 2. Refer to "Wiring Diagram", EC-170. **Continuity should exist.** 2. Also check harness for short to ground and short to power.	

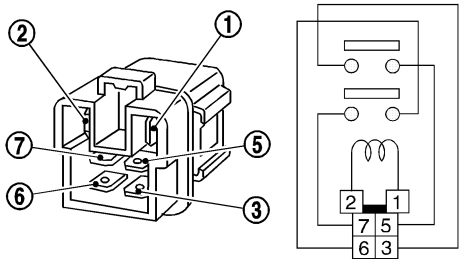
OK or NG

OK	▶	GO TO 13.
NG	▶	GO TO 12.

12	DETECT MALFUNCTIONING PART
Check the harness for open or short between PCM relay and PCM.	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

13	CHECK PCM RELAY

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



SEC202BC

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

OK or NG

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

14	CHECK GROUND CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect PCM harness connector.
3. Check harness continuity between PCM terminals 48, 57, 106, 108 and engine ground.
   Refer to "Wiring Diagram", EC-170.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

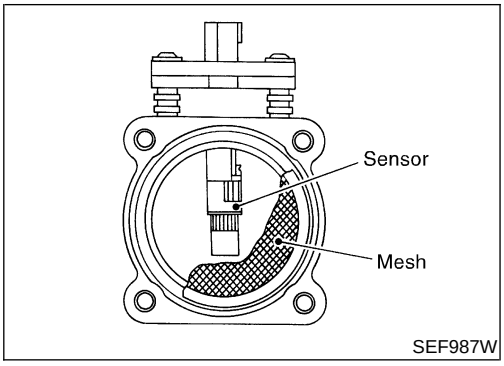
OK or NG

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

15	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-169.

▶ **INSPECTION END**



Component Description

NIEC0050

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

CONSULT-II Reference Value in Data Monitor Mode

NIEC0051

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	1.0 - 1.7V
		2,500 rpm	1.5 - 2.4V
CAL/LD VALUE	• Engine: After warming up • Air conditioner switch: “OFF” • Shift lever: “N” • No-load	Idle	20.0 - 35.5%
		2,500 rpm	12.0 - 27.0%
MASS AIRFLOW	• Engine: After warming up • Air conditioner switch: “OFF” • Shift lever: “N” • No-load	Idle	1.4 - 4.0 g·m/s
		2,500 rpm	5.0 - 10.0 g·m/s

On Board Diagnosis Logic

NIEC0053

DTC No.	Malfunction is detected when ...		Check Items (Possible Cause)
P0100	A)	An excessively high voltage from the sensor is sent to PCM when engine is not running.	• Harness or connectors (The sensor circuit is open or shorted.) • Mass air flow sensor
	C)	A high voltage from the sensor is sent to PCM under light load driving condition.	
	B)	An excessively low voltage from the sensor is sent to PCM* when engine is running.	• Harness or connectors (The sensor circuit is open or shorted.) • Intake air leaks • Mass air flow sensor
	D)	A low voltage from the sensor is sent to PCM under heavy load driving condition.	
	E)	A voltage from the sensor exists constantly approx. 1.0V when engine is running.	

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

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

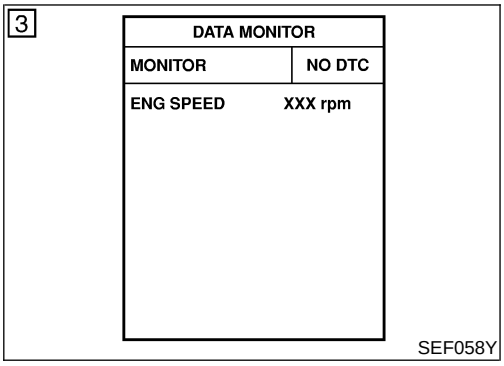
DTC Confirmation Procedure

NIEC0054

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".

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.



PROCEDURE FOR MALFUNCTION A

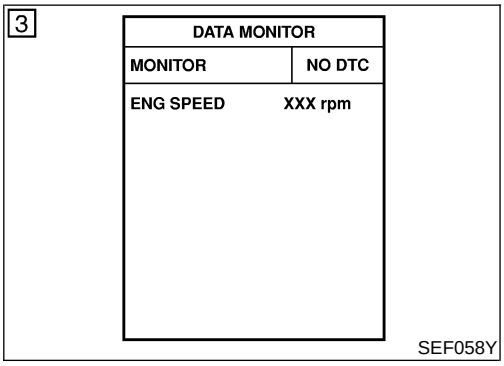
NIEC0054S01

With CONSULT-II

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-181.

With GST

Follow the procedure "With CONSULT-II" above.



PROCEDURE FOR MALFUNCTION B AND E

NIEC0054S02

With CONSULT-II

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-181.

With GST

Follow the procedure "With CONSULT-II" above.

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

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

NIEC0054S03

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.

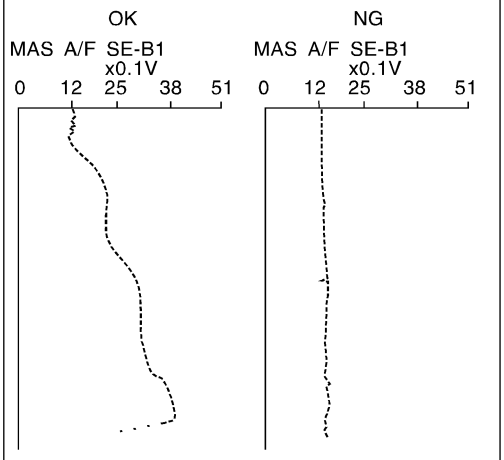
With CONSULT-II

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-181.

With GST

Follow the procedure "With CONSULT-II" above.

6



SEF243Y

PROCEDURE FOR MALFUNCTION D

NIEC0054S04

With CONSULT-II

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-181.
3) Select "DATA MONITOR" mode with CONSULT-II.
4) Check the voltage of "MAS A/F SE-B1" 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-181.
   If OK, go to following step.
7) Maintain the following conditions for at least 10 consecutive seconds.

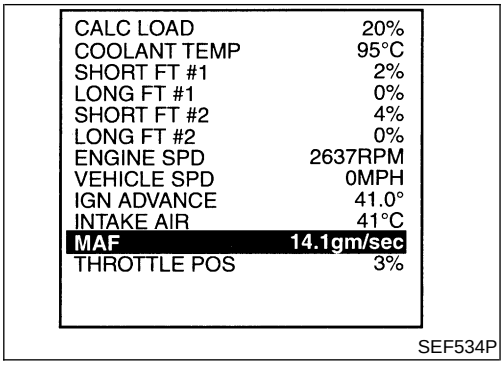
ENG SPEED	More than 2,000 rpm
THRTL POS SEN	More than 3V
Selector lever	Suitable position
Driving location	Driving vehicle uphill (Increased engine load) will help maintain the driving conditions required for this test.

8) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-181.

7

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

SEF719Y



Overall Function Check

NIEC0055

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

PROCEDURE FOR MALFUNCTION D

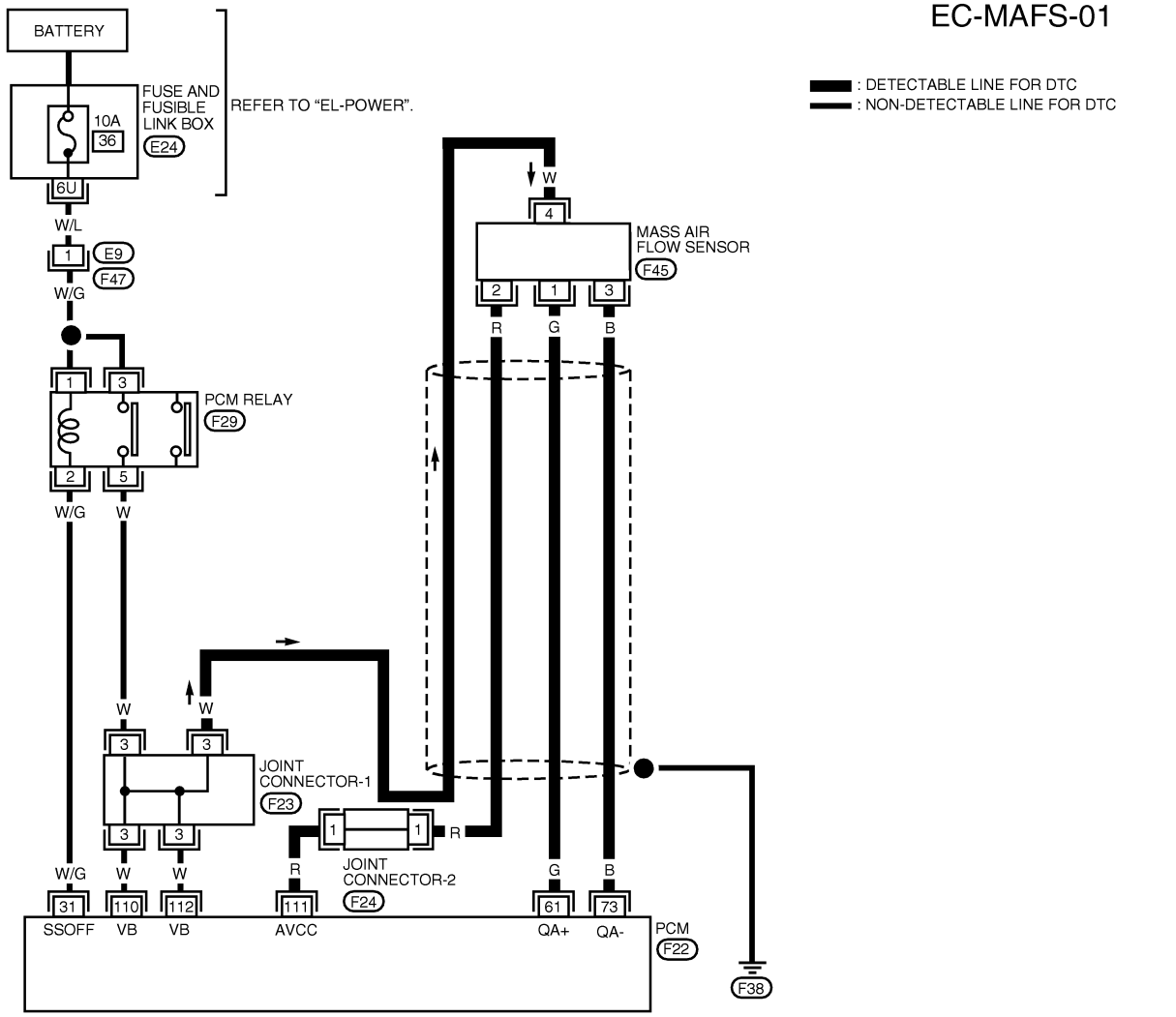
NIEC0055S01

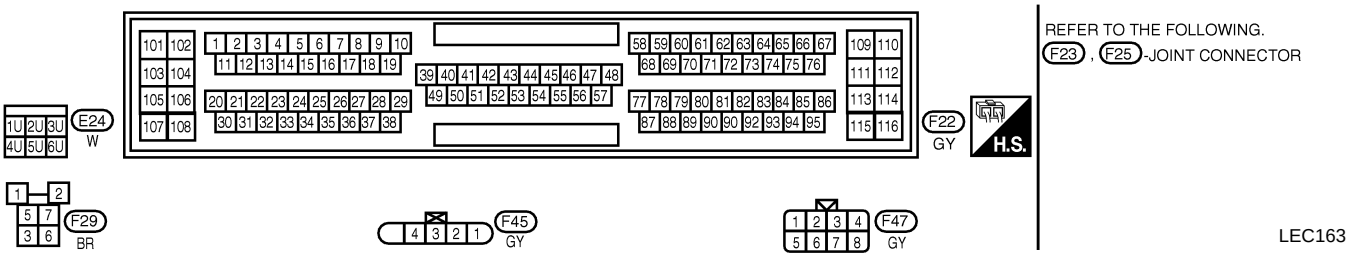
With GST

1) Turn ignition switch “ON”.
2) Start engine and warm it up to normal operating temperature.
3) Select “MODE 1” with GST.
4) Check the mass air flow sensor signal with “MODE 1”.
5) Check for linear mass air flow rise in response to increases to about 4,000 rpm in engine speed.
6) If NG, go to “Diagnostic Procedure”, EC-181.

Wiring Diagram

NIEC0056





LEC163

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

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
61	G	MASS AIR FLOW SENSOR	ENGINE RUNNING AT IDLE SPEED UNDER WARM-UP CONDITION	1.3 - 1.7V
			ENGINE RUNNING AT 2,500 RPM UNDER WARM-UP CONDITION	1.8 - 2.4V
73	B	MASS AIR FLOW SENSOR GROUND	ENGINE RUNNING AT IDLE SPEED UNDER WARM-UP CONDITION	APPROX. 0V
111	R	SENSOR'S POWER SUPPLY	IGN ON	APPROX. 5V

SEF172Z

Diagnostic Procedure

NIEC0057

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 connections.
- Air duct
- Vacuum hoses
- Intake air passage between air duct to collector

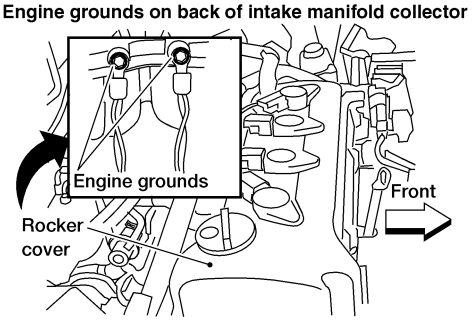
OK or NG

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

3	RETIGHTEN GROUND SCREWS

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

Engine grounds on back of intake manifold collector



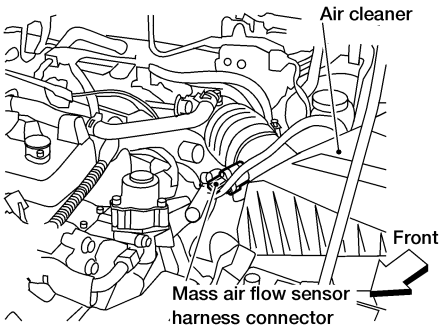
WEC249

	▶	GO TO 4.

Diagnostic Procedure (Cont'd)

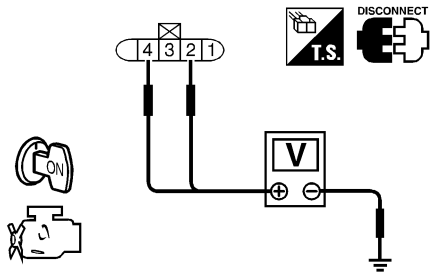
4	CHECK POWER SUPPLY

1. Disconnect mass air flow sensor harness connector.



WEC250

2. Turn ignition switch "ON".
3. Check voltage between MAFS terminal 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.
- Joint connector-1
- Joint connector-2
- Harness for open or short between PCM relay and mass air flow sensor
- Harness for open or short between mass air flow sensor and PCM

	▶	Repair harness or connectors.

6	CHECK GROUND CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect PCM harness connector.
3. Check harness continuity between MAFS terminal 3 and PCM terminal 73.
   Refer to "Wiring Diagram", EC-180.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

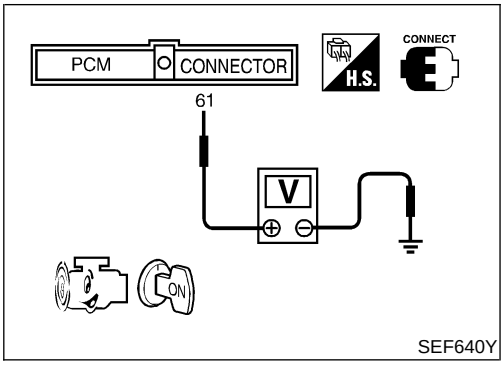
OK or NG

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

7	CHECK INPUT SIGNAL CIRCUIT	
1. Check harness continuity between MAFS terminal 1 and PCM terminal 61. Refer to "Wiring Diagram", EC-180. **Continuity should exist.** 2. Also check harness for short to ground and short to power.		
OK or NG		
OK	▶	GO TO 8.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

8	CHECK MASS AIR FLOW SENSOR	
Refer to "Component Inspection", EC-184.		
OK or NG		
OK	▶	GO TO 9.
NG	▶	Replace mass air flow sensor.

9	CHECK INTERMITTENT INCIDENT	
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-169.		
	▶	**INSPECTION END**



Component Inspection

=NIEC0058

MASS AIR FLOW SENSOR

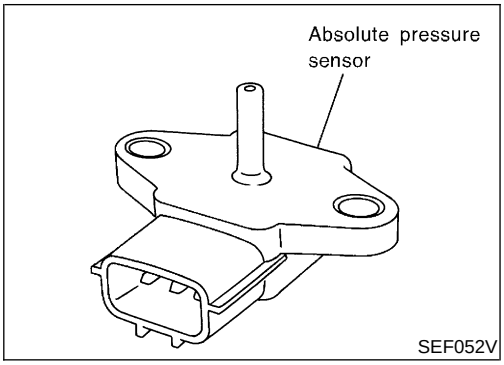
NIEC0058S01

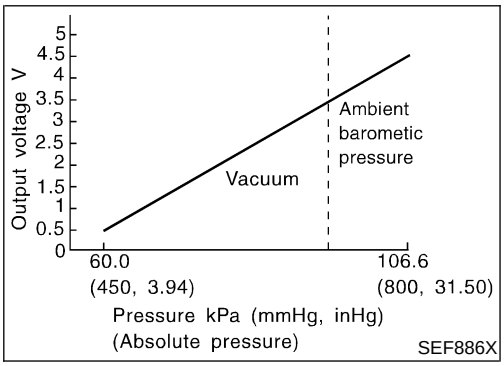
1. Turn ignition switch “ON”.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between PCM terminal 61 (Mass air flow sensor signal) and ground.

Conditions	Voltage V
Ignition switch “ON” (Engine stopped.)	Less than 1.0
Idle (Engine is warmed-up to normal operating temperature.)	1.0 - 1.7
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.5 - 2.4
Idle to about 4,000 rpm*	1.3 - 1.7 to Approx. 3.6

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

4. If the voltage is out of specification, disconnect mass air flow sensor harness connector and connect it again. Repeat above check.
5. If NG, remove mass air flow sensor from air duct. Check hot film for damage or dust.





Component Description

NIEC0059

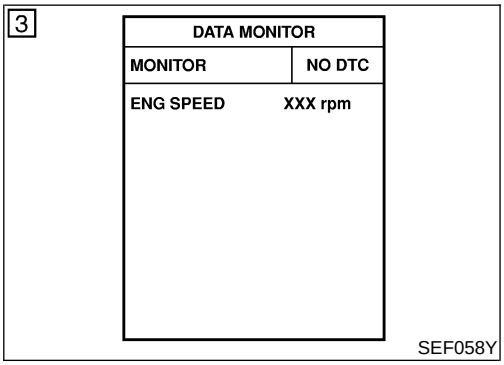
The absolute pressure sensor detects ambient barometric pressure and sends the voltage signal to the PCM. As the pressure increases, the voltage rises.

The absolute pressure sensor is located at the lower instrument panel right side.

On Board Diagnosis Logic

NIEC0060

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0105	An excessively low or high voltage from the sensor is sent to PCM.	• Harness or connectors (Absolute pressure sensor circuit is open or shorted.) • Absolute pressure sensor



DTC Confirmation Procedure

NIEC0061

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

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-187.

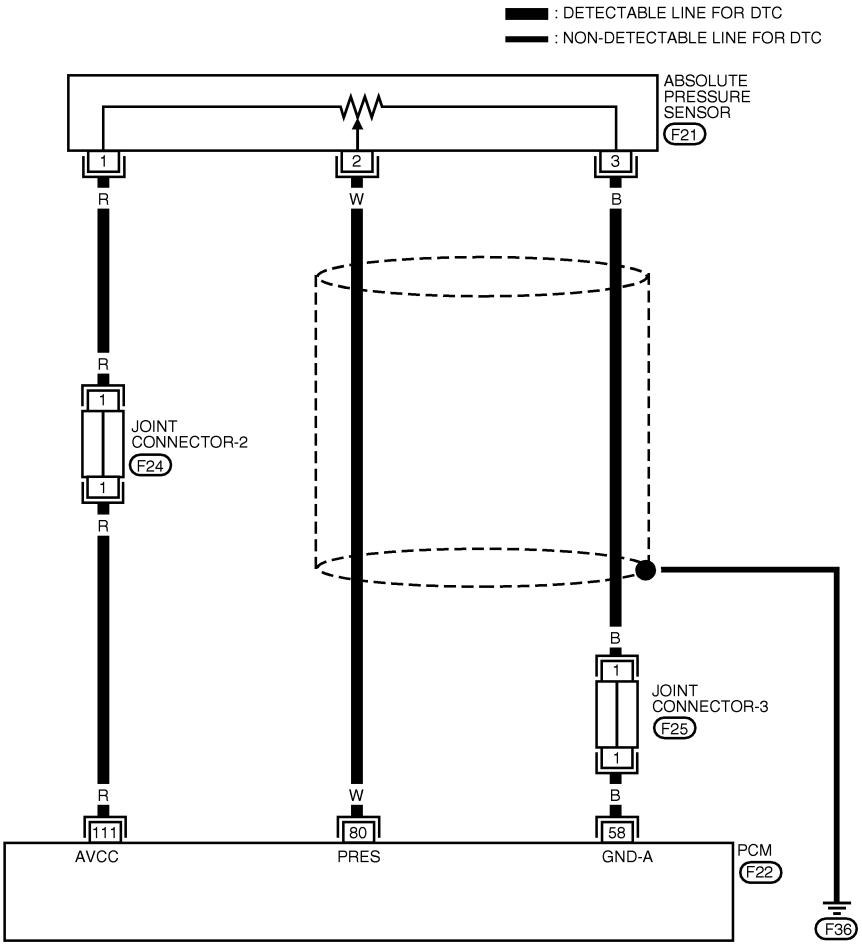
With GST

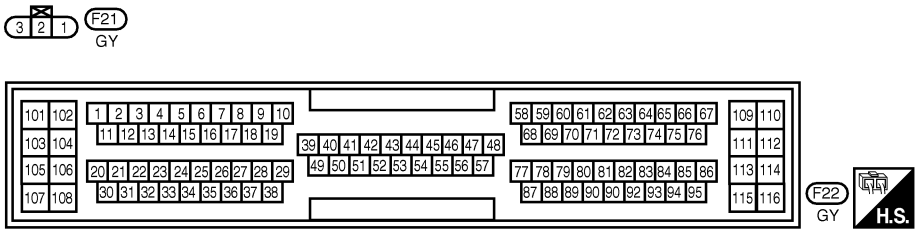
Follow the procedure “With CONSULT-II” above.

Wiring Diagram

NIEC0063

EC-AP/SEN-01





REFER TO THE FOLLOWING.
F24, F25 - JOINT CONNECTOR

LEC139

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

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

SEF173Z

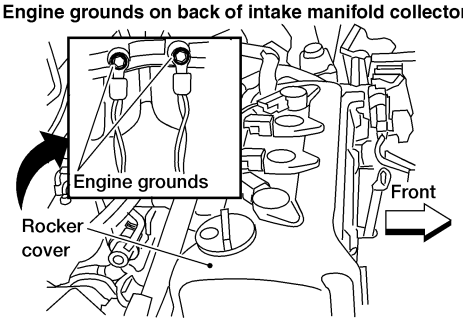
Diagnostic Procedure

NIEC0064

1	RETIGHTEN GROUND SCREWS

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

Engine grounds on back of intake manifold collector



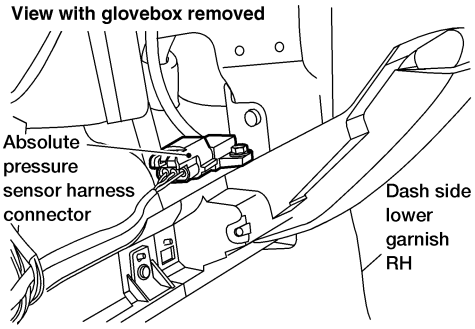
WEC249

▶	GO TO 2.

2	CHECK CONNECTOR

1. Disconnect absolute pressure sensor harness connector.

View with glovebox removed



LEC430

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

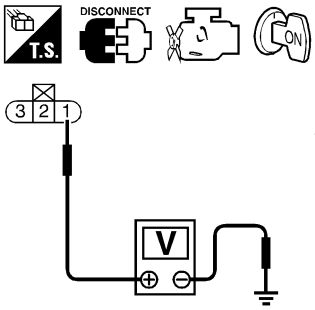
OK or NG

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

Diagnostic Procedure (Cont'd)

3	CHECK POWER SUPPLY

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



Voltage: Approximately 5V

SEF299X

OK or NG

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

4	DETECT MALFUNCTIONING PART

Check the following.
1. Joint connector-2
2. Harness open or short between PCM and absolute pressure sensor

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 GROUND CIRCUIT

1. Turn ignition switch "OFF".
2. Check harness continuity between absolute pressure sensor terminal 3 and engine ground.
   Refer to "Wiring Diagram", EC-186.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 6.

6	DETECT MALFUNCTIONING PART

Check the harness for open or short between PCM and absolute pressure sensor.

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

7	CHECK INPUT SIGNAL CIRCUIT

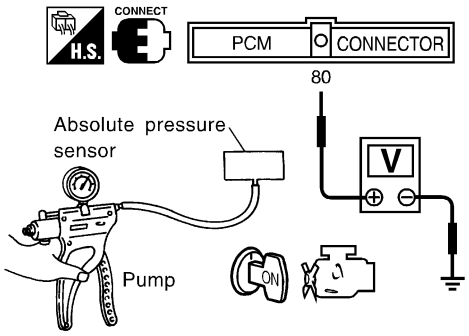
1. Disconnect PCM harness connector.
2. Check harness continuity between PCM terminal 80 and absolute pressure sensor terminal 2.
   Refer to "Wiring Diagram", EC-186.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

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 ABSOLUTE PRESSURE SENSOR

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



Applied vacuum kPa (mmHg, inHg)	Voltage V
Not applied	1.8 - 4.8
–26.7 (–200, –7.87)	1.0 to 1.4V lower than above value

SEF720Y

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.**

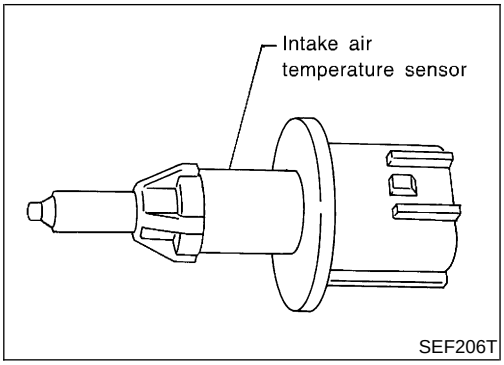
OK or NG

OK	▶	GO TO 9.
NG	▶	Replace absolute pressure sensor.

9	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-169.

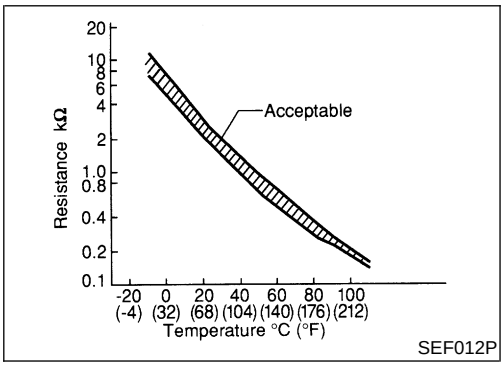
▶ **INSPECTION END**



Component Description

NIEC0066

The intake air temperature sensor is mounted to the air duct housing. The sensor detects intake air temperature and transmits a signal to the PCM.
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 PCM terminal 64 (Intake air temperature sensor) and ground.

CAUTION:
Do not use PCM ground terminals when measuring input/ output voltage. Doing so may lead to PCM's transistor damage. Use ground other than PCM, such as engine ground.

On Board Diagnosis Logic

NIEC0067

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

DTC Confirmation Procedure

NIEC0068

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

NOTE:
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 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

NIEC0068S01

With CONSULT-II

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-193.

With GST

Follow the procedure "With CONSULT-II" above.

PROCEDURE FOR MALFUNCTION B

NIEC0068S02

CAUTION:

Always drive vehicle at a safe speed.

TESTING CONDITION:

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

With CONSULT-II

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 more than 70 km/h (44 MPH) for 105 consecutive seconds.
6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-193.

With GST

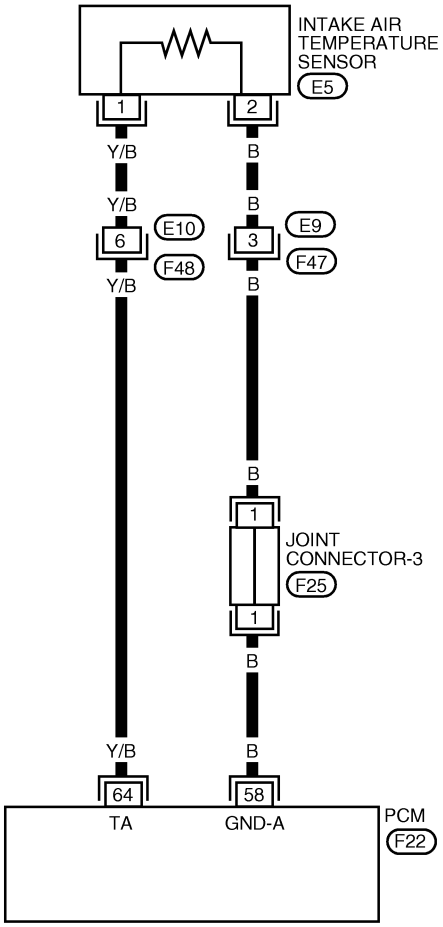
Follow the procedure "With CONSULT-II" above.

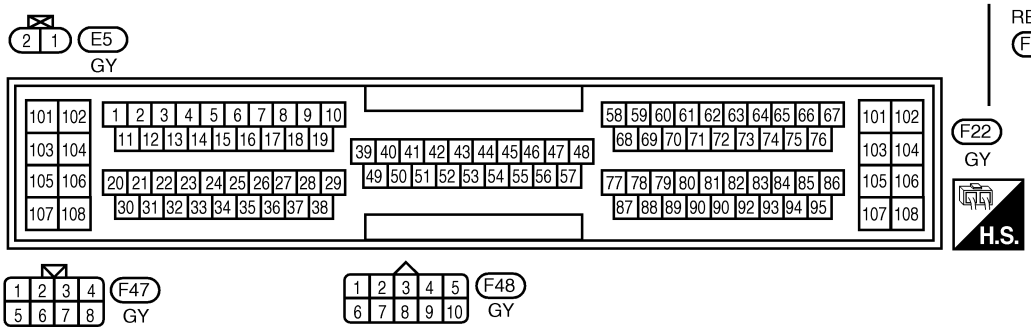
Wiring Diagram

NIEC0069

EC-IATS-01

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





REFER TO THE FOLLOWING.
F25 - JOINT CONNECTOR

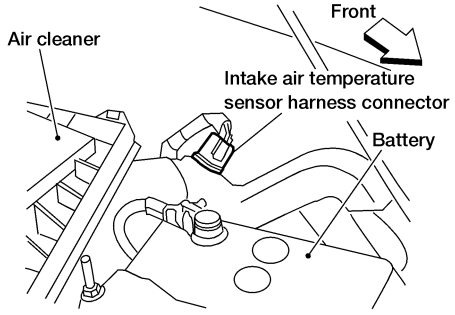
LEC151

Diagnostic Procedure

NIEC0070

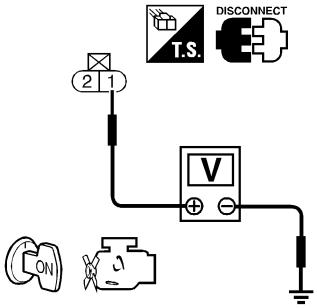
1	CHECK POWER SUPPLY

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



LEC243

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



Voltage: Approximately 5V

SEF301X

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E10, F48
- Harness for open or short between PCM and intake air temperature sensor

	▶	Repair harness or connectors.

3	CHECK GROUND CIRCUIT

1. Turn ignition switch “OFF”.
2. Check harness continuity between terminal 2 and engine ground.
   Refer to “Wiring Diagram”, EC-192.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

OK or NG

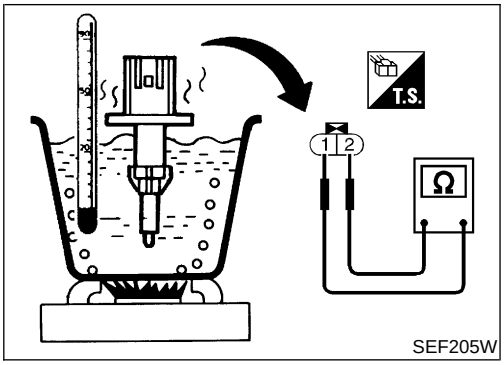
OK	▶	GO TO 5.
NG	▶	GO TO 4.

Diagnostic Procedure (Cont'd)

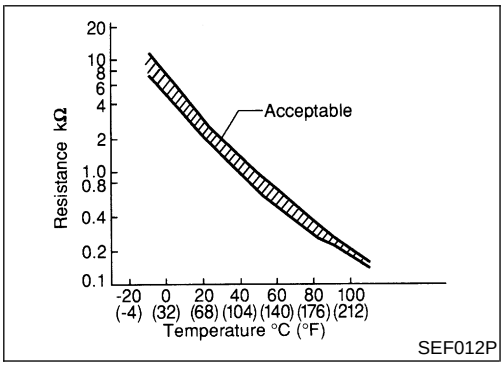
4	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E9, F47 ● Joint connector-3 ● Harness for open or short between PCM and intake air temperature sensor	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK INTAKE AIR TEMPERATURE SENSOR
Refer to "Component Inspection", EC-195.	
OK or NG	
OK ▶	GO TO 6.
NG ▶	Replace intake air temperature sensor.

6	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-169.	
▶	**INSPECTION END**



SEF205W



SEF012P

Component Inspection

=NIEC0071

INTAKE AIR TEMPERATURE SENSOR

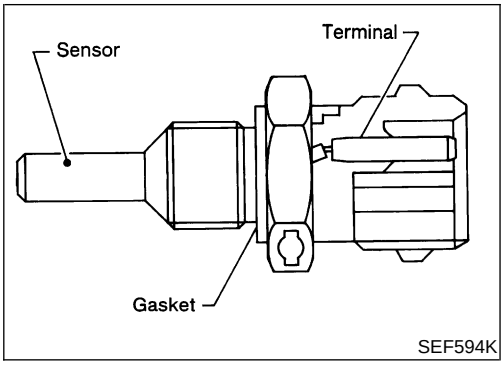
NIEC0071S01

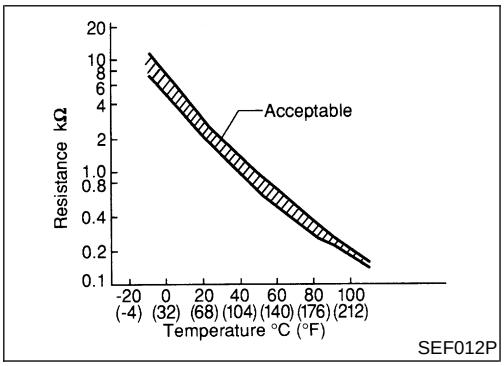
Check resistance as shown in the figure.

<Reference data>

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

If NG, replace intake air temperature sensor.





Component Description

NIEC0072

The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the PCM. The modified signal returns to the PCM 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 PCM terminal 70 (Engine coolant temperature sensor) and ground.

CAUTION:

Do not use PCM ground terminals when measuring input/ output voltage. Doing so may lead to PCM's transistor damage. Use ground other than PCM, such as engine ground.

CONSULT-II Reference Value in Data Monitor Mode

NIEC0073

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

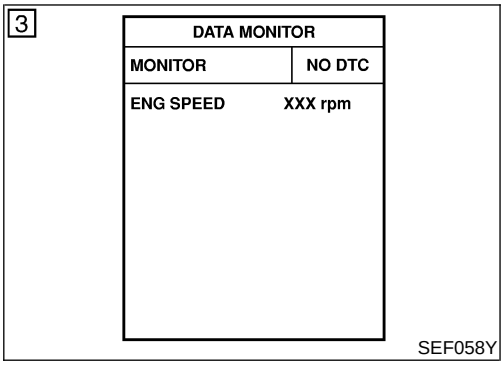
On Board Diagnosis Logic

NIEC0074

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

*: When this malfunction is detected, the PCM 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 PCM based on the time after turning ignition switch "ON" or "START". CONSULT-II displays the engine coolant temperature decided by PCM.	
	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)
	When the fail-safe system for engine coolant temperature sensor is activated, the cooling fan operates while the engine is running.	



DTC Confirmation Procedure

NIEC0075

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

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-199.

With GST

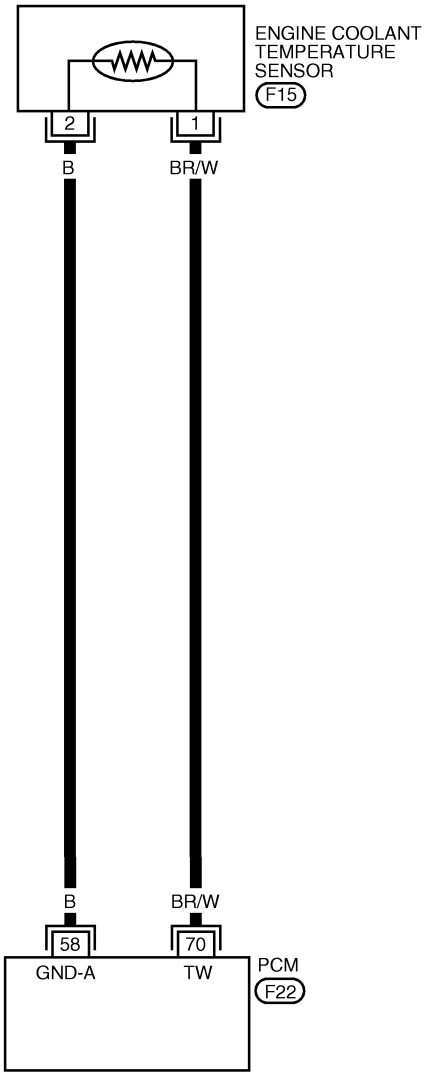
Follow the procedure "With CONSULT-II" above.

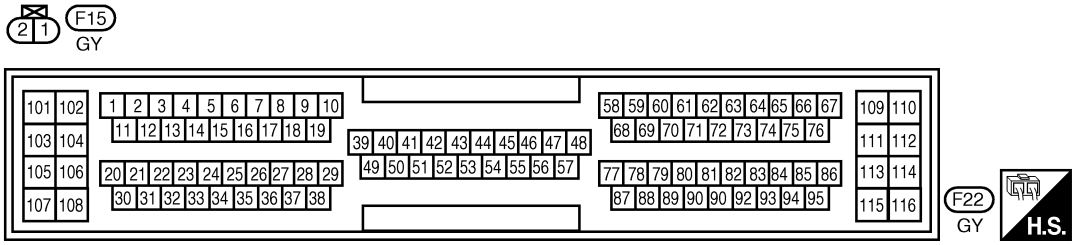
Wiring Diagram

NIEC0076

EC-ECTS-01

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





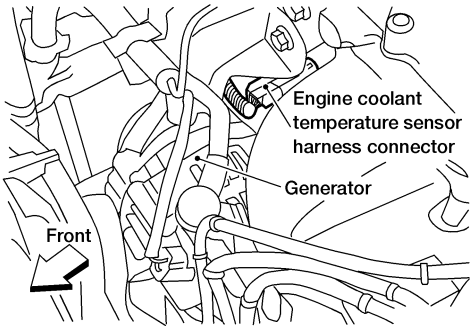
LEC137

Diagnostic Procedure

NIEC0077

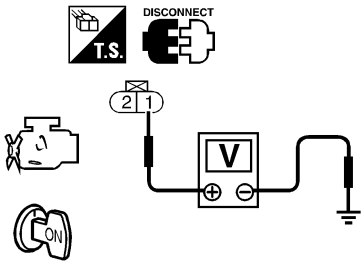
1	CHECK POWER SUPPLY

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



WEC251

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 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the harness for open or short between PCM and engine coolant temperature sensor.

	▶	Repair harness or connectors.

3	CHECK GROUND CIRCUIT

1. Turn ignition switch “OFF”.
2. Check harness continuity between ECTS terminal 2 and engine ground.
   Refer to “Wiring Diagram”, EC-198.
   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

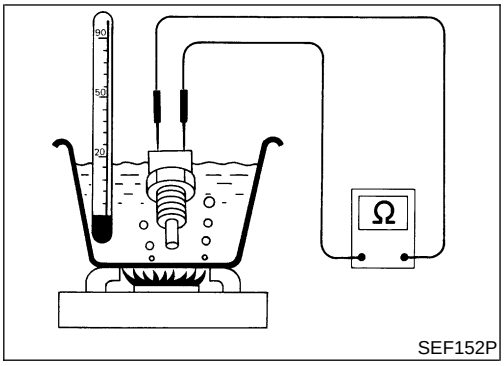
Check the harness for open or short between PCM and engine coolant temperature sensor.

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

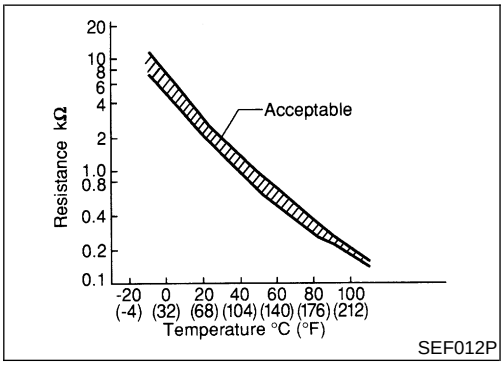
Diagnostic Procedure (Cont'd)

5	CHECK ENGINE COOLANT TEMPERATURE SENSOR	
Refer to "Component Inspection", EC-200.		
	OK or NG	
OK	▶	GO TO 6.
NG	▶	Replace engine coolant temperature sensor.

6	CHECK INTERMITTENT INCIDENT	
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-169.		
	▶	**INSPECTION END**



SEF152P



SEF012P

Component Inspection

NIEC0078

ENGINE COOLANT TEMPERATURE SENSOR

NIEC0078S01

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

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

If NG, replace engine coolant temperature sensor.

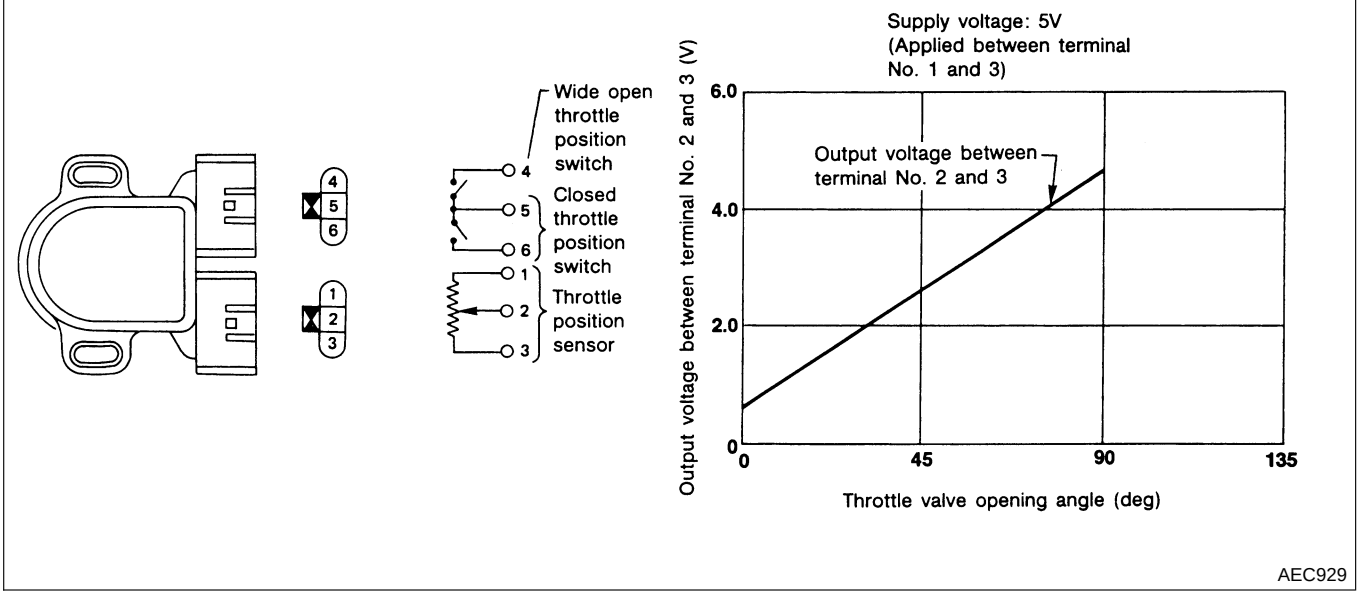
Component Description

NIEC0079

NOTE:
If DTC P0120 (0403) is displayed with DTC P0510 (0203), first perform trouble diagnosis for DTC P0510, EC-464.

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 PCM. In addition, the sensor detects the opening and closing speed of the throttle valve and feeds the voltage signal to the PCM.

Idle position of the throttle valve is determined by the PCM 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.



AEC929

CONSULT-II Reference Value in Data Monitor Mode

NIEC0080

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	0.0°
	• Engine: After warming up • Ignition switch: ON (Engine stopped)	Throttle valve: fully opened	Approx. 88.0%

On Board Diagnosis Logic

NIEC0082

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

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

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

DTC Confirmation Procedure

NIEC0083

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

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

PROCEDURE FOR MALFUNCTION A

NIEC0083S01

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 in the shop with the drive wheels lifted 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

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.

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

3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-207.

With GST

Follow the procedure "With CONSULT-II" above.

3

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

PROCEDURE FOR MALFUNCTION B

NIEC0083S02

With CONSULT-II

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.

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

4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-207.

With GST

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

NIEC0083S03

CAUTION:

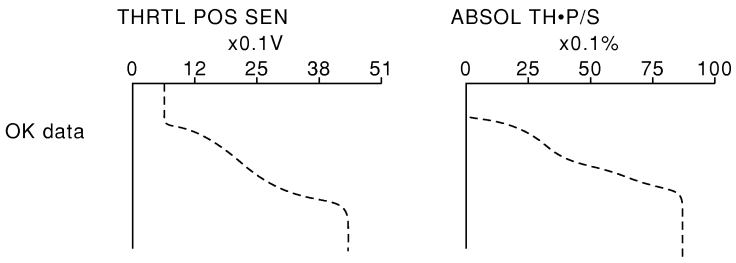
Always drive vehicle at a safe speed.

With CONSULT-II

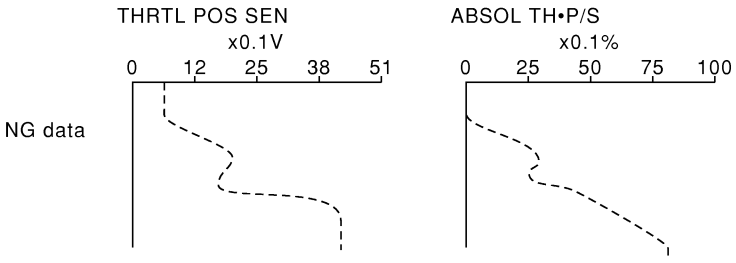
1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 10 seconds.
3) Turn ignition switch "ON".
4) Select "MANU TRIG" in "DATA MONITOR" mode with CONSULT-II.
5) Select "THRTL POS SEN" and "ABSOL TH·P/S" in "DATA MONITOR" mode with CONSULT-II.
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-207.
  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

SEF174Z

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

9

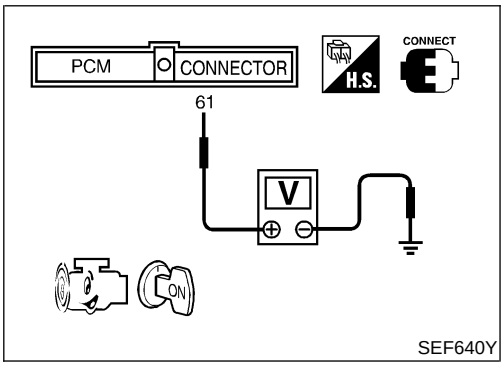
DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
COOLAN TEMP/S	XXX °C

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 3V
COOLAN TEMP/S	More than 70°C (158°F)
Selector lever	Suitable position
Driving location	Driving vehicle uphill (Increased engine load) will help maintain the driving conditions required for this test.

10) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-207.



With GST

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

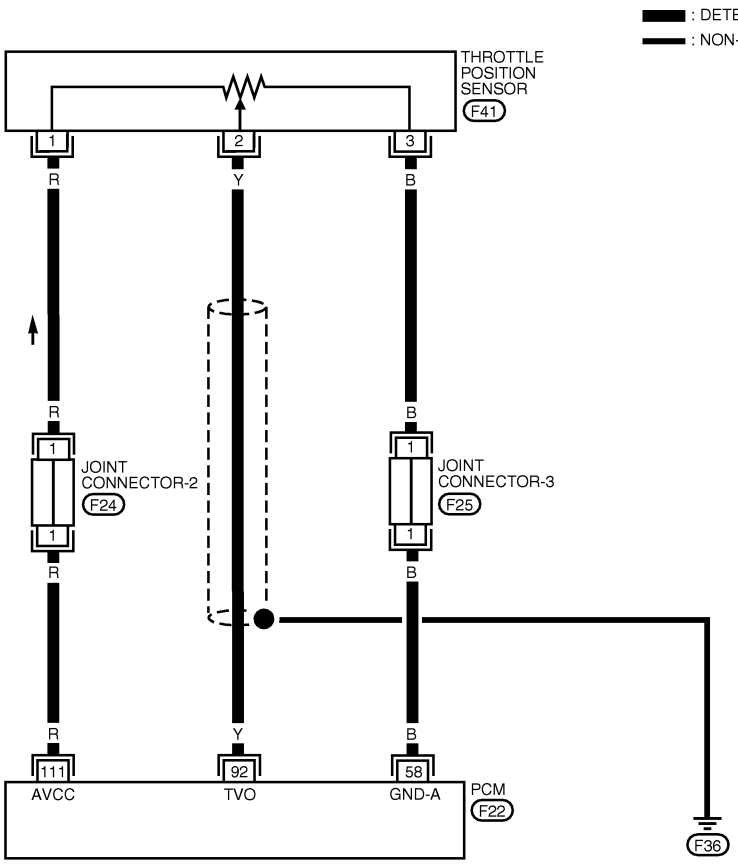
Gear position	Suitable position
Engine speed	More than 2,000 rpm
Engine coolant temperature	More than 70°C (158°F)
Voltage between PCM terminal 61 (Mass air flow sensor signal) and ground	More than 3V

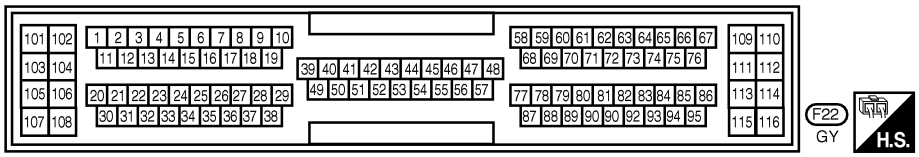
2) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-207.

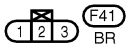
Wiring Diagram

NIEC0084

EC-TPS-01







REFER TO THE FOLLOWING.
F24 , F25 - JOINT CONNECTOR

LEC159

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

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
58	B	SENSOR'S GROUND	IGN ON	APPROX. 0V
92	Y	THROTTLE POSITION SENSOR	ENGINE RUNNING UNDER WARM-UP CONDITION WITH ACCELERATOR PEDAL FULLY RELEASED	0.2 - 0.8V
			IGN ON WITH ACCELERATOR PEDAL FULLY DEPRESSED	3.5 - 4.5V
111	R	SENSOR'S POWER SUPPLY	IGN ON	APPROX. 5V

SEF175Z

Diagnostic Procedure

NIEC0085

1	INSPECTION START

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

MALFUNCTION	Type
A	A
B	B
C	C

MTBL0066

Type A, B or C

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

2	ADJUST THROTTLE POSITION SENSOR

Perform “Basic Inspection”, EC-131.

OK or NG

OK	▶	GO TO 3.

3	CHECK INTAKE SYSTEM

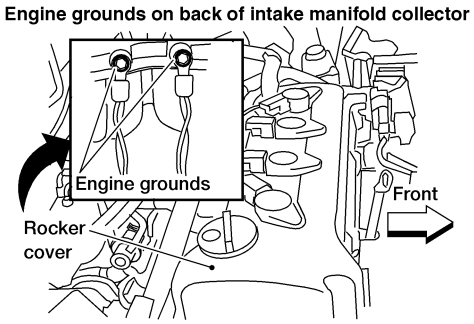
Check the following connections.
- Air duct
- Vacuum hoses
- Intake air passage between air duct to intake manifold collector

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.



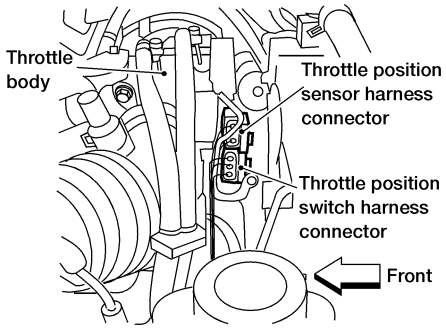
WEC249

	▶	GO TO 5.

Diagnostic Procedure (Cont'd)

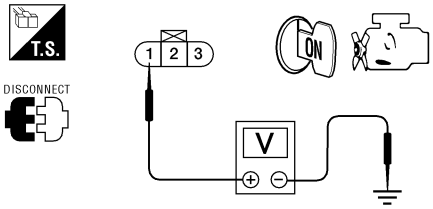
5	CHECK POWER SUPPLY

1. Disconnect throttle position sensor harness connector.



WEC244

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



Voltage: Approximately 5V

LEC433

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 6.

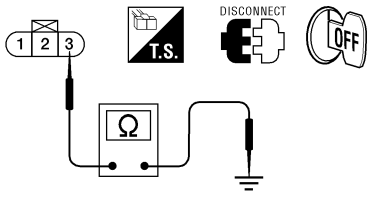
6	DETECT MALFUNCTIONING PARTS

Check the following.
- Joint connector-3
- Harness for open or short between throttle position sensor and PCM

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

7	CHECK GROUND CIRCUIT

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



Continuity should exist.

LEC434

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

OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 8.

8	DETECT MALFUNCTIONING PART
Check the following. ● Joint connector-2 ● Harness for open or short between PCM and throttle position sensor	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

9	CHECK INPUT SIGNAL CIRCUIT
1. Disconnect PCM harness connector. 2. Check harness continuity between PCM terminal 92 and throttle position sensor terminal 2. Refer to the "Wiring Diagram", EC-206. **Continuity should exist.** 3. Also check harness for short to ground and short to power.	
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 THROTTLE POSITION SENSOR
Refer to "Component Inspection", EC-211.	
OK or NG	
OK (Type B in step1) ▶	GO TO 11.
OK (Type A or C in step1) ▶	GO TO 14.
NG ▶	Replace throttle position sensor. To adjust it, perform "Basic Inspection", EC-131.

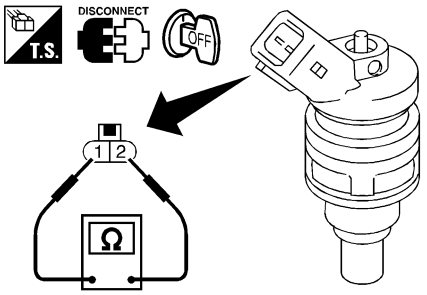
11	CHECK MASS AIR FLOW SENSOR
Refer to "Component Inspection", EC-184.	
OK or NG	
OK ▶	GO TO 12.
NG ▶	Replace mass air flow sensor.

12	CHECK CAMSHAFT POSITION SENSOR (PHASE)
Refer to "Component Inspection", EC-368.	
OK or NG	
OK ▶	GO TO 13.
NG ▶	Replace camshaft position sensor (PHASE).

Diagnostic Procedure (Cont'd)

13	CHECK FUEL INJECTOR

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



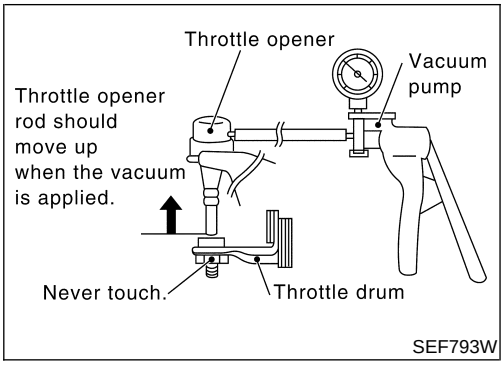
Resistance: 13.5 - 17.5 Ω [at 20°C (68°F)]

SEF964XA

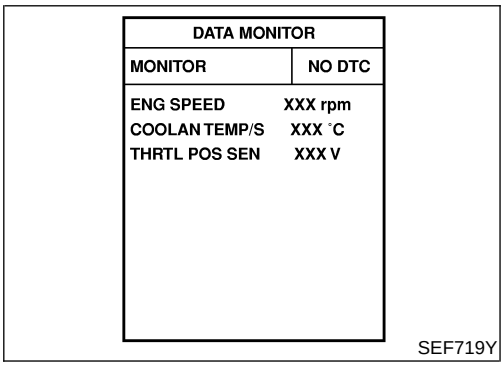
OK or NG

OK	▶	GO TO 14.
NG	▶	Replace fuel injector.

14	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-169.	
▶	**INSPECTION END**



SEF793W



SEF719Y

Component Inspection

=NIEC0086

THROTTLE POSITION SENSOR

NIEC0086S01

With CONSULT-II

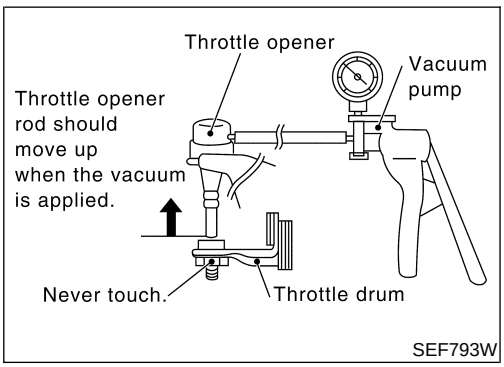
1) Start engine and warm it up to normal operating temperature.
2) Stop engine (ignition switch OFF).
3) Remove the vacuum hose connected to the throttle opener.
4) Connect suitable vacuum hose to the vacuum pump and the opener.
5) Apply vacuum [more than −40.0 kPa (−300 mmHg, –11.81 inHg)] until the throttle drum becomes free from the rod of the throttle opener.
6) Turn ignition switch ON.
7) Select “DATA MONITOR” mode with CONSULT-II.
8) Check voltage of “THRTL POS SEN” under the following conditions.

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

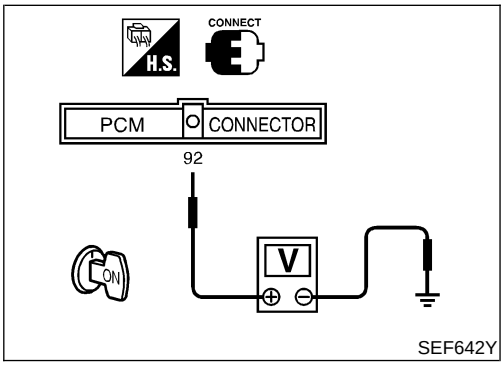
Throttle valve conditions	Voltage V
Completely closed	0.15 - 0.85 (a)
Partially open	Between (a) and (b)
Completely open	3.5 - 4.7 (b)

If NG, adjust closed throttle position switch. Refer to “Basic Inspection”, EC-131.

9) If it is impossible to adjust closed throttle position switch in “Basic Inspection”, replace throttle position sensor.



SEF793W



SEF642Y

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.
6) Turn ignition switch ON.
7) Check voltage between PCM terminal 92 (Throttle position sensor signal) and ground under the following conditions.

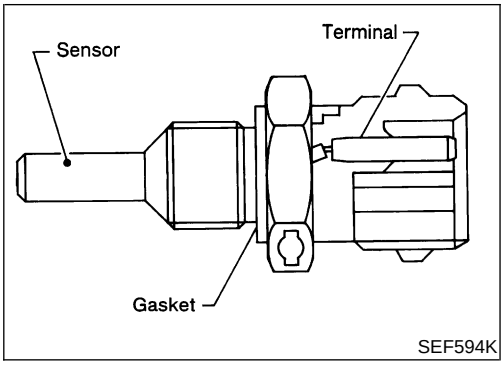
NOTE:
Voltage measurement must be made with throttle position sensor installed in vehicle.

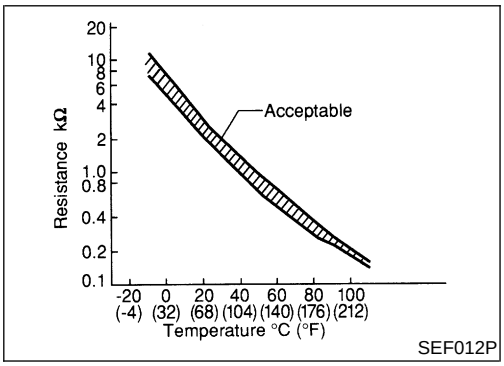
Throttle valve conditions	Voltage V
Completely closed	0.15 - 0.85 (a)
Partially open	Between (a) and (b)
Completely open	3.5 - 4.7 (b)

Component Inspection (Cont'd)

If NG, adjust closed throttle position switch. Refer to "Basic Inspection", EC-131.

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





Component Description

NIEC0087

NOTE:
If DTC P0125 (0908) is displayed with P0115 (0103), first perform trouble diagnosis for DTC P0115, EC-196.

The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the PCM. The modified signal returns to the PCM 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 PCM terminal 70 (Engine coolant temperature sensor) and ground.

CAUTION:
Do not use PCM ground terminals when measuring input/output voltage. Doing so may lead to PCM's transistor damage. Use ground other than PCM, such as engine ground.

CONSULT-II Reference Value in Data Monitor Mode

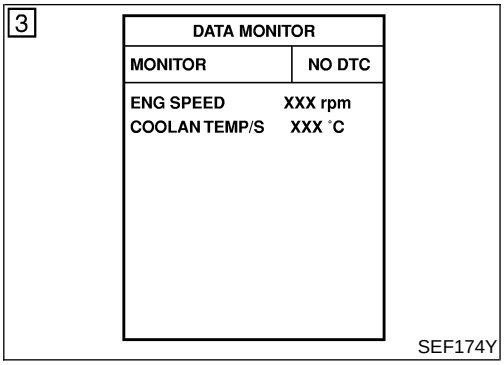
NIEC0088

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

On Board Diagnosis Logic

NIEC0089

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



DTC Confirmation Procedure

=NIEC0090

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

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-216.

With GST

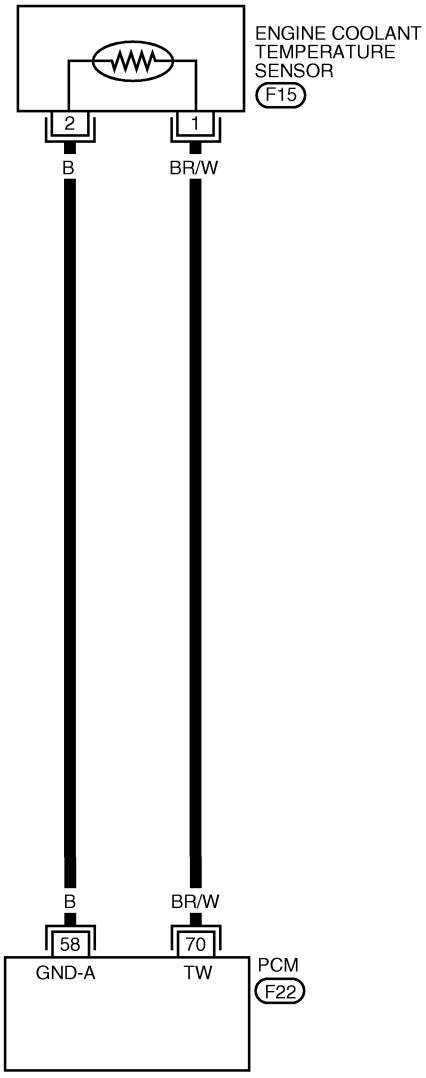
Follow the procedure “With CONSULT-II” above.

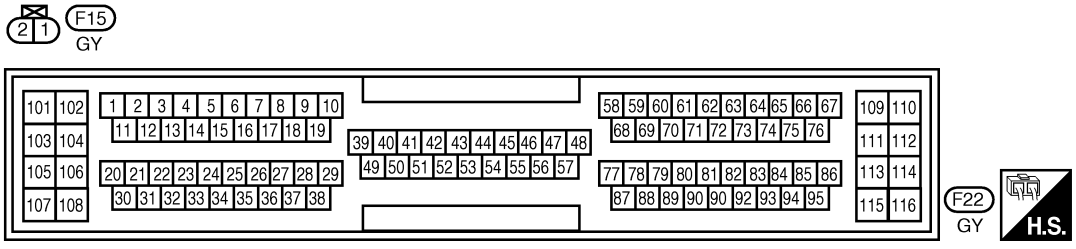
Wiring Diagram

NIEC0091

EC-ECTS-01

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





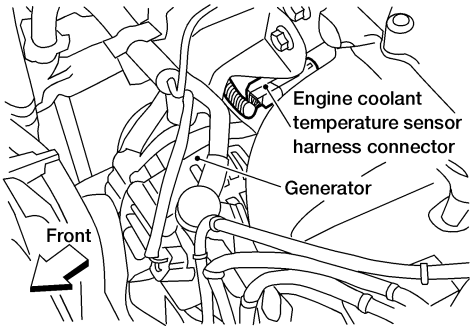
LEC137

Diagnostic Procedure

NIEC0092

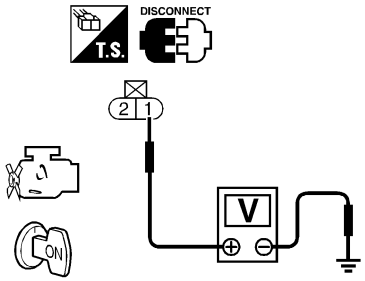
1	CHECK POWER SUPPLY

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



WEC251

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 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the harness for open or short between PCM and engine coolant temperature sensor.

	▶	Repair harness or connectors.

3	CHECK GROUND CIRCUIT

1. Turn ignition switch “OFF”.
2. Check harness continuity between ECTS terminal 2 and engine ground.
   Refer to the “Wiring Diagram”, EC-215.
   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

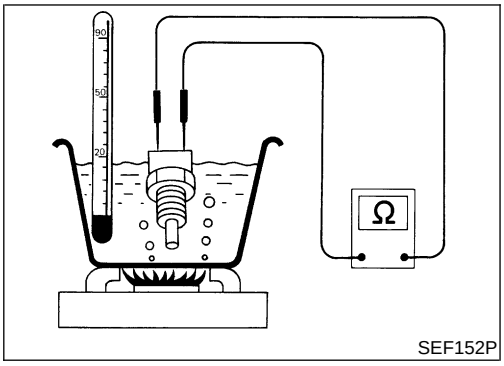
Check the harness for open or short between PCM and engine coolant temperature sensor.

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

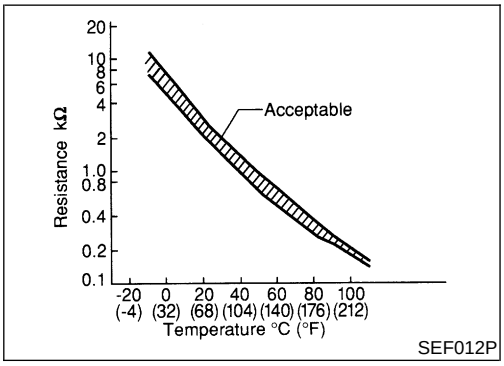
5	CHECK ENGINE COOLANT TEMPERATURE SENSOR	
Refer to "Component Inspection", EC-217.		
OK or NG		
OK	▶	GO TO 6.
NG	▶	Replace engine coolant temperature sensor.

6	CHECK THERMOSTAT OPERATION	
When the engine is cooled [lower than 82°C (180°F)], grasp lower radiator hose and confirm the engine coolant does not flow.		
OK or NG		
OK	▶	GO TO 7.
NG	▶	Repair or replace thermostat. Refer to ***LC-13***, "Thermostat".

7	CHECK INTERMITTENT INCIDENT	
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-169.		
	▶	**INSPECTION END**



SEF152P



SEF012P

Component Inspection

ENGINE COOLANT TEMPERATURE SENSOR

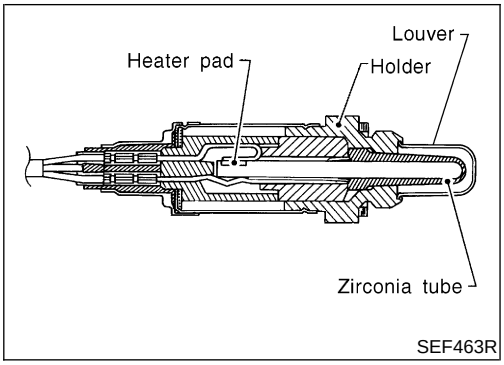
NIEC0093

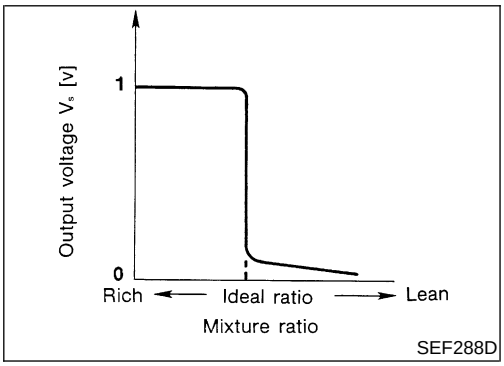
NIEC0093S01

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

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

If NG, replace engine coolant temperature sensor.





Component Description

NIEC0094

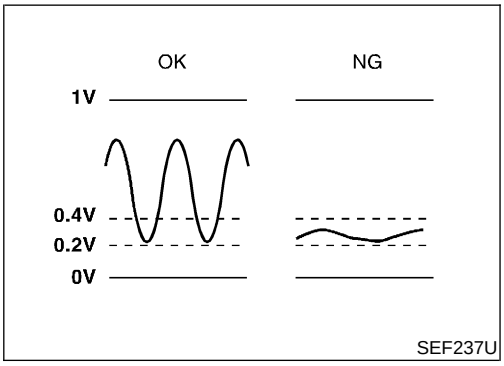
The heated oxygen sensor 1 (front) is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 (front) has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 (front) signal is sent to the PCM. The PCM 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

NIEC0095

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1)/(B2)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1)/(B2)			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.

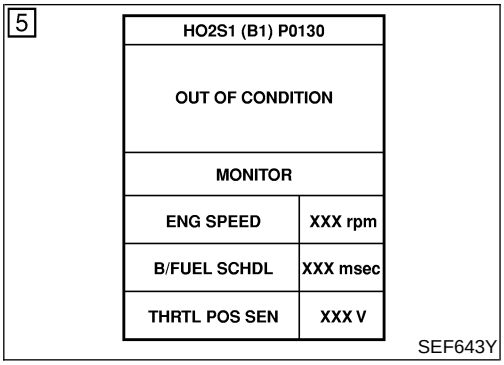


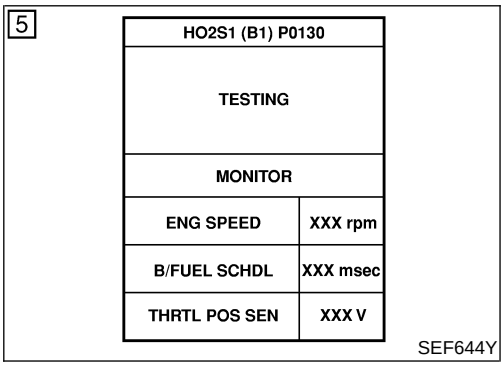
On Board Diagnosis Logic

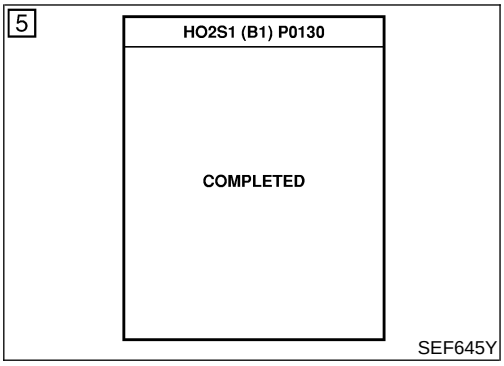
NIEC0097

Under the condition in which the heated oxygen sensor 1 (front) signal is not input, the PCM circuits will read a continuous approximately 0.3V. Therefore, for this diagnosis, the time that output voltage is within 200 to 400 mV range is monitored, and the diagnosis checks that this time is not inordinately long.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0130	• The voltage from the sensor is constantly approx. 0.3V.	• Harness or connectors (The sensor circuit is open or shorted.) • Heated oxygen sensor 1 (front)
P0150		







DTC Confirmation Procedure

NIEC0098

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

1) Start engine and warm it up to normal operating temperature.
2) Select "HO2S1 (B1)/(B2), P0130 (P0150)" of "HO2S1 (B1)/(B2)" in "DTC WORK SUPPORT" mode with CONSULT-II.
3) Touch "START".
4) Let it idle for at least 3.5 minutes.

NOTE:

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

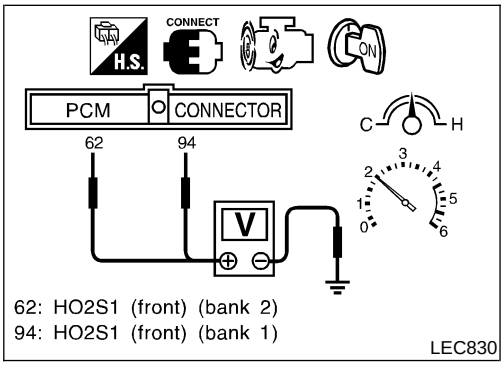
5) When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take approximately 10 to 60 seconds.)

ENG SPEED	1,600 - 3,400 rpm (A/T) 1,900 - 4,100 rpm (M/T)
Vehicle speed	64 - 130 km/h (40 - 81 MPH)
B/FUEL SCHDL	2.4 - 12.5 msec (A/T) 2.8 - 10 msec (M/T)
Selector lever	Suitable position

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

6) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-223.

During this test, P1148, P1168 may be displayed on CONSULT-II screen.



Overall Function Check

NIEC0099

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

With GST

1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between PCM terminal 62 (HO2S1 bank 2 signal) or 94 (HO2S1 bank 1) 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-223.

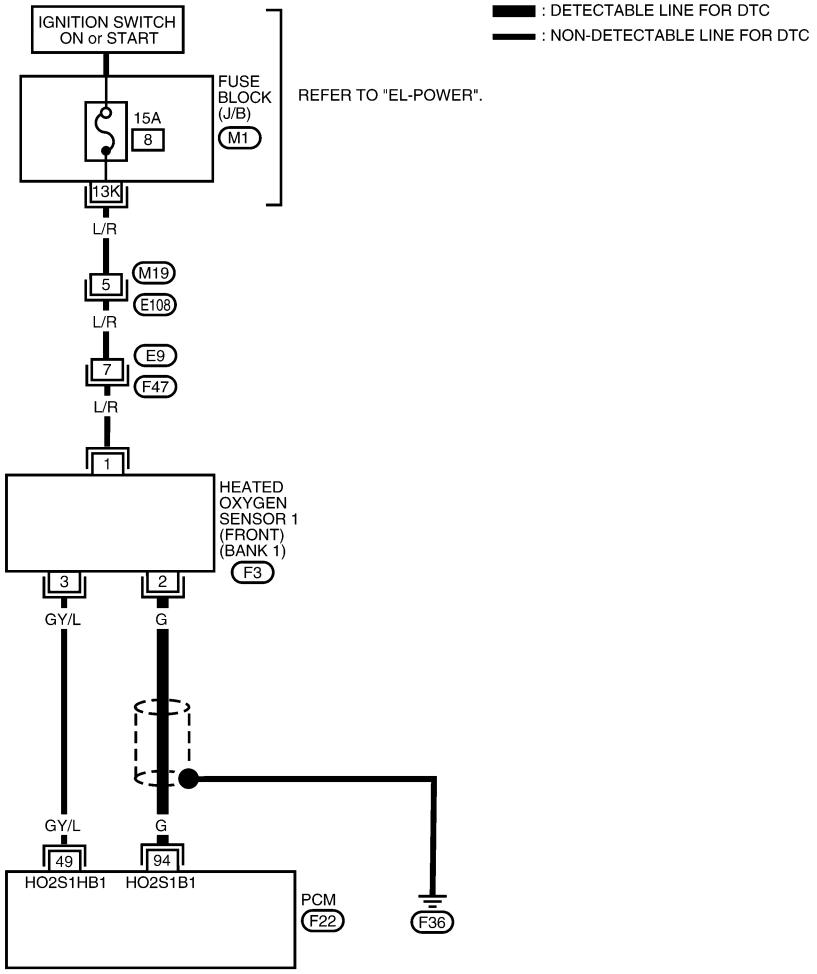
Wiring Diagram

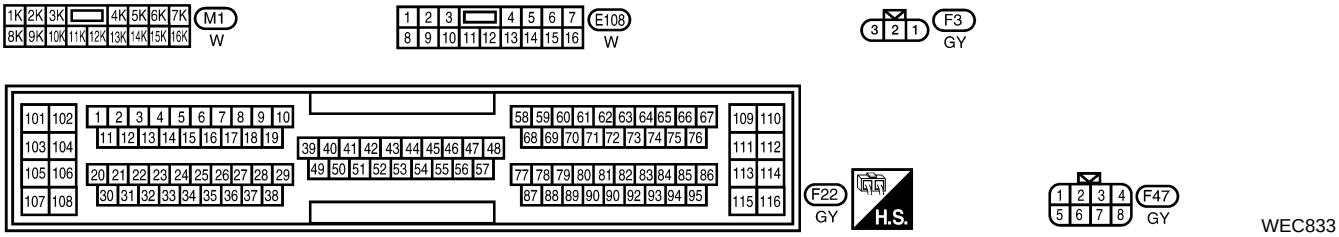
=NIEC0100

BANK 1

NIEC0100S03

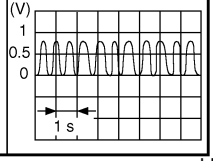
EC-O2S1B1-01





WEC833

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

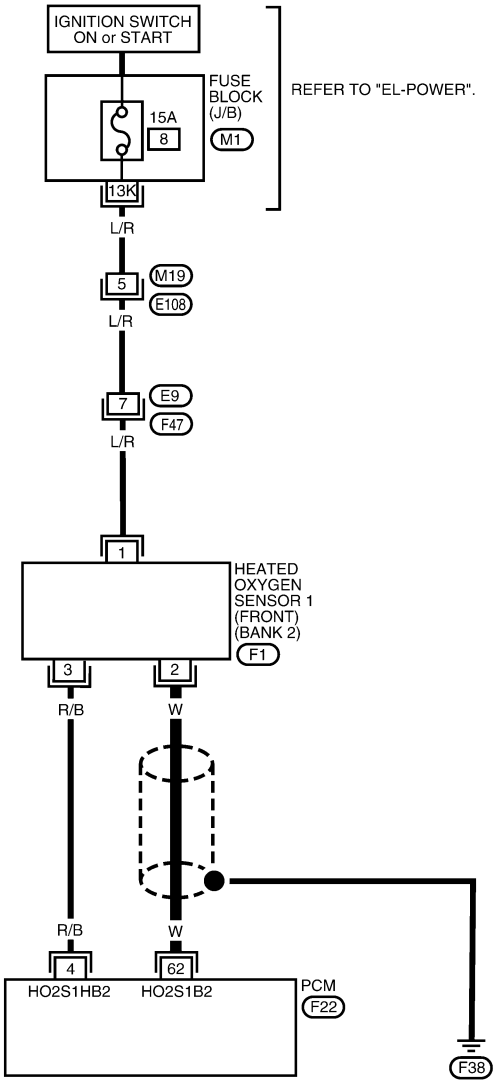
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
94	G	HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)	ENGINE RUNNING AT 2,000 RPM AFTER WARMING UP TO NORMAL OPERATING TEMPERATURE	0 - APPROX. 1.0V 

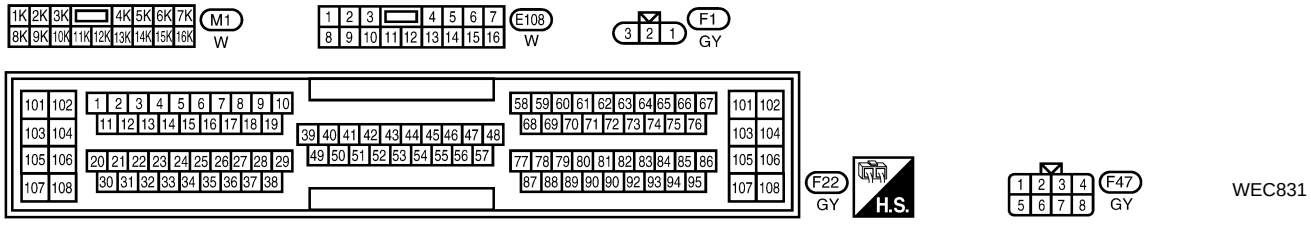
LEC834

Wiring Diagram (Cont'd)

BANK 2

NIEC0100S04





WEC831

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

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
62	W	HEATED OXYGEN SENSOR 1 (FRONT) (BANK 2)	ENGINE RUNNING AT 2,000 RPM AFTER WARMING UP TO NORMAL OPERATING TEMPERATURE	0 - APPROX. 1.0V

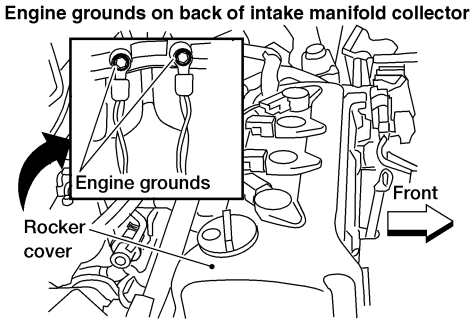
LEC832

Diagnostic Procedure

NIEC0101

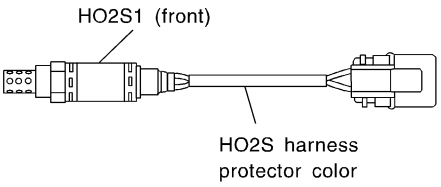
1	INSPECTION START

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



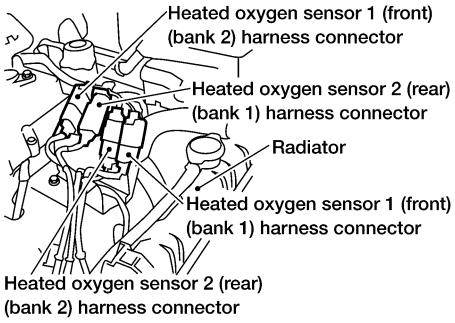
WEC249

3. Check the HO2S1 (front) harness protector color, and disconnect the corresponding heated oxygen sensor 1 (front) harness connector.



HO2S1 (front) (bank 1): Black
HO2S1 (front) (bank 2): Blue

LEC646



WEC835

▶	GO TO 2.

Diagnostic Procedure (Cont'd)

2	CHECK INPUT SIGNAL CIRCUIT

1. Disconnect PCM harness connector.
2. Check harness continuity between PCM terminal and HO2S1 (front) as follows. Refer to "Wiring Diagram", EC-221.

DTC	Terminals		Bank
	PCM or Sensor	Sensor	
P0130	62	2	2
P0150	94	2	1

LEC836

Continuity should exist.

3. Check harness continuity between PCM terminal or HO2S1 (front) and ground as follows. Refer to "Wiring Diagram", EC-221.

DTC	Terminals		Bank
	PCM or Sensor	Ground	
P0130	62 or 2	Ground	2
P0150	94 or 2	Ground	1

LEC837

Continuity should not exist.

4. Also check harness for short to power.

OK or NG

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

3	CHECK HEATED OXYGEN SENSOR 1 (FRONT)

Refer to "Component Inspection", EC-225.

OK or NG

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

4	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-169.

▶ **INSPECTION END**

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S1 MNTR (B1)	LEAN

SEF646Y

Bank 1

cycle	1	2	3	4	5
HO2S1 MNTR (B1)	R-L	R-L	R-L	R-L	R-L

Bank 2

cycle	1	2	3	4	5
HO2S1 MNTR (B2)	R-L	R-L	R-L	R-L	R-L

R means HO2S1 MNTR (B1)/(B2) indicates RICH

L means HO2S1 MNTR (B1)/(B2) indicates LEAN

SEF647Y

Component Inspection

=NIEC0102

HEATED OXYGEN SENSOR 1 (FRONT)

NIEC0102S01

With CONSULT-II

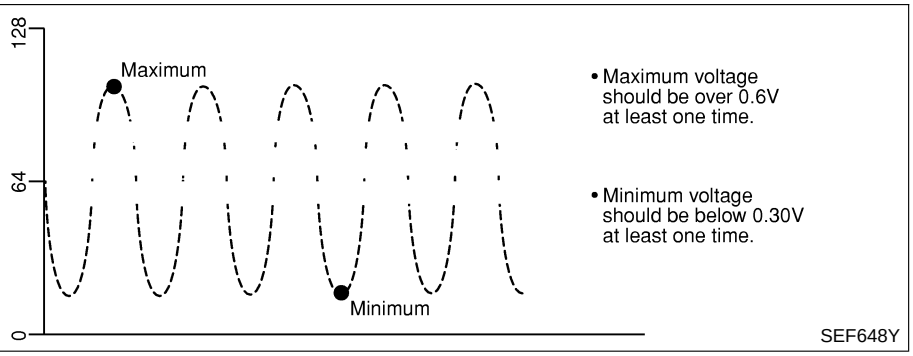
1) Start engine and warm it up to normal operating temperature.
2) Select “MANU TRIG” in “DATA MONITOR” mode, and select “HO2S1 (B1)/(B2)” and “HO2S1 MNTR (B1)/(B2)”.
3) Hold engine speed at 2,000 rpm under no load during the following steps.
4) Touch “RECORD” on CONSULT-II screen.
5) Check the following.

- “HO2S1 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:
  R = “HO2S1 MNTR (B1)/(B2)”, “RICH”
  L = “HO2S1 MNTR (B1)/(B2)”, “LEAN”
- “HO2S1 (B1)/(B2)” voltage goes above 0.6V at least once.
- “HO2S1 (B1)/(B2)” voltage goes below 0.3V at least once.
- “HO2S1 (B1)/(B2)” voltage never exceeds 1.0V.

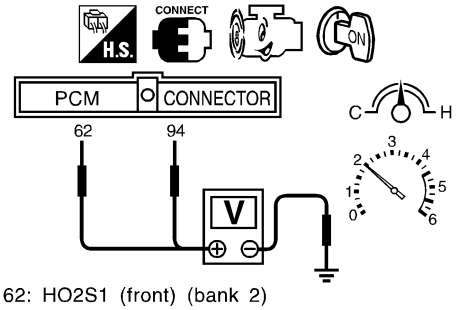
CAUTION:

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

Trigger	ENG SPEED	HO2S1 (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



SEF648Y



62: HO2S1 (front) (bank 2)
94: HO2S1 (front) (bank 1)

LEC830

Without CONSULT-II

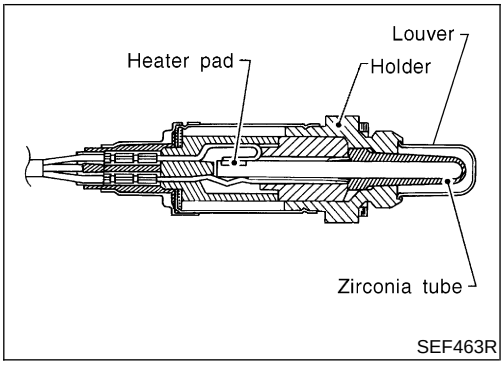
1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between PCM terminal 62 (HO2S1 bank 2) or 94 (HO2S1 bank 1) and engine ground.
3) Check the following with engine speed held at 2,000 rpm constant under no load.

- The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than five 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

- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is below 0.3V at least one time.
- The voltage never exceeds 1.0V.

CAUTION:

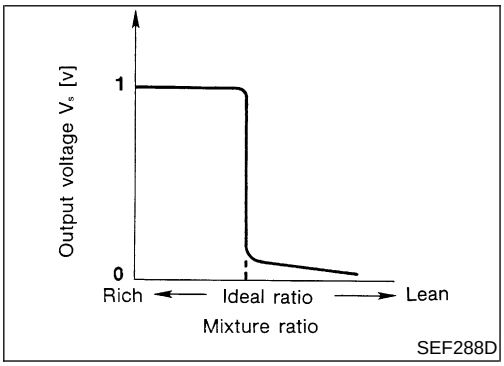
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**



Component Description

NIEC0103

The heated oxygen sensor 1 (front) is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 (front) 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 heated oxygen sensor 1 (front) signal is sent to the PCM. The PCM 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.

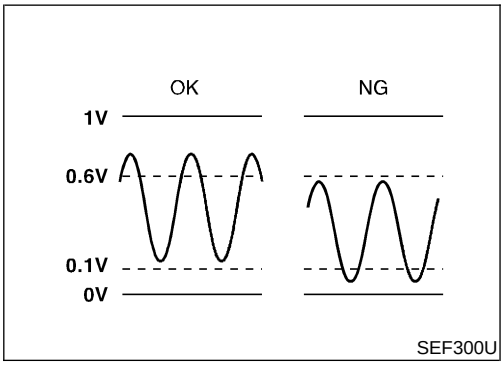


CONSULT-II Reference Value in Data Monitor Mode

NIEC0104

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1)/(B2)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1)/(B2)			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.

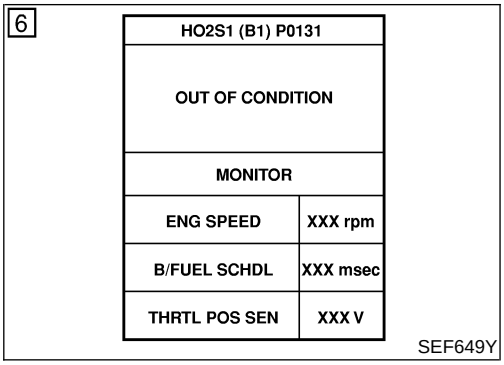


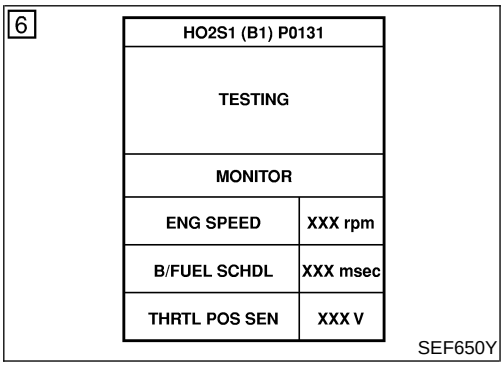
On Board Diagnosis Logic

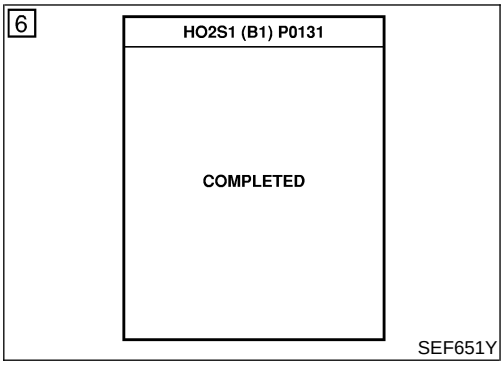
NIEC0106

To judge the malfunction, the output from the heated oxygen sensor 1 (front) is monitored to determine whether the “rich” output is sufficiently high and whether the “lean” output is sufficiently low. When both the outputs are shifting to the lean side, the malfunction will be detected.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0131 P0151	• The maximum and minimum voltages from the sensor are not reached to the specified voltages.	• Heated oxygen sensor 1 (front) • Heated oxygen sensor heater 1 (front) • Fuel pressure • Injectors • Intake air leaks







DTC Confirmation Procedure

NIEC0107

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

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 "HO2S1 (B1)/(B2) P0131 (P0151)" of "HO2S1 (B1)/(B2)" in "DTC WORK SUPPORT" mode with CONSULT-II.
4) Touch "START".
5) Start engine and let it idle for at least 3.5 minutes.

NOTE:

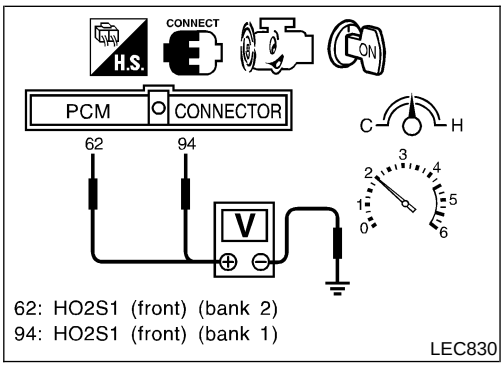
Never raise engine speed above 3,600 rpm after this step. If the engine speed limit is exceeded, return to step 5.

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 20 seconds or more.)

ENG SPEED	1,350 - 2,700 rpm (A/T) 1,450 - 3,200 rpm (M/T)
Vehicle speed	50 - 100 km/h (31 - 62 MPH)
B/FUEL SCHDL	2.6 - 12.5 msec (A/T) 2.4 - 10.0 msec (M/T)
Selector lever	Suitable position

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

7) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-229.



Overall Function Check

NIEC0108

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

With GST

1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between PCM terminal 62 (HO2S1 bank 2) or 94 (HO2S1 bank 1) and engine ground.
3) Check the following with engine speed held at 2,000 rpm constant under no load.

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

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

4) If NG, go to "Diagnostic Procedure", EC-229.

Diagnostic Procedure

NIEC0109

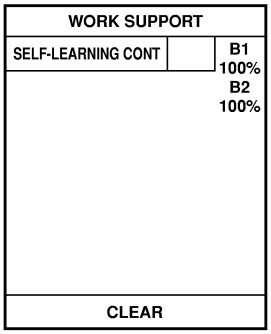
1	RETIGHTEN HEATED OXYGEN SENSOR 1 (FRONT)
1. Turn ignition switch "OFF". 2. Loosen and retighten the corresponding heated oxygen sensor 1 (front). **Tightening torque:** **40 - 60 N·m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)**	
▶	GO TO 2.

Diagnostic Procedure (Cont'd)

2	CLEAR THE SELF-LEARNING DATA.

With CONSULT-II

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

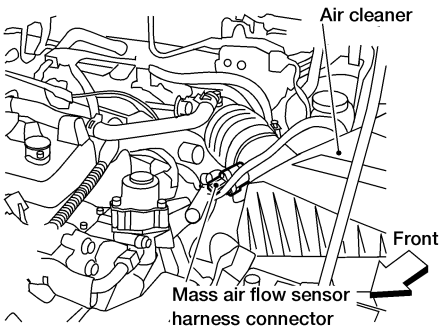


SEF652Y

4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 (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 3 seconds at idle speed.



WEC250

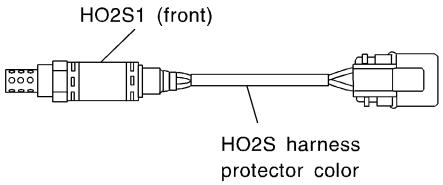
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC P0100 is displayed.
6. Erase the 1st trip DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-98.
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 (P0174) detected? Is it difficult to start engine?

Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0171 (P0174). Refer to EC-306.
No	▶	GO TO 3.

3	CHECK HEATED OXYGEN SENSOR 1 HEATER (FRONT)

1. Turn ignition switch "OFF".
2. Check the HO2S1 (front) harness protector color, and disconnect the corresponding HO2S1 (front) harness connector.



HO2S1 (front) (bank 1): Black
HO2S1 (front) (bank 2): Blue

LEC646

3. Check HO2S1 heater (front), refer to EC-264.

OK or NG

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

4	CHECK HEATED OXYGEN SENSOR 1 (FRONT)

Refer to "Component Inspection", EC-231.

OK or NG

OK	▶	GO TO 5.
NG	▶	Replace corresponding heated oxygen sensor 1.

5	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-169.
Refer to "Wiring Diagram", EC-221, for circuit.

	▶	**INSPECTION END**

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S1 MNTR (B1)	LEAN

SEF646Y

Bank 1

cycle	1	2	3	4	5
HO2S1 MNTR (B1)	R-L	R-L	R-L	R-L	R-L

Bank 2

cycle	1	2	3	4	5
HO2S1 MNTR (B2)	R-L	R-L	R-L	R-L	R-L

R means HO2S1 MNTR (B1)/(B2) indicates RICH
L means HO2S1 MNTR (B1)/(B2) indicates LEAN

SEF647Y

Component Inspection

NIEC0110

HEATED OXYGEN SENSOR 1 (FRONT)

NIEC0110S02

With CONSULT-II

1) Start engine and warm it up to normal operating temperature.
2) Select "MANU TRIG" in "DATA MONITOR" mode, and select "HO2S1 (B1)/(B2)" and "HO2S1 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.
5) Check the following.

- "HO2S1 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:
  R = "HO2S1 MNTR (B1)/(B2)", "RICH"
  L = "HO2S1 MNTR (B1)/(B2)", "LEAN"
- "HO2S1 (B1)/(B2)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)/(B2)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)/(B2)" voltage never exceeds 1.0V.

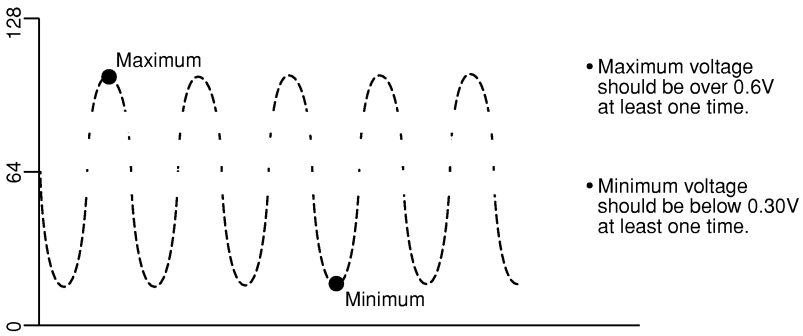
CAUTION:

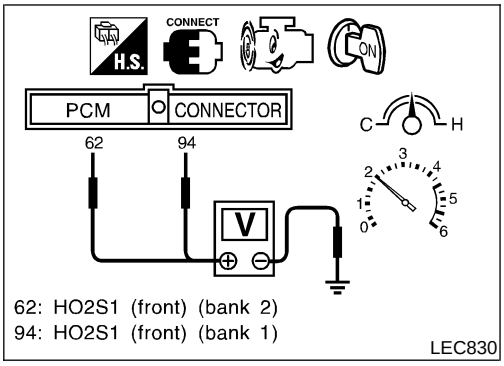
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**

Component Inspection (Cont'd)

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

Trigger	ENG SPEED	HO2S1 (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





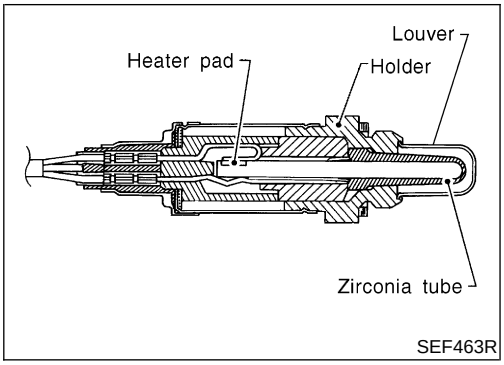
Without CONSULT-II

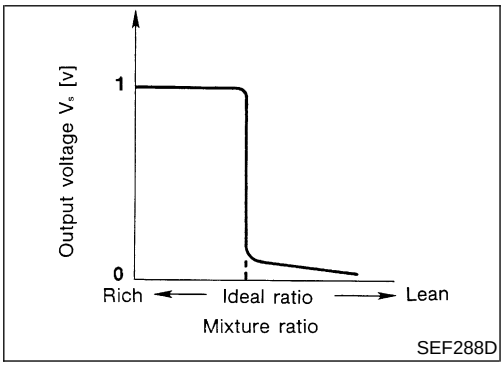
1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between PCM terminal 62 (HO2S1 bank 2) or 94 (HO2S1 bank 1) and engine ground.
3) Check the following with engine speed held at 2,000 rpm constant under no load.

- The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than five 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
- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is below 0.3V at least one time.
- The voltage never exceeds 1.0V.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**





Component Description

NIEC0111

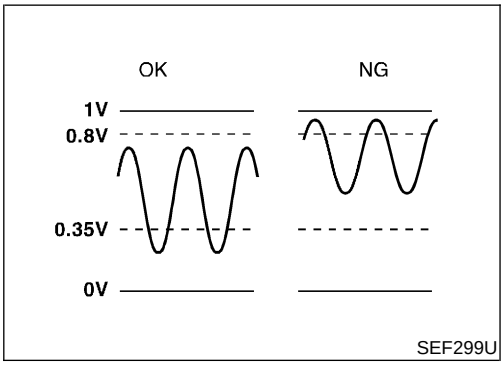
The heated oxygen sensor 1 (front) is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 (front) has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 (front) signal is sent to the PCM. The PCM 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

NIEC0112

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1)/(B2)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1)/(B2)			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.



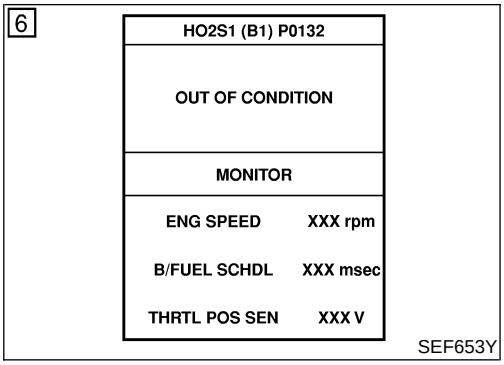
On Board Diagnosis Logic

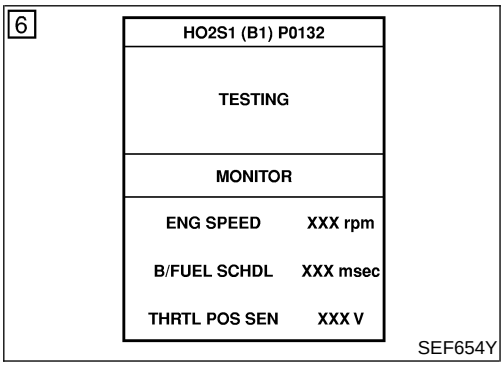
NIEC0114

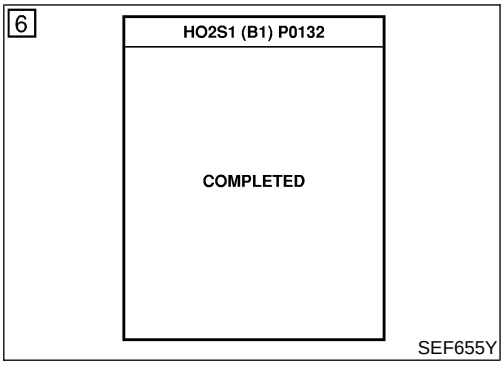
To judge the malfunction, the output from the heated oxygen sensor 1 (front) is monitored to determine whether the “rich” output is sufficiently high. The “lean” output is sufficiently low. When both the outputs are shifting to the rich side, the malfunction will be detected.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0132 P0152	• The maximum and minimum voltages from the sensor are beyond the specified voltages.	• Heated oxygen sensor 1 (front) • Heated oxygen sensor heater 1 (front) • Fuel pressure • Injectors

On Board Diagnosis Logic (Cont'd)







DTC Confirmation Procedure

NIEC0115

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

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 "HO2S1 (B1)/(B2) P0132 (P0152)" of "HO2S1 (B1)/(B2)" in "DTC WORK SUPPORT" mode with CONSULT-II.
4) Touch "START".
5) Start engine and let it idle for at least 3.5 minutes.

NOTE:

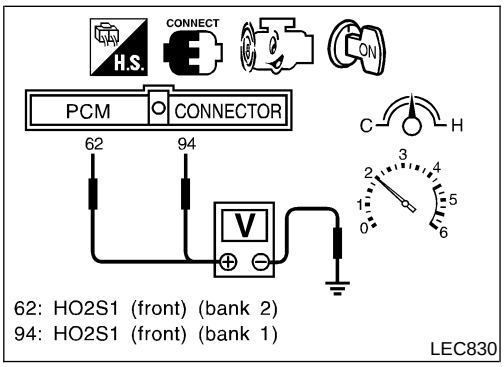
Never raise engine speed above 3,600 rpm after this step. If the engine speed limit is exceeded, return to step 5.

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 20 seconds or more.)

ENG SPEED	1,350 - 2,700 rpm (A/T) 1,450 - 3,200 rpm (M/T)
Vehicle speed	50 - 100 km/h (31 - 62 MPH)
B/FUEL SCHDL	2.6 - 12.5 msec (A/T) 2.4 - 10.0 msec (M/T)
Selector lever	Suitable position

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

7) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-236.



Overall Function Check

NIEC0116

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

With GST

1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between PCM terminal 62 (HO2S1 bank 2) or 94 (HO2S1 bank 1) and engine ground.
3) Check the following with engine speed held at 2,000 rpm constant under no load.

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

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

4) If NG, go to "Diagnostic Procedure", EC-236.

Diagnostic Procedure

=NIEC0117

1	RETIGHTEN HEATED OXYGEN SENSOR 1 (FRONT)

1. Turn ignition switch “OFF”.
2. Loosen and retighten the corresponding heated oxygen sensor 1 (front).

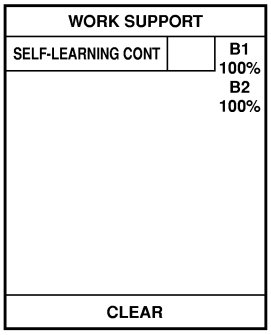
Tightening torque:
40 - 60 N·m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)

▶ GO TO 2.

2	CLEAR THE SELF-LEARNING DATA

With CONSULT-II

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

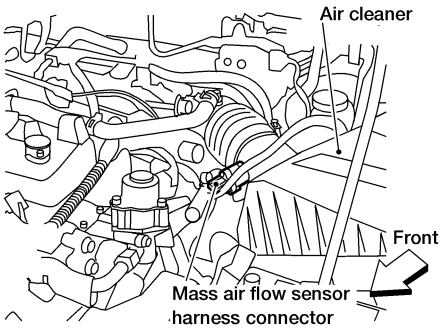


SEF652Y

4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 (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 3 seconds at idle speed.



WEC250

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-98.
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 (P0175) detected? Is it difficult to start engine?

Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0172 (P0175). Refer to EC-315.
No	▶	GO TO 3.

3	CHECK HARNESS CONNECTOR

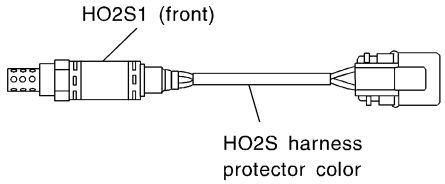
1. Turn ignition switch "OFF".
2. Disconnect heated oxygen sensor 1 (front) harness connector.
3. Check harness connector for water.
   Water should not exit.

OK or NG

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

4	CHECK HEATED OXYGEN SENSOR 1 HEATER (FRONT)

1. Turn ignition switch "OFF".
2. Make sure HO2S1 (front) harness protector color, and disconnect the corresponding HO2S1 (front) harness connector.



HO2S1 (front) (bank 1): Black
HO2S1 (front) (bank 2): Blue

LEC646

3. Check HO2S1 heater (front), refer to EC-264.

OK or NG

OK	▶	GO TO 5.
NG	▶	Replace heated oxygen sensor 1 (front).

5	CHECK HEATED OXYGEN SENSOR 1 (FRONT)

Refer to "Component Inspection", EC-238.

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace corresponding heated oxygen sensor 1 (front).

6	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-169.
Refer to "Wiring Diagram", EC-221, for circuit.

	▶	**INSPECTION END**

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S1 MNTR (B1)	LEAN

SEF646Y

Bank 1

cycle	1	2	3	4	5
HO2S1 MNTR (B1)	R-L	R-L	R-L	R-L	R-L

Bank 2

cycle	1	2	3	4	5
HO2S1 MNTR (B2)	R-L	R-L	R-L	R-L	R-L

R means HO2S1 MNTR (B1)/(B2) indicates RICH

L means HO2S1 MNTR (B1)/(B2) indicates LEAN

SEF647Y

Component Inspection

NIEC0118

HEATED OXYGEN SENSOR 1 (FRONT)

NIEC0118S02

With CONSULT-II

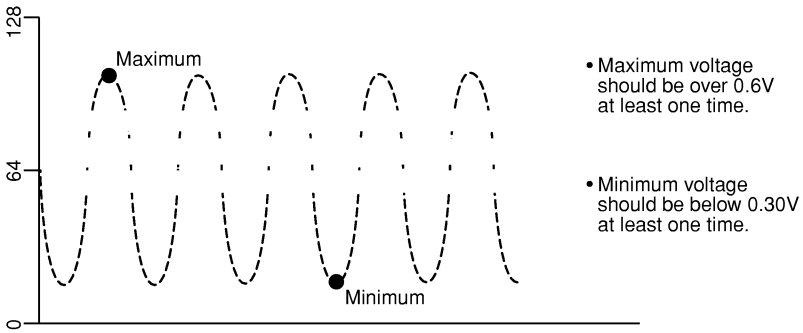
1) Start engine and warm it up to normal operating temperature.
2) Select “MANU TRIG” in “DATA MONITOR” mode, and select “HO2S1 (B1)/(B2)” and “HO2S1 MNTR (B1)/(B2)”.
3) Hold engine speed at 2,000 rpm under no load during the following steps.
4) Touch “RECORD” on CONSULT-II screen.
5) Check the following.

- “HO2S1 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:
  R = “HO2S1 MNTR (B1)/(B2)”, “RICH”
  L = “HO2S1 MNTR (B1)/(B2)”, “LEAN”
- “HO2S1 (B1)/(B2)” voltage goes above 0.6V at least once.
- “HO2S1 (B1)/(B2)” voltage goes below 0.3V at least once.
- “HO2S1 (B1)/(B2)” voltage never exceeds 1.0V.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Trigger	ENG SPEED	HO2S1 (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
XXX	XXX	XXX



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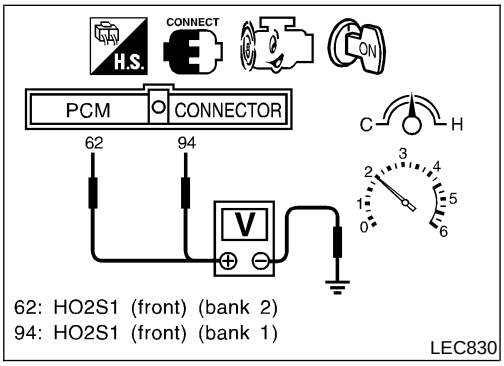


62: HO2S1 (front) (bank 2)
94: HO2S1 (front) (bank 1)

LEC830

Without CONSULT-II

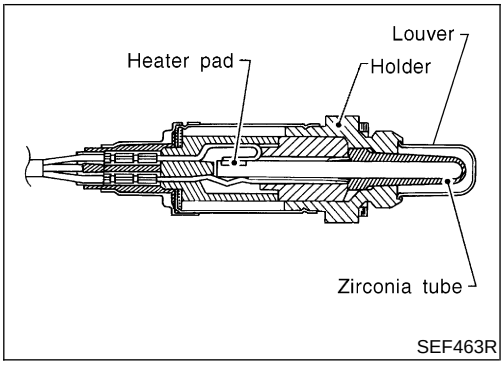
1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between PCM terminal 62 (HO2S1 bank 2) or 94 (HO2S1 bank 1) and engine ground.
3) Check the following with engine speed held at 2,000 rpm constant under no load.

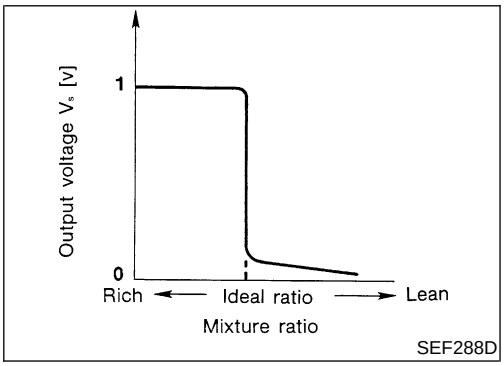
- The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times when 10 seconds.
  1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
  2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is below 0.3V at least one time.
- The voltage never exceeds 1.0V.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**





Component Description

NIEC0119

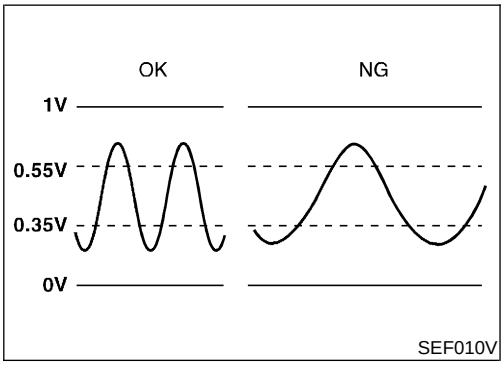
The heated oxygen sensor 1 (front) is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 (front) has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 (front) signal is sent to the PCM. The PCM 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

NIEC0120

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1)/(B2)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1)/(B2)			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.

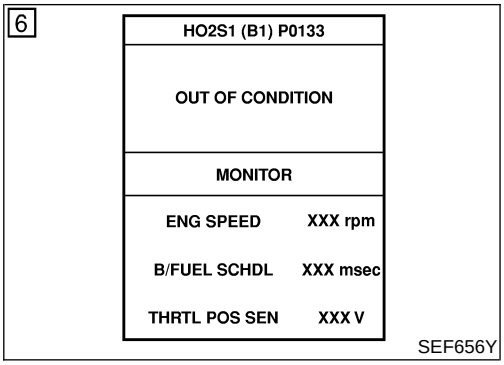


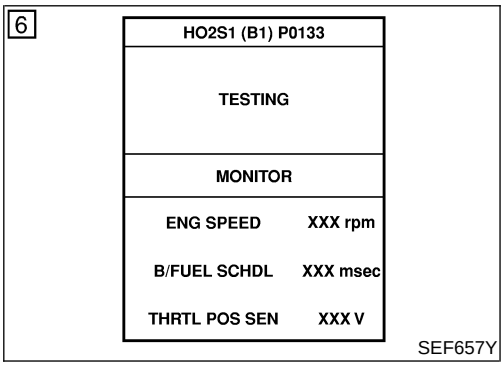
On Board Diagnosis Logic

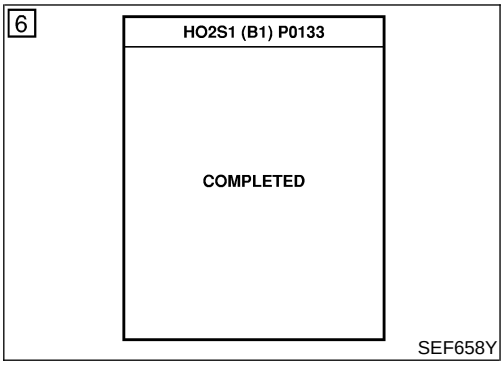
NIEC0122

To judge the malfunction of heated oxygen sensor 1 (front), this diagnosis measures response time of heated oxygen sensor signal. The time is compensated by engine operating (speed and load), fuel feedback control constant, and heated oxygen sensor temperature index. Judgment is based on whether the compensated time (heated oxygen sensor cycling time index) is inordinately long or not.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0133 P0153	• The response of the voltage signal from the sensor takes more than the specified time.	• Harness or connectors (The sensor circuit is open or shorted.) • Heated oxygen sensor 1 (front) • Heated oxygen sensor heater 1 (front) • Fuel pressure • Injectors • Intake air leaks • Exhaust gas leaks • PCV • Mass air flow sensor







DTC Confirmation Procedure

NIEC0123

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

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 "HO2S1 (B1)/(B2) P0133 (P0153)" of "HO2S1 (B1)/(B2)" in "DTC WORK SUPPORT" mode with CONSULT-II.
4) Touch "START".
5) Start engine and let it idle for at least 3.5 minutes.

NOTE:

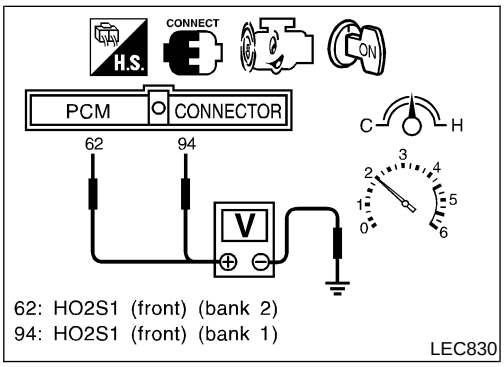
Never raise engine speed above 3,600 rpm after this step. If the engine speed limit is exceeded, return to step 5.

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 20 seconds.)

ENG SPEED	1,950 - 3,200 rpm (A/T) 2,300 - 3,750 rpm (M/T)
Vehicle speed	80 - 120 km/h (50 - 75 MPH)
B/FUEL SCHDL	3.5 - 12.5 msec (A/T) 3 - 10 msec (M/T)
Selector lever	Suitable position

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

7) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-245.



Overall Function Check

NIEC0124

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

With GST

1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between PCM terminal 62 (HO2S1 bank 2) or 94 (HO2S2 bank 1) 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 five 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-245.

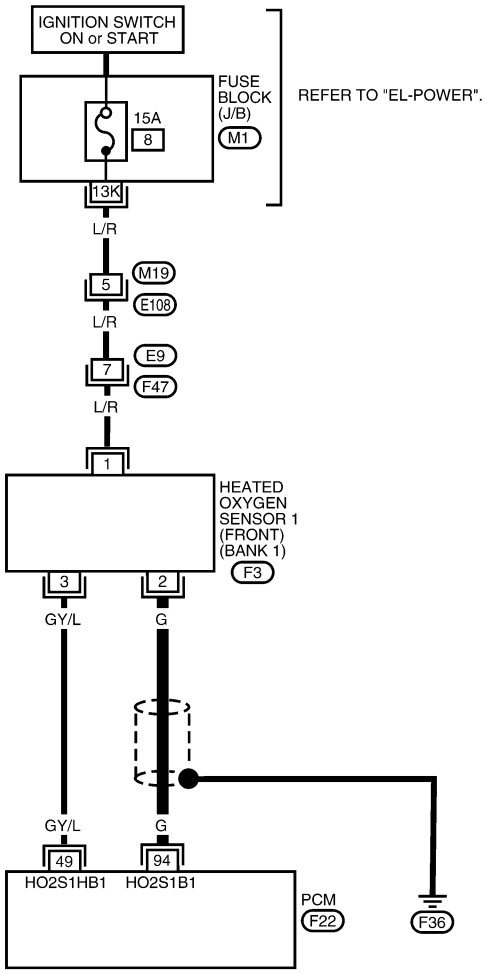
Wiring Diagram

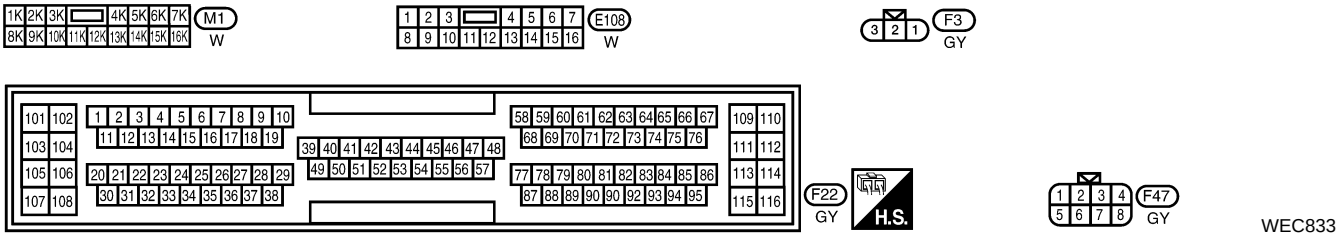
=NIEC0125

NIEC0125S03

BANK 1

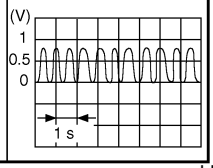
EC-O2S1B1-01





WEC833

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

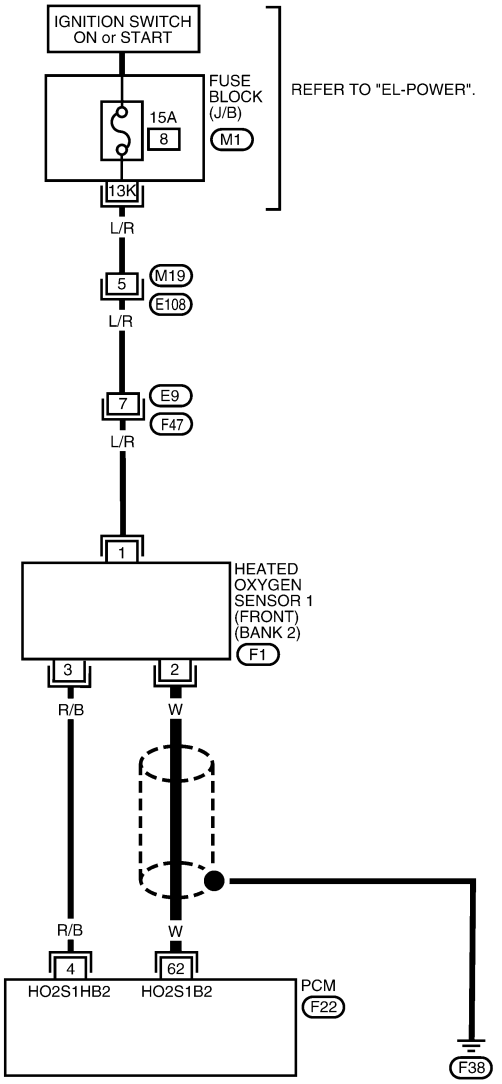
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
94	G	HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)	ENGINE RUNNING AT 2,000 RPM AFTER WARMING UP TO NORMAL OPERATING TEMPERATURE	0 - APPROX. 1.0V 

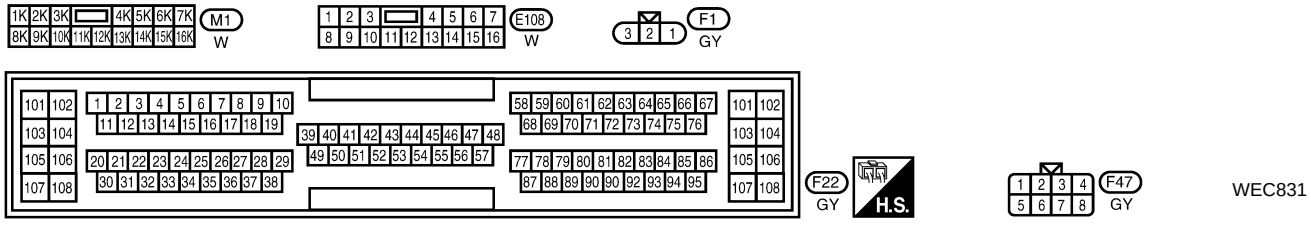
LEC834

Wiring Diagram (Cont'd)

BANK 2

NIEC0125S04





WEC831

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

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
62	W	HEATED OXYGEN SENSOR 1 (FRONT) (BANK 2)	ENGINE RUNNING AT 2,000 RPM AFTER WARMING UP TO NORMAL OPERATING TEMPERATURE	0 - APPROX. 1.0V

LEC832

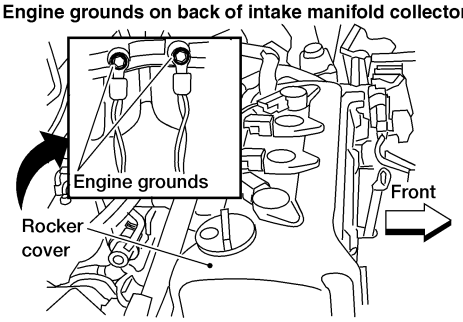
Diagnostic Procedure

NIEC0126

1	RETIGHTEN GROUND SCREWS

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

Engine grounds on back of intake manifold collector



WEC249

▶	GO TO 2.

2	RETIGHTEN HEATED OXYGEN SENSOR 1 (FRONT)

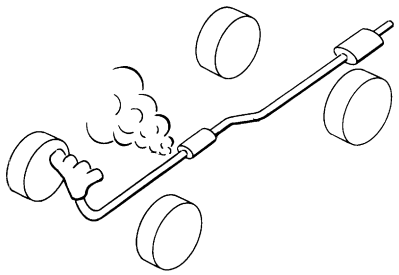
Loosen and retighten the corresponding heated oxygen sensor 1 (front).

Tightening torque:
40 - 60 N·m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)

▶	GO TO 3.

3	CHECK EXHAUST AIR LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust air leak before three way catalyst.



SEF099P

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair or replace.

4	CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

OK or NG

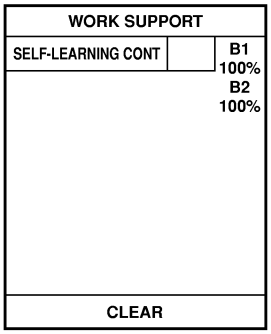
OK	▶	GO TO 5.
NG	▶	Repair or replace.

Diagnostic Procedure (Cont'd)

5	CLEAR THE SELF-LEARNING DATA

With CONSULT-II

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

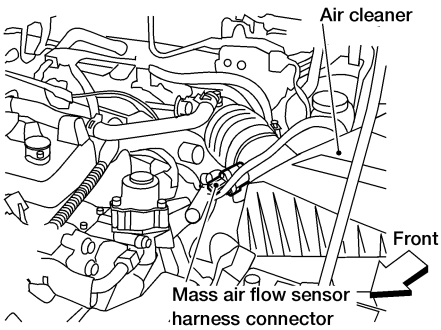


SEF652Y

4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171, P0174 or P0172, 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 3 seconds at idle speed.



WEC250

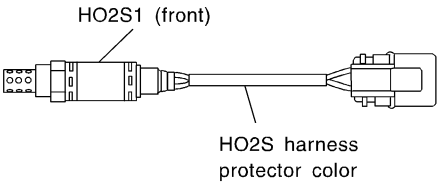
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC P0100 is displayed.
6. Erase the 1st trip DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-98.
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171, P0174 or P0172, P0175 detected? Is it difficult to start engine?

Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0171, P0174, P0172, P0175. Refer to EC-306, 315.
No	▶	GO TO 6.

6 CHECK INPUT SIGNAL CIRCUIT

1. Check the HO2S1 (front) harness protector color, and disconnect the corresponding heated oxygen sensor 1 (front) harness connector and PCM harness connector.



HO2S1 (front) (bank 1): Black
HO2S1 (front) (bank 2): Blue

LEC646

2. Check harness continuity between PCM terminal and HO2S1 (front) as follows.
Refer to "Wiring Diagram", EC-243.

DTC	Terminals		Bank
	PCM	Sensor	
P0133	62	2	2
P0153	94	2	1

LEC838

Continuity should exist.

3. Check harness continuity between PCM terminal or HO2S1 (front) and ground as follows.
Refer to "Wiring Diagram", EC-243.

DTC	Terminals		Bank
	PCM or Sensor	Ground	
P0133	62 or 2	Ground	2
P0153	94 or 2	Ground	1

LEC839

Continuity should not exist.

4. Also check harness for short to power.

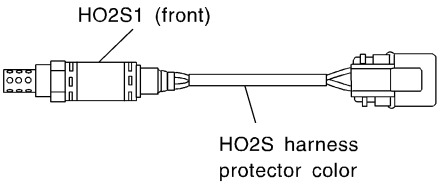
OK or NG

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

Diagnostic Procedure (Cont'd)

7	CHECK HEATED OXYGEN SENSOR 1 HEATER (FRONT)

1. Turn ignition switch "OFF".
2. Check the HO2S1 (front) harness protector color, and disconnect the corresponding HO2S1 (front) harness connector.



HO2S1 (front) (bank 1): Black
HO2S1 (front) (bank 2): Blue

LEC646

3. Check HO2S1 heater (front), refer to EC-264.

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace corresponding heated oxygen sensor 1 (front).

8	CHECK HEATED OXYGEN SENSOR 1 (FRONT)

Refer to "Component Inspection", EC-249.

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace corresponding heated oxygen sensor bank 1 (bank 2) sensor 1 (front).

9	CHECK MASS AIR FLOW SENSOR

Refer to "Component Inspection", EC-184.

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace mass air flow sensor.

10	CHECK PCV VALVE

Refer to "Positive Crankcase Ventilation", EC-66.

OK or NG

OK	▶	GO TO 11.
NG	▶	Repair or replace PCV valve.

11	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-169.

	▶	**INSPECTION END**

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S1 MNTR (B1)	LEAN

SEF646Y

Bank 1

cycle	1	2	3	4	5
HO2S1 MNTR (B1)	R-L	R-L	R-L	R-L	R-L

Bank 2

cycle	1	2	3	4	5
HO2S1 MNTR (B2)	R-L	R-L	R-L	R-L	R-L

R means HO2S1 MNTR (B1)/(B2) indicates RICH

L means HO2S1 MNTR (B1)/(B2) indicates LEAN

SEF647Y

Component Inspection

NIEC0127

HEATED OXYGEN SENSOR 1 (FRONT)

NIEC0127S02

With CONSULT-II

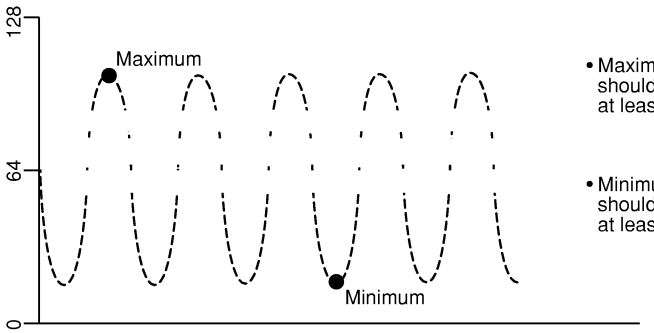
1) Start engine and warm it up to normal operating temperature.
2) Select “MANU TRIG” in “DATA MONITOR” mode, and select “HO2S1 (B1)/(B2)” and “HO2S1 MNTR (B1)/(B2)”.
3) Hold engine speed at 2,000 rpm under no load during the following steps.
4) Touch “RECORD” on CONSULT-II screen.
5) Check the following.

- “HO2S1 MNTR (B1)/(B2)” in “DATA MONITOR” mode changes from “RICH” to “LEAN” to “RICH” five times in 10 seconds.
  5 times (cycles) are counted as shown below:
  R = “HO2S1 MNTR (B1)/(B2)”, “RICH”
  L = “HO2S1 MNTR (B1)/(B2)”, “LEAN”
- “HO2S1 (B1)/(B2)” voltage goes above 0.6V at least once.
- “HO2S1 (B1)/(B2)” voltage goes below 0.3V at least once.
- “HO2S1 (B1)/(B2)” voltage never exceeds 1.0V.

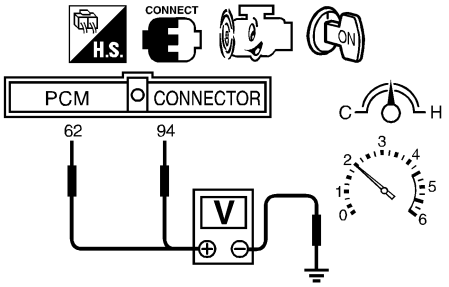
CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Trigger	ENG SPEED	HO2S1 (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



SEF648Y



62: HO2S1 (front) (bank 2)
94: HO2S1 (front) (bank 1)

LEC830

Without CONSULT-II

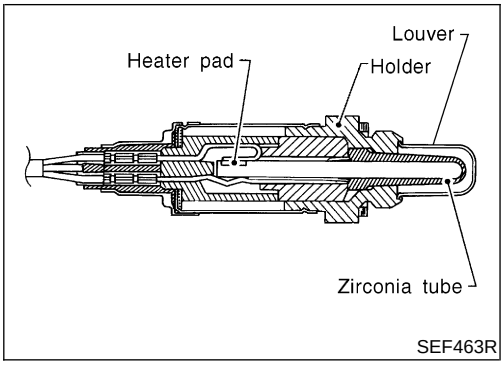
1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between PCM terminal 62 (HO2S1 bank 2) or 94 (HO2S1 bank 1) and engine ground.
3) Check the following with engine speed held at 2,000 rpm constant under no load.

- The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than five 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

- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is below 0.3V at least one time.
- The voltage never exceeds 1.0V.

CAUTION:

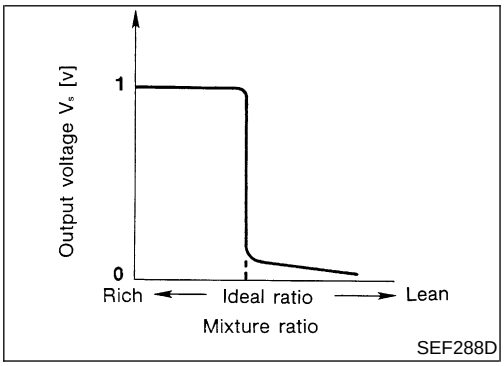
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**



Component Description

NIEC0128

The heated oxygen sensor 1 (front) is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 (front) 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 heated oxygen sensor 1 (front) signal is sent to the PCM. The PCM 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.

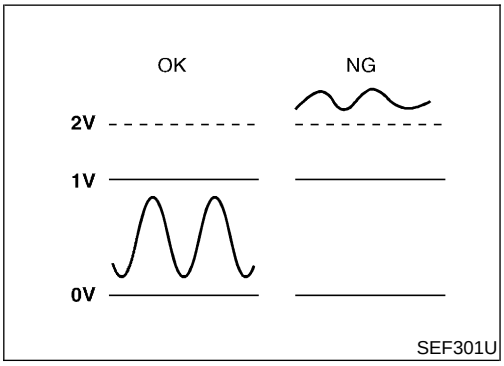


CONSULT-II Reference Value in Data Monitor Mode

NIEC0129

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1)/(B2)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1)/(B2)			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.



On Board Diagnosis Logic

NIEC0131

To judge the malfunction, the diagnosis checks that the heated oxygen sensor 1 (front) output is not inordinately high.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0134 P0154	• An excessively high voltage from the sensor is sent to PCM.	• Harness or connectors (The sensor circuit is open or shorted.) • Heated oxygen sensor 1 (front)

2

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C

SEF174Y

DTC Confirmation Procedure

NIEC0132

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

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 2 minutes.
6) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-255.

With GST

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 2 minutes.
4) Turn ignition switch “OFF” and wait at least 10 seconds.
5) Restart engine and let it idle for 2 minutes.
6) Select “MODE 3” with GST.
7) If DTC is detected, go to “Diagnostic Procedure”, EC-255.

- **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.**

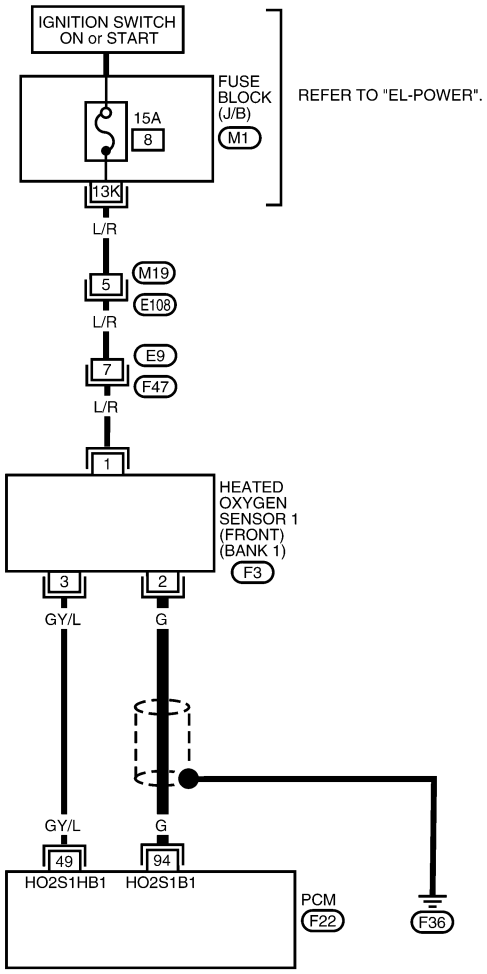
Wiring Diagram

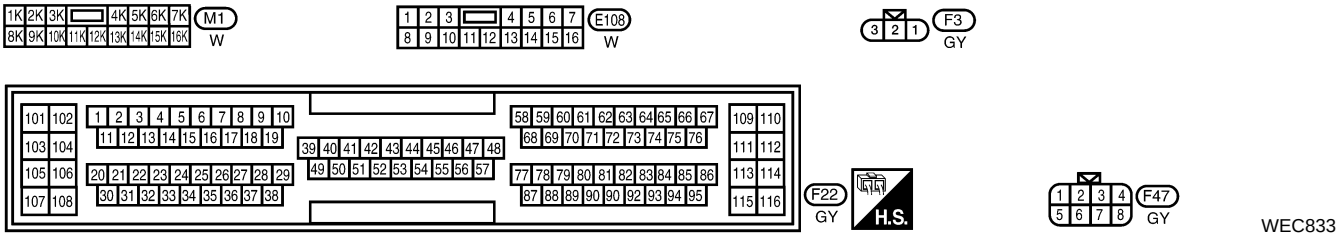
NIEC0133

BANK 1

NIEC0133S03

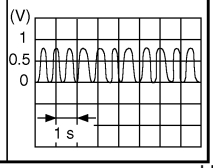
EC-O2S1B1-01





WEC833

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

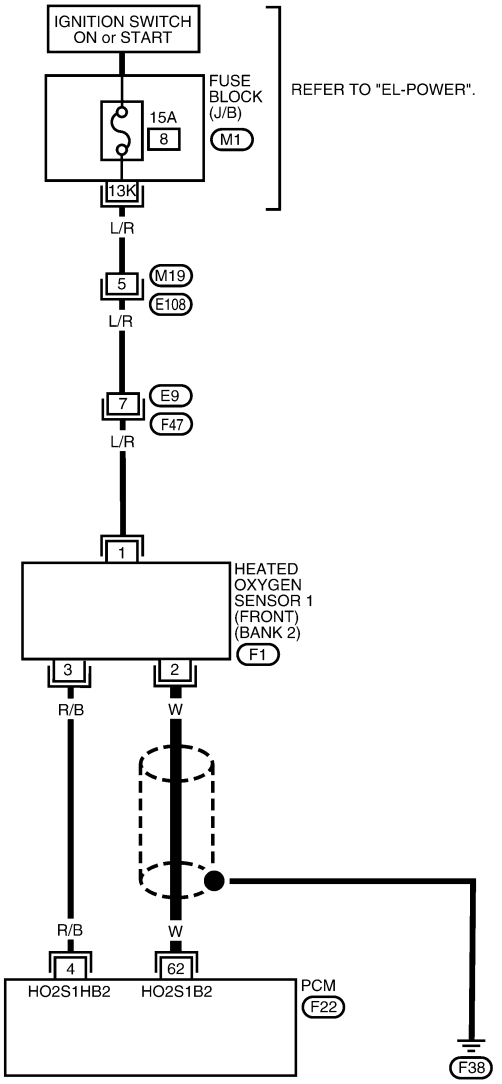
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
94	G	HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)	ENGINE RUNNING AT 2,000 RPM AFTER WARMING UP TO NORMAL OPERATING TEMPERATURE	0 - APPROX. 1.0V 

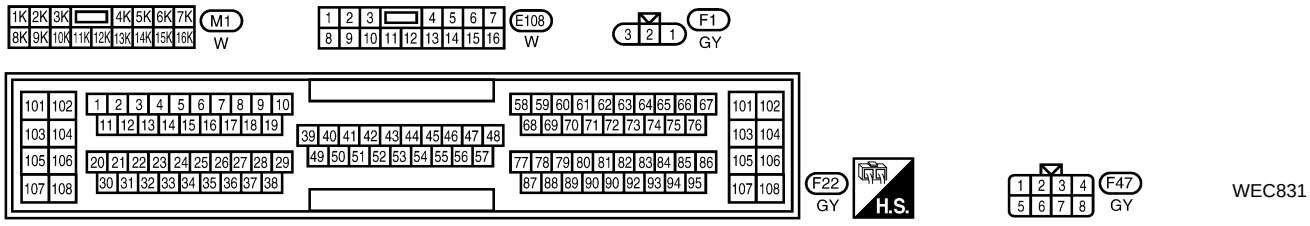
LEC834

Wiring Diagram (Cont'd)

BANK 2

NIEC0133S04





WEC831

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

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
62	W	HEATED OXYGEN SENSOR 1 (FRONT) (BANK 2)	ENGINE RUNNING AT 2,000 RPM AFTER WARMING UP TO NORMAL OPERATING TEMPERATURE	0 - APPROX. 1.0V

LEC832

Diagnostic Procedure

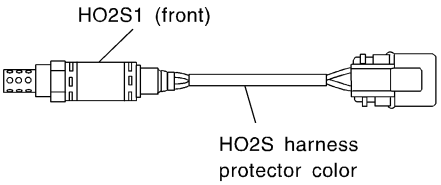
NIEC0134

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

Diagnostic Procedure (Cont'd)

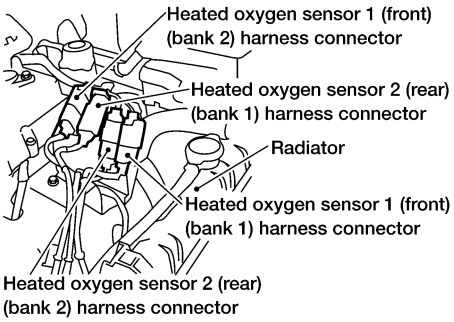
2 CHECK INPUT SIGNAL CIRCUIT

1. Check the HO2S1 (front) harness protector color, and disconnect the corresponding heated oxygen sensor 1 (front) harness connector and PCM harness connector.



HO2S1 (front) (bank 1): Black
HO2S1 (front) (bank 2): Blue

LEC646



WEC835

2. Check harness continuity between PCM terminal and HO2S1 (front) as follows. Refer to "Wiring Diagram", EC-253.

DTC	Terminals		Bank
	PCM	Sensor	
P0134	62	2	2
P0154	94	2	1

LEC840

Continuity should exist.

3. Check harness continuity between PCM terminal or HO2S1 (front) and ground. Refer to "Wiring Diagram", EC-253.

DTC	Terminals		Bank
	PCM or Sensor	Ground	
P0134	62 or 2	Ground	2
P0154	94 or 2	Ground	1

LEC841

Continuity should not exist.

4. Also check harness for short to power.

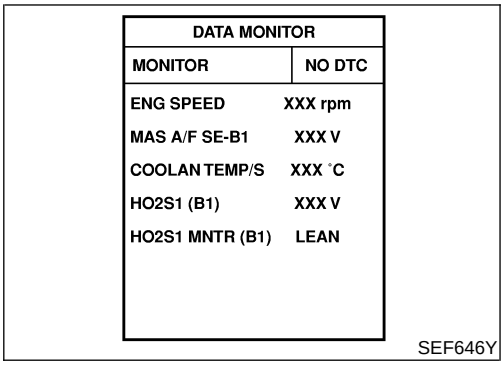
OK or NG

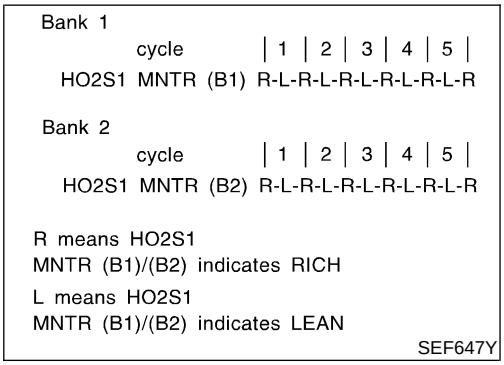
OK	▶	GO TO 3.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

3	CHECK HARNESS CONNECTOR	
Check heated oxygen sensor 1 (front) harness connector for water. **Water should not exist.**		
OK or NG		
OK	▶	GO TO 4.
NG	▶	Repair or replace harness connector.

4	CHECK HEATED OXYGEN SENSOR 1 (FRONT)	
Refer to "Component Inspection", EC-257.		
OK or NG		
OK	▶	GO TO 5.
NG	▶	Replace corresponding heated oxygen sensor.

5	CHECK INTERMITTENT INCIDENT	
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-169.		
	▶	**INSPECTION END**





Component Inspection

NIEC0135

HEATED OXYGEN SENSOR 1 (FRONT)

NIEC0135S01

With CONSULT-II

1) Start engine and warm it up to normal operating temperature.
2) Select "MANU TRIG" in "DATA MONITOR" mode, and select "HO2S1 (B1)/(B2)" and "HO2S1 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.
5) Check the following.

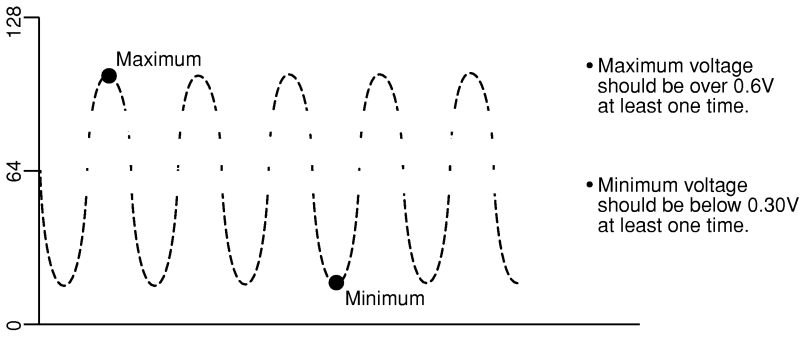
- "HO2S1 MNTR (B1)/(B2)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" five times in 10 seconds.
  5 times (cycles) are counted as shown below:
  R = "HO2S1 MNTR (B1)/(B2)", "RICH"
  L = "HO2S1 MNTR (B1)/(B2)", "LEAN"
- "HO2S1 (B1)/(B2)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)/(B2)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)/(B2)" voltage never exceeds 1.0V.

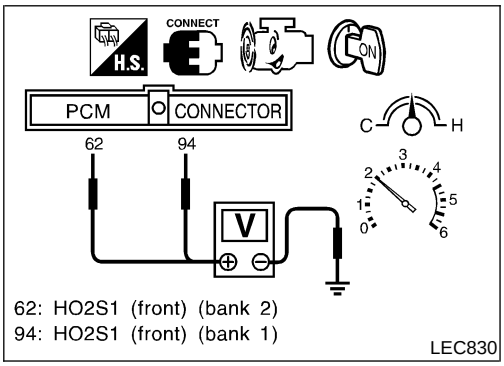
CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Component Inspection (Cont'd)

Trigger	ENG SPEED	HO2S1 (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





Without CONSULT-II

1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between PCM terminal 62 (HO2S1 bank 2) or 94 (HO2S1 bank 1) 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 five 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
- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is below 0.3V at least one time.
- The voltage never exceeds 1.0V.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Description

NIEC0136

SYSTEM DESCRIPTION

NIEC0136S01

Sensor	Input Signal to PCM	PCM function	Actuator
Camshaft position sensor (PHASE) Crankshaft position sensor (POS)	Engine speed	Heated oxygen sensor 1 heater (front) control	Heated oxygen sensor 1 heater (front)

The PCM performs ON/OFF control of the heated oxygen sensor 1 heater (front) corresponding to the engine operating condition.

OPERATION

NIEC0136S02

Engine speed	Heated oxygen sensor 1 heater (front)
Above 3,600 rpm	OFF
Below 3,600 rpm	ON

CONSULT-II Reference Value in Data Monitor Mode

NIEC0137

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S1 HTR (B1)/(B2)	• Engine speed: Below 3,600 rpm	ON
	• Engine speed: Above 3,600 rpm	OFF

On Board Diagnosis Logic

NIEC0139

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0135 P0155	• The current amperage in the heated oxygen sensor 1 heater (front) circuit is out of the normal range. (An improper voltage drop signal is sent to PCM through the front heated oxygen sensor heater.)	• Harness or connectors (The heated oxygen sensor 1 heater (front) circuit is open or shorted.) • Heated oxygen sensor 1 heater (front)

DTC Confirmation Procedure

NIEC0140

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.

DTC Confirmation Procedure (Cont'd)

2

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

With CONSULT-II

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-263.

With GST

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-263.

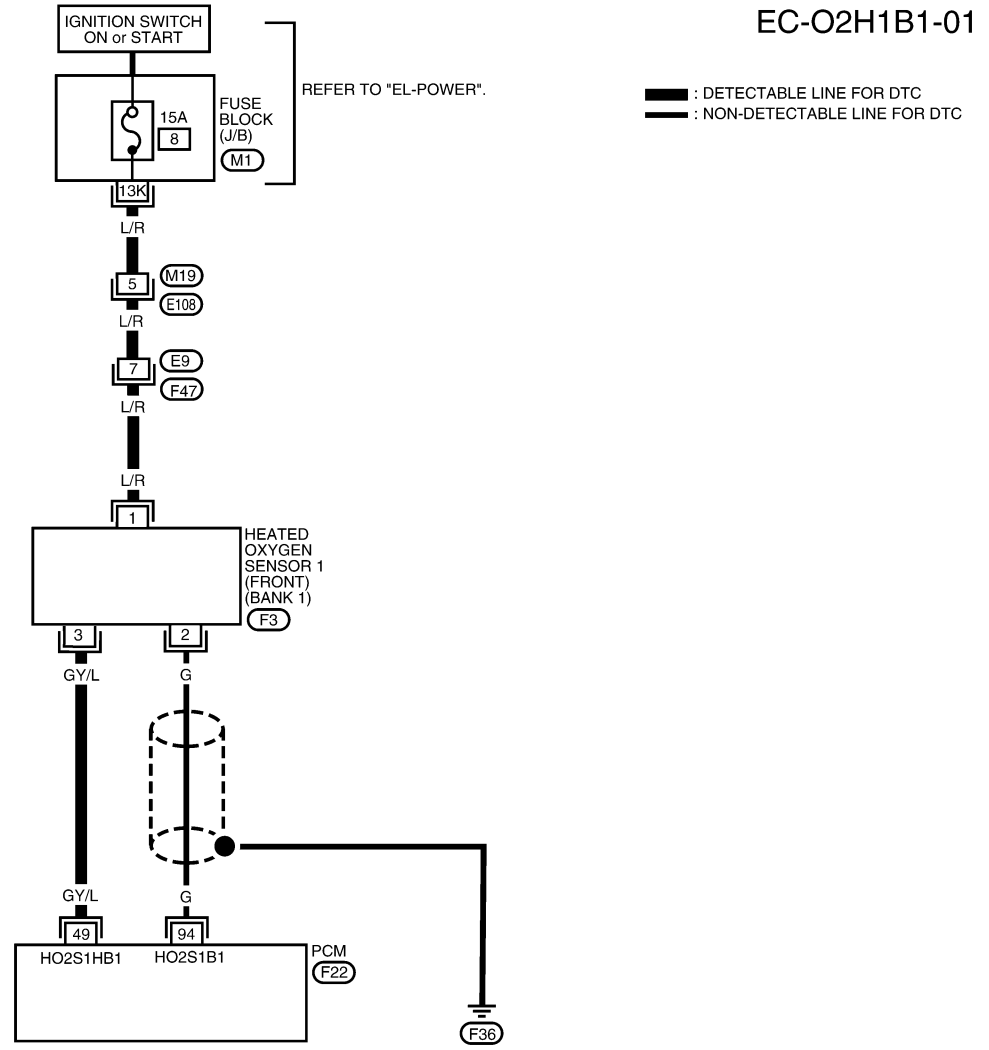
- **When using GST, "DTC Confirmation Procedure" should be performed twice as much as when using CONSULT-II because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II is recommended.**

Wiring Diagram

NIEC0141

BANK 1

NIEC0141S03



WEC844

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

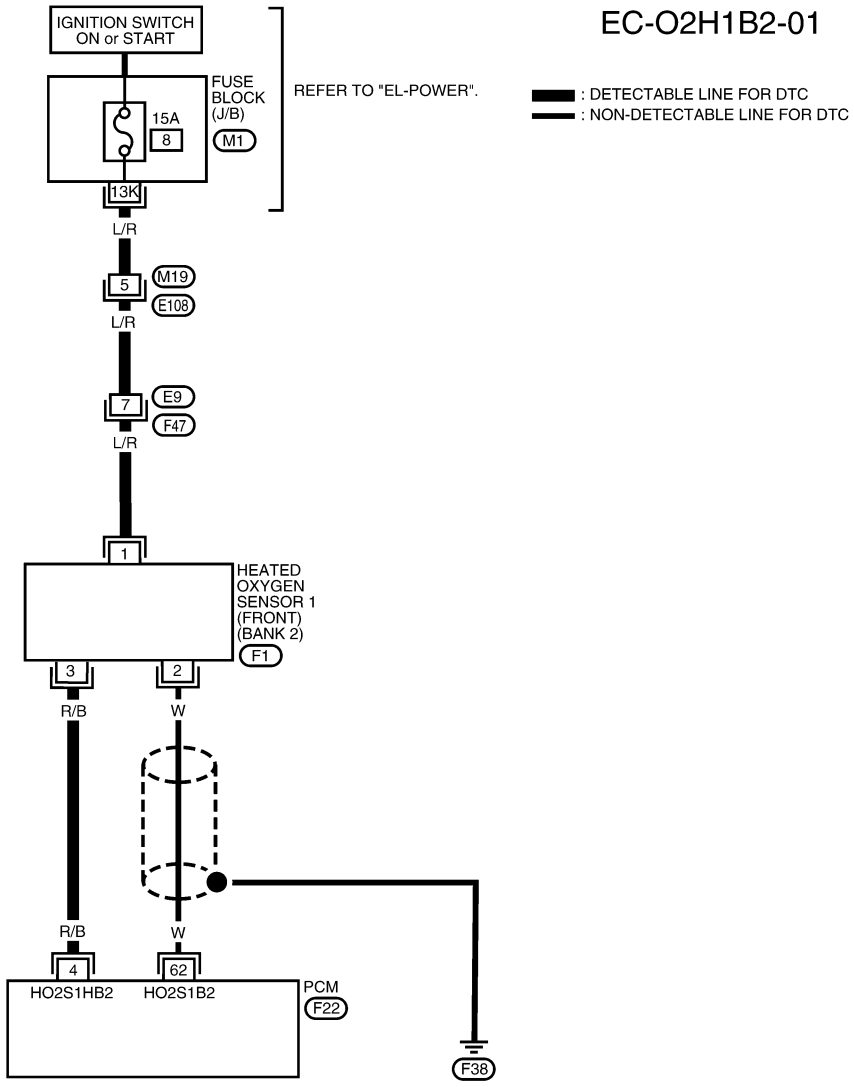
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
49	GY/L	HEATED OXYGEN SENSOR 1 HEATER (FRONT) (BANK 1)	ENGINE RUNNING BELOW 3,600 RPM	0 - 1.0V
			ENGINE RUNNING ABOVE 3,600 RPM	BATTERY VOLTAGE

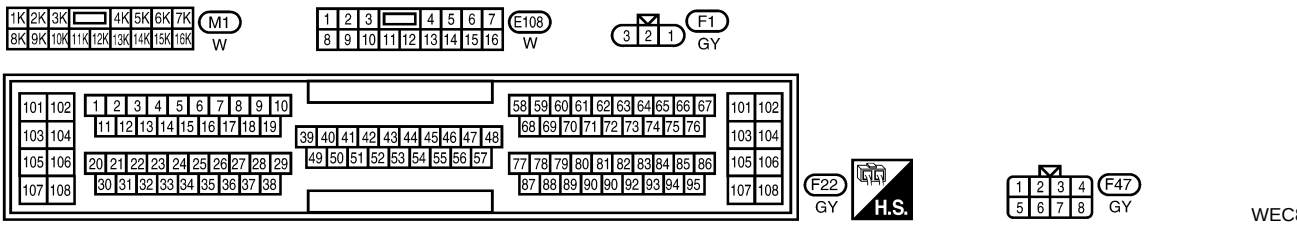
LEC845

Wiring Diagram (Cont'd)

BANK 2

NIEC0141S04





WEC842

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

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
4	R/B	HEATED OXYGEN SENSOR 1 HEATER (FRONT) (BANK 2)	ENGINE RUNNING BELOW 3,600 RPM	0 - 1.0V
			ENGINE RUNNING ABOVE 3,600 RPM	BATTERY VOLTAGE

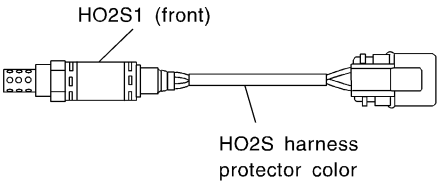
LEC843

Diagnostic Procedure

NIEC0142

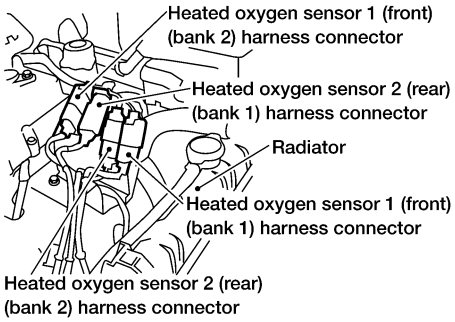
1	CHECK POWER SUPPLY

1. Turn ignition switch “OFF”.
2. Check the HO2S1 (front) harness protector color, and disconnect the corresponding heated oxygen sensor 1 (front) harness connector.



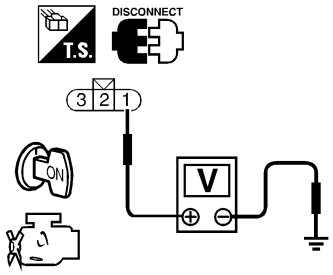
HO2S1 (front) (bank 1): Black
HO2S1 (front) (bank 2): Blue

LEC646



WEC835

3. Turn ignition switch “ON”.
4. Check voltage between HO2S1 (front) terminal 1 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF934X

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E9, F47
- Harness connectors M19, E108
- 15A fuse
- Harness for open or short between heated oxygen sensor 1 (front) and fuse

	▶	Repair harness or connectors.

Diagnostic Procedure (Cont'd)

3	CHECK GROUND CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect PCM harness connector.
3. Check harness continuity between PCM terminal and HO2S1 (front) as follows.
   Refer to "Wiring Diagram", EC-261.

DTC	Terminals		Bank
	PCM	Sensor	
P0135	4	3	2
P0155	49	3	1

LEC846

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 HEATED OXYGEN SENSOR 1 HEATER

Refer to "Component Inspection", EC-264.

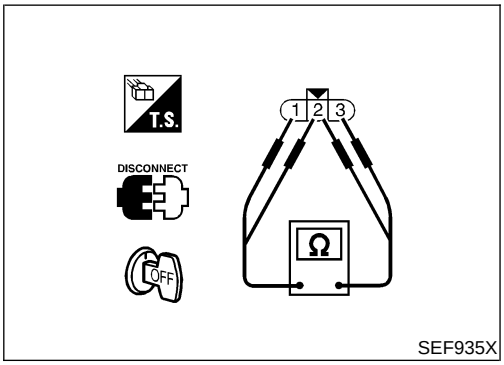
OK or NG

OK	▶	GO TO 5.
NG	▶	Replace corresponding heated oxygen sensor 1 (front).

5	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-169.

▶ **INSPECTION END**



SEF935X

Component Inspection

NIEC0143

HEATED OXYGEN SENSOR 1 HEATER (FRONT)

NIEC0143S01

Check resistance between terminals 3 and 1.

Resistance: 2.3 - 4.3Ω at 25°C (77°F)

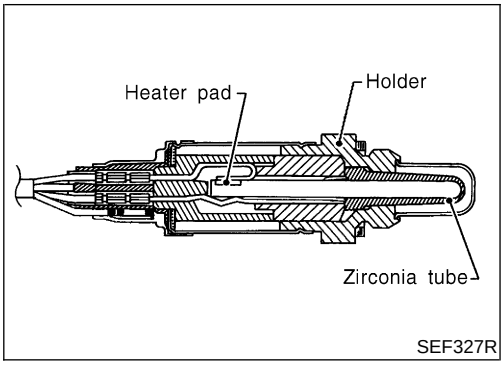
Check continuity between terminals 2 and 1, 3 and 2.

Continuity should not exist.

If NG, replace the heated oxygen sensor 1 (front).

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



Component Description

NIEC0144

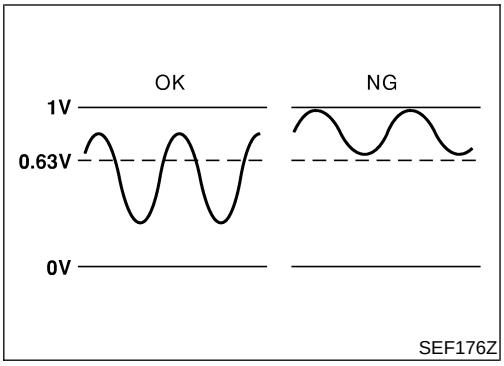
The heated oxygen sensor 2 (rear), after three way catalyst, monitors the oxygen level in the exhaust gas.
Even if switching characteristics of the heated oxygen sensor 1 (front) are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the rear heated oxygen sensor.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 (rear) is not used for engine control operation.

CONSULT-II Reference Value in Data Monitor Mode

NIEC0145

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1)/(B2)	• Engine: After warming up	Revving engine from idle to 3,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)/(B2)			LEAN ⟷ RICH

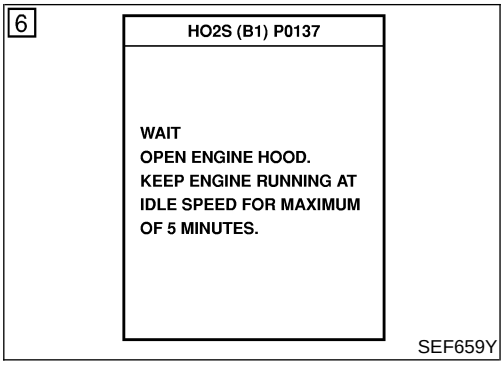


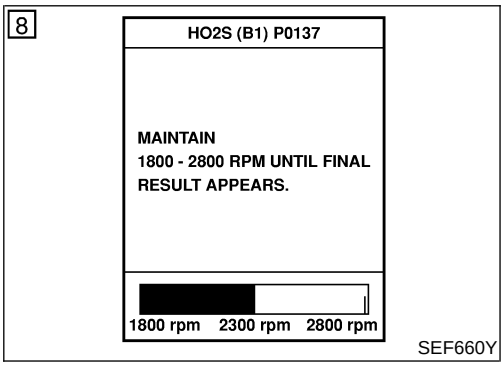
On Board Diagnosis Logic

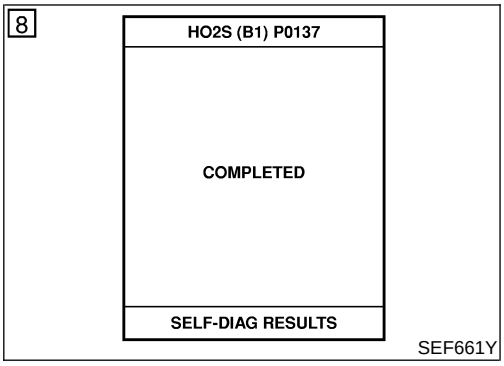
NIEC0147

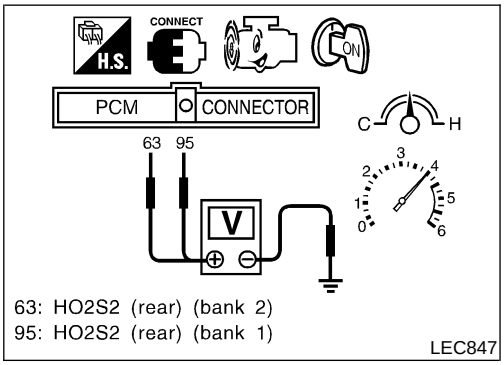
The heated oxygen sensor 2 (rear) has a much longer switching time between rich and lean than the heated oxygen sensor 1 (front). The oxygen storage capacity before the three way catalyst causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2 (rear), PCM monitors whether the minimum voltage of the sensor is sufficiently low during various driving conditions such as fuel-cut.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0137 P0157	• The minimum voltage from the sensor does not reach the specified voltage.	• Harness or connectors (The sensor circuit is open or shorted.) • Heated oxygen sensor 2 (rear) • Fuel pressure • Injectors









DTC Confirmation Procedure

NIEC0148

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

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 "HO2S2 (B1)/(B2) P0137 (P0157)" of "HO2S2 (B1)/(B2)" 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-269.
   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

NIEC0149

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

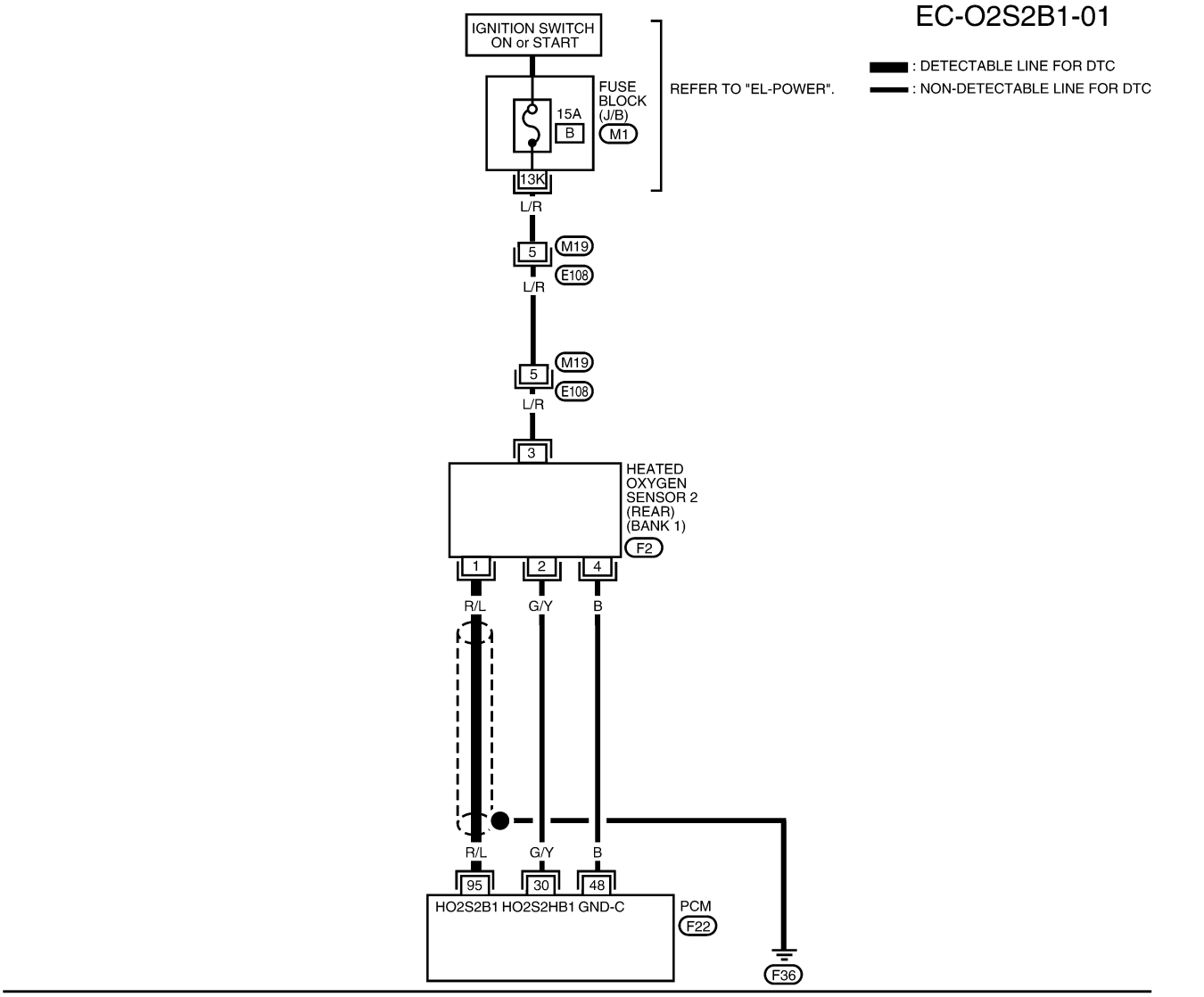
1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Set voltmeter probes between PCM terminals 63 (HO2S2 bank 2) or 95 (HO2S2 bank 1) and engine ground.
4) Check the voltage when revving engine up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be below 0.43V at least once during this procedure.
   If the voltage can be confirmed in step 4, step 5 is not necessary.
5) Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), D position with "OD" OFF (A/T).
   The voltage should be below 0.43V at least once during this procedure.
6) If NG, go to "Diagnostic Procedure", EC-269.

Wiring Diagram

NIEC0150

BANK 1

NIEC0150S03



WEC850

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

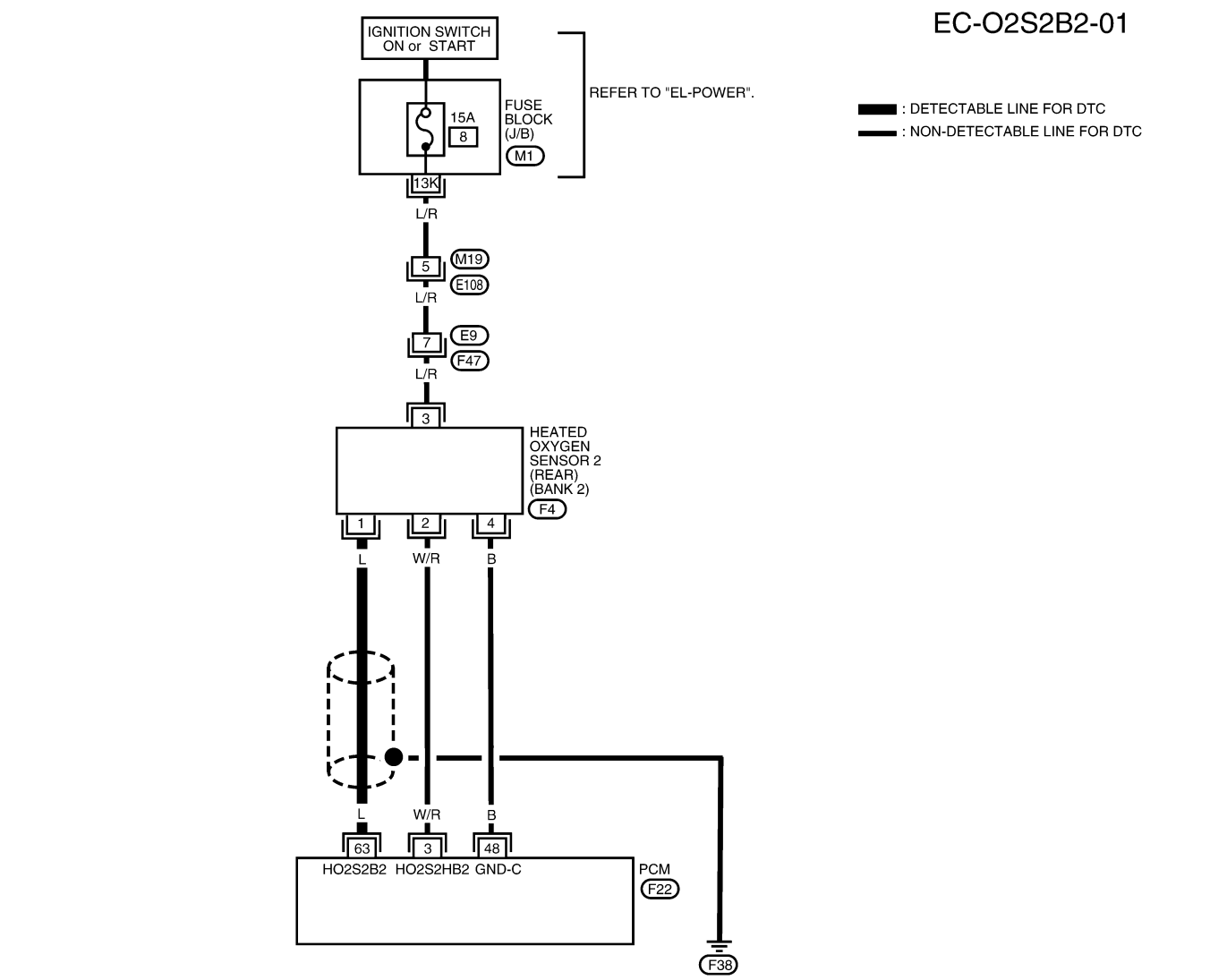
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
95	R/L	HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)	ENGINE RUNNING FROM IDLE UP TO 2,000 RPM UNDER WARM-UP CONDITION	0 - APPROX. 1.0V

LEC851

Wiring Diagram (Cont'd)

BANK 2

NIEC0150S04



WEC848

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

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
63	L	HEATED OXYGEN SENSOR 2 (REAR) (BANK 2)	ENGINE RUNNING FROM IDLE UP TO 2,000 RPM UNDER WARM-UP CONDITION	0 - APPROX. 1.0V

LEC849

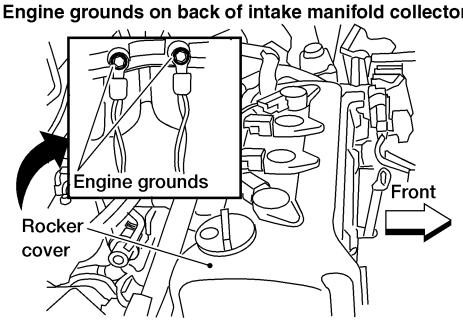
Diagnostic Procedure

NIEC0151

1	RETIGHTEN GROUND SCREWS

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

Engine grounds on back of intake manifold collector



WEC249

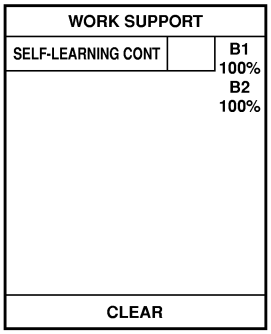
▶	GO TO 2.

Diagnostic Procedure (Cont'd)

2	CLEAR THE SELF-LEARNING DATA

With CONSULT-II

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

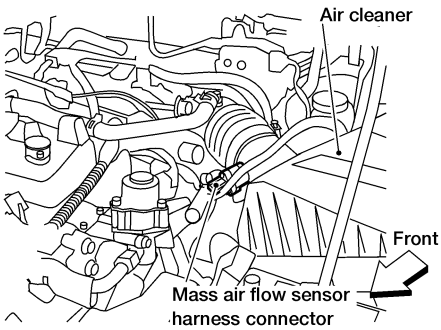


SEF652Y

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 3 seconds at idle speed.



WEC250

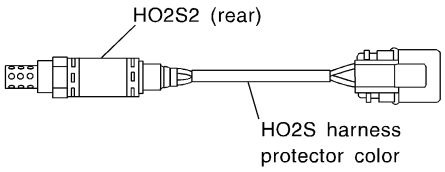
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC P0100 is displayed.
6. Erase the 1st trip DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-98.
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle 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 or P0175. Refer to EC-315.
No	▶	GO TO 3.

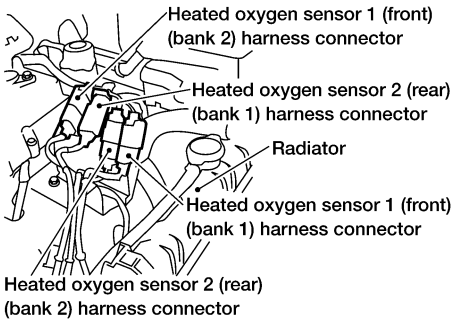
3 CHECK INPUT SIGNAL CIRCUIT

1. Turn ignition switch "OFF".
2. Check the HO2S2 (rear) harness protector color, and disconnect the corresponding heated oxygen sensor 2 (rear) harness connector and PCM harness connector.



HO2S2 (rear) (bank 1): White or Gray
HO2S2 (rear) (bank 2): Red or Reddish brown

SEF471Y



WEC835

3. Check harness continuity between PCM terminal and HO2S2 (rear) terminal as follows. Refer to "Wiring Diagram", EC-267.

DTC	Terminals		Bank
	PCM	Sensor	
P0137	63	1	2
P0157	95	1	1

LEC852

Continuity should exist.

4. Check harness continuity between PCM terminal or HO2S2 (rear) and ground as follows. Refer to "Wiring Diagram", EC-267.

DTC	Terminals		Bank
	PCM or Sensor	Ground	
P0137	63 or 1	Ground	2
P0157	95 or 1	Ground	1

LEC853

Continuity should not exist.

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

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

Diagnostic Procedure (Cont'd)

4	CHECK GROUND CIRCUIT	
1. Check harness continuity between HO2S2 (rear) terminal 4 and body ground. Refer to "Wiring Diagram", EC-267. **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 HEATED OXYGEN SENSOR 2 (REAR)	
Refer to "Component Inspection", EC-272.		
OK or NG		
OK	▶	GO TO 6.
NG	▶	Replace corresponding heated oxygen sensor 2 (rear).

6	CHECK INTERMITTENT INCIDENT	
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-169.		
	▶	**INSPECTION END**

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
HO2S1 (B1)	XXX V
HO2S2 (B1)	XXX V
HO2S1 MNTR (B1)	RICH
HO2S2 MNTR (B1)	RICH

SEF662Y

Component Inspection

NIEC0152

HEATED OXYGEN SENSOR 2 (REAR)

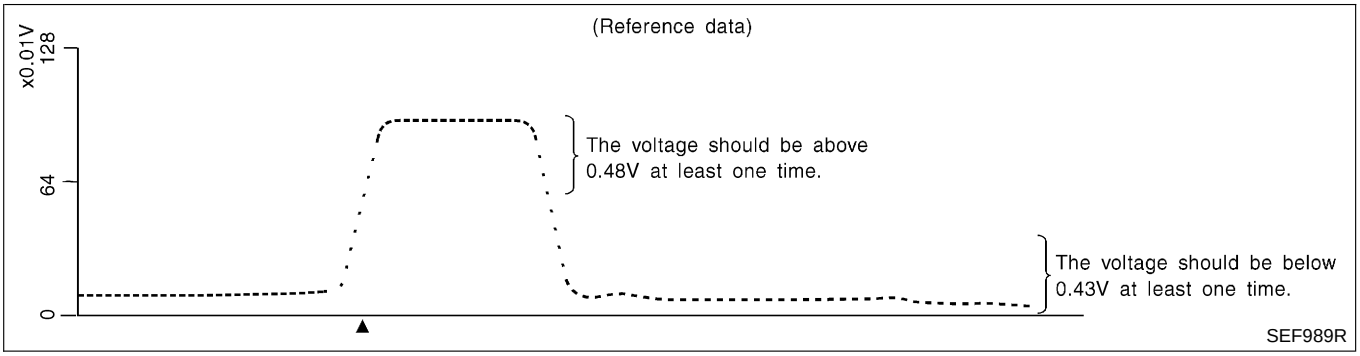
NIEC0152S01

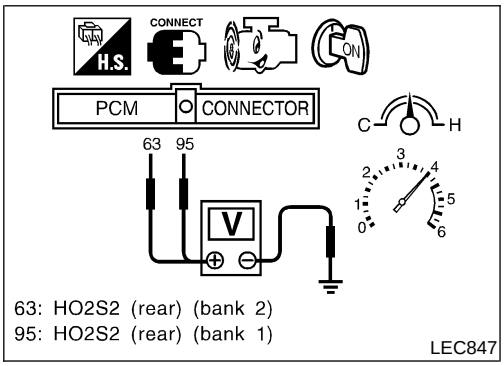
With CONSULT-II

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 "HO2S2 (B1)/(B2)" as the monitor item with CONSULT-II.
4) Check "HO2S2 (B1)/(B2)" at idle speed when adjusting "FUEL INJECTION" to ±25%.
   "HO2S2 (B1)/(B2)" should be above 0.48V at least once when the "FUEL INJECTION" is +25%."HO2S2 (B1)/(B2)" should be below 0.43V at least once when the "FUEL INJECTION" is −25%.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**



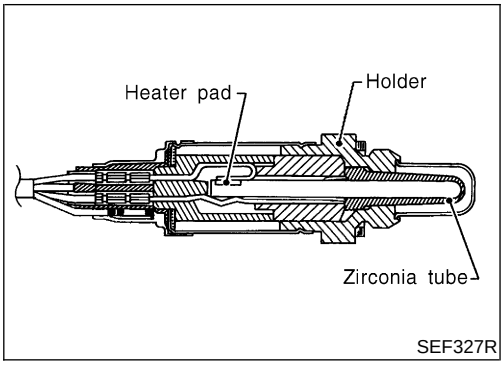


Without CONSULT-II

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 PCM terminals 63 (HO2S2 bank 2) or 95 (HO2S2 bank 1) and engine ground.
4) Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
(Depress and release accelerator pedal as soon as possible.)
The voltage should be above 0.48V at least once.
If the voltage is above 0.48V at step 4, step 5 is not necessary.
5) Check the voltage when revving up to 6,000 rpm under no load. Or keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), D position with "OD" OFF (A/T).
The voltage should be below 0.43V at least once.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**



Component Description

NIEC0153

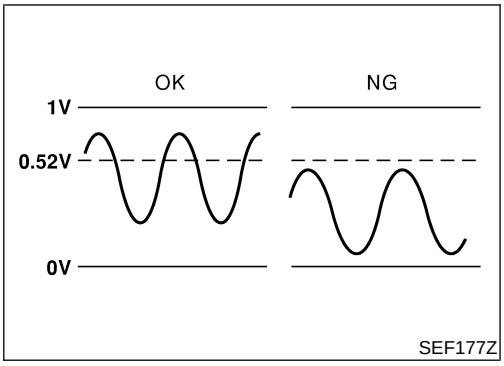
The heated oxygen sensor 2 (rear), after three way catalyst, monitors the oxygen level in the exhaust gas.
Even if switching characteristics of the heated oxygen sensor 1 (front) are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the rear heated oxygen sensor.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 (rear) is not used for engine control operation.

CONSULT-II Reference Value in Data Monitor Mode

NIEC0154

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1)/(B2)	• Engine: After warming up	Revving engine from idle to 3,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)/(B2)			LEAN ⟷ RICH

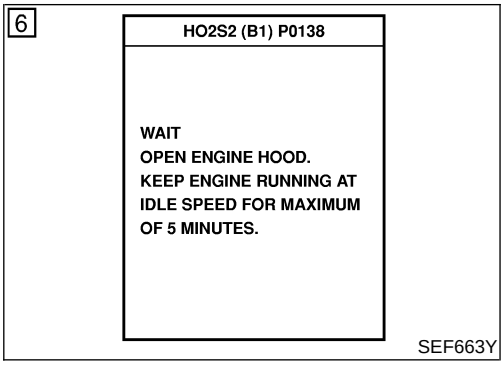


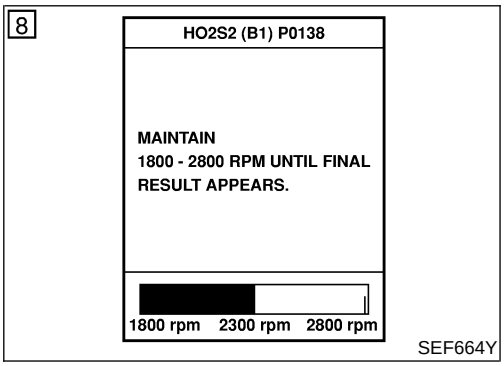
On Board Diagnosis Logic

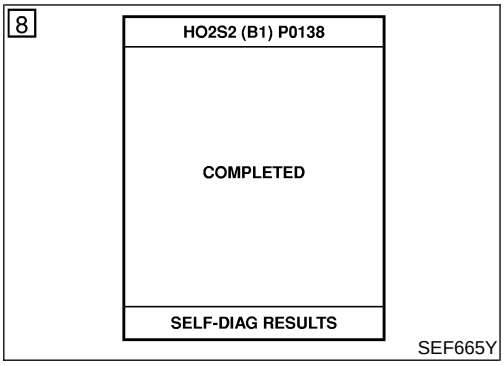
NIEC0156

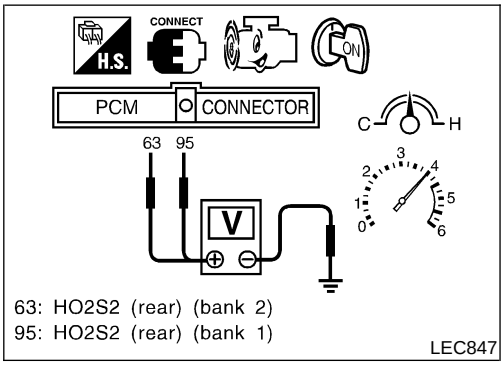
The heated oxygen sensor 2 (rear) has a much longer switching time between rich and lean than the heated oxygen sensor 1 (front). The oxygen storage capacity before the three way catalyst causes the longer switching time. To judge the malfunctions of rear heated oxygen sensor, PCM monitors whether the maximum voltage of the sensor is sufficiently high during various driving conditions such as fuel-cut.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0138	• The maximum voltage from the sensor does not reach the specified voltage.	• Harness or connectors (The sensor circuit is open or shorted.) • Heated oxygen sensor 2 (rear) • Fuel pressure • Injectors • Intake air leaks
P0158		









DTC Confirmation Procedure

NIEC0157

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

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 "HO2S2 (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-278.
   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

NIEC0158

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

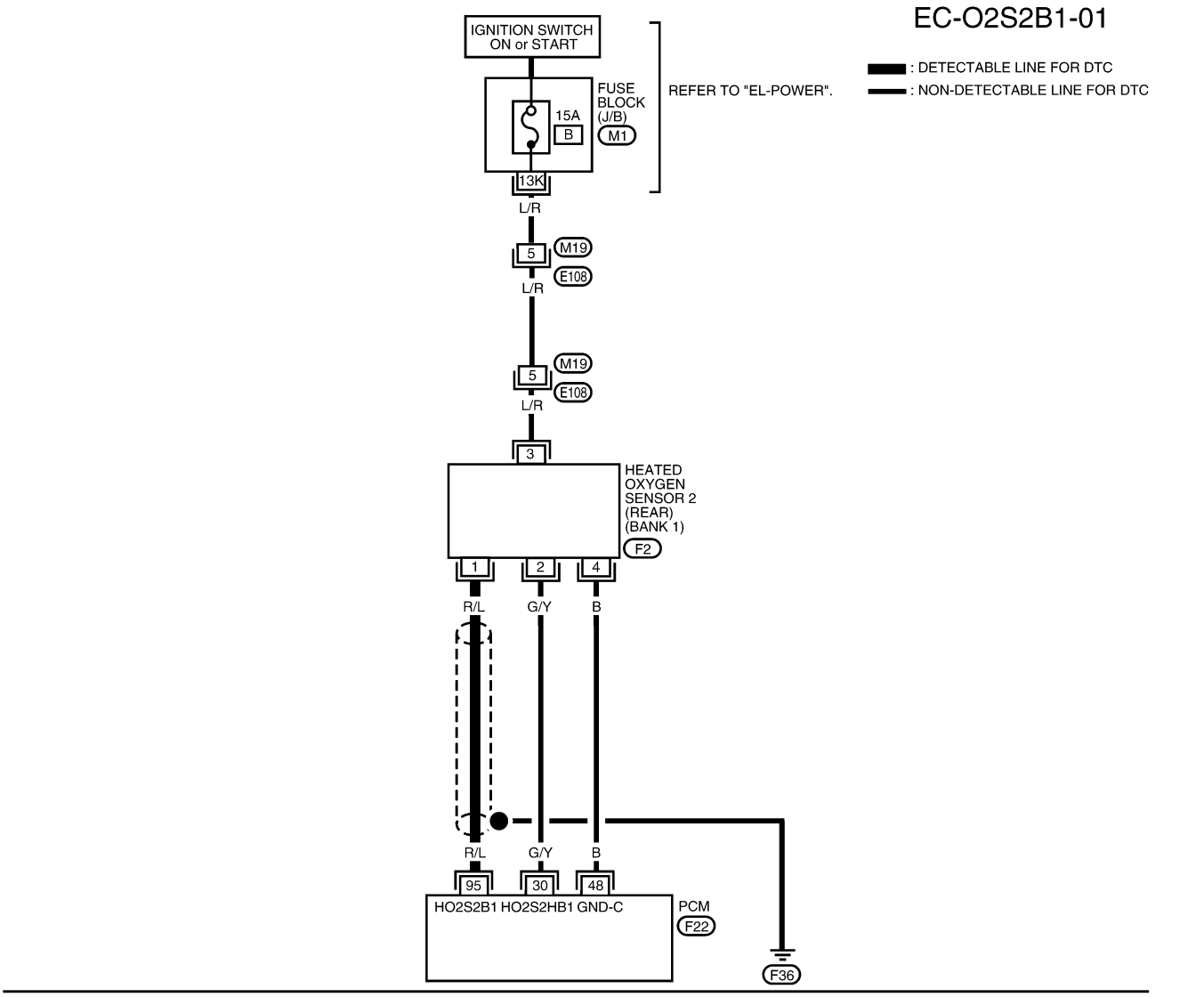
1) Start engine and drive vehicle at a speed of 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Set voltmeter probes between PCM terminals 63 (HO2S2 bank 2) or 95 (HO2S2 bank 1) and engine ground.
4) Check the voltage when revving engine up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.48V at least once during this procedure.
   If the voltage can be confirmed in step 4, step 5 is not necessary.
5) Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), D position with "OD" OFF (A/T).
   The voltage should be above 0.48V at least once during this procedure.
6) If NG, go to "Diagnostic Procedure", EC-278.

Wiring Diagram

NIEC0159

BANK 1

NIEC0159S03



WEC850

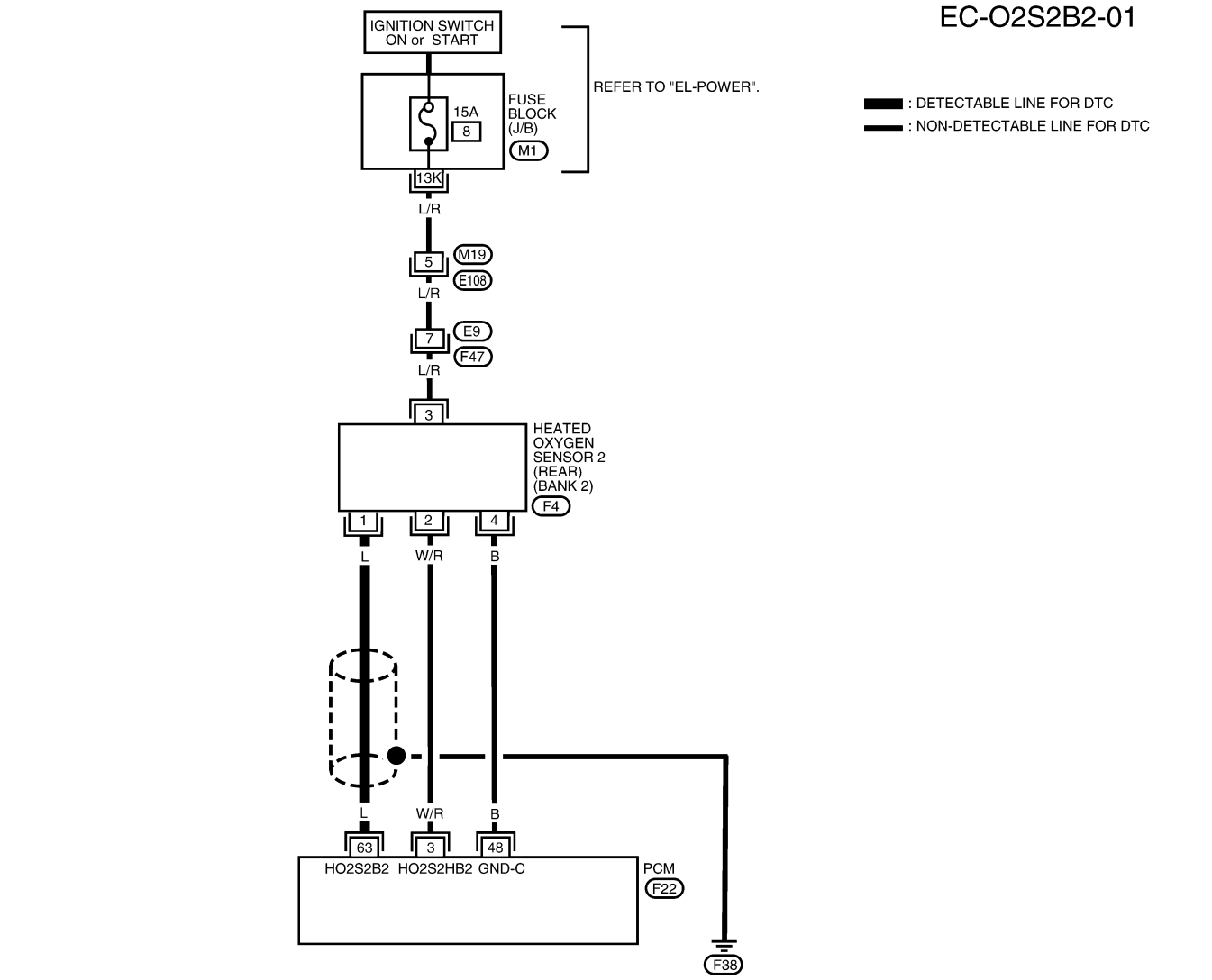
PCM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE PCM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE PCM'S TRANSISTOR. USE A GROUND OTHER THAN PCM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
95	R/L	HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)	ENGINE RUNNING FROM IDLE UP TO 2,000 RPM UNDER WARM-UP CONDITION	0 - APPROX. 1.0V

LEC851

BANK 2

NIEC0159S04



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

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
63	L	HEATED OXYGEN SENSOR 2 (REAR) (BANK 2)	ENGINE RUNNING FROM IDLE UP TO 2,000 RPM UNDER WARM-UP CONDITION	0 - APPROX. 1.0V

LEC849

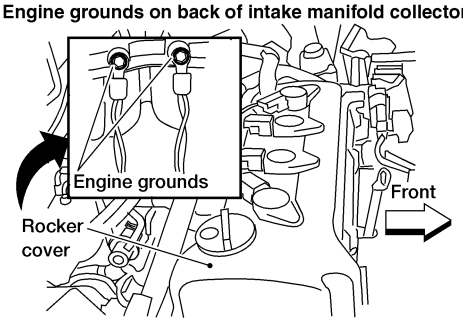
Diagnostic Procedure

NIEC0160

1	RETIGHTEN GROUND SCREWS

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

Engine grounds on back of intake manifold collector



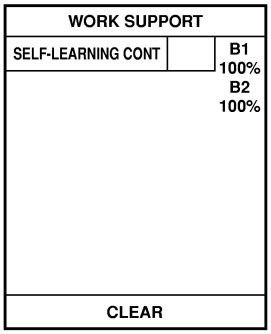
WEC249

▶	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-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching "CLEAR".

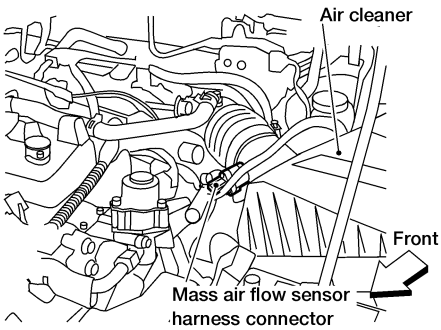


SEF652Y

4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171, 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 3 seconds at idle speed.



WEC250

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-98.
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171, P0174 detected? Is it difficult to start engine?

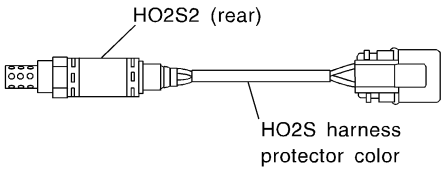
Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0171, P0174. Refer to EC-306.
No	▶	GO TO 3.

Diagnostic Procedure (Cont'd)

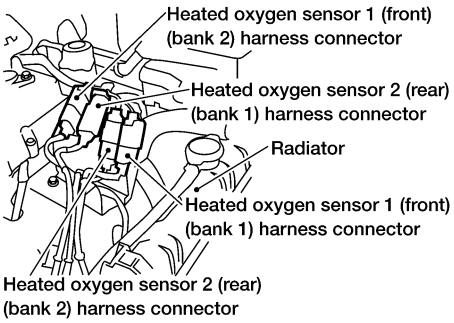
3 CHECK INPUT SIGNAL CIRCUIT

1. Turn ignition switch "OFF".
2. Check the HO2S2 (rear) harness protector color, and disconnect the corresponding heated oxygen sensor 2 (rear) harness connector and PCM harness connector.



HO2S2 (rear) (bank 1): White or Gray
HO2S2 (rear) (bank 2): Red or Reddish brown

SEF471Y



WEC835

3. Check harness continuity between PCM terminal and HO2S2 (rear) terminal as follows. Refer to "Wiring Diagram", EC-276.

DTC	Terminals		Bank
	PCM	Sensor	
P0138	63	1	2
P0158	95	1	1

LEC854

Continuity should exist.

4. Check harness continuity between PCM terminal or HO2S2 (rear) and ground as follows. Refer to "Wiring Diagram", EC-276.

DTC	Terminals		Bank
	PCM or Sensor	Ground	
P0138	63 or 1	Ground	2
P0158	95 or 1	Ground	1

LEC855

Continuity should not exist.

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

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK GROUND CIRCUIT	
1. Check harness continuity between HO2S2 (rear) terminal 4 and engine ground. Refer to "Wiring Diagram", EC-276. **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 HEATED OXYGEN SENSOR 2 (REAR)	
Refer to "Component Inspection", EC-281. **OK or NG**		
OK	▶	GO TO 6.
NG	▶	Replace corresponding heated oxygen sensor 2 (rear).

6	CHECK INTERMITTENT INCIDENT	
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-169.		
	▶	**INSPECTION END**

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
HO2S1 (B1)	XXX V
HO2S2 (B1)	XXX V
HO2S1 MNTR (B1)	RICH
HO2S2 MNTR (B1)	RICH

SEF662Y

Component Inspection

NIEC0161

HEATED OXYGEN SENSOR 2 (REAR)

NIEC0161S01

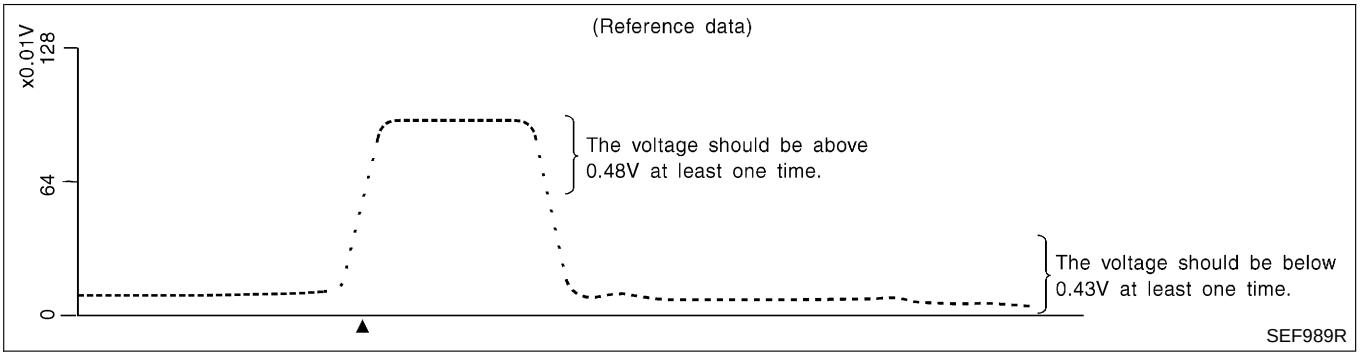
With CONSULT-II

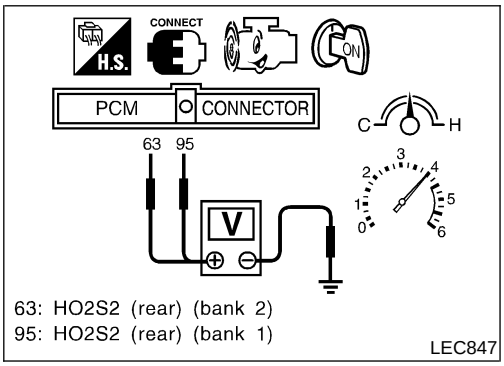
1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)/(B2)" as the monitor item with CONSULT-II.
4) Check "HO2S2 (B1)/(B2)" at idle speed when adjusting "FUEL INJECTION" to ±25%.
   "HO2S2 (B1)/(B2)" should be above 0.48V at least once when the "FUEL INJECTION" is +25%.
   "HO2S2 (B1)/(B2)" should be below 0.43V at least once when the "FUEL INJECTION" is −25%.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Component Inspection (Cont'd)



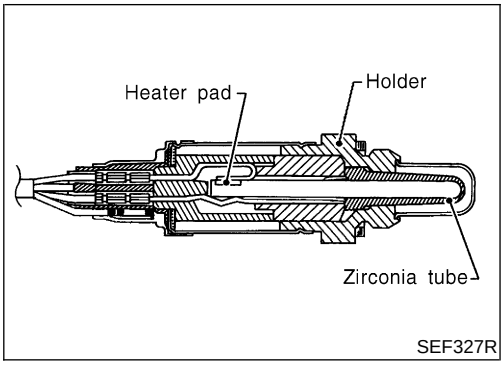


Without CONSULT-II

1) Start engine and drive vehicle at a speed of 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Set voltmeter probes between PCM terminals 63 (HO2S2 bank 2) or 95 (HO2S2 bank 1) and engine ground.
4) Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.48V at least once.
   If the voltage is above 0.48V at step 4, step 5 is not necessary.
5) Check the voltage when revving up to 6,000 rpm under no load. Or keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), D position with "OD" OFF (A/T).
   The voltage should be below 0.43V at least once.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**



Component Description

NIEC0162

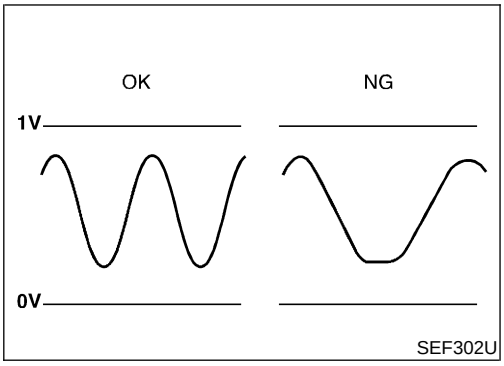
The heated oxygen sensor 2 (rear), after three way catalyst, monitors the oxygen level in the exhaust gas.
Even if switching characteristics of the heated oxygen sensor 1 (front) are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the rear heated oxygen sensor.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 (rear) is not used for engine control operation.

CONSULT-II Reference Value in Data Monitor Mode

NIEC0163

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1)/(B2)	• Engine: After warming up	Revving engine from idle to 3,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)/(B2)			LEAN ⟷ RICH

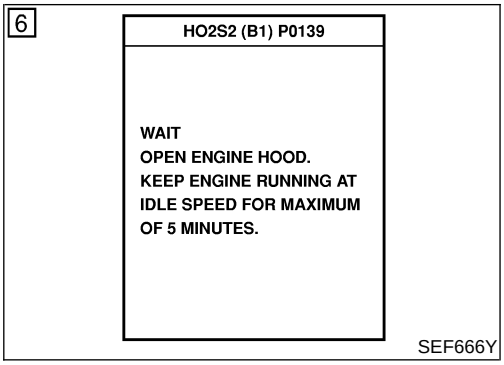


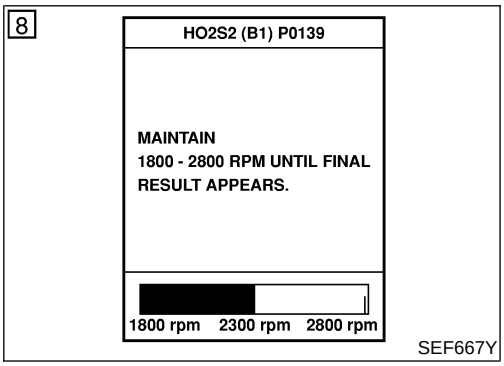
On Board Diagnosis Logic

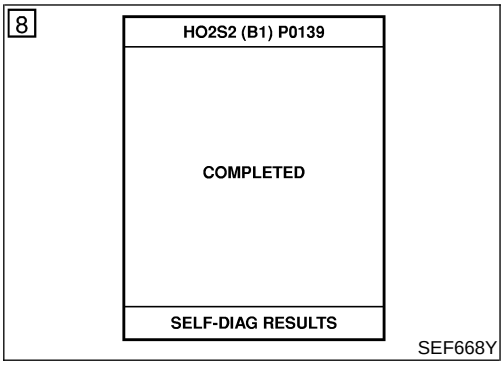
NIEC0165

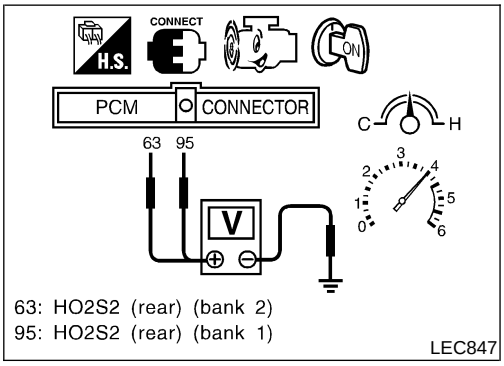
The heated oxygen sensor 2 (rear) has a much longer switching time between rich and lean than the heated oxygen sensor 1 (front). The oxygen storage capacity before the three way catalyst causes the longer switching time. To judge the malfunctions of rear heated oxygen sensor, PCM monitors whether the switching response of the sensor's voltage is faster than specified during various driving conditions such as fuel-cut.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0139	• It takes more than the specified time for the sensor to respond between rich and lean.	• Harness or connectors (The sensor circuit is open or shorted.) • Heated oxygen sensor 2 (rear) • Fuel pressure • Injectors • Intake air leaks









DTC Confirmation Procedure

NIEC0166

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

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 "HO2S2 (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-287.
   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

NIEC0167

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

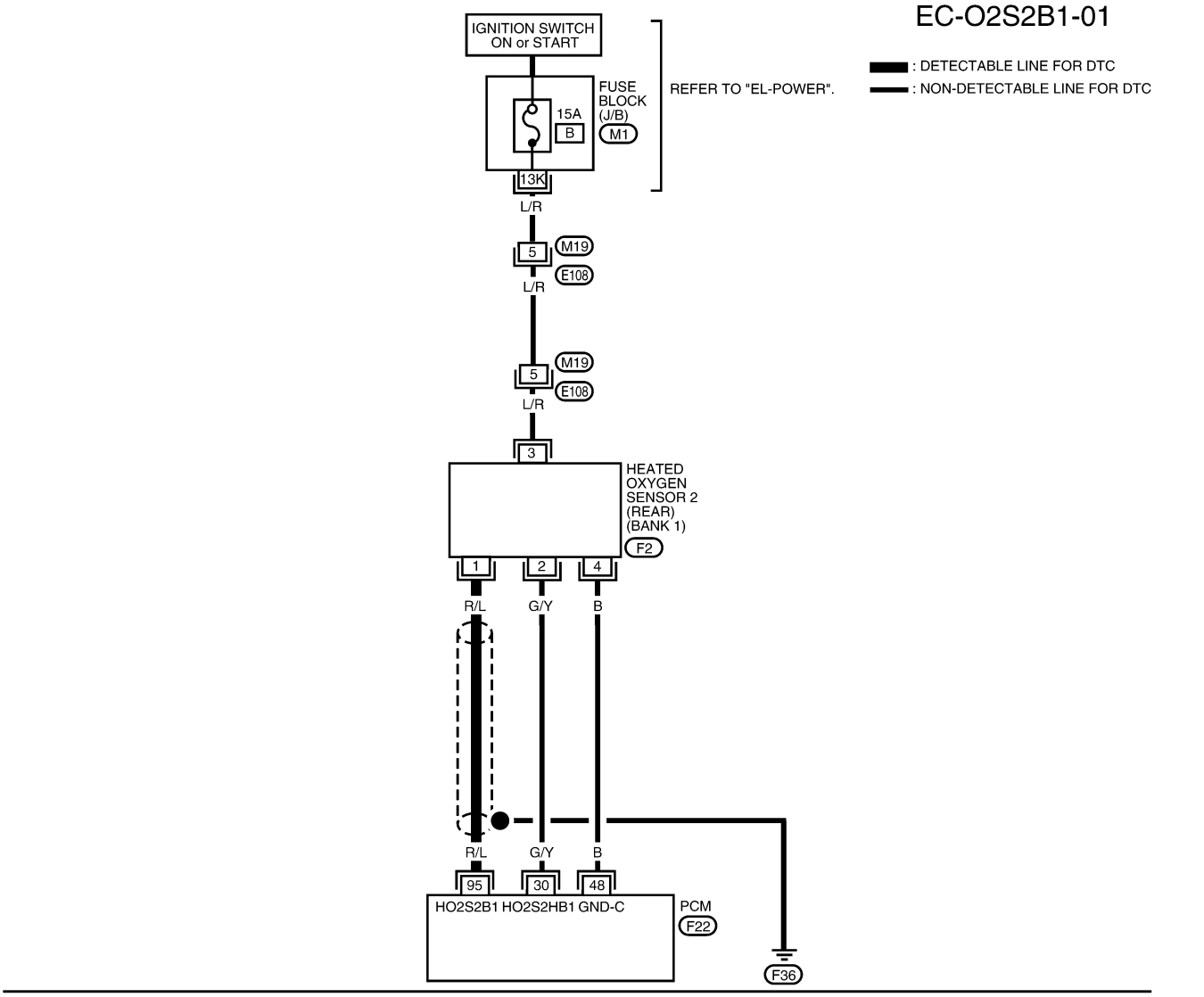
1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Set voltmeter probes between PCM terminals 63 (HO2S2 bank 2) or 95 (HO2S2 bank 1) and engine ground.
4) Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should change at more than 0.06V for 1 second during this procedure.
   If the voltage can be confirmed in step 4, step 5 is not necessary.
5) Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), D position with "OD" OFF (A/T).
   The voltage should change at more than 0.06V for 1 second during this procedure.
6) If NG, go to "Diagnostic Procedure", EC-287.

Wiring Diagram

NIEC0168

BANK 1

NIEC0168S03



WEC850

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

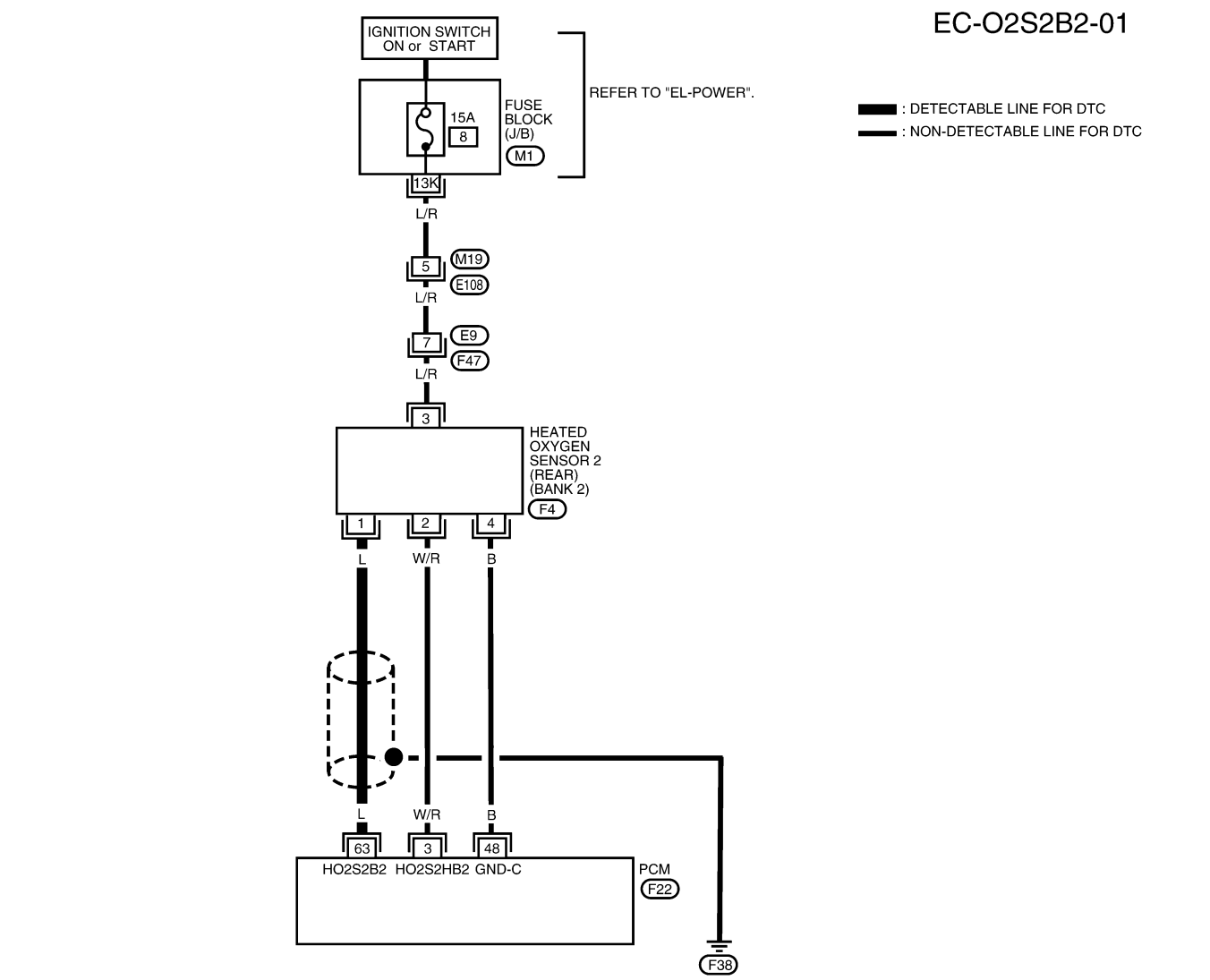
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
95	R/L	HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)	ENGINE RUNNING FROM IDLE UP TO 2,000 RPM UNDER WARM-UP CONDITION	0 - APPROX. 1.0V

LEC851

Wiring Diagram (Cont'd)

BANK 2

NIEC0168S04



WEC848

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

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
63	L	HEATED OXYGEN SENSOR 2 (REAR) (BANK 2)	ENGINE RUNNING FROM IDLE UP TO 2,000 RPM UNDER WARM-UP CONDITION	0 - APPROX. 1.0V

LEC849

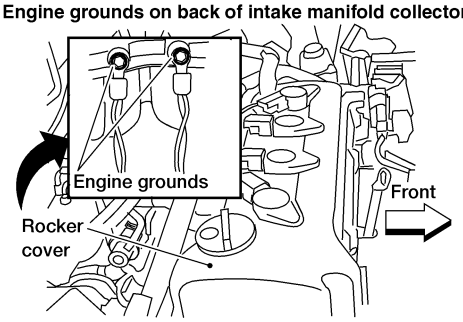
Diagnostic Procedure

NIEC0169

1	RETIGHTEN GROUND SCREWS

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

Engine grounds on back of intake manifold collector



WEC249

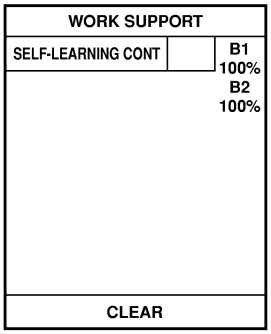
▶	GO TO 2.

Diagnostic Procedure (Cont'd)

2	CLEAR THE SELF-LEARNING DATA

With CONSULT-II

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

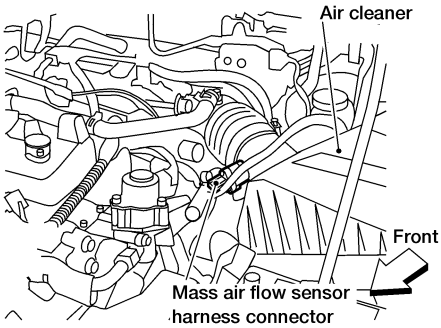


SEF652Y

4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171, P0172, P0174, 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 3 seconds at idle speed.



WEC250

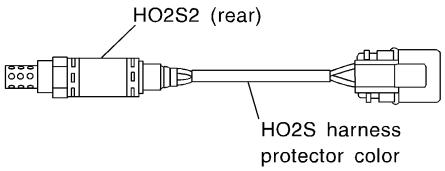
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC P0100 is displayed.
6. Erase the 1st trip DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-98.
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171, P0172, P0174, P0175 detected? Is it difficult to start engine?

Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0171, P0172, P0174, P0175. Refer to EC-306.
No	▶	GO TO 3.

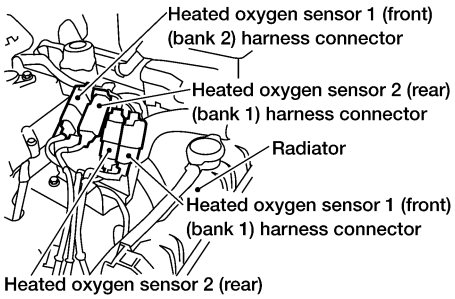
3 **CHECK INPUT SIGNAL CIRCUIT**

1. Turn ignition switch "OFF".
2. Check the HO2S2 (rear) harness protector color, and disconnect the corresponding heated oxygen sensor 2 (rear) harness connector and PCM harness connector.



HO2S2 (rear) (bank 1): White or Gray
HO2S2 (rear) (bank 2): Red or Reddish brown

SEF471Y



WEC835

3. Check harness continuity between PCM terminal and HO2S2 (rear) terminal as follows. Refer to "Wiring Diagram", EC-285.

DTC	Terminals		Bank
	PCM	Sensor	
P0139	63	1	2
P0159	95	1	1

LEC856

Continuity should exist.

4. Check harness continuity between PCM terminal HO2S2 (rear) and ground as follows. Refer to "Wiring Diagram", EC-285.

DTC	Terminals		Bank
	PCM or Sensor	Ground	
P0139	63 or 1	Ground	2
P0159	95 or 1	Ground	1

LEC857

Continuity should not exist.

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

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

Diagnostic Procedure (Cont'd)

4	CHECK GROUND CIRCUIT
1. Check harness continuity between HO2S2 (rear) terminal 4 and engine ground. Refer to "Wiring Diagram", EC-285. **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 HEATED OXYGEN SENSOR 2 (REAR)
Refer to "Component Inspection", EC-290.	
OK or NG	
OK ▶	GO TO 6.
NG ▶	Replace corresponding heated oxygen sensor 2 (rear).

6	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-169.	
▶	**INSPECTION END**

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
HO2S1 (B1)	XXX V
HO2S2 (B1)	XXX V
HO2S1 MNTR (B1)	RICH
HO2S2 MNTR (B1)	RICH

SEF662Y

Component Inspection

NIEC0170

HEATED OXYGEN SENSOR 2 (REAR)

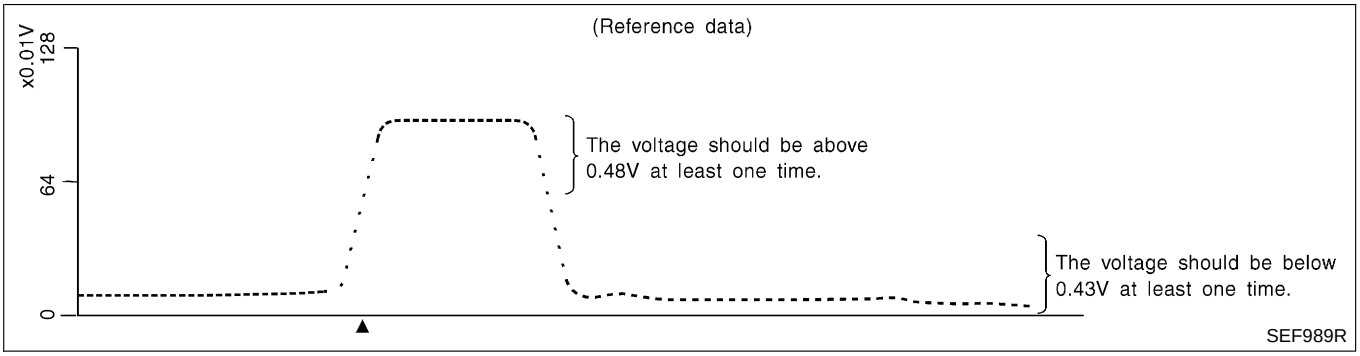
NIEC0170S01

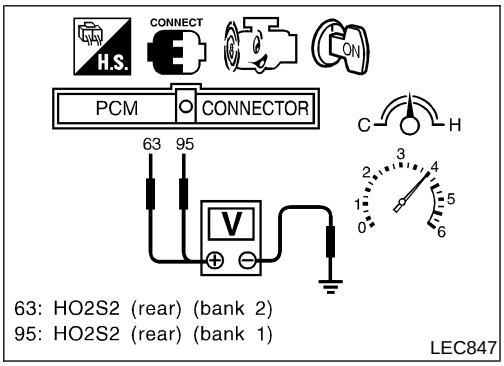
With CONSULT-II

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 "HO2S2 (B1)/(B2)" as the monitor item with CONSULT-II.
4) Check "HO2S2 (B1)/(B2)" at idle speed when adjusting "FUEL INJECTION" to ±25%.
   "HO2S2 (B1)/(B2)" should be above 0.48V at least once when the "FUEL INJECTION" is +25%.
   "HO2S2 (B1)/(B2)" should be below 0.43V at least once when the "FUEL INJECTION" is −25%.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**



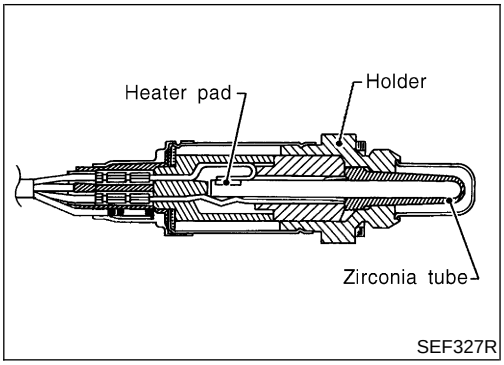


Without CONSULT-II

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 PCM terminals 63 (HO2S2 bank 2) or 95 (HO2S2 bank 1) and engine ground.
4) Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.48V at least once.
   If the voltage is above 0.48V at step 4, step 5 is not necessary.
5) Check the voltage when revving up to 6,000 rpm under no load. Or keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), D position with "OD" OFF (A/T).
   The voltage should be below 0.43V at least once.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**



Component Description

NIEC0171

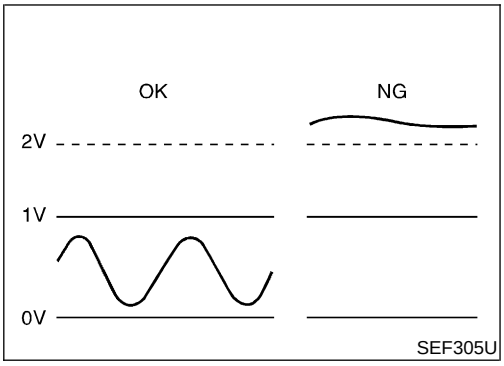
The heated oxygen sensor 2 (rear), after three way catalyst, monitors the oxygen level in the exhaust gas.
Even if switching characteristics of the heated oxygen sensor 1 (front) are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the rear heated oxygen sensor.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 (rear) is not used for engine control operation.

CONSULT-II Reference Value in Data Monitor Mode

NIEC0172

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1)/(B2)	• Engine: After warming up	Revving engine from idle to 3,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)/(B2)			LEAN ⟷ RICH

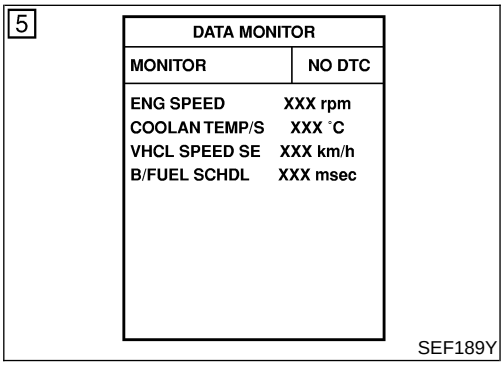


On Board Diagnosis Logic

NIEC0174

The heated oxygen sensor 2 (rear) has a much longer switching time between rich and lean than the heated oxygen sensor 1 (front). The oxygen storage capacity before the three way catalyst causes the longer switching time. To judge the malfunctions of rear heated oxygen sensor, PCM monitors whether or not the voltage is too high during various driving conditions such as fuel-cut.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0140	• An excessively high voltage from the sensor is sent to PCM.	• Harness or connectors (The sensor circuit is open or shorted.) • Heated oxygen sensor 2 (rear)



DTC Confirmation Procedure

NIEC0175

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

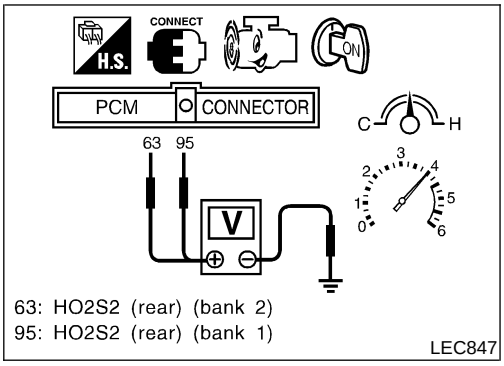
1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
2) Start engine and drive vehicle at a speed of more than 70 km/h

(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	1,000 - 3,000 rpm (A/T) 1,000 - 3,600 rpm (M/T)
VHCL SPEED SE	68 - 130 km/h (42 - 81 MPH)
B/FUEL SCHDL	2.0 - 12.5 msec (A/T) 2.0 - 10.0 msec (M/T)
Selector lever	Suitable position

6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-296.



Overall Function Check

NIEC0176

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

Without CONSULT-II

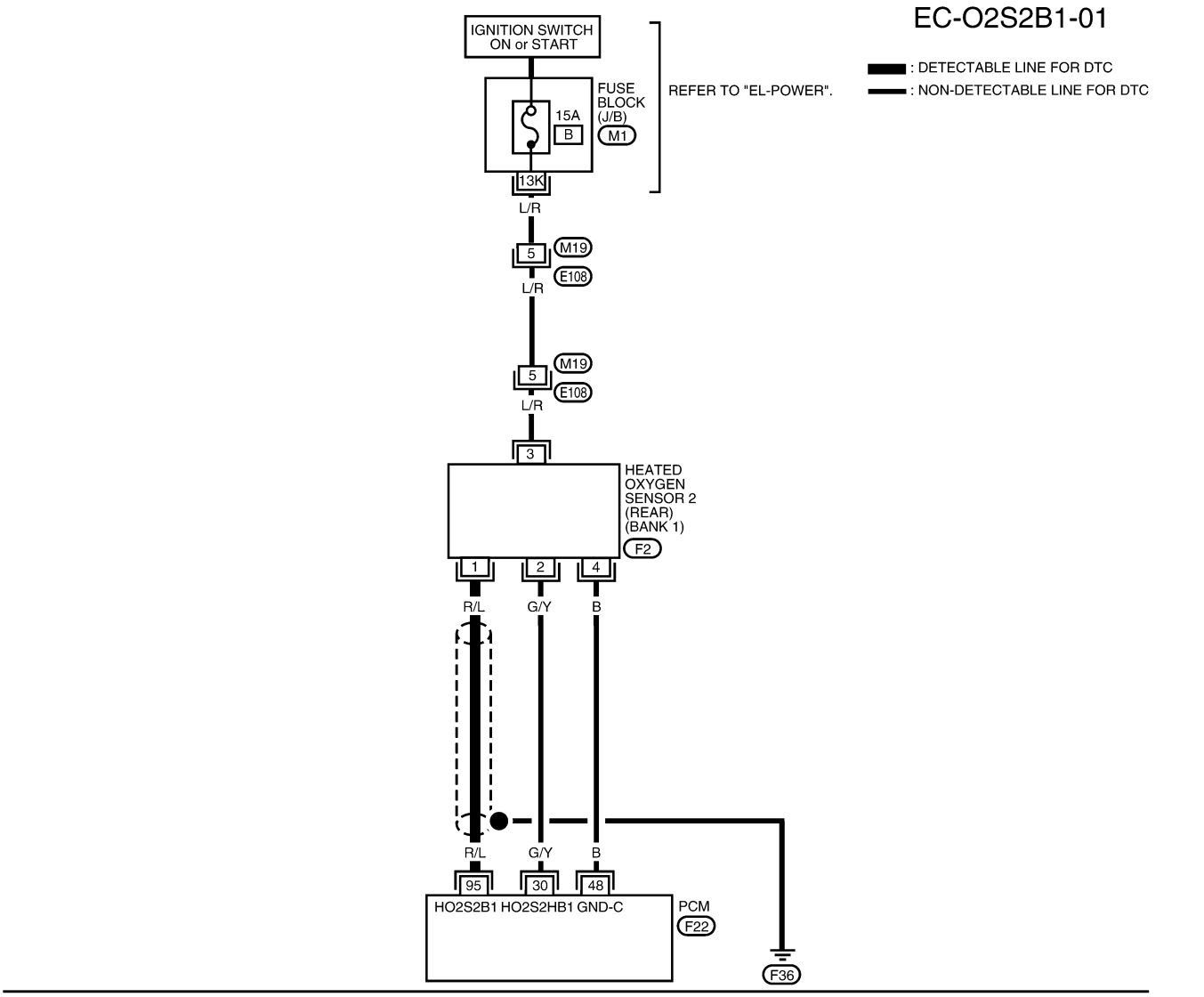
1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Set voltmeter probes between PCM terminals 63 (HO2S2 bank 2) or 95 (HO2S2 bank 1) and engine ground.
4) Check the voltage after revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be below 2V during this procedure.
5) If NG, go to "Diagnostic Procedure", EC-296.

Wiring Diagram

NIEC0177

BANK 1

NIEC0177S03



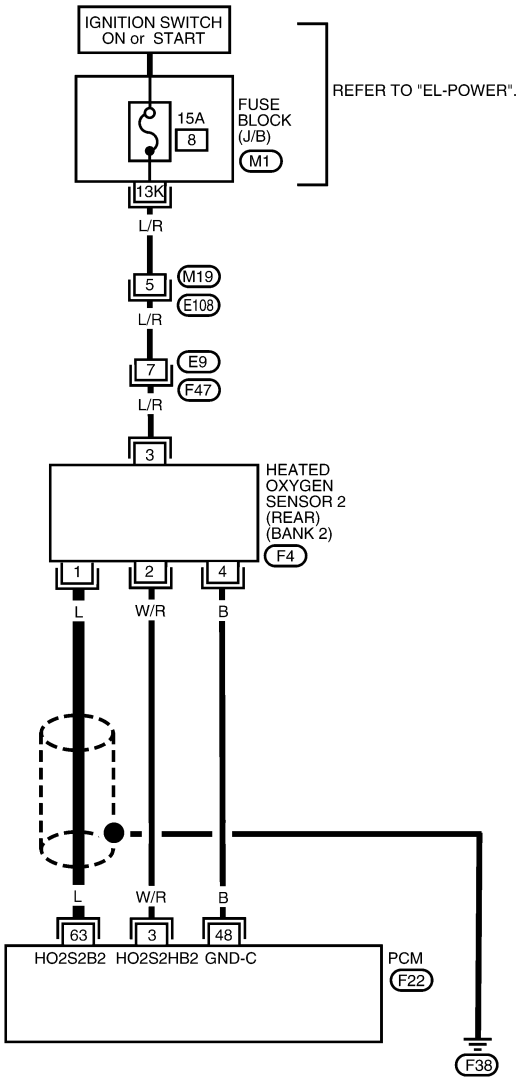
PCM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE PCM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE PCM'S TRANSISTOR. USE A GROUND OTHER THAN PCM TERMINALS, SUCH AS THE GROUND.

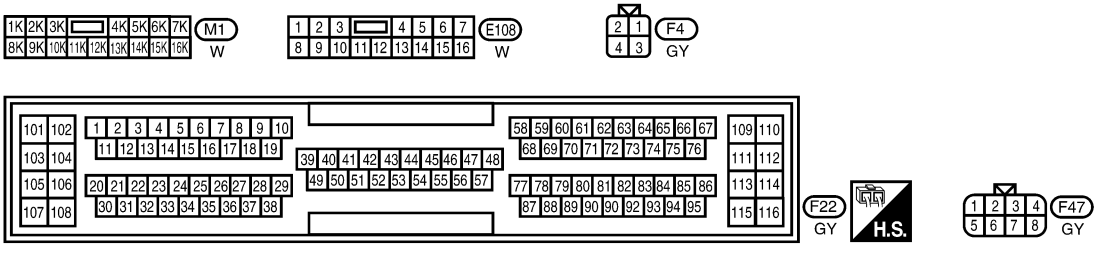
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
95	R/L	HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)	ENGINE RUNNING FROM IDLE UP TO 2,000 RPM UNDER WARM-UP CONDITION	0 - APPROX. 1.0V

LEC851

BANK 2

NIEC0177S04





WEC848

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

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
63	L	HEATED OXYGEN SENSOR 2 (REAR) (BANK 2)	ENGINE RUNNING FROM IDLE UP TO 2,000 RPM UNDER WARM-UP CONDITION	0 - APPROX. 1.0V

LEC849

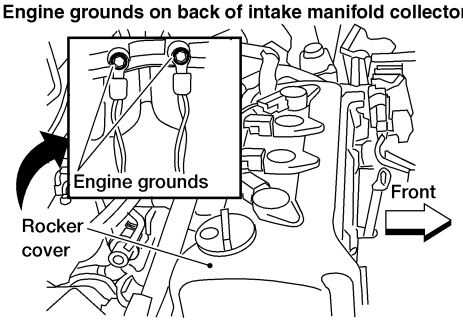
Diagnostic Procedure

NIEC0178

1	RETIGHTEN GROUND SCREWS

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

Engine grounds on back of intake manifold collector

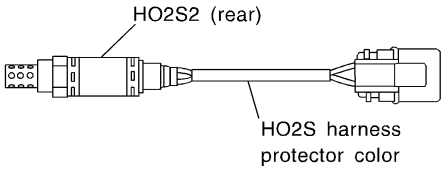


WEC249

▶	GO TO 2.

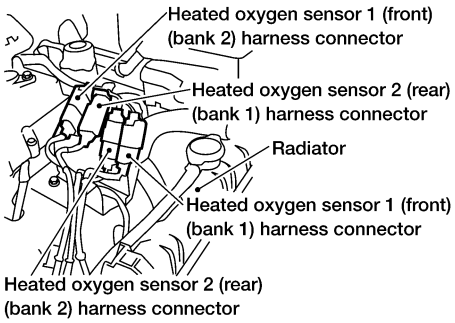
2 **CHECK INPUT SIGNAL CIRCUIT**

1. Check the HO2S2 harness protector color, and disconnect the corresponding heated oxygen sensor HO2S2 (rear) harness connector and PCM harness connector.



HO2S2 (rear) (bank 1): White or Gray
HO2S2 (rear) (bank 2): Red or Reddish brown

SEF471Y



WEC835

2. Check harness continuity between PCM terminal HO2S2 (rear) terminal as follows. Refer to "Wiring Diagram", EC-294.

DTC	Terminals		Bank
	PCM	Sensor	
P0140	63	1	2
P0160	95	1	1

LEC858

Continuity should exist.

3. Check harness continuity between PCM terminal HO2S2 (rear) and ground as follows. Refer to "Wiring Diagram", EC-294.

DTC	Terminals		Bank
	PCM or Sensor	Ground	
P0140	63 or 1	Ground	2
P0160	95 or 1	Ground	1

LEC859

Continuity should not exist.

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

OK or NG

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

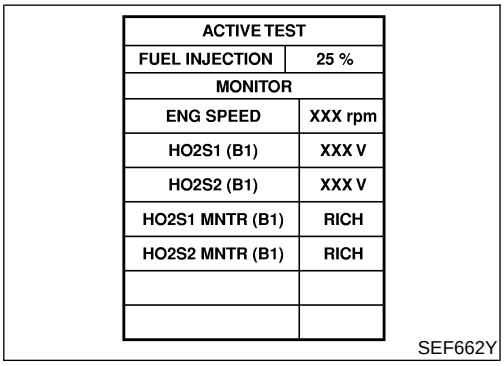
Diagnostic Procedure (Cont'd)

3	CHECK GROUND CIRCUIT	
1. Check harness continuity between HO2S2 (rear) terminal 4 and engine ground. Refer to "Wiring Diagram", EC-294. **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 HARNESS CONNECTOR	
Check heated oxygen sensor 2 (rear) harness connector for water. **Water should not exist.**		
OK or NG		
OK	▶	GO TO 5.
NG	▶	Repair or replace harness connector.

5	CHECK HEATED OXYGEN SENSOR 2 (REAR)	
Refer to "Component Inspection", EC-298.		
OK or NG		
OK	▶	GO TO 6.
NG	▶	Replace corresponding heated oxygen sensor 2 (rear).

6	CHECK INTERMITTENT INCIDENT	
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-169.		
	▶	**INSPECTION END**



Component Inspection

NIEC0179

HEATED OXYGEN SENSOR 2 (REAR)

NIEC0179S01

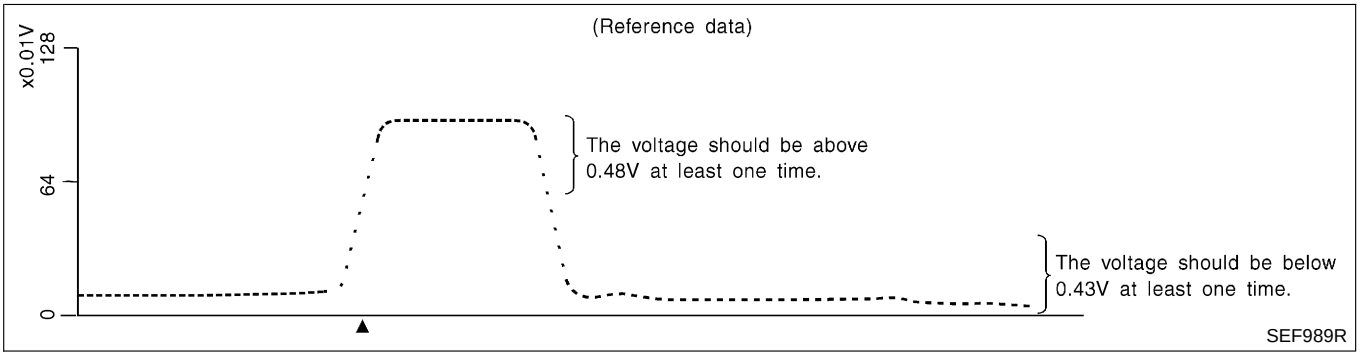
With CONSULT-II

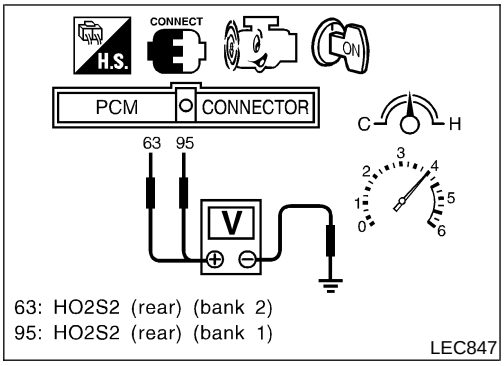
1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)/(B2)" as the monitor item with CONSULT-II.
4) Check "HO2S2 (B1)/(B2)" at idle speed when adjusting "FUEL INJECTION" to ±25%.
   "HO2S2 (B1)/(B2)" should be above 0.48V at least once when the "FUEL INJECTION" is +25%.
   "HO2S2 (B1)/(B2)" should be below 0.43V at least once when the "FUEL INJECTION" is −25%.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and**

approved anti-seize lubricant.





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 PCM terminals 63 (HO2S2 bank 2) or 95 (HO2S2 bank 1) and engine ground.
4) Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.48V at least once.
   If the voltage is above 0.48V at step 4, step 5 is not necessary.
5) Check the voltage when revving up to 6,000 rpm under no load. Or keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), D position with "OD" OFF (A/T).
   The voltage should be below 0.43V at least once.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Description

NIEC0180

SYSTEM DESCRIPTION

NIEC0180S01

Sensor	Input Signal to PCM	PCM function	Actuator
Camshaft position sensor (PHASE)	Engine speed	Heated oxygen sensor 2 heater (rear) control	Heated oxygen sensor 2 heater (rear)
Crankshaft position sensor (POS)			

The PCM performs ON/OFF control of the heated oxygen sensor 2 heater (rear) corresponding to the engine speed.

OPERATION

NIEC0180S02

Engine speed rpm	Heated oxygen sensor 2 heater (rear)
Above 3,600	OFF
Below 3,600	ON

CONSULT-II Reference Value in Data Monitor Mode

NIEC0181

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 HTR (B1)/ (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

On Board Diagnosis Logic

NIEC0183

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0141 P0161	● The current amperage in the heated oxygen sensor 2 heater (rear) circuit is out of the normal range. [An improper voltage drop signal is sent to PCM through the heated oxygen sensor 2 heater (rear).]	● Harness or connectors (The heated oxygen sensor 2 heater (rear) circuit is open or shorted.) ● Heated oxygen sensor 2 heater (rear)

DTC Confirmation Procedure

NIEC0184

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.

2

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

SEF179Y

With CONSULT-II

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 and let engine idle for at least 6 seconds.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-304.

With GST

1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle and let engine idle for at least 6 seconds.
3) Turn ignition switch "OFF" and wait at least 10 seconds.
4) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
5) Stop vehicle and let engine idle for at least 6 seconds.
6) Select "MODE 3" with GST.
7) If DTC is detected, go to "Diagnostic Procedure", EC-304.

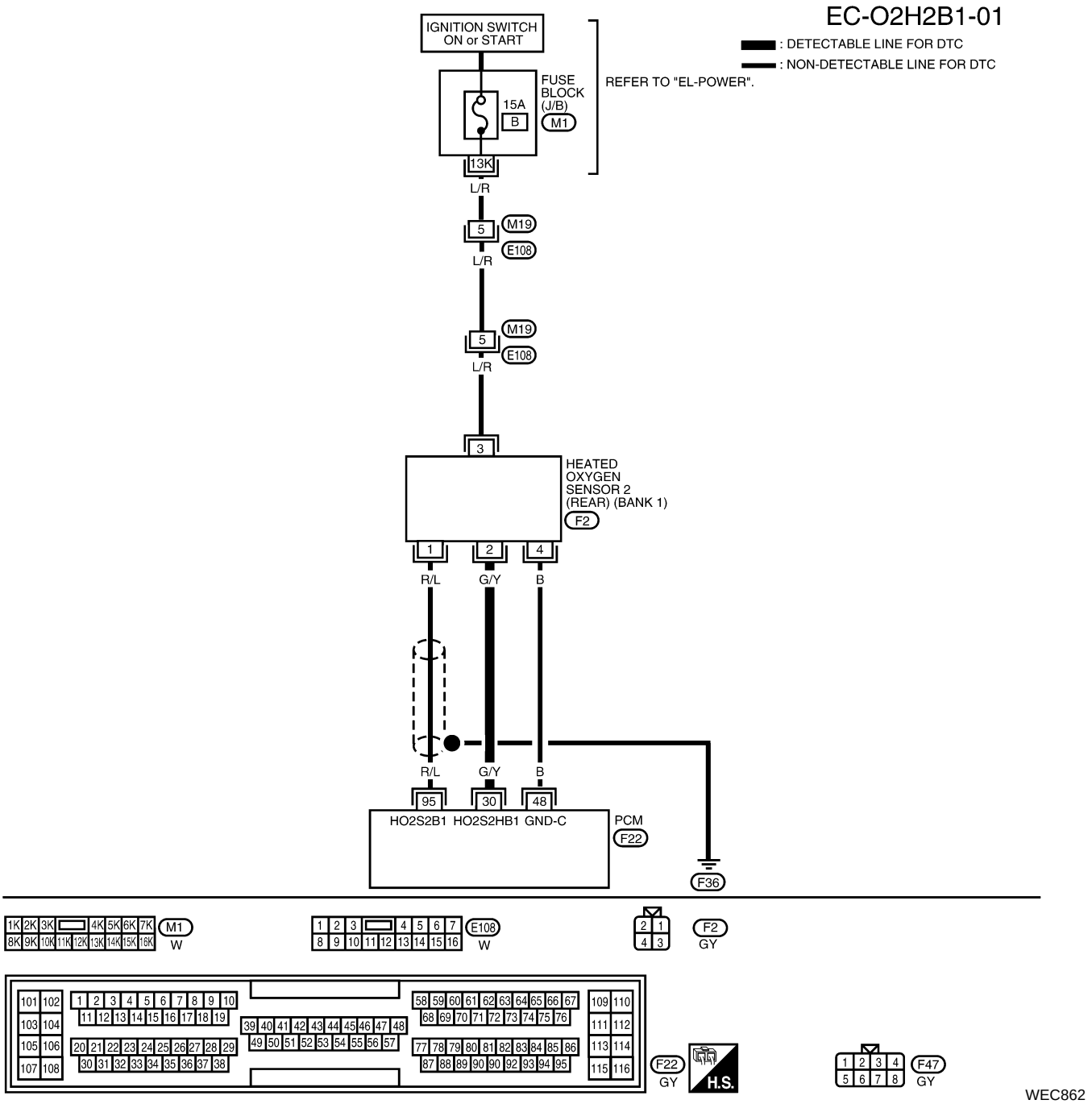
When using GST, "DTC Confirmation Procedure" should be performed twice as much as when using CONSULT-II because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II is recommended.

Wiring Diagram

NIEC0185

BANK 1

NIEC0185S03



WEC862

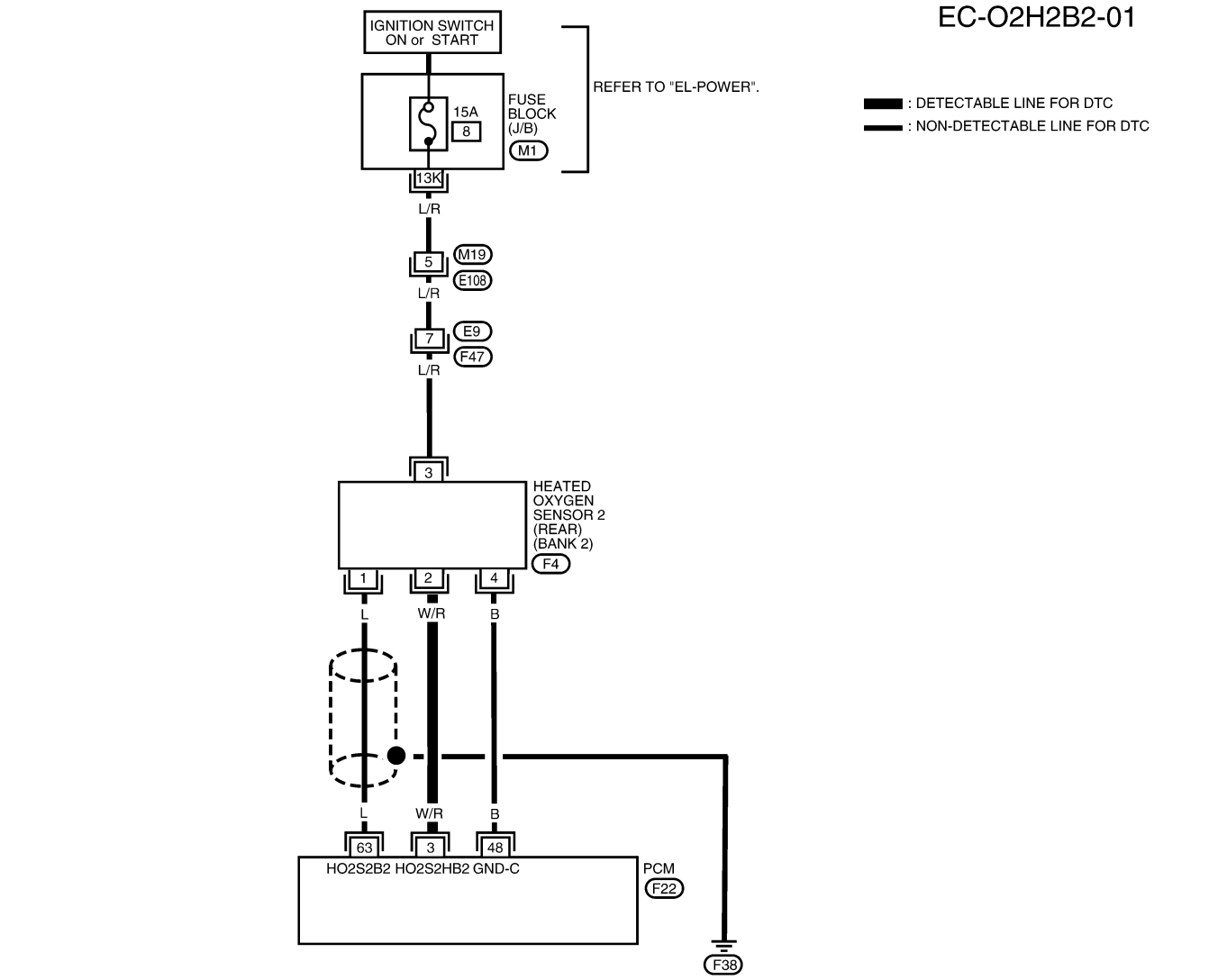
PCM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE PCM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE PCM'S TRANSISTOR. USE A GROUND OTHER THAN PCM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
30	G/Y	HEATED OXYGEN SENSOR 2 HEATER (REAR) (BANK 1)	IGN ON	BATTERY VOLTAGE
			ENGINE RUNNING ABOVE 3,600 RPM	
			ENGINE RUNNING BELOW 3,600 RPM AFTER DRIVING FOR 2 MINUTES AT A SPEED OF 70 KM/H (43 MPH) OR MORE	0 - 1.0V

WEC863

BANK 2

NIEC0185S04



WEC860

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

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
3	W/R	HEATED OXYGEN SENSOR 2 HEATER (REAR) (BANK 2)	IGN ON	BATTERY VOLTAGE
			ENGINE RUNNING ABOVE 3,600 RPM	
			ENGINE RUNNING BELOW 3,600 RPM AFTER DRIVING FOR 2 MINUTES AT A SPEED OF 70 KM/H (43 MPH) OR MORE	0 - 1.0V

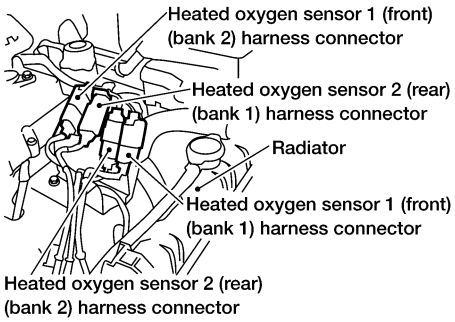
LEC861

Diagnostic Procedure

NIEC0186

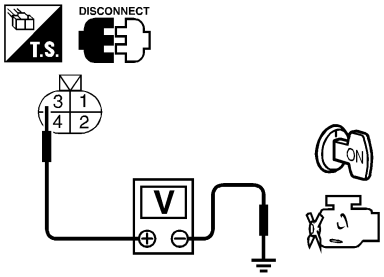
1	CHECK POWER SUPPLY

1. Turn ignition switch “OFF”.
2. Check the HO2S2 (rear) harness protector color, and disconnect the corresponding heated oxygen sensor harness connector.



WEC835

3. Turn ignition switch “ON”.
4. Check voltage between rear HO2S terminal 3 and ground.



SEF474Y

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E7, F41
- Harness connectors M17, E108
- Fuse block (J/B) connector M1
- 15A fuse
- Harness for open or short between heated oxygen sensor 2 (rear) and fuse

	▶	Repair harness or connectors.

3	CHECK GROUND CIRCUIT

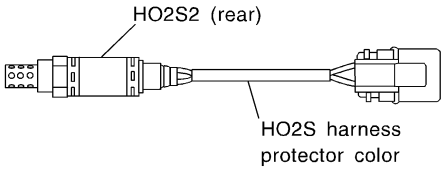
1. Turn ignition switch “OFF”.
2. Disconnect PCM harness connector.
3. Check harness continuity between HO2S2 (rear) terminal 4 and PCM terminal 48. Refer to “Wiring Diagram”, EC-302.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

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 HEATED OXYGEN SENSOR 2 HEATER (REAR)

1. Turn ignition switch "OFF".
2. Check the HO2S2 (rear) harness protector color, and disconnect the corresponding HO2S1 (rear) harness connector.



HO2S2 (rear) (bank 1): White or Gray
HO2S2 (rear) (bank 2): Red or Reddish brown

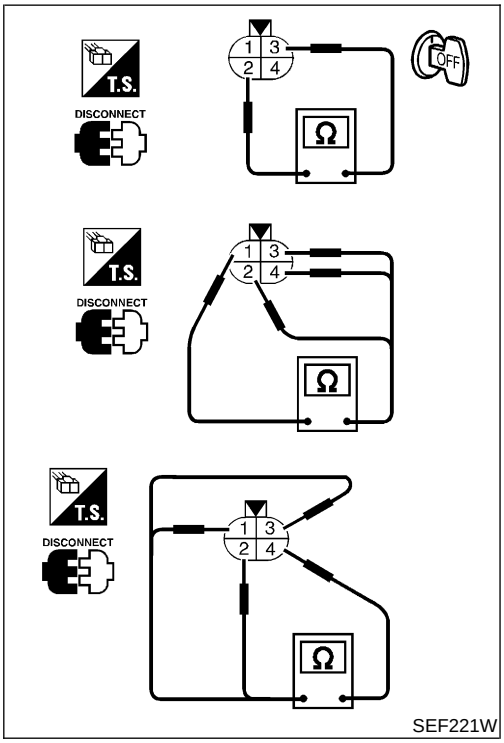
SEF471Y

3. Check HO2S2 heater (rear), refer to EC-305.

OK or NG

OK	▶	GO TO 5.
NG	▶	Replace corresponding heated oxygen sensor 2 (rear).

5	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-169.	
▶	**INSPECTION END**



Component Inspection

HEATED OXYGEN SENSOR 2 HEATER (REAR)

NIEC0187
NIEC0187S01

Check the following.

1. Check resistance between terminals 2 and 3.
   Resistance: 2.3 - 4.3Ω at 25°C (77°F)
2. Check continuity.

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

If NG, replace the heated oxygen sensor 2 (rear).

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

On Board Diagnosis Logic

NIEC0188

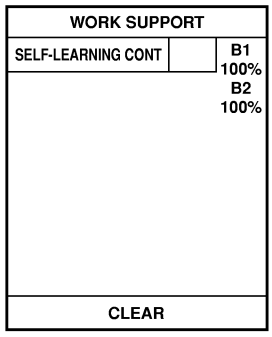
With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the heated oxygen sensor 1 (front) (bank 1)/(bank 2). The PCM calculates the necessary compensation to correct the offset 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 PCM judges the condition as a fuel injection system malfunction and lights up the MIL (2 trip detection logic).

Sensor	Input Signal to PCM	PCM function	Actuator
Heated oxygen sensor 1 (front) (bank 1)/(bank 2)	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection & mixture ratio control	Injectors

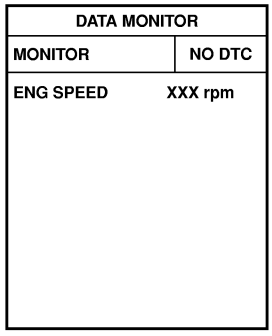
DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0171	• Fuel injection system does not operate properly. • The amount of mixture ratio compensation is too large. (The mixture ratio is too lean.)	• Intake air leaks • Heated oxygen sensor 1 (front) (bank 1)/(bank 2) • Injectors • Exhaust gas leaks • Incorrect fuel pressure • Lack of fuel • Mass air flow sensor
P0174		

4

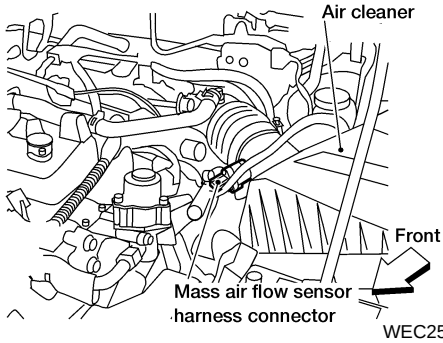


SEF652Y

6



SEF058Y



WEC250

DTC Confirmation Procedure

NIEC0189

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

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-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
4) Clear the self-learning control coefficient by touching “CLEAR”.
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 (P0174) should be detected at this stage, if a malfunction exists. If so, go to “Diagnostic Procedure”, EC-310.
7) If it is difficult to start engine at step 6, the fuel injection system has a malfunction.
8) Crank engine while depressing accelerator pedal. If engine starts, go to “Diagnostic Procedure”, EC-310. If engine does not start, visually check for exhaust and intake air leak.

With GST

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch “OFF” and wait at least 10 seconds.
3) Disconnect mass air flow sensor harness connector. Then restart and run engine for at least 3 seconds at idle speed.
4) Stop engine and reconnect mass air flow sensor harness connector.
5) Select “MODE 7” with GST. Make sure 1st trip DTC P0100 is detected.
6) Select “MODE 4” with GST and erase the 1st trip DTC P0100.

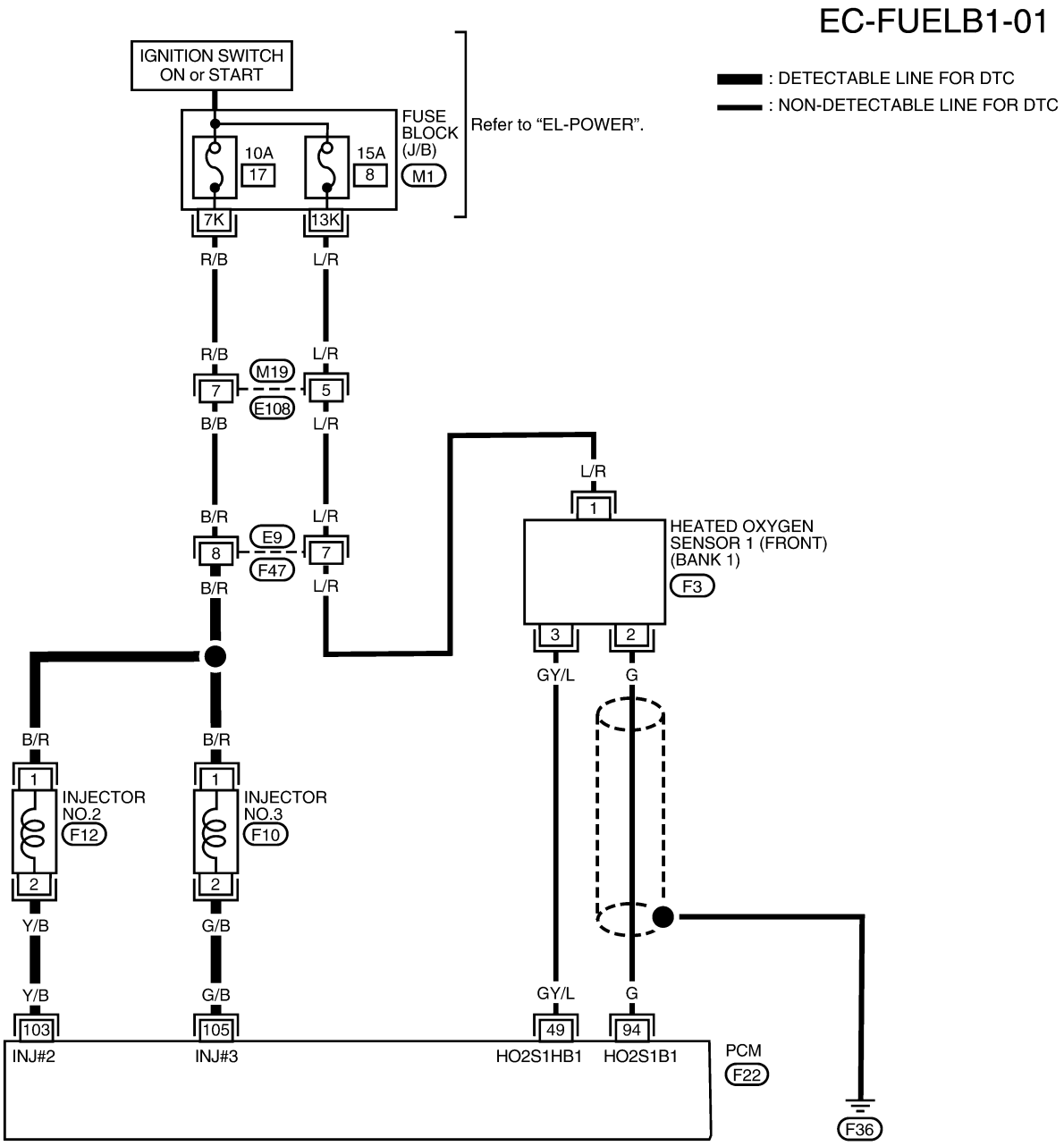
7) Start engine again and run it for at least 10 minutes at idle speed.
8) Select "MODE 7" with GST. The 1st trip DTC P0171 (P0174) should be detected at this stage, if a malfunction exists. If so, go to "Diagnostic Procedure", EC-310.
9) If it is difficult to start engine at step 8, the fuel injection system has a malfunction.
10) Crank engine while depressing accelerator pedal. If engine starts, go to "Diagnostic Procedure", EC-310. If engine does not start, visually check for exhaust and intake air leak.

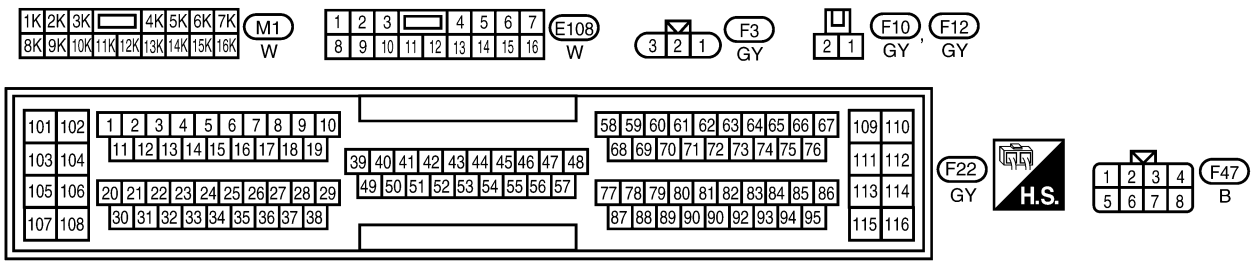
Wiring Diagram

NIEC0190

BANK 1

NIEC0190S03

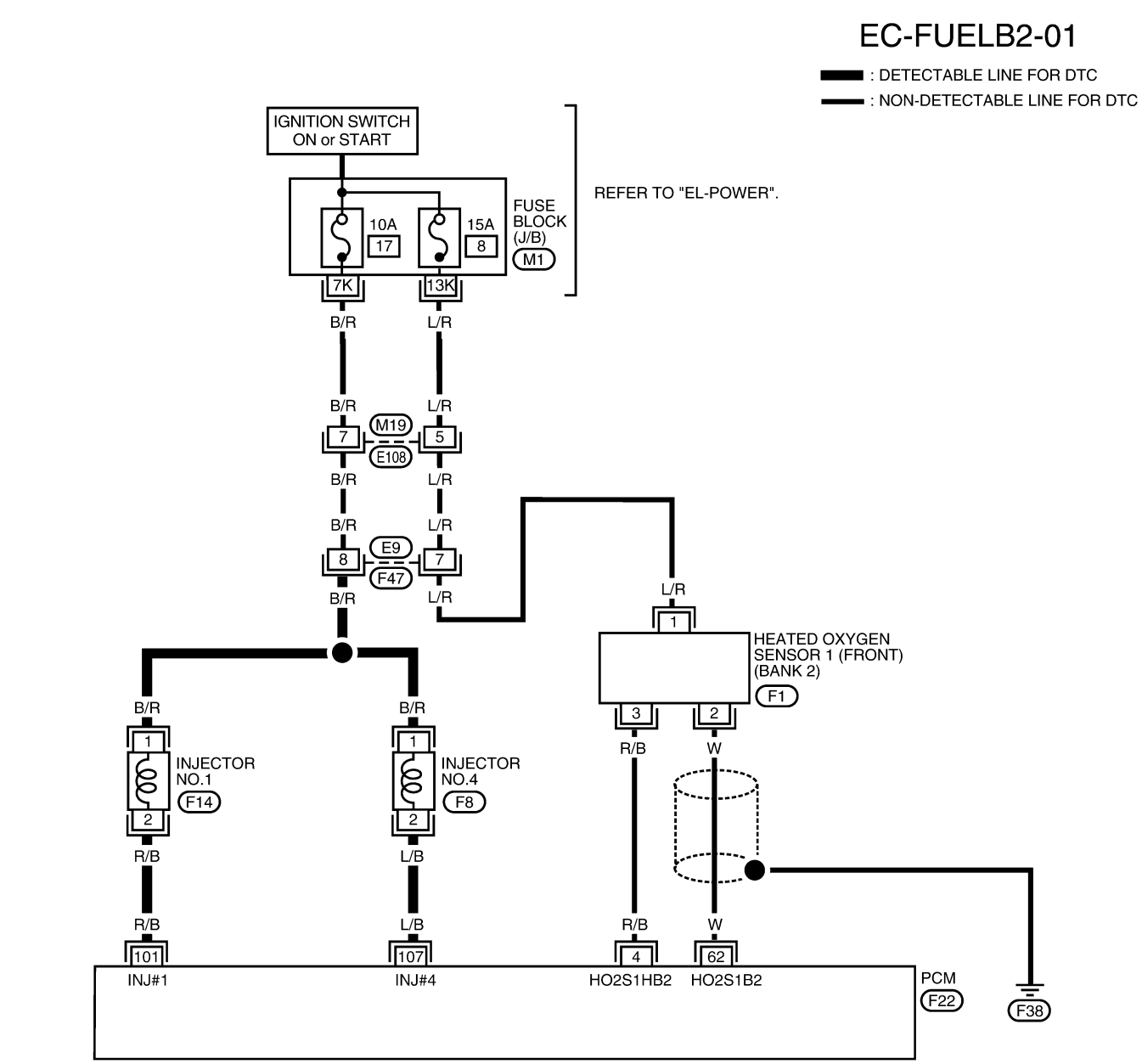


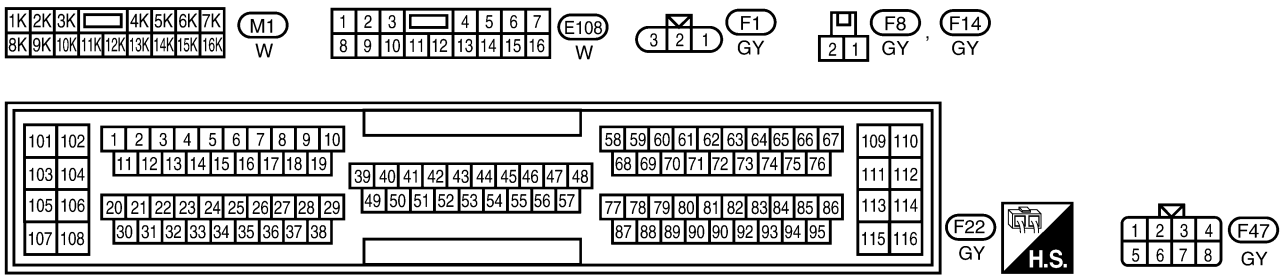


WEC865

BANK 2

NIEC0190S04





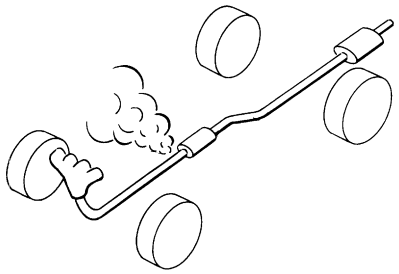
WEC864

Diagnostic Procedure

NIEC0191

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

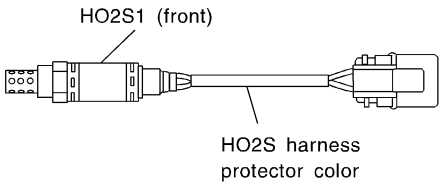
Listen for an intake air leak after the mass air flow sensor.

OK or NG

OK	▶	GO TO 3.
NG	▶	Repair or replace.

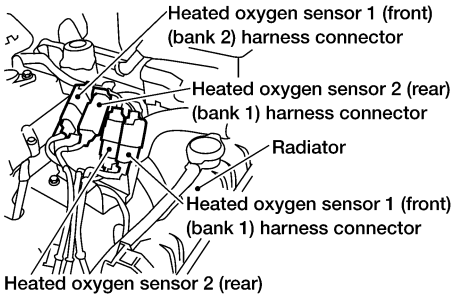
3 **CHECK HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) CIRCUITS**

1. Turn ignition switch "OFF".
2. Check the HO2S1 (front) (bank 1)/(bank 2) harness protector color, and disconnect the corresponding heated oxygen sensor 1 (front) (bank 1)/(bank 2) harness connector and PCM harness connector.



HO2S1 (front) (bank 1): Black
HO2S1 (front) (bank 2): Blue

LEC646



WEC835

3. Check harness continuity between PCM terminal and HO2S1 (front) (bank 1)/(bank 2) terminal as follows. Refer to "Wiring Diagram", EC-308.

DTC	Terminals		Bank
	PCM	Sensor	
P0171	62	2	2
P0174	94	2	1

LEC866

Continuity should exist.

4. Check harness continuity between PCM terminal or HO2S1 (front) (bank 1)/(bank 2) and ground as follows. Refer to "Wiring Diagram", EC-308.

DTC	Terminals		Bank
	PCM or Sensor	Ground	
P0171	62 or 2	Ground	2
P0174	94 or 2	Ground	1

LEC867

Continuity should not exist.

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

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

Diagnostic Procedure (Cont'd)

4	CHECK FUEL PRESSURE

1. Release fuel pressure to zero.
   Refer to EC-67.
2. Install fuel pressure gauge and check fuel pressure.
   At idling:
   When fuel pressure regulator vacuum hose is connected.
   235 kPa (2.4 kg/cm^2, 34 psi)
   When fuel pressure regulator vacuum hose is disconnected.
   294 kPa (3.0 kg/cm^2, 43 psi)

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART

Check the following.
- Fuel pump and circuit Refer to EC-674.
- Fuel pressure regulator Refer to EC-68.
- Fuel lines. Refer to ***MA-19***, "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.
   at idling: 1.4 - 4.0 g·m/sec
   at 2,500 rpm: 5.0 - 10.0 g·m/sec

With GST
1. Install all removed parts.
2. Check mass air flow sensor signal in MODE 1 with GST.
   at idling: 1.4 - 4.0 g·m/sec
   at 2,500 rpm: 5.0 - 10.0 g·m/sec

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-176.

7	CHECK FUNCTION OF INJECTORS

With CONSULT-II

1. Start engine.
2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-II.

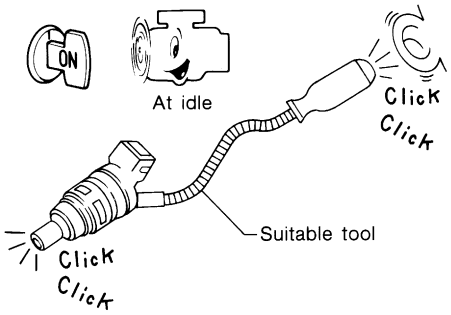
ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
IACV-AAC/V	XXX step

SEF190Y

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-665.

8	REMOVE INJECTOR

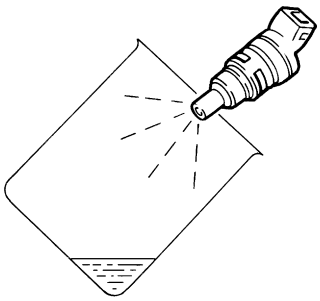
1. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
2. Turn ignition switch "OFF".
3. Remove injector with fuel tube assembly. Refer to EC-68.
   Keep fuel hose and all injectors connected to injector gallery. The injector harness connectors should remain connected.

	▶	GO TO 9.

Diagnostic Procedure (Cont'd)

9	CHECK INJECTOR

1. Disconnect all ignition wires.
2. Place pans or saucers under each injector.
3. Crank engine for about 3 seconds. Make sure that fuel sprays out from injectors.



SEF595Q

Fuel should be sprayed evenly for each cylinder.

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace injectors from which fuel does not spray out. Always replace O-ring with new one.

10	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-169.	
▶	**INSPECTION END**

On Board Diagnosis Logic

NIEC0192

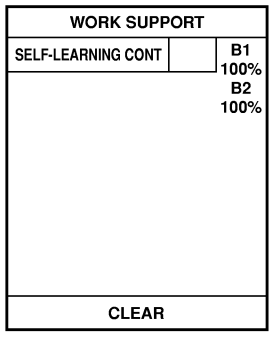
With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the heated oxygen sensor 1 (front) (bank 1)/(bank 2). The PCM calculates the necessary compensation to correct the offset 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 PCM judges the condition as the fuel injection system malfunction and lights up the MIL (2 trip detection logic).

Sensor	Input Signal to PCM	PCM function	Actuator
Heated oxygen sensor 1 (front) (bank 1)/(bank 2)	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection & mixture ratio control	Injectors

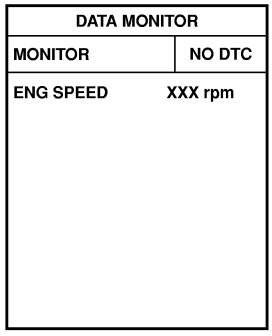
DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0172 P0175	• Fuel injection system does not operate properly. • The amount of mixture ratio compensation is too large. (The mixture ratio is too rich.)	• Heated oxygen sensor 1 (front) (bank 1)/(bank 2) • Injectors • Exhaust gas leaks • Incorrect fuel pressure • Mass air flow sensor

4

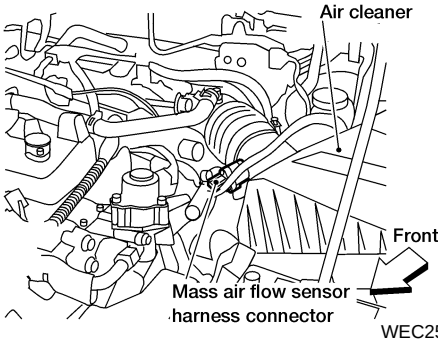


SEF652Y

6



SEF058Y



WEC250

DTC Confirmation Procedure

NIEC0193

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

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-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II.
4) Clear the self-learning control coefficient by touching "CLEAR" or "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-319.
7) If it is difficult to start engine at step 6, the fuel injection system has a malfunction.
8) Crank engine while depressing accelerator pedal. If engine starts, go to "Diagnostic Procedure", EC-319. If engine does not start, remove ignition plugs and check for fouling, etc.

With GST

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 10 seconds.
3) Disconnect mass air flow sensor harness connector. Then restart and run engine for at least 3 seconds at idle speed.
4) Stop engine and reconnect mass air flow sensor harness connector.
5) Select "MODE 7" with GST. Make sure 1st trip DTC P0100 is detected.
6) Select "MODE 4" with GST and erase the 1st trip DTC P0100.

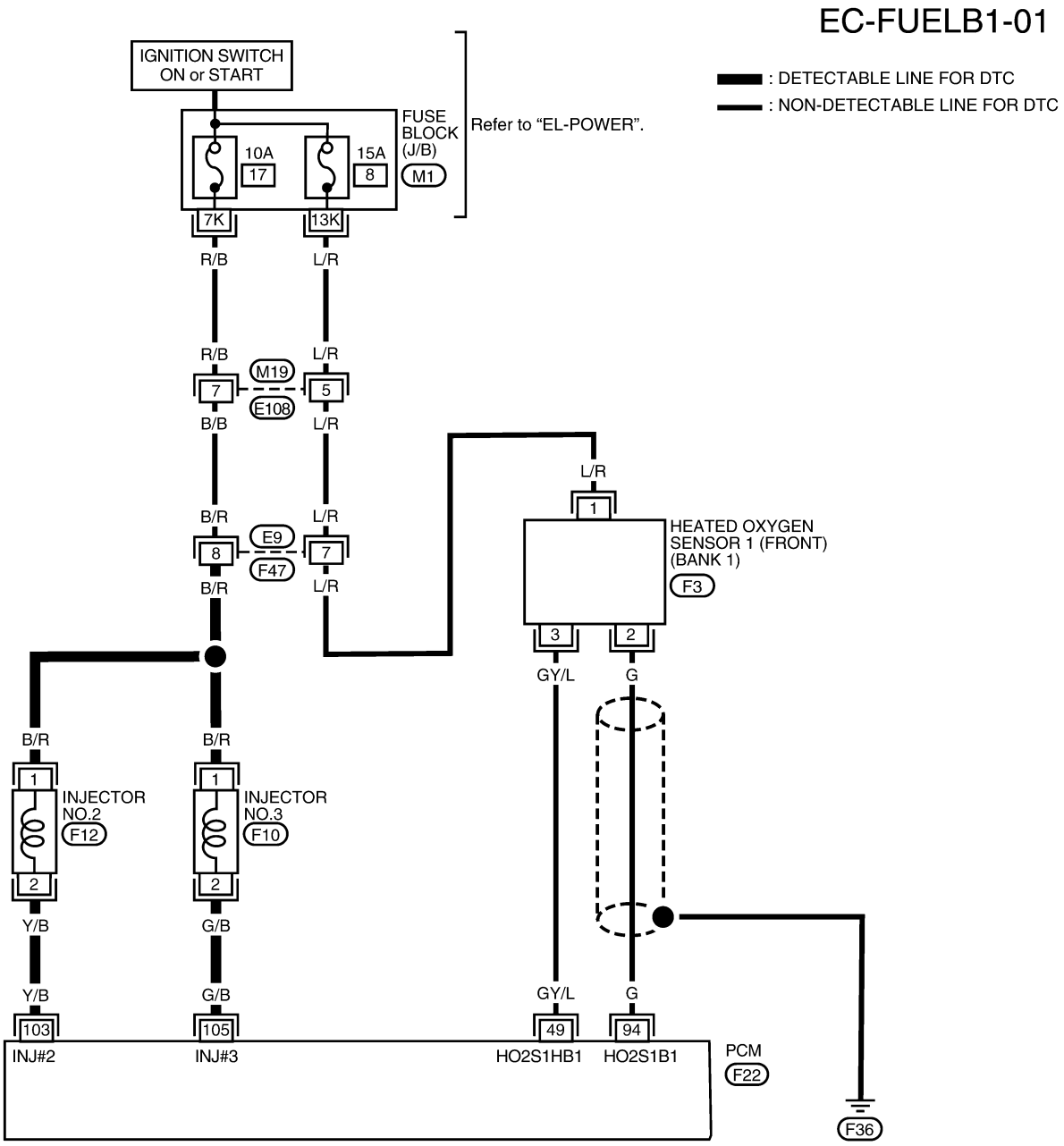
7) Start engine again and run it for at least 10 minutes at idle speed.
8) Select "MODE 7" with GST. The 1st trip DTC P0172 (P0175) should be detected at this stage, if a malfunction exists. If so, go to "Diagnostic Procedure", EC-319.
9) If it is difficult to start engine at step 8, the fuel injection system has a malfunction.
10) Crank engine while depressing accelerator pedal.
If engine starts, go to "Diagnostic Procedure", EC-319. If engine does not start, remove ignition plugs and check for fouling, etc.

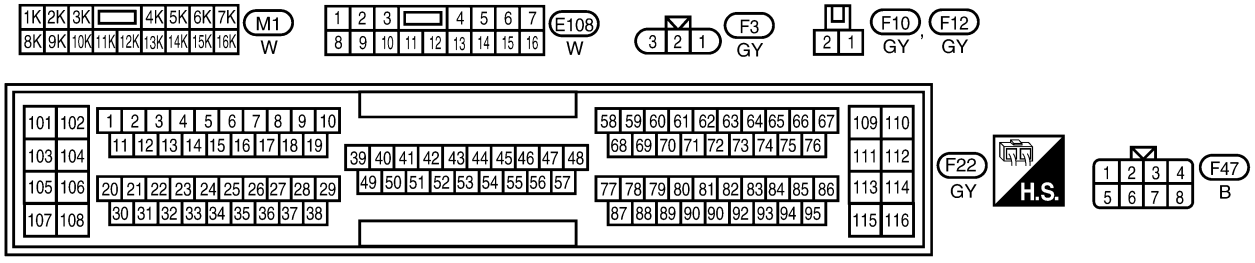
Wiring Diagram

NIEC0194

NIEC0194S03

BANK 1



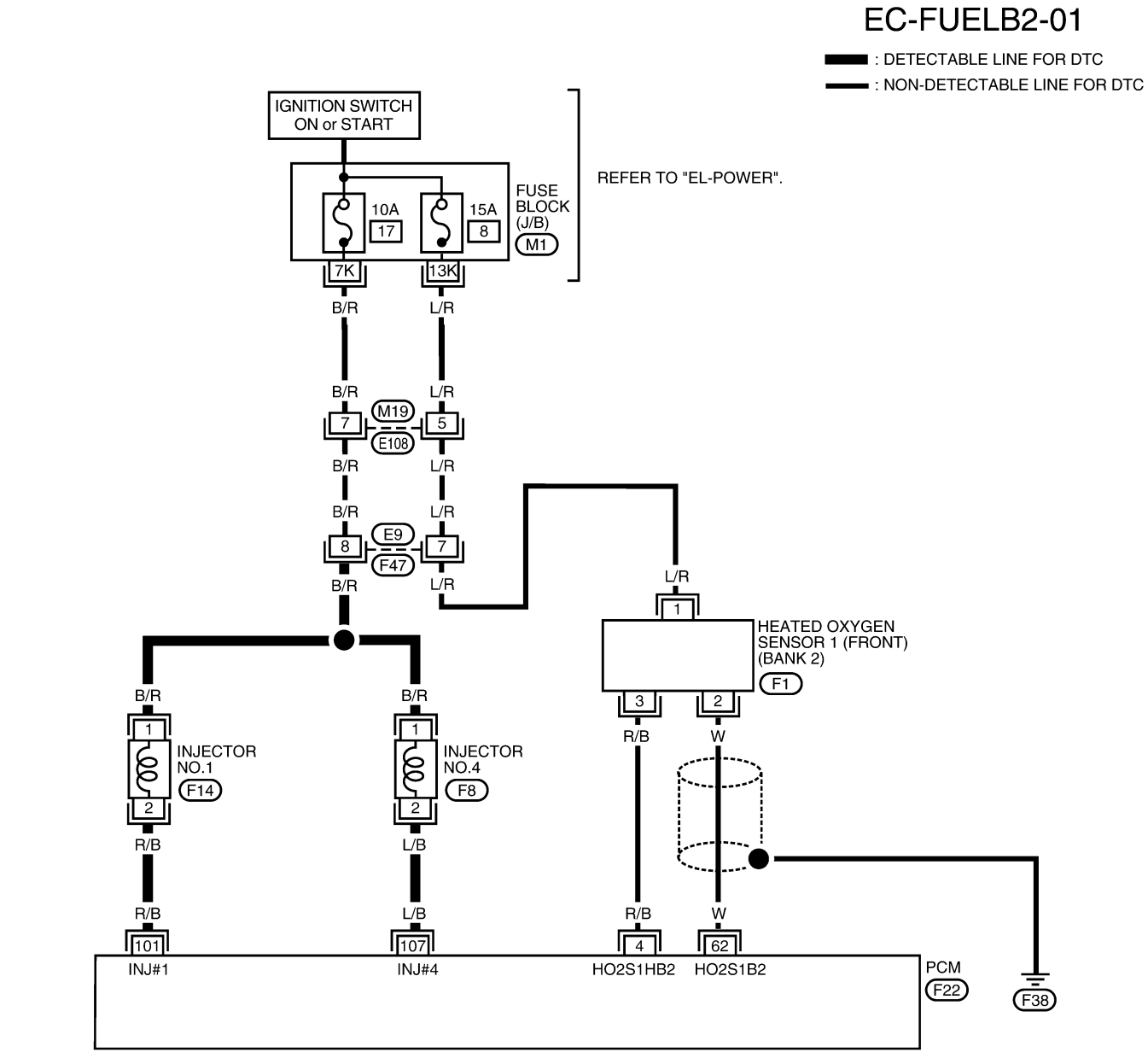


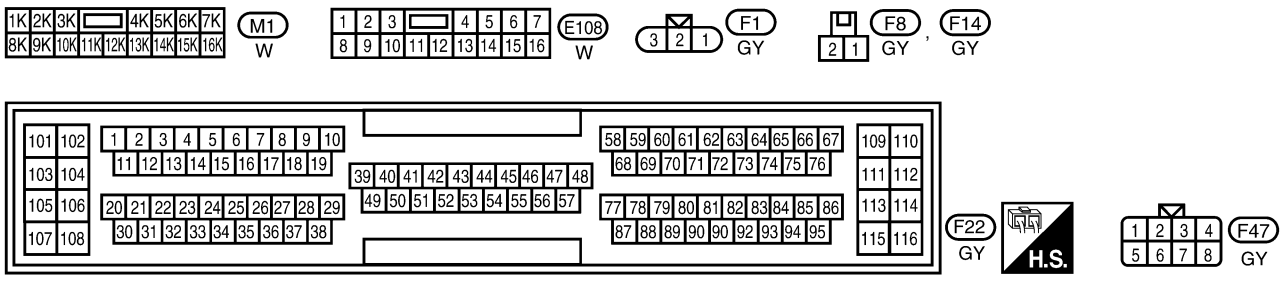
WEC865

Wiring Diagram (Cont'd)

BANK 2

NIEC0194S04





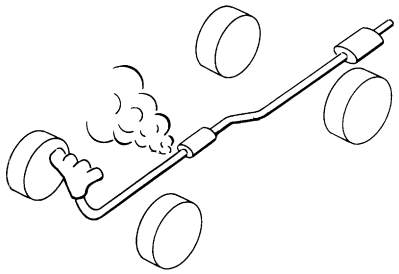
WEC864

Diagnostic Procedure

NIEC0195

1	CHECK FOR EXHAUST AIR LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust air leak before the three way catalyst.



SEF099P

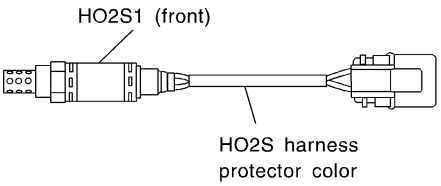
OK or NG

OK	▶	GO TO 2.
NG	▶	Repair or replace.

Diagnostic Procedure (Cont'd)

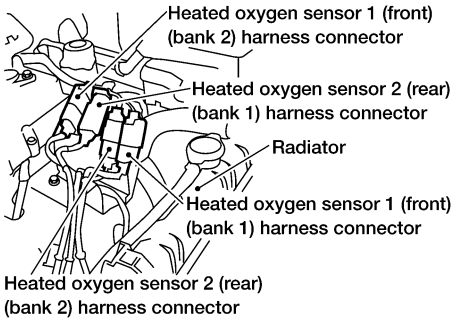
2 CHECK HEATED OXYGEN SENSOR 1 (FRONT) CIRCUIT

1. Turn ignition switch "OFF".
2. Check the HO2S1 (front) (bank 1)/(bank 2) harness protector color, and disconnect the corresponding heated oxygen sensor 1 (front) (bank 1)/(bank 2) harness connector and PCM harness connector.



HO2S1 (front) (bank 1): Black
HO2S1 (front) (bank 2): Blue

LEC646



WEC835

3. Check harness continuity between PCM terminal and HO2S1 (front) (bank 1)/(bank 2) terminal as follows. Refer to "Wiring Diagram", EC-317.

DTC	Terminals		Bank
	PCM	Sensor	
P0172	62	2	2
P0175	94	2	1

LEC868

Continuity should exist.

4. Check harness continuity between PCM terminal or HO2S1 (front) (bank 1)/(bank 2) and ground as follows. Refer to "Wiring Diagram", EC-317.

DTC	Terminals		Bank
	PCM or Sensor	Ground	
P0172	62 or 2	Ground	2
P0175	94 or 2	Ground	1

LEC869

Continuity should not exist.

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

OK or NG

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

3	CHECK FUEL PRESSURE
1. Release fuel pressure to zero. Refer to EC-67. 2. Install fuel pressure gauge and check fuel pressure. **At idling:** **When fuel pressure regulator vacuum hose is connected.** **Approximately 235 kPa (2.4 kg/cm^2, 34 psi)** **When fuel pressure regulator vacuum hose is disconnected.** **Approximately 294 kPa (3.0 kg/cm^2, 43 psi)** **OK or NG**	
OK ▶	GO TO 5.
NG ▶	GO TO 4.

4	DETECT MALFUNCTIONING PART
Check the following. ● Fuel pump and circuit (Refer to EC-674.) ● Fuel pressure regulator (Refer to EC-68.)	
▶	Repair or replace.

5	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. **at idling: 1.4 - 4.0 g·m/sec** **at 2,500 rpm: 5.0 - 10.0 g·m/sec**	
With GST 1. Install all removed parts. 2. Check mass air flow sensor signal in MODE 1 with GST. **at idling: 1.4 - 4.0 g·m/sec** **at 2,500 rpm: 5.0 - 10.0 g·m/sec** **OK or NG**	
OK ▶	GO TO 6.
NG ▶	Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-176.

Diagnostic Procedure (Cont'd)

6	CHECK FUNCTION OF INJECTORS

With CONSULT-II

1. Start engine.
2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-II.

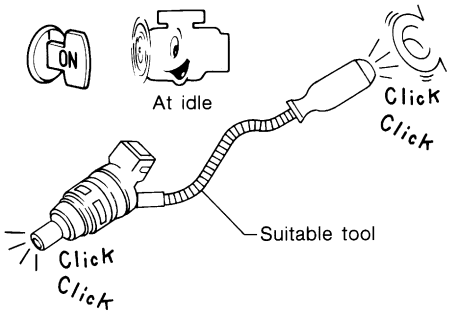
ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
IACV-AAC/V	XXX step

SEF190Y

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 7.
NG	▶	Perform trouble diagnosis for "INJECTORS", EC-665.

7	REMOVE INJECTOR

1. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
2. Turn ignition switch "OFF".
3. Remove injector assembly. Refer to EC-68.
   Keep fuel hose and all injectors connected to injector gallery.

	▶	GO TO 8.

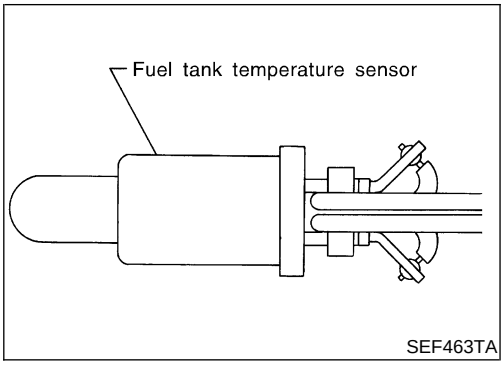
8	CHECK INJECTOR

1. Disconnect all injector harness connectors.
2. Disconnect all ignition coil harness connectors.
3. Prepare pans or saucers under each injectors.
4. Crank engine for about 3 seconds.
   Make sure fuel does not drip from injector.

OK or NG

OK (Does not drip)	▶	GO TO 9.
NG (Drips)	▶	Replace the injectors from which fuel is dripping. Always replace O-ring with new one.

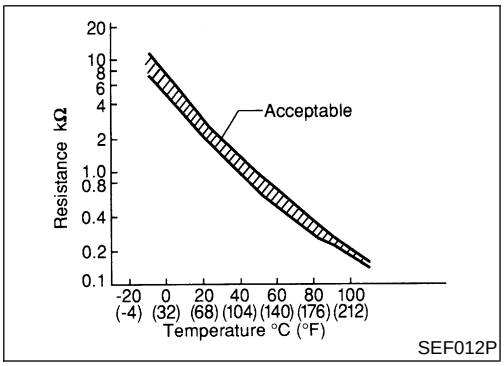
9	**CHECK INTERMITTENT INCIDENT**
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-169.	
▶	**INSPECTION END**



Component Description

NIEC0196

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



<Reference data>

Fluid temperature °C (°F)	Voltage* V	Resistance kΩ
20 (68)	3.5	2.3 - 2.7
50 (122)	2.2	0.79 - 0.90

*: These data are reference values and are measured between PCM terminal 82 (Fuel tank temperature sensor) and ground.

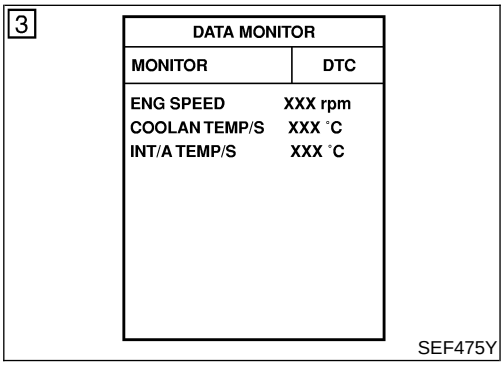
CAUTION:

Do not use PCM ground terminals when measuring input/ output voltage. Doing so may lead to PCM's transistor damage. Use ground other than PCM, such as engine ground.

On Board Diagnosis Logic

NIEC0197

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0180	• An excessively high or low voltage is sent to PCM. • Rationally incorrect voltage is sent to PCM, compared with the voltage signals from engine coolant temperature sensor and intake air temperature sensor.	• Harness or connectors (The sensor circuit is open or shorted.) • Fuel tank temperature sensor



DTC Confirmation Procedure

NIEC0198

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

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Wait at least 10 seconds.
   If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-327.

If the result is OK, go to following step.

4) Check "COOLAN TEMP/S" signal.
   If the signal is less than 50°C (122°F), the result will be OK.
   If the signal is above 50°C (122°F), go to the following step.
5) Cool engine down until "COOLAN TEMP/S" signal is less than 50°C (122°F).
6) Wait at least 10 seconds.
7) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-327.

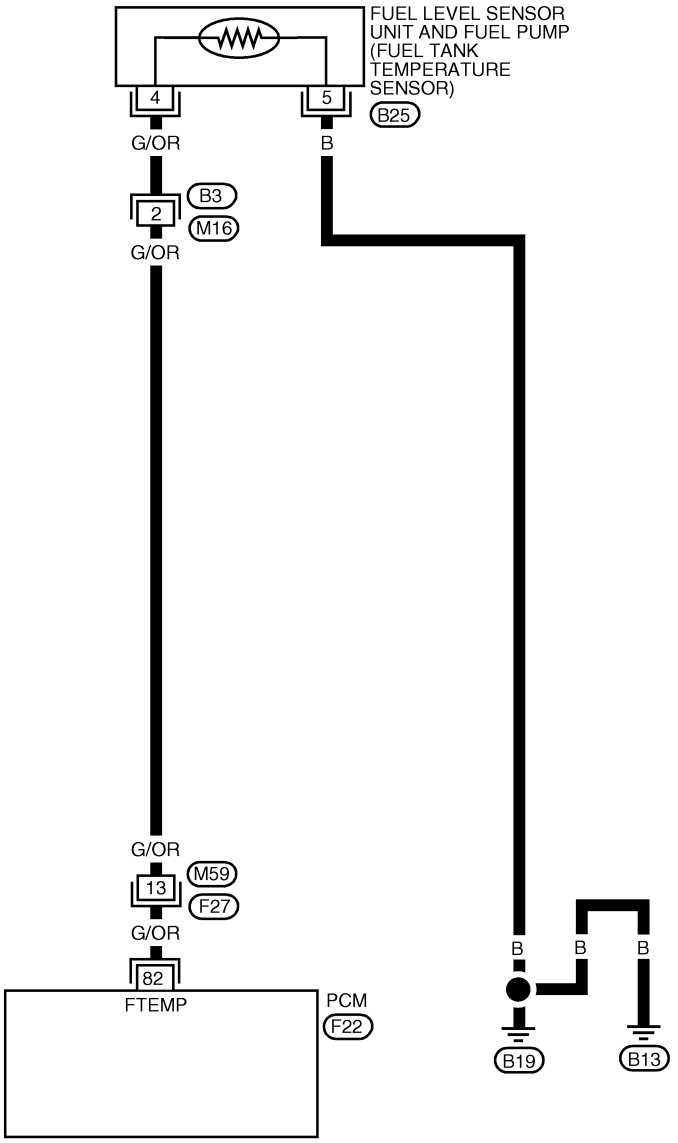
With GST
Follow the procedure "With CONSULT-II" above.

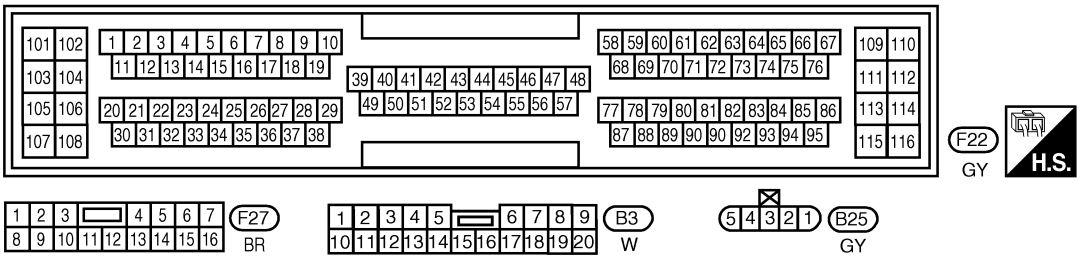
Wiring Diagram

NIEC0199

EC-FTTS-01

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





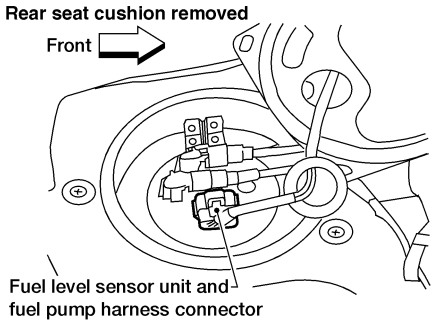
LEC156

Diagnostic Procedure

NIEC0200

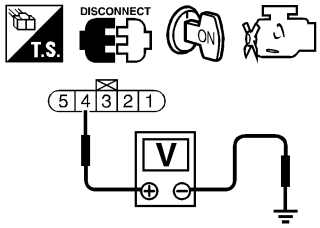
1	CHECK POWER SUPPLY

1. Turn ignition switch “OFF”.
2. Disconnect fuel level sensor unit and fuel pump harness connector.



WEC265

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 M59, F27
- Harness connectors B3, M16
- Harness for open or short between PCM and fuel level sensor unit and fuel pump

	▶	Repair harness or connector.

3	CHECK GROUND CIRCUIT

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”, EC-326.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

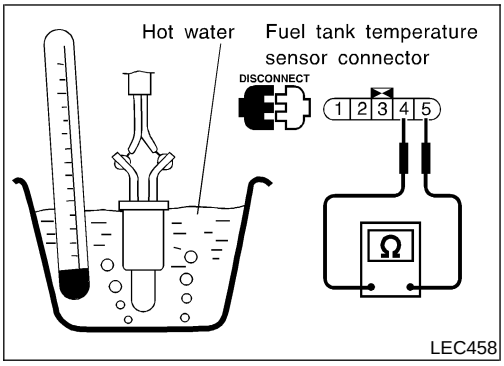
OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

Diagnostic Procedure (Cont'd)

4	CHECK FUEL TANK TEMPERATURE SENSOR	
Refer to "Component Inspection", EC-328.		
OK or NG		
OK	▶	GO TO 5.
NG	▶	Replace fuel tank temperature sensor.

5	CHECK INTERMITTENT INCIDENT	
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-169.		
	▶	**INSPECTION END**



Component Inspection

NIEC0201

FUEL TANK TEMPERATURE SENSOR

NIEC0201S01

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

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

If NG, replace fuel tank temperature sensor.

System Description

NIEC0505

COOLING FAN CONTROL

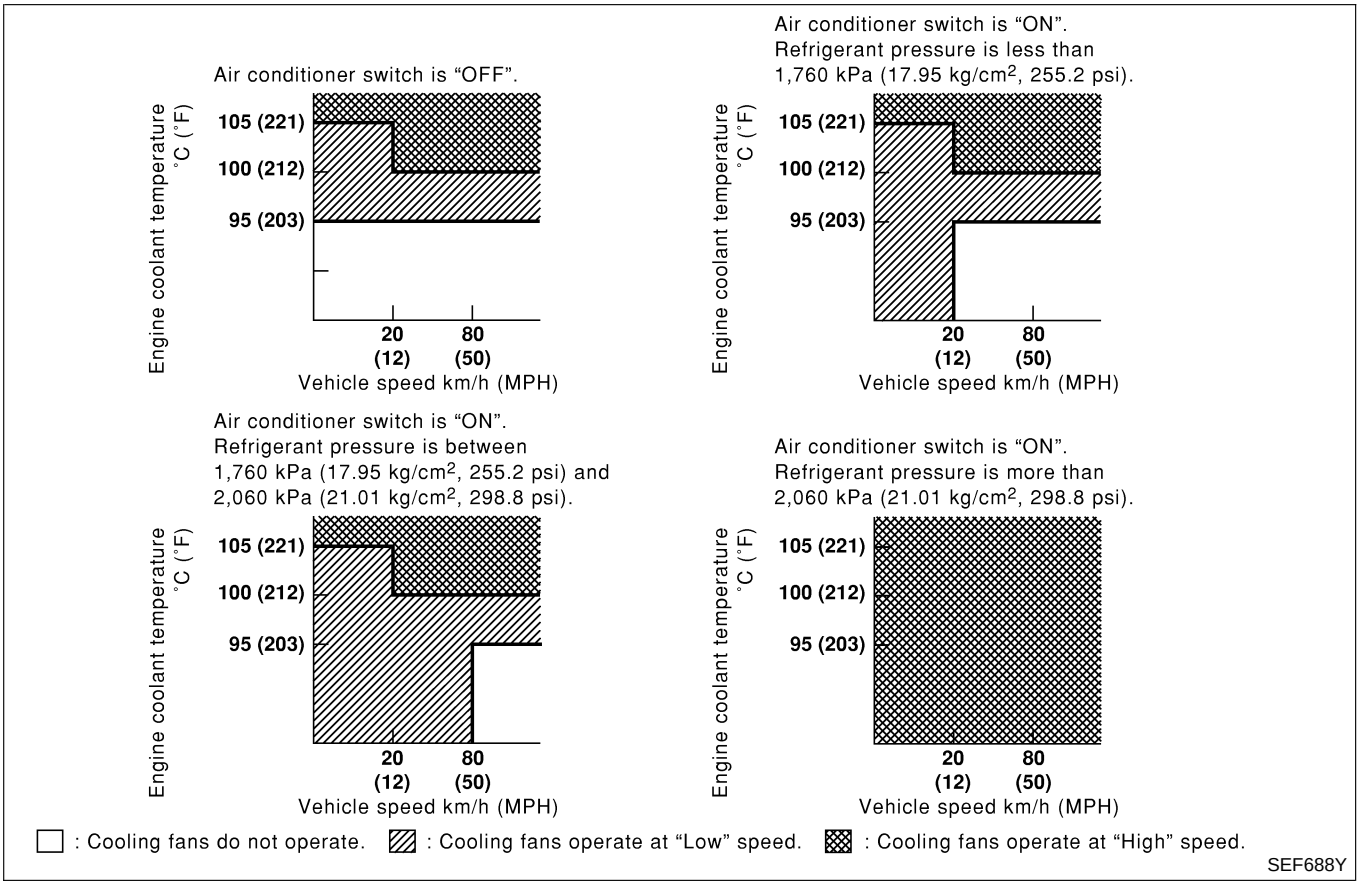
NIEC0505S01

Sensor	Input Signal to PCM	PCM 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 PCM 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

NIEC0505S02



CONSULT-II Reference Value in Data Monitor Mode

NIEC0506

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

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

MONITOR ITEM	CONDITION		SPECIFICATION
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

NIEC0507

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

NIEC0508

- 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 damaged from a collision 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-346.

CAUTION:

When a malfunction is indicated, be sure to replace the coolant. Refer to *MA-17*, "Changing Engine Coolant". Also, replace the engine oil. Refer to *MA-20*, "Changing 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-15*, "Anti-freeze Coolant Mixture Ratio".**
2) **After refilling coolant, run engine to ensure that no water-flow noise is emitted.**

Overall Function Check

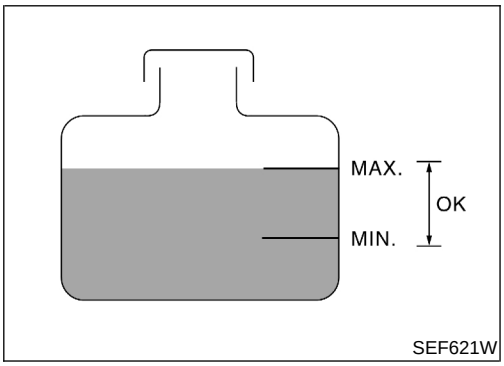
NIEC0509

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

NIEC0509S01

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-335.
- If the coolant mixture ratio is out of the range of 45 to 55%, replace the coolant in the following procedure ***MA-17***, “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-15***, “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-335. 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-21***, “TROUBLE DIAGNOSES”. After repair, go to the next step.

5) Perform “ENG COOLANT TEMP” in “ACTIVE TEST” mode with CONSULT-II at idle.

a) Set “ENG COOLANT TEMP” to 95°C (203°F) and make sure that cooling fan operates at low speed.
If NG, go to “Diagnostic Procedure”, EC-335.

b) Set “ENG COOLANT TEMP” to 105°C (221°F) and make sure that cooling fan operates at high speed. If NG, go to “Diagnostic Procedure”, EC-335. 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-335. 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-335.
If NG, replace ECT sensor and go to the next step.

9) Check ignition timing. Refer to "Basic Inspection", EC-131.
Make sure that ignition timing is 9°±2° at idle.
If NG, refer to "Basic Inspection", EC-131, and then recheck.

WITH GST

NIEC0509S02

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-335.
- If the coolant mixture ratio is out of the range of 45 to 55%, replace the coolant in the following procedure ***MA-17***, "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-15***, "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-335. 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-21***, "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-335. 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-335. 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.

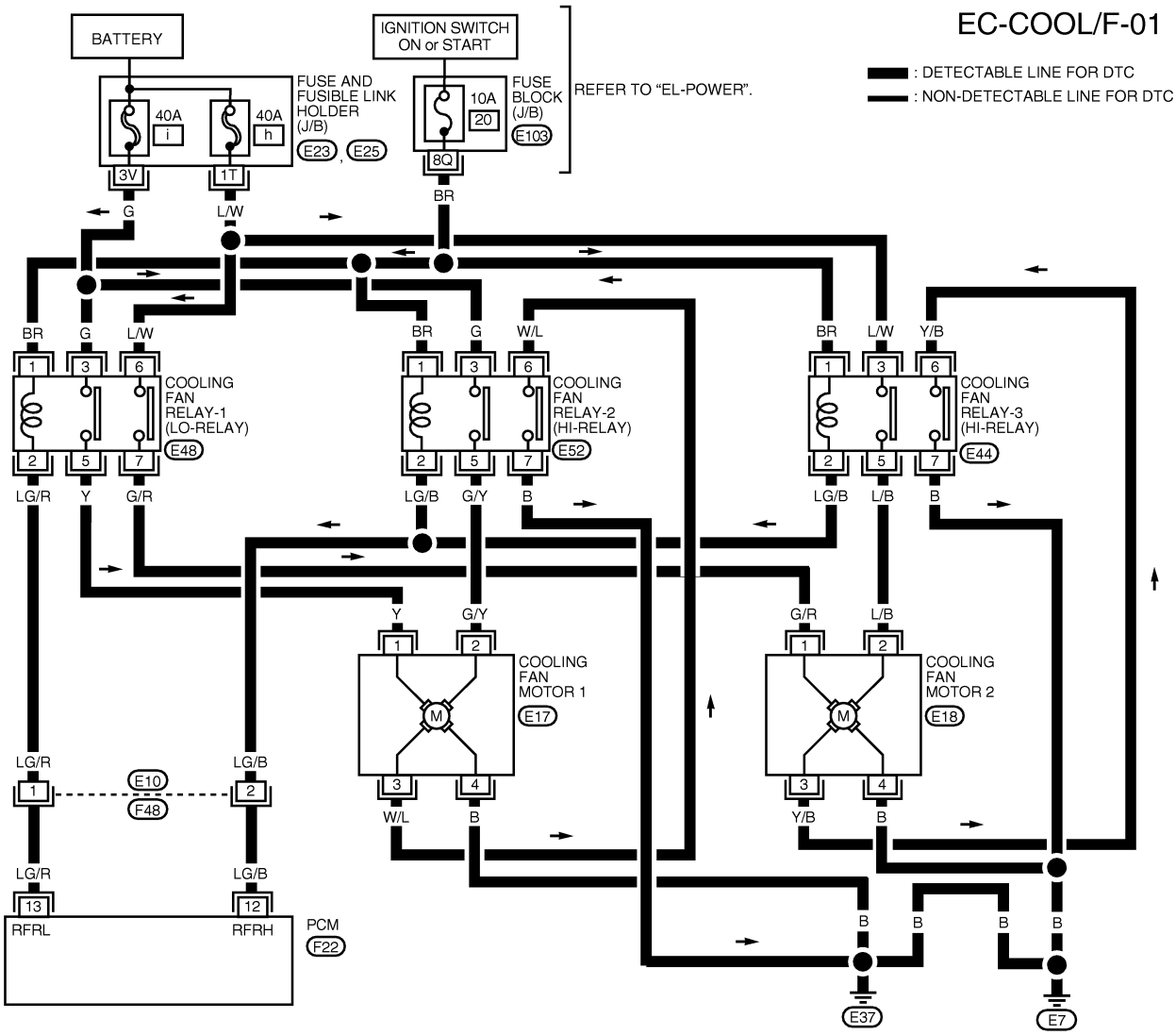
b) Check the front end for clogging caused by insects or debris.

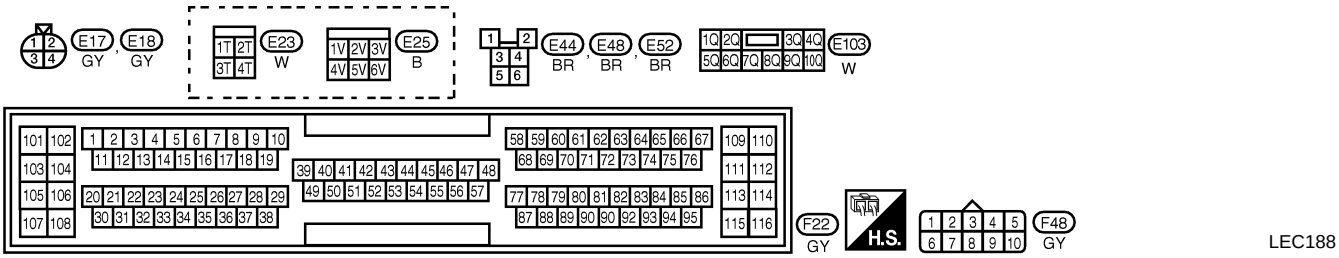
c) Check for improper fitting of front-end cover, damaged radiator grille or bumper, damaged vehicle front.
If NG, take appropriate action and then go to the next step.

11) Check function of ECT sensor.
Refer to step 6 of "Diagnostic Procedure", EC-335.
If NG, replace ECT sensor and go to the next step.
12) Check ignition timing. Refer to "Basic Inspection", EC-131.
Make sure that ignition timing is 9°±2° at idle.
If NG, refer to "Basic Inspection", EC-131, and then recheck.

Wiring Diagram

=NIEC0510





LEC188

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

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
12	LG/B	COOLING FAN RELAY (HIGH)	ENGINE RUNNING WITH COOLING FAN NOT OPERATING	BATTERY VOLTAGE
			ENGINE RUNNING WITH COOLING FAN OPERATING AT HIGH SPEED	0 - 0.6V
13	LG/R	COOLING FAN RELAY (LOW)	ENGINE RUNNING WITH COOLING FAN NOT OPERATING	BATTERY VOLTAGE
			ENGINE RUNNING WITH COOLING FAN OPERATING AT LOW SPEED	0 - 0.6V

SEF178Z

Diagnostic Procedure

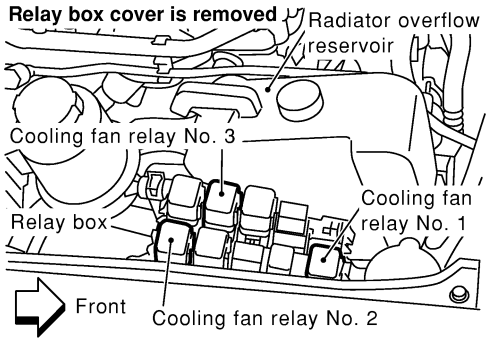
NIEC0511

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.



SEF689Y

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-341.)

Diagnostic Procedure (Cont'd)

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

SEF646X

6. Make sure that cooling fans-1 and -2 operate at higher speed than low speed.

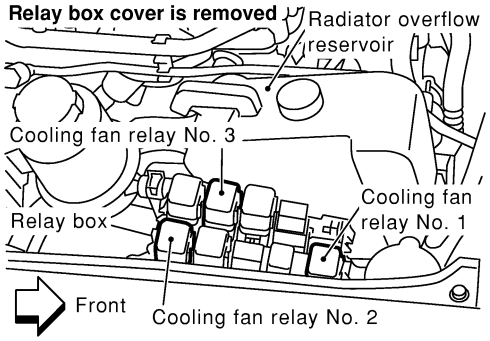
OK or NG

OK	▶	GO TO 6.
NG	▶	Check cooling fan high speed control circuit. (Go to PROCEDURE B, EC-344.)

4	CHECK COOLING FAN LOW SPEED OPERATION

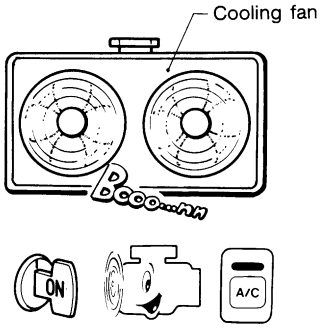
Without CONSULT-II

1. Disconnect cooling fan relays-2 and -3.



SEF689Y

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

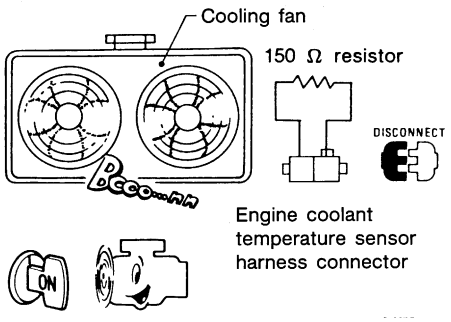
OK	▶	GO TO 5.
NG	▶	Check cooling fan low speed control circuit. (Go to PROCEDURE A, EC-341.)

Diagnostic Procedure (Cont'd)

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-344.)

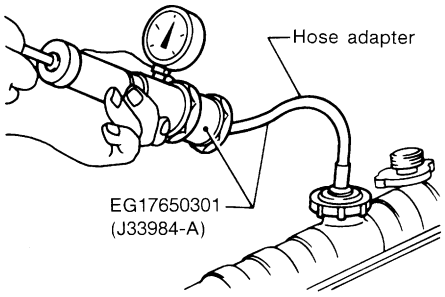
6	CHECK COOLING SYSTEM FOR LEAK

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

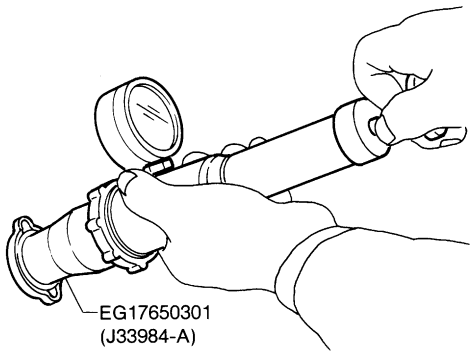
Check the following for leaks.

- Hose
- Radiator
- Water pump (Refer to ***LC-13***, "Water Pump".)

	▶	Repair or replace.

8	CHECK RADIATOR CAP

Apply pressure to cap with a tester and check radiator cap relief pressure.



SLC755A

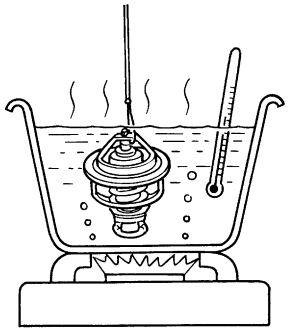
Radiator cap relief pressure:
59 - 98 kPa (0.6 - 1.0 kg/cm^2, 9 - 14 psi)

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:
76.5°C (170°F) [standard]
Valve lift:
More than 9 mm/90°C (0.35 in/194°F)

4. Check if valve is closed at 5°C (9°F) below valve opening temperature. For details, refer to ***LC-13***, "Thermostat".

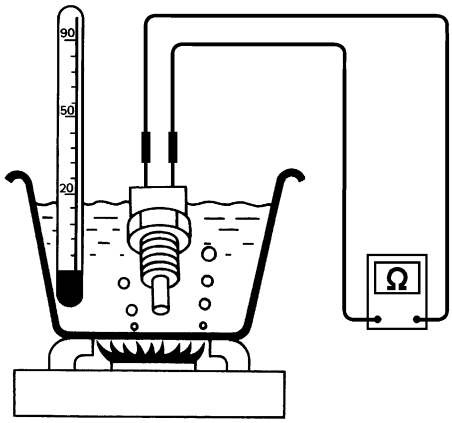
OK or NG

OK	▶	GO TO 10.
NG	▶	Replace thermostat

Diagnostic Procedure (Cont'd)

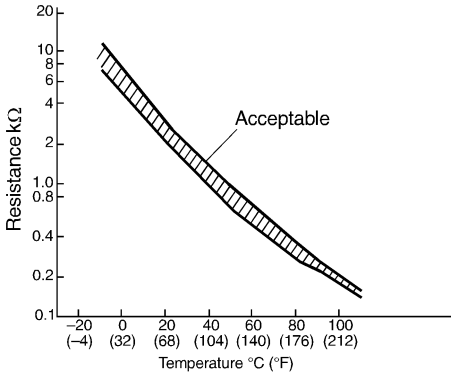
10	CHECK ENGINE COOLANT TEMPERATURE SENSOR

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-346.

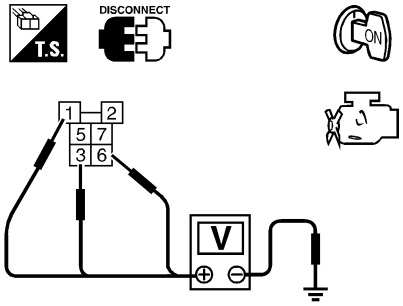
▶ **INSPECTION END**

PROCEDURE A

=NIEC0511S01

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.



SEF477Y

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

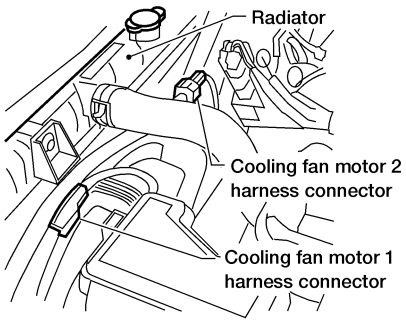
Check the following.
- 10A fuse
- 40A fusible links
- Harness for open or short between cooling fan relay-1 and fuse
- Harness for open or short between cooling fan relay-1 and battery

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

Diagnostic Procedure (Cont'd)

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.



LEC320

3. Check harness continuity between cooling fan relay-1 terminal 5 and cooling fan motor-1 terminal 1, cooling fan motor-1 terminal 4 and body ground.
   Refer to "Wiring Diagram", EC-334.
   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 1, cooling fan motor-2 terminal 4 and body ground.
   Refer to "Wiring Diagram", EC-334.
   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 PCM harness connector.
2. Check harness continuity between PCM terminal 13 and cooling fan relay-1 terminal 2.
   Refer to "Wiring Diagram", EC-334.
   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.

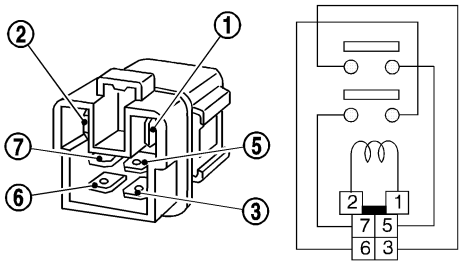
5	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E9, F47
- Harness for open or short between cooling fan relay-1 and PCM

	▶	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

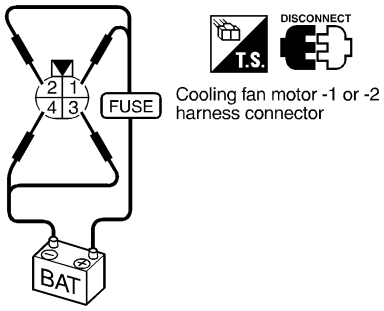
SEF591X

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 or -2	Low	1	4
	High	1, 2	3, 4

SEF937X

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace cooling fan motors.

8	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-169.

▶ **INSPECTION END**

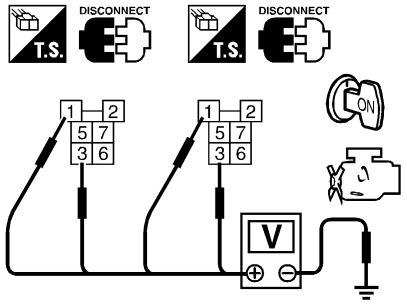
Diagnostic Procedure (Cont'd)

PROCEDURE B

=NIEC0511S02

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.
- Harness for open or short between cooling fan relays-2 and -3 and fuse
- Harness for open or short between cooling fan relays-2 and -3 and fusible link

	▶	Repair harness or connectors.

3	CHECK 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 2, cooling fan relay-2 terminal 6 and cooling fan motor-1 terminal 3, cooling fan relay-2 terminal 7 and body ground.
   Refer to "Wiring Diagram" EC-334.
   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 2, cooling fan relay-3 terminal 6 and cooling fan motor-2 terminal 3, cooling fan relay-3 terminal 7 and body ground.
   Refer to "Wiring Diagram", EC-334.
   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 PCM harness connector.
2. Check harness continuity between PCM terminal 12 and cooling fan relay-2 terminal 2, cooling fan relay-3 terminal 2. Refer to "Wiring Diagram", EC-334.
   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.

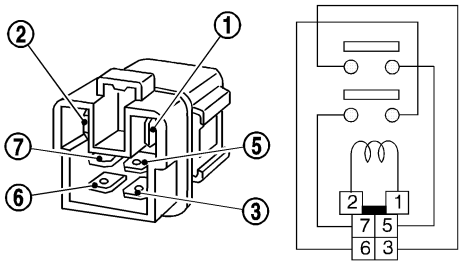
5	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E9, F47
- Harness for open or short between cooling fan relays-2 and -3 and PCM

	▶	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

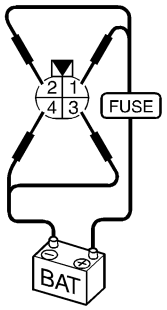
SEF591X

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace cooling fan relays.

7	CHECK COOLING FAN MOTORS-1 AND -2

Supply battery voltage between the following terminals and check operation.



Cooling fan motor -1 or -2 harness connector

	Speed	Terminals (+)	Terminals (–)
Cooling fan motor -1 or -2	Low	1	4
	High	1, 2	3, 4

SEF937X

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace cooling fan motors.

Diagnostic Procedure (Cont'd)

8	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-169.	
▶	INSPECTION END

Main 12 Causes of Overheating

NIEC0512

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-13***, "RECOMMENDED FLUIDS AND LUBRICANTS".
	3	• Coolant level	• Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	See ***MA-17***, "Changing Engine Coolant".
	4	• Radiator cap	• Pressure tester	59 - 98 kPa (0.6 - 1.0 kg/cm^2, 9 - 14 psi) (Limit)	See ***LC-10***, "System Check".
ON*2	5	• Coolant leaks	• Visual	No leaks	See ***LC-10***, "System Check".
ON*2	6	• Thermostat	• Touch the upper and lower radiator hoses	Both hoses should be hot	See ***LC-13***, "Thermostat" and ***LC-15***, "Radiator".
ON*1	7	• Cooling fan	• CONSULT-II	Operating	See trouble diagnosis for DTC P0217 (EC-329).
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-17***, "Changing Engine Coolant".
OFF*4	10	• Coolant return from reservoir tank to radiator	• Visual	Should be initial level in reservoir tank	See ***MA-16***, "ENGINE MAINTENANCE".
OFF	11	• Cylinder head	• Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	See ***EM-110***, "Inspection".
	12	• Cylinder block and pistons	• Visual	No scuffing on cylinder walls or piston	See ***EM-132***, "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-19***, "OVERHEATING CAUSE ANALYSIS".

On Board Diagnosis Logic

NIEC0202

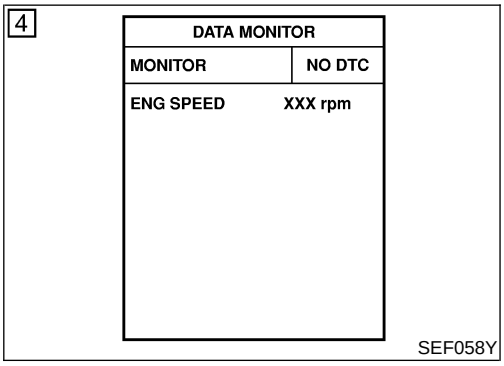
When a misfire occurs, engine speed will fluctuate (vary). If the engine speed fluctuates enough to cause the crankshaft position sensor (POS) signal to vary, PCM can determine that a misfire is occurring.

Sensor	Input Signal to PCM	PCM 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 PCM monitors the crankshaft position sensor (POS) 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 cause damage to 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 PCM monitors the crankshaft positon sensor (POS) signal every 1,000 engine revolutions.
   A misfire malfunction can be detected on any one cylinder or on multiple cylinders.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0300	• Multiple cylinders misfire.	• 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/Flywheel • Heated oxygen sensor 1 (front)
P0301	• No. 1 cylinder misfires.	
P0302	• No. 2 cylinder misfires.	
P0303	• No. 3 cylinder misfires.	
P0304	• No. 4 cylinder misfires.	



DTC Confirmation Procedure

NIEC0203

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

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-348.

With GST

Follow the procedure “With CONSULT-II” above.

Diagnostic Procedure

NIEC0204

1	CHECK FOR INTAKE AIR LEAK	
1. Start engine and run it at idle speed. 2. Listen for the sound of the intake air leak.		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Discover air leak location and repair.

2	CHECK FOR EXHAUST SYSTEM CLOGGING	
Stop engine and visually check exhaust tube, three way catalyst and muffler for dents.		
OK or NG		
OK	▶	GO TO 3.
NG	▶	Repair or replace it.

3	CHECK EGR FUNCTION	
Perform DTC Confirmation Procedure for DTC P1402 EGR FUNCTION (OPEN). Refer to EC-572.		
OK or NG		
OK	▶	GO TO 4.
NG	▶	Repair EGR system.

4	PERFORM POWER BALANCE TEST

With CONSULT-II

1. Perform "POWER BALANCE" in "ACTIVE TEST" mode.

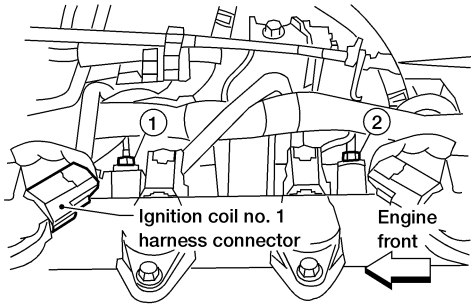
ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
IACV-AAC/V	XXX step

SEF190Y

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?



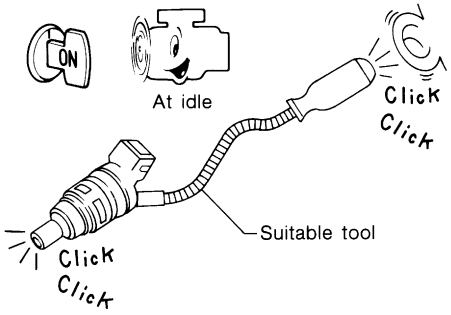
LEC242

Yes or No

Yes	▶	GO TO 5.
No	▶	GO TO 8.

5	CHECK INJECTOR

Does each injector make an operating sound at idle?



MEC703B

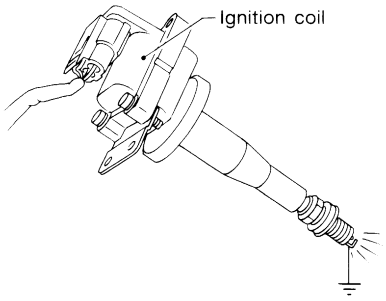
Yes or No

Yes	▶	GO TO 6.
No	▶	Check injector(s) and circuit(s). Refer to EC-665.

Diagnostic Procedure (Cont'd)

6	CHECK IGNITION SPARK

1. Turn Ignition switch "OFF".
2. Disconnect ignition wire from spark plug.
3. Connect a known good spark plug to the ignition wire.
4. Place end of spark plug against a suitable ground and crank engine.
5. Check for spark.



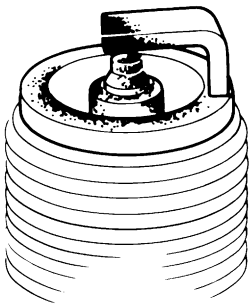
SEF575Q

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

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-16***, "ENGINE MAINTENANCE".

8	CHECK COMPRESSION PRESSURE

Refer to ***EM-66***, "Measurement of Compression Pressure".

- Check compression pressure.

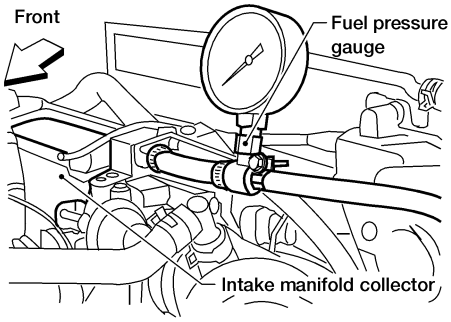
Standard:
1,324 kPa (13.5 kg/cm^2, 182 psi)/300 rpm
Minimum:
1,157 kPa (11.8 kg/cm^2, 168 psi)/300 rpm
Difference between each cylinder:
98 kPa (1.0 kg/cm^2, 14 psi)/300 rpm

OK or NG

OK	▶	GO TO 9.
NG	▶	Check pistons, piston rings, valves, valve seats and cylinder head gaskets.

9	CHECK FUEL PRESSURE

1. Install any parts removed.
2. Release fuel pressure to zero. Refer to EC-67.
3. Install fuel pressure gauge and check fuel pressure.



LEC314

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 EC-674.
- Fuel pressure regulator Refer to EC-68.
- Fuel lines. Refer to ***MA-19***, "Checking Fuel Lines".
- Fuel filter for clogging

	▶	Repair or replace.

11	CHECK IGNITION TIMING

Perform "Basic Inspection", EC-131.

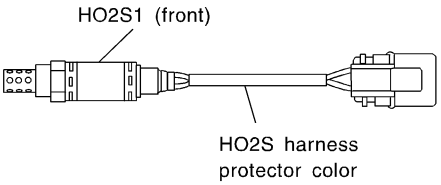
OK or NG

OK	▶	GO TO 12.
NG	▶	Adjust ignition timing.

Diagnostic Procedure (Cont'd)

12	CHECK HEATED OXYGEN SENSOR 1 (FRONT)

1. Turn ignition switch "OFF".
2. Check the HO2S1 (front) harness protector color, and disconnect the corresponding HO2S1 (front) harness connector.



HO2S1 (front) (bank 1): Black
HO2S1 (front) (bank 2): Blue

LEC646

3. Check HO2S1 heater (front), refer to EC-264.

OK or NG

OK	▶	GO TO 13.
NG	▶	Replace heated oxygen sensor 1 (front).

13	CHECK MASS AIR FLOW SENSOR

With CONSULT-II
Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT-II.
at idling: 1.4 - 4.0 g·m/sec
at 2,500 rpm: 5.0 - 10.0 g·m/sec

With GST
Check mass air flow sensor signal in MODE 1 with GST.
at idling: 1.4 - 4.0 g·m/sec
at 2,500 rpm: 5.0 - 10.0 g·m/sec

OK or NG

OK	▶	GO TO 15.
NG	▶	GO TO 14.

14	CHECK CONNECTORS

Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds.
Refer to EC-176.

OK or NG

NG	▶	Repair or replace it.

15	CHECK SYMPTOM MATRIX CHART

Check items on the rough idle symptom in "Symptom Matrix Chart", EC-147.

OK or NG

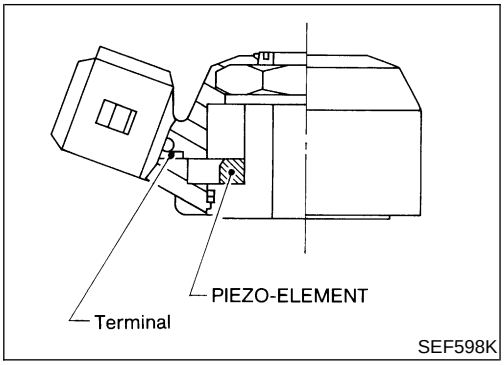
OK	▶	GO TO 16.
NG	▶	Repair or replace.

16	ERASE THE 1ST TRIP DTC

Some tests may cause a 1st trip DTC to be set.
Erase the 1st trip DTC from the PCM memory after performing the tests. Refer to EC-98.

	▶	GO TO 17.

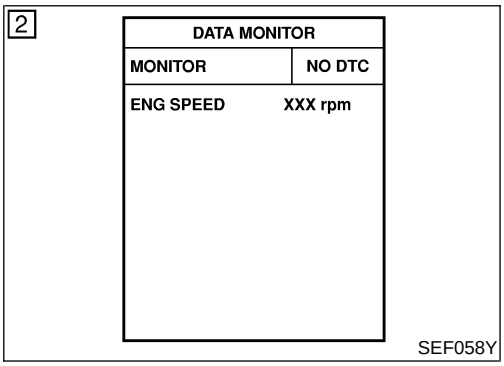
17	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-169.	
▶	INSPECTION END



Component Description

NIEC0206

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



DTC Confirmation Procedure

NIEC0209

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

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-356.

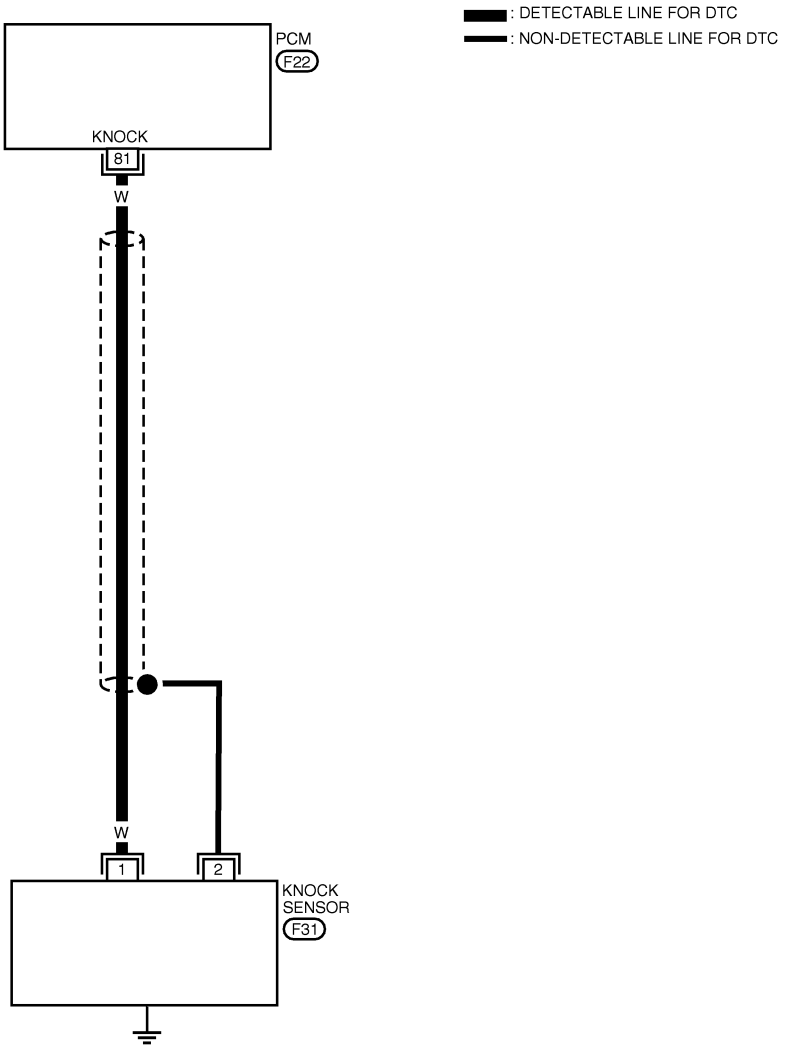
With GST

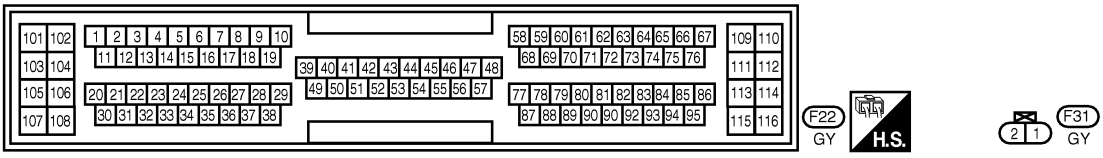
Follow the procedure “With CONSULT-II” above.

Wiring Diagram

NIEC0210

EC-KS-01





LEC157

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

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
81	W	KNOCK SENSOR	ENGINE RUNNING AT IDLE SPEED	APPROX. 2.5V

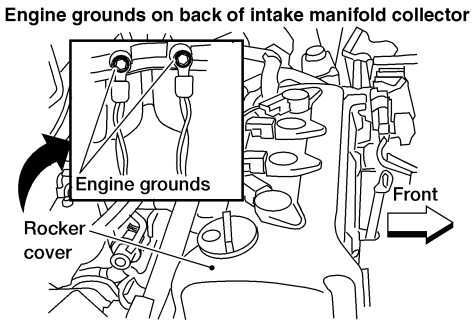
LEC445

Diagnostic Procedure

NIEC0211

1	RETIGHTEN GROUND SCREWS

Loosen and retighten engine ground screws.

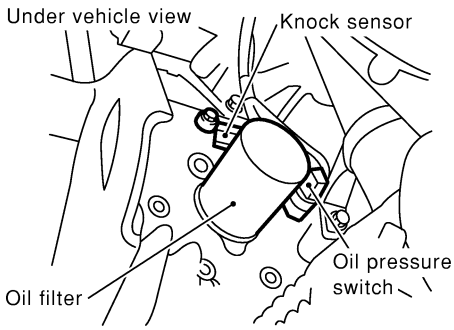


WEC249

	▶	GO TO 2.

2	CHECK INPUT SIGNAL CIRCUIT-1

1. Turn ignition switch “OFF”.
2. Disconnect PCM harness connector and knock sensor harness connector.



SEF729Y

3. Check harness continuity between knock sensor terminal 1 and PCM terminal 81.
   Refer to “Wiring Diagram”, EC-355.
   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 harness for open or short between knock sensor and PCM.

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

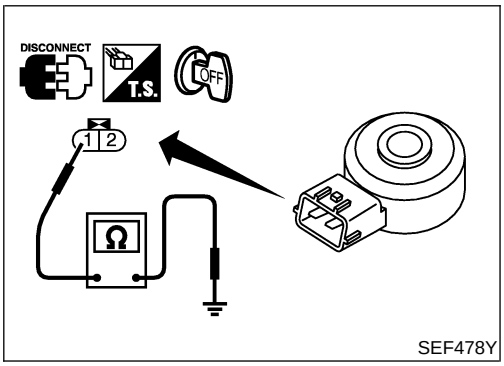
4	CHECK KNOCK SENSOR

Knock sensor
Refer to “Component Inspection”, EC-357.

OK or NG

OK	▶	GO TO 5.
NG	▶	Replace knock sensor.

5	**CHECK INTERMITTENT INCIDENT**
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-169.	
▶	**INSPECTION END**



SEF478Y

Component Inspection

KNOCK SENSOR

NIEC0212

NIEC0212S01

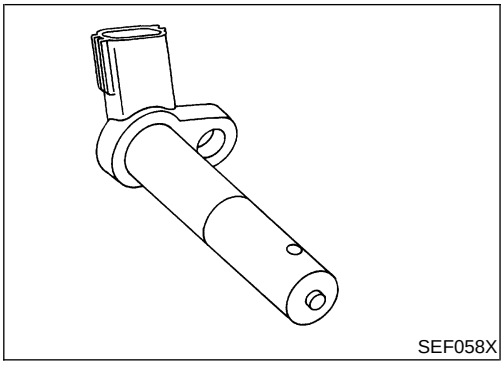
- Use an ohmmeter which can measure more than 10 MΩ.

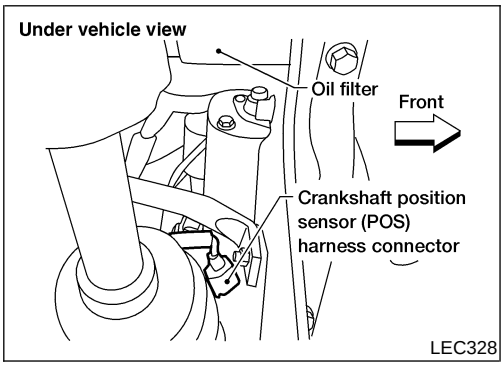
1. Disconnect knock sensor harness connector.
2. Check resistance between terminal 1 and ground.

Resistance: 500 - 620 kΩ [at 20°C (68°F)]

CAUTION:

Discard any knock sensors that have been dropped or physically damaged. Use only new ones.


SEF058X



LEC328

Component Description

NIEC0213

The crankshaft position sensor (POS) is located on the cylinder block rear housing facing the gear teeth (cogs) of the signal plate at the end of the crankshaft. It detects the fluctuation of the engine revolution.

The sensor consists of a permanent magnet and hall IC.

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

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

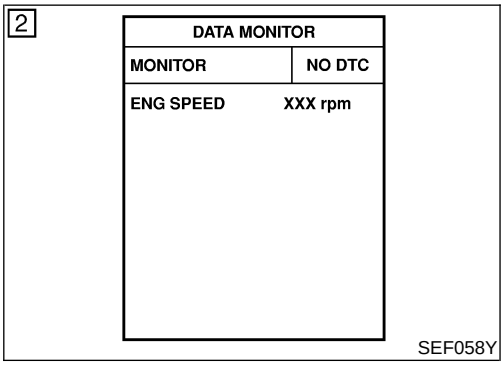
Due to the changing magnetic field, the voltage from the sensor changes.

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

On Board Diagnosis Logic

NIEC0215

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0335	• The crankshaft position sensor signal is not detected by the PCM during the first few seconds of engine cranking. • The proper pulse signal from the crankshaft position sensor (POS) is not sent to PCM while the engine is running. • The crankshaft position sensor signal is not in the normal pattern during engine running.	• Harness or connectors (The crankshaft position sensor (POS) circuit is open.) • Crankshaft position sensor (POS)



SEF058Y

DTC Confirmation Procedure

NIEC0216

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 the battery voltage is more than 10.5V and the ignition switch is “ON”.

With CONSULT-II

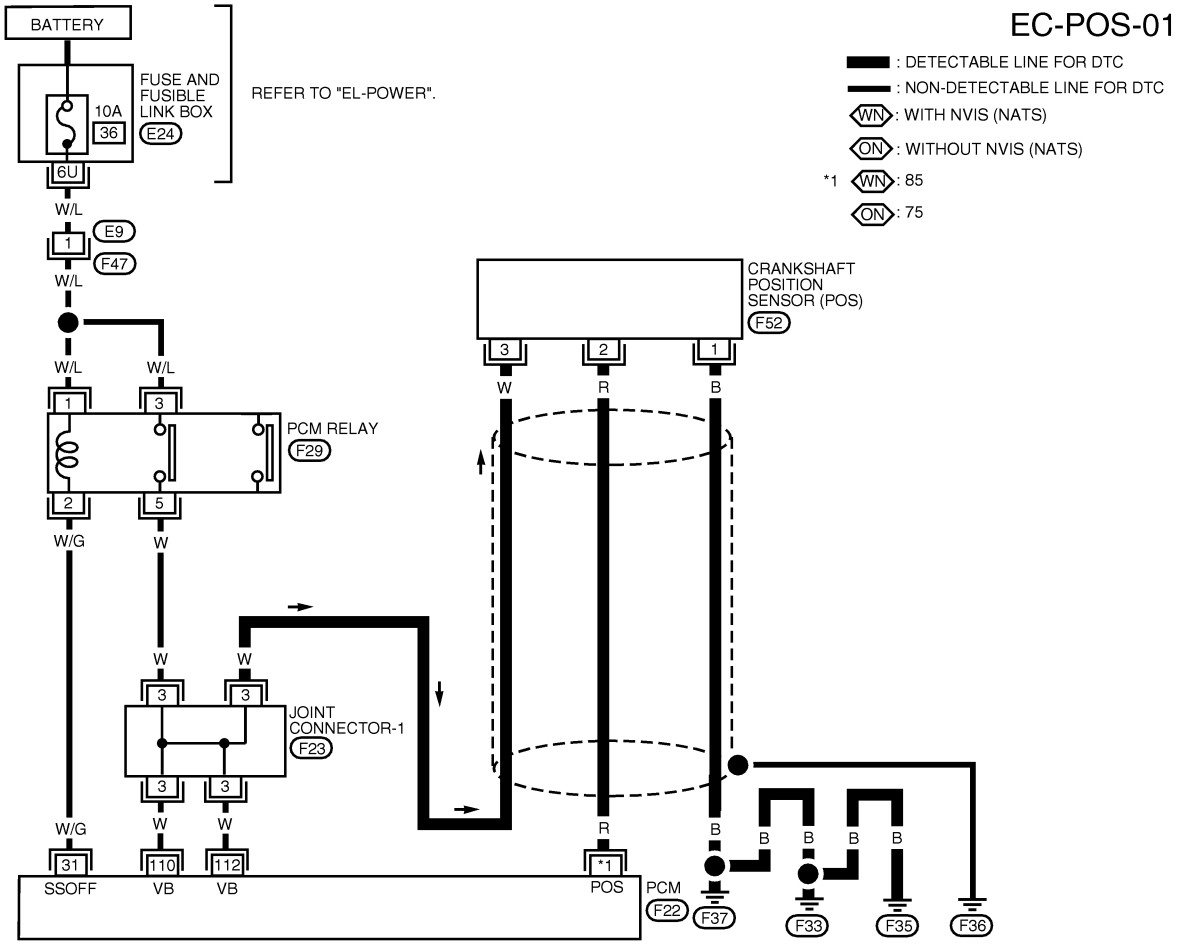
1) Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II.
2) Crank engine for at least 2 seconds and run it for at least 5 seconds at idle speed.
3) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-360.

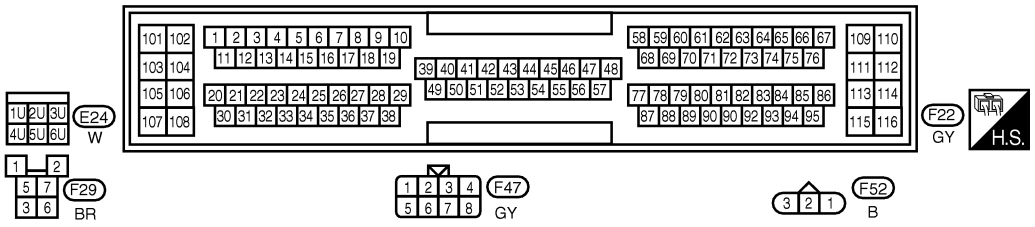
With GST

Follow the procedure “With CONSULT-II” above.

Wiring Diagram

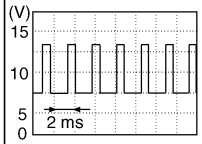
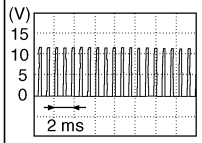
NIEC0217





LEC162

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

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
75 WITHOUT NVIS (NATS)	R	CRANKSHAFT POSITION SENSOR (POS)	ENGINE RUNNING AT IDLE SPEED UNDER WARM-UP CONDITION	APPROX. 3.0V - 4.0V 
85 WITH NVIS (NATS)			ENGINE RUNNING AT 2,000 RPM	APPROX. 3.0V - 4.0V 

SEF730Y

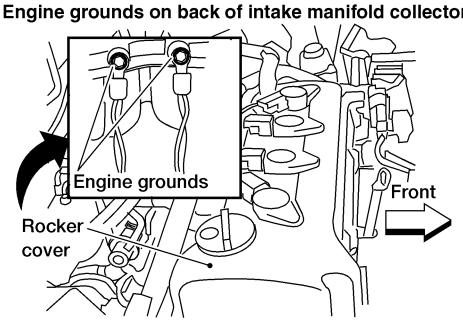
Diagnostic Procedure

NIEC0218

1	RETIGHTEN GROUND SCREWS

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

Engine grounds on back of intake manifold collector



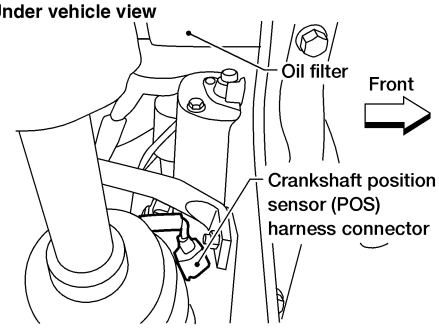
WEC249

▶	GO TO 2.

2	CHECK POWER SUPPLY

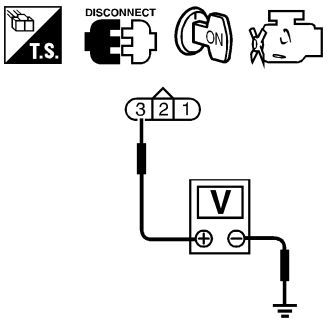
1. Disconnect crankshaft position sensor (POS) harness connector and PCM harness connectors.

Under vehicle view



LEC328

2. Check voltage between harness connector terminal 3 and ground with CONSULT-II or tester.



SEF479Y

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-1
- Harness for open or short between PCM relay and crankshaft position sensor (POS)

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

4	CHECK INPUT SIGNAL CIRCUIT

1. Check continuity between PCM terminal and crankshaft position sensor (POS) terminal as follows. Refer to "Wiring Diagram", EC-359.

	PCM terminal	Sensor
Without NVIS	75	2
With NVIS	85	2

Continuity should exist.

LEC432

2. 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 harness for open or short between crankshaft position sensor (POS) and PCM.

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

6	CHECK GROUND CIRCUIT

1. Reconnect PCM harness connector.
2. Check harness continuity between crankshaft position sensor (POS) terminal 1 and engine ground. Refer to the "Wiring Diagram", EC-359.
   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 harness for open or short between crankshaft position sensor (POS) and PCM.

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

8	CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to "Component Inspection", EC-362.

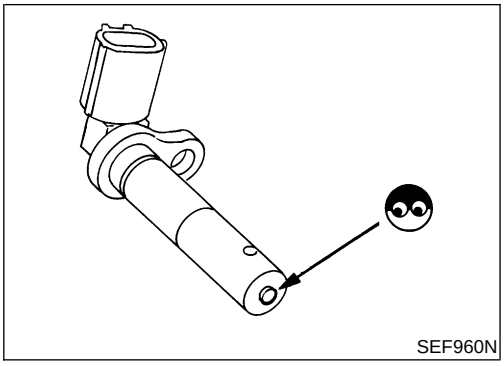
OK or NG

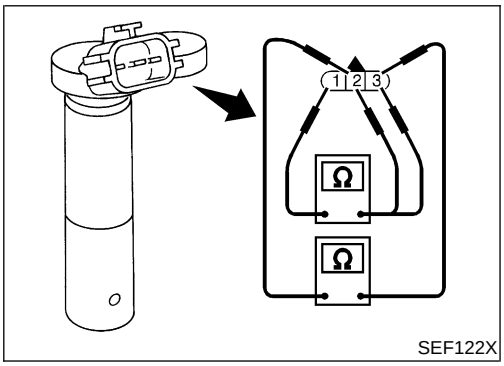
OK	▶	GO TO 9.
NG	▶	Replace crankshaft position sensor (POS).

9	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-169.

	▶	**INSPECTION END**


SEF960N



SEF122X

Component Inspection

NIEC0219

CRANKSHAFT POSITION SENSOR (POS)

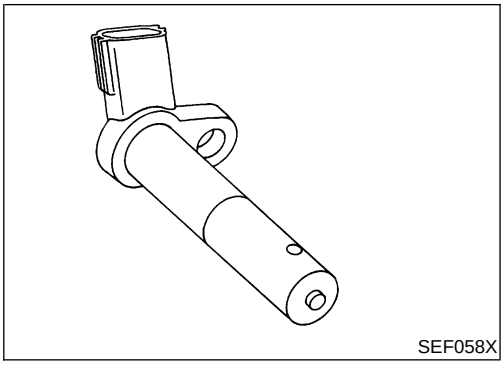
NIEC0219S01

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

5. Check resistance as shown in the figure.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
3 (+) - 1 (–)	Except 0 or ∞
2 (+) - 1 (–)	
3 (+) - 2 (–)	

If NG, replace crankshaft position sensor (POS).


SEF058X

Component Description

NIEC0220

The camshaft position sensor (PHASE) senses the protrusion provided with exhaust valve cam sprocket to identify a particular cylinder. The crankshaft position sensor (POS) senses the piston position.

When the crankshaft position sensor (POS) system becomes inoperative, the camshaft position sensor (PHASE) provides various controls of engine parts instead, utilizing timing of cylinder identification signals.

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

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

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

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

On Board Diagnosis Logic

NIEC0222

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0340	• The cylinder No. signal is not entered to PCM for the first few seconds during engine cranking. • The cylinder No. signal is not enter to PCM during engine running. • The cylinder No. signal is not in the normal pattern during engine running.	• Harness or connectors (The camshaft position sensor (PHASE) circuit is open or shorted.) • Camshaft position sensor (PHASE) • Starter motor (Refer to ***SC-6***.) • Starting system circuit (Refer to ***SC-6***.)

DTC Confirmation Procedure

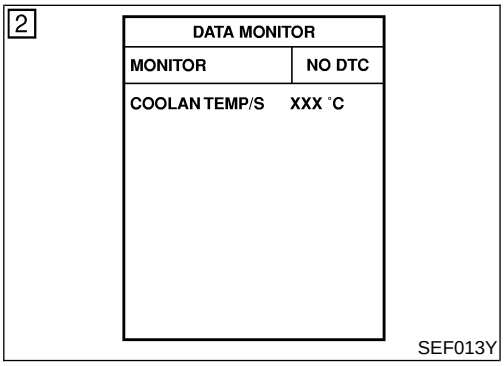
NIEC0223

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.



SEF013Y

With CONSULT-II

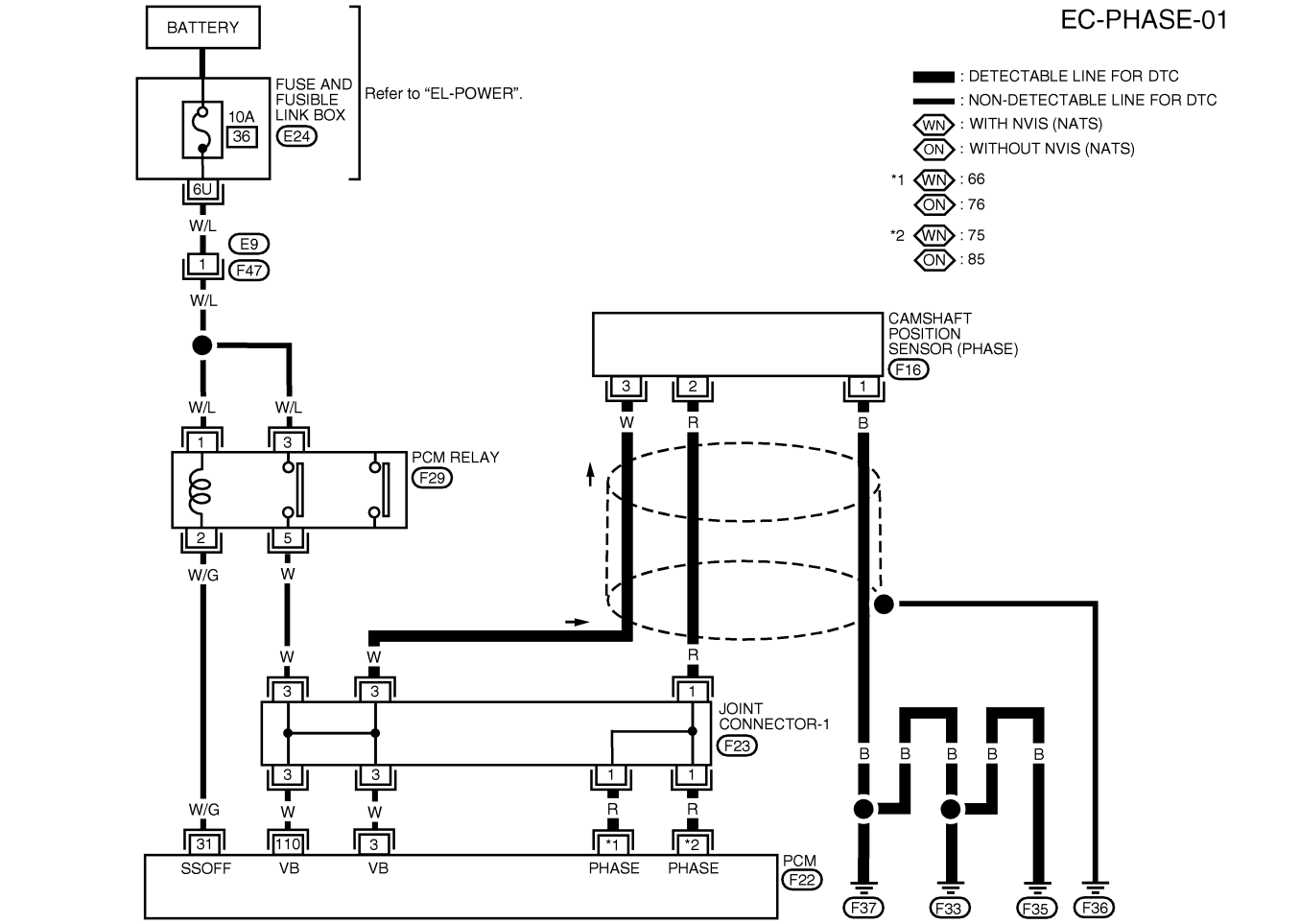
1) Turn ignition switch “ON”.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Crank engine for at least 2 seconds and run it for at least 5 seconds at idle speed.
4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-365.

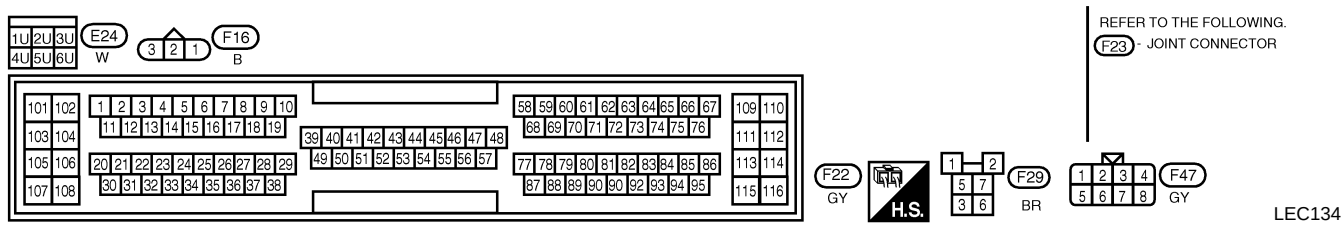
With GST

Follow the procedure “With CONSULT-II” above.

Wiring Diagram

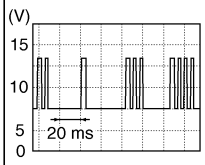
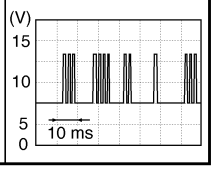
=NIEC0224





LEC134

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

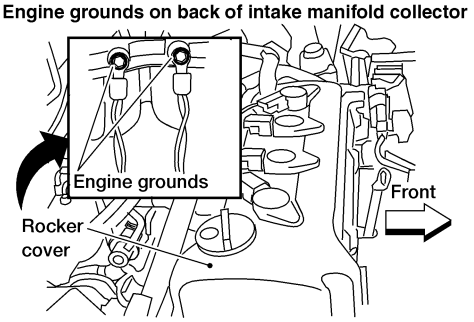
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
76, 85 WITHOUT NVIS (NATS)	R	CAMSHAFT POSITION SENSOR (PHASE)	ENGINE RUNNING AT IDLE SPEED UNDER WARM-UP CONDITION	APPROX. 3.0V - 4.0V 
66, 75 WITH NVIS (NATS)			ENGINE RUNNING AT 2,000 RPM	APPROX. 3.0V - 4.0V 

SEF731Y

Diagnostic Procedure

NIEC0225

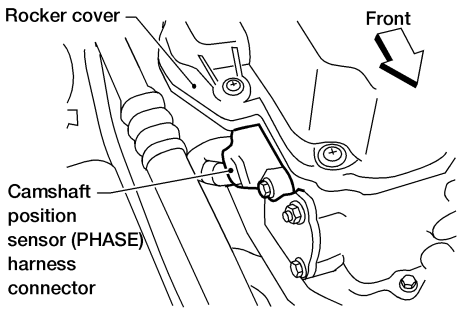
1	CHECK STARTING SYSTEM	
Does the engine turn over? (Does the starter motor operate?)		
	Yes or No	
Yes	▶	GO TO 2.
No	▶	Check starting system. (Refer to ***SC-6***, “STARTING SYSTEM”.)

2	RETIGHTEN GROUND SCREWS	
1. Turn ignition switch “OFF”. 2. Loosen and retighten engine ground screws.		
Engine grounds on back of intake manifold collector  WEC249		
	▶	GO TO 3.

Diagnostic Procedure (Cont'd)

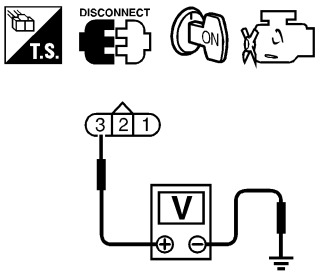
3	CHECK POWER SUPPLY

1. Disconnect camshaft position sensor (PHASE) harness connector.



WEC253

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



SEF481Y

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Joint connector-1
- Harness for open or short between camshaft position sensor (PHASE) and PCM relay
- Harness for open or short between camshaft position sensor (PHASE) and PCM

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

5	CHECK INPUT SIGNAL CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect PCM harness connector.
3. Check harness continuity between camshaft position sensor (PHASE) terminal and PCM terminal as follows. Refer to "Wiring Diagram", EC-364.

PCM terminal	Sensor terminal	Application
76, 85	2	Without NVIS (NATS)
66, 75	2	With NVIS (NATS)

Continuity should exist.

LEC437

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.
- Joint connector-1
- Harness for open or short between camshaft position sensor (PHASE) and PCM

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

7	CHECK GROUND CIRCUIT

1. Turn ignition switch "OFF".
2. Check harness continuity between camshaft position sensor (PHASE) terminal 1 and engine ground. Refer to the "Wiring Diagram", EC-364.
   Continuity should exist.
3. 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 CAMSHAFT POSITION SENSOR (PHASE)

Refer to "Component Inspection", EC-368.

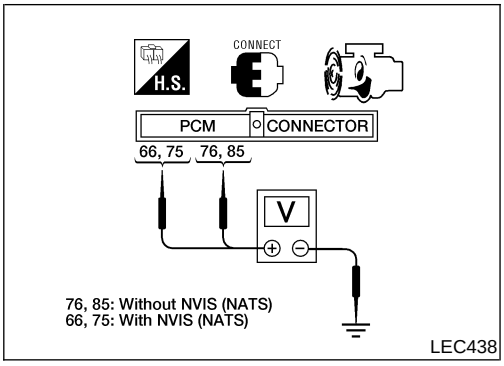
OK or NG

OK	▶	GO TO 9.
NG	▶	Replace camshaft position sensor (PHASE).

9	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-169.

	▶	**INSPECTION END**



Component Inspection

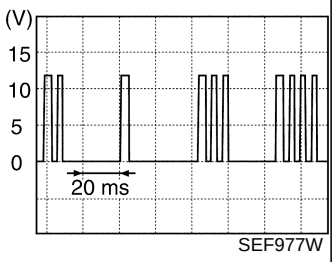
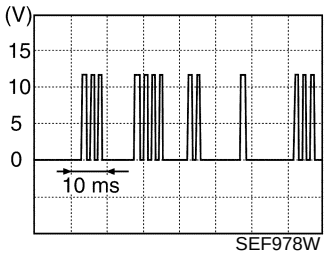
=NIEC0226

CAMSHAFT POSITION SENSOR (PHASE)

NIEC0226S01

1. Start engine and warm it up to normal operating temperature.
2. Check voltage between PCM terminals and engine ground as follows.

PCM Terminals	Application
76, 85	Without NVIS (NATS)
66, 75	With NVIS (NATS)

Condition	Idle	2,000 rpm
Voltage	Approximately 2.0 - 3.0V	Approximately 2.0 - 3.0V
Pulse signal		

SEF977W

SEF978W

If NG, replace camshaft position sensor (PHASE).

Description

SYSTEM DESCRIPTION

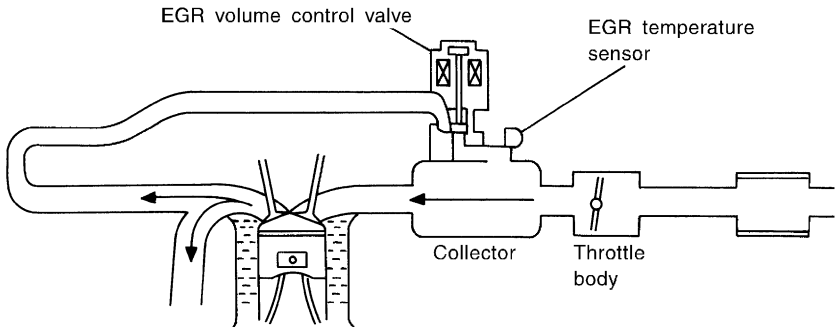
NIEC0513

NIEC0513S01

Sensor	Input Signal to PCM	PCM function	Actuator
Crankshaft position sensor (POS)	Engine speed	EGR volume control	EGR volume control valve
Camshaft position sensor (PHASE)	Engine speed and cylinder position		
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		
PCM	Gear position, shifting signal		

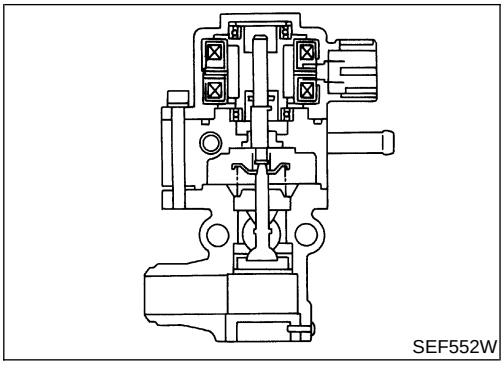
This system controls flow rate of EGR led from exhaust manifold to intake manifold. The opening of the EGR bypass passage in the EGR volume control valve changes to control the flow rate. A built-in step motor moves the valve in steps corresponding to the PCM output pulses. The opening of the valve varies for optimum engine control. The optimum value stored in the PCM is determined by considering various engine conditions. The EGR volume control valve remains closed 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

NIEC0513S02

EGR volume control valve

NIEC0513S0201

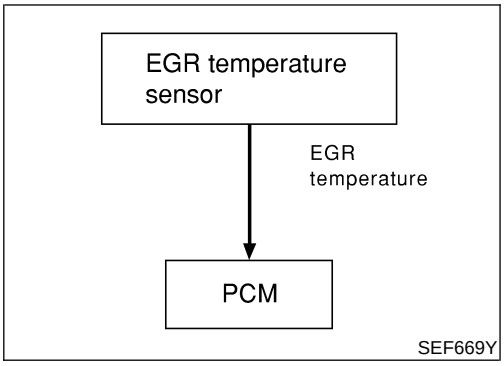
The EGR volume control valve uses a step motor to control the flow rate of EGR from exhaust manifold. This motor has four winding phases. It operates according to the output pulse signal of the PCM. Two windings are turned ON and OFF in sequence. Each time an ON pulse is issued, the valve opens or closes, changing the flow rate. When no change in the flow rate is needed, the PCM 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

NIEC0514

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 steps



SEF669Y

On Board Diagnosis Logic

NIEC0515

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

NIEC0516

- 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

3

DATA MONITOR	
MONITOR	NO DTC
COOLAN TEMP/S	XXX °C

SEF013Y

5

EGR SYSTEM P0400	
OUT OF CONDITION	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
THRTL POS SEN	XXX V

SEF732Y

8

EGR SYSTEM P0400	
TESTING	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
THRTL POS SEN	XXX V

SEF733Y

8

EGR SYSTEM P0400
COMPLETED

SEF235Y

DTC Confirmation Procedure

NIEC0517

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

- If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.
- P0400 will not be displayed at "SELF-DIAG RESULTS" mode with CONSULT-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

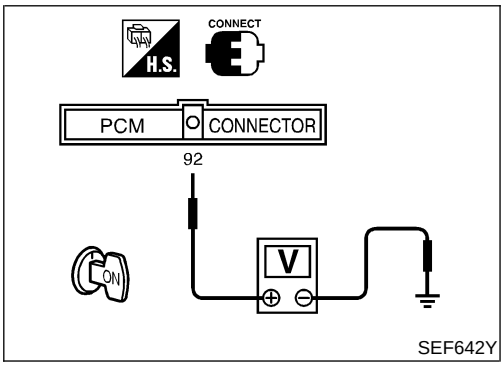
NIEC0517S01

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 70°C (158°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) Check the output voltage of "THRTL POS SEN" (at closed throttle position) and note it.
9) 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 - 3,600 rpm
Vehicle speed	More than 10 km/h (6 MPH)
B/FUEL SCHDL	4.5 - 8.0 msec
Selector lever	Suitable position

   If "TESTING" is not displayed after 5 minutes, retry from step 2.
10) Make sure that "OK" is displayed after touching "SELF-DIAG

RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-374.



WITH GST

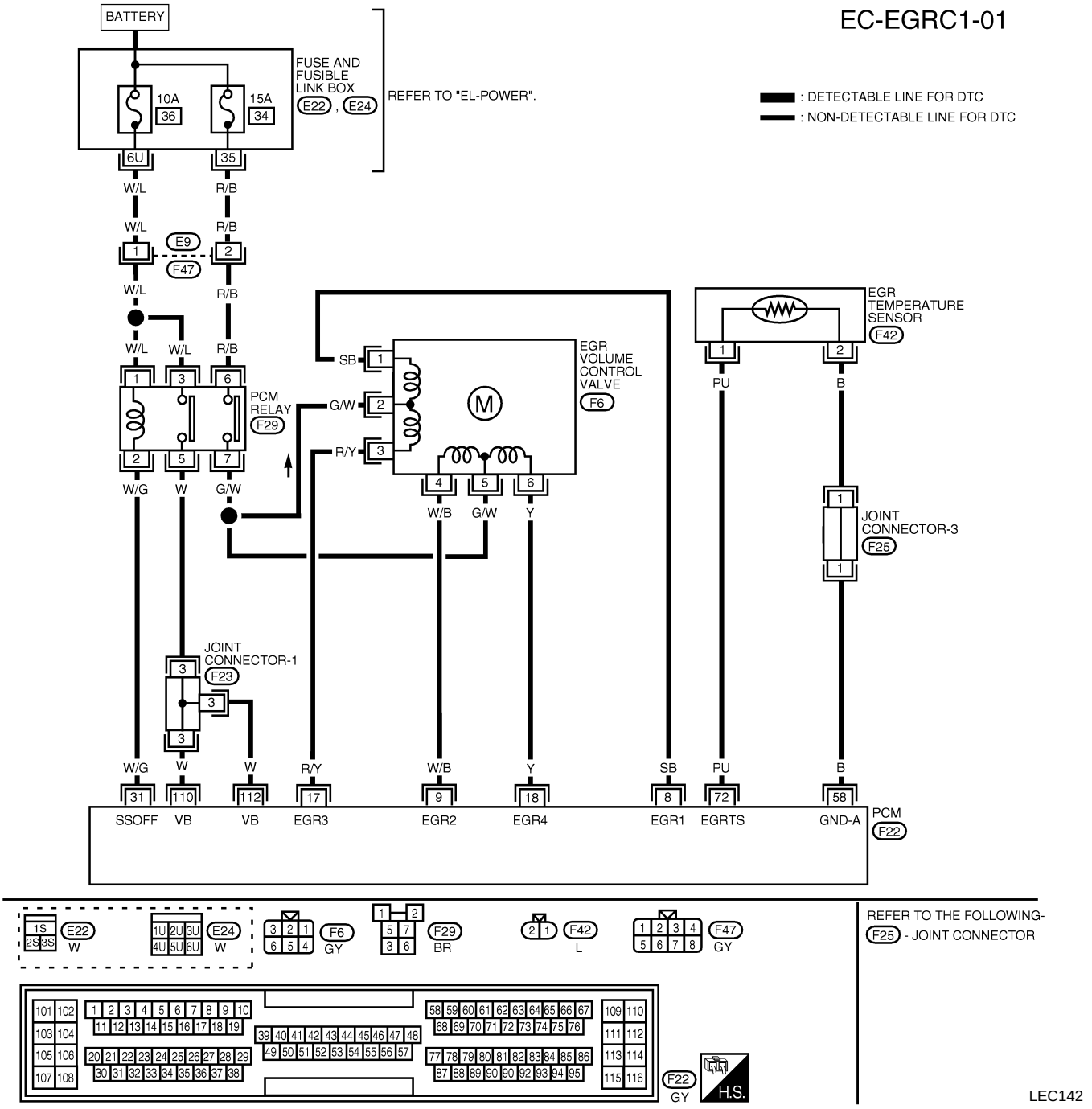
NIEC0517S02

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 70°C (158°F), immediately go to the next step.
5) Maintain the following conditions for at least 1 minute.
   Engine speed: 1,800 - 2,800 rpm
   Vehicle speed: More than 10 km/h (6 MPH)
   Voltage between PCM terminal 92 and ground: 0.86 - 2.0V
   Selector lever: Suitable position
6) Stop vehicle.
7) Turn ignition switch "OFF" and wait at least 10 seconds, then turn "ON".
8) Repeat steps 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

NIEC0518



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

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
8	SB	EGR VOLUME CONTROL VALVE	ENGINE RUNNING AT IDLE SPEED	0.1 - 14V
9	W/B			
17	R/Y			
18	Y			

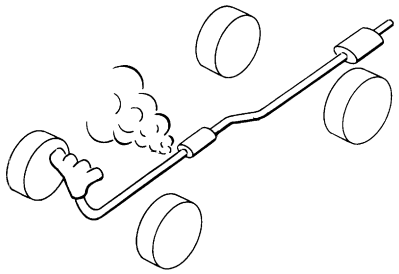
SEF180Z

Diagnostic Procedure

NIEC0519

1	CHECK EXHAUST SYSTEM

1. Start engine.
2. Check exhaust pipes and muffler for leaks.



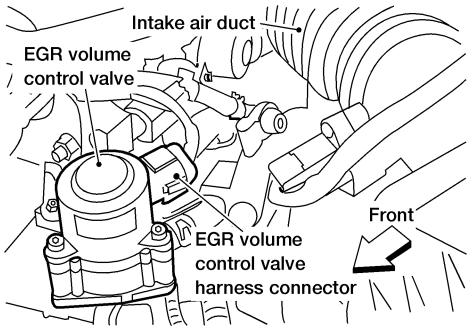
SEF099P

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair or replace exhaust system.

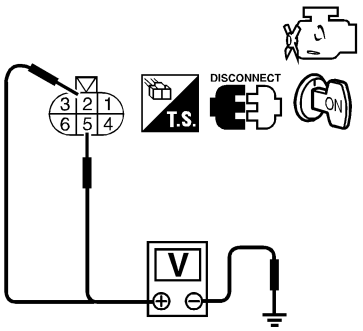
2	CHECK EGR VOLUME CONTROL VALVE POWER SUPPLY CIRCUIT

1. Disconnect EGR volume control valve harness connector.



LEC333

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 harness for open or short between PCM 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 PCM harness connector.
3. Check harness continuity between PCM terminals and EGR volume control valve terminals as follows. Refer to "Wiring Diagram", EC-373.

PCM terminal	EGR volume control valve
8	1
9	4
17	3
18	6

MTBL0448

Continuity should exist.

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

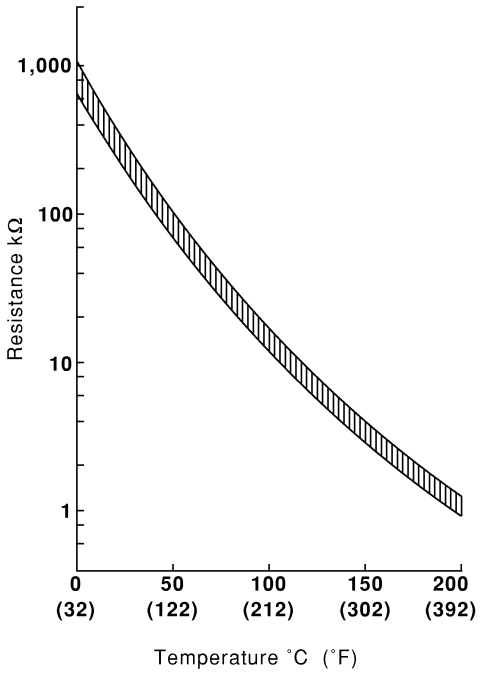
OK or NG

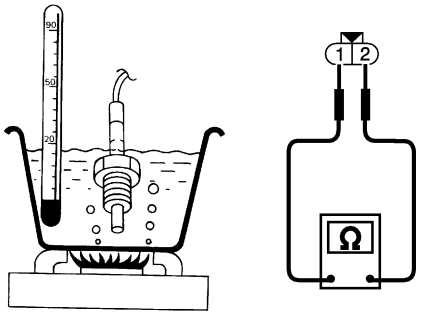
OK	▶	GO TO 5.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK EGR PASSAGE
Check EGR passage for clogging and cracks.	
OK or NG	
OK ▶	GO TO 6.
NG ▶	Repair or replace EGR passage.

6	CHECK EGR TEMPERATURE SENSOR AND CIRCUIT

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)	4.56	0.62 - 1.05
50 (122)	2.25	0.065 - 0.094
100 (212)	0.59	0.011 - 0.015

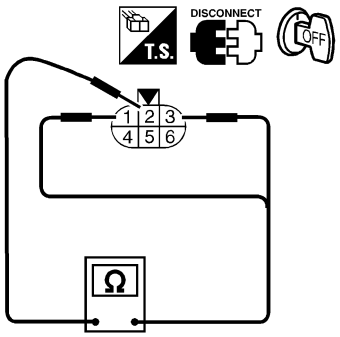
SEF483Y

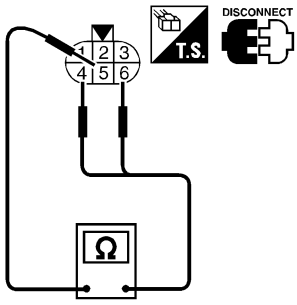
OK or NG

OK	▶	GO TO 7.
NG	▶	Replace EGR temperature sensor.

7	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

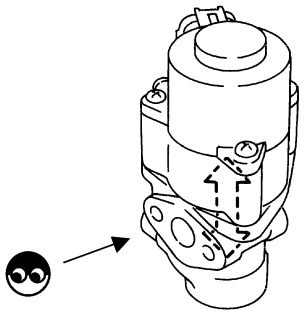
OK (With CONSULT-II)	▶	GO TO 8.
OK (Without CONSULT-II)	▶	GO TO 9.
NG	▶	Replace EGR volume control valve.

8	CHECK EGR VOLUME CONTROL VALVE-II

With CONSULT-II

1. Remove EGR volume control valve.
2. Reconnect PCM 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
EGR TEMP SEN	XXX V



SEF491Y

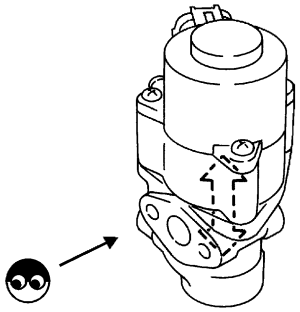
OK or NG

OK	▶	GO TO 10.
NG	▶	Replace EGR volume control valve.

9	CHECK EGR VOLUME CONTROL VALVE-II

Without CONSULT-II

1. Remove EGR volume control valve.
2. Reconnect PCM 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 10.
NG	▶	Replace EGR volume control valve.

10	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-169.	
▶	**INSPECTION END**

Description

NIEC0520

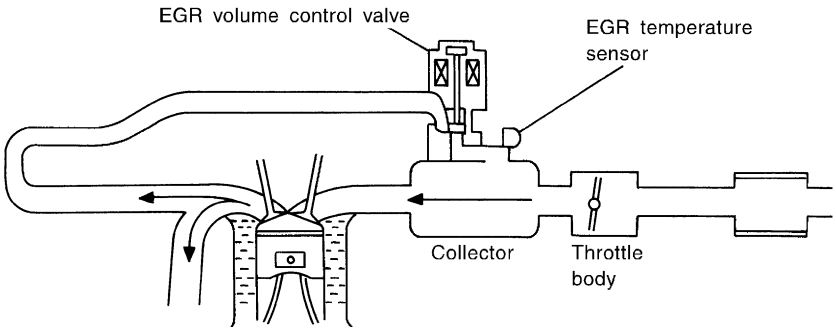
SYSTEM DESCRIPTION

NIEC0520S01

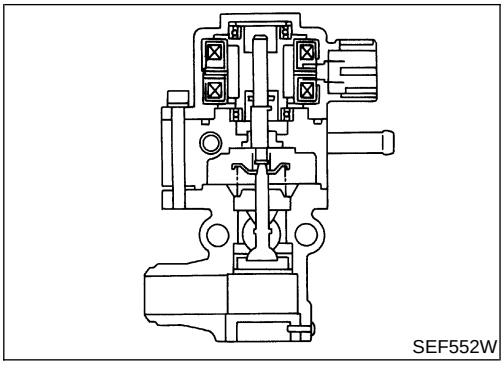
Sensor	Input Signal to PCM	PCM function	Actuator
Camshaft position sensor (PHASE)	Engine speed and cylinder position	EGR volume control	EGR volume control valve
Crankshaft position sensor (POS)	Engine speed		
Vehicle speed sensor	Vehicle speed		
Engine coolant temperature sensor	Engine coolant temperature		
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		
PCM	Gear position, shifting signal		

This system controls flow rate of EGR led from exhaust manifold to intake manifold. The opening of the EGR bypass 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 PCM output pulses. The opening of the valve varies for optimum engine control. The optimum value stored in the PCM is determined by considering various engine conditions. The EGR volume control valve remains closed 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

NIEC0520S02

EGR volume control valve

NIEC0520S0201

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 PCM. 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 PCM 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

NIEC0521

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
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 steps

On Board Diagnosis Logic

NIEC0522

Malfunction is detected when an improper voltage signal is sent to PCM through the valve.

FAIL-SAFE MODE

NIEC0522S01

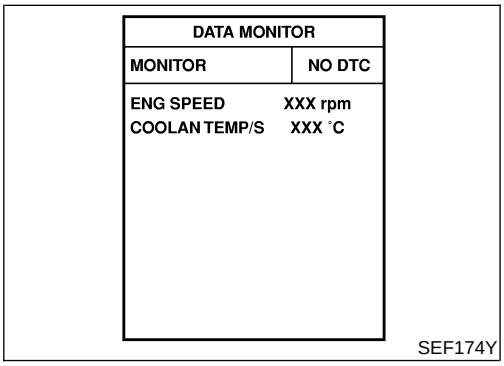
When the PCM enters the fail-safe mode, the MIL illuminates.

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

NIEC0523

- Harness or connectors
  (EGR volume control valve circuit is open or shorted.)
- EGR volume control valve



SEF174Y

DTC Confirmation Procedure

NIEC0524

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

NIEC0524S01

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.

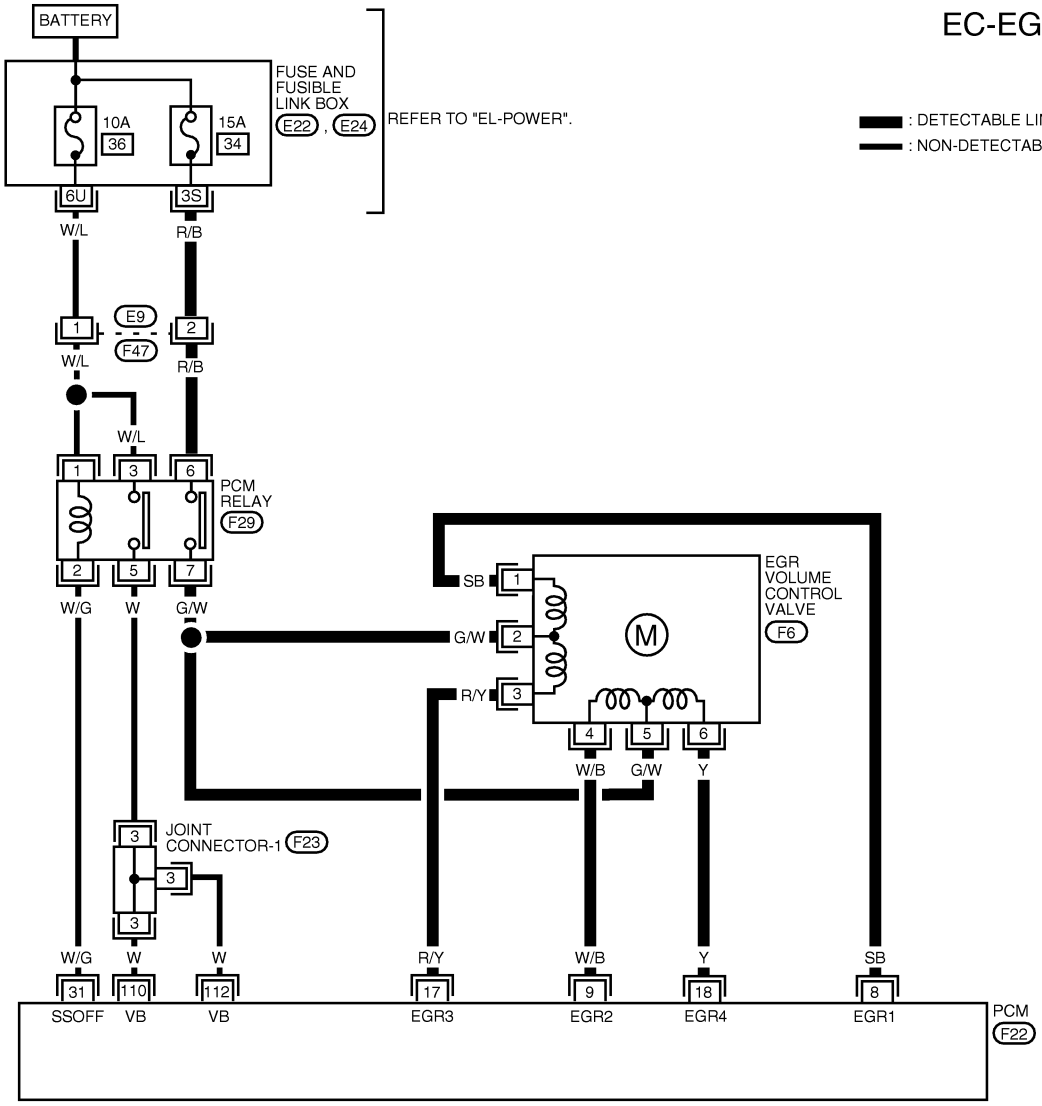
WITH GST

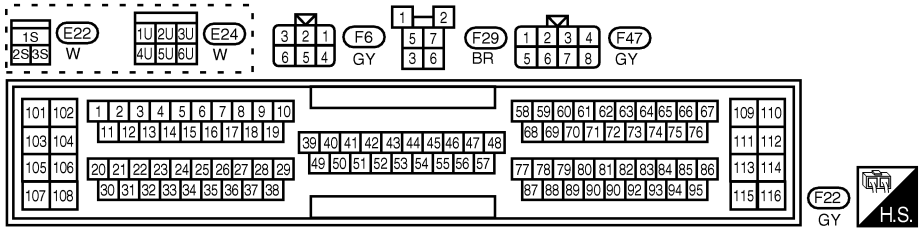
NIEC0524S02

Follow the procedure "With CONSULT-II" above.

Wiring Diagram

=NIEC0525





LEC143

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

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
8	SB	EGR VOLUME CONTROL VALVE	ENGINE RUNNING AT IDLE SPEED	0.1 - 14V
9	W/B			
17	R/Y			
18	Y			

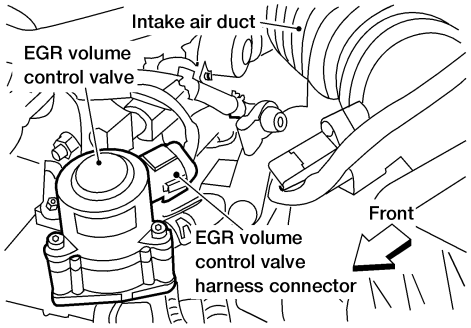
SEF181Z

Diagnostic Procedure

NIEC0526

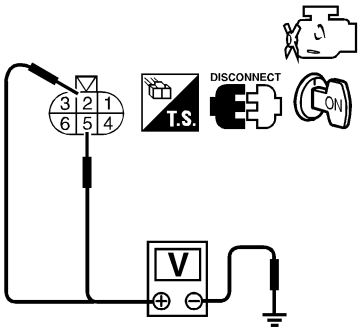
1	CHECK EGR VOLUME CONTROL VALVE POWER SUPPLY CIRCUIT

1. Disconnect EGR volume control valve harness connector.



LEC333

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 harness for open or short between PCM 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 PCM harness connector.
3. Check harness continuity between PCM terminals and EGR volume control valve terminals as follows. Refer to “Wiring Diagram”, EC-381.

PCM terminal	EGR volume control valve
8	1
9	4
17	3
18	6

MTBL0448

Continuity should exist.

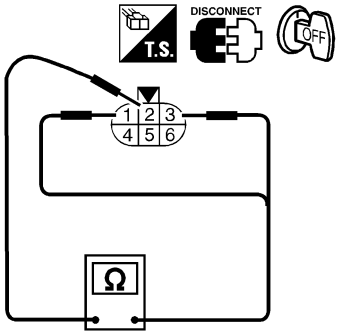
4. Also check harness for short to ground and short to power.

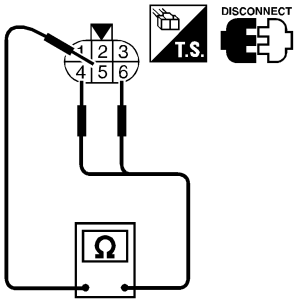
OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK 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

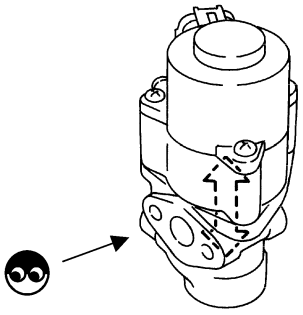
OK (With CONSULT-II)	▶	GO TO 5.
OK (Without CONSULT-II)	▶	GO TO 6.
NG	▶	Replace EGR volume control valve.

5	CHECK EGR VOLUME CONTROL VALVE-II

With CONSULT-II

1. Remove EGR volume control valve.
2. Reconnect PCM 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
EGR TEMP SEN	XXX V



SEF491Y

OK or NG

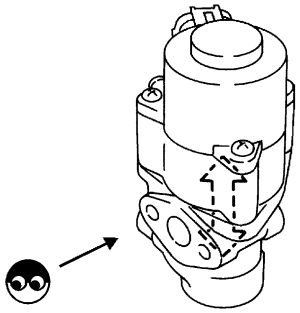
OK	▶	GO TO 7.
NG	▶	Replace EGR volume control valve.

Diagnostic Procedure (Cont'd)

6	CHECK EGR VOLUME CONTROL VALVE-II

Without CONSULT-II

1. Remove EGR volume control valve.
2. Reconnect PCM 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.

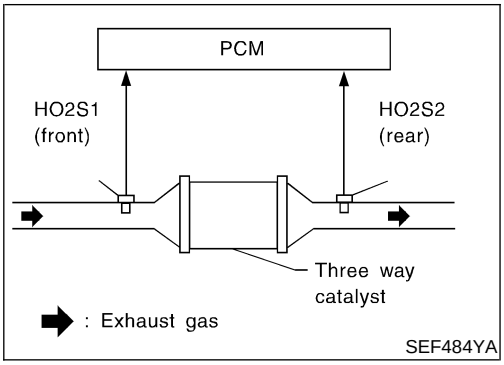


SEF560W

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace EGR volume control valve.

7	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-169.	
▶	**INSPECTION END**



SEF484YA

On Board Diagnosis Logic

NIEC0240

The PCM monitors the switching frequency ratio of sensor 1 and sensor 2 of heated oxygen sensors.
A three way catalyst with high oxygen storage capacity will indicate a low switching frequency of heated oxygen sensor 2 (rear). As oxygen storage capacity decreases, the heated oxygen sensor 2 (rear) switching frequency will increase.
When the frequency ratio of sensor 1 and sensor 2 heated oxygen sensors approaches a specified limit value, the three way catalyst malfunction is diagnosed.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0420 P0430	• Three way catalyst does not operate properly. • Three way catalyst does not have enough oxygen storage capacity.	• Three way catalyst • Exhaust tube • Intake air leaks • Injectors • Injector leaks • Spark plug • Improper ignition timing

SRT WORK SUPPORT	
CATALYST	INCMP
EVAP SYSTEM	INCMP
O2 SEN HEATER	CMPLT
O2 SENSOR	INCMP
EGR SYSTEM	INCMP
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE B1	XXX V
B/FUEL SCHDL	XXX msec
A/F ALPHA-B1	XXX V
COOLAN TEMP/S	XX °C
HO2S1 (B1)	XXX V

SEF671Y

SRT WORK SUPPORT	
CATALYST	CMPLT
EVAP SYSTEM	INCMP
O2 SEN HEATER	CMPLT
O2 SENSOR	INCMP
EGR SYSTEM	INCMP
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE B1	XXX V
B/FUEL SCHDL	XXX msec
A/F ALPHA-B1	XXX V
COOLAN TEMP/S	XX °C
HO2S1 (B1)	XXX V

SEF672Y

SELF DIAG RESULTS	
DTC RESULTS	TIME
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	

SEF560X

DTC Confirmation Procedure

NIEC0241

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.

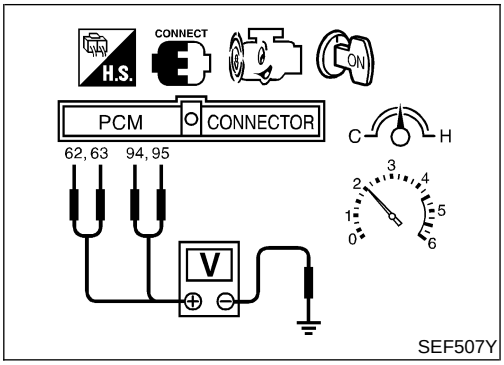
WITH CONSULT-II

NIEC0241S01

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.
   If "INCMP" of CATALYST changes to "CMPLT", go to step 7).
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-386.



Overall Function Check

NIEC0242

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

With GST

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 PCM terminals and engine ground as follows.

PCM terminal	Ground
HO2S1 (front) (B2) 62 HO2S2 (rear) (B2) 63	Ground
HO2S1 (front) (B1) 94 HO2S2 (rear) (B1) 95	Ground

4) Keep engine speed at 2,000 rpm constant under no load.
5) Make sure that the voltage switching frequency (high & low) between PCM terminal 94 (95) and engine ground is much less than that of PCM terminal 62 (63) and engine ground.
   Switching frequency ratio = A/B
   A: Rear heated oxygen sensor voltage switching frequency
   B: Front heated oxygen sensor voltage switching frequency
   This ratio should be less than 0.75.
   If the ratio is greater than above, it means three way catalyst does not operate properly.

NOTE:
If the voltage at terminal 62 (63) does not switch periodically more than 5 times within 10 seconds at step 4, perform trouble diagnosis for DTC P0133 first. (See EC-240.)

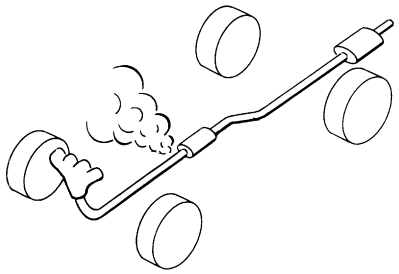
Diagnostic Procedure

NIEC0243

1	CHECK EXHAUST SYSTEM	
Visually check exhaust tubes and muffler for dent. **OK or NG**		
OK	▶	GO TO 2.
NG	▶	Repair or replace.

2	CHECK EXHAUST AIR LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust air leak before the three way catalyst.



SEF099P

OK or NG

OK	▶	GO TO 3.
NG	▶	Repair or replace.

3	CHECK INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair or replace.

4	CHECK IGNITION TIMING

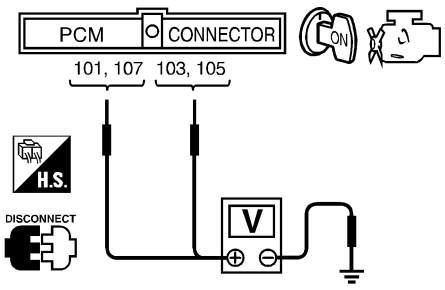
Check for ignition timing.
Refer to "BASIC INSPECTION", EC-131.

OK or NG

OK	▶	GO TO 5.
NG	▶	Adjust ignition timing.

5	CHECK INJECTORS

1. Refer to Wiring Diagram for Injectors, EC-666.
2. Stop engine and then turn ignition switch "ON".
3. Check voltage between PCM terminals 101 and 107 (103 and 105) and ground with CONSULT-II or tester.



Terminal	CYL No.	Bank
101	1	1
107	4	
103	2	2
105	3	

SEF485Y

Battery voltage should exist.

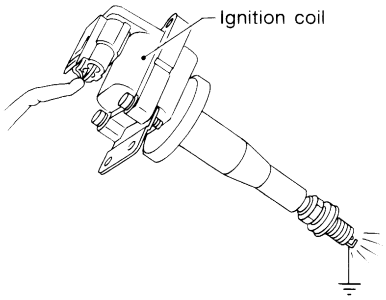
OK or NG

OK	▶	GO TO 6.
NG	▶	Perform "Diagnostic Procedure" INJECTOR, EC-667.

Diagnostic Procedure (Cont'd)

6	CHECK IGNITION SPARK

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



SEF575Q

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	CHECK INJECTOR

1. Turn ignition switch "OFF".
2. Remove injector assembly. Refer to EC-68.
   Keep fuel hose and all injectors connected to injector gallery.
3. Disconnect ignition coil assembly harness connector.
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

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-169.

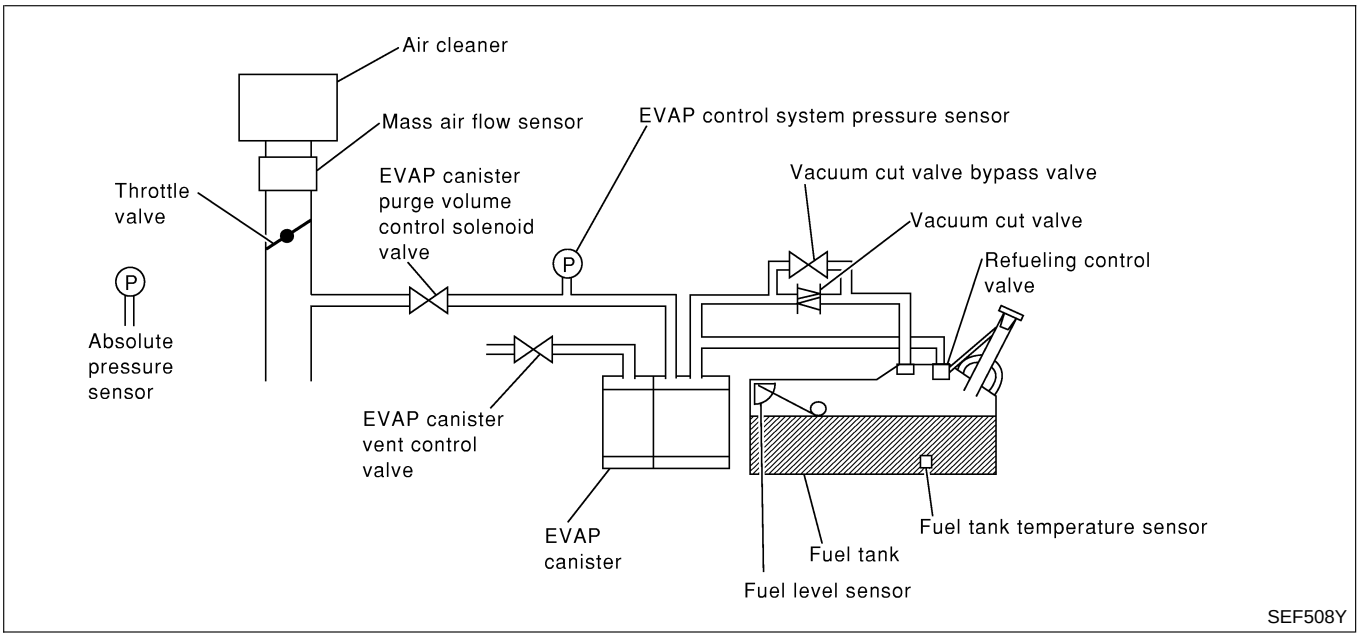
Trouble is fixed	▶	**INSPECTION END**
Trouble is not fixed	▶	Replace three way catalyst.

On Board Diagnosis Logic

NIEC0527

NOTE:
If DTC P0440 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-629.)

This diagnosis detects leaks in the EVAP purge line using engine intake manifold vacuum.
If pressure does not increase, the PCM 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.**

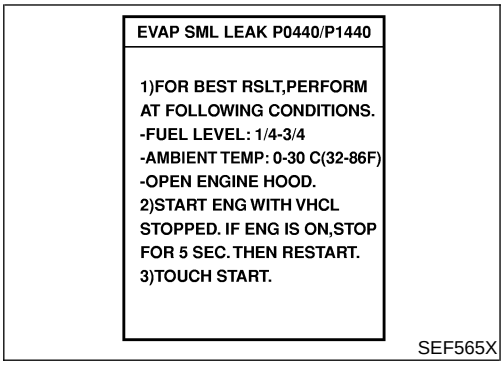
Possible Cause

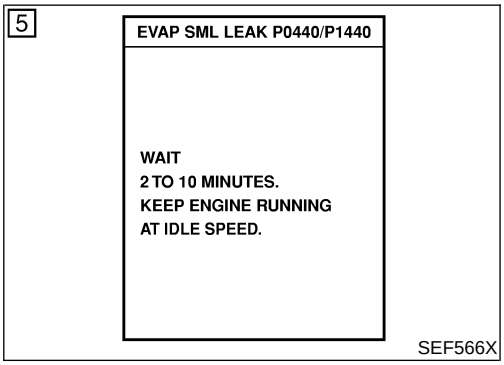
NIEC0528

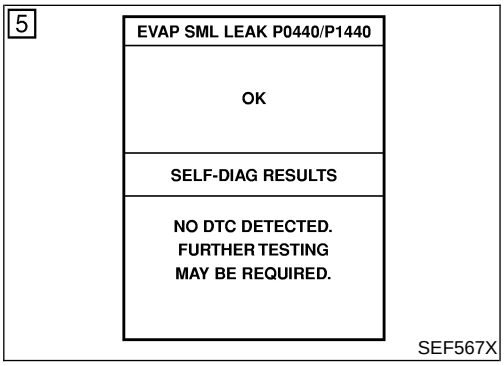
- Incorrect fuel tank vacuum relief valve
- Incorrect fuel filler cap used
- Fuel filler cap remains open or fails to close.
- Foreign matter caught in fuel filler cap.
- Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.
- Foreign matter caught in EVAP canister 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 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

NIEC0529

CAUTION:

Never remove fuel filler cap during the DTC confirmation procedure.

NOTE:

- **If DTC P0440 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-629.)**
- **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 following procedure.**

WITH CONSULT-II

NIEC0529S01

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) Check the following conditions are met.
   COOLAN TEMP/S: 0 - 70°C (32 - 158°F)
   INT/A TEMP SE: 0 - 60°C (32 - 140°F)
5) Select "EVAP SML LEAK P0440/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-131.

- Make sure that EVAP hoses are connected to the EVAP canister purge volume control solenoid valve properly.

6) Make sure that "OK" is displayed.
If "NG" is displayed, refer to "Diagnostic Procedure", EC-391.

WITH GST

NIEC0529S02

NOTE:
Be sure to read the explanation of "Driving Pattern" on EC-92 before driving vehicle.

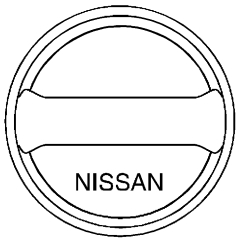
1) Start engine.
2) Drive vehicle according to "Driving Pattern", EC-92.
3) Stop vehicle.
4) Select "MODE 1" with GST.
- If SRT of EVAP system is not set yet, go to the following step.
- If SRT of EVAP system is set, the result will be OK.

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-92.
8) Stop vehicle.
9) Select "MODE 3" with GST.
- If P0440 or P1440 is displayed on the screen, go to "Diagnostic Procedure", EC-391.
- If P1447 is displayed on the screen, go to "Diagnostic Procedure" for DTC P1447, EC-620.
- 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

NIEC0530

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.

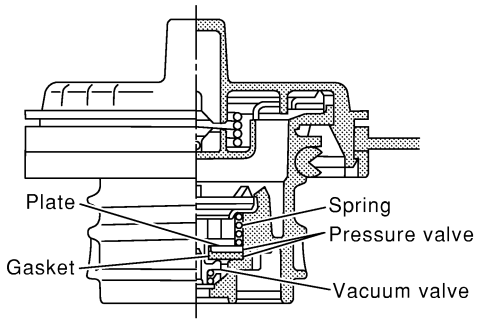
Diagnostic Procedure (Cont'd)

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.

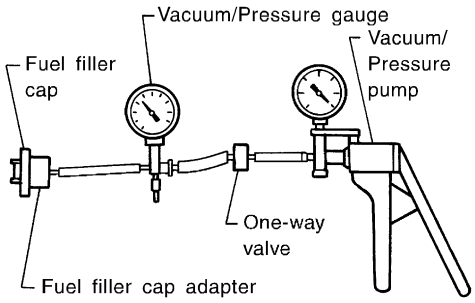
3	CHECK FUEL FILLER CAP FUNCTION	
Check for air releasing sound while opening the fuel filler cap.		
OK or NG		
OK	▶	GO TO 6.
NG	▶	GO TO 4.

4 CHECK FUEL TANK VACUUM RELIEF VALVE

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



SEF445Y



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 −0.035 kg/cm^2, −0.87 to −0.48 psi)

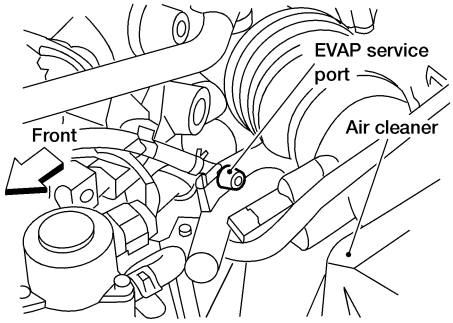
CAUTION:
Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.

OK or NG

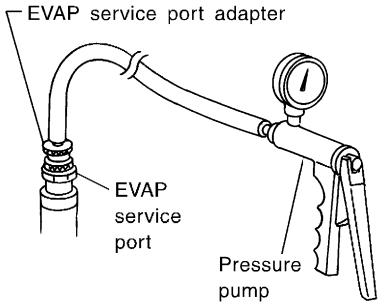
OK	▶	GO TO 5.
NG	▶	Replace fuel filler cap with a genuine one.

5	INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.



LEC256



SEF916U

NOTE:
Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.

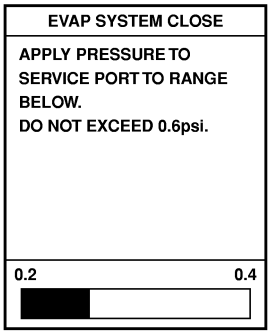
Models with CONSULT-II ▶	GO TO 6.
Models without CONSULT-II ▶	GO TO 7.

Diagnostic Procedure (Cont'd)

6	CHECK FOR EVAP LEAK

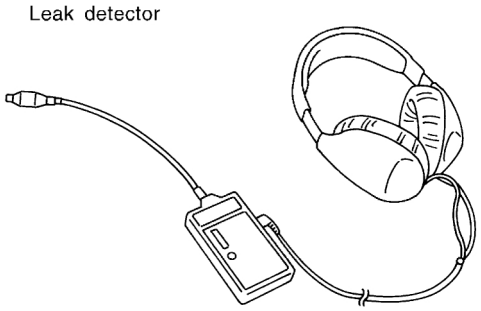
With CONSULT-II

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-53.



SEF200U

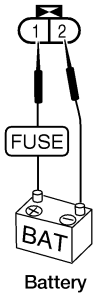
OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace.

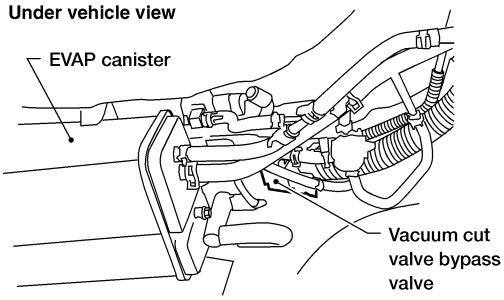
7	CHECK FOR EVAP LEAK

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.)

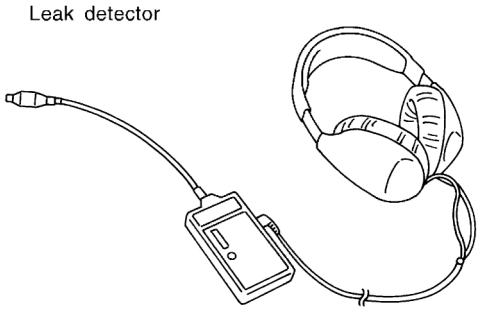


Battery



WEC334

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-53.



SEF200U

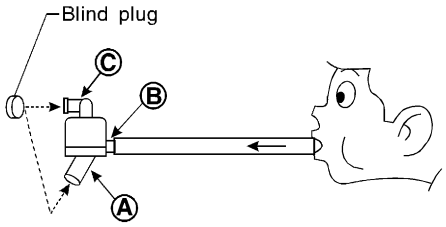
OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace.

Diagnostic Procedure (Cont'd)

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

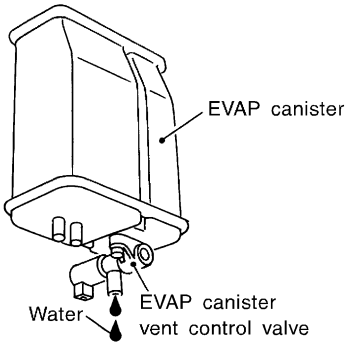
Refer to "DTC Confirmation Procedure", EC-403.

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
A/F ALPHA-B1	XX %
A/F ALPHA-B2	XX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN
THRTL POS SEN	X. XX V

Vacuum should exist.

SEF673Y

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 18.
NG ▶	GO TO 15.

Diagnostic Procedure (Cont'd)

15	CHECK VACUUM HOSE	
Check vacuum hoses for clogging or disconnection. Refer to "Vacuum Hose Drawing", EC-43.		
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.		
OK or NG		
OK	▶	GO TO 18.
NG	▶	GO TO 17.

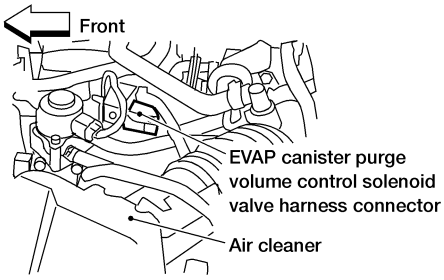
ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XX %
A/F ALPHA-B2	XX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN
THRTL POS SEN	X. XX V

SEF677Y

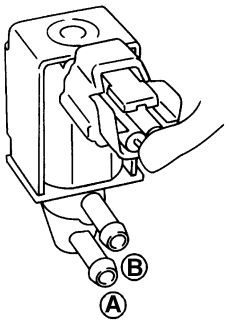
17	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



WEC254

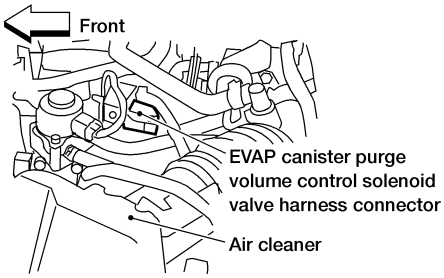


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

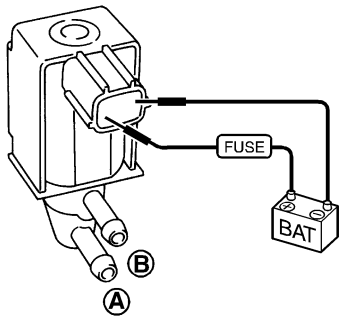
SEF334X

Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



WEC254



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

SEF335X

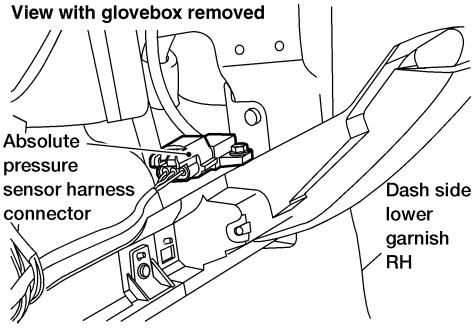
OK or NG

OK	▶	GO TO 18.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

Diagnostic Procedure (Cont'd)

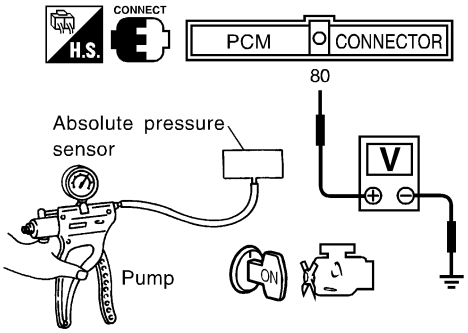
18	CHECK ABSOLUTE PRESSURE SENSOR

1. Remove absolute pressure sensor with its harness connector connected.



LEC430

2. Install a vacuum pump to absolute pressure sensor.
3. Turn ignition switch "ON" and check output voltage between PCM terminal 80 and engine ground under the following conditions.



Applied vacuum kPa (mmHg, inHg)	Voltage V
Not applied	1.8 - 4.8
–26.7 (–200, –7.87)	1.0 to 1.4V lower than above value

SEF487Y

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

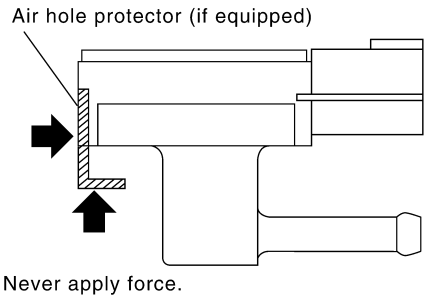
1. Remove fuel level sensor unit.
2. Check fuel tank temperature sensor.
   Refer to "Component Inspection", EC-328.

OK or NG

OK	▶	GO TO 20.
NG	▶	Replace fuel level sensor unit.

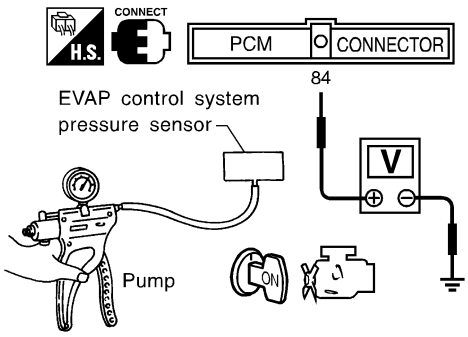
20	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

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 PCM 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

SEF674Y

CAUTION:
- **Discard any 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 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-49.

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.

Diagnostic Procedure (Cont'd)

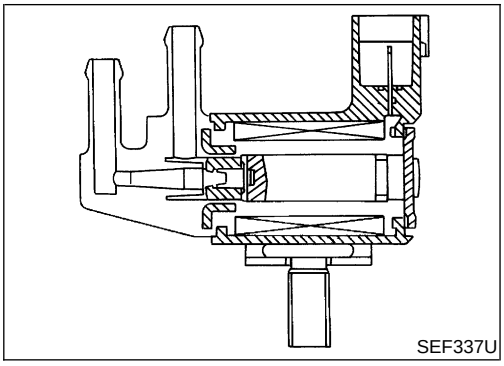
23	CHECK REFUELING EVAP VAPOR LINE	
• Check refueling EVAP vapor line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-53.		
OK or NG		
OK	▶	GO TO 24.
NG	▶	Repair or replace hoses and tubes.

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 hose end B. Air should flow freely into the fuel tank. 3. Blow air into hose end A and check that 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.		
OK or NG		
OK	▶	GO TO 26.
NG	▶	Replace refueling control valve with fuel tank.

26	CHECK FUEL LEVEL SENSOR	
Refer to ***EL-103***, "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-169.		
	▶	**INSPECTION END**


SEF337U

Description

NIEC0531

COMPONENT DESCRIPTION

NIEC0531S02

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 PCM. 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

NIEC0532

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

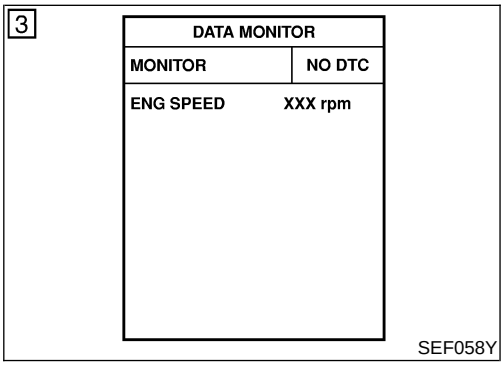
NIEC0533

Malfunction is detected when an improper voltage signal is sent to PCM through the valve.

Possible Cause

NIEC0534

- Harness or connectors
  (The valve circuit is open or shorted.)
- EVAP canister purge volume control solenoid valve



SEF058Y

DTC Confirmation Procedure

NIEC0535

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

NIEC0535S01

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-406.

WITH GST

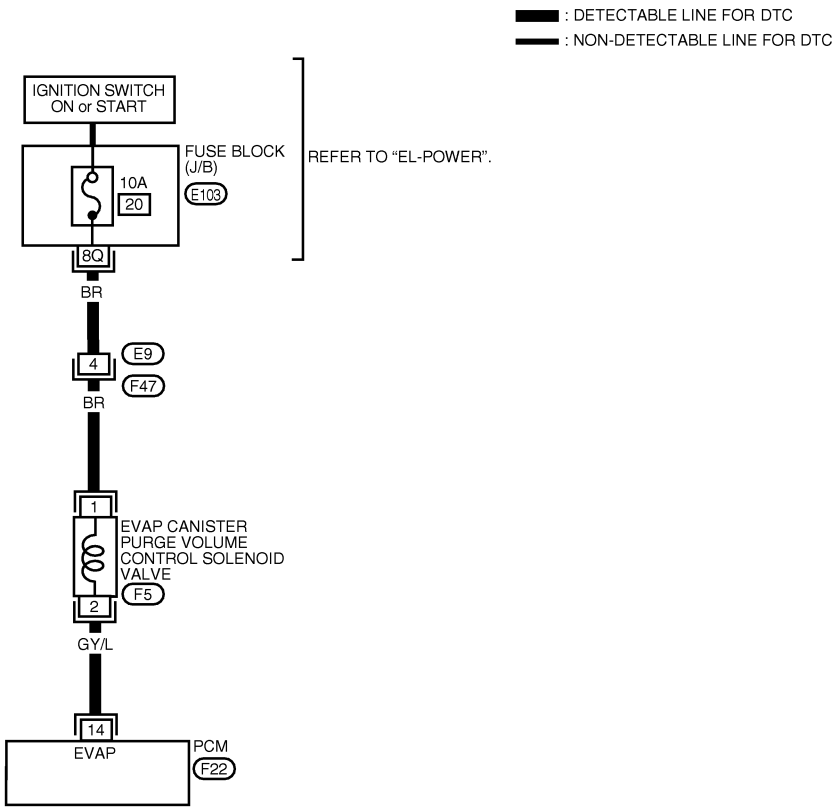
NIEC0535S02

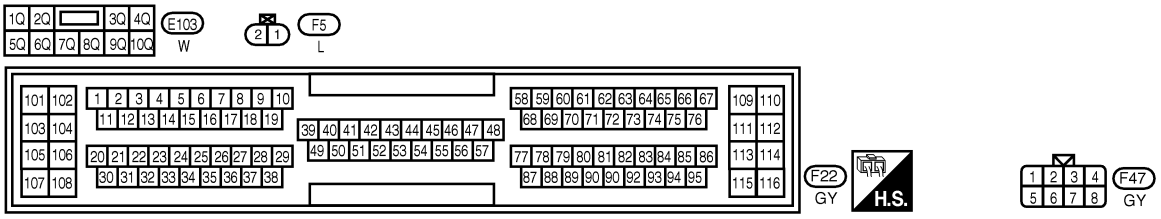
Follow the procedure "WITH CONSULT-II" above.

Wiring Diagram

=NIEC0536

EC-PGC/V-01





LEC161

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

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
14	GY/L	EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE	ENGINE RUNNING AT IDLE SPEED	BATTERY VOLTAGE (V) 40 20 0 50 ms
			ENGINE RUNNING AT 2,000 RPM (MORE THAN 100 SECONDS AFTER STARTING ENGINE)	BATTERY VOLTAGE (V) 40 20 0 50 ms

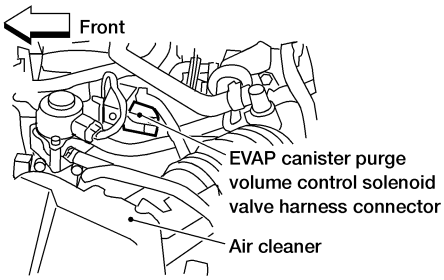
SEF182Z

Diagnostic Procedure

NIEC0537

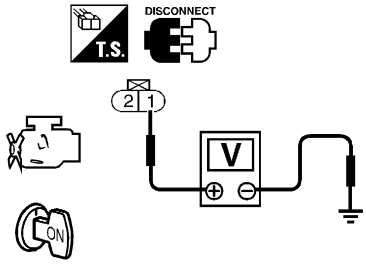
1	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.



WEC254

3. Turn ignition switch “ON”.
4. Check voltage between EVAP canister purge volume control solenoid valve terminal 1 and ground with CONSULT-II or tester.



SEF206W

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E9, F47
- Fuse block (J/B) connector E103
- 10A 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 PCM harness connector.
3. Check harness continuity between PCM terminal 14 and EVAP canister purge volume control solenoid valve terminal 2. Refer to "Wiring Diagram", EC-405.
   Continuity should exist.
4. 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	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the harness for open or short between EVAP canister purge volume control solenoid valve and PCM.

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

5	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	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XX %
A/F ALPHA-B2	XX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN
THRTL POS SEN	X. XX V

SEF677Y

OK or NG

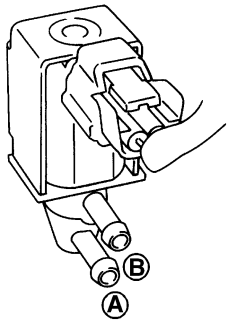
OK	▶	GO TO 7.
NG	▶	GO TO 6.

Diagnostic Procedure (Cont'd)

6	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.

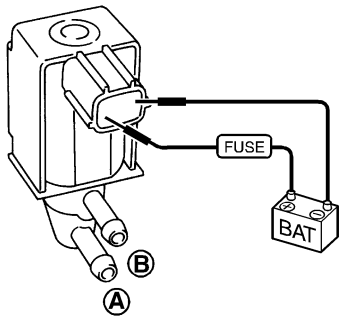


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

SEF334X

Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



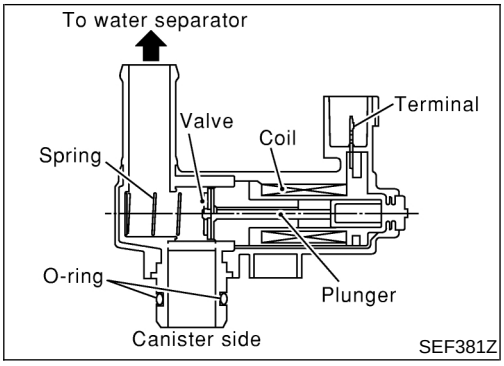
Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

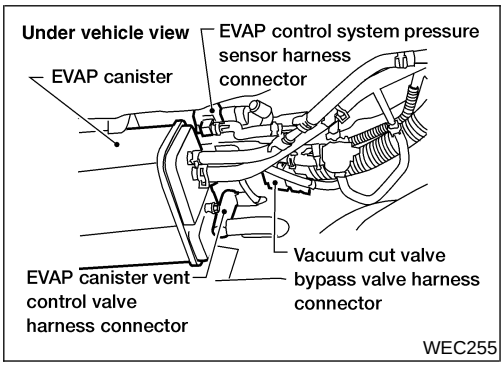
SEF335X

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

7	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-169.	
▶	**INSPECTION END**





Component Description

NIEC0538

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 PCM. When the PCM 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" diagnoses.

CONSULT-II Reference Value in Data Monitor Mode

NIEC0539

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	• Ignition switch: ON	OFF

On Board Diagnosis Logic

NIEC0540

Malfunction is detected when an improper voltage signal is sent to PCM through EVAP canister vent control valve.

Possible Cause

NIEC0541

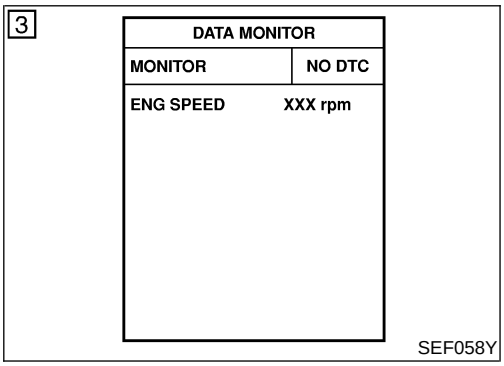
- Harness or connectors
  (The valve circuit is open or shorted.)
- EVAP canister vent control valve

DTC Confirmation Procedure

NIEC0542

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

NIEC0542S01

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-412.

WITH GST

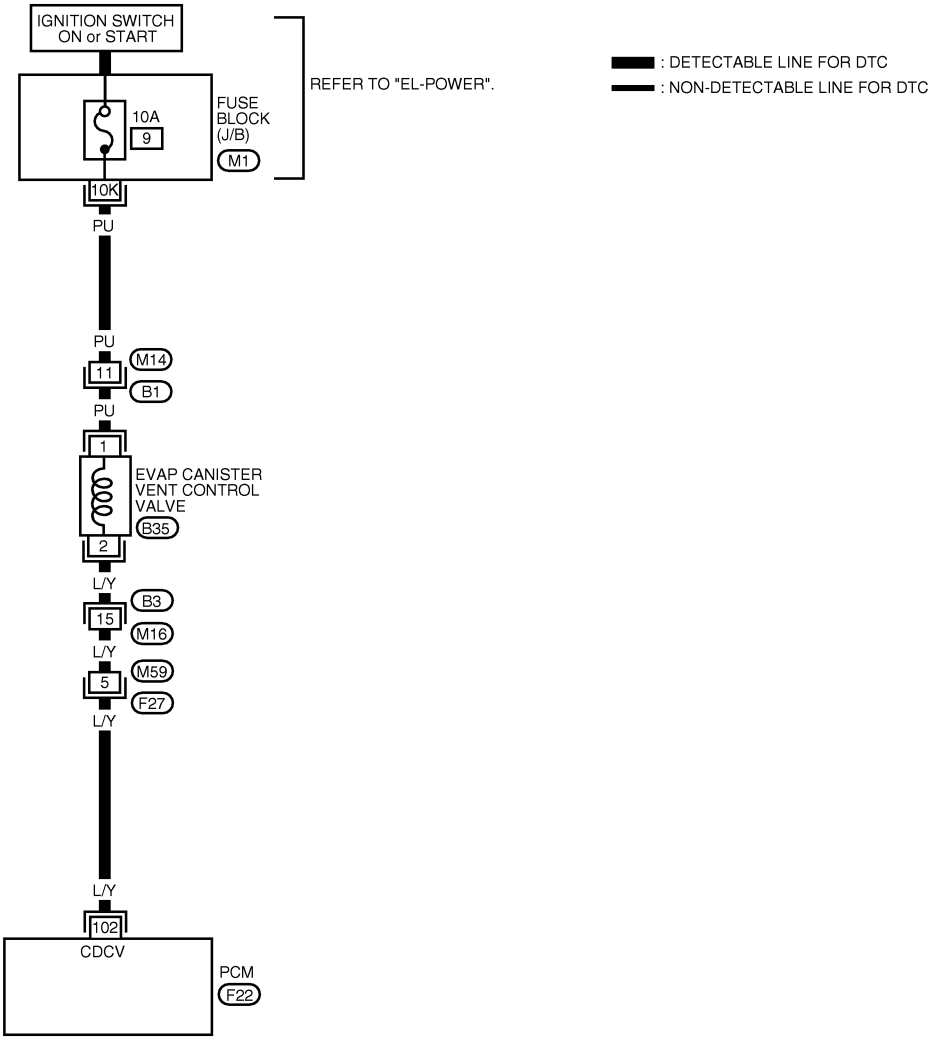
NIEC0542S02

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

NIEC0543

EC-VENT/V-01



LEC149

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

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
102	L/Y	EVAP CANISTER VENT CONTROL VALVE	IGN ON	BATTERY VOLTAGE

SEF185Z

Diagnostic Procedure

NIEC0544

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	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XX %
A/F ALPHA-B2	XX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN
THRTL POS SEN	X. XX V

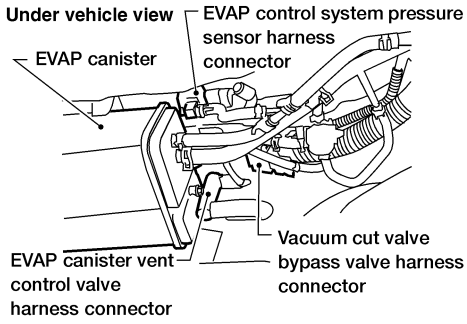
SEF677Y

4. Check for operating sound of the valve.
   Clicking noise should be heard.

OK or NG		
OK	▶	GO TO 7.
NG	▶	GO TO 3.

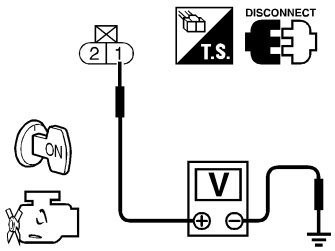
3	CHECK EVAP CANISTER VENT CONTROL VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect EVAP canister vent control valve harness connector.



WEC255

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 M14, B1
- Fuse block (J/B) connector M1
- 10A 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 PCM harness connector.
3. Check harness continuity between PCM terminal 102 and EVAP canister vent control valve terminal 2. Refer to "Wiring Diagram", EC-411.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

OK or NG

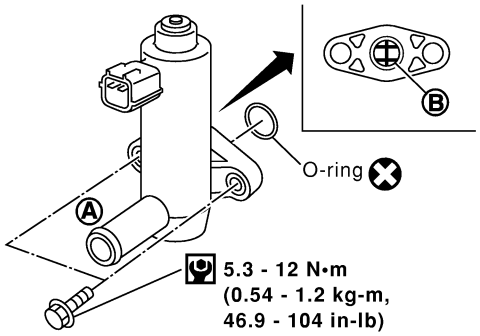
OK	▶	GO TO 7.
NG	▶	GO TO 6.

Diagnostic Procedure (Cont'd)

6	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors B3, M16 ● Harness connectors M59, F27 ● Harness for open or short between EVAP canister vent control valve and PCM	
▶	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.	



SEF376Z

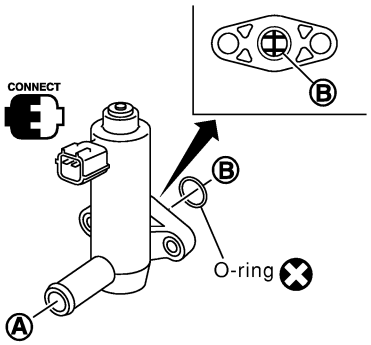
OK or NG	
OK ▶	GO TO 9.
NG ▶	Replace EVAP canister vent control valve.

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
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN
THRTL POS SEN	XXX V



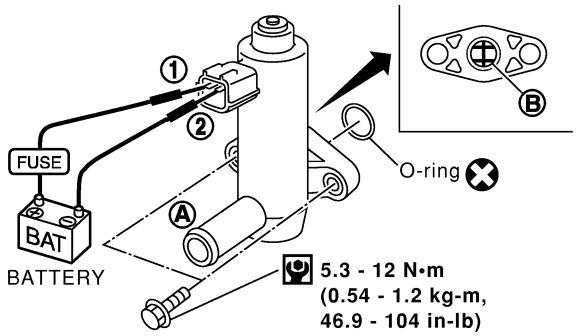
Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

SEF377Z

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.

SEF378Z

Make sure new O-ring is installed properly.

OK or NG

OK	▶	GO TO 11.
NG	▶	GO TO 10.

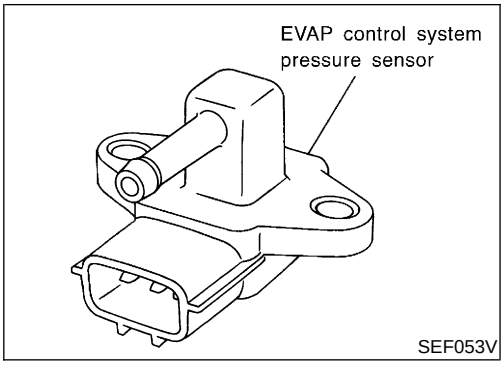
10	CHECK EVAP CANISTER VENT CONTROL VALVE-III

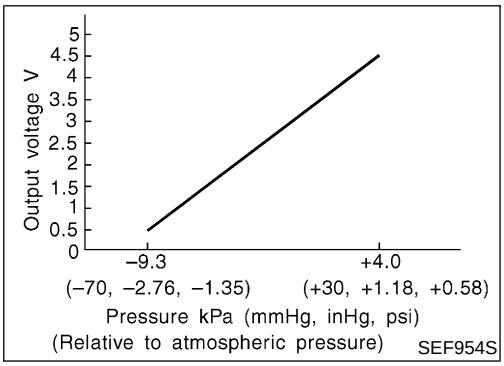
1. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
2. Perform Test No. 9 again.

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-169.	
▶	**INSPECTION END**





Component Description

NIEC0545

The EVAP control system pressure sensor detects pressure in the purge line. The sensor output voltage to the PCM 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

NIEC0546

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
EVAP SYS PRES	• Ignition switch: ON	Approx. 3.4V

On Board Diagnosis Logic

NIEC0547

Malfunction is detected when an improper voltage signal from EVAP control system pressure sensor is sent to PCM.

Possible Cause

NIEC0548

- 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

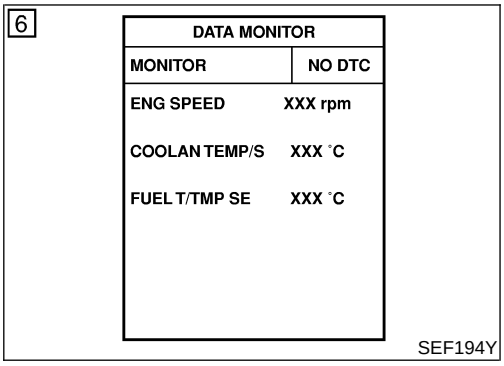
- Rubber hose from EVAP canister vent control valve to water separator

DTC Confirmation Procedure

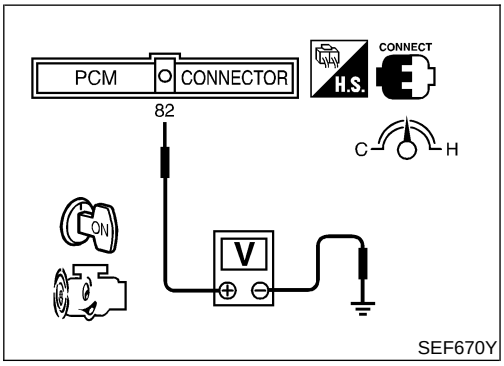
NIEC0549

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 0°C (41°F) or more.



SEF194Y



SEF670Y

WITH CONSULT-II

NIEC0549S01

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-419.

WITH GST

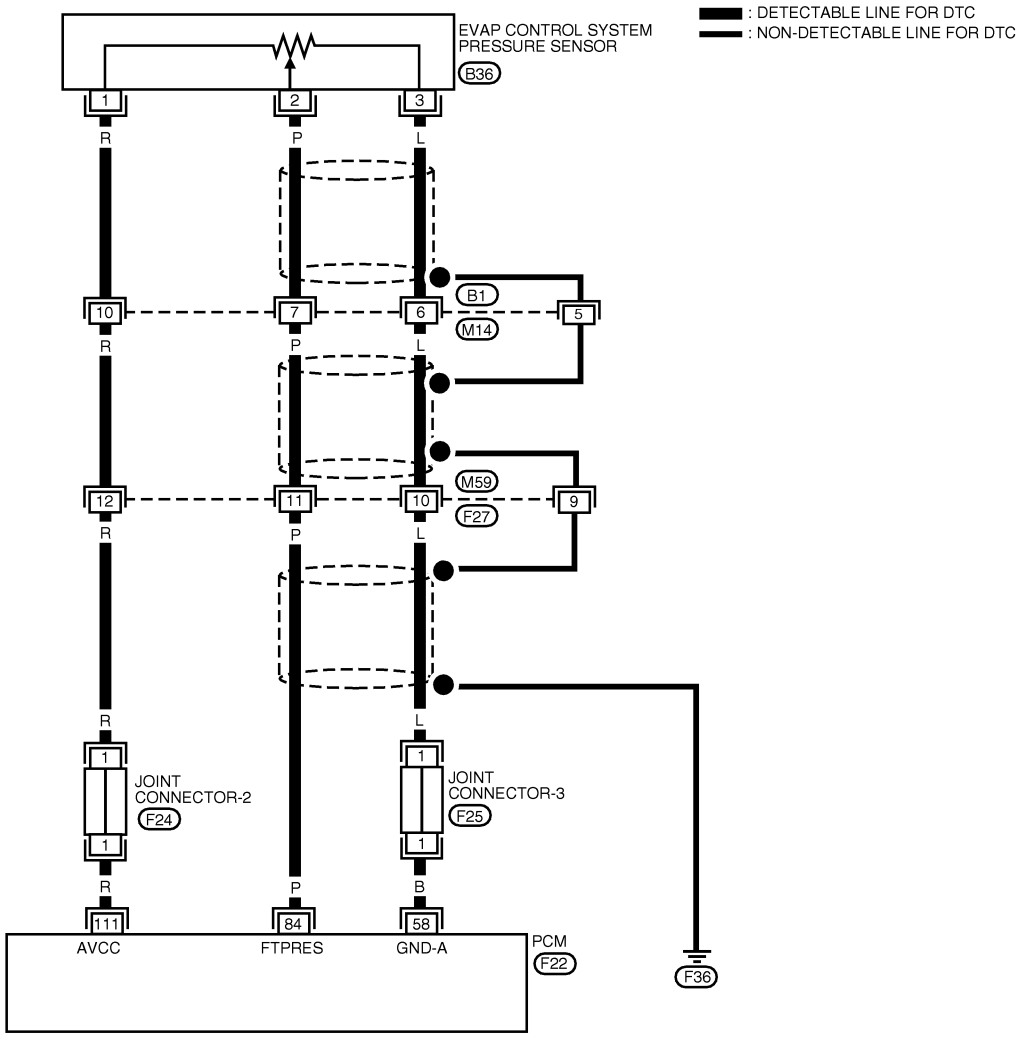
NIEC0549S02

1) Start engine and warm it up to normal operating temperature.
2) Check that voltage between PCM terminal 82 (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-419.

Wiring Diagram

NIEC0550

EC-PRE/SE-01



LEC152

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

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
58	B	SENSOR'S GROUND	IGN ON	APPROX. 0V
84	P	EVAP CONTROL SYSTEM PRESSURE SENSOR	IGN ON	APPROX. 3.4V
111	R	SENSOR'S POWER SUPPLY	IGN ON	APPROX. 5V

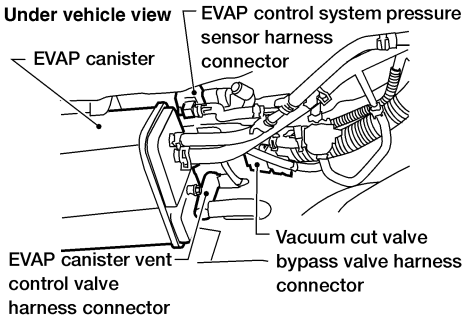
SEF186Z

Diagnostic Procedure

NIEC0551

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.



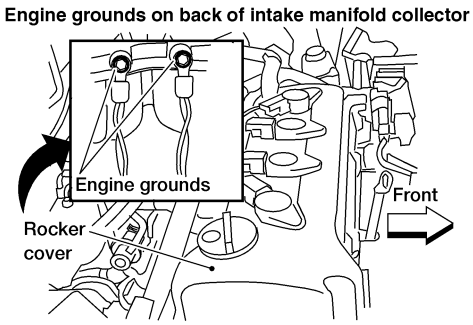
WEC255

OK or NG

OK	▶	GO TO 2.
NG	▶	Reconnect, repair or replace.

2	RETIGHTEN GROUND SCREWS

Loosen and retighten engine ground screws.



WEC249

	▶	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.

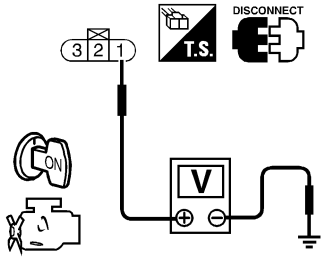
OK or NG

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

Diagnostic Procedure (Cont'd)

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 B1, M14
- Harness connectors M59, F27
- Joint connector-2
- Harness for open or short between EVAP control system pressure sensor and PCM

	▶	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", EC-418.
   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 B1, M14
- Harness connectors M59, F27
- Joint connector-3
- Harness for open or short between EVAP control system pressure sensor and PCM

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

8	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect PCM harness connector.
2. Check harness continuity between PCM terminal 84 and EVAP control system pressure sensor terminal 2. Refer to "Wiring Diagram", EC-418.
   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 B1, M14
- Harness connectors M59, F27
- Harness for open or short between PCM 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	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XX %
A/F ALPHA-B2	XX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN
THRTL POS SEN	X. XX V

SEF677Y

OK or NG

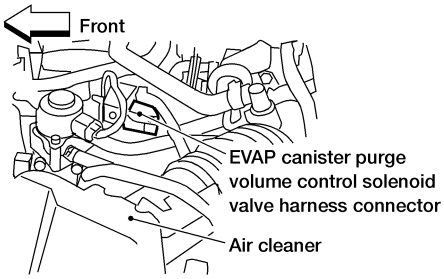
OK	▶	GO TO 12.
NG	▶	GO TO 11.

Diagnostic Procedure (Cont'd)

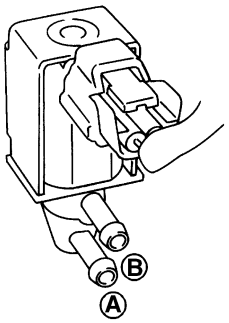
11	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



WEC254

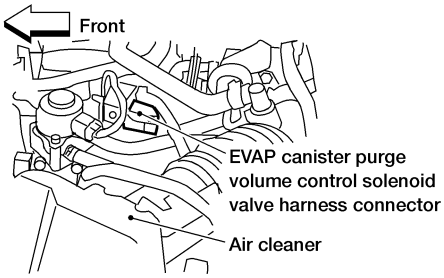


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

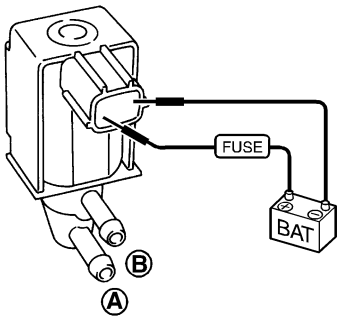
SEF334X

Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



WEC254



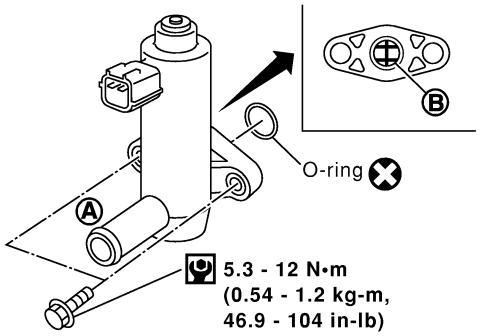
Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

SEF335X

OK or NG

OK	▶	GO TO 12.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

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.		
 SEF376Z		
OK or NG		
OK	▶	GO TO 14.
NG	▶	Replace EVAP canister vent control valve.

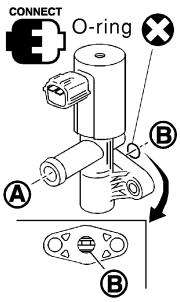
Diagnostic Procedure (Cont'd)

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
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN
THRTL POS SEN	XXX V



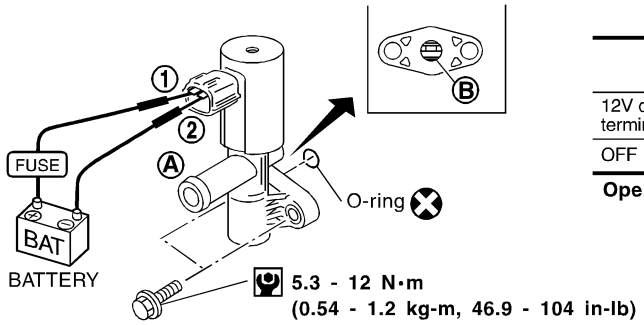
Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

SEF675Y

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

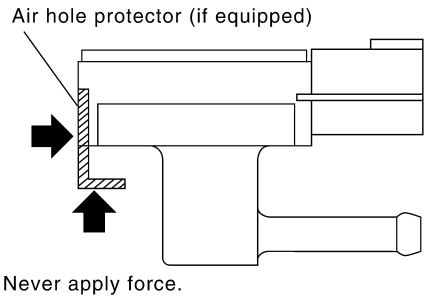
1. Clean the air passage (portion **A** to **B**) of EVAP canister vent control valve using an air blower.
2. Perform Test No. 14 again.

OK or NG

OK	▶	GO TO 16.
NG	▶	Replace EVAP canister vent control valve.

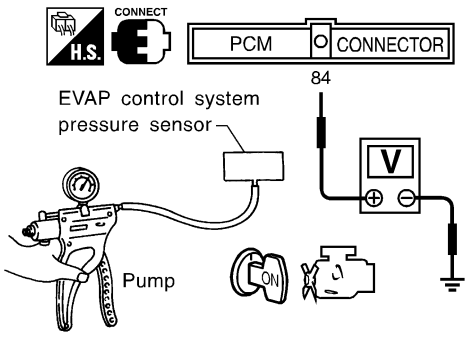
16	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

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 PCM 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

SEF674Y

CAUTION:
- **Discard any 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.

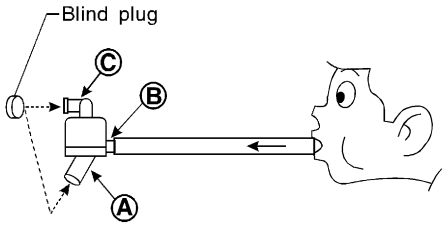
OK or NG

OK	▶	GO TO 18.
NG	▶	Clean rubber tube using an air blower, repair or replace rubber tube.

Diagnostic Procedure (Cont'd)

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.

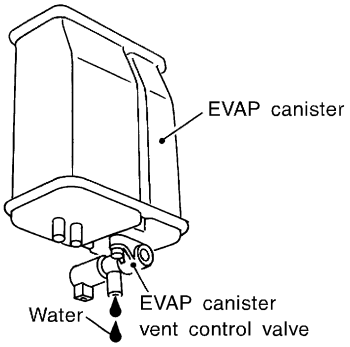
NOTE:
- Do not disassemble water separator.

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 21.

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.

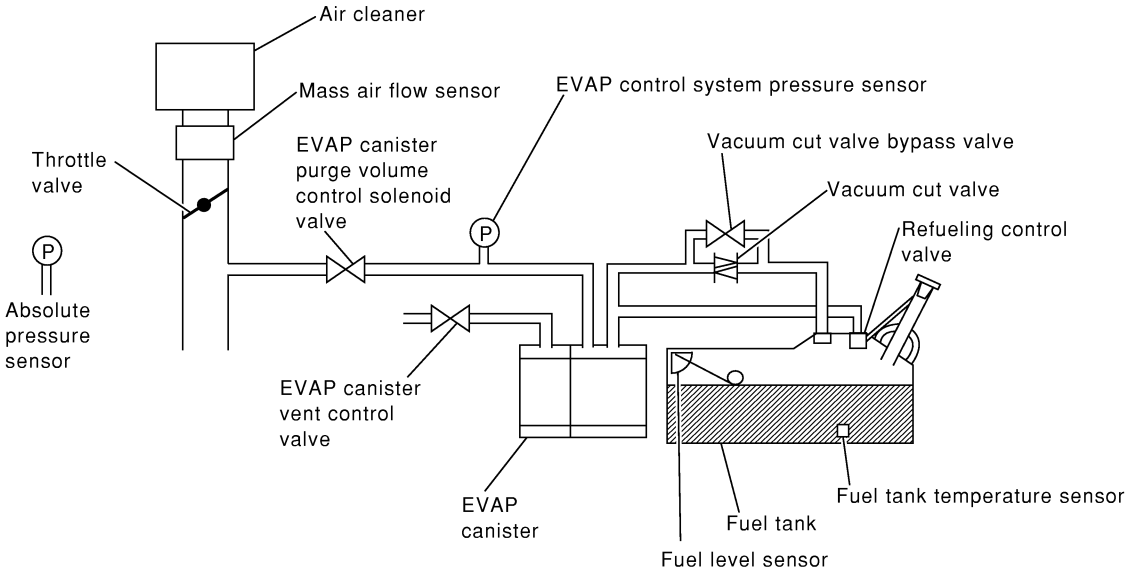
22	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-169.	
▶	**INSPECTION END**

On Board Diagnosis Logic

NIEC0649

NOTE:
If DTC P0455 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-629.)

This diagnosis detects a very large leak (fuel filler cap fell off, etc.) in the EVAP system between the fuel tank and the EVAP canister purge volume control solenoid valve.



Malfunction is detected when EVAP control system has very large leaks such as when fuel filler cap has fallen off, EVAP control system does not operate properly.

CAUTION:

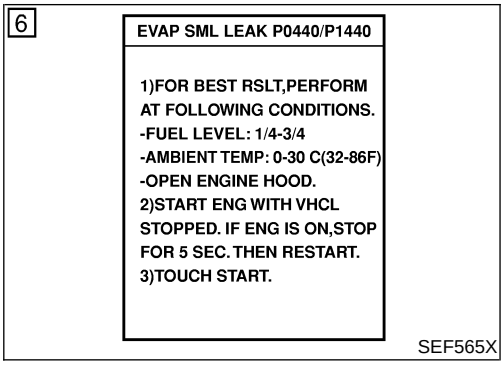
- **Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.**
- **If the fuel filler cap is not tightened properly, the MIL may come on.**
- **Use only a genuine NISSAN rubber tube as a replacement.**

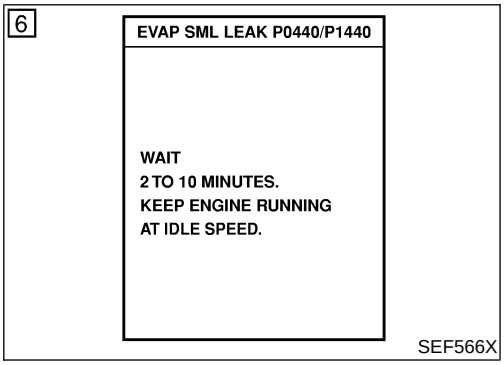
Possible Cause

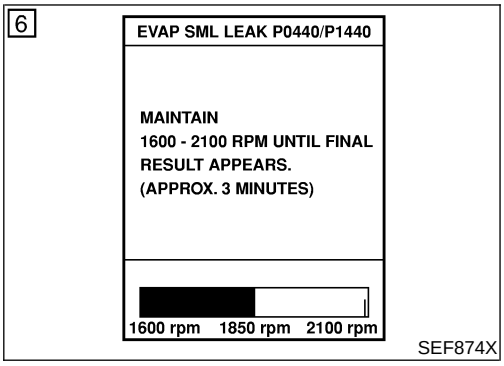
NIEC0650

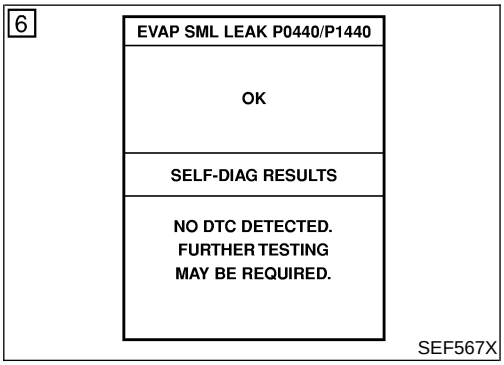
- Fuel filler cap remains open or fails to close
- Incorrect fuel tank vacuum relief valve
- Incorrect fuel filler cap used
- Foreign matter caught in fuel filler cap
- Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve
- Foreign matter caught in EVAP canister 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.
- EVAP control system pressure sensor
- Refueling control valve
- ORVR system leaks









DTC Confirmation Procedure

NIEC0651

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-629.)**
- **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 procedure.**

WITH CONSULT-II

NIEC0651S01

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-131.

7) Make sure that "OK" is displayed.
   If "NG" is displayed, select "SELF-DIAG RESULTS" mode with CONSULT-II and make sure that "EVAP GROSS LEAK [P0455]" is displayed. If it is displayed, refer to "Diagnostic Procedure", EC-431.
   If P0440 is displayed, perform "Diagnostic Procedure" for DTC P0440, EC-389.

WITH GST

NIEC0651S02

NOTE:

Be sure to read the explanation of "Driving Pattern" on EC-92 before driving vehicle.

1) Start engine.
2) Drive vehicle according to "Driving Pattern", EC-92.
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-92.
8) Stop vehicle.
9) Select "MODE 3" with GST.

- If P0455 is displayed on the screen, go to "Diagnostic Procedure", EC-431.
- If P0440 or P1440 is displayed on the screen, go to "Diagnostic Procedure", for DTC P0440, EC-406.
- If P1447 is displayed on the screen, go to "Diagnostic Procedure" for DTC P1447, EC-620.
- If P0440, P0455, P1440 and P1447 are not displayed on the screen, go to the following step.

10) Select "MODE 1" with GST.

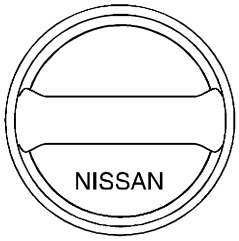
- If SRT of EVAP system is set, the result will be OK.
- If SRT of EVAP system is not set, go to step 6.

Diagnostic Procedure

NIEC0652

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

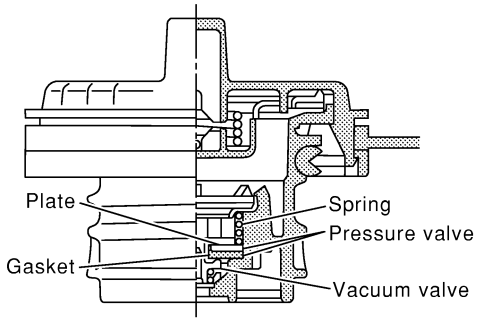
OK	▶	GO TO 3.
NG	▶	• Open fuel filler cap, then clean cap and fuel filler neck threads using air blower. • Retighten until ratcheting sound is heard.

Diagnostic Procedure (Cont'd)

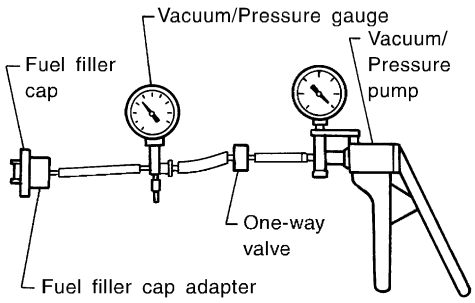
3	CHECK FUEL FILLER CAP FUNCTION
Check for air releasing sound while opening the fuel filler cap.	
OK or NG	
OK ▶	GO TO 5.
NG ▶	GO TO 4.

4	CHECK FUEL TANK VACUUM RELIEF VALVE

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



SEF445Y



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 −0.035 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.

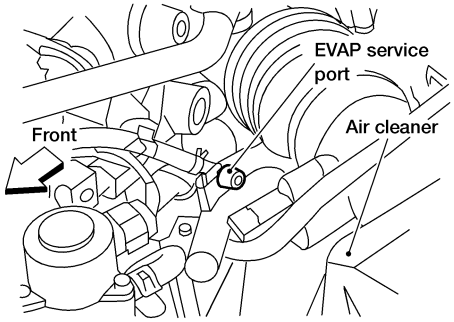
5	CHECK EVAP PURGE LINE
Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks, improper connection or disconnection. Refer to "Evaporative Emission System", EC-49.	
OK or NG	
OK ▶	GO TO 6.
NG ▶	Repair or reconnect the hose.

6	CLEAN EVAP PURGE LINE
Clean EVAP purge line (pipe and rubber tube) using air blower.	
▶	GO TO 7.

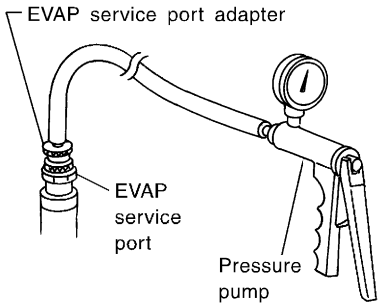
7	CHECK EVAP CANISTER VENT CONTROL VALVE, O-RING AND CIRCUIT	
Refer to "DTC Confirmation Procedure", EC-410.		
OK or NG		
OK	▶	GO TO 8.
NG	▶	Repair or replace EVAP canister vent control valve and O-ring or harness/connector.

8	INSTALL THE PRESSURE PUMP	

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.



LEC256



SEF916U

NOTE:
Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.

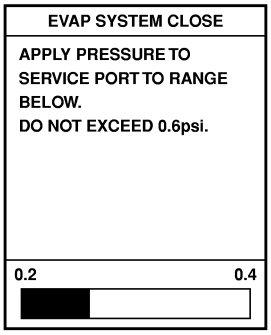
Models with CONSULT-II	▶	GO TO 9.
Models without CONSULT-II	▶	GO TO 10.

Diagnostic Procedure (Cont'd)

9	CHECK FOR EVAP LEAK

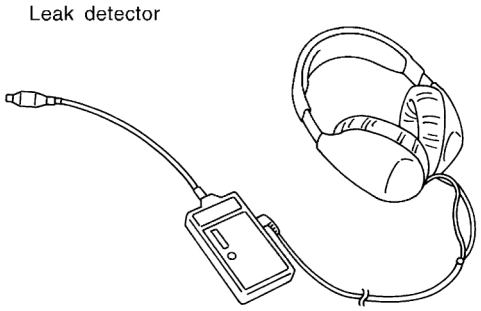
With CONSULT-II

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-53.



SEF200U

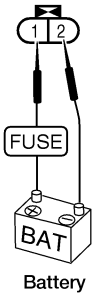
OK or NG

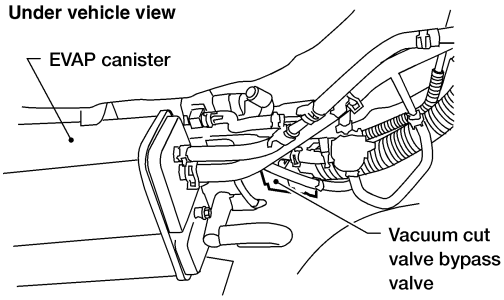
OK (With CONSULT-II)	▶	GO TO 11.
OK (Without CONSULT-II)	▶	GO TO 12.
NG	▶	Repair or replace.

10	CHECK FOR EVAP LEAK

Without CONSULT-II

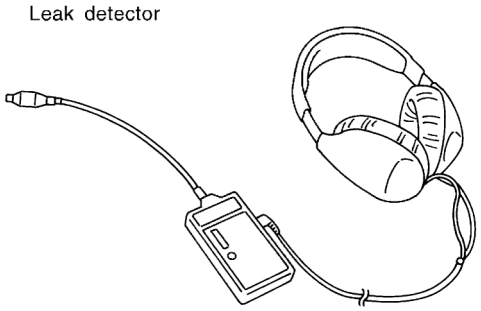
1. Turn ignition switch "OFF".
2. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)
3. Apply 12 volts DC to vacuum cut valve bypass valve. The valve will open. (Continue to apply 12V until the end of test.)





WEC334

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-53.



SEF200U

OK or NG

OK (With CONSULT-II)	▶	GO TO 11.
OK (Without CONSULT-II)	▶	GO TO 12.
NG	▶	Repair or replace.

Diagnostic Procedure (Cont'd)

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
A/F ALPHA-B1	XX %
A/F ALPHA-B2	XX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN
THRTL POS SEN	X. XX V

Vacuum should exist.

SEF673Y

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-43.

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	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XX %
A/F ALPHA-B2	XX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN
THRTL POS SEN	X. XX V

SEF677Y

OK or NG

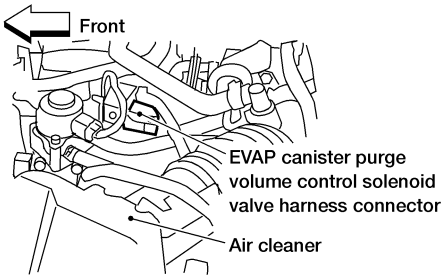
OK	▶	GO TO 16.
NG	▶	GO TO 15.

Diagnostic Procedure (Cont'd)

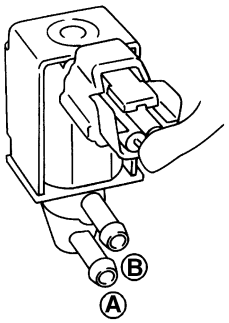
15	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



WEC254

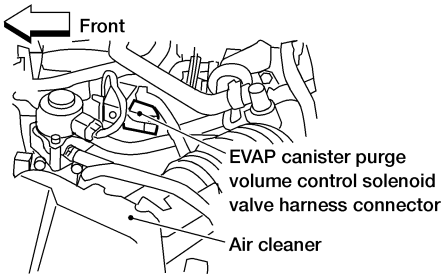


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

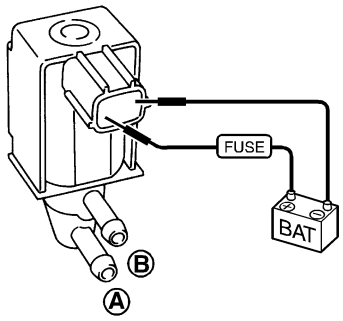
SEF334X

Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



WEC254



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

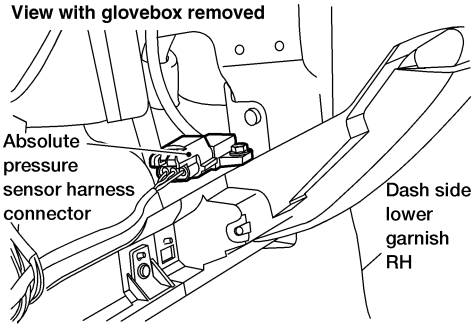
SEF335X

OK or NG

OK	▶	GO TO 16.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

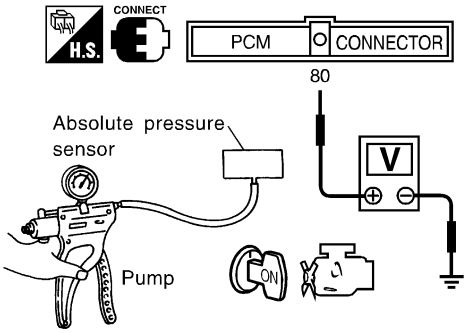
16	CHECK ABSOLUTE PRESSURE SENSOR

1. Remove absolute pressure sensor with its harness connector connected.



LEC430

2. Install a vacuum pump to absolute pressure sensor.
3. Turn ignition switch "ON" and check output voltage between PCM terminal 80 and engine ground under the following conditions.



Applied vacuum kPa (mmHg, inHg)	Voltage V
Not applied	1.8 - 4.8
–26.7 (–200, –7.87)	1.0 to 1.4V lower than above value

SEF720Y

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 fuel tank temperature sensor.
   Refer to "Component Inspection", EC-328.

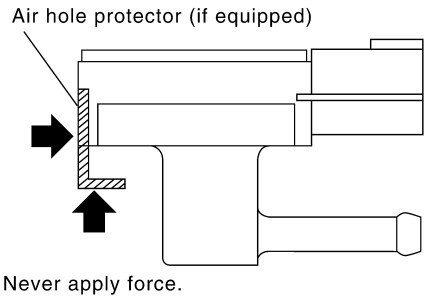
OK or NG

OK	▶	GO TO 18.
NG	▶	Replace fuel level sensor unit.

Diagnostic Procedure (Cont'd)

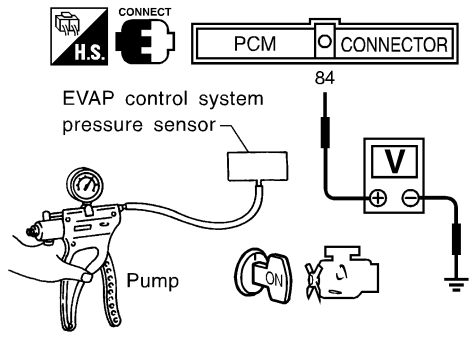
18	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

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 PCM 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

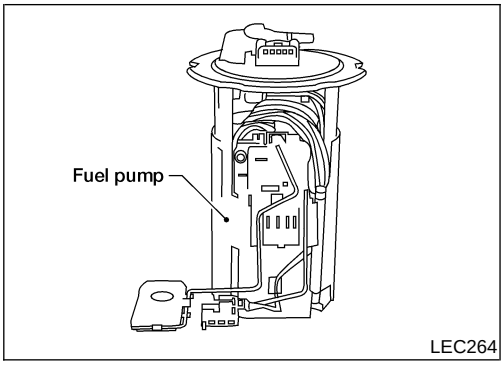
SEF674Y

CAUTION:
- **Discard any 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 19.
NG	▶	Replace EVAP control system pressure sensor.

19	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-169.	
▶	**INSPECTION END**



Component Description

NIEC0552

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 PCM.
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

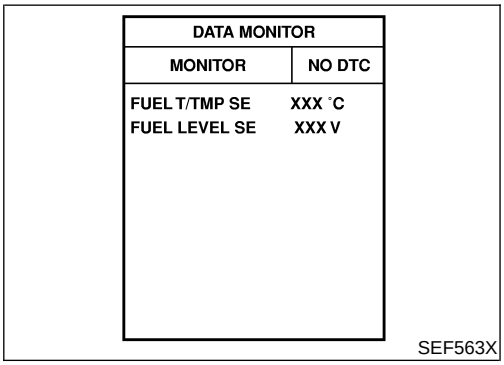
NIEC0553

When the vehicle is parked, the fuel level in the fuel tank is stable. It means the output signal of the fuel level sensor does not change. If PCM 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 PCM.

Possible Cause

NIEC0554

- Fuel level sensor circuit
  (The fuel level sensor circuit is open or shorted.)
- Fuel level sensor



DTC Confirmation Procedure

NIEC0555

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

NIEC0555S01

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-443.

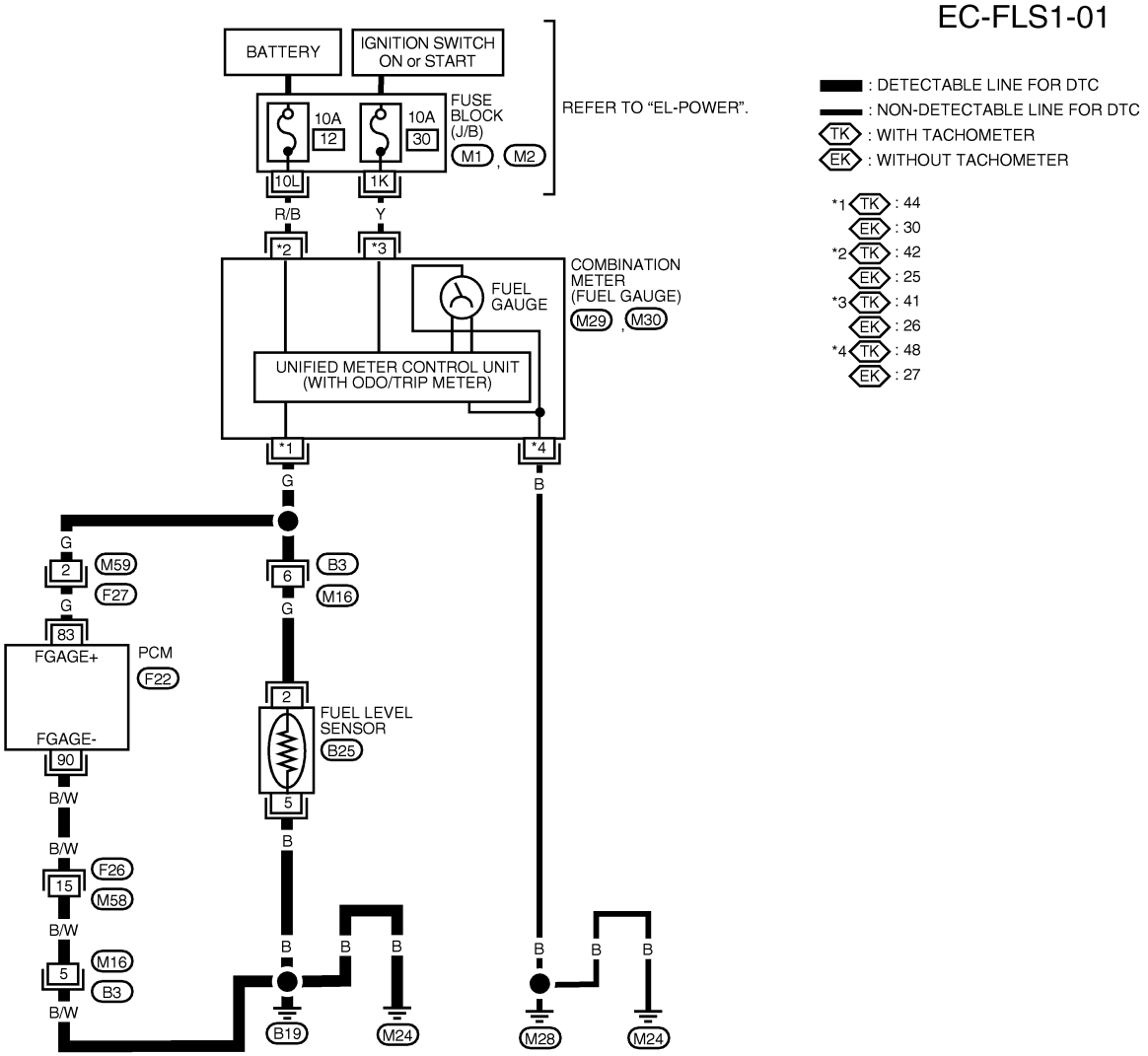
WITH GST

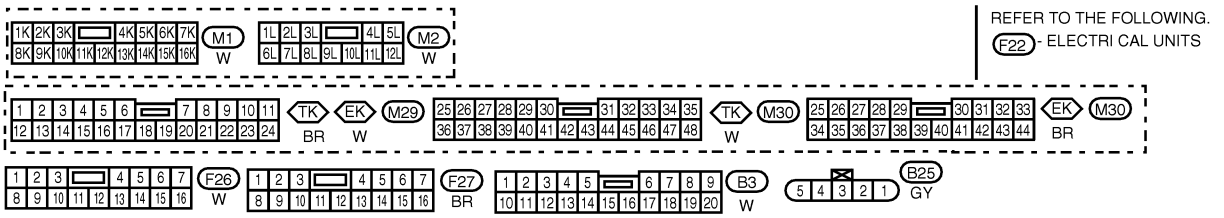
NIEC0555S02

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

NIEC0556





LEC370

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

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
83	G	FUEL LEVEL SENSOR	IGN ON	APPROX. 0 - 4.8V
90	B/W	FUEL LEVEL SENSOR GROUND	ENGINE RUNNING AT IDLE SPEED	APPROX. 0V

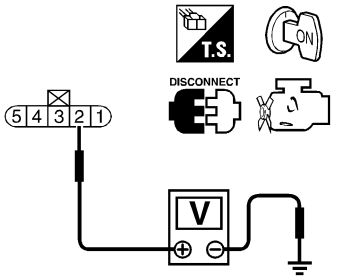
SEF187Z

Diagnostic Procedure

=NIEC0557

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 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 M16, B3
- Harness for open or short between combination meter and fuel level sensor unit

	▶	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 terminal 5 and body ground.
   Refer to “Wiring Diagram”, EC-442.
   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 PCM harness connector.
2. Check harness continuity between PCM terminal 83 and fuel level sensor unit terminal 2, PCM terminal 90 and fuel level sensor unit terminal 5.
   Refer to “Wiring Diagram”, EC-442.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

OK or NG

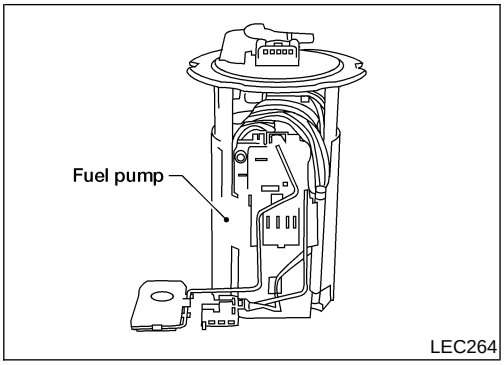
OK	▶	GO TO 6.
NG	▶	GO TO 5.

Diagnostic Procedure (Cont'd)

5	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors F26, M58 ● Harness connectors M59, F27 ● Harness connectors M16, B3 ● Harness for open or short between PCM and fuel level sensor and combination meter	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK FUEL LEVEL SENSOR	
Refer to ***EL-103***, "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-169.	
▶	**INSPECTION END**



Component Description

=NIEC0558

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 PCM.
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

NIEC0559

Driving long distances affects 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

NIEC0560

- Harness or connectors
  (The level sensor circuit is open or shorted.)
- Fuel level sensor

Overall Function Check

NIEC0561

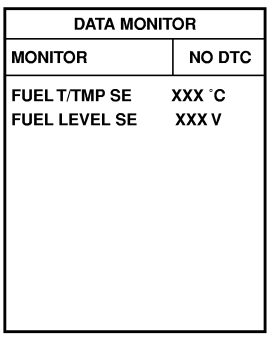
Use this procedure to check the overall function of the fuel level sensor function. During this check, a 1st trip DTC might not be confirmed.

WARNING:

When performing following procedure, be sure to observe the handling of the fuel. Refer to *FE-5*, "FUEL SYSTEM".

TESTING CONDITION:

Before starting overall function check, preparation of draining fuel and refilling fuel is required.



WITH CONSULT-II

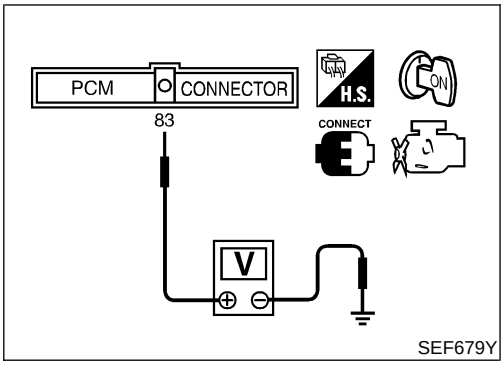
NIEC0561S01

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-67.
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-103***, "FUEL LEVEL SENSOR UNIT CHECK".

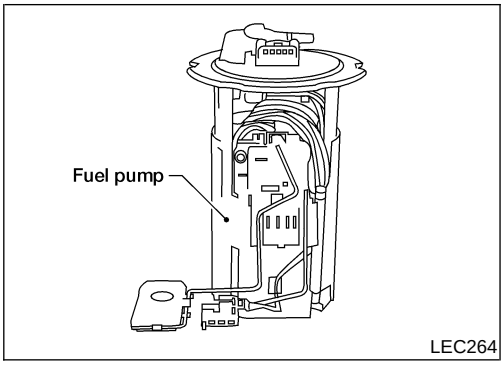


WITH GST

NIEC0561S02

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-67.
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 PCM terminal 83 (fuel level sensor signal) and ground.
7) Turn ignition switch "ON".
8) Check voltage between PCM 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 PCM terminal 83 and ground changes more than 0.03V during step 8 - 10.
If NG, check component of fuel level sensor, refer to ***EL-103***, "FUEL LEVEL SENSOR UNIT CHECK".



Component Description

NIEC0562

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 PCM.
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

NIEC0563

PCM 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 PCM.

Possible Cause

NIEC0564

- Fuel level sensor circuit
  (The fuel level sensor circuit is open or shorted.)
- Fuel level sensor

DTC Confirmation Procedure

NIEC0565

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”.

DATA MONITOR	
MONITOR	NO DTC
FUEL T/TMP SE	XXX °C
FUEL LEVEL SE	XXX V

SEF195Y

WITH CONSULT-II

NIEC0565S01

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-449.

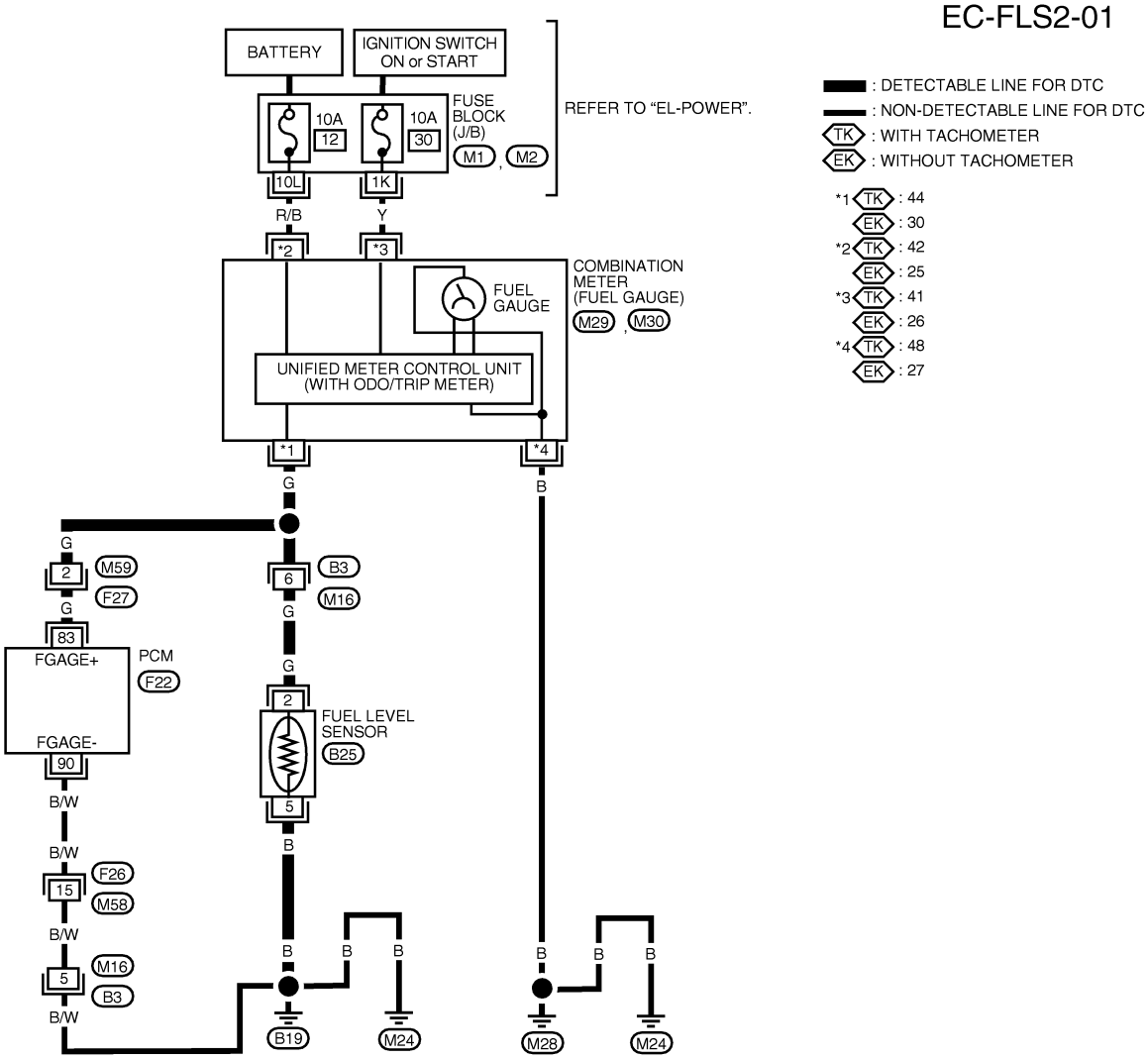
WITH GST

NIEC0565S02

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

NIEC0566



LEC184

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

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
83	G	FUEL LEVEL SENSOR	IGN ON	APPROX. 0 - 4.8V
90	B/W	FUEL LEVEL SENSOR GROUND	ENGINE RUNNING AT IDLE SPEED	APPROX. 0V

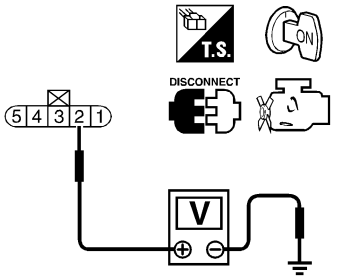
SEF188Z

Diagnostic Procedure

=NIEC0567

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 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 M16, B3
- Harness for open or short between combination meter and fuel level sensor unit

	▶	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 terminal 5 and body ground.
   Refer to “Wiring Diagram”, EC-448.
   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 PCM harness connector.
2. Check harness continuity between PCM terminal 83 and fuel level sensor unit terminal 2.
   Refer to “Wiring Diagram”, EC-442.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

OK or NG

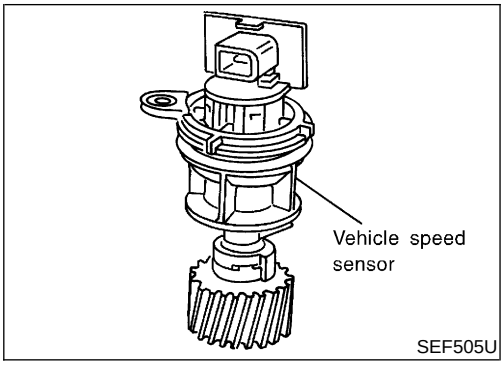
OK	▶	GO TO 6.
NG	▶	GO TO 5.

Diagnostic Procedure (Cont'd)

5	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors F26, M58 ● Harness connectors M16, B3 ● Harness connectors F27, M59 ● Harness for open or short between PCM 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-103***, "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-169.	
▶	**INSPECTION END**



Component Description

NIEC0272

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 PCM.

On Board Diagnosis Logic

NIEC0274

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0500	• The almost 0 km/h (0 MPH) signal from vehicle speed sensor is sent to PCM even when vehicle is being driven.	• Harness or connector (The vehicle speed sensor circuit is open or shorted.) • Vehicle speed sensor

DTC Confirmation Procedure

NIEC0275

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:

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

6

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

1) Start engine
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.
3) If NG, go to “Diagnostic Procedure”, EC-454.
   If OK, go to following step.
4) Select “DATA MONITOR” mode with CONSULT-II.
5) Warm engine up to normal operating temperature.
6) Maintain the following conditions for at least 10 consecutive seconds.

ENG SPEED	1,800 - 3,400 rpm (A/T) 2,200 - 4,100 rpm (M/T)
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	4.8 - 10.5 msec (A/T) 4.8 - 10.7 msec (M/T)
Selector lever	Suitable position
PW/ST SIGNAL	OFF

7) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-454.

Overall Function Check

NIEC0276

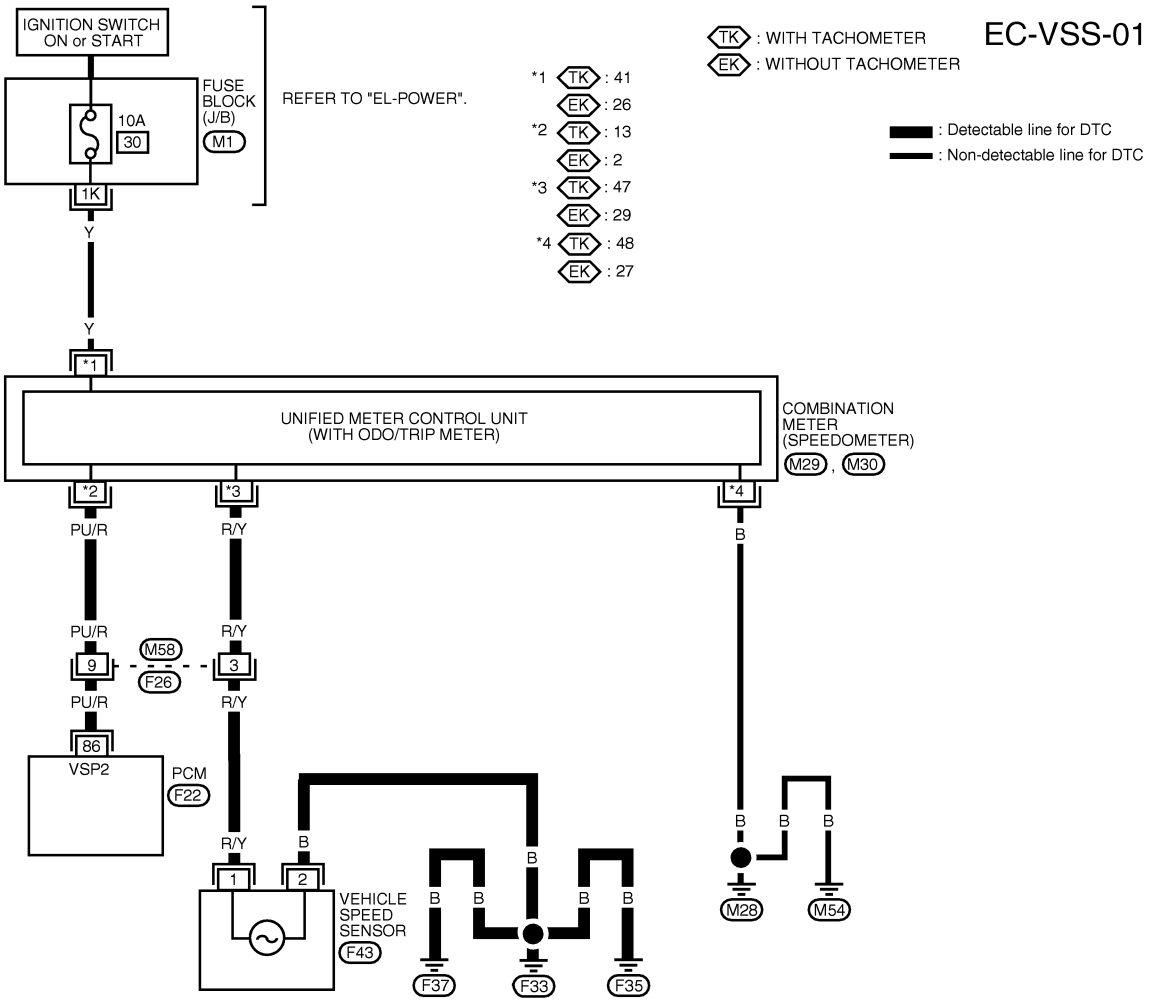
Use this procedure to check the overall function of the EVAP canister vent control valve circuit. During this check, a 1st trip DTC might not be confirmed.

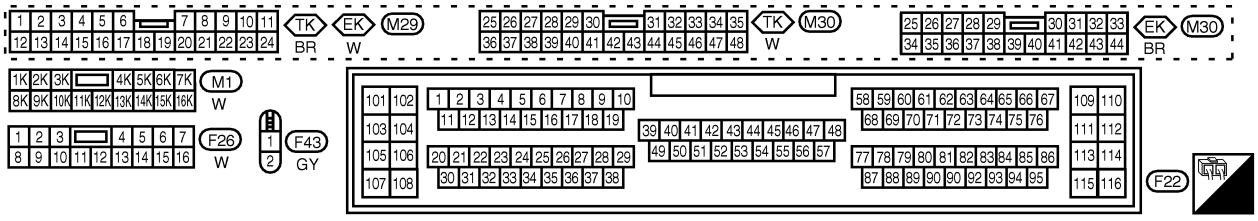
With GST

1) Lift up drive wheels.
2) Start engine.
3) Read vehicle speed sensor signal in “MODE 1” with GST.
   The vehicle speed sensor on GST should be able to exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.
4) If NG, go to “Diagnostic Procedure”, EC-454.

Wiring Diagram

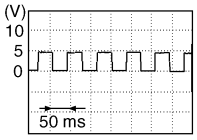
NIEC0277





LEC164

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

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
86	PU/R	VEHICLE SPEED SENSOR	VEHICLE DRIVING AT 40 KM/H (25 MPH) IN 2ND GEAR POSITION UNDER LIFTED UP CONDITION	0 - APPROX. 4.2V 

SEF189Z

Diagnostic Procedure

NIEC0278

1	CHECK INPUT SIGNAL CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect PCM harness connector and combination meter harness connector.
3. Check harness continuity between PCM terminal 86 and combination meter terminal 13 (with tachometer) or 2 (without tachometer).
   Refer to “Wiring Diagram”, EC-453.
   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 M58, F26
- Harness for open or short between PCM 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 M58, F26
- Harness for open or short between combination meter and vehicle speed sensor

OK or NG

OK	▶	Check combination meter and vehicle speed sensor. Refer to ***EL-85***, “METERS AND GAUGES”.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK INTERMITTENT INCIDENT

Perform “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-169.

	▶	**INSPECTION END**

Description

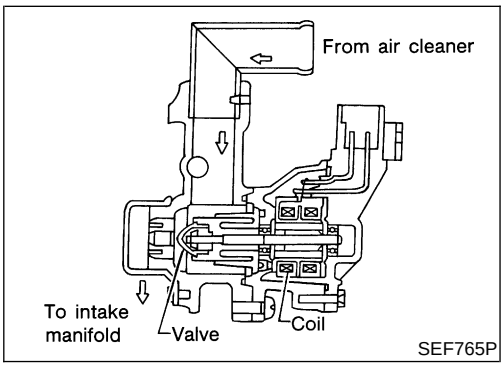
SYSTEM DESCRIPTION

NIEC0279

NIEC0279S01

Sensor	Input Signal to PCM	PCM function	Actuator
Crankshaft position sensor (POS)	Engine speed	Idle air control	IACV-AAC valve
Camshaft position sensor (PHASE)	Engine speed and cylinder position		
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		
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 bypasses the throttle valve via IACV-AAC valve. The IACV-AAC valve changes the opening of the air bypass 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 PCM output signals. One step of IACV-AAC valve movement causes the respective opening of the air bypass 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 camshaft position sensor detects the actual engine speed and sends a signal to the PCM. The PCM then controls the step position of the IACV-AAC valve so that engine speed coincides with the target value memorized in PCM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the PCM is determined by taking into consideration various engine conditions, such as during warm up, deceleration, and engine load (air conditioner, power steering and cooling fan operation).



COMPONENT DESCRIPTION

NIEC0279S02

IACV-AAC Valve

NIEC0279S0202

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 PCM which turns ON and OFF two windings each in sequence. Each time the IACV-AAC valve opens or closes to change the auxiliary air quantity, the PCM sends a pulse signal to the step motor. When no change in the auxiliary air quantity is needed, the PCM 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

NIEC0280

MONITOR ITEM	CONDITION		SPECIFICATION
IACV-AAC/V	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: “N” • No-load	Idle	5 - 20 steps
		2,000 rpm	—

On Board Diagnosis Logic

NIEC0282

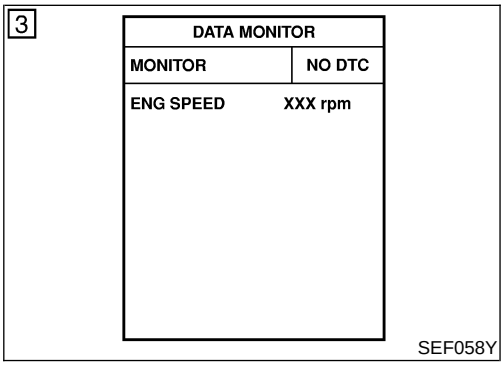
DTC No.	Malfunction is detected when ...		Check Items (Possible Cause)
P0505	A)	The IACV-AAC valve does not operate properly.	• Harness or connectors (The IACV-AAC valve circuit is open.) • IACV-AAC valve
	B)	The IACV-AAC valve does not operate properly.	• Harness or connectors (The IACV-AAC valve circuit is shorted.) • Air control valve (Power steering) • IACV-AAC valve

DTC Confirmation Procedure

NIEC0283

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 specified value, perform “Idle Air Volume Learning”, EC-83, before conducting “DTC Confirmation Procedure”. For the target idle speed refer to the “Service Data And Specifications (SDS)”, EC-699.**



PROCEDURE FOR MALFUNCTION A

NIEC0283S01

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5V with ignition switch “ON”.

With CONSULT-II

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.
5) Perform step 4 once more.

6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-459.

With GST
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

NIEC0283S02

TESTING CONDITION:

- **Before performing the following procedure, make sure battery voltage is more than 11V at idle.**
- **For best results, perform the test at a temperature above –10°C (14°F).**
- **Electrical load not applied.**

With CONSULT-II

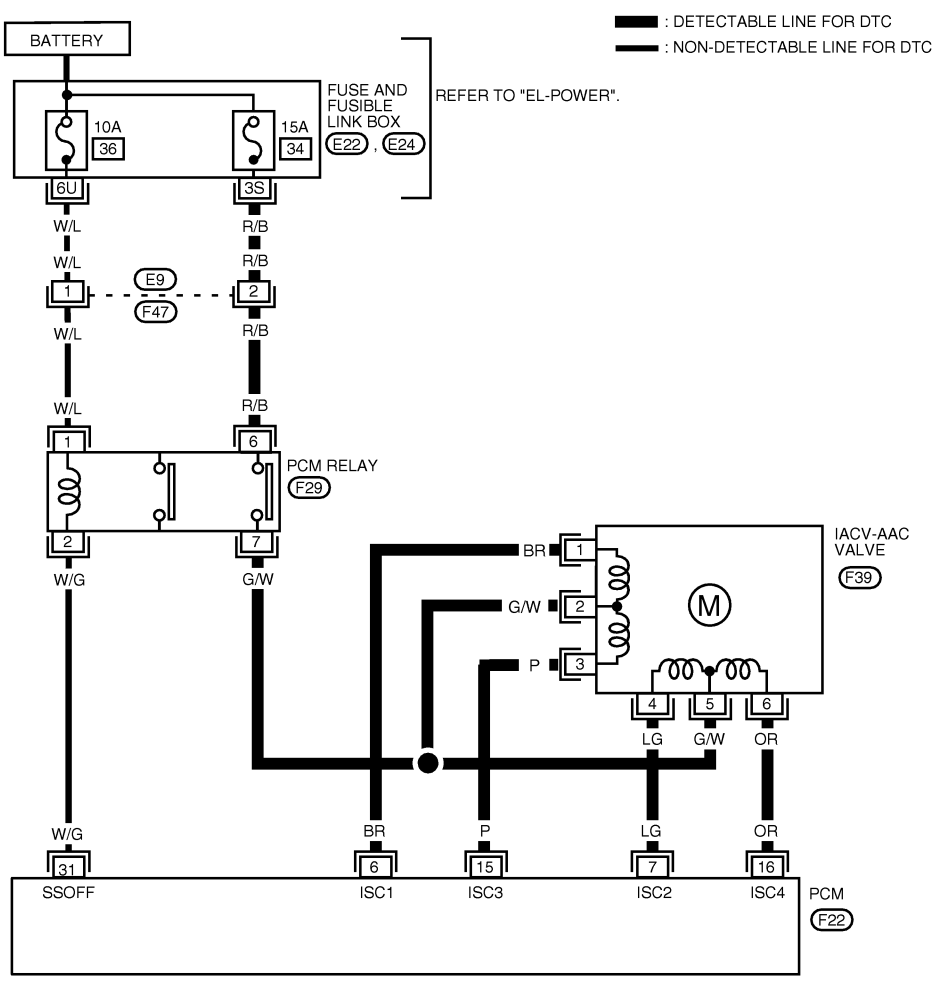
1) Open engine hood.
2) Start engine and warm it up to normal operating temperature.
3) Turn ignition switch "OFF" and wait at least 10 seconds.
4) Turn ignition switch "ON" again and select "DATA MONITOR" mode with CONSULT-II.
5) Start engine and run it for at least 1 minute at idle speed.
6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-459.

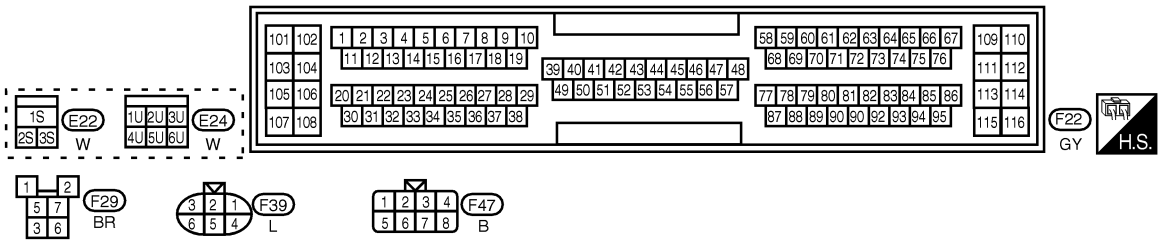
With GST
Follow the procedure "With CONSULT-II" above.

Wiring Diagram

NIEC0284

EC-AAC/V-01





LEC170

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

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
6	BR	IACV-AAC VALVE	ENGINE RUNNING AT IDLE SPEED	0.1 - 14V
7	LG			
15	P			
16	OR			

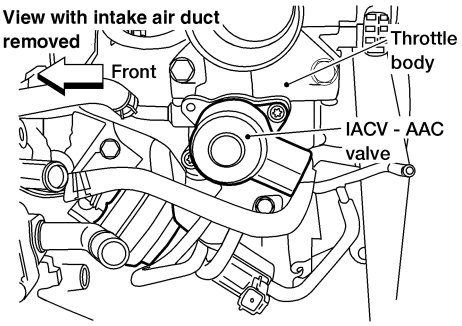
SEF158Z

Diagnostic Procedure

NIEC0285

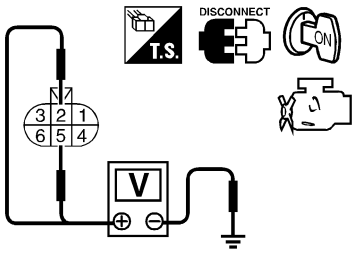
1 CHECK IACV-AAC VALVE POWER SUPPLY CIRCUIT

1. Stop engine.
2. Disconnect IACV-AAC valve harness connector.



WEC257

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 harness for open or short between IACV-AAC valve and PCM relay.

	▶	Repair harness or connectors.

3 CHECK IACV-AAC VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect PCM harness connector.
3. Check harness continuity between PCM terminals and IACV-AAC valve terminals as follows. Refer to “Wiring Diagram”, EC-458.

PCM terminal	IACV-AAC valve terminal
6	1
7	4
15	3
16	6

MTBL0449

Continuity should exist.

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

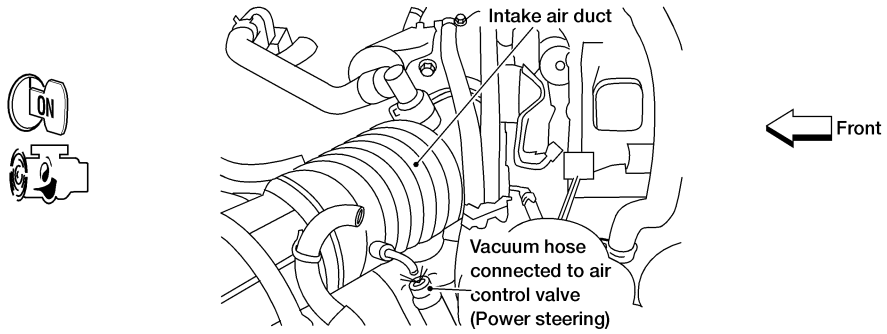
OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

Diagnostic Procedure (Cont'd)

4	CHECK AIR CONTROL VALVE (POWER STEERING) OPERATION-I

1. Reconnect PCM 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.



LEC324

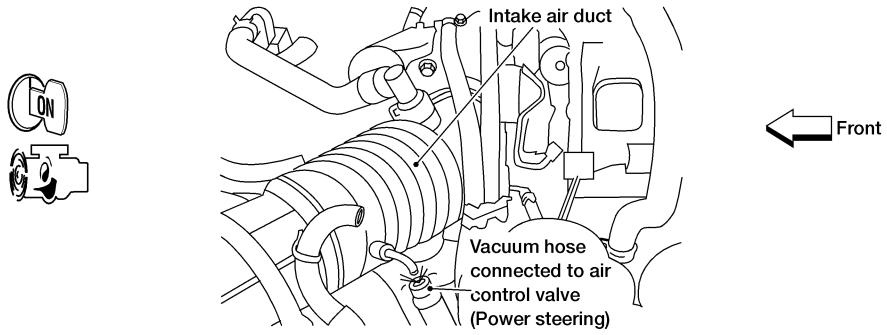
Very little or no vacuum should exist.

OK or NG

OK	▶	GO TO 5.
NG	▶	Replace air control valve (Power steering).

5	CHECK AIR CONTROL VALVE (POWER STEERING) OPERATION-II

Check vacuum hose for vacuum existence when steering wheel is turned.



LEC324

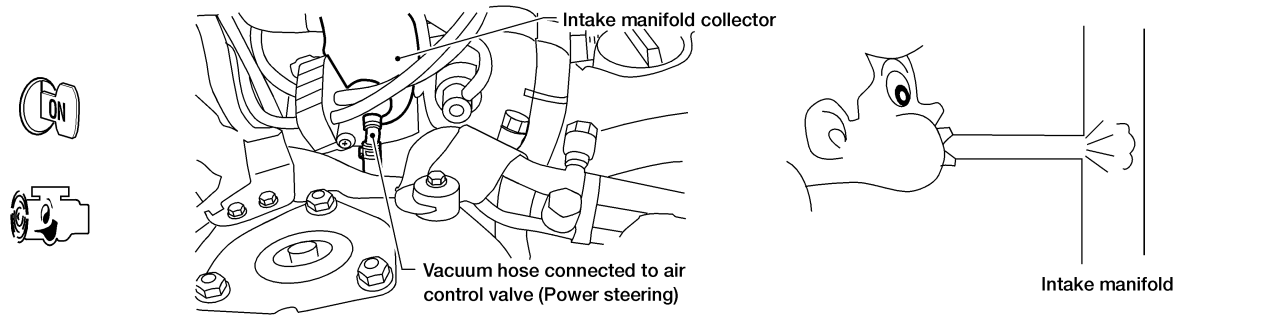
Vacuum should exist.

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 the vacuum port.
3. Blow air into vacuum port.
4. Check that air flows freely.



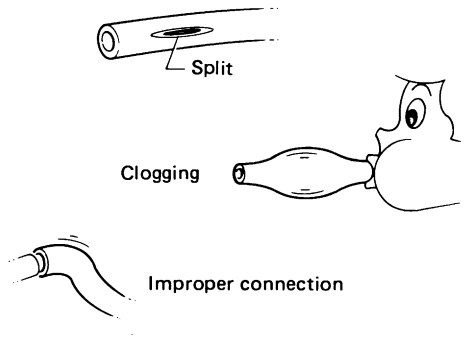
LEC325

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 cracks, clogging, improper connection or disconnection.



SEF109L

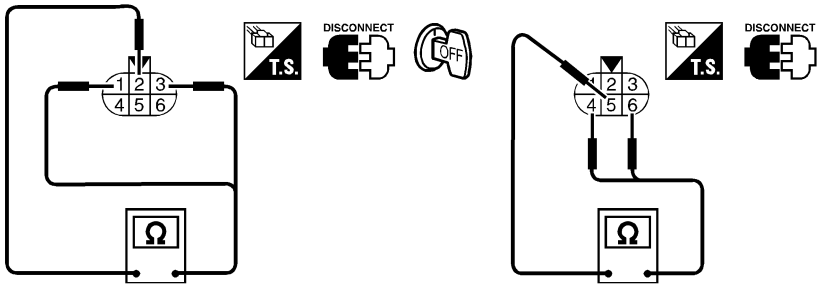
OK or NG

OK	▶	GO TO 8.
NG	▶	Repair hoses or tubes.

Diagnostic Procedure (Cont'd)

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:
20 - 24 Ω [at 20°C (68°F)]

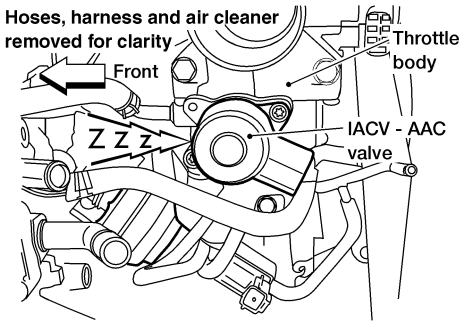
SEF214Z

OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 10.

9	CHECK IACV-AAC VALVE-II

1. Reconnect IACV-AAC valve harness connector and PCM harness connector.
2. Turn ignition switch "ON" and "OFF", and ensure the IACV-AAC valve makes operating sound according to the ignition switch position.



LEC431

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-83.

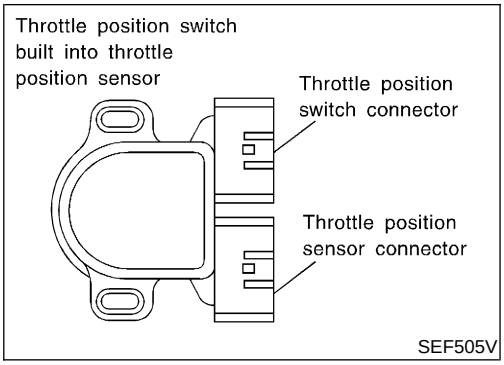
Is the result CMPLT or INCMP?

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 A/T models with CONSULT-II, drive vehicle until "FLUID TEMP SE" in "DATA MONITOR" mode of "A/T" system indicates less than 0.9V. ● For A/T models without CONSULT-II and M/T models, drive vehicle for 10 minutes. 5. Stop vehicle with engine running. 6. Check target idle speed. **M/T = 650 ± 50 rpm** **A/T = 800 ± 50 rpm (in "P" or "N" position)**		
OK or NG		
OK	▶	GO TO 12.
NG	▶	Perform "Idle Air Volume Learning", EC-83.

12	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-169.	
▶	**INSPECTION END**



Component Description

NIEC0287

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 PCM. The PCM only uses this signal to open or close the EVAP canister purge control valve when the throttle position sensor is malfunctioning.

CONSULT-II Reference Value in Data Monitor Mode

NIEC0655

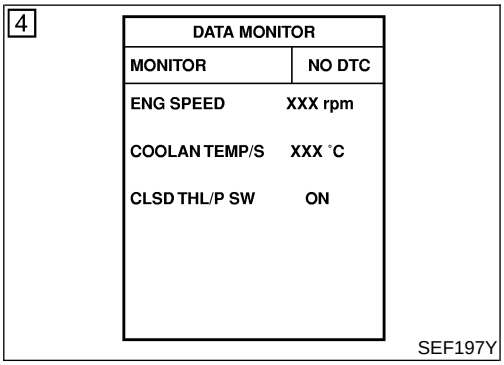
Specification data are reference values.

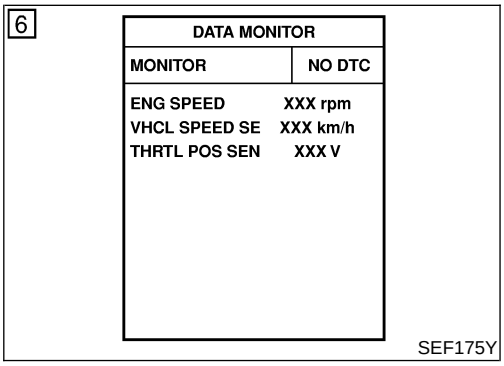
MONITOR ITEM	CONDITION		SPECIFICATION
CLSD THL/P SW	● Engine: After warming up, idle the engine	Throttle valve: Idle position	ON
		Throttle valve: Slightly open	OFF

On Board Diagnosis Logic

NIEC0289

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0510	● Battery voltage from the closed throttle position switch is sent to PCM with the throttle valve opened.	● Harness or connectors (The closed throttle position switch circuit is shorted.) ● Closed throttle position switch ● Throttle position sensor





DTC Confirmation Procedure

NIEC0290

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

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 with CONSULT-II.
4) Check the signal under the following conditions.

Condition	Signal indication
Throttle valve: Idle position	ON
Throttle valve: Slightly open	OFF

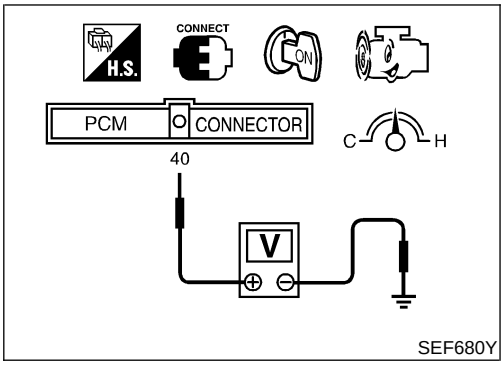
If the result is NG, go to “Diagnostic Procedure”, EC-467.
If OK, go to following step.

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 2.3V
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-467.



Overall Function Check

NIEC0291

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

Without CONSULT-II

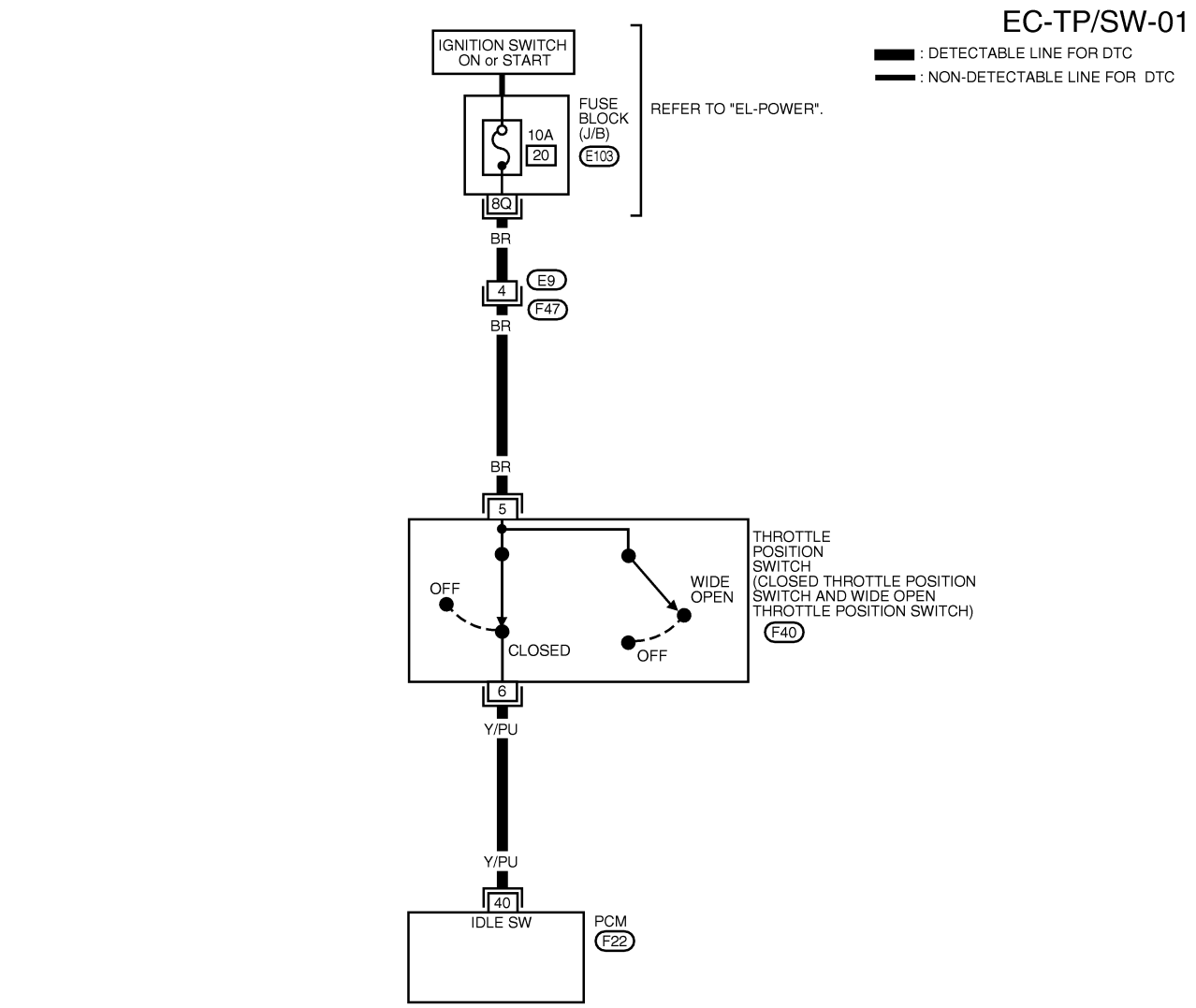
1) Start engine and warm it up to normal operating temperature.
2) Check the voltage between PCM terminal 40 (Closed throttle position switch signal) and ground under the following conditions.

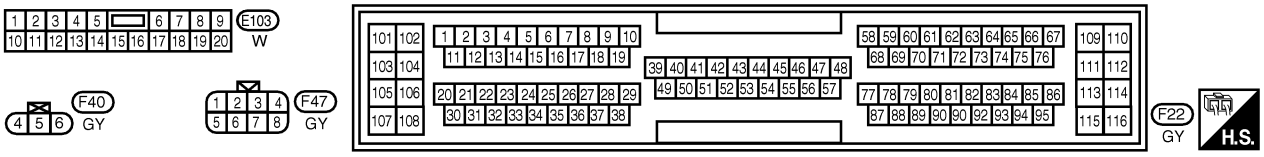
Condition	Voltage
At idle	Battery voltage
At 2,000 rpm	Approximately 0V

3) If NG, go to "Diagnostic Procedure", EC-467.

Wiring Diagram

NIEC0292





LEC154

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

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
40	Y/PU	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

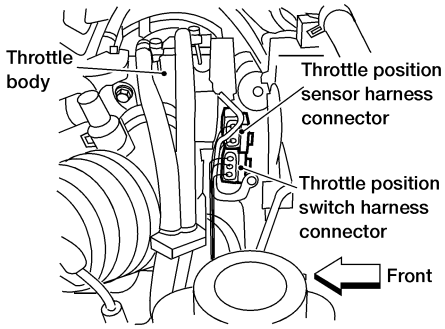
SEF190Z

Diagnostic Procedure

NIEC0293

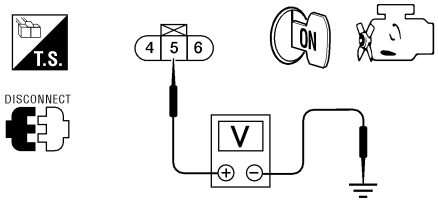
1	CHECK CLOSED THROTTLE POSITION SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect throttle position switch harness connector.



WEC244

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

LEC435

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E9, F47
- 10A fuse
- Harness for open or short between throttle position switch and fuse

	▶	Repair harness or connectors.

3	CHECK CLOSED THROTTLE POSITION SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect PCM harness connector.
3. Check harness continuity between PCM terminal 40 and throttle position switch terminal 6.
   Refer to “Wiring Diagram”, EC-466.
   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.

Diagnostic Procedure (Cont'd)

4	DETECT MALFUNCTIONING PART
Check the harness for open or short between PCM and throttle position switch.	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK IGNITION TIMING AND ENGINE IDLE SPEED

Check the following items. Refer to "Basic Inspection", EC-131.

Items	Specifications
Ignition timing	9° ± 2° BTDC
Idle speed	M/T: 650 ± 50 rpm A/T: 800 ± 50 rpm (in "P" or "N" position)

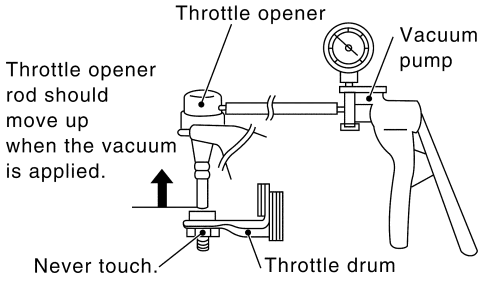
MTBL0439

Models with CONSULT-II ▶	GO TO 6.
Models without CONSULT-II ▶	GO TO 7.

6	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

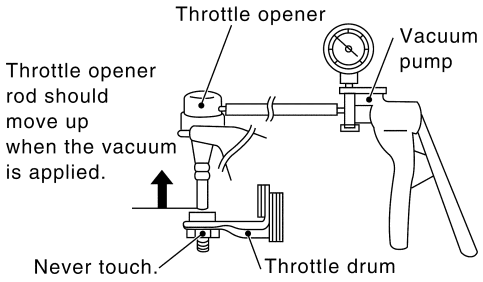
OK or NG

OK (With CONSULT-II) ▶	GO TO 9.
OK (Without CONSULT-II) ▶	GO TO 10.
NG ▶	GO TO 8.

7	CHECK THROTTLE POSITION SWITCH

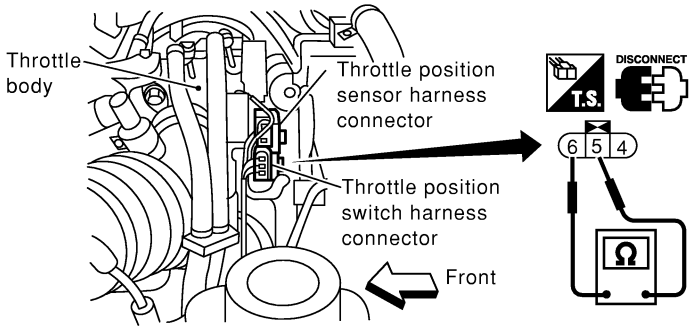
Without CONSULT-II

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 6 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

LEC436

OK or NG

OK (With CONSULT-II)	▶	GO TO 9.
OK (Without CONSULT-II)	▶	GO TO 10.
NG	▶	GO TO 8.

Diagnostic Procedure (Cont'd)

8	ADJUST THROTTLE POSITION SWITCH

Check the following items. Refer to "Basic Inspection", EC-131.

Items	Specifications
Ignition timing	9°±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	M/T: 650±50 rpm A/T: 800±50 rpm (in "P" or "N" position)

MTBL0440

Is it possible to adjust closed throttle position switch?

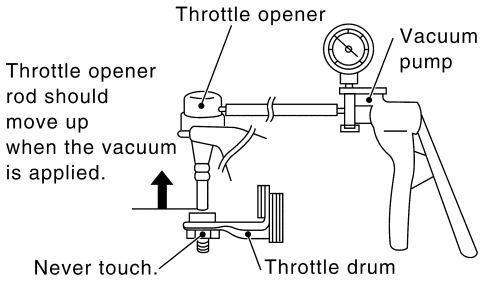
Yes or No

Yes (With CONSULT-II) ▶	GO TO 9.
Yes (Without CONSULT-II) ▶	GO TO 10.
No ▶	Replace throttle position switch.

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.

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

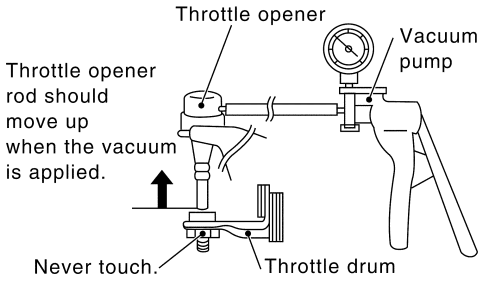
OK or NG

OK ▶	GO TO 11.
NG ▶	Replace throttle position sensor.

10	CHECK THROTTLE POSITION SENSOR

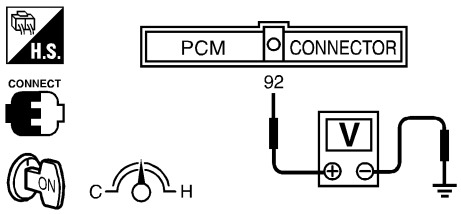
Without CONSULT-II

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 PCM terminal 92 (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

SEF486Y

OK or NG

OK	▶	GO TO 11.
NG	▶	Replace throttle position sensor.

11	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-169.	
▶	**INSPECTION END**

System Description

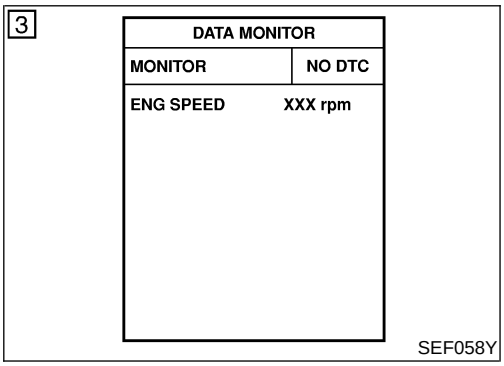
NIEC0494

This system is used to control the smooth shifting up and down of A/T during the hard acceleration/deceleration.

On Board Diagnosis Logic

NIEC0496

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0600	• PCM receives incorrect signal from A/T control part of PCM.	• PCM



DTC Confirmation Procedure

NIEC0497

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 ignition switch "ON".

With CONSULT-II

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Wait at least 10 seconds.
4) If DTC is detected, go to "Diagnostic Procedure", EC-472.

Diagnostic Procedure

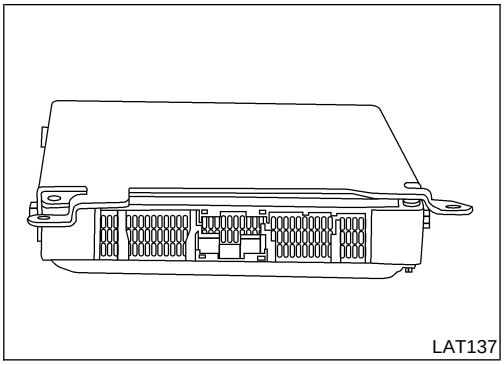
NIEC0500

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-474. 5. Is the 1st trip DTC P0600 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-474. 5. Is the 1st trip DTC P0600 displayed again?		
	Yes or No	
Yes	▶	GO TO 2.
No	▶	**INSPECTION END**

2	REPLACE PCM
1. Replace PCM. 2. Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs. Refer to "NVIS (NISSAN VEHICLE IMMOBILIZER SYSTEM — NATS)", EC-100. 3. Perform "Idle Air Volume Learning", EC-83, **Which is the result CMPLT or INCMP?**	

CMPLT or INCMP

CMPLT	▶	**INSPECTION END**
INCMP	▶	Follow the instruction of "Idle Air Volume Learning".


LAT137

Component Description

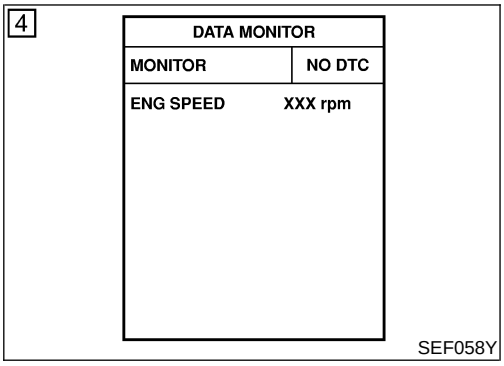
NIEC0295

The PCM consists of a microcomputer and connector for signal input and output and for power supply. The PCM controls the engine.

On Board Diagnosis Logic

NIEC0296

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0605	• PCM calculation function is malfunctioning.	• PCM



SEF058Y

DTC Confirmation Procedure

NIEC0297

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

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-475.

With GST

Follow the procedure “With CONSULT-II” above.

Diagnostic Procedure

NIEC0298

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-474.
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-474.
5. Is the 1st trip DTC P0605 displayed again?

Yes or No

Yes	▶	GO TO 2.
No	▶	**INSPECTION END**

2	REPLACE PCM

1. Replace PCM.
2. Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs. Refer to “NVIS (NISSAN VEHICLE IMMOBILIZER SYSTEM — NATS)”, EC-100.
3. Perform “Idle Air Volume Learning”, EC-83,
   Which is the result CMPLT or INCMP?

CMPLT or INCMP

CMPLT	▶	**INSPECTION END**
INCMP	▶	Follow the instruction of “Idle Air Volume Learning”.

Description

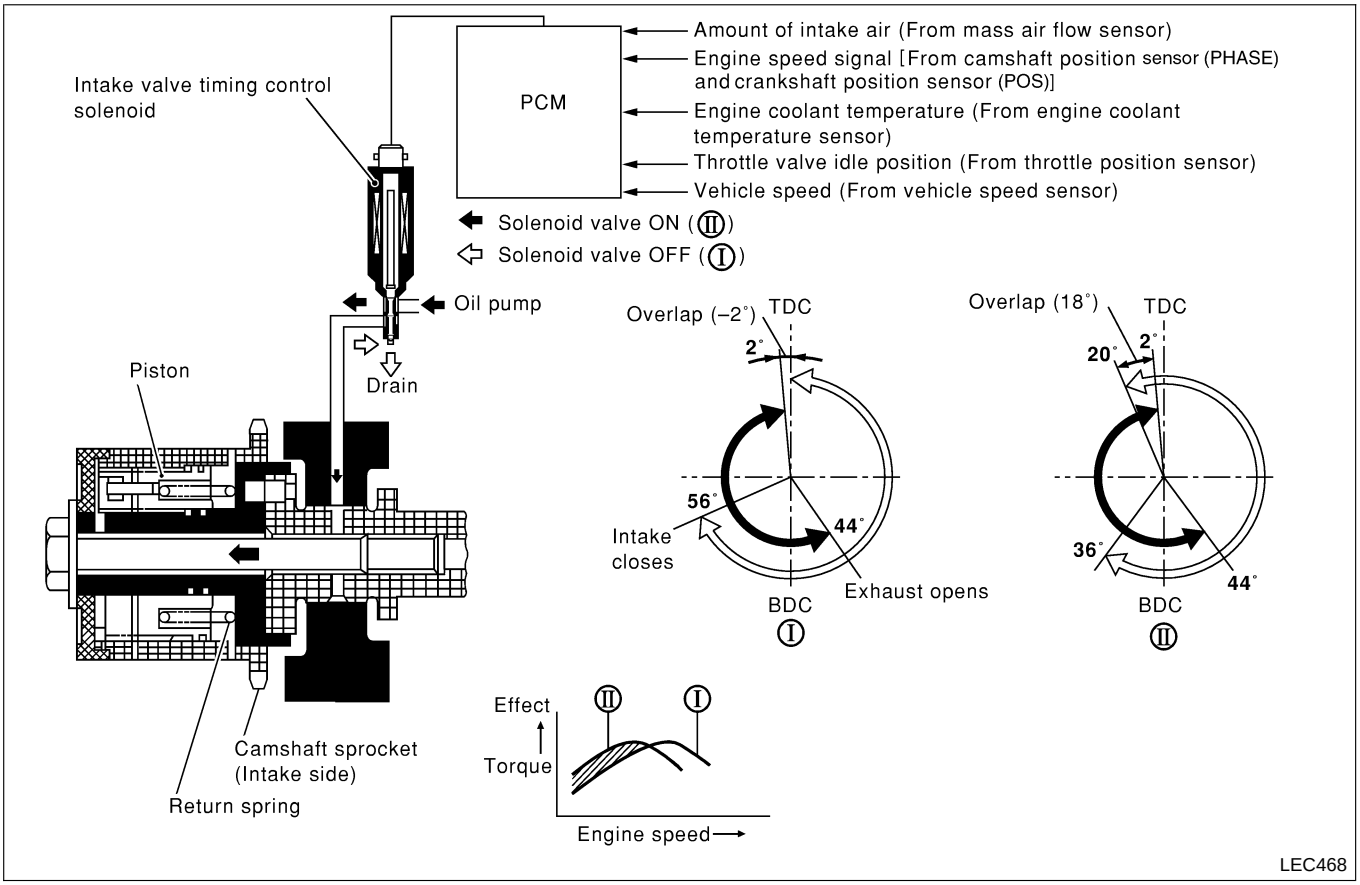
NIEC0668

SYSTEM DESCRIPTION

NIEC0668S01

Sensor	Input Signal to PCM	PCM function	Actuator
Camshaft position sensor (PHASE)	Engine speed and cylinder number	PCM	Intake valve timing control solenoid valve
Crankshaft position sensor (POS)	Engine speed		
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Throttle position sensor	Throttle position		
Vehicle speed sensor	Vehicle speed		

The intake valve timing control system is utilized to control intake valve opening and closing timing. Engine coolant temperature signals, engine speed, amount of intake air, vehicle speed and throttle position are used to determine intake valve timing.
The intake camshaft sprocket position is regulated by oil pressure controlled by the intake valve timing control.
When PCM sends ON signal to intake valve timing control solenoid valve, oil pressure is transmitted to camshaft sprocket. Then, intake side camshaft is advanced.



OPERATION

=NIEC0668S02

Engine operating condition	Intake valve timing control solenoid valve	Intake valve opening and closing time	Valve overlap	Engine valve timing
• Engine coolant temperature is between 15°C (59°F) to 110°C (230°F) and engine speed is between 1,100 rpm and 4,200 rpm. • During high load condition	ON	Advance	Increased	II
Those other than above	OFF	Normal	Normal	I

CONSULT-II Reference Value in Data Monitor Mode

NIEC0669

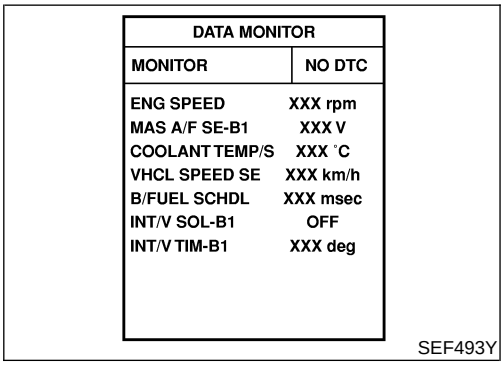
Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
INT/V SOL-B1	• Engine is in warm up condition. • Engine speed is more than 2,000 rpm. • Quickly depressed accelerator pedal	OFF → ON

On Board Diagnosis Logic

NIEC0671

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1110	• Comparing the intake valve timing position when the intake valve timing solenoid is ON with that when the solenoid is OFF, the difference does not exceed a certain limit.	• Harness or connectors (The intake valve timing control position sensor circuit is open.) • Intake valve timing control position sensor • Accumulation of debris to the signal pick-up portion of the camshaft



DTC Confirmation Procedure

NIEC0672

CAUTION:

Always drive at safe speed.

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Do not apply electrical load (e.g., cooling fan, rear window defogger, etc.)

With CONSULT-II

1) Warm up engine to normal operating temperature.
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) Restart engine and wait at least 30 seconds.
5) Let engine idle at least 50 seconds. (Test is completed when "INT/V SOL - B1 in "DATA MONITOR" with CONSULT-II remains "OFF".) If indication is "ON", repeat step.
6) Maintain the following conditions for at least 30 seconds. (Test is completed when "INT/V SOL - B1 in "DATA MONITOR" with CONSULT-II remains "ON".) If indication is "OFF", repeat step.

ENG SPEED	More than 2,000 rpm
B/FUEL SCHDL	More than 6 msec
Selector lever	5th (M/T) 3rd with OD "OFF" (A/T)

7) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-480.

With GST

1) Warm up engine to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 10 seconds.
3) Restart engine and wait at least 30 seconds.
4) Let engine idle at least 50 seconds.
5) Maintain the following conditions for at least 30 seconds.

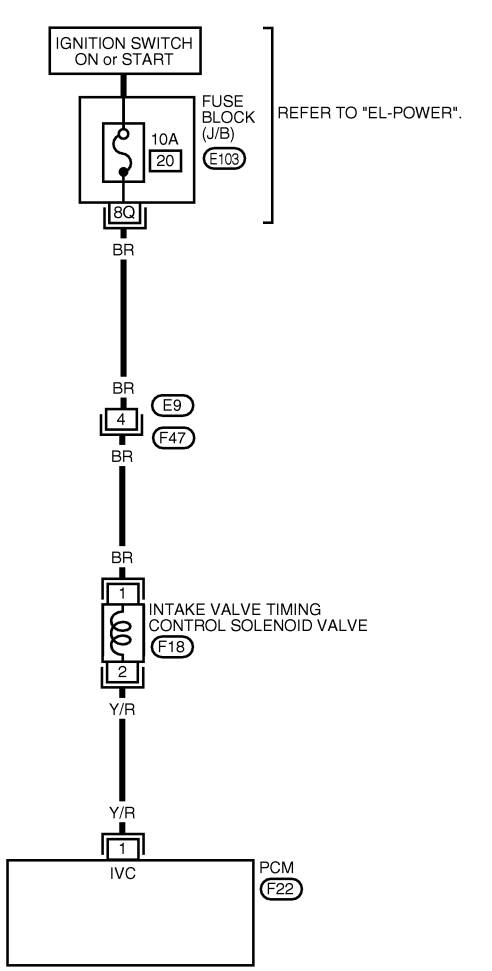
ENG SPEED	More than 2,000 rpm
B/FUEL SCHDL	More than 6 msec
Selector lever	5th (M/T) 3rd with OD "OFF" (A/T)

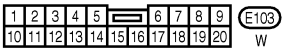
6) Select "MODE 7" with GST.
7) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-480.

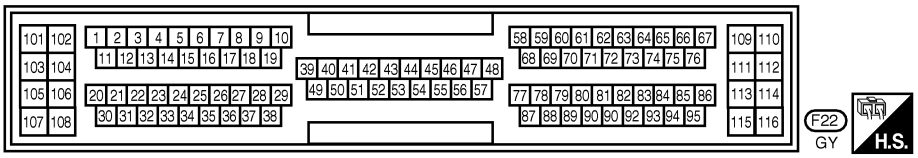
Wiring Diagram

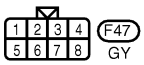
NIEC0673

EC-IVC-01









LEC439

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

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
1	Y/R	INTAKE VALVE TIMING CONTROL SOLENOID VALVE	SOLENOID VALVE IS OPERATING AT ENGINE RUNNING UNDER WARM-UP CONDITION	APPROX. 0V
			SOLENOID VALVE IS NOT OPERATING AT ENGINE RUNNING UNDER WARM-UP CONDITION	BATTERY VOLTAGE

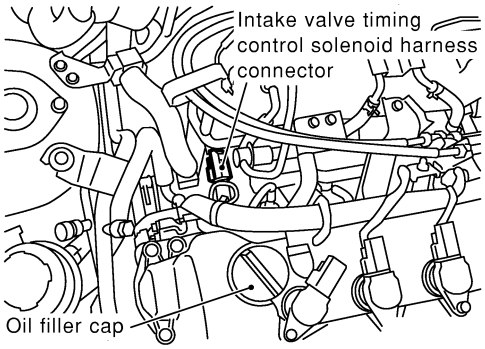
SEF737Y

Diagnostic Procedure

NIEC0674

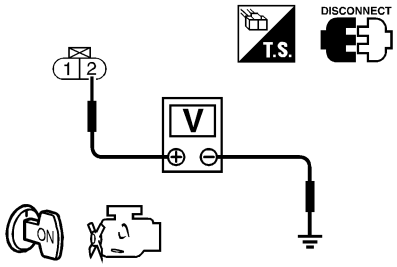
1	CHECK POWER SUPPLY

1. Stop engine.
2. Disconnect intake valve timing control solenoid valve harness connector.



SEF735Y

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



SEF097X

Voltage:
Battery voltage

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

- Harness connectors F47, E9
- 10A fuse
- Harness for open or short between the intake valve timing control solenoid valve and fuse

	▶	Repair harness or connectors.

3	CHECK OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect PCM harness connector.
3. Check harness continuity between PCM terminal 1 and solenoid valve terminal 2.
   Refer to “Wiring Diagram”, EC-479.
   Continuity should exist.
   If OK, check harness for short to ground and short to power.

OK or NG

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

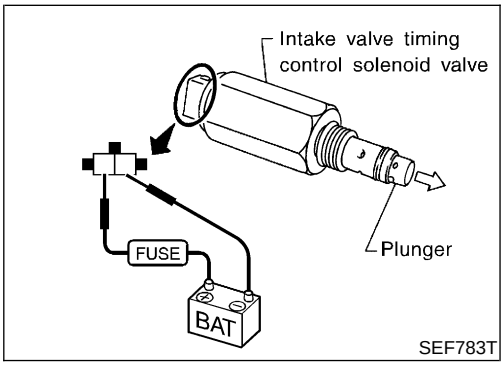
4	CHECK ENGINE OIL PRESSURE	
Refer to ***LC-5***, "Oil Pressure Check".		
	OK or NG	
OK	▶	GO TO 5.
NG	▶	Repair lubrication system.

5	CHECK INTAKE AIR SYSTEM	
Check intake air system for leaks.		
	OK or NG	
OK	▶	GO TO 6.
NG	▶	Repair intake air system.

6	CHECK INTAKE VALVE TIMING CONTROL POSITION SENSOR	
Refer to DTC P1140, EC-518.		
	OK or NG	
OK	▶	GO TO 7.
NG	▶	Repair or replace.

7	CHECK COMPONENT (Intake valve timing control solenoid valve).	
Refer to "COMPONENT INSPECTION" below.		
	OK or NG	
OK	▶	Replace intake valve timing control sprocket with camshaft.
NG	▶	Replace intake valve timing control solenoid valve.

8	CHECK INTERMITTENT INCIDENT	
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-169.		
	▶	**INSPECTION END**



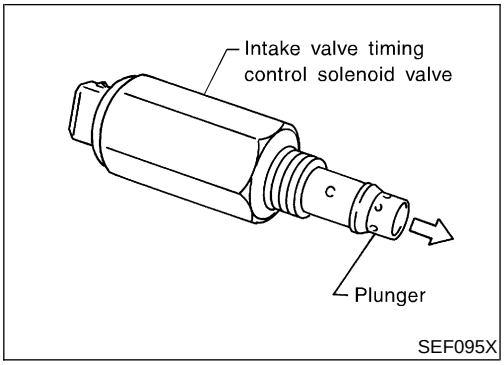
Component Inspection

INTAKE VALVE TIMING CONTROL SOLENOID VALVE

NIEC0675

NIEC0675S01

1. Check oil passage visually for any metal debris.
2. Supply intake valve timing control solenoid valve terminals with battery voltage.
3. Make sure that inside plunger protrudes.
   If NG, replace intake valve timing control solenoid valve.



Component Description

NIEC0677

The valve timing control system is utilized to control intake valve opening and closing timing. Engine coolant temperature signals, engine speed and throttle position are used to determine intake valve timing.
The intake camshaft sprocket position is regulated by oil pressure controlled by the intake valve timing control.
When PCM sends ON signal to intake valve timing control solenoid valve, oil pressure is transmitted to camshaft sprocket. Then, intake side camshaft is advanced.

Operation

NIEC0678

Engine operating condition				Intake valve timing control solenoid valve	Intake valve opening and closing time	Valve overlap
Engine coolant temperature	Engine speed	B/FUEL SCHDL	Neutral switch			
15°C (59°F) - 55°C (131°F)	1,100 - 4,200 rpm	Above 0 msec	OFF	ON	Advance	Increased
Above 70°C (158°F)		Above 6 msec				
Conditions other than those above				OFF	Normal	Normal

CONSULT-II Reference Value in Data Monitor Mode

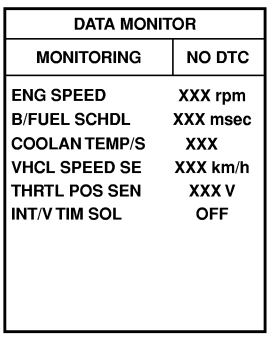
NIEC0679

MONITOR ITEM	CONDITION		SPECIFICATION
INT/V TIM SOL	• Engine: After warming up	Idle	OFF
		Revving engine with full throttle opening (Under 4,200 rpm)	ON

On Board Diagnosis Logic

NIEC0681

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1111	• An improper voltage signal is entered to PCM through intake valve timing control solenoid valve.	• Harness or connectors (The intake valve timing control solenoid valve circuit is open or shorted.) • Intake valve timing control solenoid valve



DTC Confirmation Procedure

NIEC0682

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

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-485.

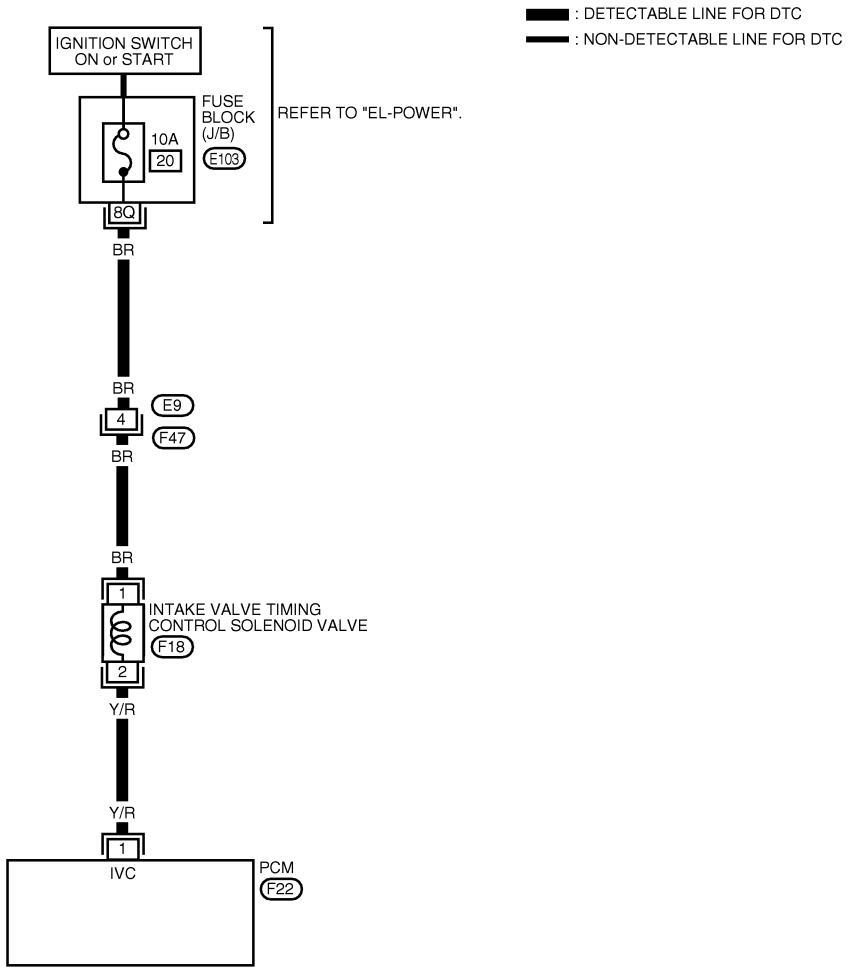
⊗ **Without CONSULT-II**

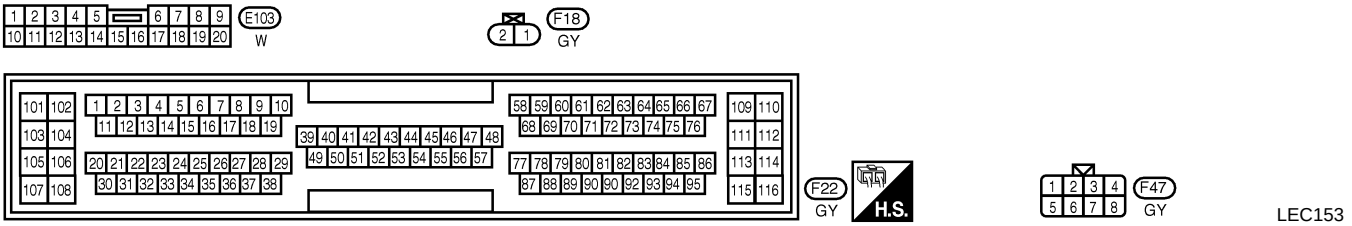
Follow the procedure "With CONSULT-II" above.

Wiring Diagram

=NIEC0683

EC-IVC-02





LEC153

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

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
1	Y/R	INTAKE VALVE TIMING CONTROL SOLENOID VALVE	SOLENOID VALVE IS OPERATING AT ENGINE RUNNING UNDER WARM-UP CONDITION	APPROX. 0V
			SOLENOID VALVE IS NOT OPERATING AT ENGINE RUNNING UNDER WARM-UP CONDITION	BATTERY VOLTAGE

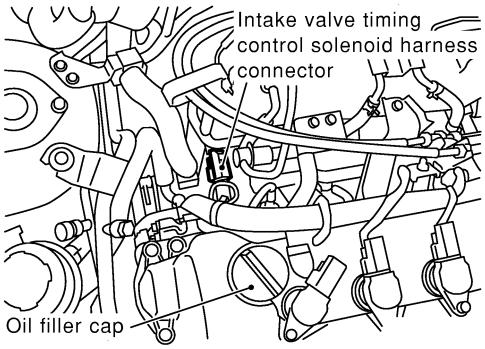
SEF737Y

Diagnostic Procedure

NIEC0684

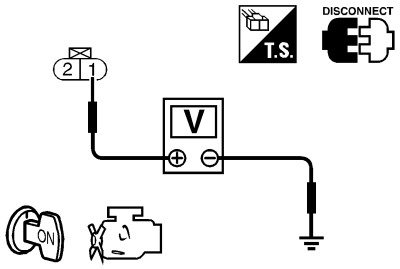
1	CHECK POWER SUPPLY

1. Turn ignition switch “OFF”.
2. Disconnect intake valve timing control solenoid valve harness connector.



SEF735Y

3. Turn ignition switch “ON”.
4. Check voltage between terminal 2 and engine ground with CONSULT-II or tester.



SEF193Z

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connector F47, E9
- 10A fuse
- Harness for open or short between valve timing control solenoid valve and fuse

	▶	Repair harness or connectors.

3	CHECK OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect PCM harness connector.
3. Check harness continuity between PCM terminal 1 and intake valve timing control solenoid valve harness connector terminal 2.
   Refer to “Wiring Diagram”, EC-484.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

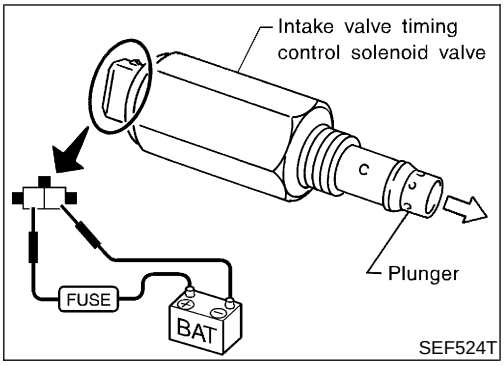
OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground to short to power or connectors.

Diagnostic Procedure (Cont'd)

4	CHECK VALVE TIMING CONTROL SOLENOID VALVE	
Refer to "Component Inspection", EC-486.		
OK or NG		
OK	▶	GO TO 5.
NG	▶	Replace valve timing control solenoid valve.

5	CHECK INTERMITTENT INCIDENT	
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-169.		
	▶	**INSPECTION END**



Component Inspection

NIEC0685

INTAKE VALVE TIMING CONTROL SOLENOID VALVE

NIEC0685S01

1. Check oil passage visually for any metal debris.
2. Supply intake valve timing control solenoid valve terminals with battery voltage.
3. Make sure that inside plunger protrudes.
   If NG, replace intake valve timing control solenoid valve.

On Board Diagnosis Logic

NIEC0568

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 stuck open.
Malfunction is detected when the engine coolant temperature does not reach to specified temperature even though the engine has run long enough.

Possible Cause

NIEC0569

- Thermostat function
- Leakage from sealing portion of thermostat
- Engine coolant temperature sensor

DTC Confirmation Procedure

NIEC0570

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

NIEC0570S01

1) Replace thermostat with new one. Refer to ***LC-13***, "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-488.

WITH GST

NIEC0570S02

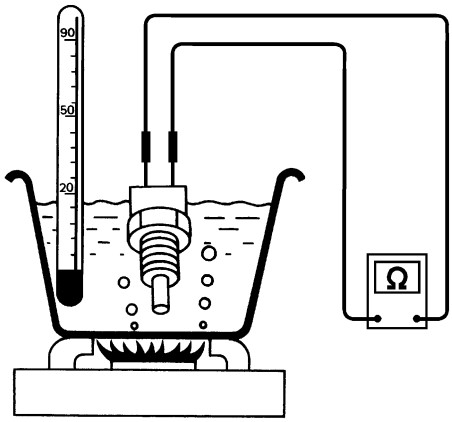
1) Follow the procedure "WITH CONSULT-II" above.

Diagnostic Procedure

NIEC0571

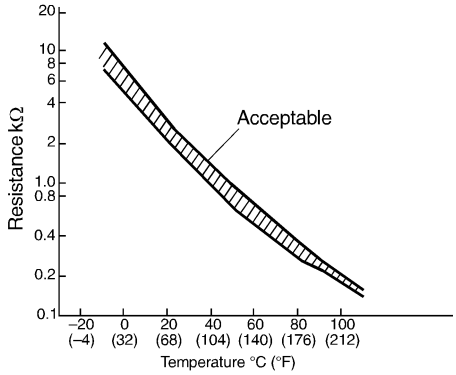
1	CHECK ENGINE COOLANT TEMPERATURE SENSOR

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

NIEC0686

If DTC P1130 is displayed with P1165, first perform trouble diagnosis for DTC P1165, EC-525.

SYSTEM DESCRIPTION

NIEC0686S01

Sensor	Input Signal to PCM	PCM function	Actuator
Throttle position sensor	Throttle position	PCM	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		
Camshaft position sensor (PHASE)	Engine speed and cylinder position		
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.

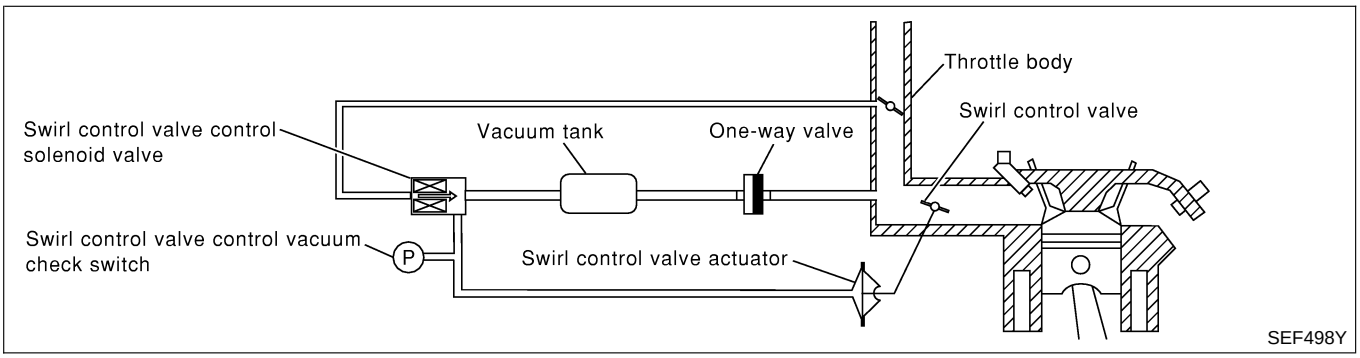
Because of this operation, this system tends to increase the burning speed of the gas mixture, improve fuel consumption, and increase the stability in running conditions.

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.

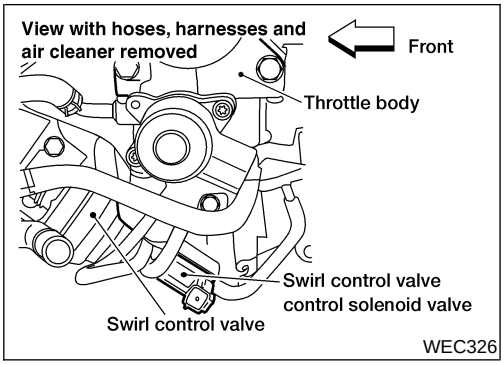
The solenoid valve controls swirl control valve's shut/open condition. This solenoid valve is operated by the PCM.

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 3,200 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

NIEC0686S02

Swirl Control Valve Control Solenoid Valve

NIEC0686S0201

The swirl control valve control solenoid valve responds to signals from the PCM. When the PCM 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 PCM sends an OFF signal, the vacuum signal is cut and the swirl control valve opens.

CONSULT-II Reference Value in Data Monitor Mode

NIEC0687

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
SWRL CONT S/V	● Engine speed: Idle	Engine coolant temperature is between 15°C (55°F) to 55°C (131°F).	ON
		Engine coolant temperature is above 55°C (131°F).	OFF

On Board Diagnosis Logic

NIEC0688

Malfunction is detected when
(Malfunction A) 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 B) The vacuum signal is sent to swirl control valve even though swirl control valve control solenoid valve is OFF.

Possible Cause

NIEC0689

MALFUNCTION A

NIEC0689S02

- 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
- One-way valve
- Vacuum tank
- Mass air flow sensor
- Crankshaft position sensor (POS)
- Camshaft position sensor (PHASE)
- Throttle position sensor

MALFUNCTION B

NIEC0689S03

- Harness or connector
  (The swirl control valve control solenoid valve circuit is shorted.)

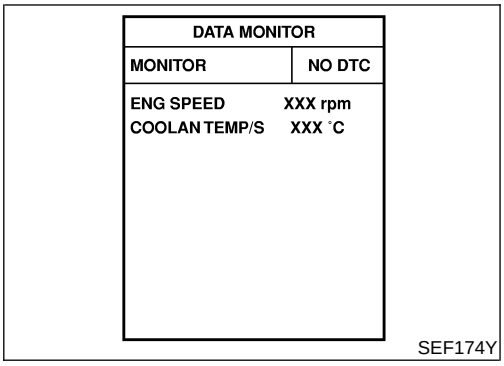
- Swirl control valve control vacuum check switch
- Camshaft position sensor (PHASE)
- Crankshaft position sensor (POS)
- Throttle position sensor
- Hoses and tubes between air cleaner and swirl control valve vacuum check switch
- Swirl control valve control solenoid valve

DTC Confirmation Procedure

NIEC0690

Perform "Procedure for Malfunction A" first. If the 1st trip DTC cannot be confirmed, perform "Procedure for Malfunction B".

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



PROCEDURE FOR MALFUNCTION A

NIEC0690S02

TESTING CONDITION:

- **For best results, 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

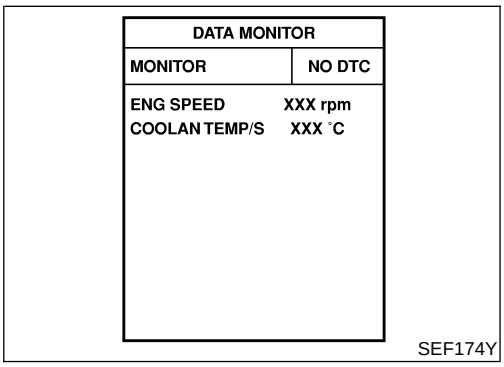
NIEC0690S0201

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-494.

With GST

NIEC0690S0202

Follow the procedure "With CONSULT-II" above.



PROCEDURE FOR MALFUNCTION B

NIEC0690S03

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

NIEC0690S0301

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-494.

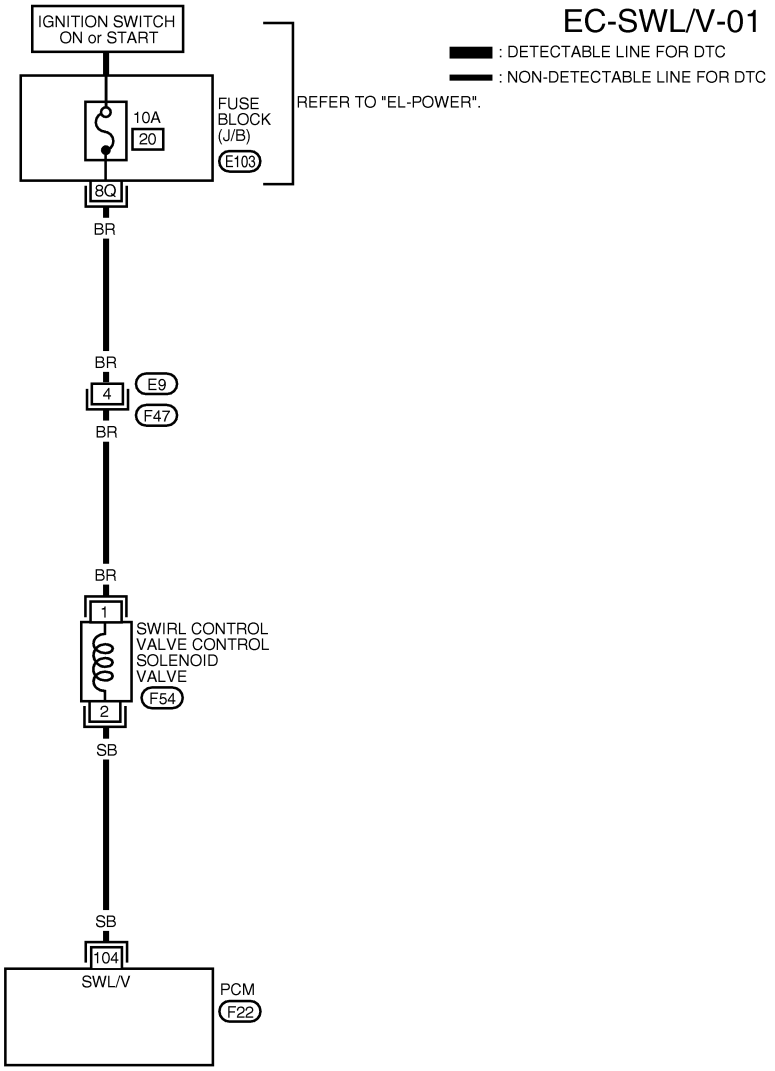
With GST

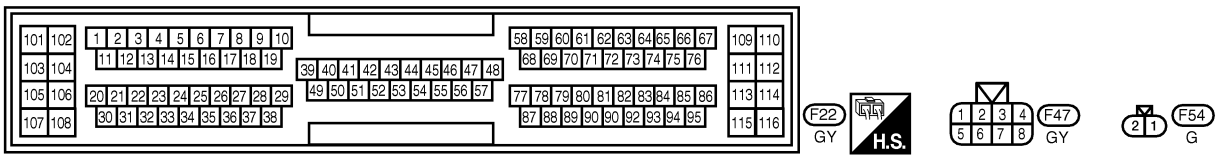
NIEC0690S0302

Follow the procedure "With CONSULT-II" above.

Wiring Diagram

=NIEC0691





LEC440

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

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
104	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

SEF738Y

Diagnostic Procedure

NIEC0692

PROCEDURE A

NIEC0692S02

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.

ACTIVE TEST	
SWIRL CONT SOL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
IACV-AAC/V	XXX step

SEF499Y

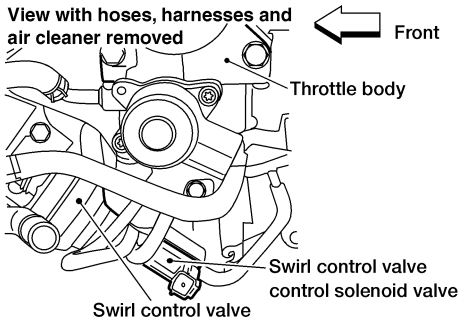
3. Make sure that clicking sound is heard from the swirl control valve control solenoid valve.

OK or NG

OK ▶	GO TO 6.
NG ▶	GO TO 3.

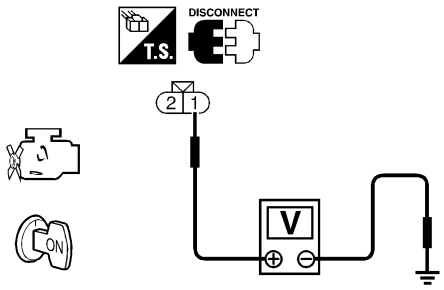
3	CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect swirl control valve control solenoid valve harness connector.



WEC326

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

SEF500Y

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E9, F47
- 10A 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 PCM harness connector.
3. Check harness continuity between PCM terminal 104 and swirl control valve control solenoid valve terminal 2. Refer to "Wiring Diagram", EC-493.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

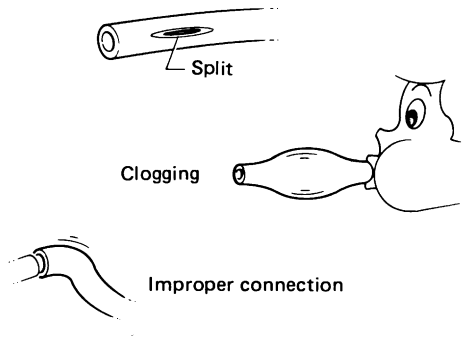
OK or NG

OK	▶	GO TO 6.
NG	▶	Repair open circuit, short to ground or short to power in harness connectors.

Diagnostic Procedure (Cont'd)

6	CHECK HOSES

Check hoses and tubes between intake manifold, and swirl control valve actuator for crack, clogging, improper connection or disconnection.



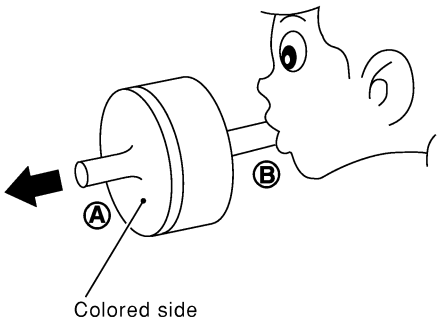
SEF109L

OK or NG

OK	▶	GO TO 7.
NG	▶	Repair hoses or tubes.

7	CHECK ONE-WAY VALVE

Check one-way valve air passage continuity under the following conditions.



Condition	Air passage continuity
Blow air from side B to A	Yes
Blow air from side A to B	No

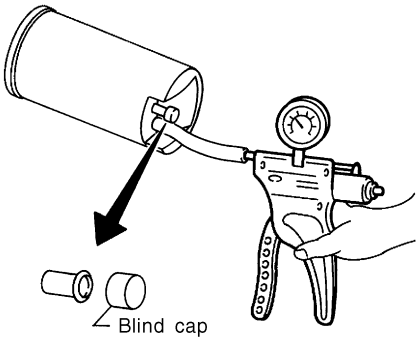
SEF194Z

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace one-way valve.

8	CHECK VACUUM TANK

1. Apply vacuum −80.0 kPa (−600 mmHg, −23.62 inHg, −11.60 psi).
2. Confirm that there is no leakage.



SEF405S

YES or NO

YES	▶	GO TO 9.
NO	▶	Replace vacuum tank.

Diagnostic Procedure (Cont'd)

9	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.

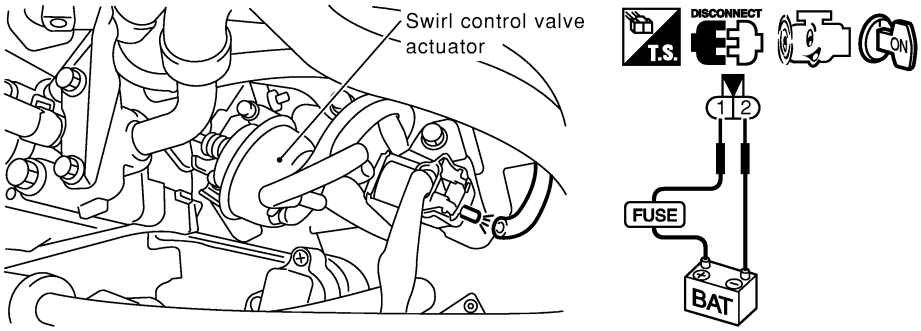
PCM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE PCM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE PCM'S TRANSISTOR. USE A GROUND OTHER THAN PCM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
59	P/L	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

SEF764Y

Without CONSULT-II

1. Reconnect PCM 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.



SEF763Y

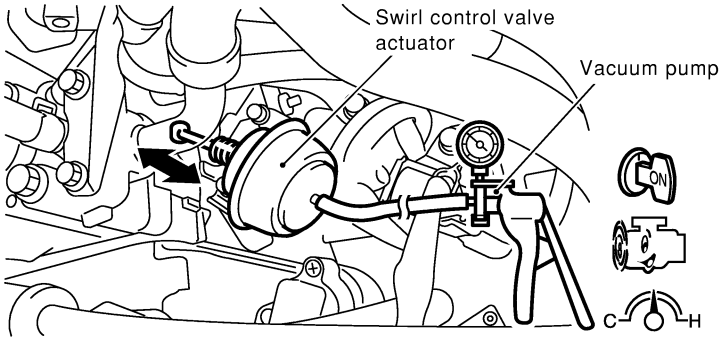
OK or NG

OK	▶	GO TO 10.
NG	▶	Replace intake manifold collector assembly.

10	CHECK SWIRL CONTROL VALVE ACTUATOR

With CONSULT-II

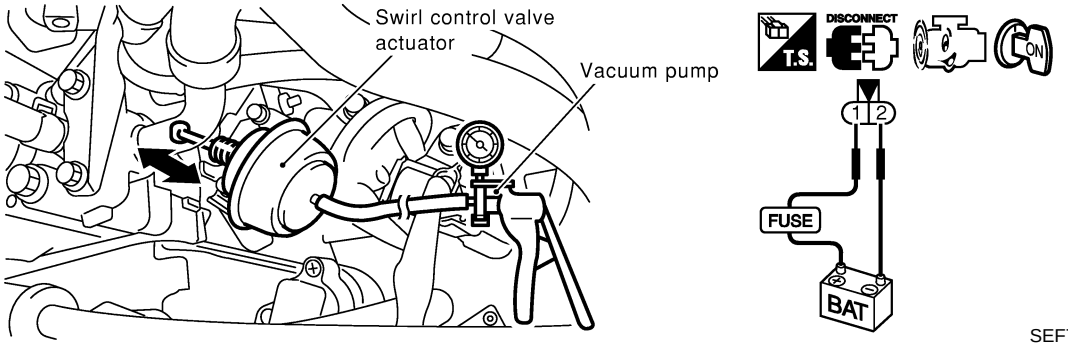
1. Reconnect vacuum hose between swirl control valve actuator and swirl control valve control solenoid valve.
2. Start engine and let it idle.
3. Select "SWIRL CONT SOL/V" in "ACTIVE TEST" mode.
4. Touch "ON" and "OFF" on CONSULT-II screen.
5. Make sure that swirl control valve actuator rod moves according to "SWIRL CONT SOL/V indication.



SEF762Y

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.



SEF761Y

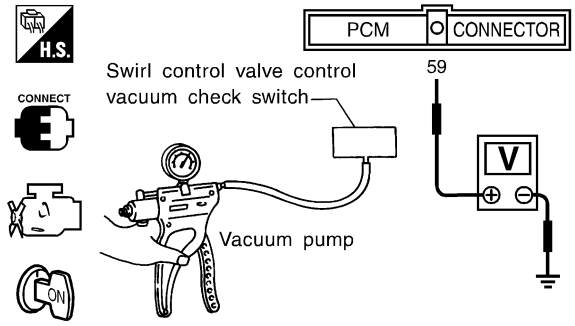
OK or NG

OK	▶	GO TO 11.
NG	▶	Replace swirl control valve and actuator.

Diagnostic Procedure (Cont'd)

11	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 PCM terminal 59 and ground under the following conditions.



Applied pressure kPa (mmHg, inHg)	Voltage V
More than –20.0 (–150, –5.91)	Engine ground
–20.0 to –23.0 (–150 to –172, –5.91 to –6.77)	Engine ground or Approx. 4.8
Less than –23.0 (–172, –6.77)	Approx. 4.8

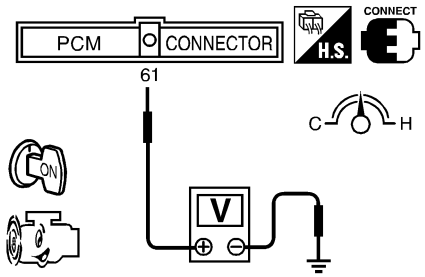
SEF739Y

OK or NG

OK	▶	GO TO 12.
NG	▶	Replace swirl control valve control vacuum check switch.

12	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 PCM 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.

SEF740Y

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

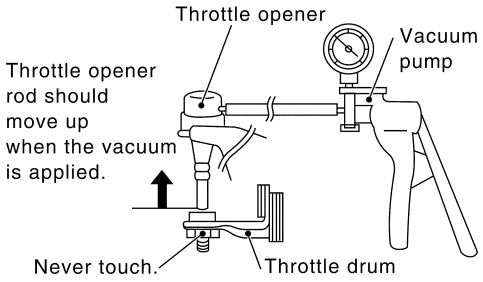
OK or NG

OK (With CONSULT-II)	▶	GO TO 13.
OK (Without CONSULT-II)	▶	GO TO 14.
NG	▶	Replace mass air flow sensor.

13	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	
MONITORING	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

SEF741Y

OK or NG

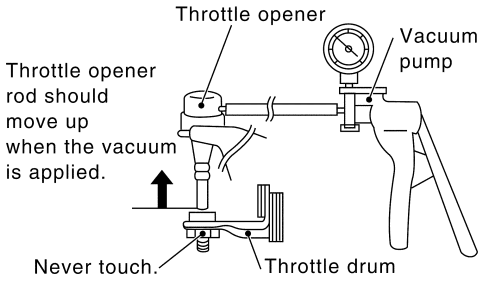
OK	▶	GO TO 16.
NG	▶	GO TO 15.

Diagnostic Procedure (Cont'd)

14	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 PCM 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 16.
NG	▶	GO TO 15.

15	ADJUST CLOSED THROTTLE POSITION SWITCH

Adjust closed throttle position switch. Refer to "Basic Inspection", EC-131.

Items	Specifications
Ignition timing	9°±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	M/T: 650±50 rpm A/T: 800±50 rpm (in "P" or "N" position)

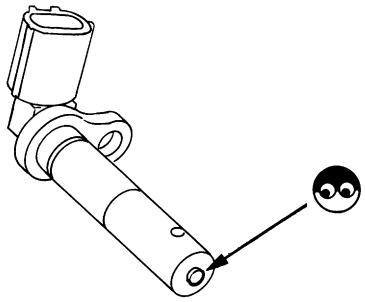
MTBL0440

OK or NG

OK	▶	GO TO 16.
NG	▶	Replace throttle position sensor. To adjust it, perform "Basic Inspection", EC-131.

16	CHECK CRANKSHAFT POSITION SENSOR (POS)-I

1. Turn ignition switch "OFF".
2. Loosen the fixing bolts and remove the crankshaft position sensor (POS).
3. Visually check the crankshaft position sensor (POS) for chipping.



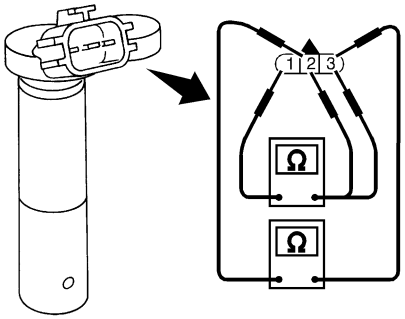
SEF960N

OK or NG

OK	▶	GO TO 17.
NG	▶	Replace crankshaft position sensor (POS).

17	CHECK CRANKSHAFT POSITION SENSOR (POS)-II

Check resistance between crankshaft position sensor (POS) terminals as shown below.



Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
3 (+) - 1 (–)	Except 0 or ∞
3 (+) - 1 (–)	
3 (+) - 2 (–)	

SEF492Y

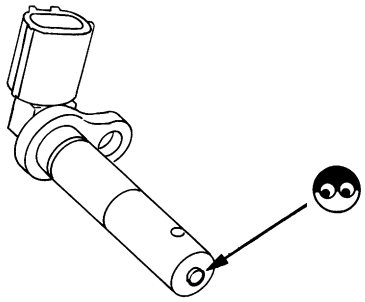
OK or NG

OK	▶	GO TO 18.
NG	▶	Replace crankshaft position sensor (POS).

Diagnostic Procedure (Cont'd)

18	CHECK CAMSHAFT POSITION SENSOR (PHASE)-I

1. Turn ignition switch "OFF".
2. Loosen fixing bolt and remove the camshaft position sensor (PHASE).
3. Visually check the camshaft position sensor (PHASE) for chipping.



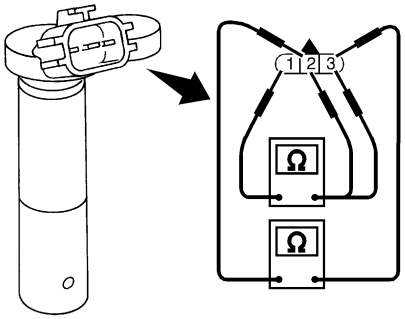
SEF960N

OK or NG

OK	▶	GO TO 19.
NG	▶	Replace camshaft position sensor (PHASE).

19	CHECK CAMSHAFT POSITION SENSOR (PHASE)-II

Check resistance as shown below.



Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
3 (+) - 1 (–)	Except 0 or ∞
3 (+) - 1 (–)	
3 (+) - 2 (–)	

SEF492Y

OK or NG

OK	▶	GO TO 20.
NG	▶	Replace camshaft position sensor (PHASE).

20	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-169.

▶ **INSPECTION END**

PROCEDURE B

NIEC0692S03

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 "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

SEF499Y

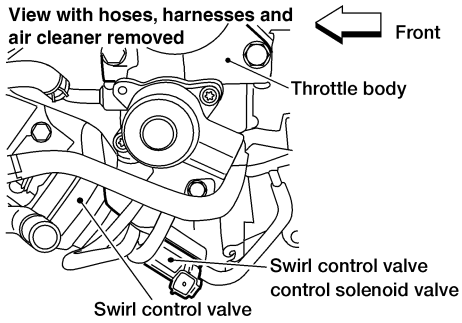
4. Make sure that clicking sound is heard from the swirl control valve control solenoid valve.

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 3.

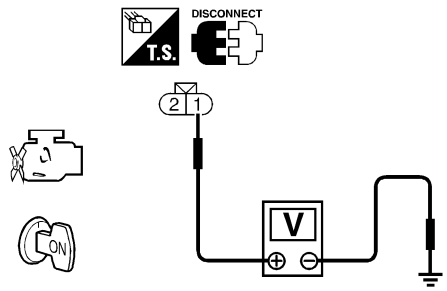
3	CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect swirl control valve control solenoid valve harness connector.



WEC326

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

SEF500Y

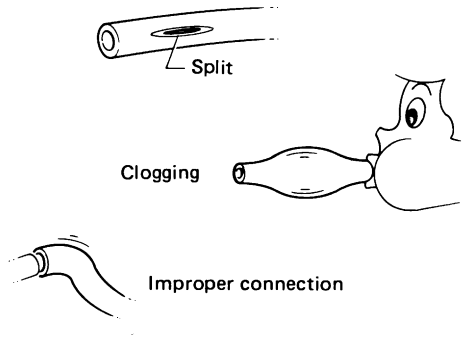
OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

Diagnostic Procedure (Cont'd)

4	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E9, F47 ● 10A 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 PCM harness connector. 3. Check harness continuity between PCM terminal 104 and terminal 2. Refer to "Wiring Diagram", EC-493. **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.

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.

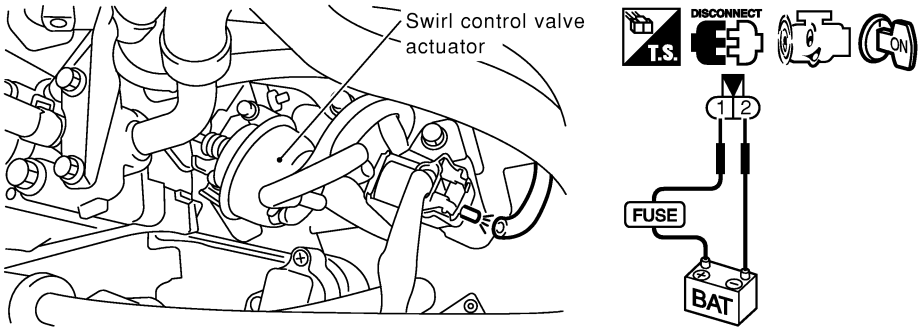
PCM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE PCM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE PCM'S TRANSISTOR. USE A GROUND OTHER THAN PCM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
59	P/L	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

SEF764Y

Without CONSULT-II

1. Reconnect PCM 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.



SEF763Y

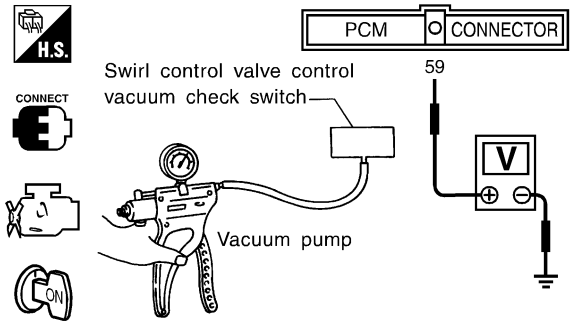
OK or NG

OK	▶	GO TO 8.
NG	▶	Replace intake manifold collector assembly.

Diagnostic Procedure (Cont'd)

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 PCM terminal 55 and ground under the following conditions.



Applied pressure kPa (mmHg, inHg)	Voltage V
More than –20.0 (–150, –5.91)	Engine ground
–20.0 to –23.0 (–150 to –172, –5.91 to –6.77)	Engine ground or Approx. 4.8
Less than –23.0 (–172, –6.77)	Approx. 4.8

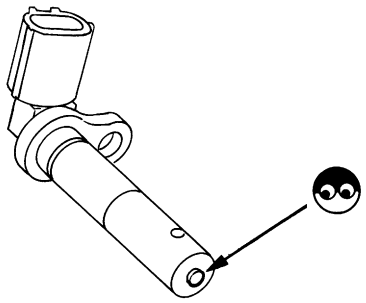
SEF739Y

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace swirl control valve control vacuum check switch.

9	CHECK CRANKSHAFT POSITION SENSOR (POS)-I

1. Turn ignition switch "OFF".
2. Loosen the fixing bolts and remove the POS.
3. Visually check the crankshaft position sensor (POS) for chipping.



SEF960N

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace crankshaft position sensor (POS).

10	CHECK CRANKSHAFT POSITION SENSOR (POS)-II

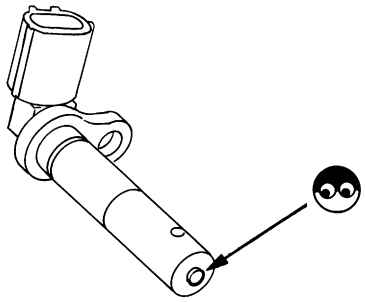
Check resistance between crankshaft position sensor (POS) terminals 1 and 2.

OK or NG

OK	▶	GO TO 11.
NG	▶	Replace crankshaft position sensor (POS).

11	CHECK CAMSHAFT POSITION SENSOR (PHASE)-I

1. Turn ignition switch "OFF".
2. Loosen fixing bolt and remove the camshaft position sensor (PHASE).
3. Visually check the camshaft position sensor (PHASE) for chipping.



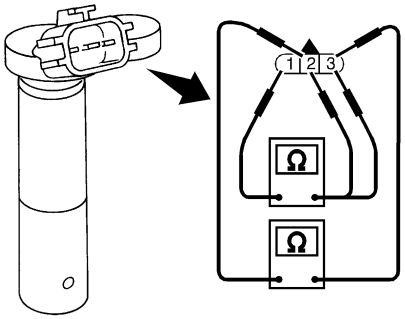
SEF960N

OK or NG

OK	▶	GO TO 12.
NG	▶	Replace camshaft position sensor (PHASE).

12	CHECK CAMSHAFT POSITION SENSOR (PHASE)-II

Check resistance as shown below.



Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
3 (+) - 1 (–)	Except 0 or ∞
3 (+) - 1 (–)	
3 (+) - 2 (–)	

SEF492Y

OK or NG

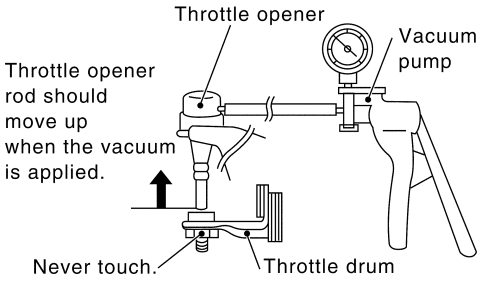
OK (With CONSULT-II)	▶	GO TO 13.
OK (Without CONSULT-II)	▶	GO TO 14.
NG	▶	Replace camshaft position sensor (PHASE).

Diagnostic Procedure (Cont'd)

13	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	
MONITORING	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

SEF741Y

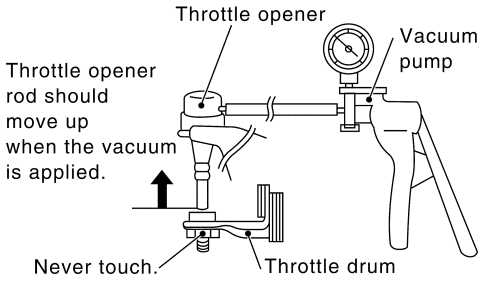
OK or NG

OK	▶	GO TO 14.
NG	▶	GO TO 13.

14	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 PCM 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 16.
NG	▶	GO TO 15.

15	ADJUST CLOSED THROTTLE POSITION SWITCH

Adjust closed throttle position switch. Refer to "Basic Inspection", EC-131.

Items	Specifications
Ignition timing	9°±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	M/T: 650±50 rpm A/T: 800±50 rpm (in "P" or "N" position)

MTBL0440

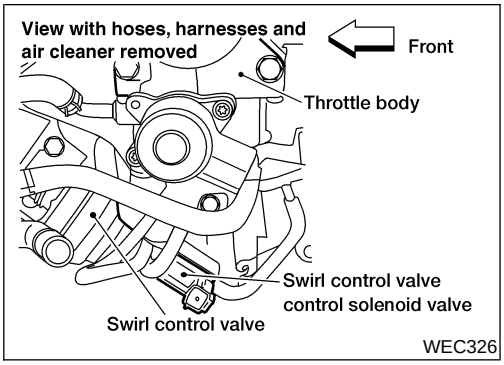
OK or NG

OK	▶	GO TO 16.
NG	▶	Replace throttle position sensor. To adjust it, perform "Basic Inspection", EC-131.

16	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-169.

▶ **INSPECTION END**



Component Description

NIEC0717

The swirl control valve control solenoid valve responds to signals from the PCM. When the PCM 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 PCM sends an OFF signal, the vacuum signal is cut and the swirl control valve opens.

CONSULT-II Reference Value in Data Monitor Mode

NIEC0718

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 55°C (131°F).	ON
		Engine coolant temperature is above 55°C (131°F).	OFF

On Board Diagnosis Logic

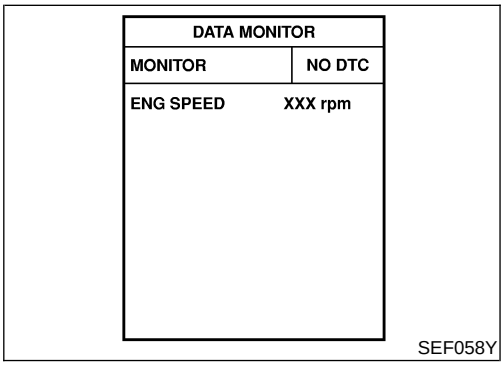
NIEC0719

Malfunction is detected when an improper voltage signal is sent to PCM through swirl control valve control solenoid valve.

Possible Cause

NIEC0720

- Harness or connectors
  (The swirl control valve control solenoid valve circuit is open or shorted.)
- Swirl control valve control solenoid valve



DTC Confirmation Procedure

NIEC0721

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

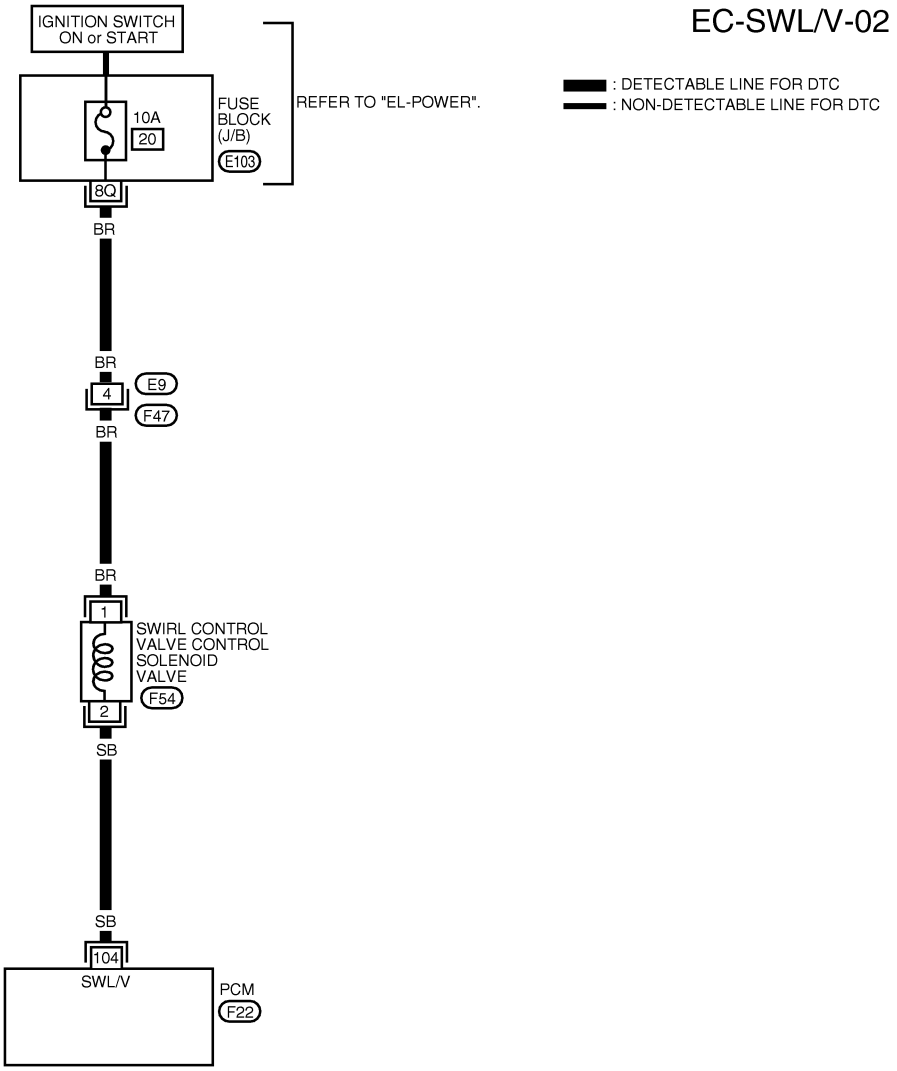
1) Turn ignition switch “ON”.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Wait at least 5 seconds.
   If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-515.

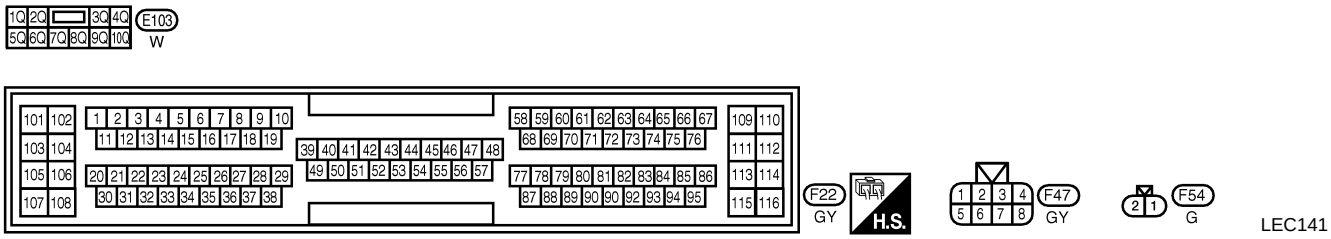
With GST

Follow the procedure "With CONSULT-II" above.

Wiring Diagram

=NIEC0722





LEC141

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

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
104	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

SEF738Y

Diagnostic Procedure

NIEC0723

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

SEF499Y

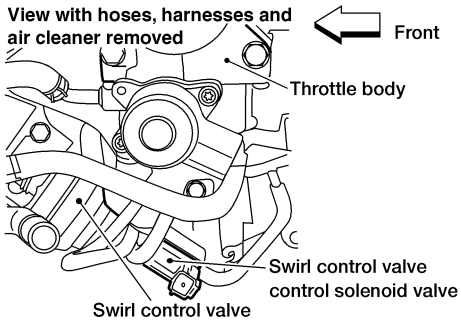
4. Make sure that clicking sound is heard from the swirl control valve control solenoid valve.

OK or NG		
OK	▶	GO TO 6.
NG	▶	GO TO 3.

Diagnostic Procedure (Cont'd)

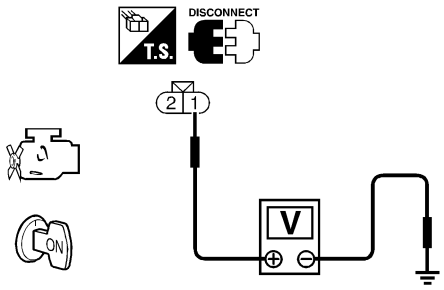
3	CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect swirl control valve control solenoid valve harness connector.



WEC326

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

SEF500Y

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E9, F47
- 10A 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 PCM harness connector.
3. Check harness continuity between PCM terminal 104 and swirl control valve control solenoid valve terminal 2. Refer to "Wiring Diagram", EC-514.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

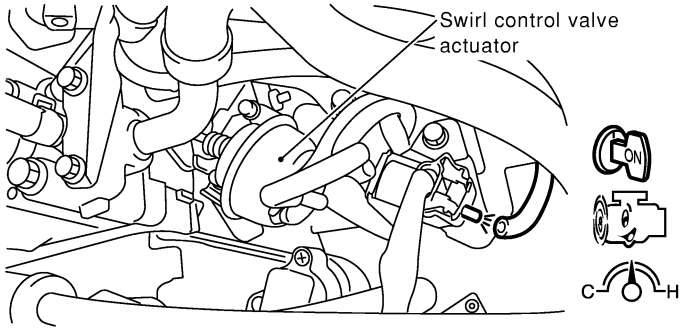
OK or NG

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

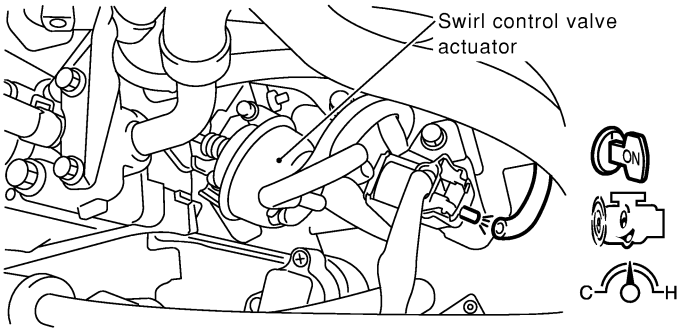
1. Reconnect the disconnected harness connectors.
2. Start engine and let it idle.
3. Remove vacuum hose connected to swirl control valve actuator.
4. Select "SWIRL CONT SOL/V" in "ACTIVE TEST" mode with CONSULT-II.
5. Touch "ON" and "OFF" on CONSULT-II screen.
6. Check vacuum existence and operation delay time under the following conditions.



SEF757Y

Without CONSULT-II

1. Reconnect PCM 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.



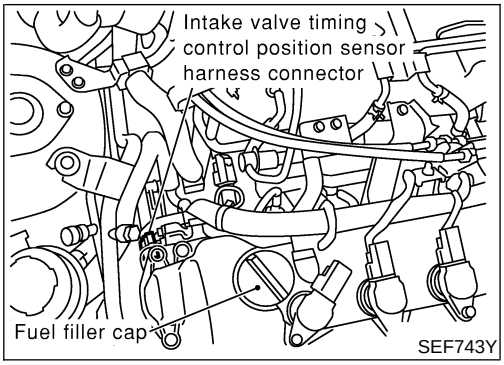
Condition	Vacuum
12V direct current supply	Should exist.
No supply	Should not exist.

SEF195Z

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace intake manifold collector assembly.

7	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-169.	
▶	**INSPECTION END**



Component Description

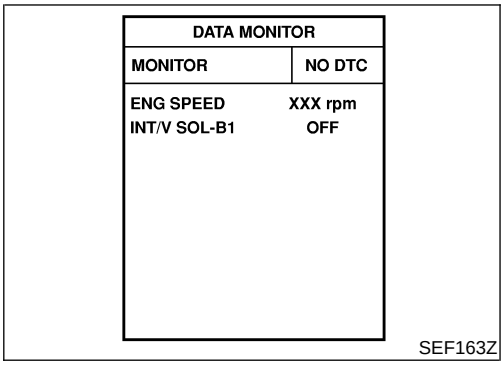
NIEC0676

The intake valve timing control position sensor is located in front of the cylinder head. This sensor detects a signal (intake valve position) generated by the protrusion of camshaft sprocket and sends it to the PCM. This sensor is not used to control the engine system. It is used only for the on board diagnosis of intake valve timing control.

On Board Diagnosis Logic

NIEC0695

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1140	• The proper pulse signal from the intake valve timing control position sensors is not sent to PCM while the engine is running at the specified engine speed.	• Harness or connectors (The intake valve timing control position sensor circuit is open.) • Intake valve timing control position sensor • Accumulation of debris to the signal pick-up portion of the camshaft



DTC Confirmation Procedure

NIEC0696

NOTE:

If “DIAGNOSTIC TROUBLE CODE 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

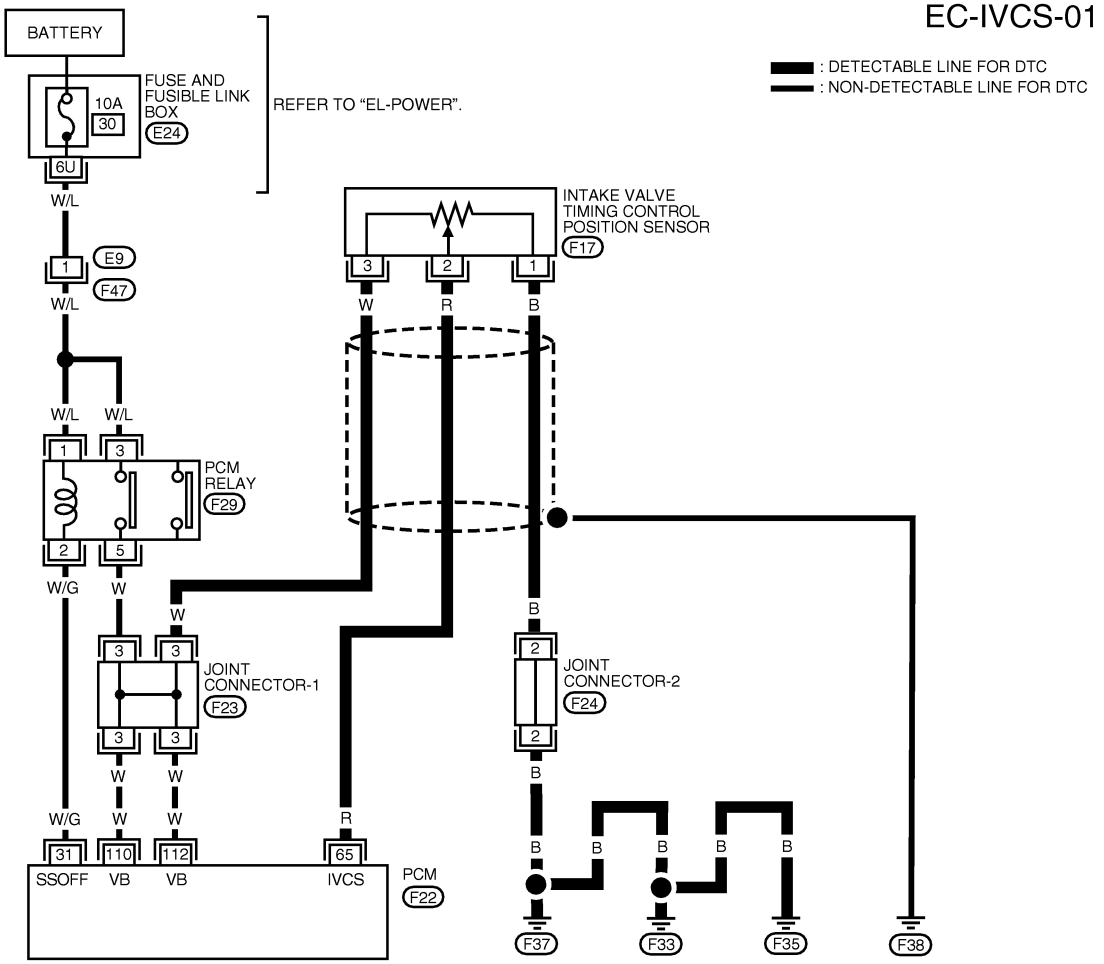
1) Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II.
2) Start engine and keep the engine speed at 2,000 rpm and wait at least 15 seconds.
3) If 1st trip DTC is detected, go to “DIAGNOSTIC PROCEDURE”, EC-520.

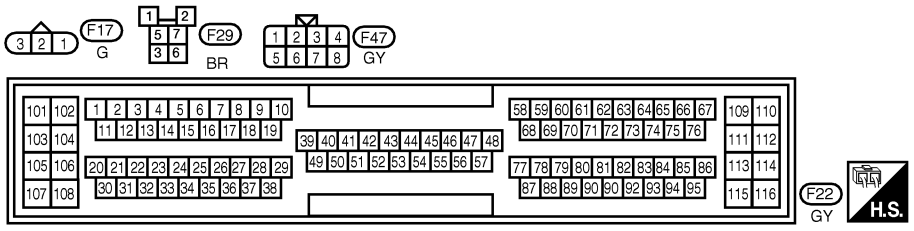
With GST

Follow the procedure “With CONSULT-II” above.

Wiring Diagram

NIEC0697

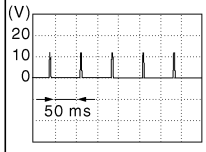
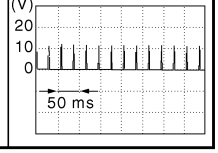




REFER TO THE FOLLOWING.
F23 , F24 -JOINT CONNECTOR

LEC372

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

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
65	R	INTAKE VALVE TIMING CONTROL POSITION SENSOR	ENGINE RUNNING AT IDLE UNDER WARM-UP CONDITION	APPROX. 0V 
			ENGINE RUNNING AT 2,000 RPM UNDER WARM-UP CONDITION	APPROX. 0V 

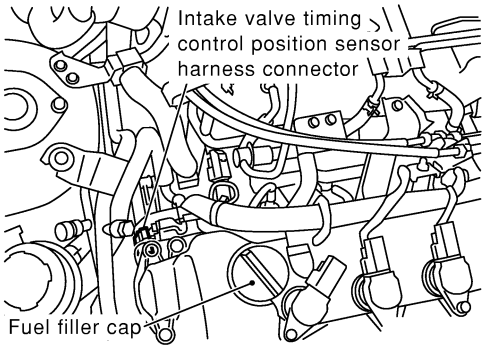
SEF744Y

Diagnostic Procedure

NIEC0698

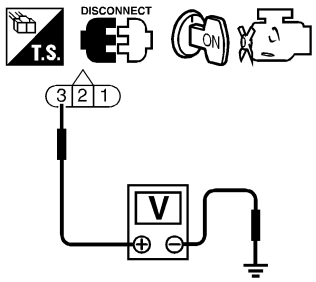
1	CHECK POWER SUPPLY

1. Turn ignition switch “OFF”.
2. Disconnect intake valve timing control position sensor harness connector.



SEF743Y

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



SEF509Y

Voltage:
Battery voltage

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

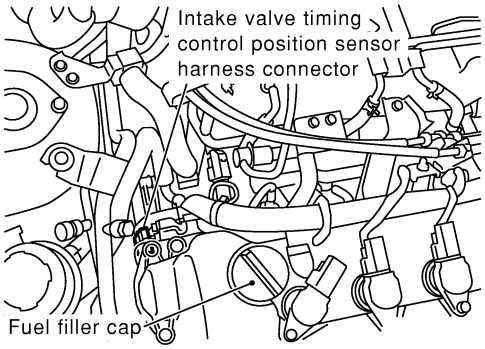
2	DETECT MALFUNCTIONING PART

- Joint connector-1
- Harness for open or short between the intake valve timing control position sensor and PCM relay

	▶	Repair harness or connectors.

3	CHECK INPUT SIGNAL CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect PCM harness connector.
3. Disconnect intake valve timing control position sensor harness connector.



SEF743Y

4. Check harness continuity between PCM terminal 65 and terminal 2.
   Refer to "Wiring Diagram", EC-519.
   Continuity should exist.
   If OK, check harness for short to ground and short to power.

OK or NG

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

4	CHECK GROUND CIRCUIT

1. Loosen and retighten engine ground screws.
2. Check harness continuity between sensor terminal 1 and engine ground.
   Refer to wiring diagram.
   Continuity should exist.
   If OK, 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.
- Joint connector-2

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

6	CHECK CAMSHAFT

Check accumulation of debris to the signal pick-up portion of the camshaft. Refer to ***EM-20***, "TIMING CHAIN".

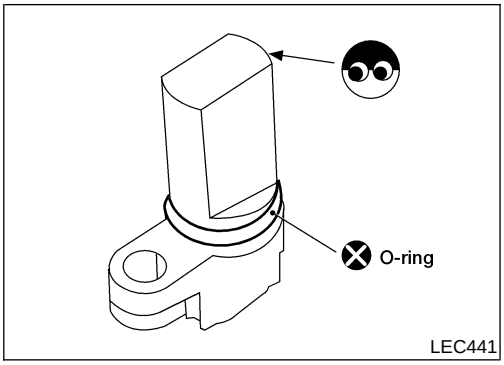
OK or NG

OK	▶	Replace intake valve timing control position sensor. GO TO 7.
NG	▶	Remove debris and clean the signal pick-up cutout of camshaft.

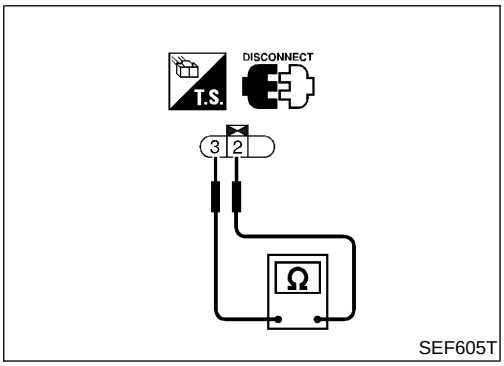
7	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-169.

	▶	**INSPECTION END**



LEC441



SEF605T

Component Inspection

NIEC0699

INTAKE VALVE TIMING CONTROL POSITION SENSOR

NIEC0699S01

1. Disconnect intake valve timing control position sensor harness connector.
2. Loosen fixing bolt of the sensor.
3. Visually check the sensor for chipping.
4. Check resistance between terminals 2 and 3.

Resistance:

600 - 740Ω [at 20°C (68°F)]

If NG, replace intake valve timing control position sensor.

On Board Diagnosis Logic

NIEC0307

★ **The closed loop control has the one trip detection logic.**

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1148 (BANK 1)	• The closed loop control function does not operate even when vehicle is driving in the specified condition.	• The heated oxygen sensor 1 (front) circuit is open or shorted. • Heated oxygen sensor 1 (front) • Heated oxygen sensor 1 heater (front)
P1168 (BANK 2)		

3

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
VHCL SPEED SE	XXX km/h

SEF682Y

DTC Confirmation Procedure

NIEC0308

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 4.**
- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**

With CONSULT-II

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 the following.

- "HO2S1 (B1)/(B2)" voltage should go above 0.70V at least once.
- "HO2S1 (B1)/(B2)" voltage should go below 0.21V at least once.

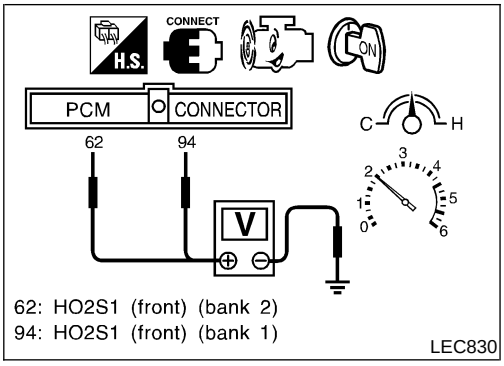
If the result is NG, perform "Diagnosis Procedure", EC-524.
If the result is OK, perform the following step.

4) Let engine idle at least 5 minutes.
5) Maintain the following condition at least 50 consecutive seconds.

B/FUEL SCHDL	More than 3.3 msec (A/T), 2.8 msec (M/T)
ENG SPEED	More than 1,750 rpm (A/T), 2,100 rpm (M/T)
Selector lever	Suitable position
VHCL SPEED SE	More than 70 km/h (43 MPH)

During this test, P0130 DTC may be displayed on CONSULT-II screen.

6) If DTC is detected, go to "Diagnostic Procedure", EC-524.



Overall Function Check

NIEC0309

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

With GST

1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between PCM terminal 62 (heated oxygen sensor 1 signal) and engine ground.
3) Check the following with engine speed held at 2,000 rpm constant under no load.

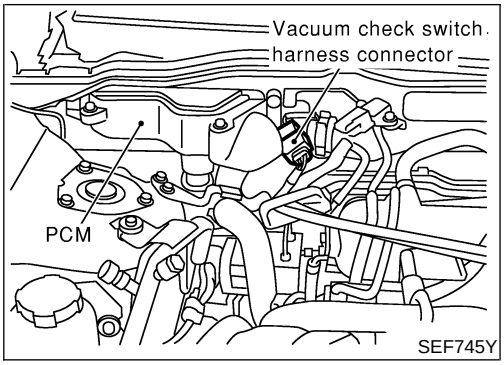
- The voltage should go above 0.70V at least once.
- The voltage should go below 0.21V at least once.

4) If NG, go to “Diagnostic Procedure”, EC-524.

Diagnostic Procedure

NIEC0310

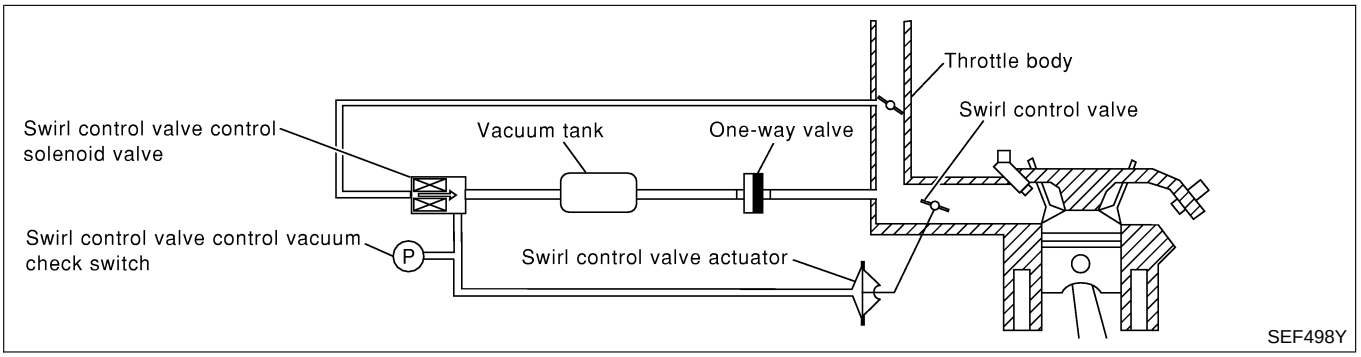
Refer to “Diagnostic Procedure” for DTC P0133, EC-245.



Component Description

NIEC0700

The swirl control valve control vacuum check switch detects vacuum signal to the swirl control valve, and sends “ON” or “OFF” signal to the PCM.
When vacuum is supplied to the valve, the swirl control valve control vacuum check switch sends “OFF” signal to the PCM.
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

NIEC0701

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 55°C (131°F).	OFF
	• Engine speed: Idle • Engine coolant temperature is above 55°C (131°F).	ON

On Board Diagnosis Logic

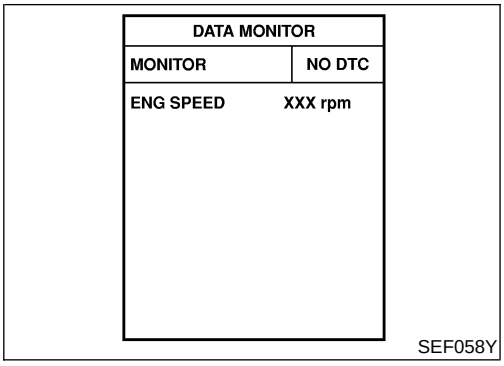
NIEC0702

Malfunction is detected when the swirl control valve control vacuum check switch remains “OFF” under specified engine conditions.

Possible Cause

NIEC0703

- 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
- Swirl control valve actuator



DTC Confirmation Procedure

NIEC0704

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 the test at a temperature above 5°C (41°F).

WITH CONSULT-II

NIEC0704S01

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-528.

WITH GST

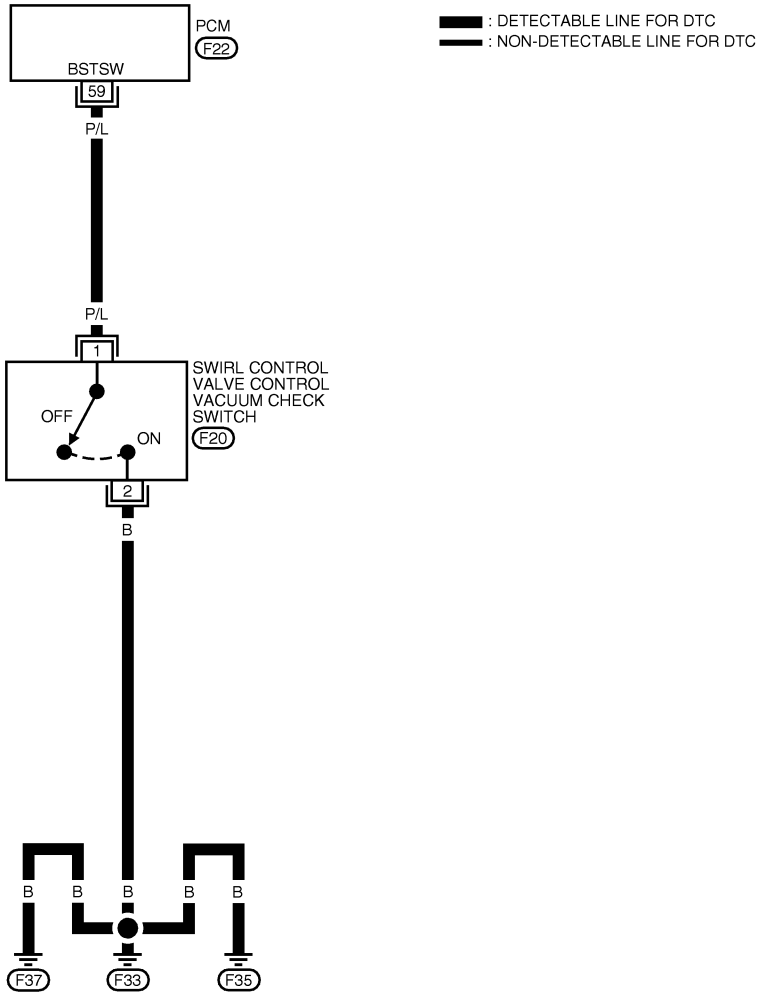
NIEC0704S02

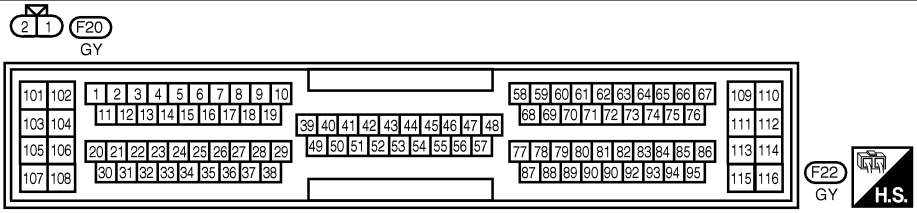
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

NIEC0705

EC-S/VCSW-01





LEC140

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

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
59	P/L	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

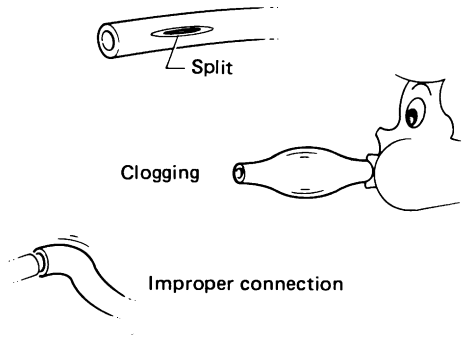
SEF751Y

Diagnostic Procedure

NIEC0706

1	CHECK HOSES

1. Turn ignition switch “OFF”.
2. Check hose for clogging or improper connection.



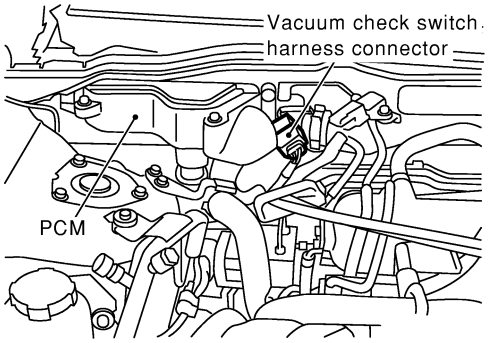
SEF109L

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.



SEF745Y

2. Check harness continuity between terminal 2 and ground.
   Refer to “Wiring Diagram”, EC-527.
   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 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

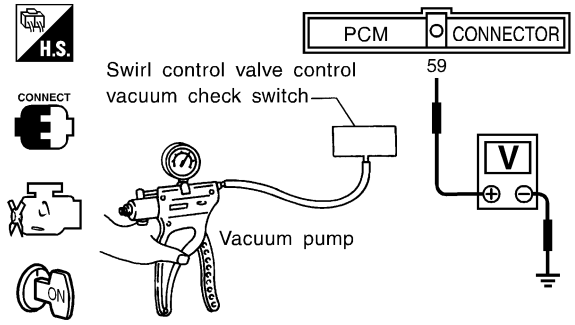
1. Disconnect PCM harness connector.
2. Check harness continuity between PCM terminal 59 and swirl control valve control vacuum check switch terminal 1. Refer to "Wiring Diagram", EC-527.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

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 PCM terminal 59 and ground under the following conditions.



Applied pressure kPa (mmHg, inHg)	Voltage V
More than –20.0 (–150, –5.91)	Engine ground
–20.0 to –23.0 (–150 to –172, –5.91 to –6.77)	Engine ground or Approx. 4.8
Less than –23.0 (–172, –6.77)	Approx. 4.8

SEF501Y

OK or NG

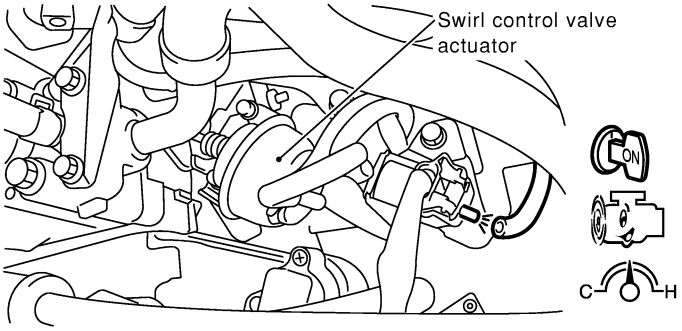
OK	▶	GO TO 6.
NG	▶	Replace swirl control valve control vacuum check switch.

Diagnostic Procedure (Cont'd)

6	CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE

With CONSULT-II

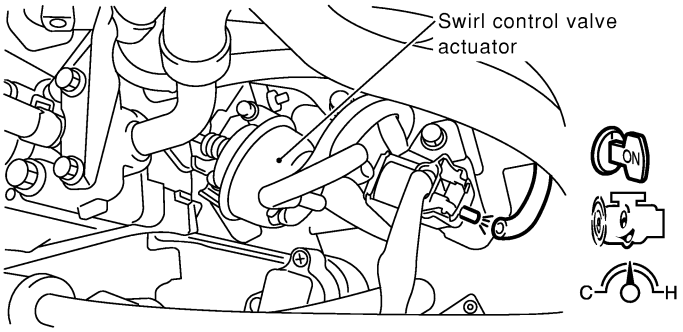
1. Reconnect the disconnected harness connectors.
2. Start engine and let it idle.
3. Remove vacuum hose connected to swirl control valve actuator.
4. Select "SWIRL CONT SOL/V" in "ACTIVE TEST" mode with CONSULT-II.
5. Touch "ON" and "OFF" on CONSULT-II screen.
6. Check vacuum existence and operation delay time under the following conditions.



SEF757Y

Without CONSULT-II

1. Reconnect PCM 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.

SEF195Z

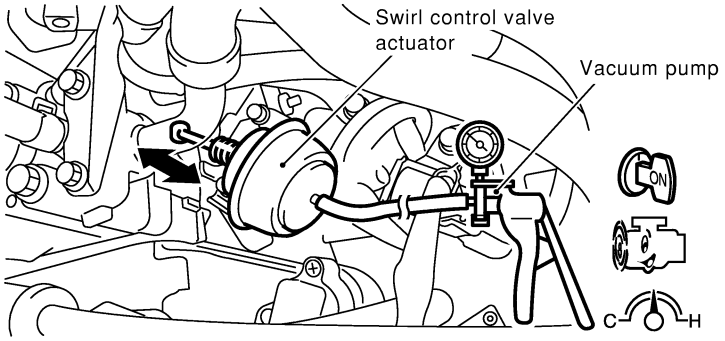
OK or NG

OK	▶	GO TO 7.
NG	▶	Replace swirl control valve control solenoid valve.

7	CHECK SWIRL CONTROL VALVE ACTUATOR

With CONSULT-II

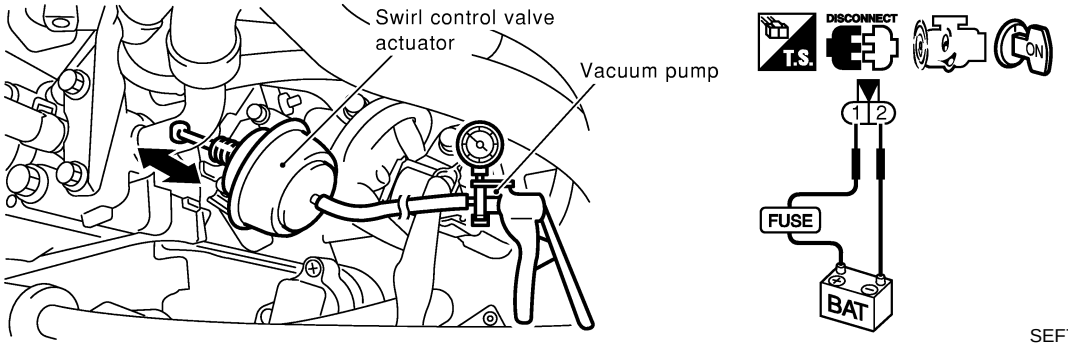
1. Reconnect vacuum hose between swirl control valve actuator and swirl control valve control solenoid valve.
2. Start engine and let it idle.
3. Select "SWIRL CONT SOL/V" in "ACTIVE TEST" mode.
4. Touch "ON" and "OFF" on CONSULT-II screen.
5. Make sure that swirl control valve actuator rod moves according to "SWIRL CONT SOL/V" indication.



SEF762Y

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 of 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.



SEF761Y

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace swirl control valve and actuator.

8	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-169.	
▶	**INSPECTION END**

System Description

NIEC0433

COOLING FAN CONTROL

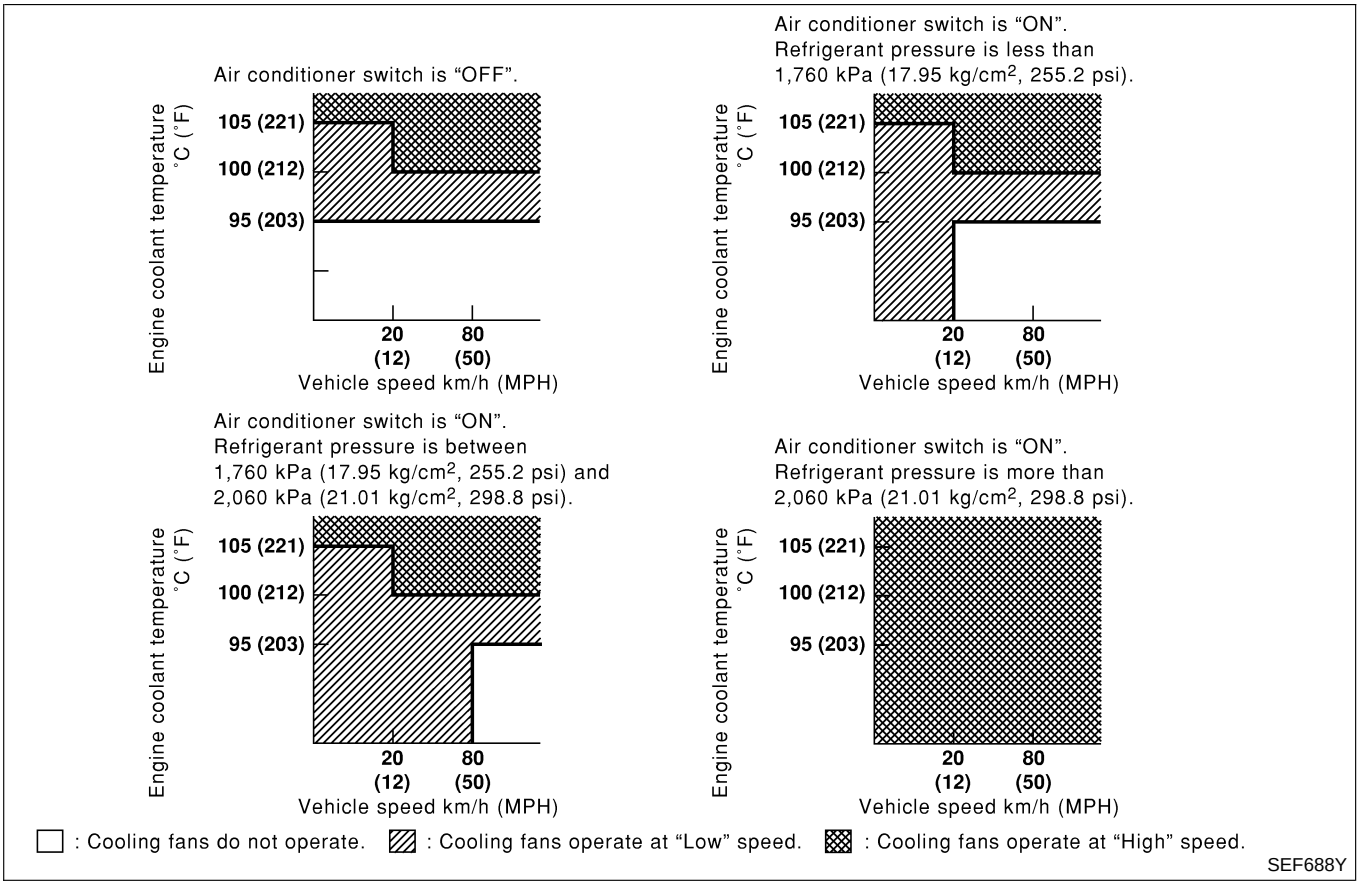
NIEC0433S01

Sensor	Input Signal to PCM	PCM 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 PCM 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

NIEC0433S02



CONSULT-II Reference Value in Data Monitor Mode

NIEC0486

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

MONITOR ITEM	CONDITION		SPECIFICATION
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

NIEC0488

If the cooling fan or another component in the cooling system malfunctions, engine coolant temperature will rise.
When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is indicated.

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1217	• Cooling fan does not operate properly (Overheat). • Cooling fan system does not operate properly (Overheat). • Engine coolant was not added to the system using the proper filling method.	• Harness or connectors (The cooling fan circuit is open or shorted.) • Cooling fan • Radiator hose • Radiator • Radiator cap • Water pump • Thermostat For more information, refer to "MAIN 12 CAUSES OF OVERHEATING", EC-547.

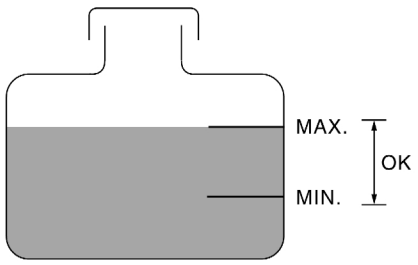
CAUTION:

When a malfunction is indicated, be sure to replace the coolant. Refer to *MA-17*, "Changing Engine Coolant". Also, replace the engine oil. Refer to *MA-20*, "Changing 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-15*, "Anti-freeze Coolant Mixture Ratio".

2) After refilling coolant, run engine to ensure that no water-flow noise is emitted.

1

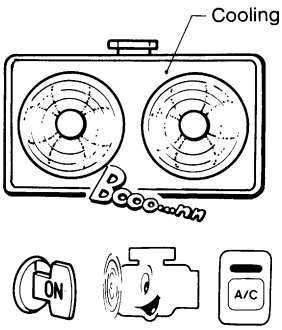


SEF621W

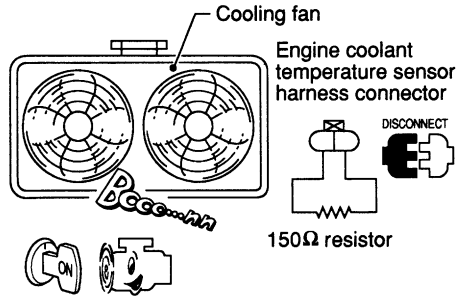
4

ACTIVE TEST	
COOLING FAN	OFF
MONITOR	
COOLAN TEMP/S	XXX °C

SEF646X



SEC163BA



MEC475B

Overall Function Check

NIEC0489

Use this procedure to check the overall function of the cooling fan. During this check, a DTC might not be confirmed.

WARNING:

Never remove the radiator cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator.
Wrap a thick cloth around cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.

With CONSULT-II

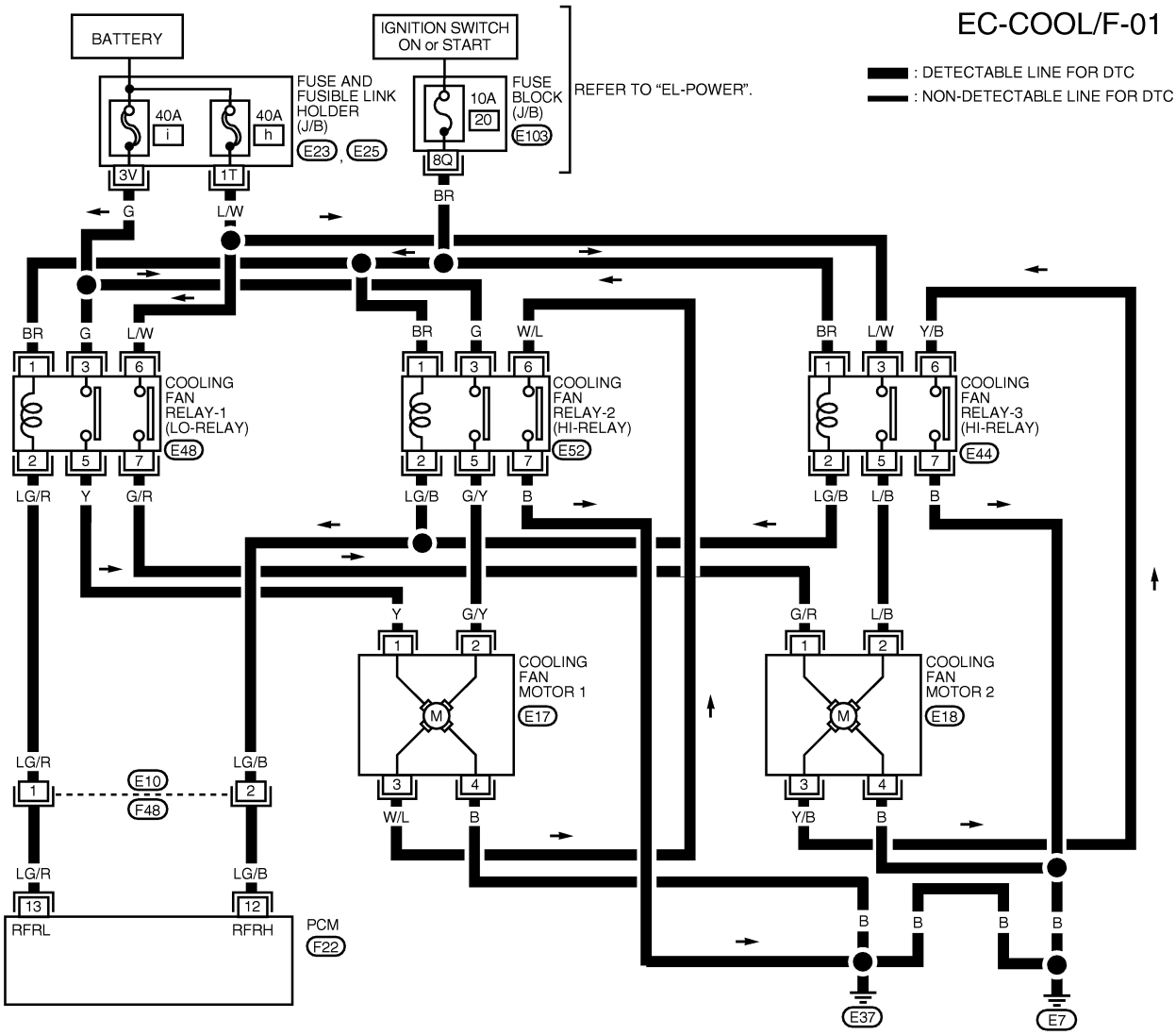
1) Check the coolant level in the reservoir tank and radiator.
Allow engine to cool before checking coolant level.
If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to “Diagnostic Procedure”, EC-536.
2) Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to “Diagnostic Procedure”, EC-536.
3) Turn ignition switch “ON”.
4) Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-II.
5) If the results are NG, go to “Diagnostic Procedure”, EC-536.

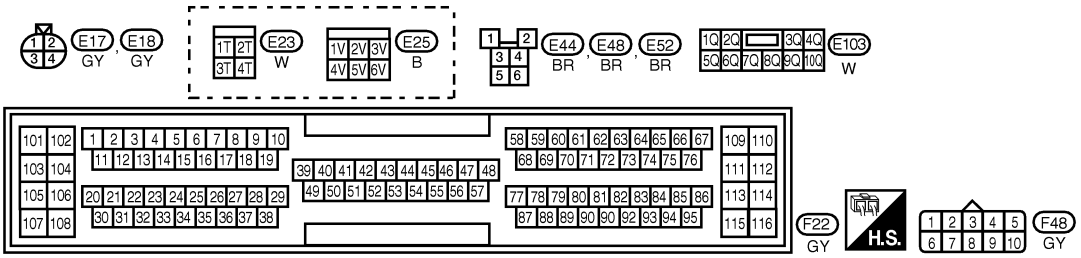
With GST

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-536.
2) Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to “Diagnostic Procedure”, EC-536.
3) Start engine.
Be careful not to overheat engine.
4) Set temperature control lever to full cold position.
5) Turn air conditioner switch “ON”.
6) Turn blower fan switch “ON”.
7) Run engine at idle for a few minutes with air conditioner operating.
Be careful not to overheat engine.
8) Make sure that cooling fan operates at low speed.
If NG, go to “Diagnostic Procedure”, EC-536.
If OK, go to the following step.
9) Turn ignition switch “OFF”.
10) Turn air conditioner switch and blower fan switch “OFF”.
11) Disconnect engine coolant temperature sensor harness connector.
12) Connect 150Ω resistor to engine coolant temperature sensor harness connector.
13) Restart engine and make sure that cooling fan operates at higher speed than low speed.
Be careful not to overheat engine.
14) If NG, go to “Diagnostic Procedure”, EC-536.

Wiring Diagram

NIEC0490





LEC188

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

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
12	LG/B	COOLING FAN RELAY (HIGH)	ENGINE RUNNING WITH COOLING FAN NOT OPERATING	BATTERY VOLTAGE
			ENGINE RUNNING WITH COOLING FAN OPERATING AT HIGH SPEED	0 - 0.6V
13	LG/R	COOLING FAN RELAY (LOW)	ENGINE RUNNING WITH COOLING FAN NOT OPERATING	BATTERY VOLTAGE
			ENGINE RUNNING WITH COOLING FAN OPERATING AT LOW SPEED	0 - 0.6V

SEF178Z

Diagnostic Procedure

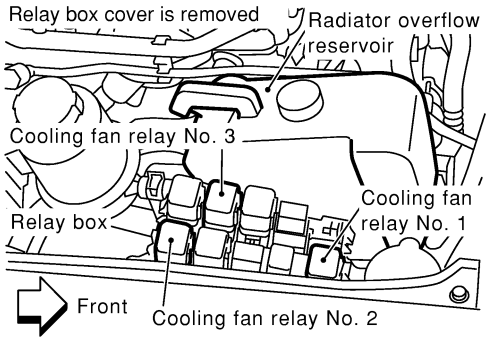
NIEC0491

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.



SEF768Y

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-542.)

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

SEF646X

6. Make sure that cooling fans-1 and -2 operate at higher speed than low speed.

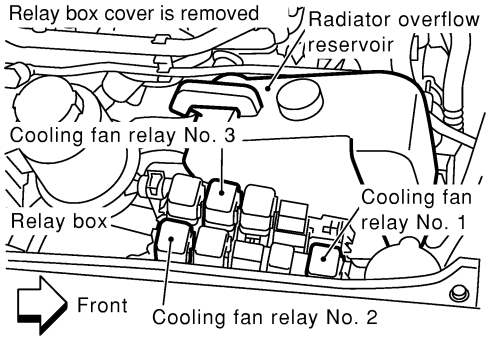
OK or NG

OK	▶	GO TO 6.
NG	▶	Check cooling fan high speed control circuit. (Go to PROCEDURE B, EC-545.)

4	CHECK COOLING FAN LOW SPEED OPERATION

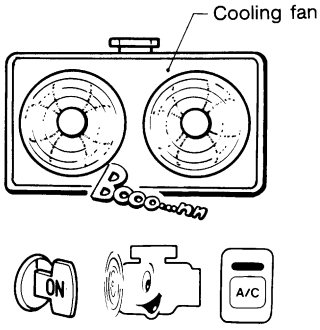
Without CONSULT-II

1. Disconnect cooling fan relays-2 and -3.



SEF768Y

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

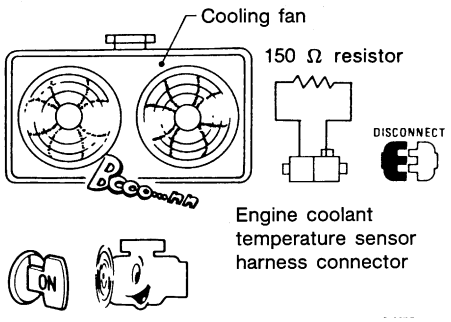
OK or NG

OK	▶	GO TO 5.
NG	▶	Check cooling fan low speed control circuit. (Go to PROCEDURE A, EC-542.)

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-545.)

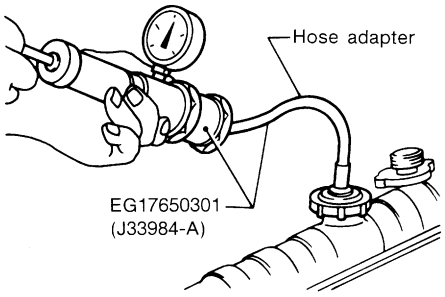
6	CHECK COOLING SYSTEM FOR LEAK

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.

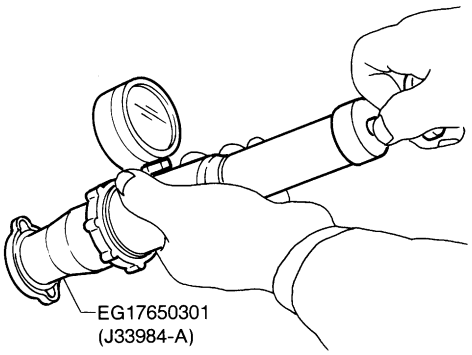
OK or NG

OK	▶	GO TO 7.
NG	▶	**Check the following for leak** ● Hose ● Radiator ● Water pump Refer to ***LC-12***, "Water Pump".

Diagnostic Procedure (Cont'd)

7	CHECK RADIATOR CAP

Apply pressure to cap with a tester.



SLC755A

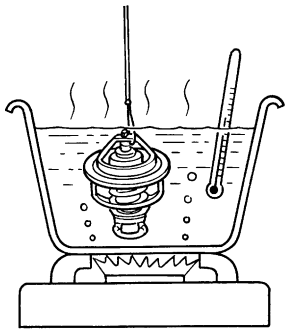
Radiator cap relief pressure:
59 - 98 kPa (0.6 - 1.0 kg/cm^2, 9 - 14 psi)

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace radiator cap.

8	CHECK THERMOSTAT

1. Check valve seating condition at normal room temperatures.
   It should seat tightly.
2. Check valve opening temperature and valve lift.



SLC343

Valve opening temperature:
76.5°C (170°F) [standard]
Valve lift:
More than 9 mm/90°C (0.35 in/194°F)

3. Check if valve is closed at 5°C (9°F) below valve opening temperature.

For details, refer to ***LC-13***, "Thermostat".

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace thermostat

9	CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to "COMPONENT INSPECTION", EC-217.

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace engine coolant temperature sensor.

10	CHECK MAIN 12 CAUSES
If the cause cannot be isolated, go to "MAIN 12 CAUSES OF OVERHEATING", EC-547.	
▶	INSPECTION END

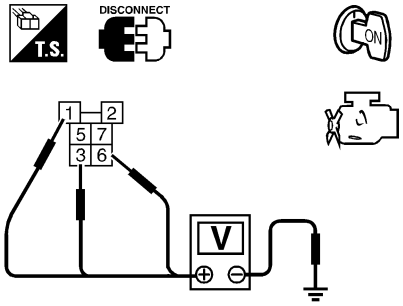
Diagnostic Procedure (Cont'd)

PROCEDURE A

=NIEC0491S01

1	CHECK POWER SUPPLY

1. Turn ignition switch "OFF".
2. Disconnect cooling fan relay-1.
3. Turn ignition switch "ON".
4. Check voltage between cooling fan relay-1 terminals 1, 3, 6 and ground with CONSULT-II or tester.



SEF477Y

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

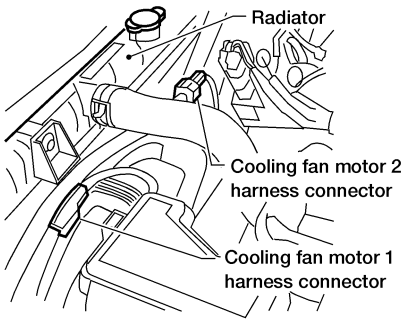
2	DETECT MALFUNCTIONING PART

Check the following.
- 10A fuse
- 40A fusible 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 GROUND CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect cooling fan motor-1 harness connector and cooling fan motor-2 harness connector.



LEC320

3. Check harness continuity between cooling fan relay-1 terminal 5 and cooling fan motor-1 terminal 1, cooling fan motor-1 terminal 4 and body ground.
   Refer to "Wiring Diagram", EC-535.
   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 1, cooling fan motor-2 terminal 4 and body ground.
   Refer to "Wiring Diagram", EC-535.
   Continuity should exist.
6. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK OUTPUT SIGNAL CIRCUIT

1. Disconnect PCM harness connector.
2. Check harness continuity between PCM terminal 13 and cooling fan relay-1 terminal 2.
   Refer to "Wiring Diagram", EC-535.
   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 E9, F47
- Harness for open or short between cooling fan relay-1 and PCM

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

6	CHECK COOLING FAN RELAY-1

Refer to "Component Inspection", EC-547.

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace cooling fan relay.

Diagnostic Procedure (Cont'd)

7	CHECK COOLING FAN MOTORS-1 AND -2	
Refer to "Component Inspection", EC-548.		
OK or NG		
OK	▶	GO TO 8.
NG	▶	Replace cooling fan motors.

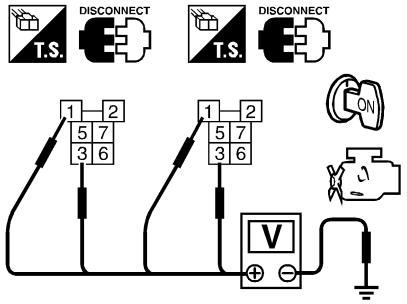
8	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-169.	
▶	**INSPECTION END**

PROCEDURE B

=NIEC0491S02

1	CHECK POWER SUPPLY

1. Turn ignition switch "OFF".
2. Disconnect cooling fan relays-2 and -3.
3. Turn ignition switch "ON".
4. Check voltage between cooling fan relays-2 and -3 terminals 1, 3 and ground with CONSULT-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.
- Harness for open or short between cooling fan relays-2 and -3 and fuse
- Harness for open or short between cooling fan relays-2 and -3 and fusible link

	▶	Repair harness or connectors.

3	CHECK GROUND CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect cooling fan motor-1 harness connector and cooling fan motor-2 harness connector.
3. Check harness continuity between cooling fan relay-2 terminal 5 and cooling fan motor-1 terminal 2, cooling fan relay-2 terminal 6 and cooling fan motor-1 terminal 3, cooling fan relay-2 terminal 7 and body ground.
   Refer to "Wiring Diagram", EC-535.
   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 2, cooling fan relay-3 terminal 6 and cooling fan motor-2 terminal 3, cooling fan relay-3 terminal 7 and body ground.
   Refer to "Wiring Diagram", EC-535.
   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 OUTPUT SIGNAL CIRCUIT
1. Disconnect PCM harness connector. 2. Check harness continuity between PCM terminal 12 and cooling fan relay-2 terminal 2, cooling fan relay-3 terminal 2. Refer to "Wiring Diagram", EC-535. **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 E9, F47 ● Harness for open or short between cooling fan relays-2 and -3 and PCM	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK COOLING FAN RELAYS-2 AND -3
Refer to "Component Inspection", EC-547.	
OK or NG	
OK ▶	GO TO 7.
NG ▶	Replace cooling fan relays.

7	CHECK COOLING FAN MOTORS
Refer to "Component Inspection", EC-548.	
OK or NG	
OK ▶	GO TO 8.
NG ▶	Replace cooling fan motors.

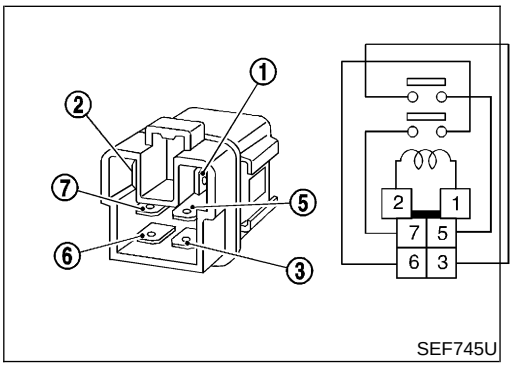
8	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-169.	
▶	**INSPECTION END**

Main 12 Causes of Overheating

NIEC0492

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-13***, "RECOMMENDED FLUIDS AND LUBRICANTS".
	3	• Coolant level	• Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	See ***MA-17***, "Changing Engine Coolant".
	4	• Radiator cap	• Pressure tester	59 - 98 kPa (0.6 - 1.0 kg/cm^2, 9 - 14 psi) (Limit)	See ***LC-10***, "System Check".
ON*2	5	• Coolant leaks	• Visual	No leaks	See ***LC-10***, "System Check".
ON*2	6	• Thermostat	• Touch the upper and lower radiator hoses	Both hoses should be hot	See ***LC-13***, "Thermostat", and ***LC-15***, "Radiator".
ON*1	7	• Cooling fan	• CONSULT-II	Operating	See trouble diagnosis for DTC P1217 (EC-532).
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-17***, "Changing Engine Coolant".
OFF*4	10	• Coolant return from reservoir tank to radiator	• Visual	Should be initial level in reservoir tank	See ***MA-16***, "ENGINE MAINTENANCE".
OFF	11	• Cylinder head	• Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	See ***EM-34***, "Inspection".
	12	• Cylinder block and pistons	• Visual	No scuffing on cylinder walls or piston	See ***EM-55***, "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-19***, "OVERHEATING CAUSE ANALYSIS".



Component Inspection

NIEC0493

COOLING FAN RELAYS-1, -2 AND -3

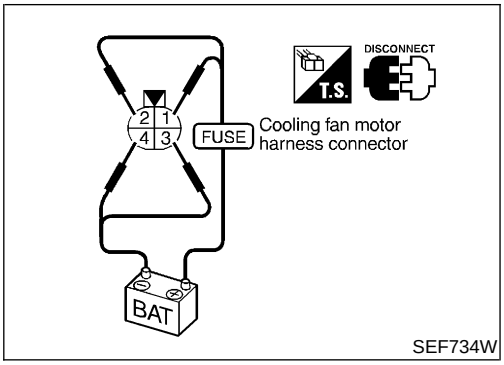
NIEC0493S01

Check continuity between terminals 3 and 5, 6 and 7.

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

If NG, replace relay.

Component Inspection (Cont'd)



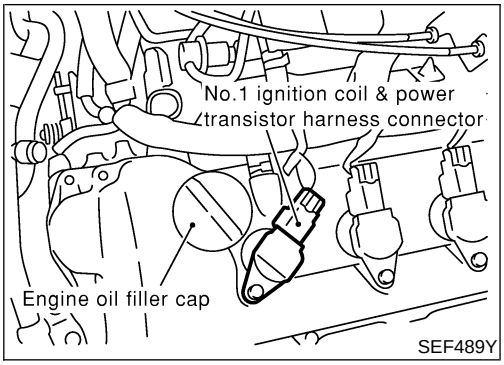
COOLING FAN MOTORS-1 AND -2

NIEC0493S02

1. Disconnect cooling fan motor harness connectors.
2. Supply cooling fan motor terminals with battery voltage and check operation.

	Speed	Terminals	
		(+)	(−)
Cooling fan motor	Low	1	4
	High	1, 2	3, 4

Cooling fan motor should operate.
If NG, replace cooling fan motor.



Component Description

NIEC0707

IGNITION COIL & POWER TRANSISTOR

NIEC0707S01

The ignition signal from the PCM 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

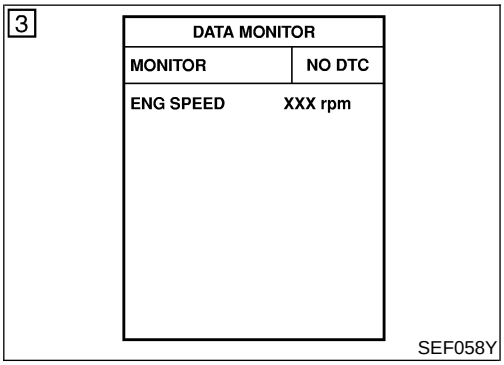
NIEC0708

Malfunction is detected when the ignition signal in the primary circuit is not sent to PCM during engine cranking or running.

Possible Cause

NIEC0709

- Harness or connectors (The ignition primary circuit is open or shorted.)
- Power transistor unit built into ignition coil
- Condenser
- Crankshaft position sensor (POS)
- Crankshaft position sensor (POS) circuit
- Camshaft position sensor (PHASE)
- Camshaft position sensor (PHASE) circuit



DTC Confirmation Procedure

NIEC0710

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 or P1336, perform trouble diagnosis for DTC P0335, P0340 or P1336 first. Refer to EC-358, EC-363 or EC-560.**

WITH CONSULT-II

NIEC0710S01

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-553.

WITH GST

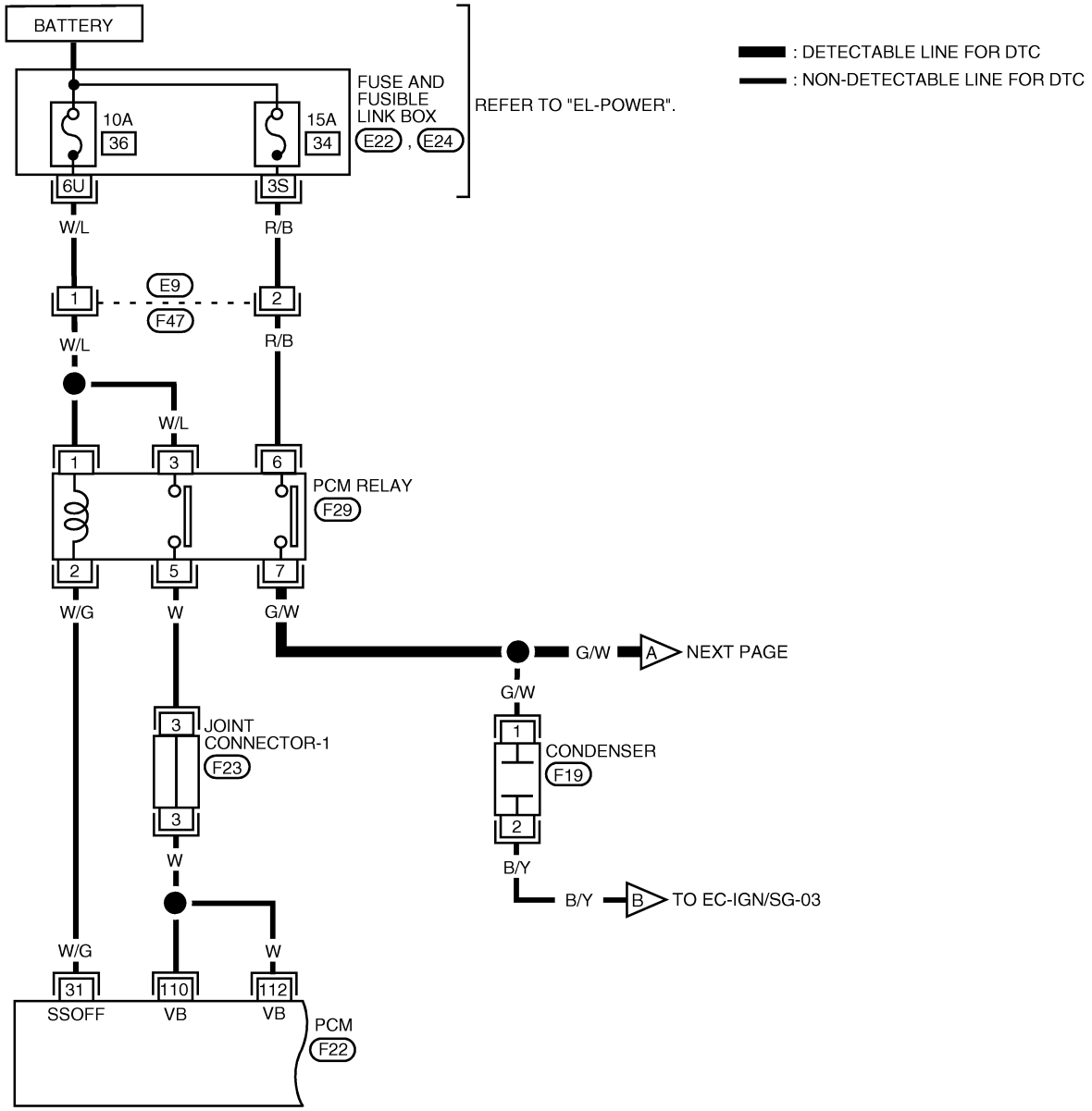
NIEC0710S02

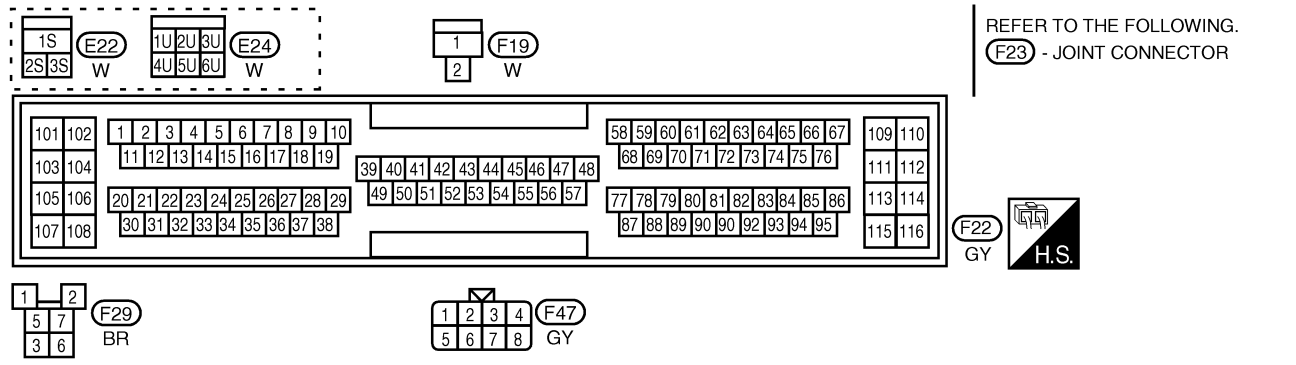
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

NIEC0711

EC-IGN/SG-01

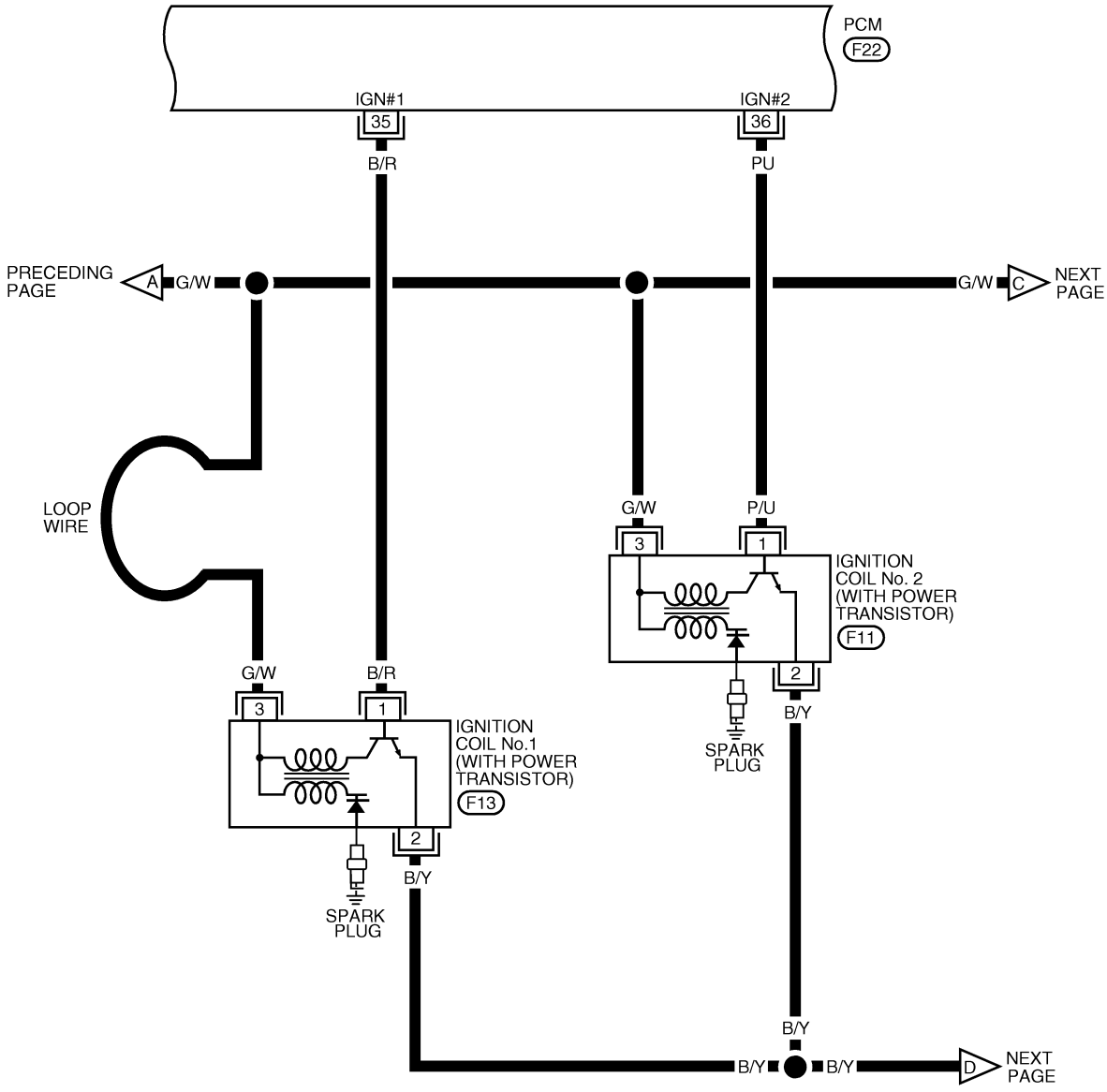


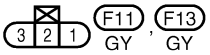


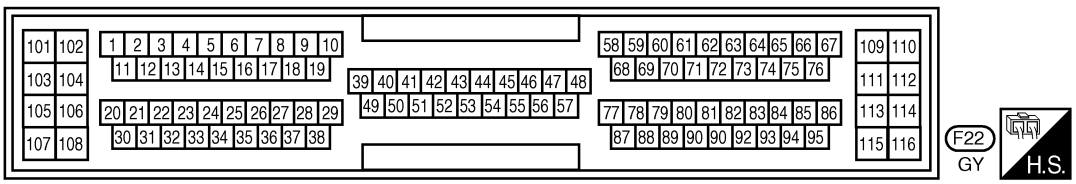
LEC165

EC-IGN/SG-02

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





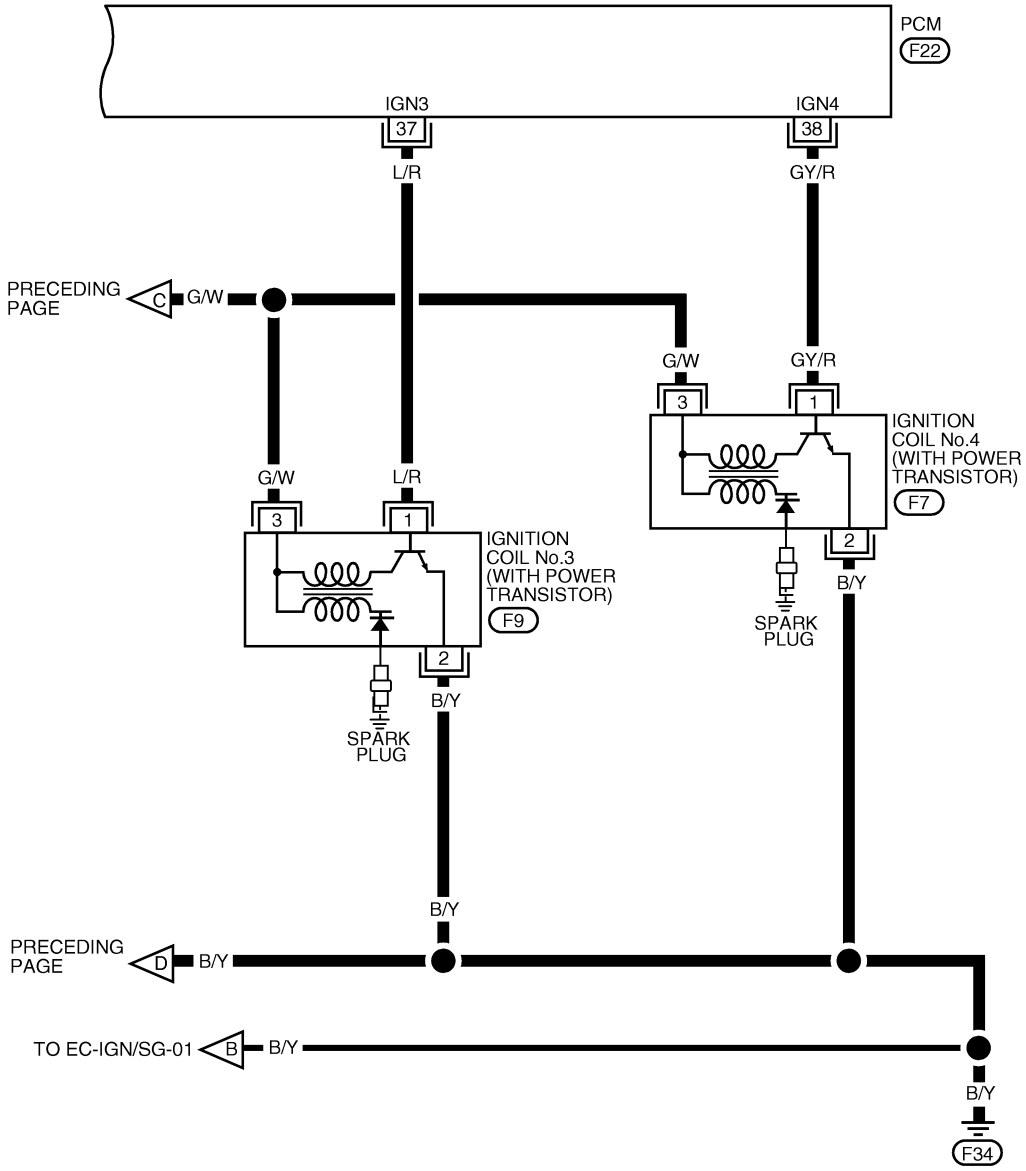


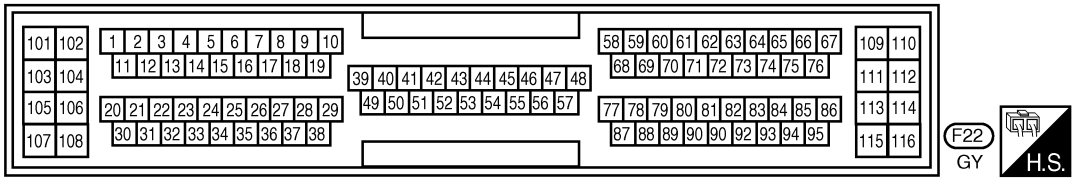
LEC166

EC-IGN/SG/03

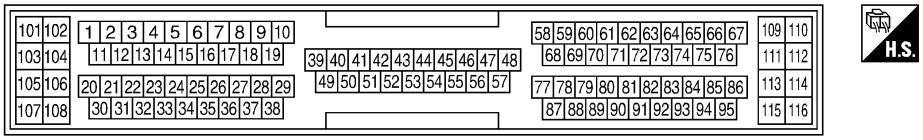
: DETECTABLE LINE FOR DTC

: NON-DETECTABLE LINE FOR DTC



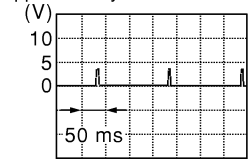
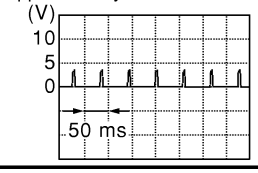


LEC167



SEF970W

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

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
35	BR	IGNITION SIGNAL NO. 1	ENGINE RUNNING AT IDLE SPEED UNDER WARM. UP CONDITION	Approximately 0.3V ★ 
36	PU	IGNITION SIGNAL NO. 2		
37	L/R	IGNITION SIGNAL NO. 3	ENGINE RUNNING AT 2,000 RPM	Approximately 0.5V ★ 
38	GY/R	IGNITION SIGNAL NO. 4		

★ : AVERAGE VOLTAGE FOR PULSE SIGNAL (ACTUAL PULSE SIGNAL CAN BE CONFIRMED BY OSCILLOSCOPE.)

SEF746Y

Diagnostic Procedure

NIEC0712

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.

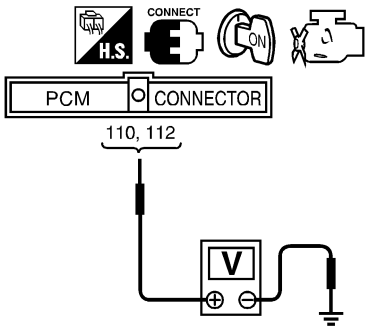
ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
IACV-AAC/V	XXX step

SEF190Y

	▶	GO TO 12.

3	CHECK IGNITION COIL POWER SUPPLY CIRCUIT-I

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



Voltage: Battery voltage

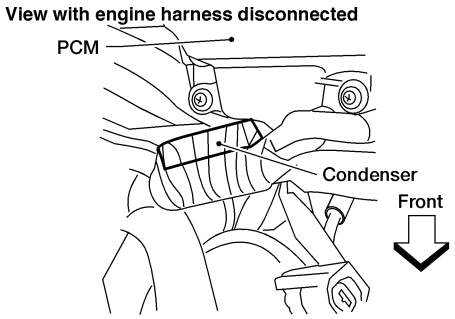
SEF683Y

OK or NG

OK	▶	GO TO 4.
NG	▶	Go to TROUBLE DIAGNOSIS FOR POWER SUPPLY, EC-170.

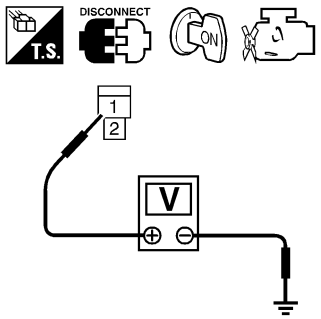
4 CHECK IGNITION COIL POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect condenser harness connector.



WEC260

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



Voltage: Battery voltage

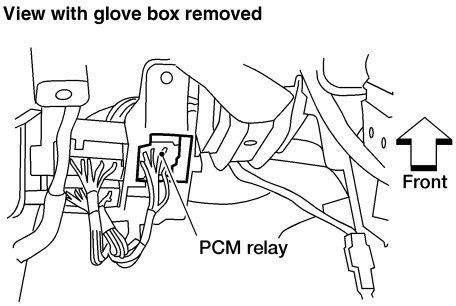
SEF367X

OK or NG

OK	▶	GO TO 10.
NG	▶	GO TO 5.

5 CHECK IGNITION COIL POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF.
2. Disconnect PCM relay.



WEC248

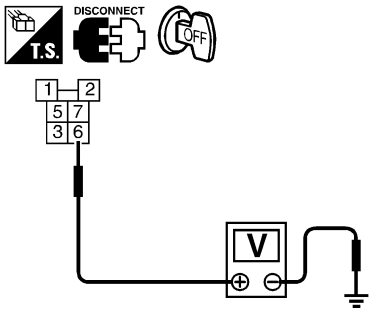
3. Check harness continuity between PCM relay terminal 7 and condenser terminal 1. Refer to "Wiring Diagram", EC-550.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 6.

6	DETECT MALFUNCTIONING PART
Check the harness for open or short between PCM 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 PCM relay terminal 6 and ground with CONSULT-II or tester.	



Voltage: Battery voltage

SEF368X

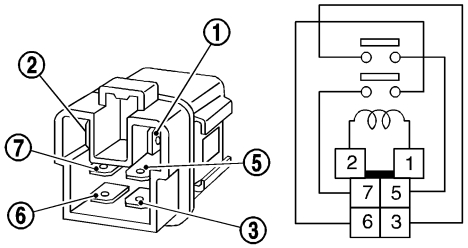
OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 8.

8	DETECT MALFUNCTIONING PART
Check the following. ● 15A fuse ● Harness for open and short between PCM relay and fuse	
▶	Repair or replace harness or connectors.

9	CHECK PCM RELAY

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

10	CHECK CONDENSER GROUND CIRCUIT FOR OPEN AND SHORT

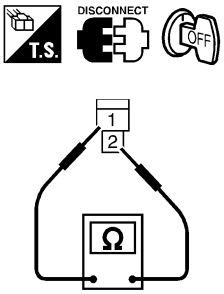
1. Turn ignition switch OFF.
2. Check harness continuity between condenser terminal 2 and engine ground.
   Refer to "Wiring Diagram", EC-550.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

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

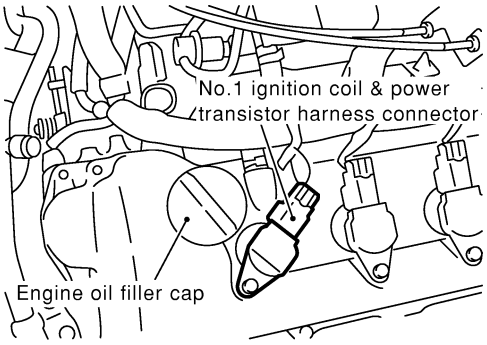
OK or NG

OK	▶	GO TO 12.
NG	▶	Replace condenser.

Diagnostic Procedure (Cont'd)

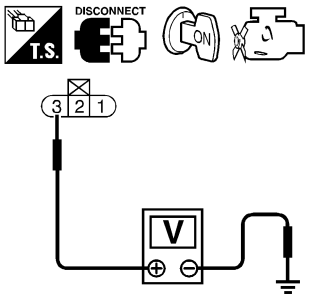
12	CHECK IGNITION COIL POWER SUPPLY CIRCUIT-V

1. Turn ignition switch OFF.
2. Reconnect harness connectors disconnected.
3. Disconnect ignition coil harness connector.



SEF489Y

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 PCM relay.

	▶	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", EC-550.
   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

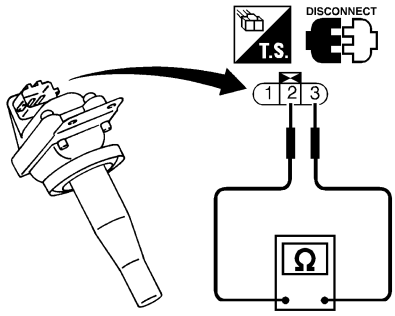
1. Disconnect PCM harness connector.
2. Check harness continuity between PCM terminals 35, 36, 37, 38 and ignition coil terminal 1.
   Refer to "Wiring Diagram", EC-550
   Continuity should exist.
3. Also check harness for short to ground and short to power.

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

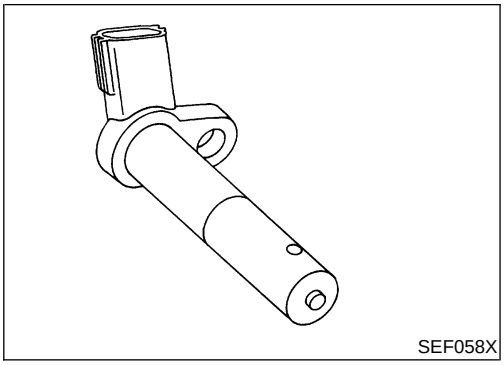
OK or NG

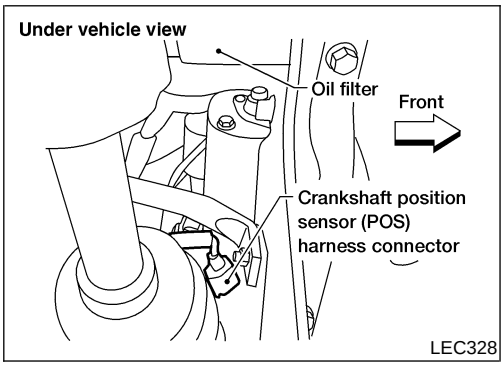
OK	▶	GO TO 17.
NG	▶	Replace ignition coil with power transistor.

17	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-169.

▶ **INSPECTION END**


SEF058X



LEC328

Component Description

NIEC0327

The crankshaft position sensor (POS) is located on the cylinder block rear housing facing the gear teeth (cogs) of signal plate at end of crankshaft drive plate. It detects the fluctuation of the engine revolution.

The sensor consists of a permanent magnet and hall IC.

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

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

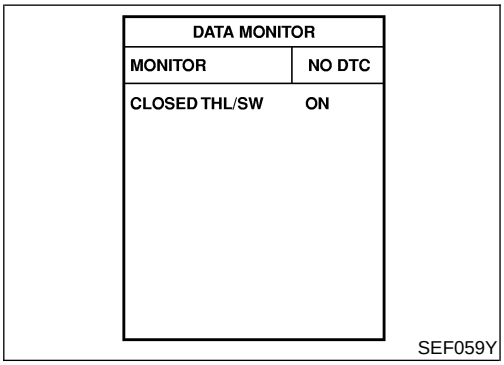
Due to the changing magnetic field, the voltage from the sensor changes.

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

On Board Diagnosis Logic

NIEC0329

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1336	• A chipping of the signal plate gear tooth (cog) is detected by the PCM.	• Harness or connectors • Crankshaft position sensor (POS) • Signal plate



SEF059Y

DTC Confirmation Procedure

NIEC0330

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

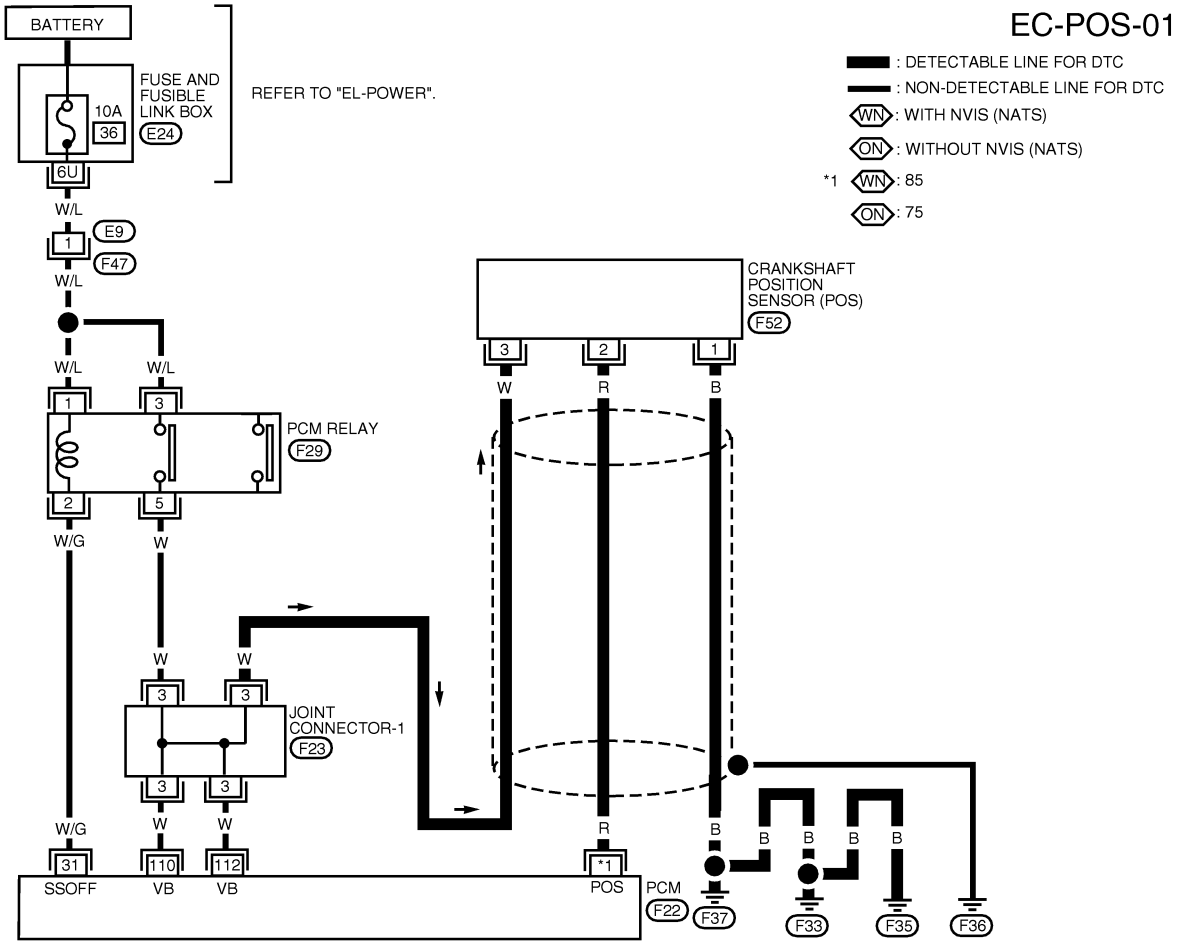
1) Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II.
2) Start engine and run it for at least 4 minutes at idle speed.
3) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-562.

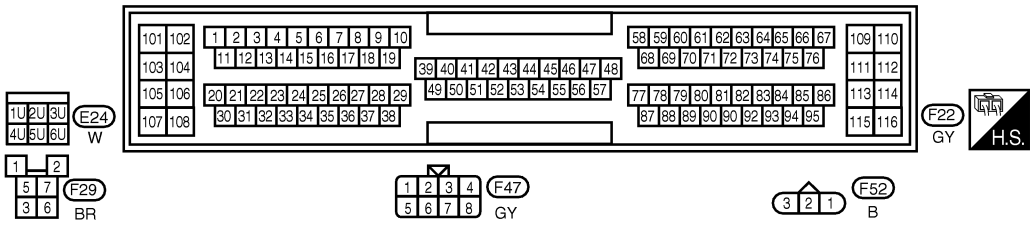
With GST

Follow the procedure “With CONSULT-II” above.

Wiring Diagram

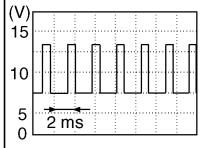
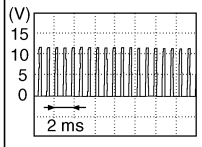
NIEC0331





LEC162

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

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
75 WITHOUT NVIS (NATS)	R	CRANKSHAFT POSITION SENSOR (POS)	ENGINE RUNNING AT IDLE SPEED UNDER WARM-UP CONDITION	APPROX. 3.0V - 4.0V 
85 WITH NVIS (NATS)			ENGINE RUNNING AT 2,000 RPM	APPROX. 3.0V - 4.0V 

SEF730Y

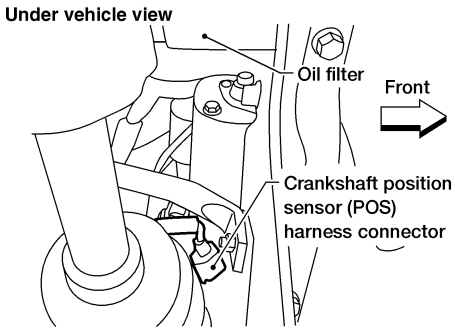
Diagnostic Procedure

NIEC0332

1	RETIGHTEN GROUND SCREWS
1. Turn ignition switch “OFF”. 2. Loosen and retighten engine ground screws.	
▶	GO TO 2.

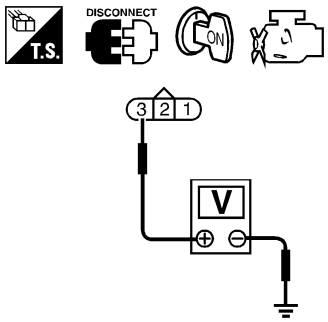
2	CHECK POWER SUPPLY

1. Disconnect crankshaft position sensor (POS) harness connector F52 and PCM harness connectors.



LEC328

2. Check voltage between crankshaft position sensor (POS) harness connector F52 terminal 3 and ground with CONSULT-II or tester.



SEF479Y

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-1 ● Harness for open or short between PCM relay and crankshaft position sensor (POS)	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK GROUND CIRCUIT

1. Reconnect PCM harness connectors.
2. Check harness continuity between crankshaft position sensor (POS) terminal 1 and engine ground. Refer to “Wiring Diagram”, EC-561.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

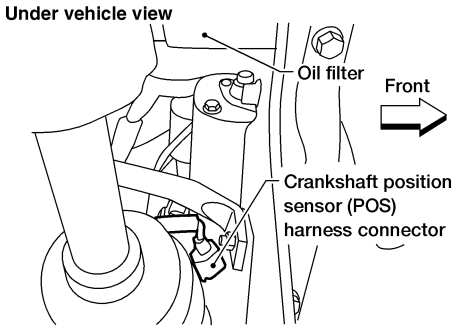
OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART
Check the harness for open or short between crankshaft position sensor (POS) and PCM.	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK INPUT SIGNAL CIRCUIT

1. Disconnect crankshaft position sensor (POS) and PCM harness connectors.



LEC328

2. Check continuity between PCM terminal and sensor terminal as follows. Refer to "Wiring Diagram", EC-561.

PCM terminals	Sensor terminal	Model
75	2	Without NVIS (NATS)
85	2	With NVIS (NATS)

MTBL0441

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 harness for open or short between crankshaft position sensor (POS) and PCM.	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

8	CHECK IMPROPER INSTALLATION
Loosen and retighten the fixing bolt of the crankshaft position sensor (POS). Then retest.	
Trouble is not fixed. ▶	GO TO 9.

9	CHECK CRANKSHAFT POSITION SENSOR (POS)
Refer to "Component Inspection", EC-564.	

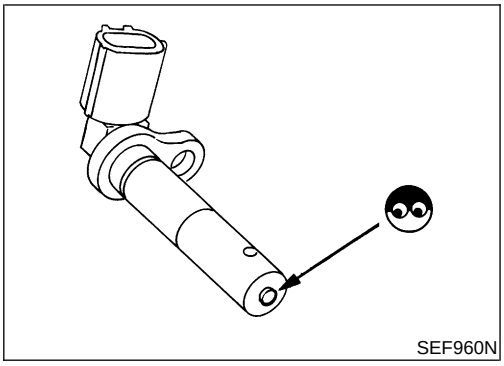
OK or NG

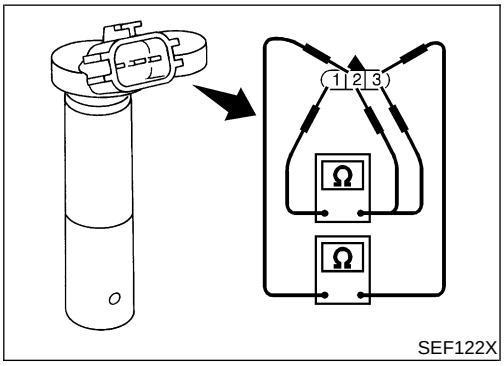
OK	▶	GO TO 10.
NG	▶	Replace crankshaft position sensor (POS).

Diagnostic Procedure (Cont'd)

10	CHECK SIGNAL PLATE TOOTH	
Visually check for chipping signal plate tooth (cog).		
OK or NG		
OK	▶	GO TO 11.
NG	▶	Replace the signal plate. Refer to ***EM-54***, "PISTON AND CRANKSHAFT".

11	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-169.	
▶	**INSPECTION END**


SEF960N



SEF122X

Component Inspection

NIEC0333

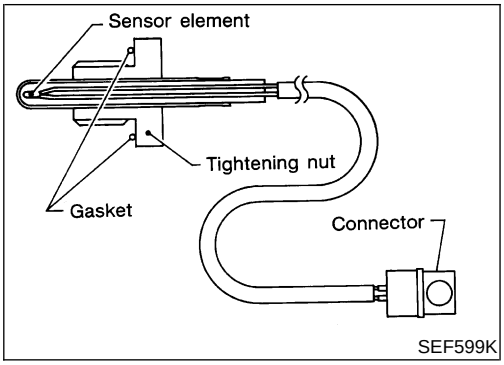
CRANKSHAFT POSITION SENSOR (POS)

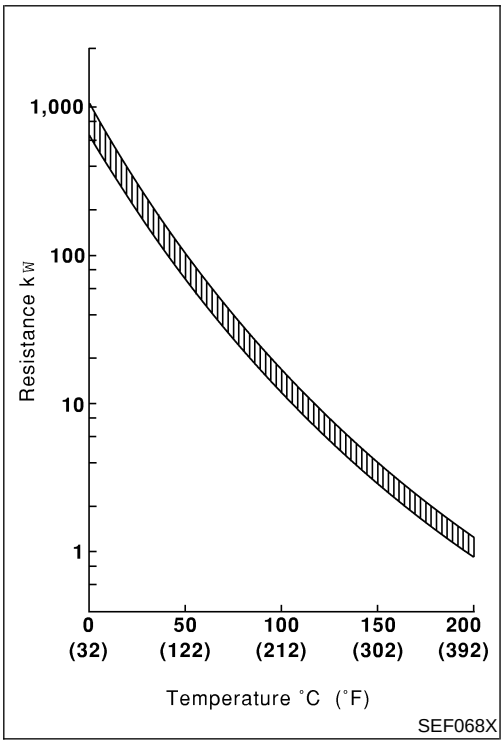
NIEC0333S01

1. Disconnect crankshaft position sensor (POS) harness connector.
2. Loosen the fixing bolt of the sensor.
3. Remove the sensor.
4. Visually check the sensor for chipping.
5. Check resistance as shown in the figure.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
3 (+) - 1 (–)	Except 0 or ∞
2 (+) - 1 (–)	
3 (+) - 2 (–)	

If NG, replace crankshaft position sensor (POS).





Component Description

NIEC0572

The EGR temperature sensor detects temperature changes in the EGR passageway. When the EGR volume control valve opens, hot exhaust gases flow, and the temperature in the passageway changes. The EGR temperature sensor is a thermistor that modifies a voltage signal sent from the PCM. This modified signal then returns to the PCM 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)	4.56	0.62 - 1.05
50 (122)	2.25	0.065 - 0.094
100 (212)	0.59	0.011 - 0.015

*: These data are reference values and are measured between PCM terminal 72 (EGR temperature sensor) and PCM terminal ground.

CAUTION:

Do not use PCM ground terminals when measuring input/output voltage. Doing so may lead the PCM's transistor damage. Use ground other than PCM, such as body ground.

When EGR system is operating.
Voltage: 0 - 1.5V

On Board Diagnosis Logic

NIEC0573

Malfunction is detected when
(Malfunction A) an excessively low voltage from the EGR temperature sensor is sent to PCM even when engine coolant temperature is low.
(Malfunction B) an excessively high voltage from the EGR temperature sensor is sent to PCM even when engine coolant temperature is high.

Possible Cause

NIEC0574

MALFUNCTION A

NIEC0574S01

- Harness or connectors (The EGR temperature sensor circuit is shorted.)
- EGR temperature sensor
- Malfunction of EGR function

MALFUNCTION B

NIEC0574S02

- Harness or connectors (The EGR temperature sensor circuit is open.)
- EGR temperature sensor

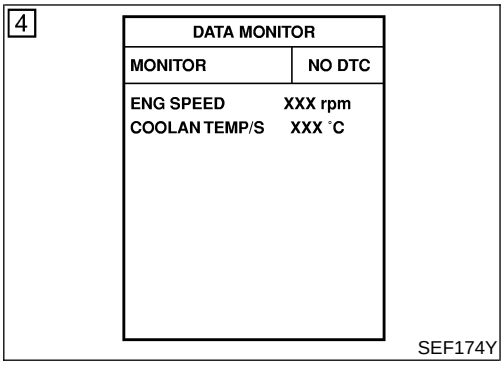
- Malfunction of EGR function

DTC Confirmation Procedure

NIEC0575

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

NIEC0575S01

With CONSULT-II

NIEC0575S0101

1) Turn ignition switch “ON”.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Verify that “COOLAN TEMP/S” is less than 50°C (122°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-569.

With GST

NIEC0575S0102

Follow the procedure “With CONSULT-II” above.

ACTIVE TEST	
EGR VOL CONT/V	50 step
MONITOR	
ENG SPEED	XXX rpm
EGR TEMP SEN	XXX V

SEF200Y

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

NIEC0575S02

CAUTION:

Always drive vehicle at a safe speed.

TESTING CONDITION:

Always perform the test at a temperature above –10°C (14°F).

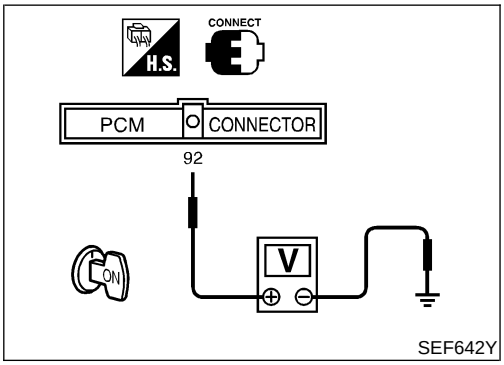
With CONSULT-II

NIEC0575S0201

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-569.
   If the check result is OK, go to the following step.
5) Turn ignition switch "OFF" and wait at least 5 seconds then turn "ON".
6) Check the output voltage of "THRTL POS SEN" (at closed throttle position) and note it.
7) Start engine and maintain the following conditions for at least 5 consecutive seconds.

ENG SPEED	1,200 - 3,600 rpm
VHCL SPEED SE	10 km/h (6 MPH) or more
B/FUEL SCHDL	4.5 - 8.0 msec
Selector lever	Suitable position

8) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-569.



SEF642Y

With GST

NIEC0575S0202

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 - 3,600 rpm
Vehicle speed	10 km/h (6 MPH) or more
Selector lever	Suitable position

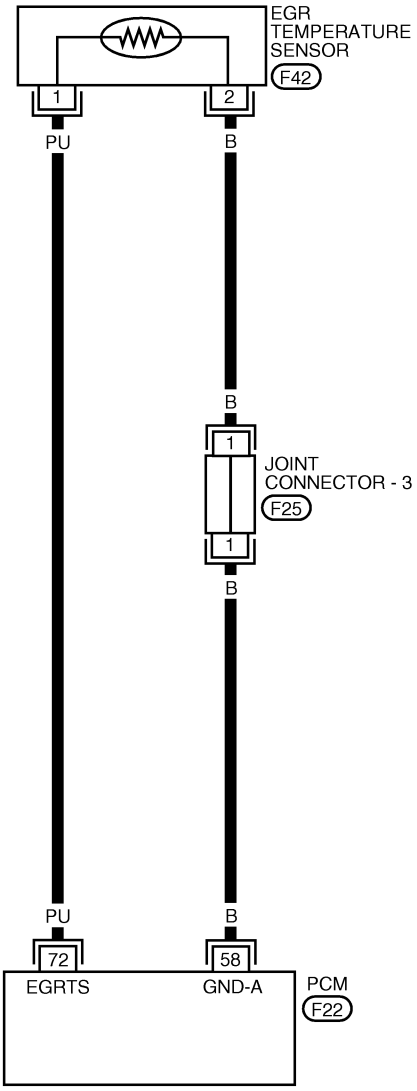
4) Select "MODE 7" with GST.
5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-569.

Wiring Diagram

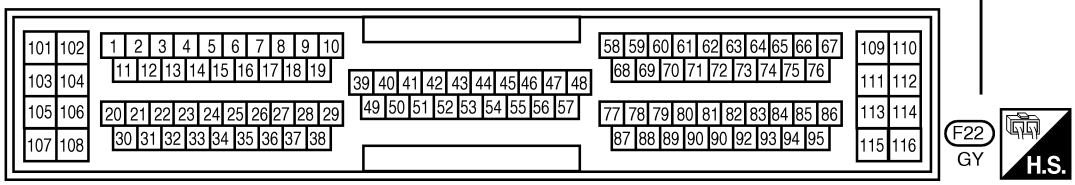
NIEC0576

EC-EGR/TS-01

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



REFER TO THE FOLLOWING.
F25 - JOINT CONNECTOR



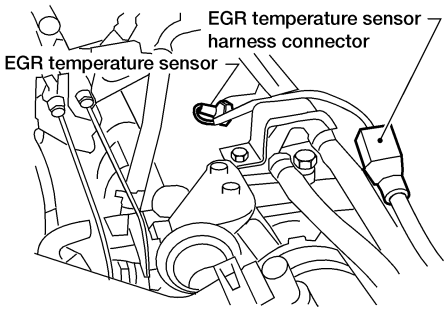
LEC150

Diagnostic Procedure

NIEC0577

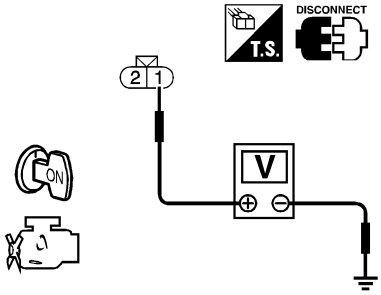
1	CHECK EGR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

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



WEC261

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



Voltage: Approximately 5V

SEF197Z

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair or replace harness or connectors.

2	CHECK EGR TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Check harness continuity between EGR temperature sensor terminal 2 and engine ground.
   Refer to “Wiring Diagram”, EC-568.
   Continuity should exist.
3. Also check harness for short to ground or short to power.

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	DETECT MALFUNCTIONING PART

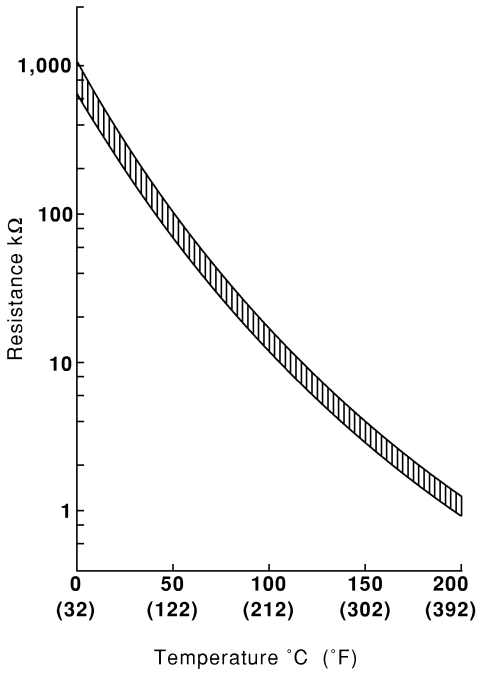
Check the following.
- Joint connector-3
- Harness for open or short between PCM and EGR temperature sensor

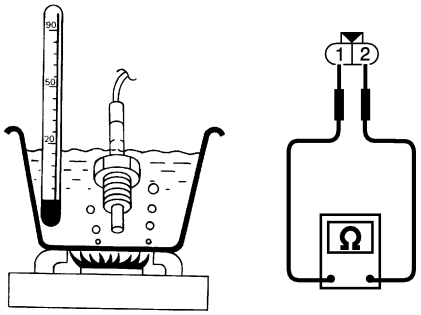
	▶	Repair open circuit or short to ground or short to power in harness or connector.

Diagnostic Procedure (Cont'd)

4	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)	4.56	0.62 - 1.05
50 (122)	2.25	0.065 - 0.094
100 (212)	0.59	0.011 - 0.015

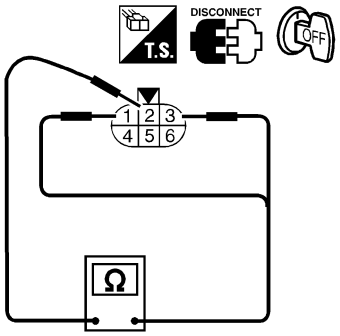
SEF483Y

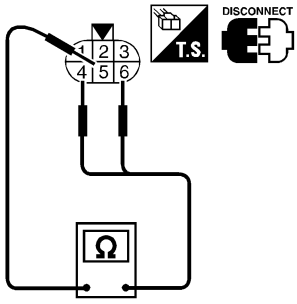
OK or NG

OK	▶	GO TO 5.
NG	▶	Replace EGR temperature sensor.

5	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

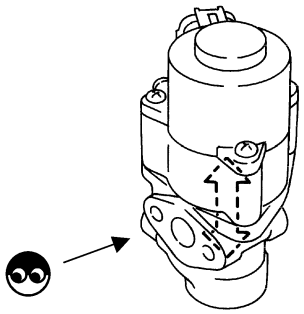
OK (With CONSULT-II)	▶	GO TO 6.
OK (Without CONSULT-II)	▶	GO TO 7.
NG	▶	Replace EGR volume control valve.

6	CHECK EGR VOLUME CONTROL VALVE-II

With CONSULT-II

1. Remove EGR volume control valve.
2. Reconnect PCM 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
EGR TEMP SEN	XXX V



SEF491Y

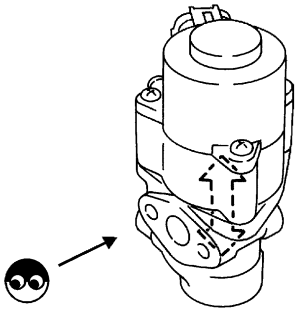
OK or NG

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 PCM 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-169.	
▶	**INSPECTION END**

Description

SYSTEM DESCRIPTION

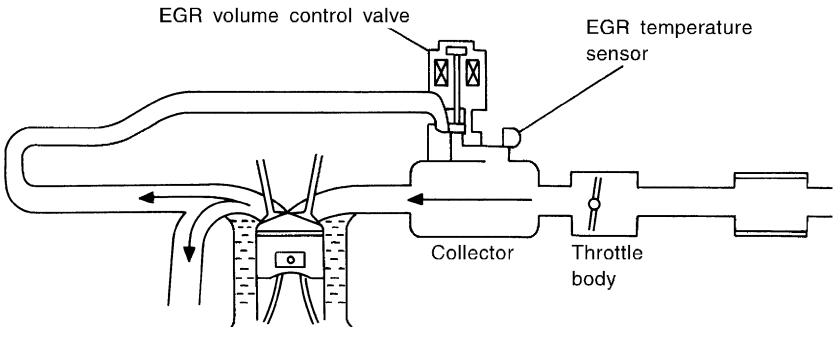
NIEC0578

NIEC0578S01

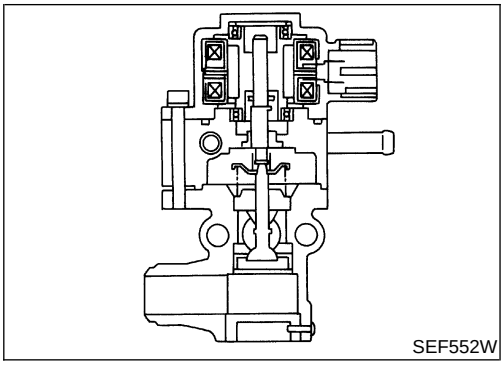
Sensor	Input Signal to PCM	PCM function	Actuator
Crankshaft position sensor (POS)	Engine speed	EGR volume control	EGR volume control valve
Camshaft position sensor (PHASE)	Engine speed and cylinder position		
Vehicle speed sensor	Vehicle speed		
Engine coolant temperature sensor	Engine coolant temperature		
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		
PCM	Gear position, shifting signal		

This system controls flow rate of EGR led from exhaust manifold to intake manifold. The opening of the EGR bypass 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 PCM output pulses. The opening of the valve varies for optimum engine control. The optimum value stored in the PCM 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

NIEC0578S02

EGR Volume Control Valve

NIEC0578S0201

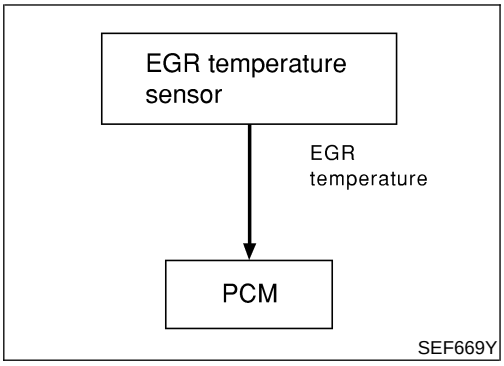
The EGR volume control valve uses a step motor to control the flow rate of EGR from exhaust manifold. This motor has four winding phases. It operates according to the output pulse signal of the PCM. Two windings are turned ON and OFF in sequence. Each time an ON pulse is issued, the valve opens or closes, changing the flow rate. When no change in the flow rate is needed, the PCM 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

NIEC0579

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 steps



SEF669Y

On Board Diagnosis Logic

NIEC0580

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

NIEC0581

- Harness or connectors
  (EGR volume control valve circuit is open or shorted.)
- EGR volume control valve leaking or stuck open
- EGR temperature sensor

DATA MONITOR	
MONITOR	NO DTC
COOLAN TEMP/S	XXX °C
EGR TEMP SEN	XXX V

SEF202Y

4

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XX %
A/F ALPHA-B2	XX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN
THRTL POS SEN	X. XX V

SEF677Y

4

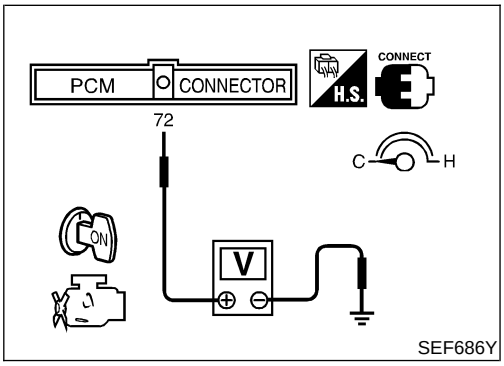
DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
FUEL T/TMP SE	XXX °C

SEF194Y

4

EGR SYSTEM P1402
COMPLETED

SEF236Y



SEF686Y

DTC Confirmation Procedure

NIEC0582

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 50°C (14 to 122°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

NIEC0582S01

1) Turn ignition switch “OFF”, and wait at least 5 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 50°C (14 to 122°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-576.

WITH GST

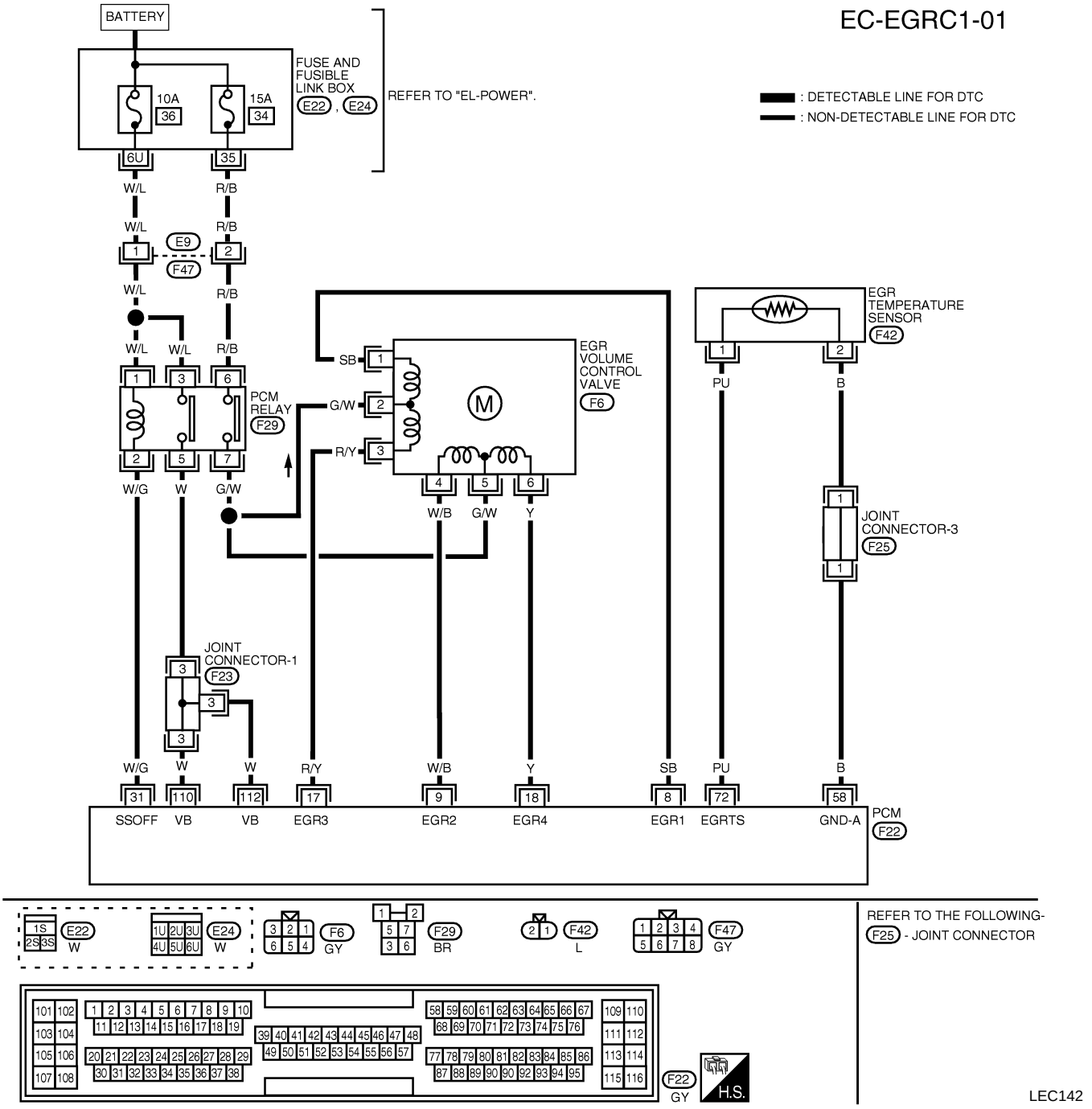
NIEC0582S02

1) Turn ignition switch “ON” and select “MODE 1” with GST.
2) Check that engine coolant temperature is within the range of −10 to 50°C (14 to 122°F).
3) Check that voltage between PCM terminal 72 (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-576.

- **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

NIEC0583



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

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
8	SB	EGR VOLUME CONTROL VALVE	ENGINE RUNNING AT IDLE SPEED	0.1 - 14V
9	W/B			
17	R/Y			
18	Y			

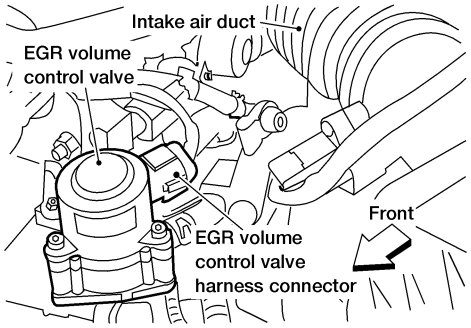
SEF196Z

Diagnostic Procedure

NIEC0584

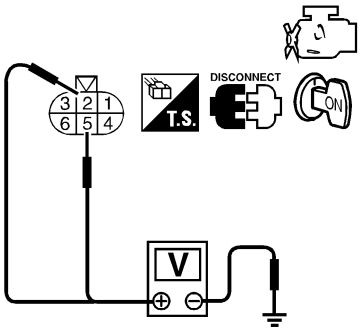
1	CHECK EGR VOLUME CONTROL VALVE POWER SUPPLY CIRCUIT

1. Disconnect EGR volume control valve harness connector.



LEC333

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 for open or short between PCM 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 PCM harness connector.
3. Check harness continuity between PCM terminals and EGR volume control valve terminals as follows. Refer to "Wiring Diagram", EC-575.

PCM terminal	EGR volume control valve
8	1
9	4
17	3
18	6

MTBL0448

Continuity should exist.

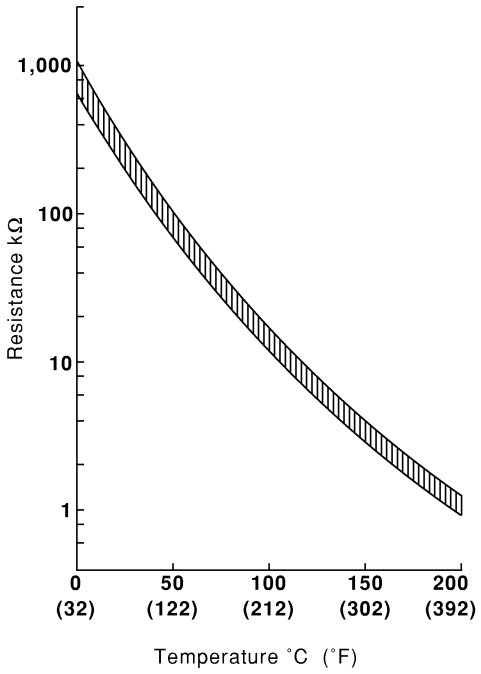
4. Also check harness for short to ground and short to power.

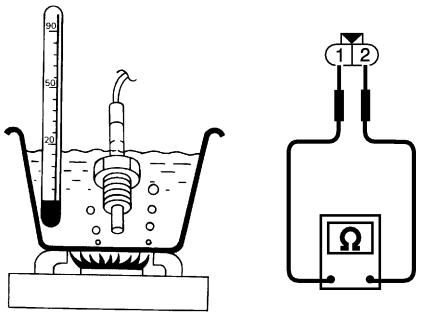
OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK 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)	4.56	0.62 - 1.05
50 (122)	2.25	0.065 - 0.094
100 (212)	0.59	0.011 - 0.015

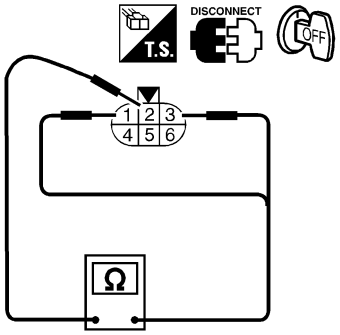
SEF483Y

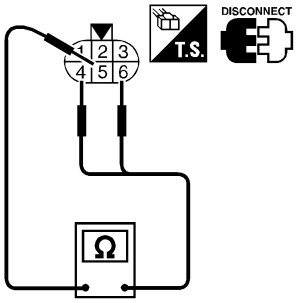
OK or NG

OK	▶	GO TO 5.
NG	▶	Replace EGR temperature sensor.

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

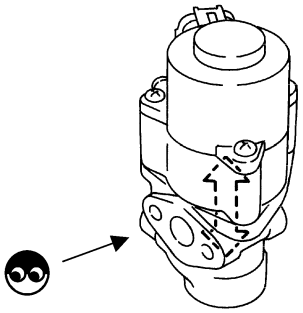
OK (With CONSULT-II)	▶	GO TO 6.
OK (Without CONSULT-II)	▶	GO TO 7.
NG	▶	Replace EGR volume control valve.

6	CHECK EGR VOLUME CONTROL VALVE-II

With CONSULT-II

1. Remove EGR volume control valve.
2. Reconnect PCM 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
EGR TEMP SEN	XXX V



SEF491Y

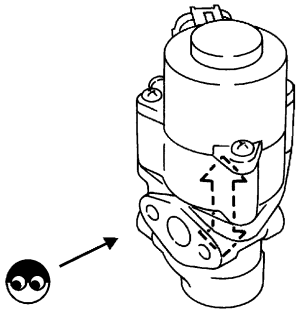
OK or NG

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 PCM 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.

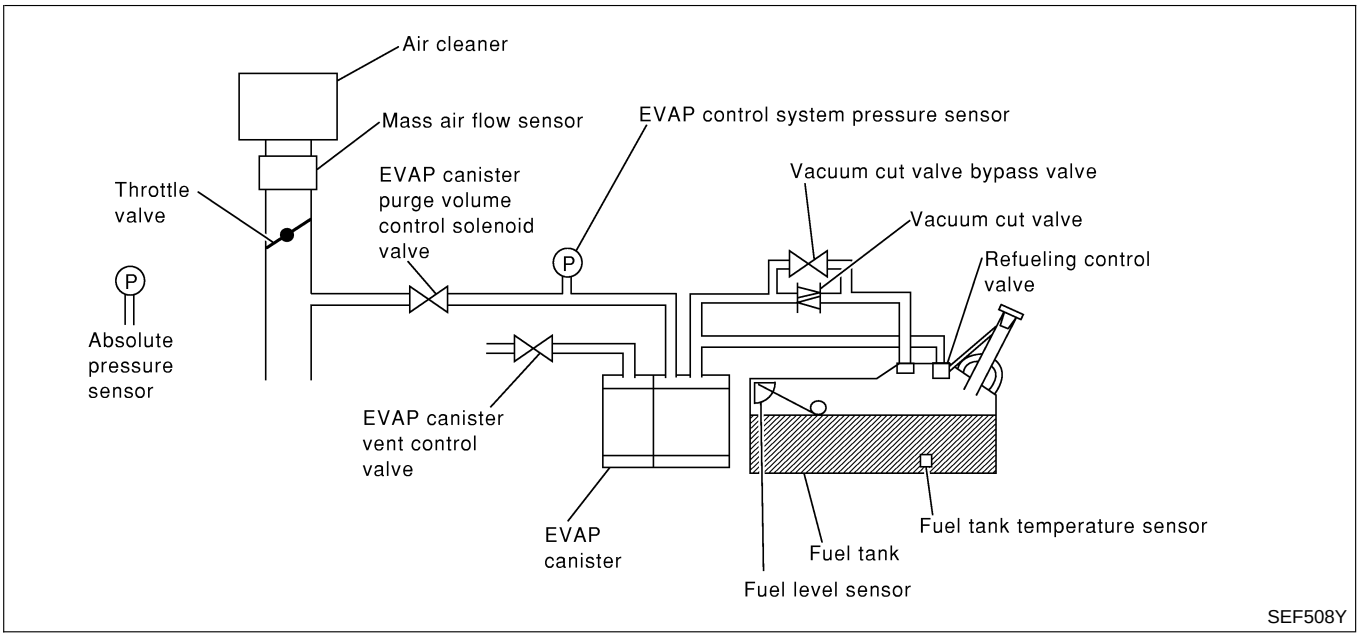
8	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-169.	
▶	**INSPECTION END**

On Board Diagnosis Logic

NIEC0585

NOTE:
If DTC P1440 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-629.)

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 PCM 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

NIEC0586

- 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
- 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
- Foreign matter caught in EVAP canister purge volume control solenoid valve

DTC Confirmation Procedure

NIEC0587

Refer to "P1441 EVAP CONTROL SYSTEM (VERY SMALL LEAK) (NEGATIVE PRESSURE)", EC-582.

Diagnostic Procedure

NIEC0588

Refer to "P1441 EVAP CONTROL SYSTEM (VERY SMALL LEAK) (NEGATIVE PRESSURE)", EC-582.

On Board Diagnosis Logic

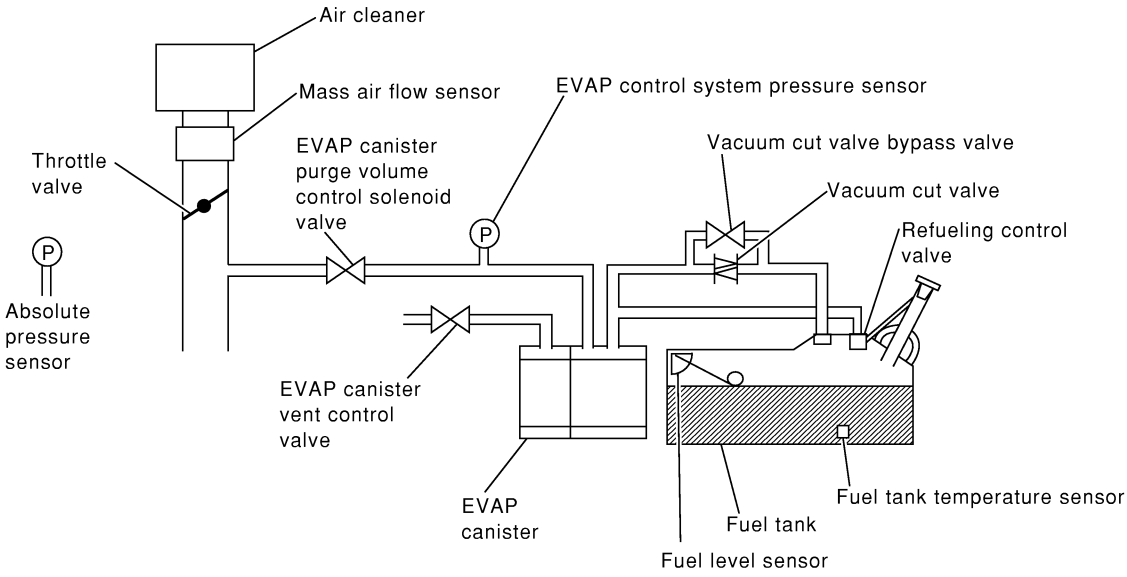
NIEC0713

This diagnosis detects very small leaks in the EVAP line between fuel tank and EVAP canister purge volume control solenoid valve, using the intake manifold same as a conventional EVAP small leak diagnosis.

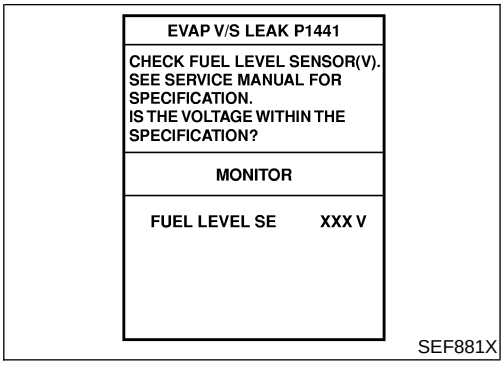
If PCM judges a leak which corresponds to a very small leak, the very small leak P1441 will be detected.

If PCM judges a leak equivalent to a small leak, EVAP small leak P0440 will be detected.

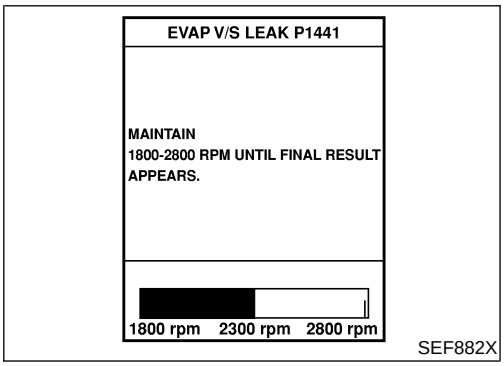
If PCM judges there are no leaks, the diagnosis will be OK.



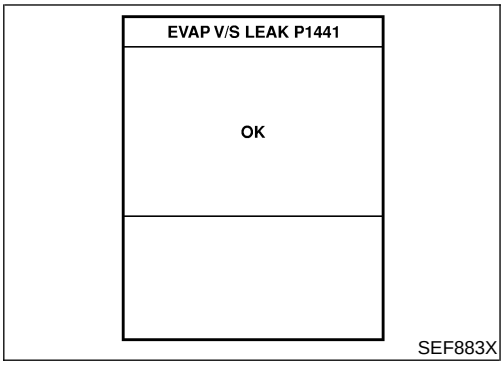
DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1441	• EVAP system has a very small leak. • EVAP system does not operate properly.	• Incorrect fuel tank vacuum relief valve. • Incorrect fuel filler cap used. • Fuel filler cap remains open or fails to close • Foreign matter caught in fuel filler cap. • Leak is in line between intake manifold and EVAP canister purge 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 valve and the circuit • EVAP canister purge volume control solenoid valve • Absolute pressure sensor • O-ring of EVAP canister vent control valve is missing or damaged. • Water separator • EVAP canister saturated with water • EVAP control system pressure sensor • Refueling control valve • ORVR system leaks • Fuel level sensor and the circuit



SEF881X



SEF882X



SEF883X

DTC Confirmation Procedure

NIEC0714

CAUTION:

Never remove fuel filler cap during the DTC confirmation procedure.

NOTE:

- **If DTC P1441 is displayed with P0440, perform TROUBLE DIAGNOSIS FOR DTC P1441 first.**
- **If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test.**
- **After repair, make sure that the hoses and clips are installed properly.**

TESTING CONDITION:

- **Open engine hood before conducting following procedure.**
- **If any of following conditions are met just before the DTC confirmation procedure, leave the vehicle for more than 1 hour.**

a) **Fuel filler cap is removed.**
b) **Refilled or drained the fuel.**
c) **EVAP component parts is/are removed.**

- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**

With CONSULT-II

1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
2) Make sure the following conditions are met.
   FUEL LEVEL SE: 0.25 - 1.15V
   COOLAN TEMP/S: 0 - 32°C (32 - 90°F)
   FUEL T/TMP SE: 0 - 32°C (32 - 90°F)
   INT A/TEMP SE: More than 0°C (32°F)
   If NG, turn ignition switch "OFF" and leave the vehicle in a cool place (soak the vehicle) or refilling/draining fuel until the output voltage condition of the "FUEL LEVEL SE" meets within the range above and leave the vehicle for more than 1 hour. Then start from step 1).
3) Turn ignition switch "OFF" and wait at least 10 seconds.
4) Turn ignition switch "ON".
5) Select "EVAP VERY/SML LEAK P1441" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
   Follow the instruction displayed.
6) Make sure that "OK" is displayed.
   If "NG" is displayed, refer to "Diagnostic Procedure", EC-585.

NOTE:

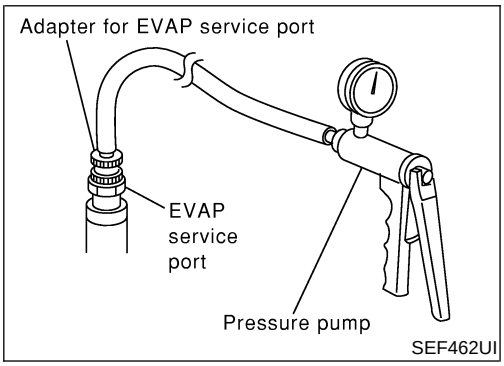
- **If the engine speed cannot be maintained within the range displayed on CONSULT-II screen, go to "Basic inspection", EC-131.**
- **Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.**

Overall Function Check

NIEC0715

With GST

Use this procedure to check the overall function of the EVAP very small leak function. During this check, a 1st trip DTC might not be confirmed.



CAUTION:

- **Never use compressed air, doing so may damage the EVAP system.**
- **Do not start engine.**
- **Do not exceeded 4.12 kPa (0.042 kg/cm^2, 0.6 psi).**

1) Attach the EVAP service port adapter securely to the EVAP service port.
2) Set the pressure pump and a hose.
3) Also set a vacuum gauge via 3-way connector and a hose.
4) Turn ignition switch “ON”.
5) Connect GST and select mode 8.
6) Using mode 8 control the EVAP canister vent control valve (close) and vacuum cut valve bypass valve (open).
7) Apply pressure and make sure the following conditions are satisfied.
   Pressure to be applied: 2.7 kPa (20 mmHg, 0.79 inHg)
   Time to be waited after the pressure drawn in to the EVAP system and the pressure to be dropped: 60 seconds and the pressure should not be dropped more than 0.4 kPa (3 mmHg, 0.12 inHg).
   If NG, go to diagnostic procedure, EC-585.

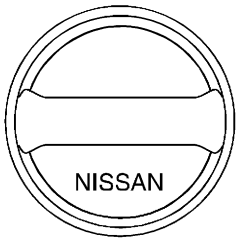
NOTE:
For more information, refer to GST instruction manual.

Diagnostic Procedure

NIEC0716

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.

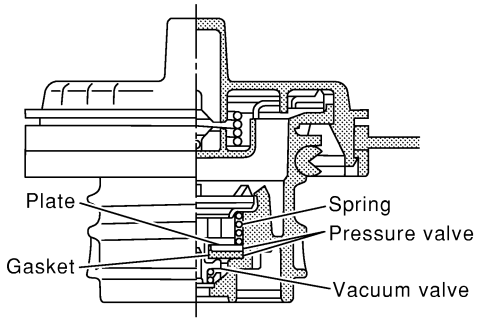
OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 4.

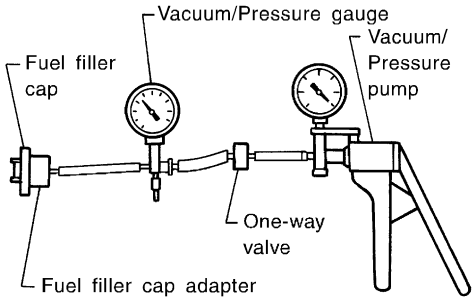
Diagnostic Procedure (Cont'd)

4	CHECK FUEL TANK VACUUM RELIEF VALVE

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



SEF445Y



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 −0.035 kg/cm^2, −0.87 to −0.48 psi)

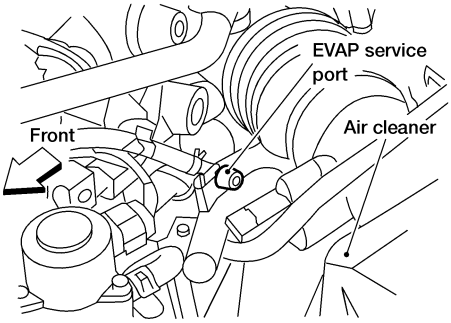
CAUTION:
Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.

OK or NG

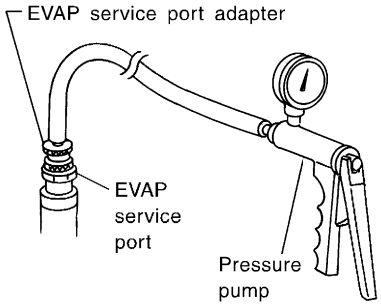
OK	▶	GO TO 5.
NG	▶	Replace fuel filler cap with a genuine one.

5	INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.



LEC256



SEF916U

NOTE:
Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.

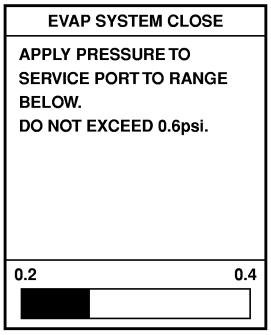
Models with CONSULT-II ▶	GO TO 6.
Models without CONSULT-II ▶	GO TO 7.

Diagnostic Procedure (Cont'd)

6	CHECK FOR EVAP LEAK

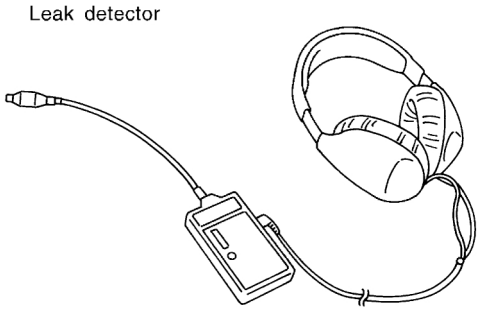
With CONSULT-II

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-53.



SEF200U

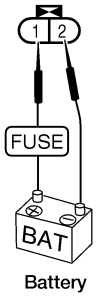
OK or NG

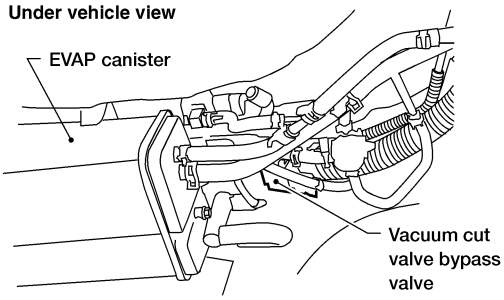
OK	▶	GO TO 8.
NG	▶	Repair or replace.

7	CHECK FOR EVAP LEAK

Without CONSULT-II

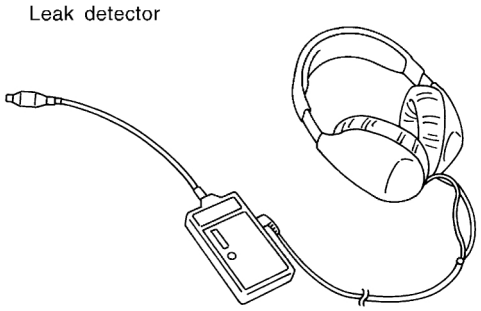
1. Turn ignition switch "OFF".
2. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)
3. Apply 12 volts DC to vacuum cut valve bypass valve. The valve will open. (Continue to apply 12V until the end of test.)





WEC334

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-53.



SEF200U

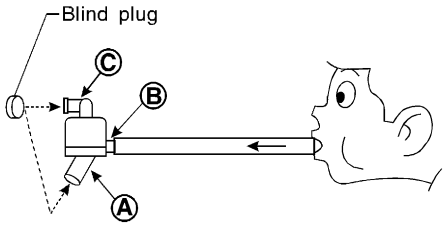
OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace.

Diagnostic Procedure (Cont'd)

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

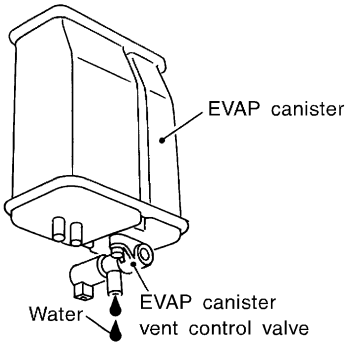
Refer to "DTC Confirmation Procedure", EC-630.

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
A/F ALPHA-B1	XX %
A/F ALPHA-B2	XX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN
THRTL POS SEN	X. XX V

Vacuum should exist.

SEF673Y

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 18.
NG	▶	GO TO 15.

Diagnostic Procedure (Cont'd)

15	CHECK VACUUM HOSE
Check vacuum hoses for clogging or disconnection. Refer to "Vacuum Hose Drawing", EC-43.	
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	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XX %
A/F ALPHA-B2	XX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN
THRTL POS SEN	X. XX V

SEF677Y

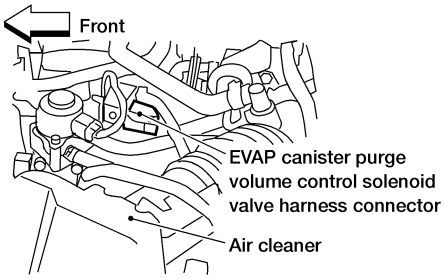
OK or NG

OK ▶	GO TO 18.
NG ▶	GO TO 17.

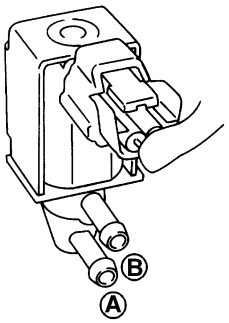
17	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



WEC254

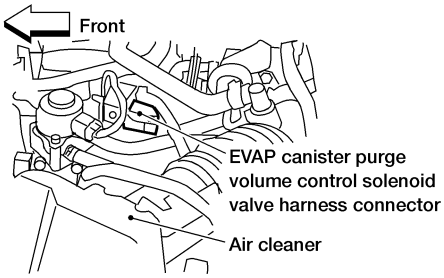


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

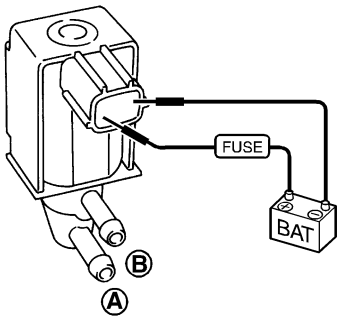
SEF334X

Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



WEC254



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

SEF335X

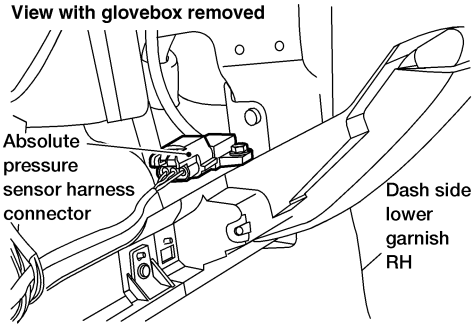
OK or NG

OK	▶	GO TO 18.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

Diagnostic Procedure (Cont'd)

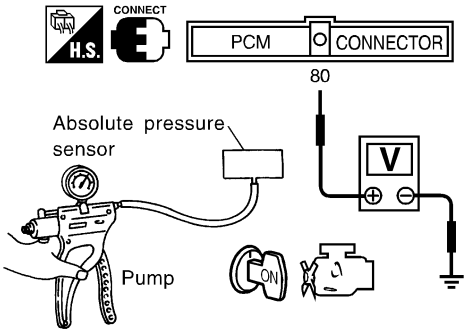
18	CHECK ABSOLUTE PRESSURE SENSOR

1. Remove absolute pressure sensor with its harness connector connected.



LEC430

2. Install a vacuum pump to absolute pressure sensor.
3. Turn ignition switch "ON" and check output voltage between PCM terminal 80 and engine ground under the following conditions.



Applied vacuum kPa (mmHg, inHg)	Voltage V
Not applied	1.8 - 4.8
–26.7 (–200, –7.87)	1.0 to 1.4V lower than above value

SEF720Y

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

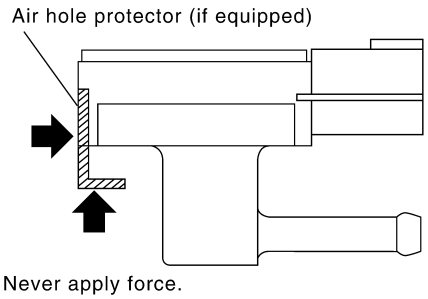
1. Remove fuel level sensor unit.
2. Check fuel tank temperature sensor.
   Refer to EC-328, "Component Inspection".

OK or NG

OK	▶	GO TO 20.
NG	▶	Replace fuel level sensor unit.

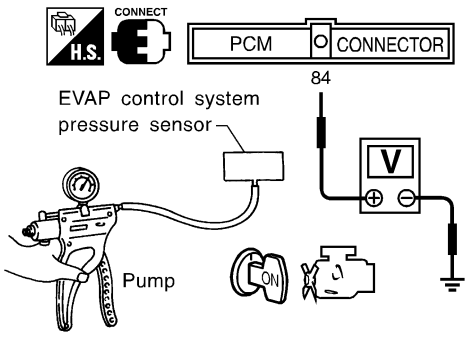
20	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

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 PCM 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

SEF674Y

CAUTION:
- **Discard any 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 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-49.

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.

Diagnostic Procedure (Cont'd)

23	CHECK FUEL LEVEL SENSOR	
Refer to ***EL-103***, "Fuel Level Sensor Unit Check".		
OK or NG		
OK	▶	GO TO 24.
NG	▶	Replace fuel level sensor unit.

24	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-169.		
	▶	**INSPECTION END**

Description

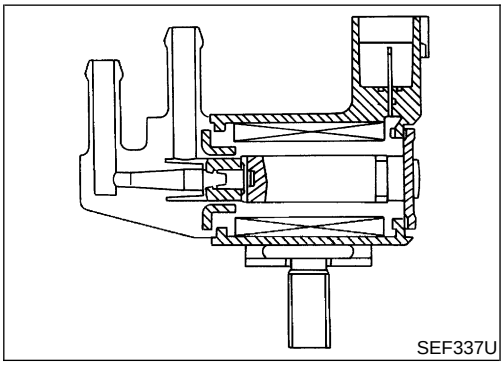
SYSTEM DESCRIPTION

NIEC0589

NIEC0589S01

Sensor	Input Signal to PCM	PCM function	Actuator
Crankshaft position sensor (POS)	Engine speed	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
Camshaft position sensor (PHASE)	Engine speed and cylinder position		
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		
Heated oxygen sensors 1 (front)	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 bypass 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 PCM. The opening of the valve varies for optimum engine control. The optimum value stored in the PCM 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

NIEC0589S02

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 PCM. 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

NIEC0590

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

NIEC0591

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

NIEC0592

- 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

NIEC0593

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 test at a temperature of 0°C (32°F) or more.

6

PURG VOL CN/V P1444	
OUT OF CONDITION	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
THRTL POS SEN	XXX V

SEF747Y

6

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

6

PURG VOL CN/V P1444
COMPLETED

SEF237Y

WITH CONSULT-II

NIEC0593S01

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-601.

WITH GST

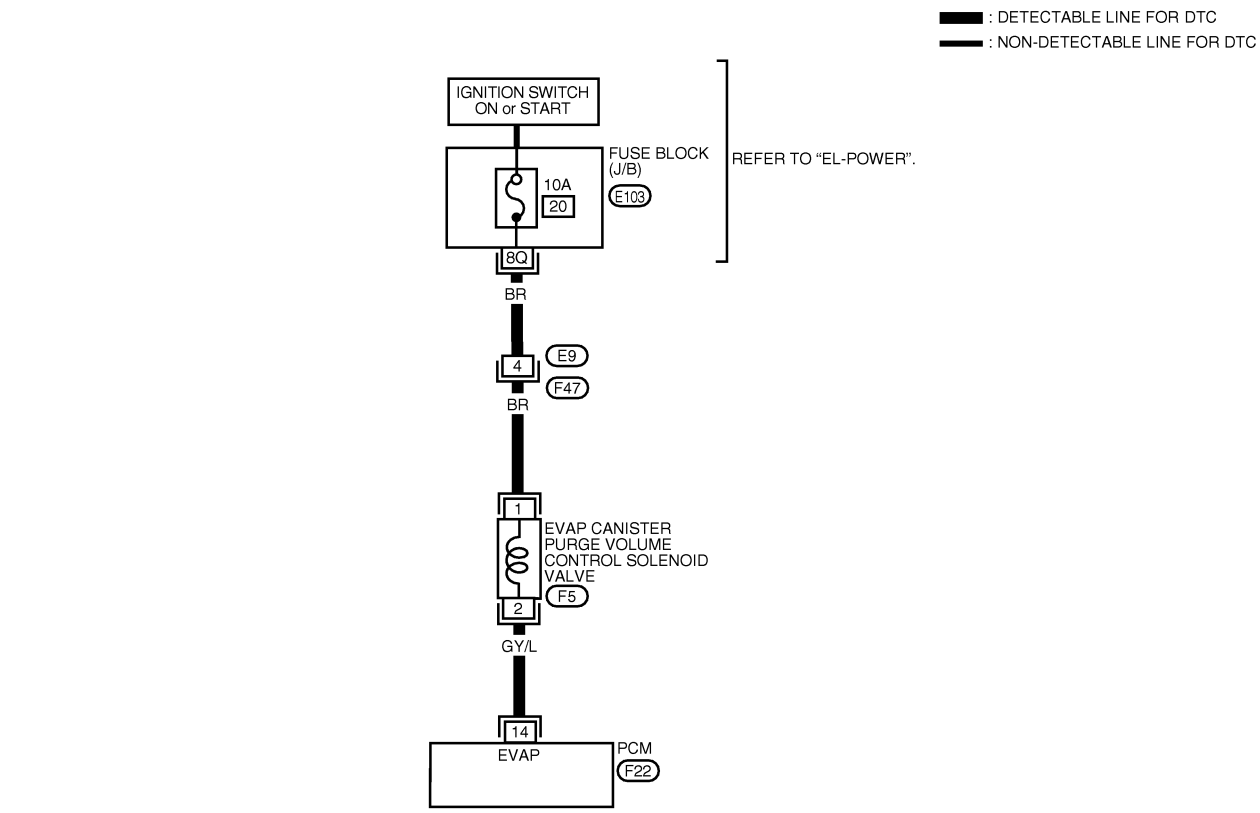
NIEC0593S02

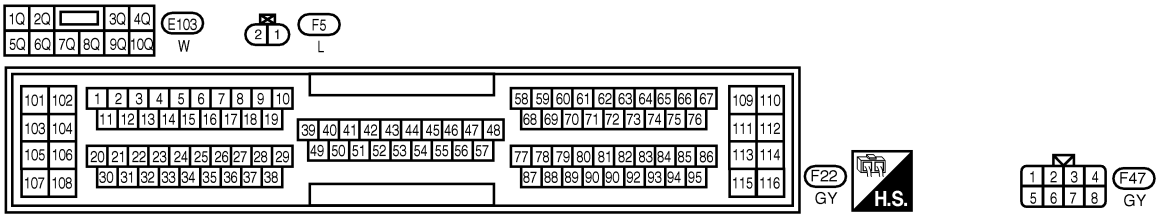
1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 10 seconds.
3) Start engine and let it idle for at least 20 seconds.
4) Select "MODE 7" with GST.
5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-601.

Wiring Diagram

NIEC0594

EC-PGC/V-01





LEC161

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

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
14	GY/L	EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE	ENGINE RUNNING AT IDLE SPEED	BATTERY VOLTAGE (V) 40 20 0 50 ms
			ENGINE RUNNING AT 2,000 RPM (MORE THAN 100 SECONDS AFTER STARTING ENGINE)	BATTERY VOLTAGE (V) 40 20 0 50 ms

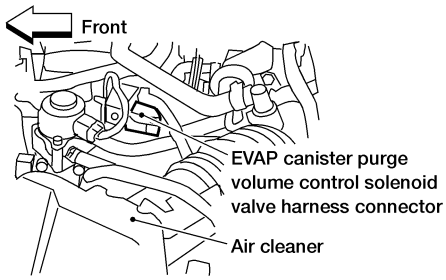
SEF198Z

Diagnostic Procedure

NIEC0595

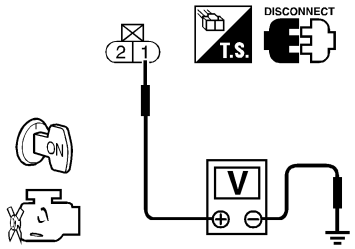
1	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.



WEC254

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

SEF948X

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E9, F47
- Fuse block (J/B) connector E103
- 10A 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 PCM harness connector.
3. Check harness continuity between PCM terminal 14 and EVAP canister purge volume control solenoid valve terminal 2. Refer to “Wiring Diagram”, EC-600.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

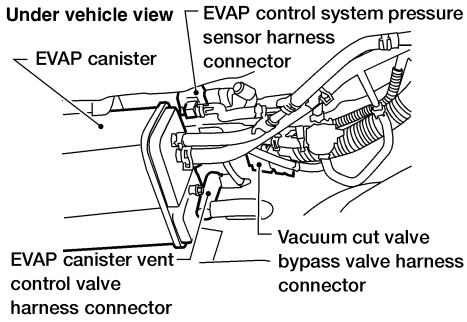
OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

Diagnostic Procedure (Cont'd)

4	DETECT MALFUNCTIONING PART
Check the harness for open or short between EVAP canister purge volume control solenoid valve and PCM.	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE
Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.	



WEC255

OK or NG

OK	▶	GO TO 6.
NG	▶	Repair it.

6	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check connectors for water.

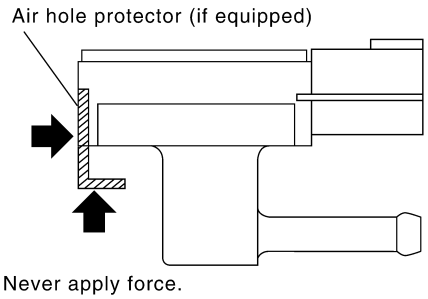
Water should not exist.

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace EVAP control system pressure sensor.

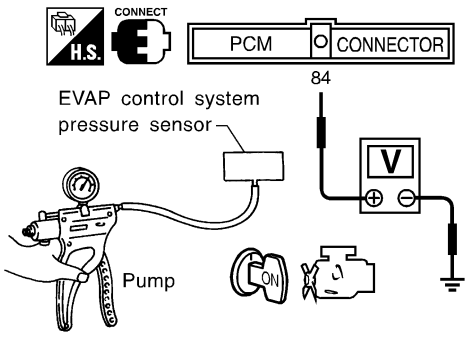
7	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

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 PCM 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

SEF674Y

CAUTION:
- **Discard any 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 8.
OK (Without CONSULT-II)	▶	GO TO 9.
NG	▶	Replace EVAP control system pressure sensor.

Diagnostic Procedure (Cont'd)

8	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	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XX %
A/F ALPHA-B2	XX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN
THRTL POS SEN	X. XX V

SEF677Y

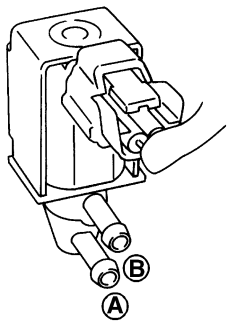
OK or NG

OK	▶	GO TO 10.
NG	▶	GO TO 9.

9	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.

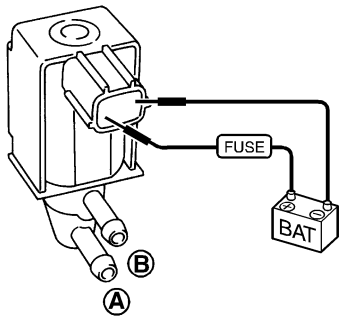


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

SEF334X

Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



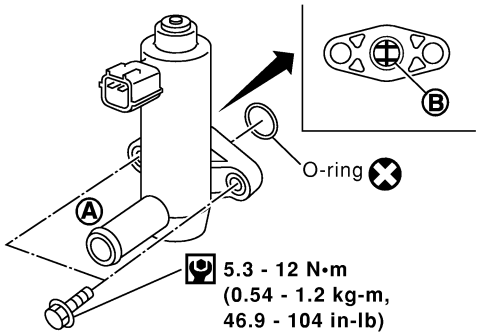
Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

SEF335X

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

10	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 11.
NG	▶	Clean the rubber tube using an air blower.

11	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.		
 SEF376Z		
OK or NG		
OK	▶	GO TO 12.
NG	▶	Replace EVAP canister vent control valve.

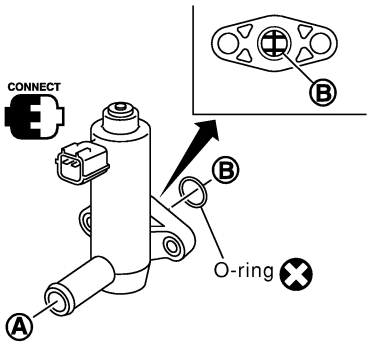
Diagnostic Procedure (Cont'd)

12	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
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN
THRTL POS SEN	XXX V



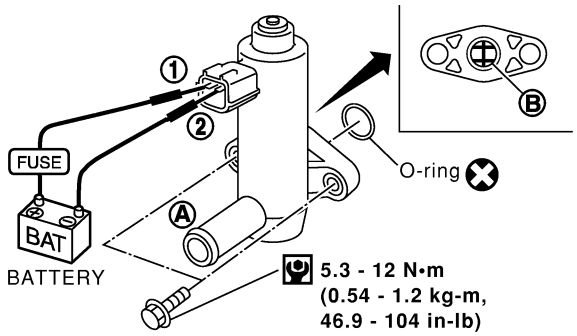
Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

SEF377Z

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.

SEF378Z

Make sure new O-ring is installed properly.

OK or NG

OK	▶	GO TO 14.
NG	▶	GO TO 13.

13	CHECK EVAP CANISTER VENT CONTROL VALVE-III

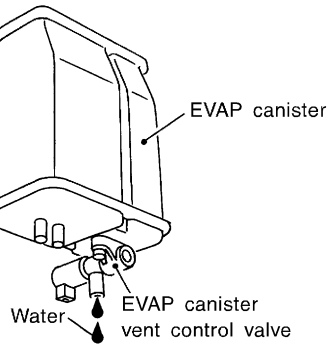
1. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
2. Perform procedure 10 again.

OK or NG

OK	▶	GO TO 14.
NG	▶	Replace EVAP canister vent control valve.

14	CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Check if water will drain from the EVAP canister.



SEF596U

Yes or No

Yes	▶	GO TO 15.
No	▶	GO TO 18.

15	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 17.
NG	▶	GO TO 16.

16	DETECT MALFUNCTIONING PART

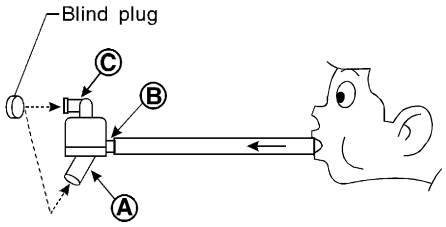
Check the following.
- EVAP canister for damage
- EVAP hose between EVAP canister and water separator for clogging or poor connection

	▶	Repair hose or replace EVAP canister.

Diagnostic Procedure (Cont'd)

17	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

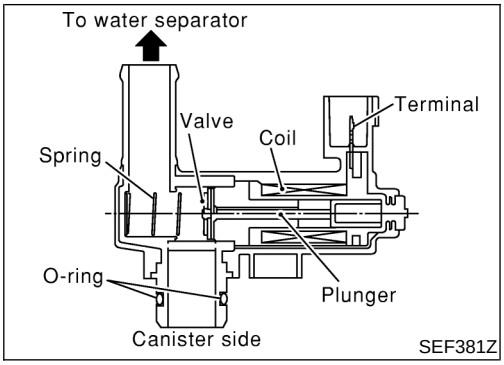
5. In case of NG in items 2 - 4, replace the parts.

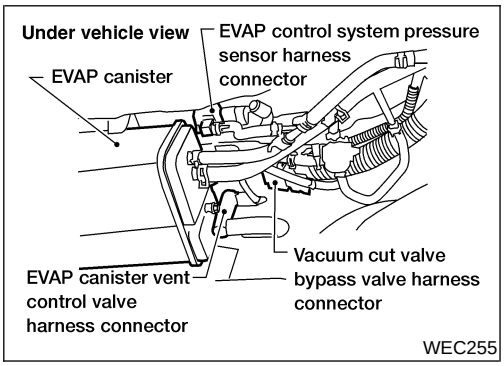
NOTE:
- Do not disassemble water separator.

OK or NG

OK	▶	GO TO 18.
NG	▶	Clean or replace water separator.

18	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-169.	
▶	**INSPECTION END**





Component Description

NIEC0596

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 PCM. When the PCM 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, Gross Leak, Very Small Leak)" diagnosis.

CONSULT-II Reference Value in Data Monitor Mode

NIEC0597

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	• Ignition switch: ON	OFF

On Board Diagnosis Logic

NIEC0598

Malfunction is detected when EVAP canister vent control valve remains closed under specified driving conditions.

Possible Cause

NIEC0599

- 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

4

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

DTC Confirmation Procedure

NIEC0600

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

NIEC0600S01

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-612.

WITH GST

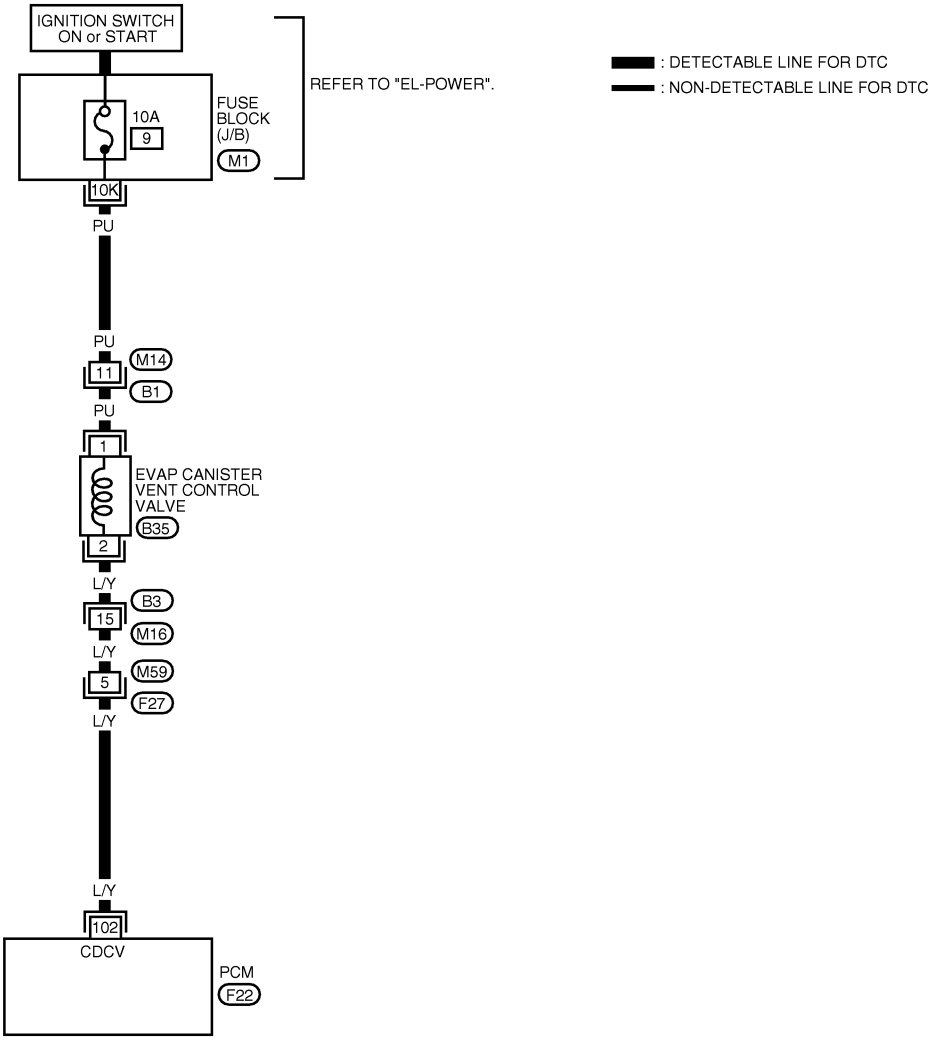
NIEC0600S02

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

NIEC0601

EC-VENT/V-01



LEC149

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

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
102	L/Y	EVAP CANISTER VENT CONTROL VALVE	IGN ON	BATTERY VOLTAGE

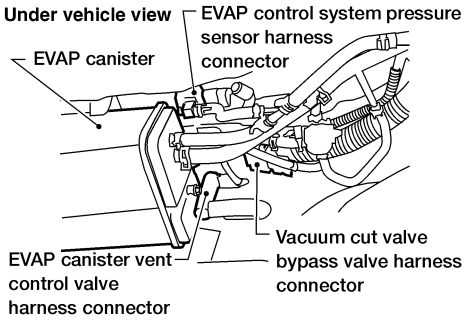
SEF203Z

Diagnostic Procedure

NIEC0602

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.



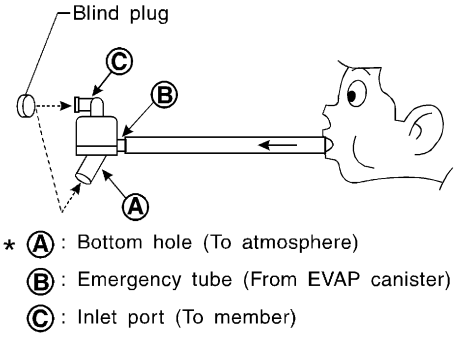
WEC255

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.



SEF829T

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

NOTE:

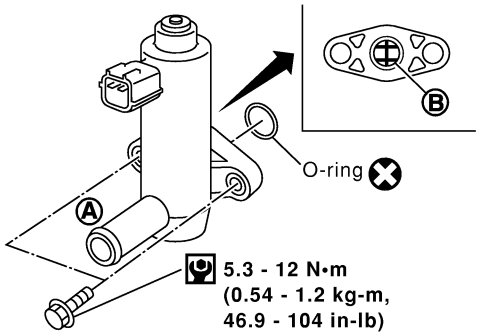
- Do not disassemble water separator.

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.



SEF376Z

OK or NG

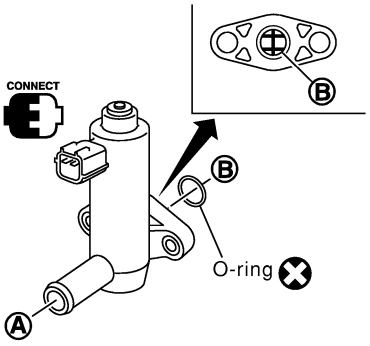
OK	▶	GO TO 4.
NG	▶	Replace EVAP canister vent control valve.

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
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN
THRTL POS SEN	XXX V



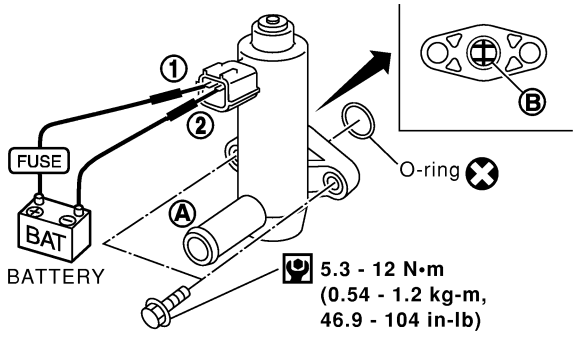
Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

SEF377Z

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.

SEF378Z

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

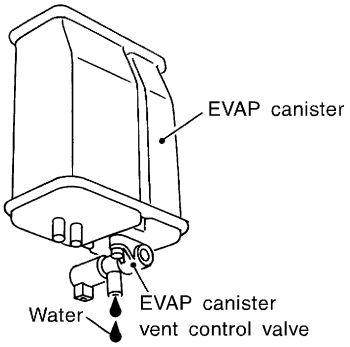
1. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
2. Perform the procedure 4 again.

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

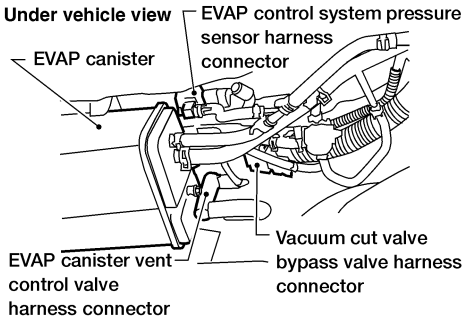
Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.

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.



WEC255

2. Check connectors for water.
Water should not exist.

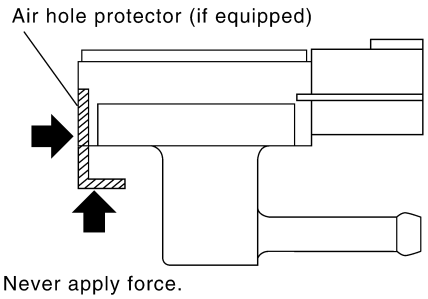
OK or NG

OK	▶	GO TO 11.
NG	▶	Replace EVAP control system pressure sensor.

Diagnostic Procedure (Cont'd)

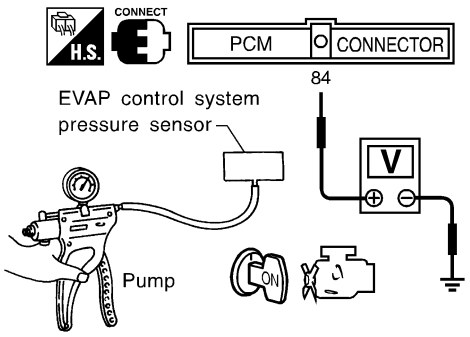
11	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

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 PCM 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

SEF674Y

CAUTION:
- **Discard any 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

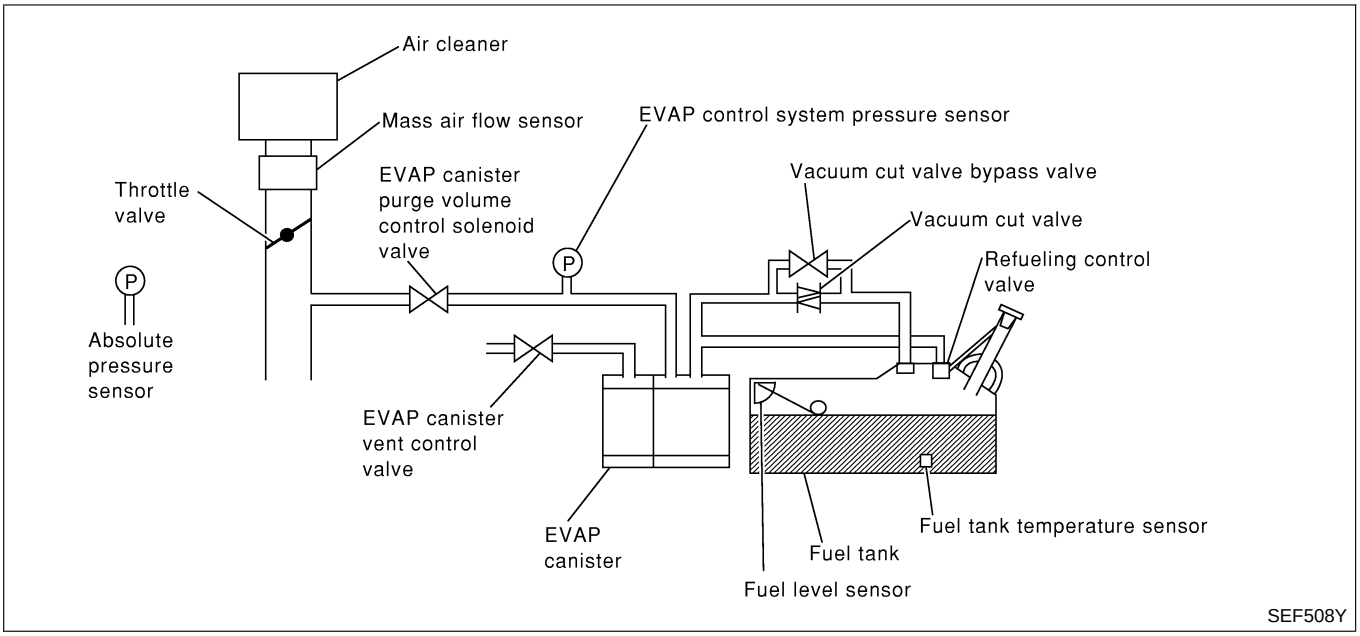
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-169.

▶ **INSPECTION END**

System Description

NIEC0603

NOTE:
If DTC P1447 is displayed with P0510, perform trouble diagnosis for DTC P0510 first. (See EC-464.)



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

NIEC0604

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

NIEC0605

- 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

Possible Cause (Cont'd)

- EVAP canister vent control valve

5

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

6

PURG FLOW P1447
COMPLETED

SEF238Y

DTC Confirmation Procedure

NIEC0606

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:

For best results, perform test at a temperature of 0°C (32°F) or more.

WITH CONSULT-II

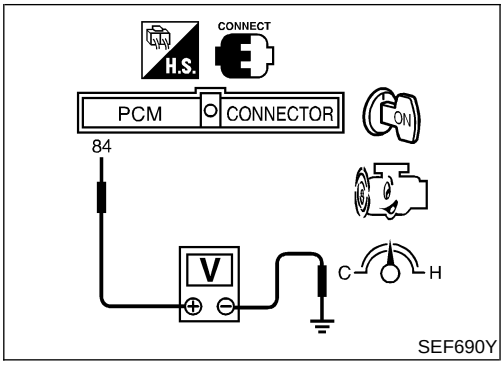
NIEC0606S01

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 - 3,800 rpm
B/FUEL SCHDL	1.0 - 6.2 msec
Engine coolant temperature	More than 70°C (158°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-620.



Overall Function Check

NIEC0607

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

NIEC0607S01

1) Lift up drive wheels.
2) Start engine 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 PCM 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-620.

Diagnostic Procedure

=NIEC0608

1	CHECK EVAP CANISTER

1. Turn ignition switch “OFF”.
2. Check EVAP canister for cracks.

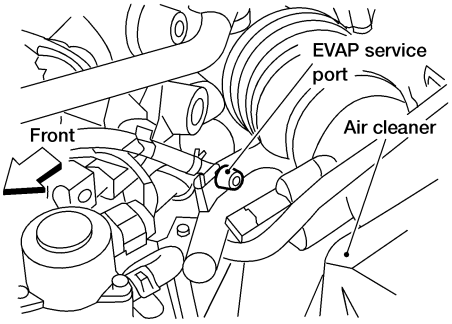
OK or NG

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.



LEC256

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
A/F ALPHA-B1	XXX %
HO2S1 (B1)	LEAN
THRTL POS SEN	XXX V

PURG VOL CONT/V	VACUUM
100.0%	Should exist
0.0%	Should not exist

SEF691Y

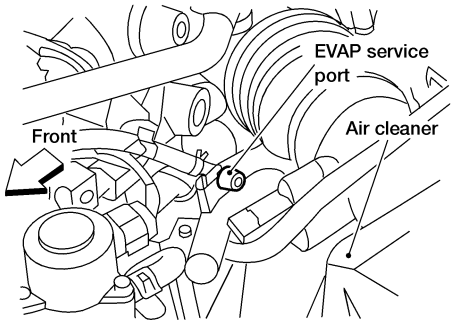
OK or NG

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.



LEC256

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-53.

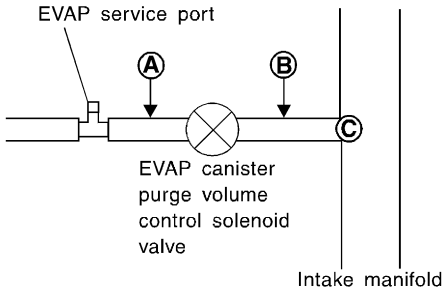
OK or NG

OK	▶	GO TO 5.
NG	▶	Repair it.

Diagnostic Procedure (Cont'd)

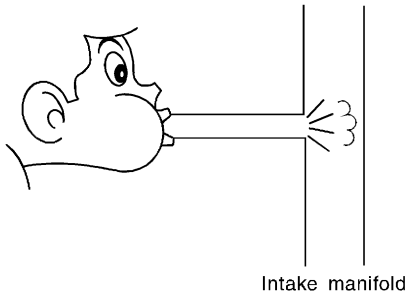
5	CHECK EVAP PURGE HOSE AND PURGE PORT

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 (With CONSULT-II)	▶	GO TO 6.
OK (Without CONSULT-II)	▶	GO TO 7.
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	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XX %
A/F ALPHA-B2	XX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN
THRTL POS SEN	X. XX V

SEF677Y

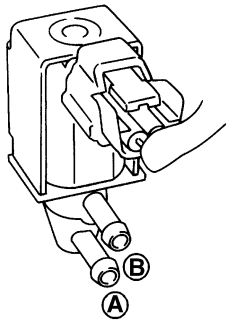
OK or NG

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.

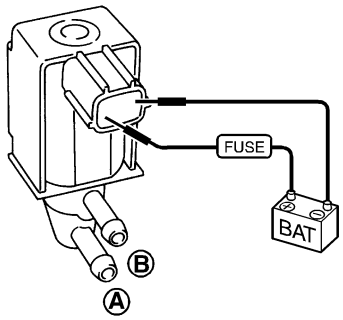


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

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.

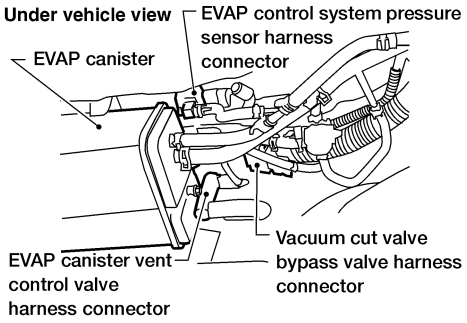
OK or NG

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.



WEC255

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-417.

OK or NG

OK	▶	GO TO 11.
NG	▶	Replace EVAP control system pressure sensor.

11	CHECK RUBBER TUBE FOR CLOGGING

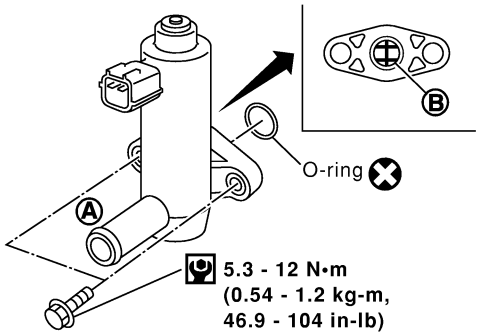
1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

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.



SEF376Z

OK or NG

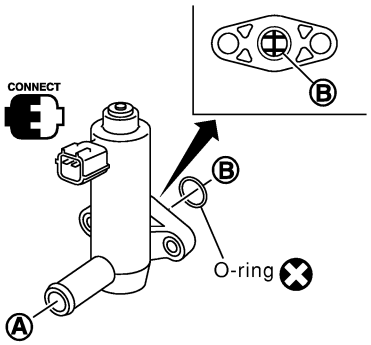
OK	▶	GO TO 13.
NG	▶	Replace EVAP canister vent control valve.

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
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN
THRTL POS SEN	XXX V



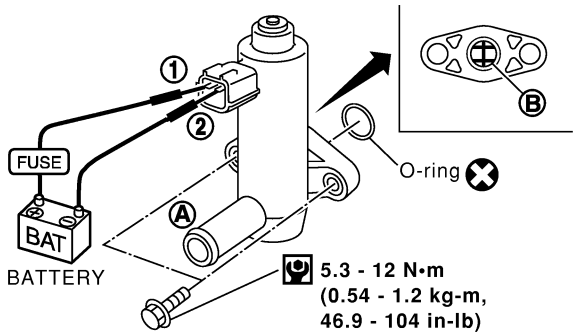
Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

SEF377Z

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.

SEF378Z

Make sure new O-ring is installed properly.

OK or NG

OK (With CONSULT-II)	▶	GO TO 15.
OK (Without CONSULT-II)	▶	GO TO 16.
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

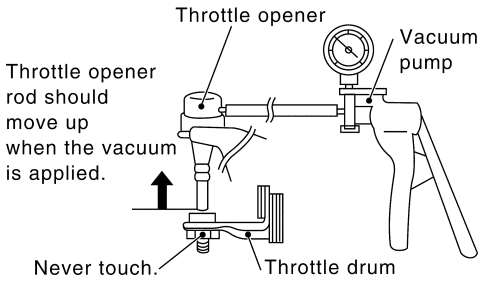
OK (With CONSULT-II)	▶	GO TO 15.
OK (Without CONSULT-II)	▶	GO TO 16.
NG	▶	Replace EVAP canister vent control valve.

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

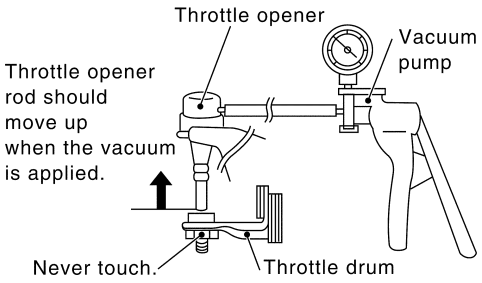
OK or NG

OK	▶	GO TO 18.
NG	▶	GO TO 17.

16	CHECK THROTTLE POSITION SWITCH

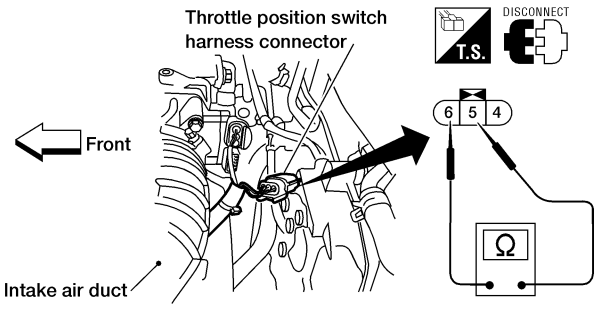
Without CONSULT-II

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. Disconnect closed throttle position switch harness connector.
8. Check continuity between closed throttle position switch terminals 5 and 6 under the following conditions. Resistance measurement must be made with throttle position switch installed in vehicle.



Throttle valve condition	Continuity
Completely closed	Yes
Partially open	No
Completely open	No

LEC337

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-131.

Items	Specifications
Ignition timing	9°±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	M/T: 650±50 rpm A/T: 800±50 rpm (in "P" or "N" position)

MTBL0440

Is it possible to adjust closed throttle position switch?

Yes or No

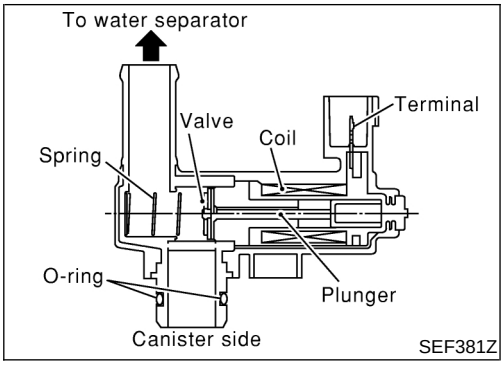
Yes	▶	GO TO 18.
No	▶	Replace throttle position switch.

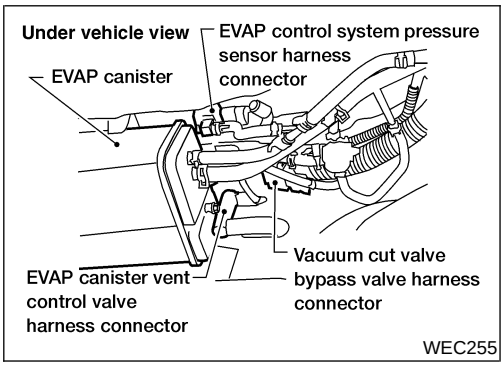
Diagnostic Procedure (Cont'd)

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-53.		
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-169.		
	▶	**INSPECTION END**





Component Description

NIEC0609

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 PCM. When the PCM 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

NIEC0610

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	• Ignition switch: ON	OFF

On Board Diagnosis Logic

NIEC0611

Malfunction is detected when EVAP canister vent control valve remains opened under specified driving conditions.

Possible Cause

NIEC0612

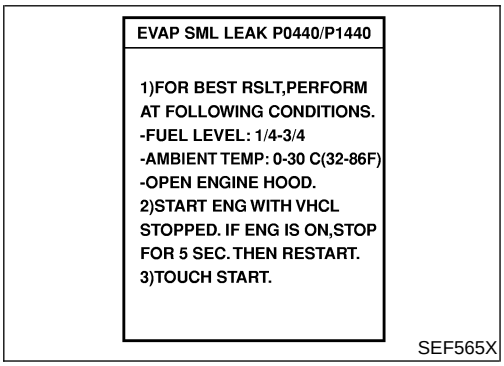
- EVAP canister vent control valve
- EVAP control system pressure sensor and circuit
- Blocked rubber tube to EVAP canister vent control valve
- Water separator
- EVAP canister is saturated with water
- Vacuum cut valve

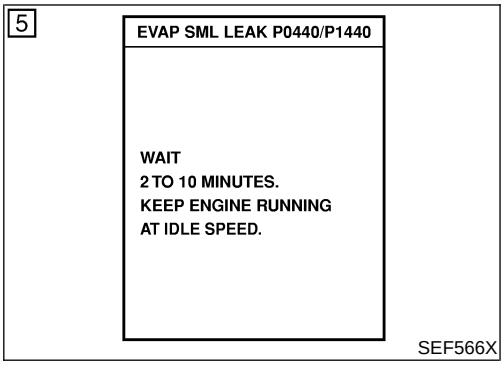
DTC Confirmation Procedure

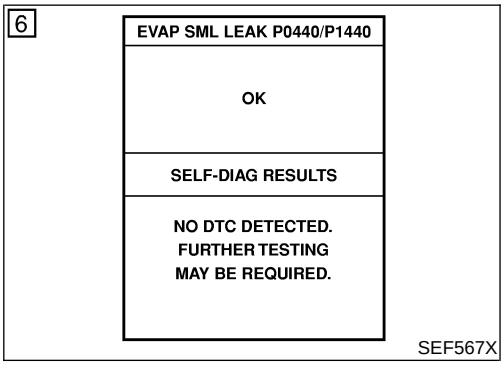
NIEC0613

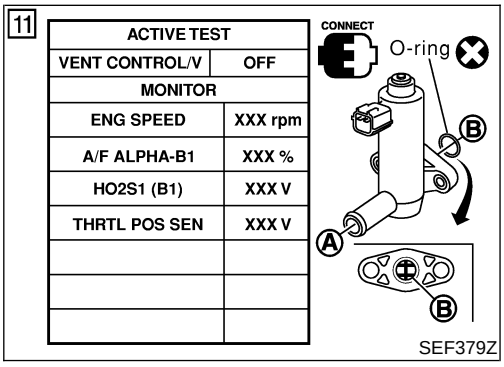
NOTE:

- **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

NIEC0613S01

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 following procedure.**

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)

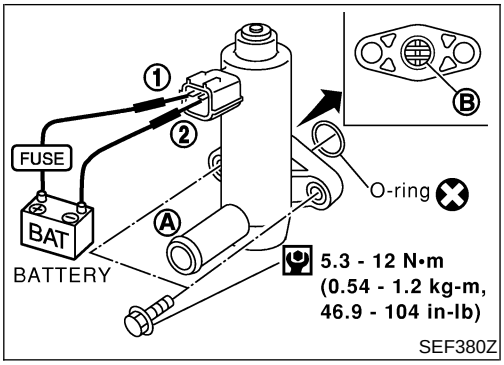
5) Select "EVAP SML LEAK P0440/P1440" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
   Follow the instruction displayed.
   If the engine speed cannot be maintained within the range displayed on the CONSULT-II screen, go to "Basic Inspection", EC-131.
6) Make sure that "OK" is displayed.
   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 5 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-633.
If the result is OK, go to "Diagnostic Procedure" for DTC P0440, EC-391.



Overall Function Check

NIEC0614

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

NIEC0614S01

1) Disconnect hose from water separator.
2) Disconnect EVAP canister vent control valve harness connector.
3) Verify the following.

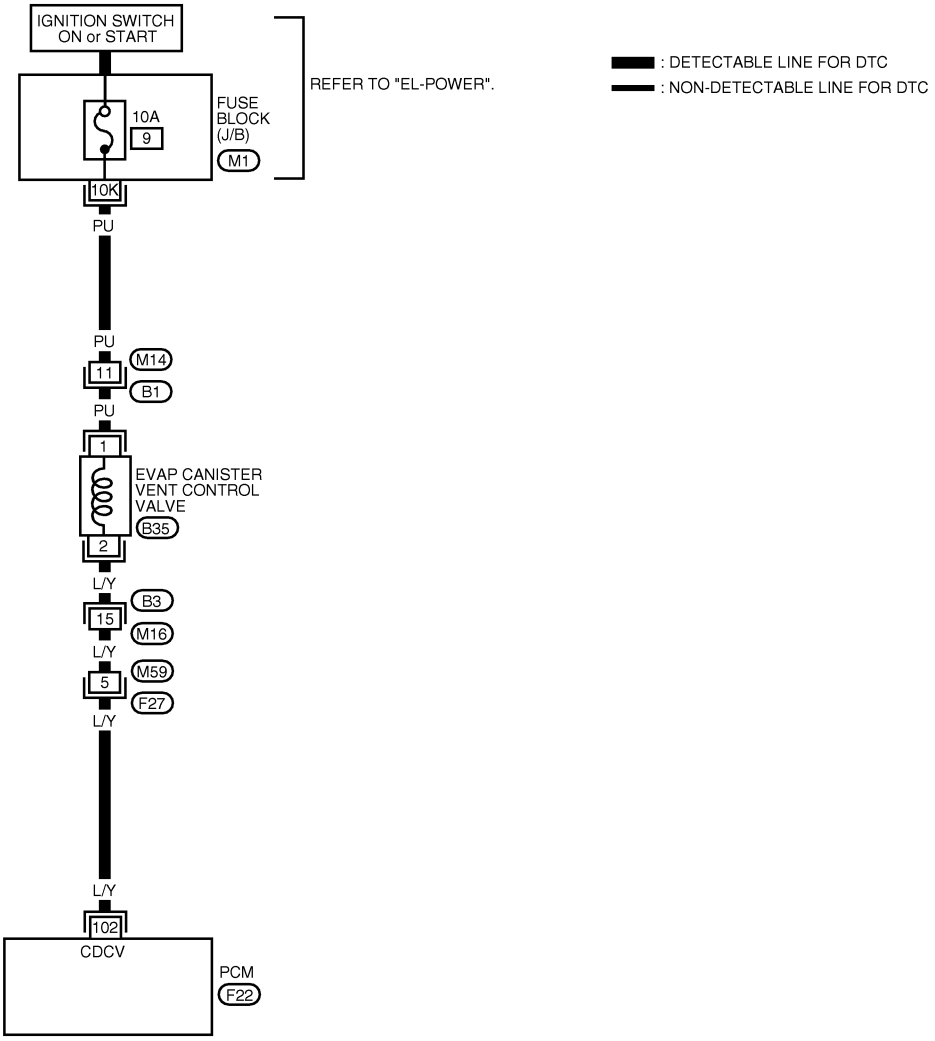
Condition	Air passage continuity
12V direct current supply between terminals 1 and 2	No
No supply	Yes

If the result is NG, go to “Diagnostic Procedure”, EC-633.
If the result is OK, go to “Diagnostic Procedure” for DTC P0440, EC-391.

Wiring Diagram

NIEC0615

EC-VENT/V-01



LEC149

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

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
83	G	FUEL LEVEL SENSOR	IGN ON	APPROX. 0 - 4.8V
90	B/W	FUEL LEVEL SENSOR GROUND	ENGINE RUNNING AT IDLE SPEED	APPROX. 0V

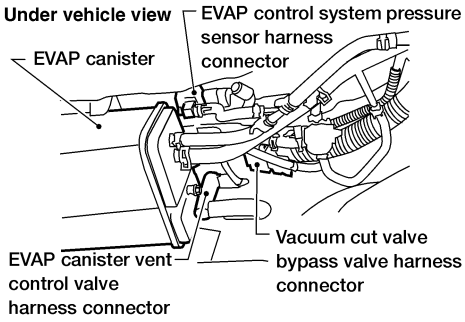
SEF204Z

Diagnostic Procedure

NIEC0616

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.



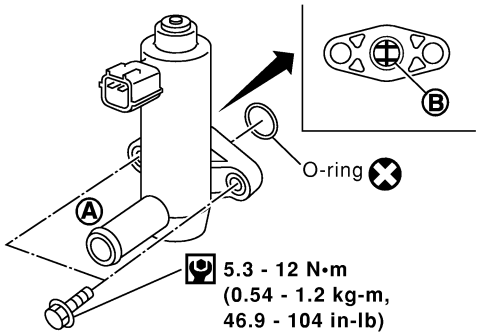
WEC255

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.



SEF376Z

OK or NG

OK	▶	GO TO 3.
NG	▶	Replace EVAP canister vent control valve.

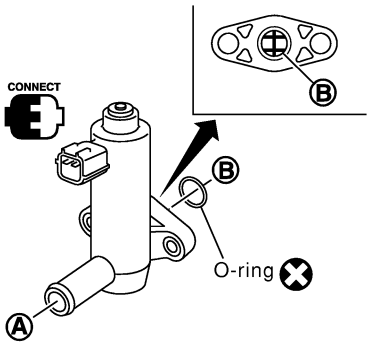
Diagnostic Procedure (Cont'd)

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
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN
THRTL POS SEN	XXX V



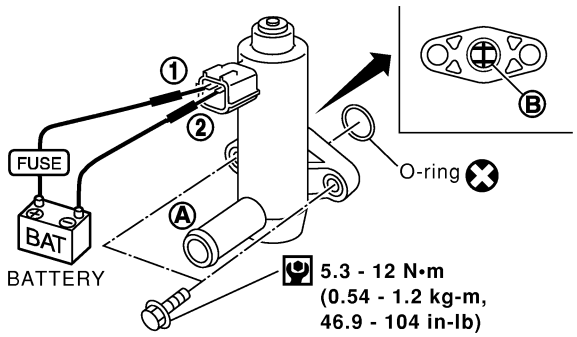
Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

SEF377Z

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.

SEF378Z

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

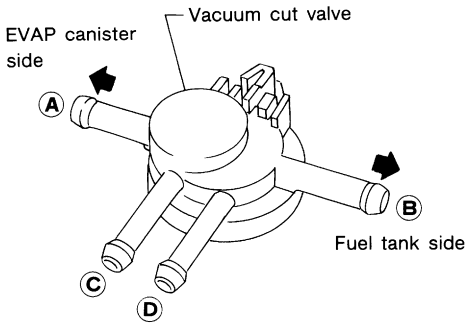
1. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
2. Perform Test No. 3 again.

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

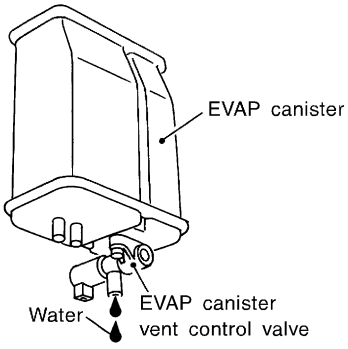
a. Plug port **C** and **D** with fingers.
b. Apply vacuum to port **A** and check that there is no suction from port **B**.
c. Apply vacuum to port **B** and check that there is suction from port **A**.
d. Blow air in port **B** and check that there is a resistance to flow out of port **A**.
e. Open 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.

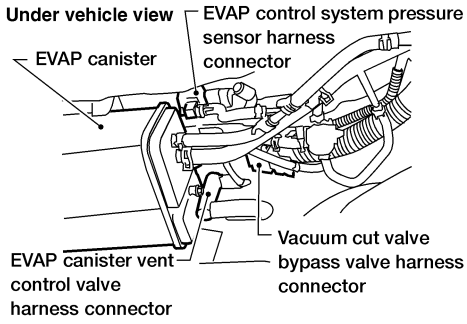
Diagnostic Procedure (Cont'd)

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.



WEC255

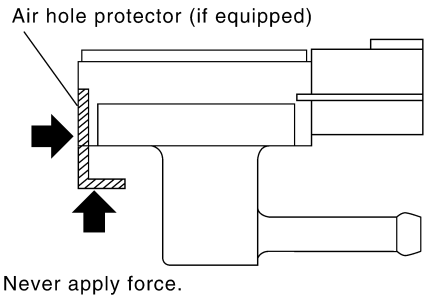
2. Check connectors for water.
Water should not exist.

OK or NG

OK ▶	GO TO 11.
NG ▶	Replace EVAP control system pressure sensor.

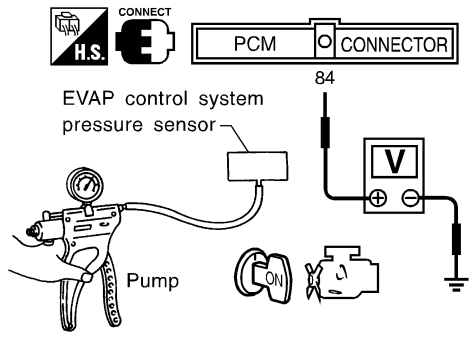
11	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

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 PCM 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

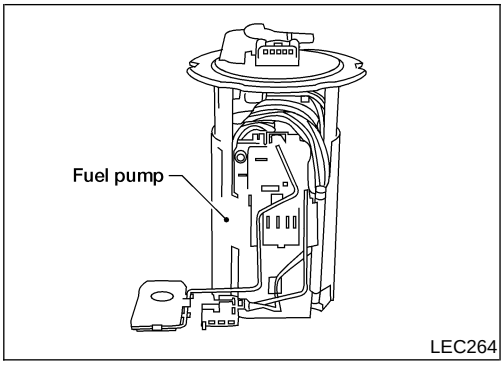
SEF674Y

CAUTION:
- **Discard any 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-169.	
▶	**INSPECTION END**



Component Description

NIEC0617

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 PCM.
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

NIEC0618

PCM 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 PCM.

Possible Cause

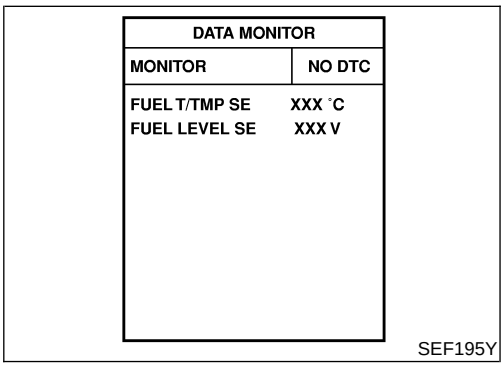
NIEC0619

- Fuel level sensor circuit
  (The fuel level sensor circuit is open or shorted.)

DTC Confirmation Procedure

NIEC0620

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

NIEC0620S01

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-640.

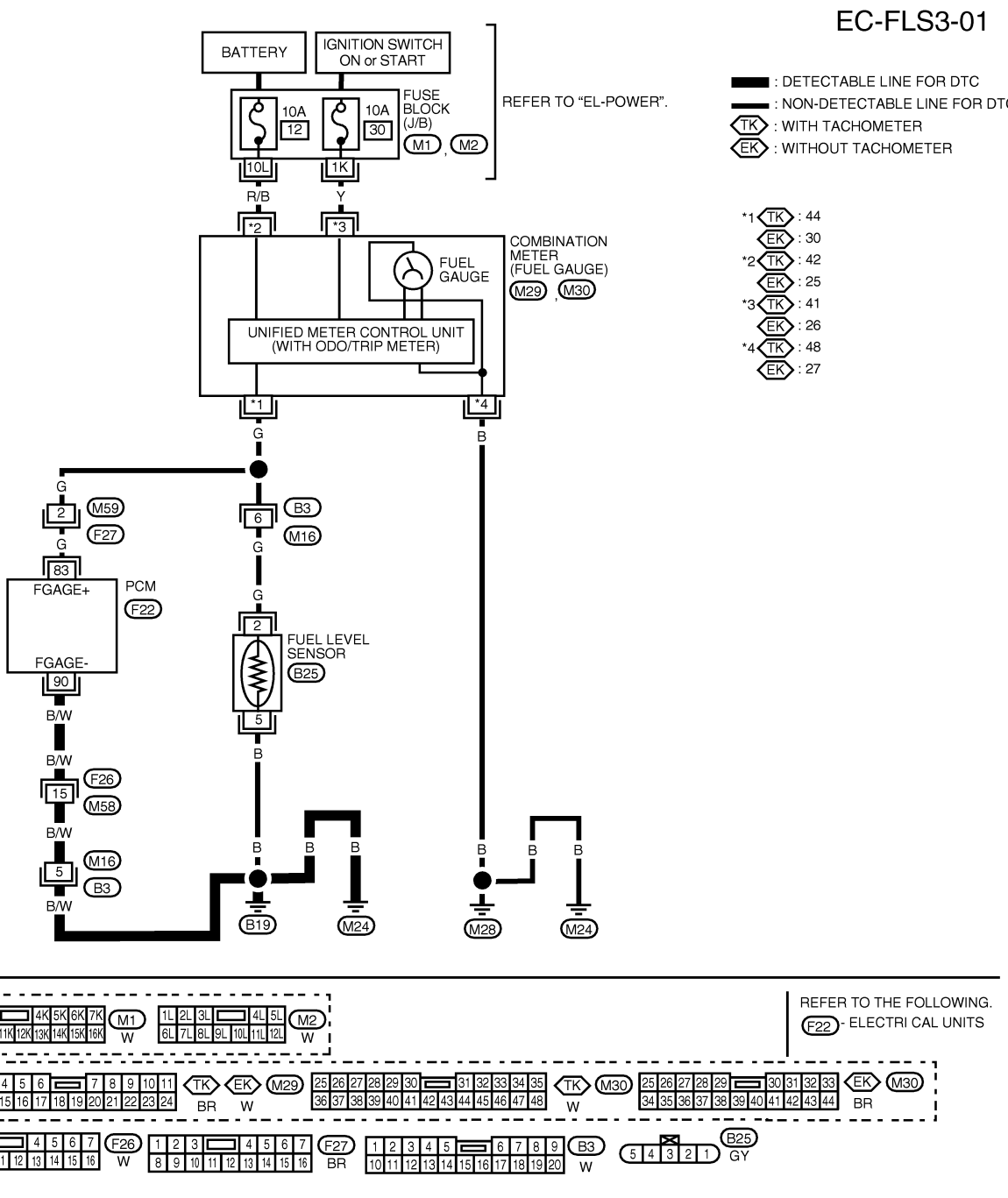
WITH GST

NIEC0620S02

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

NIEC0621



LEC183

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

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
83	G	FUEL LEVEL SENSOR	IGN ON	APPROX. 0 - 4.8V
90	B/W	FUEL LEVEL SENSOR GROUND	ENGINE RUNNING AT IDLE SPEED	APPROX. 0V

SEF204Z

Diagnostic Procedure

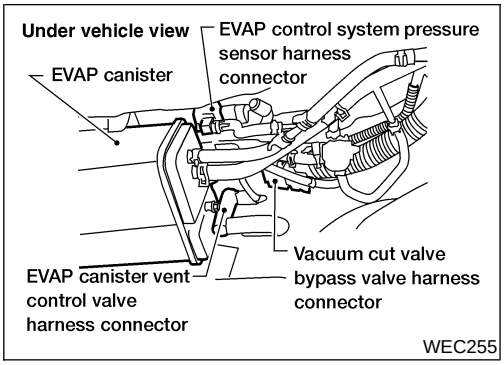
=NIEC0622

1	CHECK FUEL LEVEL SENSOR GROUND CIRCUIT FOR OPEN AND SHORT
1. Turn ignition switch “OFF”. 2. Disconnect PCM harness connector. 3. Check harness continuity between PCM terminal 90 and body ground. Refer to “Wiring Diagram”, EC-639. **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 F26, M58 ● Harness connectors M16, B3 ● Harness for open and short between PCM 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-103***, “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-169	
OK or NG	
▶	**INSPECTION END**



Description

=NIEC0623

COMPONENT DESCRIPTION

NIEC0623S01

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 PCM. When the PCM sends an ON (ground) signal, the valve is opened.

CONSULT-II Reference Value in Data Monitor Mode

NIEC0624

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VC/V BYPASS/V	• Ignition switch: ON	OFF

On Board Diagnosis Logic

NIEC0625

Malfunction is detected when an improper voltage signal is sent to PCM through vacuum cut valve bypass valve.

Possible Cause

NIEC0626

- Harness or connectors
  (The vacuum cut valve bypass valve circuit is open or shorted.)
- Vacuum cut valve bypass valve

DTC Confirmation Procedure

NIEC0627

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.

DTC Confirmation Procedure (Cont'd)

3

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

WITH CONSULT-II

NIEC0627S01

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-644.

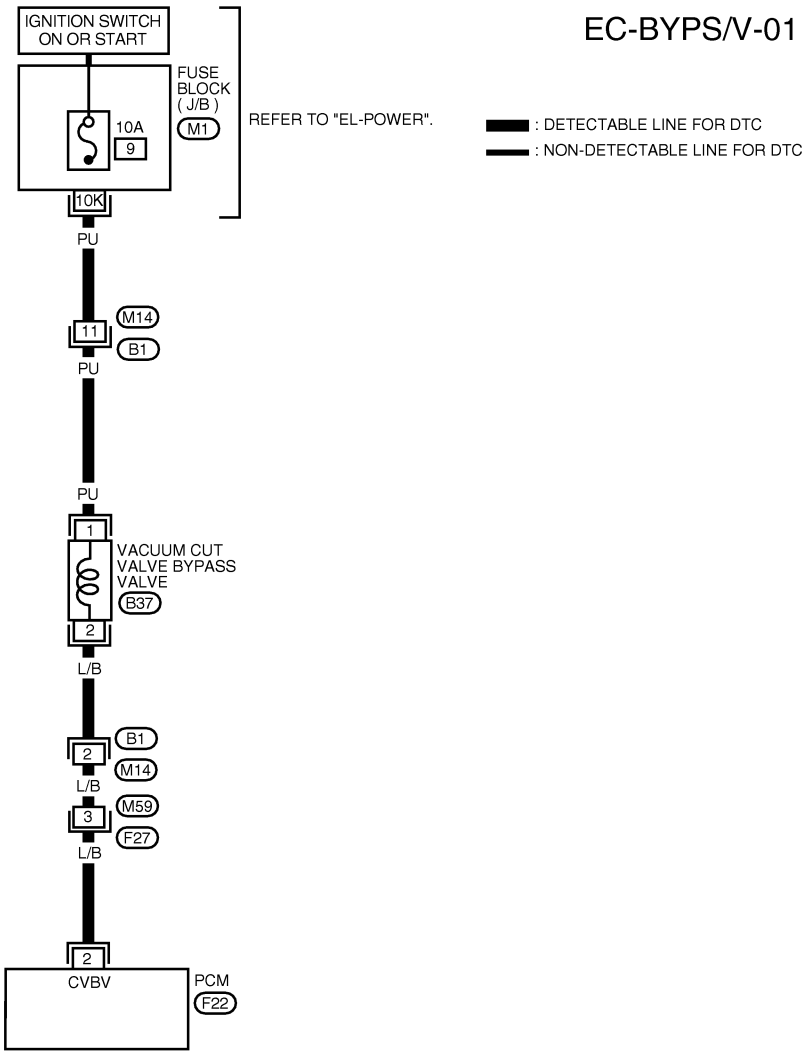
WITH GST

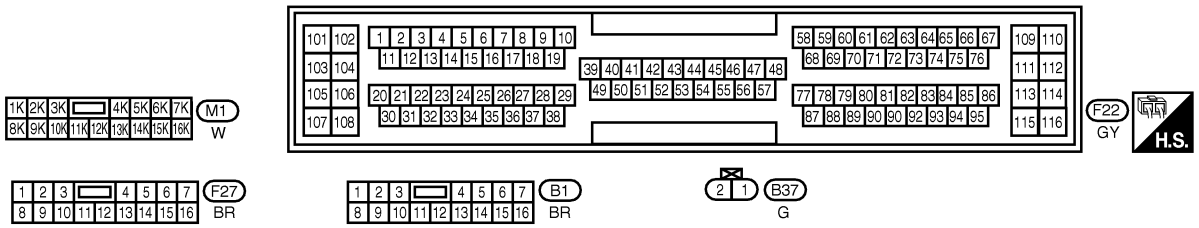
NIEC0627S02

Follow the procedure "WITH CONSULT-II" above.

Wiring Diagram

=NIEC0628





LEC158

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

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
2	L/B	VACUUM CUT VALVE BYPASS VALVE	IGN ON	BATTERY VOLTAGE

SEF205Z

Diagnostic Procedure

NIEC0629

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
A/F ALPHA- B1	XXX %
A/F ALPHA- B2	XXX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN
THRTL POS SEN	X.XX V

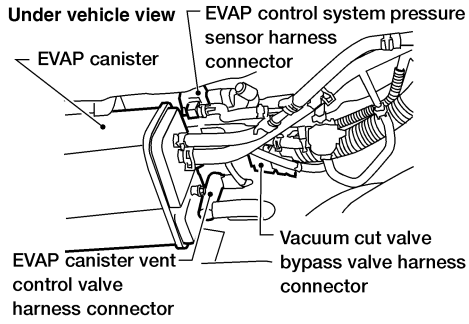
SEF694Y

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.

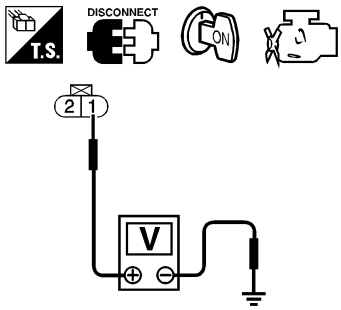
3	CHECK VACUUM CUT VALVE BYPASS VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect vacuum cut valve bypass valve harness connector.



WEC255

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 M14, B1
- Fuse block (J/B) connector M1
- 10A 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 PCM harness connector.
3. Check harness continuity between PCM terminal 2 and vacuum cut valve bypass valve terminal 2.
   Refer to "Wiring Diagram", EC-643.
   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.

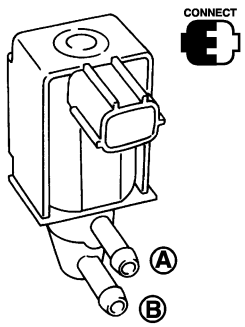
Diagnostic Procedure (Cont'd)

6	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors B1, M14 ● Harness connectors M57, F27 ● Harness for open or short between vacuum cut valve bypass valve and PCM	
▶	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
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN
THRTL POS SEN	X.XX V

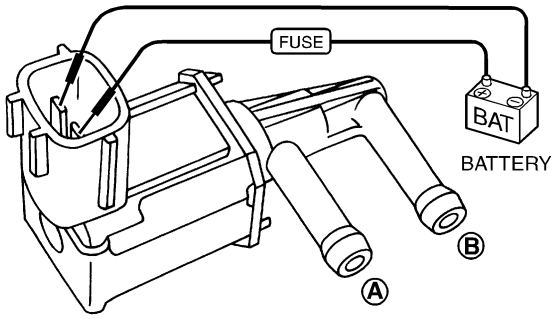
Condition VC/V BYPASS/V	Air passage continuity between A and B
ON	Yes
OFF	No

Operation takes less than 1 second.

SEF641Y

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

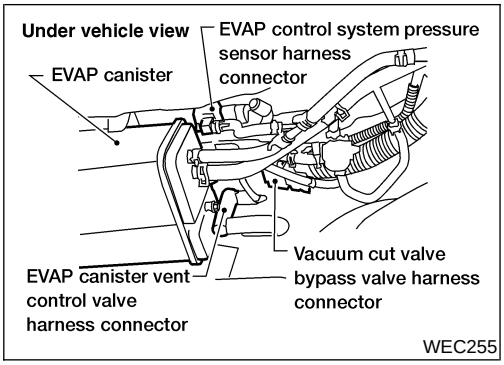
Operation takes less than 1 second.

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-169.	
▶	**INSPECTION END**



Description

NIEC0630

COMPONENT DESCRIPTION

NIEC0630S01

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.

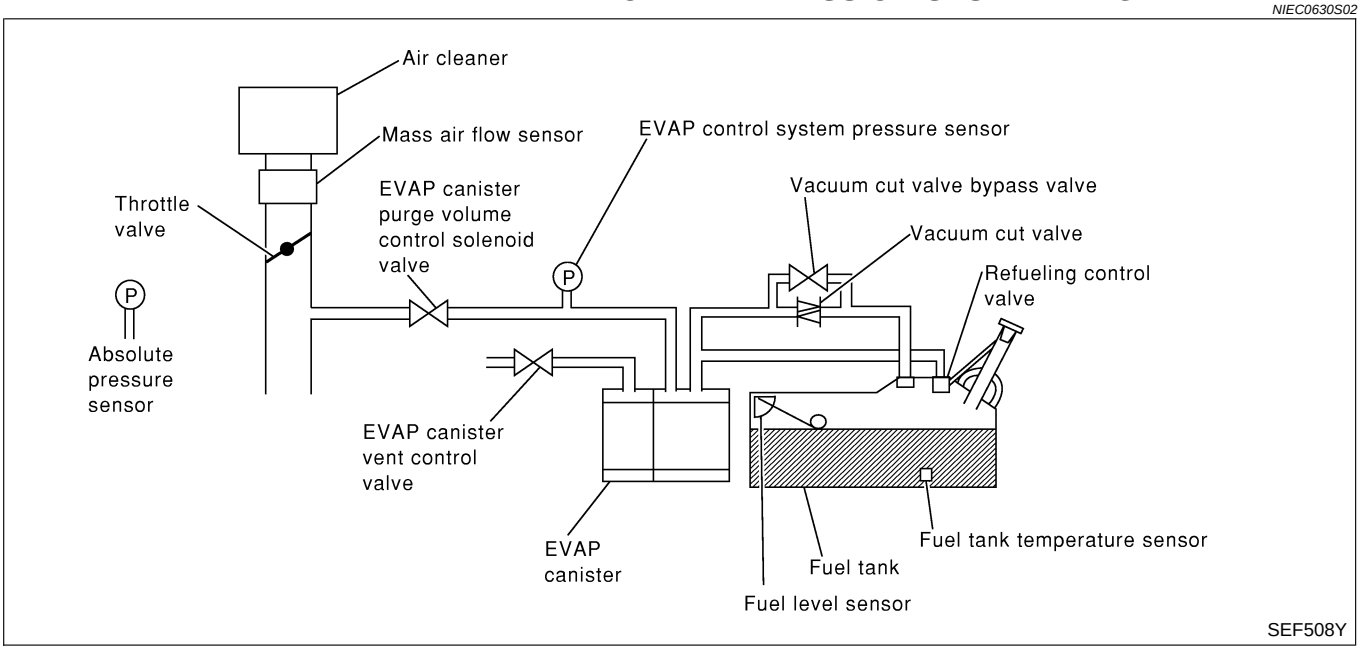
The vacuum cut valve prevents the intake manifold vacuum from being applied to the fuel tank.

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 PCM. When the PCM 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

NIEC0630S02



CONSULT-II Reference Value in Data Monitor Mode

NIEC0631

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VC/V BYPASS/V	• Ignition switch: ON	OFF

On Board Diagnosis Logic

NIEC0632

Malfunction is detected when vacuum cut valve bypass valve does not operate properly.

Possible Cause

NIEC0633

- 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

7

VC CUT/V BP/V P1491	
OUT OF CONDITION	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
VHCL SPEED SE	XXX km/h

SEF748Y

7

VC CUT/V BP/V P1491	
TESTING	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
VHCL SPEED SE	XXX km/h

SEF749Y

7

VC CUT/V BP/V P1491
COMPLETED

SEF239Y

DTC Confirmation Procedure

NIEC0634

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:

For best results, perform test at a temperature of 0°C (32°F) or higher.

WITH CONSULT-II

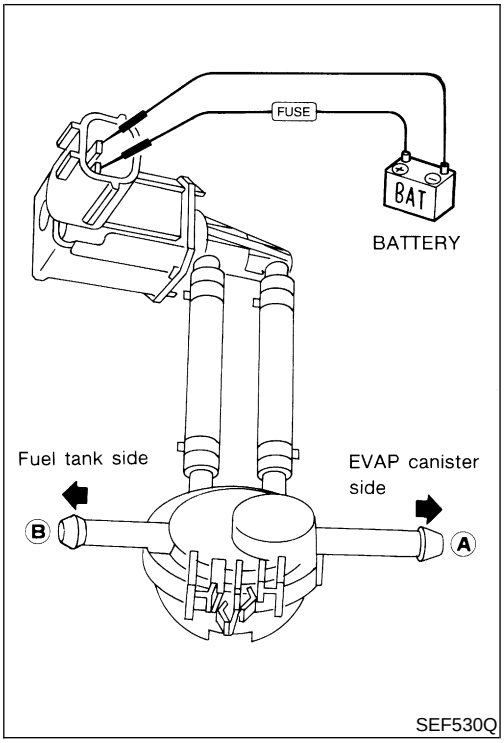
NIEC0634S01

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 - 3,800 rpm
Selector lever	Suitable position
Vehicle speed	36 - 120 km/h (22 - 75 MPH)
B/FUEL SCHDL	1.0 - 8.2 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-649.



Overall Function Check

NIEC0635

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

NIEC0635S01

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-649.

Diagnostic Procedure

NIEC0637

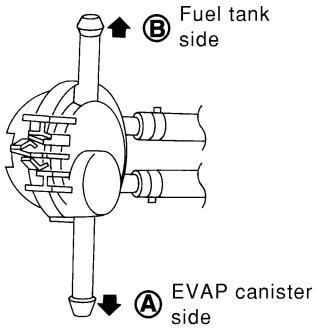
1	INSPECTION START	
Do you have CONSULT-II?		
Yes or No		
Yes	▶	GO TO 2.
No	▶	GO TO 3.

Diagnostic Procedure (Cont'd)

2	CHECK 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
A/F ALPHA- B1	XXX %
A/F ALPHA- B2	XXX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN
THRTL POS SEN	X.XX V

SEF695Y

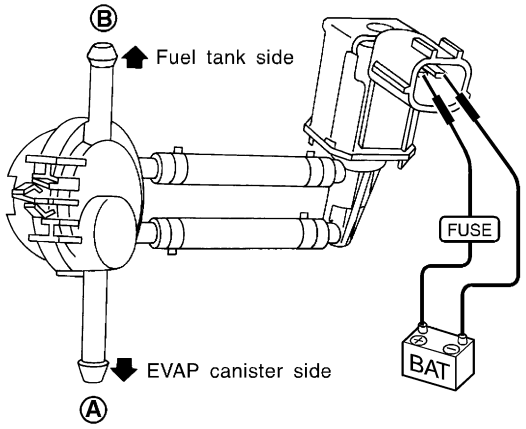
OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 5.

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

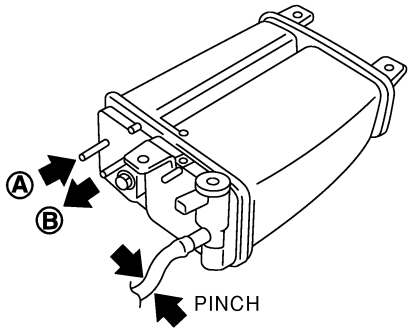
OK or NG

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**.		



SEF494Y

OK or NG		
OK	▶	GO TO 12.
NG	▶	Replace EVAP canister.

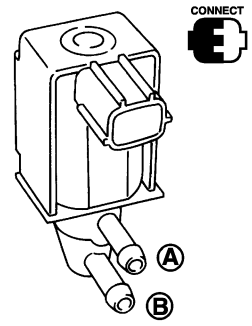
7	CHECK BYPASS HOSE	
Check bypass hoses for clogging.		
OK or NG		
OK	▶	GO TO 8.
NG	▶	Repair or replace hoses.

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
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN
THRTL POS SEN	X.XX V

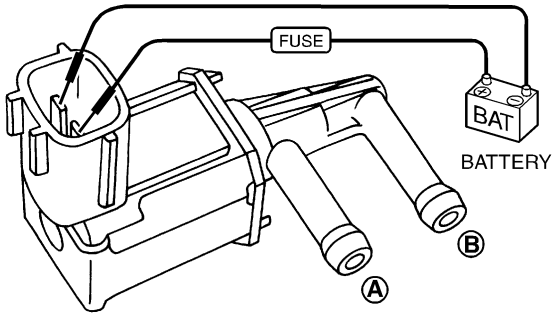
Condition VC/V BYPASS/V	Air passage continuity between A and B
ON	Yes
OFF	No

Operation takes less than 1 second.

SEF641Y

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.

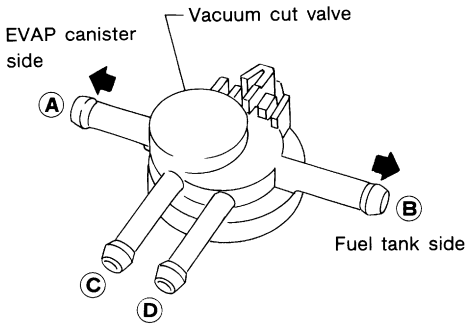
SEF358X

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

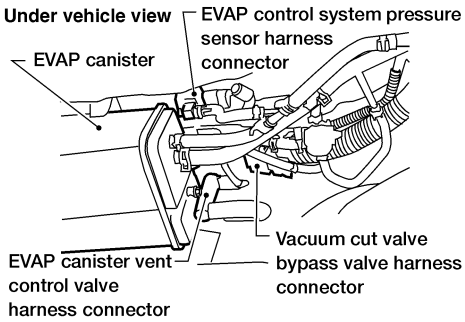
1. Turn ignition switch "OFF".
2. Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.

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.



WEC255

2. Check connectors for water.
Water should not exist.

OK or NG

OK	▶	GO TO 12.
NG	▶	Replace EVAP control system pressure sensor.

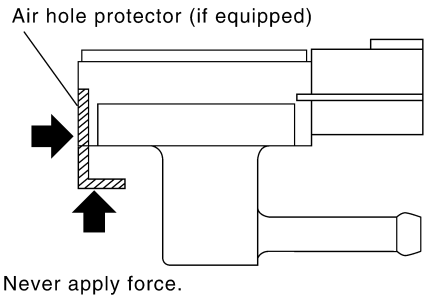
Diagnostic Procedure (Cont'd)

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.**



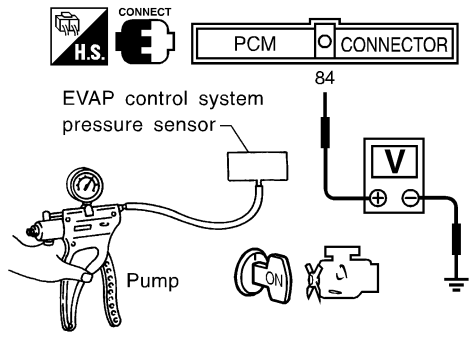
SEF799W

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 PCM 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

SEF674Y

CAUTION:

- **Discard any 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

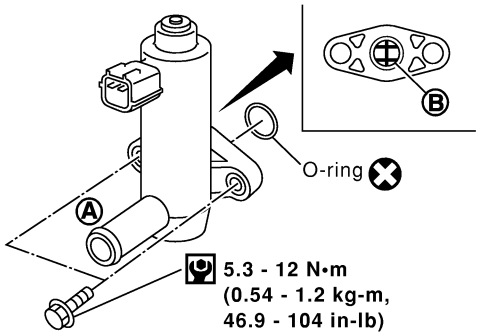
1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

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.



SEF376Z

OK or NG

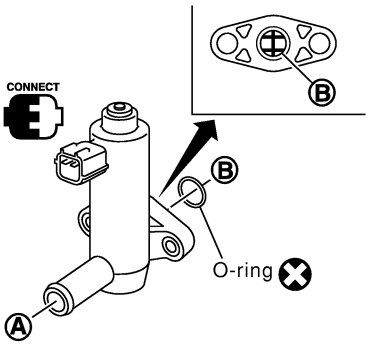
OK	▶	GO TO 15.
NG	▶	Replace EVAP canister vent control valve.

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
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN
THRTL POS SEN	XXX V



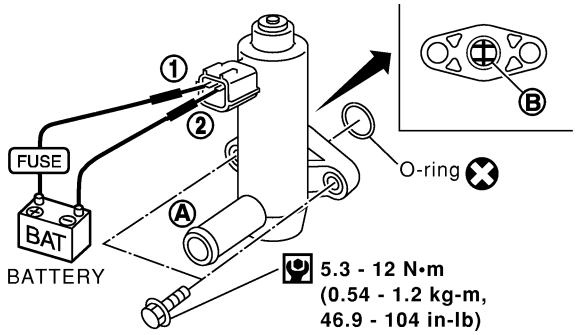
Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

SEF377Z

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.

SEF378Z

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-169.		
	▶	**INSPECTION END**

System Description

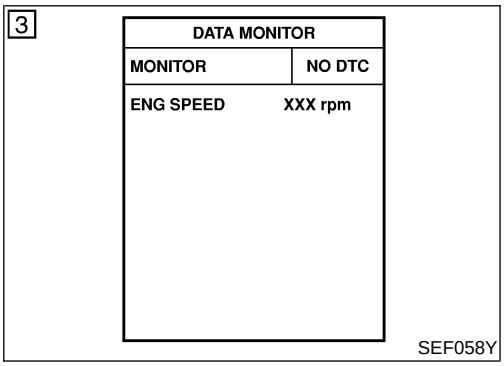
NIEC0418

The malfunction information related to A/T (Automatic Transaxle) is transferred from A/T control part of PCM. Therefore, be sure to erase the malfunction information such as DTC not only in TCM (Transmission Control Module) but also PCM after the A/T related repair.

On Board Diagnosis Logic

NIEC0420

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1605	• An incorrect signal from A/T control part of PCM is sent to Engine control part of PCM.	• PCM • PCM harness connector



DTC Confirmation Procedure

NIEC0421

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 the battery voltage is more than 10.5V with the ignition switch "ON".

With CONSULT-II

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Start engine and let it idle for at least 40 seconds.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-657.

With GST

Follow the procedure "With CONSULT-II" above.

Diagnostic Procedure

NIEC0423

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-474.
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-474.
5. Is the 1st trip DTC P0605 displayed again?

Yes or No

Yes	▶	GO TO 2.
No	▶	**INSPECTION END**

Diagnostic Procedure (Cont'd)

2	CHECK PCM HARNESS CONNECTOR

1. Turn ignition switch "OFF".
2. Disconnect battery negative cable.
3. Remove PCM. Refer to "PCM Terminals and Reference Value", EC-156, for instruction of the PCM.
4. Check PCM harness connector for loose fitting.
5. Is the PCM harness connector fastened securely?

OK or NG

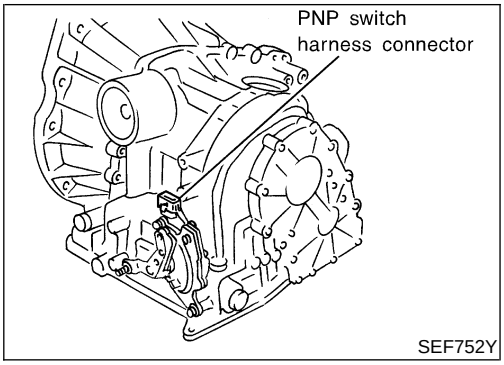
YES	▶	GO TO 3.
NO	▶	Repair.

3	REPLACE PCM

1. Replace PCM.
2. Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs. Refer to "NVIS (NISSAN VEHICLE IMMOBILIZER SYSTEM — NATS)", EC-100.
3. Perform "Idle Air Volume Learning", EC-83,
   Which is the result CMPLT or INCMP?

CMPLT or INCMP

CMPLT	▶	**INSPECTION END**
INCMP	▶	Follow the instruction of "Idle Air Volume Learning".



Component Description

NIEC0424

When the gear position is “P” (A/T models only) or “N”, park/neutral position (PNP) switch is “ON”.
PCM detects the park/neutral position when continuity with ground exists.

CONSULT-II Reference Value in Data Monitor Mode

NIEC0425

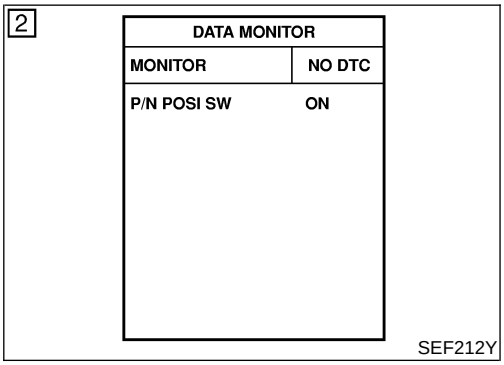
Specification data are reference values.

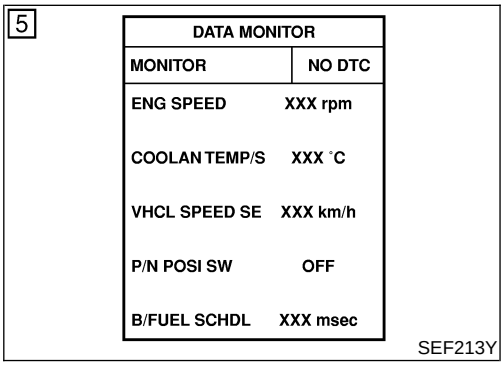
MONITOR ITEM	CONDITION		SPECIFICATION
P/N POSI SW	• Ignition switch: ON	Shift lever: “P” or “N”	ON
		Except above	OFF

On Board Diagnosis Logic

NIEC0427

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1706	• The signal of the PNP switch is not changed in the process of engine starting and driving.	• Harness or connectors (The PNP switch circuit is open or shorted.) • PNP switch





DTC Confirmation Procedure

NIEC0428

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

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” (A/T only) position	ON
Except the above position	OFF

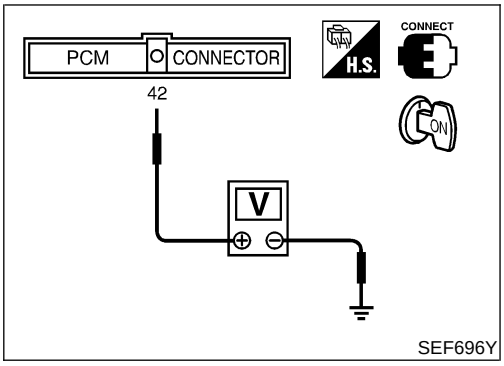
If NG, go to “Diagnostic Procedure”, EC-662.
If OK, go to following step.

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 50 consecutive seconds.

ENG SPEED	1,550 - 3,450 rpm (A/T) 1,850 - 4,100 rpm (M/T)
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	3.0 - 12.5 msec (A/T) 2.8 - 10.0 msec (M/T)
VHCL SPEED SE	64 - 130 km/h (40 - 81 MPH)
Selector lever	Suitable position

6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-662.



Overall Function Check

NIEC0429

Use this procedure to check the overall function of the park/neutral position switch circuit. During this check, a 1st trip DTC might not be confirmed.

Without CONSULT-II

1) Turn ignition switch "ON".
2) Check voltage between PCM terminal 42 (PNP switch signal) and body ground under the following conditions.

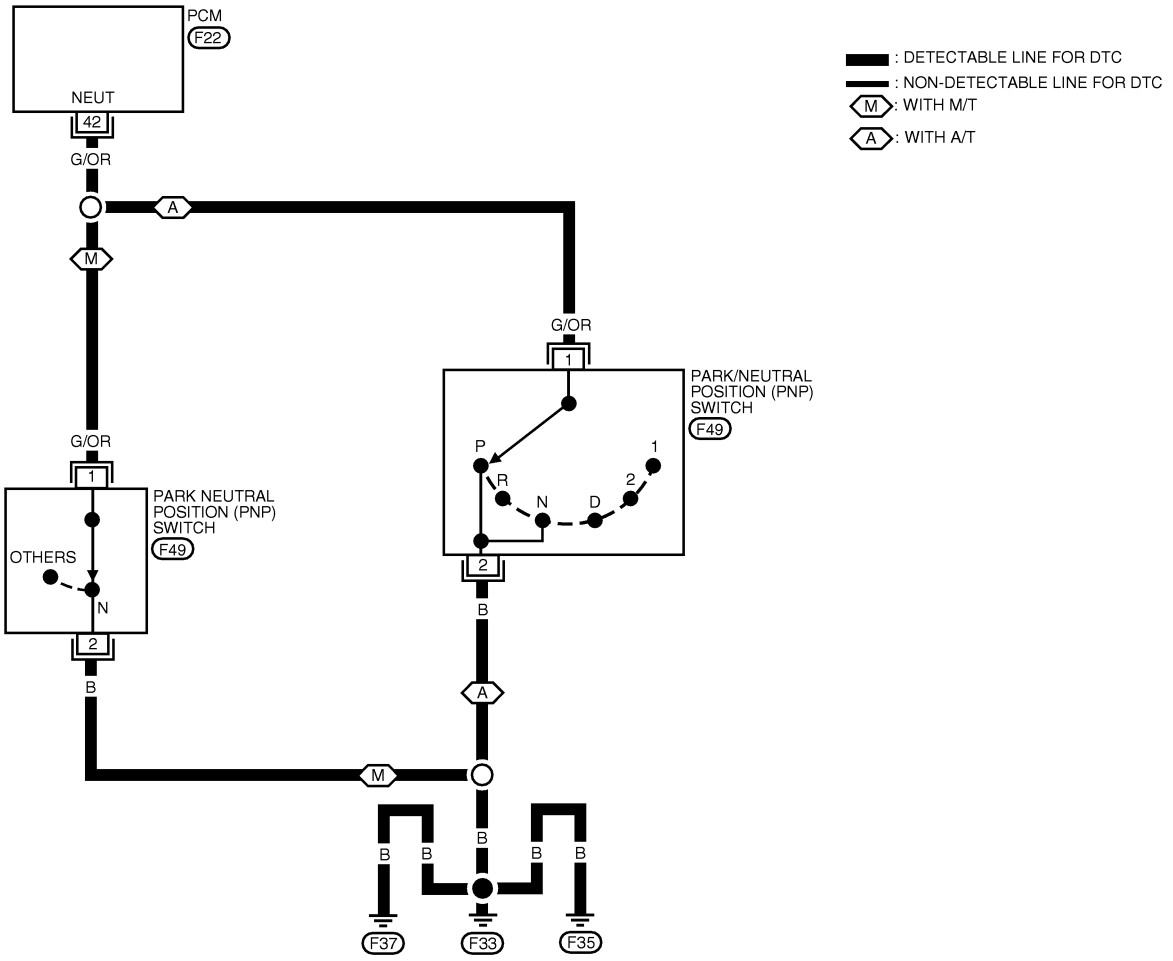
Condition (Gear position)	Voltage (V) (Known good data)
"P" (A/T only) and "N" position	Approx. 0
Except the above position	BATTERY VOLTAGE (11 - 14V)

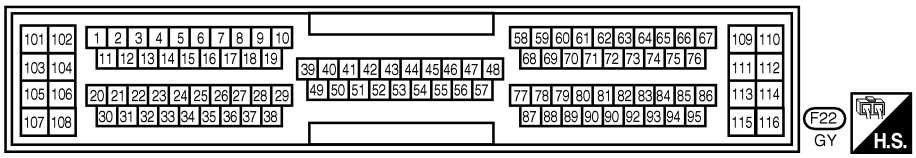
3) If NG, go to "Diagnostic Procedure", EC-662.

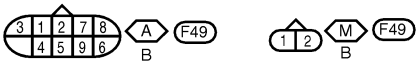
Wiring Diagram

NIEC0430

EC-PNP/SW-01







LEC176

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

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
42	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

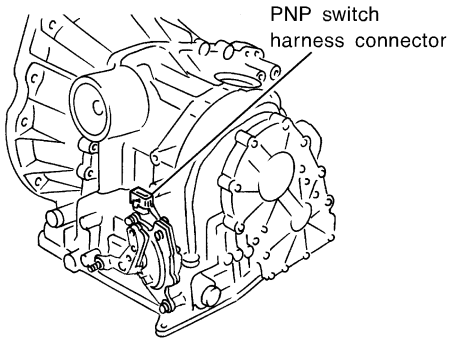
SEF206Z

Diagnostic Procedure For M/T Models

NIEC0431

1	CHECK GROUND CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect PNP switch harness connector.



SEF752Y

3. Check harness continuity between PNP switch terminal 2 and body ground.
   Refer to “Wiring Diagram”, EC-661.
   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 harness for open or short between PNP switch and body ground.

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

3	CHECK INPUT SIGNAL CIRCUIT

1. Disconnect PCM harness connector.
2. Check harness continuity between PCM terminal 42 and PNP switch terminal 1.
   Refer to “Wiring Diagram”, EC-661.
   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 harness for open or short between PCM and PNP switch.

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

5	CHECK PNP SWITCH

Refer to ***MT-10***, “Position Switch Check”.

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace PNP switch.

6	**CHECK INTERMITTENT INCIDENT**
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-169.	
▶	**INSPECTION END**

Diagnostic Procedure For A/T Models

=NIEC0432

1	CHECK GROUND CIRCUIT
1. Turn ignition switch “OFF”. 2. Disconnect PNP switch harness connector. 3. Check continuity between PNP switch terminal 2 and ground with CONSULT-II or tester. Refer to “Wiring Diagram”, EC-661. **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.

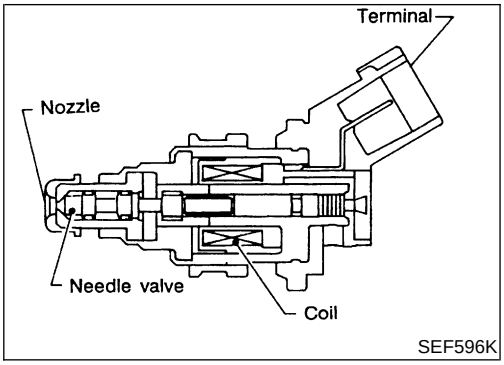
2	DETECT MALFUNCTIONING PART
Check the harness for open or short between PNP switch and body ground.	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

3	CHECK INPUT SIGNAL CIRCUIT
1. Disconnect PCM harness connector. 2. Check harness continuity between PCM terminal 42 and PNP switch terminals 1. Refer to “Wiring Diagram”, EC-661. **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 harness for open or short between PNP switch and PCM.	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK PNP SWITCH
Refer to ***AT-275***, “Diagnostic Procedure”.	
OK or NG	
OK ▶	GO TO 6.
NG ▶	Replace PNP switch.

6	CHECK INTERMITTENT INCIDENT
Perform “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-169.	
▶	**INSPECTION END**



Component Description

NIEC0435

The fuel injector is a small, precise solenoid valve. When the PCM 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 PCM controls the injection pulse duration based on engine fuel needs.

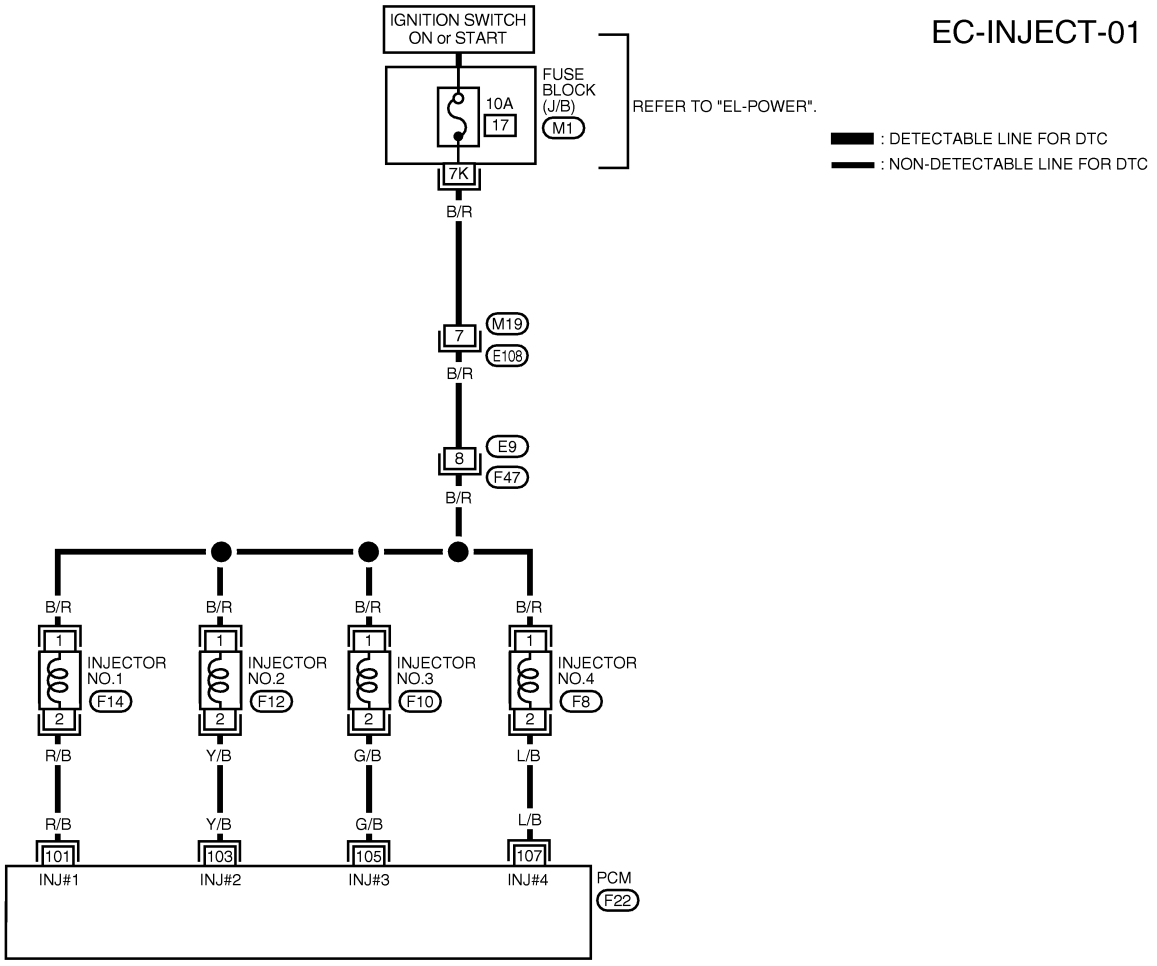
CONSULT-II Reference Value in Data Monitor Mode

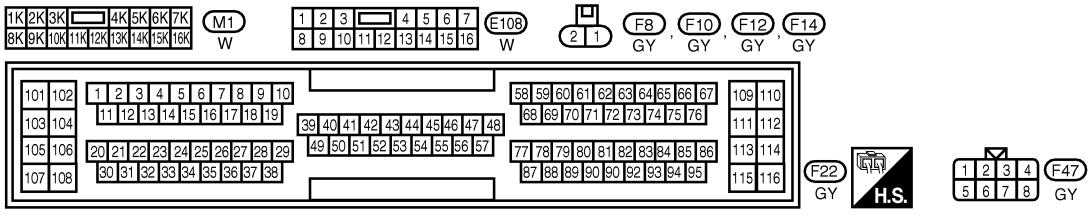
NIEC0436

MONITOR ITEM	CONDITION		SPECIFICATION
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 - 3.2 msec
B/FUEL SCHDL	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: “N” ● No-load	Idle	1.0 - 1.6 msec
		2,000 rpm	0.7 - 1.3 msec

Wiring Diagram

NIEC0434





LEC181

PCM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE PCM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE PCM'S TRANSISTOR. USE A GROUND OTHER THAN PCM 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 (V) 40 20 0 — 20 ms
103	Y/B	INJECTOR NO. 2		
105	G/B	INJECTOR NO. 3		
107	L/B	INJECTOR NO. 4		
			ENGINE RUNNING AT 2,000 RPM UNDER WARM-UP CONDITION	BATTERY VOLTAGE (V) 40 20 0 — 20 ms

SEF207Z

Diagnostic Procedure

NIEC0438

1	CHECK OVERALL FUNCTION

With CONSULT-II

1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-II.

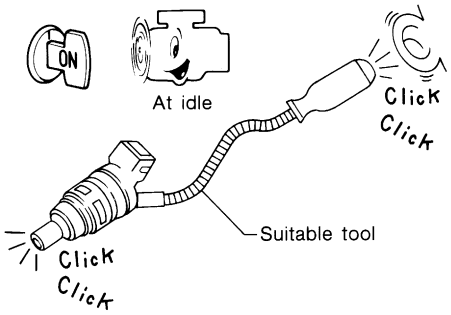
ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
IACV-AAC/V	XXX step

SEF190Y

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.

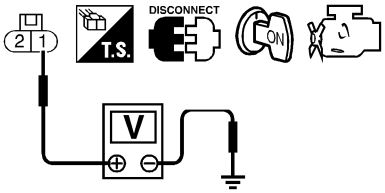
OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 2.

Diagnostic Procedure (Cont'd)

2	CHECK POWER SUPPLY

1. Stop engine.
2. Disconnect injector harness connector.
3. Turn ignition switch "ON".
4. Check voltage between injector terminal 1 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF949X

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	DETECT MALFUNCTIONING PART

Check the following.
- 10A fuse
- Harness connectors M19, E108
- Harness connectors E9, F47
- Harness for open or short between injector and fuse

	▶	Repair harness or connectors.

4	CHECK OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between injector harness connector terminal 2 and ECM terminals 101, 103, 105, 107. Refer to "Wiring Diagram", EC-666.
   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.

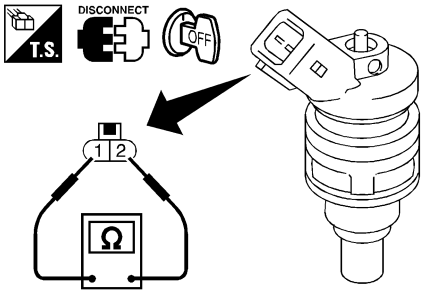
5	DETECT MALFUNCTIONING PART

Check the harness for open or short between ECM and injector.

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

6	CHECK INJECTOR

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



Resistance: 13.5 - 17.5 Ω [at 20°C (68°F)]

SEF964XA

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace injector.

7	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-169.	
▶	**INSPECTION END**

CONSULT-II Reference Value in Data Monitor Mode

NIEC0441

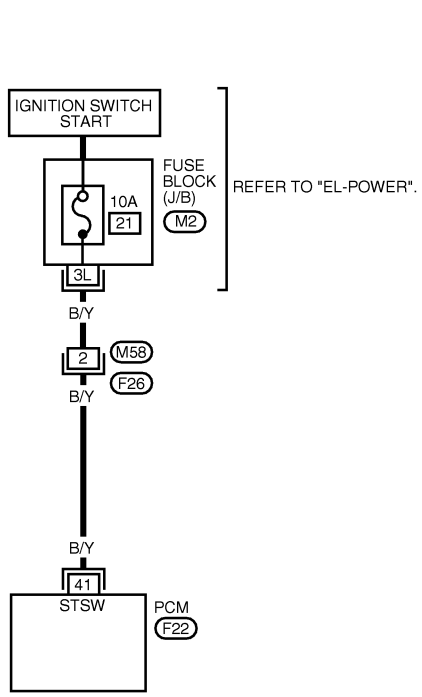
Specification data are reference values.

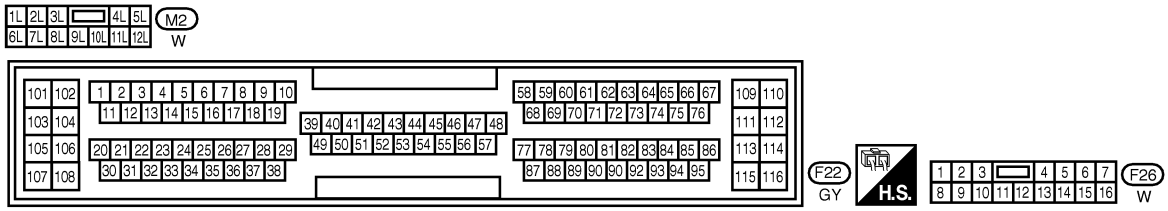
MONITOR ITEM	CONDITION	SPECIFICATION
START SIGNAL	● Ignition switch: ON → START → ON	OFF → ON → OFF

Wiring Diagram

=NIEC0440

EC-S/SIG-01





LEC155

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

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
41	B/Y	START SIGNAL	IGN ON	APPROX. 0V
			IGN START	9 - 14V

SEF208Z

Diagnostic Procedure

=NIEC0443

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	
MONITORING	NO FAIL
START SIGNAL	OFF
CLSD TH/P SW	ON
AIR COND SIG	OFF
P/N POSI SW	ON

Condition	“START SIGNAL”
Ignition switch “ON”	OFF
Ignition switch “START”	ON

SEF604X

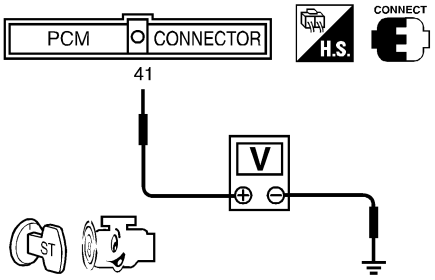
OK or NG

OK ▶	**INSPECTION END**
NG ▶	GO TO 4.

3	CHECK OVERALL FUNCTION

Without CONSULT-II

1. Turn ignition switch to “START”.
2. Check voltage between PCM terminal 41 and ground under the following conditions.



SEF697Y

Condition	Voltage
Ignition switch “START”	Battery voltage
Except above	Approximately 0V

MTBL0143

OK or NG

OK ▶	**INSPECTION END**
NG ▶	GO TO 4.

4	DETECT MALFUNCTIONING PART	
Check the following. ● Harness connectors M58, F26 ● 10A fuse ● Harness for open or short between PCM and fuse		
OK or NG		
OK	▶	GO TO 5.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK INTERMITTENT INCIDENT	
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-169.		
	▶	**INSPECTION END**

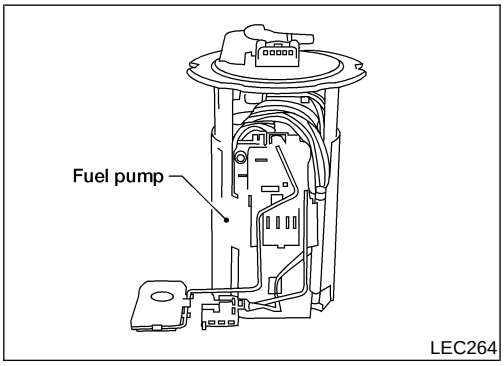
System Description

NIEC0444

Sensor	Input Signal to PCM	PCM function	Actuator
Crankshaft position sensor (POS)	Engine speed	Fuel pump control	Fuel pump relay
Camshaft position sensor (PHASE)	Engine speed and cylinder number		
Ignition switch	Start signal		

The PCM activates the fuel pump for several seconds after the ignition switch is turned on to improve engine startability. If the PCM receives a 180° signal from the camshaft position sensor (PHASE), it knows that the engine is rotating, and causes the pump to perform. If the 180° signal is not received when the ignition switch is on, the engine stalls. The PCM stops pump operation and prevents battery discharging, thereby improving safety. The PCM does not directly drive the fuel pump. It controls the ON/OFF fuel pump relay, which in turn controls the fuel pump.

Condition	Fuel pump operation
Ignition switch is turned to ON.	Operates for 5 seconds
Engine running and cranking	Operates
When engine is stopped	Stops in 1 second
Except as shown above	Stops



Component Description

NIEC0501

A turbine type design fuel pump is used in the fuel tank.

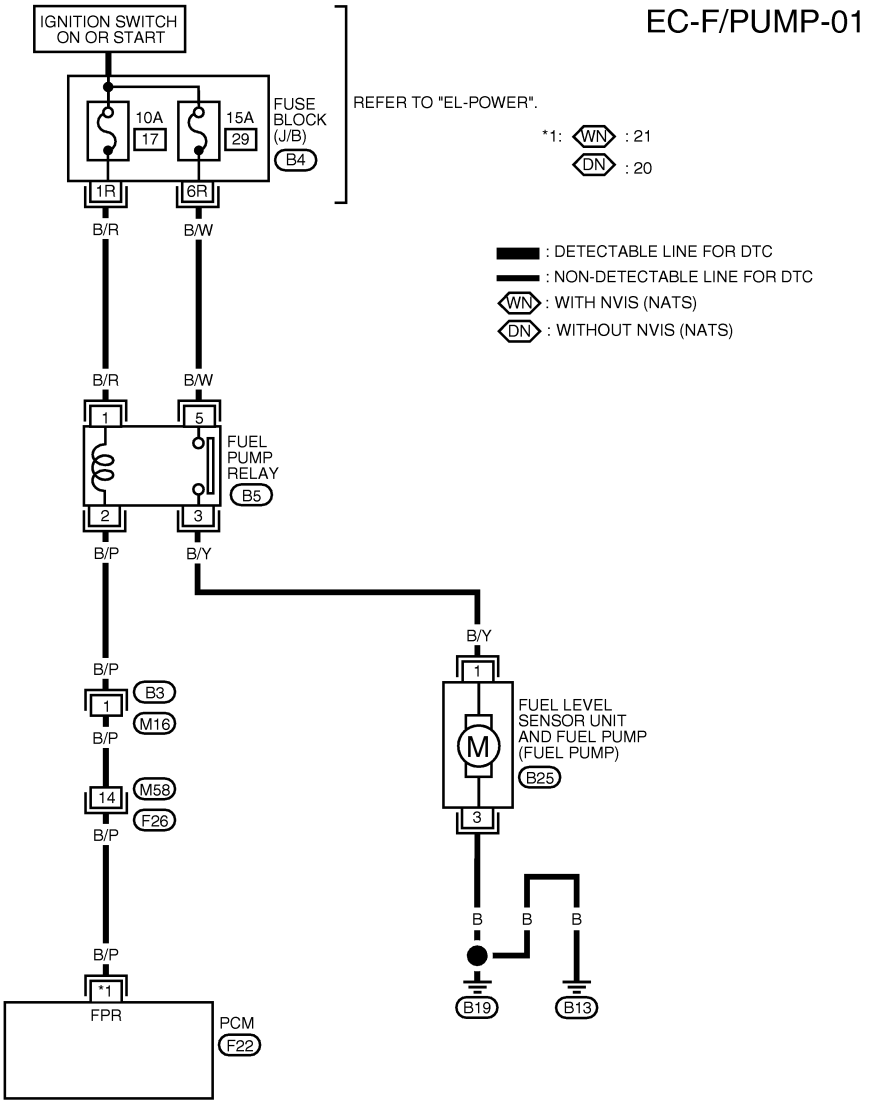
CONSULT-II Reference Value in Data Monitor Mode

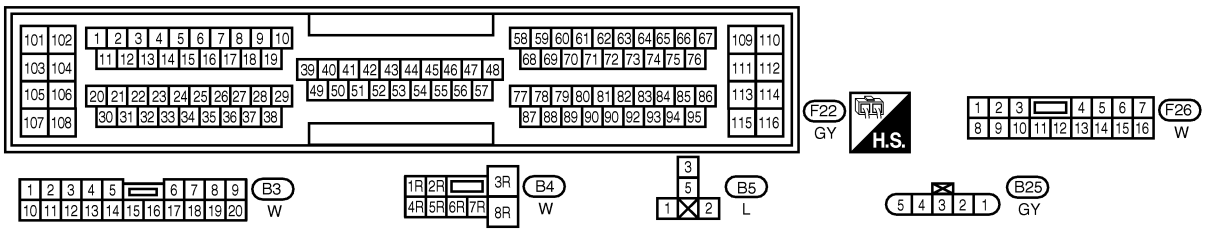
NIEC0445

MONITOR ITEM	CONDITION	SPECIFICATION
FUEL PUMP RLY	● Ignition switch is turned to ON (Operates for 5 seconds) ● Engine running and cranking ● When engine is stopped (stops in 1.0 seconds)	ON
	● Except as shown above	OFF

Wiring Diagram

NIEC0447





LEC182

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

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
20 WITHOUT NVIS (NATS)	B/P	FUEL PUMP RELAY	FOR 5 SECONDS AFTER IGN ON	0 - 1V
21 WITH NVIS (NATS)	B/P		ENGINE RUNNING	BATTERY VOLTAGE
			MORE THAN 5 SECONDS AFTER IGN ON	

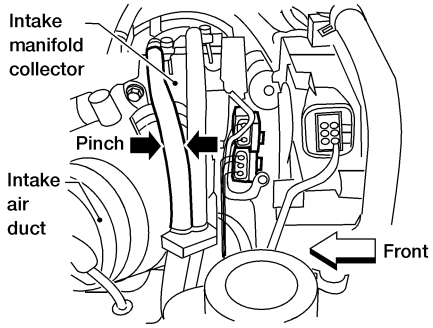
SEF209Z

Diagnostic Procedure

NIEC0448

1	CHECK OVERALL FUNCTION

1. Turn ignition switch “ON”.
2. Pinch fuel feed hose with fingers.



LEC262

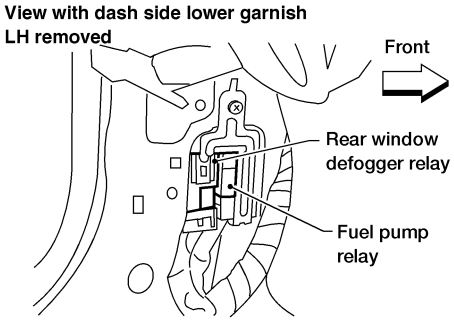
Fuel pressure pulsation should be felt on the fuel feed hose for 5 seconds after ignition switch is turned “ON”.

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 2.

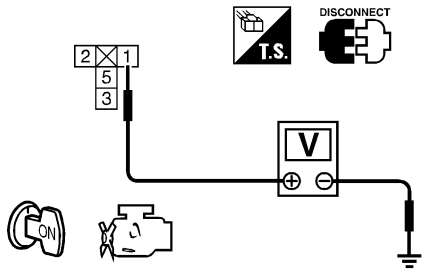
2	CHECK POWER SUPPLY-I

1. Turn ignition switch “OFF”.
2. Disconnect fuel pump relay.



LEC363

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



Voltage: Battery voltage

SEF495Y

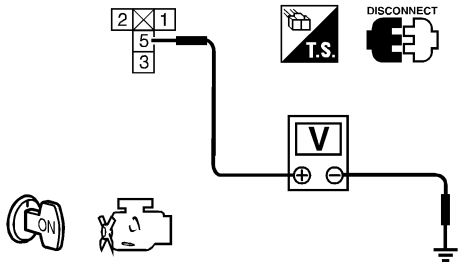
OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	DETECT MALFUNCTIONING PART
Check the following. ● 10A fuse ● Harness for open or short between fuse and fuel pump relay	
▶	Repair harness or connectors.

4	CHECK POWER SUPPLY-II

1. Check voltage between fuel pump relay terminal 5 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF496Y

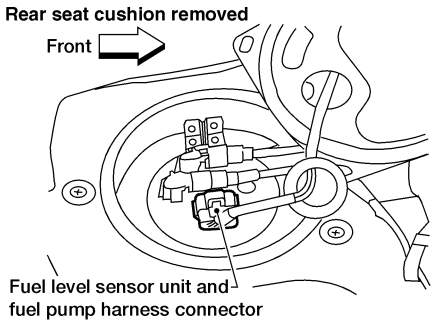
OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART
Check the following. ● 15A fuse ● Harness for open or short between fuse and fuel pump relay	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK POWER GROUND CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect fuel pump harness connector.



WEC265

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", EC-675.
   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.

Diagnostic Procedure (Cont'd)

7	DETECT MALFUNCTIONING PART
Check the following. ● Harness for open or short between fuel pump and body ground ● Harness for open or short between fuel pump and fuel pump relay	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

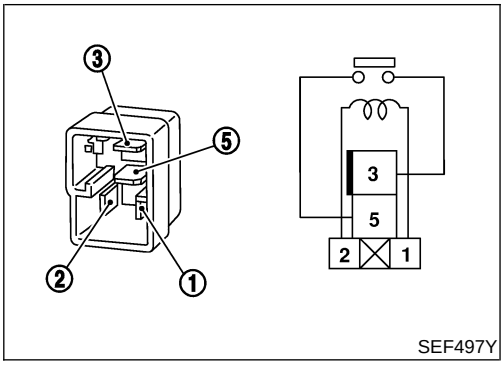
8	CHECK OUTPUT SIGNAL CIRCUIT
1. Disconnect PCM harness connector. 2. Check harness continuity between PCM terminal 20 (without NVIS) or 21 (with NVIS) and fuel pump relay connector terminal 2. Refer to "Wiring Diagram", EC-675. **Continuity should exist.** 3. Also check harness for short to ground and short to power.	
OK or NG	
OK ▶	GO TO 10.
NG ▶	GO TO 9.

9	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors B3, M16 ● Harness connector M58, F26 ● Harness for open or short between PCM and fuel pump relay	
NG ▶	Repair open circuit or short to ground or short to power in harness or connectors.

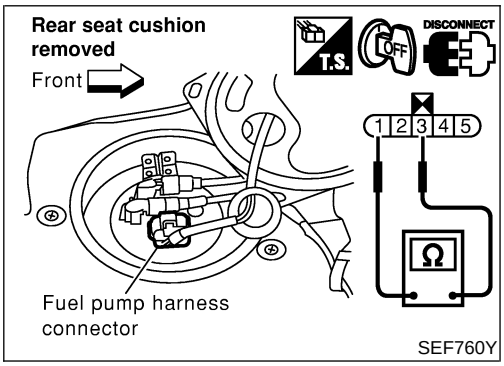
10	CHECK FUEL PUMP RELAY
Refer to "Component Inspection", EC-679.	
OK or NG	
OK ▶	GO TO 11.
NG ▶	Replace fuel pump relay.

11	CHECK FUEL PUMP
Refer to "Component Inspection", EC-679.	
OK or NG	
OK ▶	GO TO 12.
NG ▶	Replace fuel pump.

12	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-169.	
▶	**INSPECTION END**



SEF497Y



SEF760Y

Component Inspection

=NIEC0449

FUEL PUMP RELAY

NIEC0449S01

Check continuity between terminals 3 and 5.

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

If NG, replace relay.

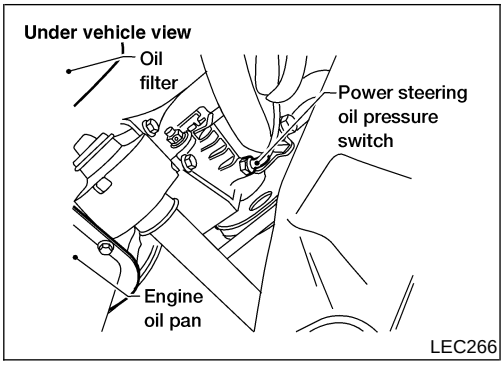
FUEL PUMP

NIEC0449S02

1. Disconnect fuel pump harness connector.
2. Check resistance between terminals 1 and 2.

Resistance: 0.2 - 5.0Ω [at 25°C (77°F)]

If NG, replace fuel pump.



Component Description

NIEC0451

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 PCM. The PCM adjusts the IACV-AAC valve to increase the idle speed and adjust for the increased load.

CONSULT-II Reference Value in Data Monitor Mode

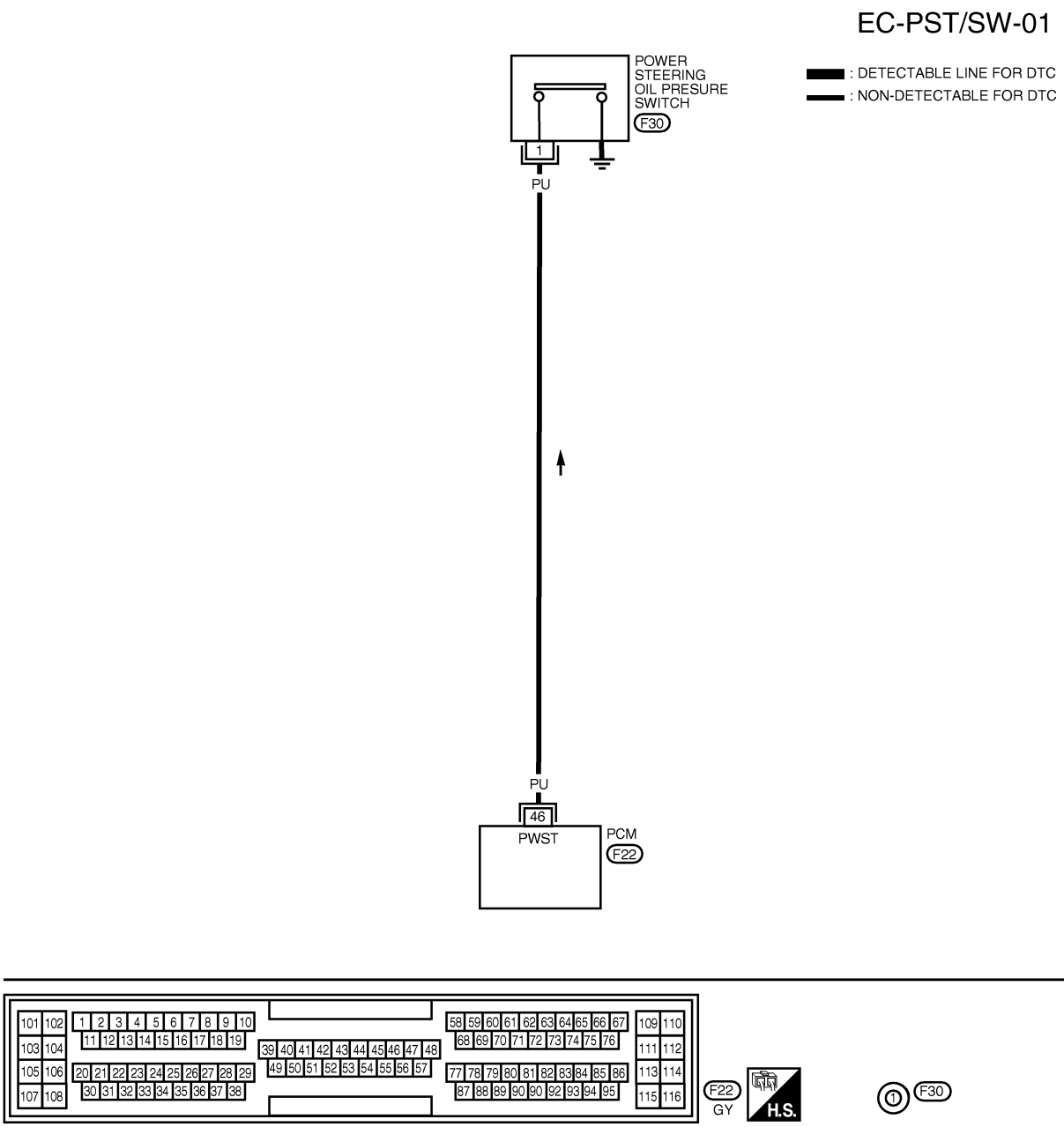
NIEC0452

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

NIEC0450



LEC377

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

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
46	PU/W	POWER STEERING OIL PRESSURE SWITCH	ENGINE RUNNING WITH STEERING WHEEL BEING FULLY TURNED	APPROX. 0V
			ENGINE RUNNING WITH STEERING WHEEL NOT BEING TURNED	APPROX. 5V

SEF210Z

Diagnostic Procedure

=NIEC0454

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

Steering is in neutral position	OFF
Steering is turned	ON

SEF228Y

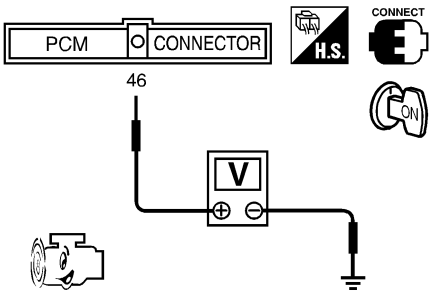
OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 4.

3	CHECK OVERALL FUNCTION

Without CONSULT-II

1. Start engine.
2. Check voltage between PCM terminal 46 and ground under the following conditions.



SEF698Y

Condition	Voltage
When steering wheel is turned quickly	Approximately 0V
Except above	Approximately 5V

MTBL0142

OK or NG

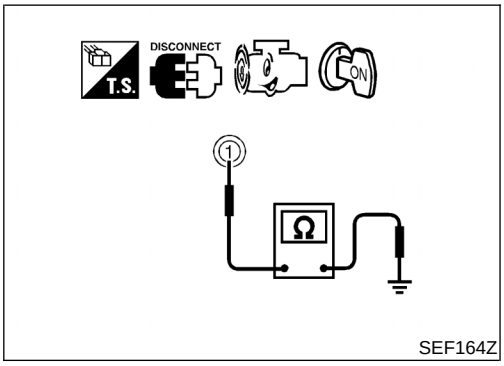
OK	▶	**INSPECTION END**
NG	▶	GO TO 4.

4	CHECK INPUT SIGNAL CIRCUIT
1. Disconnect PCM harness connector. 2. Check harness continuity between PCM terminal 46 and terminal 1. Refer to "Wiring Diagram", EC-681. **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 harness for open or short between PCM and power steering oil pressure switch.	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK POWER STEERING OIL PRESSURE SWITCH
Refer to "Component Inspection", EC-683.	
OK or NG	
OK ▶	GO TO 7.
NG ▶	Replace power steering oil pressure switch.

7	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-169.	
▶	**INSPECTION END**



SEF164Z

Component Inspection

NIEC0455

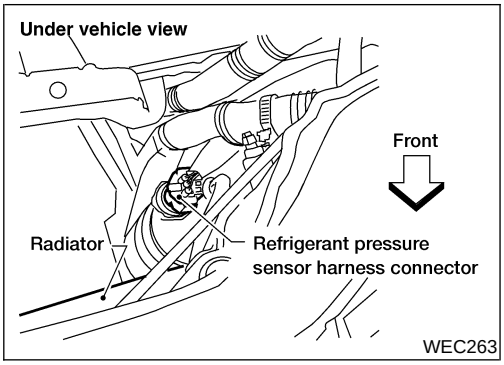
POWER STEERING OIL PRESSURE SWITCH

NIEC0455S01

1. Turn ignition switch "OFF".
2. Disconnect power steering oil pressure switch harness connector.
3. Start engine.
4. Check continuity between terminal 1 and body ground.

Conditions	Continuity
Steering wheel is being turned	Yes
Steering wheel is not being turned	No

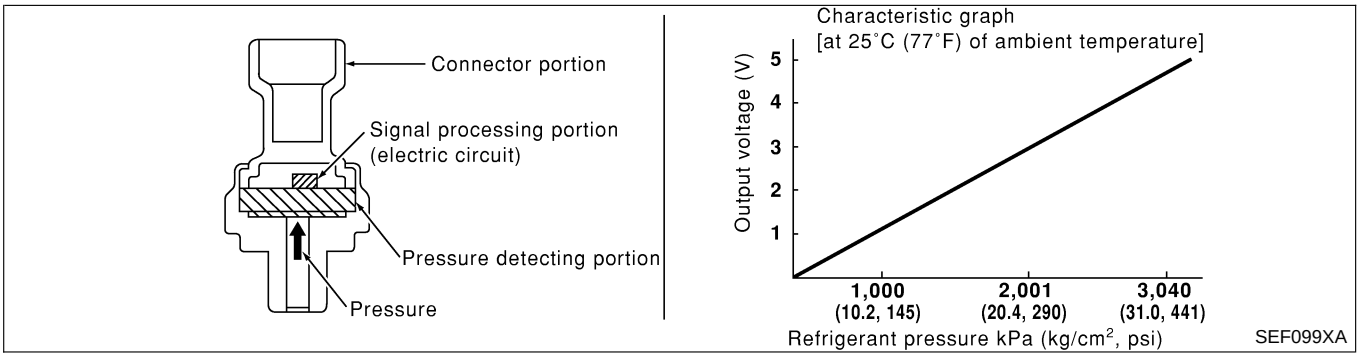
If NG, replace power steering oil pressure switch.



Description

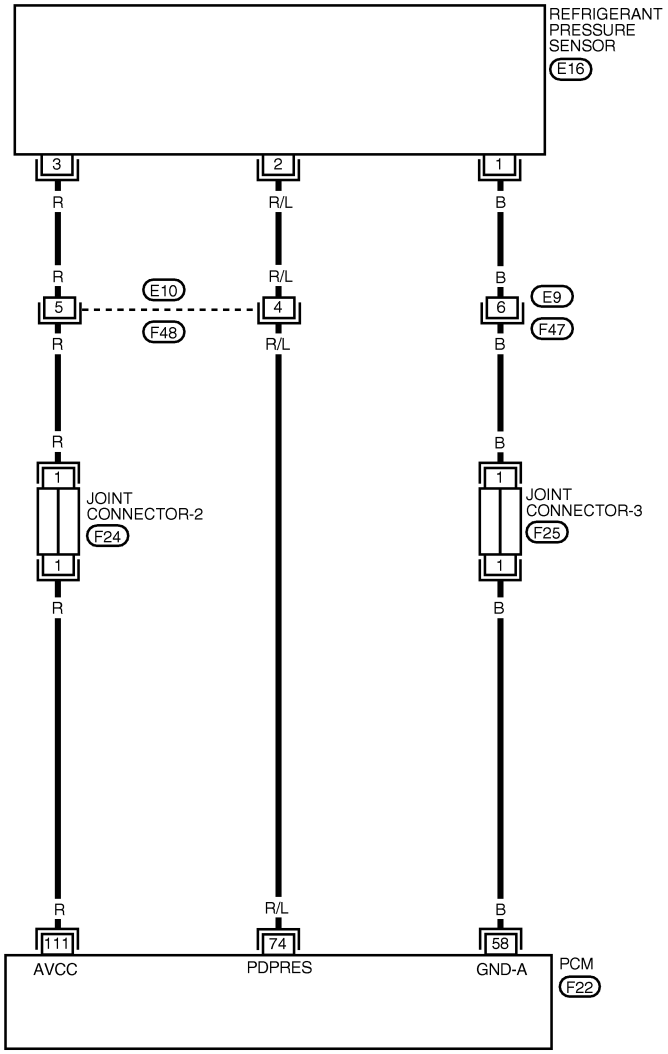
NIEC0638

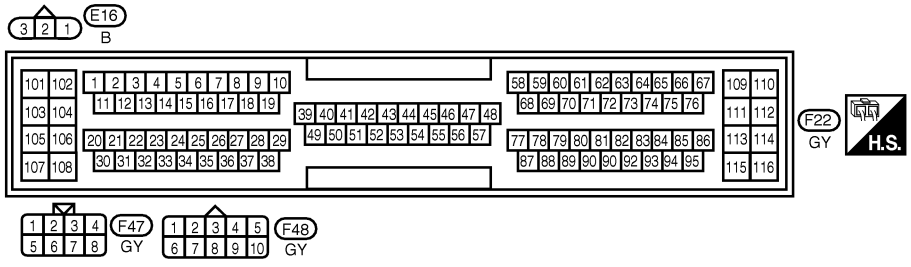
The refrigerant pressure sensor is installed at the liquid tank of the air conditioner system. The sensor uses an electrostatic volume pressure transducer to convert refrigerant pressure to voltage. The voltage signal is sent to PCM, and PCM controls cooling fan system.



Wiring Diagram

NIEC0639





Refer to the following.

F24, F25 - JOINT CONNECTOR

LEC189

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

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
58	B	SENSOR'S GROUND	IGN ON	APPROX. 0V
74	R/L	REFRIGERANT PRESSURE SENSOR	ENGINE RUNNING UNDER WARM-UP CONDITION WITH A/C SWITCH AND BLOWER SWITCH ON	0.36 - 3.88V
111	R	SENSOR'S POWER SUPPLY	IGN ON	APPROX. 5V

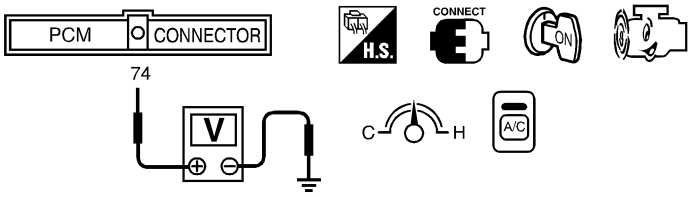
SEF211Z

Diagnostic Procedure

NIEC0640

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 PCM terminal 74 and ground with CONSULT-II or tester.



Voltage: 1.0 - 4.0V

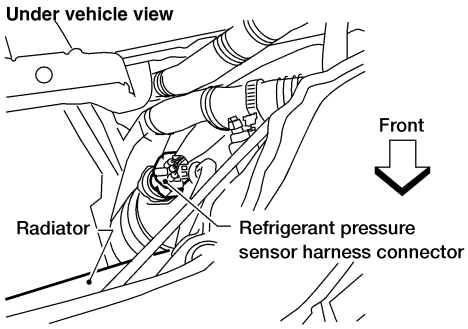
SEF699Y

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 2.

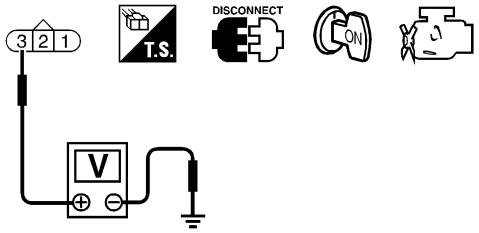
2	CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn A/C switch and blower switch “OFF”.
2. Stop engine.
3. Disconnect refrigerant pressure sensor harness connector.



WEC263

4. Turn ignition switch “ON”.
5. Check voltage between refrigerant pressure sensor terminal 3 and ground with CONSULT-II or tester.



Voltage: Approximately 5V

SEF953X

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E10, F48 ● Joint connector-2 ● Harness for open or short between PCM 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 1 and engine ground. Refer to "Wiring Diagram", EC-685. **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 E9, F47 ● Joint connector-3 ● Harness for open or short between PCM 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 PCM harness connector. 2. Check harness continuity between PCM terminal 74 and refrigerant pressure sensor terminal 2. Refer to "Wiring Diagram", EC-685. **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 E10, F48 ● Harness for open or short between PCM 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-49***, "Refrigerant pressure sensor".	
OK or NG	
OK ▶	GO TO 9.
NG ▶	Replace refrigerant pressure sensor.

Diagnostic Procedure (Cont'd)

9	**CHECK INTERMITTENT INCIDENT**
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-169.	
▶	**INSPECTION END**

CONSULT-II Reference Value in Data Monitor Mode

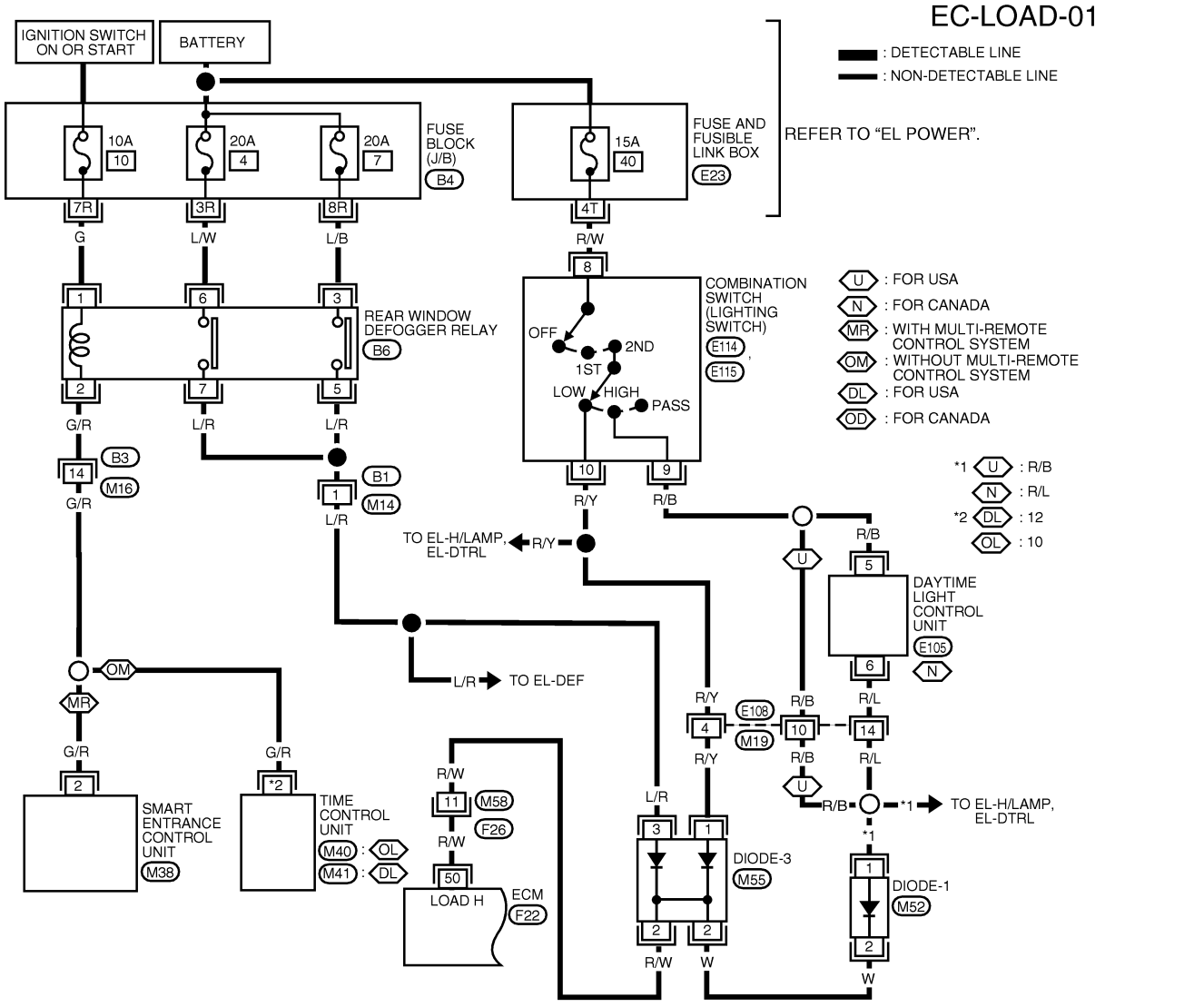
NIEC0664

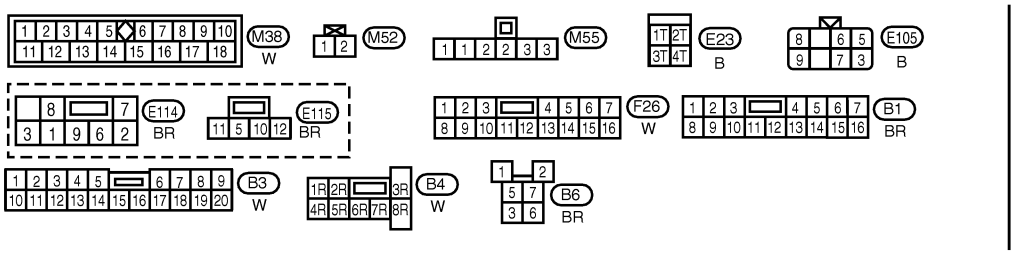
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
LOAD SIGNAL	• Ignition switch: ON	Rear window defogger switch and/or lighting switch “ON”	ON
		Rear window defogger switch and lighting switch “OFF”	OFF

Wiring Diagram

=NIEC0641





REFER TO THE FOLLOWING.
F22, M40, M41 - ELECTRICAL UNITS

LEC173

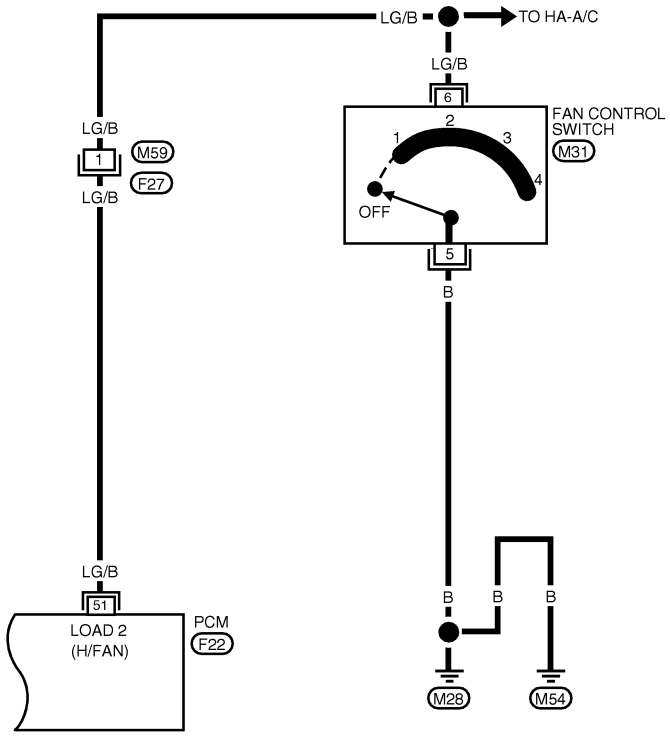
PCM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE PCM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE PCM'S TRANSISTOR. USE A GROUND OTHER THAN PCM TERMINALS, SUCH AS THE GROUND.

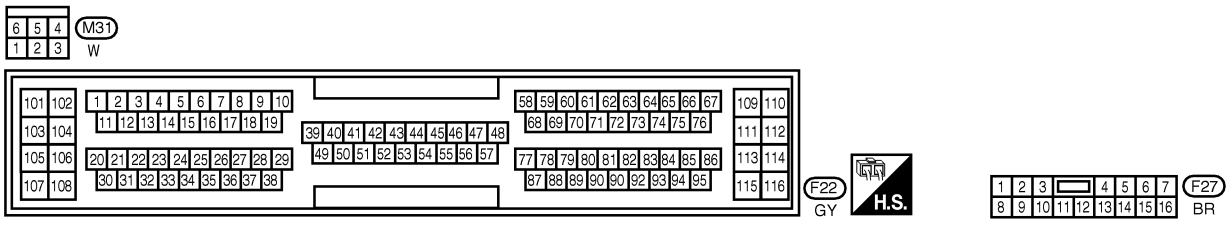
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
50	R	ELECTRICAL LOAD SIGNAL	IGN ON WITH REAR WINDOW DEFOGGER SWITCH ON OR LIGHTING SWITCH ON AT 2ND POSITION	BATTERY VOLTAGE
			IGN ON WITH REAR WINDOW DEFOGGER SWITCH AND LIGHTING SWITCH OFF	0V

SEF212Z

EC-LOAD-02

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





LEC174

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

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
51	LG/B	HEATER FAN SWITCH	IGN ON WITH HEATER FAN SWITCH ON	APPROX. 0V
			IGN ON WITH HEATER FAN SWITCH OFF	APPROX. 5V

SEF213Z

Diagnostic Procedure

NIEC0642

1	INSPECTION START

Do you have CONSULT-II?

Yes or No

Yes	▶	GO TO 2.
No	▶	GO TO 5.

2	CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-I

With CONSULT-II

1. Turn ignition switch “ON”.
2. Check “LOAD SIGNAL” in “DATA MONITOR” mode with CONSULT-II under the following conditions.

DATA MONITOR	
MONITOR	NO DTC
LOAD SIGNAL	ON

Rear window defogger switch "ON"	ON
Rear window defogger switch "OFF"	OFF

SEF954X

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 8.

3	CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-II

With CONSULT-II

1. Turn ignition switch “ON”.
2. Check “LOAD SIGNAL” in “DATA MONITOR” mode with CONSULT-II under the following conditions.

DATA MONITOR	
MONITOR	NO DTC
LOAD SIGNAL	ON

Lighting switch "ON" at 2nd position	ON
Lighting switch "OFF"	OFF

SEF955X

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 13.

4	CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-III

With CONSULT-II

1. Turn ignition switch "ON".
2. Check "LOAD SIGNAL" in "DATA MONITOR" mode with CONSULT-II under the following conditions.

DATA MONITOR	
MONITOR	NO DTC
LOAD SIGNAL	ON

Fan control switch "ON"	ON
Fan control switch "OFF"	OFF

SEF165Z

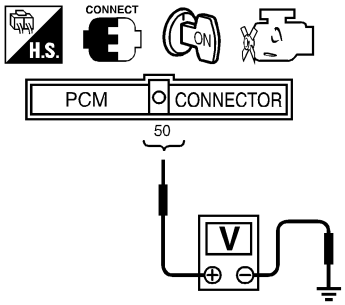
OK or NG

OK	▶	INSPECTION END.
NG	▶	GO TO 9.

5	CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-I

Without CONSULT-II

1. Turn ignition switch "ON".
2. Check voltage between PCM terminal 50 and ground under the following conditions.



Condition	Voltage
Rear window defogger switch "ON"	BATTERY VOLTAGE
Rear window defogger switch "OFF"	0V

SEF700Y

OK or NG

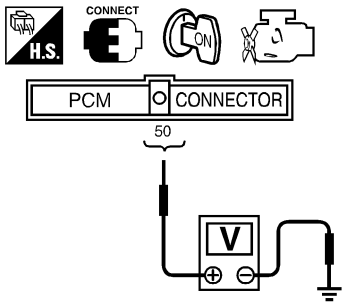
OK	▶	GO TO 6.
NG	▶	GO TO 8.

Diagnostic Procedure (Cont'd)

6	CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-II

Without CONSULT-II

1. Turn ignition switch "ON".
2. Check voltage between PCM terminal 50 and ground under the following conditions.



Condition	Voltage
Lighting switch "ON" at 2nd position	BATTERY VOLTAGE
Lighting switch "OFF"	0V

SEF701Y

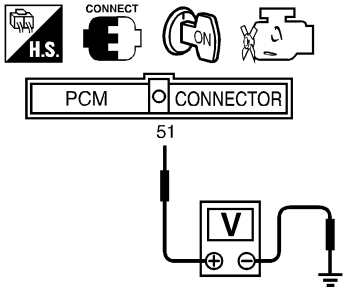
OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 13.

7	CHECK FAN CONTROL CIRCUIT OVERALL FUNCTION-III

Without CONSULT-II

1. Turn ignition switch "ON".
2. Check voltage between PCM terminal 51 and ground under the following conditions.



Condition	Voltage
Fan control switch "ON"	BATTERY VOLTAGE
Fan control switch "OFF"	0V

SEF166Z

OK or NG

OK	▶	GO TO 17.
NG	▶	GO TO 9.

8	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 10.
No	▶	Refer to ***EL-145***, "Rear Window Defogger".

9	CHECK FAN CONTROL FUNCTION

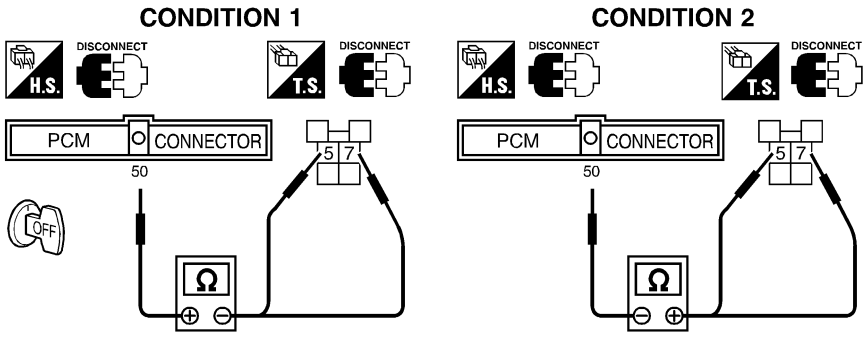
1. Start engine.
2. Turn "ON" the fan control switch.
3. Check the blower fan motor. Does the blower fan motor activate?

YES or NO

YES	▶	GO TO 17.
NO	▶	Refer to ***HA-36***, "Blower Motor".

10	CHECK REAR WINDOW DEFOGGER INPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Stop engine.
2. Disconnect PCM harness connector.
3. Disconnect rear window defogger relay.
4. Check harness continuity between PCM terminal 50 and rear window defogger relay terminals 5 and 7.



CONDITION	CONTINUITY
1	Should exist.
2	Should not exist.

SEF702Y

5. 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 B1, M14
- Harness connectors M58, F26
- Diode M55
- Harness for open and short between PCM and rear window defogger relay

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

12	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-169.

	▶	**INSPECTION END**

13	CHECK HEADLAMP FUNCTION

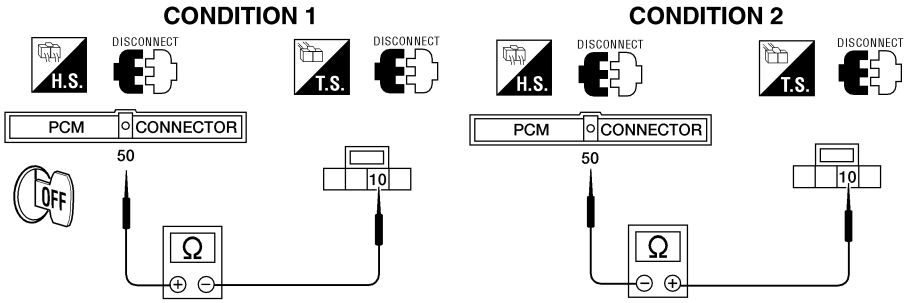
1. Start engine.
2. Turn the lighting switch "ON" at 2nd position.
3. Check that headlamps are illuminated.

OK or NG

OK	▶	GO TO 14.
NG	▶	Refer to ***EL-35***, "HEADLAMP (FOR USA)" or "***EL-40***, "HEADLAMP (FOR CANADA) — DAYTIME LIGHT SYSTEM".

14	CHECK HEADLAMP INPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Stop engine.
2. Disconnect PCM harness connector.
3. Disconnect lighting switch harness connectors.
4. Check harness continuity between PCM terminal 50 and lighting switch terminal 10 under the following conditions.



CONDITION	CONTINUITY
1	Should exist.
2	Should not exist.

LEC443

5. 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 M58, F26
- Fuse block M1, E103
- Diode M55
- Harness for open and short between ECM and lighting switch

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

16	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-169.

▶	**INSPECTION END**

17	CHECK FAN CONTROL CIRCUIT FOR OPEN OR SHORT

1. Stop engine.
2. Disconnect PCM harness connector.
3. Disconnect fan control switch harness connector.
4. Check harness continuity between PCM terminal 51 and fan control switch terminal 6.
5. Check harness continuity between fan control switch terminal 5 and body ground.
   Refer to "Wiring Diagram", EC-690.
6. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 19.
NG	▶	GO TO 18.

18	DETECT MALFUNCTIONING PART

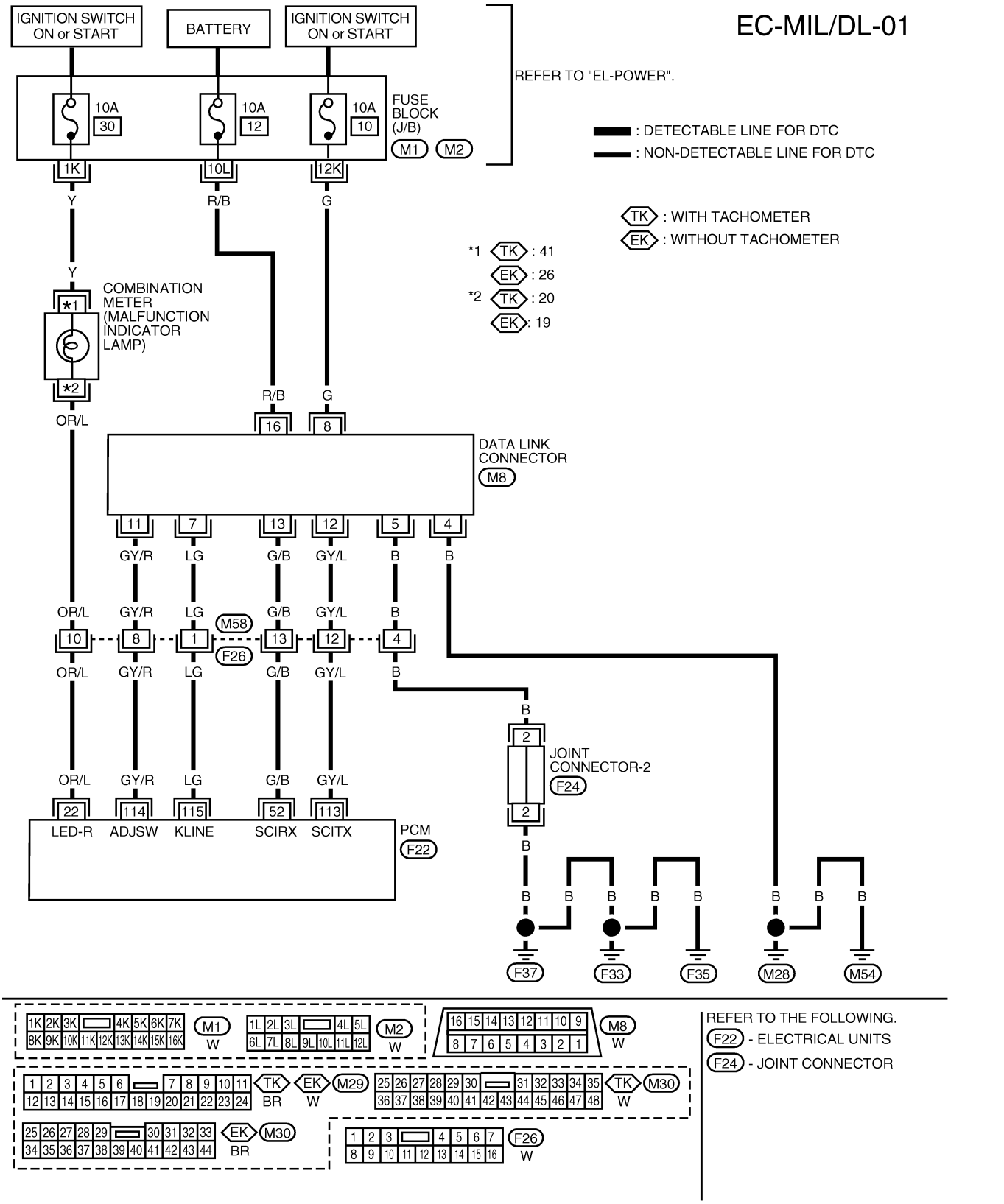
Check the following.
- Harness connectors M59, F27
- Harness for open and short between PCM and fan control switch
- Harness for open or short between fan control switch and body ground

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

19	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-169.	
▶	INSPECTION END

Wiring Diagram

NIEC0466



LEC175

Fuel Pressure Regulator

NIEC0467

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

NIEC0468

Target idle speed*1 rpm	No-load*2 (in “P” or “N” position)	M/T: 650±50 A/T: 800±50
Air conditioner: ON rpm	In “P” or “N” position	850 or more
Ignition timing*1	In “P” or “N” position	9°±2° BTDC
Throttle position sensor idle position V		0.2 - 0.8

*1: Throttle position sensor harness connector connected
*2: Under the following conditions:

- Air conditioner switch: OFF
- Electrical load: OFF (Lights & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Mass Air Flow Sensor

NIEC0470

Supply voltage V	Battery voltage (11 - 14)
Output voltage V	1.0 - 1.7*
Mass air flow (Using CONSULT-II or GST) g·m/sec	1.4 - 4.0 at idle* 5.0 - 10.0 at 2,500 rpm*

*: Engine is warmed up to normal operating temperature and idling under no-load.

Engine Coolant Temperature Sensor

NIEC0471

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

NIEC0472

EGR temperature °C (°F)	Voltage V	Resistance MΩ
0 (32)	4.56	0.62 - 1.05
50 (122)	2.25	0.065 - 0.094
100 (212)	0.59	0.011 - 0.015

Fuel Pump

NIEC0473

Resistance [at 25°C (77°F)] Ω	0.2 - 5.0

IACV-AAC Valve

NIEC0474

Resistance [at 20°C (68°F)] Ω	Approximately 22

Injector

NIEC0475

Resistance [at 20°C (68°F)] Ω	13.5 - 17.5

Resistor

NIEC0476

Resistance [at 25°C (77°F)] Ω	4 - 8

Throttle Position Sensor

NIEC0477

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

Front Heated Oxygen Sensor Heater

NIEC0478

Resistance [at 25°C (77°F)] Ω	2.3 - 4.3

Calculated Load Value

NIEC0479

	Calculated load value % (Using CONSULT-II or GST)
At idle	20.0 - 35.5
At 2,500 rpm	12.0 - 27.0

Intake Air Temperature Sensor

NIEC0480

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

EVAP Canister Purge Volume Control Valve

NIEC0481

Resistance [at 20°C (68°F)] Ω	22 - 26

Rear Heated Oxygen Sensor Heater

NIEC0483

Resistance [at 25°C (77°F)] Ω	2.3 - 4.3

Crankshaft Position Sensor (POS)

NIEC0484

Resistance [at 20°C (68°F)] Ω	166 - 204

Fuel Tank Temperature Sensor

NIEC0485

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

Alphabetical & P No. Index for DTC

NIEC1187

ALPHABETICAL INDEX FOR DTC

NIEC1187S01

Items (CONSULT-II screen terms)	DTC*1	Reference page
Unable to access ECM	—	EC-818
ABSL PRES SEN/CIRC	P0105	EC-859
AIR TEMP SEN/CIRC	P0110	EC-864
A/F SENSOR1 (B1)	P1271	EC-1193
A/F SENSOR1 (B1)	P1272	EC-1198
A/F SENSOR1 (B1)	P1273	EC-1203
A/F SENSOR1 (B1)	P1274	EC-1209
A/F SENSOR1 (B1)	P1275	EC-1215
A/F SENSOR1 (B1)	P1276	EC-1223
A/F SEN1 HTR (B1)	P1277	EC-1228
A/T 1ST GR FNCTN	P0731	***AT-135***
A/T 2ND GR FNCTN	P0732	***AT-142***
A/T 3RD GR FNCTN	P0733	***AT-148***
A/T 4TH GR FNCTN	P0734	***AT-154***
A/T COMM LINE	P0600*2	EC-1125
A/T DIAG COMM LINE	P1605	EC-1322
A/T TCC S/V FNCTN	P0744	***AT-167***
ATF TEMP SEN/CIRC	P0710	***AT-120***
CMP SEN/CIRCUIT	P0340	EC-1014
CLOSED LOOP-B1	P1148	EC-1175
CLOSED TP SW/CIRC	P0510	EC-1117
COOLANT T SEN/CIRC*3	P0115	EC-870
*COOLAN T SEN/CIRC	P0125	EC-886
CKP SEN/CIRCUIT	P0335	EC-1009
CYL 1 MISFIRE	P0301	EC-998
CYL 2 MISFIRE	P0302	EC-998
CYL 3 MISFIRE	P0303	EC-998
CYL 4 MISFIRE	P0304	EC-998
ECM	P0605	EC-1128
EGR SYSTEM	P0400	EC-1020
EGR SYSTEM	P1402	EC-1251
EGR TEMP SEN/CIRC	P1401	EC-1244
EGR VOL CONT/V CIR	P0403	EC-1029
ENGINE SPEED SIG	P0725	***AT-131***
ENG OVER TEMP	P0217	EC-980

Items (CONSULT-II screen terms)	DTC*1	Reference page
ENG OVER TEMP	P1217*2	EC-1176
EVAP GROSS LEAK	P0455	EC-1080
EVAP PURG FLOW/MON	P1447	EC-1280
EVAP SYS PRES SEN	P0450	EC-1068
EVAP SMALL LEAK	P0440	EC-1040
EVAP SMALL LEAK	P1440	EC-1258
FUEL LEVL SEN/CIRC	P0464	EC-1100
FUEL LEVL SEN/CIRC	P1464	EC-1301
FUEL LEVEL SENSOR	P0461	EC-1098
FUEL LV SE (SLOSH)	P0460	EC-1094
FUEL SYS-LEAN/BK1	P0171	EC-961
FUEL SYS-RICH/BK1	P0172	EC-968
FUEL TEMP SEN/CIRC	P0180	EC-975
HO2S2 (B1)	P0137	EC-891
HO2S2 (B1)	P0138	EC-899
HO2S2 (B1)	P0139	EC-907
HO2S2 (B1)	P0140	EC-915
HO2S2 HTR (B1)	P0141	EC-921
HO2S3 (B1)	P0143	EC-926
HO2S3 (B1)	P0144	EC-934
HO2S3 (B1)	P0145	EC-942
HO2S3 (B1)	P0146	EC-950
HO2S3 HTR (B1)	P0147	EC-956
IACV/AAC VLV/CIRC	P0505	EC-1108
IGN SIGNAL-PRIMARY	P1320	EC-1233
INT/V TIM CONT-B1	P1110	EC-1137
INTK TIM S/CIRC-B1	P1140	EC-1170
INT/V TIM V/CIR-B1	P1111	EC-1143
KNOCK SEN/CIRC-B1	P0325*2	EC-1005
L/PRES SOL/CIRC	P0745	***AT-178***
MAP SENSOR	P1108	EC-1130
MAF SEN/CIRCUIT*3	P0100	EC-850
MULTI CYL MISFIRE	P0300	EC-998
NATS MALFUNCTION	P1610 - P1615	***EL-305***
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	**P0000**	**—**
O/R CLTCH SOL/CIRC	P1760	***AT-199***
P-N POS SW/CIRCUIT	P1706	EC-1325

Items (CONSULT-II screen terms)	DTC*1	Reference page
PNP SW/CIRC	P0705	***AT-115***
PURG VOLUME CONT/V	P0443	EC-1055
PURG VOLUME CONT/V	P1444	EC-1260
SFT SOL A/CIRC*3	P0750	***AT-183***
SFT SOL B/CIRC*3	P0755	***AT-187***
SWIRL CONT VALVE	P1138	EC-1162
SWL CON/V POS SEN	P1137	EC-1155
TCC SOLENOID/CIRC	P0740	***AT-163***
THERMOSTAT FNCTN	P1126	EC-1148
TP SEN/CIRC A/T*3	P1705	***AT-191***
TRTL POS SEN/CIRC*3	P0120	EC-875
TW CATALYST SYS-B1	P0420	EC-1036
VARI SWL CON/SV-B1	P1132	EC-1150
VC CUT/V BYPASS/V	P1491	EC-1310
VC/V BYPASS/V	P1490	EC-1304
VEH SPEED SEN/CIRC*4	P0500	EC-1104
VEH SPD SEN/CIR A/T*4	P0720	***AT-126***
VENT CONTROL VALVE	P0446	EC-1061
VENT CONTROL VALVE	P1446	EC-1272
VENT CONTROL VALVE	P1448	EC-1292

*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.

P NO. INDEX FOR DTC

=NIEC1187S02

DTC*1	Items (CONSULT-II screen terms)	Reference page
—	Unable to access ECM	EC-818
P0000	**NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.**	**—**
P0100	MAF SEN/CIRCUIT*3	EC-850
P0105	ABSL PRES SEN/CIRC	EC-859
P0110	AIR TEMP SEN/CIRC	EC-864
P0115	COOLANT T SEN/CIRC*3	EC-870
P0120	THRTL POS SEN/CIRC*3	EC-875
P0125	*COOLAN T SEN/CIRC	EC-886
P0137	HO2S2 (B1)	EC-891
P0138	HO2S2 (B1)	EC-899
P0139	HO2S2 (B1)	EC-907
P0140	HO2S2 (B1)	EC-915
P0141	HO2S2 HTR (B1)	EC-921
P0143	HO2S3 (B1)	EC-926
P0144	HO2S3 (B1)	EC-934
P0145	HO2S3 (B1)	EC-942
P0146	HO2S3 (B1)	EC-950
P0147	HO2S3 HTR (B1)	EC-956
P0171	FUEL SYS-LEAN/BK1	EC-961
P0172	FUEL SYS-RICH/BK1	EC-968
P0180	FUEL TEMP SEN/CIRC	EC-975
P0217	ENG OVER TEMP	EC-980
P0300	MULTI CYL MISFIRE	EC-998
P0301	CYL 1 MISFIRE	EC-998
P0302	CYL 2 MISFIRE	EC-998
P0303	CYL 3 MISFIRE	EC-998
P0304	CYL 4 MISFIRE	EC-998
P0325*2	KNOCK SEN/CIRC-B1	EC-1005
P0335	CKP SEN/CIRCUIT	EC-1009
P0340	CMP SEN/CIRCUIT	EC-1014
P0400	EGR SYSTEM	EC-1020
P0403	EGR VOL CONT/V CIR	EC-1029
P0420	TW CATALYST SYS-B1	EC-1036
P0440	EVAP SMALL LEAK	EC-1040
P0443	PURG VOLUME CONT/V	EC-1055
P0446	VENT CONTROL VALVE	EC-1061

DTC*1	Items (CONSULT-II screen terms)	Reference page
P0450	EVAP SYS PRES SEN	EC-1068
P0455	EVAP GROSS LEAK	EC-1080
P0460	FUEL LV SE (SLOSH)	EC-1094
P0461	FUEL LEVEL SENSOR	EC-1098
P0464	FUEL LEVL SEN/CIRC	EC-1100
P0500	VEH SPEED SEN/CIRC*4	EC-1104
P0505	IACV/AAC VLV/CIRC	EC-1108
P0510	CLOSED TP SW/CIRC	EC-1117
P0600*2	A/T COMM LINE	EC-1125
P0605	ECM	EC-1128
P0705	PNP SW/CIRC	***AT-115***
P0710	ATF TEMP SEN/CIRC	***AT-120***
P0720	VEH SPD SEN/CIR A/T*4	***AT-126***
P0725	ENGINE SPEED SIG	***AT-131***
P0731	A/T 1ST GR FNCTN	***AT-135***
P0732	A/T 2ND GR FNCTN	***AT-142***
P0733	A/T 3RD GR FNCTN	***AT-148***
P0734	A/T 4TH GR FNCTN	***AT-154***
P0740	TCC SOLENOID/CIRC	***AT-163***
P0744	A/T TCC S/V FNCTN	***AT-167***
P0745	L/PRESS SOL/CIRC	***AT-178***
P0750	SFT SOL A/CIRC*3	***AT-183***
P0755	SFT SOL B/CIRC*3	***AT-187***
P1108	MAP SENSOR	EC-1130
P1110	INT/V TIM CONT-B1	EC-1137
P1111	INT/V TIM V/CIR-B1	EC-1143
P1126	THERMOSTAT FNCTN	EC-1148
P1132	VARI SWL CON/SV-B1	EC-1150
P1137	SWL CON/V POS SEN	EC-1155
P1138	SWIRL CONT VALVE	EC-1162
P1140	INTK TIM S/CIRC-B1	EC-1170
P1148	CLOSED LOOP-B1	EC-1175
P1217*2	ENG OVER TEMP	EC-1176
P1271	A/F SENSOR1 (B1)	EC-1193
P1272	A/F SENSOR1 (B1)	EC-1198
P1273	A/F SENSOR1 (B1)	EC-1203
P1274	A/F SENSOR1 (B1)	EC-1209

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

DTC*1	Items (CONSULT-II screen terms)	Reference page
P1275	A/F SENSOR1 (B1)	EC-1215
P1276	A/F SENSOR1 (B1)	EC-1223
P1277	A/F SEN1 HTR (B1)	EC-1228
P1320	IGN SIGNAL-PRIMARY	EC-1233
P1401	EGR TEMP SEN/CIRC	EC-1244
P1402	EGR SYSTEM	EC-1251
P1440	EVAP SMALL LEAK	EC-1258
P1444	PURG VOLUME CONT/V	EC-1260
P1446	VENT CONTROL VALVE	EC-1272
P1447	EVAP PURG FLOW/MON	EC-1280
P1448	VENT CONTROL VALVE	EC-1292
P1464	FUEL LEVL SEN/CIRC	EC-1301
P1490	VC/V BYPASS/V	EC-1304
P1491	VC CUT/V BYPASS/V	EC-1310
P1605	A/T DIAG COMM LINE	EC-1322
P1610 - P1615	NATS MALFUNCTION	***EL-306***
P1705	TP SEN/CIRC A/T*3	***AT-191***
P1706	P-N POS SW/CIRCUIT	EC-1325
P1760	O/R CLTCH SOL/CIRC	***AT-199***

*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.

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

NIEC1188

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 NISSAN MODEL B15 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), front 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), side air bag (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 must be performed by an authorized NISSAN dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. 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.**

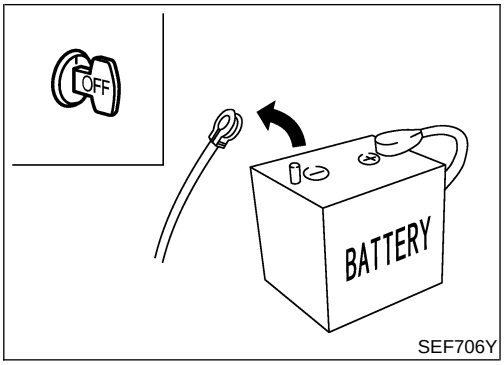
Precautions for On Board Diagnostic (OBD) System of Engine and A/T

NIEC1189

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.**



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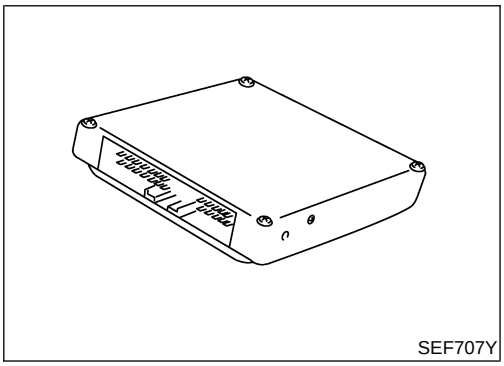
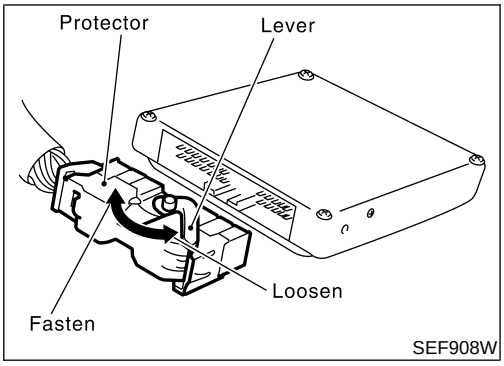

SEF707Y



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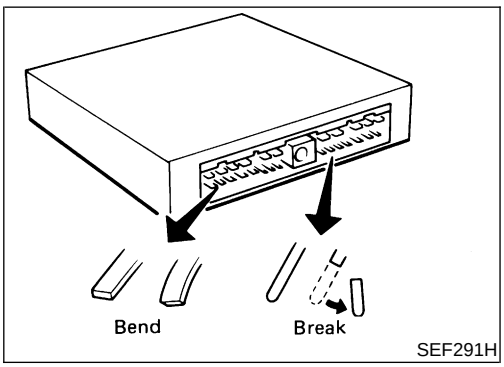
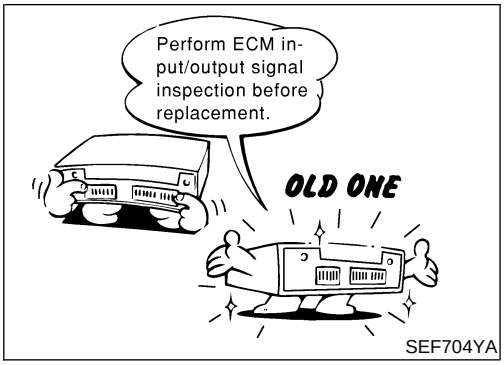


SEF291H

Precautions

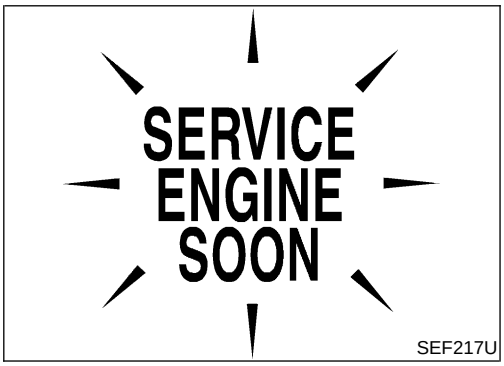
NIEC1190

- **Always use a 12 volt battery as power source.**
- **Do not attempt to disconnect battery cables while engine is running.**
- **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.**
- **Before removing parts, turn off ignition switch and then disconnect battery ground cable.**
- **Do not disassemble ECM.**
- **If a battery terminal is disconnected, the memory will return to the ECM value.**
  The ECM will now start to self-control at its initial value. Engine operation can vary slightly when the terminal is disconnected. However, this is not an indication of a problem. Do not replace parts because of a slight variation.
- **When connecting ECM harness connector, fasten it securely with a lever as far as it will go as shown at left.**
- **When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).**
  Make sure that there are not any bends or breaks on ECM pin terminals when connecting pin connectors.
- **Securely connect ECM harness connectors.**
  A Poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to ICs.
- **Keep ECM harness at least 10 cm (4 in) away from adjacent harness, to prevent a ECM system malfunctions due to receiving external noise, degraded operation of ICs, etc.**
- **Keep ECM parts and harness dry.**



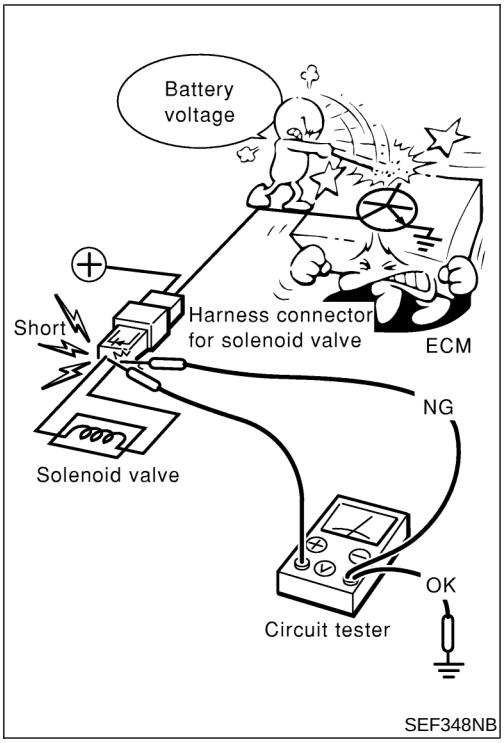
SEF704YA

- **Before replacing ECM, perform Terminals and Reference Value inspection and make sure ECM functions properly. Refer to EC-828.**



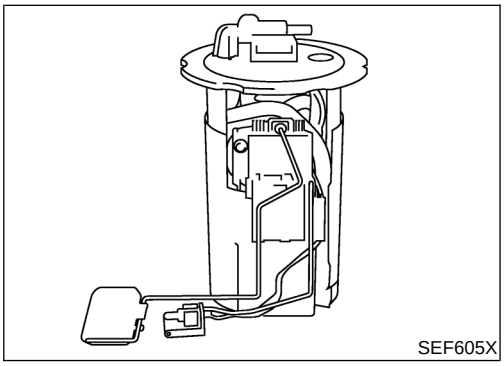
SEF217U

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

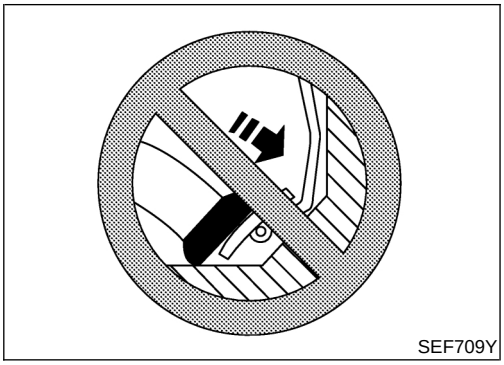


SEF348NB

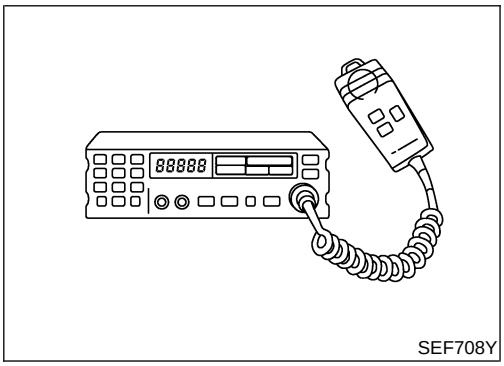
- **When measuring ECM signals with a circuit tester, never allow the two tester probes to contact.**
  Accidental contact of probes will cause a short circuit and damage the ECM power transistor.
- **Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**
- **Handle mass air flow sensor carefully to avoid damage.**
- **Do not disassemble mass air flow sensor.**
- **Do not clean mass air flow sensor with any type of detergent.**
- **Do not disassemble IAC valve-AAC valve.**
- **Even a slight leak in the air intake system can cause serious problems.**
- **Do not shock or jar the camshaft position sensor.**


SEF605X

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


SEF709Y

- **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.**


SEF708Y

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

a) **Keep the antenna as far as possible from the electronic control units.**

b) **Keep the antenna feeder line more than 20 cm (8 in) away from the harness of electronic controls.**
Do not let them run parallel for a long distance.

c) **Adjust the antenna and feeder line so that the standing-wave ratio can be kept smaller.**

d) **Be sure to ground the radio to vehicle body.**

Wiring Diagrams and Trouble Diagnosis

NIEC1191

When you read Wiring diagrams, refer to the following:

- ***GI-11***, "HOW TO READ WIRING DIAGRAMS"
- ***EL-9***, "POWER SUPPLY ROUTING" for power distribution circuit

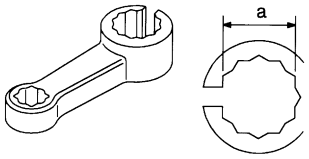
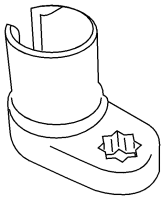
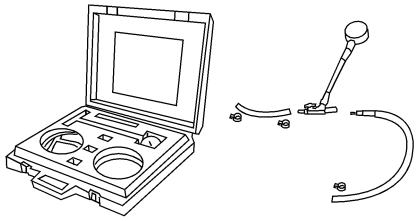
When you perform trouble diagnosis, refer to the following:

- ***GI-36***, "How To Follow Test Groups In Trouble Diagnosis"
- ***GI-25***, "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT"

Special Service Tools

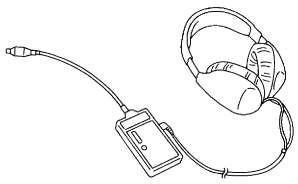
NIEC1192

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

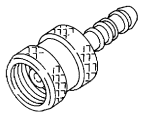
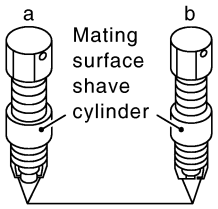
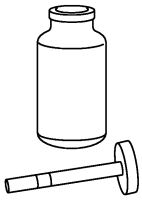
Tool number (Kent-Moore No.) Tool name	Description	
KV10114400 (J-38365) Heated oxygen sensor wrench	 NT636	Loosening or tightening heated oxygen sensor **a: 22 mm (0.87 in)**
(J44626) Air fuel ratio (A/F) sensor wrench	 LEM054	Loosening or tightening air fuel ratio (A/F) sensor 1
(J-44321) Fuel pressure gauge kit	 LEC642	Checking fuel pressure

Commercial Service Tools

NIEC1193

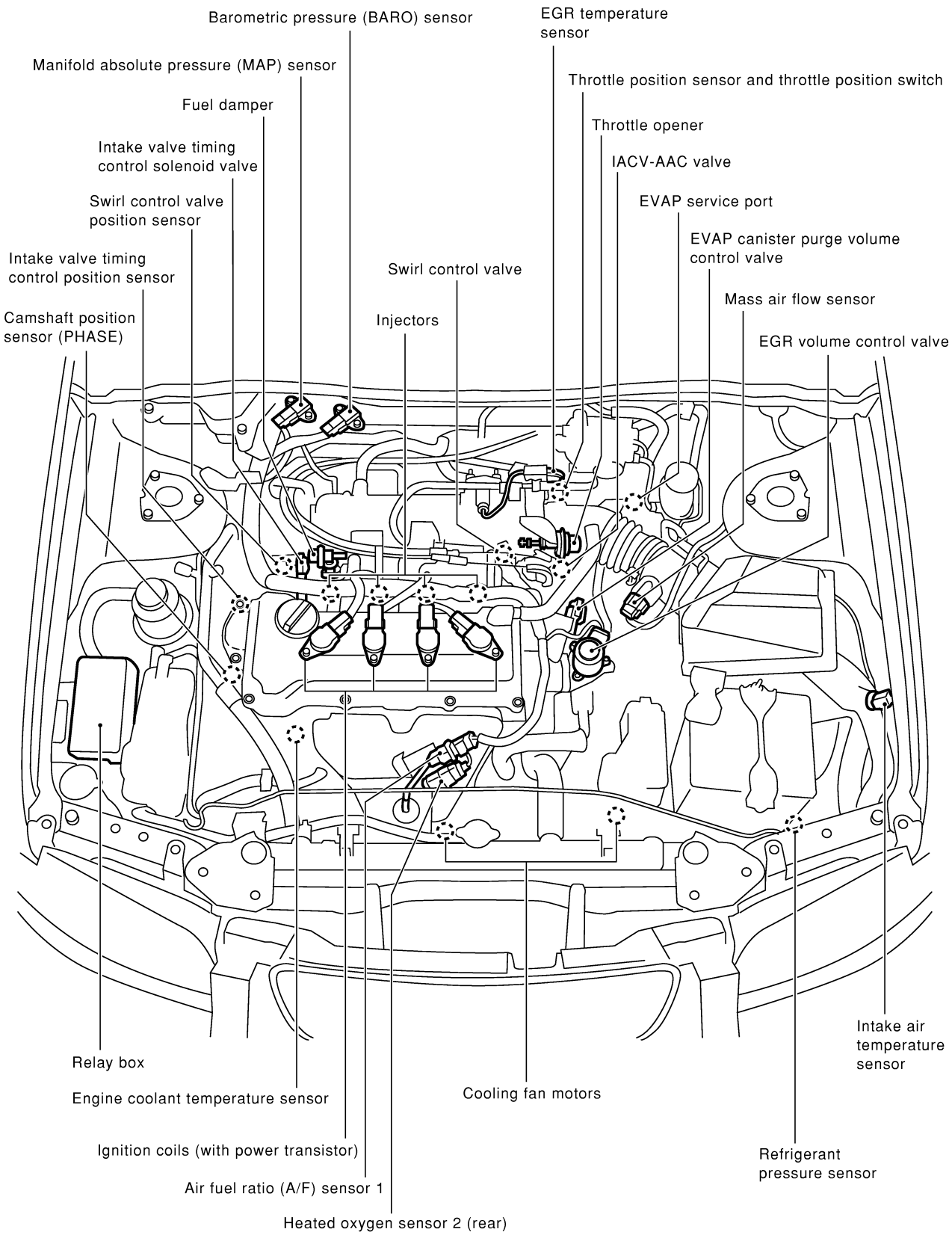
Tool name	Description	
Fuel filler cap adapter (MLR-8382)	 NT815	Checking fuel tank vacuum relief valve opening pressure
Leak detector (J41416)	 NT703	Locating the EVAP leak

Commercial Service Tools (Cont'd)

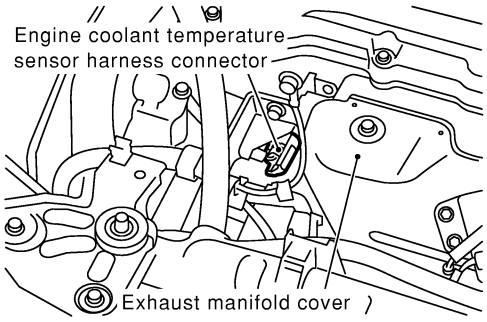
Tool name	Description	
EVAP service port adapter (J41413-OBD)	 NT704	Applying positive pressure through EVAP service port
Oxygen sensor thread cleaner (J-43897-18) (J-43897-12)	 NT778	Reconditioning the exhaust system threads before installing a new oxygen sensor or A/F sensor. Use with anti-seize lubricant shown below. **a: J-43897-18 18 mm with 1.5 mm pitch dia., for Zirconia Oxygen Sensor or A/F sensor** **b: J-43897-12 12 mm with 1.25 mm pitch dia., 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.
Fuel tube removal tool	 LEC643	For disconnecting fuel tube quick connectors **a: 7.9 mm (5/16 in)**

Engine Control Component Parts Location

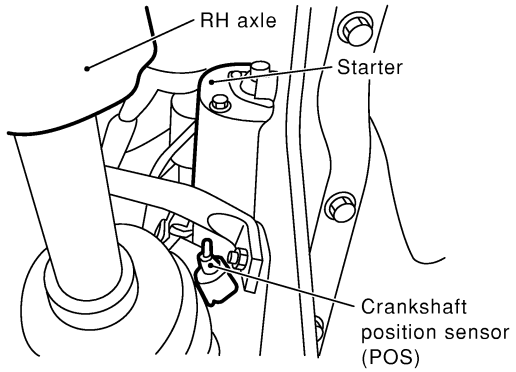
NIEC1194

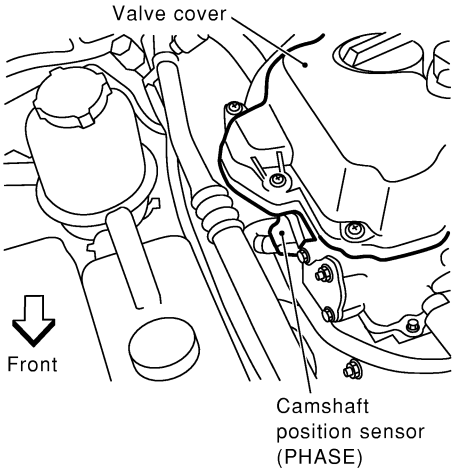


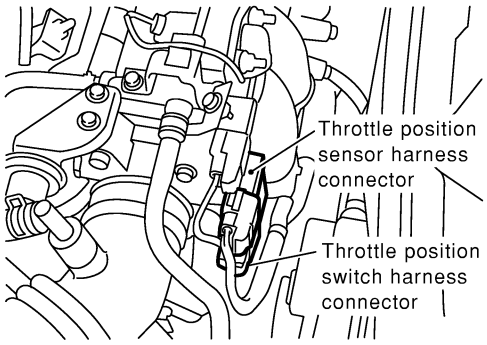
SEF382Z

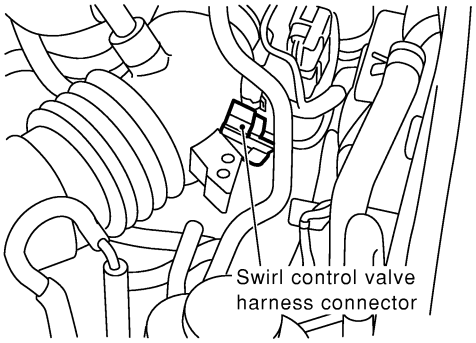


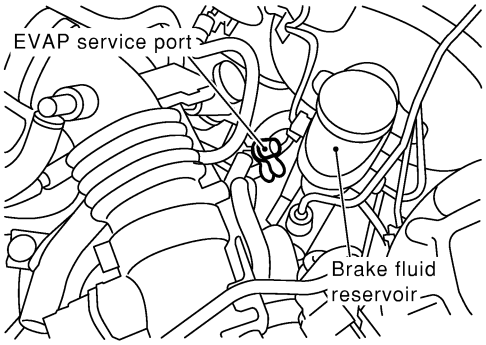
Under vehicle view



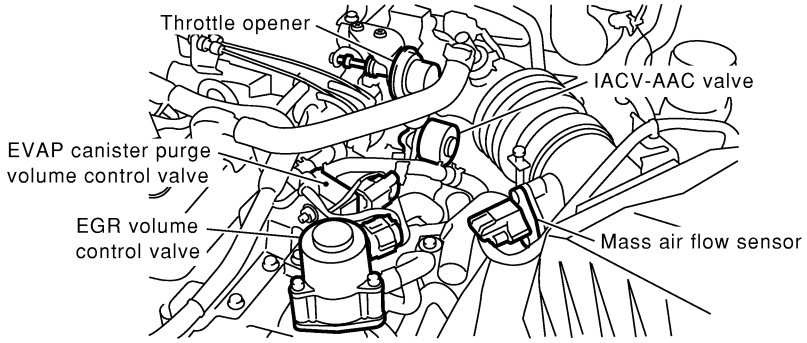


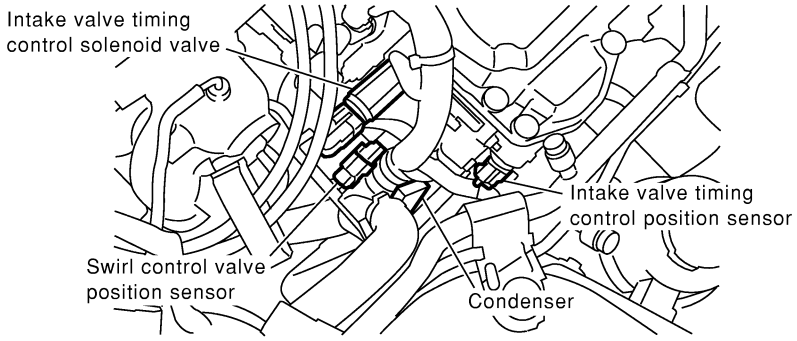


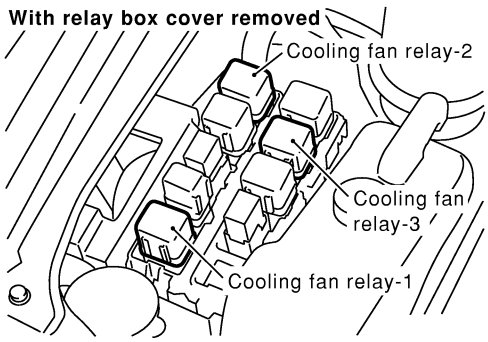


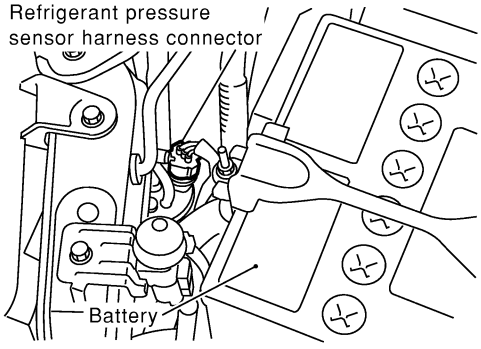


SEF383Z

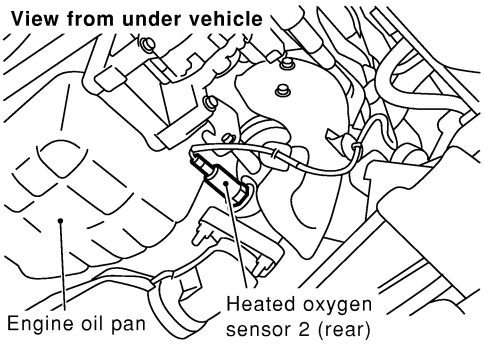

Throttle opener
IACV-AAC valve
EVAP canister purge volume control valve
EGR volume control valve
Mass air flow sensor

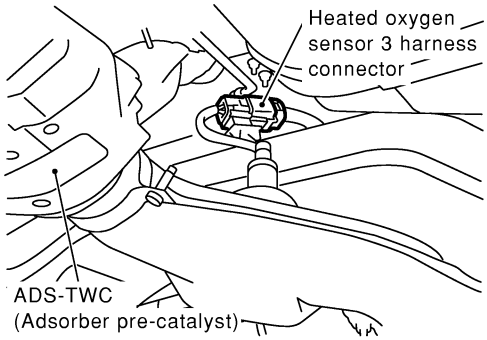

Intake valve timing control solenoid valve
Intake valve timing control position sensor
Swirl control valve position sensor
Condenser

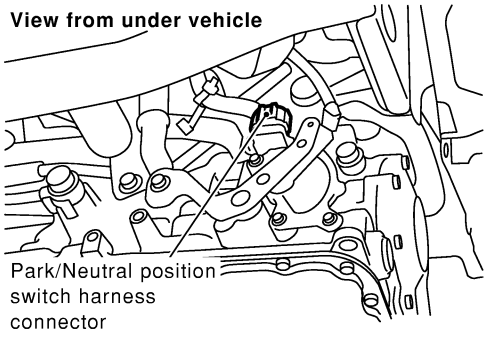

With relay box cover removed
Cooling fan relay-2
Cooling fan relay-3
Cooling fan relay-1

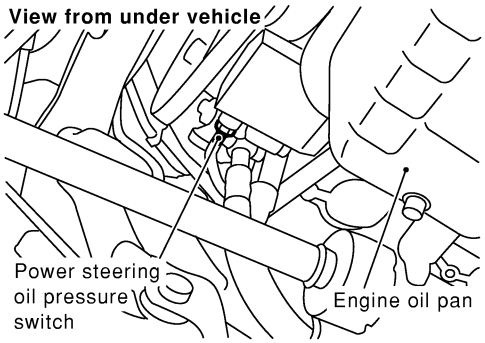

Refrigerant pressure sensor harness connector
Battery

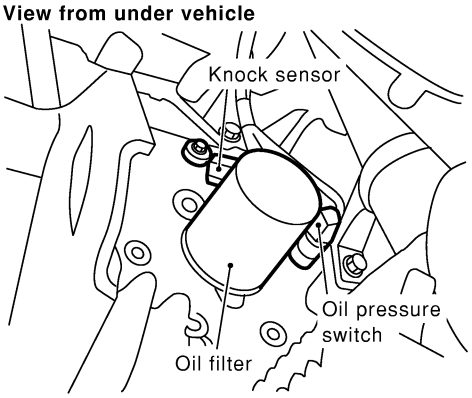
SEF384Z

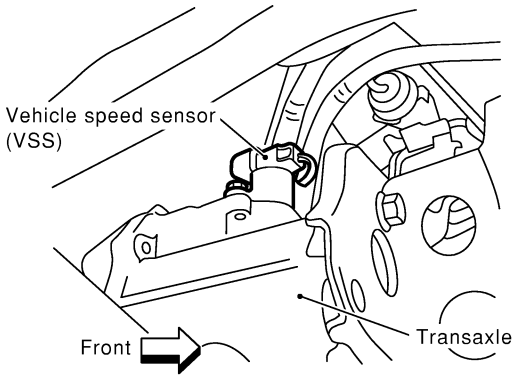

View from under vehicle
Engine oil pan
Heated oxygen sensor 2 (rear)


Heated oxygen sensor 3 harness connector
ADS-TWC (Adsorber pre-catalyst)


View from under vehicle
Park/Neutral position switch harness connector

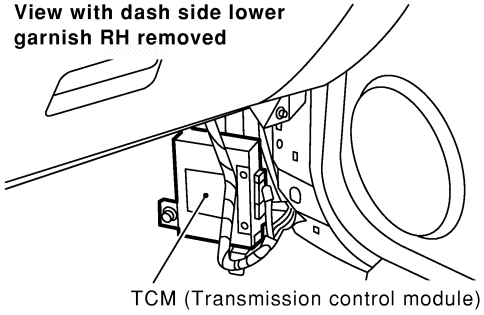

View from under vehicle
Power steering oil pressure switch
Engine oil pan


View from under vehicle
Knock sensor
Oil pressure switch
Oil filter

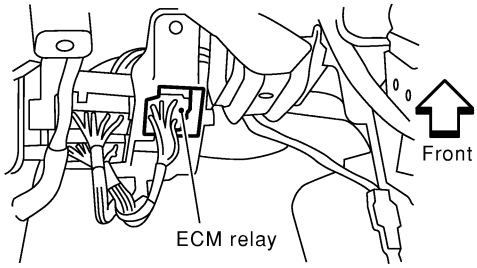

Vehicle speed sensor (VSS)
Front
Transaxle

SEF385Z

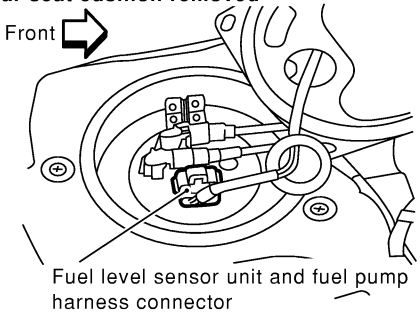
View with dash side lower garnish RH removed

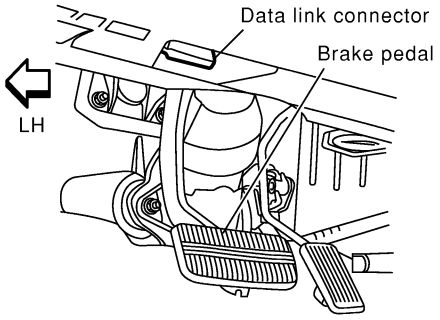


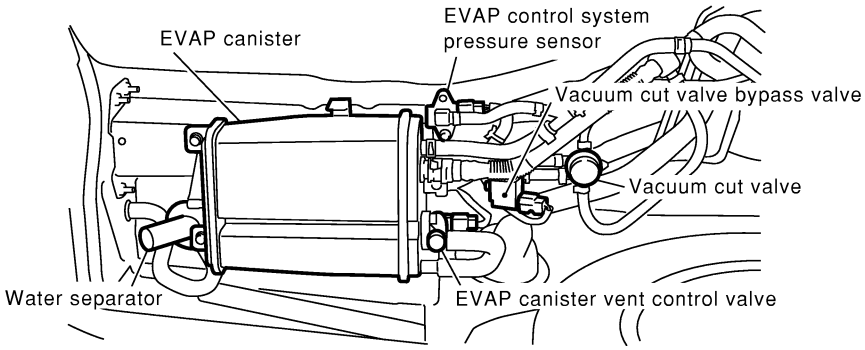
Passenger side view with instrument panel removed for clarity



Rear seat cushion removed



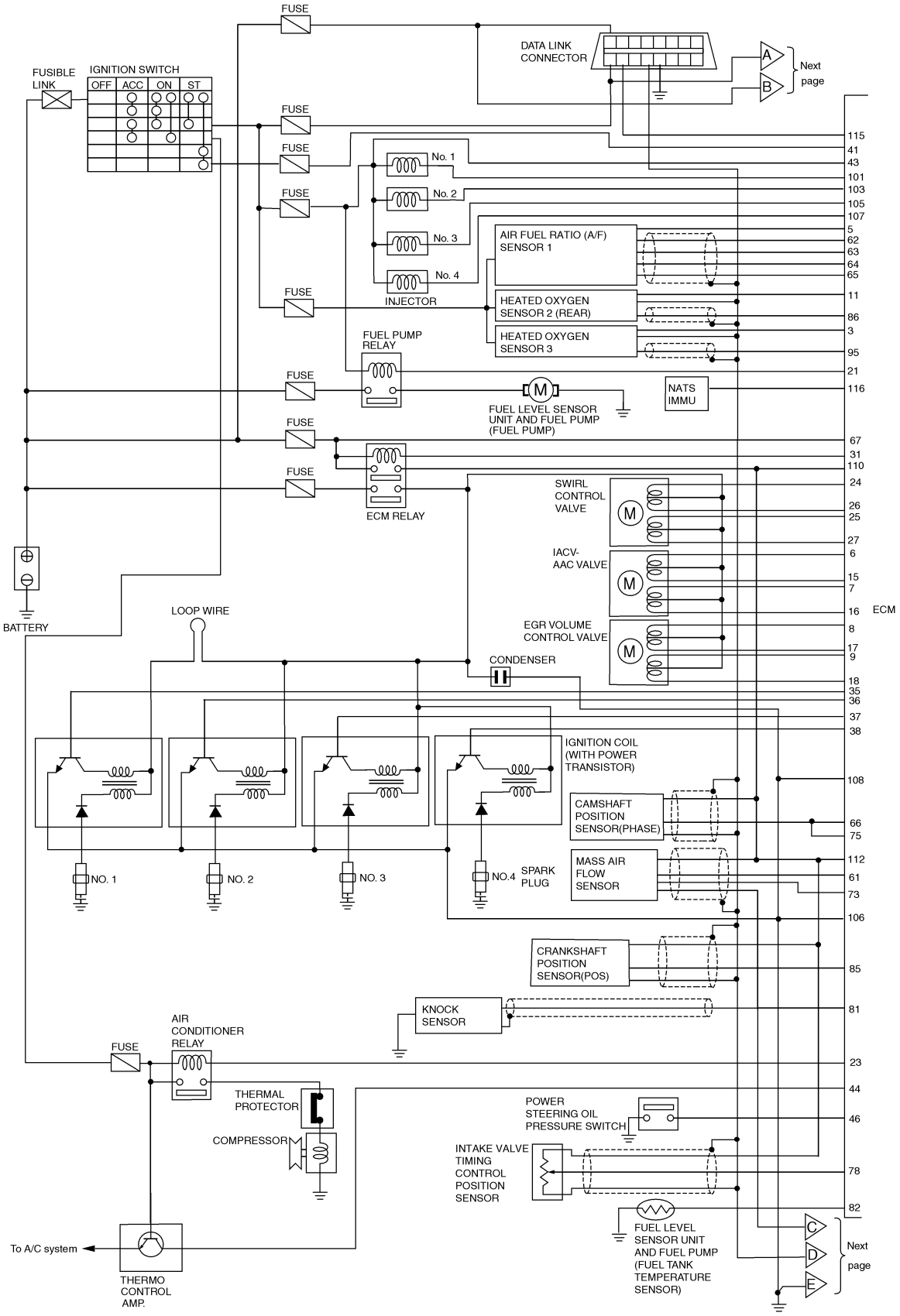




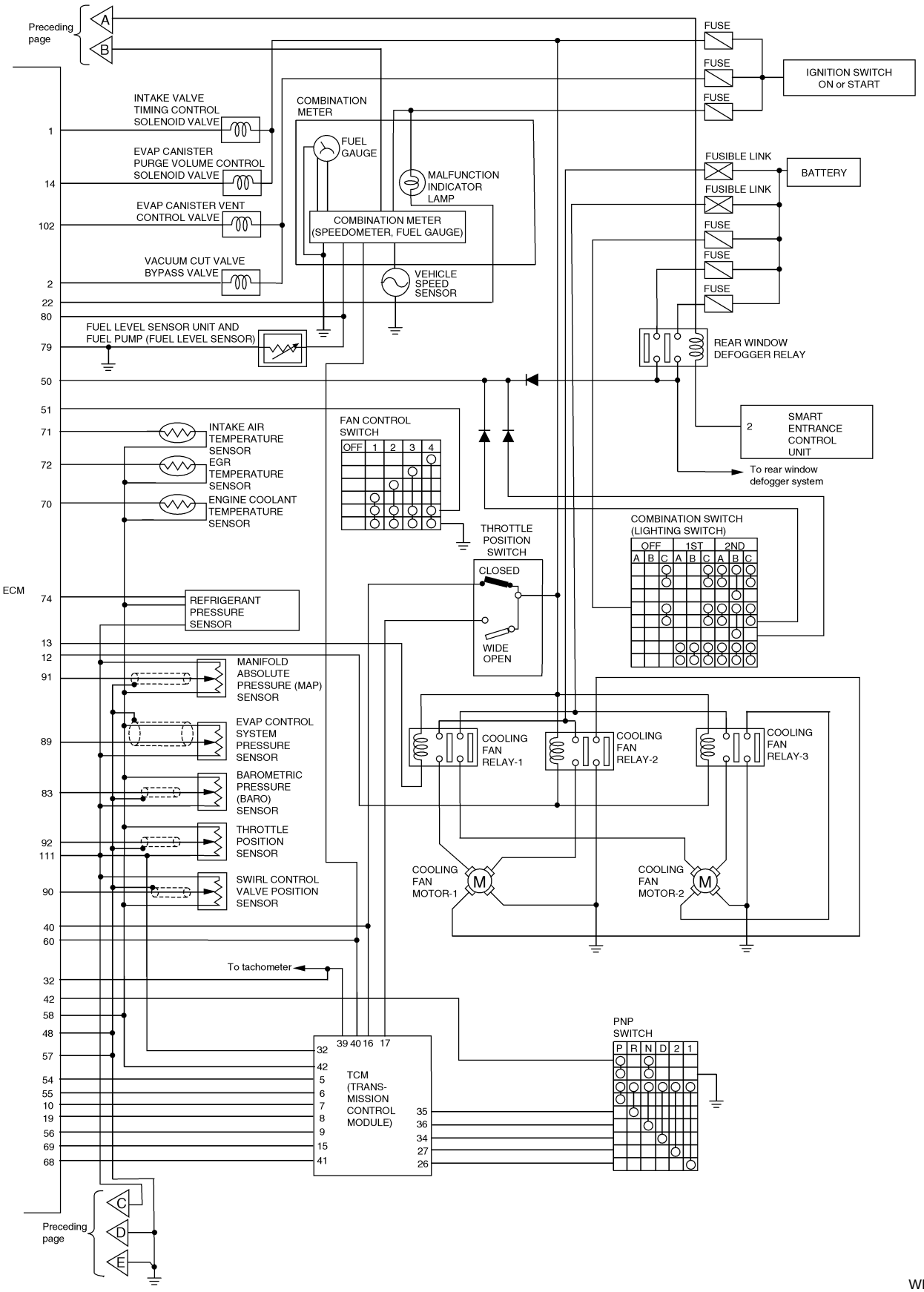
SEF386Z

Circuit Diagram

NIEC1195



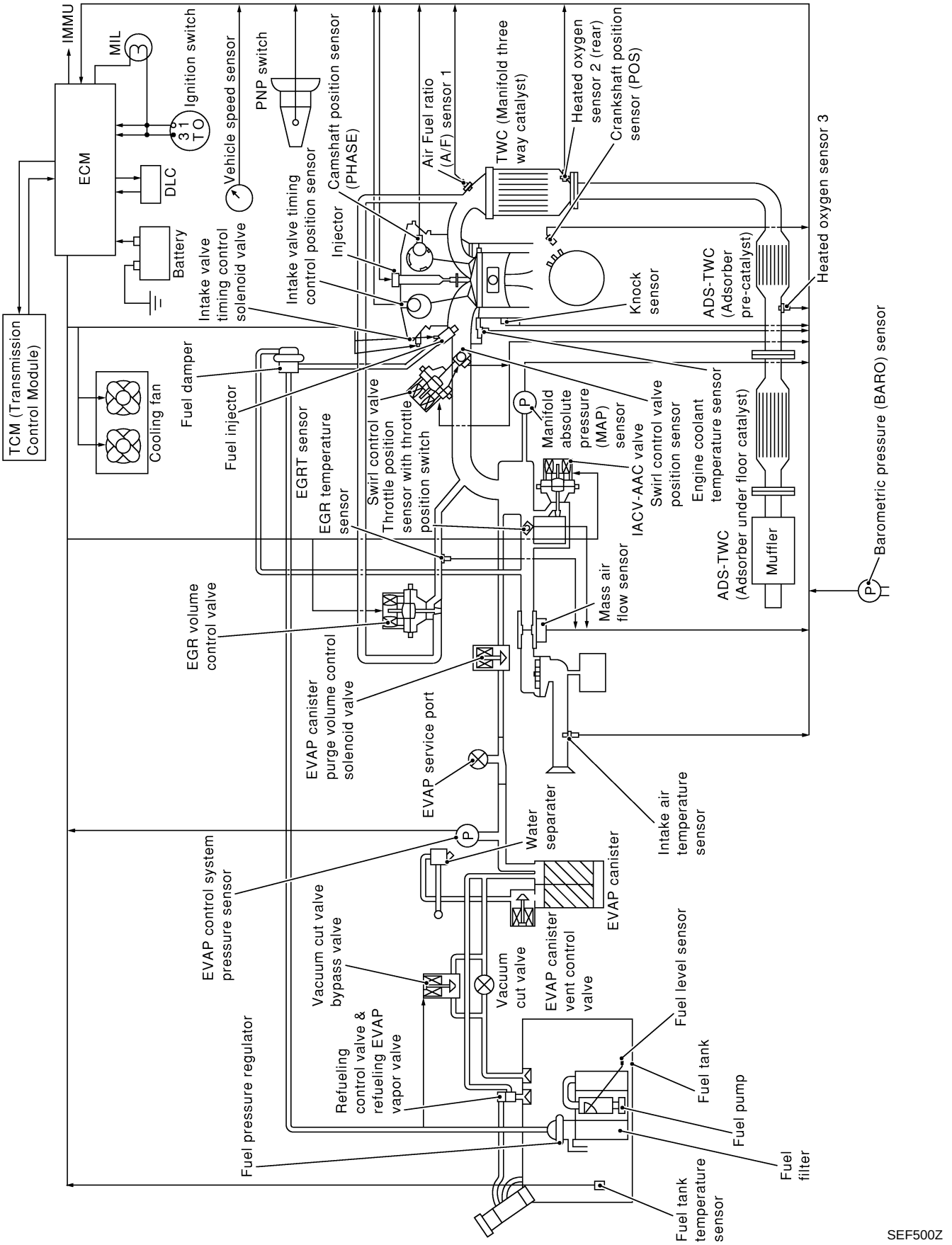
WEC422


Preceding page
A
B
FUSE
FUSE
FUSE
IGNITION SWITCH ON or START
INTAKE VALVE TIMING CONTROL SOLENOID VALVE
1
EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE
14
EVAP CANISTER VENT CONTROL VALVE
102
VACUUM CUT VALVE BYPASS VALVE
2
22
80
79
COMBINATION METER
FUEL GAUGE
MALFUNCTION INDICATOR LAMP
COMBINATION METER (SPEEDOMETER, FUEL GAUGE)
VEHICLE SPEED SENSOR
FUEL LEVEL SENSOR UNIT AND FUEL PUMP (FUEL LEVEL SENSOR)
FUSIBLE LINK
BATTERY
FUSIBLE LINK
FUSE
FUSE
FUSE
REAR WINDOW DEFOGGER RELAY
50
51
71
72
70
INTAKE AIR TEMPERATURE SENSOR
EGR TEMPERATURE SENSOR
ENGINE COOLANT TEMPERATURE SENSOR
FAN CONTROL SWITCH
OFF 1 2 3 4
2
SMART ENTRANCE CONTROL UNIT
To rear window defogger system
THROTTLE POSITION SWITCH
CLOSED
WIDE OPEN
COMBINATION SWITCH (LIGHTING SWITCH)
OFF 1ST 2ND
A B C A B C A B C
ECM
74
REFRIGERANT PRESSURE SENSOR
13
12
91
MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR
89
EVAP CONTROL SYSTEM PRESSURE SENSOR
83
BAROMETRIC PRESSURE (BARO) SENSOR
92
111
THROTTLE POSITION SENSOR
90
SWIRL CONTROL VALVE POSITION SENSOR
40
60
COOLING FAN RELAY-1
COOLING FAN RELAY-2
COOLING FAN RELAY-3
COOLING FAN MOTOR-1
COOLING FAN MOTOR-2
M
M
To tachometer
32
42
58
48
57
54
55
10
19
56
69
68
39 40 16 17
32
42
5
6
7
8
9
15
41
TCM (TRANS-MISSION CONTROL MODULE)
35
36
34
27
26
PNP SWITCH
P R N D 2 1
C
D
E
Preceding page

WEC423

System Diagram

NIEC1196



System Chart

NIEC1197

Input (Sensor)	ECM Function	Output (Actuator)
• Camshaft position sensor (PHASE) • Crankshaft position sensor (POS) • Mass air flow sensor • Engine coolant temperature sensor • Air fuel ratio (A/F) sensor 1 • Ignition switch • Throttle position sensor • PNP switch • Air conditioner switch • Knock sensor • EGR temperature sensor*1 • EVAP control system pressure sensor*1 • Fuel tank temperature sensor*1 • Battery voltage • Power steering oil pressure switch • Vehicle speed sensor • Intake air temperature sensor • Manifold absolute pressure (MAP) sensor • Barometric pressure (BARO) sensor • Heated oxygen sensor 2 (rear) • Heated oxygen sensor 3*3 • TCM (Transmission control module)*2 • Closed throttle position switch*4 • Electrical load • Intake valve timing control position sensor*1 • Swirl control valve position sensor*1 • Fuel level sensor*1 • Refrigerant pressure sensor	Fuel injection & mixture ratio control	Injectors
	Distributor ignition system	Power transistor
	Idle air control system	IACV-AAC valve
	Intake valve timing control	Intake valve timing control solenoid valve
	Fuel pump control	Fuel pump relay
	On board diagnostic system	Malfunction indicator lamp (On the instrument panel)
	EGR control	EGR volume control valve
	Swirl control valve control	Swirl control valve
	A/F sensor 1 heater and heated oxygen sensor 2 and 3 heater control	A/F sensor 1 heater and heated oxygen sensor heater
	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
	Cooling fan control	Cooling fan relays
	Air conditioning cut control	Air conditioner relay
	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: The DTC related to A/T will be sent to ECM.
*3: Under normal conditions, this sensor is not for engine control operation.
*4: This switch will operate in place of the throttle position sensor to control EVAP parts if the sensor malfunctions.

Multiport Fuel Injection (MFI) System

DESCRIPTION

Input/Output Signal Chart

NIEC1198

NIEC1198S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE)	Engine speed and piston number	Fuel injection & mixture ratio control	Injector
Crankshaft position sensor (POS)	Engine speed		
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Air fuel ratio (A/F) sensor 1	Density of oxygen in exhaust gas		
Throttle position sensor	Throttle position Throttle valve idle position		
PNP switch	Gear position		
Vehicle speed sensor	Vehicle speed		
Ignition switch	Start signal		
Air conditioner switch	Air conditioner operation		
Knock sensor	Engine knocking condition		
Electrical load	Electrical load signal		
Battery	Battery voltage		
Power steering oil pressure switch	Power steering operation		
Heated oxygen sensor 2 (rear)	Density of oxygen in exhaust gas		
Barometric pressure (BARO) sensor	Ambient air barometric pressure		

Basic Multiport Fuel Injection System

NIEC1198S02

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

Various Fuel Injection Increase/Decrease Compensation

NIEC1198S03

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

<Fuel increase>

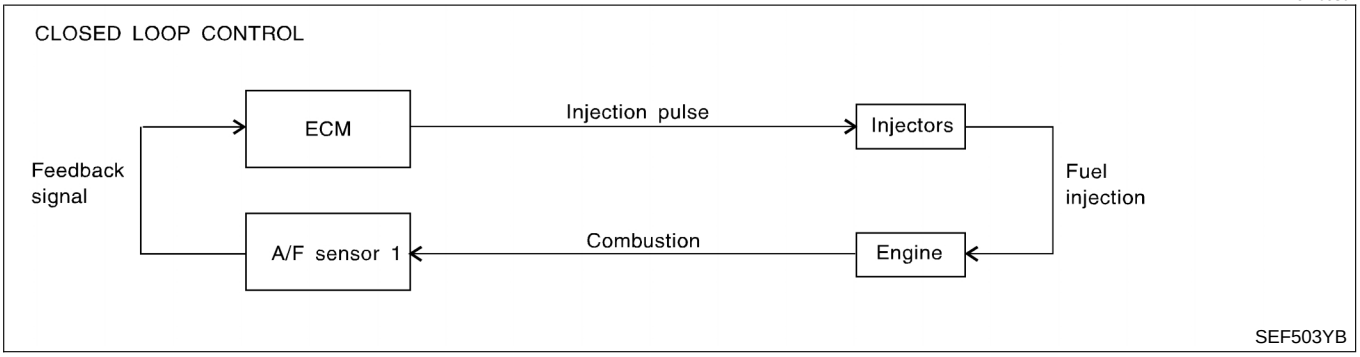
- During warm-up
- When starting the engine
- During acceleration
- Hot-engine operation
- When selector lever is changed from “N” to “D”
- High-load, high-speed operation

<Fuel decrease>

- During deceleration
- During high engine speed operation
- During high vehicle speed operation
- Extremely high engine coolant temperature

Mixture Ratio Feedback Control (Closed loop control)

NIEC1198S04



The mixture ratio feedback system provides the best air-fuel mixture ratio for driveability and emission control. The three way catalyst can then better reduce CO, HC and NOx emissions. This system uses a air fuel ratio (A/F) sensor 1 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 air fuel ratio (A/F) sensor 1, refer to EC-1193. 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.
Heated oxygen sensor 2 (rear) is located downstream of the three way catalyst. Even if the switching characteristics of the A/F sensor 1 shift, the air-fuel ratio is controlled to stoichiometric by the signal from the heated oxygen sensor 2 (rear).

Open Loop Control

NIEC1198S05

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 A/F sensor 1 or its circuit
- Insufficient activation of A/F sensor 1 at low engine coolant temperature
- High engine coolant temperature
- During warm-up
- When starting the engine

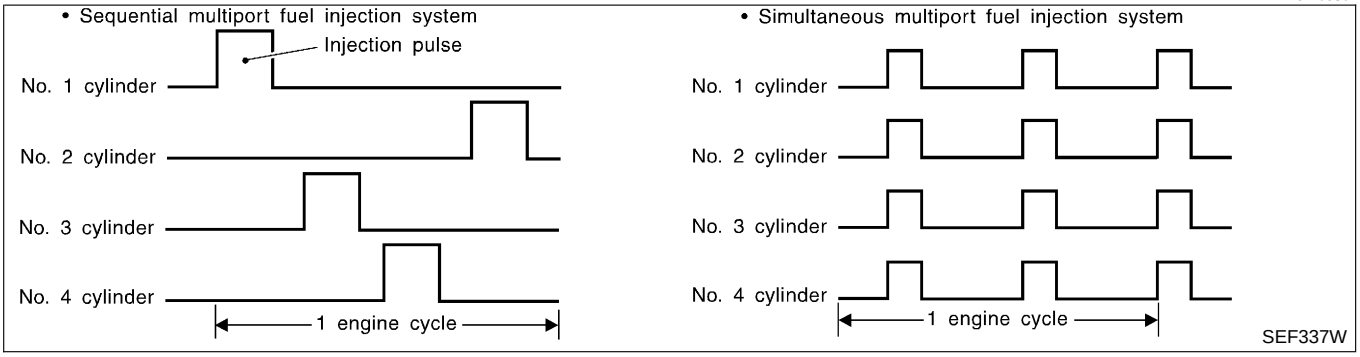
Mixture Ratio Self-learning Control

NIEC1198S06

The mixture ratio feedback control system monitors the mixture ratio signal transmitted from the A/F sensor 1. This feedback signal is then sent to the ECM. The ECM controls the basic mixture ratio as close to the theoretical mixture ratio as possible. However, the basic mixture ratio is not necessarily controlled as originally designed. Both manufacturing differences (i.e., mass air flow sensor hot film) and characteristic changes during operation (i.e., injector clogging) directly affect mixture ratio.
Accordingly, the difference between the basic and theoretical mixture ratios is monitored in this system. This is then computed in terms of "injection pulse duration" to automatically compensate for the difference between the two ratios.
"Fuel trim" refers to the feedback compensation value compared against the basic injection duration. Fuel trim includes short term fuel trim and long term fuel trim.
"Short term fuel trim" is the short-term fuel compensation used to maintain the mixture ratio at its theoretical value. The signal from the A/F sensor 1 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

NIEC1198S07



Two types of systems are used.

Sequential Multiport Fuel Injection System

NIEC1198S0701

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

NIEC1198S0702

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

Fuel Shut-off

NIEC1198S08

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

Distributor Ignition (DI) System

DESCRIPTION

NIEC1199

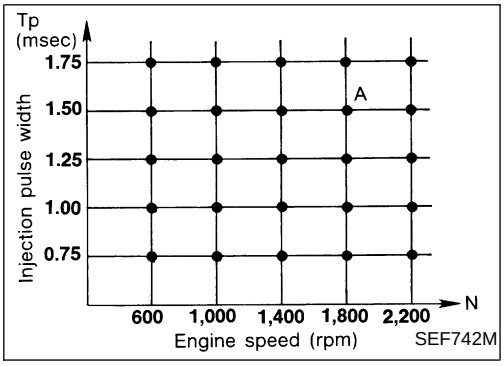
Input/Output Signal Chart

NIEC1199S01

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

System Description

NIEC1199S02



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

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

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

Air Conditioning Cut Control

DESCRIPTION

NIEC1200

Input/Output Signal Chart

NIEC1200S01

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

System Description

NIEC1200S02

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.

Air Conditioning Cut Control (Cont'd)

- 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 the refrigerant pressure is excessively high or low.

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

DESCRIPTION

NIEC1201

Input/Output Signal Chart

NIEC1201S01

Sensor	Input Signal to ECM	ECM function	Actuator
Vehicle speed sensor	Vehicle speed	Fuel cut control	Injectors
PNP switch	Neutral position		
Throttle position sensor	Throttle position		
Engine coolant temperature sensor	Engine coolant temperature		
Crankshaft position sensor (POS)	Engine speed		
Camshaft position sensor (PHASE)	Engine speed and piston number		

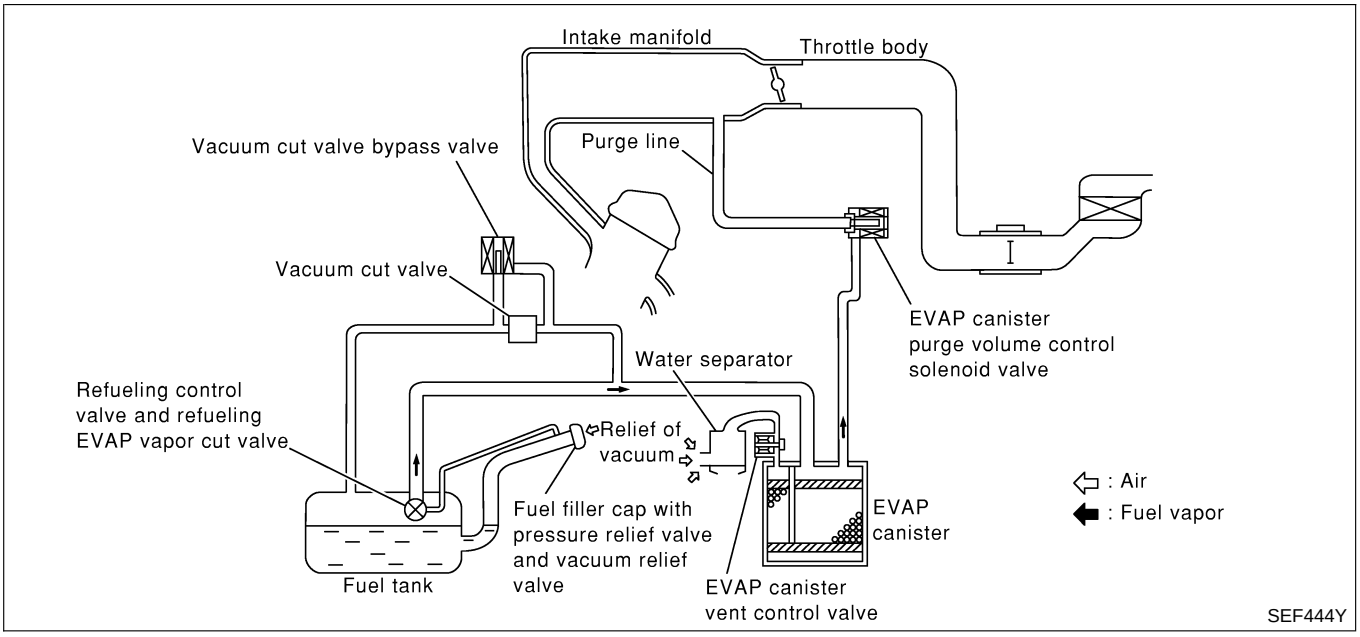
If the engine speed is above 2,500 rpm with no load, (for example, in Neutral and engine speed over 2,500 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed. Fuel cut will operate until the engine speed reaches 2,000 rpm, then fuel cut is cancelled.

NOTE:
This function is different from deceleration control listed under "Multiport Fuel Injection (MFI) System", EC-722.

Evaporative Emission System

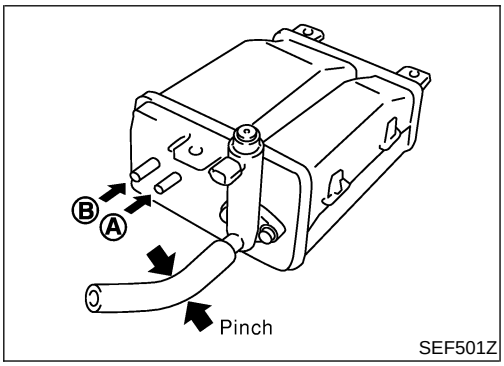
DESCRIPTION

NIEC1202



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 control solenoid valve also shuts off the vapor purge line during decelerating and idling.



INSPECTION

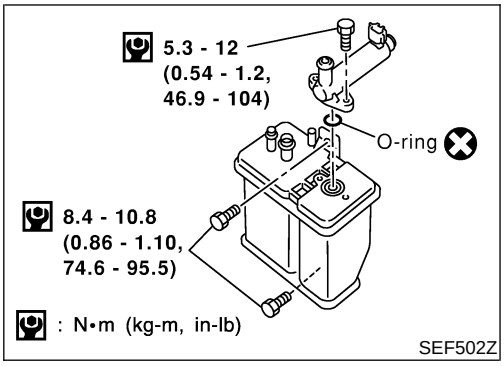
EVAP Canister

NIEC1203

NIEC1203S01

Check EVAP canister as follows:

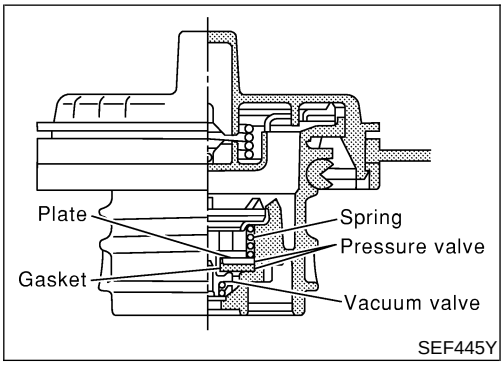
1. Pinch the fresh air hose.
2. Blow air into port **A** and check that air flows freely through port **B**.



Tightening Torque

NIEC1203S02

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)

NIEC1203S03

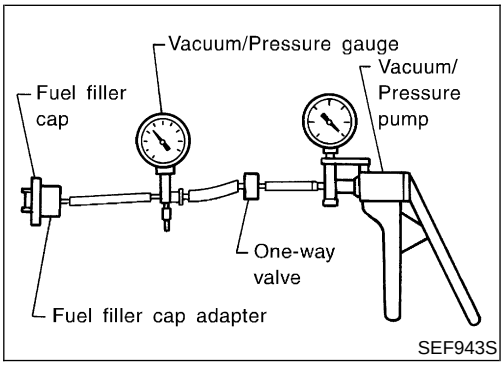
NOTE:
Refer to fuel filler cap adapter instruction manual before performing following inspection.

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 −3.4 kPa (−0.061 to −0.035 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 NISSAN 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
NIEC1203S04

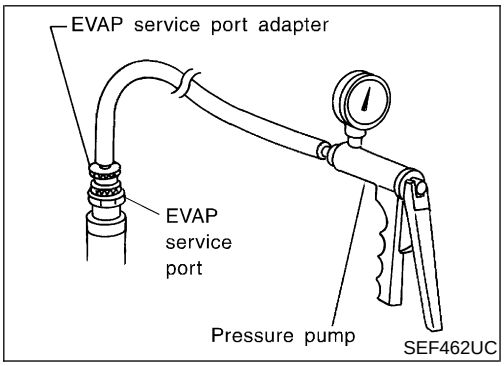
Refer to EC-1310.

Evaporative Emission (EVAP) Canister Purge Volume Control Solenoid Valve
NIEC1203S05

Refer to EC-1055.

Fuel Tank Temperature Sensor
NIEC1203S06

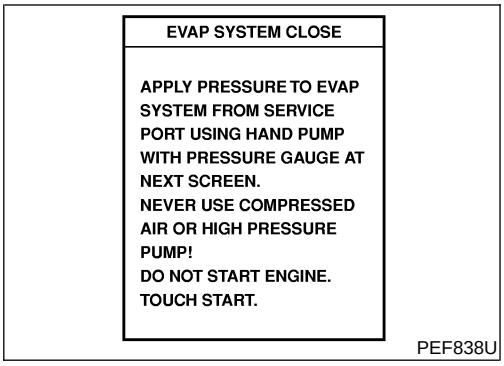
Refer to EC-975.



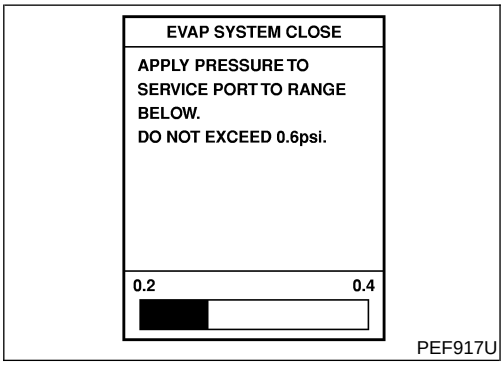
SEF462UC

EVAP Service Port
NIEC1203S07

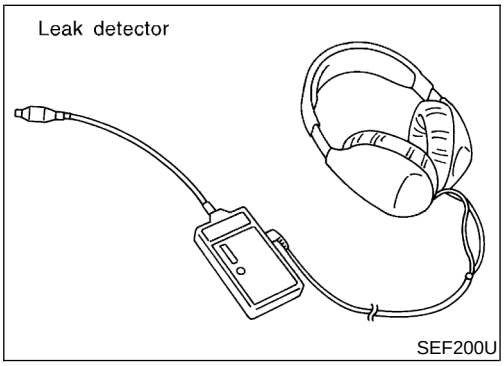
Positive pressure is delivered to the EVAP system through the EVAP service port. If fuel vapor leakage in the EVAP system occurs, use a leak detector to locate the leak.



PEF838U



PEF917U



SEF200U

How to Detect Fuel Vapor Leakage
NIEC1203S08

CAUTION:

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

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

With CONSULT-II

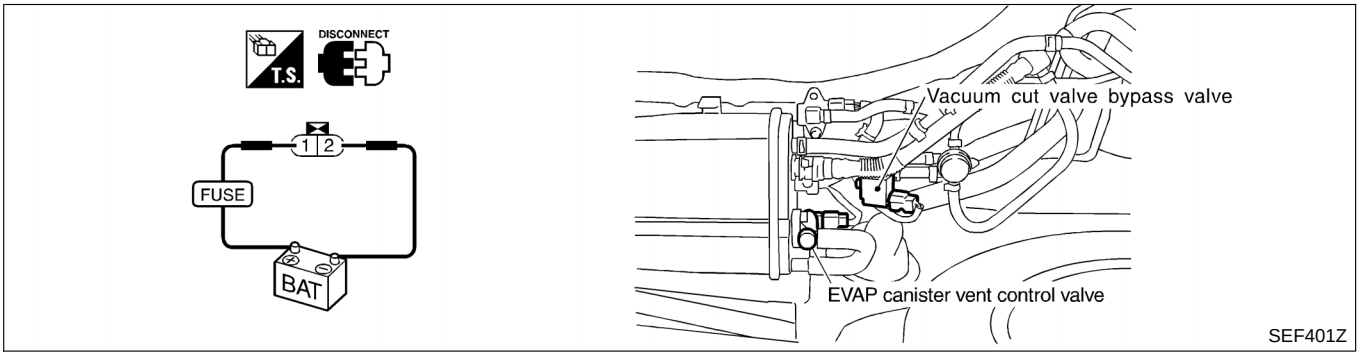
1) Attach the EVAP service port adapter securely to the EVAP service port.
2) Also attach the pressure pump and hose.
3) Turn ignition switch "ON".
4) Select the "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-II.
5) Touch "START". A bar graph (Pressure indicating display) will appear on the screen.
6) Apply positive pressure to the EVAP system until the pressure indicator reaches the middle of the bar graph.
7) Remove the EVAP service port adapter and hose with pressure pump.
8) Locate the leak using a leak detector. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-730.

Without CONSULT-II

1) Attach the EVAP service port adapter securely to the EVAP service port and pressure pump with pressure gauge to the EVAP service port.
2) Apply battery voltage to between the terminals of both EVAP canister vent control valve and vacuum cut valve bypass valve to make a closed EVAP system.
3) To locate the leak, deliver positive pressure to the EVAP system until pressure gauge points reach 1.38 to 2.76 kPa (0.014

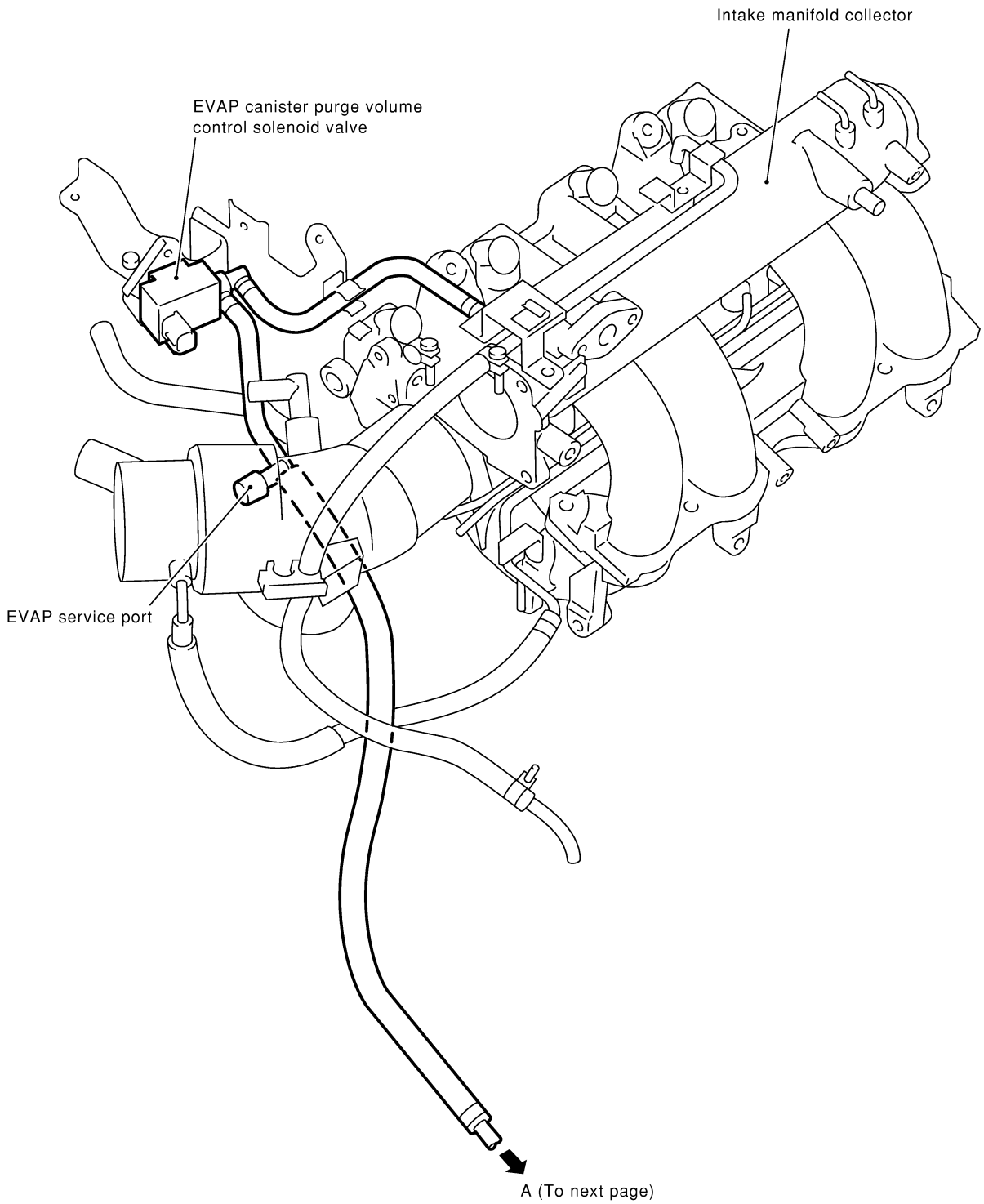
to 0.028 kg/cm^2, 0.2 to 0.4 psi).

4) Remove the EVAP service port adapter and hose with pressure pump.
5) Locate the leak using a leak detector. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-730.



EVAPORATIVE EMISSION LINE DRAWING

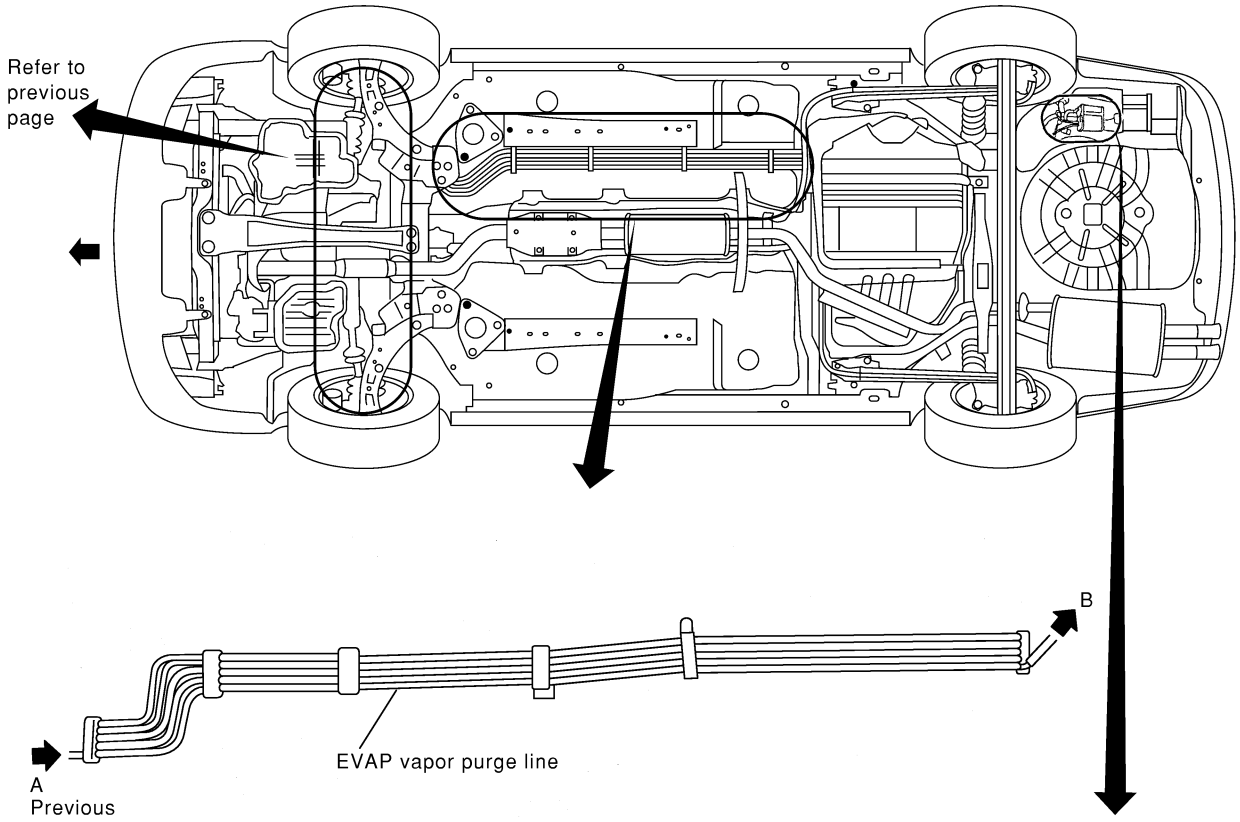
NIEC1204

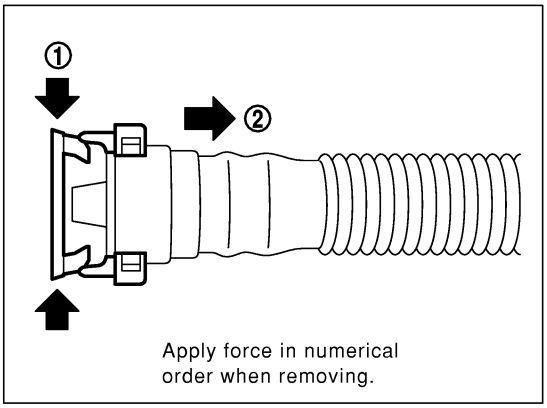


NOTE : Do not use soapy water or any type of solvent while installing vacuum hoses or purge hoses.

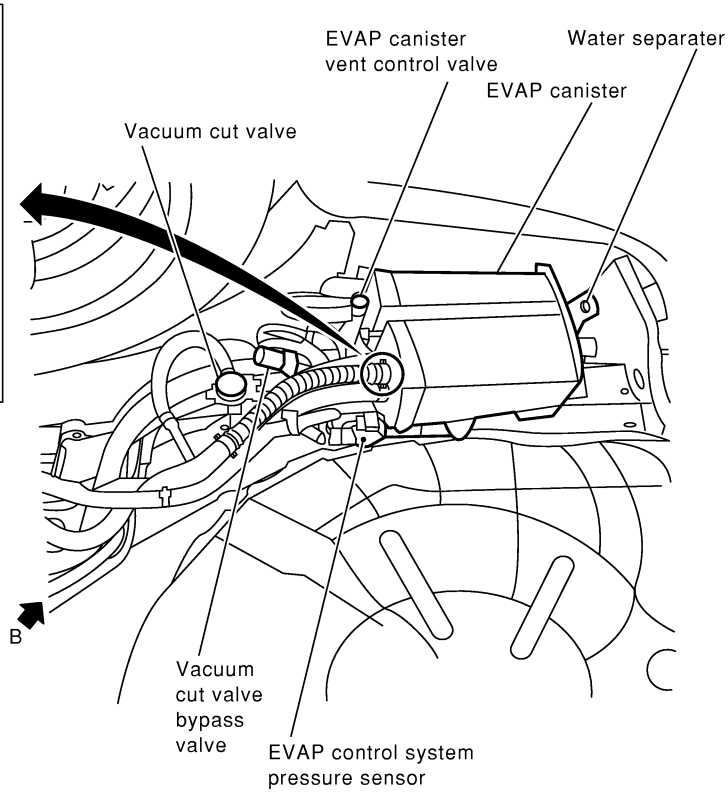
SEF503Z

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





INSTALLATION PRECAUTIONS:
- **This hose can be reused, but do not remove it unless necessary.**
- **Remove any foreign matter (dust, sand, etc.) from the hose connection before installing.**
- **Apply oil to the O-ring before installing.**
- **Replace the hose assembly if the O-ring is scratched or cracked.**



SEF515Z

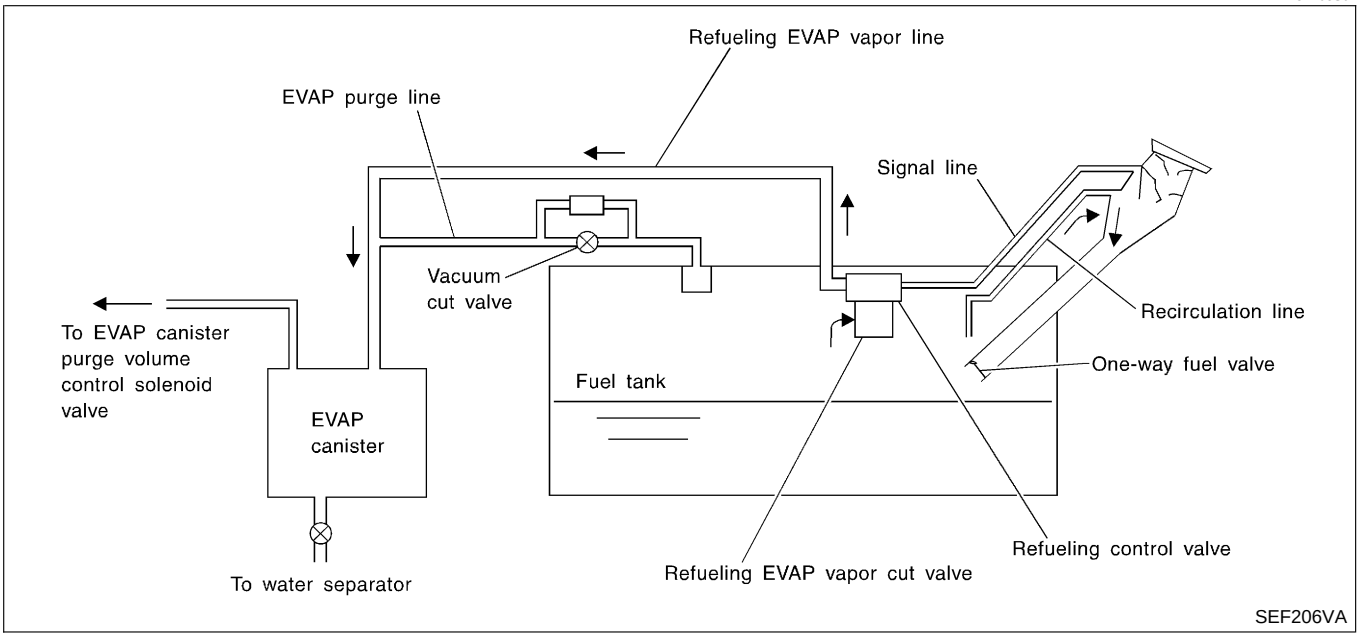
Evaporative Emission System (Cont'd)

ON BOARD REFUELING VAPOR RECOVERY (ORVR)

NIEC1205

System Description

NIEC1205S01



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-744.
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.**

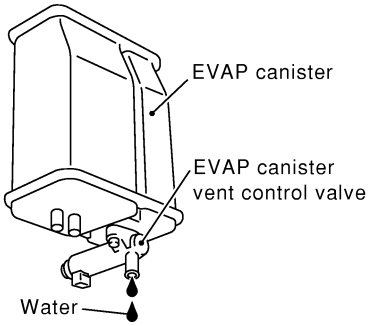
Diagnostic Procedure

NIEC1205S02

Symptom: Fuel Odor from EVAP Canister Is Strong.

NIEC1205S0201

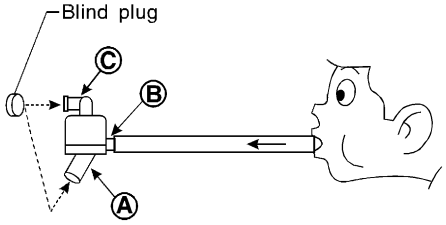
1	CHECK EVAP CANISTER	
1. Remove EVAP canister with EVAP canister vent control valve attached. 2. Weigh the EVAP canister with EVAP canister vent control valve attached. The weight should be less than 1.8 kg (4.0 lb).		
OK or NG		
OK	▶	GO TO 2.
NG	▶	GO TO 3.

2	CHECK IF EVAP CANISTER SATURATED WITH WATER	
Does water drain from the EVAP canister?  SEF504Z		
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

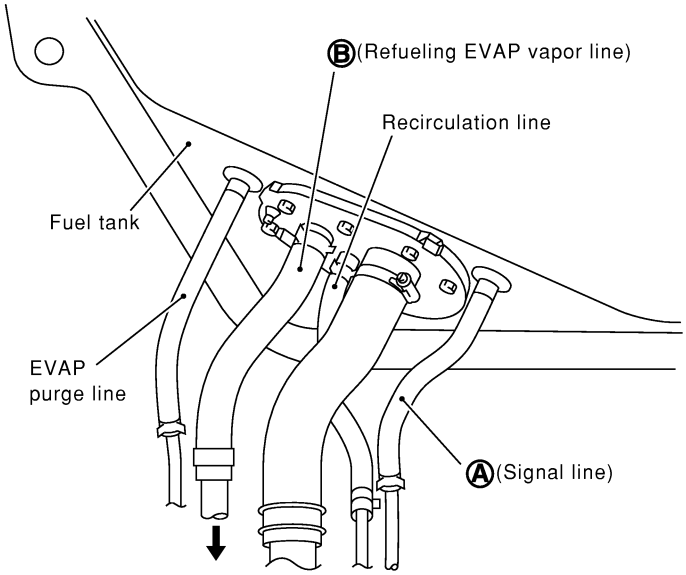
With CONSULT-II

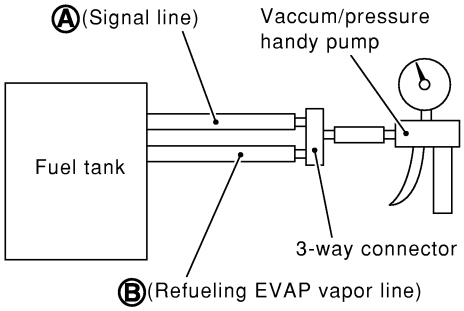
1. Remove fuel tank. Refer to ***FE-5***, "FUEL SYSTEM.
2. Drain fuel from the tank as follows:

a. Remove fuel feed hose located on the fuel level sensor unit retainer.
b. Connect a spare fuel hose, one side to fuel level sensor unit 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 level sensor 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 level sensor unit retainer remaining open and check that the pressure is applicable.





SEF505Z

OK or NG

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

7	CHECK REFUELING EVAP VAPOR CUT VALVE

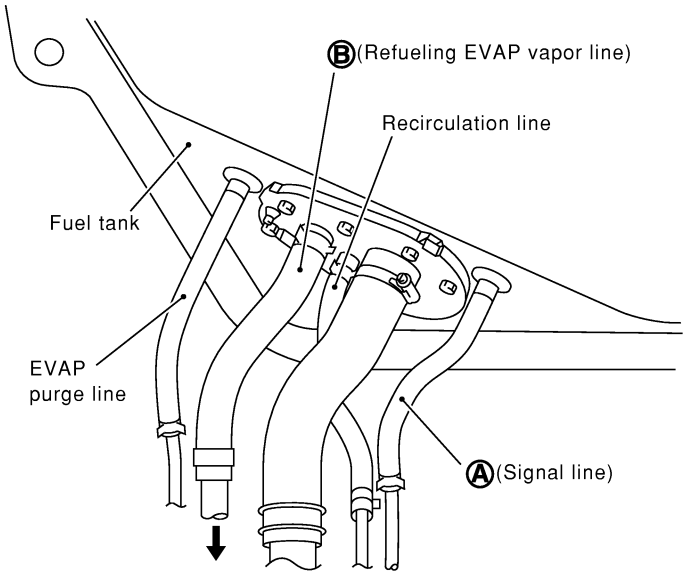
Without CONSULT-II

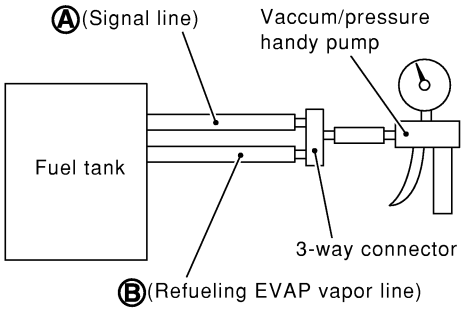
1. Remove fuel tank. Refer to ***FE-5***, "FUEL SYSTEM".
2. Drain fuel from the tank as follows:

a. Remove fuel level sensor unit 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 level sensor unit retainer with fuel level sensor 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 level sensor unit retainer remaining open and check that the pressure is applicable.





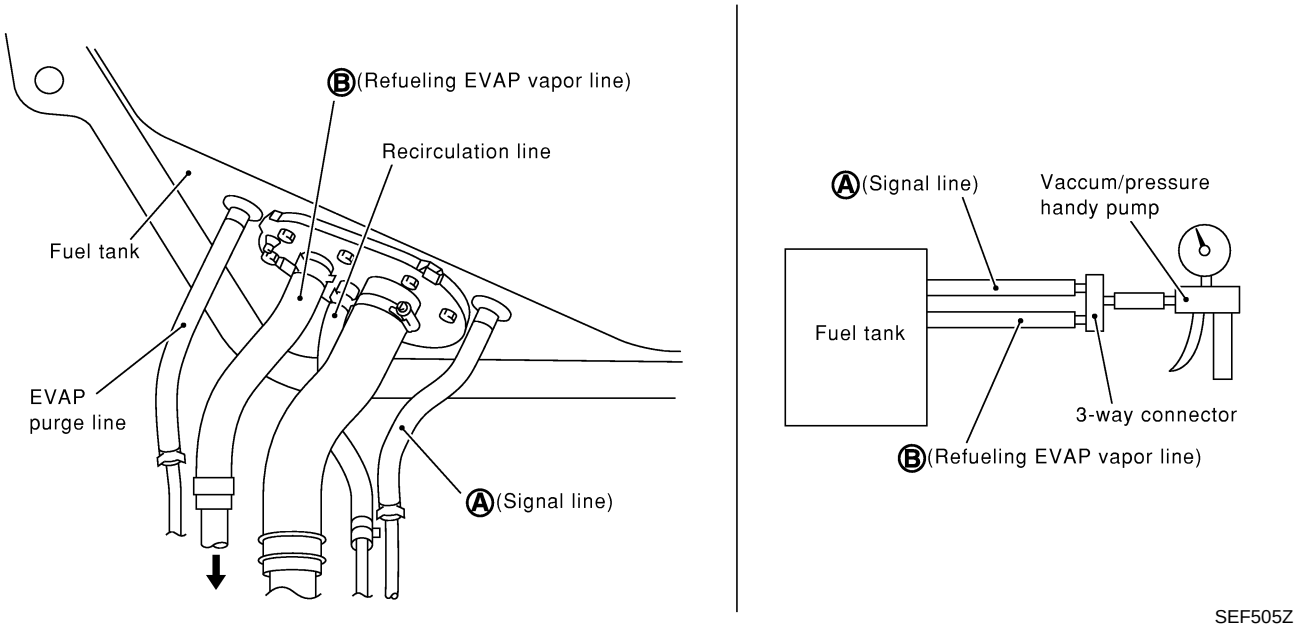
SEF505Z

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.



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.

NIEC1205S0202

1	CHECK EVAP CANISTER

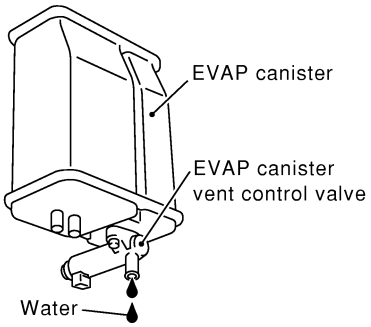
1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Weigh the EVAP canister with EVAP canister vent control valve attached.
   The weight should be less than 1.8 kg (4.0 lb).

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?



SEF504Z

Yes or No

Yes	▶	GO TO 3.
No	▶	GO TO 6.

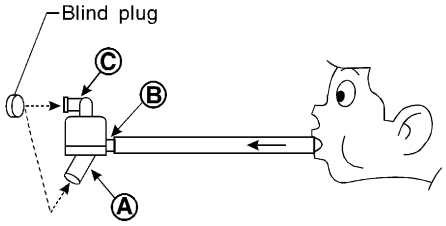
3	REPLACE EVAP CANISTER

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.

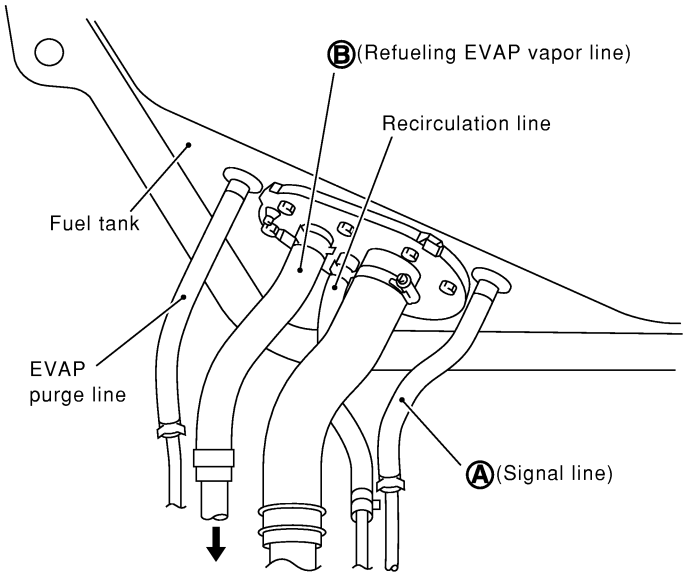
	▶	Repair or replace EVAP hose.

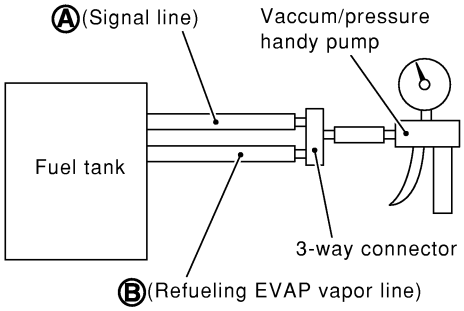
6	CHECK VENT HOSES AND VENT TUBES	
Check hoses and tubes between EVAP canister and refueling control valve for clogging, kink, looseness and improper connection.		
OK or NG		
OK	▶	GO TO 7.
NG	▶	Repair or replace hoses and tubes.

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.





SEF505Z

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

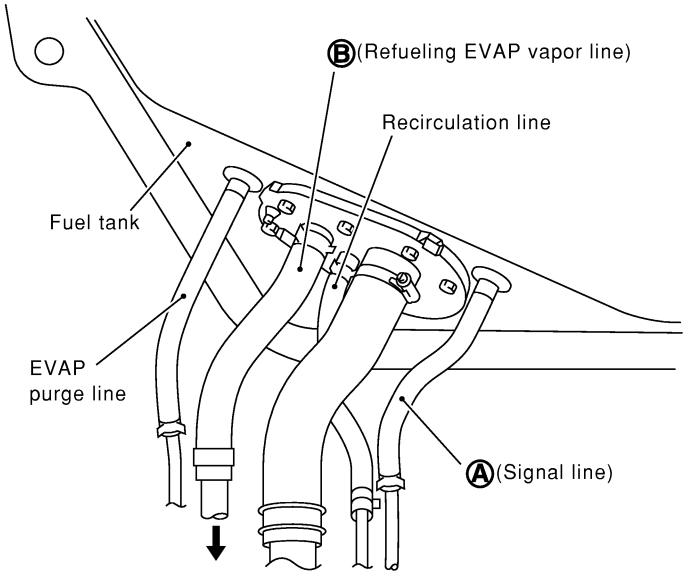
With CONSULT-II

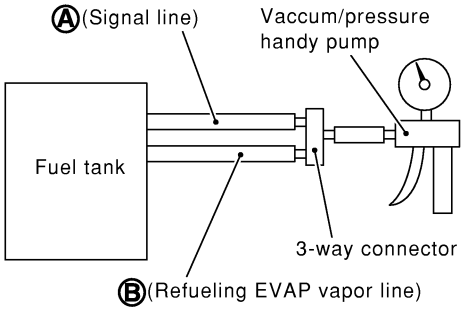
1. Remove fuel tank. Refer to ***FE-5***, "FUEL SYSTEM".
2. Drain fuel from the tank as follows:

a. Remove fuel feed hose located on the fuel level sensor unit retainer.
b. Connect a spare fuel hose, one side to fuel level sensor unit 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 level sensor unit retainer with fuel level sensor 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 level sensor unit retainer remaining open and check that the pressure is applicable.





SEF505Z

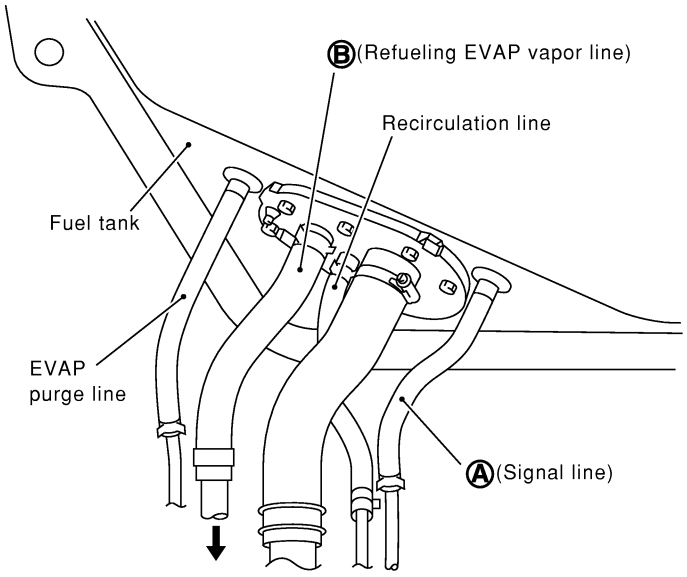
OK or NG

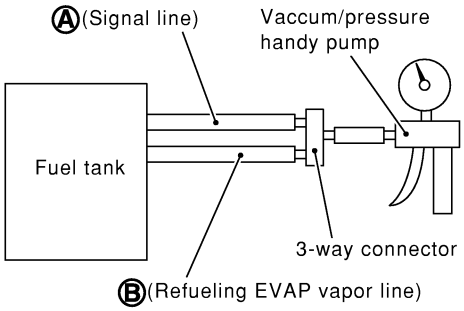
OK	▶	GO TO 11.
NG	▶	Replace refueling EVAP vapor cut valve with fuel tank.

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 level sensor unit 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 level sensor unit retainer with fuel level sensor 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 level sensor unit retainer remaining open and check that the pressure is applicable.





SEF505Z

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

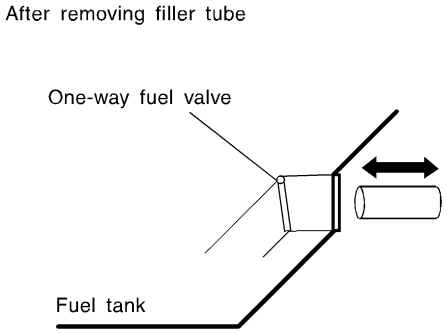
Check one-way valve for clogging.

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.



SEF665U

Do not drop any material into the tank.

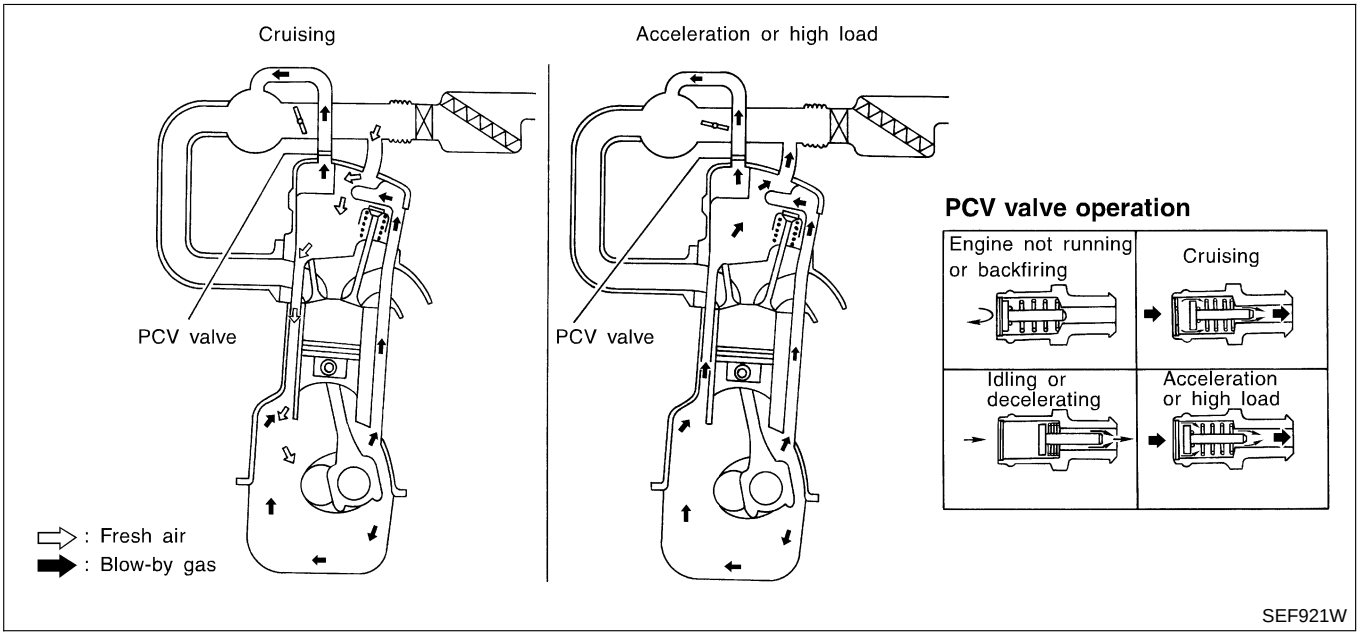
OK or NG

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

Positive Crankcase Ventilation

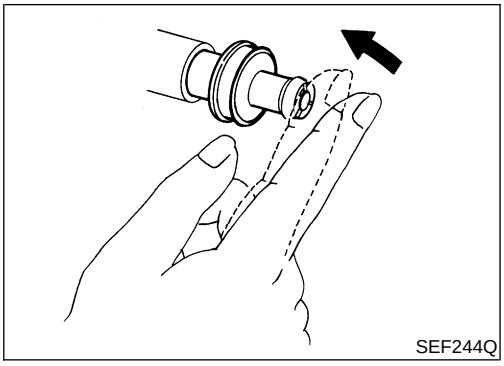
DESCRIPTION

NIEC1206



SEF921W

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


SEF244Q

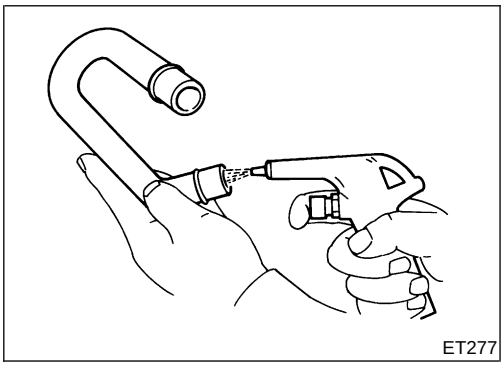
INSPECTION

NIEC1207

PCV (Positive Crankcase Ventilation) Valve

NIEC1207S01

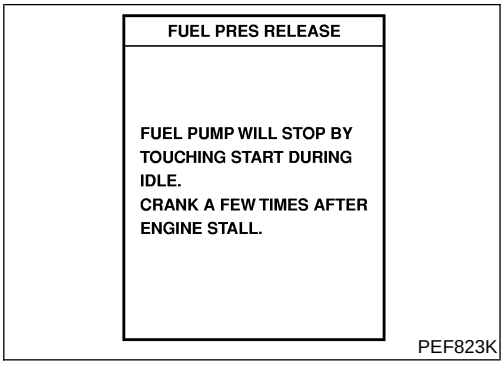
With engine running at idle, remove PCV valve from rocker cover. A properly working valve makes a hissing noise as air passes through it. A strong vacuum should be felt immediately when a finger is placed over the valve inlet.

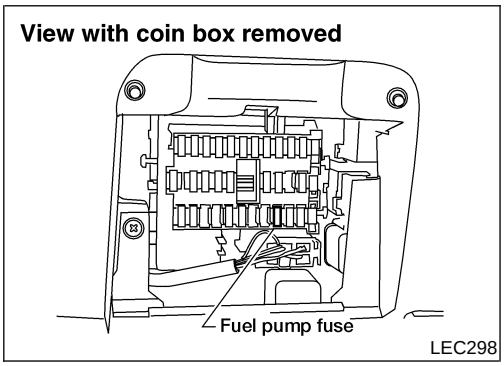

ET277

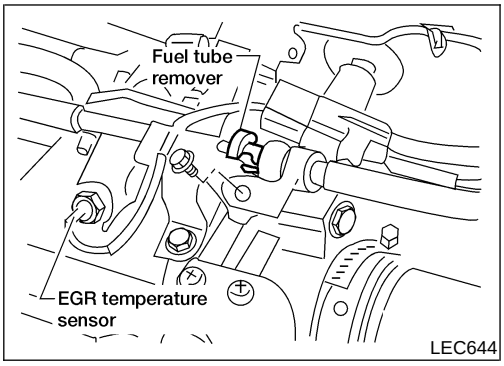
Ventilation Hose

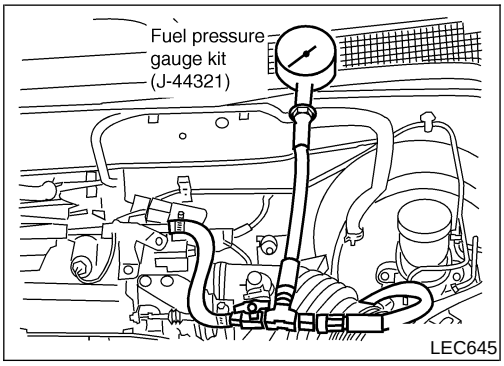
NIEC1207S02

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

NIEC1208

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

WITH CONSULT-II

NIEC1208S01

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

WITHOUT CONSULT-II

NIEC1208S02

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

Fuel Pressure Check

NIEC1209

- **Make sure that clamp screws do not contact adjacent parts.**
- **Use a torque driver to tighten clamps.**
- **Use Fuel Pressure Gauge Kit J-44321 to check fuel pressure.**
- **Do not perform fuel pressure check with system operating. Fuel pressure gauge may indicate false readings.**

1. Release fuel pressure to zero.
2. Disconnect fuel hose from fuel feed tube (engine side) using fuel tube quick connect removal tool.
3. Release quick connector and disconnect fuel hose from fuel feed tube (underbody side). Remove fuel hose assembly.

CAUTION:

Do not install hose clamps over flared portions of fuel feed tubes or damage to fuel feed tubes may result.

4. Install fuel pressure gauge from kit J-44321 between fuel tubes using hose and clamps from kit.
5. Turn ignition switch “ON” and check for fuel leakage.
6. Start engine and read the indication on fuel pressure gauge.

At idle speed:

Approximately 350 kPa (3.57 kg/cm^2, 51 psi)

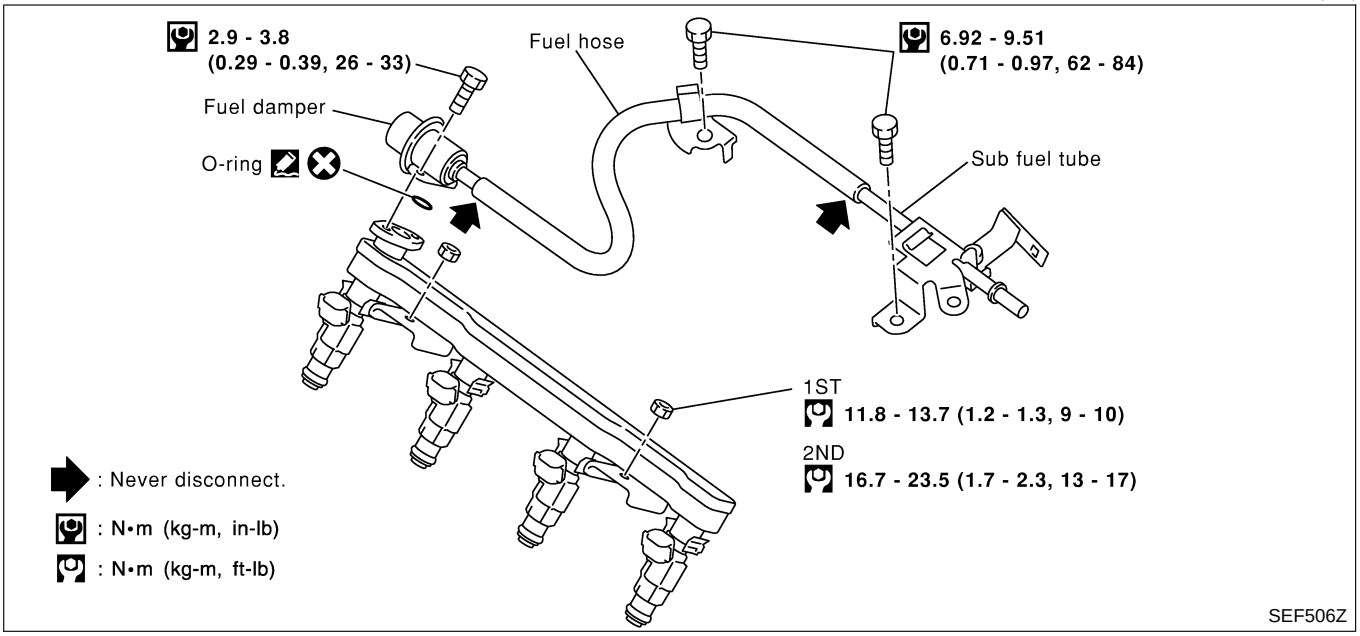
If results are unsatisfactory, check for fuel leakage in fuel line between fuel tank and injector, and check fuel filter for clogging.

If fuel line and fuel filter are OK, replace fuel pressure regulator. Refer to ***FE-12***, “QG18DE CALIF. CA MODEL”.

Injector

REMOVAL AND INSTALLATION

NIEC1210

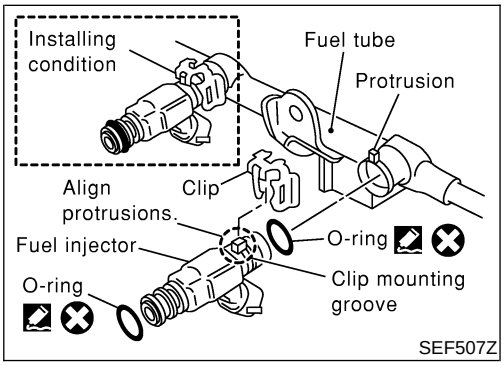


1. Release fuel pressure to zero. Refer to previous page.
2. Remove accelerator cables.
3. Remove intake manifold bracket.
4. Remove PCV hose with bracket.
5. Disconnect injector harness connectors.
6. Disconnect fuel damper vacuum hose from intake manifold collector.
7. Remove fuel damper with fuel hose and sub fuel tube from the fuel rail. Do not kink or pull fuel hose.

CAUTION:

Do not separate fuel hose from fuel damper and sub fuel tube.

8. Remove injectors with fuel tube assembly.



9. Expand and remove clips securing fuel injectors.
10. Extract fuel injectors straight from fuel tubes.

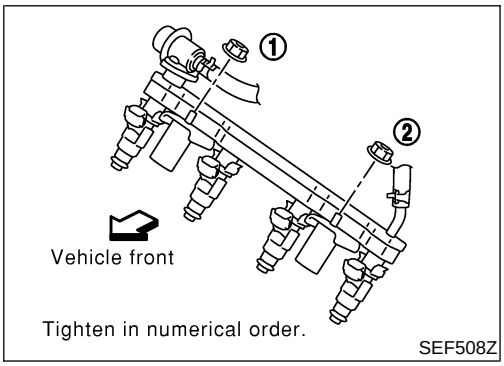
- **Be careful not to damage injector nozzles during removal.**
- **Do not bump or drop fuel injectors.**

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

- **Lubricate O-rings by smearing 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.**

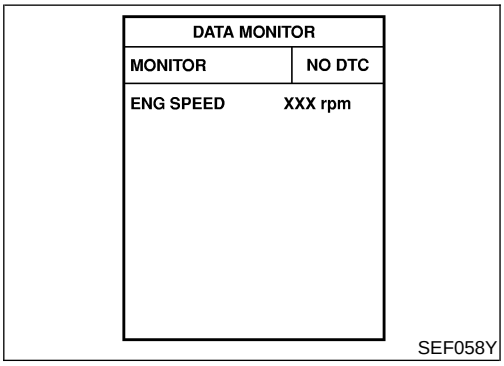
12. Position clips in grooves on fuel injectors.
- **Make sure that protrusions of fuel injectors are aligned with cutouts of clips after installation.**

13. Align protrusions of fuel tubes with those of fuel injectors.
14. 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.



15. Tighten fuel tube assembly mounting nuts in two stages.
: Tightening torque N·m (kg-m, ft-lb)
1st stage:
12 - 13 (1.2 - 1.4, 9 - 10)
2nd stage:
17 - 23 (1.7 - 2.4, 13 - 17)
16. Install all removed parts in the reverse order of removal.

CAUTION:
- **When installing the fuel damper, install the fuel damper with fuel hose and sub fuel tube as assembly.**
- **After properly connecting fuel tube assembly to injector and fuel hose, check connection for fuel leakage.**



How to Check Idle Speed and Ignition Timing

NIEC1211

IDLE SPEED

NIEC1211S01

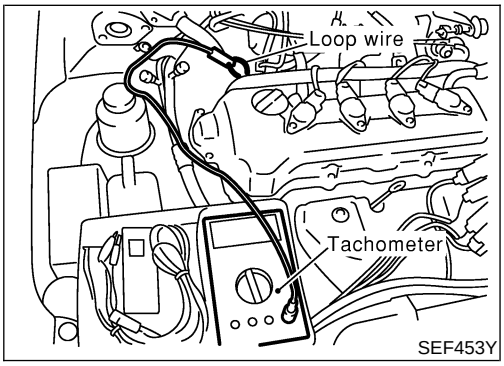
Method A

- **With CONSULT-II**

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

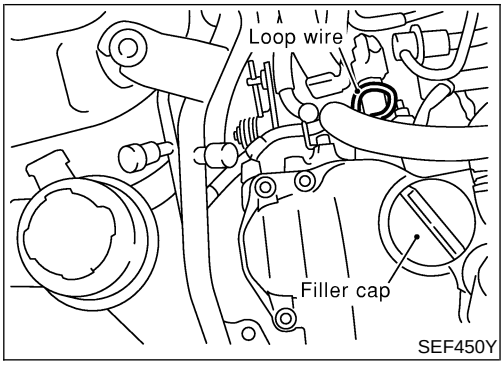
- **With GST**

Check idle speed in "MODE 1" with GST.



Method B (Using Loop wire)

Check the idle speed using loop-wire as shown in the figure.



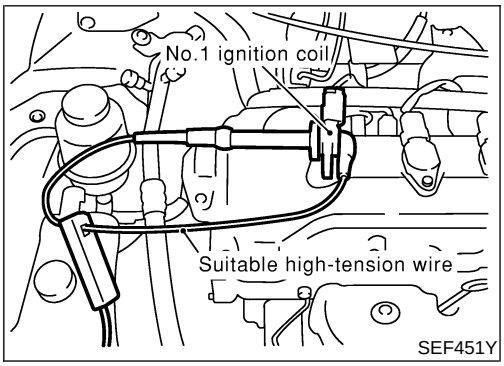
IGNITION TIMING

NIEC1211S02

Any of following two methods may be used.

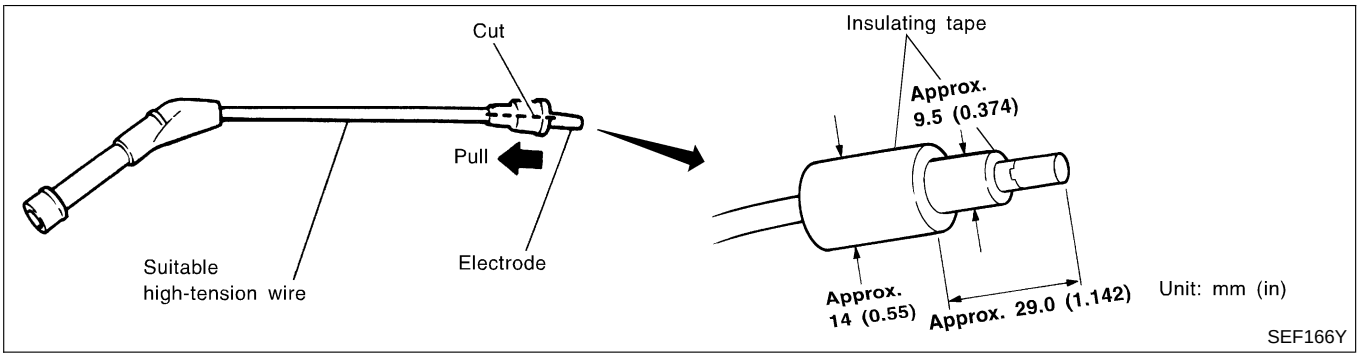
Method A

1) Attach timing light to loop wire which location is shown in the figure.
2) Check ignition timing.



Method B

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



Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment

NIEC1212

PREPARATION

NIEC1212S01

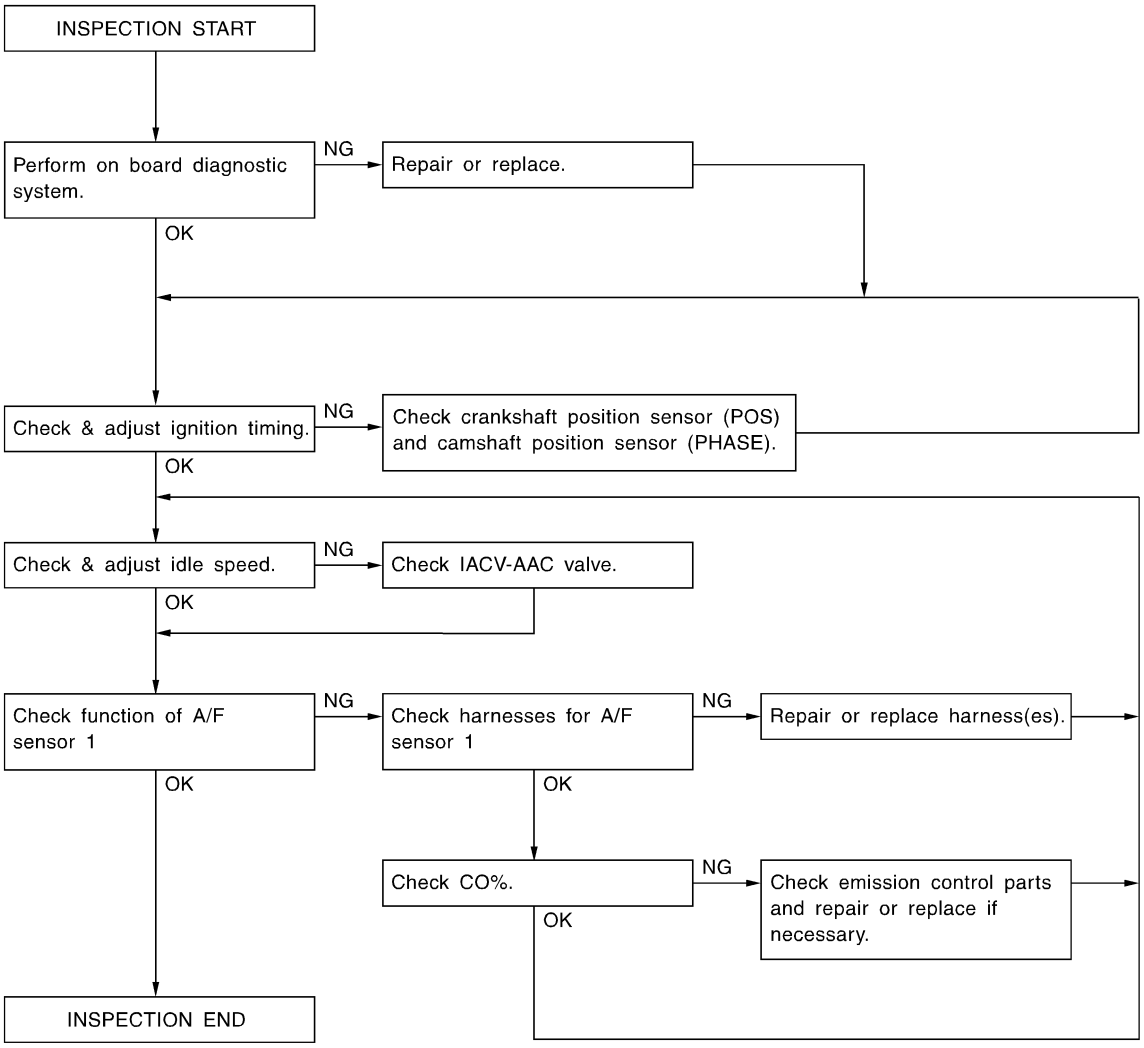
1) Make sure that the following parts are in good order.
- Battery
- Ignition system
- Engine oil and coolant levels
- Fuses
- ECM harness connector
- Vacuum hoses
- Air intake system
  (Oil filler cap, oil level gauge, etc.)
- Fuel pressure
- Engine compression
- EGR valve operation
- Throttle valve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

2) On models equipped with air conditioner, checks should be carried out while the air conditioner is "OFF".
3) On models equipped with automatic transaxle, when checking idle speed, ignition timing and mixture ratio, checks should be carried out while shift lever is in "P" or "N" position.
4) When measuring "CO" percentage, insert probe more than 40 cm (15.7 in) into tail pipe.

5) Turn off headlamps, heater blower, rear window defogger.
6) Keep front wheels pointed straight ahead.
7) Make the check after the cooling fan has stopped.

Overall Inspection Sequence

NIEC1212S0101



SEF612Z

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.

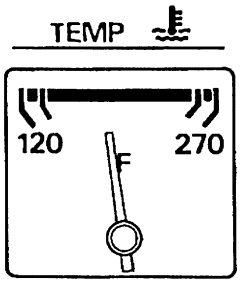
INSPECTION PROCEDURE

=NIEC1212S02

1	INSPECTION START

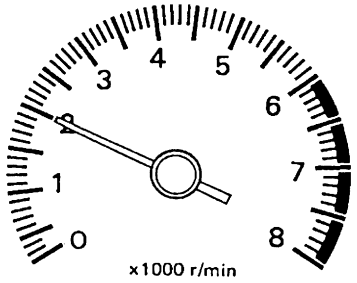
1. Visually check the following:
- Air cleaner clogging
- Hoses and ducts for leaks
- EGR valve operation
- Electrical connectors
- Gasket
- Throttle position and throttle position sensor operation

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.

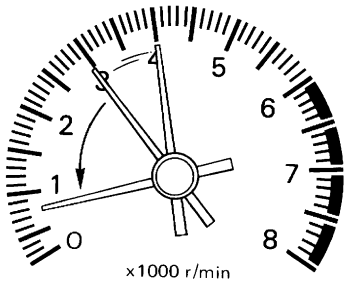
OK or NG

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.

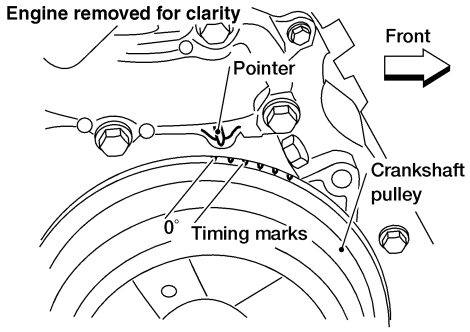
3	CHECK IGNITION TIMING

1. Run engine at about 2,000 rpm for about 2 minutes under no-load.
2. Rev engine (2,000 to 3,000 rpm) two or three times under no-load, then run engine at idle speed for about 1 minute.



SEF978U

3. Check ignition timing with a timing light.



LEC245

9°±2° BTDC (in "P" or "N" position)

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Check camshaft position sensor (PHASE) and circuit, repair or replace if necessary. Refer to EC-1014.
- Check crankshaft position sensor (POS) and circuit, repair or replace if necessary. Refer to EC-1009.
- 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.

5	CHECK TARGET IDLE SPEED

With CONSULT-II

1. Run engine at about 2,000 rpm for about 2 minutes under no-load and run engine for about 1 minute at idle speed.
2. Read idle speed in "DATA MONITOR" mode with CONSULT-II.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

800±50 rpm (in "P" or "N" position)

Without CONSULT-II

1. Run engine at about 2,000 rpm for about 2 minutes under no-load and run engine for about 1 minute at idle speed.
2. Check idle speed.

800±50 rpm (in "P" or "N" position)

OK or NG

OK (With CONSULT-II)	▶	GO TO 8.
OK (Without CONSULT-II)	▶	GO TO 9.
NG	▶	GO TO 6.

6	CHECK TARGET IDLE SPEED AGAIN

Perform test No. 5 again.

OK or NG

OK (With CONSULT-II)	▶	GO TO 8.
OK (Without CONSULT-II)	▶	GO TO 9.
NG	▶	GO TO 7.

7	DETECT MALFUNCTIONING PART

Check the following.

- Check IACV-AAC valve and replace if necessary. Refer to EC-1108.
- Check IACV-AAC valve harness and repair if necessary. Refer to EC-1108.
- Check ECM function by substituting another known-good ECM.
  (ECM may be the cause of a problem, but this is rarely the case.)

With CONSULT-II	▶	GO TO 8.
Without CONSULT-II	▶	GO TO 9.

8	CHECK AIR FUEL RATIO (A/F) SENSOR 1 FUNCTION

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes in "D" position with "OD" OFF.
   NOTE:
   Keep the accelerator pedal as steady as possible during the cruising.
3. Set "OD" ON, then release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (30 MPH).
   NOTE:
   Never apply brake during releasing the accelerator pedal.
4. Repeat steps 2 to 3 five times.
5. Stop vehicle and connect CONSULT-II to the vehicle.
6. Make sure that no 1st trip DTC is displayed in "SELF-DIAG RESULTS" mode.

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 10.

9	CHECK AIR FUEL RATIO (A/F) 1 SENSOR FUNCTION

Without CONSULT-II

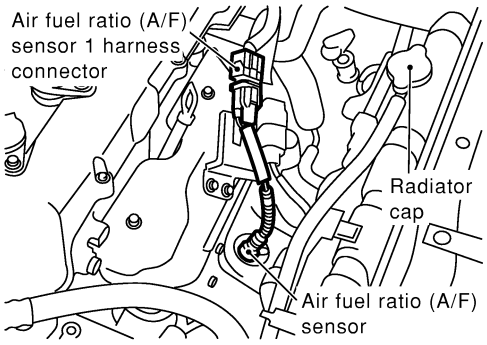
1. Start engine and warm it up to normal operating temperature.
2. Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes in "D" position with "OD" OFF.
   NOTE:
   Keep the accelerator pedal as steady as possible during the cruising.
3. Set "OD" ON, then release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (30 MPH).
   NOTE:
   Never apply brake during releasing the accelerator pedal.
4. Repeat steps 2 to 3 five times.
5. Stop the vehicle and turn ignition switch "OFF".
6. Wait at least 10 seconds and restart engine.
7. Repeat steps 2 to 3 five times.
8. Stop vehicle and connect GST to the vehicle.
9. Make sure that no DTC is displayed.

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 10.

10	CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

1. Turn ignition switch "OFF" and disconnect battery ground cable.
2. Disconnect ECM harness connector and A/F sensor 1 harness connector.



SEF393Z

3. Check harness continuity between the following terminals. Refer to "Wiring Diagram", EC-1196.

ECM terminal	A/F sensor 1 terminal
62	2
63	5
64	1
65	6

MTBL0542

Continuity should exist.

4. Check harness continuity between ECM terminals 62, 63, 64, 65 or A/F sensor 1 terminals 1, 2, 5, 6 and ground. Refer to Wiring Diagram.
Continuity should exist.
5. Also check harness for short to power.

OK or NG

OK	▶	GO TO 12.
NG	▶	GO TO 11.

11	REPAIR OR REPLACE

Repair open circuit or short to ground or short to power in harness or connectors between ECM and A/F sensor 1.

▶ GO TO 5.

12 **PREPARATION FOR "CO" % CHECK**

With CONSULT-II

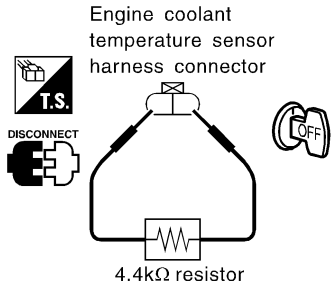
1. Reconnect ECM harness connector.
2. Turn ignition switch "ON".
3. Select "COOLANT TEMP" in "ACTIVE TEST" mode.
4. Set "COOLANT TEMP" to 5°C (41°F) by touching "DWN" and "Qd".

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. Reconnect 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.

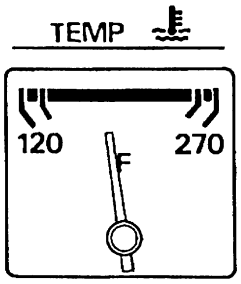


SEF982UA

▶ GO TO 13.

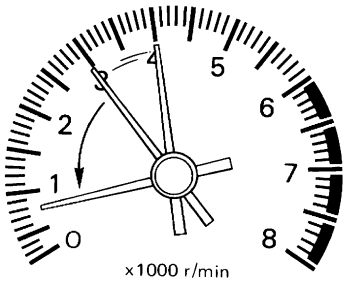
13	CHECK "CO" %

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% and engine runs smoothly.
4. ⊗ **Without CONSULT-II**
   After checking CO%,

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

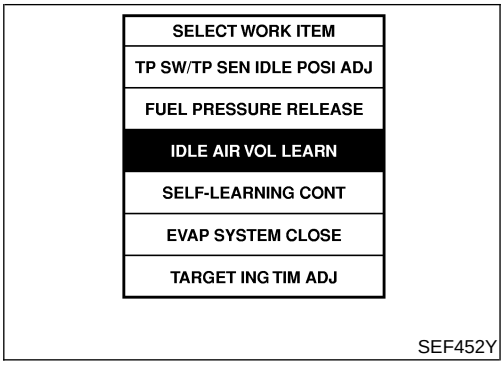
OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 14.

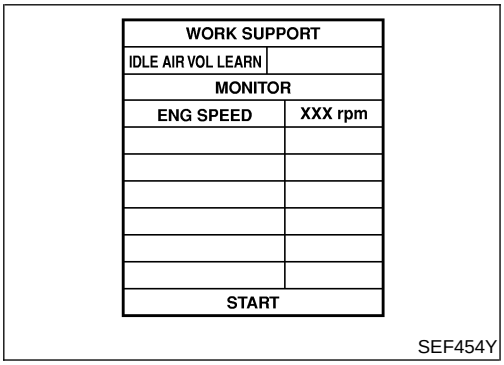
14	DETECT MALFUNCTIONING PART

Check the following.
- Connect A/F sensor 1 harness connector to A/F sensor 1.
- Check fuel pressure. Refer to EC-744.
- Check mass air flow sensor and its circuit. Refer to EC-850.
- Check injector and its circuit. Refer to EC-1329.
  Clean or replace if necessary.
- Check engine coolant temperature sensor and its circuit. Refer to EC-870.
- Check ECM function by substituting another known-good ECM.
  (ECM may be the cause of a problem, but this is rarely the case.)

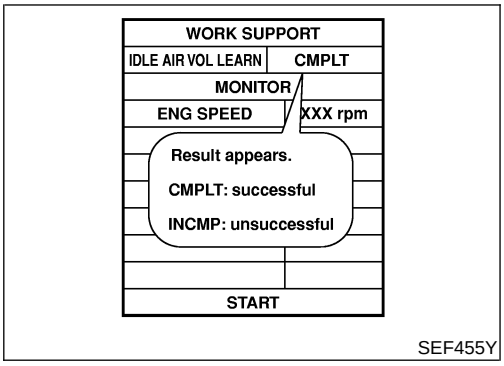
	▶	GO TO 5.



SEF452Y



SEF454Y



SEF455Y

Idle Air Volume Learning

=NIEC1213

DESCRIPTION

NIEC1213S01

"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

NIEC1213S02

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 - 95°C (158 - 203°F)
- PNP switch: ON
- Electric load switch: OFF
  (Air conditioner, headlamp, rear window defogger)

On vehicles equipped with daytime light systems, if the parking brake is applied before the engine is started, the headlamp will not be illuminated.

- 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 TEMPSE" in "DATA MONITOR" mode of "A/T" system indicates less than 0.9 V.
  For models without CONSULT-II, drive vehicle for 10 minutes.

OPERATION PROCEDURE

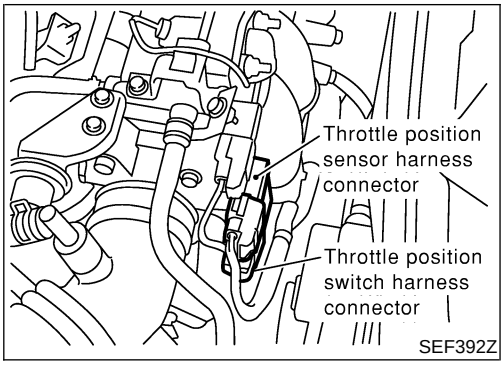
NIEC1213S03

With CONSULT-II

NIEC1213S0301

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	800±50 rpm (in "P" or "N" position)
Ignition timing	9°±2° BTDC (in "P" or "N" position)



Without CONSULT-II

NIEC1213S0302

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	800±50 rpm (in "P" or "N" position)
Ignition timing	9°±2° 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 that downstream of throttle valve is free from air leakage.**
3) **Adjust closed throttle position switch and reset memory. (Refer to Basic Inspection, EC-802.)**
4) **When the above three items check out OK, engine component parts and their installation condition are questionable. Check and eliminate the cause of the problem.**
5) **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

NIEC1214

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-818.)

Two Trip Detection Logic

NIEC1215

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 - P0304 is being detected	X	—	—	—	—	—	X	—
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0304 is being detected	—	—	X	—	—	X	—	—
Closed loop control — DTC: P1148	—	X	—	—	X	—	X	—
Fail-safe items (Refer to EC-818.)	—	X	—	—	X*1	—	X*1	—
Except above	—	—	—	X	—	X	X	—

*1: Except “ECM”

Emission-related Diagnostic Information

NIEC1216

DTC AND 1ST TRIP DTC

NIEC1216S01

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 logi0319c). 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-770.

For malfunctions in which 1st trip DTCs are displayed, refer to EC-768. 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-800. 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

NIEC1216S0101

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
IACV-AAC VALVE [P0505]	0

1st trip DTC display

SELF DIAG RESULTS	
DTC RESULTS	TIME
IACV-AAC VALVE [P0505]	1t

SEF698X

FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA

NIEC1216S02

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-783.
Only one set of freeze frame data (either 1st trip freeze frame data or freeze frame data) can be stored in the ECM. 1st trip freeze frame data is stored in the ECM memory along with the 1st trip DTC. There is no priority for 1st trip freeze frame data and it is updated each time a different 1st trip DTC is detected. However, once freeze frame data (2nd trip detection/MIL on) is stored in the ECM memory, 1st trip freeze frame data is no longer stored. Remember, only one set of freeze frame data can be stored in the ECM. The ECM has the following priorities to update the data.

Priority	Items	
1	Freeze frame data	Misfire — DTC: P0300 - P0304 Fuel Injection System Function — DTC: P0171, P0172
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-770.

SYSTEM READINESS TEST (SRT) CODE

NIEC1216S03

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

=NIEC1216S0301

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
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
HO2S	3	Air fuel ratio (A/F) sensor 1 (circuit)	P1271
		Air fuel ratio (A/F) sensor 1 (circuit)	P1272
		Air fuel ratio (A/F) sensor 1 (lean shift monitoring)	P1273
		Air fuel ratio (A/F) sensor 1 (rich shift monitoring)	P1274
		Air fuel ratio (A/F) sensor 1 (response monitoring)	P1275
		Air fuel ratio (A/F) sensor 1 (high voltage)	P1276
		Heated oxygen sensor 2 (rear) (min. voltage monitoring)	P0137
		Heated oxygen sensor 2 (rear) (max. voltage monitoring)	P0138
		Heated oxygen sensor 2 (rear) (response monitoring)	P0139
		Heated oxygen sensor 2 (rear) (high voltage)	P0140
		Heated oxygen sensor 3 (min. voltage monitoring)	P0143
		Heated oxygen sensor 3 (max. voltage monitoring)	P0144
		Heated oxygen sensor 3 (response monitoring)	P0145
		Heated oxygen sensor 3 (high voltage)	P0145
HO2S HTR	3	Air fuel ratio (A/F) sensor 1 heater	P1277
		Heated oxygen sensor 2 (rear) heater	P0141
		Heated oxygen sensor 3 heater	P0147
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 performance priority for models with CONSULT-II.

SRT Set Timing

=NIEC1216S0302

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".

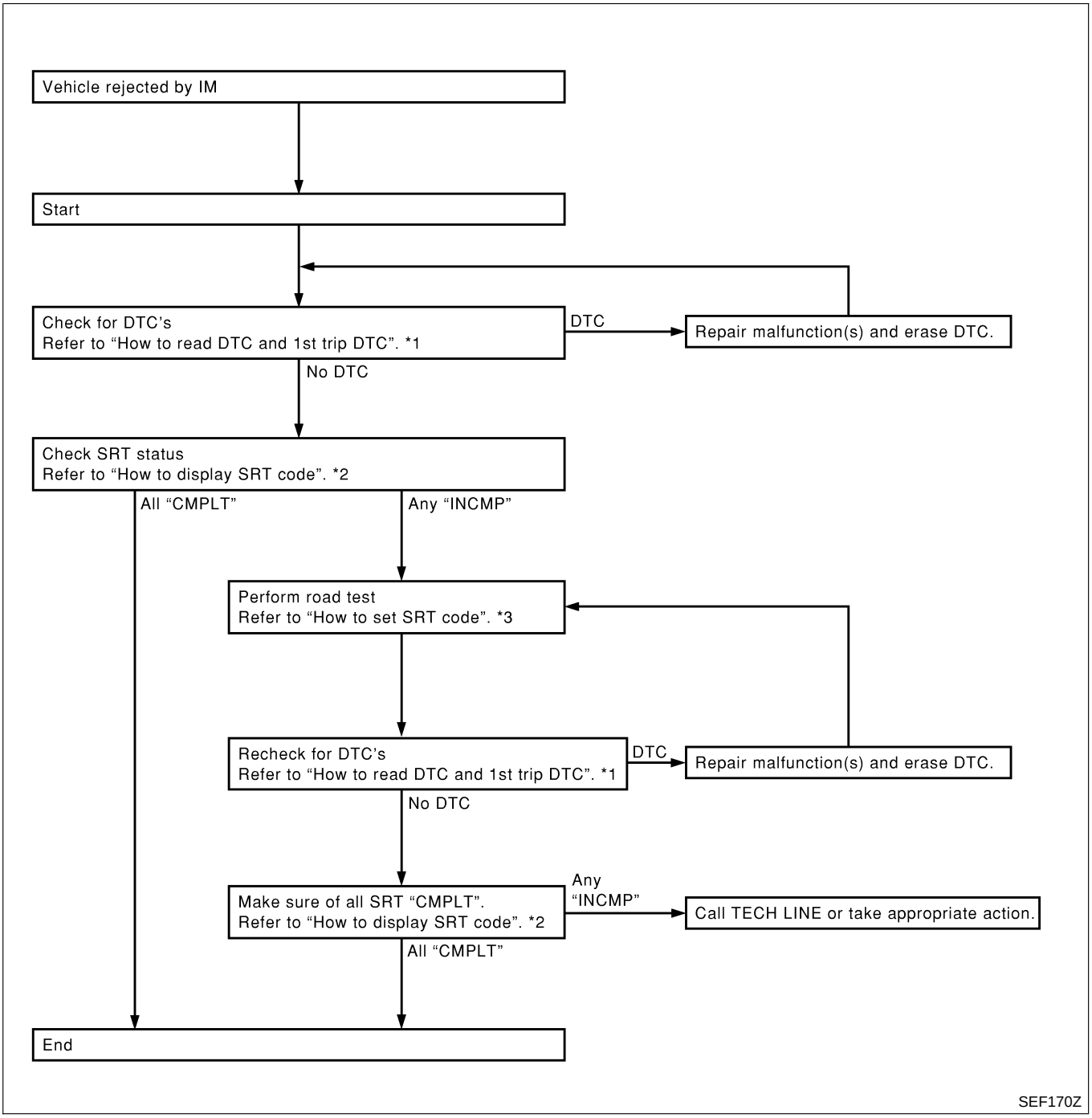
NOTE:

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

NIEC1216S0303

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-759 *2 EC-763 *3 EC-764

How to Display SRT Code

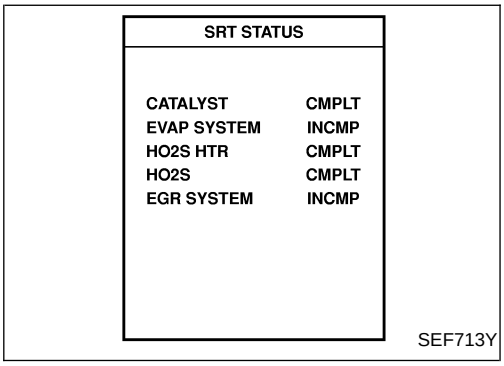
NIEC1216S0304

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

NIEC1216S0305

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-761.

Without CONSULT-II

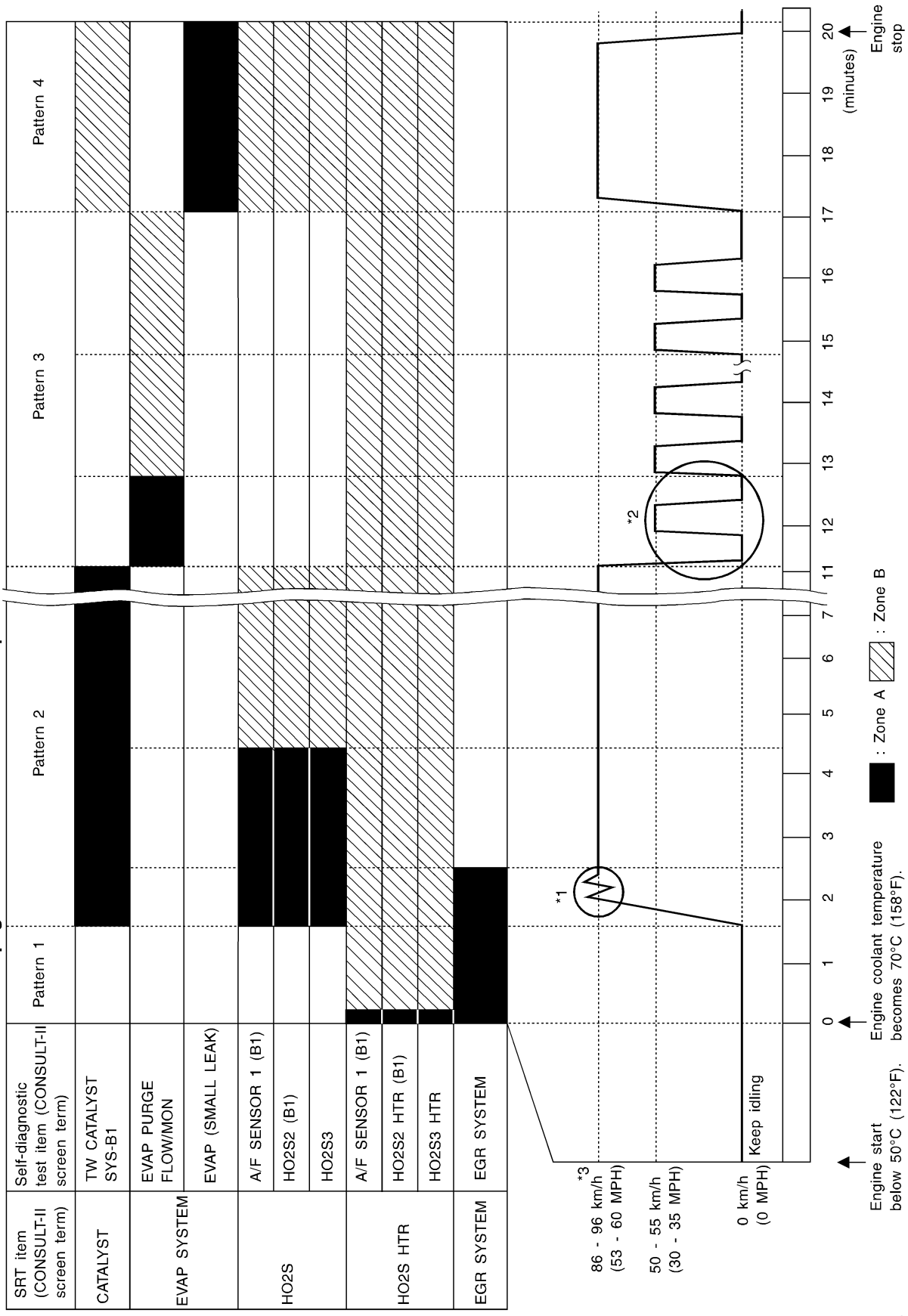
The most efficient driving pattern in which SRT codes can be properly set is explained on the next page. The driving pattern should be performed one or more times to set all SRT codes.

Driving Pattern

NIEC1216S0306

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.



SEF509Z

- 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 82 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.

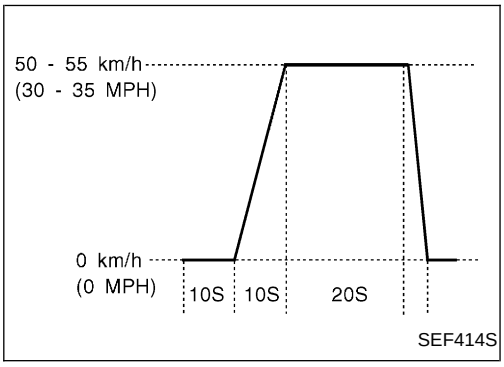
Pattern 4:

- 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)

NIEC1216S04

The following is the information specified in Mode 6 of SAE J1979.
The test value is a parameter used to determine whether a system/circuit diagnostic test is "OK" or "NG" while being monitored by the ECM during self-diagnosis. The test limit is a reference value which is specified as the maximum or minimum value and is compared with the test value being monitored.
Items for which these data (test value and test limit) are displayed are the same as SRT code items (9 test items).
These data (test value and test limit) are specified by Test ID (TID) and Component ID (CID) and can be displayed on the GST screen.

X: Applicable —: Not applicable

SRT item	Self-diagnostic test item	Test value (GST display)		Test limit	Application
		TID	CID		
CATALYST	Three way catalyst function	01H	01H	Max.	X
		02H	81H	Min.	X
EVAP SYSTEM	EVAP control system (Small leak)	05H	03H	Max.	X
	EVAP control system purge flow monitoring	06H	83H	Min.	X
HO2S	A/F sensor 1	43H	0EH	Max.	X
		44H	8EH	Min.	X
		45H	8EH	Min.	X
	Heated oxygen sensor 2 (rear)	19H	86H	Min.	X
		1AH	86H	Min.	X
		1BH	06H	Max.	X
		1CH	06H	Max.	X
	Heated oxygen sensor 3	61H	92H	Min.	X
		62H	92H	Min.	X
		63H	12H	Max.	X
		64H	12H	Max.	X
HO2S HTR	A/F sensor 1 heater	57H	10H	Max.	X
		58H	90H	Min.	X
	Heated oxygen sensor 2 heater (rear)	2DH	0AH	Max.	X
		2EH	8AH	Min.	X
	Heated oxygen sensor 3 heater	71H	14H	Max.	X
		72H	94H	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

NIEC1216S05

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-850
ABSL PRES SEN/CIRC	P0105	—	—	X	EC-859
AIR TEMP SEN/CIRC	P0110	—	—	X	EC-864
COOLANT T SEN/CIRC	P0115	—	—	X	EC-870
THRTL POS SEN/CIRC	P0120	—	—	X	EC-875
*COOLAN T SEN/CIRC	P0125	—	—	X	EC-886
HO2S2 (B1)	P0137	X	X	X*2	EC-891
HO2S2 (B1)	P0138	X	X	X*2	EC-899
HO2S2 (B1)	P0139	X	X	X*2	EC-907
HO2S2 (B1)	P0140	X	X	X*2	EC-915
HO2S2 HTR (B1)	P0141	X	X	X*2	EC-921
HO2S3 (B1)	P0143	X	X	X*2	EC-926
HO2S3 (B1)	P0144	X	X	X*2	EC-934
HO2S3 (B1)	P0145	X	X	X*2	EC-942
HO2S3 (B1)	P0146	X	X	X*2	EC-950
HO2S3 HTR (B1)	P0147	X	X	X*2	EC-956
FUEL SYS-LEAN/BK1	P0171	—	—	X	EC-961
FUEL SYS-RICH/BK1	P0172	—	—	X	EC-968
FUEL TEMP SEN/CIRC	P0180	—	—	X	EC-975
ENG OVER TEMP	P0217	—	—	X	EC-980
MULTI CYL MISFIRE	P0300	—	—	X	EC-998
CYL 1 MISFIRE	P0301	—	—	X	EC-998
CYL 2 MISFIRE	P0302	—	—	X	EC-998
CYL 3 MISFIRE	P0303	—	—	X	EC-998
CYL 4 MISFIRE	P0304	—	—	X	EC-998
KNOCK SEN/CIRC-B1	P0325	—	—	—	EC-1005
CKP SEN/CIRCUIT	P0335	—	—	X	EC-1009
CMP SEN/CIRCUIT	P0340	—	—	X	EC-1014
EGR SYSTEM	P0400	X	X	X*2	EC-1020
EGR VOL CONT/V CIR	P0403	—	—	X	EC-1029
TW CATALYST SYS-B1	P0420	X	X	X*2	EC-1036
EVAP SMALL LEAK	P0440	X	X	X*2	EC-1040
PURG VOLUME CONT/V	P0443	—	—	X	EC-1055

Items (CONSULT-II screen terms)	DTC*1	SRT code	Test value/ Test limit (GST only)	1st trip DTC*1	Reference page
VENT CONTROL VALVE	P0446	—	—	X	EC-1061
EVAPO SYS PRES SEN	P0450	—	—	X	EC-1068
EVAP GROSS LEAK	P0455	—	X	X*2	EC-1080
FUEL LV SE (SLOSH)	P0460	—	—	X	EC-1094
FUEL LEVEL SENSOR	P0461	—	—	X	EC-1098
FUEL LEVEL SEN/CIRC	P0464	—	—	X	EC-1100
VEH SPEED SEN/CIRC	P0500	—	—	X	EC-1104
IACV/AAC VLV/CIRC	P0505	—	—	X	EC-1108
CLOSED TP SW/CIRC	P0510	—	—	X	EC-1117
A/T COMM LINE	P0600	—	—	—	EC-1125
ECM	P0605	—	—	X	EC-1128
PNP SW/CIRC	P0705	—	—	X	***AT-115***
ATF TEMP SEN/CIRC	P0710	—	—	X	***AT-115***
VEH SPD SEN/CIR AT	P0720	—	—	X	***AT-119***
ENGINE SPEED SIG	P0725	—	—	X	***AT-123***
A/T 1ST GR FNCTN	P0731	—	—	X	***AT-126***
A/T 2ND GR FNCTN	P0732	—	—	X	***AT-142***
A/T 3RD GR FNCTN	P0733	—	—	X	***AT-133***
A/T 4TH GR FNCTN	P0734	—	—	X	***AT-139***
TCC SOLENOID/CIRC	P0740	—	—	X	***AT-145***
A/T TCC S/V FNCTN	P0744	—	—	X	***AT-148***
L/PRESS SOL/CIRC	P0745	—	—	X	***AT-153***
SFT SOL A/CIRC	P0750	—	—	X	***AT-158***
SFT SOL B/CIRC	P0755	—	—	X	***AT-164***
MAP SENSOR	P1108	—	—	X	EC-1130
INT/V TIMING CONT	P1110	—	—	X	EC-1137
INT/V TIM V/CIR-B1	P1111	—	—	X	EC-1143
THERMOSTAT FNCTN	P1126	—	—	X	EC-1148
VARI SWL CON/SV-B1	P1132	—	—	X	EC-1150
SWIRL CON/V POS SEN	P1137	—	—	X	EC-1155
SWIRL CONT VALVE	P1138	—	—	X	EC-1162
INT TIM S/CIR-B1	P1140	—	—	X	EC-1170
CLOSED LOOP-B1	P1148	—	—	X	EC-1175
ENG OVER TEMP	P1217	—	—	X	EC-1176
A/F SENSOR 1 (B1)	P1271	X	X	X	EC-1193
A/F SENSOR 1 (B1)	P1272	X	X	X	EC-1198
A/F SENSOR 1 (B1)	P1273	X	X	X	EC-1203

Items (CONSULT-II screen terms)	DTC*1	SRT code	Test value/ Test limit (GST only)	1st trip DTC*1	Reference page
A/F SENSOR 1 (B1)	P1274	X	X	X	EC-1209
A/F SENSOR 1 (B1)	P1275	X	X	X	EC-1215
A/F SENSOR 1 (B1)	P1276	X	X	X	EC-1223
A/F SEN1 HTR (B1)	P1277	X	X	X	EC-1228
IGN SIGNAL-PRIMARY	P1320	—	—	X	EC-1233
EGR TEMP SEN/CIRC	P1401	—	—	X	EC-1244
EGR SYSTEM	P1402	X	X	X*2	EC-1251
EVAP SMALL LEAK	P1440	X	X	X*2	EC-1258
PURG VOLUME CONT/V	P1444	—	—	X	EC-1260
VENT CONTROL VALVE	P1446	—	—	X	EC-1272
EVAP PURG FLOW/MON	P1447	X	X	X*2	EC-1280
VENT CONTROL VALVE	P1448	—	—	X	EC-1292
FUEL LEVEL SEN/CIRC	P1464	—	—	X	EC-1301
VC/V BYPASS/V	P1490	—	—	X	EC-1304
VC CUT/V BYPASS/V	P1491	—	—	X	EC-1310
A/T DIAG COMM LINE	P1605	—	—	X	EC-1322
TP SEN/CIRC A/T	P1705	—	—	X	***AT-191***
P-N POS SW/CIRCUIT	P1706	—	—	X	EC-1325
O/R CLTCH SOL/CIRC	P1760	—	—	X	***AT-199***

*1: 1st trip DTC No. is the same as DTC No.
*2: These are not displayed with GST.

HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION

NIEC1216S06

How to Erase DTC (With CONSULT-II)

NIEC1216S0601

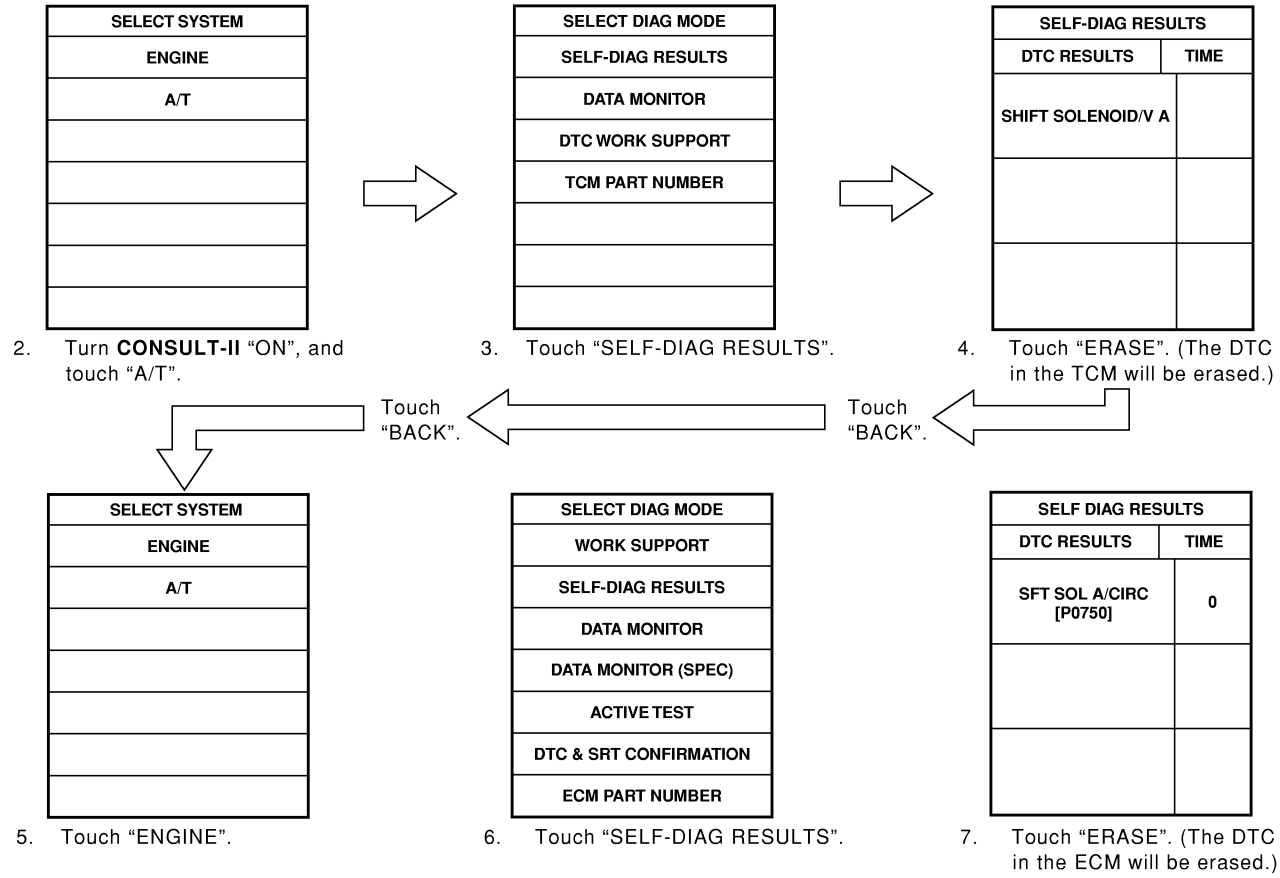
NOTE:
If the DTC is not for A/T related items (see EC-701), skip steps 2 through 4.

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.



SEF823YC

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)

NIEC1216S0602

NOTE:

If the DTC is not for A/T related items (see EC-701), 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.

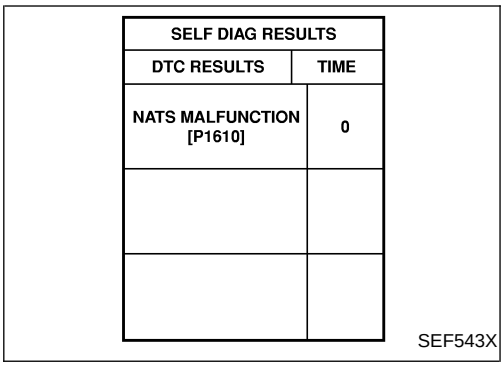
- **If the battery is disconnected, the emission-related diagnostic information will be lost after approx. 24 hours.**
- **The following data are cleared when the ECM memory is erased.**

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.

NVIS (NISSAN VEHICLE IMMOBILIZER SYSTEM — NATS)

NIEC1216S07

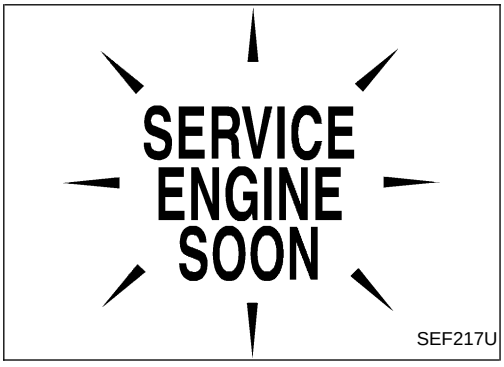


- **If the security indicator lights up with the ignition switch in the "ON" position or "NATS MALFUNCTION" is displayed on "SELF-DIAG RESULTS" screen, perform self-diagnostic results mode with CONSULT-II using NATS program card. Refer to *EL-306*, "NVIS (NISSAN Vehicle Immobilizer System — NATS)".**
- **Confirm no self-diagnostic results of NVIS (NATS) is displayed before touching "ERASE" in "SELF-DIAG RESULTS" mode with CONSULT-II.**
- **When replacing ECM, initialization of NVIS (NATS) system and registration of all NVIS (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 NVIS (NATS) initialization and NVIS (NATS) ignition key ID registration, refer to CONSULT-II operation manual, IVIS/NVIS.

Malfunction Indicator Lamp (MIL)

DESCRIPTION

NIEC1217



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-105***, "WARNING LAMPS" or see EC-1363.

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

=NIEC1217S01

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

NIEC1217S0101

In this mode, the MIL on the instrument panel should stay ON. If it remains OFF, check the bulb. Refer to ***EL-105***, "WARNING LAMPS" or see EC-1363.

Diagnostic Test Mode I — Malfunction Warning

NIEC1217S0102

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

OBD System Operation Chart

=NIEC1218

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

NIEC1218S01

- 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-758.
- 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

NIEC1218S02

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

For details about patterns “B” and “C” under “Fuel Injection System” and “Misfire”, see EC-776.

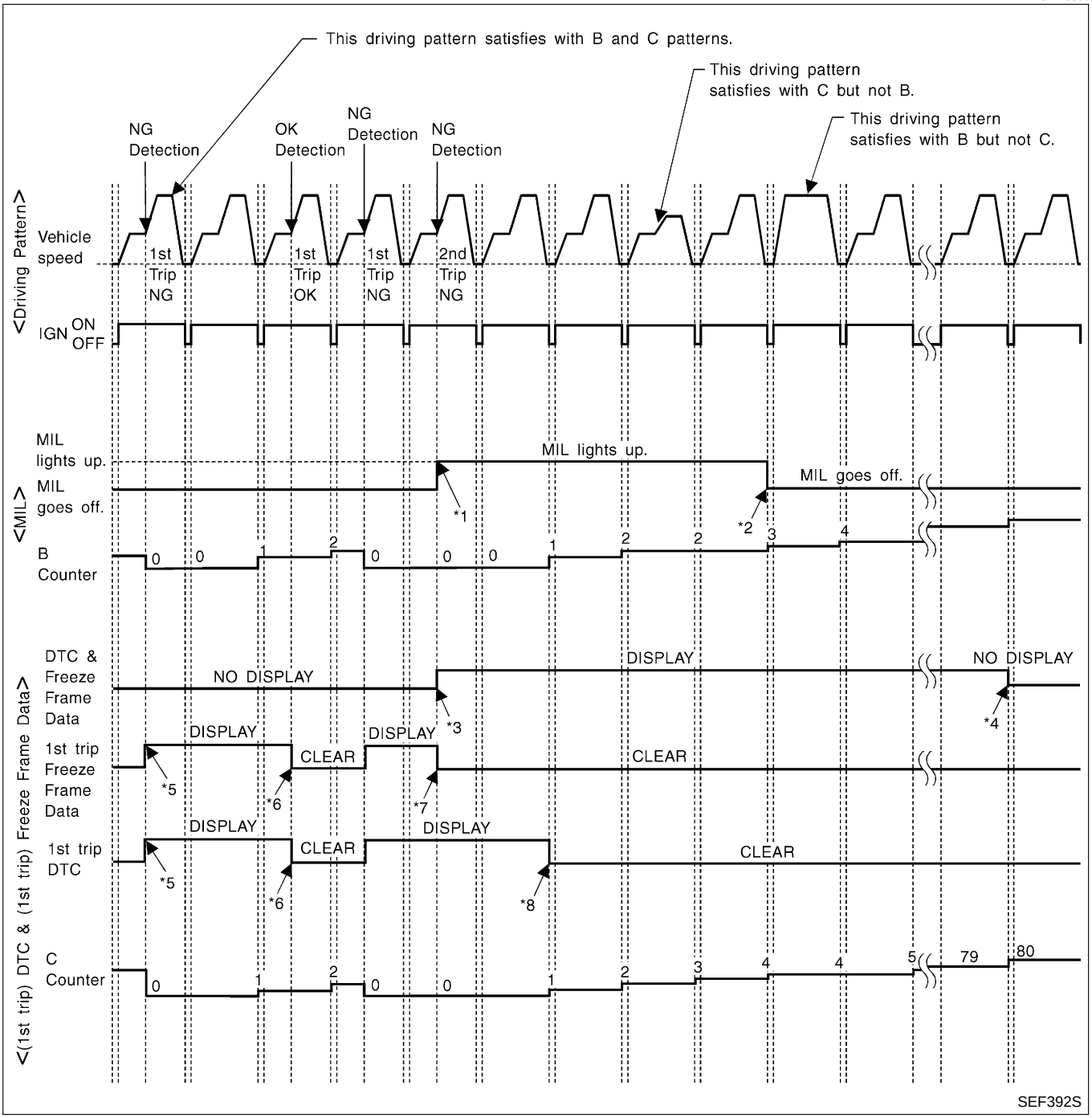
For details about patterns “A” and “B” under “Other”, see EC-778.

*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"

=NIEC1218S03



*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.

OBD System Operation Chart (Cont'd)

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

=NIEC1218S04

Driving Pattern B

NIEC1218S0401

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

NIEC1218S0402

Driving pattern C means the vehicle operation as follows:

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

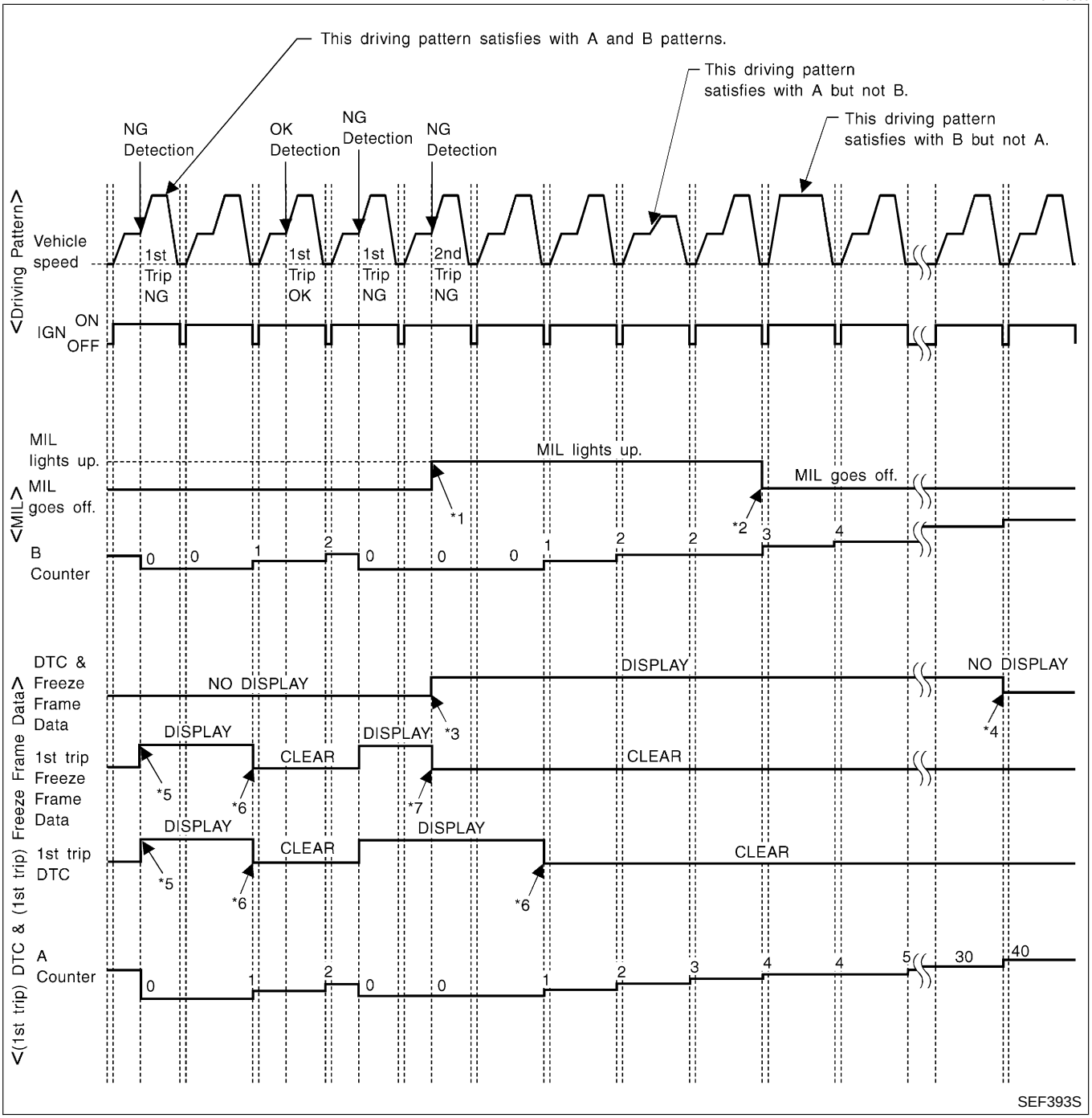
- When the freeze frame data shows lower than 70°C (158°F), "T" should be lower than 70°C (158°F).
- When the freeze frame data shows higher than or equal to 70°C (158°F), "T" should be higher than or equal to 70°C (158°F).

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

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

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

NIEC1218S05



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

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

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

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

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

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

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

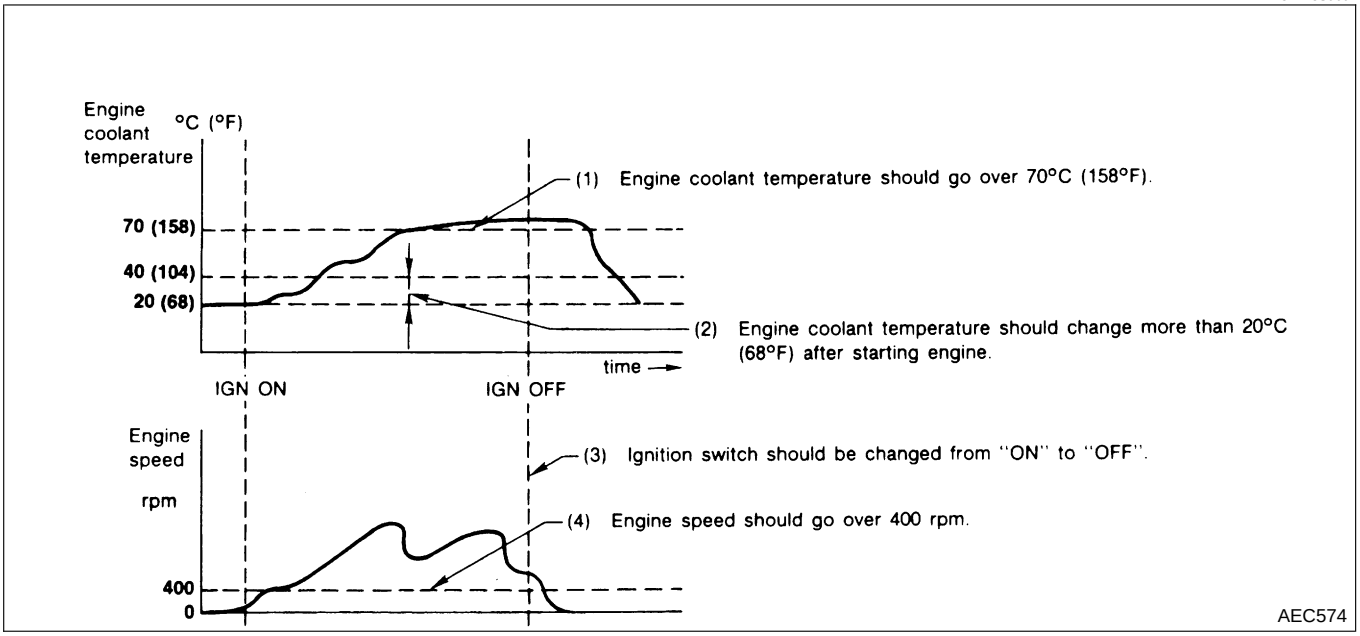
OBD System Operation Chart (Cont'd)

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

NIEC1218S06

Driving Pattern A

NIEC1218S0601



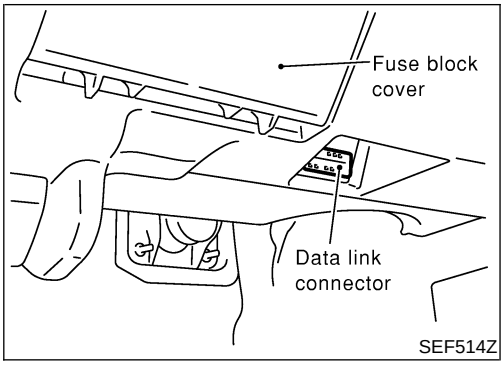
- The A counter will be cleared when the malfunction is detected regardless of (1) - (4).
- The A counter will be counted up when (1) - (4) are satisfied without the same malfunction.
- The DTC will not be displayed after the A counter reaches 40.

Driving Pattern B

NIEC1218S0602

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").



SEF514Z

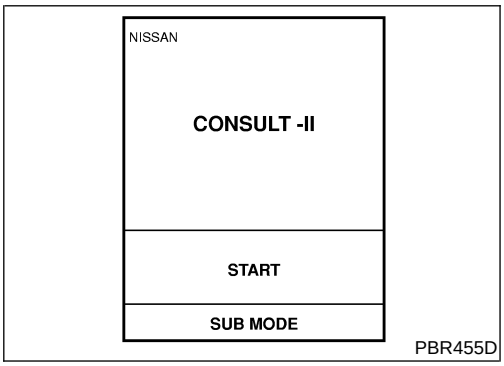
CONSULT-II

=NIEC1219

CONSULT-II INSPECTION PROCEDURE

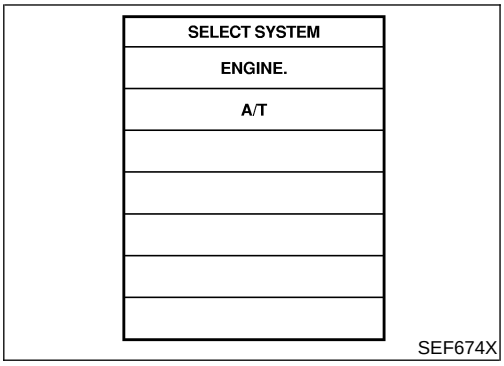
NIEC1219S01

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.



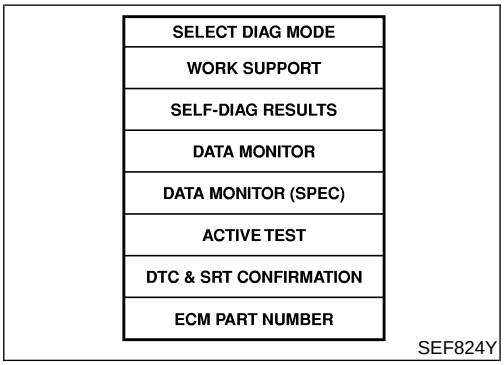
PBR455D

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



SEF674X

5. Touch “ENGINE”.



SEF824Y

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

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

ENGINE CONTROL COMPONENT PARTS/CONTROL SYSTEMS APPLICATION

NIEC1219S02

		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 STA-TUS	DTC WORK SUP-PORT
ENGINE CONTROL COMPONENT PARTS	INPUT	Camshaft position sensor (PHASE)		X	X					
		Crankshaft position sensor (POS)		X			X			
		Mass air flow sensor		X		X	X			
		Engine coolant temperature sensor		X	X	X	X	X		
		A/F sensor 1		X		X			X	X
		Heated oxygen sensor 2 (rear)		X		X	X		X	X
		Heated oxygen sensor 3		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			
		MAP sensor		X	X	X	X			
		BARO sensor		X						
		EGR temperature sensor		X		X	X			
		Intake air temperature sensor		X	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			
		Load signal				X	X			
		Swirl control valve position sensor		X		X	X			
		Fuel level sensor		X		X	X			

Item			DIAGNOSTIC TEST MODE							
			WORK SUPPORT	SELF-DIAGNOSTIC RESULTS		DATA MONITOR	DATA MONITOR (SPEC)	ACTIVE TEST	DTC & SRT CONFIRMATION	
				DTC*1	FREEZE FRAME DATA*2				SRT STATUS	DTC WORK SUPPORT
ENGINE CONTROL COMPONENT PARTS	OUTPUT	Injectors				X	X	X		
		Power transistor (Ignition timing)	X	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		
		A/F sensor 1 heater		X		X			X	
		Heated oxygen sensor 2 heater		X		X	X		X	
		Heated oxygen sensor 3 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		X		X	X	X		
		Intake valve timing control solenoid valve		X		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-759.

CONSULT-II (Cont'd)

FUNCTION

=NIEC1219S03

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 specification 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 & SRT 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

NIEC1219S04

WORK ITEM	CONDITION	USAGE
TP SW/TP SEN IDLE POSI ADJ	● FOLLOW THE BASIC INSPECTION INSTRUCTION IN THE SERVICE MANUAL.	When adjusting the idle throttle position
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
IDLE AIR VOL LEARN	● THE IDLE AIR VOLUME THAT KEEPS THE ENGINE WITHIN THE SPECIFIED RANGE IS MEMORIZED IN ECM.	When learning the idle air volume
SELF-LEARNING CONT	● THE COEFFICIENT OF SELF-LEARNING CONTROL MIXTURE RATIO RETURNS TO THE ORIGINAL COEFFICIENT.	When clear the coefficient of self-learning control value

WORK ITEM	CONDITION	USAGE
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. ● If once the "TARGET IDLE RPM ADJ" has been done, the Idle Air Volume Learning procedure will not be completed.

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

SELF-DIAGNOSTIC MODE

NIEC1219S05

DTC and 1st Trip DTC

NIEC1219S0501

Regarding items of "DTC and 1st trip DTC", refer to "TROUBLE DIAGNOSIS — INDEX" (See EC-701.)

Freeze Frame Data and 1st Trip Freeze Frame Data

NIEC1219S0502

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-701.)
FUEL SYS-B1	● "Fuel injection system status" at the moment a malfunction is detected is displayed. ● One mode in the following is displayed. "MODE 2": Open loop due to detected system malfunction "MODE 3": Open loop due to driving conditions (power enrichment, deceleration enrichment) "MODE 4": Closed loop - using oxygen sensor(s) as feedback for fuel control "MODE 5": Open loop - has not yet satisfied condition to go to closed loop
CAL/LD VALUE [%]	● The calculated load value at the moment a malfunction is detected is displayed.
COOLANT TEMP [°C] or [°F]	● The engine coolant temperature at the moment a malfunction is detected is displayed.
S-FUEL TRIM-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.

CONSULT-II (Cont'd)

Freeze frame data item*1	Description
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.
ENGINE SPEED [rpm]	● The engine speed at the moment a malfunction is detected is displayed.
VEHICLE SPEED [km/h] or [mph]	● The vehicle speed at the moment a malfunction is detected is displayed.
INT MANI PRES [kPa]	● The intake manifold absolute pressure 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.

DATA MONITOR MODE

=NIEC1219S06

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
ENG SPEED [rpm]	○	○	• Indicates the engine speed computed from the POS signal of the crankshaft position sensor.	
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.
B/FUEL SCHDL [msec]		○	• "Base fuel schedule" indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.	
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.
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.
A/F SEN1 (B1) [V]	○	○	• The A/F signal computed from the input signal of the A/F sensor 1 is displayed.	
HO2S2 (B1) [V]	○	○	• The signal voltage of the heated oxygen sensor 2 (rear) is displayed.	
HO2S2 MNTR (B1) [RICH/LEAN]	○		• Display of heated oxygen sensor 2 (rear) signal: RICH ... means the amount of oxygen after TWC (Manifold three way catalyst) is relatively small. LEAN ... means the amount of oxygen after TWC (Manifold three way catalyst) is relatively large.	• When the engine is stopped, a certain value is indicated.
VHCL SPEED SE [km/h] or [mph]	○	○	• The vehicle speed computed from the vehicle speed sensor signal is displayed.	
BATTERY VOLT [V]	○	○	• The power supply voltage of ECM is displayed.	
THRTL POS SEN [V]	○	○	• The throttle position sensor signal voltage is displayed.	
FUEL T/TMP SE [°C] or [°F]			• The fuel temperature judged from the tank fuel temperature sensor signal voltage is displayed.	
INT/A TEMP SE [°C] or [°F]	○	○	• The intake air temperature determined by the signal voltage of the intake air temperature sensor is indicated.	
EGR TEMP SEN [V]	○	○	• The signal voltage of the EGR temperature sensor is displayed.	
EVAP SYS PRES [V]	○		• The signal voltage of EVAP control system pressure sensor is displayed.	
ABSOL PRES/SE [V]	○		• The signal voltage of the BARO sensor is displayed.	

CONSULT-II (Cont'd)

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
FUEL LEVEL SE [V]	○		• The signal voltage of the fuel level 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 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.	
LOAD SIGNAL [ON/OFF]	○	○	• Indicates [ON/OFF] condition from the electrical load signal and/or lighting switch. ON ... rear defogger is operating and/or lighting switch is on. OFF ... rear defogger is not operating and lighting switch is not on.	
IGNITION SW [ON/OFF]	○		• Indicates [ON/OFF] condition from ignition switch.	
INJ PULSE-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.
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.
CAL/LD VALUE [%]			• "Calculated load value" indicates the value of the current airflow divided by peak airflow.	
ABSOL TH·P/S [degree]			• "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.	
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.	

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
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.	
SWRL C/V (B1) [step]			• Indicates the swirl control valve control value computed by the ECM according to the input signals. • The opening becomes larger as the value increases.	
INT/V SOL-B1 [ON/OFF]			• The control condition of the intake valve timing control solenoid valve is indicated. ON ... Intake valve timing control solenoid is operating. OFF ... Intake valve timing control solenoid is not operating.	
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.	
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	
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	
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	
HO2S2 HTR (B1) [ON/OFF]			• Indicates [ON/OFF] condition of heated oxygen sensor 2 heater determined by ECM according to the input signals.	
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.	
TRVL AFTER MIL [km] or [Mile]			• Distance traveled while MIL is activated	

CONSULT-II (Cont'd)

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
MAP SENSOR [V]			• The signal voltage of MAP sensor is displayed.	
HO2S3 (B1) [V]	○		• The signal voltage of the heated oxygen sensor 3 is displayed.	
A/F S1 HTR (B1) [%]			• Indicates A/F sensor 1 heater control value computed by ECM according to the input signal. • The current flow to the heater become larger as the value increases.	
HO2S3 HTR (B1) [ON/OFF]			• Indicates [ON/OFF] condition of heated oxygen sensor 3 heater determined by ECM according to the input signals.	
SWL/C POSI SE [degree]	○		• Indicates the swirl control value opening angle computed by ECM according to signal voltage of the swirl control valve position sensor.	
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.

DATA MONITOR (SPEC) MODE

=NIEC1219S07

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
ENG SPEED [rpm]	○	○	• Indicates the engine speed computed from the POS signal of the crankshaft position sensor.	
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.
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.
A/F SEN1 (B1) [V]	○	○	• The A/F signal computed from the input signal of the A/F sensor 1 is displayed.	
HO2S2 (B1) [V]	○	○	• The signal voltage of the heated oxygen sensor 2 (rear) is displayed.	
HO2S2 MNTR (B1) [RICH/LEAN]	○		• Display of heated oxygen sensor 2 (rear) signal: RICH ... means the amount of oxygen after TWC (Manifold three way catalyst) is relatively small. LEAN ... means the amount of oxygen after TWC (Manifold three way catalyst) is relatively large.	• When the engine is stopped, a certain value is indicated.
VHCL SPEED SE [km/h] or [mph]	○	○	• The vehicle speed computed from the vehicle speed sensor signal is displayed.	
BATTERY VOLT [V]	○	○	• The power supply voltage of ECM is displayed.	
THRTL POS SEN [V]	○	○	• The throttle position sensor signal voltage is displayed.	
FUEL T/TMP SE [°C] or [°F]	○		• The fuel temperature judged from the tank fuel temperature sensor signal voltage is displayed.	
INT/A TEMP SE [°C] or [°F]	○	○	• The intake air temperature determined by the signal voltage of the intake air temperature sensor is indicated.	
EGR TEMP SEN [V]	○	○	• The signal voltage of the EGR temperature sensor is displayed.	
EVAP SYS PRES [V]	○		• The signal voltage of EVAP control system pressure sensor is displayed.	
ABSOL PRES/SE [V]	○		• The signal voltage of the BARO sensor is displayed.	

CONSULT-II (Cont'd)

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
FUEL LEVEL SE [V]	○		• The signal voltage of the fuel level 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 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.	
LOAD SIGNAL [ON/OFF]	○	○	• Indicates [ON/OFF] condition from the electrical load signal and/or lighting switch. ON ... rear defogger is operating and/or lighting switch is on. OFF ... rear defogger is not operating and lighting switch is not on.	
IGNITION SW [ON/OFF]	○		• Indicates [ON/OFF] condition from ignition switch.	
INJ PULSE-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.
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.
CAL/LD VALUE [%]			• "Calculated load value" indicates the value of the current airflow divided by peak airflow.	
ABSOL TH·P/S [degree]			• "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.	
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.	

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
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.	
SWRL C/V (B1) [step]			• Indicates the swirl control valve control value computed by the ECM according to the input signals. • The opening becomes larger as the value increases.	
INT/V SOL-B1 [ON/OFF]			• The control condition of the intake valve timing control solenoid valve is indicated. ON ... Intake valve timing control solenoid is operating. OFF ... Intake valve timing control solenoid is not operating.	
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.	
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	
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	
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	
HO2S2 HTR (B1) [ON/OFF]			• Indicates [ON/OFF] condition of heated oxygen sensor 2 heater determined by ECM according to the input signals.	
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.	
MAP SENSOR [V]			• The signal voltage of MAP pressure is displayed.	

CONSULT-II (Cont'd)

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
HO2S3 (B1) [V]	○		• The signal voltage of the heated oxygen sensor 3 is displayed.	
A/F S1 HTR (B1) [%]			• Indicates A/F sensor 1 heater control value computed by ECM according to the input signal. • The current flow to the heater become larger as the value increases.	
HO2S3 HTR (B1) [ON/OFF]			• Indicates [ON/OFF] condition of heated oxygen sensor 3 heater determined by ECM according to the input signals.	
SWL/C POSI SE [degree]	○		• Indicates the swirl control value opening angle computed by ECM according to signal voltage of the swirl control valve control position sensor.	
TRVL AFTER MIL [km] or [Mile]			• Distance traveled while MIL is activated	
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.

ACTIVE TEST MODE

NIEC1219S08

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 • A/F sensor 1
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.	• "Idle Air Volume Learning" (Refer to EC-XXX.) • Crankshaft position sensor (POS) • Crankshaft position sensor (PHASE) • Engine component parts and installing conditions
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
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

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
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
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
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
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
VALVE TIMING SOL	• Ignition switch: ON (Engine stopped) • 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
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 CONTROL VALVE	• Ignition switch: ON (Engine stopped) • Change swirl control valve opening step using CONSULT-II.	Swirl control valve makes an operating sound.	• Harness and connector • Swirl control valve

DTC & SRT CONFIRMATION MODE

NIEC1219S09

SRT STATUS Mode

NIEC1219S0901

For details, refer to "SYSTEM READINESS TEST (SRT) CODE", EC-760.

SRT Work Support Mode

NIEC1219S0902

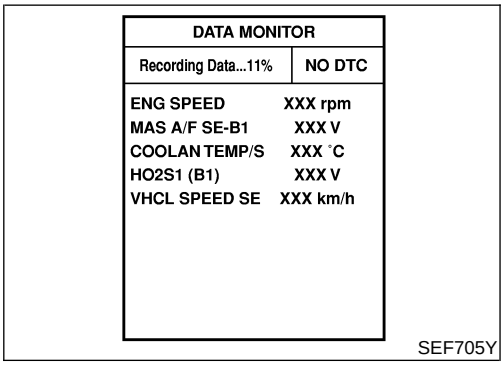
This mode enables a technician to drive a vehicle to set the SRT while monitoring the SRT status.

CONSULT-II (Cont'd)

DTC Work Support Mode

NIEC1219S0903

Test mode	Test item	Condition	Reference page
EVAPORATIVE SYSTEM	EVAP SML LEAK P0440/P1440	Refer to corresponding trouble diagnosis for DTC.	EC-1040
	PURG VOL CN/V P1444		EC-1260
	PURGE FLOW P1447		EC-1280
	VC CUT/V BP/V P1491		EC-1310
A/F SEN1	A/F SEN1 (B1) P1273		EC-1203
	A/F SEN1 (B1) P1274		EC-1209
	A/F SEN1 (B1) P1275		EC-1215
	A/F SEN1 (B1) P1276		EC-1223
HO2S2	HO2S2 (B1) P0137		EC-891
	HO2S2 (B1) P0138		EC-899
	HO2S2 (B1) P0139		EC-907
HO2S3	HO2S3 (B1) P0143		EC-926
	HO2S3 (B1) P0144		EC-934
	HO2S3 (B1) P0145		EC-942
EGR SYSTEM	EGR SYSTEM P0400		EC-1020
	EGR SYSTEM P1402		EC-1251



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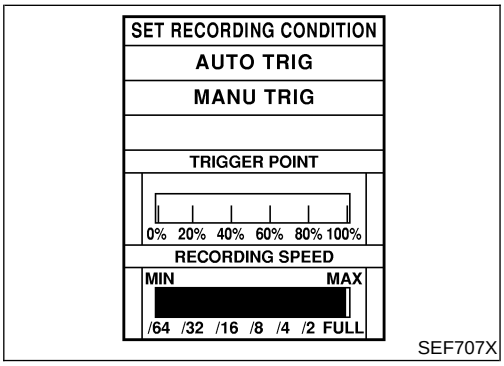


SEF707X

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

NIEC1219S10

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.

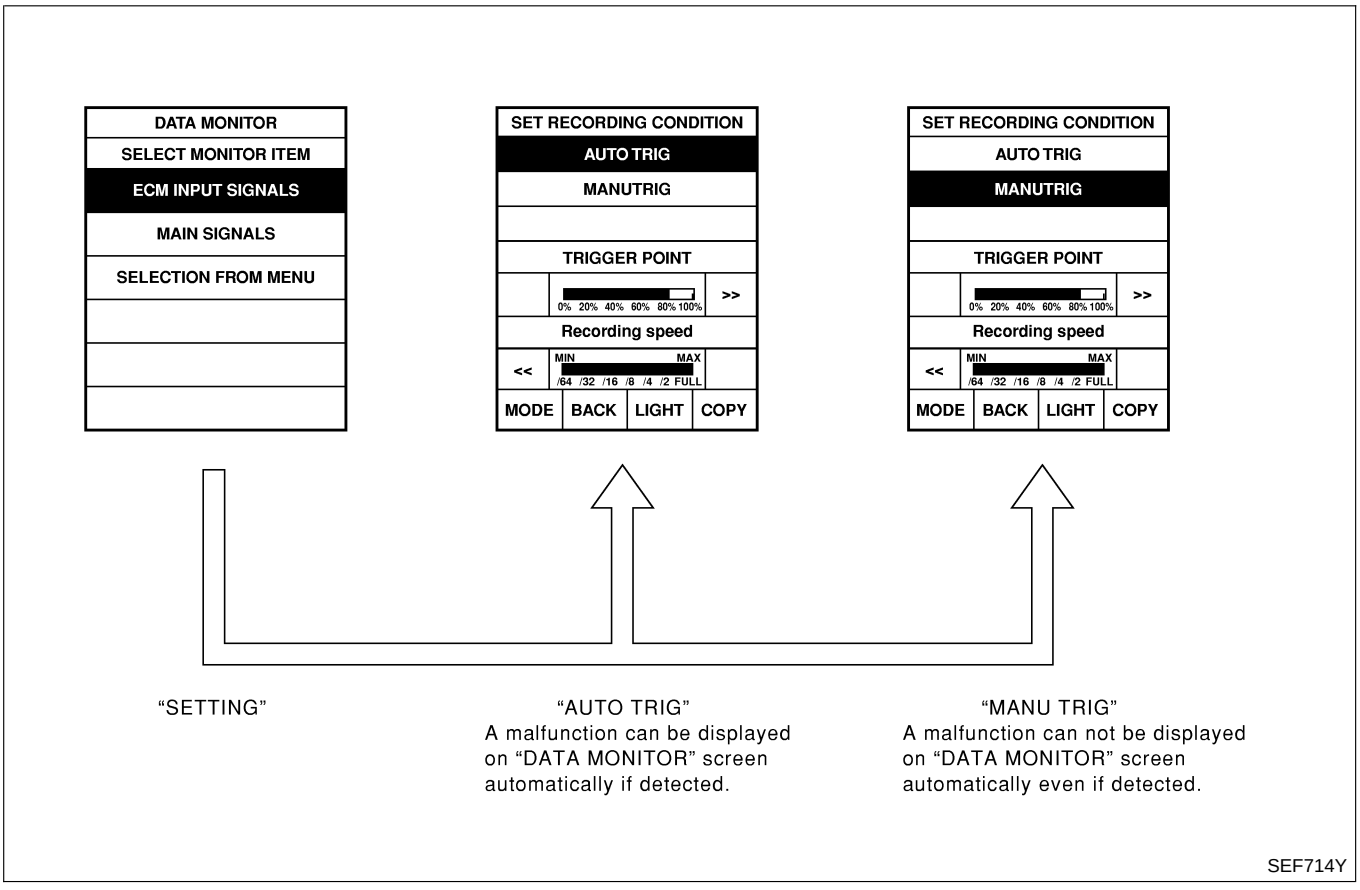
Use these triggers as follows:

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.



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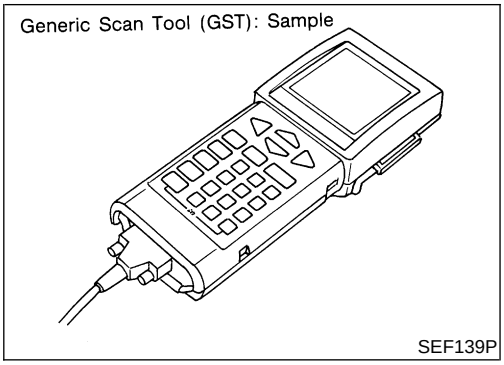


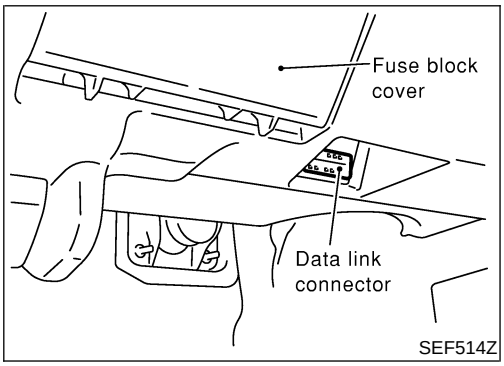
Generic Scan Tool (GST)

=NIEC1220

DESCRIPTION

NIEC1220S01

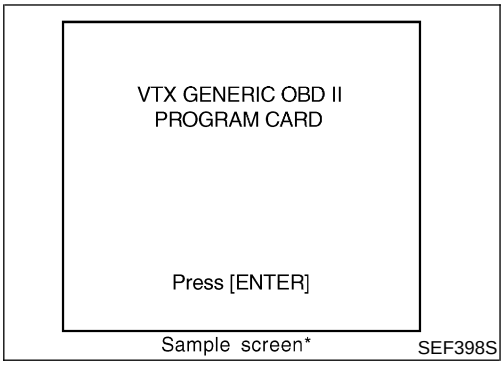
Generic Scan Tool (OBDII scan tool) complying with SAE J1978 has 8 different functions explained on the next page.
ISO9141 is used as the protocol.
The name “GST” or “Generic Scan Tool” is used in this service manual.



GST INSPECTION PROCEDURE

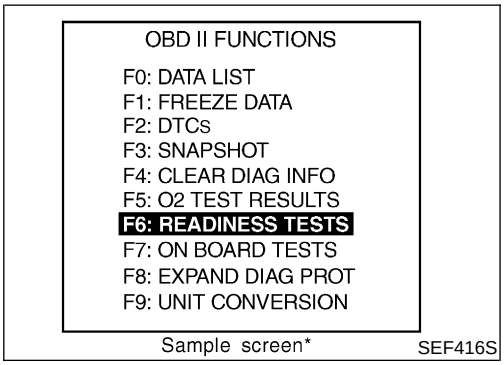
NIEC1220S02

1. Turn ignition switch OFF.
2. Connect GST to data link connector for GST 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.)



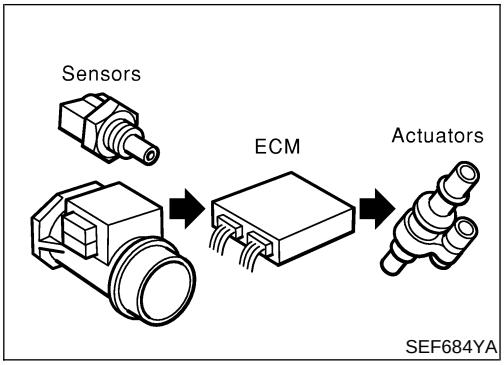
5. Perform each diagnostic mode according to each service procedure.

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

FUNCTION

NIEC1220S03

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-783).]
MODE 3	DTCs	This mode gains access to emission-related power train trouble codes which were stored by ECM.
MODE 4	CLEAR DIAG INFO	This mode can clear all emission-related diagnostic information. This includes: ● Clear number of diagnostic trouble codes (MODE 1) ● Clear diagnostic trouble codes (MODE 3) ● Clear trouble code for freeze frame data (MODE 1) ● Clear freeze frame data (MODE 2) ● Reset status of system monitoring test (MODE 1) ● Clear on board monitoring test results (MODE 6 and 7)
MODE 6	(ON BOARD TESTS)	This mode accesses the results of on board diagnostic monitoring tests of specific components/systems that are not continuously monitored.
MODE 7	(ON BOARD TESTS)	This mode enables the off board test drive to obtain test results for emission-related powertrain components/systems that are continuously monitored during normal driving conditions.
MODE 8	—	This mode can close EVAP system in ignition switch "ON" position (Engine stopped). When this mode is performed, following parts can be opened or closed. ● EVAP canister vent control valve open ● Vacuum cut valve bypass valve closed In the following conditions, this mode cannot function. ● Low ambient temperature ● Low battery voltage ● Engine running ● Ignition switch "OFF" ● Low fuel temperature ● Too much pressure is applied to EVAP system
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.



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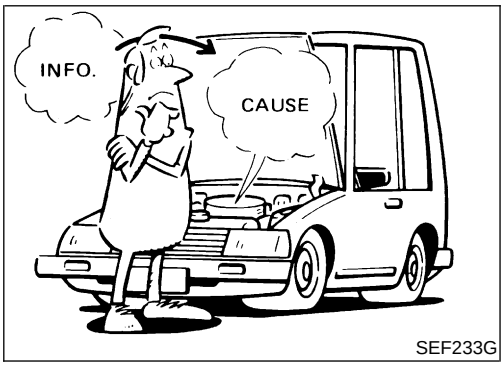

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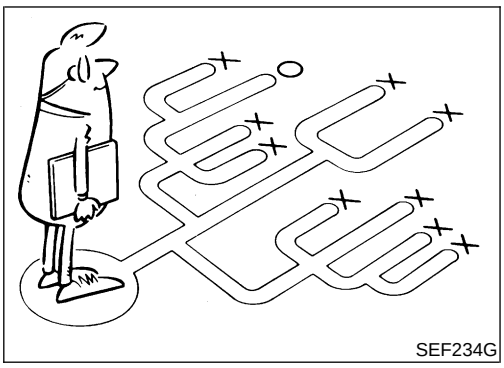

SEF234G

KEY POINTS

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

SEF907L

Introduction

NIEC1221

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-800.

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

NIEC1221S01

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

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

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

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

- Vehicle ran out of fuel, which caused the engine to misfire.

Worksheet Sample

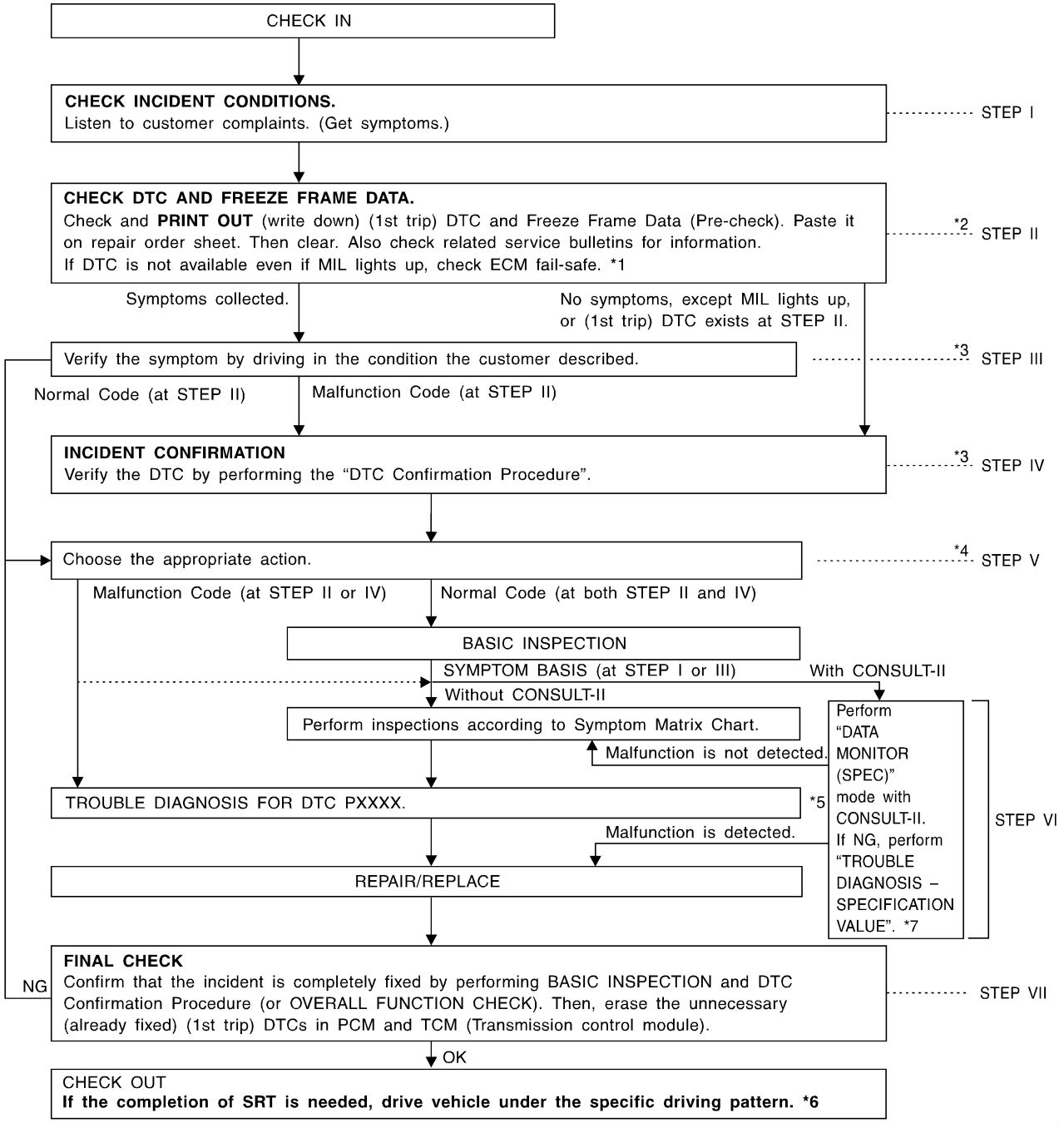
NIEC1221S0101

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

MTBL0017

Work Flow

NIEC1222



SEF510Z

*1: EC-818

*2: If time data of “SELF-DIAG RESULTS” is other than “0” or “1t”, refer to “TROUBLE DIAGNOSIS FOR INTERMITTENT”, EC-842.

*3: If the incident cannot be duplicated, refer to “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-842.

*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-843.

*5: If the malfunctioning part cannot be found, refer to “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-842.

*6: EC-765

*7: EC-838

DESCRIPTION FOR WORK FLOW

NIEC1222S01

STEP	DESCRIPTION
STEP I	Get detailed information about the conditions and the environment when the incident/symptom occurred using the "DIAGNOSTIC WORK SHEET", EC-799.
STEP II	Before confirming the concern, check and write down (print out using CONSULT-II or Generic Scan Tool) the (1st trip) Diagnostic Trouble Code (DTC) and the (1st trip) freeze frame data, then erase the code and the data. (Refer to EC-770.) The (1st trip) DTC and the (1st trip) freeze frame data can be used when duplicating the incident at STEP III & IV. Study the relationship between the cause, specified by (1st trip) DTC, and the symptom described by the customer. (The "Symptom Matrix Chart" will be useful. See EC-819.) 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 INCIDENT SIMULATION TESTS. (Refer to ***GI-26***.) If the malfunction code is detected, skip STEP IV and perform STEP V.
STEP IV	Try to detect the (1st trip) Diagnostic Trouble Code by driving in (or performing) the "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE". Check and read the (1st trip) DTC and (1st trip) freeze frame data by using CONSULT-II or Generic Scan Tool. 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 INCIDENT SIMULATION TESTS. (Refer to ***GI-26***.) In case the "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" is not available, perform the "OVERALL FUNCTION CHECK" instead. The (1st trip) DTC cannot be displayed by this check, however, this simplified "check" is an effective alternative. The "NG" result of the "OVERALL FUNCTION CHECK" is the same as the (1st trip) DTC detection.
STEP V	Take the appropriate action based on the results of STEP I through IV. If the malfunction code is indicated, proceed to TROUBLE DIAGNOSIS FOR DTC PXXXX. If the normal code is indicated, proceed to the BASIC INSPECTION. (Refer to EC-802.) If CONSULT-II is available, perform "DATA MONITOR (SPEC)" mode with CONSULT-II and proceed to the "TROUBLE DIAGNOSIS — SPECIFICATION VALUE", EC-838. (If malfunction is detected, proceed to "REPAIR/REPLACE". Then perform inspections according to the Symptom Matrix Chart. (Refer to EC-819.)
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-828. The "DIAGNOSTIC PROCEDURE" in EC section contains a description based on open circuit inspection. A short circuit inspection is also required for the circuit check in the DIAGNOSTIC PROCEDURE. For details, refer to GI section ("HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT", "Circuit Inspection"). Repair or replace the malfunction parts. If malfunctioning part cannot be detected, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-842.
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 or 0505] is detected. If the incident is still detected in the final check, perform STEP VI by using a different method from the previous one. Before returning the vehicle to the customer, be sure to erase the unnecessary (already fixed) (1st trip) DTC in ECM and TCM (Transmission control module). (Refer to EC-770.)

Basic Inspection

NIEC1223

Precaution:

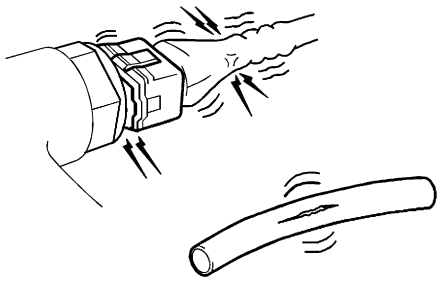
Perform Basic Inspection without electrical or mechanical loads applied;

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

1	INSPECTION START

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



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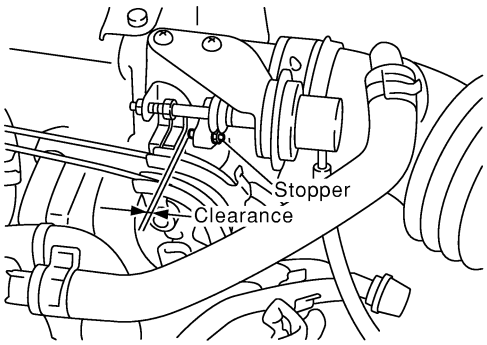
▶ GO TO 2.

2	CHECK THROTTLE OPENER OPERATION-I

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



SEF456Y

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	CHECK THROTTLE OPENER FIXING BOLTS

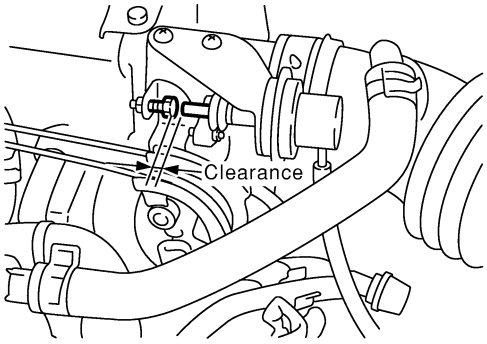
Check throttle opener fixing bolts for loosening.

OK or NG

OK	▶	Repair or replace throttle body assembly.
NG	▶	Retighten the fixing bolts.

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.



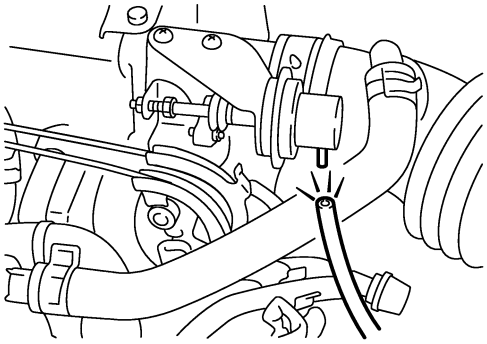
SEF457Y

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.



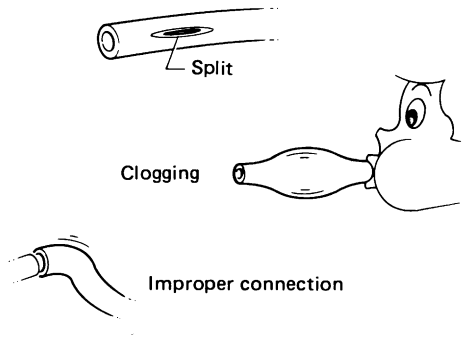
SEF458Y

OK or NG

OK	▶	Repair or replace throttle body assembly.
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.



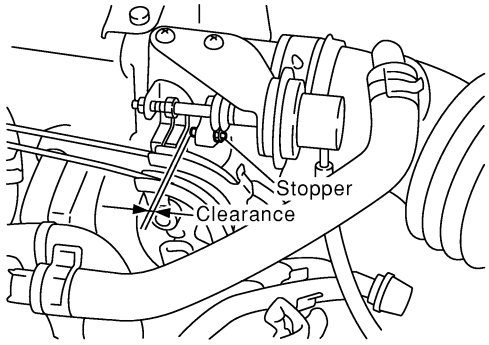
SEF109L

OK or NG

OK	▶	Clean vacuum port by blowing air.
NG	▶	Replace vacuum hose.

7	CHECK THROTTLE DRUM OPERATION

Confirm that throttle drum moves to contact the stopper.



SEF456Y

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	▶	Adjust accelerator wire. Refer to ***FE-3***, "Adjusting Accelerator Wire".

9	CHECK THROTTLE VALVE OPERATION

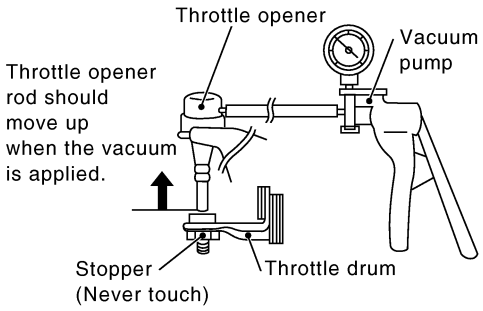
1. Remove intake air ducts.
2. Check throttle valve operation when moving throttle drum by hand.

OK or NG

OK	▶	Retighten the throttle drum fixing nuts.
NG	▶	Clean the throttle body and throttle valve.

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.

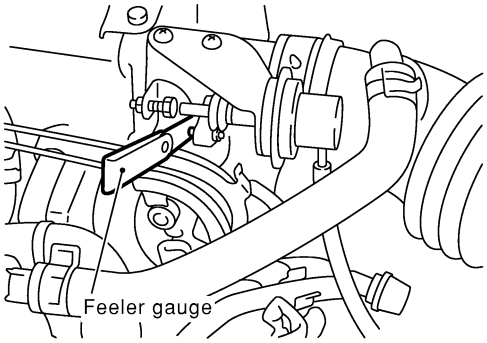
With CONSULT-II	▶	GO TO 11.
Without CONSULT-II	▶	GO TO 17.

11	CHECK THROTTLE POSITION SWITCH CLOSED POSITION-II

With CONSULT-II

1. Turn ignition switch "ON".
2. Select "A/T", then "DATA MONITOR" mode with CONSULT-II.
3. Select "CLOSED THL/SW" from the menu.
4. Read "CLOSED THL/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.



SEF459Y

DATA MONITOR	
MONITOR	NO DTC
CLOSED THL/SW	ON

SEF059Y

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

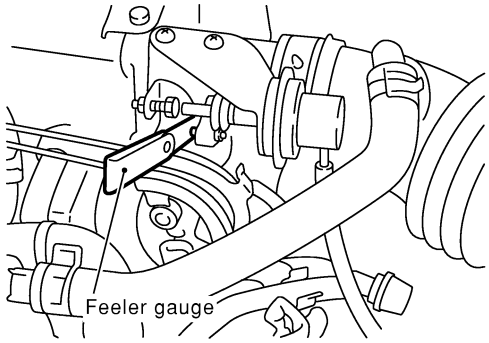
OK or NG

OK	▶	GO TO 14.
NG	▶	GO TO 12.

12	ADJUSTMENT THROTTLE POSITION SWITCH CLOSED POSITION-I

With CONSULT-II

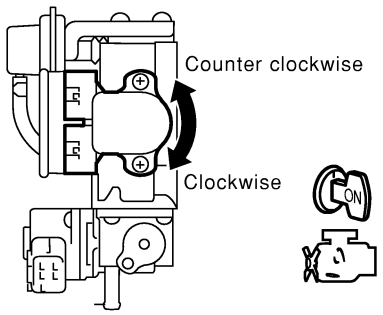
1. Loosen throttle position sensor fixing bolts.
2. Confirm that proper vacuum is applied. Refer to test No. 10. During adjustment, vacuum should be applied.
3. Insert 0.05 mm (0.0020 in) feeler gauge between stopper and throttle drum as shown in the figure.



SEF459Y

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

DATA MONITOR	
MONITOR	NO DTC
CLOSED THL/SW	OFF



SEF511Z

▶	GO TO 13.

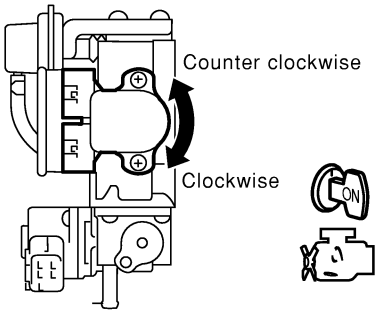
13	ADJUSTMENT THROTTLE POSITION SWITCH CLOSED POSITION-II

With CONSULT-II

1. Temporarily tighten sensor body fixing bolts as follows.

- **Gradually move the sensor body clockwise and stop it when "CLOSED THL/SW" signal switches from "OFF" to "ON", then temporarily tighten sensor body fixing bolts.**

DATA MONITOR	
MONITOR	NO DTC
CLOSED THL/SW	ON



SEF512Z

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 "CLOSED THL/SW" signal again.
   The signal remains "OFF" while closing throttle valve.

OK or NG

OK	▶	GO TO 14.
NG	▶	GO TO 12.

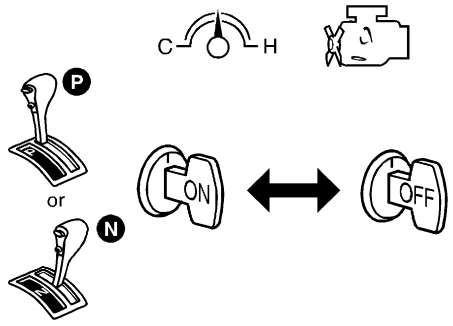
14	RESET THROTTLE POSITION SENSOR IDLE POSITION MEMORY

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 "ENGINE", then 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

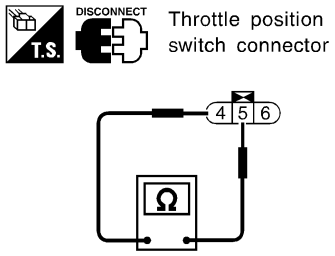
SEF061Y

▶	GO TO 15.

15	CHECK THROTTLE POSITION SWITCH CLOSED POSITION-II

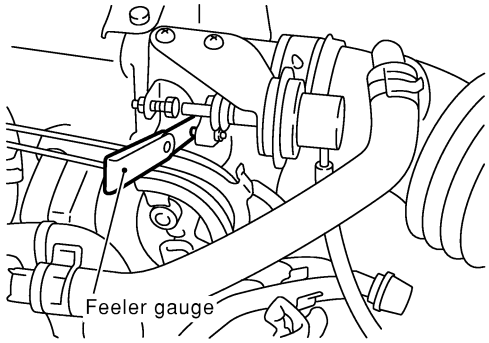
Without CONSULT-II

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.



SEF459Y

"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.

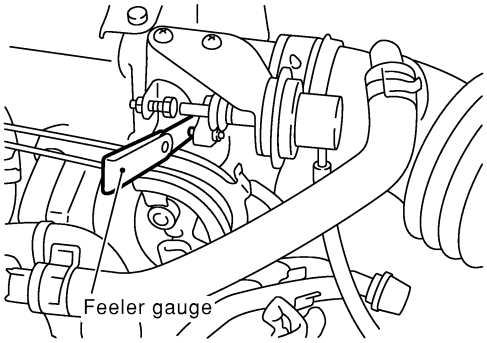
OK or NG

OK	▶	GO TO 18.
NG	▶	GO TO 16.

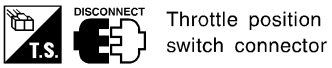
16	ADJUSTMENT THROTTLE POSITION SWITCH CLOSED POSITION-I

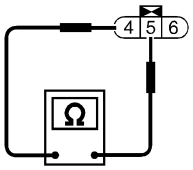
Without CONSULT-II

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.



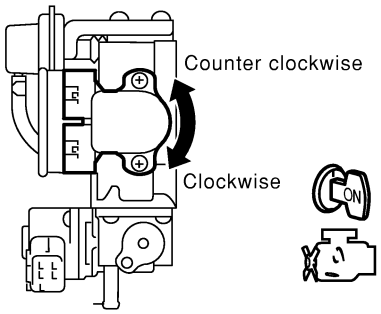
SEF459Y





SEF711X

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



SEF460Y

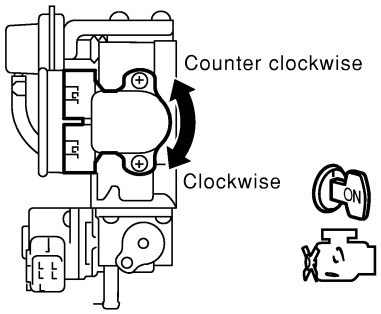
▶	GO TO 17.

17	ADJUSTMENT THROTTLE POSITION SWITCH CLOSED POSITION-II

Without CONSULT-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.**



SEF460Y

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.

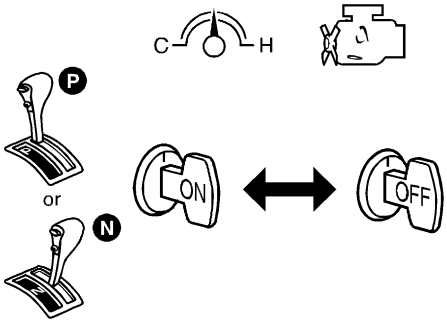
18	RESET THROTTLE POSITION SENSOR IDLE POSITION MEMORY

Without 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. Stop engine. (Turn ignition switch "OFF".)
6. Turn ignition switch "ON" and wait at least 5 seconds.



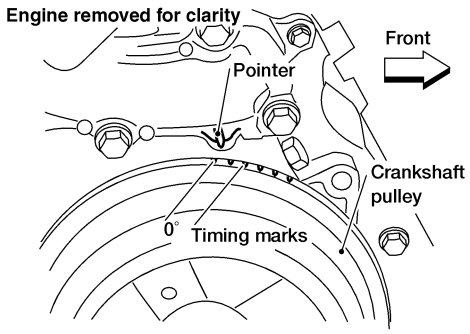
SEF864V

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

	▶	GO TO 19.

19	CHECK IGNITION TIMING-I

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. Check ignition timing at idle using a timing light.



LEC245

Ignition timing:
9°±2° BTDC (in "P" or "N" position)

OK or NG

OK (With CONSULT II)	▶	GO TO 25.
OK (Without CONSULT II)	▶	GO TO 26.
NG	▶	GO TO 20.

20	DETECT MALFUNCTIONING PART

Check the following.
- Crankshaft position sensor (POS) circuit and function. Refer to EC-1009.
- Camshaft position sensor (PHASE) circuit and function. Refer to EC-1014.

OK or NG

OK	▶	GO TO 22.
NG	▶	GO TO 21.

21	REPAIR MALFUNCTION

Repair or replace malfunctioning part following the "Diagnostic Procedure" corresponding the detected malfunction.

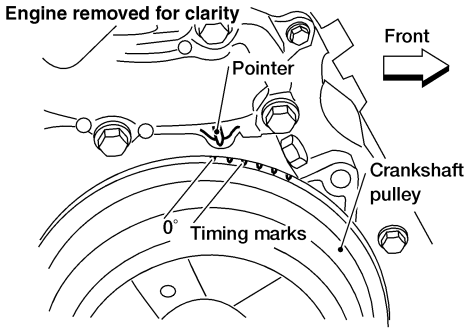
	▶	GO TO 23.

22	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 NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs. Refer to "NVIS (NISSAN VEHICLE IMMOBILIZER SYSTEM — NATS)", EC-772.

	▶	GO TO 23.

23	PERFORM IDLE AIR VOLUME LEARNING	
Refer to "Idle Air Volume Learning", EC-756. **Which is the result CMPLT or INCMP?**		
CMPLT or INCMP		
CMPLT	▶	GO TO 24.
INCMP	▶	Follow the construction of "Idle Air Volume Leaning".

24	CHECK IGNITION TIMING-II	
1. Start engine and warm it up to normal operating temperature. 2. Check ignition timing at idle using a timing light.		
 LEC245		
Ignition timing: **9°±2° BTDC (in "P" or "N" position)**		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 25.
OK (Without CONSULT-II)	▶	GO TO 26.
NG	▶	GO TO 22.

25	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. 3. Check idle speed. **800±50 rpm (in "P" or "N" position)**		
OK or NG		
OK	▶	GO TO 34.
NG	▶	GO TO 27.

26	CHECK TARGET IDLE SPEED	
Without CONSULT-II 1. Start engine and warm it up to normal operating temperature. 2. Check idle speed. **800±50 rpm (in "P" or "N" position)**		
OK or NG		
OK	▶	GO TO 34.
NG	▶	GO TO 27.

27	CHECK FOR INTAKE AIR LEAK
1. Start engine and let it idle. 2. Listen for an air leak from PCV hose and after IACV-AAC valve.	
OK or NG	
OK ▶	GO TO 29.
NG ▶	GO TO 28.

28	REPAIR MALFUNCTION
1. Stop engine. 2. Repair or replace malfunctioning part.	
▶	GO TO 31.

29	DETECT MALFUNCTIONING PART
Check the IACV-AAC valve circuit and function. Refer to EC-1108.	
OK or NG	
OK ▶	GO TO 31.
NG ▶	GO TO 30.

30	REPAIR MALFUNCTION
Repair or replace malfunction part following the "Diagnostic Procedure" corresponding the detected malfunction.	
▶	GO TO 31.

31	PERFORM IDLE AIR VOLUME LEARNING
Refer to "Idle Air Volume Learning", EC-756. **Which is the result CMPLT or INCMP?**	
CMPLT or INCMP	
CMPLT ▶	GO TO 32.
INCMP ▶	Follow the instruction of "Idle Air Volume Learning", EC-756.

32	CHECK TARGET IDLE SPEED AGAIN
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. **800±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 NVIS (NATS) system and registration of NVIS (NATS) ignition key IDs. Refer to "NVIS (NISSAN VEHICLE IMMOBILIZER SYSTEM — NATS)", EC-772.	
▶	GO TO 31.

34	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-770 and ***AT-40***, "HOW TO ERASE DTC".	
▶	**INSPECTION END**

DTC Inspection Priority Chart

NIEC1224

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 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 • P1605 A/T diagnosis communication line • P1706 Park/Neutral position (PNP) switch
2	• P0105 Barometric pressure sensor • P1271-P1276 A/F sensor 1 • P1277 A/F sensor 1 heater • P0137-P0140 Heated oxygen sensor 2 (rear) • P0141 Heated oxygen sensor 2 heater (rear) • P0143-P0146 Heated oxygen sensor 3 • P0147 Heated oxygen sensor 3 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-P0725, P0740-P1760 A/T related sensors, solenoid valves and switches • P1108 Manifold absolute pressure sensor • P1137 Swirl control valve • P1138 Swirl control valve position sensor • P1140 Intake valve timing control position sensor circuit • P1401 EGR temperature sensor • P1447 EVAP control system purge flow monitoring • P1490, P1491 Vacuum cut valve bypass valve
3	• P0171, P0172 Fuel injection system function • P0300-P0304 Misfire • P0400, P1402 EGR function • P0420 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 • P1110 Intake valve timing control function • P1111 Intake valve timing control solenoid valve • P1132 Swirl control valve • P1148 Closed loop control

Fail-safe Chart

=NIEC1225

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 colspan="2">Engine operating condition in fail-safe mode</th></tr>
<tr><td>P0100</td><td>Mass air flow sensor circuit</td><td colspan="2">Engine speed will not rise more than 2,400 rpm due to the fuel cut.</td></tr>
<tr><td rowspan="5">P0115</td><td rowspan="5">Engine coolant temperature sensor circuit</td><td colspan="2">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.</td></tr>
<tr><td>Condition</td><td>Engine coolant temperature decided (CONSULT-II display)</td></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>
<tr><td rowspan="4">P0120</td><td rowspan="4">Throttle position sensor circuit</td><td colspan="2">Throttle position will be determined based on the injected fuel amount and the engine speed. Therefore, acceleration will be poor.</td></tr>
<tr><td>Condition</td><td>Driving condition</td></tr>
<tr><td>When engine is idling</td><td>Normal</td></tr>
<tr><td>When accelerating</td><td>Poor acceleration</td></tr>
<tr><td>P0403</td><td>EGR volume control valve circuit</td><td colspan="2">Engine speed will not rise more than 2,800 rpm due to the fuel cut.</td></tr>
<tr><td rowspan="9">Unable to access ECM</td><td rowspan="9">ECM</td><td colspan="2">ECM fail-safe activating condition
The computing function of the ECM was judged to be malfunctioning.
When the fail-safe system activates (i.e., if the ECM detects a malfunction condition in the CPU of ECM), the MIL on the instrument panel lights to warn the driver.
However it is not possible to access ECM and DTC cannot be confirmed.
Engine control with fail-safe
When ECM fail-safe is operating, fuel injection, ignition timing, fuel pump operation and IACV-AAC valve operation are controlled under certain limitations.</td></tr>
<tr><td></td><td>ECM fail-safe operation</td></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 colspan="2">Replace ECM, if ECM fail-safe condition is confirmed.</td></tr>
</table>

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

Symptom Matrix Chart

NIEC1226

SYSTEM — ENGINE CONTROL SYSTEM

NIEC1226S01

		SYMPTOM													
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	Reference page
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel pump circuit	1	1	2	3	2		2	2			3		2	EC-1338
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			FE section
	Injector circuit	1	1	2	3	2		2	2			2			EC-1329
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			EC-726
Air	Positive crankcase ventilation system	3	3	4	4	4	4	4	4	4		4	1		EC-742
	Incorrect idle speed adjustment	3	3				1	1	1	1		1			EC-802
	IACV-AAC valve circuit	1	1	2	3	3	2	2	2	2		2		2	EC-1108
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC-802
	Ignition circuit	1	1	2	2	2		2	2			2			EC-1233
EGR	EGR volume control valve circuit		2	2	3	3						3			EC-1029
	EGR system	2	1	2	3	3	3	2	2	3		3			EC-1020, EC-1251
Main power supply and ground circuit		2	2	3	3	3		3	3		2	3		2	EC-843
Air conditioner circuit		2	2	3	3	3	3	3	3	3		3		2	HA section

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

(continued on next page)

Symptom Matrix Chart (Cont'd)

	SYMPTOM													Reference page
	HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Camshaft position sensor circuit	2	2	3	3	3		3	3			3			EC-1014
Mass air flow sensor circuit	1	1	2	2	2		2	2			2			EC-850
A/F sensor 1		1	2	3	2		2	2			2			EC-1193
Engine coolant temperature sensor circuit	1	1	2	3	2	3	2	2	3		2			EC-870, 886
Throttle position sensor circuit		1	2		2	2	2	2	2		2			EC-875
Incorrect throttle position sensor adjustment		3	1		1	1	1	1	1		1			EC-802
Swirl control valve circuit	3	3						2						EC-1150
Intake valve timing control system		3	3		3		3				3			EC-1137
Vehicle speed sensor circuit		2	3		3						3			EC-1104
Knock sensor circuit			2								3			EC-1005
ECM	2	2	3	3	3	3	3	3	3	3	3			EC-1128, 818
Start signal circuit	2													EC-1334
PNP switch circuit			3		3		3	3			3			EC-1325
Power steering oil pressure switch circuit		2					3	3						EC-1344
Electrical load signal circuit							3	3						EC-1353

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

(continued on next page)

SYSTEM — ENGINE MECHANICAL & OTHER

NIEC1226S02

		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 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													
	Flywheel/Drive plate/Signal 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 page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Engine	Cylinder head	5	5	5	5	5		5	5			5			EM section
	Cylinder head gasket										4		3		
	Cylinder block	6	6	6	6	6		6	6			6	4		
	Piston														
	Piston ring														
	Connecting rod														
	Bearing														
	Crankshaft														
Valve mechanism	Timing chain	5	5	5	5	5		5	5			5			EM section
	Camshaft														
	Intake valve												3		
	Exhaust valve														
Exhaust	Exhaust manifold/Tube/ Muffler/Gasket	5	5	5	5	5		5	5			5			FE section
	Three way catalyst														
Lubrication	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery	5	5	5	5	5		5	5			5			MA, EM and LC sections
	Oil level (Low)/Filthy oil														
Cooling	Radiator/Hose/Radiator filler cap	5	5	5	5	5		5	5		4	5			LC section
	Thermostat									5					
	Water pump														
	Water gallery														
	Cooling fan									5					EC-1176
	Coolant level (low)/ Contaminated coolant														MA section

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

CONSULT-II Reference Value in Data Monitor Mode

NIEC1227

Remarks:

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

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

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

MONITOR ITEM	CONDITION		SPECIFICATION
ENG SPEED	• Tachometer: Connect • Run engine and compare tachometer indication with the CONSULT-II value.		Almost the same speed as the CONSULT-II value.
MAS A/F SE-B1	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: “N” • No-load	Idle	1.0 - 1.7V
		2,500 rpm	1.5 - 2.4V
B/FUEL SCHDL	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: “N” • No-load	Idle	1.0 - 1.6 msec
		2,000 rpm	0.7 - 1.3 msec
A/F ALPHA-B1	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	53 - 155%
COOLAN TEMP/S	• Engine: After warming up		More than 70°C (158°F)
A/F SEN1 (B1)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 1.5V
HO2S2 (B1)	• Engine: After warming up	Revving engine from idle to 3,000 rpm quickly	0 - 0.3V ⟷ 0.6 - 1.0V
HO2S2 MNTR (B1)	• Engine: After warming up	Revving engine from idle to 3,000 rpm quickly	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) • Vacuum is applied using a vacuum pump	Throttle valve: fully opened	3.5 - 4.7V
FUEL T/TMP SE	• Engine: After warming up		Less than 60°C (140°F)
EGR TEMP SEN	• Engine: After warming up		Less than 4.5V
EVAP SYS PRES	• Ignition switch: ON		Approx. 3.4V
ABSOL PRES/SE	• Ignition switch: ON		Approx. 4.4V
FUEL LEVEL SE	• Ignition switch: ON		Approx. 0 - 2.5V
START SIGNAL	• Ignition switch: ON → START → ON		OFF → ON → OFF

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

MONITOR ITEM	CONDITION		SPECIFICATION
CLSD THL POS	• Engine: After warming up • Ignition switch: ON (Engine stopped) • Vacuum is applied using a vacuum pump	Throttle valve: Idle position	ON
		Throttle valve: Slightly open	OFF
AIR COND SIG	• Engine: After warming up, idle the engine	A/C switch "OFF"	OFF
		A/C switch "ON" (Compressor operates)	ON
P/N POSI SW	• Ignition switch: ON	Shift lever "P" or "N"	ON
		Except above	OFF
PW/ST SIGNAL	• Engine: After warming up, idle the engine	Steering wheel in neutral position (forward direction)	OFF
		The steering wheel is turned	ON
LOAD SIGNAL	• Ignition switch: ON	Rear window defogger or headlamp is "ON"	ON
		Rear window defogger and headlamp is "OFF"	OFF
IGNITION SW	• Ignition switch: ON → OFF		ON → OFF
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 - 3.2 msec
IGN TIMING	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: "N" • No-load	Idle	9°±2° BTDC
		2,000 rpm	More than 25° BTDC
CAL/LD VALUE	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: "N" • No-load	Idle	20.0 - 35.5%
		2,500 rpm	12.0 - 30.0%
ABSOL TH·P/S	• Engine: After warming up, idle the engine	Throttle valve: fully closed	0.0%
	• 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	1.4 - 4.0 g·m/s
		2,500 rpm	5.0 - 10.0 g·m/s
IACV-AAC/V	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: "N" • No-load	Idle	5 - 20 steps
		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	—

MONITOR ITEM	CONDITION		SPECIFICATION
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
SWL C/V (B1)	• Engine: Idle the engine	Engine coolant temperature is below 44°C (111°F)	0 - 5 step
		Engine coolant temperature is above 45°C (113°F)	115 - 120 step
INT/V SOL-B1	• Engine is running • Engine speed is more than 2,000 rpm • Quickly depressed accelerator pedal. • Vehicle speed is more than 4 km/h (2 MPH)		OFF → ON
AIR COND RLY	• Air conditioner switch: OFF → ON		OFF → ON
FUEL PUMP RLY	• Ignition switch is turned to ON (Operates for 5 seconds) • Engine running and cranking • When engine is stopped (stops in 1.0 seconds)		ON
	• Except as shown above		OFF
VC/V BYPASS/V	• Ignition switch: ON		OFF
VENT CONT/V	• Ignition switch: ON		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
HO2S2 HTR (B1) HO2S3 HTR (B1)	• 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
TRVL AFTER MIL	• Ignition switch: ON	MIL is not illuminated	0 km (0 mile)
		MIL is illuminated	0 km (0 mile) or more
MAP SENSOR	• Engine: After warming up, idle the engine		Approx. 1.3V
HO2S3 (B1)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	Approx. 0 - 1.0V
A/F S1 HTR (B1)	• Engine: After warming up, idle the engine		0 - 100%
SWL/C POSI SE	• Engine: Idle the engine	Engine coolant temperature is below 44°C (111°F)	Approx. 0 deg.
		Engine coolant temperature is above 45°C (113°F)	Approx. 80 deg.

Major Sensor Reference Graph in Data Monitor Mode

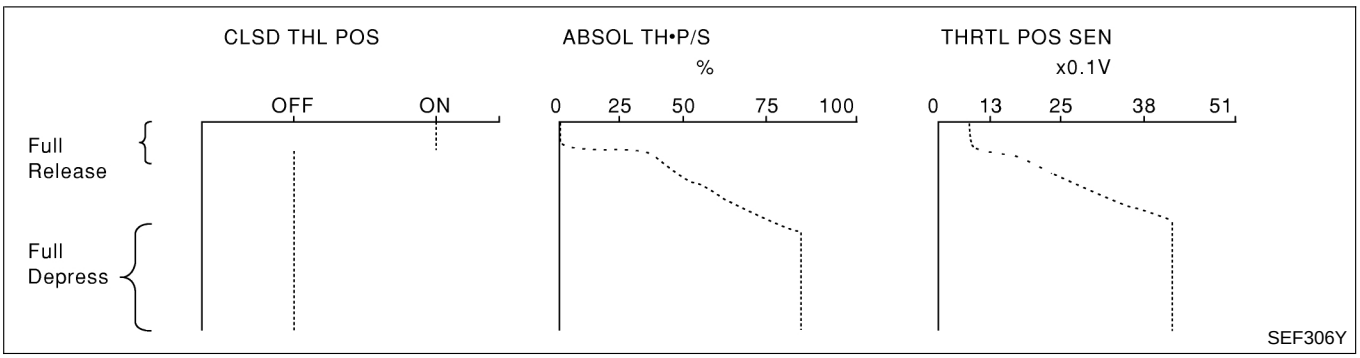
NIEC1228

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

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

NIEC1228S01

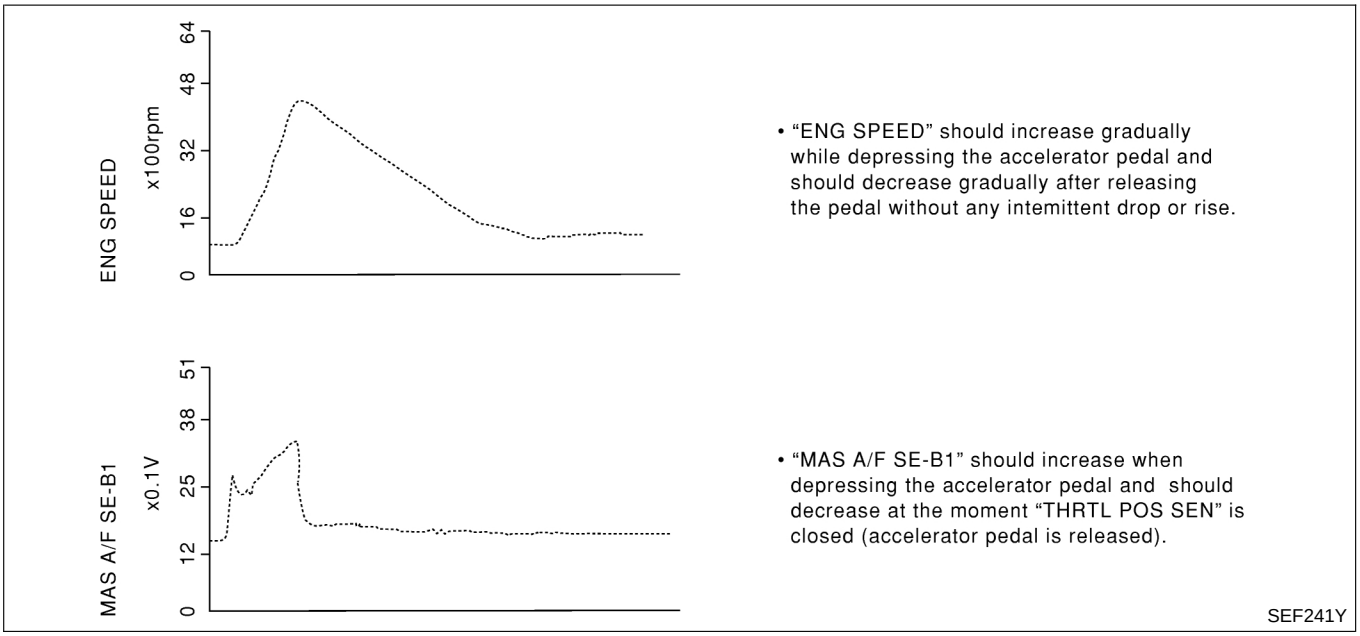
Below is the data for “THRTL POS SEN”, “ABSOL TH·P/S” and “CLSD THL POS” when depressing the accelerator pedal with the ignition switch “ON”.
The signal of “THRTL POS SEN” and “ABSOL TH·P/S” should rise gradually without any intermittent drop or rise after “CLSD THL POS” is changed from “ON” to “OFF”.

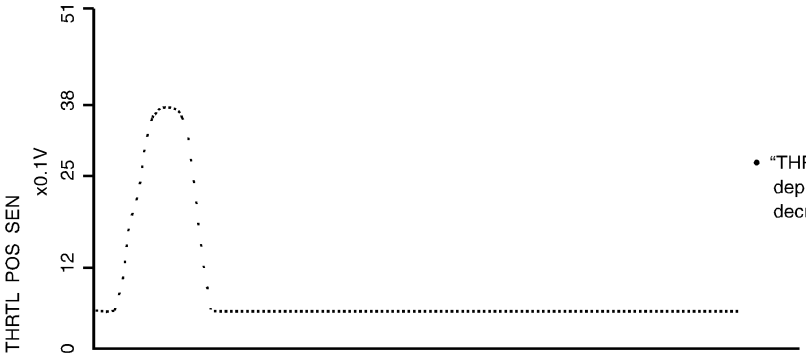


ENG SPEED, MAS A/F SE-B1, THRTL POS SEN, HO2S2 (B1), INJ PULSE-B1

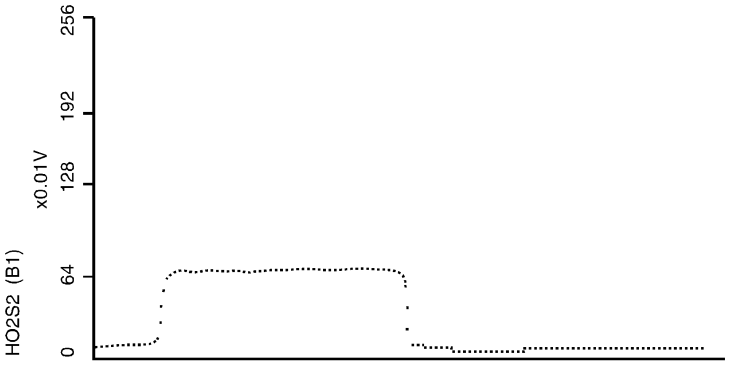
NIEC1228S02

Below is the data for “ENG SPEED”, “MAS A/F SE-B1”, “THRTL POS SEN”, “HO2S2 (B1/B2)” and “INJ PULSE” when revving engine quickly up to 4,800 rpm under no load after warming up engine to normal operating temperature.
Each value is for reference, the exact value may vary.

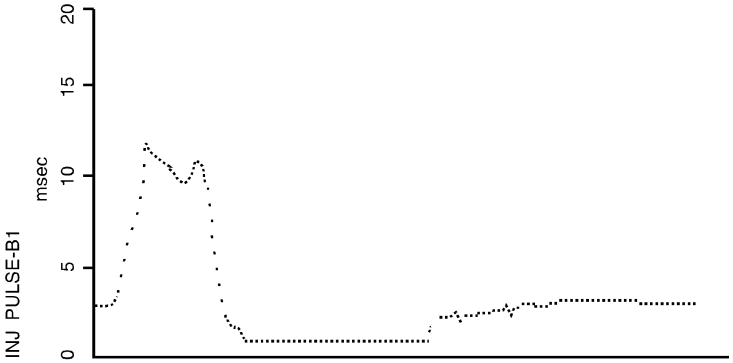




- "THRTL POS SEN" should increase while depressing the accelerator pedal and should decrease while releasing it.

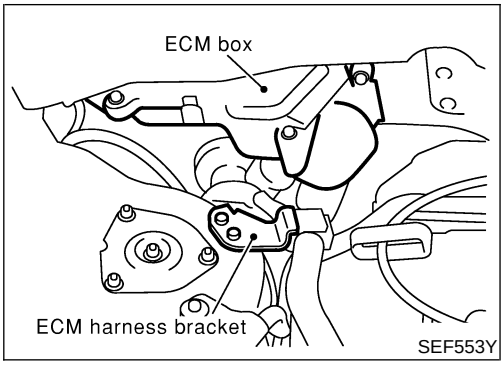


- "HO2S2 (B1)" may increase immediately after depressing the accelerator pedal and may decrease after releasing the pedal.



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

SEF600Z



ECM Terminals and Reference Value

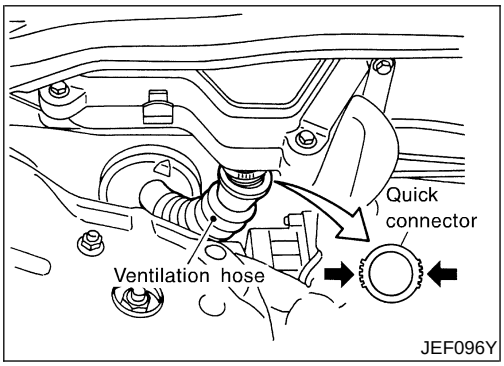
NIEC1229

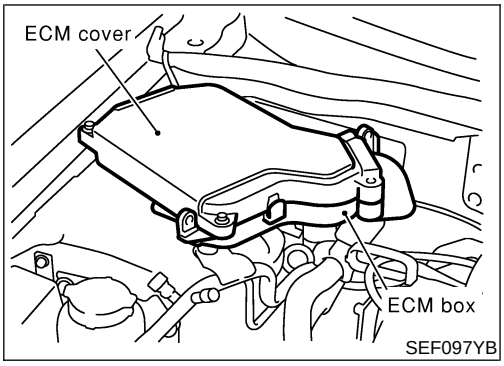
PREPARATION

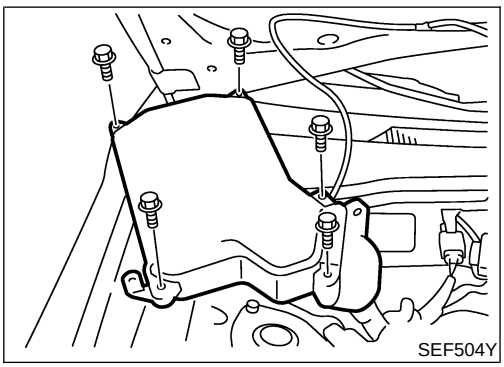
NIEC1229S01

1. ECM is located in the right side of the cowl top (behind the strut tower).
   For this inspection:

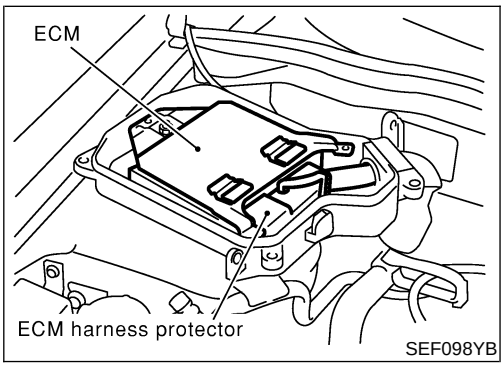
- Remove engine control harness bracket on the strut tower.
- Remove quick connector on the ventilation hose.
- Remove ECM fixing bolts and pull it out all the way.





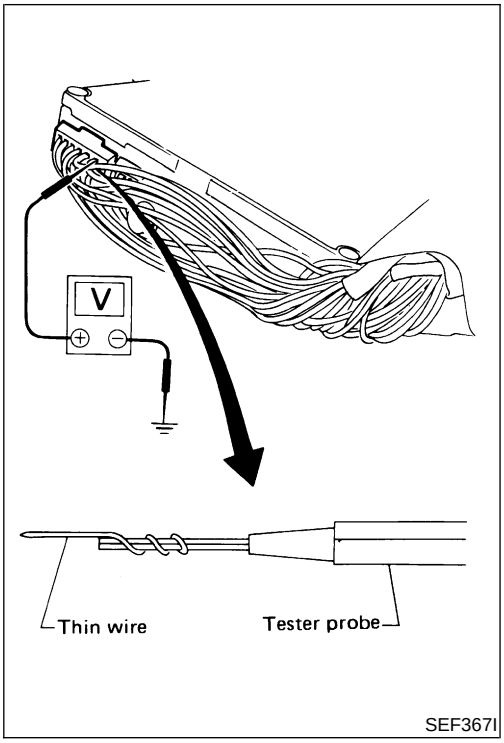


- Remove ECM cover fixing bolts.



- Remove ECM fixing bolts.
- Remove ECM with it's harness from the cover.

2. Remove ECM harness protector.

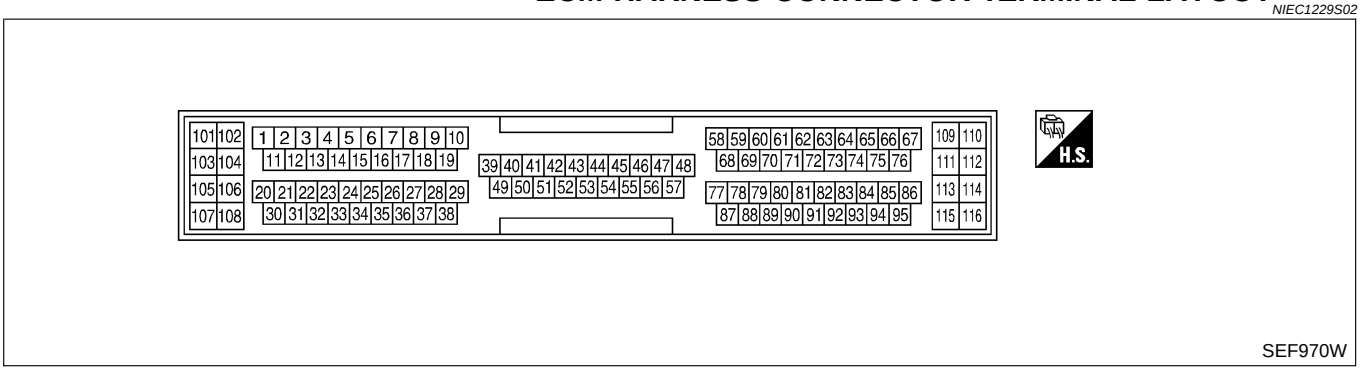


3. Perform all voltage measurements with the connector connected. Extend tester probe as shown to perform tests easily.
- Open harness securing clip to make testing easier.
- Use extreme care not to touch 2 pins at one time.
- Data is for comparison and may not be exact.

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.

ECM HARNESS CONNECTOR TERMINAL LAYOUT

NIEC1229S02



ECM INSPECTION TABLE

NIEC1229S03

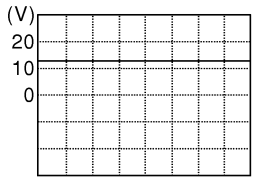
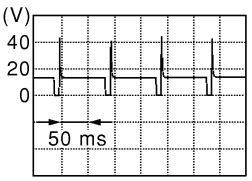
Specification data are reference values and are measured between each terminal and ground.

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.

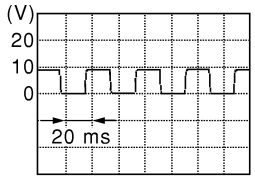
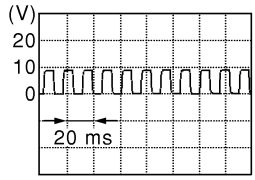
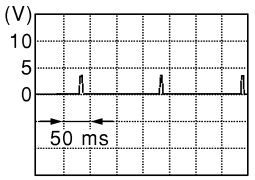
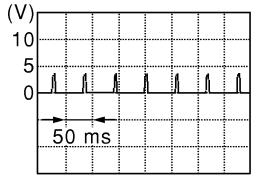
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	Y/R	Intake valve timing control solenoid valve	**[Engine is running]** ● Intake valve timing control is operating	0 - 1V
			[Engine is not running] ● Intake valve timing control is not operating	BATTERY VOLTAGE (11 - 14V)
2	L/B	Vacuum cut valve bypass valve	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)

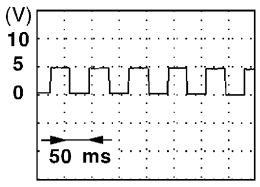
ECM Terminals and Reference Value (Cont'd)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	W/R	Heated oxygen sensor 3 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	R	A/F sensor 1 heater	**[Engine is running]** ● **Warmed-up condition** ● Idle speed	Approximately 5V
6 7 15 16	BR LG P OR	IACV-AAC valve	**[Engine is running]** ● Idle speed	0.1 - 14V
8 9 17 18	SB W/B R/Y BR/R	EGR volume control valve	**[Engine is running]** ● Idle speed	0.1 - 14V
10	Y/B	A/T signal No. 3	**[Engine is running]** ● Idle speed	Voltage fluctuates between 0 and 9V.
11	R/B	Heated oxygen sensor 2 (rear) 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
			[Engine is running] ● Engine speed is above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)
12	LG/B	Cooling fan relay (High)	**[Engine is running]** ● Cooling fan is not operating	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Cooling fan (High) is operating	0 - 0.6V
13	LG/R	Cooling fan relay (Low)	**[Engine is running]** ● Cooling fan is not operating	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Cooling fan is operating	0 - 0.6V

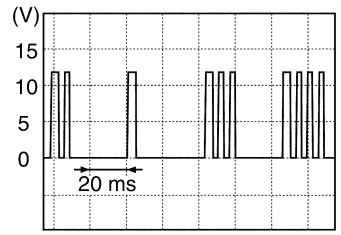
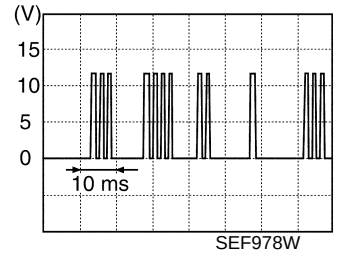
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
14	GY/L	EVAP canister purge volume control solenoid valve	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)  SEF462Y
			[Engine is running] ● Engine speed is about 2,000 rpm (More than 100 seconds after starting engine).	BATTERY VOLTAGE (11 - 14V)  SEF461Y
19	BR/W	A/T signal No. 5	**[Engine is running]** ● Idle speed	Voltage fluctuates between 0 and 9V.
21	B/P	Fuel pump relay	**[Ignition switch "ON"]** ● For 5 seconds after turning ignition switch "ON" **[Engine is running]**	0 - 1V
			[Ignition switch "ON"] ● More than 5 seconds after turning ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
22	OR/L	Malfunction indicator lamp	**[Ignition switch "ON"]**	0 - 1.0V
			[Engine is running] ● Idle speed	BATTERY VOLTAGE (11 - 14V)
23	L	Air conditioner relay	**[Engine is running]** ● Both A/C switch and blower switch are "ON" (Compressor operates)	0 - 0.6V
			[Engine is running] ● A/C switch is "OFF"	BATTERY VOLTAGE (11 - 14V)
24 25 26 27	L/R G R/B G/OR	Swirl control valve	**[Engine is running]** ● Idle speed	0.1 - 14V
31	W/G	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch "OFF"]** ● For 7 seconds after turning ignition switch "OFF"	0 - 1.0V
			[Ignition switch "OFF"] ● More than 7 seconds passed after turning ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)

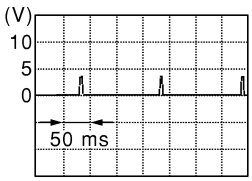
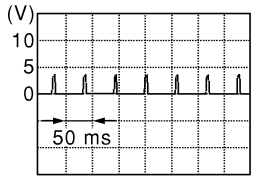
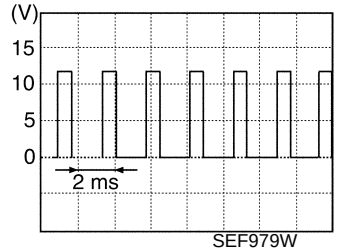
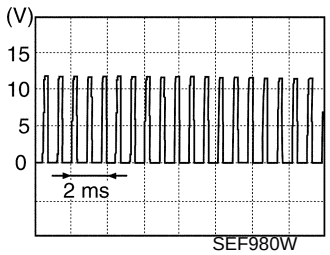
ECM Terminals and Reference Value (Cont'd)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
32	L/OR	Tachometer	**[Engine is running]** ● **Warmed-up condition** ● Idle speed	Approximately 8 - 9V  SEF463Y
			[Engine is running] ● Engine speed is 2,000 rpm	Approximately 8 - 9V  SEF464Y
35 36 37 38	B/R PU L/R GY/R	Ignition signal	**[Engine is running]** ● **Warmed-up condition** ● Idle speed	Approximately 0.3V  SEF465Y
			[Engine is running] ● Engine speed is 2,000 rpm	Approximately 0.5V  SEF466Y
40	Y/PU	Throttle position switch (Closed position)	**[Engine is running]** ● **Warmed-up condition** ● Accelerator pedal fully released	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Accelerator pedal depressed	Approximately 0V
41	B/Y	Start signal	**[Ignition switch "ON"]**	Approximately 0V
			[Ignition switch "START"]	9 - 12V
42	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)
43	B/R	Ignition switch	**[Ignition switch "OFF"]**	0V
			[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)

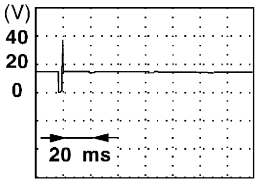
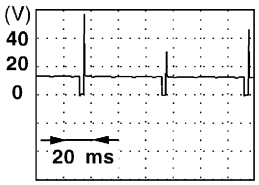
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
44	L/R	Air conditioner switch	**[Engine is running]** ● Both A/C switch and blower switch are "ON"	Approximately 0V
			[Engine is running] ● A/C switch is "OFF"	BATTERY VOLTAGE (11 - 14V)
46	PU	Power steering oil pressure switch	**[Engine is running]** ● Steering wheel is being turned.	Approximately 0V
			[Engine is running] ● Steering wheel is not being turned.	Approximately 5V
48	B	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
50	R/W	Electrical load signal	**[Ignition switch "ON"]** ● Lighting switch and/or rear window defogger switch "ON"	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch "ON"] ● Lighting switch and rear window defogger switch "OFF"	0V
51	LG/B	Heater fan switch	**[Engine is running]** ● Heater fan switch "ON"	Approximately 0V
			[Engine is running] ● Heater fan switch "OFF"	Approximately 5V
54	Y/R	A/T signal No. 1	**[Engine is running]** ● Idle speed	Voltage fluctuates between 0 and 9V.
55	Y/G	A/T signal No. 2	**[Engine is running]** ● Idle speed	Voltage fluctuates between 0 and 9V.
56	G/Y	A/T signal No. 4	**[Engine is running]** ● Idle speed	Voltage fluctuates between 0 and 9V.
57	B	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
58	B	Sensor's ground	**[Engine is running]** ● **Warmed-up condition** ● Idle speed	Approximately 0V
60	PU/R	Vehicle speed sensor	**[Engine is running]** ● Lift up the vehicle ● In 2nd gear position ● Vehicle speed is 40 km/h (25 MPH)	0 - Approximately 4.2V  SEF003W
61	G	Mass air flow sensor	**[Engine is running]** ● **Warmed-up condition** ● Idle speed	1.0 - 1.7V
			[Engine is running] ● **Warmed-up condition** ● Engine speed is 2,500 rpm	1.5 - 2.4V

ECM Terminals and Reference Value (Cont'd)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
62	W/L	A/T sensor 1	**[Engine is running]** ● **Warmed-up condition** ● Idle speed	2 - 3V
63	W			Approximately 2.6V
64	OR/L			Approximately 3.1V
65	OR			2 - 3V
66 75	R	Camshaft position sensor (PHASE)	**[Engine is running]** ● **Warmed-up condition** ● Idle speed	Approximately 2.0 - 3.0V  SEF977W
			[Engine is running] ● Engine speed is 2,000 rpm	Approximately 2.0 - 3.0V  SEF978W
67	W/L	Power supply for ECM (Back-up)	**[Ignition switch "OFF"]**	BATTERY VOLTAGE (11 - 14V)
68	OR/L	Throttle position sensor signal output	**[Engine is running]** ● **Warmed-up condition** ● Accelerator pedal fully released	Approximately 0.5V
			[Ignition switch "ON"] ● Accelerator pedal fully depressed	Approximately 4V
69	PU	A/T diagnosis communication line	**[Engine is running]** ● Idle speed	Voltage fluctuates between 0 and 9V.
70	BR/W	Engine coolant temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with engine coolant temperature.
71	Y/B	Intake air temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with intake air temperature.
72	PU	EGR temperature sensor	**[Engine is running]** ● **Warmed-up condition** ● Idle speed	Less than 4.5V
			[Engine is running] ● **Warmed-up condition** ● EGR system is operating	0 - 1.5V
73	B	Mass air flow sensor ground	**[Engine is running]** ● **Warmed-up condition** ● Idle speed	Approximately 0V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
74	R/L	Refrigerant pressure sensor	**[Engine is running]** ● **Warmed-up condition** ● Both A/C switch and blower switch are "ON" (Compressor operates)	0.36 - 3.88V
78	R	Intake valve timing control position sensor	**[Engine is running]** ● **Warmed-up condition** ● Idle speed	Approximately 0.5 - 0.6V  SEF465Y
			[Engine is running] ● Engine speed is 2,000 rpm	Approximately 0.5 - 0.6V  SEF466Y
79	B/W	Fuel level sensor ground	**[Engine is running]** ● Idle speed	Approximately 0V
80	G	Fuel level sensor	**[Ignition switch "ON"]**	Approximately 0 - 4.8V Output voltage varies with fuel level.
81	W	Knock sensor	**[Engine is running]** ● Idle speed	Approximately 2.5V
82	G/OR	Fuel tank temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with fuel tank temperature.
83	W	BARO sensor	**[Ignition switch "ON"]**	Approximately 4.4V
85	R	Crankshaft position sensor (POS)	**[Engine is running]** ● **Warmed-up condition** ● Idle speed	Approximately 3.0 - 4.0V  SEF979W
			[Engine is running] ● Engine speed is 2,000 rpm	Approximately 3.0 - 4.0V  SEF980W

ECM Terminals and Reference Value (Cont'd)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
86	W	Heated oxygen sensor 2 (rear)	**[Engine is running]** ● **Warmed-up condition** ● Engine speed is 2,000 rpm	0 - Approximately 1.0V
89	P	EVAP control system pressure sensor	**[Ignition switch "ON"]**	Approximately 3.4V
90	P/L	Swirl control valve position sensor	**[Engine is running]** ● Idle speed ● Engine coolant temperature is below 44°C (111°F).	Approximately 5V
			[Engine is running] ● Idle speed ● Engine coolant temperature is above 45°C (113°F).	0 - 1.0V
91	W	MAP sensor	**[Engine is running]** ● **Warmed-up condition** ● Idle speed	Approximately 1.3V
92	W	Throttle position sensor	**[Engine is running]** ● **Warmed-up condition** ● Accelerator pedal fully released ● Vacuum is created using vacuum pump	0.15 - 0.85V
			[Ignition switch "ON"] ● Accelerator pedal fully depressed ● Vacuum is created using vacuum pump	3.5 - 4.7V
95	L	Heated oxygen sensor 3	**[Engine is running]** ● **Warmed-up condition** ● Engine speed is 2,000 rpm	0 - approximately 1.0V
101 103 105 107	R/B Y/B G/B L/B	Injector No. 1 Injector No. 2 Injector No. 3 Injector No. 4	**[Engine is running]** ● **Warmed-up condition** ● Idle speed	BATTERY VOLTAGE (11 - 14V)  SEF011W
			[Engine is running] ● **Warmed-up condition** ● Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14V)  SEF012W
102	L/Y	EVAP canister vent control valve	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)
106 108	B B	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
110 112	W W	Power supply for ECM	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)
111	R	Sensor's power supply	**[Ignition switch "ON"]**	Approximately 5V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
115	LG	DATA link connector	**[Ignition switch "ON"]** ● CONSULT-II or GST is disconnected.	Approximately 8V

Description

NIEC1230

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)

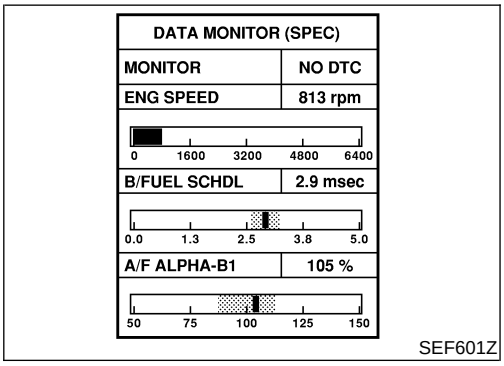
Testing Condition

NIEC1231

- 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 more than 60°C (140°F). For MT 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

NIEC1232

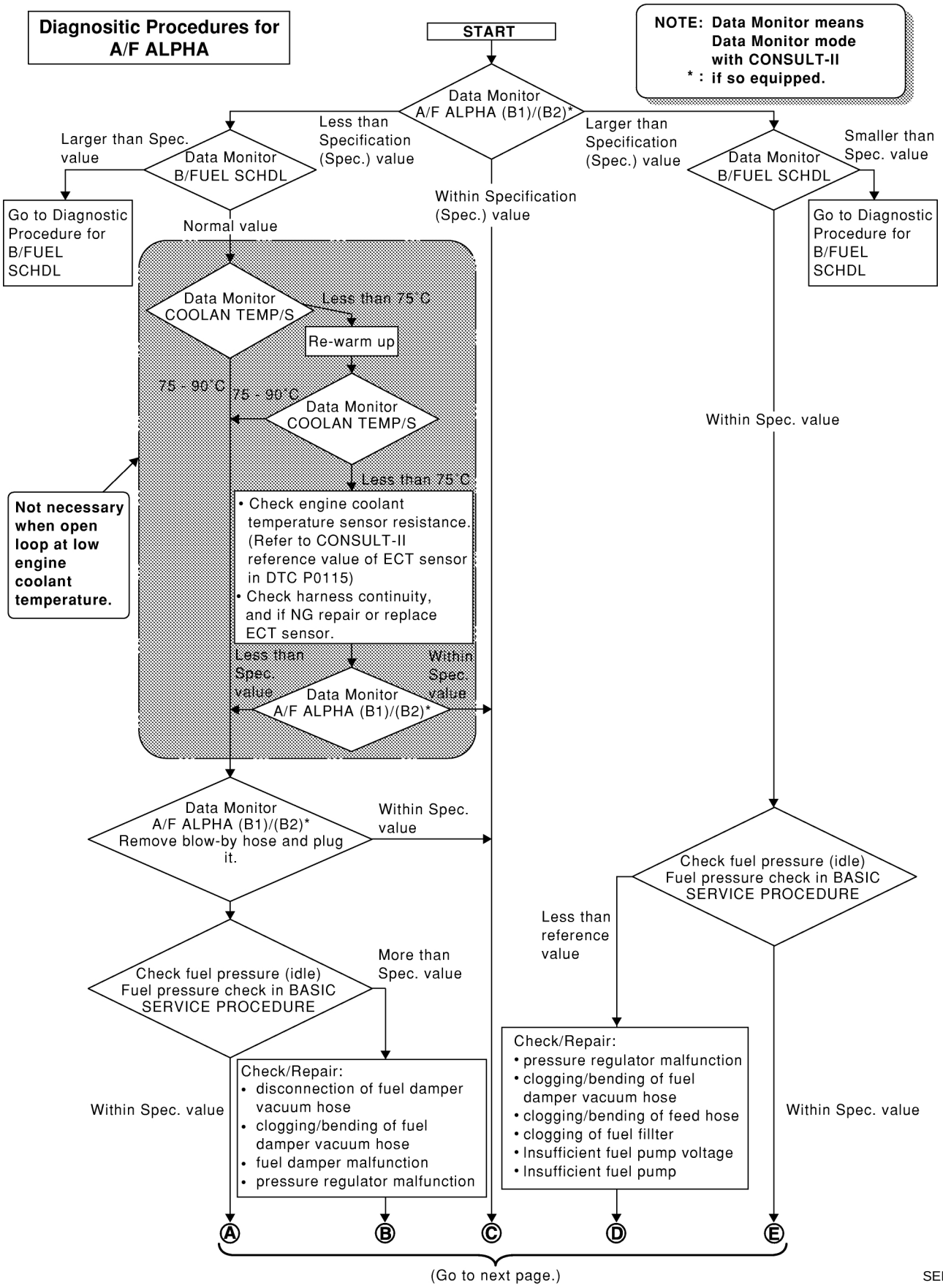
NOTE:

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

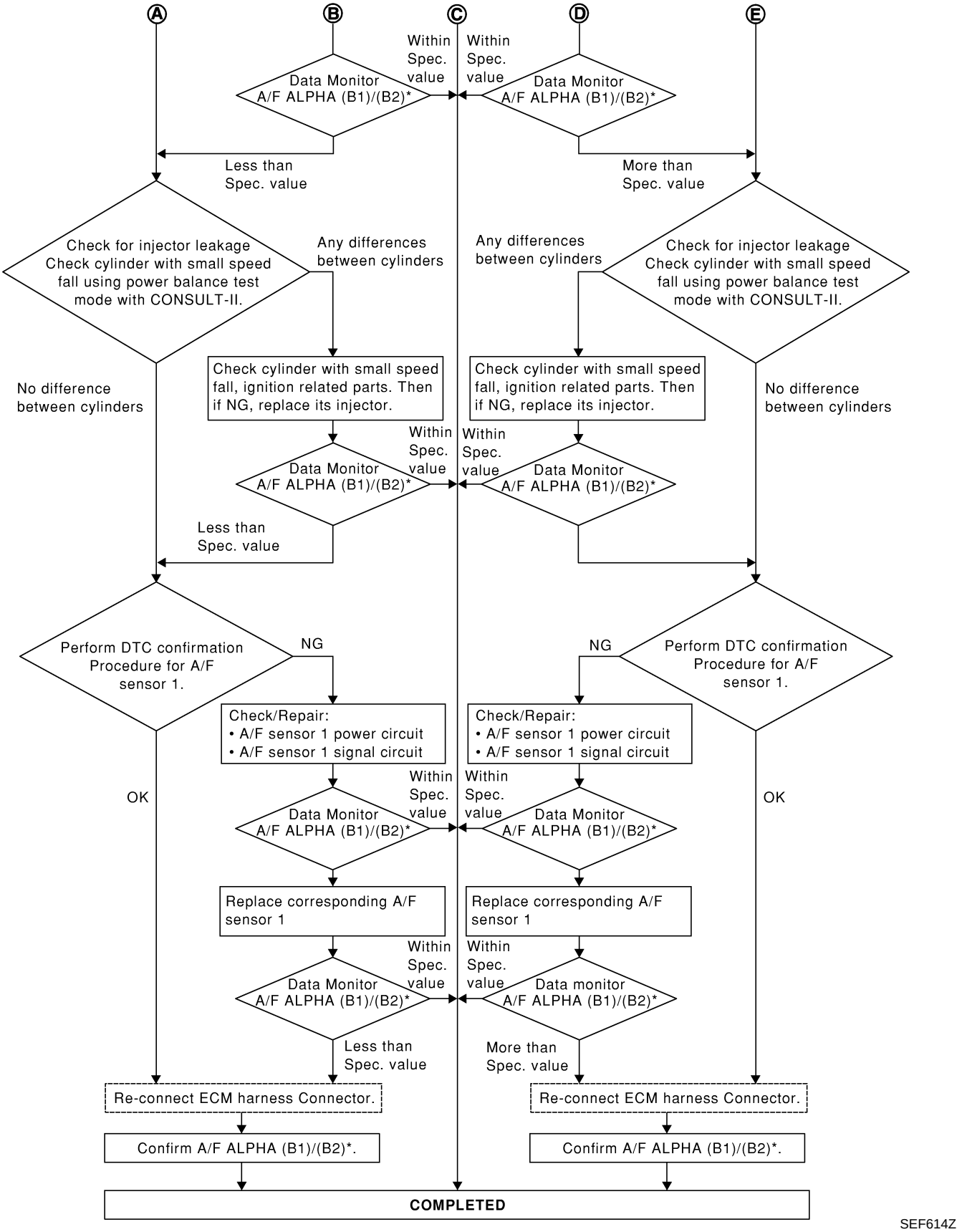
1. Perform “Basic Inspection”, EC-802.
2. Confirm that the testing conditions indicated above are met.
3. Select “B/FUEL SCHDL”, “A/F ALPHA-B1” and “MAS A/F SE-B1” in “DATA MONITOR (SPEC)” mode with CONSULT-II.
4. Make sure that monitor items are within the SP value.
5. If NG, go to “Diagnostic Procedure”, EC-802.

Diagnostic Procedure

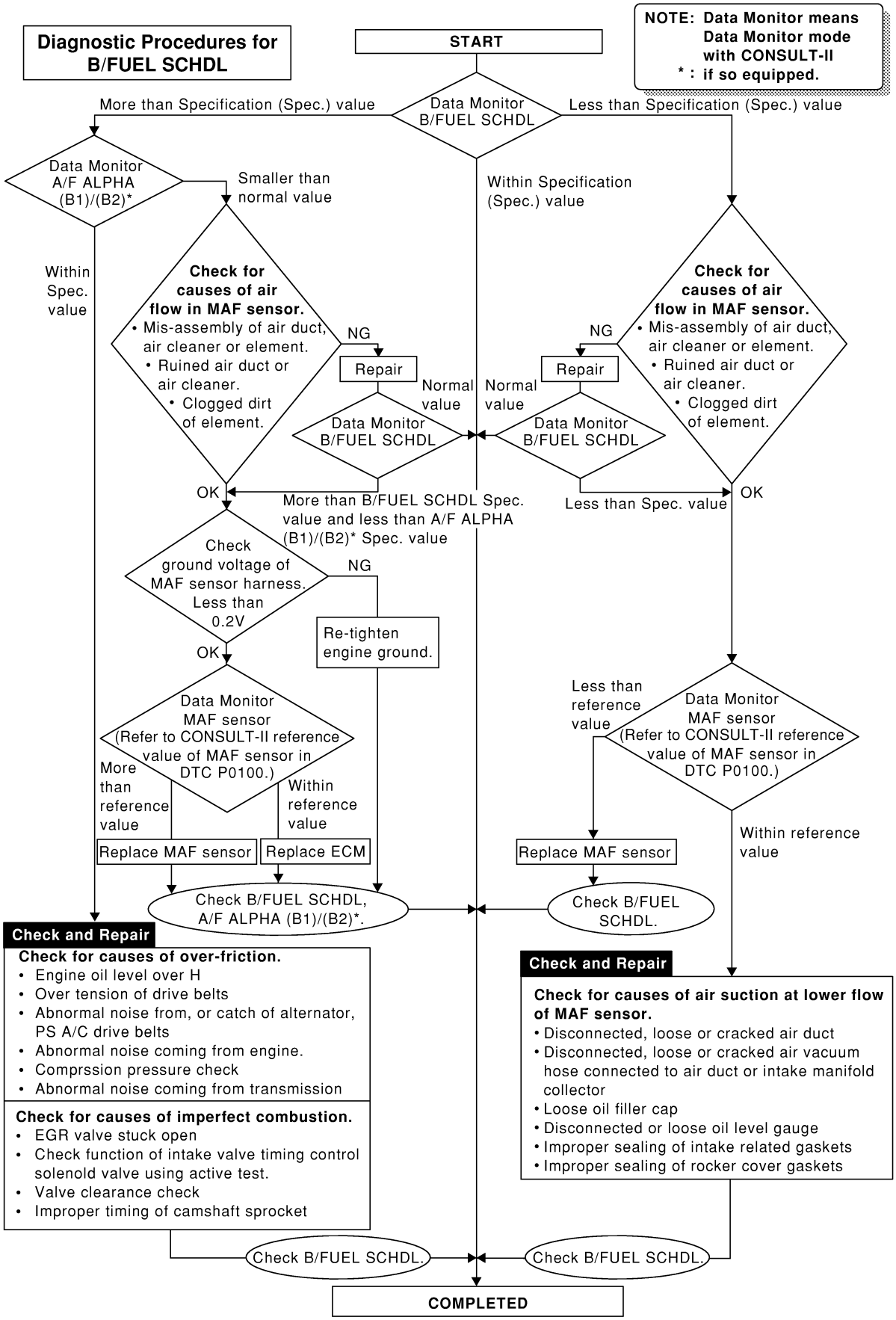
NIEC1233



SEF613Z


Ⓐ
Ⓑ
Ⓒ
Ⓓ
Ⓔ
Within Spec. value
Data Monitor A/F ALPHA (B1)/(B2)*
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 A/F sensor 1.
NG
OK
Check/Repair:
• A/F sensor 1 power circuit
• A/F sensor 1 signal circuit
Replace corresponding A/F sensor 1
Data monitor A/F ALPHA (B1)/(B2)*
Re-connect ECM harness Connector.
Confirm A/F ALPHA (B1)/(B2)*.
COMPLETED

SEF614Z


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
Data Monitor MAF sensor (Refer to CONSULT-II reference value of MAF sensor in DTC P0100.)
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

NIEC1234

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

COMMON I/I REPORT SITUATIONS

NIEC1234S01

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 data does not appear during the DTC CONFIRMATION PROCEDURE.
VI	The TROUBLE DIAGNOSIS for PXXXX does not indicate the problem area.

Diagnostic Procedure

NIEC1235

1	INSPECTION START
Erase (1st trip) DTCs. Refer to "HOW TO ERASE EMISSION-RELATED INFORMATION", EC-770.	
▶	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
Refer to ***GI-26***, "Incident Simulation Tests".	
OK or NG	
OK ▶	GO TO 4.
NG ▶	Repair or replace.

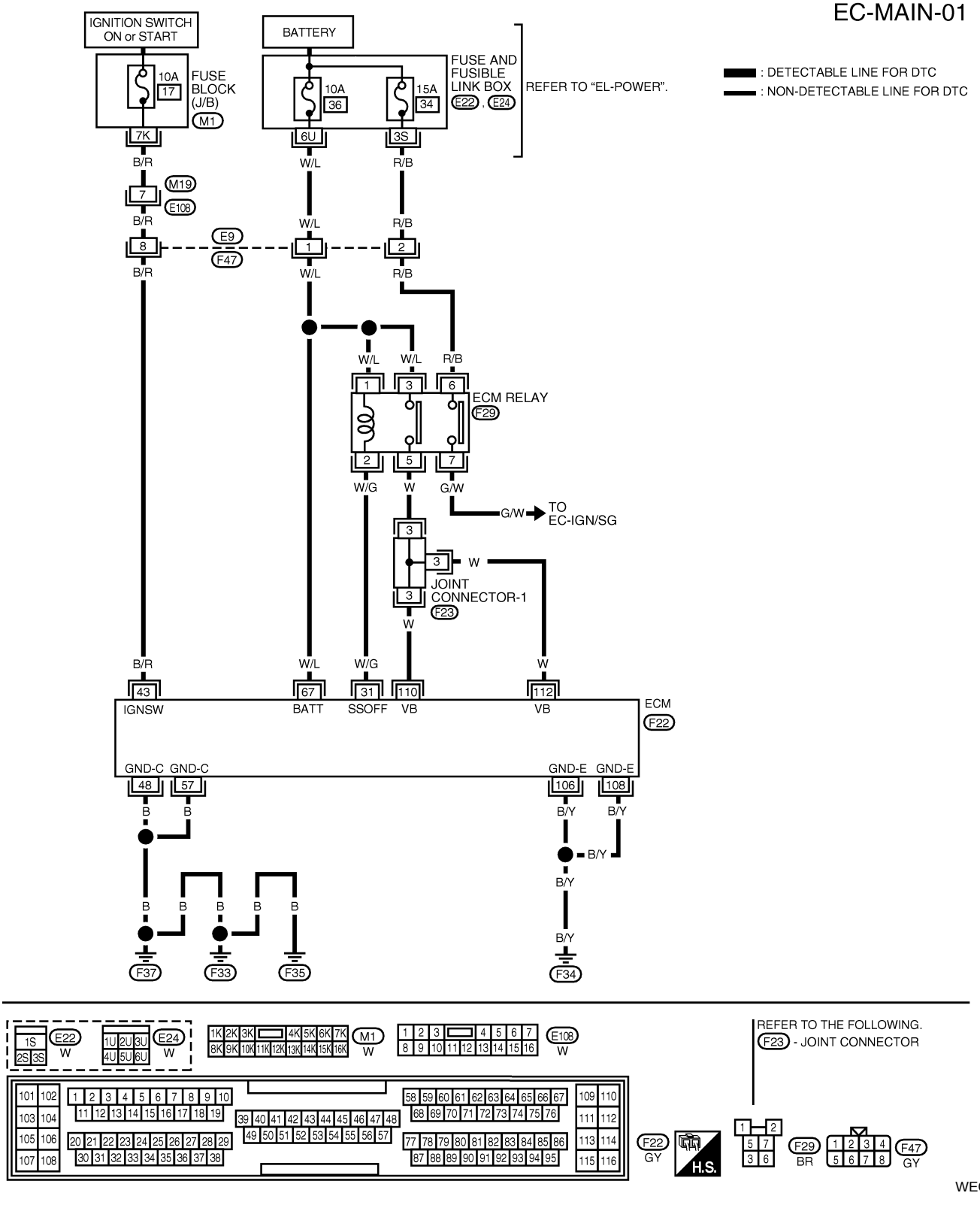
4	CHECK CONNECTOR TERMINALS
Refer to ***GI-23***, "How to Check Enlarged Contact Spring of Terminal".	
OK or NG	
OK ▶	**INSPECTION END**
NG ▶	Repair or replace connector.

Main Power Supply and Ground Circuit

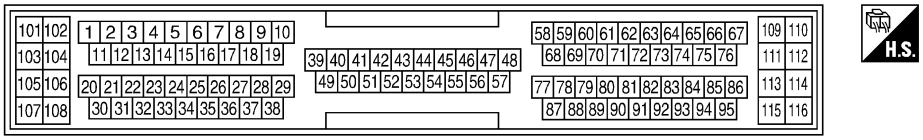
WIRING DIAGRAM

NIEC1236

EC-MAIN-01



WEC379



SEF970W

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)
31	W/G	ECM RELAY (SELF-SHUTOFF)	ENGINE RUNNING FOR 5 SECONDS AFTER TURNING IGN OFF	0 - 1.0V
			5 SECONDS PASSED AFTER TURNING IGN OFF	BATTERY VOLTAGE
43	B/R	IGN	IGN OFF	0V
			IGN ON	BATTERY VOLTAGE
48 57	B B	ECM GROUND	ENGINE RUNNING	ENGINE GROUND
67	W/L	POWER SUPPLY (BACK-UP)	IGN OFF	BATTERY VOLTAGE
106 108	B/Y B/Y	ECM GROUND	ENGINE RUNNING AT IDLE SPEED	ENGINE GROUND
110 112	W W	POWER SUPPLY FOR ECM	IGN ON	BATTERY VOLTAGE

SEF603Z

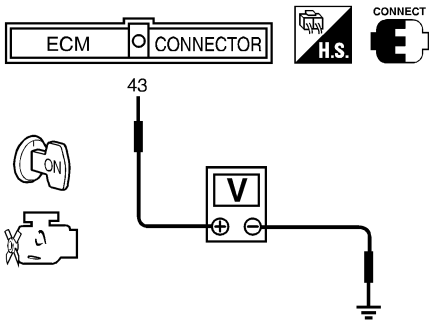
DIAGNOSTIC PROCEDURE

NIEC1237

1	INSPECTION START	
Start engine. Is engine running? **Yes or No**		
Yes	▶	GO TO 8.
No	▶	GO TO 2.

2	CHECK POWER SUPPLY-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 E9, F47
- Harness connectors M19, E108
- Fuse block (J/B) connector M1
- 10A fuse
- Harness for open or short between ECM and 10A fuse

	▶	Repair harness or connectors.

4	CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-I

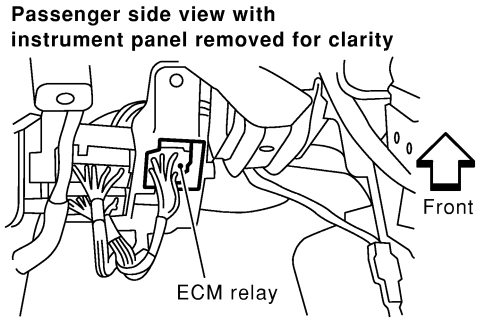
1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminals 48, 57, 106, 108 and engine ground.
   Refer to WIRING DIAGRAM.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

OK or NG

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

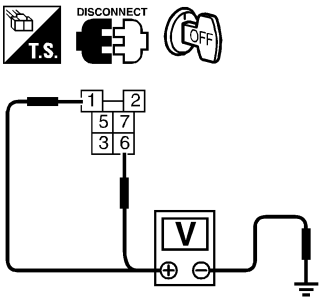
5	CHECK POWER SUPPLY-II

1. Disconnect ECM relay.



SEF387Z

2. Check voltage between ECM relay terminals 1, 6 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF516Z

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 6.

6	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E9, F47
- Fuse and fusible link box connectors E22, E24
- 10A fuse
- 15A fuse
- 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

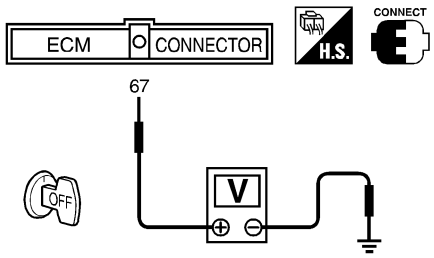
1. Check harness continuity between ECM terminal 31 and ECM relay terminal 1.
   Continuity should exist.
2. Also check harness for short to ground and short to power.

OK or NG

OK	▶	Go to "DTC P1320 IGNITION SIGNAL", EC-1233.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

8	CHECK POWER SUPPLY-III

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 10.
NG	▶	GO TO 9.

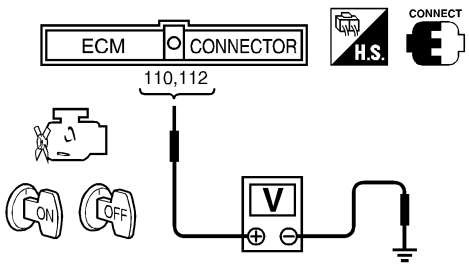
9	DETECT MALFUNCTIONING PART

Check the harness for open or short between ECM and harness connector F47.

▶ Repair harness or connectors.

10	CHECK POWER SUPPLY-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

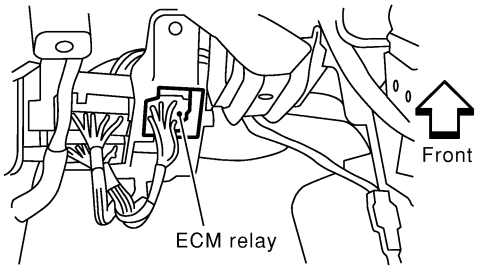
OK or NG

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

11	CHECK HARNESS CONTINUITY BETWEEN ECM RELAY AND ECM

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

Passenger side view with instrument panel removed for clarity



SEF387Z

3. Check harness continuity between ECM terminals 110, 112 and ECM relay terminal 5. 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 13.
NG	▶	GO TO 12.

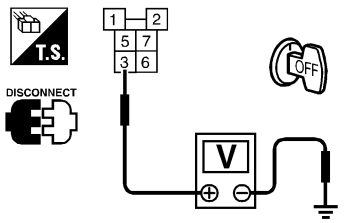
12	DETECT MALFUNCTIONING PART

Check the following.
- Joint connector-1
- Harness for open or short between ECM relay and ECM

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

13	CHECK VOLTAGE BETWEEN ECM RELAY AND GROUND

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



Voltage: Battery voltage

SEF295X

OK or NG

OK	▶	GO TO 15.
NG	▶	GO TO 14.

14	DETECT MALFUNCTIONING PART

Check the harness for open or short between ECM relay and harness connector F47.

	▶	Repair harness or connectors.

15	CHECK OUTPUT SIGNAL CIRCUIT

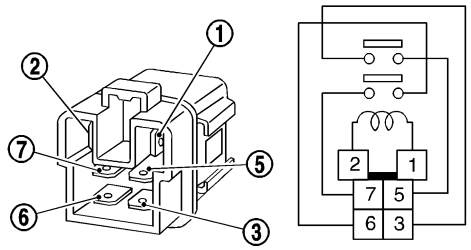
1. Check harness continuity between ECM terminal 31 and ECM relay terminal 2.
   Refer to Wiring Diagram.
   Continuity should exist.
2. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 16.
NG	▶	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 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.

17	CHECK GROUND CIRCUIT

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.

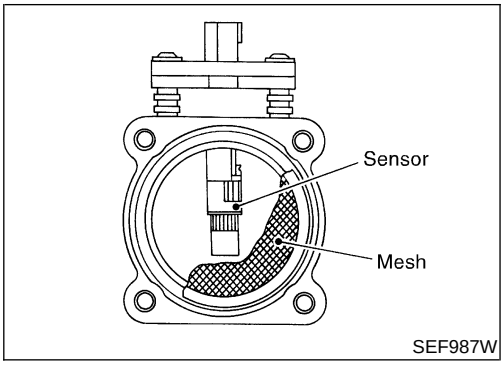
OK or NG

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

18	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-842.

▶ **INSPECTION END**



Component Description

NIEC1238

The mass air flow sensor is placed in the stream of intake air. It measures the intake flow rate by measuring a part of the entire intake flow. It consists of a hot film that is supplied with electric current from the ECM. The temperature of the hot film is controlled by the ECM a certain amount. The heat generated by the hot film 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 film as air flow increases. The ECM detects the air flow by means of this current change.

CONSULT-II Reference Value in Data Monitor Mode

NIEC1239

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	1.0 - 1.7V
		2,500 rpm	1.5 - 2.4V
CAL/LD VALUE	• Engine: After warming up • Air conditioner switch: “OFF” • Shift lever: “N” • No-load	Idle	20.0 - 35.5%
		2,500 rpm	12.0 - 30.0%
MASS AIRFLOW	• Engine: After warming up • Air conditioner switch: “OFF” • Shift lever: “N” • No-load	Idle	1.4 - 4.0 g·m/s
		2,500 rpm	5.0 - 10.0 g·m/s

On Board Diagnosis Logic

NIEC1240

DTC No.	Malfunction is detected when ...		Check Items (Possible Cause)
P0100	A)	An excessively high voltage from the sensor is sent to ECM when engine is not running.	• Harness or connectors (The sensor circuit is open or shorted.) • Mass air flow sensor
	C)	A high voltage from the sensor is sent to ECM under light load driving condition.	
	B)	An excessively low voltage from the sensor is sent to ECM* when engine is running.	• Harness or connectors (The sensor circuit is open or shorted.) • Intake air leaks • Mass air flow sensor
	D)	A low voltage from the sensor is sent to ECM under heavy load driving condition.	
	E)	A voltage from the sensor exists constantly approx. 1.0V when engine is running.	

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

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

DTC Confirmation Procedure

NIEC1241

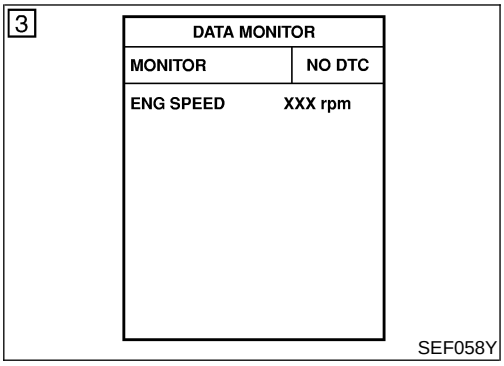
Perform "PROCEDURE FOR MALFUNCTION A" first. If the 1st trip DTC cannot be confirmed, perform "PROCEDURE FOR MALFUNCTION B and E". If there is no problem on "PROCEDURE FOR MALFUNCTION B and E", perform "PROCEDURE FOR MALFUNCTION C". If there is no problem on "PROCEDURE FOR MALFUNCTION C", perform "PROCEDURE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

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.



PROCEDURE FOR MALFUNCTION A

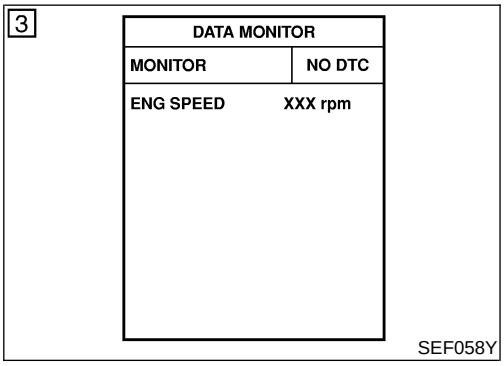
NIEC1241S01

With CONSULT-II

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-855.

With GST

Follow the procedure "With CONSULT-II" above.



PROCEDURE FOR MALFUNCTION B AND E

NIEC1241S02

With CONSULT-II

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-855.

With GST

Follow the procedure "With CONSULT-II" above.

NOTE:

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

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

NIEC1241S03

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.

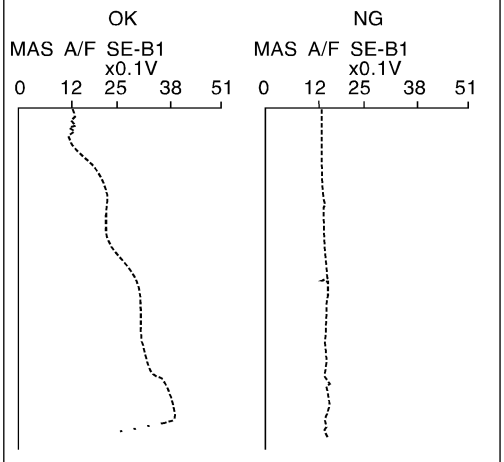
With CONSULT-II

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-855.

With GST

Follow the procedure "With CONSULT-II" above.

6



SEF243Y

PROCEDURE FOR MALFUNCTION D

NIEC1241S04

With CONSULT-II

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-855.
3) Select "DATA MONITOR" mode with CONSULT-II.
4) Check the voltage of "MAS A/F SE-B1" 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-855.
   If OK, go to following step.
7) Maintain the following conditions for at least 10 consecutive seconds.

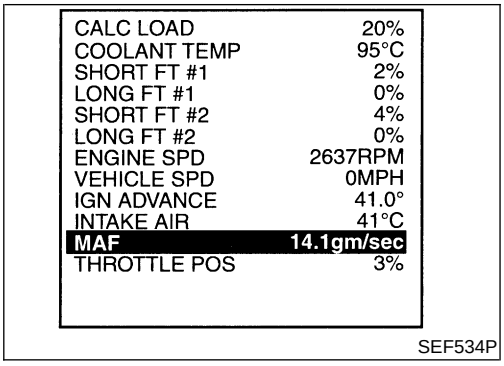
ENG SPEED	More than 2,000 rpm
THRTL POS SEN	More than 3V
Selector lever	Suitable position
Driving location	Driving vehicle uphill (Increased engine load) will help maintain the driving conditions required for this test.

8) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-855.

7

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

SEF719Y



Overall Function Check

NIEC1242

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

PROCEDURE FOR MALFUNCTION D

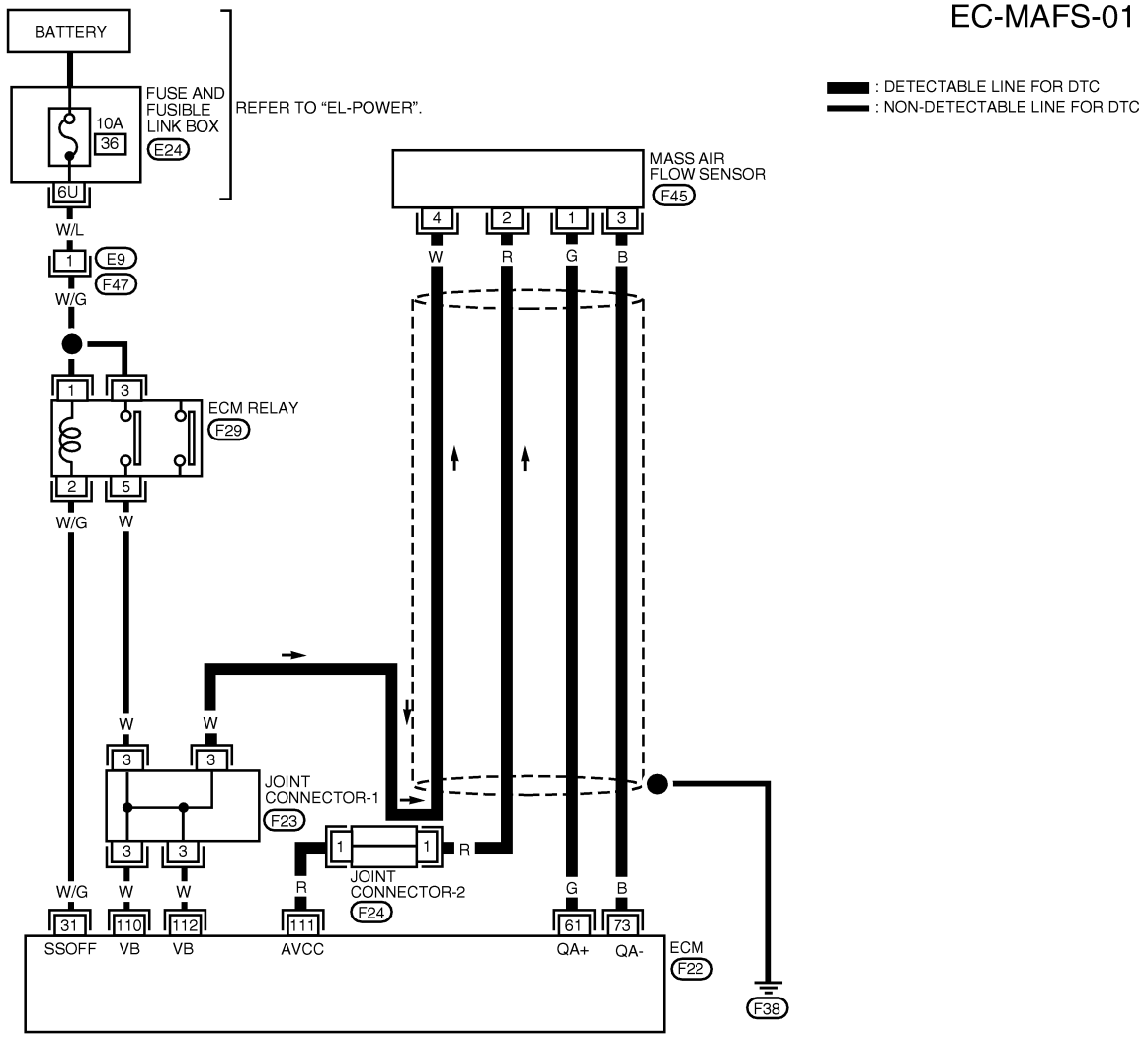
NIEC1242S01

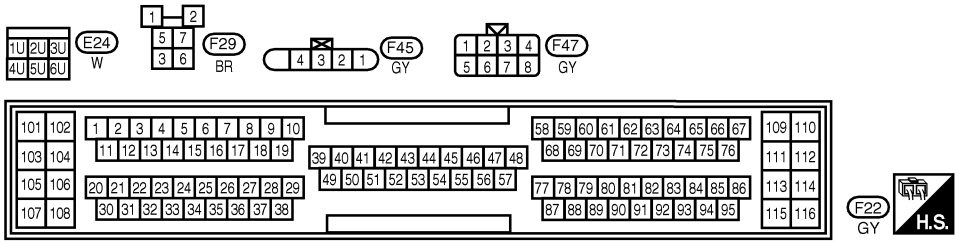
With GST

1) Turn ignition switch “ON”.
2) Start engine and warm it up to normal operating temperature.
3) Select “MODE 1” with GST.
4) Check the mass air flow sensor signal with “MODE 1”.
5) Check for linear mass air flow rise in response to increases to about 4,000 rpm in engine speed.
6) If NG, go to “Diagnostic Procedure”, EC-855.

Wiring Diagram

NIEC1243





REFER TO THE FOLLOWING.
F23 , F24 -JOINT CONNECTOR

WEC384

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	G	MASS AIR FLOW SENSOR	ENGINE RUNNING AT IDLE SPEED UNDER WARM-UP CONDITION	1.3 - 1.7V
			ENGINE RUNNING AT 2,500 RPM UNDER WARM-UP CONDITION	1.8 - 2.4V
73	B	MASS AIR FLOW SENSOR GROUND	ENGINE RUNNING AT IDLE SPEED UNDER WARM-UP CONDITION	APPROX. 0V
111	R	SENSOR'S POWER SUPPLY	IGN ON	APPROX. 5V

SEF564Y

Diagnostic Procedure

NIEC1244

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

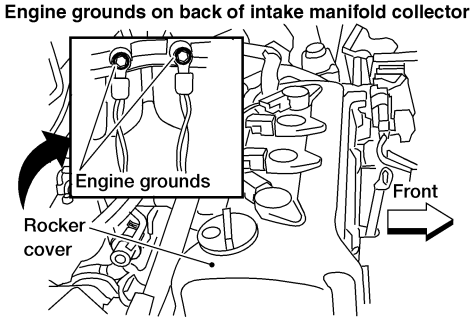
OK or NG

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

3	RETIGHTEN GROUND SCREWS

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

Engine grounds on back of intake manifold collector



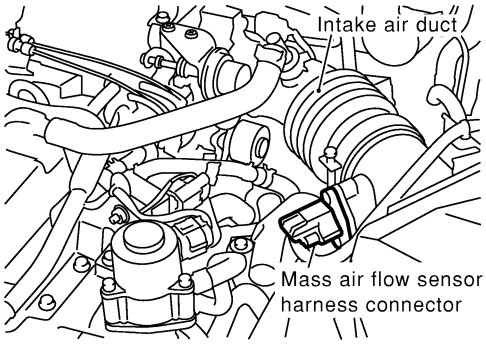
WEC249

	▶	GO TO 4.

Diagnostic Procedure (Cont'd)

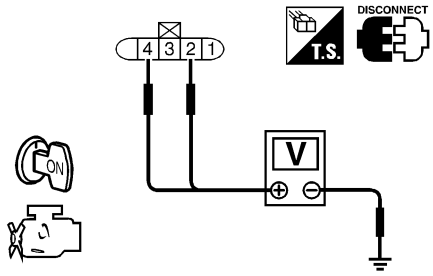
4	CHECK POWER SUPPLY

1. Disconnect mass air flow sensor harness connector.



SEF388Z

2. Turn ignition switch "ON".
3. Check voltage between MAFS terminal 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.
- Joint connector-1
- Joint connector-2
- Harness for open or short between ECM relay and mass air flow sensor
- Harness for open or short between mass air flow sensor and ECM

	▶	Repair harness or connectors.

6	CHECK GROUND CIRCUIT

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

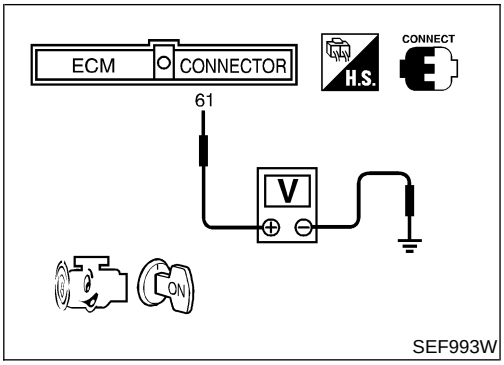
OK or NG

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

7	CHECK INPUT SIGNAL CIRCUIT	
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	
Refer to "Component Inspection", EC-858.		
OK or NG		
OK	▶	GO TO 9.
NG	▶	Replace mass air flow sensor.

9	CHECK INTERMITTENT INCIDENT	
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-842.		
	▶	**INSPECTION END**



SEF993W

Component Inspection

=NIEC1245

MASS AIR FLOW SENSOR

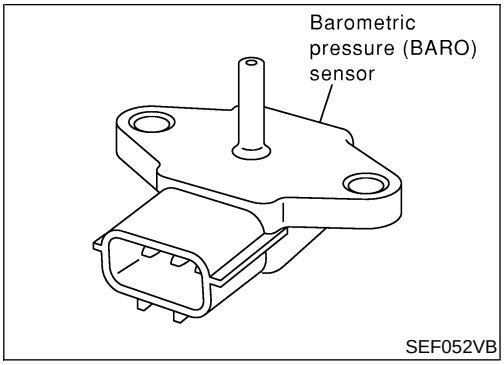
NIEC1245S01

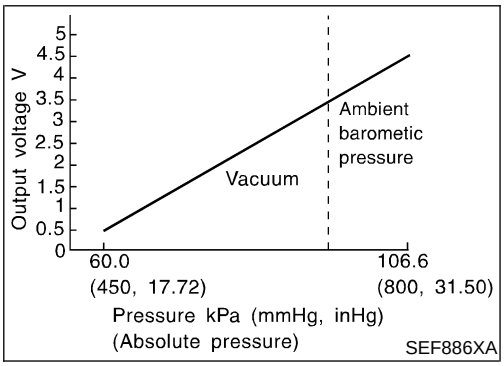
1. Turn ignition switch “ON”.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 61 (Mass air flow sensor signal) and ground.

Conditions	Voltage V
Ignition switch “ON” (Engine stopped.)	Less than 1.0
Idle (Engine is warmed-up to normal operating temperature.)	1.0 - 1.7
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.5 - 2.4
Idle to about 4,000 rpm*	1.0 - 1.7 to Approx. 4.0

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

4. If the voltage is out of specification, disconnect mass air flow sensor harness connector and connect it again. Repeat above check.
5. If NG, remove mass air flow sensor from air duct. Check hot film for damage or dust.





Component Description

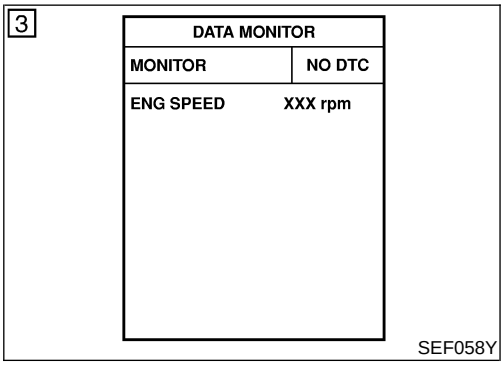
NIEC1246

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

On Board Diagnosis Logic

NIEC1247

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0105	An excessively low or high voltage from the sensor is sent to ECM.	• Harness or connectors (Barometric pressure sensor circuit is open or shorted.) • Barometric pressure sensor



DTC Confirmation Procedure

NIEC1248

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

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-XX.

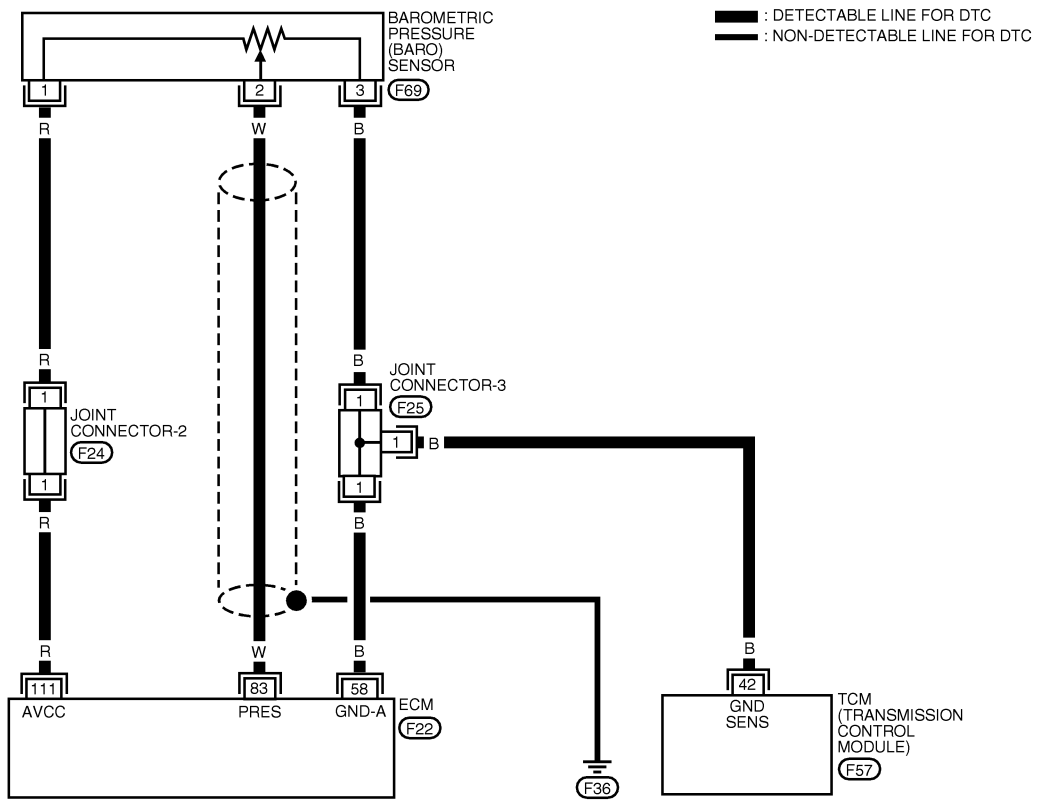
With GST

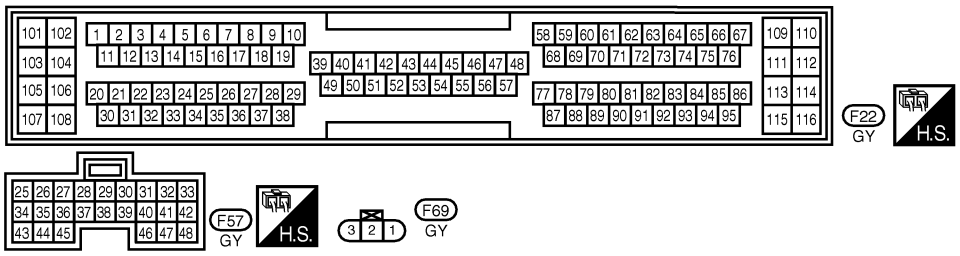
Follow the procedure “With CONSULT-II” above.

Wiring Diagram

NIEC1249

EC-BARO-01





REFER TO THE FOLLOWING.
F24 , F25 - JOINT CONNECTOR

WEC382

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	IGN ON	APPROX. 0V
83	W	BARO SENSOR	IGN ON	APPROX. 4.4V
111	R	SENSOR'S POWER SUPPLY	IGN ON	APPROX. 5V

SEF604Z

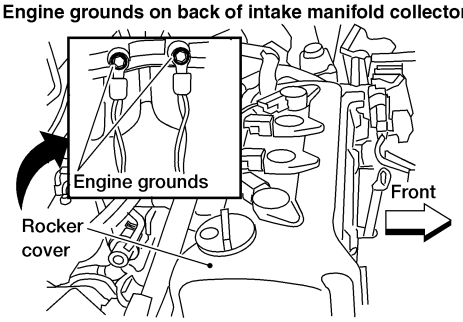
Diagnostic Procedure

NIEC1250

1	RETIGHTEN GROUND SCREWS

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

Engine grounds on back of intake manifold collector

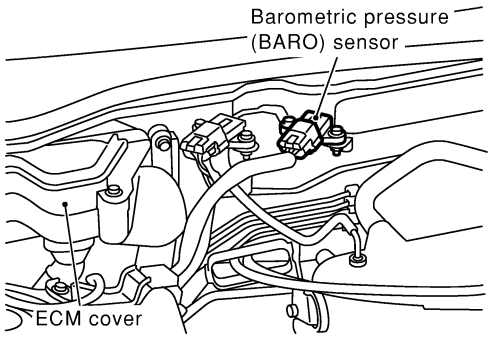


WEC249

	▶	GO TO 2.

2	CHECK CONNECTOR

1. Disconnect barometric pressure (BARO) sensor harness connector.



SEF390Z

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

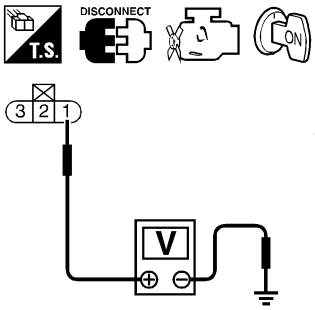
OK or NG

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

Diagnostic Procedure (Cont'd)

3	CHECK POWER SUPPLY

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



Voltage: Approximately 5V

SEF299X

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Joint connector-2
- Harness for open or short between ECM and BARO sensor

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

5	CHECK GROUND CIRCUIT

1. Turn ignition switch "OFF".
2. Check harness continuity between BARO 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 7.
NG	▶	GO TO 6.

6	DETECT MALFUNCTIONING PART

Check the following.
- Joint connector-3
- Harness for open or short between ECM and BARO sensor
- Harness for open or short between TCM and BARO sensor

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

7	CHECK INPUT SIGNAL CIRCUIT

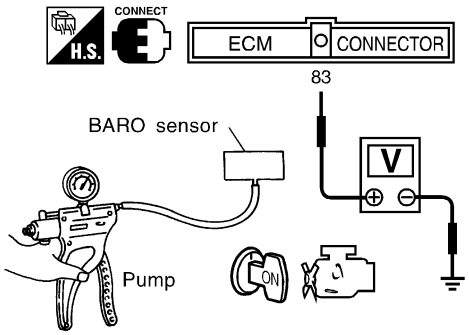
1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 83 and BARO sensor terminal 2.
   Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

OK or NG

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

8	CHECK BARO SENSOR

1. Reconnect ECM harness connector.
2. Reconnect BARO sensor harness connector.
3. Install a vacuum pump to BARO sensor.
4. Turn ignition switch "ON" and check output voltage between ECM terminal 83 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

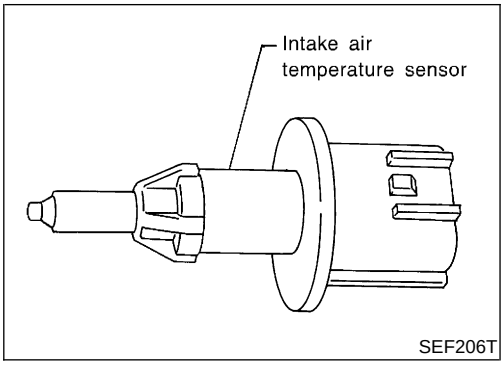
SEF542Z

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 9.
NG	▶	Replace BARO sensor.

9	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-842.	
▶	**INSPECTION END**

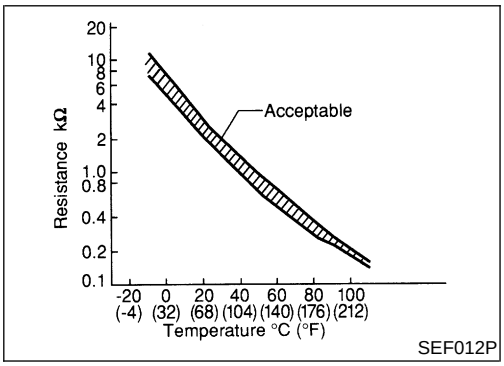


Component Description

NIEC1251

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 71 (Intake air temperature sensor) and ground.

CAUTION:

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

On Board Diagnosis Logic

NIEC1252

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

DTC Confirmation Procedure

NIEC1253

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

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 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

NIEC1253S01

With CONSULT-II

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-867.

With GST

Follow the procedure "With CONSULT-II" above.

PROCEDURE FOR MALFUNCTION B

NIEC1253S02

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

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 more than 70 km/h (44 MPH) for 105 consecutive seconds.
6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-867.

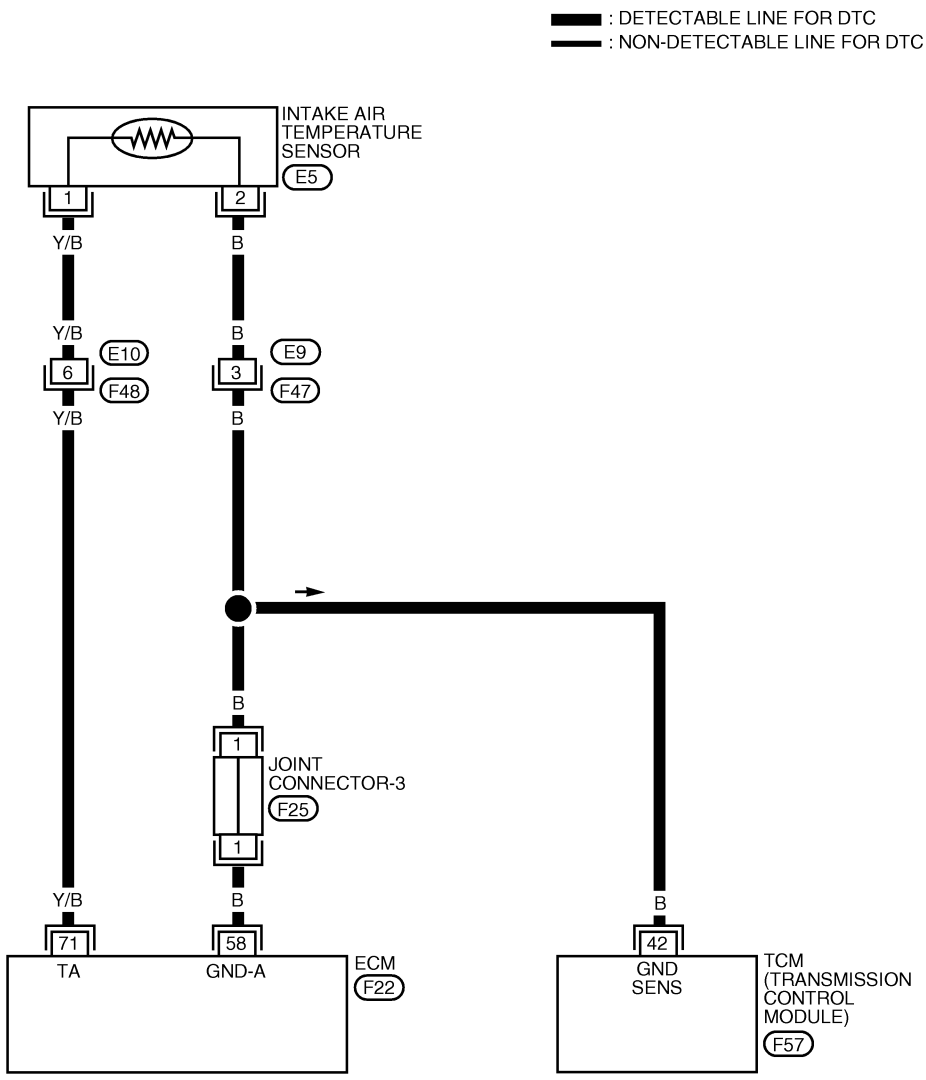
With GST

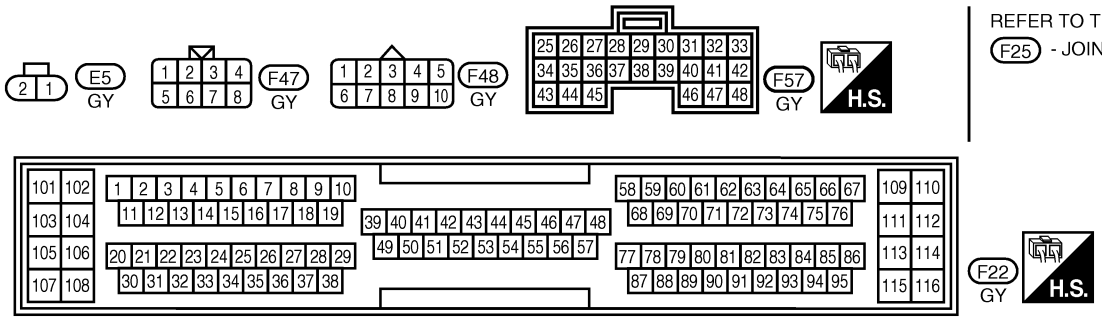
Follow the procedure "With CONSULT-II" above.

Wiring Diagram

NIEC1254

EC-IATS-01





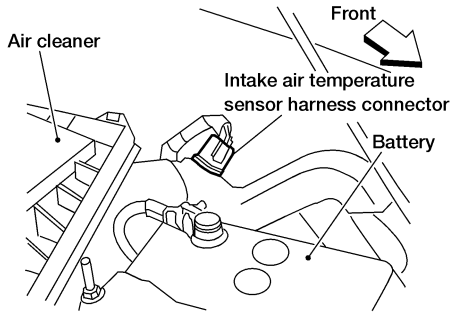
WEC383

Diagnostic Procedure

NIEC1255

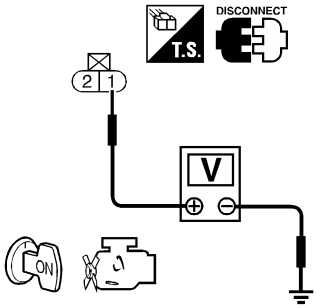
1	CHECK POWER SUPPLY

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



LEC243

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



Voltage: Approximately 5V

SEF301X

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E10, F48
- Harness for open or short between ECM and intake air temperature sensor

	▶	Repair harness or connectors.

3	CHECK GROUND CIRCUIT

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

OK or NG

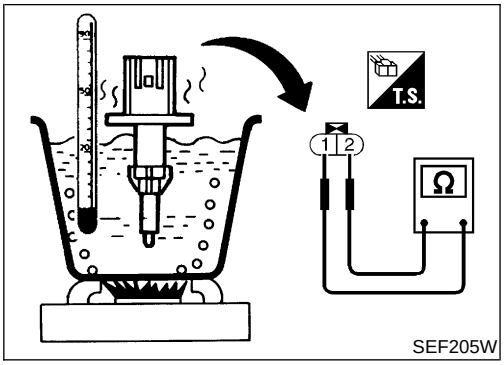
OK	▶	GO TO 5.
NG	▶	GO TO 4.

Diagnostic Procedure (Cont'd)

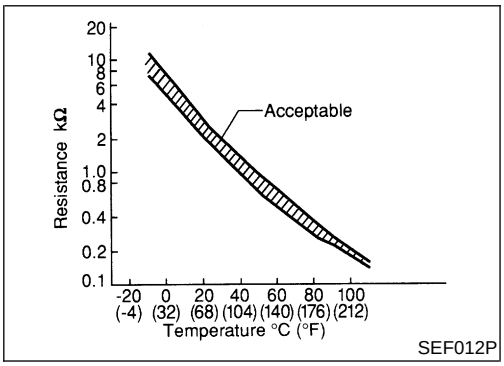
4	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E9, F47 ● Joint connector-3 ● Harness for open or short between TCM and intake air temperature sensor ● Harness for open or short between ECM and intake air temperature sensor	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK INTAKE AIR TEMPERATURE SENSOR	
Refer to "Component Inspection", EC-869.		
OK or NG		
OK	▶	GO TO 6.
NG	▶	Replace intake air temperature sensor.

6	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-842.	
▶	**INSPECTION END**



SEF205W



SEF012P

Component Inspection

=NIEC1256

INTAKE AIR TEMPERATURE SENSOR

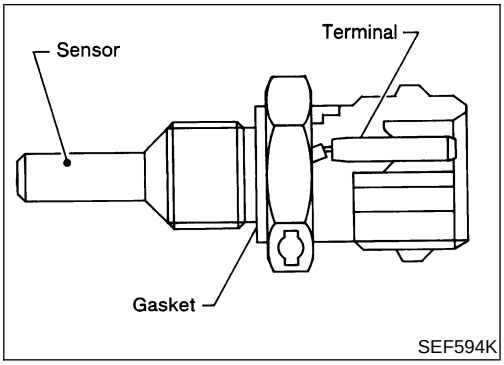
NIEC1256S01

Check resistance as shown in the figure.

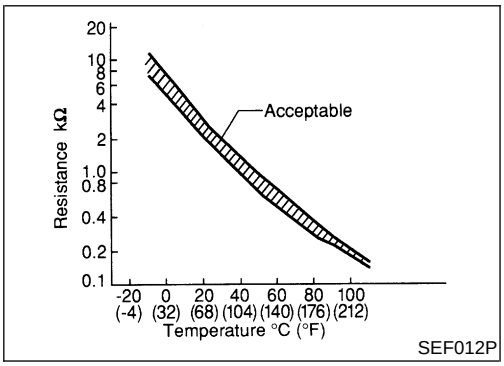
<Reference data>

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

If NG, replace intake air temperature sensor.



SEF594K



SEF012P

Component Description

NIEC1257

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 ground.

CAUTION:

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

CONSULT-II Reference Value in Data Monitor Mode

NIEC1258

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

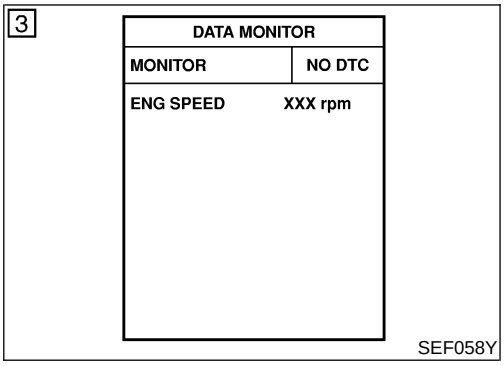
On Board Diagnosis Logic

NIEC1259

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

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

Detected items	Engine operating condition in fail-safe mode	
Engine coolant temperature sensor circuit	Engine coolant temperature will be determined by ECM based on the time after turning ignition switch "ON" or "START". CONSULT-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)
	When the fail-safe system for engine coolant temperature sensor is activated, the cooling fan operates while the engine is running.	



DTC Confirmation Procedure

NIEC1260

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

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-873.

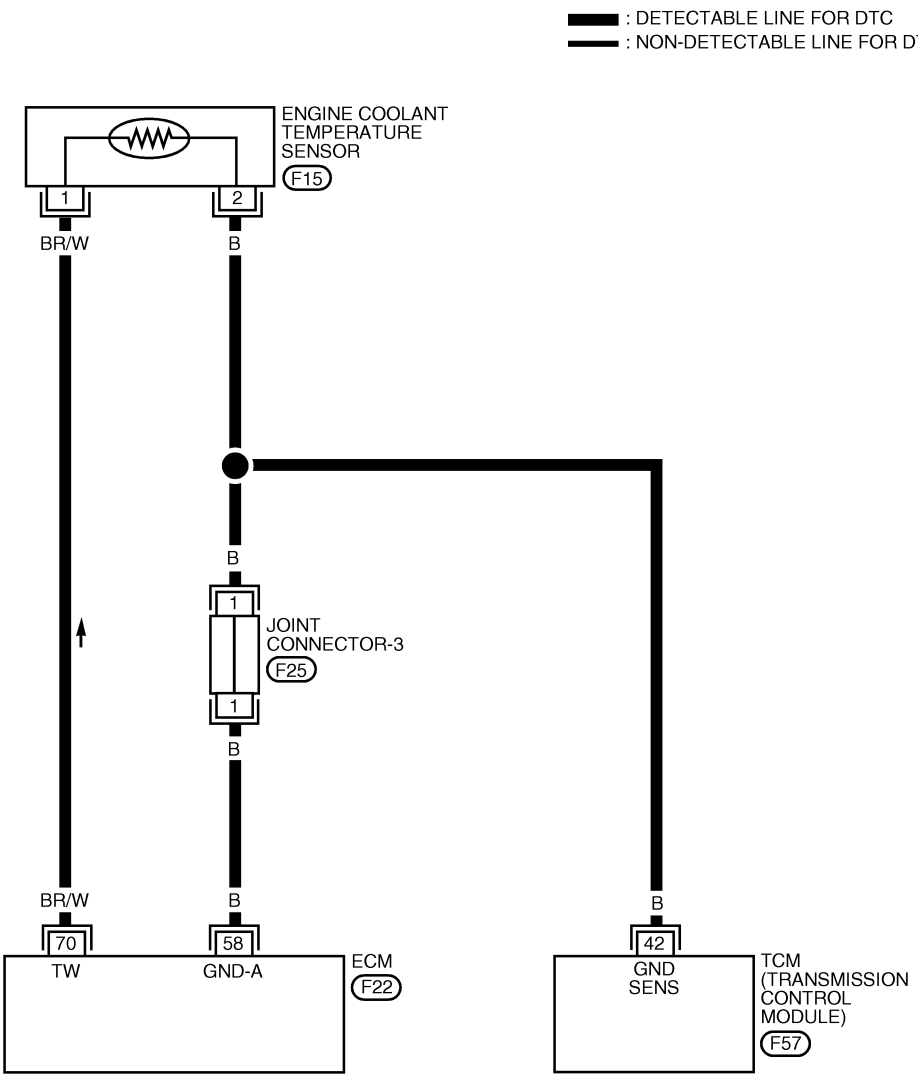
With GST

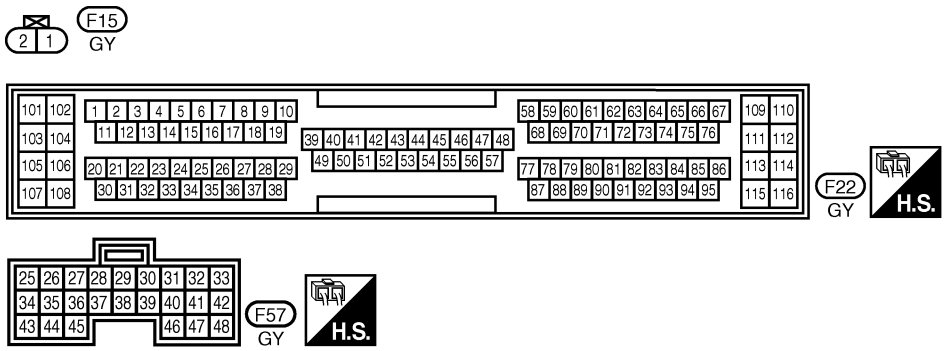
Follow the procedure "With CONSULT-II" above.

Wiring Diagram

NIEC1261

EC-ECTS-01





REFER TO THE FOLLOWING.
F25 - JOINT CONNECTOR

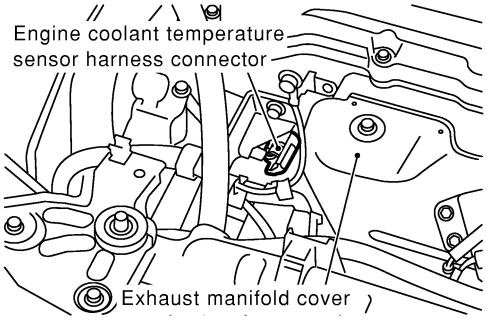
WEC385

Diagnostic Procedure

NIEC1262

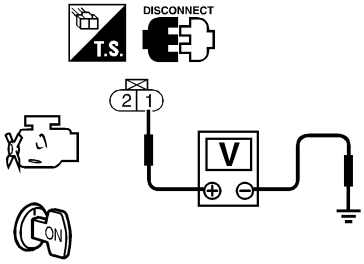
1	CHECK POWER SUPPLY

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



SEF391Z

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 or replace harness or connectors.

2	CHECK GROUND 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

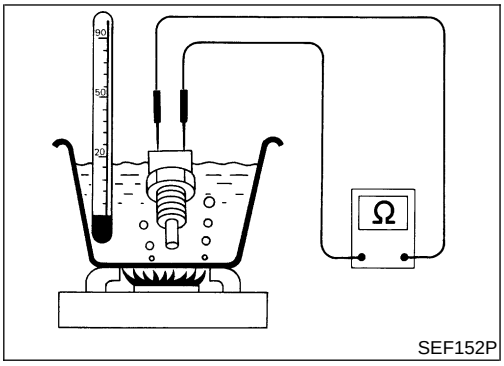
Check the following.
- Joint connector-3
- Harness for open or short between TCM and engine control temperature sensor
- Harness for open or short between ECM and engine coolant temperature sensor

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

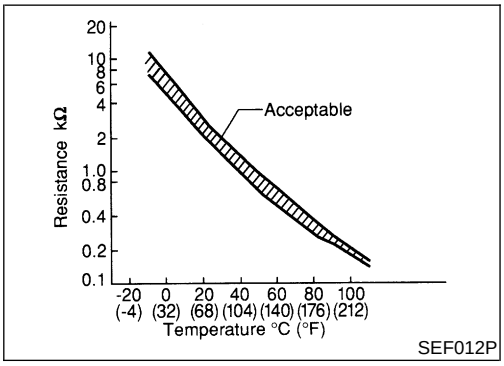
Diagnostic Procedure (Cont'd)

4	CHECK ENGINE COOLANT TEMPERATURE SENSOR	
Refer to "Component Inspection", EC-874.		
	OK or NG	
OK	▶	GO TO 5.
NG	▶	Replace engine coolant temperature sensor.

5	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-842.	
▶	**INSPECTION END**



SEF152P



SEF012P

Component Inspection

NIEC1263

ENGINE COOLANT TEMPERATURE SENSOR

NIEC1263S01

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

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

If NG, replace engine coolant temperature sensor.

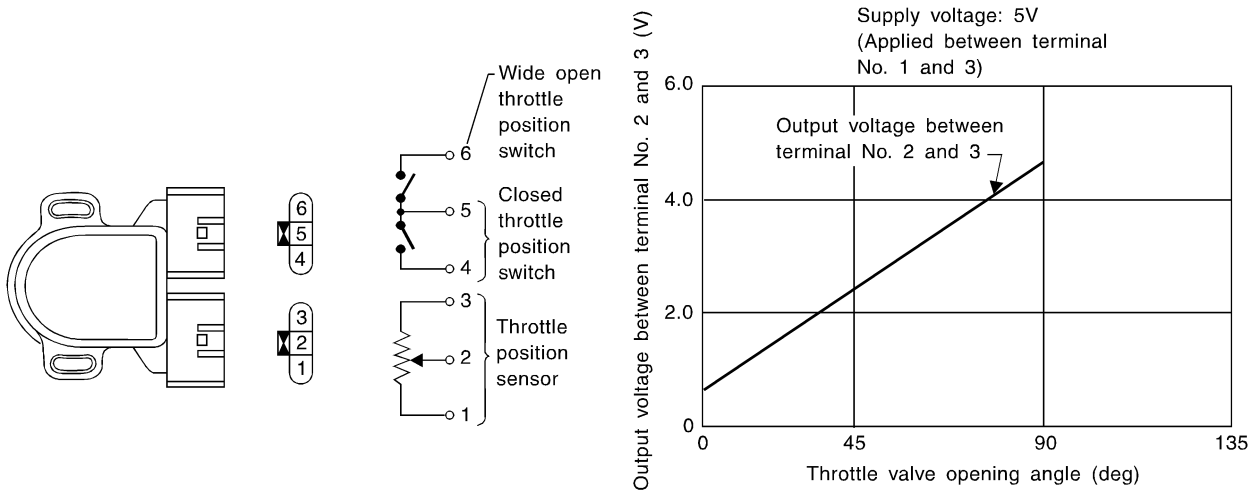
Component Description

NIEC1264

NOTE:
If DTC P0120 (0403) is displayed with DTC P0510 (0203), first perform trouble diagnosis for DTC P0510, EC-1117.

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.



SEF470Y

CONSULT-II Reference Value in Data Monitor Mode

NIEC1265

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	0.0%
	● Engine: After warming up ● Ignition switch: ON (Engine stopped)	Throttle valve: fully opened	Approx. 80.0%

On Board Diagnosis Logic

NIEC1266

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

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

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

DTC Confirmation Procedure

NIEC1267

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

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

PROCEDURE FOR MALFUNCTION A

NIEC1267S01

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

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.

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

3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-881.

With GST

Follow the procedure "With CONSULT-II" above.

3

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

PROCEDURE FOR MALFUNCTION B

NIEC1267S02

With CONSULT-II

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" position
Brake pedal	Depressed
Vehicle speed	0 km/h (0 MPH)

4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-881.

With GST

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

NIEC1267S03

CAUTION:

Always drive vehicle at a safe speed.

With CONSULT-II

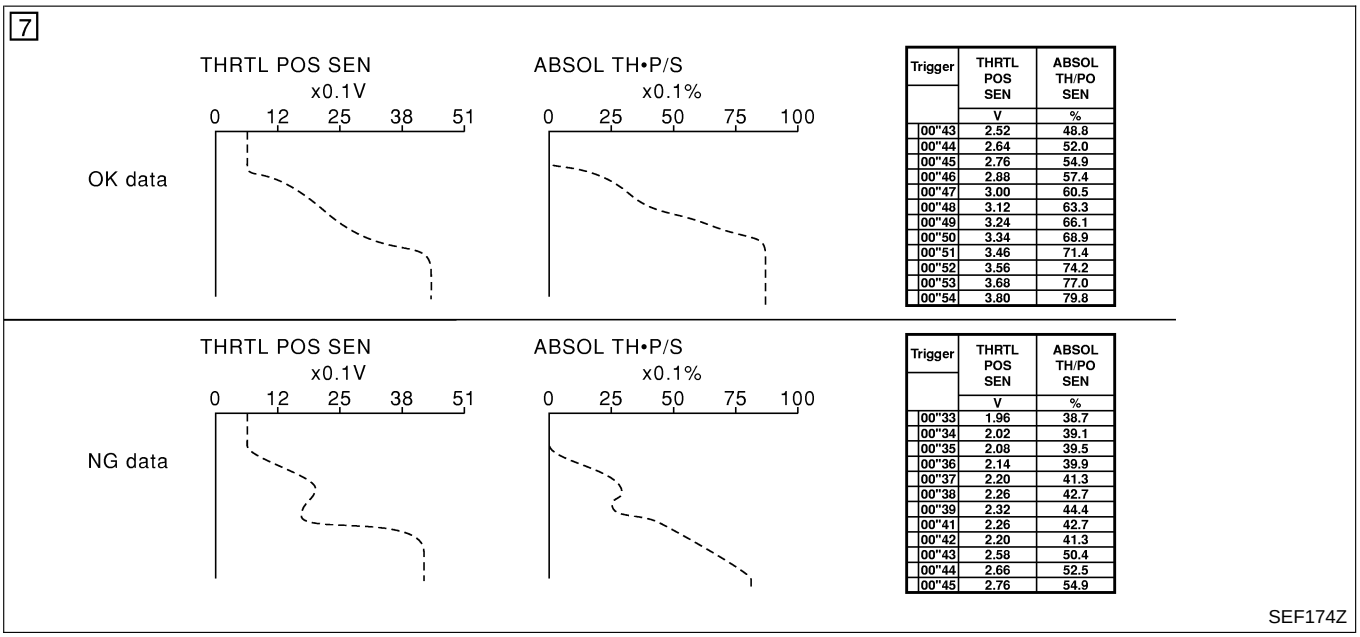
1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 10 seconds.
3) Turn ignition switch "ON".
4) Select "MANU TRIG" in "DATA MONITOR" mode with CONSULT-II.
5) Select "THRTL POS SEN" and "ABSOL TH·P/S" in "DATA

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-881.
  If OK, go to following step.

7



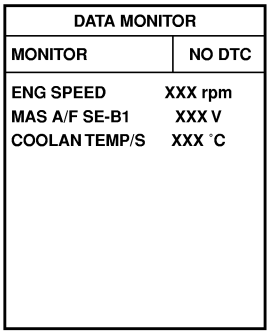
Trigger	THRTL POS SEN	ABSOL TH/PO SEN
	V	%
00"43	2.52	48.8
00"44	2.64	52.0
00"45	2.76	54.9
00"46	2.88	57.4
00"47	3.00	60.5
00"48	3.12	63.3
00"49	3.24	66.1
00"50	3.34	68.9
00"51	3.46	71.4
00"52	3.56	74.2
00"53	3.68	77.0
00"54	3.80	79.8

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

SEF174Z

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

9

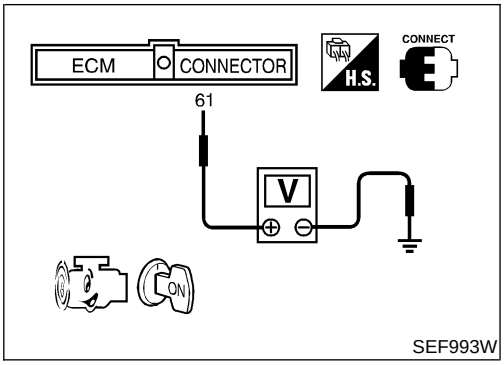


SEF178Y

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

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

10) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-881.



With GST

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

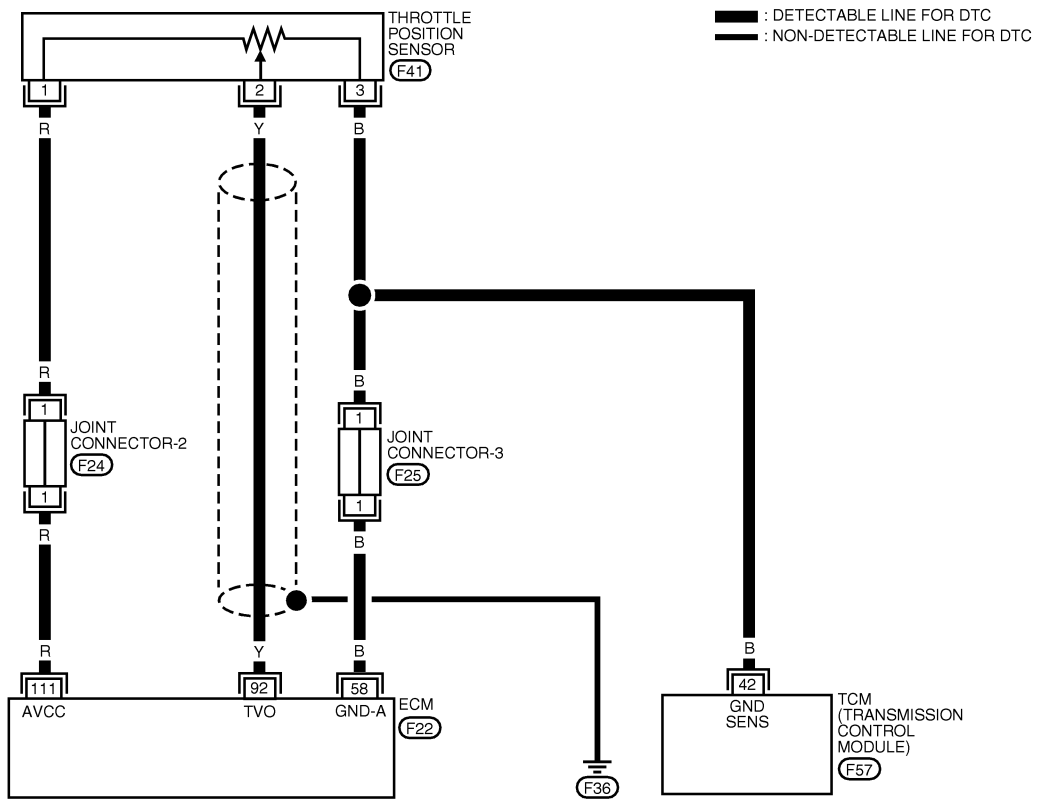
Gear position	Suitable position
Engine speed	More than 2,000 rpm
Engine coolant temperature	More than 70°C (158°F)
Voltage between ECM terminal 61 (Mass air flow sensor signal) and ground	More than 3V

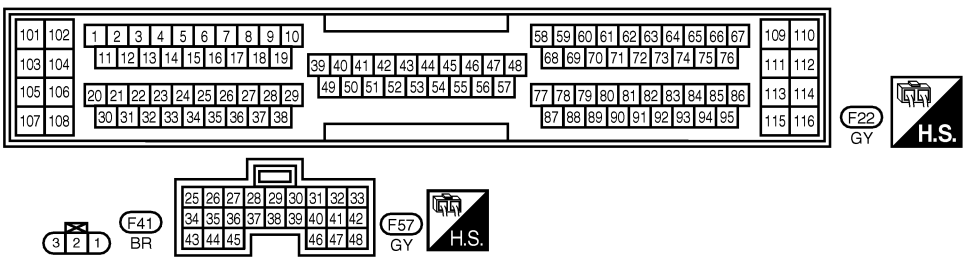
2) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-881.

Wiring Diagram

NIEC1268

EC-TPS-01





F41 BR

F57 GY

F22 GY

H.S.

REFER TO THE FOLLOWING.
F24 , F25 - JOINT CONNECTOR

WEC387

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	IGN ON	APPROX. 0V
92	Y	THROTTLE POSITION SENSOR	ENGINE RUNNING UNDER WARM-UP CONDITION WITH ACCELERATOR PEDAL FULLY RELEASED	0.2 - 0.8V
			IGN ON WITH ACCELERATOR PEDAL FULLY DEPRESSED	3.5 - 4.5V
111	R	SENSOR'S POWER SUPPLY	IGN ON	APPROX. 5V

SEF566Y

Diagnostic Procedure

NIEC1269

1	INSPECTION START

Which malfunction A, B or C is duplicated?

MALFUNCTION	Type
A	A
B	B
C	C

MTBL0066

Type A, B or C

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

2	ADJUST THROTTLE POSITION SENSOR

Perform “Basic Inspection”, EC-802.

OK or NG

OK	▶	GO TO 3.

3	CHECK INTAKE SYSTEM

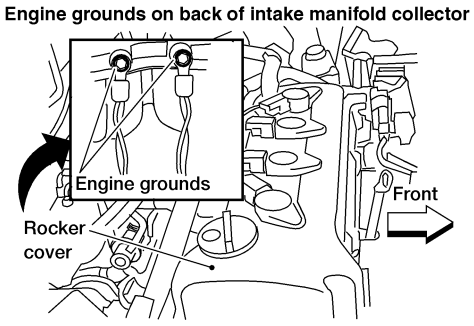
Check the followings for connection.
- Air duct
- Vacuum hoses
- Intake air passage between air duct to intake manifold collector

OK or NG

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

4	RETIGHTEN GROUND SCREWS

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



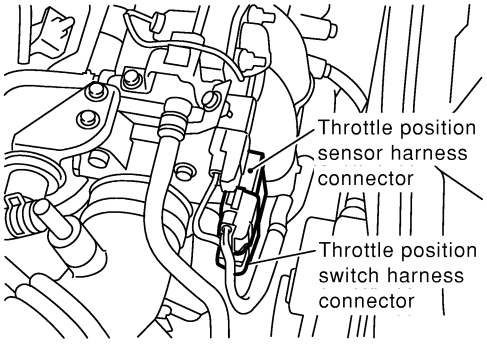
WEC249

	▶	GO TO 5.

Diagnostic Procedure (Cont'd)

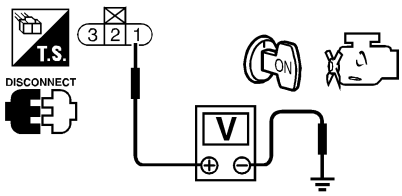
5	CHECK POWER SUPPLY

1. Disconnect throttle position sensor harness connector.



SEF392Z

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



Voltage: Approximately 5V

SEF517Z

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 6.

6	DETECT MALFUNCTIONING PARTS

Check the following.
- Joint connector-2
- Harness for open or short between throttle position sensor and ECM

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

7	CHECK GROUND CIRCUIT

1. Turn ignition switch "OFF".
2. Check harness continuity between throttle position sensor terminal 3 and engine ground. Refer to the wiring diagram.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 8.

8	DETECT MALFUNCTIONING PART

Check the following.
- Joint connector-3
- Harness for open or short between TCM and throttle position sensor
- Harness for open or short between ECM and throttle position sensor

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

9	CHECK INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 92 and throttle position sensor terminal 2. Refer to the wiring diagram.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

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 THROTTLE POSITION SENSOR

Refer to "Component Inspection", EC-884.

OK or NG

OK (Type B in step1)	▶	GO TO 11.
OK (Type A or C in step1)	▶	GO TO 14.
NG	▶	Replace throttle position sensor. To adjust it, perform "Basic Inspection", EC-802.

11	CHECK MASS AIR FLOW SENSOR

Refer to "Component Inspection", EC-858.

OK or NG

OK	▶	GO TO 12.
NG	▶	Replace mass air flow sensor.

12	CHECK CAMSHAFT POSITION SENSOR

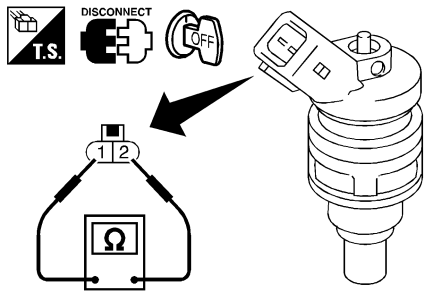
Refer to "Component Inspection", EC-1019.

OK or NG

OK	▶	GO TO 13.
NG	▶	Replace camshaft position sensor.

13	CHECK FUEL INJECTOR

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



Resistance: 13.5 - 17.5 Ω [at 20°C (68°F)]

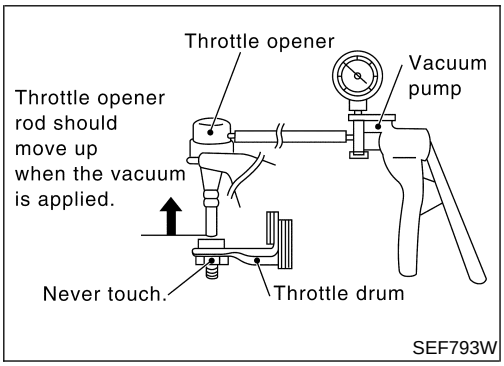
SEF964XA

OK or NG

OK	▶	GO TO 14.
NG	▶	Replace fuel injector.

Diagnostic Procedure (Cont'd)

14	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-842.	
▶	INSPECTION END



SEF793W

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

SEF719Y

Component Inspection

NIEC1270

THROTTLE POSITION SENSOR

NIEC1270S01

With CONSULT-II

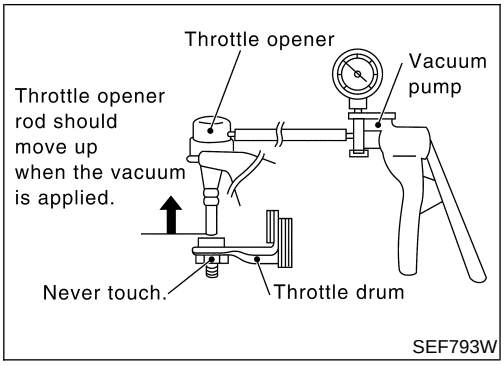
1) Start engine and warm it up to normal operating temperature.
2) Stop engine (ignition switch OFF).
3) Remove the vacuum hose connected to the throttle opener.
4) Connect suitable vacuum hose to the vacuum pump and the opener.
5) Apply vacuum [more than −40.0 kPa (−300 mmHg, –11.81 inHg)] until the throttle drum becomes free from the rod of the throttle opener.
6) Turn ignition switch ON.
7) Select "DATA MONITOR" mode with CONSULT-II.
8) Check voltage of "THRTL POS SEN" under the following conditions.

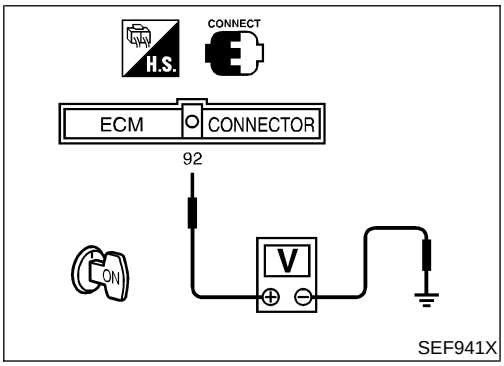
NOTE:
Voltage measurement must be made with throttle position sensor installed in vehicle.

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

If NG, adjust closed throttle position switch. Refer to "Basic Inspection", EC-802.

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





Without CONSULT-II

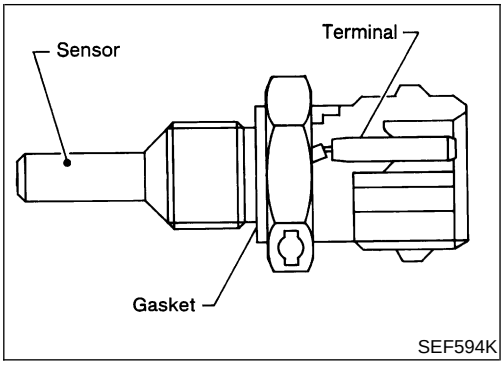
1) Start engine and warm it up to normal operating temperature.
2) Stop engine (ignition switch OFF).
3) Remove the vacuum hose connected to the throttle opener.
4) Connect suitable vacuum hose to the vacuum pump and the opener.
5) Apply vacuum [more than −40.0 kPa (−300 mmHg, –11.81 inHg)] until the throttle drum becomes free from the rod of the throttle opener.
6) Turn ignition switch ON.
7) Check voltage between ECM terminal 92 (Throttle position sensor signal) and ground under the following conditions.

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

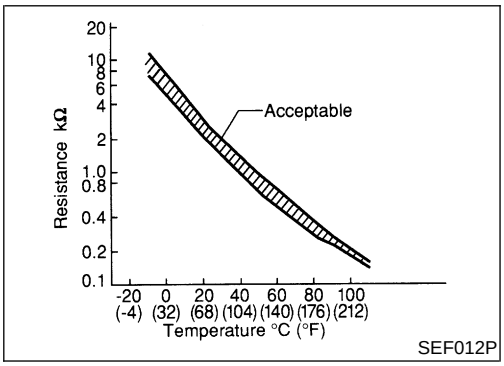
Throttle valve conditions	Voltage V
Completely closed	0.15 - 0.85 (a)
Partially open	Between (a) and (b)
Completely open	3.5 - 4.7 (b)

If NG, adjust closed throttle position switch. Refer to "Basic Inspection", EC-802.

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



SEF594K



SEF012P

Component Description

NIEC1271

NOTE:
If DTC P0125 (0908) is displayed with P0115 (0103), first perform trouble diagnosis for DTC P0115, EC-870.

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 ground.

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

CONSULT-II Reference Value in Data Monitor Mode

NIEC1272

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

On Board Diagnosis Logic

NIEC1273

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

3

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C

SEF174Y

DTC Confirmation Procedure

=NIEC1274

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

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Check that "COOLAN TEMP/S" is above 15°C (59°F).
   If it is above 15°C (59°F), the test result will be OK. If it is below 15°C (59°F), go to following step.
4) Start engine and run it for 65 minutes at idle speed.
   If "COOLAN TEMP/S" increases to more than 15°C (59°F) within 65 minutes, stop engine because the test result will be OK.
5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-889.

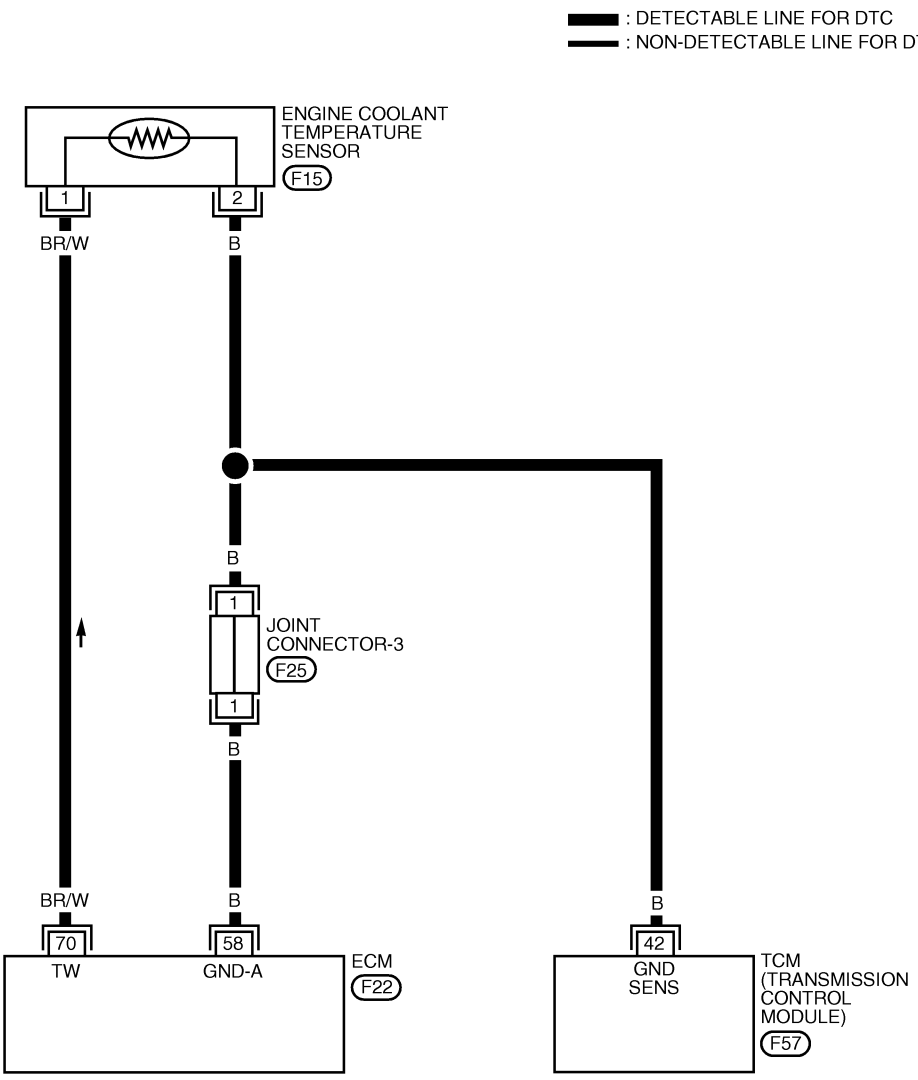
With GST

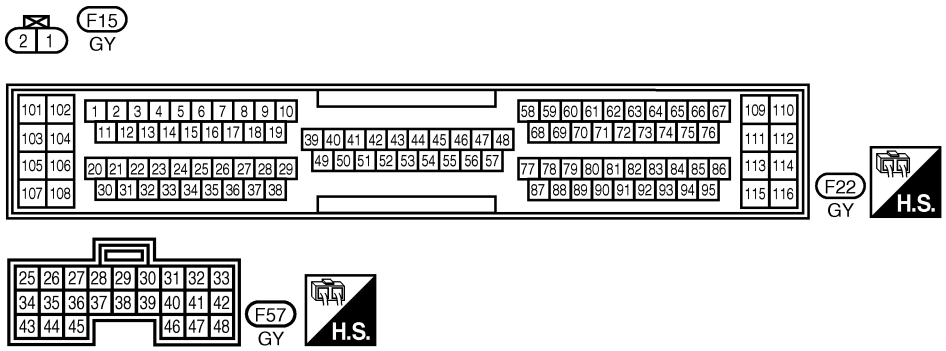
Follow the procedure "With CONSULT-II" above.

Wiring Diagram

NIEC1275

EC-ECTS-01





REFER TO THE FOLLOWING.
F25 - JOINT CONNECTOR

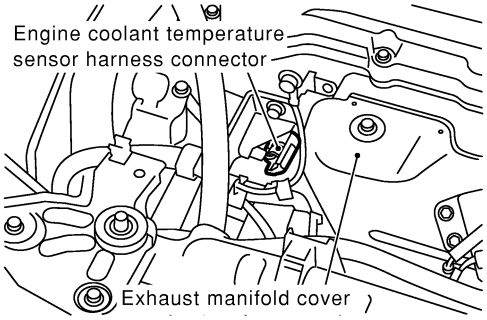
WEC385

Diagnostic Procedure

NIEC1276

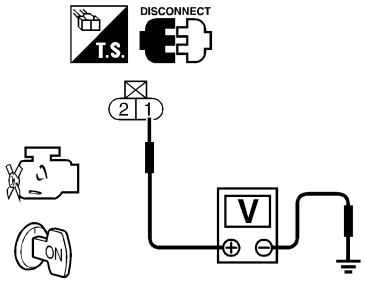
1	CHECK POWER SUPPLY

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



SEF391Z

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 or replace harness or connectors.

2	CHECK GROUND CIRCUIT

1. Turn ignition switch “OFF”.
2. Check harness continuity between ECTS terminal 2 and engine ground.
   Refer to the 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
- Harness for open or short between TCM and engine coolant temperature sensor
- Harness for open or short between ECM and engine coolant temperature sensor

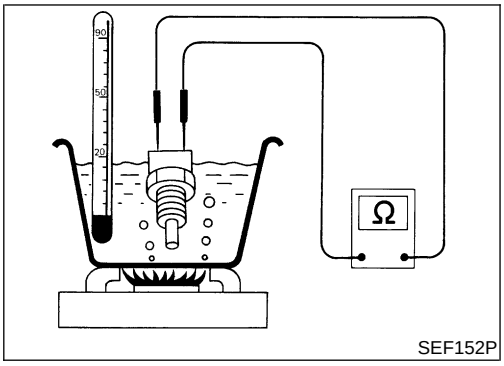
	▶	Repair open circuit or short to ground or short to power in harness or connectors.

Diagnostic Procedure (Cont'd)

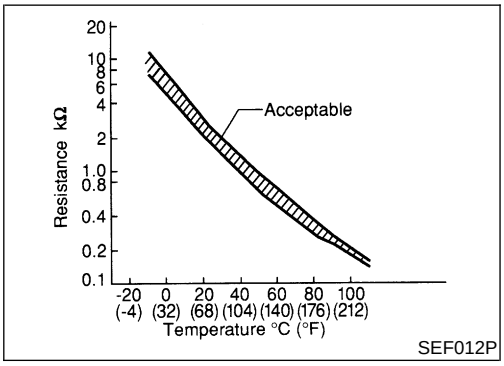
4	CHECK ENGINE COOLANT TEMPERATURE SENSOR	
Refer to "Component Inspection", EC-890.		
OK or NG		
OK	▶	GO TO 5.
NG	▶	Replace engine coolant temperature sensor.

5	CHECK THERMOSTAT OPERATION	
When the engine is cooled [lower than 82°C (180°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-13***, "Thermostat".

6	CHECK INTERMITTENT INCIDENT	
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-842.		
	▶	**INSPECTION END**



SEF152P



SEF012P

Component Inspection

NIEC1277

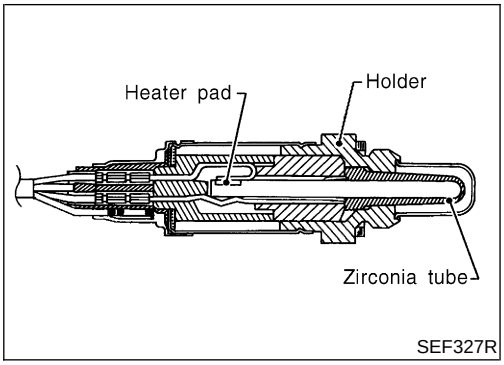
ENGINE COOLANT TEMPERATURE SENSOR

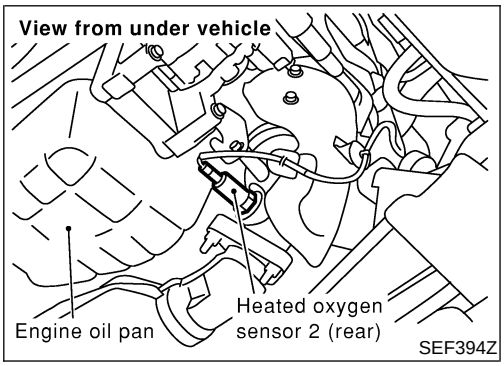
NIEC1277S01

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

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

If NG, replace engine coolant temperature sensor.





Component Description

NIEC1278

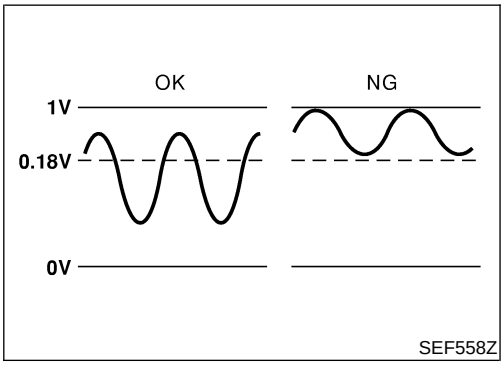
The heated oxygen sensor 2 (rear), after TWC (Manifold three way catalyst), monitors the oxygen level in the exhaust gas.
Even if switching characteristics of the air fuel ratio (A/F) sensor 1 are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.
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 heated oxygen sensor 2 (rear) is not used for engine control operation.

CONSULT-II Reference Value in Data Monitor Mode

NIEC1279

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1)	• Engine: After warming up	Revving engine from idle to 3,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)			LEAN ⟷ RICH

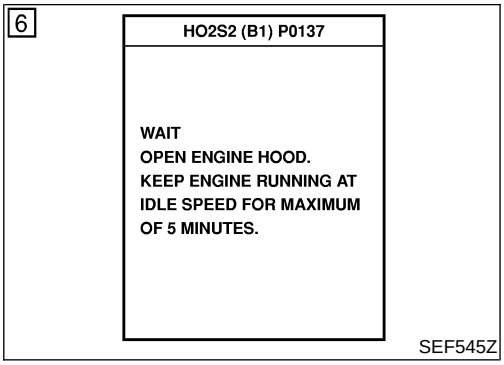


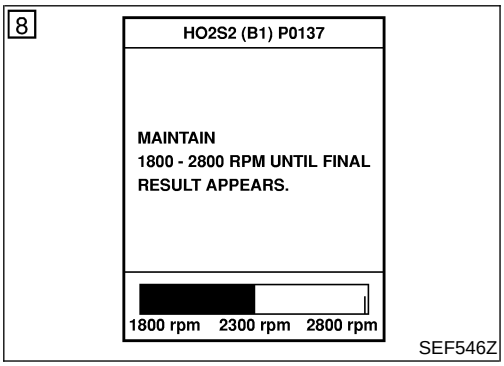
On Board Diagnosis Logic

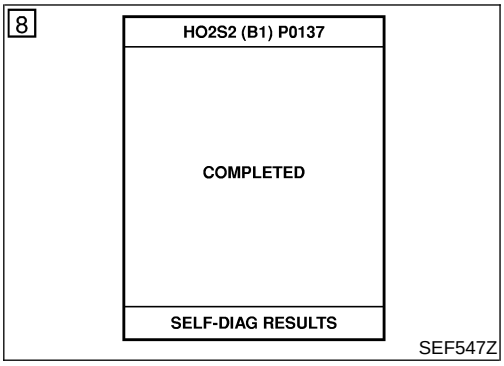
NIEC1280

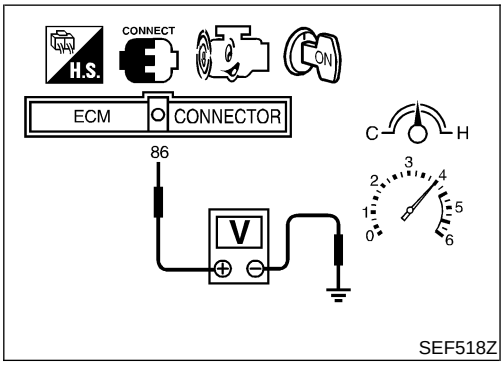
The heated oxygen sensor 2 (rear) has a much longer switching time between rich and lean than the air fuel ratio (A/F) sensor 1. The oxygen storage capacity before the TWC (Manifold three way catalyst) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2 (rear), ECM monitors whether the minimum voltage of the sensor is sufficiently low during various driving conditions such as fuel-cut.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0137	• The minimum voltage from the sensor does not reach the specified voltage.	• Harness or connectors (The sensor circuit is open or shorted.) • Heated oxygen sensor 2 (rear) • Fuel pressure • Injectors









DTC Confirmation Procedure

NIEC1281

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

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 “HO2S2 (B1) P0137” of “HO2S2” 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-894.
   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

NIEC1282

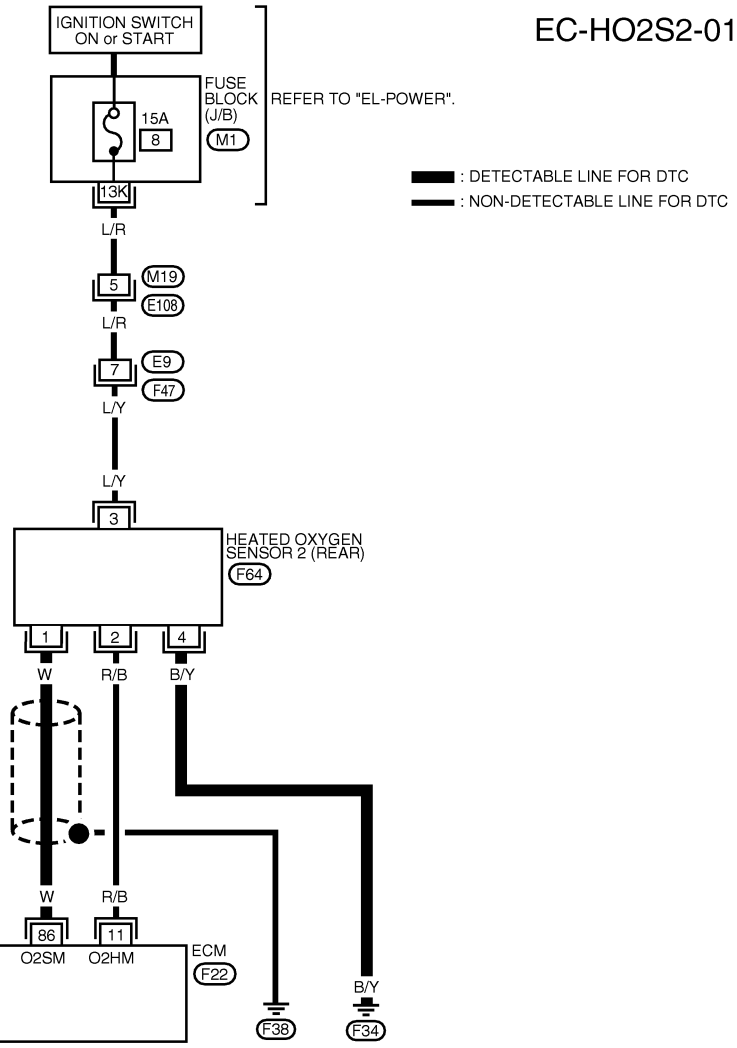
Use this procedure to check the overall function of the rear heated oxygen sensor circuit. During this check, a 1st trip DTC might not be confirmed.

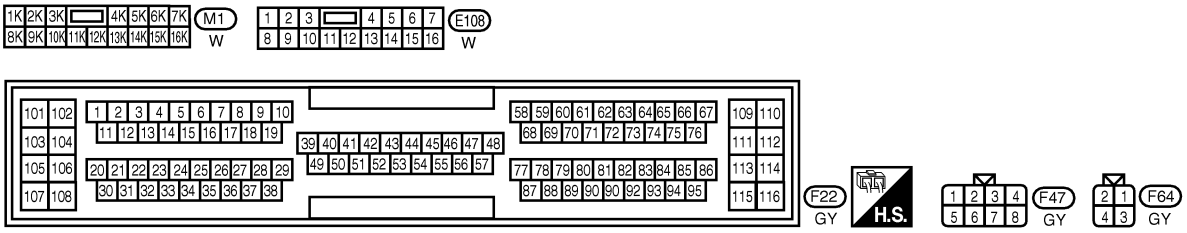
With GST

1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Set voltmeter probes between ECM terminals 86 (HO2S2 signal) and engine ground.
4) Check the voltage when revving engine up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be below 0.43V at least once during this procedure.
   If the voltage can be confirmed in step 4, step 5 is not necessary.
5) Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with “OD” OFF.
   The voltage should be below 0.43V at least once during this procedure.
6) If NG, go to “Diagnostic Procedure”, EC-894.

Wiring Diagram

NIEC1283





WEC390

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	W	HEATED OXYGEN SENSOR 2 (REAR)	ENGINE RUNNING FROM IDLE UP TO 2,000 RPM UNDER WARM-UP CONDITION	0 - APPROX. 1.0V

SEF724YA

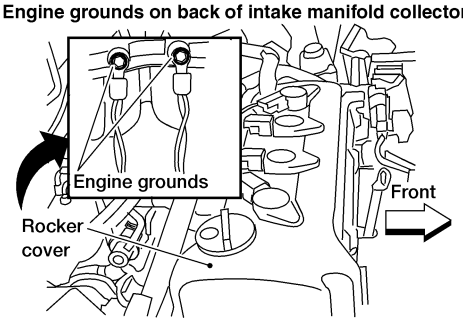
Diagnostic Procedure

NIEC1284

1	RETIGHTEN GROUND SCREWS

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

Engine grounds on back of intake manifold collector



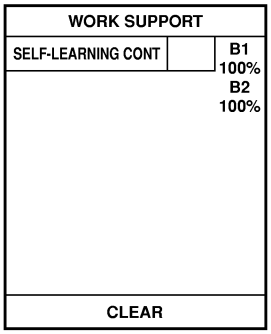
WEC249

▶	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-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching "CLEAR".

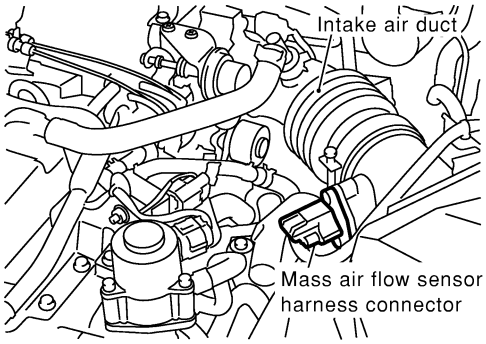


SEF652Y

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

Without CONSULT-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 3 seconds at idle speed.



SEF388Z

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-770.
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 detected? Is it difficult to start engine?

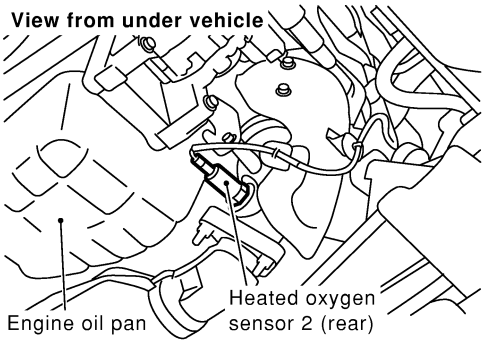
Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0172. Refer to EC-968.
No	▶	GO TO 3.

Diagnostic Procedure (Cont'd)

3	CHECK INPUT SIGNAL CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect heated oxygen sensor 2 (rear) harness connector and ECM harness connector.



SEF394Z

3. Check harness continuity between ECM terminal 86 and HO2S2 (rear) terminal 1.
   Refer to Wiring Diagram.
   Continuity should exist.
4. Check harness continuity between ECM terminal 86 or HO2S2 (rear) terminal 1 and ground.
   Refer to Wiring Diagram.
   Continuity should not exist.
5. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK GROUND CIRCUIT

1. Check harness continuity between HO2S2 (rear) terminal 4 and body 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 HEATED OXYGEN SENSOR 2 (REAR)

Refer to "Component Inspection", EC-897.

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace heated oxygen sensor 2 (rear).

6	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-842.

▶ **INSPECTION END**

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
A/F SEN1 (B1)	XXX V
HO2S2 (B1)	XXX V
HO2S3 (B1)	XXX V

SEF519Z

Component Inspection

NIEC1285

HEATED OXYGEN SENSOR 2 (REAR)

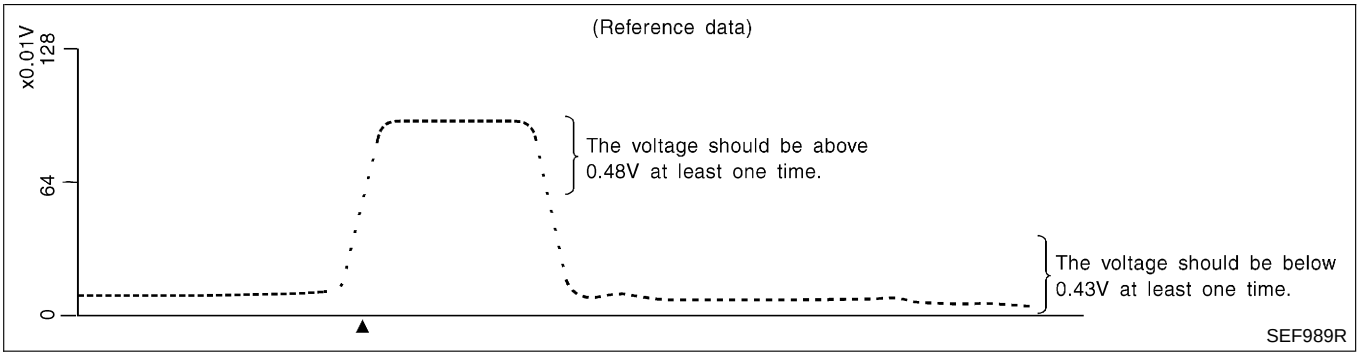
NIEC1285S01

With CONSULT-II

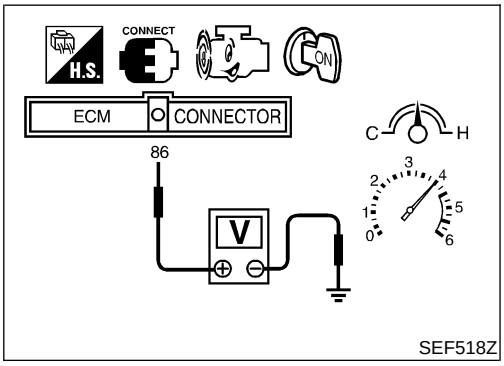
1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)” as the monitor item with CONSULT-II.
4) Check “HO2S2 (B1)” at idle speed when adjusting “FUEL INJECTION” to ±25%.
   “HO2S2 (B1)” should be above 0.48V at least once when the “FUEL INJECTION” is +25%.
   “HO2S2 (B1)” should be below 0.43V at least once when the “FUEL INJECTION” is −25%.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**



SEF989R



SEF518Z

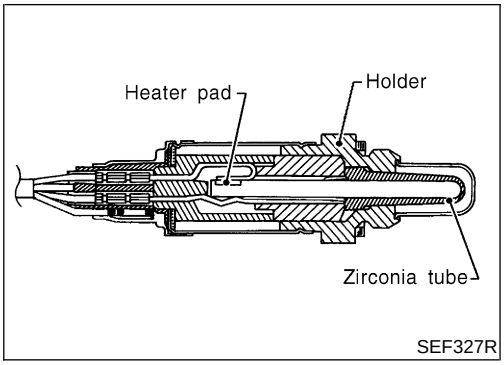
Without CONSULT-II

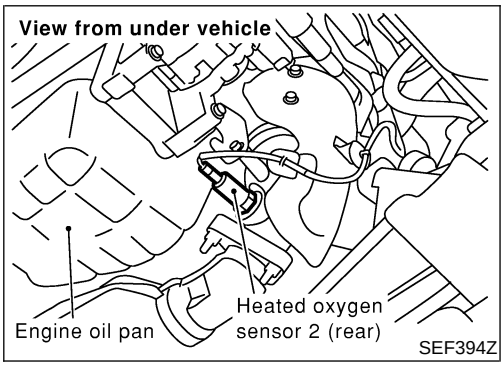
1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Set voltmeter probes between ECM terminals 86 (HO2S2 signal) and engine ground.
4) Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.48V at least once.
   If the voltage is above 0.48V at step 4, step 5 is not necessary.
5) Check the voltage when revving up to 6,000 rpm under no load. Or keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with “OD” OFF.
   The voltage should be below 0.43V at least once.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor**

Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.





Component Description

NIEC1286

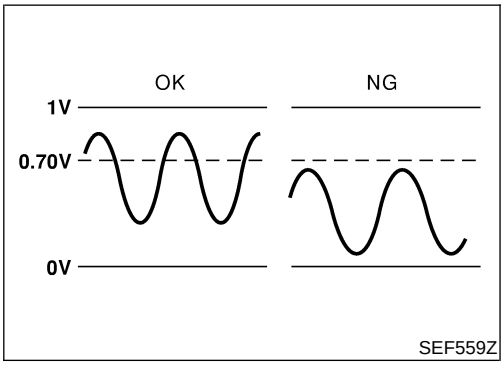
The heated oxygen sensor 2 (rear), after TWC (Manifold three way catalyst), monitors the oxygen level in the exhaust gas.
Even if switching characteristics of the air fuel ratio (A/F) sensor 1 are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.
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 heated oxygen sensor 2 (rear) is not used for engine control operation.

CONSULT-II Reference Value in Data Monitor Mode

NIEC1287

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1)	• Engine: After warming up	Revving engine from idle to 3,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)			LEAN ⟷ RICH

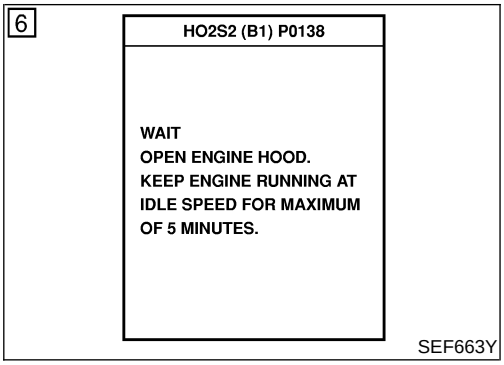


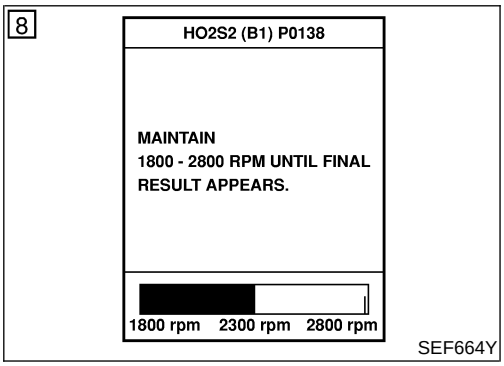
On Board Diagnosis Logic

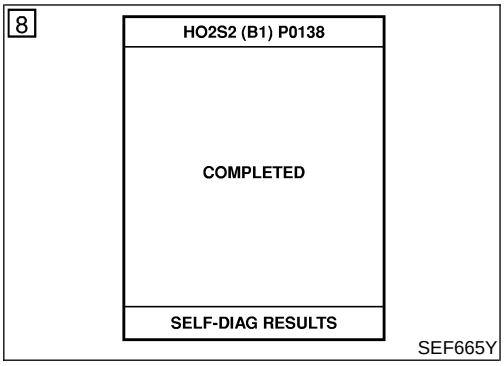
NIEC1288

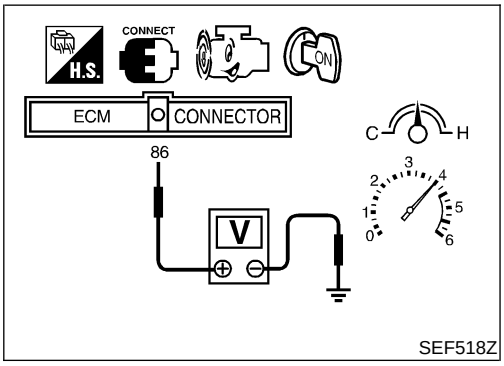
The heated oxygen sensor 2 (rear) has a much longer switching time between rich and lean than the air fuel ratio (A/F) sensor 1. The oxygen storage capacity before the TWC (Manifold three way catalyst) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the maximum voltage of the sensor is sufficiently high during various driving conditions such as fuel-cut.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0138	• The maximum voltage from the sensor does not reach the specified voltage.	• Harness or connectors (The sensor circuit is open or shorted.) • Heated oxygen sensor 2 (rear) • Fuel pressure • Injectors • Intake air leaks









DTC Confirmation Procedure

NIEC1289

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

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 “HO2S2 (B1) P0138” of “HO2S2” 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-902.
   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

NIEC1290

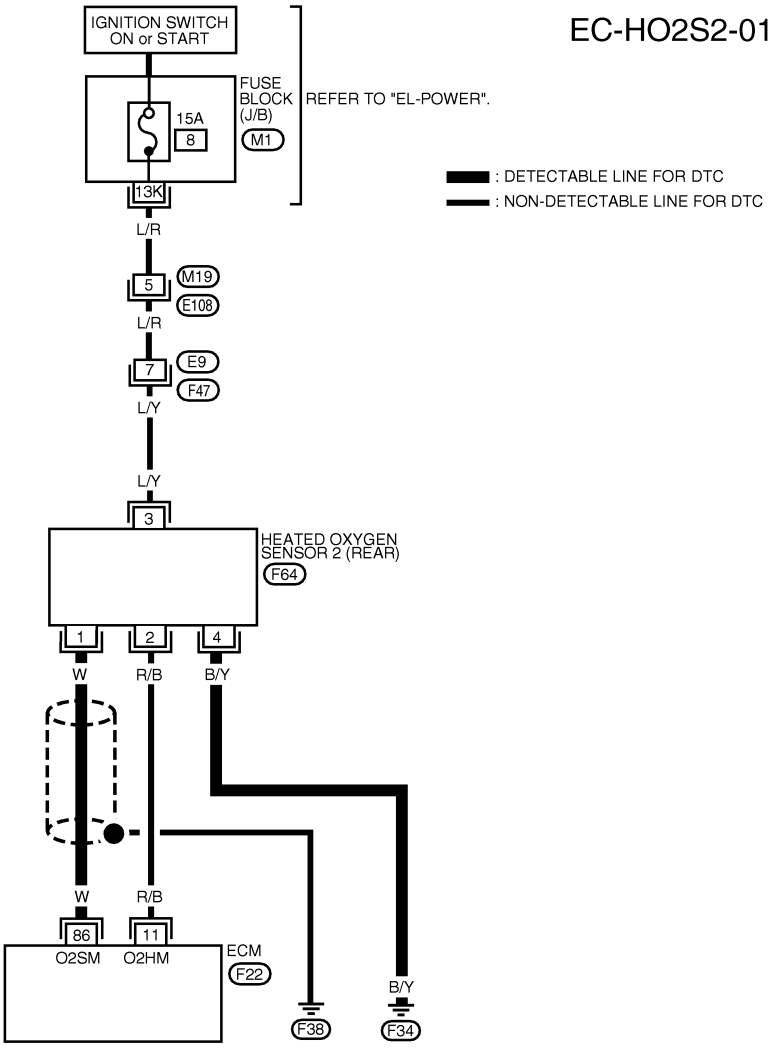
Use this procedure to check the overall function of the rear heated oxygen sensor circuit. During this check, a 1st trip DTC might not be confirmed.

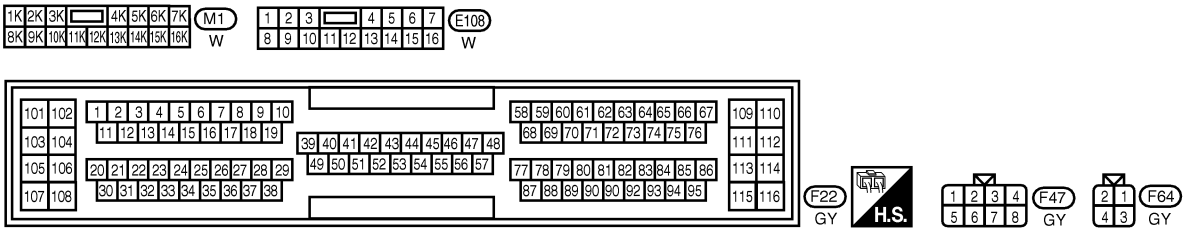
With GST

1) Start engine and drive vehicle at a speed of 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Set voltmeter probes between ECM terminals 86 (HO2S2 signal) and engine ground.
4) Check the voltage when revving engine up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.48V at least once during this procedure.
   If the voltage can be confirmed in step 4, step 5 is not necessary.
5) Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with “OD” OFF.
   The voltage should be above 0.48V at least once during this procedure.
6) If NG, go to “Diagnostic Procedure”, EC-902.

Wiring Diagram

NIEC1291





WEC390

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	W	HEATED OXYGEN SENSOR 2 (REAR)	ENGINE RUNNING FROM IDLE UP TO 2,000 RPM UNDER WARM-UP CONDITION	0 - APPROX. 1.0V

SEF724YA

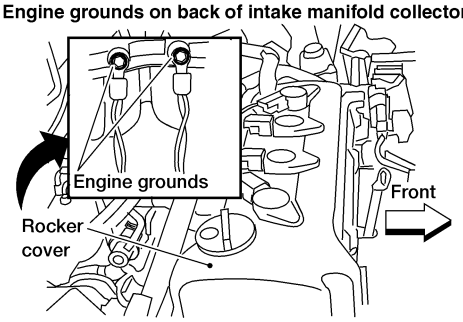
Diagnostic Procedure

NIEC1292

1	RETIGHTEN GROUND SCREWS

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

Engine grounds on back of intake manifold collector



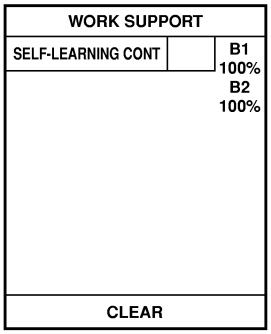
WEC249

▶	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-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching "CLEAR".

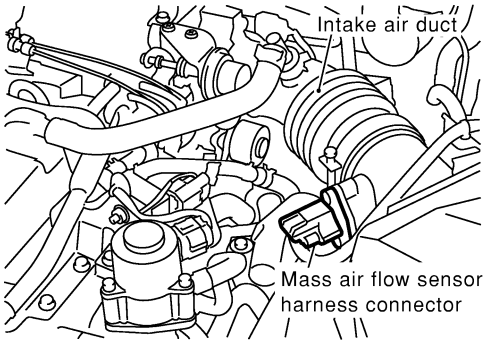


SEF652Y

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

Without CONSULT-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 3 seconds at idle speed.



SEF388Z

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-770.
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 detected? Is it difficult to start engine?

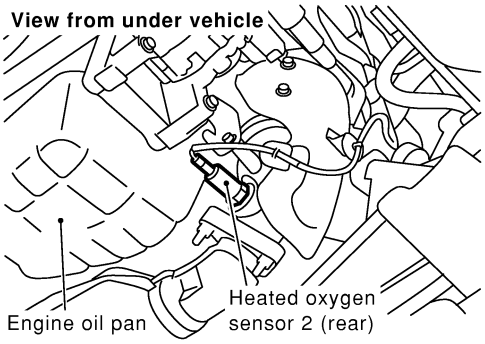
Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0171. Refer to EC-961.
No	▶	GO TO 3.

Diagnostic Procedure (Cont'd)

3	CHECK INPUT SIGNAL CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect heated oxygen sensor 2 (rear) harness connector and ECM harness connector.



SEF394Z

3. Check harness continuity between ECM terminal 86 and HO2S2 (rear) terminal 1.
   Refer to Wiring Diagram.
   Continuity should exist.
4. Check harness continuity between ECM terminal 86 or HO2S2 (rear) terminal 1 and ground.
   Refer to Wiring Diagram.
   Continuity should not exist.
5. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK GROUND CIRCUIT

1. Check harness continuity between HO2S2 (rear) 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 5.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK HEATED OXYGEN SENSOR 2 (REAR)

Refer to "Component Inspection", EC-905.

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace heated oxygen sensor 2 (rear).

6	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-842.

▶ **INSPECTION END**

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
A/F SEN1 (B1)	XXX V
HO2S2 (B1)	XXX V
HO2S3 (B1)	XXX V

SEF519Z

Component Inspection

NIEC1293

HEATED OXYGEN SENSOR 2 (REAR)

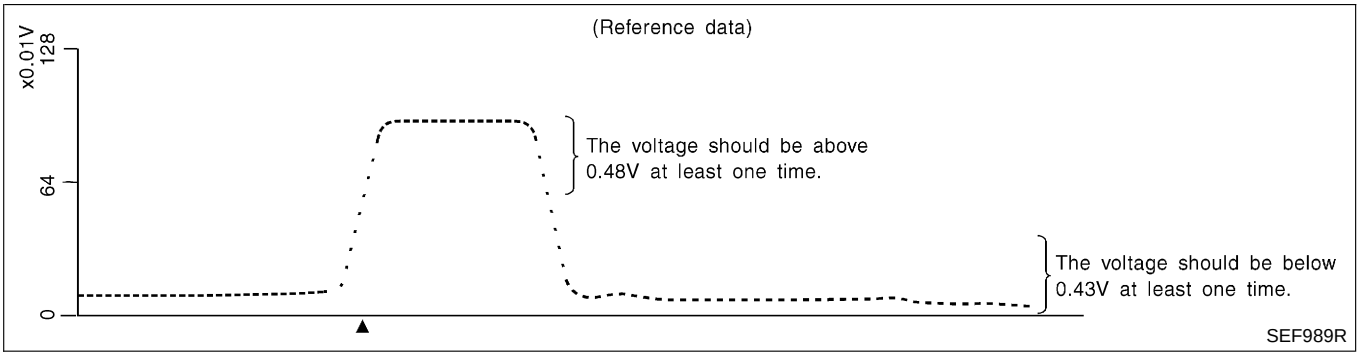
NIEC1293S01

With CONSULT-II

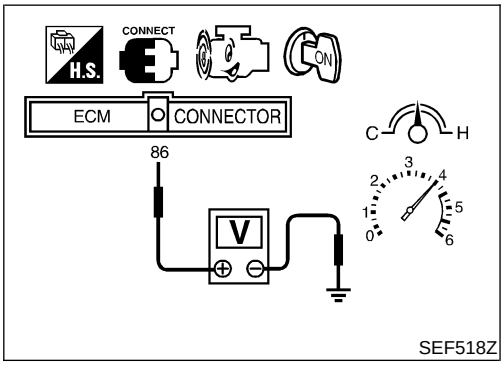
1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes..
2) Stop vehicle with engine running.
3) Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)” as the monitor item with CONSULT-II.
4) Check “HO2S2 (B1)” at idle speed when adjusting “FUEL INJECTION” to ±25%.
   “HO2S2 (B1)” should be above 0.48V at least once when the “FUEL INJECTION” is +25%.
   “HO2S2 (B1)” should be below 0.43V at least once when the “FUEL INJECTION” is −25%.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**



SEF989R



SEF518Z

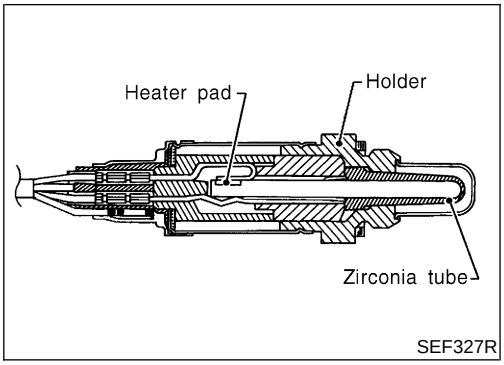
Without CONSULT-II

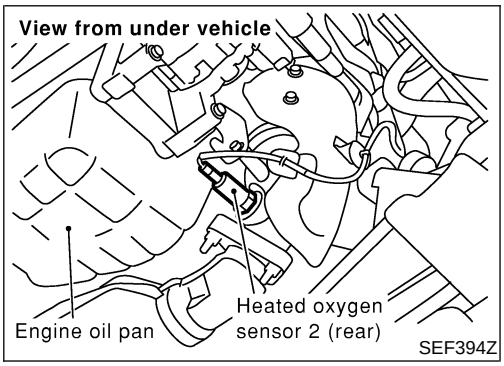
1) Start engine and drive vehicle at a speed of 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Set voltmeter probes between ECM terminals 86 (HO2S2 signal) and engine ground.
4) Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.48V at least once.
   If the voltage is above 0.48V at step 4, step 5 is not necessary.
5) Check the voltage when revving up to 6,000 rpm under no load. Or keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with “OD” OFF.
   The voltage should be below 0.43V at least once.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor**

Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.





Component Description

NIEC1294

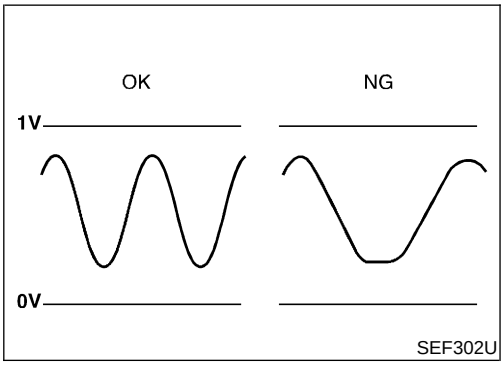
The heated oxygen sensor 2 (rear), after TWC (Manifold three way catalyst), monitors the oxygen level in the exhaust gas.
Even if switching characteristics of the air fuel ratio (A/F) sensor 1 are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.
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 heated oxygen sensor 2 (rear) is not used for engine control operation.

CONSULT-II Reference Value in Data Monitor Mode

NIEC1295

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1)	• Engine: After warming up	Revving engine from idle to 3,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)			LEAN ⟷ RICH

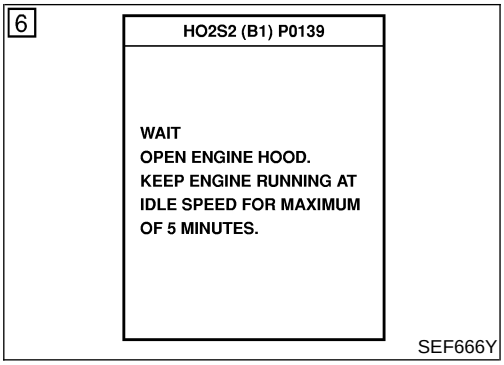


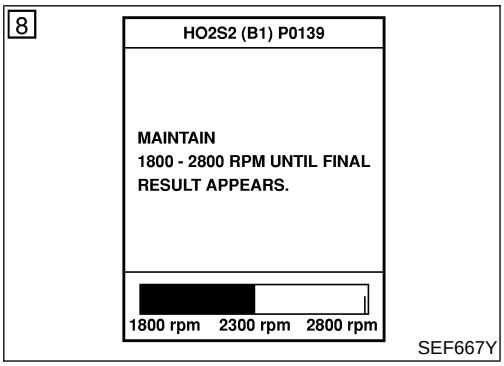
On Board Diagnosis Logic

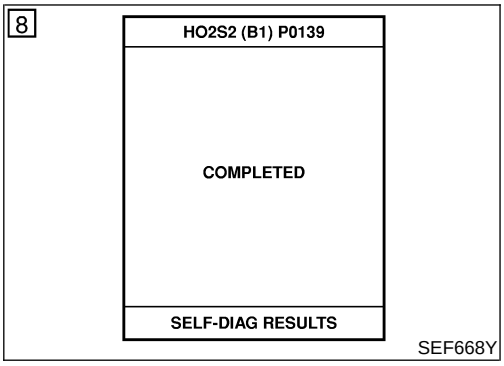
NIEC1296

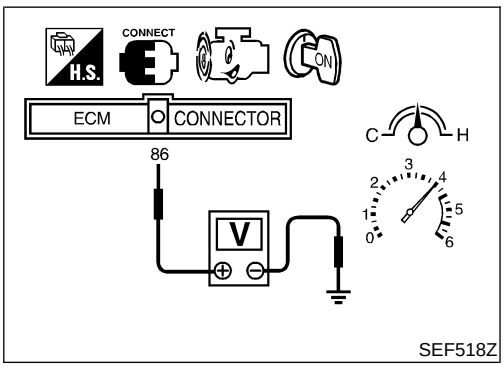
The heated oxygen sensor 2 (rear) has a much longer switching time between rich and lean than the air fuel ratio (A/F) sensor 1. The oxygen storage capacity before the TWC (Manifold three way catalyst) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the switching response of the sensor's voltage is faster than specified during various driving conditions such as fuel-cut.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0139	• It takes more than the specified time for the sensor to respond between rich and lean.	• Harness or connectors (The sensor circuit is open or shorted.) • Heated oxygen sensor 2 (rear) • Fuel pressure • Injectors • Intake air leaks









DTC Confirmation Procedure

NIEC1297

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

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 “HO2S2 (B1) P0139” of “HO2S2” 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-910.
   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

NIEC1298

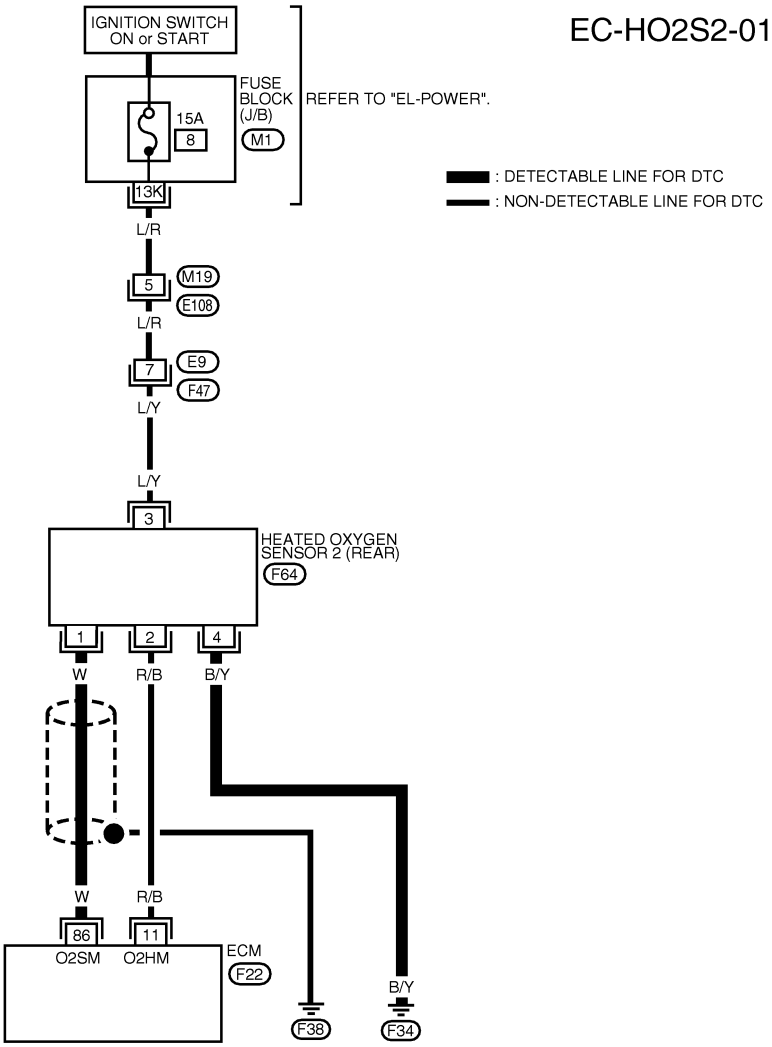
Use this procedure to check the overall function of the rear heated oxygen sensor circuit. During this check, a 1st trip DTC might not be confirmed.

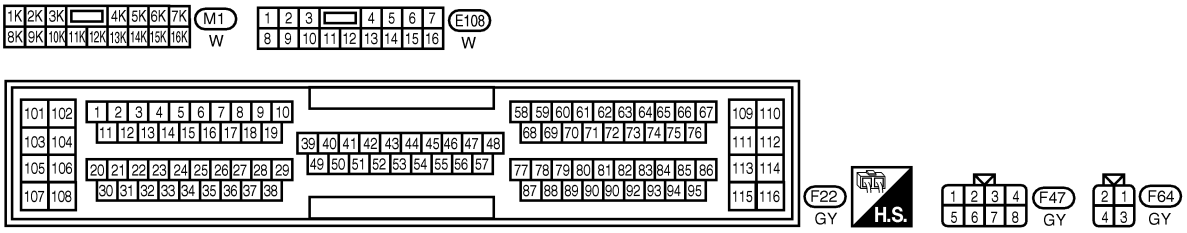
With GST

1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Set voltmeter probes between ECM terminals 86 (HO2S2 signal) and engine ground.
4) Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should change at more than 0.06V for 1 second during this procedure.
   If the voltage can be confirmed in step 4, step 5 is not necessary.
5) Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 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-910.

Wiring Diagram

NIEC1299





WEC390

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	W	HEATED OXYGEN SENSOR 2 (REAR)	ENGINE RUNNING FROM IDLE UP TO 2,000 RPM UNDER WARM-UP CONDITION	0 - APPROX. 1.0V

SEF724YA

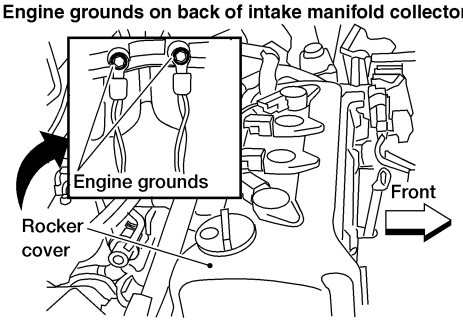
Diagnostic Procedure

NIEC1300

1	RETIGHTEN GROUND SCREWS

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

Engine grounds on back of intake manifold collector



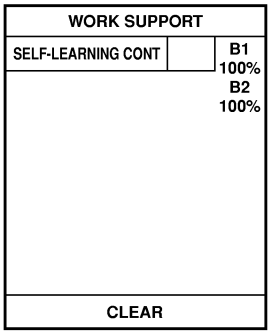
WEC249

▶	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-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching "CLEAR".

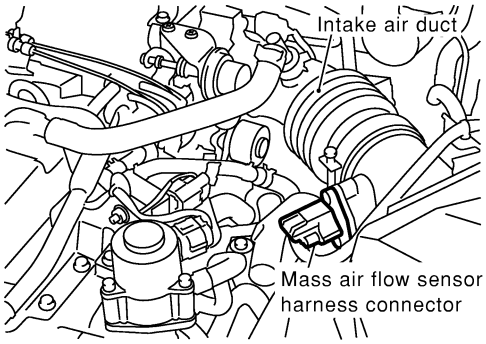


SEF652Y

4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171, P0172 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 3 seconds at idle speed.



SEF388Z

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-770.
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 detected? Is it difficult to start engine?

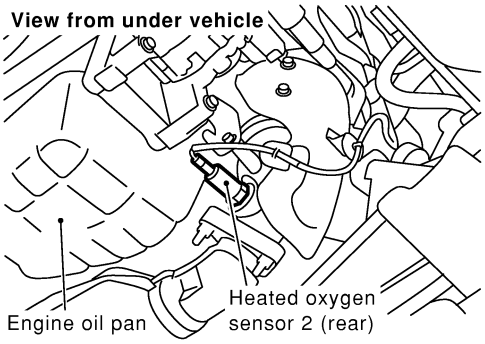
Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0171, P0172. Refer to EC-961, EC-968.
No	▶	GO TO 3.

Diagnostic Procedure (Cont'd)

3	CHECK INPUT SIGNAL CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect heated oxygen sensor 2 (rear) harness connector and ECM harness connector.



SEF394Z

3. Check harness continuity between ECM terminal 86 and HO2S2 (rear) terminal 1.
   Refer to Wiring Diagram.
   Continuity should exist.
4. Check harness continuity between ECM terminal 86 or HO2S2 (rear) terminal 1 and ground.
   Refer to Wiring Diagram.
   Continuity should not exist.
5. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK GROUND CIRCUIT

1. Check harness continuity between HO2S2 (rear) 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 5.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK HEATED OXYGEN SENSOR 2 (REAR)

Refer to "Component Inspection", EC-913.

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace heated oxygen sensor 2 (rear).

6	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-842.

	▶	**INSPECTION END**

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
A/F SEN1 (B1)	XXX V
HO2S2 (B1)	XXX V
HO2S3 (B1)	XXX V

SEF519Z

Component Inspection

NIEC1301

HEATED OXYGEN SENSOR 2 (REAR)

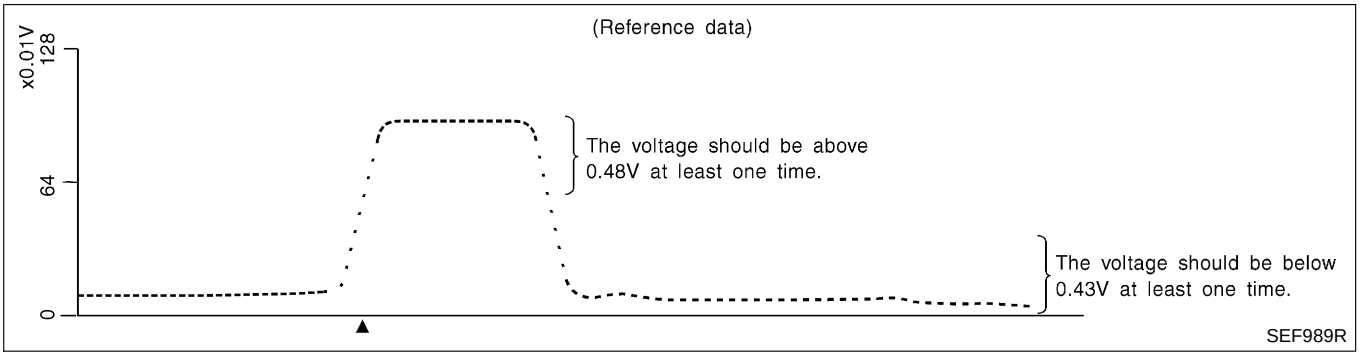
NIEC1301S01

With CONSULT-II

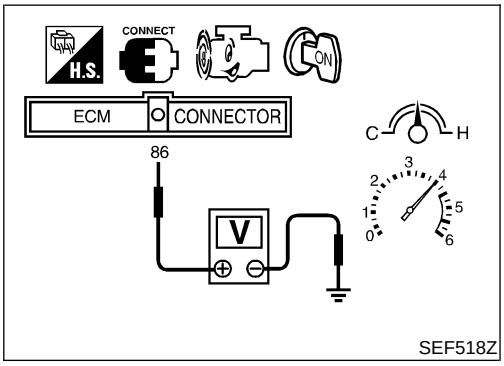
1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)” as the monitor item with CONSULT-II.
4) Check “HO2S2 (B1)” at idle speed when adjusting “FUEL INJECTION” to ±25%.
   “HO2S2 (B1)” should be above 0.48V at least once when the “FUEL INJECTION” is +25%.
   “HO2S2 (B1)” should be below 0.43V at least once when the “FUEL INJECTION” is −25%.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**



SEF989R



SEF518Z

Without CONSULT-II

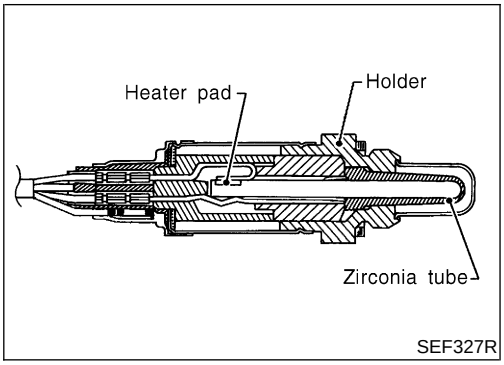
1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Set voltmeter probes between ECM terminals 86 (HO2S2 signal) and engine ground.
4) Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.48V at least once.
   If the voltage is above 0.48V at step 4, step 5 is not necessary.
5) Check the voltage when revving up to 6,000 rpm under no load. Or keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with “OD” OFF.
   The voltage should be below 0.43V at least once.

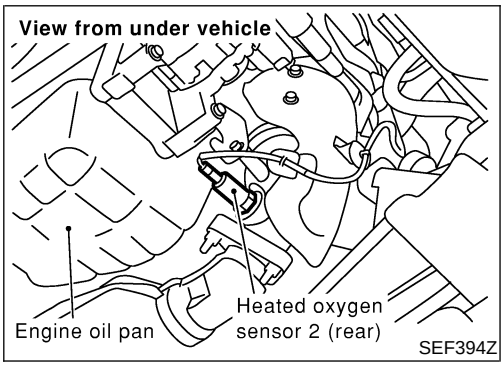
CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor**

Component Inspection (Cont'd)

Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.





Component Description

NIEC1302

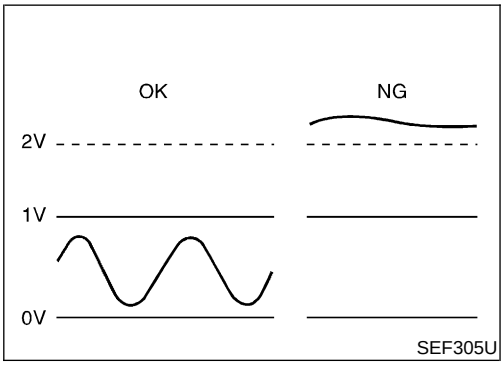
The heated oxygen sensor 2 (rear), after TWC (Manifold three way catalyst), monitors the oxygen level in the exhaust gas.
Even if switching characteristics of the air fuel ratio (A/F) sensor 1 are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.
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 heated oxygen sensor 2 (rear) is not used for engine control operation.

CONSULT-II Reference Value in Data Monitor Mode

NIEC1303

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1)	• Engine: After warming up	Revving engine from idle to 3,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)			LEAN ⟷ RICH

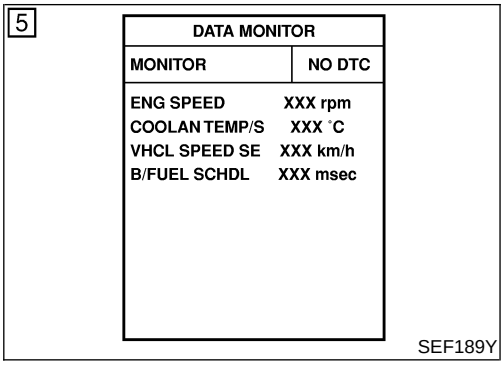


On Board Diagnosis Logic

NIEC1304

The heated oxygen sensor 2 (rear) has a much longer switching time between rich and lean than the air fuel ratio (A/F) sensor 1. The oxygen storage capacity before the TWC (Manifold three way catalyst) causes the longer switching time. To judge the malfunctions of rear heated oxygen sensor 2, ECM monitors whether or not the voltage is too high during various driving conditions such as fuel-cut.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0140	• An excessively high voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Heated oxygen sensor 2 (rear)



DTC Confirmation Procedure

NIEC1305

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

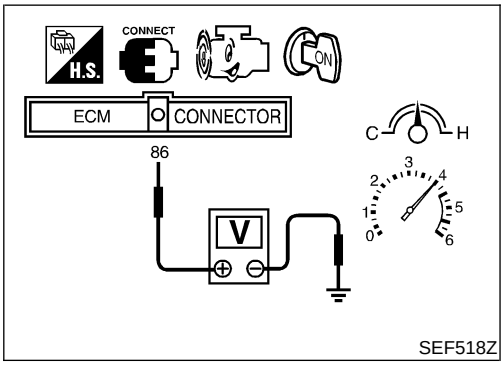
If “DTC Confirmation Procedure ” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

With CONSULT-II

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	1,000 - 3,000 rpm
VHCL SPEED SE	68 - 130 km/h (42 - 81 MPH)
B/FUEL SCHDL	2.0 - 12.5 msec
Selector lever	Suitable position

6) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-918.



Overall Function Check

NIEC1306

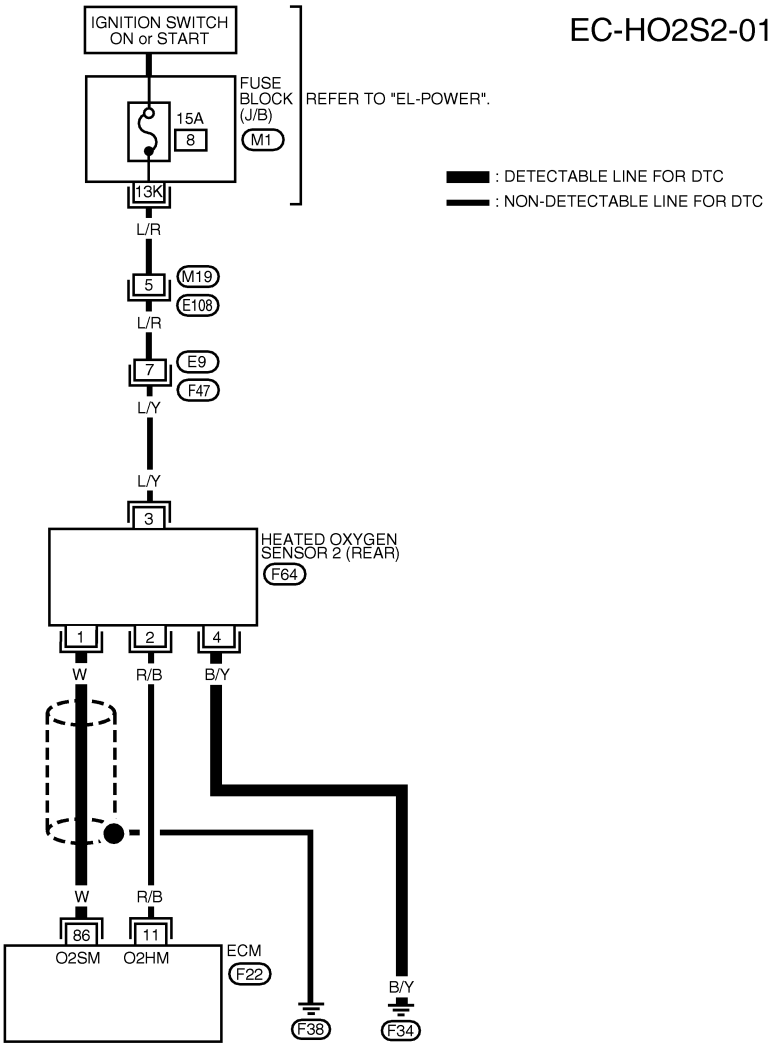
Use this procedure to check the overall function of the rear heated oxygen sensor circuit. During this check, a 1st trip DTC might not be confirmed.

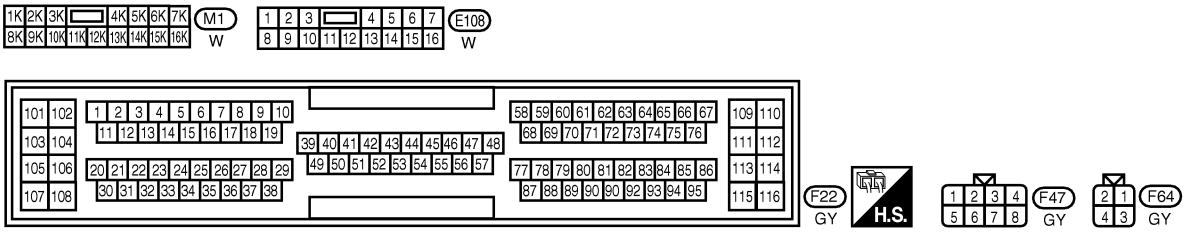
Without CONSULT-II

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 terminals 86 (HO2S2 signal) and engine ground.
4) Check the voltage after revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be below 2V during this procedure.
5) If NG, go to “Diagnostic Procedure”, EC-918.

Wiring Diagram

NIEC1307





WEC390

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	W	HEATED OXYGEN SENSOR 2 (REAR)	ENGINE RUNNING FROM IDLE UP TO 2,000 RPM UNDER WARM-UP CONDITION	0 - APPROX. 1.0V

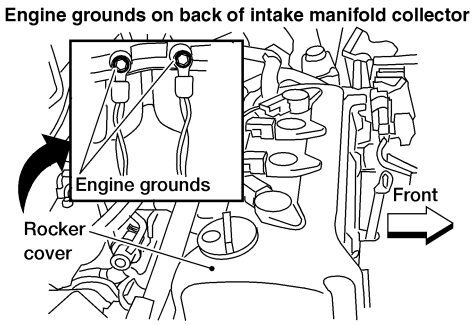
SEF724YA

Diagnostic Procedure

NIEC1308

1	RETIGHTEN GROUND SCREWS

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

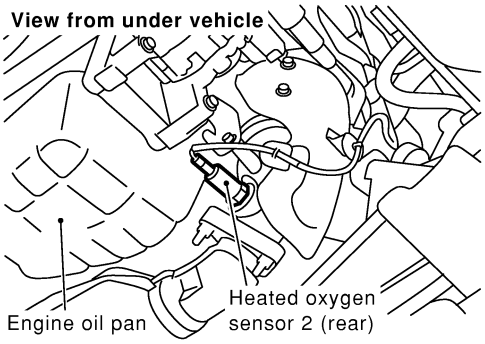


WEC249

	▶	GO TO 2.

2	CHECK INPUT SIGNAL CIRCUIT

1. Disconnect heated oxygen sensor HO2S2 (rear) harness connector and ECM harness connector.



SEF394Z

2. Check harness continuity between ECM terminal 86 and HO2S2 (rear) terminal 1.
   Refer to Wiring Diagram.
   Continuity should exist.
3. Check harness continuity between ECM terminal 86 or HO2S2 (rear) terminal 1 and ground.
   Refer to Wiring Diagram.
   Continuity should not exist.
4. Also check harness for short to ground and short to power.

OK or NG

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

3	CHECK GROUND CIRCUIT

1. Check harness continuity between HO2S2 (rear) 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 HARNESS CONNECTOR
Check heated oxygen sensor 2 (rear) harness connector for water. **Water should not exist.**	
OK or NG	
OK ▶	GO TO 5.
NG ▶	Repair or replace harness connector.

5	CHECK HEATED OXYGEN SENSOR 2 (REAR)
Refer to "Component Inspection", EC-919.	
OK or NG	
OK ▶	GO TO 6.
NG ▶	Replace heated oxygen sensor 2 (rear).

6	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-842.	
▶	**INSPECTION END**

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
A/F SEN1 (B1)	XXX V
HO2S2 (B1)	XXX V
HO2S3 (B1)	XXX V

SEF519Z

Component Inspection

NIEC1309

HEATED OXYGEN SENSOR 2 (REAR)

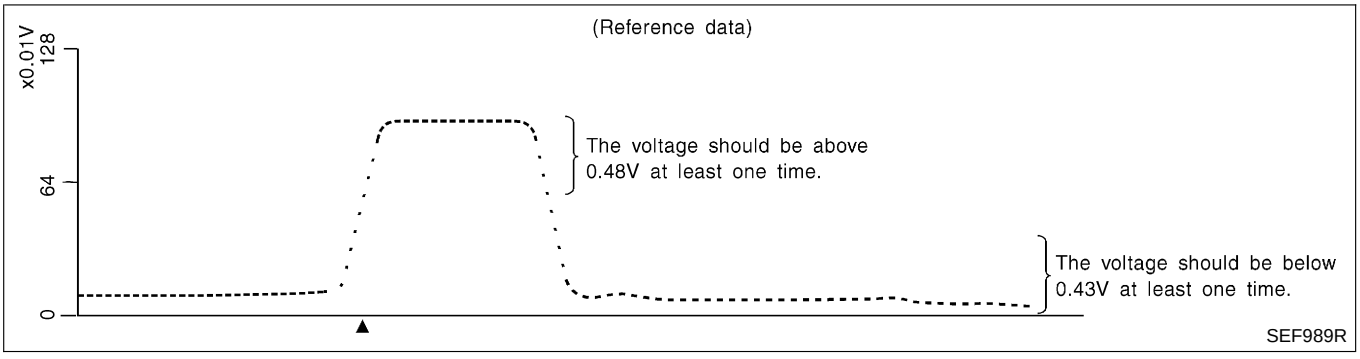
NIEC1309S01

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 "HO2S2 (B1)" as the monitor item with CONSULT-II.
4) Check "HO2S2 (B1)" at idle speed when adjusting "FUEL INJECTION" to ±25%.
   "HO2S2 (B1)" should be above 0.48V at least once when the "FUEL INJECTION" is +25%.
   "HO2S2 (B1)" should be below 0.43V at least once when the "FUEL INJECTION" is −25%.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**



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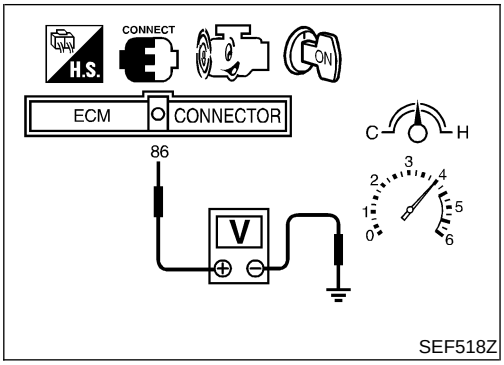
Component Inspection (Cont'd)



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 terminals 86 (HO2S2 signal) and engine ground.
4) Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.48V at least once.
   If the voltage is above 0.48V at step 4, step 5 is not necessary.
5) Check the voltage when revving up to 6,000 rpm under no load. Or keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with "OD" OFF.
   The voltage should be below 0.43V at least once.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Description

NIEC1310

SYSTEM DESCRIPTION

NIEC1310S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE)	Engine speed	Heated oxygen sensor 2 heater (rear) control	Heated oxygen sensor 2 heater (rear)
Crankshaft position sensor (POS)			

The ECM performs ON/OFF control of the heated oxygen sensor 2 heater (rear) corresponding to the engine speed.

OPERATION

NIEC1310S02

Engine speed rpm	Heated oxygen sensor 2 heater (rear)
Above 3,600	OFF
Below 3,600	ON

CONSULT-II Reference Value in Data Monitor Mode

NIEC1311

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 HTR (B1)	• 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

On Board Diagnosis Logic

NIEC1312

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0141	• The current amperage in the heated oxygen sensor 2 heater (rear) circuit is out of the normal range. [An improper voltage drop signal is sent to ECM through the heated oxygen sensor 2 heater (rear).]	• Harness or connectors (The heated oxygen sensor 2 heater (rear) circuit is open or shorted.) • Heated oxygen sensor 2 heater (rear)

DTC Confirmation Procedure

NIEC1313

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.

DTC Confirmation Procedure (Cont'd)

2

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

SEF179Y

With CONSULT-II

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 and let engine idle for at least 6 seconds.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-924.

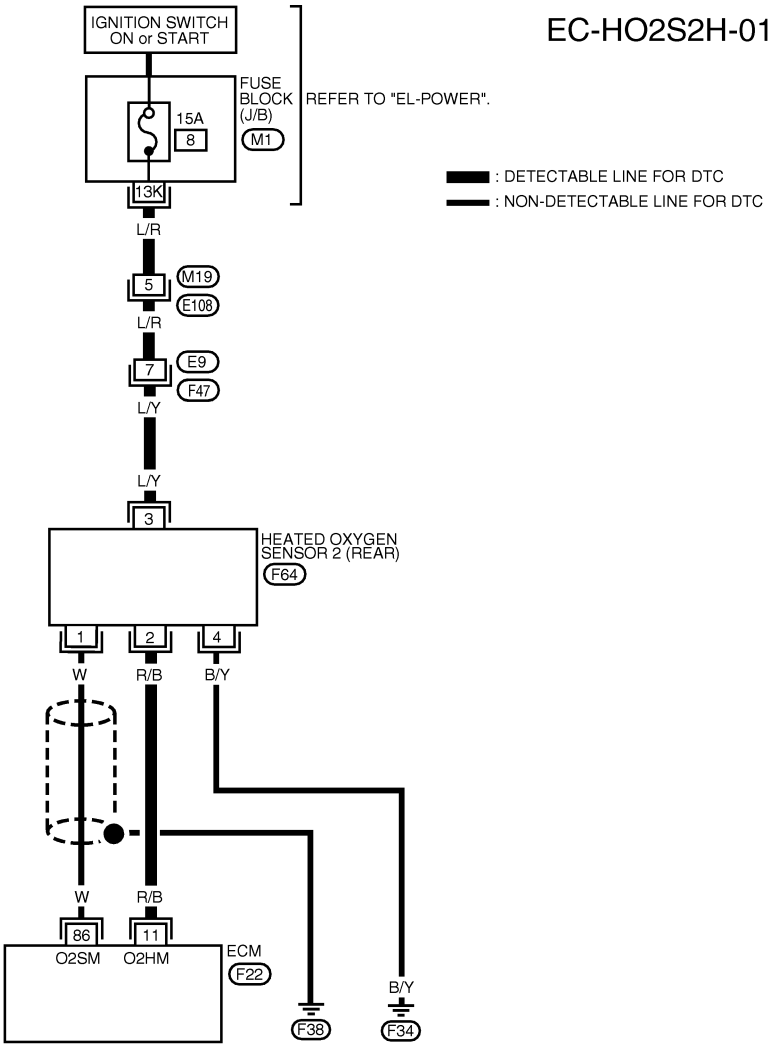
With GST

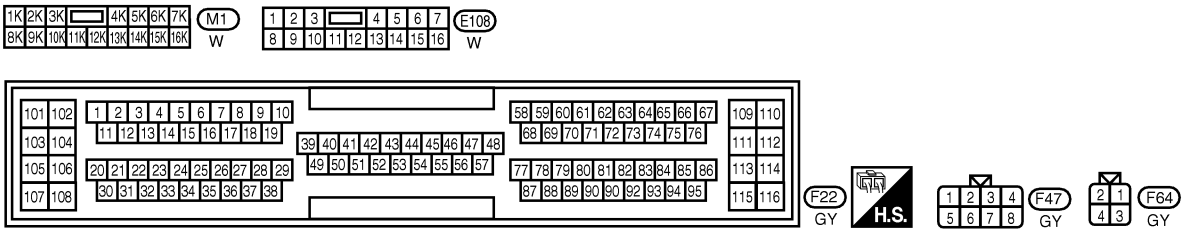
1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle and let engine idle for at least 6 seconds.
3) Turn ignition switch "OFF" and wait at least 10 seconds.
4) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
5) Stop vehicle and let engine idle for at least 6 seconds.
6) Select "MODE 3" with GST.
7) If DTC is detected, go to "Diagnostic Procedure", EC-924.

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

NIEC1314





WEC391

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)
11	R/B	HEATED OXYGEN SENSOR 2 (REAR) 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

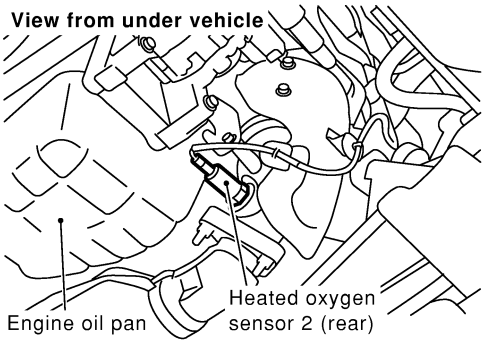
SEF728YA

Diagnostic Procedure

NIEC1315

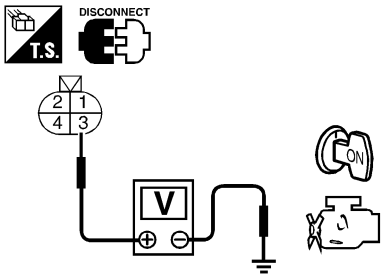
1	CHECK POWER SUPPLY

1. Turn ignition switch “OFF”.
2. Disconnect heated oxygen sensor HO2S2 (rear) harness connector.



SEF394Z

3. Turn ignition switch “ON”.
4. Check voltage between rear HO2S2 terminal 3 and ground.



Voltage: Battery voltage

SEF520Z

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E9, F47
- Harness connectors M19, E108
- Fuse block (J/B) connector M1
- 15A fuse
- Harness for open or short between heated oxygen sensor 2 (rear) and fuse

	▶	Repair harness or connectors.

3	CHECK GROUND CIRCUIT

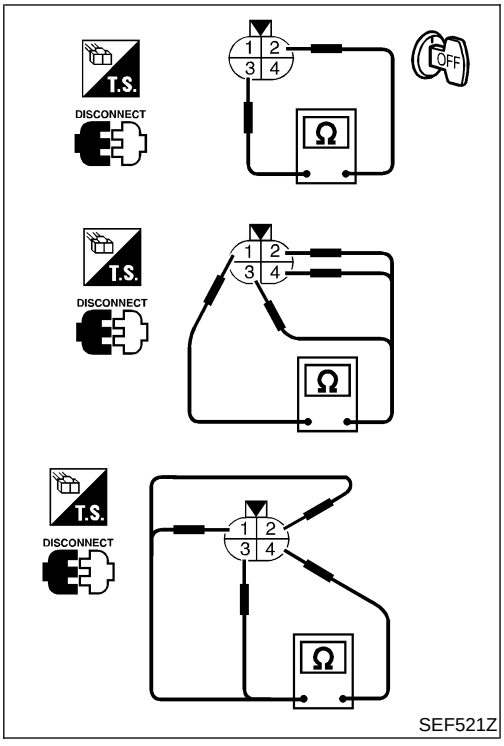
1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between HO2S2 (rear) terminal 2 and ECM terminal 11.
   Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

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 HEATED OXYGEN SENSOR 2 HEATER (REAR)	
Refer to "Component Inspection", EC-925.		
OK or NG		
OK	▶	GO TO 5.
NG	▶	Replace heated oxygen sensor 2 (rear).

5	CHECK INTERMITTENT INCIDENT	
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-842.		
	▶	**INSPECTION END**



Component Inspection

HEATED OXYGEN SENSOR 2 HEATER (REAR)

NIEC1316
NIEC1316S01

Check the following.

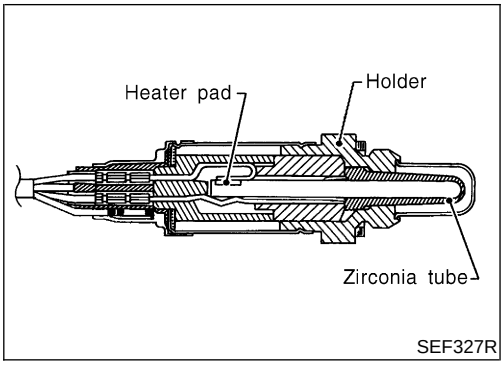
1. Check resistance between terminals 2 and 3.
   Resistance: 2.3 - 4.3Ω at 25°C (77°F)
2. Check continuity.

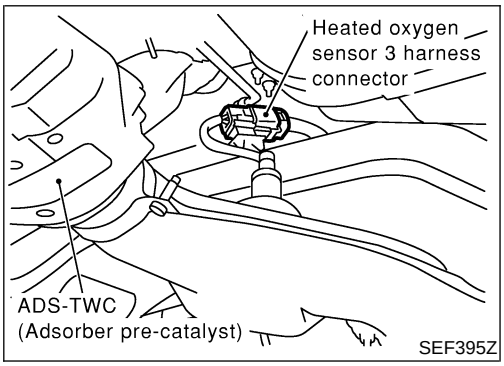
Terminal No.	Continuity
1 and 2, 3, 4	No
4 and 1, 2, 3	

If NG, replace the heated oxygen sensor 2 (rear).

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





Component Description

NIEC1317

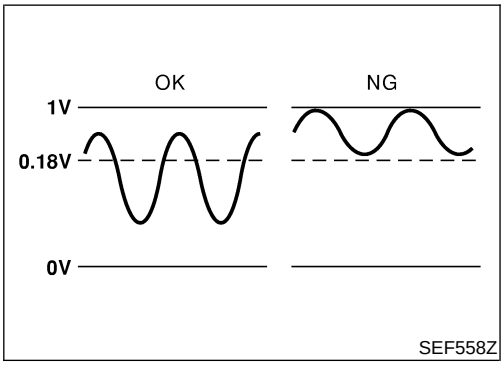
The heated oxygen sensor 3, after ADS-TWC (Adsorber pre-catalyst), monitors the oxygen level in the exhaust gas.
This sensor is used for recovery control of air fuel ratio after the fuel cut operation.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.

CONSULT-II Reference Value in Data Monitor Mode

NIEC1318

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S3 (B1)	● Engine: After warming up	Revving engine from idle to 3,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V

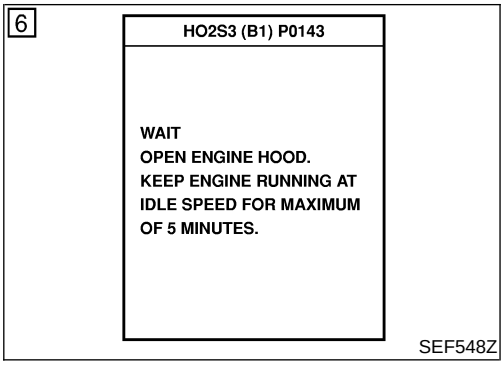


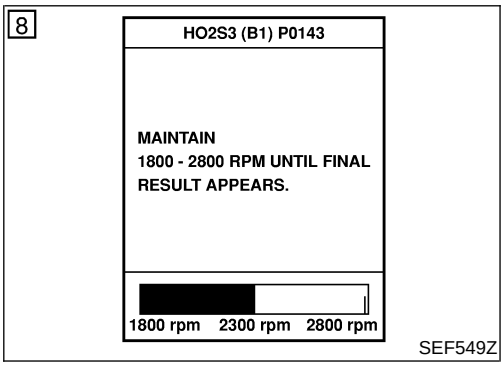
On Board Diagnosis Logic

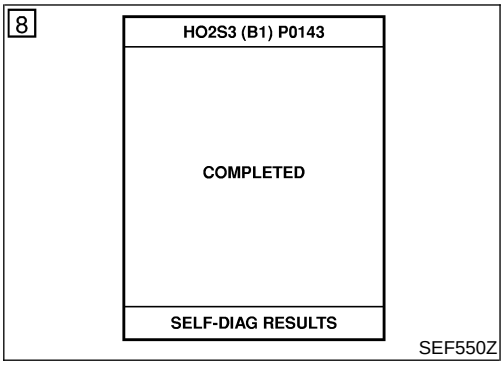
NIEC1319

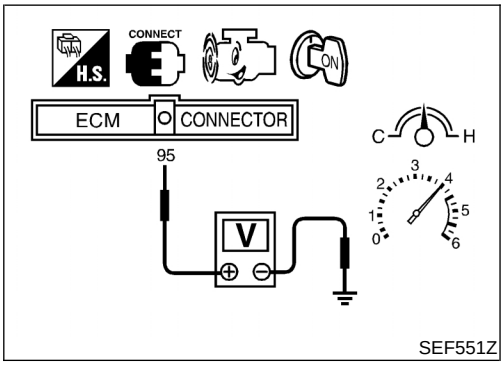
The heated oxygen sensor 3 has a much longer switching time between rich and lean than the air fuel ratio (A/F) sensor 1. The oxygen storage capacity before the TWC (Manifold three way catalyst) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 3, ECM monitors whether the minimum voltage of the sensor is sufficiently low during various driving conditions such as fuel-cut.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0143	● The minimum voltage from the sensor does not reach the specified voltage.	● Harness or connectors (The sensor circuit is open or shorted.) ● Heated oxygen sensor 3 ● Fuel pressure ● Injectors









DTC Confirmation Procedure

NIEC1320

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

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 "HO2S3 (B1) P0143" of "HO2S3" 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-929.
   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

NIEC1321

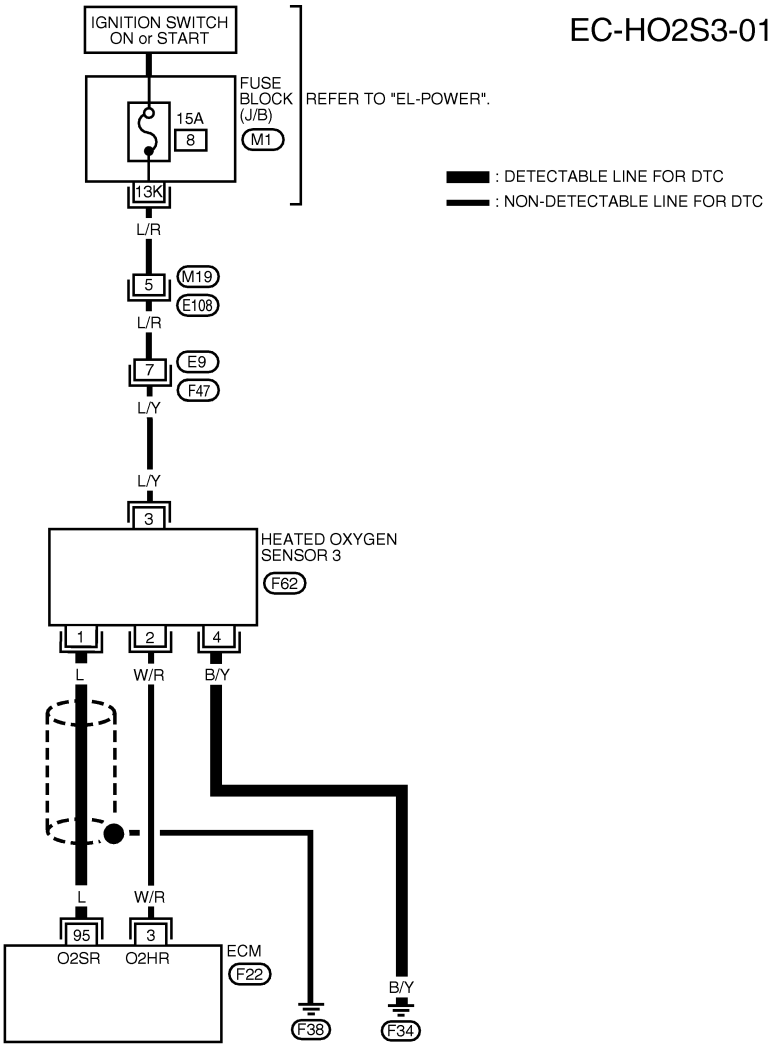
Use this procedure to check the overall function of the rear heated oxygen sensor circuit. During this check, a 1st trip DTC might not be confirmed.

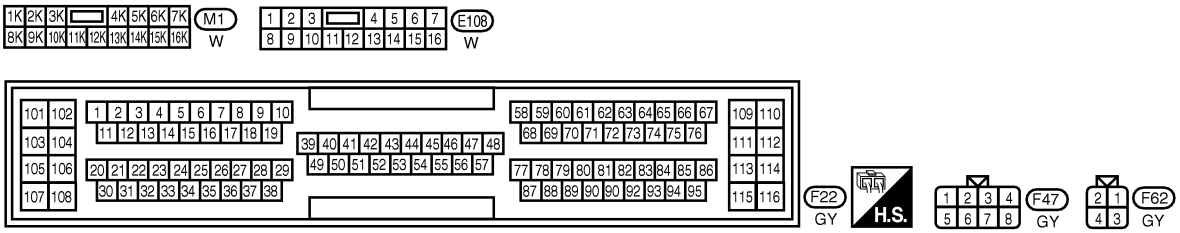
With GST

1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Set voltmeter probes between ECM terminals 95 (HO2S3 signal) and engine ground.
4) Check the voltage when revving engine up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be below 0.43V at least once during this procedure.
   If the voltage can be confirmed in step 4, step 5 is not necessary.
5) Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with "OD" OFF.
   The voltage should be below 0.43V at least once during this procedure.
6) If NG, go to "Diagnostic Procedure", EC-929.

Wiring Diagram

NIEC1322





WEC392

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)
95	L	HEATED OXYGEN SENSOR 3	ENGINE RUNNING FROM IDLE UP TO 2,000 RPM UNDER WARM-UP CONDITION	0 - APPROX. 1.0V

SEF724YB

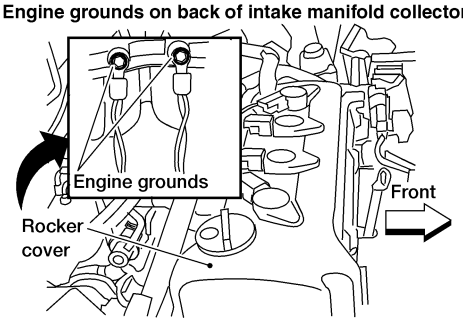
Diagnostic Procedure

NIEC1323

1	RETIGHTEN GROUND SCREWS

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

Engine grounds on back of intake manifold collector



WEC249

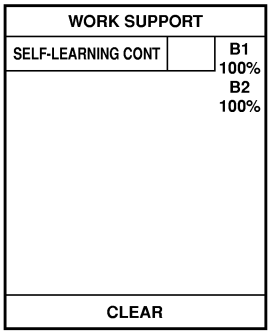
▶	GO TO 2.

Diagnostic Procedure (Cont'd)

2	CLEAR THE SELF-LEARNING DATA

With CONSULT-II

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

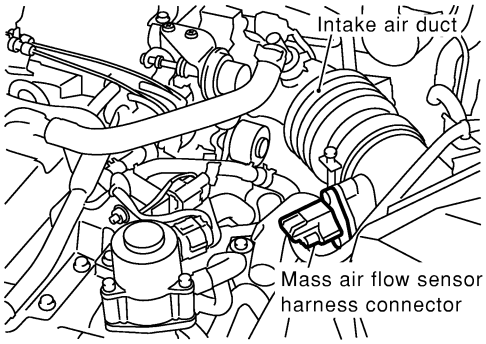


SEF652Y

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

Without CONSULT-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 3 seconds at idle speed.



SEF388Z

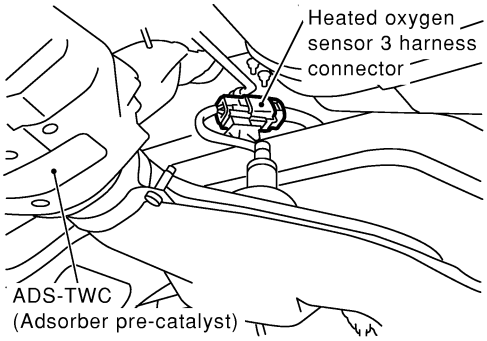
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC P0100 is displayed.
6. Erase the 1st trip DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-770.
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 detected? Is it difficult to start engine?

Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0172. Refer to EC-968.
No	▶	GO TO 3.

3	CHECK INPUT SIGNAL CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect heated oxygen sensor 3 harness connector and ECM harness connector.



SEF395Z

3. Check harness continuity between ECM terminal 95 and HO2S3 terminal 1.
   Refer to Wiring Diagram.
   Continuity should exist.
4. Check harness continuity between ECM terminal 95 or HO2S3 terminal 1 and ground.
   Refer to Wiring Diagram.
   Continuity should not exist.
5. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK GROUND CIRCUIT

1. Check harness continuity between HO2S3 terminal 4 and body 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 HEATED OXYGEN SENSOR 2 (REAR)

Refer to "Component Inspection", EC-932.

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace corresponding heated oxygen sensor 3.

6	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-842.

▶ **INSPECTION END**

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
A/F SEN1 (B1)	XXX V
HO2S2 (B1)	XXX V
HO2S3 (B1)	XXX V

SEF519Z

Component Inspection

NIEC1324

HEATED OXYGEN SENSOR 3

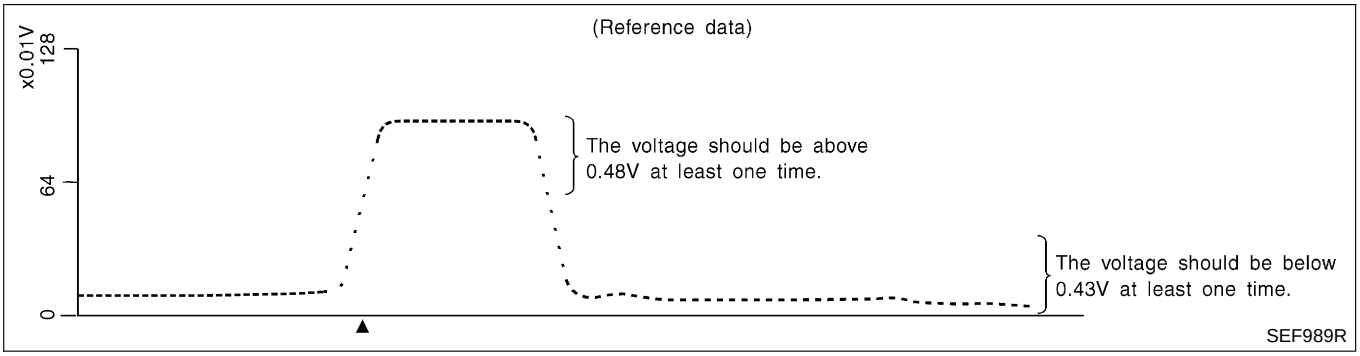
NIEC1324S01

With CONSULT-II

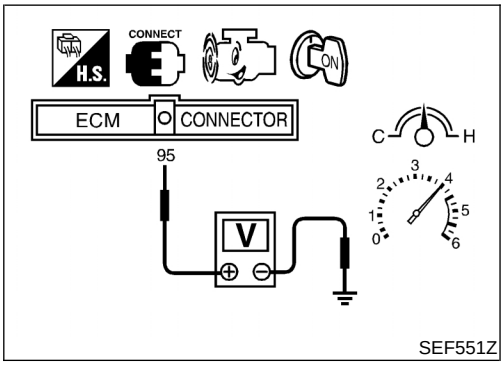
1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S3 (B1)” as the monitor item with CONSULT-II.
4) Check “HO2S3 (B1)” at idle speed when adjusting “FUEL INJECTION” to ±25%.
   “HO2S3 (B1)” should be above 0.48V at least once when the “FUEL INJECTION” is +25%.
   “HO2S3 (B1)” should be below 0.43V at least once when the “FUEL INJECTION” is −25%.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**



SEF989R



SEF551Z

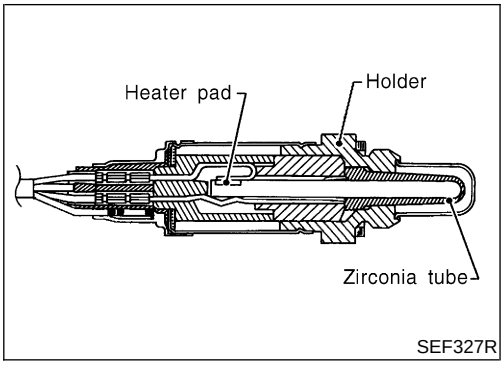
Without CONSULT-II

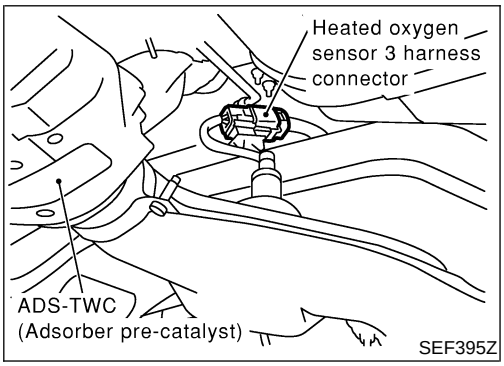
1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Set voltmeter probes between ECM terminals 95 (HO2S3 signal) and engine ground.
4) Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.48V at least once.
   If the voltage is above 0.48V at step 4, step 5 is not necessary.
5) Check the voltage when revving up to 6,000 rpm under no load. Or keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with “OD” OFF.
   The voltage should be below 0.43V at least once.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor**

Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.





Component Description

NIEC1325

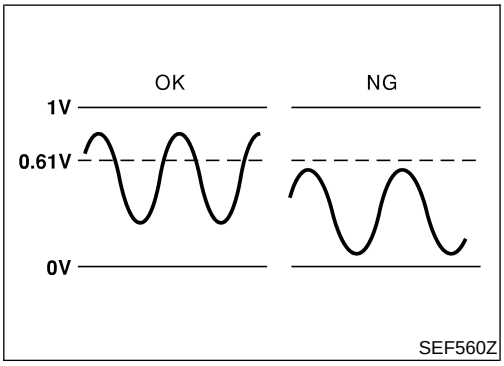
The heated oxygen sensor 3, after ADS-TWC (Adsorber pre-catalyst) monitors the oxygen level in the exhaust gas.
This sensor is used for recovery control of air fuel ratio after the fuel cut operation.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.

CONSULT-II Reference Value in Data Monitor Mode

NIEC1326

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S3 (B1)	● Engine: After warming up	Revving engine from idle to 3,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V

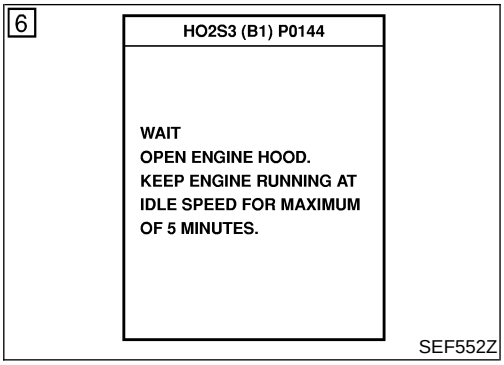


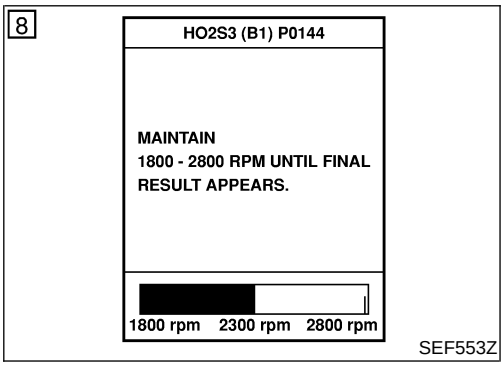
On Board Diagnosis Logic

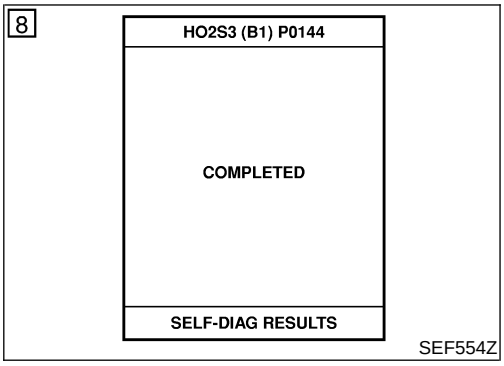
NIEC1327

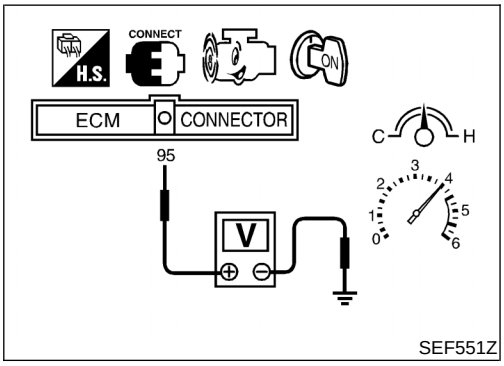
The heated oxygen sensor 3 has a much longer switching time between rich and lean than the air fuel ratio (A/F) sensor 1. The oxygen storage capacity before the TWC (Manifold three way catalyst) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 3, ECM monitors whether the maximum voltage of the sensor is sufficiently high during various driving conditions such as fuel-cut.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0144	● The maximum voltage from the sensor does not reach the specified voltage.	● Harness or connectors (The sensor circuit is open or shorted.) ● Heated oxygen sensor 3 ● Fuel pressure ● Injectors ● Intake air leaks









DTC Confirmation Procedure

NIEC1328

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

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 "HO2S3 (B1) P0144" of "HO2S3" 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-937.
   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

NIEC1329

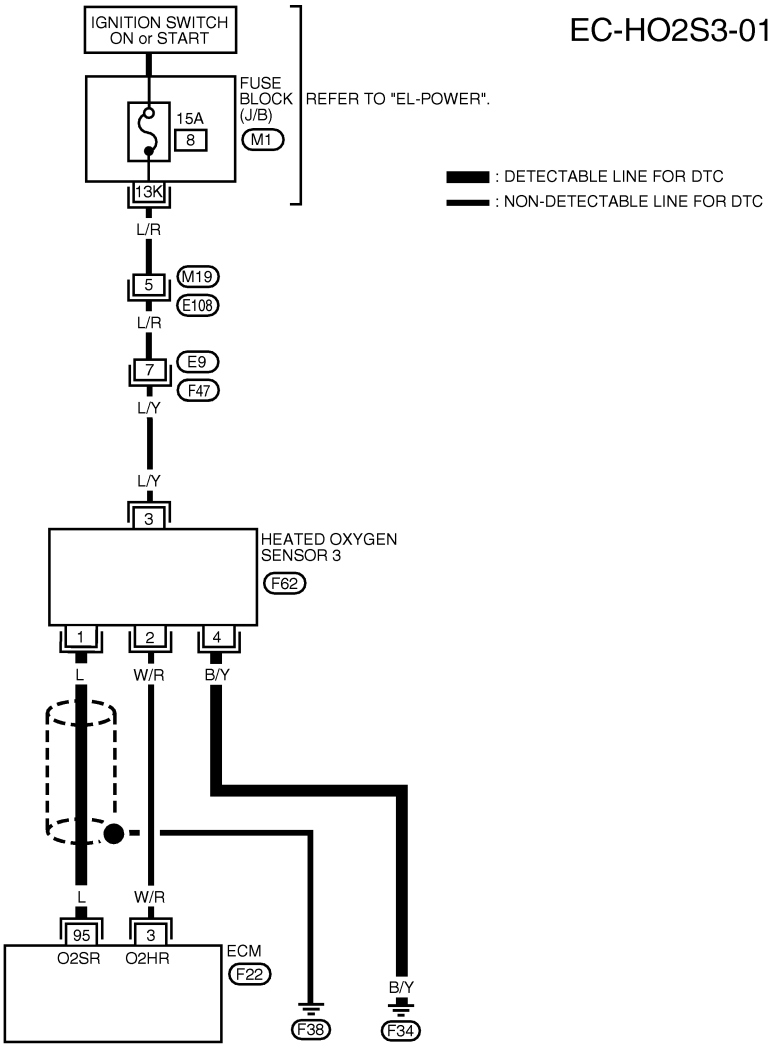
Use this procedure to check the overall function of the rear heated oxygen sensor circuit. During this check, a 1st trip DTC might not be confirmed.

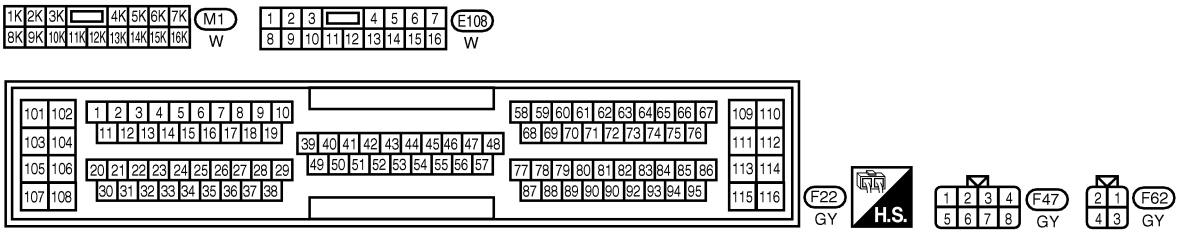
With GST

1) Start engine and drive vehicle at a speed of 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Set voltmeter probes between ECM terminals 95 (HO2S3 signal) and engine ground.
4) Check the voltage when revving engine up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.48V at least once during this procedure.
   If the voltage can be confirmed in step 4, step 5 is not necessary.
5) Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with "OD" OFF.
   The voltage should be above 0.48V at least once during this procedure.
6) If NG, go to "Diagnostic Procedure", EC-937.

Wiring Diagram

NIEC1330





WEC392

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)
95	L	HEATED OXYGEN SENSOR 3	ENGINE RUNNING FROM IDLE UP TO 2,000 RPM UNDER WARM-UP CONDITION	0 - APPROX. 1.0V

SEF724YB

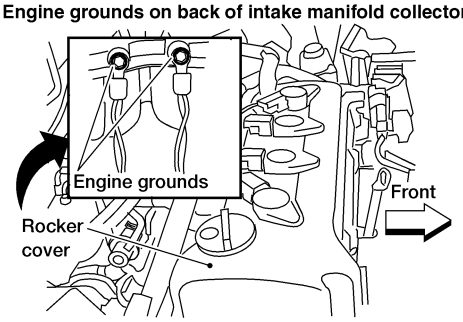
Diagnostic Procedure

NIEC1331

1	RETIGHTEN GROUND SCREWS

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

Engine grounds on back of intake manifold collector



WEC249

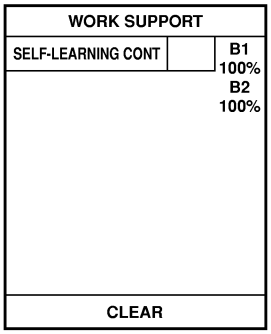
▶	GO TO 2.

Diagnostic Procedure (Cont'd)

2	CLEAR THE SELF-LEARNING DATA

With CONSULT-II

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

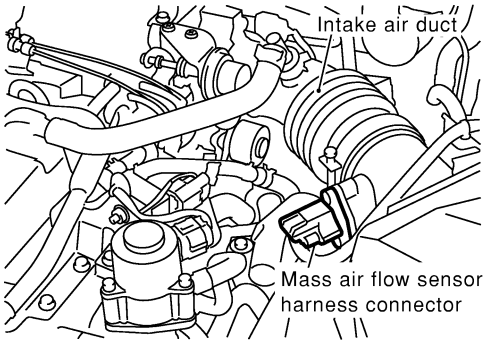


SEF652Y

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

Without CONSULT-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 3 seconds at idle speed.



SEF388Z

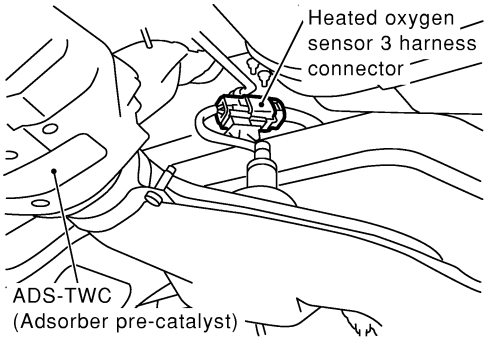
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC P0100 is displayed.
6. Erase the 1st trip DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-770.
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 detected? Is it difficult to start engine?

Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0171. Refer to EC-961.
No	▶	GO TO 3.

3	CHECK INPUT SIGNAL CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect heated oxygen sensor 3 harness connector and ECM harness connector.



SEF395Z

3. Check harness continuity between ECM terminal 95 and HO2S3 terminal 1.
   Refer to Wiring Diagram.
   Continuity should exist.
4. Check harness continuity between ECM terminal 95 or HO2S3 terminal 1 and ground.
   Refer to Wiring Diagram.
   Continuity should not exist.
5. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK GROUND CIRCUIT

1. Check harness continuity between HO2S3 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 5.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK HEATED OXYGEN SENSOR 2 (REAR)

Refer to "Component Inspection", EC-940.

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace corresponding heated oxygen sensor 3.

6	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-842.

▶ **INSPECTION END**

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
A/F SEN1 (B1)	XXX V
HO2S2 (B1)	XXX V
HO2S3 (B1)	XXX V

SEF519Z

Component Inspection

NIEC1332

HEATED OXYGEN SENSOR 3

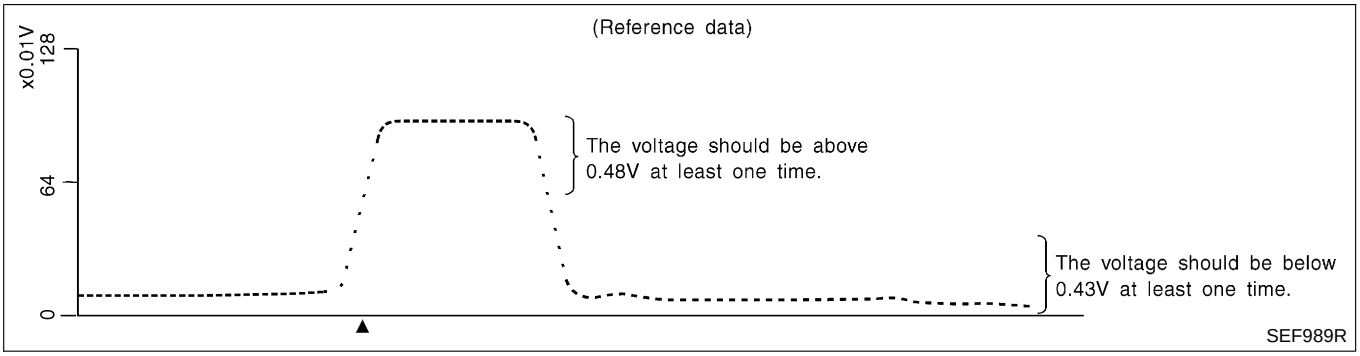
NIEC1332S01

With CONSULT-II

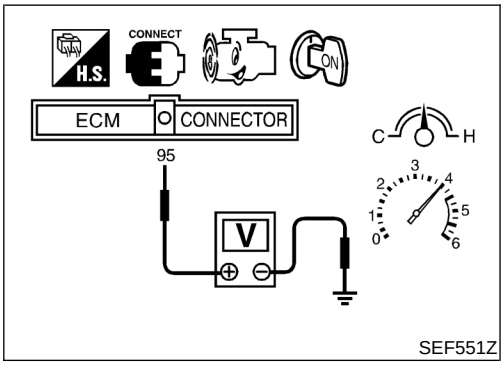
1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes..
2) Stop vehicle with engine running.
3) Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S3 (B1)” as the monitor item with CONSULT-II.
4) Check “HO2S3 (B1)” at idle speed when adjusting “FUEL INJECTION” to ±25%.
   “HO2S3 (B1)” should be above 0.48V at least once when the “FUEL INJECTION” is +25%.
   “HO2S3 (B1)” should be below 0.43V at least once when the “FUEL INJECTION” is −25%.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**



SEF989R



SEF551Z

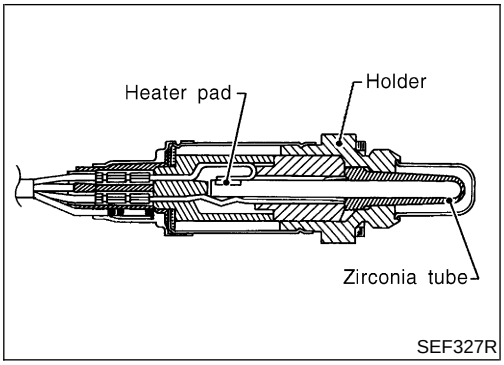
Without CONSULT-II

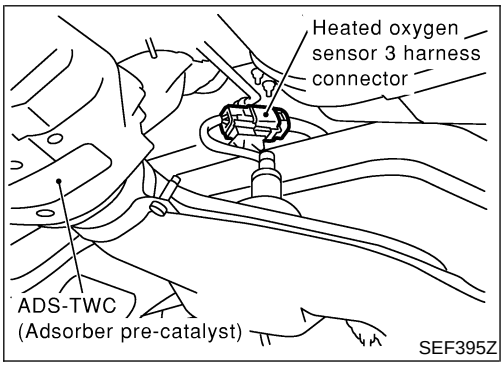
1) Start engine and drive vehicle at a speed of 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Set voltmeter probes between ECM terminals 95 (HO2S3 signal) and engine ground.
4) Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.48V at least once.
   If the voltage is above 0.48V at step 4, step 5 is not necessary.
5) Check the voltage when revving up to 6,000 rpm under no load. Or keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with “OD” OFF.
   The voltage should be below 0.43V at least once.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor**

Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.





Component Description

NIEC1333

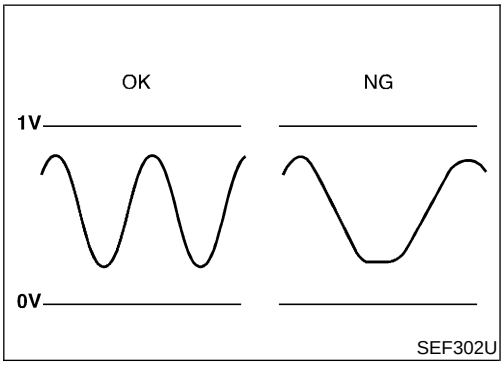
The heated oxygen sensor 3, after ADS-TWC (Adsorber pre-catalyst), monitors the oxygen level in the exhaust gas.
This sensor is used for recovery control of air fuel ratio after the fuel cut operation.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.

CONSULT-II Reference Value in Data Monitor Mode

NIEC1334

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S3 (B1)	● Engine: After warming up	Revving engine from idle to 3,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V

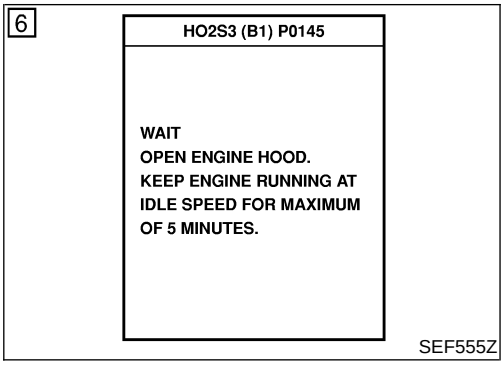


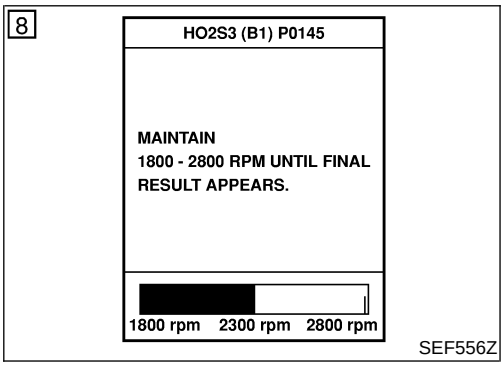
On Board Diagnosis Logic

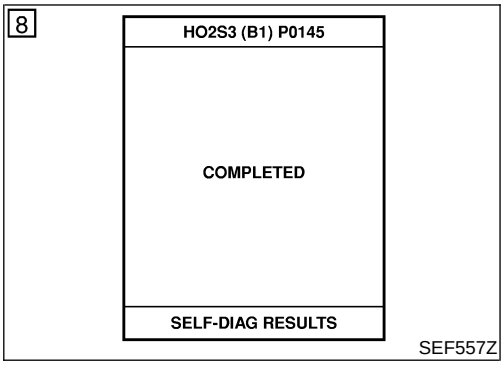
NIEC1335

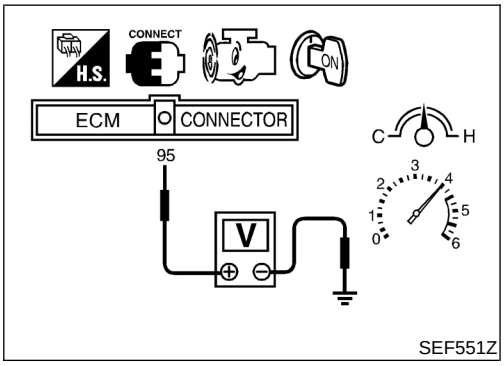
The heated oxygen sensor 3 has a much longer switching time between rich and lean than the air fuel ratio (A/F) sensor 1. The oxygen storage capacity before the TWC (Manifold three way catalyst) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 3, ECM monitors whether the switching response of the sensor's voltage is faster than specified during various driving conditions such as fuel-cut.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0145	● It takes more than the specified time for the sensor to respond between rich and lean.	● Harness or connectors (The sensor circuit is open or shorted.) ● Heated oxygen sensor 3 ● Fuel pressure ● Injectors ● Intake air leaks









DTC Confirmation Procedure

NIEC1336

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

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 "HO2S3 (B1) P0145" of "HO2S3" 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-945.
   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

NIEC1337

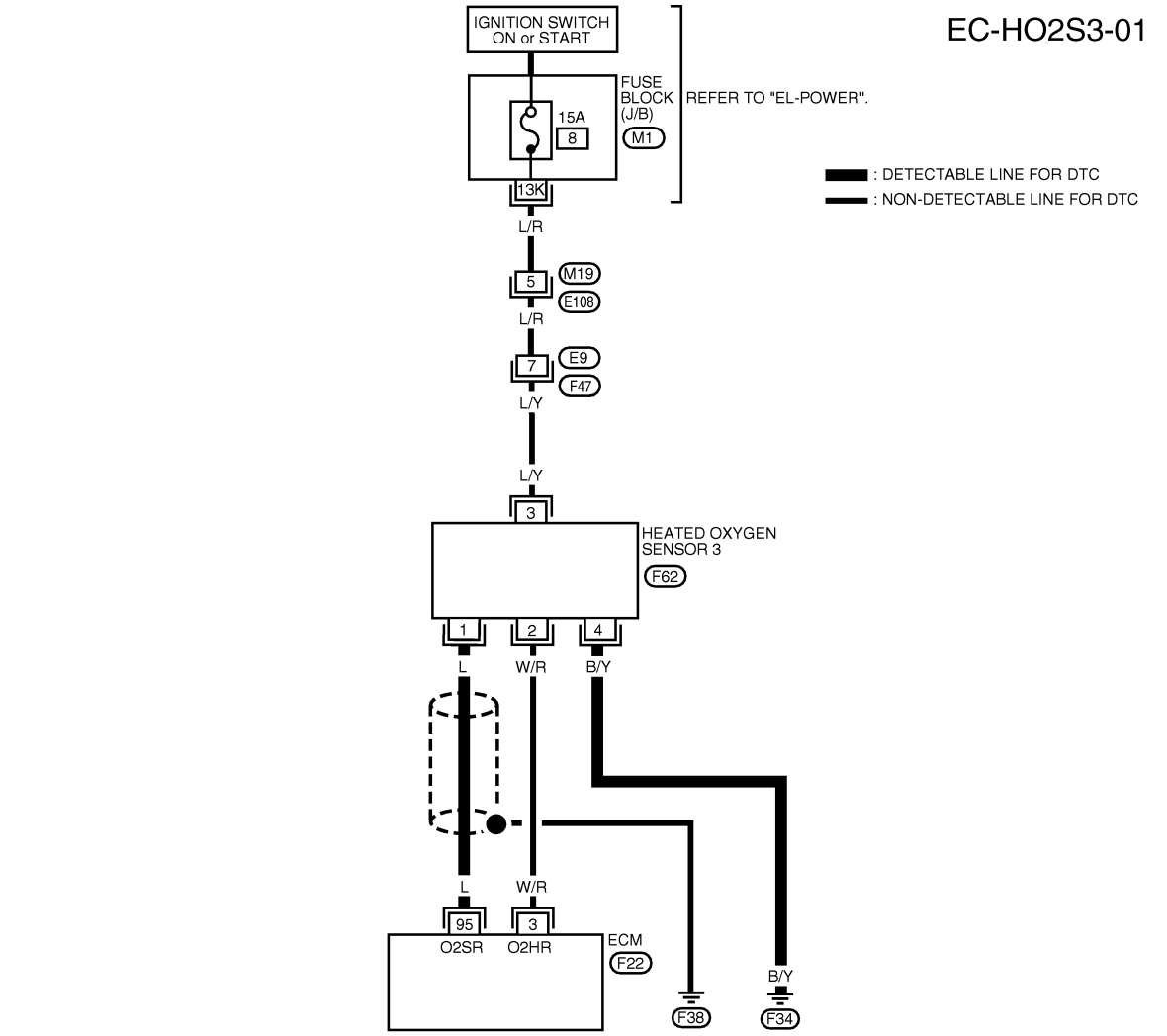
Use this procedure to check the overall function of the rear heated oxygen sensor circuit. During this check, a 1st trip DTC might not be confirmed.

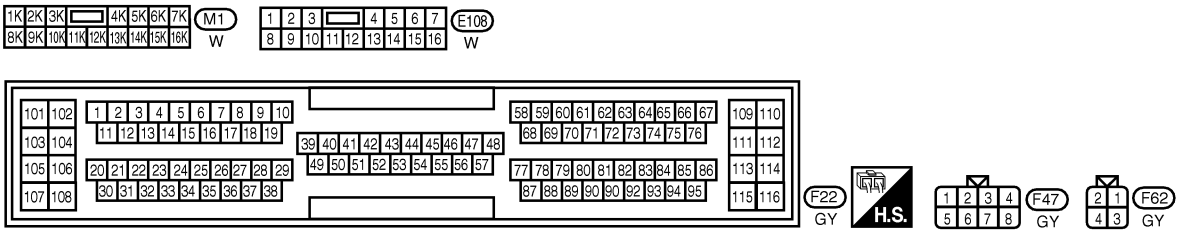
With GST

1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Set voltmeter probes between ECM terminals 95 (HO2S3 signal) and engine ground.
4) Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should change at more than 0.06V for 1 second during this procedure.
   If the voltage can be confirmed in step 4, step 5 is not necessary.
5) Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 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-945.

Wiring Diagram

NIEC1338





WEC392

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)
95	L	HEATED OXYGEN SENSOR 3	ENGINE RUNNING FROM IDLE UP TO 2,000 RPM UNDER WARM-UP CONDITION	0 - APPROX. 1.0V

SEF724YB

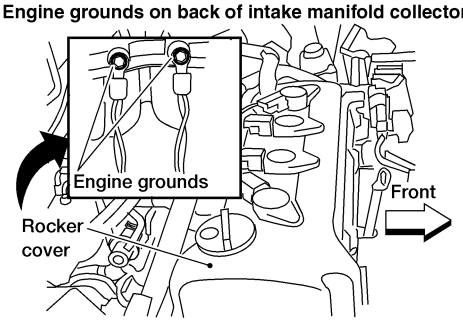
Diagnostic Procedure

NIEC1339

1	RETIGHTEN GROUND SCREWS

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

Engine grounds on back of intake manifold collector



WEC249

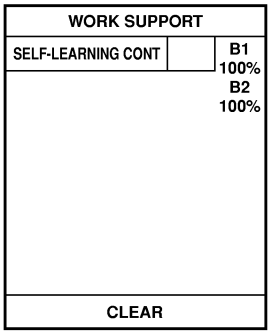
▶	GO TO 2.

Diagnostic Procedure (Cont'd)

2	CLEAR THE SELF-LEARNING DATA

With CONSULT-II

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

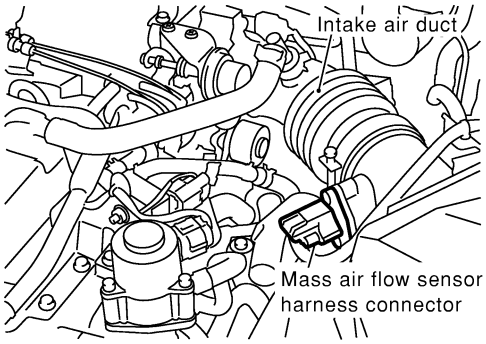


SEF652Y

4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171, P0172 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 3 seconds at idle speed.



SEF388Z

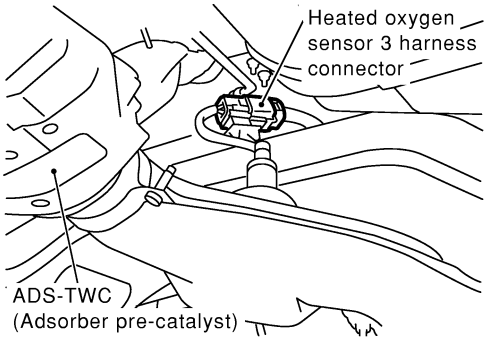
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC P0100 is displayed.
6. Erase the 1st trip DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-770.
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171, P0172 detected? Is it difficult to start engine?

Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0171, P0172. Refer to EC-968.
No	▶	GO TO 3.

3	CHECK INPUT SIGNAL CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect heated oxygen sensor 3 harness connector and ECM harness connector.



SEF395Z

3. Check harness continuity between ECM terminal 95 and HO2S3 terminal 1.
   Refer to Wiring Diagram.
   Continuity should exist.
4. Check harness continuity between ECM terminal 95 HO2S3 terminal 1 and ground.
   Refer to Wiring Diagram.
   Continuity should not exist.
5. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK GROUND CIRCUIT

1. Check harness continuity between HO2S3 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 5.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK HEATED OXYGEN SENSOR 2 (REAR)

Refer to "Component Inspection", EC-948.

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace corresponding heated oxygen sensor 3.

6	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-842.

▶ **INSPECTION END**

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
A/F SEN1 (B1)	XXX V
HO2S2 (B1)	XXX V
HO2S3 (B1)	XXX V

SEF519Z

Component Inspection

NIEC1340

HEATED OXYGEN SENSOR 3

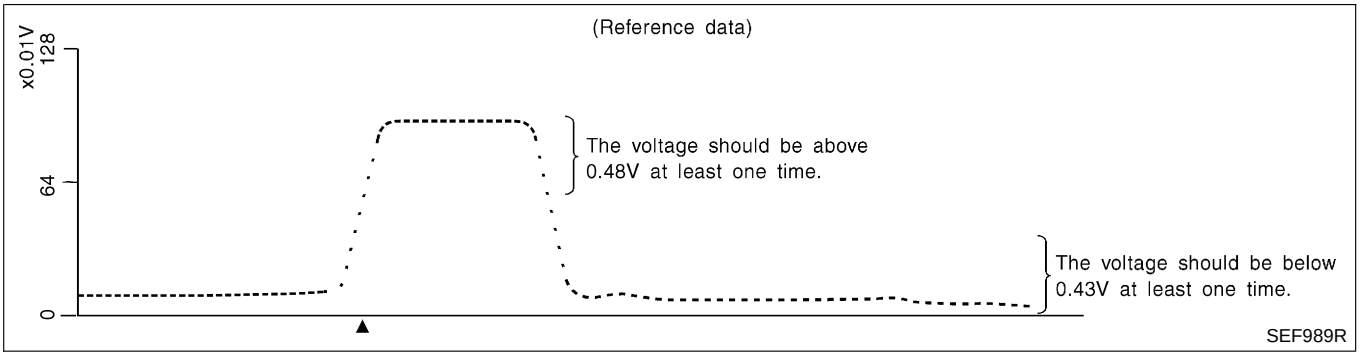
NIEC1340S01

With CONSULT-II

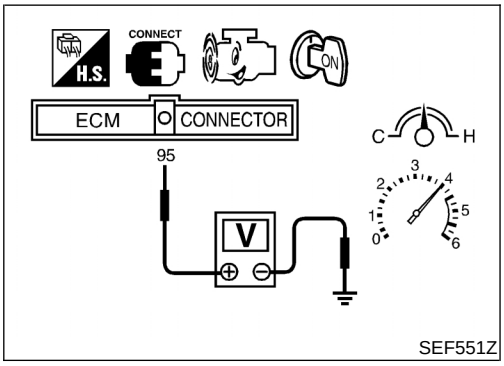
1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S3 (B1)” as the monitor item with CONSULT-II.
4) Check “HO2S3 (B1)” at idle speed when adjusting “FUEL INJECTION” to ±25%.
   “HO2S3 (B1)” should be above 0.48V at least once when the “FUEL INJECTION” is +25%.
   “HO2S3 (B1)” should be below 0.43V at least once when the “FUEL INJECTION” is −25%.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**



SEF989R



SEF551Z

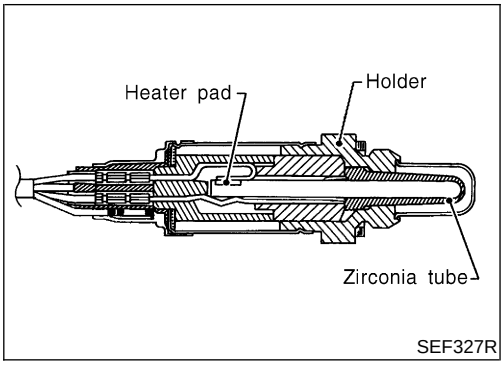
Without CONSULT-II

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 terminals 95 (HO2S3 terminal) and engine ground.
4) Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.48V at least once.
   If the voltage is above 0.48V at step 4, step 5 is not necessary.
5) Check the voltage when revving up to 6,000 rpm under no load. Or keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with “OD” OFF.
   The voltage should be below 0.43V at least once.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor**

Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.



Component Description

NIEC1341

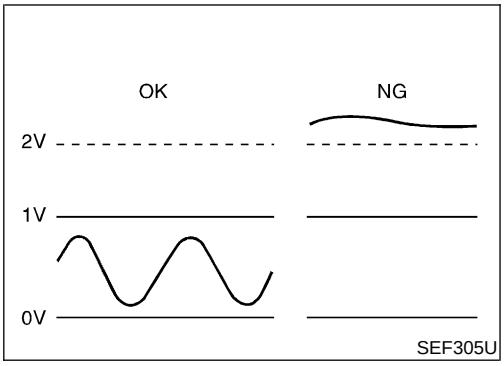
The heated oxygen sensor 3, after ADS-TWC (Adsorber pre-catalyst), monitors the oxygen level in the exhaust gas.
This sensor is used for recovery control of air fuel ratio after the fuel cut operation.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.

CONSULT-II Reference Value in Data Monitor Mode

NIEC1342

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S3 (B1)	● Engine: After warming up	Revving engine from idle to 3,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V

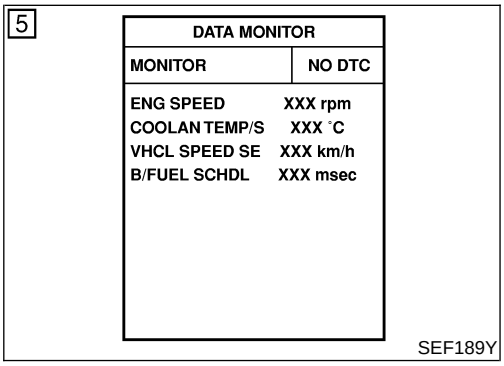


On Board Diagnosis Logic

NIEC1343

The heated oxygen sensor 3 has a much longer switching time between rich and lean than the air fuel ratio (A/F) sensor 1. The oxygen storage capacity before the TWC (Manifold three way catalyst) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 3, ECM monitors whether or not the voltage is too high during various driving conditions such as fuel-cut.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0146	● An excessively high voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Heated oxygen sensor 3



DTC Confirmation Procedure

NIEC1344

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.

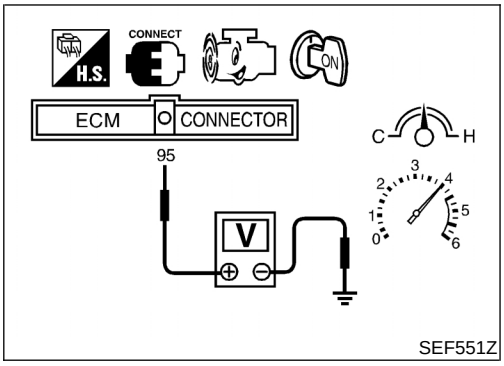
With CONSULT-II

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	1,000 - 3,000 rpm
VHCL SPEED SE	68 - 130 km/h (42 - 81 MPH)
B/FUEL SCHDL	2.0 - 12.5 msec
Selector lever	Suitable position

6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-953.



Overall Function Check

NIEC1345

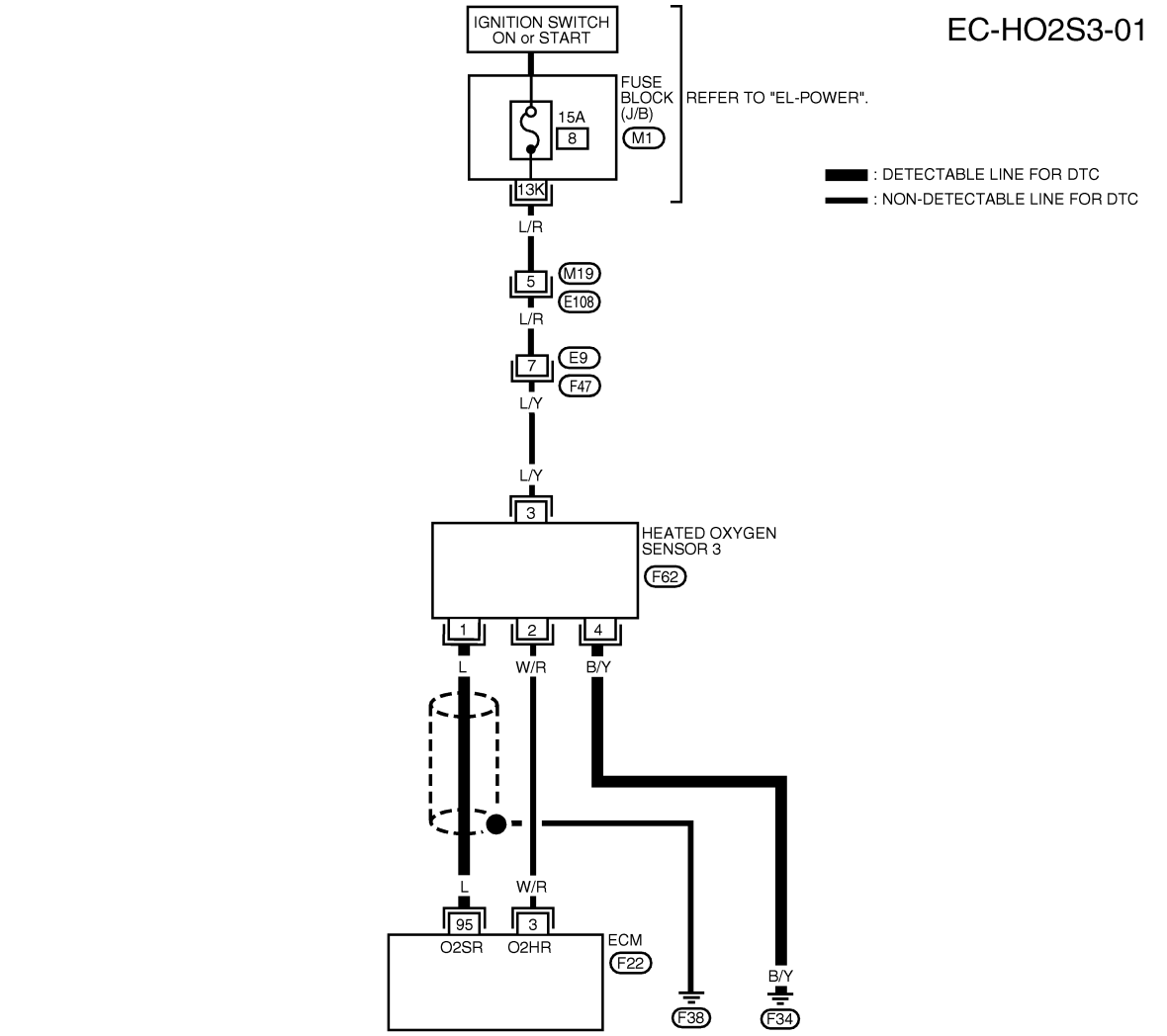
Use this procedure to check the overall function of the rear heated oxygen sensor circuit. During this check, a 1st trip DTC might not be confirmed.

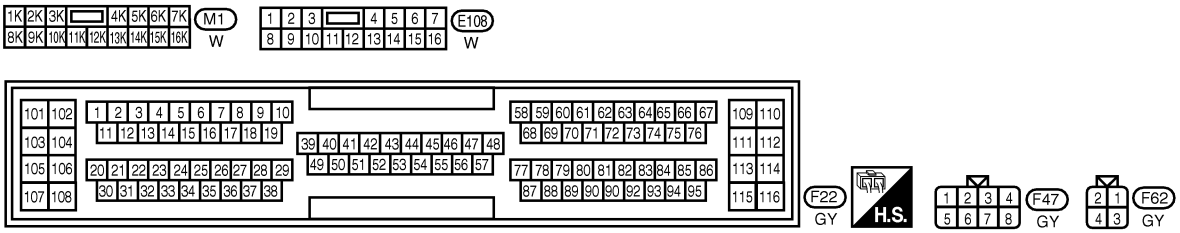
Without CONSULT-II

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 terminals 95 (HO2S3 signal) and engine ground.
4) Check the voltage after revving up to 4,000 rpm under no load at least 10 times.
(Depress and release accelerator pedal as soon as possible.)
The voltage should be below 2V during this procedure.
5) If NG, go to "Diagnostic Procedure", EC-953.

Wiring Diagram

NIEC1346





WEC392

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)
95	L	HEATED OXYGEN SENSOR 3	ENGINE RUNNING FROM IDLE UP TO 2,000 RPM UNDER WARM-UP CONDITION	0 - APPROX. 1.0V

SEF724YB

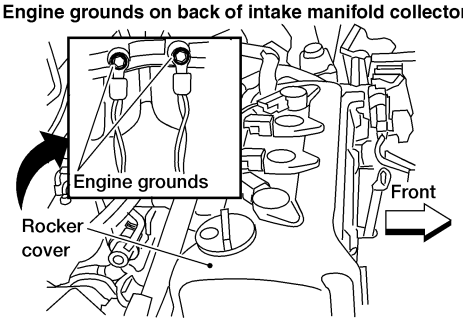
Diagnostic Procedure

NIEC1347

1	RETIGHTEN GROUND SCREWS

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

Engine grounds on back of intake manifold collector

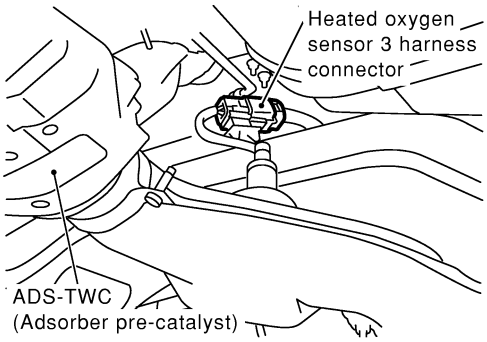


WEC249

	▶	GO TO 2.

2	CHECK INPUT SIGNAL CIRCUIT

1. Disconnect heated oxygen sensor 3 harness connector and ECM harness connector.



SEF395Z

2. Check harness continuity between ECM terminal 95 and HO2S3 terminal 1.
   Refer to Wiring Diagram.
   Continuity should exist.
3. Check harness continuity between ECM terminal 95 or HO2S3 terminal 1 and ground.
   Refer to Wiring Diagram.
   Continuity should not exist.
4. Also check harness for short to ground and short to power.

OK or NG

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

3	CHECK GROUND CIRCUIT

1. Check harness continuity between HO2S3 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.

Diagnostic Procedure (Cont'd)

4	CHECK HARNESS CONNECTOR	
Check heated oxygen sensor 3 harness connector for water. **Water should not exist.**		
OK or NG		
OK	▶	GO TO 5.
NG	▶	Repair or replace harness connector.

5	CHECK HEATED OXYGEN SENSOR 2 (REAR)	
Refer to "Component Inspection", EC-954.		
OK or NG		
OK	▶	GO TO 6.
NG	▶	Replace corresponding heated oxygen sensor 3.

6	CHECK INTERMITTENT INCIDENT	
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-842.		
	▶	**INSPECTION END**

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
A/F SEN1 (B1)	XXX V
HO2S2 (B1)	XXX V
HO2S3 (B1)	XXX V

SEF519Z

Component Inspection

NIEC1348

HEATED OXYGEN SENSOR 3

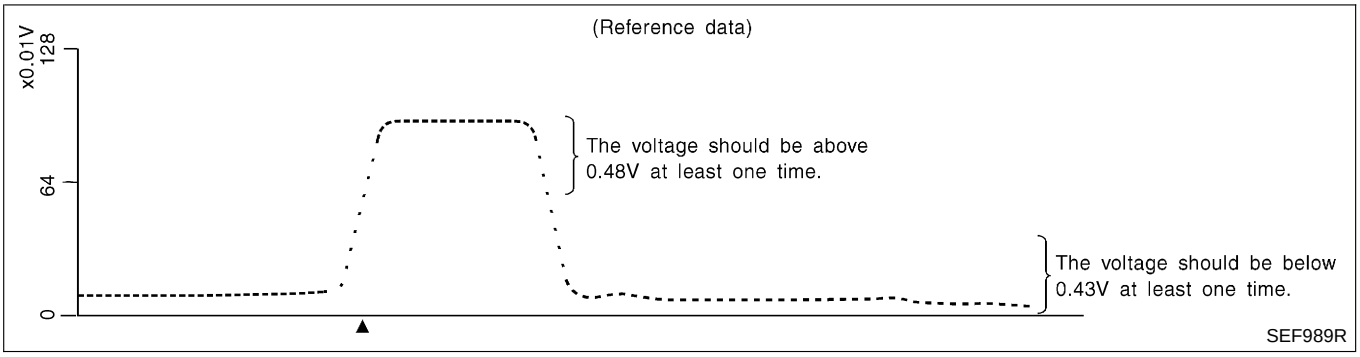
NIEC1348S01

With CONSULT-II

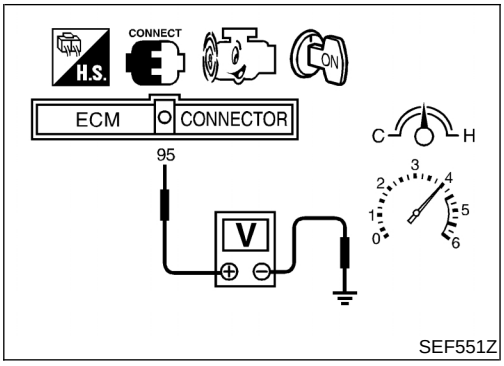
1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S3 (B1)" as the monitor item with CONSULT-II.
4) Check "HO2S3 (B1)" at idle speed when adjusting "FUEL INJECTION" to ±25%.
   "HO2S3 (B1)" should be above 0.48V at least once when the "FUEL INJECTION" is +25%.
   "HO2S3 (B1)" should be below 0.43V at least once when the "FUEL INJECTION" is −25%.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**



SEF989R



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 terminals 95 (HO2S3 signal) and engine ground.
4) Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
(Depress and release accelerator pedal as soon as possible.)
The voltage should be above 0.48V at least once.
If the voltage is above 0.48V at step 4, step 5 is not necessary.
5) Check the voltage when revving up to 6,000 rpm under no load. Or keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with "OD" OFF.
The voltage should be below 0.43V at least once.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Description

NIEC1349

SYSTEM DESCRIPTION

NIEC1349S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE)	Engine speed	Heated oxygen sensor 3 heater control	Heated oxygen sensor 3 heater
Crankshaft position sensor (POS)			

The ECM performs ON/OFF control of the heated oxygen sensor 3 heater corresponding to the engine speed.

OPERATION

NIEC1349S02

Engine speed rpm	Heated oxygen sensor 3 heater
Above 3,600	OFF
Below 3,600	ON

On Board Diagnosis Logic

NIEC1350

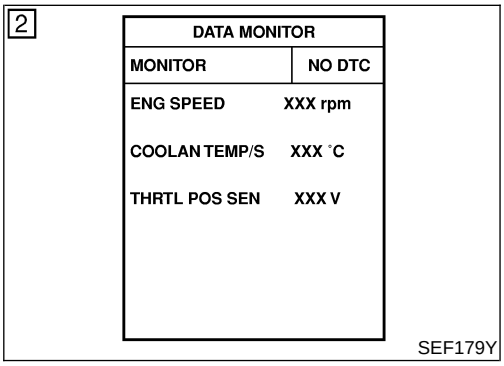
DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0147	• The current amperage in the heated oxygen sensor 3 heater circuit is out of the normal range. (An improper voltage drop signal is sent to ECM through the heated oxygen sensor 3 heater.)	• Harness or connectors (The heated oxygen sensor 3 heater circuit is open or shorted.) • Heated oxygen sensor 3 heater

DTC Confirmation Procedure

NIEC1351

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 in between 10.5V and 16V at idle.



With CONSULT-II

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 and let engine idle for at least 6 seconds.
4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-959.

With GST

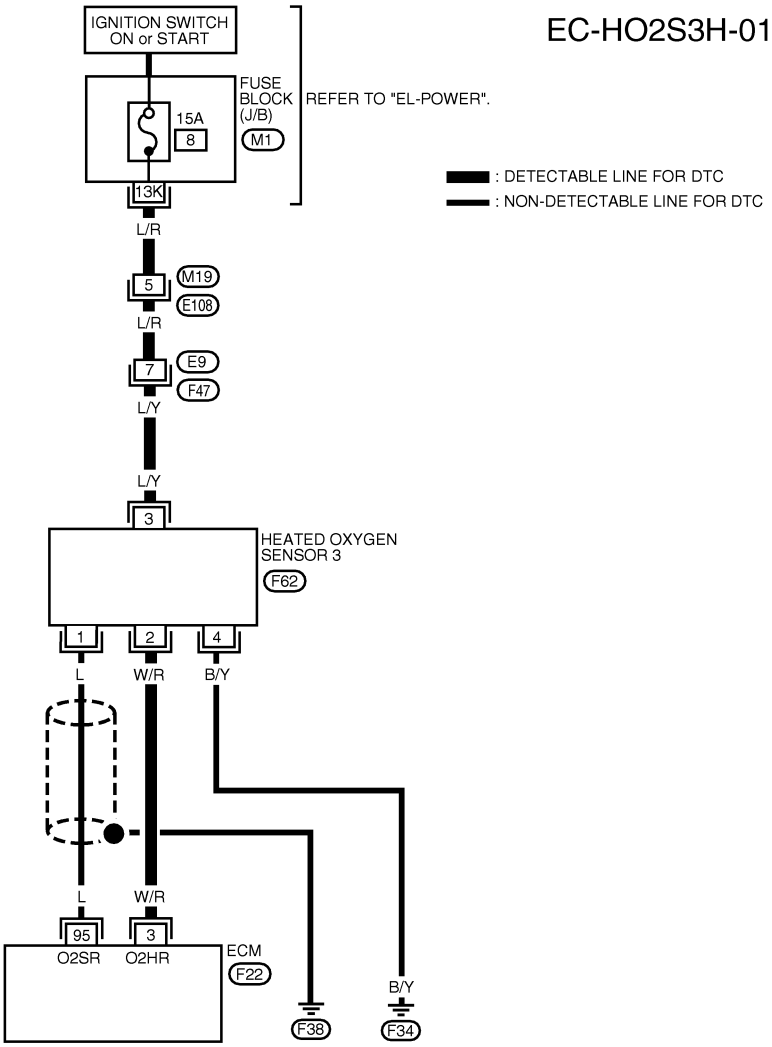
1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.

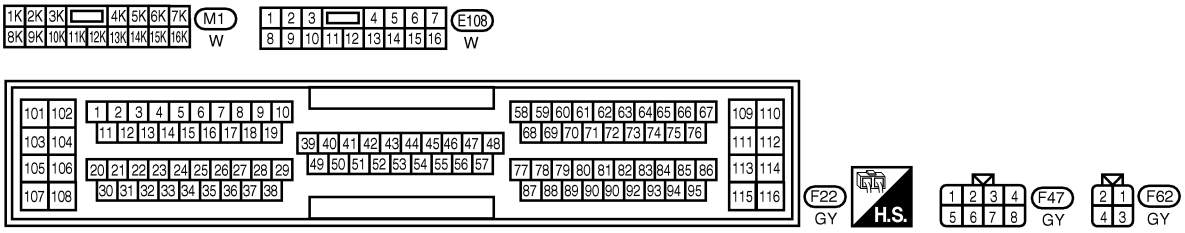
2) Stop vehicle and let engine idle for at least 6 seconds.
3) Turn ignition switch "OFF" and wait at least 5 seconds.
4) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
5) Stop vehicle and let engine idle for at least 6 seconds.
6) Select "MODE 3" with GST.
7) If DTC is detected, go to "Diagnostic Procedure", EC-959.

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

=NIEC1352





WEC393

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	W/R	HEATED OXYGEN SENSOR 3 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

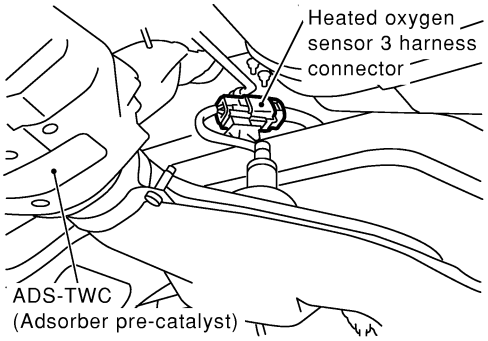
SEF728YB

Diagnostic Procedure

NIEC1353

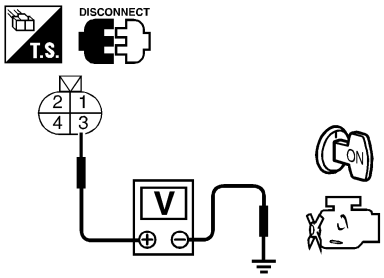
1	CHECK POWER SUPPLY

1. Turn ignition switch “OFF”.
2. Disconnect heated oxygen sensor 3 harness connector.



SEF395Z

3. Turn ignition switch “ON”.
4. Check voltage between rear HO2S3 terminal 3 and ground.



Voltage: Battery voltage

SEF520Z

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E9, F47
- Harness connectors M19, E108
- Fuse block (J/B) connector M1
- 15A fuse
- Harness for open or short between heated oxygen sensor 3 and fuse

	▶	Repair harness or connectors.

3	CHECK GROUND CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between HO2S3 terminal 2 and ECM terminal 3.
   Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

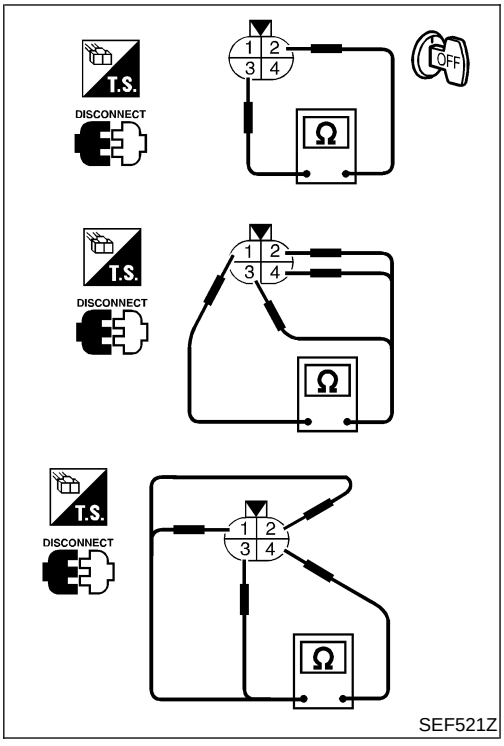
OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

Diagnostic Procedure (Cont'd)

4	CHECK HEATED OXYGEN SENSOR 3 HEATER	
Check HO2S3 heater, refer to "Component Inspection", EC-960.		
OK or NG		
OK	▶	GO TO 5.
NG	▶	Replace corresponding heated oxygen sensor 3.

5	CHECK INTERMITTENT INCIDENT	
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-842.		
	▶	**INSPECTION END**



SEF521Z

Component Inspection

NIEC1354

HEATED OXYGEN SENSOR 3 HEATER

NIEC1354S01

Check the following.

1. Check resistance between terminals 2 and 3.
   Resistance: 2.3 - 4.3Ω at 25°C (77°F)
2. Check continuity.

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

If NG, replace the heated oxygen sensor 3.

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

On Board Diagnosis Logic

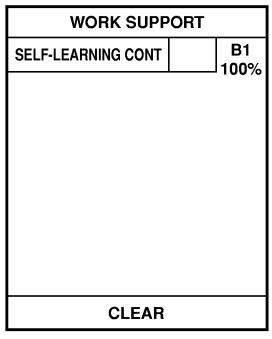
NIEC1355

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 air fuel ratio (A/F) sensor 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios. In case the amount of the compensation value is extremely large (The actual mixture ratio is too lean.), the ECM judges the condition as the fuel injection system malfunction and lights up the MIL (2 trip detection logic).

Sensor	Input Signal to ECM	ECM function	Actuator
Air fuel ratio (A/F) sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection & mixture ratio control	Injectors

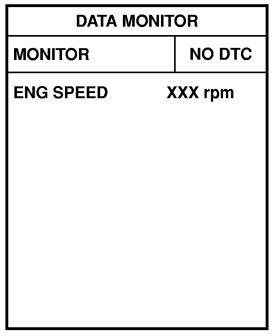
DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0171	• Fuel injection system does not operate properly. • The amount of mixture ratio compensation is too large. (The mixture ratio is too lean.)	• Intake air leaks • Air fuel ratio (A/F) sensor 1 • Injectors • Exhaust gas leaks • Incorrect fuel pressure • Lack of fuel • Mass air flow sensor

4

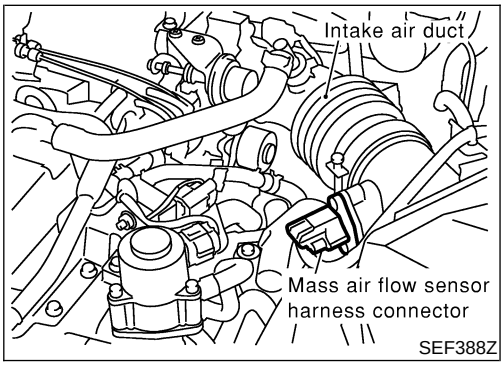


SEF215Z

6



SEF058Y



SEF388Z

DTC Confirmation Procedure

NIEC1356

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

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-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II.
4) Clear the self-learning control coefficient by touching "CLEAR".
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 should be detected at this stage, if a malfunction exists. If so, go to "Diagnostic Procedure", EC-964.
7) If it is difficult to start engine at step 6, the fuel injection system has a malfunction.
8) Crank engine while depressing accelerator pedal. If engine starts, go to "Diagnostic Procedure", EC-964. If engine does not start, visually check for exhaust and intake air leak.

With GST

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 10 seconds.
3) Disconnect mass air flow sensor harness connector. Then restart and run engine for at least 3 seconds at idle speed.
4) Stop engine and reconnect mass air flow sensor harness connector.
5) Select "MODE 7" with GST. Make sure 1st trip DTC P0100 is detected.
6) Select "MODE 4" with GST and erase the 1st trip DTC P0100.

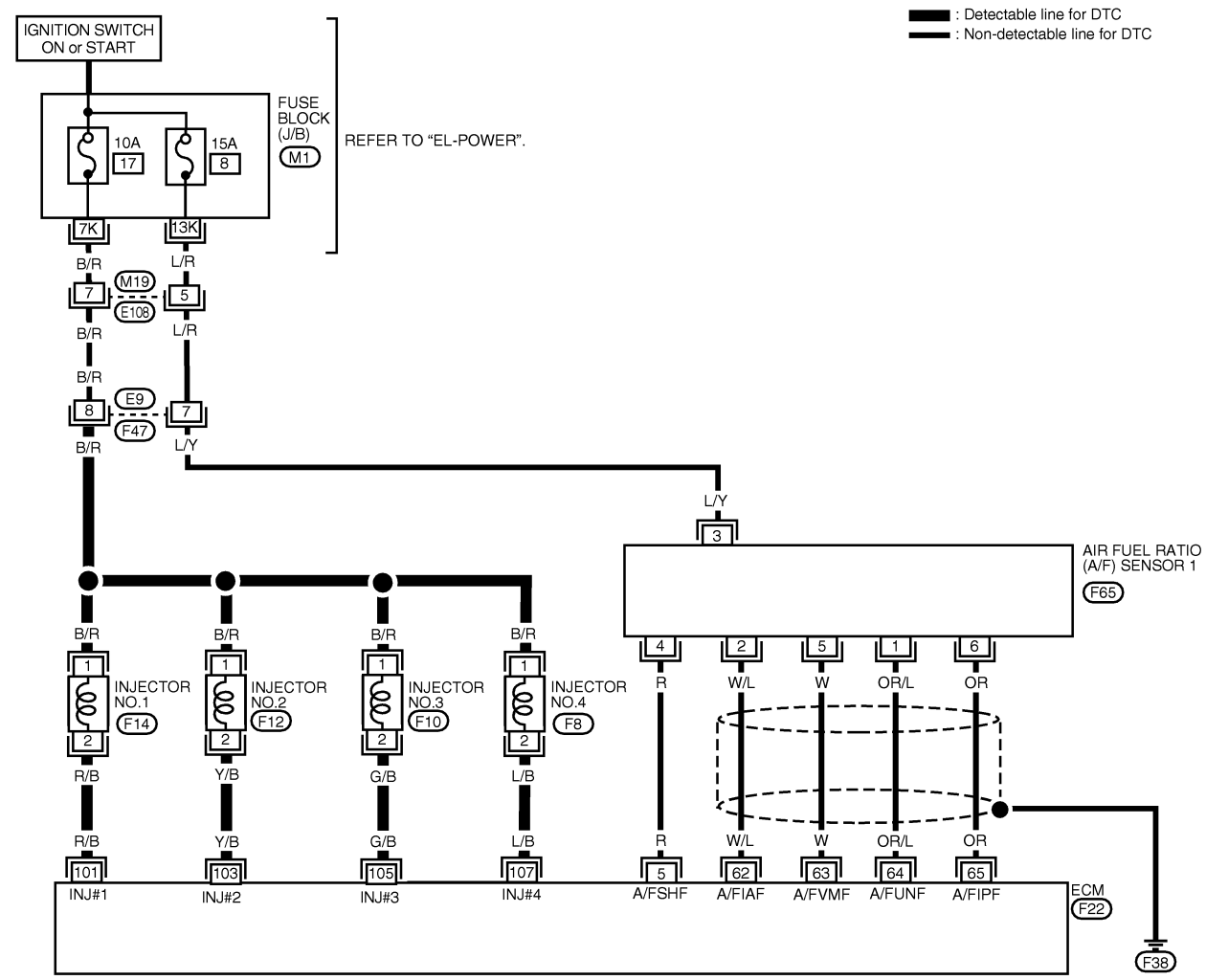
DTC Confirmation Procedure (Cont'd)

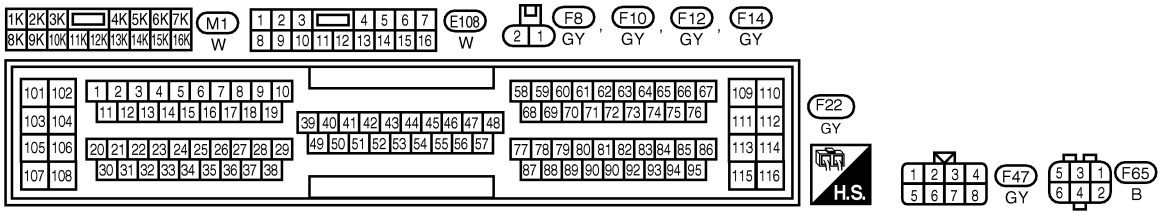
7) Start engine again and run it for at least 10 minutes at idle speed.
8) Select "MODE 7" with GST. The 1st trip DTC P0171 should be detected at this stage, if a malfunction exists. If so, go to "Diagnostic Procedure", EC-964.
9) If it is difficult to start engine at step 8, the fuel injection system has a malfunction.
10) Crank engine while depressing accelerator pedal. If engine starts, go to "Diagnostic Procedure", EC-964. If engine does not start, visually check for exhaust and intake air leak.

Wiring Diagram

NIEC1357

EC-FUEL-01





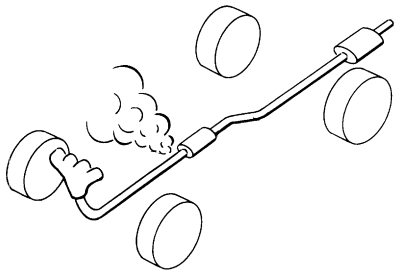
WEC394

Diagnostic Procedure

NIEC1358

1	CHECK EXHAUST AIR LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust air leak before TWC (Manifold three way catalyst).



SEF099P

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair or replace.

2	CHECK FOR INTAKE AIR LEAK

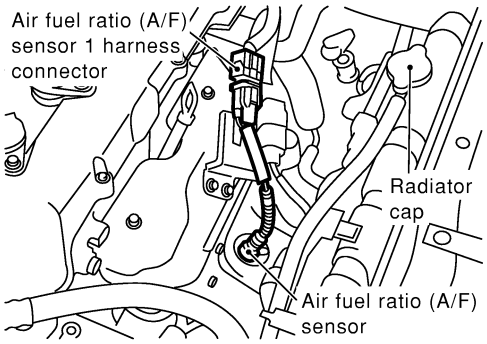
Listen for an intake air leak after the mass air flow sensor.

OK or NG

OK	▶	GO TO 3.
NG	▶	Repair or replace.

3	CHECK AIR FUEL RATIO (A/F) SENSOR 1 CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect A/F sensor 1 harness connector and ECM harness connector.



SEF393Z

3. Check harness continuity between ECM terminals and A/F sensor 1 terminals as follows. Refer to Wiring Diagram.

ECM terminal	A/F sensor 1
62	2
63	5
64	1
65	6

MTBL0538

Continuity should exist.

4. Check harness continuity between ECM terminals 62, 63, 64, 65 and ground, or A/F sensor 1 terminals 1, 2, 5, 6 and ground. Refer to Wiring Diagram.
   Continuity should not exist.
5. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK FUEL PRESSURE

1. Release fuel pressure to zero. Refer to EC-744.
2. Install fuel pressure gauge and check fuel pressure.
   At idling:
   350 kPa (3.57 kg/cm^2, 51 psi)

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART

Check the following.
- Fuel pump and circuit Refer to EC-1338.
- Fuel lines. Refer to ***MA-19***, "Checking Fuel Lines".
- Fuel filter for clogging

OK or NG

OK	▶	Replace fuel pressure regulator.
NG	▶	Repair or replace.

Diagnostic Procedure (Cont'd)

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.
   at idling: 1.4 - 4.0 g·m/sec
   at 2,500 rpm: 5.0 - 10.0 g·m/sec

With GST

1. Install all removed parts.
2. Check mass air flow sensor signal in MODE 1 with GST.
   at idling: 1.4 - 4.0 g·m/sec
   at 2,500 rpm: 5.0 - 10.0 g·m/sec

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-850.

7	CHECK FUNCTION OF INJECTORS

With CONSULT-II

1. Start engine.
2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-II.

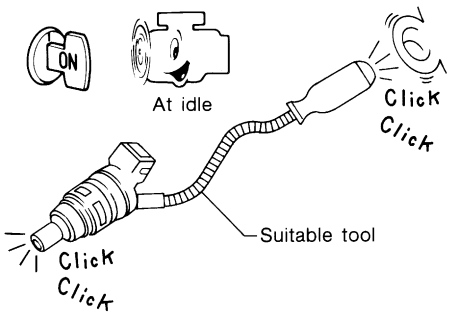
ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
IACV-AAC/V	XXX step

SEF190Y

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

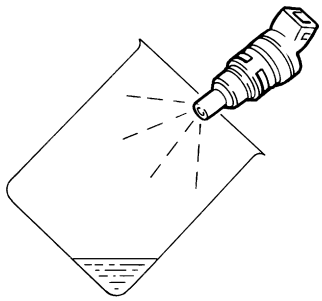
Clicking noise should be heard.

OK or NG

OK	▶	GO TO 8.
NG	▶	Perform trouble diagnosis for "INJECTORS", EC-1329.

8	REMOVE INJECTOR
1. Confirm that the engine is cooled down and there are no fire hazards near the vehicle. 2. Turn ignition switch "OFF". 3. Remove injector with fuel tube assembly. Refer to EC-745. Keep fuel hose and all injectors connected to injector gallery. The injector harness connectors should remain connected.	
▶	GO TO 9.

9	CHECK INJECTOR
1. Disconnect all ignition wires. 2. Place pans or saucers under each injector. 3. Crank engine for about 3 seconds. Make sure that fuel sprays out from injectors.	



SEF595Q

Fuel should be sprayed evenly for each cylinder.

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace injectors from which fuel does not spray out. Always replace O-ring with new one.

10	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-842.	
▶	**INSPECTION END**

On Board Diagnosis Logic

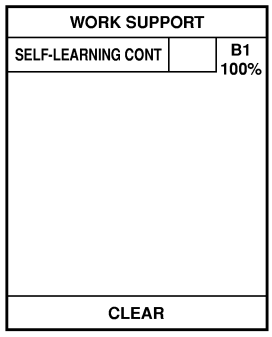
NIEC1359

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 air fuel ratio (A/F) sensor 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios. In case the amount of the compensation value is extremely large (The actual mixture ratio is too rich.), the ECM judges the condition as the fuel injection system malfunction and lights up the MIL (2 trip detection logic).

Sensor	Input Signal to ECM	ECM function	Actuator
Air fuel ratio (A/F) sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection & mixture ratio control	Injectors

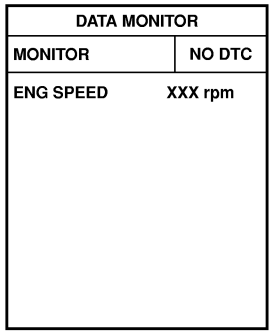
DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0172	• Fuel injection system does not operate properly. • The amount of mixture ratio compensation is too large. (The mixture ratio is too rich.)	• Air fuel ratio (A/F) sensor 1 • Injectors • Exhaust gas leaks • Incorrect fuel pressure • Mass air flow sensor

4

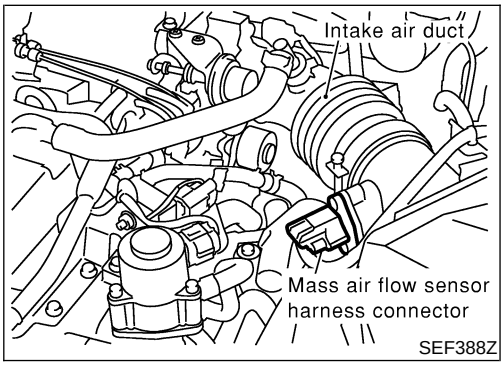


SEF215Z

6



SEF058Y



SEF388Z

DTC Confirmation Procedure

NIEC1360

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

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-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
4) Clear the self-learning control coefficient by touching “CLEAR” or “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 should be detected at this stage, if a malfunction exists. If so, go to “Diagnostic Procedure”, EC-971.
7) If it is difficult to start engine at step 6, the fuel injection system has a malfunction.
8) Crank engine while depressing accelerator pedal. If engine starts, go to “Diagnostic Procedure”, EC-971. If engine does not start, remove ignition plugs and check for fouling, etc.

With GST

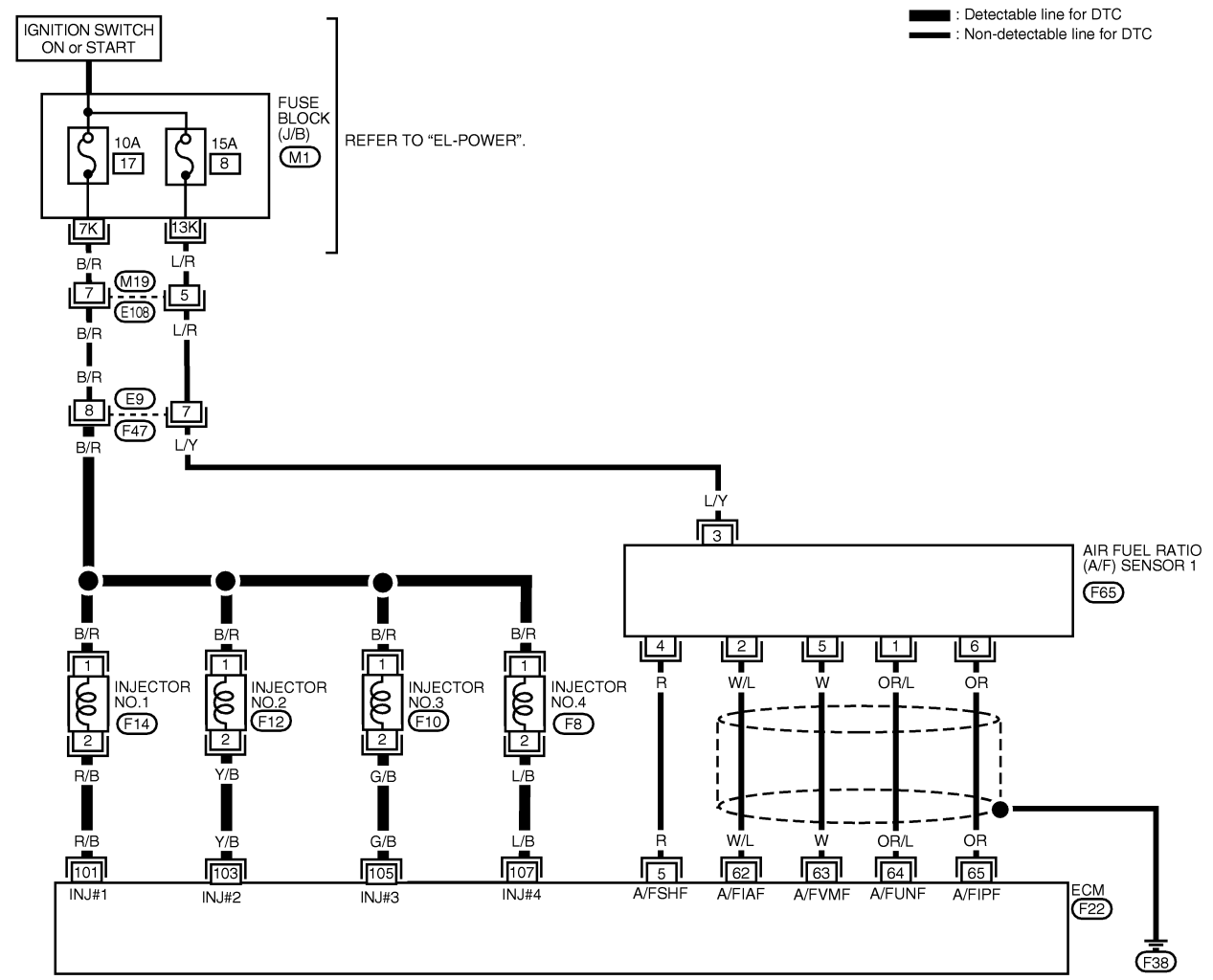
1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch “OFF” and wait at least 10 seconds.
3) Disconnect mass air flow sensor harness connector. Then restart and run engine for at least 3 seconds at idle speed.
4) Stop engine and reconnect mass air flow sensor harness connector.
5) Select “MODE 7” with GST. Make sure 1st trip DTC P0100 is detected.
6) Select “MODE 4” with GST and erase the 1st trip DTC P0100.

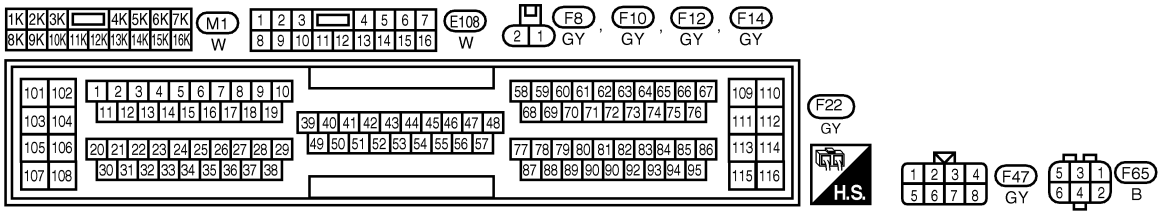
7) Start engine again and run it for at least 10 minutes at idle speed.
8) Select "MODE 7" with GST. The 1st trip DTC P0172 should be detected at this stage, if a malfunction exists. If so, go to "Diagnostic Procedure", EC-971.
9) If it is difficult to start engine at step 8, the fuel injection system has a malfunction.
10) Crank engine while depressing accelerator pedal.
If engine starts, go to "Diagnostic Procedure", EC-971. If engine does not start, remove ignition plugs and check for fouling, etc.

Wiring Diagram

NIEC1361

EC-FUEL-01





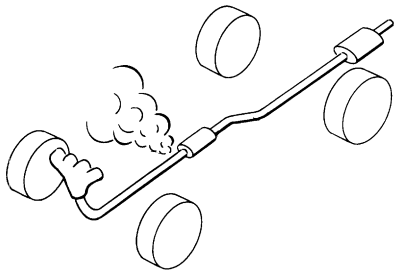
WEC394

Diagnostic Procedure

NIEC1362

1	CHECK FOR EXHAUST AIR LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust air leak before TWC (Manifold three way catalyst).



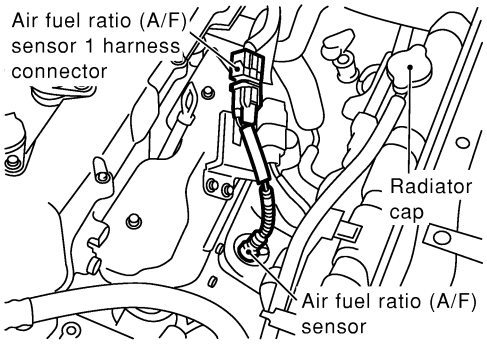
SEF099P

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair or replace.

2	CHECK AIR FUEL RATIO (A/F) SENSOR 1 CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect A/F sensor 1 harness connector and ECM harness connector.



SEF393Z

3. Check harness continuity between ECM terminals and A/F sensor 1 terminals as follows.
   Refer to Wiring Diagram.

ECM terminal	A/F sensor 1
62	2
63	5
64	1
65	6

MTBL0538

Continuity should exist.

4. Check harness continuity between ECM terminals 62, 63, 64, 65 and ground, or A/F sensor 1 terminals 1, 2, 5, 6 and ground.
   Refer to Wiring Diagram.
   Continuity should not exist.
5. Also check harness for short to ground and short to power.

OK or NG

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

Diagnostic Procedure (Cont'd)

3	CHECK FUEL PRESSURE

1. Release fuel pressure to zero.
   Refer to EC-744.
2. Install fuel pressure gauge and check fuel pressure.
   At idling:
   Approximately 350 kPa (3.57 kg/cm^2, 51 psi)

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Fuel pump and circuit (Refer to EC-1338.)

OK or NG

OK	▶	Replace fuel pressure regulator.
NG	▶	Repair or replace.

5	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.
   at idling: 1.4 - 4.0 g·m/sec
   at 2,500 rpm: 5.0 - 10.0 g·m/sec

With GST
1. Install all removed parts.
2. Check mass air flow sensor signal in MODE 1 with GST.
   at idling: 1.4 - 4.0 g·m/sec
   at 2,500 rpm: 5.0 - 10.0 g·m/sec

OK or NG

OK	▶	GO TO 6.
NG	▶	Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-850.

6	CHECK FUNCTION OF INJECTORS

With CONSULT-II

1. Start engine.
2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-II.

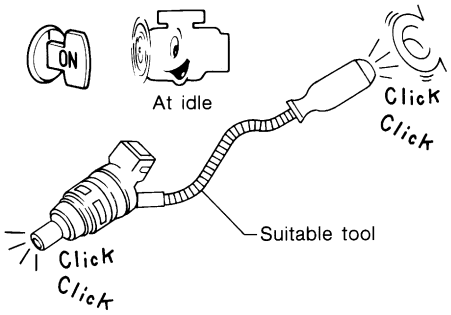
ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
IACV-AAC/V	XXX step

SEF190Y

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 7.
NG	▶	Perform trouble diagnosis for "INJECTORS", EC-1329.

7	REMOVE INJECTOR

1. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
2. Turn ignition switch "OFF".
3. Remove injector assembly. Refer to EC-745.
   Keep fuel hose and all injectors connected to injector gallery.

	▶	GO TO 8.

8	CHECK INJECTOR

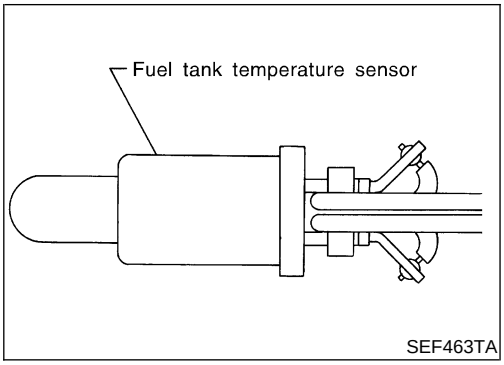
1. Disconnect all injector harness connectors.
2. Disconnect all ignition coil harness connectors.
3. Prepare pans or saucers under each injectors.
4. Crank engine for about 3 seconds.
   Make sure fuel does not drip from injector.

OK or NG

OK (Does not drip)	▶	GO TO 9.
NG (Drips)	▶	Replace the injectors from which fuel is dripping. Always replace O-ring with new one.

Diagnostic Procedure (Cont'd)

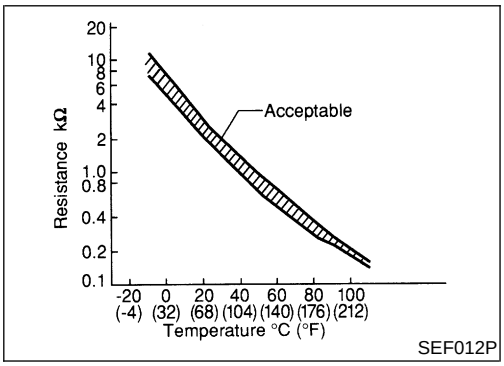
9	**CHECK INTERMITTENT INCIDENT**
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-842.	
▶	**INSPECTION END**



Component Description

NIEC1363

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>

Fluid temperature °C (°F)	Voltage* V	Resistance kΩ
20 (68)	3.5	2.3 - 2.7
50 (122)	2.2	0.79 - 0.90

*: These data are reference values and are measured between ECM terminal 82 (Fuel tank temperature sensor) and ground.

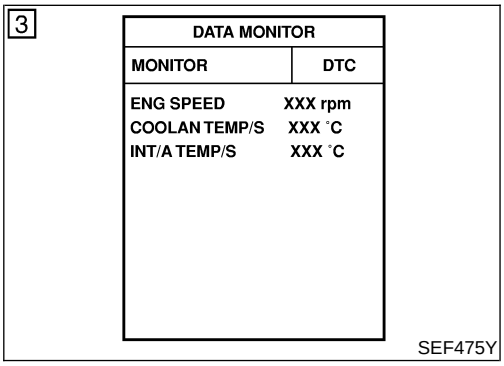
CAUTION:

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

On Board Diagnosis Logic

NIEC1364

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0180	• An excessively high or low voltage is sent to ECM. • Rationally incorrect voltage is sent to ECM, compared with the voltage signals from engine coolant temperature sensor and intake air temperature sensor.	• Harness or connectors (The sensor circuit is open or shorted.) • Fuel tank temperature sensor



DTC Confirmation Procedure

NIEC1365

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

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Wait at least 10 seconds.
   If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-978.

If the result is OK, go to following step.

4) Check "COOLAN TEMP/S" signal.
   If the signal is less than 50°C (122°F), the result will be OK.
   If the signal is above 50°C (122°F), go to the following step.
5) Cool engine down until "COOLAN TEMP/S" signal is less than 50°C (122°F).
6) Wait at least 10 seconds.
7) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-978.

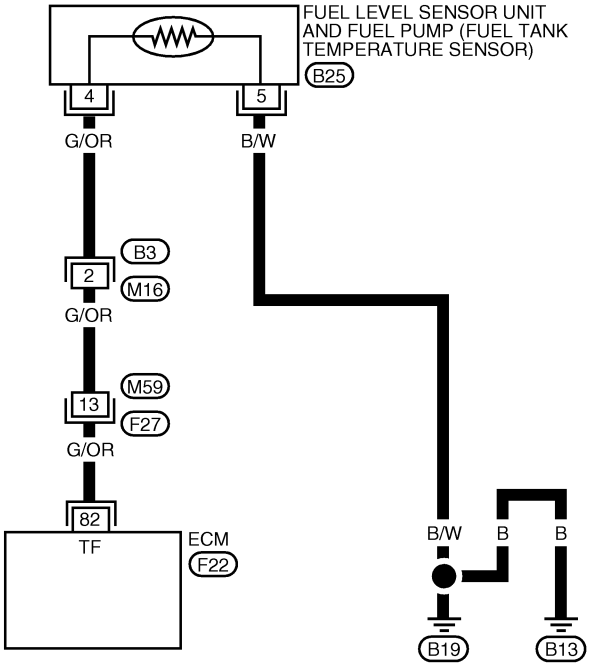
With GST

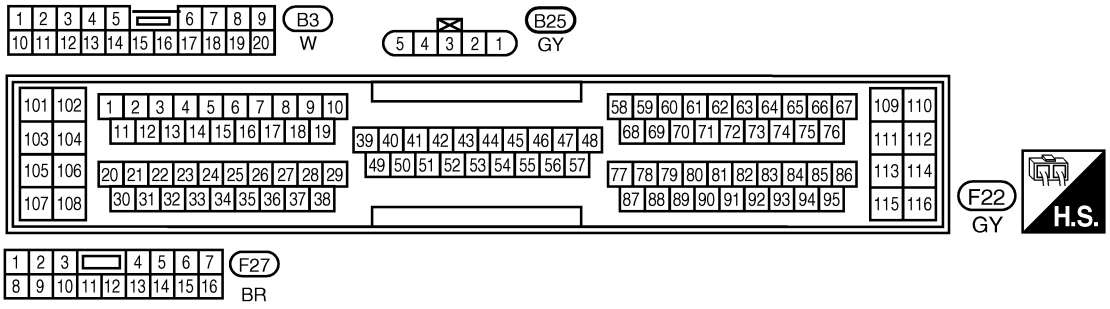
Follow the procedure "With CONSULT-II" above.

Wiring Diagram

NIEC1366

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





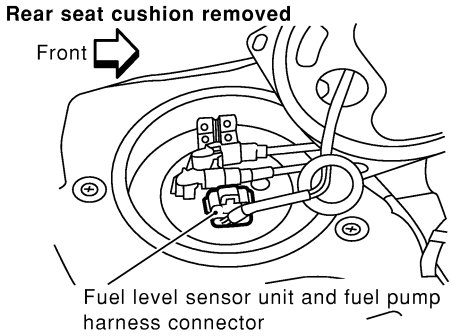
WEC573

Diagnostic Procedure

NIEC1367

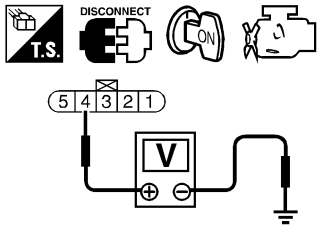
1	CHECK POWER SUPPLY

1. Turn ignition switch “OFF”.
2. Disconnect fuel level sensor unit and fuel pump harness connector.



SEF396Z

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 M59, F27
- Harness connectors B3, M16
- Harness for open or short between ECM and fuel level sensor unit and fuel pump

	▶	Repair harness or connector.

3	CHECK GROUND CIRCUIT

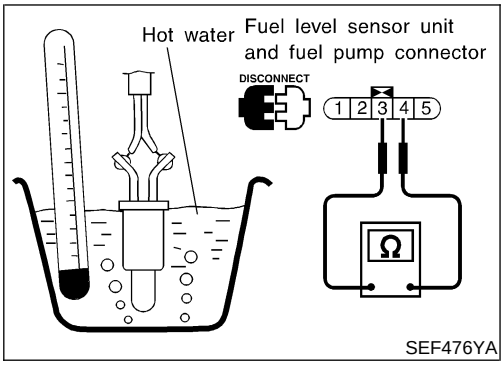
1. Turn ignition switch “OFF”.
2. Check harness continuity between fuel level sensor unit and fuel pump terminal 3 and body ground. Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

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	
Refer to "Component Inspection", EC-979.		
OK or NG		
OK	▶	GO TO 5.
NG	▶	Replace fuel level sensor unit and fuel pump.

5	CHECK INTERMITTENT INCIDENT	
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-842.		
	▶	**INSPECTION END**



Component Inspection

NIEC1368

FUEL TANK TEMPERATURE SENSOR

NIEC1368S01

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

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

If NG, replace fuel level sensor unit and fuel pump.

System Description

NIEC1369

COOLING FAN CONTROL

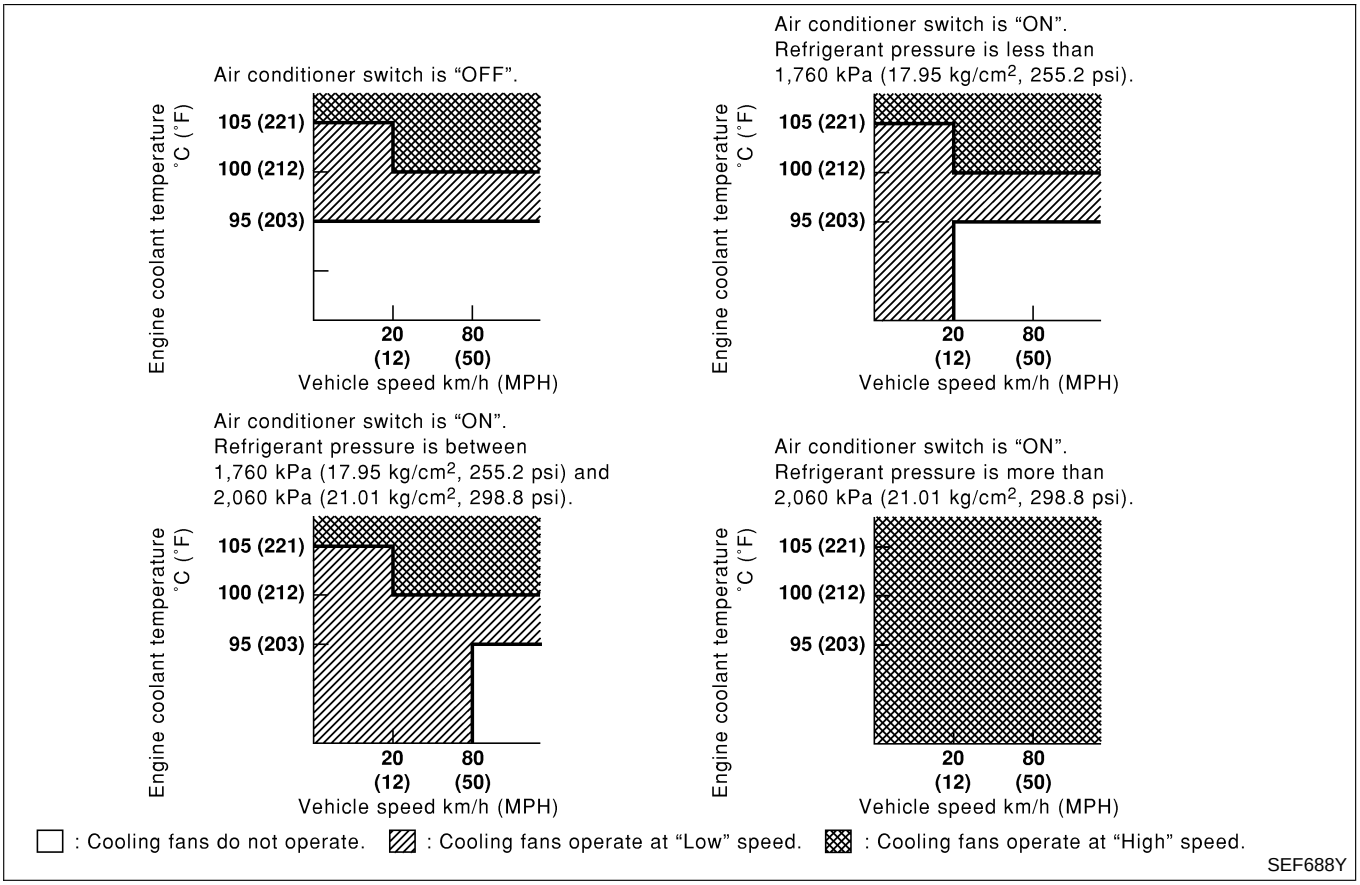
NIEC1369S01

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

NIEC1369S02



CONSULT-II Reference Value in Data Monitor Mode

NIEC1370

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

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

MONITOR ITEM	CONDITION		SPECIFICATION
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

NIEC1371

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

NIEC1372

- 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-997.

CAUTION:

When a malfunction is indicated, be sure to replace the coolant. Refer to *MA-17*, "Changing Engine Coolant". Also, replace the engine oil. Refer to *MA-20*, "Changing 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-15*, "Anti-Freeze Coolant Mixture Ratio".**
2) **After refilling coolant, run engine to ensure that no water-flow noise is emitted.**

Overall Function Check

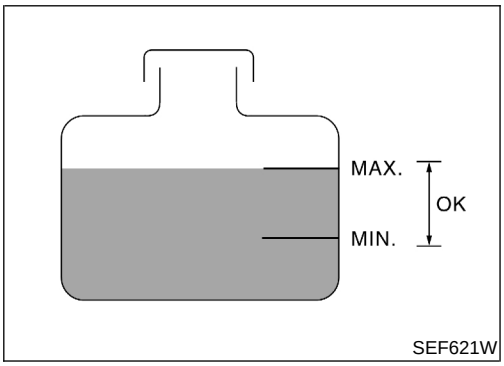
NIEC1373

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

NIEC1373S01

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-986.
- If the coolant mixture ratio is out of the range of 45 to 55%, replace the coolant in the following procedure ***MA-17***, “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-15***, “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-986. 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-19*** “TROUBLE DIAGNOSES”. After repair, go to the next step.

5) Perform “ENG COOLANT TEMP” in “ACTIVE TEST” mode with CONSULT-II at idle.

a) Set “ENG COOLANT TEMP” to 95°C (203°F) and make sure that cooling fan operates at low speed.
If NG, go to “Diagnostic Procedure”, EC-986.

b) Set “ENG COOLANT TEMP” to 105°C (221°F) and make sure that cooling fan operates at high speed. If NG, go to “Diagnostic Procedure”, EC-986. 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-986. 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-986.
If NG, replace ECT sensor and go to the next step.

9) Check ignition timing. Refer to "Basic Inspection", EC-802.
Make sure that ignition timing is 9°±2° at idle.
If NG, follow the procedure under "Basic Inspection".

WITH GST

NIEC1373S02

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-986.
- If the coolant mixture ratio is out of the range of 45 to 55%, replace the coolant in the following procedure ***MA-17***, "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-15***, "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-986. 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-19***, "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-986. 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-986. 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.

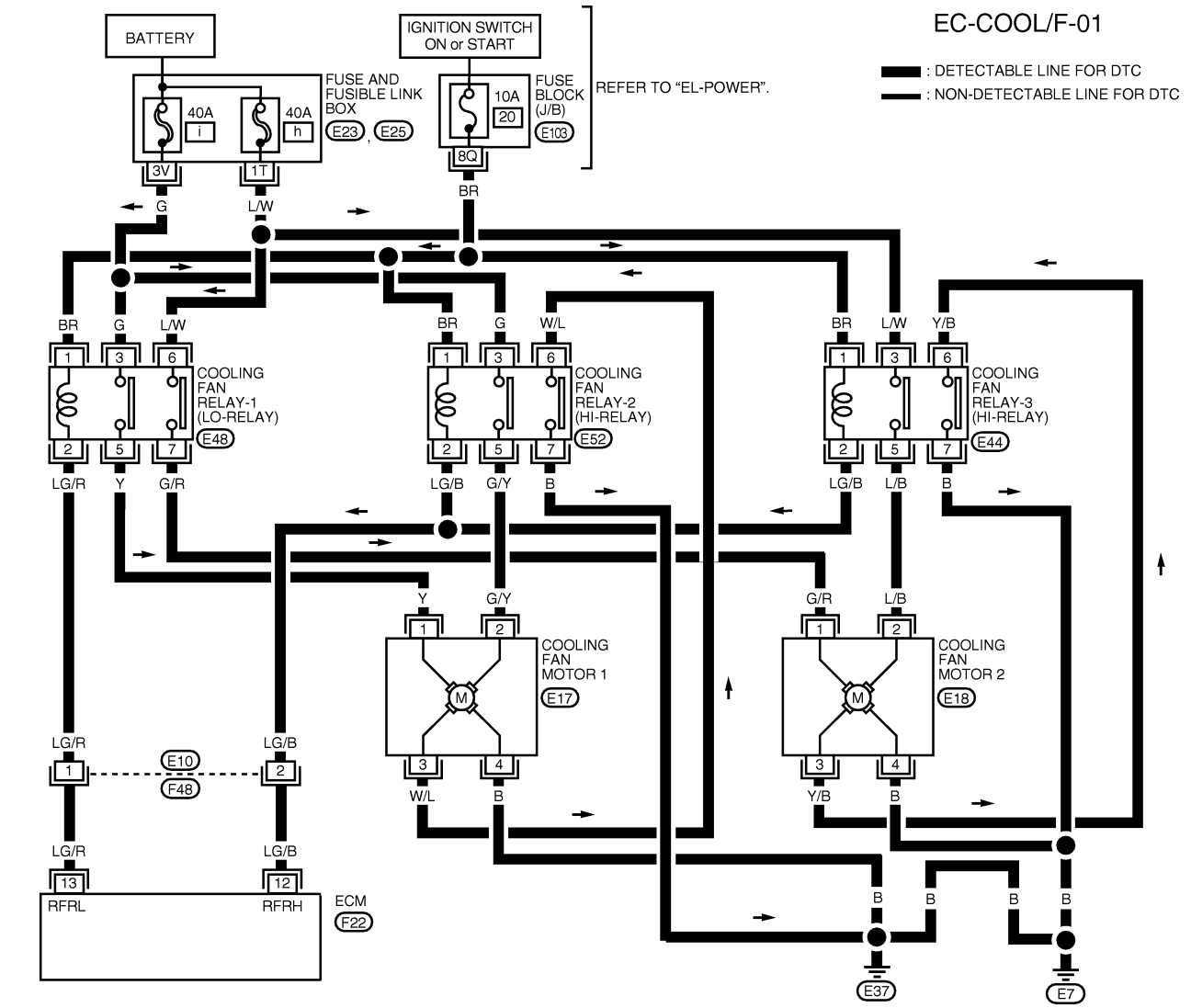
b) Check the front end for clogging caused by insects or debris.

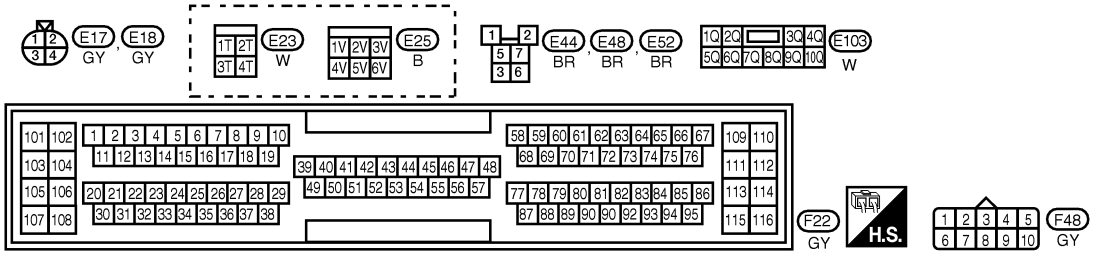
c) Check for improper fitting of front-end cover, damaged radiator grille or bumper, damaged vehicle front.
If NG, take appropriate action and then go to the next step.

11) Check function of ECT sensor.
Refer to step 6 of "Diagnostic Procedure", EC-986.
If NG, replace ECT sensor and go to the next step.
12) Check ignition timing. Refer to "Basic Inspection", EC-802.
Make sure that ignition timing is 9°±2° at idle.
If NG, follow the procedure under "Basic Inspection".

Wiring Diagram

=NIEC1374





LEC222

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)
12	LG/B	COOLING FAN RELAY (HIGH)	ENGINE RUNNING WITH COOLING FAN NOT OPERATING	BATTERY VOLTAGE
			ENGINE RUNNING WITH COOLING FAN OPERATING AT HIGH SPEED	0 - 0.6V
13	LG/R	COOLING FAN RELAY (LOW)	ENGINE RUNNING WITH COOLING FAN NOT OPERATING	BATTERY VOLTAGE
			ENGINE RUNNING WITH COOLING FAN OPERATING AT LOW SPEED	0 - 0.6V

SEF571Y

Diagnostic Procedure

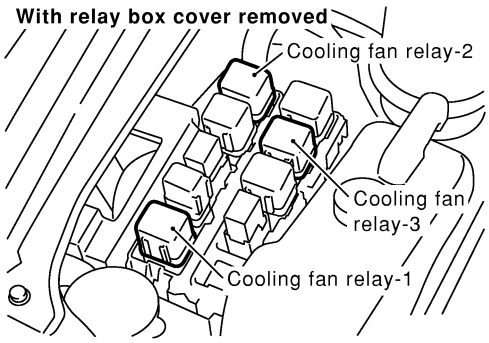
NIEC1375

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.



SEF397Z

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-992.)

3	CHECK COOLING FAN HIGH SPEED OPERATION

With CONSULT-II

1. Turn ignition switch "OFF".
2. Reconnect cooling fan relays-2 and -3.
3. Turn ignition switch "ON".
4. Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT-II.

ACTIVE TEST	
COOLING FAN	OFF
MONITOR	
COOLAN TEMP/S	XXX °C

SEF646X

5. Make sure that cooling fans-1 and -2 operate at high speed.

OK or NG

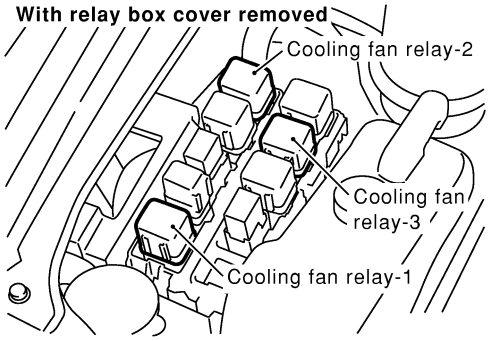
OK	▶	GO TO 6.
NG	▶	Check cooling fan high speed control circuit. (Go to PROCEDURE B, EC-995.)

Diagnostic Procedure (Cont'd)

4	CHECK COOLING FAN LOW SPEED OPERATION

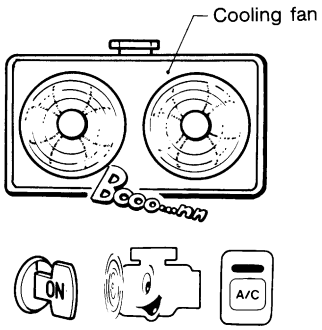
Without CONSULT-II

1. Disconnect cooling fan relays-2 and -3.



SEF397Z

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

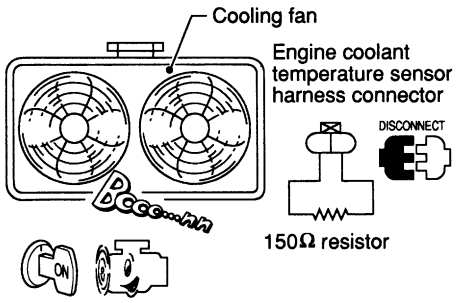
OK or NG

OK	▶	GO TO 5.
NG	▶	Check cooling fan low speed control circuit. (Go to PROCEDURE A, EC-992.)

5	CHECK COOLING FAN HIGH SPEED OPERATION

Without CONSULT-II

1. Turn ignition switch "OFF".
2. Reconnect cooling fan relays-2 and -3.
3. Turn air conditioner switch and blower fan switch "OFF".
4. Disconnect engine coolant temperature sensor harness connector.
5. Connect 150Ω resistor to engine coolant temperature sensor harness connector.
6. Restart engine and make sure that cooling fans-1 and -2 operate at high speed.



MEC475B

OK or NG

OK	▶	GO TO 6.
NG	▶	Check cooling fan high speed control circuit. (Go to PROCEDURE B, EC-995.)

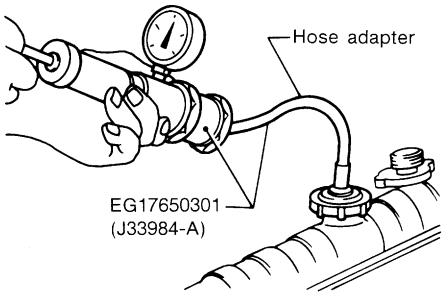
6	CHECK COOLING SYSTEM FOR LEAK

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.

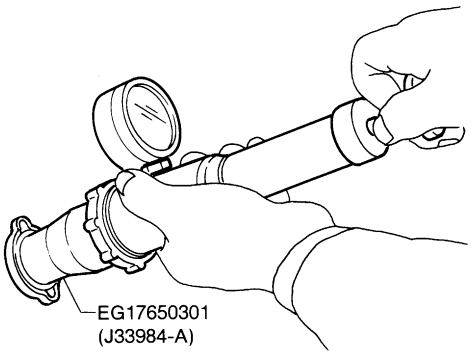
- Hose
- Radiator
- Water pump (Refer to ***LC-13***, "Water Pump".)

	▶	Repair or replace.

Diagnostic Procedure (Cont'd)

8	CHECK RADIATOR CAP

Apply pressure to cap with a tester and check radiator cap relief pressure.



SLC755A

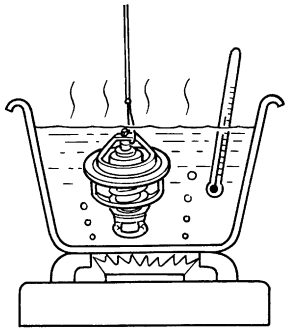
Radiator cap relief pressure:
59 - 98 kPa (0.6 - 1.0 kg/cm^2, 9 - 14 psi)

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:
76.5°C (170°F) [standard]
Valve lift:
More than 9 mm/90°C (0.35 in/194°F)

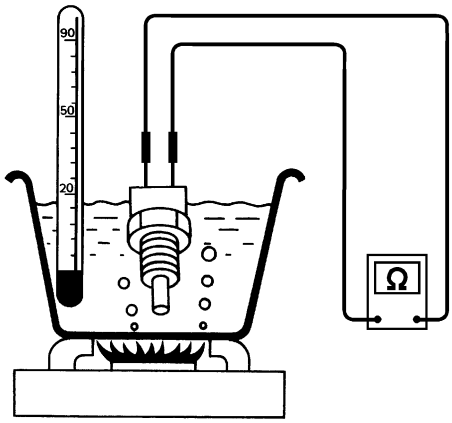
4. Check if valve is closed at 5°C (9°F) below valve opening temperature. For details, refer to ***LC-15***, "Thermostat".

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace thermostat

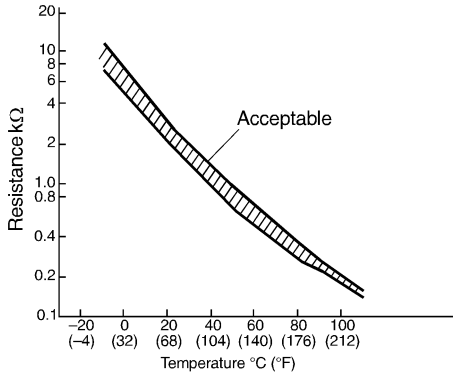
10	CHECK ENGINE COOLANT TEMPERATURE SENSOR

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-997.

▶ **INSPECTION END**

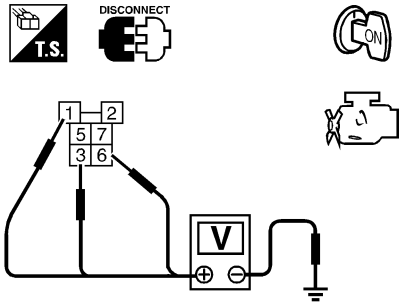
Diagnostic Procedure (Cont'd)

PROCEDURE A

=NIEC1375S01

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.



SEF477Y

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

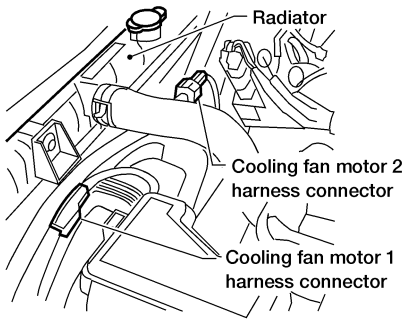
2	DETECT MALFUNCTIONING PART

Check the following.
- 10A fuse
- 40A fusible 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.



LEC320

3. Check harness continuity between cooling fan relay-1 terminal 5 and cooling fan motor-1 terminal 1, cooling fan motor-1 terminal 4 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 1, cooling fan motor-2 terminal 4 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 13 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

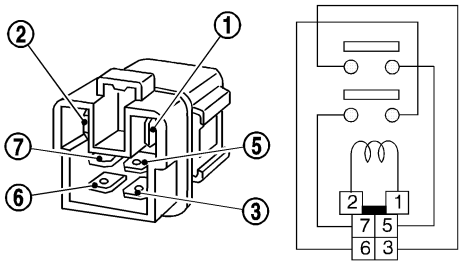
Check the following.
- Harness connectors E10, F48
- Harness for open or short between cooling fan relay-1 and ECM

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

Diagnostic Procedure (Cont'd)

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

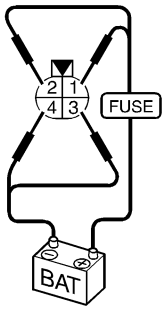
SEF591X

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.



Cooling fan motor -1 or -2 harness connector

	Speed	Terminals	
		(+)	(−)
Cooling fan motor -1 or -2	Low	1	4
	High	1, 2	3, 4

SEF937X

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace cooling fan motors.

8	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-842.

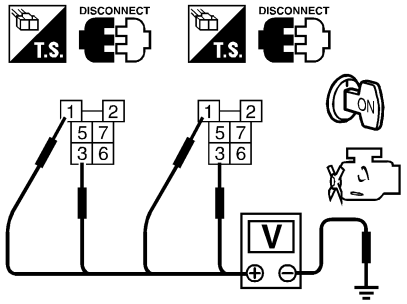
▶ **INSPECTION END**

PROCEDURE B

=NIEC1375S02

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.
- Harness for open or short between cooling fan relays-2 and -3 and fuse
- Harness for open or short between cooling fan relays-2 and -3 and fusible link

	▶	Repair harness or connectors.

3	CHECK 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 2, cooling fan relay-2 terminal 6 and cooling fan motor-1 terminal 3, cooling fan relay-2 terminal 7 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 2, cooling fan relay-3 terminal 6 and cooling fan motor-2 terminal 3, cooling fan relay-3 terminal 7 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 12 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

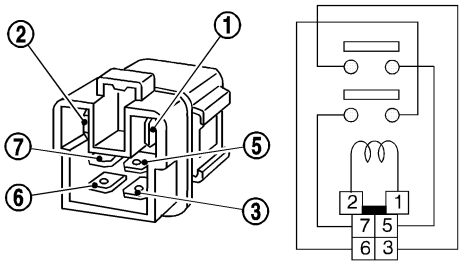
OK	▶	GO TO 6.
NG	▶	GO TO 5.

Diagnostic Procedure (Cont'd)

5	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E10, F48 ● 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

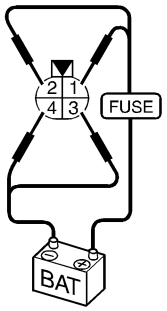
SEF591X

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace cooling fan relays.

7	CHECK COOLING FAN MOTORS-1 AND -2

Supply battery voltage between the following terminals and check operation.



Cooling fan motor -1 or -2 harness connector

	Speed	Terminals (+)	Terminals (–)
Cooling fan motor -1 or -2	Low	1	4
	High	1, 2	3, 4

SEF937X

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace cooling fan motors.

8	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-842.	
▶	**INSPECTION END**

Main 12 Causes of Overheating

NIEC1376

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-13***, "RECOMMENDED FLUIDS AND LUBRICANTS".
	3	• Coolant level	• Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	See ***MA-17***, "Changing Engine Coolant".
	4	• Radiator cap	• Pressure tester	59 - 98 kPa (0.6 - 1.0 kg/cm^2, 9 - 14 psi) (Limit)	See ***LC-10***, "System Check".
ON*2	5	• Coolant leaks	• Visual	No leaks	See ***LC-10***, "System Check".
ON*2	6	• Thermostat	• Touch the upper and lower radiator hoses	Both hoses should be hot	See ***LC-13***, "Thermostat" and ***LC-15***, "Radiator".
ON*1	7	• Cooling fan	• CONSULT-II	Operating	See trouble diagnosis for DTC P0217 (EC-980).
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-17***, "Changing Engine Coolant".
OFF*4	10	• Coolant return from reservoir tank to radiator	• Visual	Should be initial level in reservoir tank	See ***MA-16***, "ENGINE MAINTENANCE".
OFF	11	• Cylinder head	• Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	See ***EM-34***, "Inspection".
	12	• Cylinder block and pistons	• Visual	No scuffing on cylinder walls or piston	See ***EM-55***, "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-19***, "Overheating Cause Analysis".

On Board Diagnosis Logic

NIEC1377

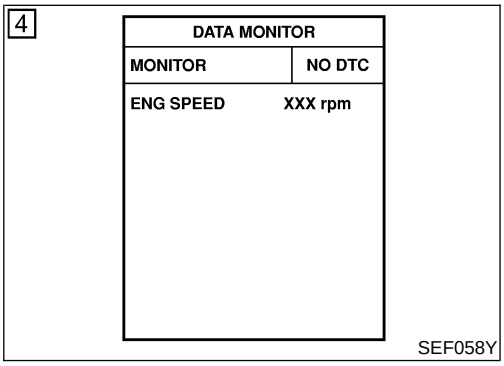
When a misfire occurs, engine speed will fluctuate. If the engine speed fluctuates enough to cause the crankshaft position sensor (POS) signal to vary, the ECM can determine that a misfire is occurring.

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. On the first trip that a misfire condition occurs that can damage the TWC (Manifold three way catalyst) due to overheating, the MIL will blink.
   When a misfire condition occurs, the ECM monitors the crankshaft position sensor (POS) signal every 200 engine revolutions for a change.
   When the misfire condition decreases to a level that will not damage the TWC (Manifold three way catalyst), the MIL will turn off.
   If another misfire condition occurs that can damage the TWC (Manifold three way catalyst) on a second trip, the MIL will blink.
   When the misfire condition decreases to a level that will not damage the TWC (Manifold three way catalyst), the MIL will remain on.
   If another misfire condition occurs that can damage the TWC (Manifold three way catalyst), the MIL will begin to blink again.
2. Two Trip Detection Logic (Exhaust quality deterioration)
   For misfire conditions that will not damage the TWC (Manifold three way catalyst) (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 crankshaft position sensor (POS) signal every 1,000 engine revolutions.
   A misfire malfunction can be detected on any one cylinder or on multiple cylinders.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0300	• Multiple cylinders misfire.	• 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 • Air fuel ratio (A/F) sensor 1
P0301	• No. 1 cylinder misfires.	
P0302	• No. 2 cylinder misfires.	
P0303	• No. 3 cylinder misfires.	
P0304	• No. 4 cylinder misfires.	



DTC Confirmation Procedure

NIEC1378

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

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-999.

With GST
Follow the procedure "With CONSULT-II" above.

Diagnostic Procedure

NIEC1379

1	CHECK FOR INTAKE AIR LEAK	
1. Start engine and run it at idle speed. 2. Listen for the sound of the intake air leak.		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Discover air leak location and repair.

2	CHECK FOR EXHAUST SYSTEM CLOGGING	
Stop engine and visually check exhaust tube, TWC (Manifold three way catalyst) and muffler for dents.		
OK or NG		
OK	▶	GO TO 3.
NG	▶	Repair or replace it.

3	CHECK EGR FUNCTION	
Perform DTC Confirmation Procedure for DTC P1402 EGR FUNCTION (OPEN). Refer to EC-1251.		
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.

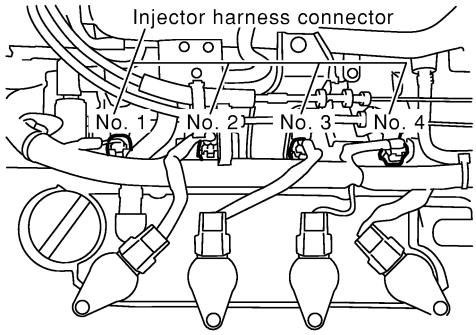
ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
IACV-AAC/V	XXX step

SEF190Y

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?



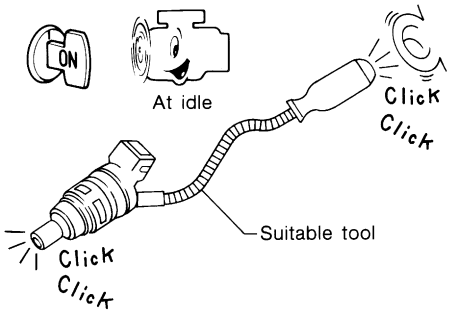
SEF398Z

Yes or No

Yes	▶	GO TO 5.
No	▶	GO TO 8.

5	CHECK INJECTOR

Does each injector make an operating sound at idle?



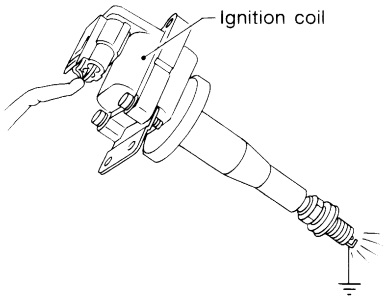
MEC703B

Yes or No

Yes	▶	GO TO 6.
No	▶	Check injector(s) and circuit(s). Refer to EC-1329.

6	CHECK IGNITION SPARK

1. Turn Ignition switch "OFF".
2. Remove ignition coil from the engine.
3. Place end of spark plug against a suitable ground and crank engine.
4. Check for spark properly.



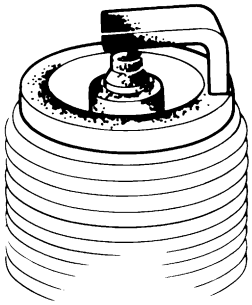
SEF575Q

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	CHECK SPARK PLUGS

Check the spark plugs for fouling, etc.



SEF156I

OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace ignition coil.

8	CHECK COMPRESSION PRESSURE

Refer to ***EM-87***, "Measurement of Compression Pressure".

- Check compression pressure.

Standard:
1,324 kPa (13.5 kg/cm^2, 192 psi)/300 rpm
Minimum:
1,128 kPa (11.5 kg/cm^2, 164 psi)/300 rpm
Difference between each cylinder:
98 kPa (1.0 kg/cm^2, 14 psi)/300 rpm

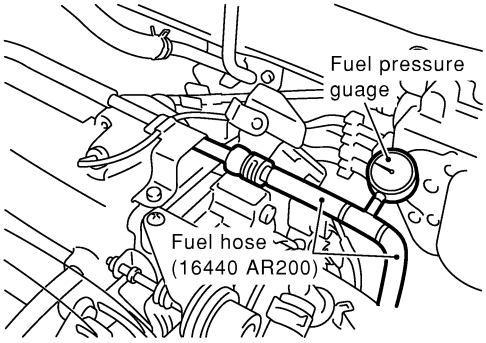
OK or NG

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 any parts removed.
2. Release fuel pressure to zero. Refer to EC-744.
3. Install fuel pressure gauge and check fuel pressure.



SEF399Z

At idle: Approx. 350 kPa (3.57 kg/cm^2, 51 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 EC-1338.
- Fuel lines. Refer to ***MA-19***, "Checking Fuel Lines".
- Fuel filter for clogging

OK or NG

NG	▶	Replace fuel pressure regulator.
OK	▶	Repair or replace.

11	CHECK IGNITION TIMING

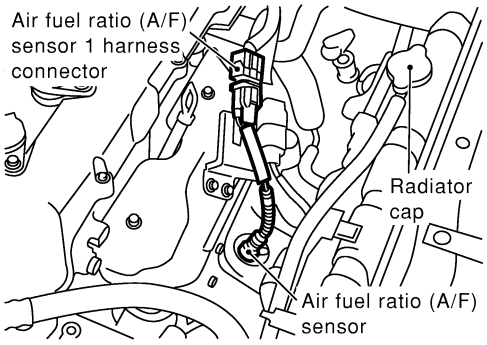
Perform "Basic Inspection", EC-802.

OK or NG

OK	▶	GO TO 12.
NG	▶	Adjust ignition timing.

12	CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector and A/F sensor 1 harness connector.



SEF393Z

3. Check harness continuity between the following terminals. Refer to "Wiring Diagram", EC-1196.

ECM terminal	A/F sensor 1 terminal
62	2
63	5
64	1
65	6

MTBL0542

Continuity should exist.

4. Check harness continuity between ECM terminals 62, 63, 64, 65 or A/F sensor 1 terminals 1, 2, 5, 6 and ground. Refer to Wiring Diagram.
Continuity should not exist.
5. Also check harness for short to power.

OK or NG

OK	▶	GO TO 13.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

13	CHECK A/F SENSOR 1 HEATER

Refer to "Component Inspection", EC-1232.

OK or NG

OK	▶	GO TO 14.
NG	▶	Replace A/F sensor 1.

14	CHECK MASS AIR FLOW SENSOR

With CONSULT-II
Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT-II.
at idling: 1.4 - 4.0 g·m/sec
at 2,500 rpm: 5.0 - 10.0 g·m/sec

With GST
Check mass air flow sensor signal in MODE 1 with GST.
at idling: 1.4 - 4.0 g·m/sec
at 2,500 rpm: 5.0 - 10.0 g·m/sec

OK or NG

OK	▶	GO TO 16.
NG	▶	GO TO 15.

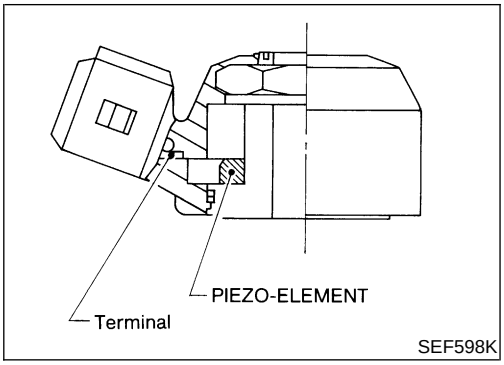
Diagnostic Procedure (Cont'd)

15	CHECK CONNECTORS
Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-850.	
OK or NG	
NG ▶	Repair or replace it.

16	CHECK SYMPTOM MATRIX CHART
Check items on the rough idle symptom in "Symptom Matrix Chart", EC-819.	
OK or NG	
OK ▶	GO TO 17.
NG ▶	Repair or replace.

17	ERASE THE 1ST TRIP DTC
Some tests may cause a 1st trip DTC to be set. Erase the 1st trip DTC from the ECM memory after performing the tests. Refer to EC-770.	
▶	GO TO 18.

18	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-842.	
▶	**INSPECTION END**



SEF598K

Component Description

NIEC1380

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.

2

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

DTC Confirmation Procedure

NIEC1381

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

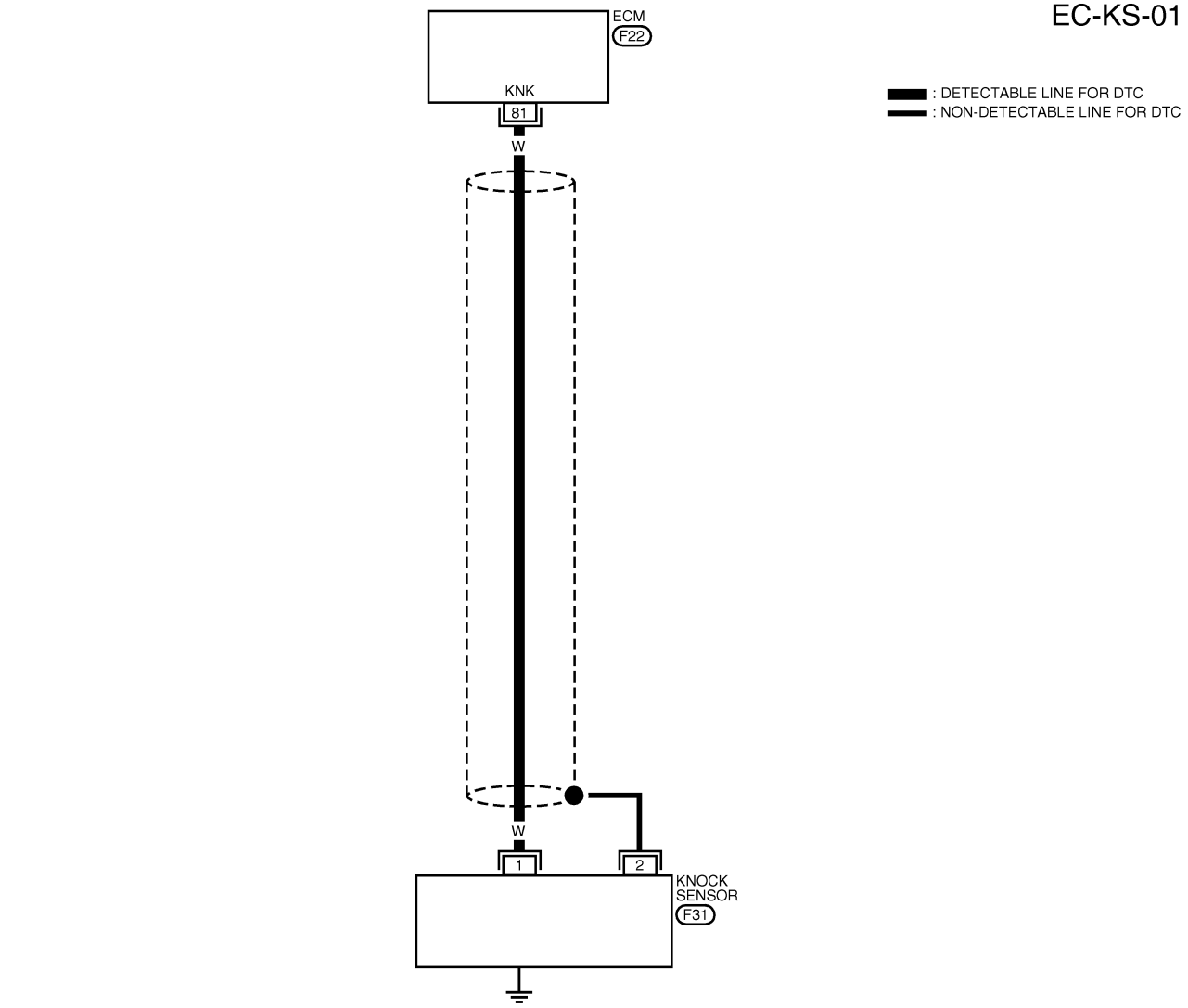
1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
2) Start engine and run it for at least 5 seconds at idle speed.
3) If DTC is detected, go to "Diagnostic Procedure", EC-1007.

With GST

Follow the procedure "With CONSULT-II" above.

Wiring Diagram

NIEC1382



WEC386

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)
81	W	KNOCK SENSOR	ENGINE RUNNING AT IDLE SPEED	APPROX. 2.5V

SEF572Y

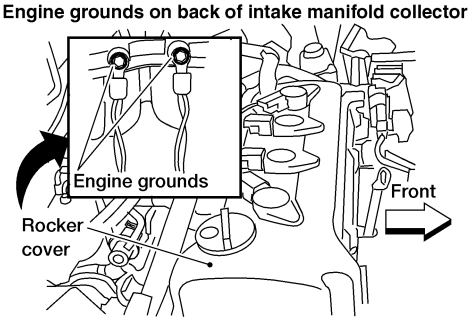
Diagnostic Procedure

NIEC1383

1	RETIGHTEN GROUND SCREWS

Loosen and retighten engine ground screws.

Engine grounds on back of intake manifold collector

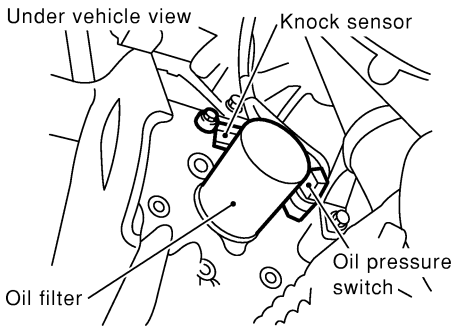


WEC249

▶ GO TO 2.

2	CHECK INPUT SIGNAL CIRCUIT-1

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector and knock sensor harness connector.



SEF729Y

3. Check harness continuity between knock sensor terminal 1 and ECM terminal 81. 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	▶	Repair open circuit or short to ground or short to power in harness or connectors.

3	CHECK KNOCK SENSOR

Knock sensor
Refer to “Component Inspection”, EC-1008.

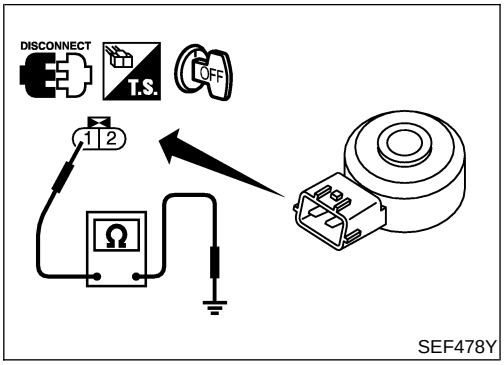
OK or NG

OK	▶	GO TO 4.
NG	▶	Replace knock sensor.

4	CHECK INTERMITTENT INCIDENT

Perform “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-842.

▶ **INSPECTION END**



Component Inspection

NIEC1384

KNOCK SENSOR

NIEC1384S01

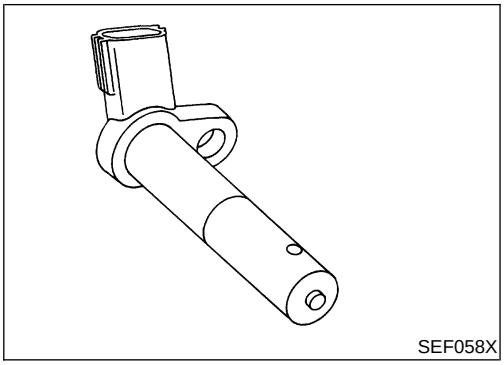
- Use an ohmmeter which can measure more than 10 MΩ.

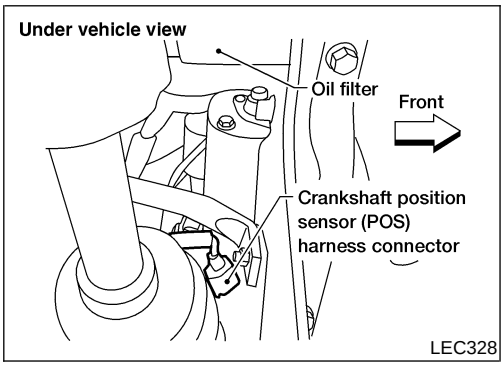
1. Disconnect knock sensor harness connector.
2. Check resistance between terminal 1 and ground.

Resistance: 500 - 620 kΩ [at 20°C (68°F)]

CAUTION:

Discard any knock sensors that have been dropped or physically damaged. Use only new ones.


SEF058X



LEC328

Component Description

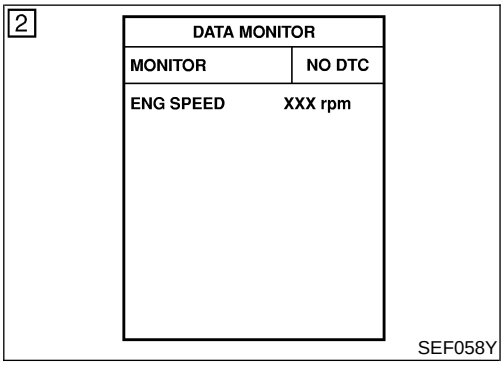
NIEC1385

The crankshaft position sensor (POS) is located on the cylinder block rear housing facing the gear teeth (cogs) of the signal plate at the end of crankshaft. It detects the fluctuation of the engine revolution.
The sensor consists of a permanent magnet and hall IC.
When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.
The changing gap causes the magnetic field near the sensor to change.
Due to the changing magnetic field, the voltage from the sensor changes.
The ECM receives the voltage signal and detects the fluctuation of the engine revolution.

On Board Diagnosis Logic

NIEC1386

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0335	• The crankshaft position sensor (POS) signal is not sent to ECM during the first few seconds of engine cranking. • The proper pulse signal from the crankshaft position sensor (POS) is not sent to ECM while the engine is running. • The crankshaft position sensor (POS) signal is not in the normal pattern during engine running.	• Harness or connectors (The crankshaft position sensor (POS) circuit is open.) • Crankshaft position sensor (POS)



SEF058Y

DTC Confirmation Procedure

NIEC1387

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 ignition switch “ON”.

With CONSULT-II

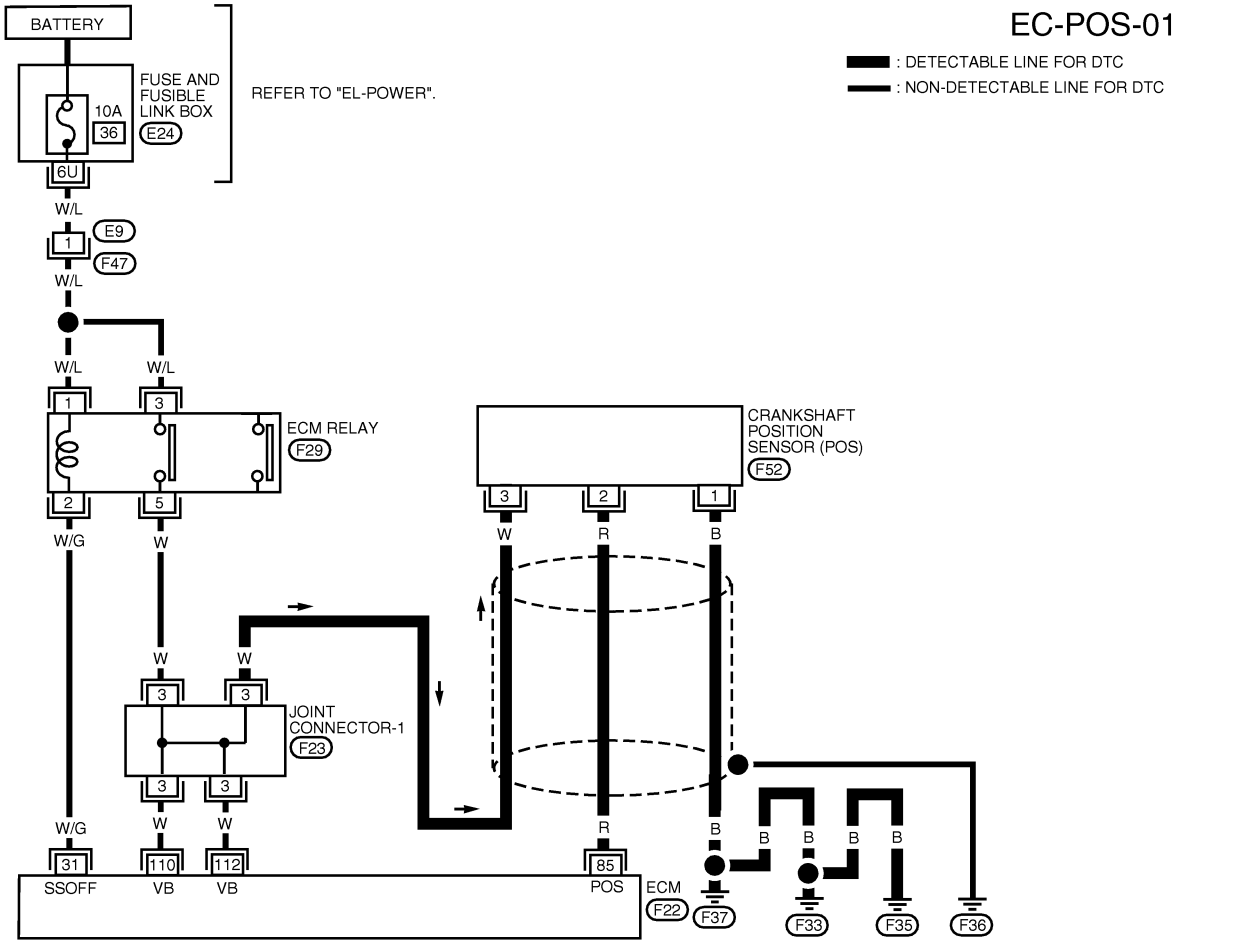
1) Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II.
2) Start engine and run it for at least 10 seconds at idle speed.
3) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-1011.

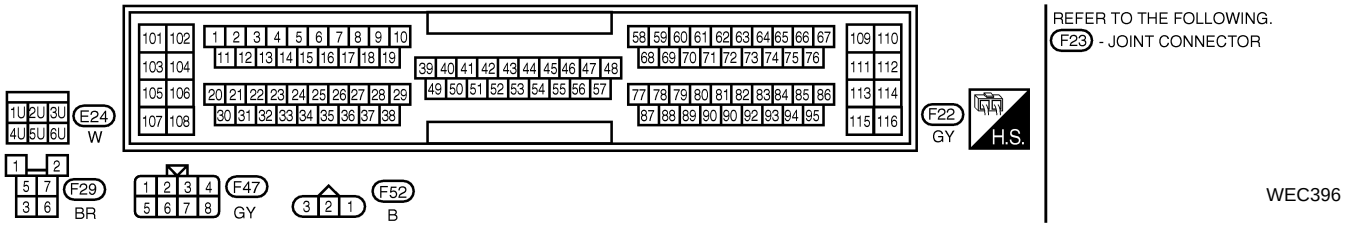
With GST

Follow the procedure “With CONSULT-II” above.

Wiring Diagram

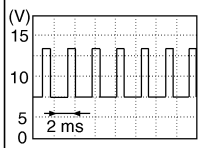
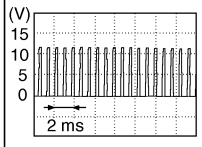
NIEC1388





WEC396

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	R	CRANKSHAFT POSITION SENSOR (POS)	ENGINE RUNNING AT IDLE SPEED UNDER WARM-UP CONDITION	APPROX. 3.0V - 4.0V 
			ENGINE RUNNING AT 2,000 RPM	APPROX. 3.0V - 4.0V 

SEF605Z

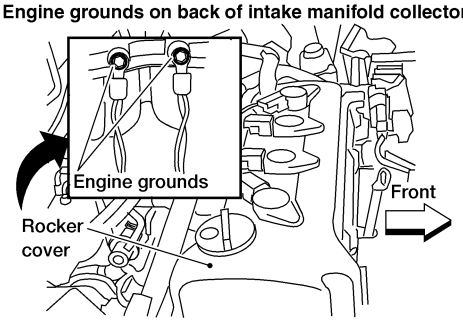
Diagnostic Procedure

NIEC1389

1	RETIGHTEN GROUND SCREWS

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

Engine grounds on back of intake manifold collector



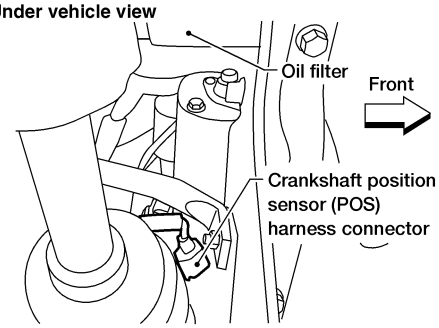
WEC249

▶	GO TO 2.

2	CHECK POWER SUPPLY

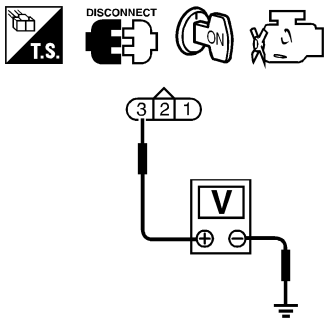
1. Disconnect crankshaft position sensor (POS) harness connector and ECM harness connectors.

Under vehicle view



LEC328

2. Check voltage between crankshaft position sensor (POS) harness connector terminal 3 and ground with CONSULT-II or tester.



SEF479Y

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

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

Diagnostic Procedure (Cont'd)

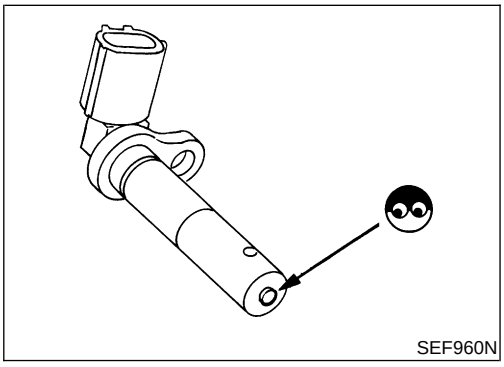
3	DETECT MALFUNCTIONING PART
Check the following. ● Joint connector-1 ● Harness for open and short between ECM and crankshaft position sensor (POS) ● Harness for open or short between ECM relay and crankshaft position sensor (POS)	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK INPUT SIGNAL CIRCUIT	
1. Check continuity between ECM terminal 85 and CKPS (POS) terminal 2. 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 GROUND CIRCUIT	
1. Reconnect ECM harness connector. 2. Check harness continuity between CKPS (POS) terminal 1 and engine ground. Refer to the 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 CRANKSHAFT POSITION SENSOR (POS)	
Refer to "Component Inspection", EC-1012. **OK or NG**		
OK	▶	GO TO 7.
NG	▶	Replace crankshaft position sensor (POS).

7	CHECK INTERMITTENT INCIDENT	
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-842.		
▶	**INSPECTION END**	


SEF960N

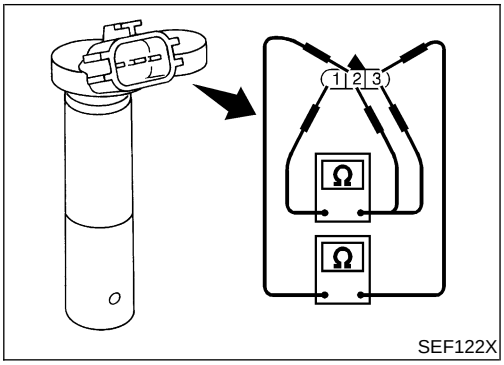
Component Inspection

NIEC1390

CRANKSHAFT POSITION SENSOR (POS)

NIEC1390S01

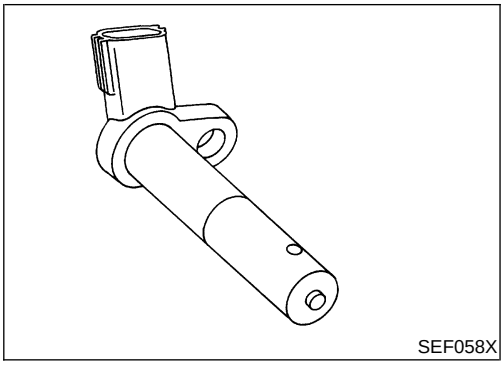
1. Disconnect crankshaft position sensor (POS) harness connector.
2. Loosen the fixing bolt of the sensor.
3. Remove the sensor.
4. Visually check the sensor for chipping.



5. Check resistance as shown in the figure.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
3 (+) - 1 (–)	Except 0 or ∞
2 (+) - 1 (–)	
3 (+) - 2 (–)	

If NG, replace crankshaft position sensor (POS).


SEF058X

Component Description

NIEC1391

The camshaft position sensor senses the protrusion provided with exhaust valve cam sprocket to identify a particular cylinder. The crankshaft position sensor senses the piston position.
When the crankshaft position sensor system becomes inoperative, the camshaft position sensor provides various controls of engine parts instead, utilizing timing of cylinder identification signals.
The sensor consists of a permanent magnet, core and coil.
When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.
The changing gap causes the magnetic field near the sensor to change.
Due to the changing magnetic field, the voltage from the sensor changes.

On Board Diagnosis Logic

NIEC1392

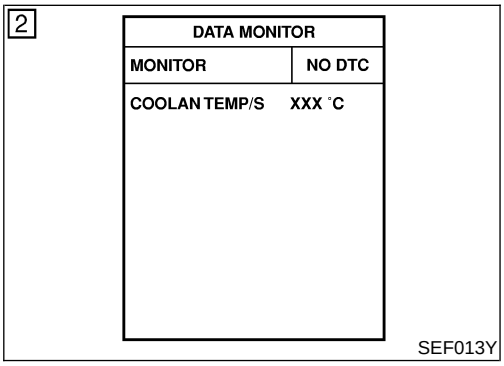
DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0340	• The cylinder No. signal is not entered to ECM for the first few seconds during engine cranking. • The cylinder No. signal is not enter to ECM during engine running. • The cylinder No. signal is not in the normal pattern during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

DTC Confirmation Procedure

NIEC1393

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.



SEF013Y

With CONSULT-II

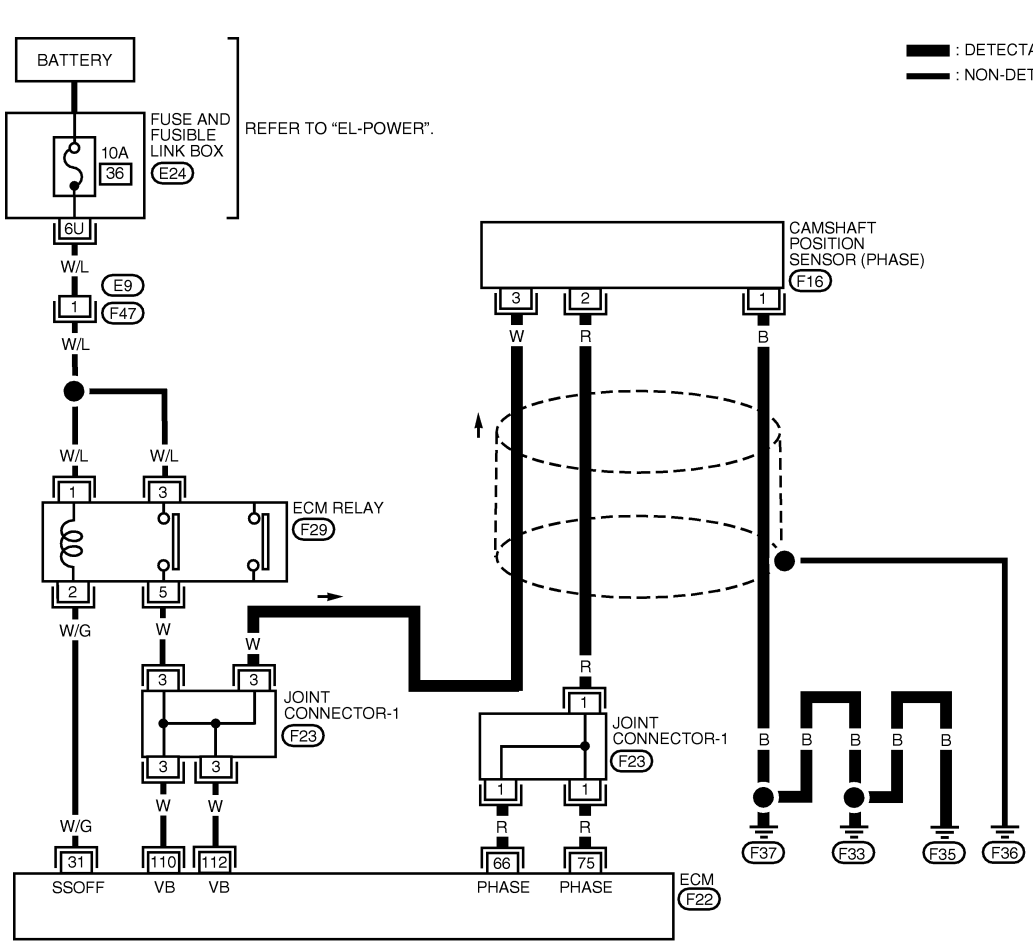
1) Turn ignition switch “ON”.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Crank engine for at least 2 seconds and run it at idle speed for at least 5 seconds.
4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-1016.

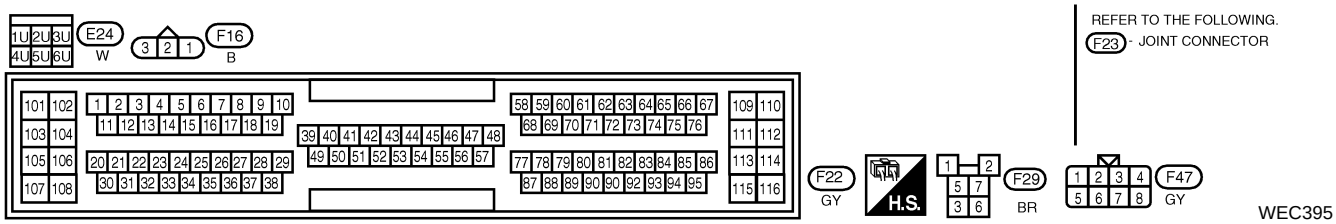
With GST

Follow the procedure “With CONSULT-II” above.

Wiring Diagram

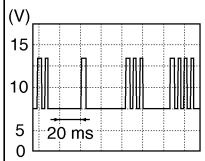
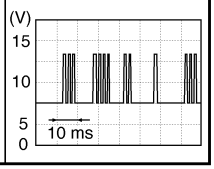
=NIEC1394





WEC395

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.

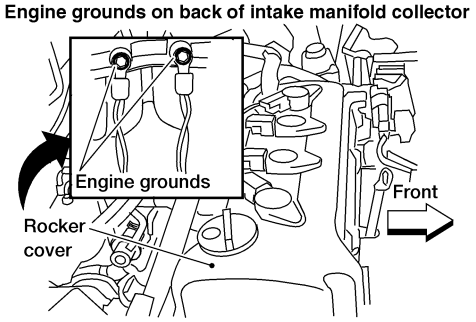
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
66, 75	R	CAMSHAFT POSITION SENSOR (PHASE)	ENGINE RUNNING AT IDLE SPEED UNDER WARM-UP CONDITION	APPROX. 3.0V - 4.0V 
			ENGINE RUNNING AT 2,000 RPM	APPROX. 3.0V - 4.0V 

SEF606Z

Diagnostic Procedure

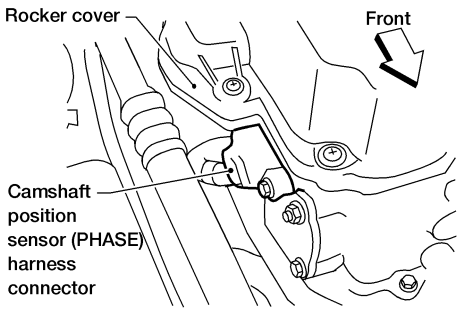
NIEC1395

1	CHECK STARTING SYSTEM	
Does the engine turn over? (Does the starter motor operate?)		
Yes or No		
Yes	▶	GO TO 2.
No	▶	Check starting system. (Refer to ***SC-6***, “STARTING SYSTEM”.)

2	RETIGHTEN GROUND SCREWS	
1. Turn ignition switch “OFF”. 2. Loosen and retighten engine ground screws. **Engine grounds on back of intake manifold collector**  WEC249		
	▶	GO TO 3.

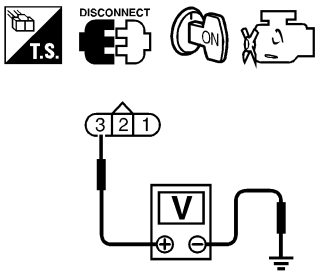
3	CHECK POWER SUPPLY

1. Disconnect camshaft position sensor (PHASE) harness connector.



WEC253

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



SEF481Y

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Joint connector-1
- Harness for open or short between camshaft poistion sensor (PHASE) and ECM relay
- Harness for open or short between camshaft position sensor (PHASE) and ECM

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

5	CHECK INPUT SIGNAL CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between camshaft position sensor (PHASE) terminal 2 and ECM terminals 66, 75. 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.

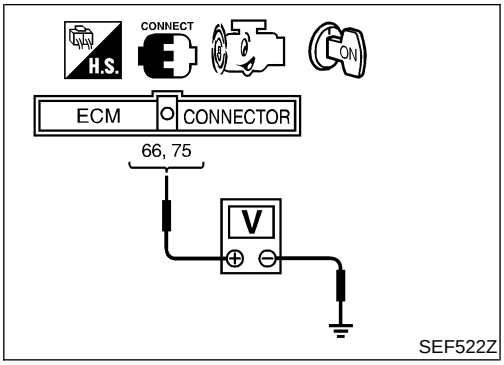
Diagnostic Procedure (Cont'd)

6	DETECT MALFUNCTIONING PART
Check the following. ● Joint connector-1 ● Harness for open or short between camshaft position sensor and ECM	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

7	CHECK GROUND CIRCUIT
1. Turn ignition switch "OFF". 2. Check harness continuity between camshaft position sensor terminal 1 and engine ground. Refer to the 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 ▶	Repair open circuit or short to ground or short to power in harness or connectors.

8	CHECK CAMSHAFT POSITION SENSOR
Refer to "Component Inspection", EC-1019.	
OK or NG	
OK ▶	GO TO 9.
NG ▶	Replace camshaft position sensor.

9	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-842.	
▶	**INSPECTION END**



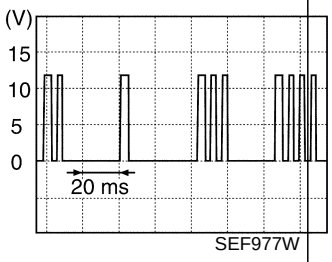
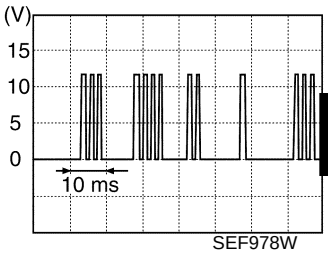
Component Inspection

=NIEC1396

CAMSHAFT POSITION SENSOR (PHASE)

NIEC1396S01

1. Start engine and warm it up to normal operating temperature.
2. Check voltage between ECM terminals 66, 75 and engine ground.

Condition	Idle	2,000 rpm
Voltage	Approximately 2.0 - 3.0V	Approximately 2.0 - 3.0V
Pulse signal		

SEF977W

SEF978W

If NG, replace camshaft position sensor.

Description

NIEC1397

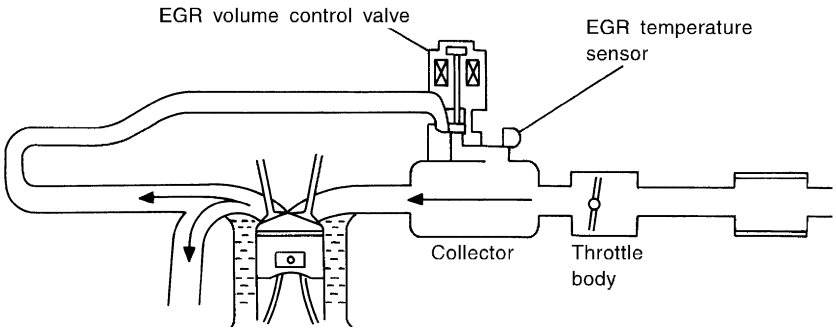
SYSTEM DESCRIPTION

NIEC1397S01

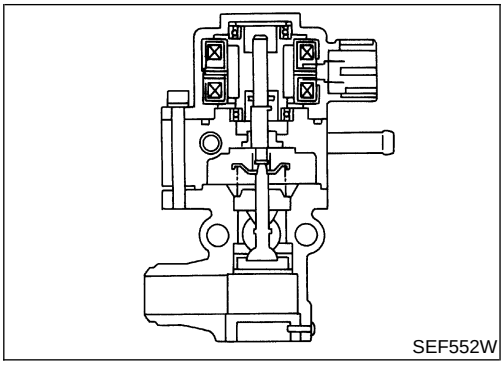
Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed	EGR volume control	EGR volume control valve
Camshaft position sensor (PHASE)	Engine speed and cylinder position		
Vehicle speed sensor	Vehicle speed		
Engine coolant temperature sensor	Engine coolant temperature		
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	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

NIEC1397S02

EGR volume control valve

NIEC1397S0201

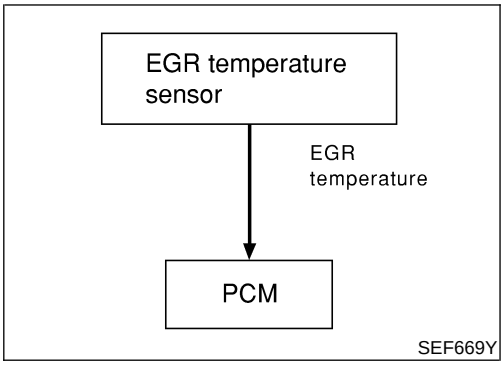
The EGR volume control valve uses a step motor to control the flow rate of EGR from exhaust manifold. This motor has four winding phases. It operates according to the output pulse signal of the ECM. Two windings are turned ON and OFF in sequence. Each time an ON pulse is issued, the valve opens or closes, 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

NIEC1398

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



SEF669Y

On Board Diagnosis Logic

NIEC1399

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

NIEC1400

- 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

3

DATA MONITOR	
MONITOR	NO DTC
COOLAN TEMP/S	XXX °C

SEF013Y

5

EGR SYSTEM P0400	
OUT OF CONDITION	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
THRTL POS SEN	XXX V

SEF732Y

8

EGR SYSTEM P0400	
TESTING	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
THRTL POS SEN	XXX V

SEF733Y

8

EGR SYSTEM P0400
COMPLETED

SEF235Y

DTC Confirmation Procedure

NIEC1401

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

- If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.
- P0400 will not be displayed at "SELF-DIAG RESULTS" mode with CONSULT-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

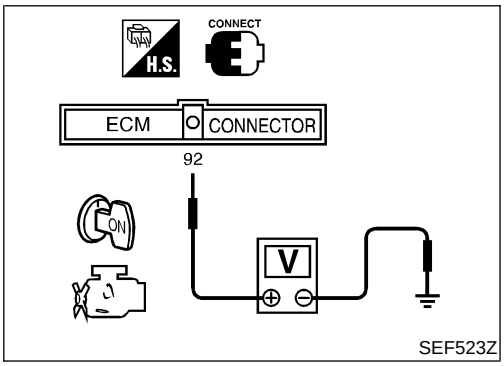
NIEC1401S01

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 70°C (158°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) Check the output voltage of "THRTL POS SEN" (at closed throttle position) and note it.
9) 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 - 3,600 rpm
Vehicle speed	More than 10 km/h (6 MPH)
B/FUEL SCHDL	4.5 - 8.0 msec
Selector lever	Suitable position

   If "TESTING" is not displayed after 5 minutes, retry from step 2.
10) Make sure that "OK" is displayed after touching "SELF-DIAG

RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-1025.



WITH GST

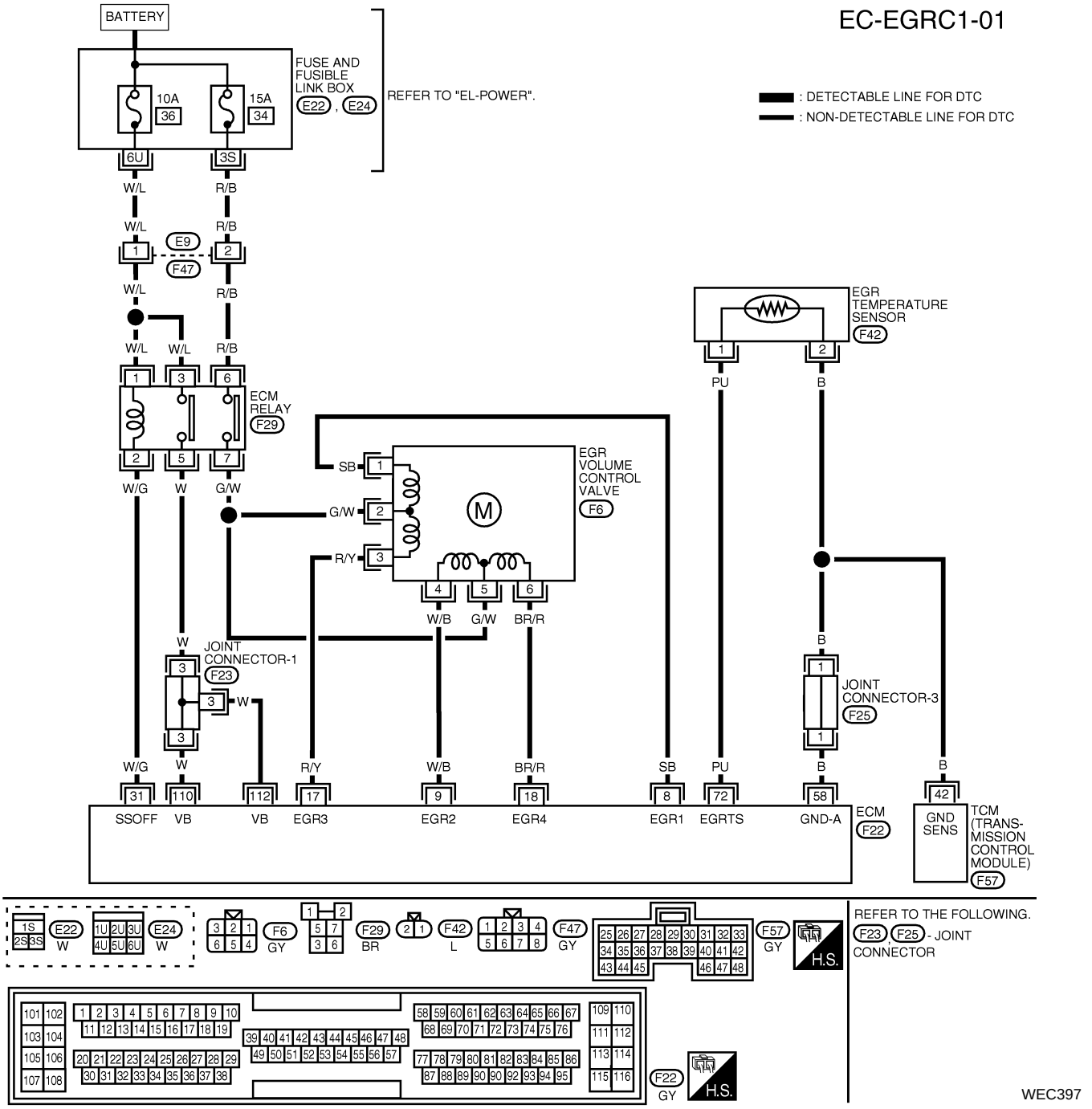
NIEC1401S02

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 70°C (158°F), immediately go to the next step.
5) Maintain the following conditions for at least 1 minute.
   Engine speed: 1,200 - 3,600 rpm
   Vehicle speed: More than 10 km/h (6 MPH)
   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-1025.

- **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

NIEC1402



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)
8	SB	EGR VOLUME CONTROL VALVE	ENGINE RUNNING AT IDLE SPEED	0.1 - 14V
9	W/B			
17	R/Y			
18	BR/R			

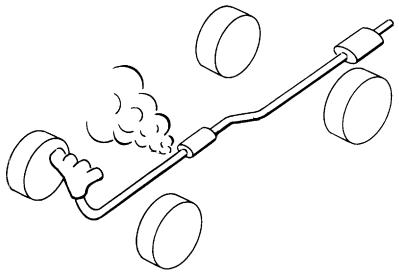
SEF575YA

Diagnostic Procedure

NIEC1403

1	CHECK EXHAUST SYSTEM

1. Start engine.
2. Check exhaust pipes and muffler for leaks.



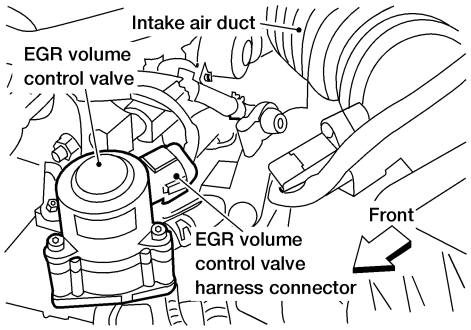
SEF099P

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair or replace exhaust system.

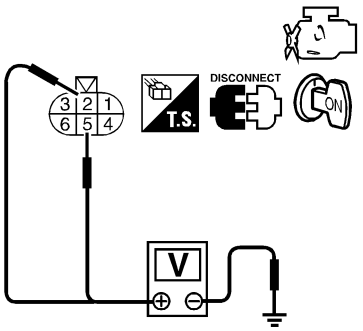
2	CHECK EGR VOLUME CONTROL VALVE POWER SUPPLY CIRCUIT

1. Disconnect EGR volume control vale harness connector.



LEC333

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.

Diagnostic Procedure (Cont'd)

3	DETECT MALFUNCTIONING PART
Check the 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
8	1
9	4
17	3
18	6

MTBL0543

Continuity should exist.

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

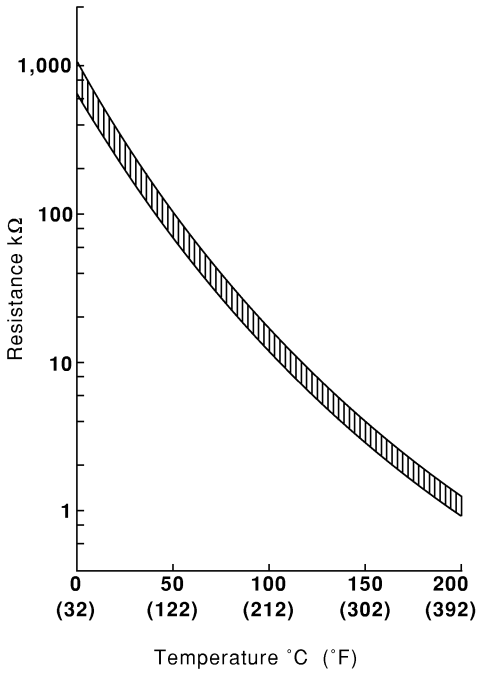
OK or NG

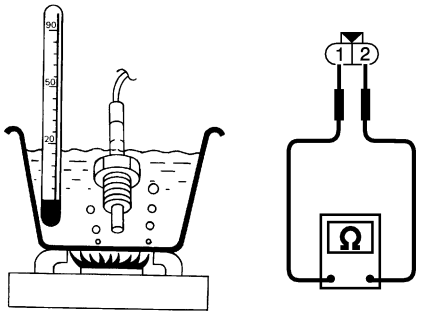
OK	▶	GO TO 5.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK EGR PASSAGE
Check EGR passage for clogging and cracks.	
OK or NG	
OK ▶	GO TO 6.
NG ▶	Repair or replace EGR passage.

6	CHECK EGR TEMPERATURE SENSOR AND CIRCUIT

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)	4.56	0.62 - 1.05
50 (122)	2.25	0.065 - 0.094
100 (212)	0.59	0.011 - 0.015

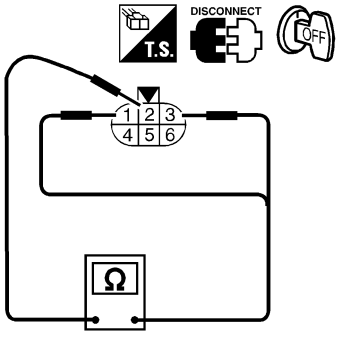
SEF483Y

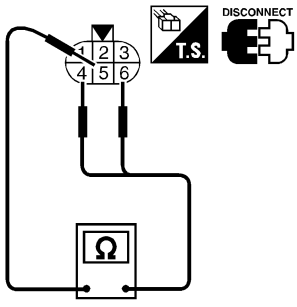
OK or NG

OK	▶	GO TO 7.
NG	▶	Replace EGR temperature sensor.

7	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 8.
OK (Without CONSULT-II)	▶	GO TO 9.
NG	▶	Replace EGR volume control valve.

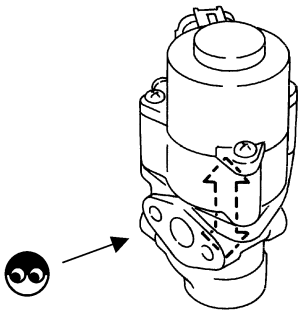
Diagnostic Procedure (Cont'd)

8	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
EGR TEMP SEN	XXX V



SEF491Y

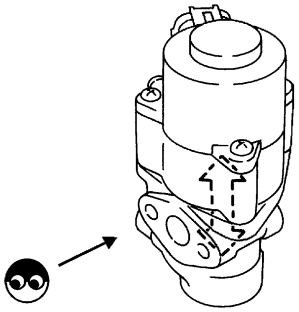
OK or NG

OK	▶	GO TO 10.
NG	▶	Replace EGR volume control valve.

9	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 10.
NG	▶	Replace EGR volume control valve.

10	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-842.	
▶	**INSPECTION END**

Description

SYSTEM DESCRIPTION

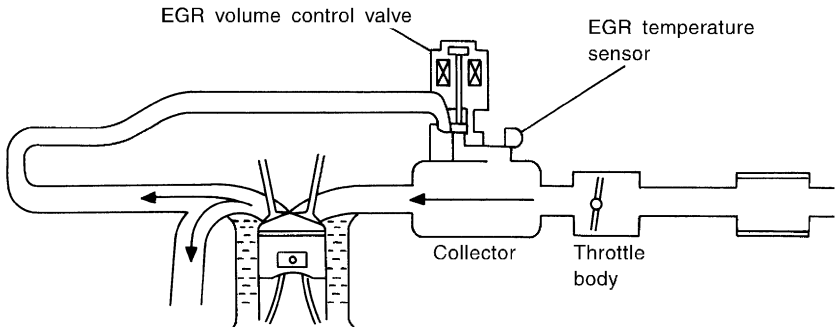
NIEC1404

NIEC1404S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE)	Engine speed and cylinder position	EGR volume control	EGR volume control valve
Crankshaft position sensor (POS)	Engine speed		
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	Gear position, shifting signal		

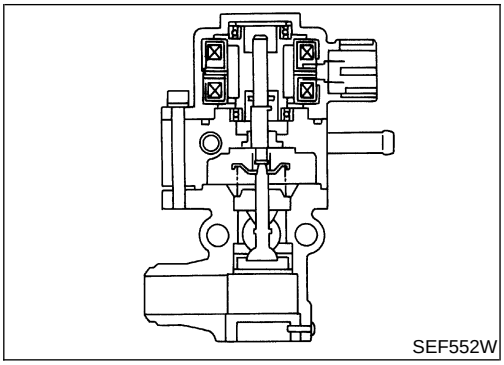
This system controls flow rate of EGR led from exhaust manifold to intake manifold. The opening of the EGR by-pass passage in the EGR volume control valve changes to control the flow rate. A built-in step motor moves the valve in steps corresponding to the ECM output pulses. The opening of the valve 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

NIEC1404S02

EGR volume control valve

NIEC1404S0201

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

NIEC1405

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
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

NIEC1406

Malfunction is detected when an improper voltage signal is sent to ECM through the valve.

FAIL-SAFE MODE

NIEC1406S01

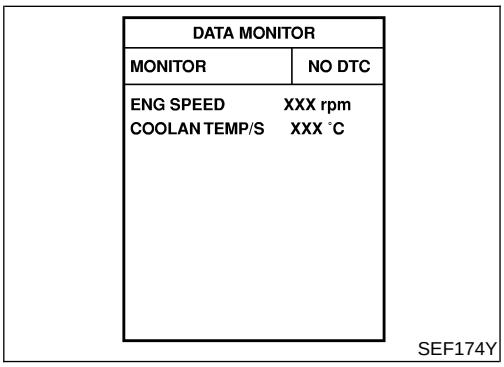
When the ECM enters the fail-safe mode, the MIL illuminates.

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

NIEC1407

- Harness or connectors
  (EGR volume control valve circuit is open or shorted.)
- EGR volume control valve



SEF174Y

DTC Confirmation Procedure

NIEC1408

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

NIEC1408S01

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-1033.

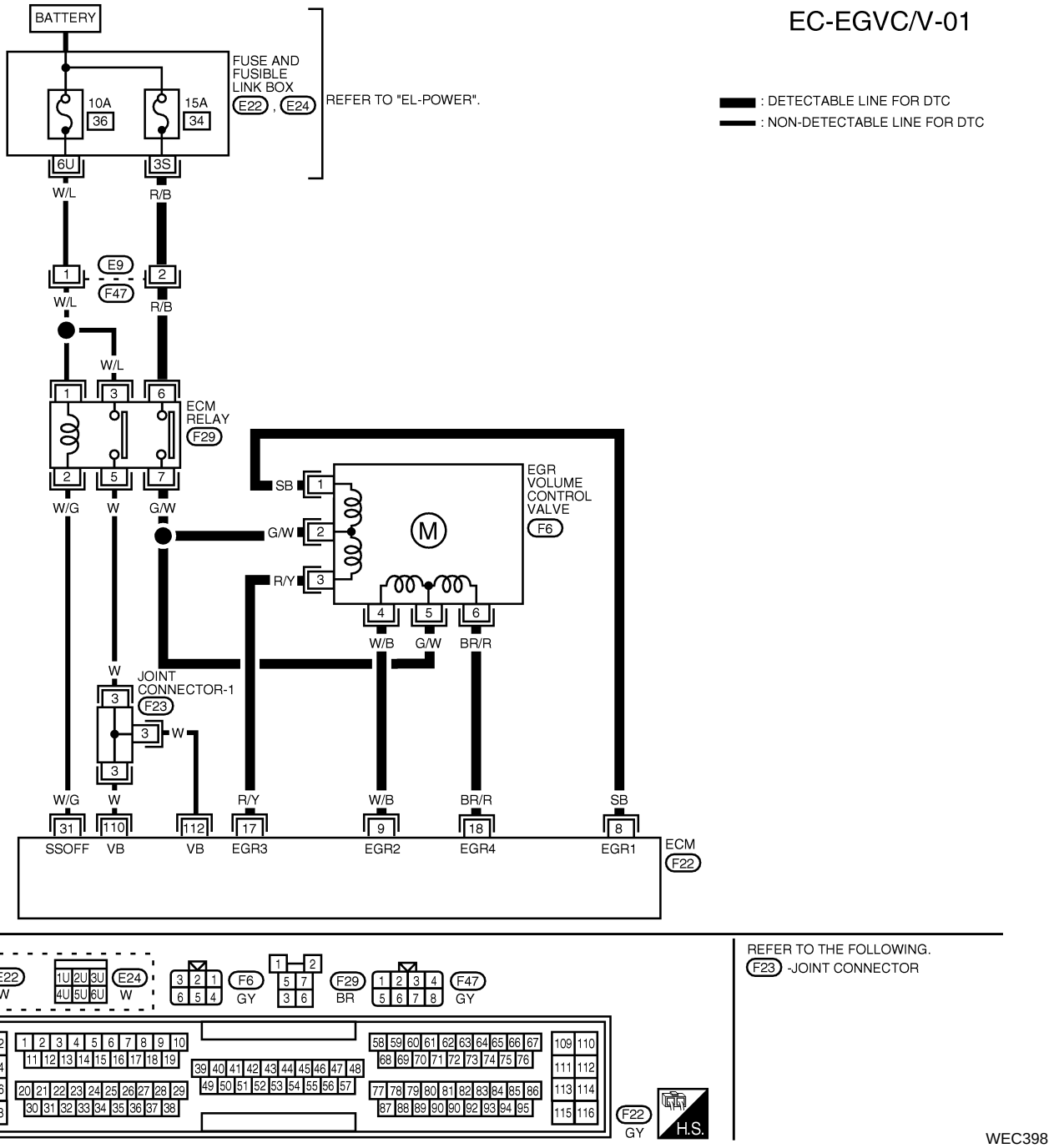
WITH GST

NIEC1408S02

Follow the procedure "With CONSULT-II" above.

Wiring Diagram

=NIEC1409



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)
8	SB	EGR VOLUME CONTROL VALVE	ENGINE RUNNING AT IDLE SPEED	0.1 - 14V
9	W/B			
17	R/Y			
18	BR/R			

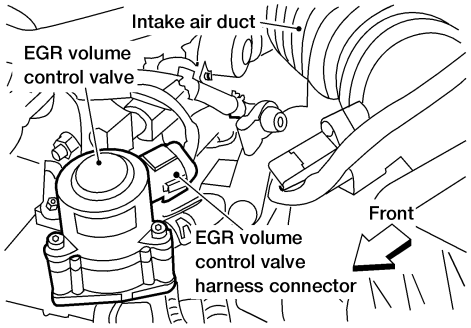
SEF575YA

Diagnostic Procedure

NIEC1410

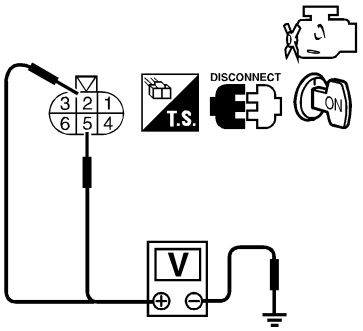
1	CHECK EGR VOLUME CONTROL VALVE POWER SUPPLY CIRCUIT

1. Disconnect EGR volume control valve harness connector.



LEC333

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 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
8	1
9	4
17	3
18	6

MTBL0543

Continuity should exist.

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

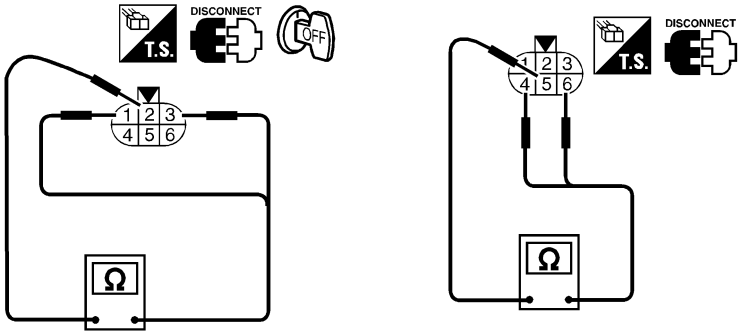
OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

Diagnostic Procedure (Cont'd)

4	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

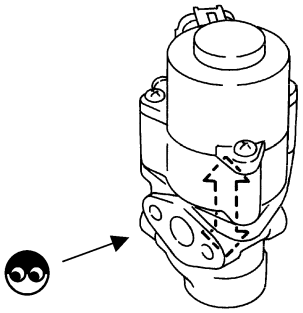
OK (With CONSULT-II)	▶	GO TO 5.
OK (Without CONSULT-II)	▶	GO TO 6.
NG	▶	Replace EGR volume control valve.

5	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
EGR TEMP SEN	XXX V



SEF491Y

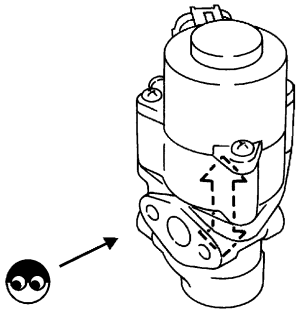
OK or NG

OK	▶	GO TO 7.
NG	▶	Replace EGR volume control valve.

6	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.

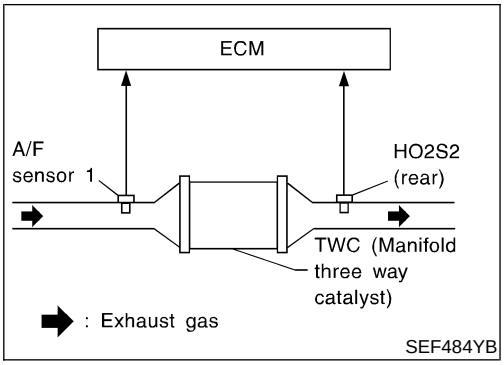


SEF560W

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace EGR volume control valve.

7	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-842.	
▶	**INSPECTION END**



SEF484YB

On Board Diagnosis Logic

NIEC1411

The ECM monitors the switching frequency ratio of air fuel ratio (A/F) sensor 1 and heated oxygen sensor 2 (rear).

A TWC (Manifold three way catalyst) with high oxygen storage capacity will indicate a low switching frequency of heated oxygen sensor 2 (rear). As oxygen storage capacity decreases, the heated oxygen sensor 2 (rear) switching frequency will increase.

When the frequency ratio of air fuel ratio (A/F) sensor 1 and heated oxygen sensor 2 (rear) approaches a specified limit value, the three way catalyst malfunction is diagnosed.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0420	• TWC (Manifold three way catalyst) does not operate properly. • TWC (Manifold three way catalyst) does not have enough oxygen storage capacity.	• TWC (Manifold three way catalyst) • Exhaust tube • Intake air leaks • Injectors • Injector leaks • Spark plug • Improper ignition timing

SRT WORK SUPPORT	
CATALYST	INCMP
EVAP SYSTEM	INCMP
HO2S HTR	CMPLT
HO2S	INCMP
EGR SYSTEM	INCMP
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
B/FUEL SCHDL	XXX msec
A/F ALPHA-B1	XXX V
COOLAN TEMP/S	XX °C
A/F SEN1 (B1)	XXX V

SEF533Z

SRT WORK SUPPORT	
CATALYST	CMPLT
EVAP SYSTEM	INCMP
HO2S HTR	CMPLT
HO2S	INCMP
EGR SYSTEM	INCMP
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
B/FUEL SCHDL	XXX msec
A/F ALPHA-B1	XXX V
COOLAN TEMP/S	XX °C
A/F SEN1 (B1)	XXX V

SEF534Z

SELF DIAG RESULTS	
DTC RESULTS	TIME
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	

SEF535Z

DTC Confirmation Procedure

NIEC1412

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.

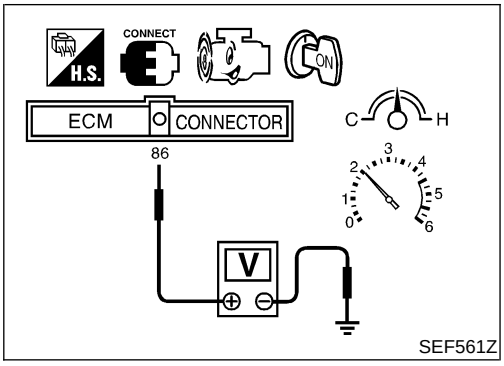
WITH CONSULT-II

NIEC1412S01

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.
   If “INCMP” of CATALYST changes to “CMPLT”, go to step 7.
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-1037.



Overall Function Check

NIEC1413

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

With GST

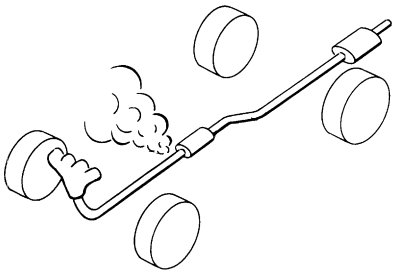
1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Set voltmeter probe between ECM terminal 86 and ground.
4) Keep engine speed at 2,500 rpm constant under no load.
5) Make sure that the voltage does not vary for more than 5 seconds.
   If the voltage fluctuation cycle takes less than 5 seconds, go to “Diagnostic Procedure”, EC-1037

- 1 cycle: 0.6 - 1.0 V → 0 - 0.3 V → 0.6 - 1.0 V

Diagnostic Procedure

NIEC1414

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 TWC (Manifold three way catalyst).  SEF099P **OK or NG**		
OK	▶	GO TO 3.
NG	▶	Repair or replace.

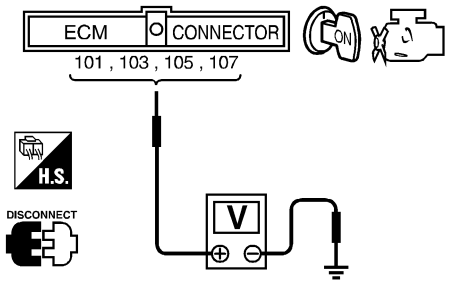
Diagnostic Procedure (Cont'd)

3	CHECK INTAKE AIR LEAK	
Listen for an intake air leak after the mass air flow sensor.		
OK or NG		
OK	▶	GO TO 4.
NG	▶	Repair or replace.

4	CHECK IGNITION TIMING	
Check for ignition timing. Refer to "Basic Inspection", EC-802.		
OK or NG		
OK	▶	GO TO 5.
NG	▶	Adjust ignition timing.

5	CHECK INJECTORS	

1. Refer to Wiring Diagram for Injectors, EC-1330.
2. Stop engine and then turn ignition switch "ON".
3. Check voltage between ECM terminals 101, 103, 105, 107 and ground with CONSULT-II or tester.



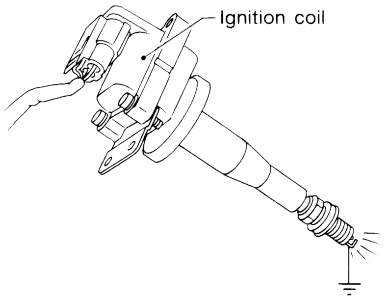
SEF075X

Battery voltage should exist.

OK or NG		
OK	▶	GO TO 6.
NG	▶	Perform "Diagnostic Procedure" INJECTOR, EC-1331.

6	CHECK IGNITION SPARK

1. Turn ignition switch "OFF".
2. Remove ignition coil from the engine.
3. Place end of spark plug against a suitable ground and crank engine.
4. Check for spark properly.



SEF575Q

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace ignition coil.

7	CHECK INJECTOR

1. Turn ignition switch "OFF".
2. Remove injector assembly. Refer to EC-745.
   Keep fuel hose and all injectors connected to injector gallery.
3. Disconnect ignition coil assembly harness connector.
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.

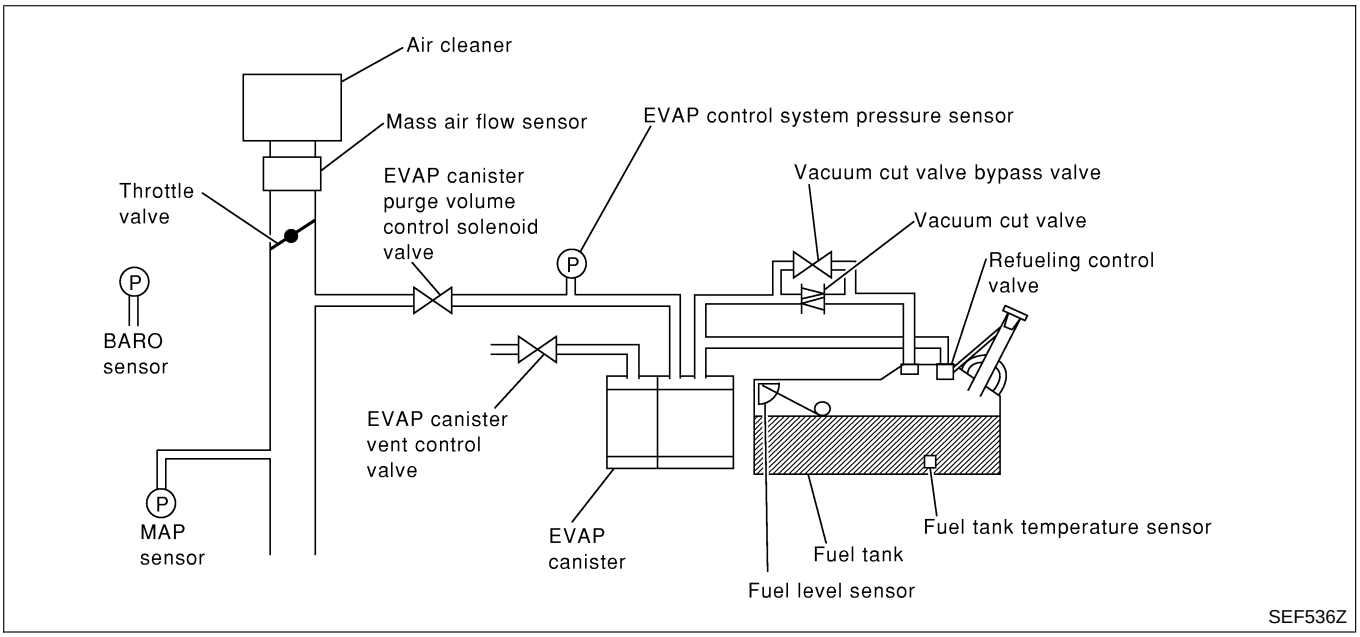
8	CHECK INTERMITTENT INCIDENT	
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-842.		
Trouble is fixed	▶	**INSPECTION END**
Trouble is not fixed	▶	Replace TWC (Manifold three way catalyst) together with ADS-TWC (Adsorber pre-catalyst).

On Board Diagnosis Logic

NIEC1415

NOTE:
If DTC P0440 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-1292.)

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:

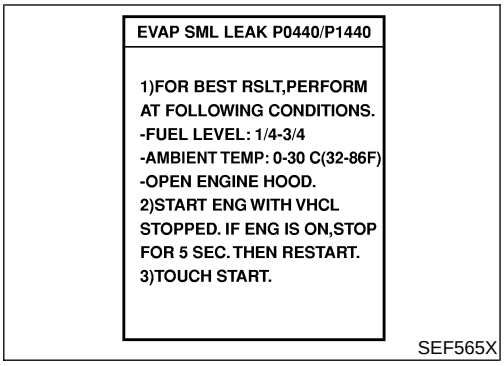
- **Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.**
- **If the fuel filler cap is not tightened properly, the MIL may come on.**
- **Use only a genuine NISSAN rubber tube as a replacement.**

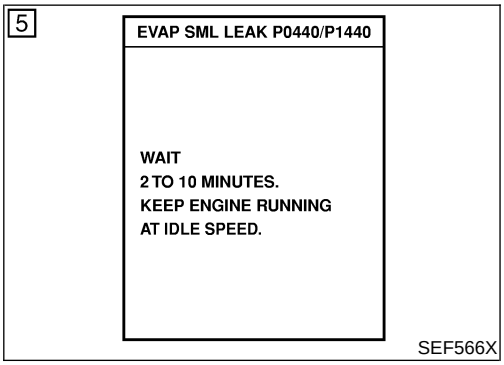
Possible Cause

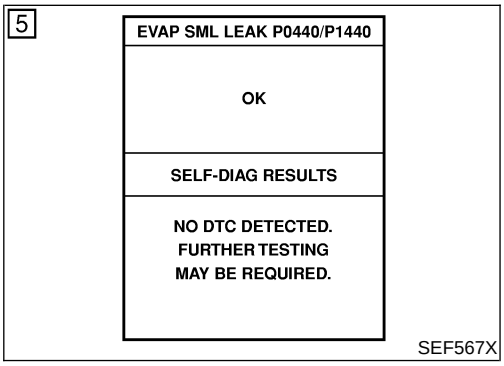
NIEC1416

- 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
- Manifold absolute pressure (MAP) 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

NIEC1417

CAUTION:

Never remove fuel filler cap during the DTC confirmation procedure.

NOTE:

- **If DTC P0440 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-1292.)**
- **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 following procedure.**

WITH CONSULT-II

NIEC1417S01

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) Check the following conditions are met.
   COOLAN TEMP/S: 0 - 70°C (32 - 158°F)
   INT/A TEMP SE: 0 - 60°C (32 - 140°F)
5) Select "EVAP SML LEAK P0440/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-802.

- Make sure that EVAP hoses are connected to the EVAP canister purge volume control solenoid valve properly.

6) Make sure that "OK" is displayed.
If "NG" is displayed, refer to "Diagnostic Procedure", EC-1042.

WITH GST

NIEC1417S02

NOTE:
Be sure to read the explanation of "Driving Pattern" on EC-765 before driving vehicle.

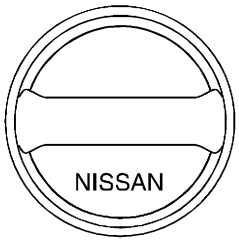
1) Start engine.
2) Drive vehicle according to "Driving Pattern", EC-765.
3) Stop vehicle.
4) Select "MODE 1" with GST.
- If SRT of EVAP system is not set yet, go to the following step.
- If SRT of EVAP system is set, the result will be OK.

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-765.
8) Stop vehicle.
9) Select "MODE 3" with GST.
- If P0440 or P1440 is displayed on the screen, go to "Diagnostic Procedure", EC-1042.
- If P1447 is displayed on the screen, go to "Diagnostic Procedure" for DTC P1447, EC-1283.
- 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

NIEC1418

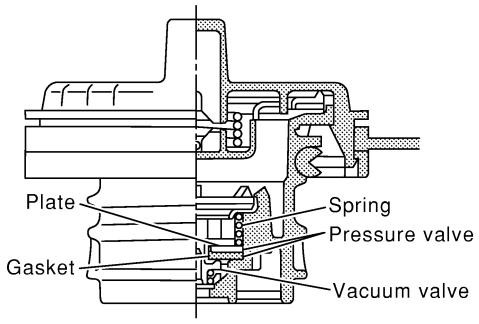
1	CHECK FUEL FILLER CAP DESIGN	
1. Turn ignition switch "OFF". 2. Check for genuine NISSAN fuel filler cap design.  SEF915U **OK or NG**		
OK	▶	GO TO 2.
NG	▶	Replace with genuine NISSAN fuel filler cap.

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.

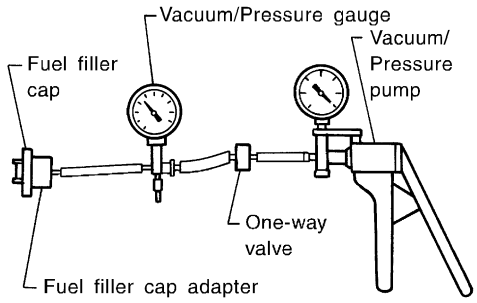
3	CHECK FUEL FILLER CAP FUNCTION	
Check for air releasing sound while opening the fuel filler cap.		
OK or NG		
OK	▶	GO TO 6.
NG	▶	GO TO 4.

4 CHECK FUEL TANK VACUUM RELIEF VALVE

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



SEF445Y



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 −0.035 kg/cm^2, −0.87 to −0.50 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.

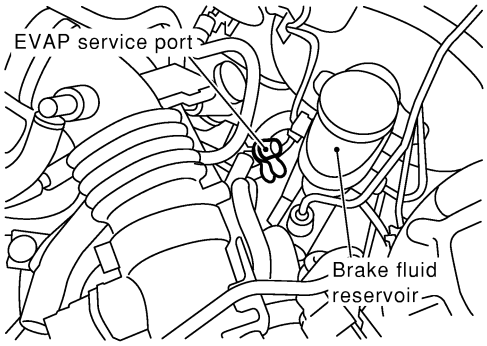
OK or NG

OK	▶	GO TO 5.
NG	▶	Replace fuel filler cap with a genuine one.

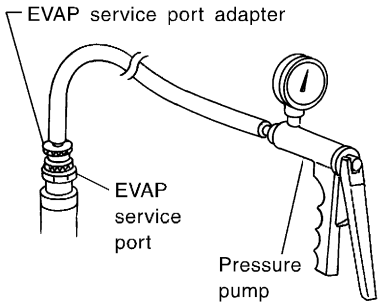
Diagnostic Procedure (Cont'd)

5	INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.



SEF400Z



SEF916U

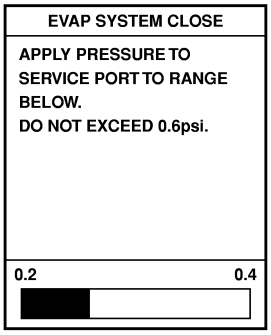
NOTE:
Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.

Models with CONSULT-II ▶	GO TO 6.
Models without CONSULT-II ▶	GO TO 7.

6	CHECK FOR EVAP LEAK

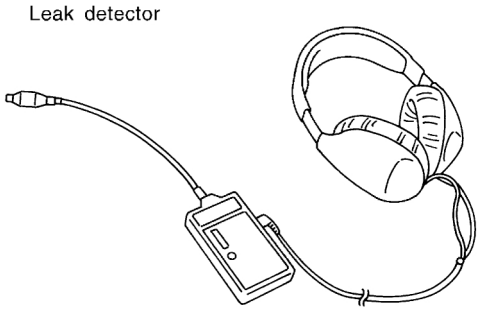
With CONSULT-II

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-730.



SEF200U

OK or NG

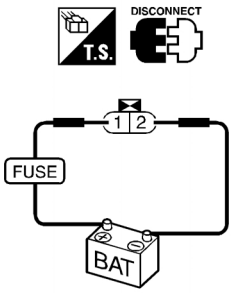
OK	▶	GO TO 8.
NG	▶	Repair or replace.

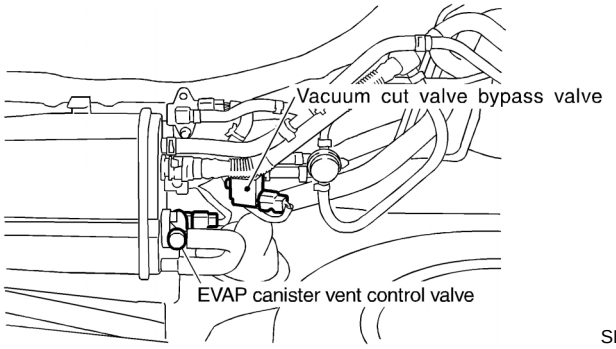
Diagnostic Procedure (Cont'd)

7	CHECK FOR EVAP LEAK

Without CONSULT-II

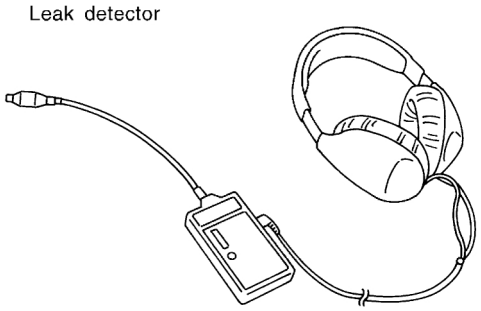
1. Turn ignition switch "OFF".
2. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)
3. Apply 12 volts DC to vacuum cut valve bypass valve. The valve will open. (Continue to apply 12V until the end of test.)





SEF401Z

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-730.



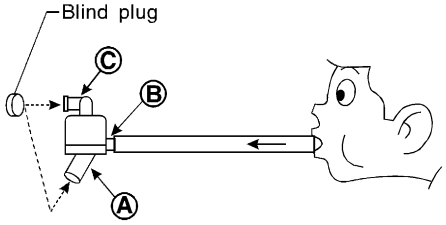
SEF200U

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

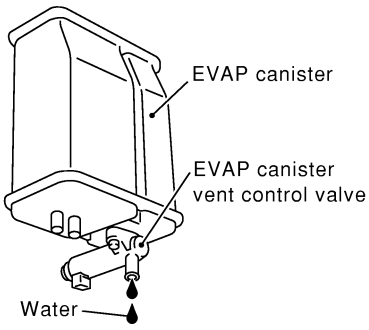
Refer to "DTC Confirmation Procedure", EC-1055.

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?



SEF504Z

Yes or No

Yes	▶	GO TO 11.
No (With CONSULT-II)	▶	GO TO 13.
No (Without CONSULT-II)	▶	GO TO 14.

Diagnostic Procedure (Cont'd)

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
A/F ALPHA-B1	XX %
THRTL POS SEN	X. XX V

Vacuum should exist.

SEF537Z

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 18.
NG ▶	GO TO 15.

15	CHECK VACUUM HOSE
Check vacuum hoses for clogging or disconnection. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-730.	
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	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
THRTL POS SEN	XXX V

SEF539Z

OK or NG

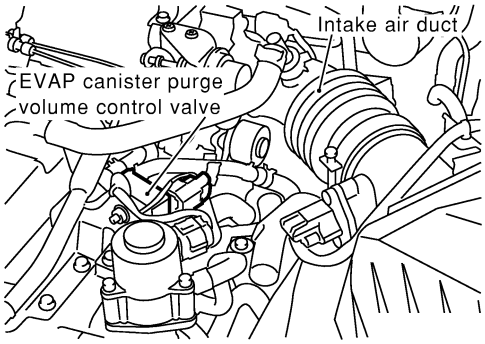
OK ▶	GO TO 18.
NG ▶	GO TO 17.

Diagnostic Procedure (Cont'd)

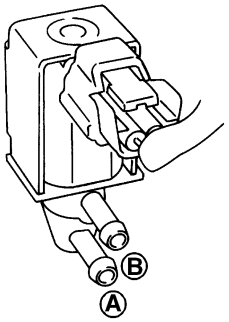
17 **CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE**

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



SEF402Z

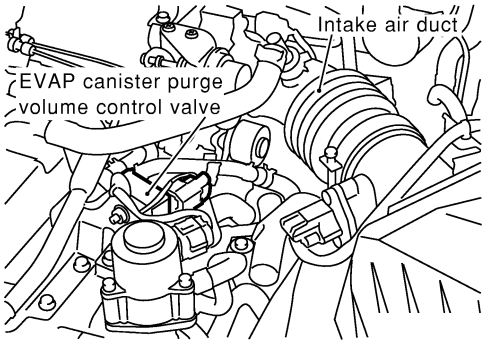


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

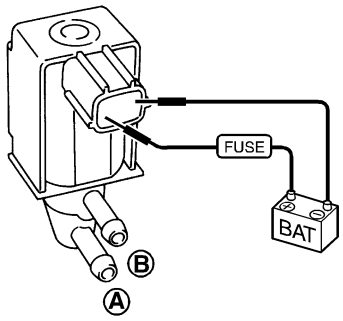
SEF334X

Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



SEF402Z



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

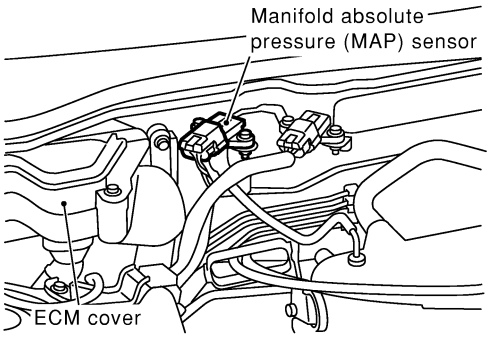
SEF335X

OK or NG

OK	▶	GO TO 18.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

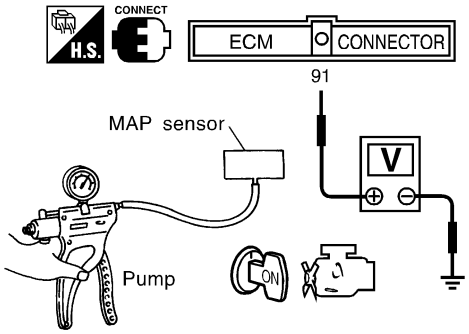
18	CHECK MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR

1. Remove manifold absolute pressure (MAP) sensor with its harness connector connected.



SEF389Z

2. Install a vacuum pump to MAP sensor.
3. Turn ignition switch "ON" and check output voltage between ECM terminal 91 and engine ground under the following conditions.



Applied vacuum kPa (mmHg, inHg)	Voltage V
Not applied	1.8 - 4.8
–26.7 (–200, –7.87)	1.0 to 1.4V lower than above value

SEF541Z

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 MAP sensor.

19	CHECK FUEL TANK TEMPERATURE SENSOR

1. Remove fuel level sensor unit.
2. Check fuel tank temperature sensor.
   Refer to "Component Inspection", EC-979.

OK or NG

OK	▶	GO TO 20.
NG	▶	Replace fuel level sensor unit.

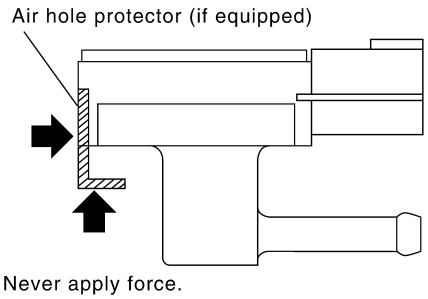
Diagnostic Procedure (Cont'd)

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.**



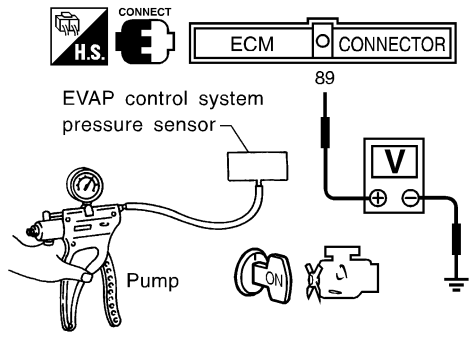
SEF799W

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 89 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

SEF543Z

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 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-726.

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-732.

OK or NG

OK	▶	GO TO 24.
NG	▶	Repair or replace hoses and tubes.

24	CHECK SIGNAL LINE AND RECIRCULATION LINE

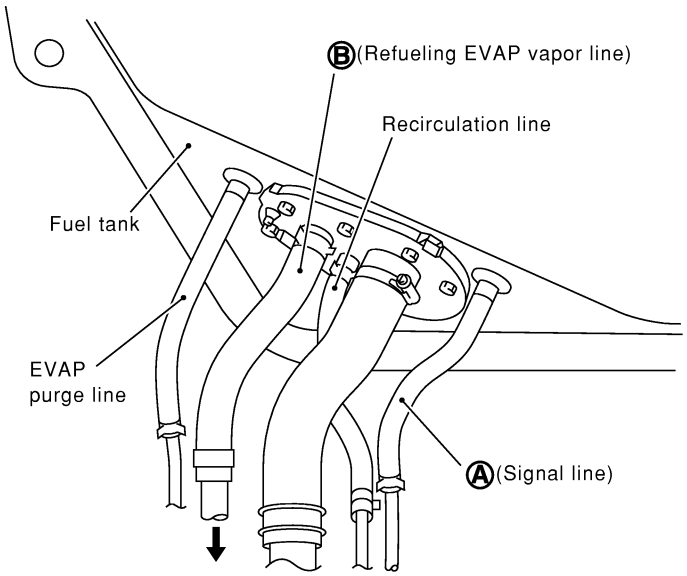
Check signal line and recirculation line between filler neck tube and fuel tank for clogging, kink, cracks, looseness and improper connection.

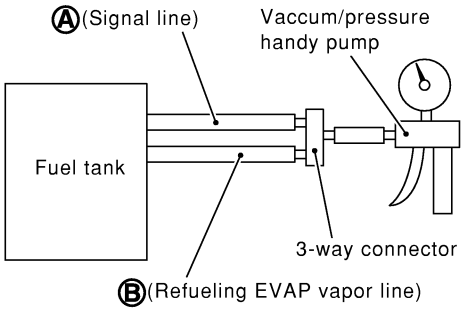
OK or NG

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.





SEF505Z

OK or NG

OK	▶	GO TO 26.
NG	▶	Replace refueling control valve with fuel tank.

26	CHECK FUEL LEVEL SENSOR

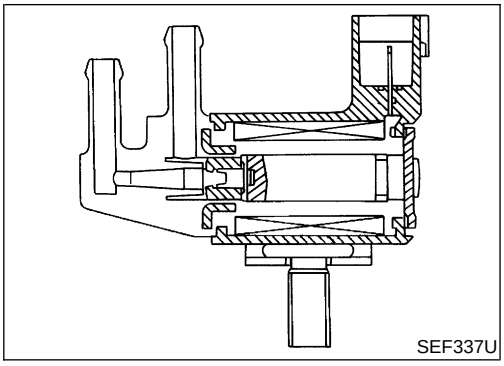
Refer to ***EL-103***, "Fuel Level Sensor Unit Check".

OK or NG

OK	▶	GO TO 27.
NG	▶	Replace fuel level sensor unit.

Diagnostic Procedure (Cont'd)

27	**CHECK INTERMITTENT INCIDENT**
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-842.	
▶	**INSPECTION END**


SEF337U

Description

NIEC1419

COMPONENT DESCRIPTION

NIEC1419S01

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

NIEC1420

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

NIEC1421

Malfunction is detected when an improper voltage signal is sent to ECM through the valve.

Possible Cause

NIEC1422

- Harness or connectors
  (The valve circuit is open or shorted.)
- EVAP canister purge volume control solenoid valve

3

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

DTC Confirmation Procedure

NIEC1423

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

NIEC1423S01

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-1058.

WITH GST

NIEC1423S02

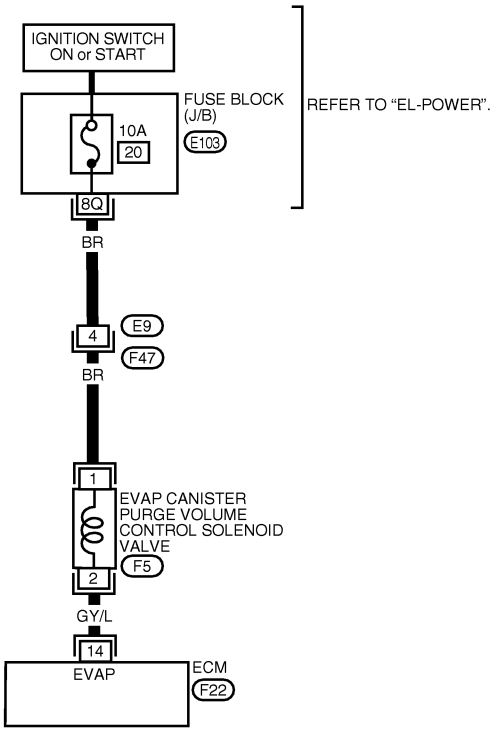
Follow the proocedure "WITH CONSULT-II" above.

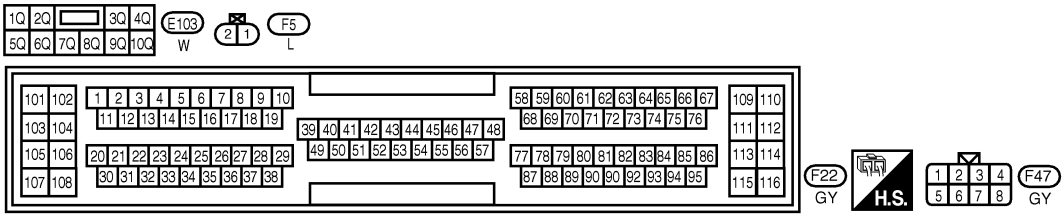
Wiring Diagram

=NIEC1424

EC-PGC/V-01

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





WEC401

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)
14	GY/L	EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE	ENGINE RUNNING AT IDLE SPEED	BATTERY VOLTAGE (V) 40 20 0 50 ms
			ENGINE RUNNING AT 2,000 RPM (MORE THAN 100 SECONDS AFTER STARTING ENGINE)	BATTERY VOLTAGE (V) 40 20 0 50 ms

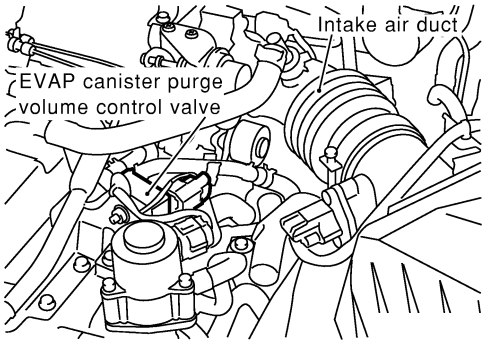
SEF576Y

Diagnostic Procedure

NIEC1425

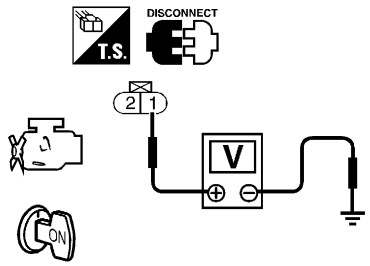
1	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.



SEF402Z

3. Turn ignition switch “ON”.
4. Check voltage between EVAP canister purge volume control solenoid valve terminal 1 and ground with CONSULT-II or tester.



SEF206W

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E9, F47
- Fuse block (J/B) connector E103
- 10A 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 14 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 (With CONSULT-II)	▶	GO TO 5.
OK (Without CONSULT-II)	▶	GO TO 6.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART
Check the harness for open or short between EVAP canister purge volume control solenoid valve and ECM.	
▶	Repair open circuit or short to ground and short to power in harness or connectors.

5	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	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XX %
THRTL POS SEN	X. XX V

SEF538Z

OK or NG

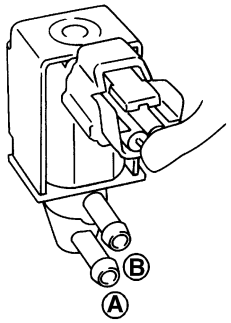
OK	▶	GO TO 7.
NG	▶	GO TO 6.

Diagnostic Procedure (Cont'd)

6	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.

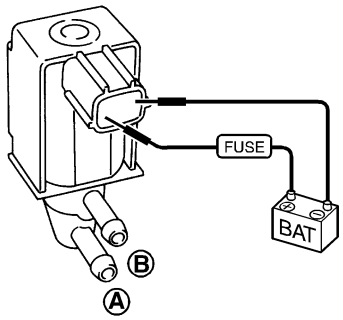


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

SEF334X

Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



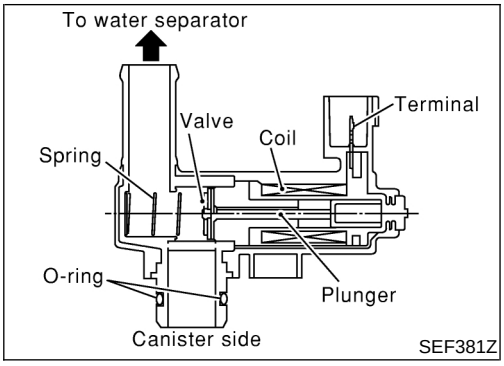
Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

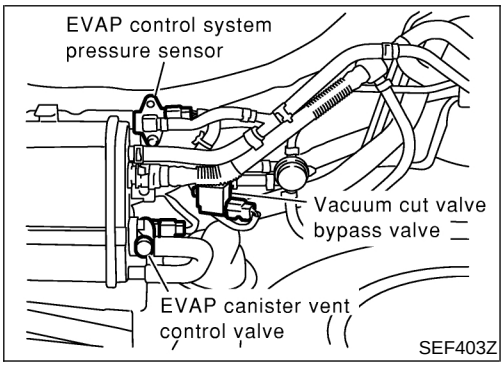
SEF335X

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

7	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-842.	
▶	**INSPECTION END**





Component Description

NIEC1426

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" diagnoses.

CONSULT-II Reference Value in Data Monitor Mode

NIEC1427

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	• Ignition switch: ON	OFF

On Board Diagnosis Logic

NIEC1428

Malfunction is detected when an improper voltage signal is sent to ECM through EVAP canister vent control valve.

Possible Cause

NIEC1429

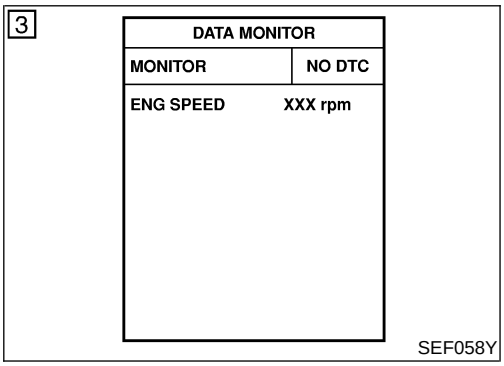
- Harness or connectors
  (The valve circuit is open or shorted.)
- EVAP canister vent control valve

DTC Confirmation Procedure

NIEC1430

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

NIEC1430S01

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-1064.

WITH GST

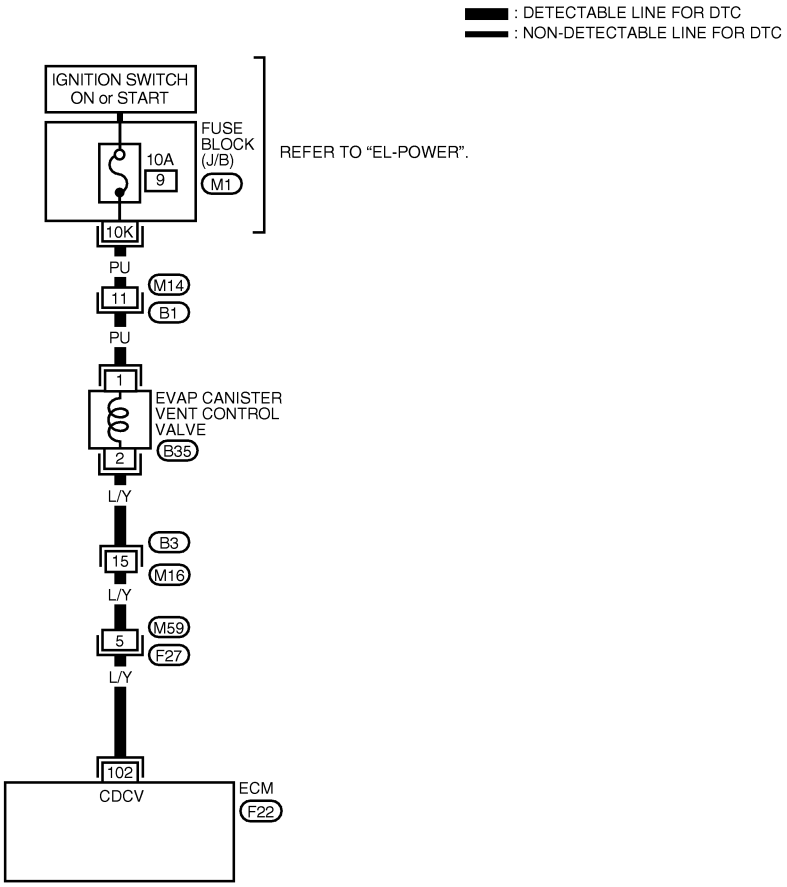
NIEC1430S02

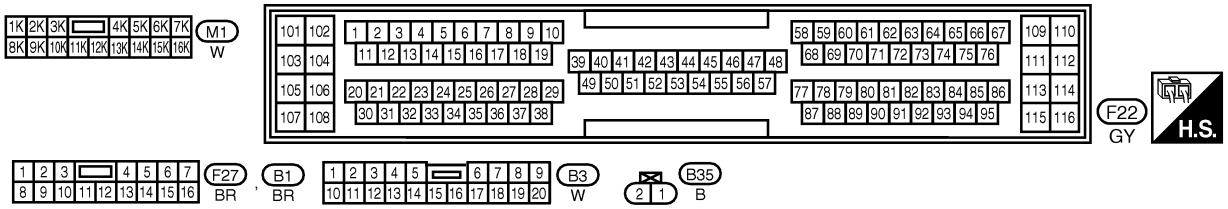
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

NIEC1431

EC-VENT/V-01





LEC202

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)
102	L/Y	EVAP CANISTER VENT CONTROL VALVE	IGN ON	BATTERY VOLTAGE

SEF577Y

Diagnostic Procedure

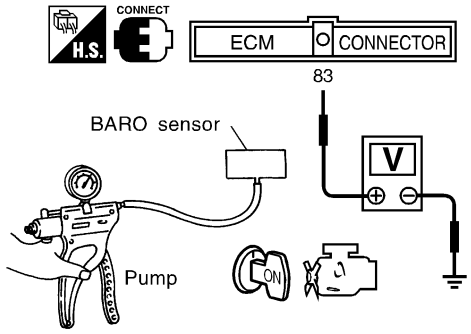
NIEC1432

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.



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

SEF542Z

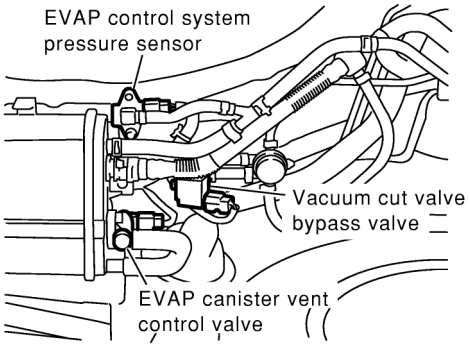
4. Check for operating sound of the valve.
   Clicking noise should be heard.

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 3.

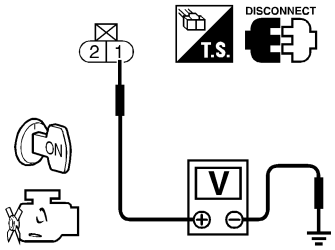
3	CHECK EVAP CANISTER VENT CONTROL VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect EVAP canister vent control valve harness connector.



SEF403Z

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 M14, B1
- Fuse block (J/B) connector M1
- 10A 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 102 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

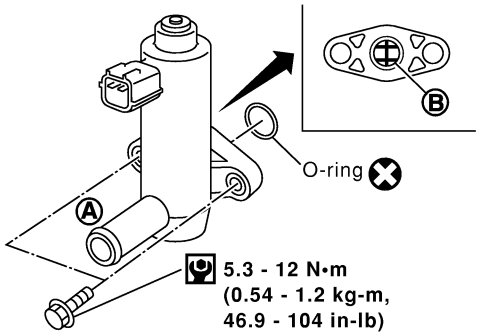
OK	▶	GO TO 7.
NG	▶	GO TO 6.

Diagnostic Procedure (Cont'd)

6	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors B3, M16 ● Harness connectors M59, F27 ● 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.	



SEF376Z

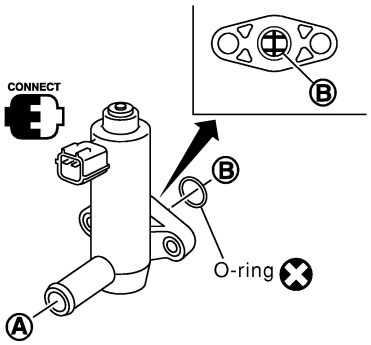
OK or NG	
OK ▶	GO TO 9.
NG ▶	Replace EVAP canister vent control valve.

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
A/F ALPHA-B1	XXX %
A/F SEN1 (B1)	XXX V
THRTL POS SEN	XXX V



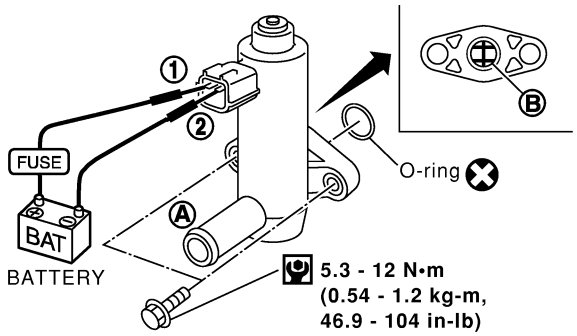
Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

SEF544Z

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.

SEF378Z

Make sure new O-ring is installed properly.

OK or NG

OK	▶	GO TO 11.
NG	▶	GO TO 10.

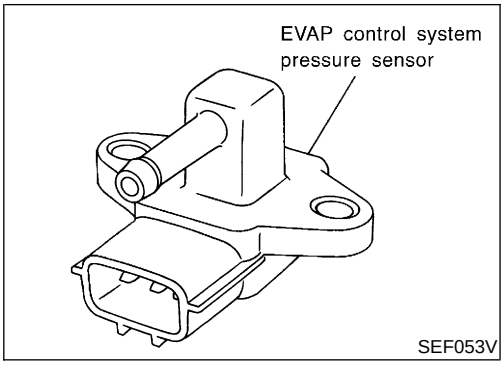
10	CHECK EVAP CANISTER VENT CONTROL VALVE-III

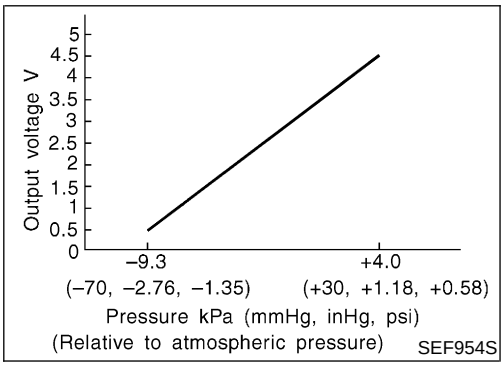
1. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
2. Perform Test No. 9 again.

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-842.	
▶	**INSPECTION END**





Component Description

NIEC1433

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

NIEC1434

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
EVAP SYS PRES	• Ignition switch: ON	Approx. 3.4V

On Board Diagnosis Logic

NIEC1435

Malfunction is detected when an improper voltage signal from EVAP control system pressure sensor is sent to ECM.

Possible Cause

NIEC1436

- 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

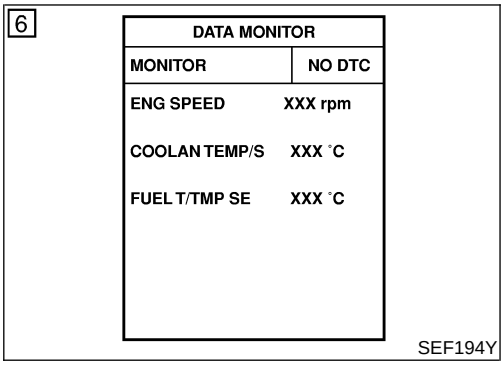
- Rubber hose from EVAP canister vent control valve to water separator

DTC Confirmation Procedure

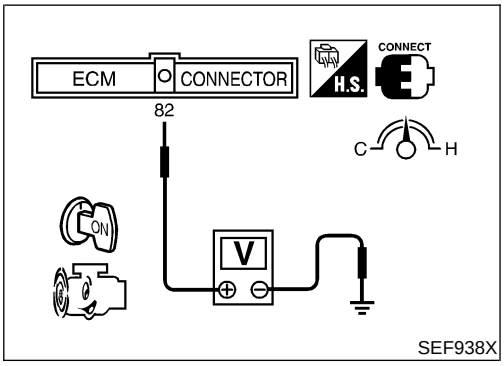
NIEC1437

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 0°C (41°F) or more.



SEF194Y



SEF938X

WITH CONSULT-II

NIEC1437S01

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-1071.

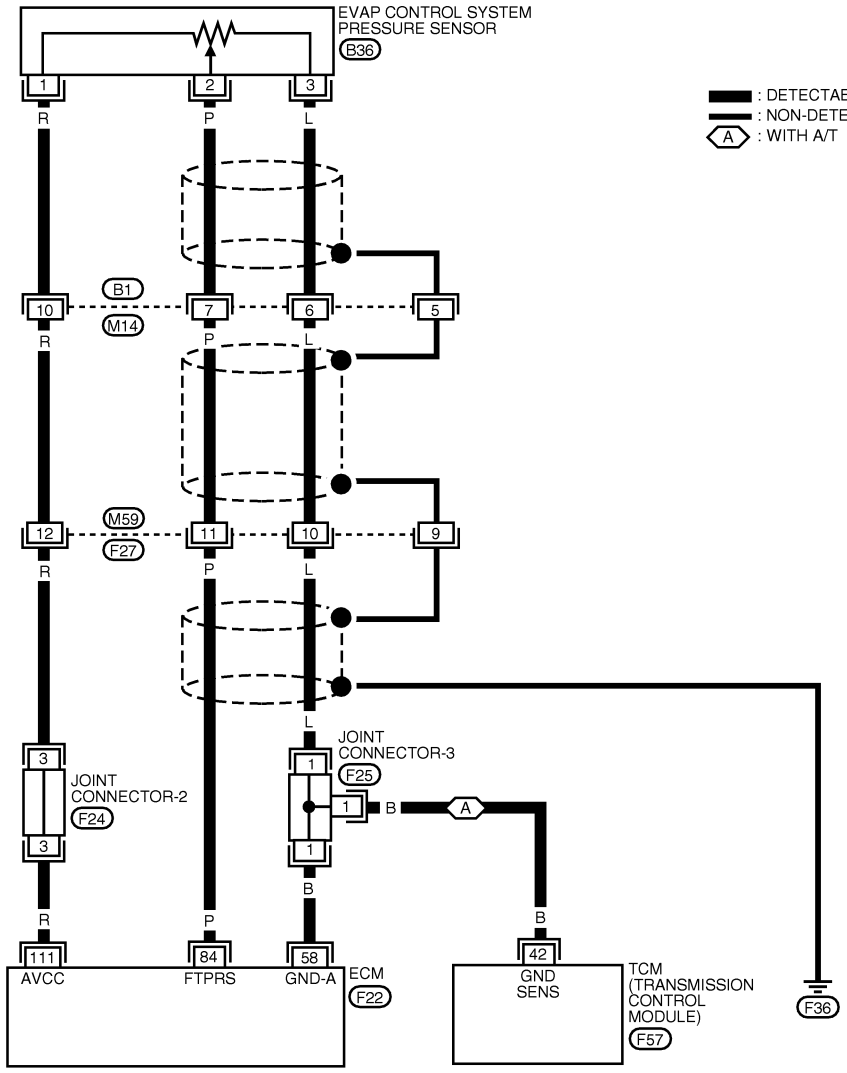
WITH GST

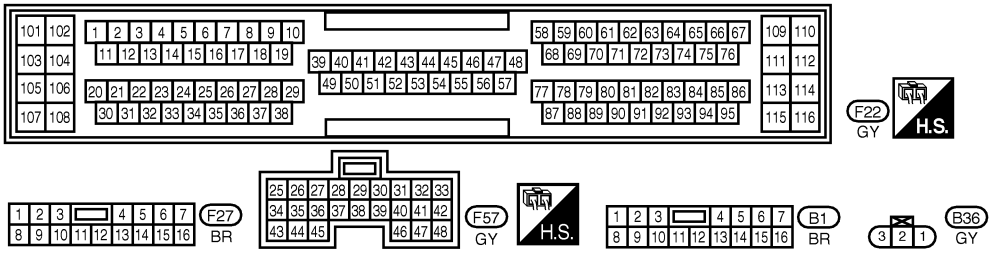
NIEC1437S02

1) Start engine and warm it up to normal operating temperature.
2) Check that voltage between ECM terminal 82 (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-1071.

Wiring Diagram

NIEC1438





REFER TO THE FOLLOWING.
F24, F25 - JOINT CONNECTOR

LEC205

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	IGN ON	APPROX. 0V
89	P	EVAP CONTROL SYSTEM PRESSURE SENSOR	IGN ON	APPROX. 3.4V
111	R	SENSOR'S POWER SUPPLY	IGN ON	APPROX. 5V

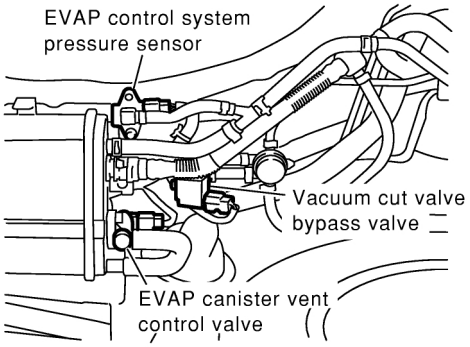
SEF578YA

Diagnostic Procedure

NIEC1439

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.



SEF403Z

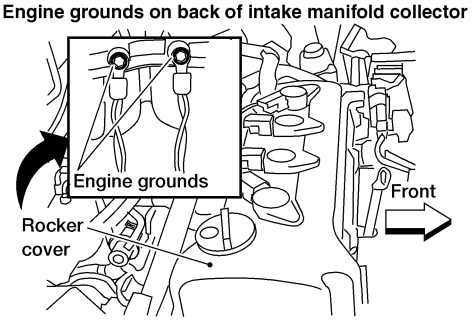
OK or NG

OK	▶	GO TO 2.
NG	▶	Reconnect, repair or replace.

2	RETIGHTEN GROUND SCREWS

Loosen and retighten engine ground screws.

Engine grounds on back of intake manifold collector



WEC249

	▶	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.

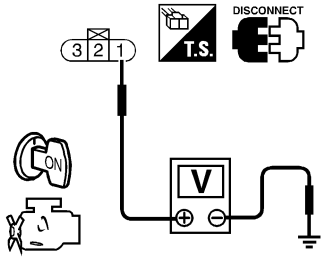
OK or NG

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

Diagnostic Procedure (Cont'd)

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 B1, M14
- Harness connectors M59, F27
- Joint connector-2
- 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 B1, M14
- Harness connectors M59, F27
- Joint connector-3
- Harness for open or short between EVAP control system pressure sensor and TCM
- Harness for open or short between EVAP control system pressure sensor and ECM

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

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 89 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 B1, M14
- Harness connectors M59, F27
- 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	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XX %
THRTL POS SEN	X. XX V

SEF538Z

OK or NG

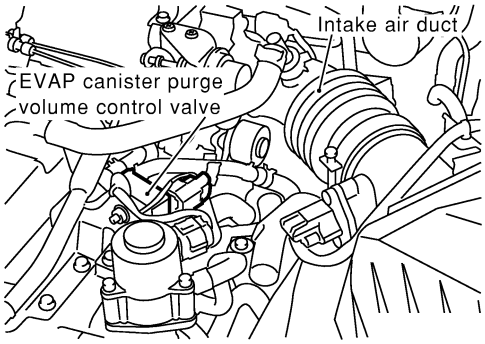
OK	▶	GO TO 12.
NG	▶	GO TO 11.

Diagnostic Procedure (Cont'd)

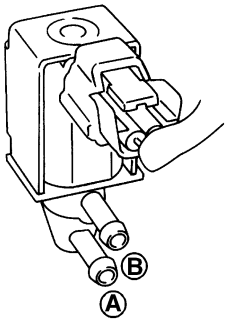
11	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



SEF402Z

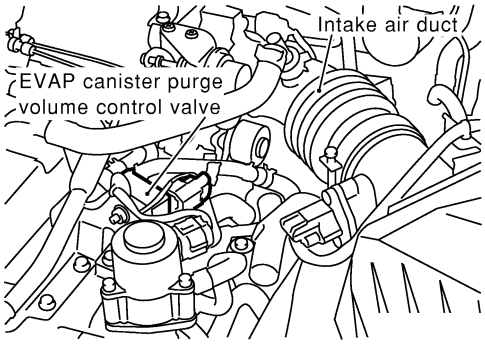


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

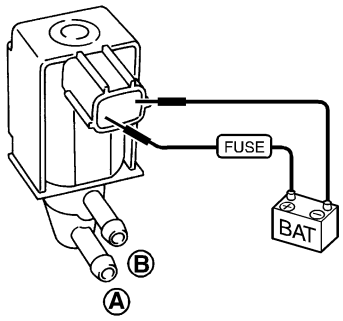
SEF334X

Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



SEF402Z



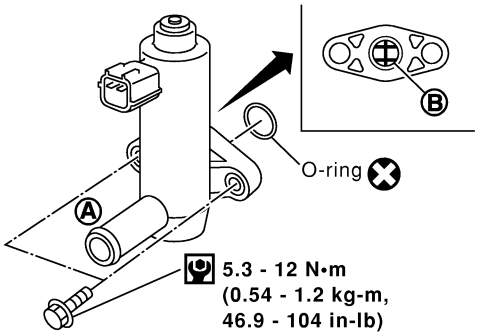
Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

SEF335X

OK or NG

OK	▶	GO TO 12.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

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.  SEF376Z **OK or NG**		
OK	▶	GO TO 14.
NG	▶	Replace EVAP canister vent control valve.

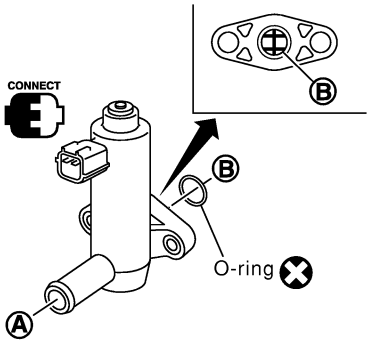
Diagnostic Procedure (Cont'd)

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
A/F ALPHA-B1	XXX %
A/F SEN1 (B1)	XXX V
THRTL POS SEN	XXX V



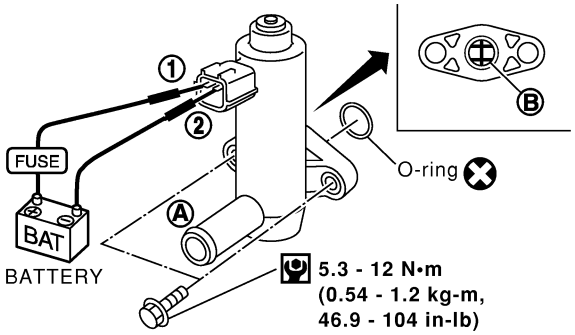
Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

SEF544Z

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.

SEF378Z

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

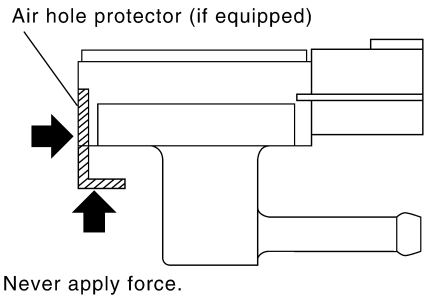
1. Clean the air passage (portion **A** to **B**) of EVAP canister vent control valve using an air blower.
2. Perform Test No. 14 again.

OK or NG

OK	▶	GO TO 16.
NG	▶	Replace EVAP canister vent control valve.

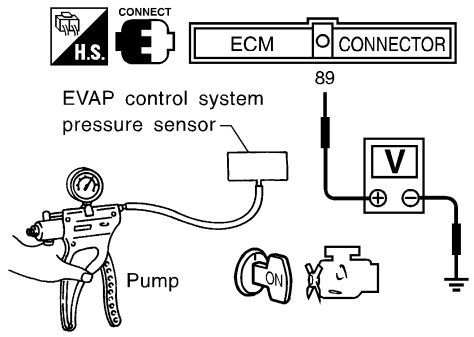
16	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

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 89 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

SEF543Z

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.

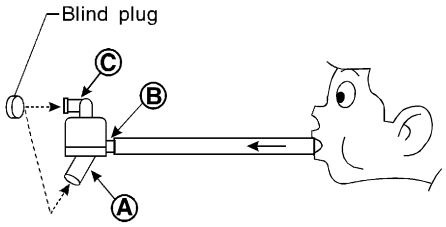
OK or NG

OK	▶	GO TO 18.
NG	▶	Clean rubber tube using an air blower, repair or replace rubber tube.

Diagnostic Procedure (Cont'd)

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.

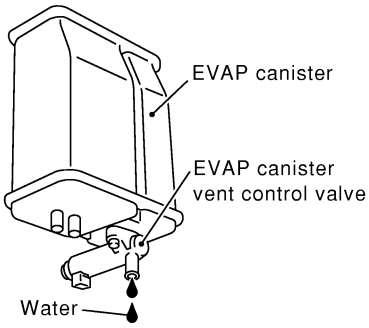
NOTE:
- Do not disassemble water separator.

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.



SEF504Z

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 21.

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.

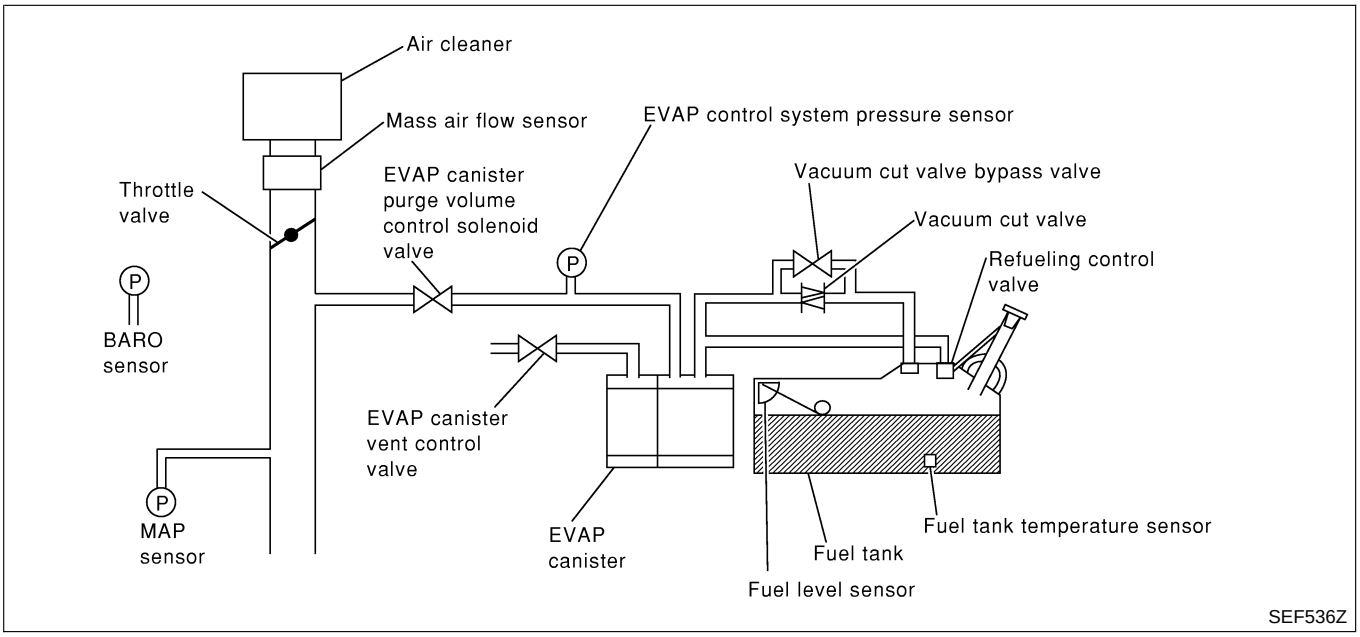
22	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-842.	
▶	**INSPECTION END**

On Board Diagnosis Logic

NIEC1440

NOTE:
If DTC P0455 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-1292.)

This diagnosis detects a very large leak (fuel filler cap fell off etc.) in the EVAP system between the fuel tank and the EVAP canister purge volume control solenoid valve.



Malfunction is detected when EVAP control system has very large leaks such as when fuel filler cap has fallen off, EVAP control system does not operate properly.

CAUTION:

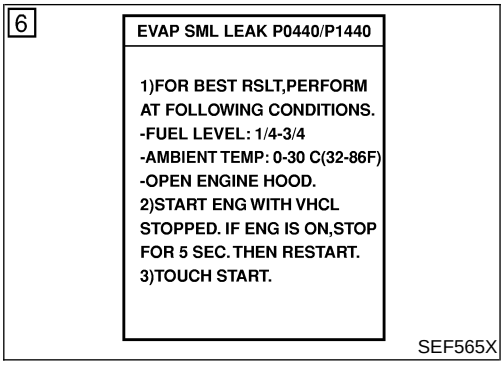
- **Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.**
- **If the fuel filler cap is not tightened properly, the MIL may come on.**
- **Use only a genuine NISSAN rubber tube as a replacement.**

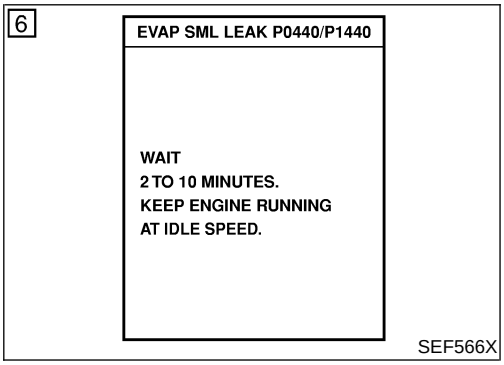
Possible Cause

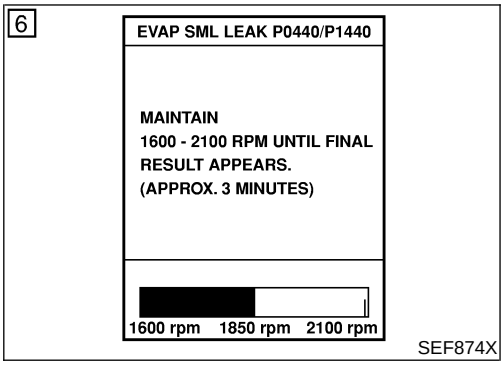
NIEC1441

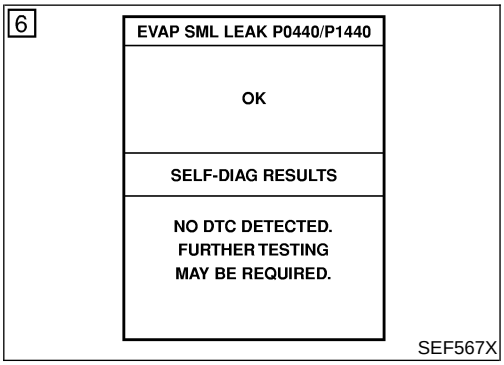
- Fuel filler cap remains open or fails to close.
- Incorrect fuel tank vacuum relief valve
- Incorrect fuel filler cap used
- Foreign matter caught in fuel filler cap.
- Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.
- Foreign matter caught in EVAP canister 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
- Manifold absolute pressure (MAP) sensor
- Fuel tank temperature sensor
- O-ring of EVAP canister vent control valve is missing or damaged.
- EVAP control system pressure sensor
- Refueling control valve
- ORVR system leaks









DTC Confirmation Procedure

NIEC1442

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-1292.)**
- **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 procedure.**

WITH CONSULT-II

NIEC1442S01

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-802.

7) Make sure that "OK" is displayed.
   If "NG" is displayed, select "SELF-DIAG RESULTS" mode with CONSULT-II and make sure that "EVAP GROSS LEAK [P0455]" is displayed. If it is displayed, refer to "Diagnostic Procedure", EC-1083.
   If P0440 is displayed, perform "Diagnostic Procedure" for DTC P0440, EC-1042.

WITH GST

NIEC1442S02

NOTE:

Be sure to read the explanation of "Driving Pattern" on EC-765 before driving vehicle.

1) Start engine.
2) Drive vehicle according to "Driving Pattern", EC-765.
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-765.
8) Stop vehicle.
9) Select "MODE 3" with GST.

- If P0455 is displayed on the screen, go to "Diagnostic Procedure", EC-1083.
- If P0440 or P1440 is displayed on the screen, go to "Diagnostic Procedure", for DTC P0440, EC-1042.
- If P1447 is displayed on the screen, go to "Diagnostic Procedure" for DTC P1447, EC-1283.
- If P0440, P0455, P1440 and P1447 are not displayed on the screen, go to the following step.

10) Select "MODE 1" with GST.

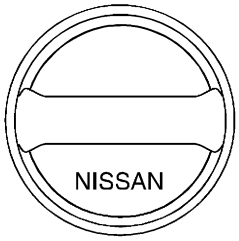
- If SRT of EVAP system is set, the result will be OK.
- If SRT of EVAP system is not set, go to step 6.

Diagnostic Procedure

NIEC1443

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

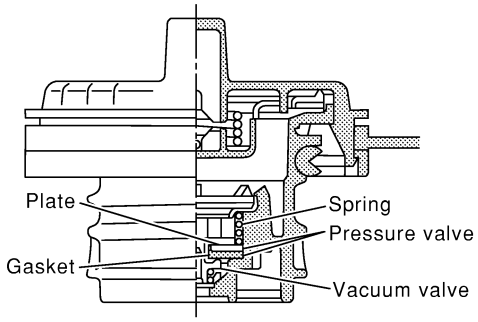
OK	▶	GO TO 3.
NG	▶	• Open fuel filler cap, then clean cap and fuel filler neck threads using air blower. • Retighten until ratcheting sound is heard.

Diagnostic Procedure (Cont'd)

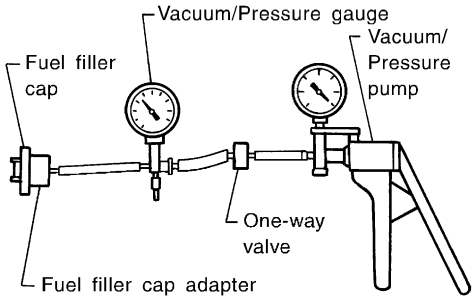
3	CHECK FUEL FILLER CAP FUNCTION	
Check for air releasing sound while opening the fuel filler cap.		
OK or NG		
OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	CHECK FUEL TANK VACUUM RELIEF VALVE	

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



SEF445Y



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 −0.035 kg/cm^2, −0.87 to −0.50 psi)

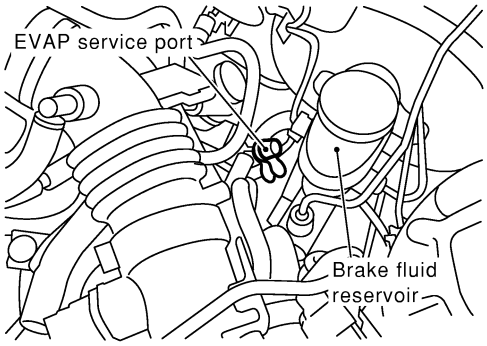
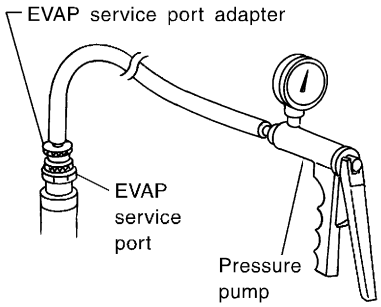
CAUTION:
Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.

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-726.		
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-1062.		
OK or NG		
OK	▶	GO TO 8.
NG	▶	Repair or replace EVAP canister vent control valve and O-ring or harness/connector.

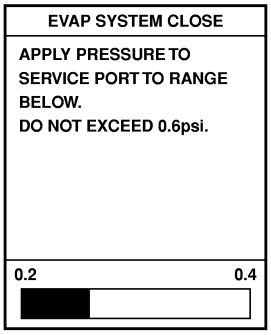
8	INSTALL THE PRESSURE PUMP	
To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.		
 SEF400Z		
 SEF916U		
NOTE: **Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.**		
Models with CONSULT-II	▶	GO TO 9.
Models without CONSULT-II	▶	GO TO 10.

Diagnostic Procedure (Cont'd)

9	CHECK FOR EVAP LEAK

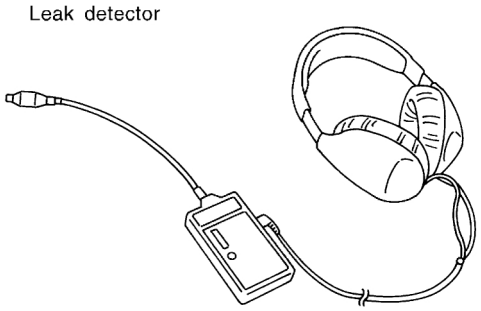
With CONSULT-II

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-730.



SEF200U

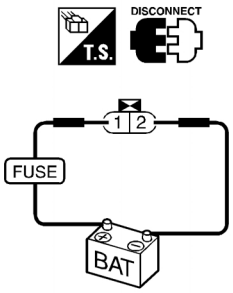
OK or NG

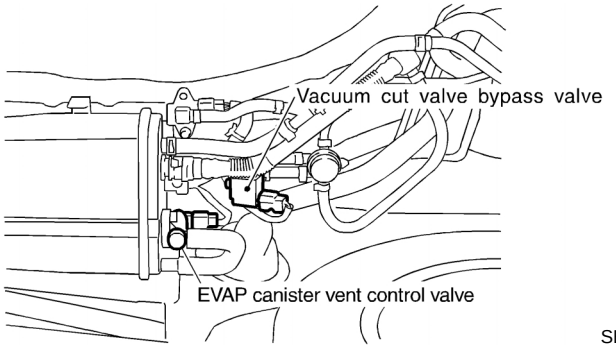
OK (With CONSULT-II)	▶	GO TO 11.
OK (Without CONSULT-II)	▶	GO TO 12.
NG	▶	Repair or replace.

10	CHECK FOR EVAP LEAK

Without CONSULT-II

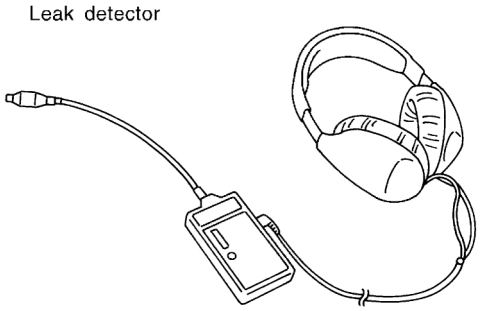
1. Turn ignition switch "OFF".
2. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)
3. Apply 12 volts DC to vacuum cut valve bypass valve. The valve will open. (Continue to apply 12V until the end of test.)





SEF401Z

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-730.



SEF200U

OK or NG

OK (With CONSULT-II)	▶	GO TO 11.
OK (Without CONSULT-II)	▶	GO TO 12.
NG	▶	Repair or replace.

Diagnostic Procedure (Cont'd)

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
A/F ALPHA-B1	XX %
THRTL POS SEN	X. XX V

Vacuum should exist.

SEF537Z

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 "EVAPORATIVE EMISSION LINE DRAWING", EC-730.

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	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XX %
THRTL POS SEN	X. XX V

SEF538Z

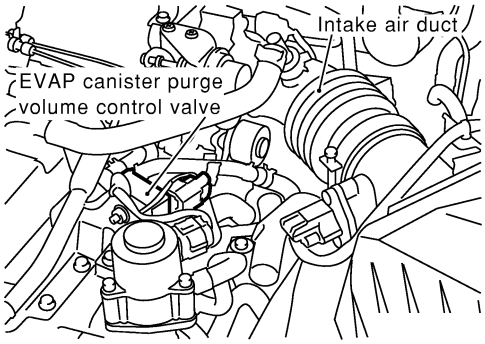
OK or NG

OK	▶	GO TO 16.
NG	▶	GO TO 15.

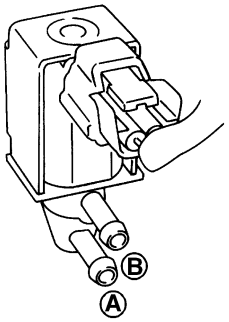
15	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



SEF402Z

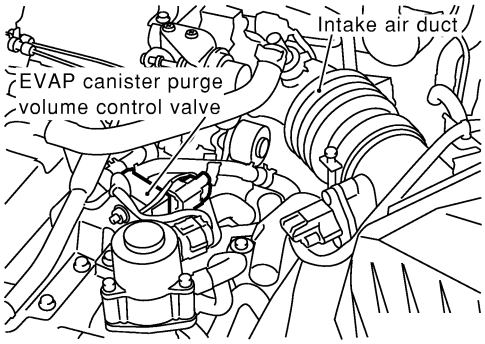


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

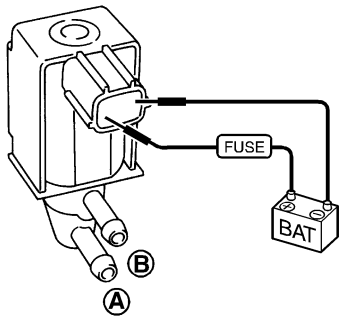
SEF334X

Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



SEF402Z



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

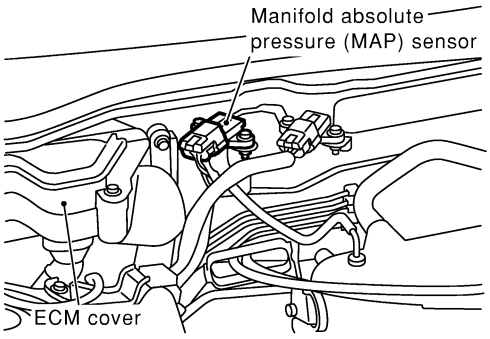
SEF335X

OK or NG

OK	▶	GO TO 16.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

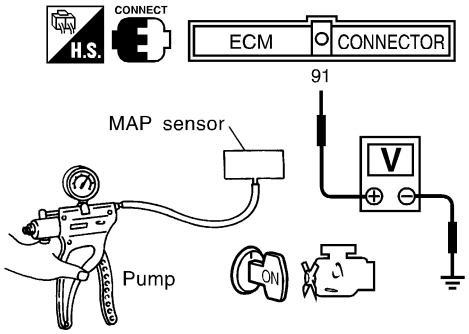
16	CHECK MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR

1. Remove manifold absolute pressure (MAP) sensor with its harness connector connected.



SEF389Z

2. Install a vacuum pump to MAP sensor.
3. Turn ignition switch "ON" and check output voltage between ECM terminal 91 and engine ground under the following conditions.



Applied vacuum kPa (mmHg, inHg)	Voltage V
Not applied	1.8 - 4.8
–26.7 (–200, –7.87)	1.0 to 1.4V lower than above value

SEF541Z

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 MAP sensor.

17	CHECK FUEL TANK TEMPERATURE SENSOR

1. Remove fuel level sensor unit.
2. Check fuel tank temperature sensor.
   Refer to "Component Inspection", EC-979.

OK or NG

OK	▶	GO TO 18.
NG	▶	Replace fuel level sensor unit.

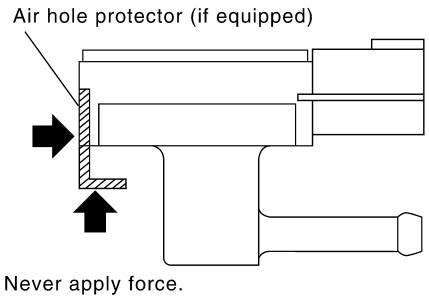
Diagnostic Procedure (Cont'd)

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.**



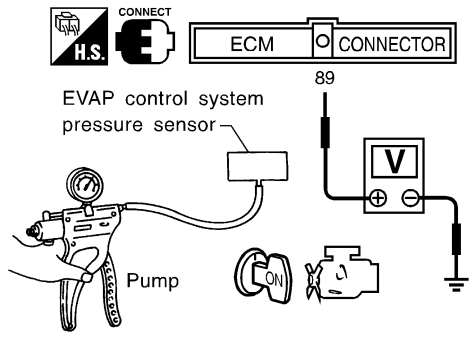
SEF799W

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 89 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

SEF543Z

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 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-732.

OK or NG

OK	▶	GO TO 20.
	▶	Repair or replace hoses and tubes.

20	CHECK SIGNAL LINE AND RECIRCULATION LINE

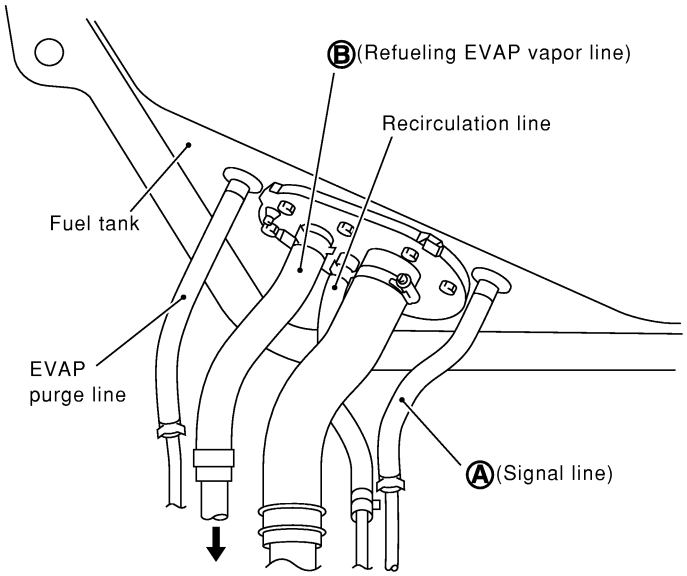
Check signal line and recirculation line between filler neck tube and fuel tank for clogging, kink, cracks, looseness and improper connection.

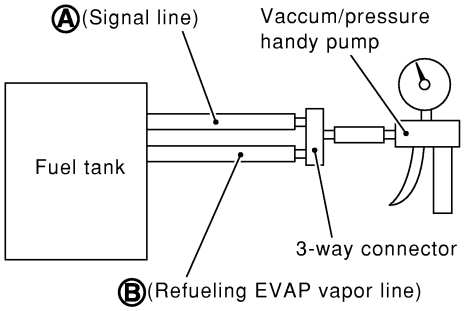
OK or NG

OK	▶	GO TO 21.
	▶	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.



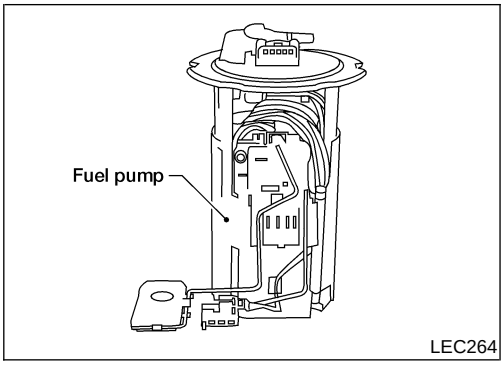


SEF505Z

OK or NG

OK	▶	GO TO 22.
	▶	Replace refueling control valve with fuel tank.

22	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-842.	
▶	**INSPECTION END**



Component Description

NIEC1444

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

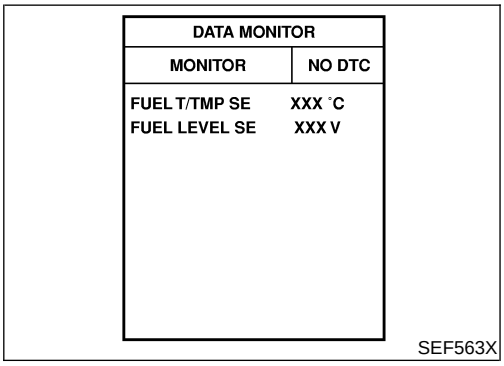
NIEC1445

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

NIEC1446

- Fuel level sensor circuit
  (The fuel level sensor circuit is open or shorted.)
- Fuel level sensor



DTC Confirmation Procedure

NIEC1447

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

NIEC1447S01

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-1096.

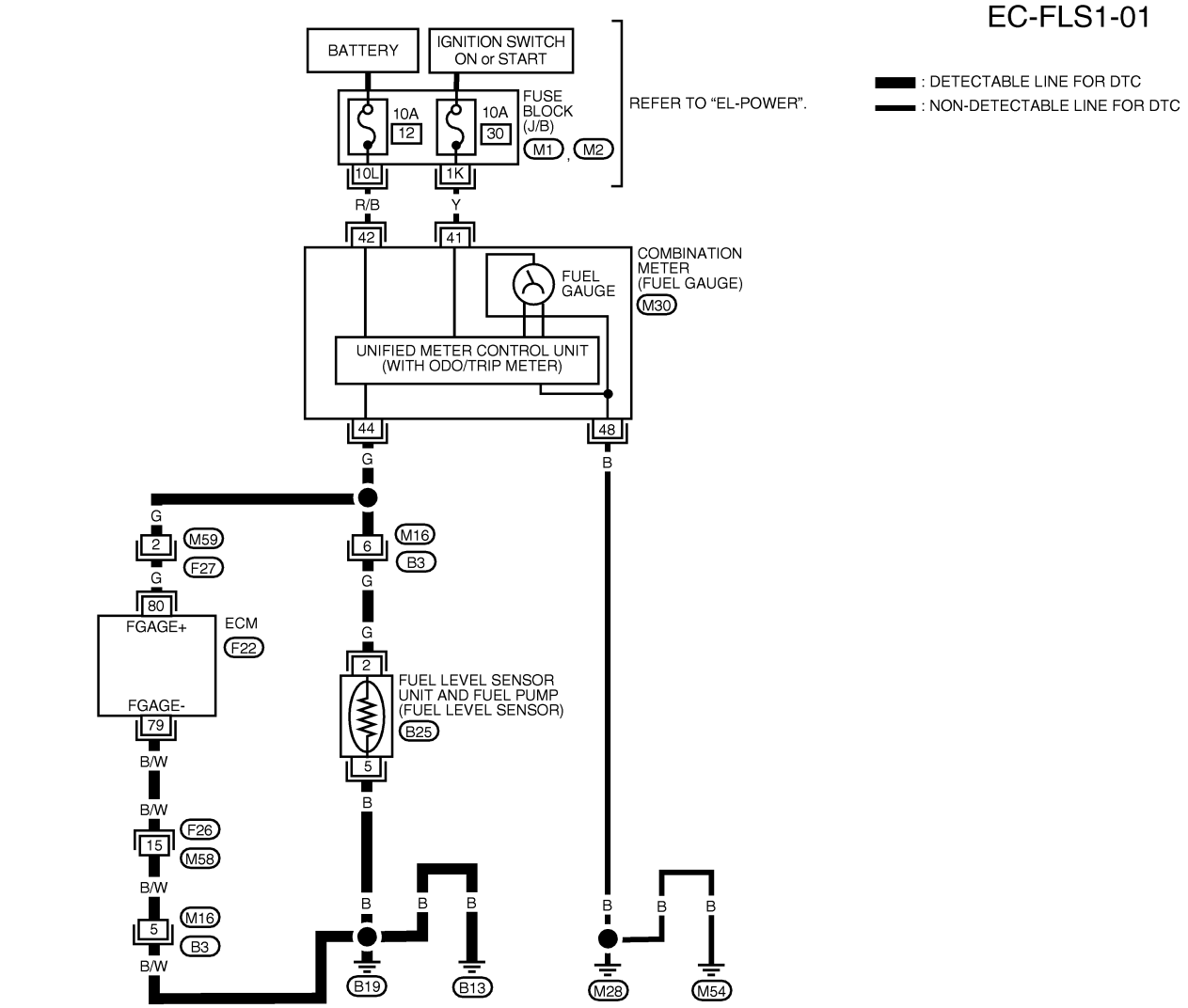
WITH GST

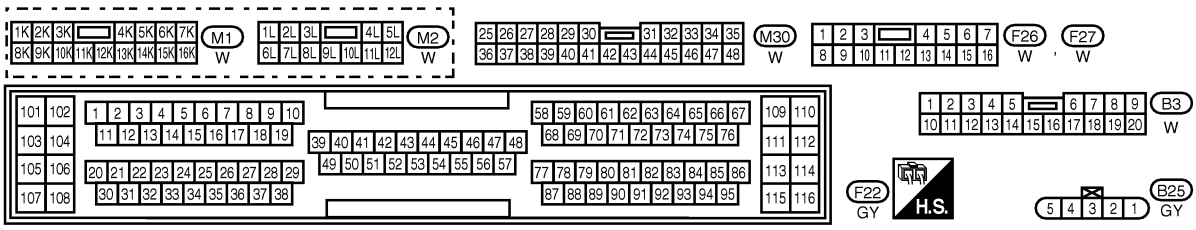
NIEC1447S02

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

NIEC1448





WEC421

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	G	FUEL LEVEL SENSOR	IGN ON	APPROX. 0 - 4.8V
79	B/W	FUEL LEVEL SENSOR GROUND	ENGINE RUNNING AT IDLE SPEED	APPROX. 0V

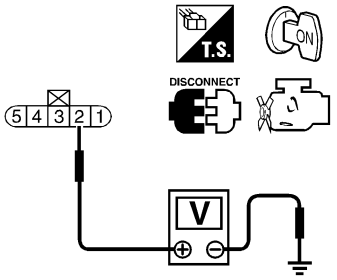
SEF579YA

Diagnostic Procedure

=NIEC1449

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 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 M16, B3
- Harness for open or short between combination meter and fuel level sensor unit

	▶	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 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 80 and fuel level sensor unit terminal 2, ECM terminal 79 and fuel level sensor unit terminal 5. Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

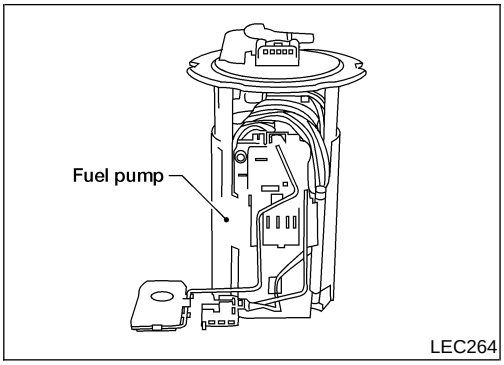
OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors F27, M59 ● Harness connectors F26, M58 ● Harness connectors M16, B3 ● Harness for open or short between ECM and combination meter ● 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-103***, "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-842.	
▶	**INSPECTION END**



Component Description

=NIEC1450

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

NIEC1451

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

NIEC1452

- Harness or connectors
  (The level sensor circuit is open or shorted.)
- Fuel level sensor

Overall Function Check

NIEC1453

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-5*, "FUEL SYSTEM".

TESTING CONDITION:

Before starting overall function check, preparation of draining fuel and refilling fuel is required.

DATA MONITOR	
MONITOR	NO DTC
FUEL T/TMP SE	XXX °C
FUEL LEVEL SE	XXX V

SEF195Y

WITH CONSULT-II

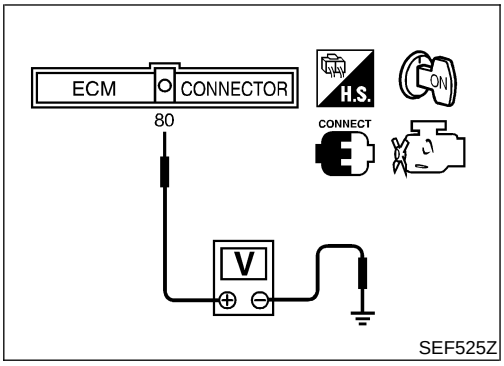
NIEC1453S01

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-744.
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 30ℓ (7-7/8 US gal, 6-5/8 Imp gal) and stop it.
10) Fill fuel into the fuel tank for 30ℓ (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-103***, "FUEL LEVEL SENSOR UNIT CHECK".

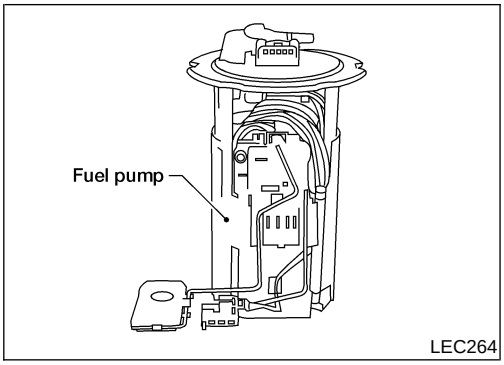


WITH GST

NIEC1453S02

NOTE:
Start from step 11, if it is possible to confirm that the fuel cannot be drained by 30ℓ (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-744.
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 80 (fuel level sensor signal) and ground.
7) Turn ignition switch "ON".
8) Check voltage between ECM terminal 80 and ground and note it.
9) Drain fuel by 30ℓ (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 30ℓ (7-7/8 US gal, 6-5/8 Imp gal).
11) Confirm that the voltage between ECM terminal 80 and ground changes more than 0.03V during step 8 - 10.
If NG, check component of fuel level sensor, refer to ***EL-103***, "FUEL LEVEL SENSOR UNIT CHECK".



Component Description

NIEC1454

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

NIEC1455

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

NIEC1456

- Fuel level sensor circuit
  (The fuel level sensor circuit is open or shorted.)
- Fuel level sensor

DTC Confirmation Procedure

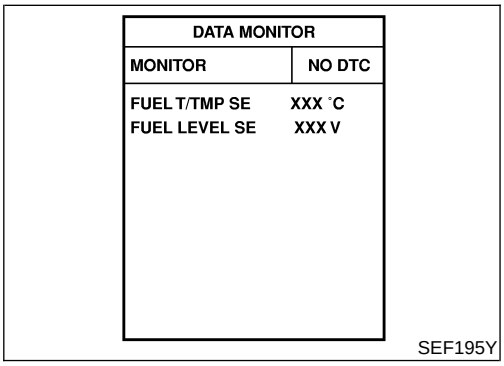
NIEC1457

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”.



WITH CONSULT-II

NIEC1457S01

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-1102.

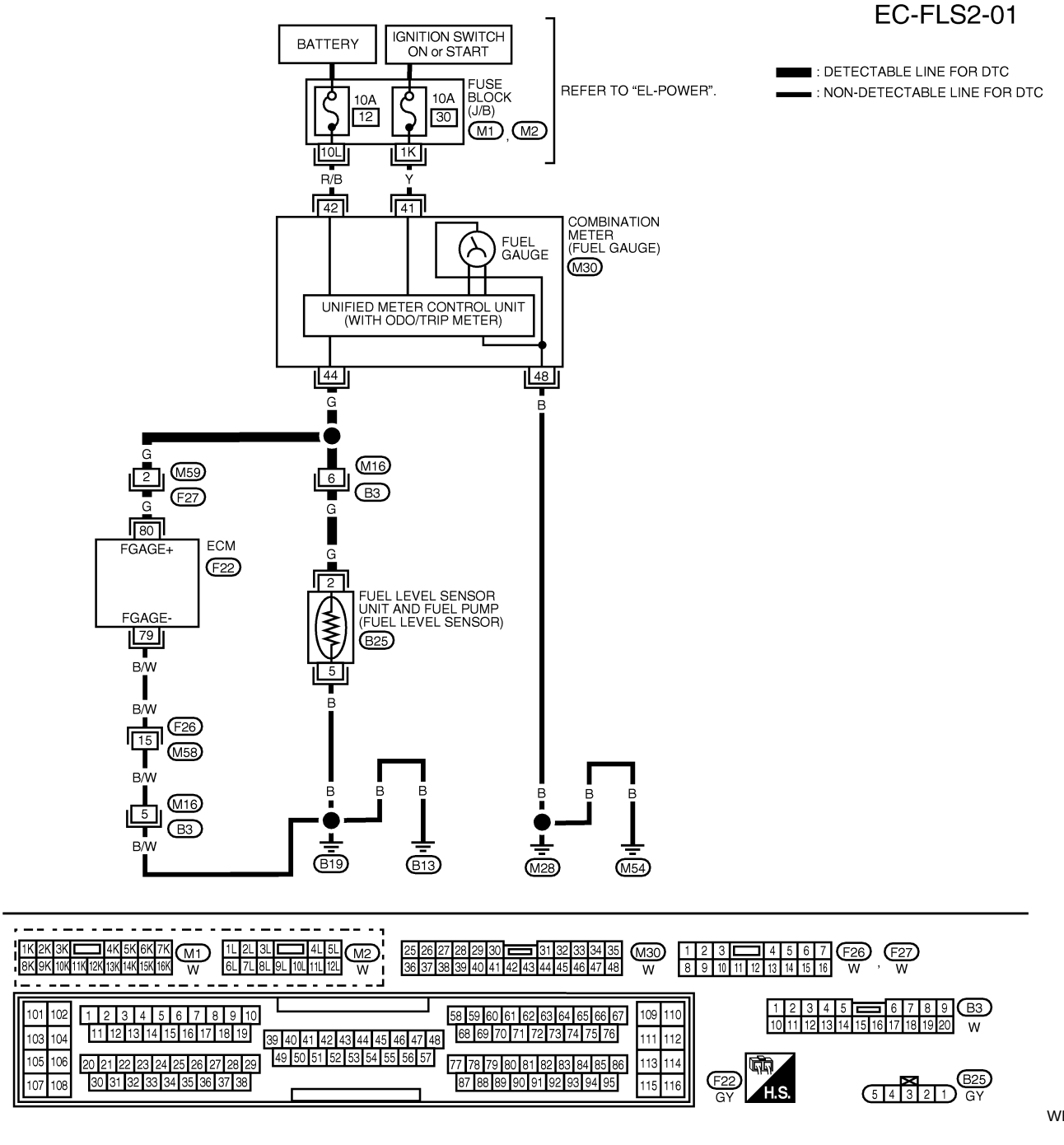
WITH GST

NIEC1457S02

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

NIEC1458



WEC403

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	G	FUEL LEVEL SENSOR	IGN ON	APPROX. 0 - 4.8V
79	B/W	FUEL LEVEL SENSOR GROUND	ENGINE RUNNING AT IDLE SPEED	APPROX. 0V

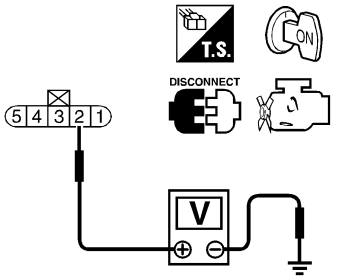
SEF579YA

Diagnostic Procedure

=NIEC1459

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 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 M16, B3
- Harness for open or short between combination meter and fuel level sensor unit

	▶	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 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 80 and fuel level sensor unit 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.

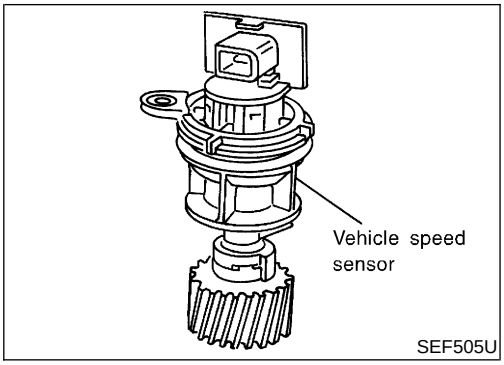
5	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F27, M59
- Harness for open or short between ECM and combination meter

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

6	CHECK FUEL LEVEL SENSOR	
Refer to ***EL-103***, "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-842.		
	▶	**INSPECTION END**



Component Description

NIEC1460

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

NIEC1461

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0500	• The almost 0 km/h (0 MPH) signal from vehicle speed sensor is sent to ECM even when vehicle is being driven.	• Harness or connector (The vehicle speed sensor circuit is open or shorted.) • Vehicle speed sensor

DTC Confirmation Procedure

NIEC1462

CAUTION:

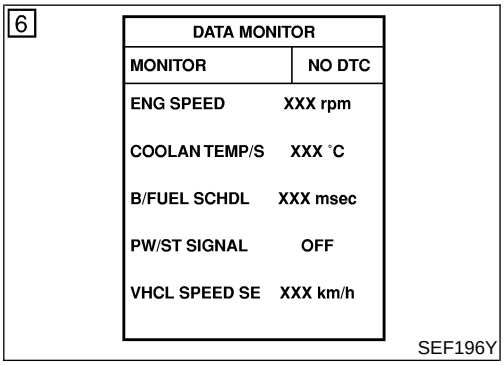
Always drive vehicle at a safe speed.

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:

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



With CONSULT-II

1) Start engine
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.
3) If NG, go to “Diagnostic Procedure”, EC-1107.
   If OK, go to following step.
4) Select “DATA MONITOR” mode with CONSULT-II.
5) Warm engine up to normal operating temperature.
6) Maintain the following conditions for at least 10 consecutive seconds.

ENG SPEED	2,100 - 3,000 rpm
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	6.5 - 10.75 msec
Selector lever	Suitable position
PW/ST SIGNAL	OFF

7) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-1107.

Overall Function Check

NIEC1463

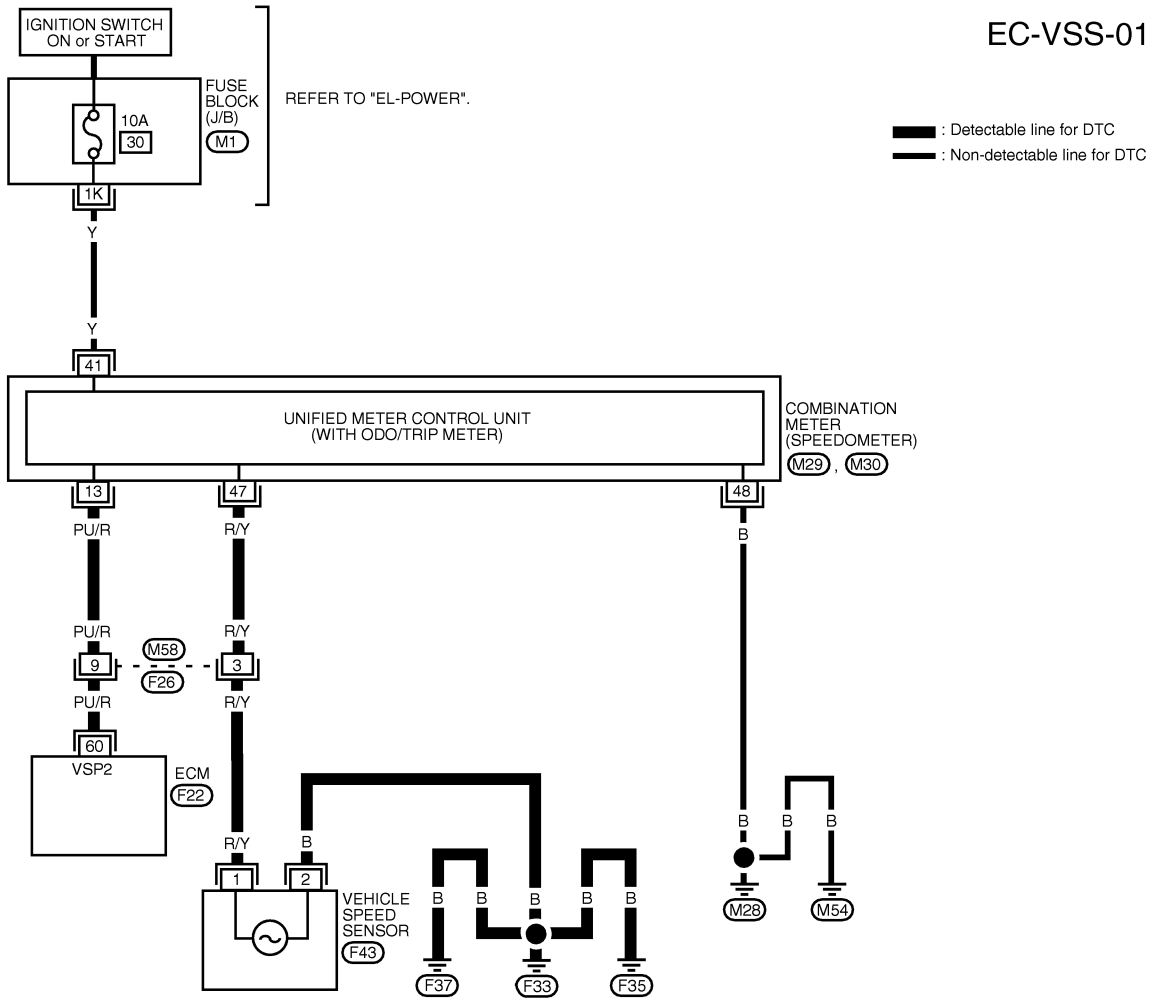
Use this procedure to check the overall function of the EVAP canister vent control valve circuit. During this check, a 1st trip DTC might not be confirmed.

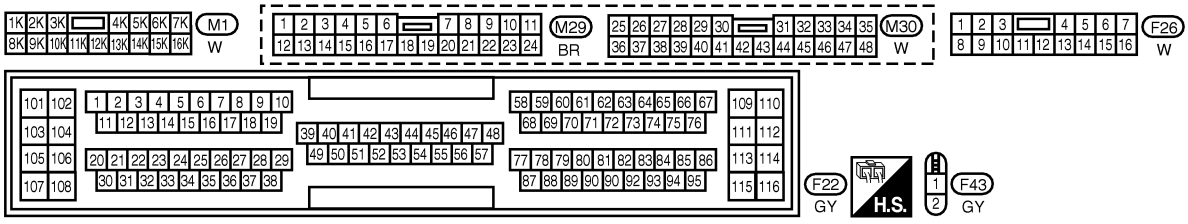
With GST

1) Lift up drive wheels.
2) Start engine.
3) Read vehicle speed sensor signal in “MODE 1” with GST. The vehicle speed sensor on GST should be able to exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.
4) If NG, go to “Diagnostic Procedure”, EC-1107.

Wiring Diagram

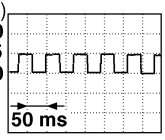
NIEC1464





WEC400

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)
60	PU/R	VEHICLE SPEED SENSOR	VEHICLE DRIVING AT 40 KM/H (25 MPH) IN 2ND GEAR POSITION UNDER LIFTED UP CONDITION	0 - APPROX. 4.2V 

SEF580YA

Diagnostic Procedure

NIEC1465

1	CHECK INPUT SIGNAL CIRCUIT	
1. Turn ignition switch “OFF”. 2. Disconnect ECM harness connector and combination meter harness connector. 3. Check harness continuity between ECM terminal 60 and combination meter terminal 13. 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 M58, F26 ● 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 M58, F26 ● Harness for open or short between combination meter and vehicle speed sensor		
OK or NG		
OK	▶	Check combination meter and vehicle speed sensor. Refer to ***EL-85***, “METERS AND GAUGES”.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK INTERMITTENT INCIDENT	
Perform “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-842.		
	▶	**INSPECTION END**

Description

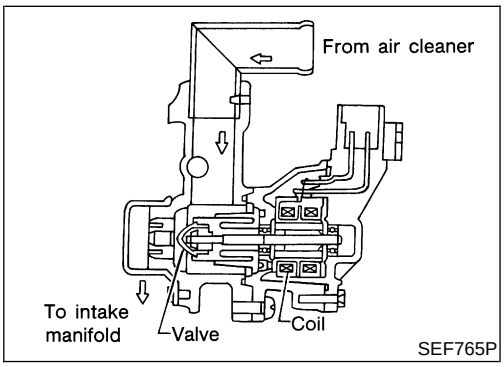
NIEC1466

SYSTEM DESCRIPTION

NIEC1466S01

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed	Idle air control	IACV-AAC valve
Camshaft position sensor (PHASE)	Engine speed and cylinder position		
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		
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 camshaft position sensor 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

NIEC1466S02

IACV-AAC Valve

NIEC1466S0201

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

NIEC1467

MONITOR ITEM	CONDITION		SPECIFICATION
IACV-AAC/V	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: "N" • No-load	Idle	5 - 20 steps
		2,000 rpm	—

On Board Diagnosis Logic

NIEC1468

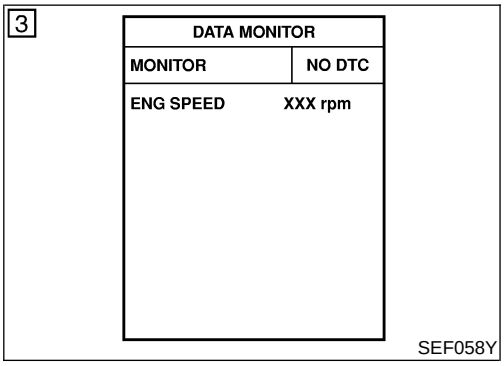
DTC No.	Malfunction is detected when ...		Check Items (Possible Cause)
P0505	A)	The IACV-AAC valve does not operate properly.	• Harness or connectors (The IACV-AAC valve circuit is open.) • IACV-AAC valve
	B)	The IACV-AAC valve does not operate properly.	• Harness or connectors (The IACV-AAC valve circuit is shorted.) • Air control valve (Power steering) • IACV-AAC valve

DTC Confirmation Procedure

NIEC1469

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, refer to EC-1364, perform "Idle Air Volume Learning", EC-756, before conducting "DTC Confirmation Procedure".**



PROCEDURE FOR MALFUNCTION A

NIEC1469S01

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5V with ignition switch "ON".

With CONSULT-II

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.
5) Perform step 4 once more.
6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1112.

With GST

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 B

NIEC1469S02

TESTING CONDITION:

- **Before performing the following procedure, make sure battery voltage is more than 11V at idle.**
- **For best results, perform the test at a temperature above –10°C (14°F).**
- **Electrical load (rear window defogger, headlamps, air conditioner, etc.) is not applied.**

With CONSULT-II

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-1112.

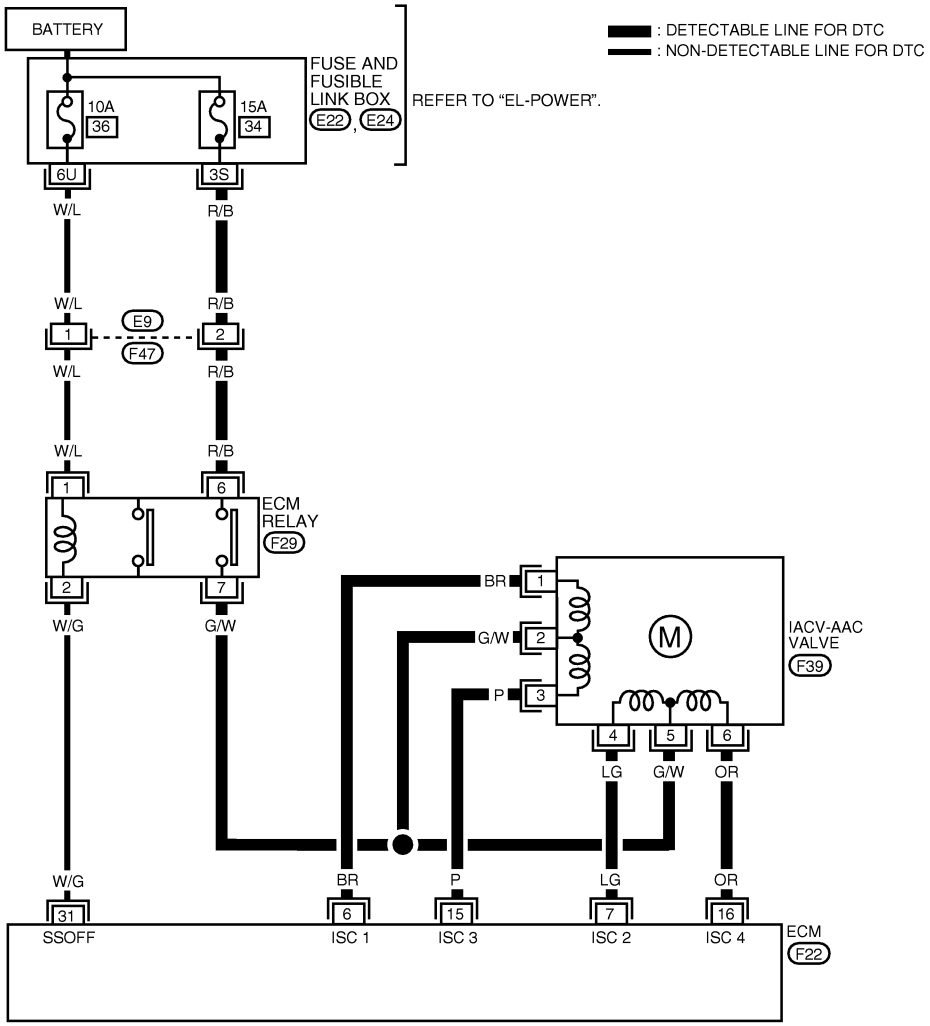
With GST

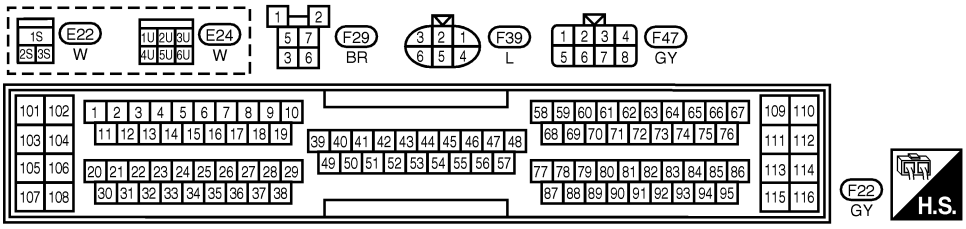
Follow the procedure "With CONSULT-II" above.

Wiring Diagram

NIEC1470

EC-AAC/V-01





LEC208

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	BR	IACV-AAC VALVE	ENGINE RUNNING AT IDLE SPEED	0.1 - 14V
7	LG			
15	P			
16	OR			

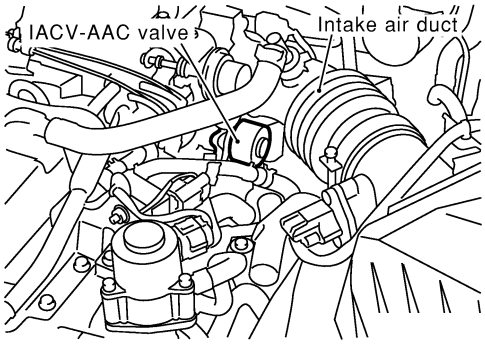
SEF581Y

Diagnostic Procedure

NIEC1471

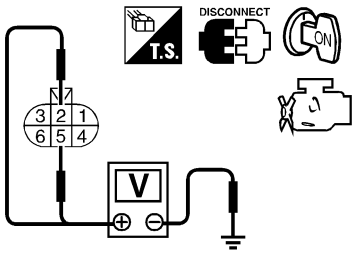
1	CHECK IACV-AAC VALVE POWER SUPPLY CIRCUIT

1. Stop engine.
2. Disconnect IACV-AAC valve harness connector.



SEF404Z

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 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
15	3
16	6

MTBL0544

Continuity should exist.

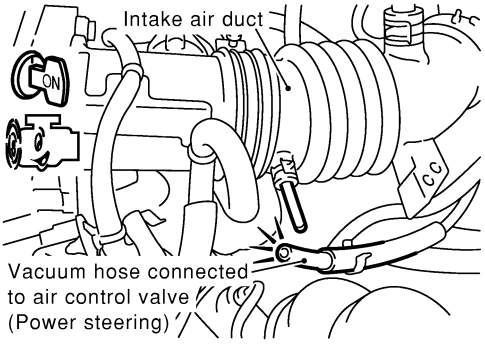
4. Also check harness for short to ground and short to power.

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.



SEF583Z

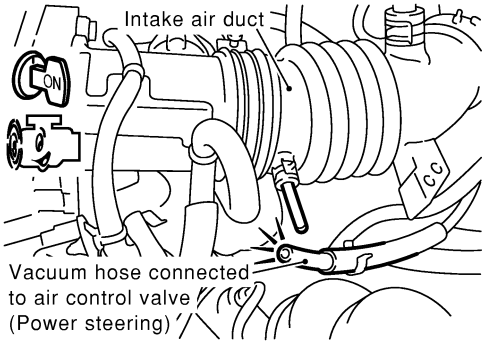
Vacuum slightly exists or does not exist.

OK or NG

OK	▶	GO TO 5.
NG	▶	Replace air control valve (Power steering).

5	CHECK AIR CONTROL VALVE (POWER STEERING) OPERATION-II

Check vacuum hose for vacuum existence when steering wheel is turned.



SEF583Z

Vacuum should exist.

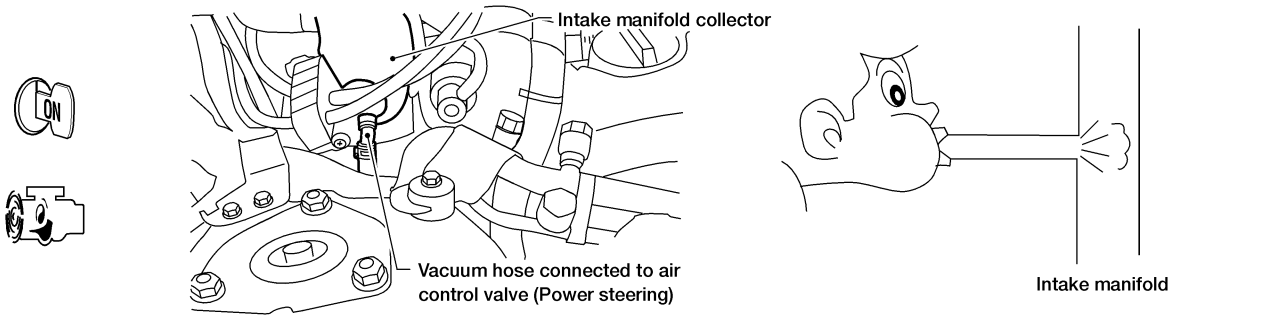
OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 6.

Diagnostic Procedure (Cont'd)

6	CHECK VACUUM PORT

1. Stop engine.
2. Disconnect vacuum hose connected to air control valve (Power steering) at the vacuum port.
3. Blow air into vacuum port.
4. Check that air flows freely.



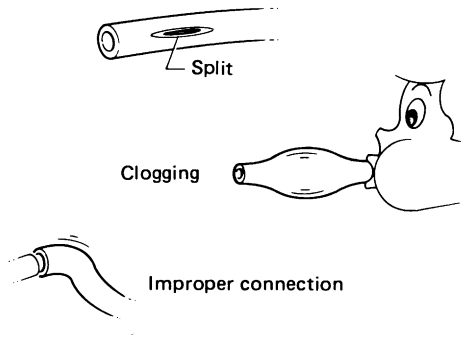
LEC325

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 cracks, clogging, improper connection or disconnection.



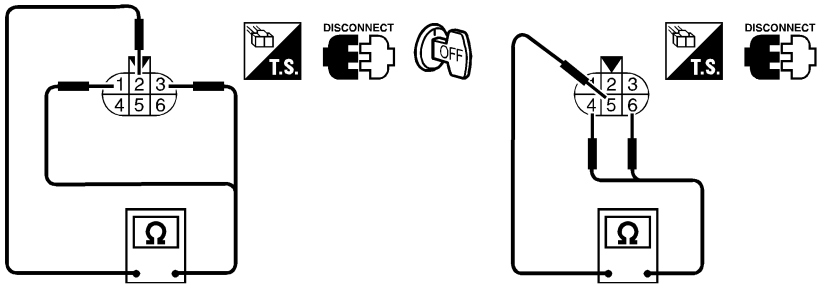
SEF109L

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:
20 - 24Ω [at 20°C (68°F)]

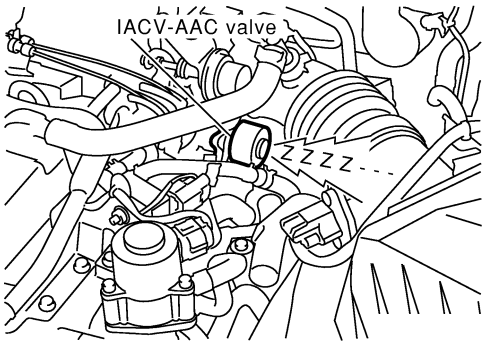
SEF214Z

OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 10.

9	CHECK IACV-AAC VALVE-II

1. Reconnect IACV-AAC valve harness connetor 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.



SEF405Z

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-756.
   Is the result CMPLT or INCMP?

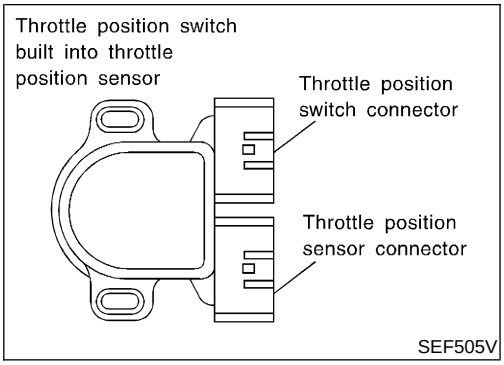
CMPLT or INCMP

CMPLT	▶	**INSPECTION END**
INCMP	▶	Follow the construction of "Idle Air Volume Learning".

Diagnostic Procedure (Cont'd)

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 "FUEL TEMP SE" in "DATA MONITOR" mode of "A/T" system indicates less than 0.9 V> ● For models without CONSULT-II, drive vehicle for 10 minutes. 5. Check target idle speed. **800±50 rpm (in "P" or "N" position)**		
OK or NG		
OK	▶	GO TO 12.
NG	▶	Perform "Idle Air Volume Learning", EC-842.

12	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-842.		
	▶	**INSPECTION END**



Component Description

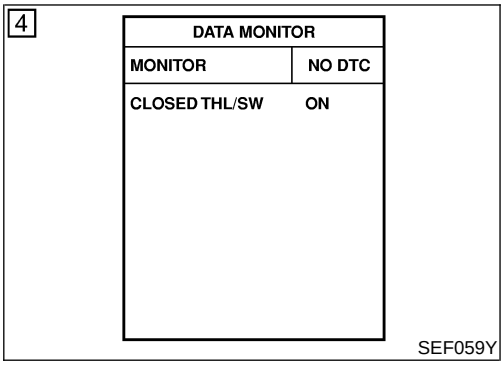
NIEC1472

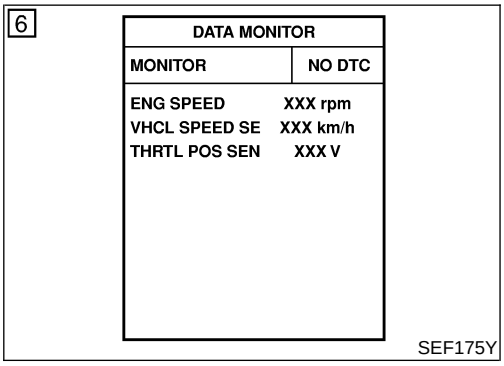
A closed throttle position switch and wide open throttle position switch are built into the throttle position sensor unit. The wide open throttle position switch is used only for A/T control.
When the throttle valve is in the closed position, the closed throttle position switch sends a voltage signal to the ECM. The ECM only uses this signal to open or close the EVAP canister purge control valve when the throttle position sensor is malfunctioning.

On Board Diagnosis Logic

NIEC1473

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0510	• Battery voltage from the closed throttle position switch is sent to ECM with the throttle valve opened.	• Harness or connectors (The closed throttle position switch circuit is shorted.) • Closed throttle position switch • Throttle position sensor





DTC Confirmation Procedure

NIEC1474

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

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 "A/T", then select "CLOSED THL/SW" in "DATA MONITOR" mode with CONSULT-II.
4) Check the signal under the following conditions.

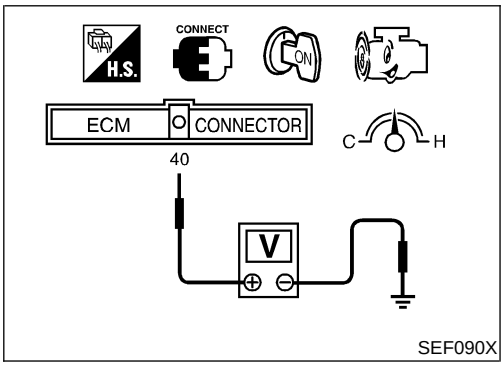
Condition	Signal indication
Throttle valve: Idle position	ON
Throttle valve: Slightly open	OFF

If the result is NG, go to "Diagnostic Procedure", EC-1120.
If OK, go to following step.

5) Select "ENGINE", then 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 2.3V
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-1120.



Overall Function Check

NIEC1475

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

Without CONSULT-II

1) Start engine and warm it up to normal operating temperature.
2) Check the voltage between ECM terminal 40 (Closed throttle position switch signal) and ground under the following conditions.

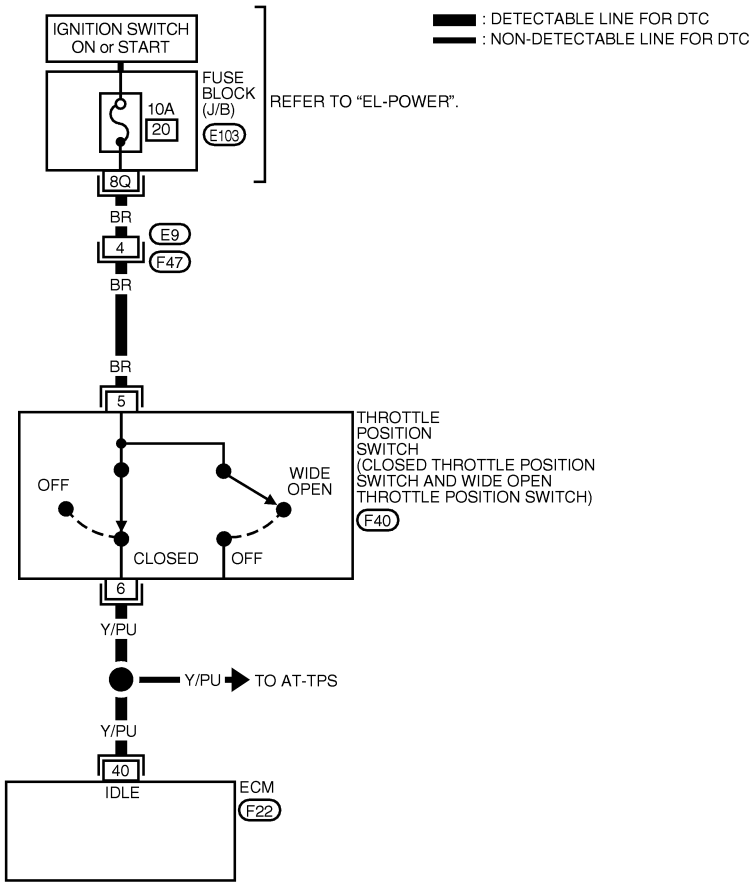
Condition	Voltage
At idle	Battery voltage
At 2,000 rpm	Approximately 0V

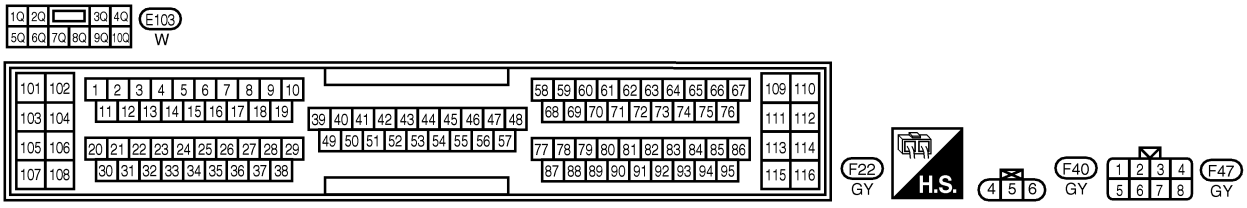
3) If NG, go to “Diagnostic Procedure”, EC-1120.

Wiring Diagram

NIEC1476

EC-TP/SW-01





LEC206

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	Y/PU	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

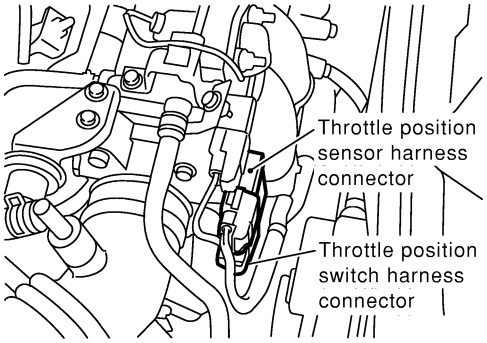
SEF582Y

Diagnostic Procedure

NIEC1477

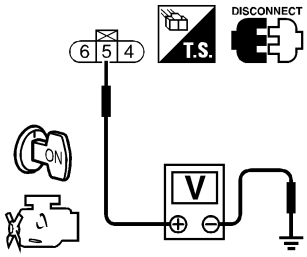
1	CHECK CLOSED THROTTLE POSITION SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect throttle position switch harness connector.



SEF392Z

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 E9, F47
- 10A fuse
- Harness for open or short between throttle position switch and fuse

	▶	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 40 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 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART
Check the harness for open or short between ECM and throttle position switch.	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK IGNITION TIMING AND ENGINE IDLE SPEED

Check the following items. Refer to "Basic Inspection", EC-802.

Items	Specifications
Ignition timing	9° ± 2° BTDC
Idle speed	800 ± 50 rpm (in "P" or "N" position)

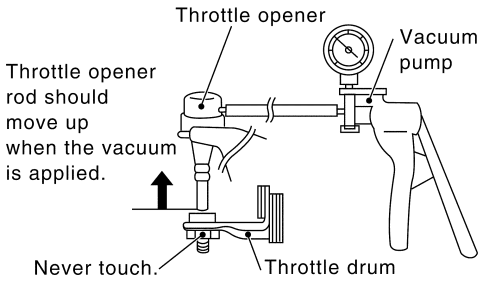
MTBL0539

Models with CONSULT-II ▶	GO TO 6.
Models without CONSULT-II ▶	GO TO 7.

6	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 "A/T" then 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

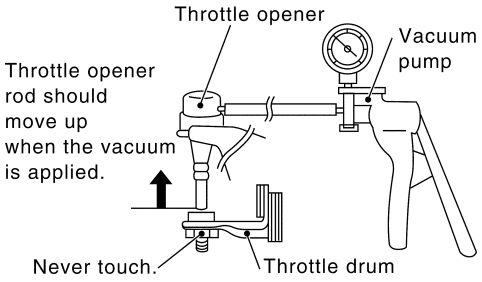
OK (With CONSULT-II) ▶	GO TO 9.
OK (Without CONSULT-II) ▶	GO TO 10.
NG ▶	GO TO 8.

Diagnostic Procedure (Cont'd)

7	CHECK THROTTLE POSITION SWITCH

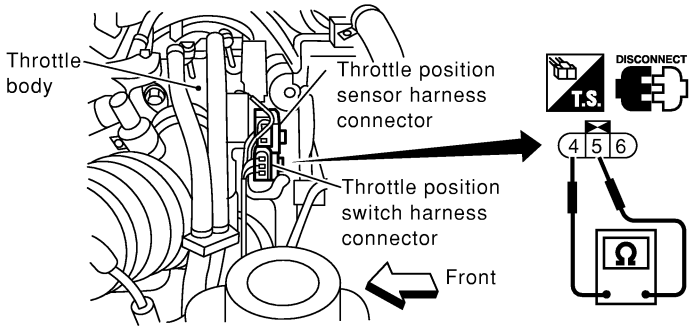
Without CONSULT-II

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

SEF770Y

OK or NG

OK (With CONSULT-II)	▶	GO TO 9.
OK (Without CONSULT-II)	▶	GO TO 10.
NG	▶	GO TO 8.

8	ADJUST THROTTLE POSITION SWITCH

Check the following items. Refer to "Basic Inspection", EC-802.

Items	Specifications
Ignition timing	9°±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	800±50 rpm (in "P" or "N" position)

MTBL0540

Is it possible to adjust closed throttle position switch?

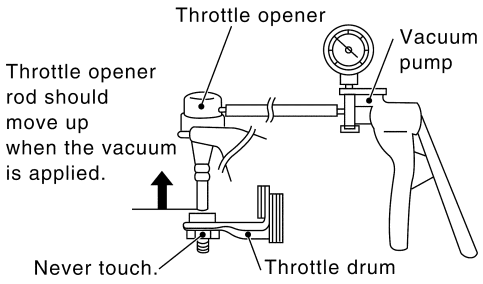
Yes or No

Yes (With CONSULT-II)	▶	GO TO 9.
Yes (Without CONSULT-II)	▶	GO TO 10.
No	▶	Replace throttle position switch.

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 conditins.
   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

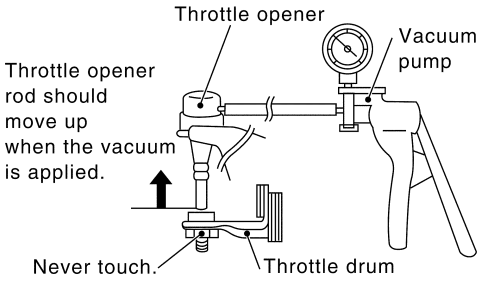
OK	▶	GO TO 11.
NG	▶	Replace throttle position sensor.

Diagnostic Procedure (Cont'd)

10	CHECK THROTTLE POSITION SENSOR

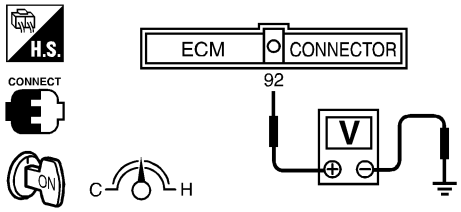
Without CONSULT-II

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 92 (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

SEF526Z

OK or NG

OK	▶	GO TO 11.
NG	▶	Replace throttle position sensor.

11	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-842.	
▶	**INSPECTION END**

System Description

NIEC1478

These circuit lines are used to control the smooth shifting up and down of A/T during the hard acceleration/deceleration. Voltage signals are exchanged between ECM and TCM (Transmission control module).

On Board Diagnosis Logic

NIEC1479

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0600*	• ECM receives incorrect signal from TCM (Transmission control module) continuously.	• Harness or connectors [The circuit between ECM and TCM (Transmission control module) is open or shorted.]

*: This DTC can be detected only by “DATA MONITOR (AUTO TRIG)” with CONSULT-II.

3

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

DTC Confirmation Procedure

NIEC1480

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 ignition switch “ON”.

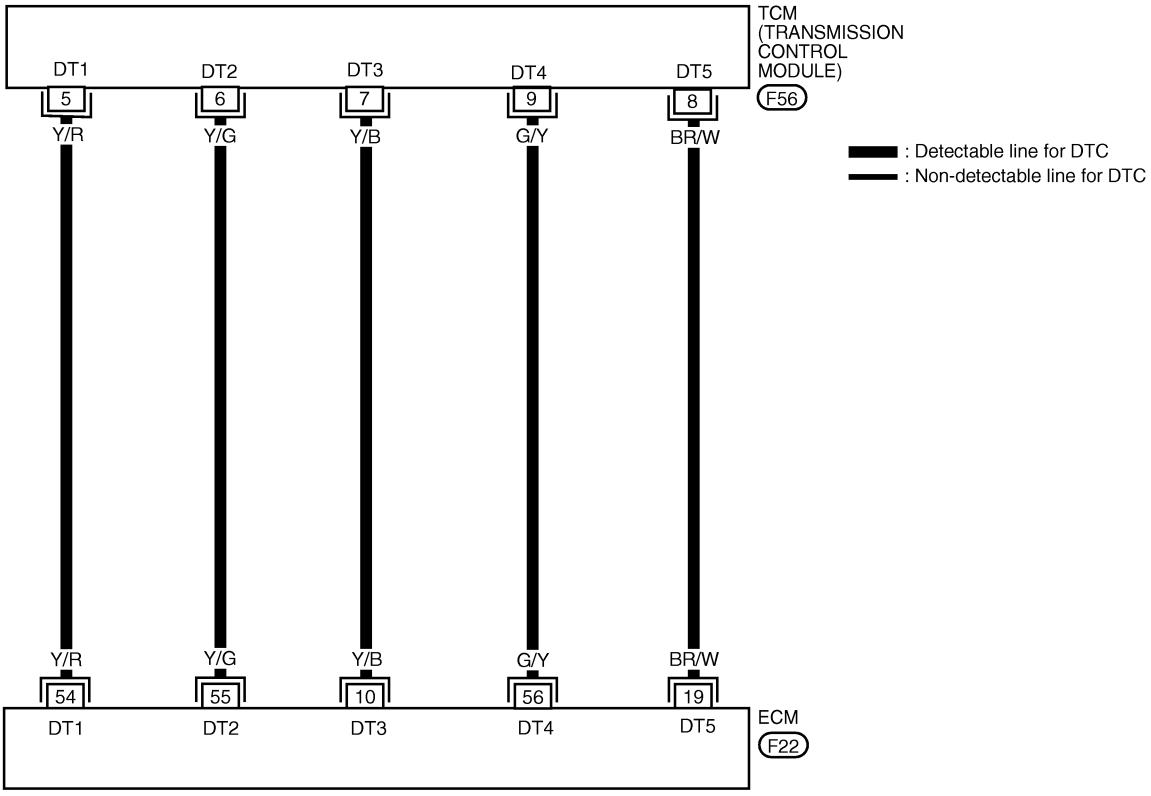
With CONSULT-II

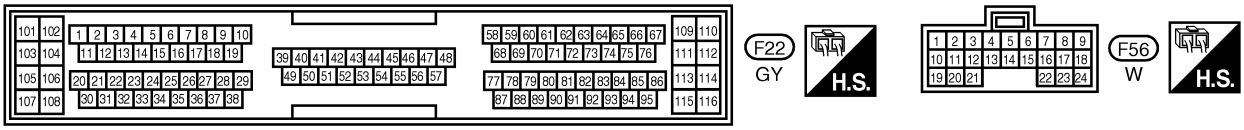
1) Turn ignition switch “ON”.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Wait at least 10 seconds.
4) If DTC is detected, go to “Diagnostic Procedure”, EC-1127.

Wiring Diagram

NIEC1481

EC-AT/C-01





LEC376

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)
10	Y/B	A/T SIGNAL NO. 3	ENGINE RUNNING AT IDLE SPEED	APPROX. 0 - 1.0V
19	BR/W	A/T SIGNAL NO. 5	ENGINE RUNNING AT IDLE SPEED	APPROX. 8V
54	Y/R	A/T SIGNAL NO. 1	ENGINE RUNNING AT IDLE SPEED	APPROX. 0 - 1.0V
55	Y/G	A/T SIGNAL NO. 2	ENGINE RUNNING AT IDLE SPEED	APPROX. 0 - 1.0V
56	G/Y	A/T SIGNAL NO. 4	ENGINE RUNNING AT IDLE SPEED	APPROX. 0 - 1.0V

SEF583Y

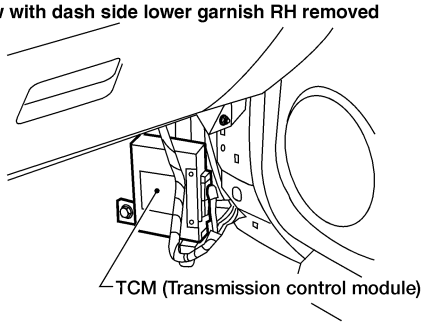
Diagnostic Procedure

NIEC1482

1	CHECK INPUT SIGNAL CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector and TCM (Transmission control module) harness connector.

View with dash side lower garnish RH removed



LEC306

3. Check harness continuity between ECM terminal 10 and TCM terminal 7, ECM terminal 19 and TCM terminal 8, ECM terminal 54 and terminal 5, ECM terminal 55 and TCM terminal 6, ECM terminal 56 and TCM terminal 9.
   Refer to Wiring Diagram.
   Continuity should exist.

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair harness or connectors.

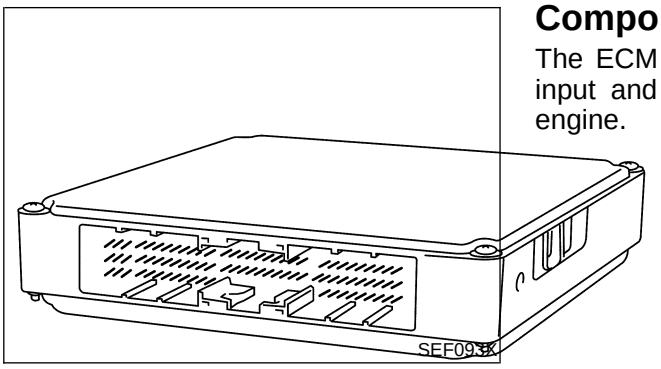
2	CHECK INPUT SIGNAL CIRCUIT

1. Check harness continuity between ECM terminal 10 and ground, ECM terminal 19 and ground, ECM terminal 54 and ground, ECM terminal 55 and ground, ECM terminal 56 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.

3	CHECK INTERMITTENT INCIDENT
Refer to “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-842.	
▶	**INSPECTION END**



Component Description

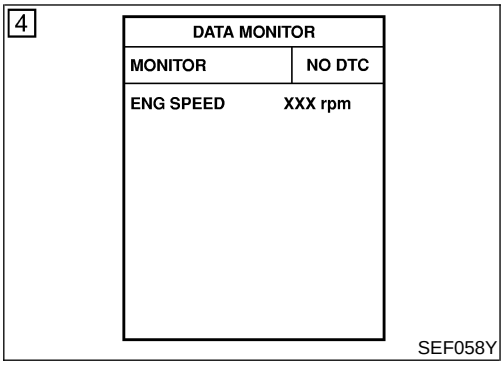
NIEC1483

The ECM consists of a microcomputer and connector for signal input and output and for power supply. The ECM controls the engine.

On Board Diagnosis Logic

NIEC1484

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0605	• ECM calculation function is malfunctioning.	• ECM



DTC Confirmation Procedure

NIEC1485

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

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-1129.

With GST

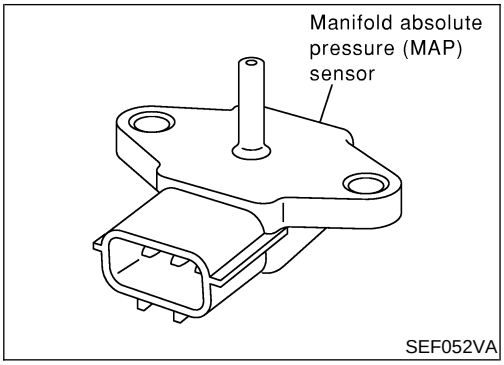
Follow the procedure “With CONSULT-II” above.

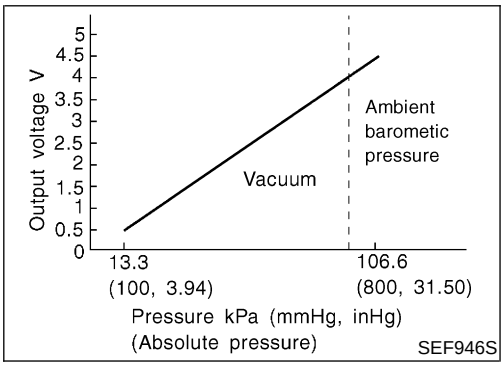
Diagnostic Procedure

NIEC1486

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-1128. 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-1128. 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 NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs. Refer to “NVIS (NISSAN VEHICLE IMMOBILIZER SYSTEM — NATS)”, EC-772. 3. Perform “Idle Air Volume Learning”, EC-756, **Which is the result CMPLT or INCMP?**	
CMPLT or INCMP	
CMPLT ▶	**INSPECTION END**
INCMP ▶	Follow the construction of “Idle Air Volume Learning”.





Component Description

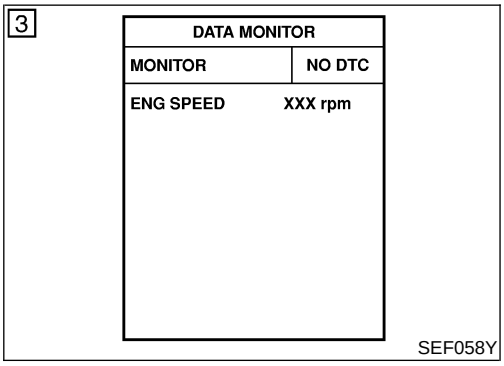
NIEC1487

The manifold absolute pressure (MAP) sensor detects intake manifold pressure and sends the voltage signal to the ECM. As the pressure increases, the voltage rises.

On Board Diagnosis Logic

NIEC1488

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1108	An excessively low or high voltage from the sensor is sent to ECM.	• Harness or connectors (Manifold absolute pressure sensor circuit is open or shorted.) • Manifold absolute pressure sensor



DTC Confirmation Procedure

NIEC1489

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

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch “OFF”, wait at least 10 seconds and then turn it “ON”.
3) Select “DATA MONITOR” mode with CONSULT-II.
4) Start engine and let it idle for at least 10 seconds.
5) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-1133.
   If 1st trip DTC is not detected, go to the next step.
6) Drive vehicle for at least 10 seconds under conditions similar to the freeze frame data.
   TESTING CONDITION:
   The condition in which “B/FUEL SCHDL” indication is more than that of the freeze frame data is advised.
7) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-1133.

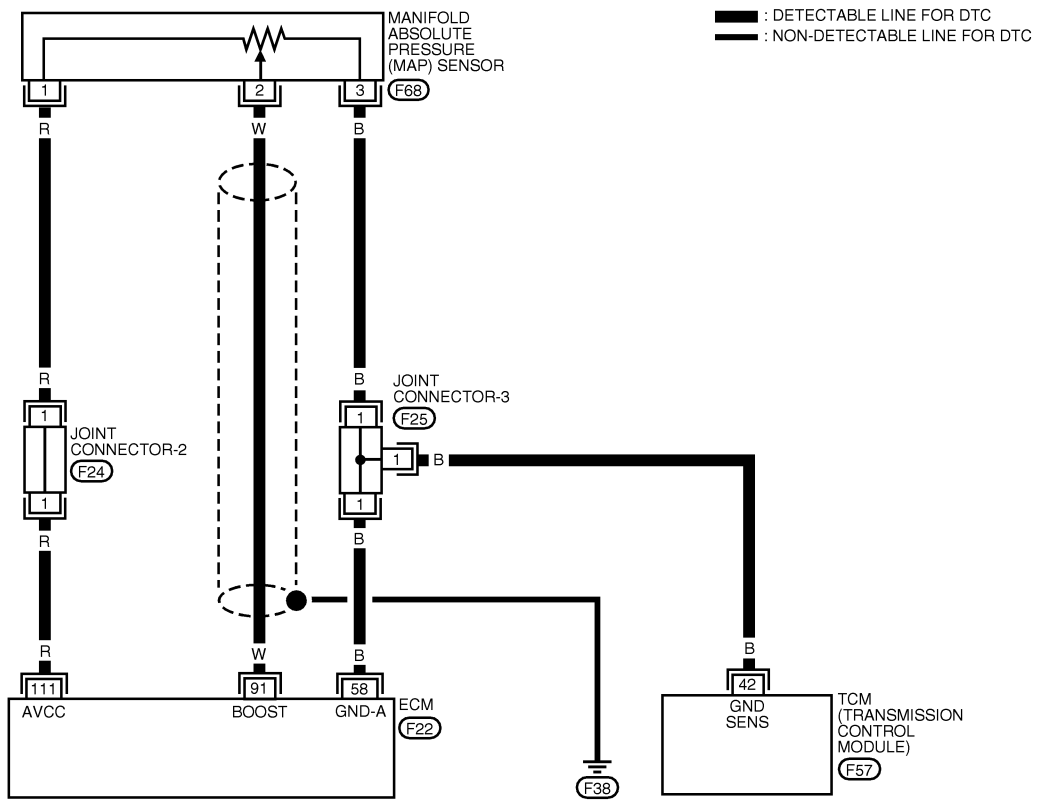
With GST

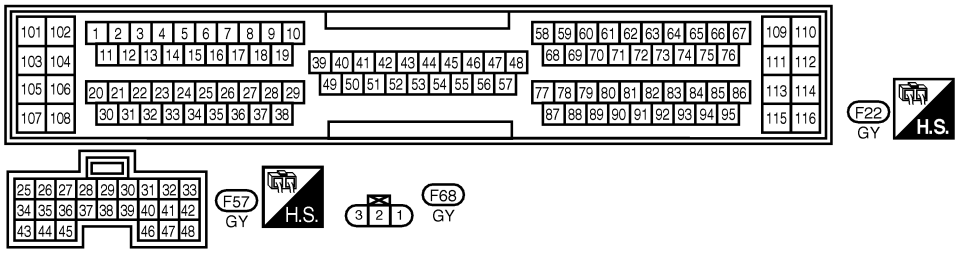
Follow the procedure "With CONSULT-II" above.

Wiring Diagram

=NIEC1490

EC-MAP-01





REFER TO THE FOLLOWING.
F24 , F25 - JOINT CONNECTOR

WEC381

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	IGN ON	APPROX. 0V
91	W	MAP SENSOR	IGN ON	APPROX. 1.3V
111	R	SENSOR'S POWER SUPPLY	IGN ON	APPROX. 5V

SEF607Z

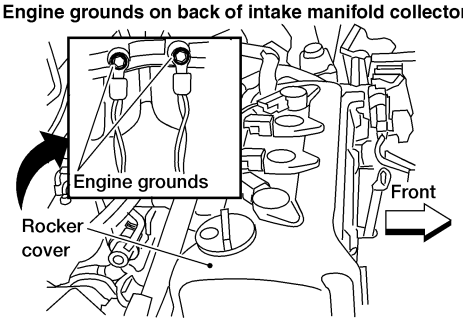
Diagnostic Procedure

NIEC1491

1	RETIGHTEN GROUND SCREWS

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

Engine grounds on back of intake manifold collector

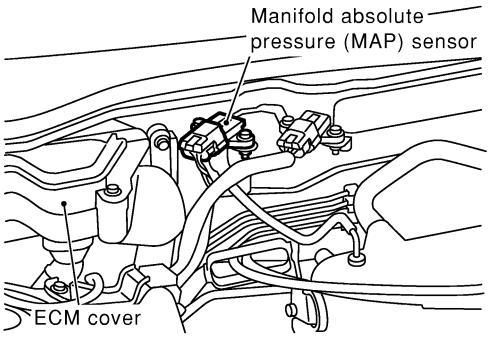


WEC249

	▶	GO TO 2.

2	CHECK CONNECTOR

1. Disconnect manifold absolute pressure (MAP) sensor harness connector.



SEF389Z

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

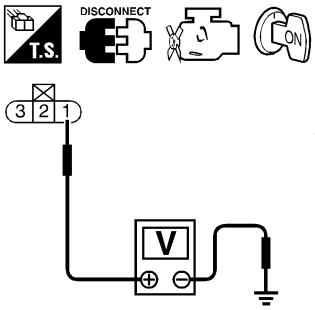
OK or NG

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

Diagnostic Procedure (Cont'd)

3	CHECK POWER SUPPLY

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



Voltage: Approximately 5V

SEF299X

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Joint connector-2
- Harness for open or short between ECM and MAP sensor

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 GROUND CIRCUIT

1. Turn ignition switch "OFF".
2. Check harness continuity between MAP 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 7.
NG	▶	GO TO 6.

6	DETECT MALFUNCTIONING PART

Check the following.
- Joint connector-3
- Harness for open or short between TCM and MAP sensor
- Harness for open or short between ECM and MAP sensor

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

7	CHECK INPUT SIGNAL CIRCUIT

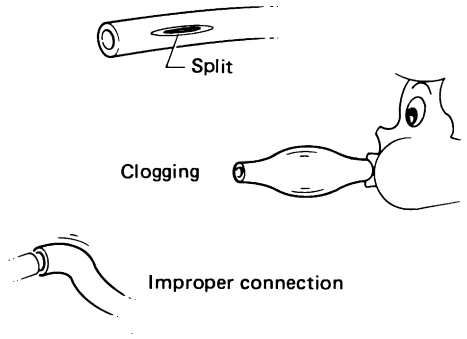
1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 91 and MAP sensor terminal 2.
   Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

OK or NG

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

8	CHECK HOSE

1. Remove hose connected to MAP sensor.
2. Check hose for clogging, cracks or improper connection.



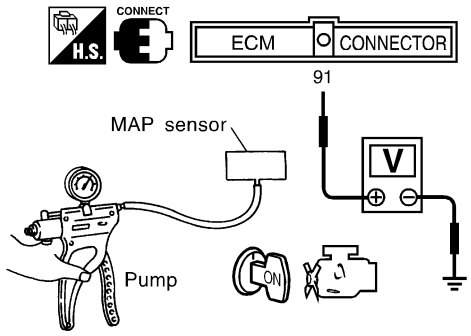
SEF109L

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace hose.

9	CHECK MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR

1. Remove MAP sensor with its harness connector connected.
2. Install a vacuum pump to MAP sensor.
3. Turn ignition switch "ON" and check output voltage between ECM terminal 91 and engine ground under the following conditions.



Applied vacuum kPa (mmHg, inHg)	Voltage V
Not applied	1.8 - 4.8
–26.7 (–200, –7.87)	1.0 to 1.4V lower than above value

SEF541Z

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 10.
NG	▶	Replace MAP sensor.

Diagnostic Procedure (Cont'd)

10	**CHECK INTERMITTENT INCIDENT**
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-842.	
▶	**INSPECTION END**

Description

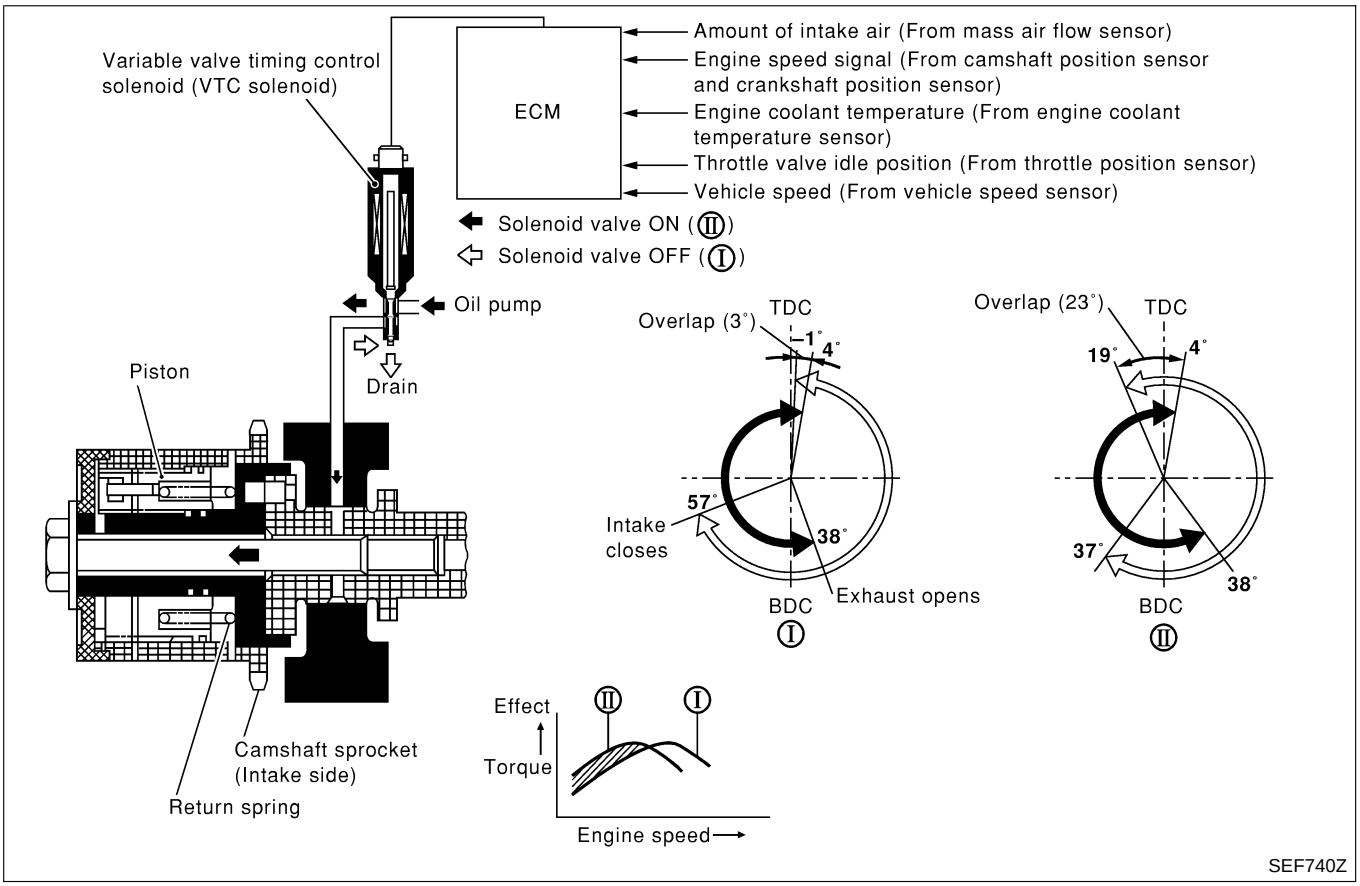
SYSTEM DESCRIPTION

NIEC1492

NIEC1492S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE)	Engine speed and cylinder number	Intake valve timing control	Intake valve timing control solenoid valve
Crankshaft position sensor (POS)	Engine speed		
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Throttle position sensor	Throttle position		
Vehicle speed sensor	Vehicle speed		

The intake valve timing control system is utilized to control intake valve opening and closing timing. Engine coolant temperature signals, engine speed, amount of intake air, vehicle speed and throttle position are used to determine intake valve timing.
The intake camshaft sprocket position is regulated by oil pressure controlled by the intake valve timing control.
When ECM sends ON signal to intake valve timing control solenoid valve, oil pressure is transmitted to camshaft sprocket. Then, intake side camshaft is advanced.



Description (Cont'd)

OPERATION

=NIEC1492S02

Engine operating condition	Intake valve timing control solenoid valve	Intake valve opening and closing time	Valve overlap	Engine valve timing
• Engine coolant temperature is between 15°C (59°F) to 119°C (246°F) and engine speed is between 1,100 rpm and 4,200 rpm. • During high load condition	ON	Advance	Increased	II
Those other than above	OFF	Normal	Normal	I

CONSULT-II Reference Value in Data Monitor Mode

NIEC1493

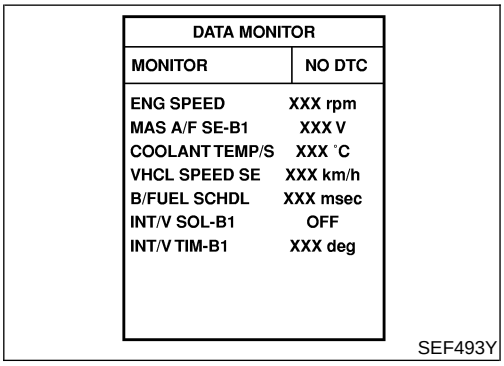
Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
INT/V SOL-B1	• Engine is in warm up condition. • Engine speed is more than 2,000 rpm. • Quickly depressed accelerator pedal	OFF → ON

On Board Diagnosis Logic

NIEC1494

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1110	• Comparing the intake valve timing position when the intake valve timing solenoid is ON with that when the solenoid is OFF, the difference does not exceed a certain limit.	• Harness or connectors (The intake valve timing control position sensor circuit is open.) • Intake valve timing control position sensor • Accumulation of debris to the signal pick-up portion of the camshaft



DTC Confirmation Procedure

NIEC1495

CAUTION:

Always drive at 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:

Do not apply electrical load (e.g. cooling fan, rear defogger, headlamp, etc.).

With CONSULT-II

1) Warm up engine to normal operating temperature.
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) Restart engine and wait at least 30 seconds.
5) Keep engine speed between idle and 1,000 rpm for at least 50 seconds. (Test is completed when "INT/V SOL - B1" in "DATA MONITOR" with CONSULT-II remains "OFF". If indication is "ON", repeat step 6.
6) Shift selector lever to "2nd" position.

7) Quickly raise engine speed to more than 2,000 rpm and maintain the following conditions for at least 30 seconds. (Test is completed when "INT/V SOL - B1" in "DATA MONITOR" with CONSULT-II remains "ON". If indication is "OFF", repeat step 7.

ENG SPEED	More than 2,000 rpm
B/FUEL SCHDL	More than 6 msec

8) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1141.

With GST

1) Warm up engine to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Restart engine and wait at least 30 second.
4) Keep engine speed between idle and 1,000 rpm for at least 50 seconds.
5) Shift selector lever to "2nd" position.
6) Quickly raise engine speed to more than 2,000 rpm and keep it there for at least 30 seconds.

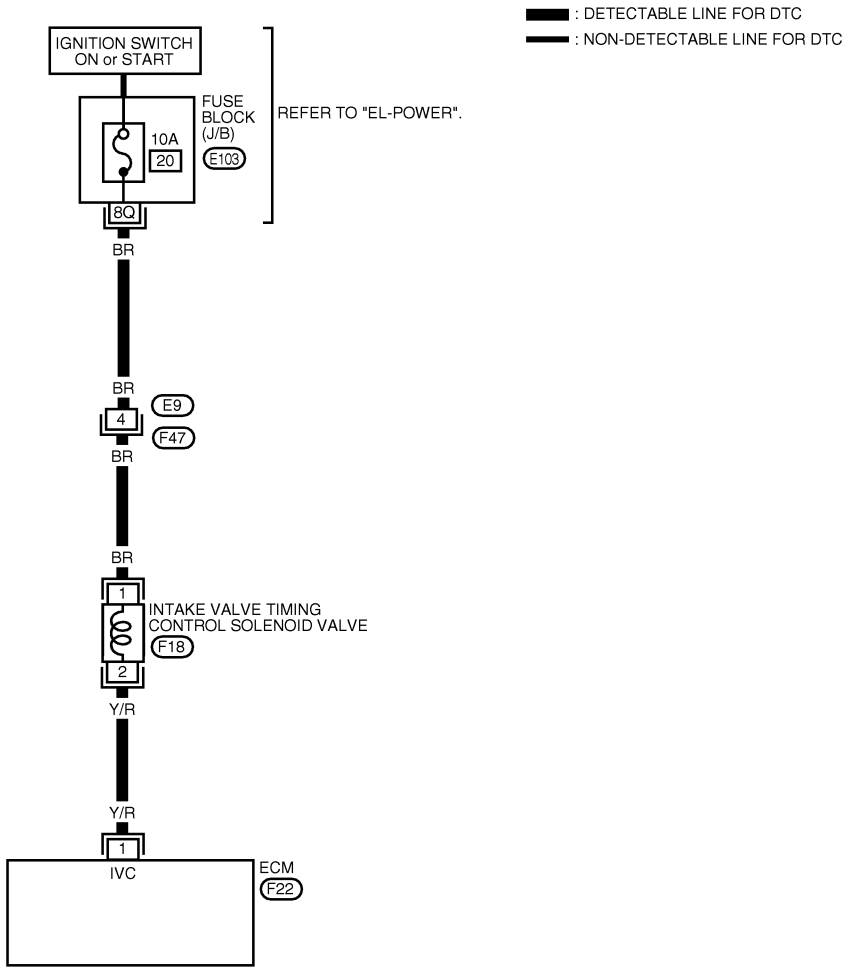
- Driving location: Driving vehicle uphill (increased engine load) will help maintain the driving conditions required for this test.

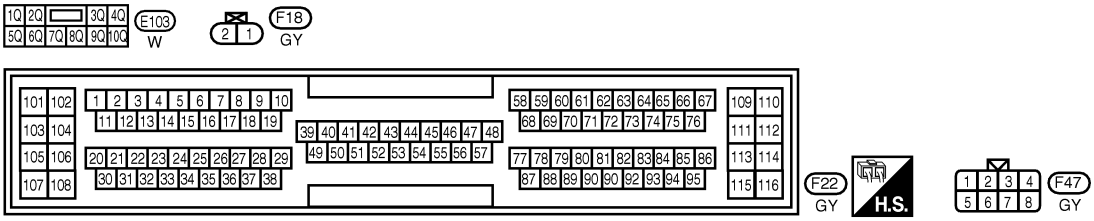
7) Select "MODE 7" with GST.
8) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1141.

Wiring Diagram

NIEC1496

EC-IVC/V-01





WEC410

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

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
1	Y/R	INTAKE VALVE TIMING CONTROL SOLENOID VALVE	SOLENOID VALVE IS OPERATING AT ENGINE RUNNING UNDER WARM-UP CONDITION	APPROX. 0V
			SOLENOID VALVE IS NOT OPERATING AT ENGINE RUNNING UNDER WARM-UP CONDITION	BATTERY VOLTAGE

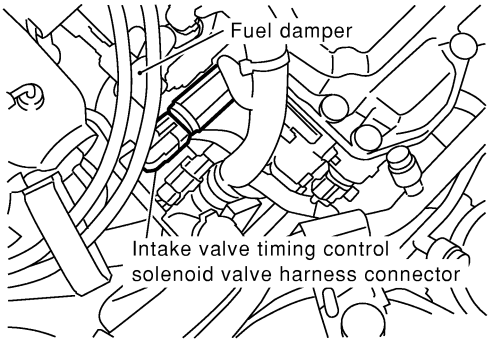
SEF737Y

Diagnostic Procedure

NIEC1497

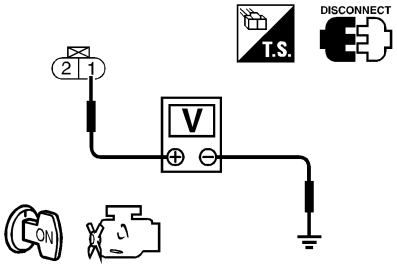
1	CHECK POWER SUPPLY

1. Stop engine.
2. Disconnect intake valve timing control solenoid valve harness connector.



SEF406Z

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



Voltage: Battery voltage

SEF527Z

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

- Harness connectors F47, E9
- 10A fuse
- Harness for open or short between the intake valve timing control solenoid valve and fuse

	▶	Repair harness or connectors.

3	CHECK OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 1 and intake valve timing control solenoid valve terminal 2.
   Refer to wiring diagram.
   Continuity should exist.
   If OK, check harness for short to ground and short to power.

OK or NG

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

Diagnostic Procedure (Cont'd)

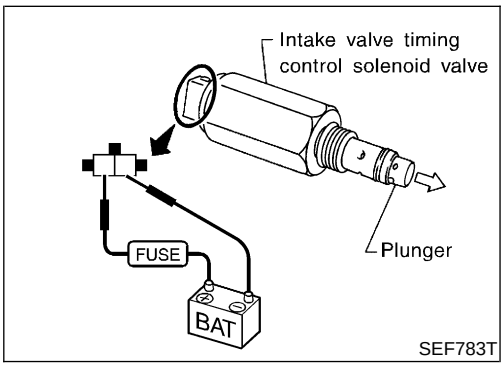
4	CHECK ENGINE OIL PRESSURE	
Refer to ***LC-5***, "Oil Pressure Check".		
OK or NG		
OK	▶	GO TO 5.
NG	▶	Repair lubrication system.

5	CHECK INTAKE AIR SYSTEM	
Check intake air system for leaks.		
OK or NG		
OK	▶	GO TO 6.
NG	▶	Repair intake air system.

6	CHECK INTAKE VALVE TIMING CONTROL POSITION SENSOR	
Refer to "Component Inspection", EC-1174.		
OK or NG		
OK	▶	GO TO 7.
NG	▶	Repair or replace.

7	CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE	
Refer to "Component Inspection", EC-1142.		
OK or NG		
OK	▶	Replace intake valve timing control sprocket with camshaft.
NG	▶	Replace intake valve timing control solenoid valve.

8	CHECK INTERMITTENT INCIDENT	
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-842.		
	▶	**INSPECTION END**



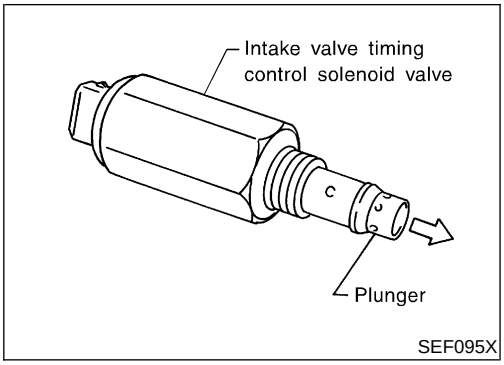
Component Inspection

NIEC1498

INTAKE VALVE TIMING CONTROL SOLENOID VALVE

NIEC1498S01

1. Check oil passage visually for any metal debris.
2. Supply intake valve timing control solenoid valve terminals with battery voltage.
3. Make sure that inside plunger protrudes.
   If NG, replace intake valve timing control solenoid valve.



SEF095X

Component Description

NIEC1499

The valve timing control system is utilized to control intake valve opening and closing timing. Engine coolant temperature signals, engine speed and throttle position are used to determine intake valve timing.
The intake camshaft sprocket position is regulated by oil pressure controlled by the intake valve timing control.
When ECM sends ON signal to intake valve timing control solenoid valve, oil pressure is transmitted to camshaft sprocket. Then, intake side camshaft is advanced.

Operation

NIEC1500

Engine operating condition				Intake valve timing control solenoid valve	Intake valve opening and closing time	Valve overlap
Engine coolant temperature	Engine speed	B/FUEL SCHDL	Neutral switch			
15°C (59°F) - 55°C (131°F)	1,100 - 4,200 rpm	Above 0 msec	OFF	ON	Advance	Increased
Above 55°C (131°F)		Above 6 msec				
Conditions other than those above				OFF	Normal	Normal

CONSULT-II Reference Value in Data Monitor Mode

NIEC1501

MONITOR ITEM	CONDITION		SPECIFICATION
INT/V TIM SOL	• Engine: After warming up	Idle	OFF
		Revving engine with full throttle opening (Under 4,200 rpm)	ON

On Board Diagnosis Logic

NIEC1502

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1111	• An improper voltage signal is entered to ECM through intake valve timing control solenoid valve.	• Harness or connectors (The intake valve timing control solenoid valve circuit is open or shorted.) • Intake valve timing control solenoid valve

DATA MONITOR	
MONITORING	NO DTC
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX
VHCL SPEED SE	XXX km/h
THRTL POS SEN	XXX V
INT/V TIM SOL	OFF

SEF736Y

DTC Confirmation Procedure

NIEC1503

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

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-1146.

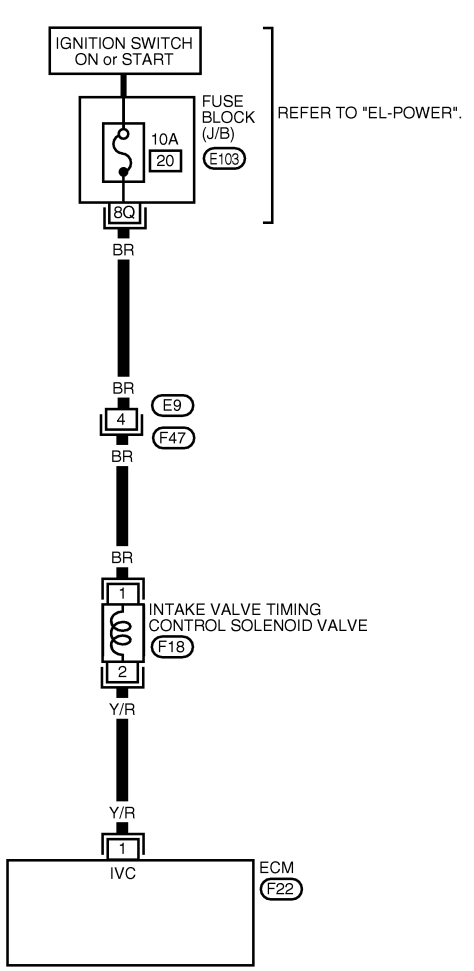
⊗ **Without CONSULT-II**

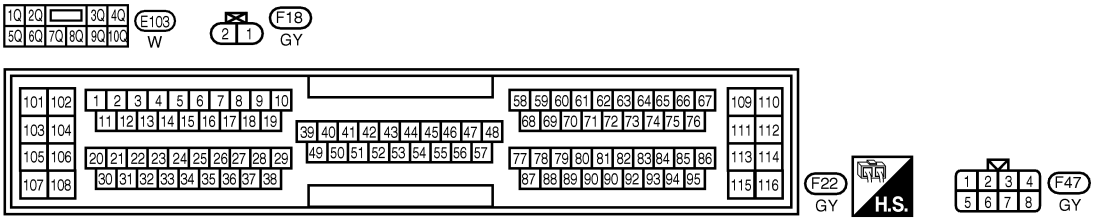
Follow lthe procedure "With CONSULT-II" above.

Wiring Diagram

=NIEC1504

EC-IVC/V-01





WEC410

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

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
1	Y/R	INTAKE VALVE TIMING CONTROL SOLENOID VALVE	SOLENOID VALVE IS OPERATING AT ENGINE RUNNING UNDER WARM-UP CONDITION	APPROX. 0V
			SOLENOID VALVE IS NOT OPERATING AT ENGINE RUNNING UNDER WARM-UP CONDITION	BATTERY VOLTAGE

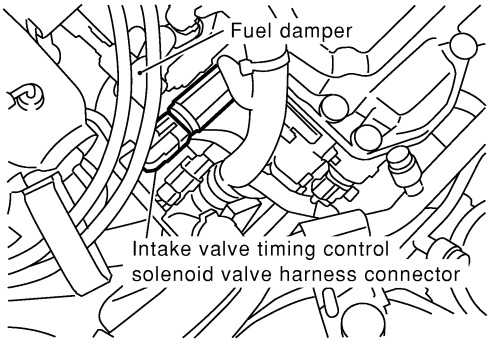
SEF737Y

Diagnostic Procedure

NIEC1505

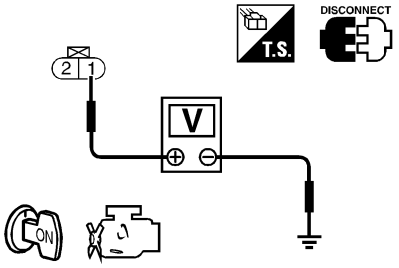
1	CHECK POWER SUPPLY

1. Turn ignition switch “OFF”.
2. Disconnect intake valve timing control solenoid valve harness connector.



SEF406Z

3. Turn ignition switch “ON”.
4. Check voltage between terminal 2 and engine ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF527Z

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connector F47, E9
- 10A fuse
- Harness for open or short between valve timing control solenoid valve and fuse

	▶	Repair harness or connectors.

3	CHECK OUTPUT SIGNAL CIRCUIT

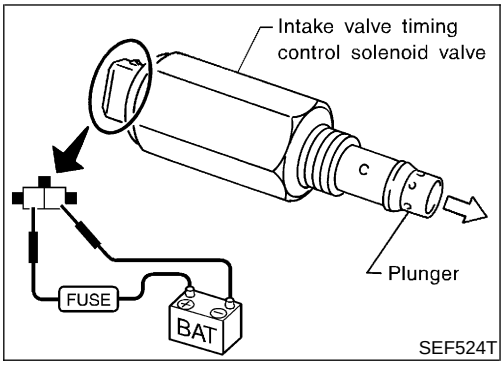
1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 1 and intake valve timing control solenoid valve harness connector terminal 1. Refer to wiring diagram.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground to short to power or connectors.

4	CHECK VALVE TIMING CONTROL SOLENOID VALVE	
Refer to "Component Inspection", EC-1147.		
OK or NG		
OK	▶	GO TO 5.
NG	▶	Replace valve timing control solenoid valve.

5	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-842.	
▶	INSPECTION END



Component Inspection

INTAKE VALVE TIMING CONTROL SOLENOID VALVE

NIEC1506
NIEC1506S01

1. Check oil passage visually for any metal debris.
2. Supply intake valve timing control solenoid valve terminals with battery voltage.
3. Make sure that inside plunger protrudes.
   If NG, replace intake valve timing control solenoid valve.

On Board Diagnosis Logic

NIEC1507

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

NIEC1508

- Thermostat function
- Leakage from sealing portion of thermostat
- Engine coolant temperature sensor

DTC Confirmation Procedure

NIEC1509

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

NIEC1509S01

1) Replace thermostat with new one. Refer to ***LC-15***, "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-1149.

WITH GST

NIEC1509S02

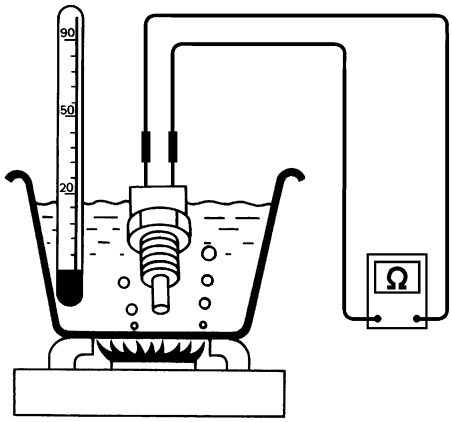
1) Follow the prodedure "WITH CONSULT-II" above.

Diagnostic Procedure

NIEC1510

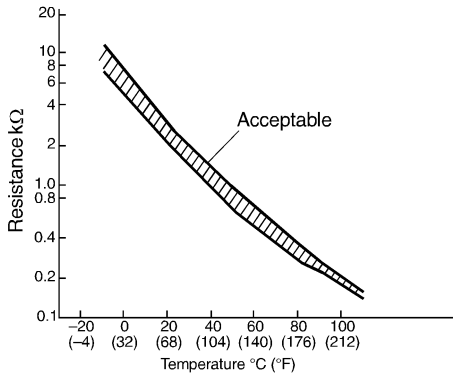
1	CHECK ENGINE COOLANT TEMPERATURE SENSOR

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>

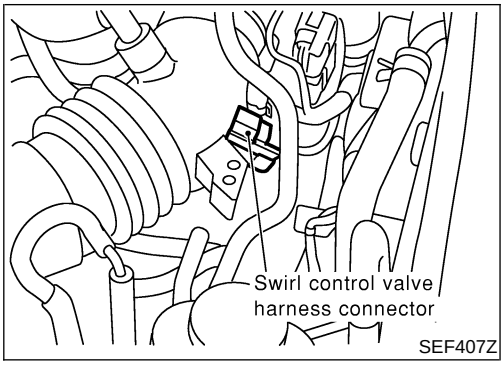
Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260



SEF304X

OK or NG

OK	▶	**INSPECTION END**
NG	▶	Replace engine coolant temperature sensor.



Component Description

NIEC1511

Swirl control valve consists of actuator and valve. The valve is installed in the intake manifold, and the actuator is connected to the rear end of the valve shaft.

The swirl control valve uses a step motor which 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. When no change in the control position 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

NIEC1512

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
SWL C/V (B1)	● Engine speed: Idle	Engine coolant temperature is below 44°C (111°F).	0 - 5 step
		Engine coolant temperature is above 45°C (113°F).	115 - 120 step
SWL/C POSI SE	● Engine speed: Idle ● Engine coolant temperature is below 44°C (111°F).		Approximately 0 deg
	● Engine speed: Idle ● Engine coolant temperature is above 45°C (113°F).		Approximately 80 deg

On Board Diagnosis Logic

NIEC1513

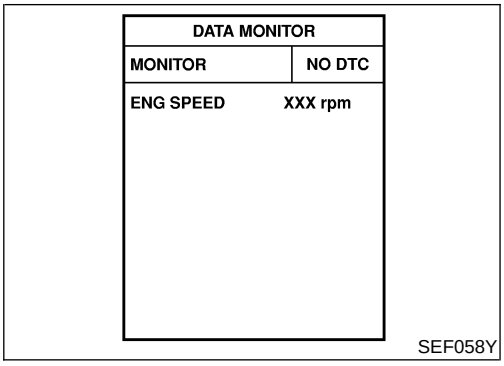
Malfunction is detected when

An improper voltage signal is sent to ECM through swirl control valve.

Possible Cause

NIEC1514

- Harness or connectors
  (The swirl control valve circuit is open or shorted.)
- Swirl control valve



DTC Confirmation Procedure

NIEC1515

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

1) Turn ignition switch "ON" and wait at least 2 seconds.
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Start engine and let it idle for at least 10 seconds.
4) Turn ignition switch "OFF" and wait at least 10 seconds.
5) Turn ignition switch "ON" and wait at least 2 seconds.
6) Start engine and let it idle for at least 10 seconds.
7) Maintain engine speed at about 2,000 rpm for at least 10 seconds.
8) Turn ignition switch "OFF", wait at least 10 seconds and then turn "ON".
   If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1153.
   If 1st trip DTC is not detected, go to next step.
9) Perform step 5 through 8 three times.

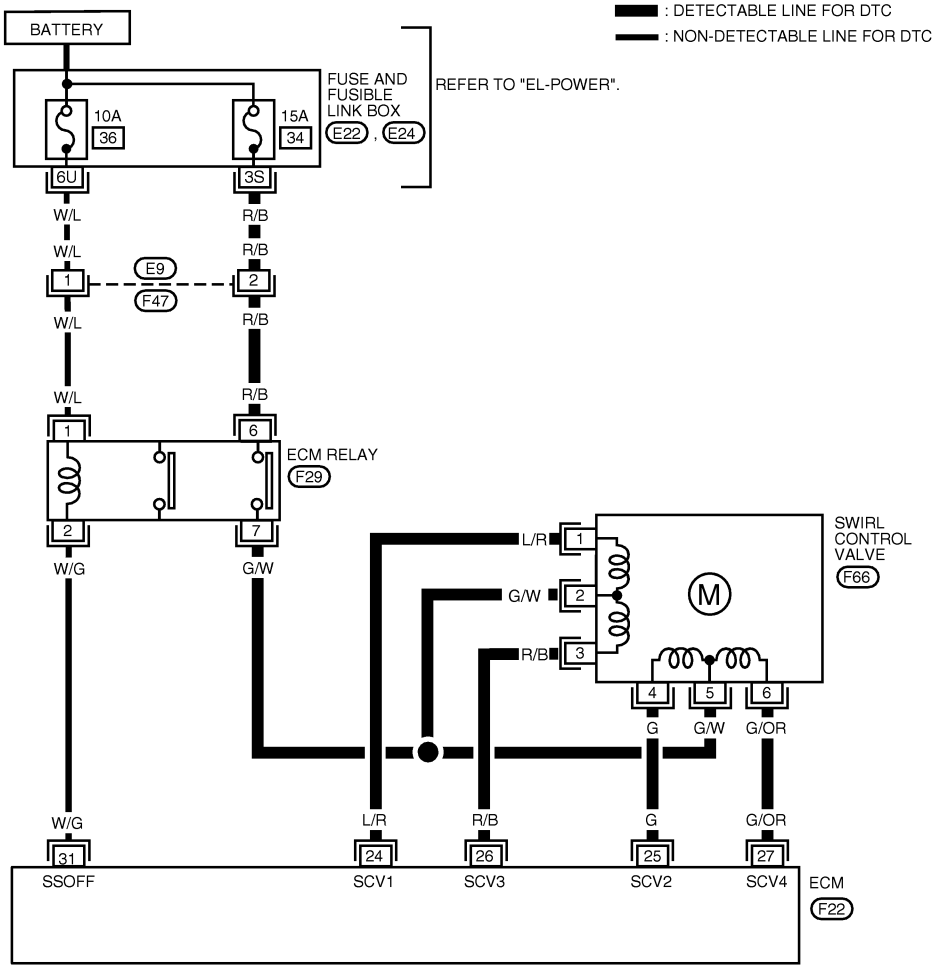
With GST

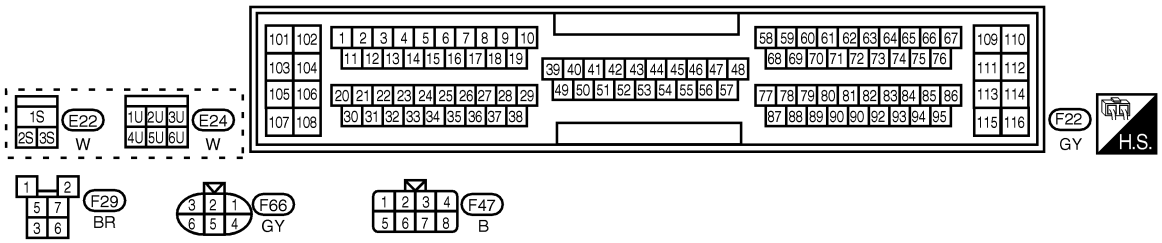
Follow the procedure "With CONSULT-II" above.

Wiring Diagram

=NIEC1516

EC-SWL/V-01





WEC412

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)
24	L/R	SWIRL CONTROL VALVE	ENGINE RUNNING AT IDLE SPEED	0.1 - 14V
25	G			
26	R/B			
27	G/OR			

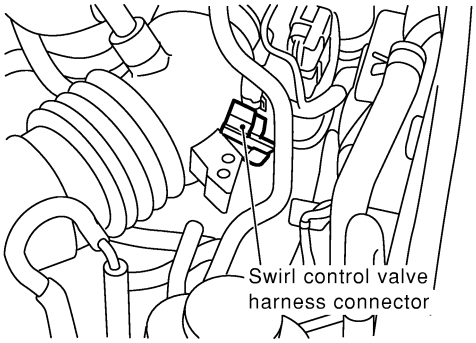
SEF575YB

Diagnostic Procedure

NIEC1517

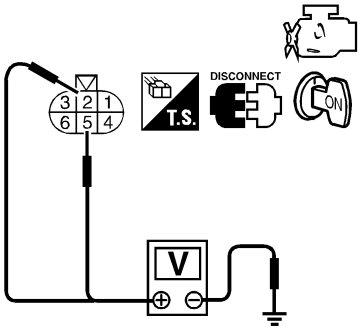
1	CHECK SWIRL CONTROL VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect swirl control valve harness connector.



SEF407Z

3. Turn ignition switch “ON”.
4. Check voltage between swirl 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 harness for open or short between ECM relay and swirl control valve.

	▶	Repair harness or connectors.

3	CHECK SWIRL 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 swirl control valve terminals as follows. Refer to Wiring Diagram.

ECM terminal	Swirl volume control valve
24	1
25	4
26	3
27	6

MTBL0541

Continuity should exist.

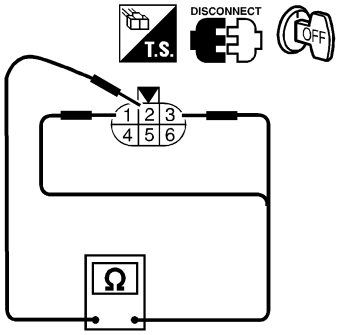
4. Also check harness for short to ground and short to power.

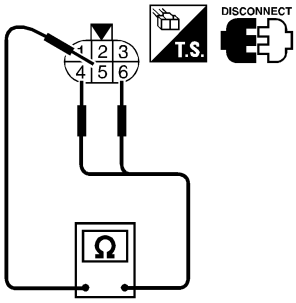
OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK SWIRL CONTROL VALVE

Check resistance between swirl control valve terminal 2 and terminals 1, 3, terminal 5 and terminals 4, 6.





Resistance:
20.5 - 23.5 Ω [At 20°C (68°F)]

SEF540Z

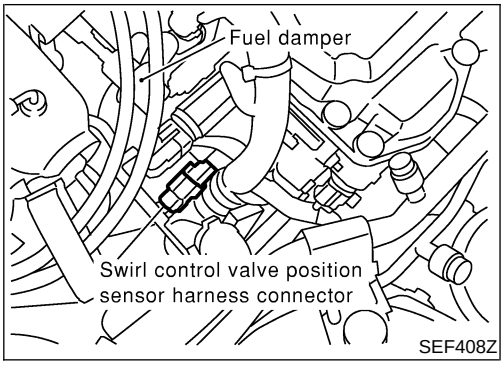
OK or NG

OK	▶	GO TO 5.
NG	▶	Replace intake manifold assembly.

5	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-842.

▶ **INSPECTION END**



Component Description

NIEC1518

Swirl control valve position sensor is installed on the intake manifold. The sensor is connected to the front end of the valve shaft of the swirl control valve.

The sensor responds to the valve shaft movement. This sensor is a kind of potentiometer which transforms the swirl control valve position into output voltage, and emits the voltage signal to the ECM.

CONSULT-II Reference Value in Data Monitor Mode

NIEC1519

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
SWL C/V (B1)	● Engine speed: Idle	Engine coolant temperature is below 44°C (111°F).	0 - 5 step
		Engine coolant temperature is above 45°C (113°F).	115 - 120 step
SWL/C POSI SE	● Engine speed: Idle ● Engine coolant temperature is below 44°C (111°F).		Approximately 0 deg
	● Engine speed: Idle ● Engine coolant temperature is above 45°C (113°F).		Approximately 80 deg

On Board Diagnosis Logic

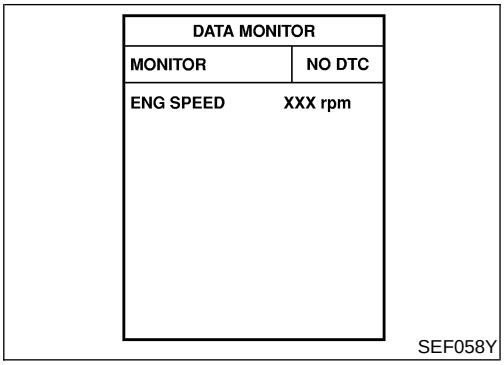
NIEC1520

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

Possible Cause

NIEC1521

- Harness or connectors
  (Swirl control valve position sensor circuit is open or shorted.)
- Swirl control valve position sensor
- Harness or connectors
  (Swirl control valve circuit is open or shorted.)
- Swirl control valve



DTC Confirmation Procedure

NIEC1522

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

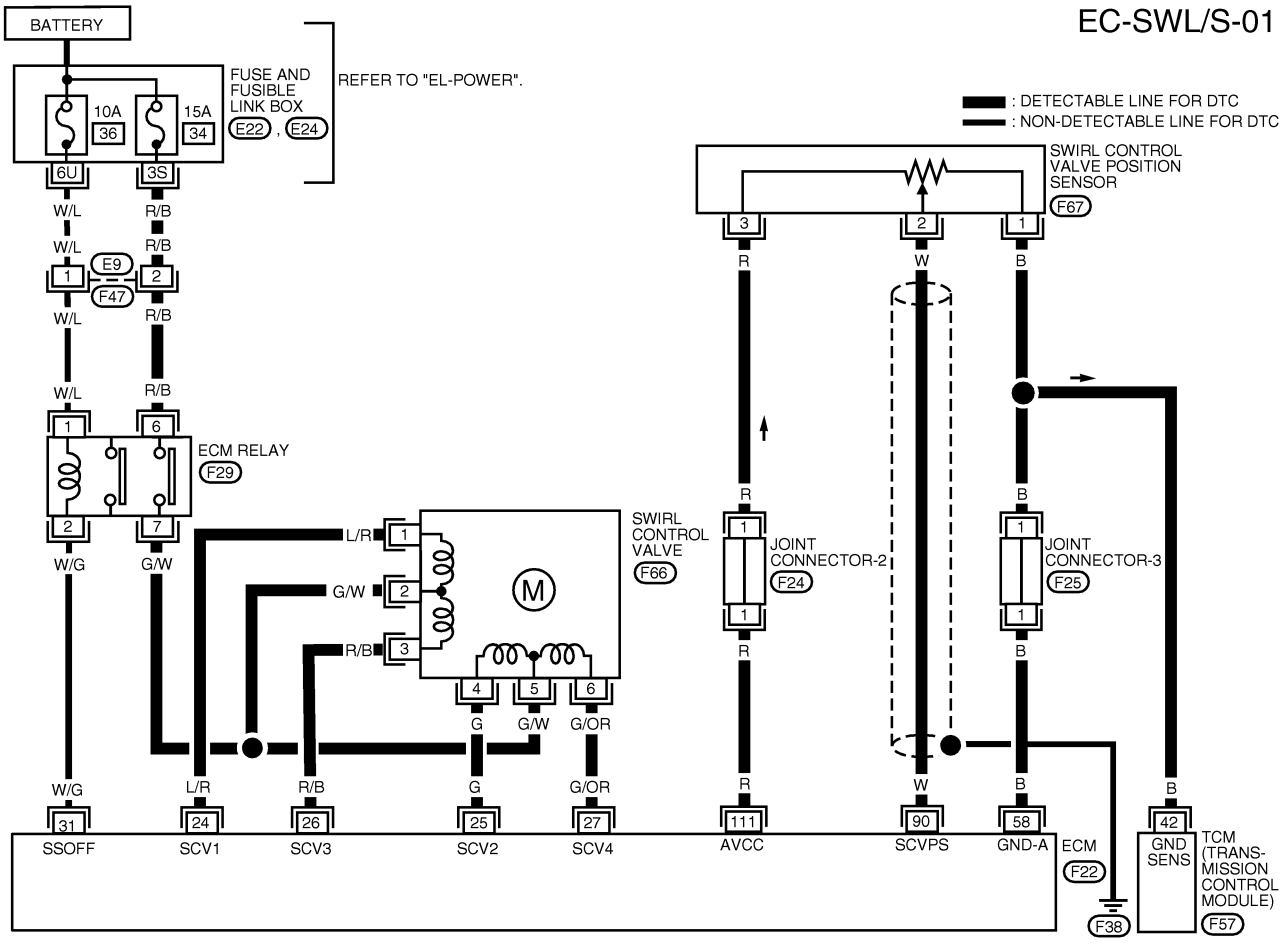
1) Turn ignition switch “OFF” and wait at least 10 seconds.
2) Turn ignition switch “ON”.
3) Select “DATA MONITOR” mode with CONSULT-II and wait at least 5 seconds.
   If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-1058.

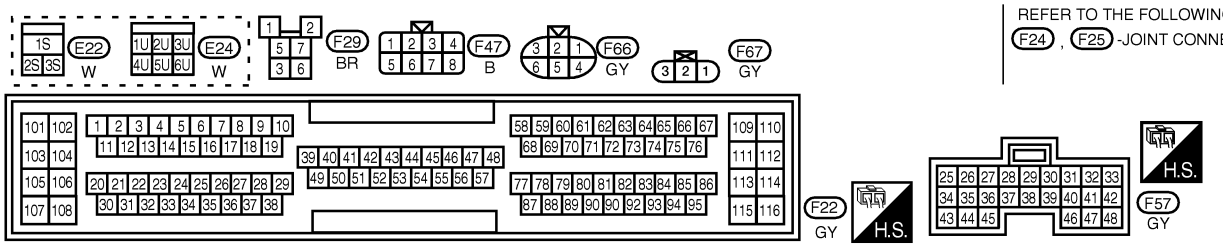
With GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

NIEC1523





REFER TO THE FOLLOWING.
F24 , F25 -JOINT CONNECTOR

WEC413

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)
24 25 26 27	L/R G R/B G/OR	SWIRL CONTROL VALVE	ENGINE RUNNING AT IDLE SPEED	0.1 - 14V
58	B	SENSOR'S GROUND	IGN ON	APPROX. 0V
90	W	SWIRL CONTROL VALVE CONTROL POSITION SENSOR	IGN ON	0.21 - 4.4V
111	R	SENSOR'S POWER SUPPLY	IGN ON	APPROX. 5V

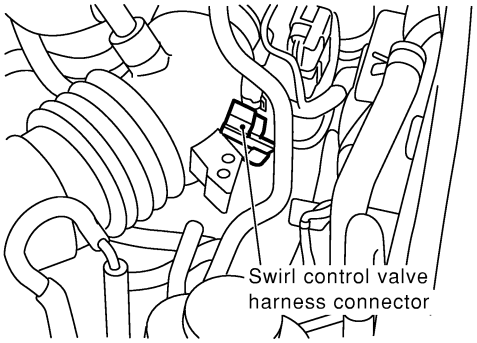
SEF608Z

Diagnostic Procedure

NIEC1524

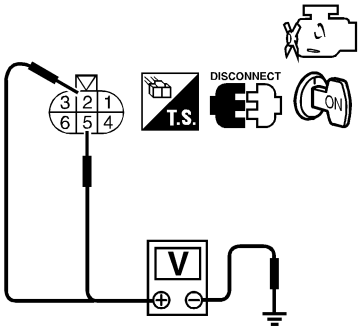
1	CHECK SWIRL CONTROL VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect swirl control valve harness connector.



SEF407Z

3. Turn ignition switch “ON”.
4. Check voltage between swirl 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 harness for open or short between ECM relay and swirl control valve.

	▶	Repair harness or connectors.

3	CHECK SWIRL 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 swirl control valve terminals as follows.
   Refer to Wiring Diagram.

ECM terminal	Swirl volume control valve
24	1
25	4
26	3
27	6

MTBL0541

Continuity should exist.

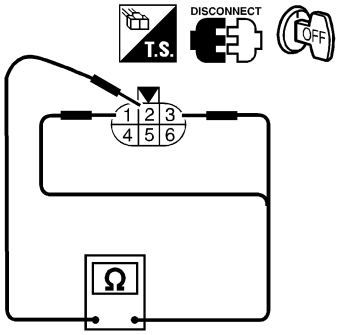
4. Also check harness for short to ground and short to power.

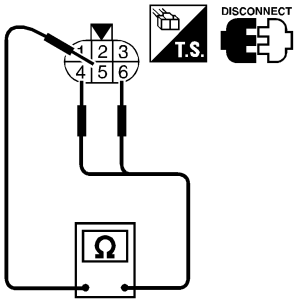
OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK SWIRL CONTROL VALVE

Check resistance between swirl control valve terminal 2 and terminals 1, 3, terminal 5 and terminals 4, 6.





Resistance:
20.5 - 23.5 Ω [At 20°C (68°F)]

SEF540Z

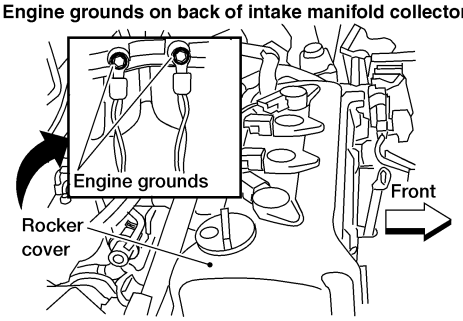
OK or NG

OK	▶	GO TO 5.
NG	▶	Replace intake manifold collector assembly.

5	RETIGHTEN GROUND SCREWS

Loosen and retighten engine ground screws.

Engine grounds on back of intake manifold collector



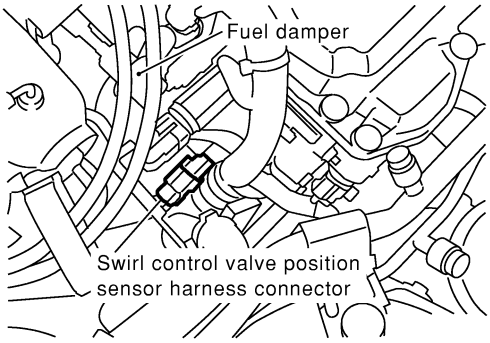
WEC249

	▶	GO TO 6.

Diagnostic Procedure (Cont'd)

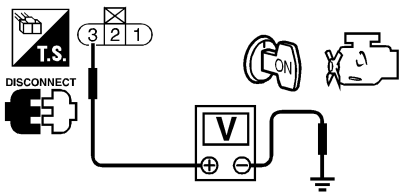
6	CHECK SWIRL CONTROL VALVE POSITION SENSOR POWER SUPPLY CIRCUIT

1. Disconnect swirl control valve position sensor harness connector.



SEF408Z

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



Voltage: Approximately 5V

SEF306X

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	DETECT MALFUNCTIONING PART

Check the following.
- Joint connector-2
- Harness for open or short between swirl control valve position sensor and ECM

	▶	Repair harness or connectors.

8	CHECK SWIRL CONTROL VALVE POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Check harness continuity between swirl control valve position 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 10.
NG	▶	GO TO 9.

9	DETECT MALFUNCTIONING PART

Check the following.
- Joint connector-3
- Harness for open or short between swirl control valve position sensor and TCM
- Harness for open or short between swirl control valve position sensor and ECM

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

10	CHECK SWIRL CONTROL VALVE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 90 and swirl control valve 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 11.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

11	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-842.

OK or NG

OK	▶	Replace intake manifold assembly.
NG	▶	Repair or replace.

Description

NIEC1525

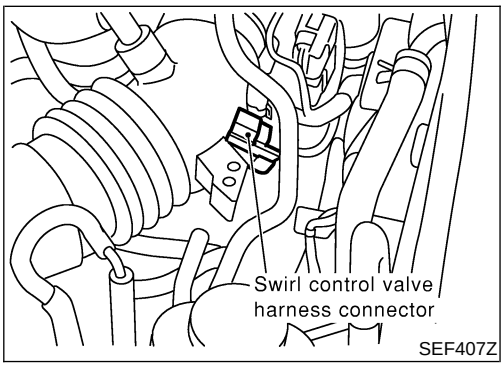
SYSTEM DESCRIPTION

NIEC1525S01

Sensor	Input Signal to ECM	ECM function	Actuator
Throttle position sensor	Throttle position	Swirl control valve control	Swirl control valve
Ignition switch	Start signal		
Crankshaft position sensor (POS)	Engine speed		
Camshaft position sensor (PHASE)	Engine speed and cylinder position		
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Swirl control valve position sensor	Swirl control valve position		

Swirl control valve has a valve portion in the intake passage of each cylinder.
While idling and during low engine coolant temperature, 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 coolant temperature, 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 swirl control valve is operated by the ECM.

Throttle position sensor (Idle position)	Engine coolant temperature	Swirl control valve
OFF	—	Open
ON	Above 45°C	Open
	Below 44°C	Close



COMPONENT DESCRIPTION

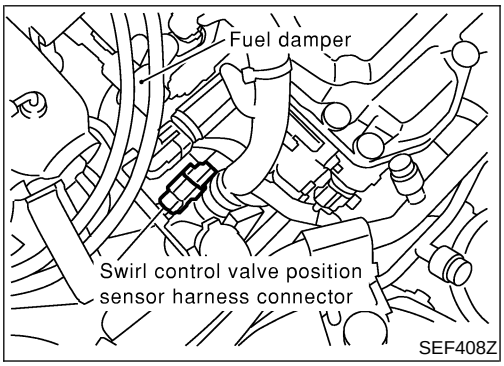
NIEC1525S02

Swirl Control Valve

NIEC1525S0201

Swirl control valve consists of actuator and valve. The valve is installed in the intake manifold, and the actuator is connected to the rear end of the valve shaft.
The swirl control valve uses a step motor which 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. When no

change in the control position 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.



Swirl Control Valve Position Sensor

NIEC1525S0202

Swirl control valve position sensor is installed on the intake manifold. The sensor is connected to the front end of the valve shaft of the swirl control valve.
The sensor responds to the valve shaft movement. This sensor is a kind of potentiometer which transforms the swirl control valve position into output voltage, and emits the voltage signal to the ECM.

CONSULT-II Reference Value in Data Monitor Mode

NIEC1526

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
SWL C/V (B1)	• Engine speed: Idle	Engine coolant temperature is below 44°C (111°F).	0 - 5 step
		Engine coolant temperature is above 45°C (113°F).	115 - 120 step

On Board Diagnosis Logic

NIEC1527

Malfunction is detected when the target opening angle of swirl control valve controlled by ECM and the input signal from swirl control valve position sensor is not in the normal range.

Possible Cause

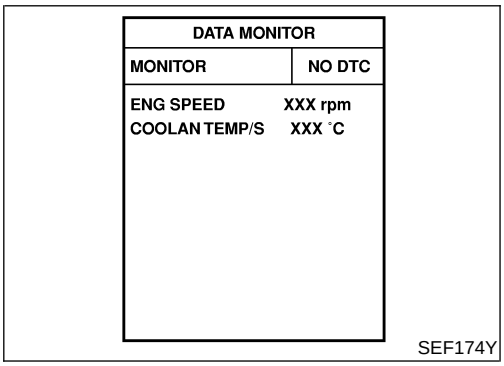
NIEC1528

- Harness or connectors
  (The swirl control valve circuit is open or shorted.)
- Swirl control valve
- Harness or connectors
  (The swirl control valve position sensor circuit is open or shorted.)
- Swirl control valve position sensor

DTC Confirmation Procedure

NIEC1529

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

1) Turn ignition switch “ON” and wait at least 2 seconds.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Start engine and let it idle for at least 10 seconds.
4) Turn ignition switch “OFF” and wait at least 10 seconds.
5) Turn ignition switch “ON” and wait at least 2 seconds.
6) Start engine and let it idle for at least 10 seconds.
7) Maintain engine speed at about 2,000 rpm for at least 10 seconds.
8) Turn ignition switch “OFF”, wait at least 10 seconds and then turn “ON”.
   If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-1166.
   If 1st trip DTC is not detected, go to next step.
9) Perform step 5 through 8 three times.

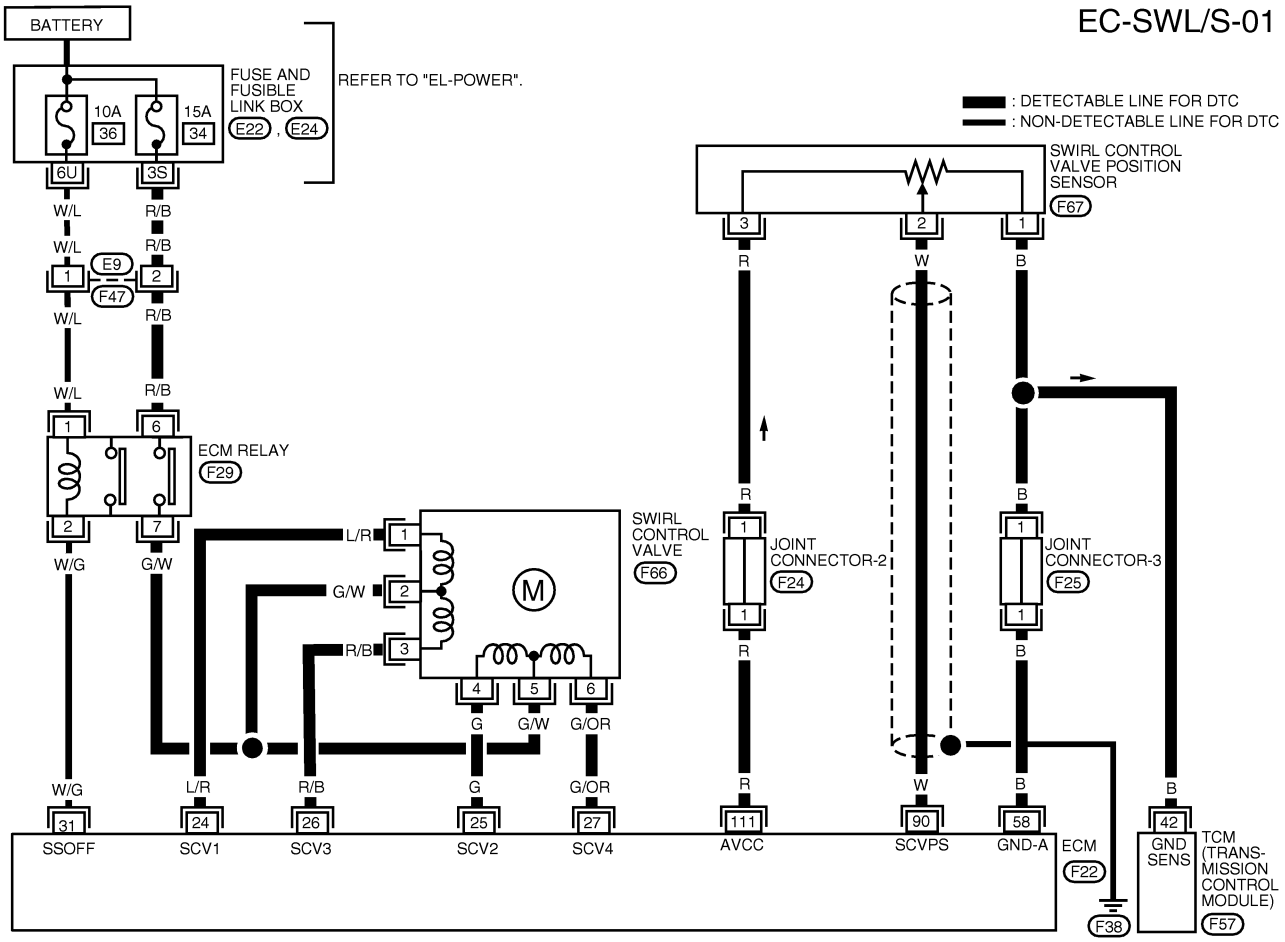
With GST

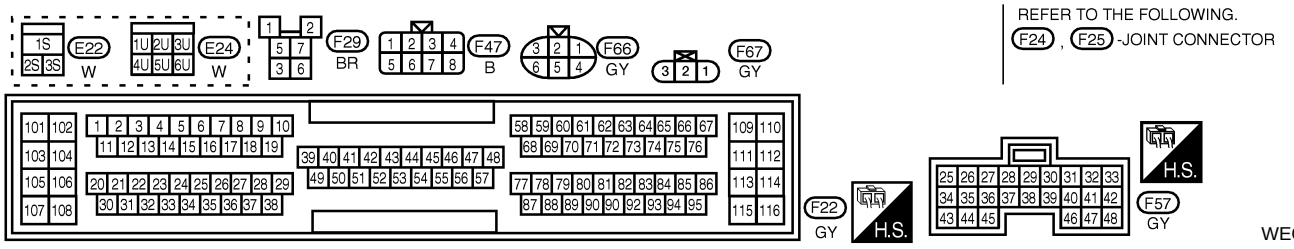
Follow the procedure “With CONSULT-II” above.

Wiring Diagram

=NIEC1530

EC-SWL/S-01





WEC413

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)
24 25 26 27	L/R G R/B G/OR	SWIRL CONTROL VALVE	ENGINE RUNNING AT IDLE SPEED	0.1 - 14V
58	B	SENSOR'S GROUND	IGN ON	APPROX. 0V
90	W	SWIRL CONTROL VALVE CONTROL POSITION SENSOR	IGN ON	0.21 - 4.4V
111	R	SENSOR'S POWER SUPPLY	IGN ON	APPROX. 5V

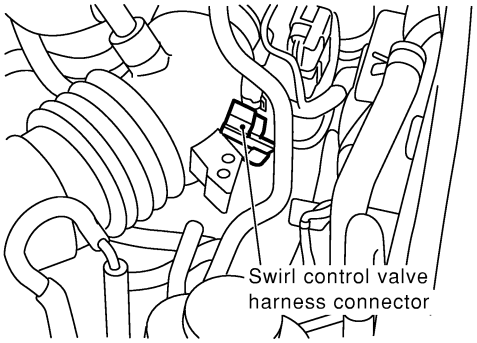
SEF608Z

Diagnostic Procedure

NIEC1531

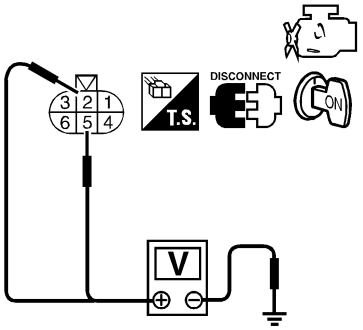
1	CHECK SWIRL CONTROL VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect swirl control valve harness connector.



SEF407Z

3. Turn ignition switch “ON”.
4. Check voltage between swirl 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 harness for open or short between ECM relay and swirl control valve.

	▶	Repair harness or connectors.

3	CHECK SWIRL 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 swirl control valve terminals as follows.
   Refer to Wiring Diagram.

ECM terminal	Swirl volume control valve
24	1
25	4
26	3
27	6

MTBL0541

Continuity should exist.

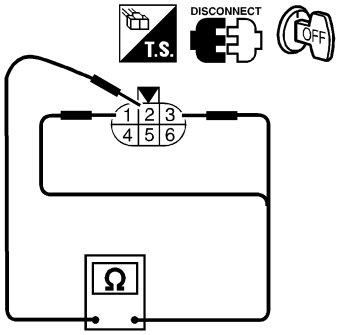
4. Also check harness for short to ground and short to power.

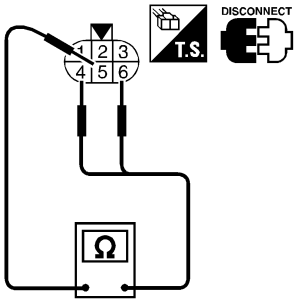
OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK SWIRL CONTROL VALVE

Check resistance between swirl control valve terminal 2 and terminals 1, 3, terminal 5 and terminals 4, 6.





Resistance:
20.5 - 23.5 Ω [At 20°C (68°F)]

SEF540Z

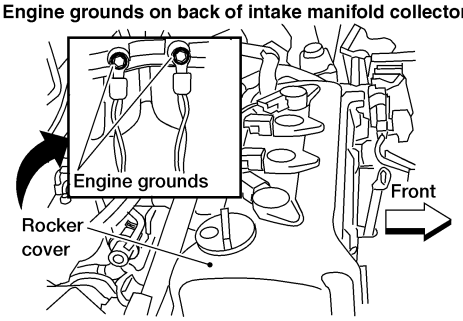
OK or NG

OK	▶	GO TO 5.
NG	▶	Replace intake manifold collector assembly.

5	RETIGHTEN GROUND SCREWS

Loosen and retighten engine ground screws.

Engine grounds on back of intake manifold collector



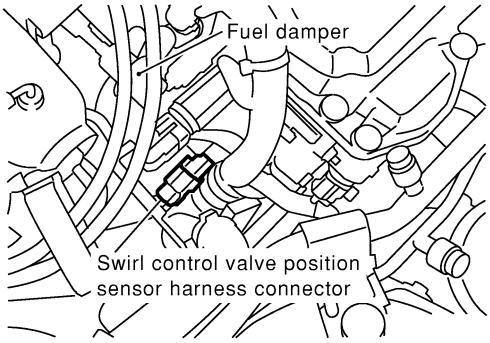
WEC249

	▶	GO TO 6.

Diagnostic Procedure (Cont'd)

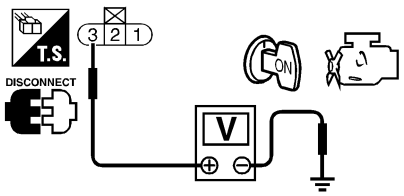
6	CHECK SWIRL CONTROL VALVE POSITION SENSOR POWER SUPPLY CIRCUIT

1. Disconnect swirl control valve position sensor harness connector.



SEF408Z

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



Voltage: Approximately 5V

SEF306X

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	DETECT MALFUNCTIONING PART

Check the following.
- Joint connector-2
- Harness for open or short between swirl control valve position sensor and ECM

	▶	Repair harness or connectors.

8	CHECK SWIRL CONTROL VALVE POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Check harness continuity between swirl control valve position 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 10.
NG	▶	GO TO 9.

9	DETECT MALFUNCTIONING PART

Check the following.
- Joint connector-3
- Harness for open or short between swirl control valve position sensor and TCM
- Harness for open or short between swirl control valve position sensor and ECM

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

10	CHECK SWIRL CONTROL VALVE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 90 and swirl control valve 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

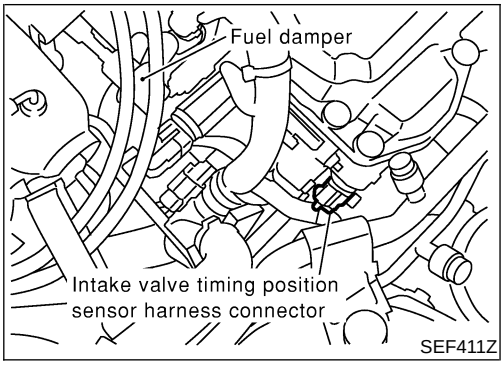
OK (With CONSULT-II)	▶	GO TO 11.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

11	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-842.

OK or NG

OK	▶	Replace intake manifold assembly.
NG	▶	Repair or replace.



Component Description

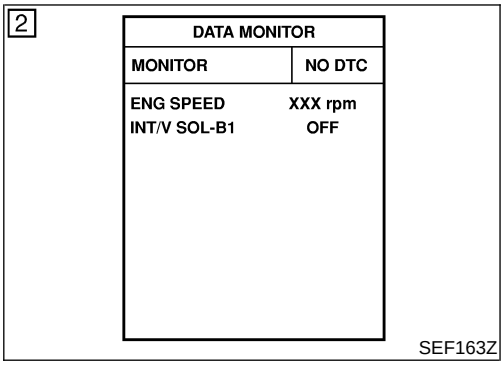
NIEC1532

The intake valve timing control position sensor is located front-end of the cylinder head. This sensor detects a signal (intake valve position) generated by the protrusion of camshaft sprocket and sends it to the ECM. This sensor is not used to control the engine system. It is used only for the on board diagnosis of intake valve timing control.

On Board Diagnosis Logic

NIEC1533

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1140	• The proper pulse signal from the intake valve timing control position sensors is not sent to ECM while the engine is running at the specified engine speed.	• Harness or connectors (The intake valve timing control position sensor circuit is open.) • Intake valve timing control position sensor • Accumulation of debris to the signal pick-up portion of the camshaft



DTC Confirmation Procedure

NIEC1534

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

1) Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II.
2) Start engine and keep the engine speed at 2,000 rpm and wait at least 15 seconds.
3) If 1st trip DTC is detected, go to “DIAGNOSTIC PROCEDURE”, EC-1172.

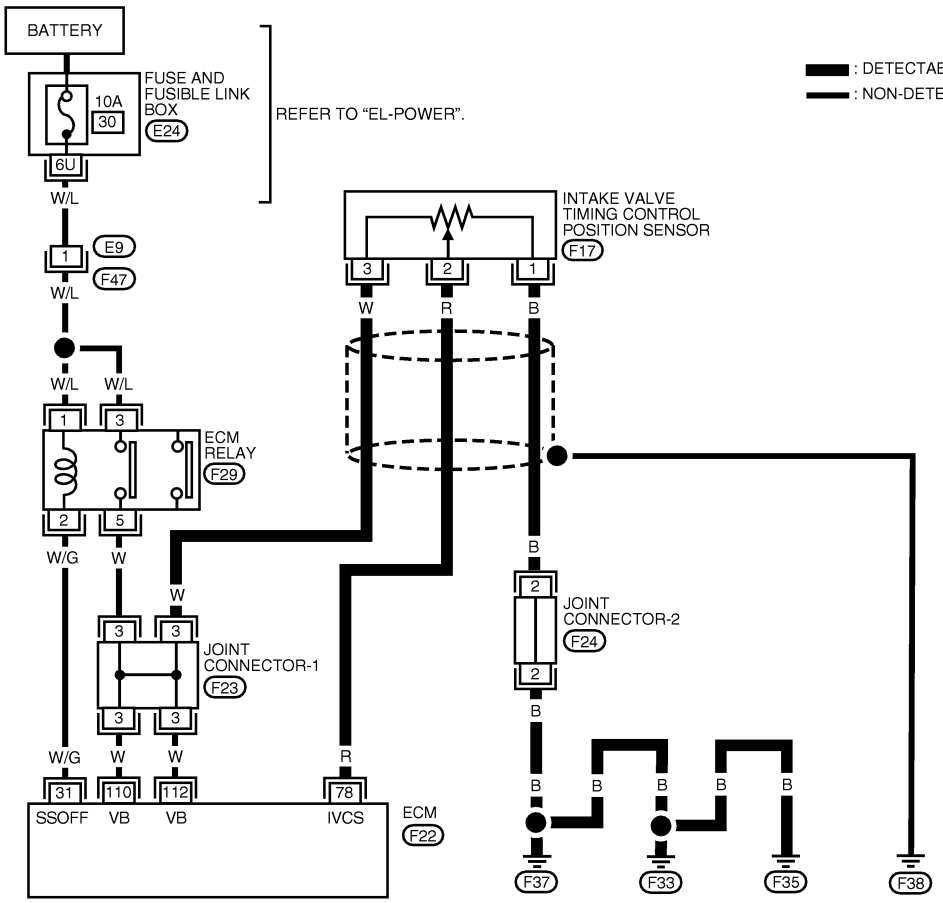
With GST

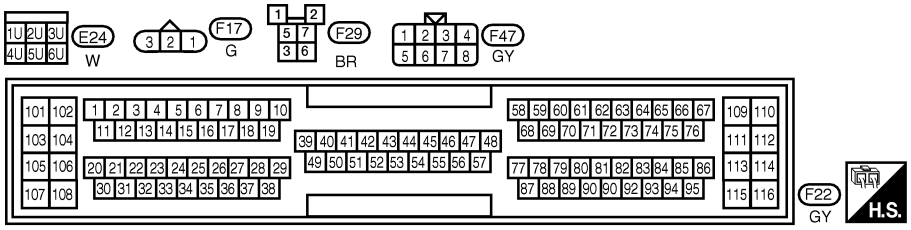
Follow the procedure “With CONSULT-II” above.

Wiring Diagram

NIEC1535

EC-IVCS-01

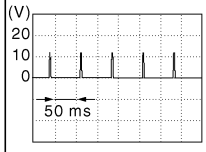
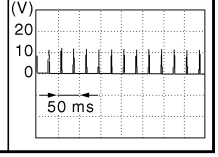




REFER TO THE FOLLOWING.
F23 , F24 -JOINT CONNECTOR

WEC411

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)
78	R	INTAKE VALVE TIMING CONTROL POSITION SENSOR	ENGINE RUNNING AT IDLE UNDER WARM-UP CONDITION	APPROX. 0V 
			ENGINE RUNNING AT 2,000 RPM UNDER WARM-UP CONDITION	APPROX. 0V 

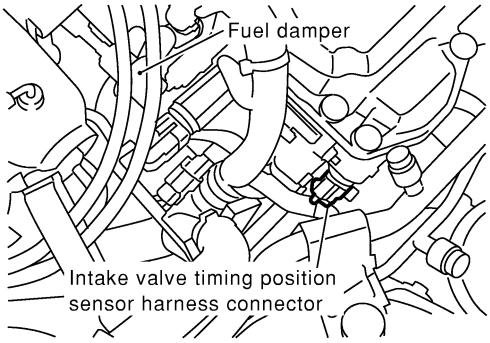
SEF744YA

Diagnostic Procedure

NIEC1536

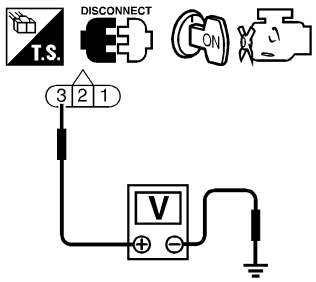
1	CHECK POWER SUPPLY

1. Turn ignition switch “OFF”.
2. Disconnect intake valve timing control position sensor harness connector.



SEF411Z

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



SEF509Y

Voltage:
Battery voltage

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

- Joint connector-1
- Harness for open or short between the intake valve timing control position sensor and ECM relay

	▶	Repair harness or connectors.

3	CHECK INPUT SIGNAL CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 78 and intake valve timing control position sensor 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 harness or connectors.

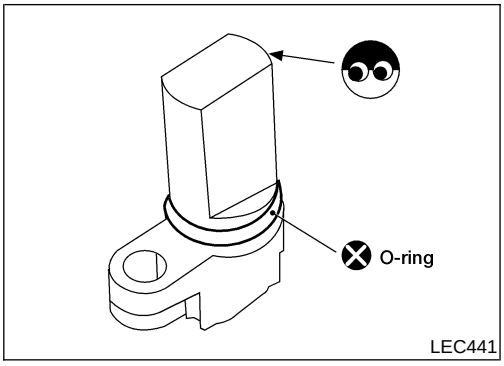
4	CHECK GROUND CIRCUIT	
1. Loosen and retighten engine ground screws. 2. Check harness continuity between sensor intake valve timing control position sensor terminal 1 and engine ground. Refer to wiring diagram. **Continuity should exist.** 3. Also check harness for short to ground and short to power.		
OK or NG		
OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART	
Check the following. ● Joint connector-2 ● Harness for open or short between intake valve timing control position sensor and engine ground		
	▶	Repair open circuit or short to ground or short to power in harness or connectors.

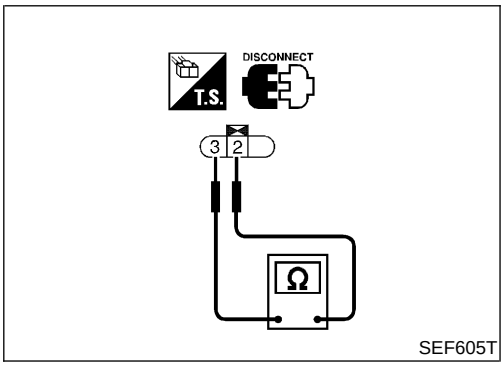
6	CHECK CAMSHAFT	
Check accumulation of debris to the signal pick-up portion of the camshaft. Refer to EC-176, "Component".		
OK or NG		
OK	▶	GO TO 7.
NG	▶	Remove debris and clean the signal pick-up cutout of camshaft.

7	CHECK INTAKE VALVE TIMING CONTROL POSITION SENSOR	
Refer to "Component Inspection", EC-1174.		
OK or NG		
OK	▶	GO TO 8.
NG	▶	Replace intake valve timing control position sensor.

8	CHECK INTERMITTENT INCIDENT	
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-842.		
	▶	**INSPECTION END**



LEC441



SEF605T

Component Inspection

NIEC1537

INTAKE VALVE TIMING CONTROL POSITION SENSOR

NIEC1537S01

1. Disconnect intake valve timing control position sensor harness connector.
2. Loosen fixing bolt of the sensor.
3. Visually check the sensor for chipping.
4. Check resistance between terminals 2 and 3.

Resistance:

600 - 740Ω [at 20°C (68°F)]

If NG, replace intake valve timing control position sensor.

On Board Diagnosis Logic

NIEC1538

★ The closed loop control has the one trip detection logic.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1148	• The closed loop control function does not operate even when vehicle is driving in the specified condition.	• The air fuel ratio (A/F) sensor 1 circuit is open or shorted. • Air fuel ratio (A/F) sensor 1 • Air fuel ratio (A/F) sensor 1 heater

DTC P1148 is displayed with another DTC for air fuel ratio (A/F) sensor 1. Perform the trouble diagnosis for the corresponding DTC.

System Description

NIEC1539

COOLING FAN CONTROL

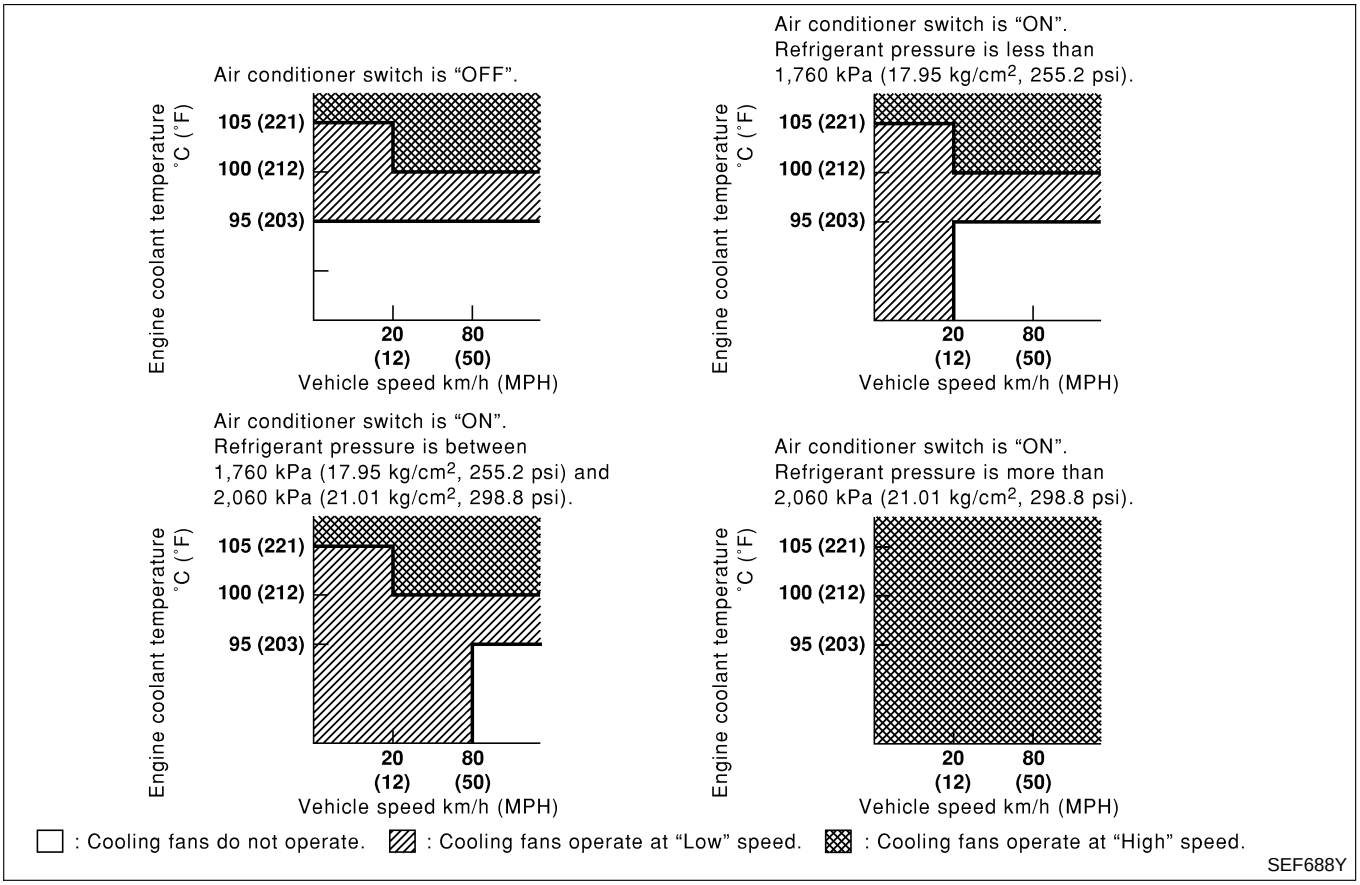
NIEC1539S01

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

NIEC1539S02



CONSULT-II Reference Value in Data Monitor Mode

NIEC1540

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

MONITOR ITEM	CONDITION		SPECIFICATION
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

NIEC1541

If the cooling fan or another component in the cooling system malfunctions, engine coolant temperature will rise.
When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is indicated.

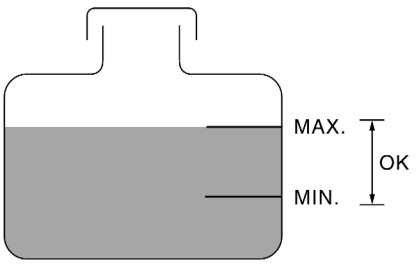
Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1217	• Cooling fan does not operate properly (Overheat). • Cooling fan system does not operate properly (Overheat). • Engine coolant was not added to the system using the proper filling method.	• Harness or connectors (The cooling fan circuit is open or shorted.) • Cooling fan • Radiator hose • Radiator • Radiator cap • Water pump • Thermostat For more information, refer to "MAIN 12 CAUSES OF OVERHEATING", EC-1191.

CAUTION:
When a malfunction is indicated, be sure to replace the coolant. Refer to *MA-17*, "Changing Engine Coolant". Also, replace the engine oil. Refer to *MA-20*, "Changing 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-15*, "Anti-freeze Coolant Mixture Ratio".

2) After refilling coolant, run engine to ensure that no water-flow noise is emitted.

1

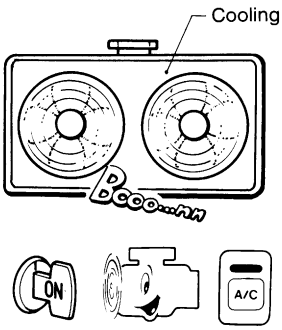


SEF621W

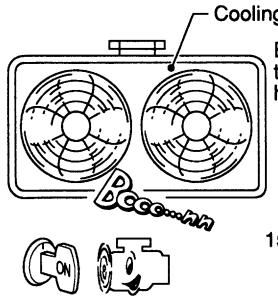
4

ACTIVE TEST	
COOLING FAN	OFF
MONITOR	
COOLAN TEMP/S	XXX °C

SEF646X



SEC163BA



MEC475B

Overall Function Check

NIEC1542

Use this procedure to check the overall function of the cooling fan. During this check, a DTC might not be confirmed.

WARNING:

Never remove the radiator cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator.
Wrap a thick cloth around cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.

With CONSULT-II

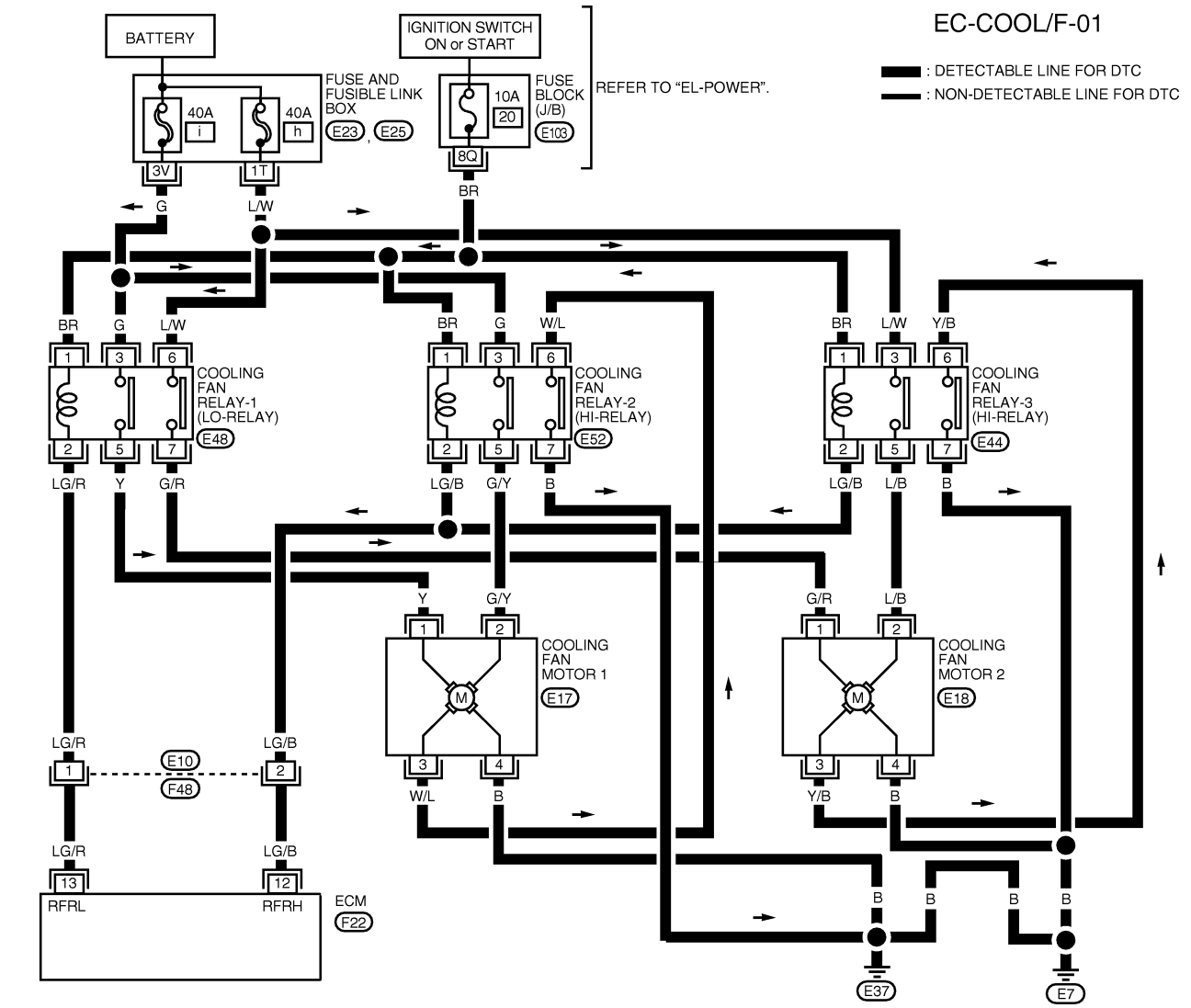
1) Check the coolant level in the reservoir tank and radiator.
Allow engine to cool before checking coolant level.
If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to “Diagnostic Procedure”, EC-1180.
2) Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to “Diagnostic Procedure”, EC-1180.
3) Turn ignition switch “ON”.
4) Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-II.
5) If the results are NG, go to “Diagnostic Procedure”, EC-1180.

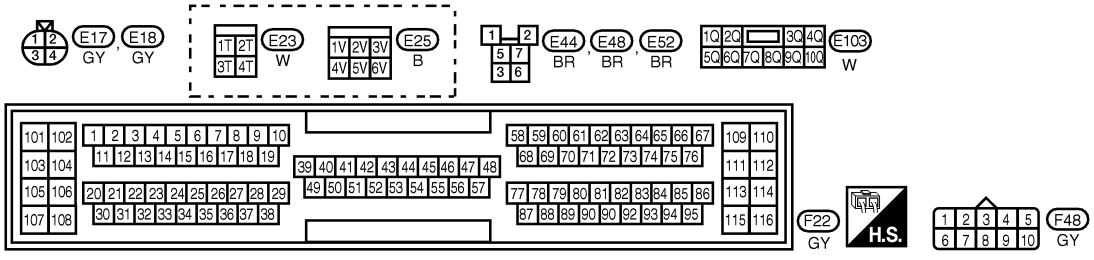
With GST

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-1180.
2) Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to “Diagnostic Procedure”, EC-1180.
3) Start engine.
Be careful not to overheat engine.
4) Set temperature control lever to full cold position.
5) Turn air conditioner switch “ON”.
6) Turn blower fan switch “ON”.
7) Run engine at idle for a few minutes with air conditioner operating.
Be careful not to overheat engine.
8) Make sure that cooling fan operates at low speed.
If NG, go to “Diagnostic Procedure”, EC-1180.
If OK, go to the following step.
9) Turn ignition switch “OFF”.
10) Turn air conditioner switch and blower fan switch “OFF”.
11) Disconnect engine coolant temperature sensor harness connector.
12) Connect 150Ω resistor to engine coolant temperature sensor harness connector.
13) Restart engine and make sure that cooling fan operates at higher speed than low speed.
Be careful not to overheat engine.
14) If NG, go to “Diagnostic Procedure”, EC-1180.

Wiring Diagram

NIEC1543





LEC222

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)
12	LG/B	COOLING FAN RELAY (HIGH)	ENGINE RUNNING WITH COOLING FAN NOT OPERATING	BATTERY VOLTAGE
			ENGINE RUNNING WITH COOLING FAN OPERATING AT HIGH SPEED	0 - 0.6V
13	LG/R	COOLING FAN RELAY (LOW)	ENGINE RUNNING WITH COOLING FAN NOT OPERATING	BATTERY VOLTAGE
			ENGINE RUNNING WITH COOLING FAN OPERATING AT LOW SPEED	0 - 0.6V

SEF571Y

Diagnostic Procedure

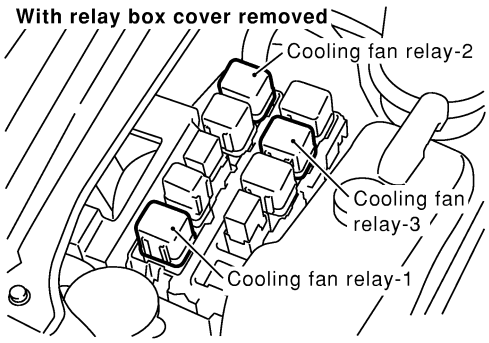
NIEC1544

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.



SEF397Z

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-1186.)

3	CHECK COOLING FAN HIGH SPEED OPERATION

With CONSULT-II

1. Turn ignition switch "OFF".
2. Reconnect cooling fan relays-2 and -3.
3. Turn ignition switch "ON".
4. Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT-II.

ACTIVE TEST	
COOLING FAN	OFF
MONITOR	
COOLAN TEMP/S	XXX °C

SEF646X

5. Make sure that cooling fans-1 and -2 operate at high speed.

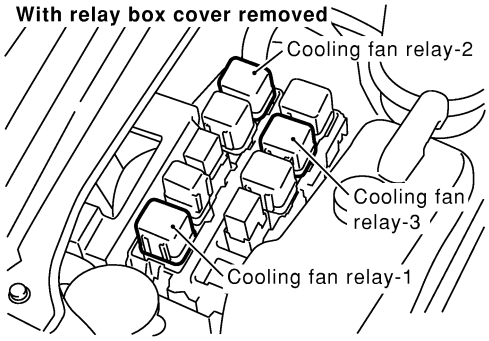
OK or NG

OK	▶	GO TO 6.
NG	▶	Check cooling fan high speed control circuit. (Go to PROCEDURE B, EC-1189.)

4	CHECK COOLING FAN LOW SPEED OPERATION

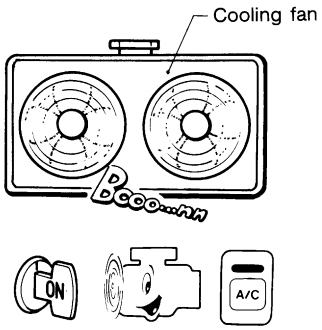
Without CONSULT-II

1. Disconnect cooling fan relays-2 and -3.



SEF397Z

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

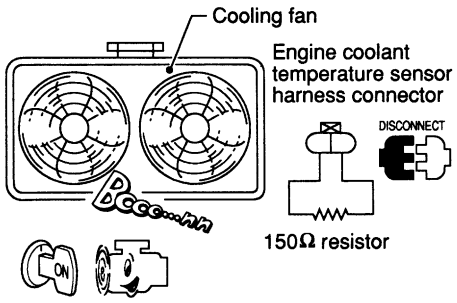
OK or NG

OK	▶	GO TO 5.
NG	▶	Check cooling fan low speed control circuit. (Go to PROCEDURE A, EC-1186.)

5	CHECK COOLING FAN HIGH SPEED OPERATION

Without CONSULT-II

1. Turn ignition switch "OFF".
2. Reconnect cooling fan relays-2 and -3.
3. Turn air conditioner switch and blower fan switch "OFF".
4. Disconnect engine coolant temperature sensor harness connector.
5. Connect 150Ω resistor to engine coolant temperature sensor harness connector.
6. Restart engine and make sure that cooling fans-1 and -2 operate at high speed.



MEC475B

OK or NG

OK	▶	GO TO 6.
NG	▶	Check cooling fan high speed control circuit. (Go to PROCEDURE B, EC-1189.)

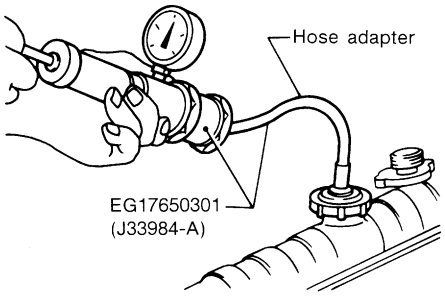
6	CHECK COOLING SYSTEM FOR LEAK

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.

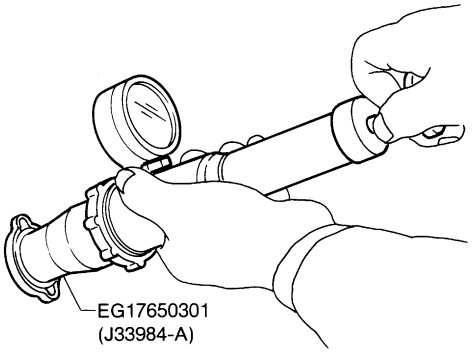
- Hose
- Radiator
- Water pump (Refer to ***LC-13***, "Water Pump".)

	▶	Repair or replace.

Diagnostic Procedure (Cont'd)

8	CHECK RADIATOR CAP

Apply pressure to cap with a tester.



SLC755A

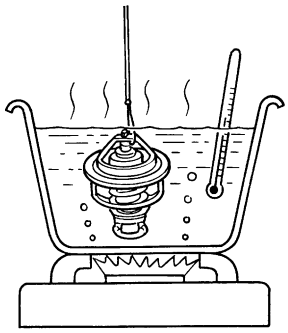
Radiator cap relief pressure:
59 - 98 kPa (0.6 - 1.0 kg/cm^2, 9 - 14 psi)

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace radiator cap.

9	CHECK THERMOSTAT

1. Check valve seating condition at normal room temperatures.
   It should seat tightly.
2. Check valve opening temperature and valve lift.



SLC343

Valve opening temperature:
76.5°C (170°F) [standard]
Valve lift:
More than 9 mm/90°C (0.35 in/194°F)

3. Check if valve is closed at 5°C (9°F) below valve opening temperature.

For details, refer to ***LC-15***, "Thermostat".

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace thermostat.

10	CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to "COMPONENT INSPECTION", EC-890.

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-1191.	
▶	INSPECTION END

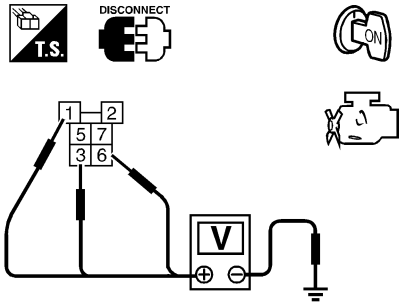
Diagnostic Procedure (Cont'd)

PROCEDURE A

=NIEC1544S01

1	CHECK POWER SUPPLY

1. Turn ignition switch "OFF".
2. Disconnect cooling fan relay-1.
3. Turn ignition switch "ON".
4. Check voltage between cooling fan relay-1 terminals 1, 3, 6 and ground with CONSULT-II or tester.



SEF477Y

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

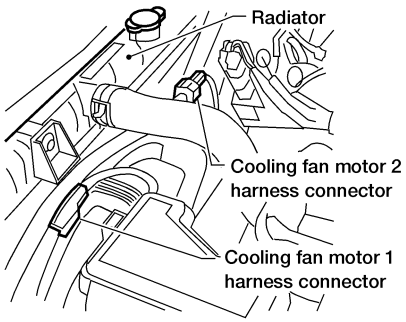
2	DETECT MALFUNCTIONING PART

Check the following.
- 10A fuse
- 40A fusible 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 GROUND CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect cooling fan motor-1 harness connector and cooling fan motor-2 harness connector.



LEC320

3. Check harness continuity between cooling fan relay-1 terminal 5 and cooling fan motor-1 terminal 1, cooling fan motor-1 terminal 4 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 1, cooling fan motor-2 terminal 4 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 OUTPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 13 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 E10, F48
- Harness for open or short between cooling fan relay-1 and ECM

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

6	CHECK COOLING FAN RELAY-1

Refer to "Component Inspection", EC-1191.

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace cooling fan relay.

Diagnostic Procedure (Cont'd)

7	CHECK COOLING FAN MOTORS-1 AND -2	
Refer to "Component Inspection", EC-1192.		
OK or NG		
OK	▶	GO TO 8.
NG	▶	Replace cooling fan motors.

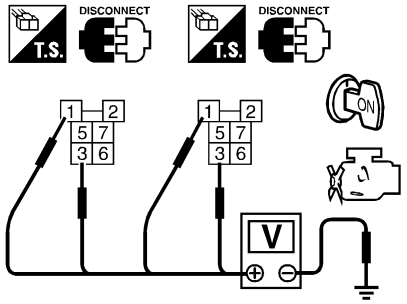
8	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-842.	
▶	**INSPECTION END**

PROCEDURE B

=NIEC1544S02

1	CHECK POWER SUPPLY

1. Turn ignition switch "OFF".
2. Disconnect cooling fan relays-2 and -3.
3. Turn ignition switch "ON".
4. Check voltage between cooling fan relays-2 and -3 terminals 1, 3 and ground with CONSULT-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.
- Harness for open or short between cooling fan relays-2 and -3 and fuse
- Harness for open or short between cooling fan relays-2 and -3 and fusible link

	▶	Repair harness or connectors.

3	CHECK GROUND CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect cooling fan motor-1 harness connector and cooling fan motor-2 harness connector.
3. Check harness continuity between cooling fan relay-2 terminal 5 and cooling fan motor-1 terminal 2, cooling fan relay-2 terminal 6 and cooling fan motor-1 terminal 3, cooling fan relay-2 terminal 7 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 2, cooling fan relay-3 terminal 6 and cooling fan motor-2 terminal 3, cooling fan relay-3 terminal 7 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 OUTPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 12 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.

Diagnostic Procedure (Cont'd)

5	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E10, F48 ● Harness for open or short between cooling fan relays-2 and -3 and ECM	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK COOLING FAN RELAYS-2 AND -3
Refer to "Component Inspection", EC-1191.	
OK or NG	
OK ▶	GO TO 7.
NG ▶	Replace cooling fan relays.

7	CHECK COOLING FAN MOTORS
Refer to "Component Inspection", EC-1192.	
OK or NG	
OK ▶	GO TO 8.
NG ▶	Replace cooling fan motors.

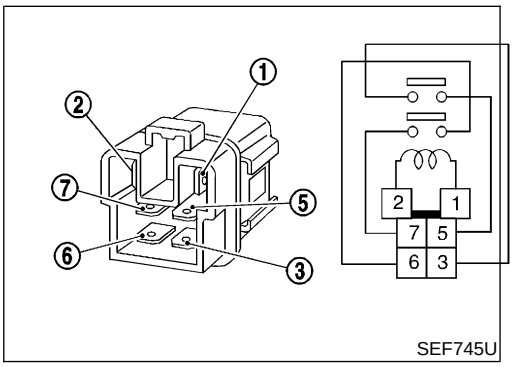
8	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-842.	
▶	**INSPECTION END**

Main 12 Causes of Overheating

NIEC1545

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-13***, "RECOMMENDED FLUIDS AND LUBRICANTS".
	3	• Coolant level	• Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	See ***MA-17***, "Changing Engine Coolant".
	4	• Radiator cap	• Pressure tester	59 - 98 kPa (0.6 - 1.0 kg/cm^2, 9 - 14 psi) (Limit)	See ***LC-10***, "System Check".
ON*2	5	• Coolant leaks	• Visual	No leaks	See ***LC-10***, "System Check".
ON*2	6	• Thermostat	• Touch the upper and lower radiator hoses	Both hoses should be hot	See ***LC-13***, "Thermostat" and ***LC-15***, "Radiator".
ON*1	7	• Cooling fan	• CONSULT-II	Operating	See trouble diagnosis for DTC P0217 (EC-980).
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-17***, "Changing Engine Coolant".
OFF*4	10	• Coolant return from reservoir tank to radiator	• Visual	Should be initial level in reservoir tank	See ***MA-16***, "ENGINE MAINTENANCE".
OFF	11	• Cylinder head	• Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	See ***EM-34***, "Inspection".
	12	• Cylinder block and pistons	• Visual	No scuffing on cylinder walls or piston	See ***EM-55***, "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-19***, "Overheating Cause Analysis".



SEF745U

Component Inspection

NIEC1546

COOLING FAN RELAYS-1, -2 AND -3

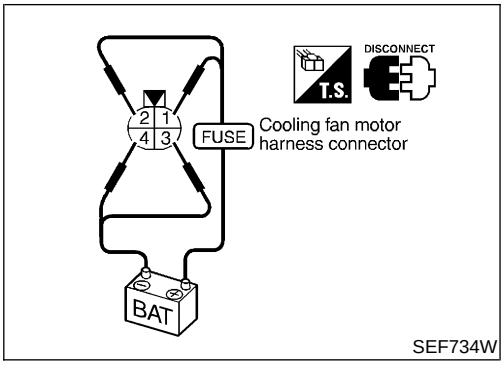
NIEC1546S01

Check continuity between terminals 3 and 5, 6 and 7.

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

If NG, replace relay.

Component Inspection (Cont'd)



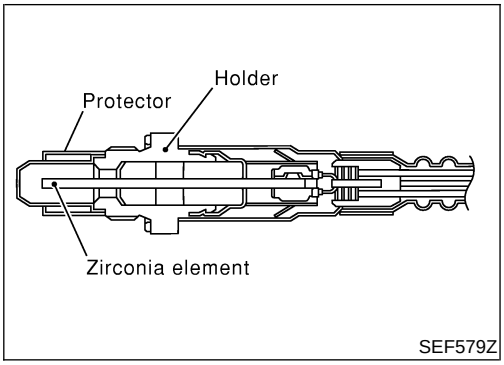
COOLING FAN MOTORS-1 AND -2

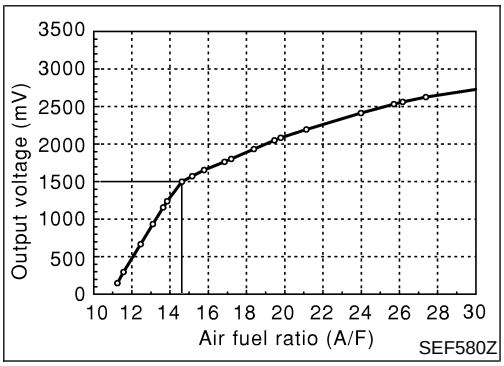
NIEC1546S02

1. Disconnect cooling fan motor harness connectors.
2. Supply cooling fan motor terminals with battery voltage and check operation.

	Speed	Terminals	
		(+)	(−)
Cooling fan motor	Low	1	4
	High	1, 2	3, 4

Cooling fan motor should operate.
If NG, replace cooling fan motor.





Component Description

NIEC1547

The A/F sensor is a planar dual-cell limit current sensor. The sensor element of the A/F sensor is the combination of a Nernst concentration cell (sensor cell) with an oxygen-pump cell, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range ($0.7 < \lambda <$ air).

The exhaust gas components diffuse through the diffusion gap at the electrode of the oxygen pump and Nernst concentration cell, where they are brought to thermodynamic balance.

An electronic circuit controls the pump current through the oxygen-pump cell so that the composition of the exhaust gas in the diffusion gap remains constant at $\lambda = 1$. Therefore, the A/F sensor is able to indicated air/fuel ratio by this pumping of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of 700 - 800°C (1,292 - 1,472°F).

CONSULT-II Reference Value in Data Monitor Mode

NIEC1548

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
A/F SEN1 (B1)	• Engine: Idle speed after warming up	Fluctuates around 1.5V.

On Board Diagnosis Logic

NIEC1549

To judge the malfunction, the diagnosis checks that the A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal is not inordinately low.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1271	• The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 0V.	• Harness or connectors (The sensor circuit is open or shorted.) • Air fuel ratio (A/F) sensor 1

3

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
A/F SEN1 (B1)	XXX V

SEF581Z

6

A/F SEN1 (B1) P1275	
OUT OF CONDITION	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h

SEF573Z

7

A/F SEN1 (B1) P1275	
TESTING SELECT 3RD GEAR AND THEN RELEASE ACCELERATOR PEDAL OFF	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h

SEF574Z

8

A/F SEN1 (B1) P1275
COMPLETED

SEF575Z

DTC Confirmation Procedure

NIEC1550

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

1) Start engine and warm it up to normal operating temperature.
2) Select “A/F SEN1 (B1)” in “DATA MONITOR” mode with CONSULT-II.
3) Check “A/F SEN1 (B1)” indication.
   If the indication is constantly approx. 0V, go to “Diagnostic Procedure”, EC-1197.
   If the indication is not constantly approx. 0V, go to next step.
4) Select “A/F SEN1 (B1) P1275” of “A/F SEN1” in “DTC WORK SUPPORT” mode.
5) Touch “START”.
6) When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen.

ENG SPEED	1,500 - 3,000 rpm
Vehicle speed	70 - 120 km/h (43 - 75 MPH)
B/FUEL SCHDL	1.0 - 8.0 msec
Selector lever	“D” position with “OD” ON

If “TESTING” is not displayed after 20 seconds, retry from step 2.

7) Following the instructions of CONSULT-II screen, set “OD” OFF and release accelerator pedal fully.
8) Make sure that “TESTING” changes to “COMPLETED”.
   If “TESTING” changed to “OUT OF CONDITION”, retry from step 6.
9) Touch “BACK” and “MODE”, then select “SELF-DIAG RESULT” mode.
   If P1271 is displayed, go to “Diagnostic Procedure”, EC-1197.
   If another DTC is displayed, go to the corresponding “Diagnostic Procedure”.

Overall Function Check

NIEC1551

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

With GST

1) Start engine and warm it up to normal operating temperature.
2) Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes in “D” position with “OD” OFF.

NOTE:

Keep the accelerator pedal as steady as possible during the cruising.

3) Set "OD" on, then release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (30 MPH).

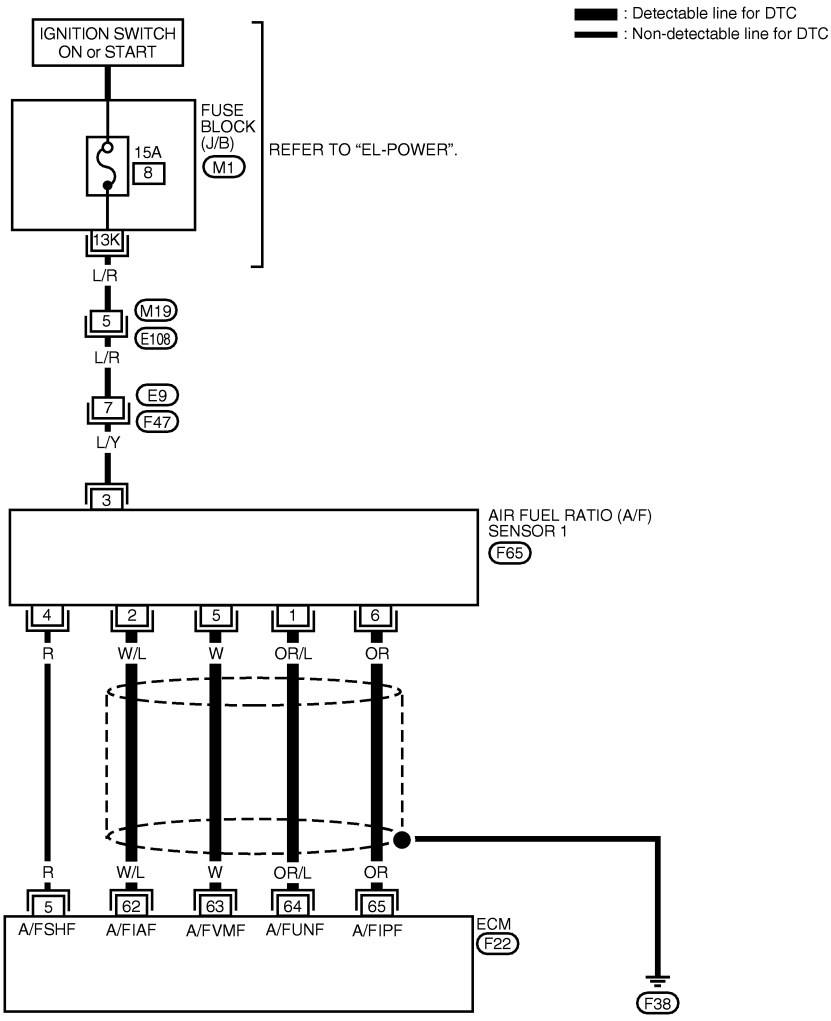
NOTE:
Never apply brake during releasing the accelerator pedal.

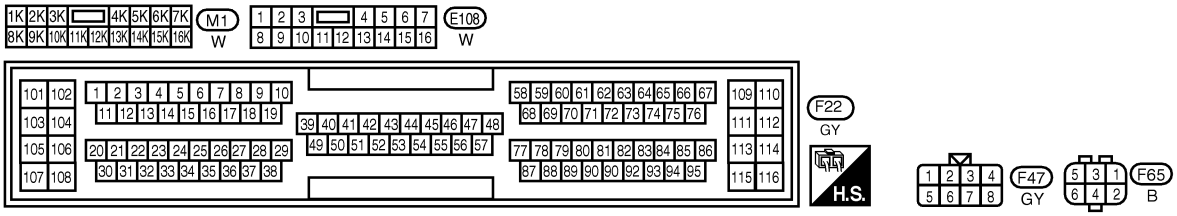
4) Repeat steps 2 to 3 five times.
5) Stop the vehicle and turn ignition switch "OFF".
6) Wait at least 10 seconds and restart engine.
7) Repeat steps 2 to 3 five times.
8) Stop the vehicle and connect GST to the vehicle.
9) Make sure that no DTC is displayed.
   If the DTC is displayed, go to "Diagnostic Procedure", EC-1197.

Wiring Diagram

=NIEC1552

EC-A/F-01





WEC388

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/L	A/F SENSOR	ENGINE RUNNING AT IDLE SPEED UNDER WARM-UP CONDITION	2.0 - 3.5V
63	W			2.0 - 3.0V
64	OR/L			2.5 - 3.5V
65	OR			2.0 - 3.5V

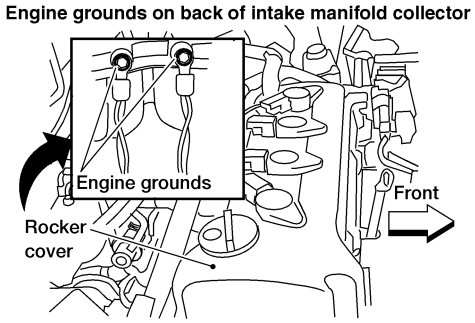
SEF609Z

Diagnostic Procedure

NIEC1553

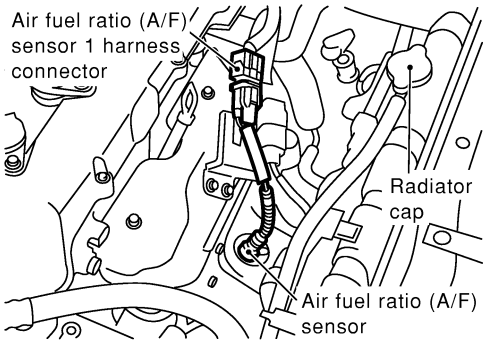
1	CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

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



WEC249

3. Disconnect ECM harness connector and A/F sensor 1 harness connector.



SEF393Z

4. Check harness continuity between the following terminals. Refer to Wiring Diagram.

ECM terminal	A/F sensor 1 terminal
62	2
63	5
64	1
65	6

MTBL0542

Continuity should exist.

5. Check harness continuity between ECM terminals 62, 63, 64, 65 or A/F sensor 1 terminals 1, 2, 5, 6 and ground. Refer to Wiring Diagram.

Continuity should not exist.

6. Also check harness for short to power.

OK or NG

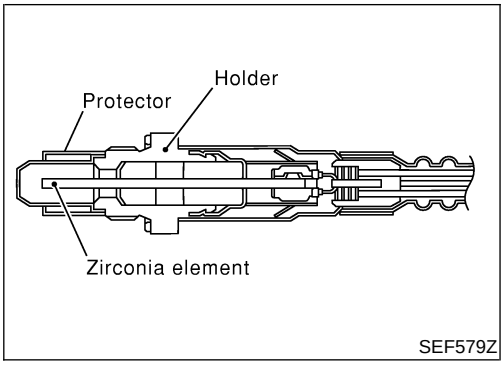
OK	▶	GO TO 2.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

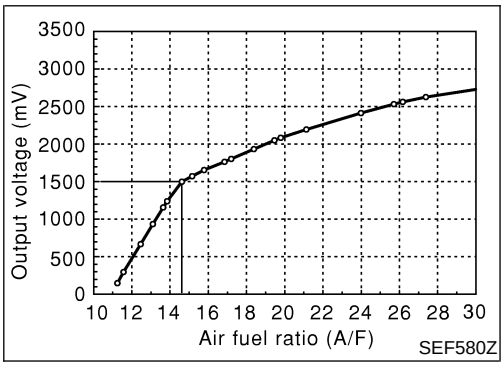
2	CHECK INTERMITTENT INCIDENT

Perform “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-842.

OK or NG

OK	▶	Replace A/F sensor 1.
NG	▶	Repair or replace.





Component Description

NIEC1554

The A/F sensor is a planar dual-cell limit current sensor. The sensor element of the A/F sensor is the combination of a Nernst concentration cell (sensor cell) with an oxygen-pump cell, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range ($0.7 < \lambda <$ air).

The exhaust gas components diffuse through the diffusion gap at the electrode of the oxygen pump and Nernst concentration cell, where they are brought to thermodynamic balance.

An electronic circuit controls the pump current through the oxygen-pump cell so that the composition of the exhaust gas in the diffusion gap remains constant at $\lambda = 1$. Therefore, the A/F sensor is able to indicated air/fuel ratio by this pumping of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of 700 - 800°C (1,292 - 1,472°F).

CONSULT-II Reference Value in Data Monitor Mode

NIEC1555

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
A/F SEN1 (B1)	• Engine: Idle speed after warming up	Fluctuates around 1.5V.

On Board Diagnosis Logic

NIEC1556

To judge the malfunction, the diagnosis checks that the A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal is not inordinately high.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1272	• The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 4.5V.	• Harness or connectors (The sensor circuit is open or shorted.) • Air fuel ratio (A/F) sensor 1

3

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
A/F SEN1 (B1)	XXX V

SEF581Z

6

A/F SEN1 (B1) P1275	
OUT OF CONDITION	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h

SEF573Z

7

A/F SEN1 (B1) P1275	
TESTING SELECT 3RD GEAR AND THEN RELEASE ACCELERATOR PEDAL OFF	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h

SEF574Z

8

A/F SEN1 (B1) P1275
COMPLETED

SEF575Z

DTC Confirmation Procedure

NIEC1557

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

1) Start engine and warm it up to normal operating temperature.
2) Select “A/F SEN1 (B1)” in “DATA MONITOR” mode with CONSULT-II.
3) Check “A/F SEN1 (B1)” indication.
   If the indication is constantly approx. 4.5V, go to “Diagnostic Procedure”, EC-1202.
   If the indication is not constantly approx. 4.5V, go to next step.
4) Select “A/F SEN1 (B1) P1275” of “A/F SEN1” in “DTC WORK SUPPORT” mode.
5) Touch “START”.
6) When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen.

ENG SPEED	1,500 - 3,000 rpm
Vehicle speed	70 - 120 km/h (43 - 75 MPH)
B/FUEL SCHDL	1.0 - 8.0 msec
Selector lever	“D” position with “OD” ON

If “TESTING” is not displayed after 20 seconds, retry from step 2.

7) Following the instructions of CONSULT-II screen, set “OD” OFF and release accelerator pedal fully.
8) Make sure that “TESTING” changes to “COMPLETED”.
   If “TESTING” changed to “OUT OF CONDITION”, retry from step 6.
9) Touch “BACK” and “MODE”, then select “SELF-DIAG RESULT” mode.
   If P1272 is displayed, go to “Diagnostic Procedure”, EC-1202.
   If another DTC is displayed, go to the corresponding “Diagnostic Procedure”.

Overall Function Check

NIEC1558

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

With GST

1) Start engine and warm it up to normal operating temperature.
2) Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes in “D” position with “OD” OFF.

NOTE:

Keep the accelerator pedal as steady as possible during the cruising.

3) Set "OD" on, then release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (30 MPH).

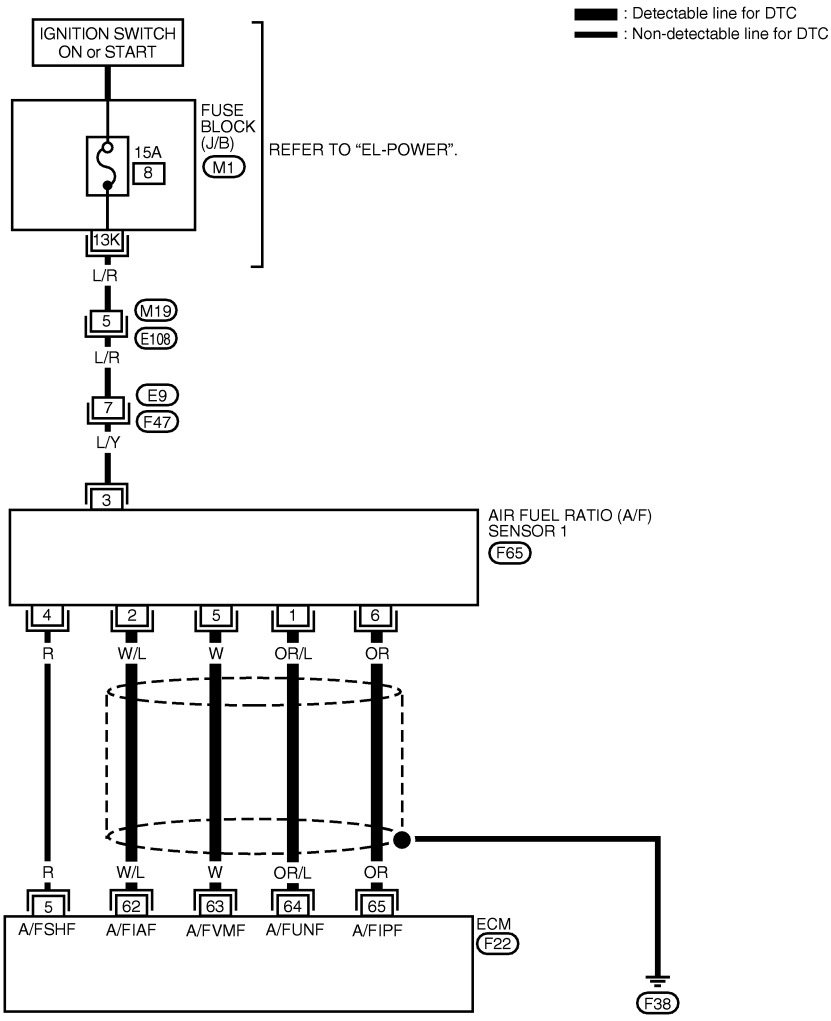
NOTE:
Never apply brake during releasing the accelerator pedal.

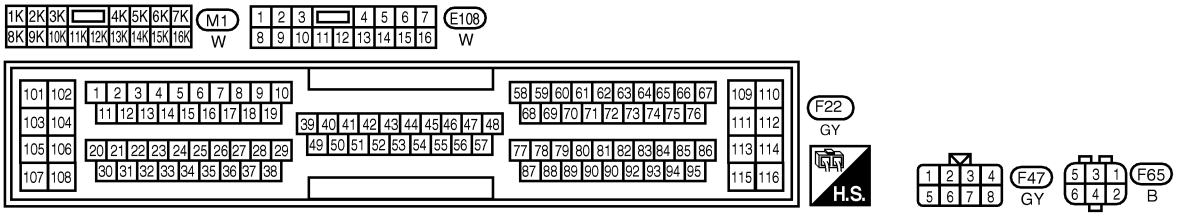
4) Repeat steps 2 to 3 five times.
5) Stop the vehicle and turn ignition switch "OFF".
6) Wait at least 10 seconds and restart engine.
7) Repeat steps 2 to 3 five times.
8) Stop the vehicle and connect GST to the vehicle.
9) Make sure that no DTC is displayed.
   If the DTC is displayed, go to "Diagnostic Procedure", EC-1202.

Wiring Diagram

NIEC1559

EC-A/F-01





WEC388

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/L	A/F SENSOR	ENGINE RUNNING AT IDLE SPEED UNDER WARM-UP CONDITION	2.0 - 3.5V
63	W			2.0 - 3.0V
64	OR/L			2.5 - 3.5V
65	OR			2.0 - 3.5V

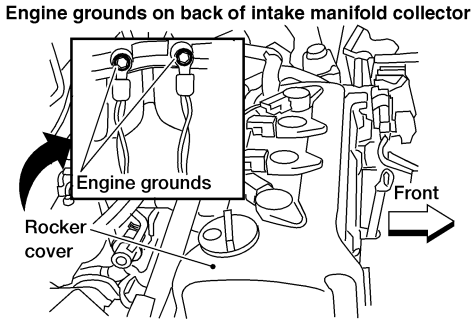
SEF609Z

Diagnostic Procedure

NIEC1560

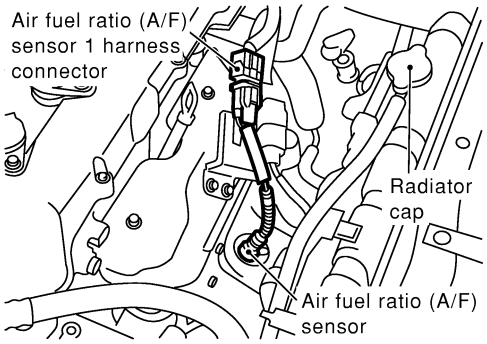
1	CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

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



WEC249

3. Disconnect ECM harness connector and A/F sensor 1 harness connector.



SEF393Z

4. Check harness continuity between the following terminals. Refer to Wiring Diagram.

ECM terminal	A/F sensor 1 terminal
62	2
63	5
64	1
65	6

MTBL0542

Continuity should exist.

5. Check harness continuity between ECM terminals 62, 63, 64, 65 or A/F sensor 1 terminals 1, 2, 5, 6 and ground. Refer to Wiring Diagram.

Continuity should not exist.

6. Also check harness for short to power.

OK or NG

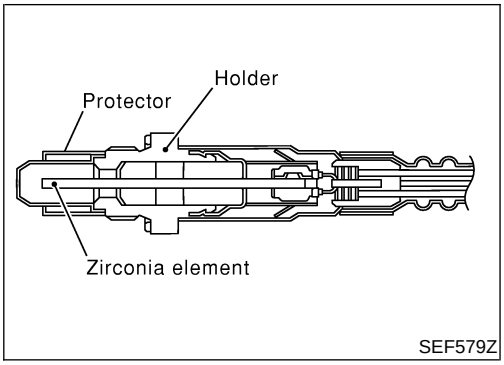
OK	▶	GO TO 2.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

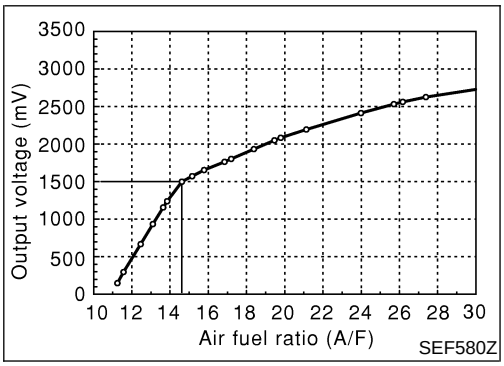
2	CHECK INTERMITTENT INCIDENT

Perform “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-842.

OK or NG

OK	▶	Replace A/F sensor 1.
NG	▶	Repair or replace.





Component Description

NIEC1561

The A/F sensor is a planar dual-cell limit current sensor. The sensor element of the A/F sensor is the combination of a Nernst concentration cell (sensor cell) with an oxygen-pump cell, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range ($0.7 < \lambda <$ air).

The exhaust gas components diffuse through the diffusion gap at the electrode of the oxygen pump and Nernst concentration cell, where they are brought to thermodynamic balance.

An electronic circuit controls the pump current through the oxygen-pump cell so that the composition of the exhaust gas in the diffusion gap remains constant at $\lambda = 1$. Therefore, the A/F sensor is able to indicated air/fuel ratio by this pumping of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of 700 - 800°C (1,292 - 1,472°F).

CONSULT-II Reference Value in Data Monitor Mode

NIEC1562

Specification data are reference values.

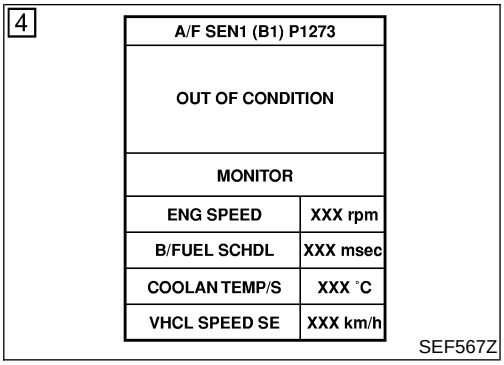
MONITOR ITEM	CONDITION	SPECIFICATION
A/F SEN1 (B1)	• Engine: Idle speed after warming up	Fluctuates around 1.5V.

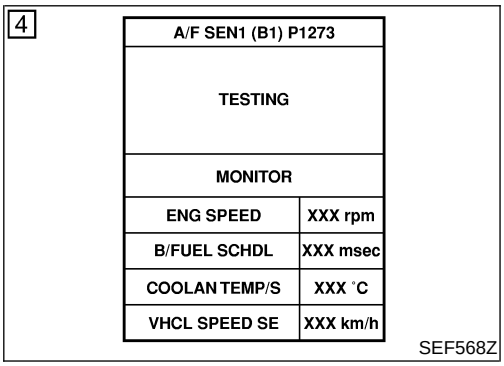
On Board Diagnosis Logic

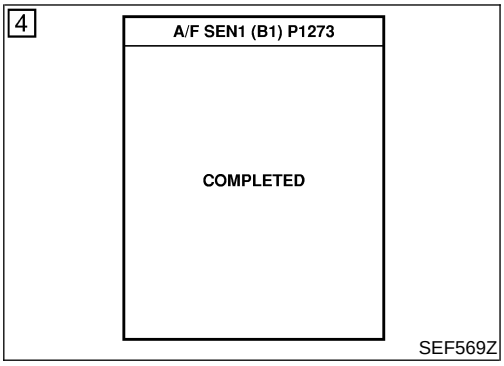
NIEC1563

To judge the malfunction, the A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal is monitored not to be shifted “lean” side or “rich” side. When the A/F signal is shifting to the lean side, the malfunction will be detected.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1273	• The output voltage computed by ECM from the A/F sensor 1 signal is shifted to the lean side for a specified period.	• Air fuel ratio (A/F) sensor 1 • Air fuel ratio (A/F) sensor heater 1 • Fuel pressure • Injectors • Intake air leaks







DTC Confirmation Procedure

NIEC1564

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

1) Start engine and warm it up to normal operating temperature.
2) Select “A/F SEN1 (B1) P1273” of “A/F SEN1” in “DTC WORK SUPPORT” mode.
3) Touch “START”.
4) Maintain the following conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 400 to 800 seconds.)

NOTE:
Keep the accelerator pedal as steady as possible.

ENG SPEED	Below 3,000 rpm
B/FUEL SCHDL	Below 9.0 msec
Selector lever	“P” or “N” position

If “TESTING” is not displayed after 20 minutes, retry from step 2.

5) Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”.
   If “NG” is displayed, go to “Diagnostic Procedure”, EC-1206.

Overall Function Check

NIEC1565

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

With GST

1) Start engine and warm it up to normal operating temperature.
2) Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes in “D” position with “OD” OFF.

NOTE:
Keep the accelerator pedal as steady as possible during the cruising.

3) Set “OD” on, then release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (30 MPH).

NOTE:
Never apply brake during releasing the accelerator pedal.

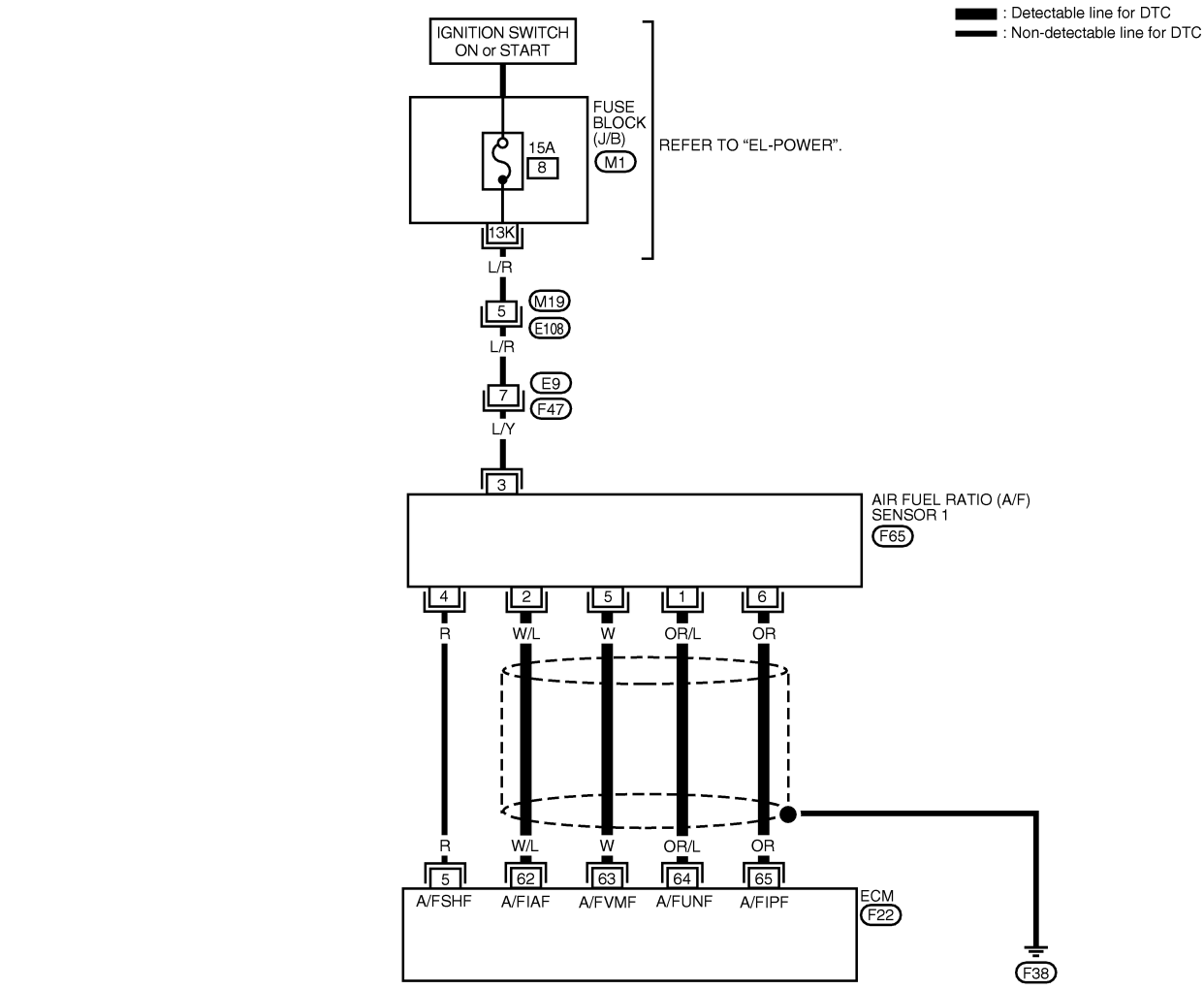
4) Repeat steps 2 to 3 five times.
5) Stop the vehicle and turn ignition switch “OFF”.
6) Wait at least 10 seconds and restart engine.
7) Repeat steps 2 to 3 five times.
8) Stop the vehicle and connect GST to the vehicle.
9) Make sure that no DTC is displayed.

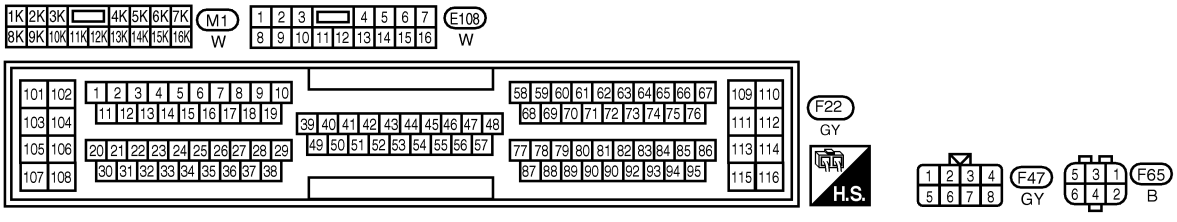
If the DTC is displayed, go to “Diagnostic Procedure”, EC-1206.

Wiring Diagram

NIEC1566

EC-A/F-01





WEC388

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)
62	W/L	A/F SENSOR	ENGINE RUNNING AT IDLE SPEED UNDER WARM-UP CONDITION	2.0 - 3.5V
63	W			2.0 - 3.0V
64	OR/L			2.5 - 3.5V
65	OR			2.0 - 3.5V

SEF609Z

Diagnostic Procedure

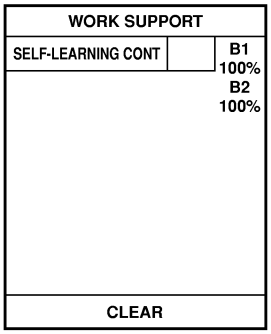
NIEC1567

1	RETIGHTEN AIR FUEL RATIO (A/F) SENSOR 1
1. Turn ignition switch "OFF". 2. Loosen and retighten the air fuel ratio (A/F) sensor 1. **Tightening torque:** **40 - 60 N·m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)**	
▶	GO TO 2.

2	CLEAR THE SELF-LEARNING DATA.

With CONSULT-II

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

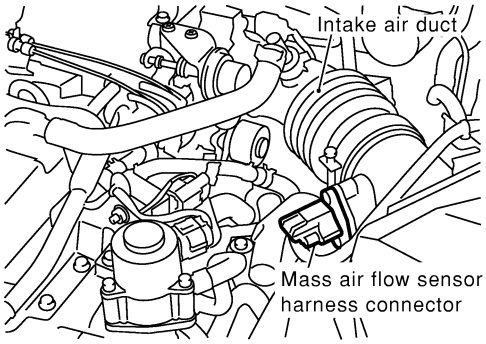


SEF652Y

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

Without CONSULT-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 3 seconds at idle speed.



SEF388Z

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-770.
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 detected? Is it difficult to start engine?

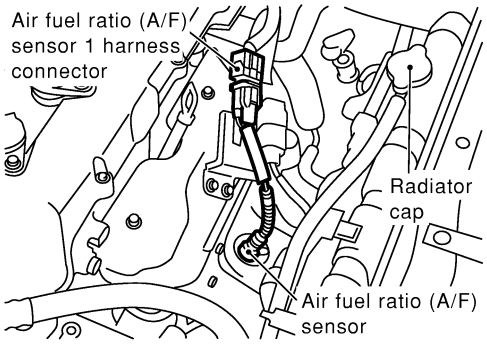
Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0171. Refer to EC-961.
No	▶	GO TO 3.

Diagnostic Procedure (Cont'd)

3	CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector and A/F sensor 1 harness connector.



SEF393Z

3. Check harness continuity between the following terminals. Refer to Wiring Diagram.

ECM terminal	A/F sensor 1 terminal
62	2
63	5
64	1
65	6

MTBL0542

Continuity should exist.

4. Check harness continuity between ECM terminals 62, 63, 64, 65 or A/F sensor 1 terminals 1, 2, 5, 6 and ground. Refer to Wiring Diagram.

Continuity should not exist.

5. 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 A/F SENSOR 1 HEATER

Refer to "Component Inspection", EC-1232.

OK or NG

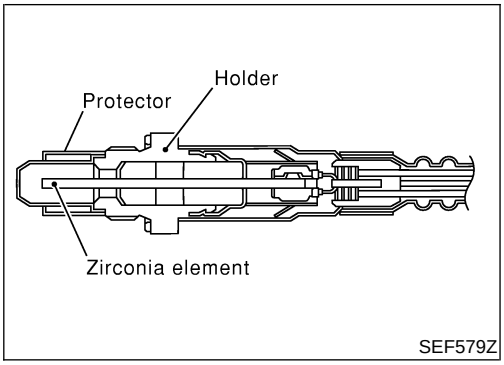
OK	▶	GO TO 5.
NG	▶	Replace A/F sensor 1.

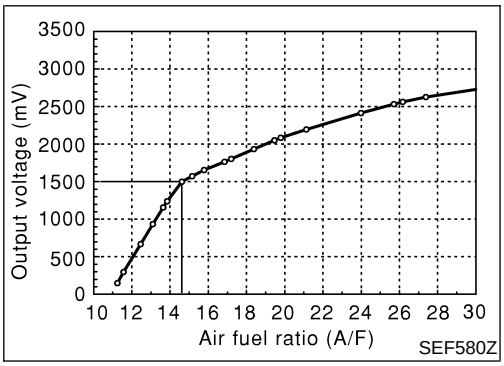
5	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-842.

OK or NG

OK	▶	Replace A/F sensor 1.
NG	▶	Repair or replace.





Component Description

NIEC1568

The A/F sensor is a planar dual-cell limit current sensor. The sensor element of the A/F sensor is the combination of a Nernst concentration cell (sensor cell) with an oxygen-pump cell, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range ($0.7 < \lambda <$ air).

The exhaust gas components diffuse through the diffusion gap at the electrode of the oxygen pump and Nernst concentration cell, where they are brought to thermodynamic balance.

An electronic circuit controls the pump current through the oxygen-pump cell so that the composition of the exhaust gas in the diffusion gap remains constant at $\lambda = 1$. Therefore, the A/F sensor is able to indicated air/fuel ratio by this pumping of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of 700 - 800°C (1,292 - 1,472°F).

CONSULT-II Reference Value in Data Monitor Mode

NIEC1569

Specification data are reference values.

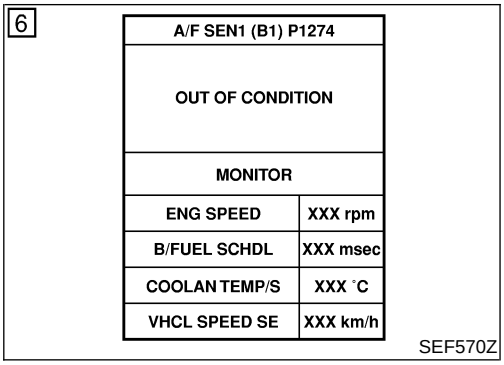
MONITOR ITEM	CONDITION	SPECIFICATION
A/F SEN1 (B1)	• Engine: Idle speed after warming up	Fluctuates around 1.5V.

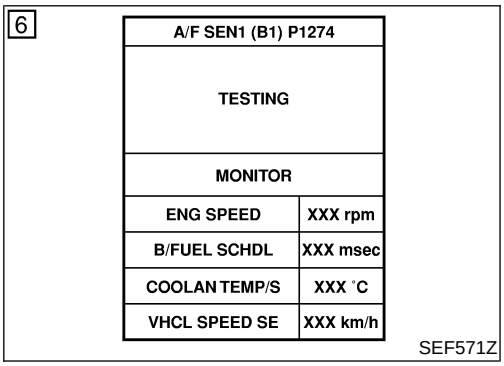
On Board Diagnosis Logic

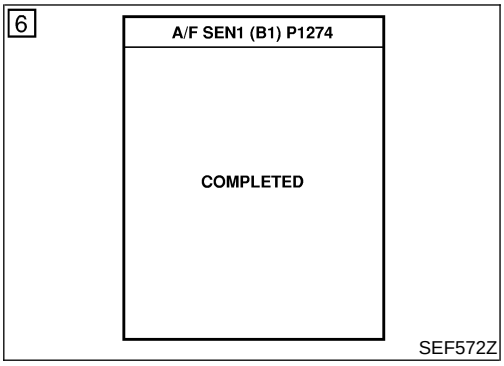
NIEC1570

To judge the malfunction, the A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal is monitored not to be shifted to the “lean” side or “rich” side. When the A/F signal is shifting to the rich side, the malfunction will be detected.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1274	• The A/F signal computed by ECM from the A/F sensor 1 signal is shifted to the rich side for a specified period.	• Air fuel ratio (A/F) sensor 1 • Air fuel ratio (A/F) sensor heater 1 • Fuel pressure • Injectors







DTC Confirmation Procedure

NIEC1571

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

1) Start engine and warm it up to normal operating temperature.
2) Select “A/F SEN1 (B1) P1274” of “A/F SEN1” in “DTC WORK SUPPORT” mode.
3) Touch “START”.
4) Maintain the following conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 400 to 800 seconds.)

NOTE:
Keep the accelerator pedal as steady as possible.

ENG SPEED	Below 3,000 rpm
B/FUEL SCHDL	Below 9.0 msec
Selector lever	“P” or “N” position

If “TESTING” is not displayed after 20 minutes, retry from step 2.

5) Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”.
   If “NG” is displayed, go to “Diagnostic Procedure”, EC-1212.

Overall Function Check

NIEC1572

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

With GST

1) Start engine and warm it up to normal operating temperature.
2) Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes in “D” position with “OD” OFF.

NOTE:
Keep the accelerator pedal as steady as possible during the cruising.

3) Set “OD” on, then release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (30 MPH).

NOTE:
Never apply brake during releasing the accelerator pedal.

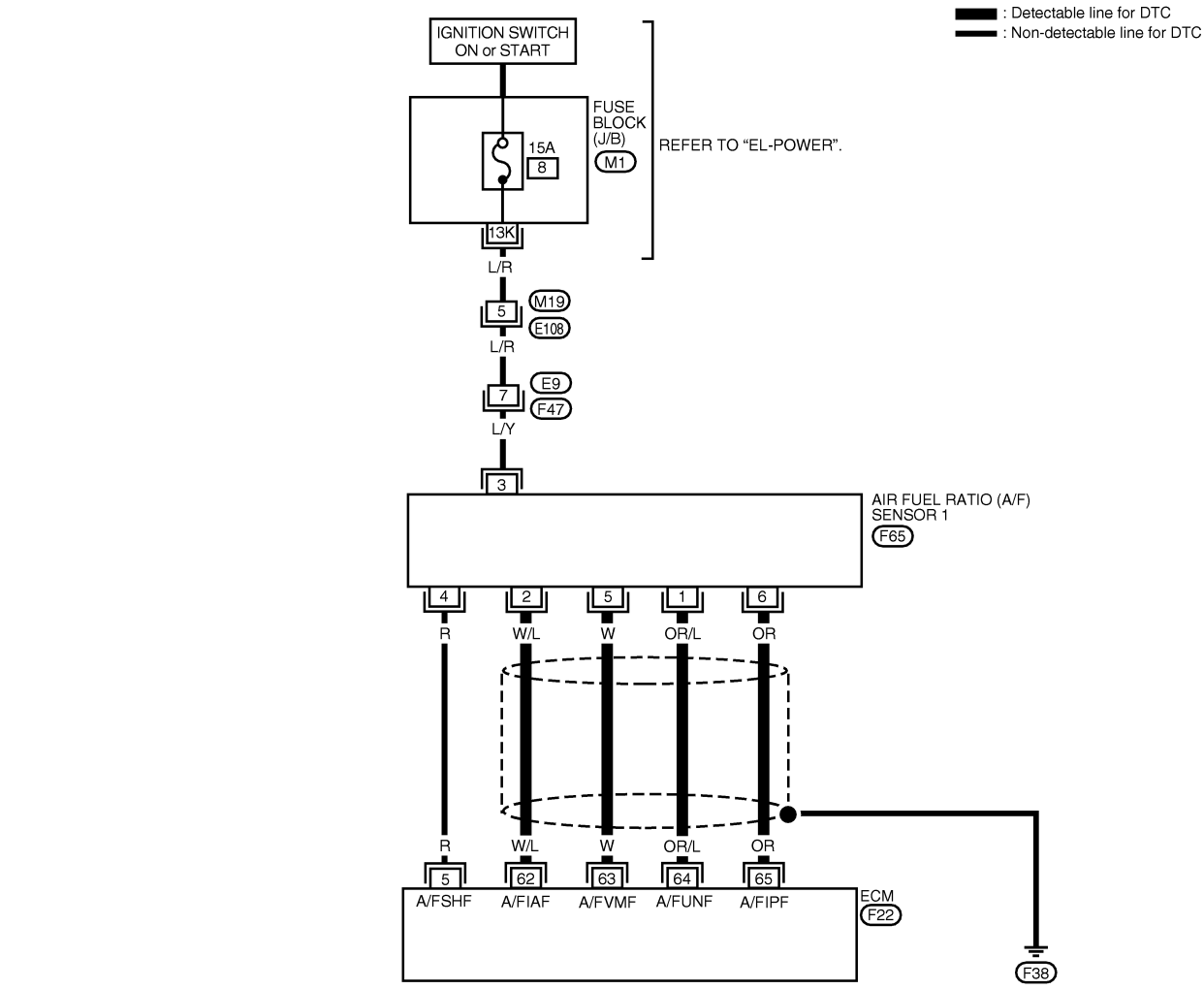
4) Repeat steps 2 to 3 five times.
5) Stop the vehicle and turn ignition switch “OFF”.
6) Wait at least 10 seconds and restart engine.
7) Repeat steps 2 to 3 five times.
8) Stop the vehicle and connect GST to the vehicle.
9) Make sure that no DTC is displayed.

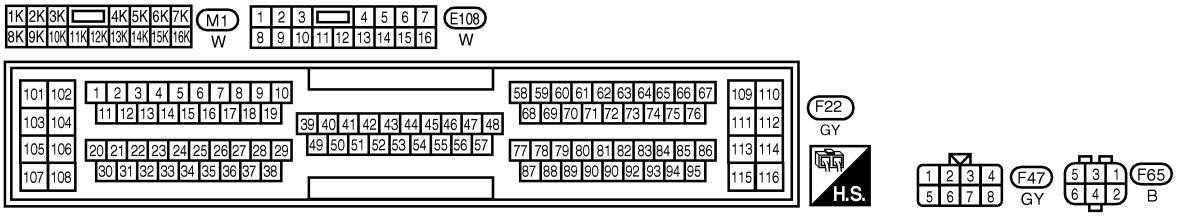
If the DTC is displayed, go to “Diagnostic Procedure”, EC-1212.

Wiring Diagram

NIEC1573

EC-A/F-01





WEC388

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)
62	W/L	A/F SENSOR	ENGINE RUNNING AT IDLE SPEED UNDER WARM-UP CONDITION	2.0 - 3.5V
63	W			2.0 - 3.0V
64	OR/L			2.5 - 3.5V
65	OR			2.0 - 3.5V

SEF609Z

Diagnostic Procedure

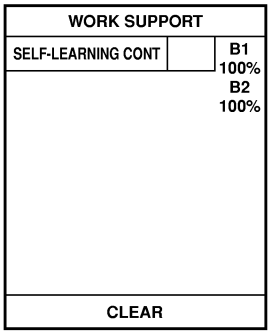
NIEC1574

1	RETIGHTEN AIR FUEL RATIO (A/F) SENSOR 1
1. Turn ignition switch "OFF". 2. Loosen and retighten the air fuel ratio (A/F) sensor 1. **Tightening torque:** **40 - 60 N·m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)**	
▶	GO TO 2.

2	CLEAR THE SELF-LEARNING DATA

With CONSULT-II

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

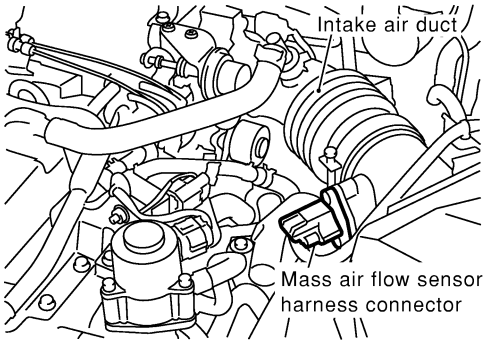


SEF652Y

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

Without CONSULT-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 3 seconds at idle speed.



SEF388Z

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-770.
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 detected? Is it difficult to start engine?

Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0172. Refer to EC-968.
No	▶	GO TO 3.

3	CHECK HARNESS CONNECTOR

1. Turn ignition switch "OFF".
2. Disconnect A/F sensor 1 harness connector.
3. Check harness connector for water.
   Water should not exit.

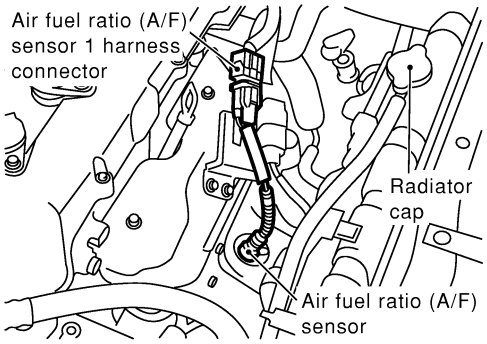
OK or NG

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

Diagnostic Procedure (Cont'd)

4	CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector and A/F sensor 1 harness connector.



SEF393Z

3. Check harness continuity between the following terminals. Refer to Wiring Diagram.

ECM terminal	A/F sensor 1 terminal
62	2
63	5
64	1
65	6

MTBL0542

Continuity should exist.

4. Check harness continuity between ECM terminals 62, 63, 64, 65 or A/F sensor 1 terminals 1, 2, 5, 6 and ground. Refer to Wiring Diagram.

Continuity should not exist.

5. Also check harness for 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 A/F SENSOR 1 HEATER

Refer to "Component Inspection", EC-1232.

OK or NG

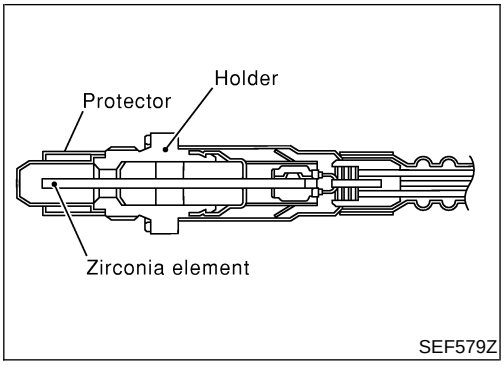
OK	▶	GO TO 6.
NG	▶	Replace A/F sensor 1.

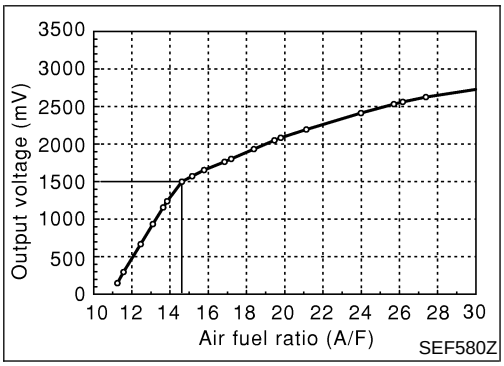
6	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-842.

OK or NG

OK	▶	Replace A/F sensor 1.
NG	▶	Repair or replace.





Component Description

NIEC1575

The A/F sensor is a planar dual-cell limit current sensor. The sensor element of the A/F sensor is the combination of a Nernst concentration cell (sensor cell) with an oxygen-pump cell, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range ($0.7 < \lambda <$ air).

The exhaust gas components diffuse through the diffusion gap at the electrode of the oxygen pump and Nernst concentration cell, where they are brought to thermodynamic balance.

An electronic circuit controls the pump current through the oxygen-pump cell so that the composition of the exhaust gas in the diffusion gap remains constant at $\lambda = 1$. Therefore, the A/F sensor is able to indicated air/fuel ratio by this pumping of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of 700 - 800°C (1,292 - 1,472°F).

CONSULT-II Reference Value in Data Monitor Mode

NIEC1576

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
A/F SEN1 (B1)	• Engine: Idle speed after warming up	Fluctuates around 1.5V.

On Board Diagnosis Logic

NIEC1577

To judge the malfunction of air fuel ratio (A/F) sensor 1, this diagnosis measures response time of the A/F signal computed by ECM from the air fuel ration (A/F) sensor 1 signal. The time is compensated by engine operating (speed and load), fuel feedback control constant, and the air fuel ration (A/F) sensor 1 temperature index. Judgment is based on whether the compensated time (the A/F signal cycling time index) is inordinately long or not.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1275	• The response of the A/F signal computed by ECM from A/F sensor 1 signal takes more than the specified time.	• Harness or connectors (The sensor circuit is open or shorted.) • Air fuel ratio (A/F) sensor 1 • Air fuel ratio (A/F) sensor heater 1 • Fuel pressure • Injectors • Intake air leaks • Exhaust gas leaks • PCV • Mass air flow sensor

4

A/F SEN1 (B1) P1275	
OUT OF CONDITION	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h

SEF573Z

5

A/F SEN1 (B1) P1275	
TESTING SELECT 3RD GEAR AND THEN RELEASE ACCELERATOR PEDAL OFF	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h

SEF574Z

6

A/F SEN1 (B1) P1275
COMPLETED

SEF575Z

DTC Confirmation Procedure

NIEC1578

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

1) Start engine and warm it up to normal operating temperature.
2) Select “A/F SEN1 (B1) P1275” of “A/F SEN1” in “DTC WORK SUPPORT” mode.
3) Touch “START”.
4) When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen.

ENG SPEED	1,500 - 3,000 rpm
Vehicle speed	70 - 120 km/h (43 - 75 MPH)
B/FUEL SCHDL	1.0 - 8.0 msec
Selector lever	“D” position with “OD” ON

If “TESTING” is not displayed after 20 seconds, retry from step 2.

5) Following the instructions of CONSULT-II screen, set “OD” OFF and release accelerator pedal fully.
6) Make sure that “TESTING” changes to “COMPLETED”.
If “TESTING” changed to “OUT OF CONDITION”, retry from step 6.
7) Make sure that “OK” is displayed after touching “SELF-DIAG RESULT”.
If “NG” is displayed, go to “Diagnostic Procedure”, EC-1219

Overall Function Check

NIEC1579

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

With GST

1) Start engine and warm it up to normal operating temperature.
2) Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes in “D” position with “OD” OFF.

NOTE:

Keep the accelerator pedal as steady as possible during the cruising.

3) Set “OD” on, then release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (30 MPH).

NOTE:

Never apply brake during releasing the accelerator pedal.

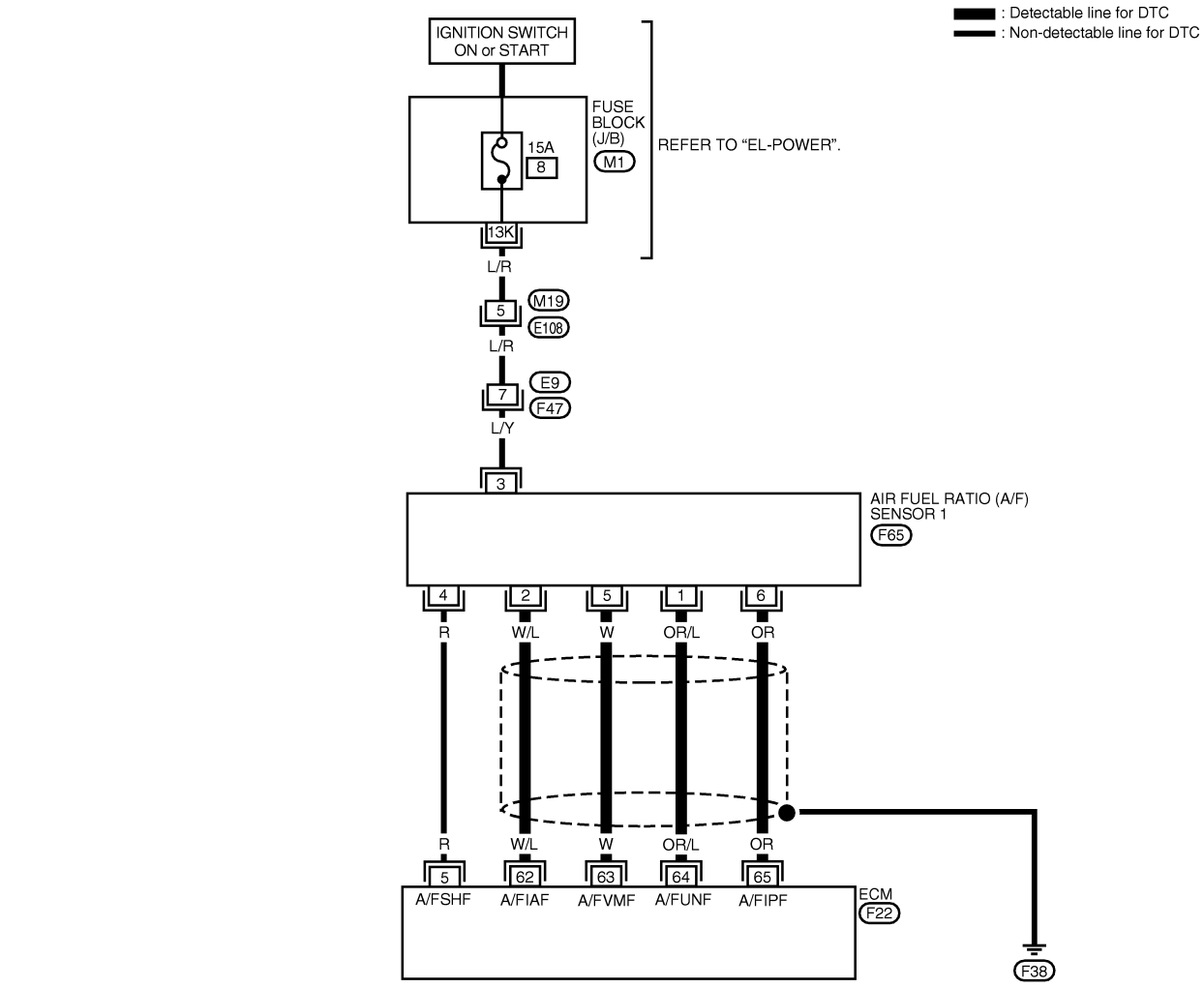
4) Repeat steps 2 to 3 five times.
5) Stop the vehicle and turn ignition switch “OFF”.
6) Wait at least 10 seconds and restart engine.
7) Repeat steps 2 to 3 five times.
8) Stop the vehicle and connect GST to the vehicle.
9) Make sure that no DTC is displayed.

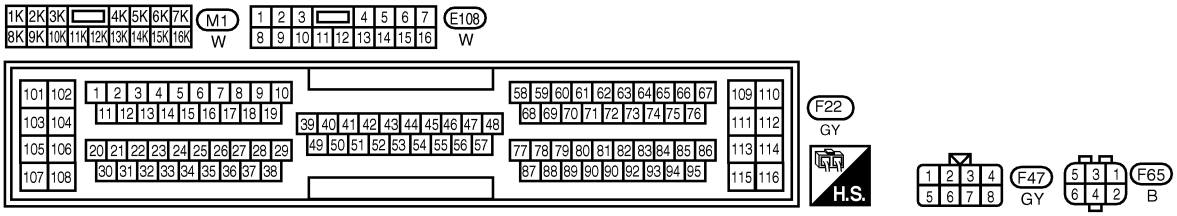
If the DTC is displayed, go to "Diagnostic Procedure", EC-1219.

Wiring Diagram

=NIEC1580

EC-A/F-01





WEC388

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/L	A/F SENSOR	ENGINE RUNNING AT IDLE SPEED UNDER WARM-UP CONDITION	2.0 - 3.5V
63	W			2.0 - 3.0V
64	OR/L			2.5 - 3.5V
65	OR			2.0 - 3.5V

SEF609Z

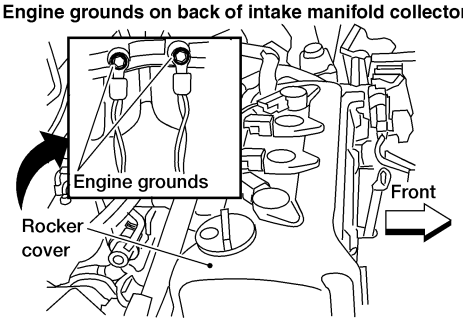
Diagnostic Procedure

NIEC1581

1	RETIGHTEN GROUND SCREWS

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

Engine grounds on back of intake manifold collector



WEC249

	▶	GO TO 2.

2	RETIGHTEN AIR FUEL RATIO (A/F) SENSOR 1

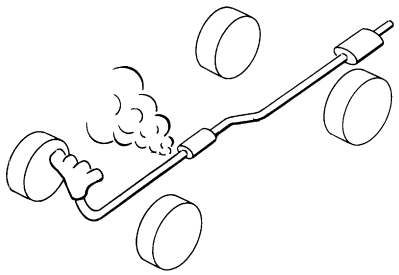
Loosen and retighten the air fuel ratio (A/F) sensor 1.

Tightening torque:
40 - 60 N·m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)

	▶	GO TO 3.

3	CHECK EXHAUST AIR LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust air leak before TWC (Manifold 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

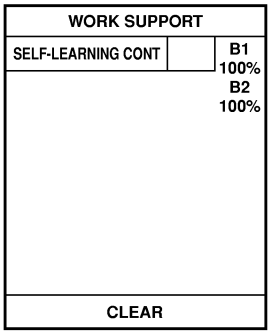
OK	▶	GO TO 5.
NG	▶	Repair or replace.

Diagnostic Procedure (Cont'd)

5	CLEAR THE SELF-LEARNING DATA

With CONSULT-II

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

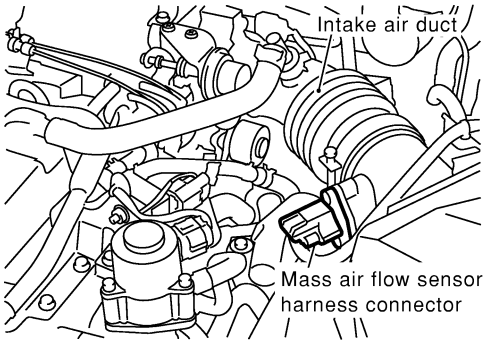


SEF652Y

4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 or P0172 detected? Is it difficult to start engine?

Without CONSULT-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 3 seconds at idle speed.



SEF388Z

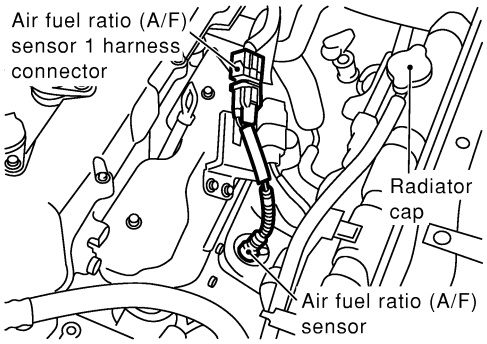
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC P0100 is displayed.
6. Erase the 1st trip DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-770.
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 or P0172 detected? Is it difficult to start engine?

Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0171, P0172. Refer to EC-961, 968.
No	▶	GO TO 6.

6	CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector and A/F sensor 1 harness connector.



SEF393Z

3. Check harness continuity between the following terminals. Refer to Wiring Diagram.

ECM terminal	A/F sensor 1 terminal
62	2
63	5
64	1
65	6

MTBL0542

Continuity should exist.

4. Check harness continuity between ECM terminals 62, 63, 64, 65 or A/F sensor 1 terminals 1, 2, 5, 6 and ground. Refer to Wiring Diagram.
Continuity should exist.
5. Also check harness for short to power.

OK or NG

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

7	CHECK AIR FUEL RATIO (A/F) SENSOR 1 HEATER

Refer to "Component Inspection", EC-1232.

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace A/F sensor 1.

8	CHECK MASS AIR FLOW SENSOR

Refer to "Component Inspection", EC-858.

OK or NG

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

9	CHECK PCV VALVE

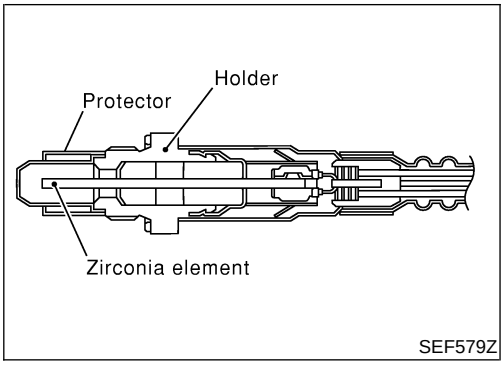
Refer to "Positive Crankcase Ventilation", EC-743.

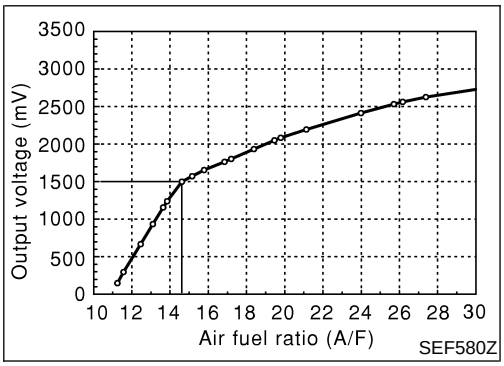
OK or NG

OK	▶	GO TO 10.
NG	▶	Repair or replace PCV valve.

Diagnostic Procedure (Cont'd)

10	CHECK INTERMITTENT INCIDENT	
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-842.		
OK or NG		
OK	▶	Replace A/F sensor 1.
NG	▶	Repair or replace.





Component Description

NIEC1582

The A/F sensor is a planar dual-cell limit current sensor. The sensor element of the A/F sensor is the combination of a Nernst concentration cell (sensor cell) with an oxygen-pump cell, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range ($0.7 < \lambda <$ air).

The exhaust gas components diffuse through the diffusion gap at the electrode of the oxygen pump and Nernst concentration cell, where they are brought to thermodynamic balance.

An electronic circuit controls the pump current through the oxygen-pump cell so that the composition of the exhaust gas in the diffusion gap remains constant at $\lambda = 1$. Therefore, the A/F sensor is able to indicated air/fuel ratio by this pumping of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of 700 - 800°C (1,292 - 1,472°F).

CONSULT-II Reference Value in Data Monitor Mode

NIEC1583

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
A/F SEN1 (B1)	• Engine: Idle speed after warming up	Fluctuates around 1.5V.

On Board Diagnosis Logic

NIEC1584

To judge the malfunction, the diagnosis checks that the A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal fluctuates according to fuel feedback control.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1276	• The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 1.5V.	• Harness or connectors (The sensor circuit is open or shorted.) • Air fuel ratio (A/F) sensor 1

6

A/F SEN1 (B1) P1276	
OUT OF CONDITION	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h

SEF576Z

7

A/F SEN1 (B1) P1276	
TESTING SELECT 3RD GEAR AND THEN RELEASE ACCELERATOR PEDAL OFF	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h

SEF577Z

8

A/F SEN1 (B1) P1276
COMPLETED

SEF578Z

DTC Confirmation Procedure

NIEC1585

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

1) Start engine and warm it up to normal operating temperature.
2) Select “A/F SEN1 (B1)” of “DATA MONITOR” mode with CONSULT-II.
3) Check “A/F SEN1 (B1)” indication.
   If the indication is constantly approx. 1.5V and does not fluctuates, go to “Diagnostic Procedure”, EC-1227.
   If the indication fluctuates around 1.5V, go to next step.
4) Select “A/F SEN1 (B1) P1276” of “A/F SEN1” in “DTC WORK SUPPORT” mode.
5) Touch “START”.
6) When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen.

ENG SPEED	1,500 - 3,000 rpm
Vehicle speed	70 - 120 km/h (43 - 75 MPH)
B/FUEL SCHDL	1.0 - 8.0 msec
Selector lever	“D” position with “OD” ON

   If “TESTING” is not displayed after 20 seconds, retry from step 2.
7) Following the instructions of CONSULT-II screen, set “OD” OFF and release accelerator pedal fully.
8) Make sure that “TESTING” changes to “COMPLETED”.
   If “TESTING” changed to “OUT OF CONDITION”, retry from step 6.
9) Make sure that “OK” is displayed after touching “SELF-DIAG RESULT”.
   If “NG” is displayed, go to “Diagnostic Procedure”, EC-1227

Overall Function Check

NIEC1586

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

With GST

1) Start engine and warm it up to normal operating temperature.
2) Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes in “D” position with “OD” OFF.

NOTE:

Keep the accelerator pedal as steady as possible during the cruising.

3) Set "OD" on, then release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (30 MPH).

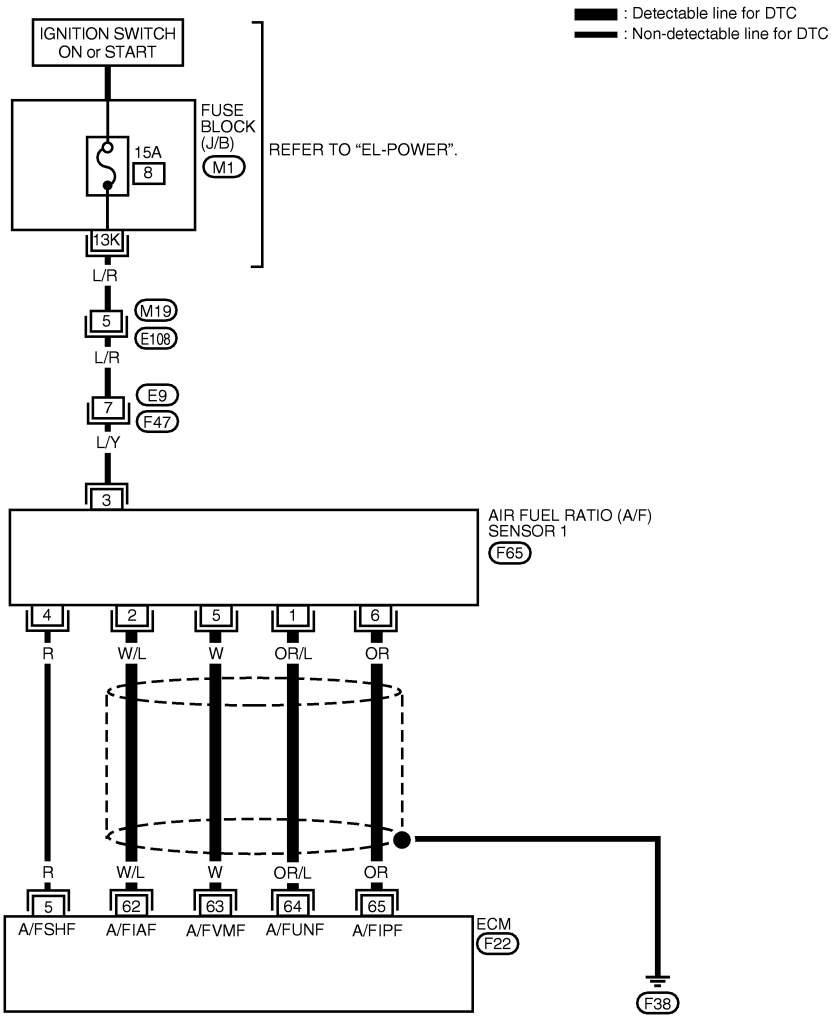
NOTE:
Never apply brake during releasing the accelerator pedal.

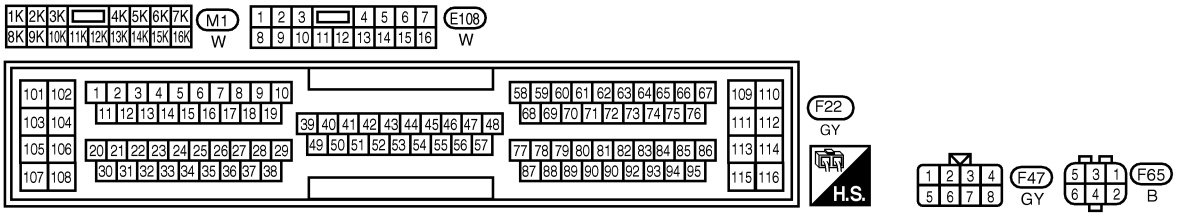
4) Repeat steps 2 to 3 five times.
5) Stop the vehicle and turn ignition switch "OFF".
6) Wait at least 10 seconds and restart engine.
7) Repeat steps 2 to 3 five times.
8) Stop the vehicle and connect GST to the vehicle.
9) Make sure that no DTC is displayed.
   If the DTC is displayed, go to "Diagnostic Procedure", EC-1227.

Wiring Diagram

=NIEC1587

EC-A/F-01





WEC388

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/L	A/F SENSOR	ENGINE RUNNING AT IDLE SPEED UNDER WARM-UP CONDITION	2.0 - 3.5V
63	W			2.0 - 3.0V
64	OR/L			2.5 - 3.5V
65	OR			2.0 - 3.5V

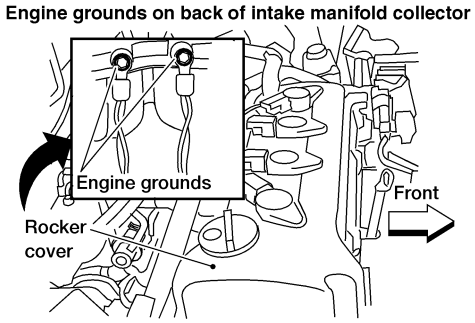
SEF609Z

Diagnostic Procedure

NIEC1588

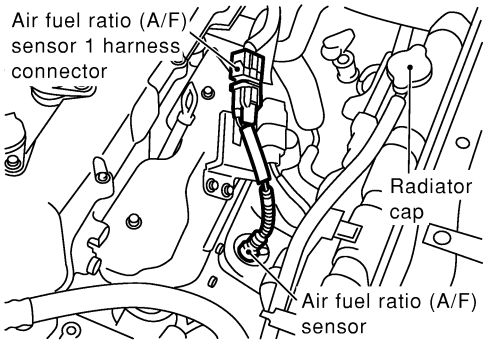
1	CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

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



WEC249

3. Disconnect ECM harness connector and A/F sensor 1 harness connector.



SEF393Z

4. Check harness continuity between the following terminals. Refer to Wiring Diagram.

ECM terminal	A/F sensor 1 terminal
62	2
63	5
64	1
65	6

MTBL0542

Continuity should exist.

5. Check harness continuity between ECM terminals 62, 63, 64, 65 or A/F sensor 1 terminals 1, 2, 5, 6 and ground. Refer to Wiring Diagram.

Continuity should not exist.

6. Also check harness for short to power.

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

2	CHECK INTERMITTENT INCIDENT

Perform “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-842.

OK or NG

OK	▶	Replace A/F sensor 1.
NG	▶	Repair or replace.

Description

NIEC1589

SYSTEM DESCRIPTION

NIEC1589S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE) Crankshaft position sensor (POS)	Engine speed	Air fuel ratio (A/F) sensor 1 heater control	Air fuel ratio (A/F) sensor 1 heater
Mass air flow sensor	Amount of intake air		

The ECM performs ON/OFF duty control of the A/F sensor 1 heater corresponding to the engine operating condition to keep the temperature of A/F sensor 1 element at the specified range.

CONSULT-II Reference Value in Data Monitor Mode

NIEC1590

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
A/F S1 HTR (B1)	• Engine speed: Idle	Approx. 70%

On Board Diagnosis Logic

NIEC1591

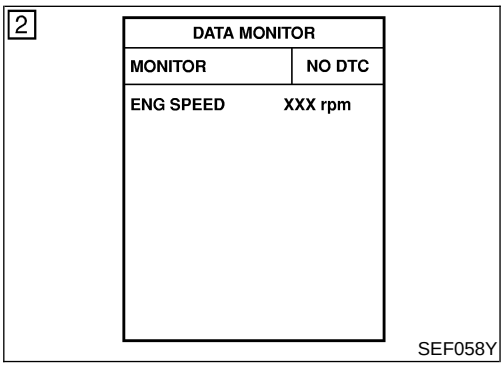
DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1277	• The current amperage in the A/F sensor 1 heater circuit is out of the normal range. (An improper voltage drop signal is sent to ECM through the front heated oxygen sensor heater.)	• Harness or connectors (The A/F sensor 1 heater circuit is open or shorted.) • A/F sensor 1 heater

DTC Confirmation Procedure

NIEC1592

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

1) Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II.
2) Start engine and run it for at least 10 seconds at idle speed.
3) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-1231.

With GST

1) Start engine and run it for at least 10 seconds at idle speed.
2) Turn ignition switch “OFF” and wait at least 10 seconds.
3) Start engine and run it for at least 10 seconds at idle speed.

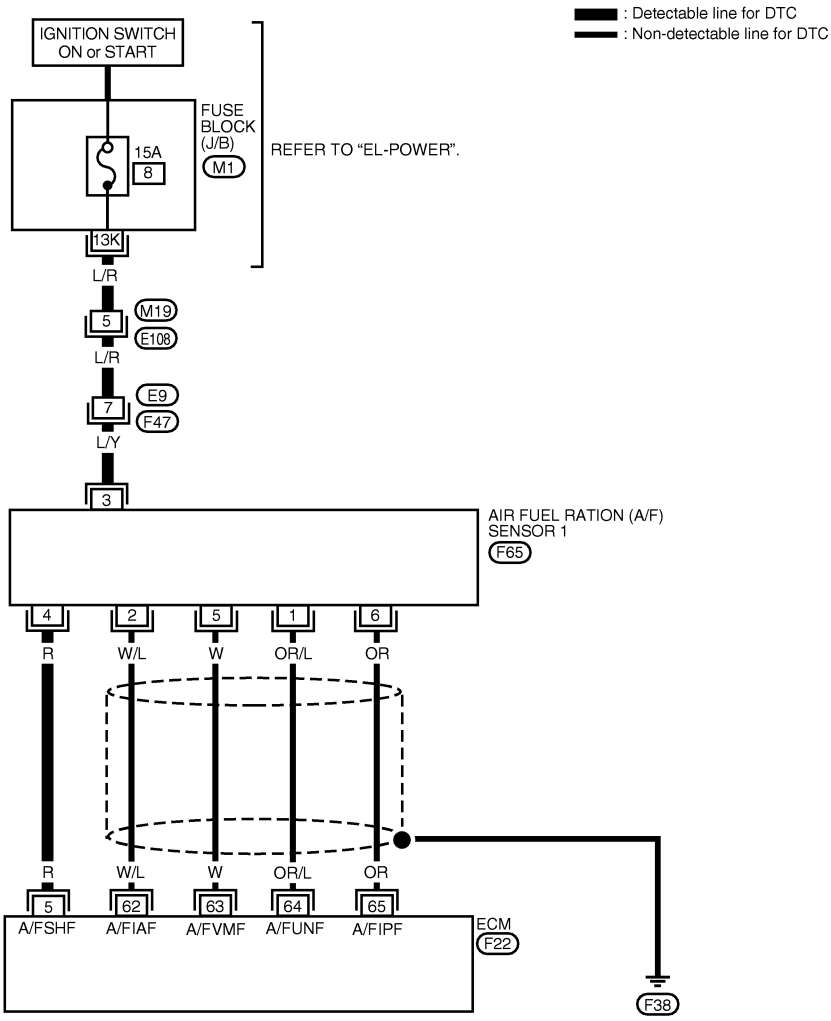
4) Select "MODE 3" with GST.
5) If DTC is detected, go to "Diagnostic Procedure", EC-1231.

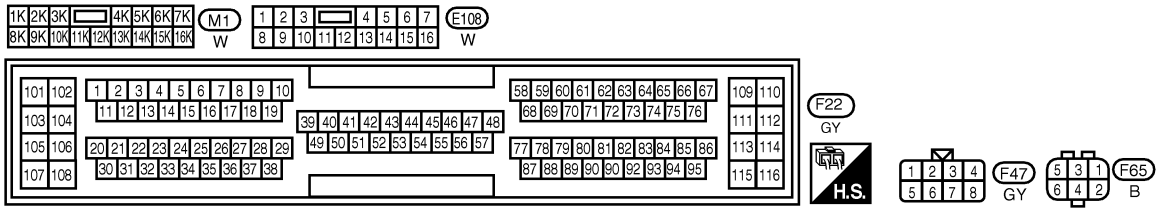
- **When using GST, "DTC Confirmation Procedure" should be performed twice as much as when using CONSULT-II because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II is recommended.**

Wiring Diagram

=NIEC1593

EC-A/FH-01





WEC389

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	A/F SENSOR 1 HEATER	ENGINE RUNNING AT IDLE SPEED AFTER WARMING UP TO NORMAL OPERATING TEMPERATURE	APPROX. 5V

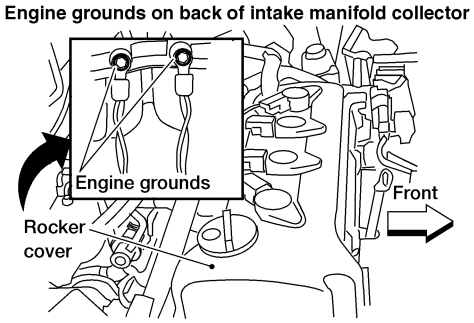
SEF610Z

Diagnostic Procedure

NIEC1594

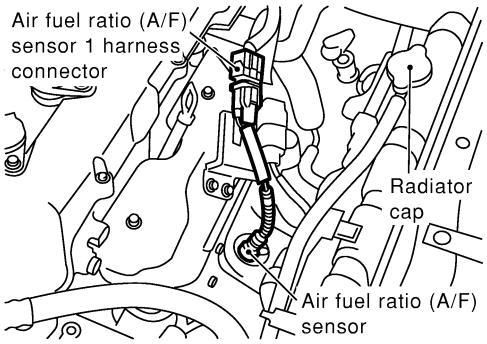
1	CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

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



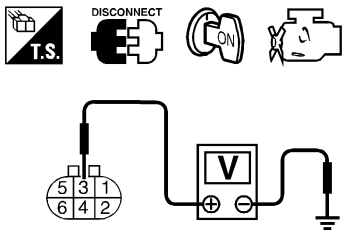
WEC249

3. Disconnect air fuel ratio (A/F) sensor 1 harness connector.



SEF393Z

4. Turn ignition switch “ON”.
5. Check voltage between A/F sensor 1 terminal 3 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF741Z

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M19, E109
- Harness connectors E9, F47
- Fuse block (J/B) connector M1
- 15A fuse
- Harness for open or short between A/F sensor 1 and fuse

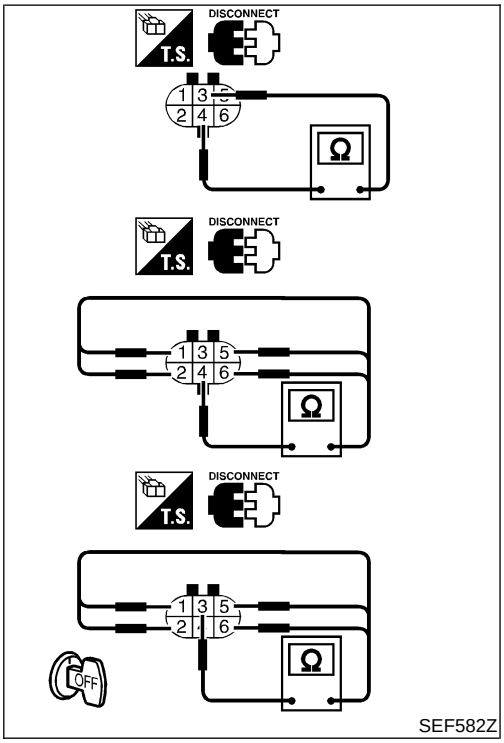
	▶	Repair or replace harness or connectors.

Diagnostic Procedure (Cont'd)

3	CHECK A/F SENSOR 1 OUTPUT SIGNAL CIRCUIT	
1. Turn ignition switch "OFF". 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminal 5 and A/F sensor 1 terminal 4. Refer to Wiring Diagram. **Continuity should 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 A/F SENSOR 1 HEATER	
Refer to "Component Inspection", EC-1232. **OK or NG**		
OK	▶	GO TO 5.
NG	▶	Replace A/F sensor 1.

5	CHECK INTERMITTENT INCIDENT	
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-842. **OK or NG**		
OK	▶	Replace A/F sensor 1.
NG	▶	Repair or replace.



Component Inspection

NIEC1595

AIR FUEL RATIO (A/F) SENSOR 1 HEATER

NIEC1595S01

Check resistance between terminals 3 and 4.

Resistance: 2.3 - 4.3Ω at 25°C (77°F)

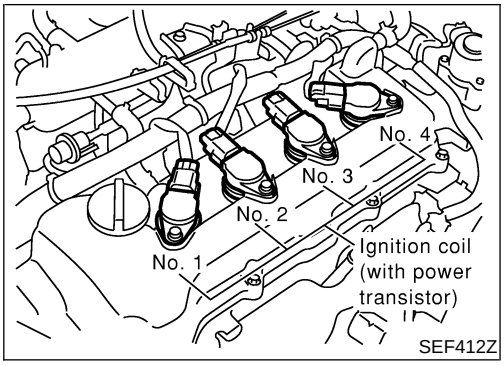
Check continuity between terminals 3 and 1, 2, 5, 6, terminals 4 and 1, 2, 5, 6.

Continuity should not exist.

If NG, replace the A/F sensor 1.

CAUTION:

- **Discard any A/F 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.**
- **Before installing new A/F sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**



Component Description

NIEC1596

IGNITION COIL & POWER TRANSISTOR

NIEC1596S01

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

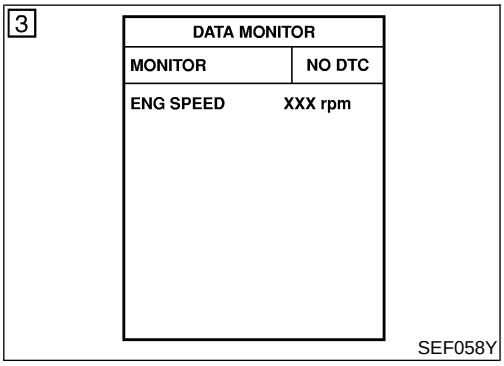
NIEC1597

Malfunction is detected when the ignition signal in the primary circuit is not sent to ECM during engine cranking or running.

Possible Cause

NIEC1598

- Harness or connectors (The ignition primary circuit is open or shorted.)
- Power transistor unit built into ignition coil
- Condenser
- Crankshaft position sensor (POS)
- Crankshaft position sensor (POS) circuit
- Camshaft position sensor (PHASE)
- Camshaflt position sensor (PHASE) circuit



DTC Confirmation Procedure

NIEC1599

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 perform trouble diagnosis for DTC P0335, P0340 first. Refer to EC-1009, EC-1014.**

WITH CONSULT-II

NIEC1599S01

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-1237.

WITH GST

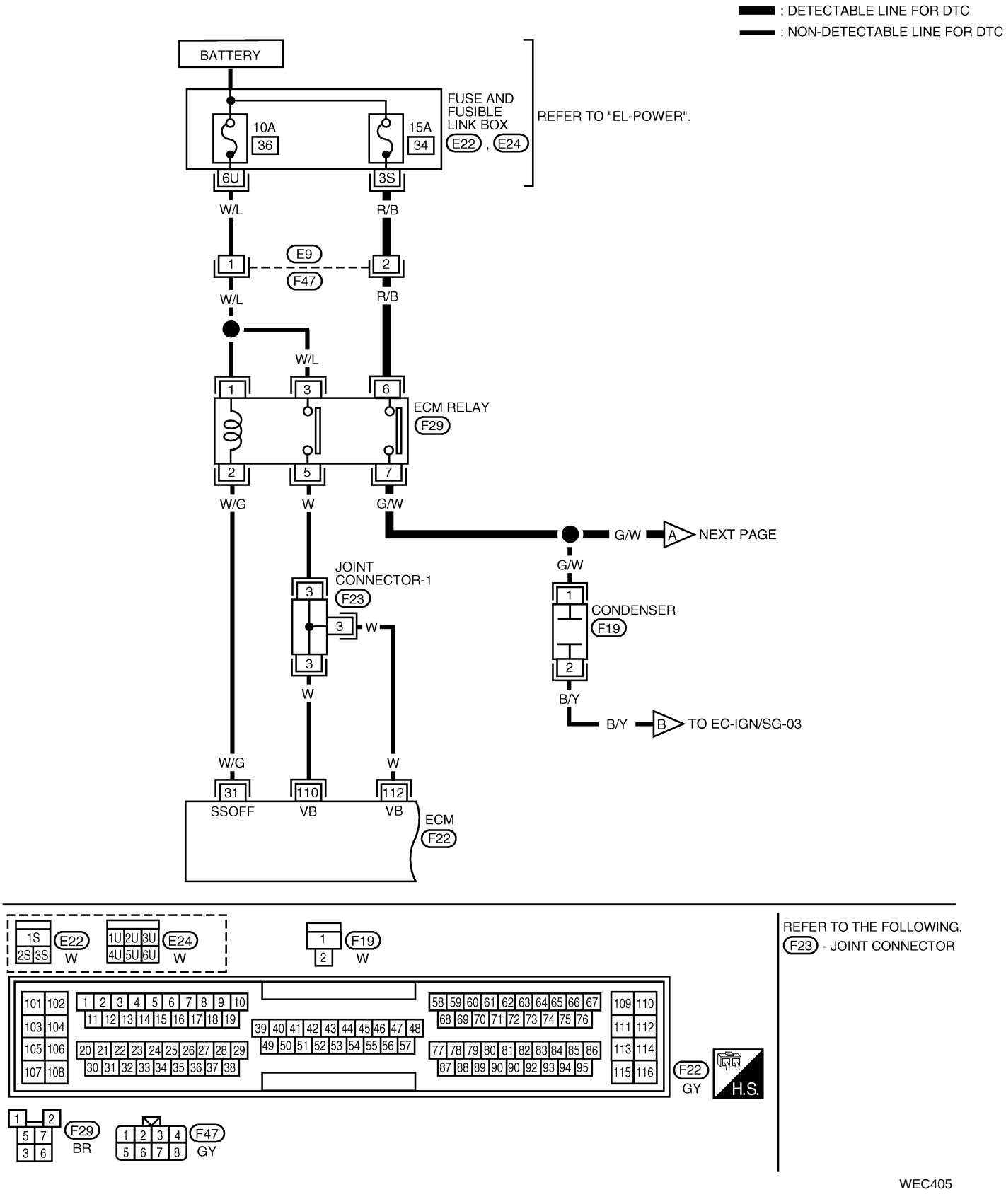
NIEC1599S02

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

NIEC1600

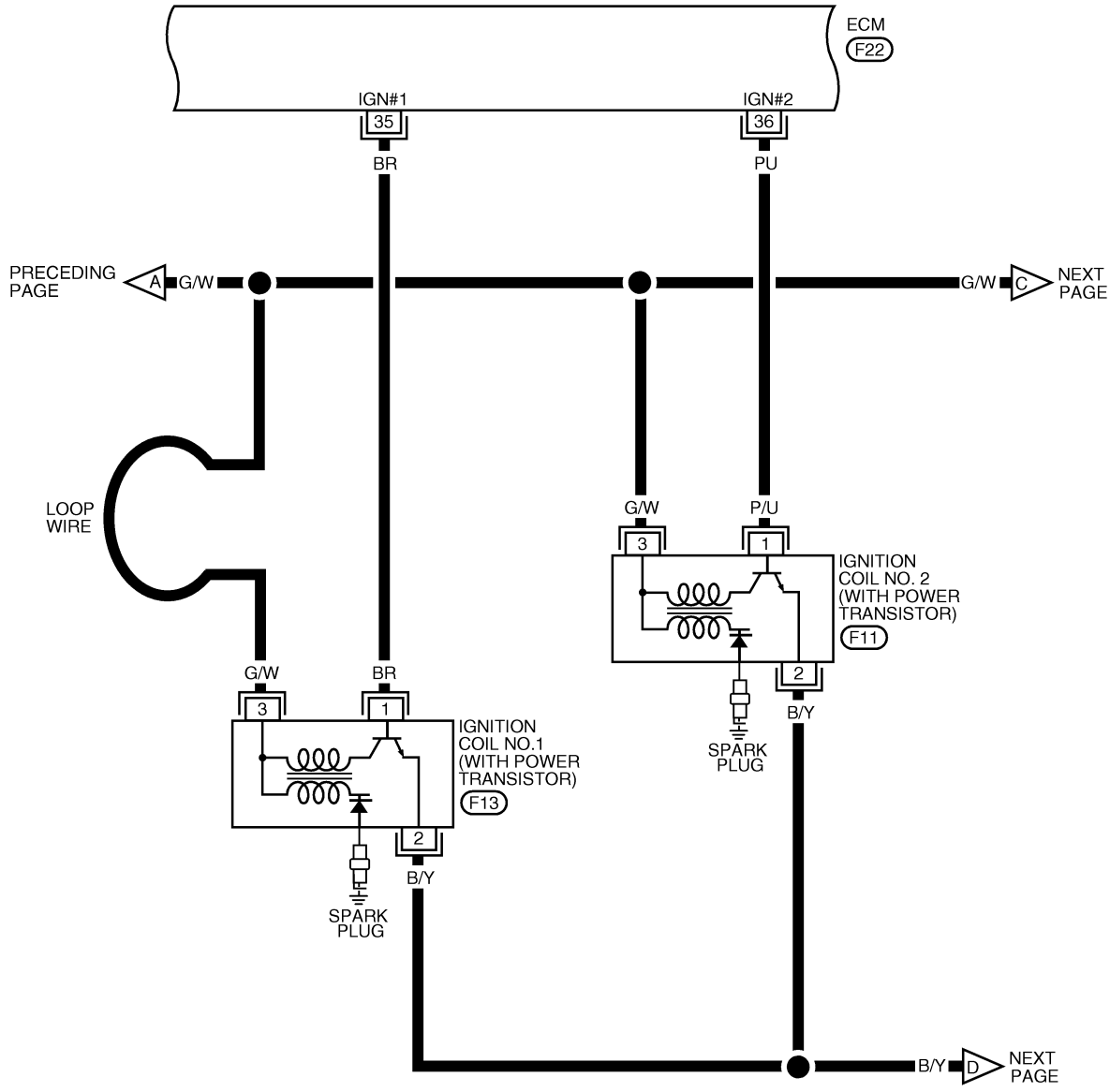
EC-IGN/SG-01

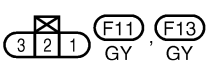


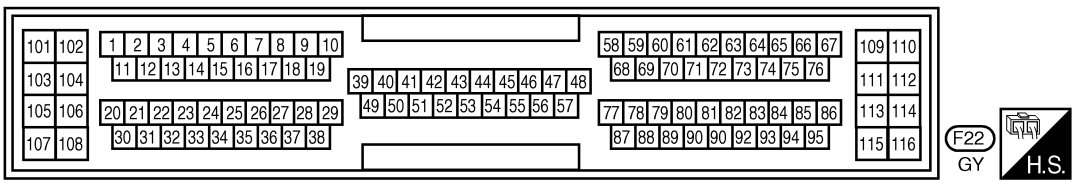
EC-IGN/SG-02

: DETECTABLE LINE FOR DTC

: NON-DETECTABLE LINE FOR DTC



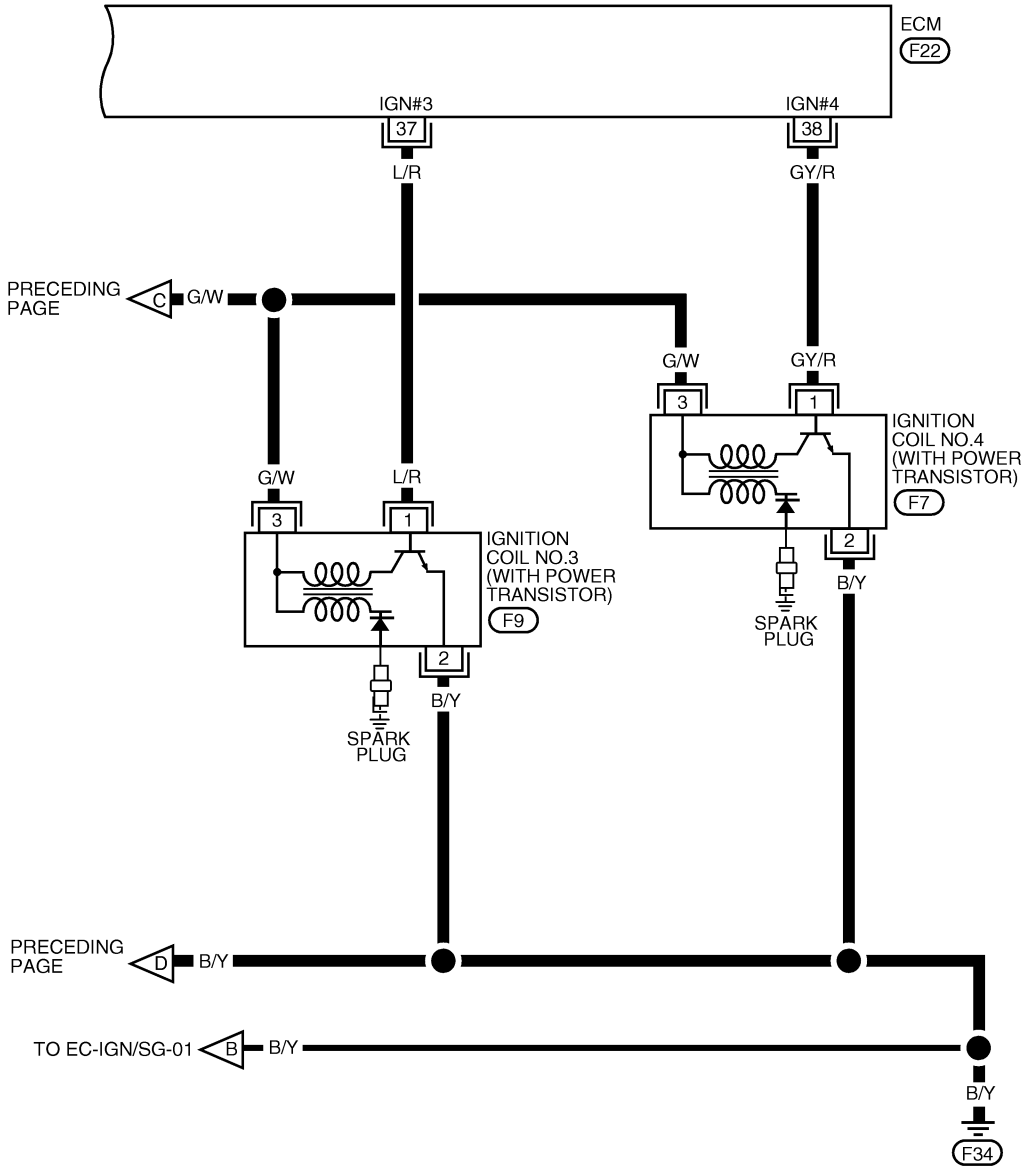


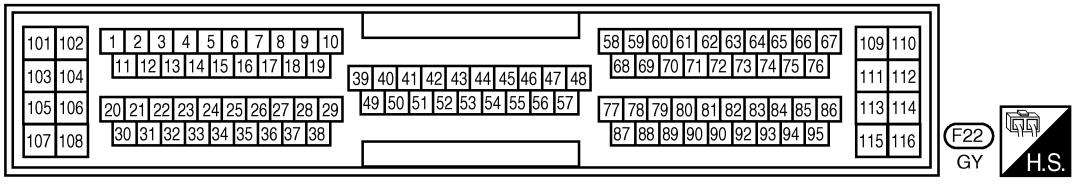


WEC406

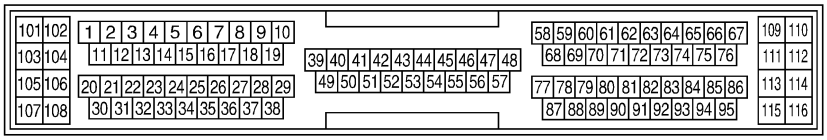
EC-IGN/SG-03

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



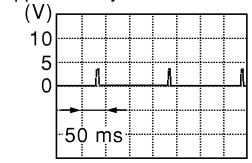
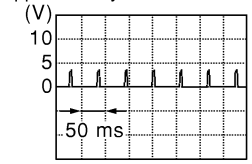


WEC407



SEF970W

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)
35	B/R	IGNITION SIGNAL NO. 1	ENGINE RUNNING AT IDLE SPEED UNDER WARM-UP CONDITION	Approximately 0.3V ★ 
36	PU	IGNITION SIGNAL NO. 2		
37	L/R	IGNITION SIGNAL NO. 3	ENGINE RUNNING AT 2,000 RPM	Approximately 0.5V ★ 
38	GY/R	IGNITION SIGNAL NO. 4		

★ : AVERAGE VOLTAGE FOR PULSE SIGNAL (ACTUAL PULSE SIGNAL CAN BE CONFIRMED BY OSCILLOSCOPE.)

SEF746YA

Diagnostic Procedure

NIEC1601

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.

Diagnostic Procedure (Cont'd)

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.

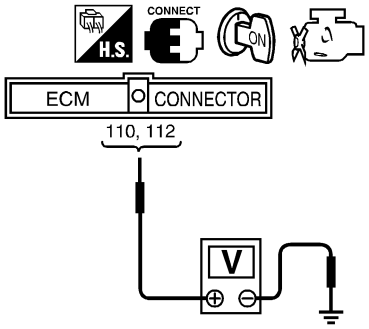
ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
IACV-AAC/V	XXX step

SEF190Y

	▶	GO TO 12.

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

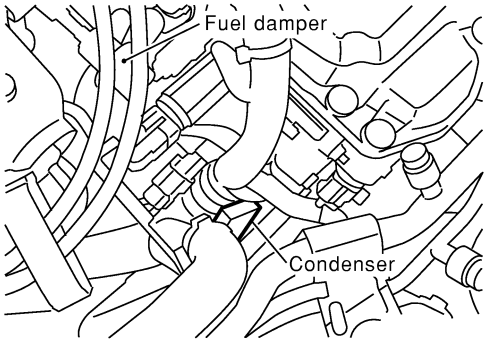
SEF528Z

OK or NG

OK	▶	GO TO 4.
NG	▶	Go to TROUBLE DIAGNOSIS FOR POWER SUPPLY, EC-843.

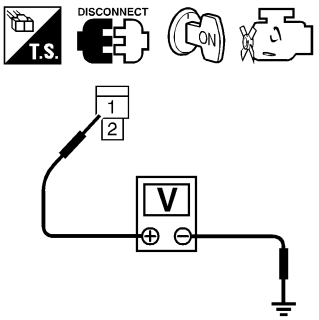
4	CHECK IGNITION COIL POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect condenser harness connector.



SEF413Z

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



Voltage: Battery voltage

SEF367X

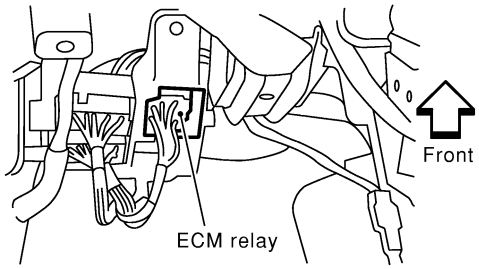
OK or NG

OK	▶	GO TO 10.
NG	▶	GO TO 5.

5	CHECK IGNITION COIL POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF.
2. Disconnect ECM relay.

Passenger side view with instrument panel removed for clarity



SEF387Z

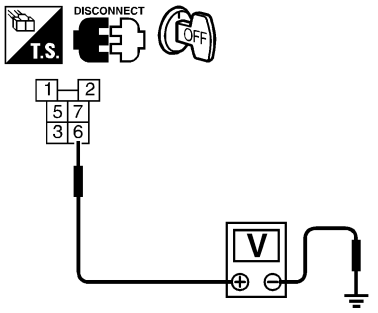
3. Check harness continuity between ECM relay terminal 7 and condenser terminal 1. Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 6.

6	DETECT MALFUNCTIONING PART
Check the 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

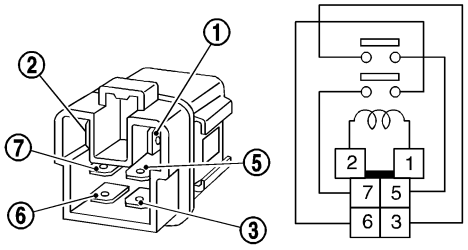
SEF368X

OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 8.

8	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E9, F47 ● 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.	



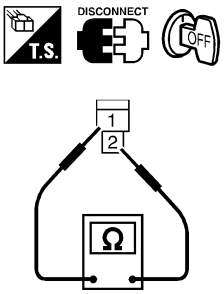
Condition	Continuity
12V direct current supply between terminals 1 and 2	Yes
OFF	No

SEF296X

OK or NG

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

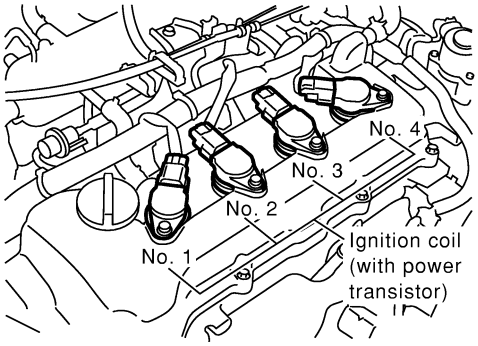
10	CHECK CONDENSER GROUND CIRCUIT FOR OPEN AND SHORT	
1. Turn ignition switch OFF. 2. Check harness continuity between condenser terminal 2 and engine ground. Refer to Wiring Diagram. **Continuity should exist.** 3. Also check harness for short to ground and short to power. **OK or NG**		
OK	▶	GO TO 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)

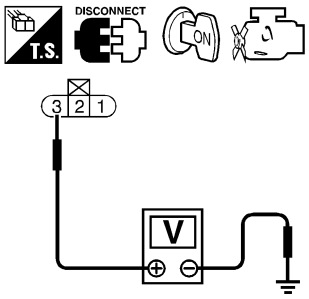
12	CHECK IGNITION COIL POWER SUPPLY CIRCUIT-V

1. Turn ignition switch OFF.
2. Reconnect harness connectors disconnected.
3. Disconnect ignition coil harness connector.



SEF412Z

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 ECM relay.

	▶	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

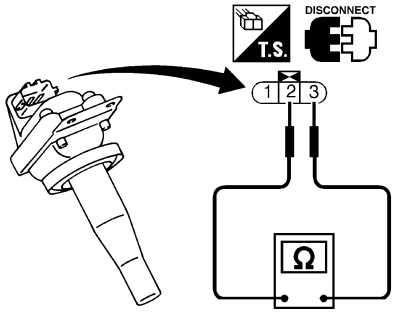
1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminals 35, 36, 37, 38 and ignition coil terminal 1. Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

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

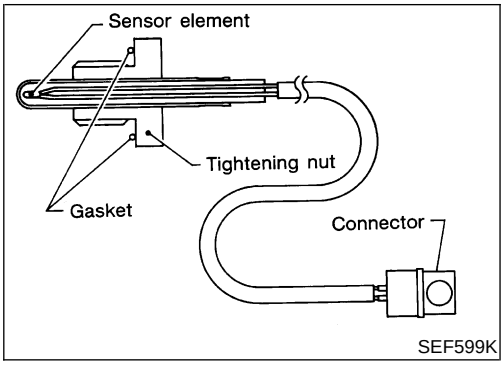
OK or NG

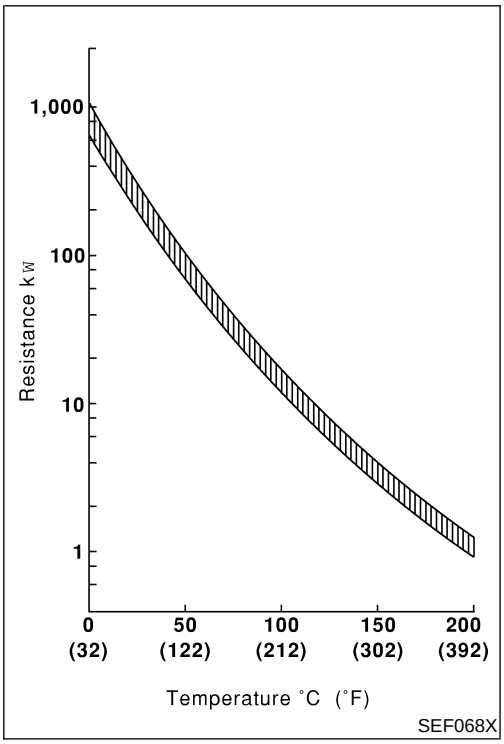
OK	▶	GO TO 17.
NG	▶	Replace ignition coil with power transistor.

17	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-842.

▶ **INSPECTION END**





Component Description

NIEC1602

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)	4.56	0.62 - 1.05
50 (122)	2.25	0.065 - 0.094
100 (212)	0.59	0.011 - 0.015

*: These data are reference values and are measured between ECM terminal 72 (EGR temperature sensor) and ground.

CAUTION:

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

When EGR system is operating.

Voltage: 0 - 1.5V

On Board Diagnosis Logic

NIEC1603

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

NIEC1604

MALFUNCTION A

NIEC1604S01

- Harness or connectors (The EGR temperature sensor circuit is shorted.)
- EGR temperature sensor
- Malfunction of EGR function

MALFUNCTION B

NIEC1604S02

- Harness or connectors (The EGR temperature sensor circuit is open.)
- EGR temperature sensor

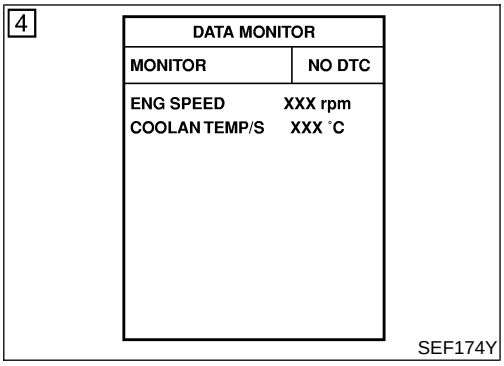
- Malfunction of EGR function

DTC Confirmation Procedure

NIEC1605

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

NIEC1605S01

With CONSULT-II

NIEC1605S0101

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Verify that "COOLAN TEMP/S" is less than 50°C (122°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-1248.

With GST

NIEC1605S0102

Follow the procedure "With CONSULT-II" above.

DTC Confirmation Procedure (Cont'd)

ACTIVE TEST	
EGR VOL CONT/V	50 step
MONITOR	
ENG SPEED	XXX rpm
EGR TEMP SEN	XXX V

SEF200Y

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

NIEC1605S02

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

NIEC1605S0201

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-1248.
   If the check result is OK, go to the following step.
5) Turn ignition switch "OFF" and wait at least 5 seconds then turn "ON".
6) Check the output voltage of "THRTL POS SEN" (at closed throttle position) and note it.
7) Start engine and maintain the following conditions for at least 5 consecutive seconds.

ENG SPEED	1,200 - 3,600 rpm
VHCL SPEED SE	10 km/h (6 MPH) or more
B/FUEL SCHDL	4.5 - 8.0 msec
Selector lever	Suitable position

8) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1248.

With GST

NIEC1605S0202

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.

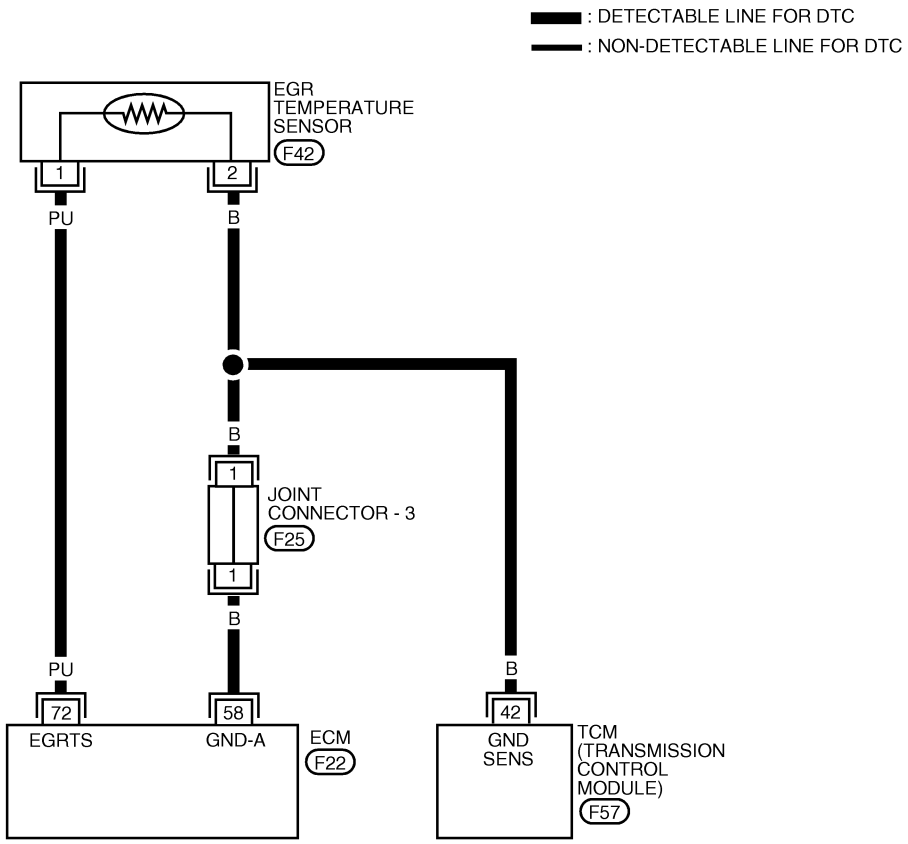
Engine speed	1,200 - 3,600 rpm
Vehicle speed	10 km/h (6 MPH) or more
Selector lever	Suitable position

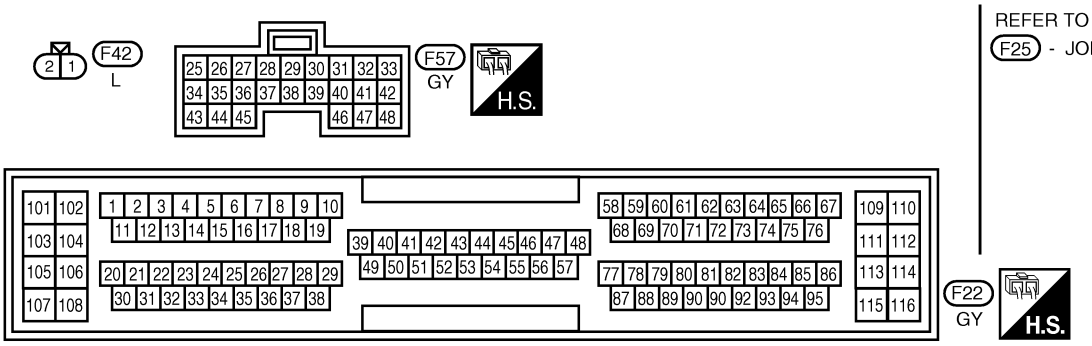
4) Select "MODE 7" with GST.
5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1248.

Wiring Diagram

NIEC1606

EC-EGR/TS-01





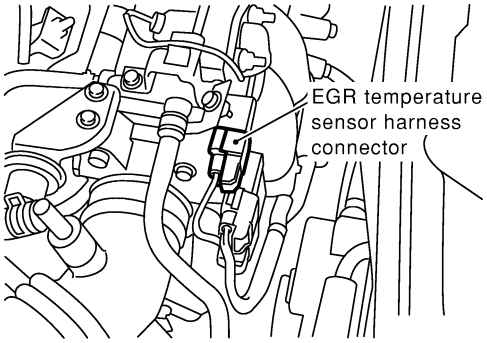
WEC399

Diagnostic Procedure

NIEC1607

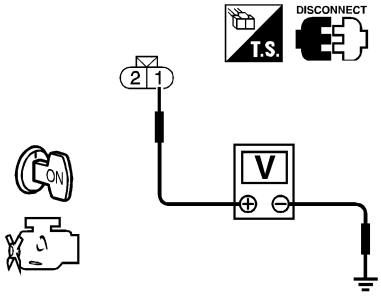
1	CHECK EGR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

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



SEF414Z

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



Voltage: Approximately 5V

SEF197Z

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair or replace harness or connectors.

2	CHECK EGR TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Check harness continuity between EGR temperature sensor terminal 2 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 4.
NG	▶	GO TO 3.

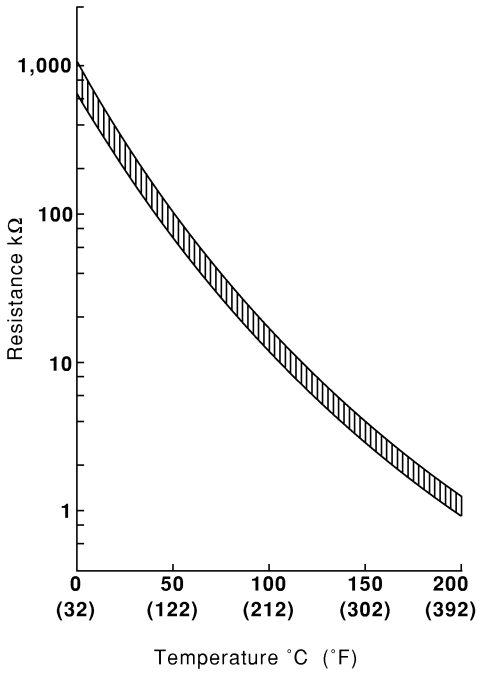
3	DETECT MALFUNCTIONING PART

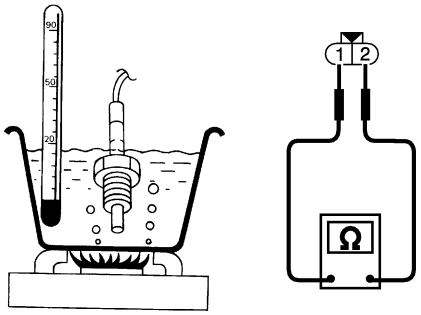
Check the following.
- Joint connector-3
- Harness for open or short between TCM and EGR temperature sensor
- Harness for open or short between ECM and EGR temperature sensor

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

4	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)	4.56	0.62 - 1.05
50 (122)	2.25	0.065 - 0.094
100 (212)	0.59	0.011 - 0.015

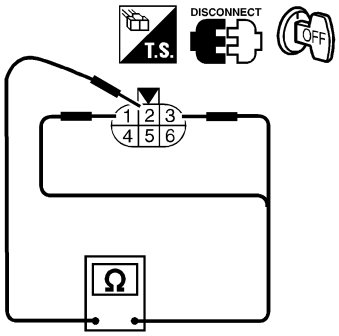
SEF483Y

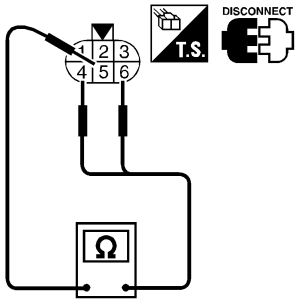
OK or NG

OK	▶	GO TO 5.
NG	▶	Replace EGR temperature sensor.

5	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 6.
OK (Without CONSULT-II)	▶	GO TO 7.
NG	▶	Replace EGR volume control valve.

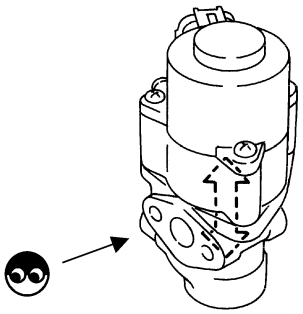
Diagnostic Procedure (Cont'd)

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 smoothly forward and backward according to the valve opening steps.

ACTIVE TEST	
EGR VOL CONT/V	20 step
MONITOR	
ENG SPEED	XXX rpm
EGR TEMP SEN	XXX V



SEF491Y

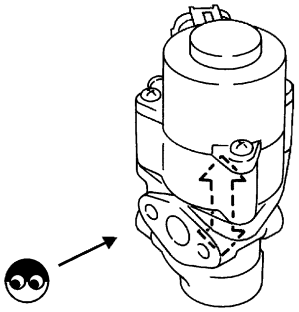
OK or NG

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-842.	
▶	**INSPECTION END**

Description

SYSTEM DESCRIPTION

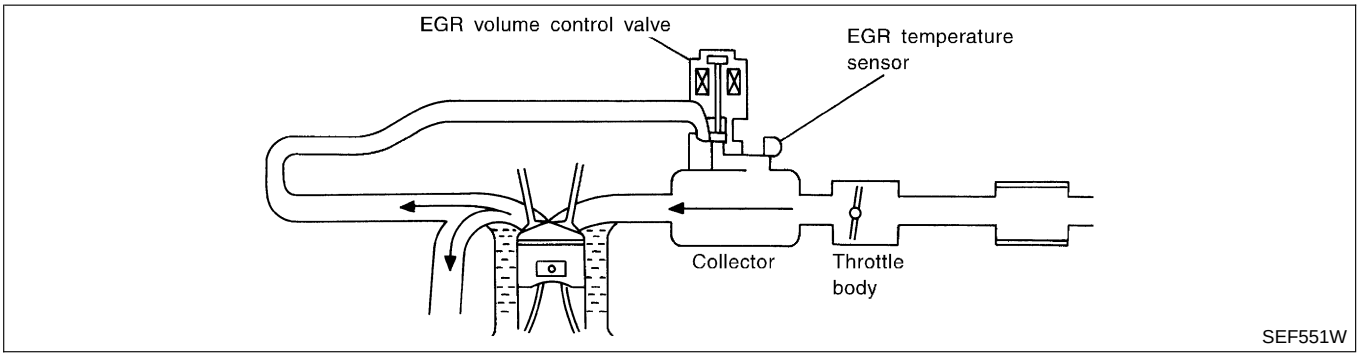
NIEC1608

NIEC1608S01

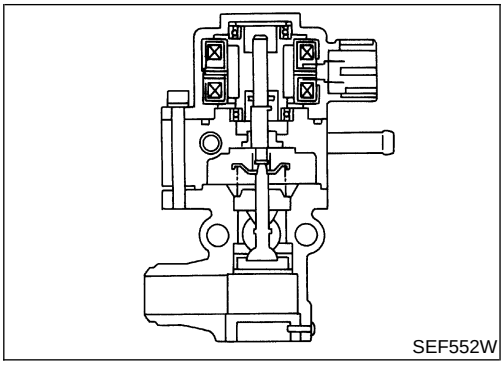
Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed	EGR volume control	EGR volume control valve
Camshaft position sensor (PHASE)	Engine speed and cylinder position		
Vehicle speed sensor	Vehicle speed		
Engine coolant temperature sensor	Engine coolant temperature		
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		
ECM	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



Description (Cont'd)


SEF552W

COMPONENT DESCRIPTION

NIEC1608S02

EGR Volume Control Valve

NIEC1608S0201

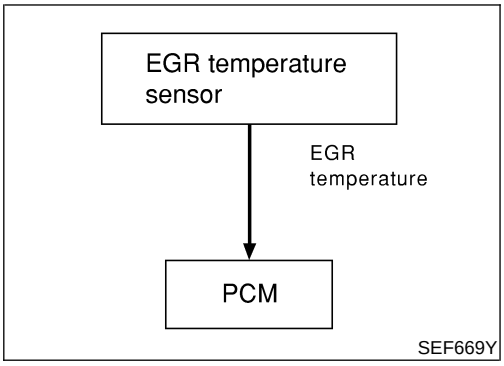
The EGR volume control valve uses a step motor to control the flow rate of EGR from exhaust manifold. This motor has four winding phases. It operates according to the output pulse signal of the ECM. Two windings are turned ON and OFF in sequence. Each time an ON pulse is issued, the valve opens or closes, 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

NIEC1609

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



SEF669Y

On Board Diagnosis Logic

NIEC1610

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

NIEC1611

- Harness or connectors
  (EGR volume control valve circuit is open or shorted.)
- EGR volume control valve leaking or stuck open
- EGR temperature sensor

DATA MONITOR	
MONITOR	NO DTC
COOLAN TEMP/S	XXX °C
EGR TEMP SEN	XXX V

SEF202Y

4 EGR SYSTEM P1402	
OUT OF CONDITION	
MONITOR	
ENG SPEED	XXX rpm
THRTL POS SEN	XXX V
B/FUEL SCHDL	XXX msec

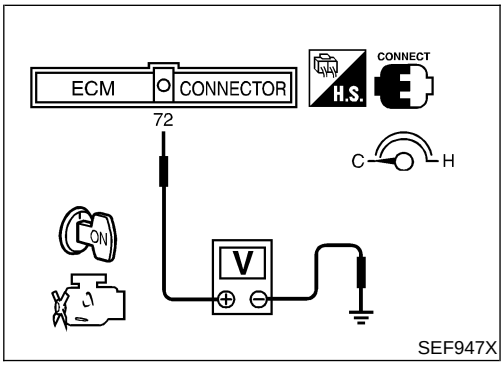
SEF203Y

4 EGR SYSTEM P1402	
TESTING	
MONITOR	
ENG SPEED	XXX rpm
THRTL POS SEN	XXX V
B/FUEL SCHDL	XXX msec

SEF204Y

4 EGR SYSTEM P1402
COMPLETED

SEF236Y



SEF947X

DTC Confirmation Procedure

NIEC1612

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 50°C (14 to 122°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

NIEC1612S01

1) Turn ignition switch "OFF", and wait at least 5 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 50°C (14 to 122°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-1255.

WITH GST

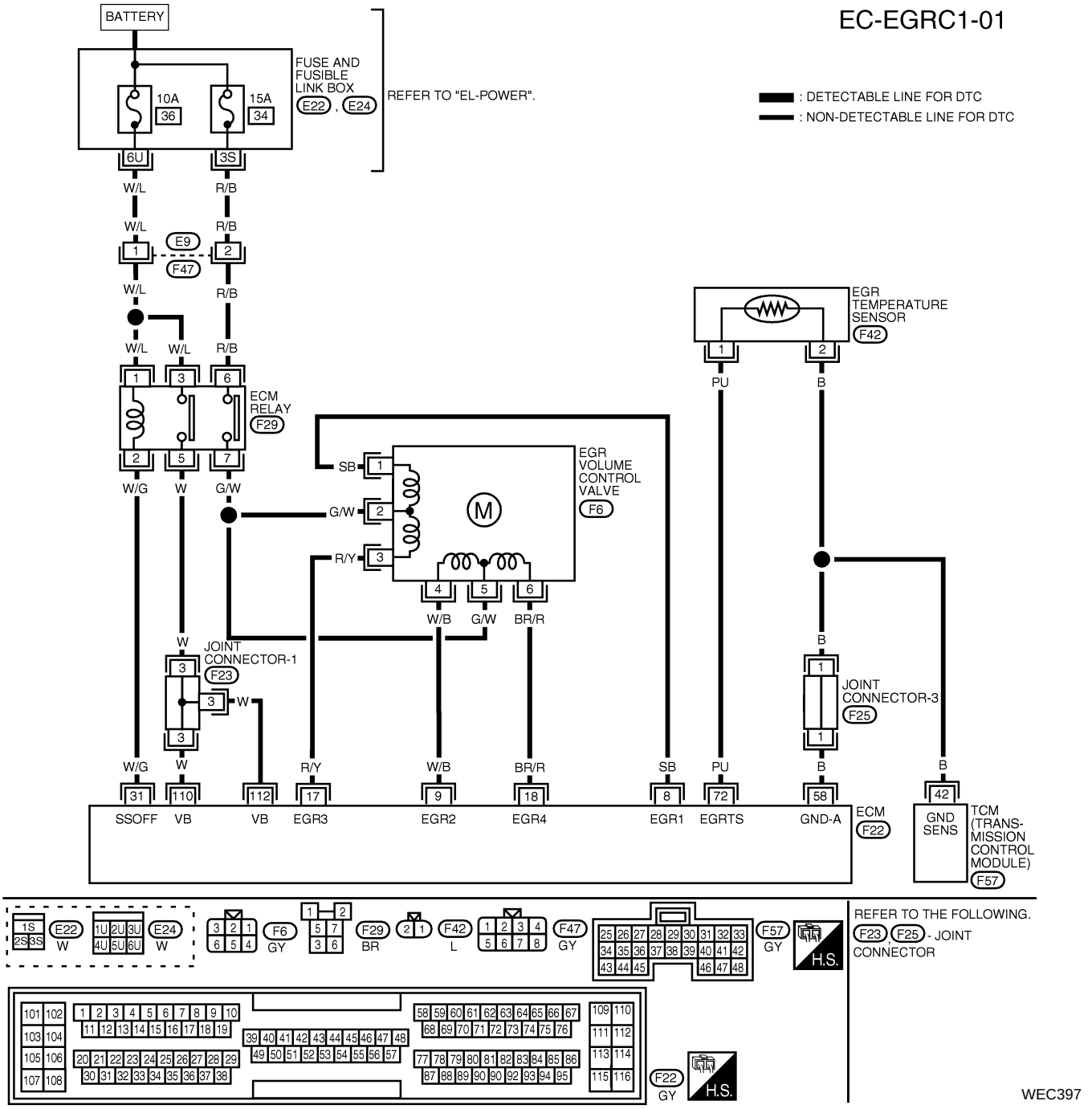
NIEC1612S02

1) Turn ignition switch "ON" and select "MODE 1" with GST.
2) Check that engine coolant temperature is within the range of −10 to 50°C (14 to 122°F).
3) Check that voltage between ECM terminal 72 (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-1255.

- **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

NIEC1613



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)
8	SB	EGR VOLUME CONTROL VALVE	ENGINE RUNNING AT IDLE SPEED	0.1 - 14V
9	W/B			
17	R/Y			
18	BR/R			

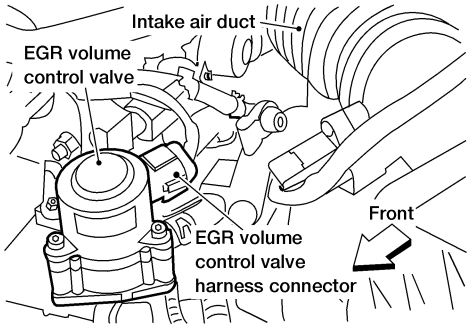
SEF575YA

Diagnostic Procedure

NIEC1614

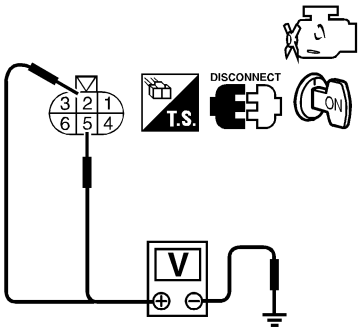
1	CHECK EGR VOLUME CONTROL VALVE POWER SUPPLY CIRCUIT

1. Disconnect EGR volume control valve harness connector.



LEC333

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 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
8	1
9	4
17	3
18	6

MTBL0543

Continuity should exist.

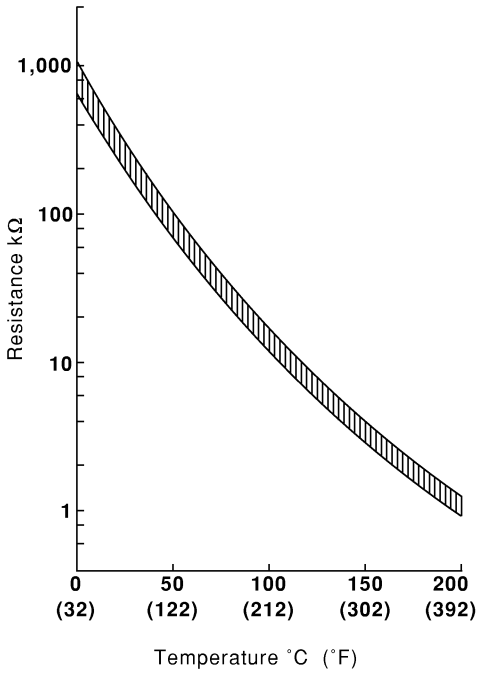
4. Also check harness for short to ground and short to power.

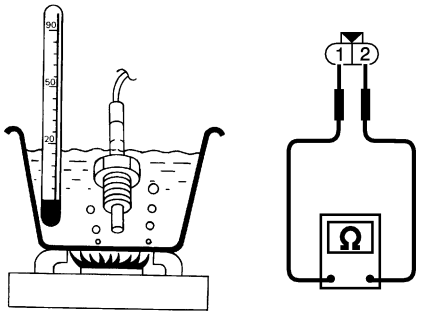
OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK 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)	4.56	0.62 - 1.05
50 (122)	2.25	0.065 - 0.094
100 (212)	0.59	0.011 - 0.015

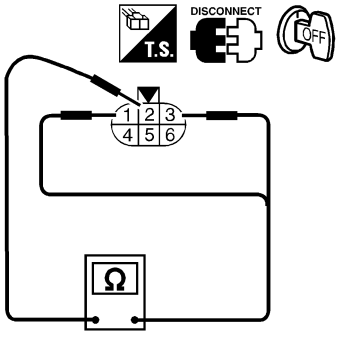
SEF483Y

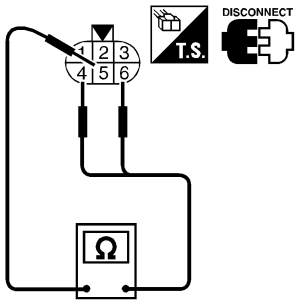
OK or NG

OK	▶	GO TO 5.
NG	▶	Replace EGR temperature sensor.

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

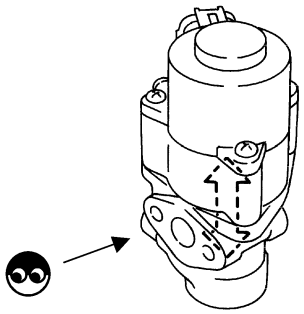
OK (With CONSULT-II)	▶	GO TO 6.
OK (Without CONSULT-II)	▶	GO TO 7.
NG	▶	Replace EGR volume control valve.

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 smoothly forward and backward according to the valve opening steps.

ACTIVE TEST	
EGR VOL CONT/V	20 step
MONITOR	
ENG SPEED	XXX rpm
EGR TEMP SEN	XXX V



SEF491Y

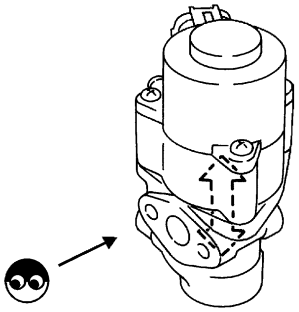
OK or NG

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.

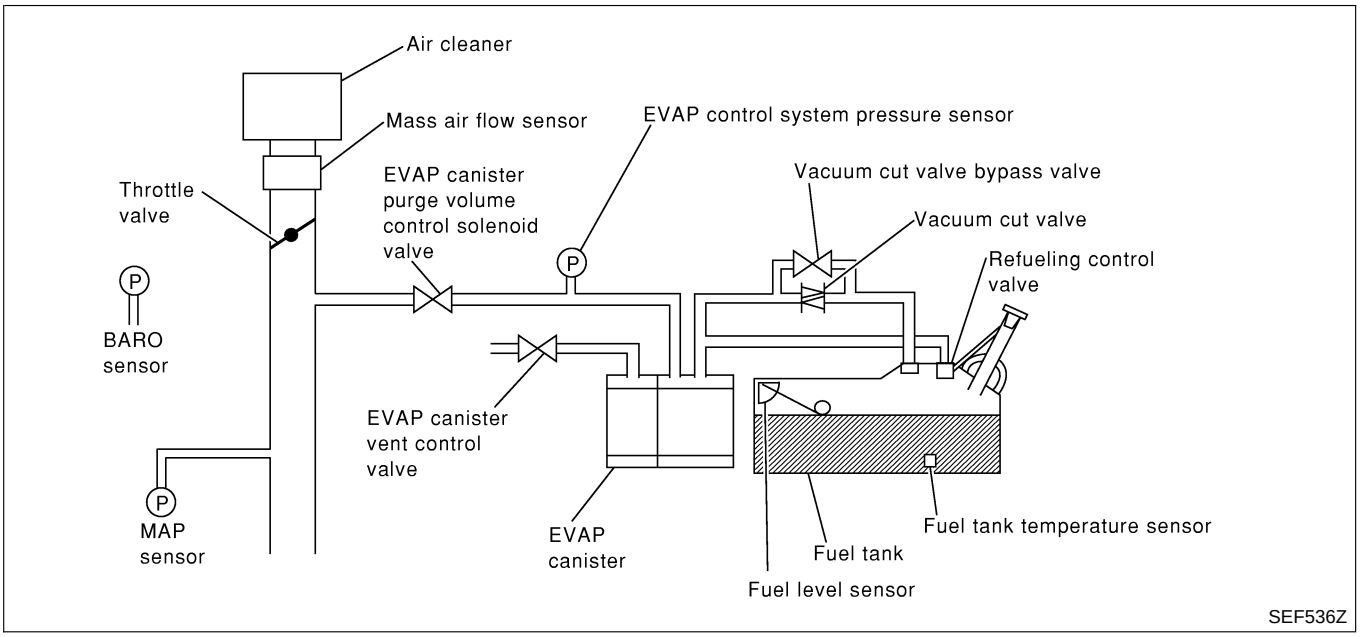
8	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-842.	
▶	**INSPECTION END**

On Board Diagnosis Logic

NIEC1615

NOTE:
If DTC P1440 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-1292.)

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

NIEC1616

- 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
- 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
- Manifold absolute pressure (MAP) 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
- Foreign matter caught in EVAP canister purge volume control solenoid valve

DTC Confirmation Procedure

NIEC1617

Refer to "P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)", EC-1040.

Diagnostic Procedure

NIEC1618

Refer to "P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)", EC-1040.

Description

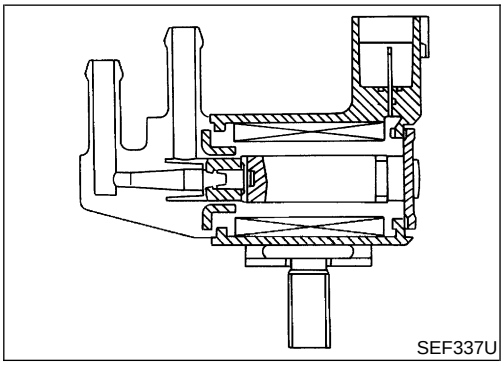
NIEC1619

SYSTEM DESCRIPTION

NIEC1619S01

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
Camshaft position sensor (PHASE)	Engine speed and cylinder position		
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		
Air fuel ratio (A/F) sensors 1	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

NIEC1619S02

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

NIEC1620

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

NIEC1621

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

NIEC1622

- 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.)

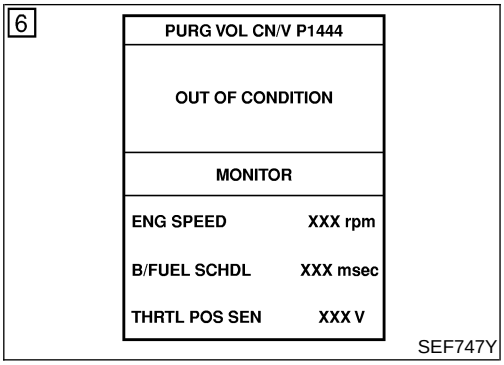
DTC Confirmation Procedure

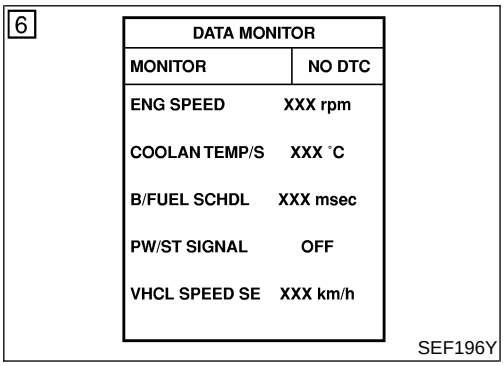
NIEC1623

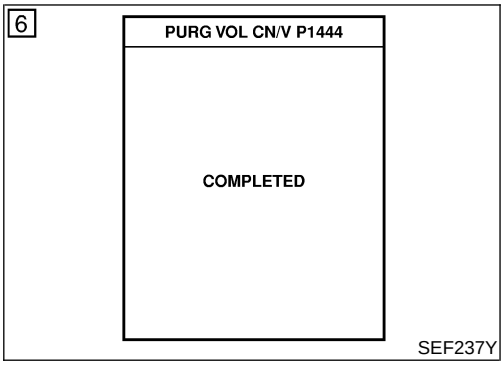
NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
For best results, perform test at a temperature of 0°C (32°F) or more.

DTC Confirmation Procedure (Cont'd)







WITH CONSULT-II

NIEC1623S01

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-1264.

WITH GST

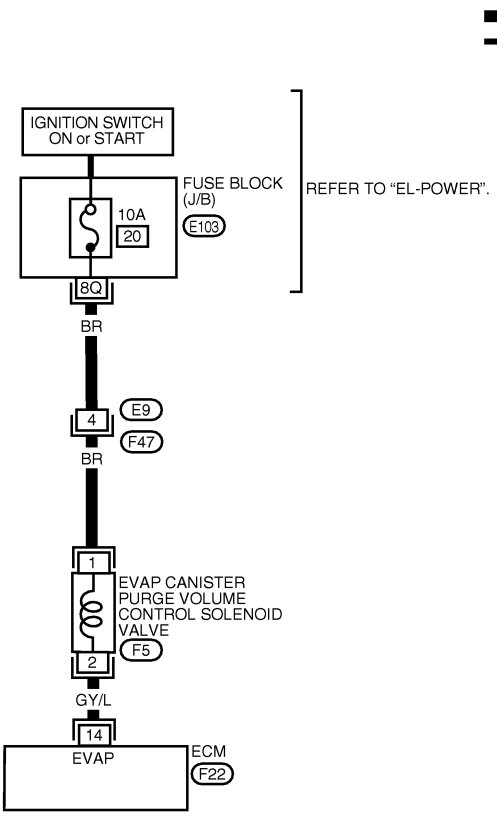
NIEC1623S02

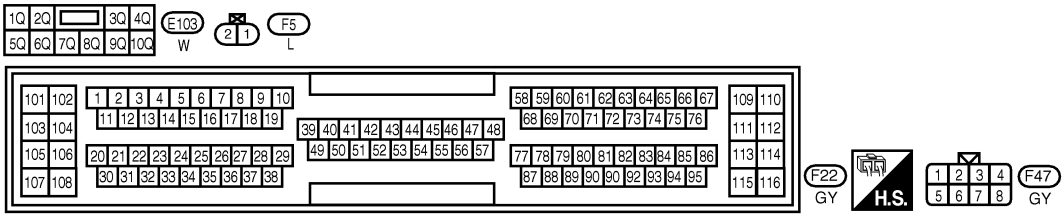
1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 10 seconds.
3) Start engine and let it idle for at least 20 seconds.
4) Select "MODE 7" with GST.
5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1264.

Wiring Diagram

NIEC1624

EC-PGC/V-01





WEC401

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)
14	GY/L	EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE	ENGINE RUNNING AT IDLE SPEED	BATTERY VOLTAGE (V) 40 20 0 50 ms
			ENGINE RUNNING AT 2,000 RPM (MORE THAN 100 SECONDS AFTER STARTING ENGINE)	BATTERY VOLTAGE (V) 40 20 0 50 ms

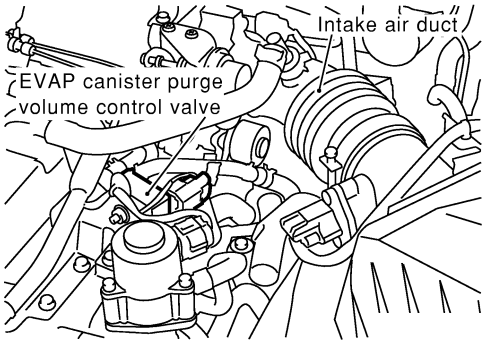
SEF576Y

Diagnostic Procedure

NIEC1625

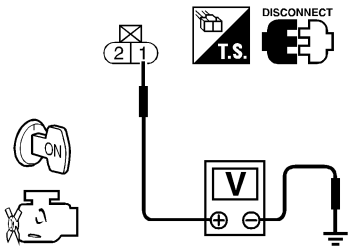
1	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.



SEF402Z

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

SEF948X

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E9, F47
- Fuse block (J/B) connector E103
- 10A 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

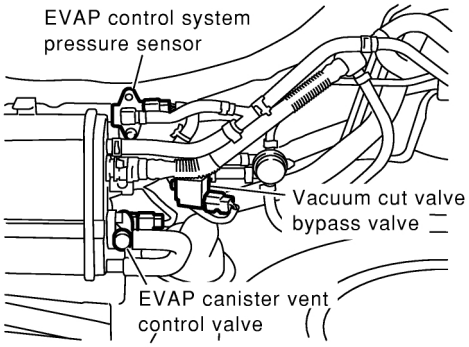
1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 14 and EVAP canister purge volume control solenoid valve terminal 2. Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART
Check the harness for open or short between EVAP canister purge volume control solenoid valve and ECM.	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE
Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.	



SEF403Z

OK or NG

OK	▶	GO TO 6.
NG	▶	Repair it.

6	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.**	

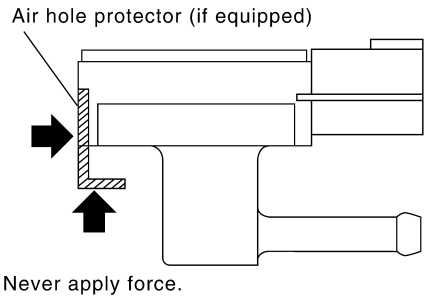
OK or NG

OK	▶	GO TO 7.
NG	▶	Replace EVAP control system pressure sensor.

Diagnostic Procedure (Cont'd)

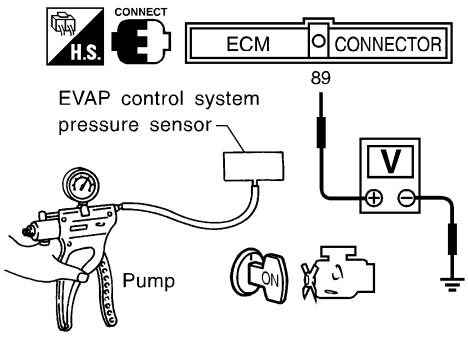
7	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

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 89 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

SEF543Z

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 8.
OK (Without CONSULT-II)	▶	GO TO 9.
NG	▶	Replace EVAP control system pressure sensor.

8	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	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XX %
THRTL POS SEN	X. XX V

SEF538Z

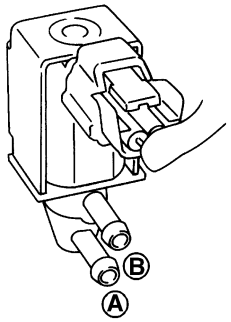
OK or NG

OK	▶	GO TO 10.
NG	▶	GO TO 9.

9	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.

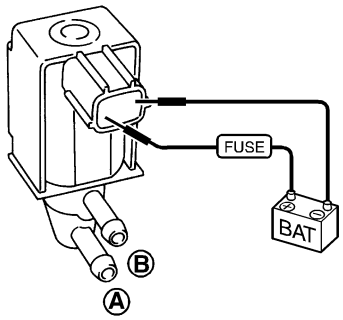


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

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 10.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

Diagnostic Procedure (Cont'd)

10	CHECK RUBBER TUBE FOR CLOGGING

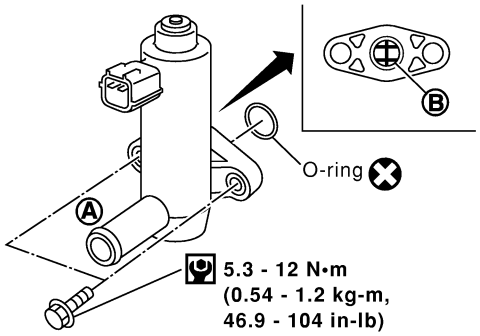
1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

OK or NG

OK	▶	GO TO 11.
NG	▶	Clean the rubber tube using an air blower.

11	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.



SEF376Z

OK or NG

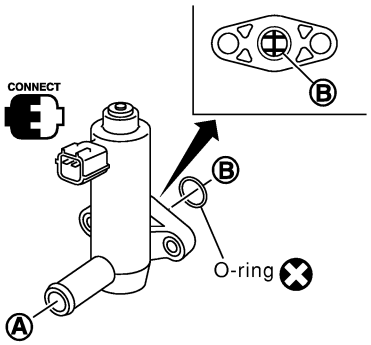
OK	▶	GO TO 12.
NG	▶	Replace EVAP canister vent control valve.

12	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
A/F ALPHA-B1	XXX %
A/F SEN1 (B1)	XXX V
THRTL POS SEN	XXX V



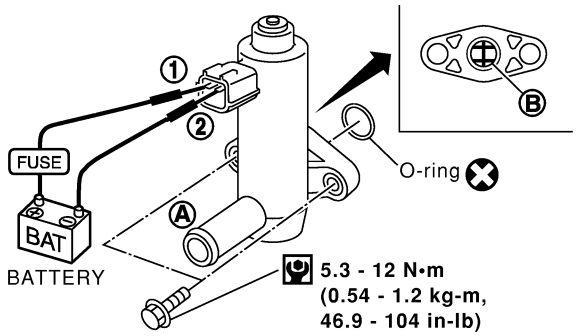
Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

SEF544Z

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.

SEF378Z

Make sure new O-ring is installed properly.

OK or NG

OK	▶	GO TO 14.
NG	▶	GO TO 13.

13	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 10 again.

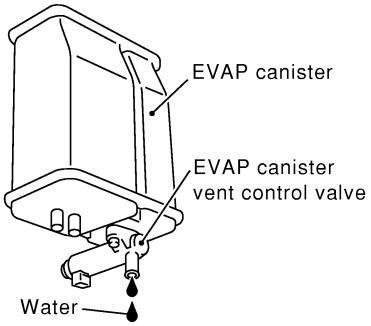
OK or NG

OK	▶	GO TO 14.
NG	▶	Replace EVAP canister vent control valve.

Diagnostic Procedure (Cont'd)

14	CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Check if water will drain from the EVAP canister.



SEF504Z

Yes or No

Yes	▶	GO TO 15.
No	▶	GO TO 18.

15	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 17.
NG	▶	GO TO 16.

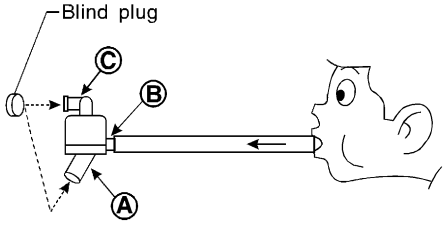
16	DETECT MALFUNCTIONING PART

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.

17	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

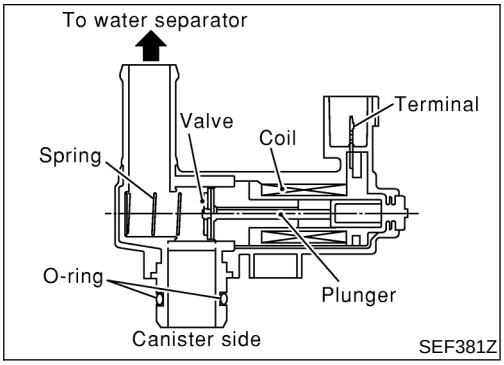
5. In case of NG in items 2 - 4, replace the parts.

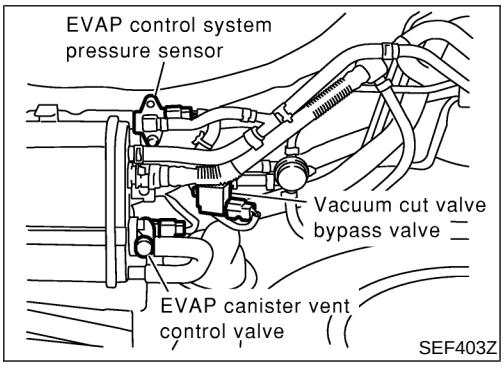
NOTE:
- Do not disassemble water separator.

OK or NG

OK	▶	GO TO 18.
NG	▶	Clean or replace water separator.

18	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-842.	
▶	**INSPECTION END**





Component Description

NIEC1626

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" diagnoses.

CONSULT-II Reference Value in Data Monitor Mode

NIEC1627

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	• Ignition switch: ON	OFF

On Board Diagnosis Logic

NIEC1628

Malfunction is detected when EVAP canister vent control valve remains closed under specified driving conditions.

Possible Cause

NIEC1629

- 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.

4

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

DTC Confirmation Procedure

NIEC1630

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

NIEC1630S01

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-1275.

WITH GST

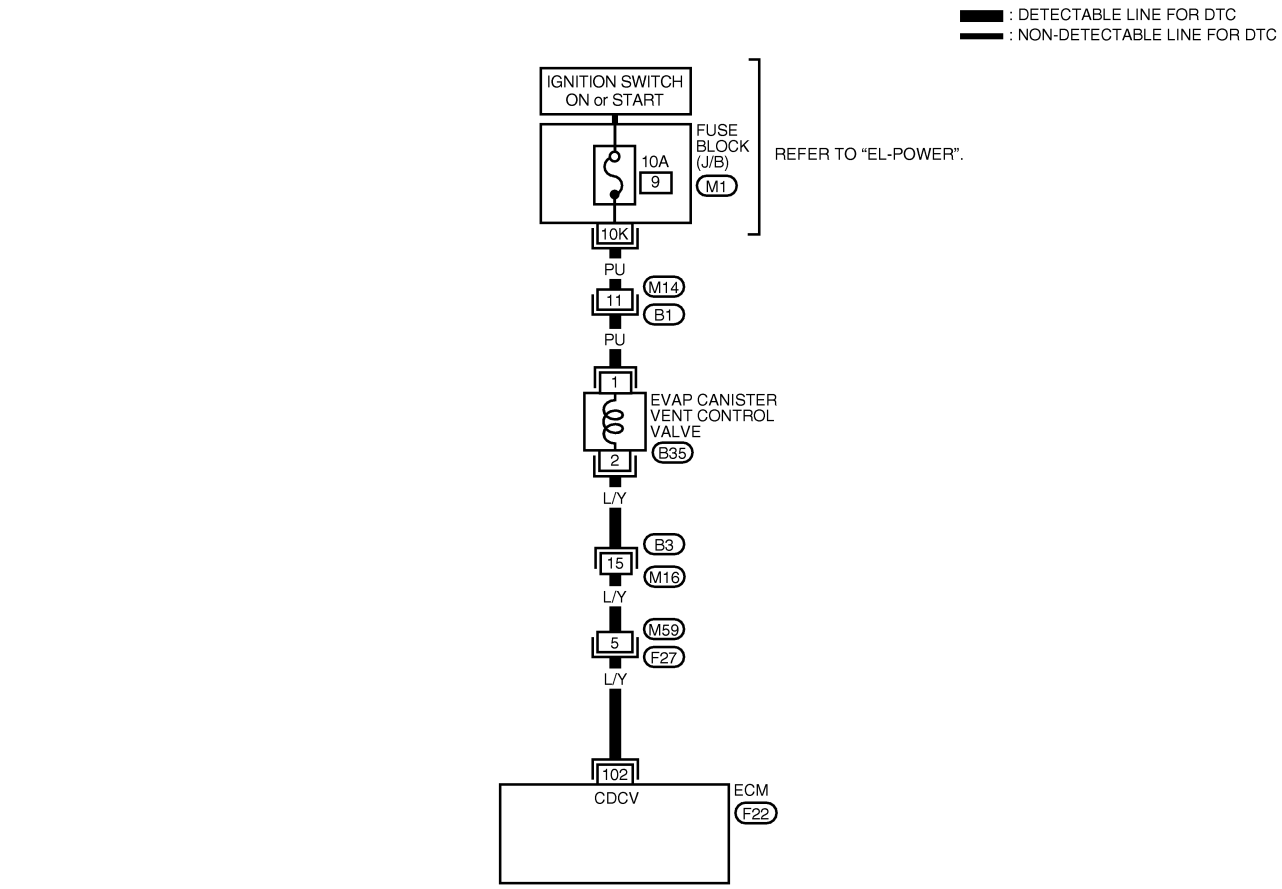
NIEC1630S02

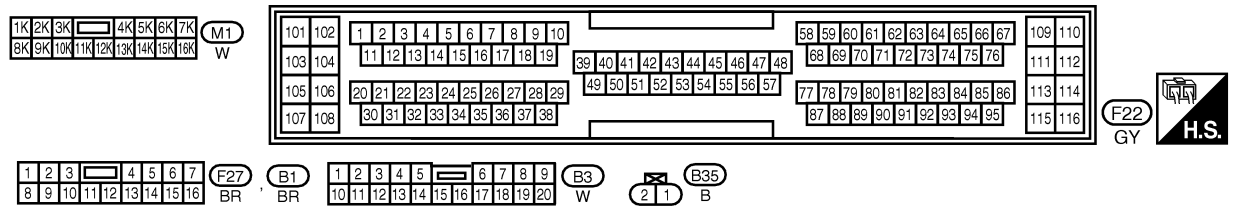
Follow the procedure "WITH CONSULT-II" above.

Wiring Diagram

NIEC1631

EC-VENT/V-01





LEC202

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)
102	L/Y	EVAP CANISTER VENT CONTROL VALVE	IGN ON	BATTERY VOLTAGE

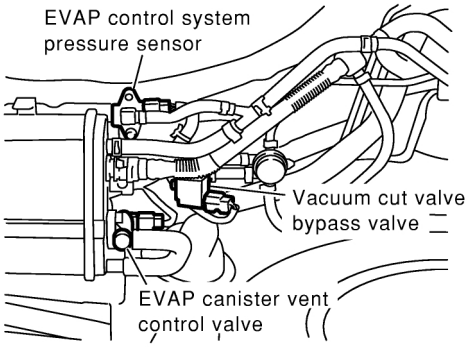
SEF577Y

Diagnostic Procedure

NIEC1632

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.



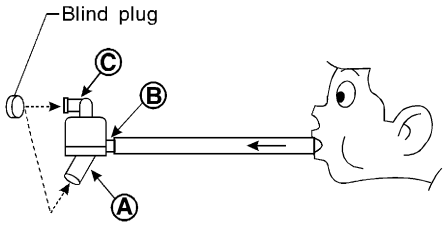
SEF403Z

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.

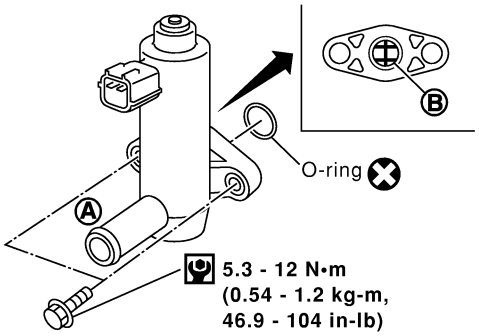
OK or NG

OK	▶	GO TO 3.
NG	▶	Clean or replace water separator.

Diagnostic Procedure (Cont'd)

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.



SEF376Z

OK or NG

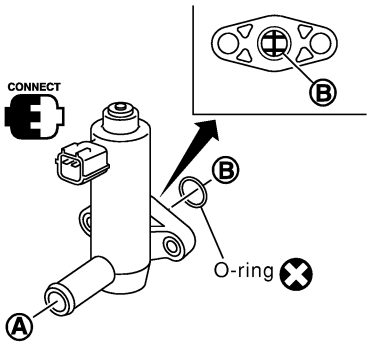
OK	▶	GO TO 4.
NG	▶	Replace EVAP canister vent control valve.

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
A/F ALPHA-B1	XXX %
A/F SEN1 (B1)	XXX V
THRTL POS SEN	XXX V



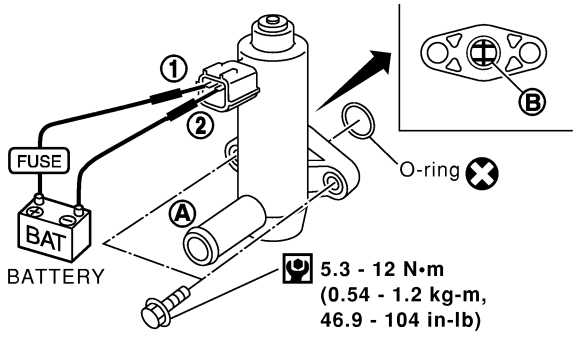
Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

SEF544Z

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.

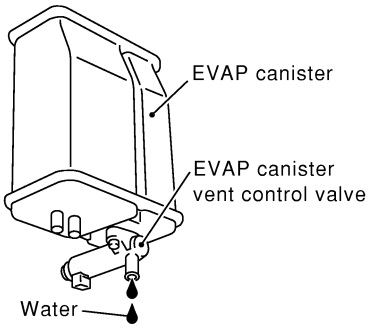
SEF378Z

Make sure new O-ring is installed properly.

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

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.		
 SEF504Z		
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.

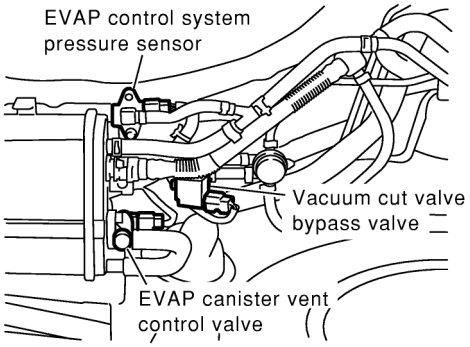
8	DETECT MALFUNCTIONING PART	
Check the following. ● EVAP canister for damage ● EVAP hose between EVAP canister and water separator for clogging or poor connection		
	▶	Repair hose or replace EVAP canister.

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.

Diagnostic Procedure (Cont'd)

10	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.



SEF403Z

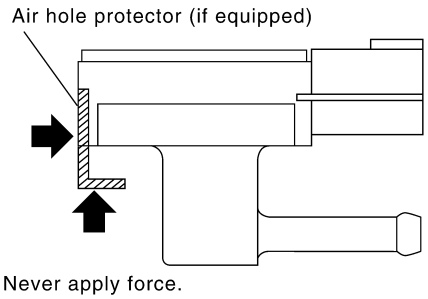
2. Check connectors for water.
Water should not exist.

OK or NG

OK	▶	GO TO 11.
NG	▶	Replace EVAP control system pressure sensor.

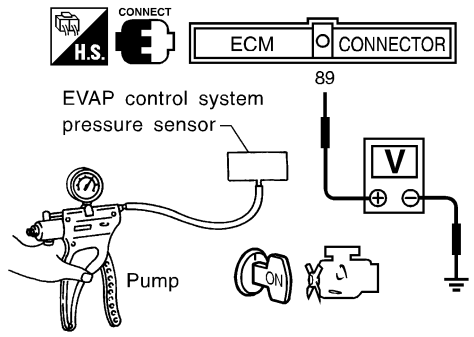
11	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

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 89 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

SEF543Z

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

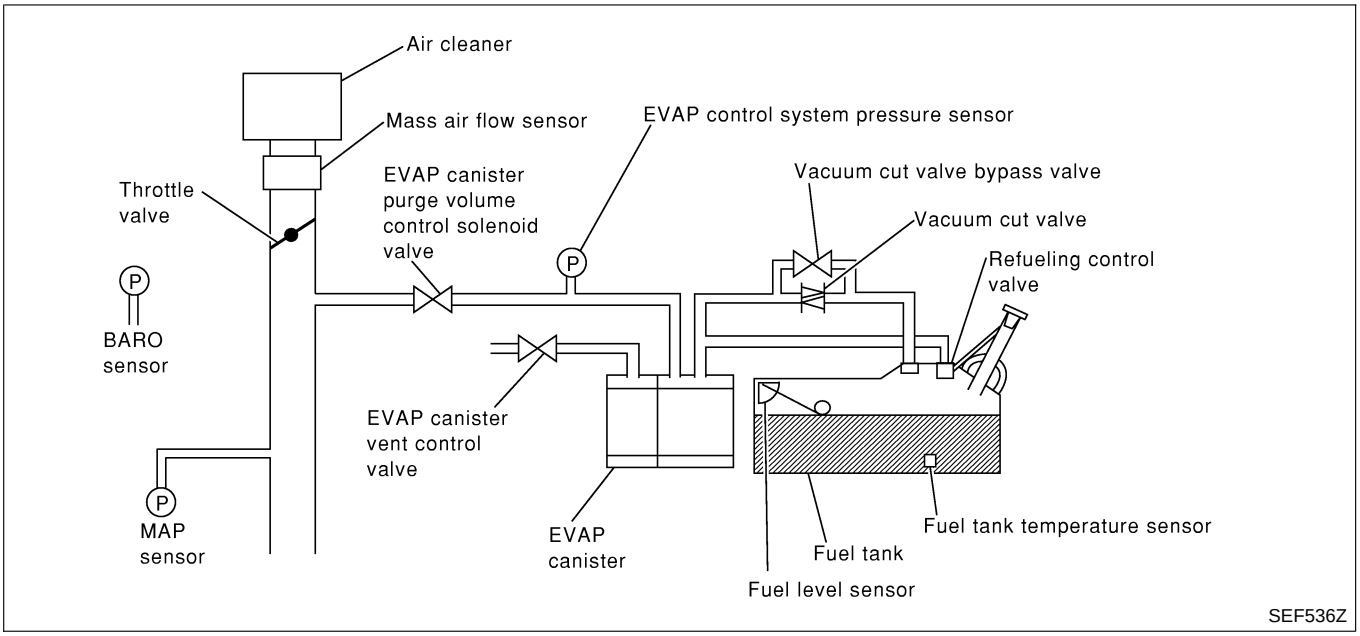
OK	▶	GO TO 12.
NG	▶	Replace EVAP control system pressure sensor.

12	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-842.	
▶	**INSPECTION END**

System Description

NIEC1633

NOTE:
If DTC P1447 is displayed with P0510, perform trouble diagnosis for DTC P0510 first. (See EC-1117.)



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

NIEC1634

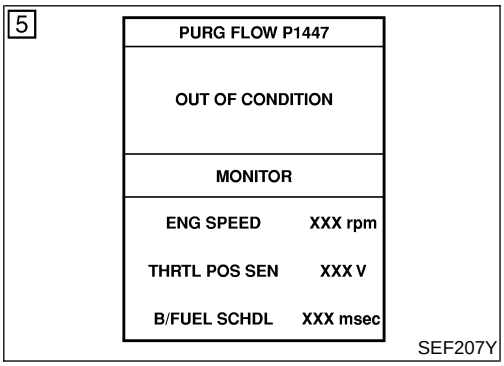
Under normal conditions (non-closed throttle), sensor output voltage indicates if pressure drop and purge flow are adequate. If not, a fault is determined.
Malfunction is detected when EVAP control system does not operate properly, EVAP control system has a leak between intake manifold and EVAP control system pressure sensor.

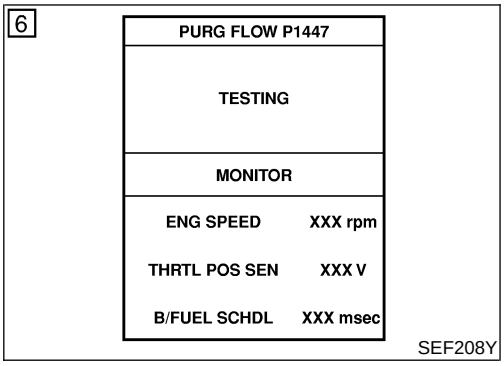
Possible Cause

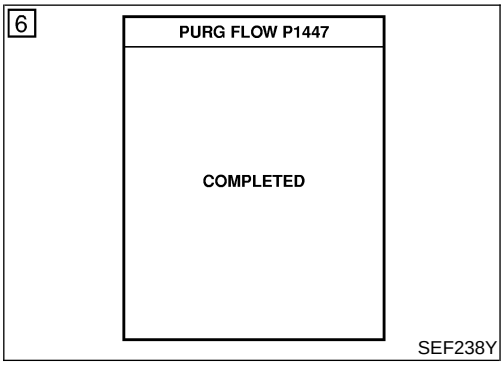
NIEC1635

- 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







DTC Confirmation Procedure

NIEC1636

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:

For best results, perform test at a temperature of 0°C (32°F) or more.

WITH CONSULT-II

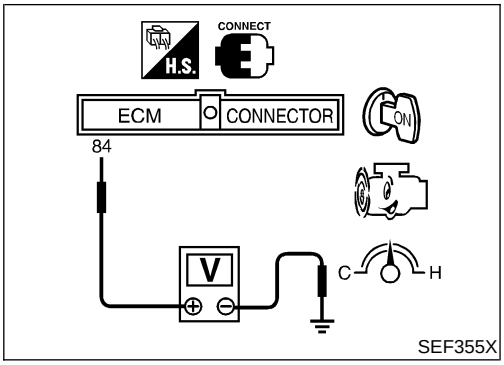
NIEC1636S01

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 - 3,800 rpm
B/FUEL SCHDL	1.0 - 8.2 msec
Engine coolant temperature	More than 70°C (158°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-1283.



Overall Function Check

NIEC1637

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

NIEC1637S01

1) Lift up drive wheels.
2) Start engine 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-1283.

Diagnostic Procedure

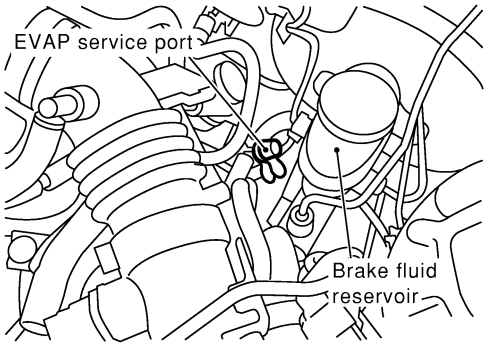
=NIEC1638

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.



SEF400Z

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
A/F ALPHA-B1	XXX %
A/F SEN1 (B1)	XXX V
THRTL POS SEN	XXX V

PURG VOL CONT/V	VACUUM
100.0%	Should exist
0.0%	Should not exist

SEF562Z

OK or NG

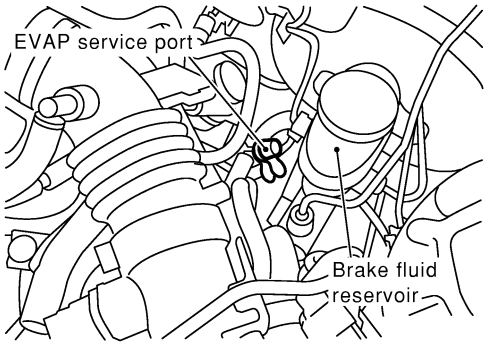
OK	▶	GO TO 7.
NG	▶	GO TO 4.

Diagnostic Procedure (Cont'd)

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.



SEF400Z

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

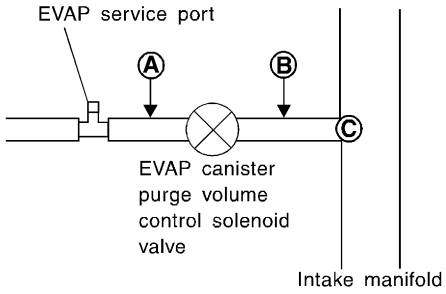
1. Turn ignition switch "OFF".
2. Check EVAP purge line for improper connection or disconnection.
   Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-730.

OK or NG

OK	▶	GO TO 5.
NG	▶	Repair it.

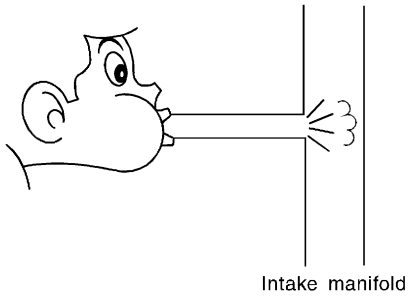
5	CHECK EVAP PURGE HOSE AND PURGE PORT

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 (With CONSULT-II)	▶	GO TO 6.
OK (Without CONSULT-II)	▶	GO TO 7.
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	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XX %
THRTL POS SEN	X. XX V

SEF538Z

OK or NG

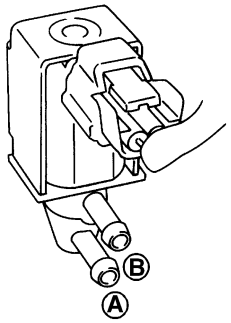
OK	▶	GO TO 8.
NG	▶	GO TO 7.

Diagnostic Procedure (Cont'd)

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.

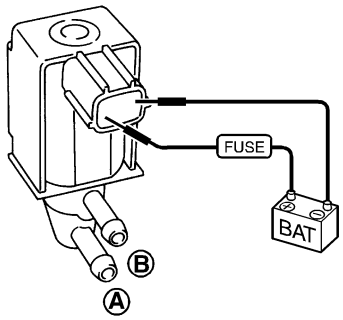


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

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

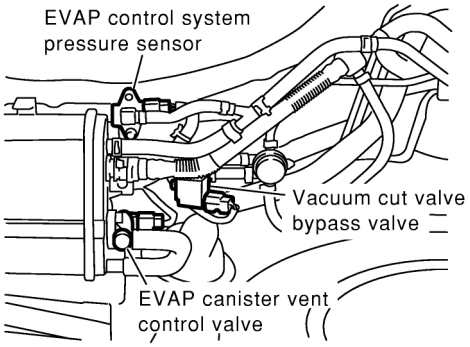
1. Turn ignition switch "OFF".
2. Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.

OK or NG

OK	▶	GO TO 9.
NG	▶	Repair it.

9	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.



SEF403Z

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-1069.

OK or NG

OK	▶	GO TO 11.
NG	▶	Replace EVAP control system pressure sensor.

11	CHECK RUBBER TUBE FOR CLOGGING

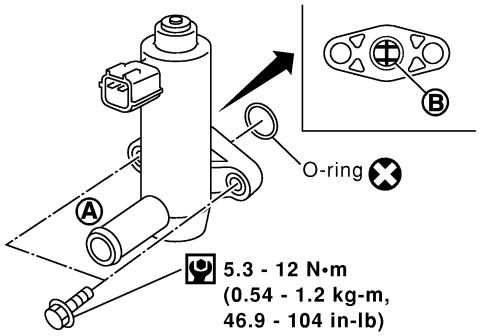
1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

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.



SEF376Z

OK or NG

OK	▶	GO TO 13.
NG	▶	Replace EVAP canister vent control valve.

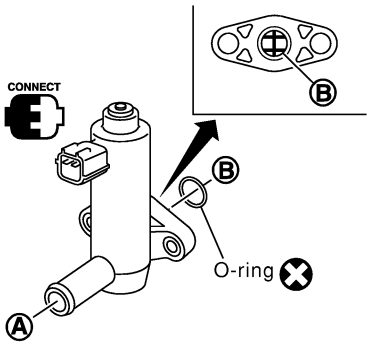
Diagnostic Procedure (Cont'd)

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
A/F ALPHA-B1	XXX %
A/F SEN1 (B1)	XXX V
THRTL POS SEN	XXX V



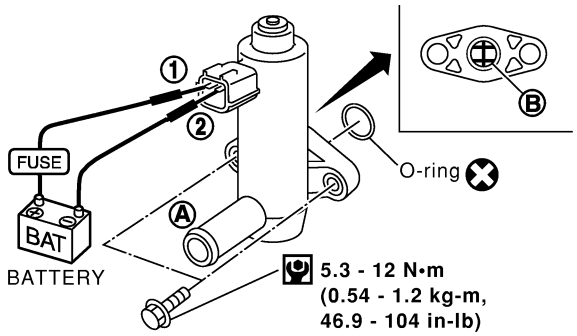
Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

SEF544Z

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.

SEF378Z

Make sure new O-ring is installed properly.

OK or NG

OK (With CONSULT-II)	▶	GO TO 15.
OK (Without CONSULT-II)	▶	GO TO 16.
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.

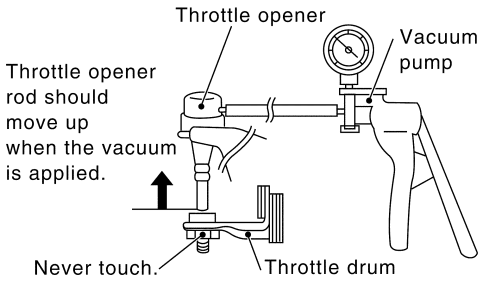
OK or NG

OK (With CONSULT-II)	▶	GO TO 15.
OK (Without CONSULT-II)	▶	GO TO 16.
NG	▶	Replace EVAP canister vent control valve.

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 "A/T" then 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

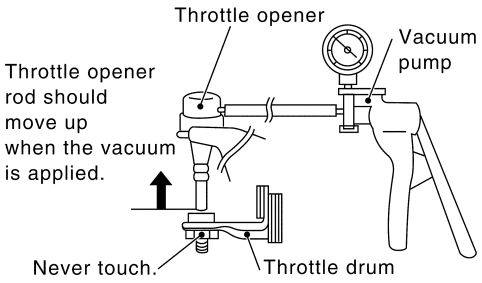
OK	▶	GO TO 18.
NG	▶	GO TO 17.

Diagnostic Procedure (Cont'd)

16	CHECK THROTTLE POSITION SWITCH

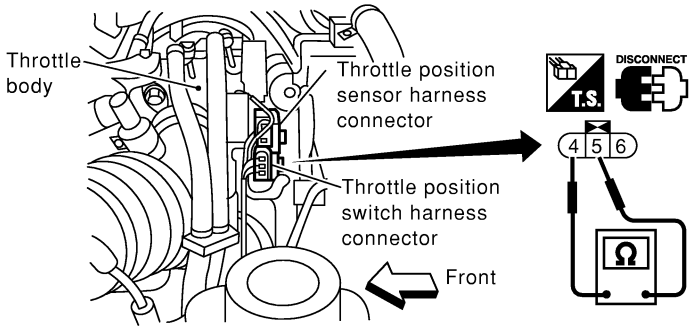
Without CONSULT-II

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. 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

SEF770Y

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-802.

Items	Specifications
Ignition timing	9°±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	800±50 rpm (in "P" or "N" position)

MTBL0540

Is it possible to adjust closed throttle position switch?

Yes or No

Yes	▶	GO TO 18.
No	▶	Replace throttle position switch.

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-730.		
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-842.		
	▶	**INSPECTION END**

Component Description

NIEC1639

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" diagnoses.

CONSULT-II Reference Value in Data Monitor Mode

NIEC1640

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	• Ignition switch: ON	OFF

On Board Diagnosis Logic

NIEC1641

Malfunction is detected when EVAP canister vent control valve remains opened under specified driving conditions.

Possible Cause

NIEC1642

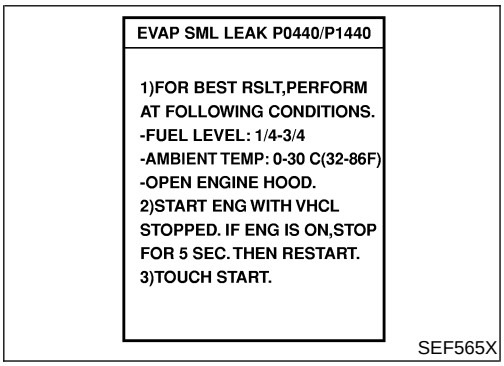
- EVAP canister vent control valve
- EVAP control system pressure sensor and circuit
- Blocked rubber tube to EVAP canister vent control valve
- Water separator
- EVAP canister is saturated with water.
- Vacuum cut valve

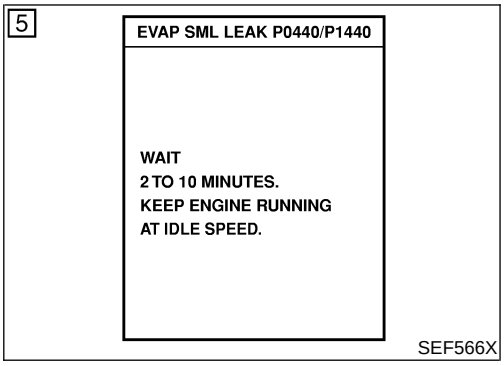
DTC Confirmation Procedure

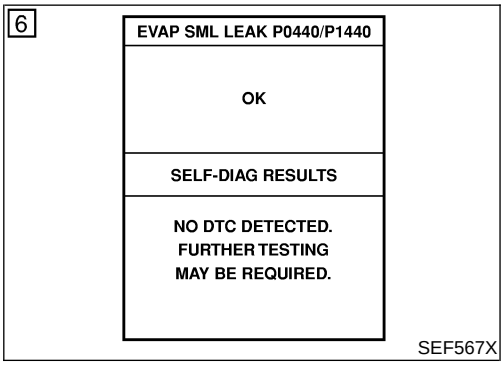
NIEC1643

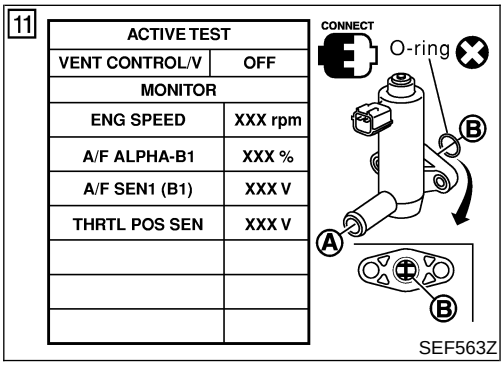
NOTE:

- **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

NIEC1643S01

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 following procedure.**

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)

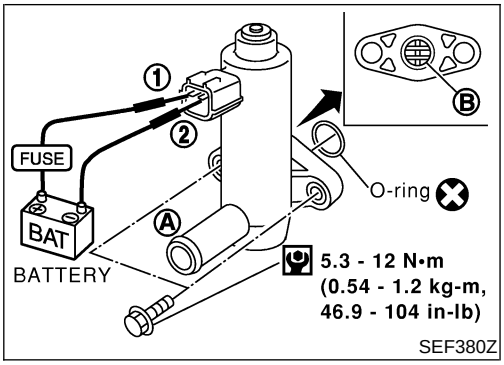
5) Select "EVAP SML LEAK P0440/P1440" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
   Follow the instruction displayed.
   If the engine speed cannot be maintained within the range displayed on the CONSULT-II screen, go to "Basic Inspection", EC-802.
6) Make sure that "OK" is displayed.
   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 5 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-1296.
If the result is OK, go to "Diagnostic Procedure" for DTC P0440, EC-1042.



Overall Function Check

NIEC1644

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

NIEC1644S01

1) Disconnect hose from water separator.
2) Disconnect EVAP canister vent control valve harness connector.
3) Verify the following.

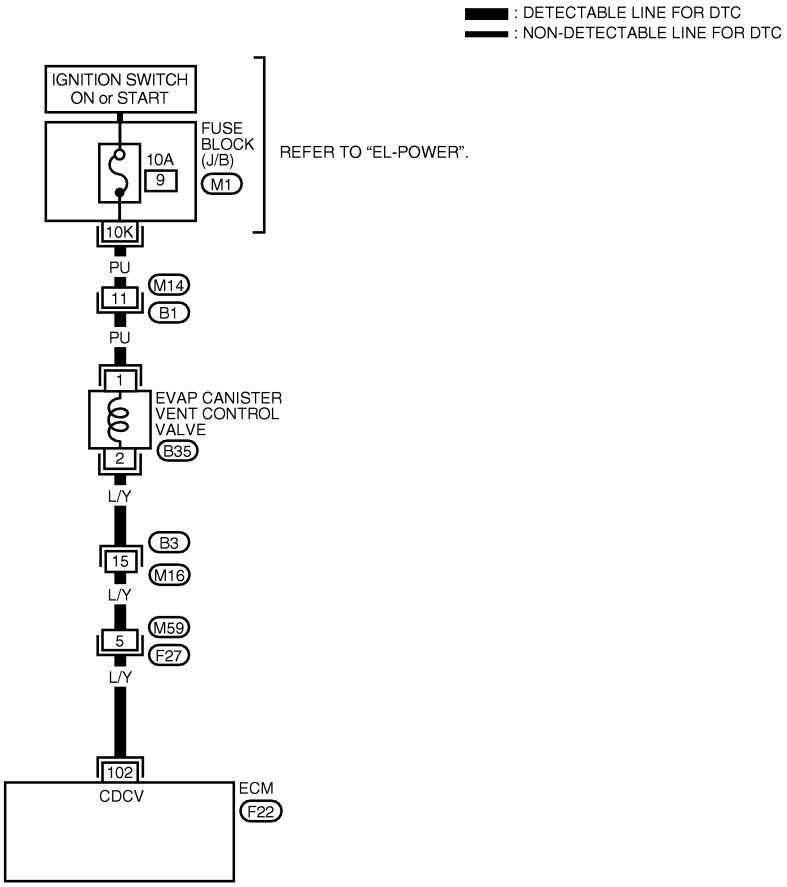
Condition	Air passage continuity
12V direct current supply between terminals 1 and 2	No
No supply	Yes

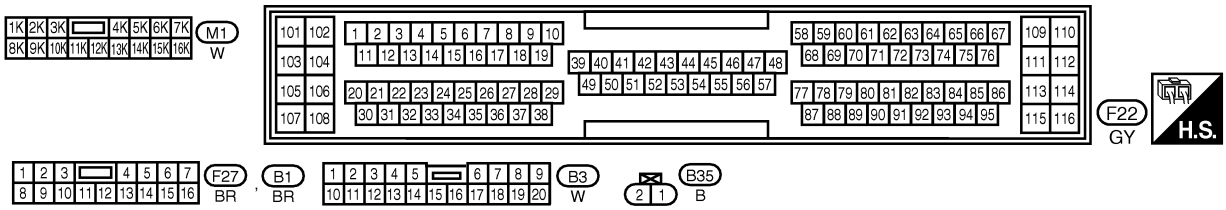
If the result is NG, go to “Diagnostic Procedure”, EC-1296.
If the result is OK, go to “Diagnostic Procedure” for DTC P0440, EC-1042.

Wiring Diagram

NIEC1645

EC-VENT/V-01





LEC202

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)
102	L/Y	EVAP CANISTER VENT CONTROL VALVE	IGN ON	BATTERY VOLTAGE

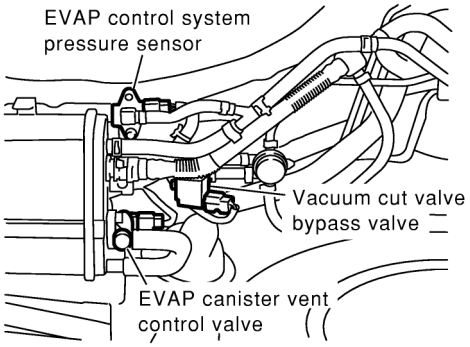
SEF577Y

Diagnostic Procedure

NIEC1646

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.



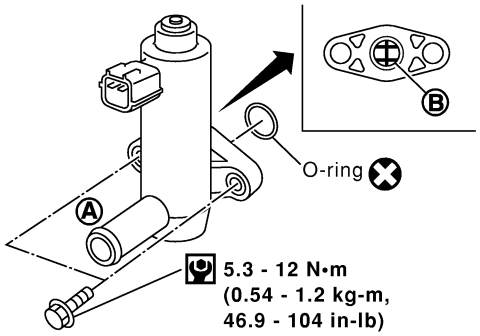
SEF403Z

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.



SEF376Z

OK or NG

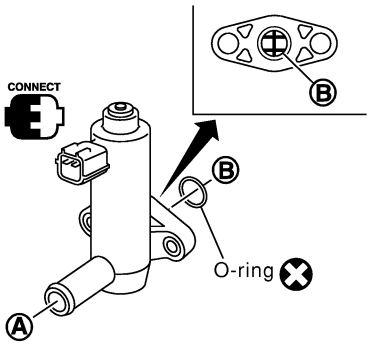
OK	▶	GO TO 3.
NG	▶	Replace EVAP canister vent control valve.

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
A/F ALPHA-B1	XXX %
A/F SEN1 (B1)	XXX V
THRTL POS SEN	XXX V



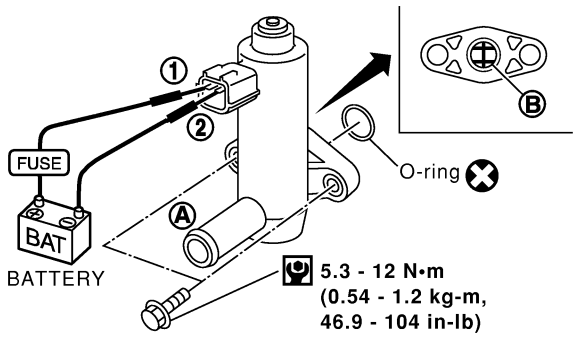
Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

SEF544Z

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.

SEF378Z

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.

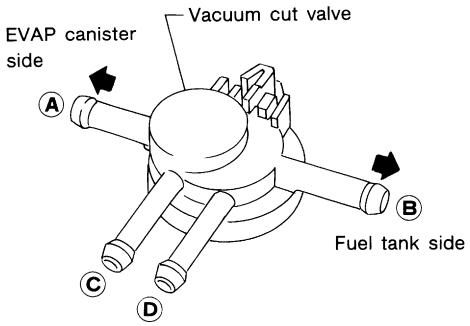
OK or NG

OK	▶	GO TO 5.
NG	▶	Replace EVAP canister vent control valve.

Diagnostic Procedure (Cont'd)

5	CHECK VACUUM CUT VALVE

1. Turn ignition switch OFF.
2. Remove vacuum cut valve.
3. Check vacuum cut valve as follows:



SEF379Q

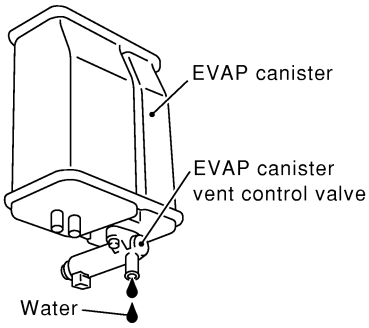
a. Plug port **C** and **D** with fingers.
b. Apply vacuum to port **A** and check that there is no suction from port **B**.
c. Apply vacuum to port **B** and check that there is suction from port **A**.
d. Blow air in port **B** and check that there is a resistance to flow out of port **A**.
e. Open 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.



SEF504Z

Yes or No

Yes	▶	GO TO 7.
No	▶	GO TO 9.

7	CHECK EVAP CANISTER

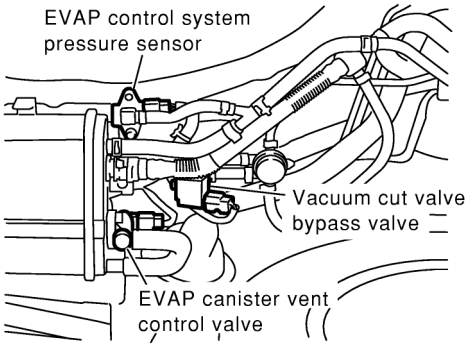
Weigh the EVAP canister with the EVAP canister vent control valve attached.
The weight should be less than 1.8 kg (4.0 lb).

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.		
 SEF403Z		
2. Check connectors for water. **Water should not exist.**		
OK or NG		
OK	▶	GO TO 11.
NG	▶	Replace EVAP control system pressure sensor.

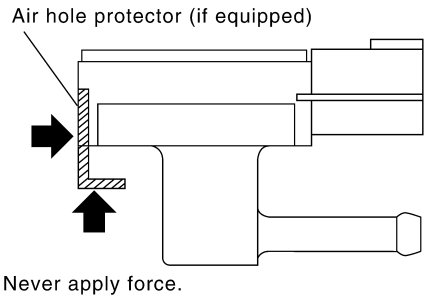
Diagnostic Procedure (Cont'd)

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.**



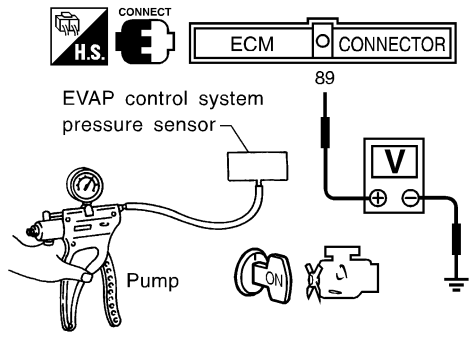
SEF799W

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 89 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

SEF543Z

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.**

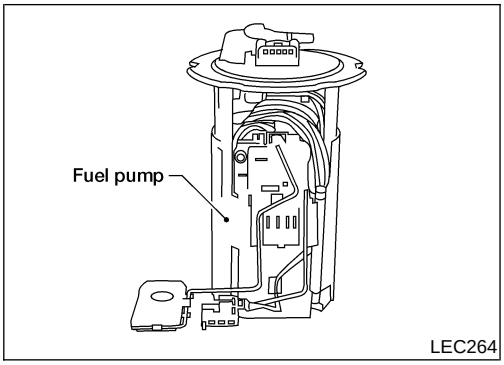
OK or NG

OK	▶	GO TO 12.
NG	▶	Replace EVAP control system pressure sensor.

12	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-842.

▶ **INSPECTION END**



Component Description

NIEC1647

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

NIEC1648

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

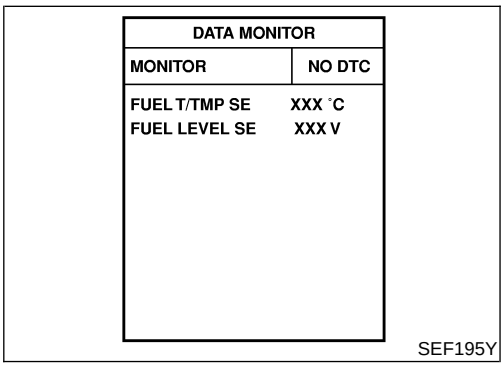
NIEC1649

- Fuel level sensor circuit
  (The fuel level sensor circuit is open or shorted.)

DTC Confirmation Procedure

NIEC1650

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

NIEC1650S01

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-1303.

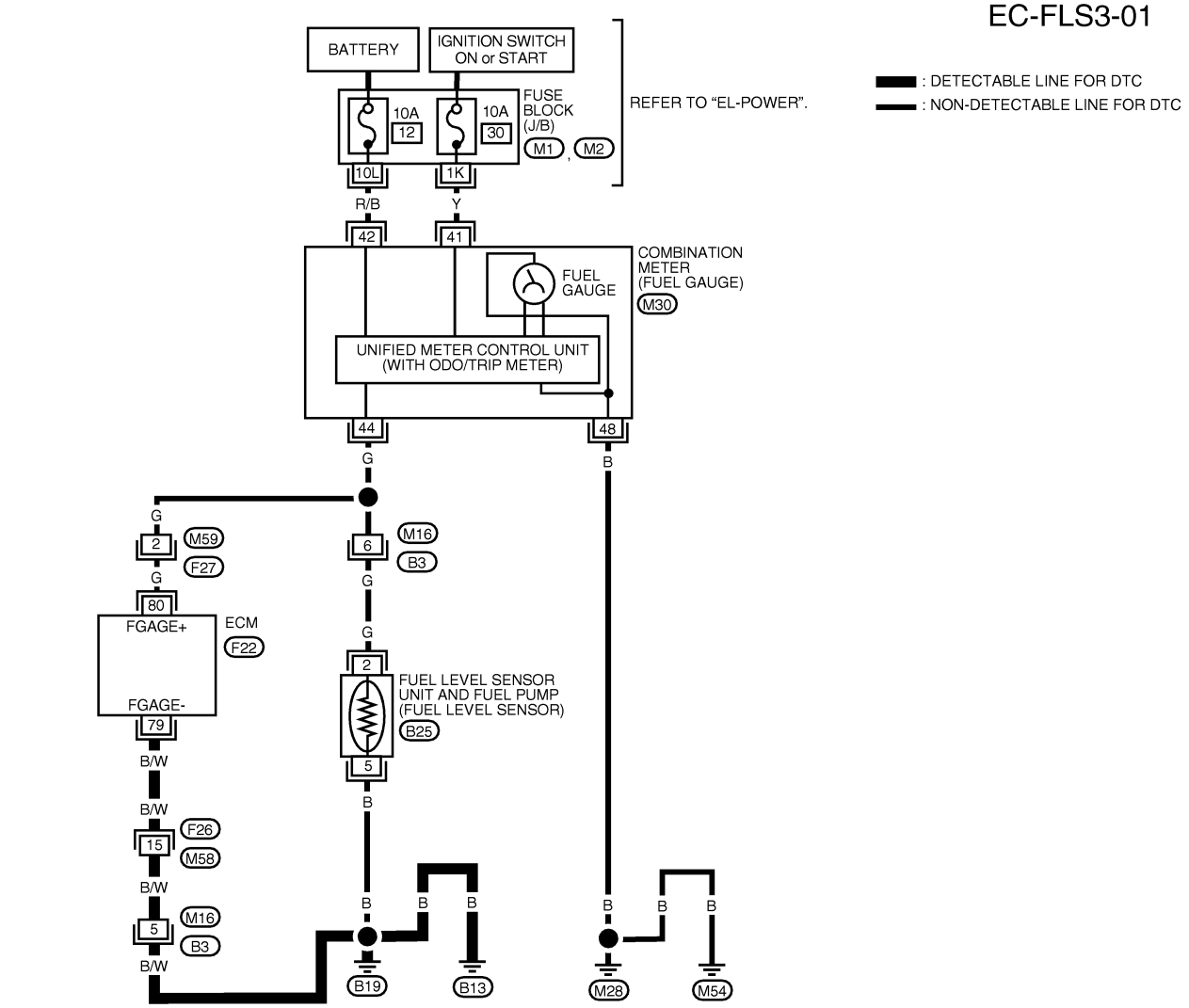
WITH GST

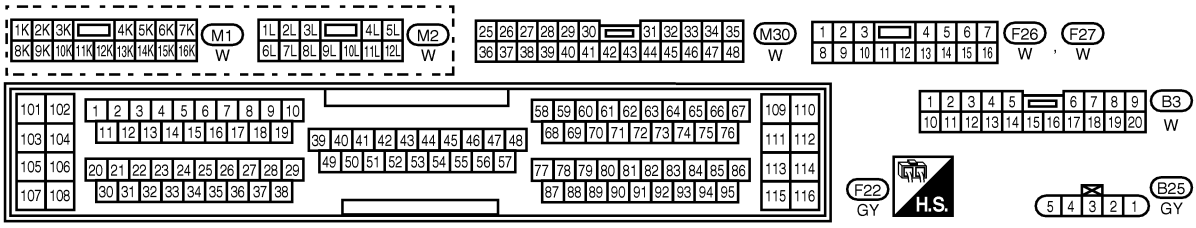
NIEC1650S02

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

NIEC1651





WEC402

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	G	FUEL LEVEL SENSOR	IGN ON	APPROX. 0 - 4.8V
79	B/W	FUEL LEVEL SENSOR GROUND	ENGINE RUNNING AT IDLE SPEED	APPROX. 0V

SEF579YA

Diagnostic Procedure

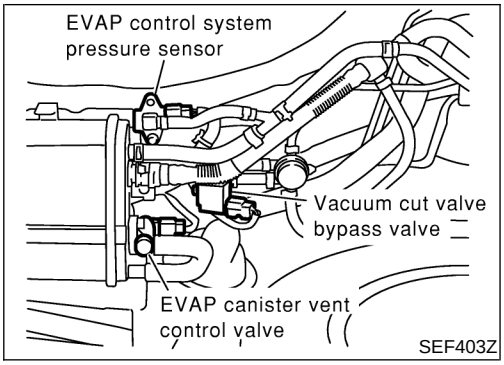
=NIEC1652

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 79 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 F26, M58 ● Harness connectors M16, B3 ● 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-103***, “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-842 **OK or NG**		
	▶	**INSPECTION END**



Description

=NIEC1653

COMPONENT DESCRIPTION

NIEC1653S01

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.

CONSULT-II Reference Value in Data Monitor Mode

NIEC1654

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VC/V BYPASS/V	• Ignition switch: ON	OFF

On Board Diagnosis Logic

NIEC1655

Malfunction is detected when an improper voltage signal is sent to ECM through vacuum cut valve bypass valve.

Possible Cause

NIEC1656

- Harness or connectors
  (The vacuum cut valve bypass valve circuit is open or shorted.)
- Vacuum cut valve bypass valve

DTC Confirmation Procedure

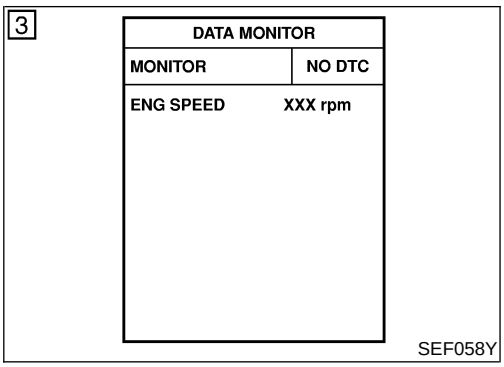
NIEC1657

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.

3

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm


SEF058Y

WITH CONSULT-II

NIEC1657S01

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-1307.

WITH GST

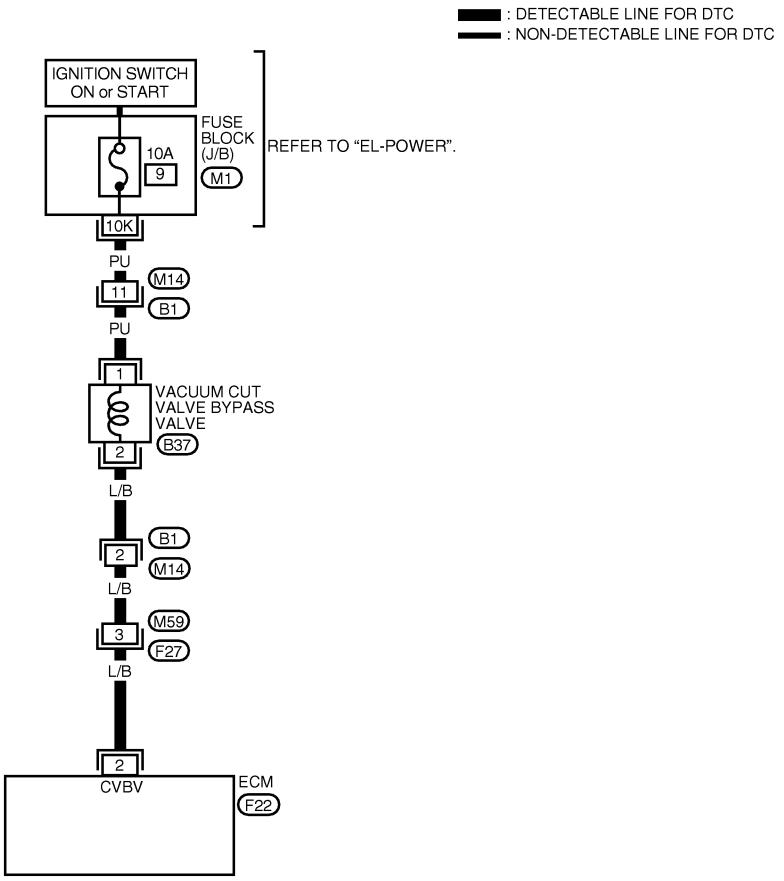
NIEC1657S02

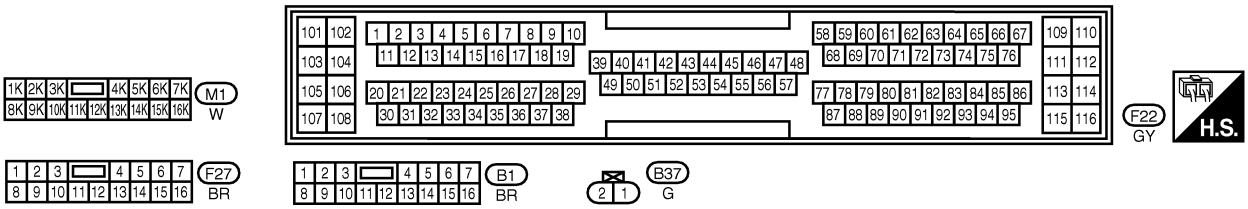
Follow the procedure "WITH CONSULT-II" above.

Wiring Diagram

=NIEC1658

EC-BYPS/V-01





LEC211

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	L/B	VACUUM CUT VALVE BYPASS VALVE	IGN ON	BATTERY VOLTAGE

SEF585Y

Diagnostic Procedure

NIEC1659

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
A/F ALPHA- B1	XXX %
A/F SEN1 (B1)	XXX V
THRTL POS SEN	X.XX V

SEF564Z

4. Make sure that clicking sound is heard from the vacuum cut valve bypass valve.

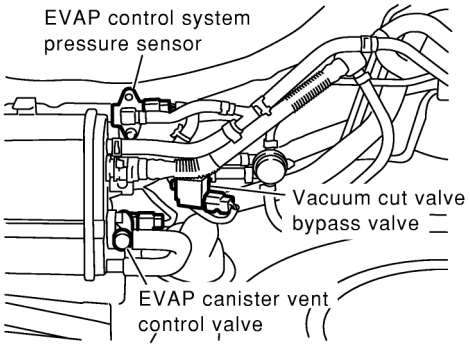
OK or NG

OK ▶	GO TO 7.
NG ▶	GO TO 3.

Diagnostic Procedure (Cont'd)

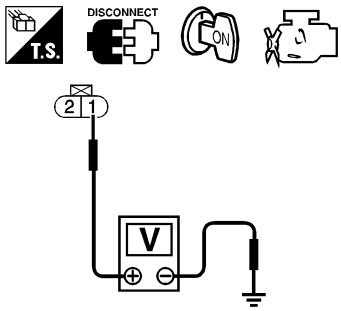
3	CHECK VACUUM CUT VALVE BYPASS VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect vacuum cut valve bypass valve harness connector.



SEF403Z

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 M14, B1
- Fuse block (J/B) connector M1
- 10A 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 2 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

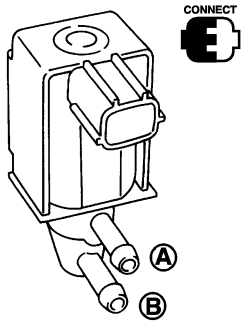
OK	▶	GO TO 7.
NG	▶	GO TO 6.

6	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors B1, M14 ● Harness connectors M59, F27 ● 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
A/F ALPHA-B1	XXX %
A/F SEN1 (B1)	XXX V
THRTL POS SEN	X.XX V

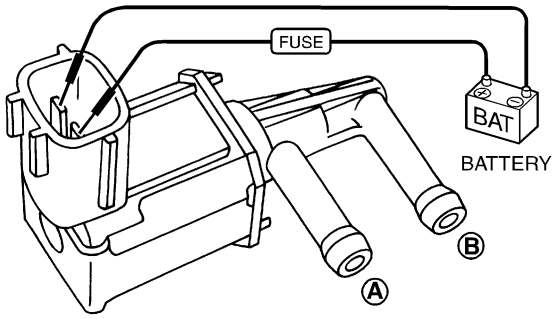
Condition VC/V BYPASS/V	Air passage continuity between A and B
ON	Yes
OFF	No

Operation takes less than 1 second.

SEF565Z

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

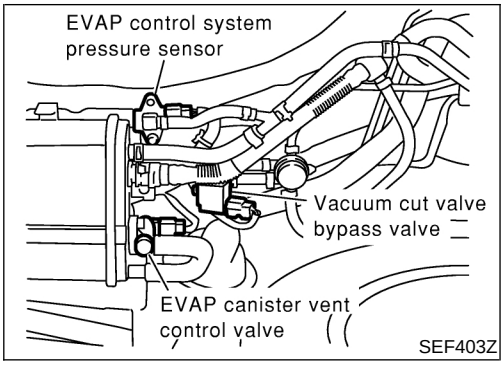
Operation takes less than 1 second.

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-842.	
▶	**INSPECTION END**



Description

NIEC1660

COMPONENT DESCRIPTION

NIEC1660S01

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.

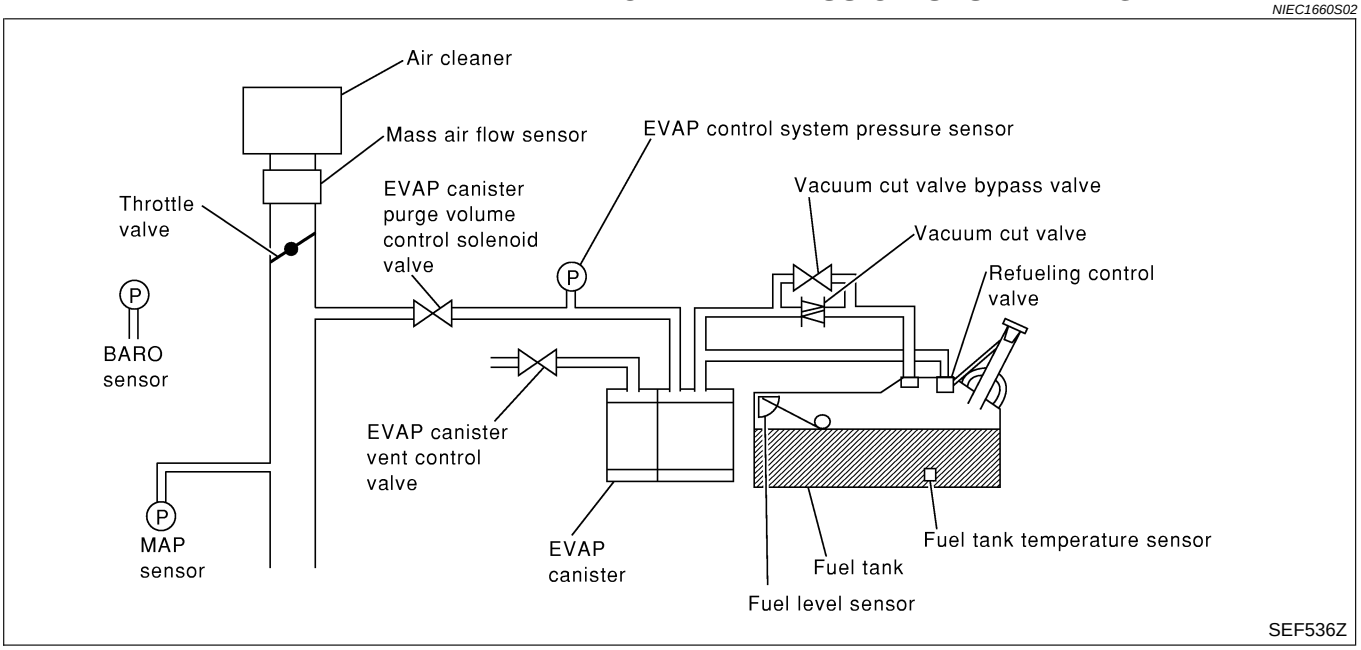
The vacuum cut valve prevents the intake manifold vacuum from being applied to the fuel tank.

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

NIEC1660S02



CONSULT-II Reference Value in Data Monitor Mode

NIEC1661

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VC/V BYPASS/V	• Ignition switch: ON	OFF

On Board Diagnosis Logic

NIEC1662

Malfunction is detected when vacuum cut valve bypass valve does not operate properly.

Possible Cause

NIEC1663

- 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

NIEC1664

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:

For best results, perform test at a temperature of 0°C (32°F) or higher.

WITH CONSULT-II

NIEC1664S01

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 - 3,800 rpm
Selector lever	Suitable position
Vehicle speed	36 - 120 km/h (22 - 75 MPH)
B/FUEL SCHDL	1.0 - 8.2 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-1314.

7

VC CUT/V BP/V P1491	
OUT OF CONDITION	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
VHCL SPEED SE	XXX km/h

SEF748Y

7

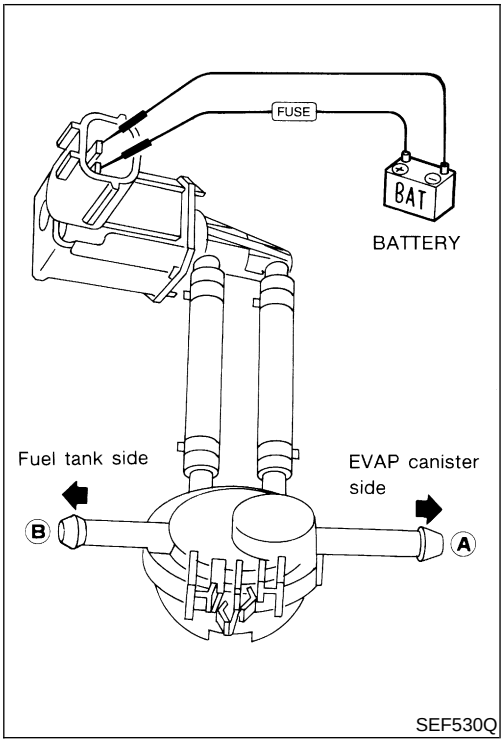
VC CUT/V BP/V P1491	
TESTING	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
VHCL SPEED SE	XXX km/h

SEF749Y

7

VC CUT/V BP/V P1491
COMPLETED

SEF239Y



Overall Function Check

NIEC1665

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

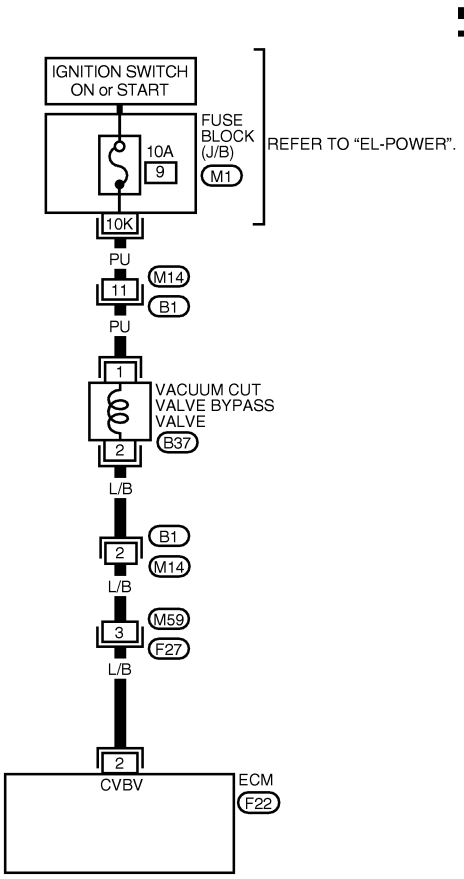
NIEC1665S01

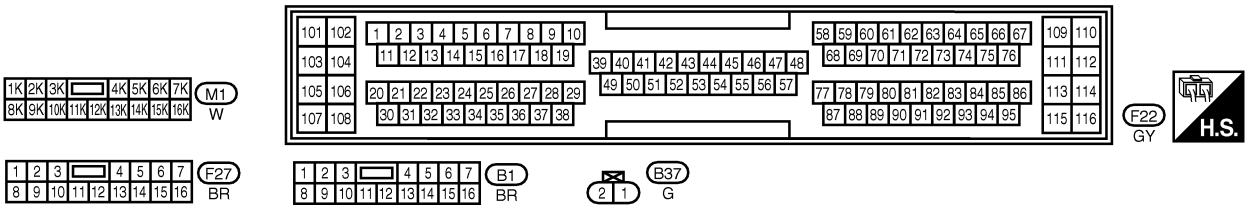
1) Remove vacuum cut valve and vacuum cut valve bypass valve as an assembly.
2) Apply vacuum to port **A** and check that there is no suction from port **B**.
3) Apply vacuum to port **B** and check that there is suction from port **A**.
4) Blow air in port **B** and check that there is a resistance 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-1314.

Wiring Diagram

NIEC1666

EC-BYPS/V-01





LEC211

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	L/B	VACUUM CUT VALVE BYPASS VALVE	IGN ON	BATTERY VOLTAGE

SEF585Y

Diagnostic Procedure

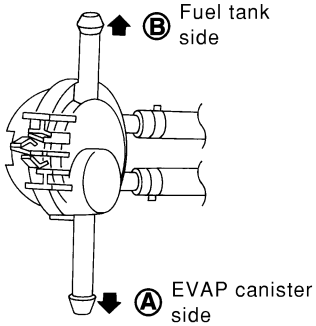
NIEC1667

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
A/F ALPHA- B1	XXX %
A/F SEN1 (B1)	XXX V
THRTL POS SEN	X.XX V

SEF566Z

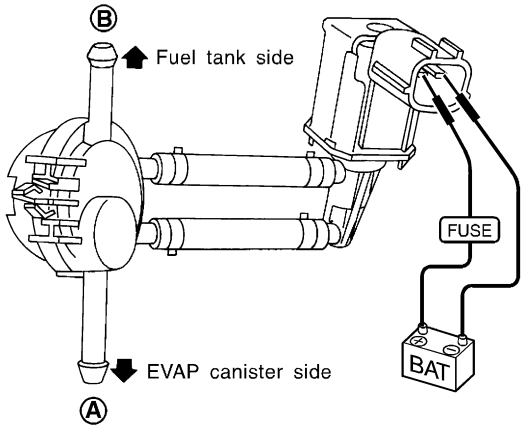
OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 5.

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.

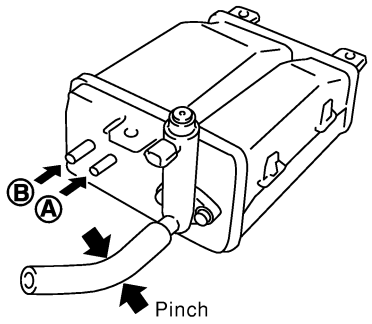
OK or NG

OK	▶	GO TO 6.
NG	▶	Clean EVAP purge port.

Diagnostic Procedure (Cont'd)

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**.



SEF501Z

OK or NG

OK	▶	GO TO 12.
NG	▶	Replace EVAP canister.

7	CHECK BYPASS HOSE

Check bypass hoses for clogging.

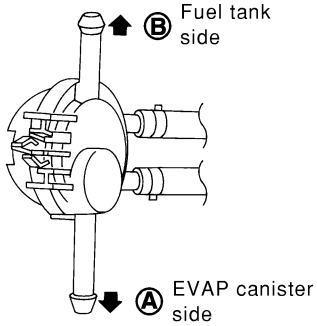
OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace hoses.

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.

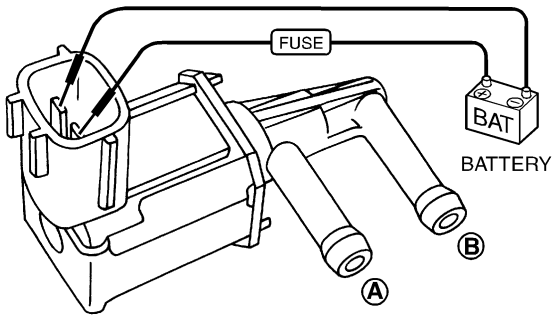


ACTIVE TEST	
VC/V BYPASS/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA- B1	XXX %
A/F SEN1 (B1)	XXX V
THRTL POS SEN	X.XX V

SEF566Z

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

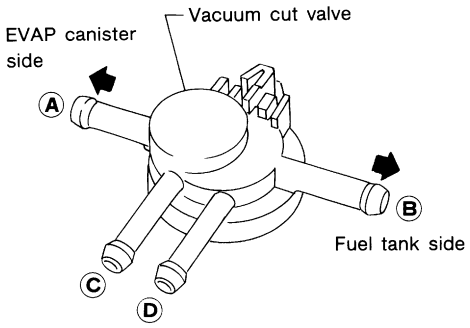
OK or NG

OK	▶	GO TO 9.
NG	▶	Replace vacuum cut valve bypass valve.

Diagnostic Procedure (Cont'd)

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

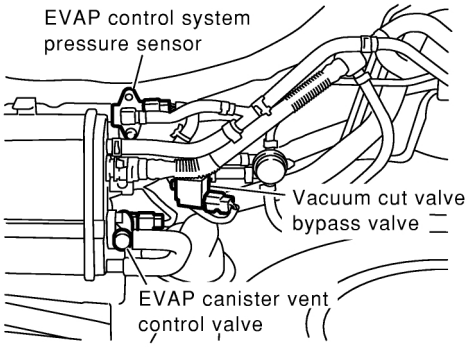
1. Turn ignition switch "OFF".
2. Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.

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.



SEF403Z

2. Check connectors for water.
Water should not exist.

OK or NG

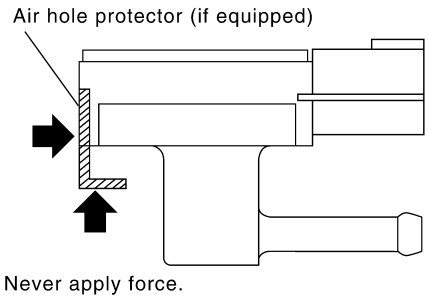
OK	▶	GO TO 12.
NG	▶	Replace EVAP control system pressure sensor.

12	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

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.**



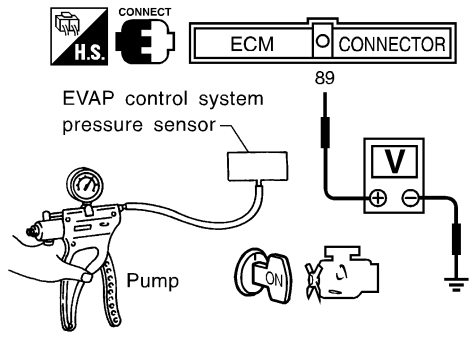
SEF799W

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 89 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

SEF543Z

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.

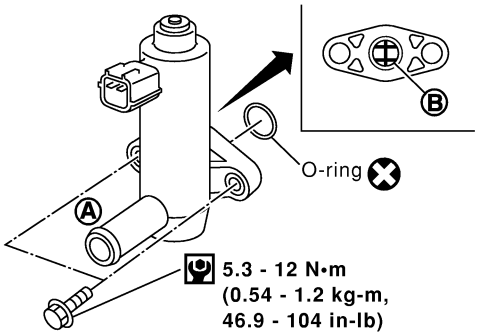
OK or NG

OK	▶	GO TO 14.
NG	▶	Clean the rubber tube using an air blower.

Diagnostic Procedure (Cont'd)

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.



SEF376Z

OK or NG

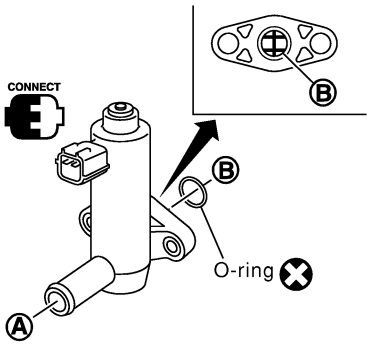
OK	▶	GO TO 15.
NG	▶	Replace EVAP canister vent control valve.

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
A/F ALPHA-B1	XXX %
A/F SEN1 (B1)	XXX V
THRTL POS SEN	XXX V



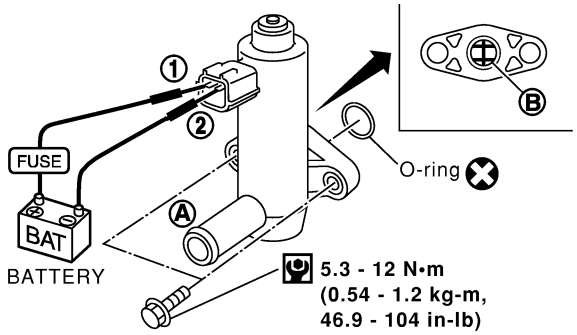
Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

SEF544Z

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.

SEF378Z

Make sure new O-ring is installed properly.

OK or NG

OK	▶	GO TO 17.
NG	▶	GO TO 16.

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-842.	
▶	**INSPECTION END**

System Description

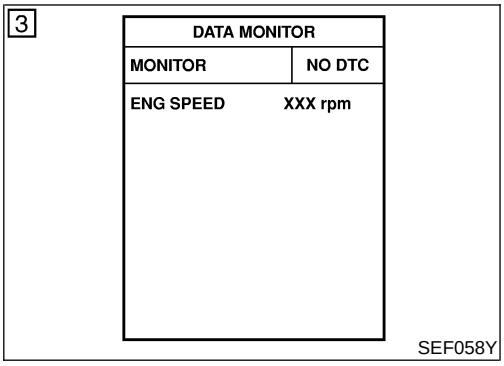
NIEC1668

The malfunction information related to A/T (Automatic Transaxle) is transferred through the line (circuit) from TCM (Transmission Control Module) to ECM. Therefore, be sure to erase the malfunction information such as DTC not only in TCM (Transmission Control Module) but also ECM after the A/T related repair.

On Board Diagnosis Logic

NIEC1669

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1605	• An incorrect signal from TCM (Transmission Control Module) is sent to ECM.	• Harness or connectors [The communication line circuit between ECM and TCM (Transmission Control Module) is open or shorted.] • Dead (Weak) battery • TCM (Transmission Control Module)



DTC Confirmation Procedure

NIEC1670

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 is more than 10.5V with the ignition switch “ON”.

With CONSULT-II

1) Turn ignition switch “ON”.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Start engine and let it idle for at least 40 seconds.
4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-1324.

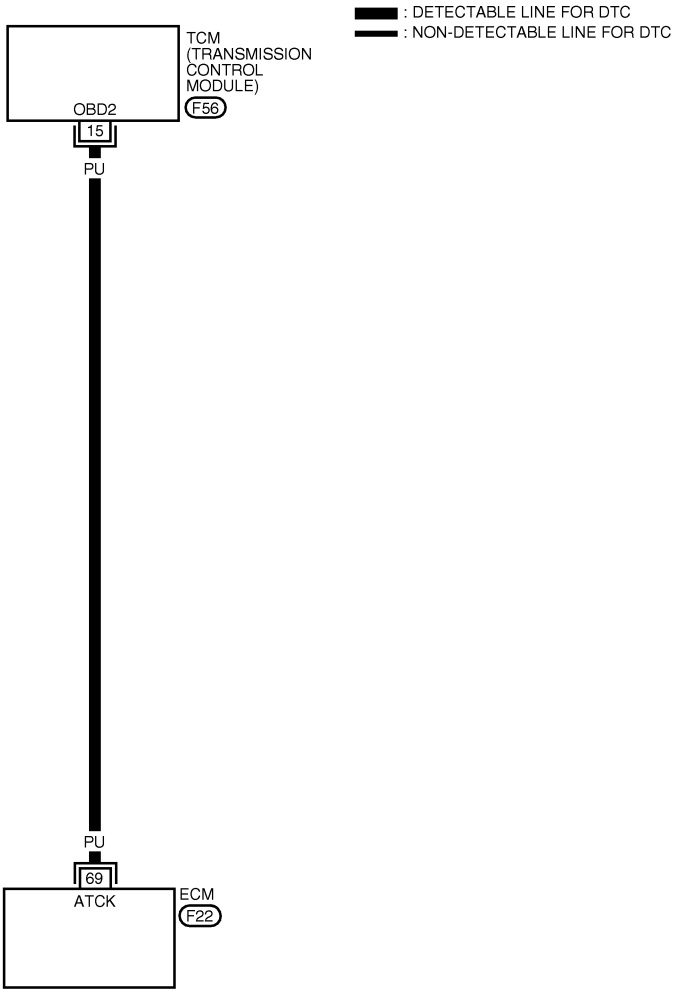
With GST

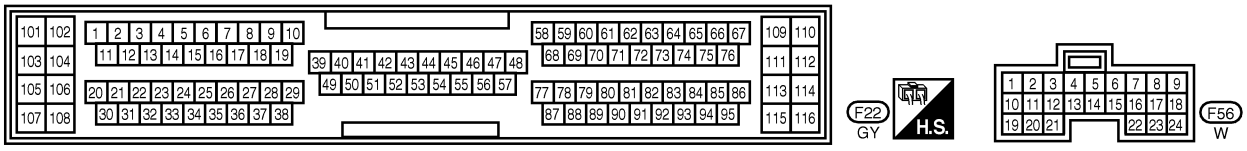
Follow the procedure “With CONSULT-II” above.

Wiring Diagram

NIEC1671

EC-ATDIAG-01





WEC404

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)
69	PU	A/T CHECK SIGNAL	IGN ON	0 - APPROX. 5V

SEF586YA

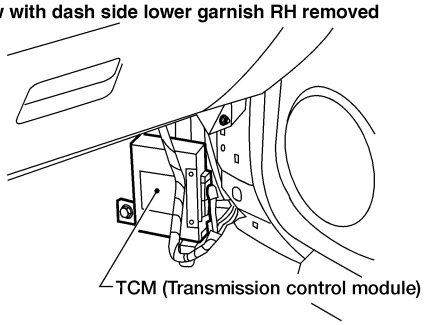
Diagnostic Procedure

NIEC1672

1	CHECK INPUT SIGNAL CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector and TCM harness connector.

View with dash side lower garnish RH removed



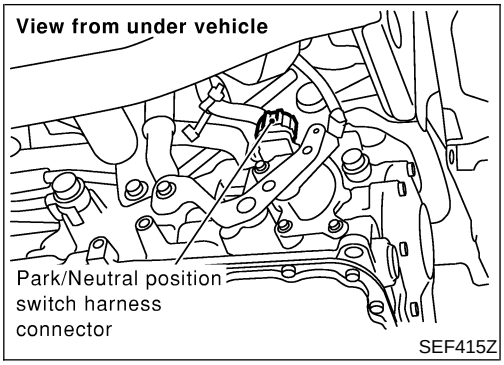
LEC306

3. Check harness continuity between ECM terminal 69 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
Perform “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-842.	
▶	**INSPECTION END**



Component Description

NIEC1673

When the gear position is “P” or “N”, park/neutral position (PNP) switch is “ON”.
ECM detects the park/neutral position when continuity with ground exists.

CONSULT-II Reference Value in Data Monitor Mode

NIEC1674

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

NIEC1675

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1706	• The signal of the PNP switch is not changed in the process of engine starting and driving.	• Harness or connectors (The PNP switch circuit is open or shorted.) • PNP switch

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

DTC Confirmation Procedure

NIEC1676

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

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

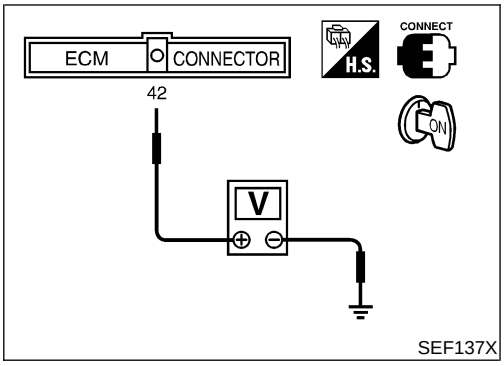
If NG, go to “Diagnostic Procedure”, EC-1328.
If OK, go to following step.

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 50 consecutive seconds.

ENG SPEED	1,600 - 3,400 rpm
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	3.0 - 12.5 msec
VHCL SPEED SE	64 - 130 km/h (40 - 81 MPH)
Selector lever	Suitable position

6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1328.



Overall Function Check

NIEC1677

Use this procedure to check the overall function of the park/neutral position switch circuit. During this check, a 1st trip DTC might not be confirmed.

Without CONSULT-II

1) Turn ignition switch "ON".
2) Check voltage between ECM terminal 42 (PNP switch signal) and body ground under the following conditions.

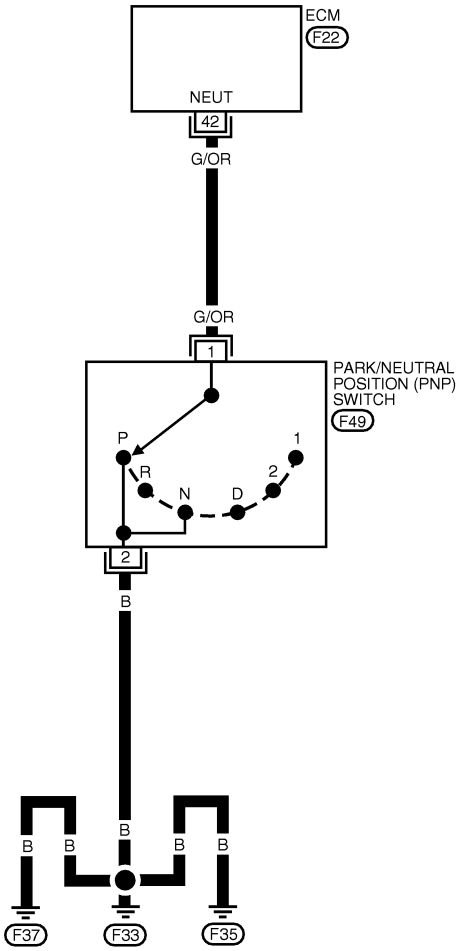
Condition (Gear position)	Voltage (V) (Known-good data)
"P" (A/T only) and "N" position	Approx. 0
Except the above position	BATTERY VOLTAGE (11 - 14V)

3) If NG, go to "Diagnostic Procedure", EC-1328.

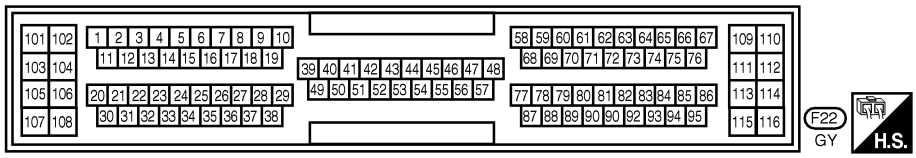
Wiring Diagram

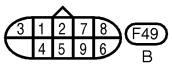
NIEC1678

EC-PNP/SW-01



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





WEC409

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	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

SEF587Y

Diagnostic Procedure

NIEC1679

1	CHECK GROUND CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect PNP switch harness connector.
3. Check harness continuity between PNP switch terminal 2 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 2.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

2	CHECK INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 42 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 3.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

3	CHECK PNP SWITCH

Refer to ***AT-119***, “Component Inspection”.

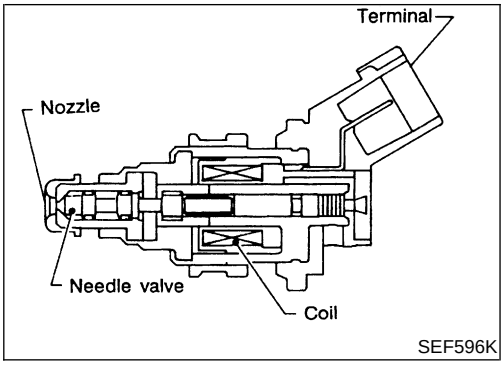
OK or NG

OK	▶	GO TO 4.
NG	▶	Replace PNP switch.

4	CHECK INTERMITTENT INCIDENT

Perform “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-842.

	▶	**INSPECTION END**



Component Description

NIEC1680

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

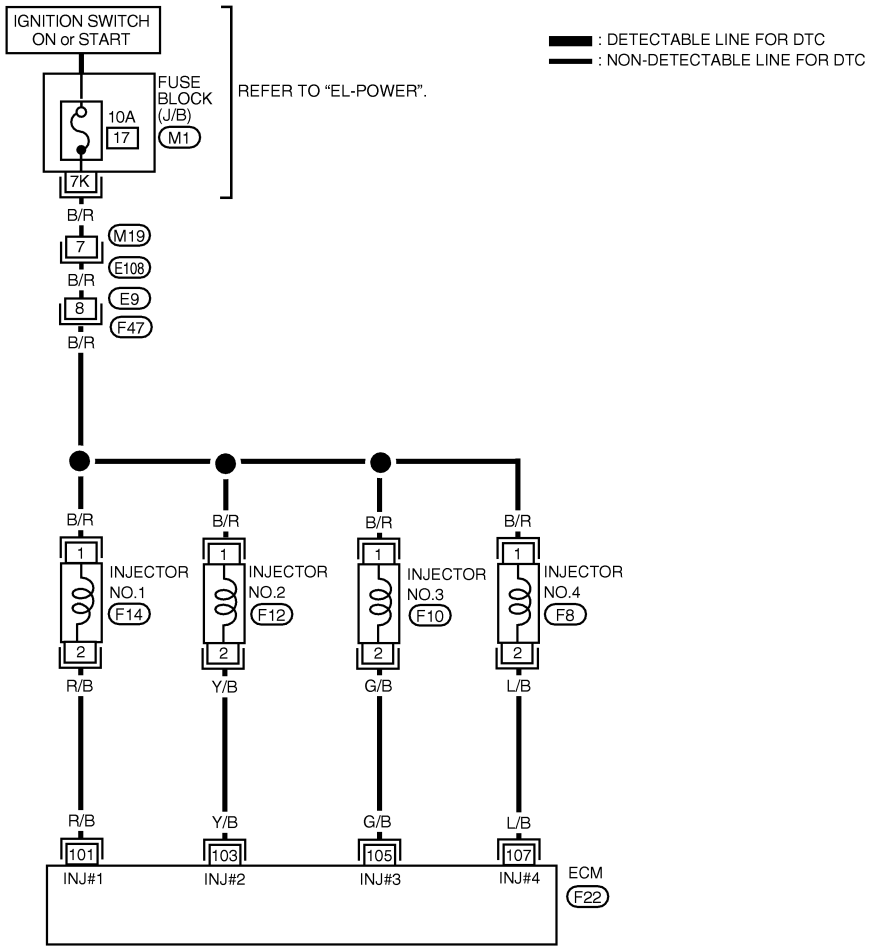
NIEC1681

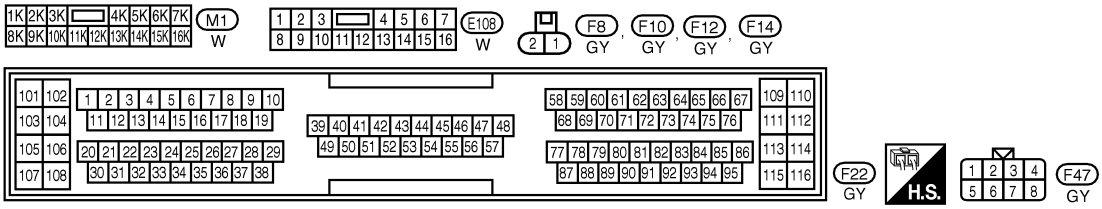
MONITOR ITEM	CONDITION		SPECIFICATION
INJ PULSE-B1	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: “N” • No-load	Idle	2.4 - 3.2 msec
		2,000 rpm	1.9 - 2.8 msec
B/FUEL SCHDL	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: “N” • No-load	Idle	1.0 - 1.6 msec
		2,000 rpm	0.7 - 1.3 msec

Wiring Diagram

NIEC1682

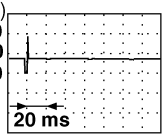
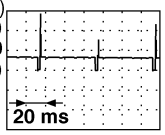
EC-INJECT-01





WEC415

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 (V) 40 20 0  20 ms
103	Y/B	INJECTOR NO. 2		
105	G/B	INJECTOR NO. 3		
107	L/B	INJECTOR NO. 4		
			ENGINE RUNNING AT 2,000 RPM UNDER WARM-UP CONDITION	BATTERY VOLTAGE (V) 40 20 0  20 ms

SEF588Y

Diagnostic Procedure

NIEC1683

1	CHECK OVERALL FUNCTION

With CONSULT-II

1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-II.

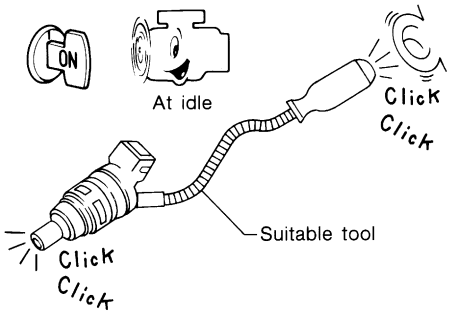
ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
IACV-AAC/V	XXX step

SEF190Y

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.

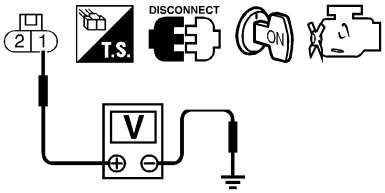
OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 2.

Diagnostic Procedure (Cont'd)

2	CHECK POWER SUPPLY

1. Stop engine.
2. Disconnect injector harness connector.
3. Turn ignition switch "ON".
4. Check voltage between injector terminal 1 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF949X

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	DETECT MALFUNCTIONING PART

Check the following.
- 10A fuse
- Harness connectors M19, E108
- Harness connectors E9, F47
- Harness for open or short between injector and fuse

	▶	Repair harness or connectors.

4	CHECK OUTPUT SIGNAL CIRCUIT

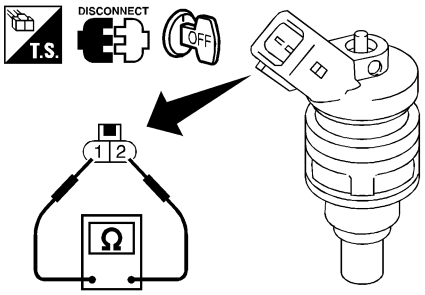
1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between injector harness connector terminal 2 and ECM terminals 101, 103, 105, 107. Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

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 INJECTOR

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



Resistance: 13.5 - 17.5 Ω [at 20°C (68°F)]

SEF964XA

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace injector.

6	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-842.	
▶	**INSPECTION END**

CONSULT-II Reference Value in Data Monitor Mode

NIEC1684

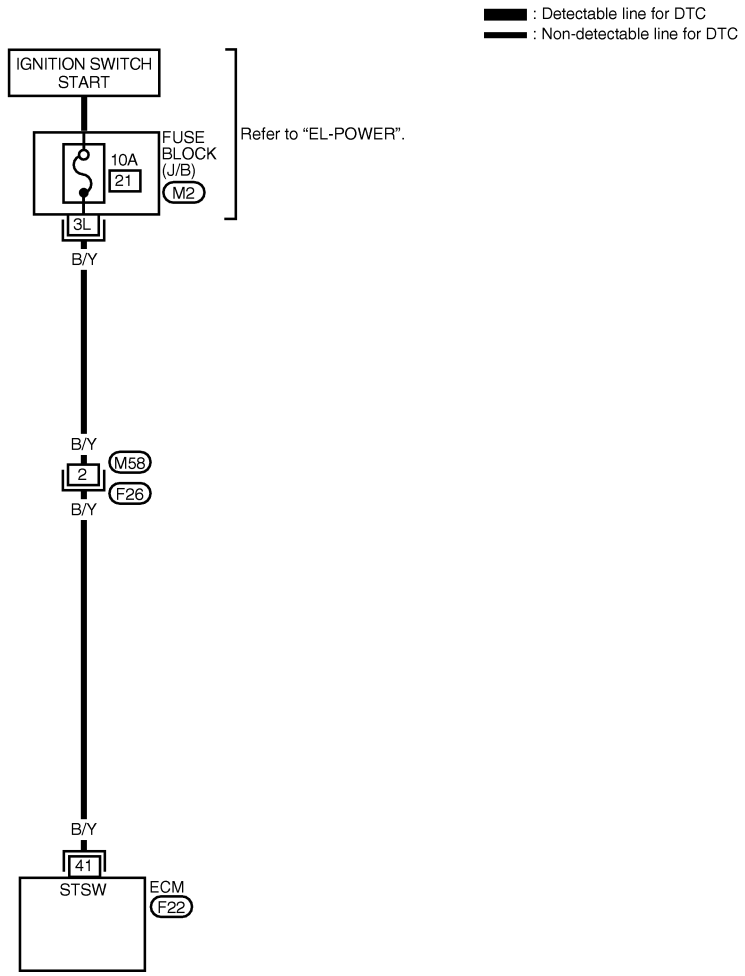
Specification data are reference values.

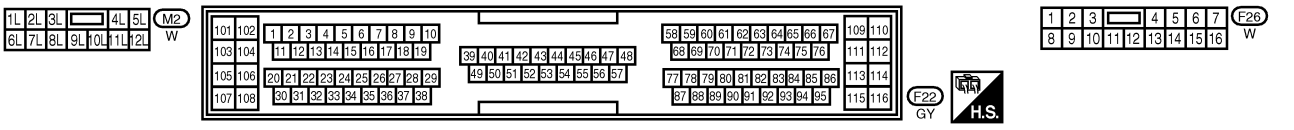
MONITOR ITEM	CONDITION	SPECIFICATION
START SIGNAL	• Ignition switch: ON → START → ON	OFF → ON → OFF

Wiring Diagram

=NIEC1685

EC-S/SIG-01





LEC212

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)
41	B/Y	START SIGNAL	IGN ON	APPROX. 0V
			IGN START	9 - 14V

SEF589Y

Diagnostic Procedure

=NIEC1686

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	
MONITORING	NO FAIL
START SIGNAL	OFF
CLSD TH/P SW	ON
AIR COND SIG	OFF
P/N POSI SW	ON

Condition	“START SIGNAL”
Ignition switch “ON”	OFF
Ignition switch “START”	ON

SEF604X

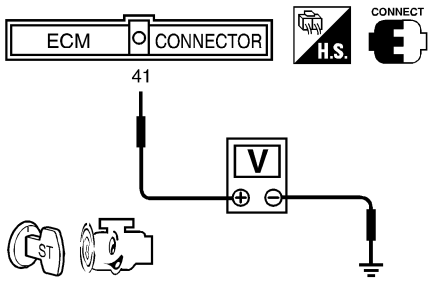
OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 4.

3	CHECK OVERALL FUNCTION

Without CONSULT-II

1. Turn ignition switch to “START”.
2. Check voltage between ECM terminal 41 and ground under the following conditions.



Condition	Voltage
Ignition switch “START”	Battery voltage
Except above	Approximately 0V

SEF529Z

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART	
Check the following. ● Harness connectors M58, F26 ● 10A fuse ● Harness for open or short between ECM and fuse		
OK or NG		
OK	▶	GO TO 5.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK INTERMITTENT INCIDENT	
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-842.		
	▶	**INSPECTION END**

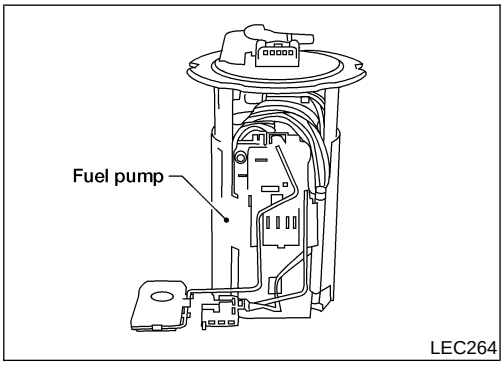
System Description

NIEC1687

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed	Fuel pump control	Fuel pump relay
Camshaft position sensor (PHASE)	Engine speed and cylinder number		
Ignition switch	Start signal		

The ECM activates the fuel pump for several seconds after the ignition switch is turned on to improve engine startability. If the ECM receives a 180° signal from the camshaft position sensor, it knows that the engine is rotating, and causes the pump to perform. If the 180° signal is not received when the ignition switch is on, the engine stalls. The ECM stops pump operation and prevents battery discharging, thereby improving safety. The ECM does not directly drive the fuel pump. It controls the ON/OFF fuel pump relay, which in turn controls the fuel pump.

Condition	Fuel pump operation
Ignition switch is turned to ON.	Operates for 5 seconds
Engine running and cranking	Operates
When engine is stopped	Stops in 1 second
Except as shown above	Stops



Component Description

NIEC1688

A turbine type design fuel pump is used in the fuel tank.

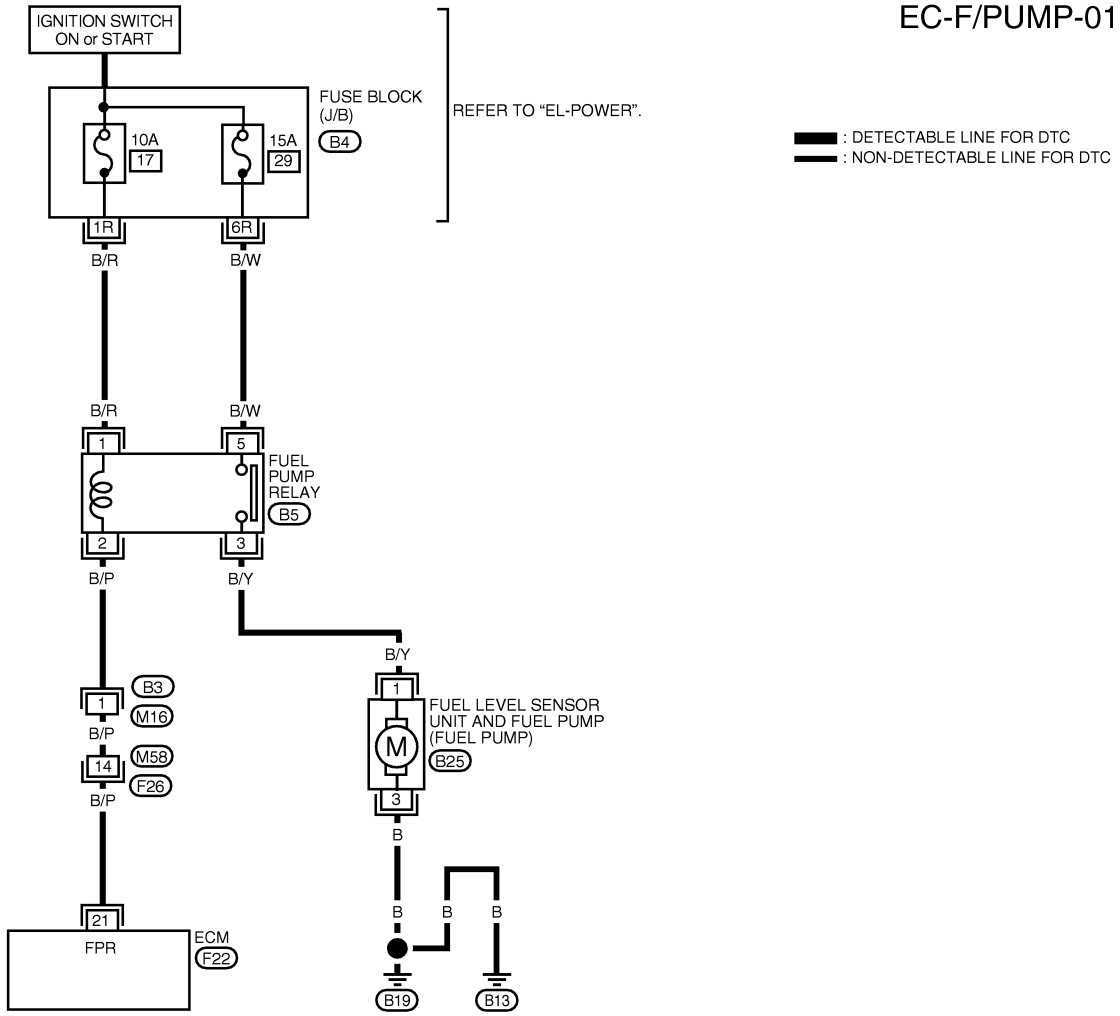
CONSULT-II Reference Value in Data Monitor Mode

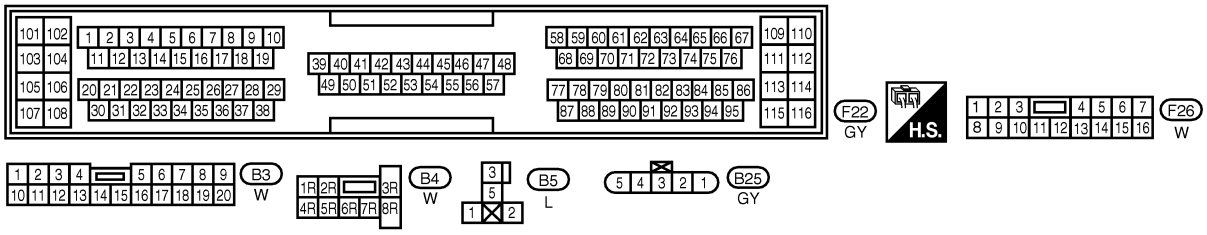
NIEC1689

MONITOR ITEM	CONDITION	SPECIFICATION
FUEL PUMP RLY	• Ignition switch is turned to ON (Operates for 5 seconds) • Engine running and cranking • When engine is stopped (stops in 1.0 seconds)	ON
	• Except as shown above	OFF

Wiring Diagram

NIEC1690





WEC414

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)
21	B/P	FUEL PUMP RELAY	FOR 5 SECONDS AFTER IGN ON	0 - 1V
			ENGINE RUNNING	
			MORE THAN 5 SECONDS AFTER IGN ON	BATTERY VOLTAGE

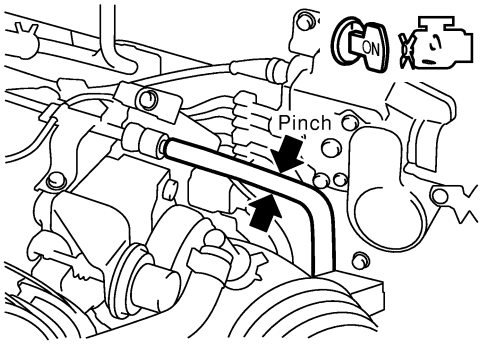
SEF611Z

Diagnostic Procedure

NIEC1691

1	CHECK OVERALL FUNCTION

1. Turn ignition switch “ON”.
2. Pinch fuel feed hose with fingers.



SEF416Z

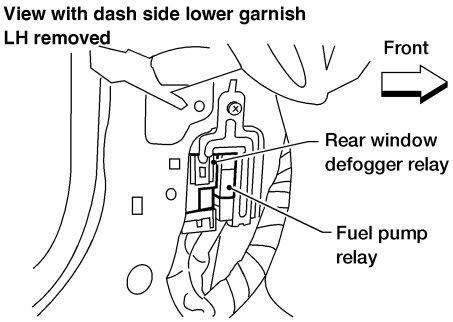
Fuel pressure pulsation should be felt on the fuel feed hose for 5 seconds after ignition switch is turned “ON”.

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 2.

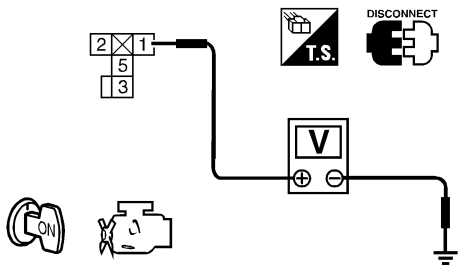
2	CHECK POWER SUPPLY-I

1. Turn ignition switch “OFF”.
2. Disconnect fuel pump relay-1.



LEC363

3. Turn ignition switch “ON”.
4. Check voltage between fuel pump relay terminals 1, 5 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF530Z

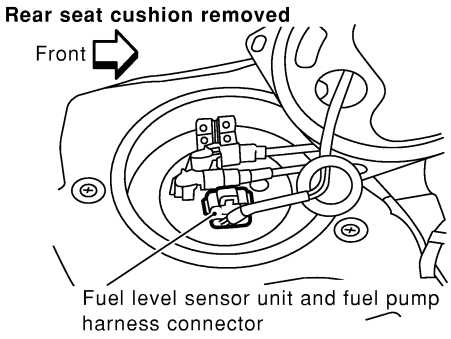
OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	DETECT MALFUNCTIONING PART
Check the following. ● 10A fuse ● 15A fuse ● Harness for open or short between fuse and fuel pump relay	
▶	Repair harness or connectors.

4	CHECK POWER GROUND CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect fuel level sensor unit and fuel pump harness connector.



SEF396Z

3. Check harness continuity between fuel level sensor unit and fuel pump terminal 3 and body ground, fuel level sensor unit and 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 level sensor unit and fuel pump and body ground ● Harness for open or short between fuel level sensor unit and fuel pump and fuel pump relay	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK OUTPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 21 and fuel pump relay connector 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.

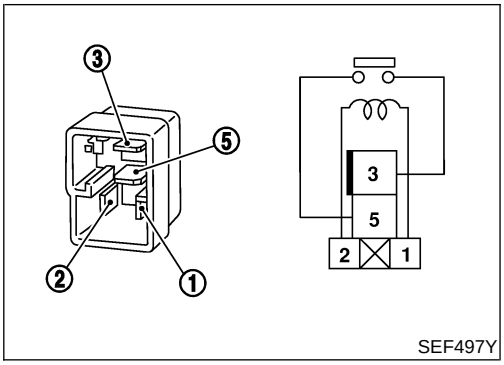
7	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors B3, M16 ● Harness connector M58, F26 ● Harness for open or short between ECM and fuel pump relay	
NG ▶	Repair open circuit or short to ground or short to power in harness or connectors.

Diagnostic Procedure (Cont'd)

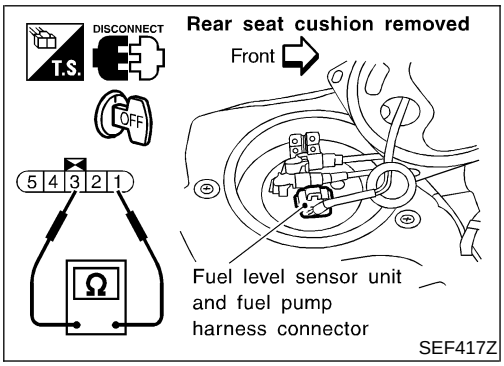
8	CHECK FUEL PUMP RELAY	
Refer to "Component Inspection", EC-1343.		
OK or NG		
OK	▶	GO TO 9.
NG	▶	Replace fuel pump relay.

9	CHECK FUEL PUMP	
Refer to "Component Inspection", EC-1343.		
OK or NG		
OK	▶	GO TO 10.
NG	▶	Replace fuel pump.

10	CHECK INTERMITTENT INCIDENT	
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-842.		
	▶	**INSPECTION END**



SEF497Y



SEF417Z

Component Inspection

=NIEC1692

FUEL PUMP RELAY

NIEC1692S01

Check continuity between terminals 3 and 5.

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

If NG, replace relay.

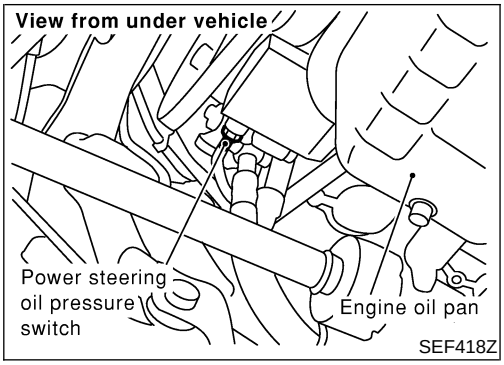
FUEL PUMP

NIEC1692S02

1. Disconnect fuel pump harness connector.
2. Check resistance between terminals 1 and 2.

   Resistance: 0.2 - 5.0Ω [at 25°C (77°F)]

   If NG, replace fuel pump.



Component Description

NIEC1693

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

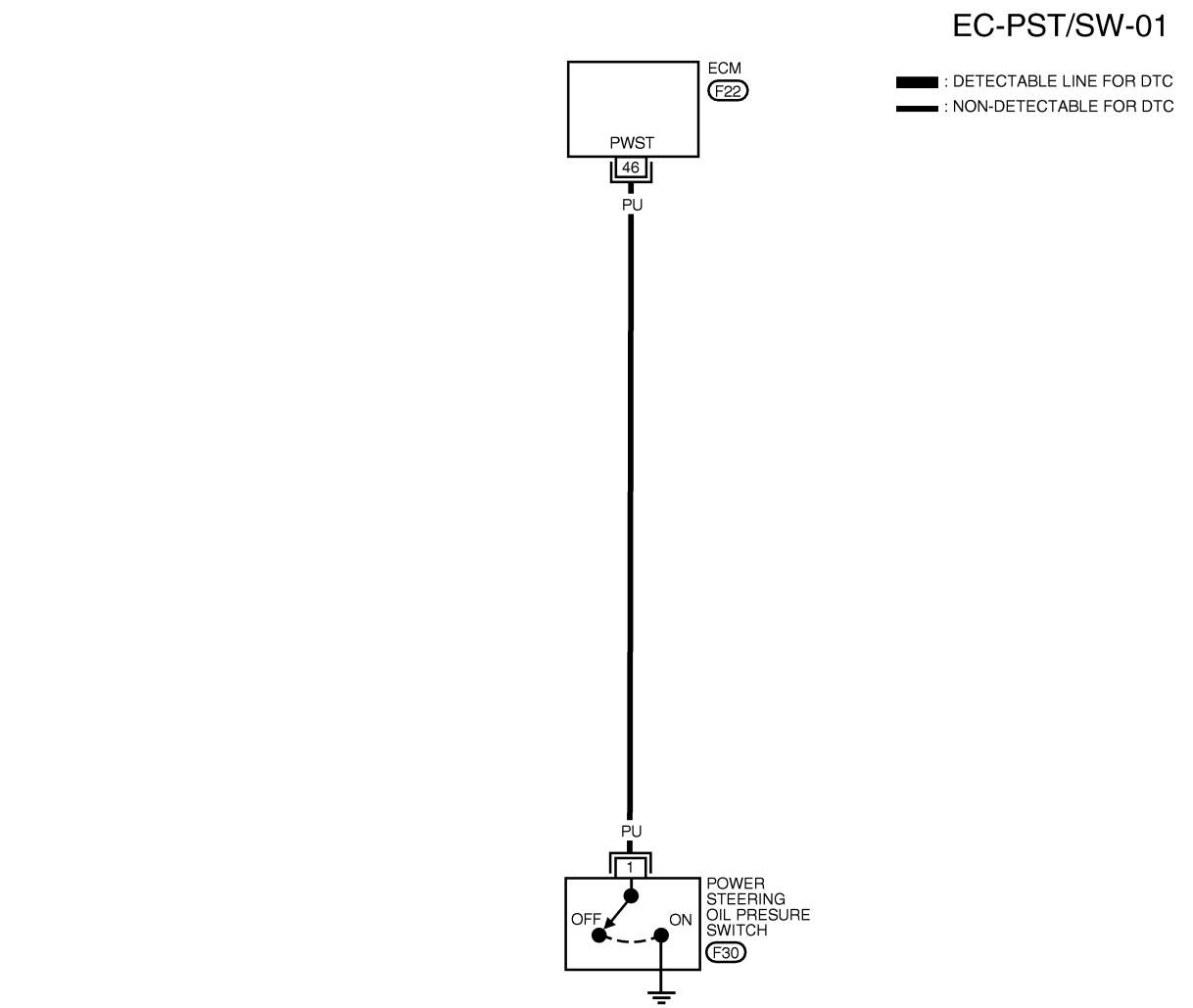
NIEC1694

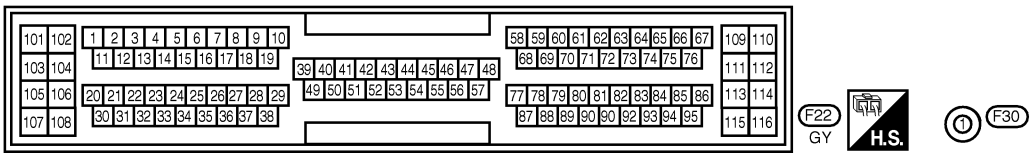
Specification data are reference values.

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

NIEC1695





WEC416

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)
46	PU	POWER STEERING OIL PRESSURE SWITCH	ENGINE RUNNING WITH STEERING WHEEL BEING FULLY TURNED	APPROX. 0V
			ENGINE RUNNING WITH STEERING WHEEL NOT BEING TURNED	APPROX. 5V

SEF591YA

Diagnostic Procedure

=NIEC1696

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

Condition	PW/ST SIGNAL indication
Steering is in neutral position	OFF
Steering is turned	ON

SEF531Z

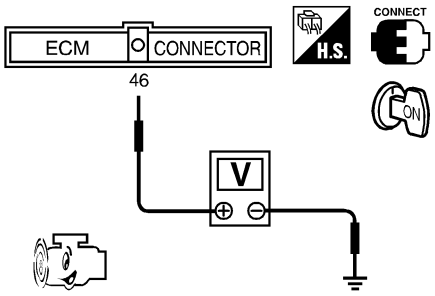
OK or NG

OK ▶	**INSPECTION END**
NG ▶	GO TO 4.

3	CHECK OVERALL FUNCTION

Without CONSULT-II

1. Start engine.
2. Check voltage between ECM terminal 46 and ground under the following conditions.



Condition	Voltage
When steering wheel is turned quickly	Approximately 0V
Except above	Approximately 5V

SEF532Z

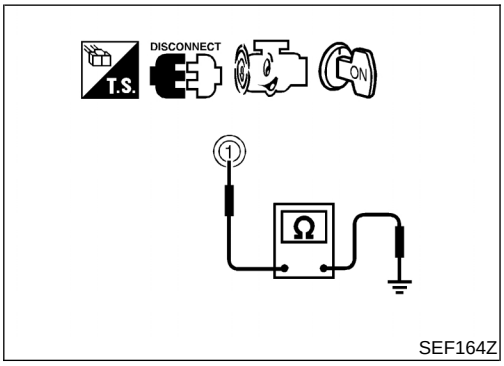
OK or NG

OK ▶	**INSPECTION END**
NG ▶	GO TO 4.

4	CHECK INPUT SIGNAL CIRCUIT
1. Turn ignition switch "OFF". 2. Disconnect power steering oil pressure switch harness connector. 3. Disconnect ECM harness connector. 4. Check harness continuity between ECM terminal 46 and terminal 1. Refer to Wiring Diagram. **Continuity should exist.** 5. 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
Refer to "Component Inspection", EC-1347.	
OK or NG	
OK ▶	GO TO 6.
NG ▶	Replace power steering oil pressure switch.

6	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-842.	
▶	**INSPECTION END**



SEF164Z

Component Inspection

NIEC1697

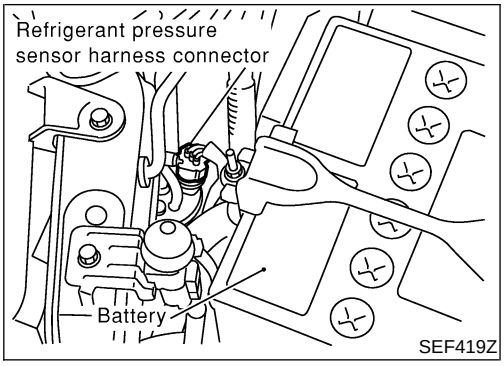
POWER STEERING OIL PRESSURE SWITCH

NIEC1697S01

1. Turn ignition switch "OFF".
2. Disconnect power steering oil pressure switch harness connector.
3. Start engine and let it idle.
4. Check continuity between terminals 1 and body ground.

Conditions	Continuity
Steering wheel is being turned	Yes
Steering wheel is not being turned	No

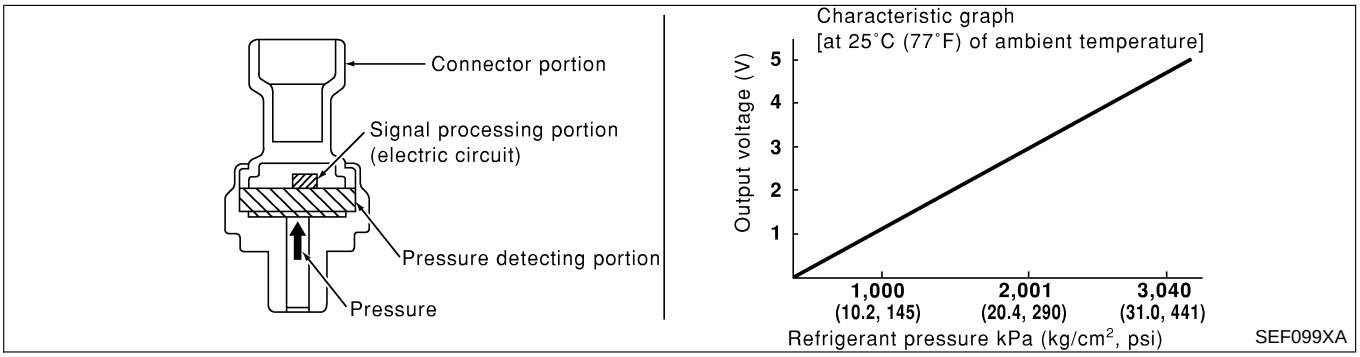
If NG, replace power steering oil pressure switch.



Description

NIEC1698

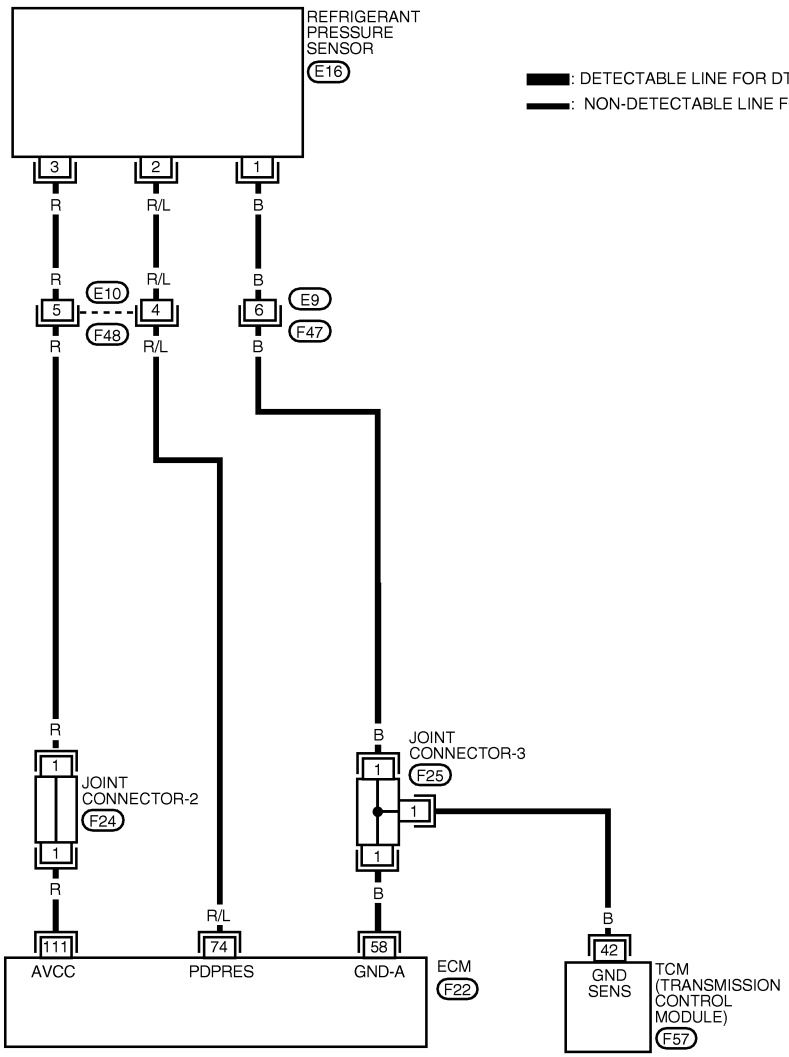
The refrigerant pressure sensor is installed at the liquid tank of the air conditioner system. The sensor uses an electrostatic volume pressure transducer to convert refrigerant pressure to voltage. The voltage signal is sent to ECM, and ECM controls cooling fan system.

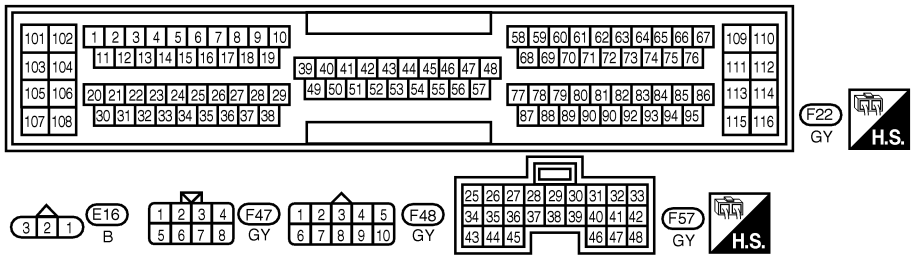


Wiring Diagram

NIEC1699

EC-RP/SEN-01





REFER TO THE FOLLOWING.
F24, F25 - JOINT CONNECTOR

WEC417

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	IGN ON	APPROX. 0V
74	R/L	REFRIGERANT PRESSURE SENSOR	ENGINE RUNNING UNDER WARM-UP CONDITION WITH A/C SWITCH AND BLOWER SWITCH ON	0.36 - 3.88V
111	R	SENSOR'S POWER SUPPLY	IGN ON	APPROX. 5V

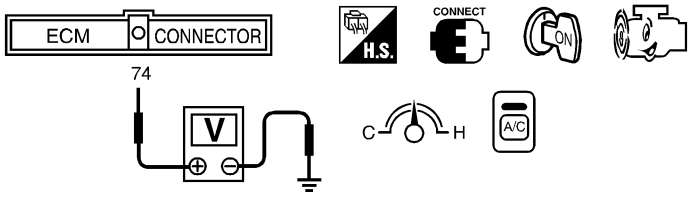
SEF592Y

Diagnostic Procedure

NIEC1700

1	CHECK REFRIGERANT PRESSURE SENSOR OVERALL FUNCTION

1. Start engine and warm it up to normal operating temperature.
2. Turn A/C switch and fan control switch “ON”.
3. Check voltage between ECM terminal 74 and ground with CONSULT-II or tester.



Voltage: 0.36 - 3.88V

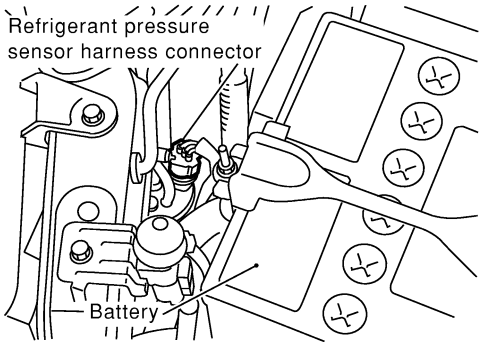
SEF952X

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 2.

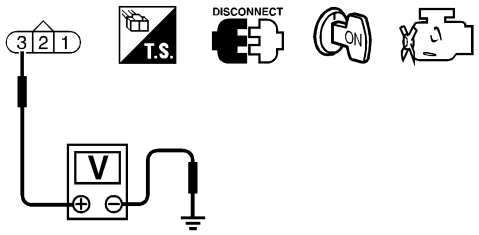
2	CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn A/C switch and fan control switch “OFF”.
2. Stop engine.
3. Disconnect refrigerant pressure sensor harness connector.



SEF419Z

4. Turn ignition switch “ON”.
5. Check voltage between refrigerant pressure sensor terminal 3 and ground with CONSULT-II or tester.



Voltage: Approximately 5V

SEF953X

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E10, F48 ● Joint connector-2 ● 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 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 6.
NG ▶	GO TO 5.

5	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E9, F47 ● Joint connector-3 ● Harness for open or short between TCM and refrigerant pressure sensor ● 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.

6	CHECK REFRIGERANT PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 74 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 E10, F48 ● 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-49***, "Refrigerant pressure sensor".	
OK or NG	
OK ▶	GO TO 9.
NG ▶	Replace refrigerant pressure sensor.

Diagnostic Procedure (Cont'd)

9	**CHECK INTERMITTENT INCIDENT**
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-842.	
▶	**INSPECTION END**

CONSULT-II Reference Value in Data Monitor Mode

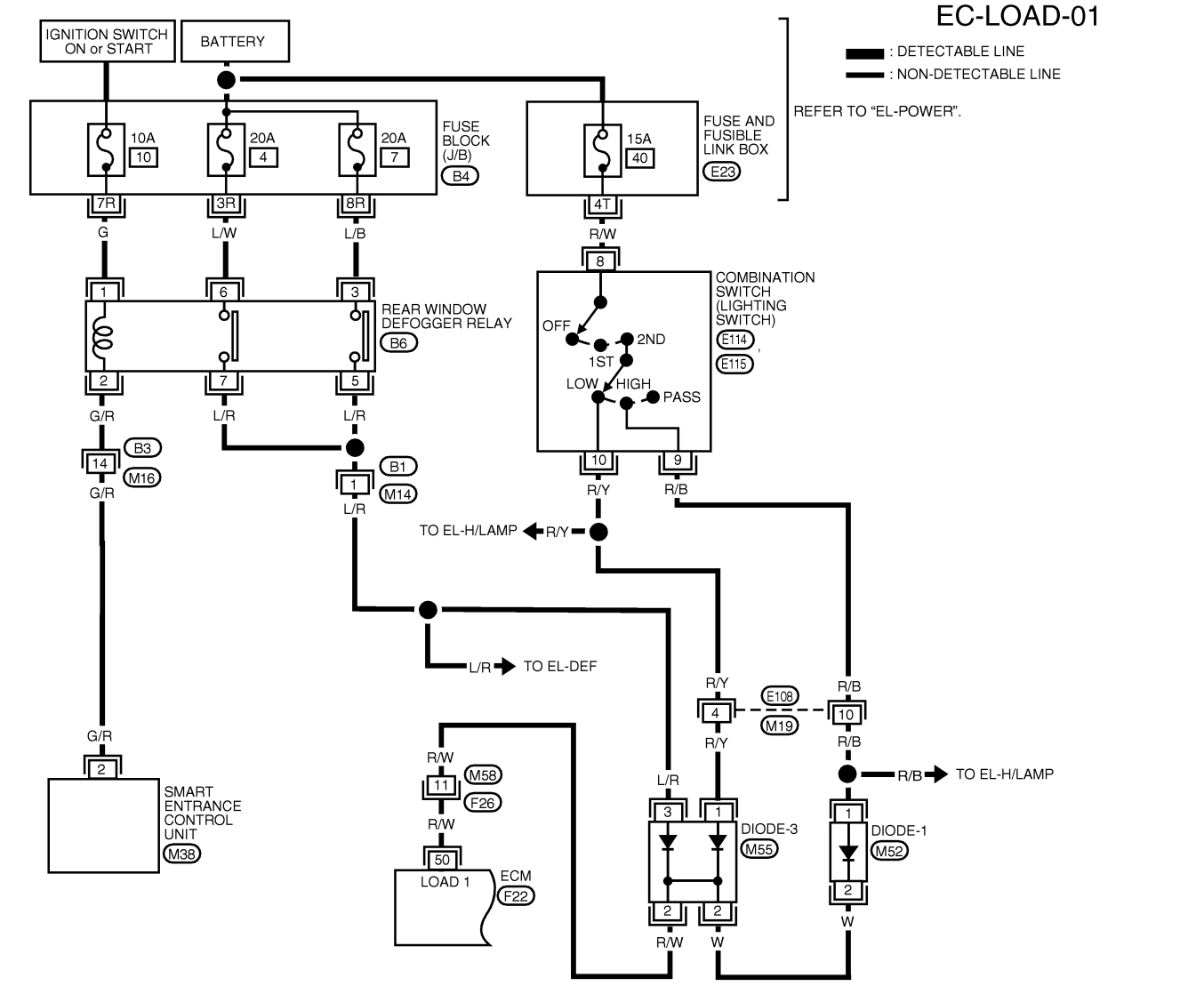
NIEC1701

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
LOAD SIGNAL	• Ignition switch: ON	Rear window defogger switch and/or lighting switch “ON”	ON
		Rear window defogger switch and lighting switch “OFF”	OFF

Wiring Diagram

=NIEC1702



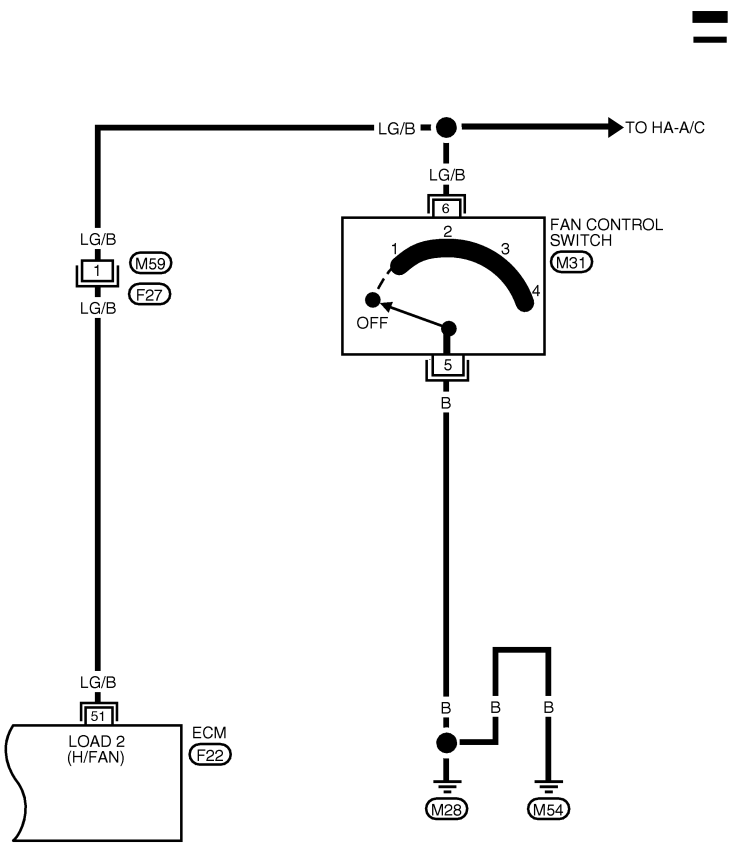
WEC418

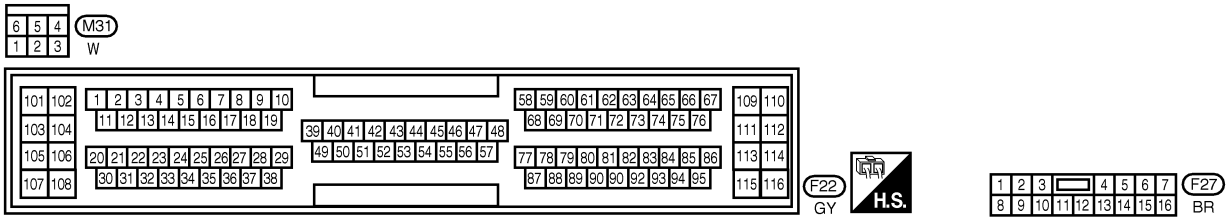
ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
50	R/W	ELECTRICAL LOAD SIGNAL	IGN ON WITH REAR WINDOW DEFOGGER SWITCH ON OR LIGHTING SWITCH 2ND POSITION	BATTERY VOLTAGE
			IGN ON WITH REAR WINDOW DEFOGGER SWITCH AND LIGHTING SWITCH OFF	0V

SEF593YA

EC-LOAD-02





WEC419

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)
51	LG/B	HEATER FAN SWITCH	IGN ON WITH FAN CONTROL SWITCH ON	APPROX. 0V
			IGN ON WITH FAN CONTROL SWITCH OFF	APPROX. 5V

SEF594Y

Diagnostic Procedure

NIEC1703

1	INSPECTION START

Do you have CONSULT-II?

Yes or No

Yes	▶	GO TO 2.
No	▶	GO TO 5.

2	CHECK LOAD SIGNAL (REAR WINDOW DEFOGGER) CIRCUIT OVERALL FUNCTION

With CONSULT-II

1. Turn ignition switch “ON”.
2. Check “LOAD SIGNAL” in “DATA MONITOR” mode with CONSULT-II under the following conditions.

DATA MONITOR	
MONITOR	NO DTC
LOAD SIGNAL	ON

Conditions	“LOAD SIGNAL”
Rear window defogger switch "ON"	ON
Rear window defogger switch "OFF"	OFF

SEF602Z

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 9.

3	CHECK LOAD SIGNAL (HEADLAMP LOW BEAM) CIRCUIT OVERALL FUNCTION

With CONSULT-II

Check “LOAD SIGNAL” in “DATA MONITOR” mode with CONSULT-II under the following conditions.

DATA MONITOR	
MONITOR	NO DTC
LOAD SIGNAL	ON

Condition	“LOAD SIGNAL”
Lighting switch “2ND” and “LOW” position	ON
Lighting switch “OFF”	OFF

SEF167Z

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 13.

4	CHECK LOAD SIGNAL (HEADLAMP HIGH BEAM) CIRCUIT OVERALL FUNCTION

With CONSULT-II

Check "LOAD SIGNAL" in "DATA MONITOR" mode with CONSULT-II under the following conditions.

DATA MONITOR	
MONITOR	NO DTC
LOAD SIGNAL	ON

Condition	"LOAD SIGNAL"
Lighting switch "2ND" and "HIGH" position	ON
Lighting switch "OFF"	OFF

SEF168Z

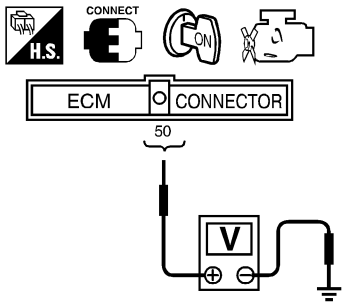
OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 17.

5	CHECK LOAD SIGNAL (REAR WINDOW DEFOGGER) CIRCUIT OVERALL FUNCTION

Without CONSULT-II

1. Turn ignition switch "ON".
2. Check voltage between ECM terminal 50 and ground under the following conditions.



Condition	Voltage
Rear window defogger switch "ON"	BATTERY VOLTAGE
Rear window defogger switch "OFF"	0V

SEF956X

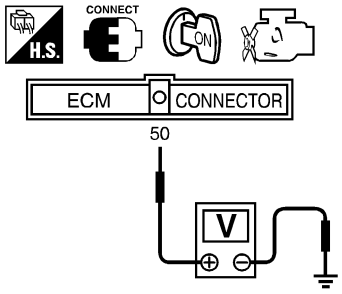
OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 9.

6	CHECK LOAD SIGNAL (HEADLAMP LOW BEAM) CIRCUIT OVERALL FUNCTION

Without CONSULT-II

Check voltage between ECM terminal 50 and ground under the following conditions.



Condition	Voltage
Lighting switch "2ND" and "LOW" position	BATTERY VOLTAGE
Lighting switch "OFF"	0V

SEF183Z

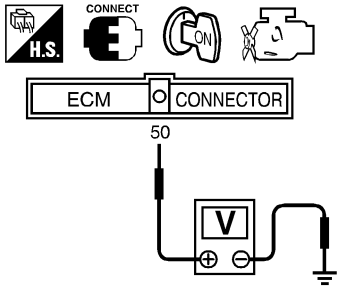
OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 13.

7	CHECK LOAD SIGNAL (HEADLAMP HIGH BEAM) CIRCUIT OVERALL FUNCTION

Without CONSULT-II

Check voltage between ECM terminal 50 and ground under the following conditions.



Condition	Voltage
Lighting switch "2ND" and "HIGH" position	BATTERY VOLTAGE
Lighting switch "OFF"	0V

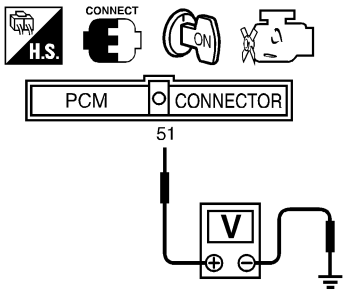
SEF184Z

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 17.

8	CHECK LOAD SIGNAL (FAN CONTROL SWITCH) CIRCUIT OVERALL FUNCTION

Check voltage between ECM terminal 51 and ground under the following conditions.



Condition	Voltage
Fan control switch "ON"	BATTERY VOLTAGE
Fan control switch "OFF"	0V

SEF166Z

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 21.

9	CHECK REAR WINDOW DEFOGGER FUNCTION

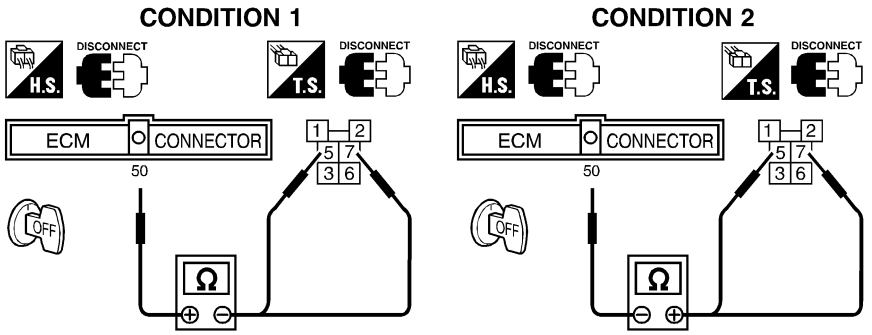
1. Start engine.
2. Turn "ON" the rear window defogger switch.
3. Check the rear windshield. Is the rear windshield heated up?

Yes or No

Yes	▶	GO TO 10.
No	▶	Refer to ***EL-145***, "Rear Window Defogger".

10	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 50 and rear window defogger relay terminals 5 and 7 under the following conditions.



CONDITION	CONTINUITY
1	Should exist.
2	Should not exist.

SEF560Y

5. 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 B1, M14
- Harness connectors M58, F26
- Diode M55
- 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.

12	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-842.

	▶	**INSPECTION END**

13	CHECK HEADLAMP LOW BEAM FUNCTION

1. Start engine.
2. Turn the lighting switch "2ND" and "LOW" position.
3. Check that headlamp low beams are illuminated.

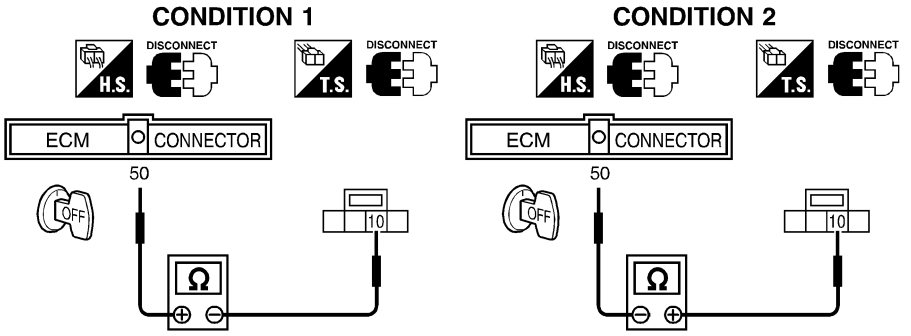
OK or NG

OK	▶	GO TO 14.
NG	▶	Refer to ***EL-53***, "HEADLAMP (FOR USA)".

Diagnostic Procedure (Cont'd)

14	CHECK HEADLAMP INPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Stop engine.
2. Disconnect ECM harness connector.
3. Disconnect lighting switch harness connectors.
4. Check harness continuity between ECM terminal 50 and lighting switch terminal 10 under the following conditions.



CONDITION	CONTINUITY
1	Should exist.
2	Should not exist.

SEF199Z

5. 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 M58, F26
- Harness connectors M19, E108
- Diode M55
- Harness for open and short between ECM and lighting switch

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

16	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-842.

	▶	**INSPECTION END**

17	CHECK HEADLAMP HIGH BEAM FUNCTION

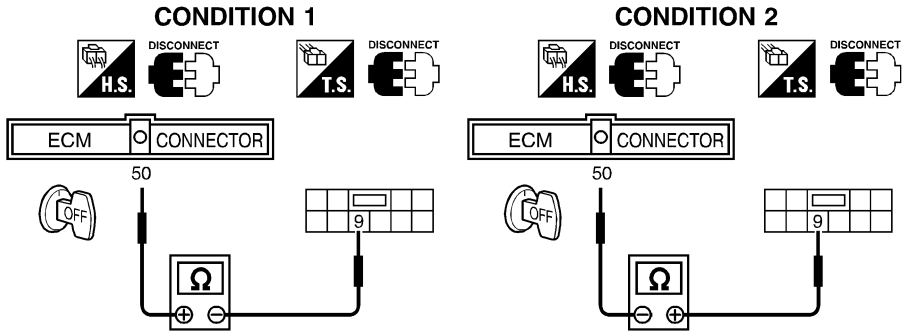
1. Start engine.
2. Turn the lighting switch "2ND" and "HIGH" position.
3. Check that headlamp high beams are illuminated.

OK or NG

OK	▶	GO TO 18.
NG	▶	Refer to ***EL-35***, "HEADLAMP (FOR USA)".

18	CHECK HEADLAMP HIGH BEAM INPUT SIGNAL CIRCUIT FOR OPEN OR SHORT (FOR USA)

1. Stop engine.
2. Disconnect ECM harness connector.
3. Disconnect lighting switch harness connector.
4. Check harness continuity between ECM terminal 50 and lighting switch terminal 9 under the following conditions.



CONDITION	CONTINUITY
1	Should exist.
2	Should not exist.

SEF200Z

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

OK or NG

OK	▶	GO TO 20.
NG	▶	GO TO 19.

19	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M58, F26
- Harness connectors E108, M19
- Diode-1 M52
- Diode-3 M55
- Harness for open and short between ECM and lighting switch

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

20	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-842.

	▶	**INSPECTION END**

21	CHECK FAN CONTROL SWITCH FUNCTION

1. Start engine.
2. Turn "ON" the fan control switch.
3. Check the blower fan motor. Is the blower fan motor operating?

Yes or No

Yes	▶	GO TO 22.
No	▶	Refer to ***HA-36***, "Trouble Diagnosis Procedure for Blower Motor".

Diagnostic Procedure (Cont'd)

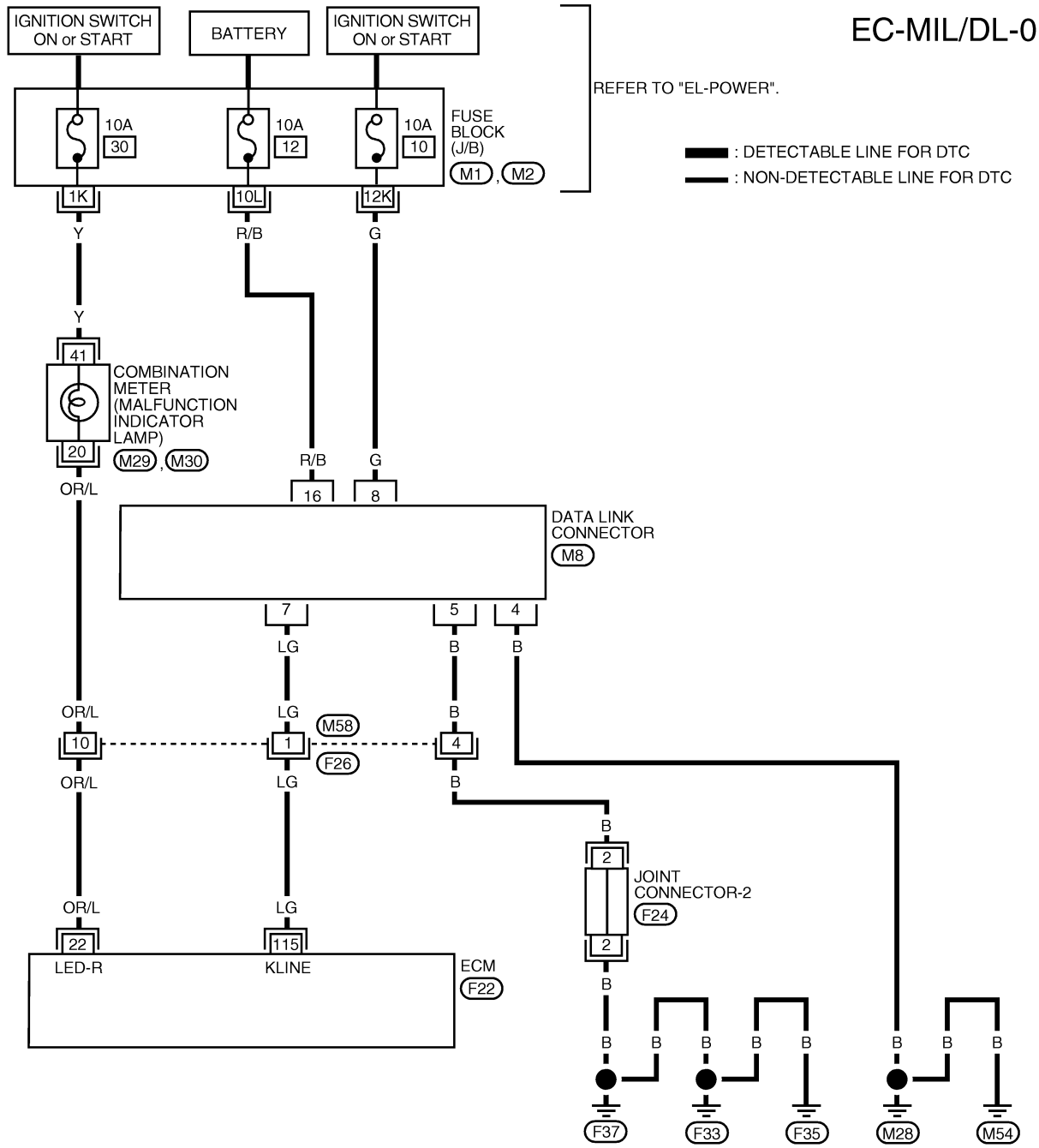
22	CHECK FAN CONTROL SWITCH INPUT SIGNAL CIRCUIT FOR OPEN OR SHORT
1. Stop engine. 2. Disconnect ECM harness connector. 3. Disconnect fan control switch harness connector. 4. Check harness continuity between ECM terminal 51 and fan control switch terminal 6. Refer to Wiring Diagram. **Continuity should exist.** 5. Also check harness for short to ground and short to power.	
OK or NG	
OK ▶	GO TO 24.
NG ▶	GO TO 23.

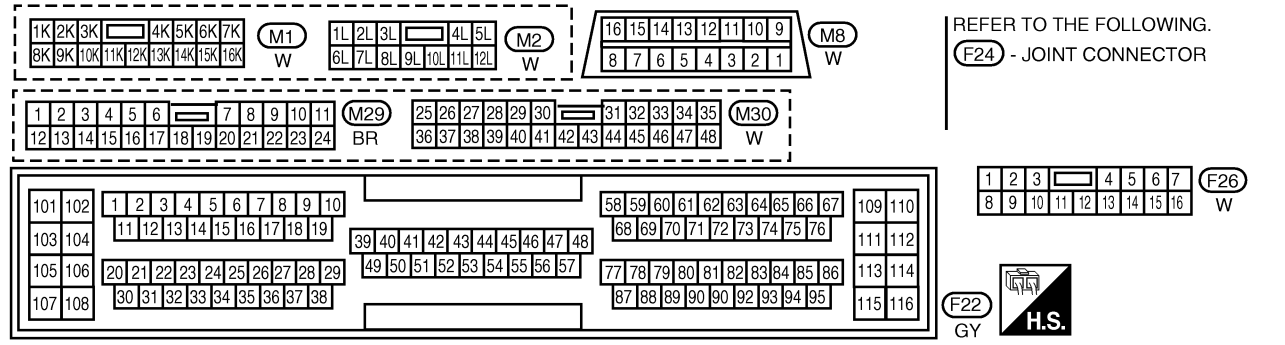
23	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors M59, F27 ● Harness for open and short between ECM and fan control switch	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

24	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-842.	
▶	**INSPECTION END**

Wiring Diagram

NIEC1704





WEC420

Fuel Pressure Regulator

NIEC1705

Fuel pressure at idling kPa (kg/cm^2, psi)	Approximately 350 (3.57, 51)

Idle Speed and Ignition Timing

NIEC1706

Target idle speed*1 rpm (Engine is warmed up to normal operating temperature)	No-load*2 (in “P” or “N” position)	800±50
Air conditioner: ON rpm	In “P” or “N” position	850 or more
Ignition timing*1	In “P” or “N” position	9°±2° BTDC
Throttle position sensor idle position V		0.15 - 0.85

*1: Throttle position sensor harness connector connected
*2: Under the following conditions:

- Air conditioner switch: OFF
- Electrical load: OFF (Lights & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Mass Air Flow Sensor

NIEC1707

Supply voltage V	Battery voltage (11 - 14)
Output voltage V	1.0 - 1.7*
Mass air flow (Using CONSULT-II or GST) g·m/sec	1.4 - 4.0 at idle* 5.0 - 10.0 at 2,500 rpm*

*: Engine is warmed up to normal operating temperature and idling under no-load.

Engine Coolant Temperature Sensor

NIEC1708

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

NIEC1709

EGR temperature °C (°F)	Voltage V	Resistance MΩ
0 (32)	4.56	0.62 - 1.05
50 (122)	2.25	0.065 - 0.094
100 (212)	0.59	0.011 - 0.015

Fuel Pump

NIEC1710

Resistance [at 25°C (77°F)] Ω	0.2 - 5.0

IACV-AAC Valve

NIEC1711

Resistance [at 20°C (68°F)] Ω	Approximately 22

Injector

NIEC1712

Resistance [at 20°C (68°F)] Ω	13.5 - 17.5

Resistor

NIEC1713

Resistance [at 25°C (77°F)] Ω	4 - 8

Throttle Position Sensor

NIEC1714

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

Air Fuel Ratio (A/F) Sensor 1 Heater

NIEC1715

Resistance [at 25°C (77°F)] Ω	2.3 - 4.3

Calculated Load Value

NIEC1716

	Calculated load value % (Using CONSULT-II or GST)
At idle	20.0 - 35.5
At 2,500 rpm	17.0 - 30.0

Intake Air Temperature Sensor

NIEC1717

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

EVAP Canister Purge Volume Control Valve

NIEC1718

Resistance [at 20°C (68°F)] Ω	22 - 26

Heated Oxygen Sensor 2 Heater

NIEC1719

Resistance [at 25°C (77°F)] Ω	2.3 - 4.3

Crankshaft Position Sensor (POS)

NIEC1720

Resistance [at 20°C (68°F)] Ω	166 - 204

Fuel Tank Temperature Sensor

NIEC1721

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

Heated Oxygen Sensor 3 Heater

NIEC1722

Resistance [at 25°C (77°F)] Ω	2.3 - 4.3

Alphabetical & P No. Index for DTC

NIEC0724

ALPHABETICAL INDEX FOR DTC

NIEC0724S01

Items (CONSULT-II screen terms)	DTC*1	Reference page
Unable to access ECM	—	EC-1485
ABSL PRES SEN/CIRC	P0105	EC-1524
AIR TEMP SEN/CIRC	P0110	EC-1529
A/T 1ST GR FNCTN	P0731	***AT-135***
A/T 2ND GR FNCTN	P0732	***AT-142***
A/T 3RD GR FNCTN	P0733	***AT-148***
A/T 4TH GR FNCTN	P0734	***AT-154***
A/T COMM LINE	P0600*2	EC-1793
A/T DIAG COMM LINE	P1605	EC-1909
A/T TCC S/V FNCTN	P0744	***AT-167***
ATF TEMP SEN/CIRC	P0710	***AT-120***
CKP SEN/CIRCUIT	P0335	EC-1678
CKP SENSOR (COG)	P1336	EC-1826
CLOSED LOOP-B1	P1148	EC-1800
CLOSED TP SW/CIRC	P0510	EC-1785
CMP SEN/CIRCUIT	P0340	EC-1683
COOLANT T SEN/CIRC*3	P0115	EC-1535
*COOLAN T SEN/CIRC	P0125	EC-1551
CYL 1 MISFIRE	P0301	EC-1667
CYL 2 MISFIRE	P0302	EC-1667
CYL 3 MISFIRE	P0303	EC-1667
CYL 4 MISFIRE	P0304	EC-1667
ECM	P0605	EC-1796
EGR SYSTEM	P0400	EC-1690
EGR SYSTEM	P1402	EC-1838
EGR TEMP SEN/CIRC	P1401	EC-1831
EGR VOL CONT/V CIR	P0403	EC-1699
ENGINE SPEED SIG	P0725	***AT-131***
ENG OVER TEMP	P0217	EC-1649
ENG OVER TEMP	P1217*2	EC-1802
EVAP GROSS LEAK	P0455	EC-1750
EVAP PURG FLOW/MON	P1447	EC-1867
EVAP SYS PRES SEN	P0450	EC-1738
EVAP SMALL LEAK	P0440	EC-1710
EVAP SMALL LEAK	P1440	EC-1845

Items (CONSULT-II screen terms)	DTC*1	Reference page
FUEL LEVEL SENSOR	P0461	EC-1766
FUEL LEVL SEN/CIRC	P0464	EC-1768
FUEL LEVL SEN/CIRC	P1464	EC-1888
FUEL LEV SEN SLOSH	P0460	EC-1762
FUEL SYS-LEAN/BK1	P0171	EC-1630
FUEL SYS-RICH/BK1	P0172	EC-1637
FUEL TEMP SEN/CIRC	P0180	EC-1644
HO2S1 (B1)	P0130	EC-1556
HO2S1 (B1)	P0131	EC-1563
HO2S1 (B1)	P0132	EC-1569
HO2S1 (B1)	P0133	EC-1575
HO2S1 (B1)	P0134	EC-1584
HO2S1 HTR (B1)	P0135	EC-1590
HO2S2 (B1)	P0137	EC-1595
HO2S2 (B1)	P0138	EC-1603
HO2S2 (B1)	P0139	EC-1611
HO2S2 (B1)	P0140	EC-1619
HO2S2 HTR (B1)	P0141	EC-1625
IACV/AAC VLV/CIRC	P0505	EC-1776
IGN SIGNAL-PRIMARY	P1320	EC-1820
KNOCK SEN/CIRC-B1	P0325*2	EC-1674
L/PRES SOL/CIRC	P0745	***AT-178***
MAF SEN/CIRCUIT*3	P0100	EC-1515
MULTI CYL MISFIRE	P0300	EC-1667
NATS MALFUNCTION	P1610 - P1615*2	***EL-305***
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	**P0000**	**—**
O/R CLTCH SOL/CIRC	P1760	***AT-199***
P-N POS SW/CIRCUIT	P1706	EC-1912
PNP SW/CIRC	P0705	***AT-115***
PURG VOLUME CONT/V	P0443	EC-1725
PURG VOLUME CONT/V	P1444	EC-1847
SFT SOL A/CIRC*3	P0750	***AT-183***
SFT SOL B/CIRC*3	P0755	***AT-187***
TCC SOLENOID/CIRC	P0740	***AT-163***
THERMOSTAT FNCTN	P1126	EC-1798
TP SEN/CIRC A/T*3	P1705	***AT-191***
TRTL POS SEN/CIRC*3	P0120	EC-1540

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

Items (CONSULT-II screen terms)	DTC*1	Reference page
TW CATALYST SYS-B1	P0420	EC-1706
VC CUT/V BYPASS/V	P1491	EC-1897
VC/V BYPASS/V	P1490	EC-1891
VEH SPEED SEN/CIRC*4	P0500	EC-1772
VEH SPD SEN/CIR A/T*4	P0720	***AT-126***
VENT CONTROL VALVE	P0446	EC-1731
VENT CONTROL VALVE	P1446	EC-1859
VENT CONTROL VALVE	P1448	EC-1879

*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.

P NO. INDEX FOR DTC

=NIEC0724S02

DTC*1	Items (CONSULT-II screen terms)	Reference page
—	Unable to access ECM	EC-1485
P0000	**NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.**	**—**
P0100	MAF SEN/CIRCUIT*3	EC-1515
P0105	ABSL PRES SEN/CIRC	EC-1524
P0110	AIR TEMP SEN/CIRC	EC-1529
P0115	COOLANT T SEN/CIRC*3	EC-1535
P0120	THRTL POS SEN/CIRC*3	EC-1540
P0125	*COOLAN T SEN/CIRC	EC-1551
P0130	HO2S1 (B1)	EC-1556
P0131	HO2S1 (B1)	EC-1563
P0132	HO2S1 (B1)	EC-1569
P0133	HO2S1 (B1)	EC-1575
P0134	HO2S1 (B1)	EC-1584
P0135	HO2S1 HTR (B1)	EC-1590
P0137	HO2S2 (B1)	EC-1595
P0138	HO2S2 (B1)	EC-1603
P0139	HO2S2 (B1)	EC-1611
P0140	HO2S2 (B1)	EC-1619
P0141	HO2S2 HTR (B1)	EC-1625
P0171	FUEL SYS-LEAN/BK1	EC-1630
P0172	FUEL SYS-RICH/BK1	EC-1637
P0180	FUEL TEMP SEN/CIRC	EC-1644
P0217	ENG OVER TEMP	EC-1649
P0300	MULTI CYL MISFIRE	EC-1667
P0301	CYL 1 MISFIRE	EC-1667
P0302	CYL 2 MISFIRE	EC-1667
P0303	CYL 3 MISFIRE	EC-1667
P0304	CYL 4 MISFIRE	EC-1667
P0325*2	KNOCK SEN/CIRC-B1	EC-1674
P0335	CKP SEN/CIRCUIT	EC-1678
P0340	CMP SEN/CIRCUIT	EC-1683
P0400	EGR SYSTEM	EC-1690
P0403	EGR VOL CONT/V CIR	EC-1699
P0420	TW CATALYST SYS-B1	EC-1706
P0440	EVAP SMALL LEAK	EC-1710
P0443	PURG VOLUME CONT/V	EC-1725

DTC*1	Items (CONSULT-II screen terms)	Reference page
P0446	VENT CONTROL VALVE	EC-1731
P0450	EVAP SYS PRES SEN	EC-1738
P0455	EVAP GROSS LEAK	EC-1750
P0460	FUEL LEV SEN SLOSH	EC-1762
P0461	FUEL LEVEL SENSOR	EC-1766
P0464	FUEL LEVL SEN/CIRC	EC-1768
P0500	VEH SPEED SEN/CIRC*4	EC-1772
P0505	IACV/AAC VLV/CIRC	EC-1776
P0510	CLOSED TP SW/CIRC	EC-1785
P0600*2	A/T COMM LINE	EC-1793
P0605	ECM	EC-1796
P0705	PNP SW/CIRC	***AT-115***
P0710	ATF TEMP SEN/CIRC	***AT-120***
P0720	VEH SPD SEN/CIR A/T*4	***AT-126***
P0725	ENGINE SPEED SIG	***AT-131***
P0731	A/T 1ST GR FNCTN	***AT-135***
P0732	A/T 2ND GR FNCTN	***AT-142***
P0733	A/T 3RD GR FNCTN	***AT-148***
P0734	A/T 4TH GR FNCTN	***AT-154***
P0740	TCC SOLENOID/CIRC	***AT-163***
P0744	A/T TCC S/V FNCTN	***AT-167***
P0745	L/PRESS SOL/CIRC	***AT-178***
P0750	SFT SOL A/CIRC*3	***AT-183***
P0755	SFT SOL B/CIRC*3	***AT-187***
P1126	THERMOSTAT FNCTN	EC-1798
P1148	CLOSED LOOP-B1	EC-1800
P1217*2	ENG OVER TEMP	EC-1802
P1320	IGN SIGNAL-PRIMARY	EC-1820
P1336	CKP SENSOR (COG)	EC-1826
P1401	EGR TEMP SEN/CIRC	EC-1831
P1402	EGR SYSTEM	EC-1838
P1440	EVAP SMALL LEAK	EC-1845
P1444	PURG VOLUME CONT/V	EC-1847
P1446	VENT CONTROL VALVE	EC-1859
P1447	EVAP PURG FLOW/MON	EC-1867
P1448	VENT CONTROL VALVE	EC-1879
P1464	FUEL LEVL SEN/CIRC	EC-1888

DTC*1	Items (CONSULT-II screen terms)	Reference page
P1490	VC/V BYPASS/V	EC-1891
P1491	VC CUT/V BYPASS/V	EC-1897
P1605	A/T DIAG COMM LINE	EC-1909
P1610 - P1615*2	NATS MALFUNCTION	***EL-305***
P1705	TP SEN/CIRC A/T*3	***AT-191***
P1706	P-N POS SW/CIRCUIT	EC-1912
P1760	O/R CLTCH SOL/CIRC	***AT-199***

*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.

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

NIEC0725

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 NISSAN MODEL B15 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), front 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), side air bag (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 NISSAN dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional 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.**

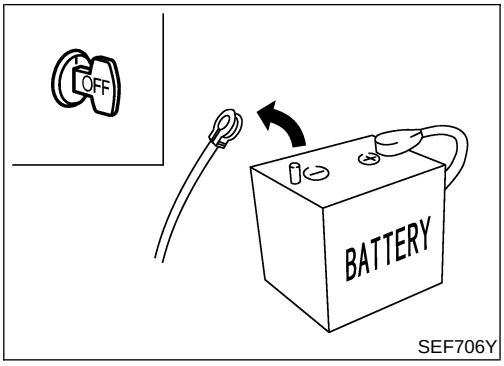
Precautions for On Board Diagnostic (OBD) System of Engine and A/T

NIEC0726

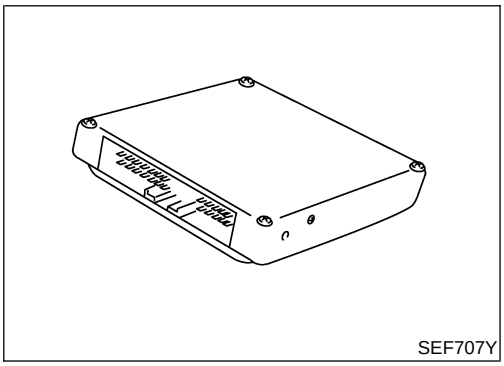
The ECM has an on board diagnostic system. It will light up the malfunction indicator lamp (MIL) to warn the driver of a malfunction causing emission deterioration.

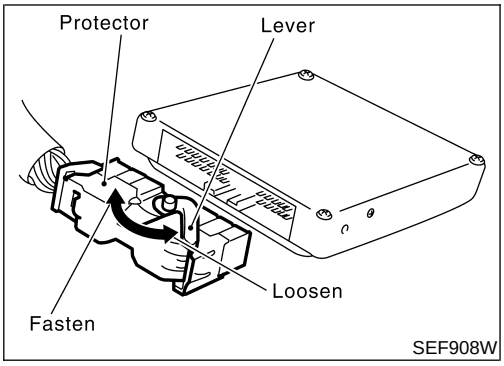
CAUTION:

- **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.**

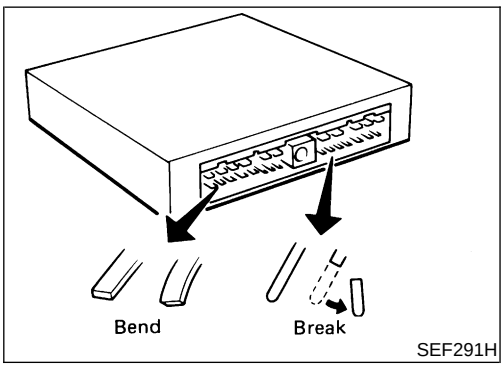


SEF706Y


SEF707Y



SEF908W

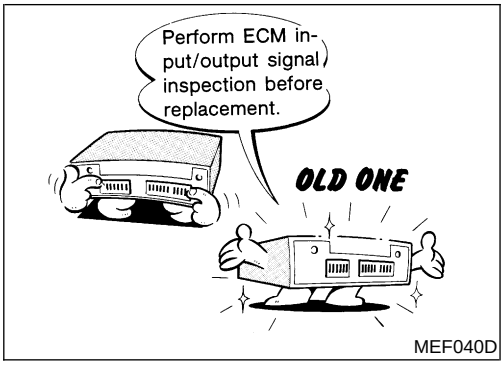


SEF291H

Precautions

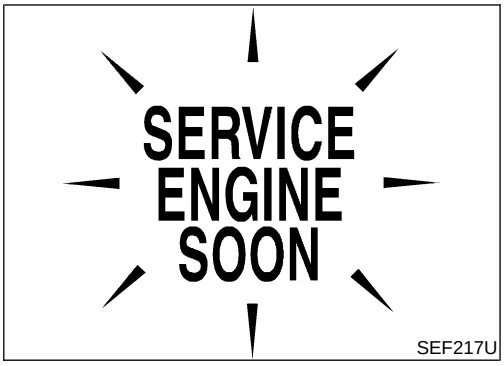
NIEC0727

- **Always use a 12 volt battery as power source.**
- **Do not attempt to disconnect battery cables while engine is running.**
- **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.**
- **Before removing parts, turn ignition switch OFF and then disconnect battery ground cable.**
- **Do not disassemble ECM.**
- **If a battery terminal is disconnected, the memory will return to the ECM value.**
  The ECM will now start to self-control at its initial value. Engine operation can vary slightly when the terminal is disconnected. However, this is not an indication of a problem. Do not replace parts because of a slight variation.
- **When connecting ECM harness connector, fasten it securely with a lever as far as it will go, as shown at left.**
- **When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).**
  Make sure that there are not any bends or breaks on ECM pin terminals when connecting pin connectors.
- **Securely connect ECM harness connectors.**
  A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to ICs.
- **Keep ECM harness at least 10 cm (4 in) away from adjacent harness, to prevent an ECM system malfunctions due to receiving external noise, degraded operation of ICs, etc.**
- **Keep ECM parts and harness dry.**



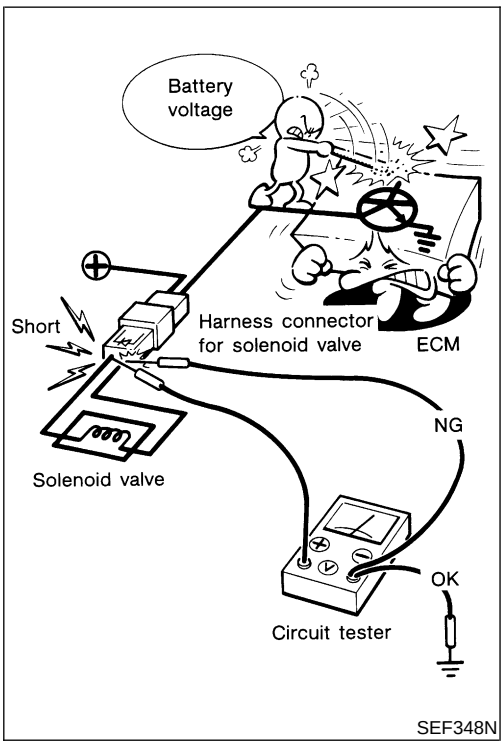
MEF040D

- **Before replacing ECM, perform Terminals and Reference Value inspection and make sure ECM functions properly. Refer to EC-1495.**
- **Handle mass air flow sensor carefully to avoid damage.**
- **Do not disassemble mass air flow sensor.**
- **Do not clean mass air flow sensor with any type of detergent.**
- **Do not disassemble IAC valve-AAC valve.**
- **Even a slight leak in the air intake system can cause serious problems.**
- **Do not shock or jar the camshaft position sensor (PHASE).**



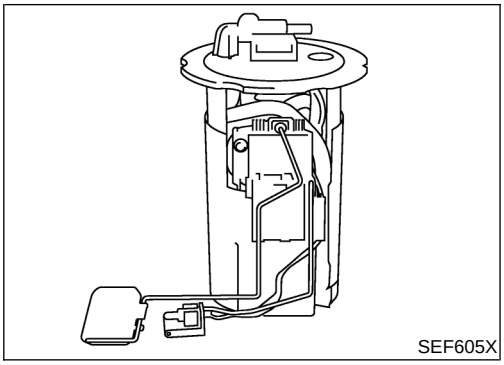
SEF217U

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

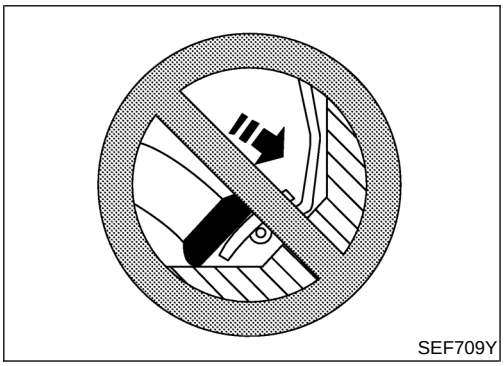


SEF348N

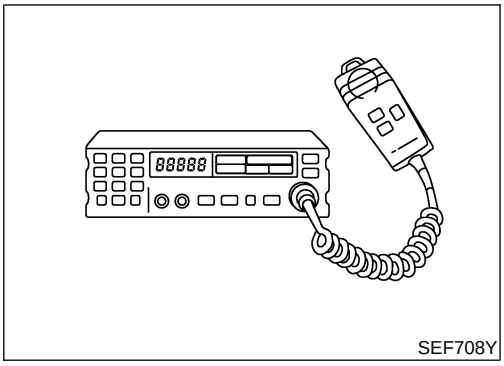
- **When measuring ECM signals with a circuit tester, never allow the two tester probes to contact.**
  Accidental contact of probes will cause a short circuit and damage the ECM power transistor.
- **Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's power transistor. Use a ground other than ECM terminals, such as an engine ground.**


SEF605X

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


SEF709Y

- **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.**


SEF708Y

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

a) **Keep the antenna as far as possible from the electronic control units.**

b) **Keep the antenna feeder line more than 20 cm (8 in) away from the harness of electronic controls.**
Do not let them run parallel for a long distance.

c) **Adjust the antenna and feeder line so that the standing-wave radio can be kept smaller.**

d) **Be sure to ground the radio to vehicle body.**

Wiring Diagrams and Trouble Diagnosis

NIEC0728

When you read Wiring diagrams, refer to the following:

- ***GI-11***, "HOW TO READ WIRING DIAGRAMS"
- ***EL-9***, "POWER SUPPLY ROUTING" for power distribution circuit

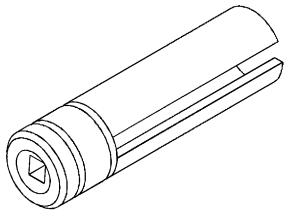
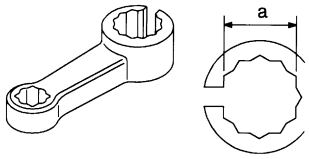
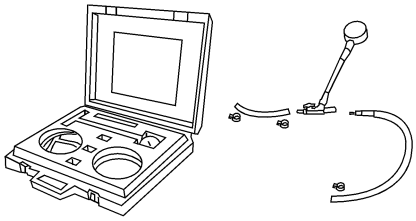
When you perform trouble diagnosis, refer to the following:

- ***GI-36***, "How To Follow Test Group In Trouble Diagnosis"
- ***GI-25***, "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT"

Special Service Tools

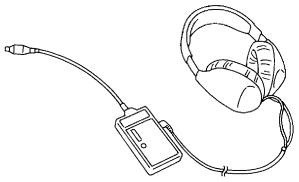
NIEC0729

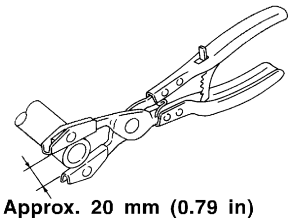
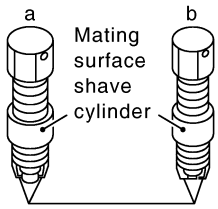
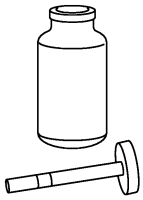
The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description	
KV10117100 (J36471-A) Heated oxygen sensor wrench	 NT379	Loosening or tightening heated oxygen sensor 1 (front) with 22 mm (0.87 in) hexagon nut
KV10114400 (J-38365) Heated oxygen sensor wrench	 NT636	Loosening or tightening heated oxygen sensor 2 (rear) **a: 22 mm (0.87 in)**
(J-44321) Fuel pressure gauge kit	 LEC642	Checking fuel pressure

Commercial Service Tools

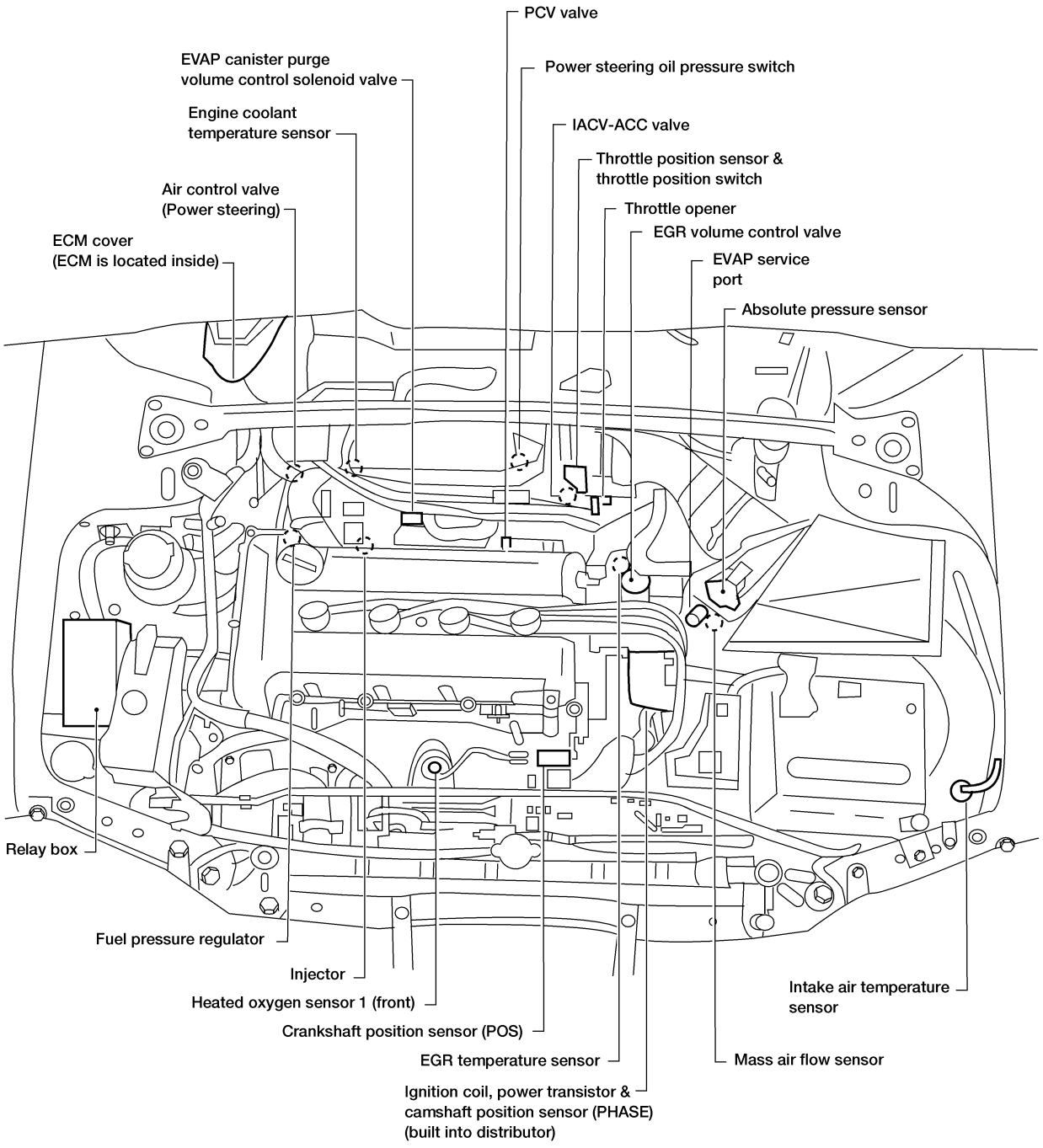
NIEC0730

Tool name	Description	
Fuel filler cap adapter (MLR-8382)	 NT815	Checking fuel tank vacuum relief valve opening pressure
Leak detector (J41416)	 NT703	Locating the EVAP leak

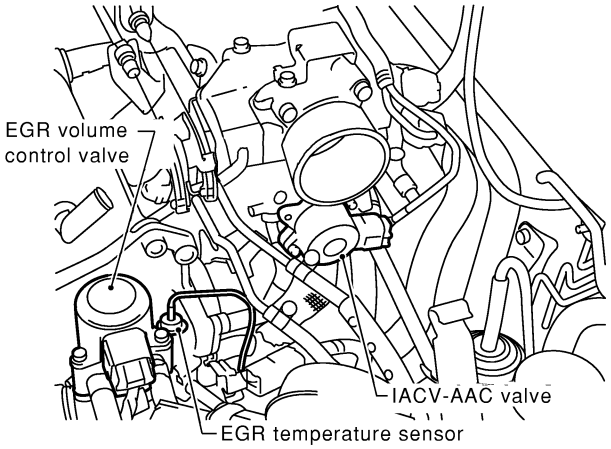
Tool name	Description	
Hose clipper	 NT720	Clamping the EVAP purge hose between the fuel tank and EVAP canister applied to DTC P1440 [EVAP control system (Small leak — Positive pressure)]
Oxygen sensor thread cleaner (J-43897-18) (J-43897-12)	 NT778	Reconditioning the exhaust system threads before installing a new oxygen sensor. Use with anti-seize lubricant shown below. **a: J-43897-18 18 mm diameter with pitch 1.5 mm, for Zirconia Oxygen Sensor** **b: J-43897-12 12 mm diameter with pitch 1.25 mm, 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.

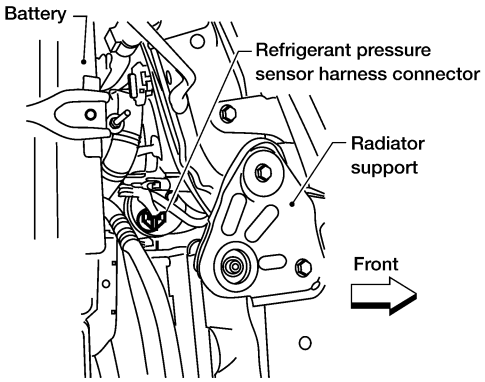
Engine Control Component Parts Location

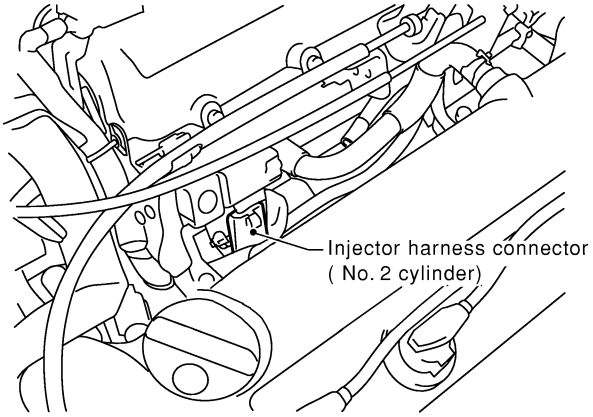
NIEC0731

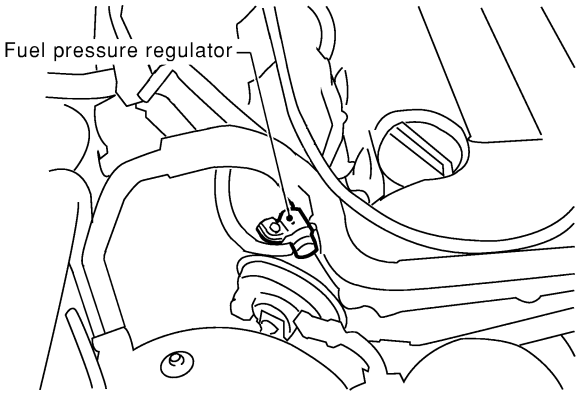


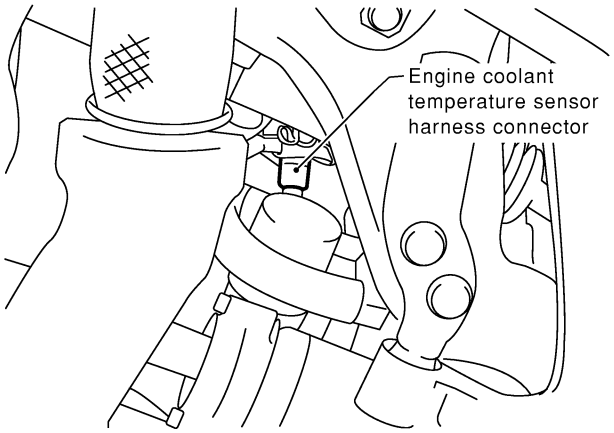
WEC308

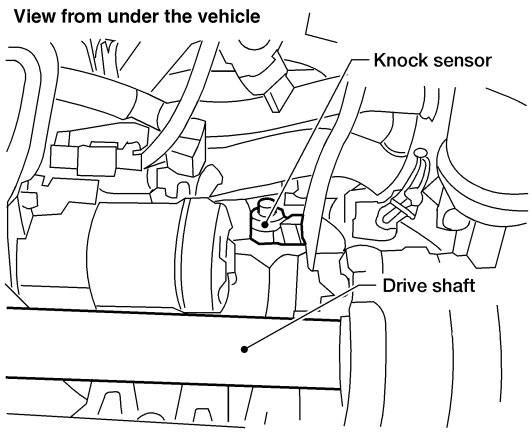

EGR volume control valve
IACV-AAC valve
EGR temperature sensor


Battery
Refrigerant pressure sensor harness connector
Radiator support
Front


Injector harness connector
(No. 2 cylinder)

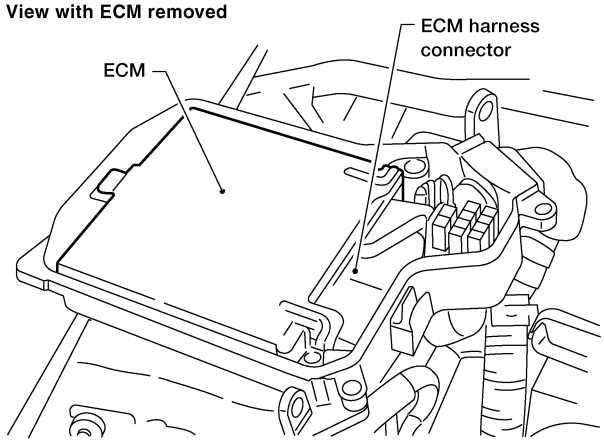

Fuel pressure regulator

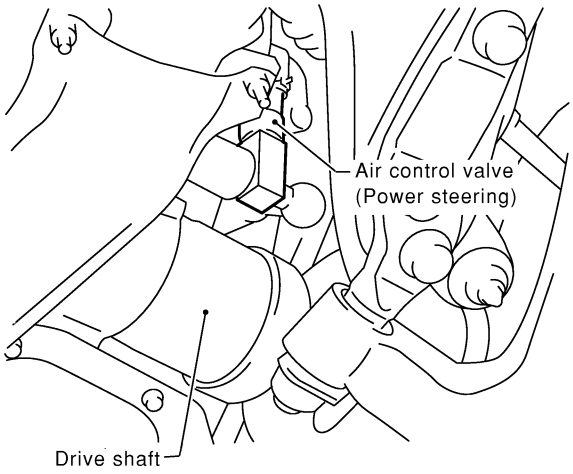

Engine coolant temperature sensor harness connector


View from under the vehicle
Knock sensor
Drive shaft

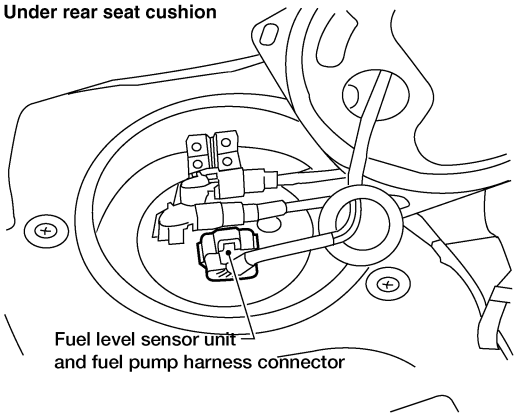
LEC303

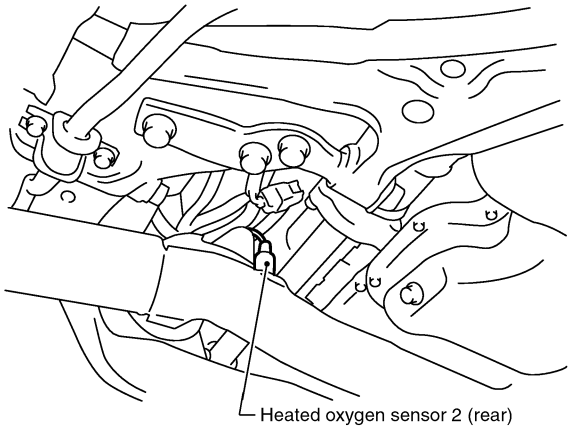
View with ECM removed

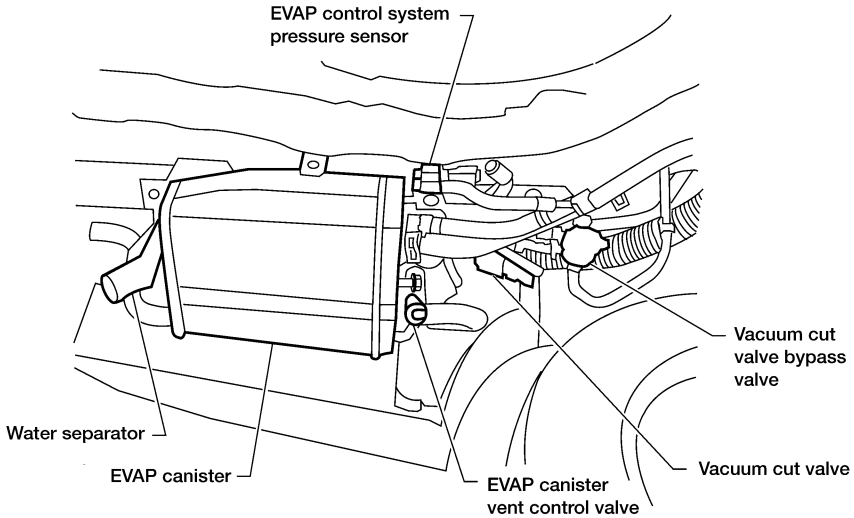




Under rear seat cushion



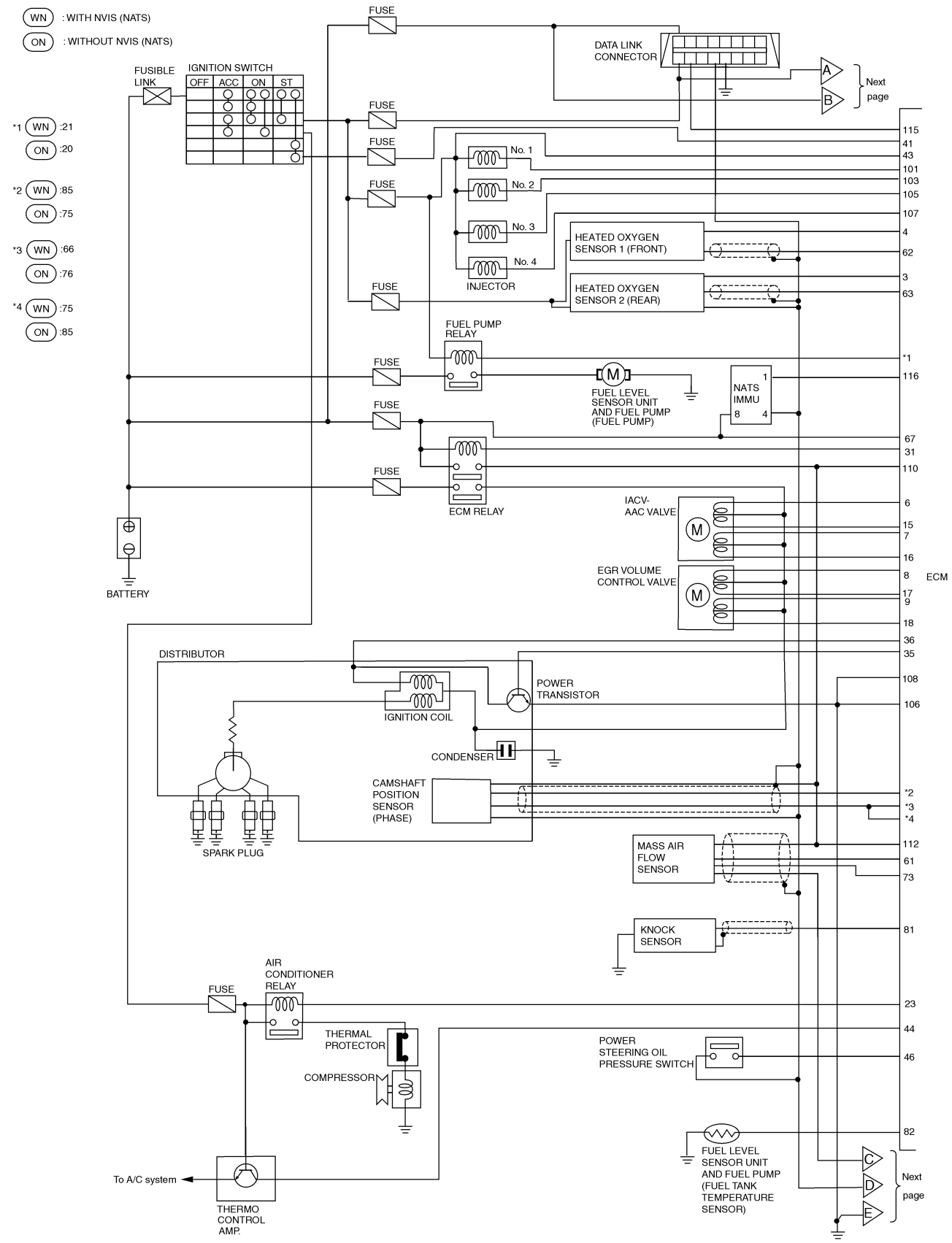




WEC309

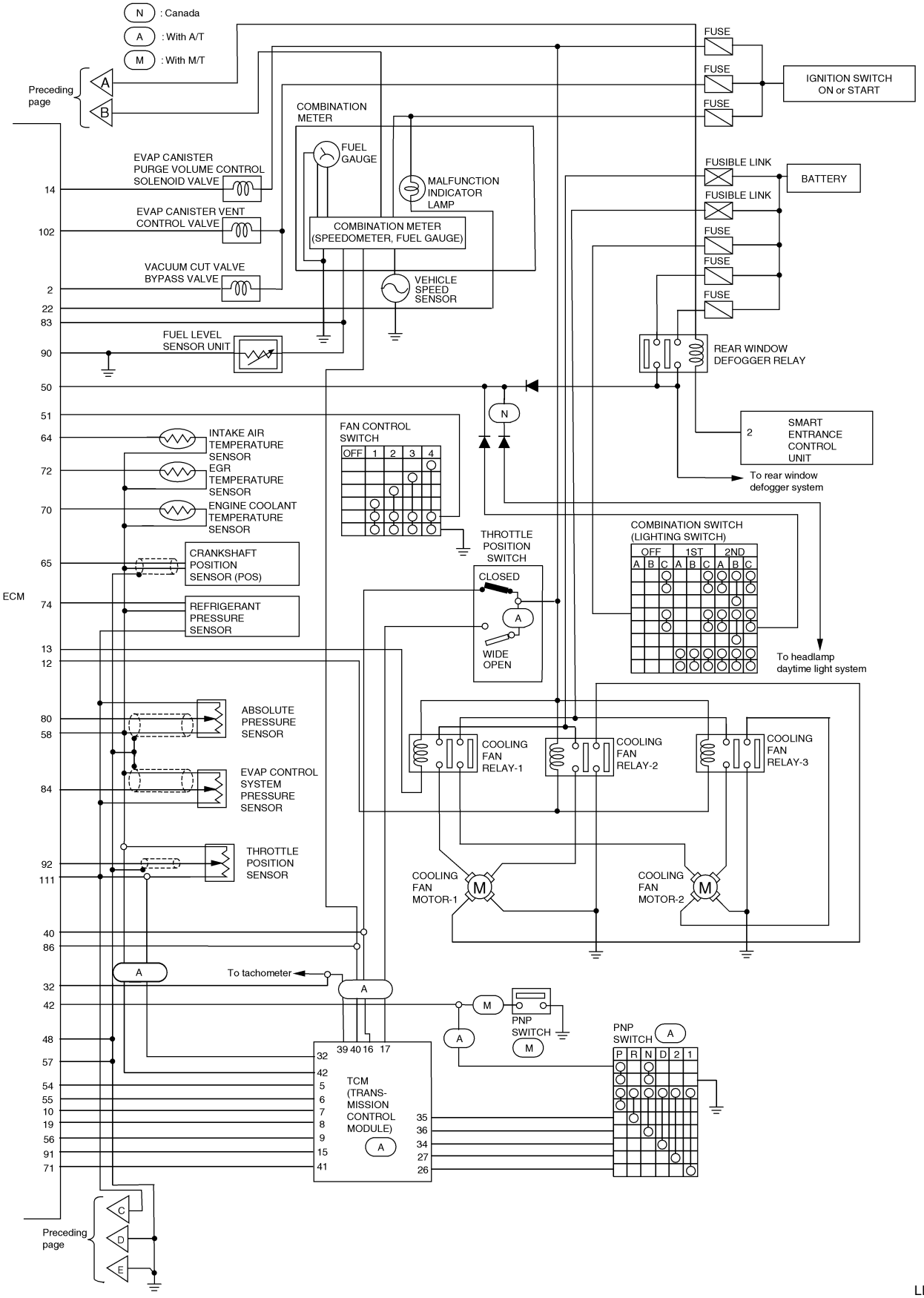
Circuit Diagram

NIEC0732



LEC229

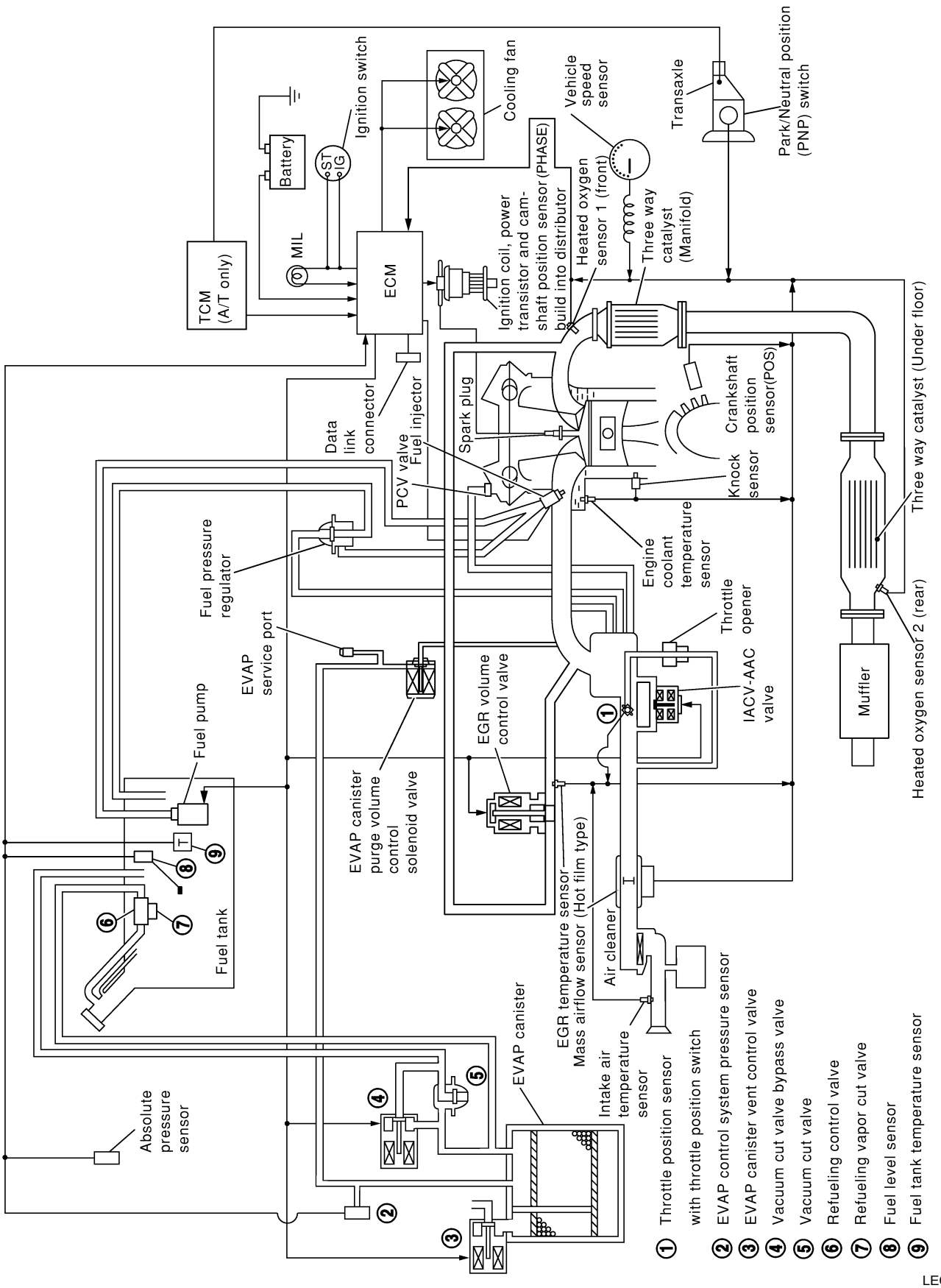
Circuit Diagram (Cont'd)



LEC375

System Diagram

NIEC0733

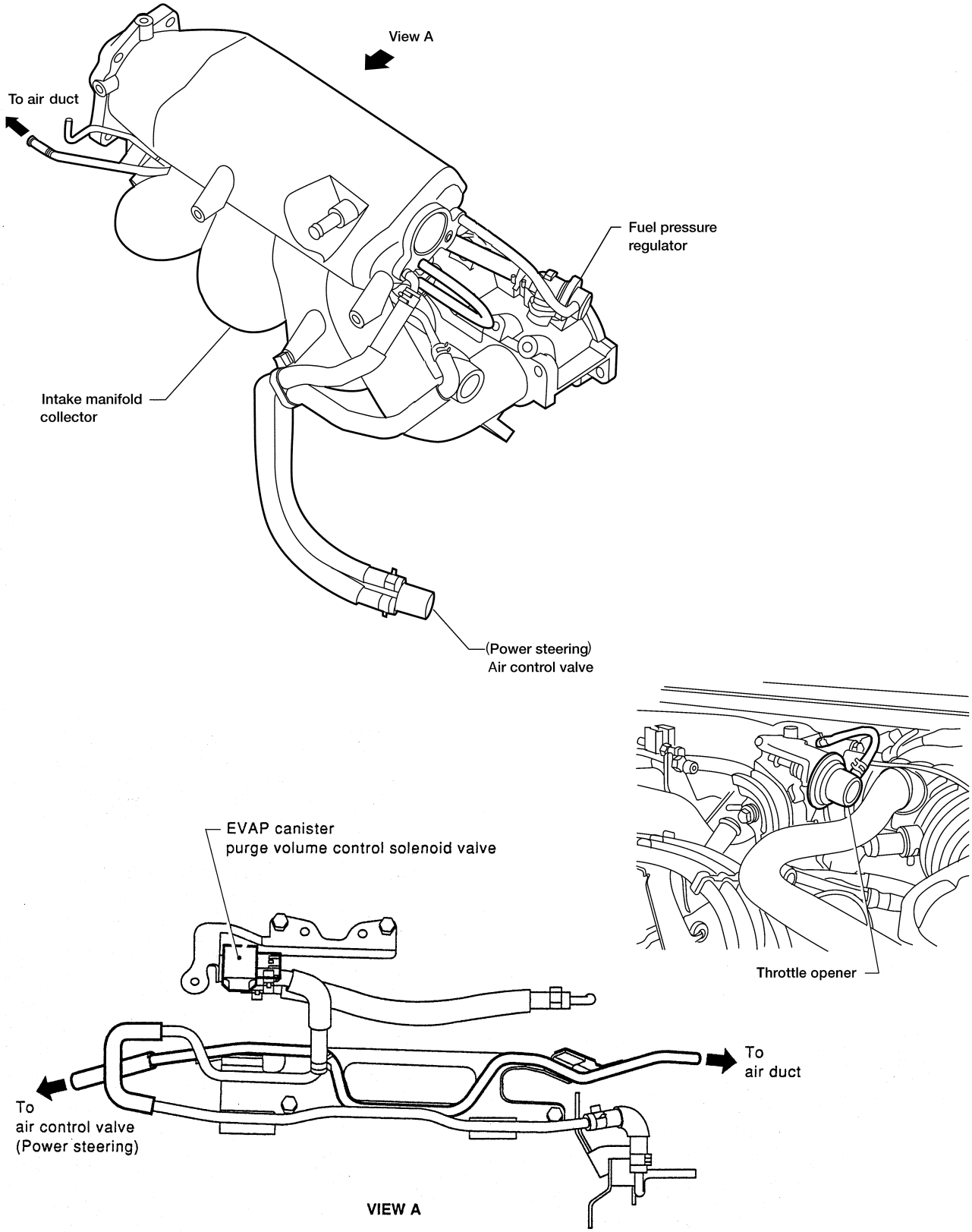


LEC470

Vacuum Hose Drawing

NIEC0734

Refer to “System Diagram” on EC-1383 for vacuum control system.



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

WEC299

System Chart

NIEC0735

Input (Sensor)	ECM Function	Output (Actuator)
• Camshaft position sensor (PHASE) • Mass air flow sensor • Engine coolant temperature sensor • Heated oxygen sensor 1 (front) • Ignition switch • Throttle position sensor • PNP switch • Air conditioner switch • Knock sensor • EGR temperature sensor*1 • Crankshaft position sensor (POS)*1 • EVAP control system pressure sensor*1 • Fuel tank temperature sensor*1 • Battery voltage • Power steering oil pressure switch • Vehicle speed sensor • Intake air temperature sensor • Absolute pressure sensor • Heated oxygen sensor 2 (rear)*3 • TCM (Transmission control module)*2 • Closed throttle position switch*4 • Electrical load • Fuel level sensor*1 • Refrigerant pressure sensor	Fuel injection & mixture ratio control	Injectors
	Distributor ignition system	Power transistor
	Idle air control system	IACV-AAC valve
	Fuel pump control	Fuel pump relay
	On board diagnostic system	Malfunction indicator lamp (On the instrument panel)
	EGR control	EGR volume control valve
	Heated oxygen sensor 1 (front) and 2 (rear) heater control	Heated oxygen sensor 1 (front) and 2 (rear) heater
	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
	Cooling fan control	Cooling fan relays
	Air conditioning cut control	Air conditioner relay
	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: The DTC related to A/T will be sent to ECM.
*3: Under normal conditions, this sensor is not for engine control operation.
*4: This switch will operate in place of the throttle position sensor to control EVAP parts if the sensor malfunctions.

Multiport Fuel Injection (MFI) System

DESCRIPTION

Input/Output Signal Chart

NIEC0736

NIEC0736S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE)	Engine speed and piston position	Fuel injection & mixture ratio control	Injector
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Heated oxygen sensor 1 (front)	Density of oxygen in exhaust gas		
Throttle position sensor	Throttle position Throttle valve idle position		
PNP switch	Gear position		
Vehicle speed sensor	Vehicle speed		
Ignition switch	Start signal		
Air conditioner switch	Air conditioner operation		
Knock sensor	Engine knocking condition		
Electrical load	Electrical load signal		
Battery	Battery voltage		
Power steering oil pressure switch	Power steering operation		
Heated oxygen sensor 2 (rear)*	Density of oxygen in exhaust gas		
Absolute pressure sensor	Ambient air barometric pressure		

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

Basic Multiport Fuel Injection System

NIEC0736S02

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

Various Fuel Injection Increase/Decrease Compensation

NIEC0736S03

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

<Fuel increase>

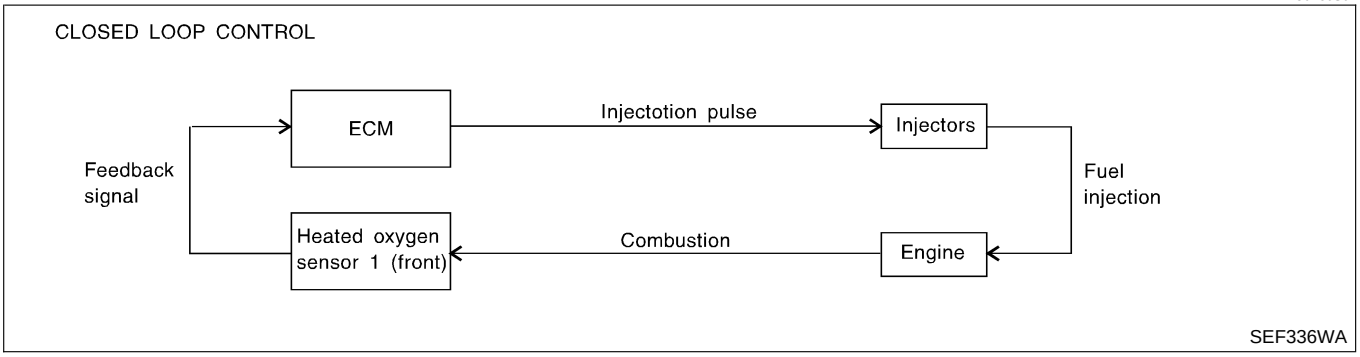
- During warm-up
- When starting the engine
- During acceleration
- Hot-engine operation
- When selector lever is changed from “N” to “D” (A/T models only)
- High-load, high-speed operation

<Fuel decrease>

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

Mixture Ratio Feedback Control (Closed loop control)

NIEC0736S04



The mixture ratio feedback system provides the best air-fuel mixture ratio for driveability and emission control. The three way catalyst can then better reduce CO, HC and NOx emissions. This system uses a heated oxygen sensor 1 (front) 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 heated oxygen sensor 1 (front), refer to EC-1556. 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.
Heated oxygen sensor 2 (rear) is located downstream of the three way catalyst. Even if the switching characteristics of the heated oxygen sensor 1 (front) shift, the air-fuel ratio is controlled to stoichiometric by the signal from the heated oxygen sensor 2 (rear).

Open Loop Control

NIEC0736S05

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 heated oxygen sensor 1 (front) or its circuit
- Insufficient activation of heated oxygen sensor 1 (front) at low engine coolant temperature
- High engine coolant temperature
- During warm-up
- When starting the engine

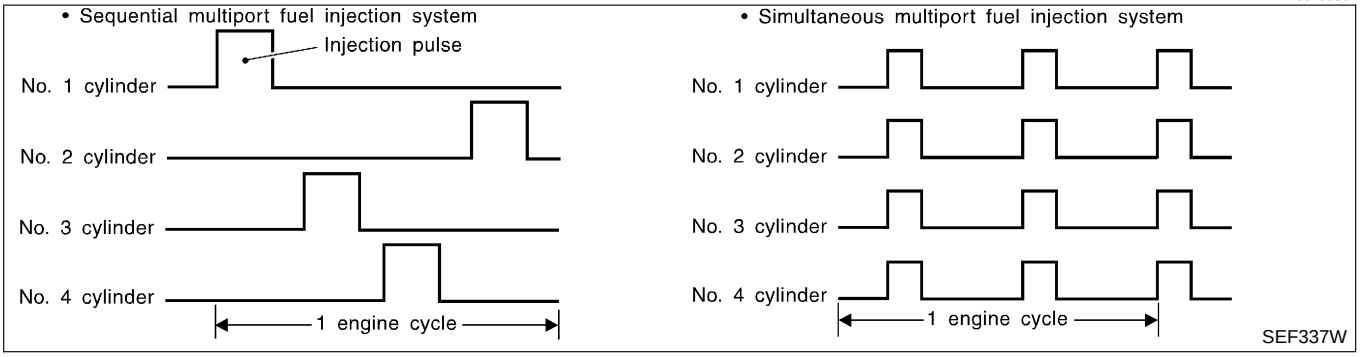
Mixture Ratio Self-learning Control

NIEC0736S06

The mixture ratio feedback control system monitors the mixture ratio signal transmitted from the heated oxygen sensor 1 (front). This feedback signal is then sent to the ECM. The ECM controls the basic mixture ratio as close to the theoretical mixture ratio as possible. However, the basic mixture ratio is not necessarily controlled as originally designed. Both manufacturing differences (i.e., mass air flow sensor hot film) and characteristic changes during operation (i.e., injector clogging) directly affect mixture ratio.
Accordingly, the difference between the basic and theoretical mixture ratios is monitored in this system. This is then computed in terms of "injection pulse duration" to automatically compensate for the difference between the two ratios.
"Fuel trim" refers to the feedback compensation value compared against the basic injection duration. Fuel trim includes short term fuel trim and long term fuel trim.
"Short term fuel trim" is the short-term fuel compensation used to maintain the mixture ratio at its theoretical value. The signal from the heated oxygen sensor 1 (front) 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

NIEC0736S07



Two types of systems are used.

Sequential Multiport Fuel Injection System

NIEC0736S0701

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

NIEC0736S0702

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

Fuel Shut-off

NIEC0736S08

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

Distributor Ignition (DI) System

DESCRIPTION

NIEC0737

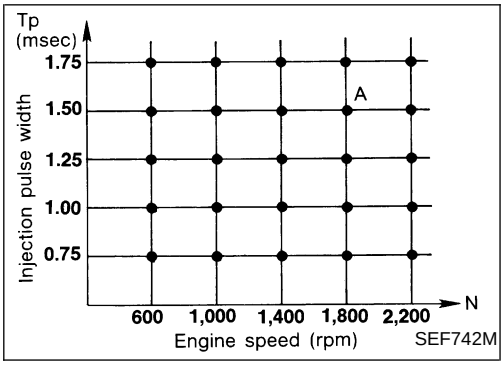
Input/Output Signal Chart

NIEC0737S01

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

System Description

NIEC0737S02



The ignition timing is controlled by the ECM to maintain the best air-fuel ratio for every running condition of the engine. The ignition timing data is stored in the ECM. This data forms the map shown above.
The ECM receives information such as the injection pulse width and camshaft position sensor (PHASE) 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

Input/Output Signal Chart

NIEC0738

NIEC0738S01

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

System Description

NIEC0738S02

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

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

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

DESCRIPTION

NIEC0739

Input/Output Signal Chart

NIEC0739S01

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

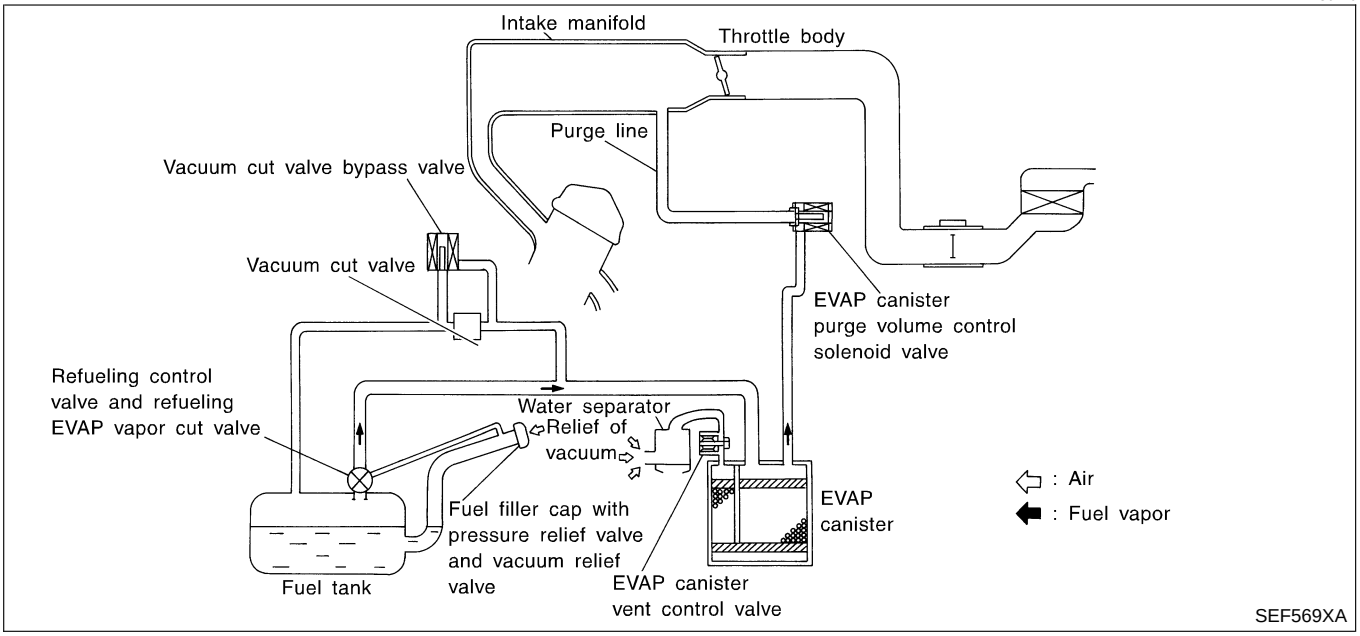
If the engine speed is above 3,950 rpm with no load, (for example, in Neutral and engine speed over 4,000 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed. Fuel cut will operate until the engine speed reaches 1,150 rpm, then fuel cut is cancelled.

NOTE:
This function is different from deceleration control listed under “Multiport Fuel Injection (MFI) System”, EC-1386.

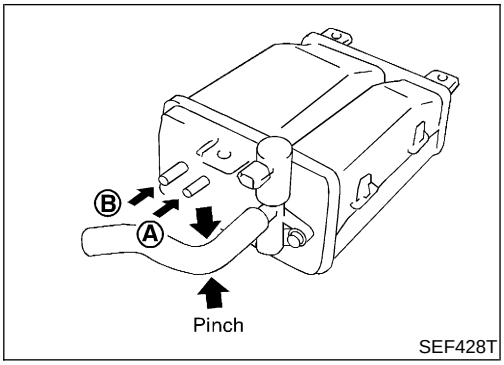
Evaporative Emission System

DESCRIPTION

NIEC0740



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 control solenoid valve also shuts off the vapor purge line during decelerating and idling.



SEF428T

INSPECTION

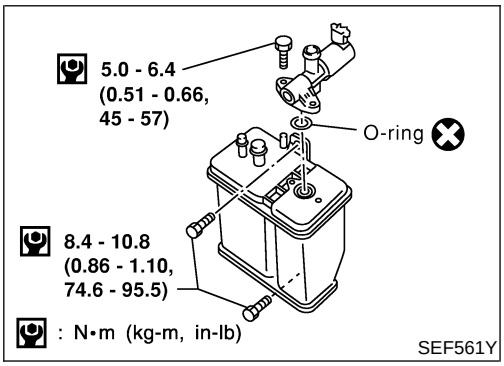
NIEC0741

EVAP Canister

NIEC0741S01

Check EVAP canister as follows:

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



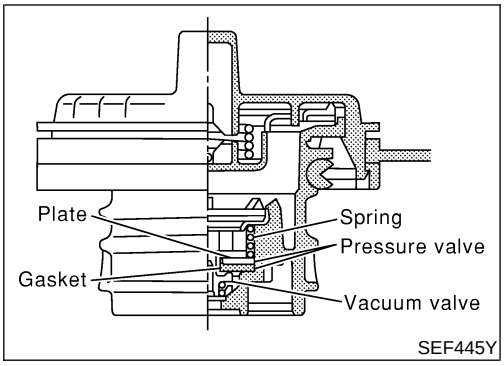
SEF561Y

Tightening Torque

NIEC0741S02

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.



SEF445Y

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

NIEC0741S03

NOTE:

Refer to fuel filler cap adapter instruction manual before performing following inspection.

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)

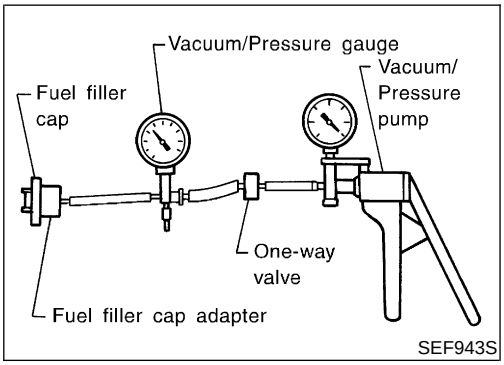
Vacuum:

−6.0 to −3.4 kPa (−0.061 to −0.035 kg/cm^2, −0.87 to −0.50 psi)

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

CAUTION:

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



SEF943S

Vacuum Cut Valve and Vacuum Cut Valve Bypass Valve

NIEC0741S04

Refer to EC-1897.

Evaporative Emission (EVAP) Canister Purge Volume Control Solenoid Valve

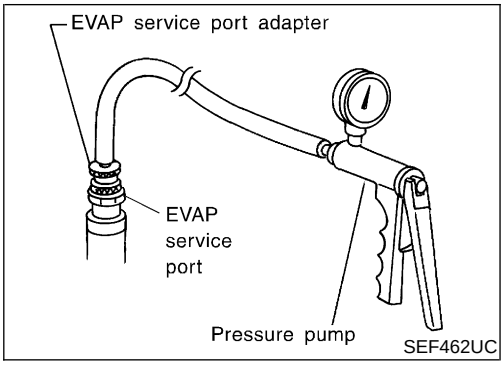
NIEC0741S05

Refer to EC-1725.

Fuel Tank Temperature Sensor

NIEC0741S06

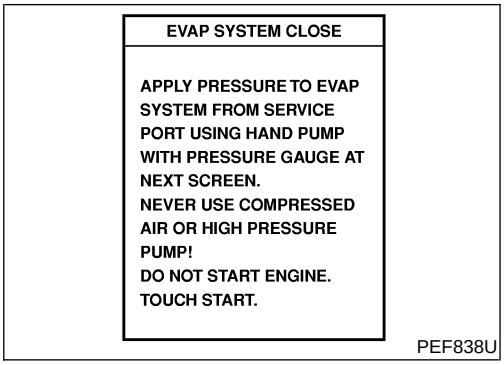
Refer to EC-1644.



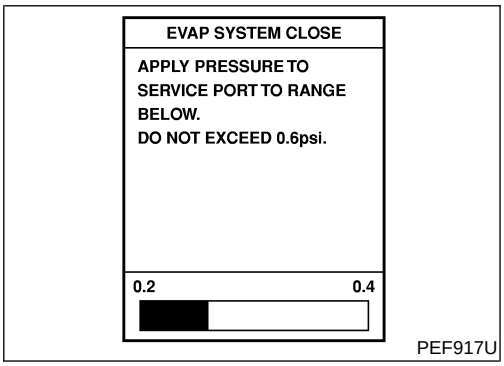
EVAP Service Port

NIEC0741S07

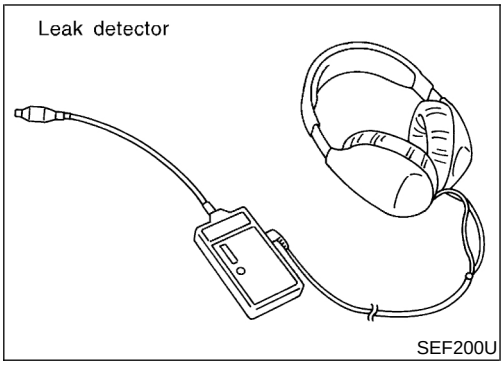
Positive pressure is delivered to the EVAP system through the EVAP service port. If fuel vapor leakage in the EVAP system occurs, use a leak detector to locate the leak.



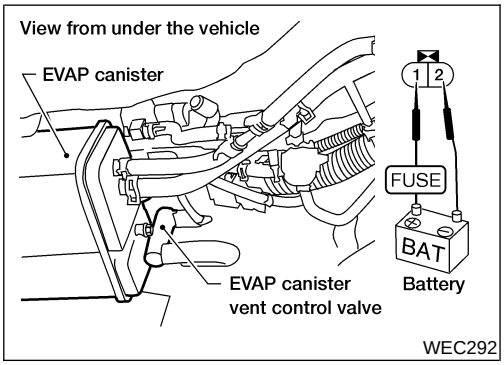
PEF838U



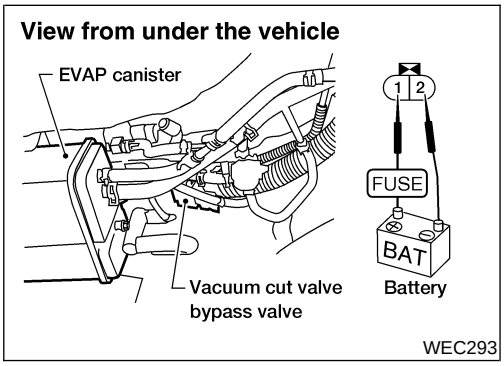
PEF917U



SEF200U



WEC292



WEC293

How to Detect Fuel Vapor Leakage

NIEC0741S08

CAUTION:

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

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

With CONSULT-II

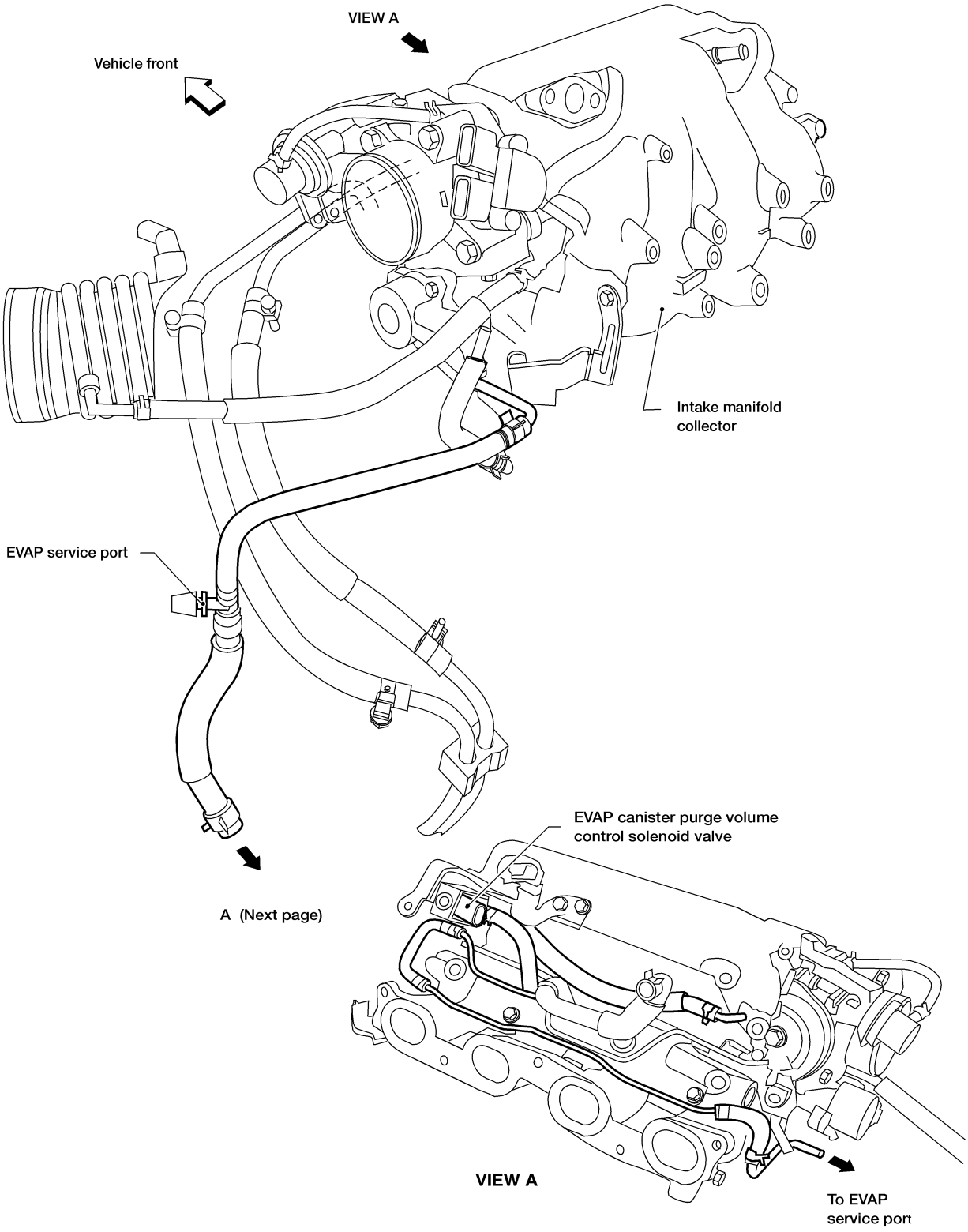
1) Attach the EVAP service port adapter securely to the EVAP service port.
2) Also attach the pressure pump and hose.
3) Turn ignition switch "ON".
4) Select the "EVAP SYSTEM CLOSE" of "WORK SUPPORT MODE" with CONSULT-II.
5) Touch "START". A bar graph (Pressure indicating display) will appear on the screen.
6) Apply positive pressure to the EVAP system until the pressure indicator reaches the middle of the bar graph.
7) Remove the EVAP service port adapter and hose with pressure pump.
8) Locate the leak using a leak detector. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-1394.

Without CONSULT-II

1) Attach the EVAP service port adapter securely to the EVAP service port and pressure pump with pressure gauge to the EVAP service port.
2) Apply battery voltage to between the terminals of both EVAP canister vent control valve and vacuum cut valve bypass valve to make a closed EVAP system.
3) To locate the leak, deliver positive pressure to the EVAP system until pressure gauge points reach 1.38 to 2.76 kPa (0.014 to 0.028 kg/cm^2, 0.2 to 0.4 psi).
4) Remove the EVAP service port adapter and hose with pressure pump.
5) Locate the leak using a leak detector. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-1394.

EVAPORATIVE EMISSION LINE DRAWING

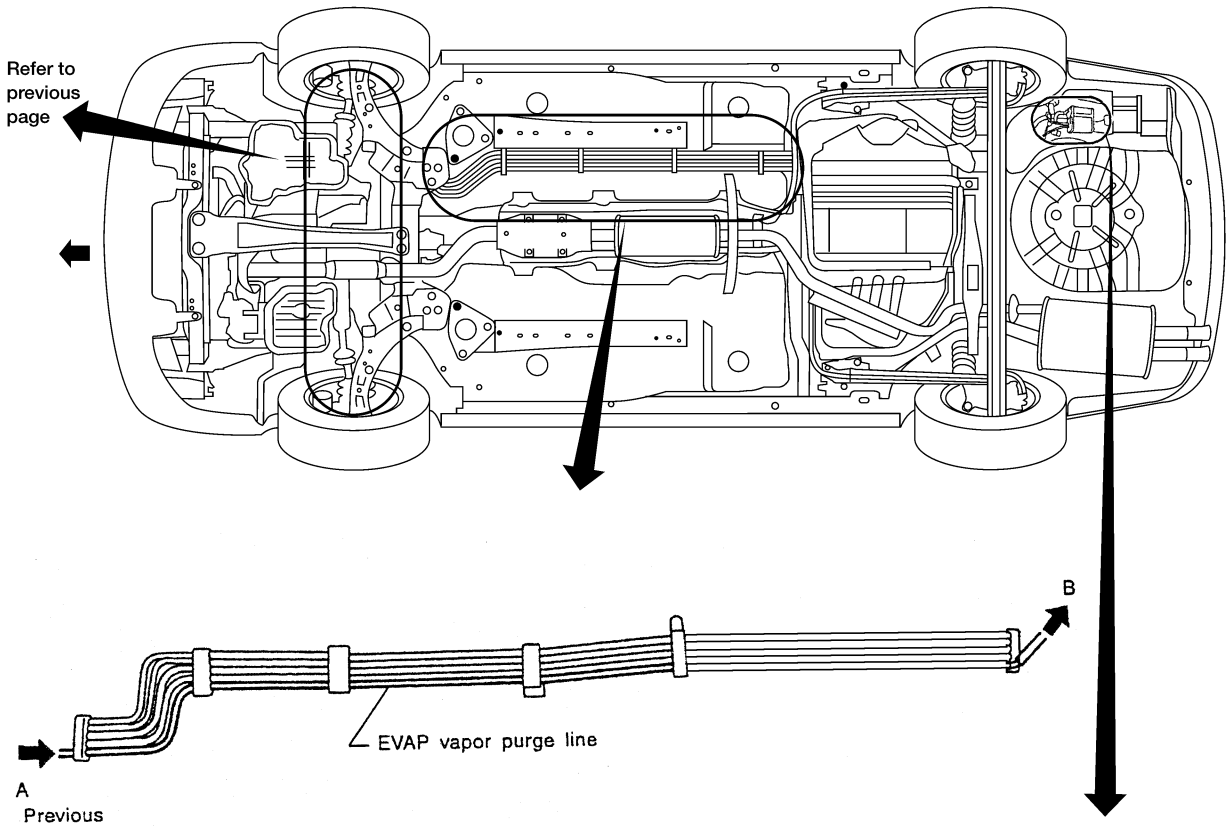
NIEC0742

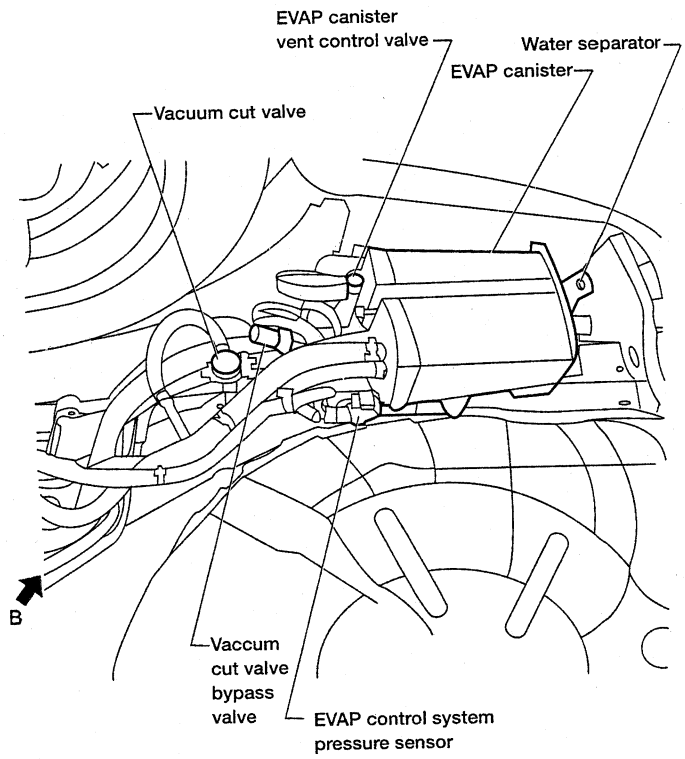


NOTE: Do not use soapy water or any type of solvent while installing vacuum hoses or purge hoses.

WEC366

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





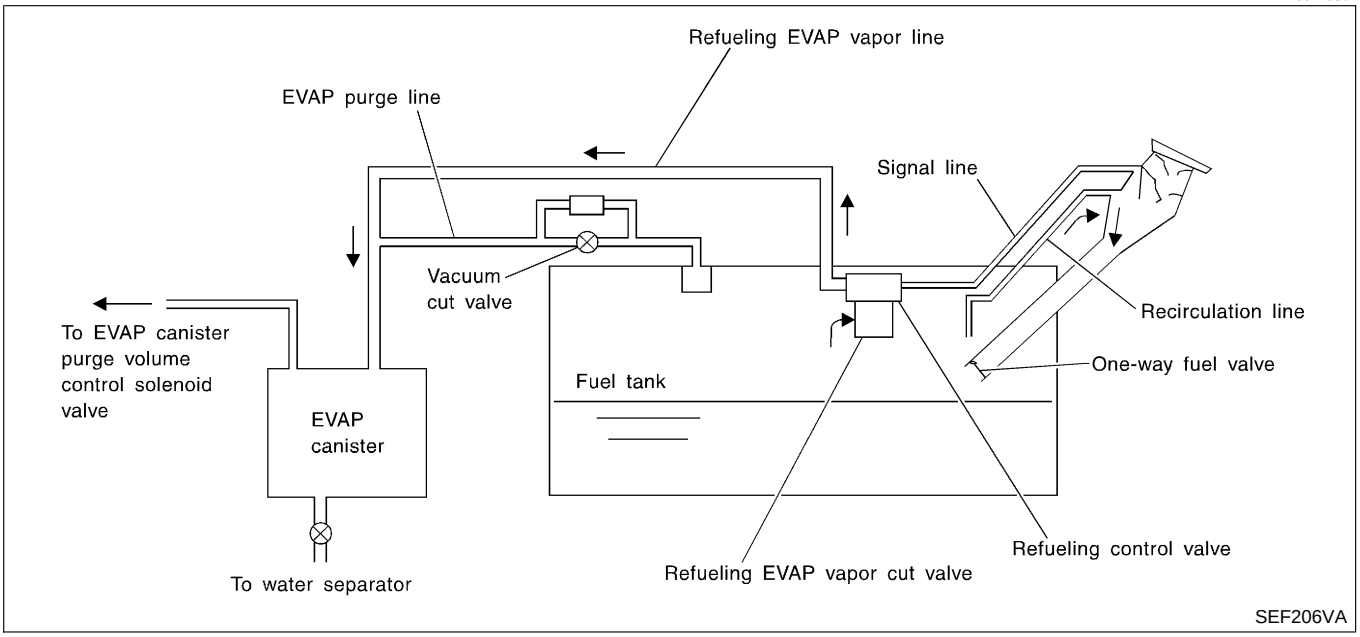
WEC362

ON BOARD REFUELING VAPOR RECOVERY (ORVR)

NIEC0743

System Description

NIEC0743S01



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-1408.
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.**

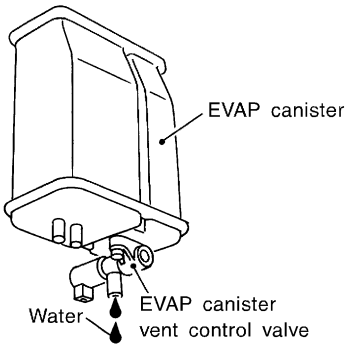
Diagnostic Procedure

NIEC0743S02

Symptom: Fuel Odor from EVAP Canister Is Strong.

NIEC0743S0201

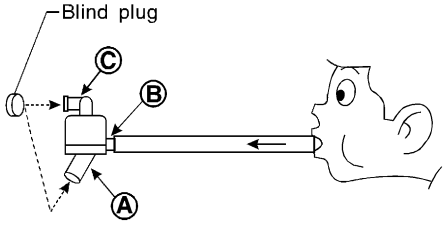
1	CHECK EVAP CANISTER
1. Remove EVAP canister with EVAP canister vent control valve attached. 2. Weigh the EVAP canister with EVAP canister vent control valve attached. The weight should be less than 1.8 kg (4.0 lb).	
OK or NG	
OK ▶	GO TO 2.
NG ▶	GO TO 3.

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

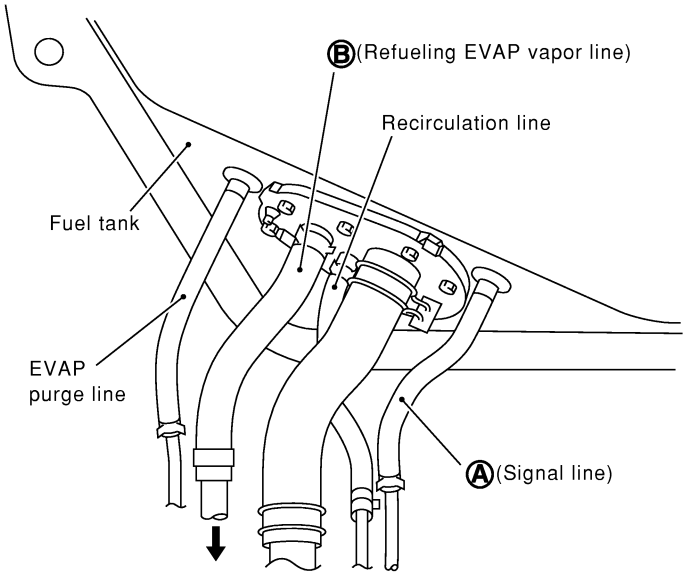
With CONSULT-II

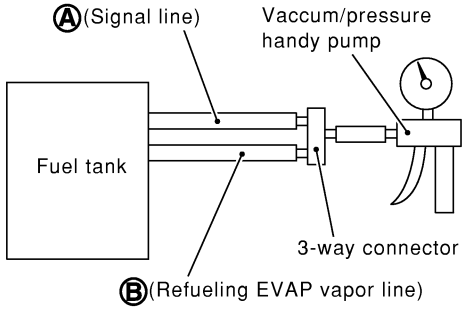
1. Remove fuel tank. Refer to ***FE-5***, "FUEL SYSTEM".
2. Drain fuel from the tank as follows:

a. Remove fuel feed hose located on the fuel level sensor unit and fuel pump.
b. Connect a spare fuel hose, one side to fuel level sensor unit and fuel pump 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 level sensor unit and fuel pump.
   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 level sensor unit and fuel pump remaining removed and check that the pressure is applicable.





SEF246Y

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

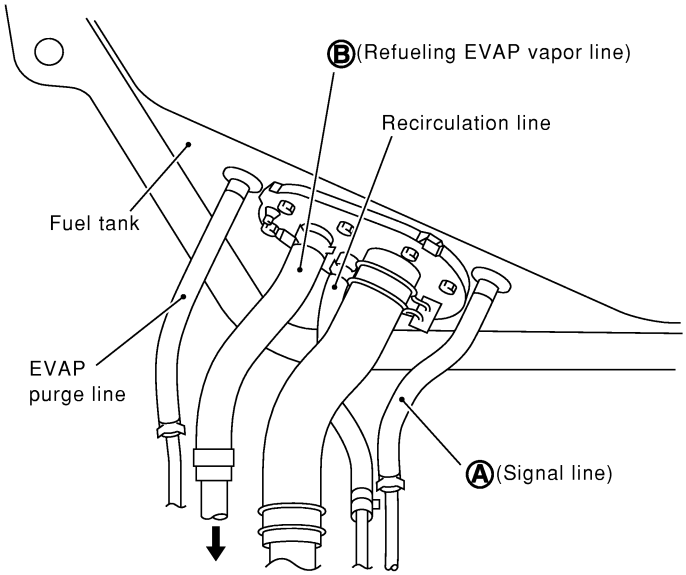
1. Remove fuel tank. Refer to ***FE-5***, "FUEL SYSTEM".
2. Drain fuel from the tank as follows:

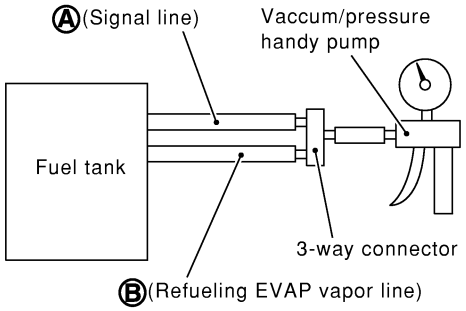
a. Remove fuel level sensor unit and fuel pump.
Always replace O-ring with new one.

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 follow.

a. Connect vacuum pump to hose ends A and B using a suitable 3-way connector.
b. Put fuel tank upside down.
c. Apply vacuum pressure to both hose ends A and B [−13.3 kPa (−100 mmHg, −3.94 inHg)] with fuel level sensor unit and fuel pump remaining removed and check that the pressure is applicable.





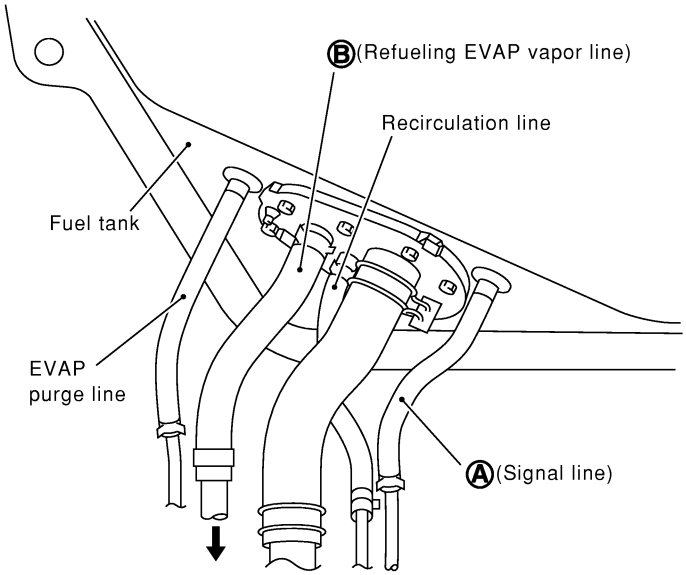
SEF246Y

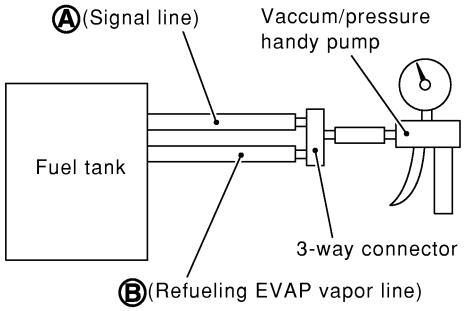
OK or NG

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.





SEF246Y

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.

NIEC0743S0202

1	CHECK EVAP CANISTER

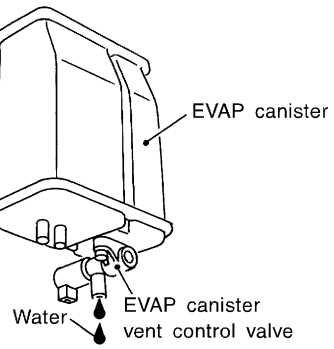
1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Weigh the EVAP canister with EVAP canister vent control valve attached.
   The weight should be less than 1.8 kg (4.0 lb).

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.

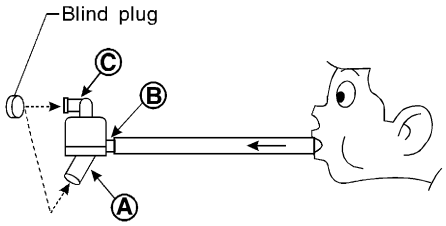
3	REPLACE EVAP CANISTER

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.

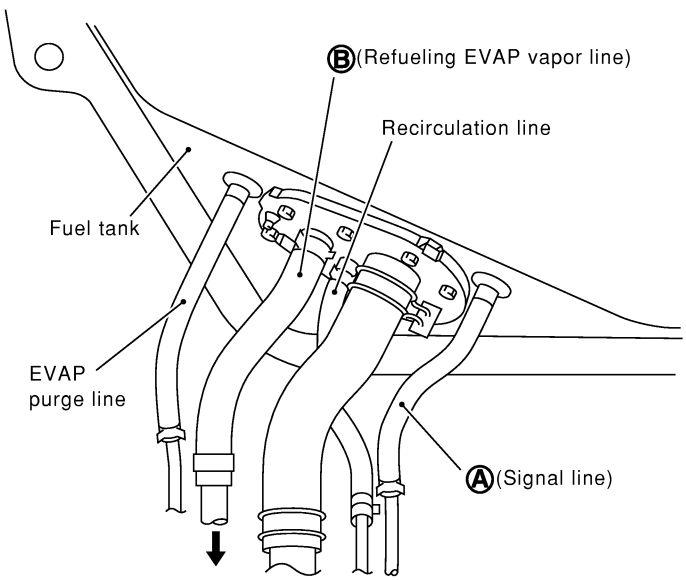
	▶	Repair or replace EVAP hose.

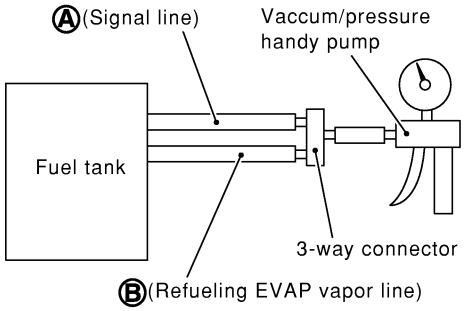
6	CHECK VENT HOSES AND VENT TUBES	
Check hoses and tubes between EVAP canister and refueling control valve for clogging, kink, looseness and improper connection.		
OK or NG		
OK	▶	GO TO 7.
NG	▶	Repair or replace hoses and tubes.

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.





SEF246Y

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

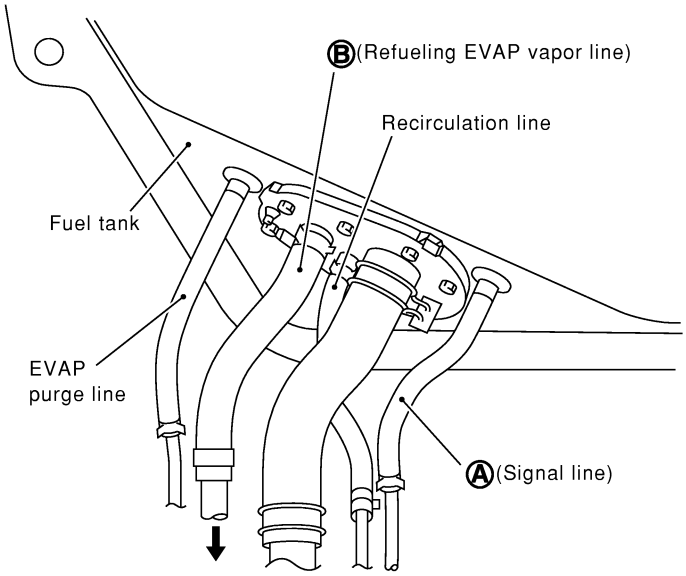
With CONSULT-II

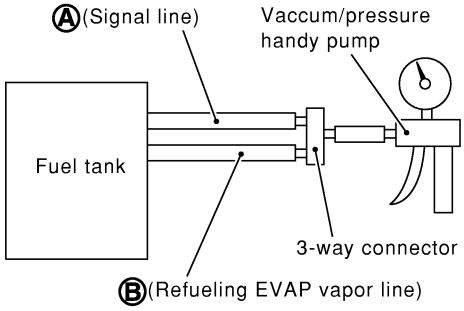
1. Remove fuel tank. Refer to ***FE-5***, "FUEL SYSTEM".
2. Drain fuel from the tank as follows:

a. Remove fuel feed hose located on the fuel level sensor unit and fuel pump.
b. Connect a spare fuel hose, one side to fuel level sensor unit and fuel pump 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 level sensor unit and fuel pump.
   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 level sensor unit and fuel pump remaining removed and check that the pressure is applicable.





SEF246Y

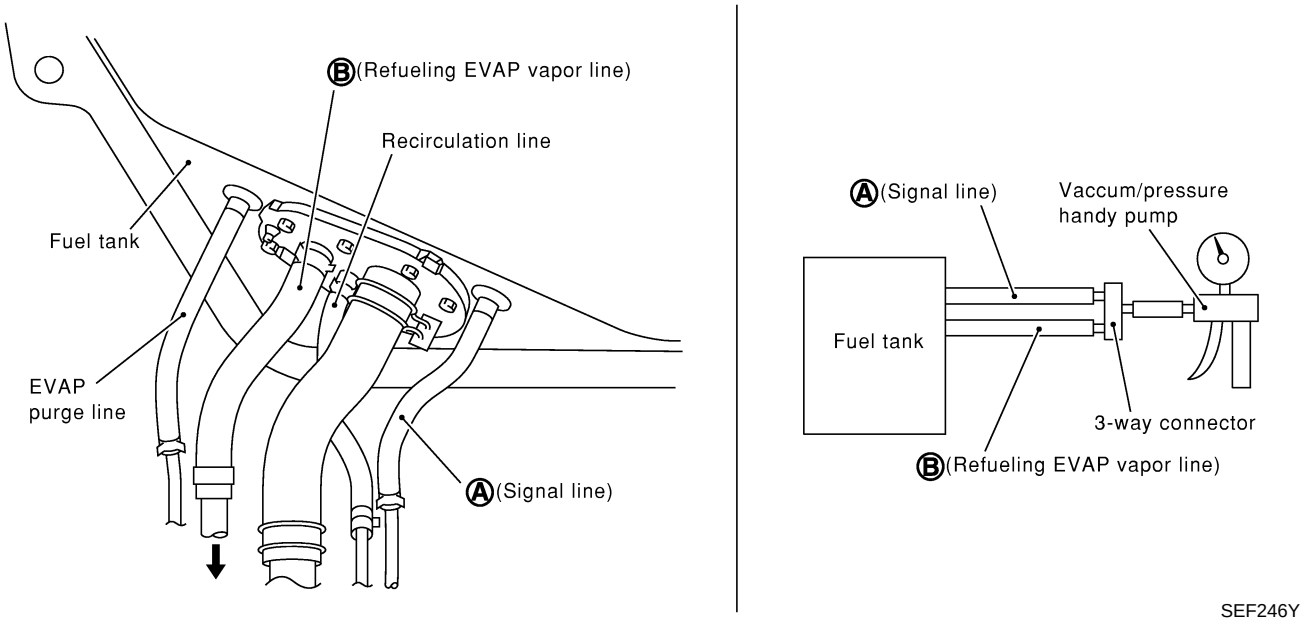
OK or NG

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 level sensor unit and fuel pump.
      Always replace O-ring with new one.
   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. Put fuel tank upside down.
   c. Apply vacuum pressure to both hose ends A and B [−13.3 kPa (−100 mmHg, −3.94 inHg)] with fuel level sensor unit and fuel pump remaining removed and check that the pressure is applicable.



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

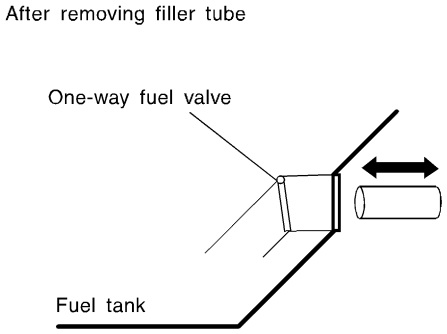
Check one-way valve for clogging.

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.



SEF665U

Do not drop any material into the tank.

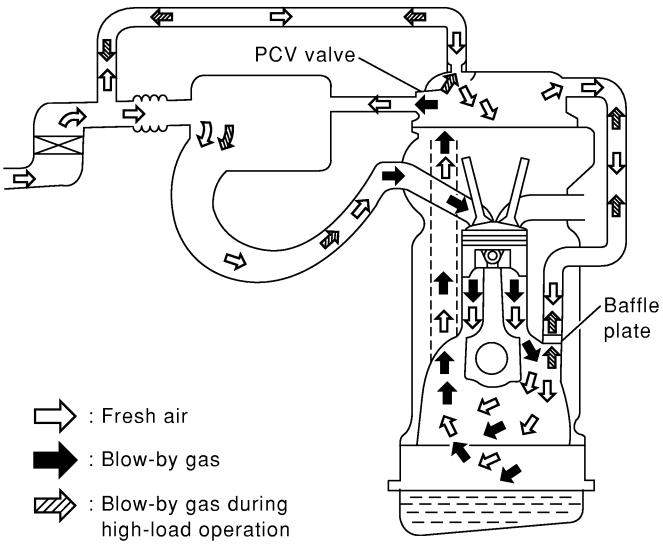
OK or NG

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

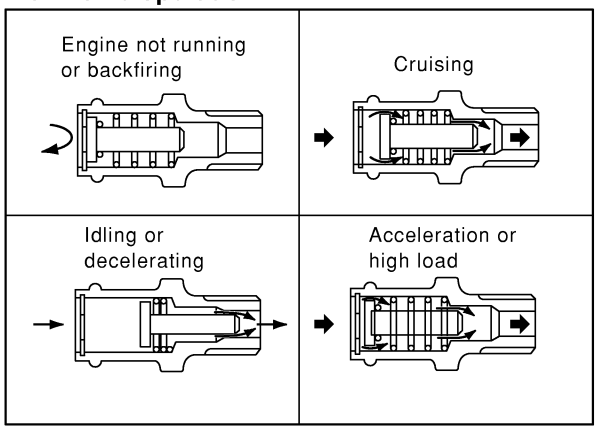
Positive Crankcase Ventilation

DESCRIPTION

NIEC0744

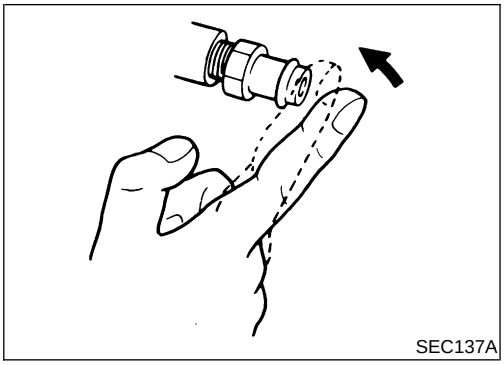


PCV valve operation



SEF833X

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


SEC137A

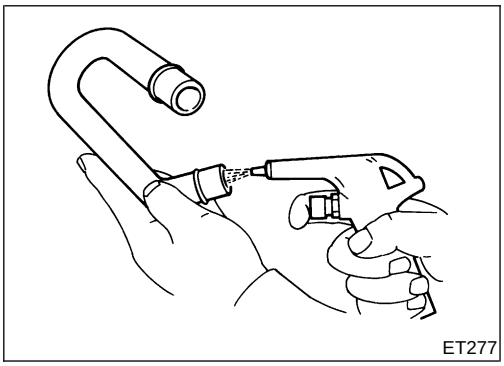
INSPECTION

NIEC0745

PCV (Positive Crankcase Ventilation) Valve

NIEC0745S01

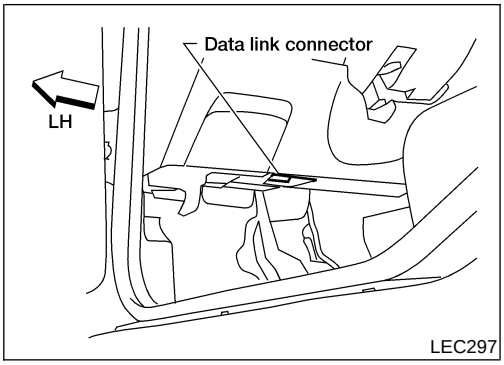
With engine running at idle, remove PCV valve from rocker cover. A properly working valve makes a hissing noise as air passes through it. A strong vacuum should be felt immediately when a finger is placed over the valve inlet.


ET277

Ventilation Hose

NIEC0745S02

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

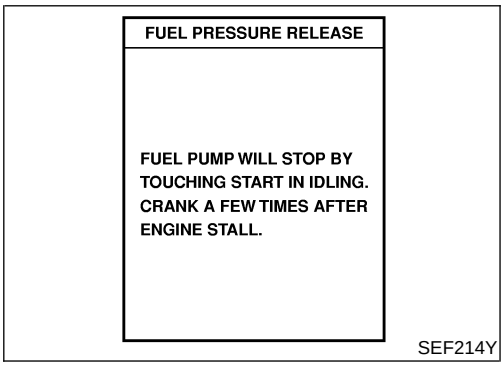
NIEC0746

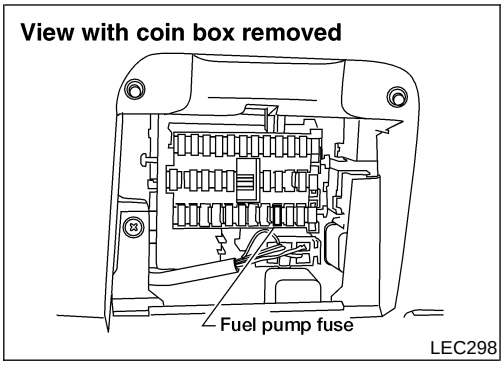
Before disconnecting fuel line, release fuel pressure from fuel line to eliminate danger.

WITH CONSULT-II

NIEC0746S01

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

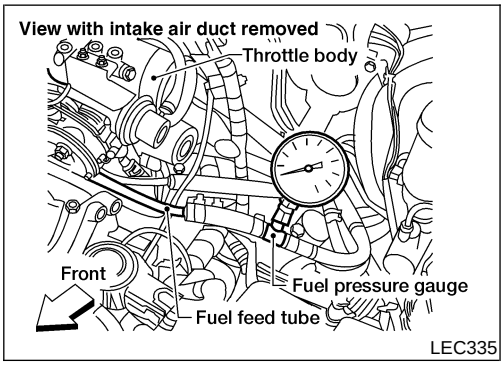




WITHOUT CONSULT-II

NIEC0746S02

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



Fuel Pressure Check

NIEC0747

- **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 Kit J-44321 to check fuel pressure.**
- **Do not perform fuel pressure check with system operating. Fuel pressure gauge may indicate false readings.**

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

At idle speed:

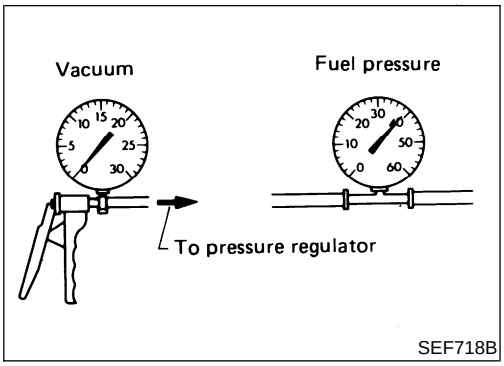
With vacuum hose connected

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

With vacuum hose disconnected

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

If results are unsatisfactory, perform Fuel Pressure Regulator Check, EC-1409.



Fuel Pressure Regulator Check

NIEC0748

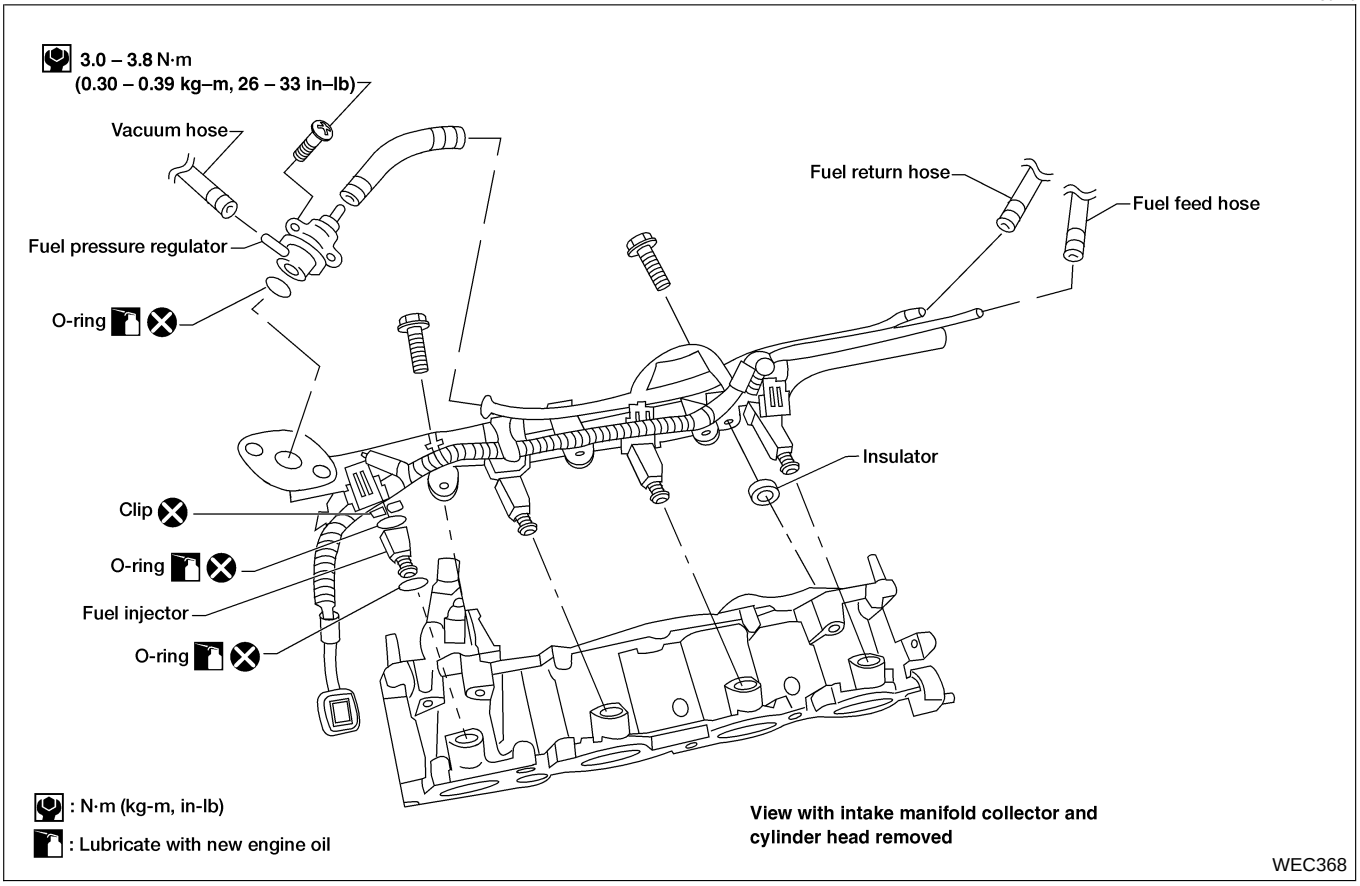
1. Stop engine and disconnect fuel pressure regulator vacuum hose from intake manifold collector.
2. Plug intake manifold collector with a rubber cap.
3. Connect variable vacuum source to fuel pressure regulator.
4. Start engine and read indication of fuel pressure gauge as vacuum is changed.

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

Injector

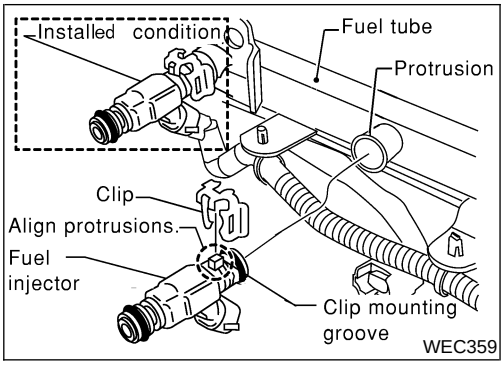
REMOVAL AND INSTALLATION

NIEC0749

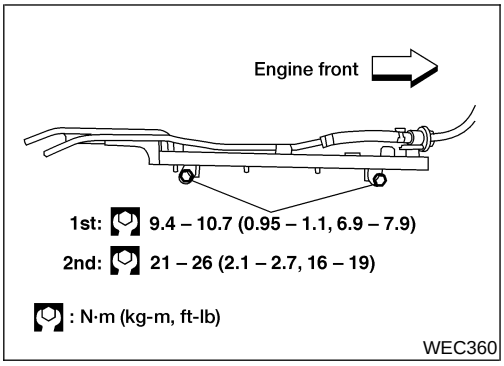


1. Release fuel pressure to zero.
2. Remove accelerator wire bracket.
3. Remove EVAP canister purge volume control solenoid valve and the bracket.
4. Remove ventilation hose.
5. Disconnect injector harness connectors.
6. Disconnect fuel pressure regulator vacuum hose from intake manifold collector.
7. Disconnect fuel hoses from fuel tube assembly.
8. Remove injectors with fuel tube assembly.

Injector (Cont'd)



9. Expand and remove clips securing fuel injectors.
10. Extract fuel injectors straight from fuel tubes.
- **Be careful not to damage injector nozzles during removal.**
- **Do not bump or drop fuel injectors.**
11. 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 or finger nails or clips. Do not expand or twist O-rings.**
- **Discard old clips; replace with new ones.**
12. Position clips in grooves on fuel injectors.
- **Make sure that protrusions of fuel injectors are aligned with cutouts of clips after installation.**
13. Align protrusions of fuel tubes with those of fuel injectors.
14. 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.



15. Tighten fuel tube assembly mounting nuts in two stages.

: Tightening torque N·m (kg-m, ft-lb)

1st stage:

9.4 - 10.7 (0.95 - 1.1, 6.9 - 7.9)

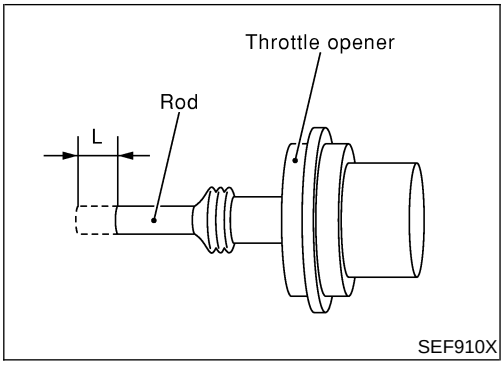
2nd stage:

21 - 26 (2.1 - 2.7, 16 - 19)

16. Install all removed parts in the reverse order of removal.

CAUTION:

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



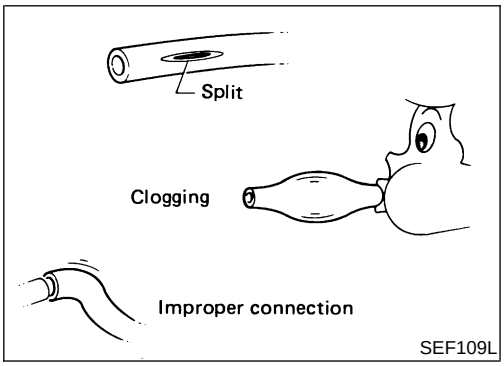
SEF910X

Throttle Opener

INSPECTION

=NIEC0750

1. Start engine and let it idle.
2. Confirm the amount of the rod moves “L” more than 3.0 mm (0.118 in), the throttle drum becomes free from the rod of the throttle opener.
   If NG, go to next step.
   If OK, inspection is complete.

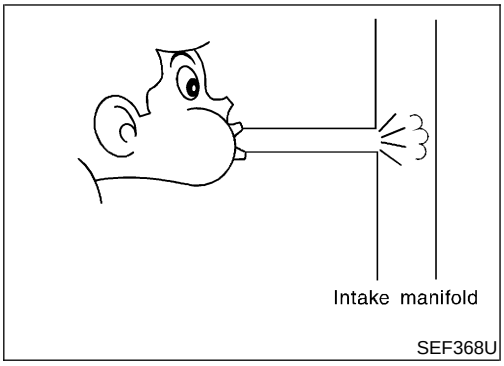


SEF109L

3. Turn ignition switch “OFF”.
4. Check vacuum source to throttle opener.

a. Check vacuum hose for disconnection or improper connection.
b. Remove vacuum hose connected to throttle opener.
c. Attach a vacuum gauge to vacuum hose, which is disconnected.
d. Start engine and let it idle.
e. Make sure that the vacuum is more than −40.0 kPa (−300 mmHg, −11.81 inHg).
f. Remove the vacuum gauge.
   If NG, go to next step.
   If OK, go to step 7.

5. Check vacuum hose for clogging and cracks.
   If NG, replace or clean vacuum hose.
   If OK, go to next step.
6. Blow air into the throttle chamber and make sure air flows freely.
   If NG, replace or clean throttle chamber.
   If OK, go to next step.

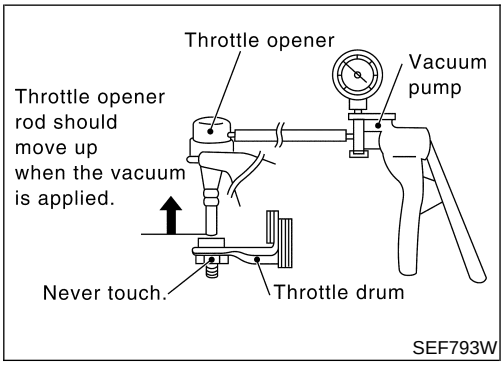


SEF368U

7. Check throttle opener.

a. Connect suitable vacuum hose to vacuum pump as shown at left.
b. 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.
c. Confirm the amount of the rod moves more than 3.0 mm (0.118 in), and also the throttle drum becomes free from the rod of the throttle opener.
   If NG, go to next step.

8. Check visually for cracking and/or distortion of throttle opener and rod.
   If NG, replace throttle opener.
   If OK, install the vacuum hose and repeat from step 1 to 2.



SEF793W

Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment

=NIEC0751

PREPARATION

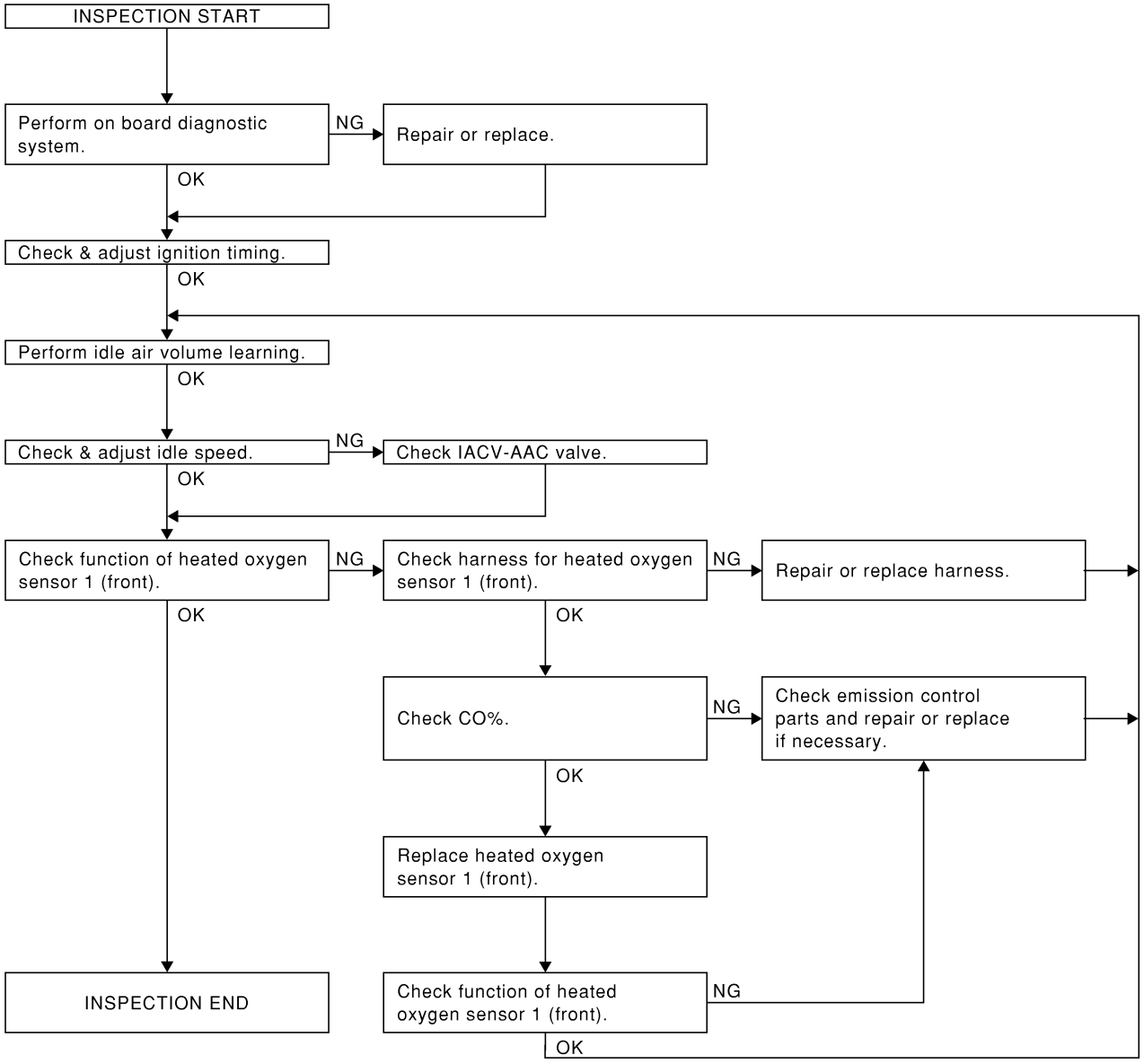
NIEC0751S01

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

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

Overall Inspection Sequence

NIEC0751S0101



SEF906XA

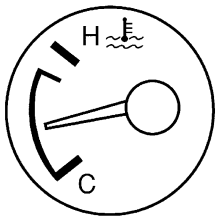
INSPECTION PROCEDURE

=NIEC0751S02

1	INSPECTION START

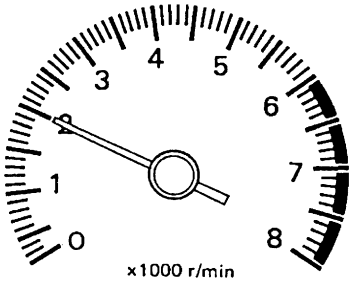
1. Visually check the following:
- Air cleaner clogging
- Hoses and ducts for leaks
- EGR valve operation
- Electrical connectors
- Gasket
- Throttle valve and throttle position sensor operation

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.



AEC692

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

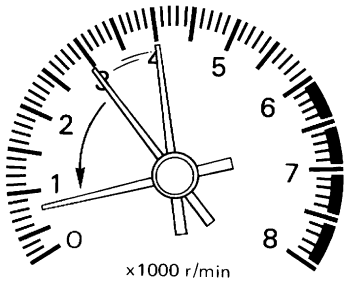
OK (With CONSULT-II)	▶	GO TO 3.
OK (Without CONSULT-II)	▶	GO TO 4.
NG	▶	GO TO 2.

2	REPAIR OR REPLACE	
Repair or replace components as necessary according to corresponding "Diagnostic Procedure".		
With CONSULT-II	▶	GO TO 3.
Without CONSULT-II	▶	GO TO 4.

3	CHECK IGNITION TIMING

With CONSULT-II

1. Run engine at about 2,000 rpm for about 2 minutes under no-load.
2. Rev engine (2,000 to 3,000 rpm) two or three times under no-load, then run engine at idle speed for about 1 minute.



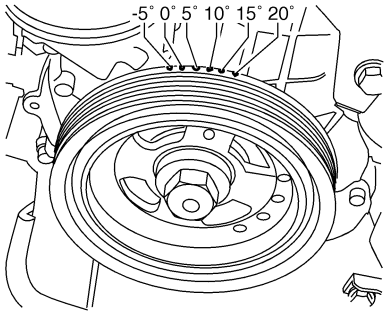
SEF978U

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

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

PEF546N

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



LEC300

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

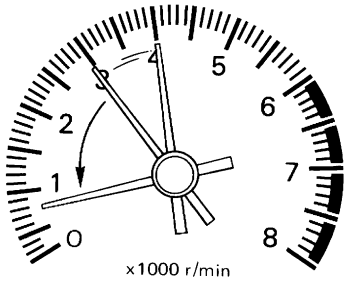
OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

4	CHECK IGNITION TIMING

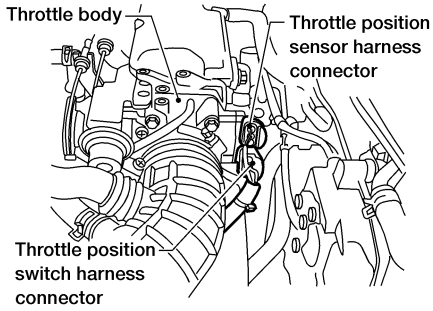
Without CONSULT-II

1. Run engine at about 2,000 rpm for about 2 minutes under no-load.
2. Rev engine (2,000 to 3,000 rpm) two or three times under no-load, then run engine at idle speed for about 1 minute.



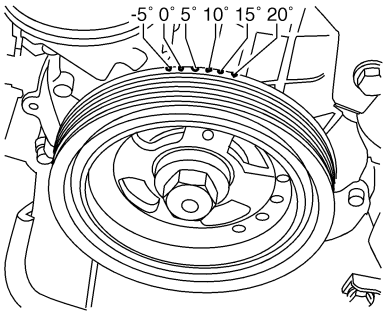
SEF978U

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



LEC279

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



LEC300

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

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

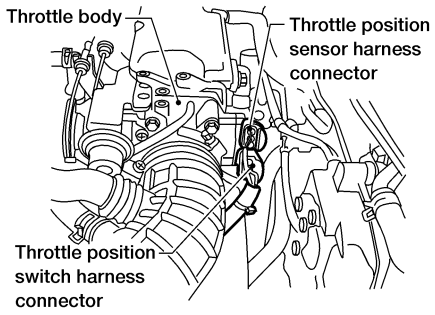
5	ADJUST IGNITION TIMING

With CONSULT-II

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

Without CONSULT-II

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



LEC279

With CONSULT-II	▶	GO TO 3.
Without CONSULT-II	▶	GO TO 4.

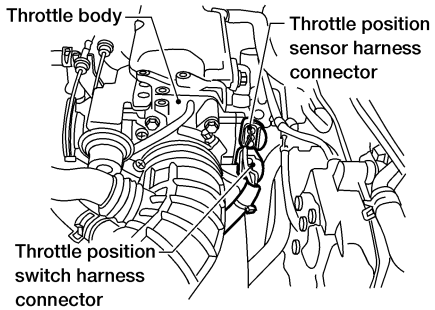
6	PERFORM IDLE AIR VOLUME LEARNING

With CONSULT-II

1. Start and rev engine (2,000 to 3,000 rpm) two or three times under no-load, then run it at idle speed.
2. Perform "Idle Air Volume Learning", EC-1424.

Without CONSULT-II

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



LEC279

2. Start and rev engine (2,000 to 3,000 rpm) two or three times under no-load, then run it at idle speed.
3. Perform "Idle Air Volume Learning", EC-1424.

	▶	GO TO 7.

7	CHECK TARGET IDLE SPEED

With CONSULT-II

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

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

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

Without CONSULT-II

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

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

OK or NG

OK (With CONSULT-II)	▶	GO TO 9.
OK (Without CONSULT-II)	▶	GO TO 10.
NG	▶	GO TO 8.

8	DETECT MALFUNCTIONING PART

Check the following.
- Check IACV-AAC valve and replace if necessary. Refer to EC-1776.
- Check IACV-AAC valve harness and repair if necessary. Refer to EC-1776.
- Check ECM function by substituting another known good ECM.
  (ECM may be the cause of a problem, but this is rarely the case.)

With CONSULT-II	▶	GO TO 9.
Without CONSULT-II	▶	GO TO 10.

9	CHECK HEATED OXYGEN SENSOR 1 (FRONT) 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)	RICH

SEF820Y

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

OK or NG

OK	▶	**INSPECTION END**
NG (Monitor does not fluctuate.)	▶	GO TO 13.
NG (Monitor fluctuates less than 5 times.)	▶	GO TO 11.

10	CHECK HEATED OXYGEN SENSOR 1 (FRONT) SIGNAL

Without CONSULT-II

1. Set voltmeter probe between ECM terminal 62 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 13.
NG (Voltage fluctuates less than 5 times.)	▶	GO TO 11.

11	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)" 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 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	▶	**INSPECTION END**
NG	▶	GO TO 12.

12	DETECT MALFUNCTIONING PART

Check the following.

- Check fuel pressure regulator. Refer to EC-1409.
- Check mass air flow sensor and its circuit. Refer to EC-1515.
- Check injector and its circuit. Refer to EC-1917.
  Clean or replace if necessary.
- Check engine coolant temperature sensor and its circuit. Refer to EC-1535.
- 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 6.

13	CHECK HEATED OXYGEN SENSOR 1 (FRONT) HARNESS

1. Turn off engine and disconnect battery ground cable.
2. Disconnect ECM harness connector.
3. Disconnect heated oxygen sensor 1 (front) harness connector.
4. Check harness continuity between ECM terminal 62 and HO2S1 (front) harness connector terminal 2.
   Refer to Wiring Diagram, EC-1559.
   Continuity should exist.

OK or NG

OK	▶	GO TO 15.
NG	▶	GO TO 14.

14	REPAIR OR REPLACE

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

	▶	GO TO 6.

15 **PREPARATION FOR "CO" % CHECK**

With CONSULT-II

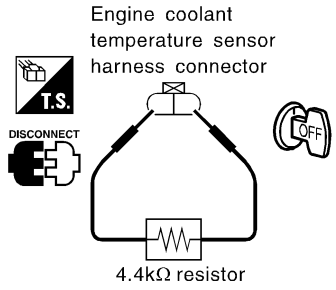
1. Reconnect ECM harness connector.
2. Turn ignition switch "ON".
3. Select "ENG COOLANT TEMP" in "ACTIVE TEST" mode.
4. Set "ENG COOLANT TEMP" to 5°C (41°F) by touching "DWN" and "Qd".

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.

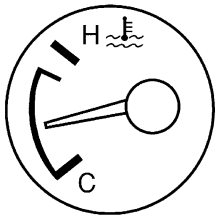


SEF982UA

▶ GO TO 16.

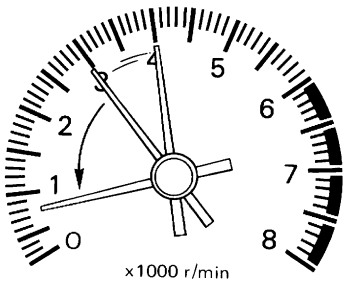
16	CHECK "CO" %

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



AEC692

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: Less than 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 17.
NG	▶	GO TO 18.

17	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)" 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 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

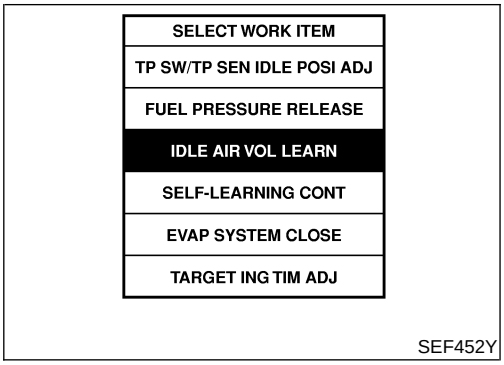
OK	▶	GO TO 6.
NG	▶	GO TO 18.

18	DETECT MALFUNCTIONING PART

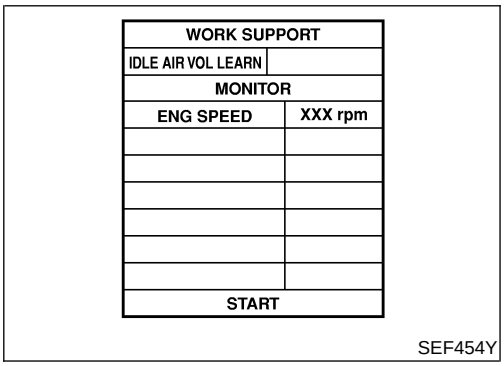
Check the following.

- Connect HO2S1 (front) harness connector to HO2S1 (front).
- Check fuel pressure regulator. Refer to EC-1409.
- Check mass air flow sensor and its circuit. Refer to EC-1515.
- Check injector and its circuit. Refer to EC-1917.
  Clean or replace if necessary.
- Check engine coolant temperature sensor and its circuit. Refer to EC-1535.
- Check ECM function by substituting another known good ECM.
  (ECM may be the cause of a problem, but this is rarely the case.)

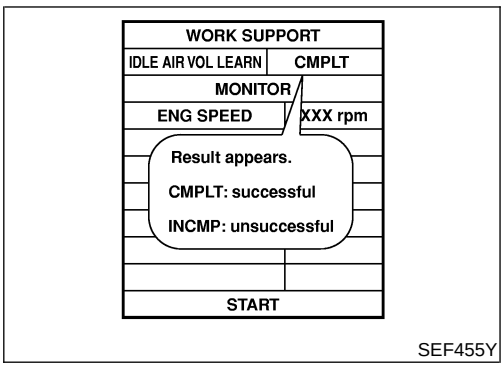
	▶	GO TO 6.



SEF452Y



SEF454Y



SEF455Y

Idle Air Volume Learning

NIEC0752

DESCRIPTION

NIEC0752S01

"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

NIEC0752S02

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 - 95°C (158 - 203°F)
- PNP switch: ON
- Electric load switch: OFF
  (Air conditioner, headlamp, rear window defogger)

On vehicles equipped with daytime running light systems, if the parking brake is applied before the engine is started the headlamp will not be illuminated.

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

OPERATION PROCEDURE

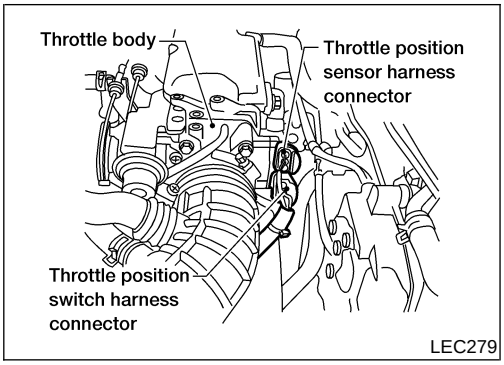
NIEC0752S03

With CONSULT-II

NIEC0752S0301

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 15 seconds.
7. Select "IDLE AIR VOL LEARN" in "WORK SUPPORT" mode.
8. Touch "START" and wait 15 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	M/T: 800±50 rpm A/T: 800±50 rpm (in "P" or "N" position)
Ignition timing	M/T: 15°±2° BTDC A/T: 15°±2° BTDC (in "P" or "N" position)



⊗ Without CONSULT-II

NIEC0752S0302

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", EC-1424 (previously mentioned) are in good order.
5. Turn ignition switch "OFF" and wait at least 5 seconds.
6. Start the engine and let it idle for at least 15 seconds.
7. Disconnect throttle position sensor harness connector (brown), then reconnect it within 5 seconds.
8. Wait 15 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	M/T: 800±50 rpm A/T: 800±50 rpm (in "P" or "N" position)
Ignition timing	M/T: 15°±2° BTDC A/T: 15°±2° 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 that downstream of throttle valve is free from air leakage.**
3) **Adjust closed throttle position switch and reset memory. (Refer to Basic Inspection, EC-1470.)**
4) **When the above three items check out OK, engine component parts and their installation condition are questionable. Check and eliminate the cause of the problem.**
5) **If any of the following conditions occur after the engine has started, eliminate the cause of the problem and perform "Idle air volume learning" again:**

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

Introduction

NIEC0753

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-1485.)

Two Trip Detection Logic

NIEC0754

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 - P0304 is being detected	X	—	—	—	X	—	X	—
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0304 has been detected	—	X	X	—	X	—	X	—
Closed loop control — DTC: P1148	—	X	—	—	X	—	X	—
Fail-safe items (Refer to EC-1485.)	—	X	—	—	X*1	—	X*1	—
Except above	—	—	—	X	—	X	X	X

*1: Except “ECM”

Emission-related Diagnostic Information

NIEC0755

DTC AND 1ST TRIP DTC

NIEC0755S01

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-1438.

For malfunctions in which 1st trip DTCs are displayed, refer to EC-1436. 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-1468. 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

NIEC0755S0101

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

NIEC0755S02

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-1452.
Only one set of freeze frame data (either 1st trip freeze frame data or freeze frame data) can be stored in the ECM. 1st trip freeze frame data is stored in the ECM memory along with the 1st trip DTC. There is no priority for 1st trip freeze frame data and it is updated each time a different 1st trip DTC is detected. However, once freeze frame data (2nd trip detection/MIL on) is stored in the ECM memory, 1st trip freeze frame data is no longer stored. Remember, only one set of freeze frame data can be stored in the ECM. The ECM has the following priorities to update the data.

Priority	Items	
1	Freeze frame data	Misfire — DTC: P0300 - P0304 Fuel Injection System Function — DTC: P0171, P0172
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-1438.

SYSTEM READINESS TEST (SRT) CODE

NIEC0755S03

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

=NIEC0755S0301

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
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	Heated oxygen sensor 1 (front) (circuit)	P0130
		Heated oxygen sensor 1 (front) (lean shift monitoring)	P0131
		Heated oxygen sensor 1 (front) (rich shift monitoring)	P0132
		Heated oxygen sensor 1 (front) (response monitoring)	P0133
		Heated oxygen sensor 1 (front) (high voltage)	P0134
		Heated oxygen sensor 2 (rear) (min. voltage monitoring)	P0137
		Heated oxygen sensor 2 (rear) (max. voltage monitoring)	P0138
		Heated oxygen sensor 2 (rear) (response monitoring)	P0139
		Heated oxygen sensor 2 (rear) (high voltage)	P0140
O2 SEN HEATER	3	Heated oxygen sensor 1 (front) heater	P0135
		Heated oxygen sensor 2 (rear) heater	P0141
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

=NIEC0755S0302

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".

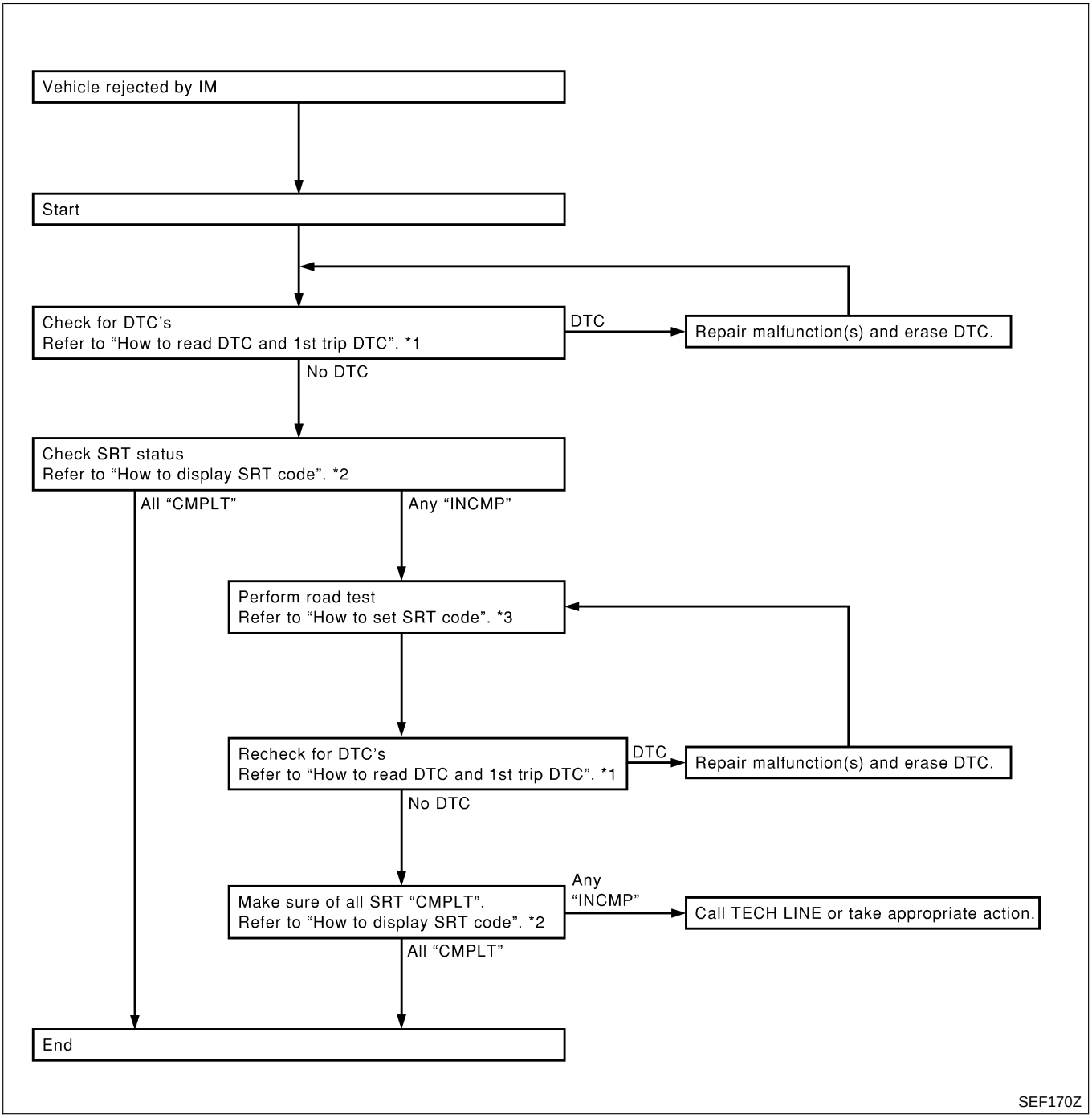
NOTE:

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

NIEC0755S0303

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-1427 *2 EC-1431 *3 EC-1432

How to Display SRT Code

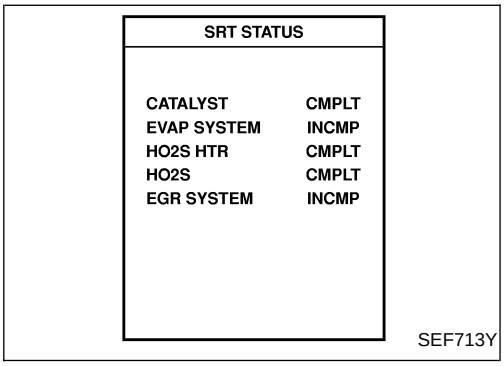
NIEC0755S0304

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

NIEC0755S0305

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-1429.

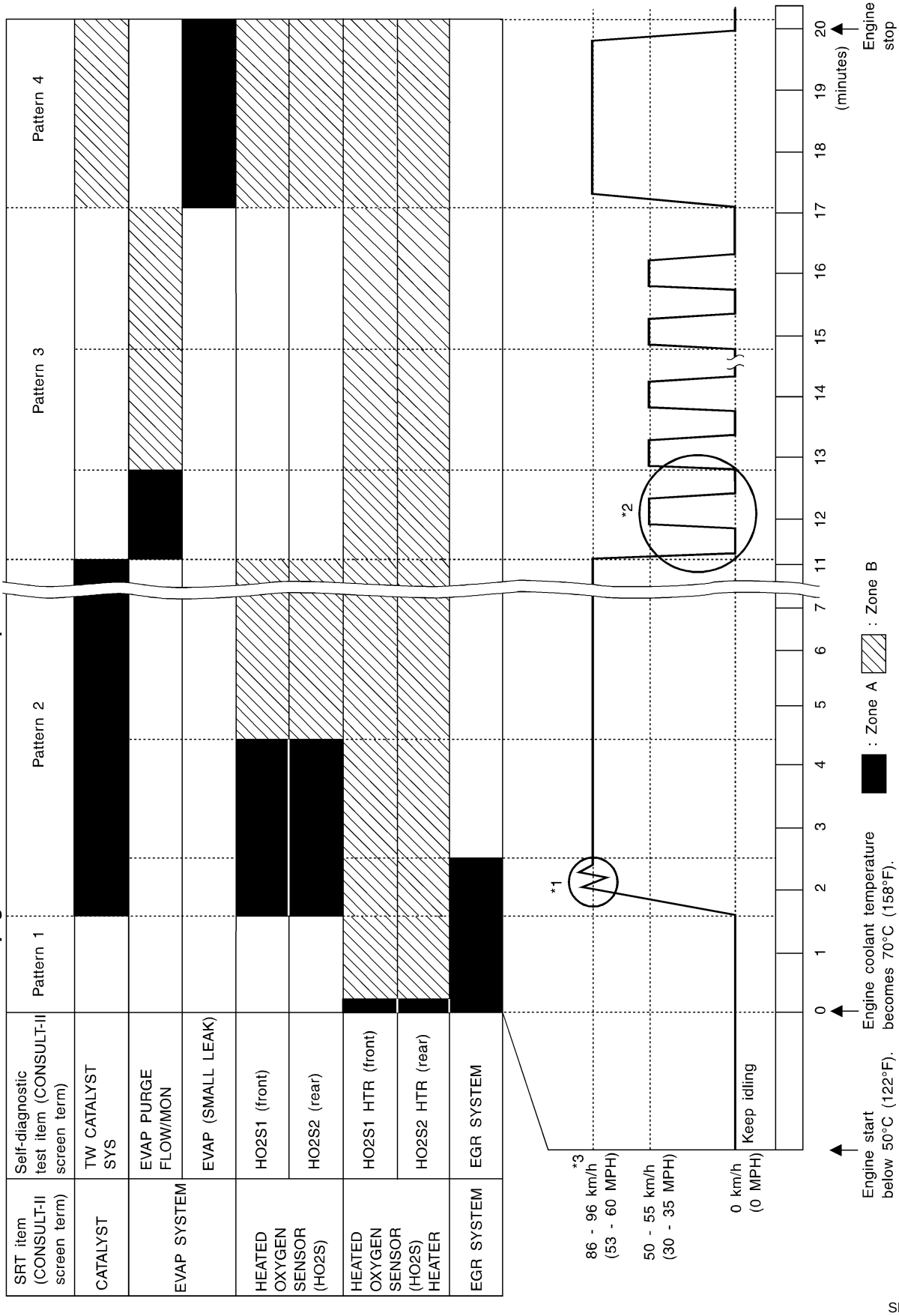
Without CONSULT-II

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

NIEC0755S0306

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.



SEF676Y

- 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 82 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.

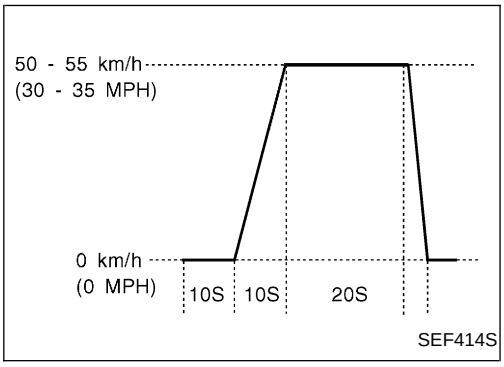
Pattern 4:

- 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.

Suggested upshift speeds for M/T models

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

	For normal acceleration in low altitude areas [less than 1,219 m (4,000 ft)]:	For quick acceleration in low altitude areas and high altitude areas [over 1,219 m (4,000 ft)]:
Gear change	ACCEL shift point km/h (MPH)	km/h (MPH)
1st to 2nd	24 (15)	25 (15)
2nd to 3rd	40 (25)	40 (25)
3rd to 4th	65 (40)	65 (40)
4th to 5th	75 (45)	75 (45)

Suggested Maximum Speed in Each Gear

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

Gear	km/h (MPH)
1st	55 (35)
2nd	95 (60)
3rd	135 (85)
4th	—
5th	—

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

NIEC0755S04

The following is the information specified in Mode 6 of SAE J1979.
The test value is a parameter used to determine whether a system/circuit diagnostic test is "OK" or "NG" while being monitored by the ECM during self-diagnosis. The test limit is a reference value which is specified as the maximum or minimum value and is compared with the test value being monitored.
Items for which these data (test value and test limit) are displayed are the same as SRT code items (9 test items).
These data (test value and test limit) are specified by Test ID (TID) and Component ID (CID) and can be displayed on the GST screen.

X: Applicable —: Not applicable

SRT item	Self-diagnostic test item	Test value (GST display)		Test limit	Application
		TID	CID		
CATALYST	Three way catalyst function	01H	01H	Max.	X
		02H	81H	Min.	X
EVAP SYSTEM	EVAP control system (Small leak)	05H	03H	Max.	X
	EVAP control system purge flow monitoring	06H	83H	Min.	X

SRT item	Self-diagnostic test item	Test value (GST display)		Test limit	Application
		TID	CID		
O2 SENSOR	Heated oxygen sensor 1 (front)	09H	04H	Max.	X
		0AH	84H	Min.	X
		0BH	04H	Max.	X
		0CH	04H	Max.	X
		0DH	04H	Max.	X
	Heated oxygen sensor 2 (rear)	19H	86H	Min.	X
		1AH	86H	Min.	X
		1BH	06H	Max.	X
		1CH	06H	Max.	X
O2 SENSOR HEATER	Heated oxygen sensor 1 (front) heater	29H	08H	Max.	X
		2AH	88H	Min.	X
	Heated oxygen sensor 2 (rear) heater	2DH	0AH	Max.	X
		2EH	8AH	Min.	X
EGR SYSTEM	EGR function	31H	8CH	Min.	X
		32H	8CH	Min.	X
		33H	8CH	Min.	X
		34H	8CH	Min.	X
		35H	0CH	Max.	X

EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS

NIEC0755S05

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-1515
ABSL PRES SEN/CIRC	P0105	—	—	X	EC-1524
AIR TEMP SEN/CIRC	P0110	—	—	X	EC-1529
COOLANT T SEN/CIRC	P0115	—	—	X	EC-1535
THRTL POS SEN/CIRC	P0120	—	—	X	EC-1540
*COOLAN T SEN/CIRC	P0125	—	—	X	EC-1551
HO2S1 (B1)	P0130	X	X	X*2	EC-1556
HO2S1 (B1)	P0131	X	X	X*2	EC-1563
HO2S1 (B1)	P0132	X	X	X*2	EC-1569
HO2S1 (B1)	P0133	X	X	X*2	EC-1575
HO2S1 (B1)	P0134	X	X	X*2	EC-1584
HO2S1 HTR (B1)	P0135	X	X	X*2	EC-1590

Items (CONSULT-II screen terms)	DTC*1	SRT code	Test value/ Test limit (GST only)	1st trip DTC*1	Reference page
HO2S2 (B1)	P0137	X	X	X*2	EC-1595
HO2S2 (B1)	P0138	X	X	X*2	EC-1603
HO2S2 (B1)	P0139	X	X	X*2	EC-1611
HO2S2 (B1)	P0140	X	X	X*2	EC-1619
HO2S2 HTR (B1)	P0141	X	X	X*2	EC-1625
FUEL SYS-LEAN/BK1	P0171	—	—	X	EC-1630
FUEL SYS-RICH/BK1	P0172	—	—	X	EC-1637
FUEL TEMP SEN/CIRC	P0180	—	—	X	EC-1644
ENG OVER TEMP	P0217	—	—	X	EC-1649
MULTI CYL MISFIRE	P0300	—	—	X	EC-1667
CYL 1 MISFIRE	P0301	—	—	X	EC-1667
CYL 2 MISFIRE	P0302	—	—	X	EC-1667
CYL 3 MISFIRE	P0303	—	—	X	EC-1667
CYL 4 MISFIRE	P0304	—	—	X	EC-1667
KNOCK SEN/CIRC-B1	P0325	—	—	—	EC-1674
CKP SEN/CIRCUIT	P0335	—	—	X	EC-1678
CMP SEN/CIRCUIT	P0340	—	—	X	EC-1683
EGR SYSTEM	P0400	X	X	X*2	EC-1690
EGR VOL CONT/V CIR	P0403	—	—	X	EC-1699
TW CATALYST SYS-B1	P0420	X	X	X*2	EC-1706
EVAP SMALL LEAK	P0440	X	X	X*2	EC-1710
PURG VOLUME CONT/V	P0443	—	—	X	EC-1725
VENT CONTROL VALVE	P0446	—	—	X	EC-1731
EVAPO SYS PRES SEN	P0450	—	—	X	EC-1738
EVAP GROSS LEAK	P0455	—	X	X*2	EC-1750
FUEL LEV SEN SLOSH	P0460	—	—	X	EC-1762
FUEL LEVEL SENSOR	P0461	—	—	X	EC-1766
FUEL LEVL SEN/CIRC	P0464	—	—	X	EC-1768
VEH SPEED SEN/CIRC	P0500	—	—	X	EC-1772
IACV/AAC VLV/CIRC	P0505	—	—	X	EC-1776
CLOSED TP SW/CIRC	P0510	—	—	X	EC-1785
A/T COMM LINE	P0600	—	—	—	EC-1793
ECM	P0605	—	—	X	EC-1796
PNP SW/CIRC	P0705	—	—	X	***AT-115***
ATF TEMP SEN/CIRC	P0710	—	—	X	***AT-120***
VEH SPD SEN/CIR AT	P0720	—	—	X	***AT-126***
ENGINE SPEED SIG	P0725	—	—	X	***AT-131***

Emission-related Diagnostic Information (Cont'd)

Items (CONSULT-II screen terms)	DTC*1	SRT code	Test value/ Test limit (GST only)	1st trip DTC*1	Reference page
A/T 1ST GR FNCTN	P0731	—	—	X	***AT-135***
A/T 2ND GR FNCTN	P0732	—	—	X	***AT-142***
A/T 3RD GR FNCTN	P0733	—	—	X	***AT-148***
A/T 4TH GR FNCTN	P0734	—	—	X	***AT-154***
TCC SOLENOID/CIRC	P0740	—	—	X	***AT-163***
A/T TCC S/V FNCTN	P0744	—	—	X	***AT-167***
L/PRESS SOL/CIRC	P0745	—	—	X	***AT-178***
SFT SOL A/CIRC	P0750	—	—	X	***AT-183***
SFT SOL B/CIRC	P0755	—	—	X	***AT-187***
THERMOSTAT FNCTN	P1126	—	—	X	EC-1798
CLOSED LOOP-B1	P1148	—	—	X	EC-1800
ENG OVER TEMP	P1217	—	—	X	EC-1802
IGN SIGNAL-PRIMARY	P1320	—	—	X	EC-1820
CKP SENSOR (COG)	P1336	—	—	X	EC-1826
EGR TEMP SEN/CIRC	P1401	—	—	X	EC-1831
EGR SYSTEM	P1402	X	X	X*2	EC-1838
EVAP SMALL LEAK	P1440	X	X	X*2	EC-1845
PURG VOLUME CONT/V	P1444	—	—	X	EC-1847
VENT CONTROL VALVE	P1446	—	—	X	EC-1859
EVAP PURG FLOW/MON	P1447	X	X	X*2	EC-1867
VENT CONTROL VALVE	P1448	—	—	X	EC-1879
FUEL LEVL SEN/CIRC	P1464	—	—	X	EC-1888
VC/V BYPASS/V	P1490	—	—	X	EC-1891
VC CUT/V BYPASS/V	P1491	—	—	X	EC-1897
A/T DIAG COMM LINE	P1605	—	—	X	EC-1909
TP SEN/CIRC A/T	P1705	—	—	X	***AT-191***
P-N POS SW/CIRCUIT	P1706	—	—	X	EC-1912
O/R CLTCH SOL/CIRC	P1760	—	—	X	***AT-199***

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

*2: These are not displayed with GST.

HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION

NIEC0755S06

How to Erase DTC (With CONSULT-II)

NIEC0755S0601

NOTE:

If the DTC is not for A/T related items (see EC-1366), skip steps 2 through 4.

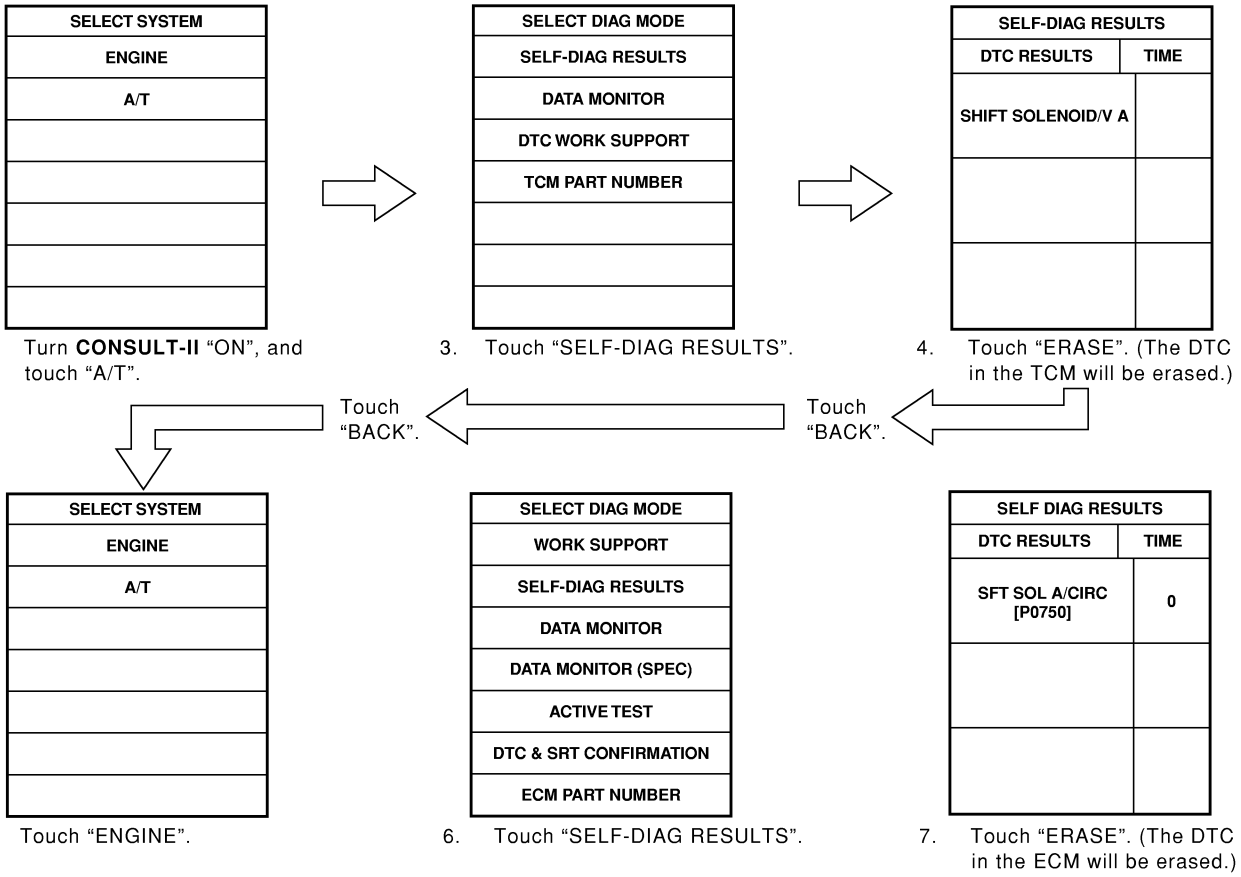
1. If the ignition switch stays "ON" after repair work, be sure to turn ignition switch "OFF" once. Wait at least 10 seconds and then turn it "ON" (engine stopped) again.
2. Turn CONSULT-II "ON" and touch "A/T".
3. Touch "SELF-DIAG RESULTS".
4. Touch "ERASE". [The DTC in the TCM (Transmission control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



SEF823YA

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)

NIEC0755S0602

NOTE:

If the DTC is not for A/T related items (see EC-1366), 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.

NVIS (NISSAN VEHICLE IMMOBILIZER SYSTEM — NATS)

NIEC0755S07

SELF DIAG RESULTS	
DTC RESULTS	TIME
NATS MALFUNCTION [P1610]	0

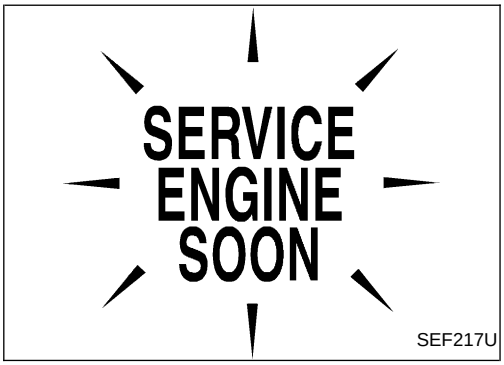
SEF515Y

- **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 *EL-305*, "NVIS (NISSAN Vehicle Immobilizer System — NATS)".**
- **Confirm no self-diagnostic results of NVIS (NATS) is displayed before touching "ERASE" in "SELF-DIAG RESULTS" mode with CONSULT-II.**
- **When replacing ECM, initialization of NVIS (NATS) system and registration of all NVIS (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 NVIS (NATS) initialization and NVIS (NATS) ignition key ID registration, refer to CONSULT-II OPERATION MANUAL, IVIS/NVIS.

Malfunction Indicator Lamp (MIL)

DESCRIPTION

NIEC0756



SEF217U

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-105***, "WARNING LAMPS" or see EC-1954.
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

=NIEC0756S01

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

NIEC0756S0101

In this mode, the MIL on the instrument panel should stay ON. If it remains OFF, check the bulb. Refer to ***EL-105***, "WARNING LAMPS" or see EC-1954.

Diagnostic Test Mode I — Malfunction Warning

NIEC0756S0102

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

OBD System Operation Chart

=NIEC0757

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

NIEC0757S01

- 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-1426.
- 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

NIEC0757S02

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

For details about patterns “B” and “C” under “Fuel Injection System” and “Misfire”, see EC-1444.

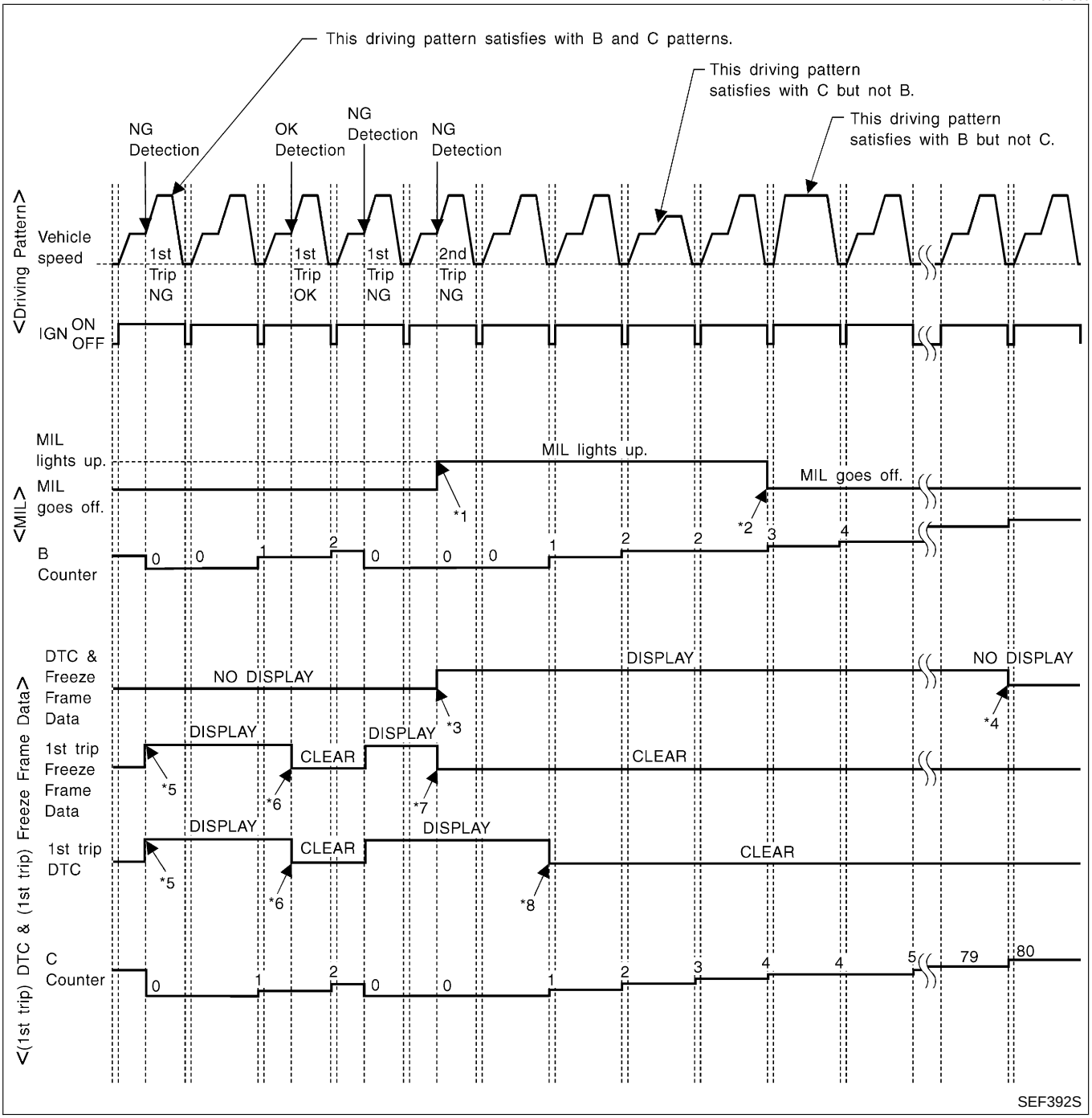
For details about patterns “A” and “B” under “Other”, see EC-1446.

*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"

=NIEC0757S03



*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"

=NIEC0757S04

Driving Pattern B

NIEC0757S0401

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

NIEC0757S0402

Driving pattern C means the vehicle operation as follows:

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

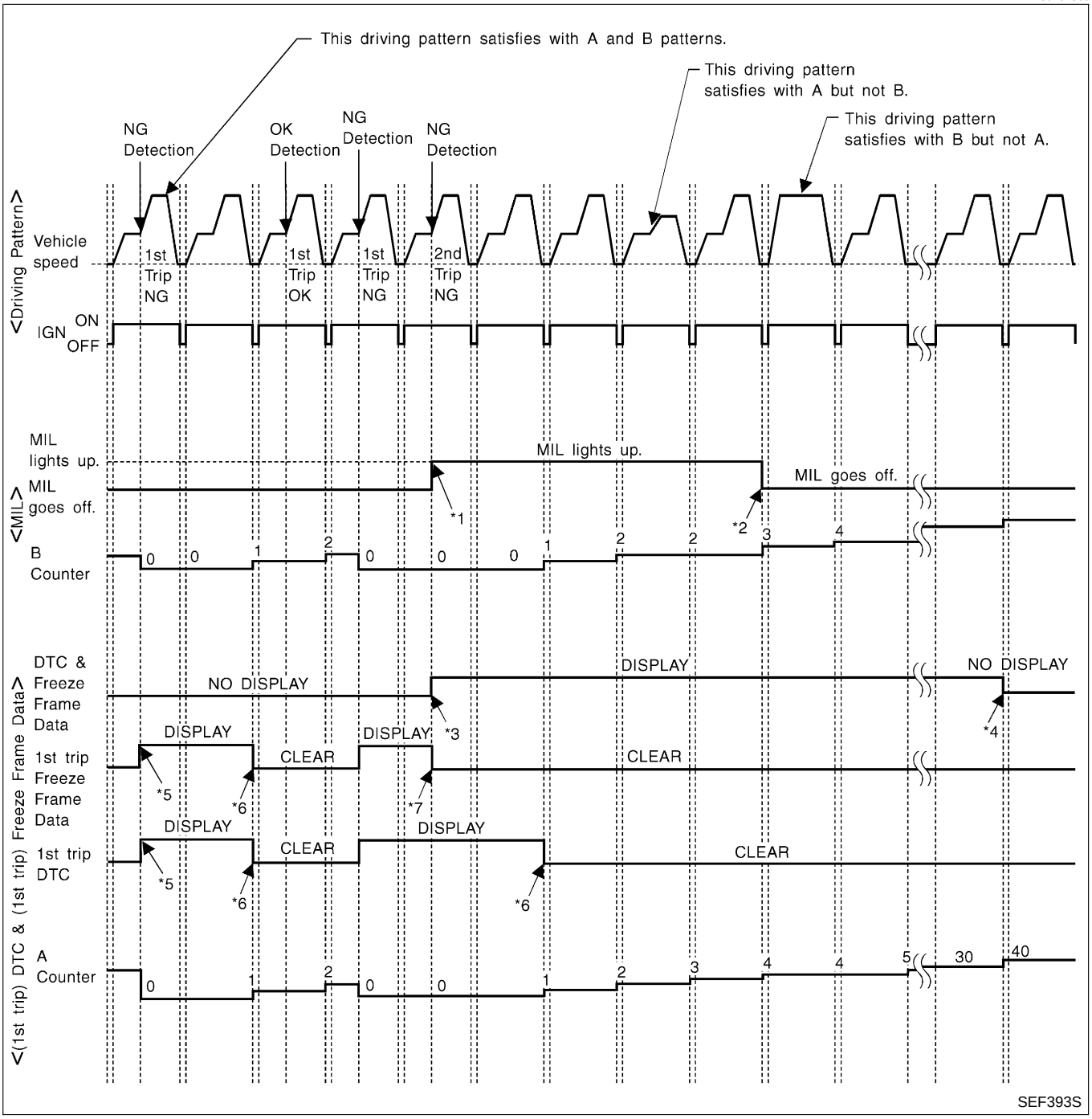
- When the freeze frame data shows lower than 70°C (158°F), "T" should be lower than 70°C (158°F).
- When the freeze frame data shows higher than or equal to 70°C (158°F), "T" should be higher than or equal to 70°C (158°F).

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

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

RELATIONSHIP BETWEEN MIL, DTC, 1ST TRIP DTC AND DRIVING PATTERNS EXCEPT FOR "MISFIRE <EXHAUST QUALITY DETERIORATION>", "FUEL INJECTION SYSTEM"

NIEC0757S05



*1: When the same malfunction is detected in two consecutive trips, MIL will light up.

*2: MIL will go off after vehicle is driven 3 times (pattern B) without any malfunctions.

*3: When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data will be stored in ECM.

*4: The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 40 times (pattern A) without the same malfunction.
(The DTC and the freeze frame data still remain in ECM.)

*5: When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM.

*6: 1st trip DTC will be cleared after vehicle is driven once (pattern B) without the same malfunction.

*7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.

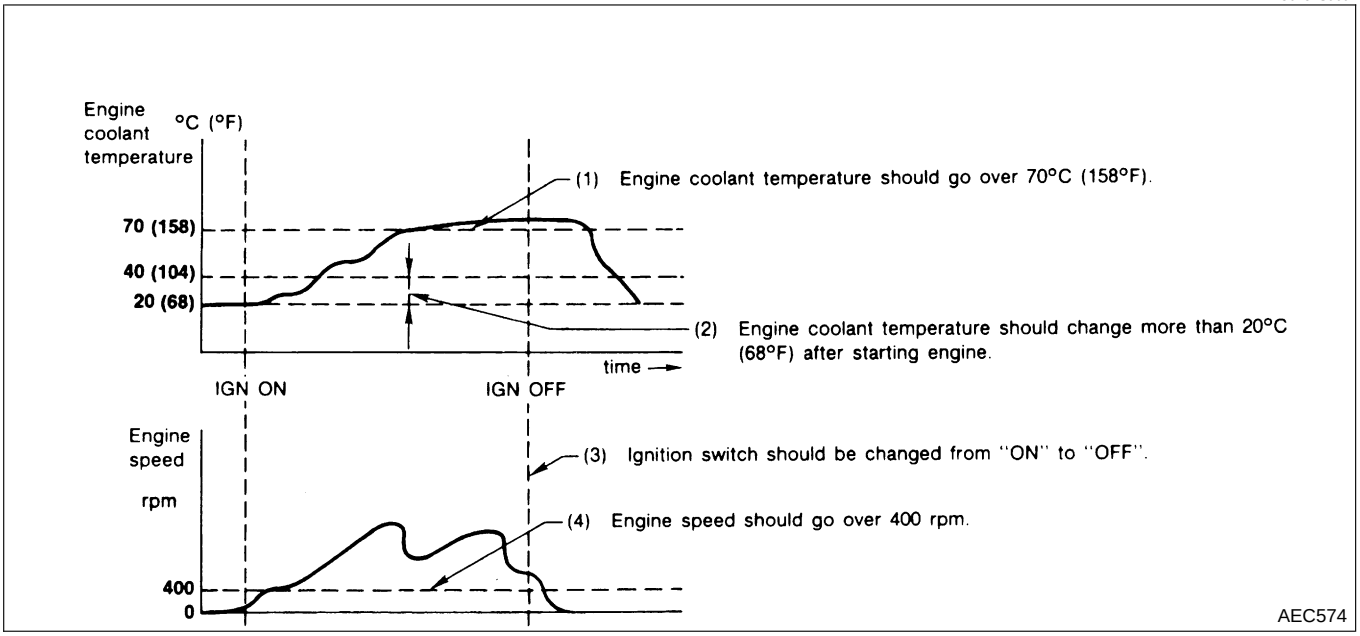
OBD System Operation Chart (Cont'd)

EXPLANATION FOR DRIVING PATTERNS EXCEPT FOR "MISFIRE <EXHAUST QUALITY DETERIORATION>", "FUEL INJECTION SYSTEM"

NIEC0757S06

Driving Pattern A

NIEC0757S0601



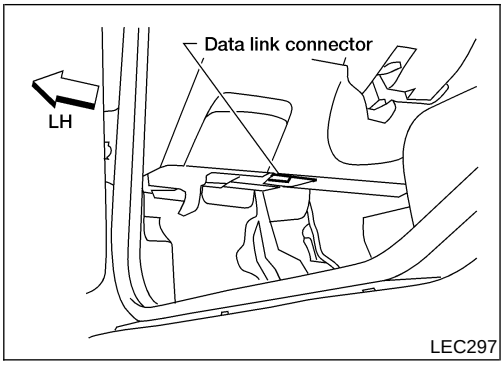
- The A counter will be cleared when the malfunction is detected regardless of (1) - (4).
- The A counter will be counted up when (1) - (4) are satisfied without the same malfunction.
- The DTC will not be displayed after the A counter reaches 40.

Driving Pattern B

NIEC0757S0602

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").



LEC297

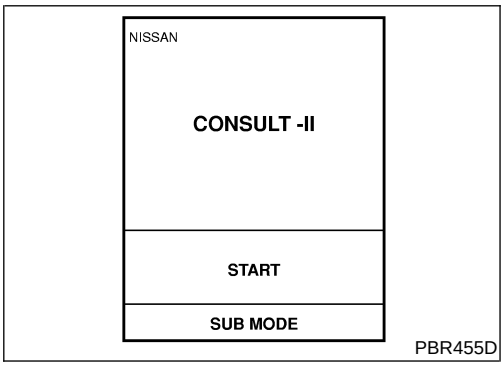
CONSULT-II

=NIEC0758

CONSULT-II INSPECTION PROCEDURE

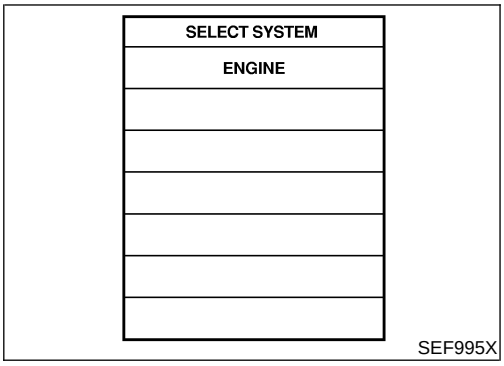
NIEC0758S01

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.



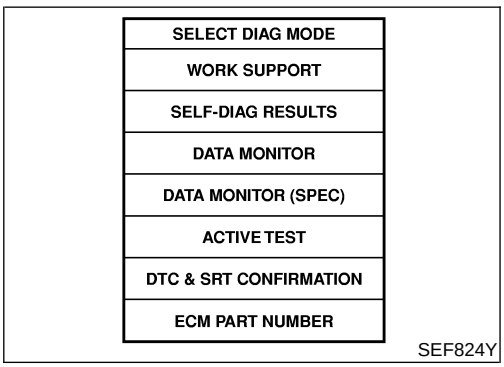
PBR455D

3. Turn ignition switch ON.
4. Touch “START”.



SEF995X

5. Touch “ENGINE”.



SEF824Y

6. Perform each diagnostic test mode according to each service procedure.

For further information, see the CONSULT-II Operation Manual.

ENGINE CONTROL COMPONENT PARTS/CONTROL SYSTEMS APPLICATION

NIEC0758S02

		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	Camshaft position sensor (PHASE)		X	X	X	X			
		Crankshaft position sensor (POS)		X						
		Mass air flow sensor		X		X	X			
		Engine coolant temperature sensor		X	X	X	X	X		
		Heated oxygen sensor 1 (front)		X		X	X		X	X
		Heated oxygen sensor 2 (rear)		X		X	X		X	X
		Vehicle speed sensor		X	X	X	X			
		Throttle position sensor		X	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	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			
		Load signal				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	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
		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-1427.

CONSULT-II (Cont'd)

FUNCTION

=NIEC0758S03

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 of the specification for Basic fuel schedule, AFM, A/F, feedback control valve 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 & SRT 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

=NIEC0758S04

WORK ITEM	CONDITION	USAGE
TP SW/TP SEN IDLE POSI ADJ	● FOLLOW THE BASIC INSPECTION IN THE SERVICE MANUAL.	When adjusting the idle throttle position.
IGNITION TIMING ADJ	● IGNITION TIMING FEEDBACK CONTROL WILL BE HELD BY TOUCHING "START". AFTER DOING SO, ADJUST IGNITION TIMING WITH A TIMING LIGHT BY TURNING THE CAMSHAFT POSITION SENSOR. (PHASE)	When adjusting initial ignition timing
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
IDLE AIR VOL LEARN	● THE IDLE AIR VOLUME THAT KEEPS THE ENGINE WITHIN THE SPECIFIED RANGE IS MEMORIZED IN ECM.	When learning the idle air volume
SELF-LEARNING CONT	● THE COEFFICIENT OF SELF-LEARNING CONTROL MIXTURE RATIO RETURNS TO THE ORIGINAL COEFFICIENT.	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

*: This function is not necessary in the usual service procedure.

SELF-DIAGNOSTIC MODE

=NIEC0758S05

DTC and 1st Trip DTC

NIEC0758S0501

Regarding items of "DTC and 1st trip DTC", refer to "TROUBLE DIAGNOSIS — INDEX" (See EC-1366.)

Freeze Frame Data and 1st Trip Freeze Frame Data

NIEC0758S0502

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-1366.)
FUEL SYS-B1	● "Fuel injection system status" at the moment a malfunction is detected is displayed. ● One mode in the following is displayed. "MODE 2": Open loop due to detected system malfunction "MODE 3": Open loop due to driving conditions (power enrichment, deceleration enrichment) "MODE 4": Closed loop - using oxygen sensor(s) as feedback for fuel control "MODE 5": Open loop - has not yet satisfied condition to go to closed loop
CAL/LD VALUE [%]	● The calculated load value at the moment a malfunction is detected is displayed.
COOLANT TEMP [°C] or [°F]	● The engine coolant temperature at the moment a malfunction is detected is displayed.
S-FUEL TRIM-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.
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.
ENGINE SPEED [rpm]	● The engine speed at the moment a malfunction is detected is displayed.
VEHICLE 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.

DATA MONITOR MODE

=NIEC0758S06

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
ENG SPEED [rpm]	○	○	• Indicates the engine speed computed from the REF signal (180° signal) of the camshaft position sensor. (PHASE)	
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.
B/FUEL SCHDL [msec]			• "Base fuel schedule" indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.	
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.
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.
HO2S1 (B1) [V]	○	○	• The signal voltage of the front heated oxygen sensor is displayed.	
HO2S2 (B1) [V]	○	○	• The signal voltage of the rear heated oxygen sensor is displayed.	
HO2S1 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.
HO2S2 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.
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.	

CONSULT-II (Cont'd)

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.	
EVAP SYS PRES [V]	○		• The signal voltage of EVAP control system pressure sensor is displayed.	
ABSOL PRES/SE [V]	○		• The signal voltage of the absolute pressure sensor is displayed.	
FUEL LEVEL SE [V]	○		• The signal voltage of the fuel level 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 POS [ON/OFF]	○	○	• Indicates idle position [ON/OFF] computed by ECM according to the throttle position sensor signal.	
CLSD THL/P SW [ON/OFF]	○		• Indicates mechanical contact [ON/OFF] condition of the closed throttle position switch.	
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.	
LOAD SIGNAL [ON/OFF]	○	○	• Indicates [ON/OFF] condition from the electrical load signal and/or lighting switch. ON ... rear defogger is operating and/or lighting switch is on. OFF ... rear defogger is not operating and lighting switch is not on.	
IGNITION SW [ON/OFF]	○		• Indicates [ON/OFF] condition from ignition switch.	
HEATER FAN SW [ON/OFF]	○		• Indicates [ON/OFF] condition from heater fan 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.
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.
CAL/LD VALUE [%]			• "Calculated load value" indicates the value of the current airflow divided by peak airflow.	

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
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.	
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.	
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.	
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.	
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	
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	
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	
HO2S1 HTR (B1) [ON/OFF]			• Indicates [ON/OFF] condition of front heated oxygen sensor heater determined by ECM according to the input signals.	
HO2S2 HTR (B1) [ON/OFF]			• Indicates [ON/OFF] condition of rear heated oxygen sensor heater determined by ECM according to the input signals.	

CONSULT-II (Cont'd)

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
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.	
TRVL AFTER MIL [km] or [Mile]			• Distance traveled while MIL is activated	
Voltage [V]			• Voltage measured by the voltage probe.	
Frequency [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.

DATA MONITOR (SPEC) MODE

=NIEC0758S07

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
ENG SPEED [rpm]	○	○	• Indicates the engine speed computed from the REF signal (180° signal) of the camshaft position sensor (PHASE).	
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.
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.
HO2S1 (B1) [V]	○	○	• The signal voltage of the front heated oxygen sensor is displayed.	
HO2S2 (B1) [V]	○	○	• The signal voltage of the rear heated oxygen sensor is displayed.	
HO2S1 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.
HO2S2 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.
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.	

CONSULT-II (Cont'd)

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.	
EVAP SYS PRES [V]	○		• The signal voltage of EVAP control system pressure sensor is displayed.	
ABSOL PRES/SE [V]	○		• The signal voltage of the absolute pressure sensor is displayed.	
FUEL LEVEL SE [V]	○		• The signal voltage of the fuel level 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 POS [ON/OFF]	○	○	• Indicates idle position [ON/OFF] computed by ECM according to the throttle position sensor signal.	
CLSD THL/P SW [ON/OFF]	○		• Indicates mechanical contact [ON/OFF] condition of the closed throttle position switch.	
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.	
LOAD SIGNAL [ON/OFF]	○	○	• Indicates [ON/OFF] condition from the electrical load signal and/or lighting switch. ON ... rear defogger is operating and/or lighting switch is on. OFF ... rear defogger is not operating and lighting switch is not on.	
IGNITION SW [ON/OFF]	○		• Indicates [ON/OFF] condition from ignition switch.	
HEATER FAN SW [ON/OFF]	○		• Indicates [ON/OFF] condition from heater fan 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.
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.
CAL/LD VALUE [%]			• "Calculated load value" indicates the value of the current airflow divided by peak airflow.	

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
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.	
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.	
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.	
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.	
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	
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	
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	
HO2S1 HTR (B1) [ON/OFF]			• Indicates [ON/OFF] condition of front heated oxygen sensor heater determined by ECM according to the input signals.	
HO2S2 HTR (B1) [ON/OFF]			• Indicates [ON/OFF] condition of rear heated oxygen sensor heater determined by ECM according to the input signals.	

CONSULT-II (Cont'd)

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
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.	
TRVL AFTER MIL [km] or [Mile]			• Distance traveled while MIL is activated	
Voltage [V]			• Voltage measured by the voltage probe.	
Frequency [msec] or [Hz] or [%]			• Pulse width, frequency or duty cycle measured by the pulse probe.	• Only "#" is displayed if item is unable to be measured. • Figures with "#"s are temporary ones. They are the same figures as an actual piece of data which was just previously measured.

NOTE:

- Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.

ACTIVE TEST MODE

NIEC0758S08

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
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
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
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
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

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
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
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
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

DTC & SRT CONFIRMATION MODE

NIEC0758S09

SRT STATUS Mode

NIEC0758S0901

For details, refer to "SYSTEM READINESS TEST (SRT) CODE", EC-1428.

SRT Work Support Mode

NIEC0758S0902

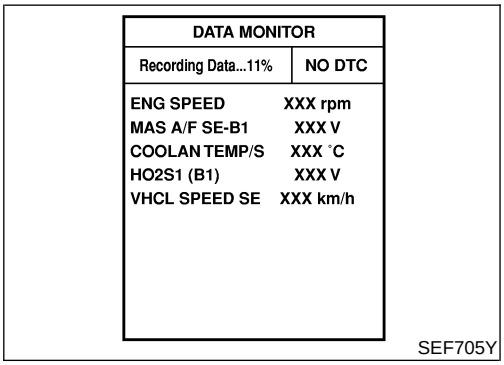
This mode enables a technician to drive a vehicle to set the SRT while monitoring the SRT status.

CONSULT-II (Cont'd)

DTC Work Support Mode

NIEC0758S0903

Test mode	Test item	Condition	Reference page
EVAPORATIVE SYSTEM	EVAP SML LEAK P0440	Refer to corresponding trouble diagnosis for DTC.	EC-1710
	EVAP SML LEAK P1440		EC-1845
	PURG VOL CN/V P1444		EC-1847
	PURGE FLOW P1447		EC-1867
	VC CUT/V BP/V P1491		EC-1897
HEATED OXYGEN SENSOR 1 (FRONT)	HO2S1 (B1) P0130		EC-1556
	HO2S1 (B1) P0131		EC-1563
	HO2S1 (B1) P0132		EC-1569
	HO2S1 (B1) P0133		EC-1575
HEATED OXYGEN SENSOR 2 (REAR)	HO2S2 (B1) P0137		EC-1595
	HO2S2 (B1) P0138		EC-1603
	HO2S2 (B1) P0139		EC-1611
EGR SYSTEM	EGR SYSTEM P0400		EC-1690
	EGR SYSTEM P1402		EC-1838



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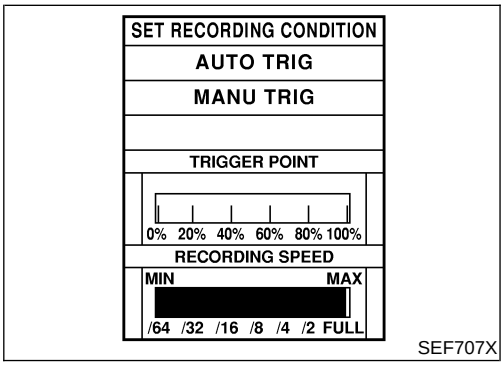


SEF707X

REAL TIME DIAGNOSIS IN DATA MONITOR MODE (RECORDING VEHICLE DATA)

NIEC0758S10

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.

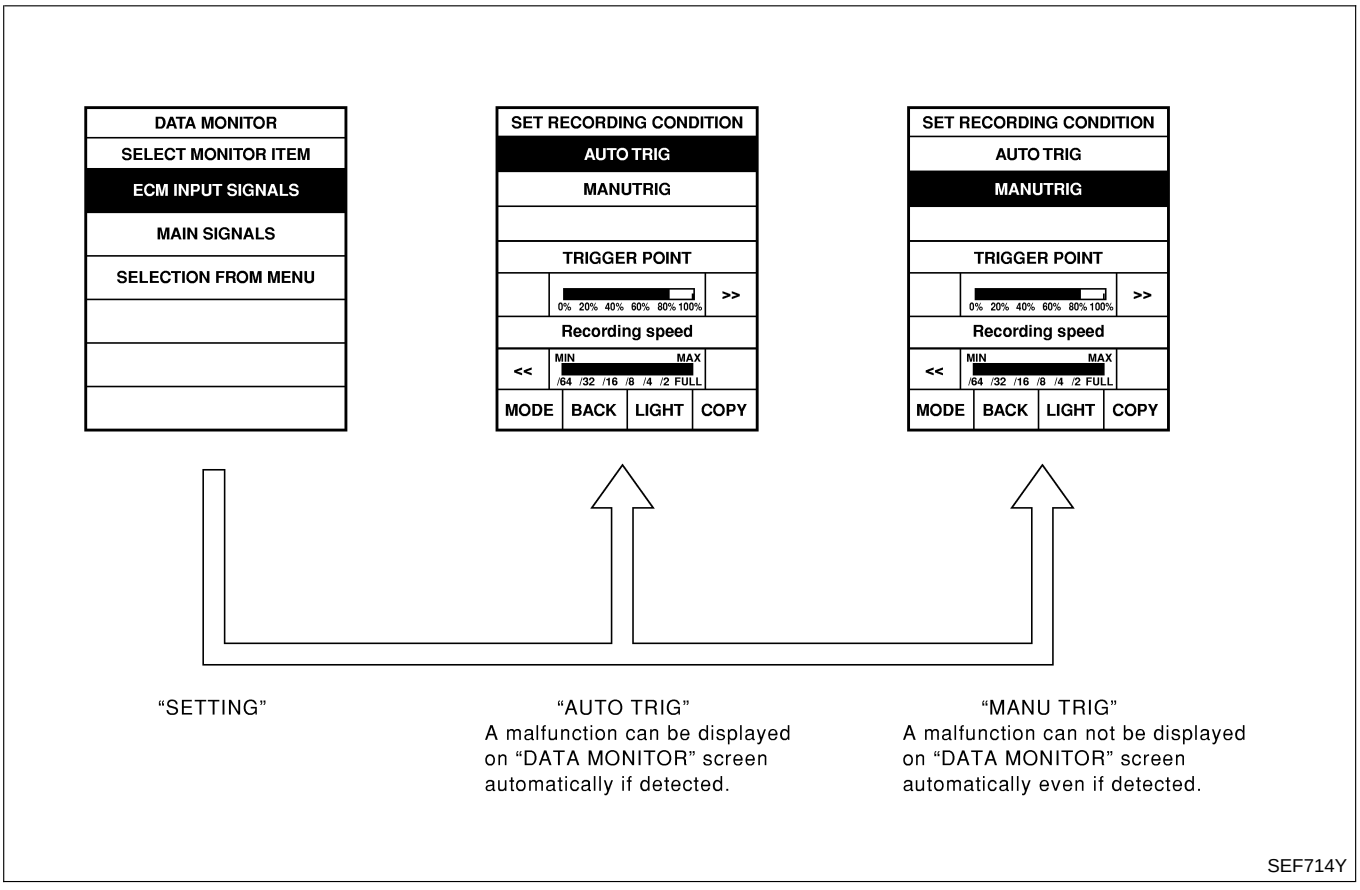
Use these triggers as follows:

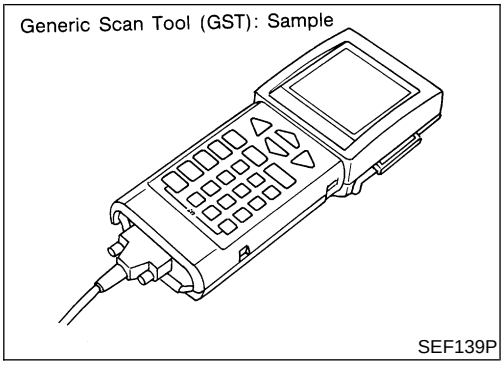
1) "AUTO TRIG"

- 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.





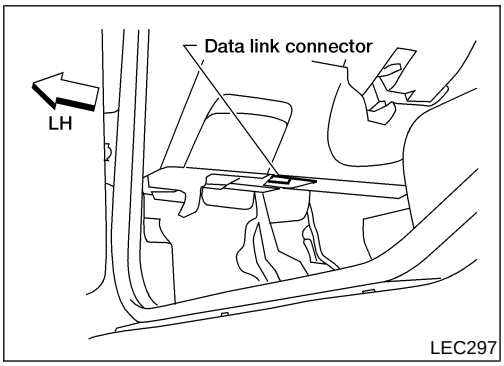
Generic Scan Tool (GST)

=NIEC0759

DESCRIPTION

NIEC0759S01

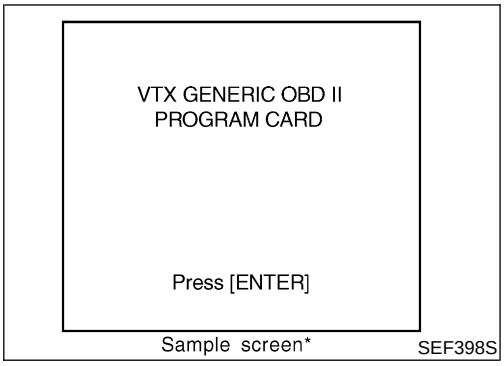
Generic Scan Tool (OBDII scan tool) complying with SAE J1978 has 7 different functions explained on the next page.
ISO9141 is used as the protocol.
The name “GST” or “Generic Scan Tool” is used in this service manual.



GST INSPECTION PROCEDURE

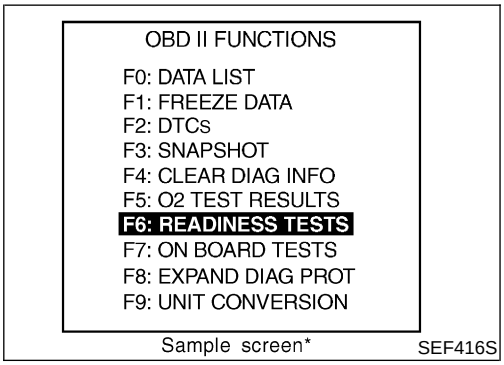
NIEC0759S02

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.)



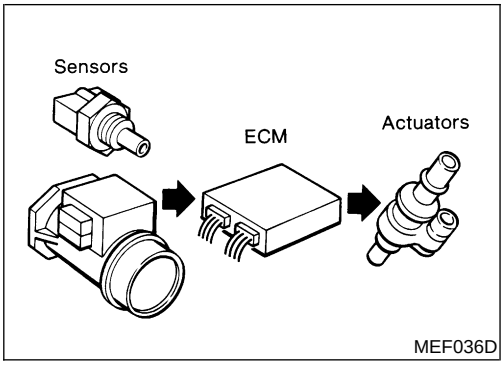
5. Perform each diagnostic mode according to each service procedure.

For further information, see the GST Operation Manual of the tool maker.

FUNCTION

NIEC0759S03

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-1452).]
MODE 3	DTCs	This mode gains access to emission-related power train trouble codes which were stored by ECM.
MODE 4	CLEAR DIAG INFO	This mode can clear all emission-related diagnostic information. This includes: ● Clear number of diagnostic trouble codes (MODE 1) ● Clear diagnostic trouble codes (MODE 3) ● Clear trouble code for freeze frame data (MODE 1) ● Clear freeze frame data (MODE 2) ● Reset status of system monitoring test (MODE 1) ● Clear on board monitoring test results (MODE 6 and 7)
MODE 6	(ON BOARD TESTS)	This mode accesses the results of on board diagnostic monitoring tests of specific components/systems that are not continuously monitored.
MODE 7	(ON BOARD TESTS)	This mode enables the off board test drive to obtain test results for emission-related powertrain components/systems that are continuously monitored during normal driving conditions.
MODE 8	—	This mode can close EVAP system in ignition switch "ON" position (Engine stopped). When this mode is performed, following parts can be opened or closed. ● EVAP canister vent control valve open ● Vacuum cut valve bypass valve closed In the following conditions, this mode cannot function. ● Low ambient temperature ● Low battery voltage ● Engine running ● Ignition switch "OFF" ● Low fuel temperature ● Too much pressure is applied to EVAP system
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.



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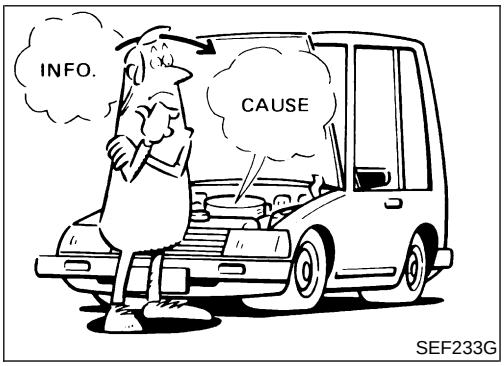

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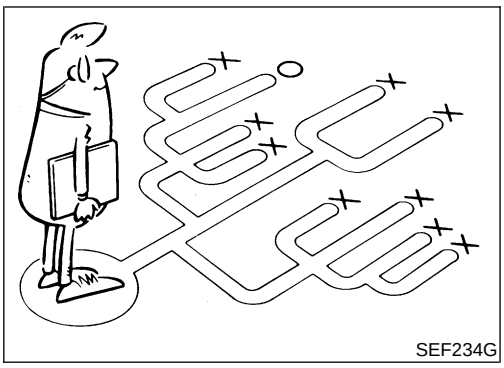

SEF234G

KEY POINTS

WHAT ..... Vehicle & engine model
WHEN ..... Date, Frequencies
WHERE..... Road conditions
HOW ..... Operating conditions, Weather conditions, Symptoms

SEF907L

Introduction

NIEC0760

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-1468.

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

NIEC0760S01

There are many operating conditions that lead to the malfunction of engine components. A good grasp of such conditions can make trouble-shooting faster and more accurate.

In general, each customer feels differently about a problem. It is important to fully understand the symptoms or conditions for a customer complaint.

Utilize a diagnostic worksheet like the one on the next page in order to organize all the information for troubleshooting.

Some conditions may cause the malfunction indicator lamp to come on steady or blink and DTC to be detected. Examples:

- Vehicle ran out of fuel, which caused the engine to misfire.
- Fuel filler cap was left off or incorrectly screwed on, allowing fuel to evaporate into the atmosphere [for the models with EVAP (SMALL LEAK) diagnosis].

Worksheet Sample

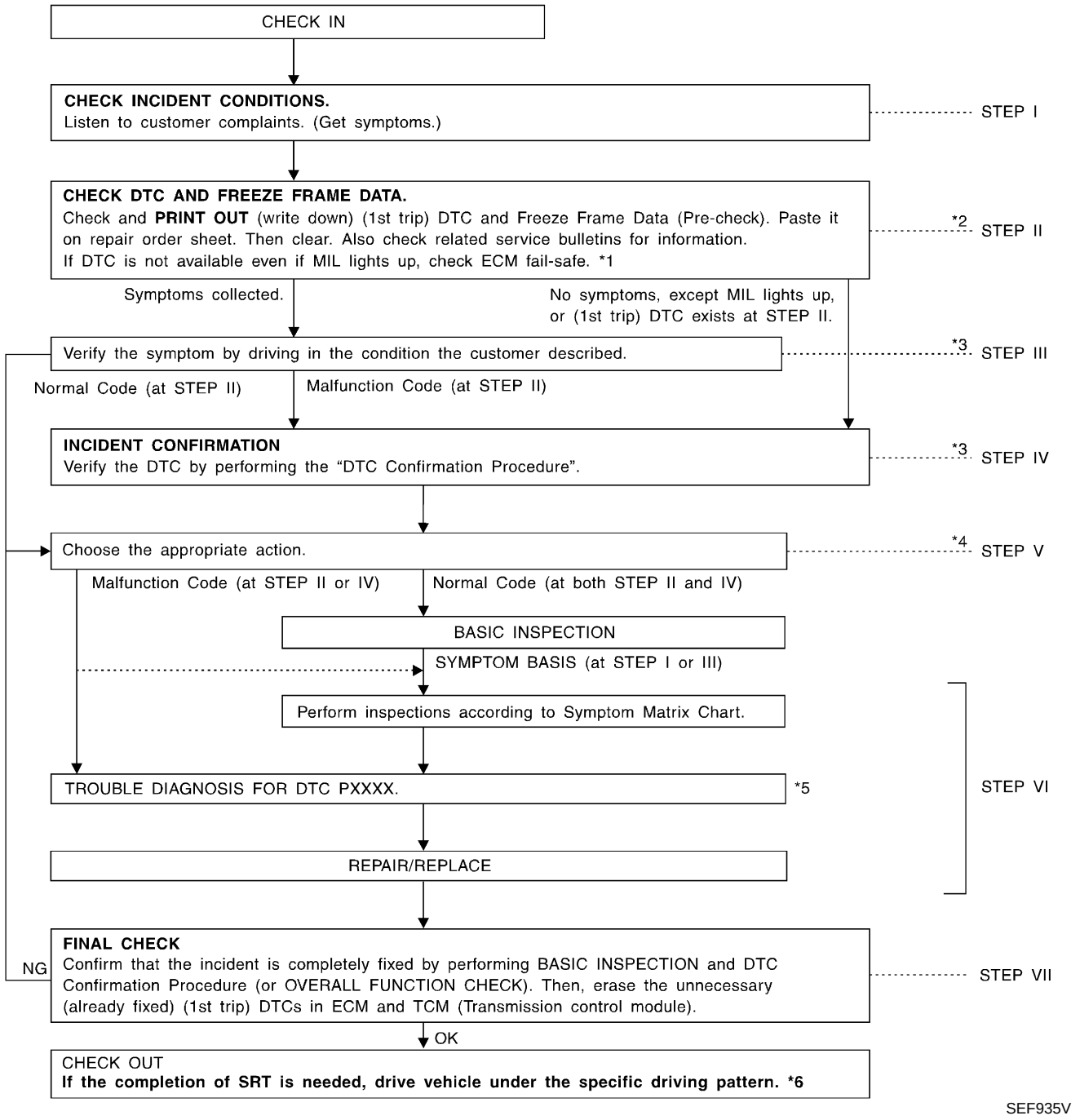
NIEC0760S0101

Customer name MR/MS		Model & Year	VIN
Engine #		Trans.	Mileage
Incident Date		Manuf. Date	In Service Date
Fuel and fuel filler cap		☐ Vehicle ran out of fuel causing misfire ☐ Fuel filler cap was left off or incorrectly screwed on.	
Symptoms	☐ Startability	☐ Inpossible to start ☐ No combustion ☐ Partial combustion ☐ Partial combustion affected by throttle position ☐ Partial combustion NOT affected by throttle position ☐ Possible but hard to start ☐ Others [ ]	
	☐ Idling	☐ No fast idle ☐ Unstable ☐ High idle ☐ Low idle ☐ Others [ ]	
	☐ Driveability	☐ Stumble ☐ Surge ☐ Knock ☐ Lack of power ☐ Intake backfire ☐ Exhaust backfire ☐ Others [ ]	
	☐ Engine stall	☐ At the time of start ☐ While idling ☐ While accelerating ☐ While decelerating ☐ Just after stopping ☐ While loading	
Incident occurrence		☐ Just after delivery ☐ Recently ☐ In the morning ☐ At night ☐ In the daytime	
Frequency		☐ All the time ☐ Under certain conditions ☐ Sometimes	
Weather conditions		☐ Not affected	
	Weather	☐ Fine ☐ Raining ☐ Snowing ☐ Others [ ]	
	Temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold ☐ Humid °F	
Engine conditions		☐ Cold ☐ During warm-up ☐ After warm-up Engine speed 0 2,000 4,000 6,000 8,000 rpm	
Road conditions		☐ In town ☐ In suburbs ☐ Highway ☐ Off road (up/down)	
Driving conditions		☐ Not affected ☐ At starting ☐ While idling ☐ At racing ☐ While accelerating ☐ While cruising ☐ While decelerating ☐ While turning (RH/LH) Vehicle speed 0 10 20 30 40 50 60 MPH	
Malfunction indicator lamp		☐ Turned on ☐ Not turned on	

MTBL0017

Work Flow

NIEC0761



SEF935V

*1: EC-1485

*2: If time data of "SELF-DIAG RESULTS" is other than "0" or "1t", refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT", EC-1508.

*3: If the incident cannot be duplicated, refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1508.

*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-1509.

*5: If the malfunctioning part cannot be found, refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1508.

*6: EC-1433

*7: EC-1504

DESCRIPTION FOR WORK FLOW

NIEC0761S01

STEP	DESCRIPTION
STEP I	Get detailed information about the conditions and the environment when the incident/symptom occurred using the "DIAGNOSTIC WORK SHEET", EC-1467.
STEP II	Before confirming the concern, check and write down (print out using CONSULT-II or Generic Scan Tool) the (1st trip) Diagnostic Trouble Code (DTC) and the (1st trip) freeze frame data, then erase the code and the data. (Refer to EC-1438.) The (1st trip) DTC and the (1st trip) freeze frame data can be used when duplicating the incident at STEP III & IV. Study the relationship between the cause, specified by (1st trip) DTC, and the symptom described by the customer. (The "Symptom Matrix Chart" will be useful. See EC-1486.) 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 INCIDENT SIMULATION TESTS. (Refer to ***GI-26***.) If the malfunction code is detected, skip STEP IV and perform STEP V.
STEP IV	Try to detect the (1st trip) Diagnostic Trouble Code by driving in (or performing) the "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE". Check and read the (1st trip) DTC and (1st trip) freeze frame data by using CONSULT-II or Generic Scan Tool. 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 INCIDENT SIMULATION TESTS. (Refer to ***GI-26***.) In case the "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" is not available, perform the "OVERALL FUNCTION CHECK" instead. The (1st trip) DTC cannot be displayed by this check, however, this simplified "check" is an effective alternative. The "NG" result of the "OVERALL FUNCTION CHECK" is the same as the (1st trip) DTC detection.
STEP V	Take the appropriate action based on the results of STEP I through IV. If the malfunction code is indicated, proceed to TROUBLE DIAGNOSIS FOR DTC PXXXX. If the normal code is indicated, proceed to the BASIC INSPECTION. (Refer to EC-1470.) If CONSULT-II is available, perform "SPECIFICATION VALUE" mode with CONSULT-II and proceed to the "TROUBLE DIAGNOSIS — SPECIFICATION VALUE". (Refer to EC-1504.) (If malfunction is detected, repair or replace as necessary.) Then perform inspections according to the Symptom Matrix Chart. (Refer to EC-1486.)
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-1495. The "DIAGNOSTIC PROCEDURE" in EC section contains a description based on open circuit inspection. A short circuit inspection is also required for the circuit check in the DIAGNOSTIC PROCEDURE. For details, refer to GI section ("HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT", "Circuit Inspection"). Repair or replace the malfunction parts. If malfunctioning part cannot be detected, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1508.
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 or 0505] is detected. If the incident is still detected in the final check, perform STEP VI by using a different method from the previous one. Before returning the vehicle to the customer, be sure to erase the unnecessary (already fixed) (1st trip) DTC in ECM and TCM (Transmission control module). (Refer to EC-1438.)

Basic Inspection

NIEC0762

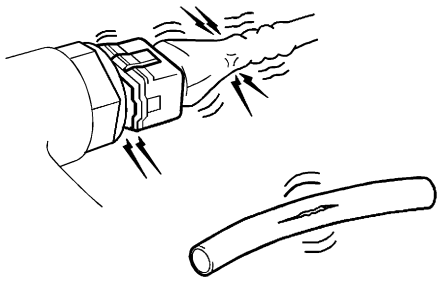
Precaution:
Perform Basic Inspection without electrical or mechanical loads applied;

- **Headlamp switch is OFF,**
- **Air conditioner switch is OFF,**
- **Rear window defogger switch is OFF,**
- **Steering wheel is in the straight-ahead position, etc.**

1	INSPECTION START

1. Check service records for any recent repairs that may indicate a related problem, or 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

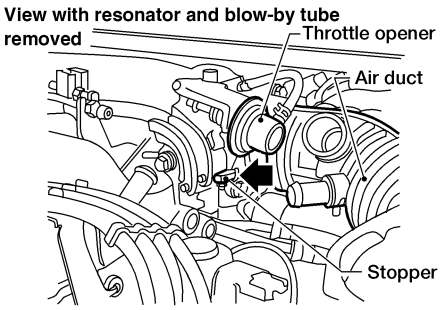
1. Start engine and let it idle.
2. Confirm that the throttle drum becomes free from the rod of the throttle opener.

OK or NG

OK	▶	GO TO 3.
NG	▶	Check throttle opener. Refer to “INSPECTION”, EC-1411.

3	CHECK THROTTLE DRUM OPERATION

Confirm that throttle drum moves to contact the stopper.



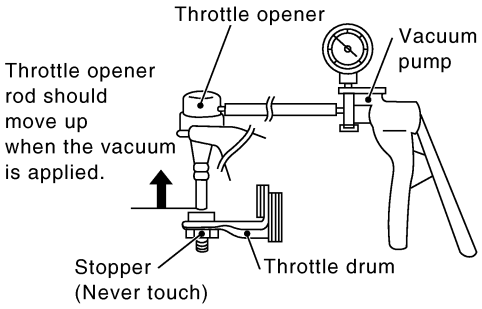
LEC267

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 4.

4	CHECK ACCELERATOR WIRE INSTALLATION	
1. Stop engine. 2. Check accelerator wire for slack.		
OK or NG		
OK	▶	GO TO 5.
NG	▶	Adjust accelerator wire. Refer to ***FE-3***, "Adjusting Accelerator Wire".

5	CHECK THROTTLE VALVE OPERATION	
1. Remove intake air ducts. 2. Check throttle valve operation when moving throttle drum by hand.		
OK or NG		
OK	▶	Retighten the throttle drum fixing nuts.
NG	▶	Clean the throttle body and throttle valve.

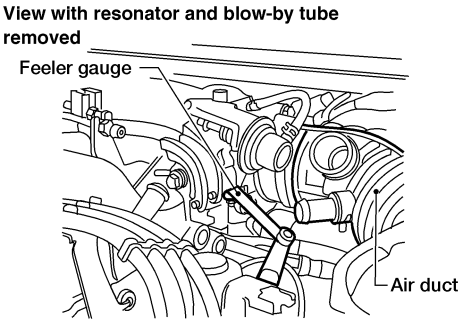
6	CHECK THROTTLE POSITION SWITCH CLOSED POSITION-I	
NOTE: **Always check ignition timing before performing the following.** 1. Warm up engine to normal operating temperature. 2. Stop engine. 3. Remove the vacuum hose connected to the throttle opener. 4. Connect suitable vacuum hose to vacuum pump as 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.		
With CONSULT-II	▶	GO TO 7.
Without CONSULT-II	▶	GO TO 13.

7	CHECK THROTTLE POSITION SWITCH CLOSED POSITION-II

With CONSULT-II

1. Turn ignition switch "ON".
2. Select "TP SW/TP SEN IDLE POSI ADJ" in "WORK SUPPORT" 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.



LEC270

TP SW/TP SEN IDLE POSI ADJ	
MONITOR	
COOLAN TEMP/S	91°C
CLSD THL POS	ON
CLSD THL/P SW	ON

SEF715Y

"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.

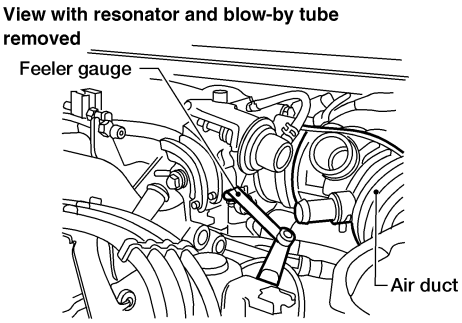
OK or NG

OK	▶	GO TO 10.
NG	▶	GO TO 8.

8	ADJUSTMENT THROTTLE POSITION SWITCH CLOSED POSITION-I

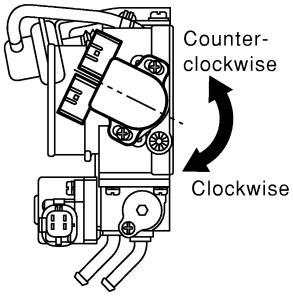
With CONSULT-II

1. Loosen throttle position sensor fixing bolts.
2. Confirm that proper vacuum is applied. Refer to test No. 6. 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.



LEC270

4. Turn throttle position sensor body counterclockwise until "CLSD THL/P SW" signal switches to "OFF".



SEF867X

TP SW/TP SEN IDLE POSI ADJ	
MONITOR	
COOLAN TEMP/S	91°C
CLSD THL POS	ON
CLSD THL/P SW	OFF

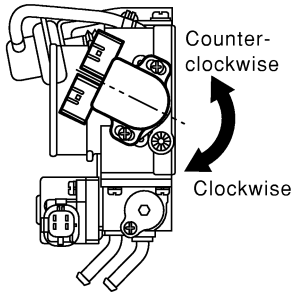
SEF716Y

▶	GO TO 9.

9	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.**



SEF867X

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 10.
NG	▶	GO TO 8.

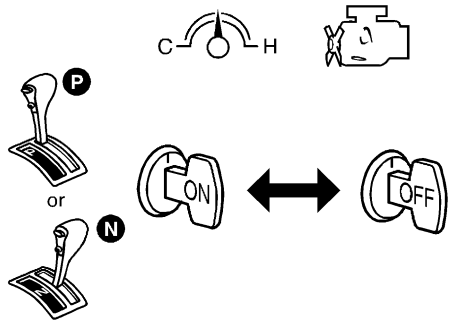
10	RESET THROTTLE POSITION SENSOR IDLE POSITION MEMORY

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. 6.
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 "TP SW/TP SEN IDLE POSI ADJ" in "WORK SUPPORT" mode.
6. Stop engine. (Turn ignition switch "OFF".)
7. Turn ignition switch "ON" and wait at least 10 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".

TP SW/TP SEN IDLE POSI ADJ	
MONITOR	
COOLAN TEMP/S	91°C
CLSD THL POS	ON
CLSD THL/P SW	ON

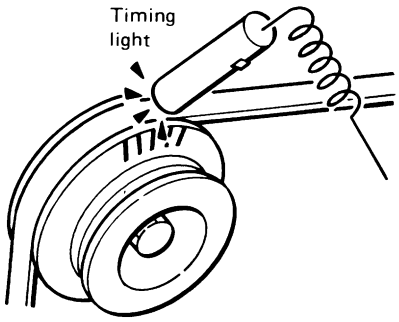
SEF715Y

▶	GO TO 11.

11	CHECK IGNITION TIMING-I

With CONSULT-II

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. Select "IGNITION TIMING ADJ" in "WORK SUPPORT" mode with CONSULT-II.
7. Touch "START".
8. Check ignition timing at idle using a timing light.



SEF284G

Ignition timing:
M/T 15°±2° BTDC
A/T 15°±2° BTDC (in "P" or "N" position)

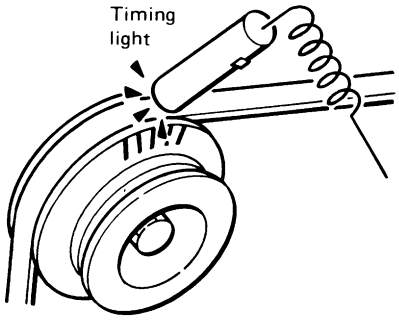
OK or NG

OK	▶	GO TO 12.
NG	▶	1. Adjust ignition timing by turning distributor. Refer to "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment", EC-1384. 2. GO TO 12.

12	CHECK IGNITION TIMING-II

With CONSULT-II

Touch "MODE" or "BACK". (Cancel "IGNITION TIMING ADJ" in "WORK SUPPORT" mode.)
Check ignition timing at idle using a timing light.



SEF284G

Ignition timing:
M/T 15°±2° BTDC
A/T 15°±2° BTDC (in "P" or "N" position)

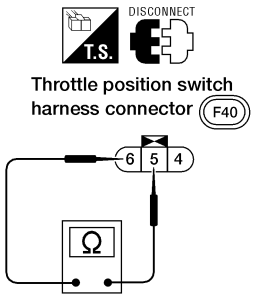
OK or NG

OK	▶	GO TO 26.
NG	▶	GO TO 19.

13	CHECK THROTTLE POSITION SWITCH CLOSED POSITION-II

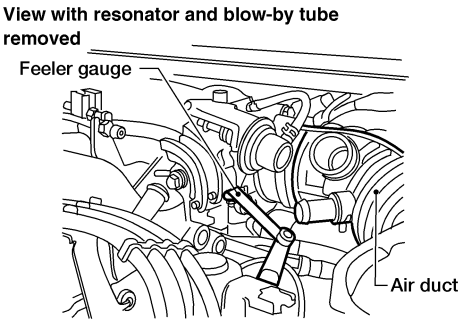
Without CONSULT-II

1. Disconnect closed throttle position switch harness connector.
2. Check continuity between closed throttle position switch terminals **5** and **6** under the following conditions.



LAT193

- 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.



LEC270

"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.

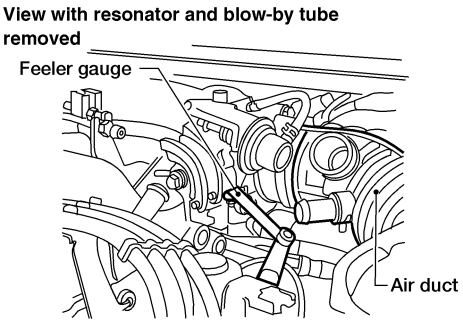
OK or NG

OK	▶	GO TO 16.
NG	▶	GO TO 14.

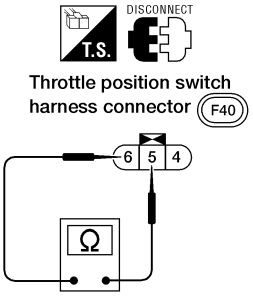
14	ADJUSTMENT THROTTLE POSITION SWITCH CLOSED POSITION-I

Without CONSULT-II

1. Loosen throttle position sensor fixing bolts.
2. Confirm that proper vacuum is applied. Refer to Test No. 6. 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.

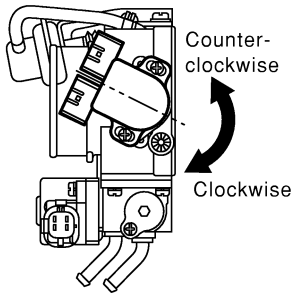


LEC270



LAT193

4. Turn throttle position sensor body counterclockwise until continuity does not exist.



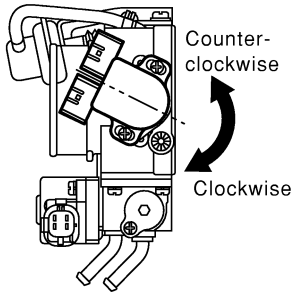
SEF867X

▶	GO TO 15.

15	ADJUSTMENT THROTTLE POSITION SWITCH CLOSED POSITION-II

Without CONSULT-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.**



SEF867X

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 16.
NG	▶	GO TO 14.

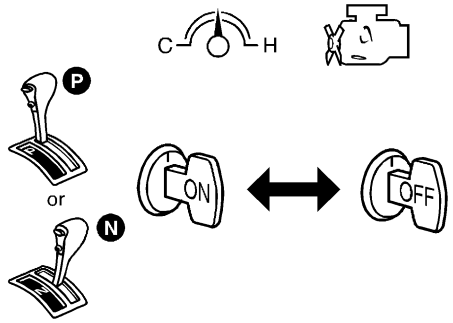
16	RESET THROTTLE POSITION SENSOR IDLE POSITION MEMORY

Without 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. 6.
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

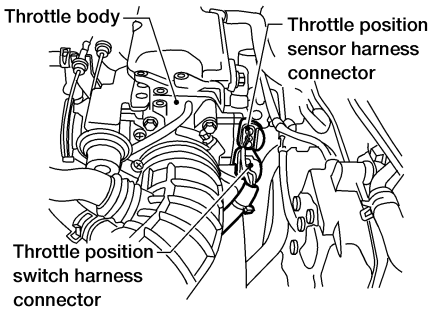
7. Turn ignition switch "OFF" and wait at least 10 seconds.
8. Repeat steps 6 and 7, 20 times.

	▶	GO TO 17.

17	CHECK IGNITION TIMING-I

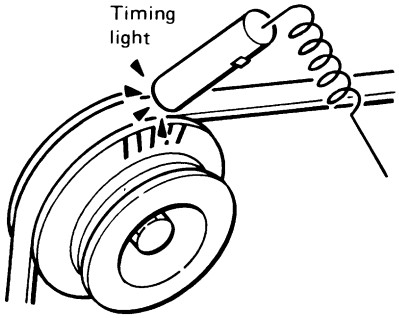
Without CONSULT-II

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. Stop engine and disconnect throttle position sensor harness connector.



LEC279

7. Start engine.
8. Check ignition timing at idle using a timing light.



SEF284G

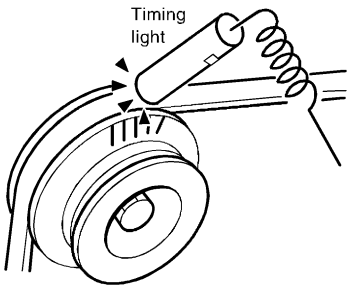
Ignition timing:
M/T 15°±2° BTDC
A/T 15°±2° BTDC (in "P" or "N" position)

OK or NG

OK	▶	GO TO 18.
NG	▶	1. Adjust ignition timing by turning distributor. Refer to "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment", EC-1412. 2. GO TO 18.

18	CHECK IGNITION TIMING-II

1. Stop engine.
2. Reconnect throttle position sensor harness connector.
3. Start engine and let it idle.
4. Check ignition timing at idle using a timing light.



SEF984U

Ignition timing:
M/T 15°±2° BTDC
A/T 15°±2° BTDC (in "P" or "N" position)

OK or NG

OK	▶	GO TO 29.
NG	▶	GO TO 19.

19	PERFORM IDLE AIR VOLUME LEARNING

Refer to "Idle Air Volume Learning", EC-1424.
Is the result CMPLT or INCMP?

CMPLT or INCMP

CMPLT	▶	GO TO 20.
INCMP	▶	Follow the instruction of "Idle Air Volume Learning".

20	CHECK IGNITION TIMING AGAIN

Check ignition timing again. Refer to Test No. 12 (With CONSULT-II) or 18 (Without CONSULT-II).

OK or NG

OK (With CONSULT-II)	▶	GO TO 26.
OK (Without CONSULT-II)	▶	GO TO 29.
NG	▶	GO TO 21.

21	CHECK FOR INTAKE AIR LEAK

1. Start engine and let it idle.
2. Listen for an air leak from PCV hose and after IACV-AAC valve.

OK or NG

OK	▶	GO TO 23.
NG	▶	GO TO 22.

22	REPAIR MALFUNCTION

1. Stop engine.
2. Repair or replace malfunctioning part.

	▶	GO TO 19.

23	DETECT MALFUNCTIONING PART	
Check the IACV-AAC valve circuit and function. Refer to EC-1776.		
OK or NG		
OK	▶	GO TO 25.
NG	▶	GO TO 24.

24	REPAIR MALFUNCTION	
Repair or replace malfunction part following the "Diagnostic Procedure" corresponding the detected malfunction.		
	▶	GO TO 19.

25	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 NVIS (NATS) system and registration of NVIS (NATS) ignition key IDs. Refer to "NVIS (NISSAN Vehicle Immobilizer System — NATS)", EC-1440.		
	▶	GO TO 19.

26	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. 3. Check idle speed. **M/T: 800±50 rpm** **A/T: 800±50 rpm (in "P" or "N" position)**		
OK or NG		
OK	▶	GO TO 32.
NG	▶	GO TO 27.

27	PERFORM IDLE AIR VOLUME LEARNING	
Refer to "Idle Air Volume Learning", EC-1424. **Is the result CMPLT or INCMP?**		
CMPLT or INCMP		
CMPLT	▶	GO TO 28.
INCMP	▶	Follow the instruction of "Idle Air Volume Learning".

28	CHECK TARGET IDLE SPEED AGAIN	
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. **M/T: 800±50 rpm** **A/T: 800±50 rpm (in "P" or "N" position)**		
OK or NG		
OK	▶	GO TO 32.
NG	▶	GO TO 21.

29	CHECK TARGET IDLE SPEED	
⊗ **Without CONSULT-II** 1. Start engine and warm it up to normal operating temperature. 2. Check idle speed. **M/T: 800±50 rpm** **A/T: 800±50 rpm (in "P" or "N" position)**		
OK or NG		
OK	▶	GO TO 32.
NG	▶	GO TO 30.

30	PERFORM IDLE AIR VOLUME LEARNING	
Refer to "Idle Air Volume Learning", EC-1424. **Is the result CMPLT or INCMP?**		
CMPLT or INCMP		
CMPLT	▶	GO TO 31.
INCMP	▶	Follow the instruction of "Idle Air Volume Learning".

31	CHECK TARGET IDLE SPEED AGAIN	
1. Start engine and warm it up to normal operating temperature. 2. Check idle speed. **M/T: 800±50 rpm** **A/T: 800±50 rpm (in "P" or "N" position)**		
OK or NG		
OK	▶	GO TO 32.
NG	▶	GO TO 21.

32	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-1438 and "HOW TO ERASE DTC", ***AT-38*** .		
	▶	**INSPECTION END**

DTC Inspection Priority Chart

NIEC0763

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 • 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 • P1605 A/T diagnosis communication line • P1706 Park/Neutral position (PNP) switch
2	• P0105 Absolute pressure sensor • P0130-P0134 Heated oxygen sensor 1 (front) • P0135 Heated oxygen sensor 1 (front) heater • P0137-P0140 Heated oxygen sensor 2 (rear) • P0141 Heated oxygen sensor 2 (rear) heater • P0217 Coolant overtemperature enrichment protection • P0335, P1336 Crankshaft position sensor (POS) • 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-P0725, P0740-P1760 A/T related sensors, solenoid valves and switches • P1401 EGR temperature sensor • P1447 EVAP control system purge flow monitoring • P1490, P1491 Vacuum cut valve bypass valve
3	• P0171, P0172 Fuel injection system function • P0300-P0304 Misfire • P0400, P1402 EGR function • P0420 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 • P1148 Closed loop control

Fail-safe Chart

=NIEC0764

The ECM enters fail-safe mode if any of the following malfunctions is detected due to the open or short circuit. When the ECM enters the fail-safe mode, the MIL illuminates.

DTC No.	Detected items	Engine operating condition in fail-safe mode	
P0100	Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.	
P0115	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)
P0120	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
P0403	EGR volume control valve circuit	Engine speed will not rise more than 2,800 rpm due to the fuel cut.	
Unable to access ECM	ECM	**ECM fail-safe activating condition** The computing function of the ECM was judged to be malfunctioning. When the fail-safe system activates (i.e., if the ECM detects a malfunction condition in the CPU of ECM), the MIL on the instrument panel lights to warn the driver. However it is not possible to access ECM and DTC cannot be confirmed. **Engine control with fail-safe** When ECM fail-safe is operating, fuel injection, ignition timing, fuel pump operation and IACV-AAC valve operation are controlled under certain limitations.	
			ECM fail-safe operation
		Engine speed	**Engine speed will not rise more than 3,000 rpm**
		Fuel injection	Simultaneous multiport fuel injection system
		Ignition timing	Ignition timing is fixed at the preset valve
		Fuel pump	Fuel pump relay is “ON” when engine is running and “OFF” when engine stalls
		IACV-AAC valve	Full open
		Replace ECM, if ECM fail-safe condition is confirmed.	

Symptom Matrix Chart

NIEC0765

SYSTEM — ENGINE CONTROL SYSTEM

NIEC0765S01

		SYMPTOM													
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	Reference page
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel pump circuit	1	1	2	3	2		2	2			3		2	EC-1926
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			EC-1409
	Injector circuit	1	1	2	3	2		2	2			2			EC-1917
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			EC-1390
Air	Positive crankcase ventilation system	3	3	4	4	4	4	4	4	4		4	1		EC-1406
	Incorrect idle speed adjustment	3	3				1	1	1	1		1			EC-1470
	IACV-AAC valve circuit	1	1	2	3	3	2	2	2	2		2		2	EC-1776
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC-1470
	Ignition circuit	1	1	2	2	2		2	2			2			EC-1820
EGR	EGR volume control valve circuit		2	2	3	3						3			EC-1699
	EGR system	2	1	2	3	3	3	2	2	3		3			EC-1690, EC-1838
Main power supply and ground circuit		2	2	3	3	3		3	3		2	3		2	EC-1509
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													Reference page
	HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Camshaft position sensor (PHASE) circuit	2	2	3	3	3		3	3			3			EC-1683
Mass air flow sensor circuit	1	1	2	2	2		2	2			2			EC-1515
Heated oxygen sensor 1 (front) circuit		1	2	3	2		2	2			2			EC-1556
Engine coolant temperature sensor circuit	1	1	2	3	2	3	2	2	3		2			EC-1535, 1551
Throttle position sensor circuit		1	2		2	2	2	2	2		2			EC-1540
Incorrect throttle position sensor adjustment		3	1		1	1	1	1	1		1			EC-1470
Vehicle speed sensor circuit		2	3		3						3			EC-1772
Knock sensor circuit			2								3			EC-1674
ECM	2	2	3	3	3	3	3	3	3	3	3			EC-1796, 1485
Start signal circuit	2													EC-1922
PNP switch circuit			3		3		3	3			3			EC-1912
Power steering oil pressure switch circuit		2					3	3						EC-1932
Electrical load signal circuit							3	3						EC-1942

1 - 6: The numbers refer to the order of inspection.
(continued on next page)

Symptom Matrix Chart (Cont'd)

SYSTEM — ENGINE MECHANICAL & OTHER

NIEC0765S02

		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 tank	5	5												FE section
	Fuel piping			5	5	5		5	5			5			—
	Vapor lock														
	Valve deposit	5		5	5	5		5	5			5			
	Poor fuel (Heavy weight gasoline, Low octane)														
Air	Air duct	5	5	5	5	5	5	5	5	5		5			—
	Air cleaner														
	Air leakage from air duct (Mass air flow sensor — throttle body)														
	Throttle body, Throttle wire														FE section
	Air leakage from intake manifold/ Collector/Gasket														—
Cranking	Battery	1	1	1		1		1	1					1	EL section
	Alternator circuit														
	Starter circuit	3										1			
	Flywheel/Drive plate	6													EM section
	PNP switch	4													AT section

1 - 6: The numbers refer to the order of inspection.

(continued on next page)

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Engine	Cylinder head	5	5	5	5	5		5	5			5			EM section
	Cylinder head gasket										4		3		
	Cylinder block	6	6	6	6	6		6	6			6	4		
	Piston														
	Piston ring														
	Connecting rod														
	Bearing														
	Crankshaft														
Valve mechanism	Timing chain	5	5	5	5	5		5	5			5			EM section
	Camshaft														
	Intake valve												3		
	Exhaust valve														
Exhaust	Exhaust manifold/Tube/Muffler/Gasket	5	5	5	5	5		5	5			5			FE section
	Three way catalyst														
Lubrication	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery	5	5	5	5	5		5	5			5			MA, EM and LC sections
	Oil level (Low)/Filthy oil														
Cooling	Radiator/Hose/Radiator filler cap	5	5	5	5	5		5	5		4	5			LC section
	Thermostat									5					
	Water pump														
	Water gallery														
	Cooling fan									5					EC-1802
	Coolant level (low)/Contaminated coolant														MA section

1 - 6: The numbers refer to the order of inspection.

CONSULT-II Reference Value in Data Monitor Mode

NIEC0766

Remarks:

- Specification data are reference values.
- Specification data are output/input values which are detected or supplied by the ECM at the connector.

  * Specification data may not be directly related to their components signals/values/operations.

  (i.e., Adjust ignition timing with a timing light before monitoring IGN TIMING. Specification data might be displayed even when ignition timing is not adjusted to specification. This IGN TIMING monitors the data calculated by the ECM according to the input signals from the camshaft position sensor and other ignition timing related sensors.)
- If the real-time diagnosis results are NG, and the on board diagnostic system results are OK, when diagnosing the mass air flow sensor, first check to see if the fuel pump control circuit is normal.

MONITOR ITEM	CONDITION		SPECIFICATION
ENG SPEED	• Tachometer: Connect • Run engine and compare tachometer indication with the CONSULT-II value.		Almost the same speed as the CONSULT-II value.
MAS A/F SE-B1	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: “N” • No-load	Idle	1.3 - 1.7V
		2,500 rpm	1.8 - 2.4V
B/FUEL SCHDL	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: “N” • No-load	Idle	1.0 - 1.6 msec
		2,000 rpm	0.7 - 1.3 msec
A/F ALPHA-B1	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	53 - 155%
COOLAN TEMP/S	• Engine: After warming up		More than 70°C (158°F)
HO2S1 (B1)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ 0.6 - 1.0V
HO2S1 MNTR (B1)			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.
HO2S2 (B1)	• Engine: After warming up	Revving engine from idle to 3,000 rpm quickly	0 - 0.3V ⟷ 0.6 - 1.0V
HO2S2 MNTR (B1)			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	0.2 - 0.8V
	• Engine: After warming up • Ignition switch: ON (Engine stopped) • Vacuum is applied using a vacuum pump	Throttle valve: fully opened	3.5 - 4.5V
EGR TEMP SEN	• Engine: After warming up		Less than 4.5V
EVAP SYS PRES	• Ignition switch: ON		Approx. 3.4V
ABSOL PRES/SE	• Ignition switch: ON		Approx. 4.4V
START SIGNAL	• Ignition switch: ON → START → ON		OFF → ON → OFF
CLSD THL POS CLSD THL/P SW	• Engine: After warming up • Ignition switch: ON (Engine stopped) • Vacuum is applied using a vacuum pump	Throttle valve: Idle position	ON
		Throttle valve: Slightly open	OFF

MONITOR ITEM	CONDITION		SPECIFICATION
AIR COND SIG	• Engine: After warming up, idle the engine	A/C switch "OFF"	OFF
		A/C switch "ON" (Compressor operates)	ON
P/N POSI SW	• Ignition switch: ON	Shift lever "P" or "N"	ON
		Except above	OFF
PW/ST SIGNAL	• Engine: After warming up, idle the engine	Steering wheel in neutral position (forward direction)	OFF
		The steering wheel is turned	ON
LOAD SIGNAL	• Ignition switch: ON	Rear window defogger switch and/or lighting switch "2ND"	ON
		Rear window defogger switch and lighting switch "OFF"	OFF
IGNITION SW	• Ignition switch: ON → OFF		ON → OFF
HEATER FAN SW	• Ignition switch: ON	Fan control switch: ON	ON
		Fan control switch: OFF	OF
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
IGN TIMING	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: "N" • No-load	Idle	15°±2° BTDC
		2,000 rpm	More than 25° BTDC
CAL/LD VALUE	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: "N" • No-load	Idle	20.0 - 35.5%
		2,500 rpm	17.0 - 30.0%
ABSOL TH·P/S	• Engine: After warming up, idle the engine	Throttle valve: fully closed	0.0%
	• Engine: After warming up • Ignition switch: ON (Engine stopped)	Throttle valve: fully opened	Approx. 88.0%
MASS AIRFLOW	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: N • No-load	Idle	2.5 - 5.0 g·m/s
		2,500 rpm	7.1 - 12.5 g·m/s
IACV-AAC/V	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: "N" • No-load	Idle	5 - 20 steps
		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	—
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
AIR COND RLY	• Air conditioner switch: OFF → ON		OFF → ON

CONSULT-II Reference Value in Data Monitor Mode (Cont'd)

MONITOR ITEM	CONDITION		SPECIFICATION
FUEL PUMP RLY	• Ignition switch is turned to ON (Operates for 5 seconds) • Engine running and cranking • When engine is stopped (stops in 1.0 seconds)		ON
	• Except as shown above		OFF
VC/V BYPASS/V	• Ignition switch: ON		OFF
VENT CONT/V	• Ignition switch: ON		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
HO2S1 HTR (B1)	• Engine speed: Below 3,200 rpm		ON
	• Engine speed: Above 3,200 rpm		OFF
HO2S2 HTR (B1)	• 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

Major Sensor Reference Graph in Data Monitor Mode

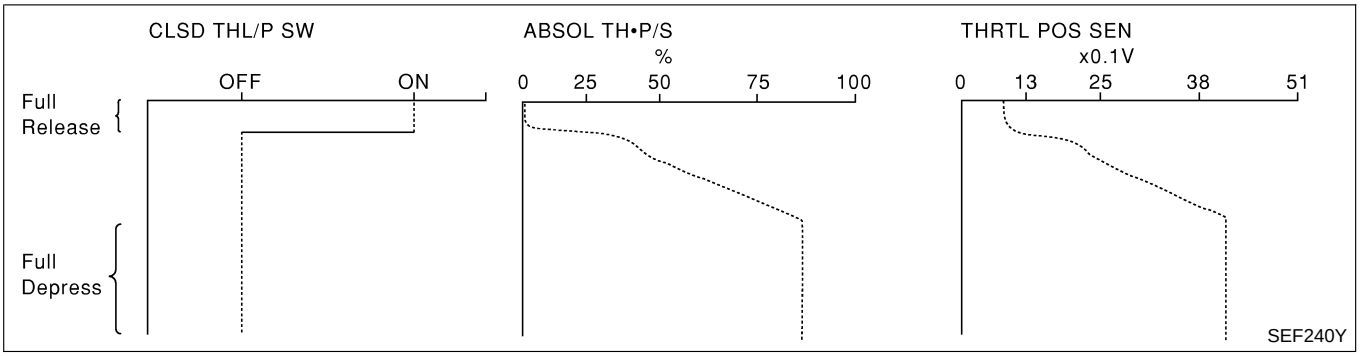
=NIEC0767

The following are the major sensor reference graphs in “DATA MONITOR” mode.

THRTL POS SEN, ABSOL TH·P/S, CLSD THL/P SW

NIEC0767S01

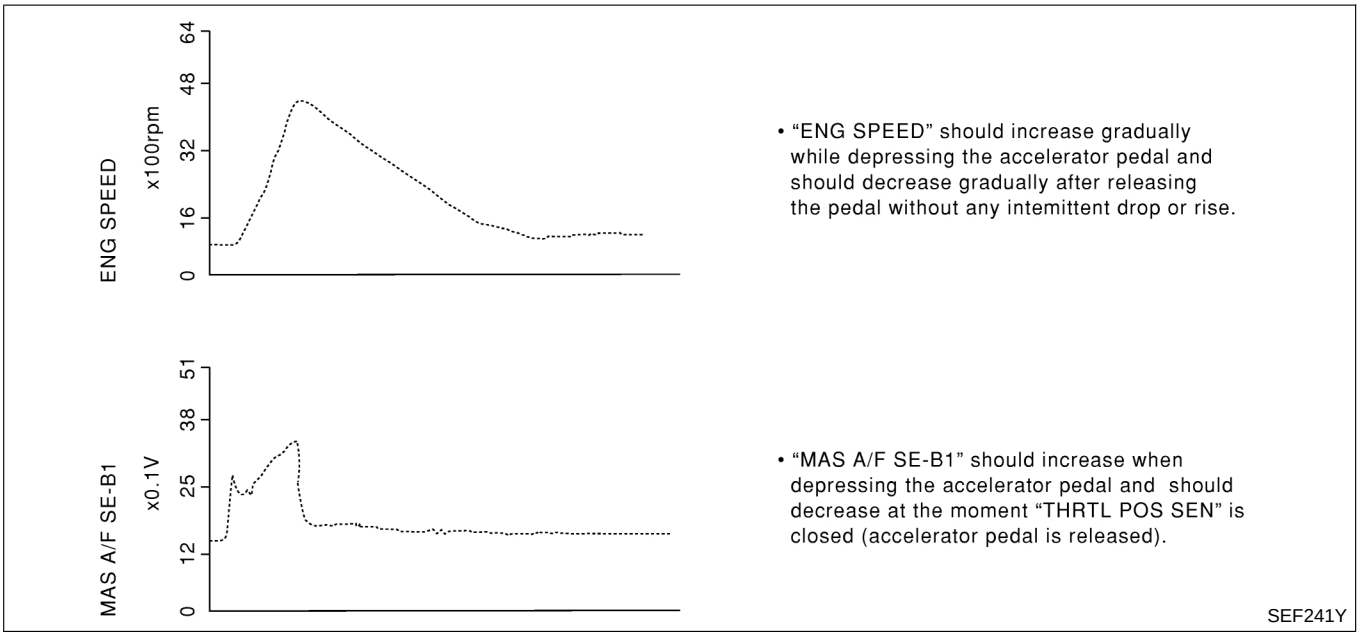
Below is the data for “THRTL POS SEN”, “ABSOL TH·P/S” and “CLSD THL/P SW” when depressing the accelerator pedal with the ignition switch “ON”.
The signal of “THRTL POS SEN” and “ABSOL TH·P/S” should rise gradually without any intermittent drop or rise after “CLSD THL/P SW” is changed from “ON” to “OFF”.

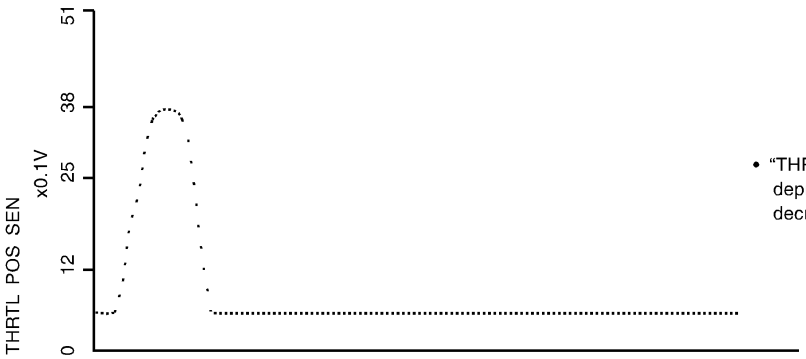


ENG SPEED, MAS A/F SE-B1, THRTL POS SEN, HO2S2 (B1), HO2S1 (B1), INJ PULSE-B1

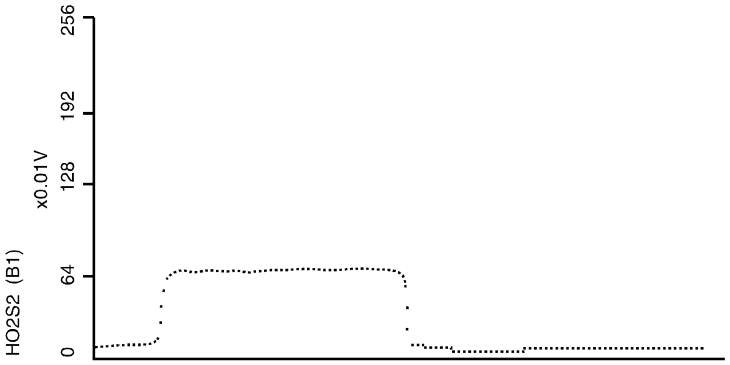
NIEC0767S02

Below is the data for “ENG SPEED”, “MAS A/F SE-B1”, “THRTL POS SEN”, “HO2S2 (B1)”, “HO2S1 (B1)” and “INJ PULSE-B1” when revving engine quickly up to 4,800 rpm under no load after warming up engine to normal operating temperature.
Each value is for reference, the exact value may vary.

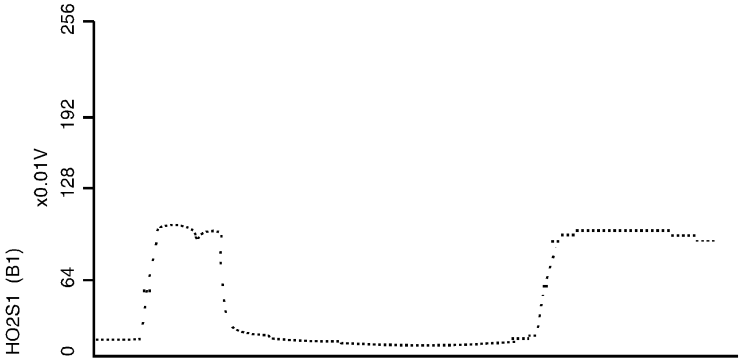




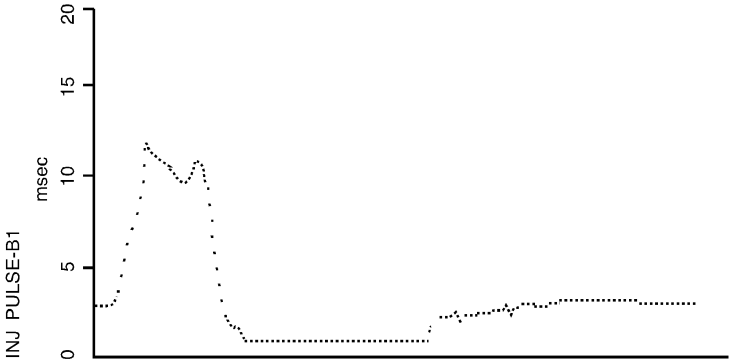
- "THRTL POS SEN" should increase while depressing the accelerator pedal and should decrease while releasing it.



- "HO2S2 (B1)" may increase immediately after depressing the accelerator pedal and may decrease after releasing the pedal.

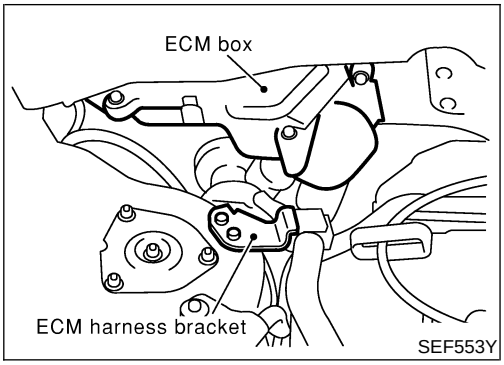


- "HO2S1 (B1)" may increase immediately after depressing the accelerator pedal and may decrease after releasing the pedal.



- "INJ PULSE-B1" should increase when depressing the accelerator pedal and should decrease when the pedal is released.

SEF242YA



ECM Terminals and Reference Value

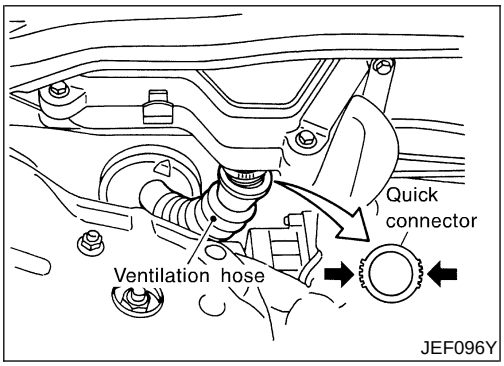
NIEC0768

PREPARATION

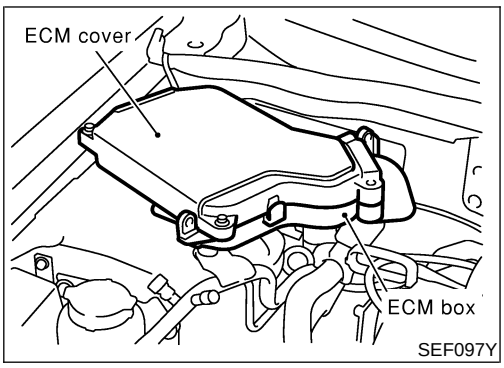
NIEC0768S01

1. ECM is located in the right side of the cowl top (behind the strut tower).
   For this inspection:

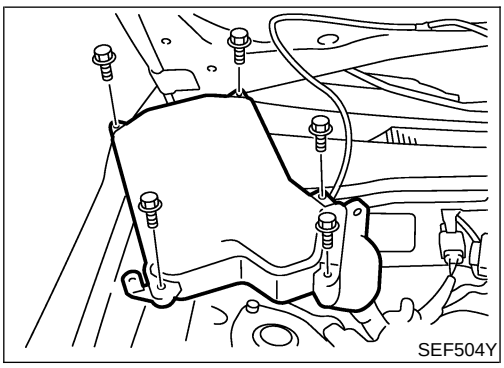
- Remove front strut tower bar. Refer to ***SU-6***, “FRONT SUSPENSION PARTS”.
- Remove engine control harness bracket on the strut tower.



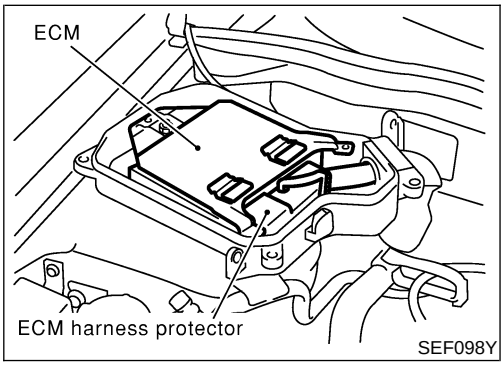
- Remove quick connector on the ventilation hose.



- Remove ECM fixing bolts and pull it out all the way.

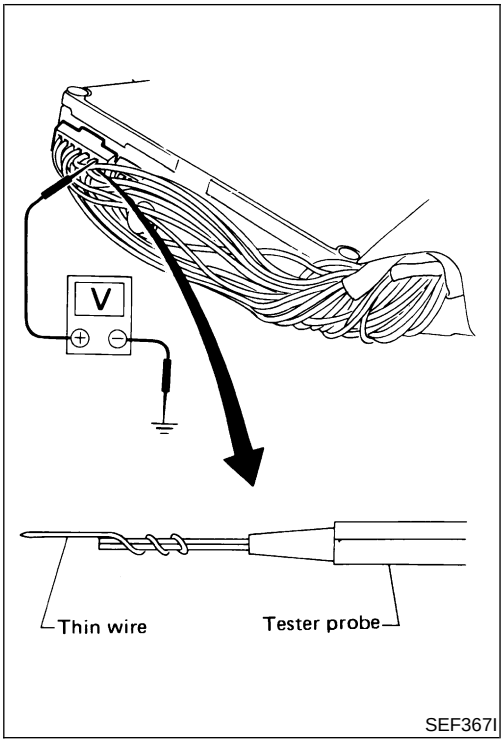


- Remove ECM cover fixing bolts.



- Remove ECM fixing bolts.
- Remove ECM with its harness from the cover.

2. Remove ECM harness protector.

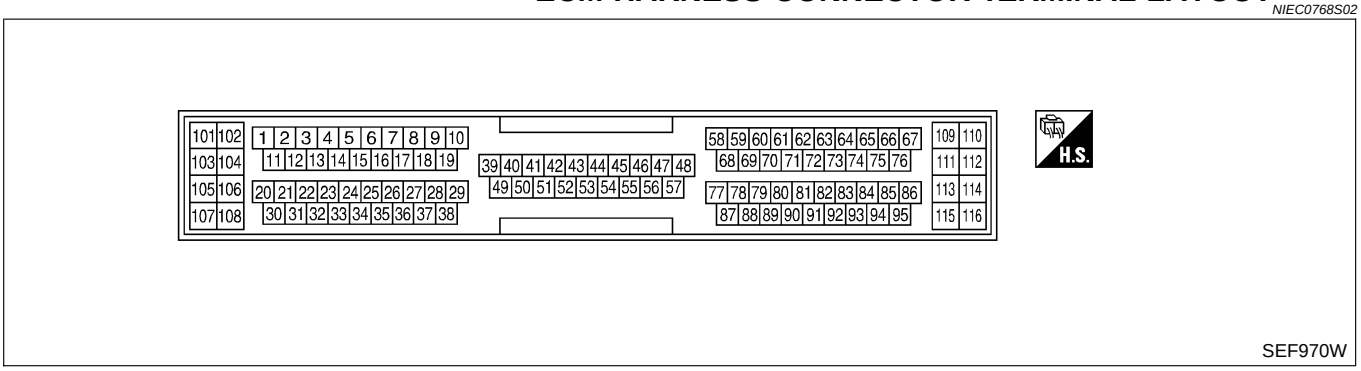


3. Perform all voltage measurements with the connector connected. Extend tester probe as shown to perform tests easily.
- Open harness securing clip to make testing easier.
- Use extreme care not to touch 2 pins at one time.
- Data is for comparison and may not be exact.

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.

ECM HARNESS CONNECTOR TERMINAL LAYOUT

NIEC0768S02



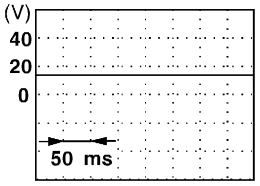
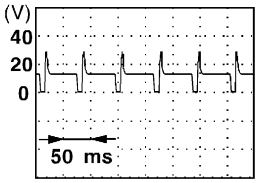
ECM INSPECTION TABLE

NIEC0768S03

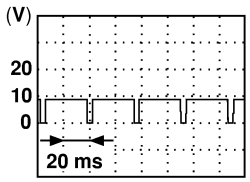
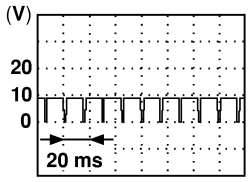
Specification data are reference values and are measured between each terminal and ground.

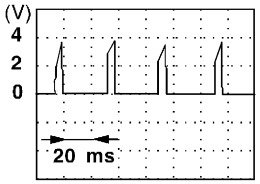
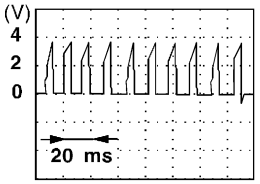
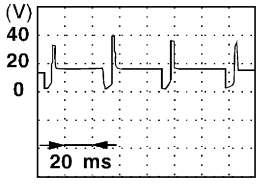
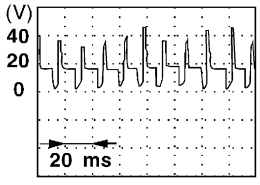
CAUTION:
Do not use ECM ground terminals when measuring input/ output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
2	L/B	Vacuum cut valve bypass valve	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)

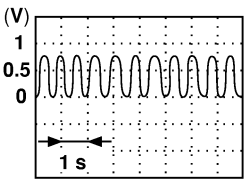
TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	W/R	Heated oxygen sensor 2 (rear) heater	**[Engine is running]** ● Engine speed is below 3,600 rpm. ● After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more.	0 - 1.0V
			[Ignition switch "ON"] ● Engine stopped **[Engine is running]** ● Engine speed is above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)
4	R/B	Heated oxygen sensor 1 (front) heater	**[Engine is running]** ● Engine speed is below 3,200 rpm.	0 - 1.0V
			[Engine is running] ● Engine speed is above 3,200 rpm.	BATTERY VOLTAGE (11 - 14V)
6 7 15 16	BR LG P OR	IACV-AAC valve	**[Engine is running]** ● Idle speed	0.1 - 14V
8 9 17 18	SB W/B R/Y Y	EGR volume control valve	**[Engine is running]** ● Idle speed	0.1 - 14V
10	Y/B	A/T signal No. 3	**[Engine is running]** ● Idle speed	0 - 1.0V
12	LG/B	Cooling fan relay (High)	**[Engine is running]** ● Cooling fan is not operating	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Cooling fan (High) is operating	0 - 0.6V
13	LG/R	Cooling fan relay (Low)	**[Engine is running]** ● Cooling fan is not operating	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Cooling fan is operating	0 - 0.6V
14	GY/L	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
19	BR/W	A/T signal No. 5	**[Engine is running]** ● Idle speed	Approximately 8V

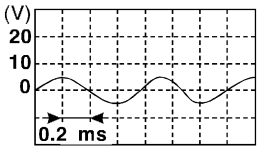
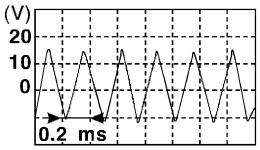
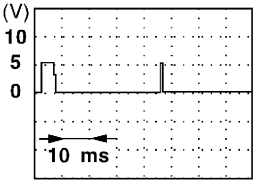
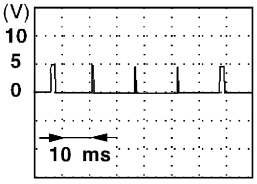
ECM Terminals and Reference Value (Cont'd)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
20 (Without NVIS model)	B/P	Fuel pump relay	**[Ignition switch "ON"]** ● For 5 seconds after turning ignition switch "ON" **[Engine is running]**	0 - 1V
21 (With NVIS model)	B/P		**[Ignition switch "ON"]** ● More than 5 seconds after turning ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
22	OR/L	Malfunction indicator lamp	**[Ignition switch "ON"]**	0 - 1.0V
			[Engine is running] ● Idle speed	BATTERY VOLTAGE (11 - 14V)
23	L	Air conditioner relay	**[Engine is running]** ● Both A/C switch and blower switch are "ON" (Compressor operates)	0 - 0.6V
			[Engine is running] ● A/C switch is "OFF"	BATTERY VOLTAGE (11 - 14V)
31	W/G	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch "OFF"]** ● For 5 seconds after turning ignition switch "OFF"	0 - 1.0V
			[Ignition switch "OFF"] ● 5 seconds passed after turning ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
32	L/OR	Tachometer	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 8.2V  SEF928X
			[Engine is running] ● Engine speed is 2,000 rpm	Approximately 8.2V  SEF929X

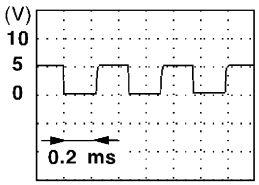
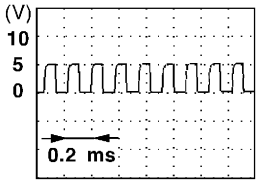
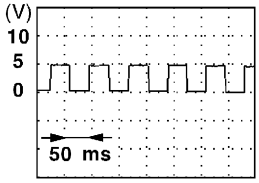
TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
35	R/G	Ignition signal	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V  SEF996V
			[Engine is running] ● Engine speed is 2,000 rpm	Approximately 0.5V  SEF997V
36	G	Ignition check	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 13V  SEF998V
			[Engine is running] ● Engine speed is 2,000 rpm	Approximately 13V  SEF999V
40	Y/PU	Throttle position switch (Closed position)	**[Engine is running]** ● **Warm-up condition** ● Accelerator pedal fully released	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Accelerator pedal depressed	Approximately 0V
41	B/Y	Start signal	**[Ignition switch "ON"]**	Approximately 0V
			[Ignition switch "START"]	9 - 14V
42	G/OR	PNP switch	**[Ignition switch "ON"]** ● Gear position is "Neutral position" (M/T models) ● Gear position is "P" or "N" (A/T models)	Approximately 0V
			[Ignition switch "ON"] ● Except the above gear position	BATTERY VOLTAGE (11 - 14V)
43	B/R	Ignition switch	**[Ignition switch "OFF"]**	0V
			[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)

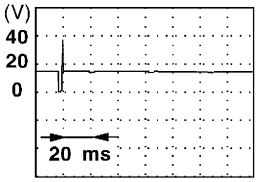
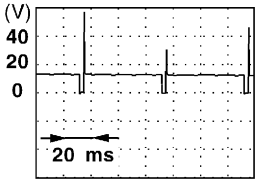
ECM Terminals and Reference Value (Cont'd)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
44	L/R	Air conditioner switch	**[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)
46	PU/W	Power steering oil pressure switch	**[Engine is running]** ● Steering wheel is being turned.	Approximately 0V
			[Engine is running] ● Steering wheel is not being turned.	Approximately 5V
48	B	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
50	R/W	Electrical load signal	**[Ignition switch "ON"]** ● Lighting switch "2ND" and/or rear window defogger switch "ON"	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch "ON"] ● Lighting switch and rear window defogger switch "OFF"	0V
51	LG/B	Heater fan switch	**[Ignition switch "ON"]** ● Heater fan switch is "ON"	Approximately 0V
			[Ignition switch "ON"] ● Heater fan switch is "OFF"	Approximately 5V
54	Y/R	A/T signal No. 1	**[Engine is running]** ● Idle speed	Approximately 0 - 1.0V
55	Y/G	A/T signal No. 2	**[Engine is running]** ● Idle speed	Approximately 0 - 1.0V
56	G/Y	A/T signal No. 4	**[Engine is running]** ● Idle speed	Approximately 0 - 1.0V
57	B	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
58	B	Sensor's ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
61	G	Mass air flow sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	1.3 - 1.7V
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,500 rpm	1.8 - 2.4V
62	W	Heated oxygen sensor 1 (front)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - Approximately 1.0V (Periodically change)  SEF059V
63	L	Heated oxygen sensor 2 (rear)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - Approximately 1.0V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
64	Y/B	Intake air temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with intake air temperature.
65	B/R	Crankshaft position sensor (POS)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	3 - 5V (AC range)  SEF721W
			[Engine is running] ● Engine speed is 2,000 rpm	6 - 9V (AC range)  SEF722W
66 75 (With NVIS model) 76 85 (Without NVIS model)	OR/L	Camshaft position sensor (PHASE) (Reference signal)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0.1 - 0.4V  SEF006W
			[Engine is running] ● Engine speed is 2,000 rpm	0.1 - 0.4V  SEF007W
67	W/L	Power supply for ECM (Back-up)	**[Ignition switch "OFF"]**	BATTERY VOLTAGE (11 - 14V)
70	BR/W	Engine coolant temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with engine coolant temperature.
71	GY	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
72	PU	EGR temperature sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Less than 4.5V
			[Engine is running] ● **Warm-up condition** ● EGR system is operating	0 - 1.5V

ECM Terminals and Reference Value (Cont'd)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
73	B	Mass air flow sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
74	R/L	Refrigerant pressure sensor	**[Engine is running]** ● **Warm-up condition** ● Both A/C switch and blower switch are "ON" (Compressor operates)	0.36 - 3.88V
80	W	Absolute pressure sensor	**[Ignition switch "ON"]**	Approximately 4.4V
81	W	Knock sensor	**[Engine is running]** ● Idle speed	Approximately 2.5V
82	G/OR	Fuel tank temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with fuel tank temperature.
83	G	Fuel level sensor	**[Ignition switch "ON"]**	Approximately 0 - 4.8V Output voltage varies with fuel level.
84	P	EVAP control system pressure sensor	**[Ignition switch "ON"]**	Approximately 3.4V
75 (Without NVIS model) 85 (With NVIS model)	W/L	Camshaft position sensor (PHASE) (Position signal)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 2.6V  SEF004W
			[Engine is running] ● Engine speed is 2,000 rpm	Approximately 2.5V  SEF005W
86	PU/R	Vehicle speed sensor	**[Engine is running]** ● Lift up the vehicle ● In 2nd gear position ● Vehicle speed is 40 km/h (25 MPH)	0 - Approximately 4.2V  SEF003W
90	B/W	Fuel level sensor ground	**[Engine is running]** ● Idle speed	Approximately 0V
91	PU	A/T check signal	**[Ignition switch "ON"]**	0 - Approximately 5V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
92	Y	Throttle position sensor	**[Engine is running]** ● **Warm-up condition** ● Accelerator pedal fully released	0.2 - 0.8V
			[Ignition switch "ON"] ● Accelerator pedal fully depressed	3.5 - 4.5V
101 103 105 107	R/B Y/B G/B L/B	Injector No. 1 Injector No. 2 Injector No. 3 Injector No. 4	**[Engine is running]** ● **Warm-up condition** ● Idle speed	BATTERY VOLTAGE (11 - 14V)  SEF011W
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14V)  SEF012W
102	L/Y	EVAP canister vent control valve	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)
106 108	B/Y B/Y	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
110 112	W W	Power supply for ECM	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)
111	R	Sensor's power supply	**[Ignition switch "ON"]**	Approximately 5V
115	LG	DATA link connector	**[Ignition switch "ON"]** ● CONSULT-II or GST is disconnected.	Approximately 8V

Description

NIEC1185

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 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 PCM prior to any learned on board correction.)
- A/F ALPHA-B1/B2 (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

NIEC1185S01

- Vehicle driven distance: More than 5,000 km (3,107 miles)
- Barometric pressure: 98.3 - 104.3 kPa (1.003 - 1.064 kg/cm^2, 14.25 - 15.12 psi)
- Atmosphere temperature: 20° to 30° C (68° to 86° F)
- Engine coolant temperature: 75° to 95° C (167° to 203°)
- Transmission: Warmed-up *1
- Electrical load: Not applied *2
- Engine speed: Idle

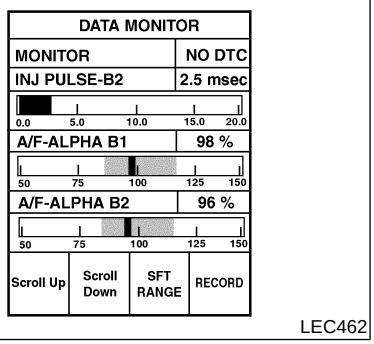
*1: For A/T models, after the engine is warmed-up to normal operating temperature, drive vehicle until “FLUID TEMP SE” (A/T fluid temperature sensor signal) indicates more than 60° C (140° F). For M/T models, drive vehicle for 5 minutes after the engine is warmed-up to normal operating temperature.
*2: Rear window defogger switch, air conditioner switch, and lighting switch are “OFF”. Cooling fans are not operating. Steering wheel straight ahead.

INSPECTION PROCEDURE

NIEC1185S02

NOTE:
Perform “DATA MONITOR (SPEC)” mode in maximum scale display.

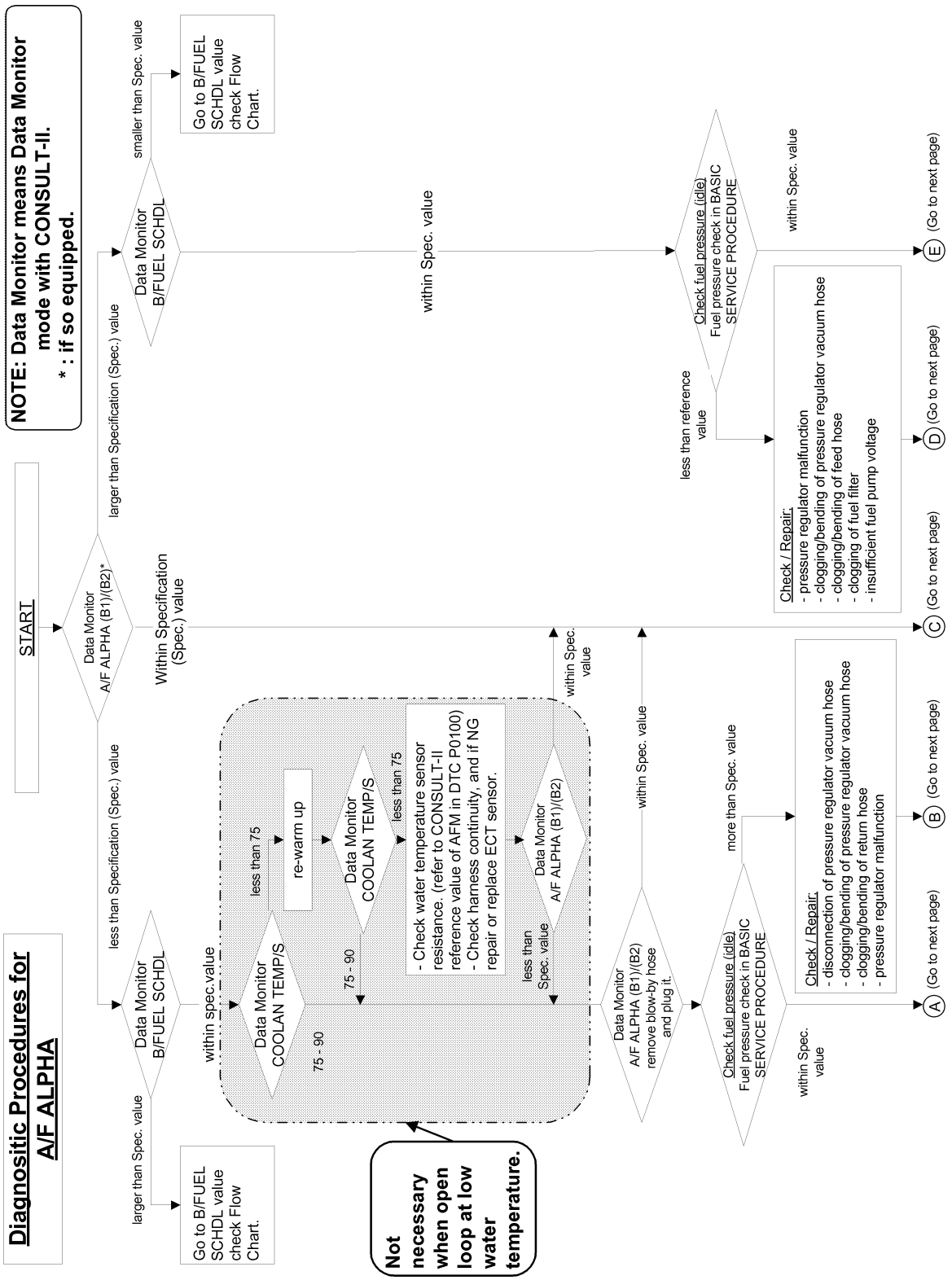
1. Perform “Basic Inspection”. Refer to “Basic Inspection”, EC-1470.
2. Confirm that the testing conditions indicated above are met.
3. Select “B/FUEL SCHDL”, “A/F ALPHA-B1”, “A/F ALPHA-B2”, and “MAS A/F SE-B1” in “DATA MONITOR (SPEC)” mode with CONSULT-II.
4. Make sure that monitor items are within the SP value.
5. If NG, go to “Diagnostic Procedure”. Refer to “Diagnostic Procedure”, EC-1505.



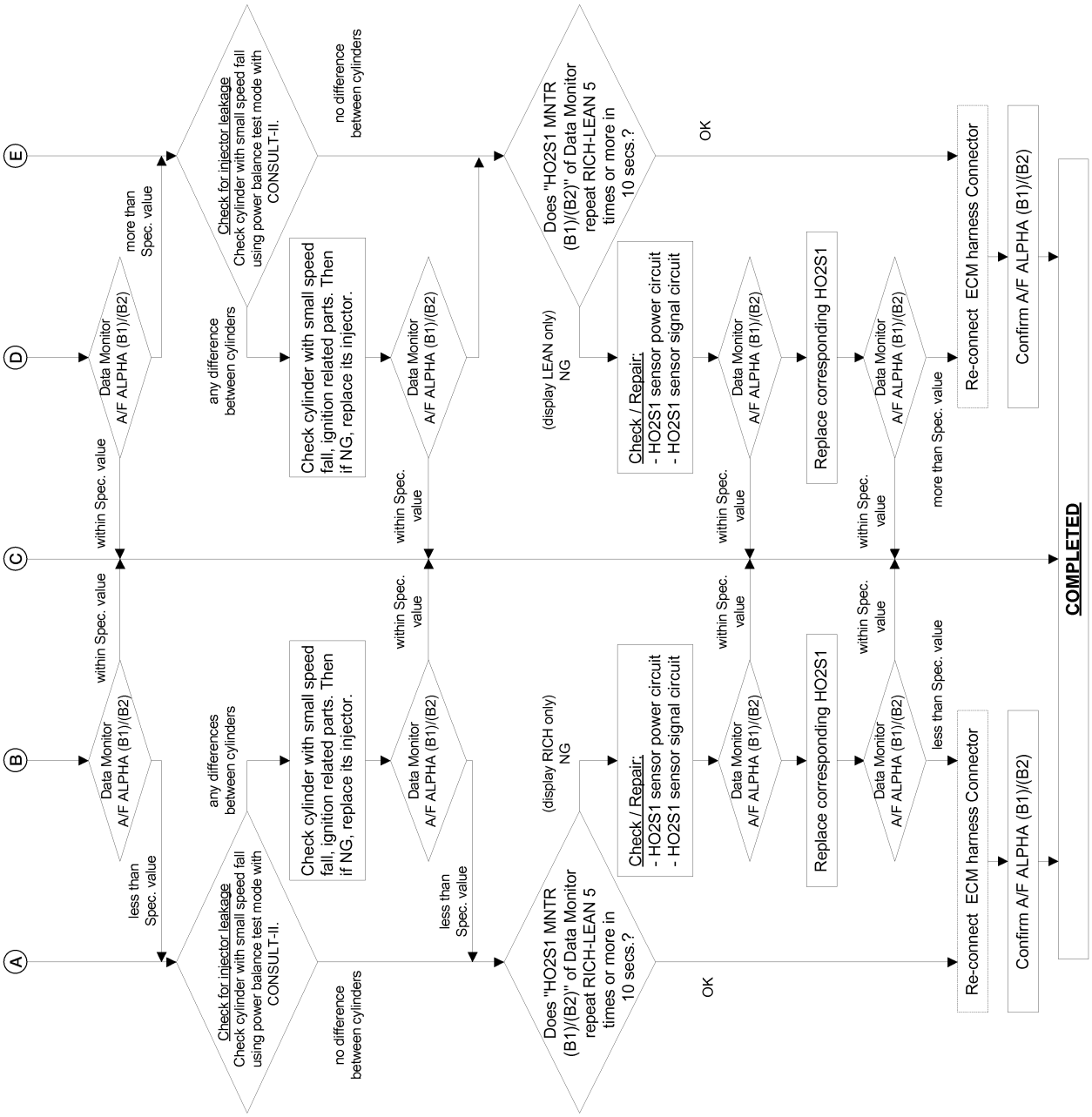
LEC462

Diagnostic Procedure

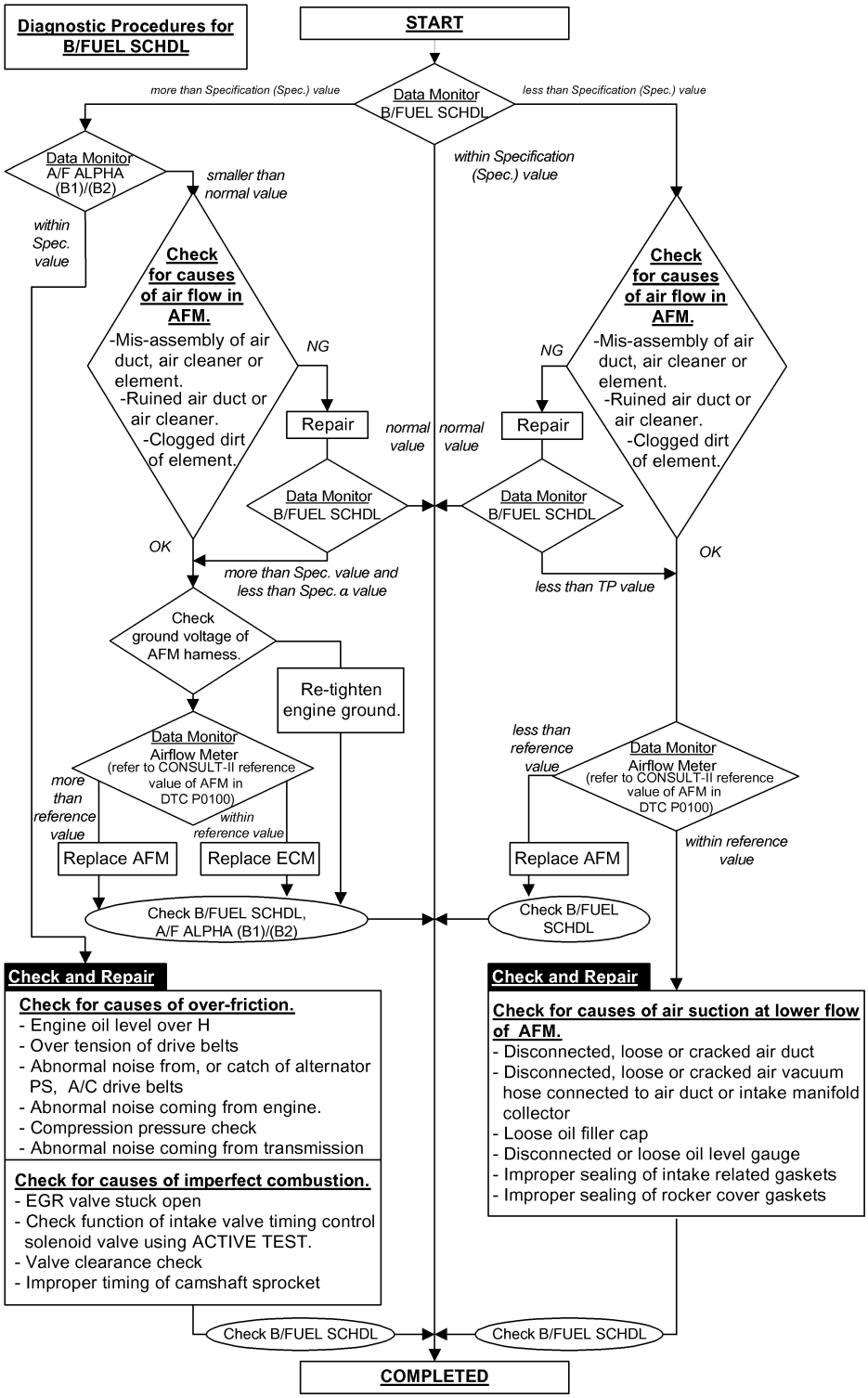
NIEC1186



LEC459


A
B
C
D
E
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
any difference between cylinders
Check cylinder with small speed fall, ignition related parts. Then if NG, replace its injector.
within Spec. value
less than Spec. value
Does "HO2S1 MNTR (B1)/(B2)" of Data Monitor repeat RICH-LEAN 5 times or more in 10 secs.?
(display RICH only)
NG
OK
Check / Repair:
- HO2S1 sensor power circuit
- HO2S1 sensor signal circuit
within Spec. value
Replace corresponding HO2S1
within Spec. value
less than Spec. value
Re-connect ECM harness Connector
Confirm A/F ALPHA (B1)/(B2)
Does "HO2S1 MNTR (B1)/(B2)" of Data Monitor repeat RICH-LEAN 5 times or more in 10 secs.?
(display LEAN only)
NG
OK
Check / Repair:
- HO2S1 sensor power circuit
- HO2S1 sensor signal circuit
within Spec. value
Replace corresponding HO2S1
within Spec. value
more than Spec. value
Re-connect ECM harness Connector
Confirm A/F ALPHA (B1)/(B2)
COMPLETED

LEC466


Diagnostic Procedures for B/FUEL SCHDL
START
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 AFM.
-Mis-assembly of air duct, air cleaner or element.
-Ruined air duct or air cleaner.
-Clogged dirt of element.
NG
Repair
normal value
normal value
Data Monitor B/FUEL SCHDL
OK
more than Spec. value and less than Spec. α value
less than TP value
Check ground voltage of AFM harness.
Re-tighten engine ground.
Data Monitor Airflow Meter (refer to CONSULT-II reference value of AFM in DTC P0100)
more than reference value
within reference value
less than reference value
within reference value
Replace AFM
Replace ECM
Check B/FUEL SCHDL, A/F ALPHA (B1)/(B2)
Check B/FUEL SCHDL
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.
- Compression pressure check
- Abnormal noise coming from transmission
Check for causes of imperfect combustion.
- EGR valve stuck open
- Check function of intake valve timing control solenoid valve using ACTIVE TEST.
- Valve clearance check
- Improper timing of camshaft sprocket
Check and Repair
Check for causes of air suction at lower flow of AFM.
- 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
Check B/FUEL SCHDL
COMPLETED

LEC467

Description

NIEC0769

Intermittent incidents (I/I) may occur. In many cases, the problem resolves itself (the part or circuit function returns to normal without intervention). It is important to realize that the symptoms described in the customer's complaint often do not recur on DTC (1st trip) visits. Realize also that the most frequent cause of I/I occurrences is poor electrical connections. Because of this, the conditions under which the incident occurred may not be clear. Therefore, circuit checks made as part of the standard diagnostic procedure may not indicate the specific problem area.

COMMON I/I REPORT SITUATIONS

NIEC0769S01

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 data does not appear during the DTC CONFIRMATION PROCEDURE.
VI	The TROUBLE DIAGNOSIS for PXXXX does not indicate the problem area.

Diagnostic Procedure

NIEC0770

1	**INSPECTION START**
Erase (1st trip) DTCs. Refer to "HOW TO ERASE EMISSION-RELATED INFORMATION", EC-1438.	
▶	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**
Refer to ***GI-26***, "Incident Simulation Tests".	
OK or NG	
OK ▶	GO TO 4.
NG ▶	Repair or replace.

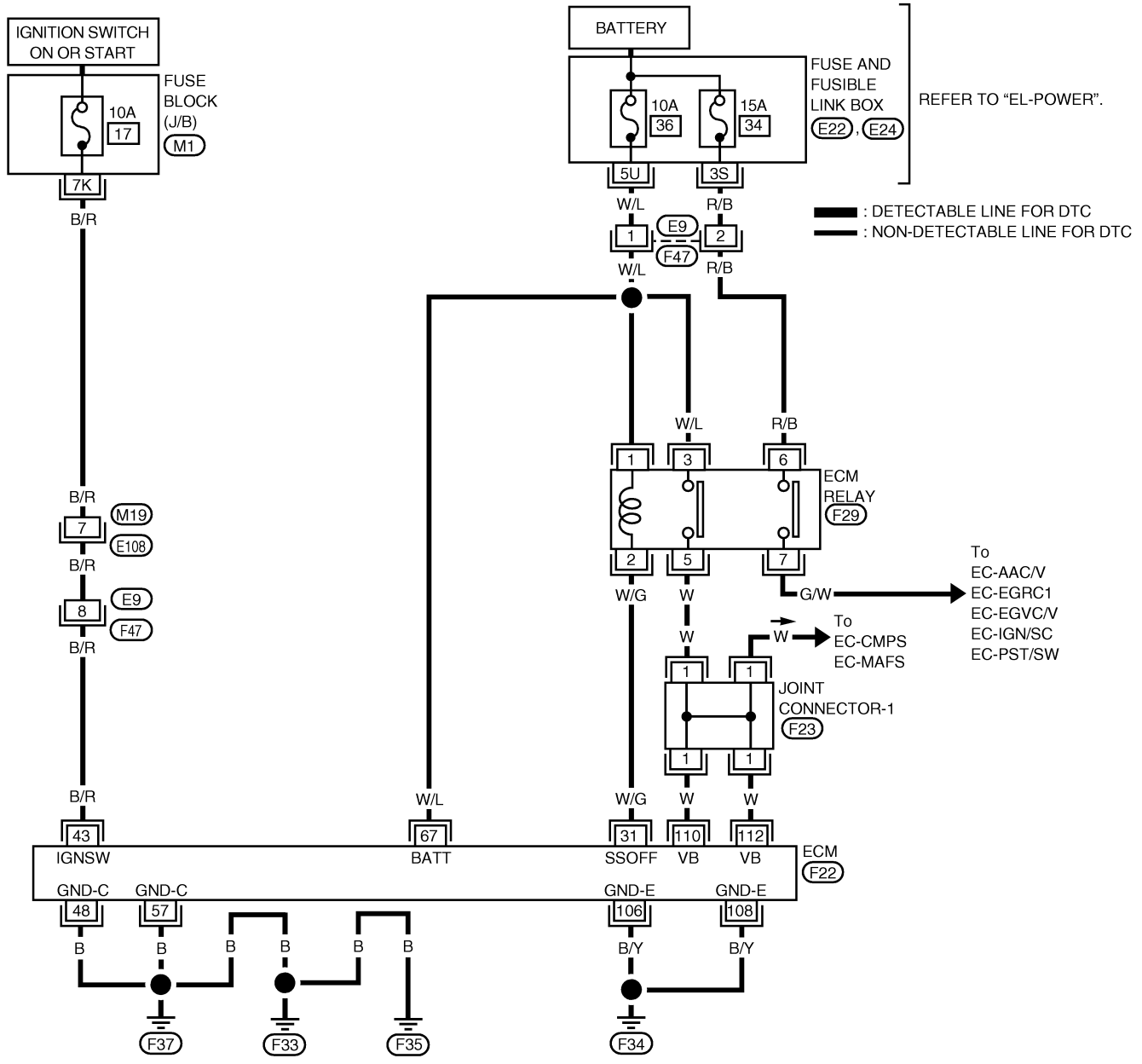
4	**CHECK CONNECTOR TERMINALS**
Refer to ***GI-23***, "How to Check Enlarged Contact Spring of Terminal".	
OK or NG	
OK ▶	**INSPECTION END**
NG ▶	Repair or replace connector.

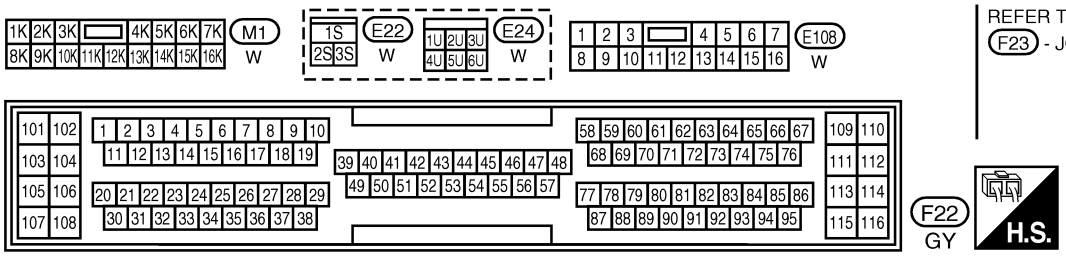
Main Power Supply and Ground Circuit

WIRING DIAGRAM

NIEC0771

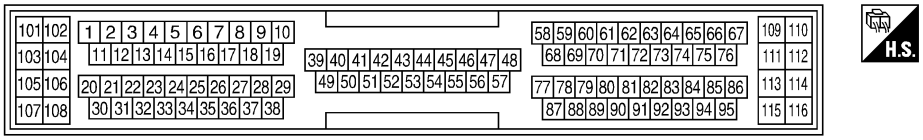
EC-MAIN-01





REFER TO THE FOLLOWING.
F23 - JOINT CONNECTOR (J/C)

LEC193



SEF970W

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)
31	W/G	ECM RELAY (SELF-SHUTOFF)	ENGINE RUNNING FOR 5 SECONDS AFTER TURNING IGN OFF	0 - 1.0V
			5 SECONDS PASSED AFTER TURNING IGN OFF	BATTERY VOLTAGE
43	B/R	IGN	IGN OFF	0V
			IGN ON	BATTERY VOLTAGE
48	B	ECM GROUND	ENGINE RUNNING	ENGINE GROUND
57	B	ECM GROUND	ENGINE RUNNING AT IDLE SPEED	APPROX. 0 - 1.0V
67	W/L	POWER SUPPLY (BACK-UP)	IGN OFF	BATTERY VOLTAGE
106 108	B/Y B/Y	ECM GROUND	ENGINE RUNNING AT IDLE SPEED	ENGINE GROUND
110 112	W W	POWER SUPPLY FOR ECM	IGN ON	BATTERY VOLTAGE

SEF563Y

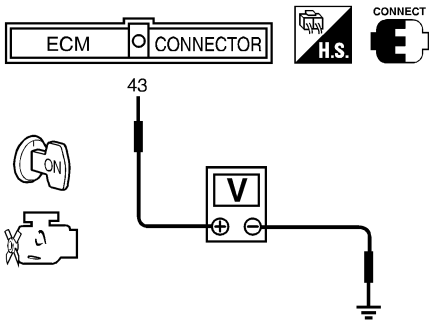
DIAGNOSTIC PROCEDURE

NIEC0772

1	INSPECTION START	
Start engine. Is engine running? **Yes or No**		
Yes	▶	GO TO 4.
No	▶	GO TO 2.

2	CHECK POWER SUPPLY-I

1. Turn ignition switch "OFF" and then "ON".
2. Check voltage between ECM terminal 43 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF291X

OK or NG

OK	▶	GO TO 14.
NG	▶	GO TO 3.

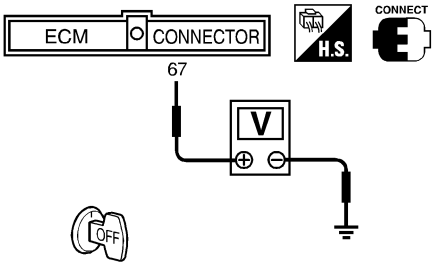
3	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M19, E108
- Hnarness connectors E9, F47
- Harness for open or short between ECM and 10A fuse

	▶	Repair harness or connectors.

4	CHECK POWER SUPPLY-II

1. Stop engine.
2. Check voltage between ECM terminal 67 and ground with CONSULT-II or tester.



SEF982W

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

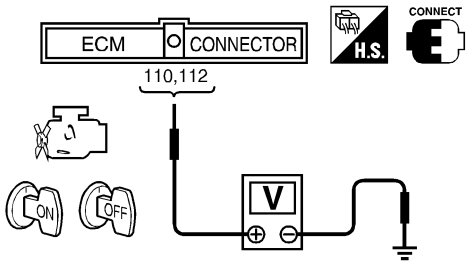
5	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E9, F47
- Fuse and fusible link box E24
- 10A fuse
- Harness for open or short between ECM and 10A fuse

	▶	Repair harness or connectors.

6	CHECK POWER SUPPLY-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

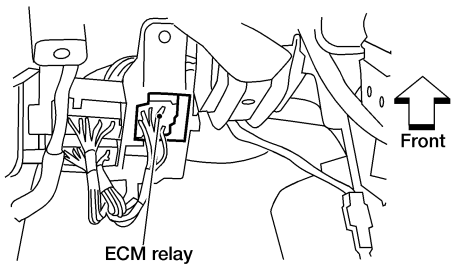
OK or NG

OK	▶	GO TO 14.
NG (Battery voltage does not exist.)	▶	GO TO 7.
NG (Battery voltage exists for more than a few seconds.)	▶	GO TO 13.

7	CHECK HARNESS CONTINUITY BETWEEN ECM RELAY AND ECM

1. Disconnect ECM harness connector.
2. Disconnect ECM relay.

View with glove box removed



LEC444

3. Check harness continuity between ECM terminals 110, 112 and ECM relay terminal 5. Refer to "Wiring Diagram", EC-1509.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 8.

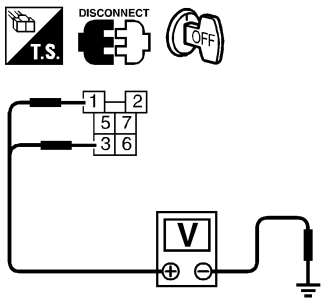
8	DETECT MALFUNCTIONING PART

Check the following.
- Joint connector-1
- Harness for open or short between ECM relay and ECM

	▶	Repair open circuit or short to ground or short to power in harness or connectors.

9	CHECK VOLTAGE BETWEEN ECM RELAY AND GROUND

Check voltage between ECM relay terminals 1, 3 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF248Y

OK or NG

OK	▶	GO TO 11.
NG	▶	GO TO 10.

10	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E9, F47
- Harness for open or short between ECM relay and fuse

	▶	Repair harness or connectors.

11	CHECK OUTPUT SIGNAL CIRCUIT

1. Check harness continuity between ECM terminal 31 and ECM relay terminal 2.
   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 13.
NG	▶	GO TO 12.

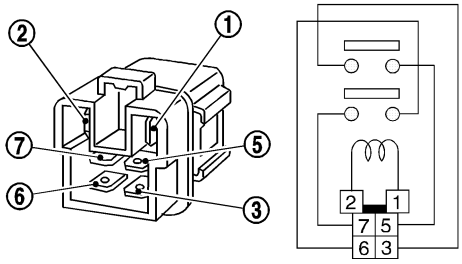
12	DETECT MALFUNCTIONING PART

Check the harness for open or short between ECM relay and ECM.

	▶	Repair open circuit or short to ground or short to power in harness or connectors.

13	CHECK ECM RELAY

1. Apply 12V direct current between ECM relay terminals 1 and 2.
2. Check continuity between ECM relay terminals 3 and 5, 6 and 7.



SEC202BC

12V (1 - 2) applied: Continuity exists.
No voltage applied: No continuity

OK or NG

OK	▶	GO TO 14.
NG	▶	Replace ECM relay.

14	CHECK GROUND CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminals 48, 57, 106, 108 and engine ground.
   Refer to "Wiring Diagram", EC-1509.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

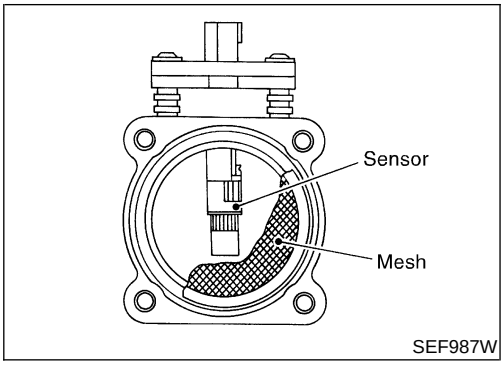
OK or NG

OK	▶	GO TO 15.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

15	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1508.

	▶	**INSPECTION END**



Component Description

NIEC0773

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

NIEC0774

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	1.3 - 1.7V
		2,500 rpm	1.8 - 2.4V
CAL/LD VALUE	• Engine: After warming up • Air conditioner switch: “OFF” • Shift lever: “N” • No-load	Idle	20.0 - 35.5%
		2,500 rpm	17.0 - 30.0%
MASS AIRFLOW	• Engine: After warming up • Air conditioner switch: “OFF” • Shift lever: “N” • No-load	Idle	2.5 - 5.0 g·m/s
		2,500 rpm	7.1 - 12.5 g·m/s

On Board Diagnosis Logic

NIEC0775

DTC No.	Malfunction is detected when ...		Check Items (Possible Cause)
P0100	A)	An excessively high voltage from the sensor is sent to ECM when engine is not running.	• Harness or connectors (The sensor circuit is open or shorted.) • Mass air flow sensor
	C)	A high voltage from the sensor is sent to ECM under light load driving condition.	
	B)	An excessively low voltage from the sensor is sent to ECM* when engine is running.	• Harness or connectors (The sensor circuit is open or shorted.) • Intake air leaks • Mass air flow sensor
	D)	A low voltage from the sensor is sent to ECM under heavy load driving condition.	
	E)	A voltage from the sensor exists constantly approx. 1.0V when engine is running.	

*: When this malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

Detected items	Engine operating condition in fail-safe mode
Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.

DTC Confirmation Procedure

NIEC0776

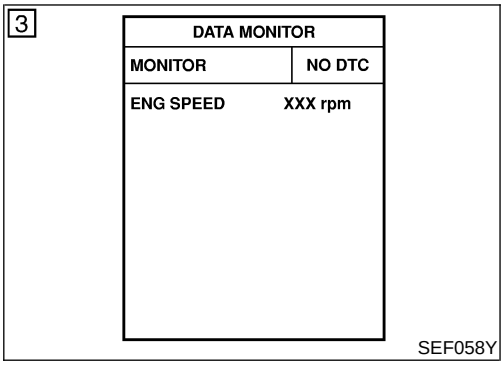
Perform "PROCEDURE FOR MALFUNCTION A" first. If the 1st trip DTC cannot be confirmed, perform "PROCEDURE FOR MALFUNCTION B and E". If there is no problem on "PROCEDURE FOR MALFUNCTION B and E", perform "PROCEDURE FOR MALFUNCTION C". If there is no problem on "PROCEDURE FOR MALFUNCTION C", perform "PROCEDURE FOR MALFUNCTION D".

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.



PROCEDURE FOR MALFUNCTION A

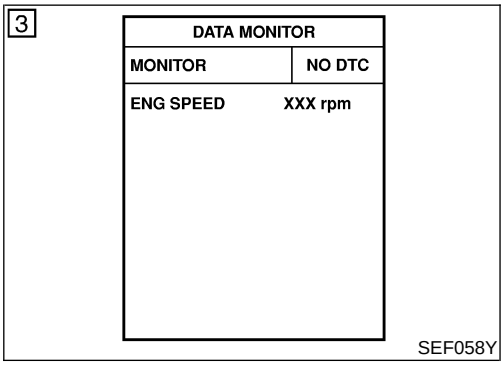
NIEC0776S01

With CONSULT-II

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-1520.

With GST

Follow the procedure "With CONSULT-II" above.



PROCEDURE FOR MALFUNCTION B AND E

NIEC0776S02

With CONSULT-II

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-1520.

With GST

Follow the procedure "With CONSULT-II" above.

NOTE:

If 1st trip DTC is confirmed after more than 5 seconds, there may be malfunction C.

4

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C

SEF174Y

PROCEDURE FOR MALFUNCTION C

NIEC0776S03

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.

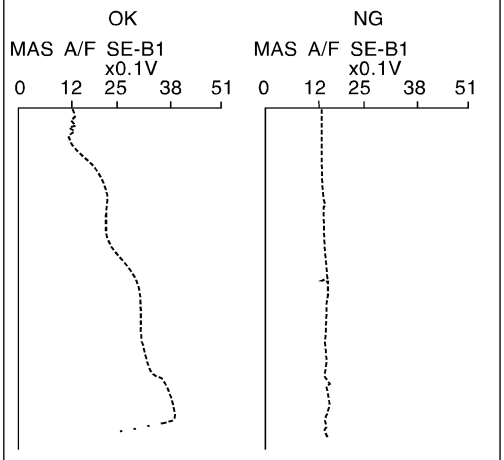
With CONSULT-II

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-1520.

With GST

Follow the procedure "With CONSULT-II" above.

6



SEF243Y

PROCEDURE FOR MALFUNCTION D

NIEC0776S04

With CONSULT-II

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-1520.
3) Select "DATA MONITOR" mode with CONSULT-II.
4) Check the voltage of "MAS A/F SE-B1" 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-1520.
   If OK, go to following step.
7) Maintain the following conditions for at least 10 consecutive seconds.

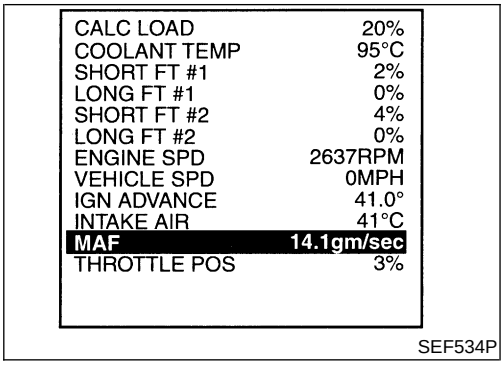
ENG SPEED	More than 2,000 rpm
THRTL POS SEN	More than 3V
Selector lever	Suitable position
Driving location	Driving vehicle uphill (Increased engine load) will help maintain the driving conditions required for this test.

8) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1520.

7

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
VHCL SPEED SE	XXX km/h
THRTL POS SEN	XXX V

SEF175Y



Overall Function Check

NIEC0777

Use this procedure to check the overall function of the mass air flow sensor circuit. During this check, a 1st trip DTC might not be confirmed.

PROCEDURE FOR MALFUNCTION D

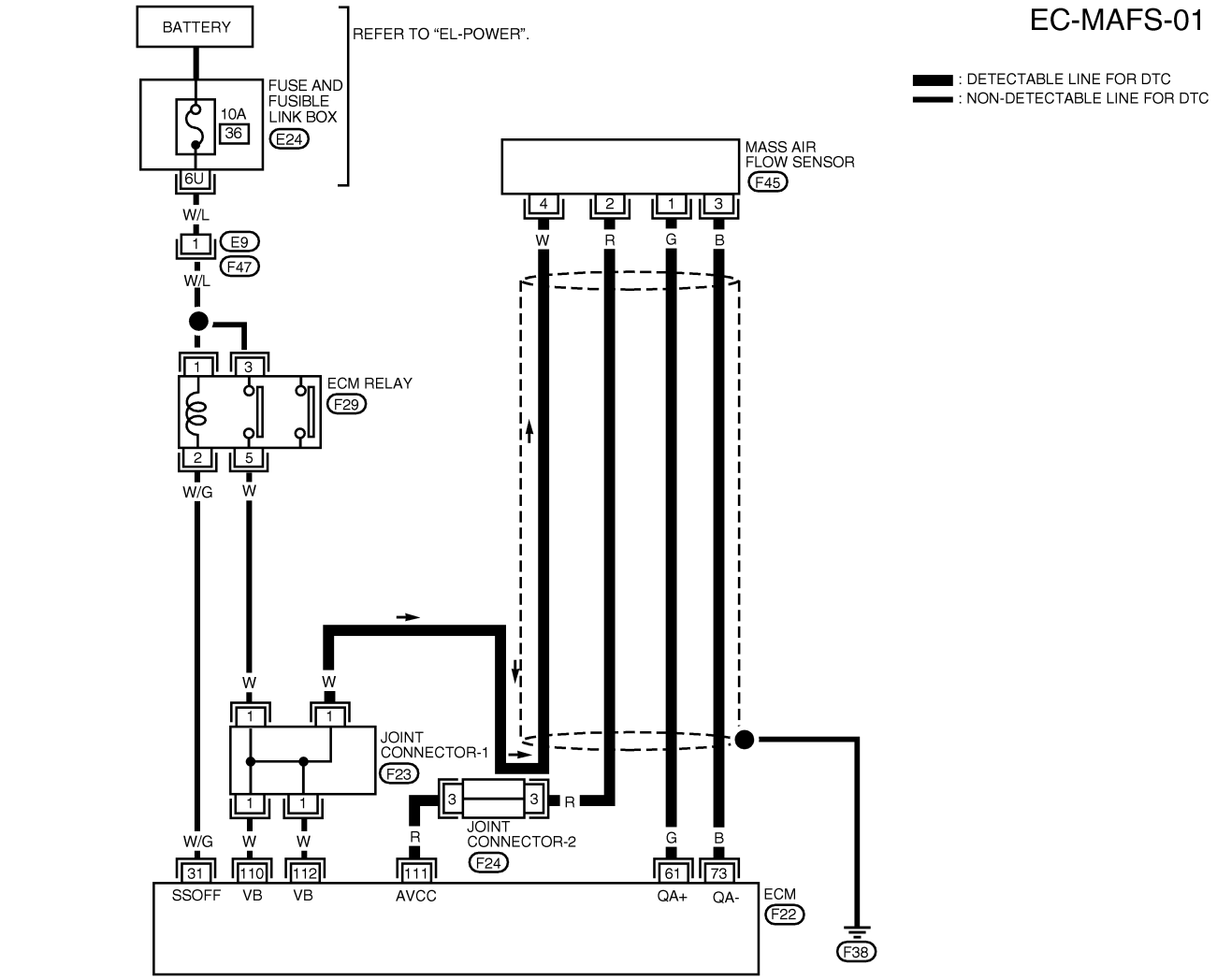
NIEC0777S01

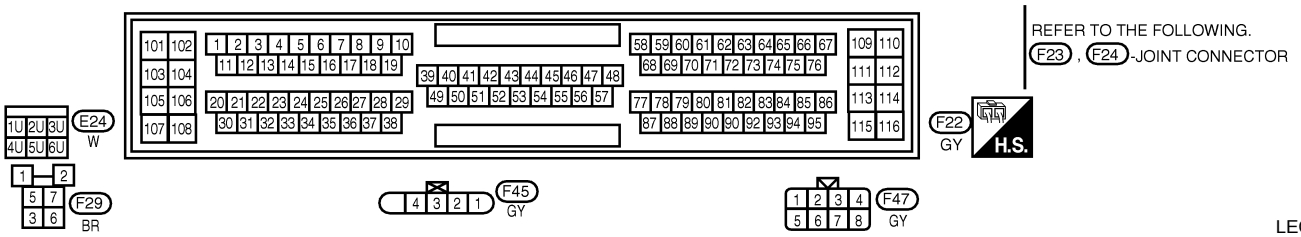
With GST

1) Turn ignition switch “ON”.
2) Start engine and warm it up to normal operating temperature.
3) Select “MODE 1” with GST.
4) Check the mass air flow sensor signal with “MODE 1”.
5) Check for linear mass air flow rise in response to increases to about 4,000 rpm in engine speed.
6) If NG, go to “Diagnostic Procedure”, EC-1520.

Wiring Diagram

NIEC0778





LEC217

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	G	MASS AIR FLOW SENSOR	ENGINE RUNNING AT IDLE SPEED UNDER WARM-UP CONDITION	1.3 - 1.7V
			ENGINE RUNNING AT 2,500 RPM UNDER WARM-UP CONDITION	1.8 - 2.4V
73	B	MASS AIR FLOW SENSOR GROUND	ENGINE RUNNING AT IDLE SPEED UNDER WARM-UP CONDITION	APPROX. 0V
111	R	SENSOR'S POWER SUPPLY	IGN ON	APPROX. 5V

SEF564Y

Diagnostic Procedure

NIEC0779

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

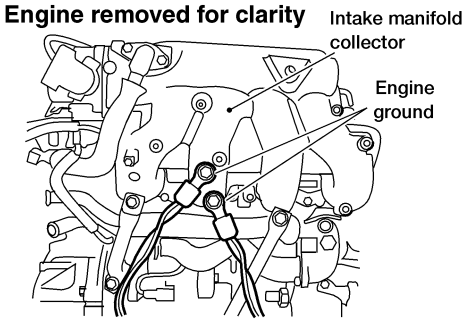
Check the following connections.
- Air duct
- Vacuum hoses
- Intake air passage between air duct to collector

OK or NG

OK	▶	GO TO 3.
NG	▶	Reconnect the parts.

3	RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

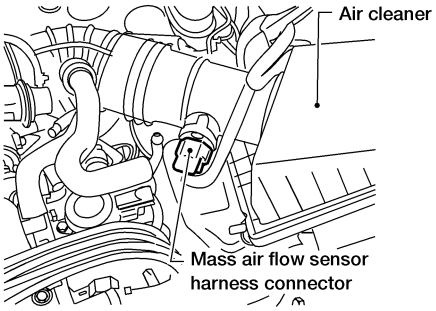


LEC302

	▶	GO TO 4.

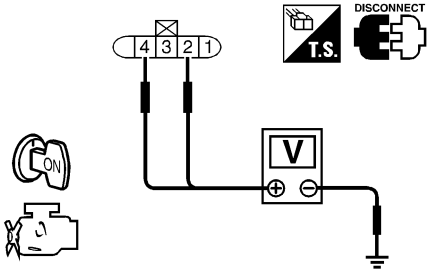
4	CHECK POWER SUPPLY

1. Disconnect mass air flow sensor harness connector.



LEC286

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.
- Joint connector-1
- Joint connector-2
- Harness for open or short between ECM relay and mass air flow sensor
- Harness for open or short between mass air flow sensor and ECM

	▶	Repair harness or connectors.

6	CHECK GROUND CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between MAFS terminal 3 and ECM terminal 73.
   Refer to "Wiring Diagram", EC-1519.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

OK or NG

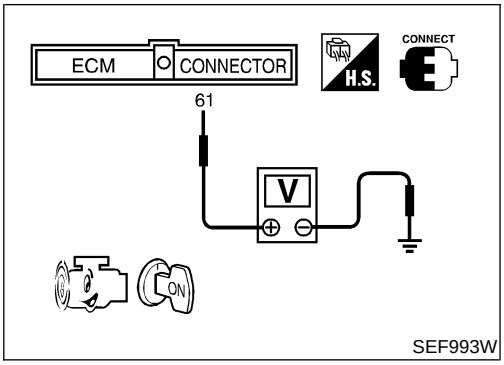
OK	▶	GO TO 7.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

Diagnostic Procedure (Cont'd)

7	CHECK INPUT SIGNAL CIRCUIT	
1. Check harness continuity between MAFS terminal 1 and ECM terminal 61. Refer to "Wiring Diagram", EC-1519. **Continuity should exist.** 2. Also check harness for short to ground and short to power.		
OK or NG		
OK	▶	GO TO 8.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

8	CHECK MASS AIR FLOW SENSOR	
Refer to "Component Inspection", EC-1523.		
OK or NG		
OK	▶	GO TO 9.
NG	▶	Replace mass air flow sensor.

9	CHECK INTERMITTENT INCIDENT	
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1508.		
	▶	**INSPECTION END**



Component Inspection

=NIEC0780

MASS AIR FLOW SENSOR

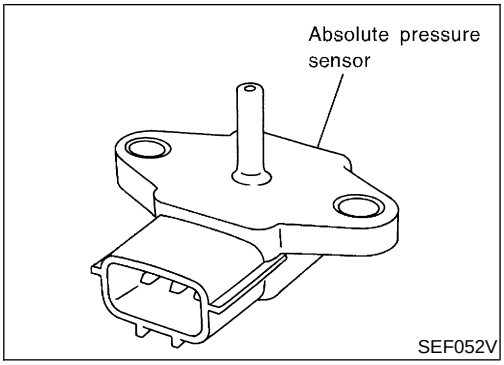
NIEC0780S01

1. Turn ignition switch “ON”.
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.

Conditions	Voltage V
Ignition switch “ON” (Engine stopped.)	Less than 1.0
Idle (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.8 - 2.4
Idle to about 4,000 rpm*	1.3 - 1.7 to Approx. 4.0

*: Check for linear voltage rise in response to increases to about 4,000 rpm in engine speed.

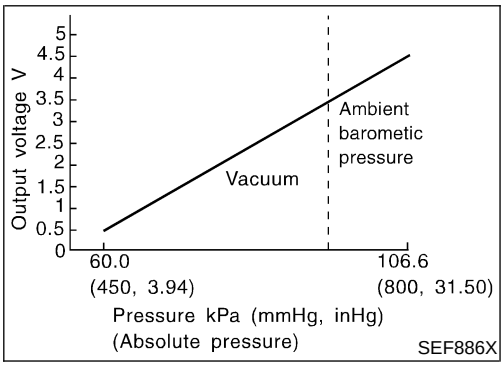
4. If the voltage is out of specification, disconnect mass air flow sensor harness connector and connect it again. Repeat above check.
5. If NG, remove mass air flow sensor from air duct. Check hot film for damage or dust.



Component Description

NIEC0781

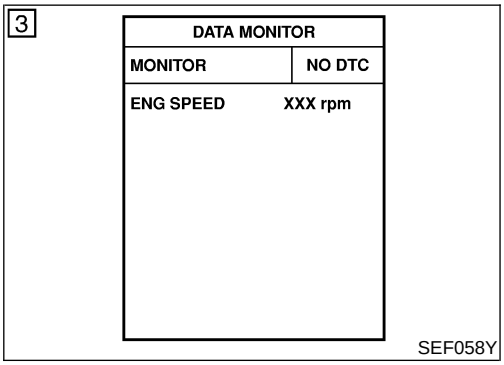
The absolute pressure sensor detects ambient barometric pressure and sends the voltage signal to the ECM. As the pressure increases, the voltage rises.



On Board Diagnosis Logic

NIEC0782

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0105	An excessively low or high voltage from the sensor is sent to ECM.	• Harness or connectors (Absolute pressure sensor circuit is open or shorted.) • Absolute pressure sensor



DTC Confirmation Procedure

NIEC0783

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

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-1526.

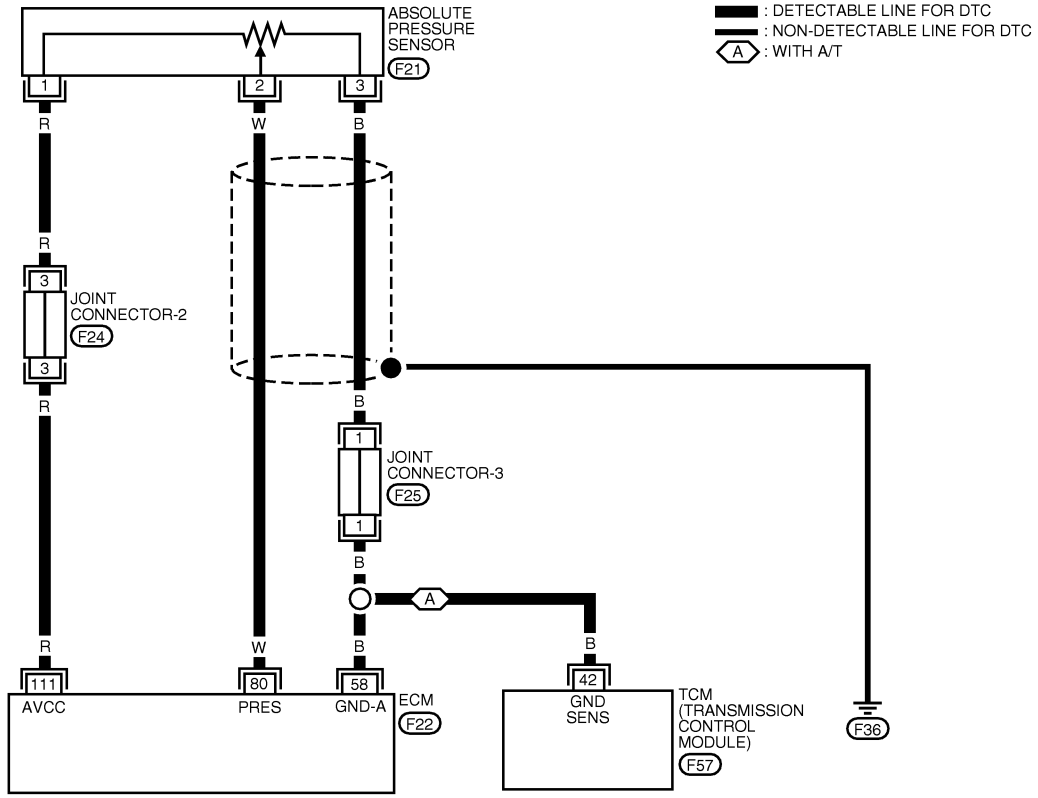
With GST

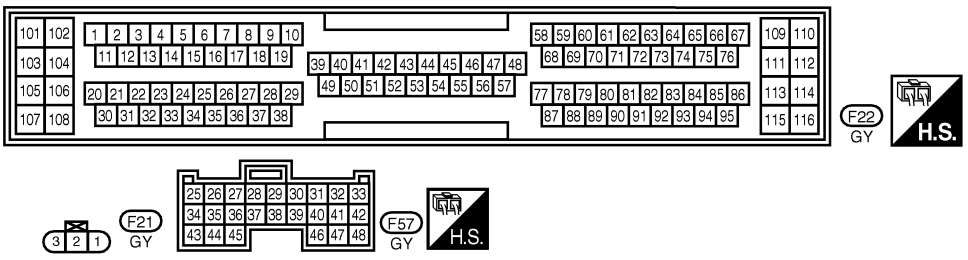
Follow the procedure “With CONSULT-II” above.

Wiring Diagram

NIEC0784

EC-AP/SEN-01





REFER TO THE FOLLOWING.
F24 , F25 - JOINT CONNECTOR

LEC203

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	IGN ON	APPROX. 0V
80	W	ABSOLUTE PRESSURE SENSOR	IGN ON	APPROX. 4.4V
111	R	SENSOR'S POWER SUPPLY	IGN ON	APPROX. 5V

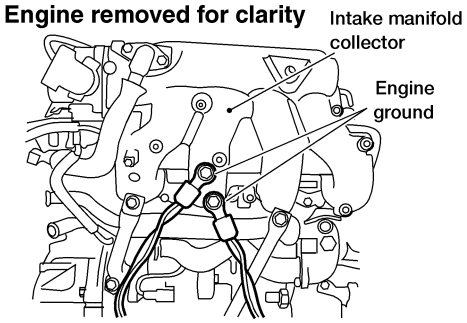
SEF565Y

Diagnostic Procedure

NIEC0785

1	RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

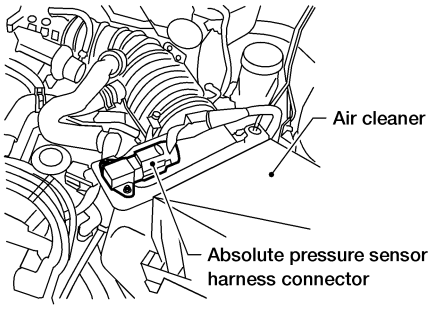


LEC302

▶	GO TO 2.

2	CHECK CONNECTOR

1. Disconnect absolute pressure sensor harness connector.



LEC322

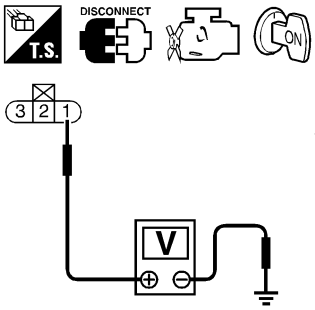
2. Check sensor harness connector for water.
   Water should not exist.

OK or NG

OK	▶	GO TO 3.
NG	▶	Repair or replace harness connector.

3	CHECK POWER SUPPLY

1. Turn ignition switch "ON".
2. Check voltage between absolute pressure sensor terminal 1 and engine ground with CONSULT-II or tester.



Voltage: Approximately 5V

SEF299X

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Joint connector-2
- Harness for open or short between ECM and absolute pressure sensor

	▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK GROUND CIRCUIT

1. Turn ignition switch "OFF".
2. Check harness continuity between absolute pressure sensor terminal 3 and engine ground.
   Refer to "Wiring Diagram", EC-1525.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 6.

6	DETECT MALFUNCTIONING PART

Check the following.
- Joint connector-3
- Harness for open or short between ECM and absolute pressure sensor
- Harness for open or short between absolute pressure sensor and TCM (Transmission control module)

	▶	Repair open circuit or short to ground or short to power in harness or connectors.

7	CHECK INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 80 and absolute pressure sensor terminal 2.
   Refer to "Wiring Diagram", EC-1525.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

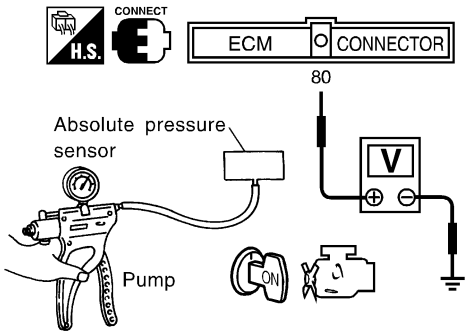
OK or NG

OK	▶	GO TO 8.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

Diagnostic Procedure (Cont'd)

8	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	1.8 - 4.8
–26.7 (–200, –7.87)	1.0 to 1.4 lower than above value

SEF300XA

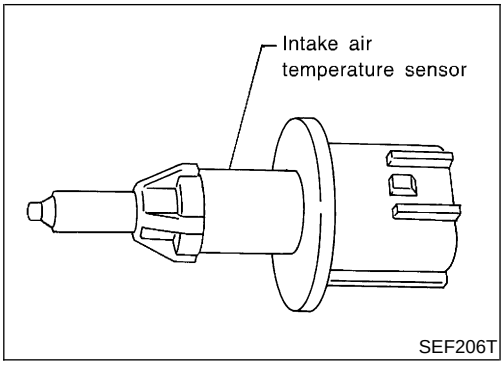
CAUTION:

- **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 9.
NG	▶	Replace absolute pressure sensor.

9	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1508.	
▶	**INSPECTION END**

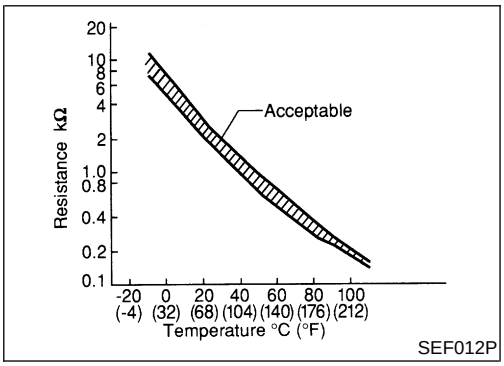


Component Description

NIEC0786

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 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

NIEC0787

DTC No.		Malfunction is detected when ...	Check Items (Possible Cause)
P0110	A)	An excessively low or high voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Intake air temperature sensor
	B)	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signal from engine coolant temperature sensor.	

DTC Confirmation Procedure

NIEC0788

Perform "PROCEDURE FOR MALFUNCTION A" first. If the 1st trip DTC cannot be confirmed, perform "PROCEDURE FOR MALFUNCTION B".

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test.

DTC Confirmation Procedure (Cont'd)

3

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

PROCEDURE FOR MALFUNCTION A

NIEC0788S01

With CONSULT-II

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-1532.

With GST

Follow the procedure "With CONSULT-II" above.

5

DATA MONITOR	
MONITOR	NO DTC
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h

SEF176Y

PROCEDURE FOR MALFUNCTION B

NIEC0788S02

CAUTION:

Always drive vehicle at a safe speed.

TESTING CONDITION:

This test may be conducted in the shop with the drive wheels lifted or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

With CONSULT-II

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 more than 70 km/h (43 MPH) for 105 consecutive seconds.
6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1532.

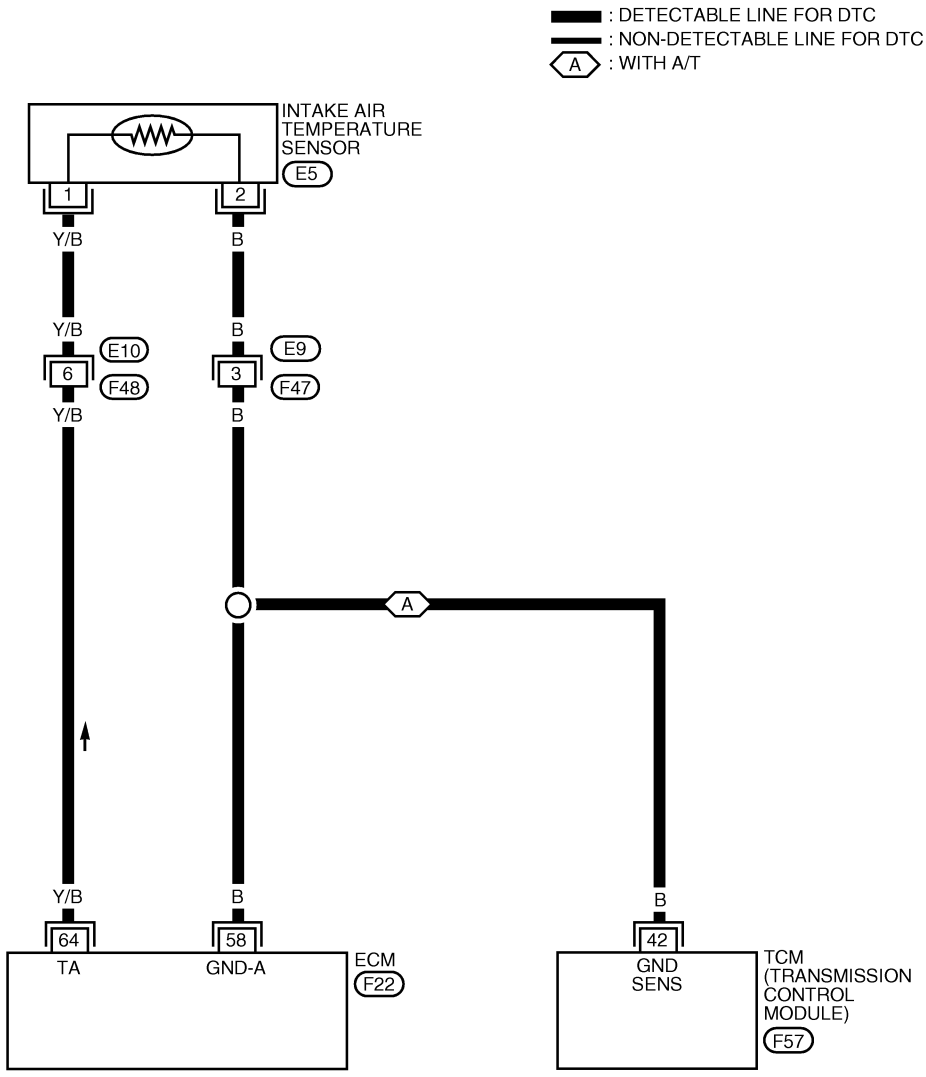
With GST

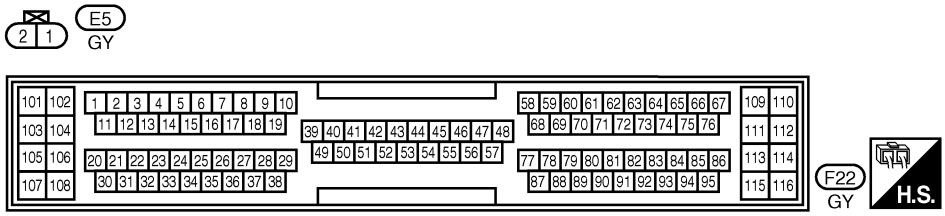
Follow the procedure "With CONSULT-II" above.

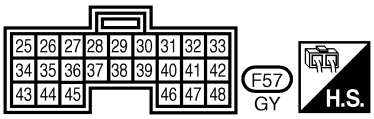
Wiring Diagram

NIEC0789

EC-IATS-01







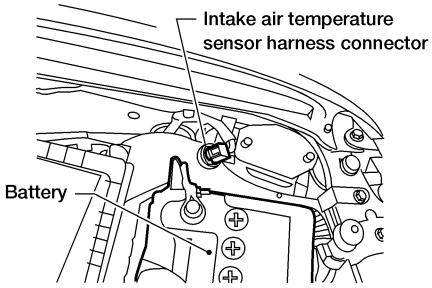
LEC197

Diagnostic Procedure

NIEC0790

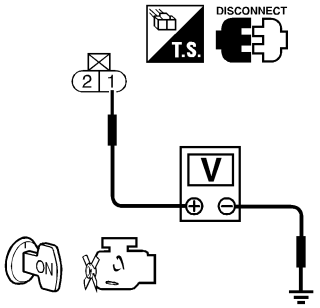
1	CHECK POWER SUPPLY

1. Turn ignition switch “OFF”.
2. Disconnect intake air temperature sensor harness connector.



LEC271

3. Turn ignition switch “ON”.
4. Check voltage between intake air temperature sensor terminal 1 and ground with CONSULT-II or tester.



Voltage: Approximately 5V

SEF301X

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

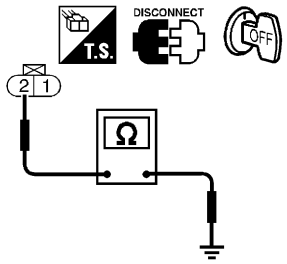
2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E10, F48
- Harness for open or short between ECM and intake air temperature sensor

	▶	Repair harness or connectors.

3	CHECK GROUND CIRCUIT

1. Turn ignition switch "OFF".
2. Check harness continuity between terminal 2 and engine ground.



SEF204W

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E9, F47
- Harness for open or short between ECM and intake air temperature sensor
- Harness for open or short between intake air temperature sensor and TCM (Transmission control module)

	▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to "Component Inspection", EC-1534.

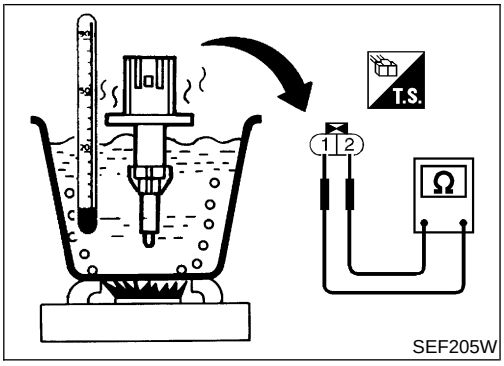
OK or NG

OK	▶	GO TO 6.
NG	▶	Replace intake air temperature sensor.

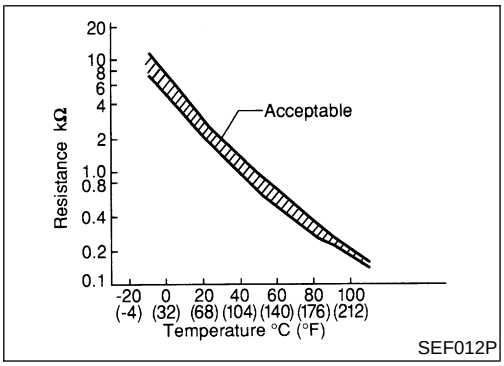
6	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1508.

	▶	**INSPECTION END**



SEF205W



SEF012P

Component Inspection

=NIEC0791

INTAKE AIR TEMPERATURE SENSOR

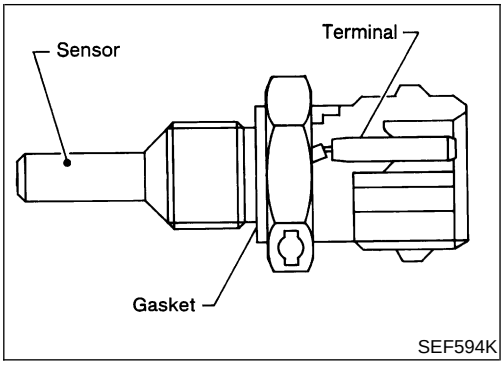
NIEC0791S01

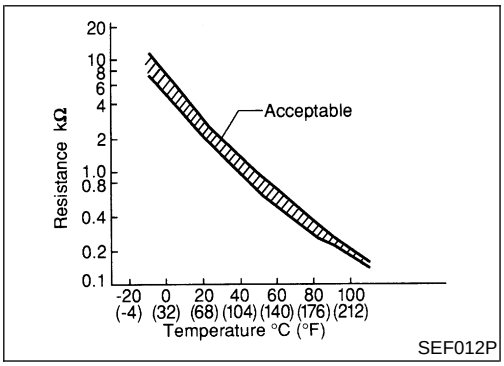
Check resistance as shown in the figure.

<Reference data>

Intake air temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
80 (176)	0.27 - 0.38

If NG, replace intake air temperature sensor.





Component Description

NIEC0792

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 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.

CONSULT-II Reference Value in Data Monitor Mode

NIEC0793

MONITOR ITEM	CONDITION	SPECIFICATION
COOLAN TEMP/S	• Engine: After warming up	More than 70°C (158°F)

On Board Diagnosis Logic

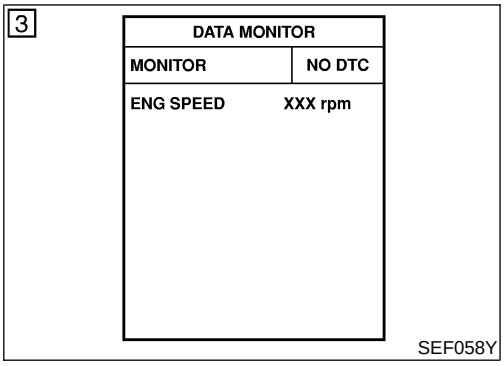
NIEC0794

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0115	• An excessively high or low voltage from the sensor is sent to ECM.*	• Harness or connectors (The sensor circuit is open or shorted.) • Engine coolant temperature sensor

*: When this malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

On Board Diagnosis Logic (Cont'd)

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)
	When the fail-safe system for engine coolant temperature sensor is activated, the cooling fan operates while the engine is running.	



DTC Confirmation Procedure

NIEC0795

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

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-1538.

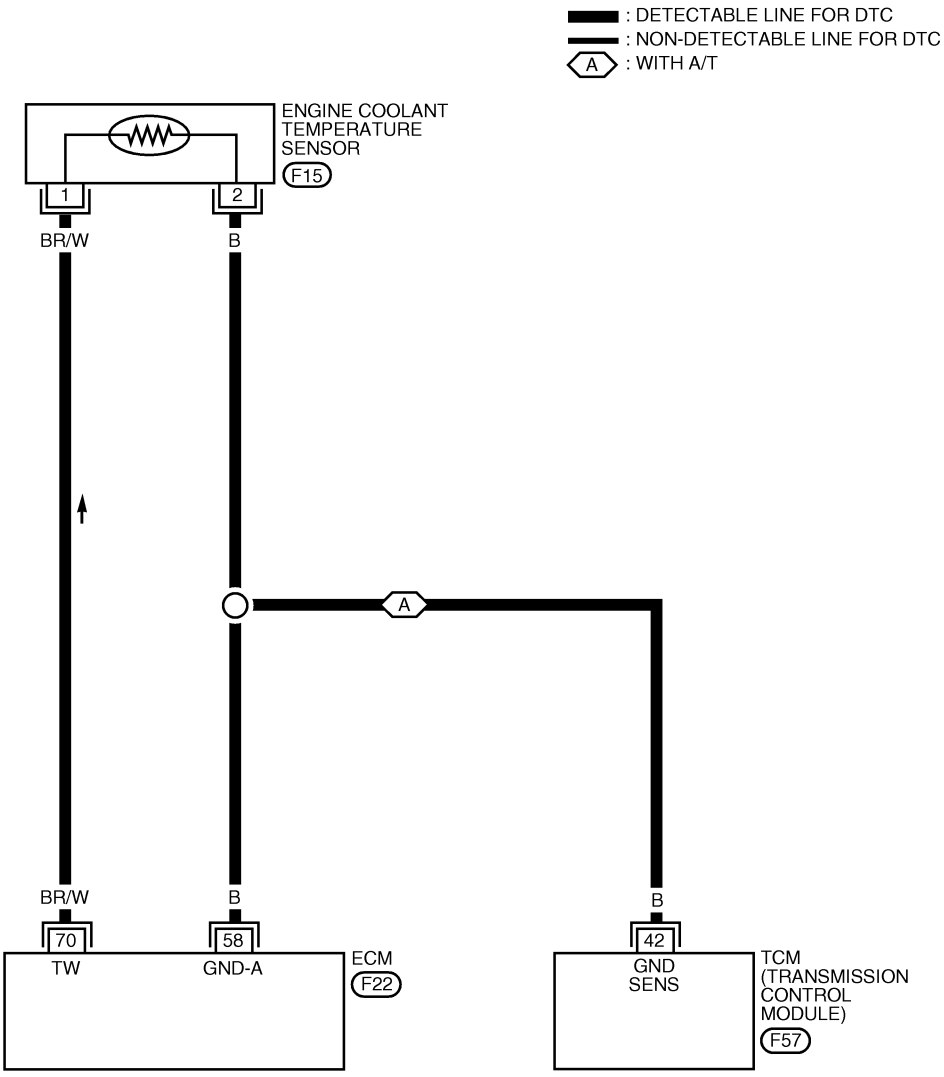
With GST

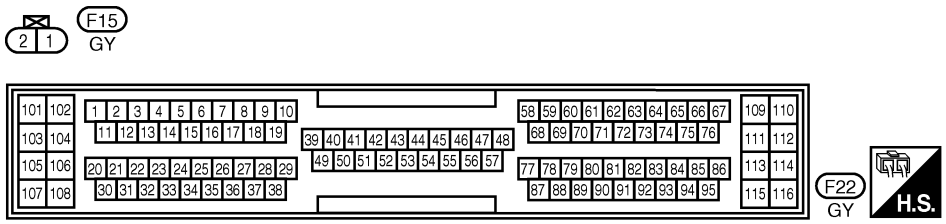
Follow the procedure "With CONSULT-II" above.

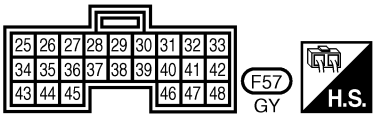
Wiring Diagram

NIEC0796

EC-ECTS-01







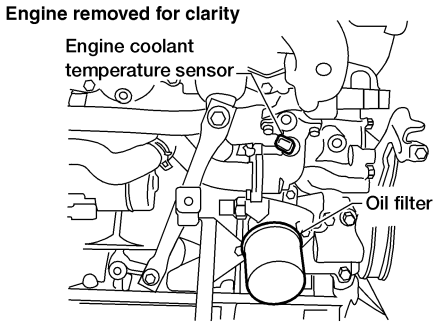
LEC198

Diagnostic Procedure

NIEC0797

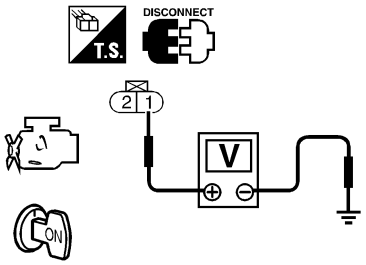
1	CHECK POWER SUPPLY

1. Turn ignition switch “OFF”.
2. Disconnect engine coolant temperature sensor (ECTS) harness connector.



LEC301

3. Turn ignition switch “ON”.
4. Check voltage between ECTS terminal 1 and ground with CONSULT-II or tester.



Voltage: Approximately 5V

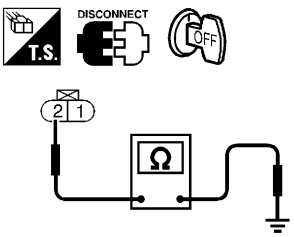
SEF585X

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair harness or connectors.

2	CHECK GROUND CIRCUIT

1. Turn ignition switch “OFF”.
2. Check harness continuity between ECTS terminal 2 and engine ground.



SEF207W

Continuity should exist.

3. Also check harness for short to ground and short to power.

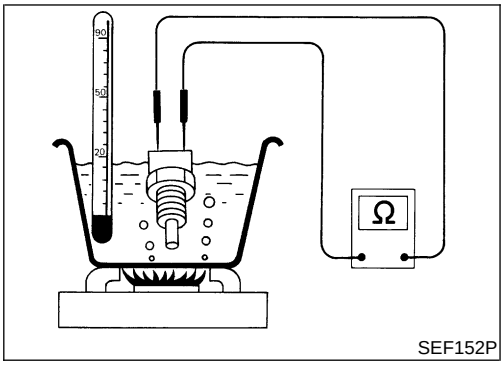
OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

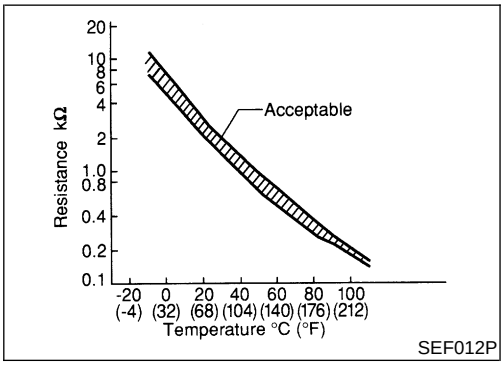
3	DETECT MALFUNCTIONING PART
Check the following. ● Harness for open or short between ECM and engine coolant temperature sensor ● Harness for open or short between engine coolant temperature sensor and TCM (Transmission control module)	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK ENGINE COOLANT TEMPERATURE SENSOR	
Refer to "Component Inspection", EC-1539.		
OK or NG		
OK	▶	GO TO 5.
NG	▶	Replace engine coolant temperature sensor.

5	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1508.	
▶	**INSPECTION END**



SEF152P



SEF012P

Component Inspection

ENGINE COOLANT TEMPERATURE SENSOR

NIEC0798

NIEC0798S01

Check resistance as shown in the figure.
<Reference data>

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260

If NG, replace engine coolant temperature sensor.

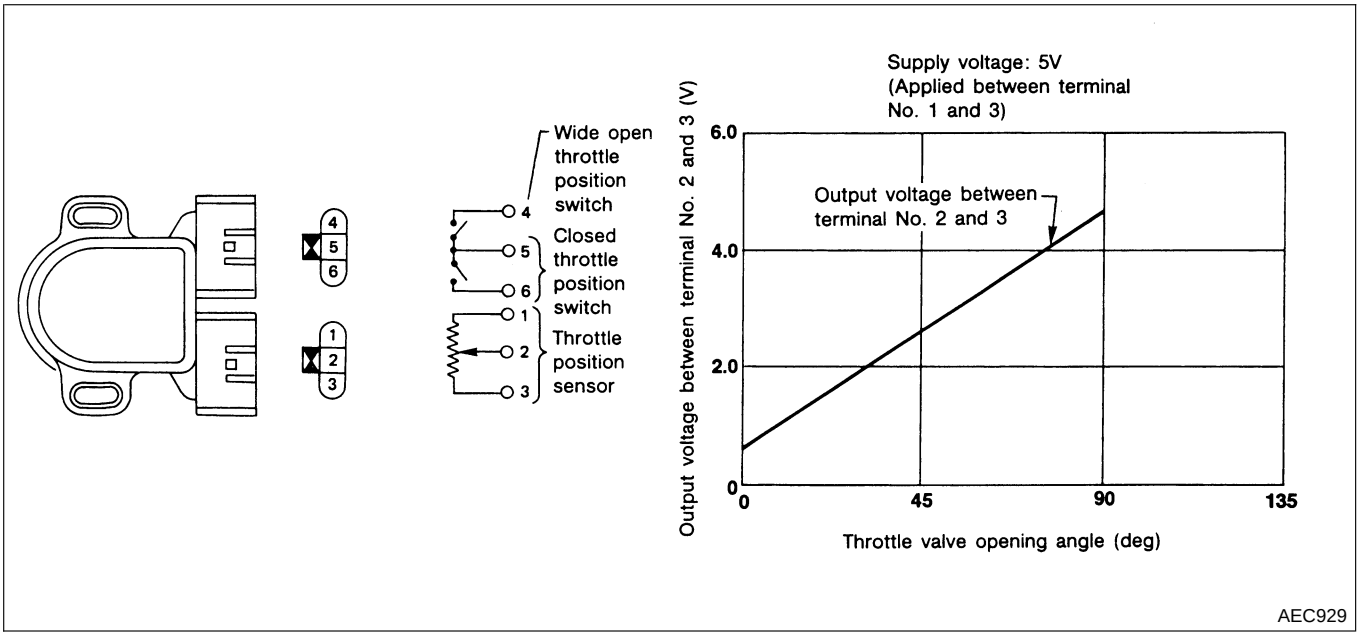
Component Description

NIEC0799

NOTE:
If DTC P0120 (0403) is displayed with DTC P0510 (0203), first perform trouble diagnosis for DTC P0510, EC-1785.

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. 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

NIEC0800

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
THRTL POS SEN	• Engine: After warming up, idle the engine	Throttle valve: fully closed	0.2 - 0.8V
	• Engine: After warming up • Ignition switch: ON (Engine stopped) • Vacuum is applied using a vacuum pump	Throttle valve: fully opened	3.5 - 4.5V
ABSOL TH·P/S	• Engine: After warming up, idle the engine	Throttle valve: fully closed	0.0°
	• Engine: After warming up • Ignition switch: ON (Engine stopped)	Throttle valve: fully opened	Approx. 88.0°

On Board Diagnosis Logic

NIEC0801

DTC No.	Malfunction is detected when ...		Check Items (Possible Cause)
P0120	A)	An excessively low or high voltage from the sensor is sent to ECM.*	• Harness or connectors (The throttle position sensor circuit is open or shorted.) • Throttle position sensor
	B)	A high voltage from the sensor is sent to ECM under light load driving condition.	• Harness or connectors (The throttle position sensor circuit is open or shorted.) • Throttle position sensor • Fuel injector • Camshaft position sensor (PHASE) • Mass air flow sensor
	C)	A low voltage from the sensor is sent to ECM under heavy load driving condition.	• Harness or connectors (The throttle position sensor circuit is open or shorted.) • Intake air leaks • Throttle position sensor

*: When this malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

Detected items	Engine operating condition in fail-safe mode	
Throttle position sensor circuit	Throttle position will be determined based on the injected fuel amount and the engine speed. Therefore, acceleration will be poor.	
	Condition	Driving condition
	When engine is idling	Normal
	When accelerating	Poor acceleration

DTC Confirmation Procedure

NIEC0802

Perform “PROCEDURE FOR MALFUNCTION A” first. If the 1st trip DTC cannot be confirmed, perform “PROCEDURE FOR MALFUNCTION B”. If there is no problem on “PROCEDURE FOR MALFUNCTION B”, perform “PROCEDURE FOR MALFUNCTION C”.

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR MALFUNCTION A

NIEC0802S01

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 in the shop with the drive wheels lifted or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.**

DTC Confirmation Procedure (Cont'd)

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

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.

VHCL SPEED SE	More than 4 km/h (2 MPH)
Selector lever	Suitable position except "P" or "N" position

3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1546.

With GST

Follow the procedure "With CONSULT-II" above.

3

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

PROCEDURE FOR MALFUNCTION B

NIEC0802S02

With CONSULT-II

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.

A/T model	Selector lever	Suitable position except "P" or "N" position
	Brake pedal	Depressed
	Vehicle speed	0 km/h (0 MPH)
M/T model	Selector lever	Suitable position except "N" (Higher gear position such as 3rd or 4th is better to keep low engine rpm.)
	Accelerator pedal	Released
	Vehicle speed	As slow as possible

4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1546.

With GST

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

NIEC0802S03

CAUTION:

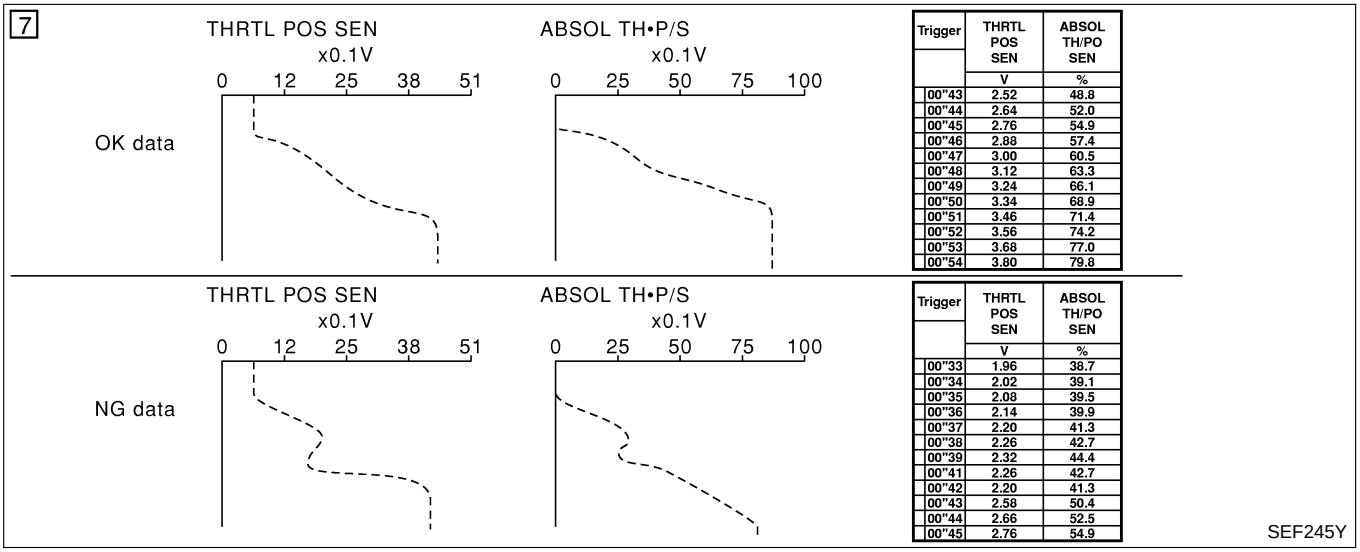
Always drive vehicle at a safe speed.

With CONSULT-II

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-1546.
  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

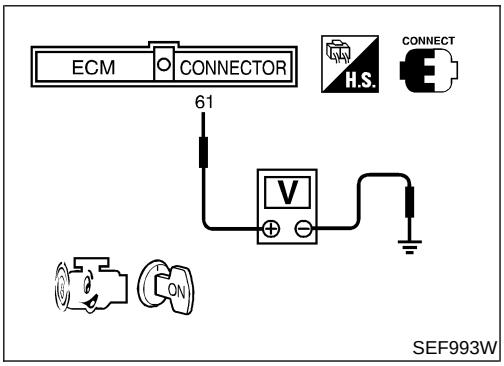
DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
COOLAN TEMP/S	XXX °C

SEF178Y

9) Maintain the following conditions for at least 10 consecutive seconds.

ENG SPEED	More than 2,000 rpm
MAS A/F SE-B1	More than 3V
COOLAN TEMP/S	More than 70°C (158°F)
Selector lever	Suitable position
Driving location	Driving vehicle uphill (Increased engine load) will help maintain the driving conditions required for this test.

10) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1546.



With GST

1) Maintain the following conditions for at least 10 consecutive seconds.

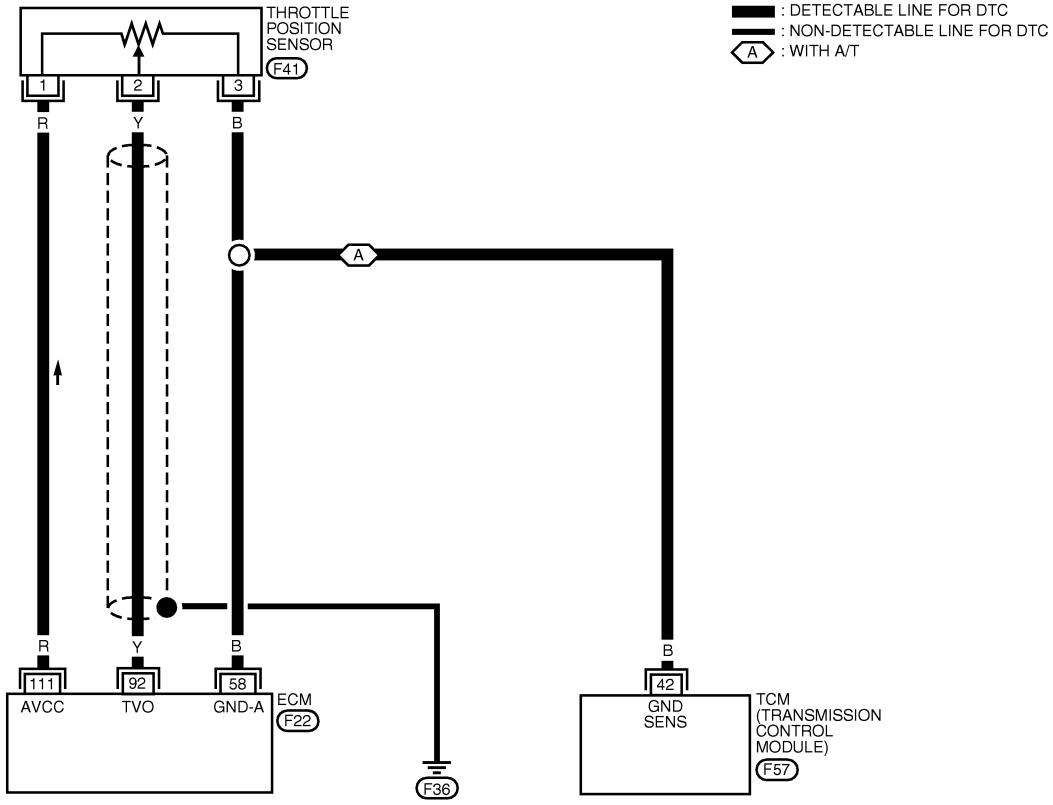
Gear position	Suitable position
Engine speed	More than 2,000 rpm
Engine coolant temperature	More than 70°C (158°F)
Voltage between ECM terminal 61 (Mass air flow sensor signal) and ground	More than 3V

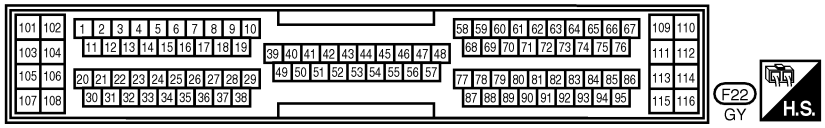
2) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1546.

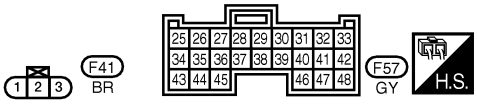
Wiring Diagram

NIEC0803

EC-TPS-01







LEC199

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	IGN ON	APPROX. 0V
92	Y	THROTTLE POSITION SENSOR	ENGINE RUNNING UNDER WARM-UP CONDITION WITH ACCELERATOR PEDAL FULLY RELEASED	0.2 - 0.8V
			IGN ON WITH ACCELERATOR PEDAL FULLY DEPRESSED	3.5 - 4.5V
111	R	SENSOR'S POWER SUPPLY	IGN ON	APPROX. 5V

SEF566Y

Diagnostic Procedure

NIEC0804

1	INSPECTION START

Which malfunction (A, B or C) is duplicated?

MALFUNCTION	Type
A	A
B	B
C	C

MTBL0066

Type A, B or C

Type A or B	▶	GO TO 4.
Type C	▶	GO TO 2.

2	ADJUST THROTTLE POSITION SENSOR

Perform “Basic Inspection”, EC-1470.

OK or NG

OK	▶	GO TO 3.

3	CHECK INTAKE SYSTEM

Check the following connections.
- Air duct
- Vacuum hoses
- Intake air passage between air duct to intake manifold collector

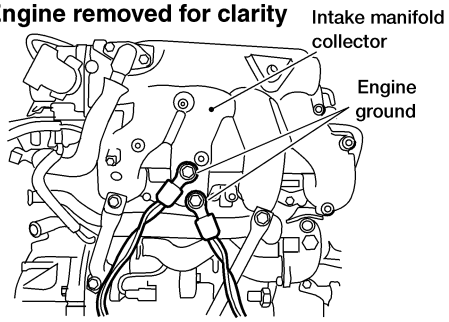
OK or NG

OK	▶	GO TO 4.
NG	▶	Reconnect the parts.

4	RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

Engine removed for clarity

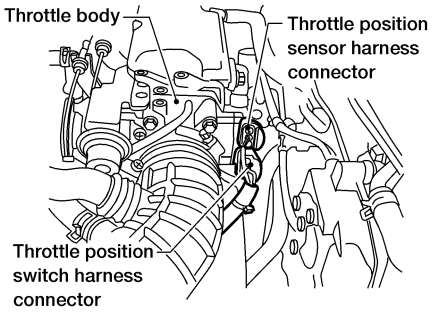


LEC302

	▶	GO TO 5.

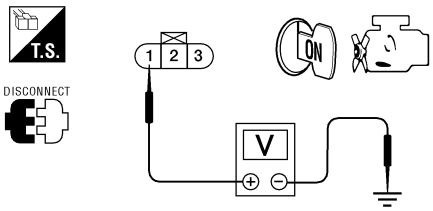
5	CHECK POWER SUPPLY

1. Disconnect throttle position sensor harness connector.



LEC279

2. Turn ignition switch "ON".
3. Check voltage between throttle position sensor terminal 1 and ground with CONSULT-II or tester.



Voltage: Approximately 5V

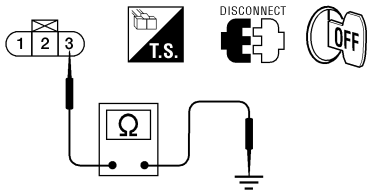
LEC433

OK or NG

OK	▶	GO TO 6.
NG	▶	Repair harness or connectors.

6	CHECK GROUND CIRCUIT

1. Turn ignition switch "OFF".
2. Check harness continuity between throttle position sensor terminal 3 and engine ground.



Continuity should exist.

LEC434

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 throttle position 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)

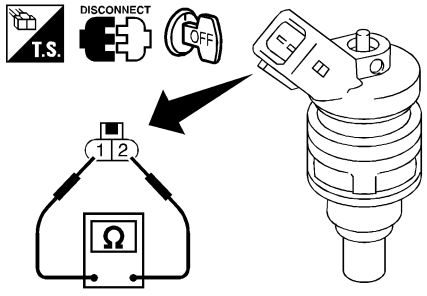
8	CHECK INPUT SIGNAL CIRCUIT	
1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 92 and throttle position sensor terminal 2. Refer to "Wiring Diagram", EC-1545. **Continuity should exist.** 3. Also check harness for short to ground and short to power.		
OK or NG		
OK	▶	GO TO 9.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

9	CHECK THROTTLE POSITION SENSOR	
Refer to "Component Inspection", EC-1549.		
OK or NG		
OK (Type B in step1)	▶	GO TO 10.
OK (Type A or C in step1)	▶	GO TO 13.
NG	▶	Replace throttle position sensor. To adjust it, perform "Basic Inspection", EC-1470.

10	CHECK MASS AIR FLOW SENSOR	
Refer to "Component Inspection", EC-1523.		
OK or NG		
OK	▶	GO TO 11.
NG	▶	Replace mass air flow sensor.

11	CHECK CAMSHAFT POSITION SENSOR (PHASE)	
Refer to "Component Inspection", EC-1689.		
OK or NG		
OK	▶	GO TO 12.
NG	▶	Replace camshaft position sensor (PHASE).

12	CHECK FUEL INJECTOR	
1. Disconnect injector harness connector. 2. Check resistance between terminals as shown in the figure.		

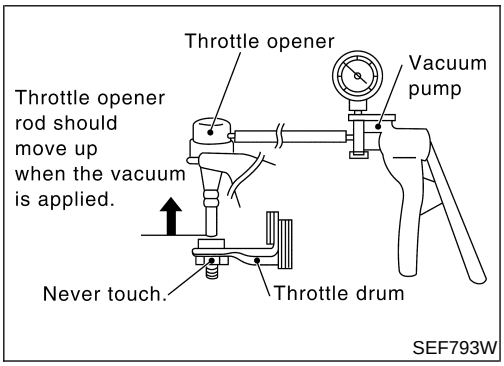


Resistance: 13.5 - 17.5 Ω [at 20°C (68°F)]

SEF964XA

OK or NG		
OK	▶	GO TO 13.
NG	▶	Replace fuel injector.

13	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1508.	
▶	INSPECTION END



SEF793W

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
THRTL POS SEN	XXX V

SEF179Y

Component Inspection

THROTTLE POSITION SENSOR

NIEC0805

NIEC0805S01

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.
6) Turn ignition switch ON.
7) Select "DATA MONITOR" mode with CONSULT-II.
8) Check voltage of "THRTL POS SEN" under the following conditions.

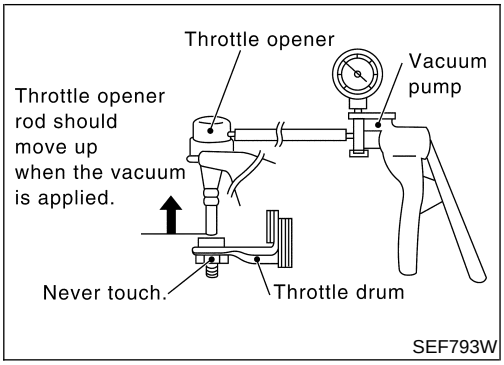
NOTE:
Voltage measurement must be made with throttle position sensor installed in vehicle.

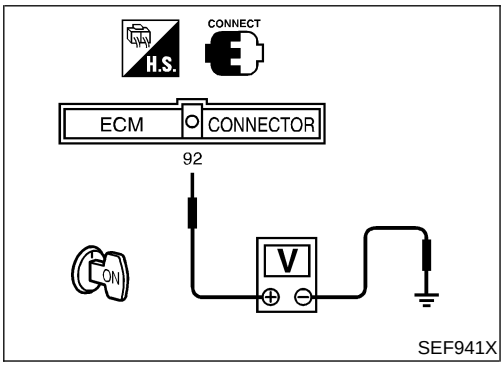
Throttle valve conditions	Voltage V
Completely closed	0.2 - 0.8 (a)
Partially open	Between (a) and (b)
Completely open	3.5 - 4.5 (b)

If NG, adjust closed throttle position switch. Refer to "Basic Inspection", EC-1541.

9) If it is impossible to adjust closed throttle position switch in "Basic Inspection", replace throttle position sensor.

Component Inspection (Cont'd)





Without CONSULT-II

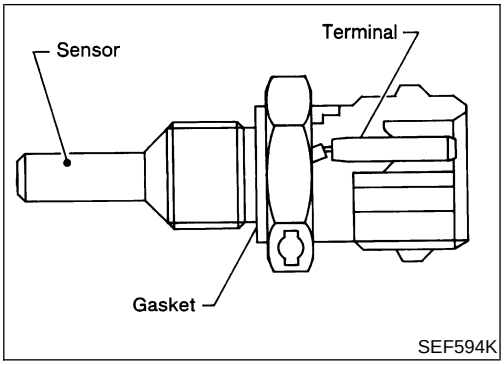
1) Start engine and warm it up to normal operating temperature.
2) Stop engine (ignition switch OFF).
3) Remove the vacuum hose connected to the throttle opener.
4) Connect suitable vacuum hose to the vacuum pump and the opener.
5) Apply vacuum [more than −40.0 kPa (−300 mmHg, 11.81 inHg)] until the throttle drum becomes free from the rod of the throttle opener.
6) Turn ignition switch ON.
7) Check voltage between ECM terminal 92 (Throttle position sensor signal) and ground under the following conditions.

NOTE:
Voltage measurement must be made with throttle position sensor installed in vehicle.

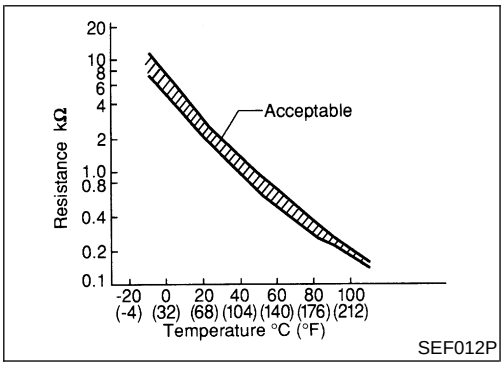
Throttle valve conditions	Voltage V
Completely closed	0.2 - 0.8 (a)
Partially open	Between (a) and (b)
Completely open	3.5 - 4.5 (b)

If NG, adjust closed throttle position switch. Refer to "Basic Inspection", EC-1541.

8) If it is impossible to adjust closed throttle position switch in "Basic Inspection", replace throttle position sensor.



SEF594K



SEF012P

Component Description

NIEC0806

NOTE:

If DTC P0125 (0908) is displayed with P0115 (0103), first perform trouble diagnosis for DTC P0115, EC-1535.

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 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.

CONSULT-II Reference Value in Data Monitor Mode

NIEC0807

MONITOR ITEM	CONDITION	SPECIFICATION
COOLAN TEMP/S	• Engine: After warming up	More than 70°C (158°F)

On Board Diagnosis Logic

NIEC0808

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0125	• Voltage sent to ECM from the sensor is not practical, even when some time has passed after starting the engine. • Engine coolant temperature is insufficient for closed loop fuel control.	• Harness or connectors (High resistance in the circuit) • Engine coolant temperature sensor • Thermostat

3

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C

SEF174Y

DTC Confirmation Procedure

=NIEC0809

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

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-1554.

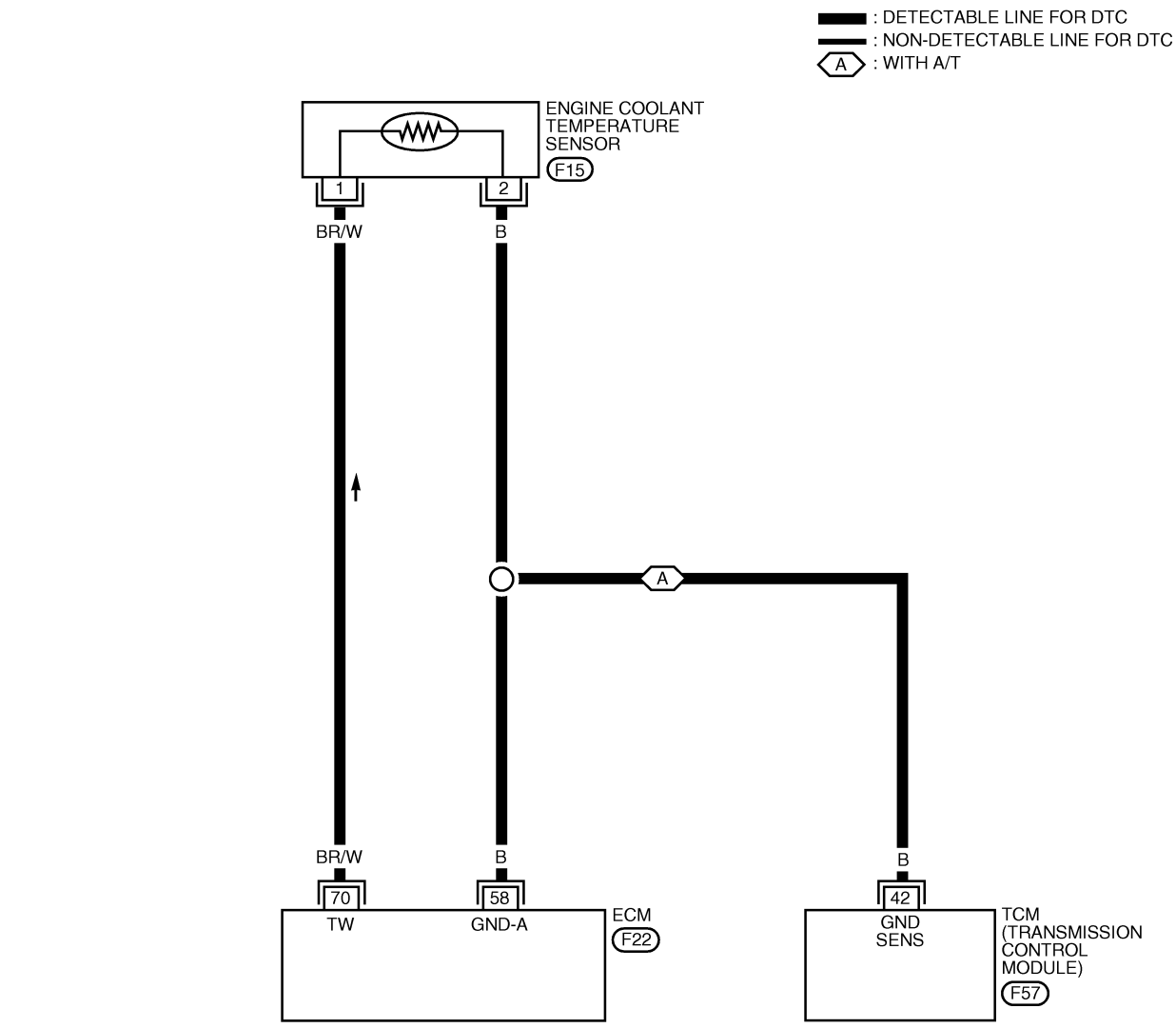
With GST

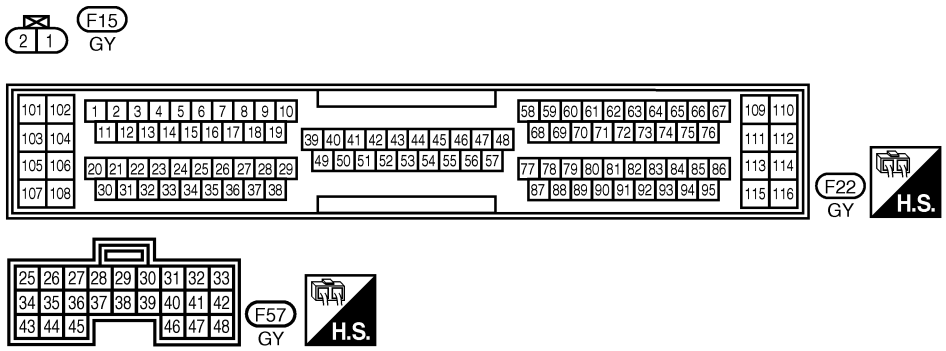
Follow the procedure “With CONSULT-II” above.

Wiring Diagram

NIEC0810

EC-ECTS-01





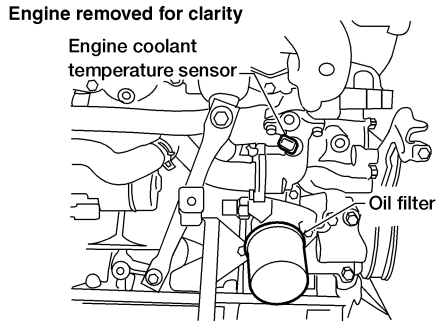
LEC198

Diagnostic Procedure

NIEC0811

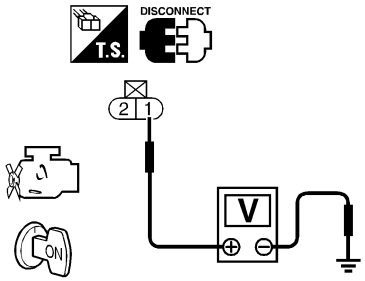
1	CHECK POWER SUPPLY

1. Turn ignition switch “OFF”.
2. Disconnect engine coolant temperature sensor harness connector.



LEC301

3. Turn ignition switch “ON”.
4. Check voltage between ECTS terminal 1 and ground with CONSULT-II or tester.



Voltage: Approximately 5V

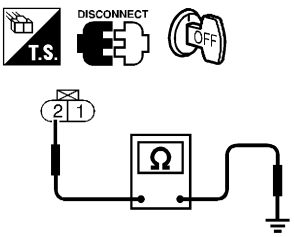
SEF303X

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair harness or conectors.

2	CHECK GROUND CIRCUIT

1. Turn ignition switch “OFF”.
2. Check harness continuity between ECTS terminal 2 and engine ground.



SEF207W

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

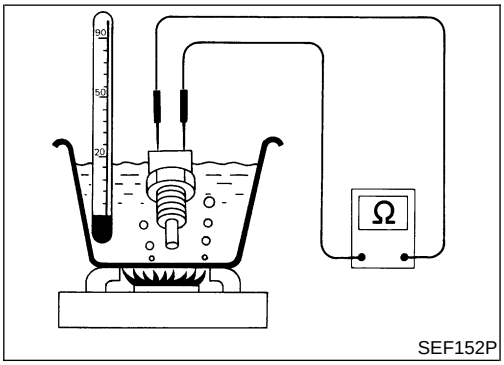
OK	▶	GO TO 4.
NG	▶	GO TO 3.

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 engine coolant temperature sensor and TCM (Transmission control module)	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

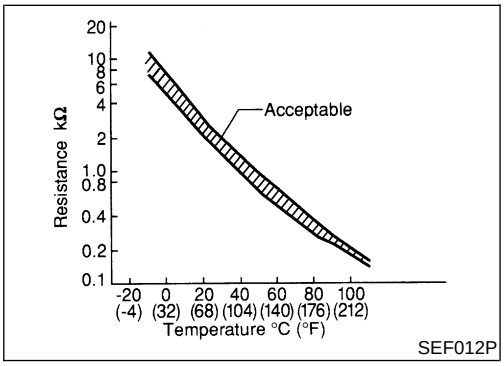
4	CHECK ENGINE COOLANT TEMPERATURE SENSOR	
Refer to "Component Inspection", EC-1555.		
OK or NG		
OK	▶	GO TO 5.
NG	▶	Replace engine coolant temperature sensor.

5	CHECK THERMOSTAT OPERATION	
When the engine is cooled [lower than 76.5°C (170°F)], 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-15***, "Thermostat".

6	CHECK INTERMITTENT INCIDENT	
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1508.		
▶	**INSPECTION END**	



SEF152P



SEF012P

Component Inspection

NIEC0812

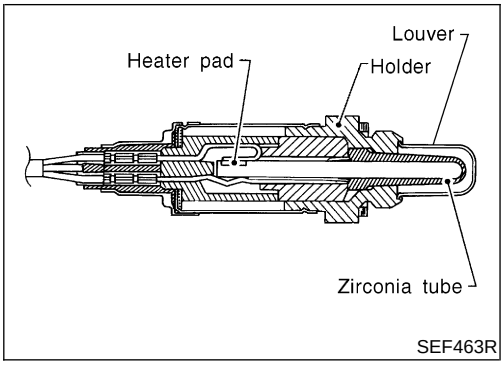
ENGINE COOLANT TEMPERATURE SENSOR

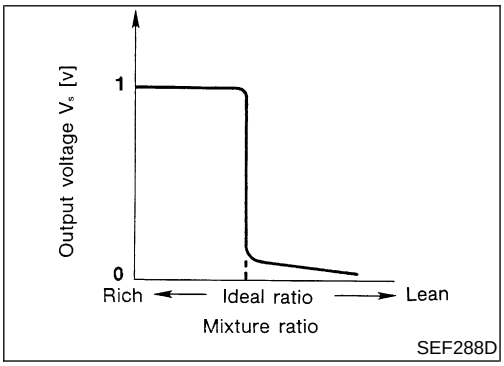
NIEC0812S01

Check resistance as shown in the figure.
<Reference data>

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.0
90 (194)	0.236 - 0.260

If NG, replace engine coolant temperature sensor.





Component Description

NIEC0813

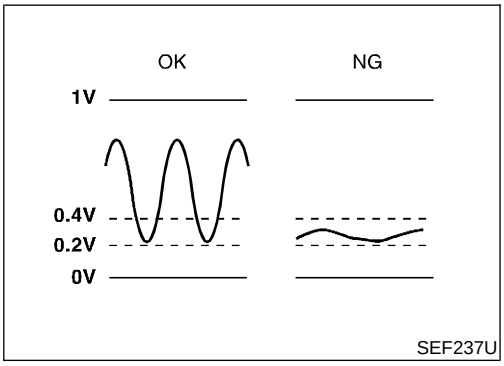
The heated oxygen sensor 1 (front) is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 (front) has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 (front) 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

NIEC0814

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1)			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.

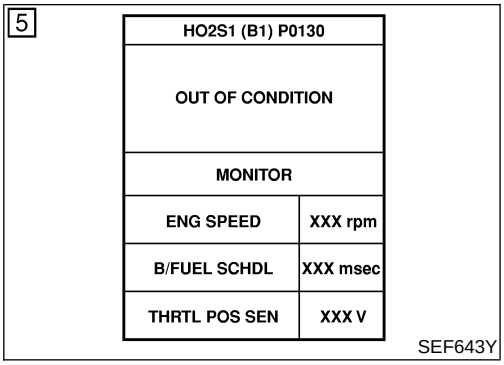


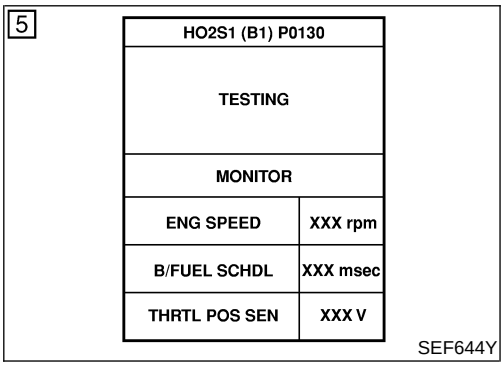
On Board Diagnosis Logic

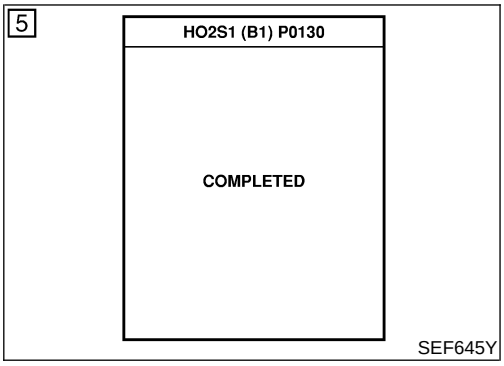
NIEC0815

Under the condition in which the heated oxygen sensor 1 (front) signal is not input, the ECM circuits will read a continuous approximately 0.3V. Therefore, for this diagnosis, the time that output voltage is within 200 to 400 mV range is monitored, and the diagnosis checks that this time is not inordinately long.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0130	• The voltage from the sensor is constantly approx. 0.3V.	• Harness or connectors (The sensor circuit is open or shorted.) • Heated oxygen sensor 1 (front)







DTC Confirmation Procedure

NIEC0816

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

1) Start engine and warm it up to normal operating temperature.
2) Select "HO2S1 (B1) P0130" of "HO2S1" in "DTC WORK SUPPORT" mode with CONSULT-II.
3) Touch "START".
4) Let it idle for at least 3.5 minutes.

NOTE:

Never raise engine speed above 3,200 rpm after this step. If the engine speed limit is exceeded, return to step 4.

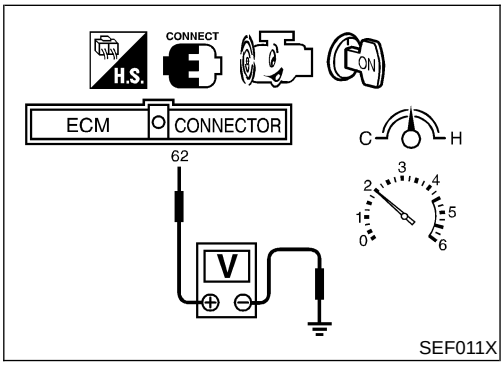
5) When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take approximately 10 to 60 seconds.)

ENG SPEED	1,500 - 3,200 rpm
Vehicle speed	64 - 130 km/h (40 - 81 MPH)
B/FUEL SCHDL	2.4 - 11.0 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-1560.

During this test, P1148 may be displayed on CONSULT-II screen.



Overall Function Check

NIEC0817

Use this procedure to check the overall function of the heated oxygen sensor 1 (front) circuit. During this check, a 1st trip DTC might not be confirmed.

With GST

1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 62 [Heated oxygen sensor 1 (front) signal] and engine ground.
3) Check the following with engine speed held at 2,000 rpm constant under no load.

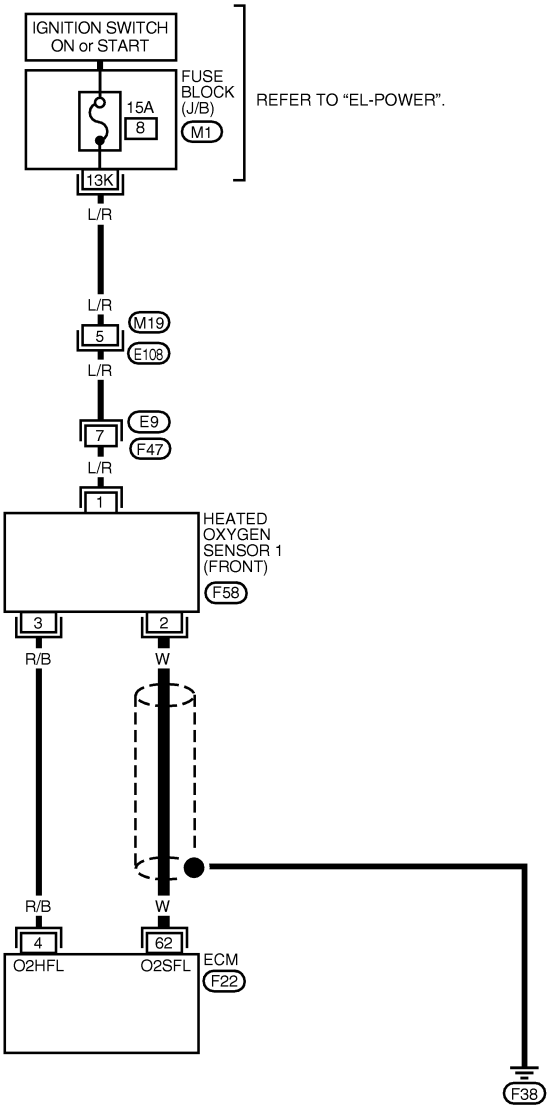
- The voltage does not remain in the range of 0.2 - 0.4V.

4) If NG, go to "Diagnostic Procedure", EC-1560.

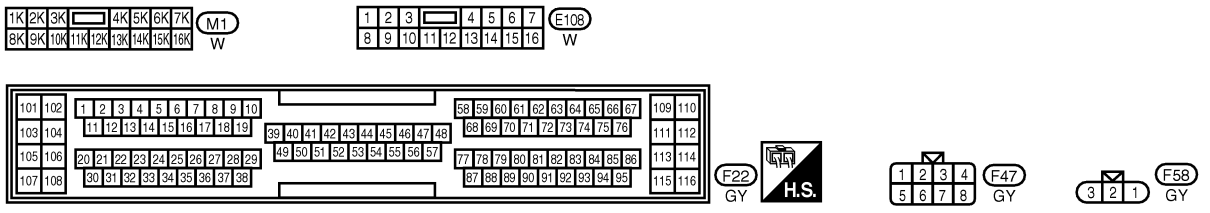
Wiring Diagram

=NIEC0818

EC-HO2S1-01

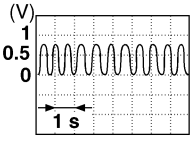


: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC



LEC195

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	HEATED OXYGEN SENSOR 1 (FRONT)	ENGINE RUNNING AT 2,000 RPM AFTER WARMING UP TO NORMAL OPERATING TEMPERATURE	0 - APPROX. 1.0V 

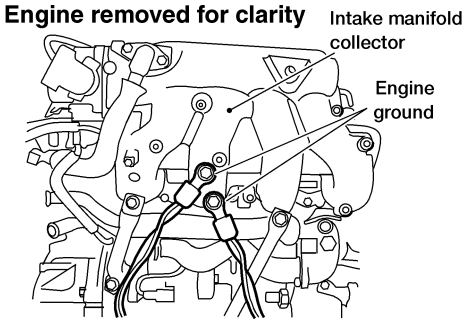
SEF567Y

Diagnostic Procedure

NIEC0819

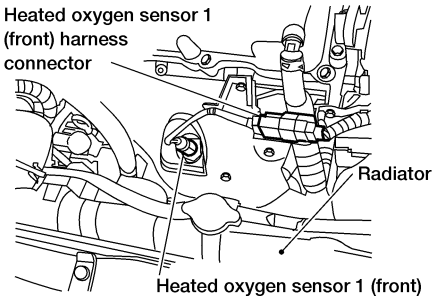
1	INSPECTION START

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.



LEC302

3. Disconnect heated oxygen sensor 1 (front) harness connector.



LEC274

	▶	GO TO 2.

2	CHECK INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 62 and HO2S1 terminal 2.
   Refer to “Wiring Diagram”, EC-1559.
   Continuity should exist.
3. Check harness continuity between ECM terminal 62 (or HO2S1 terminal 2) and ground.
   Refer to “Wiring Diagram”, EC-1559.
   Continuity should not exist.
4. Also check harness for short to power.

OK or NG

OK	▶	GO TO 3.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

3	CHECK HEATED OXYGEN SENSOR 1 (FRONT)

Refer to “Component Inspection”, EC-1561.

OK or NG

OK	▶	GO TO 4.
NG	▶	Replace heated oxygen sensor 1 (front).

4	**CHECK INTERMITTENT INCIDENT**
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1508.	
▶	**INSPECTION END**

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S1 MNTR (B1)	LEAN

SEF646Y

cycle	1	2	3	4	5
HO2S1 MNTR (B1)	R-L-R-L-R-L-R-L-R-L-R				

R means HO2S1 MNTR (B1) indicates RICH
L means HO2S1 MNTR (B1) indicates LEAN

SEF217YA

Component Inspection

HEATED OXYGEN SENSOR 1 (FRONT)

NIEC0820

NIEC0820S01

With CONSULT-II

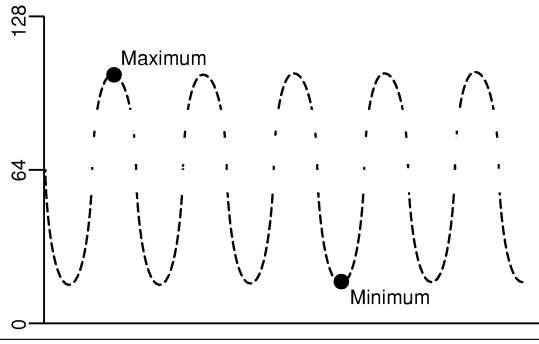
1) Start engine and warm it up to normal operating temperature.
2) Select "MANU TRIG" in "DATA MONITOR" mode, and select "HO2S1 (B1)" and "HO2S1 MNTR (B1)".
3) Hold engine speed at 2,000 rpm under no load during the following steps.
4) Touch "RECORD" on CONSULT-II screen.
5) Check the following.

- "HO2S1 MNTR (B1)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds.
  5 times (cycles) are counted as shown below:
  R = "HO2S1 MNTR (B1)", "RICH"
  L = "HO2S1 MNTR (B1)", "LEAN"
- "HO2S1 (B1)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)" voltage never exceeds 1.0V.

CAUTION:

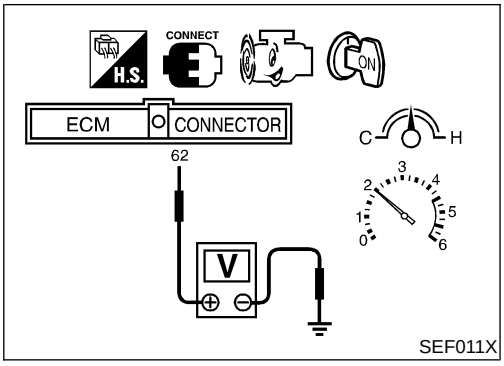
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Trigger	ENG SPEED	HO2S1 (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



SEF648Y

Component Inspection (Cont'd)



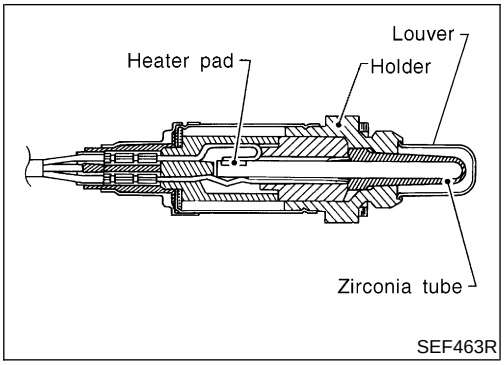
Without CONSULT-II

1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 62 [Heated oxygen sensor 1 (front) 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 five 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
- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is below 0.3V at least one time.
- The voltage never exceeds 1.0V.

CAUTION:

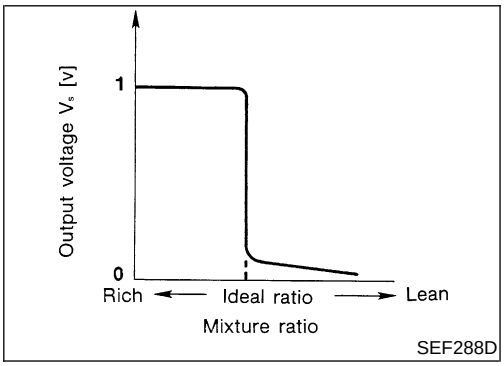
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**



Component Description

NIEC0821

The heated oxygen sensor 1 (front) is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 (front) 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 heated oxygen sensor 1 (front) 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.

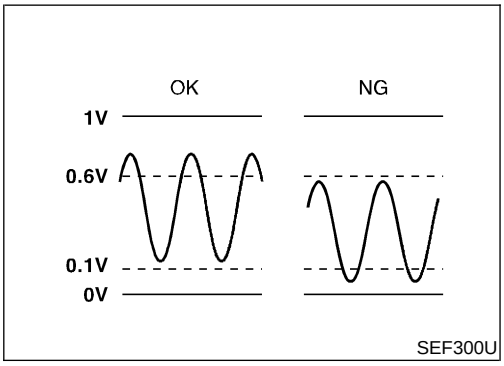


CONSULT-II Reference Value in Data Monitor Mode

NIEC0822

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1)			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.

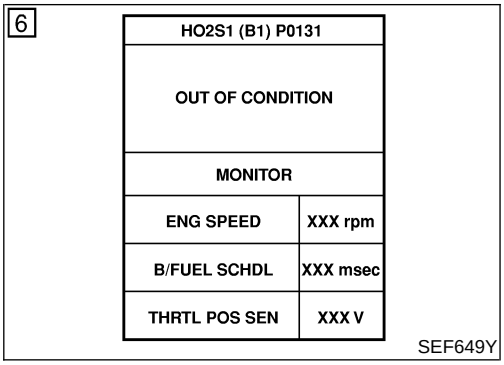


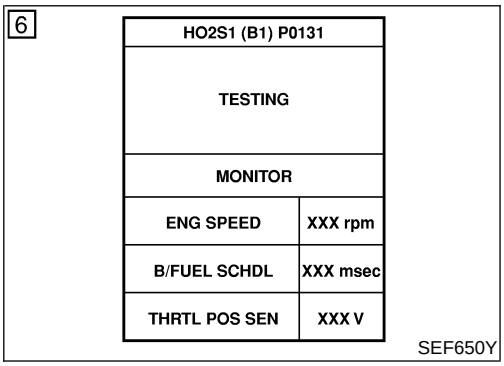
On Board Diagnosis Logic

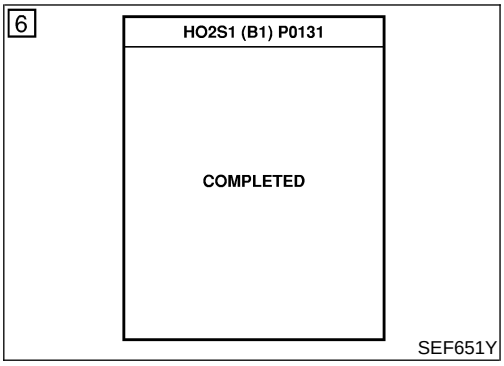
NIEC0823

To judge the malfunction, the output from the heated oxygen sensor 1 (front) is monitored to determine whether the “rich” output is sufficiently high and whether the “lean” output is sufficiently low. When both the outputs are shifting to the lean side, the malfunction will be detected.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0131	• The maximum and minimum voltages from the sensor are not reached to the specified voltages.	• Heated oxygen sensor 1 (front) • Heated oxygen sensor 1 (front) heater • Fuel pressure • Injectors • Intake air leaks







DTC Confirmation Procedure

NIEC0824

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

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 “HO2S1 (B1) P0131” of “HO2S1” in “DTC WORK SUPPORT” mode with CONSULT-II.
4) Touch “START”.
5) Start engine and let it idle for at least 3.5 minutes.

NOTE:

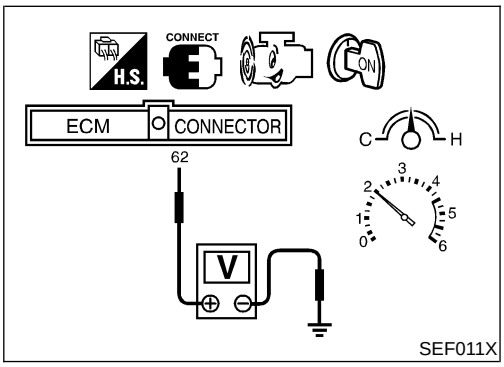
Never raise engine speed above 3,200 rpm after this step. If the engine speed limit is exceeded, return to step 5.

6) When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 50 seconds or more.)

ENG SPEED	1,400 - 2,800 rpm
Vehicle speed	50 - 100 km/h (31 - 62 MPH)
B/FUEL SCHDL	2.0 - 12.8 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-1565.



Overall Function Check

NIEC0825

Use this procedure to check the overall function of the heated oxygen sensor 1 (front) circuit. During this check, a 1st trip DTC might not be confirmed.

With GST

1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 62 [Heated oxygen sensor 1 (front) signal] and engine ground.
3) Check the following with engine speed held at 2,000 rpm constant under no load.

- The maximum voltage is over 0.6V at least one time.

- The minimum voltage is over 0.1V at least one time.

4) If NG, go to "Diagnostic Procedure", EC-1565.

Diagnostic Procedure

NIEC0826

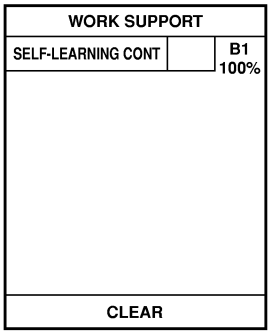
1	RETIGHTEN HEATED OXYGEN SENSOR 1 (FRONT)
1. Turn ignition switch "OFF". 2. Loosen and retighten heated oxygen sensor 1 (front). **Tightening torque:** **40 - 60 N·m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)**	
▶	GO TO 2.

Diagnostic Procedure (Cont'd)

2	CLEAR THE SELF-LEARNING DATA.

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching "CLEAR".

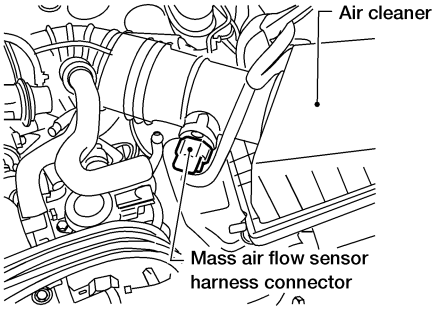


SEF215Z

4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 detected? Is it difficult to start engine?

Without CONSULT-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 3 seconds at idle speed.



LEC286

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-1438.
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 detected? Is it difficult to start engine?

Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0171. Refer to EC-1630.
No	▶	GO TO 3.

3	CHECK HEATED OXYGEN SENSOR 1 (FRONT) HEATER

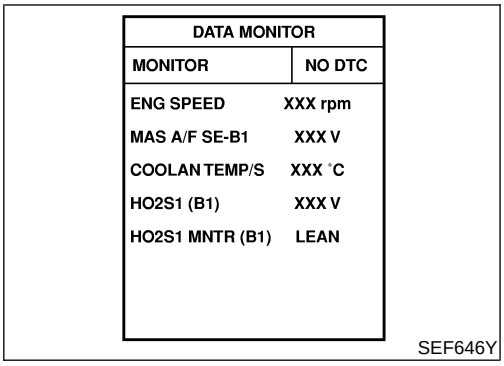
Refer to "Component Inspection", EC-1594.

OK or NG

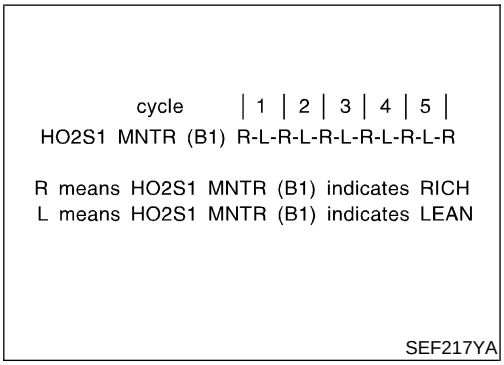
OK	▶	GO TO 4.
NG	▶	Replace heated oxygen sensor 1 (front).

4	CHECK HEATED OXYGEN SENSOR 1 (FRONT)	
Refer to "Component Inspection", EC-1567.		
OK or NG		
OK	▶	GO TO 5.
NG	▶	Replace heated oxygen sensor 1 (front).

5	CHECK INTERMITTENT INCIDENT	
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1508. Refer to "Wiring Diagram", EC-1559, for circuit.		
	▶	INSPECTION END



SEF646Y



SEF217YA

Component Inspection

NIEC0827

HEATED OXYGEN SENSOR 1 (FRONT)

NIEC0827S01

With CONSULT-II

1) Start engine and warm it up to normal operating temperature.
2) Select "MANU TRIG" in "DATA MONITOR" mode, and select "HO2S1 (B1)" and "HO2S1 MNTR (B1)".
3) Hold engine speed at 2,000 rpm under no load during the following steps.
4) Touch "RECORD" on CONSULT-II screen.
5) Check the following.

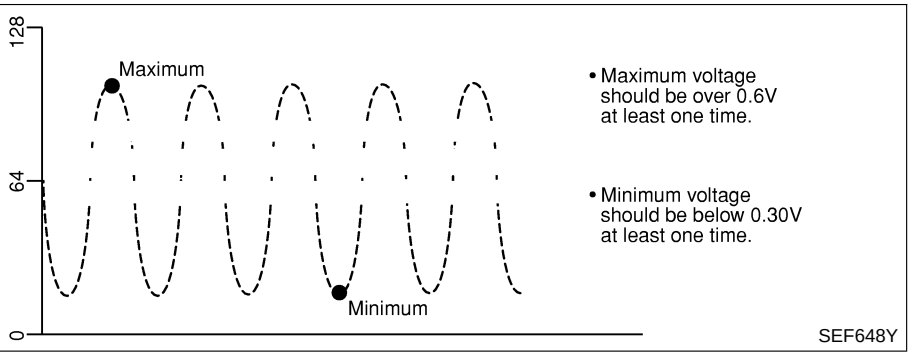
- "HO2S1 MNTR (B1)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds.
  5 times (cycles) are counted as shown below:
  R = "HO2S1 MNTR (B1)", "RICH"
  L = "HO2S1 MNTR (B1)", "LEAN"
- "HO2S1 (B1)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)" voltage never exceeds 1.0V.

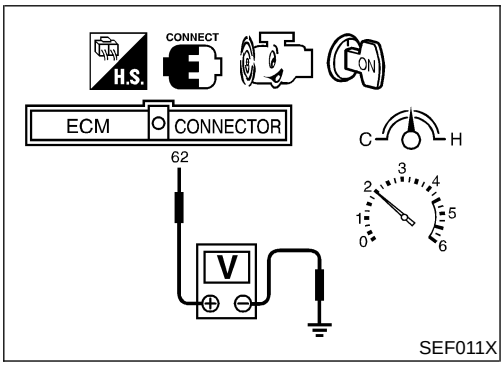
CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **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.**

Component Inspection (Cont'd)

Trigger	ENG SPEED	HO2S1 (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





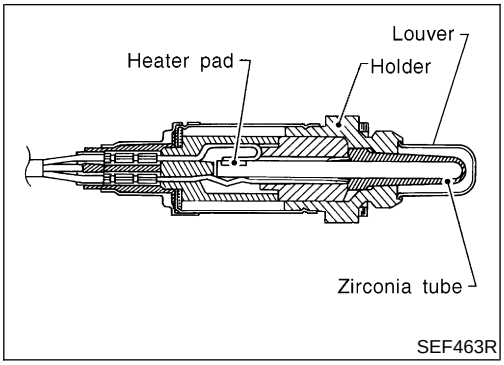
Without CONSULT-II

1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 62 [Heated oxygen sensor 1 (front) 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 five 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
- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is below 0.3V at least one time.
- The voltage never exceeds 1.0V.

CAUTION:

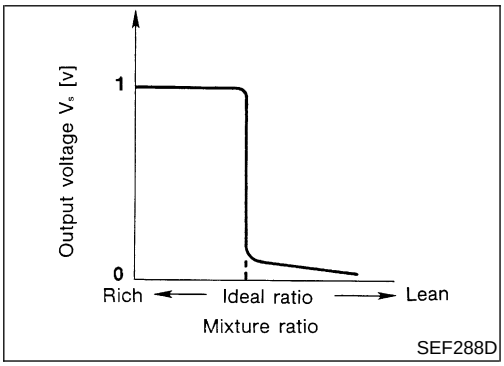
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**



Component Description

NIEC0828

The heated oxygen sensor 1 (front) is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 (front) 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 heated oxygen sensor 1 (front) 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.

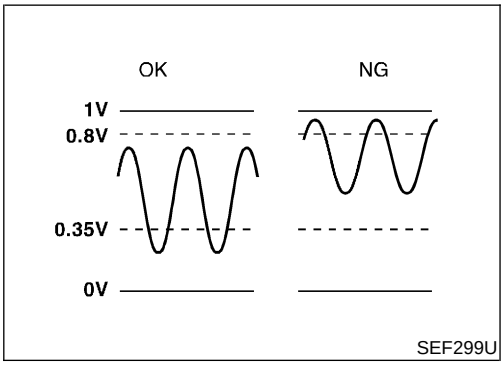


CONSULT-II Reference Value in Data Monitor Mode

NIEC0829

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1)			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.

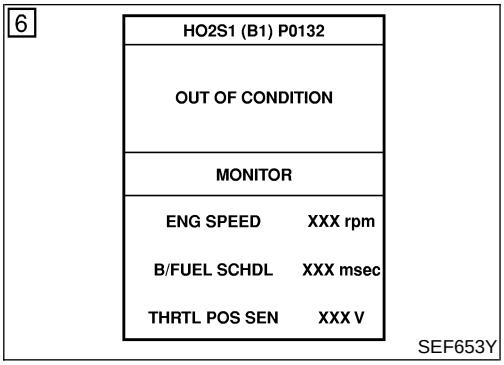


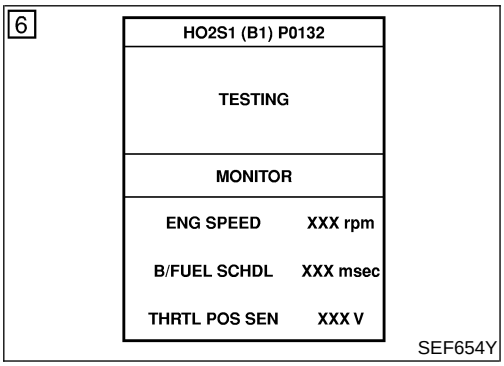
On Board Diagnosis Logic

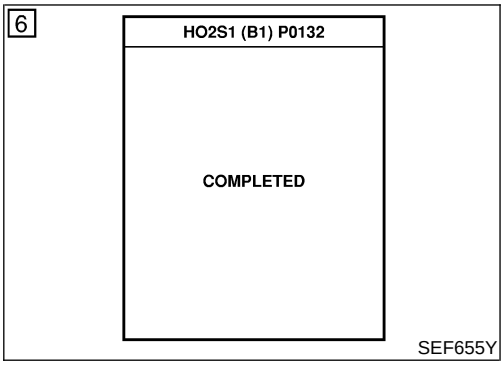
NIEC0830

To judge the malfunction, the output from the heated oxygen sensor 1 (front) is monitored to determine whether the “rich” output is sufficiently high. The “lean” output is sufficiently low. When both the outputs are shifting to the rich side, the malfunction will be detected.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0132	• The maximum and minimum voltages from the sensor are beyond the specified voltages.	• Heated oxygen sensor 1 (front) • Heated oxygen sensor 1 (front) heater • Fuel pressure • Injectors







DTC Confirmation Procedure

NIEC0831

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

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 “HO2S1 (B1) P0132” of “HO2S1” in “DTC WORK SUPPORT” mode with CONSULT-II.
4) Touch “START”.
5) Start engine and let it idle for at least 3.5 minutes.

NOTE:

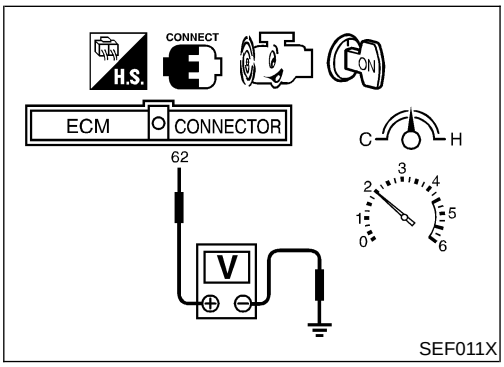
Never raise engine speed above 3,200 rpm after this step. If the engine speed limit is exceeded, return to step 5.

6) When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 50 seconds or more.)

ENG SPEED	1,400 - 2,800 rpm
Vehicle speed	50 - 100 km/h (31 - 62 MPH)
B/FUEL SCHDL	2.0 - 12.8 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-1572.



Overall Function Check

NIEC0832

Use this procedure to check the overall function of the heated oxygen sensor 1 (front) circuit. During this check, a 1st trip DTC might not be confirmed.

With GST

1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 62 [Heated oxygen sensor 1 (front) signal] and engine ground.
3) Check the following with engine speed held at 2,000 rpm constant under no load.

- The maximum voltage is below 0.8V at least one time.

- The minimum voltage is below 0.35V at least one time.

4) If NG, go to "Diagnostic Procedure", EC-1572.

Diagnostic Procedure

=NIEC0833

1	RETIGHTEN HEATED OXYGEN SENSOR 1 (FRONT)

1. Turn ignition switch “OFF”.
2. Loosen and retighten heated oxygen sensor 1 (front).

Tightening torque:

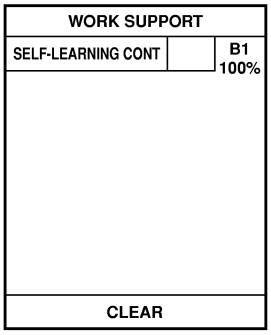
40 - 60 N·m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)

▶ GO TO 2.

2	CLEAR THE SELF-LEARNING DATA

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.



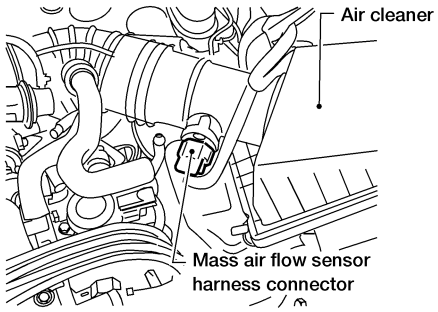
SEF215Z

4. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0172 detected? Is it difficult to start engine?

Without CONSULT-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 3 seconds at idle speed.



LEC286

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-1438.
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0172 detected? Is it difficult to start engine?

Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0172. Refer to EC-1637.
No	▶	GO TO 3.

3	CHECK HARNESS CONNECTOR
1. Turn ignition switch "OFF". 2. Disconnect heated oxygen sensor 1 (front) harness connector. 3. Check harness connector for water. **Water should not exit.**	
OK or NG	
OK ▶	GO TO 4.
NG ▶	Repair or replace harness connector.

4	CHECK HEATED OXYGEN SENSOR 1 (FRONT) HEATER
Refer to "Component Inspection", EC-1594.	
OK or NG	
OK ▶	GO TO 5.
NG ▶	Replace heated oxygen sensor 1 (front).

5	CHECK HEATED OXYGEN SENSOR 1 (FRONT)
Refer to "Component Inspection", EC-1573.	
OK or NG	
OK ▶	GO TO 6.
NG ▶	Replace heated oxygen sensor 1 (front).

6	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1508. Refer to "Wiring Diagram", EC-1559, for circuit.	
▶	**INSPECTION END**

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S1 MNTR (B1)	LEAN

SEF646Y

cycle	1	2	3	4	5
HO2S1 MNTR (B1)	R-L-R-L-R-L-R-L-R-L				

R means HO2S1 MNTR (B1) indicates RICH
L means HO2S1 MNTR (B1) indicates LEAN

SEF217YA

Component Inspection

NIEC0834

HEATED OXYGEN SENSOR 1 (FRONT)

NIEC0834S01

With CONSULT-II

1) Start engine and warm it up to normal operating temperature.
2) Select "MANU TRIG" in "DATA MONITOR" mode, and select "HO2S1 (B1)" and "HO2S1 MNTR (B1)".
3) Hold engine speed at 2,000 rpm under no load during the following steps.
4) Touch "RECORD" on CONSULT-II screen.
5) Check the following.

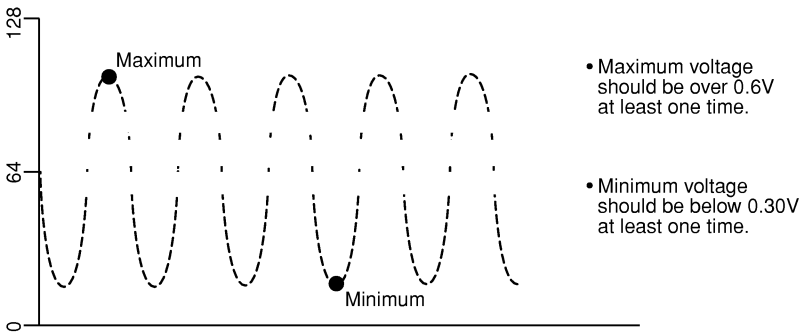
- "HO2S1 MNTR (B1)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds.
  5 times (cycles) are counted as shown below:
  R = "HO2S1 MNTR (B1)", "RICH"
  L = "HO2S1 MNTR (B1)", "LEAN"
- "HO2S1 (B1)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)" voltage never exceeds 1.0V.

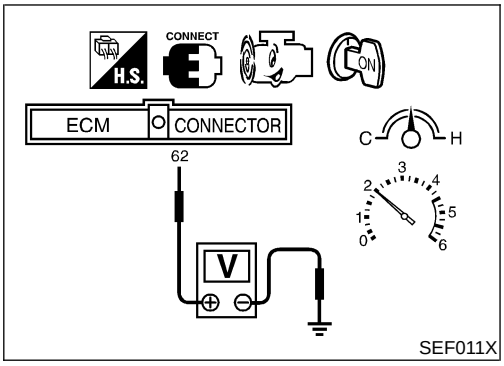
CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**

- **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.**

Trigger	ENG SPEED	HO2S1 (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





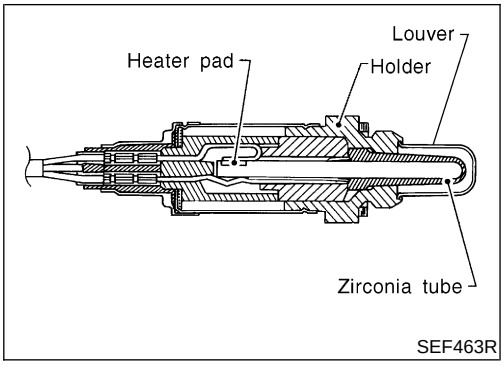
Without CONSULT-II

1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 62 [Heated oxygen sensor 1 (front) 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 when 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
- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is below 0.3V at least one time.
- The voltage never exceeds 1.0V.

CAUTION:

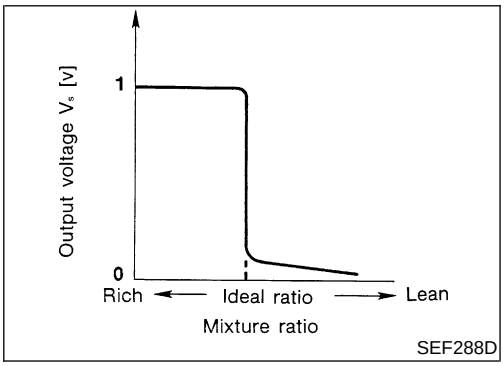
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**



Component Description

NIEC0835

The heated oxygen sensor 1 (front) is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 (front) 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 heated oxygen sensor 1 (front) 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.

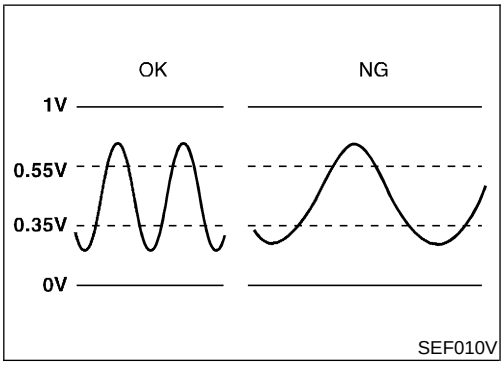


CONSULT-II Reference Value in Data Monitor Mode

NIEC0836

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1)			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.

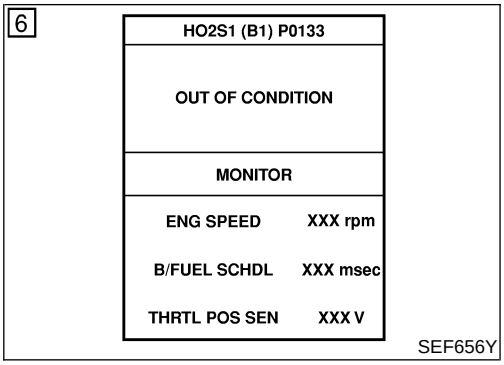


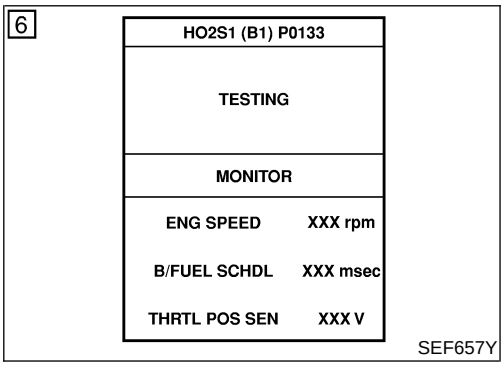
On Board Diagnosis Logic

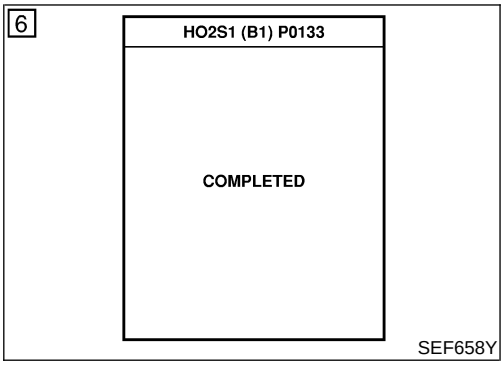
NIEC0837

To judge the malfunction of heated oxygen sensor 1 (front), this diagnosis measures response time of heated oxygen sensor 1 (front) signal. The time is compensated by engine operating (speed and load), fuel feedback control constant, and heated oxygen sensor 1 (front) temperature index. Judgment is based on whether the compensated time [heated oxygen sensor 1 (front) cycling time index] is inordinately long or not.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0133	● The response of the voltage signal from the sensor takes more than the specified time.	● Harness or connectors (The sensor circuit is open or shorted.) ● Heated oxygen sensor 1 (front) ● Heated oxygen sensor 1 (front) heater ● Fuel pressure ● Injectors ● Intake air leaks ● Exhaust gas leaks ● PCV ● Mass air flow sensor







DTC Confirmation Procedure

NIEC0838

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

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 “HO2S1 (B1) P0133” of “HO2S1” in “DTC WORK SUPPORT” mode with CONSULT-II.
4) Touch “START”.
5) Start engine and let it idle for at least 3.5 minutes.

NOTE:

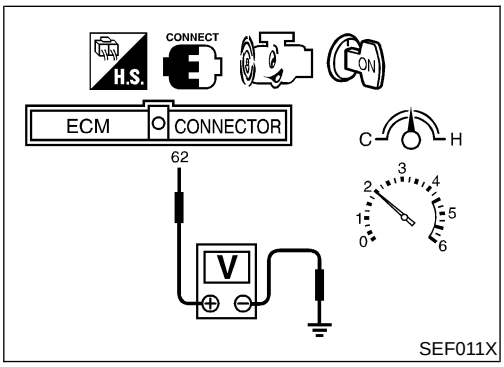
Never raise engine speed above 3,200 rpm after this step. If the engine speed limit is exceeded, return to step 5.

6) When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 20 seconds.)

ENG SPEED	1,900 - 3,100 rpm (A/T) 2,000 - 3,100 rpm (M/T)
Vehicle speed	80 - 120 km/h (50 - 75 MPH)
B/FUEL SCHDL	4.0 - 12.0 msec (A/T) 3.5 - 12.0 msec (M/T)
Selector lever	Suitable position

If “TESTING” is not displayed after 5 minutes, retry from step 2.

7) Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to “Diagnostic Procedure”, EC-1579.



Overall Function Check

NIEC0839

Use this procedure to check the overall function of the heated oxygen sensor 1 (front) circuit. During this check, a 1st trip DTC might not be confirmed.

With GST

1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 62 [Heated oxygen sensor 1 (front) signal] and engine ground.
3) Check the following with engine speed held at 2,000 rpm constant under no load.

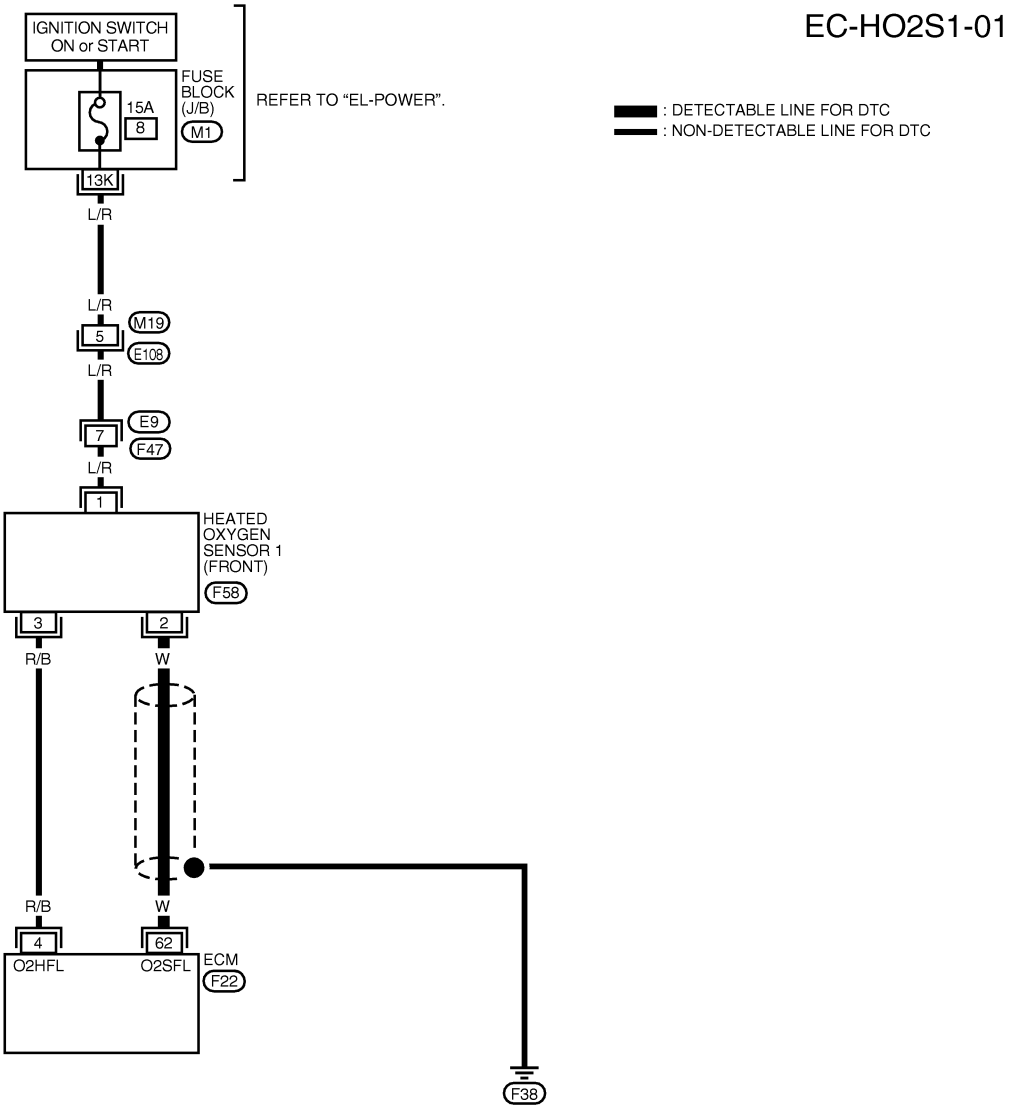
- The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more

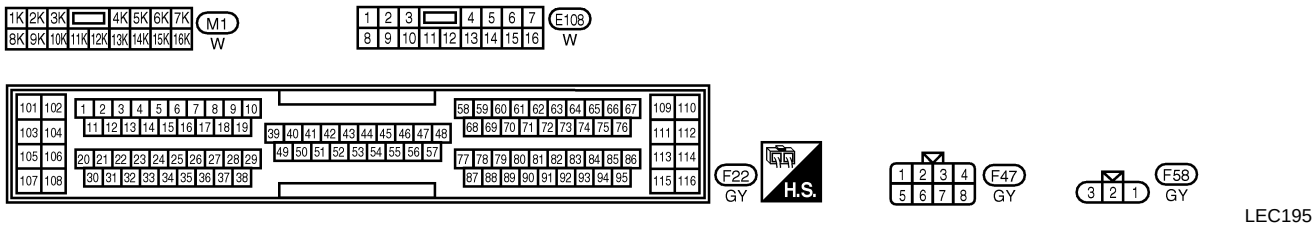
than five times within 10 seconds.
1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

4) If NG, go to "Diagnostic Procedure", EC-1579.

Wiring Diagram

=NIEC0840





LEC195

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	HEATED OXYGEN SENSOR 1 (FRONT)	ENGINE RUNNING AT 2,000 RPM AFTER WARMING UP TO NORMAL OPERATING TEMPERATURE	0 - APPROX. 1.0V

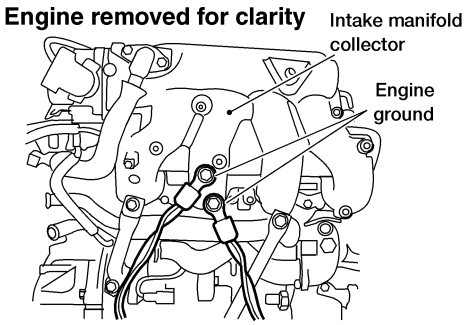
SEF567Y

Diagnostic Procedure

NIEC0841

1	RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.



LEC302

▶	GO TO 2.

2	RETIGHTEN HEATED OXYGEN SENSOR 1 (FRONT)

Loosen and retighten heated oxygen sensor 1 (front).

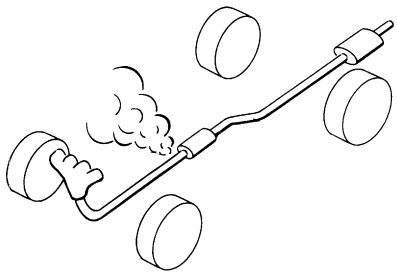
Tightening torque:

40 - 60 N·m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)

▶	GO TO 3.

3	CHECK EXHAUST AIR LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust air leak before three way catalyst.



SEF099P

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair or replace.

4	CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

OK or NG

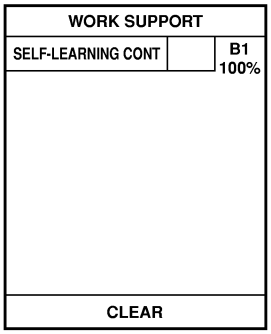
OK	▶	GO TO 5.
NG	▶	Repair or replace.

Diagnostic Procedure (Cont'd)

5	CLEAR THE SELF-LEARNING DATA

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching "CLEAR".

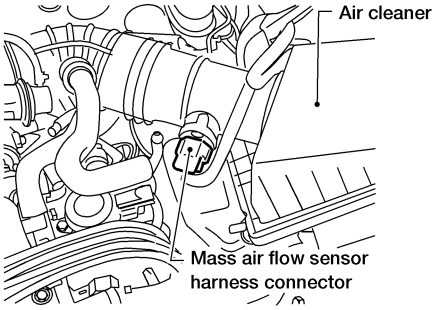


SEF215Z

4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 or P0172 detected? Is it difficult to start engine?

Without CONSULT-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 3 seconds at idle speed.



LEC286

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-1438.
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 P0172 detected? Is it difficult to start engine?

Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0171, P0172. Refer to EC-1630, 1637.
No	▶	GO TO 6.

6	CHECK INPUT SIGNAL CIRCUIT	
1. Disconnect heated oxygen sensor 1 (front) harness connector and ECM harness connector. 2. Check harness continuity between ECM terminal 62 and HO2S1 terminal 2. Refer to "Wiring Diagram", EC-1578. **Continuity should exist.** 3. Check harness continuity between ECM terminal 62 (or HO2S1 terminal 2) and ground. Refer to "Wiring Diagram", EC-1578. **Continuity should not exist.** 4. Also check harness for short to power. **OK or NG**		
OK	▶	GO TO 7.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

7	CHECK HEATED OXYGEN SENSOR 1 (FRONT) HEATER	
Refer to "Component Inspection", EC-1594. **OK or NG**		
OK	▶	GO TO 8.
NG	▶	Replace heated oxygen sensor 1 (front).

8	CHECK HEATED OXYGEN SENSOR 1 (FRONT)	
Refer to "Component Inspection", EC-1582. **OK or NG**		
OK	▶	GO TO 9.
NG	▶	Replace heated oxygen sensor 1 (front).

9	CHECK MASS AIR FLOW SENSOR	
Refer to "Component Inspection", EC-1523. **OK or NG**		
OK	▶	GO TO 10.
NG	▶	Replace mass air flow sensor.

10	CHECK PCV VALVE	
Refer to "Positive Crankcase Ventilation", EC-1407. **OK or NG**		
OK	▶	GO TO 11.
NG	▶	Repair or replace PCV valve.

11	CHECK INTERMITTENT INCIDENT	
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1508.		
	▶	**INSPECTION END**

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S1 MNTR (B1)	LEAN

SEF646Y

cycle | 1 | 2 | 3 | 4 | 5 |
HO2S1 MNTR (B1) R-L-R-L-R-L-R-L-R-L

R means HO2S1 MNTR (B1) indicates RICH
L means HO2S1 MNTR (B1) indicates LEAN

SEF217YA

Component Inspection

NIEC0842

HEATED OXYGEN SENSOR 1 (FRONT)

NIEC0842S01

With CONSULT-II

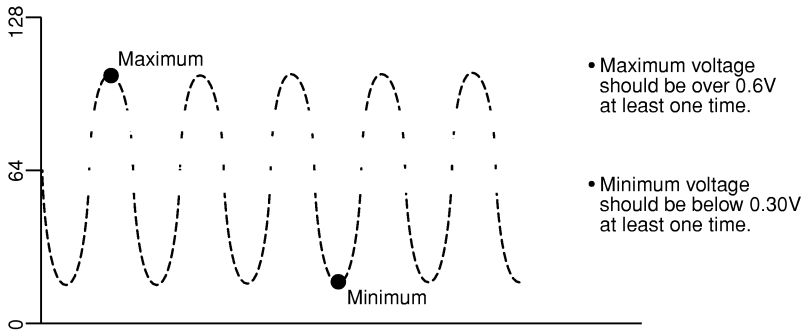
1) Start engine and warm it up to normal operating temperature.
2) Select “MANU TRIG” in “DATA MONITOR” mode, and select “HO2S1 (B1)” and “HO2S1 MNTR (B1)”.
3) Hold engine speed at 2,000 rpm under no load during the following steps.
4) Touch “RECORD” on CONSULT-II screen.
5) Check the following.

- “HO2S1 MNTR (B1)” in “DATA MONITOR” mode changes from “RICH” to “LEAN” to “RICH” five times in 10 seconds.
  5 times (cycles) are counted as shown below:
  R = “HO2S1 MNTR (B1)”, “RICH”
  L = “HO2S1 MNTR (B1)”, “LEAN”
- “HO2S1 (B1)” voltage goes above 0.6V at least once.
- “HO2S1 (B1)” voltage goes below 0.3V at least once.
- “HO2S1 (B1)” voltage never exceeds 1.0V.

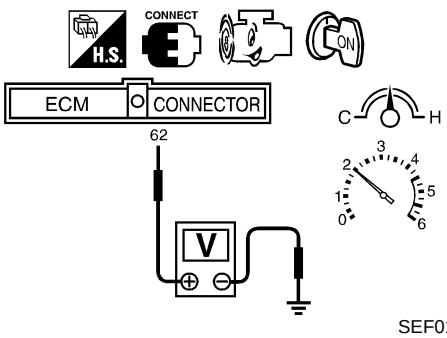
CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **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.**

Trigger	ENG SPEED	HO2S1 (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



SEF648Y



SEF011X

Without CONSULT-II

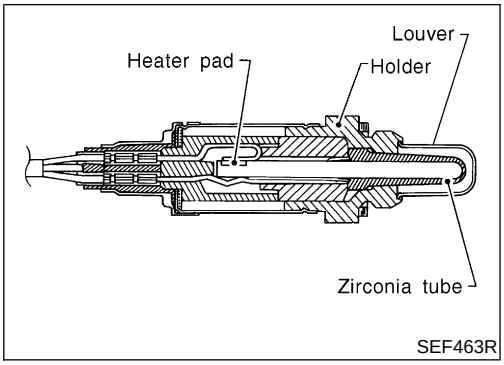
1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 62 [Heated oxygen sensor 1 (front) signal] and engine ground.
3) Check the following with engine speed held at 2,000 rpm constant under no load.

- The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than five 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

- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is below 0.3V at least one time.
- The voltage never exceeds 1.0V.

CAUTION:

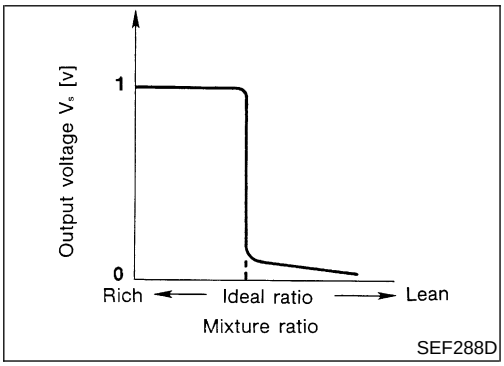
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**



Component Description

NIEC0843

The heated oxygen sensor 1 (front) is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 (front) 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 heated oxygen sensor 1 (front) 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.

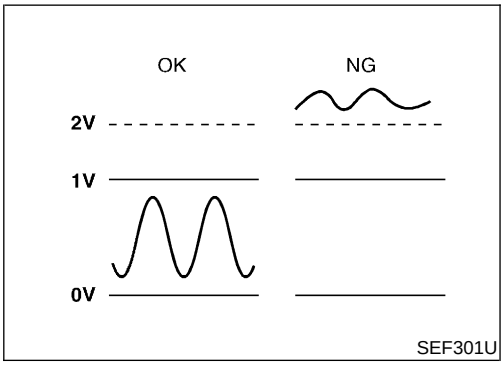


CONSULT-II Reference Value in Data Monitor Mode

NIEC0844

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1)			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.



On Board Diagnosis Logic

NIEC0845

To judge the malfunction, the diagnosis checks that the heated oxygen sensor 1 (front) output is not inordinately high.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0134	• An excessively high voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Heated oxygen sensor 1 (front)

2

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C

SEF174Y

DTC Confirmation Procedure

NIEC0846

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

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 2 minutes.
6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1587.

With GST

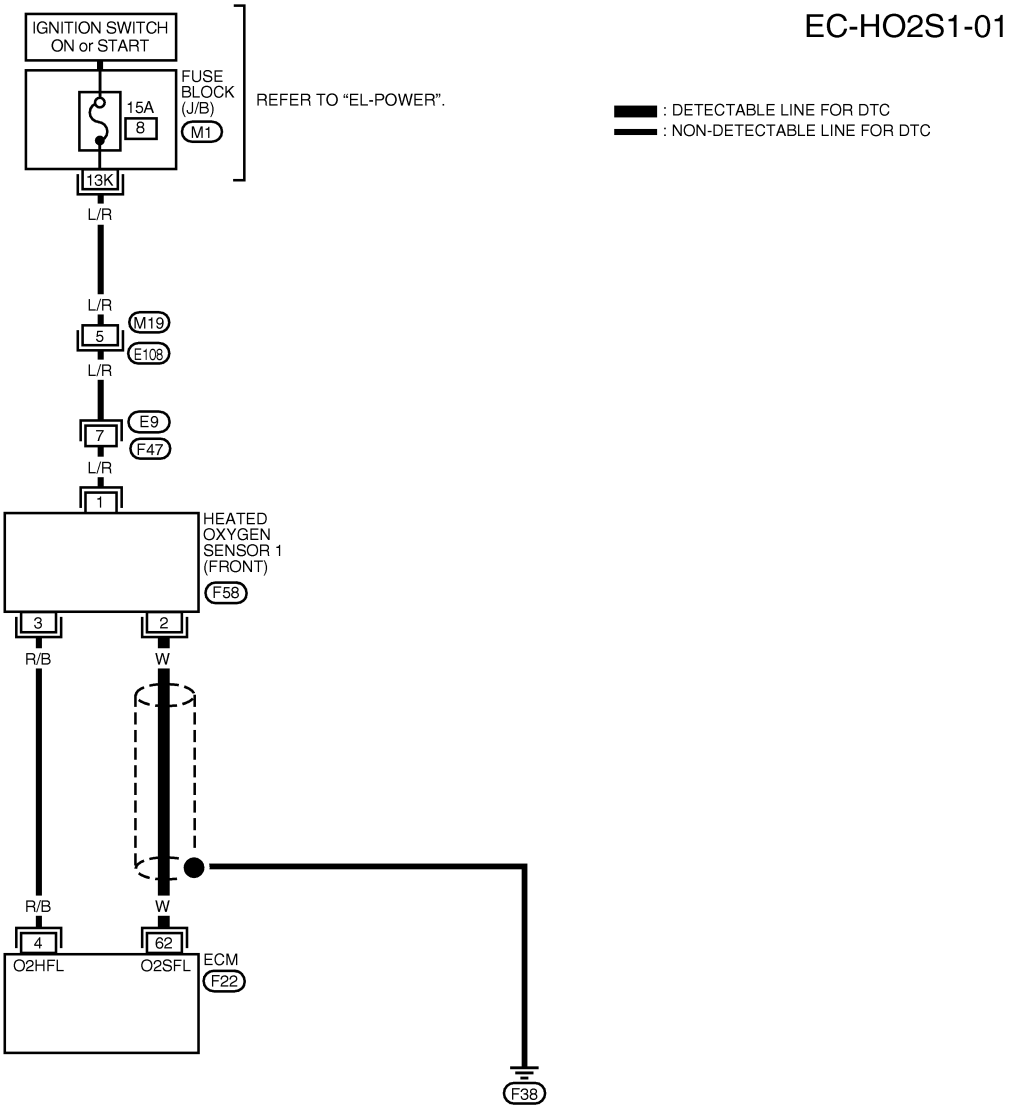
1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 10 seconds.
3) Restart engine and let it idle for 2 minutes.
4) Turn ignition switch "OFF" and wait at least 10 seconds.
5) Restart engine and let it idle for 2 minutes.
6) Select "MODE 3" with GST.
7) If DTC is detected, go to "Diagnostic Procedure", EC-1587.

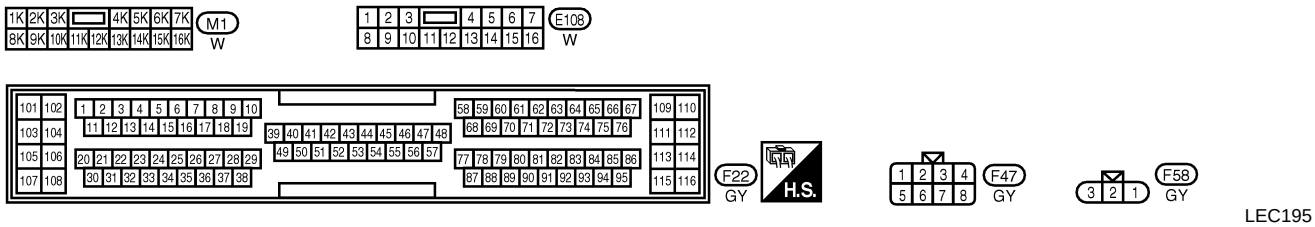
- **When using GST, "DTC Confirmation Procedure" should be performed twice as much as when using CONSULT-II because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II is recommended.**

Wiring Diagram

NIEC0847

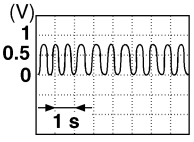
EC-HO2S1-01





LEC195

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.

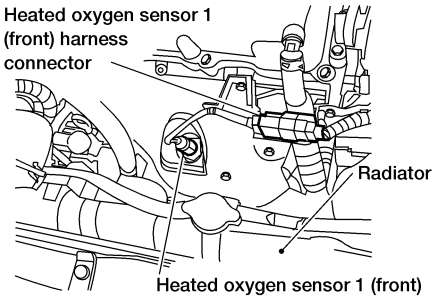
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
62	W	HEATED OXYGEN SENSOR 1 (FRONT)	ENGINE RUNNING AT 2,000 RPM AFTER WARMING UP TO NORMAL OPERATING TEMPERATURE	0 - APPROX. 1.0V 

SEF567Y

Diagnostic Procedure

NIEC0848

1	RETIGHTEN HEATED OXYGEN SENSOR 1 (FRONT)	
Loosen and retighten heated oxygen sensor 1 (front). **Tightening torque:** **40 - 60 N·m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)**		
	▶	GO TO 2.

2	CHECK INPUT SIGNAL CIRCUIT	
1. Disconnect heated oxygen sensor 1 (front) harness connector and ECM harness connector.		
 LEC274		
2. Check harness continuity between ECM terminal 62 and HO2S1 terminal 2. Refer to “Wiring Diagram”, EC-1586. **Continuity should exist.**		
3. Check harness continuity between ECM terminal 62 (or HO2S1 terminal 2) and ground. Refer to “Wiring Diagram”, EC-1586. **Continuity should not exist.**		
4. Also check harness for short to power.		
OK or NG		
OK	▶	GO TO 3.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

3	CHECK HARNESS CONNECTOR	
Check heated oxygen sensor 1 (front) harness connector for water. **Water should not exist.**		
OK or NG		
OK	▶	GO TO 4.
NG	▶	Repair or replace harness connector.

4	CHECK HEATED OXYGEN SENSOR 1 (FRONT)	
Refer to “Component Inspection”, EC-1588.		
OK or NG		
OK	▶	GO TO 5.
NG	▶	Replace heated oxygen sensor 1 (front).

5	CHECK INTERMITTENT INCIDENT	
Perform “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-1508.		
	▶	**INSPECTION END**

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S1 MNTR (B1)	LEAN

SEF646Y

cycle | 1 | 2 | 3 | 4 | 5 |
HO2S1 MNTR (B1) R-L-R-L-R-L-R-L-R-L

R means HO2S1 MNTR (B1) indicates RICH
L means HO2S1 MNTR (B1) indicates LEAN

SEF217YA

Component Inspection

NIEC0849

HEATED OXYGEN SENSOR 1 (FRONT)

NIEC0849S01

With CONSULT-II

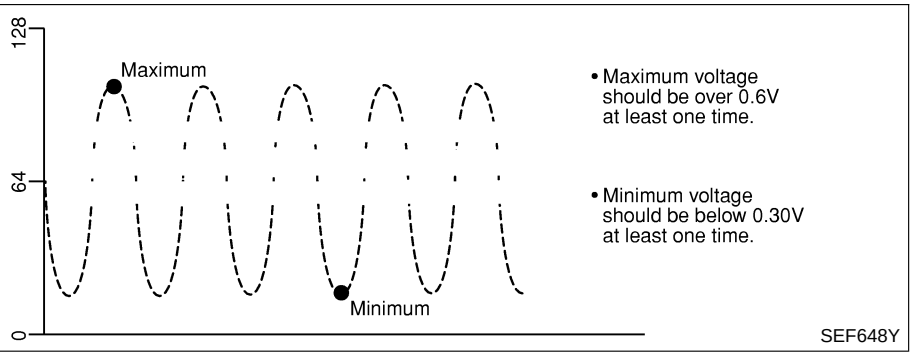
1) Start engine and warm it up to normal operating temperature.
2) Select “MANU TRIG” in “DATA MONITOR” mode, and select “HO2S1 (B1)” and “HO2S1 MNTR (B1)”.
3) Hold engine speed at 2,000 rpm under no load during the following steps.
4) Touch “RECORD” on CONSULT-II screen.
5) Check the following.

- “HO2S1 MNTR (B1)” in “DATA MONITOR” mode changes from “RICH” to “LEAN” to “RICH” five times in 10 seconds.
  5 times (cycles) are counted as shown below:
  R = “HO2S1 MNTR (B1)”, “RICH”
  L = “HO2S1 MNTR (B1)”, “LEAN”
- “HO2S1 (B1)” voltage goes above 0.6V at least once.
- “HO2S1 (B1)” voltage goes below 0.3V at least once.
- “HO2S1 (B1)” voltage never exceeds 1.0V.

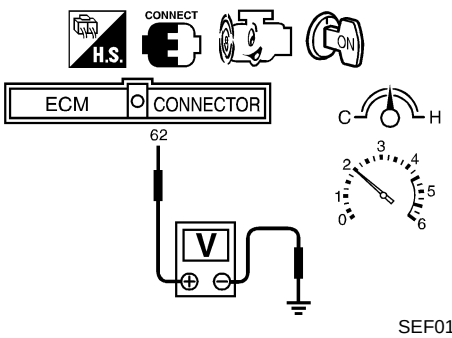
CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **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.**

Trigger	ENG SPEED	HO2S1 (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



SEF648Y



SEF011X

Without CONSULT-II

1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 62 [Heated oxygen sensor 1 (front) 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 five 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

- The maximum voltage is over 0.6V at at least one time.
- The minimum voltage is below 0.3V at least one time.
- The voltage never exceeds 1.0V.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **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.**

Description

NIEC0850

SYSTEM DESCRIPTION

NIEC0850S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE)	Engine speed	Heated oxygen sensor 1 (front) heater control	Heated oxygen sensor 1 (front) heater

The ECM performs ON/OFF control of the heated oxygen sensor 1 (front) heater corresponding to the engine operating condition.

OPERATION

NIEC0850S02

Engine speed	Heated oxygen sensor 1 (front) heater
Above 3,200 rpm	OFF
Below 3,200 rpm	ON

CONSULT-II Reference Value in Data Monitor Mode

NIEC0851

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S1 HTR (B1)	• Engine speed: Below 3,200 rpm	ON
	• Engine speed: Above 3,200 rpm	OFF

On Board Diagnosis Logic

NIEC0852

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0135	• The current amperage in the heated oxygen sensor 1 (front) heater circuit is out of the normal range. [An improper voltage drop signal is sent to ECM through the heated oxygen sensor 1 (front) heater.]	• Harness or connectors [The heated oxygen sensor 1 (front) heater circuit is open or shorted.] • Heated oxygen sensor 1 (front) heater

DTC Confirmation Procedure

NIEC0853

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.

2

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

With CONSULT-II

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-1593.

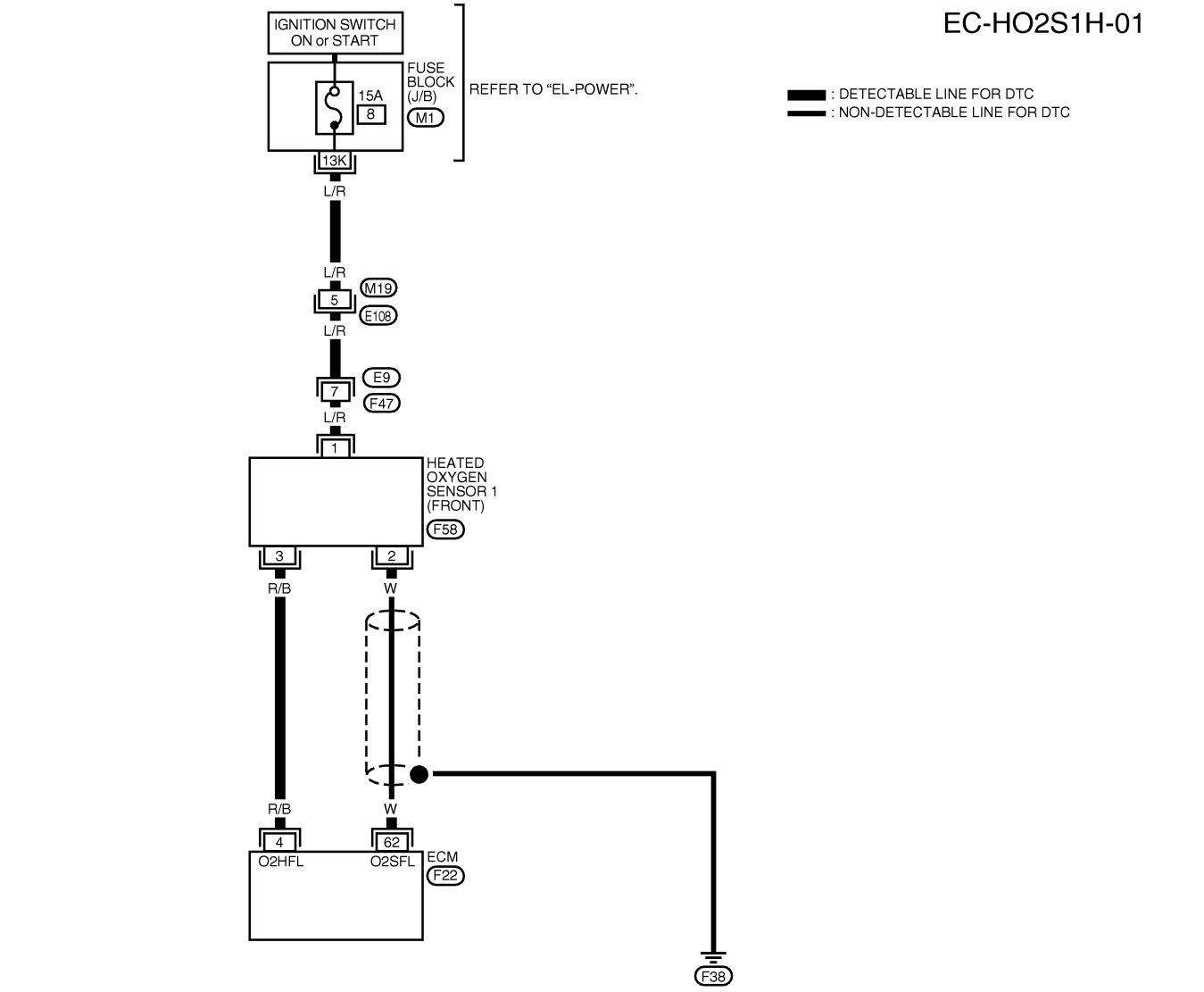
With GST

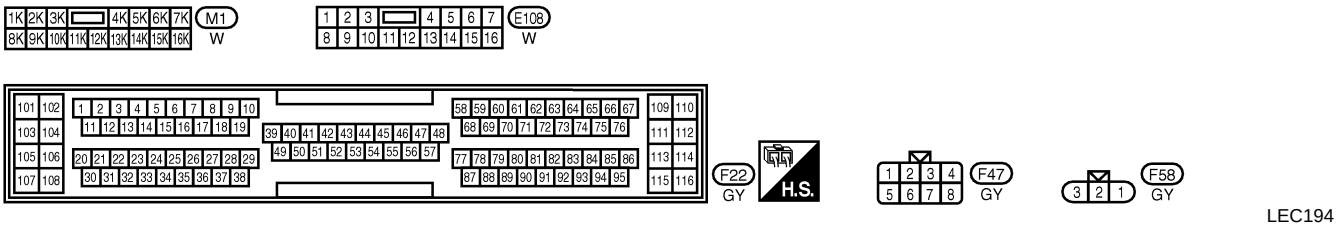
1) Start engine and run it for at least 6 seconds at idle speed.
2) Turn ignition switch "OFF" and wait at least 10 seconds.
3) Start engine and run it for at least 6 seconds at idle speed.
4) Select "MODE 3" with GST.
5) If DTC is detected, go to "Diagnostic Procedure", EC-1593.

- **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

NIEC0854





LEC194

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/B	HEATED OXYGEN SENSOR 1 (FRONT) HEATER	ENGINE RUNNING BELOW 3,600 RPM	0 - 1.0V
			ENGINE RUNNING ABOVE 3,600 RPM	BATTERY VOLTAGE

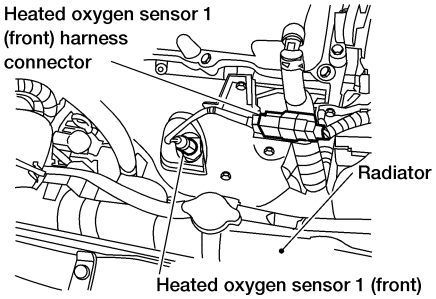
SEF568Y

Diagnostic Procedure

NIEC0855

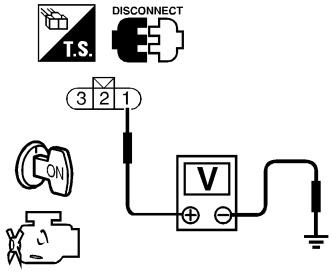
1	CHECK POWER SUPPLY

1. Turn ignition switch “OFF”.
2. Disconnect heated oxygen sensor 1 (front) harness connector.



LEC274

3. Turn ignition switch “ON”.
4. Check voltage between HO2S1 terminal 1 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF934X

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M19, E108
- Harness connectors F47, E9
- Fuse block (J/B) connector M1
- 15A fuse
- Harness for open or short between heated oxygen sensor 1 (front) and fuse

	▶	Repair harness or connectors.

3	CHECK GROUND CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between HO2S1 terminal 3 and ECM terminal 4.
   Refer to “Wiring Diagram”, EC-1592.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

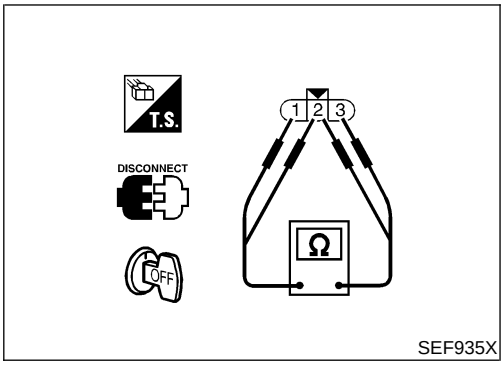
OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

Diagnostic Procedure (Cont'd)

4	CHECK HEATED OXYGEN SENSOR 1 (FRONT) HEATER	
Refer to "Component Inspection", EC-1594.		
OK or NG		
OK	▶	GO TO 5.
NG	▶	Replace heated oxygen sensor 1 (front).

5	CHECK INTERMITTENT INCIDENT	
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1508.		
	▶	**INSPECTION END**



SEF935X

Component Inspection

NIEC0856

HEATED OXYGEN SENSOR 1 (FRONT) HEATER

NIEC0856S01

Check resistance between terminals 3 and 1.

Resistance: 2.3 - 4.3Ω at 25°C (77°F)

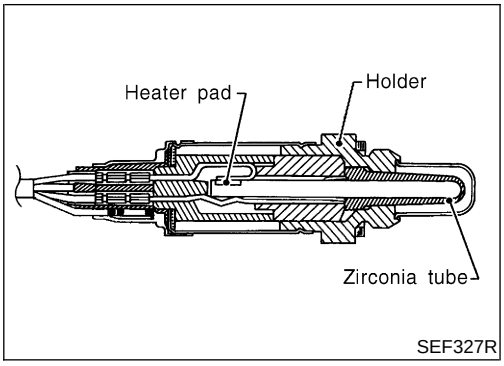
Check continuity between terminals 2 and 1, 3 and 2.

Continuity should not exist.

If NG, replace the heated oxygen sensor 1 (front).

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.**
- **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.**



Component Description

NIEC0857

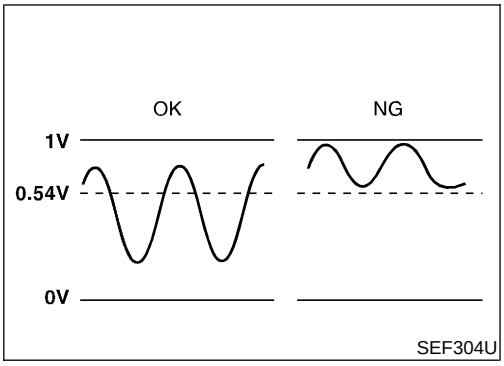
The heated oxygen sensor 2 (rear), after three way catalyst, monitors the oxygen level in the exhaust gas.
Even if switching characteristics of the heated oxygen sensor 1 (front) are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2 (rear).
This 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 heated oxygen sensor 2 (rear) is not used for engine control operation.

CONSULT-II Reference Value in Data Monitor Mode

NIEC0858

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
RR O2 SEN-B1	• Engine: After warming up	Revving engine from idle to 3,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
RR O2 MNTR-B1			LEAN ⟷ RICH

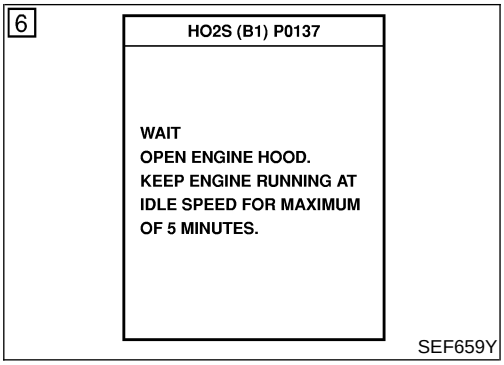


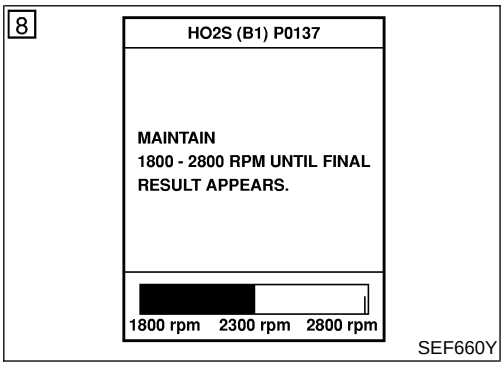
On Board Diagnosis Logic

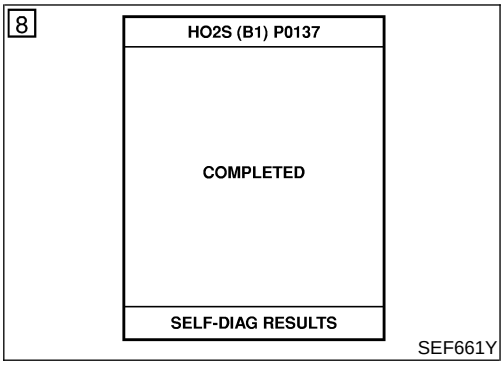
NIEC0859

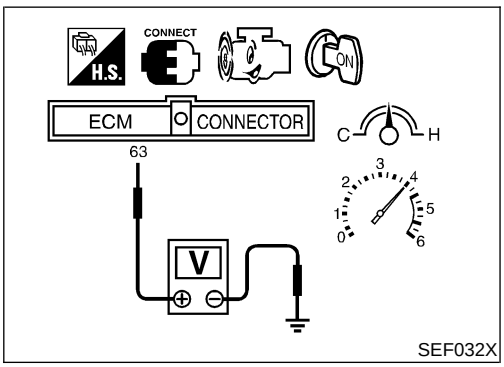
The heated oxygen sensor 2 (rear) has a much longer switching time between rich and lean than the heated oxygen sensor 1 (front). The oxygen storage capacity before the three way catalyst causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2 (rear), ECM monitors whether the minimum voltage of the sensor is sufficiently low during various driving conditions such as fuel-cut.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0137	• The minimum voltage from the sensor does not reach the specified voltage.	• Harness or connectors (The sensor circuit is open or shorted.) • Heated oxygen sensor 2 (rear) • Fuel pressure • Injectors









DTC Confirmation Procedure

NIEC0860

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

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 "HO2S2 (B1) P0137" of "HO2S2" 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-1598.
   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

NIEC0861

Use this procedure to check the overall function of the heated oxygen sensor 2 (rear) circuit. During this check, a 1st trip DTC might not be confirmed.

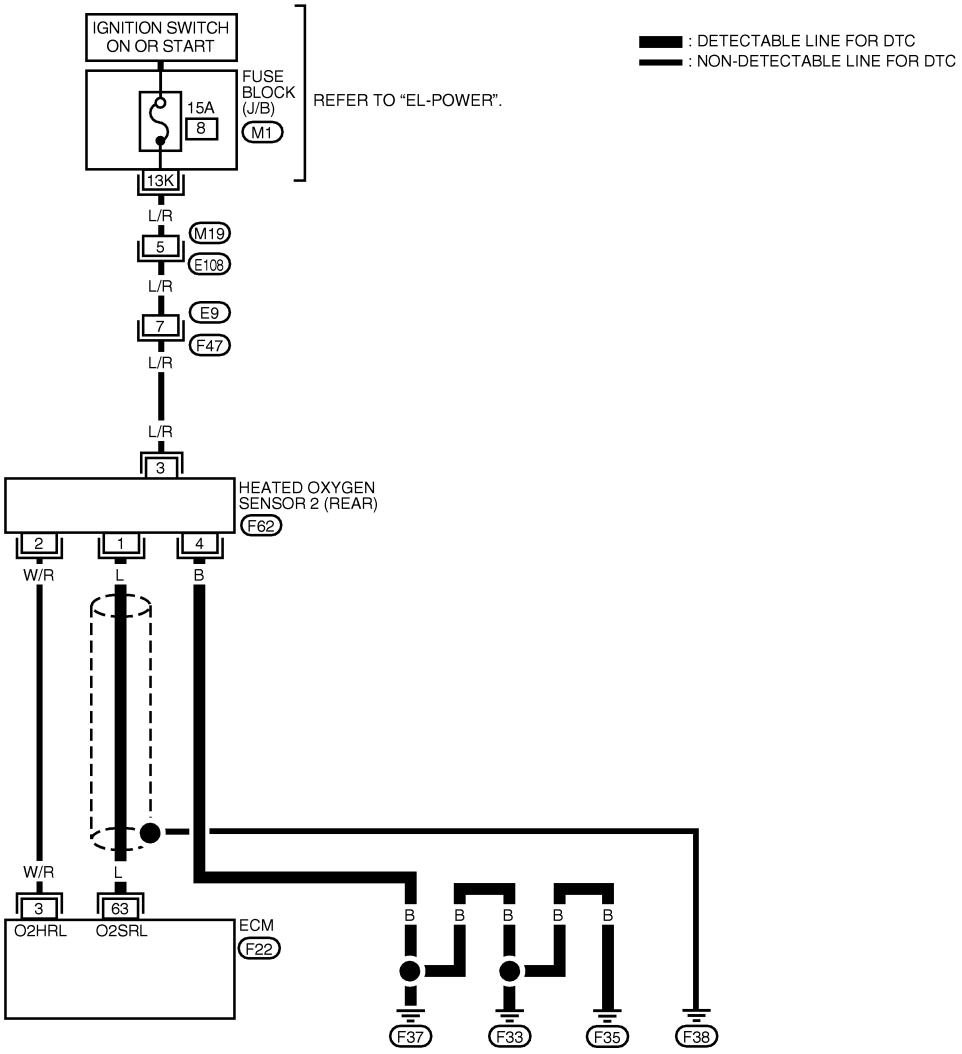
With GST

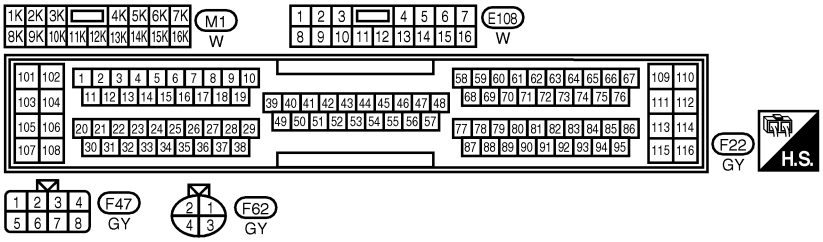
1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Set voltmeter probes between ECM terminals 63 [Heated oxygen sensor 2 (rear) signal] and engine ground.
4) Check the voltage when revving engine up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be below 0.54V at least once during this procedure.
   If the voltage can be confirmed in step 4, step 5 is not necessary.
5) Keep vehicle at idle for 10 minutes, then check the voltage, or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), D position with "OD" OFF (A/T).
   The voltage should be below 0.54V at least once during this procedure.
6) If NG, go to "Diagnostic Procedure", EC-1598.

Wiring Diagram

NIEC0862

EC-HO2S2-01





LEC200

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	L	HEATED OXYGEN SENSOR 2 (REAR)	ENGINE RUNNING FROM IDLE UP TO 2,000 RPM UNDER WARM-UP CONDITION	0 - APPROX. 1.0V

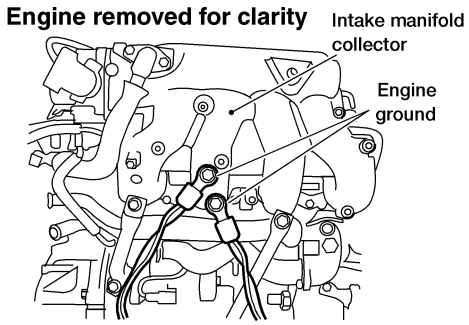
SEF569Y

Diagnostic Procedure

NIEC0863

1	RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.



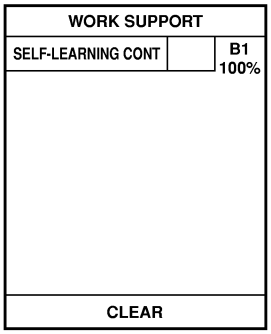
LEC302

▶	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-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching "CLEAR".

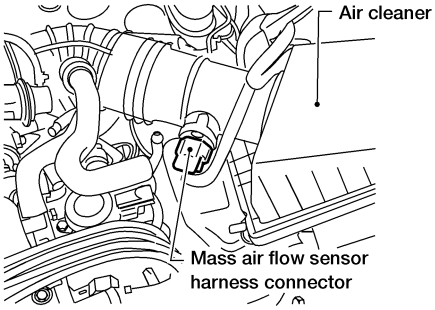


SEF215Z

4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 detected? Is it difficult to start engine?

Without CONSULT-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 3 seconds at idle speed.



LEC286

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-1438.
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 detected? Is it difficult to start engine?

Yes or No

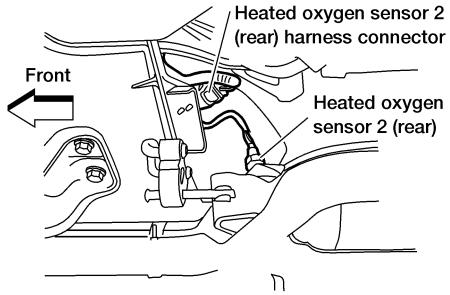
Yes	▶	Perform trouble diagnosis for DTC P0172. Refer to EC-1637.
No	▶	GO TO 3.

Diagnostic Procedure (Cont'd)

3	CHECK INPUT SIGNAL CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect heated oxygen sensor 2 (rear) harness connector and ECM harness connector.

View from under the vehicle



LEC277

3. Check harness continuity between ECM terminal 63 and HO2S2 terminal 1.
   Refer to "Wiring Diagram", EC-1597.
   Continuity should exist.
4. Check harness continuity between ECM terminal 63 (or HO2S2 terminal 1) and ground.
   Refer to "Wiring Diagram", EC-1597.
   Continuity should not exist.
5. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK GROUND CIRCUIT

1. Check harness continuity between HO2S2 terminal 4 and engine ground.
   Refer to "Wiring Diagram", EC-1597.
   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 HEATED OXYGEN SENSOR 2 (REAR)

Refer to "Component Inspection", EC-1601.

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace heated oxygen sensor 2 (rear).

6	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1508.

▶ **INSPECTION END**

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
HO2S1 (B1)	XXX V
HO2S2 (B1)	XXX V
HO2S1 MNTR (B1)	RICH
HO2S2 MNTR (B1)	RICH

SEF662Y

Component Inspection

NIEC0864

HEATED OXYGEN SENSOR 2 (REAR)

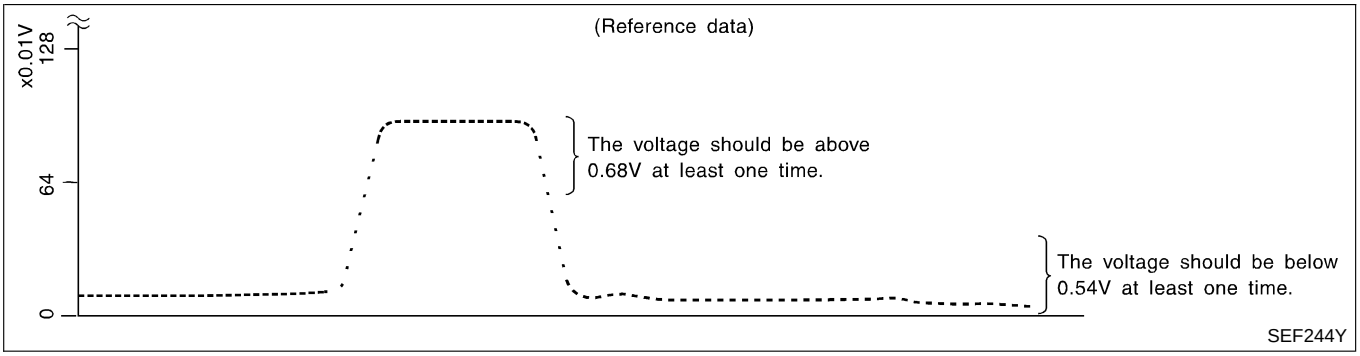
NIEC0864S01

With CONSULT-II

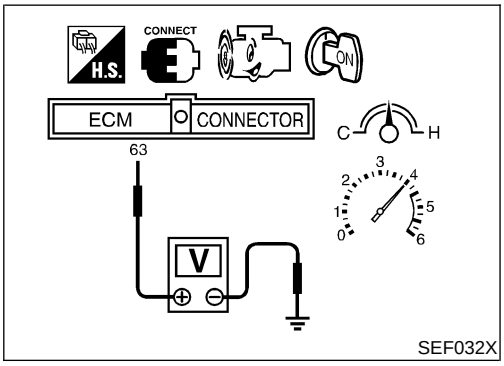
1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)” as the monitor item with CONSULT-II.
4) Check “HO2S2 (B1)” at idle speed when adjusting “FUEL INJECTION” to ±25%.
“HO2S2 (B1)” should be above 0.68V at least once when the “FUEL INJECTION” is +25%. “HO2S2 (B1)” 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.**
- **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.**



SEF244Y



SEF032X

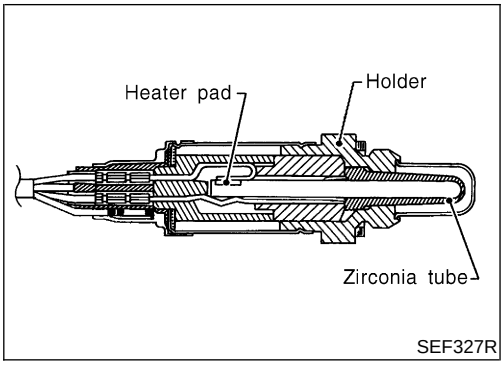
Without CONSULT-II

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 terminals 63 [Heated oxygen sensor 2 (rear) 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 0.68V at least once.
If the voltage is above 0.68V at step 4, step 5 is not necessary.
5) Check the voltage when revving up to 6,000 rpm under no load, or keep vehicle at idle for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), D position with “OD” OFF (A/T).
The voltage should be below 0.54V at least once.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**

- **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.**



Component Description

NIEC0865

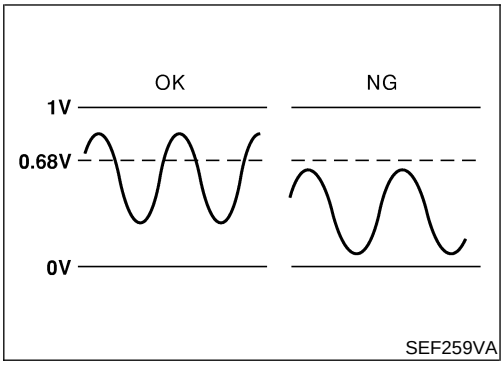
The heated oxygen sensor 2 (rear), after three way catalyst, monitors the oxygen level in the exhaust gas.
Even if switching characteristics of the heated oxygen sensor 1 (front) are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2 (rear).
This 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 heated oxygen sensor 2 (rear) is not used for engine control operation.

CONSULT-II Reference Value in Data Monitor Mode

NIEC0866

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1)	• Engine: After warming up	Revving engine from idle to 3,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)			LEAN ⟷ RICH

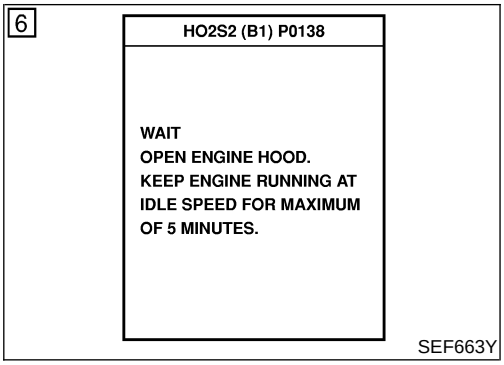


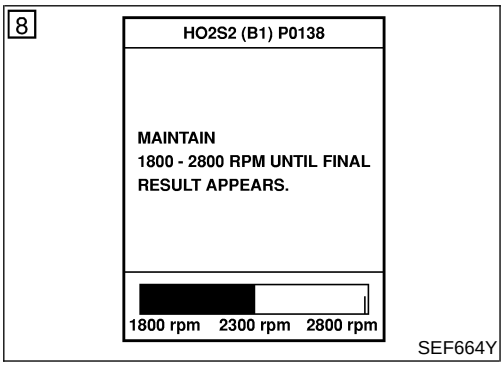
On Board Diagnosis Logic

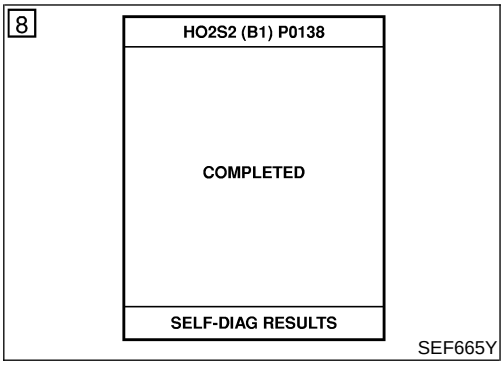
NIEC0867

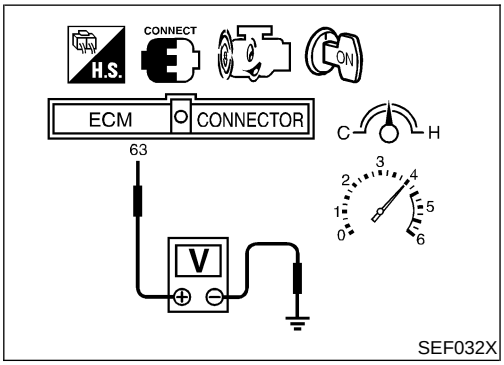
The heated oxygen sensor 2 (rear) has a much longer switching time between rich and lean than the heated oxygen sensor 1 (front). The oxygen storage capacity before the three way catalyst causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2 (rear), ECM monitors whether the maximum voltage of the sensor is sufficiently high during various driving conditions such as fuel-cut.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0138	• The maximum voltage from the sensor does not reach the specified voltage.	• Harness or connectors (The sensor circuit is open or shorted.) • Heated oxygen sensor 2 (rear) • Fuel pressure • Injectors • Intake air leaks









DTC Confirmation Procedure

NIEC0868

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

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 “HO2S2 (B1) P0138” of “HO2S2” 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-1606.
   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

NIEC0869

Use this procedure to check the overall function of the heated oxygen sensor 2 (rear) circuit. During this check, a 1st trip DTC might not be confirmed.

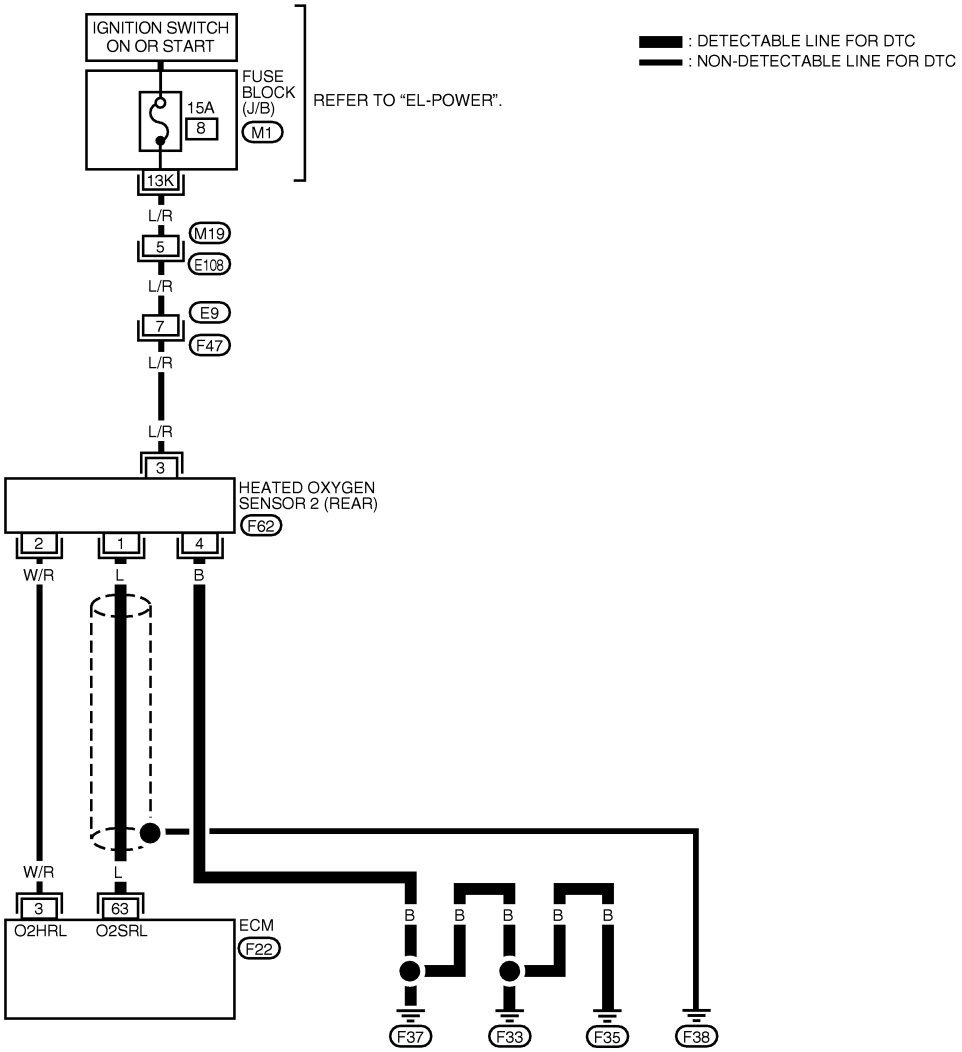
With GST

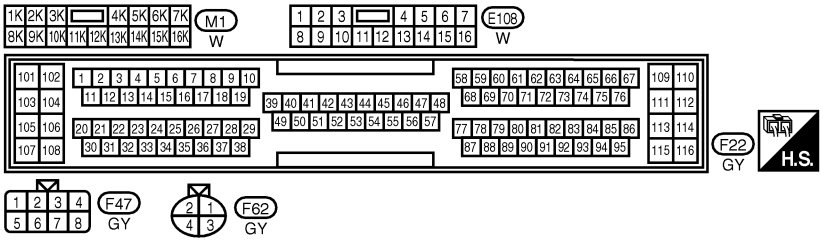
1) Start engine and drive vehicle at a speed of 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Set voltmeter probes between ECM terminals 63 [Heated oxygen sensor 2 (rear) signal] and engine ground.
4) Check the voltage when revving engine up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.68V at least once during this procedure.
   If the voltage can be confirmed in step 4, step 5 is not necessary.
5) Keep vehicle at idle for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), D position with “OD” OFF (A/T).
   The voltage should be above 0.68V at least once during this procedure.
6) If NG, go to “Diagnostic Procedure”, EC-1606.

Wiring Diagram

NIEC0870

EC-HO2S2-01





LEC200

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	L	HEATED OXYGEN SENSOR 2 (REAR)	ENGINE RUNNING FROM IDLE UP TO 2,000 RPM UNDER WARM-UP CONDITION	0 - APPROX. 1.0V

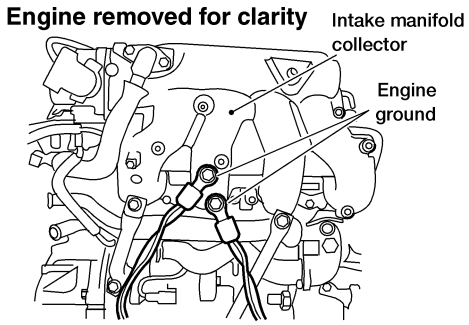
SEF569Y

Diagnostic Procedure

NIEC0871

1	RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.



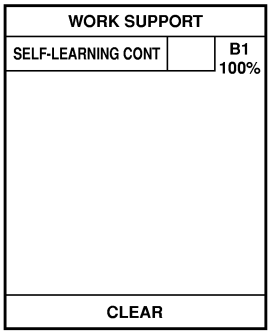
LEC302

▶	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-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching "CLEAR".

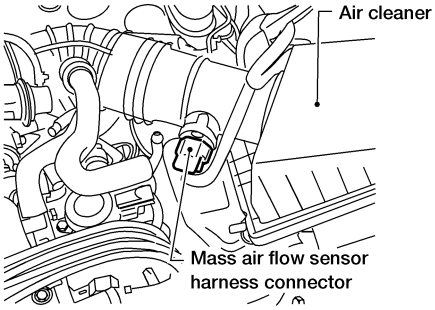


SEF215Z

4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 detected? Is it difficult to start engine?

Without CONSULT-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 3 seconds at idle speed.



LEC286

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-1438.
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 detected? Is it difficult to start engine?

Yes or No

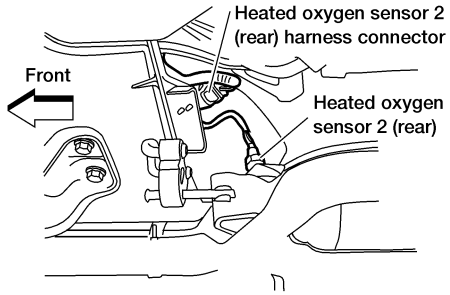
Yes	▶	Perform trouble diagnosis for DTC P0171. Refer to EC-1630.
No	▶	GO TO 3.

Diagnostic Procedure (Cont'd)

3	CHECK INPUT SIGNAL CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect heated oxygen sensor 2 (rear) harness connector and ECM harness connector.

View from under the vehicle



LEC277

3. Check harness continuity between ECM terminal 63 and HO2S2 terminal 1.
   Refer to "Wiring Diagram", EC-1605.
   Continuity should exist.
4. Check harness continuity between ECM terminal 63 (or HO2S2 terminal 1) and ground.
   Refer to "Wiring Diagram", EC-1605.
   Continuity should not exist.
5. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK GROUND CIRCUIT

1. Check harness continuity between HO2S2 terminal 4 and engine ground.
   Refer to "Wiring Diagram", EC-1605.
   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 HEATED OXYGEN SENSOR 2 (REAR)

Refer to "Component Inspection", EC-1609.

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace heated oxygen sensor 2 (rear).

6	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1508.

▶ **INSPECTION END**

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
HO2S1 (B1)	XXX V
HO2S2 (B1)	XXX V
HO2S1 MNTR (B1)	RICH
HO2S2 MNTR (B1)	RICH

SEF662Y

Component Inspection

NIEC0872

HEATED OXYGEN SENSOR 2 (REAR)

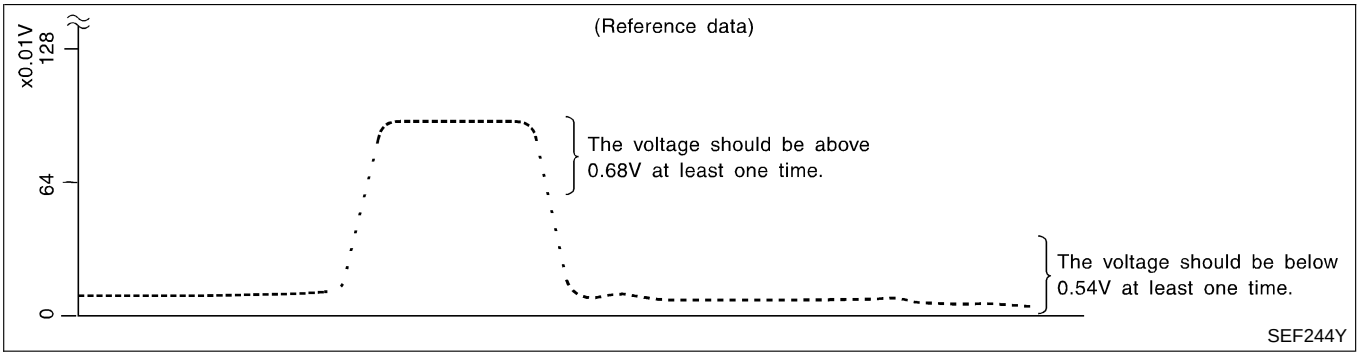
NIEC0872S01

With CONSULT-II

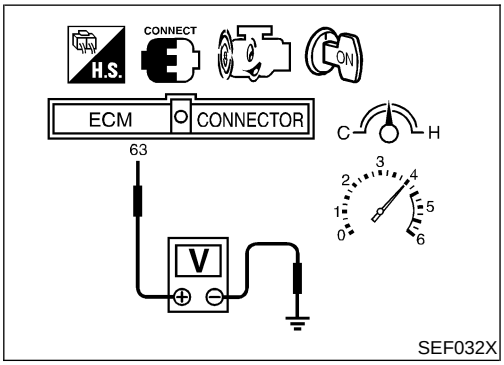
1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes..
2) Stop vehicle with engine running.
3) Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)” as the monitor item with CONSULT-II.
4) Check “HO2S2 (B1)” at idle speed when adjusting “FUEL INJECTION” to ±25%.
   “HO2S2 (B1)” should be above 0.68V at least once when the “FUEL INJECTION” is +25%.
   “HO2S2 (B1)” 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.**
- **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.**



SEF244Y



SEF032X

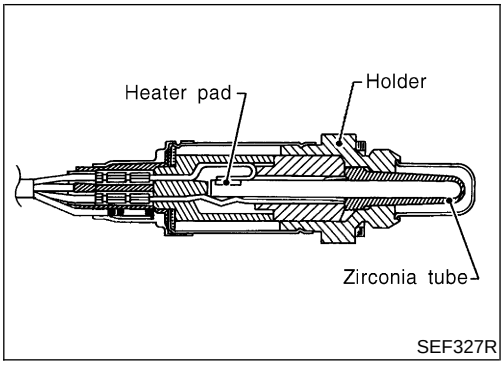
Without CONSULT-II

1) Start engine and drive vehicle at a speed of 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Set voltmeter probes between ECM terminals 63 [Heated oxygen sensor 2 (rear) 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 0.68V at least once.
   If the voltage is above 0.68V at step 4, step 5 is not necessary.
5) Check the voltage when revving up to 6,000 rpm under no load, or keep vehicle at idle for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), D position with “OD” OFF (A/T).
   The voltage should be below 0.54V at least once.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**

- **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.**



Component Description

NIEC0873

The heated oxygen sensor 2 (rear), after three way catalyst, monitors the oxygen level in the exhaust gas.

Even if switching characteristics of the heated oxygen sensor 1 (front) are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2 (rear).

This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.

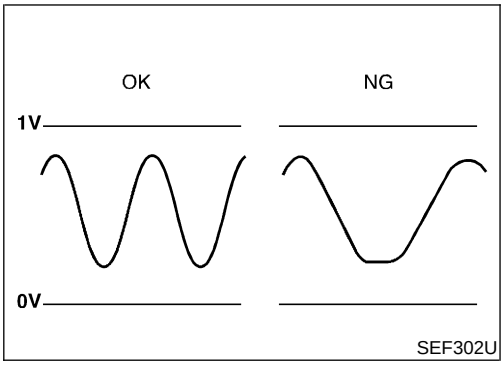
Under normal conditions the heated oxygen sensor 2 (rear) is not used for engine control operation.

CONSULT-II Reference Value in Data Monitor Mode

NIEC0874

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1)	• Engine: After warming up	Revving engine from idle to 3,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)			LEAN ⟷ RICH

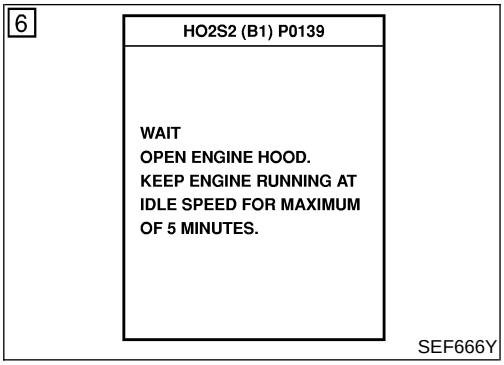


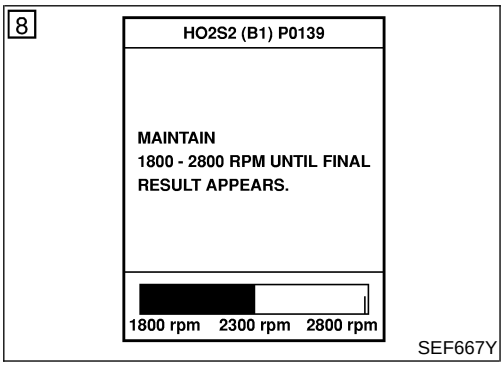
On Board Diagnosis Logic

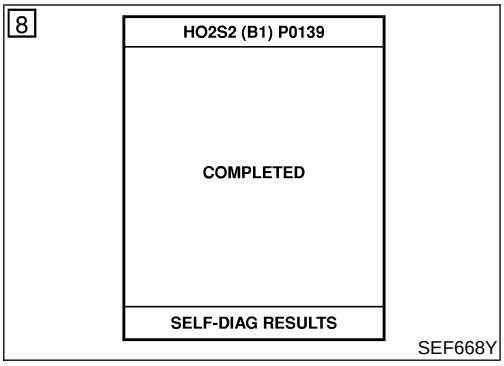
NIEC0875

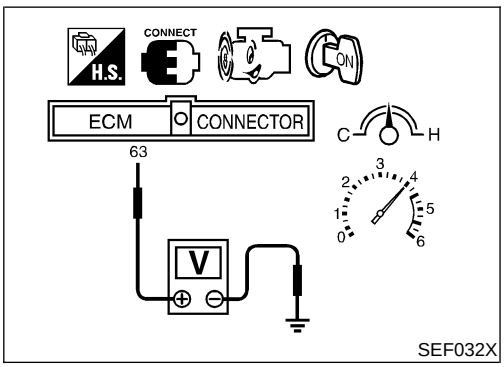
The heated oxygen sensor 2 (rear) has a much longer switching time between rich and lean than the heated oxygen sensor 1 (front). The oxygen storage capacity before the three way catalyst causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2 (rear), ECM monitors whether the switching response of the sensor's voltage is faster than specified during various driving conditions such as fuel-cut.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0139	• It takes more than the specified time for the sensor to respond between rich and lean.	• Harness or connectors (The sensor circuit is open or shorted.) • Heated oxygen sensor 2 (rear) • Fuel pressure • Injectors • Intake air leaks









DTC Confirmation Procedure

NIEC0876

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

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 “HO2S2 (B1) P0139” of “HO2S2” 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-1614.
   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

NIEC0877

Use this procedure to check the overall function of the heated oxygen sensor 2 (rear) circuit. During this check, a 1st trip DTC might not be confirmed.

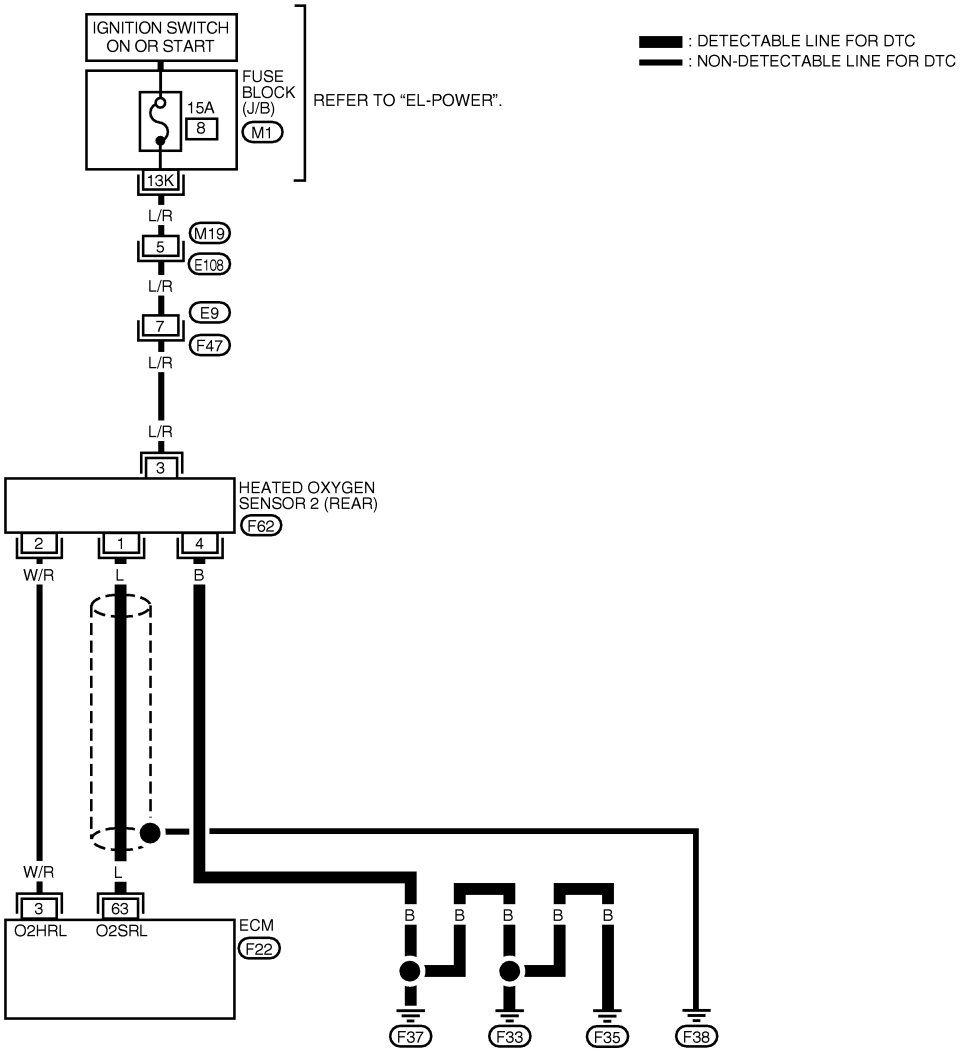
With GST

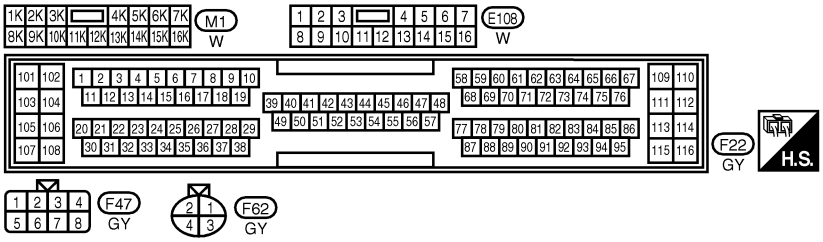
1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Set voltmeter probes between ECM terminals 63 [Heated oxygen sensor 2 (rear) signal] and engine ground.
4) Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should change at more than 0.06V for 1 second during this procedure.
   If the voltage can be confirmed in step 4, step 5 is not necessary.
5) Keep vehicle at idle for 10 minutes, then check the voltage, or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), D position with “OD” OFF (A/T).
   The voltage should change at more than 0.06V for 1 second during this procedure.
6) If NG, go to “Diagnostic Procedure”, EC-1614.

Wiring Diagram

NIEC0878

EC-HO2S2-01





LEC200

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	L	HEATED OXYGEN SENSOR 2 (REAR)	ENGINE RUNNING FROM IDLE UP TO 2,000 RPM UNDER WARM-UP CONDITION	0 - APPROX. 1.0V

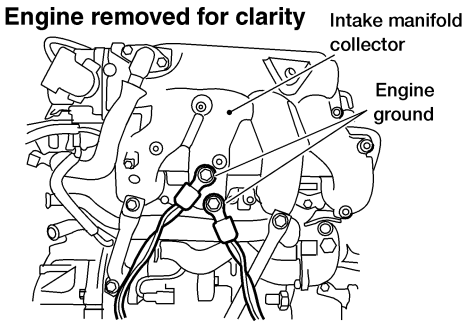
SEF569Y

Diagnostic Procedure

NIEC0879

1	RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.



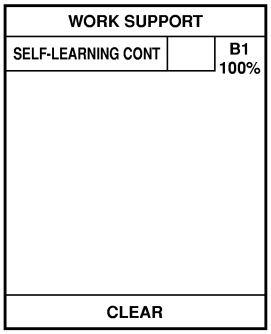
LEC302

▶	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-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching "CLEAR".

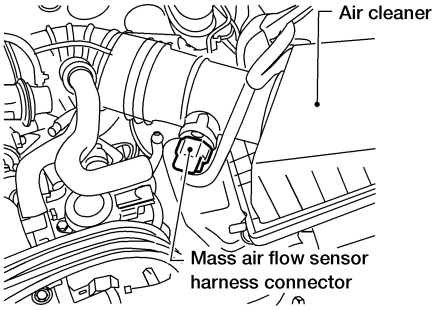


SEF215Z

4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 detected? Is it difficult to start engine?

Without CONSULT-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 3 seconds at idle speed.



LEC286

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-1438.
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 detected? Is it difficult to start engine?

Yes or No

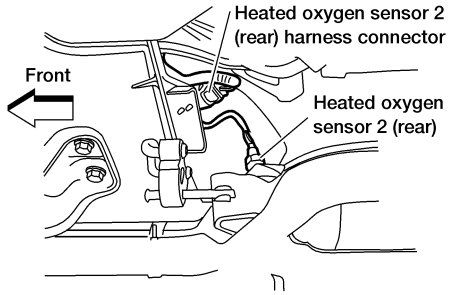
Yes	▶	Perform trouble diagnosis for DTC P0172. Refer to EC-1637.
No	▶	GO TO 3.

Diagnostic Procedure (Cont'd)

3	CHECK INPUT SIGNAL CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect heated oxygen sensor 2 (rear) harness connector and ECM harness connector.

View from under the vehicle



LEC277

3. Check harness continuity between ECM terminal 63 and HO2S2 terminal 1.
   Refer to "Wiring Diagram", EC-1613.
   Continuity should exist.
4. Check harness continuity between ECM terminal 63 (or HO2S2 terminal 1) and ground.
   Refer to "Wiring Diagram", EC-1613.
   Continuity should not exist.
5. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK GROUND CIRCUIT

1. Check harness continuity between HO2S2 terminal 4 and engine ground.
   Refer to "Wiring Diagram", EC-1613.
   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 HEATED OXYGEN SENSOR 2 (REAR)

Refer to "Component Inspection", EC-1617.

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace heated oxygen sensor 2 (rear).

6	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1508.

▶ **INSPECTION END**

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
HO2S1 (B1)	XXX V
HO2S2 (B1)	XXX V
HO2S1 MNTR (B1)	RICH
HO2S2 MNTR (B1)	RICH

SEF662Y

Component Inspection

NIEC0880

HEATED OXYGEN SENSOR 2 (REAR)

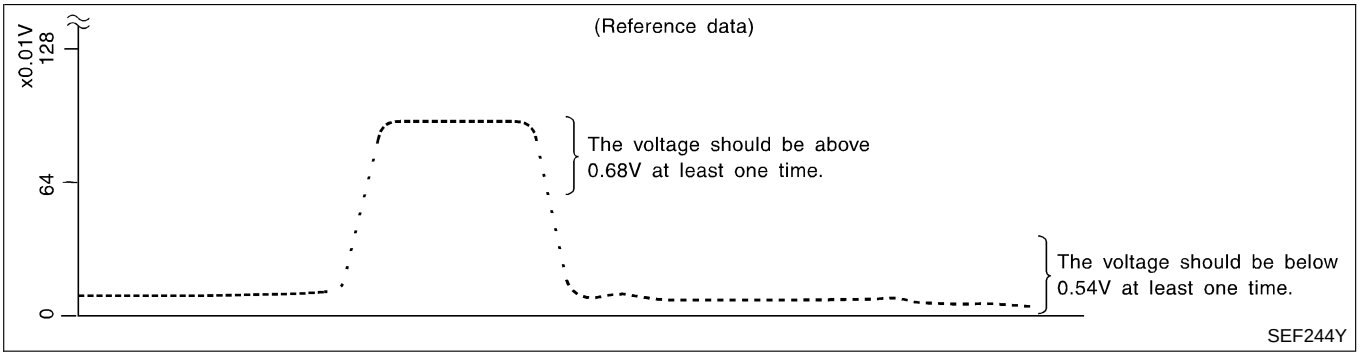
NIEC0880S01

With CONSULT-II

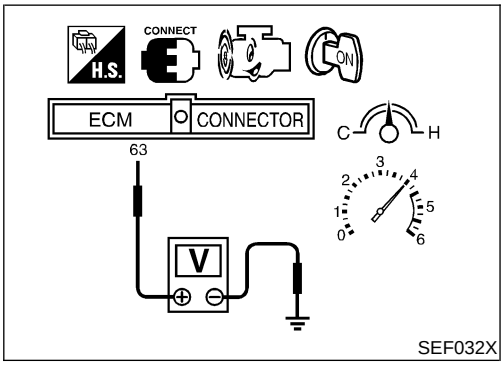
1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)” as the monitor item with CONSULT-II.
4) Check “HO2S2 (B1)” at idle speed when adjusting “FUEL INJECTION” to ±25%.
   “HO2S2 (B1)” should be above 0.68V at least once when the “FUEL INJECTION” is +25%.
   “HO2S2 (B1)” 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.**
- **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.**



SEF244Y



SEF032X

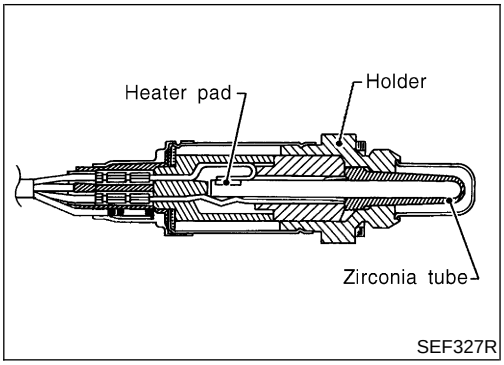
Without CONSULT-II

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 terminals 63 [Heated oxygen sensor 2 (rear) 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 0.68V at least once.
   If the voltage is above 0.68V at step 4, step 5 is not necessary.
5) Check the voltage when revving up to 6,000 rpm under no load, or keep vehicle at idle for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), D position with “OD” OFF (A/T).
   The voltage should be below 0.54V at least once.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**

- **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.**



Component Description

NIEC0881

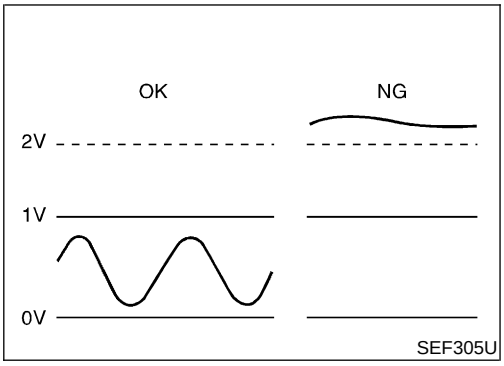
The heated oxygen sensor 2 (rear), after three way catalyst, monitors the oxygen level in the exhaust gas.
Even if switching characteristics of the heated oxygen sensor 1 (front) are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2 (rear).
This 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 heated oxygen sensor 2 (rear) is not used for engine control operation.

CONSULT-II Reference Value in Data Monitor Mode

NIEC0882

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1)	• Engine: After warming up	Revving engine from idle to 3,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)			LEAN ⟷ RICH

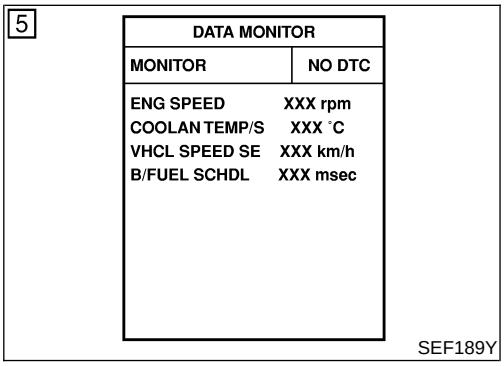


On Board Diagnosis Logic

NIEC0883

The heated oxygen sensor 2 (rear) has a much longer switching time between rich and lean than the heated oxygen sensor 1 (front). The oxygen storage capacity before the three way catalyst causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2 (rear), ECM monitors whether or not the voltage is too high during various driving conditions such as fuel-cut.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0140	• An excessively high voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Heated oxygen sensor 2 (rear)



DTC Confirmation Procedure

NIEC0884

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.

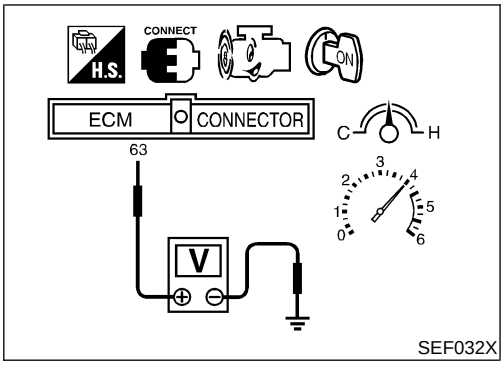
With CONSULT-II

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	1,400 - 3,400 rpm
VHCL SPEED SE	64 - 120 km/h (40 - 75 MPH)
B/FUEL SCHDL	0.5 - 3.9 msec
COOLAN TEMP/S	More than 70°C (158°F)
Selector lever	Suitable position

6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1622.



Overall Function Check

NIEC0885

Use this procedure to check the overall function of the heated oxygen sensor 2 (rear) circuit. During this check, a 1st trip DTC might not be confirmed.

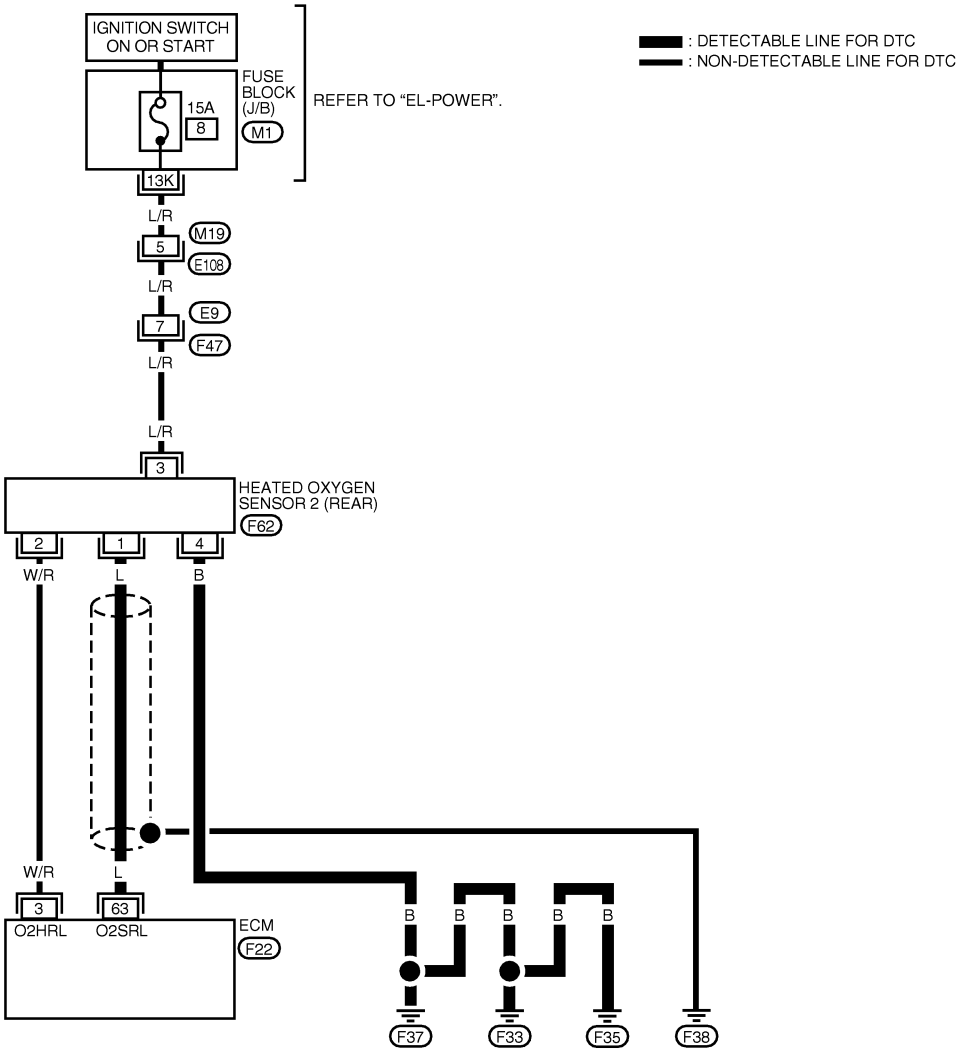
Without CONSULT-II

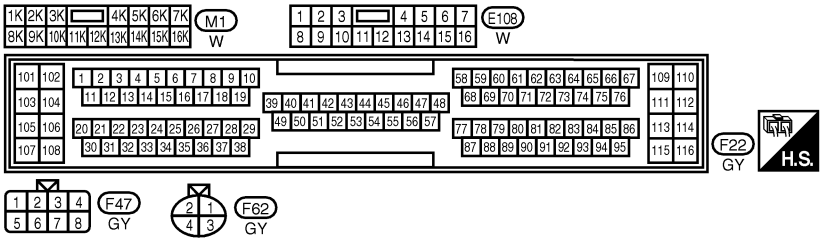
1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Set voltmeter probes between ECM terminals 63 [Heated oxygen sensor 2 (rear) signal] and engine ground.
4) Check the voltage after revving up to 4,000 rpm under no load at least 10 times.
(Depress and release accelerator pedal as soon as possible.)
The voltage should be below 2V during this procedure.
5) If NG, go to "Diagnostic Procedure", EC-1622.

Wiring Diagram

NIEC0886

EC-HO2S2-01





LEC200

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	L	HEATED OXYGEN SENSOR 2 (REAR)	ENGINE RUNNING FROM IDLE UP TO 2,000 RPM UNDER WARM-UP CONDITION	0 - APPROX. 1.0V

SEF569Y

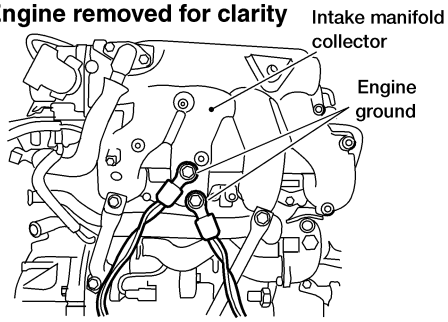
Diagnostic Procedure

NIEC0887

1	RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

Engine removed for clarity



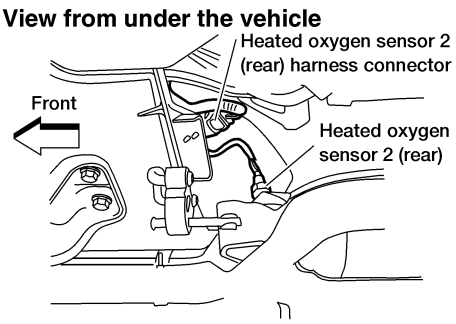
LEC302

▶	GO TO 2.

2	CHECK INPUT SIGNAL CIRCUIT

1. Disconnect heated oxygen sensor 2 (rear) harness connector and ECM harness connector.

View from under the vehicle



LEC277

2. Check harness continuity between ECM terminal 63 and HO2S2 terminal 1.
   Refer to “Wiring Diagram”, EC-1621.
   Continuity should exist.
3. Check harness continuity between ECM terminal 63 (or HO2S2 terminal 1) and ground.
   Refer to “Wiring Diagram”, EC-1621.
   Continuity should not exist.
4. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 3.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

3	CHECK GROUND CIRCUIT

1. Check harness continuity between HO2S2 terminal 4 and engine ground.
   Refer to “Wiring Diagram”, EC-1621.
   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 HARNESS CONNECTOR
Check heated oxygen sensor 2 (rear) harness connector for water. **Water should not exist.**	
OK or NG	
OK ▶	GO TO 5.
NG ▶	Repair or replace harness connector.

5	CHECK HEATED OXYGEN SENSOR 2 (REAR)
Refer to "Component Inspection", EC-1623.	
OK or NG	
OK ▶	GO TO 6.
NG ▶	Replace heated oxygen sensor 2 (rear).

6	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1508.	
▶	**INSPECTION END**

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
HO2S1 (B1)	XXX V
HO2S2 (B1)	XXX V
HO2S1 MNTR (B1)	RICH
HO2S2 MNTR (B1)	RICH

SEF662Y

Component Inspection

NIEC0888

HEATED OXYGEN SENSOR 2 (REAR)

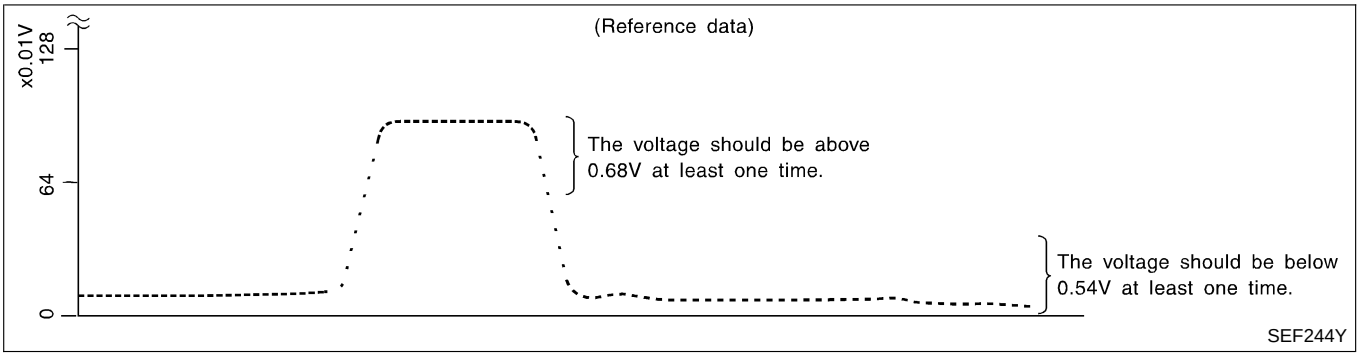
NIEC0888S01

With CONSULT-II

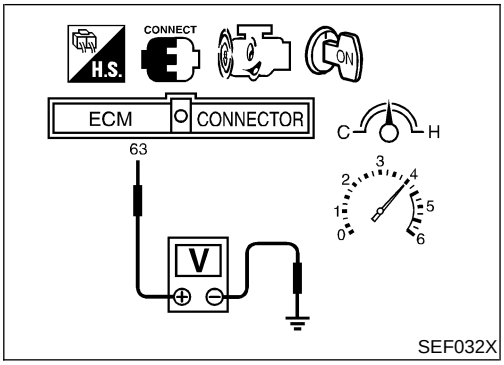
1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)" as the monitor item with CONSULT-II.
4) Check "HO2S2 (B1)" at idle speed when adjusting "FUEL INJECTION" to ±25%.
   "HO2S2 (B1)" should be above 0.68V at least once when the "FUEL INJECTION" is +25%.
   "HO2S2 (B1)" 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.**
- **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.**



Component Inspection (Cont'd)



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 terminals 63 [Heated oxygen sensor 2 (rear) 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 0.68V at least once.
   If the voltage is above 0.68V at step 4, step 5 is not necessary.
5) Check the voltage when revving up to 6,000 rpm under no load. Or keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), D position with "OD" OFF (A/T).
   The voltage should be below 0.54V at least once.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **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.**

Description

NIEC0889

SYSTEM DESCRIPTION

NIEC0889S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE)	Engine speed	Heated oxygen sensor 2 (rear) heater control	Heated oxygen sensor 2 (rear) heater

The ECM performs ON/OFF control of the heated oxygen sensor 2 (rear) heater corresponding to the engine speed.

OPERATION

NIEC0889S02

Engine speed rpm	Heated oxygen sensor 2 (rear) heater
Above 3,600	OFF
Below 3,600	ON

CONSULT-II Reference Value in Data Monitor Mode

NIEC0890

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 HTR (B1)	• 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

On Board Diagnosis Logic

NIEC0891

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0141	• The current amperage in the heated oxygen sensor 2 (rear) heater circuit is out of the normal range. [An improper voltage drop signal is sent to ECM through the heated oxygen sensor 2 (rear) heater.]	• Harness or connectors [The heated oxygen sensor 2 (rear) heater circuit is open or shorted.] • Heated oxygen sensor 2 (rear) heater

DTC Confirmation Procedure

NIEC0892

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 in between 10.5V and 16V at idle.

DTC Confirmation Procedure (Cont'd)

2

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
VHCL SPEED SE	XXX km/h
THRTL POS SEN	XXX V

SEF175Y

With CONSULT-II

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 and let engine idle for at least 6 seconds.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1628.

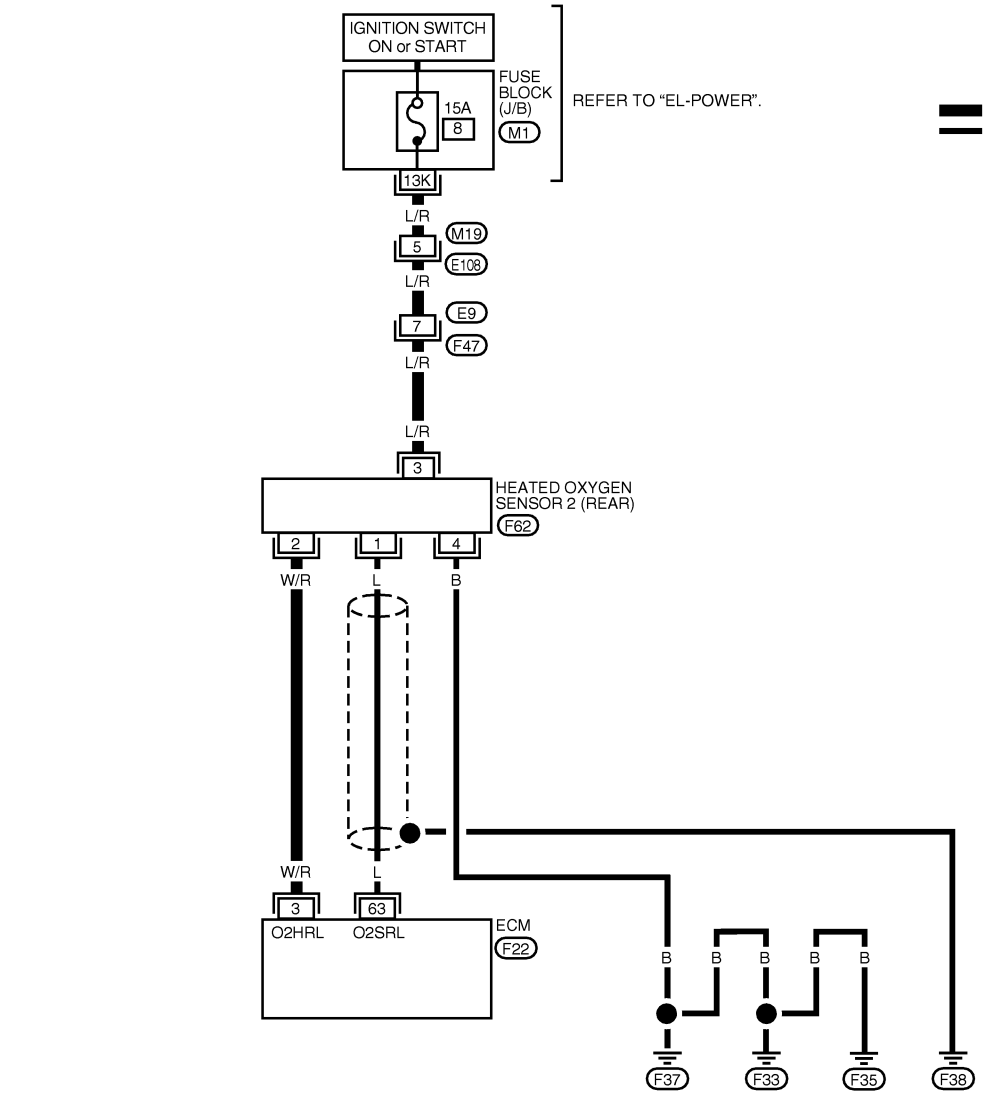
With GST

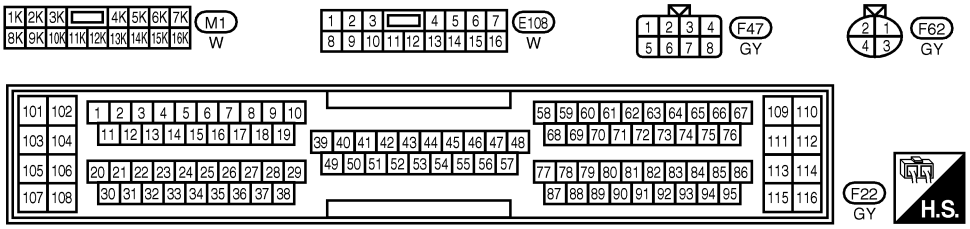
1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle and let engine idle for at least 6 seconds.
3) Turn ignition switch "OFF" and wait at least 10 seconds.
4) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
5) Stop vehicle and let engine idle for at least 6 seconds.
6) Select "MODE 3" with GST.
7) If DTC is detected, go to "Diagnostic Procedure", EC-1628.

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

NIEC0893





LEC201

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	W/R	HEATED OXYGEN SENSOR 2 (REAR) 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

SEF570Y

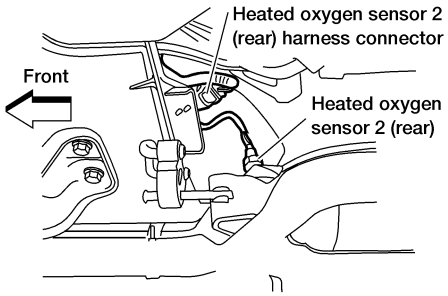
Diagnostic Procedure

NIEC0894

1	CHECK POWER SUPPLY

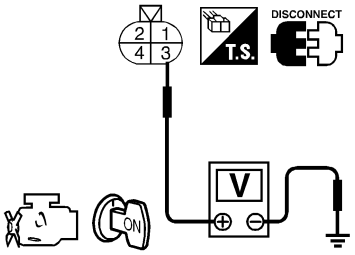
1. Turn ignition switch “OFF”.
2. Disconnect heated oxygen sensor 2 (rear) harness connector.

View from under the vehicle



LEC277

3. Turn ignition switch “ON”.
4. Check voltage between HO2S2 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 M19, E108
- Harness or connectors E9, F47
- Fuse block (J/B) connector M1
- 15A fuse
- Harness for open or short between heated oxygen sensor 2 (rear) and fuse

	▶	Repair harness or connectors.

3	CHECK GROUND CIRCUIT

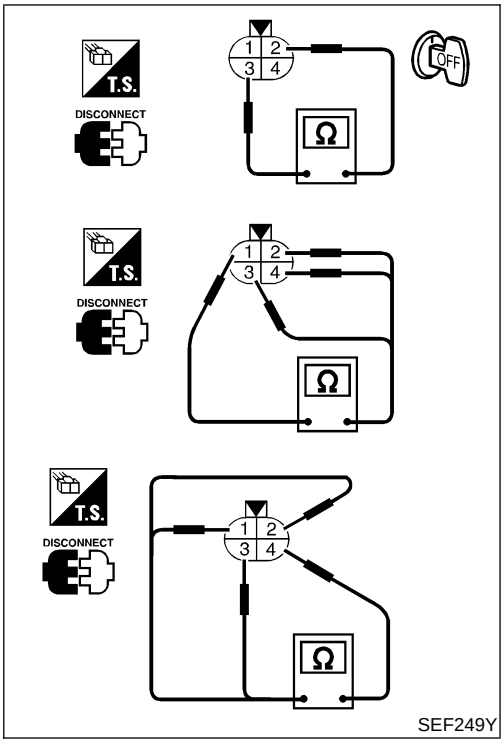
1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between HO2S2 terminal 2 and ECM terminal 3.
   Refer to “Wiring Diagram”, EC-1627.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

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 HEATED OXYGEN SENSOR 2 (REAR) HEATER	
Refer to "Component Inspection", EC-1629.		
OK or NG		
OK	▶	GO TO 5.
NG	▶	Replace heated oxygen sensor 2 (rear).

5	CHECK INTERMITTENT INCIDENT	
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1508.		
	▶	**INSPECTION END**



Component Inspection

HEATED OXYGEN SENSOR 2 (REAR) HEATER

NIEC0895

NIEC0895S01

Check the following.

1. Check resistance between terminals 2 and 3.
   Resistance: 2.3 - 4.3Ω at 25°C (77°F)
2. Check continuity.

Terminal No.	Continuity
1 and 2, 3, 4	No
4 and 1, 2, 3	

If NG, replace the heated oxygen sensor 2 (rear).

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.**
- **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.**

On Board Diagnosis Logic

NIEC0896

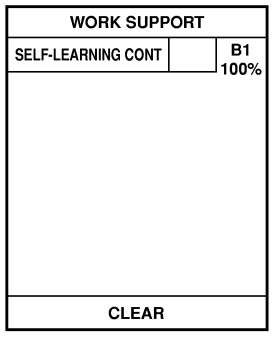
With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the heated oxygen sensor 1 (front). The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios.

In case the amount of the compensation value is extremely large (The actual mixture ratio is too lean.), the ECM judges the condition as the fuel injection system malfunction and lights up the MIL (2 trip detection logic).

Sensor	Input Signal to ECM	ECM function	Actuator
Heated oxygen sensor 1 (front)	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection & mixture ratio control	Injectors

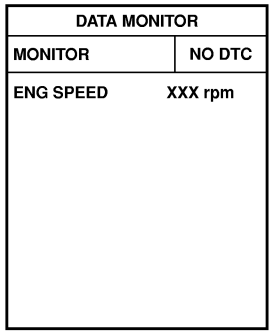
DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0171	• Fuel injection system does not operate properly. • The amount of mixture ratio compensation is too large. (The mixture ratio is too lean.)	• Intake air leaks • Heated oxygen sensor 1 (front) • Injectors • Exhaust gas leaks • Incorrect fuel pressure • Lack of fuel • Mass air flow sensor

4

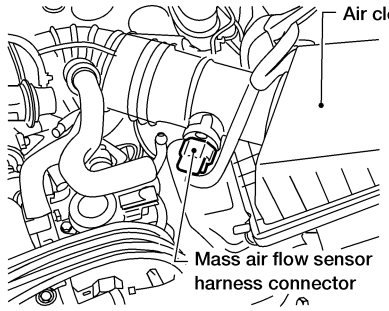


SEF215Z

6



SEF058Y



LEC286

DTC Confirmation Procedure

NIEC0897

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

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-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
4) Clear the self-learning control coefficient by touching “CLEAR”.
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 should be detected at this stage, if a malfunction exists. If so, go to “Diagnostic Procedure”, EC-1633.
7) If it is difficult to start engine at step 6, the fuel injection system has a malfunction.
8) Crank engine while depressing accelerator pedal. If engine starts, go to “Diagnostic Procedure”, EC-1633. If engine does not start, visually check for exhaust and intake air leak.

With GST

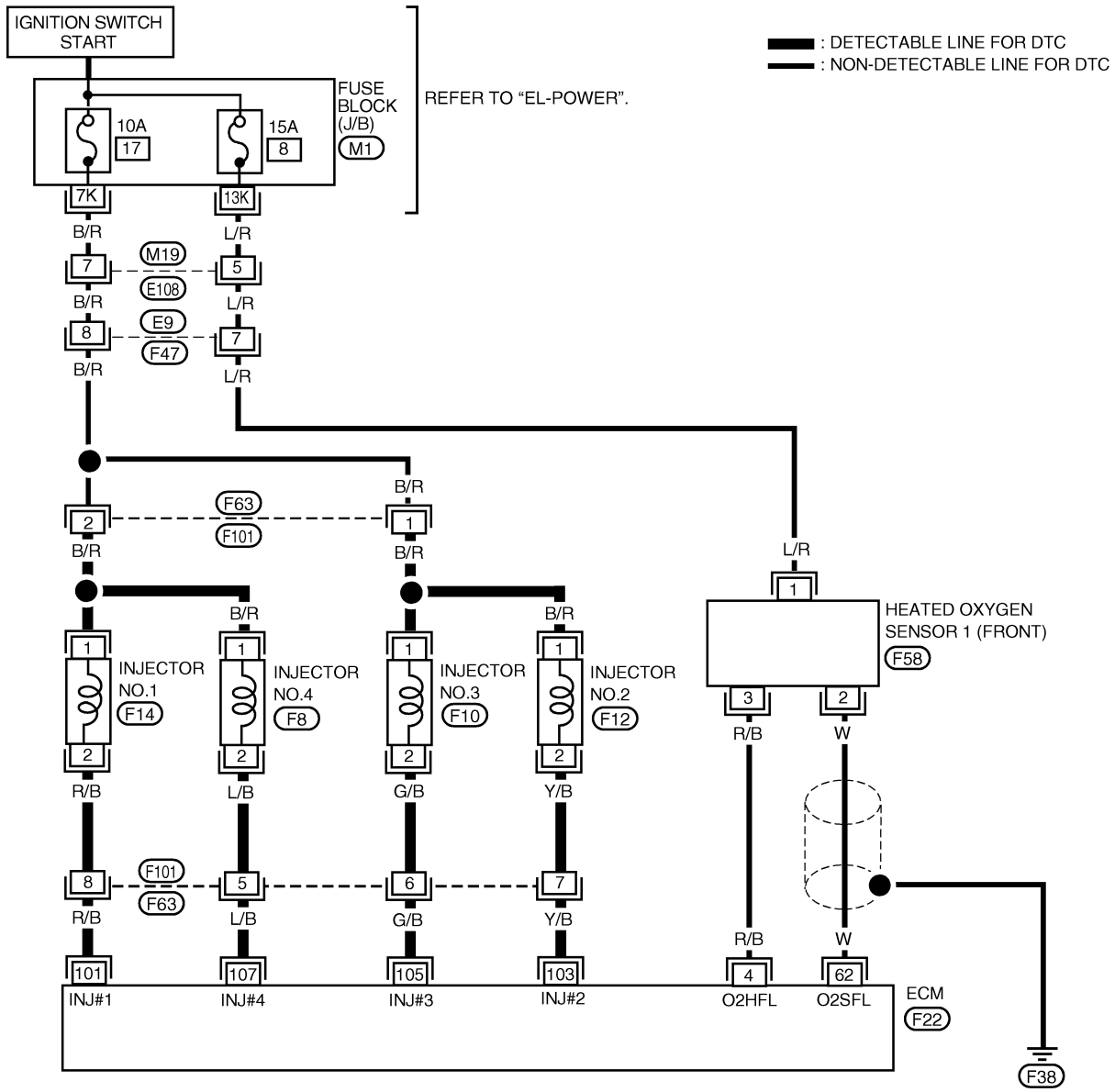
1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch “OFF” and wait at least 10 seconds.
3) Disconnect mass air flow sensor harness connector. Then restart and run engine for at least 3 seconds at idle speed.
4) Stop engine and reconnect mass air flow sensor harness connector.
5) Select “MODE 7” with GST. Make sure 1st trip DTC P0100 is detected.
6) Select “MODE 4” with GST and erase the 1st trip DTC P0100.

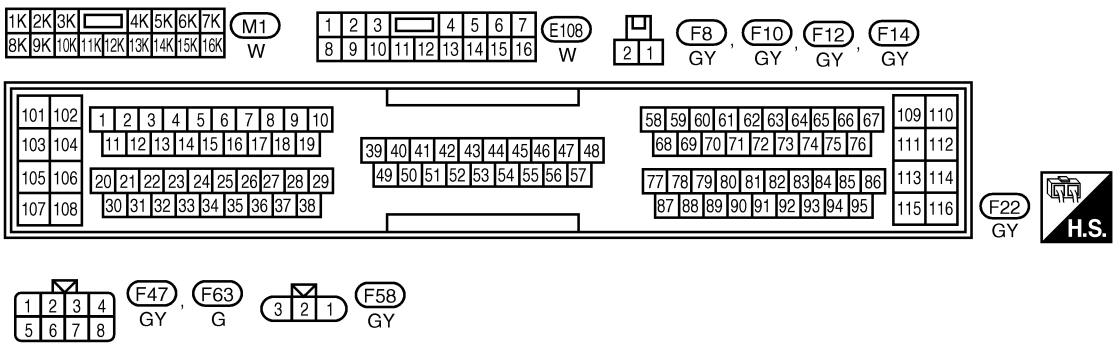
7) Start engine again and run it for at least 10 minutes at idle speed.
8) Select "MODE 7" with GST. The 1st trip DTC P0171 should be detected at this stage, if a malfunction exists. If so, go to "Diagnostic Procedure", EC-1633.
9) If it is difficult to start engine at step 8, the fuel injection system has a malfunction.
10) Crank engine while depressing accelerator pedal. If engine starts, go to "Diagnostic Procedure", EC-1633. If engine does not start, visually check for exhaust and intake air leak.

Wiring Diagram

NIEC0898

EC-FUEL-01





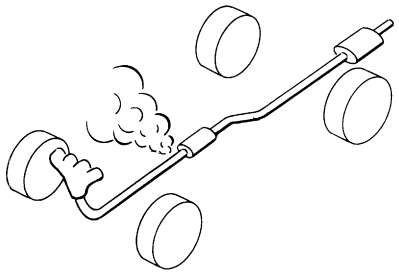
LEC214

Diagnostic Procedure

NIEC0899

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

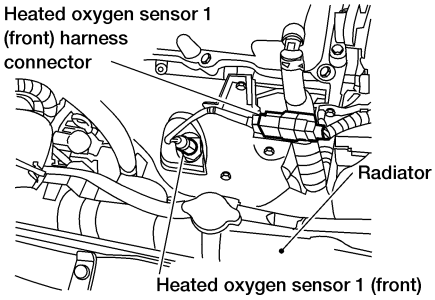
Listen for an intake air leak after the mass air flow sensor.

OK or NG

OK	▶	GO TO 3.
NG	▶	Repair or replace.

3	CHECK HEATED OXYGEN SENSOR 1 (FRONT) CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect heated oxygen sensor 1 (front) harness connector and ECM harness connector.



LEC274

3. Check harness continuity between ECM terminal 62 and HO2S1 terminal 2.
   Refer to “Wiring Diagram”, EC-1632.
   Continuity should exist.
4. Check harness continuity between ECM terminal 62 (or HO2S1 terminal 2) and ground.
   Refer to “Wiring Diagram”, EC-1632.
   Continuity should not exist.
5. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

Diagnostic Procedure (Cont'd)

4	CHECK FUEL PRESSURE

1. Release fuel pressure to zero.
   Refer to EC-1408.
2. Install fuel pressure gauge and check fuel pressure.
   At idling:
   When fuel pressure regulator valve vacuum hose is connected.
   235 kPa (2.4 kg/cm^2, 34 psi)
   When fuel pressure regulator valve vacuum hose is disconnected.
   294 kPa (3.0 kg/cm^2, 43 psi)

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART

Check the following.
- Fuel pump and circuit Refer to EC-1926.
- Fuel pressure regulator Refer to EC-1409.
- Fuel lines. Refer to ***MA-19***, "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.
   at idling: 2.5 - 5.0 g·m/sec
   at 2,500 rpm: 7.1 - 12.5 g·m/sec

With GST
1. Install all removed parts.
2. Check mass air flow sensor signal in MODE 1 with GST.
   at idling: 2.5 - 5.0 g·m/sec
   at 2,500 rpm: 7.1 - 12.5 g·m/sec

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-1515.

7	CHECK FUNCTION OF INJECTORS

With CONSULT-II

1. Start engine.
2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-II.

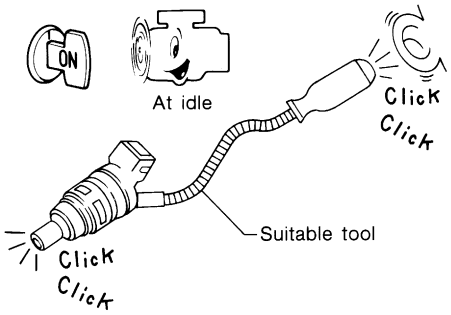
ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
IACV-AAC/V	XXX step

SEF190Y

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-1917.

8	REMOVE INJECTOR

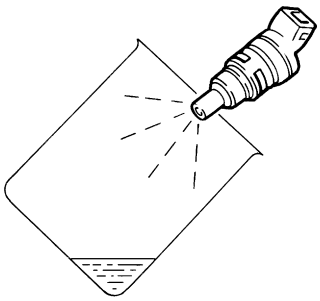
1. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
2. Turn ignition switch "OFF".
3. Remove injector with fuel tube assembly. Refer to EC-1409.
   Keep fuel hose and all injectors connected to injector gallery. The injector harness connectors should remain connected.

	▶	GO TO 9.

Diagnostic Procedure (Cont'd)

9	CHECK INJECTOR

1. Disconnect all ignition wires.
2. Place pans or saucers under each injector.
3. Crank engine for about 3 seconds. Make sure that fuel sprays out from injectors.



SEF595Q

Fuel should be sprayed evenly for each cylinder.

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace injectors from which fuel does not spray out. Always replace O-ring with new one.

10	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1508.	
▶	**INSPECTION END**

On Board Diagnosis Logic

NIEC0900

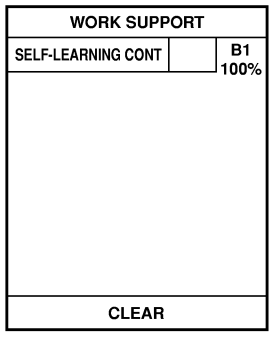
With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the heated oxygen sensor 1 (front). The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios.

In case the amount of the compensation value is extremely large (The actual mixture ratio is too rich.), the ECM judges the condition as the fuel injection system malfunction and lights up the MIL (2 trip detection logic).

Sensor	Input Signal to ECM	ECM function	Actuator
Heated oxygen sensor 1 (front)	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection & mixture ratio control	Injectors

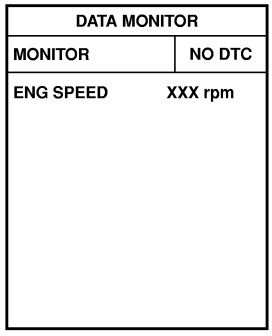
DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0172	• Fuel injection system does not operate properly. • The amount of mixture ratio compensation is too large. (The mixture ratio is too rich.)	• Heated oxygen sensor 1 (front) • Injectors • Exhaust gas leaks • Incorrect fuel pressure • Mass air flow sensor

4

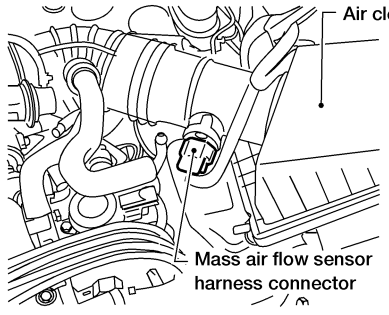


SEF215Z

6



SEF058Y



LEC286

DTC Confirmation Procedure

NIEC0901

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

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-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II.
4) Clear the self-learning control coefficient by touching "CLEAR".
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 should be detected at this stage, if a malfunction exists. If so, go to "Diagnostic Procedure", EC-1640.
7) If it is difficult to start engine at step 6, the fuel injection system has a malfunction.
8) Crank engine while depressing accelerator pedal. If engine starts, go to "Diagnostic Procedure", EC-1640. If engine does not start, remove ignition plugs and check for fouling, etc.

With GST

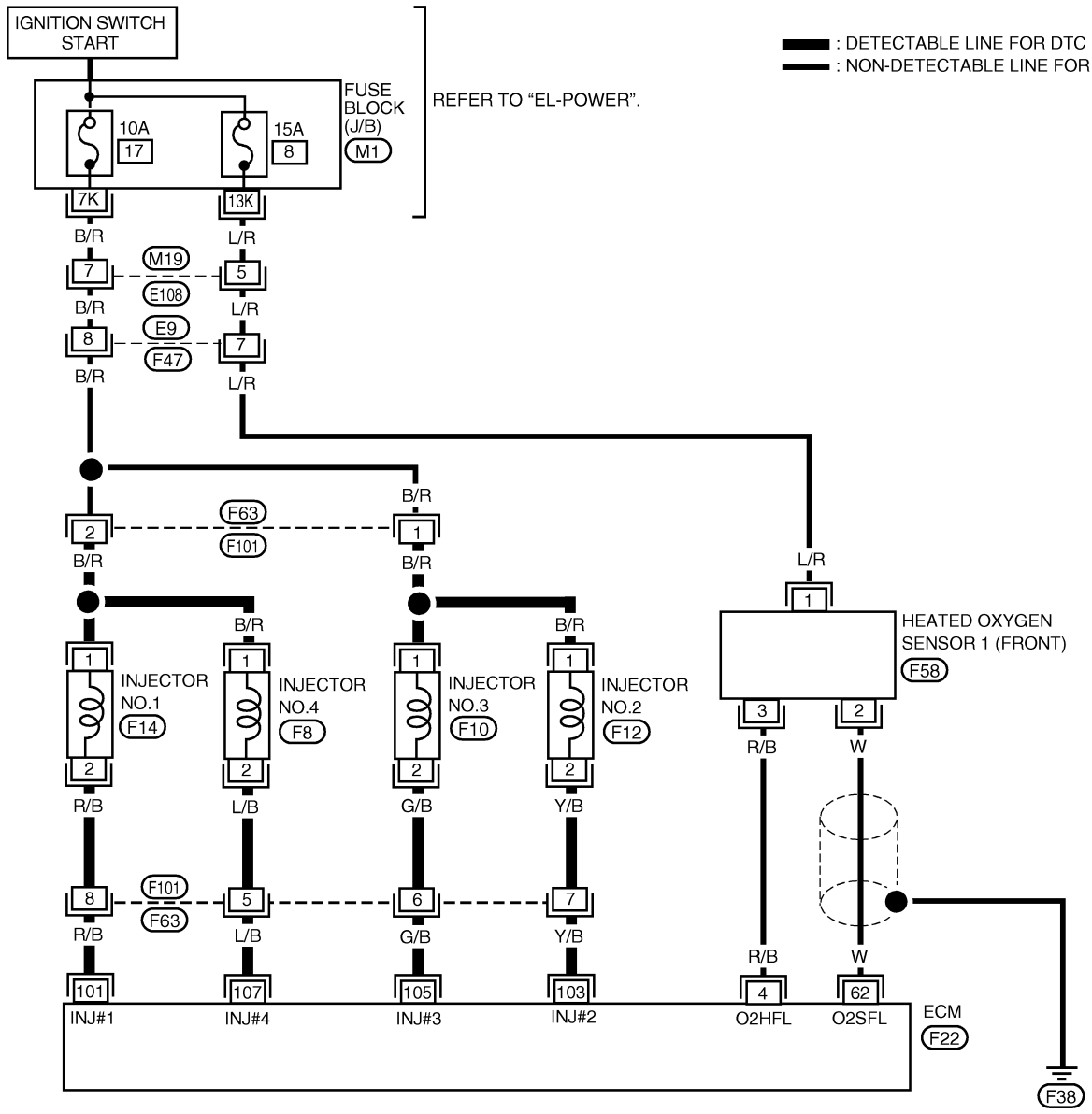
1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 10 seconds.
3) Disconnect mass air flow sensor harness connector. Then restart and run engine for at least 3 seconds at idle speed.
4) Stop engine and reconnect mass air flow sensor harness connector.
5) Select "MODE 7" with GST. Make sure 1st trip DTC P0100 is detected.
6) Select "MODE 4" with GST and erase the 1st trip DTC P0100.

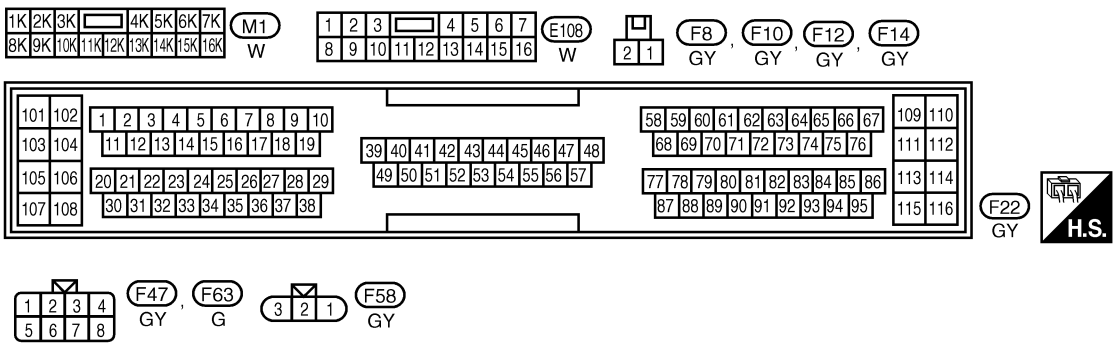
7) Start engine again and run it for at least 10 minutes at idle speed.
8) Select "MODE 7" with GST. The 1st trip DTC P0172 should be detected at this stage, if a malfunction exists. If so, go to "Diagnostic Procedure", EC-1640.
9) If it is difficult to start engine at step 8, the fuel injection system has a malfunction.
10) Crank engine while depressing accelerator pedal.
If engine starts, go to "Diagnostic Procedure", EC-1640. If engine does not start, remove ignition plugs and check for fouling, etc.

Wiring Diagram

NIEC0902

EC-FUEL-01





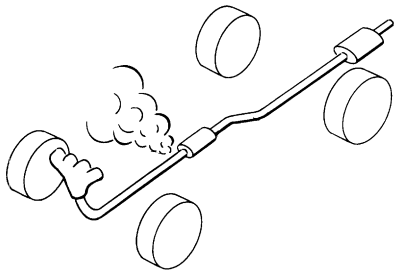
LEC214

Diagnostic Procedure

NIEC0903

1	CHECK FOR EXHAUST AIR LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust air leak before the three way catalyst.



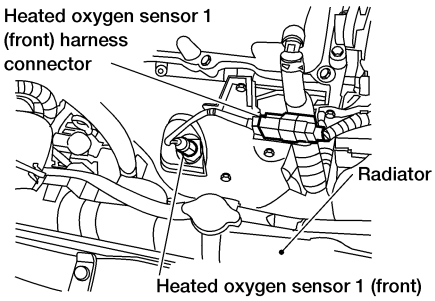
SEF099P

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair or replace.

2	CHECK HEATED OXYGEN SENSOR 1 (FRONT) CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect heated oxygen sensor 1 (front) harness connector and ECM harness connector.



LEC274

3. Check harness continuity between ECM terminal 62 and HO2S1 terminal 2.
   Refer to “Wiring Diagram”, EC-1639.
   Continuity should exist.
4. Check harness continuity between ECM terminal 62 (or HO2S1 terminal 2) and ground.
   Refer to “Wiring Diagram”, EC-1639.
   Continuity should not exist.
5. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 3.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

3	CHECK FUEL PRESSURE
1. Release fuel pressure to zero. Refer to EC-1408. 2. Install fuel pressure gauge and check fuel pressure. **At idling:** **When fuel pressure regulator valve vacuum hose is connected.** **Approximately 235 kPa (2.4 kg/cm^2, 34 psi)** **When fuel pressure regulator valve vacuum hose is disconnected.** **Approximately 294 kPa (3.0 kg/cm^2, 43 psi)** **OK or NG**	
OK ▶	GO TO 5.
NG ▶	GO TO 4.

4	DETECT MALFUNCTIONING PART
Check the following. ● Fuel pump and circuit (Refer to EC-1926.) ● Fuel pressure regulator (Refer to EC-1409.)	
▶	Repair or replace.

5	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. **at idling: 2.5 - 5.0 g·m/sec** **at 2,500 rpm: 7.1 - 12.5 g·m/sec**	
With GST 1. Install all removed parts. 2. Check mass air flow sensor signal in MODE 1 with GST. **at idling: 2.5 - 5.0 g·m/sec** **at 2,500 rpm: 7.1 - 12.5 g·m/sec** **OK or NG**	
OK ▶	GO TO 6.
NG ▶	Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-1515.

6	CHECK FUNCTION OF INJECTORS

With CONSULT-II

1. Start engine.
2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-II.

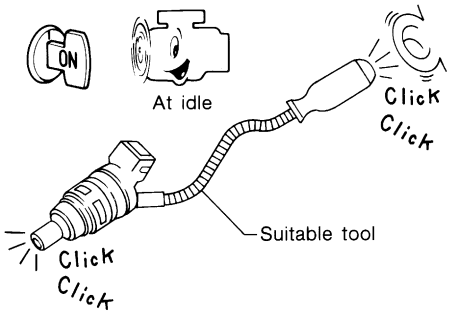
ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
IACV-AAC/V	XXX step

SEF190Y

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 7.
NG	▶	Perform trouble diagnosis for "INJECTORS", EC-1918.

7	REMOVE INJECTOR

1. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
2. Turn ignition switch "OFF".
3. Remove injector assembly. Refer to EC-1409.
   Keep fuel hose and all injectors connected to injector gallery.

	▶	GO TO 8.

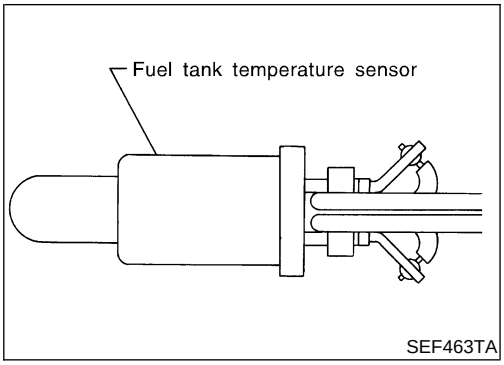
8	CHECK INJECTOR

1. Disconnect all injector harness connectors.
2. Disconnect all ignition wires.
3. Place pans or saucers under each injector.
4. Crank engine for about 3 seconds.
   Make sure fuel does not drip from injector.

OK or NG

OK (Does not drip)	▶	GO TO 9.
NG (Drips)	▶	Replace the injectors from which fuel is dripping. Always replace O-ring with new one.

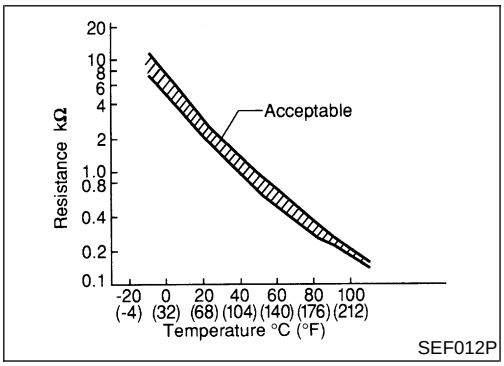
9	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1508.	
▶	INSPECTION END



Component Description

NIEC0904

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>

Fluid temperature °C (°F)	Voltage* V	Resistance kΩ
20 (68)	3.5	2.3 - 2.7
50 (122)	2.2	0.79 - 0.90

*: These data are reference values and are measured between ECM terminal 82 (Fuel tank temperature sensor) and ground.

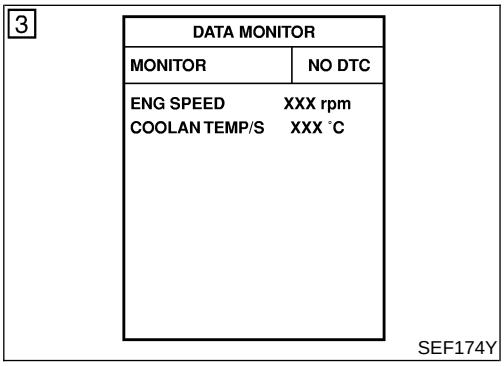
CAUTION:

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.

On Board Diagnosis Logic

NIEC0905

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0180	• An excessively high or low voltage is sent to ECM. • Rationally incorrect voltage is sent to ECM, compared with the voltage signals from engine coolant temperature sensor and intake air temperature sensor.	• Harness or connectors (The sensor circuit is open or shorted.) • Fuel tank temperature sensor



DTC Confirmation Procedure

NIEC0906

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

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Wait at least 10 seconds.
   If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1647.

If the result is OK, go to following step.

4) Check "COOLAN TEMP/S" signal.
   If the signal is less than 60°C (140°F), the result will be OK.
   If the signal is above 60°C (140°F), go to the following step.
5) Cool engine down until "COOLAN TEMP/S" signal is less than 60°C (140°F).
6) Wait at least 10 seconds.
7) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1647.

With GST

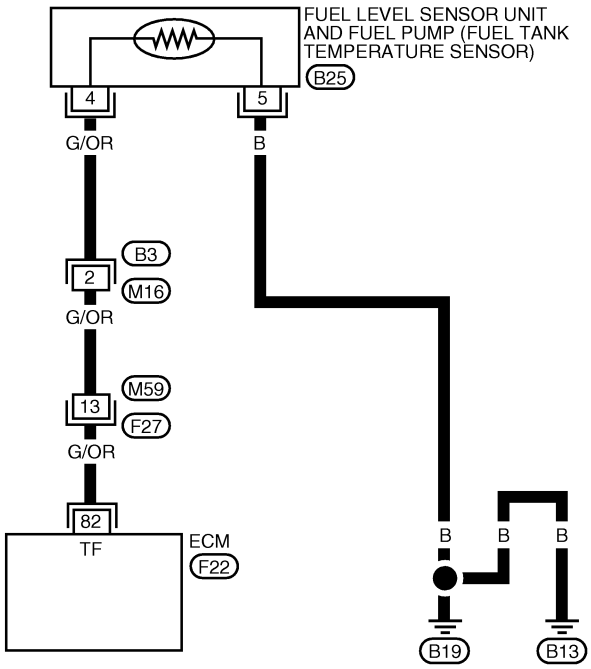
Follow the procedure "With CONSULT-II" above.

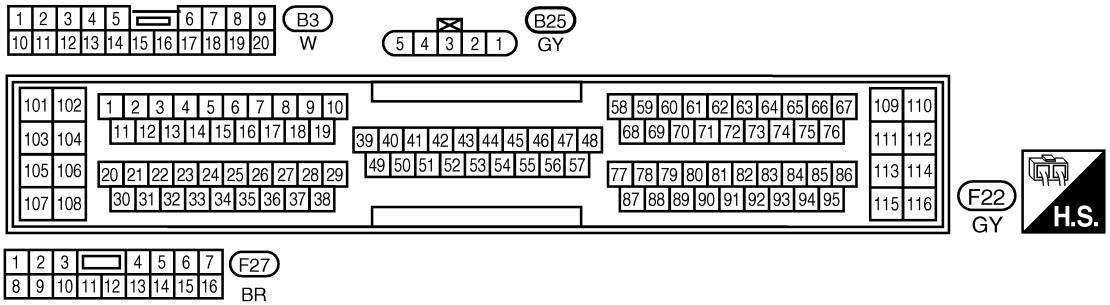
Wiring Diagram

NIEC0907

EC-FTTS-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC





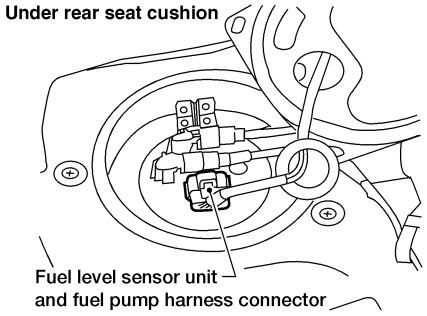
LEC207

Diagnostic Procedure

NIEC0908

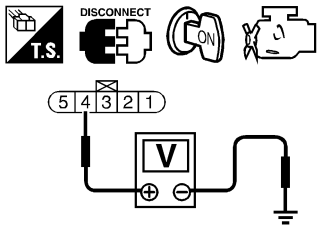
1	CHECK POWER SUPPLY

1. Turn ignition switch “OFF”.
2. Disconnect fuel level sensor unit and fuel pump harness connector.



LEC304

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, M16
- Harness connectors M59, F27
- Harness for open or short between ECM and fuel level sensor unit and fuel pump

	▶	Repair harness or connector.

3	CHECK GROUND CIRCUIT

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”, EC-1646.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

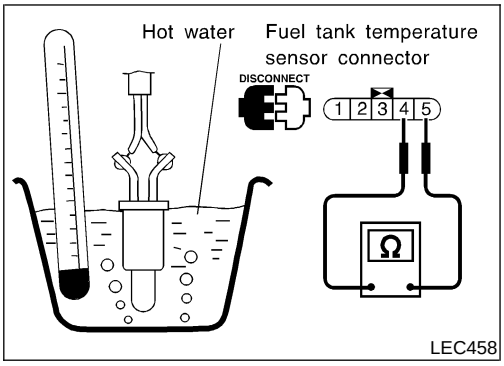
OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

Diagnostic Procedure (Cont'd)

4	CHECK FUEL TANK TEMPERATURE SENSOR	
Refer to "Component Inspection", EC-1648.		
OK or NG		
OK	▶	GO TO 5.
NG	▶	Replace fuel tank temperature sensor.

5	CHECK INTERMITTENT INCIDENT	
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1508.		
	▶	**INSPECTION END**



Component Inspection

NIEC0909

FUEL TANK TEMPERATURE SENSOR

NIEC0909S01

Check resistance by heating with hot water or heat gun as shown in the figure.

Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90

If NG, replace fuel tank temperature sensor.

System Description

NIEC0910

COOLING FAN CONTROL

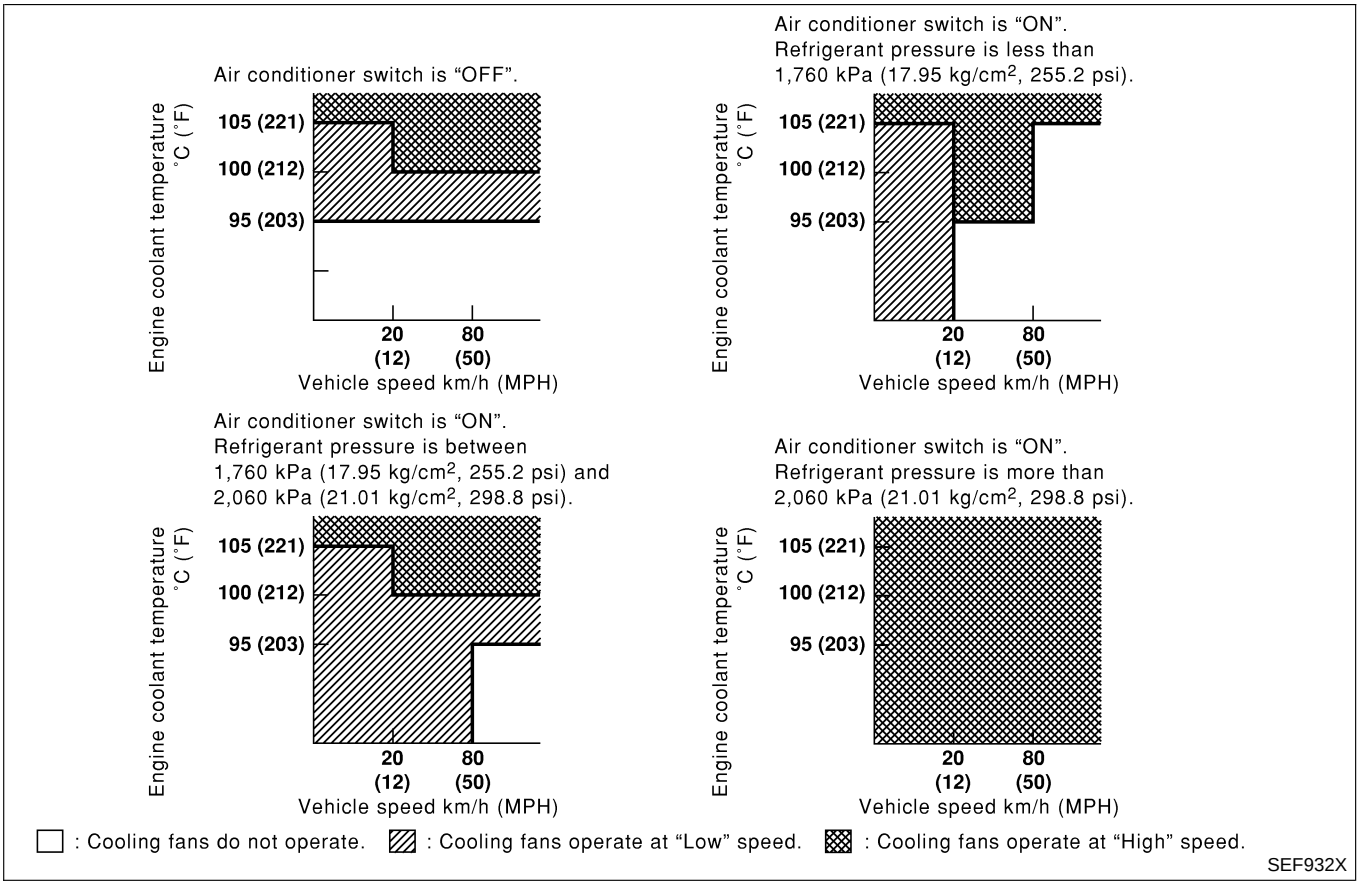
NIEC0910S01

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

NIEC0910S02



SEF932X

CONSULT-II Reference Value in Data Monitor Mode

NIEC0911

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

CONSULT-II Reference Value in Data Monitor Mode (Cont'd)

MONITOR ITEM	CONDITION		SPECIFICATION
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

NIEC0912

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

NIEC0913

- 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 damage from a collision 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-1666.

CAUTION:

When a malfunction is indicated, be sure to replace the coolant. Refer to *MA-17*, "Changing Engine Coolant". Also, replace the engine oil. Refer to *MA-20*, "Changing 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-15*, "Anti-freeze Coolant Mixture Ratio".**
2) **After refilling coolant, run engine to ensure that no water-flow noise is emitted.**

Overall Function Check

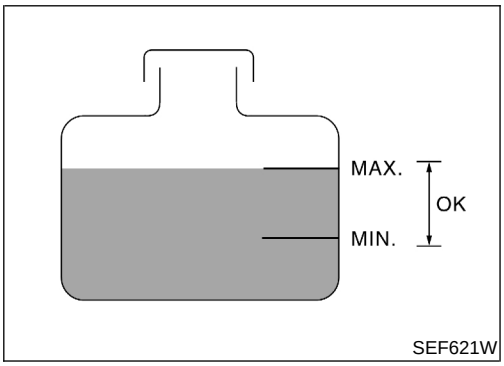
NIEC0914

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

NIEC0914S01

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-1655.
- If the coolant mixture ratio is out of the range of 45 to 55%, replace the coolant in the following procedure ***MA-17***, “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-15***, “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-1655. 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-19***, “TROUBLE DIAGNOSES”. After repair, go to the next step.

5) Perform “ENG COOLANT TEMP” in “ACTIVE TEST” mode with CONSULT-II at idle.

a) Set “ENG COOLANT TEMP” to 95°C (203°F) and make sure that cooling fan operates at low speed.
If NG, go to “Diagnostic Procedure”, EC-1655.

b) Set “ENG COOLANT TEMP” to 105°C (221°F) and make sure that cooling fan operates at high speed. If NG, go to “Diagnostic Procedure”, EC-1655. 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-1655. 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-1655.
If NG, replace ECT sensor and go to the next step.

9) Check ignition timing. Refer to basic inspection, EC-1470.
Make sure that ignition timing is 15°±2° at idle.
If NG, adjust ignition timing and then recheck.

WITH GST

NIEC0914S02

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-1655.
- If the coolant mixture ratio is out of the range of 45 to 55%, replace the coolant in the following procedure ***MA-17***, "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-15***, "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-1655. 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-19***, "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-1655. 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-1655. 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 aftermarket fog lamps have been installed, check for damaged fans and clogging in the condenser and radiator.

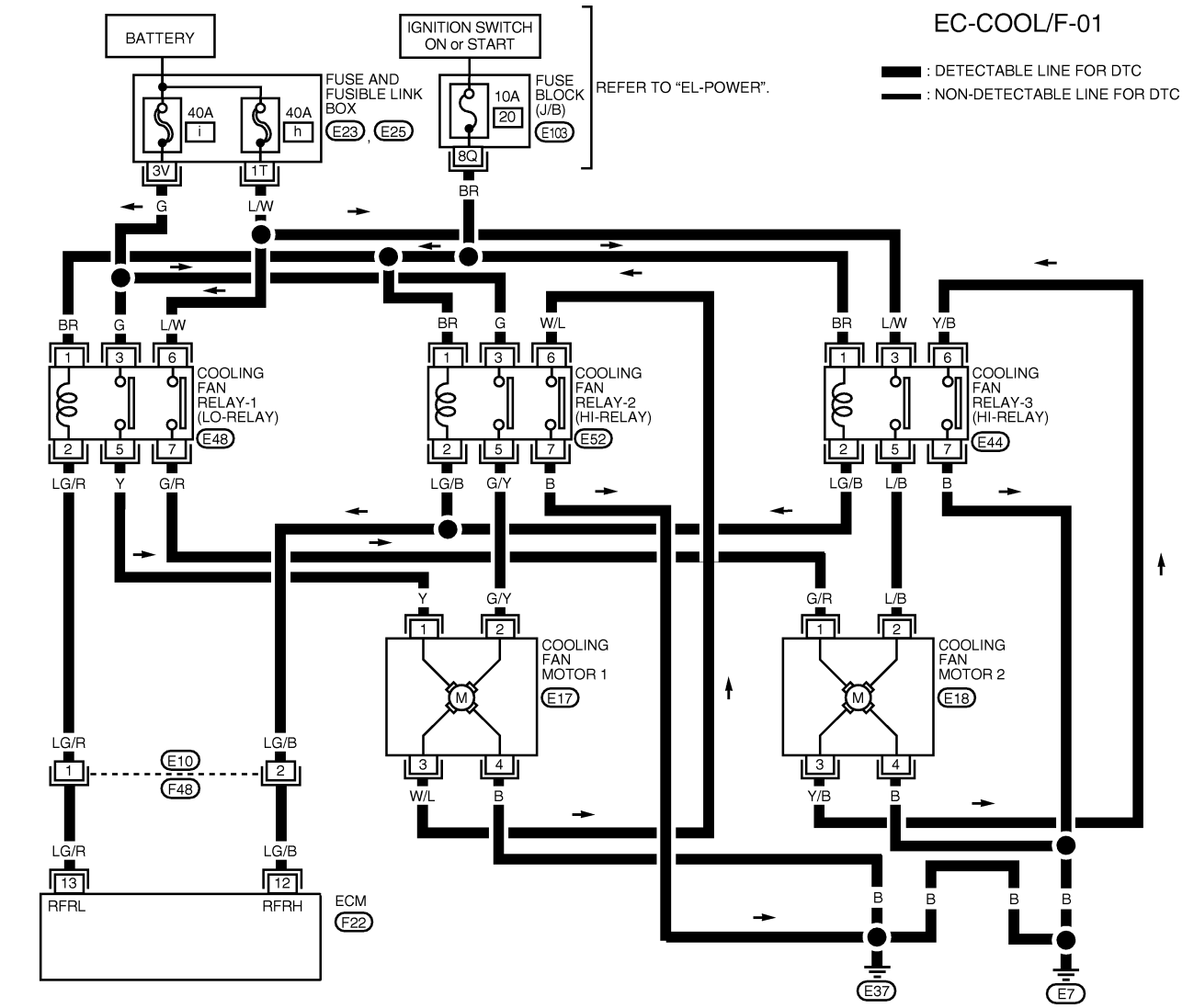
b) Check the front end for clogging caused by insects or debris.

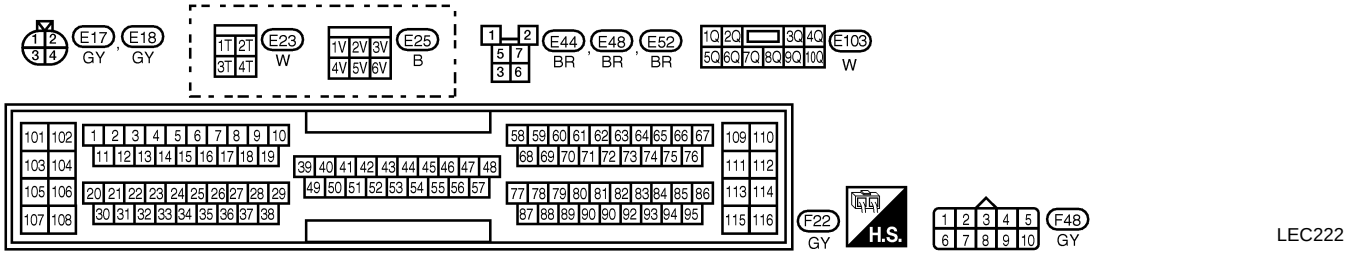
c) Check for improper fitting of front-end cover, damaged radiator grille or bumper, damaged vehicle front.
If NG, take appropriate action and then go to the next step.

11) Check function of ECT sensor.
Refer to step 6 of "Diagnostic Procedure", EC-1655.
If NG, replace ECT sensor and go to the next step.
12) Check ignition timing. Refer to basic inspection, EC-1470.
Make sure that ignition timing is 15°±2° at idle.
If NG, adjust ignition timing and then recheck.

Wiring Diagram

=NIEC0915





LEC222

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)
12	LG/B	COOLING FAN RELAY (HIGH)	ENGINE RUNNING WITH COOLING FAN NOT OPERATING	BATTERY VOLTAGE
			ENGINE RUNNING WITH COOLING FAN OPERATING AT HIGH SPEED	0 - 0.6V
13	LG/R	COOLING FAN RELAY (LOW)	ENGINE RUNNING WITH COOLING FAN NOT OPERATING	BATTERY VOLTAGE
			ENGINE RUNNING WITH COOLING FAN OPERATING AT LOW SPEED	0 - 0.6V

SEF571Y

Diagnostic Procedure

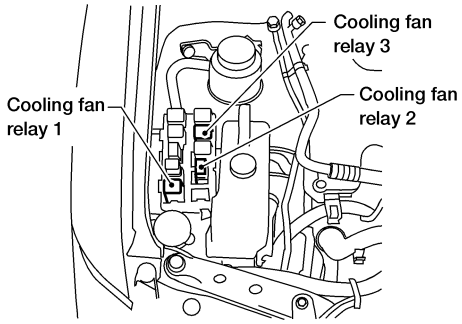
NIEC0916

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.



LEC272

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-1661.)

Diagnostic Procedure (Cont'd)

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.

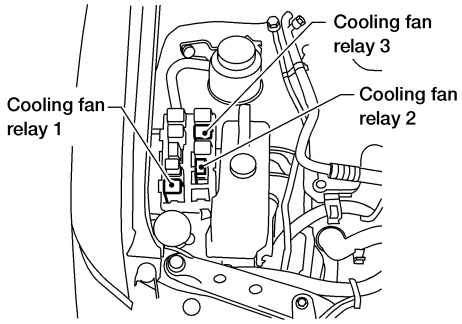
OK or NG

OK	▶	GO TO 6.
NG	▶	Check cooling fan high speed control circuit. (Go to PROCEDURE B, EC-1664.)

4	CHECK COOLING FAN LOW SPEED OPERATION

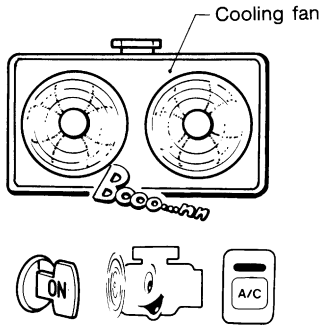
⊗ **Without CONSULT-II**

1. Disconnect cooling fan relays-2 and -3.



LEC272

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

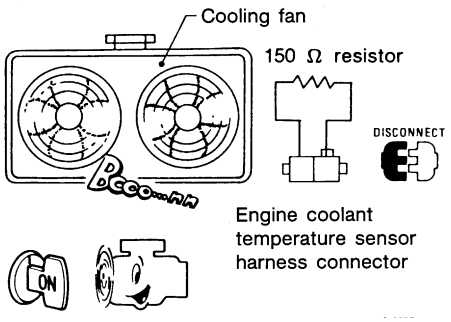
OK	▶	GO TO 5.
NG	▶	Check cooling fan low speed control circuit. (Go to PROCEDURE A, EC-1661.)

Diagnostic Procedure (Cont'd)

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-1664.)

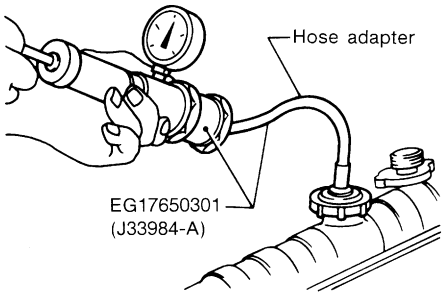
6	CHECK COOLING SYSTEM FOR LEAK

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

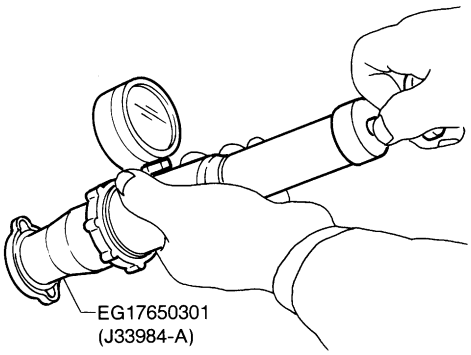
Check the following for leak.

- Hose
- Radiator
- Water pump (Refer to ***LC-13***, "Water Pump".)

	▶	Repair or replace.

8	CHECK RADIATOR CAP

Apply pressure to cap with a tester and check radiator cap relief pressure.



SLC755A

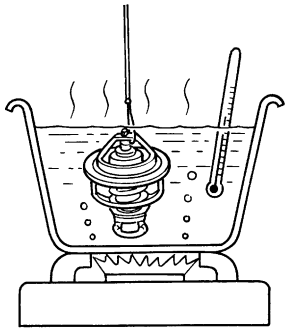
Radiator cap relief pressure:
59 - 98 kPa (0.6 - 1.0 kg/cm^2, 9 - 14 psi)

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:
76.5°C (170°F) [standard]
Valve lift:
More than 8 mm/90°C (0.31 in/194°F)

4. Check if valve is closed at 5°C (9°F) below valve opening temperature. For details, refer to ***LC-31***, "Thermostat".

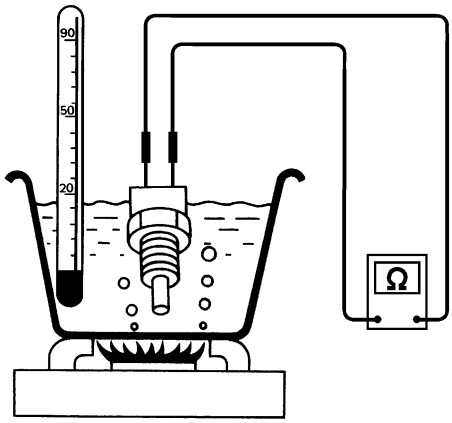
OK or NG

OK	▶	GO TO 10.
NG	▶	Replace thermostat

Diagnostic Procedure (Cont'd)

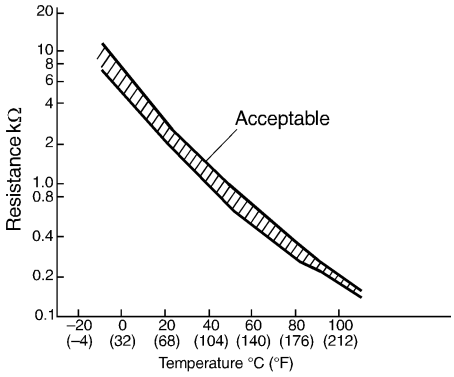
10	CHECK ENGINE COOLANT TEMPERATURE SENSOR

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-1666.

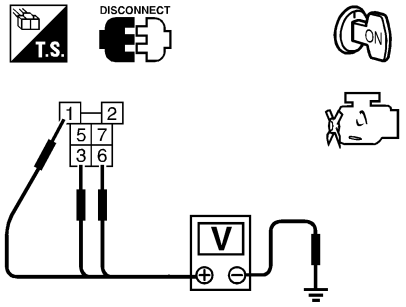
▶ **INSPECTION END**

PROCEDURE A

=NIEC0916S01

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

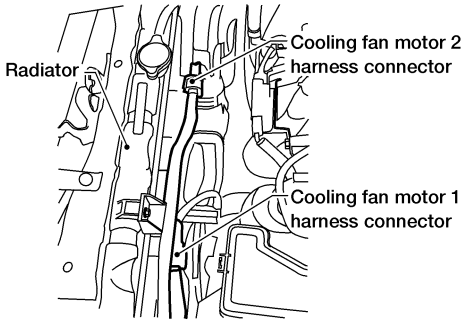
Check the following.
- 10A fuse
- 40A fusible links
- Harness for open or short between cooling fan relay-1 and fuse
- Harness for open or short between cooling fan relay-1 and battery

	▶	Repair open circuit or short to ground or short to power in harness or connectors.

Diagnostic Procedure (Cont'd)

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.



LEC289

3. Check harness continuity between cooling fan relay-1 terminal 5 and cooling fan motor-1 terminal 1, cooling fan motor-1 terminal 4 and body ground.
   Refer to "Wiring Diagram", EC-1654.
   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 1, cooling fan motor-2 terminal 4 and body ground.
   Refer to "Wiring Diagram", EC-1654.
   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 13 and cooling fan relay-1 terminal 2.
   Refer to "Wiring Diagram", EC-1654.
   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.

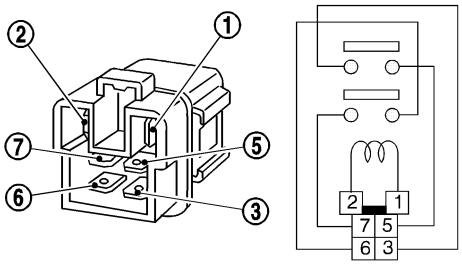
5	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E10, F48
- 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

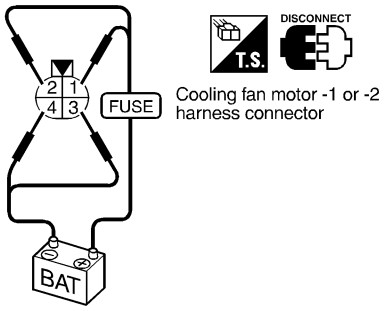
SEF591X

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 or -2	Low	1	4
	High	1, 2	3, 4

SEF937X

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace cooling fan motors.

8	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1508.

▶ **INSPECTION END**

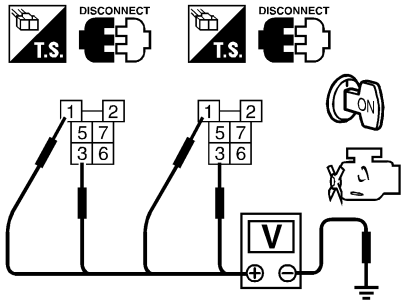
Diagnostic Procedure (Cont'd)

PROCEDURE B

=NIEC0916S02

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.
- Harness for open or short between cooling fan relays-2 and -3 and fuse
- Harness for open or short between cooling fan relays-2 and -3 and fusible link

	▶	Repair harness or connectors.

3	CHECK 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 the following:
- Cooling fan relay-2 terminal 5 and cooling fan motor-1 terminal 2
- Cooling fan relay-2 terminal 6 and cooling fan motor-1 terminal 3
- Cooling fan relay-2 terminal 7 and body ground.

   Refer to "Wiring Diagram", EC-1654.

   Continuity should exist.
4. Also check harness for short to ground and short to power.
5. Check harness continuity between the following:
- Cooling fan relay-3 terminal 5 and cooling fan motor-2 terminal 2
- Cooling fan relay-3 terminal 6 and cooling fan motor-2 terminal 3
- Cooling fan relay-3 terminal 7 and body ground.

   Refer to "Wiring Diagram", EC-1654.

   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 12 and cooling fan relay-2 terminal 2, cooling fan relay-3 terminal 2. Refer to "Wiring Diagram", EC-1654.
   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.

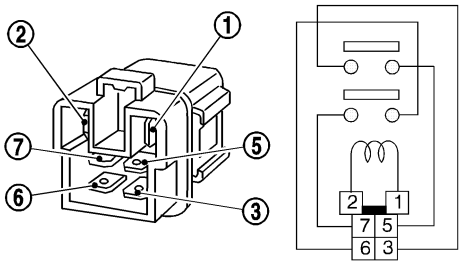
5	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E10, F48
- 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

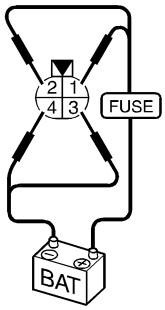
SEF591X

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace cooling fan relays.

7	CHECK COOLING FAN MOTORS-1 AND -2

Supply battery voltage between the following terminals and check operation.



Cooling fan motor -1 or -2 harness connector

	Speed	Terminals (+)	Terminals (–)
Cooling fan motor -1 or -2	Low	1	4
	High	1, 2	3, 4

SEF937X

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace cooling fan motors.

Diagnostic Procedure (Cont'd)

8	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1508.	
▶	INSPECTION END

Main 12 Causes of Overheating

NIEC0917

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-13***, "RECOMMENDED FLUIDS AND LUBRICANTS".
	3	• Coolant level	• Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	See ***MA-17***, "Changing Engine Coolant".
	4	• Radiator cap	• Pressure tester	59 - 98 kPa (0.6 - 1.0 kg/cm^2, 9 - 14 psi) (Limit)	See ***LC-28***, "System Check".
ON*2	5	• Coolant leaks	• Visual	No leaks	See ***LC-28***, "System Check".
ON*2	6	• Thermostat	• Touch the upper and lower radiator hoses	Both hoses should be hot	See ***LC-31***, "Thermostat" and ***LC-33***, "Radiator".
ON*1	7	• Cooling fan	• CONSULT-II	Operating	See trouble diagnosis for DTC P0217 (EC-1649).
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-17***, "Changing Engine Coolant".
OFF*4	10	• Coolant return from reservoir tank to radiator	• Visual	Should be initial level in reservoir tank	See ***MA-16***, "ENGINE MAINTENANCE".
OFF	11	• Cylinder head	• Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	See ***EM-110***, "Inspection".
	12	• Cylinder block and pistons	• Visual	No scuffing on cylinder walls or piston	See ***EM-132***, "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-19***, "OVERHEATING CAUSE ANALYSIS".

On Board Diagnosis Logic

NIEC0918

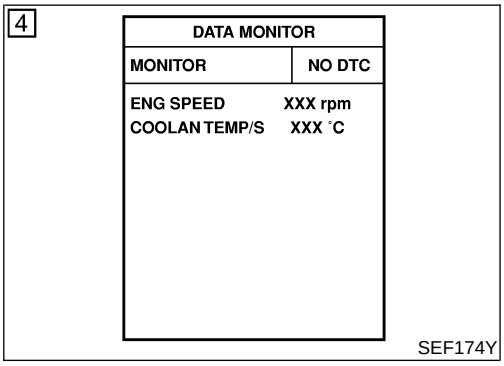
When a misfire occurs, engine speed will fluctuate (vary). If the engine speed fluctuates enough to cause the crankshaft position sensor (POS) to vary, ECM can determine that a misfire is occurring.

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 crankshaft position sensor (POS) signal every 200 engine revolutions, for a change.
   When the misfire conditions decreases to a level that will not damage the TWC, the MIL will turn off. If another misfire conditions 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 cause damage to 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 crankshaft position sensor (POS) signal every 1,000 engine revolutions.
   A misfire malfunction can be detected on any one cylinder or on multiple cylinders.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0300	• Multiple cylinders misfire.	• 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/Flywheel • Heated oxygen sensor 1 (front) • Incorrect distributor roter
P0301	• No. 1 cylinder misfires.	
P0302	• No. 2 cylinder misfires.	
P0303	• No. 3 cylinder misfires.	
P0304	• No. 4 cylinder misfires.	



DTC Confirmation Procedure

NIEC0919

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

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-1668.

With GST

Follow the procedure “With CONSULT-II” above.

Diagnostic Procedure

NIEC0920

1	CHECK FOR INTAKE AIR LEAK	
1. Start engine and run it at idle speed. 2. Listen for the sound of the intake air leak.		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Discover air leak location and repair.

2	CHECK FOR EXHAUST SYSTEM CLOGGING	
Stop engine and visually check exhaust tube, three way catalyst and muffler for dents.		
OK or NG		
OK	▶	GO TO 3.
NG	▶	Repair or replace it.

3	CHECK EGR FUNCTION	
Perform DTC Confirmation Procedure for DTC P1402 EGR FUNCTION (OPEN). Refer to EC-1838.		
OK or NG		
OK	▶	GO TO 4.
NG	▶	Repair EGR system.

4	PERFORM POWER BALANCE TEST

With CONSULT-II

1. Perform "POWER BALANCE" in "ACTIVE TEST" mode.

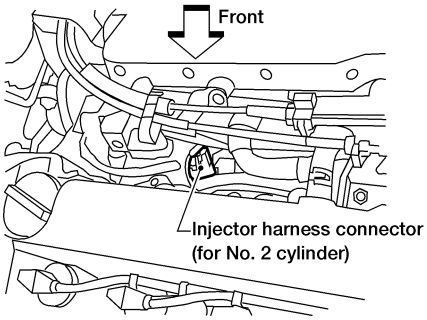
ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
IACV-AAC/V	XXX step

SEF190Y

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?



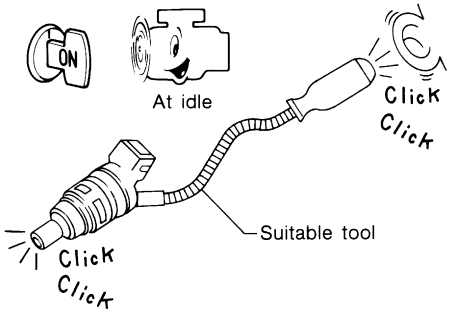
LEC290

Yes or No

Yes	▶	GO TO 5.
No	▶	GO TO 8.

5	CHECK INJECTOR

Does each injector make an operating sound at idle?



MEC703B

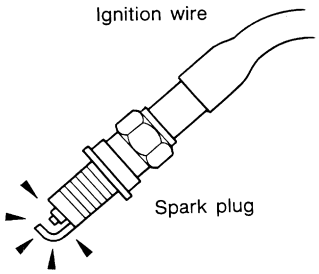
Yes or No

Yes	▶	GO TO 6.
No	▶	Check injector(s) and circuit(s). Refer to EC-1917.

Diagnostic Procedure (Cont'd)

6	CHECK IGNITION SPARK

1. Turn Ignition switch "OFF".
2. Disconnect ignition wire from spark plug.
3. Connect a known good spark plug to the ignition wire.
4. Place end of spark plug against a suitable ground and crank engine.
5. Check for spark.



SEF282G

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	CHECK IGNITION WIRES

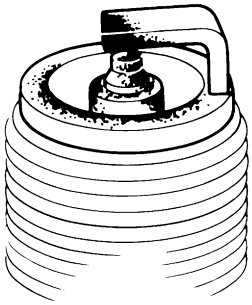
Refer to "Component Inspection", EC-1673.

OK or NG

OK	▶	Check distributor rotor head for incorrect parts. Check ignition coil, power transistor and their circuits. Refer to EC-1820.
NG	▶	Replace.

8	CHECK SPARK PLUGS

Remove the spark plugs and check for fouling, etc.



SEF156I

OK or NG

OK	▶	GO TO 9.
NG	▶	Repair or replace spark plug(s) with standard type one(s). For spark plug type, refer to ***MA-16***, "ENGINE MAINTENANCE".

9	CHECK COMPRESSION PRESSURE

Refer to ***EM-87***, "Measurement of Compression Pressure".

- Check compression pressure.

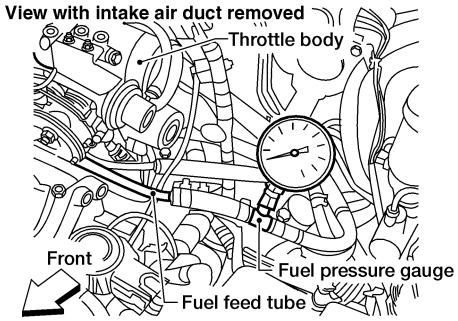
Standard:
1,226 kPa (12.5 kg/cm^2, 178 psi)/300 rpm
Minimum:
1,030 kPa (10.5 kg/cm^2, 149 psi)/300 rpm
Difference between each cylinder:
98 kPa (1.0 kg/cm^2, 14 psi)/300 rpm

OK or NG

OK	▶	GO TO 10.
NG	▶	Check pistons, piston rings, valves, valve seats and cylinder head gaskets.

10	CHECK FUEL PRESSURE

1. Install any parts removed.
2. Release fuel pressure to zero. Refer to EC-1408.
3. Install fuel pressure gauge and check fuel pressure.



LEC335

At idle: Approx. 235 kPa (2.4 kg/cm^2, 34 psi)

OK or NG

OK	▶	GO TO 12.
NG	▶	GO TO 11.

11	DETECT MALFUNCTIONING PART

Check the following.

- Fuel pump and circuit Refer to EC-1926.
- Fuel pressure regulator Refer to EC-1409.
- Fuel lines. Refer to ***MA-19***, "Checking Fuel Lines".
- Fuel filter for clogging

	▶	Repair or replace.

12	CHECK IGNITION TIMING

Perform "Basic Inspection", EC-1470.

OK or NG

OK	▶	GO TO 13.
NG	▶	Adjust ignition timing.

Diagnostic Procedure (Cont'd)

13	CHECK HEATED OXYGEN SENSOR 1 (FRONT)	
Refer to "Component Inspection", EC-1561.		
OK or NG		
OK	▶	GO TO 14.
NG	▶	Replace heated oxygen sensor 1 (front).

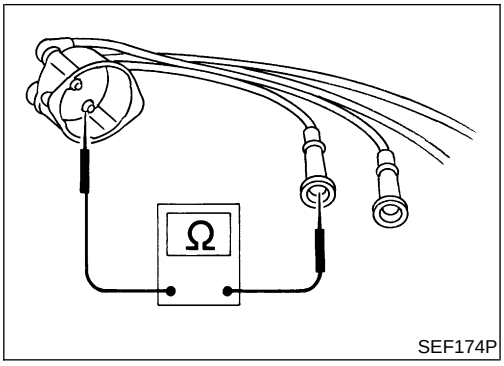
14	CHECK MASS AIR FLOW SENSOR	
With CONSULT-II Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT-II. **at idling: 2.5 - 5.0 g·m/sec** **at 2,500 rpm: 7.1 - 12.5 g·m/sec**		
With GST Check mass air flow sensor signal in MODE 1 with GST. **at idling: 2.5 - 5.0 g·m/sec** **at 2,500 rpm: 7.1 - 12.5 g·m/sec**		
OK or NG		
OK	▶	GO TO 16.
NG	▶	GO TO 15.

15	CHECK CONNECTORS	
Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-1515.		
OK or NG		
NG	▶	Repair or replace it.

16	CHECK SYMPTOM MATRIX CHART	
Check items on the rough idle symptom in "Symptom Matrix Chart", EC-1486.		
OK or NG		
OK	▶	GO TO 17.
NG	▶	Repair or replace.

17	ERASE THE 1ST TRIP DTC	
Some tests may cause a 1st trip DTC to be set. Erase the 1st trip DTC from the ECM memory after performing the tests. Refer to EC-1438.		
	▶	GO TO 18.

18	CHECK INTERMITTENT INCIDENT	
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1508.		
	▶	**INSPECTION END**



Component Inspection

NIEC0921

IGNITION WIRES

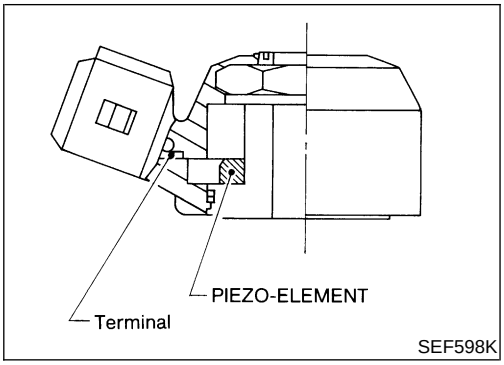
NIEC0921S01

1. Inspect wires for cracks, damage, burned terminals and for improper fit.
2. Measure the resistance of wires to their distributor cap terminal. Move each wire while testing to check for intermittent breaks.

   Resistance:

   13.6 - 18.4 kΩ/m (4.15 - 5.61 kΩ/ft) at 25°C (77°F)

   If the resistance exceeds the above specification, inspect ignition wire to distributor cap connection. Clean connection or replace the ignition wire with a new one.



Component Description

NIEC0922

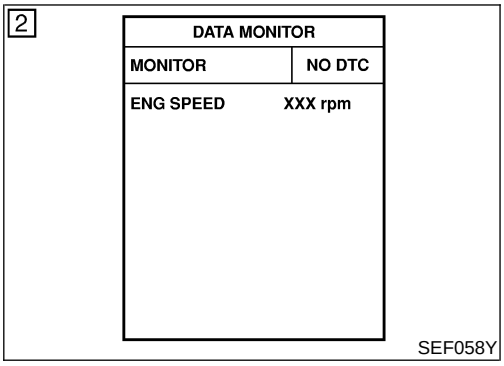
The knock sensor is attached to the cylinder block. It senses engine knocking using a piezoelectric element. A knocking vibration from the cylinder block is sensed as vibrational pressure. This pressure is converted into a voltage signal and sent to the ECM.

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

NIEC0923

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0325	• An excessively low or high voltage from the knock sensor is sent to ECM.	• Harness or connectors (The knock sensor circuit is open or shorted.) • Knock sensor



DTC Confirmation Procedure

NIEC0924

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

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-1676.

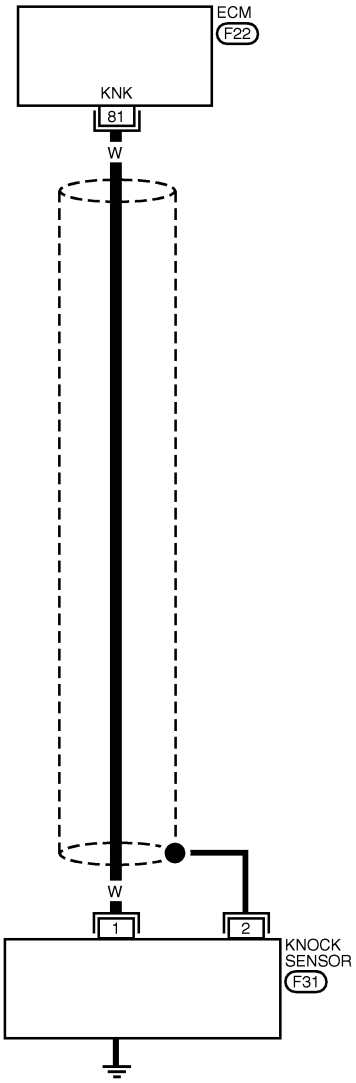
With GST

Follow the procedure “With CONSULT-II” above.

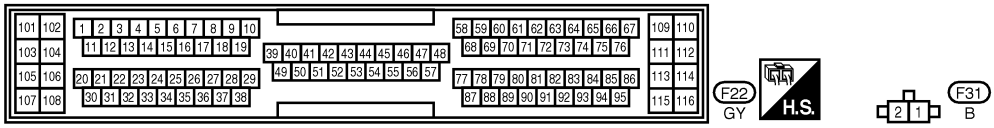
Wiring Diagram

NIEC0925

EC-KS-01



: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC



LEC196

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)
81	W	KNOCK SENSOR	ENGINE RUNNING AT IDLE SPEED	APPROX. 2.5V

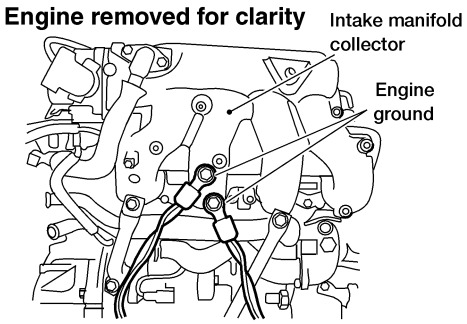
SEF572Y

Diagnostic Procedure

NIEC0926

1	RETIGHTEN GROUND SCREWS

Loosen and retighten engine ground screws.

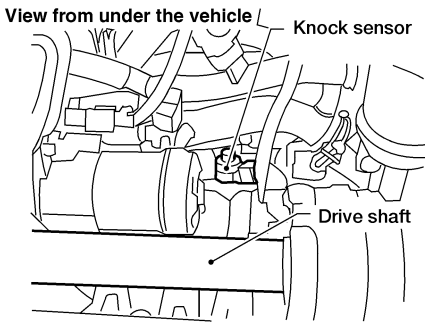


LEC302

	▶	GO TO 2.

2	CHECK INPUT SIGNAL CIRCUIT-1

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector and knock sensor harness connector.



LEC296

3. Check harness continuity between knock sensor terminal 1 and ECM terminal 81.
   Refer to “Wiring Diagram”, EC-1675.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 3.
NG	▶	Repair harness or connector.

3	CHECK KNOCK SENSOR

Knock sensor
Refer to “Component Inspection”, EC-1677.

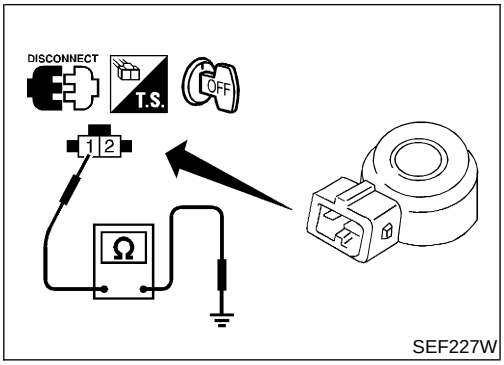
OK or NG

OK	▶	GO TO 4.
NG	▶	Replace knock sensor.

4	CHECK INTERMITTENT INCIDENT

Perform “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-1508.

	▶	**INSPECTION END**



SEF227W

Component Inspection

NIEC0927

KNOCK SENSOR

NIEC0927S01

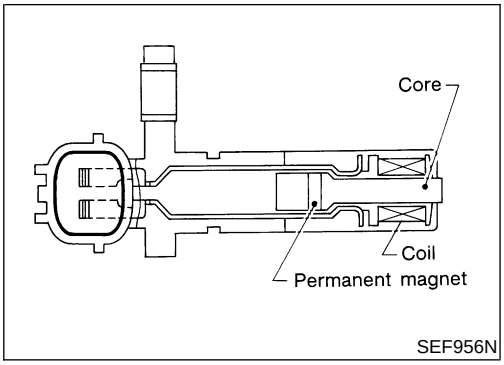
- Use an ohmmeter which can measure more than 10 MΩ.

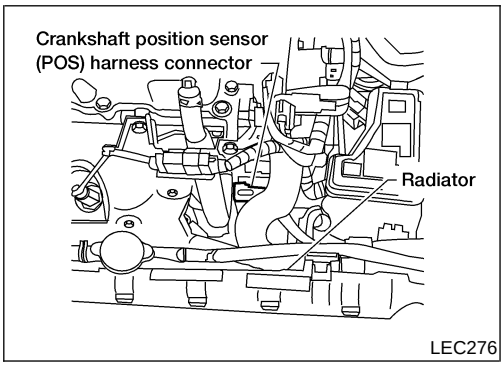
1. Disconnect knock sensor harness connector.
2. Check resistance between terminal 1 and ground.

Resistance: 500 - 620 kΩ [at 20°C (68°F)]

CAUTION:

Discard any knock sensors that have been dropped or physically damaged. Use only new ones.





Component Description

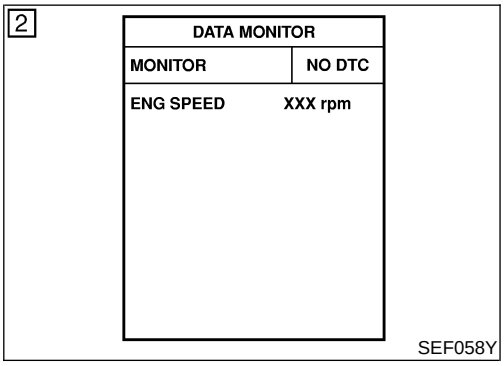
NIEC0928

The crankshaft position sensor (POS) is located on the transaxle housing facing the gear teeth (cogs) of the flywheel or drive plate. It detects the fluctuation of the engine revolution.
The sensor consists of a permanent magnet, core and coil.
When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.
The changing gap causes the magnetic field near the sensor to change.
Due to the changing magnetic field, the voltage from the sensor changes.
The ECM receives the voltage signal and detects the fluctuation of the engine revolution.
This sensor is not directly used to control the engine system. It is used only for the on board diagnosis.

On Board Diagnosis Logic

NIEC0929

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0335	• The proper pulse signal from the crankshaft position sensor (POS) is not sent to ECM while the engine is running at the specified engine speed.	• Harness or connectors (The crankshaft position sensor (POS) circuit is open.) • Crankshaft position sensor (POS)



DTC Confirmation Procedure

NIEC0930

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

1) Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II.
2) Start engine and run it for at least 10 seconds at idle speed.
3) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-1680.

With GST

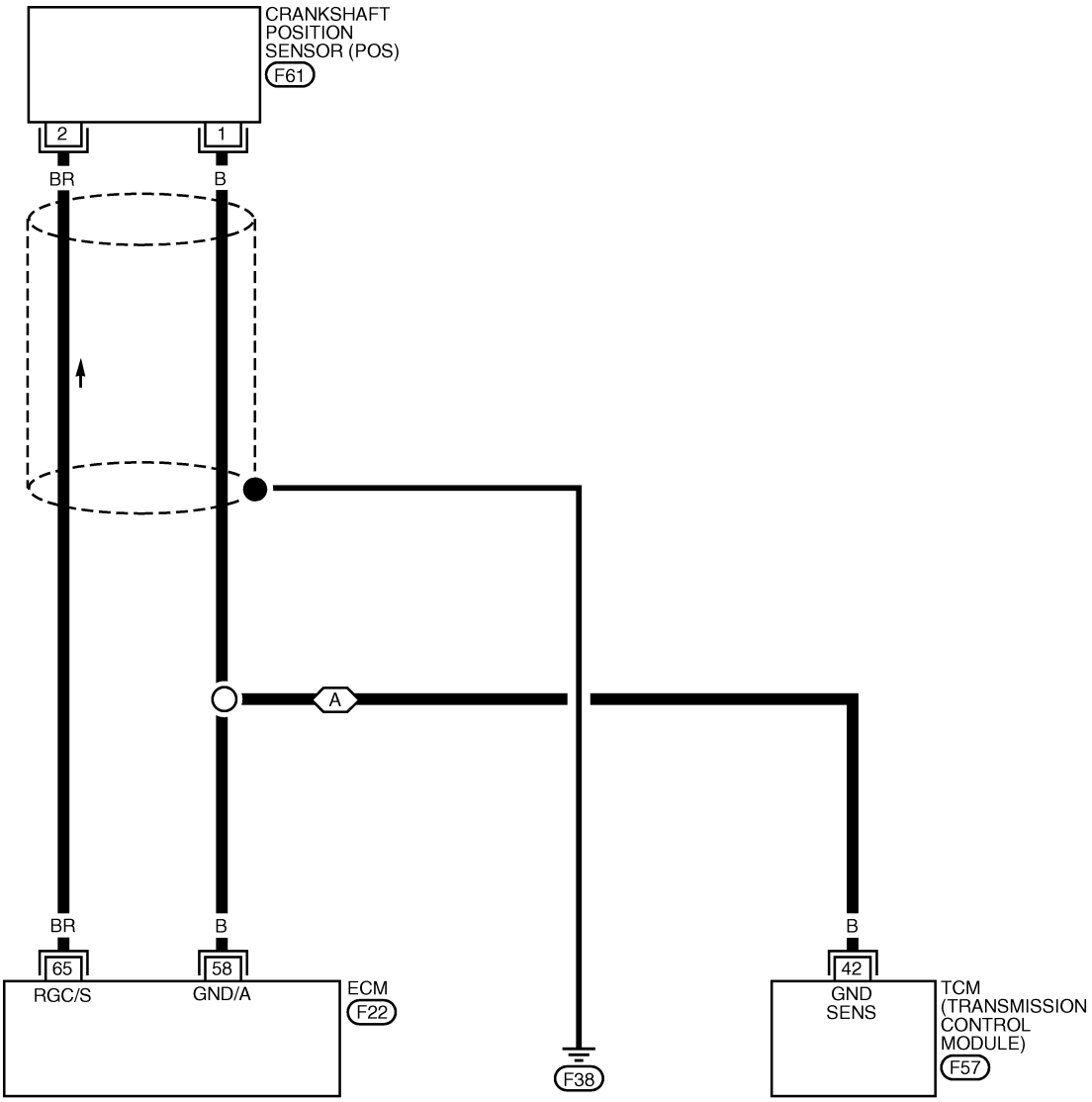
Follow the procedure “With CONSULT-II” above.

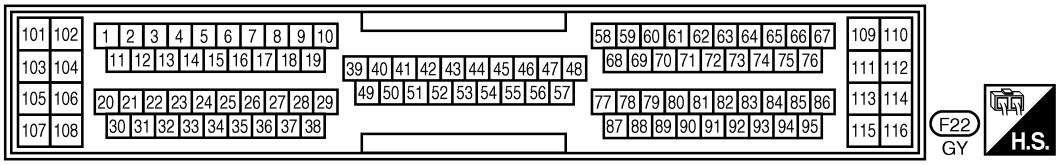
Wiring Diagram

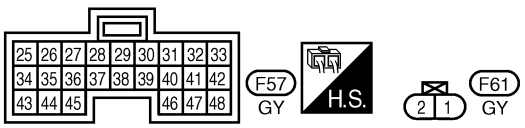
NIEC0931

EC-POS-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC
A : WITH A/T



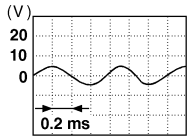
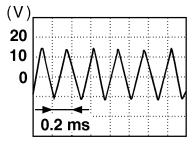




LEC192

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)
58	B	SENSOR'S GROUND	IGN ON	APPROX. 0V
65	B/R	CRANKSHAFT POSITION SENSOR (POS)	ENGINE RUNNING AT IDLE SPEED UNDER WARM-UP CONDITION	3 - 5V (AC RANGE) 
			ENGINE RUNNING AT 2,000 RPM	6 - 9V (AC RANGE) 

LEC469

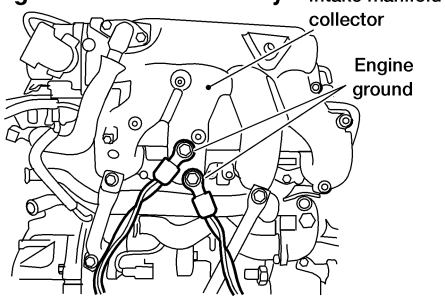
Diagnostic Procedure

NIEC0932

1	RETIGHTEN GROUND SCREWS

1. Turn ignition switch "OFF".
2. Loosen and retighten engine ground screws.

Engine removed for clarity

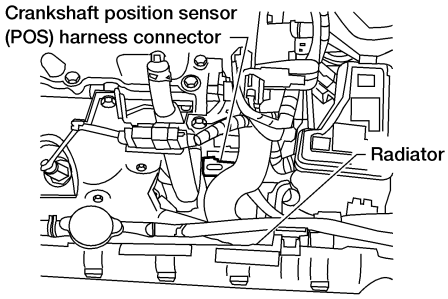


LEC302

▶	GO TO 2.

2	CHECK INPUT SIGNAL CIRCUIT

1. Disconnect crankshaft position sensor (POS) and ECM harness connectors.



LEC276

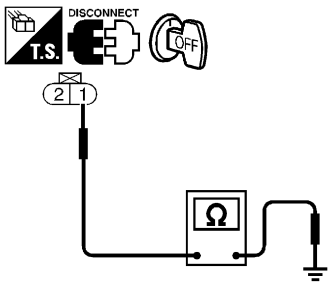
2. Check continuity between ECM terminal 65 and CKPS terminal 2.
   Refer to "Wiring Diagram", EC-1679.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 3.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

3	CHECK GROUND CIRCUIT

1. Reconnect ECM harness connector.
2. Check harness continuity between crankshaft position sensor (POS) terminal 1 and engine ground.



SEF229W

Continuity should exist.
3. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Harness for open or short between crankshaft position sensor (POS) and ECM
- Harness for open or short between crankshaft position sensor (POS) and TCM (Transmission control module)

	▶	Repair open circuit or short to ground or short to power in harness or connectors.

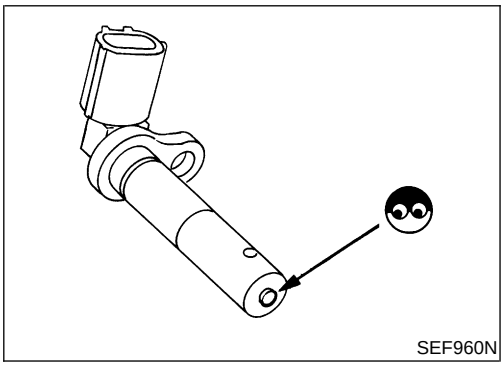
5	CHECK CRANKSHAFT POSITION SENSOR (POS)

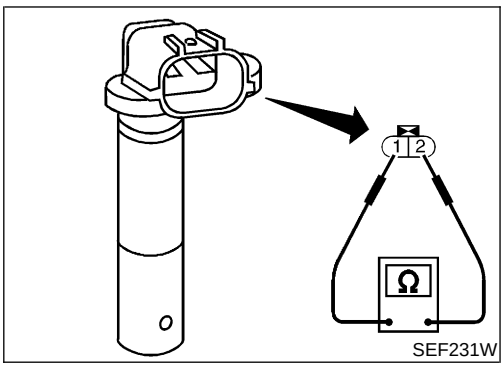
Refer to "Component Inspection", EC-1682.

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace crankshaft position sensor (CKPS).

6	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1508.	
▶	INSPECTION END


SEF960N



SEF231W

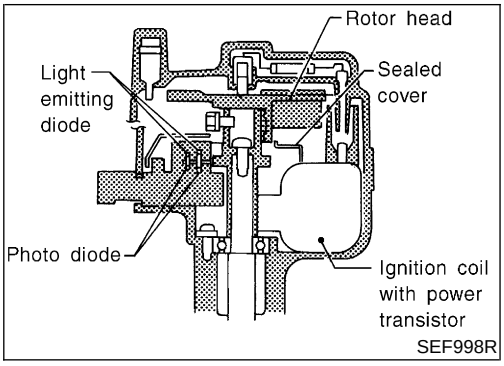
Component Inspection

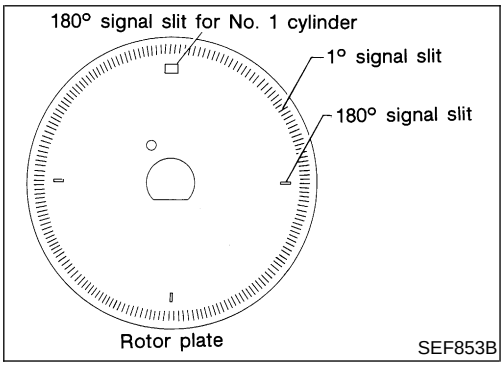
NIEC0933

CRANKSHAFT POSITION SENSOR (POS)

NIEC0933S01

1. Disconnect crankshaft position sensor (POS) harness connector.
2. Loosen the fixing bolt of the sensor.
3. Remove the sensor.
4. Visually check the sensor for chipping.
5. Check resistance as shown in the figure.
   Resistance: 166 - 204 Ω [at 20°C (68°F)]
   If NG, replace crankshaft position sensor (POS).





Component Description

NIEC0934

The camshaft position sensor (PHASE) is a basic component of the engine control system. It monitors engine speed and piston position. These input signals to the engine control system are used to control fuel injection, ignition timing and other functions.

The camshaft position sensor (PHASE) has a rotor plate and a wave-forming circuit. The rotor plate has 360 slits for a 1° (POS) signal and 4 slits for a 180° (REF) signal. The wave-forming circuit consists of Light Emitting Diodes (LED) and photo diodes.

The rotor plate is positioned between the LED and the photo diode. The LED transmits light to the photo diode. As the rotor plate turns, the slits cut the light to generate rough-shaped pulses. These pulses are converted into on-off signals by the wave-forming circuit and sent to the ECM.

The distributor is not repairable and must be replaced as an assembly except distributor cap and rotor head.

On Board Diagnosis Logic

NIEC0935

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0340	• Either 1° or 180° signal is not sent to ECM for the first few seconds during engine cranking.	• Harness or connectors [The camshaft position sensor (PHASE) circuit is open or shorted.] • Camshaft position sensor (PHASE) • Starter motor (Refer to ***SC-6***, "STARTING SYSTEM".) • Starting system circuit (Refer to ***SC-6***, "STARTING SYSTEM".) • Dead (Weak) battery
	• Either 1° or 180° signal is not sent to ECM often enough while the engine speed is higher than the specified engine speed.	
	• The relation between 1° and 180° signal is not in the normal range during the specified engine speed.	

DTC Confirmation Procedure

NIEC0936

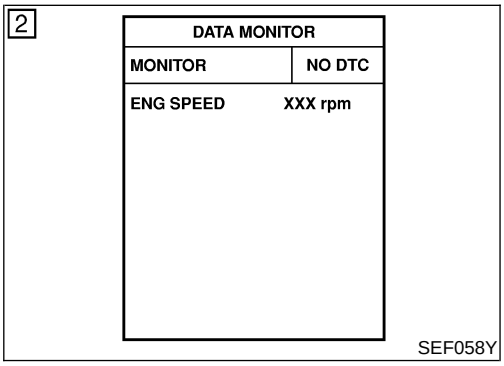
Perform "Procedure for malfunction A" first. If DTC cannot be confirmed, perform "Procedure for malfunction B and C".

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5V.



PROCEDURE FOR MALFUNCTION A

NIEC0936S01

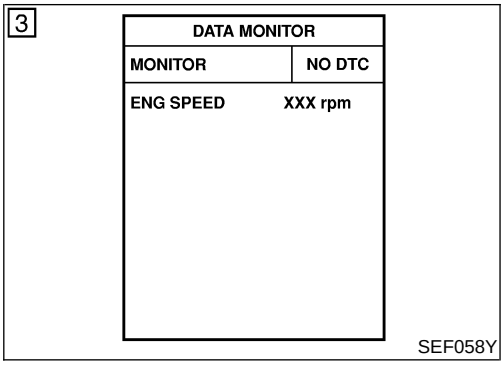
With CONSULT-II

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-1686.

With GST

Follow the procedure "With CONSULT-II" above.

DTC Confirmation Procedure (Cont'd)



PROCEDURE FOR MALFUNCTION B AND C

NIEC0936S02

With CONSULT-II

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-1686.

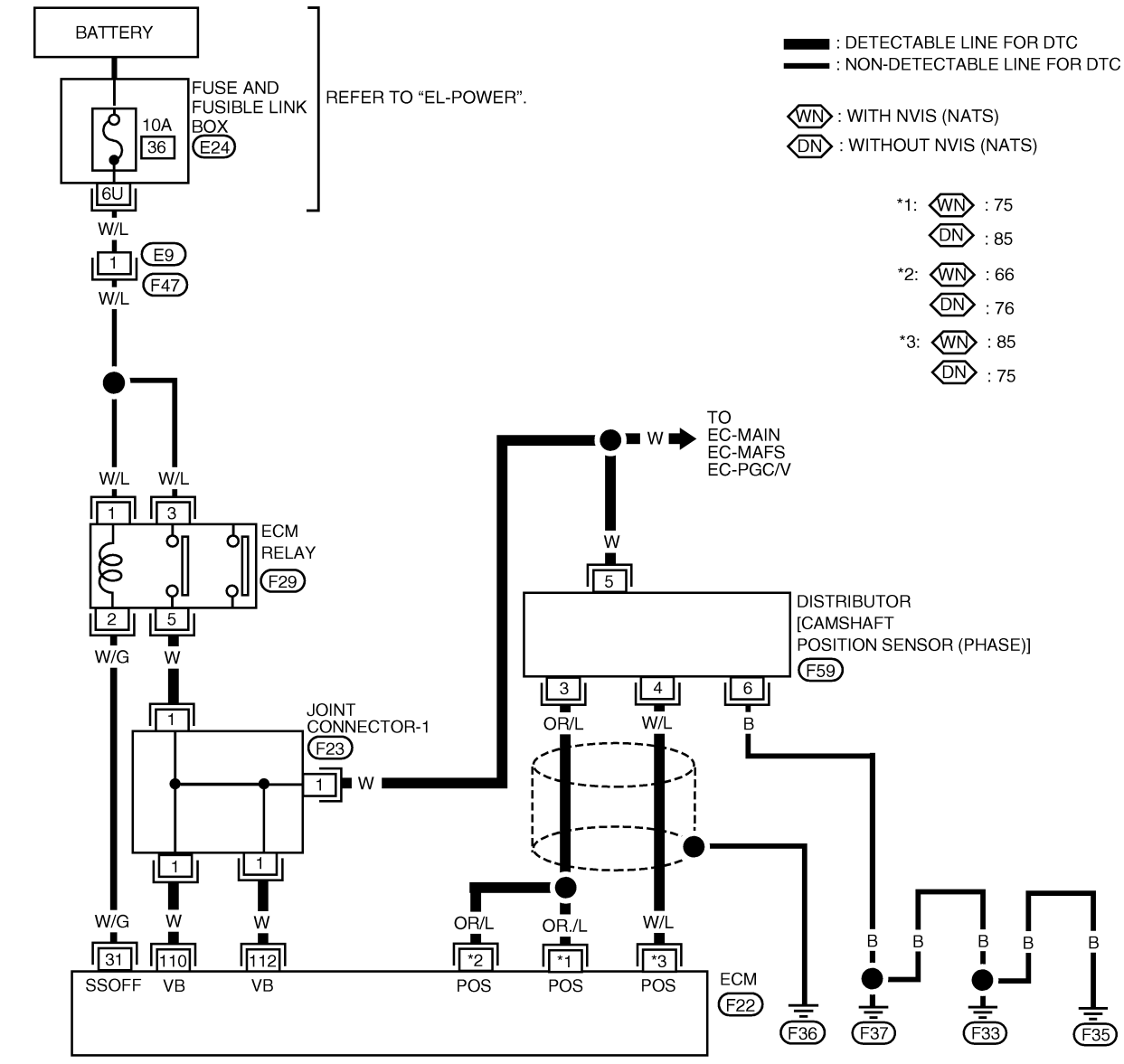
With GST

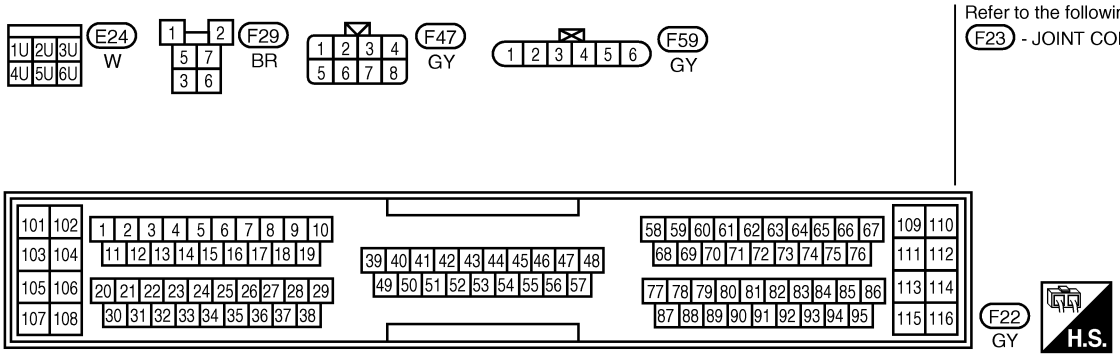
Follow the procedure "With CONSULT-II" above.

Wiring Diagram

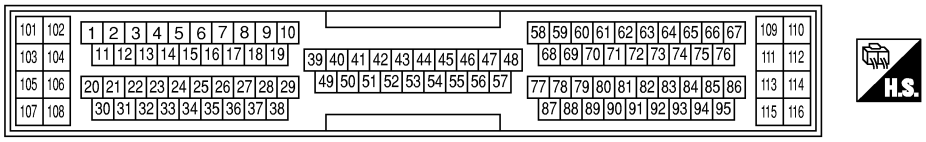
NIEC0937

EC-PHASE-01

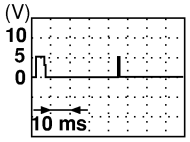
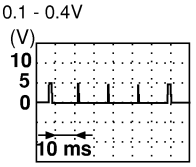
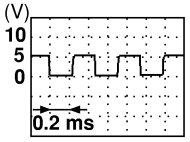
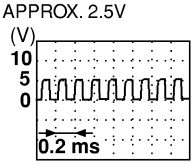




LEC216



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 75 (With NVIS) 76 85 (Without NVIS)	OR/L OR/L OR/L OR/L	CAMSHAFT POSITION SENSOR (REF)	ENGINE RUNNING AT IDLE SPEED UNDER WARM-UP CONDITION	0.1 - 0.4V 
			ENGINE RUNNING AT 2,000 RPM	0.1 - 0.4V 
75 (Without NVIS) 85 (With NVIS)	W/L W/L	CAMSHAFT POSITION SENSOR (POS)	ENGINE RUNNING AT IDLE SPEED UNDER WARM-UP CONDITION	APPROX. 2.6V 
			ENGINE RUNNING AT 2,000 RPM	APPROX. 2.5V 

SEF574Y

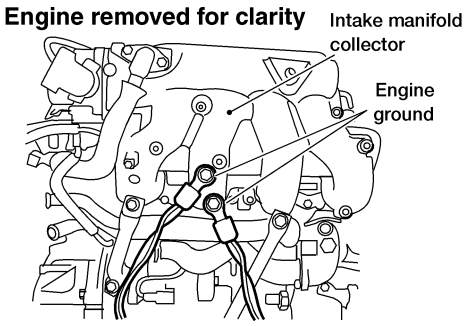
Diagnostic Procedure

NIEC0938

1	CHECK STARTING SYSTEM	
Does the engine turn over? (Does the starter motor operate?) **Yes or No**		
Yes	▶	GO TO 2.
No	▶	Check starting system. (Refer to ***SC-6***, "STARTING SYSTEM".)

2	RETIGHTEN GROUND SCREWS

1. Turn ignition switch "OFF".
2. Loosen and retighten engine ground screws.

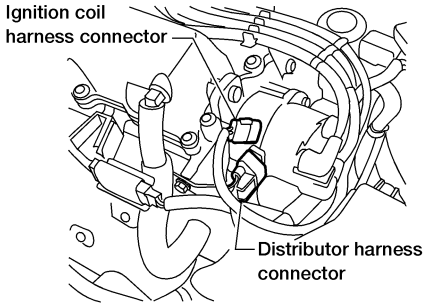


LEC302

▶	GO TO 3.

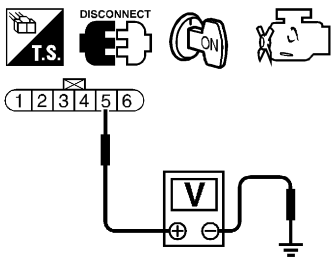
3	CHECK POWER SUPPLY

1. Disconnect distributor harness connector.



LEC283

2. Turn ignition switch "ON".
3. Check voltage between distributor harness connector terminal 5 and ground with CONSULT-II or tester.



SEF040S

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

Diagnostic Procedure (Cont'd)

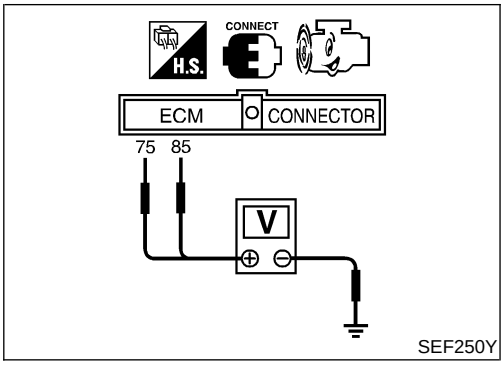
4	DETECT MALFUNCTIONING PART
Check the following. ● Joint connector-1 ● Harness for open or short between distributor and ECM relay ● Harness for open or short between distributor and ECM	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK INPUT SIGNAL CIRCUIT
1. Turn ignition switch "OFF". 2. Disconnect ECM harness connector. 3. Check harness continuity between distributor harness connector terminal 3 and ECM terminals 66, 75 (with NVIS) or 76, 85 (without NVIS), distributor harness connector terminal 4 and ECM terminal 85 (with NVIS) or 75 (without NVIS). Refer to "Wiring Diagram", EC-1685. **Continuity should exist.** 4. Also check harness for short to ground and short to power.	
OK or NG	
OK ▶	GO TO 6.
NG ▶	Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK GROUND CIRCUIT
1. Turn ignition switch "OFF". 2. Check harness continuity between distributor harness connector terminal 6 and engine ground. Refer to "Wiring Diagram", EC-1685. **Continuity should exist.** 3. Also check harness for short to ground and short to power.	
OK or NG	
OK ▶	GO TO 7.
NG ▶	Repair open circuit or short to ground or short to power in harness or connectors.

7	CHECK CAMSHAFT POSITION SENSOR (PHASE)
Refer to "Component Inspection", EC-1689.	
OK or NG	
OK ▶	GO TO 8.
NG ▶	Replace camshaft position sensor (PHASE).

8	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1508.	
▶	**INSPECTION END**



Component Inspection

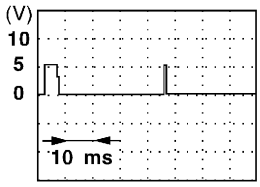
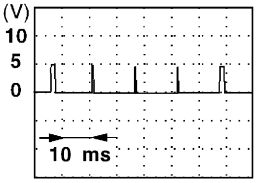
=NIEC0939

CAMSHAFT POSITION SENSOR (PHASE)

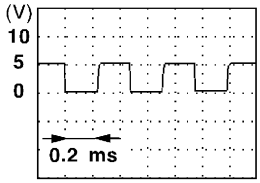
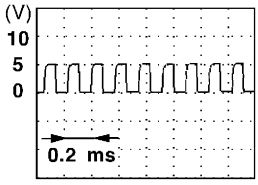
NIEC0939S01

1. Start engine and warm it up to normal operating temperature.
2. Check voltage between ECM terminals 75, 85 and engine ground under the following conditions.

With NVIS model:
Terminal 66 (or 75) and engine ground
Without NVIS model:
Terminal 76 (or 85) and engine ground

Condition	Idle	2,000 rpm
Voltage	0.1 - 0.4V	0.1 - 0.4V
Pulse signal	 SEF006W	 SEF007W

Terminal 85 (with NVIS) or 75 (without NVIS) and engine ground

Condition	Idle	2,000 rpm
Voltage	Approximately 2.5V	Approximately 2.4V
Pulse signal	 SEF004W	 SEF005W

If NG, replace distributor assembly with camshaft position sensor (PHASE).

Description

NIEC0940

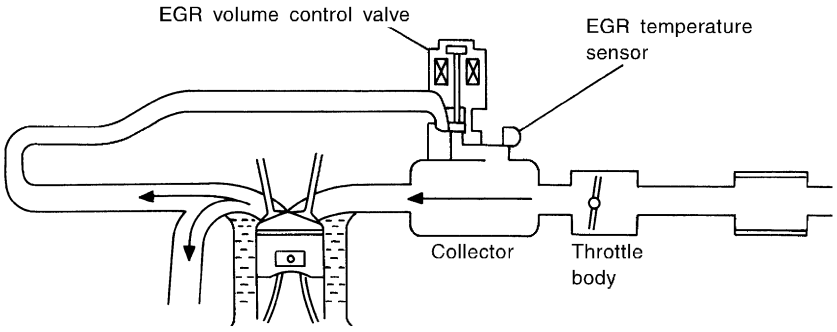
SYSTEM DESCRIPTION

NIEC0940S01

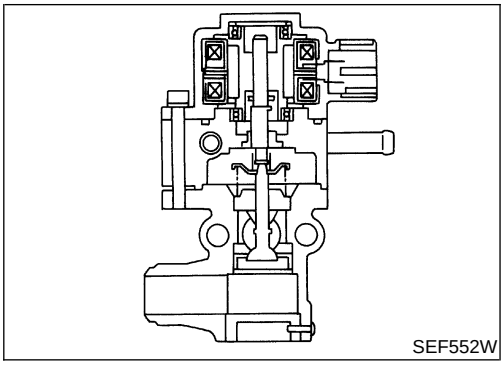
Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE)	Engine speed	EGR volume control	EGR volume control valve
Vehicle speed sensor	Vehicle speed		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle 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

NIEC0940S02

EGR volume control valve

NIEC0940S0201

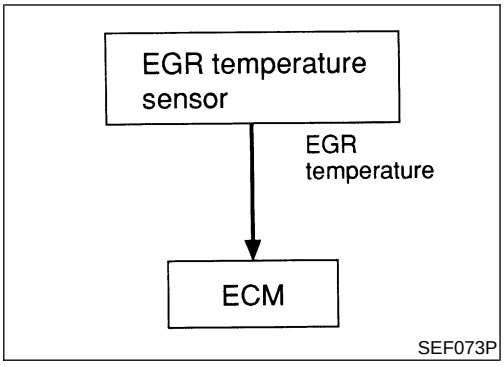
The EGR volume control valve uses a step motor to control the flow rate of EGR from exhaust manifold. This motor has four winding phases. It operates according to the output pulse signal of the ECM. Two windings are turned ON and OFF in sequence. Each time an ON pulse is issued, the valve opens or closes, 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

NIEC0941

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 steps



SEF073P

On Board Diagnosis Logic

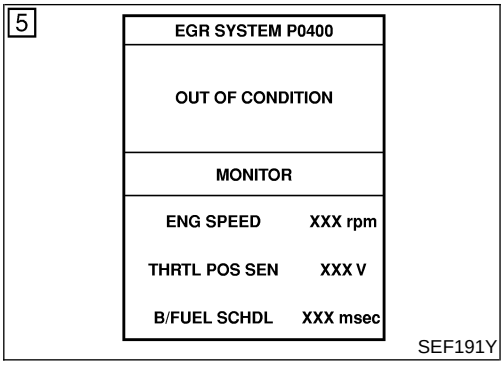
NIEC0942

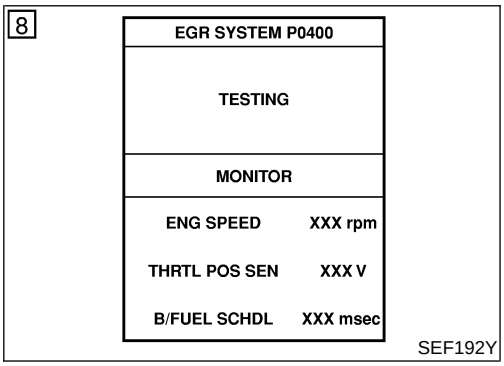
If the absence of EGR flow is detected by EGR temperature sensor under the condition that calls for EGR, a low-flow malfunction is diagnosed.
Malfunction is detected when no EGR flow is detected under condition that calls for EGR.

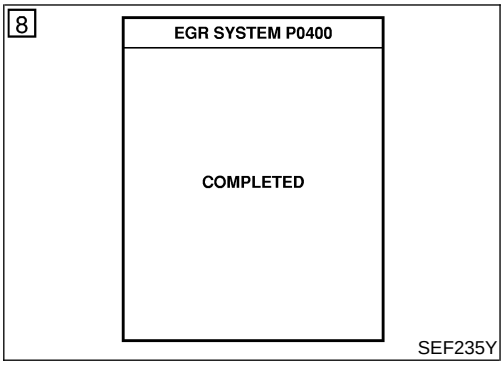
Possible Cause

NIEC0943

- 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

NIEC0944

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

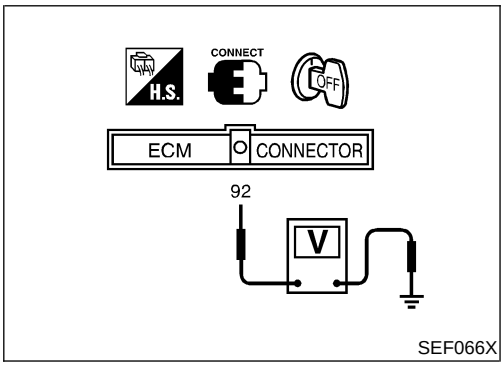
NIEC0944S01

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 70°C (158°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 10.
   If “COMPLETED” does not appear on CONSULT-II screen, go to the following step.
8) Check the output voltage of “THRTL POS SEN” (at closed throttle position) and note it.
9) 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	1,800 - 2,800 rpm
Vehicle speed	More than 10 km/h (6 MPH)
B/FUEL SCHDL	5.0 - 8.5 msec
THRTL POS SEN	(X + 0.05) – (X + 0.87) V X = Voltage value measured at step 8
Selector lever	Suitable position

If "TESTING" is not displayed after 5 minutes, retry from step 2.

10) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-1695.



WITH GST

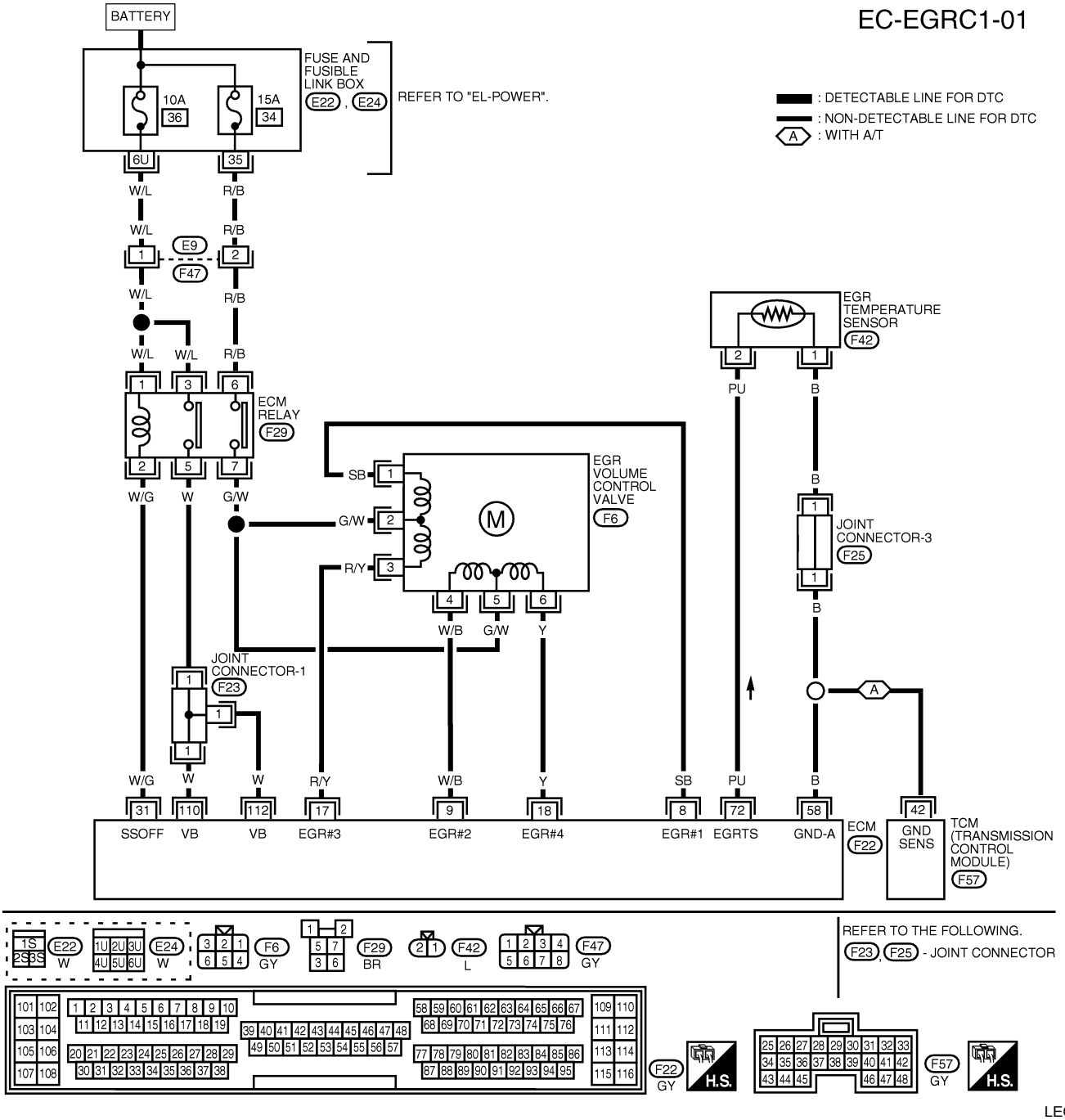
NIEC0944S02

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 70°C (158°F), immediately go to the next step.
5) Maintain the following conditions for at least 1 minute.
   Engine speed: 1,800 - 2,800 rpm
   Vehicle speed: More than 10 km/h (6 MPH)
   Voltage between ECM terminal 92 and ground: 0.86 - 2.0V
   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-1695.

- **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

NIEC0945



LEC218

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)
8	SB	EGR VOLUME CONTROL VALVE	ENGINE RUNNING AT IDLE SPEED	0.1 - 14V
9	W/B			
17	R/Y			
18	Y			

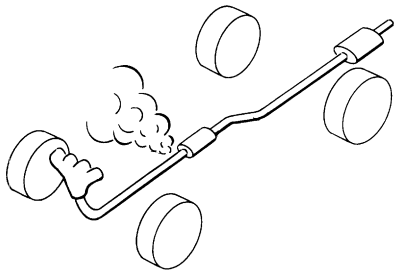
SEF575Y

Diagnostic Procedure

NIEC0946

1	CHECK EXHAUST SYSTEM

1. Start engine.
2. Check exhaust pipes and muffler for leaks.



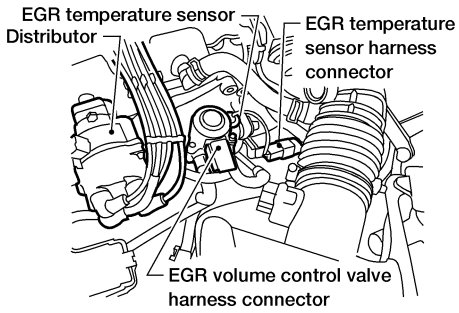
SEF099P

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair or replace exhaust system.

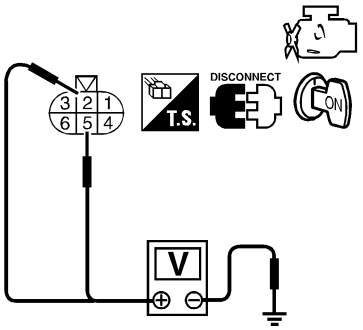
2	CHECK EGR VOLUME CONTROL VALVE POWER SUPPLY CIRCUIT

1. Disconnect EGR volume control valve harness connector.



LEC285

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	▶	Repair open circuit or short to ground or short to power in harness or connectors.

Diagnostic Procedure (Cont'd)

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", EC-1694.

ECM terminal	EGR volume control valve
8	1
9	4
17	3
18	6

MTBL0389

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 EGR PASSAGE

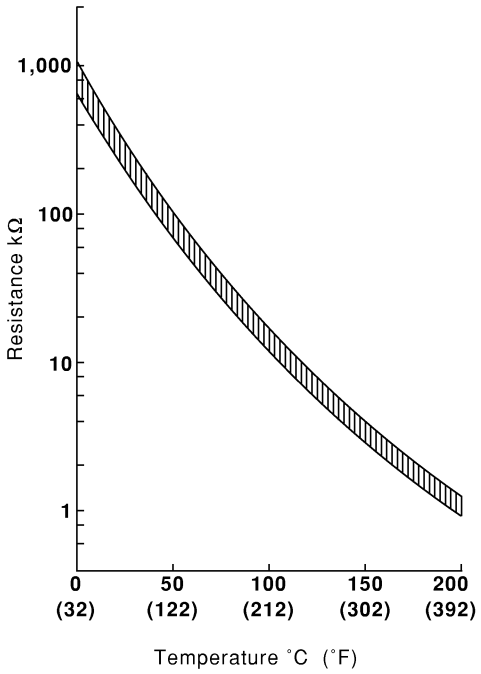
Check EGR passage for clogging and cracks.

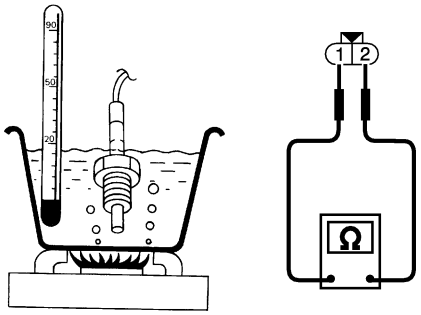
OK or NG

OK	▶	GO TO 5.
NG	▶	Repair or replace EGR passage.

5	CHECK EGR TEMPERATURE SENSOR AND CIRCUIT

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)	4.56	0.62 - 1.05
50 (122)	2.25	0.065 - 0.094
100 (212)	0.59	0.011 - 0.015

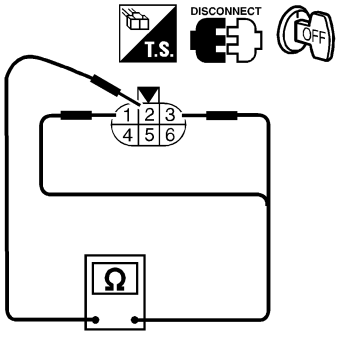
SEF483Y

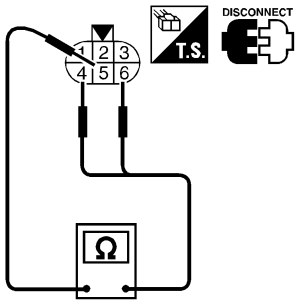
OK or NG

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.

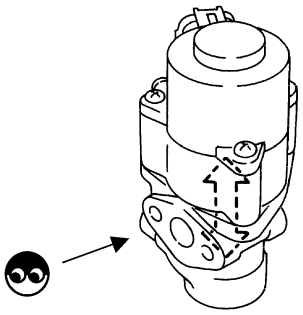
Diagnostic Procedure (Cont'd)

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

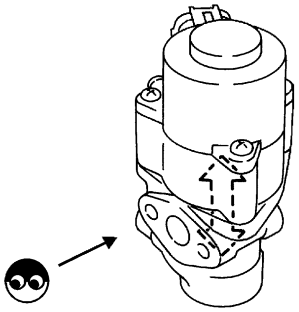
OK or NG

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-1508.	
▶	**INSPECTION END**

Description

SYSTEM DESCRIPTION

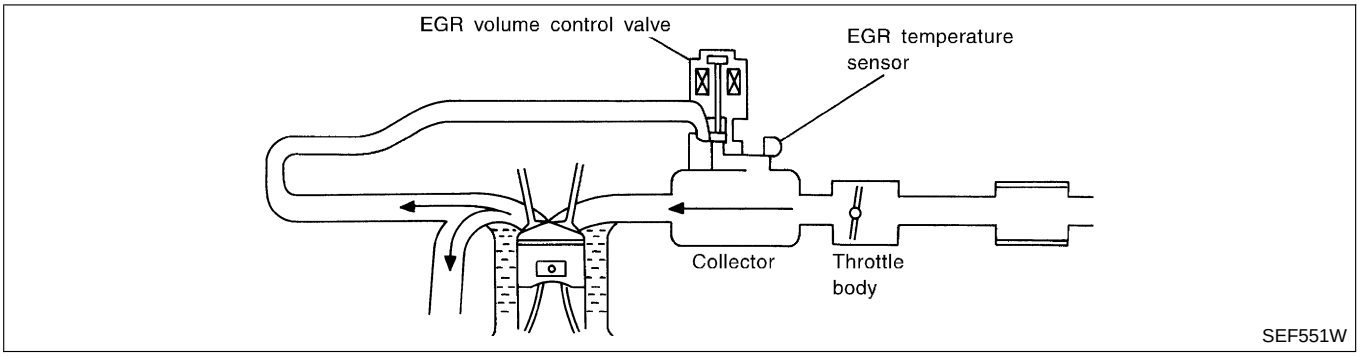
NIEC0947

NIEC0947S01

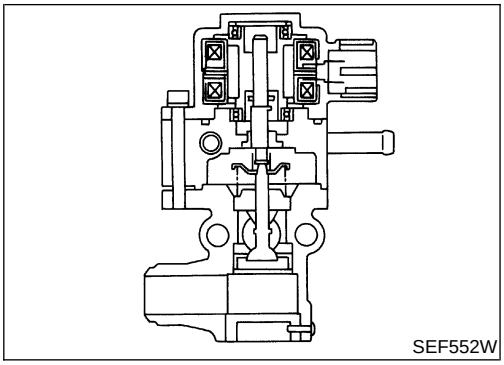
Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE)	Engine speed	EGR volume control	EGR volume control valve
Vehicle speed sensor	Vehicle speed		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle 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 bypass 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



Description (Cont'd)


SEF552W

COMPONENT DESCRIPTION

NIEC0947S02

EGR volume control valve

NIEC0947S0201

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

NIEC0948

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
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 steps

On Board Diagnosis Logic

NIEC0949

Malfunction is detected when an improper voltage signal is sent to ECM through the valve.

FAIL-SAFE MODE

NIEC0949S01

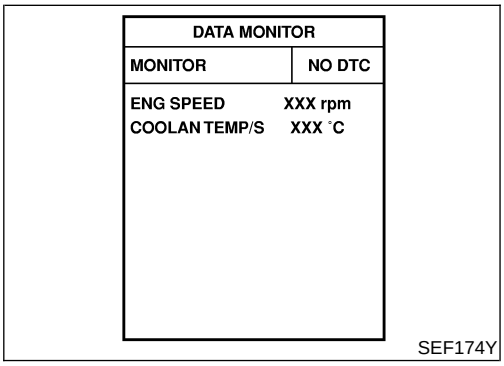
When the ECM enters the fail-safe mode, the MIL illuminates.

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

NIEC0950

- Harness or connectors
  (EGR volume control valve circuit is open or shorted.)
- EGR volume control valve



SEF174Y

DTC Confirmation Procedure

NIEC0951

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

NIEC0951S01

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-1703.

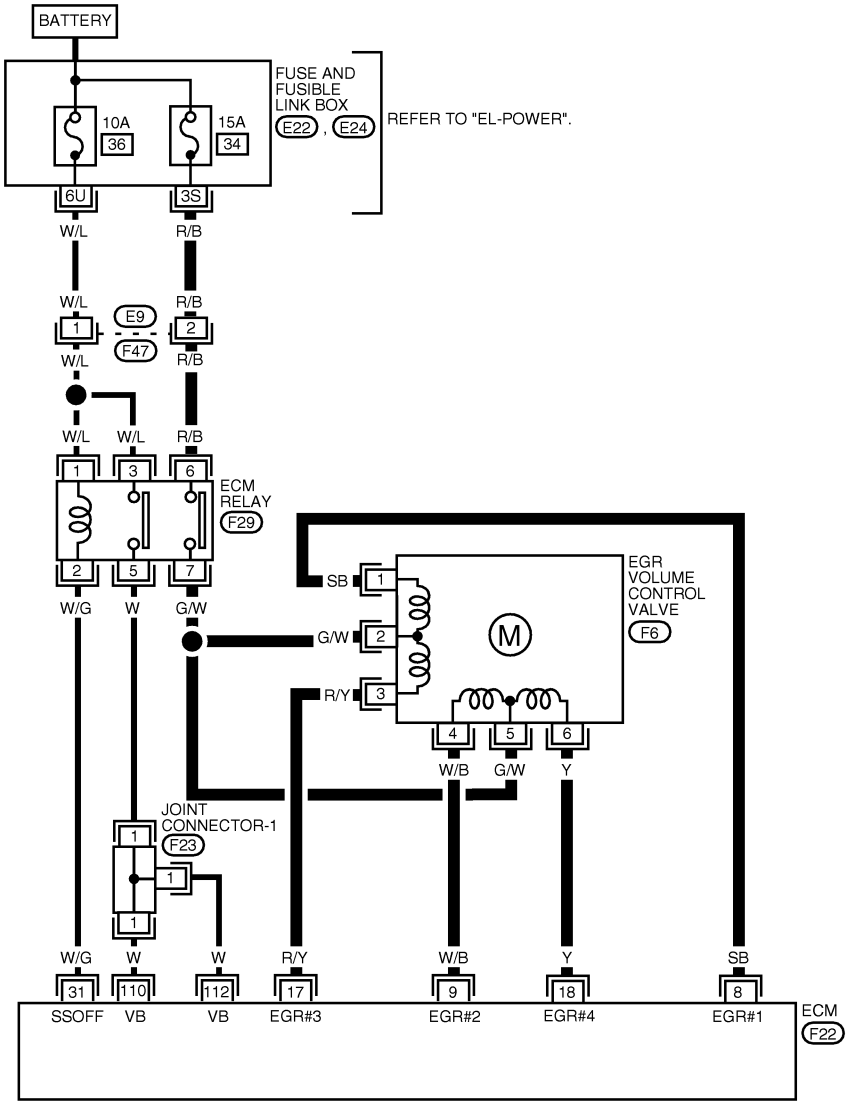
WITH GST

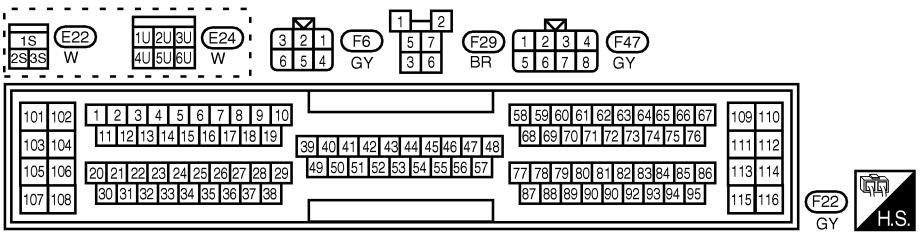
NIEC0951S02

Follow the procedure "With CONSULT-II" above.

Wiring Diagram

=NIEC0952





REFER TO THE FOLLOWING.
F23 - JOINT CONNECTOR

LEC219

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)
8	SB	EGR VOLUME CONTROL VALVE	ENGINE RUNNING AT IDLE SPEED	0.1 - 14V
9	W/B			
17	R/Y			
18	Y			

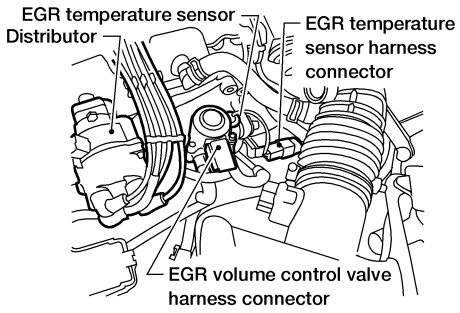
SEF575Y

Diagnostic Procedure

NIEC0953

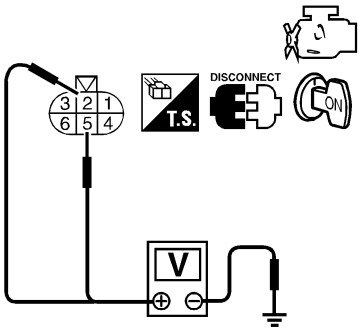
1 CHECK EGR VOLUME CONTROL VALVE POWER SUPPLY CIRCUIT

1. Disconnect EGR volume control valve harness connector.



LEC285

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 2.
NG	▶	Repair open circuit or short to ground or short to power in harness connectors.

2 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”, EC-1702.

ECM terminal	EGR volume control valve
8	1
9	4
17	3
18	6

MTBL0389

Continuity should exist.

4. Also check harness for short to ground and short to power.

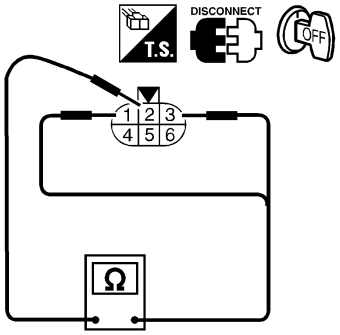
OK or NG

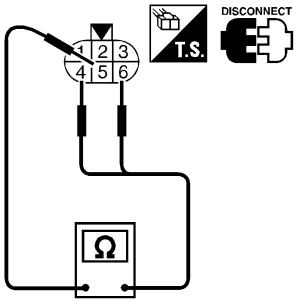
OK	▶	GO TO 3.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

Diagnostic Procedure (Cont'd)

3	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

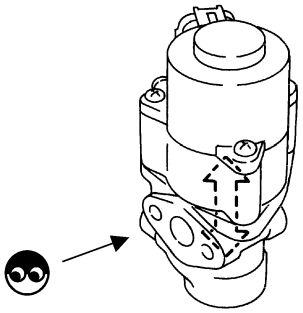
OK (With CONSULT-II)	▶	GO TO 4.
OK (Without CONSULT-II)	▶	GO TO 5.
NG	▶	Replace EGR volume control valve.

4	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

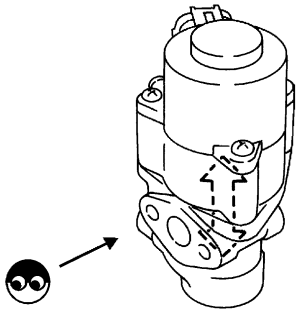
OK or NG

OK	▶	GO TO 6.
NG	▶	Replace EGR volume control valve.

5	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.

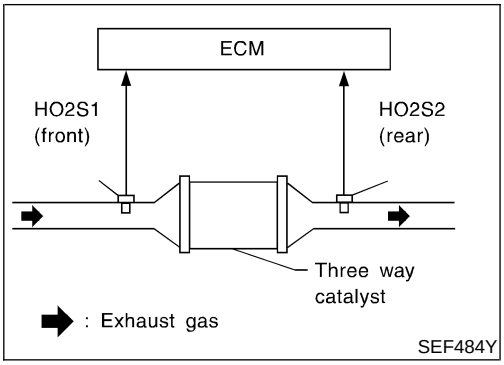


SEF560W

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace EGR volume control valve.

6	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1508.	
▶	**INSPECTION END**



SEF484Y

On Board Diagnosis Logic

NIEC0954

The ECM monitors the switching frequency ratio of heated oxygen sensor 1 (front) and 2 (rear).
A three way catalyst with high oxygen storage capacity will indicate a low switching frequency of rear heated oxygen sensor. As oxygen storage capacity decreases, the rear heated oxygen sensor switching frequency will increase.
When the frequency ratio of front and rear heated oxygen sensors approaches a specified limit value, the three way catalyst malfunction is diagnosed.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0420	• Three way catalyst does not operate properly. • Three way catalyst does not have enough oxygen storage capacity.	• Three way catalyst • Exhaust tube • Intake air leaks • Injectors • Injector leaks • Spark plug • Improper ignition timing

SRT WORK SUPPORT	
CATALYST	INCMP
EVAP SYSTEM	INCMP
O2 SEN HEATER	CMPLT
O2 SENSOR	INCMP
EGR SYSTEM	INCMP
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE B1	XXX V
B/FUEL SCHDL	XXX msec
A/F ALPHA-B1	XXX V
COOLAN TEMP/S	XX °C
HO2S1 (B1)	XXX V

SEF671Y

SRT WORK SUPPORT	
CATALYST	CMPLT
EVAP SYSTEM	INCMP
O2 SEN HEATER	CMPLT
O2 SENSOR	INCMP
EGR SYSTEM	INCMP
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE B1	XXX V
B/FUEL SCHDL	XXX msec
A/F ALPHA-B1	XXX V
COOLAN TEMP/S	XX °C
HO2S1 (B1)	XXX V

SEF672Y

SELF DIAG RESULTS	
DTC RESULTS	TIME
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	

SEF560X

DTC Confirmation Procedure

NIEC0955

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.

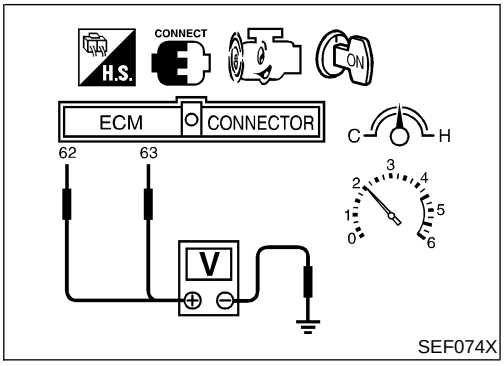
WITH CONSULT-II

NIEC0955S01

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-1707.



Overall Function Check

NIEC0956

Use this procedure to check the overall function of the three way catalyst. During this check, a 1st trip DTC might not be confirmed.

With GST

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 62 [Heated oxygen sensor 1 (front) signal], 63 [Heated oxygen sensor 2 (rear) signal] and engine ground.
4) Keep engine speed at 2,000 rpm constant under no load.
5) Make sure that the voltage switching frequency (high & low) between ECM terminal 63 and engine ground is much less than that of ECM terminal 62 and engine ground.
   Switching frequency ratio = A/B
   A: Heated oxygen sensor 2 (rear) voltage switching frequency
   B: Heated oxygen sensor 1 (front) voltage switching frequency
   This ratio should be less than 0.75.
   If the ratio is greater than above, it means three way catalyst does not operate properly.

NOTE:
If the voltage at terminal 62 does not switch periodically more than 5 times within 10 seconds at step 4, perform trouble diagnosis for DTC P0133 first. (See EC-1575.)

Diagnostic Procedure

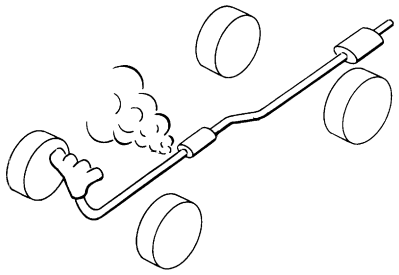
NIEC0957

1	CHECK EXHAUST SYSTEM	
Visually check exhaust tubes and muffler for dents. **OK or NG**		
OK	▶	GO TO 2.
NG	▶	Repair or replace.

Diagnostic Procedure (Cont'd)

2	CHECK EXHAUST AIR LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust air leak before the three way catalyst.



SEF099P

OK or NG

OK	▶	GO TO 3.
NG	▶	Repair or replace.

3	CHECK INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair or replace.

4	CHECK IGNITION TIMING

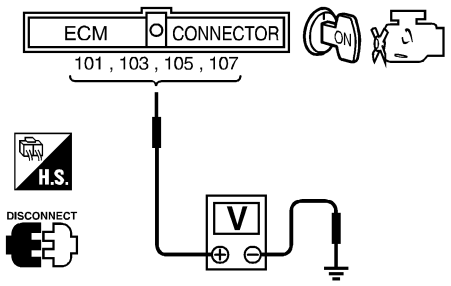
Check for ignition timing.
Refer to "BASIC INSPECTION", EC-1470.

OK or NG

OK	▶	GO TO 5.
NG	▶	Adjust ignition timing.

5	CHECK INJECTORS

1. Refer to Wiring Diagram for Injectors, EC-1918.
2. Stop engine and then turn ignition switch "ON".
3. Check voltage between ECM terminals 101, 103, 105 and 107 and ground with CONSULT-II or tester.



SEF075X

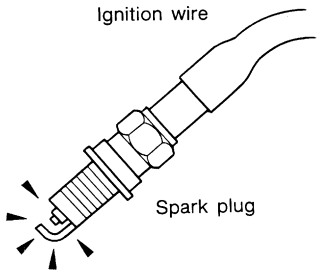
Battery voltage should exist.

OK or NG

OK	▶	GO TO 6.
NG	▶	Perform "Diagnostic Procedure" INJECTOR, EC-1919.

6	CHECK IGNITION SPARK

1. Disconnect ignition wire from spark plug.
2. Connect a known good spark plug to the ignition wire.
3. Place end of spark plug against a suitable ground and crank engine.
4. Check for spark.



SEF282G

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	CHECK IGNITION WIRES

Refer to "Component Inspection", EC-1673.

OK or NG

OK	▶	Check ignition coil, power transistor and their circuits. Refer to EC-1820.
NG	▶	Replace.

8	CHECK INJECTOR

1. Turn ignition switch "OFF".
2. Remove injector assembly. Refer to EC-1409.
   Keep fuel hose and all injectors connected to injector gallery.
3. Disconnect distributor harness connector.
4. Turn ignition switch "ON".
   Make sure fuel does not drip from injector.

OK or NG

OK (Does not drip)	▶	GO TO 9.
NG (Drips)	▶	Replace the injector(s) from which fuel is dripping.

9	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1508.

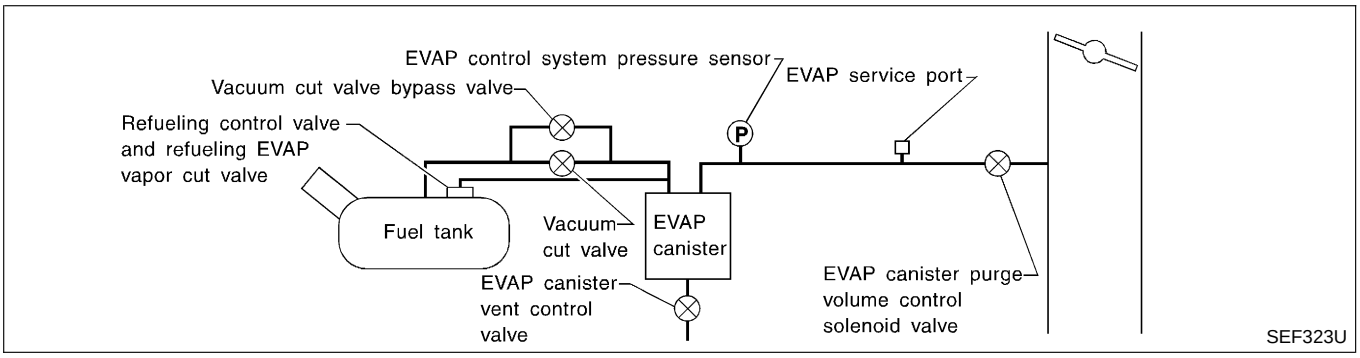
Trouble is fixed	▶	**INSPECTION END**
Trouble is not fixed	▶	Replace three way catalyst.

On Board Diagnosis Logic

NIEC0958

NOTE:
If DTC P0440 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-1879.)

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.**

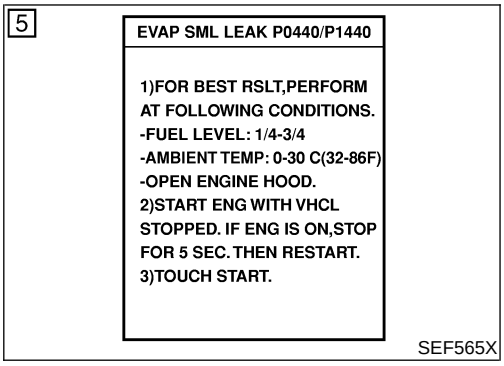
Possible Cause

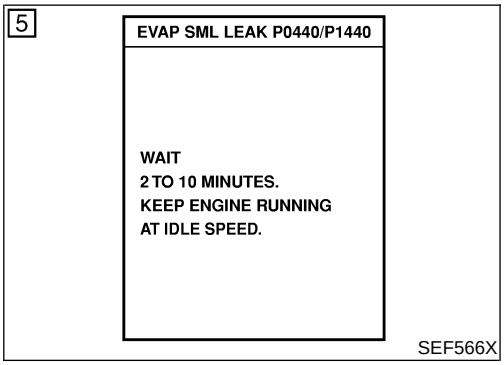
NIEC0959

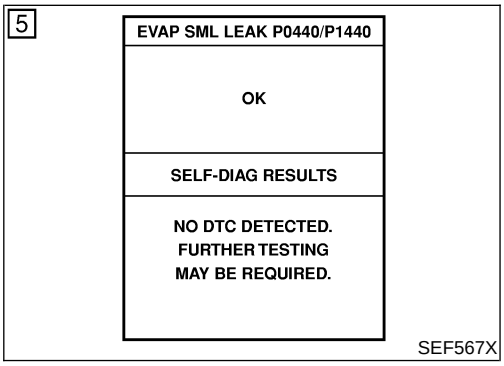
- Incorrect fuel tank vacuum relief valve
- Incorrect fuel filler cap used
- Fuel filler cap remains open or fails to close.
- Foreign matter caught in fuel filler cap.
- Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.
- Foreign matter caught in EVAP canister 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 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

NIEC0960

CAUTION:

Never remove fuel filler cap during the DTC confirmation procedure.

NOTE:

- **If DTC P0440 or P1440 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-1879.)**
- **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.**
- **Always perform test at a temperature of 0 to 30°C (32 to 86°F).**

WITH CONSULT-II

NIEC0960S01

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-1470.

6) Make sure that "OK" is displayed.
   If "NG" is displayed, refer to "Diagnostic Procedure", EC-1712.

WITH GST

NIEC0960S02

NOTE:
Be sure to read the explanation of "Driving Pattern" on EC-1433 before driving vehicle.

1) Start engine.
2) Drive vehicle according to "Driving Pattern", EC-1433.
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-1433.
8) Stop vehicle.
9) Select "MODE 3" with GST.

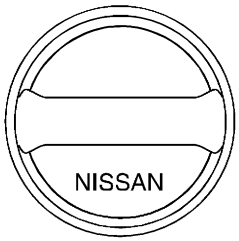
- If P0440 or P1440 is displayed on the screen, go to "Diagnostic Procedure", EC-1712.
- If P1447 is displayed on the screen, go to "Diagnostic Procedure" for DTC P1447, EC-1870.
- If P0440, P1440 and P1447 are not displayed on the screen, go to the following step.

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

NIEC0961

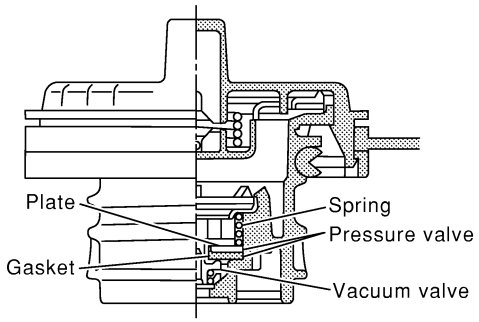
1	CHECK FUEL FILLER CAP DESIGN	
1. Turn ignition switch "OFF". 2. Check for genuine NISSAN fuel filler cap design.  SEF915U **OK or NG**		
OK	▶	GO TO 2.
NG	▶	Replace with genuine NISSAN fuel filler cap.

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.

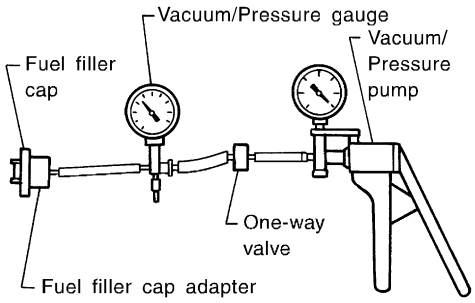
3	CHECK FUEL FILLER CAP FUNCTION
Check for air releasing sound while opening the fuel filler cap.	
OK or NG	
OK ▶	GO TO 6.
NG ▶	GO TO 4.

4 CHECK FUEL TANK VACUUM RELIEF VALVE

1. Wipe clean valve housing.
2. Check valve opening pressure and vacuum.



SEF445Y



SEF943S

Pressure:
15.3 - 20.0 kPa (0.156 - 0.204 kg/cm^2, 2.22 - 2.90 psi)
Vacuum:
−6.0 to −3.4 kPa (−0.061 to −0.035 kg/cm^2, −0.87 to −0.50 psi)

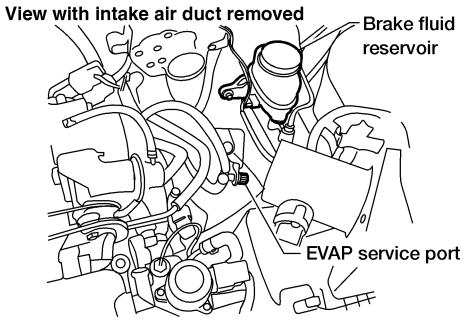
CAUTION:
Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.

OK or NG

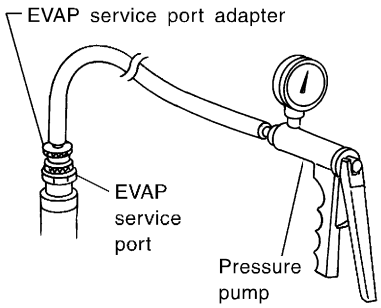
OK ▶	GO TO 5.
NG ▶	Replace fuel filler cap with a genuine one.

5	INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.



LEC288



SEF916U

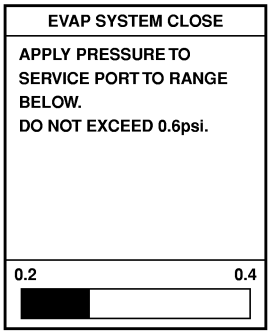
NOTE:
Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.

Models with CONSULT-II ▶	GO TO 6.
Models without CONSULT-II ▶	GO TO 7.

6	CHECK FOR EVAP LEAK

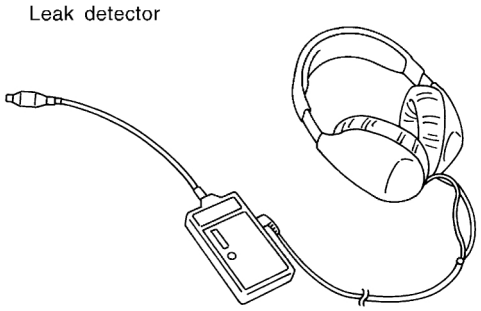
With CONSULT-II

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-1394.



SEF200U

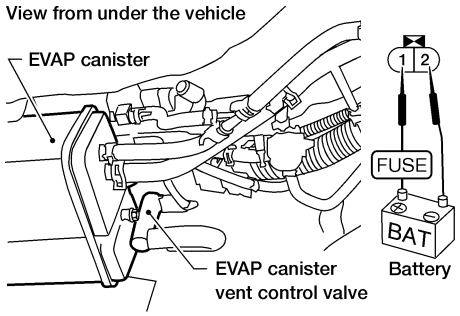
OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace.

7	CHECK FOR EVAP LEAK

Without CONSULT-II

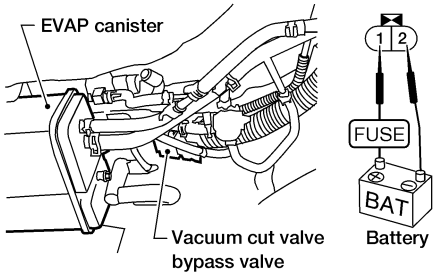
1. Turn ignition switch "OFF".
2. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)



WEC292

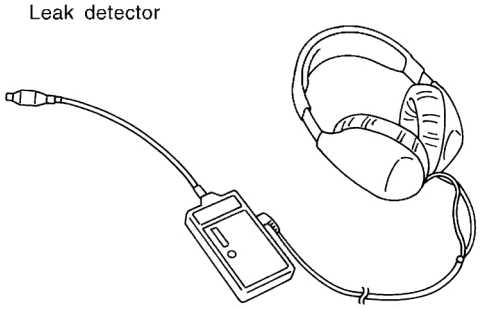
3. Apply 12 volts DC to vacuum cut valve bypass valve. The valve will open. (Continue to apply 12V until the end of test.)

View from under the vehicle



WEC293

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-1394.



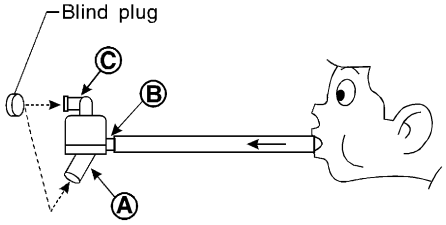
SEF200U

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

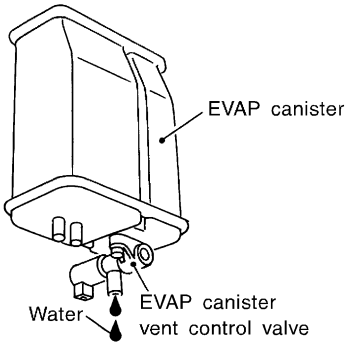
Refer to "DTC Confirmation Procedure", EC-1726.

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.

Diagnostic Procedure (Cont'd)

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
A/F ALPHA-B1	XXX %
HO2S1 MNTR (B1)	LEAN
THRTL POS SEN	XXX V

Vacuum should exist.

SEF595Y

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 18.
NG ▶	GO TO 15.

15	CHECK VACUUM HOSE	
Check vacuum hoses for clogging or disconnection. Refer to "Vacuum Hose Drawing", EC-1384.		
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.		
OK or NG		
OK	▶	GO TO 18.
NG	▶	GO TO 17.

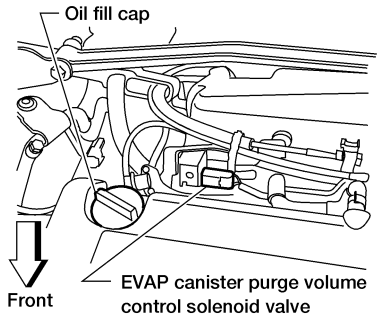
ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
HO2S1 MNTR (B1)	LEAN
THRTL POS SEN	XXX V

SEF801Y

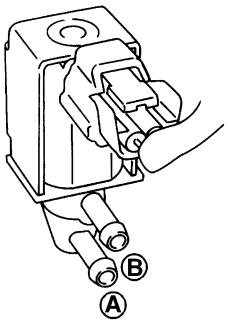
17	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



LEC273

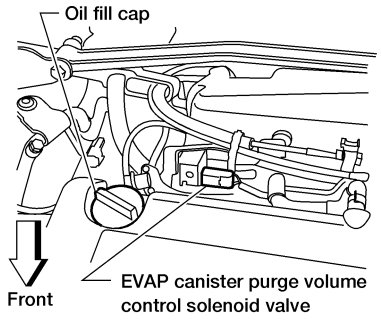


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

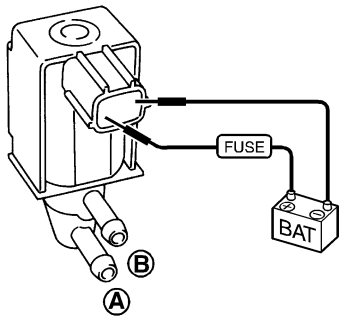
SEF334X

Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



LEC273



Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

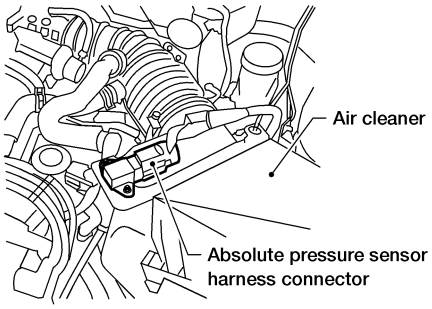
SEF335X

OK or NG

OK	▶	GO TO 18.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

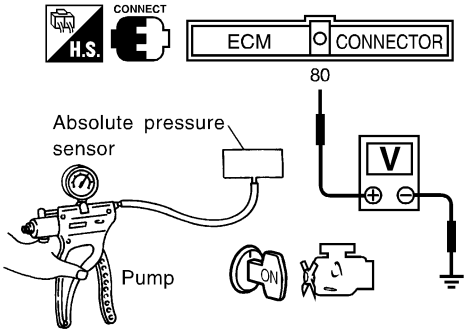
18	CHECK ABSOLUTE PRESSURE SENSOR

1. Remove absolute pressure sensor with its harness connector connected.



LEC322

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	1.8 - 4.8
–26.7 (–200, –7.87)	1.0 to 1.4 lower than above value

SEF300XA

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 and fuel pump.
2. Check fuel tank temperature sensor.
   Refer to EC-1648, "Component Inspection".

OK or NG

OK	▶	GO TO 20.
NG	▶	Replace fuel level sensor unit.

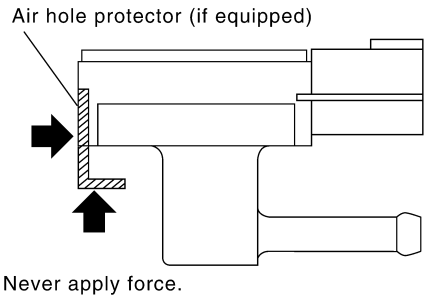
Diagnostic Procedure (Cont'd)

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.**



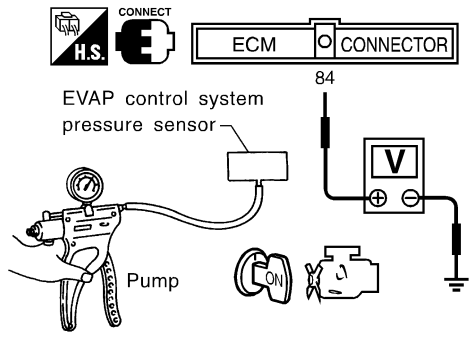
SEF799W

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 any 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 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-1390.

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-1396.

OK or NG

OK	▶	GO TO 24.
NG	▶	Repair or replace hoses and tubes.

24	CHECK SIGNAL LINE AND RECIRCULATION LINE

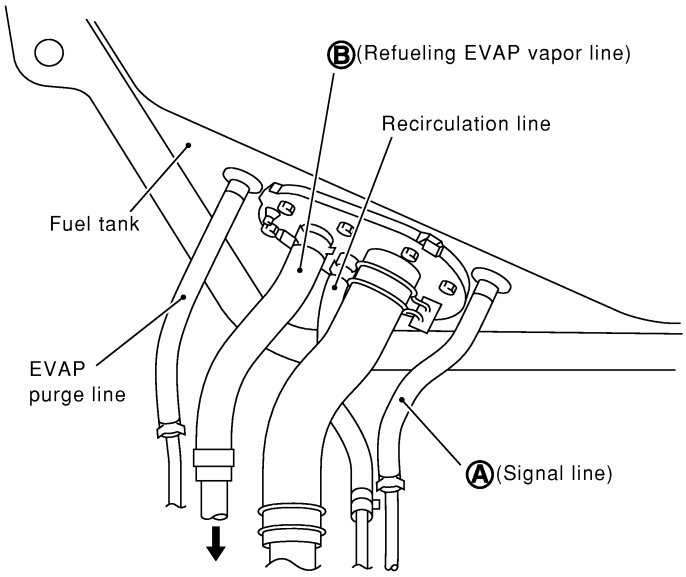
Check signal line and recirculation line between filler neck tube and fuel tank for clogging, kink, cracks, looseness and improper connection.

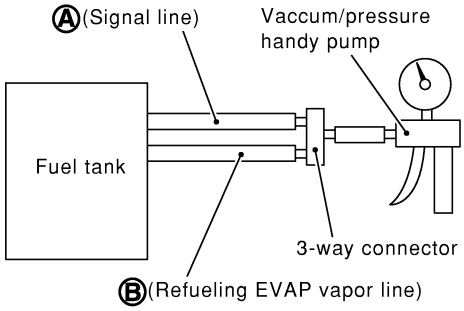
OK or NG

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.





SEF246Y

OK or NG

OK	▶	GO TO 26.
NG	▶	Replace refueling control valve with fuel tank.

26	CHECK FUEL LEVEL SENSOR

Refer to ***EL-103***, "Fuel Level Sensor Unit Check".

OK or NG

OK	▶	GO TO 27.
NG	▶	Replace fuel level sensor unit.

Diagnostic Procedure (Cont'd)

27	**CHECK INTERMITTENT INCIDENT**
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1508.	
▶	**INSPECTION END**

Description

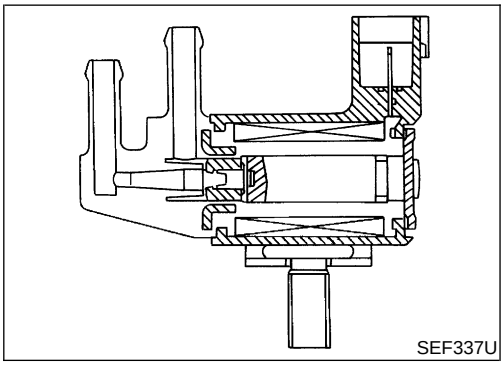
NIEC0962

SYSTEM DESCRIPTION

NIEC0962S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		
Throttle position switch	Closed throttle position		
Heated oxygen sensor 1 (front)	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 bypass 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

NIEC0962S02

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

NIEC0963

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

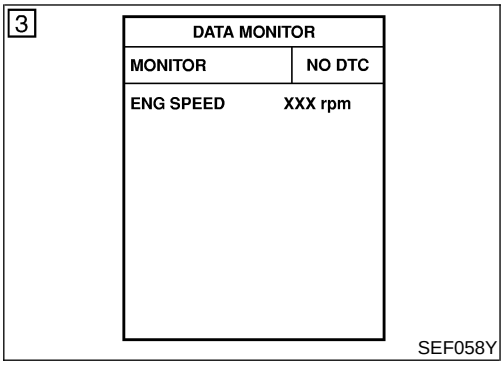
NIEC0964

Malfunction is detected when an improper voltage signal is sent to ECM through the valve.

Possible Cause

NIEC0965

- Harness or connectors
  (The valve circuit is open or shorted.)
- EVAP canister purge volume control solenoid valve



DTC Confirmation Procedure

NIEC0966

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

NIEC0966S01

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-1728.

WITH GST

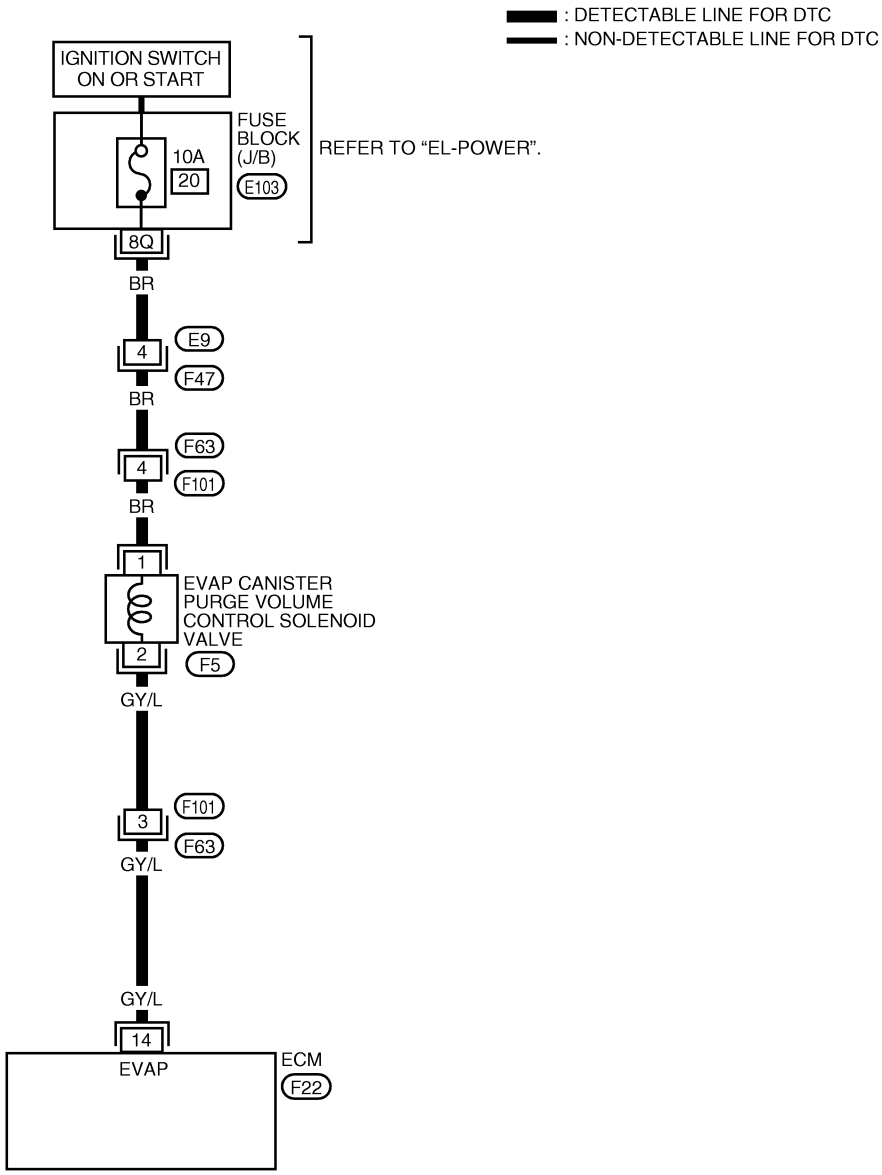
NIEC0966S02

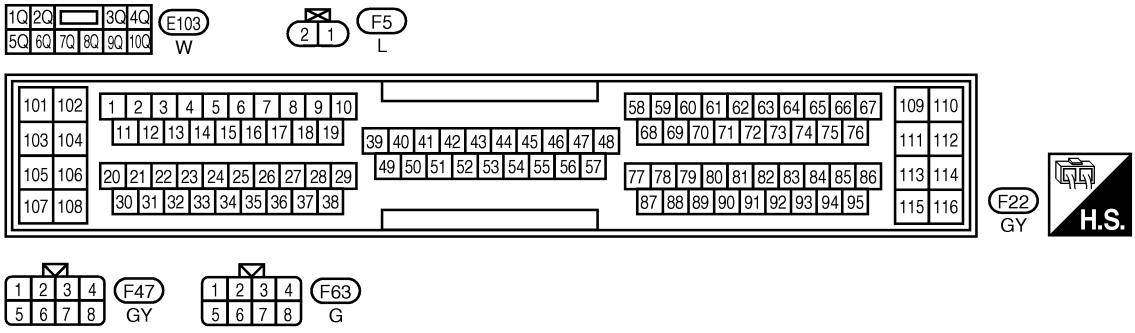
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

NIEC0967

EC-PGC/V-01





LEC210

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)
14	GY/L	EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE	ENGINE RUNNING AT IDLE SPEED	BATTERY VOLTAGE (V) 40 20 0 50 ms
			ENGINE RUNNING AT 2,000 RPM (MORE THAN 100 SECONDS AFTER STARTING ENGINE)	BATTERY VOLTAGE (V) 40 20 0 50 ms

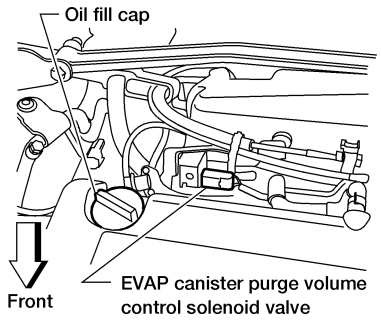
SEF576Y

Diagnostic Procedure

NIEC0968

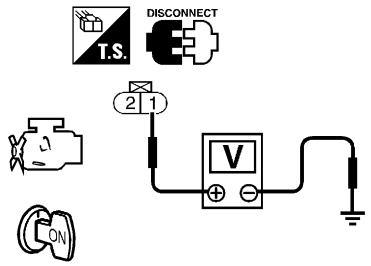
1 CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.



LEC273

3. Turn ignition switch "ON".
4. Check voltage between EVAP canister purge volume control solenoid valve terminal 1 and ground with CONSULT-II or tester.



SEF206W

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E9, F47 ● Harness connectors F63, M101 ● Fuse block (J/B) connector E103 ● 10A 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 14 and EVAP canister purge volume control solenoid valve terminal 2. Refer to "Wiring Diagram", EC-1727. **Continuity should exist.** 4. 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 ▶	GO TO 4.

4	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors F101, F63 ● Harness for open or short between EVAP canister purge volume control solenoid valve and ECM	
▶	Repair open circuit or short to ground and short to power in harness or connectors.

5	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	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
HO2S1 MNTR (B1)	LEAN
THRTL POS SEN	XXX V

SEF801Y

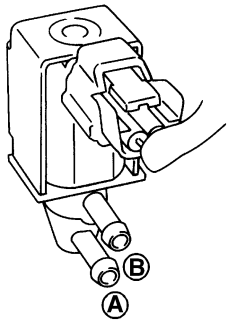
OK or NG	
OK ▶	GO TO 7.
NG ▶	GO TO 6.

Diagnostic Procedure (Cont'd)

6	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.

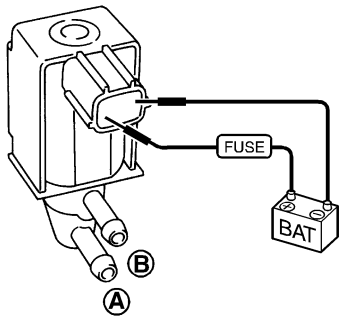


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

SEF334X

Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



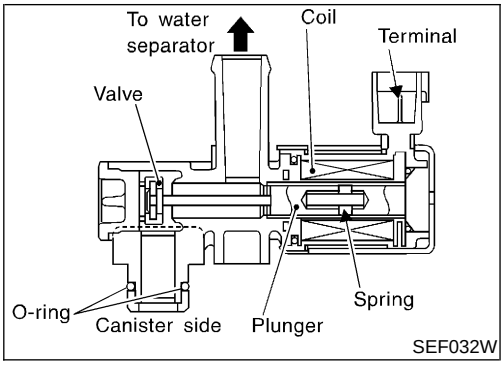
Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

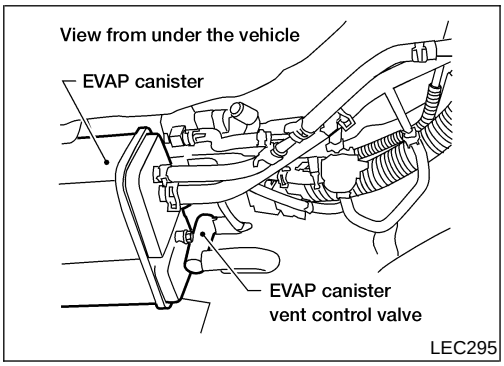
SEF335X

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

7	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1508.	
▶	**INSPECTION END**





Component Description

NIEC0969

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

NIEC0970

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	• Ignition switch: ON	OFF

On Board Diagnosis Logic

NIEC0971

Malfunction is detected when an improper voltage signal is sent to ECM through EVAP canister vent control valve.

Possible Cause

NIEC0972

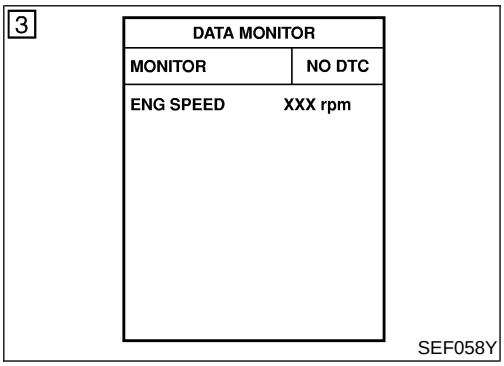
- Harness or connectors
  (The valve circuit is open or shorted.)
- EVAP canister vent control valve

DTC Confirmation Procedure

NIEC0973

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

NIEC0973S01

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-1734.

WITH GST

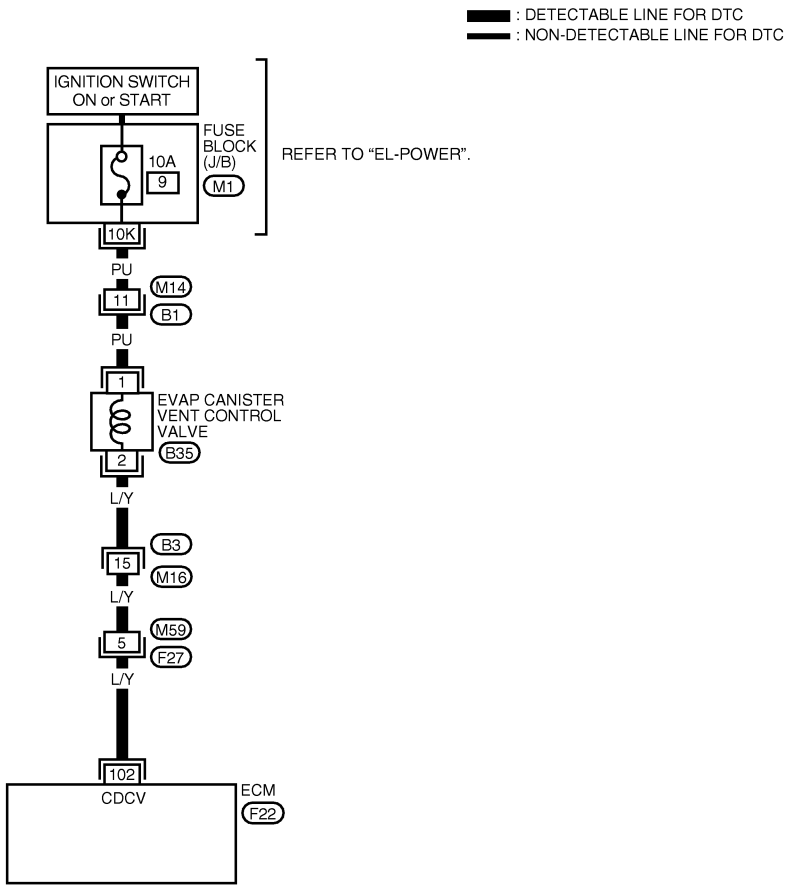
NIEC0973S02

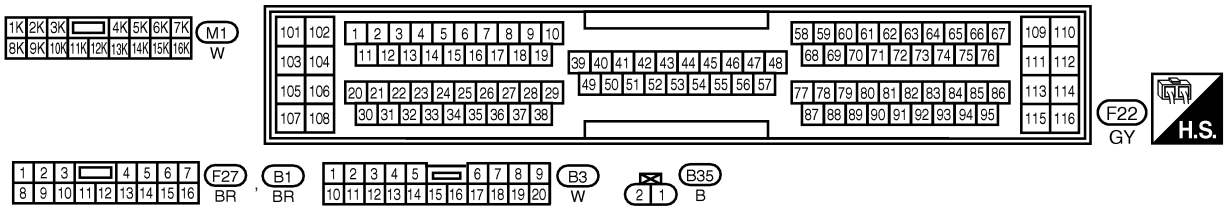
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

NIEC0974

EC-VENT/V-01





LEC202

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)
102	L/Y	EVAP CANISTER VENT CONTROL VALVE	IGN ON	BATTERY VOLTAGE

SEF577Y

Diagnostic Procedure

NIEC0975

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
A/F ALPHA-B1	XXX %
HO2S1 (B1)	XXX V
THRTL POS SEN	XXX V

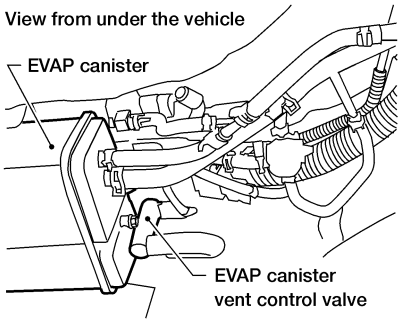
SEF802Y

4. Check for operating sound of the valve.
   Clicking noise should be heard.

OK or NG		
OK	▶	GO TO 7.
NG	▶	GO TO 3.

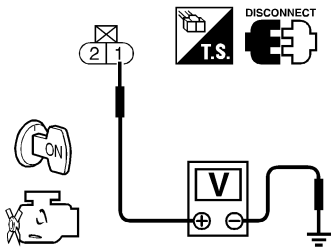
3	CHECK EVAP CANISTER VENT CONTROL VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect EVAP canister vent control valve harness connector.



LEC295

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 M14, B1
- Fuse block (J/B) connector M1
- 10A 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 102 and EVAP canister vent control valve terminal 2.
   Refer to "Wiring Diagram", EC-1733.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

OK or NG

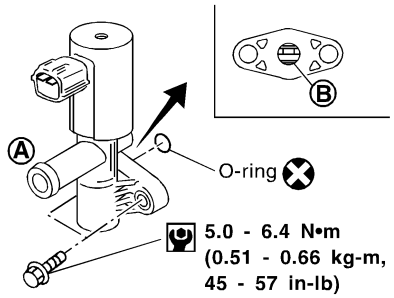
OK	▶	GO TO 7.
NG	▶	GO TO 6.

Diagnostic Procedure (Cont'd)

6	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors B3, M16 ● Harness connectors M59, F27 ● 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.	



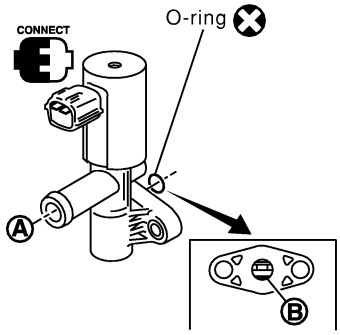
SEF337XA

OK or NG	
OK ▶	GO TO 9.
NG ▶	Replace EVAP canister vent control valve.

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
A/F ALPHA-B1	XXX %
HO2S1 (B1)	XXX V
THRTL POS SEN	XXX V

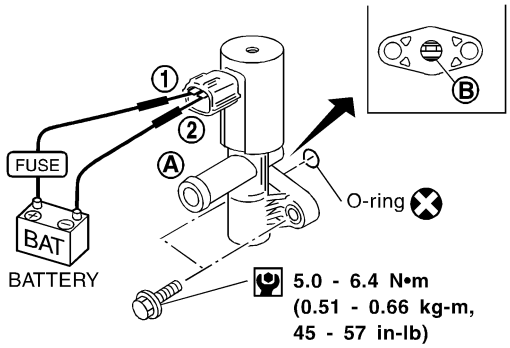
Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

SEF803Y

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.

SEF339XA

Make sure new O-ring is installed properly.

OK or NG

OK	▶	GO TO 11.
NG	▶	GO TO 10.

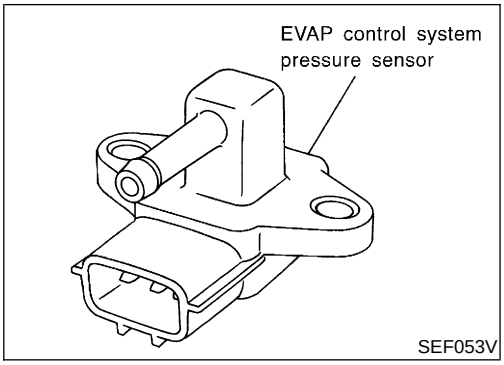
10	CHECK EVAP CANISTER VENT CONTROL VALVE-III

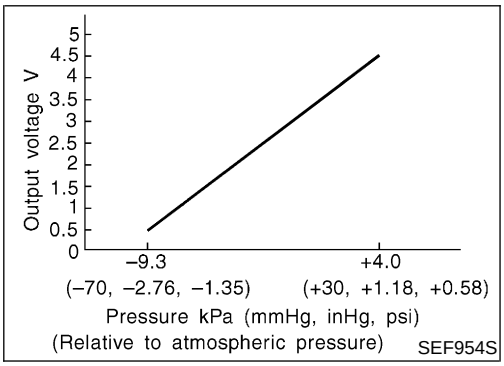
1. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
2. Perform Test No. 9 again.

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-1508.	
▶	**INSPECTION END**





Component Description

NIEC0976

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

NIEC0977

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
EVAP SYS PRES	• Ignition switch: ON	Approx. 3.4V

On Board Diagnosis Logic

NIEC0978

Malfunction is detected when an improper voltage signal from EVAP control system pressure sensor is sent to ECM.

Possible Cause

NIEC0979

- 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

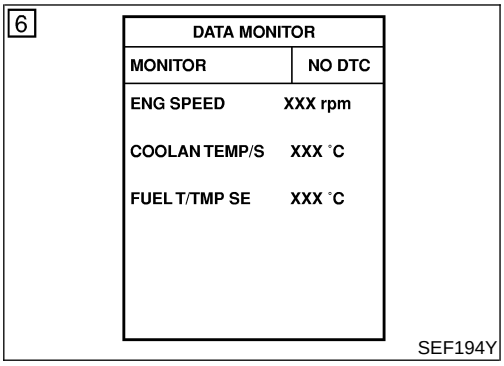
- Rubber hose from EVAP canister vent control valve to water separator

DTC Confirmation Procedure

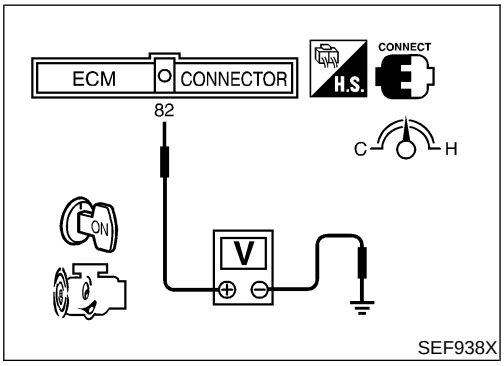
NIEC0980

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.



SEF194Y



SEF938X

WITH CONSULT-II

NIEC0980S01

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-1741.

WITH GST

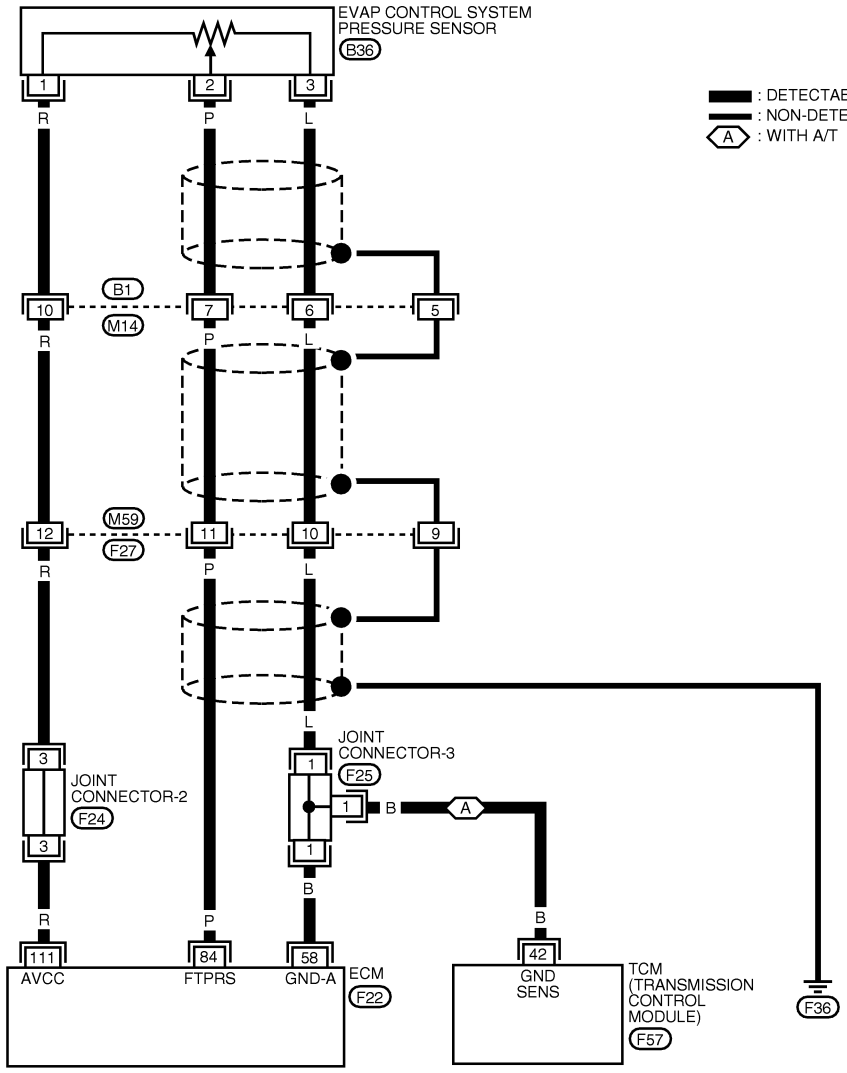
NIEC0980S02

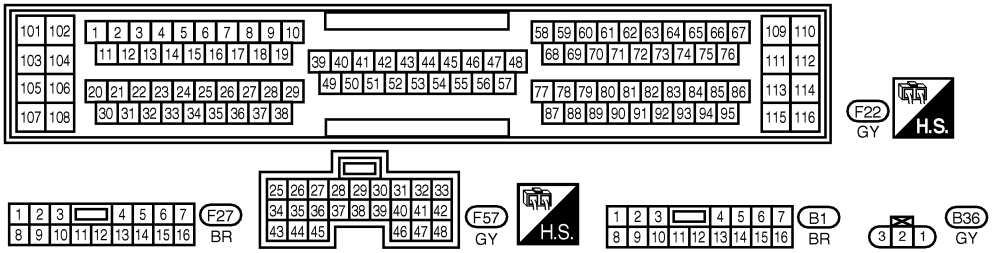
1) Start engine and warm it up to normal operating temperature.
2) Check that voltage between ECM terminal 82 (Fuel tank temperature sensor signal) and ground is less than 4.2V.
3) Turn ignition switch “OFF” and wait at least 10 seconds.
4) Start engine and wait at least 20 seconds.
5) Select “MODE 7” with GST.
6) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-1741.

Wiring Diagram

NIEC0981

EC-PRE/SE-01





REFER TO THE FOLLOWING.
F24, F25 - JOINT CONNECTOR

LEC205

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	IGN ON	APPROX. 0V
84	P	EVAP CONTROL SYSTEM PRESSURE SENSOR	IGN ON	APPROX. 3.4V
111	R	SENSOR'S POWER SUPPLY	IGN ON	APPROX. 5V

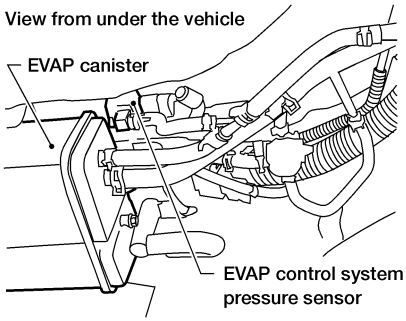
SEF578Y

Diagnostic Procedure

NIEC0982

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.



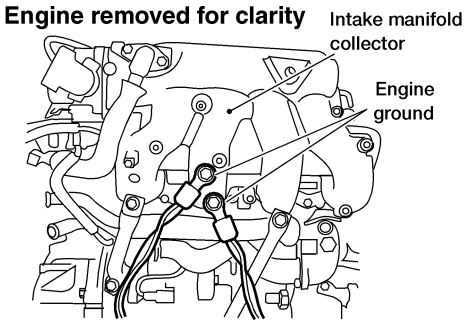
LEC294

OK or NG

OK	▶	GO TO 2.
NG	▶	Reconnect, repair or replace.

2	RETIGHTEN GROUND SCREWS

Loosen and retighten engine ground screws.



LEC302

	▶	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.

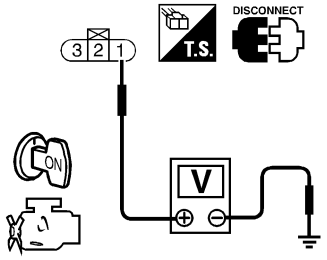
OK or NG

OK	▶	GO TO 4.
NG	▶	Repair or replace harness connector.

Diagnostic Procedure (Cont'd)

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 B1, M14
- Harness connectors M59, F27
- Joint connector-2
- 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", EC-1740.
   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 B1, M14
- Harness connectors M59, F27
- Joint connector-3
- Harness for open or short between EVAP control system pressure sensor and ECM
- Harness for open or short between EVAP control system pressure sensor and TCM (Transmission Control Module)

	▶	Repair open circuit or short to ground or short to power in harness or connectors.

8	CHECK 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", EC-1740.
   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 B1, M14
- Harness connectors M59, F27
- 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	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
HO2S1 MNTR (B1)	LEAN
THRTL POS SEN	XXX V

SEF801Y

OK or NG

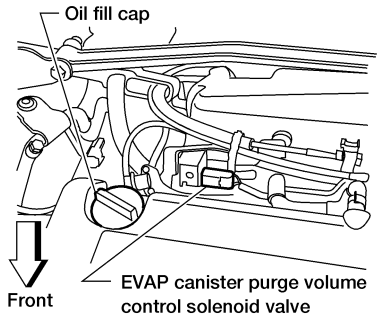
OK	▶	GO TO 12.
NG	▶	GO TO 11.

Diagnostic Procedure (Cont'd)

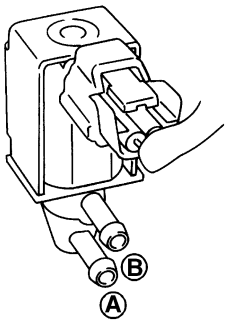
11	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



LEC273

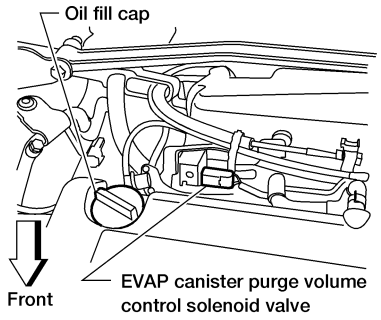


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

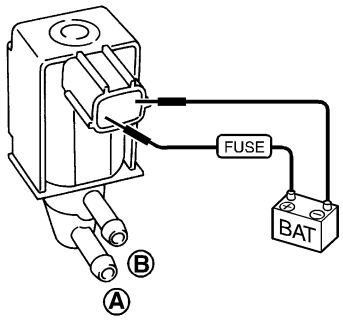
SEF334X

Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



LEC273



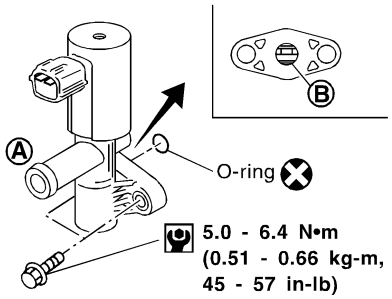
Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

SEF335X

OK or NG

OK	▶	GO TO 12.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

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.

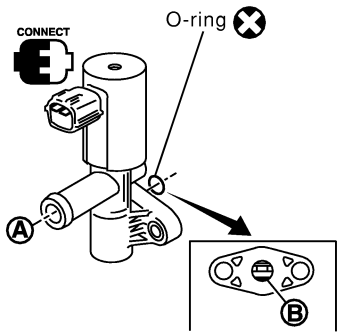
13	CHECK EVAP CANISTER VENT CONTROL VALVE-I	
1. Remove EVAP canister vent control valve from EVAP canister. 2. Check portion **B** of EVAP canister vent control valve for being rusted.		
 SEF337XA		
OK or NG		
OK	▶	GO TO 14.
NG	▶	Replace EVAP canister vent control valve.

Diagnostic Procedure (Cont'd)

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
A/F ALPHA-B1	XXX %
HO2S1 (B1)	XXX V
THRTL POS SEN	XXX V

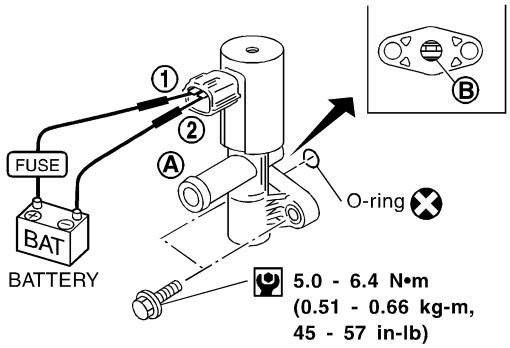
Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

SEF803Y

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.

SEF339XA

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

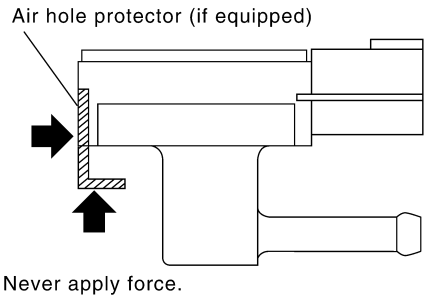
1. Clean the air passage (portion **A** to **B**) of EVAP canister vent control valve using an air blower.
2. Perform Test No. 14 again.

OK or NG

OK	▶	GO TO 16.
NG	▶	Replace EVAP canister vent control valve.

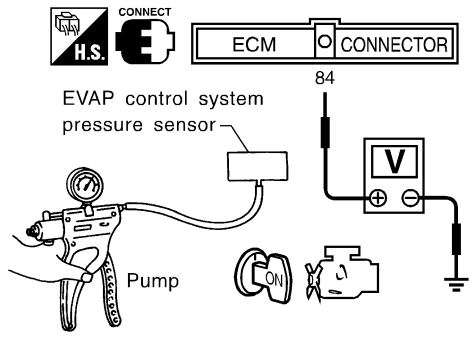
16	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

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 any 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.

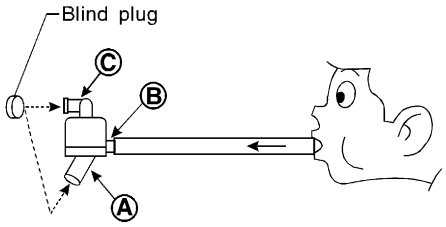
OK or NG

OK	▶	GO TO 18.
NG	▶	Clean rubber tube using an air blower, repair or replace rubber tube.

Diagnostic Procedure (Cont'd)

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.

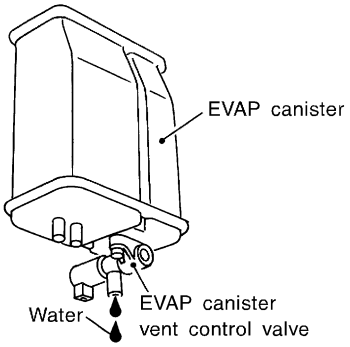
NOTE:
- Do not disassemble water separator.

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.

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 B1, M14 3. Check harness continuity between harness connector M14 terminal 5 and engine ground. Refer to "Wiring Diagram", EC-1740. **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 M59, F27 ● Harness for open or short between harness connector M14 and engine ground	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

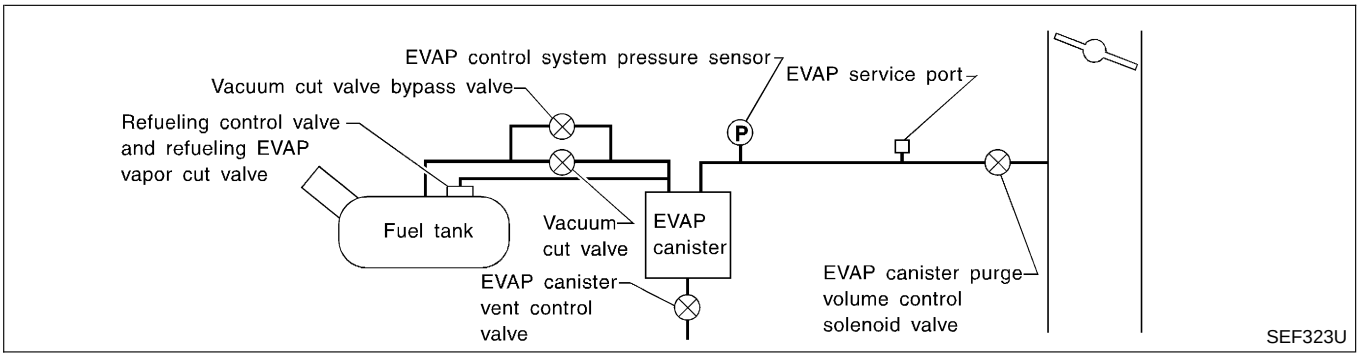
24	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1508.	
▶	**INSPECTION END**

On Board Diagnosis Logic

NIEC0983

NOTE:
If DTC P0455 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-1879.)

This diagnosis detects a very large leak (fuel filler cap fell off etc.) in the EVAP system between the fuel tank and the EVAP canister purge volume control solenoid valve.



Malfunction is detected when EVAP control system has very large leaks such as when fuel filler cap has fallen off, EVAP control system does not operate properly.

CAUTION:

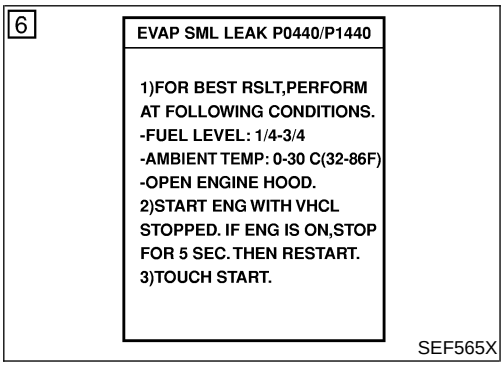
- **Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.**
- **If the fuel filler cap is not tightened properly, the MIL may come on.**
- **Use only a genuine NISSAN rubber tube as a replacement.**

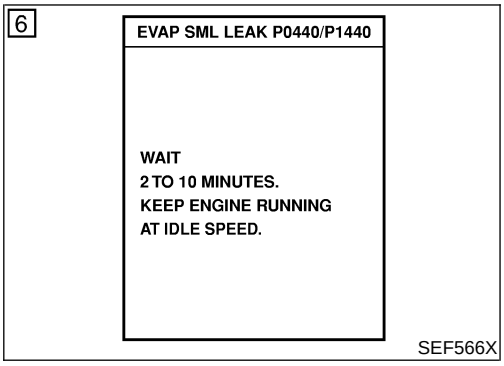
Possible Cause

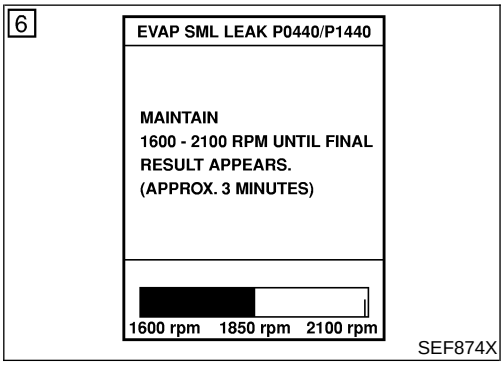
NIEC0984

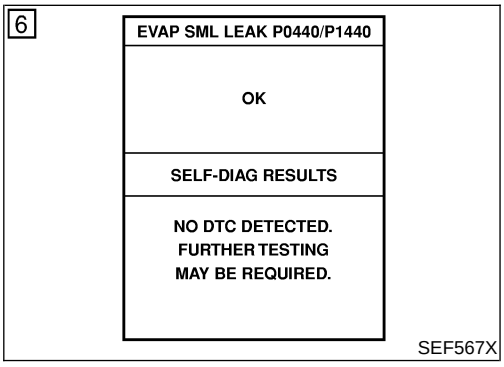
- Fuel filler cap remains open or fails to close
- Incorrect fuel tank vacuum relief valve
- Incorrect fuel filler cap used
- Foreign matter caught in fuel filler cap
- Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve
- Foreign matter caught in EVAP canister 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

- EVAP control system pressure sensor









DTC Confirmation Procedure

NIEC0985

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-1879.)**
- **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 procedure.**

WITH CONSULT-II

NIEC0985S01

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-1470.

7) Make sure that "OK" is displayed.
   If "NG" is displayed, select "SELF-DIAG RESULTS" mode with CONSULT-II and make sure that "EVAP GROSS LEAK [P0455]" is displayed. If it is displayed, refer to "Diagnostic Procedure", EC-1752.
   If P0440 is displayed, perform "Diagnostic Procedure" for DTC P0440.

WITH GST

NIEC0985S02

NOTE:
Be sure to read the explanation of "Driving Pattern" on EC-1433 before driving vehicle.

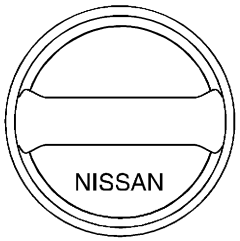
1) Start engine.
2) Drive vehicle according to "Driving Pattern", EC-1433.
3) Stop vehicle.
4) Select "MODE 1" with GST.
- If SRT of EVAP system is not set yet, go to the following step.
- If SRT of EVAP system is set, the result will be OK.

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-1433.
8) Stop vehicle.
9) Select "MODE 3" with GST.
- If P0455 is displayed on the screen, go to "Diagnostic Procedure", EC-1752.
- If P0440 or P1440 is displayed on the screen, go to "Diagnostic Procedure", for DTC P0440, EC-1712.
- If P1447 is displayed on the screen, go to "Diagnostic Procedure" for DTC P1447, EC-1870.
- If P0440, P0455, 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

NIEC0986

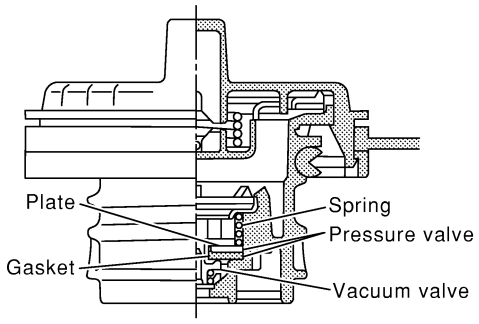
1	CHECK FUEL FILLER CAP DESIGN	
1. Turn ignition switch "OFF". 2. Check for genuine NISSAN fuel filler cap design.  SEF915U **OK or NG**		
OK	▶	GO TO 2.
NG	▶	Replace with genuine NISSAN fuel filler cap.

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.

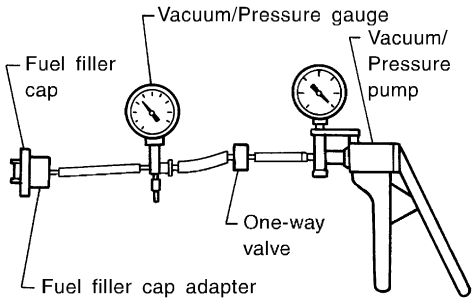
3	CHECK FUEL FILLER CAP FUNCTION	
Check for air releasing sound while opening the fuel filler cap.		
OK or NG		
OK	▶	GO TO 5.
NG	▶	GO TO 4.

4 CHECK FUEL TANK VACUUM RELIEF VALVE

1. Wipe clean valve housing.
2. Check valve opening pressure and vacuum.



SEF445Y



SEF943S

Pressure:
15.3 - 20.0 kPa (0.156 - 0.204 kg/cm^2, 2.22 - 2.90 psi)
Vacuum:
−6.0 to −3.4 kPa (−0.061 to −0.035 kg/cm^2, −0.87 to −0.50 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.

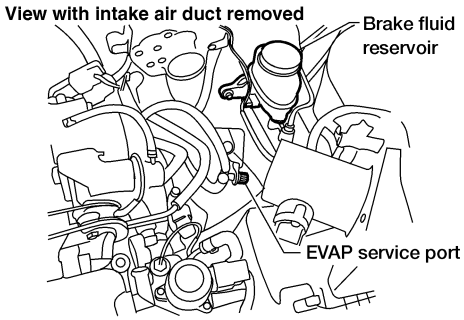
Diagnostic Procedure (Cont'd)

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-1390.		
OK or NG		
OK	▶	GO TO 6.
NG	▶	Repair or reconnect the hose.

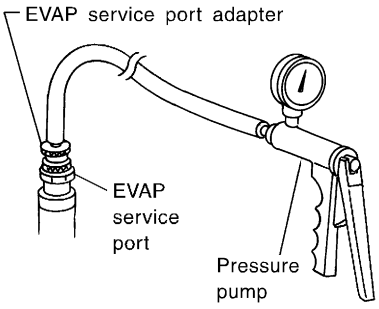
6	CLEAN EVAP PURGE LINE	
Clean EVAP purge line (pipe and rubber tube) using air blower.		
	▶	GO TO 7.

7	CHECK EVAP CANISTER VENT CONTROL VALVE, O-RING AND CIRCUIT	
Refer to "DTC Confirmation Procedure", EC-1732.		
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.		



LEC288



SEF916U

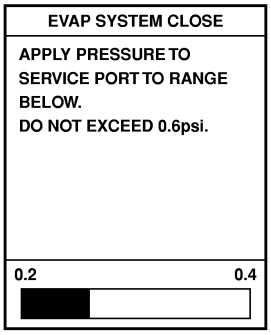
NOTE:
Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.

Models with CONSULT-II	▶	GO TO 9.
Models without CONSULT-II	▶	GO TO 10.

9	CHECK FOR EVAP LEAK

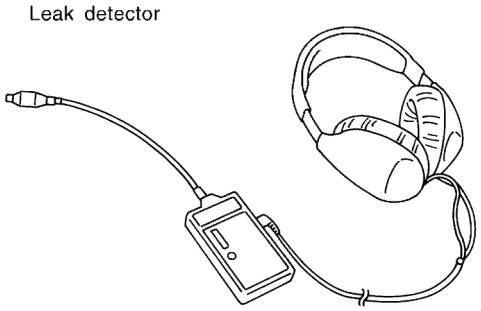
With CONSULT-II

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-1394.



SEF200U

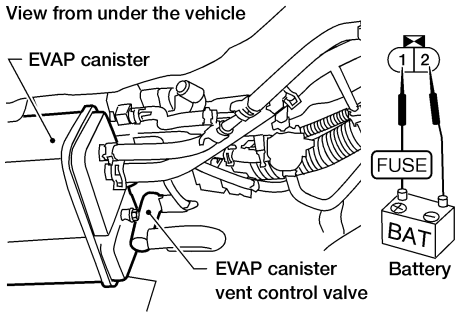
OK or NG

OK (With CONSULT-II)	▶	GO TO 11.
OK (Without CONSULT-II)	▶	GO TO 12.
NG	▶	Repair or replace.

10	CHECK FOR EVAP LEAK

Without CONSULT-II

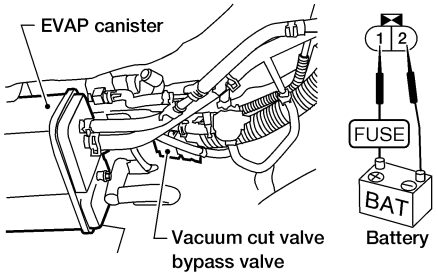
1. Turn ignition switch "OFF".
2. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)



WEC292

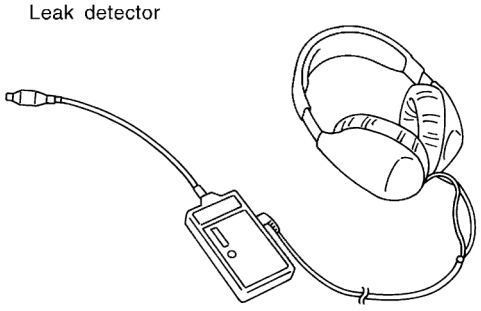
3. Apply 12 volts DC to vacuum cut valve bypass valve. The valve will open. (Continue to apply 12V until the end of test.)

View from under the vehicle



WEC293

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-1394.



SEF200U

OK or NG

OK (With CONSULT-II)	▶	GO TO 11.
OK (Without CONSULT-II)	▶	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
A/F ALPHA-B1	XXX %
HO2S1 MNTR (B1)	LEAN
THRTL POS SEN	XXX V

Vacuum should exist.

SEF595Y

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-1384.

OK or NG

OK (With CONSULT-II)	▶	GO TO 14.
OK (Without CONSULT-II)	▶	GO TO 15.
NG	▶	Repair or reconnect the hose.

Diagnostic Procedure (Cont'd)

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	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
HO2S1 MNTR (B1)	LEAN
THRTL POS SEN	XXX V

SEF801Y

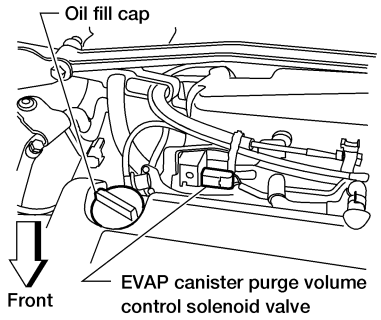
OK or NG

OK	▶	GO TO 16.
NG	▶	GO TO 15.

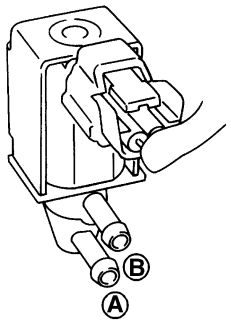
15	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



LEC273

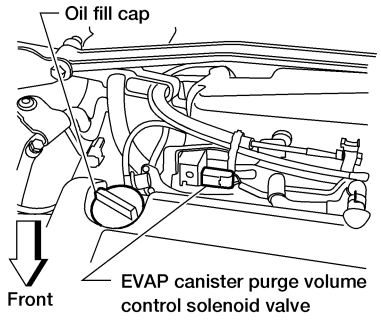


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

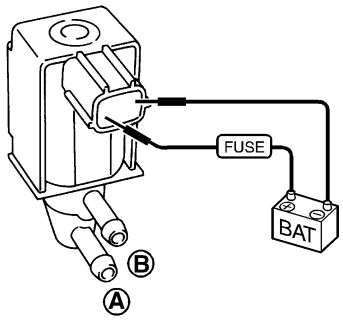
SEF334X

Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



LEC273



Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

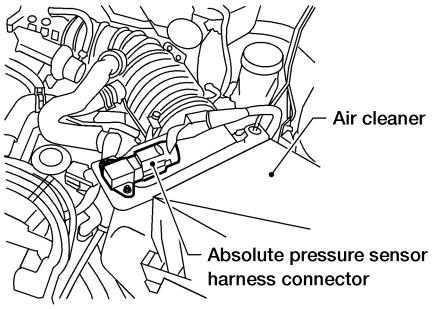
SEF335X

OK or NG

OK	▶	GO TO 16.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

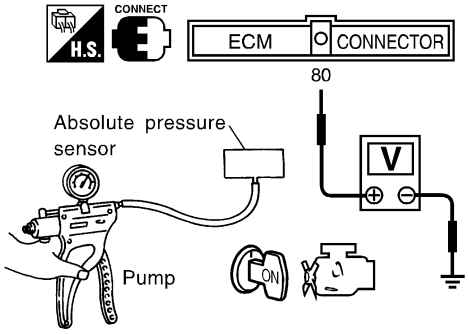
16	CHECK ABSOLUTE PRESSURE SENSOR

1. Remove absolute pressure sensor with its harness connector connected.



LEC322

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	1.8 - 4.8
–26.7 (–200, –7.87)	1.0 to 1.4 lower than above value

SEF300XA

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

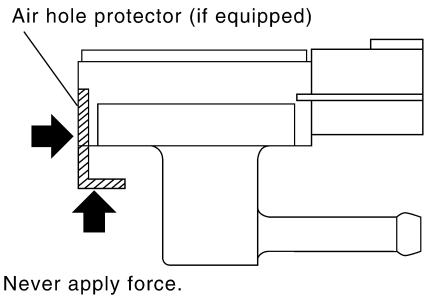
1. Remove fuel level sensor unit and fuel pump.
2. Check fuel tank temperature sensor.
   Refer to EC-1648, "Component Inspection".

OK or NG

OK	▶	GO TO 18.
NG	▶	Replace fuel level sensor unit.

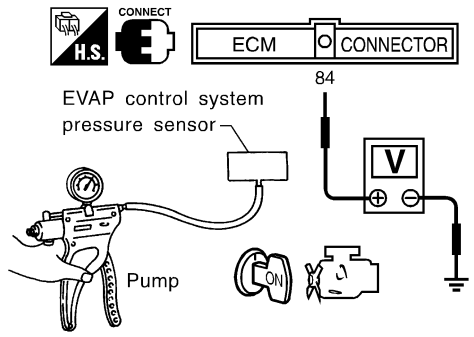
18	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

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

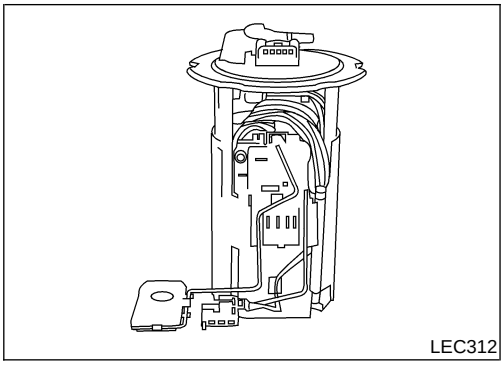
SEF342X

CAUTION:
- **Discard any 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 19.
NG	▶	Replace EVAP control system pressure sensor.

19	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1508.	
▶	**INSPECTION END**


LEC312

Component Description

NIEC0987

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

NIEC0988

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

NIEC0989

- Fuel level sensor circuit
  (The fuel level sensor circuit is open or shorted.)
- Fuel level sensor

DATA MONITOR	
MONITOR	NO DTC
FUEL T/TMP SE	XXX °C
FUEL LEVEL SE	XXX V

SEF195Y

DTC Confirmation Procedure

NIEC0990

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

NIEC0990S01

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-1764.

WITH GST

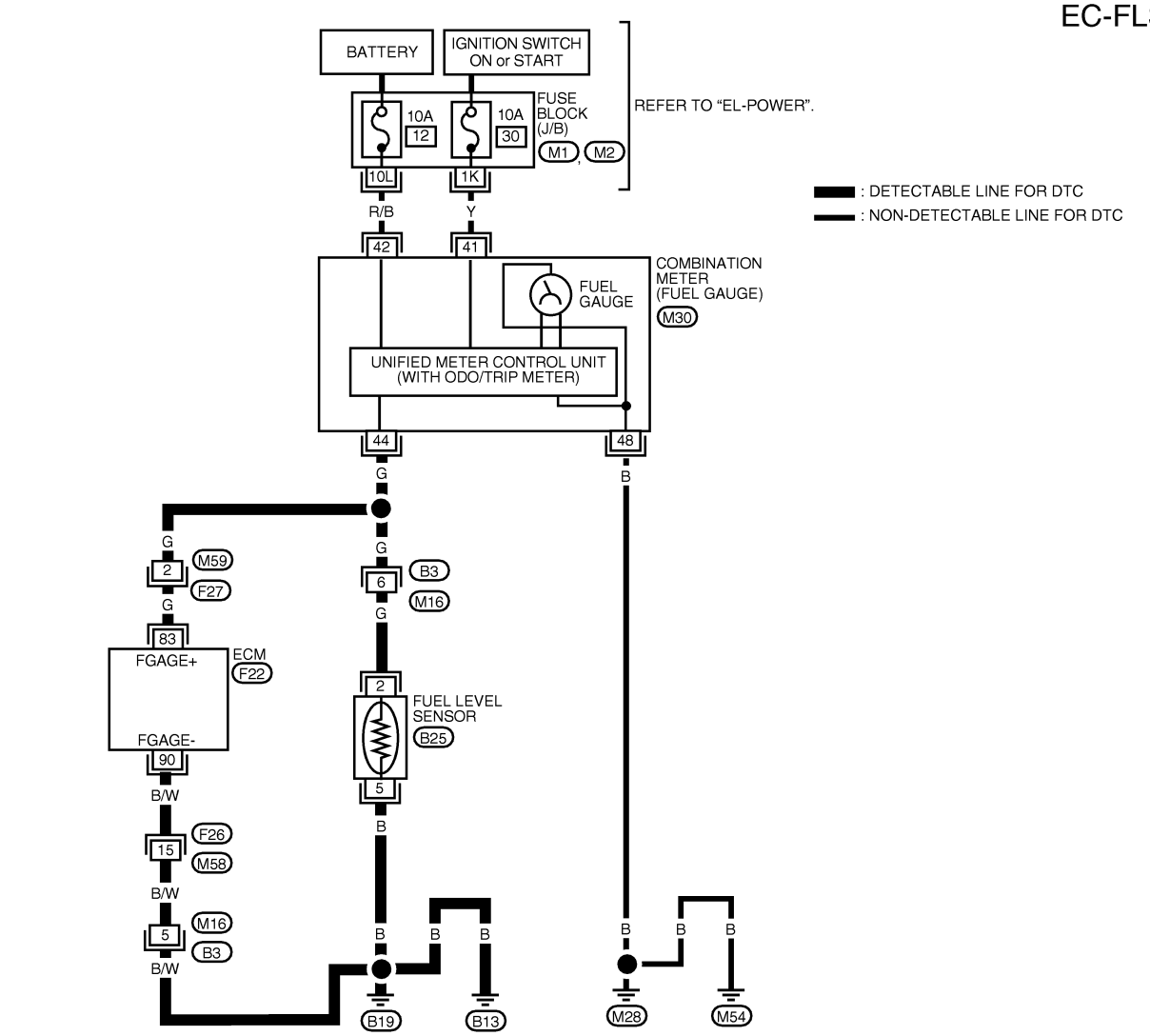
NIEC0990S02

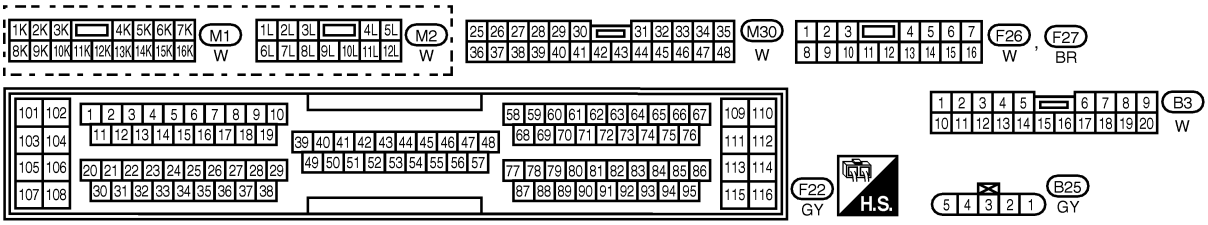
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

NIEC0991

EC-FLS1-01





LEC230

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)
83	G	FUEL LEVEL SENSOR	IGN ON	APPROX. 0 - 4.8V
90	B/W	FUEL LEVEL SENSOR GROUND	ENGINE RUNNING AT IDLE SPEED	APPROX. 0V

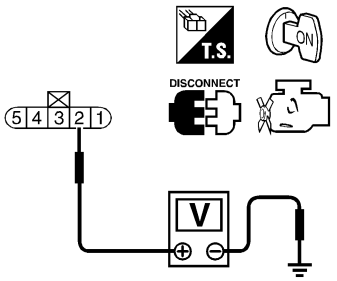
SEF579Y

Diagnostic Procedure

=NIEC0992

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 harness connector 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 B3, M16
- Harness for open or short between combination meter and fuel level sensor unit 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 harness connector terminal 5 and body ground. Refer to “Wiring Diagram”, EC-1763.
   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 harness connector terminal 2, ECM terminal 90 and fuel level sensor unit and fuel pump harness connector terminal 5. Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

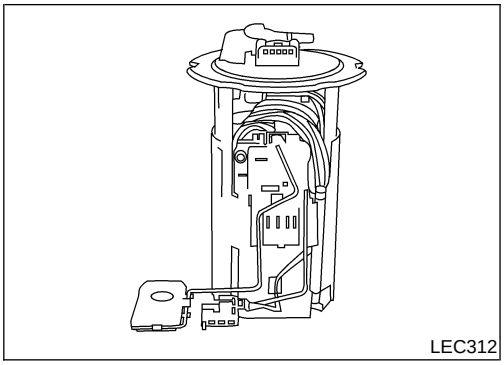
OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors B3, M16 ● Harness connectors M59, F27 ● Harness connectors F26, M58 ● 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-103***, "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-1508.	
▶	**INSPECTION END**


LEC312

Component Description

=NIEC0993

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

NIEC0994

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

NIEC0995

- Harness or connectors
  (The level sensor circuit is open or shorted.)
- Fuel level sensor

Overall Function Check

NIEC0996

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-5*, "FUEL SYSTEM".

TESTING CONDITION:
Before starting overall function check, preparation of draining fuel and refilling fuel is required.

DATA MONITOR	
MONITOR	NO DTC
FUEL T/TMP SE	XXX °C
FUEL LEVEL SE	XXX V

SEF195Y

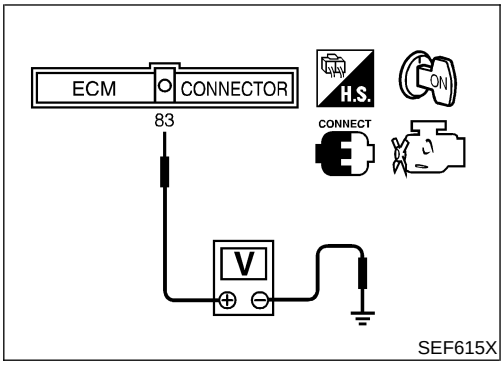
WITH CONSULT-II

NIEC0996S01

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-1408.
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-103***, "FUEL LEVEL SENSOR UNIT CHECK".

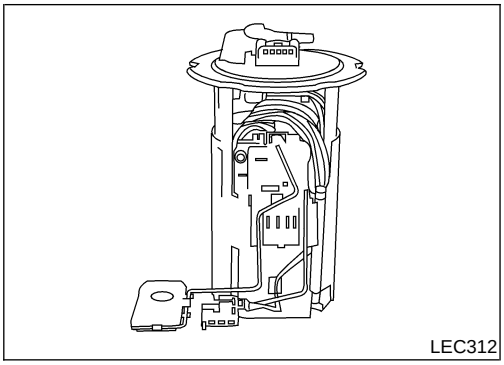


WITH GST

NIEC0996S02

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-1408.
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 voltmeter's 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-103***, "FUEL LEVEL SENSOR UNIT CHECK".


LEC312

Component Description

NIEC0997

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

NIEC0998

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

NIEC0999

- Fuel level sensor circuit
  (The fuel level sensor circuit is open or shorted.)
- Fuel level sensor

DTC Confirmation Procedure

NIEC1000

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”.

DATA MONITOR	
MONITOR	NO DTC
FUEL T/TMP SE	XXX °C
FUEL LEVEL SE	XXX V

SEF195Y

WITH CONSULT-II

NIEC1000S01

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-1770.

WITH GST

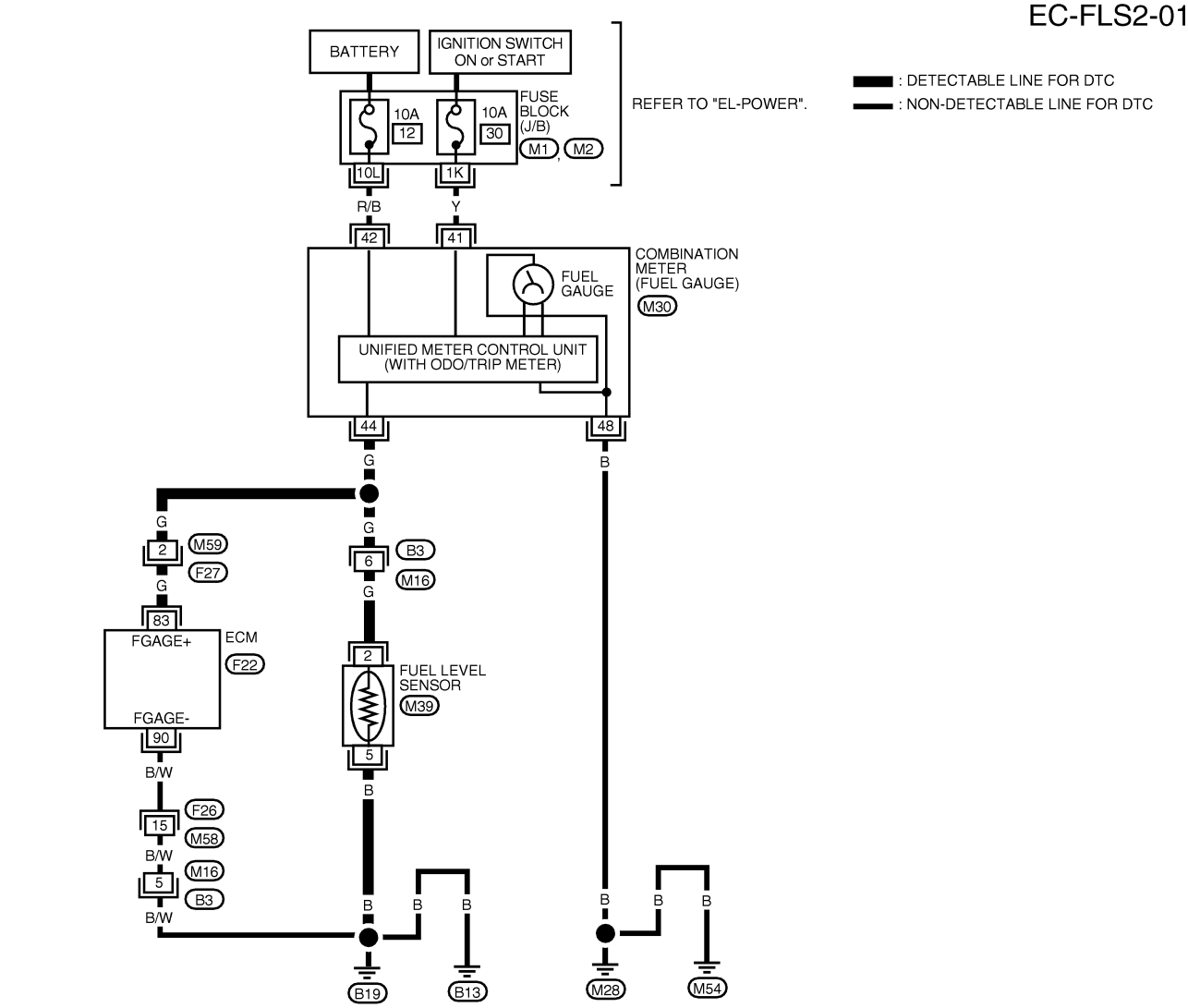
NIEC1000S02

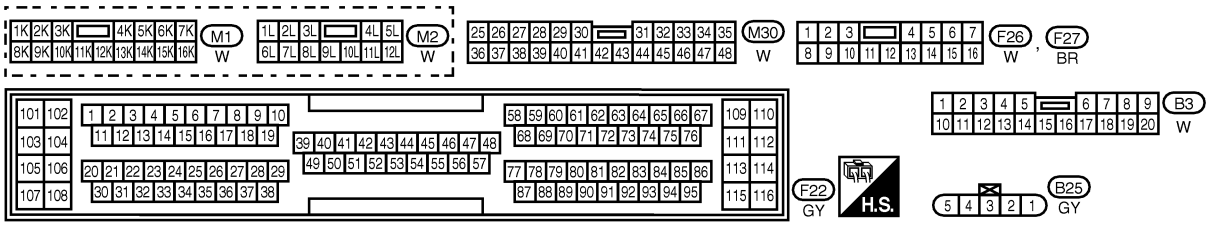
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

NIEC1001

EC-FLS2-01





LEC231

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)
83	G	FUEL LEVEL SENSOR	IGN ON	APPROX. 0 - 4.8V
90	B/W	FUEL LEVEL SENSOR GROUND	ENGINE RUNNING AT IDLE SPEED	APPROX. 0V

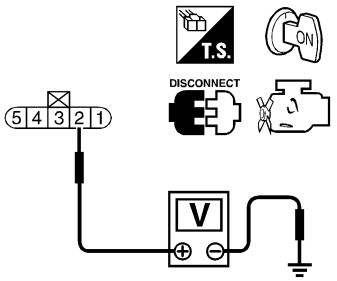
SEF579Y

Diagnostic Procedure

=NIEC1002

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 harness connector 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 B3, M16
- Harness for open or short between combination meter and fuel level sensor unit 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 harness connector terminal 5 and body ground. Refer to “Wiring Diagram”, EC-1769.
   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 harness connector terminal 2. Refer to “Wiring Diagram”, EC-1769.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

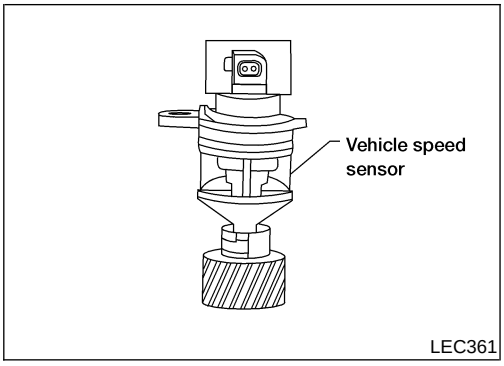
OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors B3, M16 ● Harness connectors M58, F26 ● Harness connectors M59, F27 ● 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-103***, "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-1508.	
▶	**INSPECTION END**



Component Description

NIEC1003

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

NIEC1004

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0500	• The almost 0 km/h (0 MPH) signal from vehicle speed sensor is sent to ECM even when vehicle is being driven.	• Harness or connector (The vehicle speed sensor circuit is open or shorted.) • Vehicle speed sensor

DTC Confirmation Procedure

NIEC1005

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:

This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

6

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

1) Start engine
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.
3) If NG, go to “Diagnostic Procedure”, EC-1775.
   If OK, go to following step.
4) Select “DATA MONITOR” mode with CONSULT-II.
5) Warm engine up to normal operating temperature.
6) Maintain the following conditions for at least 10 consecutive seconds.

ENG SPEED	1,650 - 3,000 rpm (A/T) 1,950 - 4,000 rpm (M/T)
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	4.8 - 10.5 msec (A/T) 4.5 - 12.0 msec (M/T)
Selector lever	Suitable position
PW/ST SIGNAL	OFF

7) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-1775.

Overall Function Check

NIEC1006

Use this procedure to check the overall function of the EVAP canister vent control valve circuit. During this check, a 1st trip DTC might not be confirmed.

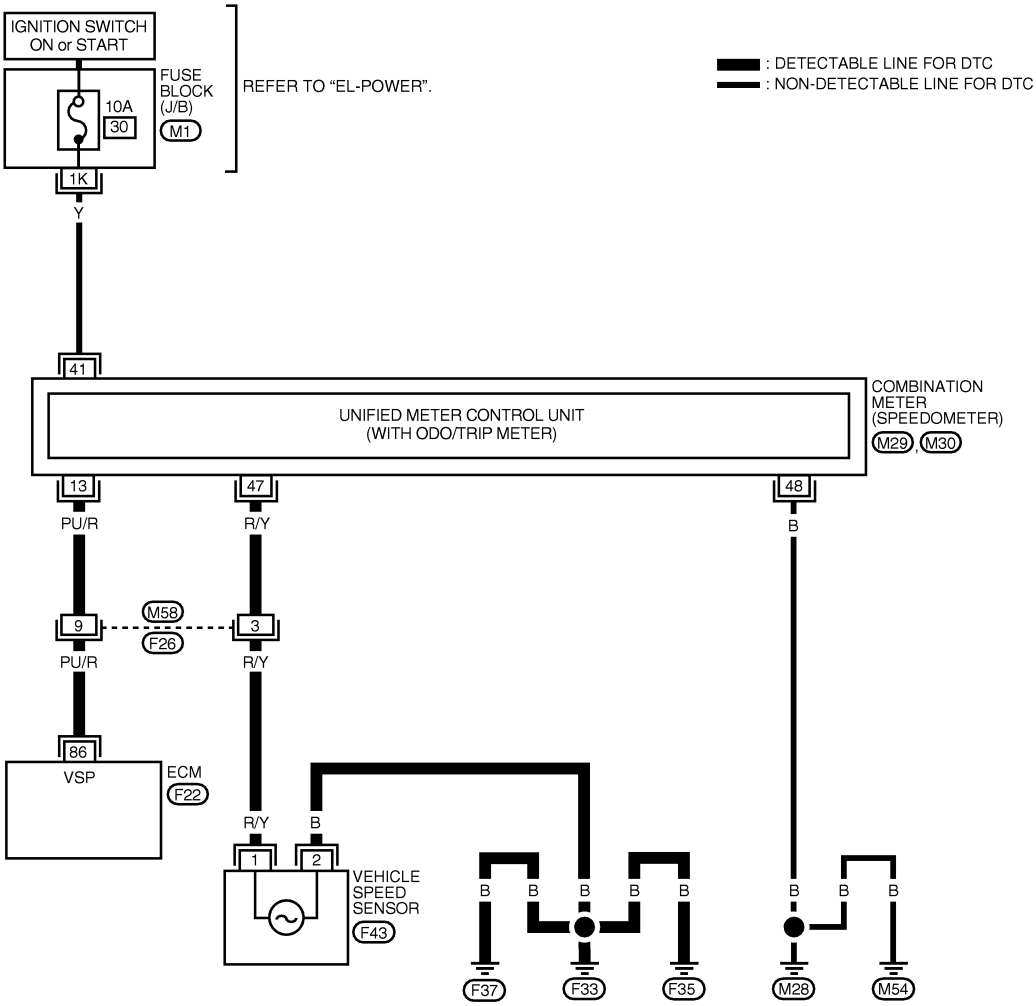
With GST

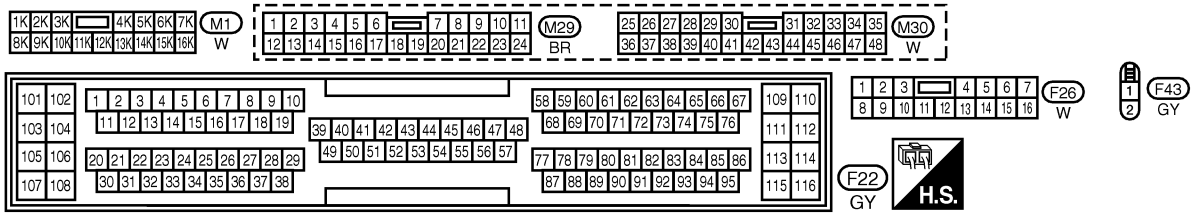
1) Lift up drive wheels.
2) Start engine.
3) Read vehicle speed sensor signal in “MODE 1” with GST. The vehicle speed sensor on GST should be able to exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.
4) If NG, go to “Diagnostic Procedure”, EC-1775.

Wiring Diagram

NIEC1007

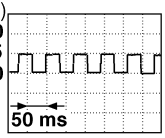
EC-VSS-01





LEC204

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	PU/R	VEHICLE SPEED SENSOR	VEHICLE DRIVING AT 40 KM/H (25 MPH) IN 2ND GEAR POSITION UNDER LIFTED UP CONDITION	0 - APPROX. 4.2V 

SEF580Y

Diagnostic Procedure

NIEC1008

1	CHECK INPUT SIGNAL CIRCUIT	
1. Turn ignition switch “OFF”. 2. Disconnect ECM harness connector and combination meter harness connector. 3. Check harness continuity between ECM terminal 86 and combination meter terminal 13. Refer to “Wiring Diagram”, EC-1774. **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 M58, F26 ● 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 M58, F26 ● Harness for open or short between combination meter and vehicle speed sensor		
OK or NG		
OK	▶	Check combination meter and vehicle speed sensor. Refer to ***EL-85***, “METERS AND GAUGES”.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK INTERMITTENT INCIDENT	
Perform “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-1508.		
	▶	**INSPECTION END**

Description

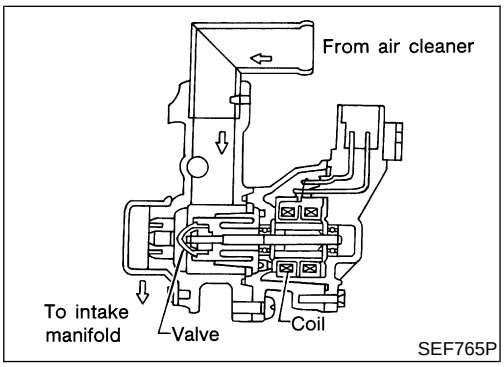
NIEC1009

SYSTEM DESCRIPTION

NIEC1009S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE)	Engine speed	Idle air control	IACV-AAC valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		
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		
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 bypasses the throttle valve via IACV-AAC valve. The IACV-AAC valve changes the opening of the air bypass 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 bypass 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 camshaft position sensor detects the actual engine speed and sends a signal to the ECM. The ECM then controls the step position of the IACV-AAC valve so that engine speed coincides with the target value memorized in ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by taking into consideration various engine conditions, such as during warm up, deceleration, and engine load (air conditioner, power steering and cooling fan operation).



COMPONENT DESCRIPTION

NIEC1009S02

IACV-AAC Valve

NIEC1009S0201

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 the auxiliary air quantity, the ECM sends a pulse signal to the step motor. When no change in the auxiliary air quantity is needed, the ECM does not issue the pulse signal. A certain voltage signal is issued so that the valve remains at that particular opening.

CONSULT-II Reference Value in Data Monitor Mode

NIEC1010

MONITOR ITEM	CONDITION		SPECIFICATION
IACV-AAC/V	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: “N” • No-load	Idle	5 - 20 steps
		2,000 rpm	—

On Board Diagnosis Logic

NIEC1011

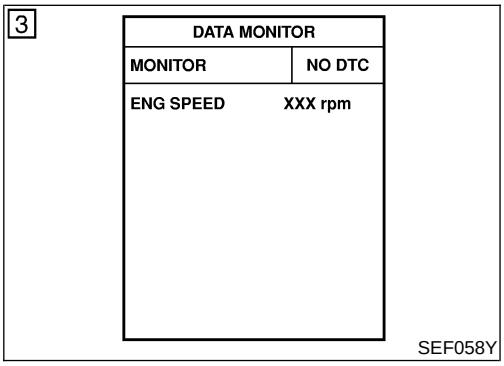
DTC No.	Malfunction is detected when ...		Check Items (Possible Cause)
P0505	A)	The IACV-AAC valve does not operate properly.	• Harness or connectors (The IACV-AAC valve circuit is open.) • IACV-AAC valve
	B)	The IACV-AAC valve does not operate properly.	• Harness or connectors (The IACV-AAC valve circuit is shorted.) • Air control valve (Power steering) • IACV-AAC valve

DTC Confirmation Procedure

NIEC1012

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-1424, before conducting “DTC Confirmation Procedure”. For the target idle speed, refer to the “Service Data And Specifications (SDS)”, EC-1955.**



PROCEDURE FOR MALFUNCTION A

NIEC1012S01

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5V with ignition switch “ON”.

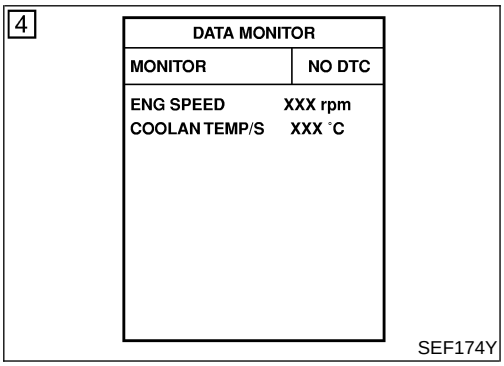
With CONSULT-II

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.
5) Perform step 4 once more.

6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1780.

With GST

Follow the procedure "With CONSULT-II" above.



PROCEDURE FOR MALFUNCTION B

NIEC1012S02

TESTING CONDITION:

- **Before performing the following procedure, make sure battery voltage is more than 11V at idle.**
- **Always perform the test at a temperature above –10°C (14°F).**

With CONSULT-II

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-1780.

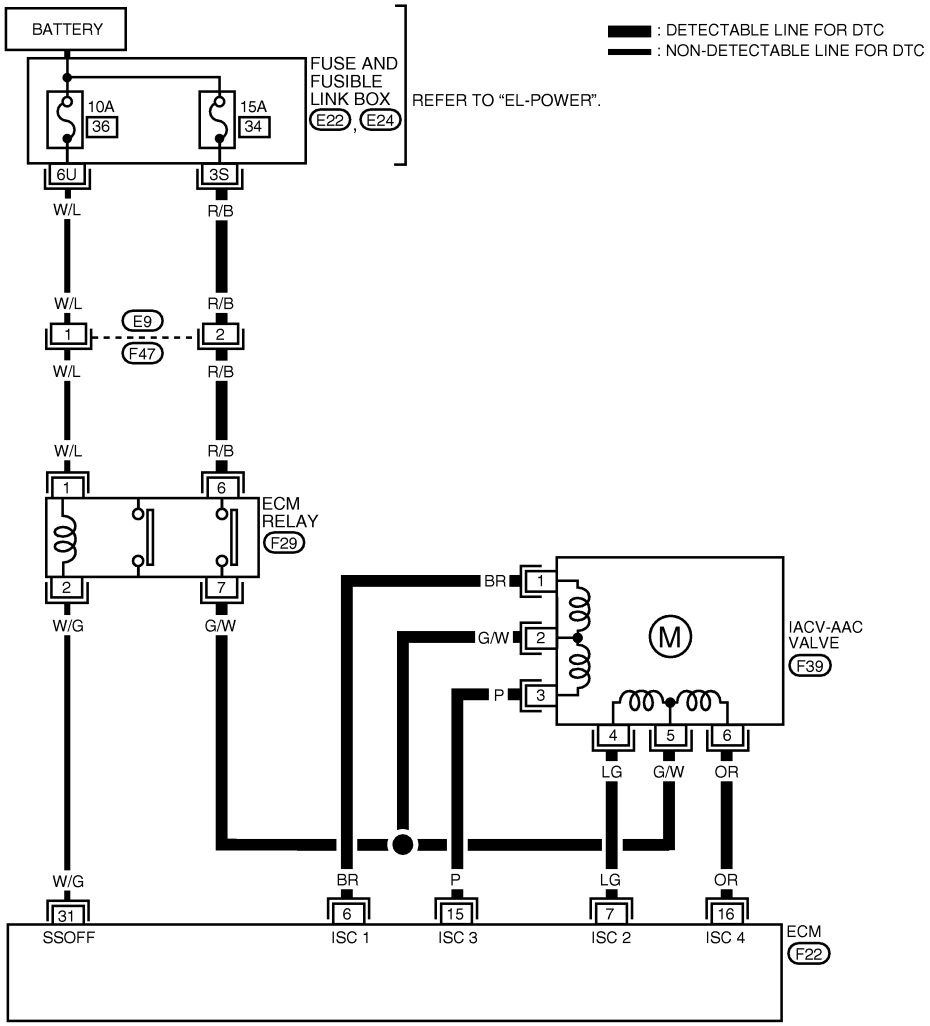
With GST

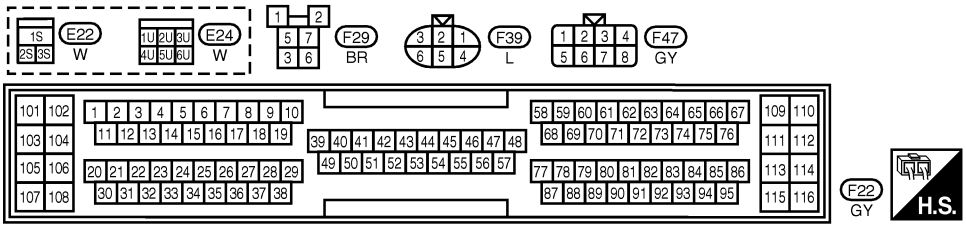
Follow the procedure "With CONSULT-II" above.

Wiring Diagram

NIEC1013

EC-AAC/V-01





LEC208

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	BR	IACV-AAC VALVE	ENGINE RUNNING AT IDLE SPEED	0.1 - 14V
7	LG			
15	P			
16	OR			

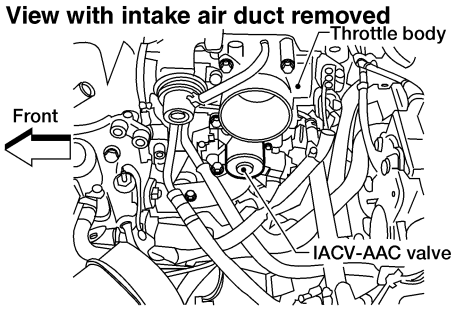
SEF581Y

Diagnostic Procedure

NIEC1014

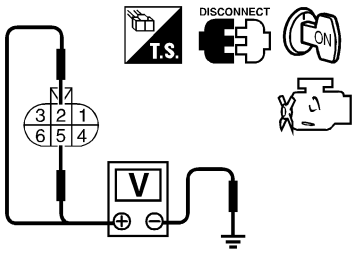
1 CHECK IACV-AAC VALVE POWER SUPPLY CIRCUIT

1. Stop engine.
2. Disconnect IACV-AAC valve harness connector.



LEC287

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 2.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

2 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”, EC-1779.

ECM terminal	IACV-AAC valve terminal
6	1
7	4
15	3
16	6

MTBL0390

Continuity should exist.

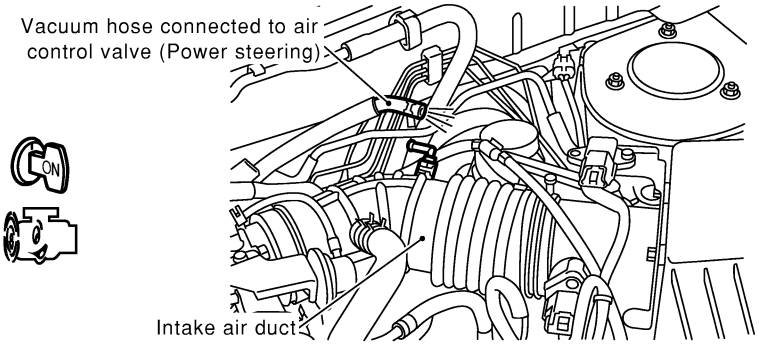
4. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 3.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

3	CHECK 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.



SEF969X

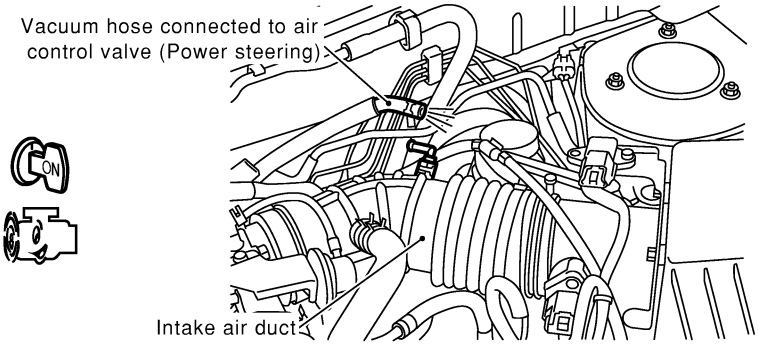
Vacuum slightly exists or does not exist.

OK or NG

OK	▶	GO TO 4.
NG	▶	Replace air control valve (Power steering).

4	CHECK AIR CONTROL VALVE (POWER STEERING) OPERATION-II

Check vacuum hose for vacuum existence when steering wheel is turned.



SEF969X

Vacuum should exist.

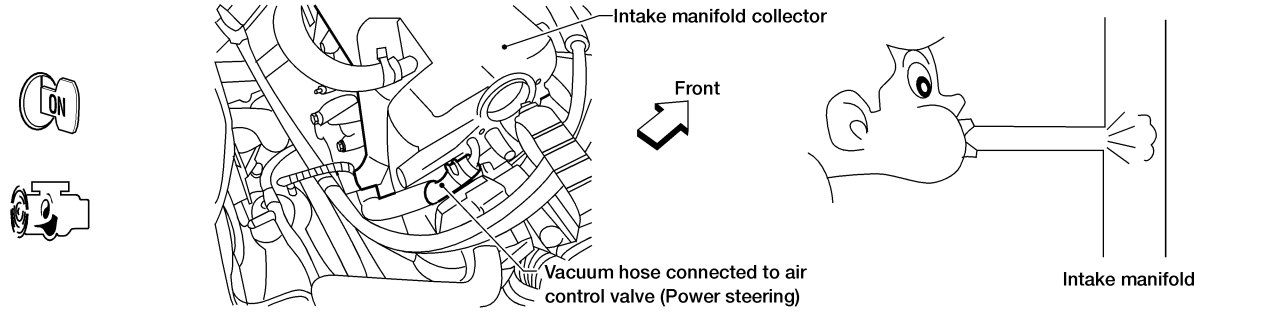
OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 5.

Diagnostic Procedure (Cont'd)

5	CHECK VACUUM PORT

1. Stop engine.
2. Disconnect vacuum hose connected to air control valve (Power steering) at the vacuum port.
3. Blow air into vacuum port.
4. Check that air flows freely.



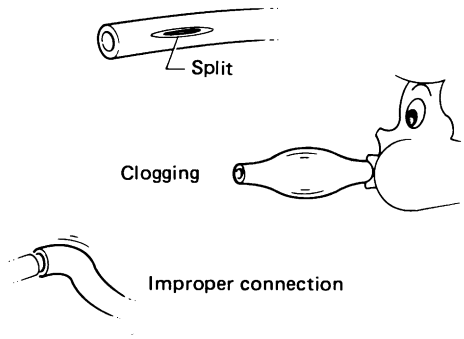
LEC338

OK or NG

OK	▶	GO TO 6.
NG	▶	Repair or clean vacuum port.

6	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 cracks, clogging, improper connection or disconnection.



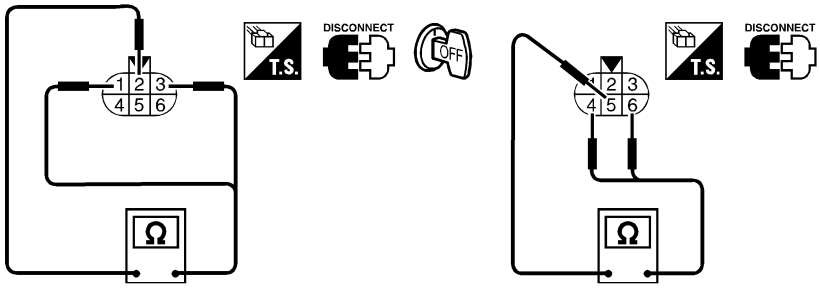
SEF109L

OK or NG

OK	▶	GO TO 7.
NG	▶	Repair hoses or tubes.

7	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:
20 - 24Ω [at 20°C (68°F)]

SEF214Z

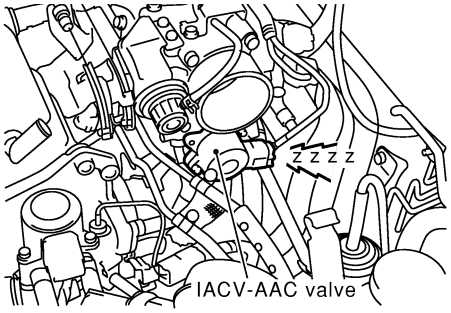
OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 9.

8	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.

View with intake air duct removed



SEF853X

OK or NG

OK	▶	GO TO 10.
NG	▶	GO TO 9.

9	REPLACE IACV-AAC VALVE

1. Replace IACV-AAC valve assembly.
2. Perform "Idle Air Volume Learning", EC-1424.
   Is the result CMPLT or INCMP?

CMPLT or INCMP

CMPLT	▶	**INSPECTION END**
INCMP	▶	Follow the instruction of "Idle Air Volume Learning".

Diagnostic Procedure (Cont'd)

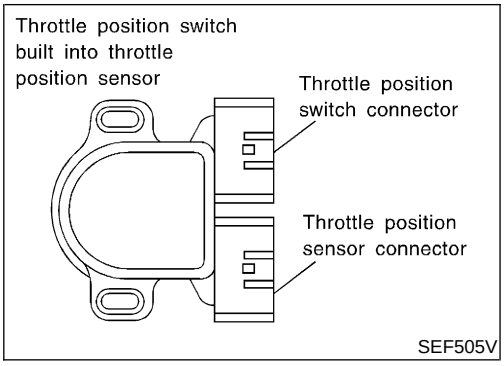
10	CHECK TARGET IDLE SPEED

1. Turn Ignition switch "OFF".
2. Reconnect all harness connectors and vacuum hoses.
3. Start engine and warm it up to normal operation temperature.
4. Also warm up transmission to normal operating temperature.
- For A/T models with CONSULT-II, drive vehicle until "FLUID TEMP SE" in"DATA MONITOR" mode of "A/T" system indicates less than 0.9V.
- For A/T models without CONSULT-II and M/T models, drive vehicle for 10 minutes.
5. Stop vehicle with engine running.
6. Check target idle speed.
   M/T: 800 ± 50 rpm
   A/T: 800 ± 50 rpm (in "P" or "N" position)

OK or NG

OK	▶	GO TO 11.
NG	▶	Perform idle air volume learning. Refer to "Idle Air Volume Learning" EC-1424.

11	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1508.	
▶	**INSPECTION END**



Component Description

NIEC1015

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

NIEC1016

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
CLSD THL/P SW	• Engine: After warming up • Ignition switch: ON • Vacuum is applied using a vacuum pump	Throttle valve: Idle position	ON
		Throttle valve: Slightly open	OFF

On Board Diagnosis Logic

NIEC1017

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0510	• Battery voltage from the closed throttle position switch is sent to ECM with the throttle valve opened.	• Harness or connectors (The closed throttle position switch circuit is shorted.) • Closed throttle position switch • Throttle position sensor

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

NIEC1018

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

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.
4) Check the signal under the following conditions.

Condition	Signal indication
Throttle valve: Idle position	ON
Throttle valve: Slightly open	OFF

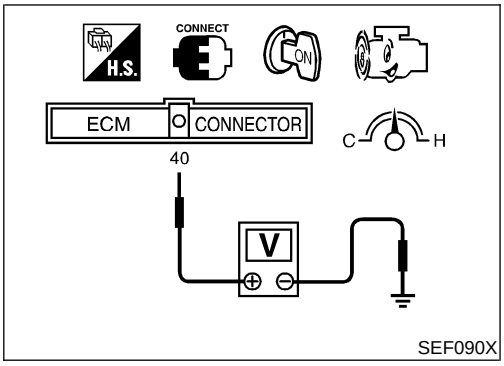
If the result is NG, go to “Diagnostic Procedure”, EC-1788.
If OK, go to following step.

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 2.3V
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-1788.



Overall Function Check

NIEC1019

Use this procedure to check the overall function of the closed throttle position switch circuit. During this check, a 1st trip DTC might not be confirmed.

Without CONSULT-II

1) Start engine and warm it up to normal operating temperature.
2) Check the voltage between ECM terminal 40 (Closed throttle position switch signal) and ground under the following conditions.

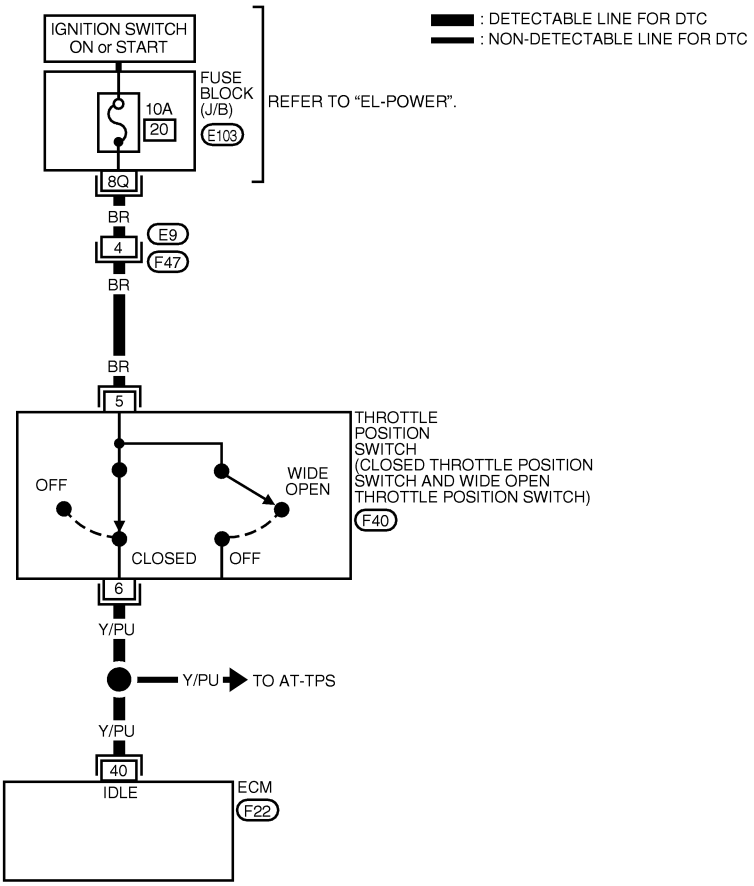
Condition	Voltage
At idle	Battery voltage
At 2,000 rpm	Approximately 0V

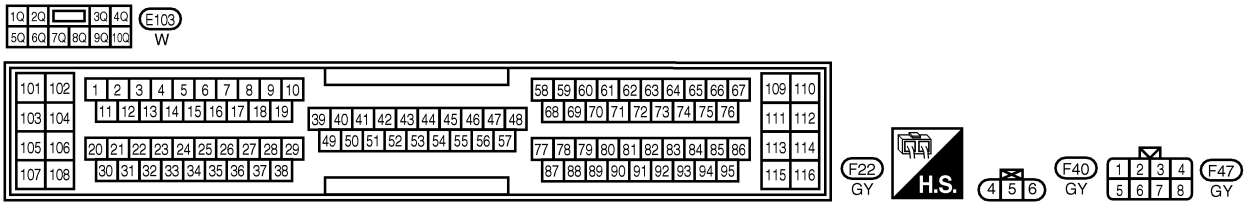
3) If NG, go to "Diagnostic Procedure", EC-1788.

Wiring Diagram

NIEC1020

EC-TP/SW-01





LEC206

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	Y/PU	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

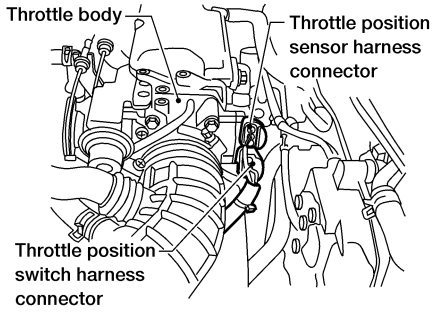
SEF582Y

Diagnostic Procedure

NIEC1021

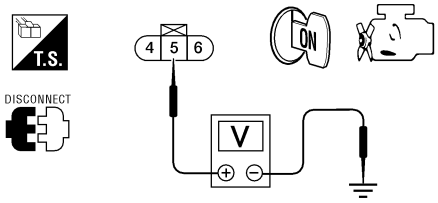
1	CHECK CLOSED THROTTLE POSITION SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect throttle position switch harness connector.



LEC279

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

LEC435

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E9, F47
- 10A fuse
- Harness for open or short between throttle position switch and fuse

	▶	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 40 and throttle position switch terminal 6.
   Refer to “Wiring Diagram”, EC-1787.
   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-1470.

Items	Specifications
Ignition timing	15° ± 2° BTDC
Idle speed	M/T: 800 ± 50 rpm A/T: 800 ± 50 rpm (in "P" or "N" position)

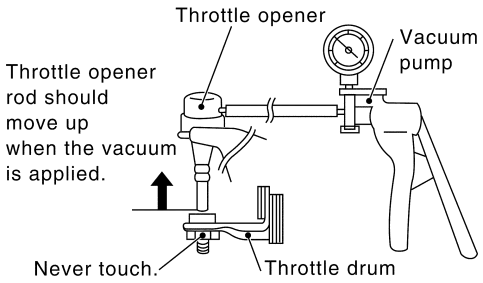
MTBL0391

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

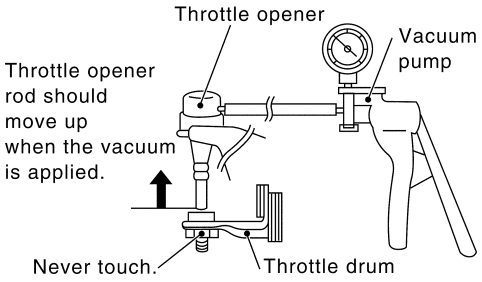
OK (With CONSULT-II) ▶	GO TO 8.
OK (Without CONSULT-II) ▶	GO TO 9.
NG ▶	GO TO 7.

Diagnostic Procedure (Cont'd)

6	CHECK THROTTLE POSITION SWITCH

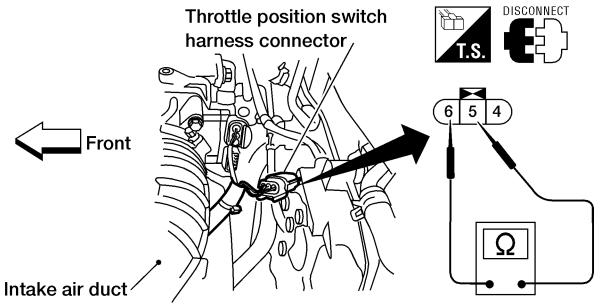
Without CONSULT-II

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 5 and 6 under the following conditions. Resistance measurement must be made with throttle position switch installed in vehicle.



Throttle valve condition	Continuity
Completely closed	Yes
Partially open	No
Completely open	No

LEC337

OK or NG

OK (With CONSULT-II)	▶	GO TO 8.
OK (Without CONSULT-II)	▶	GO TO 9.
NG	▶	GO TO 7.

7 ADJUST THROTTLE POSITION SWITCH

Check the following items. Refer to "Basic Inspection", EC-1470.

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	M/T: 800±50 A/T: 800±50 rpm (in "P" or "N" position)

MTBL0450

Is it possible to adjust closed throttle position switch?

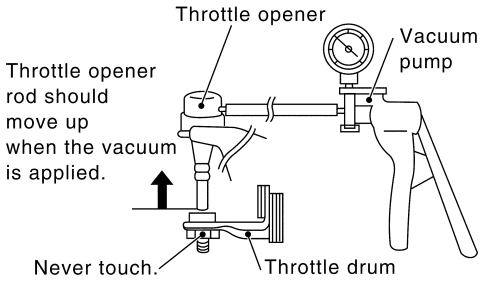
Yes or No

Yes (With CONSULT-II) ▶	GO TO 8.
Yes (Without CONSULT-II) ▶	GO TO 9.
No ▶	Replace throttle position switch.

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)	0.2 - 0.8V
Partially open	Between (a) and (b)
Completely open (b)	3.5 - 4.5V

MTBL0393

OK or NG

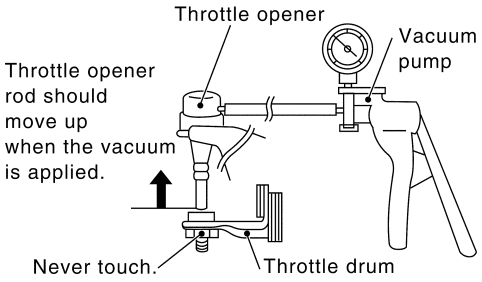
OK ▶	GO TO 10.
NG ▶	Replace throttle position sensor.

Diagnostic Procedure (Cont'd)

9	CHECK THROTTLE POSITION SENSOR

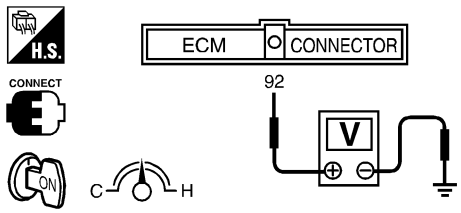
Without CONSULT-II

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 92 (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)	0.2 - 0.8V
Partially open	Between (a) and (b)
Completely open (b)	3.5 - 4.5V

SEF942X

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace throttle position sensor.

10	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1508.	
▶	**INSPECTION END**

System Description

NIEC1022

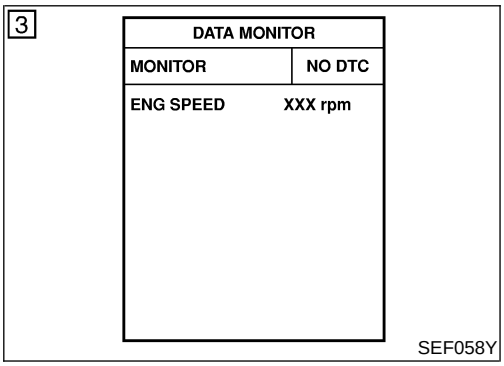
These circuit lines are used to control the smooth shifting up and down of A/T during the hard acceleration/deceleration. Voltage signals are exchanged between ECM and TCM (Transmission control module).

On Board Diagnosis Logic

NIEC1023

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0600*	• ECM receives incorrect voltage from TCM (Transmission control module) continuously.	• Harness or connectors [The circuit between ECM and TCM (Transmission control module) is open or shorted.]

*: This DTC can be detected only by “DATA MONITOR (AUTO TRIG)” with CONSULT-II.



DTC Confirmation Procedure

NIEC1024

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.

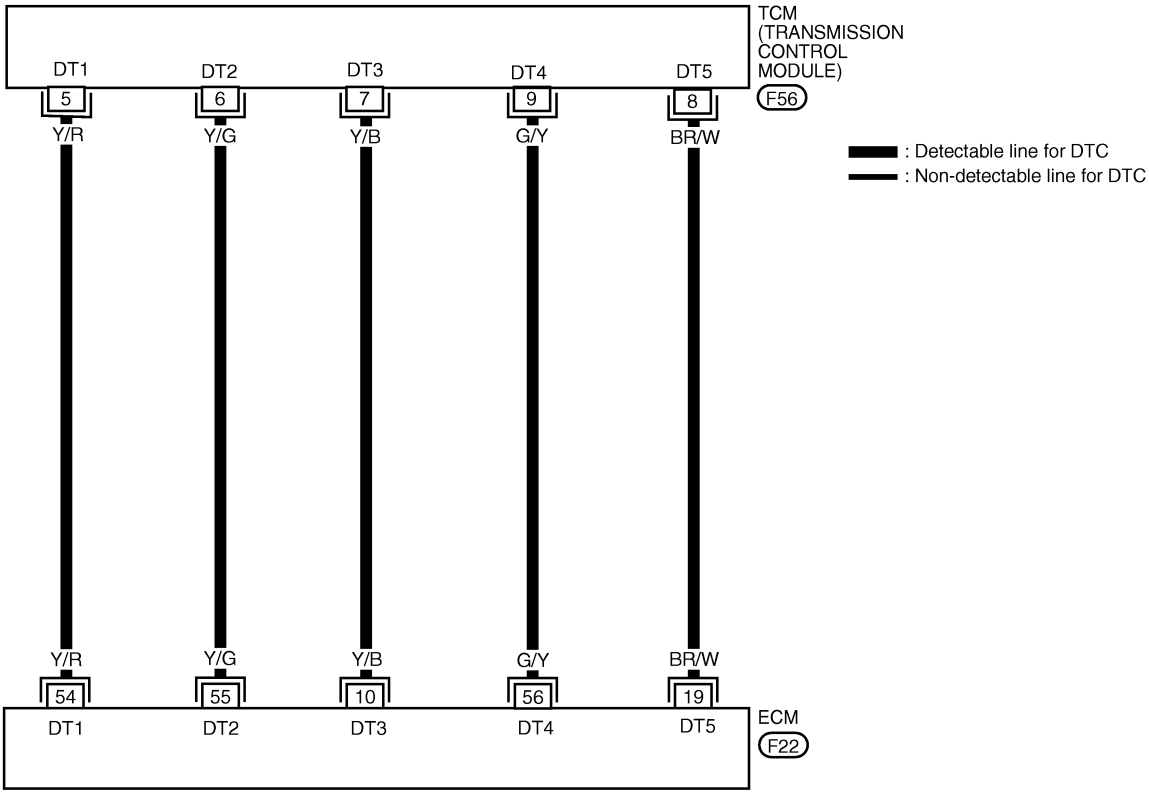
With CONSULT-II

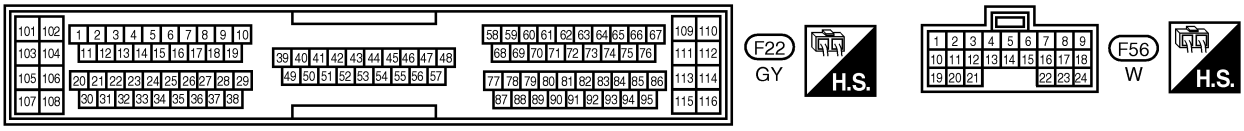
1) Turn ignition switch “ON”.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Wait at least 10 seconds.
4) If DTC is detected, go to “Diagnostic Procedure”, EC-1795.

Wiring Diagram

NIEC1025

EC-AT/C-01





LEC376

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)
10	Y/B	A/T SIGNAL NO. 3	ENGINE RUNNING AT IDLE SPEED	APPROX. 0 - 1.0V
19	BR/W	A/T SIGNAL NO. 5	ENGINE RUNNING AT IDLE SPEED	APPROX. 8V
54	Y/R	A/T SIGNAL NO. 1	ENGINE RUNNING AT IDLE SPEED	APPROX. 0 - 1.0V
55	Y/G	A/T SIGNAL NO. 2	ENGINE RUNNING AT IDLE SPEED	APPROX. 0 - 1.0V
56	G/Y	A/T SIGNAL NO. 4	ENGINE RUNNING AT IDLE SPEED	APPROX. 0 - 1.0V

SEF583Y

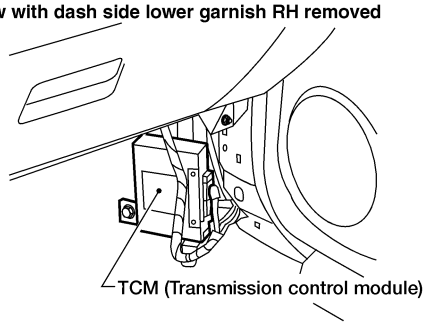
Diagnostic Procedure

NIEC1026

1	CHECK INPUT SIGNAL CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector and TCM (Transmission control module) harness connector.

View with dash side lower garnish RH removed



LEC306

3. Check harness continuity between ECM terminal 10 and TCM terminal 7, ECM terminal 19 and TCM terminal 8, ECM terminal 54 and terminal 5, ECM terminal 55 and TCM terminal 6, ECM terminal 56 and TCM terminal 9.
   Refer to “Wiring Diagram”, EC-1794.
   Continuity should exist.

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair harness or connectors.

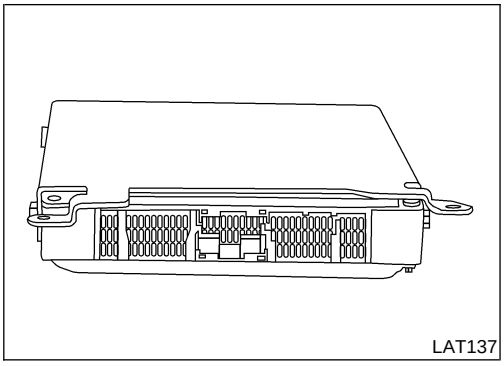
2	CHECK INPUT SIGNAL CIRCUIT

1. Check harness continuity between ECM terminal 10 and ground, ECM terminal 19 and ground, ECM terminal 54 and ground, ECM terminal 55 and ground, ECM terminal 56 and ground.
   Refer to “Wiring Diagram”, EC-1794.
   Continuity should not exist.
2. Also check harness for short to power.

OK or NG

OK	▶	GO TO 3.
NG	▶	Repair short to ground or short to power in harness.

3	CHECK INTERMITTENT INCIDENT
Refer to “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-1508.	
▶	**INSPECTION END**



LAT137

Component Description

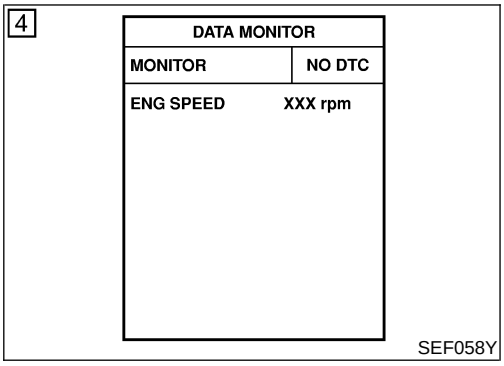
NIEC1027

The ECM consists of a microcomputer and connector for signal input and output and for power supply. The ECM controls the engine.

On Board Diagnosis Logic

NIEC1028

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0605	• ECM calculation function is malfunctioning.	• ECM



SEF058Y

DTC Confirmation Procedure

NIEC1029

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

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-1797.

With GST

Follow the procedure “With CONSULT-II” above.

Diagnostic Procedure

NIEC1030

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-1796. 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-1796. 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 NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs. Refer to “NVIS (NISSAN VEHICLE IMMOBILIZER SYSTEM — NATS)”, EC-1440. 3. Perform “Idle Air Volume Learning”, EC-1424, **Is the result CMPLT or INCMP?**	
CMPLT or INCMP	
CMPLT ▶	**INSPECTION END**
INCMP ▶	Follow the instruction of “Idle Air Volume Learning”.

On Board Diagnosis Logic

NIEC1031

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

NIEC1032

- Thermostat function
- Leakage from sealing portion of thermostat
- Engine coolant temperature sensor

DTC Confirmation Procedure

NIEC1033

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

NIEC1033S01

1) Replace thermostat with new one. Refer to ***LC-31***, "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-1799.

WITH GST

NIEC1033S02

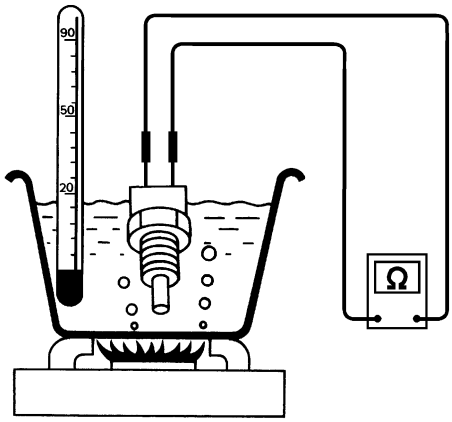
1) Follow the prodedure "WITH CONSULT-II" above.

Diagnostic Procedure

NIEC1034

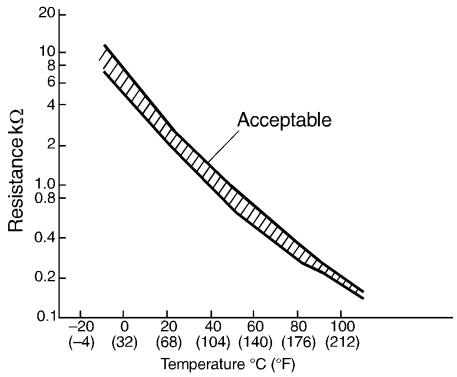
1	CHECK ENGINE COOLANT TEMPERATURE SENSOR

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

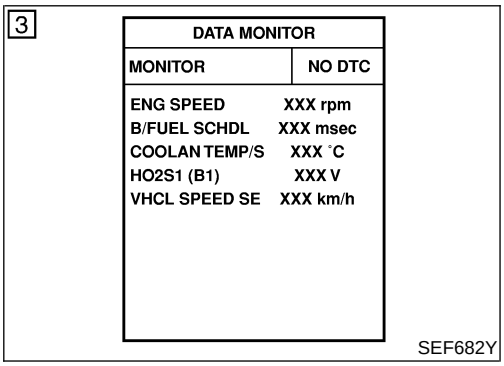
OK	▶	**INSPECTION END**
NG	▶	Replace engine coolant temperature sensor.

On Board Diagnosis Logic

NIEC1035

★ The closed loop control has the one trip detection logic.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1148	• The closed loop control function does not operate even when vehicle is driving in the specified condition.	• The heated oxygen sensor 1 (front) circuit is open or shorted. • Heated oxygen sensor 1 (front) • Heated oxygen sensor 1 (front) heater



DTC Confirmation Procedure

NIEC1036

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 3,200 rpm during the "DTC Confirmation Procedure". If the engine speed limit is exceeded, retry the procedure from step 4.**
- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**

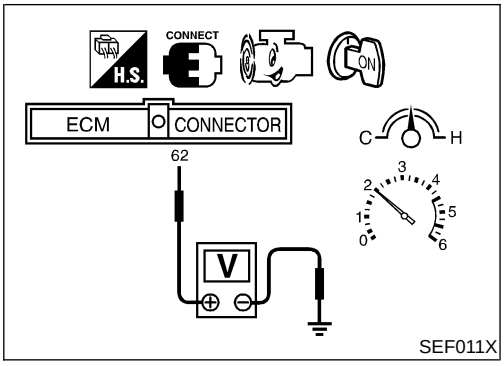
With CONSULT-II

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 the following.
- "HO2S1 (B1)" voltage should go above 0.70V at least once.
- "HO2S1 (B1)" voltage should go below 0.21V at least once.
If the result is NG, perform "Diagnosis Procedure", EC-1801.
If the result is OK, perform the following step.
4) Let engine idle at least 4 minutes.
5) Maintain the following condition at least 50 consecutive seconds.

B/FUEL SCHDL	More than 2.4 msec
ENG SPEED	More than 1,500 rpm
Selector lever	Suitable position
VHCL SPEED SE	More than 70 km/h (43 MPH)

During this test, P0130 DTC may be displayed on CONSULT-II screen.

6) If DTC is detected, go to "Diagnostic Procedure", EC-1801.



Overall Function Check

NIEC1037

Use this procedure to check the overall function of the closed loop control. During this check, a DTC might not be confirmed.

With GST

1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 62 [Heated oxygen sensor 1 (front) 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-1801.

Diagnostic Procedure

NIEC1038

Refer to “Diagnostic Procedure” for DTC P0133, EC-1579.

System Description

NIEC1039

COOLING FAN CONTROL

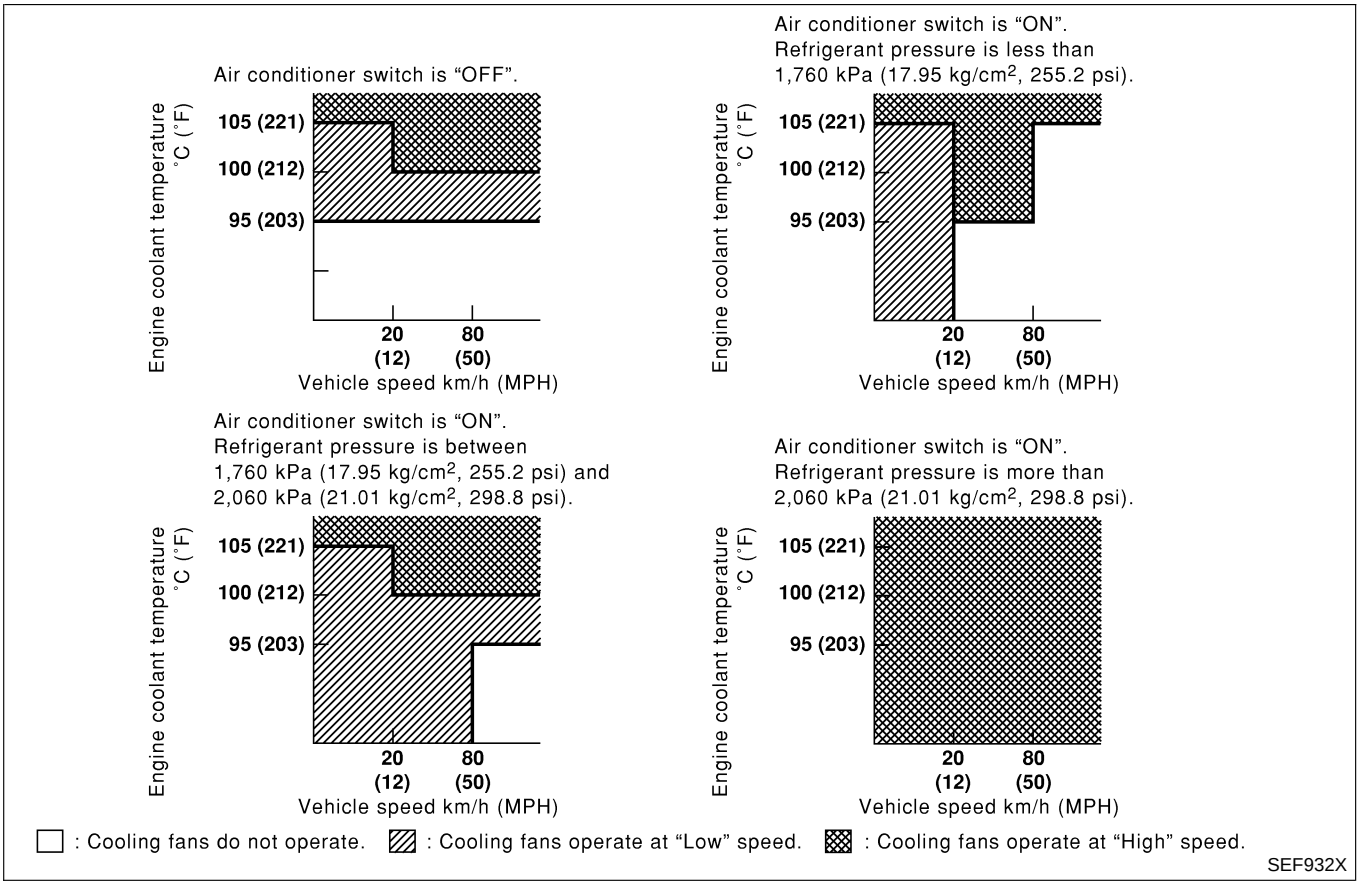
NIEC1039S01

Sensor	Input Signal to ECM	ECM function	Actuator
Vehicle speed sensor	Vehicle speed	ECM	Cooling fan relay(s)
Engine coolant temperature sensor	Engine coolant temperature		
Air conditioner switch	Air conditioner “ON” signal		
Ignition switch	Start signal		
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

NIEC1039S02



CONSULT-II Reference Value in Data Monitor Mode

NIEC1040

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

MONITOR ITEM	CONDITION		SPECIFICATION
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

NIEC1041

If the cooling fan or another component in the cooling system malfunctions, engine coolant temperature will rise.
When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is indicated.

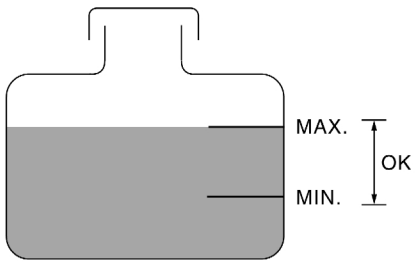
Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1217	• Cooling fan does not operate properly (Overheat). • Cooling fan system does not operate properly (Overheat). • Engine coolant was not added to the system using the proper filling method.	• Harness or connectors (The cooling fan circuit is open or shorted.) • Cooling fan • Radiator hose • Radiator • Radiator cap • Water pump • Thermostat For more information, refer to "MAIN 12 CAUSES OF OVERHEATING", EC-1818.

CAUTION:
When a malfunction is indicated, be sure to replace the coolant. Refer to *MA-17*, "Changing Engine Coolant". Also, replace the engine oil. Refer to *MA-20*, "Changing 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-15*, "Anti-freeze Coolant Mixture Ratio".

2) After refilling coolant, run engine to ensure that no water-flow noise is emitted.

1

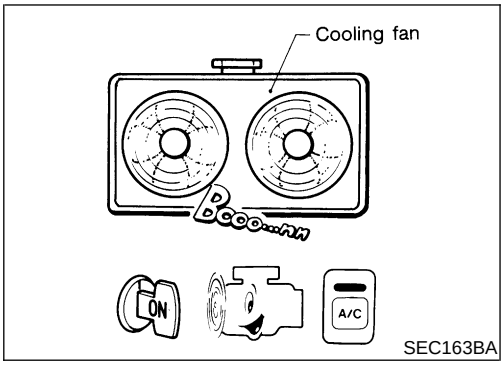


SEF621W

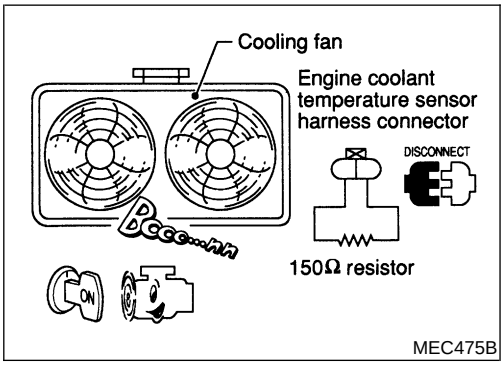
4

ACTIVE TEST	
COOLING FAN	OFF
MONITOR	
COOLAN TEMP/S	XXX °C

SEF111X



SEC163BA



MEC475B

Overall Function Check

NIEC1042

Use this procedure to check the overall function of the cooling fan. During this check, a DTC might not be confirmed.

WARNING:

Never remove the radiator cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator.
Wrap a thick cloth around cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.

With CONSULT-II

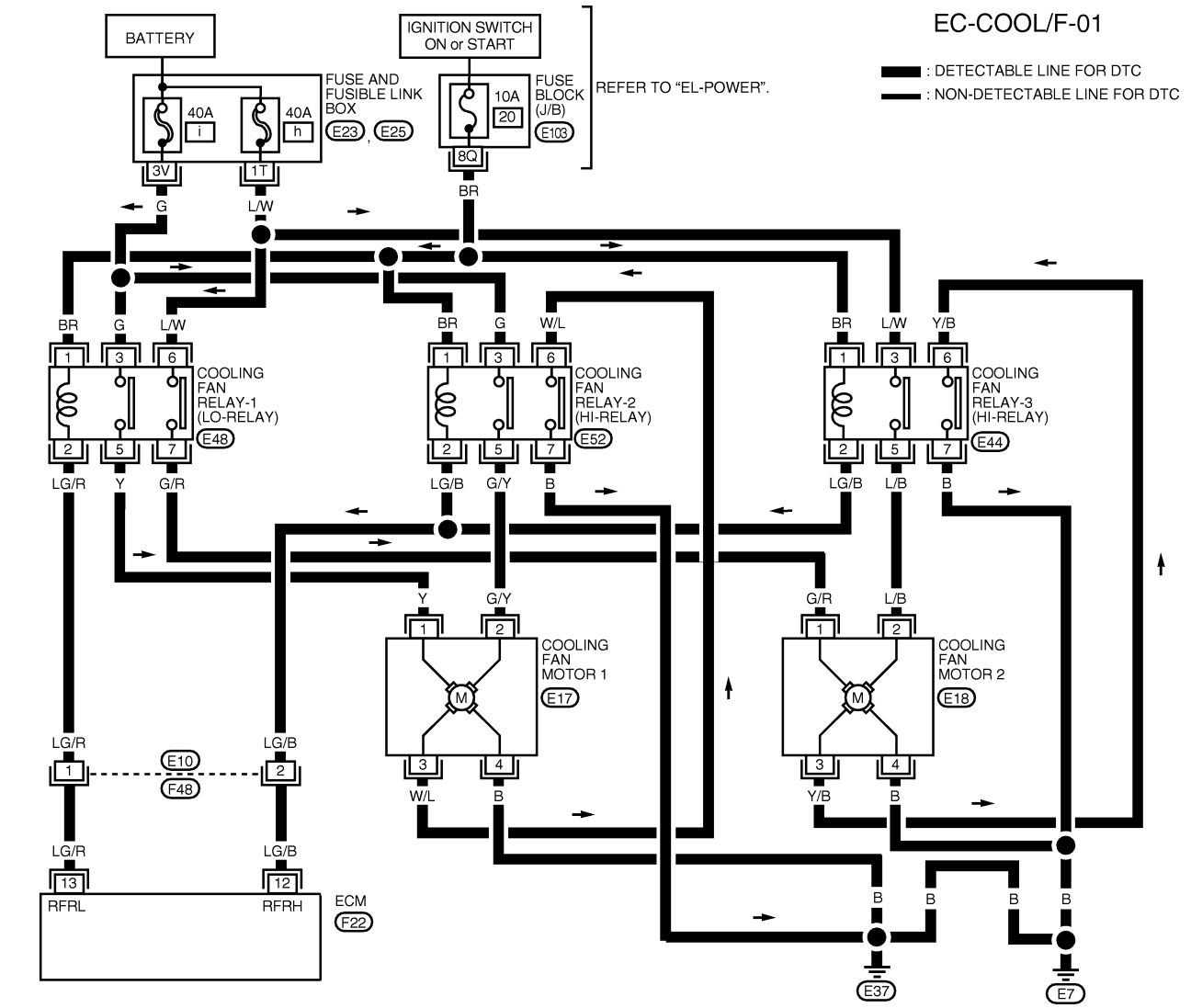
1) Check the coolant level in the reservoir tank and radiator.
Allow engine to cool before checking coolant level.
If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to “Diagnostic Procedure”, EC-1806.
2) Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to “Diagnostic Procedure”, EC-1806.
3) Turn ignition switch “ON”.
4) Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-II at idle.
5) If the results are NG, go to “Diagnostic Procedure”, EC-1806.

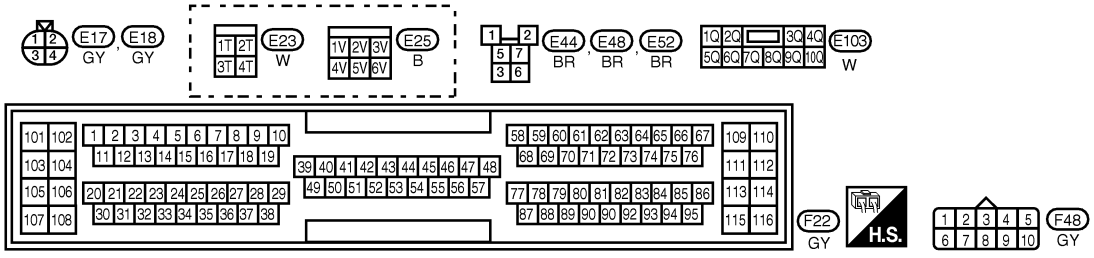
With GST

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-1806.
2) Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to “Diagnostic Procedure”, EC-1806.
3) Start engine.
Be careful not to overheat engine.
4) Set temperature control lever to full cold position.
5) Turn air conditioner switch “ON”.
6) Turn blower fan switch “ON”.
7) Run engine at idle for a few minutes with air conditioner operating.
Be careful not to overheat engine.
8) Make sure that cooling fan operates at low speed.
If NG, go to “Diagnostic Procedure”, EC-1806.
If OK, go to the following step.
9) Turn ignition switch “OFF”.
10) Turn air conditioner switch and blower fan switch “OFF”.
11) Disconnect engine coolant temperature sensor harness connector.
12) Connect 150Ω resistor to engine coolant temperature sensor harness connector.
13) Restart engine and make sure that cooling fan operates at higher speed than low speed.
Be careful not to overheat engine.
14) If NG, go to “Diagnostic Procedure”, EC-1806.

Wiring Diagram

NIEC1043





LEC222

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)
12	LG/B	COOLING FAN RELAY (HIGH)	ENGINE RUNNING WITH COOLING FAN NOT OPERATING	BATTERY VOLTAGE
			ENGINE RUNNING WITH COOLING FAN OPERATING AT HIGH SPEED	0 - 0.6V
13	LG/R	COOLING FAN RELAY (LOW)	ENGINE RUNNING WITH COOLING FAN NOT OPERATING	BATTERY VOLTAGE
			ENGINE RUNNING WITH COOLING FAN OPERATING AT LOW SPEED	0 - 0.6V

SEF571Y

Diagnostic Procedure

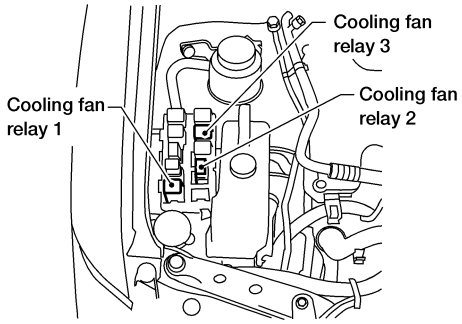
NIEC1044

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.



LEC272

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

SEF111X

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-1812.)

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.

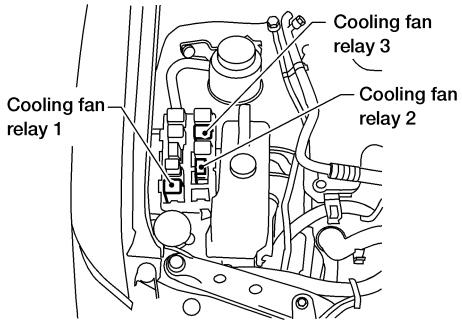
OK or NG

OK	▶	GO TO 6.
NG	▶	Check cooling fan high speed control circuit. (Go to PROCEDURE B, EC-1815.)

4	CHECK COOLING FAN LOW SPEED OPERATION

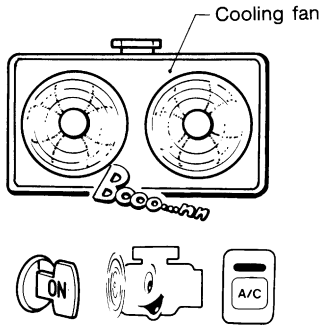
Without CONSULT-II

1. Disconnect cooling fan relays-2 and -3.



LEC272

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

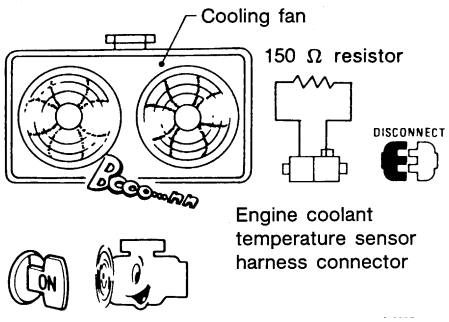
OK or NG

OK	▶	GO TO 5.
NG	▶	Check cooling fan low speed control circuit. (Go to PROCEDURE A, EC-1812.)

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-1815.)

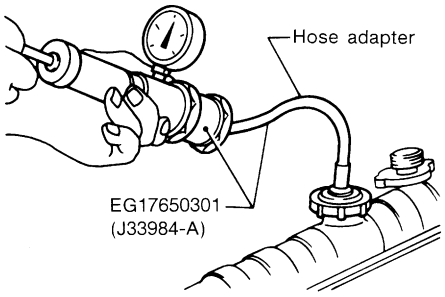
6	CHECK COOLING SYSTEM FOR LEAK

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.

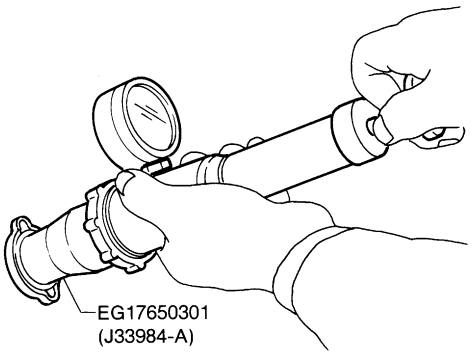
OK or NG

OK	▶	GO TO 7.
NG	▶	**Check the following for leak** ● Hose ● Radiator ● Water pump Refer to ***LC-13***, "Water Pump".

Diagnostic Procedure (Cont'd)

7	CHECK RADIATOR CAP

Apply pressure to cap with a tester.



SLC755A

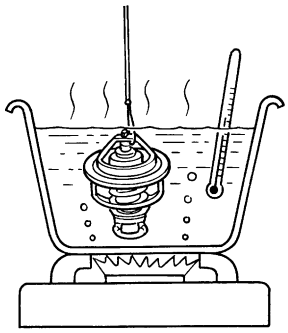
Radiator cap relief pressure:
59 - 98 kPa (0.6 - 1.0 kg/cm^2, 9 - 14 psi)

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace radiator cap.

8	CHECK THERMOSTAT

1. Check valve seating condition at normal room temperatures.
   It should seat tightly.
2. Check valve opening temperature and valve lift.



SLC343

Valve opening temperature:
76.5°C (170°F) [standard]
Valve lift:
More than 8 mm/90°C (0.31 in/194°F)

3. Check if valve is closed at 5°C (9°F) below valve opening temperature.

For details, refer to ***LC-31***, "Thermostat".

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace thermostat

9	CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to "COMPONENT INSPECTION", EC-1555.

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace engine coolant temperature sensor.

10	CHECK MAIN 12 CAUSES
If the cause cannot be isolated, go to "MAIN 12 CAUSES OF OVERHEATING", EC-1818.	
▶	INSPECTION END

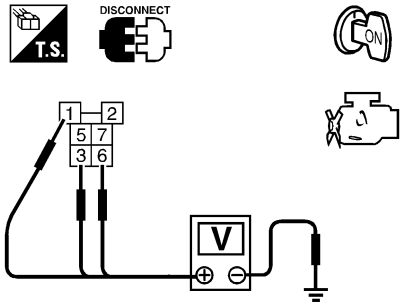
Diagnostic Procedure (Cont'd)

PROCEDURE A

=NIEC1044S01

1	CHECK POWER SUPPLY

1. Turn ignition switch "OFF".
2. Disconnect cooling fan relay-1.
3. Turn ignition switch "ON".
4. Check voltage between cooling fan relay-1 terminals 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.

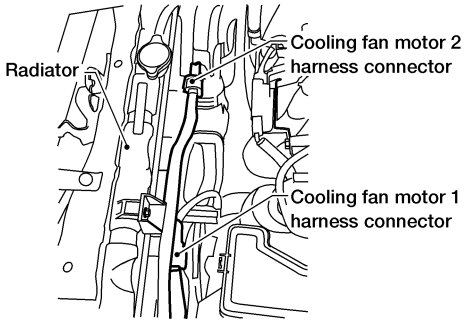
2	DETECT MALFUNCTIONING PART

Check the following.
- 10A 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 GROUND CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect cooling fan motor-1 harness connector and cooling fan motor-2 harness connector.



LEC289

3. Check harness continuity between cooling fan relay-1 terminal 5 and cooling fan motor-1 terminal 1, cooling fan motor-1 terminal 4 and body ground.
   Refer to "Wiring Diagram", EC-1805.
   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 1, cooling fan motor-2 terminal 4 and body ground.
   Refer to "Wiring Diagram", EC-1805.
   Continuity should exist.
6. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK OUTPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 13 and cooling fan relay-1 terminal 2.
   Refer to "Wiring Diagram", EC-1805.
   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 E10, F48
- Harness for open or short between cooling fan relay-1 and ECM

	▶	Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK COOLING FAN RELAY-1

Refer to "Component Inspection", EC-1818.

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace cooling fan relay.

Diagnostic Procedure (Cont'd)

7	CHECK COOLING FAN MOTORS-1 AND -2	
Refer to "Component Inspection", EC-1819.		
OK or NG		
OK	▶	GO TO 8.
NG	▶	Replace cooling fan motors.

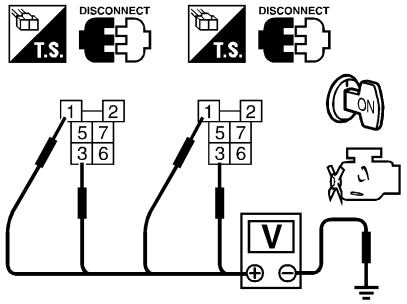
8	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1508.	
▶	**INSPECTION END**

PROCEDURE B

=NIEC1044S02

1	CHECK POWER SUPPLY

1. Turn ignition switch "OFF".
2. Disconnect cooling fan relays-2 and -3.
3. Turn ignition switch "ON".
4. Check voltage between cooling fan relays-2 and -3 terminals 1, 3 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF593X

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

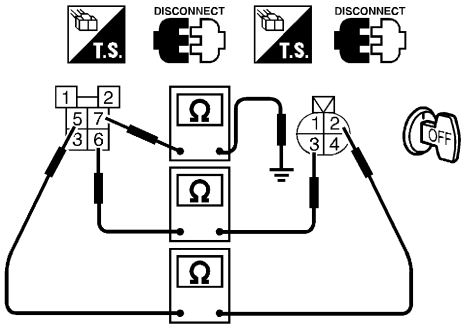
2	DETECT MALFUNCTIONING PART

Check the following.
- Harness for open or short between cooling fan relays-2 and -3 and fuse
- Harness for open or short between cooling fan relays-2 and -3 and fusible link

	▶	Repair harness or connectors.

3	CHECK GROUND CIRCUIT

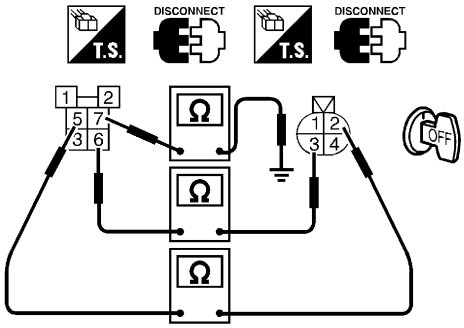
1. Turn ignition switch "OFF".
2. Disconnect cooling fan motor-1 harness connector and cooling fan motor-2 harness connector.
3. Check harness continuity between the following:
- Cooling fan relay-2 terminal 5 and cooling fan motor-1 terminal 2
- Cooling fan relay-2 terminal 6 and cooling fan motor-1 terminal 3
- Cooling fan relay-2 terminal 7 and body ground.



SEF732W

Continuity should exist.

4. Also check harness for short to ground and short to power.
5. Check harness continuity between the following:
- Cooling fan relay-3 terminal 5 and cooling fan motor-2 terminal 2
- Cooling fan relay-3 terminal 6 and cooling fan motor-2 terminal 3
- Cooling fan relay-3 terminal 7 and body ground.



SEF732W

Continuity should exist.

6. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK OUTPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 12 and cooling fan relay-2 terminal 2, cooling fan relay-3 terminal 2. Refer to "Wiring Diagram", EC-1805.
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 E10, F48 ● Harness for open or short between cooling fan relays-2 and -3 and ECM	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK COOLING FAN RELAYS-2 AND -3	
Refer to "Component Inspection", EC-1818.		
OK or NG		
OK	▶	GO TO 7.
NG	▶	Replace cooling fan relays.

7	CHECK COOLING FAN MOTORS-1 AND -2	
Refer to "Component Inspection", EC-1819.		
OK or NG		
OK	▶	GO TO 8.
NG	▶	Replace cooling fan motors.

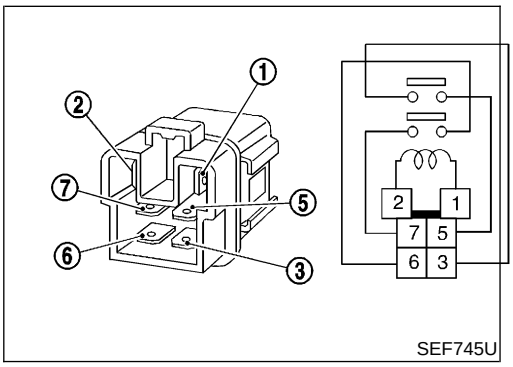
8	CHECK INTERMITTENT INCIDENT	
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1508.		
	▶	**INSPECTION END**

Main 12 Causes of Overheating

NIEC1045

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-13***, “RECOMMENDED FLUIDS AND LUBRICANTS”.
	3	• Coolant level	• Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	See ***MA-17***, “Changing Engine Coolant”.
	4	• Radiator cap	• Pressure tester	59 - 98 kPa (0.6 - 1.0 kg/cm^2, 9 - 14 psi) (Limit)	See ***LC-12***, “System Check”.
ON*2	5	• Coolant leaks	• Visual	No leaks	See ***LC-12***, “System Check”.
ON*2	6	• Thermostat	• Touch the upper and lower radiator hoses	Both hoses should be hot	See ***LC-15***, “Thermostat”, and ***LC-18***, “Radiator”.
ON*1	7	• Cooling fan	• CONSULT-II	Operating	See trouble diagnosis for DTC P1217 (EC-1802).
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-17***, “Changing Engine Coolant”.
OFF*4	10	• Coolant return from reservoir tank to radiator	• Visual	Should be initial level in reservoir tank	See ***MA-16***, “ENGINE MAINTENANCE”.
OFF	11	• Cylinder head	• Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	See ***EM-110***, “Inspection”.
	12	• Cylinder block and pistons	• Visual	No scuffing on cylinder walls or piston	See ***EM-132***, “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-19***, “OVERHEATING CAUSE ANALYSIS”.



Component Inspection

NIEC1046

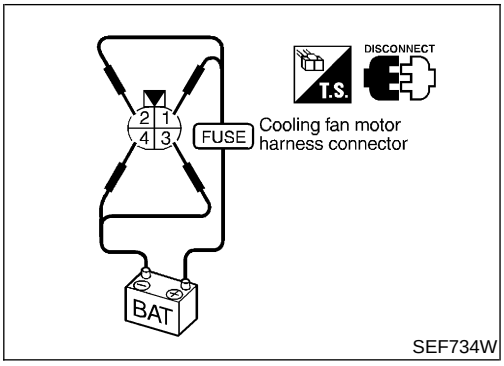
COOLING FAN RELAYS-1, -2 AND -3

NIEC1046S01

Check continuity between terminals 3 and 5, 6 and 7.

Conditions	Continuity
12V direct current supply between terminals 1 and 2	Yes
No current supply	No

If NG, replace relay.



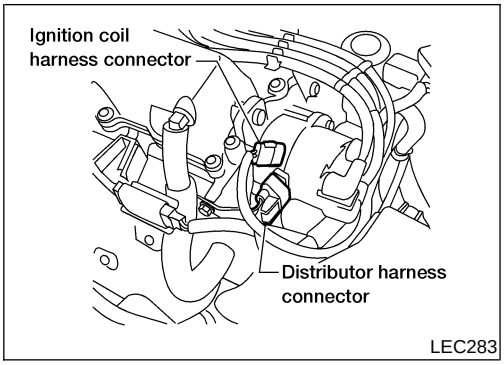
COOLING FAN MOTORS-1 AND -2

NIEC1046S02

1. Disconnect cooling fan motor harness connectors.
2. Supply cooling fan motor terminals with battery voltage and check operation.

	Speed	Terminals	
		(+)	(−)
Cooling fan motor	Low	1	4
	High	1, 2	3, 4

Cooling fan motor should operate.
If NG, replace cooling fan motor.



Component Description

NIEC1047

IGNITION COIL & POWER TRANSISTOR (BUILT INTO DISTRIBUTOR)

NIEC1047S01

The ignition coil is built into distributor. The ignition signal from the ECM is sent to the power transistor. The power transistor switches on and off the ignition coil primary circuit. As the primary circuit is turned on and off, the proper high voltage is induced in the coil secondary circuit.

The distributor is not repairable and must be replaced as an assembly except distributor cap and rotor head.

CONSULT-II Reference Value in Data Monitor Mode

NIEC1048

MONITOR ITEM	CONDITION		SPECIFICATION
IGN TIMING	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: “N” • No-load	Idle	15°±2° BTDC
		2,000 rpm	More than 25° BTDC

On Board Diagnosis Logic

NIEC1049

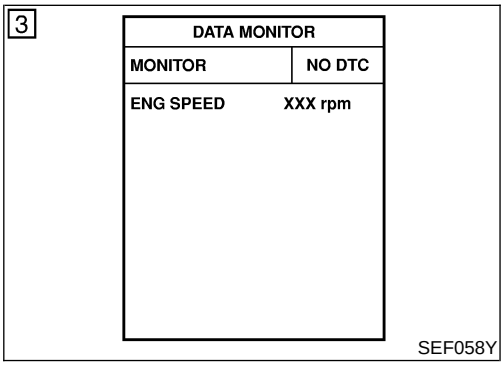
DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1320	• The ignition signal in the primary circuit is not sent to ECM during engine cranking or running.	• Harness or connectors (The ignition primary circuit is open or shorted.) • Power transistor unit. • Resistor • Camshaft position sensor (PHASE) • Camshaft position sensor (PHASE) circuit

DTC Confirmation Procedure

NIEC1050

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 P0340, perform trouble diagnosis for DTC P0340 first. Refer to EC-1683.**



With CONSULT-II

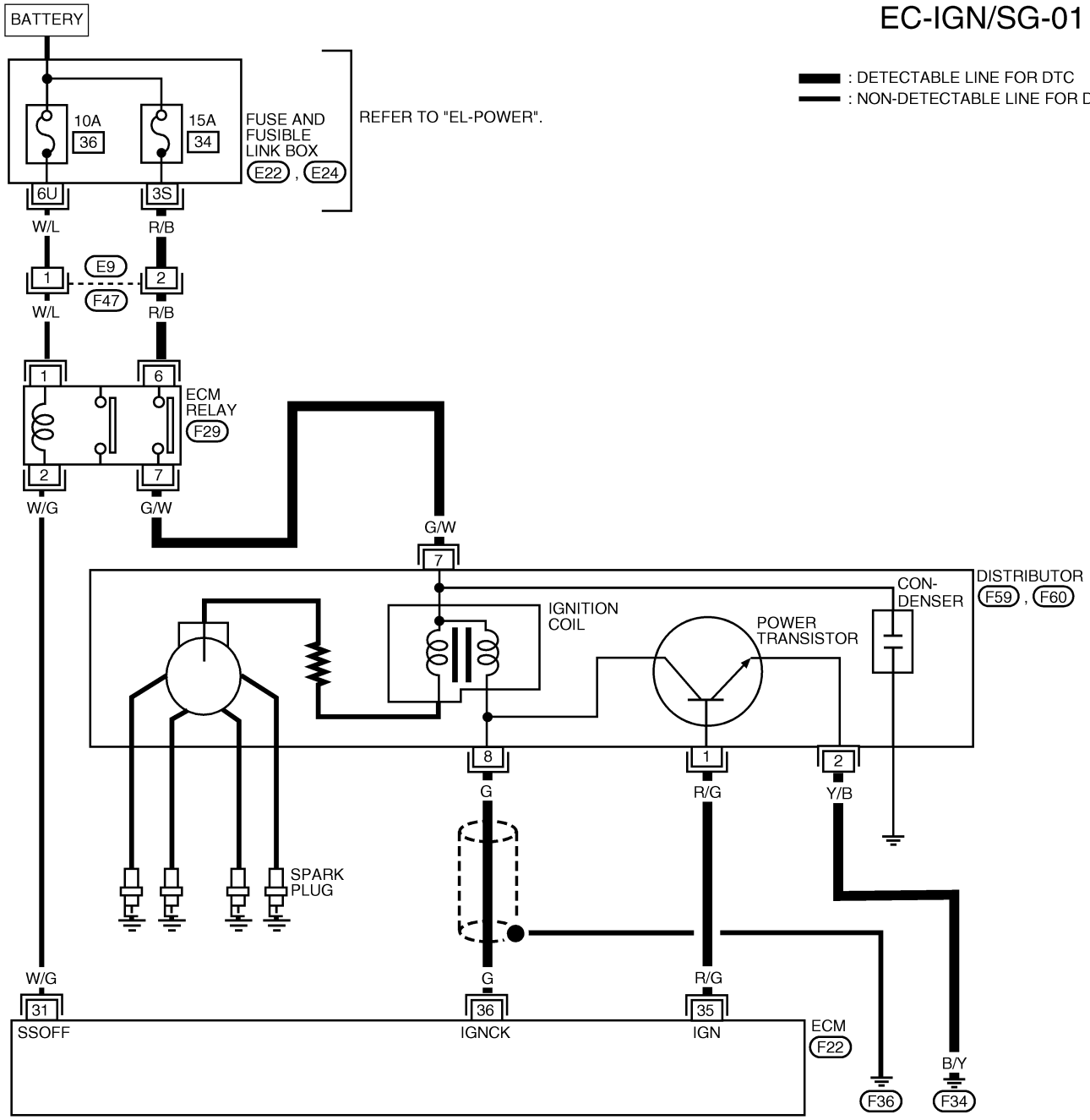
1) Turn ignition switch “ON”.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Start engine and wait at least 4 seconds. (If engine does not run, turn ignition switch to “START” at least 5 seconds.)
4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-1822.

With GST

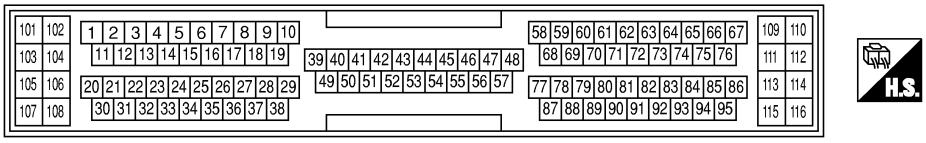
Follow the procedure “With CONSULT-II” above.

Wiring Diagram

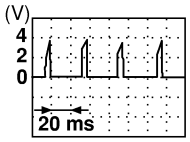
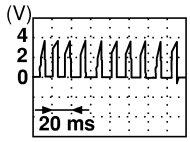
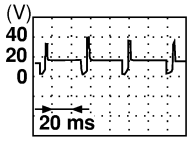
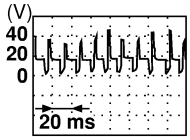
NIEC1051



LEC228



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)
35	R/G	IGNITION SIGNAL	ENGINE RUNNING AT IDLE SPEED WARM-UP CONDITION	APPROX. 0.3V 
			ENGINE RUNNING AT 2,000 RPM	APPROX. 0.5V 
36	G	IGNITION CHECK	ENGINE RUNNING AT IDLE SPEED WARM-UP CONDITION	APPROX. 13V 
			ENGINE RUNNING AT 2,000 RPM	APPROX. 13V 

SEF584Y

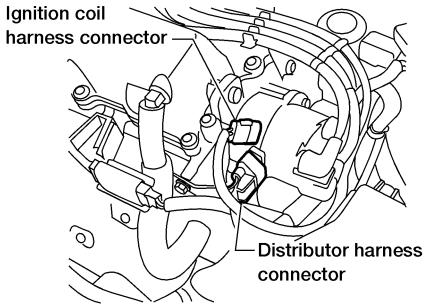
Diagnostic Procedure

NIEC1052

1	CHECK ENGINE START	
Turn ignition switch "OFF", and restart engine. **Is engine running?**		
	Yes or No	
Yes	▶	GO TO 7.
No	▶	GO TO 2.

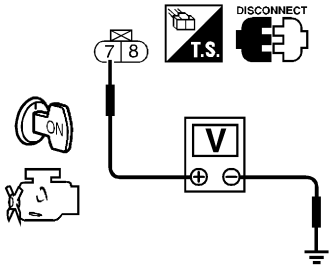
2	CHECK POWER SUPPLY

1. Turn ignition switch "OFF".
2. Disconnect ignition coil harness connector.



LEC283

3. Turn ignition switch "ON".
4. Check voltage between ignition coil harness connector terminal 8 and ground with CONSULT-II or tester.



SEF721U

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E9, F47
- ECM relay
- 15A fuse
- Harness for open or short between ignition coil and fuse

	▶	Repair harness or connectors.

4	CHECK GROUND CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect distributor harness connector.
3. Check harness continuity between distributor harness connector terminal 2 and engine ground.
   Refer to "Wiring Diagram", EC-1821.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 5.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 35 and distributor harness connector terminal 1.
   Refer to "Wiring Diagram", EC-1821.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 6.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK IGNITION COIL, POWER TRANSISTOR

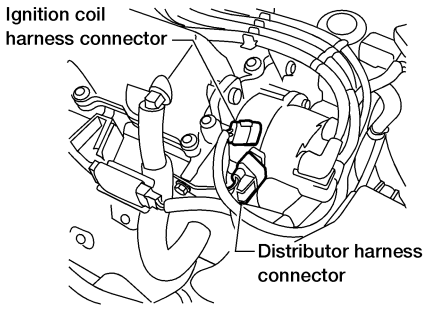
Refer to "Component Inspection", EC-1825.

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace malfunctioning component(s).

7	CHECK INPUT SIGNAL CIRCUIT

1. Stop engine.
2. Disconnect ignition coil harness connector.



LEC283

3. Disconnect ECM harness connector.
4. Check harness continuity between ignition coil terminal 7 and ECM terminal 36.
   Refer to "Wiring Diagram", EC-1821.
   Continuity should exist.
5. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 8.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

8	CHECK RESISTOR

Refer to "Component Inspection" EC-1825.

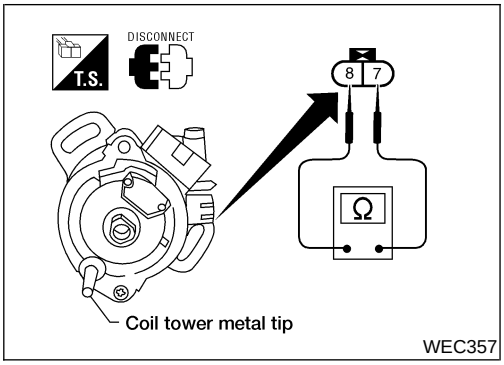
OK or NG

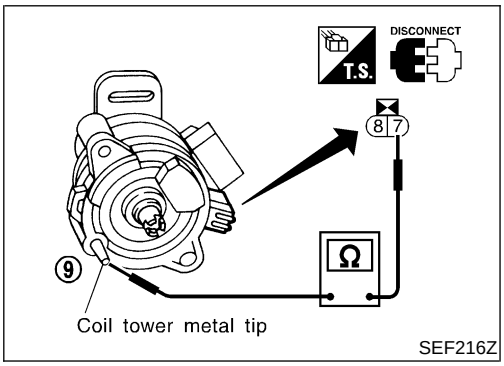
OK	▶	GO TO 9.
NG	▶	Replace distributor cap.

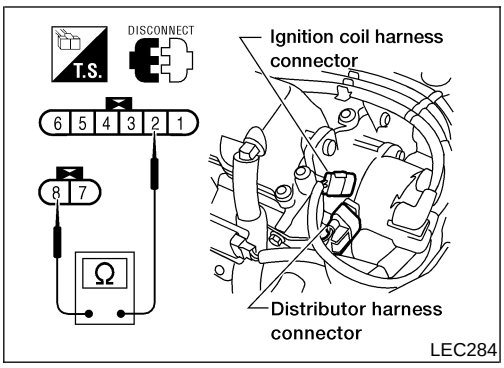
9	CHECK INTERMITTENT INCIDENT

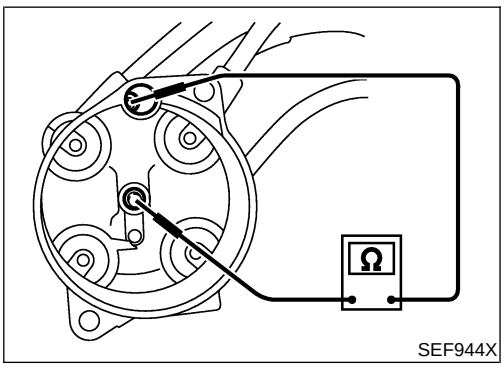
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1508.

▶ **INSPECTION END**









Component Inspection

=NIEC1053

IGNITION COIL

NIEC1053S01

1. Disconnect ignition coil harness connector.
2. Check resistance as shown in the figure.
3. For checking secondary coil, remove distributor cap.
4. Check resistance between ignition coil harness connector terminal 7 and coil tower metal tip 9 (secondary terminal) on the distributor head.

Terminal	Resistance [at 25°C (77°F)]
7 - 8 (Primary coil)	Approximately 0.8Ω
7 - secondary terminal on distributor head (Secondary coil)	Approximately 16 kΩ

If NG, replace distributor.

POWER TRANSISTOR

NIEC1053S02

1. Disconnect distributor harness connector.
2. Check power transistor resistance between terminals 2 and 8.

Terminals	Resistance	Result
2 and 8	Except 0Ω	OK
	0Ω	NG

If NG, replace distributor.

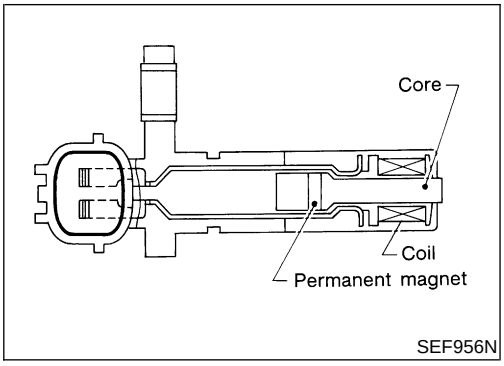
RESISTOR

NIEC1053S03

1. Disconnect resistor harness connector.
2. Check resistance as shown in the figure.

Resistance: 4 - 8 kΩ [at 25°C (77°F)]

If NG, replace distributor cap.



Component Description

NIEC1054

The crankshaft position sensor (POS) is located on the transmission housing facing the gear teeth (cogs) of the flywheel or drive plate. It detects the fluctuation of the engine revolution.

The sensor consists of a permanent magnet, core and coil.

When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.

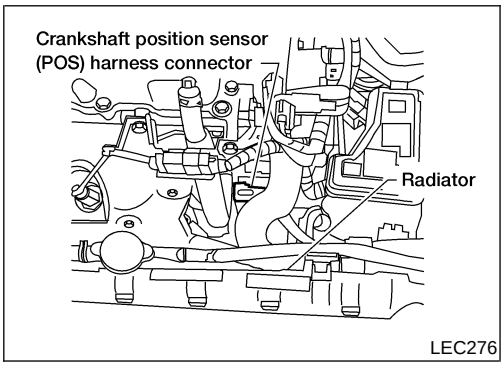
The changing gap causes the magnetic field near the sensor to change.

Due to the changing magnetic field, the voltage from the sensor changes.

The ECM receives the voltage signal and detects the fluctuation of the engine revolution.

This sensor is not used to control the engine system.

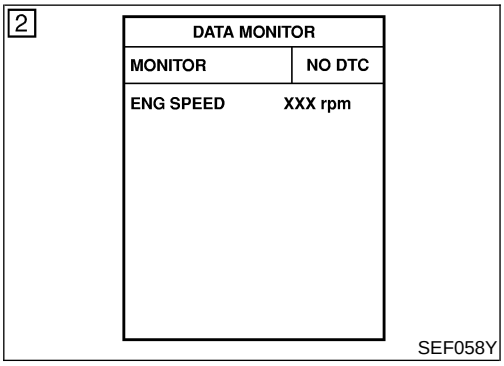
It is used only for the on board diagnosis.



On Board Diagnosis Logic

NIEC1055

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1336	• A chipping of the flywheel or drive plate gear tooth (cog) is detected by the ECM.	• Harness or connectors • Crankshaft position sensor (POS) • Drive plate/Flywheel



DTC Confirmation Procedure

NIEC1056

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

1) Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II.
2) Start engine and run it for at least 4 minutes at idle speed.
3) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-1828.

With GST

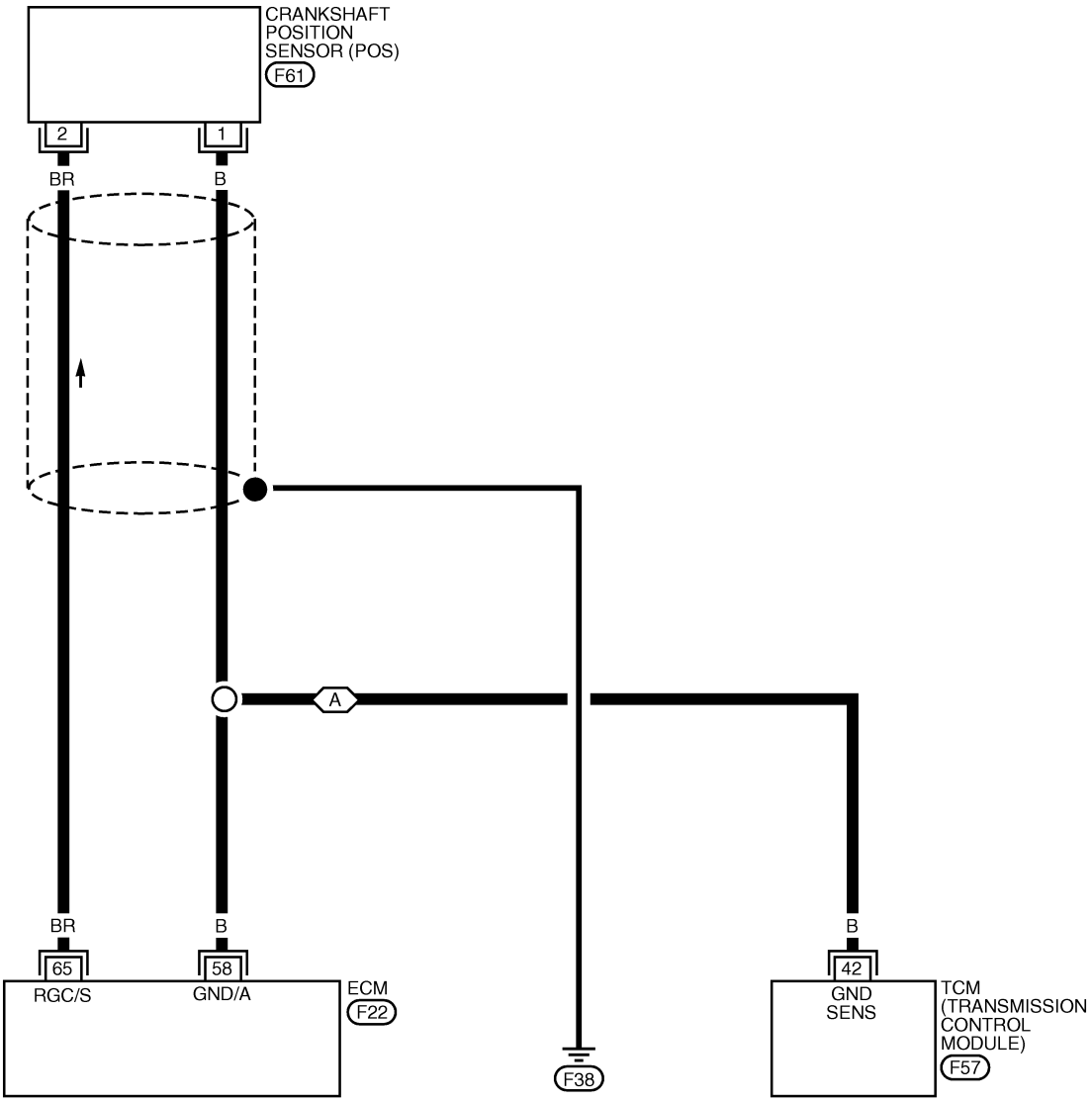
Follow the procedure “With CONSULT-II” above.

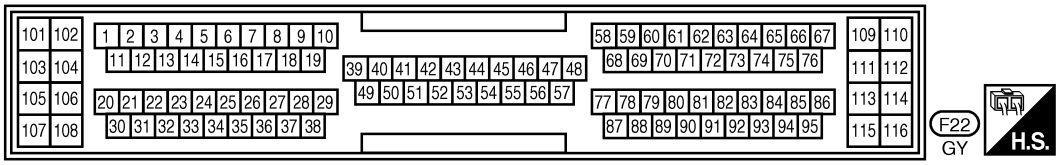
Wiring Diagram

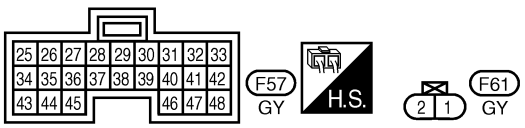
NIEC1057

EC-POS-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC
A : WITH A/T



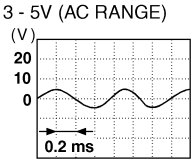
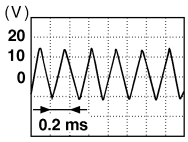




LEC192

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)
58	B	SENSOR'S GROUND	IGN ON	APPROX. 0V
65	B/R	CRANKSHAFT POSITION SENSOR (POS)	ENGINE RUNNING AT IDLE SPEED UNDER WARM-UP CONDITION	3 - 5V (AC RANGE) 
			ENGINE RUNNING AT 2,000 RPM	6 - 9V (AC RANGE) 

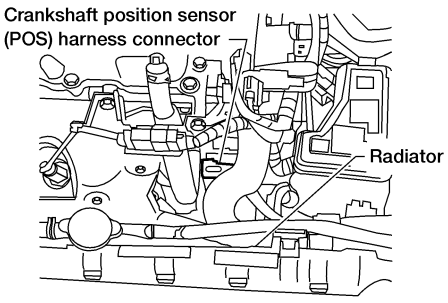
LEC469

Diagnostic Procedure

NIEC1058

1	RETIGHTEN GROUND SCREWS
1. Turn ignition switch "OFF". 2. Loosen and retighten engine ground screws.	
▶	GO TO 2.

2	CHECK INPUT SIGNAL CIRCUIT
1. Disconnect crankshaft position sensor (POS) and ECM harness connectors.	



LEC276

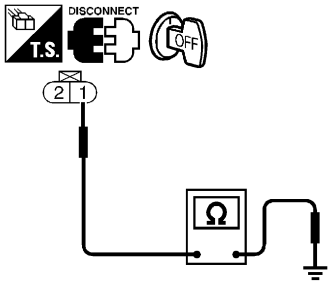
2. Check continuity between ECM terminal 65 and crankshaft position sensor (POS) harness connector terminal 2. Refer to "Wiring Diagram", EC-1827.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 3.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

3	CHECK GROUND CIRCUIT

1. Reconnect ECM harness connectors.
2. Check harness continuity between crankshaft position sensor (POS) terminal 1 and engine ground.



SEF229W

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Harness for open or short between crankshaft position sensor (POS) and ECM
- Harness for open or short between crankshaft position sensor (POS) and TCM (Transmission control module)

	▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK IMPROPER INSTALLATION

Loosen and retighten the fixing bolt of the crankshaft position sensor (POS). Then retest.

Trouble is not fixed.	▶	GO TO 6.

6	CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to "Component Inspection", EC-1830.

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace crankshaft position sensor (POS).

7	CHECK GEAR TOOTH

Visually check for chipping flywheel or drive plate gear tooth (cog).

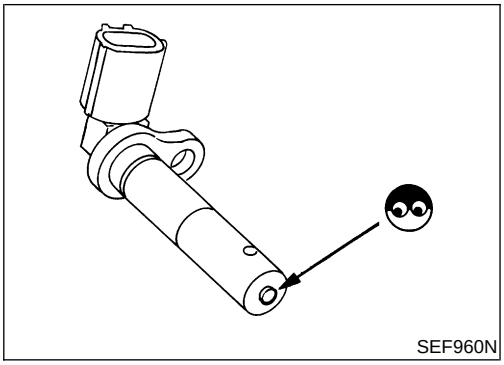
OK or NG

OK	▶	GO TO 8.
NG	▶	Replace the flywheel or drive plate.

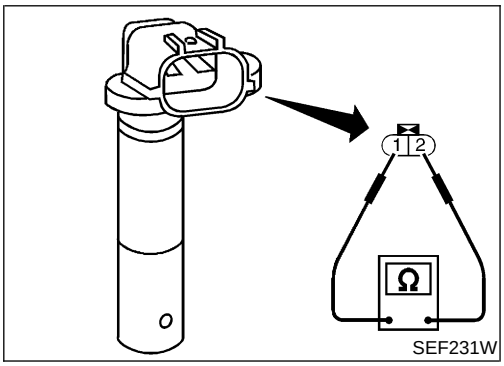
8	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1508.

	▶	**INSPECTION END**



SEF960N



SEF231W

Component Inspection

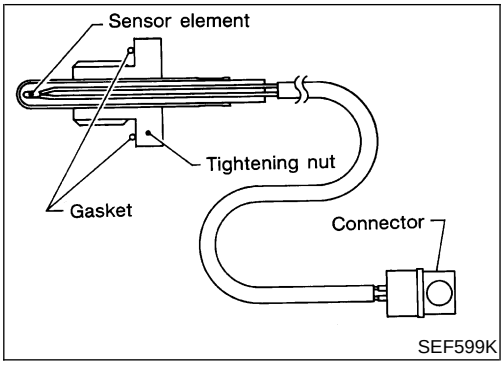
NIEC1059

CRANKSHAFT POSITION SENSOR (POS)

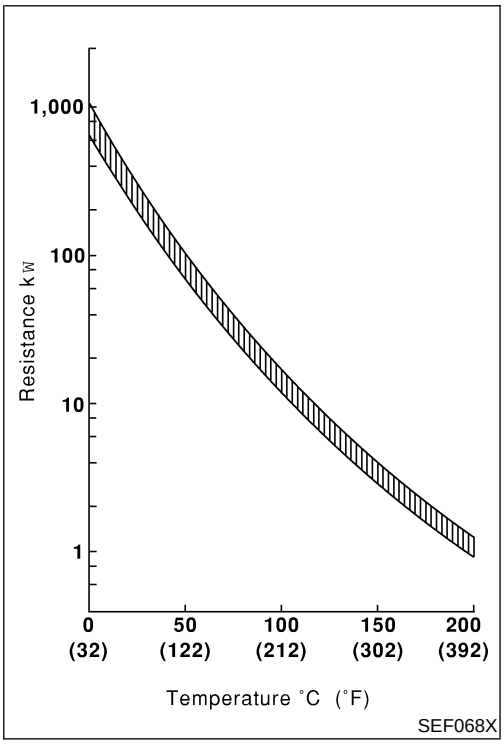
NIEC1059S01

1. Disconnect crankshaft position sensor (POS) harness connector.
2. Loosen the fixing bolt of the sensor.
3. Remove the sensor.
4. Visually check the sensor for chipping.
5. Check resistance as shown in the figure.

Resistance: 166 - 204 Ω [at 20°C (68°F)]



SEF599K



SEF068X

Component Description

NIEC1060

The EGR temperature sensor detects temperature changes in the EGR passageway. When the EGR volume control valve opens, hot exhaust gases flow, and the temperature in the passageway changes. The EGR temperature sensor is a thermistor that modifies a voltage signal sent from the ECM. This modified signal then returns to the ECM as an input signal. As the temperature increases, EGR temperature sensor resistance decreases.
This sensor is not 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)	4.56	0.62 - 1.05
50 (122)	2.25	0.065 - 0.094
100 (212)	0.59	0.011 - 0.015

*: These data are reference values and are measured between ECM terminal 72 (EGR temperature sensor) and 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

NIEC1061

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

NIEC1062

MALFUNCTION A

NIEC1062S01

- Harness or connectors (The EGR temperature sensor circuit is shorted.)
- EGR temperature sensor
- Malfunction of EGR function

MALFUNCTION B

NIEC1062S02

- Harness or connectors (The EGR temperature sensor circuit is open.)
- EGR temperature sensor

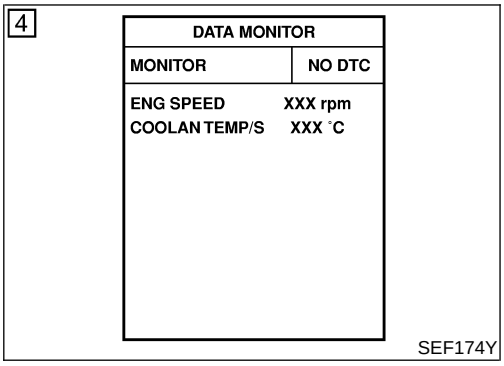
- Malfunction of EGR function

DTC Confirmation Procedure

NIEC1063

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

NIEC1063S01

With CONSULT-II

NIEC1063S0101

1) Turn ignition switch “ON”.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Verify that “COOLAN TEMP/S” is less than 50°C (122°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-1835.

With GST

NIEC1063S0102

Follow the procedure “With CONSULT-II” above.

ACTIVE TEST	
EGR VOL CONT/V	50 step
MONITOR	
ENG SPEED	XXX rpm
EGR TEMP SEN	XXX V

SEF200Y

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

NIEC1063S02

CAUTION:

Always drive vehicle at a safe speed.

TESTING CONDITION:

Always perform the test at a temperature above –10°C (14°F).

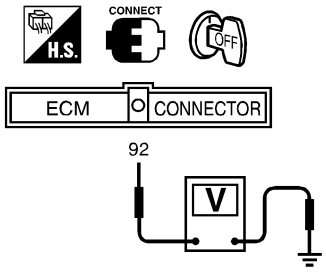
With CONSULT-II

NIEC1063S0201

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-1835.
   If the check result is OK, go to the following step.
5) Turn ignition switch "OFF" and wait at least 10 seconds then turn "ON".
6) Check the output voltage of "THRTL POS SEN" (at closed throttle position) and note it.
7) Start engine and maintain the following conditions for at least 5 consecutive seconds.

ENG SPEED	1,800 - 2,800 rpm
VHCL SPEED SE	10 km/h (6 MPH) or more
B/FUEL SCHDL	5.0 - 8.5 msec
THRTL POS SEN	(X + 0.05) – (X – 0.87) V X = Voltage value measured at step 6
Selector lever	Suitable position

8) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1835.



SEF066X

With GST

NIEC1063S0202

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.

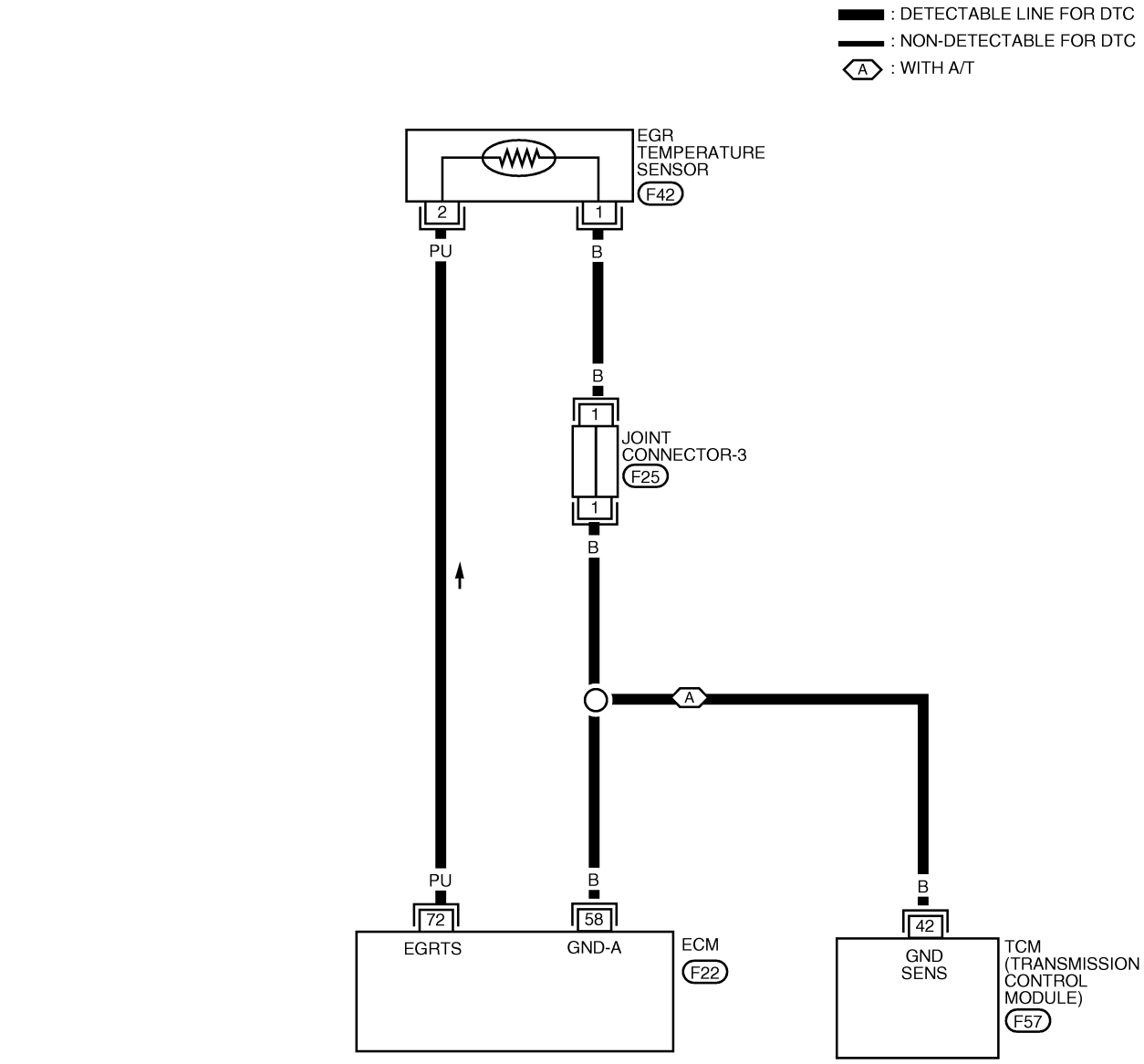
Engine speed	1,800 - 2,800 rpm
Vehicle speed	10 km/h (6 MPH) or more
Voltage between ECM terminal 92 and ground	0.86 - 2.0V
Selector lever	Suitable position

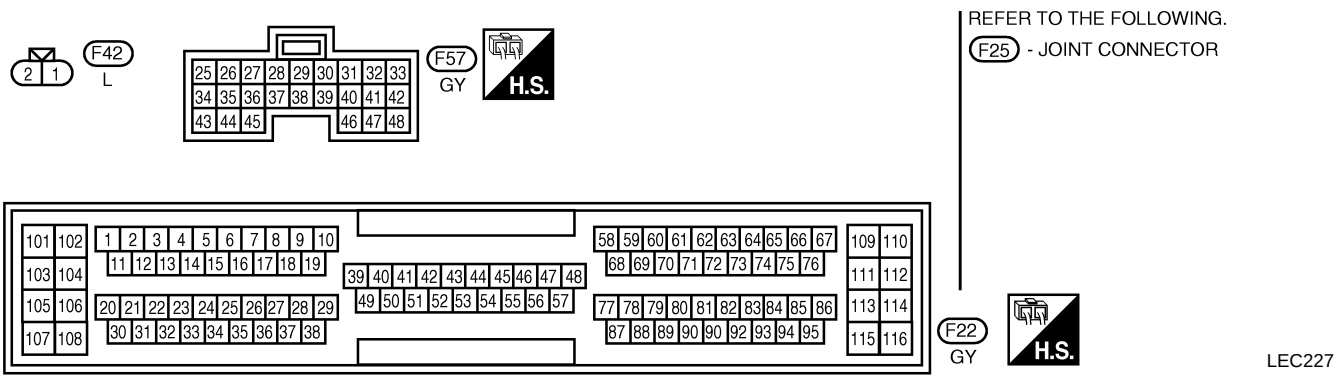
4) Select "MODE 7" with GST.
5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1835.

Wiring Diagram

NIEC1064

EC-EGR/TS-01



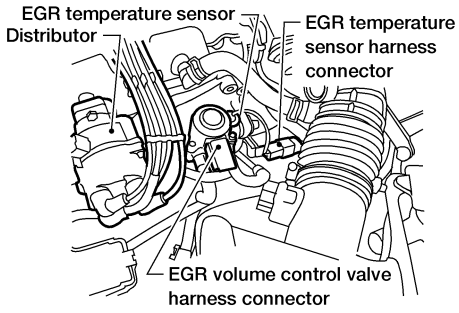


Diagnostic Procedure

NIEC1065

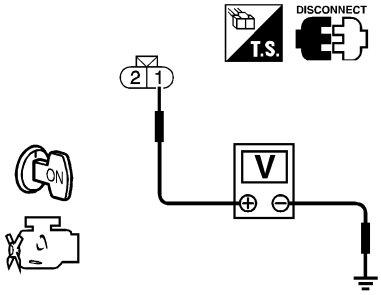
1	CHECK EGR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect EGR temperature sensor harness connector.



LEC285

3. Turn ignition switch “ON”.
4. Check voltage between EGR temperature sensor terminal 2 and ground with CONSULT-II or tester.



Voltage: Approximately 5V

SEF197Z

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair or replace harness or connectors.

2	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”, EC-1834.
   Continuity should exist.
3. Also check harness for short to ground or short to power.

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

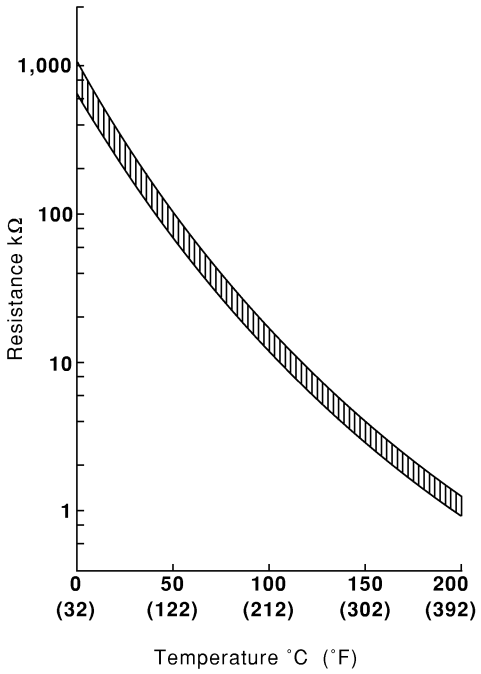
3	DETECT MALFUNCTIONING PART

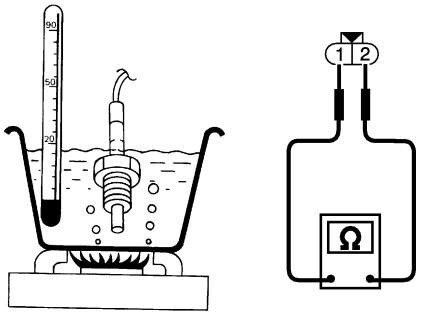
Check the following.
- Joint connector-3
- Harness for open or short between ECM and EGR temperature sensor
- Harness for open or short between TCM (Transmission Control Module) and EGR temperature sensor

	▶	Repair open circuit or short to ground or short to power in harness or connector.

4	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)	4.56	0.62 - 1.05
50 (122)	2.25	0.065 - 0.094
100 (212)	0.59	0.011 - 0.015

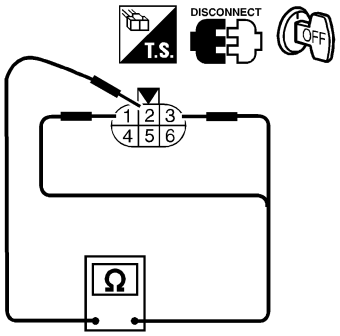
SEF483Y

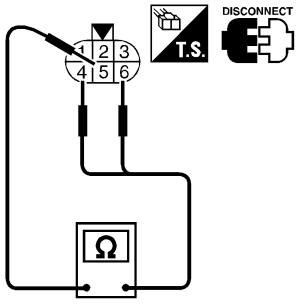
OK or NG

OK	▶	GO TO 5.
NG	▶	Replace EGR temperature sensor.

5	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

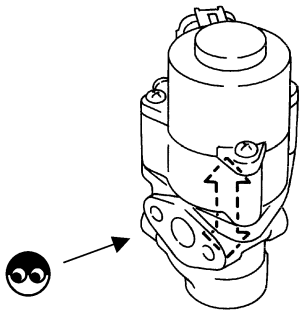
OK (With CONSULT-II)	▶	GO TO 6.
OK (Without CONSULT-II)	▶	GO TO 7.
NG	▶	Replace EGR volume control valve.

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 smoothly forward and backward according to the valve opening steps.

ACTIVE TEST	
EGR VOL CONT/V	20 step
MONITOR	
ENG SPEED	XXX rpm



SEF067Y

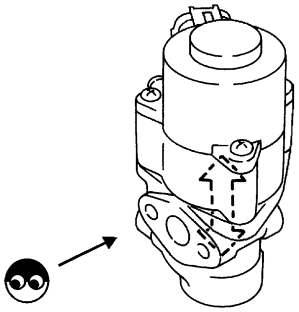
OK or NG

OK	▶	GO TO 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-1508.	
▶	**INSPECTION END**

Description

NIEC1066

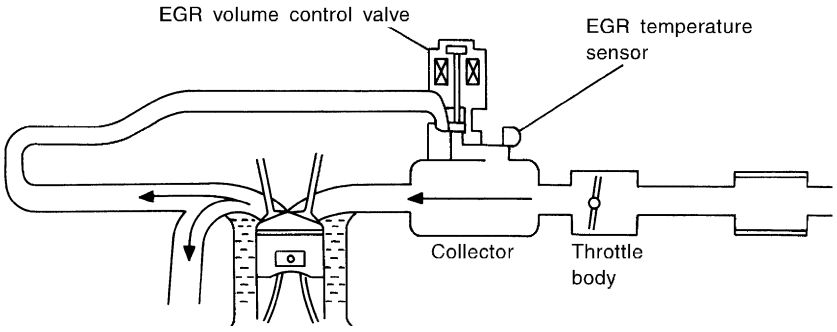
SYSTEM DESCRIPTION

NIEC1066S01

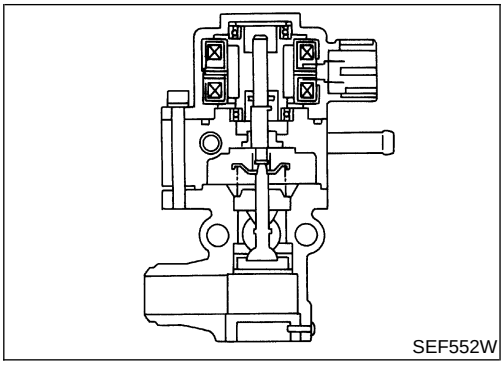
Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE)	Engine speed	EGR volume control	EGR volume control valve
Vehicle speed sensor	Vehicle speed		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle 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 bypass 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

NIEC1066S02

EGR Volume Control Valve

NIEC1066S0201

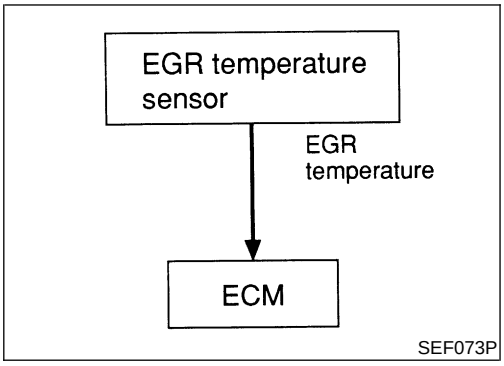
The EGR volume control valve uses a step motor to control the flow rate of EGR from exhaust manifold. This motor has four winding phases. It operates according to the output pulse signal of the ECM. Two windings are turned ON and OFF in sequence. Each time an ON pulse is issued, the valve opens or closes, 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

NIEC1067

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 steps



SEF073P

On Board Diagnosis Logic

NIEC1068

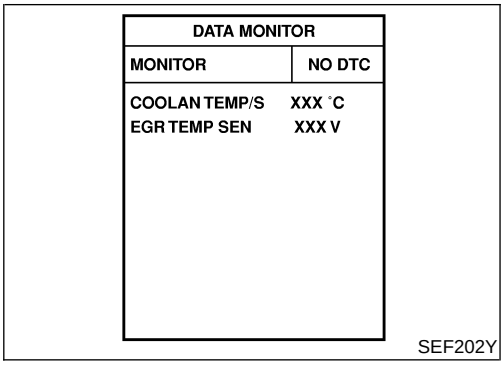
If the EGR temperature sensor detects EGR flow under the condition that does not call for EGR, a high-flow malfunction is diagnosed.
Malfunction is detected when EGR flow is detected under condition that does not call for EGR.

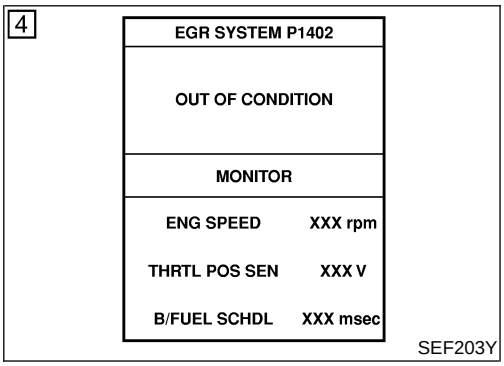
NOTE:
Diagnosis for this DTC will occur when engine coolant temperature is below 50 to 60°C (122 to 140°F). Therefore, it will be better to turn ignition switch "ON" (start engine) at the engine coolant temperature below 30°C (86°F) when starting DTC confirmation procedure.

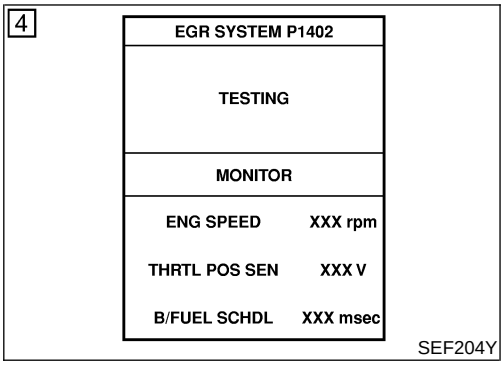
Possible Cause

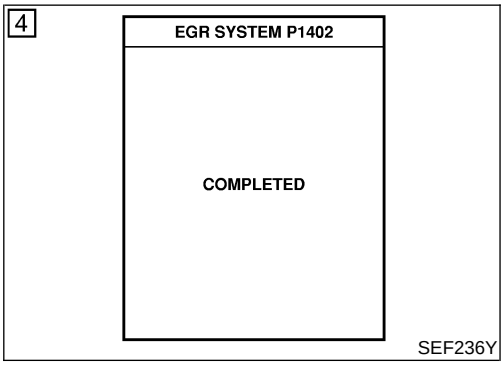
NIEC1069

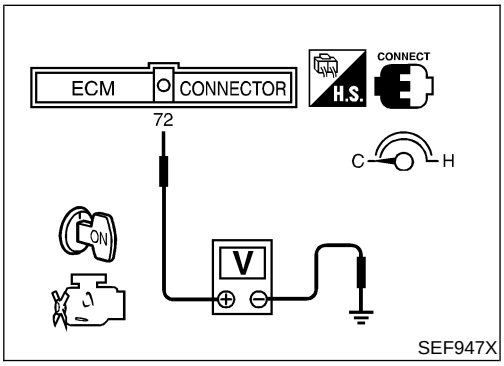
- Harness or connectors
  (EGR volume control valve circuit is open or shorted.)
- EGR volume control valve leaking or stuck open
- EGR temperature sensor











DTC Confirmation Procedure

NIEC1070

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 50°C (14 to 122°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

NIEC1070S01

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 50°C (14 to 122°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-1842.

WITH GST

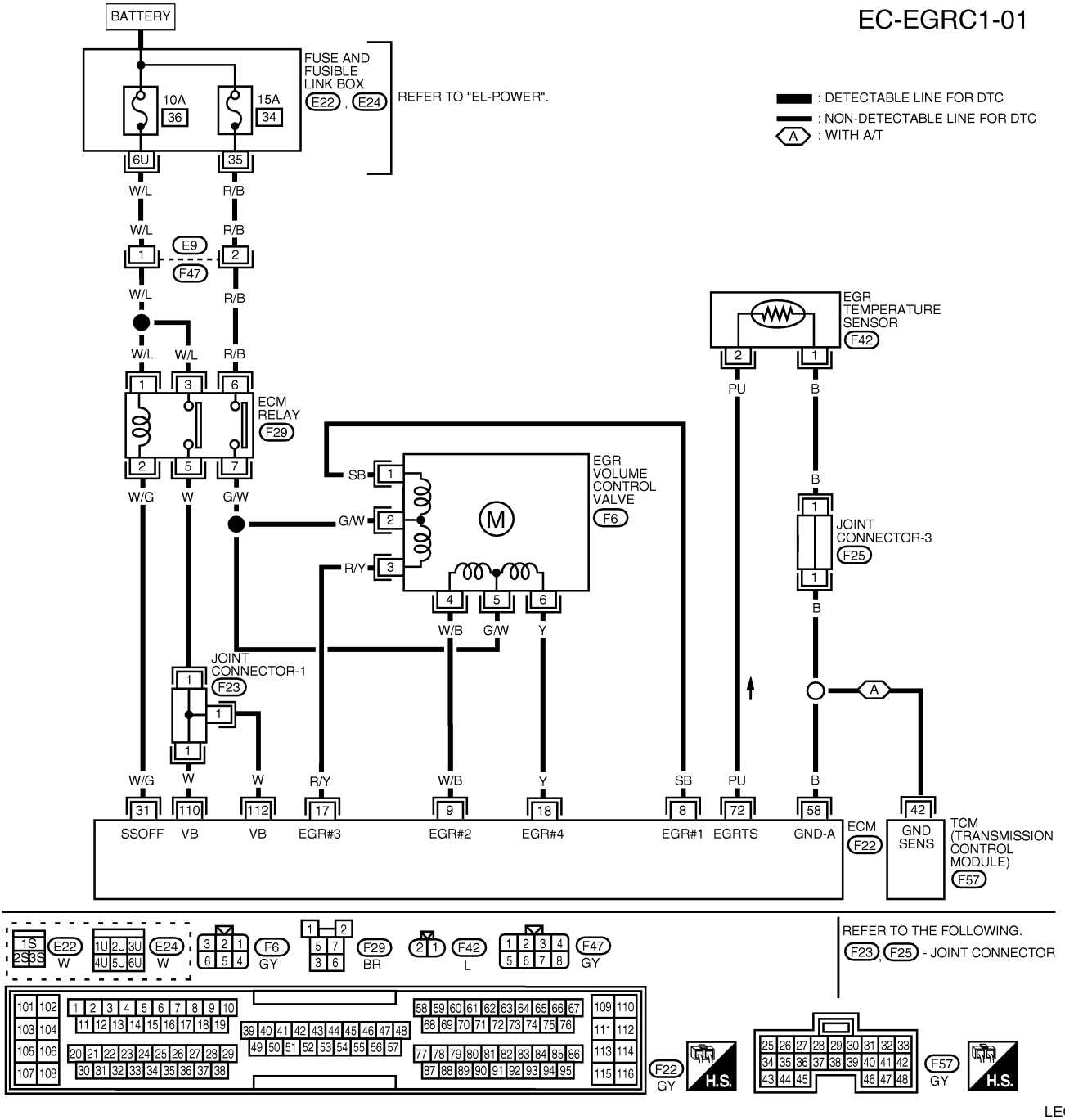
NIEC1070S02

1) Turn ignition switch "ON" and select "MODE 1" with GST.
2) Check that engine coolant temperature is within the range of −10 to 50°C (14 to 122°F).
3) Check that voltage between ECM terminal 72 (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-1842.

- **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

NIEC1071



LEC218

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)
8	SB	EGR VOLUME CONTROL VALVE	ENGINE RUNNING AT IDLE SPEED	0.1 - 14V
9	W/B			
17	R/Y			
18	Y			

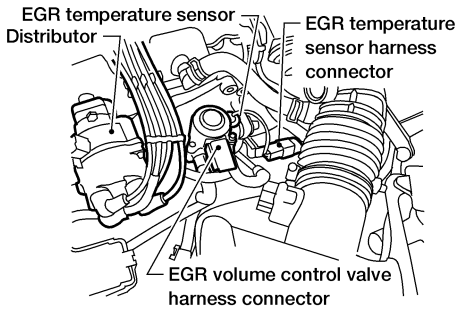
SEF575Y

Diagnostic Procedure

NIEC1072

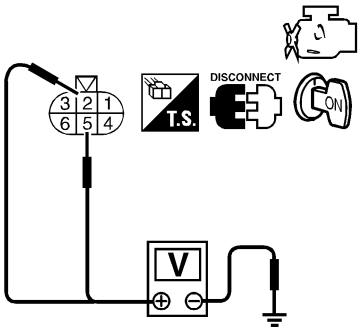
1 CHECK EGR VOLUME CONTROL VALVE POWER SUPPLY CIRCUIT

1. Disconnect EGR volume control valve harness connector.



LEC285

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 2.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

2 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”, EC-1841.

ECM terminal	EGR volume control valve
8	1
9	4
17	3
18	6

MTBL0389

Continuity should exist.

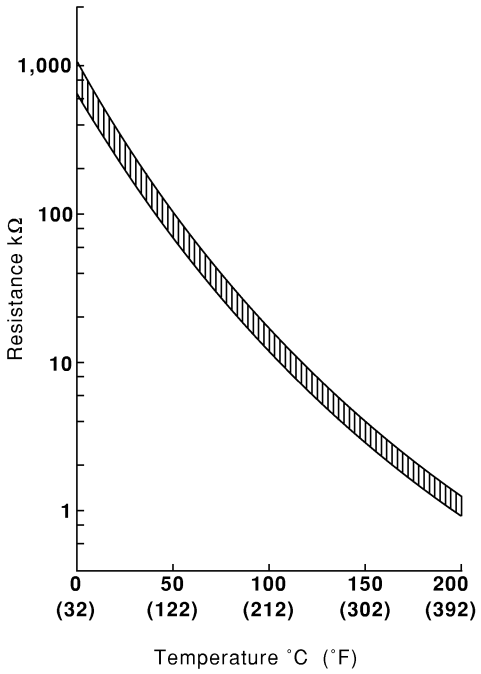
4. Also check harness for short to ground and short to power.

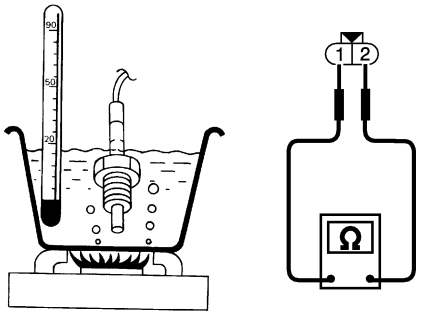
OK or NG

OK	▶	GO TO 3.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

3	CHECK 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)	4.56	0.62 - 1.05
50 (122)	2.25	0.065 - 0.094
100 (212)	0.59	0.011 - 0.015

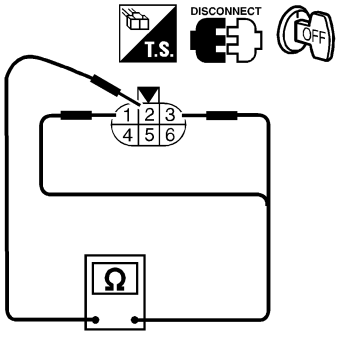
SEF483Y

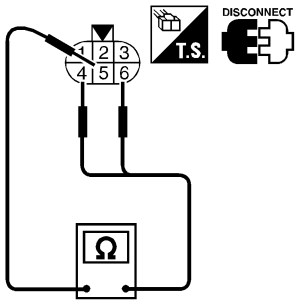
OK or NG

OK	▶	GO TO 4.
NG	▶	Replace EGR temperature sensor.

4	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 5.
OK (Without CONSULT-II)	▶	GO TO 6.
NG	▶	Replace EGR volume control valve.

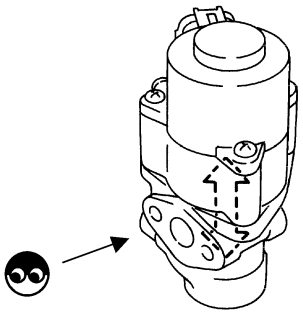
Diagnostic Procedure (Cont'd)

5	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

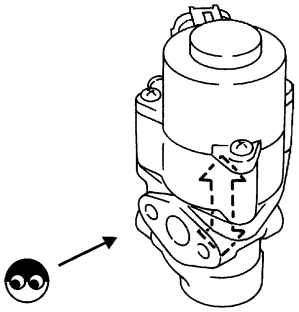
OK or NG

OK	▶	GO TO 7.
NG	▶	Replace EGR volume control valve.

6	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 7.
NG	▶	Replace EGR volume control valve.

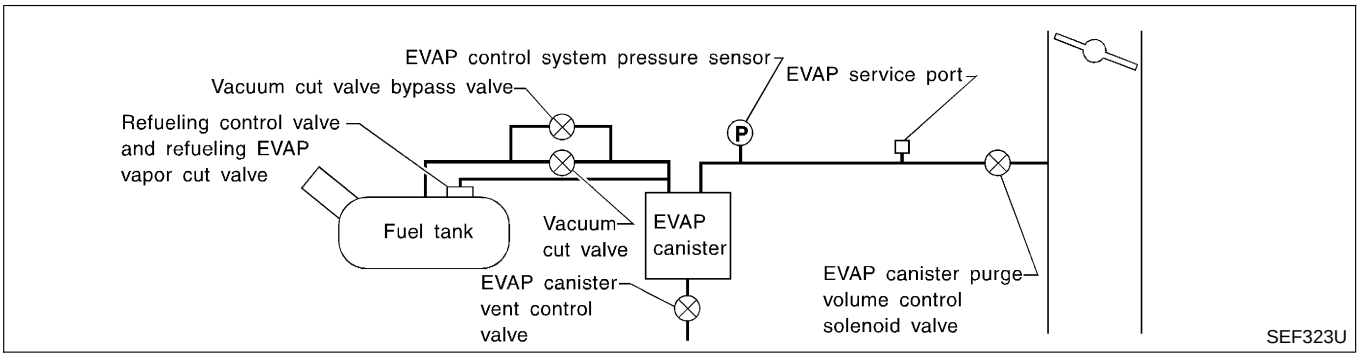
7	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1508.	
▶	**INSPECTION END**

On Board Diagnosis Logic

NIEC1073

NOTE:
If DTC P1440 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-1879.)

This diagnosis detects leaks in the EVAP purge line using vapor pressure in the fuel tank.
The EVAP canister vent control valve is closed to shut the EVAP purge line. The vacuum cut valve bypass valve will then be opened to clear the line between the fuel tank and the EVAP canister purge 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

NIEC1074

- 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

NIEC1075

Refer to "P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)", EC-1711.

Diagnostic Procedure

NIEC1076

Refer to "P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)", EC-1712.

Description

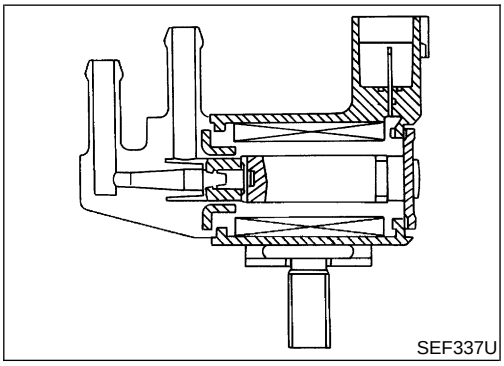
NIEC1077

SYSTEM DESCRIPTION

NIEC1077S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE)	Engine speed	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		
Throttle position switch	Closed throttle position		
Heated oxygen sensor 1 (front)	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 bypass 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

NIEC1077S02

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

NIEC1078

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

NIEC1079

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

NIEC1080

- 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

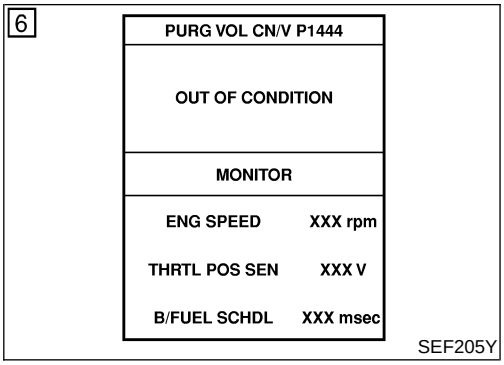
NIEC1081

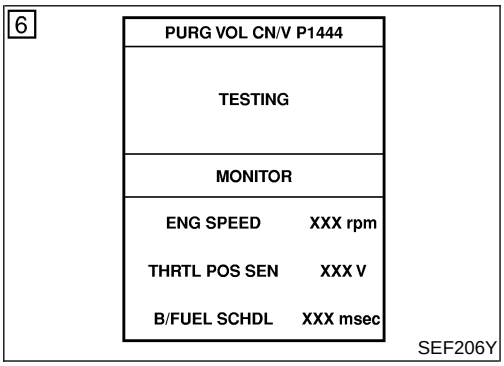
NOTE:

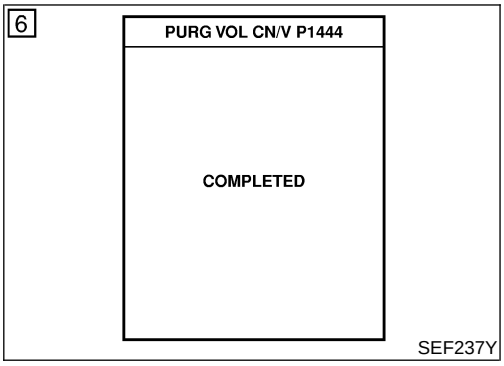
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Always perform test at a temperature of 5°C (41°F) or more.







WITH CONSULT-II

NIEC1081S01

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-1851.

WITH GST

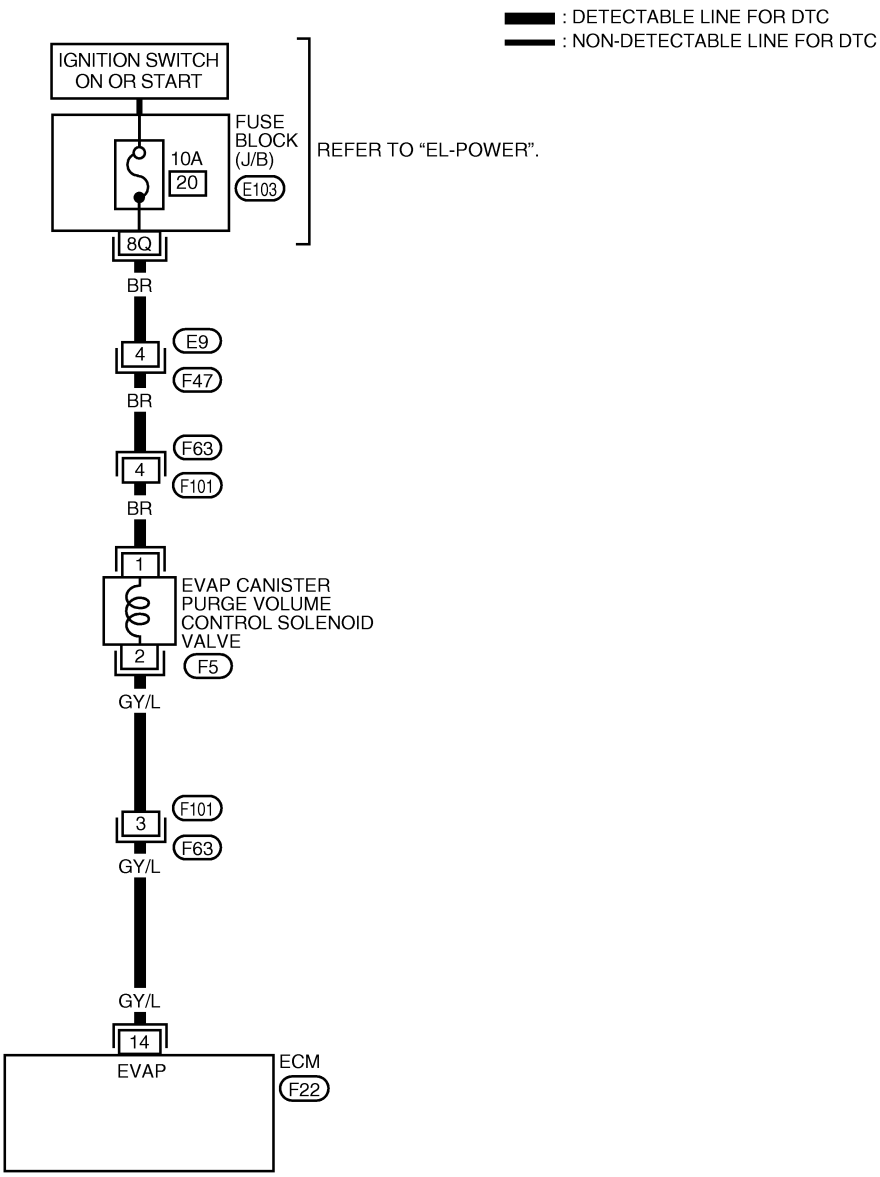
NIEC1081S02

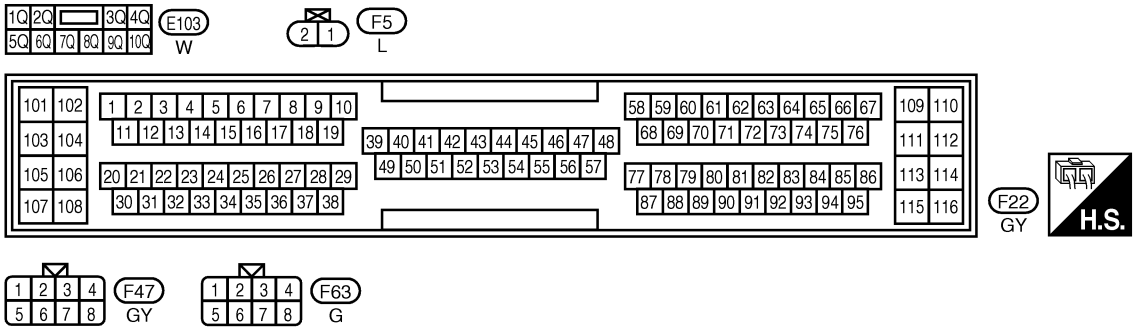
1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 10 seconds.
3) Start engine and let it idle for at least 20 seconds.
4) Select "MODE 7" with GST.
5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1851.

Wiring Diagram

NIEC1082

EC-PGC/V-01





LEC210

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)
14	GY/L	EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE	ENGINE RUNNING AT IDLE SPEED	BATTERY VOLTAGE (V) 40 20 0 50 ms
			ENGINE RUNNING AT 2,000 RPM (MORE THAN 100 SECONDS AFTER STARTING ENGINE)	BATTERY VOLTAGE (V) 40 20 0 50 ms

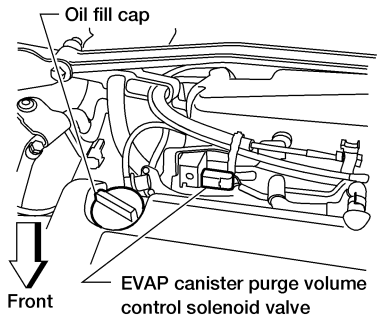
SEF576Y

Diagnostic Procedure

NIEC1083

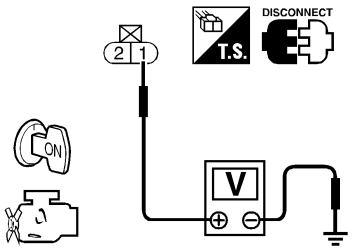
1 CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.



LEC273

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

SEF948X

OK or NG

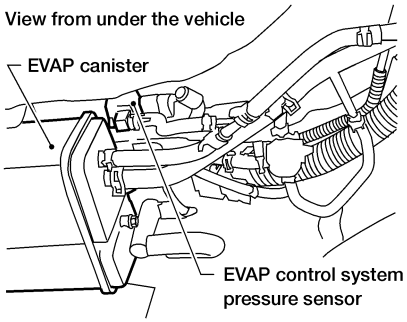
OK	▶	GO TO 3.
NG	▶	GO TO 2.

Diagnostic Procedure (Cont'd)

2	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E9, F47 ● Harness connectors F63, F101 ● Fuse block (J/B) connector E103 ● 10A 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 14 and EVAP canister purge volume control solenoid valve terminal 2. Refer to "Wiring Diagram", EC-1850. **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.

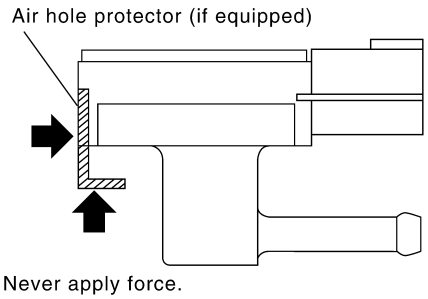
4	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors F101, F63 ● Harness for open or short between EVAP canister purge volume control solenoid valve and ECM	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE
Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.  LEC294 **OK or NG**	
OK ▶	GO TO 6.
NG ▶	Repair hose connection.

6	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 7.
NG ▶	Replace EVAP control system pressure sensor.

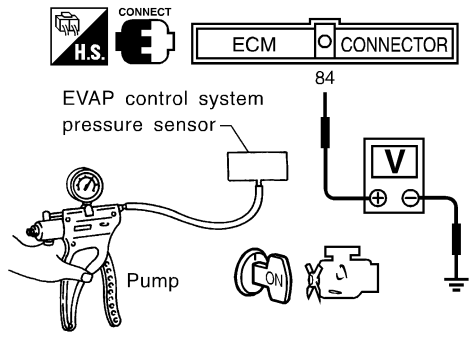
7	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

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 any 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 8.
OK (Without CONSULT-II)	▶	GO TO 9.
NG	▶	Replace EVAP control system pressure sensor.

Diagnostic Procedure (Cont'd)

8	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	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
HO2S1 MNTR (B1)	LEAN
THRTL POS SEN	XXX V

SEF801Y

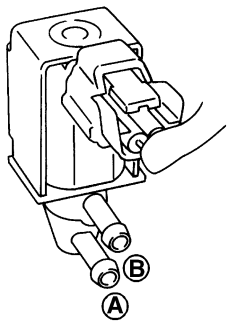
OK or NG

OK	▶	GO TO 10.
NG	▶	GO TO 9.

9	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.

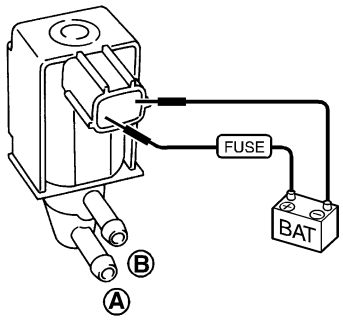


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

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

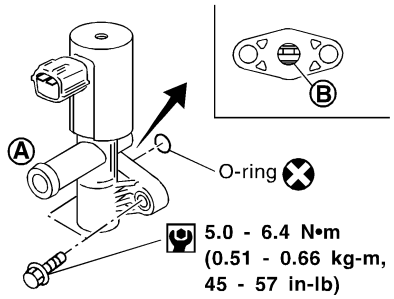
SEF335X

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

10	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 11.
NG ▶	Clean the rubber tube using an air blower.

11	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.	



SEF337XA

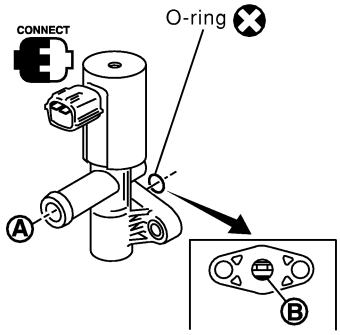
OK or NG	
OK ▶	GO TO 12.
NG ▶	Replace EVAP canister vent control valve.

Diagnostic Procedure (Cont'd)

12	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
A/F ALPHA-B1	XXX %
HO2S1 (B1)	XXX V
THRTL POS SEN	XXX V

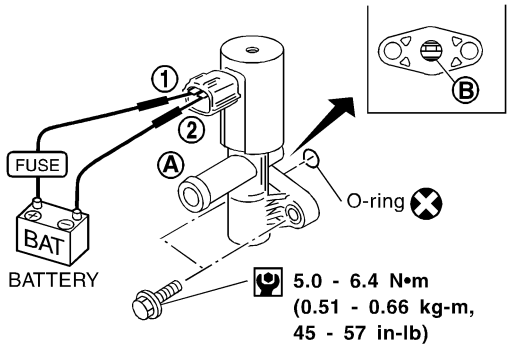
Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

SEF803Y

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.

SEF339XA

Make sure new O-ring is installed properly.

OK or NG

OK	▶	GO TO 14.
NG	▶	GO TO 13.

13	CHECK EVAP CANISTER VENT CONTROL VALVE-III

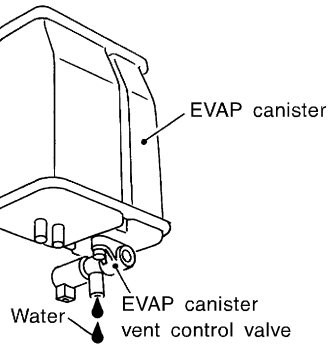
1. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
2. Perform procedure 10 again.

OK or NG

OK	▶	GO TO 14.
NG	▶	Replace EVAP canister vent control valve.

14	CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Check if water will drain from the EVAP canister.



SEF596U

Yes or No

Yes	▶	GO TO 15.
No	▶	GO TO 18.

15	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 17.
NG	▶	GO TO 16.

16	DETECT MALFUNCTIONING PART

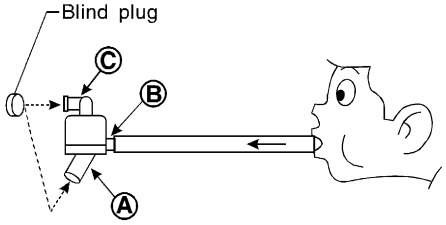
Check the following.
- EVAP canister for damage
- EVAP hose between EVAP canister and water separator for clogging or poor connection

	▶	Repair hose or replace EVAP canister.

Diagnostic Procedure (Cont'd)

17	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.

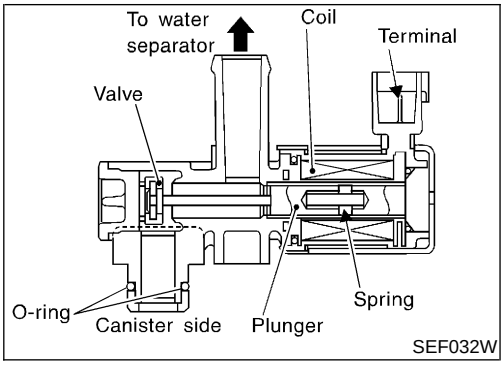
NOTE:

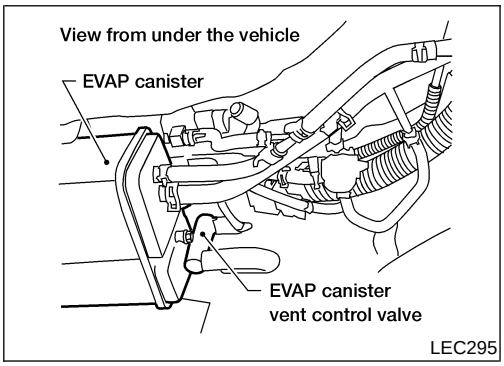
- Do not disassemble water separator.

OK or NG

OK	▶	GO TO 18.
NG	▶	Clean or replace water separator.

18	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1508.	
▶	**INSPECTION END**





Component Description

NIEC1084

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

NIEC1085

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	• Ignition switch: ON	OFF

On Board Diagnosis Logic

NIEC1086

Malfunction is detected when EVAP canister vent control valve remains closed under specified driving conditions.

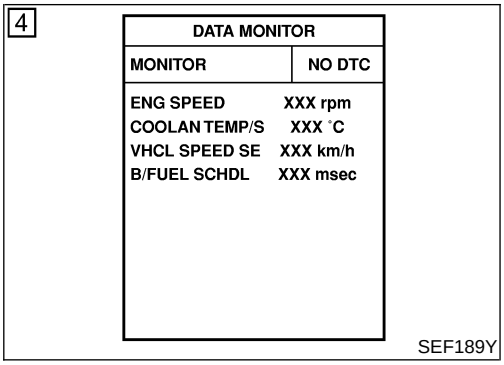
Possible Cause

NIEC1087

- 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

4

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h
B/FUEL SCHDL	XXX msec


SEF189Y

DTC Confirmation Procedure

NIEC1088

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

NIEC1088S01

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-1862.

WITH GST

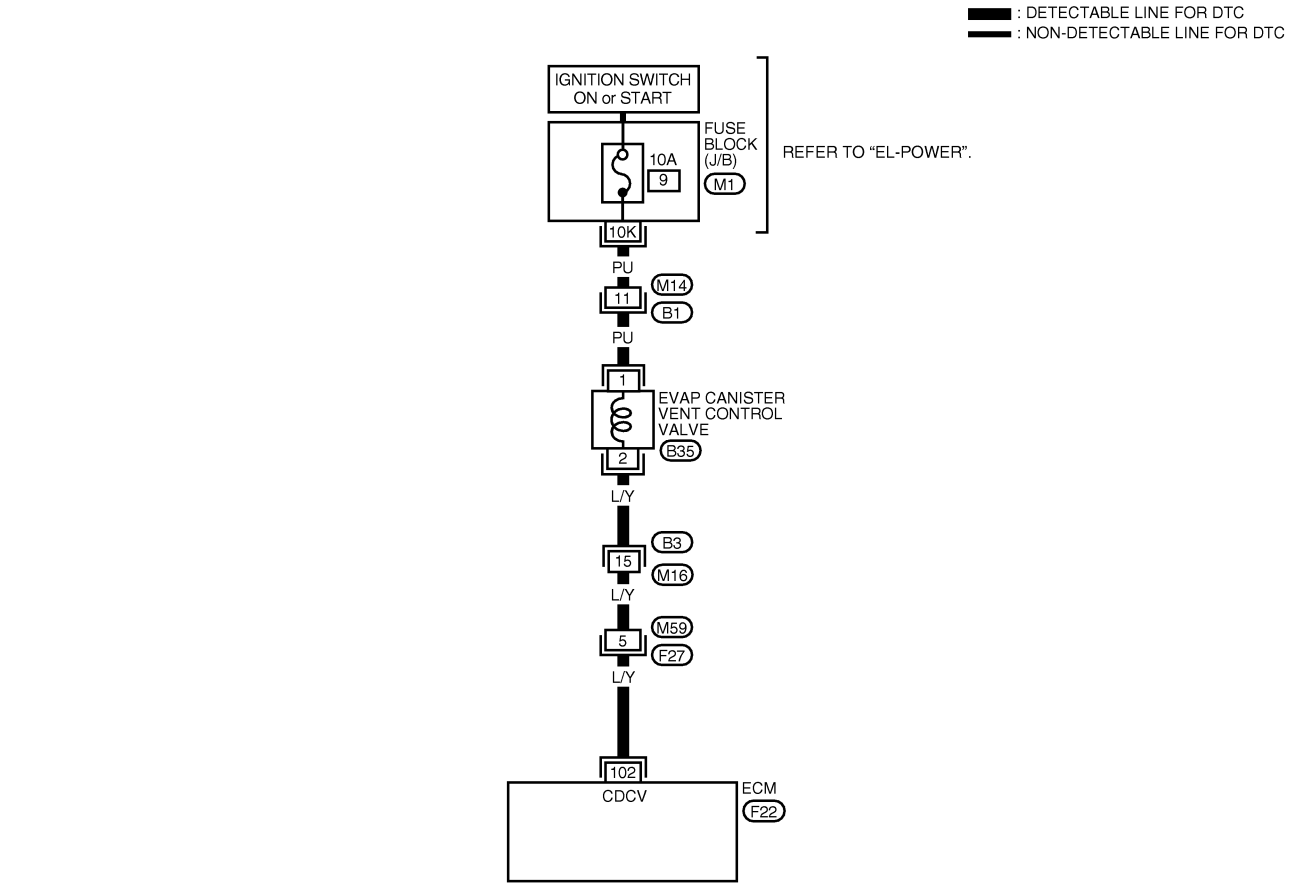
NIEC1088S02

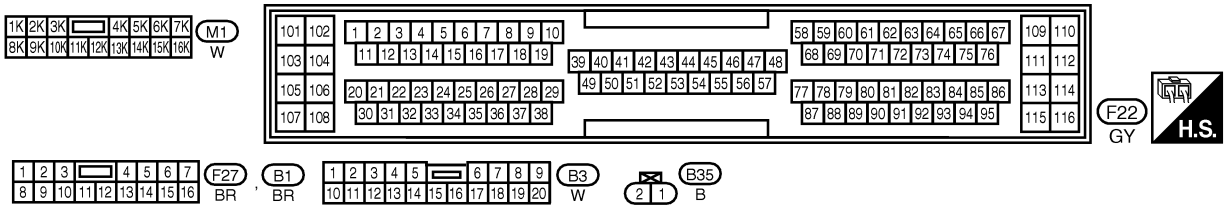
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

NIEC1089

EC-VENT/V-01





LEC202

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)
102	L/Y	EVAP CANISTER VENT CONTROL VALVE	IGN ON	BATTERY VOLTAGE

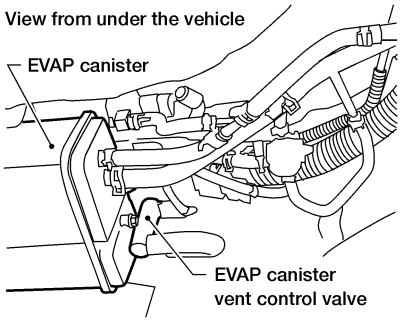
SEF577Y

Diagnostic Procedure

NIEC1090

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.



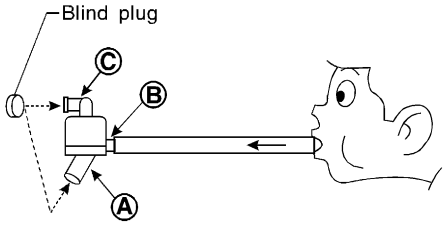
LEC295

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.



* A : Bottom hole (To atmosphere)
B : Emergency tube (From EVAP canister)
C : Inlet port (To member)

SEF829T

5. In case of NG in items 2 - 4, replace the parts.

NOTE:

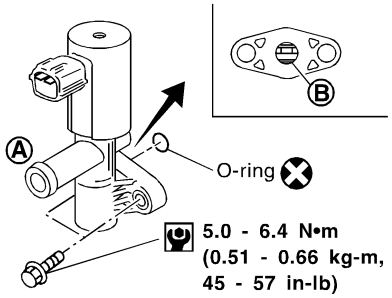
- Do not disassemble water separator.

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.



SEF337XA

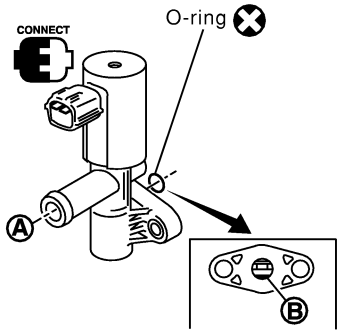
OK or NG

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
A/F ALPHA-B1	XXX %
HO2S1 (B1)	XXX V
THRTL POS SEN	XXX V

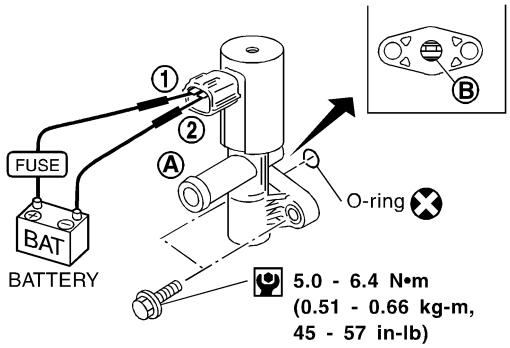
Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

SEF803Y

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.

SEF339XA

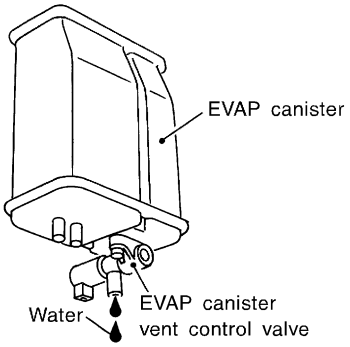
Make sure new O-ring is installed properly.

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.

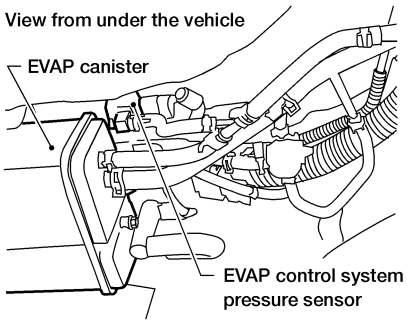
7	CHECK EVAP CANISTER	
Weigh the EVAP canister with the EVAP canister vent control valve attached. **The weight should be less than 1.8 kg (4.0 lb).**		
OK or NG		
OK	▶	GO TO 9.
NG	▶	GO TO 8.

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 hose connection.

10	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.



LEC294

2. Check connectors for water.
Water should not exist.

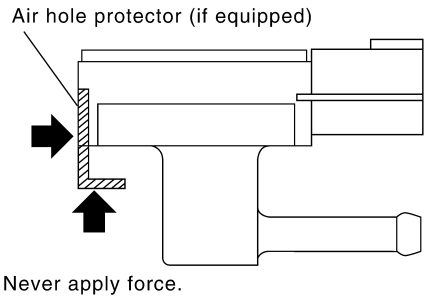
OK or NG

OK	▶	GO TO 11.
NG	▶	Replace EVAP control system pressure sensor.

Diagnostic Procedure (Cont'd)

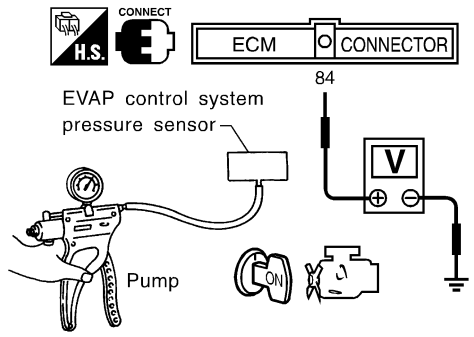
11	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

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 any 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

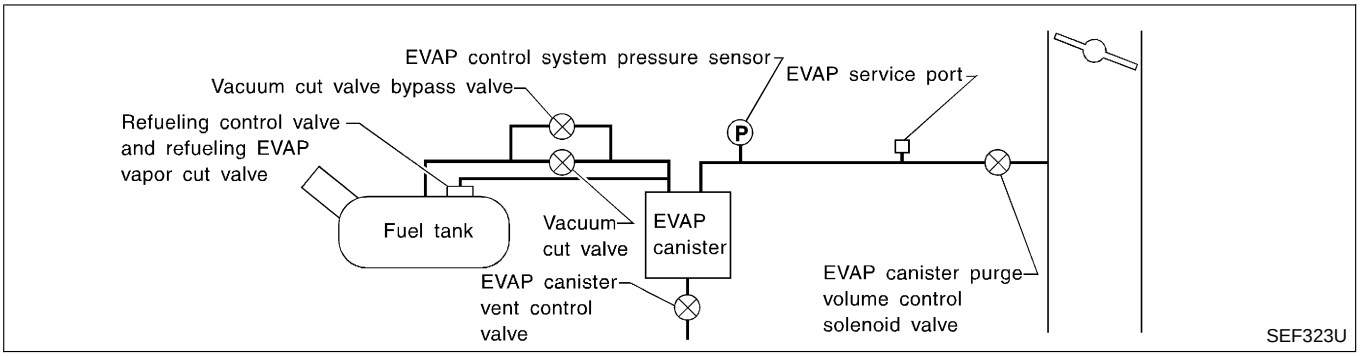
OK	▶	GO TO 12.
NG	▶	Replace EVAP control system pressure sensor.

12	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1508.	
▶	**INSPECTION END**

System Description

NIEC1091

NOTE:
If DTC P1447 is displayed with P0510, perform trouble diagnosis for DTC P0510 first. (See EC-1785.)



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

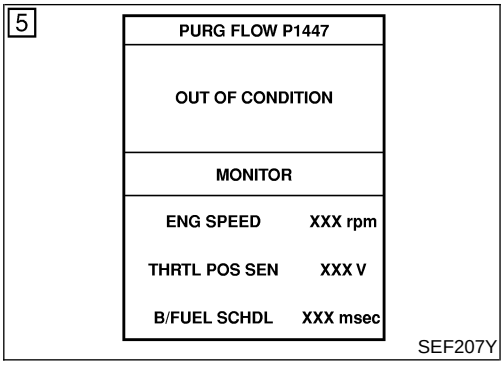
NIEC1092

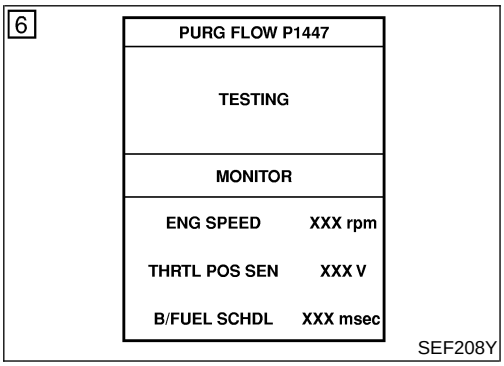
Under normal conditions (non-closed throttle), sensor output voltage indicates if pressure drop and purge flow are adequate. If not, a fault is determined.
Malfunction is detected when EVAP control system does not operate properly, EVAP control system has a leak between intake manifold and EVAP control system pressure sensor.

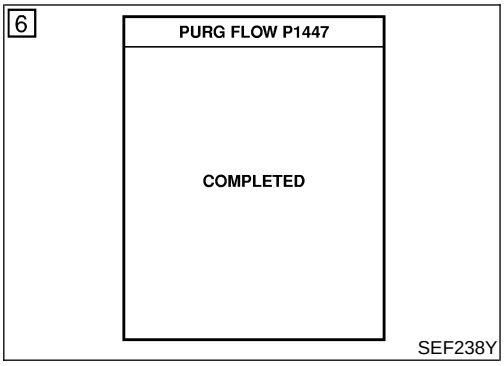
Possible Cause

NIEC1093

- 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







DTC Confirmation Procedure

NIEC1094

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

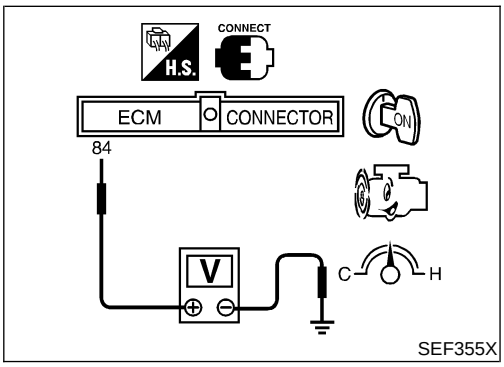
NIEC1094S01

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 - 6,300 rpm
B/FUEL SCHDL	1.0 - 8.8 msec
Engine coolant temperature	More than 70°C (158°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-1870.



Overall Function Check

NIEC1095

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

NIEC1095S01

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-1870.

Diagnostic Procedure

=NIEC1096

1	CHECK EVAP CANISTER

1. Turn ignition switch “OFF”.
2. Check EVAP canister for cracks.

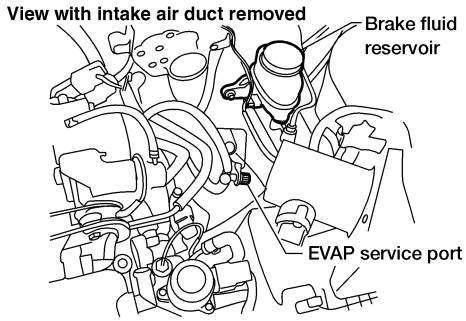
OK or NG

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.



LEC288

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
A/F ALPHA-B1	XXX %
HO2S1 MNTR (B1)	LEAN
THRTL POS SEN	XXX V

PURG VOL CONT/V	VACUUM
100.0%	Should exist
0.0%	Should not exist

SEF804Y

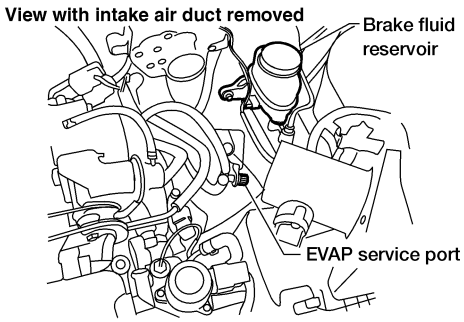
OK or NG

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.



LEC288

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-1394.

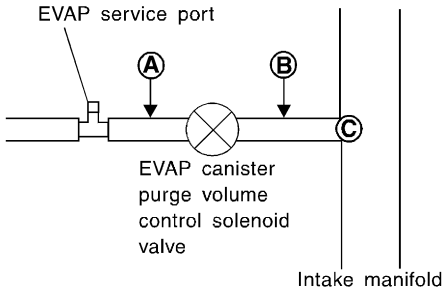
OK or NG

OK	▶	GO TO 5.
NG	▶	Repair hose connection.

Diagnostic Procedure (Cont'd)

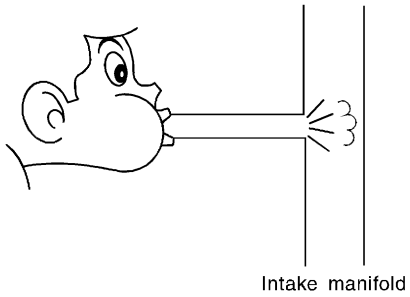
5 CHECK EVAP PURGE HOSE AND PURGE PORT

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 (With CONSULT-II)	▶	GO TO 6.
OK (Without CONSULT-II)	▶	GO TO 7.
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	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
HO2S1 MNTR (B1)	LEAN
THRTL POS SEN	XXX V

SEF801Y

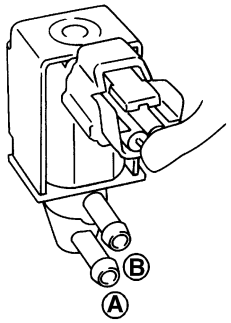
OK or NG

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.

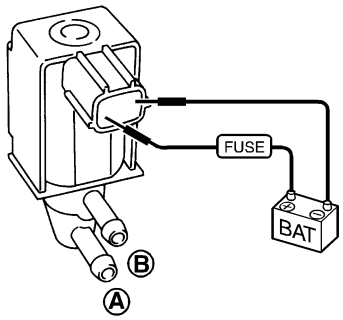


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

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.

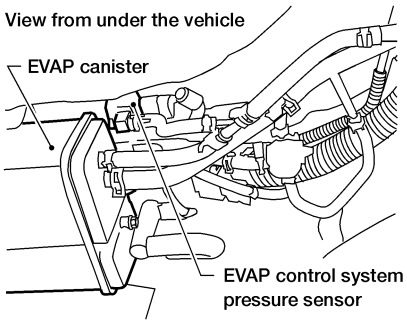
OK or NG

OK	▶	GO TO 9.
NG	▶	Repair hose connection.

Diagnostic Procedure (Cont'd)

9	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.



LEC294

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-1739.

OK or NG

OK	▶	GO TO 11.
NG	▶	Replace EVAP control system pressure sensor.

11	CHECK RUBBER TUBE FOR CLOGGING

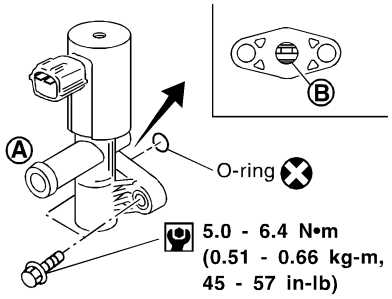
1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

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.



SEF337XA

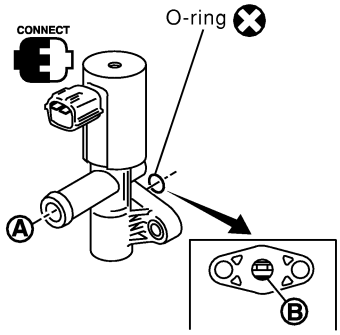
OK or NG

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
A/F ALPHA-B1	XXX %
HO2S1 (B1)	XXX V
THRTL POS SEN	XXX V

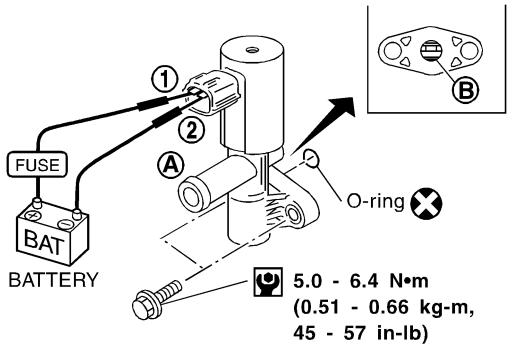
Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

SEF803Y

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.

SEF339XA

Make sure new O-ring is installed properly.

OK or NG

OK (With CONSULT-II)	▶	GO TO 15.
OK (Without CONSULT-II)	▶	GO TO 16.
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

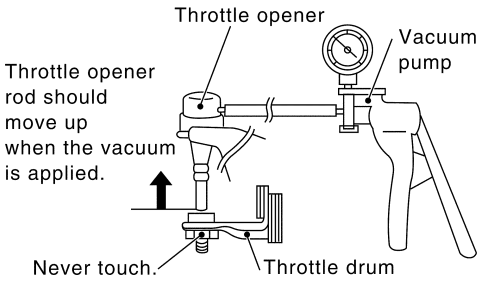
OK (With CONSULT-II)	▶	GO TO 15.
OK (Without CONSULT-II)	▶	GO TO 16.
NG	▶	Replace EVAP canister vent control valve.

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

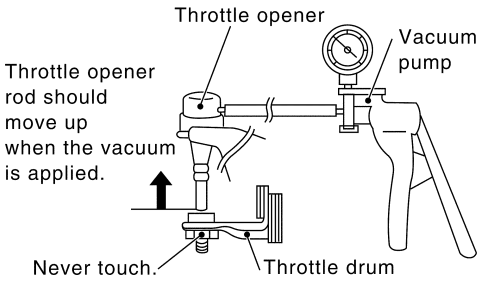
OK or NG

OK	▶	GO TO 18.
NG	▶	GO TO 17.

16 CHECK THROTTLE POSITION SWITCH

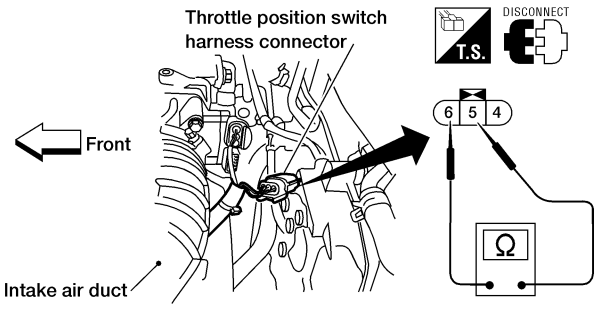
Without CONSULT-II

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. Disconnect closed throttle position switch harness connector.
8. Check continuity between closed throttle position switch terminals 5 and 6 under the following conditions. Resistance measurement must be made with throttle position switch installed in vehicle.



Throttle valve condition	Continuity
Completely closed	Yes
Partially open	No
Completely open	No

LEC337

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-1470.

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	M/T: 800±50 A/T: 800±50 rpm (in "P" or "N" position)

MTBL0450

Is it possible to adjust closed throttle position switch?

Yes or No

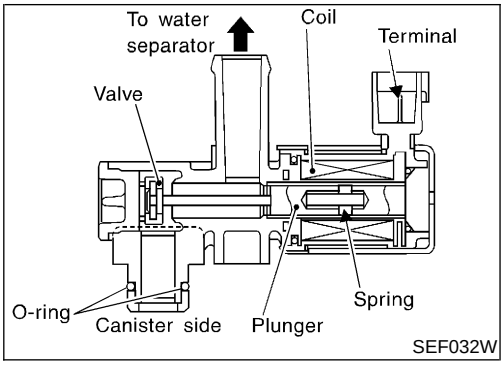
Yes	▶	GO TO 18.
No	▶	Replace throttle position switch.

Diagnostic Procedure (Cont'd)

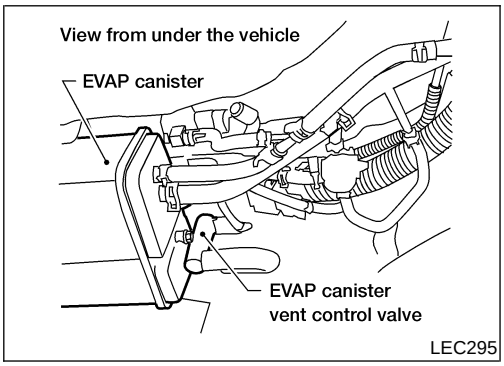
18	CHECK EVAP PURGE LINE	
Inspect EVAP purge line (pipe and rubber tube). Check for evidence of leaks. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-1394.		
OK or NG		
OK	▶	GO TO 19.
NG	▶	Replace it.

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-1508.		
	▶	**INSPECTION END**



SEF032W



LEC295

Component Description

NIEC1097

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

NIEC1098

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	• Ignition switch: ON	OFF

On Board Diagnosis Logic

NIEC1099

Malfunction is detected when EVAP canister vent control valve remains opened under specified driving conditions.

Possible Cause

NIEC1100

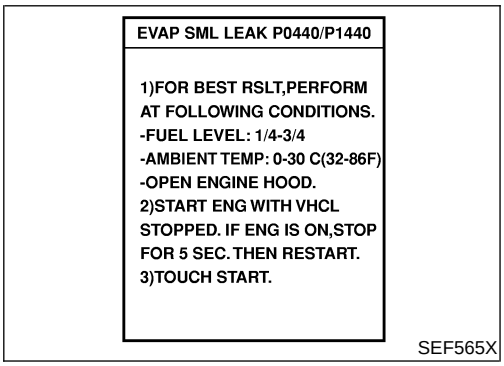
- EVAP canister vent control valve
- EVAP control system pressure sensor and circuit
- Blocked rubber tube to EVAP canister vent control valve
- Water separator
- EVAP canister is saturated with water
- Vacuum cut valve

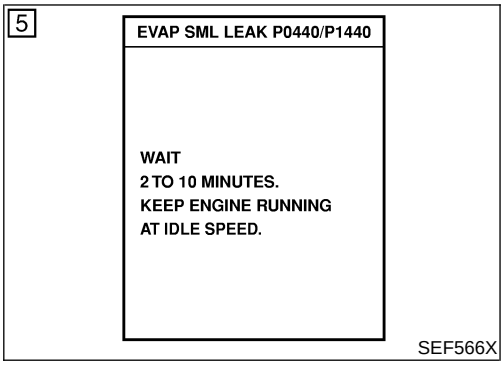
DTC Confirmation Procedure

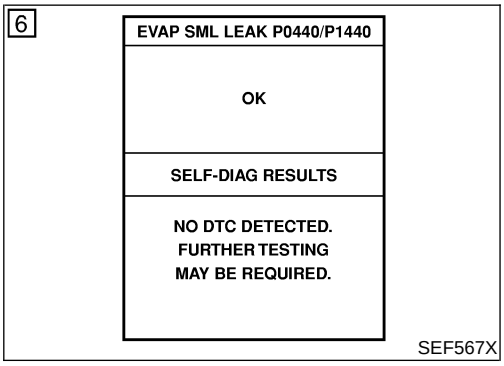
NIEC1101

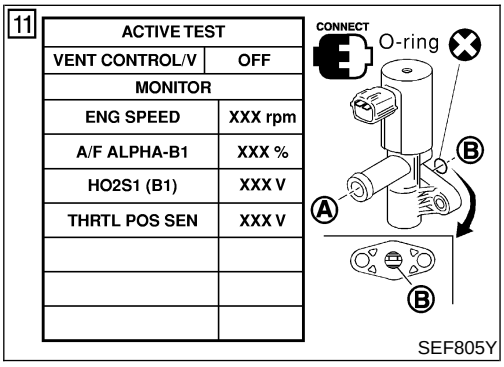
NOTE:

- **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

NIEC1101S01

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)

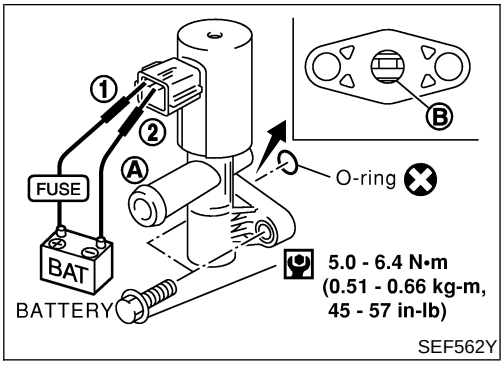
5) Select "EVAP SML LEAK P0440/P1440" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
   Follow the instruction displayed.
   If the engine speed cannot be maintained within the range displayed on the CONSULT-II screen, go to "Basic Inspection", EC-1470.
6) Make sure that "OK" is 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-1883.
If the result is OK, go to "Diagnostic Procedure" for DTC P0440, EC-1712.



Overall Function Check

NIEC1102

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

NIEC1102S01

1) Disconnect hose from water separator.
2) Disconnect EVAP canister vent control valve harness connector.
3) Verify the following.

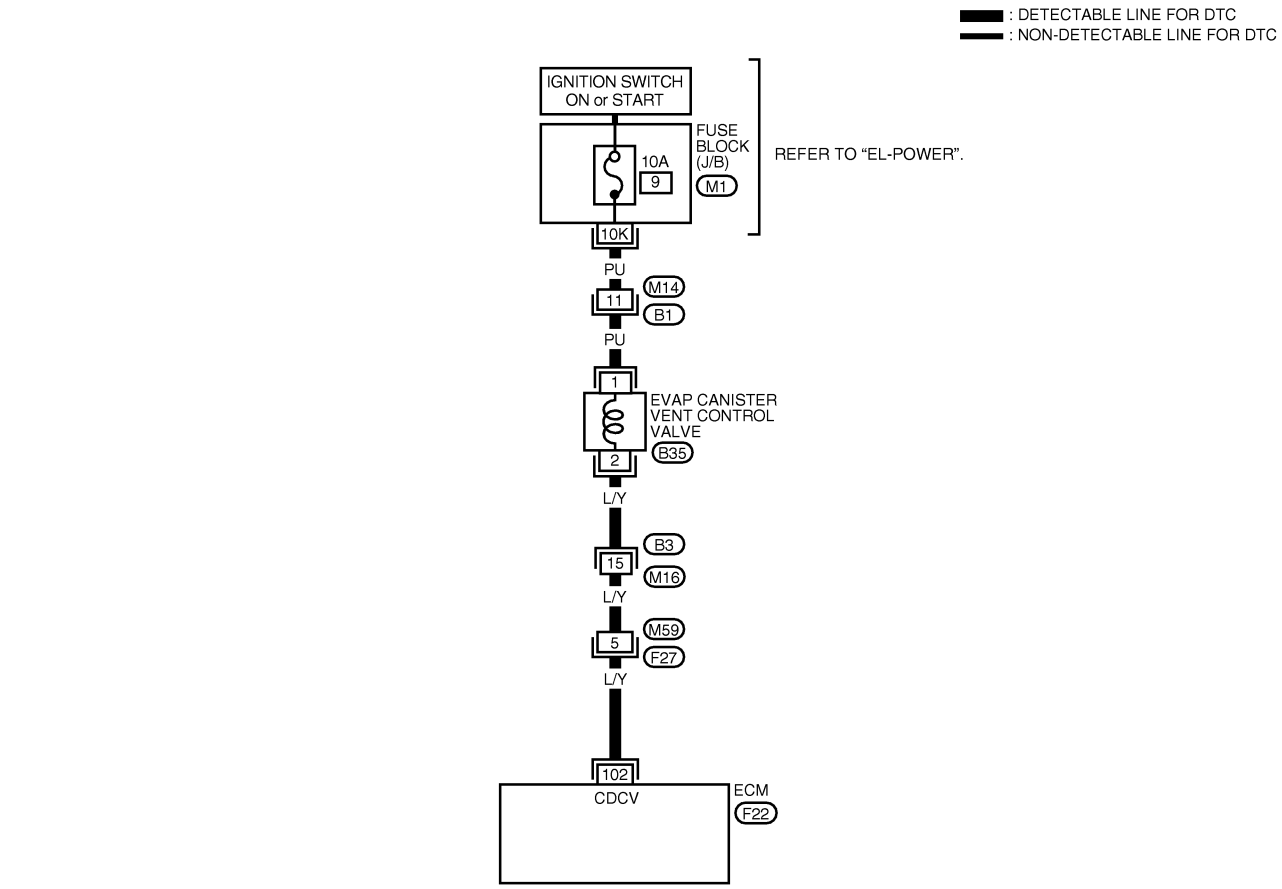
Condition	Air passage continuity
12V direct current supply between terminals 1 and 2	No
No supply	Yes

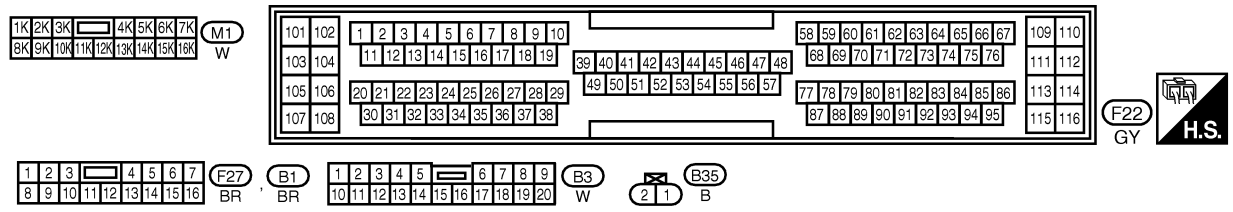
If the result is NG, go to “Diagnostic Procedure”, EC-1883.
If the result is OK, go to “Diagnostic Procedure” for DTC P0440, EC-1712.

Wiring Diagram

NIEC1103

EC-VENT/V-01





LEC202

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)
102	L/Y	EVAP CANISTER VENT CONTROL VALVE	IGN ON	BATTERY VOLTAGE

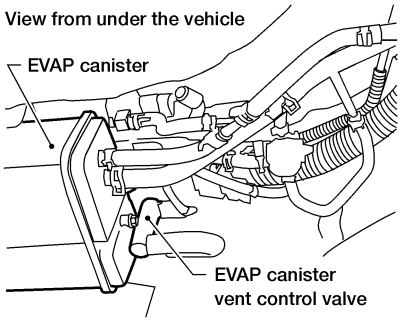
SEF577Y

Diagnostic Procedure

NIEC1104

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.



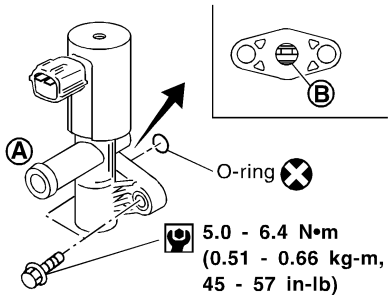
LEC295

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.



SEF337XA

OK or NG

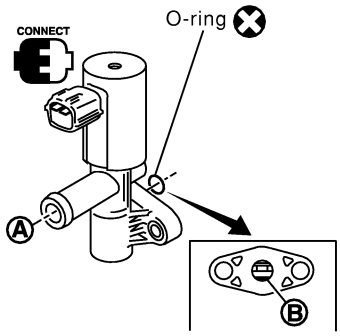
OK	▶	GO TO 3.
NG	▶	Replace EVAP canister vent control valve.

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
A/F ALPHA-B1	XXX %
HO2S1 (B1)	XXX V
THRTL POS SEN	XXX V

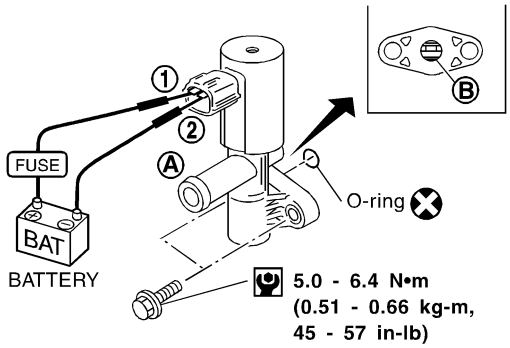
Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

SEF803Y

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.

SEF339XA

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

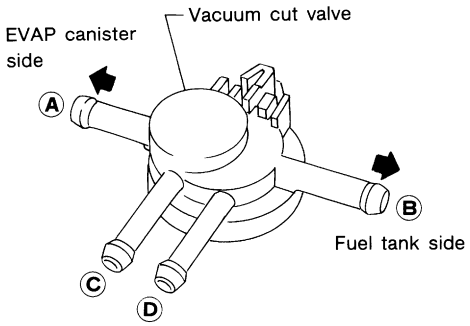
1. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
2. Perform Test No. 3 again.

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

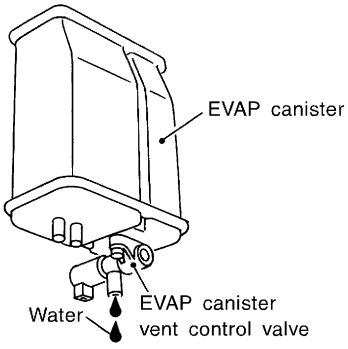
a. Plug port **C** and **D** with fingers.
b. Apply vacuum to port **A** and check that there is no suction from port **B**.
c. Apply vacuum to port **B** and check that there is suction from port **A**.
d. Blow air in port **B** and check that there is a resistance to flow out of port **A**.
e. Open 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).

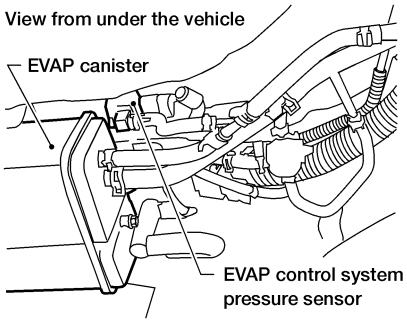
OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 8.

Diagnostic Procedure (Cont'd)

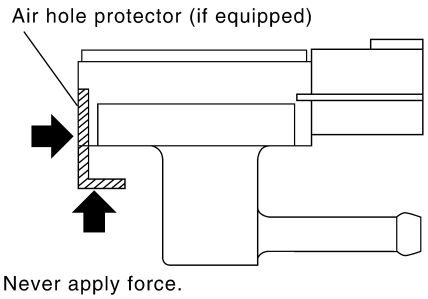
8	DETECT MALFUNCTIONING PART
Check the following. ● EVAP canister for damage ● EVAP hose between EVAP canister and water separator for clogging or poor connection	
▶	Repair hose or replace EVAP canister.

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 hose connection.

10	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR	
1. Disconnect EVAP control system pressure sensor harness connector.		
 LEC294		
2. Check connectors for water. **Water should not exist.**		
OK or NG		
OK	▶	GO TO 11.
NG	▶	Replace EVAP control system pressure sensor.

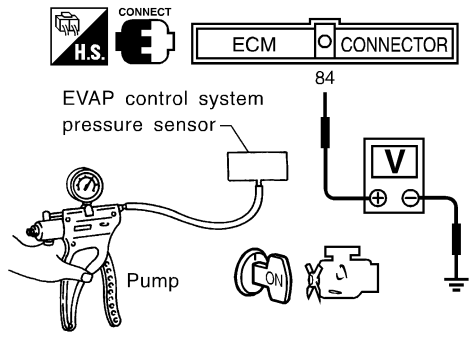
11	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

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 any 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.**

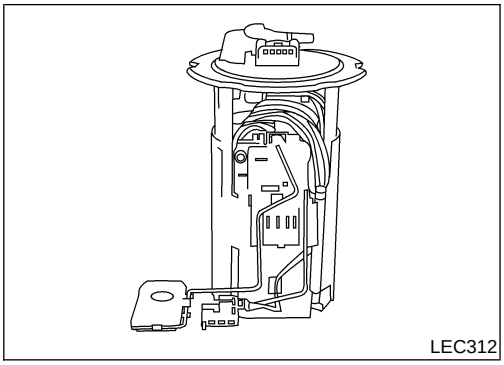
OK or NG

OK	▶	GO TO 12.
NG	▶	Replace EVAP control system pressure sensor.

12	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1508.

▶ **INSPECTION END**


LEC312

Component Description

NIEC1105

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

NIEC1106

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

NIEC1107

- Fuel level sensor circuit
  (The fuel level sensor circuit is open or shorted.)

DTC Confirmation Procedure

NIEC1108

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.

DATA MONITOR	
MONITOR	NO DTC
FUEL T/TMP SE	XXX °C
FUEL LEVEL SE	XXX V

SEF195Y

WITH CONSULT-II

NIEC1108S01

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-1890.

WITH GST

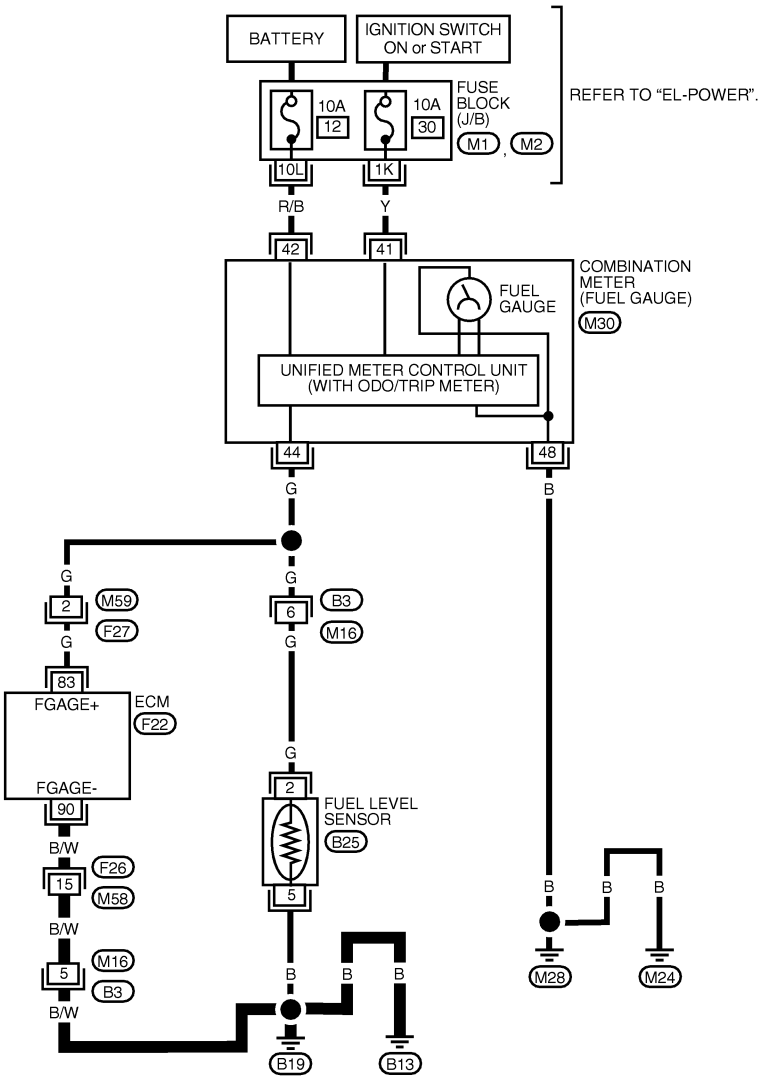
NIEC1108S02

Follow the procedure “WITH CONSULT-II” above.

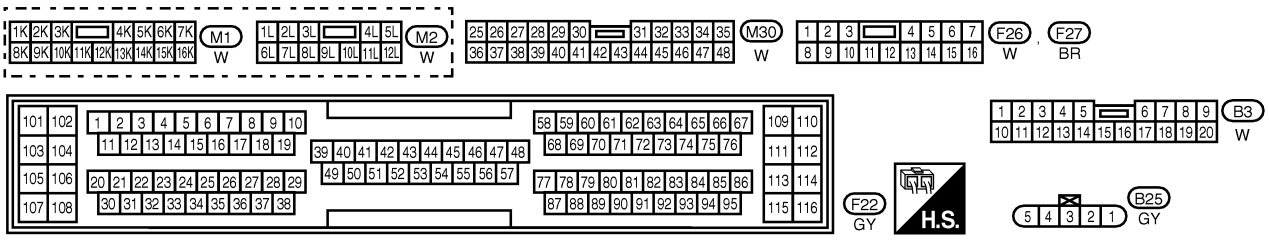
Wiring Diagram

NIEC1109

EC-FLS3-01



: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC



LEC374

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)
83	G	FUEL LEVEL SENSOR	IGN ON	APPROX. 0 - 4.8V
90	B/W	FUEL LEVEL SENSOR GROUND	ENGINE RUNNING AT IDLE SPEED	APPROX. 0V

SEF579Y

Diagnostic Procedure

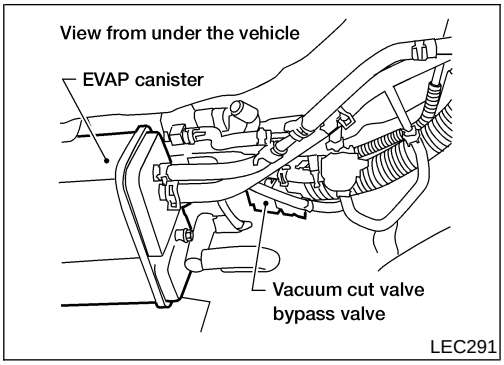
=NIEC1110

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 90 and body ground. Refer to “Wiring Diagram”, EC-1889. **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 F26, M58 ● Harness connectors M16, B3 ● 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-103***, “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-1508	
OK or NG	
▶	**INSPECTION END**



Description

=NIEC1111

COMPONENT DESCRIPTION

NIEC1111S01

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.

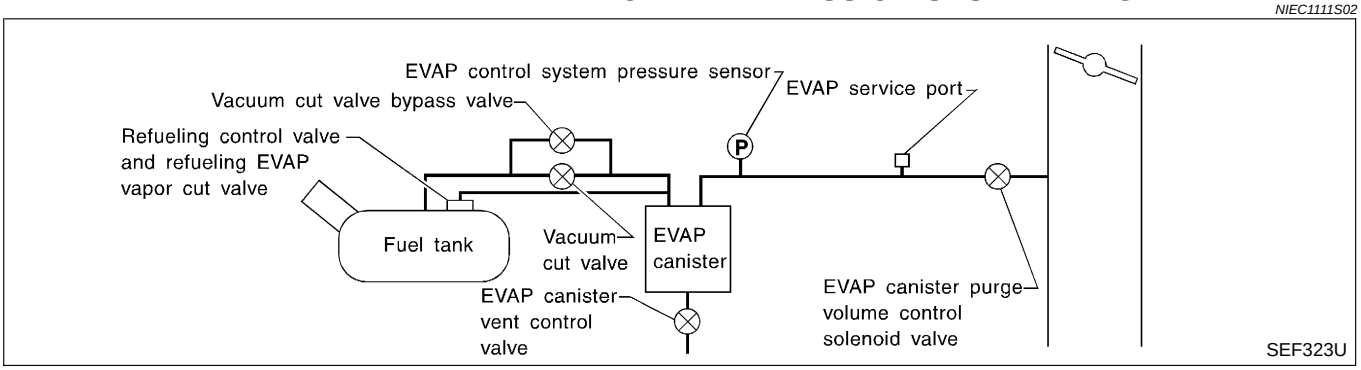
The vacuum cut valve prevents the intake manifold vacuum from being applied to the fuel tank.

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

NIEC1111S02



CONSULT-II Reference Value in Data Monitor Mode

NIEC1112

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VC/V BYPASS/V	• Ignition switch: ON	OFF

On Board Diagnosis Logic

NIEC1113

Malfunction is detected when an improper voltage signal is sent to ECM through vacuum cut valve bypass valve.

Possible Cause

NIEC1114

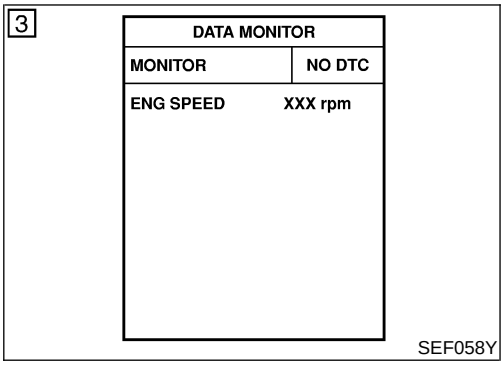
- Harness or connectors
  (The vacuum cut valve bypass valve circuit is open or shorted.)
- Vacuum cut valve bypass valve

DTC Confirmation Procedure

NIEC1115

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

NIEC1115S01

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-1894.

WITH GST

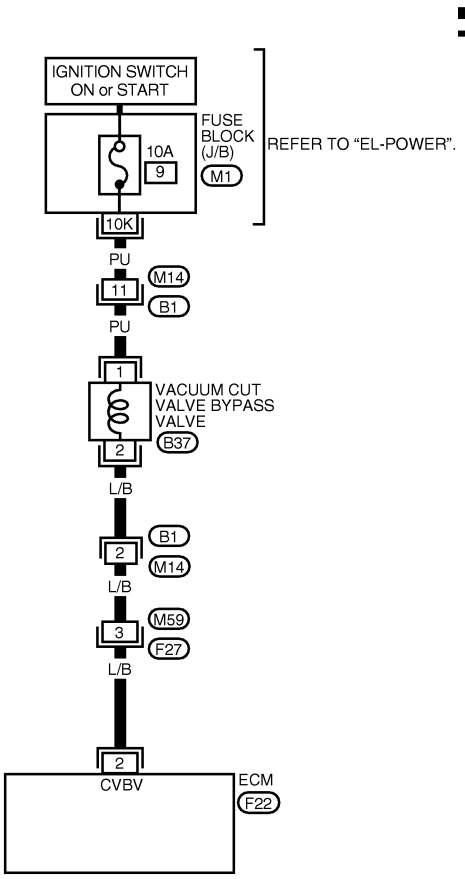
NIEC1115S02

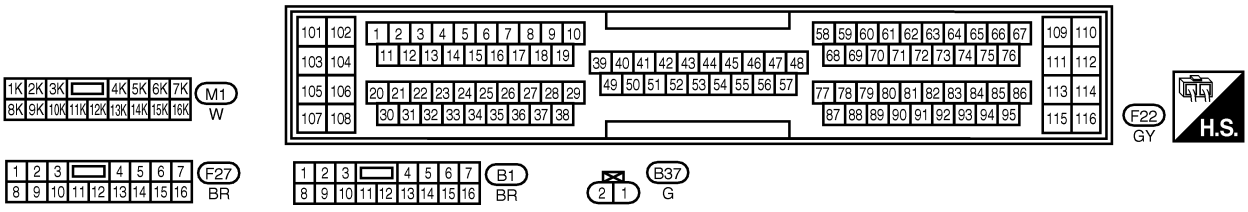
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

NIEC1116

EC-BYPS/V-01





LEC211

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	L/B	VACUUM CUT VALVE BYPASS VALVE	IGN ON	BATTERY VOLTAGE

SEF585Y

Diagnostic Procedure

NIEC1117

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
A/F ALPHA-B1	XXX %
HO2S1 MNTR (B1)	RICH
THRTL POS SEN	XXX V

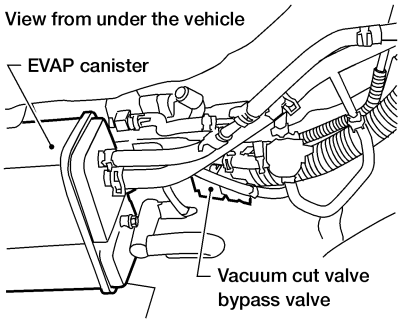
SEF806Y

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.

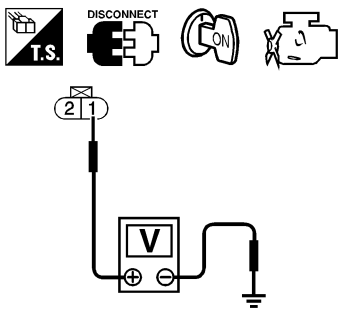
3	CHECK VACUUM CUT VALVE BYPASS VALUE POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect vacuum cut valve bypass valve harness connector.



LEC291

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 M14, B1
- Fuse block (J/B) connector M1
- 10A 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 2 and vacuum cut valve bypass valve terminal 2.
   Refer to "Wiring Diagram", EC-1893.
   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.

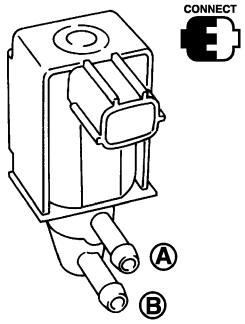
Diagnostic Procedure (Cont'd)

6	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors B1, M14 ● Harness connectors M59, F27 ● 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
A/F ALPHA-B1	XXX %
HO2S1 MNTR (B1)	RICH
THRTL POS SEN	XXX V

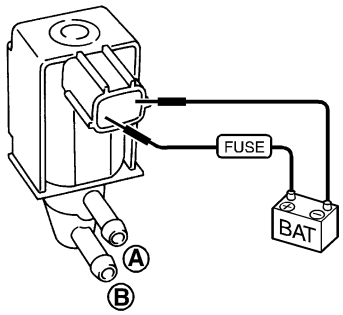
Condition VC/V BYPASS/V	Air passage continuity between A and B
ON	Yes
OFF	No

Operation takes less than 1 second.

SEF807Y

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

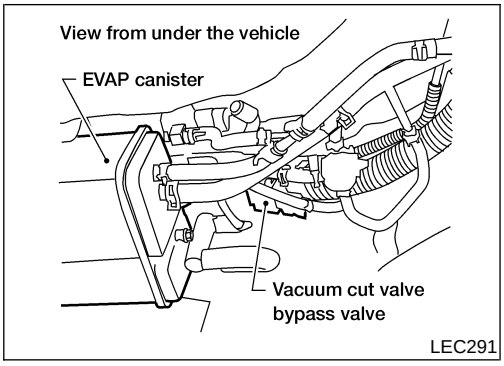
Operation takes less than 1 second.

SEF557Y

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-1508.	
▶	**INSPECTION END**



Description

NIEC1118

COMPONENT DESCRIPTION

NIEC1118S01

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.

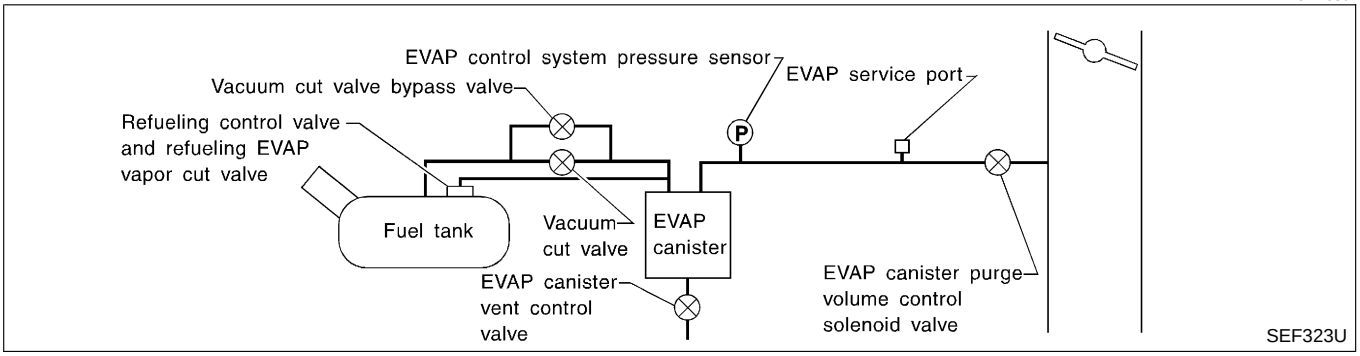
The vacuum cut valve prevents the intake manifold vacuum from being applied to the fuel tank.

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

NIEC1118S02



CONSULT-II Reference Value in Data Monitor Mode

NIEC1119

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VC/V BYPASS/V	• Ignition switch: ON	OFF

On Board Diagnosis Logic

NIEC1120

Malfunction is detected when vacuum cut valve bypass valve does not operate properly.

Possible Cause

NIEC1121

- 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

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

DTC Confirmation Procedure

NIEC1122

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

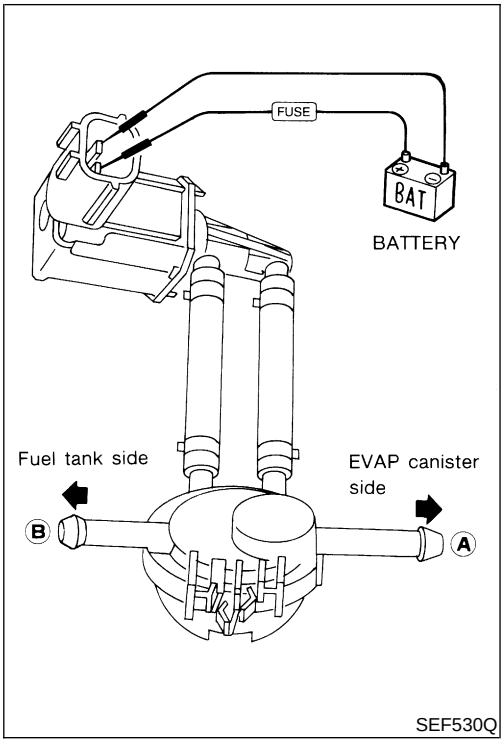
NIEC1122S01

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 - 3,500 rpm
Selector lever	Suitable position
Vehicle speed	36 - 120 km/h (22 - 75 MPH)
B/FUEL SCHDL	1 - 8.8 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-1901.



Overall Function Check

NIEC1123

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

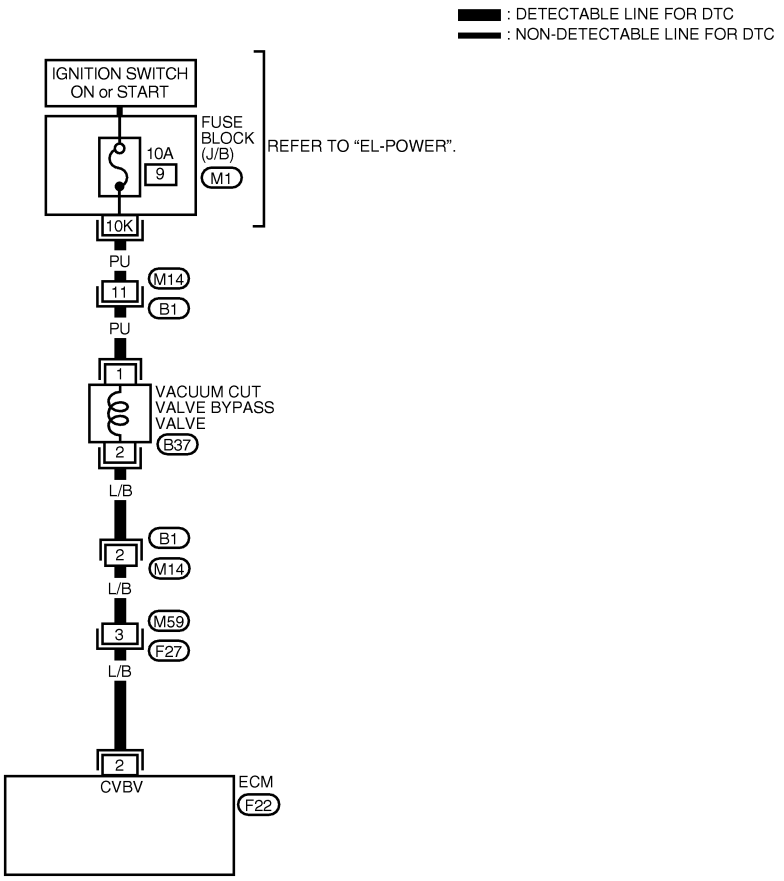
NIEC1123S01

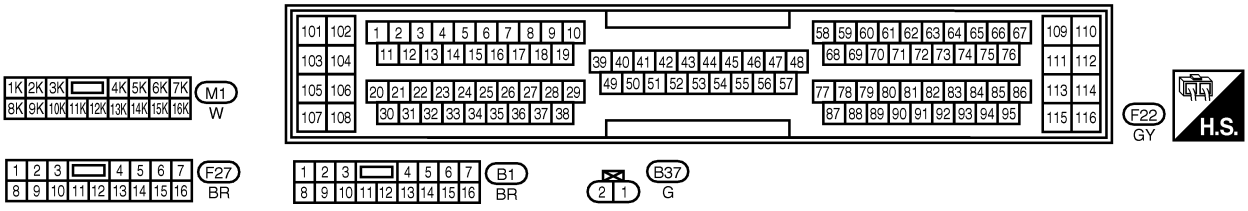
1) Remove vacuum cut valve and vacuum cut valve bypass valve as an assembly.
2) Apply vacuum to port **A** and check that there is no suction from port **B**.
3) Apply vacuum to port **B** and check that there is suction from port **A**.
4) Blow air in port **B** and check that there is a resistance 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-1901.

Wiring Diagram

NIEC1124

EC-BYPS/V-01





LEC211

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	L/B	VACUUM CUT VALVE BYPASS VALVE	IGN ON	BATTERY VOLTAGE

SEF585Y

Diagnostic Procedure

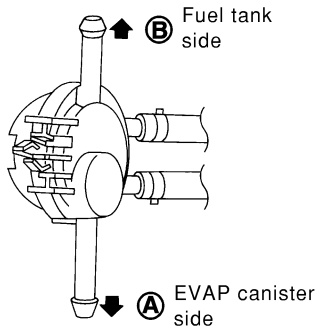
NIEC1125

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
A/F ALPHA-B1	XXX %
HO2S1 MNTR (B1)	RICH
THRTL POS SEN	XXX V

SEF808Y

OK or NG

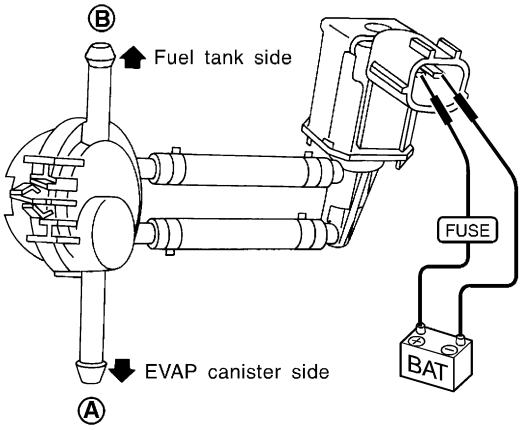
OK ▶	GO TO 4.
NG ▶	GO TO 5.

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

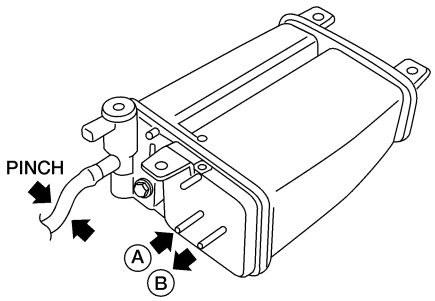
Check EVAP purge port of fuel tank for clogging.

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

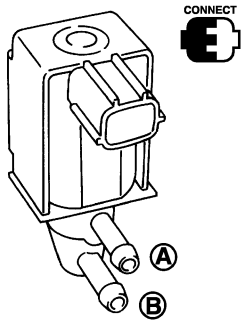
OK	▶	GO TO 8.
NG	▶	Repair or replace hoses.

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
A/F ALPHA-B1	XXX %
HO2S1 MNTR (B1)	RICH
THRTL POS SEN	XXX V

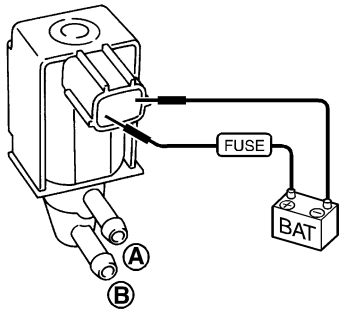
Condition VC/V BYPASS/V	Air passage continuity between A and B
ON	Yes
OFF	No

Operation takes less than 1 second.

SEF807Y

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.

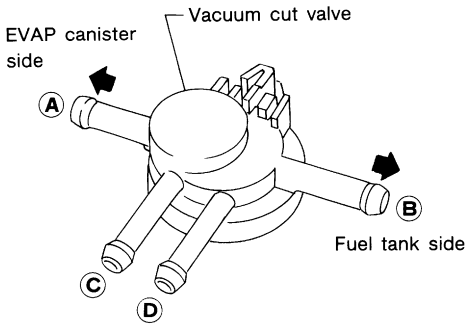
SEF557Y

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

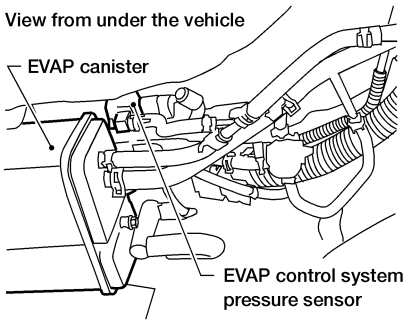
1. Turn ignition switch "OFF".
2. Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.

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.



LEC294

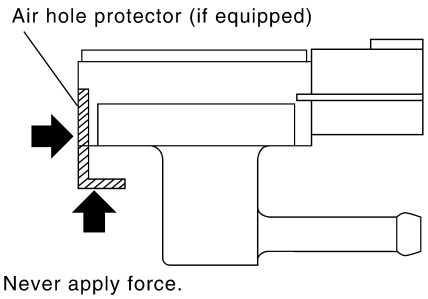
2. Check connectors for water.
   Water should not exist.

OK or NG

OK	▶	GO TO 12.
NG	▶	Replace EVAP control system pressure sensor.

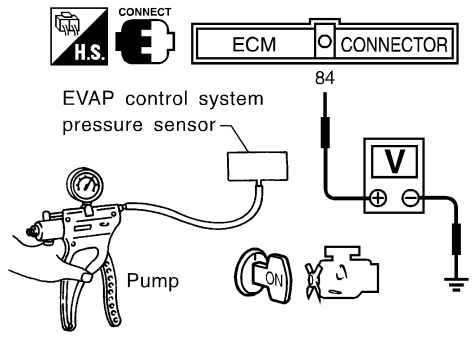
12	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

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 any 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

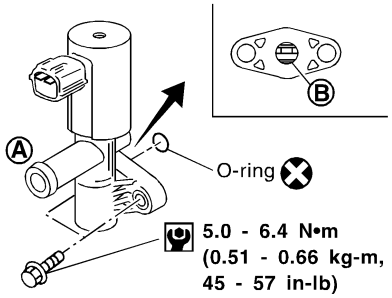
1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

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.



SEF337XA

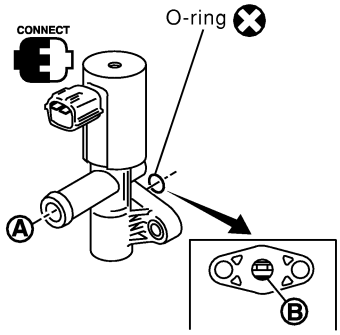
OK or NG

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
A/F ALPHA-B1	XXX %
HO2S1 (B1)	XXX V
THRTL POS SEN	XXX V

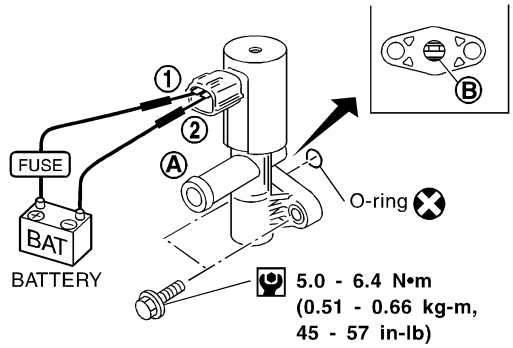
Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

SEF803Y

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.

SEF339XA

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-1508.	
▶	**INSPECTION END**

System Description

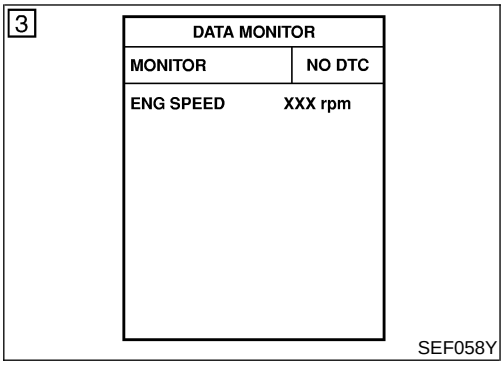
NIEC1126

The malfunction information related to A/T (Automatic Transaxle) is transferred through the line (circuit) from TCM (Transmission Control Module) to ECM. Therefore, be sure to erase the malfunction information such as DTC not only in TCM (Transmission Control Module) but also ECM after the A/T related repair.

On Board Diagnosis Logic

NIEC1127

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1605	• An incorrect signal from TCM (Transmission Control Module) is sent to ECM.	• Harness or connectors [The communication line circuit between ECM and TCM (Transmission Control Module) is open or shorted.] • Dead (Weak) battery • TCM (Transmission Control Module)



DTC Confirmation Procedure

NIEC1128

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

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
3) Start engine and let it idle for at least 40 seconds.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1911.

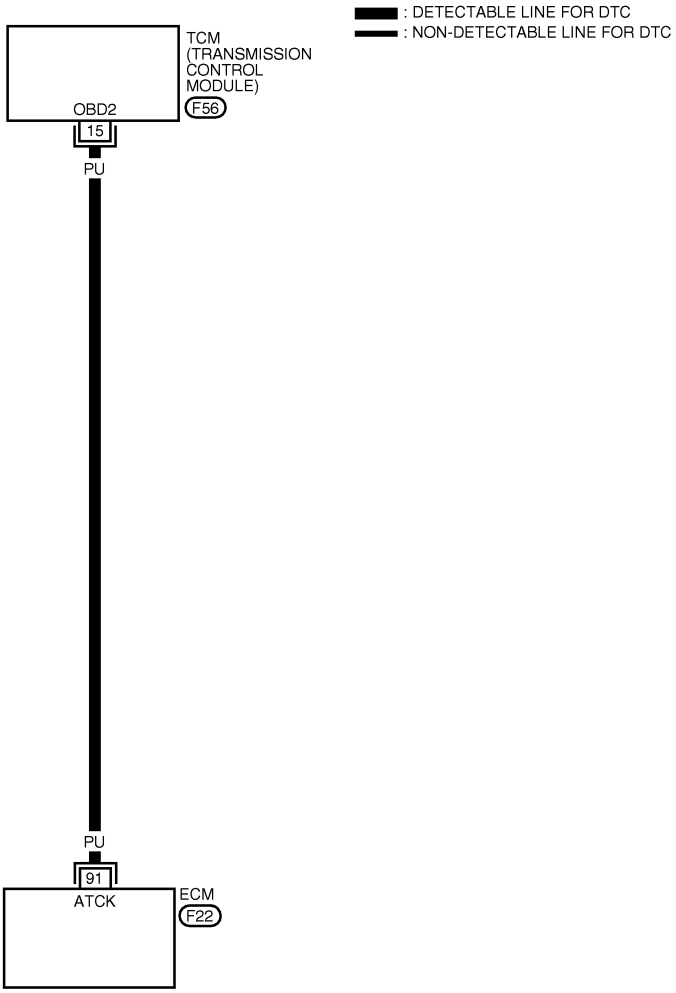
With GST

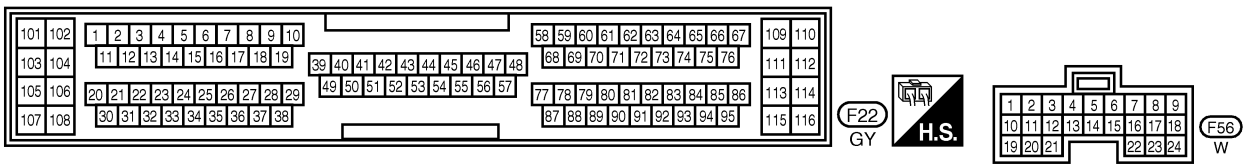
Follow the procedure "With CONSULT-II" above.

Wiring Diagram

NIEC1129

EC-ATDIAG-01





LEC209

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	PU	A/T CHECK SIGNAL	IGN ON	0 - APPROX. 5V

SEF586Y

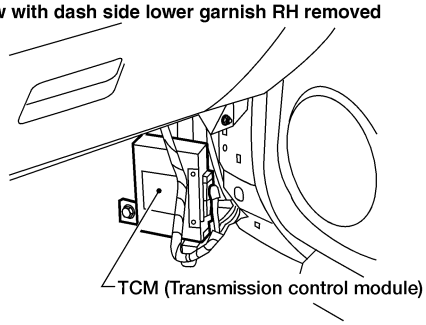
Diagnostic Procedure

NIEC1130

1	CHECK INPUT SIGNAL CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector and TCM harness connector.

View with dash side lower garnish RH removed



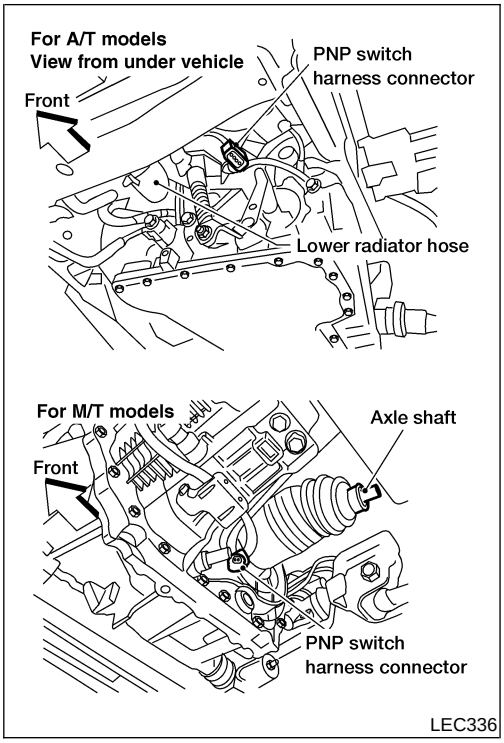
LEC306

3. Check harness continuity between ECM terminal 91 and TCM terminal 15.
   Refer to “Wiring Diagram”, EC-1910.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

2	CHECK INTERMITTENT INCIDENT
Perform “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-1508.	
▶	**INSPECTION END**



Component Description

NIEC1131

When the gear position is “P” (A/T models only) or “N”, park/neutral position (PNP) switch is “ON”.
ECM detects the park/neutral position when continuity with ground exists.

CONSULT-II Reference Value in Data Monitor Mode

NIEC1132

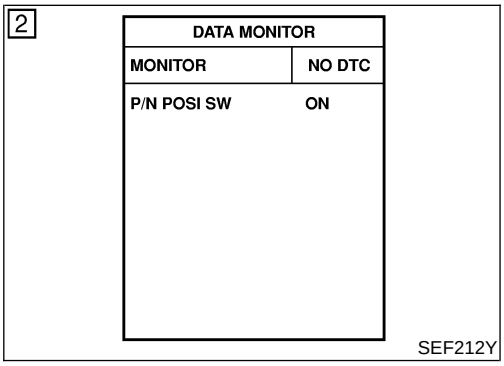
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
P/N POSI SW	• Ignition switch: ON	Shift lever: “P” or “N”	ON
		Except above	OFF

On Board Diagnosis Logic

NIEC1133

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1706	• The signal of the PNP switch is not changed in the process of engine starting and driving.	• Harness or connectors (The PNP switch circuit is open or shorted.) • PNP switch



DTC Confirmation Procedure

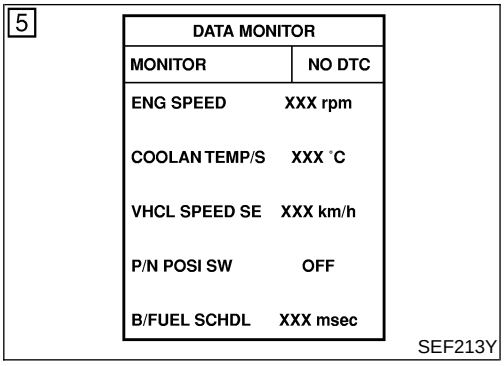
NIEC1134

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

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.

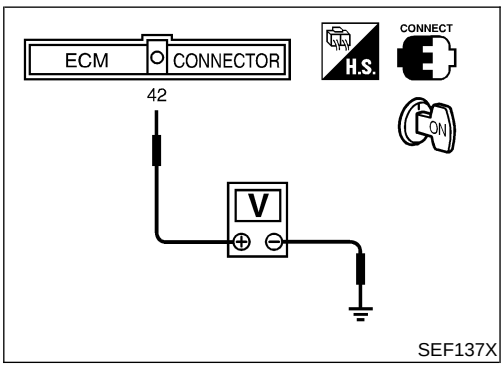
Position (Selector lever)	Known good signal
"N" and "P" (A/T only) position	ON
Except the above position	OFF

If NG, go to "Diagnostic Procedure", EC-1915.
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 50 consecutive seconds.

ENG SPEED	1,500 - 3,400 rpm
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	2.4 - 12 msec
VHCL SPEED SE	64 - 130 km/h (40 - 81 MPH)
Selector lever	Suitable position

6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1915.



Overall Function Check

NIEC1135

Use this procedure to check the overall function of the park/neutral position switch circuit. During this check, a 1st trip DTC might not be confirmed.

Without CONSULT-II

1) Turn ignition switch "ON".
2) Check voltage between ECM terminal 42 (PNP switch signal) and body ground under the following conditions.

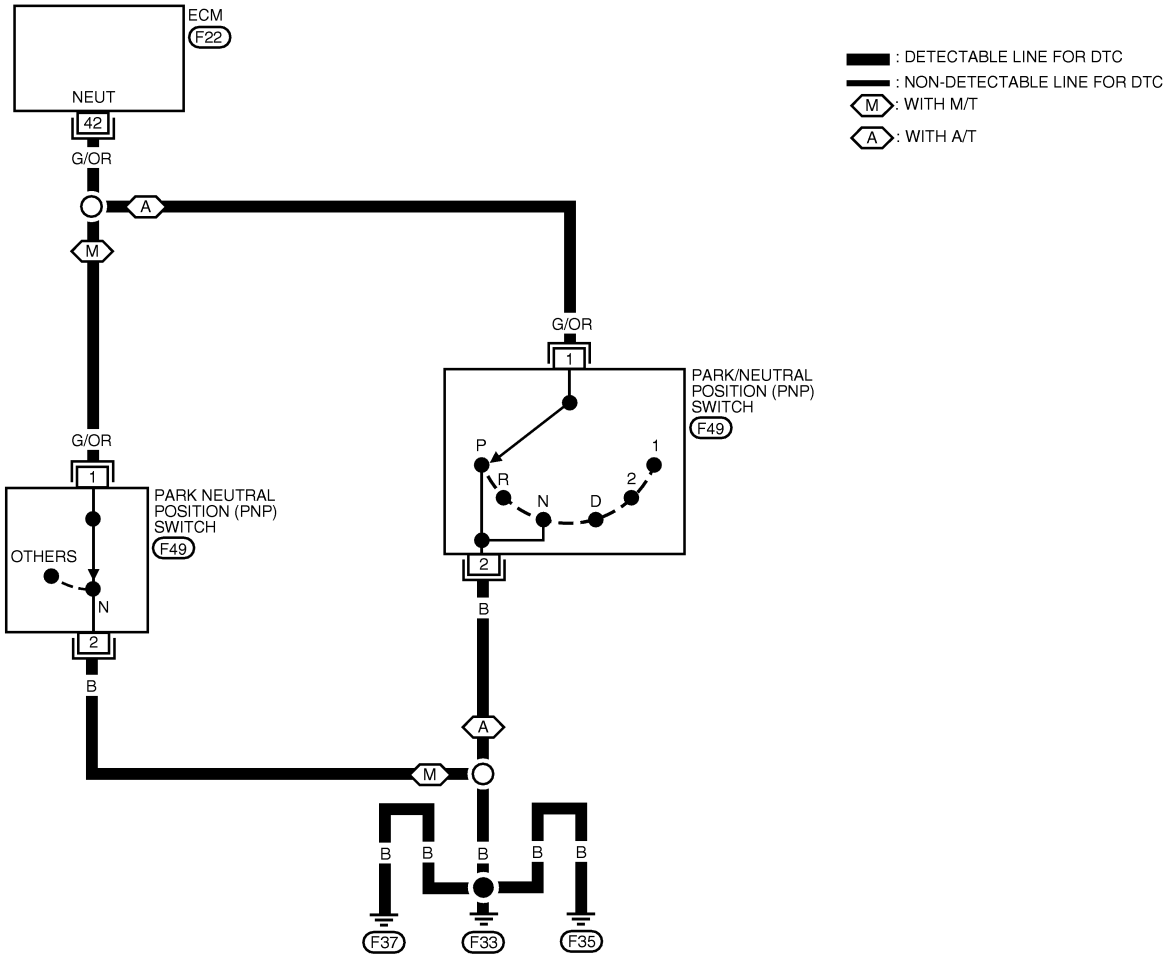
Condition (Gear position)	Voltage (V) (Known good data)
"P" (A/T only) and "N" position	Approx. 0
Except the above position	BATTERY VOLTAGE (11 - 14V)

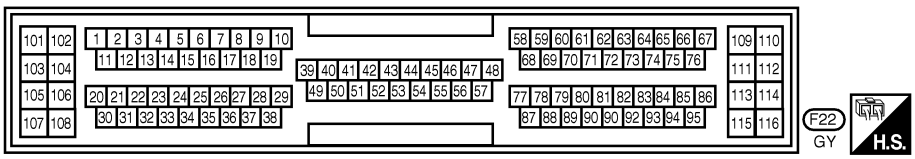
3) If NG, go to "Diagnostic Procedure", EC-1915.

Wiring Diagram

NIEC1136

EC-PNP/SW-01





LEC220

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	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

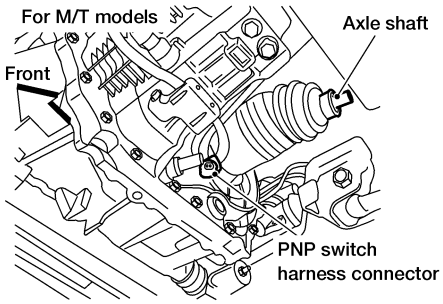
SEF587Y

Diagnostic Procedure For M/T Models

NIEC1137

1	CHECK GROUND CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect PNP switch harness connector.



LEC442

3. Check harness continuity between PNP switch terminal 2 and body ground.
   Refer to “Wiring Diagram”, EC-1914.
   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 INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 42 and PNP switch terminal 1.
   Refer to “Wiring Diagram”, EC-1914.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 3.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

3	CHECK PNP SWITCH

Refer to ***MT-10***, “PNP SWITCH”.

OK or NG

OK	▶	GO TO 4.
NG	▶	Replace PNP switch.

4	CHECK INTERMITTENT INCIDENT

Perform “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-1508.

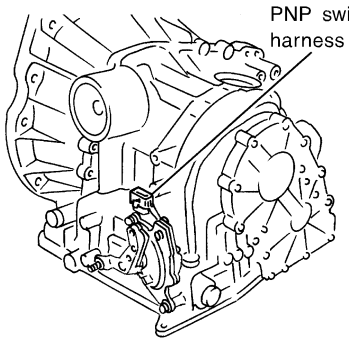
▶ **INSPECTION END**

Diagnostic Procedure For A/T Models

=NIEC1138

1	CHECK GROUND CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect PNP switch harness connector.



SEF752Y

3. Check continuity between PNP switch harness connector terminal 2 and ground with CONSULT-II or tester.
   “Refer to Wiring Diagram”, EC-1914.
   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 INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 42 and PNP switch terminals 1.
   “Refer to Wiring Diagram”, EC-1914.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 3.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

3	CHECK PNP SWITCH

Refer to ***AT-117***, “Diagnostic Procedure”.

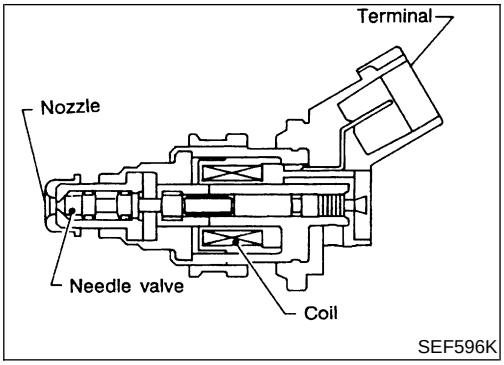
OK or NG

OK	▶	GO TO 4.
NG	▶	Replace PNP switch.

4	CHECK INTERMITTENT INCIDENT

Perform “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-1508.

▶ **INSPECTION END**



Component Description

NIEC1139

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

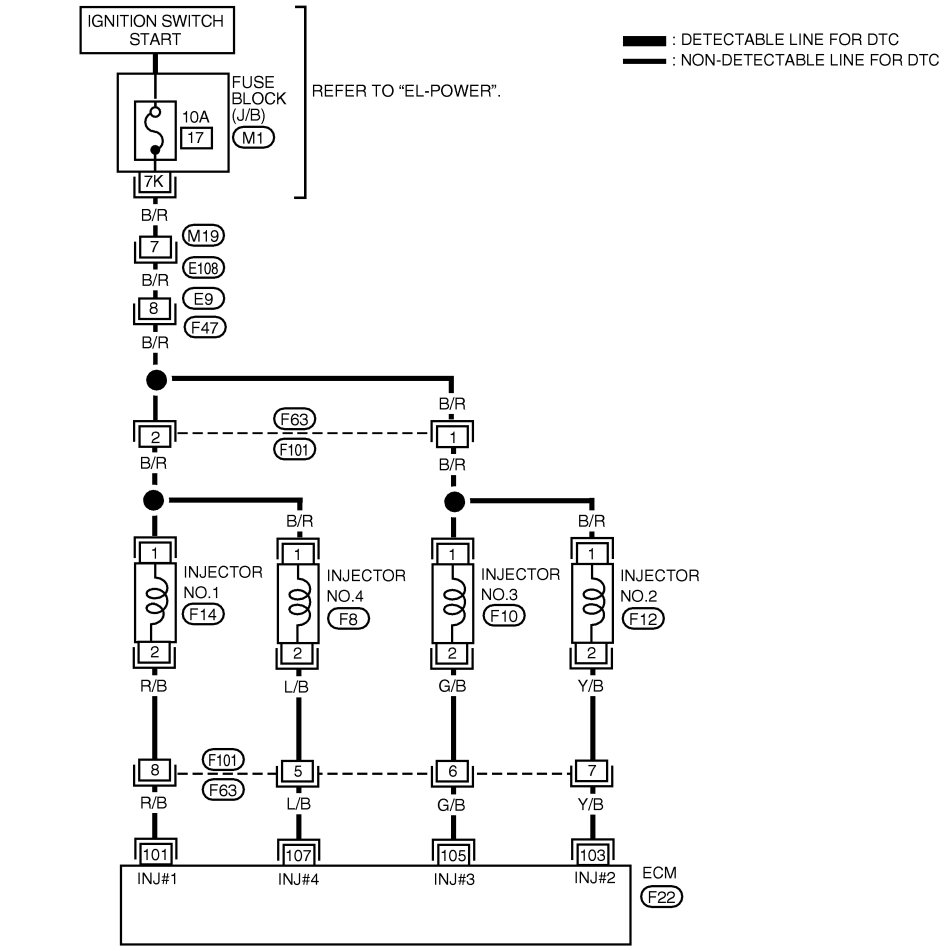
NIEC1140

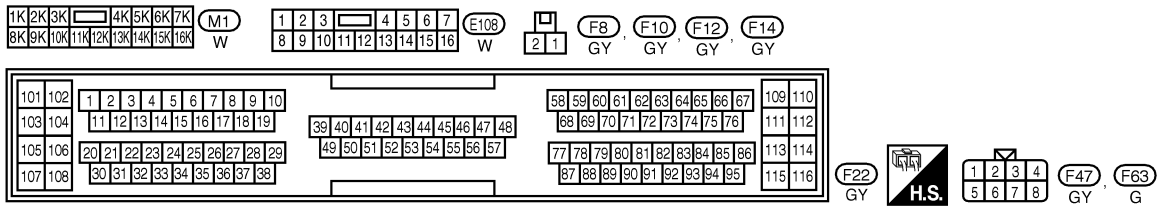
MONITOR ITEM	CONDITION		SPECIFICATION
INJ PULSE-B1	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: “N” ● No-load	Idle	2.4 - 3.2 msec
		2,000 rpm	1.9 - 2.8 msec
B/FUEL SCHDL	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: “N” ● No-load	Idle	1.0 - 1.6 msec
		2,000 rpm	0.7 - 1.3 msec

Wiring Diagram

NIEC1141

EC-INJECT-01





LEC215

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 (V) 40 20 0 — 20 ms
103	Y/B	INJECTOR NO. 2		
105	G/B	INJECTOR NO. 3		
107	L/B	INJECTOR NO. 4		
			ENGINE RUNNING AT 2,000 RPM UNDER WARM-UP CONDITION	BATTERY VOLTAGE (V) 40 20 0 — 20 ms

SEF588Y

Diagnostic Procedure

NIEC1142

1	CHECK OVERALL FUNCTION

With CONSULT-II

1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-II.

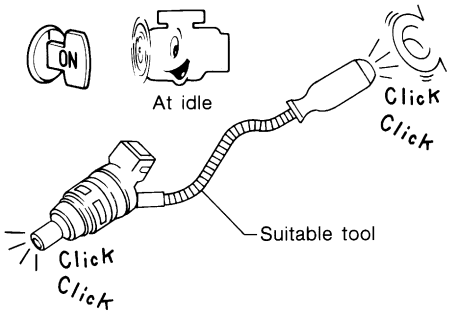
ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
IACV-AAC/V	XXX step

SEF190Y

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

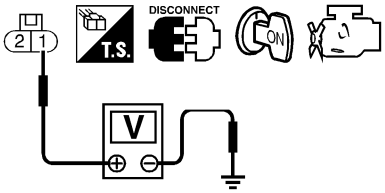
Clicking noise should be heard.

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 2.

2	CHECK POWER SUPPLY

1. Stop engine.
2. Disconnect injector harness connector.
3. Turn ignition switch "ON".
4. Check voltage between injector harness connector terminal 1 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF949X

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	DETECT MALFUNCTIONING PART

Check the following.
- 10A fuse
- Harness connectors M19, E108
- Harness connectors E9, F47
- Harness connectors F63, F101
- Harness for open or short between injector and fuse

	▶	Repair harness or connectors.

4	CHECK OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between injector harness connector terminal 2 and ECM terminals 101, 103, 105, 107. Refer to "Wiring Diagram", EC-1918.
   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.

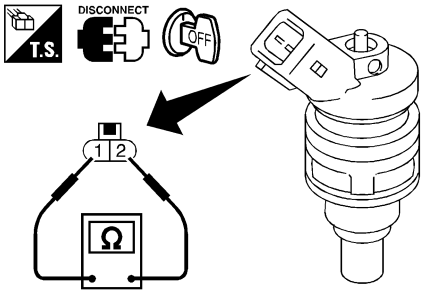
5	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F101, F63
- Harness for open or short between ECM and injector

	▶	Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK INJECTOR

1. Disconnect injector harness connector.
2. Check resistance between terminals as shown in the figure.



Resistance: 13.5 - 17.5 Ω [at 20°C (68°F)]

SEF964XA

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace injector.

7	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1508.	
▶	**INSPECTION END**

CONSULT-II Reference Value in Data Monitor Mode

NIEC1143

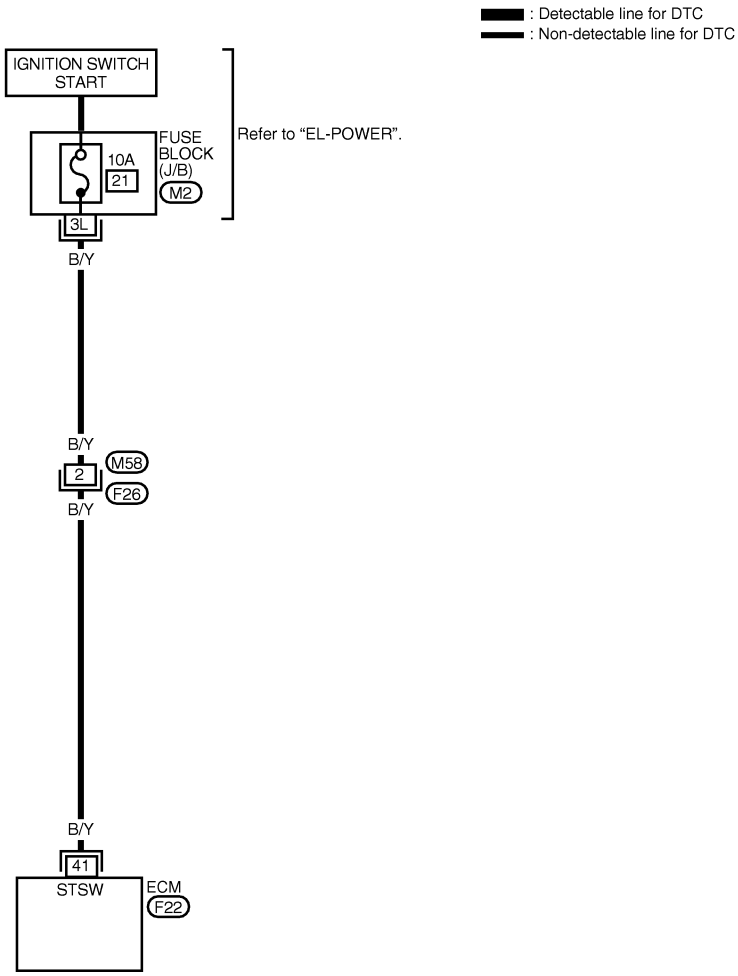
Specification data are reference values.

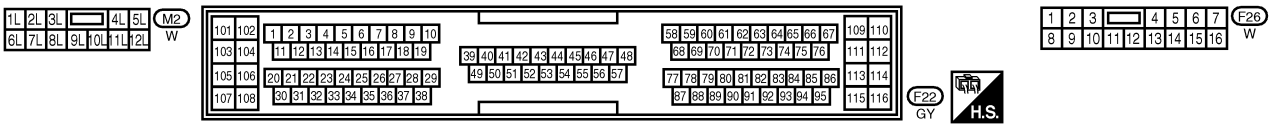
MONITOR ITEM	CONDITION	SPECIFICATION
START SIGNAL	● Ignition switch: ON → START → ON	OFF → ON → OFF

Wiring Diagram

=NIEC1144

EC-S/SIG-01





LEC212

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)
41	B/Y	START SIGNAL	IGN ON	APPROX. 0V
			IGN START	9 - 14V

SEF589Y

Diagnostic Procedure

=NIEC1145

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

Condition	“START SIGNAL”
Ignition switch “ON”	OFF
Ignition switch “START”	ON

SEF227Y

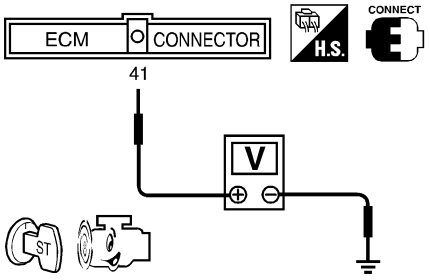
OK or NG

OK ▶	**INSPECTION END**
NG ▶	GO TO 4.

3	CHECK OVERALL FUNCTION

Without CONSULT-II

1. Turn ignition switch to “START”.
2. Check voltage between ECM terminal 41 and ground under the following conditions.



SEF142X

Condition	Voltage
Ignition switch “START”	Battery voltage
Except above	Approximately 0V

MTBL0143

OK or NG

OK ▶	**INSPECTION END**
NG ▶	GO TO 4.

4	DETECT MALFUNCTIONING PART	
Check the following. ● Harness connectors M58, F26 ● 10A fuse ● Harness for open or short between ECM and fuse		
OK or NG		
OK	▶	GO TO 5.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK INTERMITTENT INCIDENT	
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1508.		
	▶	**INSPECTION END**

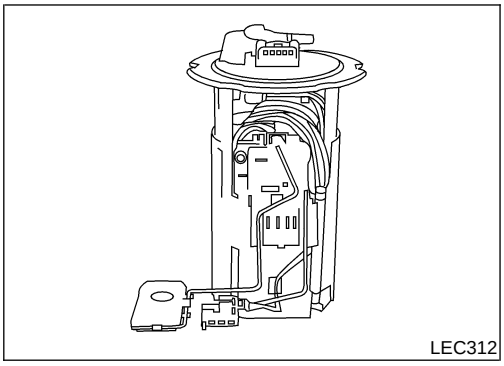
System Description

NIEC1146

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE)	Engine speed	ECM	Fuel pump relay
Ignition switch	Start signal		

The ECM activates the fuel pump for several seconds after the ignition switch is turned on to improve engine startability. If the ECM receives a 180° signal from the camshaft position sensor (PHASE), it knows that the engine is rotating, and causes the pump to perform. If the 180° signal is not received when the ignition switch is on, the engine stalls. The ECM stops pump operation and prevents battery discharging, thereby improving safety. The ECM does not directly drive the fuel pump. It controls the ON/OFF fuel pump relay, which in turn controls the fuel pump.

Condition	Fuel pump operation
Ignition switch is turned to ON.	Operates for 5 seconds
Engine running and cranking	Operates
When engine is stopped	Stops in 1 second
Except as shown above	Stops


LEC312

Component Description

NIEC1147

A turbine type design fuel pump is used in the fuel tank.

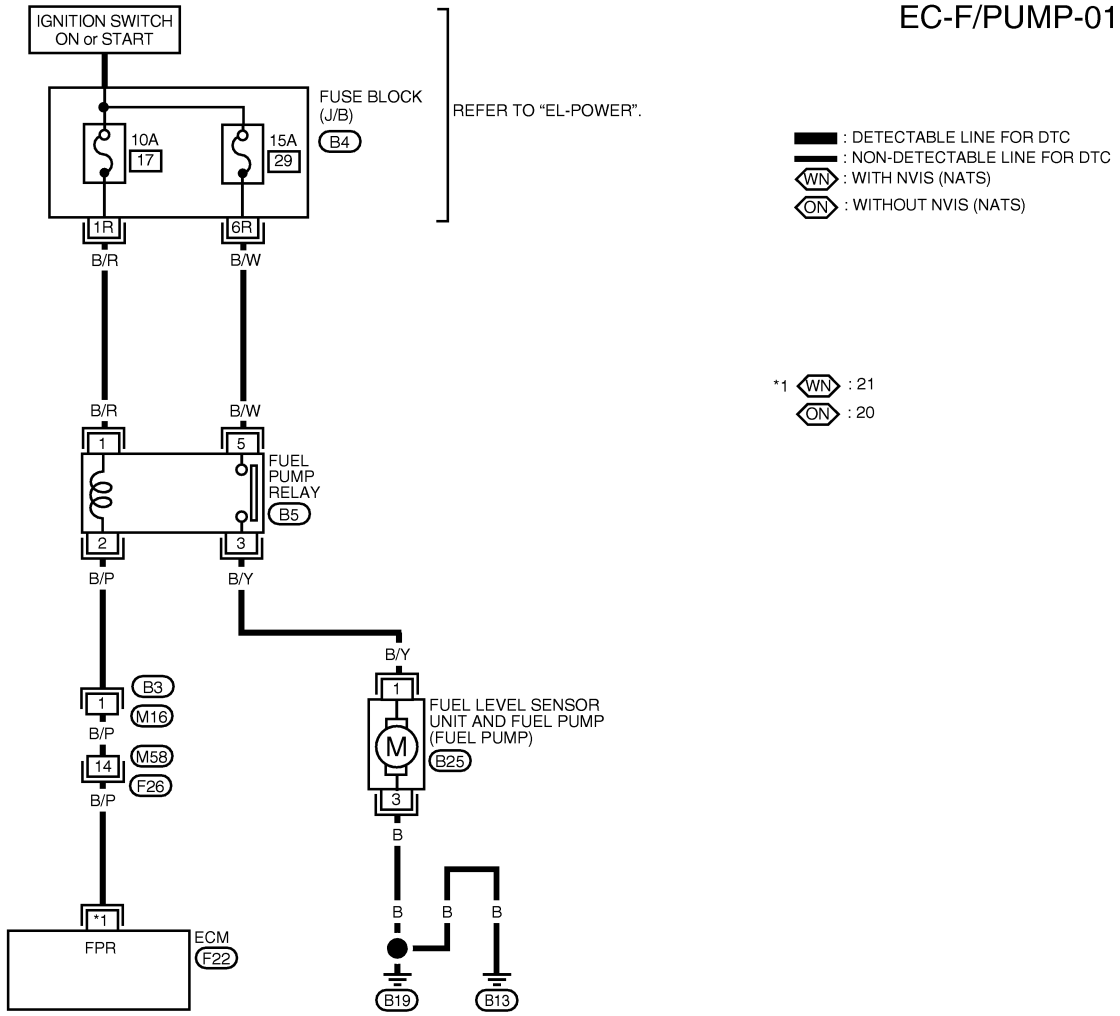
CONSULT-II Reference Value in Data Monitor Mode

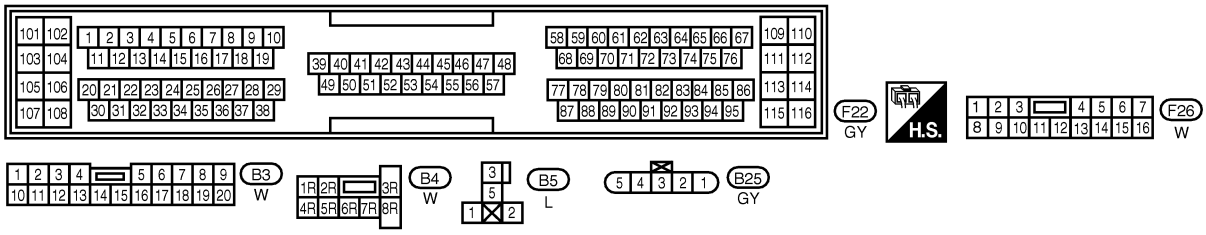
NIEC1148

MONITOR ITEM	CONDITION	SPECIFICATION
FUEL PUMP RLY	• Ignition switch is turned to ON (Operates for 5 seconds) • Engine running and cranking • When engine is stopped (stops in 1.0 seconds)	ON
	• Except as shown above	OFF

Wiring Diagram

NIEC1149





LEC213

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)
20 (Without NVIS)	B/P	FUEL PUMP RELAY	FOR 5 SECONDS AFTER IGN ON	0 - 1V
21 (With NVIS)	B/P		ENGINE RUNNING	BATTERY VOLTAGE
			MORE THAN 5 SECONDS AFTER IGN ON	

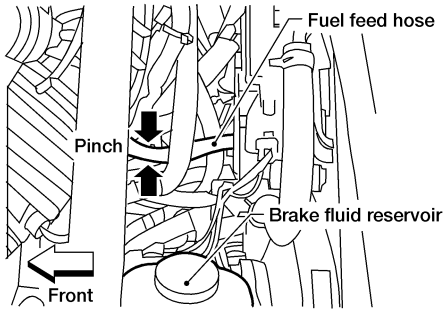
SEF590Y

Diagnostic Procedure

NIEC1150

1	CHECK OVERALL FUNCTION

1. Turn ignition switch “ON”.
2. Pinch fuel feed hose with fingers.



LEC305

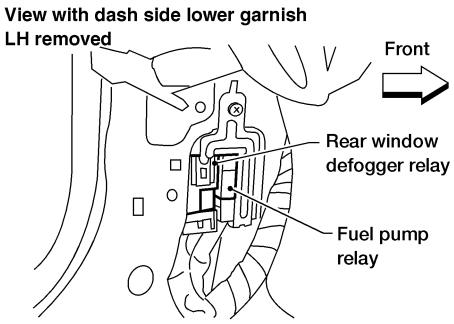
Fuel pressure pulsation should be felt on the fuel feed hose for 5 seconds after ignition switch is turned “ON”.

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 2.

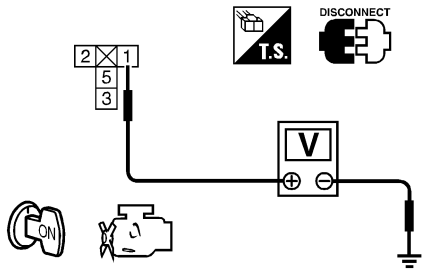
2	CHECK POWER SUPPLY-I

1. Turn ignition switch “OFF”.
2. Disconnect fuel pump relay.



LEC363

3. Turn ignition switch “ON”.
4. Check voltage between fuel pump relay terminal 1 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF495Y

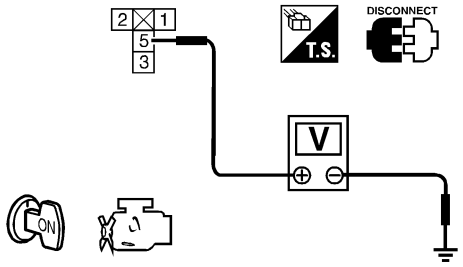
OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	DETECT MALFUNCTIONING PART
Check the following. ● 10A fuse ● Harness for open or short between fuse and fuel pump relay	
▶	Repair harness or connectors.

4	CHECK POWER SUPPLY-II

1. Check voltage between fuel pump relay terminal 5 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF496Y

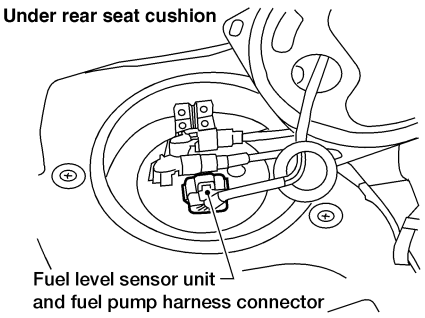
OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART
Check the following. ● 15A fuse ● Harness for open or short between fuse and fuel pump relay	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK POWER AND GROUND CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect fuel level sensor unit and fuel pump harness connector.



LEC304

3. Check harness continuity between fuel level sensor unit and fuel pump harness connector terminal 3 and body ground, fuel level sensor unit and fuel pump harness connector terminal 1 and fuel pump relay harness connector terminal 3. Refer to "Wiring Diagram", EC-1927.
   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.

Diagnostic Procedure (Cont'd)

7	DETECT MALFUNCTIONING PART
Check the following. ● Harness for open or short between fuel pump and body ground ● Harness for open or short between fuel pump and fuel pump relay	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

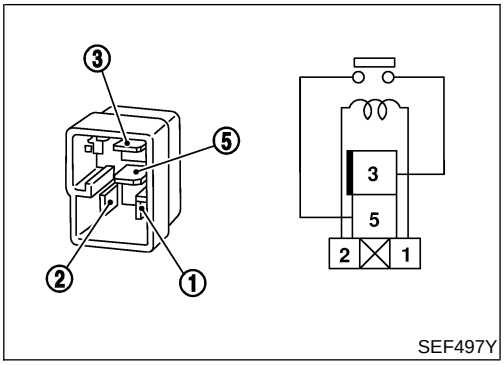
8	CHECK OUTPUT SIGNAL CIRCUIT
1. Disconnect ECM harness connector. 2. Check harness continuity between ECM harness connector terminal 21 (with NVIS) or 20 (without NVIS) and fuel pump relay harness connector terminal 2. Refer to "Wiring Diagram", EC-1927. **Continuity should exist.** 3. Also check harness for short to ground and short to power.	
OK or NG	
OK ▶	GO TO 10.
NG ▶	GO TO 9.

9	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors B3, M16 ● Harness connectors M58, F26 ● Harness for open or short between ECM and fuel pump relay	
NG ▶	Repair open circuit or short to ground or short to power in harness or connectors.

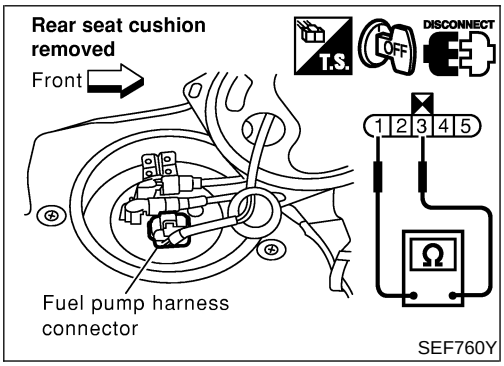
10	CHECK FUEL PUMP RELAY
Refer to "Component Inspection", EC-1931.	
OK or NG	
OK ▶	GO TO 11.
NG ▶	Replace fuel pump relay.

11	CHECK FUEL PUMP
Refer to "Component Inspection", EC-1931.	
OK or NG	
OK ▶	GO TO 12.
NG ▶	Replace fuel pump.

12	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1508.	
▶	**INSPECTION END**



SEF497Y



SEF760Y

Component Inspection

=NIEC1151

FUEL PUMP RELAY

NIEC1151S01

Check continuity between terminals 3 and 5.

Conditions	Continuity
12V direct current supply between terminals 1 and 2	Yes
No current supply	No

If NG, replace relay.

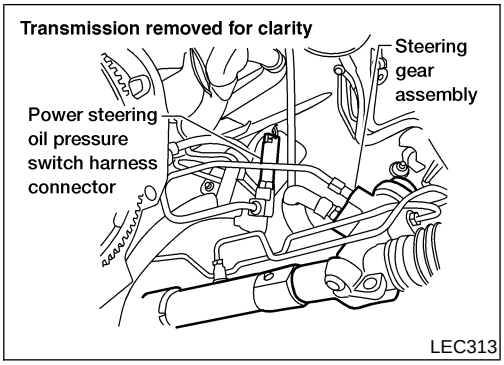
FUEL PUMP

NIEC1151S02

1. Disconnect fuel pump harness connector.
2. Check resistance between terminals 1 and 3.

Resistance: 0.2 - 5.0Ω [at 25°C (77°F)]

If NG, replace fuel pump.



Component Description

NIEC1152

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

NIEC1153

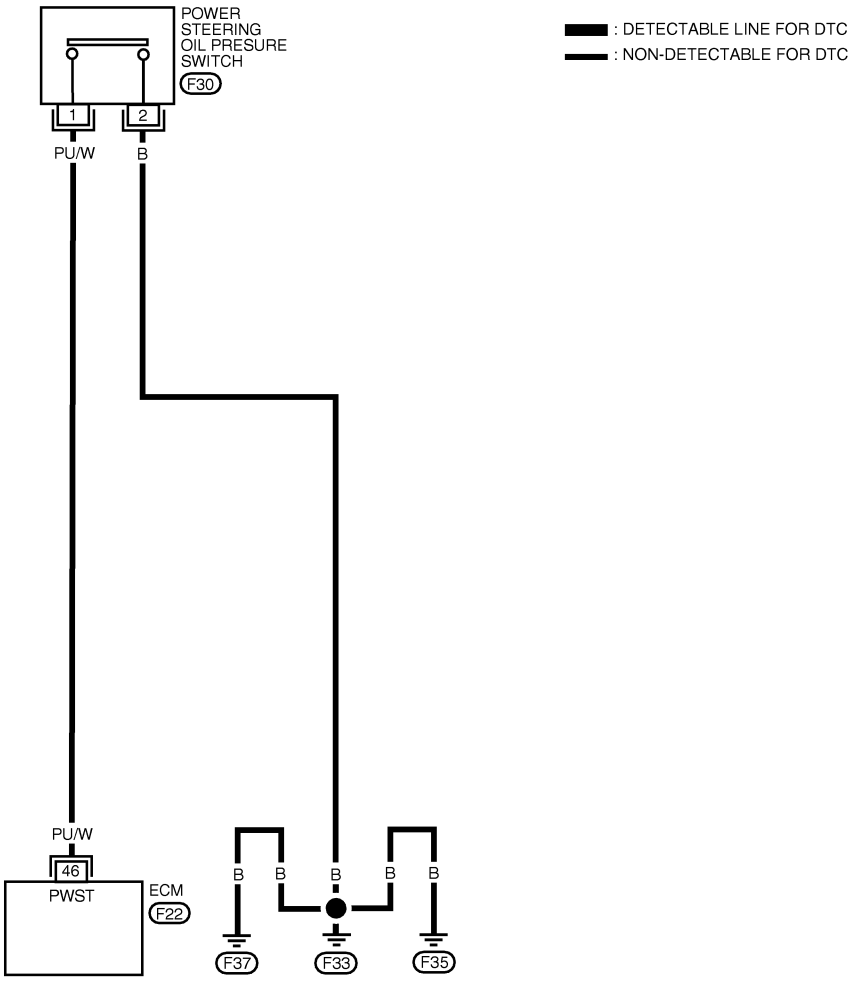
Specification data are reference values.

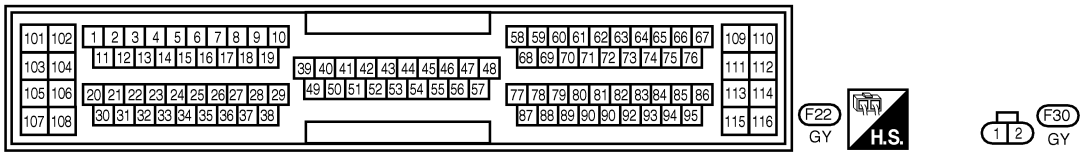
MONITOR ITEM	CONDITION		SPECIFICATION
PW/ST SIGNAL	● Engine: After warming up, idle the engine	Steering wheel in neutral position (forward direction)	OFF
		The steering wheel is fully turned	ON

Wiring Diagram

NIEC1154

EC-PST/SW-01





LEC224

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)
46	PU/W	POWER STEERING OIL PRESSURE SWITCH	ENGINE RUNNING WITH STEERING WHEEL BEING FULLY TURNED	APPROX. 0V
			ENGINE RUNNING WITH STEERING WHEEL NOT BEING TURNED	APPROX. 5V

SEF591Y

Diagnostic Procedure

=NIEC1155

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

Steering is in neutral position	OFF
Steering is turned	ON

SEF228Y

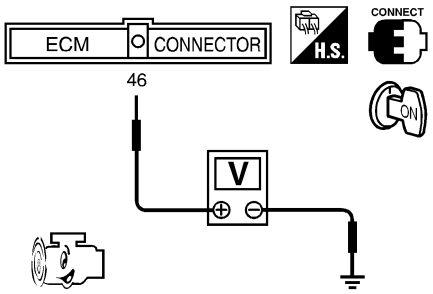
OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 4.

3	CHECK OVERALL FUNCTION

Without CONSULT-II

1. Start engine.
2. Check voltage between ECM terminal 46 and ground under the following conditions.



SEF148X

Condition	Voltage
When steering wheel is turned quickly	Approximately 0V
Except above	Approximately 5V

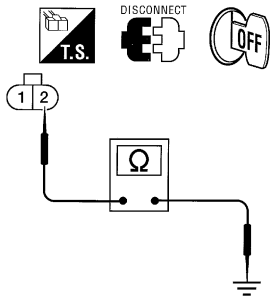
MTBL0142

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 4.

4	CHECK GROUND CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect power steering oil pressure switch harness connector.
3. Check harness continuity between power steering oil pressure switch terminal 2 and engine ground.



AEC760

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 5.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 46 and power steering oil pressure switch harness connector terminal 1.
   Refer to "Wiring Diagram", EC-1933.
   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.

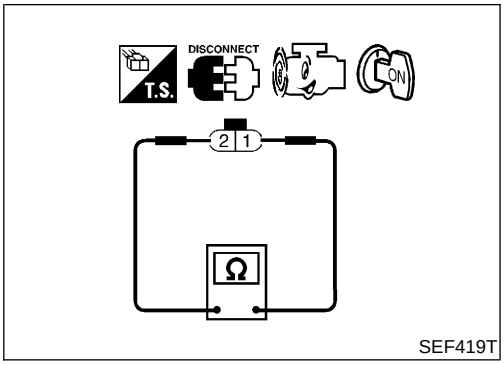
6	CHECK POWER STEERING OIL PRESSURE SWITCH

Refer to "Component Inspection", EC-1936.

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace power steering oil pressure switch.

7	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1508.	
▶	**INSPECTION END**



SEF419T

Component Inspection

=NIEC1156

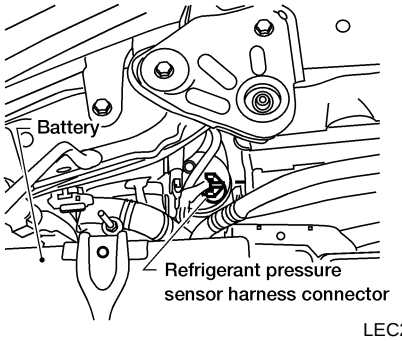
POWER STEERING OIL PRESSURE SWITCH

NIEC1156S01

1. Disconnect power steering oil pressure switch harness connector then start engine.
2. Check continuity between terminals 1 and 2.

Conditions	Continuity
Steering wheel is being turned	Yes
Steering wheel is not being turned	No

If NG, replace power steering oil pressure switch.

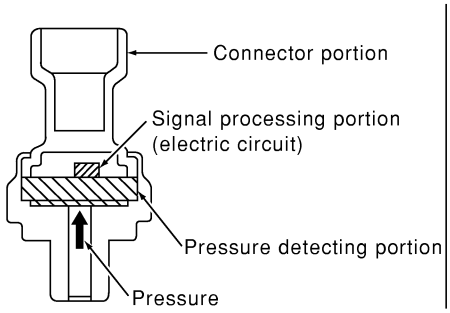


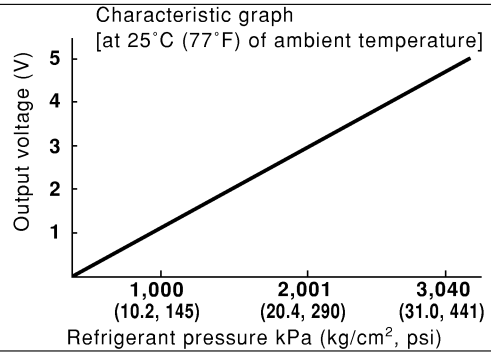
LEC278

Description

NIEC1157

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.



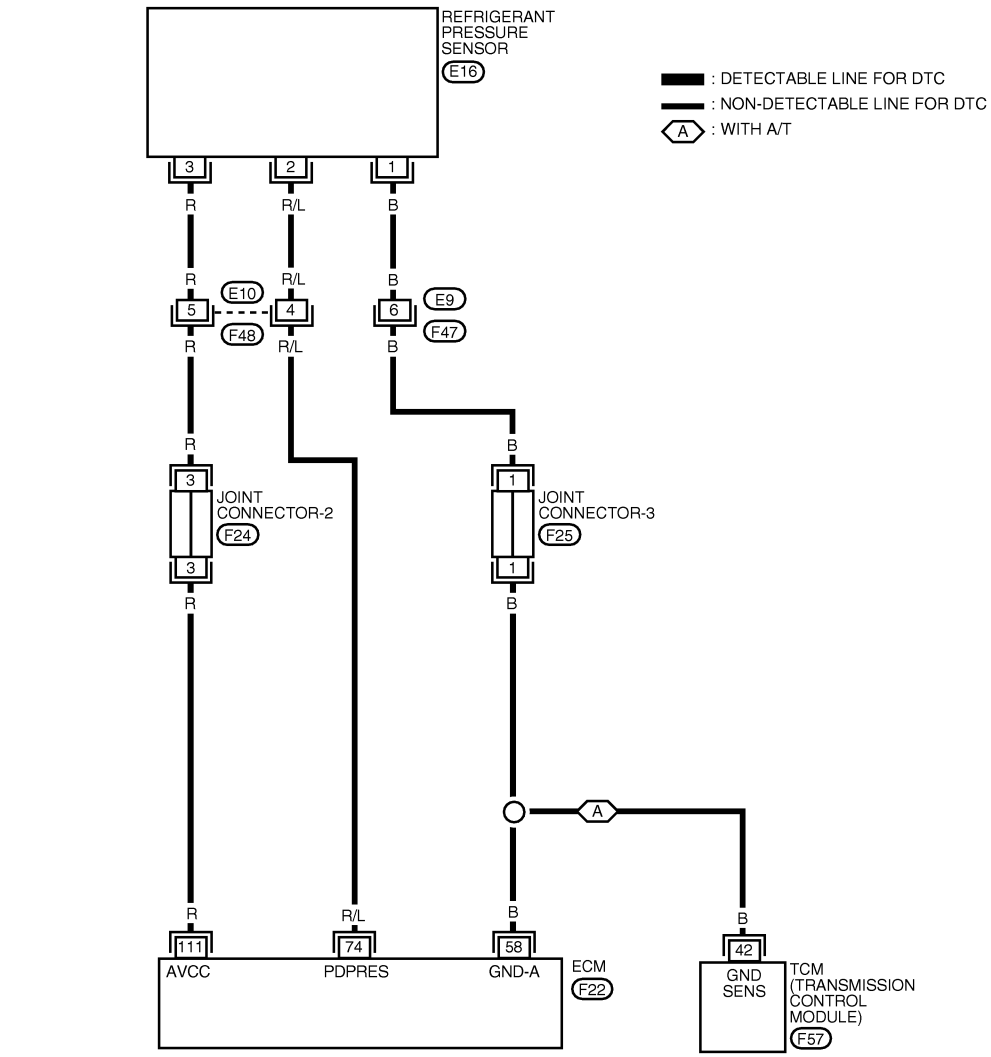


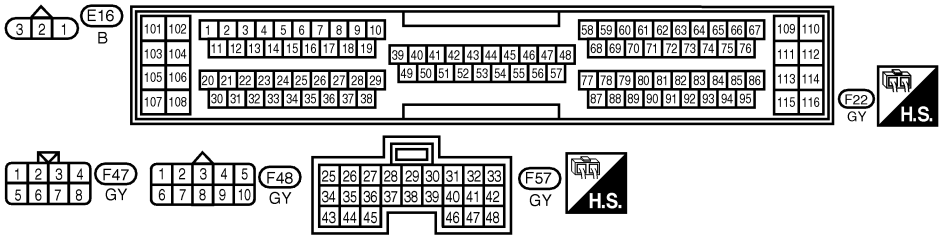
SEF099XA

Wiring Diagram

NIEC1158

EC-RP/SEN-01





REFER TO THE FOLLOWING.
F24, F25 - JOINT CONNECTOR

LEC223

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	IGN ON	APPROX. 0V
74	R/L	REFRIGERANT PRESSURE SENSOR	ENGINE RUNNING UNDER WARM-UP CONDITION WITH A/C SWITCH AND BLOWER SWITCH ON	0.36 - 3.88V
111	R	SENSOR'S POWER SUPPLY	IGN ON	APPROX. 5V

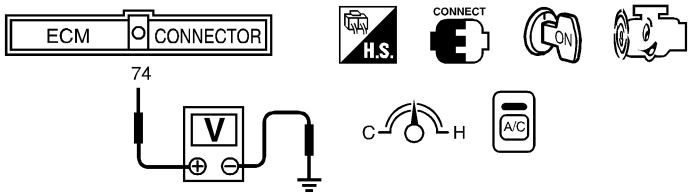
SEF592Y

Diagnostic Procedure

NIEC1159

1	CHECK REFRIGERANT PRESSURE SENSOR OVERALL FUNCTION

1. Start engine and warm it up to normal operating temperature.
2. Turn A/C switch and fan control switch “ON”.
3. Check voltage between ECM terminal 74 and ground with CONSULT-II or tester.



Voltage: 0.36 - 3.88V

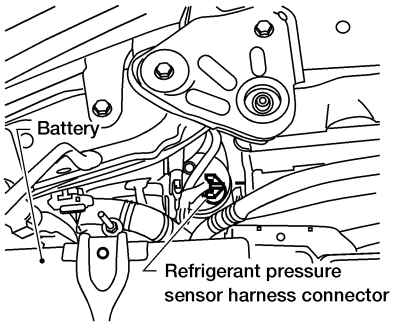
SEF952X

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 2.

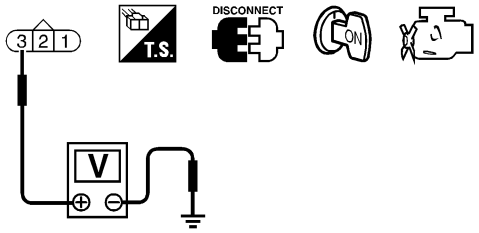
2	CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn A/C switch and fan control switch “OFF”.
2. Stop engine.
3. Disconnect refrigerant pressure sensor harness connector.



LEC278

4. Turn ignition switch “ON”.
5. Check voltage between refrigerant pressure sensor terminal 3 and ground with CONSULT-II or tester.



Voltage: Approximately 5V

SEF953X

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

Diagnostic Procedure (Cont'd)

3	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E10, F48 ● Joint connector-2 ● 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 1 and engine ground. Refer to "Wiring Diagram", EC-1938. **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 E9, F47 ● Joint connector-3 ● 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 74 and refrigerant pressure sensor terminal 2. Refer to "Wiring Diagram", EC-1938. **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 E10, F48 ● 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-14***, "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-1508.	
▶	INSPECTION END

CONSULT-II Reference Value in Data Monitor Mode

NIEC1160

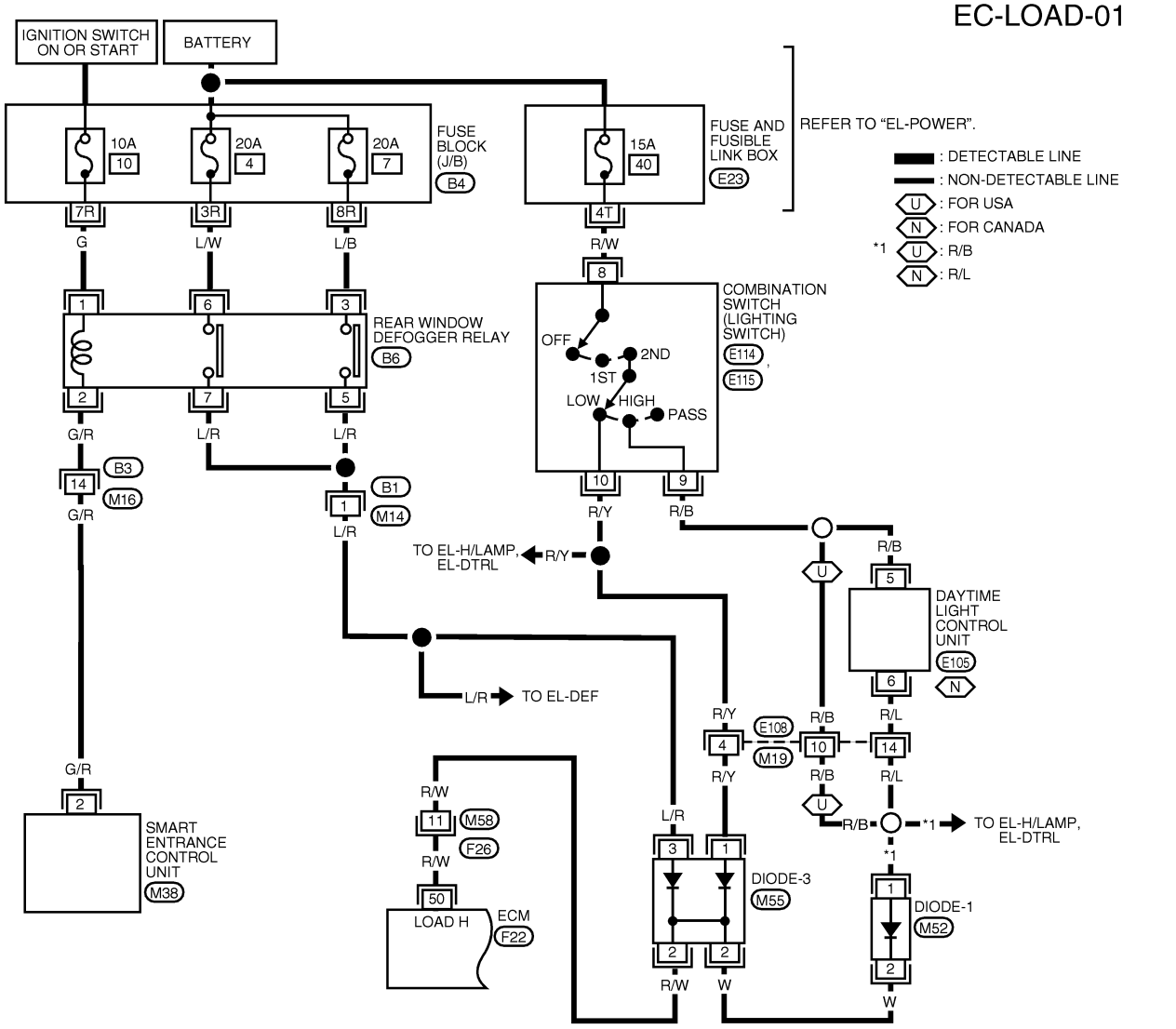
Specification data are reference values.

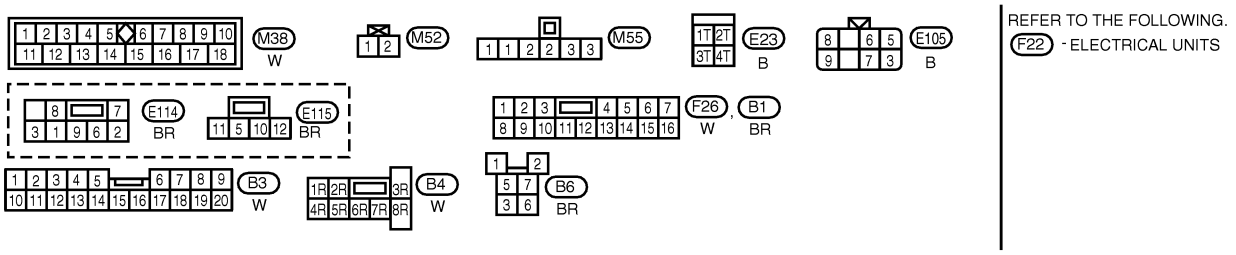
MONITOR ITEM	CONDITION		SPECIFICATION
LOAD SIGNAL	• Ignition switch: ON	Rear window defogger switch and/or lighting switch “ON”	ON
		Rear window defogger switch and lighting switch “OFF”	OFF
HEATER FAN SW	• Ignition switch: ON	Fan control switch: ON	ON
		Fan control switch: OFF	OFF

Wiring Diagram

NIEC1161

EC-LOAD-01





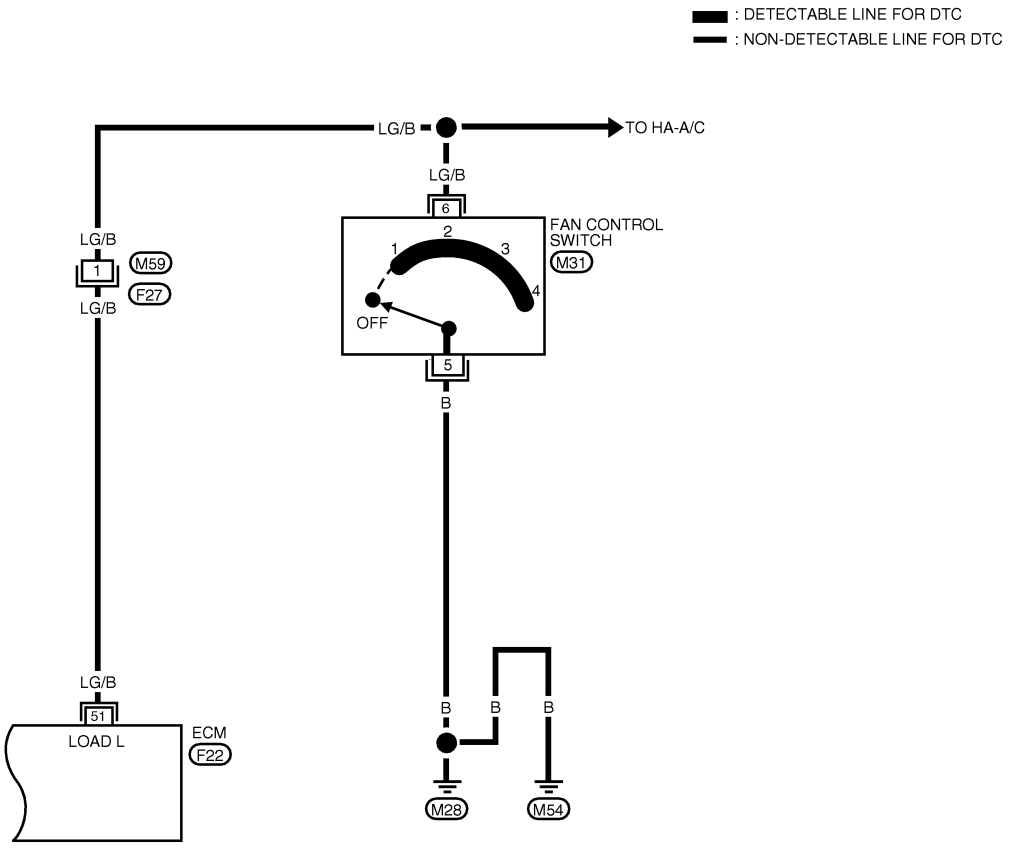
LEC225

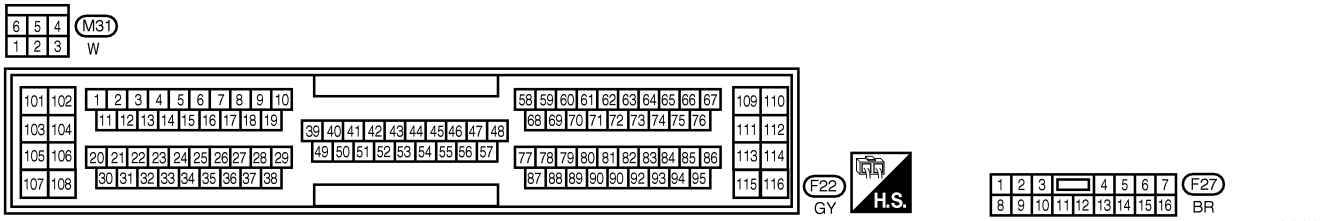
ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
50	R	ELECTRICAL LOAD SIGNAL	IGN ON WITH REAR WINDOW DEFOGGER SWITCH ON OR LIGHTING SWITCH 2ND POSITION	BATTERY VOLTAGE
			IGN ON WITH REAR WINDOW DEFOGGER SWITCH AND LIGHTING SWITCH OFF	0V

SEF593Y

EC-LOAD-02





LEC226

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)
51	LG/B	HEATER FAN SWITCH	IGN ON WITH FAN CONTROL SWITCH ON	APPROX. 0V
			IGN ON WITH FAN CONTROL SWITCH OFF	APPROX. 5V

SEF594Y

Diagnostic Procedure

NIEC1162

1	INSPECTION START	
Do you have CONSULT-II?		
Yes or No		
Yes	▶	GO TO 2.
No	▶	GO TO 6.

2	CHECK LOAD SIGNAL (REAR WINDOW DEFOGGER) CIRCUIT OVERALL FUNCTION	

With CONSULT-II
1. Turn ignition switch “ON”.
2. Check “LOAD SIGNAL” in “DATA MONITOR” mode with CONSULT-II under the following conditions.

DATA MONITOR	
MONITOR	NO DTC
LOAD SIGNAL	ON

Rear window defogger switch "ON"	ON
Rear window defogger switch "OFF"	OFF

SEF229Y

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 10.

3	CHECK LOAD SIGNAL (HEADLAMP LOW BEAM) CIRCUIT OVERALL FUNCTION	

With CONSULT-II
1. Turn ignition switch “ON”.
2. Check “LOAD SIGNAL” in “DATA MONITOR” mode with CONSULT-II under the following conditions.

DATA MONITOR	
MONITOR	NO DTC
LOAD SIGNAL	ON

Condition	“LOAD SIGNAL”
Lighting switch “2ND” and “LOW” position	ON
Lighting switch “OFF”	OFF

SEF167Z

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 14.

Diagnostic Procedure (Cont'd)

4	CHECK LOAD SIGNAL (HEADLAMP HIGH BEAM) CIRCUIT OVERALL FUNCTION

With CONSULT-II

1. Turn ignition switch "ON".
2. Check "LOAD SIGNAL" in "DATA MONITOR" mode with CONSULT-II under the following conditions.

DATA MONITOR	
MONITOR	NO DTC
LOAD SIGNAL	ON

Condition	"LOAD SIGNAL"
Lighting switch "2ND" and "HIGH" position	ON
Lighting switch "OFF"	OFF

SEF168Z

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 18.

5	CHECK LOAD SIGNAL (FAN CONTROL) CIRCUIT OVERALL FUNCTION

With CONSULT-II

1. Turn ignition switch "ON".
2. Check "HEATER FAN SW" in "DATA MONITOR" mode with CONSULT-II under the following conditions.

DATA MONITOR	
MONITOR	NO DTC
LOAD SIGNAL	ON

Fan control switch "ON"	ON
Fan control switch "OFF"	OFF

SEF165Z

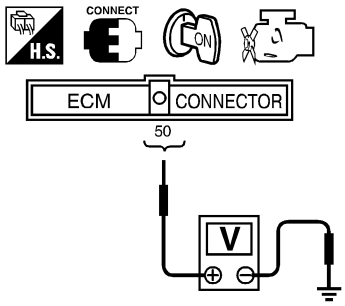
OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 25.

6	CHECK LOAD SIGNAL (REAR WINDOW DEFOGGER) CIRCUIT OVERALL FUNCTION

Without CONSULT-II

1. Turn ignition switch "ON".
2. Check voltage between ECM terminal 50 and ground under the following conditions.



Condition	Voltage
Rear window defogger switch "ON"	BATTERY VOLTAGE
Rear window defogger switch "OFF"	0V

SEF956X

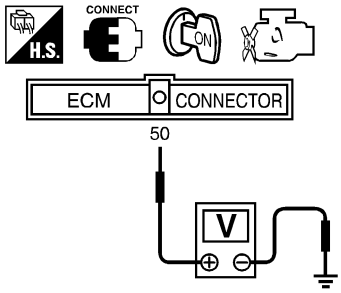
OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 10.

7	CHECK LOAD SIGNAL (HEADLAMP LOW BEAM) CIRCUIT OVERALL FUNCTION

Without CONSULT-II

1. Turn ignition switch "ON".
2. Check voltage between ECM terminal 50 and ground under the following conditions.



Condition	Voltage
Lighting switch "2ND" and "LOW" position	BATTERY VOLTAGE
Lighting switch "OFF"	0V

SEF183Z

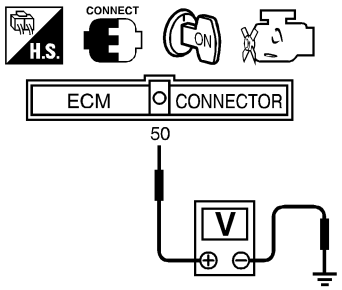
OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 14.

8	CHECK LOAD SIGNAL (HEADLAMP HIGH BEAM) CIRCUIT OVERALL FUNCTION

Without CONSULT-II

1. Turn ignition switch "ON".
2. Check voltage between ECM terminal 50 and ground under the following conditions.



Condition	Voltage
Lighting switch "2ND" and "HIGH" position	BATTERY VOLTAGE
Lighting switch "OFF"	0V

SEF184Z

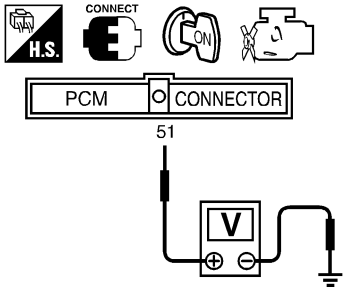
OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 18.

9	CHECK LOAD SIGNAL (FAN CONTROL) CIRCUIT OVERALL FUNCTION

Without CONSULT-II

1. Turn ignition switch "ON".
2. Check voltage between ECM terminal 51 and ground under the following conditions.



Condition	Voltage
Fan control switch "ON"	BATTERY VOLTAGE
Fan control switch "OFF"	0V

SEF166Z

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 25.

10	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?

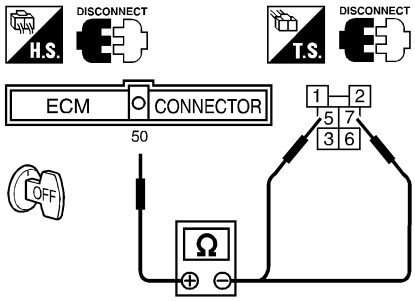
Yes or No

Yes	▶	GO TO 11.
No	▶	Refer to ***EL-145***, "Rear Window Defogger".

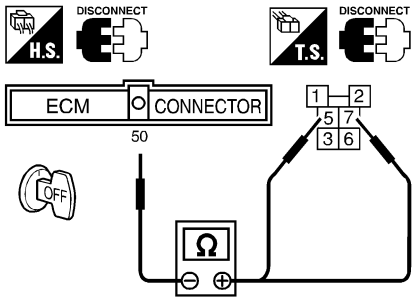
11	CHECK REAR WINDOW DEFOGGER INPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Stop engine.
2. Disconnect ECM harness connector.
3. Disconnect rear window defogger relay.
4. Check harness continuity between ECM terminal 50 and rear window defogger relay terminals 5, 7.

CONDITION 1



CONDITION 2



CONDITION	CONTINUITY
1	Should exist.
2	Should not exist.

SEF560Y

5. 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 B1, M14
- Harness connectors M58, F26
- Diode-3
- Harness for open and short between ECM and rear window defogger relay

	▶	Repair open circuit or short to ground or short to power in harness or connectors.

13	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1508.

	▶	**INSPECTION END**

14	CHECK HEADLAMP (LOW BEAM) FUNCTION

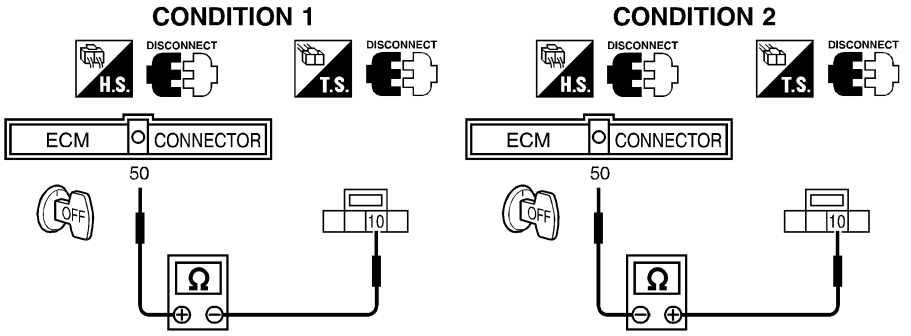
1. Start engine.
2. Turn the lighting switch to "2ND" and "LOW" positions.
3. Check that headlamp low beams are illuminated.

OK or NG

OK	▶	GO TO 15.
NG	▶	Refer to ***EL-35***, "HEADLAMP (FOR USA)" or "***EL-40***, "HEADLAMP (FOR CANADA) — DAYTIME LIGHT SYSTEM".

15	CHECK HEADLAMP (LOW BEAM) INPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Stop engine.
2. Disconnect ECM harness connector.
3. Disconnect lighting switch harness connector.
4. Check harness continuity between ECM terminal 50 and lighting switch terminal 10 under the following conditions.



CONDITION	CONTINUITY
1	Should exist.
2	Should not exist.

SEF199Z

5. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 17.
NG	▶	GO TO 16.

16	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M58, F26
- Harness connectors E108, M19
- Diode–3 M55
- Harness for open and short between ECM and lighting switch

	▶	Repair open circuit or short to ground or short to power in harness or connectors.

17	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1508.

	▶	**INSPECTION END**

18	CHECK HEADLAMP HIGH BEAM FUNCTION

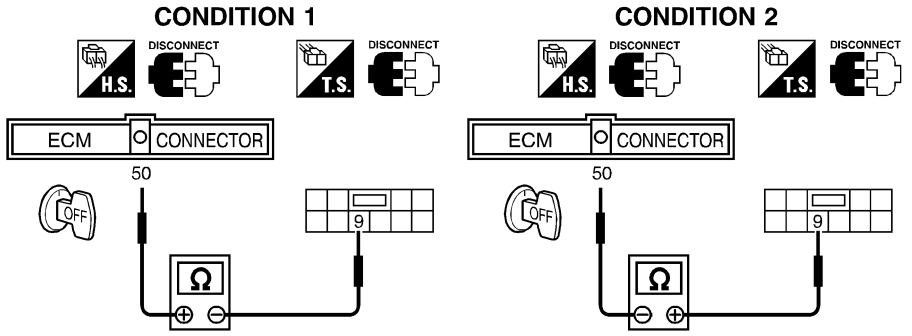
1. Start engine.
2. Turn the lighting switch to the "2ND" and "HIGH" positions.
3. Check that headlamp high beams are illuminated.

OK or NG

OK (for USA)	▶	GO TO 19.
OK (for Canada)	▶	GO TO 22.
NG	▶	Refer to ***EL-35***, "HEADLAMP (FOR USA)" or ***EL-40***, "HEADLAMP (FOR CANADA) — DAYTIME LIGHT SYSTEM".

19	CHECK HEAD LAMP HIGH BEAM INPUT SIGNAL CIRCUIT FOR OPEN OR SHORT (FOR USA)

1. Stop engine.
2. Disconnect ECM harness connector.
3. Disconnect lighting switch harness connector.
4. Check harness continuity between ECM terminal 50 and lighting switch terminal 9 under the following conditions.



CONDITION	CONTINUITY
1	Should exist.
2	Should not exist.

SEF200Z

5. Also check harness connector for short to ground and short to power.

OK or NG

OK	▶	GO TO 21.
NG	▶	GO TO 20.

20	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M58, F26
- Harness connectors E108, M19
- Diode–1 M52
- Diode–3 M55
- Harness for open and short between ECM and lighting switch

	▶	Repair open circuit or short to ground or short to power in harness or connectors.

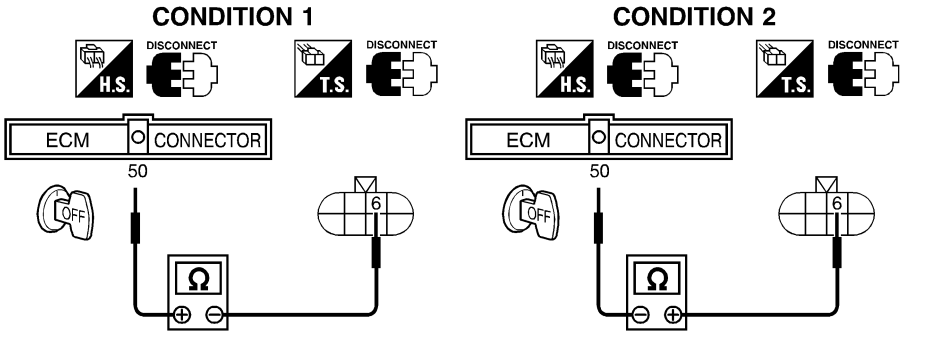
21	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1508.

	▶	**INSPECTION END**

22	CHECK HEADLAMP HIGH BEAM INPUT SIGNAL CIRCUIT FOR OPEN OR SHORT (FOR CANADA)

1. Stop engine.
2. Disconnect ECM harness connector
3. Disconnect daytime light control unit harness connector.
4. Check harness continuity between ECM terminal 50 and daytime light control unit terminal 6 under the following conditions.



CONDITION	CONTINUITY
1	Should exist.
2	Should not exist.

SEF202Z

5. Also check harness connector 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 M58, F26
- Harness connectors E108, M19
- Diode–1 M52
- Diode–3 M55
- Harness for open and short between ECM and daytime light control unit

	▶	Repair open circuit or short to ground or short to power in harness or connectors.

24	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1508.

	▶	**INSPECTION END**

25	CHECK FAN CONTROL SWITCH

1. Start engine.
2. Turn "ON" the fan control switch.
3. Check the blower fan motor. Does the blower fan motor activate?

Yes or No

Yes	▶	GO TO 26.
No	▶	Refer to ***HA-36***, "Blower Motor".

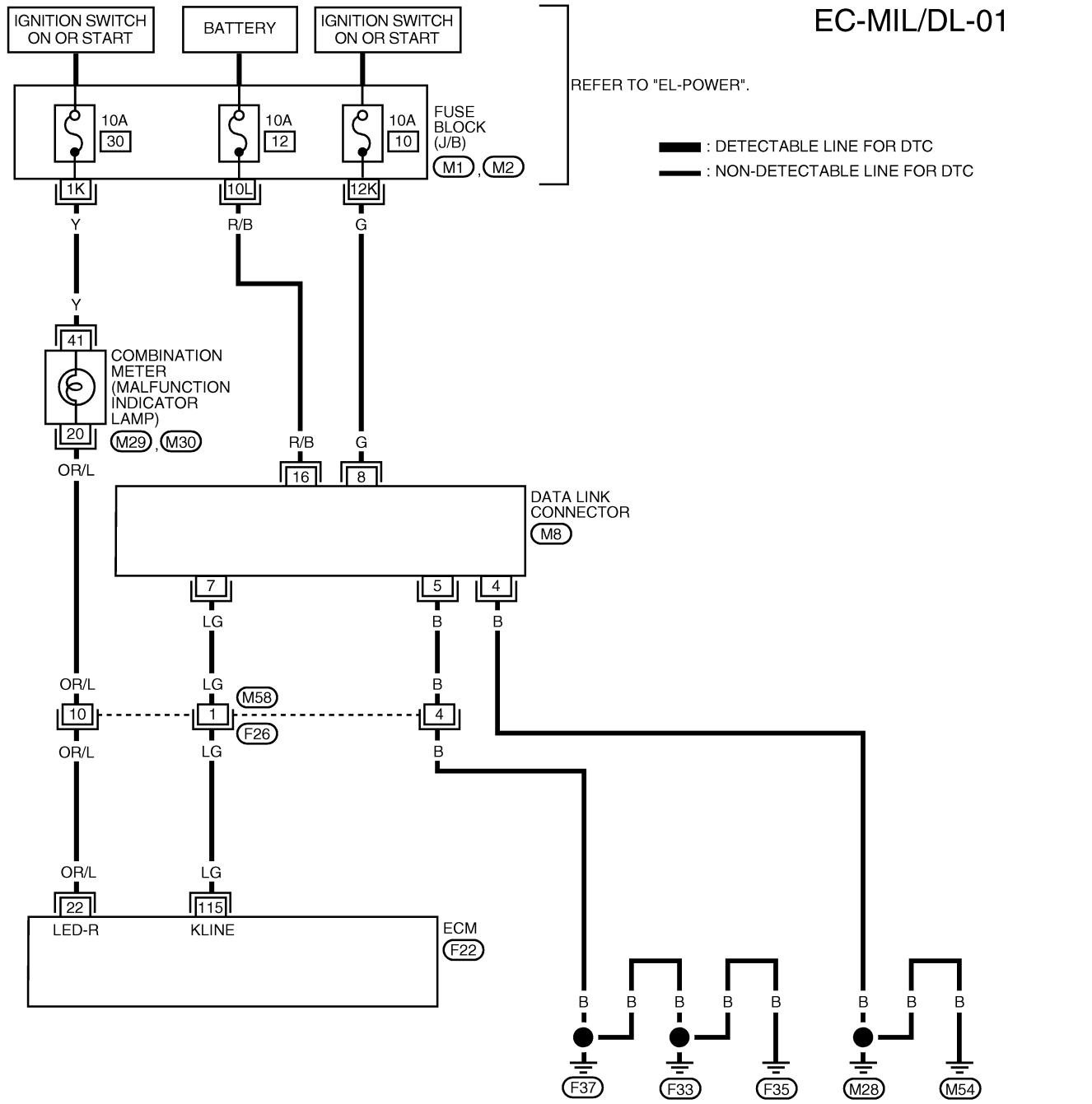
26	CHECK FAN CONTROL INPUT SIGNAL CIRCUIT FOR OPEN OR SHORT
1. Stop engine. 2. Disconnect ECM harness connector. 3. Disconnect fan control switch harness connector. 4. Check harness continuity between ECM terminal 51 and fan control switch terminal 6. Refer to "Wiring Diagram", EC-1943 **Continuity should exist.** 5. Also check harness for short to ground and short to power. **OK or NG**	
OK ▶	GO TO 28.
NG ▶	GO TO 27.

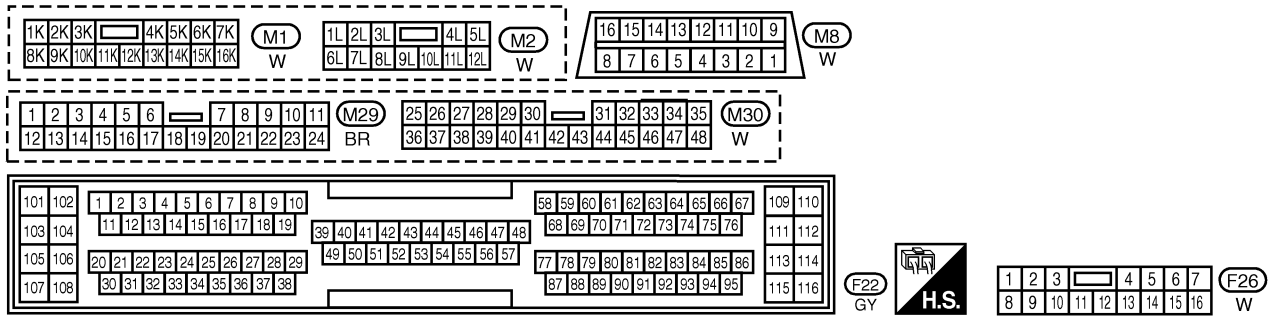
27	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors M59, F27 ● Harness for open and short between ECM and fan control switch	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

28	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1508.	
▶	**INSPECTION END**

Wiring Diagram

NIEC1163





LEC221

Fuel Pressure Regulator

NIEC1164

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

NIEC1165

Target idle speed*1 rpm	No-load*3 (in “P” or “N” position)	800±50
Air conditioner: ON rpm	In “P” or “N” position	850 or more
Ignition timing*2	In “P” or “N” position	15°±2° BTDC
Throttle position sensor idle position V		0.2 - 0.8

*1: Throttle position sensor harness connector connected
*2: Throttle position sensor harness connector disconnected
*3: Under the following conditions:

- Air conditioner switch: OFF
- Electrical load: OFF (Lights & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Ignition Coil

NIEC1166

Primary voltage V	Battery voltage (11 - 14)
Primary resistance [at 25°C (77°F)] Ω	Approximately 0.8
Secondary resistance [at 25°C (77°F)] kΩ	Approximately 16

Mass Air Flow Sensor

NIEC1167

Supply voltage V	Battery voltage (11 - 14)
Output voltage V	1.3 - 1.7*
Mass air flow (Using CONSULT-II or GST) g·m/sec	2.5 - 5.0 at idle* 7.1 - 12.5 at 2,500 rpm*

*: Engine is warmed up to normal operating temperature and idling under no-load.

Engine Coolant Temperature Sensor

NIEC1168

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

NIEC1169

EGR temperature °C (°F)	Voltage V	Resistance MΩ
0 (32)	4.56	0.62 - 1.05
50 (122)	2.25	0.065 - 0.094
100 (212)	0.59	0.011 - 0.015

Fuel Pump

NIEC1170

Resistance [at 25°C (77°F)] Ω	0.2 - 5.0

IACV-AAC Valve

NIEC1171

Resistance [at 20°C (68°F)] Ω	20 – 24

Injector

NIEC1172

Resistance [at 20°C (68°F)] Ω	13.5 – 17.5

Resistor

NIEC1173

Resistance [at 25°C (77°F)] Ω	4 - 8

Throttle Position Sensor

NIEC1174

Throttle valve conditions	Voltage (at normal operating temperature, engine off, ignition switch ON, throttle opener disengaged)
Completely closed (a)	0.2 - 0.8V
Partially open	Between (a) and (b)
Completely open (b)	3.5 - 4.5V

Heated Oxygen Sensor 1 (Front) Heater

NIEC1175

Resistance [at 25°C (77°F)] Ω	2.3 - 4.3

Calculated Load Value

NIEC1176

	Calculated load value % (Using CONSULT-II or GST)
At idle	20.0 - 35.5
At 2,500 rpm	17.0 - 30.0

Intake Air Temperature Sensor

NIEC1177

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
80 (176)	0.27 - 0.38

EVAP Canister Purge Volume Control Valve

NIEC1178

Resistance [at 20°C (68°F)] Ω	22 - 26

Heated Oxygen Sensor 2 (Rear) Heater

NIEC1179

Resistance [at 25°C (77°F)] Ω	2.3 - 4.3

Crankshaft Position Sensor (POS)

NIEC1180

Resistance [at 20°C (68°F)] Ω	166 - 204

Fuel Tank Temperature Sensor

NIEC1181

Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90